



**Mitsubishi Heavy Industries Air Conditioners**

## **Technical Manual**

**Manual Number: 2011 No. W2-01**

**Variable Frequency Wall Mounted Type**

**Room Air Conditioners**

**(Split system, heat pump type)**

**SRK20MA-S/SRC20MA-S  
SRK25MA-S/SRC25MA-S  
SRK35MA-S/SRC35MA-S  
SRK50MA-S/SRC50MA-S**

**(R410A Refrigerant Used)**



**MITSUBISHI HEAVY INDUSTRIES, LTD.**

## Table of Contents

1. GENERAL INFORMATION.....	1
1.1 Features.....	1
1.2 Model identification.....	1
2 MODEL SELECTION.....	2
2.1 Model function.....	2
2.2 Range of usage.....	6
2.3 Outline drawing.....	6
2.4 Cooling cycle system diagram.....	8
2.5 Performance curve.....	9
3 ELECTRICAL WIRING DIAGRAM.....	10
4 NAME OF EACH PART AND ITS FUNCTION.....	12
4.1 Name of each part.....	15
4.2 Emergency switch.....	15
4.3 Automatic restart.....	15
4.4 Key lock.....	15
4.5 CLEAN operation.....	15
4.6 SLEEP operation.....	16
4.7 Timing off.....	16
4.8 Timing on .....	17
4.9 Programmed timer.....	17
4.10 Current time setting.....	18
4.11 HI POWER operation.....	18
4.12 JET operation.....	18
4.13 POWER SAVE operation.....	19
4.14 Air direction adjustment.....	19
4.15 Area setting.....	20
4.16 Installation location setting.....	20
4.17 Outline of automatic operation.....	20

4.18 Outline of drying operation.....	21
4.19 Outline of defrosting operation.....	21
4.20 Outline of vertical and horizontal flaps control.....	23
4.21 Outline of electronic expansion valve (EEV) control.....	24
4.22 Outline of compressor control.....	24
4.23 Outline of outdoor fan control.....	24
4.24 Outline of indoor fan control.....	25
5 INSTALLATION.....	27
5.1 Selection of installation location.....	29
5.2 Installation of indoor unit.....	30
5.3 Installation of outdoor unit.....	33
5.4 Pipe connection.....	33
5.5 Precautions for wireless remote controller operation.....	35
5.6 Standard running data.....	36
6 MAINTENANCE.....	37
6.1 Electrical parts failure diagnosis method.....	37
6.2 Servicing.....	58
7 SERVICING MANUAL.....	59
8 MOUNT ASSEMBLY.....	74
8.1 Indoor unit.....	74
8.2 Outdoor unit.....	90

## 1 GENERAL INFORMATION

### 1.1 Features

#### (1) Inverter

- Heating/cooling

The rotate speed of the compressor is changed steplessly in relation to varying load, and is linked with the fans of indoor and outdoor units controlled by the changes of frequency, thus controls the power.

- Allowing quick heating/cooling operation during start-up period.

The room temperature is kept constant through fine-tuned control after the machine is stabilized.

#### (2) Fuzzy control: According to the fuzzy control technology, the indoor temperature and humidity, etc. are obtained through dynamic analysis to accurately regulate the rotate speeds of the compressor and the fan to realize precise temperature control.

#### (3) Comfort: 3D air blowing, sleep mode, and other air blowing modes.

#### (4) Humanization: Room temperature displaying, key lock, concentrated/area air blowing.

#### (5) Life: Actual service life: over 20,000 hours; Working life: over 100,000 hours; On/off of relay: over 50,000 times; Continuous on of LED: over 50,000 hours; On/off of emergency switch: over 10,000 times.

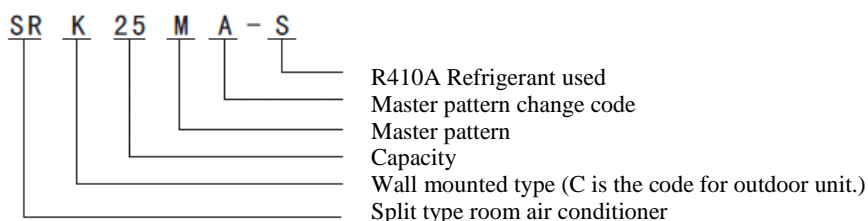
#### (4) Self diagnosis function: We will continuously provide the best services for our customers through devices judging abnormal operation, as follows:

		Error	Indoor indication		
			RUN lamp	TIMER lamp	Temp. indication
Indoor unit	Sensors	Indoor heat exchanger sensor error	1 time/8 sec.	ON	06
		Indoor inlet air (room temp.) sensor error	2 times/8 sec.		--
	Others	Indoor fan motor error	6 times/8 sec.		16
		Display communication error	--	--	00
Outdoor unit	Sensors	Outdoor temp. sensor error	Continuous flashing	1 time/8 sec.	38
		Outdoor heat exchanger (liquid pipe) sensor error		2 times/8 sec.	37
		Vent-pipe sensor error		4 times/8 sec.	39
	Others	Power cut for current protection	ON	1 time/8 sec.	42
		Failure of outdoor unit		2 times/8 sec.	59
		Current safety		3 times/8 sec.	58
		Failure of power module		4 times/8 sec.	51
		Compressor over heat protection		5 times/8 sec.	36
		Serial signal transmission error		6 times/8 sec.	05
		Outdoor fan motor error		7 times/8 sec.	48
		Cool room high pressure protection control		Continuous flashing	35
		Controllable silicon voltage error		ON	47
		Cooling circulation system protection			57
		Locked-rotor/rotor lock		2 times/8 sec.	60

The air conditioner indicates the error of the indoor and outdoor sensors (thermistors) only when it is in the stop mode. Error indication is removed after restart.

### 1.2 Model identification

For example:



## 2 MODEL SELECTION

### 2.1 Model function

#### 2.1.1 Model: SRK20MA-S (Indoor unit)

#### SRC20MA-S (Outdoor unit)

Item	Unit	Indoor unit SRK20MA-S	Outdoor unit SRC20MA-S
Net weight	kg	10	32
Machine dimension	mm	798×230×294	780×290×540
Package dimension	Length×Width×Height	850×365×310	920×380×590
Color		White	Ash-colored
Fan		Through-flow type, AS resin + glass fiber	Axial flow type, AS resin + glass fiber (embedded damping spindle sleeve)
Air flow	m <sup>3</sup> /h	600	1800
Noise in cool room	dB(A)	Hi/Me/Lo: 37/27/21(completely mute, SPL)	43(completely mute, SPL)
Noise in warm room	dB(A)	Hi/Me/Lo: 37/28/24(completely mute, SPL)	45(completely mute, SPL)
Fan motor	Nominal value	33W, DC motor, insulation grade E	24W, DC motor, insulation grade E
Power of motor	W (reference value)	19	20
Power of electric control	W (reference value)	2	7.5
Power supply and power cord		Single-phase, 220V, 50Hz and 3-core, 1.0mm <sup>2</sup> , 250V, 10A, 2m, w/o plug	
Heat exchanger		Spiral, hydrophilic, 4-folded, 15-section, 2-row, 528-fin, 1-2 circuit	Spiral, hydrophilic, 20-section, 1-row, 621-fin, 2-1 circuit
Compressor	Nominal value	THACOM RM-B5077MDE2, 527W, DC frequency conversion compressor, insulation grade E	
Refrigerating machine oil	ml	300, DIAMOND FREEZE MA68	
Refrigerant controller		Electronic expansion valve (Φ1.5mm) + hush pipe	
Refrigerant	g	R-410A, 900g, addition/reduction not needed within the use range of 15m	
Operating pressure limit	Mpa	Max.: 4.15, Min.: 1.47	
Air filters		Lysozyme filter + Antibacterial deodorizing filter + Mould-proof air filter	
Accessories and quantity		Indoor unit 1, mounting plate 1, tapping screw 5, battery 2, use and installation manual 1, remote controller 1, filter components 2, outdoor unit 1, Drain elbow 1, Water shutoff plug 1	
Operation control devices		Wireless remote controller, electronic thermostat controlling room temperature, microcomputer controlling defrosting	
Safety devices		Serial signal protection, fan error protection, compressor over heat protection, high voltage protection, over current protection, etc.	

\* The nominal values of “Noise in cool room” and “Noise in warm room” in the above table are tested in a dead room.

Item	Unit	Rating cooling	Rating heating
Capacity	W	2000	2700
Power	W	450	600
Energy efficiency ratio		4.44	4.50
Energy efficiency grade	Grade A (European norm)		

Note (1) The data are measured at the following conditions. The pipe length is 5m.

Operation	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	
Heating	20°C	—	7°C	6°C	
Low temperature Heating	20°C	—	2°C	1°C	

(2) The operation data are applied to the 220V districts respectively.

(3) The refrigerant quantity to be charged includes the refrigerant in 15m connecting piping.  
(Purging is not required even for the short piping.)

**2.1.2 Model: SRK25MA-S (Indoor unit)**  
**SRC25MA-S (Outdoor unit)**

Item	Unit	Indoor unit SRK25MA-S	Outdoor unit SRC25MA-S
Net weight	kg	10	32
Machine dimension	mm	798×230×294	780×290×540
Package dimension	Length×Width×Height	850×365×310	920×380×590
Color		White	Ash-colored
Fan		Through-flow type, AS resin + glass fiber	Axial flow type, AS resin + glass fiber (embedded damping spindle sleeve)
Air flow	m <sup>3</sup> /h	600	1800
Noise in cool room	dB(A)	Hi/Me/Lo: 37/27/22(completely mute, SPL)	44(completely mute, SPL)
Noise in warm room	dB(A)	Hi/Me/Lo: 38/29/23(completely mute, SPL)	45(completely mute, SPL)
Fan motor	Nominal value	33W, DC motor, insulation grade E	24W, DC motor, insulation grade E
Power of motor	W (reference value)	19	20
Power of electric control	W (reference value)	2	7.5
Power supply and power cord		Single-phase, 220V, 50Hz and 3-core, 1.0mm <sup>2</sup> , 250V, 10A, 2m, w/o plug	
Heat exchanger		Spiral, hydrophilic, 4-folded, 15-section, 2-row, 528-fin, 1-2 circuit	Spiral, hydrophilic, 20-section, 1-row, 621-fin, 2-1 circuit
Compressor	Nominal value	THACOM RM - B5077MDE2, 527W, DC frequency conversion compressor, insulation grade E	
Refrigerating machine oil	ml	300, DIAMOND FREEZE MA68	
Refrigerant controller		Electronic expansion valve (Φ1.5mm) + hush pipe	
Refrigerant	g	R-410A, 900g, addition/reduction not needed within the use range of 15m	
Operating pressure limit	Mpa	Max.: 4.15, Min.: 1.47	
Air filters		Lysozyme filter + Antibacterial deodorizing filter + Mould-proof air filter	
Accessories and quantity		Indoor unit 1, mounting plate 1, tapping screw 5, battery 2, use and installation manual 1, remote controller 1, filter components 2, outdoor unit 1, water elbow 1, Water shutoff plug 1	
Operation control devices		Wireless remote controller, electronic thermostat controlling room temperature, microcomputer controlling defrosting	
Safety devices		Serial signal protection, fan error protection, compressor over heat protection, high voltage protection, over current protection, etc.	

\* The nominal values of “Noise in cool room” and “Noise in warm room” in the above table are tested in a dead room.

Item	Unit	Rating cooling	Rating heating
Capacity	W	2500	3200
Power	W	680	790
Energy efficiency ratio		3.68	4.05
Energy efficiency grade	Grade A (European norm)		

Note (1) The data are measured at the following conditions. The pipe length is 5m.

Operation \ Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	
Heating	20°C	—	7°C	6°C	
Low temperature Heating	20°C	—	2°C	1°C	

(2) The operation data are applied to the 220V districts respectively.

(3) The refrigerant quantity to be charged includes the refrigerant in 15m connecting piping.  
(Purging is not required even for the short piping.)

**2.1.2 Model: SRK35MA-S (Indoor unit)**  
**SRC35MA-S (Outdoor unit)**

Item	Unit	Indoor unit SRK35MA-S	Outdoor unit SRC35MA-S
Net weight	kg	10.5	35
Machine dimension	mm	798×230×294	780×290×540
Package dimension	Length×Width×Height	850×365×310	920×380×590
Color		White	Ash-colored
Fan		Through-flow type, AS resin + glass fiber	Axial flow type, AS resin + glass fiber (embedded damping spindle sleeve)
Air flow	m <sup>3</sup> /h	600	1870
Noise in cool room	dB(A)	Hi/Me/Lo: 39/31/23 (completely mute, SPL)	46 (completely mute, SPL)
Noise in warm room	dB(A)	Hi/Me/Lo: 41/34/23 (completely mute, SPL)	50 (completely mute, SPL)
Fan motor	Nominal value	33W, DC motor, insulation grade E	24W, DC motor, insulation grade E
Power of motor	W (reference value)	19	20
Power of electric control	W (reference value)	2	7.5
Power supply and power cord		Single-phase, 220V, 50Hz and 3-core, 1.0mm <sup>2</sup> , 250V, 10A, 2m, w/o plug	
Heat exchanger		Parent: Spiral, hydrophilic, 4-folded, 15-section, 2-row, 528-fin, Pfl.2 Child: Spiral, hydrophilic, 4-section, 1-row, 452-fin, Pfl.4	Spiral, hydrophilic, 20-section, 2-row, 1221-fin, 2-1 circuit, Pfl.4
Compressor	Nominal value	THACOM RM - B5077MDE2, 527W, DC frequency conversion compressor, insulation grade E	
Refrigerating machine oil	ml	300, DIAMOND FREEZE MA68	
Refrigerant controller		Electronic expansion valve (Φ1.5mm) + hush pipe	
Refrigerant	g	R-410A, 900g, addition/reduction not needed within the use range of 15m	
Operating pressure limit	Mpa	Max.: 4.15, Min.: 1.47	
Air filters		Lysozyme filter + Antibacterial deodorizing filter + Mould-proof air filter	
Accessories and quantity		Indoor unit 1, mounting plate 1, tapping screw 5, battery 2, use and installation manual 1, remote controller 1, filter components 2, outdoor unit 1, Drain elbow 1, Water shutoff plug 1	
Operation control devices		Wireless remote controller, electronic thermostat controlling room temperature, microcomputer controlling defrosting	
Safety devices		Serial signal protection, fan error protection, compressor over heat protection, high voltage protection, over current protection, etc.	

