

Service Manual

Room Air Conditioners



CS-PE9CKE
CU-PE9CKE
CS-PE12CKE
CU-PE12CKE

WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

CONTENTS

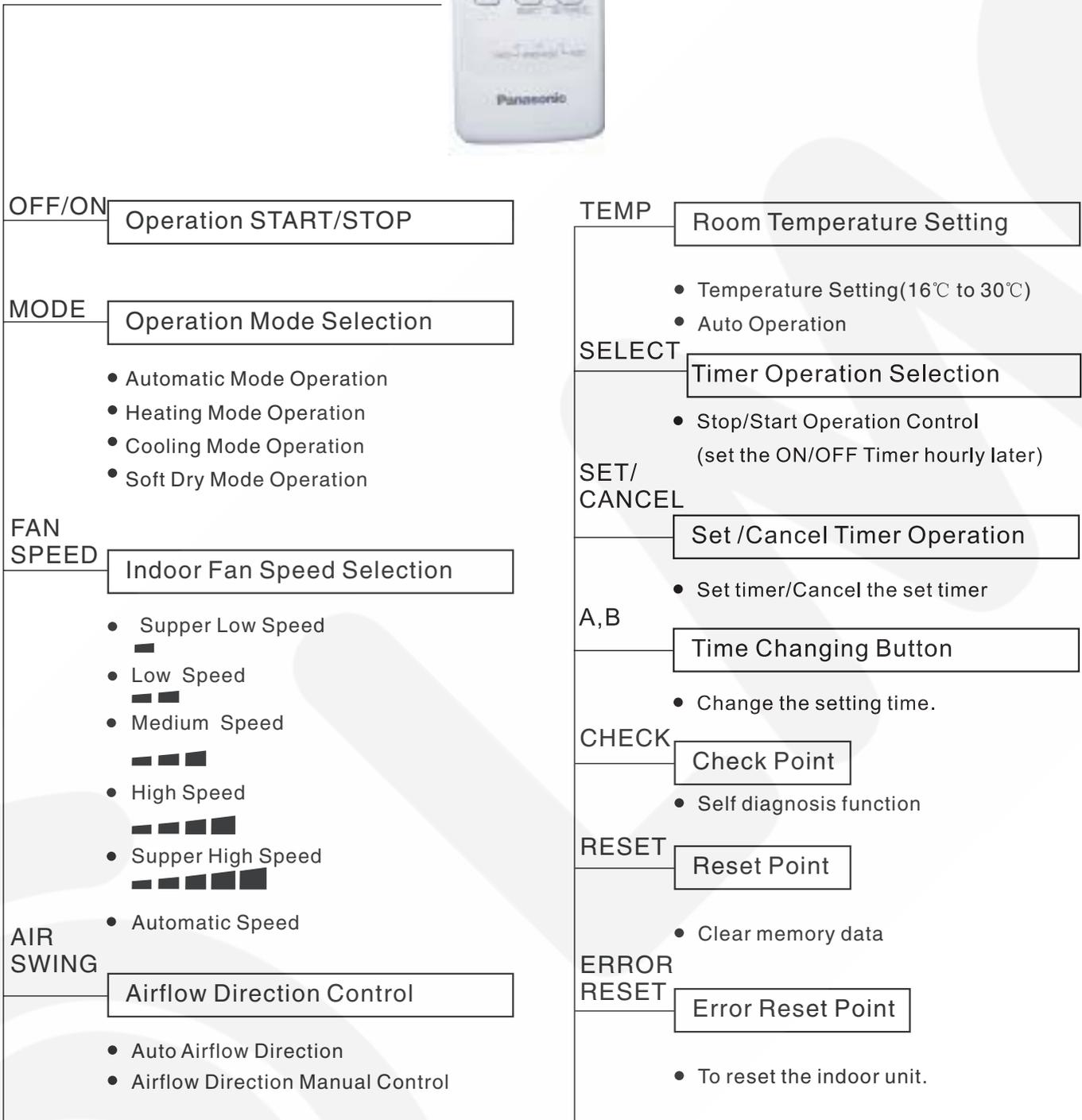
	Page		Page
1 Functions	2	10 Disassembly of the parts	68
2 Product Specifications	5	11 Trouble-shooting guide	73
3 Dimensions	9	12 Technical Data	75
4 Refrigeration Cycle Diagram	11	13 Exploded View	76
5 Block Diagram	12	14 Replacement Parts List	77
6 Wiring Diagram	13	15 Exploded View	78
7 Operation Details	15	16 Replacement Parts List	79
8 Installation Instructions	47	17 Electronic Circuit Diagram	80
9 Installation and Servicing Air Conditioner Using R410A	57	18 Electronic Circuit Diagram (Remote Control)	84

Panasonic

© Guangzhou Matsushita Air Conditioner Co., Ltd.
 (GMAC) All rights reserved. Unauthorized copying
 and distribution is a violation of law.

1 Functions

Remote Control



Indoor Unit

AUTO
OFF/ON

Automatic Operation Switch

- Press for <5s to run Automatic Operation. (Used when the remote control cannot be used.)
- Press continuously for 5s and < 8s to run Forced Cooling Operation.
- Press continuously for 8s and <11s to run Forced Heating Operation.
- Press continuously for 11s and <16s to change different remote controlling setting(A↔B) Mode.
- Press continuously for 16s and < 21s to switch OFF/ON Remote Control receiving Sound or H14 Abnormality Detection Mode.

Operation Indication Lamps

- Operation (green) lights up in operation
Blinks during Test Run operation and determining Auto Operation mode
- Timer(orange) Timer in operation

Operation Mode

- Heating/Cooling/Soft Dry Operation/ Auto Operation

Time Delay Safety Control

- The unit will restart operation 3-4 minutes after each pause.

Auto Restart Control

- Operation is restarted automatically at previous mode after a power failure.

Anti-freezing Control for the Evaporator

- Cooling or Soft Dry Operation

Anti-fog Discharge Control

- Cooling or Soft Dry Operation

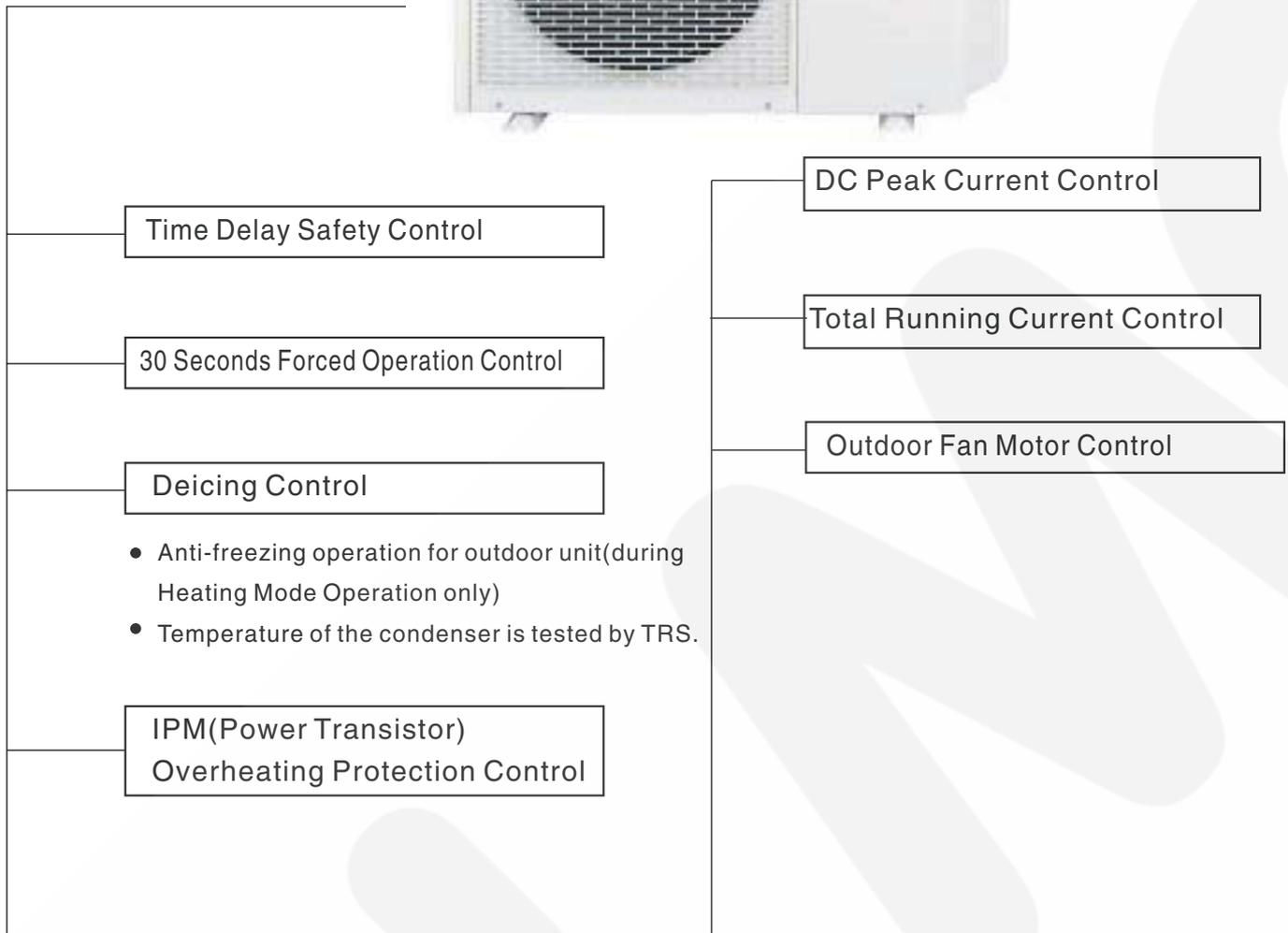
Indoor Fan Speed Control

- Super Low, Low, Medium, High, Super High and Auto Fan Speed can be selected.
- Deodorization control is available for cooling and soft dry operation.

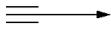
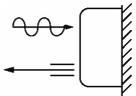
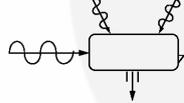
Airflow Direction Control

- Automatic Airflow Direction Control
The louver automatically swings up and down
- Airflow Direction Manual Control

Outdoor Unit

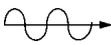
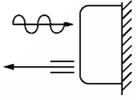
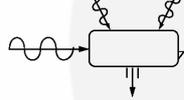


2 Product Specifications

		Unit	CS-PE9CCKE	CU-PE9CCKE
Cooling Capacity		kW	2.50(0.90-3.00)	
Heating Capacity		kW	3.7	
Moisture Removal		L/h	1.4	
Power Source		Phase V Cycle	Single 230 50	
Airflow Method		OUTLET  INTAKE 	SIDE VIEW 	TOP VIEW 
Air Circulation	Indoor air (low)	m ³ /min	6.1	—
	Indoor air (medium)	m ³ /min	7.9	—
	Indoor air (high)	m ³ /min	9.7	—
	Outdoor air	m ³ /min	—	—
Noise Level		dB(A)	Cooling: High42, Low27 Heating: High42, Low27	Cooling: High46 Heating: High47
Electrical Data	Input	W	Cooling: 780(190-1000) Heating: 910(170-1110)	
	Running Current	A	Cooling: 3.7 Heating: 4.0	
	EER /COP	W/W	Cooling: 2.76 Heating: 3.63	
	Starting Current	A	5.1	
Piping Connection Port (Flare piping)		Inch Inch	G: half union 3/8" L: half union 1/4"	G: 3-way valve 3/8" L: 2-way valve 1/4"
Piping Size (Flare piping)		Inch Inch	G: gas side 3/8" L: liquid side 1/4"	G: gas side 3/8" L: liquid side 1/4"
Drain Hose	Inner diameter	mm	12	—
	Length	m	0.6	—
Power Supply Cord Length (Number of core-wire)		m	2.2 3 core-wire/1.5mm ²	—
Dimensions	Height	mm	275	540
	Width	mm	799	780
	Depth	mm	210	289
Net Weight		kg	8.5	32
Compressor	Type		—	Rotary Type
	Motor Type		—	Brushless
	Rated Output	W	—	650

		Unit	CS-PE9CKE	CU-PE9CKE	
Air Circulation	Type		Cross-flow Fan	Propeller fan	
	Motor Type		Transistor(8poles)	Induction (6 pole)	
	Input	W	—	56	
	Rated Output	W	30	15	
	Fan Speed	Low	rpm	820±60	—
		Medium	rpm	1060±60	—
High		rpm	1300±60	670±60	
Heat Exchanger	Description		Evaporator	Condenser	
	Tube Material		copper	copper	
	Fin Type		slot type	Corrugation type	
	Rows / Stage		(Plate fin configuration, forced draft)		
			2 × 15	1 × 24	
	FPI		18	19	
Dimensions	mm	610 × 315 × 25.4	726 × 504 × 18.2		
Refrigerant Control Device		—	Capillary Tube		
Refrigeration Oil	(c.c)	—	RB68A or Freol Alpha68A		
Refrigerant (R410A)	g	—	840		
Thermostat		Electronic Control	Overload Protector		
Protection Device		—	—		
Capillary	Length	mm	—	600	
	Circulation	L/min	—	8.15	
	Inner dia	mm	—	1.3	
Air Filter			P.P Honeycomb	—	
Refrigerant Circulation Control Device			Capillary		
Fan Motor Capacitor		μFV	—	1.2μF, 400V	

- Specifications are subject to change without notice for further improvement

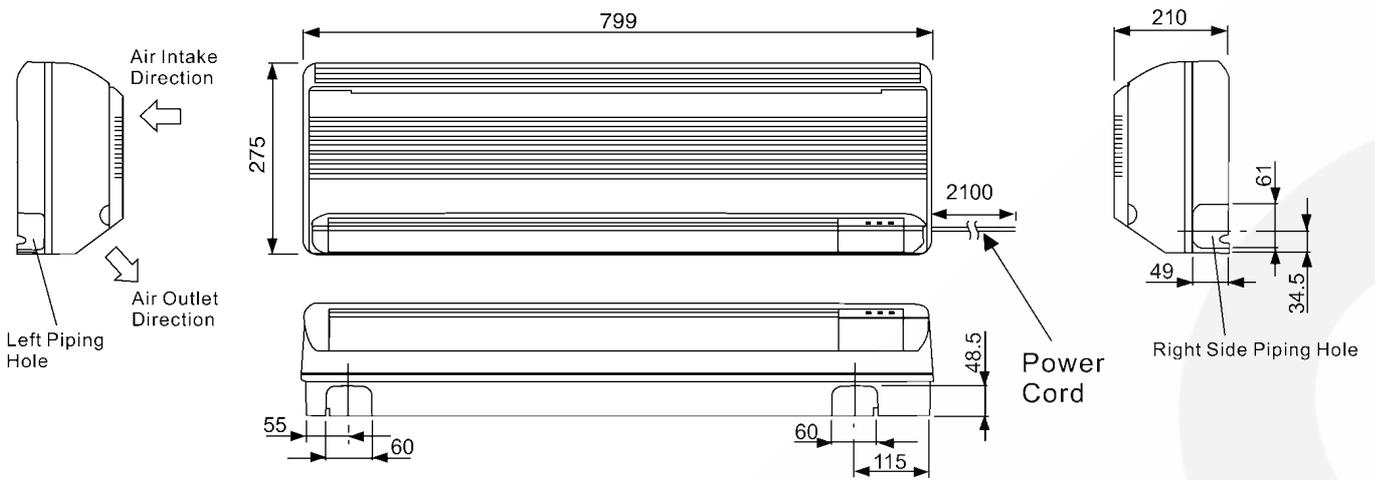
		Unit	CS-PE12CKE	CU-PE12CKE
Cooling Capacity		kW	3.15(0.90-3.80)	
Heating Capacity		kW	4.5	
Moisture Removal		L/h	2.1	
Power Source		Phase V Cycle	Single 230 50	
Airflow Method		OUTLET  INTAKE 	SIDE VIEW 	TOP VIEW 
Air Circulation	Indoor air (low)	m ³ /min	6.7	—
	Indoor air (medium)	m ³ /min	8.3	—
	Indoor air (high)	m ³ /min	9.9	—
	Outdoor air	m ³ /min	—	—
Noise Level		dB(A)	Cooling: High42, Low30 Heating: High42, Low33	Cooling: High48 Heating: High50
Electrical Data	Input	W	Cooling: 980(190-1270) Heating: 1130(170-1400)	
	Running Current	A	Cooling: 4.5 Heating: 5.0	
	EER COP	W/W	Cooling:2.77	Heating: 3.63
	Starting Current	A	6.5	
Piping Connection Port (Flare piping)		Inch Inch	G: half union 1/2" L: half union 1/4"	G: 3-way valve 1/2" L: 2-way valve 1/4"
Piping Size (Flare piping)		Inch Inch	G: gas side 1/2" L: liquid side 1/4"	G: gas side 1/2" L: liquid side 1/4"
Drain Hose	Inner diameter	mm	12	—
	Length	m	0.6	—
Power Supply Cord Length (Number of core-wire)		m	2.1 3 core-wire/1.5mm ²	— —
Dimensions	Height	mm	275	540
	Width	mm	799	780
	Depth	mm	210	289
Net Weight		kg	8.5	36
Compressor	Type		—	RotaryType
	Motor Type		—	Brushless
	Rated Output	W	—	650

		Unit	CS-PE12CKE	CU-PE12CKE	
Air Circulation	Type		Cross-flow Fan	Propeller fan	
	Motor Type		Transistor(8poles)	Induction (6 pole)	
	Input	W	—	63	
	Rate Output	W	30	25	
	Fan Speed	Low	rpm	880±60	—
		Medium	rpm	1100±60	—
High		rpm	1310±60	770±30	
Heat Exchanger	Description		Evaporator	Condenser	
	Tube Material		copper	copper	
	Fin Type		slot type	Corrugation type	
	Rows / Stage		(Plate fin configuration, forced draft)		
			2 × 15	2 × 24	
	FPI		18	17	
Dimensions	mm	610 × 315 × 25.4	726 × 504 × 36.4 696 × 504 × 36.4		
Refrigerant Control Device			—	Capillary Tube	
Refrigeration Oil	(c.c)		—	RB68A or Freol Alpha68A	
Refrigerant (R410A)	g		—	1020	
Thermostat			Electronic Control	—	
Protection Device			—	—	
Capillary	Length	mm	—	Cooling: 310, Heating: 565	
	Circulation	L/min	—	Cooling: 11.3, Heating: 12.3	
	Inner dia	mm	—	Cooling: 1.3, Heating: 1.5	
Air Filter			P.P Honeycomb	—	
Refrigerant Circulation Control Device				Capillary	
Fan Motor Capacitor		μFV	—	1.8μF, 400V	

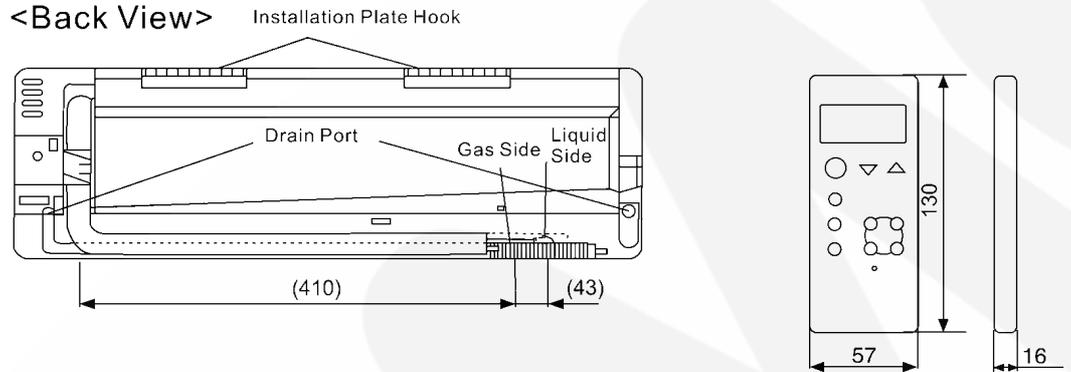
- Specifications are subject to change without notice for further improvement

3 Dimensions

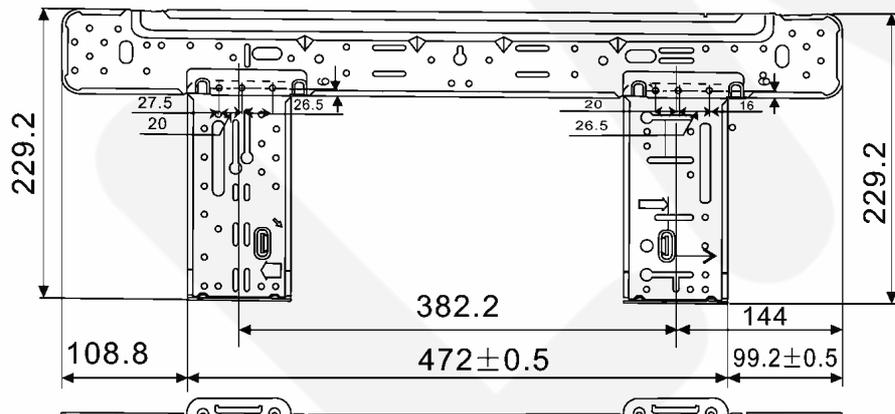
<Front View>



<Back View>

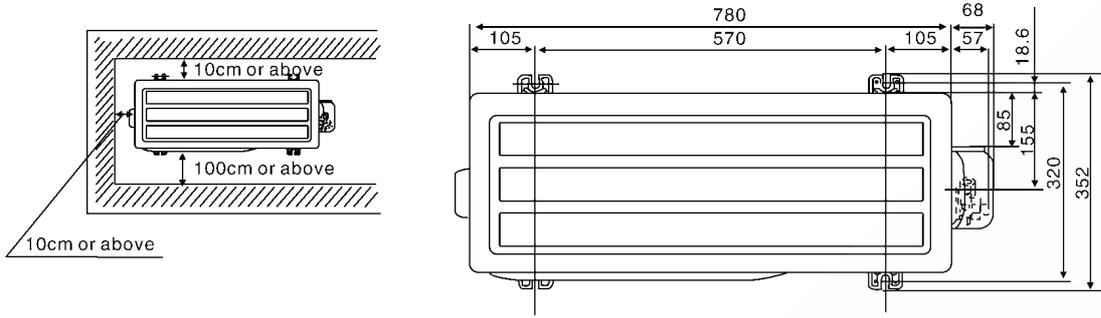


Relative position between the unit and the installation plate<Front View>

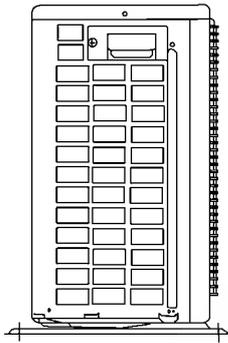


CU-PE9CKE/CU-PE12CKE (Outdoor Unit)

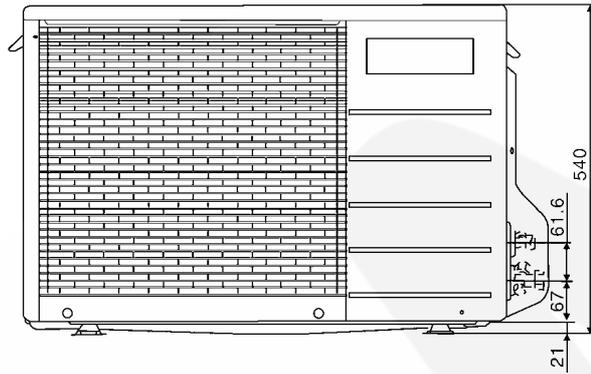
Top View



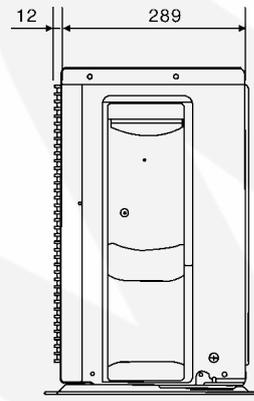
Side View



Front View

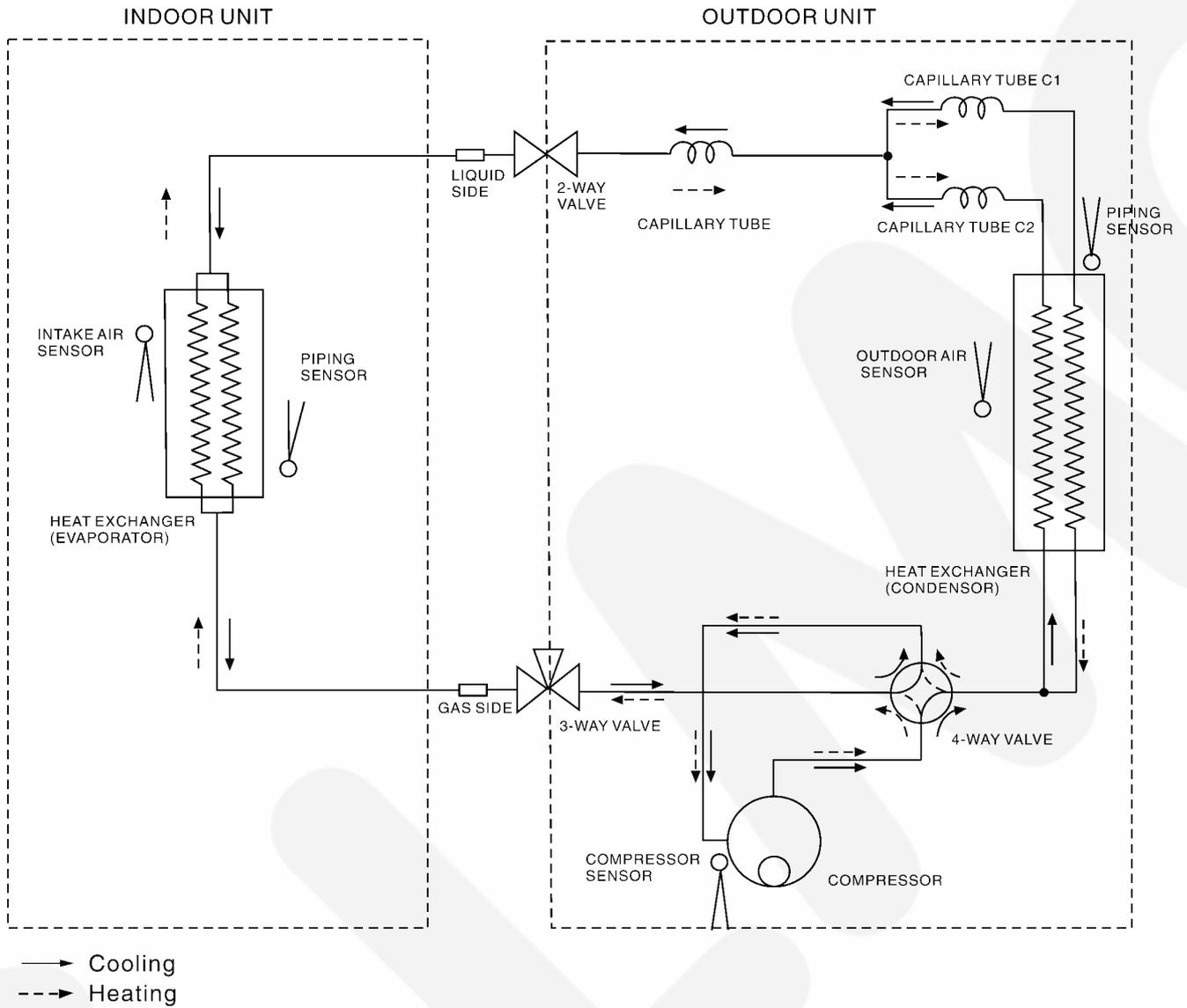


Side View



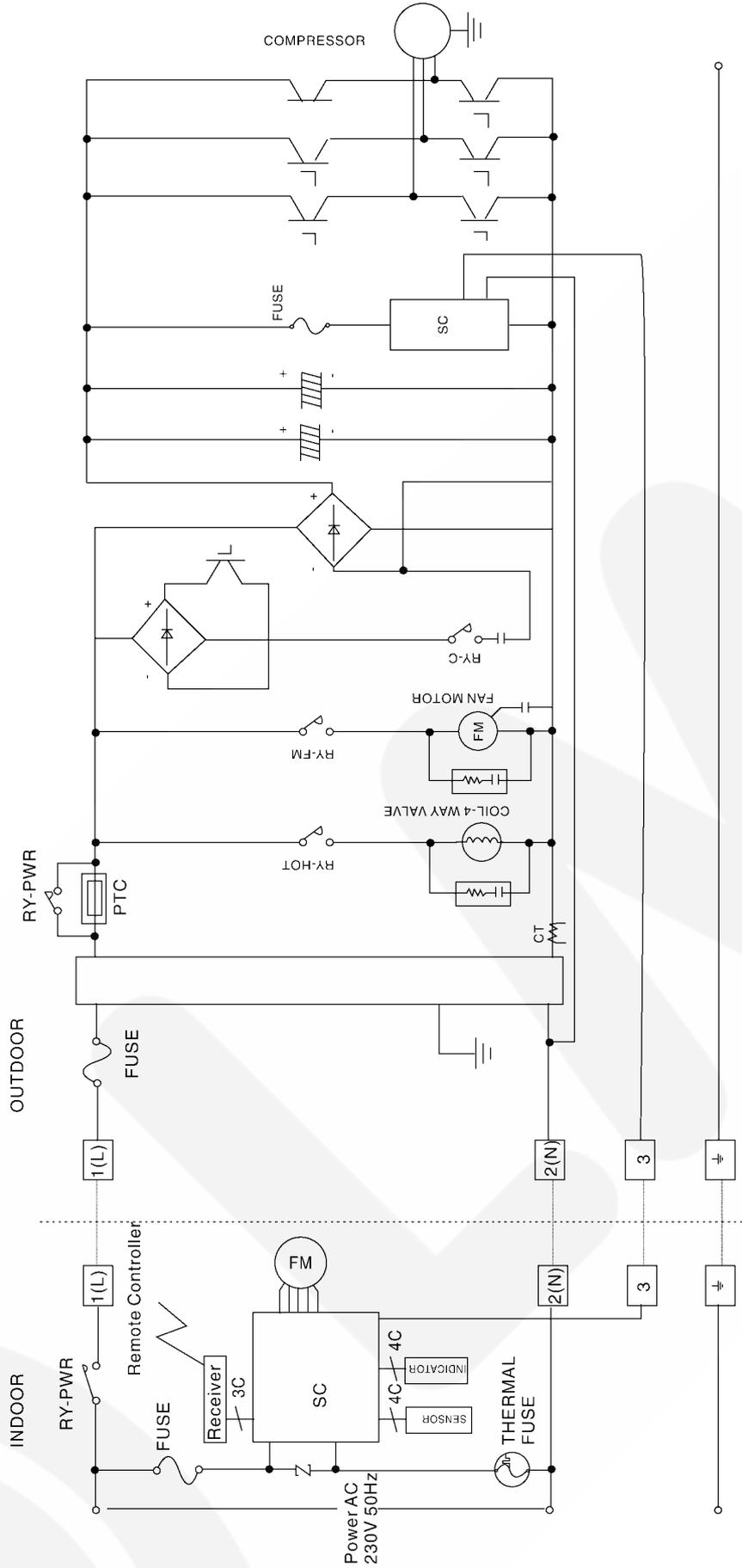
4 Refrigeration Cycle Diagram

CS-PE9CKE/CU-PE9CKE
 CS-PE12CKE/CU-PE12CKE



5 Block Diagram

CS-PE9CKE/CS-PE12CKE CU-PE9CKE/CU-PE12CKE

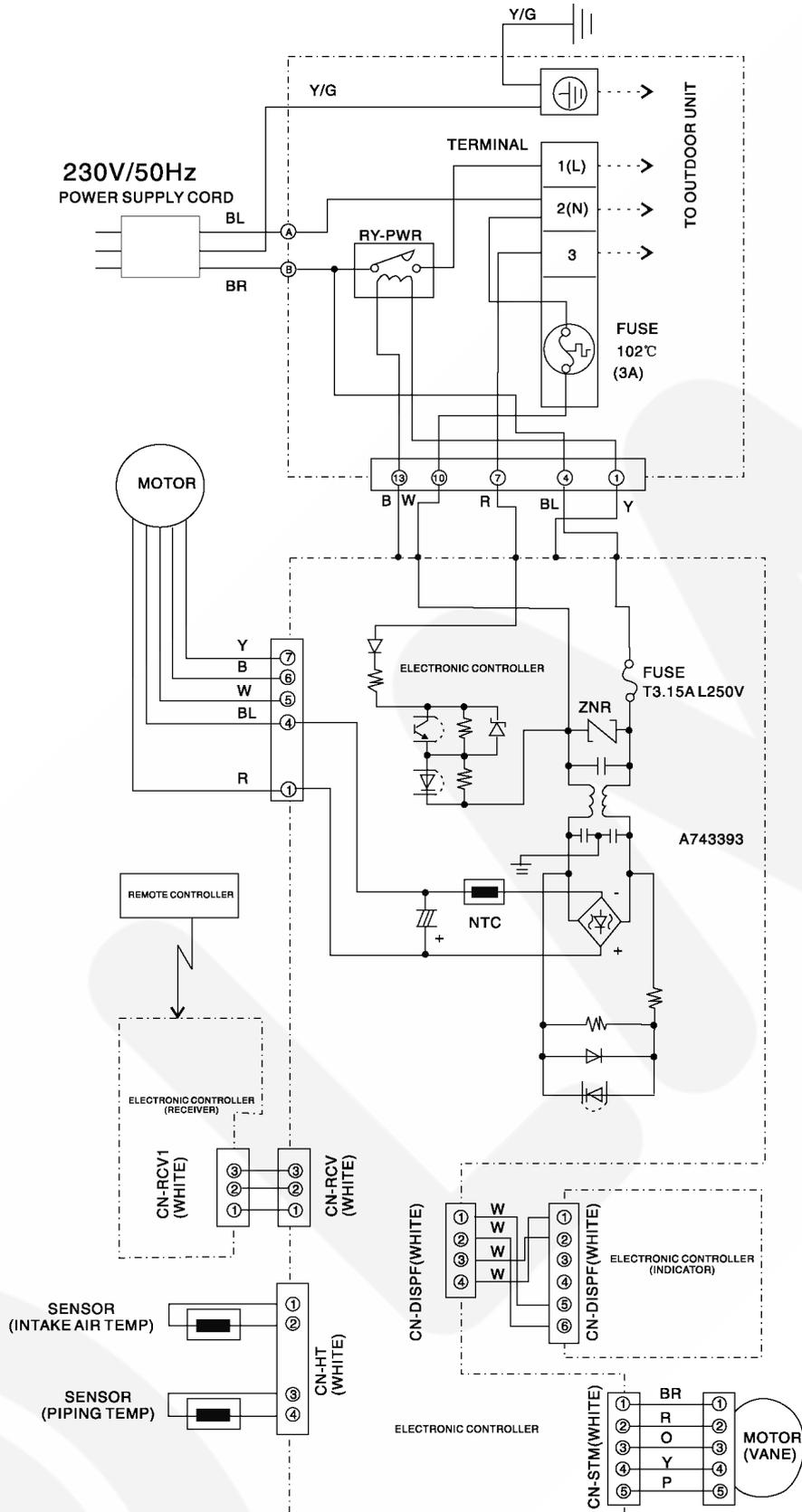


※ Indicates the electronic control unit.

