Order No. PHAAG0707018C2

Service Manual

Air Conditioners

CS/CU-UW9GKE
CS/CU-UW12GKE

⚠ 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-techical 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.

⚠ PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigeration circuit.

CONTENTS

Panasonic®

1 Features

■ High Efficiency

■ Auto Restart Control
Automatically restart after power failure

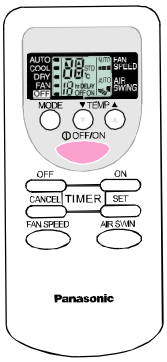
■ 12-hour Timer Setting

■ Enviromental Friendly (For Refrigerant : R410A Model)
Zero ozone depleting potential and low global warming potential by using R410A refrigerant.

■ Comfort Environment
Air filter with function to reduce dust and smoke

2 Functions

Remote Control



OFF/ON

Operation START/STOP

- Turn on/off the air conditionor
- When stop the operation by pressing OFF/ON button,the cursor key points to OFF.

MODE

Operation Mode Selection

- Automatic Mode Operation
- Heating Mode Operation
- Cooling Mode Operation
- Soft Dry Mode Operation

FAN SPEED

Indoor Fan Speed Selection

- Low Speed
- Medium Speed
- High Speed
- Automatic Speed

Air SWING

Airflow Direction Control

- Horizontal Airflow Direction Control
  -Auto Control
  -Manual Control
- Vertical Airflow Direction Manual Control

TEMP

Room Temperature Setting

- Temperature Setting(16℃ to 30℃)
- Auto Operation

TIMER OFF/ON

Timer Operation Selection

- Stop/Start Operation Control
  (set the ON/OFF Timer hourly later)

TIMER SET/ CANCEL

Set /Cancel Timer Operation

- Set timer/Cancel the set timer
- By pressing SET button for 5seconds continuously to switch to set the sensor sensitivity.

Indoor Unit

Auto Switch Button

Power Switch ON/OFF

- When the remote control cannot be used or for repairing and testing ,please use this button.

Signal Receiving Sound Control

- Keep pressing this button for 10seconds to turn on or turn off the signal receiving sound.

Auto Restart Control

- Keep pressing this button for 15seconds to switch off Auto Restart Control. To resume Auto Restart Control,repeat the above step.

Operation Indication Lamps

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

Operation Mode

- Cooling/Heating/Soft Dry /Auto Operation

Time Delay Safety Control

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

7-Minutes Time Save Control

- 7-minutes automatic restarting at Cooling Operation

Anti-freezing Control for the Evaporator

- Cooling or Soft Dry Operation

Warm Booting Control

- Indoor fan starts running when temperature of evaporator reaches 30℃ or above.
- When temperature of evaporator is between 30℃ and 34℃,indoor fan will run at Super Low or Low speed.
- When temperature of evaporator reaches 34℃, Warm Booting Operation ends.

Indoor Fan Speed Control

- High,Med,Low
- Auto Fan Speed

Airflow Direction Control

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

Delayed On-timer Control

- For cooling or soft dry mode, the unit starts 15 minutes before the set time with the remote control, but for heating mode 30 minutes before the set time.

Outdoor Unit

CU-UW9GKE

CU-UW12GKE

Anti-reverse Protection

- To protect the compressor from reverse rotation when power off suddenly.

Overload Protector

- The 2-step Overload Protector is to protect the compressor when
  1)Temperature of compressor reaches150℃
  2)High temperature or current enters into the compressor

60-seconds Test Operation Control

- Once the compressor is activated, it does not stop for 60 seconds. It stops immediately with remote control ON/OFF button.

Deicing Control

- Anti-freezing operation for outdoor unit(during Heating Mode Operation only)
- Temperature of the condenser is tested by sensor.

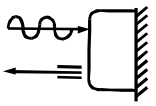
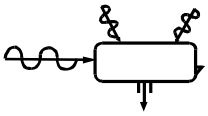
Overload Protection Control

- When the temperature of evaporator reaches 51℃,outdoor fan stops,and will restart when the temperature of evaporator declines to 49℃.
- When the temperature of evaporator reaches 65℃,compressor will stop.

4-way Valve Control

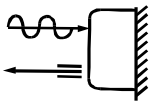
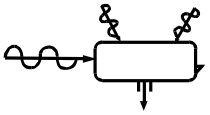
- If the unit is stopped during Heating Operation,the 4-way valve will remain in heating mode operation for 5 minutes.

3 Product Specifications

			Unit	CS-UW9GKE	CU-UW9GKE
Cooling Capacity			kW	2.50	
Heating Capacity			kW	2.70	
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	7.87	-
	Indoor Air (medium)		m^3/min	9.13	-
	Indoor Air (high)		m^3/min	10.3	24.0
	Outdoor Air		m^3/min	-	-
Noise Level			dB(A)	Cooling:high39,Low31 Heating:high39,Low31	Cooling:high48 Heating:high49
Electrical Data	Input		W	Cooling:810 Heating:780	
	Running Current		A	Cooling:3.80 Heating:3.70	
	EER/COP		W/W	Cooling:3.08 Heating:3.46	
	Starting Current		A	20	
Piping Connection Port(Flare piping)			Inch Inch	G:half union3/8" L:half union1/4"	G:3-way valve3/8" L:2-way valve1/4"
Piping Size(Flare piping)			Inch Inch	G:gas side3/8" L:liquid side1/4"	G:gas side3/8" L:liquid side1/4"
Drain Hose	Inner Diameter		mm	14	-
	Length		m	0.6	-
Power Supply Cord Length (Number of core-wire)			m	1.3 3 core-wire/1.0mm^2	- -
Dimensions	Height		mm	250	530
	Width		mm	770	650
	Depth		mm	205	230
Net Weight			kg	7.5	27
Compressor	Type			-	Rotary(1 cylinder) Rolling piston type
	Motor Type			-	Induction(2 pole)
	Rated output		W	-	700
Air Circulation	type			Cross-flow fan	Propeller fan
	Motor type			Induction(4 pole)	Induction(6 pole)
	Input		W	-	-
	Rated Output		W	13	28
	Fan Speed	Low	rpm	940±60	-
		Med	rpm	1090±60	-
		High	rpm	1230±60	800±60

		Unit	CS-UW9GKE	CU-UW9GKE
Heat Exchanger	Description		Evaporator	Condenser
	Tube Material		Copper	Copper
	Fin Type		Slot type	Corrugation type
	Rows/Stage		(Plate fin configuration,forced draft) 2 x 12	2X24
	FPI		18	18
	Dimensions	mm	610x252x25.4	569.1X504x36.4 540.5
Refrigerant Control Device			-	Capillary Tube
Refrigeration Oil		(c.c)	-	R868A or Freol Alpha68M (320 cm^3)
Refrigerant (R410A)		g	-	800
Thermostat			Electronic Control	O.L.P.(230V,37A)
Protection Device			-	
Capillary	Length	mm	-	609±10 720±10
	Circulation	L/min	-	10.0±0.2 7.5±0.2
	Inner Diameter	mm	-	1.4 1.3
Air Filter			P.P. Honeycomb	
Refrigerant Circulation Control Device			Capillary	
Compressor Capacitor		μF , V	-	30 μF , 370V
Fan Motor Capacitor		μF , V	-	2.0μF , 400V

- Specifications are subject to change without notice for further improvement.

			Unit	CS-UW12GKE	CU-UW12GKE
Cooling Capacity			kW	3.30	
Heating Capacity			kW	3.70	
Moisture Removal			L /h	1.9	
Power Source			Phase V Cycle	Single 230 50	
Airflow Method			OUTLET INTAKE	SIDE VIEW 	TOP VIEW 
Air Circulation	Indoor Air (low)		m^3/min	7.16	-
	Indoor Air (medium)		m^3/min	7.96	-
	Indoor Air (high)		m^3/min	9.20	31.8
	Outdoor Air		m^3/min	-	-
Noise Level			dB(A)	Cooling:high39,Low32 Heating:high39,Low31	Cooling:high49 Heating:high50
Electrical Data	Input		W	Cooling:1080 Heating:1060	
	Running Current		A	Cooling:5.00 Heating:4.80	
	EER/COP		W/W	Cooling:3.05 Heating:3.49	
	Starting Current		A	25	
Piping Connection Port(Flare piping)			Inch Inch	G:half union3/8" L:half union1/4"	G:3-way valve3/8" L:2-way valve1/4"
Piping Size(Flare piping)			Inch Inch	G:gas side3/8" L:liquid side1/4"	G:gas side3/8" L:liquid side1/4"
Drain Hose	Inner Diameter		mm	14	-
	Length		m	0.6	-
Power Supply Cord Length (Number of core-wire)			m	1.3 3 core-wire/1.0mm^2	- -
Dimensions	Height		mm	280	540
	Width		mm	799	780
	Depth		mm	183	289
Net Weight			kg	9	30
Compressor	Type			-	Rotary(1 cylinder) Rolling piston type
	Motor Type			-	Induction(2 pole)
	Rated output		W	-	900
Air Circulation	type			Cross-flow fan	Propeller fan
	Motor type			Induction(4 pole)	Induction(6 pole)
	Input		W	-	-
	Rated Output		W	18	28
	Fan Speed	Low	rpm	980±60	-
		Med	rpm	1090±60	-
		High	rpm	1260±60	800±60

		Unit	CS-UW12GKE	CU-UW12GKE
Heat Exchanger	Description		Evaporator	Condenser
	Tube Material		Copper	Copper
	Fin Type		Slot type	Corrugation type
	Rows/Stage		(Plate fin configuration,forced draft) 2 x 15	2X24
	FPI		20	18
	Dimensions	mm	610x252x25.4	725.1 696 X504x36.4
Refrigerant Control Device			-	Capillary Tube
Refrigeration Oil		(c.c)	-	R868A or Freol Alpha68M (320 cm^3)
Refrigerant (R410A)		g	-	980
Thermostat			Electronic Control	O.L.P.(230V,37A)
Protection Device			-	
Capillary	Length	mm	-	655±10 510±10
	Circulation	L/min	-	9.5±0.2 10.8±0.2
	Inner Diameter	mm	-	1.4 1.4
Air Filter			P.P. Honeycomb	
Refrigerant Circulation Control Device			Capillary	
Compressor Capacitor		μF , V	-	30 μF , 370V
Fan Motor Capacitor		μF , V	1.5 μF , 400V	2.0μF , 400V

* 60g for air purging is not included.

● Specifications are subject to change without notice for further improvement.

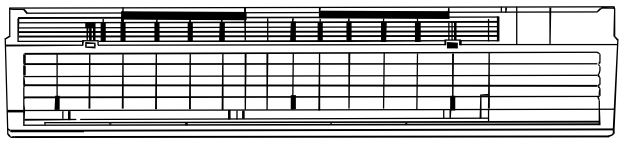
4 Dimensions

Indoor Unit

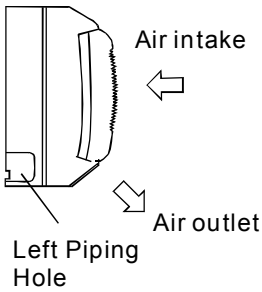
CS-UW9GKE

Unit : mm

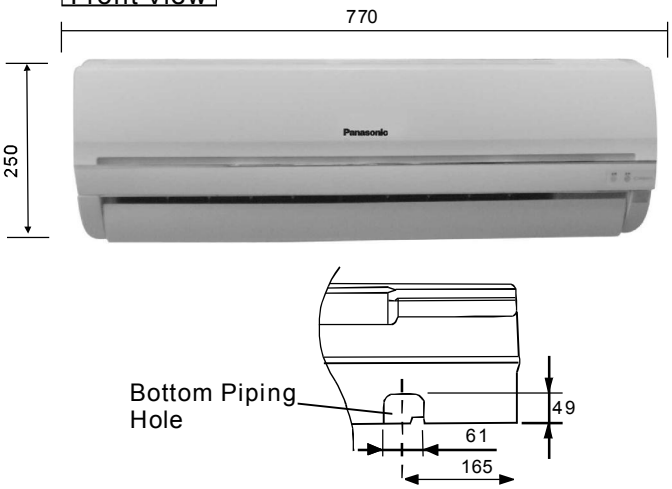
Top view



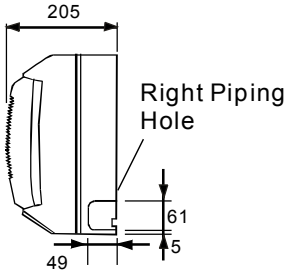
Side view



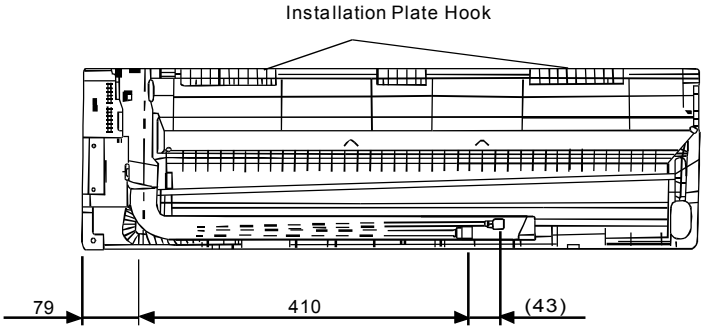
Front View

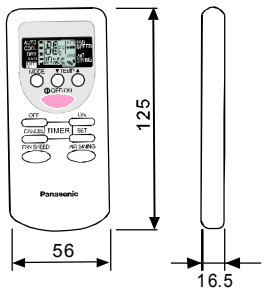


Side view

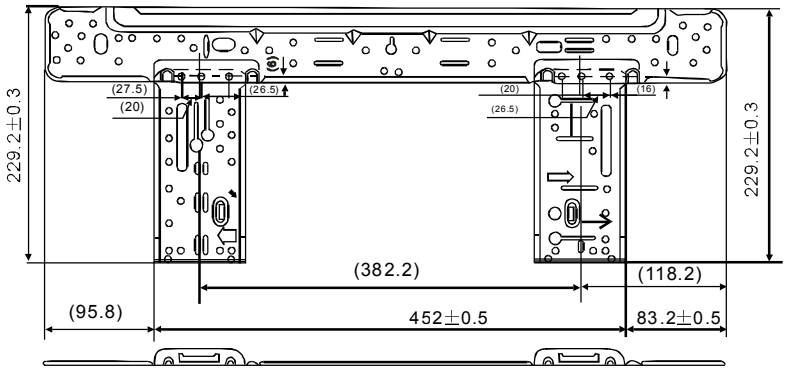


Back View





Dimension of installation plate (Front View)

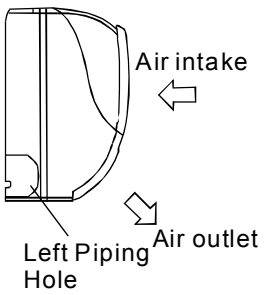


Indoor Unit

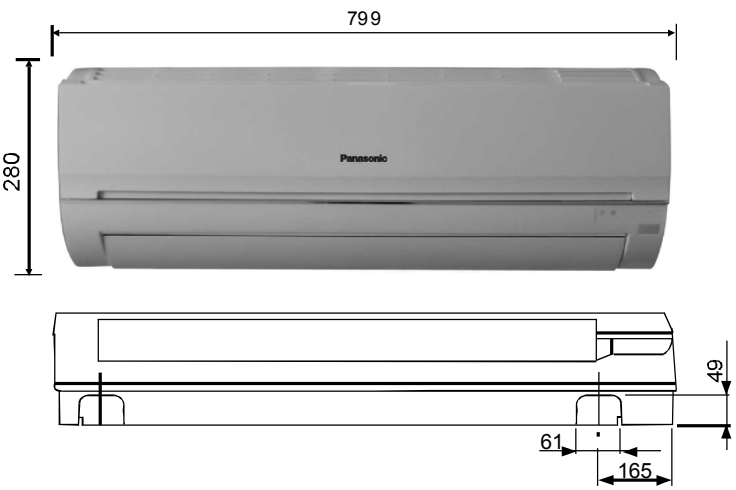
CS-UW12GKE

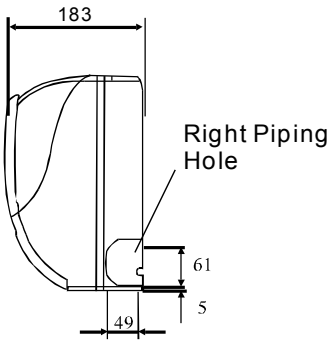
Unit : mm

Side view

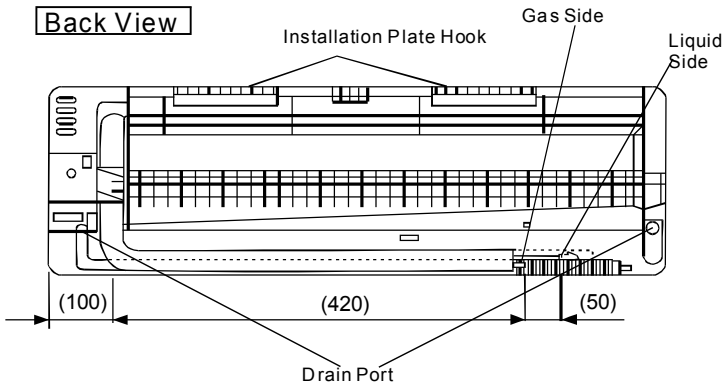


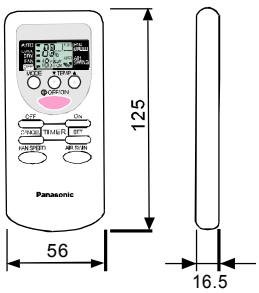
Front View



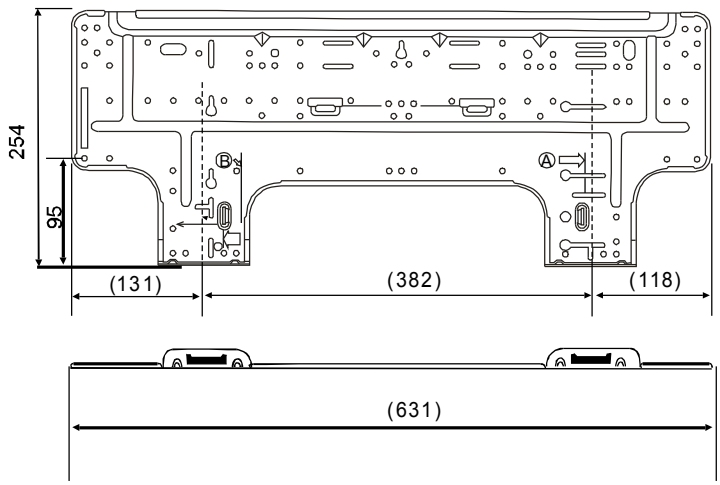


Back View





Installation plate (Front View)