\* The nominal values of “Noise in cool room” and “Noise in warm room” in the above table are tested in a dead room.

Item	Unit	Rating cooling	Rating heating
Capacity	W	3500	4000
Power	W	960	1100
Energy efficiency ratio		3.65	3.64
Energy efficiency grade	Grade A (European norm)		

Note (1) The data are measured at the following conditions. The pipe length is 5m.

Operation \ Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	
Heating	20°C	—	7°C	6°C	
Low temperature Heating	20°C	—	2°C	1°C	

(2) The operation data are applied to the 220V districts respectively.

(3) The refrigerant quantity to be charged includes the refrigerant in 15m connecting piping.  
(Purging is not required even for the short piping.)

**2.1.2 Model: SRK50MA-S (Indoor unit)**  
**SRC50MA-S (Outdoor unit)**

Item	Unit	Indoor unit SRK50MA-S	Outdoor unit SRC50MA-S
Net weight	kg	10.5	43
Machine dimension	mm	798×230×294	850×290×640
Package dimension	Length×Width×Height	850×365×310	990×395×700
Color		White	Ash-colored
Fan		Through-flow type, AS resin + glass fiber	Axial flow type, AS resin + glass fiber (embedded damping spindle sleeve)
Air flow	m <sup>3</sup> /h	720	2400
Noise in cool room	dB(A)	Hi/Me/Lo: 44/34/25(completely mute, SPL)	50(completely mute, SPL)
Noise in warm room	dB(A)	Hi/Me/Lo: 48/34/25(completely mute, SPL)	50(completely mute, SPL)
Fan motor	Nominal value	33W, DC motor, insulation grade E	24W, DC motor, insulation grade E
Power of motor	W (reference value)	19	20
Power of electric control	W (reference value)	2	7.5
Power supply and power cord		Single-phase, 220V, 50Hz and 3-core, 1.5mm <sup>2</sup> , 250V, 16A, 2m, w/o plug	
Heat exchanger		Parent: Spiral, hydrophilic, 4-folded, 15-section, 2-row, 528-fin, Pfl.2 Child: Spiral, hydrophilic, 4-section, 1-row, 452-fin, Pfl.4	Spiral, hydrophilic, 24-section, 2-row, 1334-fin, 4-1 circuit, Pfl.2
Compressor	Nominal value	THACOM RM - B5077MDE2, 527W, DC frequency conversion compressor, insulation grade E	
Refrigerating machine oil	ml	300, DIAMOND FREEZE MA68	
Refrigerant controller		Electronic expansion valve (Φ1.5mm) + hush pipe	
Refrigerant	g	R-410A, 1250g, addition/reduction not needed within the use range of 15m	
Operating pressure limit	Mpa	Max.: 4.15, Min.: 1.47	
Air filters		Lysozyme filter + Antibacterial deodorizing filter + Mould-proof air filter	
Accessories and quantity		Indoor unit 1, mounting plate 1, tapping screw 5, battery 2, use and installation manual 1, remote controller 1, filter components 2, outdoor unit 1, Drain elbow 1, Water shutoff plug 1	
Operation control devices		Wireless remote controller, electronic thermostat controlling room temperature, microcomputer controlling defrosting	
Safety devices		Serial signal protection, fan error protection, compressor over heat protection, high voltage protection, over current protection, etc.	

\* The nominal values of “Noise in cool room” and “Noise in warm room” in the above table are tested in a dead room.

Item	Unit	Rating cooling	Rating heating
Capacity	W	5000	5800
Power	W	1560	1600
Energy efficiency ratio		3.21	3.63
Energy efficiency grade	Grade A (European norm)		

Note (1) The data are measured at the following conditions. The pipe length is 5m.

Operation \ Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	
Heating	20°C	—	7°C	6°C	
Low temperature Heating	20°C	—	2°C	1°C	

- (2) The operation data are applied to the 220V districts respectively.  
(3) The refrigerant quantity to be charged includes the refrigerant in 15m connecting piping.  
(Purging is not required even for the short piping.)



## 2.2 Range of usage

Please use the air conditioners within the following range of usage, otherwise the protector will be triggered.

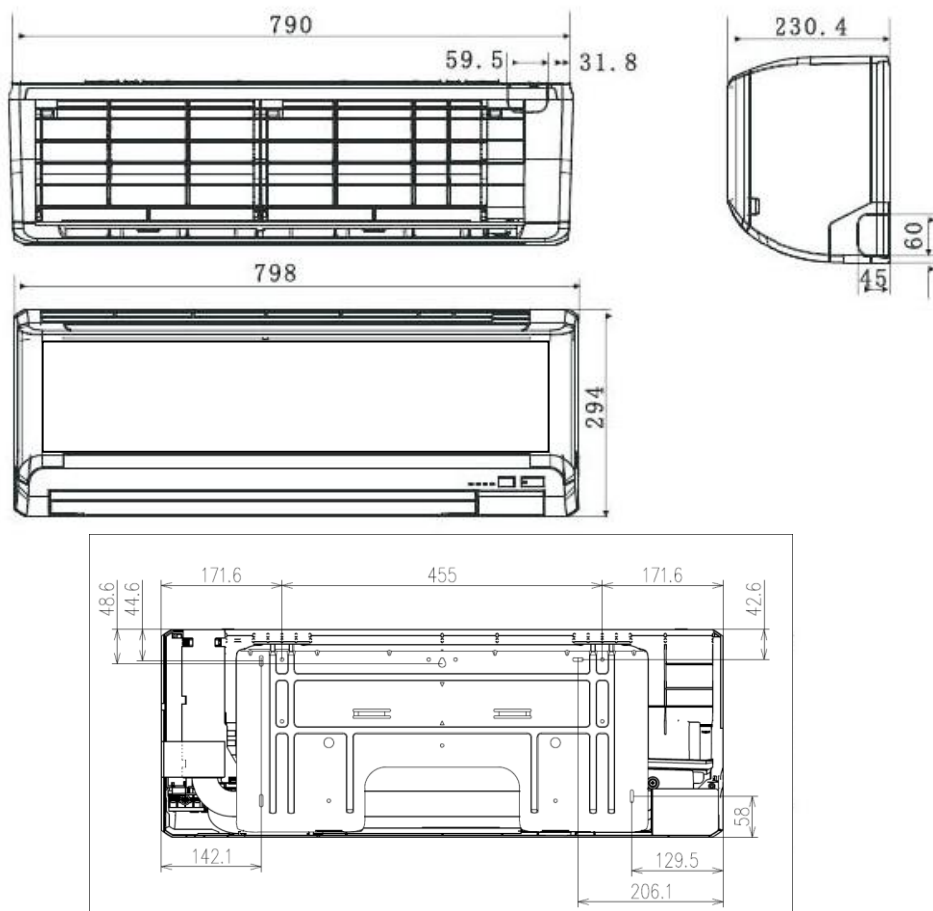
	Cooling Operation	Heating Operation
Outdoor temperature	About 18°C~43°C	About -15~24°C
Indoor temperature	About 18°C~32°C	About below 30°C
Indoor humidity	About below 80%	

	20~50 Models
Max. piping one-way length	Within 15 m
Vertical height difference	Within 5 m
Additional R410A Refrigerant	Not required
Voltage	Rating $\pm 10\%$
Starting voltage	At least 85% of rating
Switching frequency	Max. 10 times per hour
Time interval between stop and start	Min. 3 min

## 2.3 Outline drawing

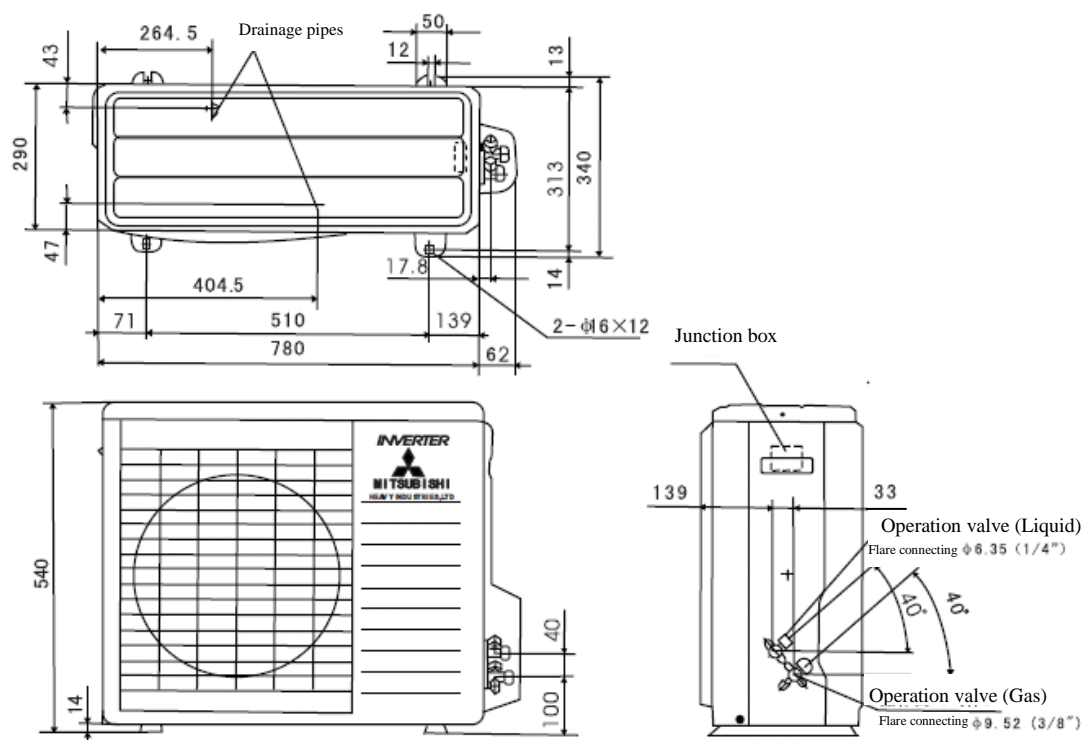
(1) Indoor unit: MA-S Series

Unit: mm



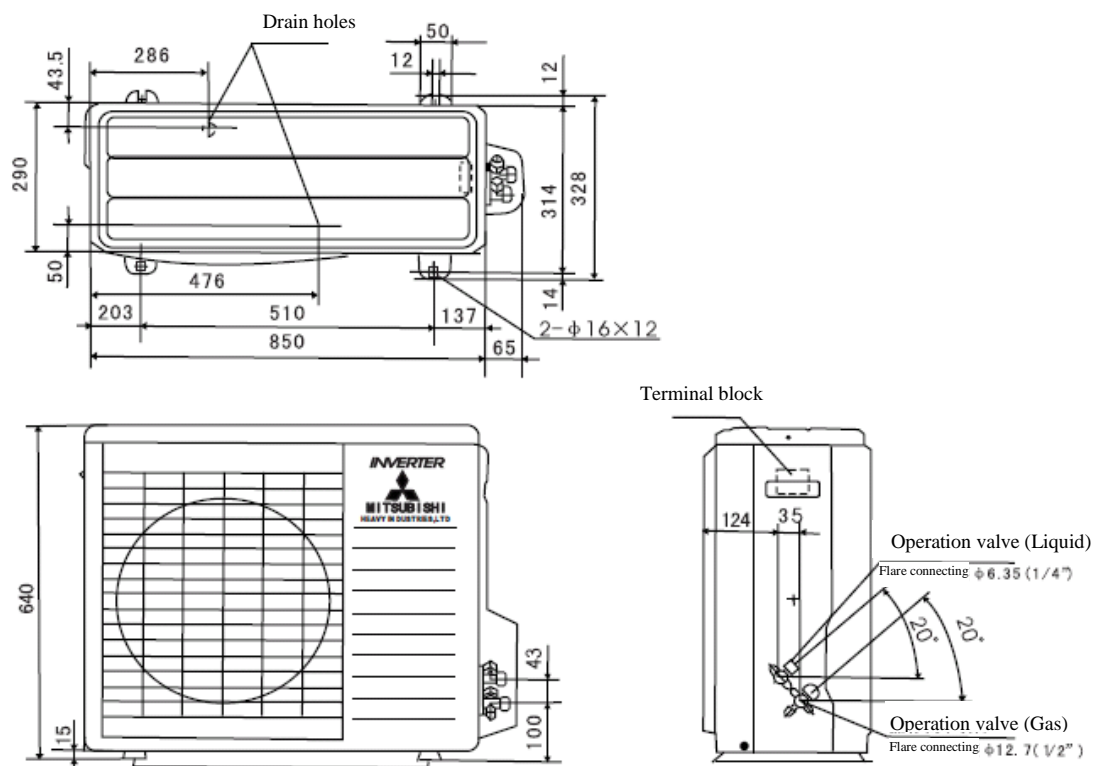
(2) Outdoor unit: SRC20MA-S/ SRC25MA-S/ SRC35MA-S