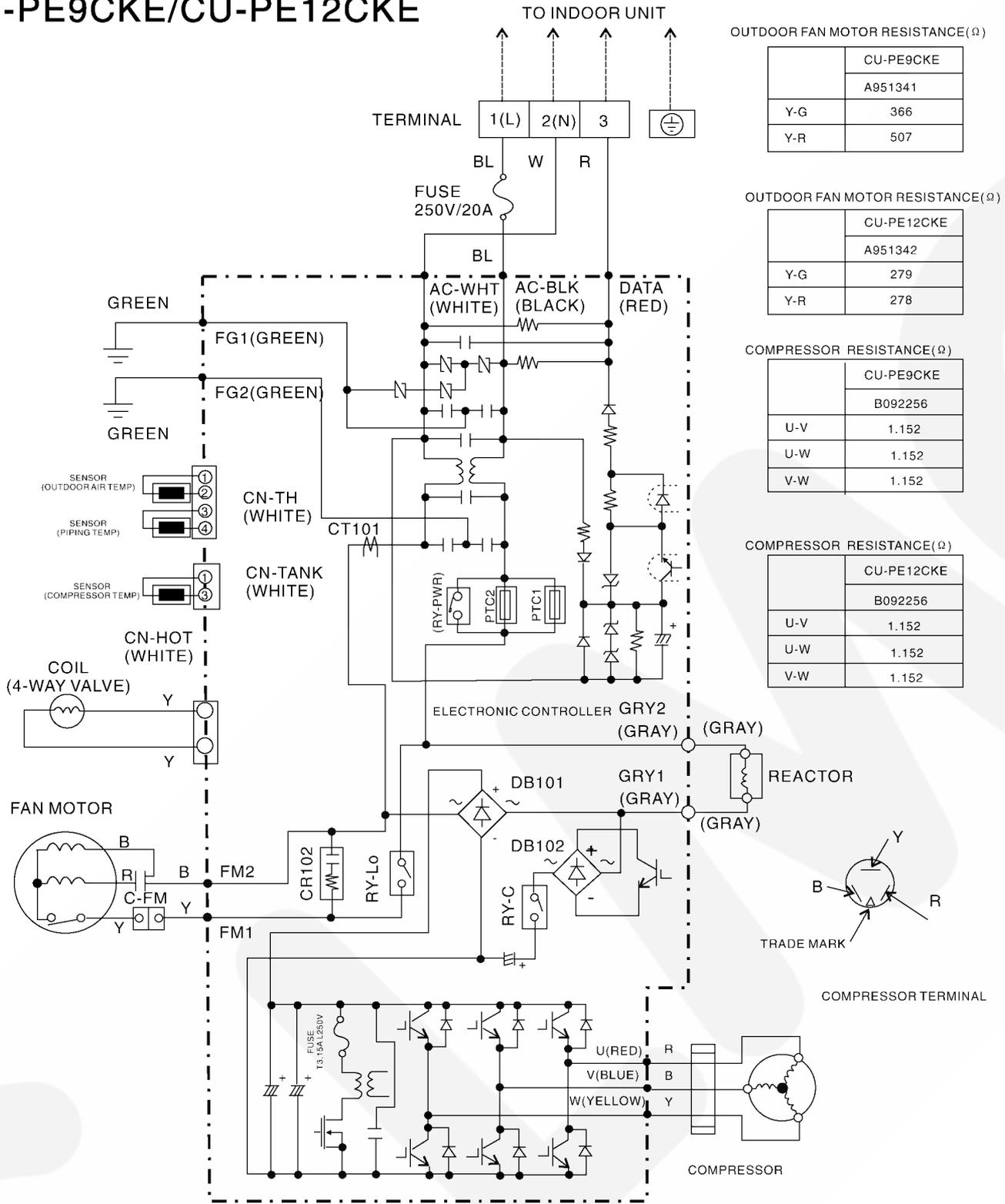
※ "C" indicates the number of core wires. (example: 6C=6 core wires)

6 Wiring Diagram

CS-PE9CKE/CS-PE12CKE



CU-PE9CKE/CU-PE12CKE



OUTDOOR FAN MOTOR RESISTANCE(Ω)

	CU-PE9CKE
	A951341
Y-G	366
Y-R	507

OUTDOOR FAN MOTOR RESISTANCE(Ω)

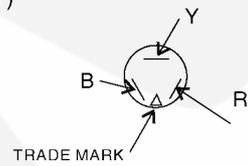
	CU-PE12CKE
	A951342
Y-G	279
Y-R	278

COMPRESSOR RESISTANCE(Ω)

	CU-PE9CKE
	B092256
U-V	1.152
U-W	1.152
V-W	1.152

COMPRESSOR RESISTANCE(Ω)

	CU-PE12CKE
	B092256
U-V	1.152
U-W	1.152
V-W	1.152



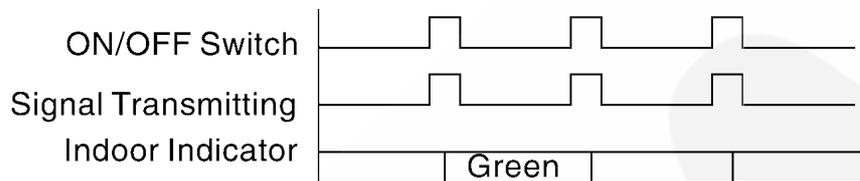
7 Operation Details

7.1. Operation and Display of Remote Controller

1.Original Setting



2.ON/OFF Button



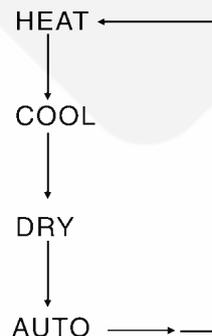
3.Mode Selecting Button

1. Function and Display of the button:

AUTO, HEAT, COOL, DRY can be selected by pressing the button. Initial display of LCD is as follow

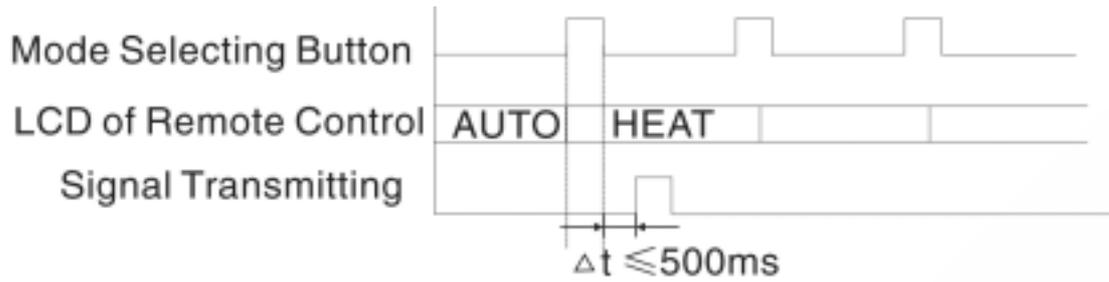
MODE	SET TEMP	FAN SPEED	AIR SWING
AUTO	25°C	AUTO	AUTO
HEAT	22°C	AUTO	AUTO
COOL	27°C	AUTO	AUTO
DRY	25°C	AUTO	AUTO

Keeping the button depressed continuously, the operation mode will change as

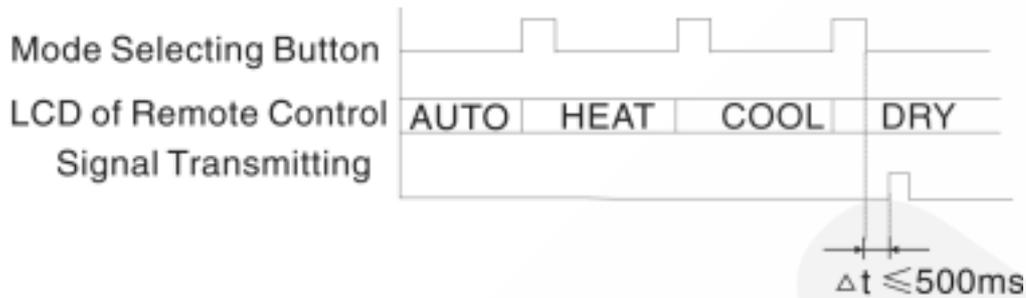


2. Shift time of the Mode selection button

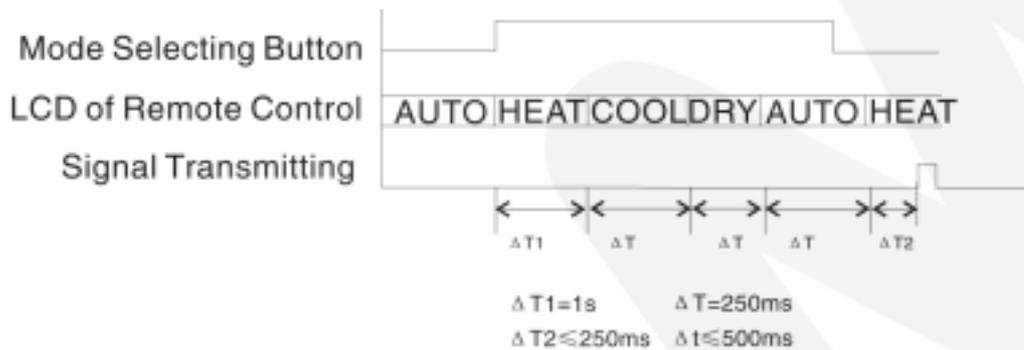
a. Single press



b. Keep depressed(less than 500ms)



c. Keep depressed continuously



If the ON/OFF button is pressed after the operation mode is set, or change the operation mode during operation, or the signal is received from the remote controller, the indoor indicator will flash or light up to start the operation.

4.Fan Speed Button

1. The display on the remote controller changes as follow by pressing the AIR SWING button.

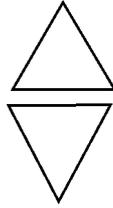


2. If the ON/OFF button is pressed after the fan speed mode is set, or change the fan speed mode during operation, or the signal is received from the remote controller, the indoor indicator will flash or light up to start the operation.

3. The shift time of the fan speed button is the same to that of mode selection button.

5.Temp Adjusting Button

1. Press this button to change the set temperature



Increase the set temperature(Max.30°C)

Decrease the set temperature(Min.16°C)

2. If the ON/OFF button is pressed after temperature is set, or change the temperature during operation, or the signal is received from the remote controller, the indoor indicator will flash or light up to start the operation.

6.Timer Set Button

1) The Function of the Timer-Setting Button

1. SELECT Button



2. Button A and B

The set time can be changed with manner of 1,2,3,4,5,6,7,8,9,10,11,12,1,2,3,4... by pressing the buttons. Pressing the button A can change the time for ON Timer and OFF Timer, off time for OFF-ON Timer, on time for ON-OFF Timer; Pressing the button B can change the time for on time for OFF-ON Timer and off time for ON-OFF Timer setting.

3. SET/CANCEL Button

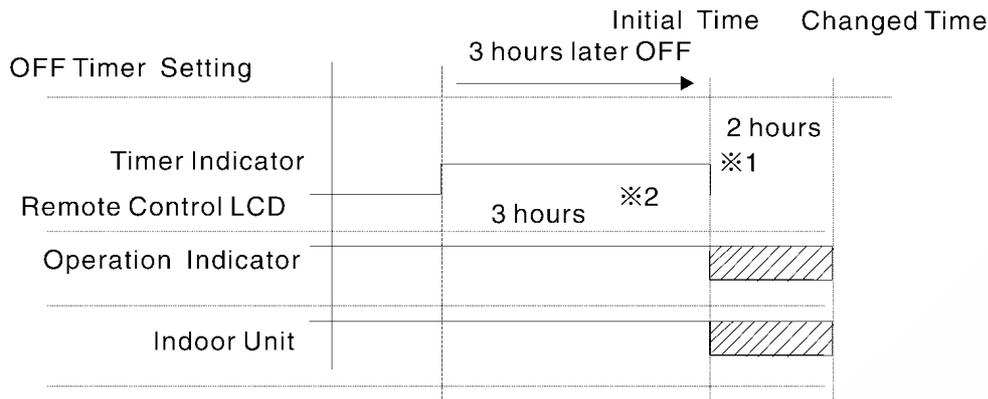
Pressing the button to set or cancel the set timer during the timer setting or activate the previous timer setting. After the timer setting is determined, "ON" or "OFF" will stop flashing. If the timer setting is cancelled, "ON" or "OFF" will disappear on the remote control display. The time on the remote control will change every hour.

Notes:

- During the operation, OFF Timer and OFF- ON Timer can be set.
- During the operation, if the ON Timer or ON-OFF Timer is set, the operation will be stopped.
- Timer setting can operate only once.
- If the OFF/ON button on the remote control or the AUTO Switch on the indoor unit is pressed, the timer setting will be cancelled.
- If Auto Restart Control occurs , timer setting will be cancelled.

2) Timing Chart of Timer-Setting

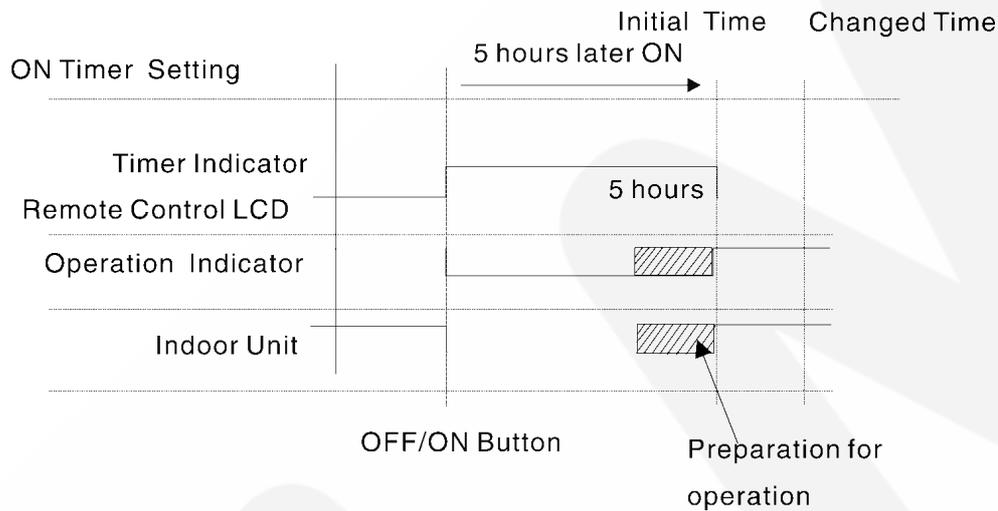
1. OFF Timer



※1: During timer operation changing the set time.

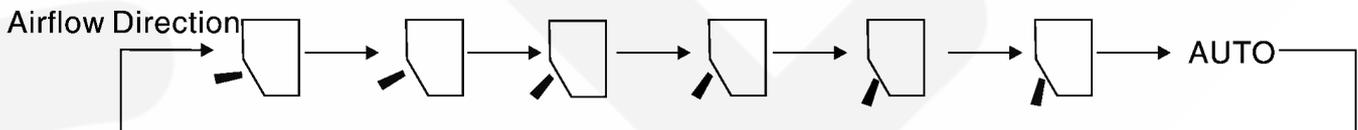
※2: During timer operation press the ON/OFF button to cancel the OFF-Timer and the timer indicator on the indoor unit will go off.

2. ON Timer



7. Air Swing Button

1. The airflow direction will change as follow by pressing the AIR SWING button.



8. Display of Diagnosis

Refer to Diagnosis section.

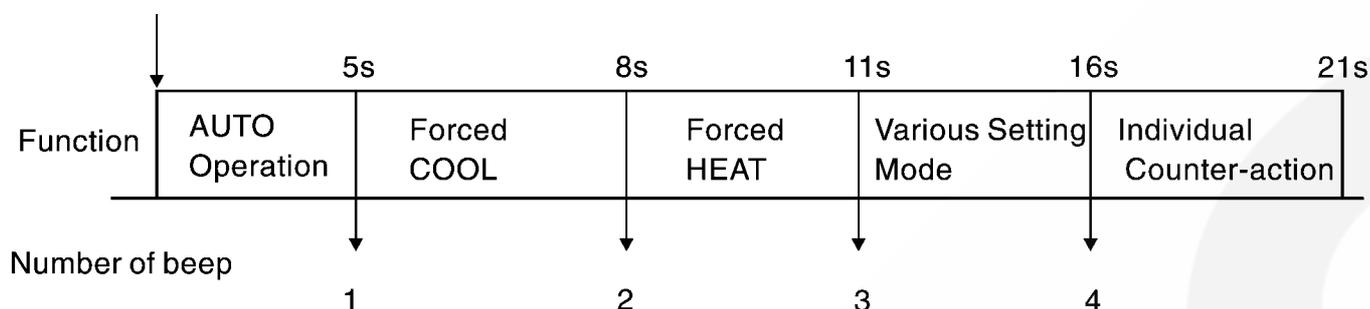
9. Change the Code of Remote Controller

Keep the "AUTO" switch on the indoor unit depressed for more than 11 seconds until 3 beeps are heard and the other remote control code will be selected.

7.2. Operation and Display of Indoor Unit

1.AUTO Operation Switch

AUTO Operation



1. When the switch is pressed between 0 to 5 seconds, Auto Mode operation starts to function.
2. When the switch is pressed between 5 to 8 seconds, the unit is forced to operate in Cooling Mode.
3. When the switch is pressed between 8 to 11 seconds, the unit is forced to operate in Heating Mode.
4. When the switch is pressed between 11 to 16 seconds and together with the signal from the remote controller, the unit can be changed to different controlling setting (A-B).
5. When the switch is pressed between 16 to 21 seconds, either H14 error detection selection mode or remote controller's signal receiving sound can be cancelled or turned on.
6. If the intake air temperature is less than 16°C and the Forced Cooling is activated, because the prior operation mode is heating, the compressor will stop for 3 minutes to start the Forced Cooling operation.

2.Indoor Unit Indicator

	ON	OFF	FLASH
Operation (Green)	Run	Stop	Hot start, deice control, mode judging and ON TimerOperation detecting.
Timer (Orange)	Timer set	Timer not set	Malfuction happens.

7.3. Common Features

1. Indoor Fan Motor Control

A. Basic Fan Speed

Fan speed is determined by the setting of the remote control. And W4~W6 can be calculated according the equations below:

Me- : $W4 = W3 + W10$

Me : $W5 = W4 + W10$

Me+ : $W6 = W5 + W10$

Cool.Dry

REMOTE CONTROL	—	○	○	○	○	○	—	—	—
FAN SPEED	SHI	HI	Me+	Me	Me-	Lo	Lo-	Slo	Sslo
ROTATING SPEED	W8C	W7C	W6C	W5C	W4C	W3C	W2C	W1C	W1SC

Heat

REMOTE CONTROL	—	○	○	○	○	○	—	—	—
FAN SPEED	SSHI	HI	Me+	Me	Me-	Lo	Lo-	Slo	Sslo
ROTATING SPEED	W8W	W7W	W6W	W5W	W4W	W3W	W2W	W1W	W1SW

		PE9CKE	PE12CKE	
COOL	SHI	W 8C	1350	1360
	HI	W 7C	1300	1310
	Me+	W 6C	1180	1210
	Me	W 5C	1060	1100
	Me-	W 4C	940	990
	Lo	W 3C	820	880
	Lo-	W 2C	760	830
	Slo	W 1C	730	780
	SSLo	W 1SC	600	720
HEAT	SSHi	W 8C	1350	1360
	SHi	W 7C	1350	1360
	Me+	W 6C	1240	1290
	Me	W 5C	1120	1220
	Me-	W 4C	1000	1150
	Lo	W 3C	880	1080
	Lo-	W 2C	640	640
	Slo	W 1C	520	520
	SSLo	W 1SC	280	280

B. Indoor Fan Control

● Cool/Dry Operation

				Cool Operation	Dry Operation	
Protection Operation				Me		
Forced Cool				Hi		
Other than above	Minimum Control		Mode judging for Auto Operation ON-Timer Operation detecting		Lo-	
	Other than above	Maximum Control			Shi	--
		Other than above	Mode judging during ON-Timer detecting	Auto Fan	Lo	Slo
	Manual Fan			Setting of Remote		
	Anti-Freezing Control			40 rpm Up	40 rpm Up	
	Other than above	Other than above	Auto Fan	Other than above	Normal Auto Fan	Slo
Manual Fan			Other than above	Fan Speed Set		

● Heat Operation

Protection Operation				Me		
Forced Heat				Hi		
Minimum Control	Mode judging in Auto Operation Preparing Operation of Timer-ON operation			Lo-		
Other than above	Hot Start			Stop		
	Deice Control			Stop		
	Low Temperature Control			Refer to the following contents		
	Maximum Control	Relay OFF(Comp OFF)			Lo-	
		Indoor Piping Temp Control(Auto Fan)			Refer to the following contents	
	Other than above	Other than above	Detection of Timer-ON Operation	Auto Fan Speed	Lo	
Manual Fan Speed				Setting On Remote Control		
Other than above		Other than above	Auto Fan Speed	Auto		
			Manual Fan Speed	Setting On Remote Control		

● Auto Fan Speed for Cooling Operation

Following eight patterns repeat over and over for auto fan speed. Each pattern persists one second.



$$\text{No.B} = W \alpha C + W \Delta C$$

$$\text{No.C} = W \alpha C - W \Delta C$$

	PE9CKE	PE12CKE
$W \alpha C$	1020	1080
$W \Delta C$	50	50
No.B	1070	1130
No.C	970	1030

● Auto Fan Speed for Heating Operation

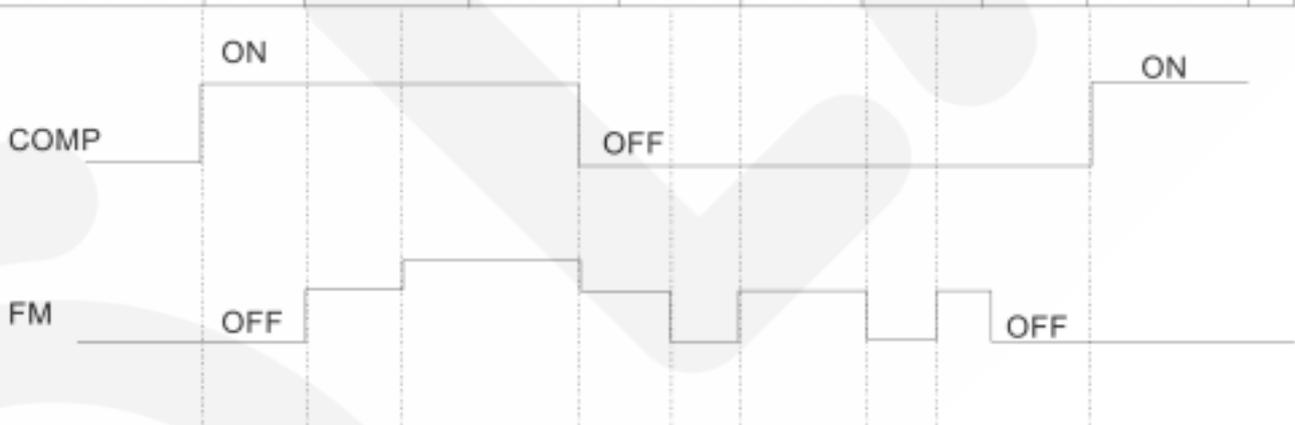
Refer to Piping Temperature Control.

C. Deodorizing Control

This type of control is applicable on Cooling Mode and Soft Dry Mode operating only.

1. During cooling or soft dry operation with automatic fan speed, the unit will operate as state below for deodorizing purpose.

Deodorising Status	1	2	3	4	5	4	5	4.5.4....	1
Compressor status	ON			OFF				ON	
Period(sec)	40	50	...	20	90	20	90	40	
Indoor fan speed	OFF	Slo	Note*	Slo	OFF	Slo	OFF	OFF	



Note*:Fan speed is automatic for cooling mode and Slo for soft dry mode.

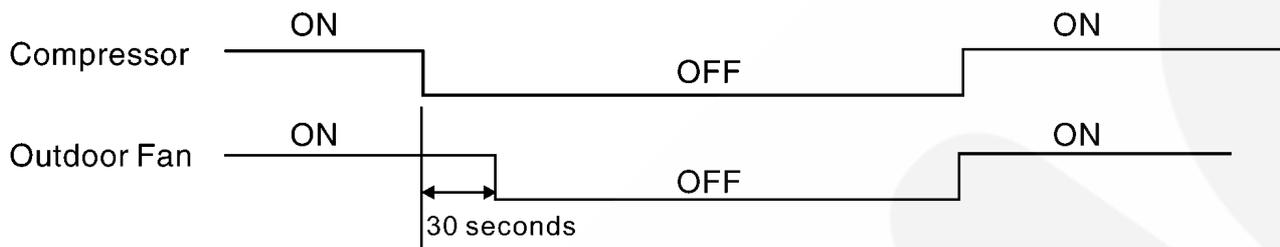
2. Outdoor Fan Motor Control

A. Specification of outdoor fan motor

Model	Fan Motor	Speed(rpm)
CU-PE9CKE	Induction Motor(6 Poles 1 speed)	670
CU-PE12CKE	Induction Motor(6 Poles 1 speed)	770

B. Operation of the fan motor

The outdoor fan runs during the operation of the compressor or within 30 seconds after the compressor stops.



3. Frequency for Compressor Operation

A. Basic Frequency

If the frequency for the compressor calculated is prohibited, 1 Hz larger than this calculated one will be selected.