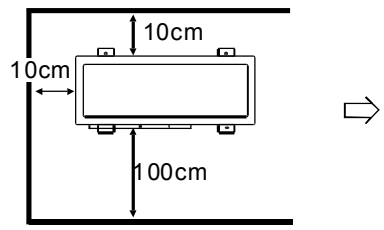


Outdoor Unit

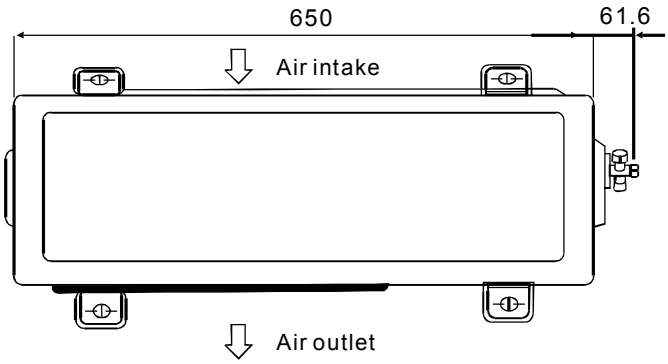
Unit : mm

CU-UW9GKE

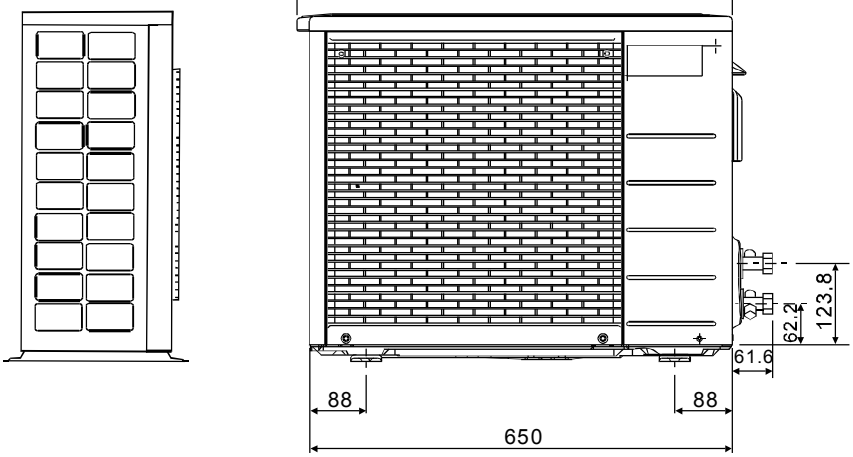
Required space for installation



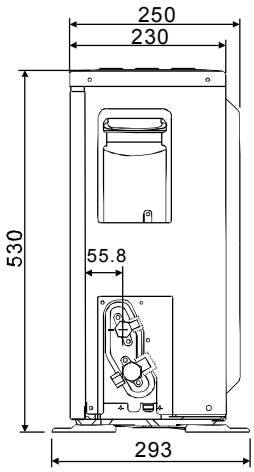
Top view



Front View



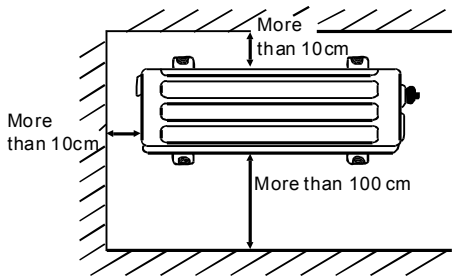
Side view



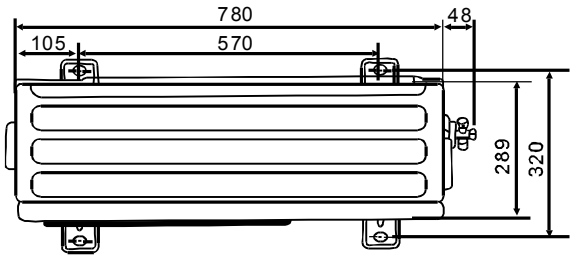
Outdoor Unit

CU-UW12GKE

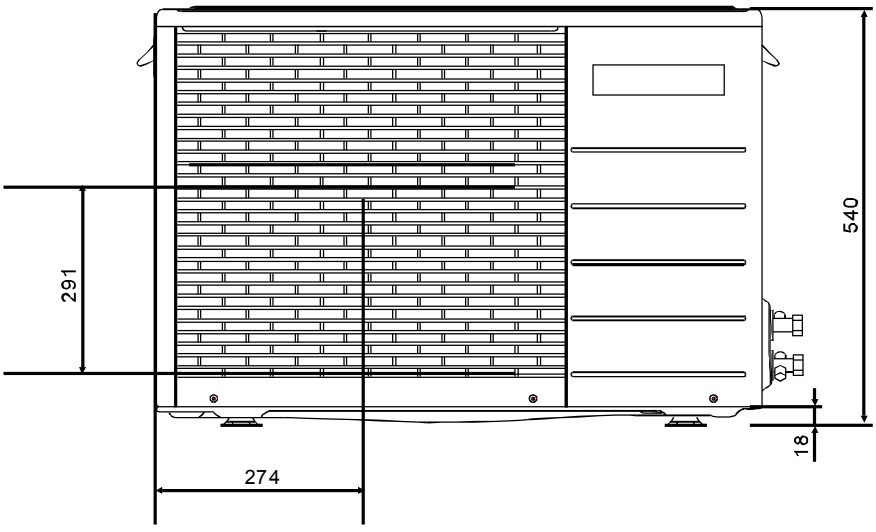
Unit : mm



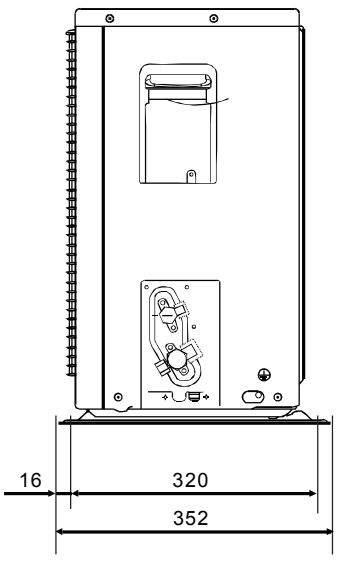
Top view



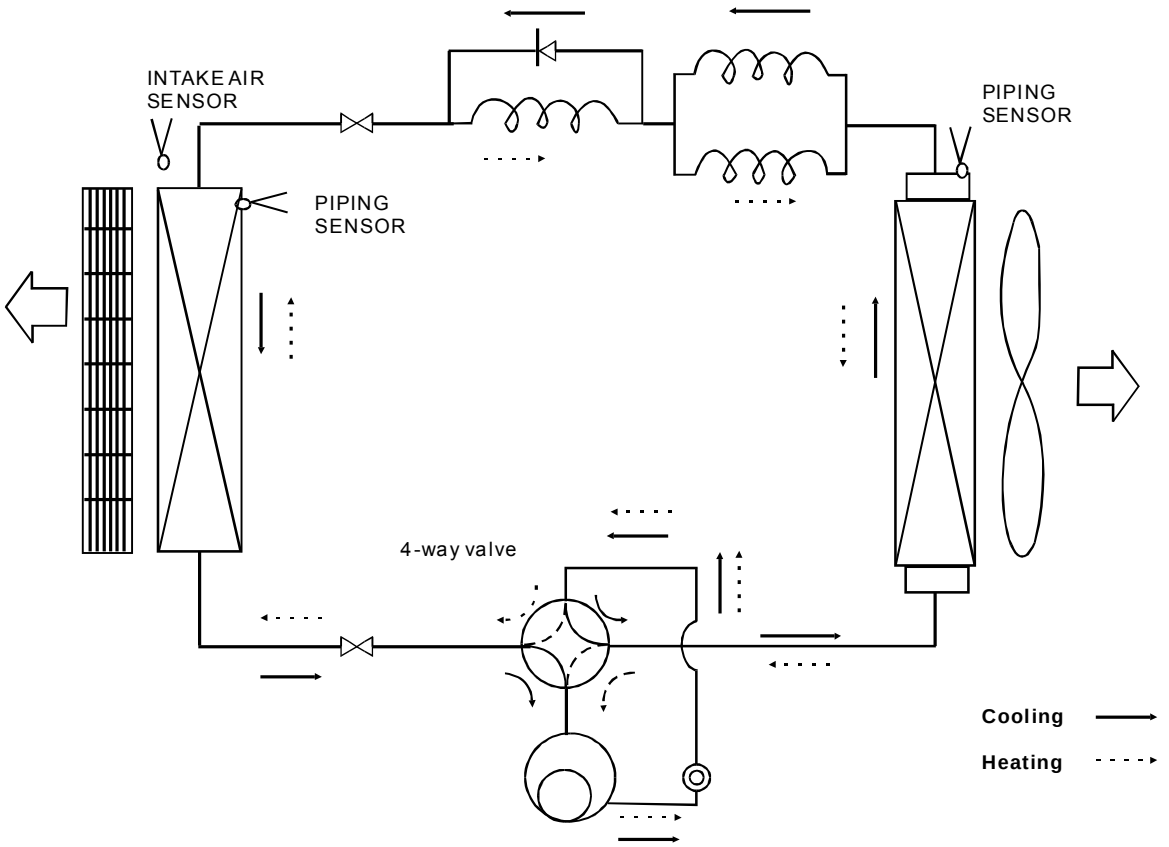
Front View



Side view

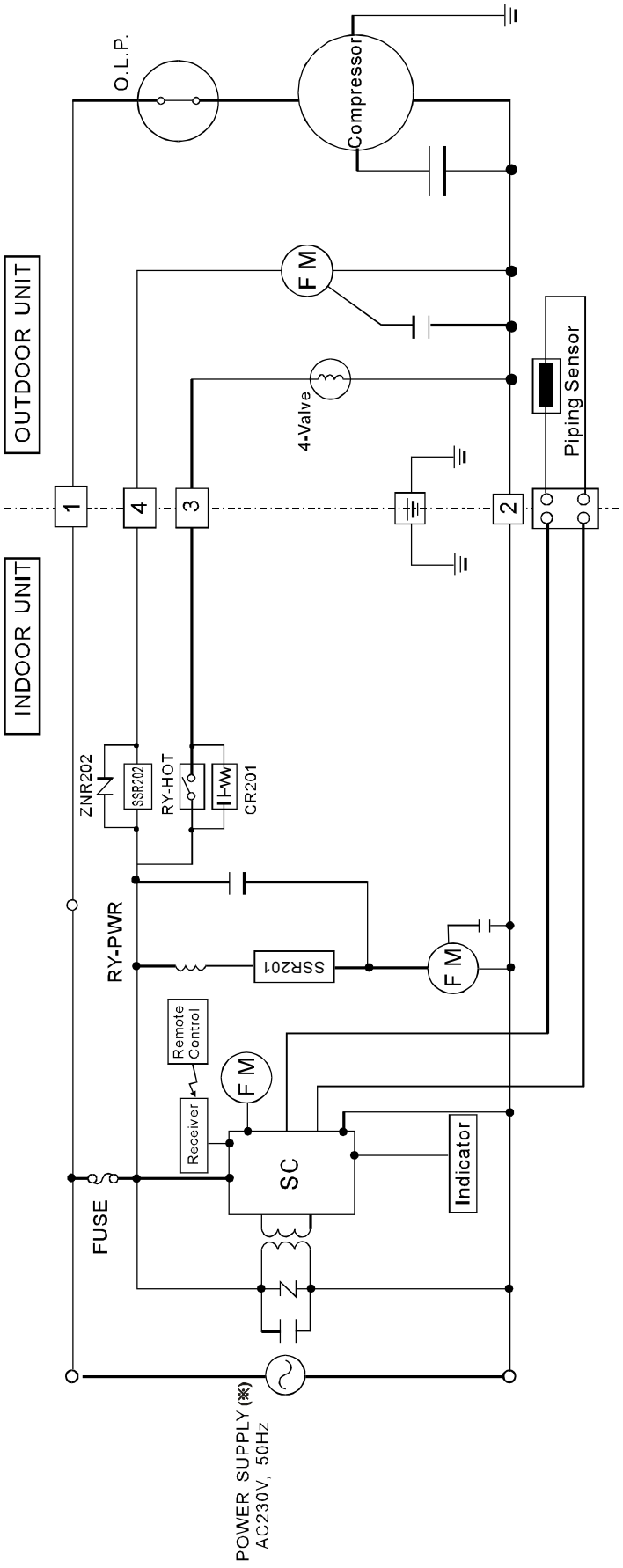


5 Refrigeration Cycle Diagram

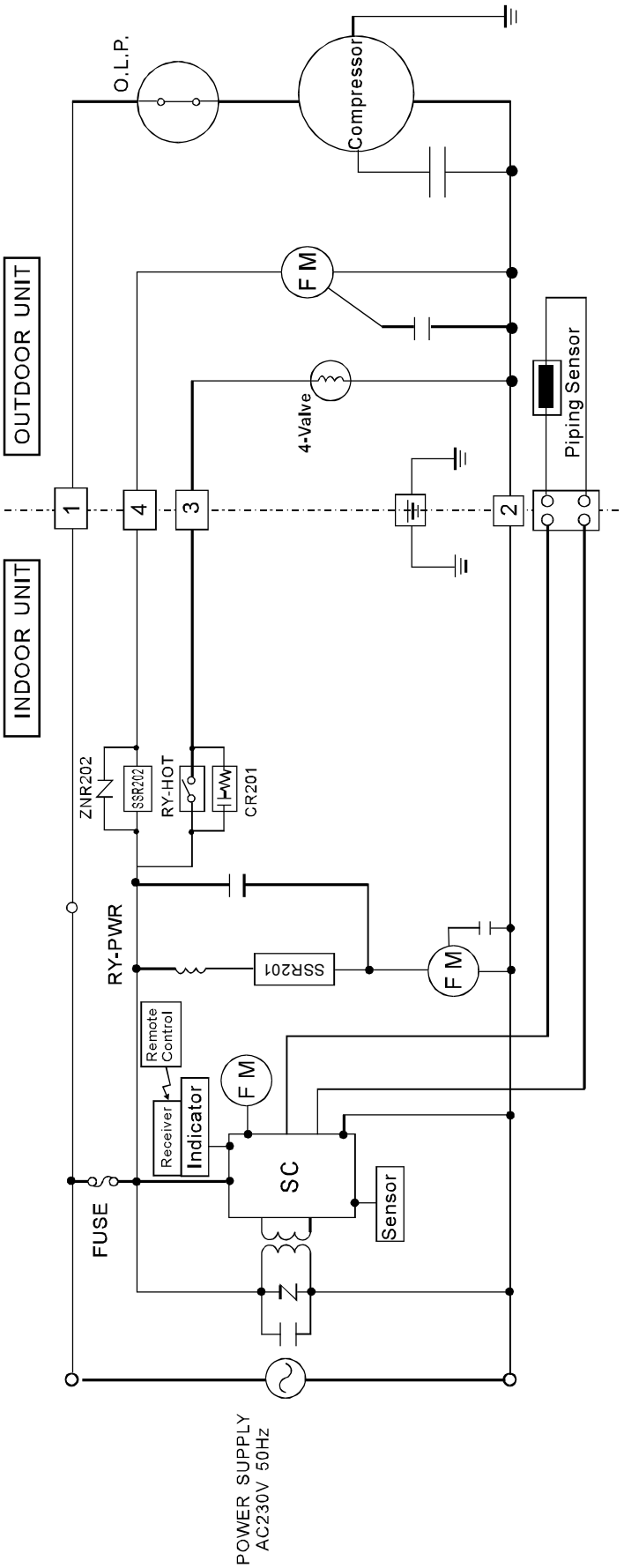


6 Block Diagram

CS-UW9GKE/CU-UW9GKE

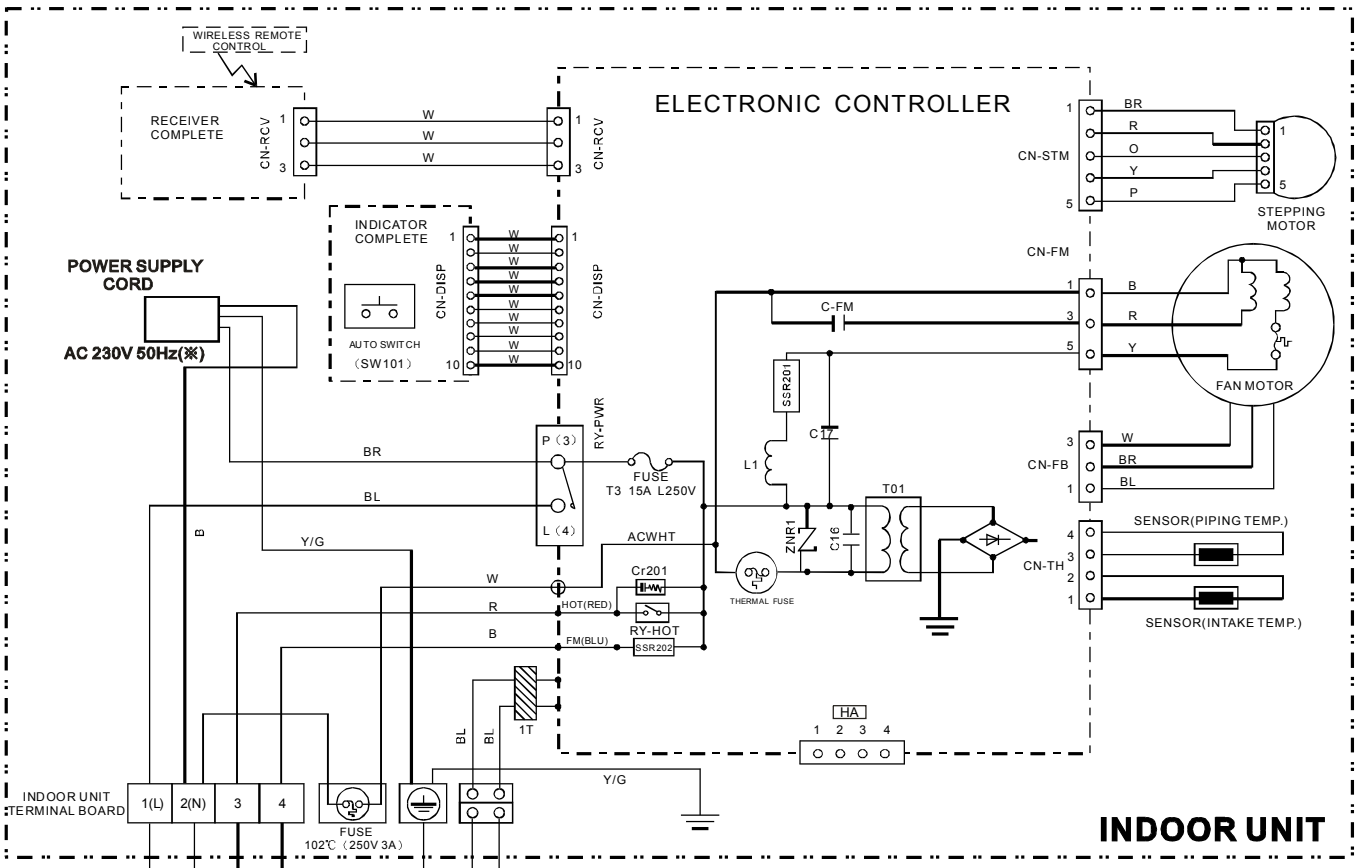


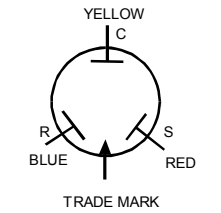
CS-UW12GKE


O.L.P.
Compressor
OUTDOOR UNIT
F M
4-Valve
Piping Sensor
1
4
3
2
INDOOR UNIT
ZNR202
SSR202
RY-HOT
CR201
RY-PWR
SSR201
F M
Remote Control
Receiver
Indicator
F M
SC
Sensor
FUSE
POWER SUPPLY
AC230V 50Hz

7 Wiring Diagram

CS/CU-UW9GKE





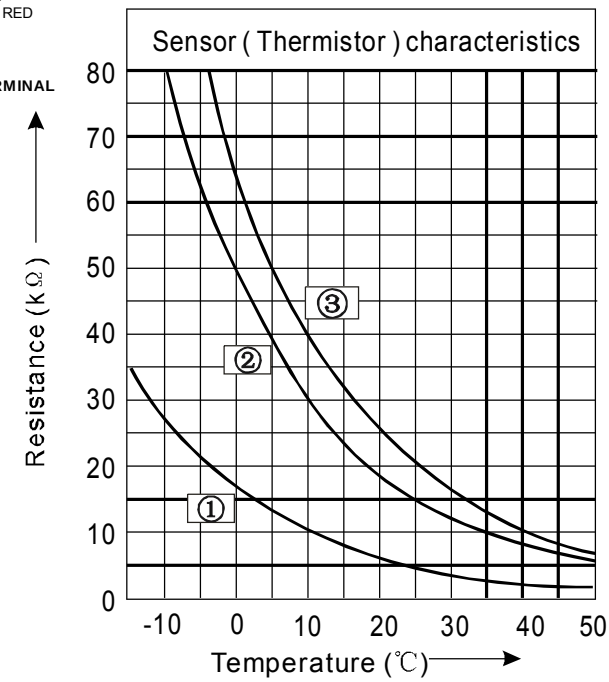
R : RED	GRY : GREY
BL : BLACK	G : GREEN
B : BLUE	Y : YELLOW
BR : BROWN	W : WHITE
O : ORANGE	Y/G : YELLOW/GREEN

INDOOR FAN MOTOR RESISTANCE(Ω)

	CS-UW9GKE
CONNECTING	CWA921372
Y-B (M)	397
Y-R (A)	308.1

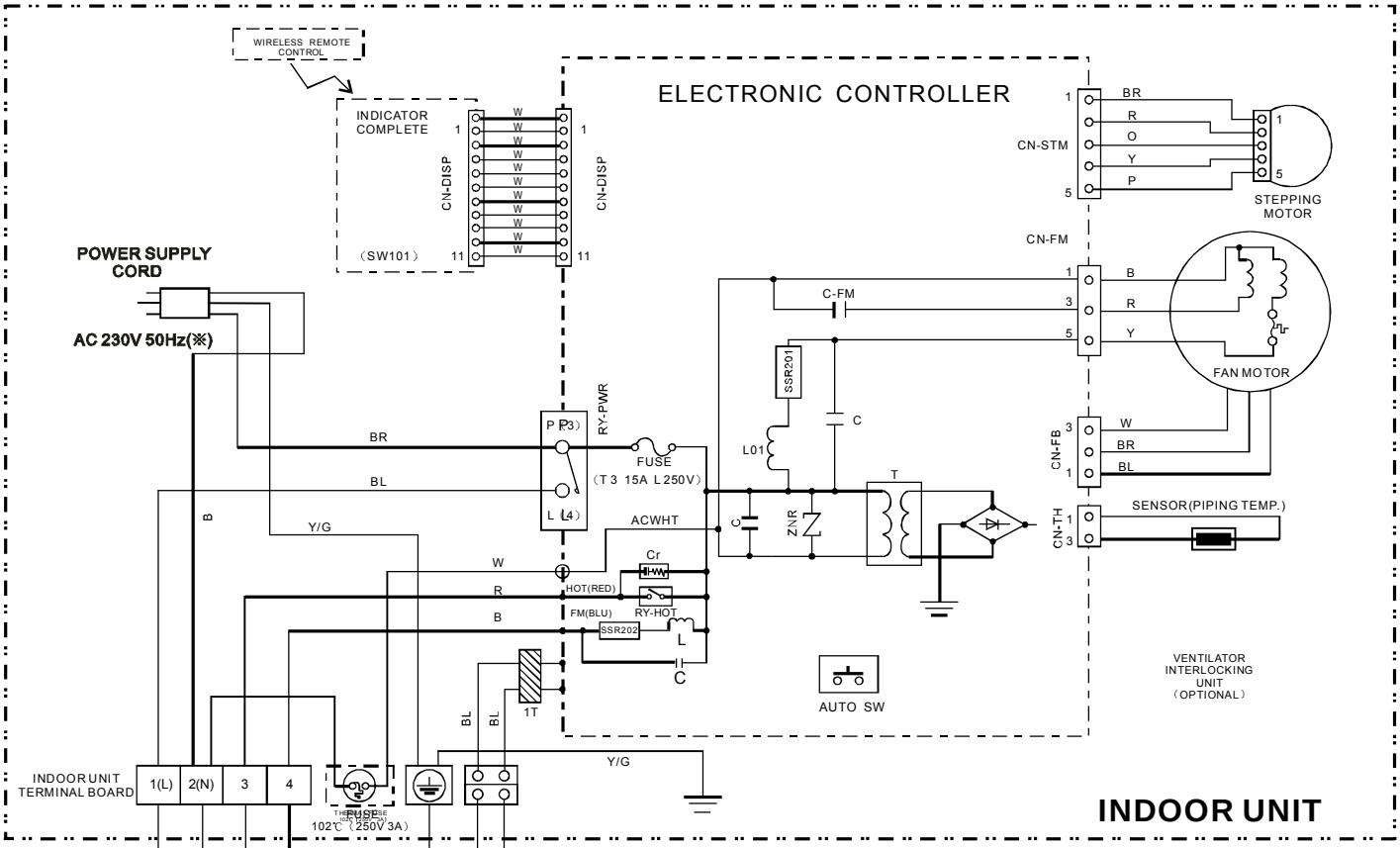
OUTDOOR FAN MOTOR RESISTANCE(Ω)