Unit: mm



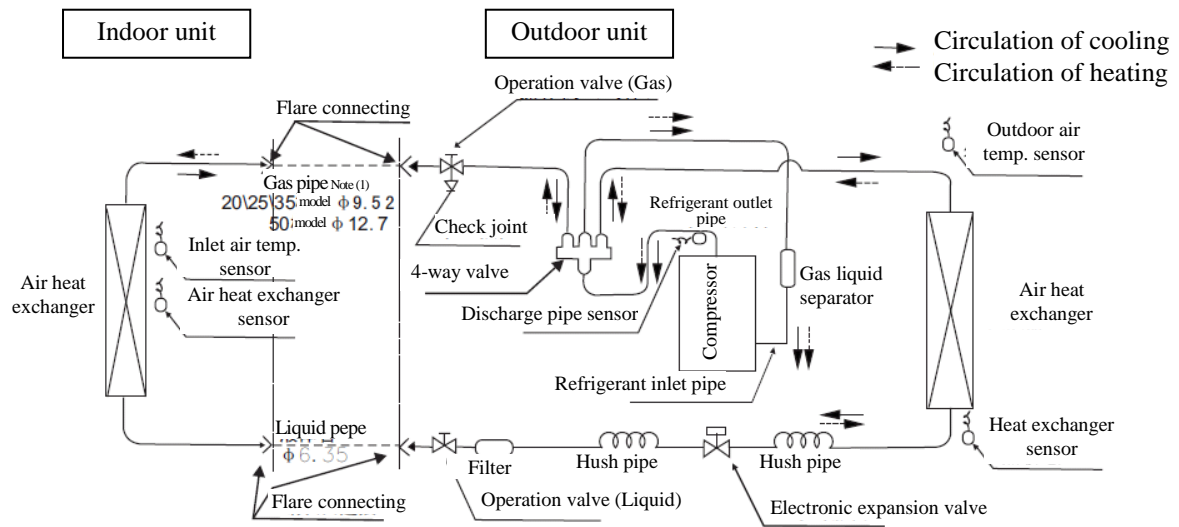
(3) Outdoor unit: SRC50-MA-S

Unit: mm



## 2.4 Cooling cycle system diagram

Models: MA-S Series



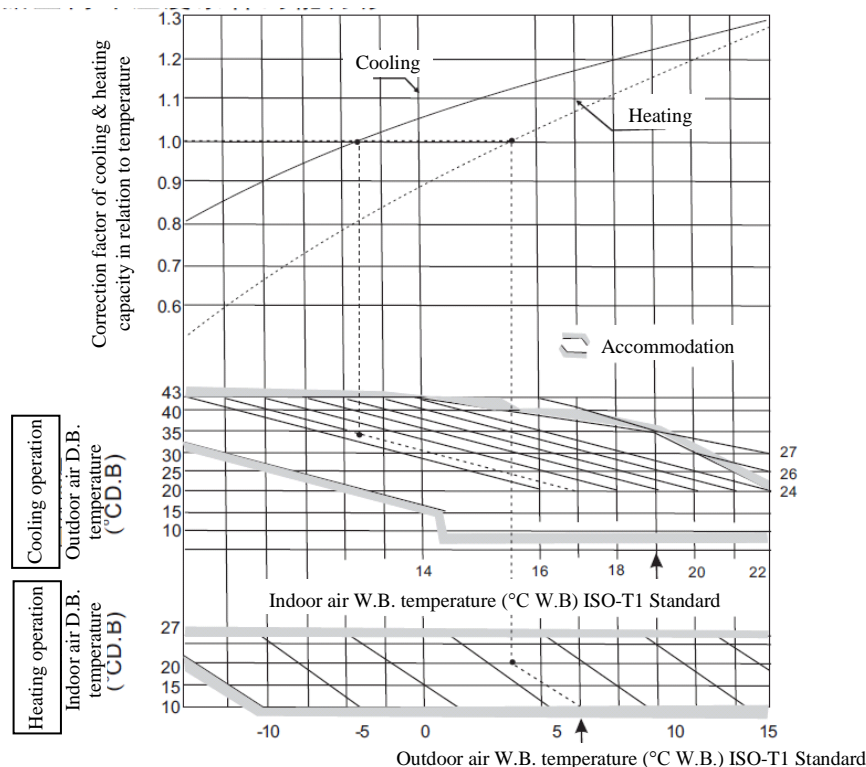
Note (1).....line is piping for site construction.

## 2.5 Performance curve

The cooling and heating capacities are measured in the following conditions. The actual capacity can be obtained with the following formula.

$$\text{Actual capacity} = \text{Rating capacity} \times \text{Correction factor}$$

### (1) Capacity correction according to indoor and outdoor temperatures:



### (2) Capacity correction according to one way length of refrigerant piping:

It is necessary to correct the cooling and heating capacity according to the one way length of refrigerant piping.

Piping length (m)	7	10	15
Cooling	1.0	0.99	0.975
Heating	1.0	1.0	1.0

### (3) Capacity correction according to frosting on outdoor heat exchanger during heating:

In additions to the foregoing corrections (1) and (2), the heating capacity also needs to be corrected according to the frosting on the outdoor heat exchanger.

Air inlet temperature of outdoor unit	-10	-9	-7	-5	-3	-1	1	3	5
Frosting correction factor	0.95	0.94	0.93	0.91	0.88	0.86	0.87	0.92	1.00

### (4) Example of cooling and heating capacity calculation:

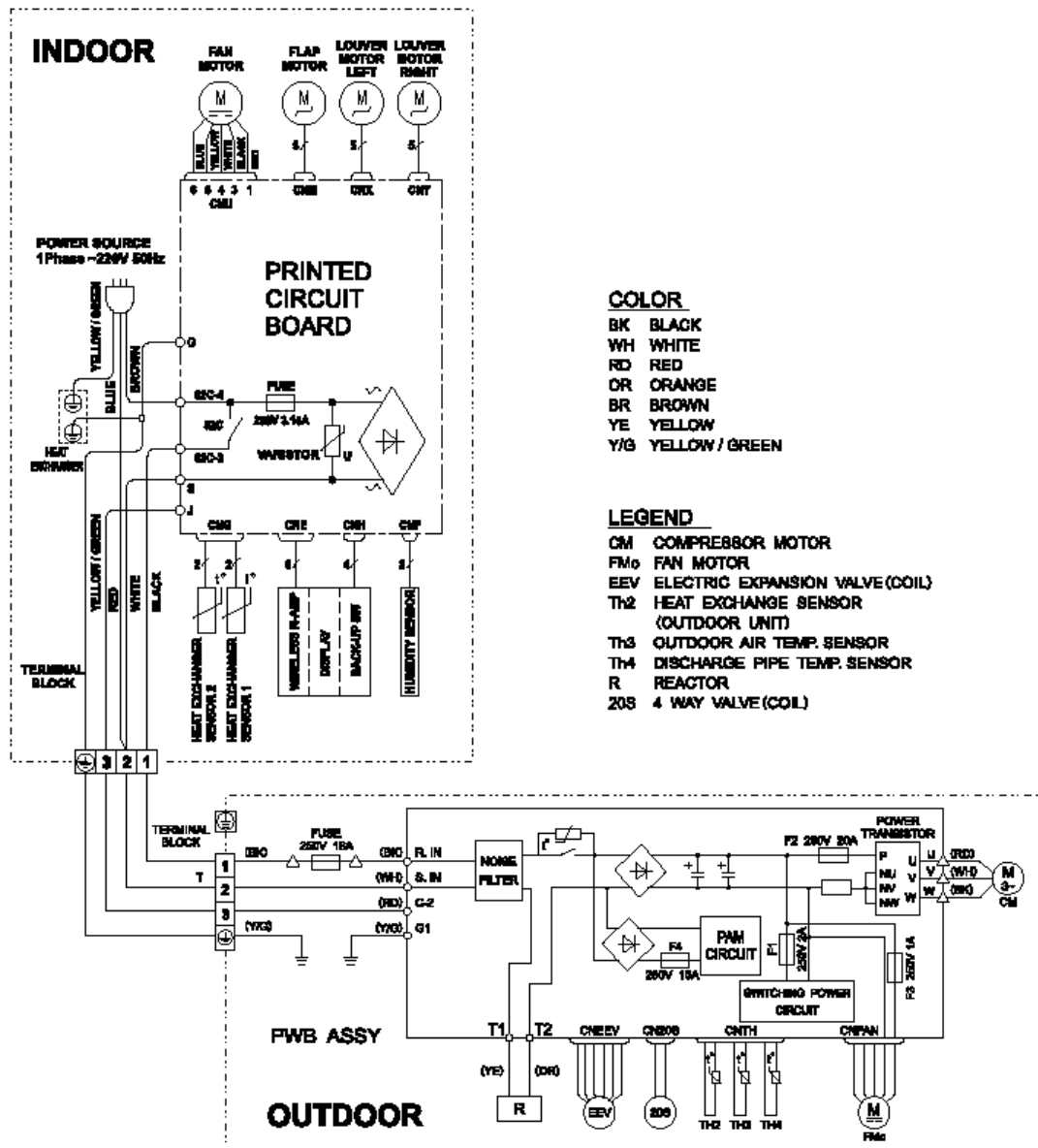
The actual cooling capacity of model SRK50MA-S with the one way piping length of 25m at the indoor wet-bulb temperature of 19°C and outdoor dry-bulb temperature of 35°C in summer or indoor dry-bulb temperature of 20°C, outdoor dry-bulb temperature of 1°C and indoor wet-bulb temperature of -1°C in winter is

$$\text{Actual cooling capacity} = 5000 \times 1.0 \times 0.95 \approx 4750\text{W}$$

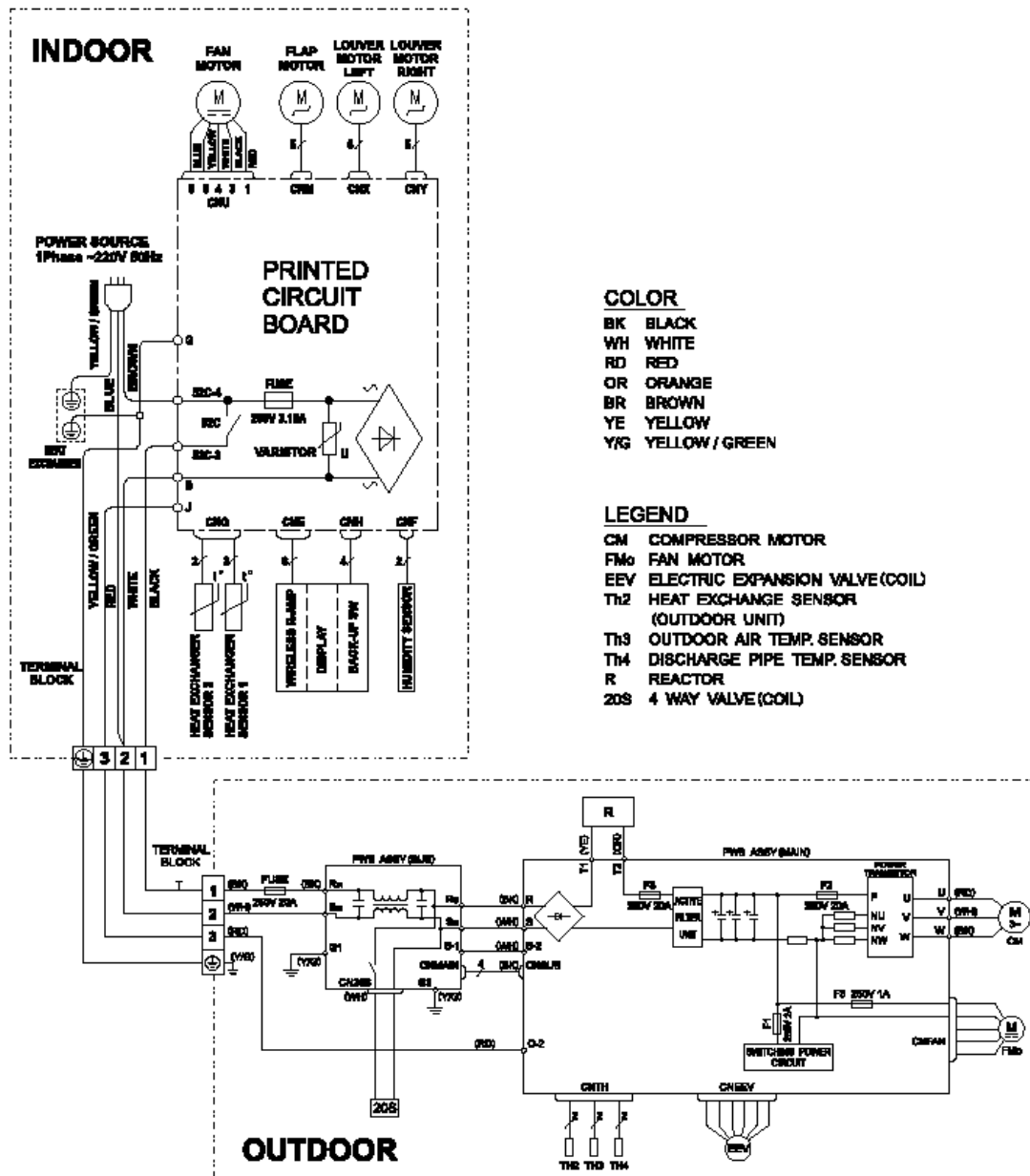
$$\begin{array}{ccccccc}
 & \text{Nominal cooling} & & \text{Temp. correction} & & \text{Piping length} & \\
 & \text{capacity} & & \text{factor} & & \text{correction factor} & \\
 \text{Actual heating capacity} = 5800 & \times & 0.81 & \times & 0.95 & \times & 0.86 \approx 3838\text{W} \\
 & \uparrow & & \uparrow & & \nwarrow & \swarrow \\
 & \text{Nominal heating} & & \text{Temp. correction} & & \text{Piping length} & \text{Frosting} \\
 & \text{capacity} & & \text{factor} & & \text{correction factor} & \text{correction factor}
 \end{array}$$