CS/CU-PE9CKE

Cool Dry				Heat				
12	●	46	80	12	●	46	80	
13	●	47	81	13	●	47	81	
14	●	48	82	14	●	48	82	
15	●	49	● 83	15	●	49	● 83	
16	●	50	● 84	16	●	50	● 84	
17		51	● 85	17		51	● 85	
18		52	86	18		52	86	
19		53	● 87	19		53	● 87	
20		54	88	20		54	88	
21		55	89	21		55	89	
22		56	90	22		56	90	
23		57	91	23		57	91	
24		58	92	24		58	92	
25		59	● 93	25		59	● 93	
26		60	● 94	26		60	● 94	
27		61	● 95	27		61	● 95	
28		62	● 96	28		62	96	
29		63	● 97	29		63	97	
30		64	98	30		64	98	
31		65	● 99	● 31		65	● 99	●
32		66	● 100	● 32		66	● 100	●
33		67	● 101	● 33		67	● 101	●
34		68	102	34		68	102	
35		69	103	35		69	103	
36	●	70	104	36	●	70	104	
37		71	105	37		71	105	
38		72	106	38		72	106	
39	●	73	107	39	●	73	107	
40		74	108	40		74	108	
41	●	75	109	41	●	75	109	
42		76	110	42		76	110	
43		77	111	43		77	111	
44		78	112	44		78	112	
45		79	113	45	●	79	113	

● Prohibited

CS/CU-PE12CKE

Cool Dry					Heat						
12	●	46		80	12	●	46		80		
13	●	47		81	13	●	47		81		
14	●	48		82	14	●	48		82		
15	●	49	●	83	15	●	49	●	83		
16	●	50	●	84	16	●	50	●	84		
17		51	●	85	17	●	51	●	85		
18		52		86	18		52		86		
19		53	●	87	19		53	●	87		
20		54		88	20		54		88		
21		55		89	21		55		89		
22		56		90	22		56		90		
23		57		91	23		57		91		
24		58		92	24		58		92		
25		59	●	93	25		59	●	93		
26		60	●	94	26		60	●	94		
27		61	●	95	27		61	●	95		
28		62	●	96	28		62		96		
29		63	●	97	29		63		97		
30		64		98	30		64		98		
31		65	●	99	●	31		65	●	99	●
32		66	●	100	●	32		66	●	100	●
33		67	●	101	●	33		67	●	101	●
34		68	●	102		34		68		102	
35		69	●	103		35		69		103	
36	●	70		104		36	●	70		104	
37		71		105		37		71		105	
38		72		106		38		72		106	
39	●	73		107		39	●	73		107	
40		74		108		40		74		108	
41	●	75		109		41	●	75		109	
42		76		110		42		76		110	
43		77		111		43		77		111	
44		78		112		44		78		112	
45		79		113		45	●	79		113	

B. Starting Control

Within 300 seconds after the start-up of the compressor, the frequency for the compressor will change as below.

1>. Start-up after the micron reset

Time From Start-up of Compressor	Min.Hz	Max. Hz
60s	40	40
60~120s	40	40
120~300s	\	110

2>. Start-up after thermal off (Set Temp Reached)

Time From Start-up of Compressor	Min.Hz	Max. Hz
60s	40	40
60~300s	40	110

3>. Start-up under other conditions

Time From Start-up of Compressor	Min.Hz	Max. Hz
60s	40	40
60~120s	40	110
120~300s	\	110

4. Protection Control**A. Time Delay Safety Control**

1. The compressor will not start for 3 minutes after the stop of the operation.
2. This control is not applicable if the power supply is turned off and turned on again.

B. 30 Seconds Forced Operation

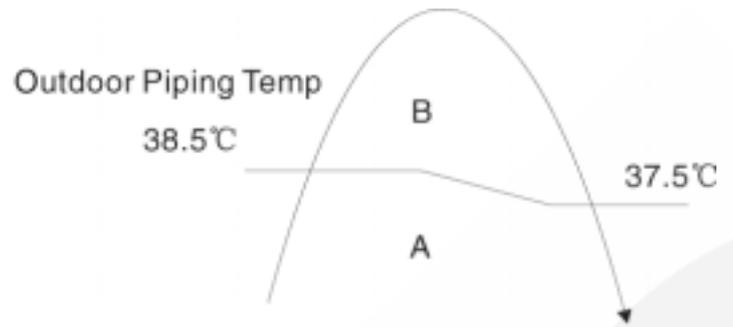
1. Once the compressor starts operation, it will not stop for 30 seconds.
2. However, it can be stopped using remote controller or Auto Switch on indoor unit.

C. Total Running Current Control

1. When the total outdoor unit running current(AC) exceeds I1 value, the frequency for compressor will decline.
2. If the running current is less than I1 value for 10 seconds, the frequency for compressor will increase.
3. However, if the total outdoor running current exceeds 17.0A, compressor will be stopped immediately for 3 minutes.

Current Value (A)(I1)

		PE9CKE	PE12CKE
COOL	A	4.5	6.1
	B	4.4	6.0
HEAT		4.0	5.0
		4.0	5.0

**D. IPM Protection Control**

1. DC Peak Current Control

When electric current to IPM exceeds set value of $DC17.3 \pm 1A$, the compressor will stop. It will restart after three minutes.

If the set value is exceeded again within 30 seconds, the operation will restart after one minute.

Error code [F99] will be displayed.

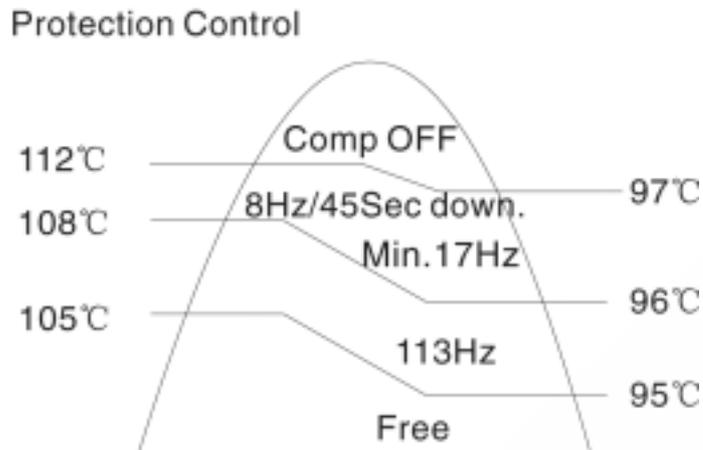
2. Overheating Protection Control

When the IPM temperature rises to $90^{\circ}C$, compressor will stop immediately.

Compressor restarts after three minutes if the temperature decreases to $85^{\circ}C$.

E. Compressor Overheating Prevention Control

The frequency is also controlled by the temperature of the compressor.



F. Compressor Protection Control (Gas Leakage)

1. When the conditions listed in the table occur, the compressor stops and restarts after three minutes.
2. If this continuously occur for twice within 20 minutes, all indoor and outdoor relays will be cut off.
3. This control is not applicable for deice operation.

Comp Frequency	45Hz or Above	64Hz or Above	58Hz or Above	73Hz or Above
Total Outdoor Current	$I_b \leq I < 1.3$	$I_b \leq I < 1.6$	$I_b \leq I < 1.3$	$I_b \leq I < 1.6$
Indoor Piping Temp	20°C or Above	25°C or Less	20°C or Above	25°C or Less
Operation Mode	Cool/Dry	Heat	Cool/Dry	Heat
Model	PE9CKE		PE12CKE	

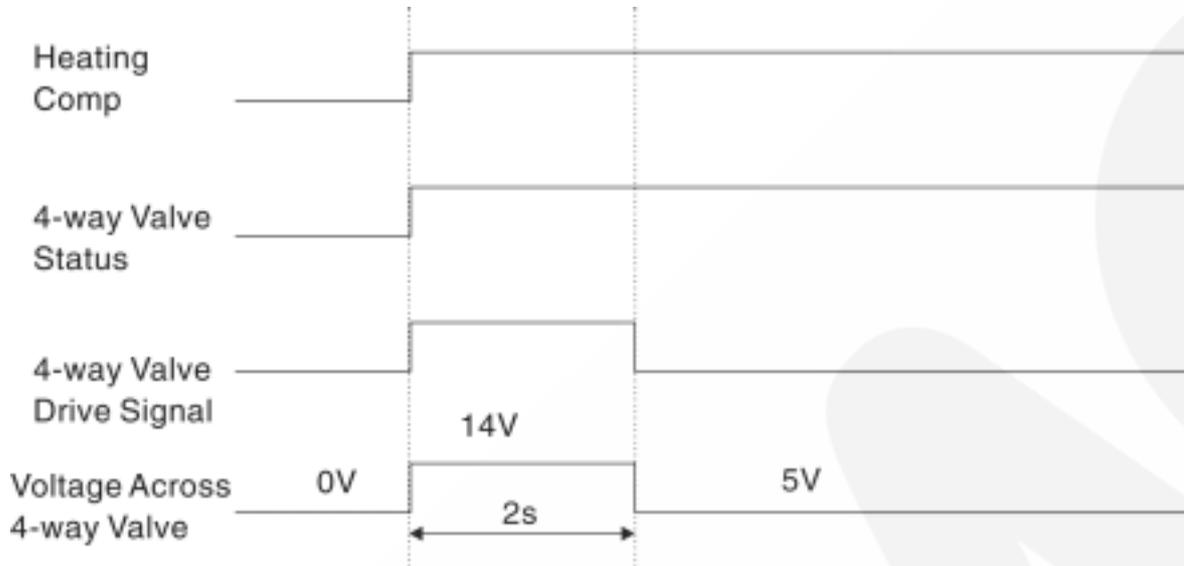
G. Low Operation Frequency Protection Control

If one of the following conditions exists, the compressor will run with the frequency of 45 Hz.

Intake Air Temp	$\geq 30^\circ\text{C}$ or $< 15^\circ\text{C}$	_____
Outdoor Temp	$\geq 38^\circ\text{C}$ or $< 16^\circ\text{C}$	$\geq 24^\circ\text{C}$ or $< 4^\circ\text{C}$
Indoor Piping Temp	$< 30^\circ\text{C}$	$\geq 0^\circ\text{C}$
Operation Mode	Cool/Dry	Heat

5.4-way Valve Control

1. The 4-way valve will be turned on as the compressor starts to operate and remains on all the time during the heating operation.
2. The 4-way valve remains on for less than 3 minutes after heating operation is stopped.
3. The 4-way valve remains off during cooling and soft dry operation.
4. If the operation is shifted from cooling or dry to heating mode, the switching of 4-way valve will be delayed for 3 minutes.



5. Heating Operation Mode

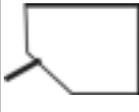
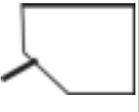
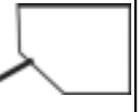
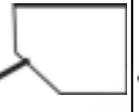
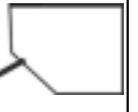
Four minutes after the start of the operation, if the indoor piping temperature detected is lower than 0°C, the operation will stop. (Restarts in 3 minutes) If this situation happens 4 times within 30 minutes, error code "F11" will be displayed.

6. Cooling Operation Mode

Four minutes after the start of the operation, if the indoor piping temperature detected is higher than 45°C, the operation will stop (Restarts in 3minutes). If this situation happens 4 times within 30 minutes, error code "F11" will be displayed.

6. Airflow Direction Control

A. Vertical Airflow Direction

Vane Angle						
Cool/Dry	Manual Airflow	138°	131°	124°	117°	108°
	Auto Airflow	108-138°				
Heat	Manual Airflow	138°	123°	107°	91°	75°
	Auto Airflow Direction	A	131°			
		B	84°			
		C	138°			
Mode Judging	Manual Airflow	Same to Cool/Dry				
	Auto Airflow	138°				
Detecting of Timer-ON Operation		138°				

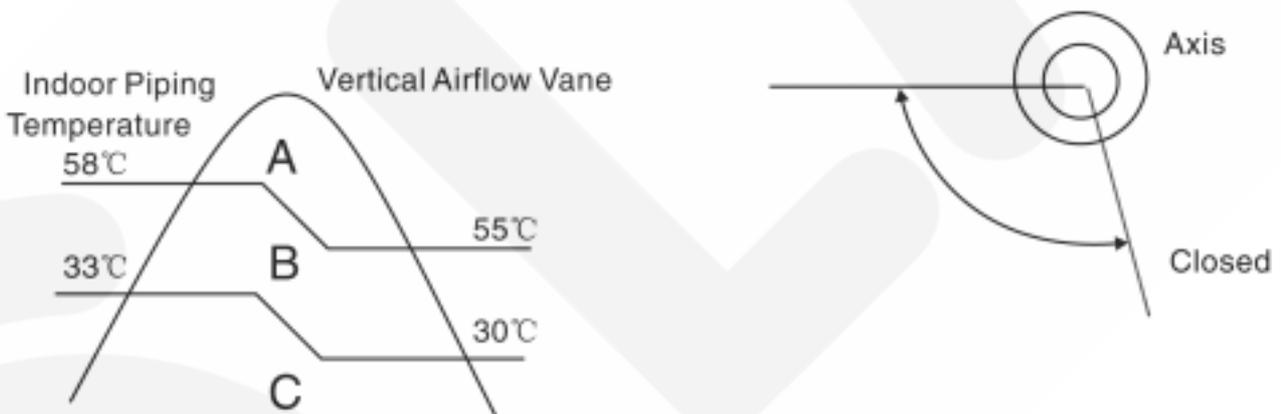
Notes:

Manual Airflow Direction: The vertical airflow vane will be fixed at the angle desired according to the instructions of remote controller no matter the operation is cooling, soft dry or heating mode.

Auto Airflow Direction:

Cool/Dry: The vertical airflow vane will swing up and down within the range indicated below.

Heat: The vertical airflow vane will change according to indoor piping temperature.



B. Angular Speed of Vertical Vane

	Vertical Airflow Vane
Airflow Direction Changes or Vertical Airflow Vane Closes	22.06/s
Swings Up and Down (Auto Airflow Direction)	2.21~5.52/s

C. Mode Judgement for Auto Operation

Airflow Mode Setting	Auto	Manual
Initializing When Power-On	Upper Limit	Lower Limit
Auto Operation	Upper Limit	Position Previously Set
Shifted to Auto Mode	Same to Cool/Dry/Heat	Same to Cool/Dry/Heat

Note:

When the air-conditioner is turned on, if manual airflow direction is selected and the angle is lower than the lower limit for heating operation, the airflow direction will be changed to the lower limit for heating mode. If Cooling operation is determined during the mode judgement, the airflow direction will be shifted to lower limit for cooling operation.

D. About Timer-Setting

During On-Timer operation, the airflow direction can be changed between Manual and Auto.

7. Self Diagnosis

A. About Self Diagnosis

When the air-conditioner is stopped due to malfunction detected by itself, the operation can be restarted using AUTO Switch on the indoor unit. In forced operation, the frequency for compressor and fan speed can not be changed and the signal receiving sound is different.

Normal Operation ON: "Pep"

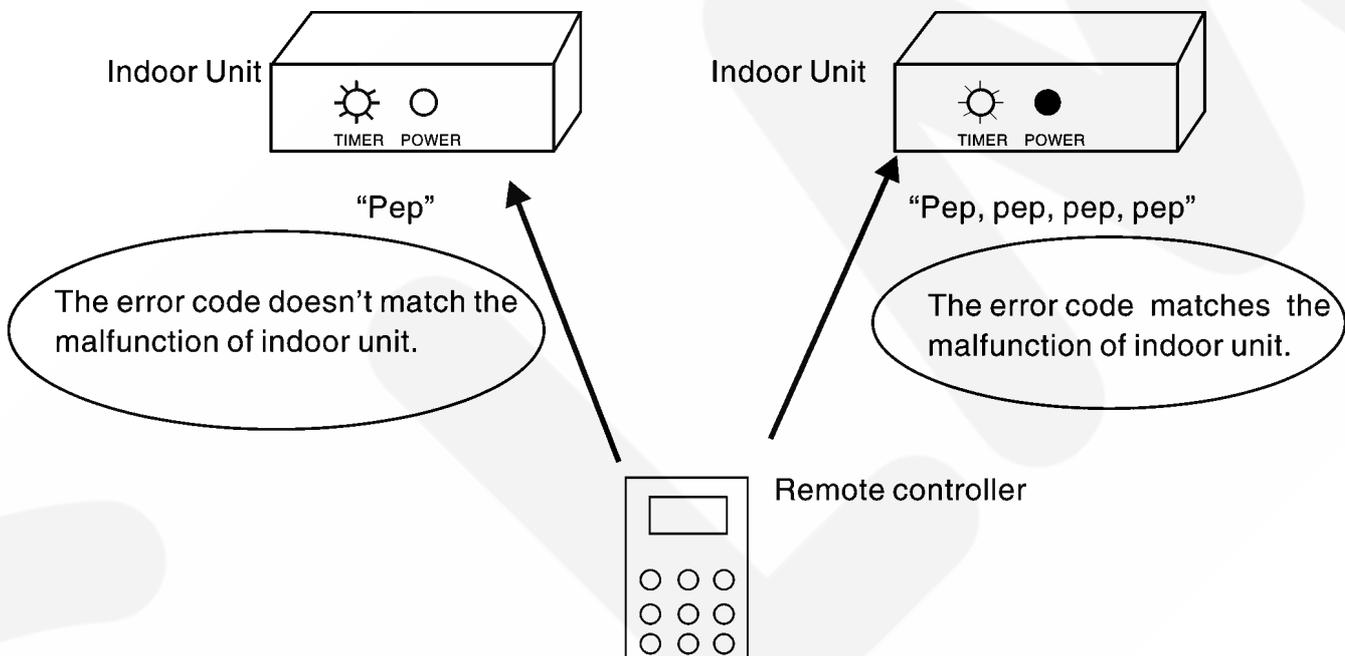
Forced Operation ON: "Pep", "Pep", "Pep", "Pep"

Stop: "Pep"

Note: Refer to the Diagnosis Code Table for the malfunction when forced operation is not available.

B. Display of Error Code

1. Keeping the CHECK button on the remote controller depressed for 5 seconds, error code ranging from H11 to H99 can be displayed on the remote controller.
2. The error code is changed and diagnosis signal is transmitted to the indoor unit by pressing the Temp Up button on the remote control.
3. When the malfunction of the air-conditioner matches the error code on the remote control, four beeps can be heard from the indoor unit and the operation indicator will light up.
4. Keep the CHECK button depressed continuously for 5 seconds to cancel the diagnosis function.



C. Diagnosis Code Table

Code	Abnormality/Protection	Judgment	Check	Emergency Operation
H11	Indoor/Outdoor abnormal communication	>1minute after starting operation	Connecting cable, Indoor /outdoor PCB	O
H14	Indoor intake air temp sensor abnormality	-	Intake air temperature sensor (defected or disconnected)	X
H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	Compressor temperature sensor(defected or disconnected)	X
H16	Outdoor current transformer open circuit	-	Outdoor PCB, IPM module	X
H19	Indoor fan lock	-	Indoor PCB, fan motor	X
H23	Indoor heat exchanger temperature A sensor	Continue for 5 sec	Heat exchanger temperature sensor (defected or disconnected)	O
H24	Indoor heat exchanger temperature B sensor	Continue for 5 sec	Heat exchanger temperature sensor B (defected or disconnected)	O
H25	Air filter abnormality	-		O
H27	Outdoor air temperature sensor abnormality	Continue for 5 sec	Outdoor temperature sensor (defected or disconnected)	O
H28	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	Outdoor heat exchanger sensor (defected or disconnected)	O
H30	Discharge temperature sensor abnormality	Continue for 5 sec.	Discharge temperature sensor (defected or disconnected)	O
H33	Incorrect connection of Indoor/Outdoor cable	-	Indoor/outdoor supply voltage	X
H97	Outdoor fan motor lock	Twice within 20 sec.	Outdoor fan motor	X
H98	Indoor high pressure protection	-	Air filter dirty Air circulation short circuit	-
H99	Indoor heat exchanger anti-freezing protection	Indoor heat exchanger freezing	Insufficient refrigerant Air filter dirty	-
F11	Cooling/heating cycle change over abnormality	4 times occurrence within 30 minutes	4-way valve V-coil	X
F16	Cooling/Dry cycle changeover abnormality	4 times occurrence within 30 minutes	Indoor PCB	X
F90	PFC control	4 times occurrence within 20 minutes	Voltage at PFC	X
F91	Refrigeration cycle abnormality	2 times occurrence within 20 minutes	No refrigerant(3-way valve is closed)	X
F93	Compressor abnormality	4 times occurrence within 20 minutes	Compressor	X
F95	Cool high pressure protection	4 times occurrence within 20 minutes	Outdoor refrigeration cycle	X
F96	IPM overheating protection	-	Excessive refrigerantImproper heat radiationIPM	X
F97	Outdoor compressoroverheating protection	4 times occurrence within 20 minutes	Insufficient refrigerantCompressor	X
F98	Total running currentprotection	3 times occurrence within 20 minutes	Excess refrigerantImproper radiationOutdoor PCBIPMCompressor	X
F99	Outdoor Peak CurrentProtection Control	4 times occurrence continuously within 30 minutes		X

8.Internal Setting Temperature

Intake temperature is based on the set temperature of remote control and temperature shifting.

1. Cool/Dry/Heat

$$\begin{aligned}
 &\text{Remote Controller Setting Temperature} \\
 &+ \\
 &\text{Outdoor Air Temperature Shifting} \\
 &+ \\
 &\text{Fan Speed Shifting} \\
 &+ \\
 &\text{Starting Shifting} \\
 &+ \\
 &\text{Soft Dry Shifting}
 \end{aligned}$$

2. Auto

$$\begin{aligned}
 &\text{Remote Controller Setting Temperature} \\
 &+ \\
 &\text{Outdoor Air Temperature Shifting} \\
 &+ \\
 &\text{Fan Speed Shifting} \\
 &+ \\
 &\text{Starting Shifting} \\
 &+ \\
 &\text{Soft Dry Shifting} \\
 &+ \\
 &\text{Judgement for Auto Operation}
 \end{aligned}$$

Once the operation starts, remote controller setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the air conditioner settings and the operation environment. The final shifted value will be used as internal setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.



Table A Outdoor Temperature Shifting

		PE9CKE	PE12CKE
COOL.DRY	≥38°C	0.00	0.00
	≥30°C, <38°C	0.00	0.00
	≥23°C, <30°C	0.00	0.00
	<23°C	0.50	0.50
HEAT	≥21°C	-1.00	-1.00
	≥17°C, <21°C	-0.75	-0.75
	≥13°C, <17°C	-0.50	-0.50
	≥9°C, <13°C	0.00	0.00
	≥5°C, <9°C	0.50	0.50
	≥1°C, <5°C	2.00	2.00
	≥-5°C, <1°C	2.50	2.50
<-5°C	2.50	2.50	

Table B Fan Speed Shifting

		PE9CKE	PE12CKE
COOL	Lo	0.50	0.50
	Me~Me+, Auto	0.50	0.50
	HI, Shi	0.50	0.50
DRY		1.75	1.00
HEAT	Lo	1.50	2.00
	Me~Me+, Auto	1.00	1.50
	HI, Shi	1.00	1.50

Table C Start-up Shifting

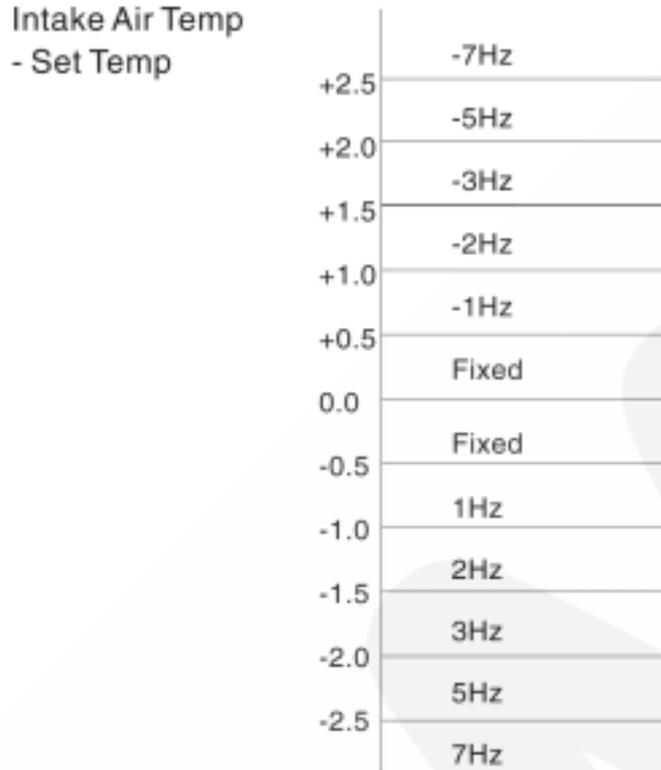
Cool/Dry	60 minutes from start-up	-1.0
Heat	60 minutes from start-up	-2.0

7.4. Cooling Operation

A. Frequency Shifting

The frequency for compressor is changed every 30 seconds, and the intake air temperature is measured every second.

After the start-up of the compressor, If the difference between the intake temperature and intake set temperature maintains a specified value for a while, the frequency will change as below.



Maximum and Minimum Frequency For Cool and Dry

		PE9CKE	PE12CKE
Normal	Max.	49	64
	Min.	17	17
Dry	Max.	27	34
	Min.	22	28
Fc		45	58

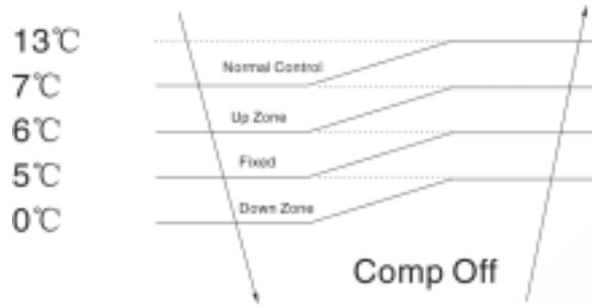
Minimum Frequency For Cool and Dry

Fan Speed	PE9CKE	PE12CKE
>Hi	30	37
>Me-	28	35
>Me-	27	34
Auto	27	34

B. Anti-freezing Control

1. Frequency of the compressor

For prevention of freezing of the indoor evaporator, the frequency of the compressor will be changed according to the indoor piping temperature.



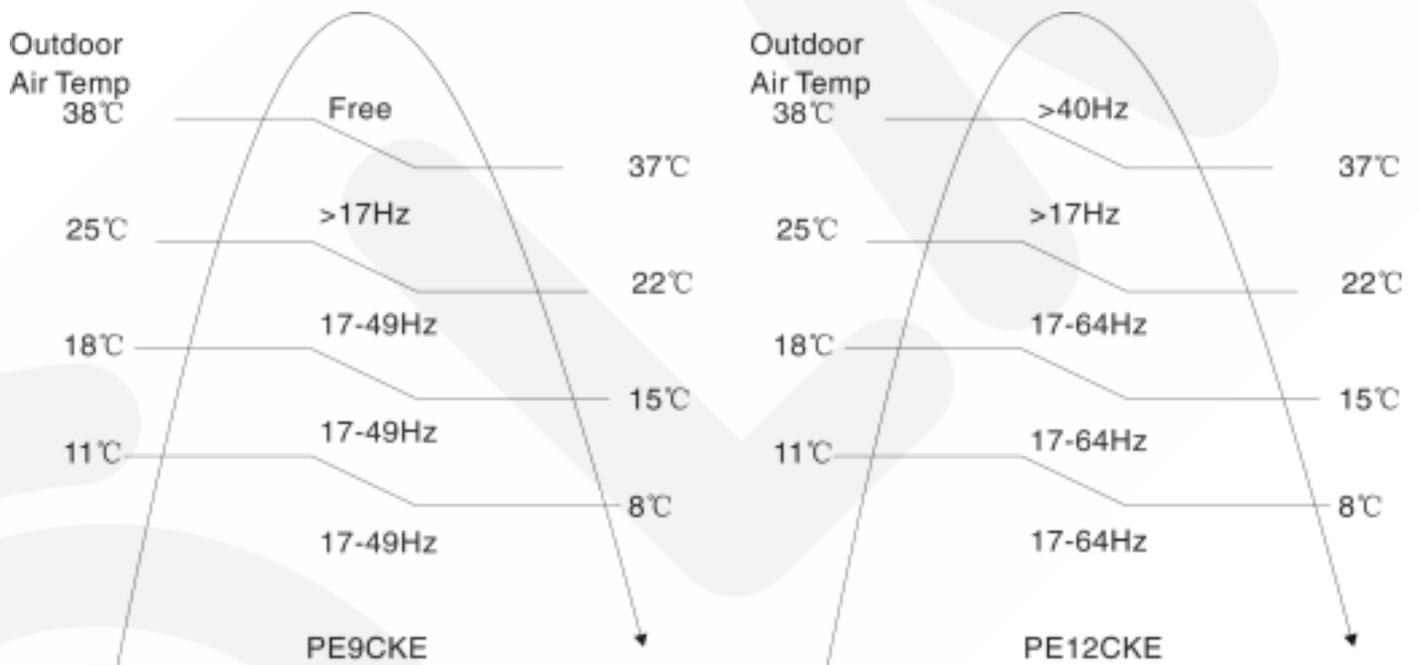
2. Indoor Fan Control

Indoor fan speed changes according to the indoor fan speed.



C. Outdoor Air Temp Control

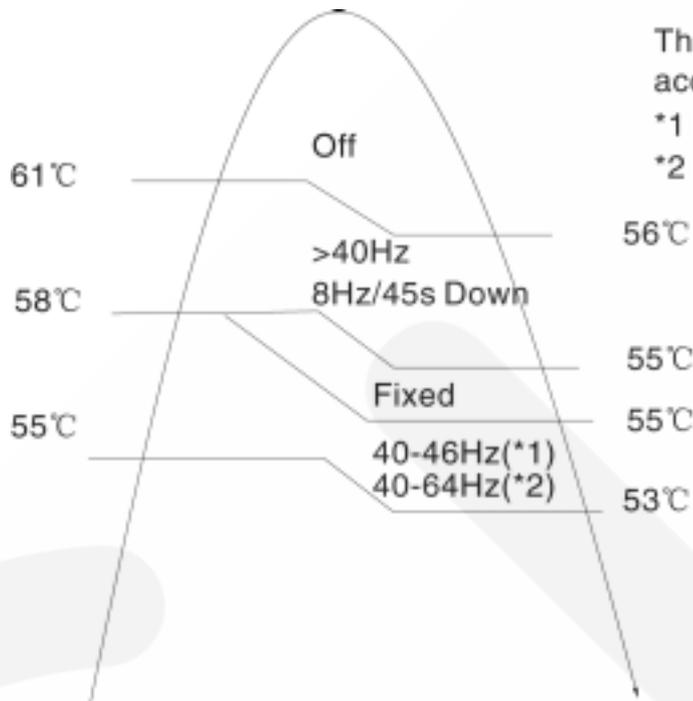
Operation Frequency for Compressor



D. Anti-Fog Control

- ① The indoor fan speed is higher than A but less than B.
- ② The indoor fan speed is less than A

	Outdoor Air Temp	Operation Time(S)		PE9CKE	PE12CKE
①	>30℃	0-30	a	45	58
		30-90	b	40	54
		90-420	c	40	54
	<30℃	0-30	a	45	58
		30-90	b	40	54
		90-420	c	35	46
②	>30℃	0-30	a	35	46
		30-90	b	35	46
		90-420	c	35	46
	<30℃	0-30	a	35	46
		30-90	b	35	46
		90-420	c	35	46
Indoor Fan Speed A				800	850
Indoor Fan Speed B				960	1020

E. Overload Protection For Cooling Operation

The frequency for the compressor will change according to the outdoor piping temperature.