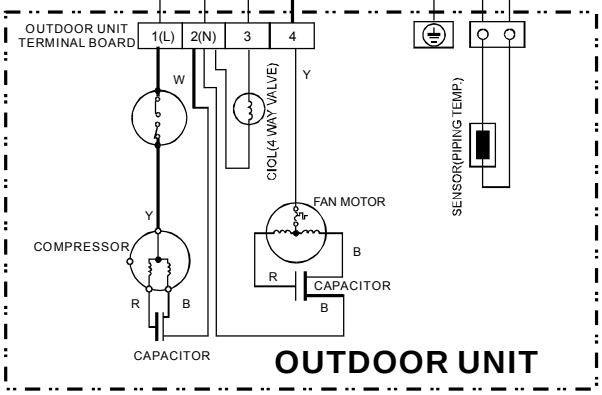
	CU-UW9GKE
CONNECTING	CWA951427
Y-B	275
Y-R	260

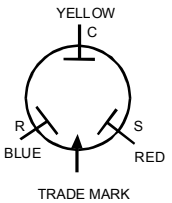


Remark:
①:Outdoor Pipe Temp. Sensor
②:Indoor intake/ Outdoor air sensor
③: Indoor pipe Temp. Sensor

CS/CU-UW12GKE







COMPRESSOR TERMINAL

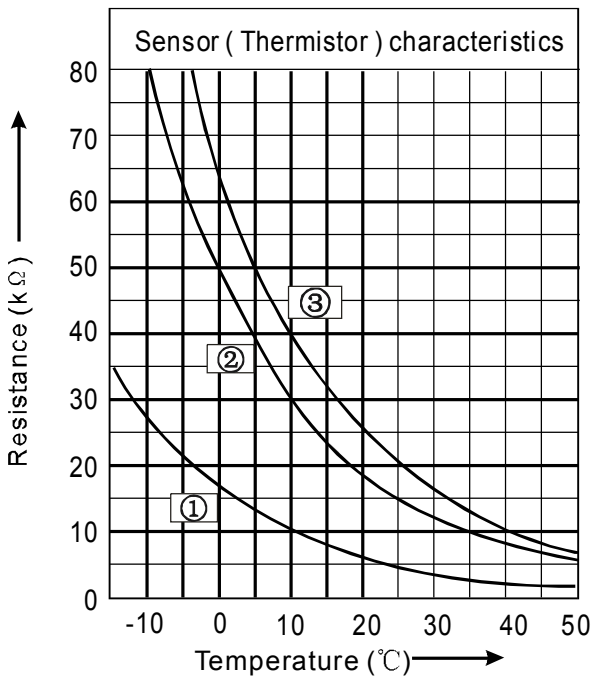
R : RED	GRY : GREY
BL : BLACK	G : GREEN
B : BLUE	Y : YELLOW
BR : BROWN	W : WHITE
O : ORANGE	Y/G : YELLOW/GREEN

INDOOR FAN MOTOR RESISTANCE(Ω)

	CS-UW12GKE
CONNECTING	CWA921378
Y-B (M)	419.8
Y-R (A)	304.4

OUTDOOR FAN MOTOR RESISTANCE(Ω)

	CU-UW12GKE
CONNECTING	CWA951427
Y-B	275
Y-R	260



Remark:
①:Outdoor Pipe Temp. Sensor
②:Indoor intake/ Outdoor air sensor
③: Indoor pipe Temp. Sensor

8 Operation Details

8.1 Cooling Mode Operation.

When selecting the Cooling Mode Operation, the unit will operate according to the setting by the Remote Controller or the control panel on the indoor unit and the operation is as the following.

Time Delay Safety Control

- 3 min.----If the compressor stops, it will not restart within 3 minutes.(Protection of compressor).

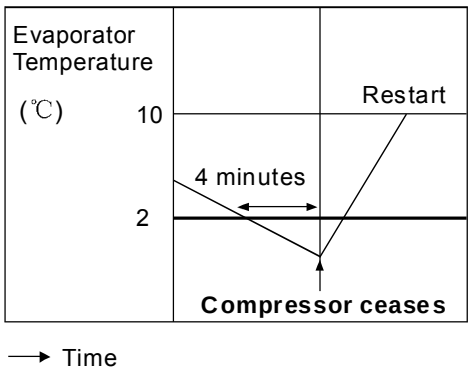
7 Minutes Time Save Control

- 7 min.----The unit will automatically operate in 7 minutes even if the room temperature is not reached. (Prevention of raising the humidity)

Anti-Freezing Control

- If temperature of evaporator is lower than 2℃ continuously for 4 minutes, the compressor will cease to prevent the evaporator from freezing. Fan speed setting will not be changed.
- When temperature of evaporator reaches 10℃, compressor will restart.

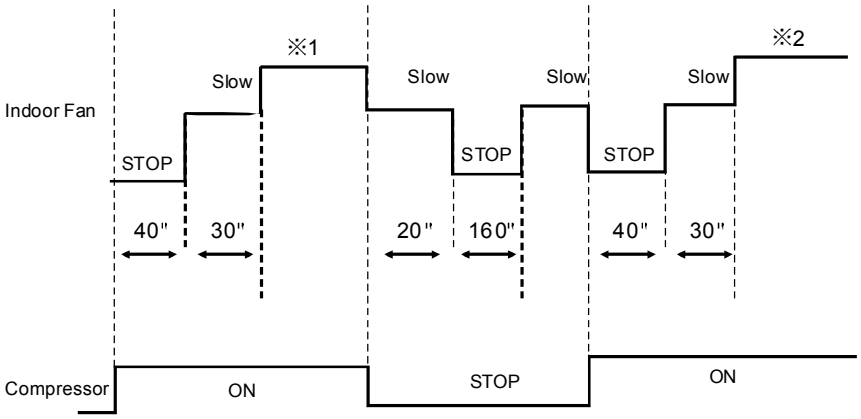
※ During Cooling Mode Operation, the Time Delay Safety Control is available.



Automatic Fan Speed Mode

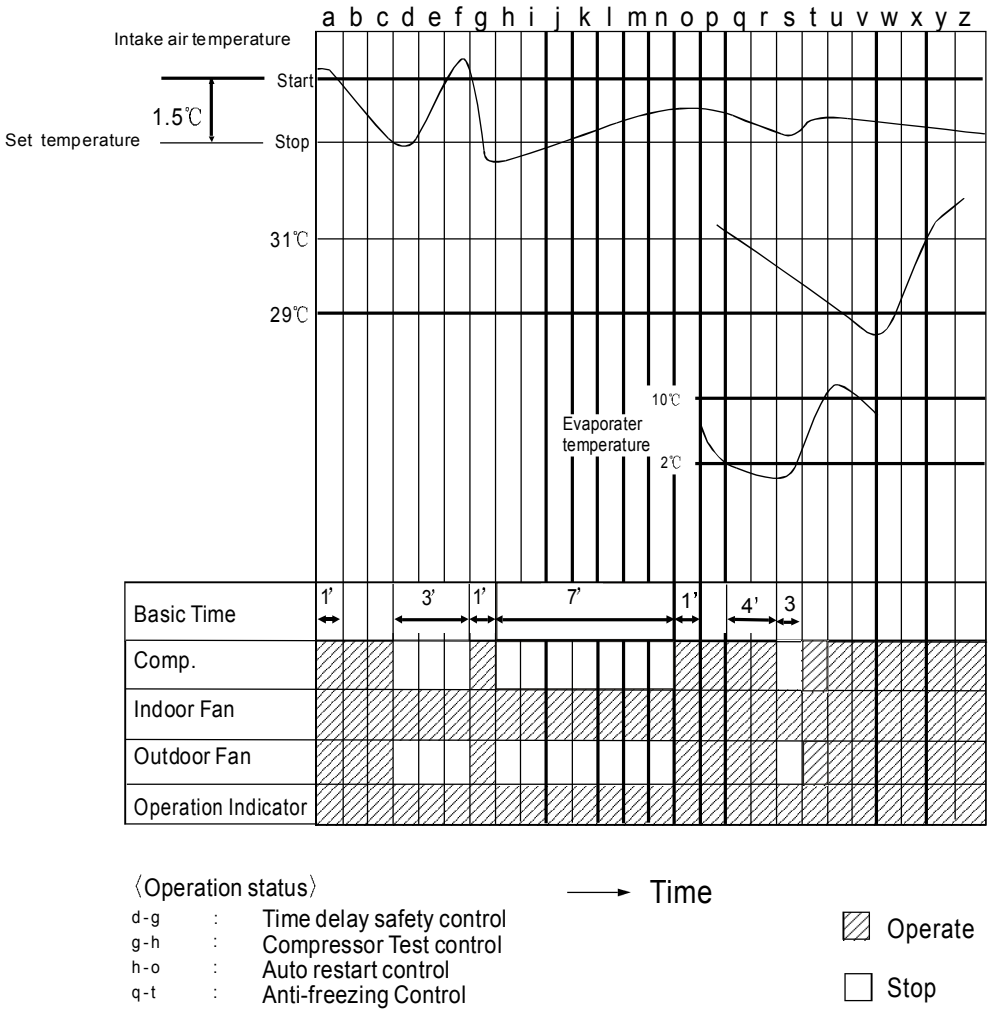
During Cooling Mode Operation, use remote controller to select Automatic Fan Speed.

- Fan speed will be at the point between "High speed" and "Medium speed".
- Deodorization control.



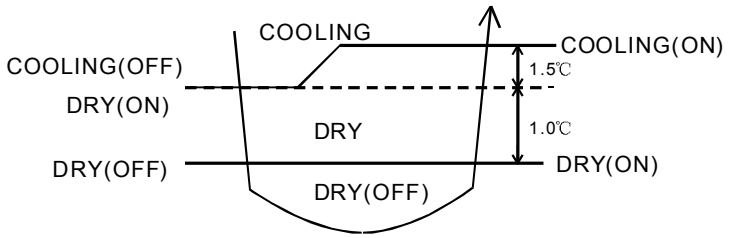
※ 1 Fan speed will be at "Hi" till the compressor ceases (set temperature reached).
※ 2 Fan speed will be at "Me" when the compressor restarts.

Time Graph for Cooling Operation



8.2. Soft Dry Mode Operation

- Operation area



- When selecting Soft Dry mode operation, the operation will be cooling until the room temperature reaches the set temp on remote control, and then Soft Dry will be activated. (During Soft Dry Mode the fan of indoor unit will operate at super low speed. The soft dry mode will run for less than 10 minutes.)
- Once Soft Dry mode operation is turned off, indoor fan, compressor and outdoor fan will stop for 6 minutes.

Time Delay Safety Protection

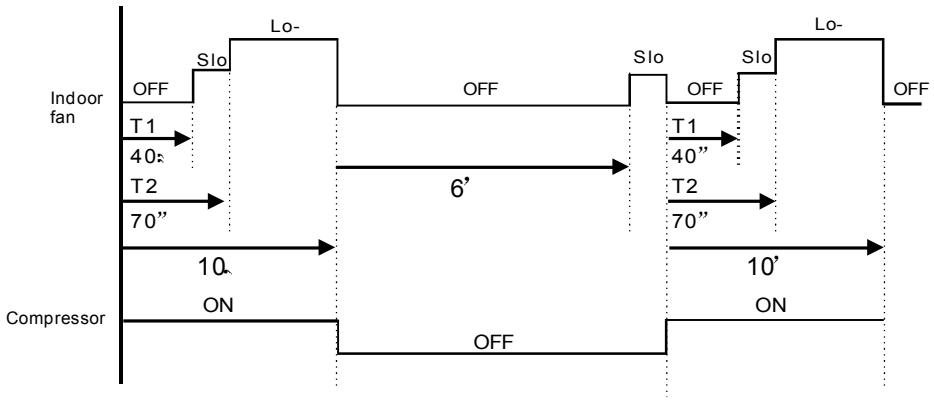
- During cooling mode operation, if the compressor ceased, it will not restart within 3 minutes.

Anti Freezing Control

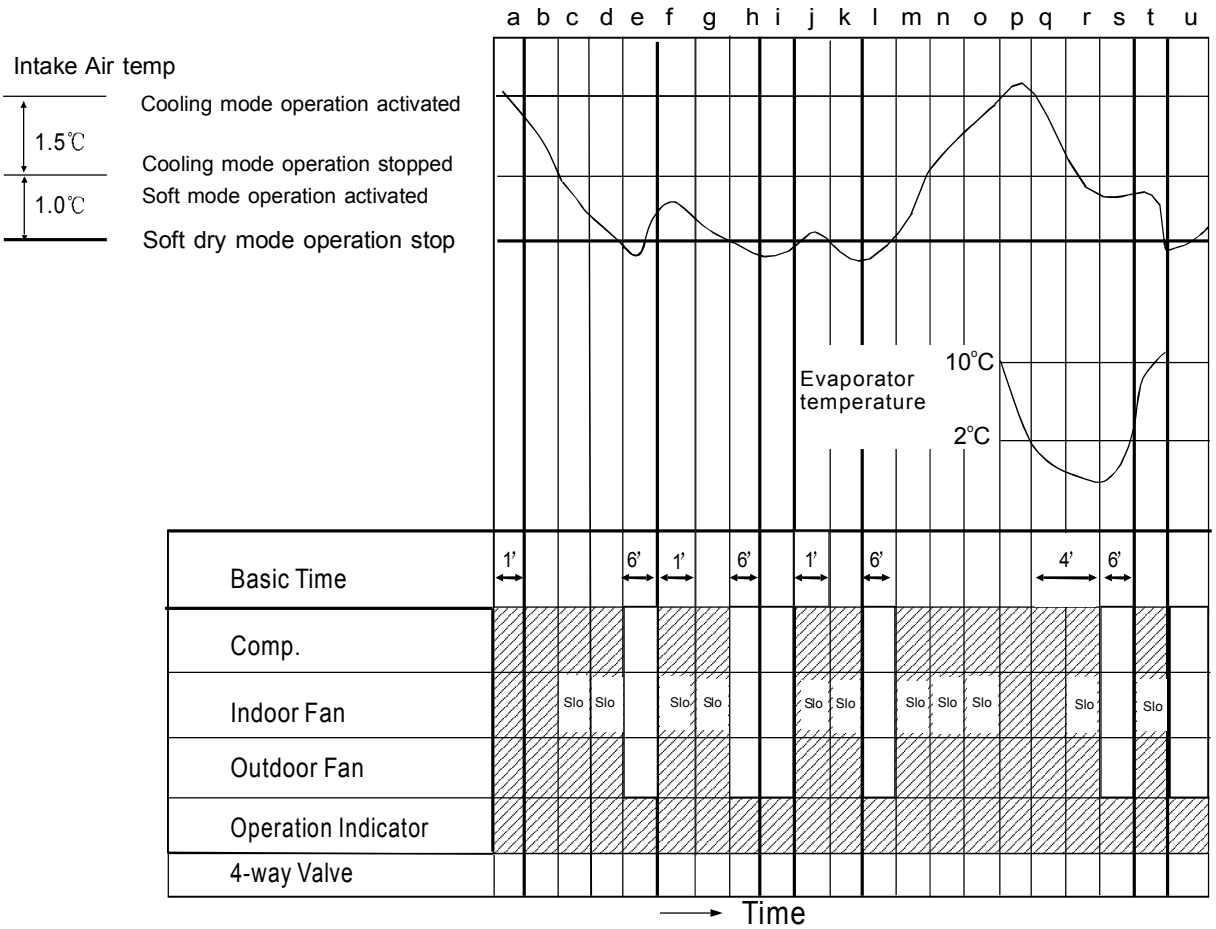
- Same as the denotation in Cooling Operation.(P19)
  (During Soft Dry Mode Operation, compressor will stop for at least 6 min.)

Automatic Fan Speed

- During Soft Dry Operation, use remote controller to select Auto Fan Speed mode.
  Indoor Fan Speed is at "Lo-"



Time Graph for soft dry operation



〈Operation status〉

a-c, p-r	:	Cooling Mode Operation
c-p, r-u	:	Soft Dry Mode Operation
e-f	:	Soft Dry Mode Operation Stopped
j-l	:	Compressor Test Operation Control
q-t	:	Anti Freezing Control

▨ Operate

□ Stop

8.3. Heating Mode Operation

When selecting the Heating Mode Operation, the unit will operate according to the setting by the Remote Controller and the operation is as the following.

Time Delay Safety Control

- If the compressor stopped by switching off, turning off by remote controller, or power off, it will not restart within 3 minutes.
- When room temperature reaches the set temperature on the remote controller, compressor stops and will not restart within 4 minutes.
- 3 minutes after the compressor stopped, indoor fan will stop for 1 minute. Then indoor fan will resume operation with the speed at "super low".

Over Load protection Control

- When temperature of indoor heat exchanger rises to 51℃, outdoor fan will stop when temperature of indoor heat exchanger falls to 49℃, outdoor fan will restart.
- When temperature of indoor heat exchanger rises to 65℃ or above, compressor stops, and will restart 4 minutes later.

Indoor Heat Exchanger ⩾65℃ → Compressor Stops → Compressor Restarts 4 minutes later

Anti-reversing Control

- If the compressor has been continuously running for 5 minutes or longer, and the difference of temperature between intake air and evaporator is continuously lower than 5.0℃ or below for 2 minutes, the compressor will stop , and then restart 3 minutes later.(Time Delay Protection Control is effective.)

• Compressor runs ⩾5 min
• △T⩽5℃ last for 2 min → Compressor Stops → Compressor Restarts 3 minutes later

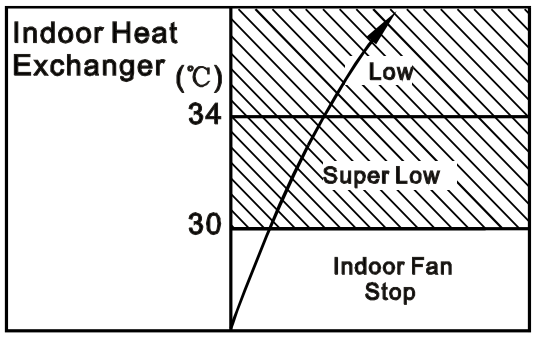
△T= intake air temperature - evaporator temperature

4-way valve control

- During heating mode operation,4-way valve is at "open" mode.
- During heating mode operation,if the unit turned off, the 4-way valve will remain at "open" mode for 5 minutes.

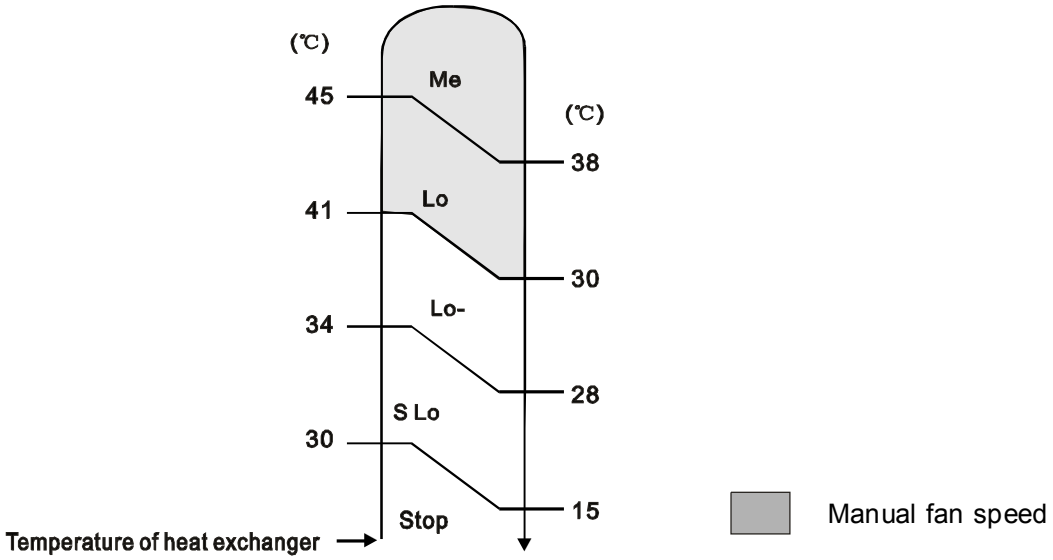
Warm Booting Control

- When turning on the unit by heating mode operation,indoor fan will be activated when temperature of indoor heat exchanger reaches 30℃. (See the figure on the right)
- Warm boot operation ends when temperature of indoor heat exchanger reaches 34℃.