### 3 ELECTRICAL WIRING DIAGRAM

#### 3.1 Circuit diagram: 20, 25, 35MA-S



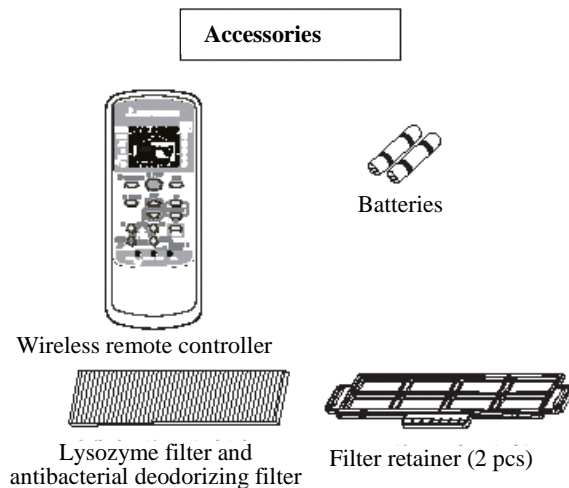
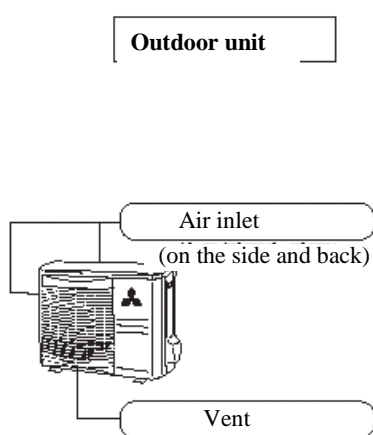
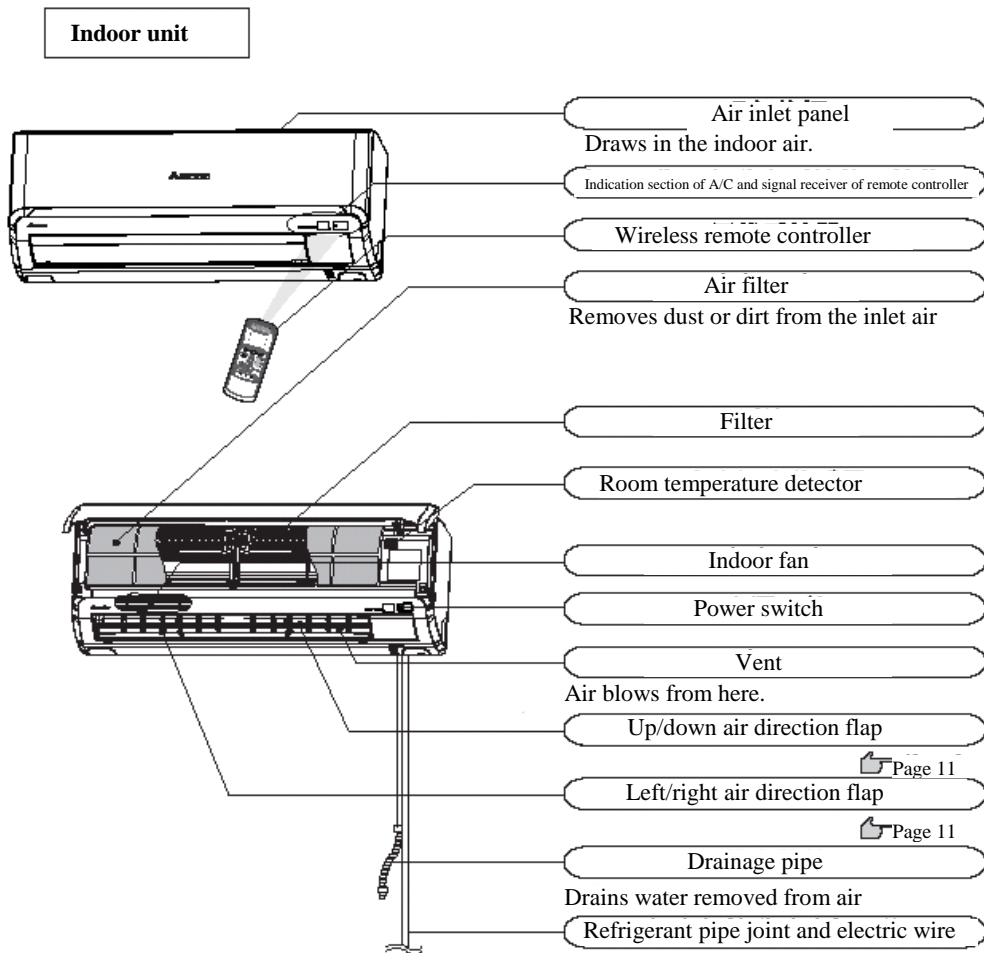
### 3.2 Circuit diagram: 50MA-S



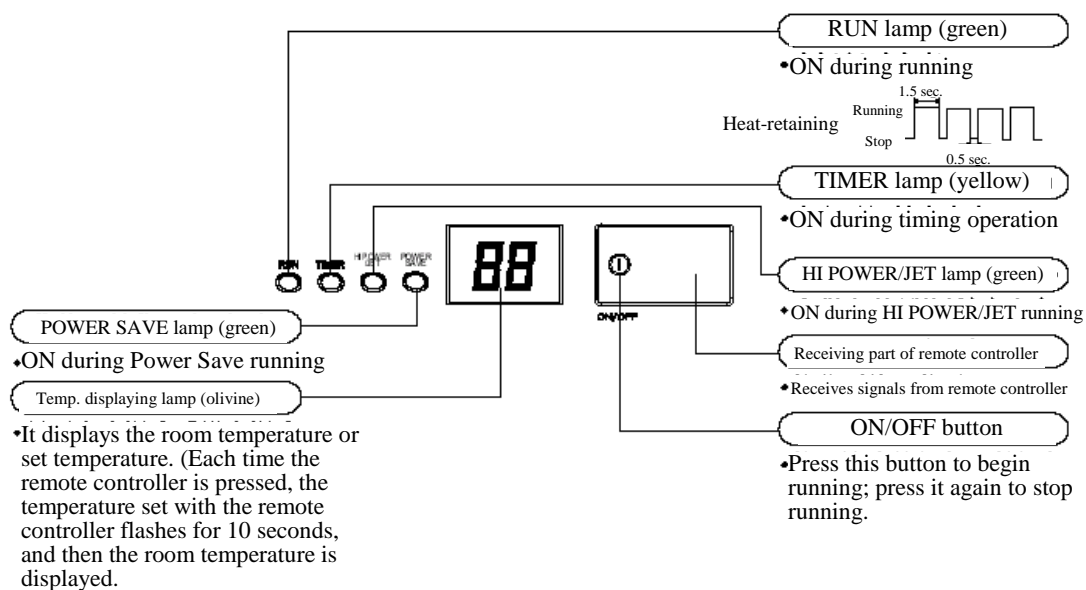


#### 4 NAME OF EACH PART AND ITS FUNCTION

##### 4.1 Name of each part

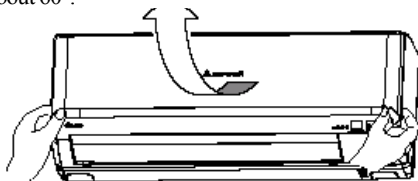


### Indication section of air conditioner



### Opening the air inlet grille

Put your hands on the indentations on both sides, raise the grille towards yourself, and stop at the opening position of about 60°.

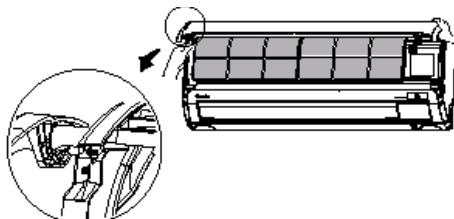


### Closing the air inlet grille

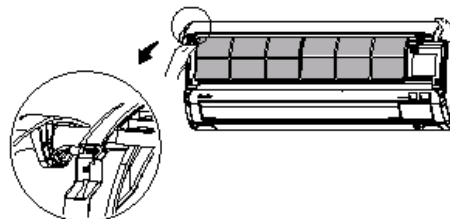
Gently push both sides and then gently push the central portion.

### Removing and mounting the air inlet grille

To remove the air inlet grille to clean the inside, open it at the position of about 65° and pull it towards yourself to remove the grille.



To mount the air inlet grille, insert the mounting arm onto the pin roll and close the grille.



## Operation and indication section for remote control

### Operation section

#### FAN SPEED button

Each time this button is pressed,  
■ displaying changes in order.

#### HI POWER button

This button is used to change  
the HI POWER mode.

#### TEMP button

This button is used to set the room  
temp. (or select the current time  
and set time for timing operation.)

#### TIMER ON button

This button is used to select  
the Timing ON operation.

#### SLEEP button

Press this button to switch to  
the SLEEP operation.

#### CLEAN button

Press this button to switch to  
the CLEAN mode.

#### POWER SAVE button

Press this button to switch to the  
POWER SAVE mode.

### Displaying section

#### SLEEP indicator

Appears in the SLEEP mode

#### HI POWER indicator

■ is used to indicate the HI POWER mode

#### TEMP indicator

Displays the set temperature  
(No temperature is displayed in  
the AUTO mode.)

#### FAN SPEED indicator

■ is used to indicate the fan speed set.

#### CLEAN indicator

Appears in the CLEAN mode

#### KEY LOCK indicator

Appears in the CLEAN mode

### Transmission method

When the remote controller is pointed at the air conditioner, press a button on the remote controller and the signal will be transmitted to the air conditioner. When the signal is received correctly, the air conditioner will issue the receiving sound. The effective linear distance of transmission of the remote controller is 5 meters. The transmission head of the remote controller should be pointed at the receiving head, otherwise, the receiving may be impacted.

#### MODE button

Each time this button is pressed, ■  
displaying changes in order.

#### ON/OFF (luminous) button

Press this button to begin running;  
press it again to stop running.

#### Up/Down air direction button

Press this button and the air flap begins  
to swing upwards and downwards.

#### Left/Right air direction button

Press this button and the air flap begins to  
swing to the left and the right.

#### AREA button

Press this button to set the air  
regulation area in the room.

#### TIMER OFF button

This button is used to select the  
Timing OFF operation.

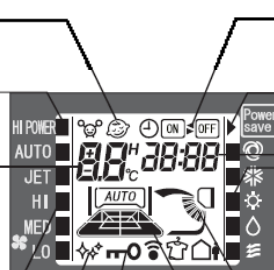
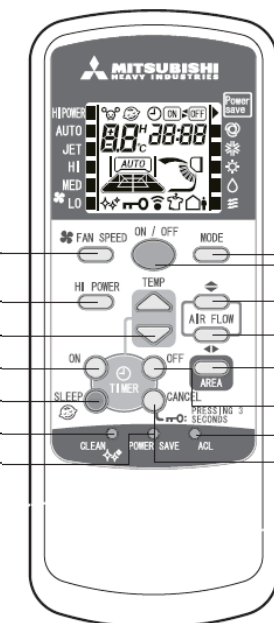
#### ACL switch

Used to reset the microcomputer

#### CANCEL/KEY LOCK button

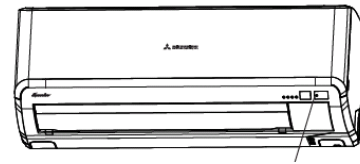
Press this button to cancel Timing ON/OFF  
and SLEEP operations; press and hold it for 3  
seconds to lock the functional keys.

• The above figure shows all  
control contents for convenient  
explanation. However, in actual  
use, only related contents are  
displayed.