*1 PE9CKE

*2 PE12CKE

7.5. Soft Dry Operation

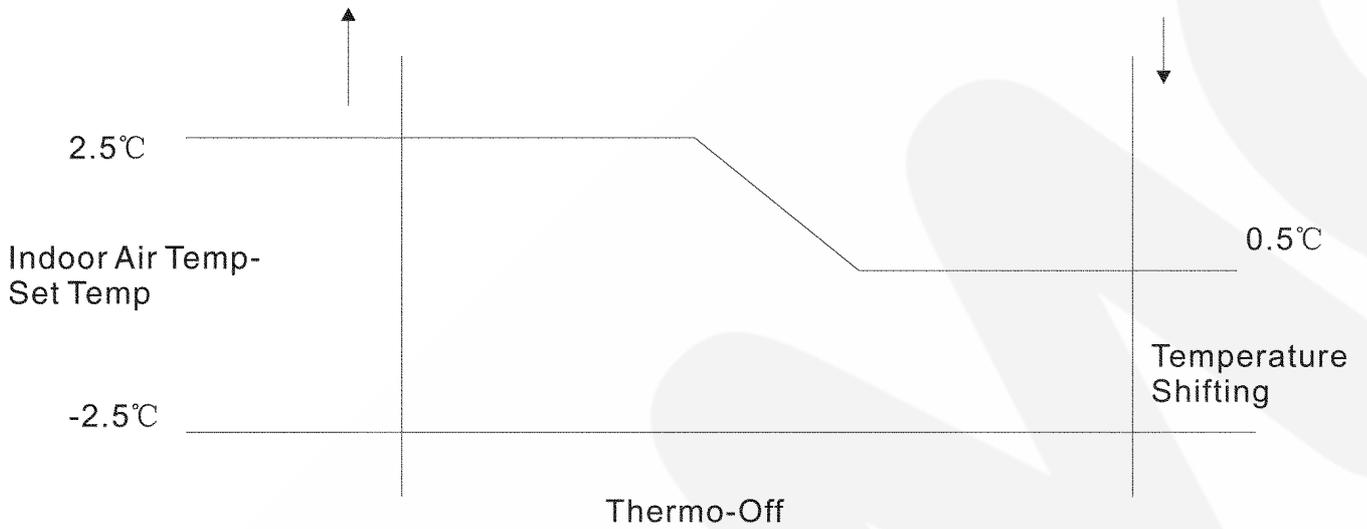
Method of frequency shifting is the same to that of cooling operation and the intake air temperature is measured every second.

Initial Frequency for Compressor

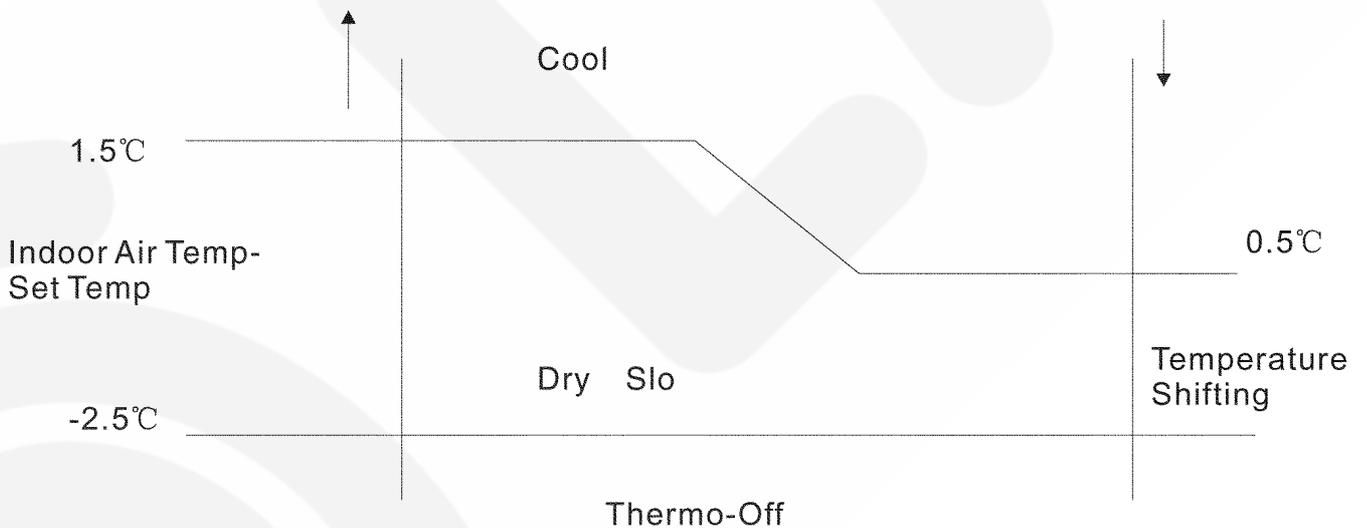
	PE9CKE	PE12CKE
$\Delta T < 4$	24	31
$\Delta T \geq 4$	27	34

$\Delta T = \text{Outdoor Air Temp} - \text{Remote Control Setting Temp}$

Thermostat Features



Indoor Fan Control

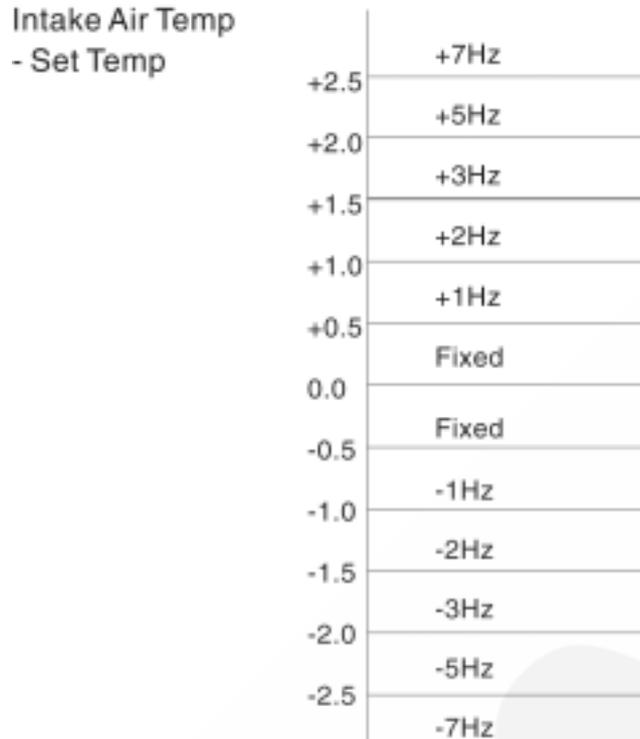


7.6. Heating Operation

A. Frequency Shifting

The frequency for compressor is changed every 60 seconds, and the intake air temperature is measured every second.

After the start-up of the compressor, if the difference between the intake temperature and intake set temperature maintains a specified value for a while, the frequency will change as below.



Maximum and Minimum Frequency For Heating Operation

		PE9CKE	PE12CKE
Normal	Max.	110	110
	Min.	17	18
Fh		64	73

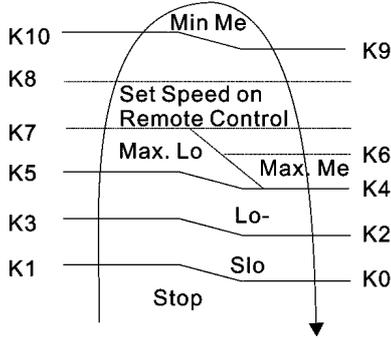
Minimum Frequency Control For Heating Mode

	PE9CKE	PE12CKE
>Hi	44	48
>Me-+AUTO	42	46
<Me-	40	44

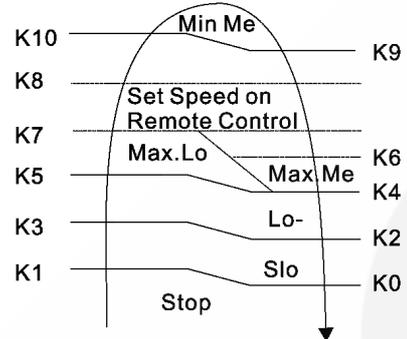
B. Indoor Fan Control

1. Indoor fan is controlled by the indoor piping temperature.

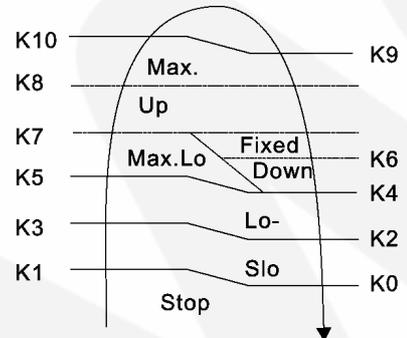
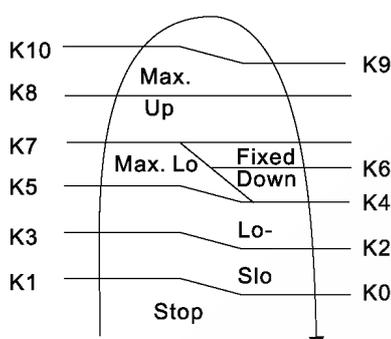
Auto Airflow Direction / Manual Fan Speed



Manual Airflow Direction / Manual Fan Speed



Auto Airflow Direction / Auto Fan Speed



Piping Temperature(°C)

	K0	K1	K2	K3	K4	K5	K6	K7	K8	K9	K10
Auto Airflow Direction	16	19	24	31	32	34	36	39	55	55	58
Manual Airflow Direction	16	19	24	31	32	34	37	39	55	55	58

2. During heating operation, the maximum fan speed is Lo when the compressor stops.

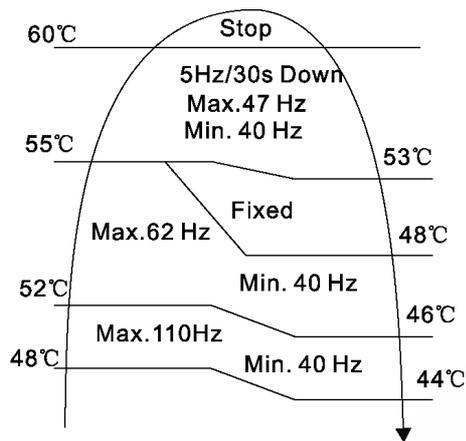
3. Hot Start

When the heating operation starts, the indoor fan stops and the compressor runs with the frequency of 117Hz. This is to prevent the cold airflow from blowing.

If the piping temperature rises to 19°C, and the indoor fan speed and airflow direction varies with the indoor piping temperature, the hot start control is completed.

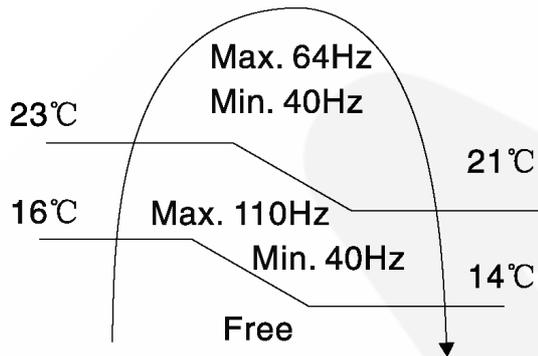
C. Overload Protection Control

The frequency for the compressor is determined by indoor piping temperature.



D. Outdoor Air Temp Control

One minute after the start-up of the compressor, outdoor air temperature control starts.

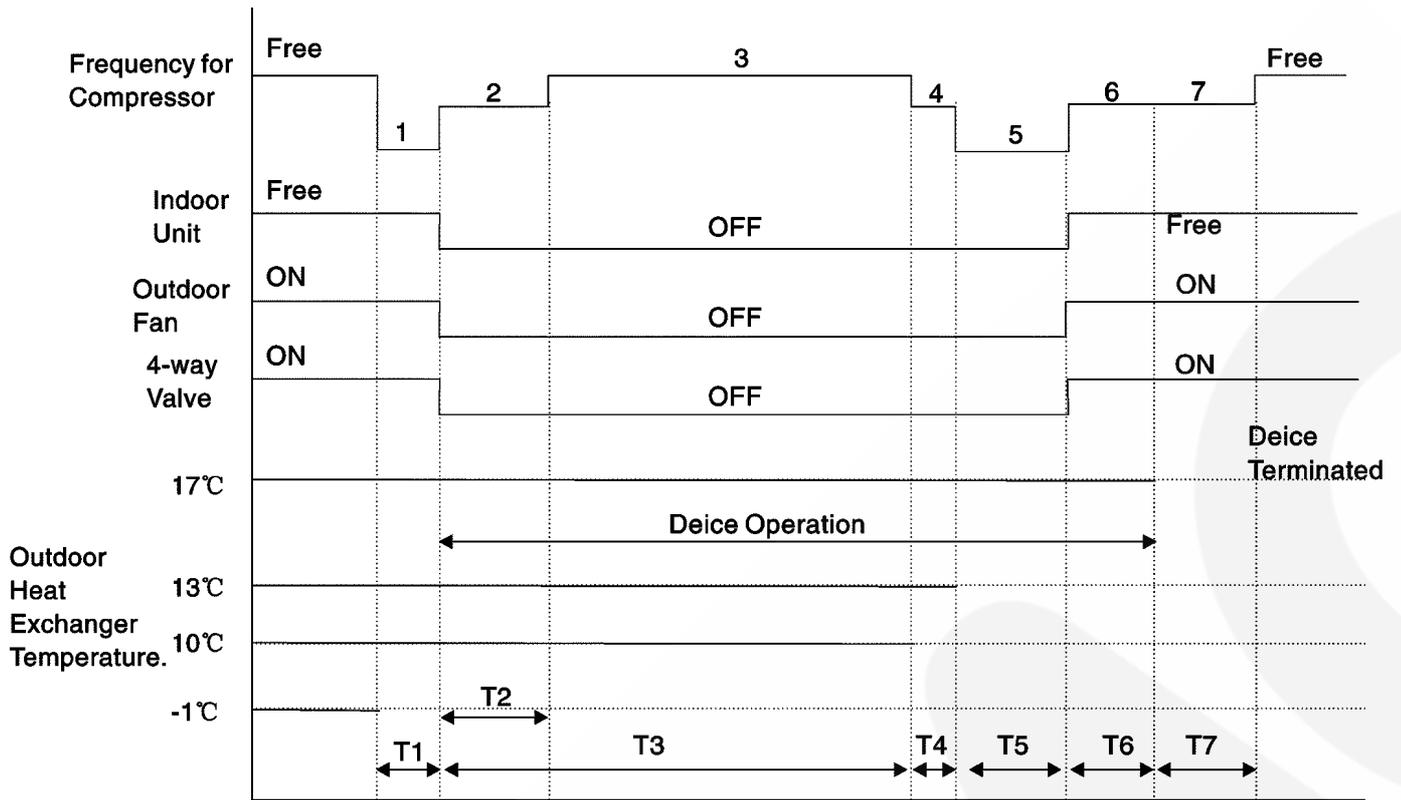


E. New JIS Deice Operation

Deice operation starts immediately after the deice instruction is received. But the first deice operation starts 1 hour after the heating operation is activated.

1. Outdoor heat exchanger temperature is lower than 3°C for 30 minutes.
2. Outdoor heat exchanger temperature is lower than -1°C continuously for 3 minutes.

Time Graph

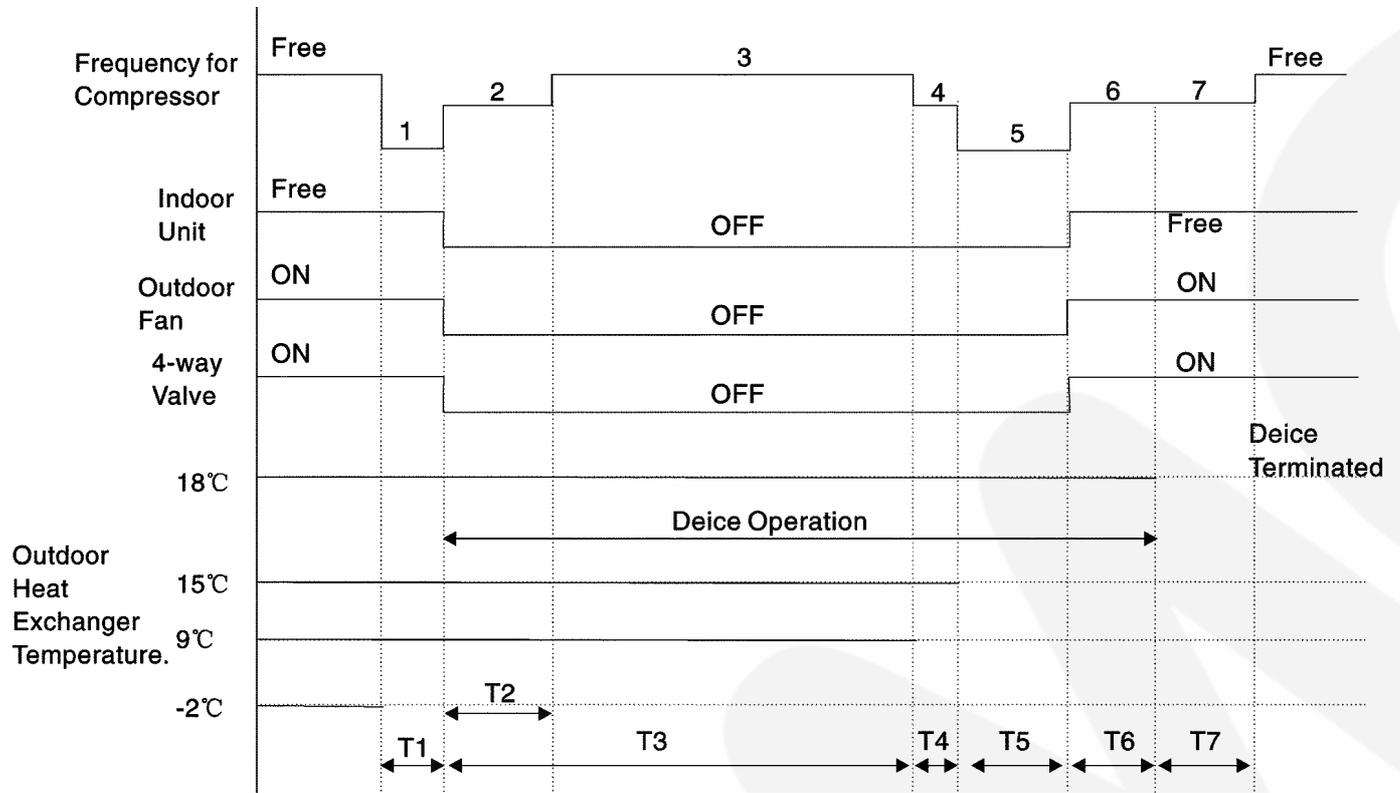


		1	2	3	4	5	6	7
Frequency For Compressor	PE9CKE	58Hz	58Hz	71Hz	51Hz	51Hz	99Hz	99Hz
	PE12CKE	58Hz	58Hz	71Hz	51Hz	51Hz	99Hz	99Hz
Indoor Fan		ON	OFF	OFF	OFF	OFF	ON	ON
Outdoor Fan		ON	OFF	OFF	OFF	OFF	ON	ON
4-way Valve		ON	OFF	OFF	OFF	OFF	ON	ON

F. Normal Deice Operation

Deice operation will start as the deice operation instruction is launched. But the first deice operation starts one hour after the heating operation starts.

Time Graph



		1	2	3	4	5	6	7
Frequency For Compressor	PE9CKE	40Hz	40Hz	65Hz	65Hz	40Hz	0Hz	0Hz
	PE12CKE	40Hz	40Hz	65Hz	65Hz	40Hz	0Hz	0Hz
Indoor Fan		ON	OFF	OFF	OFF	OFF	OFF	ON
Outdoor Fan		ON	OFF	OFF	OFF	OFF	ON	ON
4-way Valve		ON	OFF	OFF	OFF	OFF	OFF	ON

If one of the following situations exists, the instruction of the deice will be launched:

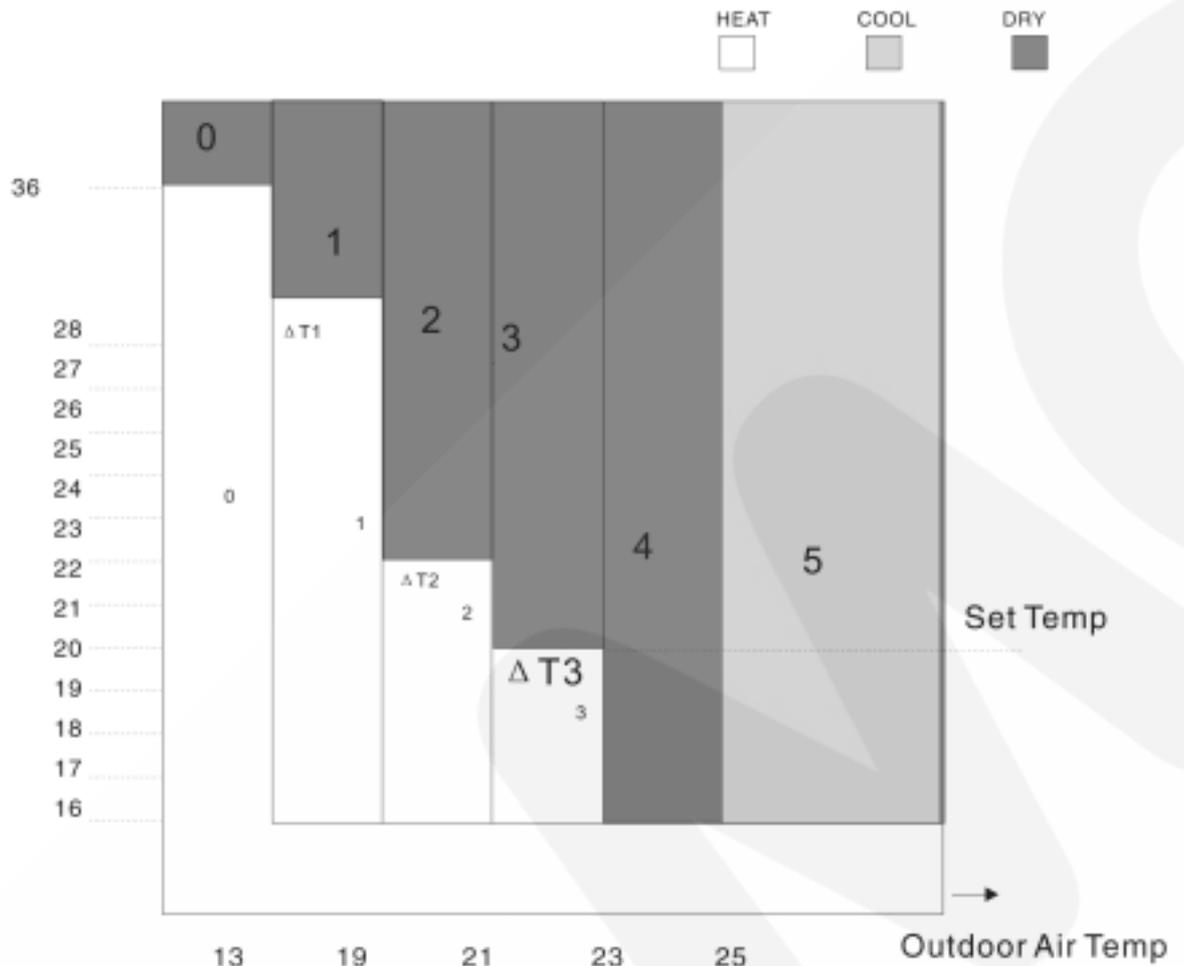
- The outdoor heat exchanger temperature remains less than 3°C for 120 minutes and -6°C for 3 minutes continuously, the outdoor air temperature is higher than -1°C and the compressor is on.
- The outdoor heat exchanger temperature remains less than 3°C for 80 minutes and -7°C for 3 minutes continuously, the outdoor air temperature is higher than -1°C and the compressor is on.
- The outdoor heat exchanger temperature remains less than 3°C for 40 minutes and -9°C for 3 minutes continuously, the outdoor air temperature is higher than -3°C and the compressor is on.
- The outdoor heat exchanger temperature remains less than 3°C for 40 minutes and -11°C for 3 minutes continuously, the outdoor air temperature is lower than -3°C and the compressor is on.

Note: The first deice operation occurs 60 minutes after the beginning of the operation.

7.7. Automatic Operation

If the Auto operation mode is selected, the operation mode will be judged by set temperature on remote control, intake air temperature and outdoor air temperature.

During operating mode judgement, indoor fan runs at low fan speed and outdoor fan runs in the purpose of detecting the intake air temperature and outdoor air temperature (for 20 seconds)



$$\text{Set Temp} = \text{Remote Set Temp} + \Delta T$$

Set Temp on Remote Control	$\Delta T1$	$\Delta T2$	$\Delta T3$
16, 17, 18	+10	-3	-5
19, 20, 21, 22	+8	-3	-7
23, 24, 25, 26	+7	-3	-7
27, 28, 29, 30	+6	-3	-8

If the operation mode changed, $\Delta T1$, $\Delta T2$, $\Delta T3$ will change as follow:

Cooling /Soft Dry → Heating Operation: -2°C

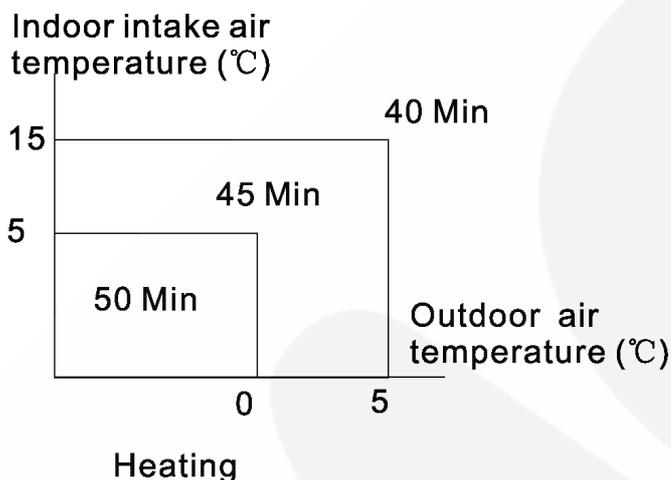
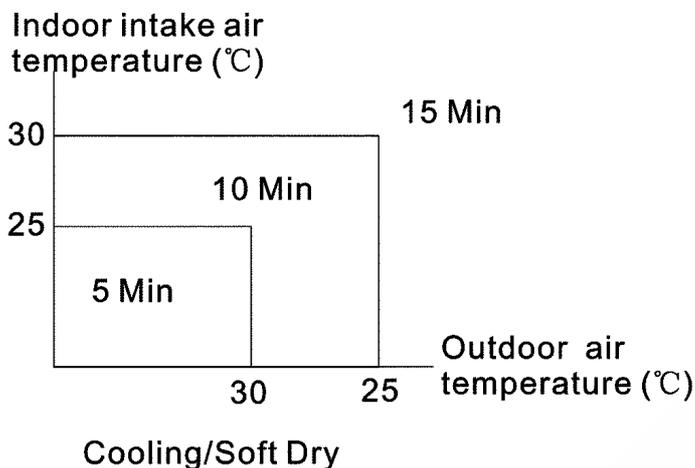
Heating → Cooling /Soft Dry Operation: $+2^{\circ}\text{C}$

7.8. Delayed ON-Timer Control

Delay ON-Timer can be set using remote controller, the unit with timer set will start operate earlier than the setting timer. This is to provide a comfortable environment when reaching the set On time.

Seventy minutes before the set time for ON Timer or ON-OFF Timer setting, indoor (at fan speed of Lo-) and outdoor fan motor start operate for 20 seconds to determine the indoor intake air temperature and outdoor air temperature in order to judge the operation mode.

From the above judgment, the decided operation will start operate earlier than the set time as shown below.



Timer Signal Receiving Sound During Operation

	Operation	Sound	Timer LED	Timer Setting
ON Timer Set	OFF	Beep-	ON	Valid
OFF Timer Set	ON	Beep-	ON	Valid
ON-OFF Timer Set	OFF	Beep-	ON	Valid
OFF-ON Timer Set	ON	Beep-	ON	Valid

Timer Signal Receiving Sound During Operation

	Operation	Sound	Timer LED	Timer Setting
ON Timer Set	OFF	Beep-	ON	Valid
OFF Timer Set	ON	Beep-	ON	Valid
ON-OFF Timer Set	OFF	Beep-	ON	Valid
OFF-ON Timer Set	ON	Beep-	ON	Valid

7.9. Auto Restart Control

If there is a power failure, operation will be automatically restarted after 3-4 minutes when the power is resumed. It will start with previous operation mode and airflow direction.

8 Installation Instructions

Required tools for Installation Works			
1. Philips screw driver	5. Spanner	9. Gas leak detector	13. Multimeter
2. Level gauge	6. Pipe cutter	10. Measuring tape	14. Torque wrench 18 N.m (1.8 kgf.m) 42 N.m (4.2 kgf.m) 55 N.m (5.5 kgf.m)
3. Electric drill, hole core drill (ø70 mm)	7. Reamer	11. Thermometer	15. Vacuum pump
4. Hexagonal wrench (4 mm)	8. Knife	12. Megameter	16. Gauge manifold

8.1. Safety Precautions

- Read the following “SAFETY PRECAUTIONS” carefully before installation.
- Electrical work must be installed by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model to be installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation due to ignoring of the instruction will cause harm or damage, and the seriousness is classified by the following indications.

 WARNING	This indication shows the possibility of causing death or serious injury.
--	---

 CAUTION	This indication shows the possibility of causing injury or damage to properties only.
--	---

The items to be followed are classified by the symbols:

	Symbol with background white denotes item that is PROHIBITED from doing.
--	--

- Carry out test running to confirm that no abnormality occurs after the installation. Then, explain to user the operation, care and maintenance as stated in instructions. Please remind the customer to keep the operating instructions for future reference.

 WARNING	
1. Engage dealer or specialist for installation. If installation done by the user is defective, it will cause water leakage, electrical shock or fire.	
2. Install according to this installation instruction strictly. If installation is defective, it will cause water leakage, electrical shock or fire.	
3. Use the attached accessories parts and specified parts for installation. Otherwise, it will cause the set to fall, water leakage, fire or electrical shock.	
4. Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
5. For electrical work, follow the local national wiring standard, regulation and this installation instruction. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock or fire.	
6. Use the specified cable (1.5 mm ²) and connect tightly for indoor/outdoor connection. Connect tightly and clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat-up or fire at the connection.	
7. Wire routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up at connection point of terminal, fire or electrical shock.	
8. When carrying out piping connection, take care not to let air substances other than the specified refrigerant go into refrigeration cycle. Otherwise, it will cause lower capacity, abnormal high pressure in the refrigeration cycle, explosion and injury.	
9. When connecting the piping, do not allow air or any substances other than the specified refrigerant (R410A) to enter the refrigeration cycle. Otherwise, this may lower the capacity, cause abnormally high pressure in the refrigeration cycle, and possibly result in explosion and injury.	
10. <ul style="list-style-type: none"> • When connecting the piping, do not use any existing (R22) pipes and flare nuts. Using such same may cause abnormally high pressure in the refrigeration cycle (piping), and possibly result in explosion and injury. Use only R410A materials. • Thickness of copper pipes used with R410A must be more than 0.8 mm. Never use copper pipes thinner than 0.8 mm. • It is desirable that the amount of residual oil is less than 40 mg/10 m. 	
11. Do not modify the length of the power supply cord or use of the extension cord, and do not share the single outlet with other electrical appliances. Otherwise, it will cause fire or electrical shock.	