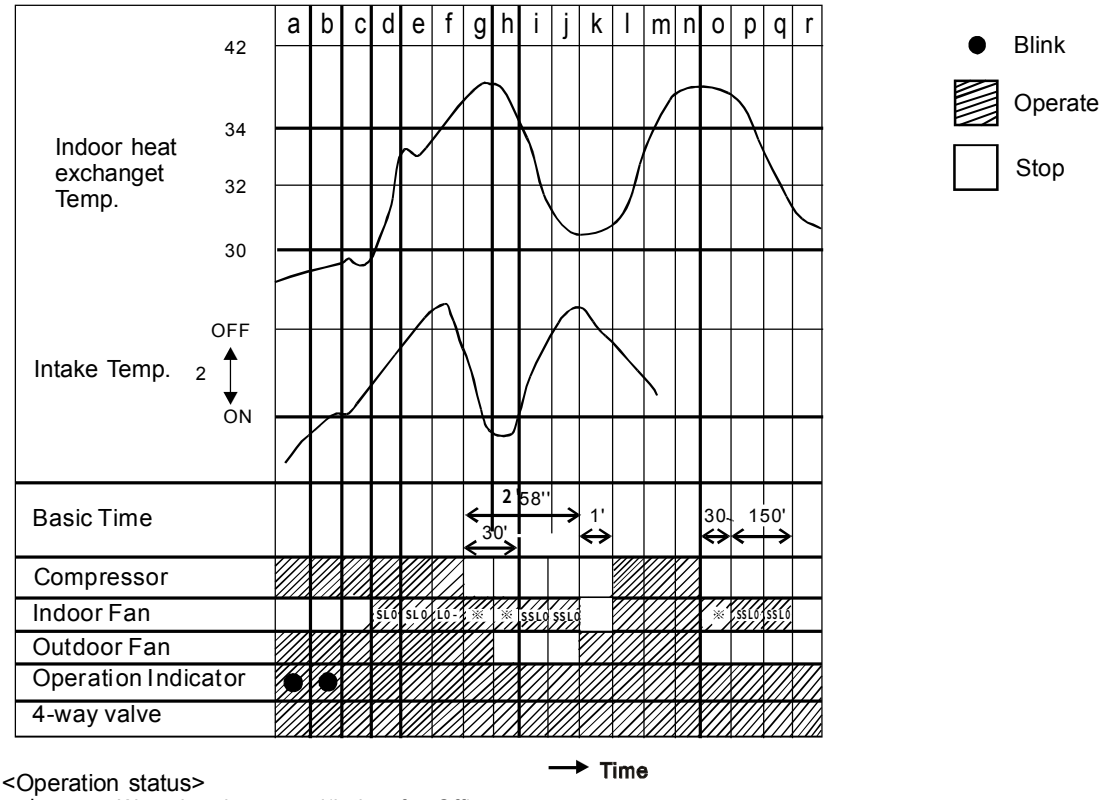


Automatic Fan Speed

During Heating Operation, use remote controller to select Auto Fan Speed mode.
Indoor Fan Speed is between "Me" and "Slo".



Time Graph for Heating Operation



<Operation status>
a - b : Warm booting control(indoor fan Off)
c - d : Warm booting control(indoor fan Super Slo)
h - k , o - r : Prevent cool air blowing out

Deice Control

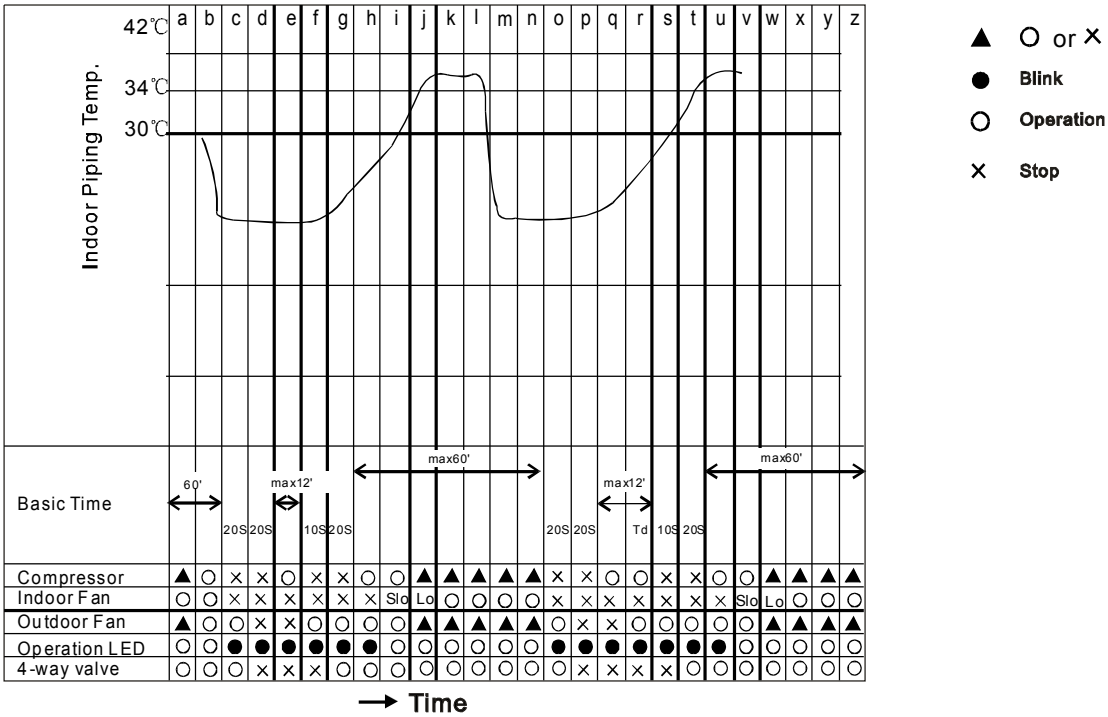
Deice operation is to protect the outdoor unit from freezing.

- Normal Deice Operation
  Deicing starts 30 minutes after heating mode operation or 60 minutes after the latest deicing operation. If temperature of outdoor piping, tested by TRS, falls to -3℃ (TRS OFF) or below for continuously 50 seconds, deicing operation starts.
- Overload Deicing Operation
  During heating operation, if the accumulative stopping time of outdoor fan reaches 60 minutes, deicing operation will start 1 minute after compressor starts.
- Deicing operation ends under conditions below
  (a) After 12 minutes.
  (b) Temperature of outdoor unit rises to 4℃.
  (c) As the illustration showed bellow and due to Time Delay (Td), deicing won't ends immediately.

Deicing Operation Time(T)	Td(s)
<3 min	0
3min ≤T<7min	60
7 min≤T<9min	120
T≥9min	180

- Once deicing operation starts, it won't end until 60 seconds later.
- When deicing operation ends, compressor will stop for 30 seconds, and 4-way valve remains at cooling mode operation for 10 seconds.

Time Graph for Normal Deicing Operation

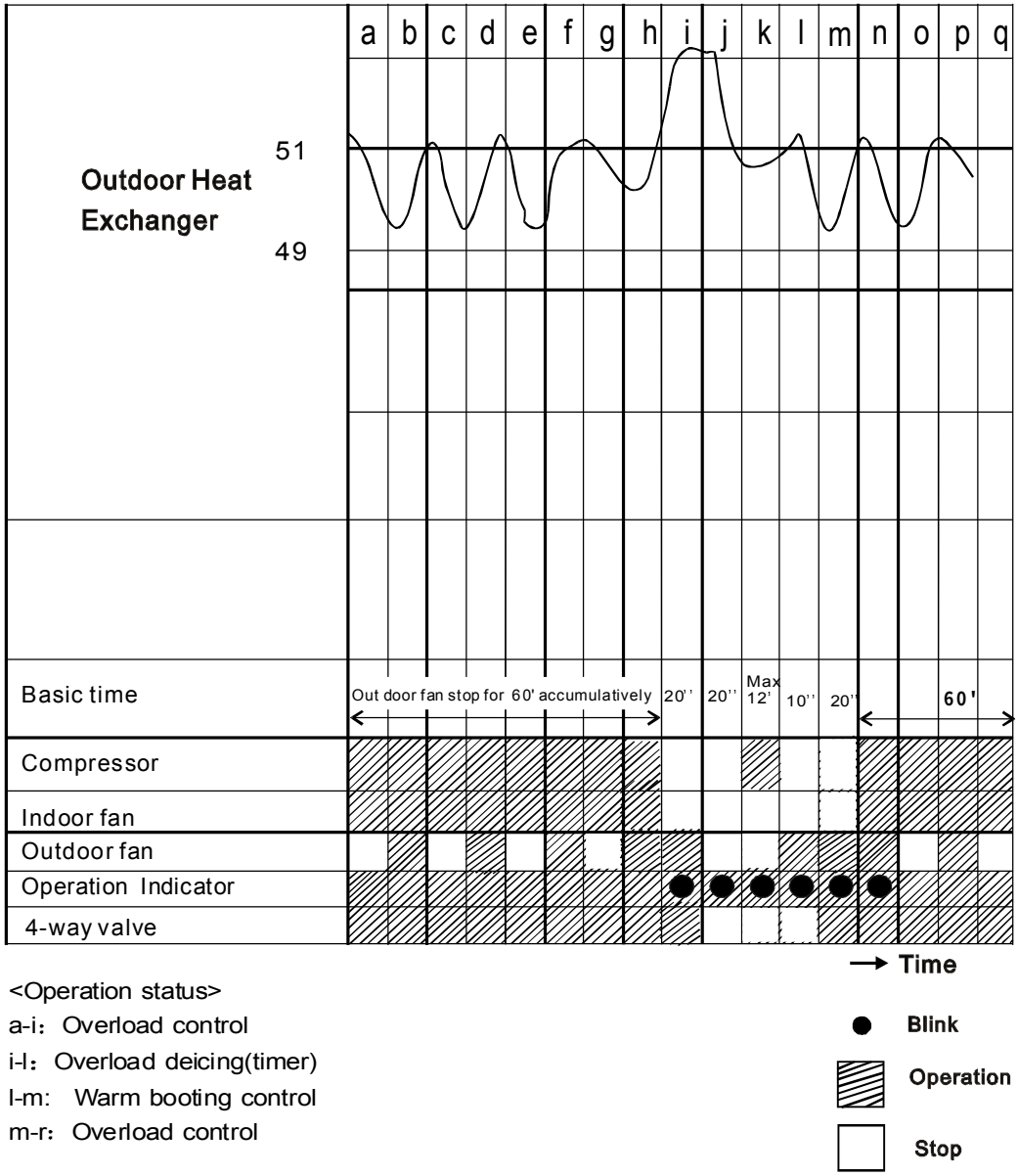


▲ ○ or ×
● Blink
○ Operation
× Stop

<Operation status>

a-c : Deicing confirmation
c-g : Deicing operation(time reset)
h-j, u-w : Warm Booting
o-r : Deicing(TRS)

Time Graph for Overload Deicing



<Operation status>

a-i：Overload control

i-l：Overload deicing(timer)

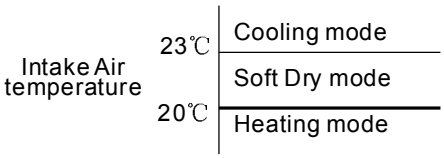
l-m: Warm booting control

m-r：Overload control

8.4. Automatic Mode Operation

Standard for Determining Operation Mode

- First Determination:



	Setting Temperature (Standard)
Cooling mode	25℃
Soft Dry mode	22℃
Heating mode	21℃

- Second Determination:

One hour after the above determination, the unit will operate according to the table below.

		Second Determination		
		Cooling	Dry	Heating
First determination	Cooling	23℃ or above	———	23℃ below
	Dry	———	20℃ or above	20℃ below
	Heating	25℃ or above	———	25℃ below

A) Indoor fan operates at super low speed for 25 seconds.

B) After judging indoor air temperature, the operation is determined and operation continued at the mode determined.

C) If indoor temperature is less than 16℃, heating operation will immediately operate.

D) After the operation mode has been determined, the mode does not change. However,Soft Dry mode operation includes cooling mode operation.

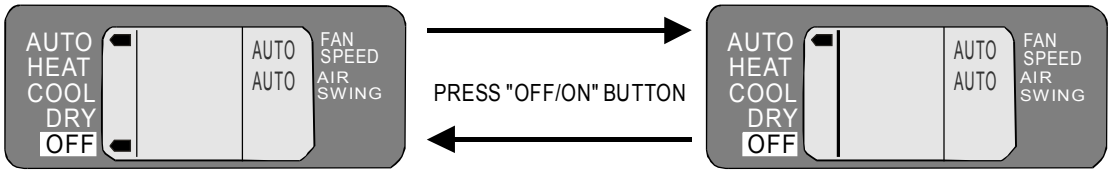
E) If automatic mode operation is started while the unit is operating,operation will continue.
If current operation is in cooling mode (including the cooling mode operation when is a part of Soft Dry mode operation) it will be maintained, and if current operation is not cooling mode, the appropriate operation mode is determined for 25seconds at super slow fan speed.Then the selected mode will continue.

F) Room temperature adjustment

Higher	→	+2℃
Standard	→	±0℃
Lower	→	−2℃

8.5 About Cursor Key Which Points To "OFF" On Remote Control

- When the ON/OFF button on the remote control is pressed, the cursor key which points to "OFF" will appear or disappear to indicate the ON/OFF status of the air conditioner.



- For some reason (Ex. The signal of the remote control does not reach the signal receiver of the indoor unit.), the display of the remote control will not correspond with the actual ON/OFF status of the indoor unit:

1. The air conditioner is running but the cursor key which points to "OFF" appears. The air conditioner can be stopped with any button (Except for "ON/OFF", "TIMER SET", "TIMER ON") pressed.
2. The air conditioner is on standby, but the cursor key which points to "OFF" disappears. The air conditioner can be started with any button(Except for "ON/OFF", "TIMER SET", "TIMER OFF") pressed.

8.6. Indoor Fan Motor Control

- Automatic fan speed control
  When automatic fan speed set, the available range for fan speed is from Hi to Slo.

- Manual Fan Speed Control
  Basic fan speed can be manually adjusted (Lo, Med, Hi) by using the fan speed selection button.

- Basic Fan Speed

Category		Hi	Me	Lo	Lo-	SLo	SSLo
Cooling Mode Operation	Manual	○	○	○			
	Auto	○	○			○	
Soft Dry Operation	Manual				○	○	
	Auto				○	○	
Heating Mode Operation	Manual	○	○	○	○	○	○
	Auto		○	○	○	○	○

8.7 Auto restart control

- If the operation is stopped due to a power failure under any operation mode, it will restart automatically under the previous operation mode when the power supply is resumed.

8.8 Airflow Direction Control

Airflow Direction Auto-control

- When set at airflow direction auto-control with remote control,the louver swings up and down as shown in the table below.
- The louver does not swing when the indoor fan stops during operation.
- When stop the unit with remote control,the discharge vent is closed with the louver.
- When temperature of indoor heat exchanger reaches 38℃ during heating mode operation, if temperature falls to 35℃,airflow direction will change from the lower limit to horizontal.

※ The left and right airflow direction louver can be adjusted manually.

Airflow direction manual control

- When the airflow direction set button is pressed,the automatic airflow is released and the airflow direction louver moves up and down as shown in thetable below. The louver can be stopped by releasing the button at the desired position.
- When the remote control is used to stop the operation,the discharge vent is closed with airflow direction louver.

Angles Of Airflow Direction Louver

Operating Mode		1	2	3	4	5
Cooling Soft dry	Manual	12°	17°	26°	32°	36°
	Auto	12° ~36°				
Heating	Manua	9°	21°	29°	44°	55°
	Auto	9° ~55°				
Determining operation mode		9°				

Notes:

- In heating mode operation

1. Airflow direction automatic control:
   Airflow direction is automatically adjusted to horizontal direction when the temperature of indoor heat exchanger is low and it will be automatically adjusted downward while the indoor temperature rises.
2. Airflow direction manual control:
   The airflow direction is automatically adjusted to horizontal direction when temperature of indoor heat exchanger is low .While temperature of indoor heat temperature rises ,the airflow direction is automatically adjusted to the place set by the remote control.

- In cooling or soft dry mode operation

If the compressor continues to operate for 60 minutes ,and the louver direction is at No 5,the fan speed is below Med, the intake air temperature is below 29 ℃ and continues to change between 2 ℃ for 30 minutes ,the louver direction will be at No 2 in order to prevent dew around the discharge vent.

9 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

9.1. 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. 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. 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.	⃠

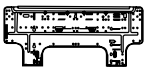
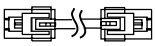
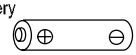
⚠ CAUTION

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 10A 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 10A 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	5	Drain elbow 	1
2	Installation plate fixing screw 	5			
3	Remote control	1	6	Connecting Wire (Connector) 	1
4	Battery 	2			

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 2.5 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		Common Length (m)	Max. Elevation (m)	Max. Piping Length (m)	Additional Refrigerant (g/m)
	Gas	Liquid				
UW9GKE	3/8"	1/4"	7.5	5	10	20
UW12GKE	3/8"	1/4"	7.5	5	15	20

Indoor/Outdoor Unit Installation Diagram

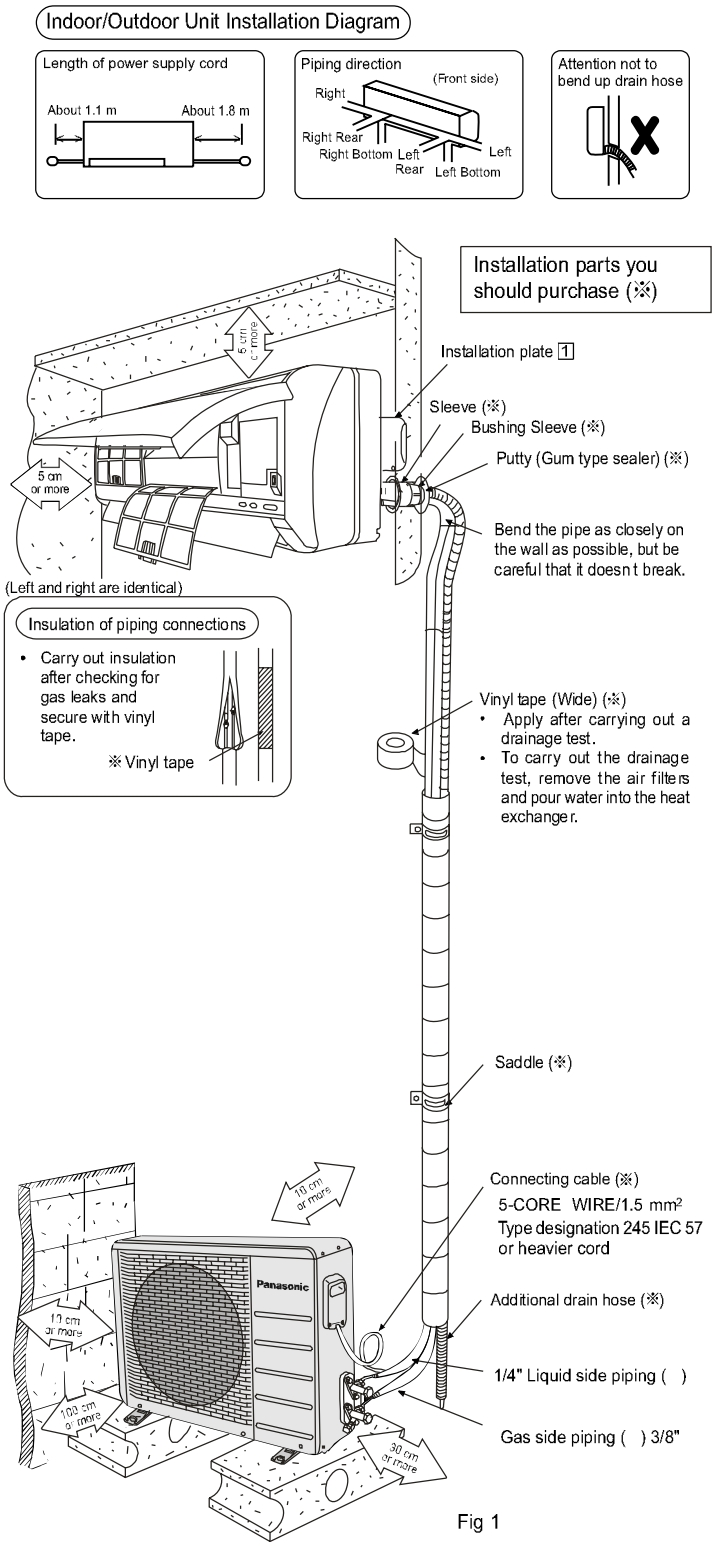


Fig 1

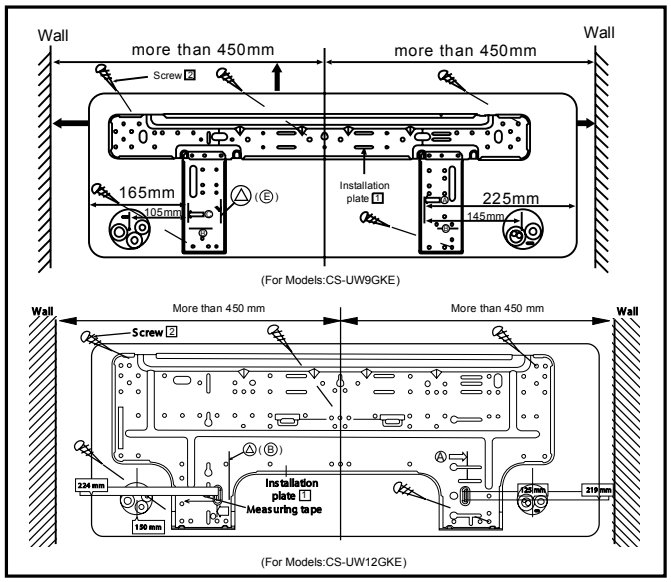
- This illustration is for explanation purposes only. The indoor unit will actually face a different way.

9.2. INDOOR UNIT

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

9.2.2. 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 62 mm(CS-UW9GKE) or 98(CS-UW12GKE).

From installation plate right edge to unit's right is 79 mm (CS-UW12GKE) or 112 (CS-UW12GKE).

△ : For left side piping, piping connection for liquid should be about 10 mm from this line.
: For left side piping, piping connection for gas should be about 45 mm from this line.
: For left side piping, piping connecting cable should be about 785mm (CS-UW9GKE) or 800mm (CS-UW12GKE) from this line.