#### 4.2 Emergency switch:

- (1) When the remote controller is not used, the emergency operation switch “ON/OFF” button can be used to turn on/off the machine.
- (2) Press the “ON/OFF” button to begin operation. Press it again to stop.
- (3) Operation items:
  - Operating mode: Automatic
  - Fan speed: Automatic
  - Air direction: Automatic
- (4) Note:  
Press and hold it for over 5 seconds to set to the cooling mode automatically.





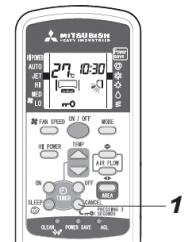
ON/OFF button of the equipment

#### 4.3 Automatic restart due to power cut:



- (1) This function can rapidly record the operation state immediately before the air conditioner is switched off due to power failure, and will resume operation automatically after the power supply is restored.
- (2) This function is set to Active by default.
- (3) Operation state memorized immediately before power cut includes:
  - Indoor operation switching (cool room · warm room · drying · automatic · air flow, stop)
  - Air flow
  - Power Save
  - Set temperature
  - Air direction
- (4) After automatic restart due to power cut, the following settings will be canceled:  
Timing operation, HI POWER operation, CLEAN operation
- (5) Priority of start:  
Compressor 3 min. delayed start control > Automatic restart due to power cut

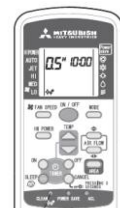
#### 4.4 Key lock:

- (1) The key lock setting prevents misoperation.
- (2) Press and hold the KEY LOCK button for over 3 seconds and  will appear on the remote controller, which means the function is enabled; press and hold the KEY LOCK button for over 3 seconds and  on the remote controller will disappear, which means the function is disabled
- (3) When the function is enabled, only the ON/OFF button can be operated, and the settings of temperature, air flow, air direction, etc. can't be changed.
- (4) When the function is enabled in the JET/ HI POWER operating mode, the operation and action are valid before the air conditioner stops and become invalid when the air conditioner operates again.
- (5) The key lock function can't be set in the CLEAN operation and various timing operations.




#### 4.5 CLEAN operation:

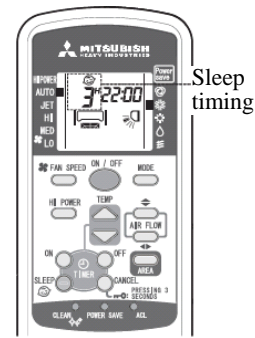
- (1) CLEAN operation: In the automatic, cooling and drying operating modes, when the air conditioner is turned off, the fan of the indoor unit will continue to run for 30 minutes to dry the moisture in the indoor unit and inhibit the growth of mould and bacteria. However, mould, bacteria, stain, etc. attached can't be removed.
- (2) Press the CLEAN button on the remote controller and  will appear, which means the CLEAN function is enabled; press it again and  will disappear, which means the CLEAN operation is disabled.
- (3) After the CLEAN function is enabled, in the automatic/cooling/drying mode, press the ON/OFF button to stop the operation of the air conditioner. In such case, the RUN lamp will go off; the CLEAN indicator on the remote controller will light up; and the CLEAN operation will run for about 30 minutes.
- (4) During the CLEAN operation, press the ON/OFF button and the CLEAN operation will stop.
- (5) According to the relative humidity, the rotate speed of the fan will be selected automatically (including 3 rotate speeds) and will not be changed during the operation.
- (6) When Air Flow, Timing On and SLEEP Operation stop, the CLEAN operation can't run.
- (7) During the CLEAN operation, press the SLEEP button and the CLEAN operation will be switched to the SLEEP operation.
- (8) The CLEAN function is disabled by default. Users need to set it according to the above steps.






CLEAN

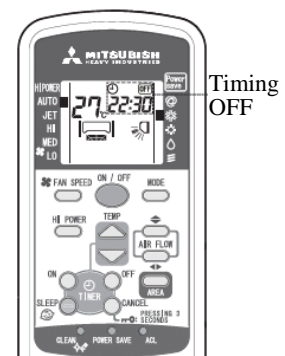
#### 4.6 SLEEP operation:

- (1) SLEEP operation: This function prevents the temperature in the cooling operation from becoming too low and the temperature in the heating operation from becoming too high; regulates the room temperature automatically as time goes by; and stops automatically after the time set.
- (2) Operation method:
  - ① If the SLEEP button is pressed during the operation of the air conditioner,  and the run time, such as 3<sup>h</sup>, will appear. There are 11 options, including 1-10 hours (interval of 10 hours) and OFF.
  - ② If the SLEEP button is pressed when the air conditioner is in the stop mode, the air conditioner will execute the previous operation settings and stop after the time set.
- (3) Making correction based on the set temperature and regulating the room temperature automatically:
  - ① During cooling operation:  
Beginning (-1°C), 1 hour later (±0°C), 2 hours later (+1°C);
  - ② During heating operation:  
Beginning (-1°C), 30 minutes later (-2°C), 1 hour later (-1°C), 2 hours later (-6°C); 4 hours later (-3°C)
- (4) The set time of SLEEP operation can be changed with the SLEEP button at any time. Since the remote controller receives the change signal, the air conditioner continues to run according to the changed set time.
- (5) When the operation switch change signal is received during the SLEEP operation, the air conditioner will control the sleep setting according to the operation switching and the temperature correction value in the elapsed time will be retained.
- (6) When the set temperature change signal is received during the SLEEP operation, the temperature correction value will be recalculated.
- (7) When the air conditioner is set to automatic control (fuzzy automatic) and the indoor operating mode (cool room · drying · warm room) is set, the SLEEP operation begins. The change of cool room · drying · warm room state arising from the automatic control (fuzzy automatic) is made only when the set temperature is changed. (In other words, the operating mode judgment according to the operation judgment timing is not executed.)
- (8) Priority of sleep timing operation
  - ① Set temperature correction: HI POWER operation > Setting correction temperature
  - ② Timing: Sleep timing run > HI POWER run



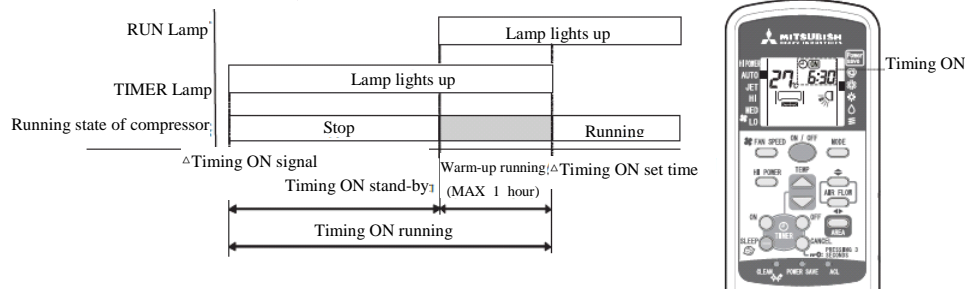
#### 4.7 Timing OFF:

- (1) Timing OFF: The timing OFF operation begins when the Timing OFF signal is received from the remote controller and stops after the set time.
- (2) Operation method:
  - ① When the air conditioner is in the stop mode, press the ON/OFF button;
  - ② When the air conditioner is running, press the TIMER OFF button and the Timing OFF indicator  will flash;
  - ③ Press the  or  button to set the OFF time (unit: 10 minutes);
  - ④ Within 60 seconds, press the TIMER OFF button and the indicator will change from flashing to a fixed state. The setting is finished;
  - ⑤ The TIMER lamp (yellow) of the indoor unit lights up.
- (3) Use the TIMER OFF button to set a new Timing OFF time at any time.
- (4) During the Timing OFF operation, all setting change signals from the remote controller are accepted.
- (5) During the Timing OFF operation, when the Timing ON signal is received, the operation will become the programmed timing operation and the remaining Timing OFF time will be retained.
- (6) During the Timing OFF operation, when the Sleep signal is received, the Timing OFF operation will be canceled (and the remaining time will be canceled too) and the operation will be switched to the SLEEP operation. (In other words, the SLEEP operation can't be used with the Timing OFF function.)
- (7) To cancel the Timing OFF function, press the Cancel button and the TIMER lamp will go off.



#### 4.8 Timing ON:

- (1) Timing ON: The air conditioner begins to detect the room temperature 60 minutes before the set time and commences operation 5-60 minutes in advance according to the difference between the room temperature and the set temperature to make the room temperature reach the best value at the set time.
- (2) Operation method:
  - ① To set the Timing ON operation, whether the air conditioner is running is not considered.
  - ② Press the **TIMER ON** button and the Timing ON lamp **[ON]** will flash;
  - ③ Press the  $\triangle$  or  $\nabla$  button to set the ON time (unit: 10 minutes);
  - ④ Within 60 seconds, press the **TIMER ON** button and the lamp will change from flashing to a fixed state. The setting is finished;
  - ⑤ The **TIMER** lamp (yellow) of the indoor unit lights up.
- (3) Composition of Timing ON operation:



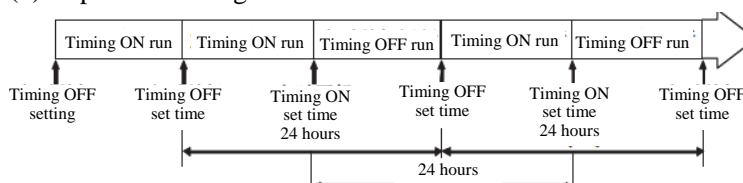
- (4) No
  - ① The air conditioner commences operation 5-60 minutes before the set time.
  - ② When the time reaches the set time, the **TIMER** lamp (yellow) will go off;
  - ③ During the Timing ON operation, the current time is not displayed.
- (5) Use the **TIMER ON** button to set a new Timing ON time at any time and the air conditioner will enter the stand-by state or warm-up running state after the changed set time.
- (6) When the Timing OFF signal is received, the air conditioner will run in the timing mode with an earlier set time.
- (7) During the Timing ON operation and stand-by, when the operation switching, mode switching or set temperature change signal is received from the remote controller, only the changed content will be accepted.

#### 4.9 Programmed timer:

- (1) Timing operations include Timing ON and Timing OFF. Once the function is enabled, the operation begins. As long as the ON/OFF button is not pressed, the air conditioner will begin operation at the same time everyday till the stop time.
- (2) Operation method:
 

For example, to set the air conditioner to turn on at 8:00 and turn off at 22:30,



  - ① ☐ Step 1: By referring to “4.9 Timing ON”, set  $\text{ON}$  8:00 ;
  - ② Step 2: By referring to “4.8 Timing OFF”, set it to  $\text{OFF}$  22:30 ;
  - ③ When the **TIMER** lamp (yellow) lights up, the setting is finished;
  - ④ The time will be displayed on the remote controller;
  - ⑤ The displaying will change with the operation state: Stop (  $\text{ON}$   $\text{OFF}$  ),  
Run (  $\text{ON}$   $\text{OFF}$  )
- (3) Repeated running:

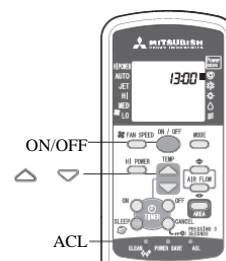


- (4) Notes:
  - ① The operation becomes programmed running only when both the Timing On and Timing OFF signals are received;
  - ② The Timing ON and Sleep combined operation is executed once only and will not become programmed operation.
- (5) Use the **TIMER ON** or **OFF** button to set new ON time.



#### 4.10 Current time setting:

- (1) After inserting the batteries, the current time is set to 13:00 automatically.  
In time setting, all contents displayed on the remote controller are reset.
- (2) Operation method:  
For example, to set to 11:30,
  - ① Step 1: Use the pen point to press the ACL switch and the TIMER lamp will flash. Here you can set the current time;
  - ② Step 2: Press the  or  button to set the current time to 11:30;
  - ③ Within 60 seconds, press the ON/OFF button and the lamp will change from flashing to a fixed state, thus the setting is finished.
- (3) Notes:
  - ① Timing operation is set according to the current time;
  - ② The time on the remote controller changes according to the setting of current time.



#### 4.11 HI POWER operation

- (1) HI POWER operation: Press the HI POWER button to enable the HI POWER operation, that is, the cooling or heating function runs continuously for 15 minutes with the fan speed set to High.
- (2) Operation method:
  - ① Step 1: In the Automatic, Cooling or Heating mode, press the ON/OFF button;
  - ② Step 2: Press the HI POWER button to switch to the HI POWER mode, and the indoor unit will commence HI POWER or JET operation 5 seconds after receiving the signal.
- (3) The HI POWER mode is canceled in one of the following cases:
  - ① The HI POWER button is pressed again;
  - ② The operating mode is changed;
  - ③ After 15 minutes;
  - ④ The FAN SPEED button is pressed;
  - ⑤ The system enters the Timing operation.
- (4) Notes:
  - ① During the HI POWER operation, the room temperature is not controlled.
  - ② The HI POWER operation is not supported during the drying and programmed timer operation.
  - ③ The Shower and Warm Feet modes can't be used with the HI POWER mode.
  - ④ During the Timing ON operation, the HI POWER operation commences only after the time reaches the ON time.
  - ⑤ During the timing operation, the HI POWER operation can be set only after the timing setting is finished.



#### (5) Setting difference between HI POWER and JET operations:

“O” means the option can be set; “X” means the option can't be set.