CAUTION

1. The equipment must be earthed. It may cause electrical shock if grounding is not perfect.
2. Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire. 
3. Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.

ATTENTION

1. Selection of the installation location.
Select a installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance.
2. Power supply connection to the room air conditioner.
Connect the power supply cord of the room air conditioner to the mains using one of the following method.
Power supply point shall be the place where there is ease for access for the power disconnection in case of emergency.
In some countries, permanent connection of this room air conditioner to the power supply is prohibited.
 1. Power supply connection to the receptacle using a power plug.
Use an approved 15A/16A power plug with earth pin for the connection to the socket.
 2. Power supply connection to a circuit breaker for the permanent connection. Use an approved 16A circuit breaker for the permanent connection. It must be a double pole switch with a minimum 3 mm contact gap.
3. Do not release refrigerant.
Do not release refrigerant during piping work for installation, reinstallation and during repairing a refrigeration parts. Take care of the liquid refrigerant, it may cause frostbite.
4. Installation work.
It may need two people to carry out the installation work.
5. Do not install this appliance in a laundry room or other location where water may drip from the ceiling, etc.

Attached accessories

No.	Accessories part	Qty.	No.	Accessories part	Qty.
1	Installation plate 	1	4	Battery 	2
2	Installation plate fixing screw 	6	5	Drain elbow 	1
3	Remote control 	1			

SELECT THE BEST LOCATION

INDOOR UNIT

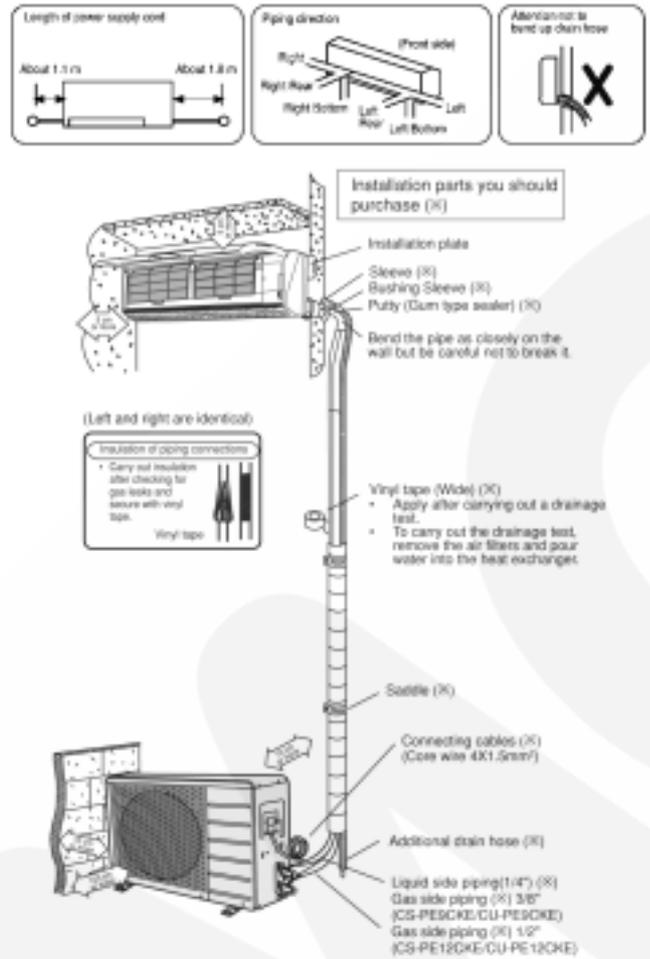
- There should not be any heat source or steam near the unit.
- There should not be any obstacles blocking the air circulation.
- A place where air circulation in the room is good.
- A place where drainage can be easily done.
- A place where noise prevention is taken into consideration.
- Do not install the unit near the door way.
- Ensure the spaces indicated by arrows from the wall, ceiling, fence or other obstacles.
- Recommended installation height for indoor unit shall be at least 2.3 m.

OUTDOOR UNIT

- If an awning is built over the unit to prevent direct sunlight or rain, be careful that heat radiation from the condenser is not obstructed.
- There should not be any animal or plant which could be affected by hot air discharged.
- Keep the spaces indicated by arrows from wall, ceiling, fence or other obstacles.
- Do not place any obstacles which may cause a short circuit of the discharged air.
- If piping length is over the common length, additional refrigerant should be added as shown in the table.

Model	Piping size		Piping Length (m)	Charging Elevation (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid				
PE9CKE	3/8"	1/4"	3-15	5	7.5	20
PE12CKE	1/2"	1/4"	3-15	5	7.5	20

Indoor/Outdoor Unit Installation Diagram



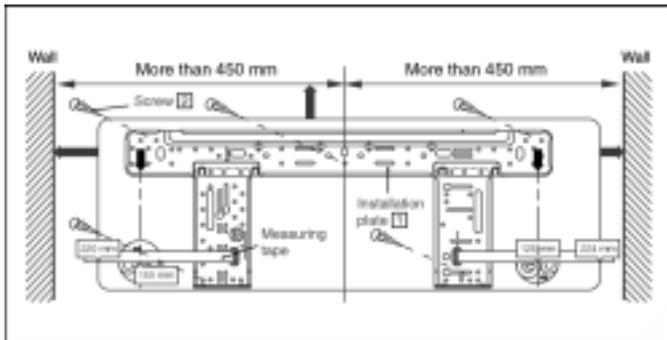
- This illustration is for explanation purposes only. The indoor unit will actually face a different way.

8.2. INDOOR UNIT

8.2.1. SELECT THE BEST LOCATION (Refer to “Select the best location” section)

8.2.2. HOW TO FIX INSTALLATION PLATE

The mounting wall is strong and solid enough to prevent it from the vibration.



The centre of installation plate should be at more than 450 mm at right and left of the wall.

The distance from installation plate edge to ceiling should more than 67 mm.

From installation plate left edge to unit's left side is 47 mm.

From installation plate right edge to unit's right is 73 mm.

- ④ : For left side piping, piping connection for liquid should be about 14 mm from this line.
- : For left side piping, piping connection for gas should be about 56 mm from this line.
- : For left side piping, piping connecting cable should be about 785 mm from this line.

1. Mount the installation plate on the wall with 5 screws or more.

(If mounting the unit on the concrete wall consider using anchor bolts.)

- Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.

2. Drill the piping plate hole with $\phi 70$ mm hole-core drill.

- Line according to the arrows marked on the lower left and right side of the installation plate. The meeting point of the extended line is the centre of the hole. Another method is by putting measuring tape at position as shown in the diagram above. The hole centre is obtained by measuring the distance namely 150 mm and 125 mm for left and right hole respectively.
- Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

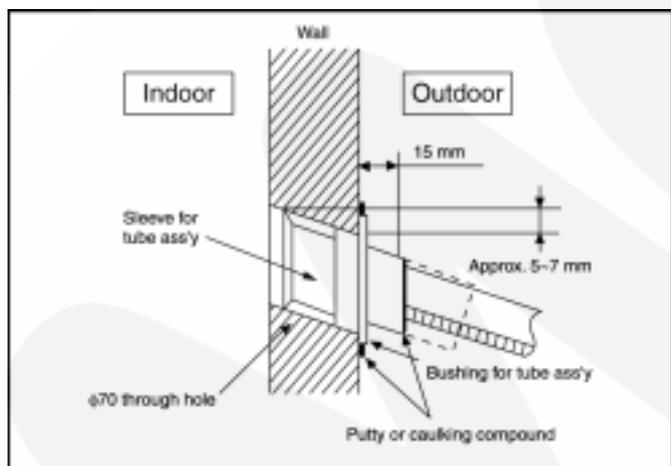
8.2.3. TO DRILL A HOLE IN THE WALL AND INSTALL A SLEEVE OF PIPING

1. Insert the piping sleeve to the hole.
2. Fix the bushing to the sleeve.
3. Cut the sleeve until it extrudes about 15 mm from the wall.

Caution

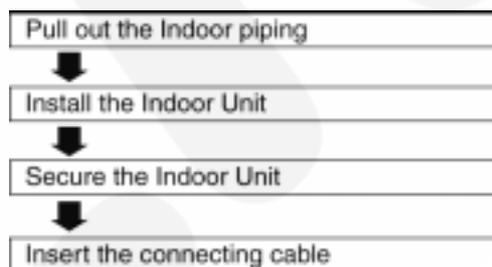
When the wall is hollow, please be sure to use the sleeve for tube ass'y to prevent dangers caused by mice biting the connecting cable.

4. Finish by sealing the sleeve with putty or caulking compound at the final stage.

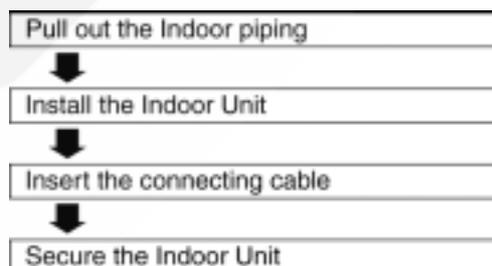


8.2.4. INDOOR UNIT INSTALLATION

1. For the right rear piping



2. For the right and right bottom piping



3. For the embedded piping

- Replace the drain hose
- ↓
- Bend the embedded piping
 - Use a spring bender or equivalent to bend the piping so that the piping is not crushed.
- ↓
- Install the Indoor Unit
- ↓
- Cut and flare the embedded piping
 - When determining the dimension of the piping, slide the unit all the way to the left on the installation plate.
 - Refer to the section "Cutting and flaring the piping".
- ↓
- Pull the connecting cable into Indoor Unit
 - The inside and outside connecting cable can be connected without removing the front grille.
- ↓
- Connect the piping
 - Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)
- ↓
- Insulate and finish the piping
 - Please refer to "Piping and finishing" column of outdoor section and "Insulation of piping connections" column as mentioned in Indoor/Outdoor Unit Installation.
- ↓
- Secure the Indoor Unit

Install the Indoor Unit

Hook the indoor unit onto the upper portion of installation plate (Engage the indoor unit with the upper edge of the installation plate). Ensure the hooks are properly seated on the installation plate by moving in left and right.

Secure the Indoor Unit

1. Tape the extra power supply cord in a bundle and keep it behind the chassis.
 - Ensure that the power supply cord is not clamped in between the unit's hook (2 positions) and installation plate.
2. Press the lower left and right side of the unit against the installation plate until hooks engages with their slots (sound click).

Pull out the piping and drain hose

Move the drain hose near to arrow mark and tape it with piping in a position as mentioned in Fig. below

To take out the unit, push the [PUSH] marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

(This can be used for left rear piping & left bottom piping also.)

How to keep the cover

In case of the cover is cut, keep the cover at the rear of chassis as shown in the illustration for future reinstallation.

(Left, right and 2 bottom covers for piping)

Exchange the drain hose and the cap

Refer view for left piping installation

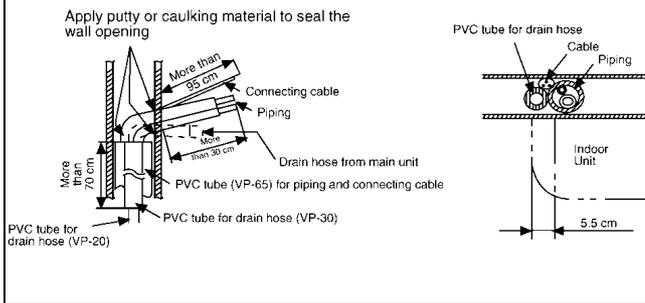
Adjust the piping slightly downwards

Insert the connecting cable

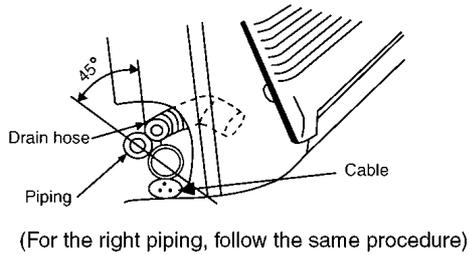
Length of connecting cable: 77 cm

More than approx. 95 cm

- How to pull the piping and drain hose out, in case of the embedded piping.



- In case of left piping how to insert the connecting cable and drain hose.

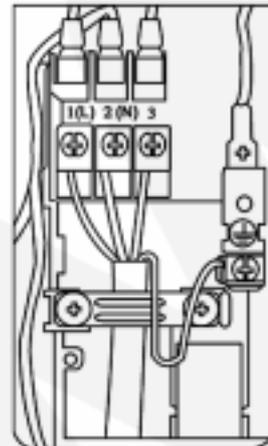


8.2.5. CONNECT THE CABLE TO THE INDOOR UNIT

1. The inside and outside connecting cable can be connected without removing the front grille.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed $4 \times 1.5 \text{ mm}^2$ flexible cord, type designation 245 IEC 57 or heavier cord.
 - Ensure the color of wires of outdoor unit and the terminal Nos. are the same to the indoor's respectively.
 - Earth lead wire shall be longer than the other lead wires as shown in the figure for the electrical safety in case of the slipping out of the cord from the anchorage.

Terminals on the indoor unit	1	2	3	
Color of wires	Grey	Black	White	Black
Terminals on the outdoor unit	1	2	3	

- Secure the cable onto the control board with the holder (clammer).

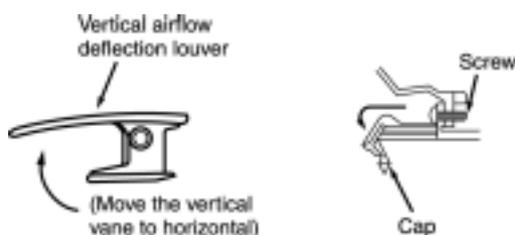


HOW TO TAKE OUT FRONT GRILLE

Please follow the steps below to take out front grille if necessary such as when servicing.

1. Set the vertical airflow direction louver to the horizontal position.
2. Slide down the two caps on the front grille as shown in the illustration at right, and then remove the two mounting screws.
3. Pull the lower section of the front grille towards you to remove the front grille.

When reinstalling the front grille, first set the vertical airflow direction louvre to the horizontal position and then carry out above steps 2 - 3 in the reverse order.



AUTO SWITCH OPERATION

The below operations will be performed by pressing the "AUTO" switch.

1. AUTO OPERATION MODE

The Auto operation will be activated immediately once the Auto Switch is pressed.

2. TEST RUN OPERATION (FOR PUMP DOWN/SERVICING PURPOSE)

The Test Run operation will be activated if the Auto Switch is pressed continuously for more than 5 sec. to below 10 sec. A "pep" sound will occur at the fifth sec., in order to identify the starting of Test Run operation

3. REMOTE CONTROLLER RECEIVING SOUND ON/OFF

The ON/OFF of Remote Controller receiving sound can be changed over by pressing the "AUTO" Switch continuously for 10 sec. and above. A "pep", "pep" sound will occur at the tenth sec., in order to indicate the "ON/OFF" changed over of remote control receiving sound.



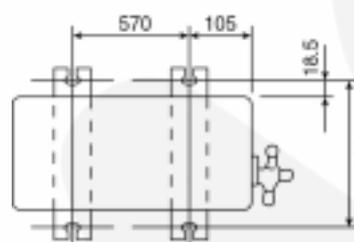
8.3. OUTDOOR UNIT

8.3.1. SELECT THE BEST LOCATION (Refer to "Select the best location" section)

8.3.2. INSTALL THE OUTDOOR UNIT

- After selecting the best location, start installation according to Indoor/Outdoor Unit Installation Diagram.

1. Fix the unit on concrete or rigid frame firmly and horizontally by bolt nut. ($\phi 10$ mm).
2. When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.



8.3.3. CONNECTING THE PIPING

Connecting The Piping To Indoor Unit

Please make flare after inserting flare nut (locate at joint portion of tube assembly) onto the copper pipe. (In case of using long piping)

Connect the piping

- Align the center of piping and sufficiently tighten the flare nut with fingers.
- Further tighten the flare nut with torque wrench in specified torque as stated in the table.



MODEL	Piping size (Torque)	
	Gas	Liquid
PE9CKE	3/8" (42 N.m)	1/4" (18 N.m)
PE12CKE	1/2" (55 N.m)	1/4" (18 N.m)

Connecting The Piping To Outdoor Unit

Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (located at valve) onto the copper pipe.

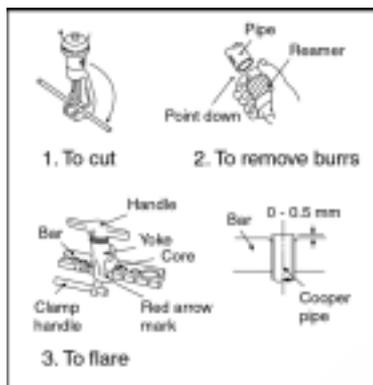
Align center of piping to valves and then tighten with torque wrench to the specified torque as stated in the table.

CUTTING AND FLARING THE PIPING

1. Please cut using pipe cutter and then remove the burrs.
2. Remove the burrs by using reamer. If burrs is not removed, gas leakage may be caused.

Turn the piping end down to avoid the metal powder entering the pipe.

3. Please make flare after inserting the flare nut onto the copper pipes.



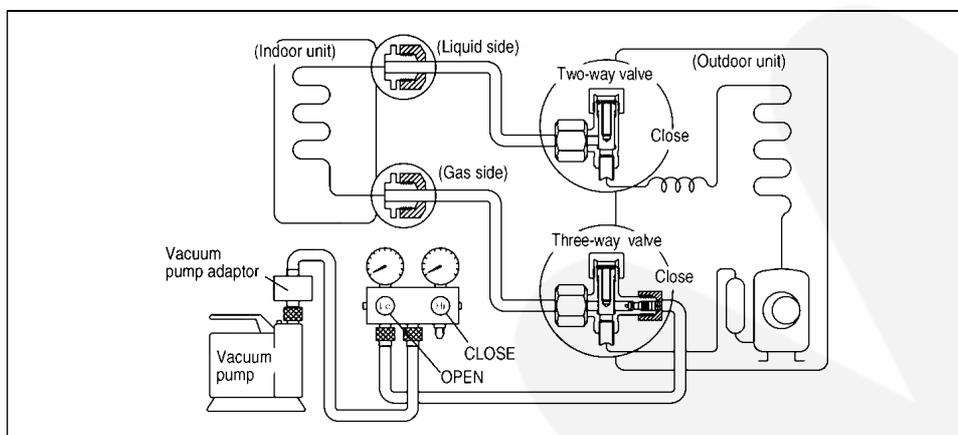
■ Improper flaring ■



When properly flared, the internal surface of the flare will evenly shine and be of even thickness. Since the flare part comes into contact with the connections, carefully check the flare finish.

8.3.4. (a) EVACUATION OF THE EQUIPMENT (FOR EUROPE & OCEANIA DESTINATION)

WHEN INSTALLING AN AIR CONDITIONER, BE SURE TO EVACUATE THE AIR INSIDE THE INDOOR UNIT AND PIPES in the following procedure.



1. Connect a charging hose with a push pin to the Low side of a charging set and the service port of the 3-way valve.
 - Be sure to connect the end of the charging hose with the push pin to the service port.
2. Connect the center hose of the charging set to a vacuum pump with check valve, or vacuum pump and vacuum pump adaptor.
3. Turn on the power switch of the vacuum pump and make sure that the needle in the gauge moves from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa). Then evacuate the air approximately ten minutes.
4. Close the Low side valve of the charging set and turn off the vacuum pump. Make sure that the needle in the gauge does not move after approximately five minutes.

Note: BE SURE TO FOLLOW THIS PROCEDURE IN ORDER TO AVOID REFRIGERANT GAS LEAKAGE.

5. Disconnect the charging hose from the vacuum pump and from the service port of the 3-way valve.
6. Tighten the service port caps of the 3-way valve at torque of 18 N.m with a torque wrench.
7. Remove the valve caps of both of the 2-way valve and 3-way valve. Position both of the valves to "OPEN" using a hexagonal wrench (4 mm).
8. Mount valve caps onto the 2-way valve and the 3-way valve.
 - Be sure to check for gas leakage.

CAUTION

- If gauge needle does not move from 0 cmHg (0 MPa) to -76 cmHg (-0.1 MPa), in step 3 above take the following measure:
- If the leak stops when the piping connections are tightened further, continue working from step 3.
- If the leak does not stop when the connections are retightened, repair the location of leak.
- Do not release refrigerant during piping work for installation and reinstallation. Take care of the liquid refrigerant, it may cause frostbite.

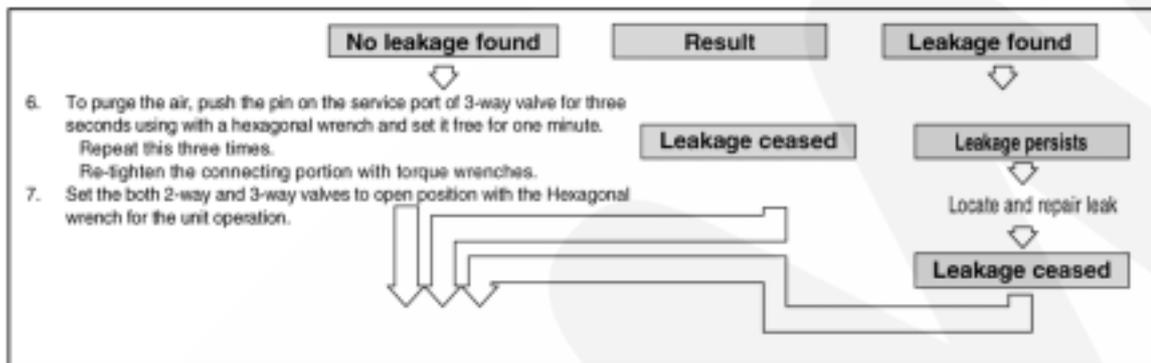
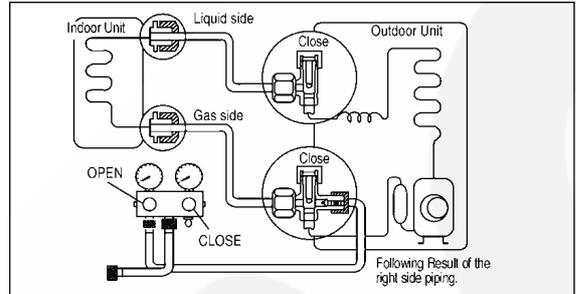
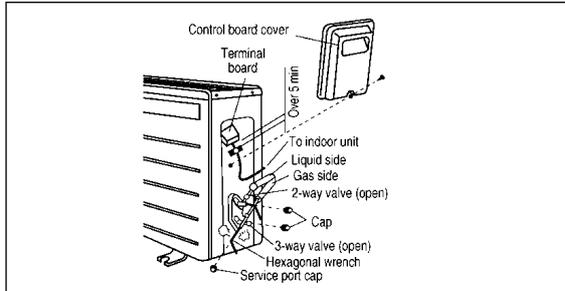
8.3.5. (b) AIR PURGING OF THE PIPING AND INDOOR UNIT

The remaining air in the Refrigeration cycle which contains moisture may cause malfunction on the compressor.

1. Remove the caps from the 2-way and 3-way valves.
2. Remove the service-port cap from the 3-way valves.
3. To open the valve, turn the valve stem of 2-way valve counter-clockwise approx. 90° and hold it there for ten seconds, then close it.
4. Check gas-leakage of the connecting portion of the pipings.

For the left pipings, refer to item 4(A).

5. To open 2-way valve again, turn the valve stem counter-clockwise until it stops.



4(A). Checking gas leakage for the left piping.

- (1) * Connect the manifold gauge to the service port of 3-way valve.
Measure the pressure.
*

- (2) * Keep it for 5-10 minutes.
Ensure that the pressure indicated on the gauge is the
* same as that of measured during the first time.

8.3.6. CONNECT THE CABLE TO THE OUTDOOR UNIT

1. Remove the control board cover from the unit by loosening the screw.
2. Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 4 x 1.5 mm² flexible cord, type designation 245 IEC 57 or heavier cord.

Terminals on the indoor unit	1	2	3	⊕
Color of wires	Grey	Black	White	Black
Terminals on the outdoor unit	1	2	3	⊕

3. Secure the cable onto the control board with the holder (clammer).
4. Attach the control board cover back to the original position with the screw.

Note: The earth terminal on the control board shall be used for the earth connection between indoor and outdoor unit as shown above. (Earth mark on the outdoor unit cabinet is for only Japanese market.)

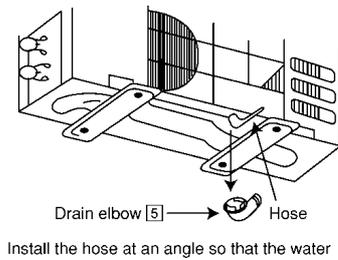
8.3.7. PIPE INSULATION

1. Please carry out insulation at pipe connection portion as mentioned in Indoor/Outdoor Unit Installation Diagram. Please wrap the insulated piping end to prevent water from going inside the piping.

2. If drain hose or connecting piping is in the room (where dew may form), please increase the insulation by using POLY-E FOAM with thickness 6 mm or above.

DISPOSAL OF OUTDOOR UNIT DRAIN WATER

- If a drain elbow is used, the unit should be placed on a stand which is taller than 3 cm.
- If the unit is used in an area where temperature falls below 0°C for 2 or 3 days in succession, it is recommended not to use a drain elbow, for the drain water freezes and the fan will not rotate.

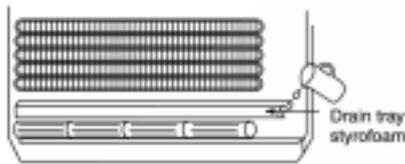


CHECK ITEMS

- Is there any gas leakage at flare nut connections?
- Has the heat insulation been carried out at flare nut connection?
- Is the connecting cable being fixed to terminal board firmly?
- Is the connecting cable being clamped firmly?
- Is the drainage OK?
(Refer to "Check the drainage" section)
- Is the earth wire connection properly done?
- Is the indoor unit properly hooked to the installation plate?
- Is the power supply voltage complied with rated value?
- Is there any abnormal sound?
- Is the cooling operation normal?
- Is the thermostat operation normal?
- Is the remote control's LCD operation normal?
- Is the air purifying filter installed?

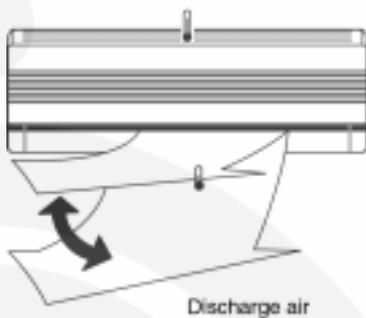
CHECK THE DRAINAGE

- Open front panel and remove air filters.
(Drainage checking can be carried out without removing the front grille.)
- Pour a glass of water into the drain tray-styrofoam.
- Ensure that water flows out from drain hose of the indoor unit.



EVALUATION OF THE PERFORMANCE

- Operate the unit at cooling operation mode for fifteen minutes or more.
- Measure the temperature of the intake and discharge air.
- Ensure the difference between the intake temperature and the discharge is more than 8°C.



9 Installation and Servicing Air Conditioner Using R410A

9.1. OUTLINE

9.1.1. About R410A Refrigerant

1. Converting air conditioners to R410A

Since it was declared in 1974 that chlorofluorocarbons (CFC), hydro chlorofluorocarbons (HCFC) and other substances pose a destructive danger to the ozone layer in the earth's upper stratosphere (20 to 40 km above the earth), measures have been taken around the world to prevent this destruction.

The R22 refrigerant which has conventionally been used in ACs is an HCFC refrigerant and, therefore, possesses this ozone-destroying potential. International regulations (the Montreal Protocol Ozone-Damaging Substances) and the domestic laws of various countries call for the early substitution of R22 by a refrigerant which will not harm the ozone layer.

- In ACs, the HFC refrigerant which has become the mainstream alternative called R410A. Compared with R22, the pressure of R410A is approximately 1.6 times as high at the same refrigerant temperature, but the energy efficiency is about the same. Consisting of hydrogen (H), fluorine (F) and carbon (C), R410A is an HFC refrigerant. Another typical HFC refrigerant is R407C. While the energy efficiency of R407C is somewhat inferior to that of R410A, it offers the advantage of having pressure characteristics which are about the same as those of R22, and is used mainly in packaged ACs.

2. The characteristics of HFC (R410A) refrigerants

a. Chemical characteristics

The chemical characteristics of R410A are similar to those of R22 in that both are chemically stable, non-flammable refrigerants with low toxicity.

However, just like R22, the specific gravity of R410A gas is heavier than that of air. Because of this, it can cause an oxygen deficiency if it leaks into a closed room since it collects in the lower area of the room. It also generates toxic gas when it is directly exposed to a flame, so it must be used in a well ventilated environment where it will not collect.

Table 1 Physical comparison of R410A and R22

	R410A	R22
Composition (wt%)	R32/R125 (50/50)	R22 (100)
Boiling point (°C)	-51.4	-40.8
Vaporizing pressure (25°C)	1.56 Mpa (15.9 kgf/cm ²)	0.94 Mpa (9.6 kgf/cm ²)
Saturated vapor density	64.0 kg/m ³	44.4 kg/m ³
Flammability	Non-flammable	Non-flammable
Ozone-destroying point (ODP)	0	0.005
Global-warming point (GWP)	1730	1700

b. Compositional change (pseudo-azeotropic characteristics)

R410A is a pseudo-azeotropic mixture comprising the two components R32 and R125. Multi-component refrigerants with these chemical characteristics exhibit little compositional change even from phase changes due to vaporization (or condensation), which means that there is little change in the circulating refrigerant composition even when the refrigerant leaks from the gaseous section of the piping.

Accordingly, R410A can be handled in almost the same manner as the single-component refrigerant R22. However, when charging, because there is a slight change in composition between the gas phase and the liquid phase inside a cylinder or other container, charging should basically begin with the liquid side.

c. Pressure characteristics

As seen in Table 2, the gas pressure of R410A is approximately 1.6 times as high as that of R22 at the same refrigerant temperature, which means that special R410A tools and materials with high-pressure specifications must be used for all refrigerant piping work and servicing.

Table 2 Comparison of R410A and R22 saturated vapor density

Refrigerant Temperature (°C)	Unit: MPa	
	R410A	R22
-20	0.30	0.14
0	0.70	0.40
20	1.35	0.81
40	2.32	1.43
60	3.73	2.33
65	4.15	2.60

d. R410A refrigerating machine oil

Conventionally, mineral oil or a synthetic oil such as alkylbenzene has been used for R22 refrigerating machine oil. Because of the poor compatibility between R410A and conventional oils like mineral oil, however, there is a tendency for the refrigerating machine oil to collect in the refrigerating cycle. For this reason, polyester and other synthetic oils which have a high compatibility with R410A are used as refrigerating machine oil.

Because of the high hygroscopic property of synthetic oil, more care must be taken in its handling than was necessary with conventional refrigerating machine oils. Also, these synthetic oils will degrade if mixed with mineral oil or alkylbenzene, causing clogging in capillary tubes or compressor malfunction. Do not mix them under any circumstances.