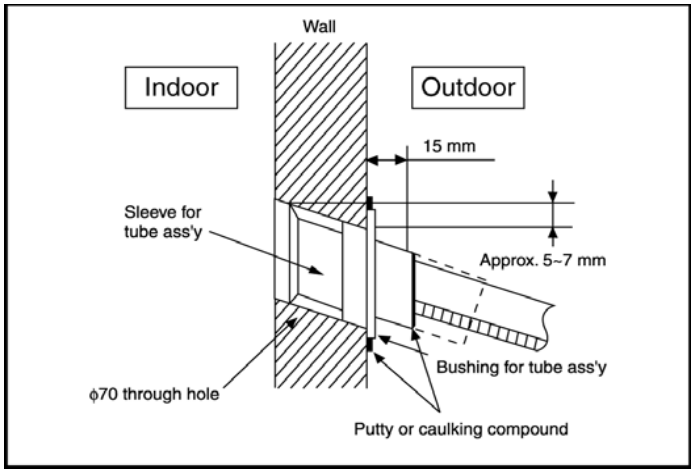
1. Mount the installation plate on the wall with 5 screws or more.
   (If mounting the unit on the concrete wall consider using anchor bolts.)
   - Always mount the installation plate horizontally by aligning the marking-off line with the thread and using a level gauge.
2. Drill the piping plate hole with ø70 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 105 mm and 145mm for left and right hole respectively (CS-UW9GKE), or 150mm and 125mm for CS-UW12GKE.
   - Drill the piping hole at either the right or the left and the hole should be slightly slanted to the outdoor side.

9.2.3. 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.



9.2.4. INDOOR UNIT INSTALLATION

1. For the right rear piping

Pull out the Indoor piping
↓
Install the Indoor Unit
↓
Secure the Indoor Unit
↓
Insert the connecting cable

2. For the right and right bottom piping

Pull out the Indoor piping
↓
Install the Indoor Unit
↓
Insert the connecting cable
↓
Secure the Indoor Unit

3. For the embed ded 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 determing 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

↓

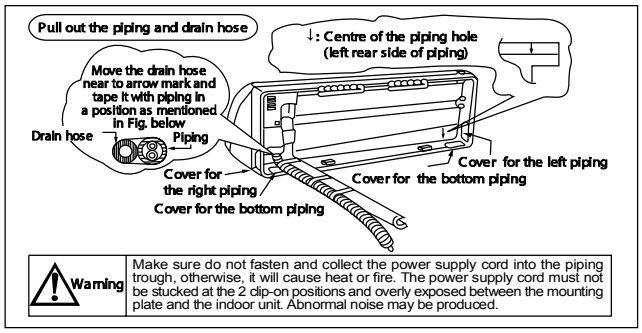
- Please refer to "Connecting the piping" column in outdoor unit section. (Below steps are done after connecting the outdoor piping and gas-leakage confirmation.)

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

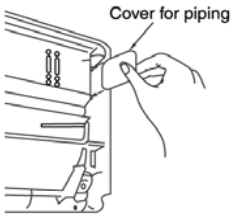


Warning: Make sure do not fasten and collect the power supply cord into the piping trough, otherwise, it will cause heat or fire. The power supply cord must not be stucked at the 2 clip-on positions and overly exposed between the mounting plate and the indoor unit. Abnormal noise may be produced.

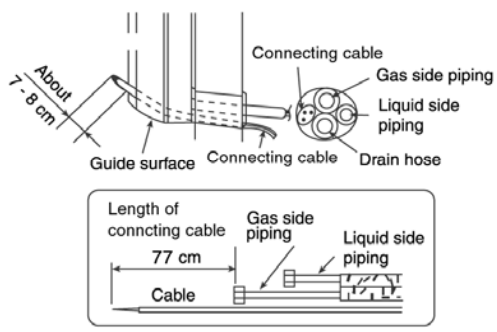
How to keep the cover

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)

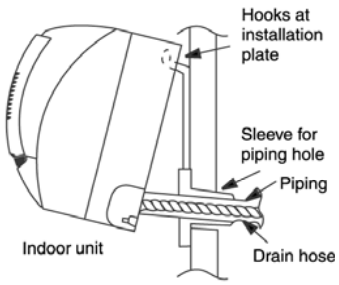


Insert the connecting cable



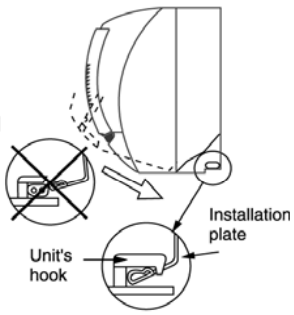
Install the Indoor Unit

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.

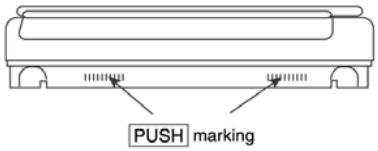


Secure the Indoor Unit

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).



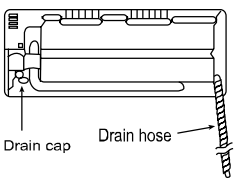
To take out the unit, push the PUSH marking at the bottom unit, and pull it slightly towards you to disengage the hooks from the unit.

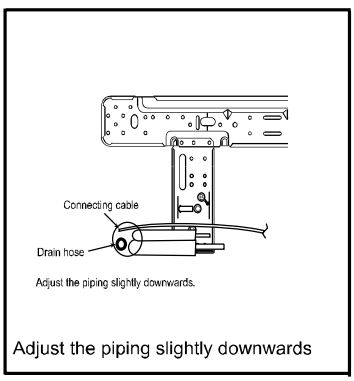


(This can be used for left rear piping & left bottom piping also.)

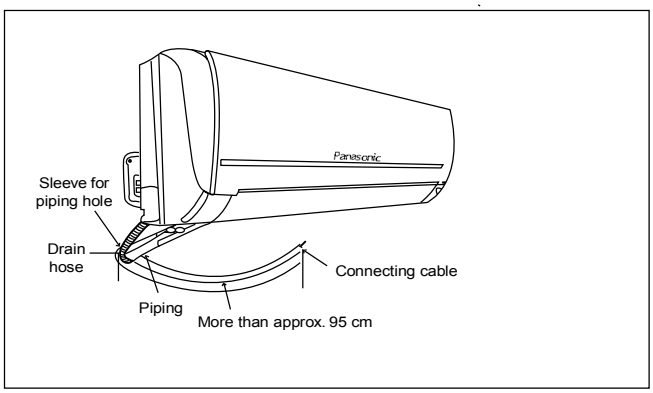
Exchange the drain hose and the cap

Refer view for left piping installation

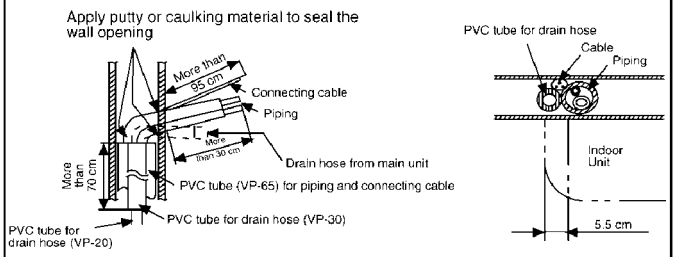




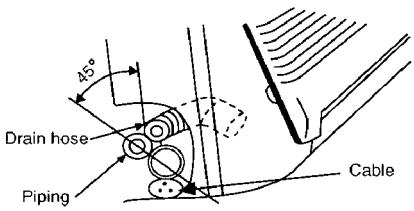
Adjust the piping slightly downwards



- 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.

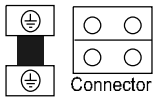


(For the right piping, follow the same procedure)

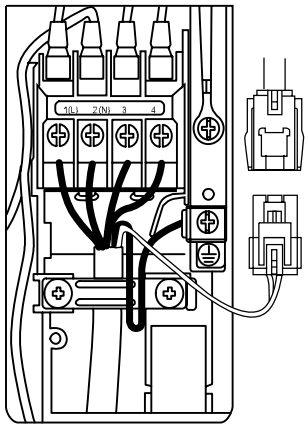
9.2.5. CONNECT THE CABLE TO THE INDOOR UNIT

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 5 x 1.5 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(L)	2(N)	3	4
Color of wires				
Terminals on the outdoor unit	1(L)	2(N)	3	4



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

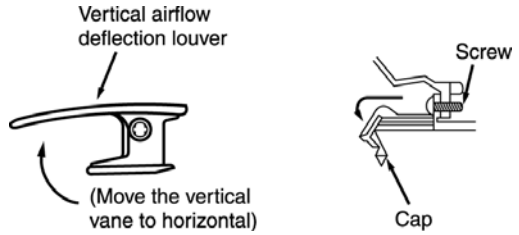


HOW TO TAKE OUT FRONT GRILLE

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

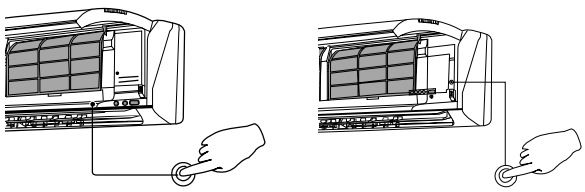
   The Auto operation will be activated immediately once the Auto Switch is pressed.

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.



CS-UW9GKE CS-UW12GKE

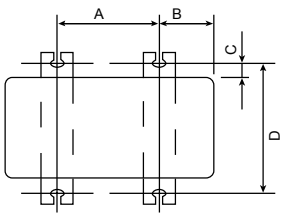
9.3. OUTDOOR UNIT

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

9.3.2. 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. (ø10 mm).
2. When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.



Unit: mm

Model	A	B	C	D
CU-UW9GKE	474	87	20	261
CU-UW12GKE	570	103.9	19.5	320

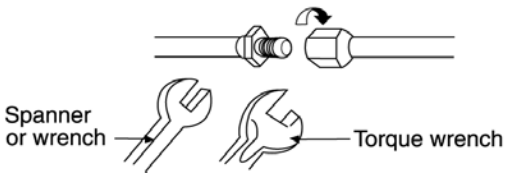
9.3.3. CONNECTING THE PIPING

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.



Piping size (Torque)	
Gas	Liquid
3/8" (42 N.m)	1/4" (18 N.m)

Connecting The Piping To Outdoor Unit

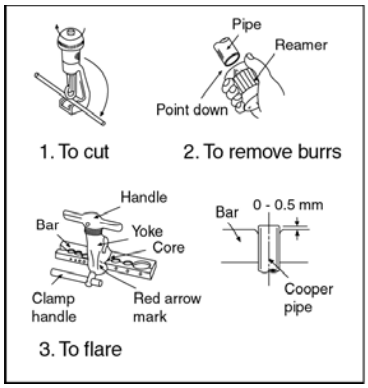
Decide piping length and then cut by using pipe cutter. Remove burrs from cut edge. Make flare after inserting the flare nut (located at valve) onto the copper pipe.

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

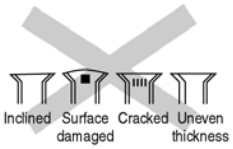
CUTTING AND FLARING THE PIPING

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.



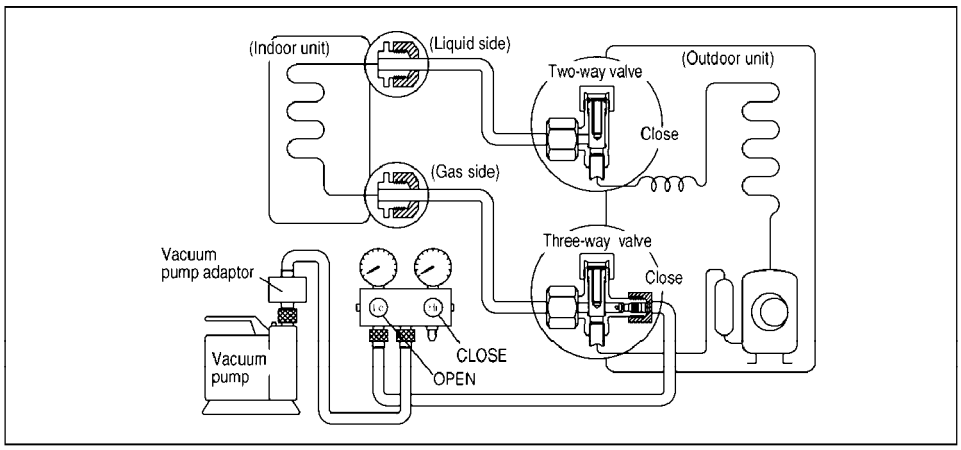
■ Improper flaring ■



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.

9.3.4. (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.

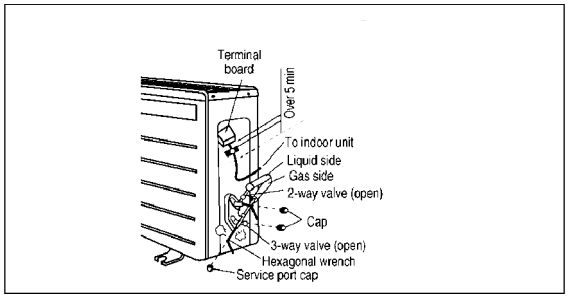
If the leak does not stop when the connections are retightened, repair the location of leak.

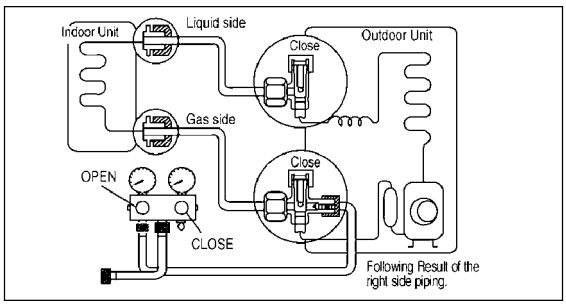
Do not release refrigerant during piping work for installation and reinstallation. Take care of the liquid refrigerant, it may cause frostbite.

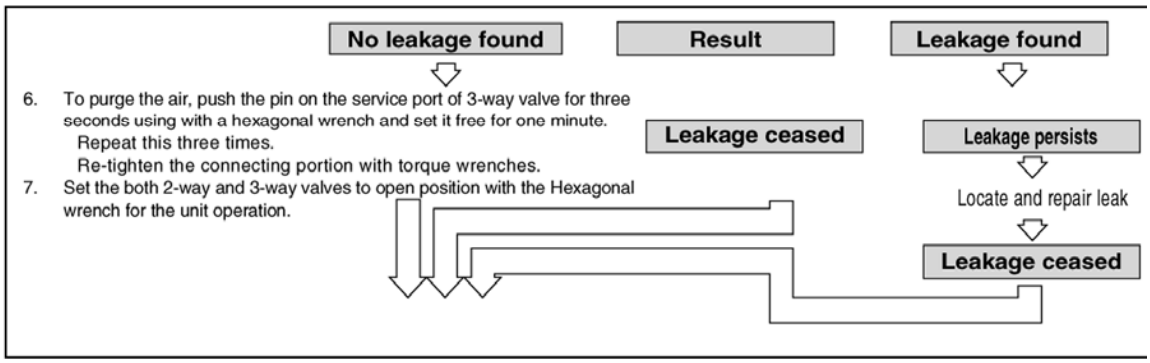
9.3.5. (b) AIR PURGING OF THE PIPING AND INDOOR UNIT

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.

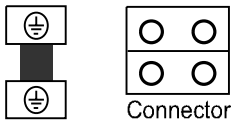
(1) * Connect the manifold gauge to the service port of 3-way valve.
Measure the pressure.
*

(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.

9.3.6. 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 5 (UW9GKE,UW12GKE) x 1.5 mm^2 flexible cord, type designation 245 IEC 57 or heavier cord.The attached wire 6 with two connectors should be applied.

Terminals on the indoor unit	1(L)	2(N)	3	4
Color of wires				
Terminals on the outdoor unit	1(L)	2(N)	3	4



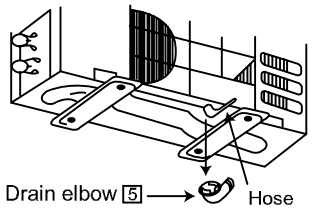
3. Secure the cable onto the control board with the holder (clamper).
4. Attach the control board cover back to the original position with the screw.

9.3.7. 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

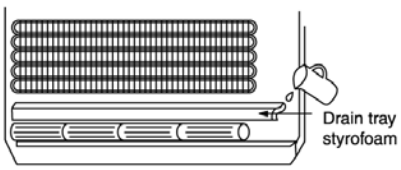
- If a drain elbow is used, the unit should be placed on a stand which is taller than 3 cm.
- If the unit is used in an area where temperature falls below 0°C for 2 or 3 days in succession, it is recommended not to use a drain elbow, for the drain water freezes and the fan will not rotate.



Install the hose at an angle so that the water smoothly flows out.

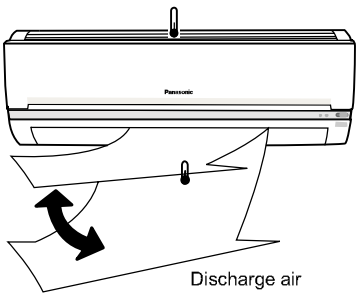
CHECK THE DRAINAGE

- 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 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 during cooling operation or 14°C during heating operation.



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?

10 Installation and Serving Air Conditioner Using R410A

10.1. OUTLINE

10.1.1 About R410A Refrigerant

1. Converting air conditioners to R410A

Since it was declared in1974 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 some what 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 isdirectly 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/cm2)	0.94 Mpa(9.6 kgf/cm2)
Saturated vapor density	64.0 kg/m3	44.4 kg/m3
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 9or 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)	R410A	R22
-20	0.30	0.14
0	0.70	0.40
20	1.35	0.81
40	2.30	1.42
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.

10.1.2 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.

10.2. TOOL FOR INSTALLING / SERVICING REFRIGERANT PIPING

10.2.1 Necessary Tools

In order to prevent an R410AAC 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 Tool 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

10.2.2. 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.

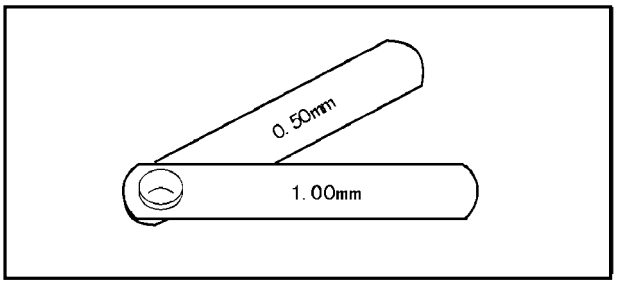


Fig. 1 Copper tube gauge for clearance adjustment

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.

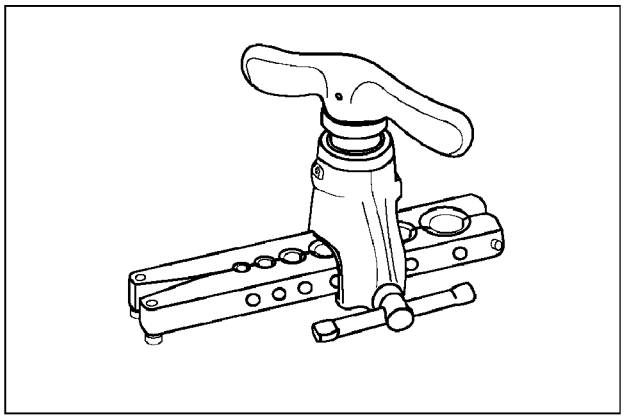


Fig. 2 Flaring tool (clutch type)

3. Torque wrenches

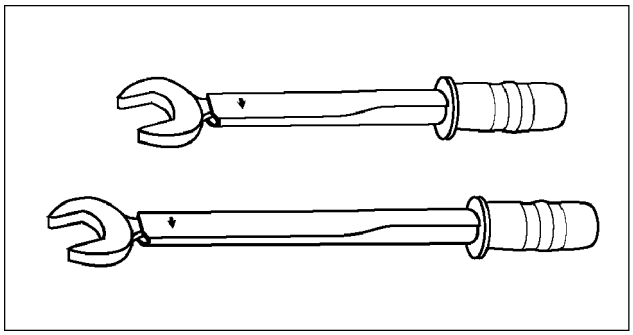


Fig. 3 Torque wrenches

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.

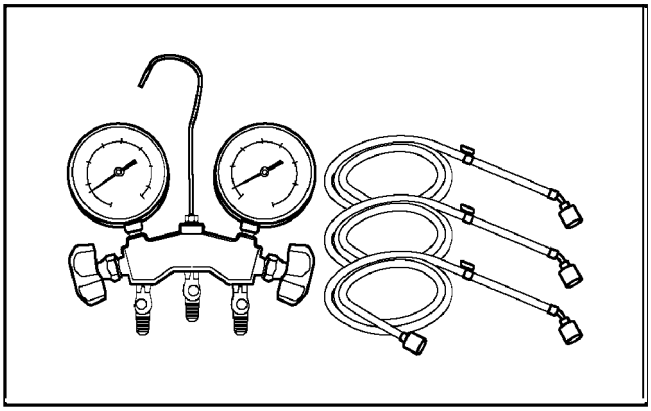


Fig. 4 Manifold gauge charging hose

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.

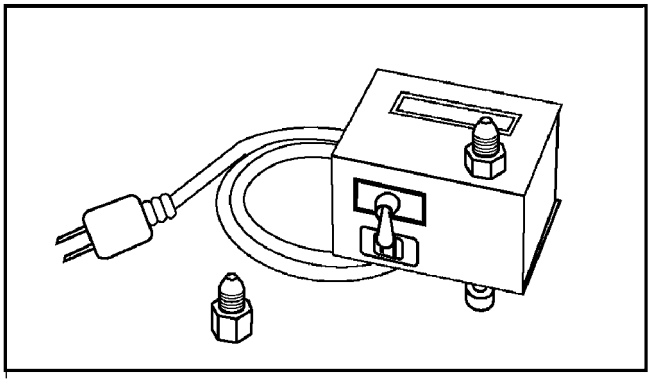


Fig. 5 Vacuum pump adaptor

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).