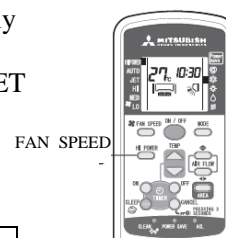
	Operating mode				Settings		
	Auto	Cooling	Heating	Drying	Air flow	Temp.	Air direction
HI POWER			X		X	X	O
JET			O		X	O	O

#### 4.12 JET operation:



- (1) JET operation: The system runs at the maximum fan speed to rapidly achieve cooling or heating.
- (2) Operation method: Press the FAN SPEED button to switch to the JET mode.
- (3) Note: JET operation has no time limit.

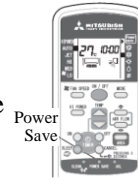
★ In the Cooling or Heating mode, the fan speeds corresponding to the various modes are as follows:

Mode	Auto	JET	HI POWER	Standard	Econo
Fan Speed	Auto	Ultra high	Hi	Me	Lo



#### 4.13 POWER SAVE operation:

- (1) The Power Save function regulates the frequency of the compressor, etc. and reduces the current value during operation, thus reduces the cooling/heating capacity to save energy.
- (2) Operation method: Point the remote controller at the air conditioner and use the  point to press the POWER SAVE button to make  point at Power Save. The Power Save operation is enabled.



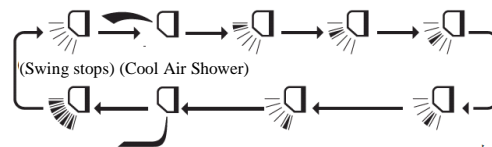
(3) Notes:

- ① The Power Save operation is set to disabled by default;
- ② When Power Save is enabled, other operations following it (except reset and CLEAN operation) are valid.

#### 4.14 Air direction regulation:

(1) Operation method:

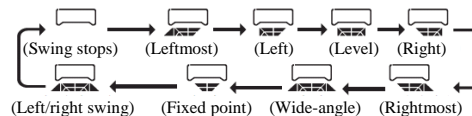
- Step 1: Press the ON/OFF button to run the air conditioner;
- ② Step 2: Press the Up/Down AIR FLOW button, as shown in the figure below, to regulate the up/down direction of the vertical flap;



(Up/down swing) (Warm Feet)







- ③ Step 3: Press the Left/Right AIR FLOW button, as shown in the figure below, to regulate the left/right air direction of the horizontal flap:



(2) Notes:

- ① Cool Air Shower (for cooling only): Through air direction regulation, cool air can be blown everywhere in the room;
- ② Warm Feet (for heating only): Through air direction regulation, warm air can be even blown to the bottom of feet;

(3) Use suggestions:

- ① Avoid directly blowing to the body for a long time;
- ② During cooling and drying, the up/down air direction is set to   to prevent too much cool air from going down;
- ③ During heating, the up/down air direction is set to   to prevent too much warm air from going up.

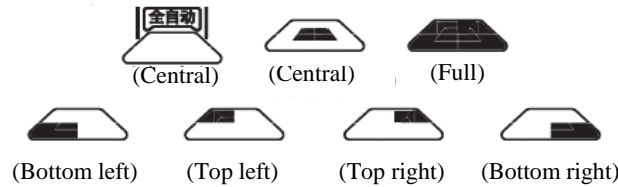
(4) Notes:

- ① When the Heating mode is enabled (that is, the heating operation begins), in order to prevent cool air from blowing, the flap will move to the level position, in which case, the air direction can't be set. When warm air begins to blow, the air flap will be restored to the set position, in which case, the air direction can be set.
- ② During the heating operation, when the room temperature is higher than the set temperature, or during the defrosting operation, when the flap is at the level position, the air direction can't be set. The air direction can be set only when warm air begins to blow.
- ③ In the Cool Air Shower or Warm Feet mode, the horizontal flap will be at the level position.
- ④ In the Cooling or Drying mode, avoid blowing downwards for a long time, otherwise, condensation may appear on the air outlet grille and drip down;
- ⑤ Never attempt to regulate the air flap or regulating port manually, otherwise, the control angle may change and the flap can't be fully closed.
- ⑥ Flap memorizing function (stop of flap): When the flap is swinging, press the AIR FLOW (Up/Down or Left/Right) button once, it will stop at that angle. As this angle is memorized in the microcomputer, the flap will automatically operate at the same angle next time the machine is started.



#### 4.15 Area setting:

- (1) The area setting function is used to regulate the indoor air and the air in the specific area in the room.
- (2) Operation method: When the air conditioner is running, press the AREA button, as needed, to switch to the desired area.
- (3) The area indications are as follows:



- (4) Cancellation: Press the Up/Down or Left/Right button to regulate the air direction.

#### (5) Notes:

- ① In the AUTO mode, the HI POWER and JET modes are not supported;
- ② After the Area setting is canceled, when the air conditioner is started again, the air direction before the Area setting will be displayed.

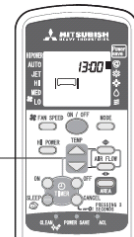
#### 4.16 Installation location setting:

- (1) The installation location setting function is used to consider the installation location of air conditioner and regulate the maximum space of the left/right air flow.
- (2) Operation method:

- ① Switch on the air conditioner and let it stay in the stop mode;  
If it is running, press the ON/OFF button to stop;
- ② Press and hold both the Up/Down and Left/Right buttons for over 5 seconds, and the installation location will flash on the display;
- ③ Press the Left/Right button to regulate to the desired position;  
whenever the Left/Right button is pressed, the displaying changes in the following order:

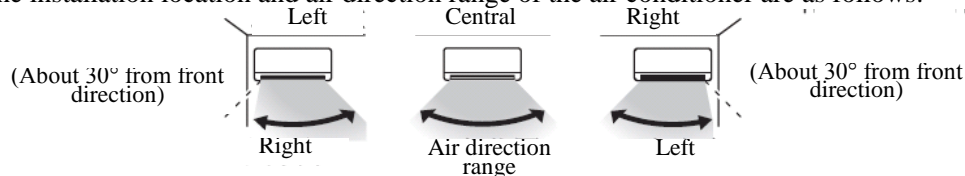


Press and hold both buttons for 5 sec.




- ④ Within 1 minute, press the ON/OFF button again to send a signal to the air conditioner and the air conditioner will memorize the installation location.

- (3) The installation location and air direction range of the air conditioner are as follows:



#### (4) Notes:

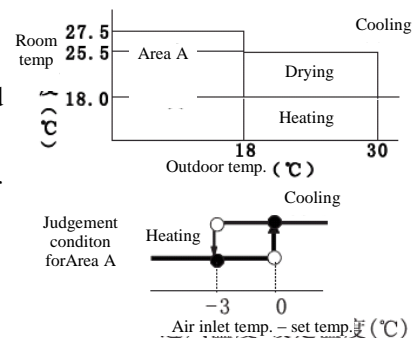
- ① After the installation location is set again, even when the plug is unplugged, the air conditioner will also memorize the installation location;
- ② During operation, the installation location can't be set;
- ③ After the installation location is set, if the air conditioner is reset or the batteries are replaced, the remote controller will display , i.e. the installation location memorized by the air conditioner.

#### 4.17 Outline of automatic operation:

- (1) Determination of operating mode:

After the indoor and outdoor fans operate at the 2nd speed and 4th speed respectively for 20 seconds, the system will check the room temperature, humidity and outdoor temperature to automatically select the cooling, heating or drying mode and the room temperature compensation value, and operate automatically. (Note: Here, the vertical flap stops at the level position and the horizontal flap stops at the central position.)







- (2) The system checks the temperature every hour after the operation begins. When the operating mode is judged to be different from the previous one, the operating mode will be changed;



- (3) If the air conditioner is started again within 1 hour after the automatic operation stops, or it is converted to automatic operation in the heating, cooling or drying mode, it will operate in the previous mode.
- (4) The temperature can be set in the following range. The relationship between the signals of the wireless remote controller and the set temperature is as follows:

		Signals of wireless remote controller (displaying)												
		-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6
Set temp	Cooling	18	19	20	21	22	23	24	25	26	27	28	29	30
	Drying	18	19	20	21	22	23	24	25	26	27	28	29	30
	Heating	20	21	22	23	24	25	26	27	28	29	30	31	32

(5) Operation of remote controller:

- ① In the AUTO mode, press the  or  button to regulate 6 levels of temperature;
- ② Each time the  or  button is pressed, the temperature will be switched in the following order: -6 ~ -5 ~ -4 ~ -3 ~ -2 ~ -1 ~ ±0 ~ +1 ~ +2 ~ +3 ~ +4 ~ +5 ~ +6
- ③ When -6 or +6 is displayed, press the  or  button and the displaying will not change;
- ④ The set temperature of ±0 in AUTO mode is: Cooling 24°C, Heating 26 °C, Drying 24°C.

#### 4.18 Outline of drying operation:

(1) Judgment of operation state:

- ① After the indoor and outdoor fans run at the 2nd speed and 3rd speed respectively for 20 minutes, the system checks the room temperature (Tai) and outdoor temperature (Th0-A) to determine the operation state. (Note: Here, the vertical flap stops at the level position and the horizontal flap stops at the central position.)
- ② The system checks the temperature every hour after the operation begins. When the operating mode is judged to be different from the previous one, the operating mode will be changed.
- ③ Judgment of operating mode:

Tai and TS (setting correction temperature), Th0-A relationship	Operating mode
Tai > TS-3 or Th0-A ≥ 19°C	Slightly cool heating & drying
Tai ≤ TS-3 or Th0-A < 19°C	Slightly warm heating & drying

(2) Notes:

- ① After the operating mode is judged, the system decides the running range according to the room temperature and setting correction temperature every 5 minutes;
- ② Slightly cool heating & drying includes four running ranges, all of which are cooling operations;
- ③ Slightly warm heating & drying includes four running ranges, in which three are cooling operations and one is heating operation.

#### 4.19 Outline of defrosting operation:

(1) Beginning conditions:

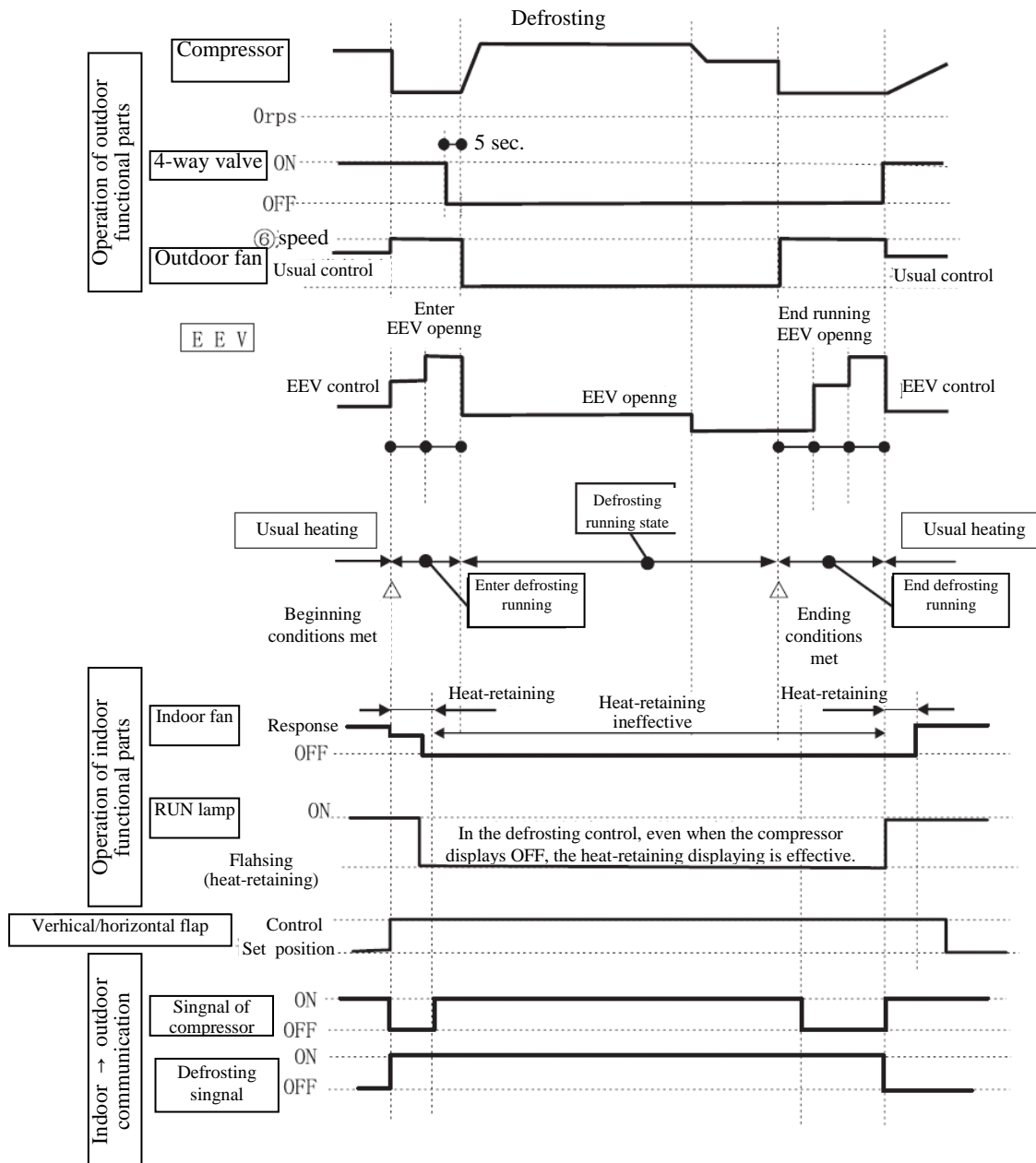
Case 1 (The defrosting running begins when all of the following conditions are met):