9.1.2. Safety Measure When Installing / Receiving Refrigerant Piping

Cause the gas pressure of R410A is approximately 1.6 times as high as that of R22, a mistake in installation or servicing could result in a major accident. It is essential that you use R410a tools and materials, and that you observe the following precautions to ensure safety.

1. Do not use any refrigerant other than R410A in ACs that have been used with R410A.
2. If any refrigerant gas leaks while you are working, ventilate the room. Toxic gas may be generated if refrigerant gas is exposed to a direct flame.
3. When installing or transferring an AC, do not allow any air or substance other than R410A to mix into the refrigeration cycle. If it does, the pressure in the refrigeration cycle can become abnormally high, possibly causing an explosion and/or injury.
4. After finishing the installation, check to make sure there is no refrigerant gas leaking.
5. When installing or transferring an AC, follow the instructions in the installation instructions carefully. Incorrect installation can result in an abnormal refrigeration cycle or water leakage, electric shock, fire, etc.
6. Do not perform any alterations on the AC unit under any circumstances. Have all repair work done by a specialist. Incorrect repairs can result in an water leakage, electric shock, fire, etc.

9.2. TOOL FOR INSTALLING / SERVICING REFRIGERANT PIPING

9.2.1. Necessary Tools

In order to prevent an R410A AC from mistakenly being charged with any other refrigerant, the diameter of the 3-way valve service port on the outdoor unit has been changed. Also, to increase its ability to withstand pressure, the opposing dimensions have been changed for the refrigerant pipe flaring size and flare nut. Accordingly, when installing or servicing refrigerant piping, you must have both the R410A and ordinary tools listed below.

Table 3 Tools for installation, transferring or replacement

Type of work	Ordinary tools	R410A tools
Flaring	Flaring tool (clutch type), pipe cutter, reamer	Copper pipe gauge for clearance Adjustment, flaring tool (clutch type)*1)
Bending, connecting pipes	Torque wrench (nominal diameter 1/4, 3/8, 1/2) Fixed spanner (opposing sides 12 mm, 17 mm, 19 mm) Adjustable wrench, Spring bender	
Air purging	Vacuum pump Hexagonal wrench (opposing sides 4 mm)	Manifold gauge, charging hose, vacuum pump adaptor
Gas leak inspection	Gas leak inspection fluid or soapy water	Electric gas leak detector for HFC refrigerant*2)

*1) You can use the conventional (R22) flaring tool. If you need to buy a new tool, buy the R410A type.

*2) Use when it is necessary to detect small gas leaks.

For other installation work, you should have the usual tools, such as screwdrivers (+,-), a metal-cutting saw, an electrical drill, a hole core drill (65 or 70 dia.), a tape measure, a level, a thermometer, a clamp meter, an insulation tester, a voltmeter, etc.

Table 4 Tools for serving

Type of work	Ordinary tools	R410A tools
Refrigerant charging		Electronic scale for refrigerant charging Refrigerant cylinder Charging orifice and packing for refrigerant cylinder
Brazing (Replacing refrigerating cycle part*1)	Nitrogen blow set (be sure to use nitrogen blowing for all brazing), and brazing), and brazing machine	

*1) Always replace the dryer of the outdoor unit at the same time. The replacement dryer is wrapped in a vacuum pack. Replace it last among the refrigerating cycle parts. Start brazing as soon as you have opened the vacuum pack, and begin the vacuuming operation within 2 hours.

9.2.2. R410A Tools

1. Cooper tube gauge for clearance adjustment
(used when flaring with the conventional flaring tool (clutch type))

- This gauge makes it easy to set the clearance for the copper tube to 1.0-1.5 mm from the clamp bar of the flaring tool.

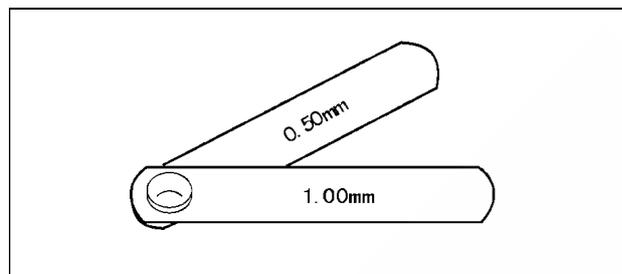


Fig. 1 Copper tube gauge for clearance adjustment

2. Flaring tool (clutch type)

- In the R410A flaring tool, the receiving hole for the clamp bar is enlarged so the clearance from the clamp bar can be set to 0-0.5 mm, and the spring inside the tool is strengthened to increase the strength of the pipe-expanding torque. This flaring tools can also be used with R22 piping, so we recommend that you select it if you are buying a new flaring tool.

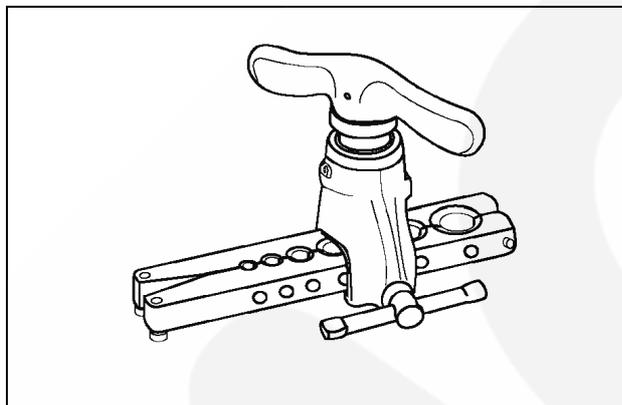


Fig. 2 Flaring tool (clutch type)

3. Torque wrenches

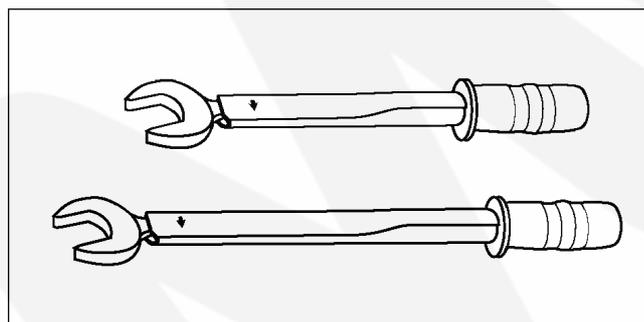


Fig. 3 Torque wrenches

Table 5

	Conventional wrenches	R410A wrenches
For 1/4 (opposite side x torque)	17 mm x 18 N.m (180 kgf.cm)	17 mm x 18 N.m (180 kgf.cm)
For 3/8 (opposite side x torque)	22 mm x 42 N.m (420 kgf.cm)	22 mm x 42 N.m (420 kgf.cm)
For 1/2 (opposite side x torque)	24 mm x 55 N.m (550 kgf.cm)	26 mm x 55 N.m (550 kgf.cm)

4. Manifold gauge

- Because the pressure is higher for the R410A type, the conventional type cannot be used.

Table 6 Difference between R410A and conventional high / low-pressure gauges

	Conventional Gauges	R410A Gauges
High-pressure gauge (red)	-76 cmHg - 35 kgf/cm ³	-0.1 - 5.3 Mpa -76 cmHg - 53 kgf/cm ³
High-pressure gauge (blue)	-76 cmHg - 17 kgf/cm ³	-0.1 - 3.8 Mpa -76 cmHg - 38 kgf/cm ³

- The shape of the manifold ports has been changed to prevent the possibility of mistakenly charging with another type of refrigerant.

Table 7 Difference between R410A and conventional manifold port size

	Conventional gauges	R410A gauges
Port size	7/6 UNF 20 threads	1/2 UNF 20 threads

5. Charging hose

- The pressure resistance of the charging hose has been raised to match the higher pressure of R410A. The hose material has also been changed to suit HFC use, and the size of the fitting has been changed to match the manifold ports.

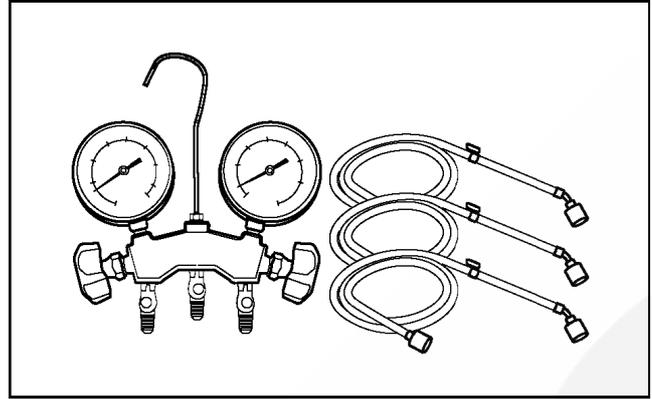


Fig. 4 Manifold gauge charging hose

Table 8 Difference between R410A and conventional charging hoses

		Conventional hoses	R410A hoses
Pressure resistance	Working pressure	3.4 MPa (35 kgf/cm ³)	5.1 MPa (52 kgf/cm ³)
	Bursting pressure	17.2 MPa (175 kgf/cm ³)	27.4 MPa (280 kgf/cm ³)
Material		NBR rubber	HNBR rubber Nylon coating inside

6. Vacuum pump adaptor

- When using a vacuum pump for R410A, it is necessary to install an electromagnetic valve to prevent the vacuum pump oil from flowing back into the charging hose. The vacuum pump adaptor is installed for that purpose. If the vacuum pump oil (mineral oil) becomes mixed with R410A, it will damage the unit.

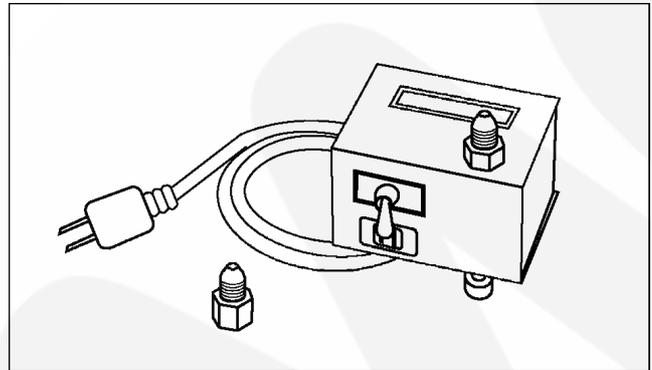


Fig. 5 Vacuum pump adaptor

7. Electric gas leak detector for HFC refrigerant

- The leak detector and halide torch that were used with CFC and HCFC cannot be used with R410A (because there is no chlorine in the refrigerant).
- The present R134a leak detector can be used, but the detection sensitivity will be lower (setting the sensitivity for R134a at 1, the level for R410A will drop to 0.6).
- For detecting small amounts of gas leakage, use the electric gas leak detector for HFC refrigerant. (Detection sensitivity with R410A is about 23 g/year).

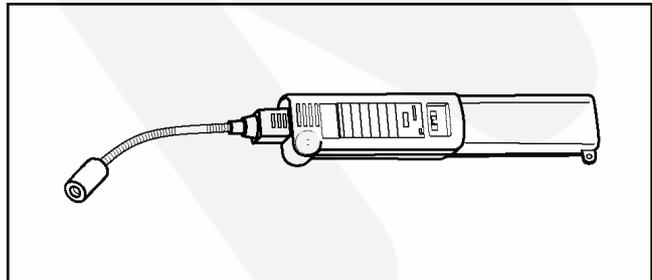


Fig. 6 Electric gas leak detector for HFC refrigerant

8. Electronic scale for refrigerant charging

- Because of the high pressure and fast vaporizing speed of R410A, the refrigerant cannot be held in a liquid phase inside the charging cylinder when charging is done using the charging cylinder method, causing bubbles to form in the measurement scale glass and making it difficult to see the reading. (Naturally, the conventional R22 charging cylinder cannot be used because of the differences in the pressure resistance, scale gradation, connecting port size, etc.)
- The electronic scale has been strengthened by using a structure in which the weight detector for the refrigerant cylinder is held by four supports. It is also equipped with two connection ports, one for R22 (*7/16 UNF, 20 threads) and one for R410A (1/2 UNF, 20 threads), so it can also be used for conventional refrigerant charging.
- There are two types of electronic scales, one for 10-kg cylinders and one for 20-kg cylinders. (The 10-kg cylinder is recommended.)

Refrigerant charging is done manually by opening and closing the valve.

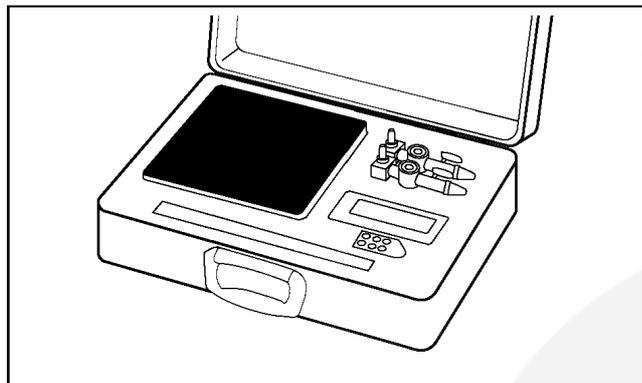


Fig. 7 Electronic scale for refrigerant charging

9. Refrigerant cylinders

- The R410A cylinders are labeled with the refrigerant name, and the coating color of the cylinder protector is pink, which is the color stipulated by ARI of the U.S.
- Cylinder equipped with a siphon tube are available to allow the cylinder to stand upright for liquid refrigerant charging.



Fig. 8 Refrigerant cylinders

10. Charging orifice and packing for refrigerant cylinders

- The charging orifice must match the size of the charging hose fitting (1/2 UNF, 20 threads).
- The packing must also be made of an HFC-resistant material.

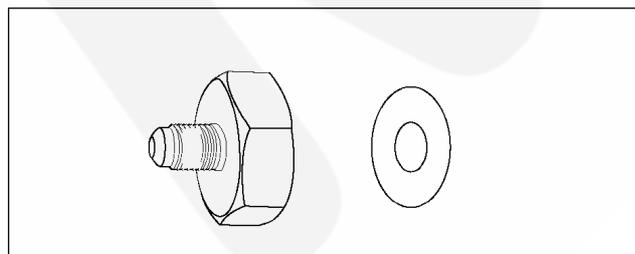


Fig. 9 Charging orifice and packing

9.2.3. R410A Tools Which Are Usable for R22 Models

Table 9 R410A tools which are usable for R22 models

	R410A tools	Usable for R22 models
(1)	Copper tube gauge for clearance adjustment	OK
(2)	Flaring tool (clutch type)	OK
(3)	Manifold gauge	NG
(4)	Charging hose	NG
(5)	Vacuum pump adaptor	OK
(6)	Electric gas leak detector for HFC refrigerant	NG
(7)	Electronic scale for refrigerant charging	OK
(8)	Refrigerant cylinder	NG
(9)	Charging orifice and packing for refrigerant cylinder	NG

9.3. REFRIGERANT PIPING WORK

9.3.1. Piping Materials

It is recommended that you use copper and copper alloy jointless pipes with a maximum oil adherence of 40 mg/10m. Do not use pipes that are crushed, deformed, or discolored (especially the inside surface). If these inferior pipes are used, impurities may clog the expansion valves or capillaries.

Because the pressure of ACs using R410A is higher than those using R22, it is essential that you select materials that are appropriate for these standards.

The thickness of the copper tubing used for R410A is shown in Table 10. Please be aware that tubing with a thickness of only 0.7 mm is also available on the market, but this should never be used.

Table 8 Difference between R410A and conventional charging hoses

Soft pipe		Thickness (mm)	
Nominal diameter	Outside diameter (mm)	R410A	(Reference) R22
1/4	6.35	0.80	0.70
3/8	9.52	0.80	0.70
1/2	12.7	0.80	0.70

9.3.2. Processing and Connecting Piping Materials

When working with refrigerant piping, the following points must be carefully observed: no moisture or dust must be allowed to enter the piping, and there must be no refrigerant leaks.

1. Procedure and precautions for flaring work

a. Cut the pipe

Use a pipe cutter, and cut slowly so the pipe will not be deformed.

b. Remove burrs and clean shavings from the cut surface

If the shape of the pipe end is poor after removing burrs, or if shavings adhere to the flared area, it may lead to refrigerant leaks.

To prevent this, turn the cut surface downward and remove burrs, then clean the surface, carefully.

c. Insert the flare nut (be sure to use the same nut that is used on the AC unit)

d. Flaring

Check the clamp bar and the cleanliness of the copper pipe.

Be sure to use the clamp bar to do the flaring with accuracy. Use either an R410A flaring tool, or a conventional flaring tool. Flaring tools come in different sizes, so be sure to check the size before using. When using a conventional flaring tool, use the copper pipe gauge for clearance adjustment, etc., to ensure the correct A dimension (see Fig. 10)

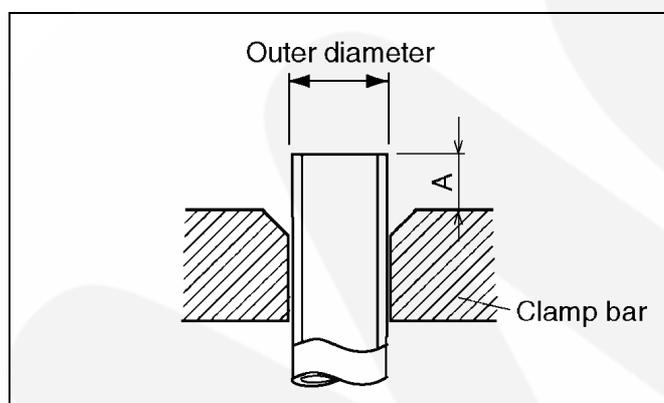


Fig. 10 Flaring dimensions

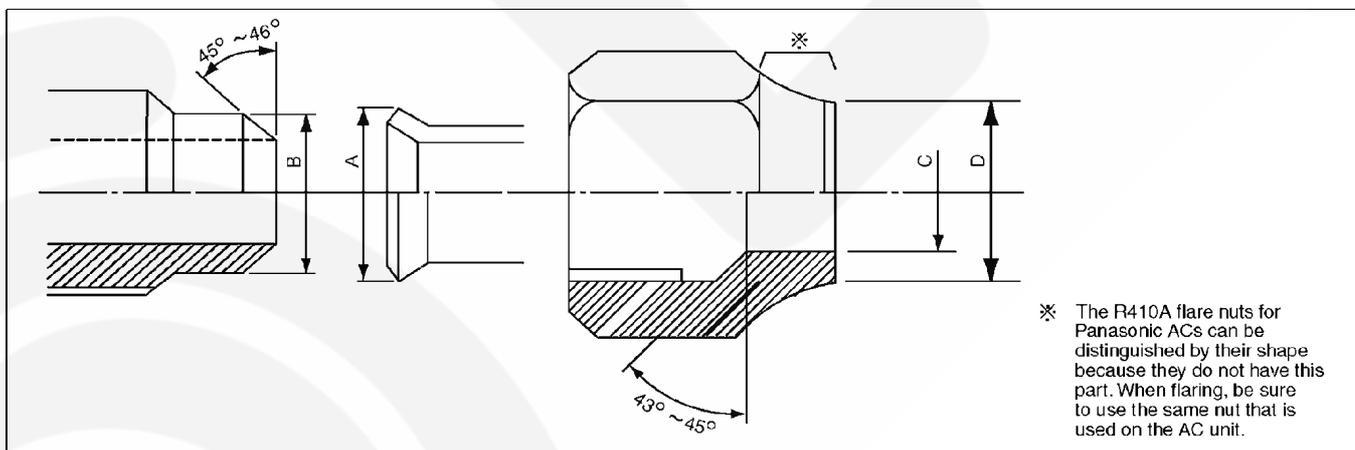


Fig. 11 Relation between the flare nut structure and flaring tool end

Table 11 R410A flaring dimensions

Nominal diameter (in)	Outside diameter (mm)	Wall thickness (mm)	A (mm)		
			R410A flaring tool, clutch type	Conventional flaring tool	
				Clutch type	Wing-nut type
1/4	6.35	0.8	0 - 0.5	1.0 - 1.5	1.5 - 2.0
3/8	9.52	0.8	0 - 0.5	1.0 - 1.5	1.5 - 2.0
1/2	12.70	0.8	0 - 0.5	1.0 - 1.5	2.0 - 2.5

Table 12 R410A flaring dimensions

Nominal diameter (in)	Outside diameter (mm)	Wall thickness (mm)	A (mm)		
			R410A flaring tool, clutch type	Conventional flaring tool	
				Clutch type	Wing-nut type
1/4	6.35	0.8	0 - 0.5	0.5 - 1.0	1.0 - 1.5
3/8	9.52	0.8	0 - 0.5	0.5 - 1.0	1.0 - 1.5
1/2	12.70	0.8	0 - 0.5	0.5 - 1.0	1.5 - 2.0

Table 13 R410A flaring and flare nut dimensions Unit: mm

Nominal diameter (in)	Outside diameter (mm)	Wall thickness (mm)	A +0, -0.4	B dimension	C dimension	D dimension	Flare nut width
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.6	16.0	12.9	23	26

Table 14 R410A flaring and flare nut dimensions Unit: mm

Nominal diameter (in)	Outside diameter (mm)	Wall thickness (mm)	A +0, -0.4	B dimension	C dimension	D dimension	Flare nut width
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.2	16.0	12.9	20	24

2. Procedure and precautions for flare connection

- Check to make sure there are no scratches, dust, etc., on the flare and union.
- Align the flared surface with the axial center of the union.
- Use a torque wrench, and tighten to the specified torque. The tightening torque for R410A is the same as the conventional torque value for R22. Be careful, because if the torque is too weak, it may lead to a gas leak. If it is too strong, it may split the flare nut or make it impossible to remove the flare nut.

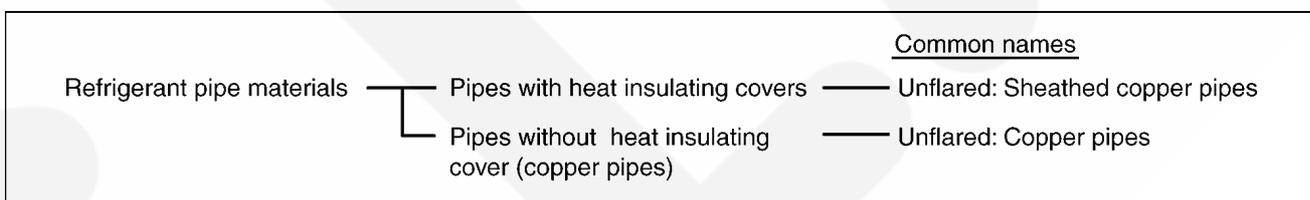
Table 15 R410A tightening torque

Nominal diameter (in)	Outside diameter (mm)	Tightening torque N.m (kgf.cm)	Torque wrench tightening torque N.m (kgf.cm)
1/4	6.35	14 - 18 (140 - 180)	18 (180)
3/8	9.52	33 - 42 (330 - 420)	42 (420)
1/2	12.70	55 (550)	55 (550)

9.3.3. Storing and managing Piping Materials

1. Types of piping and their storage

The following is a general classification of the refrigerant pipe materials used for ACs.



Because the gas pressure of R410A is approximately 1.6 times as high as that of R22, copper pipes with the thickness shown in Table 10, and with minimal impurities must be used. Care must also be taken during storage to ensure that pipes are not crushed, deformed, or scratched, and that no dust, moisture or other substance enters the pipe interior. When storing sheathed copper pipes or plain copper pipes, seal the openings by pinching or taping them securely.

2. Makings and management

a. Sheathed copper pipes and copper-element pipes

When using these pipes, check to make sure that they are the stipulated thickness. For flare nuts, be sure to use the same nut that is used on the AC unit.

b. Copper pipes

Use only copper pipes with the thickness given in table 10, and with minimal impurities. Because the surface of the pipe is exposed, you should take special care, and also take measures such as marking the pipes to make sure they are easily distinguished from other piping materials, to prevent mistaken use.

3. Precautions during refrigerant piping work

Take the following precautions on-site when connecting pipes. (Keep in mind that the need to control the entry of moisture and dust is even more important than in conventional piping).

- Keep the open ends of all pipes sealed until connection with AC equipment is complete.
- Take special care when doing piping work on rainy days. The entering of moisture will degrade the refrigerating machine oil, and lead to malfunctions in the equipment.
- Complete all pipe connections in as short a time as possible. If the pipe must be left standing for a long time after removing the seal, it must be thoroughly purged with nitrogen, or dried with a vacuum pump.

9.4. INSTALLATION, TRANSFERRING, SERVICING

9.4.1. Inspecting Gas Leaks with a Vacuum Pump for New Installations (Using New Refrigerant Piping)

- From the viewpoint of protecting the global environment, please do not release refrigerant into the atmosphere.
 - Connect the projecting side (pin-pushing side) of the charging hose for the manifold gauge to the service port of the 3-way valve. (1)
 - Fully open the handle Lo of the manifold gauge and run the vacuum pump. (2) (If the needle of the low-pressure gauge instantly reaches vacuum, re-check step a.)
 - Continue the vacuum process for at least 15 minutes, then check to make sure the low-pressure gauge has reached -0.1 MPa (-76 cmHg). Once the vacuum process has finished, fully close the handle Lo of the manifold gauge and stop the vacuum pump operation, then remove the charging hose that is connected to the vacuum pump adaptor. (Leave the unit in that condition for 1-2 minutes, and make sure that the needle of the manifold gauge does not return.) (2) and (3)
 - Turn the valve stem of the 2-way valve 90 counter-clockwise to open it, then, after 10 seconds, close it and inspect for a gas leak (4)
 - Remove the charging hose from the 3-way valve service port, then open both the 2-way valve and 3-way valve. (1) (4) (Turn the valve stem in the counter-clockwise direction until it gently makes contact. Do not turn it forcefully).
 - Tighten the service port cap with a torque wrench (18 N.m (1.8 kgf.m)). (5) Then tighten the 2-way valve and 3-way valve caps with a torque wrench (42 N.m (4.2 kgf.m)) or (55 N.m (5.5 kgf.m)).
 - After attaching each of the caps, inspect for a gas leak around the cap area. (5) (6)

Precautions

- Be sure to read the instructions for the vacuum pump, vacuum pump adaptor and manifold gauge prior to use, and follow the instructions carefully.
- Make sure that the vacuum pump is filled with oil up to the designated line on the oil gauge.
- The gas pressure back flow prevention valve on the charging hose is generally open during use. When you are removing the charging hose from the service port, it will come off more easily if you close this valve.

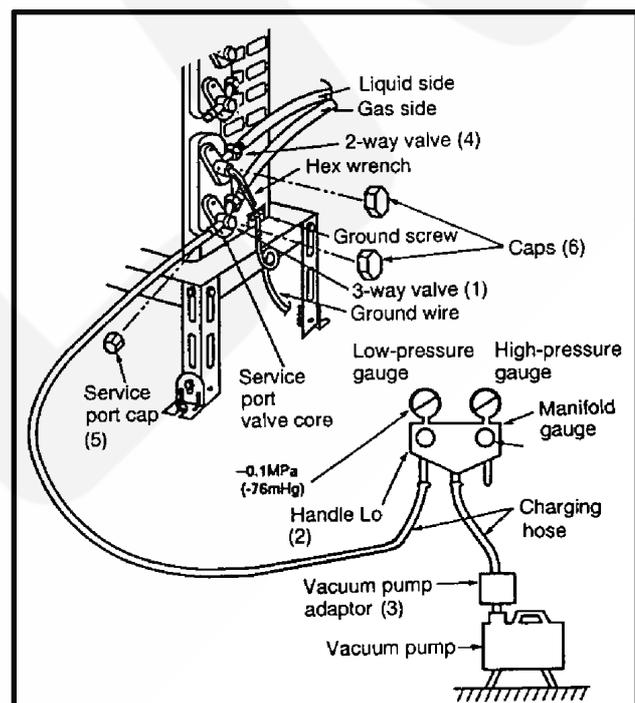


Fig. 12 Vacuum pump air purging configuration

9.4.2. Transferring (Using New Refrigerant Piping)

1. Removing the unit

a. Collecting the refrigerant into the outdoor unit by pumping down

The refrigerant can be collected into the outdoor unit (pumping down) by pressing the TEST RUN button, even when the temperature of the room is low.

- Check to make sure that the valve stems of the 2-way valve and 3-way valve have been opened by turning them counter-clockwise. (Remove the valve stem caps and check to see that the valve stems are fully opened position. Always use a hex wrench (with 4-mm opposing sides) to operate the valve stems.)
- Press the TEST RUN button on the indoor unit, and allow preliminary for 5-6 minutes. (TEST RUN mode)
- After stopping the operation, let the unit sit for about 3 minutes, then close the 2-way valve by turning the valve stem in the clockwise direction.
- Press the TEST RUN button on the indoor unit again, and after 2-3 minutes of operation, turn the valve stem of the 3-way valve quickly in the clockwise direction to close it, then stop the operation.
- Tighten the caps of the 2-way valve and 3-way valve to the stipulated torque.
- Remove the connection pipes (liquid side and gas side).

2. Installing the unit

Install the unit using new refrigerant piping. Follow the instructions in section 4.1 to evacuate the pipes connecting the indoor and outdoor units, and the pipes of the indoor unit, and check for gas leaks.

9.4.3. AC Units Replacement (Using Existing Refrigerant Piping)

When replacing an R410A AC unit with another R410A AC unit, you should re-flare the refrigerant piping. Even though the replacement AC unit uses the R410A, problems occur when, for example, either the AC unit maker or the refrigerating machine oil is different.

When replacing an R22 AC unit with an R410A AC unit, the following checks and cleaning procedures are necessary but are difficult to do because of the chemical characteristics of the refrigerating machine oil (as described in items c) and d) of section 10.1.1.(2)). In this case, you should use new refrigerant piping rather than the existing piping.

1. Piping check

Because of the different pressure characteristics of R22 and R410A, the design pressure for the equipment is 1.6 times different. The wall thickness of the piping must comply with that shown in Table 10, but this is not easy to check. Also, even if the thickness is correct, there may be flattened or bent portions midway through the piping due to sharp curves. Buried sections of the piping also cannot be checked.

2. Pipe cleaning

A large quantity of refrigerating machine oil (mineral oil) adheres to existing pipes due to the refrigeration cycle circulation. If the pipes are used just as they are for the R410A cycle, the capacity will be lowered due to the incompatibility of this oil with the R410A, or irregularities may occur in the refrigeration cycle. For this reason, the piping must be thoroughly cleaned, but this is difficult with the present technology.

9.4.4. Refrigerant Compatibility (Using R410A Refrigerant in R22 ACs and Vice Versa)

Do not operate an existing R22 AC with the new R410A refrigerant. Doing so would result in improper functioning of the equipment or malfunction, and might lead to a major accident such as an explosion in the refrigeration cycle. Similarly, do not operate an R410A AC with R22 refrigerant. The chemical reaction between the refrigerating machine oil used in R410A ACs and the chlorine that is contained in R22 would cause the refrigerating machine oil to degrade and lead to malfunction.