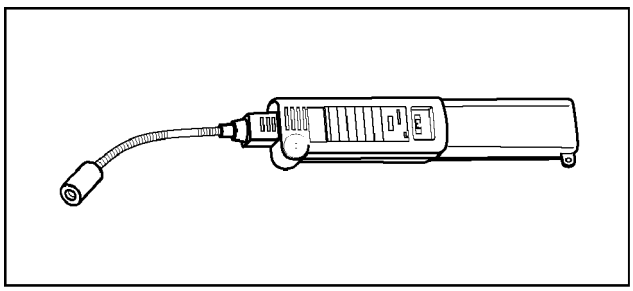


Fig. 6 Electric gas leak detector for HFC refrigerant

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.

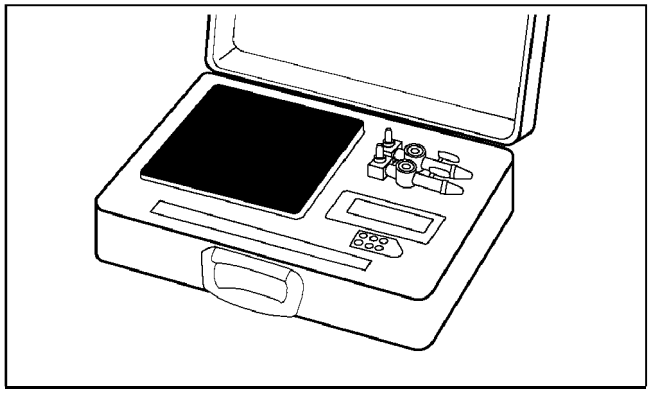


Fig. 7 Electronic scale for refrigerant charging

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.

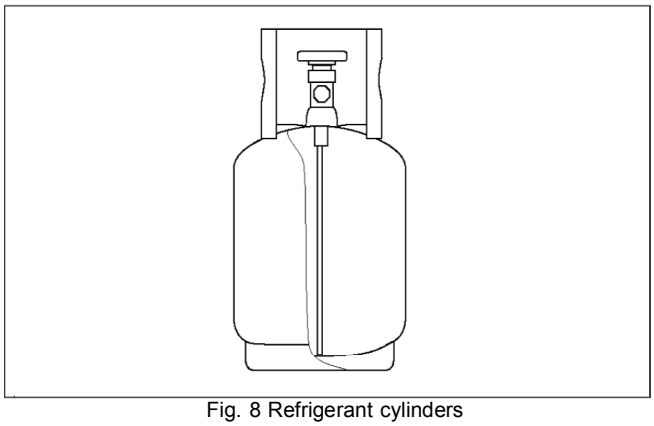


Fig. 8 Refrigerant cylinders

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.

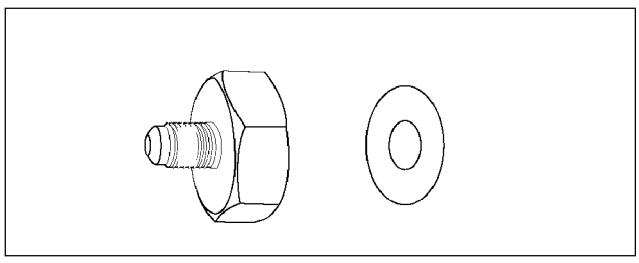


Fig. 9 Charging orifice and packing

10.2.3. 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

10.3. REFRIGERANT PIPING WORK

10.3.1. 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 used 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

10.3.2. Processing and Connecting Piping Materials

When working with refrigerant piping, the following points must be carefully observed: no moisture od 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 used 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 sued 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)

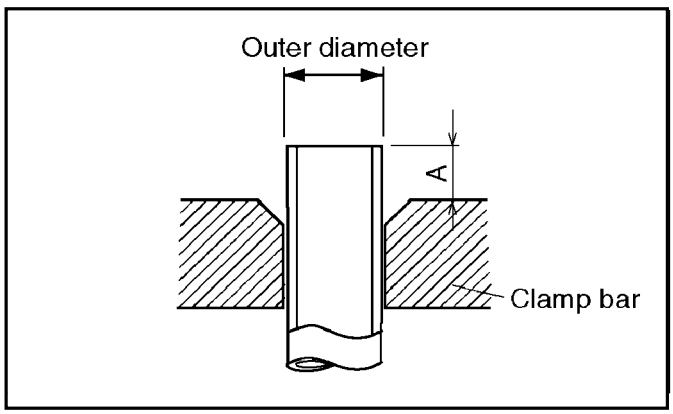


Fig. 10 Flaring dimensions

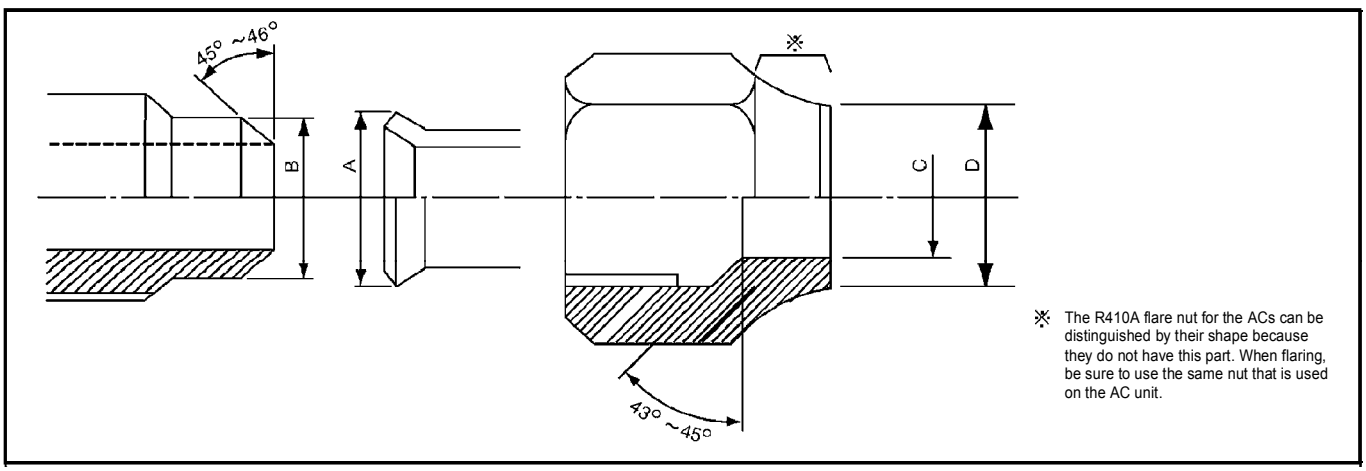


Fig. 11 Relation between the flare nut structure and flaring tool end

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

   a. Check to make sure there are no scratches, dust, etc., on the flare and union.

   b. Align the flared surface with the axial center of the union.

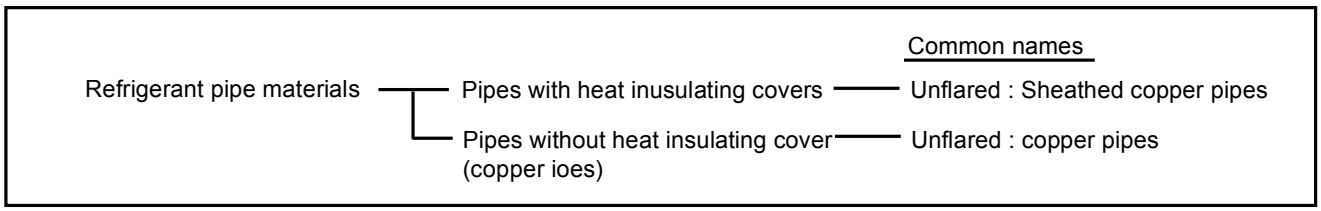
   c. Use a torque wrench, and tighten to the specified torque. The tightening torque for R410A is the same as the conventional torque value for R22. Be careful, because if the torque is too weak, it may lead to a gas leak. If it is too strong, it may split the flare nut or make it impossible to remove 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)

10.3.3. 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 used 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 that in conventional piping).
   a. Keep the open ends of all pipes sealed until connection with AC equipment is complete.
   b. 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.
   c. 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.

10.4. INSTALLATION, TRANSFERRING, SERVICING

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

1. From the viewpoint of protecting the global environment, please do not release refrigerant into the atmosphere.
   a. 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)
   b. 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).)
   c. 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)
   d. 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)
   e. 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).
   f. 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)).
   g. 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.

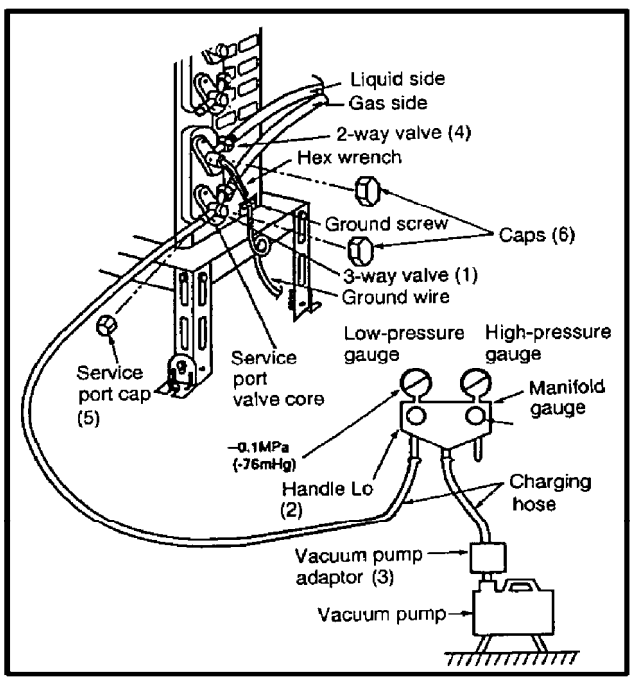


Fig. 12 Vacuum pump air purging configuration

10.4.2. 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.

10.4.3. AC Units Replacement (Using Existing Refrigerant Piping)

When replacing and 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.

10.4.4. 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.

10.4.5. 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)

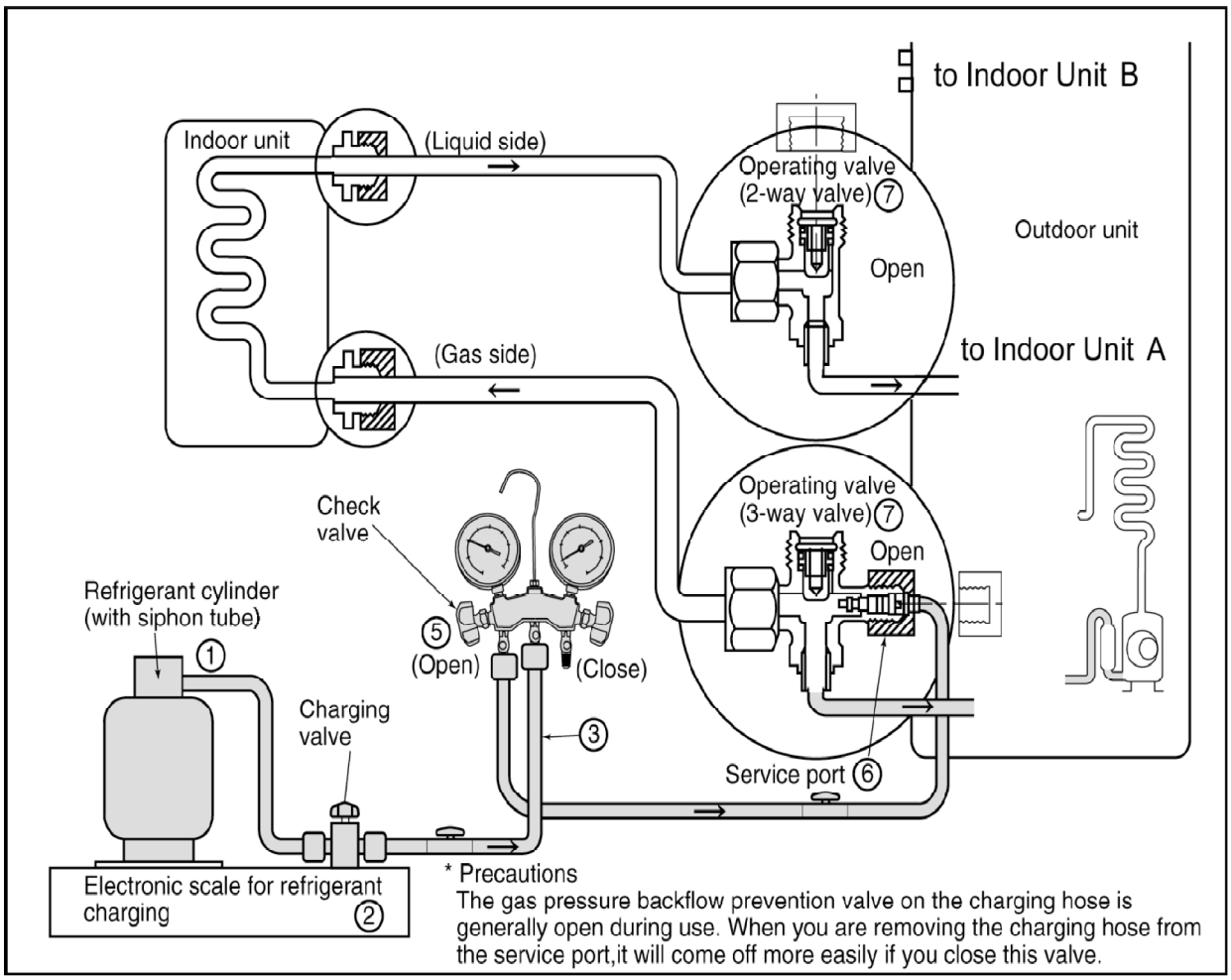


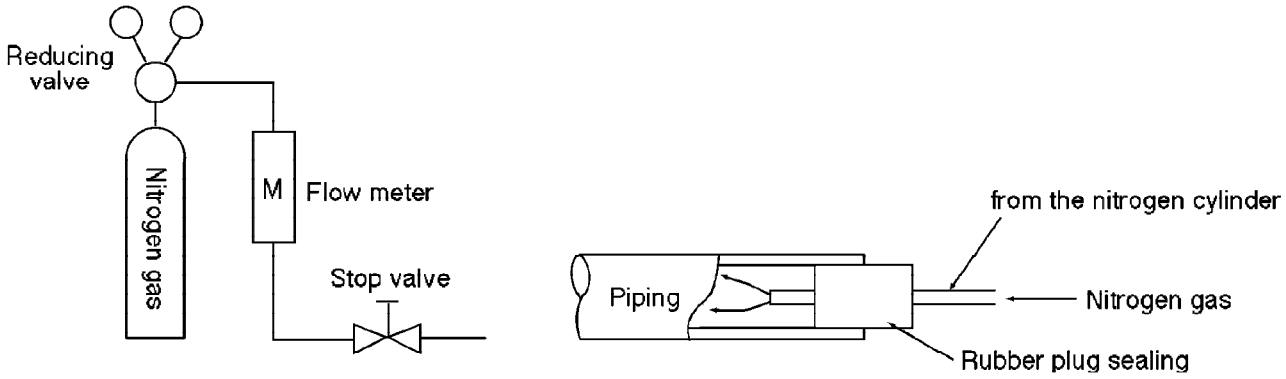
Fig. 13 Re-charging refrigerant

10.4.6. 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 m^3/h, or 0.02 MPa (0.2 kgf/cm^2) 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 preventive.

10.4.7. 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.

11 Disassembly of the parts

Removal Procedure For Intake Grille

1. Open the intake grille and pull it to the horizontal position. (Fig. 1)

Fig. 1

2. Pull up the intake grille until it falls off.(Fig. 2)

Fig. 2

Removal Procedure For Front Grille

1.Remove the two caps at the discharge port (right and left) (Fig. 3)

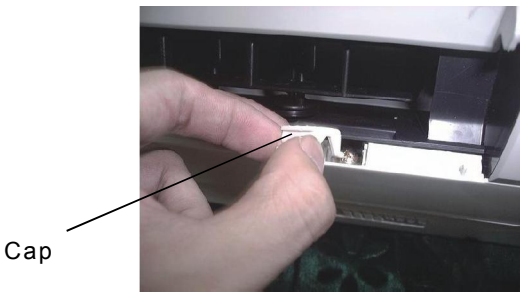


Fig. 3

2.Release the two screws under the both caps. (Fig. 4)

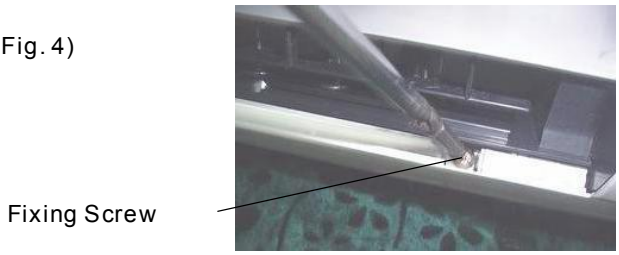


Fig. 4

3.Pull out the front grille from the unit body. (Fig.5)

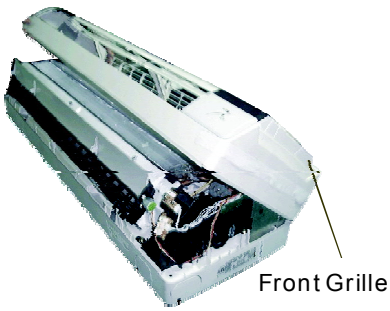


Fig. 5

Removal Procedure For Electronic Controller

1、Remove indicador complete

After removing the front grille, loose the screw behind the indicator, the whole indicator can be released.

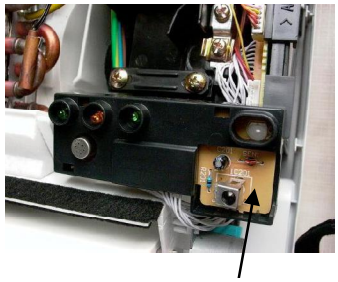


Fig 6

2、Remove the cover of control board and holder.

3、Break off the earing ,release the holder slightly.
Be sure to avoid cracking of the holder.

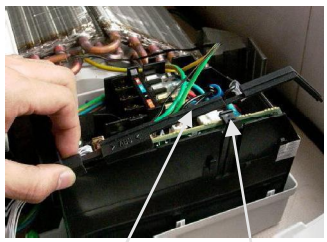


Fig 7

4. Release the lead wire CN-FM, CN-VF, CN-STM, CN-DISP and earth wire(Yellow/Green). Take out the sensor from the socket. Pull out the whole electronic controller.

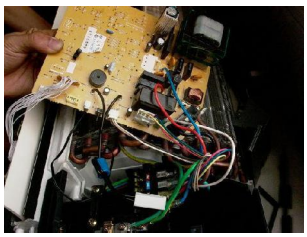


Fig 8

5. Remove the whole control board
Loose the screw s of control board,earings slightly, then the whole control board can be pulled out.

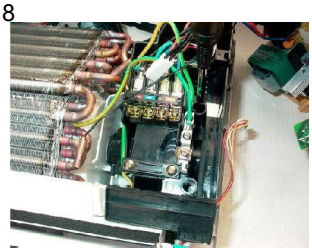


Fig 9

Removal Procedure For the Discharge Grille

1. Separate the drain hose and the drain plate(Fig.10)

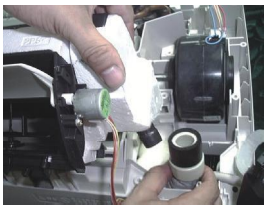


Fig 10

2. Pull out the discharge grille slightly (Fig. 11)

Fig. 11

Removal Procedure For Cross Flow Fan

1. Release the two fixing screws,disassembly the fixing board from evaporator on the left side of the evaporator and pull out the whole evaporator. (Fig. 12)

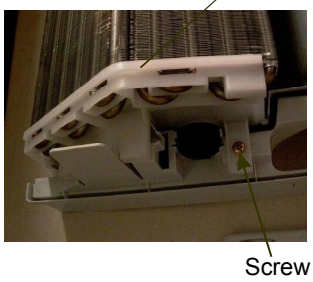


Fig. 12

2.Loose the fixing screw of the cross flow fan. (Fig. 13)

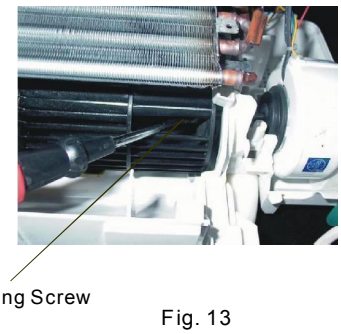


Fig. 13

3.After removing the bearing (refer to fig14) , indoor fan can be taken out from the left side.

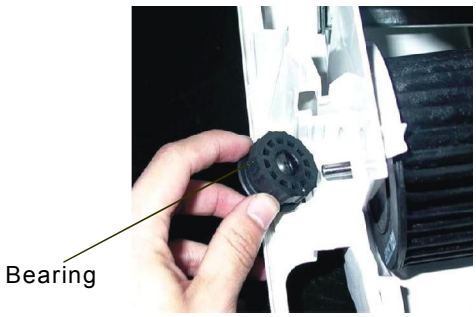


Fig 14

4. Lift up the indoor fan slightly, and then pull the fan motor out.(Fig.15)

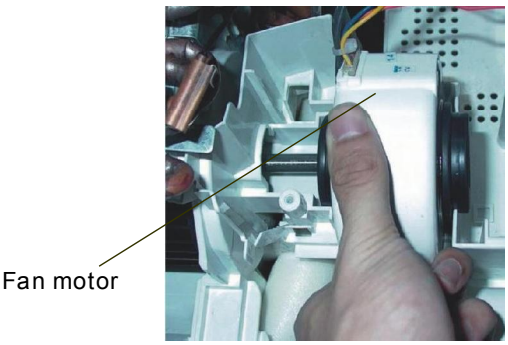


Fig 15

Remote control reset

If the display is chaotic or can not be adjusted, Remove the back lid of the remote control and you will find the resetting terminals and shorten the two terminals using a screw driver to reset.