- ① After the heating begins and the defrosting ends, the accumulated running time of the compressor exceeds 45 minutes;
- ② The outdoor heat exchanger sensor (Th0-R) meets one of the following conditions:
  - A) Accumulated running time of compressor < 150 minutes, Th0-R ≤ -5°C;
  - B) Accumulated running time of compressor ≥ 150 minutes, Th0-R ≤ -3.5°C;
- ③ The outdoor heat exchanger sensor (Th0-R) and the outdoor air temp. sensor (Th0-A) meet one of the following conditions:
  - A) When outdoor air temp. sensor Th0-A ≥ 0°C:  
Accumulated running time of compressor < 150 minutes, (Th0-A) - (Th0-R) ≥ 7.0;
  - B) When outdoor air temp. sensor Th0-A ≥ 0°C:  
Accumulated running time of compressor ≥ 150 minutes, (Th0-A) - (Th0-R) ≥ 4.0;
  - C) When outdoor air temp. sensor -15°C ≤ Th0-A < 0°C:  
Accumulated running time of compressor < 150 minutes, (Th0-A) - (Th0-R) ≥ 4/15 \* (Th0-A) + 7;
  - D) When outdoor air temp. sensor -15°C ≤ Th0-A < 0°C:  
Accumulated running time of compressor ≥ 150 minutes, (Th0-A) - (Th0-R) ≥ 4/15 \* (Th0-A) + 6;
  - E) When outdoor air temp. sensor Th0-A < -15°C: (Th0-A) - (Th0-R) ≥ -5.0;
- ④ The compressor runs for over 7 minutes continuously.

Case 2: Low load running (The defrosting running begins when all of the following conditions are met):

- ① After the heating begins and the defrosting ends, the accumulated running time of the compressor is 45 minutes with air flow controlled;

- ② The outdoor heat exchanger sensor (Th0-R) meets one of the following conditions:  
 A) When the actual rotate speed of the compressor  $N \geq 62$  rps:  $Th0-R \leq -5^{\circ}\text{C}$ ;  
 B) When the actual rotate speed of the compressor  $N < 62$  rps:  $Th0-R \leq -4^{\circ}\text{C}$ ;  
 ③ Outdoor air temp. sensor (Th0-A):  $Th0-A \leq 3^{\circ}\text{C}$ ;  
 ④ The compressor runs for over 7 minutes continuously.
- (2) Ending conditions:  
 135 seconds after the system is switched to the defrosting mode, the defrosting running is canceled when one of the following conditions is met:  
 ① Outdoor heat exchanger sensor (Th0-R):  $Th0-R \geq 13^{\circ}\text{C}$ ;  
 ② The elapsed time of defrosting running is  $15 \pm 0.5$  min.
- (3) Operation time pattern of various functional parts in defrosting control:



## 4.20 Outline of vertical and horizontal flaps control:

### (1) Overview:

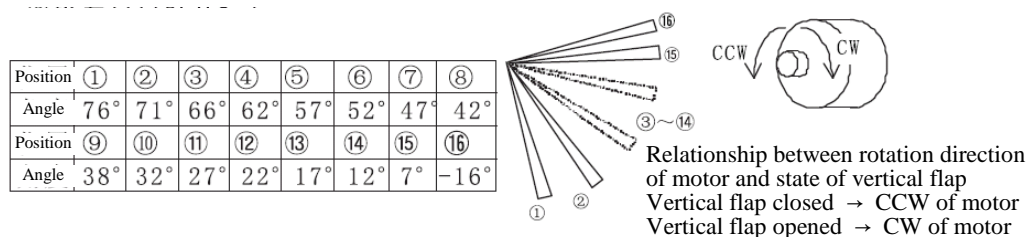
Sm1: Vertical flap (mounted on the right side when you face the appliance);

Sm2: Left horizontal flap (mounted on the left side when you face the appliance);

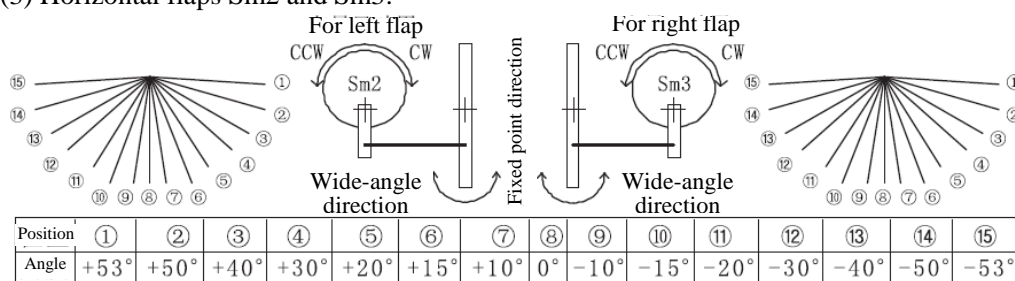
Sm3: Right horizontal flap (mounted on the right side when you face the appliance);

### (2) Vertical flap Sm1:

The level set is 0°C.



### (3) Horizontal flaps Sm2 and Sm3:



### (4) Reference position control:

- ① Beginning condition: This control is executed only when the air conditioner begins to run. It is not executed when the operating mode is switched and the flap mode is changed.
- ② Control: This control ends when the vertical flap Sm1 moves to position ① and the horizontal flaps Sm2 and Sm3 move to position ⑮. The flaps stop at the position set with the remote controller or the preset position memorized.

### (4) Control of vertical flap and horizontal flaps at the start of heating, stop of heating and for defrosting:

To avoid blowing cool air during heating before the indoor heat exchanger is fully warmed.

#### ① Beginning condition (when one of the following conditions is met):

- A) The indoor running mode is switched from a mode other than Heating to the Heating mode, and the temperature measured by the indoor heat exchanger sensor is  $< 28^{\circ}\text{C}$ ;
- B) During the Heating mode, the compressor displays OFF;
- C) During the Heating mode, the defrosting signal is received.

#### ② Control: This control ends when the vertical flap Sm1 moves to position ⑮ and the horizontal flaps Sm2 and Sm3 move to position ⑧.

#### ③ Ending conditions (when one of the following conditions is met):

- A) The indoor running mode is switched from a mode other than Heating to the Heating mode, and the temperature measured by the indoor heat exchanger sensor is  $\geq 28^{\circ}\text{C}$ ;
- B) In the Heating mode, the compressor is changed from OFF to ON, and the temperature measured by the indoor heat exchanger sensor is  $\geq 28^{\circ}\text{C}$ ;
- C) In the Heating mode, the defrosting signal is canceled, and the temperature measured by the indoor heat exchanger sensor is  $\geq 28^{\circ}\text{C}$ ;
- D) When this control is canceled, the flap position before the control is restored.

#### ④ Notes:

- A) This control is not executed in the JIS mode;
- B) This control is not executed when the temperature measured by the indoor heat exchanger sensor is approximately below  $-28^{\circ}\text{C}$  (disconnection of sensor).

#### 4.21 Outline of electronic expansion valve (EEV) control:

(1) Overview:

- ① Initial control: When the power is ON and the reference position is determined, the EEV opening is widened within 5 minutes to let the refrigerant return, thus makes the low pressure rise easily and avoid misdiagnosis of insufficient refrigerant and poor EEV operation as the low pressure can't rise after decline;
- ② Open loop control: After the initial control, when the temperature measured by the sensor, etc. are unstable, the EEV opening is set according to the balance of the compressor;
- ③ Area control: During quasi-steady running and steady running, the EEV opening is set according to the extent of over heat of exhaust, mainly aiming at the measure for the deviation due to open loop control;
- ④ Stop control: The EEV opening is set according to the stop control;
- ⑤ Negative pressure countermeasure control: When the mode is switched from a mode other than Heating to the Heating mode, the compressor is changed from OFF to ON, and the outdoor temperature is too low (temperature measured by discharge pipe sensor (Th0-D) - temperature measured by outdoor air temp. sensor (Th0-A) < 10°C), this control is executed for 8 minutes to avoid negative pressure risk;
- ⑥ Throttle correction control of cooling & drying: Five minutes after the area control, when the actual rotate speed of the compressor is below 24 rps and the temperature measured by the outdoor air temp. sensor (Th0-A) meets the condition  $25^{\circ}\text{C} \leq \text{Th0-A} < 38^{\circ}\text{C}$  and the temperature measured by the indoor heat exchanger sensor (Th1-RX) is above 10°C, this control is executed to increase the latent heat capacity in cooling;
- ⑦ Condensation prevention control: When the actual rotate speed of the compressor is above 32 rps and the value measured by the humidity sensor (HS) is above 68% for 30 minutes continuously, this control is executed to make the actual rotate speed of the compressor reduce to below 32 rps or make the value measured by HS reduce to below 63%.

(2) Priority of various EEV controls:

Stop control > Defrosting control > Indoor issued fixed opening control > Initial control > Protective control > Open loop control and area control

(3) Except the special situations such as reference position control, etc., others are controlled within the pulse range of 41-47.

#### 4.22 Outline of compressor control:

(1) Overview of ON/OFF of cooling and heating running:

- ① When the outdoor running mode is Cooling or Heating, the compressor has stopped for over 3 minutes, and the compressor running signal from the indoor unit is received, the compressor will be turned on;
- ② When the compressor is ON, the rotate speed of the compressor is fuzzily calculated using the temperature of the indoor inlet air, the temperature set with the remote controller, the setting correction temperature, etc., and the outdoor unit sends the compressor ON signal, the value of fuzzy calculation, the actual rotate speed, etc. to the indoor unit;
- ③ When the outdoor running mode is Cooling or Heating, the compressor has run for over 5 minutes, and the compressor stop signal from the indoor unit is received, the compressor will be turned off;
- ④ When the compressor is OFF, the outdoor unit sends the compressor OFF signal, the value of fuzzy calculation, the actual rotate speed, etc. to the indoor unit;
- ⑤ In defrosting control, the compressor OFF conditions are not judged.

(2) Running range: 20-120 rps (varying depending on the model).

(3) In order to prevent the oil level of the compressor from falling and ensure that oil is supplied to the pump of the compressor normally, enable the protection against temporary rise of rotate speed of compressor.

(4) In order to guarantee the pressure difference for switching the 4-way valve, enable the low load for temporary rise of rotate speed of compressor.

(5) With respect to the change rate of the actual rotate speed of the compressor, the instructed rotate speed from the outdoor inverter to the compressor and the temperature measured by the outdoor heat exchanger sensor (during cooling) or the temperature measured by the indoor heat exchanger sensor (during heating) should be observed to decide the rise/fall speed of the compressor (2 rps, 1/2 rps) and finally make the compressor operate in the appropriate working state.

#### 4.23 Outline of outdoor fan control:

(1) The settings of rotate speed of the outdoor fan are as follows:

Speed position		①	②	③	④	⑤	⑥	⑦	⑧
Rotate speed (rpm)	20MA-S	150	240	570	630	720	780	840	920
	25 MA-S	150	240	570	630	720	780	840	920
	35 MA-S	150	240	570	640	750	840	900	950
	50 MA-S	150	290	520	650	700	750	800	850

- (2) Priority of rotate speed control:  
Error response control > Outdoor fan control in compressor soft start control > Outdoor fan control in defrosting control > Outdoor fan control/indoor forcing outdoor fan running control in stop mode > Outdoor fan control at start > Outdoor fan control at the low outdoor temperature in cooling > Outdoor fan control under overload in cooling > Delayed speed position switching > Outdoor fan control under overload in heating > Speed position control
- (3) Error response control:  
When the outdoor fan runs at a speed below 75 rpm for over 30 seconds, the inverter will immediately stop output to the fan and indicate results of self-diagnosis; if this occurs 3 times, it will send the error code to the indoor unit; if the speed exceeds 75 rpm once before the 3 times, recount will be conducted.
- (4) The minimum rotate speed of the outdoor fan in the compressor soft start control is speed ④.
- (5) In the defrosting control, the rotate speed of the outdoor fan is OFF or speed ⑥.
- (6) Outdoor fan control in the stop mode:  
When the actual rotate speed of the compressor is 0, the outdoor fan continues to run at speed ③ for 1 minute or 2 minutes and 55 seconds and then stop.
- (7) Indoor forced running control:  
When the outdoor fan running start signal is received from the indoor unit, the operation at the fan speed received will begin, and this control is unrelated to the running mode, compressor instruction and protection stop (except outdoor fan error, low voltage). This control is canceled when the outdoor fan running cancel signal is received from the indoor unit.
- (8) At start, the outdoor fan operates according to the speed position control; when the compressor is started and in the ON state in the cooling mode and the outdoor temperature is below 22°C, it will run at speed ② or ① for 30 seconds.
- (9) Outdoor fan control of low outdoor temperature in cooling, overload in cooling, low outdoor temperature in heating and overload in heating:  
① In the cooling or heating mode, when the compressor is in the ON state and the temperature measured by the outdoor air temp. sensor meets the control conditions, this control will begin.  
② This control is canceled when either of the above conditions is not met.  
③ According to the temperature measured by the outdoor heat exchanger liquid pipe sensor and the temperature measured by the outdoor air temp. sensor, the rotate speed of the outdoor fan is decreased (to as low as speed ② or ①) or increased (up to speed ⑧).
- (10) Delayed speed position switching control:  
When the outdoor fan is changed from a high speed position to a low one, the switching is generally delayed for 60 seconds. If it is changed to a high speed position within 60 seconds, the delay will be canceled and it is converted to the high speed position immediately. If the outdoor fan is changed to OFF, there will be no delay and it will stop immediately.
- (11) The speed position control is generally between speed ③ and ⑧.