9.4.5. Recharging Refrigerant During Servicing

When recharging is necessary, insert the specified amount of new refrigerant in accordance with the following procedure.

1. Connect the charging hose to the service port of the outdoor unit.
2. Connect the charging hose to the vacuum pump adaptor. At this time, fully open the 2-way valve and 3-way valve.
3. Fully open the handle Lo of the manifold gauge, turn on the power of the vacuum pump and continue the vacuum process for at least one hour.
4. Confirm that the low pressure gauge shows a reading of -0.1 Mpa (-76 cmHg), then fully close the handle Lo, and turn off the vacuum pump. Wait for 1-2 minutes, then check to make sure that the needle of the Low pressure gauge has not returned. See Fig. 13 for the remaining steps of this procedure.

5. Set the refrigerant cylinder onto the electronic scale, then correct the hose the cylinder and to the connection port for the electronic scale. (1)(2)

Precaution:

Be sure to set up the cylinder for liquid charging. If you use a cylinder equipped with a siphon tube, you can charge the liquid without having to turn the cylinder around

6. Remove the charging hose of the manifold gauge from the vacuum pump adaptor, and connect it to the connection port of the electronic scale. (2)(3)
7. Open the valve of the refrigerant cylinder, then open the charging valve slightly and close it. Next, press the check valve of the manifold gauge and purge the air. (2)(4) (Watch the liquid refrigerant closely at this point.)
8. After adjusting the electronic scale to zero, open the charging valve, then open the valve Lo of the manifold gauge and charge with the liquid refrigerant. (2)(5) (Be sure to read the operating instructions for the electronic scale.)
9. If you cannot charge the stipulated amount, operate the unit in the cooling mode while charging a little of the liquid at a time (about 150 g/time as a guideline). If the charging amount is insufficient from one operation, wait about one minute, then use the same procedure to do the liquid charging again.

Precaution:

Never use the gas side to allow a larger amount of liquid refrigerant to be charged while operating the unit.

10. Close the charging valve, and after charging the liquid refrigerant inside the charging hose, fully close the valve Lo of the manifold gauge, and stop the operation of the unit. (2)(5)
11. Quickly remove the charging hose from the service port. (6) If you stop midway through, the refrigerant that is in the cycle will be discharged.
12. After putting on the caps for the service port and operating valve, inspect around the caps for a gas leak. (6)(7)

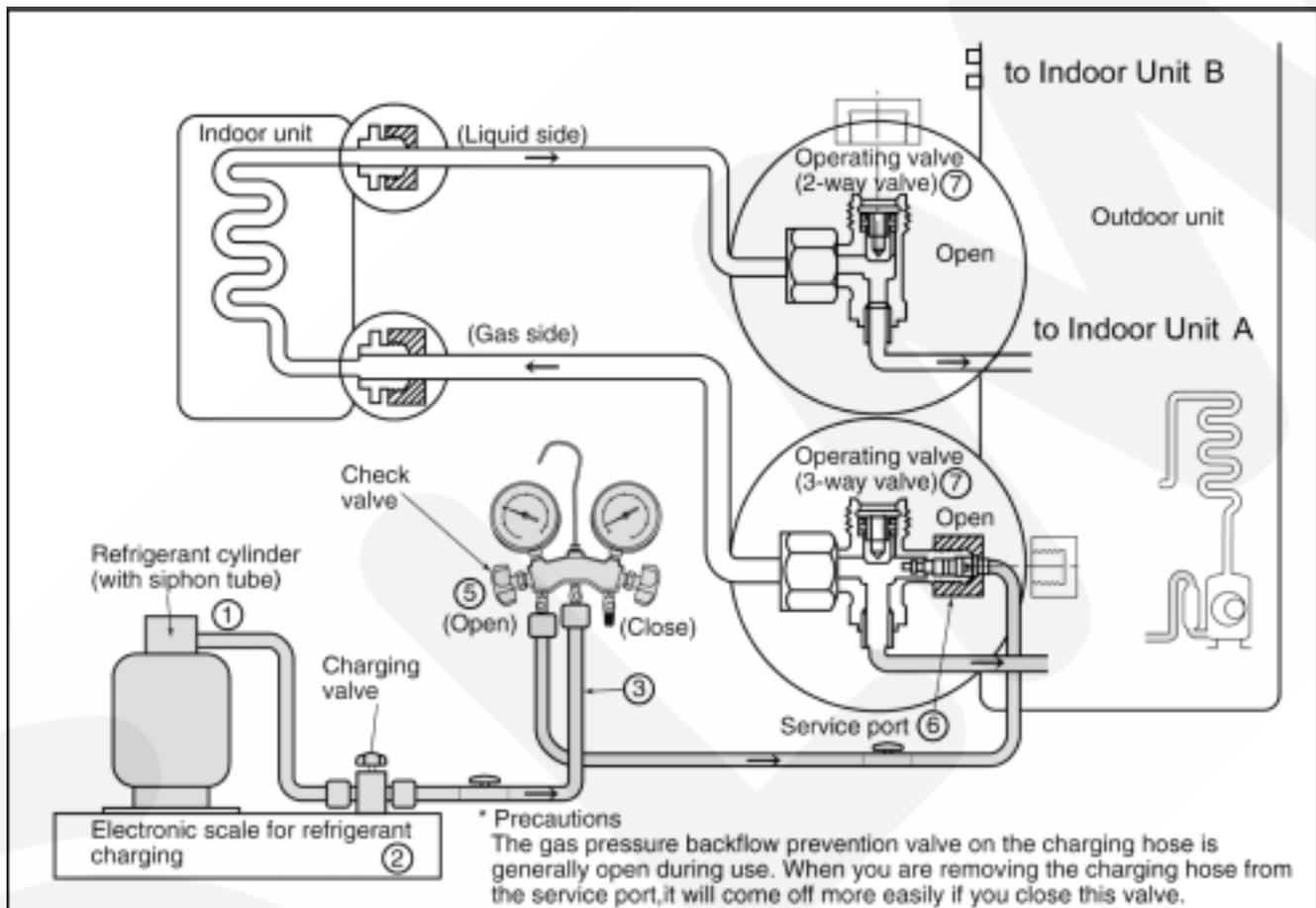


Fig. 13 Re-charging refrigerant

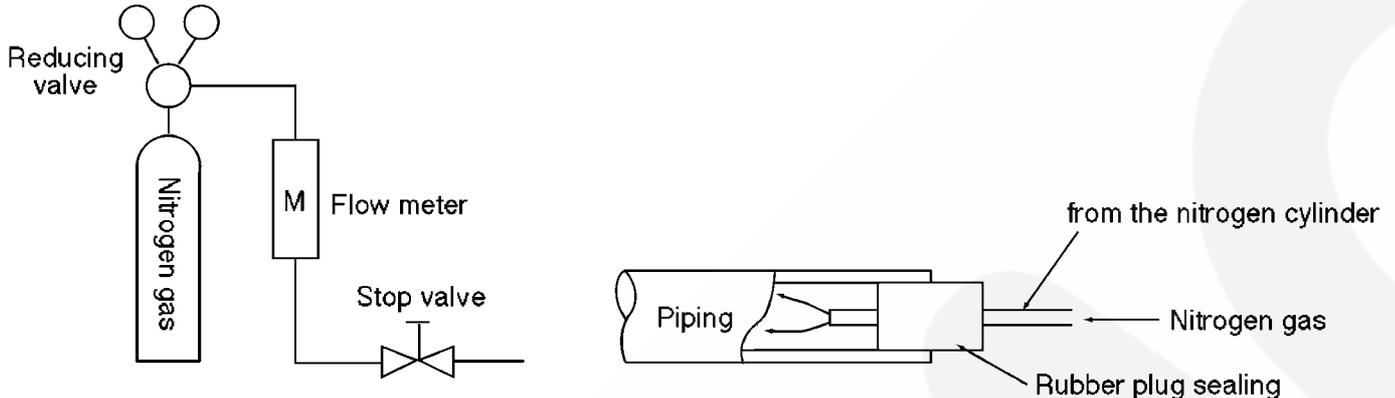
9.4.6. Brazing

As brazing requires sophisticated techniques and experiences, it must be performed by a qualified person.

In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry nitrogen gas (N₂) flow.

<Brazing Method for Preventing Oxidation>

1. Attach a reducing valve to the nitrogen gas cylinder.
2. Attach a reducing valve to the nitrogen gas cylinder.
3. Apply a seal onto the clearance between the piping and inserted pipe for the nitrogen gas in order to prevent the nitrogen gas from flowing backward.
4. When the nitrogen gas is flowing, be sure to keep the piping end open.
5. Adjust the flow rate of nitrogen gas so that it is lower than 0.05 m³/h, or 0.02 MPa (0.2 kgf/cm²) by means of the reducing valve.
6. After taking the steps above, keep the nitrogen gas flowing until the piping cools down to a certain extent (i.e. temperature at which pipes are touchable with finger).
7. Completely remove the flux after brazing.



Cautions during brazing

1. General Cautions

- a. The brazing strength should be high as required.
- b. After operation, airtightness should be kept under pressurized condition.
- c. During brazing do not allow component materials to become damaged due to overheating.
- d. The refrigerant pipe work should not become blocked with scale or flux.
- e. The brazed part should not restrict the flow in the refrigerant circuit.
- f. No corrosion should occur from the brazed part.

2. Preventing of Overheating

Due to heating, the interior and exterior surfaces of treated metal may oxidize. Especially, when the interior of the refrigerant circuit oxidizes due to overheating, scale occurs and stays in the circuit as dust, thus exerting a fatally adverse effect. So, make brazing at adequate brazing temperature and with minimum of heating area.

3. Overheating Protection

In order to prevent components near the brazed part from overheating damaged or quality deterioration due to flame or heat, take adequate steps for protection such as (1) by shielding with a metal plate, (2) by using a wet cloth, and (3) by means of heat absorbent.

4. Movement during Brazing

Eliminate all vibration during brazing to protect brazed joints from cracking and breakage.

5. Oxidation Preventative

In order to improve the brazing efficiency, various types of antioxidant are available on the market. However, the constituents of these are widely varied, and some are anticipated to corrode the piping materials, or adversely affect HFC refrigerant, lubricating oil, etc. Exercise care when using an oxidation preventative.

9.4.7. Servicing Tips

The drier must also be replaced whenever replacing the refrigerant cycle parts. Replacing the refrigerant cycle parts first before replacing the drier. The drier is supplied in a vacuum pack. Perform brazing immediately after opening the vacuum pack, and then start the vacuum within two hours. In addition, the drier also needs to be replaced when the refrigerant has leaked completely.

10 Disassembly of the parts

● Disassembly of Electronic Controller

1. Open the front grille and cover of the control board, the electronic controller, signal receiver and indicators can be seen.

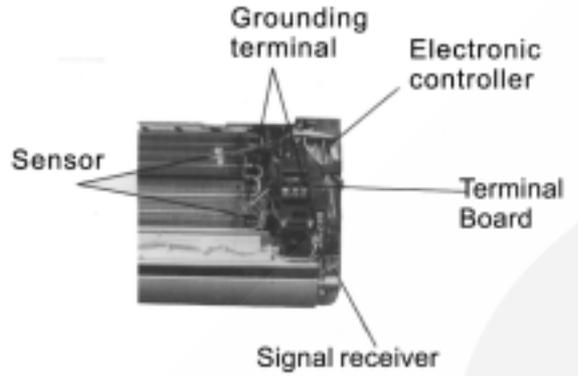


Fig 1

2. Release all the connectors and screws to remove the electronic controller.(Refer to Fig 2, Fig 3, Fig 4)

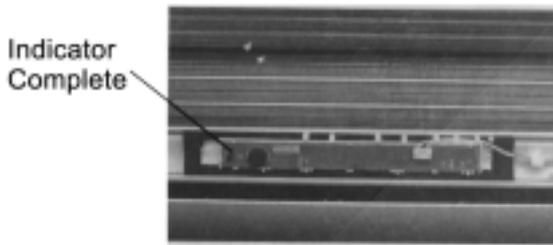


Fig 2

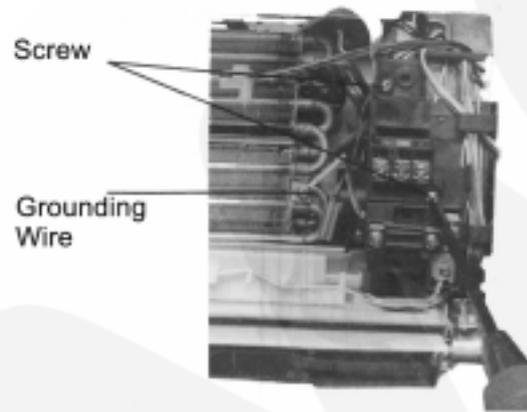


Fig 4

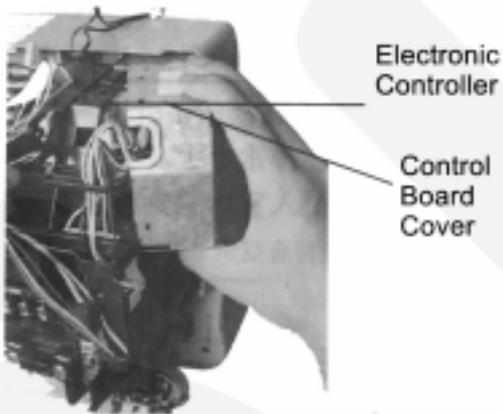


Fig 3

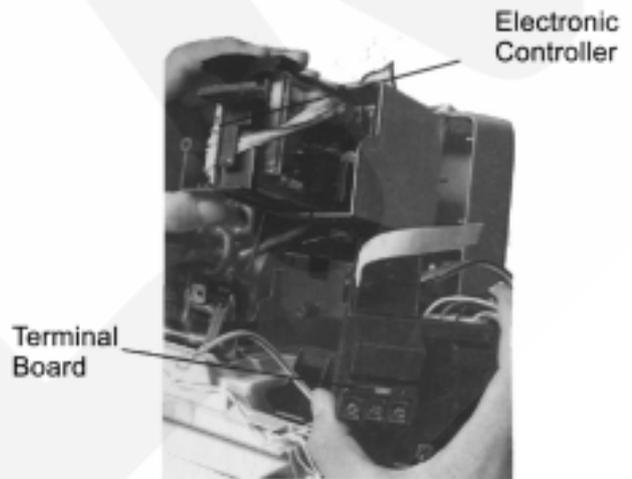


Fig 5

● Disassembly of Indoor Fan Motor

1. Remove the electronic controller and the terminal board.

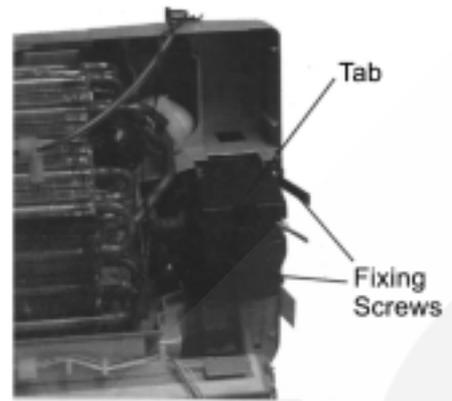


Fig 6

2. Untighten two fixing screws of the fan motor, release two tabs and remove the discharge grille. (Fig 6, Fig 7)

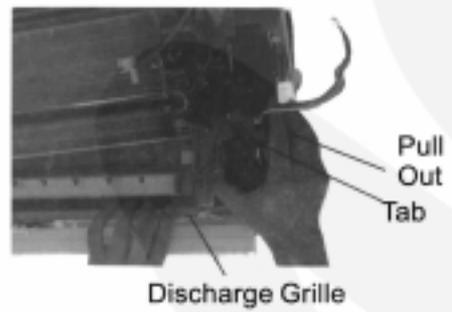


Fig 7

3. Remove the indoor fan motor. (Fig 8, Fig 9)



Fig 8



Fig 9

● **Disassembly of cross flow fan**

1. Remove the indoor fan motor and heat exchanger.

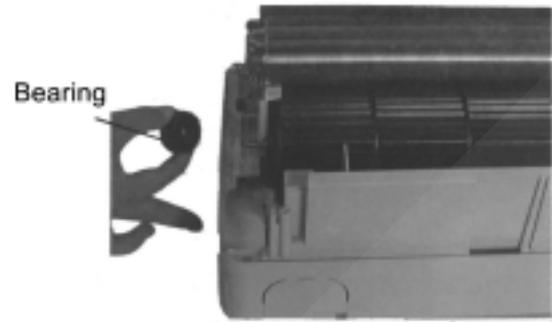


Fig 10

2. Pull out the bearing on the left side. (Fig 10)

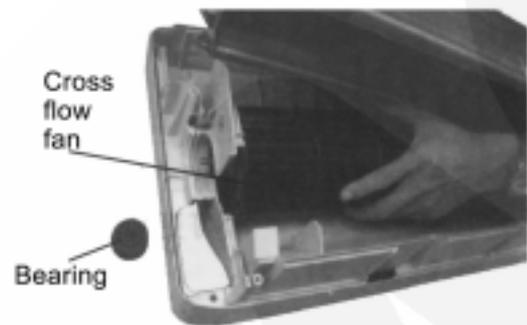


Fig 11

3. Take out the cross flow fan.(Fig 11)



Fig 12

4. Indoor electronic controller.(Fig 12 , Fig 13)



Fig 13

● Disassembly of Outdoor Unit

1. Remove the front panel of the outdoor unit. (Fig 14)



Fig 14



Fig 15

2. Release three fixing screws of C-BOX and all connectors and the C-BOX can be replaced. (Fig 15 , Fig 16 , Fig 17 , Fig 18)

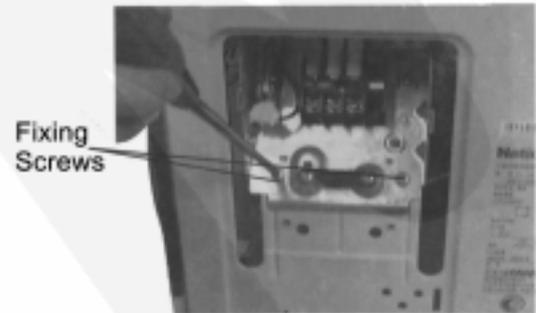


Fig 16

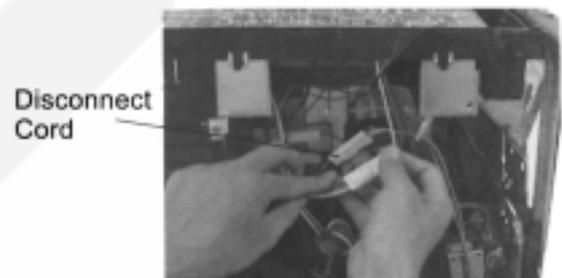


Fig 17

Outdoor
C-BOX



Fig 18

● **Remote control reset**

If the display is chaotic or can not be adjusted, use a pin to gently press RESET button to reset the remote control to the original set by manufacturer.(Fig 19)



Fig 19

11 Trouble-shooting guide

Refrigeration cycle system

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle.

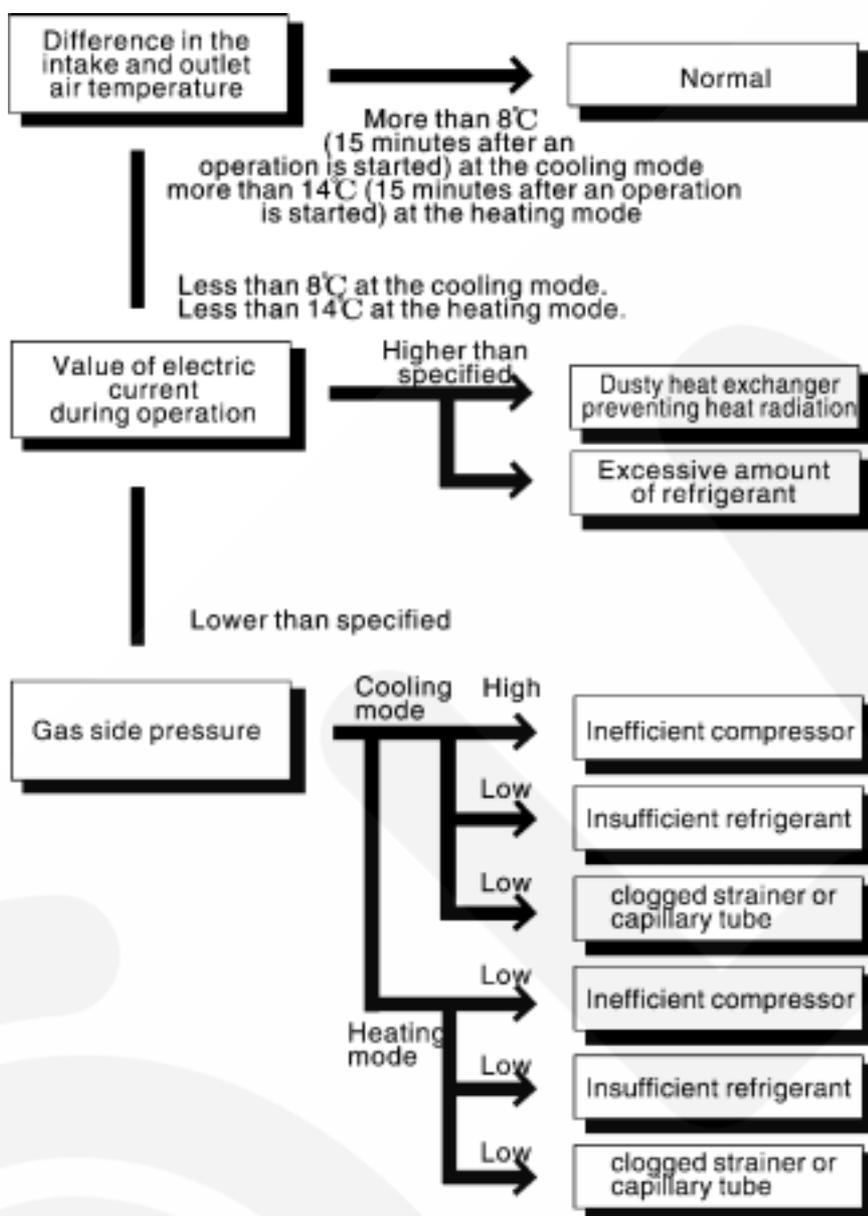
Such problems include insufficient insulation, problem with the power source, malfunction of compressor or fan.

The normal outlet air temperature and pressure of the refrigeration cycle depends on various conditions, the standard values for them are shown in the table to the right.

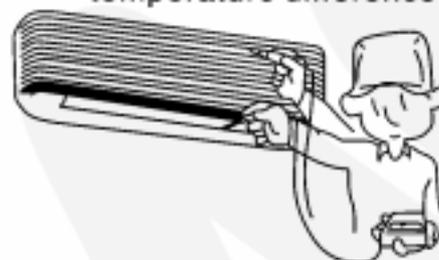
Normal pressure and outlet air temperature (standard)

	Gas side pressure Mpa (kg/cm ² G)	Outlet air temperature (°C)
Cooling mode	0.4~0.6(4~6)	12~16
Heating mode	1.5~2.1(15~21)	36~45

★ Condition: indoor fan speed: high
 outdoor temperature:
 35°C (cooling mode)
 7°C (heating mode)



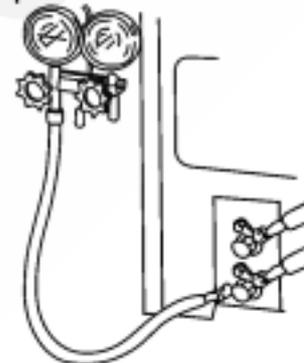
• Measuring the air temperature difference



• Measuring electric current during operation



• Measuring gas side pressure



11.1. Relationship between the condition of air conditioner and pressure and electric current

Condition of the air conditioner	Cooling mode			Heating mode		
	Low Pressure	High Pressure	Electric current during operation	Low Pressure	High Pressure	Electric current during operation
Insufficient refrigerant (gas leakage)	↘	↘	↘	↘	↘	↘
Clogged capillary tube	↘	↘	↘	↘	↘	↘
Short circuit in the indoor unit	↘	↘	↘	↗	↗	↗
Heat radiation deficiency of the outdoor unit	↗	↗	↗	↘	↘	↘
Insufficient compression	↗	↘	↘	↗	↘	↘

11.2. Diagnosis methods of a malfunction of a compressor and a 4-way valve

Nature of fault	Symptom
Insufficient compressing of a compressor	<ul style="list-style-type: none"> ● Electric current during operation becomes approximately 80% lower than the normal level. ● The discharge tube of the compressor becomes abnormally hot (normally 70~90°C). ● The difference between high pressure and low pressure becomes almost zero.
Locked compressor	<ul style="list-style-type: none"> ● Electric current reaches a high level abnormally, and the value exceeds the limit of an ammeter. In some cases, a breaker turns off. ● The compressor has a humming sound.
Inefficient switches of the 4-way valves	<ul style="list-style-type: none"> ● Electric current during operation becomes approximately 20% lower than the normal valve. ● The temperature difference between from the discharge tube to the 4-way valve and from suction tube to the 4-way valve becomes almost zero.