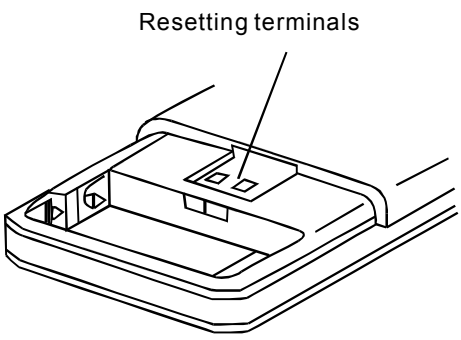


Fig 16

12 Troubleshooting Guide

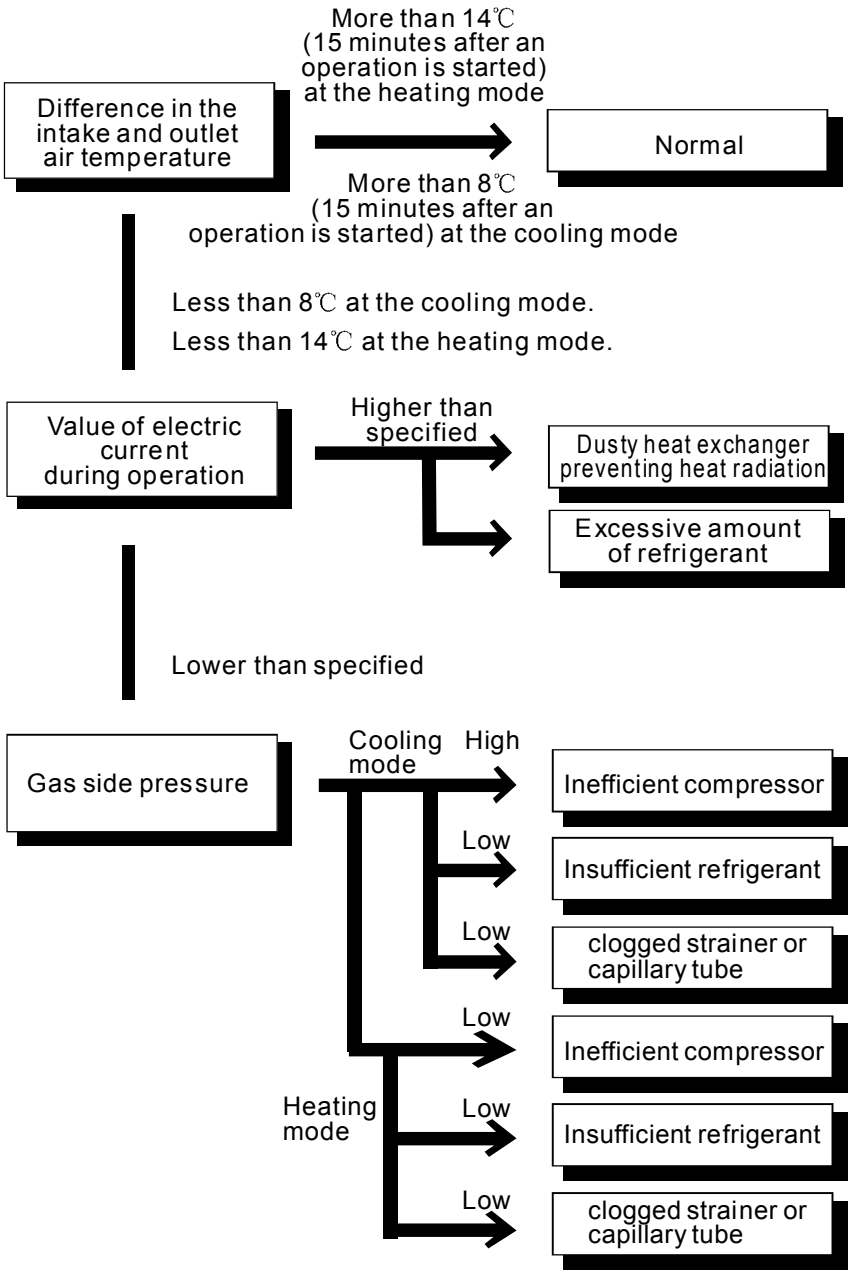
12.1. Refrigeration cycle system

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.

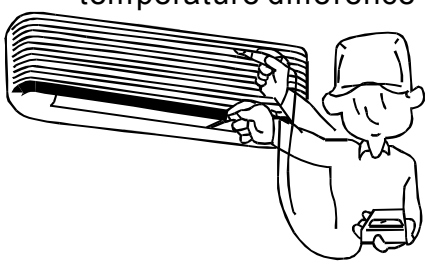
Normal pressure and outlet air temperature(standard)

	Gas side pressure Mpa (kg/cm^2G)	Outlet air temperature (℃)
Cooling mode	0.6~0.96(6~9.6)	12~16
Heating mode	2.25~3.36(22.5~33.6)	36~45

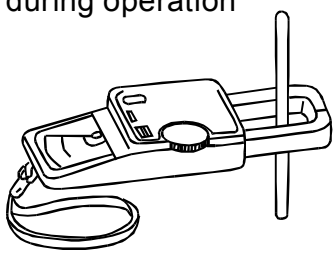
★ Condition: indoor fan speed: high
outdoor temperature:
35℃ (Cooling mode)
7℃ (Heating mode)



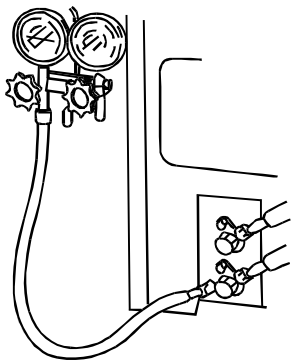
- Measuring the air temperature difference



- Measuring electric current during operation



- Measuring gas side pressure



12.2. Relationship between the condition of air conditioner and pressrue 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	↗	↘	↘	↗	↘	↘

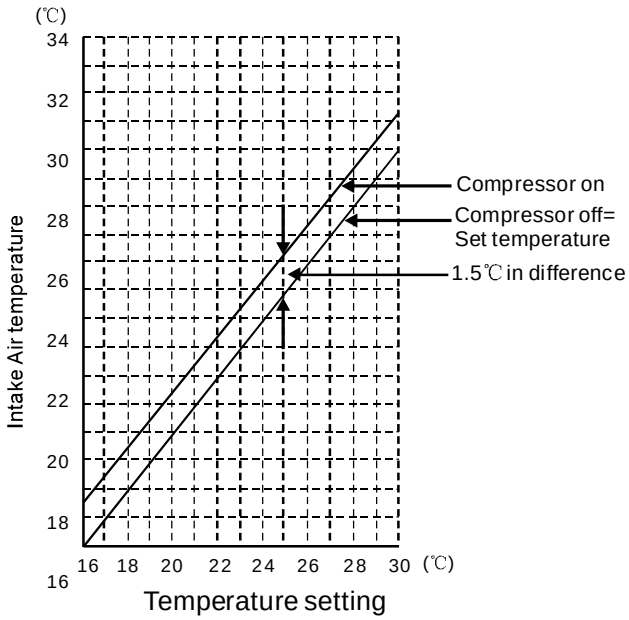
12.3. Diagnosis methods of a malfunction of a compressor .

Nature of fault	Symptom
Insufficient compressing of a compressor	• Electric current during operation becomes approximately 80% lower than the normal level. • The discharge tube of the compressor becomes abnormally hot (normally 70~90℃). • The difference between high pressure and low pressure becomes almost zero.
Locked compressor	• 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	• 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.

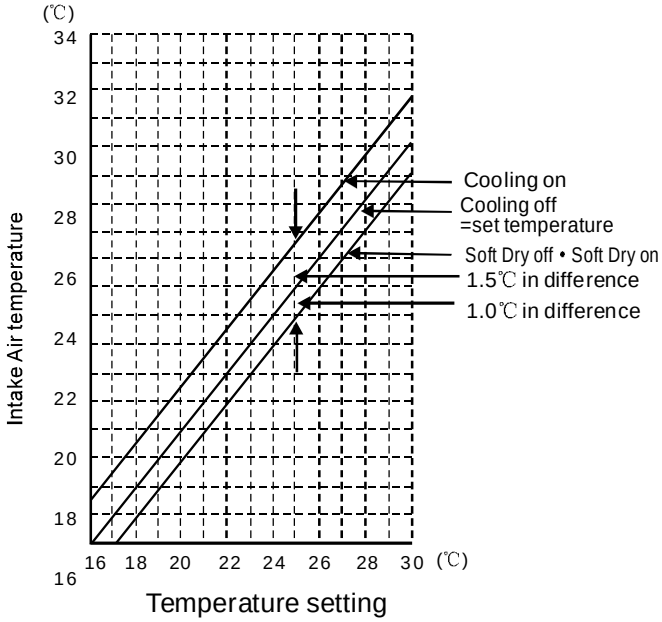
13 Technical Data

■ Thermostat characteristics

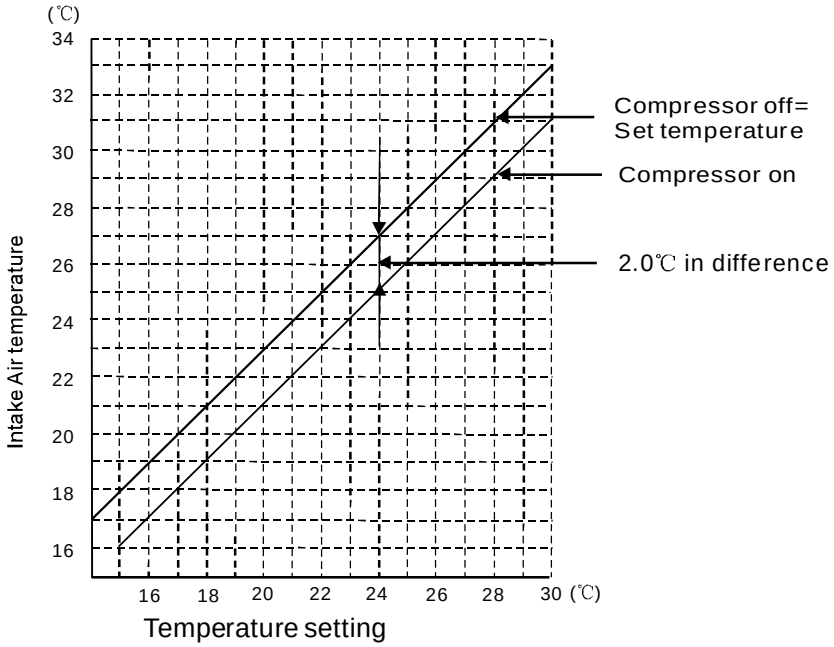
- Cooling mode



- Soft dry mode



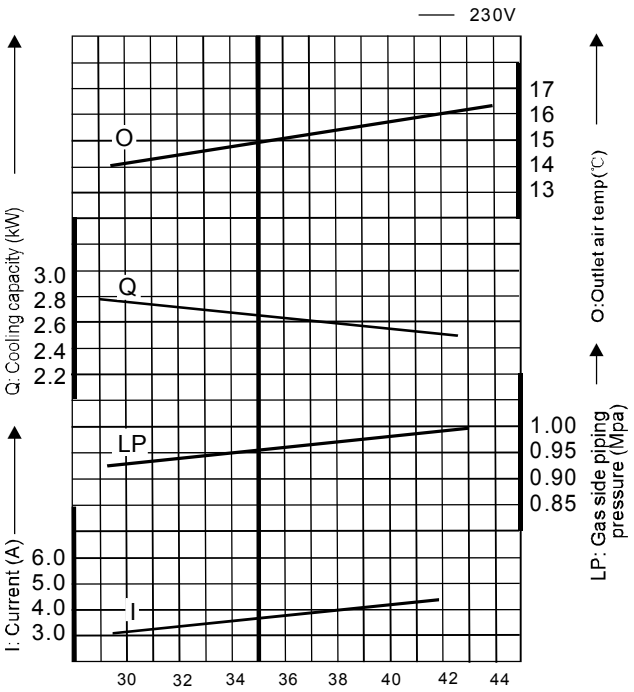
- Heating mode



■ Operation characteristics

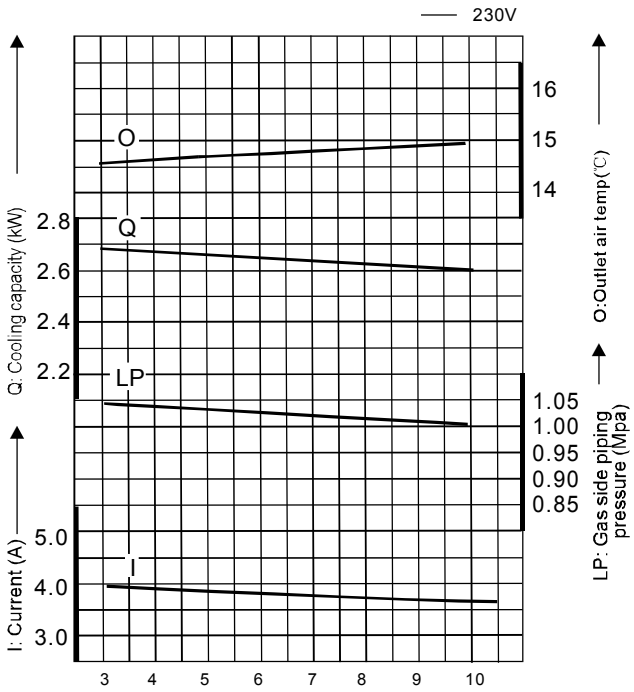
CS/CU-UW9GKE

● Cooling characteristics



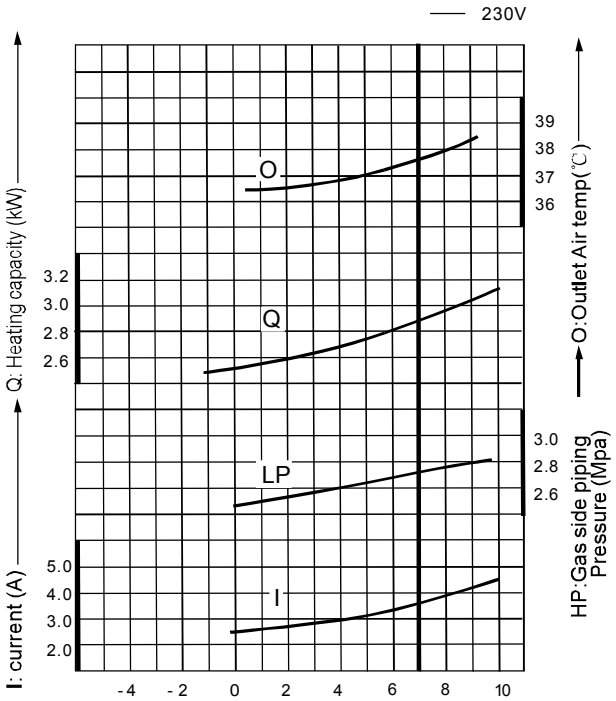
Outdoor temp(℃)
[Condition] Room temp: 27/19℃
Cooling operation:at high speed
Piping length:7.5m

● Piping Length Characteristics



PIPING LENGTH(m)
[Condition] Room temp: 27/19℃
Cooling operation:at high speed

● Heating characteristics

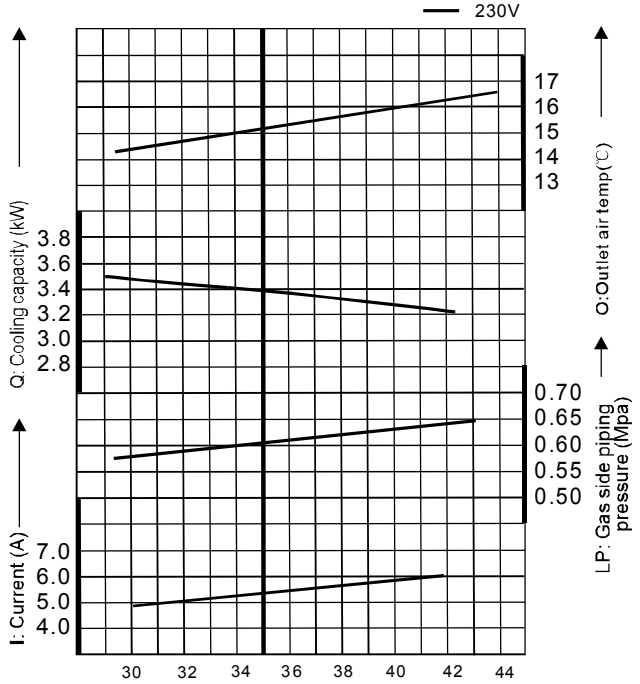


Outdoor temp(℃)
[Condition] Room temp: 20℃
Heating operation:at high speed
Piping length:7.5m

■ Operation characteristics

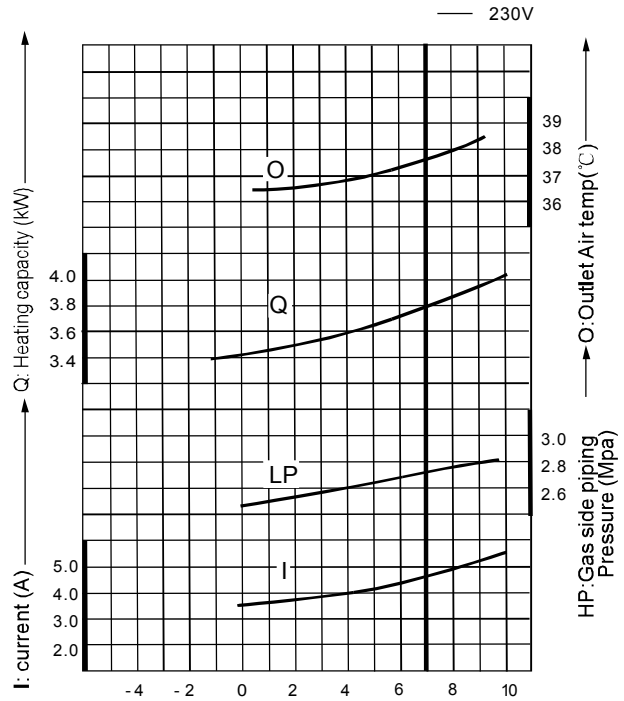
CS/CU-UW12GKE

● **Cooling characteristics**



[Condition] Room temp: 27/19℃
Cooling operation:at high speed
Piping length:7.5m

● **Heating characteristics**

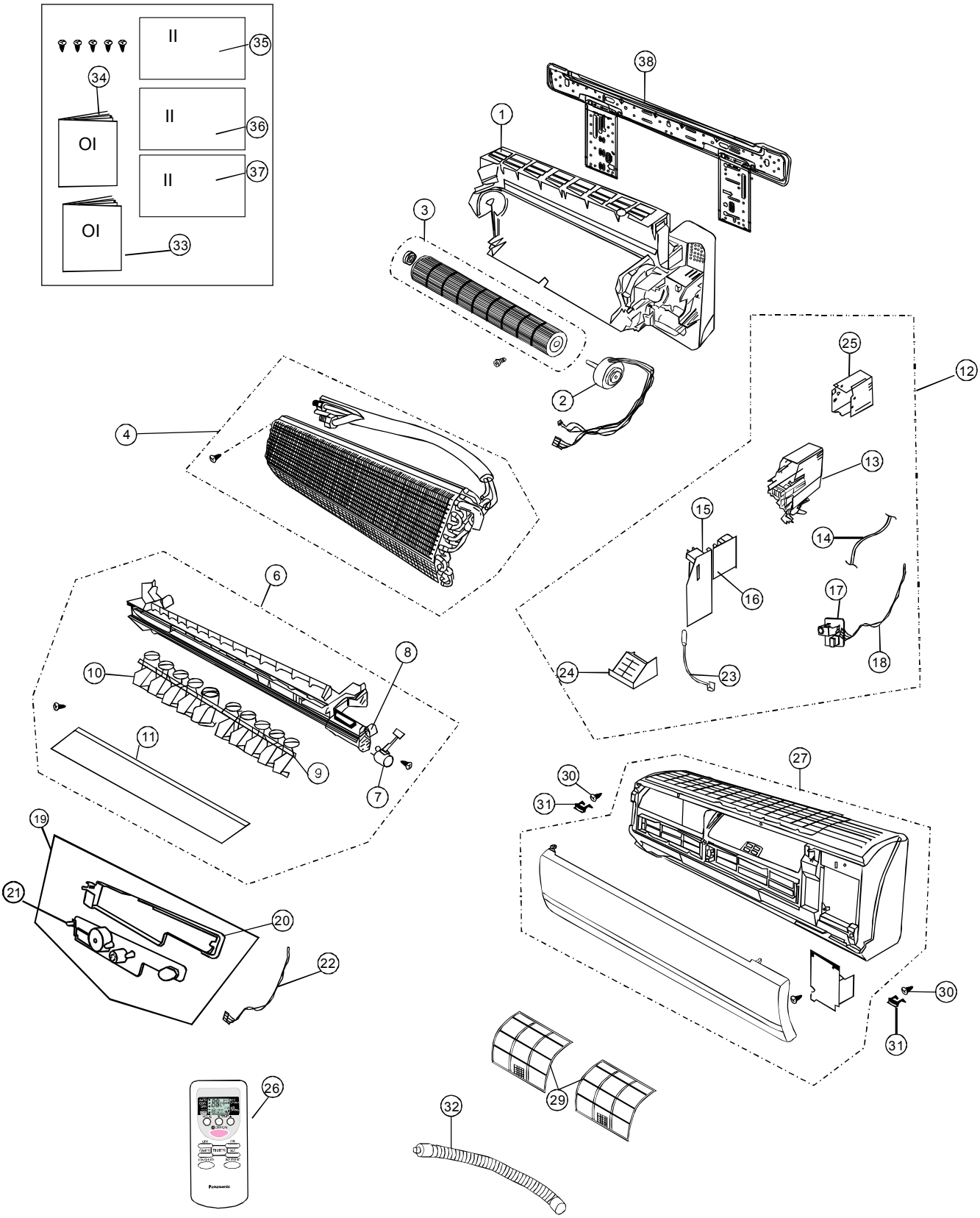


[Condition] Room temp: 20℃
Heating operation:at high speed
Piping length:7.5m

● **Piping Length Characteristics**

14 Exploded View

CS-UW9GKE



15 Replacement Parts List

CS-UW9GKE

NO	PART NAME&DESCRIPTION	Q'TY	CS-UW9GKE	RE
1	CHASSIS COMPLETE	1	CWD50C1532	
2	FAN MOTOR	1	CWA921372	*
3	CROSS FLOW FAN COMPLETE	1	CWH02C1051	
4	EVAPORATOR	1	CWB30C2146	
6	DISCHARGE GRILLE COMPLETE	1	CWE20C2708	
7	AIR SWING MOTOR	1	CWA981184	
8	DAIN ELBOW	1	CWH52160C	
9	HORIZONTAL VANE	2	CWE24C1184	
11	VERTICAL VANE	1	CWE241141	
12	C-BOX	1	CWH14C5654	*
13	CONTROL BOARD CASING	1	CWH102261	
14	POWER SUPPLY CORD COMPLETE	1	CWA20C2602	
16	MAIN PCB	1	CWA73C2593	*
17	RECEIVER	1	CWA743353	
19	INDICATOR COMPLETE	1	CWE39C1134	
20	INDICATOR HOLDER-FRONT	1	CWD932447	
21	INDICATOR PCB	1	CWA743929	
22	CONNECTING LEAD-INDICATOR	1	CWA67C5252	
23	SENSOR COMPLETE	1	CWA50C2275	*
24	CONTROL BOARD FRONT COVER	1	CWH131189	
25	CONTROL BOARD TOP COVER	1	CWH131256	
26	REMOTE CONTROL	1	CWA75C2863	*
27	FRONT GRILLE COMPLETE	1	CWE11C3874	
29	AIR FILTER	2	CWD001110	
30	SCREW-FRONT GRILLE	2	XTT4+12CFJ	
31	CAP-FRONT GRILLE	2	CWH521096	
32	DRAIN HOSE	1	CWH851095	
33	OPERATING INSTRUTIONS	1	CWF565682	
34	OPERATING INSTRUTIONS	1	CWF565683	
35	INSTALLATION INSTRUCTION	1	CWF613239	
36	INSTALLATION INSTRUCTION	1	CWF613240	
37	INSTALLATION INSTRUCTION	1	CWF613241	
38	INSTALLATION PLATE	1	CWH36K1025J	