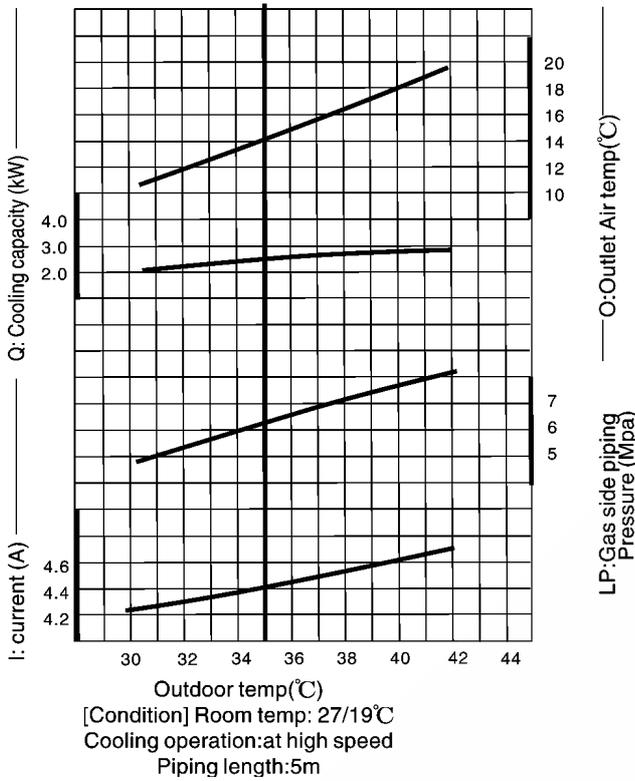
12 Technical Data

■ Operating characteristics

CS/CU-PE9CKE

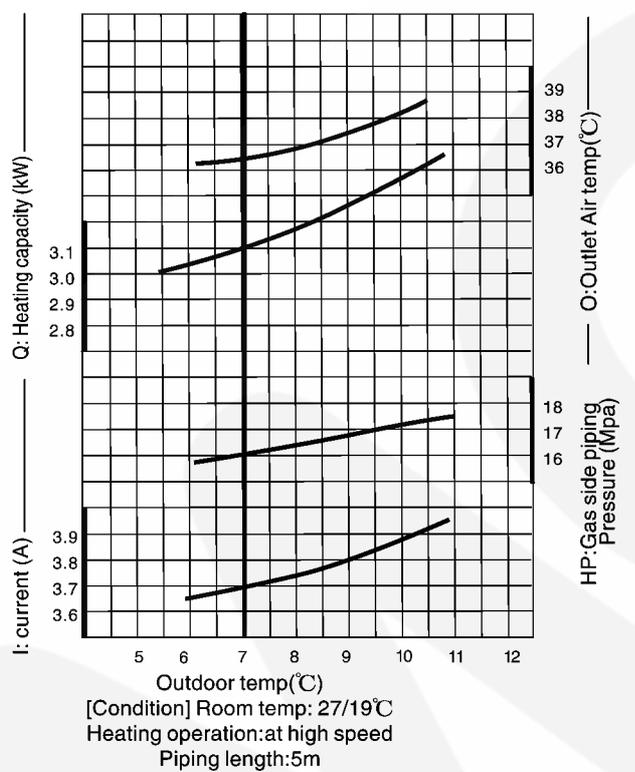
● Cooling characteristics

--- 230V



● Heating characteristics

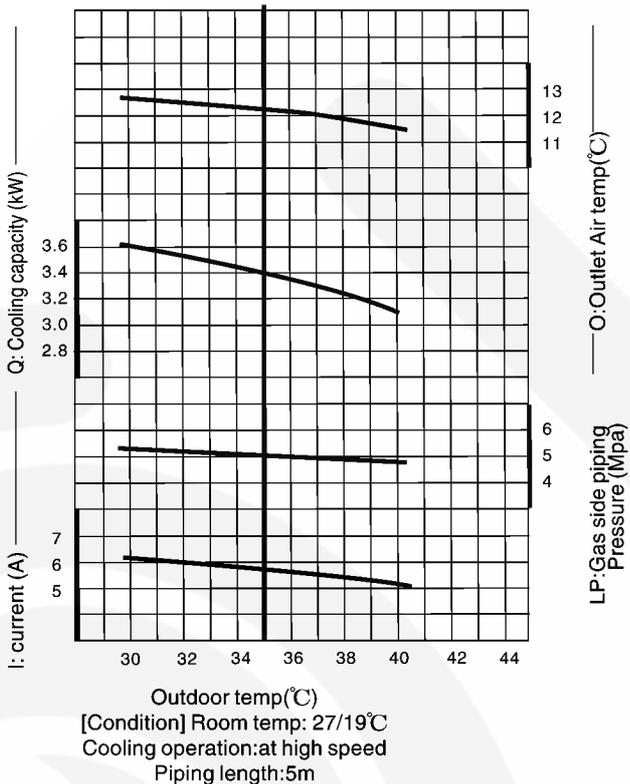
--- 230V



CS/CU-PE12CKE

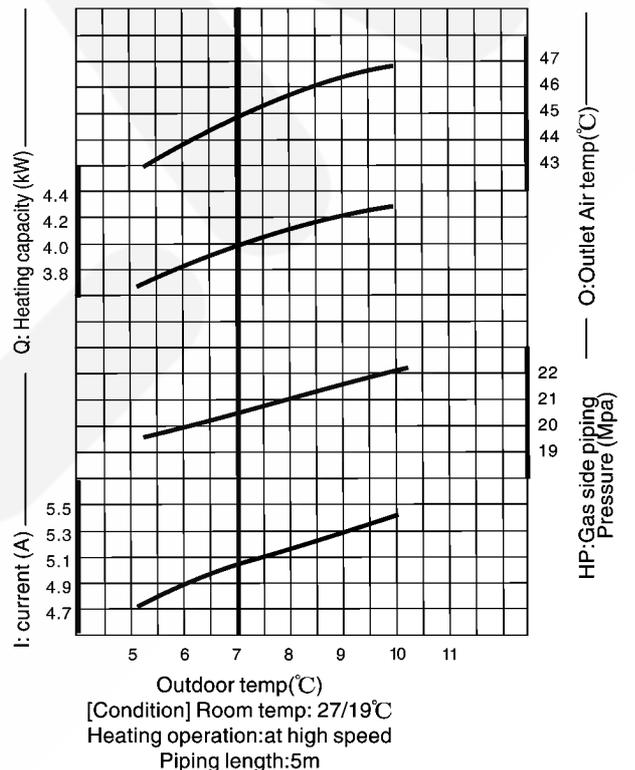
● Cooling characteristics

--- 230V



● Heating characteristics

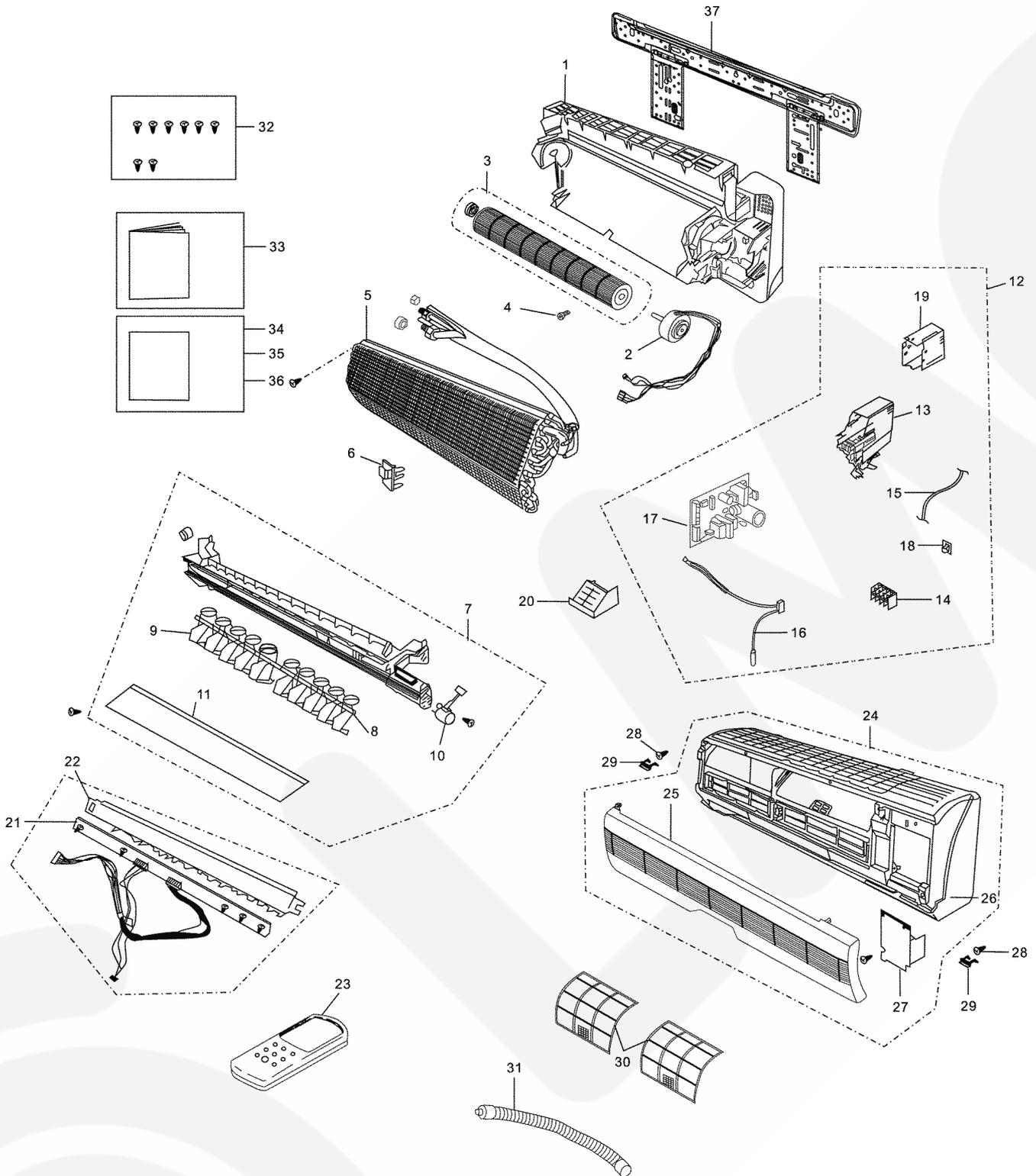
--- 230V



13 Exploded View

CS-PE9CKE/CS-PE12CKE

CS-PE9CKE/CS-PE12CKE



14 Replacement Parts List

CS-PE9CKE/CS-PE12CKE

No.	DESCRIPTION&NAME	Q'ty	CS-PE9CKE	CS-PE12CKE	RE
1	CHASSY ASS'Y	1	CWD50C1346	CWD50C1362	
2	FAN MOTOR	1	CWA981099	←	*
3	CROSS FLOW FAN COMPLETE	1	CWH02C1004	←	
4	SCREW-CROSS FLOW FAN	1	4580304	←	
5	EVAPORATOR	1	CWB30C1452	CWB30C1441	
6	INTAKE AIR SENSOR HOLDER	1	CWH32137	←	
7	DISCHARGE GRILLE COMPLETE	1	CWE20C2281	CWE20C2305	
8	HORIZONTAL AIR FLOW VANE	1	CWE24C1069	←	
9	HORIZONTAL AIR FLOW VANE	1	CWE24C1070	←	
10	MOTOR-AIR SWING	1	CWA981106	←	*
11	VERTICAL AIR FLOW VANE	1	CWE241080	←	
12	CONTROL BOX	1	CWH14C4033	←	
13	CONTROL BOARD	1	CWH102168	←	
14	TERMINAL BOARD COMPLETE	1	CWA28C2192	←	*
15	LEAD WIRE-POWER	1	CWA20C2368	←	
16	SENSOR COMPLETE	1	CWA50C2064	←	*
17	CONTROL PCB	1	CWA743393	←	*
18	RECEIVER	1	CWA742940	←	*
19	CONTROL BOARD COVER-TOP	1	CWH131140	←	
20	CONTROL BOARD COVER-FRONT	1	CWH131141	←	
21	INDICATOR PCB	1	CWA743396	←	
22	HOLDER-INDICATOR	1	CWD932325	←	
23	REMOTE CONTROL COMPLETE	1	CWA75C2551	←	*
24	FRONT GRILLE COMPLETE	1	CWE11C3022	←	
25	INTAKE GRILLE	1	E22K1220	←	
26	FRONT GRILLE	1	CWE121053	←	
27	COVER-TERMINAL	1	CWE141035A	←	
28	SCREW-FRONT GRILLE	2	XTT4+16C	←	
29	CAP-FRONT GRILLE FIXING SCREW	2	CWH521025B	←	
30	AIR FILTER	2	CWD001127	←	
31	DRAIN PIPE	1	CWH851063	←	
32	BAG COMPLETE-INSTALLATION	1	CWH82C1254	←	
33	OPERATION INSTRUCTIONS	1	CWF564285	←	
34	INSTALLATION INSTRUCTIONS	1	CWF612570	←	
35	INSTALLATION INSTRUCTIONS	1	CWF612571	←	
36	INSTALLATION INSTRUCTIONS	1	CWF612572	←	
37	INSTALLATION PLATE	1	CWH36K1008	←	

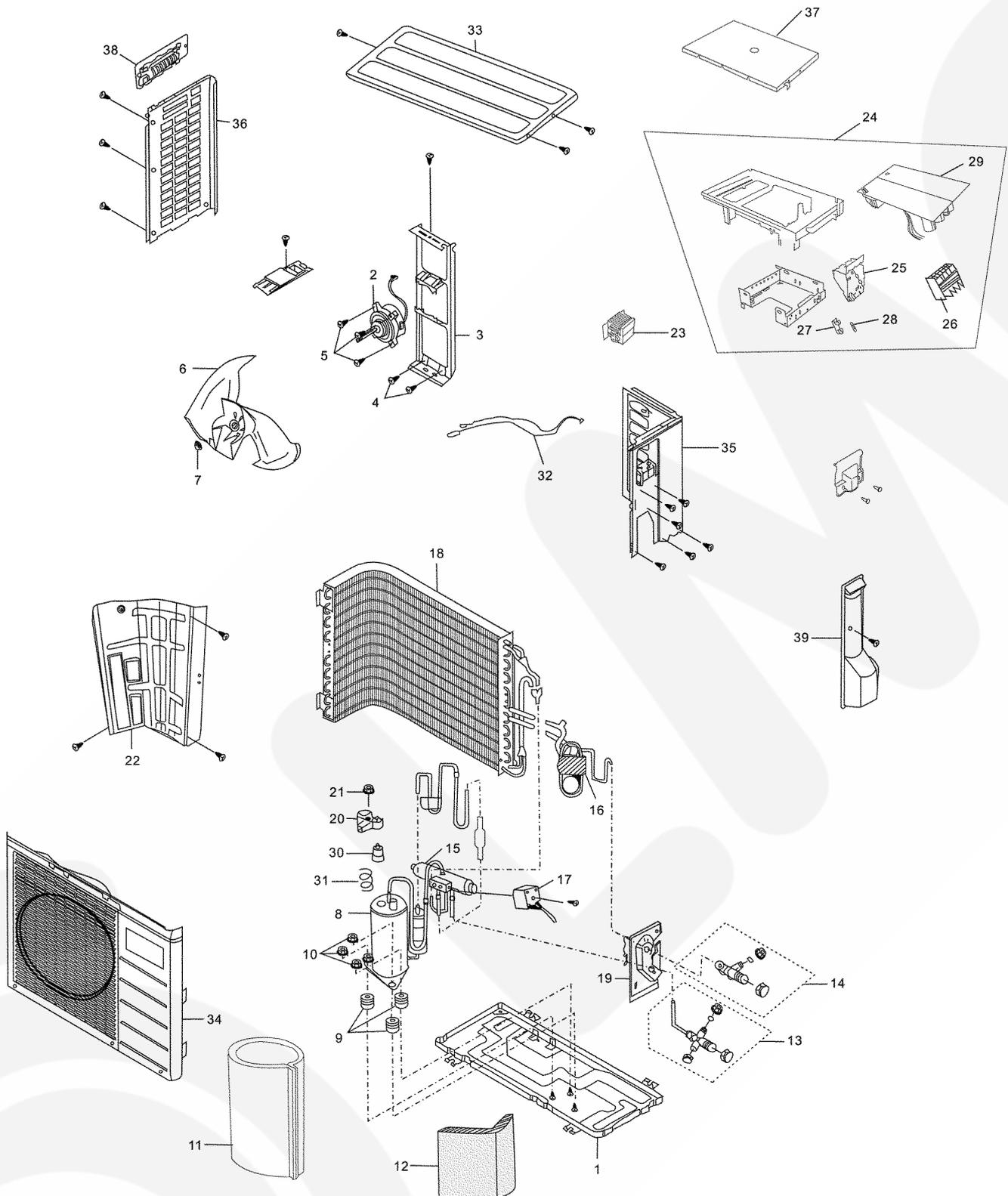
● All parts are supplied by GMAC,P.R. China.

● "*"marked parts are recommended to be kept in stock.

15 Exploded View

CU-PE9CKE/CU-PE12CKE

CU-PE9CKE/CU-PE12CKE



16 Replacement Parts List

CU-PE9CKE/CU-PE12CKE

No.	DESCRIPTION&NAME	Q'ty	CU-PE9CKE	CU-PE12CKE	RE
1	BASE ASS'Y	1	CWD50K2080A	CWD50K2080A	
2	FAN MOTOR	1	CWA951341	CWA951342	*
3	BRACKET-FAN MOTOR	1	CWD541020	←	
4	FIXING SCREW-BRACKET	2	CWH551060	←	
5	FIXING SCREW-MOTOR	4	CWH55406	←	
6	PROPELLER FAN	1	CWH03K1010	←	
7	NUT-P.FAN	1	CWH56053	←	
8	COMPRESSOR	1	CWB092256	←	*
9	MOUNT RUBBER-COMPRESSOR	3	CWH50077	←	
10	NUT-COMP.MOUNT	3	CWH56000	←	
11	SOUND PROOF MATERIAL	1	CWG302224	←	
12	SOUND PROOF MATERIAL	1	CWG302236	←	
13	3-WAY VALVE	1	CWB011211	CWB011232	
14	2-WAY VALVE	1	CWB021161	←	*
15	4-WAY VALVE	1	CWB001037	←	
16	TUBE ASS'Y-CAPILLARY	1	CWT01C2985	CWT01C2986	
17	V-COIL	1	CWA43C2143	←	
18	CONDENSER	1	CWB32C1318	CWB32C1319	
19	HOLDER-COUPLING	1	CWH351040	←	*
20	TERMINAL COVER	1	CWH17006	←	
21	NUT FOR TERMINAL COVER	1	CW7080300	←	
22	SOUND PROOF PANEL	1	CWH151072	CWH151073	
23	REACTOR	1	CWA421050	CWA421060	*
24	CONTROL BOX COMPLETE	1	CWH14C4132	CWH14C4044	
25	CONTROL BOARD	1	CWH102154	←	
26	TERMINAL BOARD ASS'Y	1	CWA28K1050	←	
27	FUSE HOLDER	1	CWK3GB1PH00016	←	
28	FUSE	1	CWK5D203BA002	←	
29	ELECTRONIC CONTROLLER	1	CWA743451	CWA743352	*
30	SENSOR COMPLETE	1	CWA50C2066	←	*
31	SENSOR HOLDER	1	CWH321010	←	
32	SENSOR COMPLETE	1	CWA50C2196+C	←	
33	SURFACE COVER	1	CWE031015A	←	
34	FRONT PANEL-CABINET	1	CWE06C1077	←	
35	SIDE PLATE-RIGHT	1	CWE041051A	CWE041051A	
36	SIDE PLATE-LEFT	1	CWE041086A	←	
37	CONTROL BOARD COVER	1	CWH131101	←	
38	HANDLE	2	CWE161001	←	
39	CONTROL BOARD COVER	1	CWH13C1050	←	

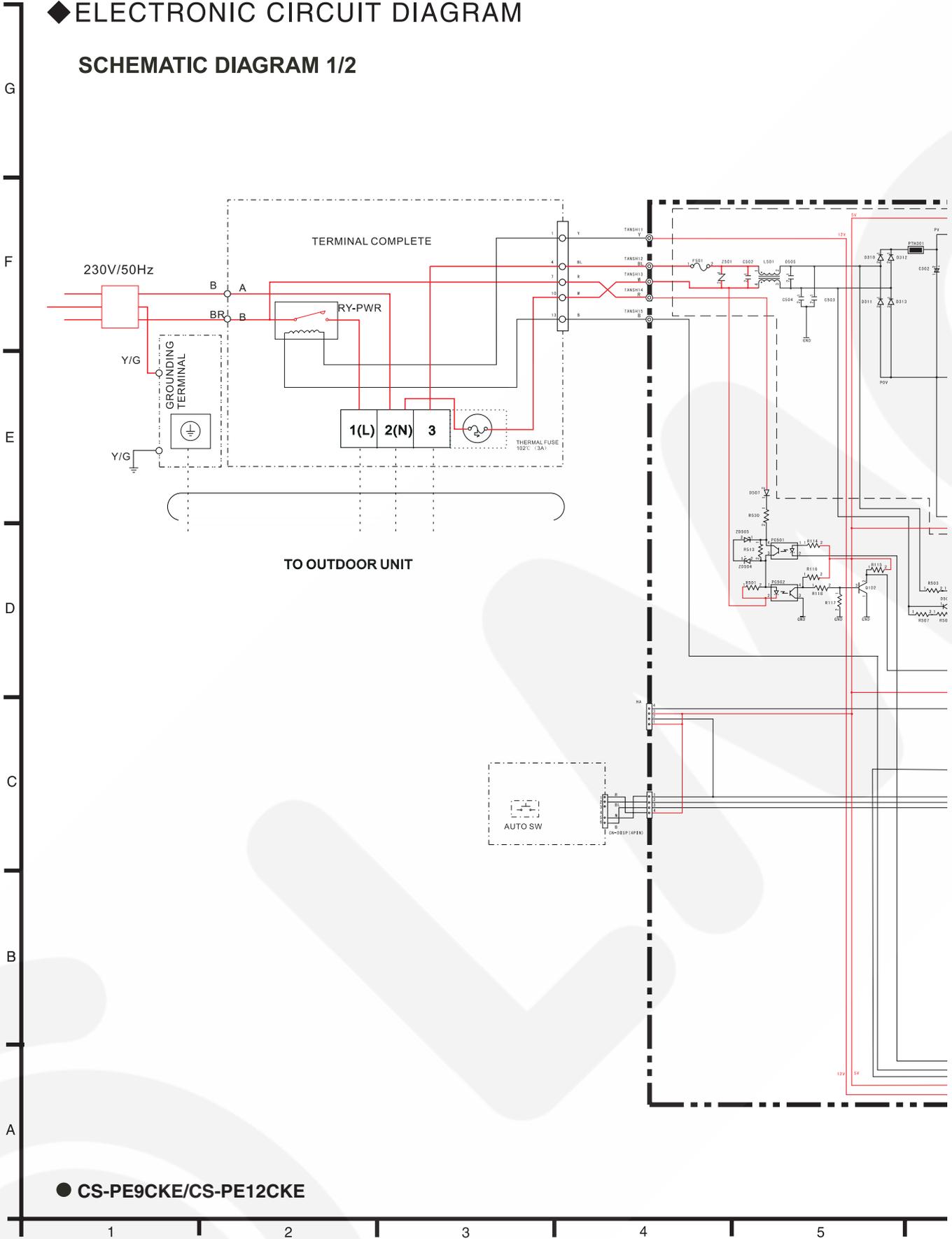
● All parts are supplied by GMAC,P.R. China.

● "*"marked parts are recommended to be kept in stock.

17 Electronic Circuit Diagram

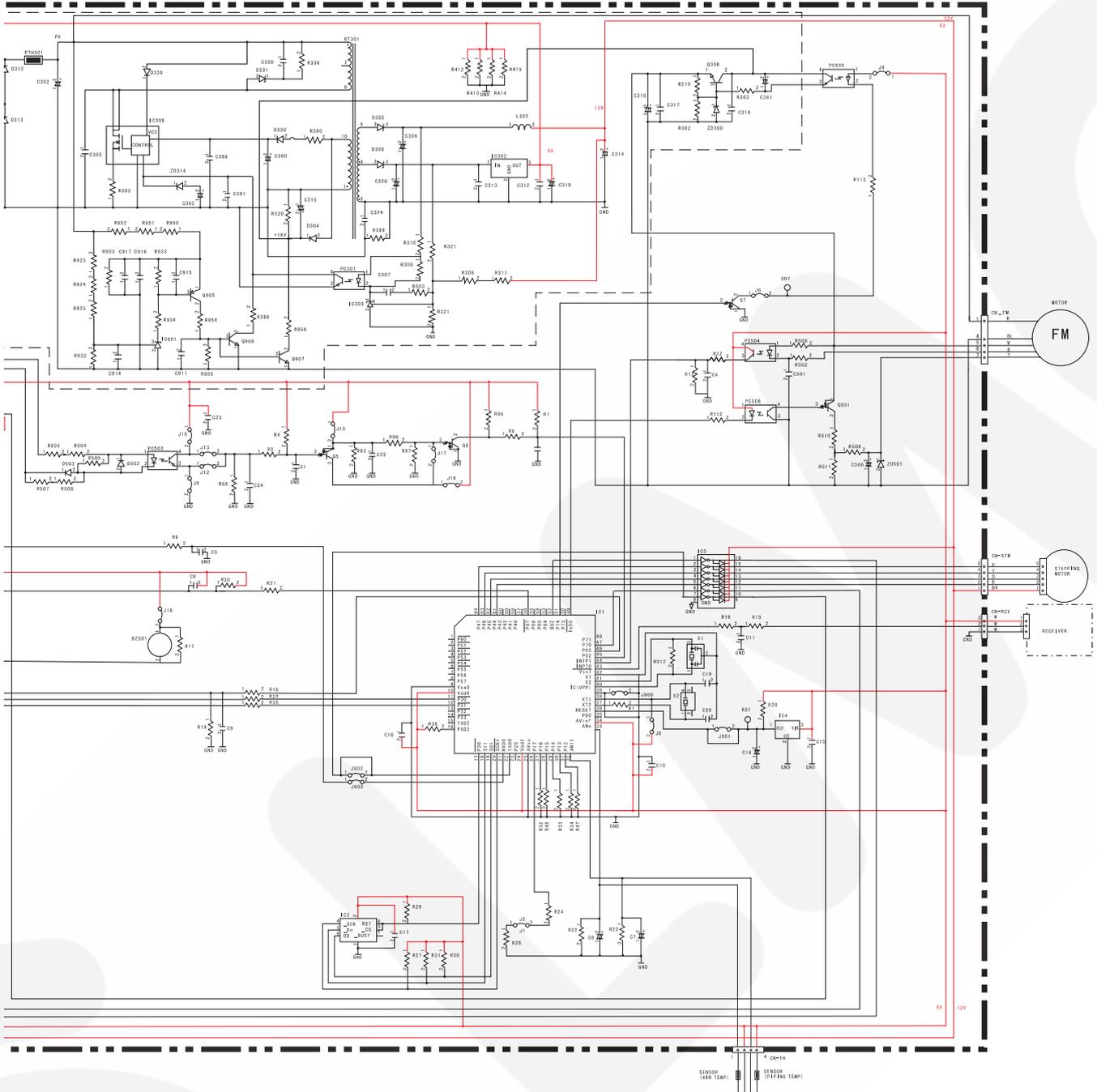
◆ ELECTRONIC CIRCUIT DIAGRAM

SCHEMATIC DIAGRAM 1/2



● CS-PE9CKE/CS-PE12CKE

SCHEMATIC DIAGRAM 2/2

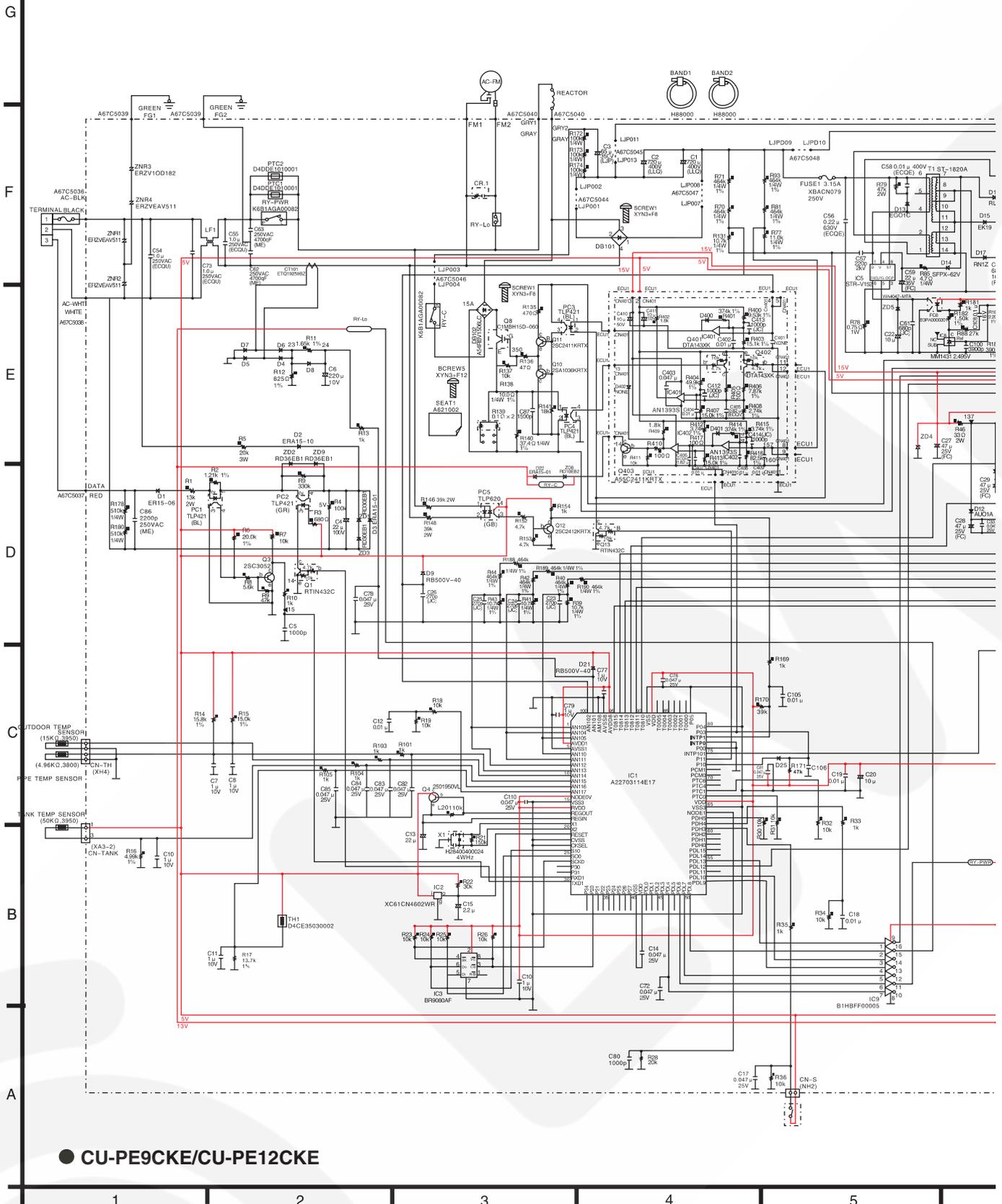


● CS-PE9CKE/CS-PE12CKE



◆ ELECTRONIC CIRCUIT DIAGRAM

SCHEMATIC DIAGRAM 1/2

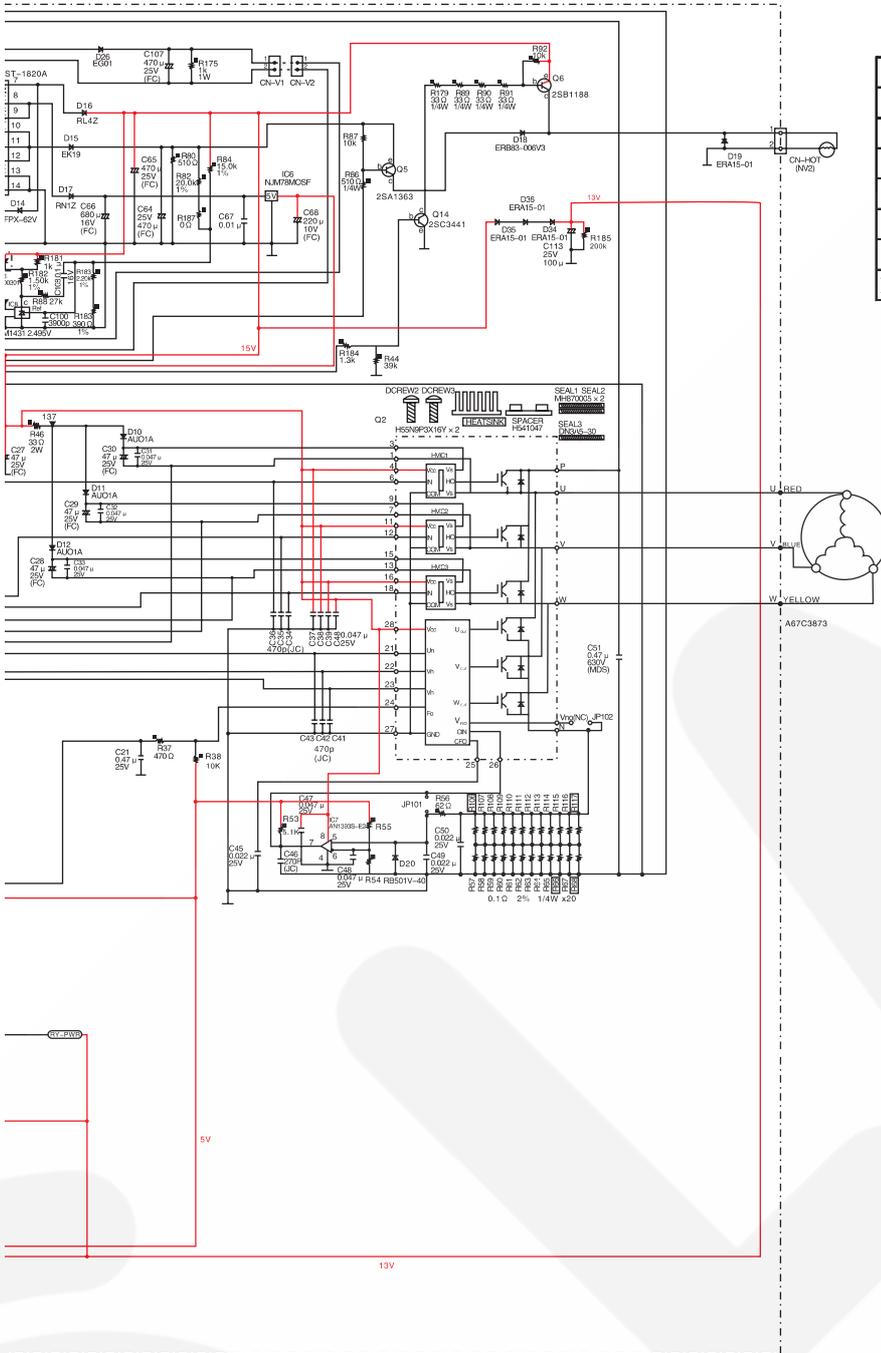


● CU-PE9CKE/CU-PE12CKE

SCHEMATIC DIAGRAM 2/2

Table 1

CODE No	A743352	A743451
Q2	B1KAC000055	B1KAC000054
JP102	NONE	EXIST
R66	NONE	NONE
R68	NONE	NONE
R106	NONE	NONE
R117	NONE	NONE
REMARK	CU-PE12CKE	CU-PE9CKE

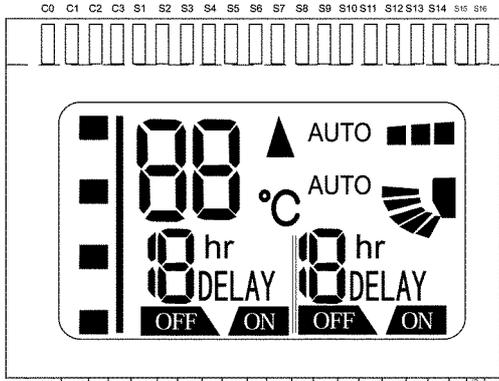


● CU-PE9CKE/CU-PE12CKE



18 Electronic Circuit Diagram (Remote Control)

● REMOTE CONTROL



KEY No.	KEY NAME
1	OFF/ON
2	TEMP DOWN
3	TEMP UP
4	MODE
5	/
6	/
7	FAN SPEED
8	TIMER A
9	TIMER B
10	AIR SWING
11	SELECT
12	SET/CANCEL
13	/
14	/
15	/
16	CHECK
17	ERROR RESET
18	RESET