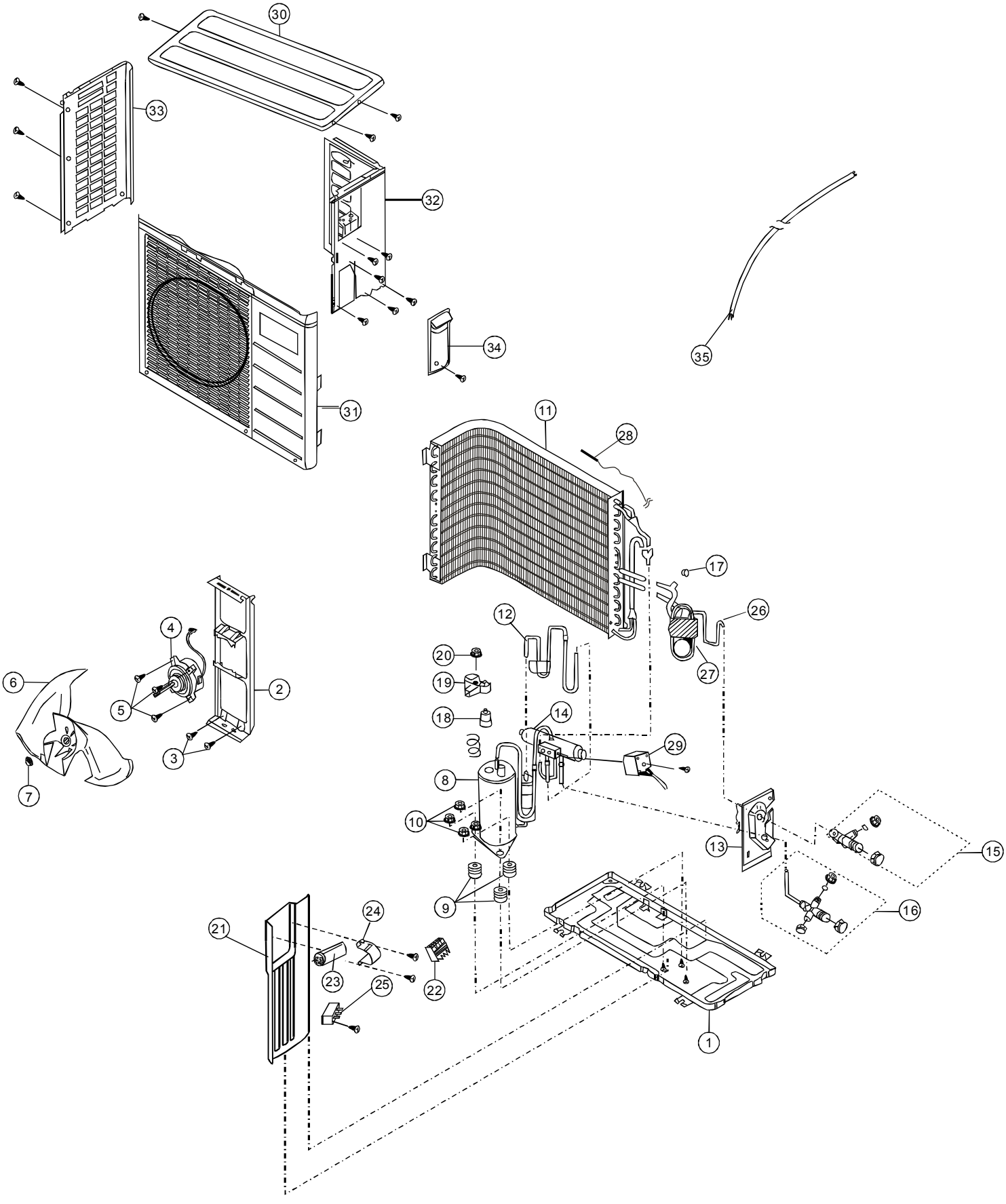
Note:

1.All parts are supplied from PHAAG, P.R. China.

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

16 Exploded View

CU-UW9GKE



17 Replacement Parts List

CU-UW9GKE

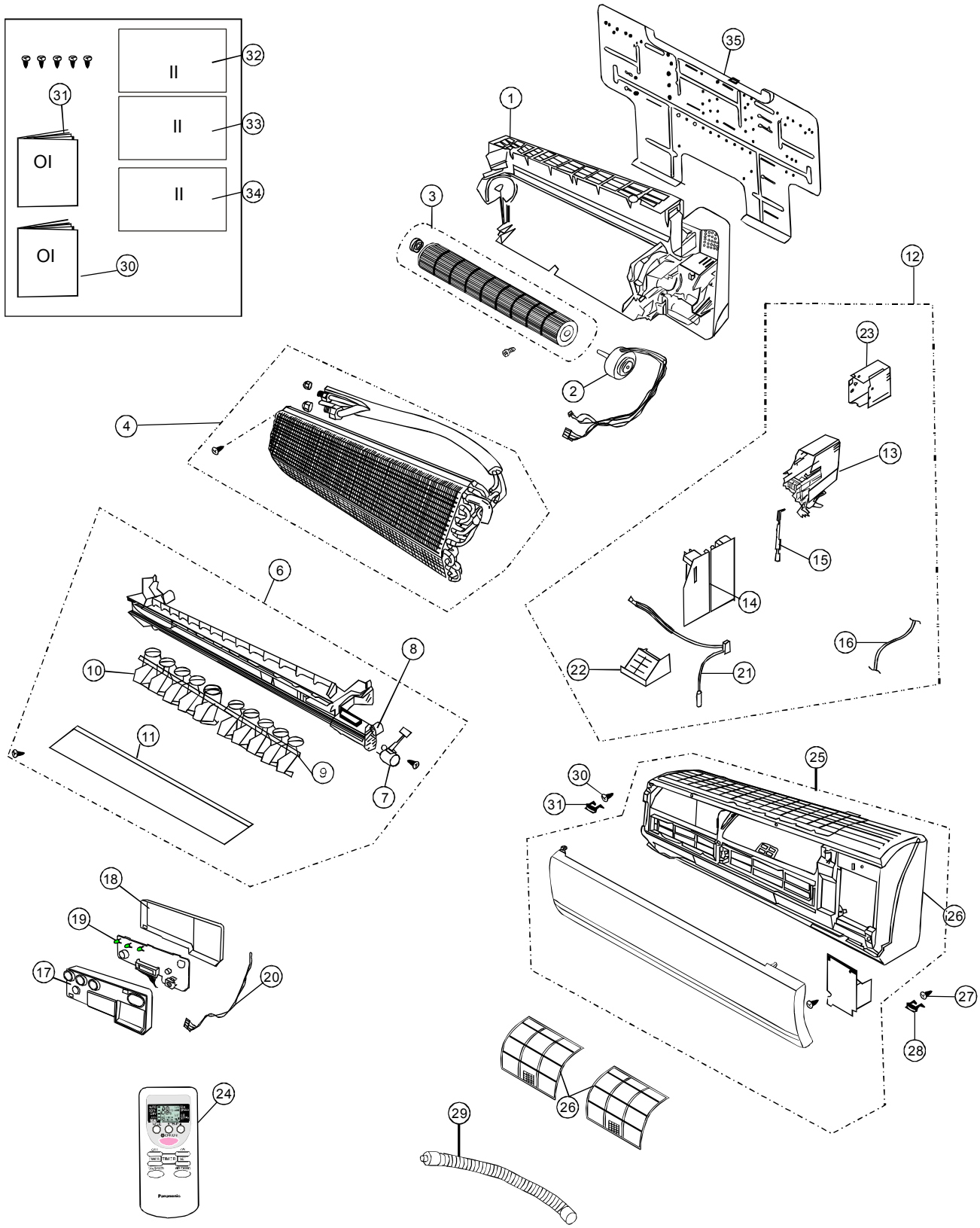
No.	PART NAME & DESCRIPTION	Q'TY	CU-UW9GKE	RE
1	CHASSIS ASS'Y	1	CWD52K1166A	
2	FAN MOTOR BRACKET	1	CWD541096	
3	SCREW-FAN MOTOR BRACKET	2	XTT4+10DFJ	
4	FAN MOTOR	1	CWA951427	*
5	SCREW-FAN MOTOR MOUNT	3	CWH55406J	
6	PROPELLER FAN ASS'Y	1	CWH03K1025	
7	NUT-PROPELLER FAN	1	CWH561036J	
8	COMPRESSOR	1	CWB092400	*
9	ANTI-VIBRATION BUSHING	3	CWH501022	
10	NUT-COMPRESSOR MOUNT	3	CWH561047A	
11	CONDENSER	1	CWB32C2022	
12	TUBE ASSY(3 WAY VALVE)	1	CWT01C4146	
13	HOLDER COUPLING ASS'Y	1	CWH351064A	
14	4-WAY VALVE	1	CWB001024J	*
15	2-WAY VALVE	1	CWB021251	
16	3-WAY VALVE	1	CWB011308	
17	STRAINER	1	CWB11094	
18	OLP	1	CWA121220	
19	TERMINAL COVER	1	CWH17006	
20	NUT FOR TERMIANL COVER	1	CW7080300J	
21	SOUND PROOF BOARD	1	CWH151080J	
22	TERMINAL BOARD ASS'Y	1	CWA28K1104	
23	CAPACITOR-COMPRESSOR	1	DS371306CPXC	*
24	HOLDER-CAPACITOR	1	CWH301037	
25	CAPACITOR-FAN MOTOR	1	F0DAH2050001	*
26	TUBE ASS'Y(CAPILLARY)	1	CWT01C4146	
27	CAPILLARY	1	CWB15513	
28	SENSOR	1	CWA50C2393	
29	V-COIL COMPLETE	1	CWA43C2208J	
30	TOP PLATE	1	CWE031044A	
31	CABINET FRONT PLATE	1	CWE06K1049	
32	CABINET SIDE PLATE (R)	1	CWE041125A	
33	CABINET SIDE PLATE (L)	1	CWE041124A	
34	CONTROL BOARD COVER	1	CWH131223	
35	CONNECT WIRE-SENSOR	1	CWA22C1022	

Note:

1. All parts are supplied from PHAAG, P.R. China.
2. "*" marked parts are recommended to be kept in stock.

18 Exploded View

CS-UW12GKE



19 Replacement Parts List

CS-UW12GKE

NO	PART NAME&DESCRIPTION	Q'TY	CS-UW12GKE	RE
1	CHASSIS COMPLETE	1	CWD50C1544	
2	FAN MOTOR	1	CWA921378	*
3	CROSS FLOW FAN COMPLETE	1	CWH02C1054	
4	EVAPORATOR	1	CWB30C2188	
6	DISCHARGE GRILLE COMPLETE	1	CWE20C2723	
7	AIR SWING MOTOR	1	CWA981091	
8	DAIN ELBOW	1	CWH52160C	
9	HORIZONTAL VANE(RIGHT)	1	CWE24C1189	
10	HORIZONTAL VANE(LEFT)	1	CWE24C1190	
11	VERTICAL VANE	1	CWE24C1191	
12	C-BOX	1	CWH14C5649	*
13	CONTROL BOARD	1	CWH102337	
14	MAIN PCB	1	CWA73C2588	*
15	PARTICULAR PIECE	1	CWD932689	
16	POWER SUPPLY CORD COMPLETE	1	CWA20C2602	
17	INDICATOR HOLDER-FRONT	1	CWD932721	
18	INDICATOR HOLDER-BACK	1	CWD932722	
19	INDICATOR PCB	1	CWA744693	
21	SENSOR COMPLETE	1	CWA50C2271J	*
22	CONTROL BOARD FRONT COVER	1	CWH131235J	
23	CONTROL BOARD TOP COVER	1	CWH131237	
24	REMOTE CONTROL	1	CWA75C2863	*
25	FRONT GRILLE COMPLETE	1	CWE11C3876	
26	AIR FILTER	2	CWD001168	
27	SCREW-FRONT GRILLE	2	XTT4+16CFJ	
28	CAP-FRONT GRILLE	2	CWH521121	
29	DRAIN HOSE	1	CWH851095	
30	OPERATING INSTRUTIONS	1	CWF565682	
31	OPERATING INSTRUTIONS	1	CWF565683	
32	INSTALLATION INSTRUCTION	1	CWF613239	
33	INSTALLATION INSTRUCTION	1	CWF613240	
34	INSTALLATION INSTRUCTION	1	CWF613241	
35	INSTALLATION PLATE	1	CWH361086	

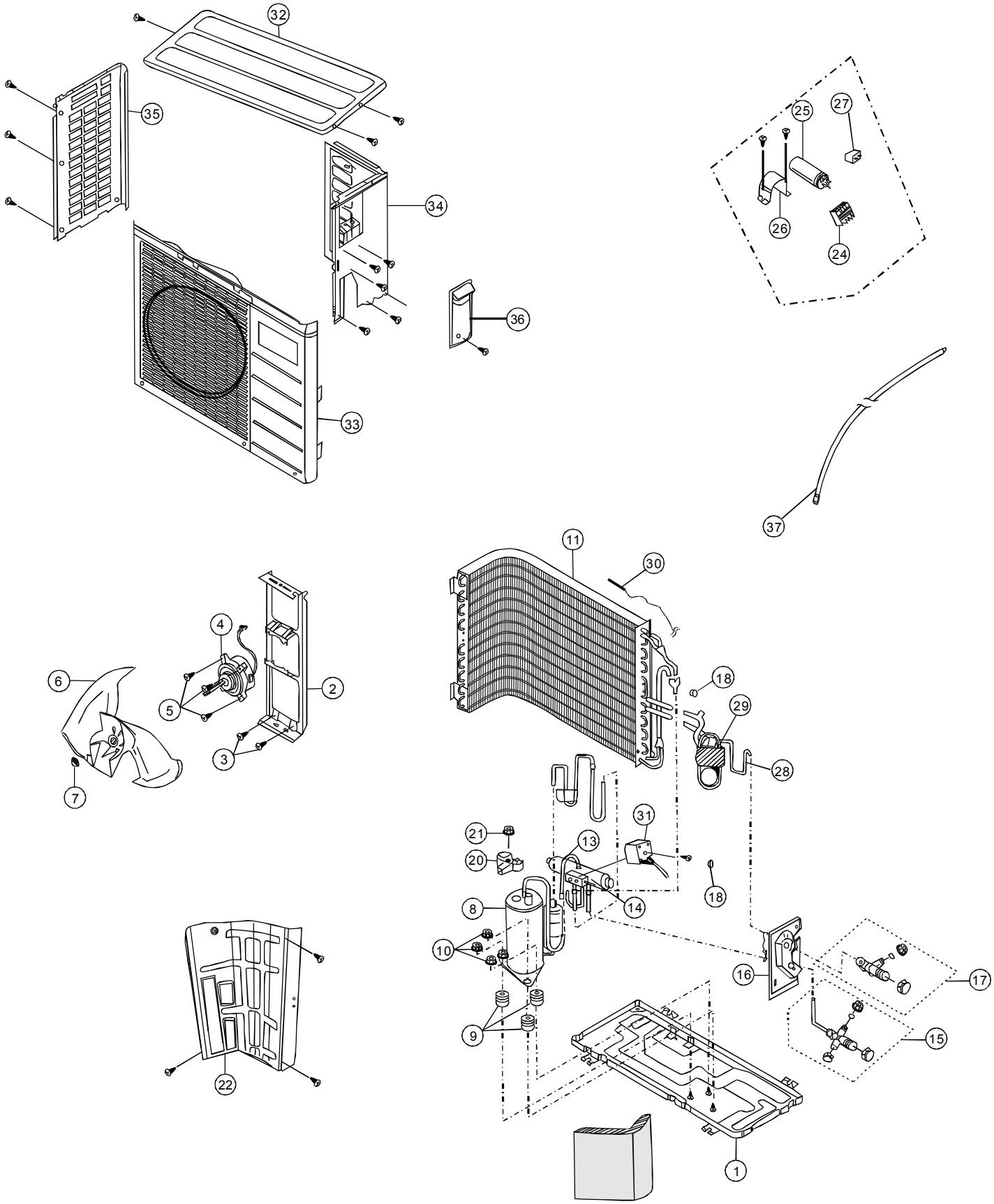
Note:

1.All parts are supplied from PHAAG, P.R. China.

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

20 Exploded View

CU-UW12GKE



21 Replacement Parts List

CU-UW12GKE

No.	PART NAME & DESCRIPTION	Q'TY	CU-UW12GKE	RE
1	CHASSIS ASS'Y	1	CWD52K1154A	
2	FAN MOTOR BRACKET	1	CWD541093	
3	SCREW-FAN MOTOR BRACKET	2	CWH551148A	
4	FAN MOTOR	1	CWA951427	*
5	SCREW-FAN MOTOR MOUNT	4	CWH55406J	
6	PROPELLER FAN ASS'Y	1	CWH03K1010	
7	NUT-PROPELLER FAN	1	CWH561036J	
8	COMPRESSOR	1	CWB092401	*
9	ANTI-VIBRATION BUSHING	3	CWH50077	
10	NUT-COMPRESSOR MOUNT	3	CWH561047A	
11	CONDENSER	1	CWB32C1986	
13	TUBE ASS'Y(3 WAY VALVE)	1	CWT01C4150	
14	4-WAY VALVE	1	CWB001024J	*
15	3-WAY VALVE	1	CWB011308	
16	HOLDER COUPLING ASS'Y	1	CWH351064A	
17	2-WAY VALVE	1	CWB021251	
18	STRAINER	1	CWB11094	
20	TERMINAL COVER	1	CWH17006	
21	NUT FOR TERMIANL COVER	1	CW7080300J	
22	SOUND PROOF BOARD	1	CWH151139	
24	TERMINAL BOARD ASS'Y	1	CWA28K1104	
25	CAPACITOR-COMPRESSOR	1	DS371306CPXC	*
26	HOLDER-CAPACITOR	1	CWH30165J	
27	CAPACITOR-FAN MOTOR	1	F0DAH2050001	*
28	TUBE ASS'Y(CAPILLARY)	1	CWT01C4153	
29	CAPILLARY	1	CWB15373	
30	SENSOR	1	CWA50C2393	
31	V-COIL COMPLETE	1	CWA43C2208J	
32	TOP PLATE	1	CWE031075A	
33	CABINET FRONT PLATE	1	CWE06C1210	
34	CABINET SIDE PLATE (L)	1	CWE041187A	
35	CABINET SIDE PLATE (R)	1	CWE041188A	
36	CONTROL BOARD COVER	1	CWH131223	
37	CONNECT WIRE-SENSOR	1	CWA22C1022	

Note:

1.All parts are supplied from PHAAG, P.R. China.

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