#### 4.24 Outline of indoor fan control:

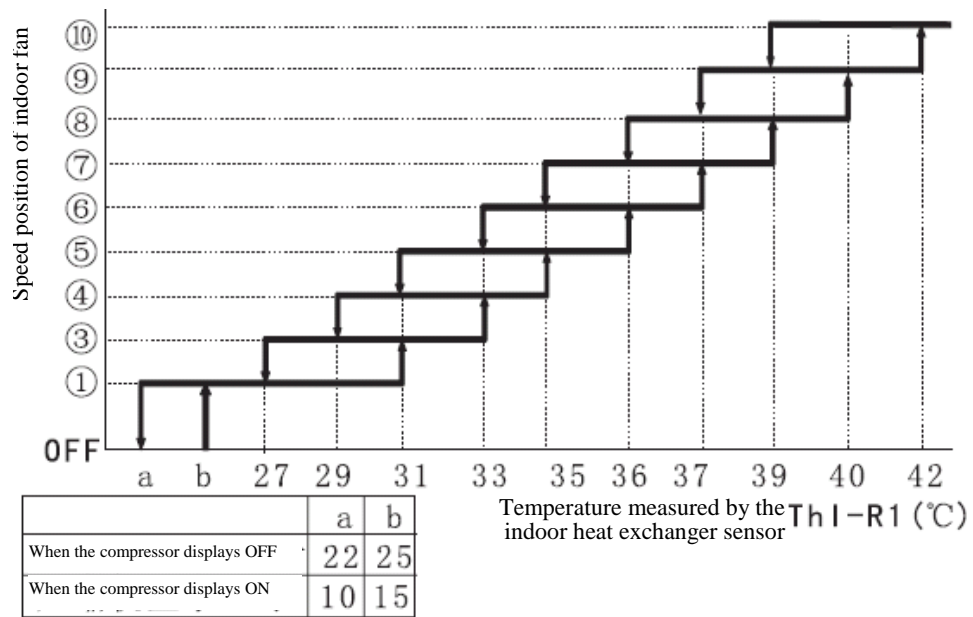
- (1) The settings of rotate speed of the indoor fan are as follows:

Speed position	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮
Rotate speed (rpm)															
20MA-S	500	580	630	680	580	680	940	1000	1030	1100	580	1000	680	1030	1030
25MA-S	500	580	630	680	730	820	940	1000	1030	1100	730	1000	820	1030	1030
35MA-S	500	600	650	700	820	940	1000	1050	1100	1150	1050	1050	940	1100	1100
50MA-S	500	610	670	740	880	970	1100	1250	1400	1400	1150	1250	970	1400	1400

- (2) Priority of rotate speed switching:  
HI POWER > AUTO/HI/ME/LO
- (3) Error response control:  
When the indoor fan runs at a speed below 75 rpm for over 30 seconds, the air conditioner will fully stop to indicate the results of self-diagnosis.
- (4) When the indoor fan is started and runs for 1 second under the initial voltage at the speed of 300 rpm, the system will compare with the signal from the fan to correct the rotate speed to the determined one.
- (5) Rate of rotate speed adjustment: 80 rpm for increase and 10 rpm for decrease.
- (6) The speed positions corresponding to the fan speeds are as follows:

Air flow switching	AUTO	HI	ME	LO	HI POWER
Speed position of indoor fan	⑤	⑥	⑤	④	⑦

- (7) The relationship between the rotate speed of heat-retaining during heating and the temperature measured by the indoor heat exchanger sensor Th1-R1 is as follows:








## 5 Installation

### Precautions for installation

- Use this system only for household and residence.
- This appliance must be installed according to the national wiring regulation.
- A 2-level switch must be used for the fixed wiring of the power supply and its disconnection clearance must be at least 3mm.
- If the outdoor unit may tip over or move and drop from the original installation location, use trip bolts or string to secure it in place.
- The liquid pipe and gas pipe in the piping should be insulated with thermal insulation.

#### SAFETY PRECAUTIONS

- Please read this "SAFETY PRECAUTIONS" carefully before the installation work in order to ensure correct installation.
- The precautions described below are divided into **⚠ WARNING** and **⚡ CAUTION**. The matters with possibilities leading to serious consequences such as death or serious personal injury due to erroneous handling are listed in the **⚠ WARNING**, however the matters listed in **⚡ CAUTION** may sometimes lead to serious accidents. These are very important precautions for safety. Be sure to observe all of them without fail.
- For qualified installing personnel, take precautions in respect to themselves by using suitable protective clothing, gloves, etc., and then perform the installation works.
- Please pay attention not to fall down the tools, etc. when installing the unit at the high position.
- If unusual noise can be heard during operation, consult the local dealer.
- Be sure to confirm no anomaly on the equipment by commissioning after completed installation and explain the operating methods as well as the maintenance methods of this equipment to the user according to the owner's manual.
- Symbols which appear frequently in the text have the following meaning:

	Strictly prohibited		Observe instructions		Provide proper earthing
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- Keep the installation manual together with owner's manual properly. Moreover if necessary, ask to hand them to a new user.

#### ⚠ WARNING

<p><b>⚠</b></p>	<ul style="list-style-type: none"> <li>• <b>Installation must be carried out by the qualified installer and only the specified optional components should be used.</b> If you install the system by yourself, it may cause serious trouble such as water leaks, electric shocks, fire and personal injury, as a result of a system malfunction.</li> <li>• <b>Install the system in full accordance with the instruction manual.</b> Incorrect installation may cause bursts, personal injury, water leaks, electric shocks and fire.</li> <li>• <b>Be sure to use only for household and residence.</b> If this appliance is installed in inferior environment such as machine shop etc., it can cause malfunction.</li> <li>• <b>Use the original accessories and the specified components for installation.</b> If parts other than those prescribed by us are used, it may cause drop of machine, water leaks, electric shocks, fire, refrigerant leakage, insufficient performance, poor control, and personal injury.</li> <li>• <b>Install the unit in a location with good support and ensure the unit is stable when installed, so that it can withstand earthquakes and strong winds.</b> Unsuitable installation locations can cause the unit to fall and cause material damage and personal injury.</li> <li>• <b>Ventilate the working area well in the event of refrigerant leakage during installation.</b> If the refrigerant comes into contact with naked flames, poisonous gas is produced.</li> <li>• <b>When the equipment is to be installed in a small room, take preventive measures to avoid refrigerant leakage exceeding the density limit.</b> Consult with the installation professionals about the preventive measures. If the density is greater than the limit of refrigerant, it may cause serious accidents such as refrigerant leakage, shortage of oxygen, etc.</li> <li>• <b>Confirm there is no refrigerant leakage after the installation.</b> If the refrigerant leaked comes into contact with the fire of an air blowing type heater, oven, etc., poisonous gas is produced.</li> <li>• <b>Use the prescribed pipes, flare nuts and tools for R410A.</b> Using conventional parts (for R22) can cause the unit failure and serious accidents due to burst of the refrigerant circuit.</li> <li>• <b>Tighten the flare nut by torque wrench with specified method.</b> If the flare nuts were tightened with excess torque, this may cause burst and refrigerant leakage after a long period.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Do not open the operation valves for liquid line and gas line until completed refrigerant piping work, air tightness test and evacuation.</b> If the compressor is operated when operation valves are open before the connection of refrigerant piping work is completed, it can cause frostbite or injury due to rapid refrigerant leakage, and burst or personal injury due to anomalously high pressure in the refrigerant circuit into which air is sucked.</li> <li>• <b>The electrical installation must be carried out by the qualified electrician in accordance with "the norm for electrical work" and "national wiring regulation", and the system must be connected to the dedicated circuit.</b> Power supply with insufficient capacity and incorrect function done by improper work can cause electric shocks and fire.</li> <li>• <b>Be sure to shut off the power before starting electrical work.</b> Failure to shut off the power can cause electric shocks, unit failure or incorrect function of equipment.</li> <li>• <b>Be sure to use the cables conformed to safety standard and cable ampacity for power distribution work.</b> Unconformable cables can cause electric leak, anomalous heat production or fire.</li> <li>• <b>This appliance must be connected to main power supply by means of a circuit breaker or switch (fuse:16A) with a contact separation of at least 3mm.</b></li> <li>• <b>If the appliance has a plug, the plug must comply with IEC 60884-1.</b></li> <li>• <b>Use the prescribed cables for electrical connection, tighten the cables securely in terminal block and relieve the cables correctly to prevent overloading the terminal block.</b> Loose connections or cable mountings can cause anomalous heat production or fire.</li> <li>• <b>Arrange the wiring in the control box so that it cannot be pushed up further into the box. Install the case and service panel correctly.</b> Incorrect installation may result in overheating and fire.</li> <li>• <b>Be sure to mount the service panel.</b> Incorrect mounting can cause electric shocks or fire due to intrusion of dust or water.</li> <li>• <b>Be sure to switch off the power supply before installation, inspection or servicing.</b> If the power supply is not shut off, there is a risk of electric shocks, unit failure or personal injury due to the unexpected start of fan.</li> </ul>
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⚠ WARNING	
❗	<ul style="list-style-type: none"> <li>• <b>To recover refrigerant, stop the compressor before closing the valve and disconnecting the refrigerant piping.</b> If the refrigerant piping is disconnected before the compressor stops and when the service valve is opened, it can cause frostbite or injury due to rapid refrigerant leakage, and burst or personal injury due to anomalously high pressure in the refrigerant circuit into which air is sucked</li> </ul>
⊘	<ul style="list-style-type: none"> <li>• <b>Do not put the drainage pipe directly into drainage channels where poisonous gases such as sulphide gas can occur.</b> Poisonous gases will flow into the room through drainage pipe and seriously affect the user's health and safety.</li> <li>• <b>Never connect the power cord to the central socket. Never use extended wires or share a socket with other electrical appliances.</b> This may cause fire or electric shocks due to defective contact, poor insulation and over-current etc.</li> <li>• <b>Do not discharge R410A to the atmosphere. R410A is a fluoride greenhouse gas and can cause global warming if it is discharged to the atmosphere.</b></li> </ul>
⚡	<ul style="list-style-type: none"> <li>• <b>Carry out the electrical work for ground lead with care.</b> Do not connect the ground lead to the gas line, liquid line, lightning conductor or telephone line's ground lead. Incorrect grounding can cause unit faults such as electric shocks due to short-circuiting. Never connect the ground lead to the gas line as gas leakage can cause explosion or fire.</li> </ul>
⚠ CAUTION	
❗	<ul style="list-style-type: none"> <li>• <b>Use the circuit breaker with correct breaking capacity at all electrodes.</b> If a wrong breaker is used, it can cause the unit malfunction and fire.</li> <li>• <b>Earth leakage breaker must be installed.</b> If the earth leakage breaker is not installed, it can cause fire or electric shocks.</li> <li>• <b>Secure a space for installation, inspection and maintenance specified in the manual.</b> Insufficient space can result in accident such as personal injury due to falling from the installation place.</li> <li>• <b>After maintenance, all wiring, wiring ties and the like, should be returned to their original state and wiring route, and the necessary clearance from all metal parts should be secured.</b></li> <li>• <b>Take care when carrying the unit by hand.</b> If the unit weighs more than 20kg, it must be carried by two or more persons. Do not carry by the plastic straps, always use the carry handle when carrying the unit by hand. Use gloves to minimize the risk of cuts by the aluminum fins.</li> </ul>
⊘	<ul style="list-style-type: none"> <li>• <b>Dispose of any packing materials correctly.</b> Any remaining packing materials can cause personal injury as it contains nails and wood. And to avoid danger of suffocation, be sure to keep the plastic wrapper away from children and to dispose after tearing it up.</li> <li>• <b>Be sure to insulate the refrigerant pipes so as not to condense the ambient air moisture on them.</b> Insufficient insulation can cause condensation, which can lead to moisture damage on the ceiling, floor, furniture and any other valuables.</li> <li>• <b>When the air conditioner is operating (cooling &amp; drying operation) and the ventilator installed in the room is also running, there is the possibility that drain water may backflow as the room enters the negative pressure state. Therefore, set up the opening port to let air enter the room to provide appropriate ventilation (for example, open the door a little). In addition, just as above, set up the opening port if the room enters the negative pressure state due to the aerator for the high rise apartment etc.</b></li> <li>• <b>Install isolator or disconnect switch on the power supply wiring in accordance with the local codes and regulations.</b></li> </ul>
⊘	<ul style="list-style-type: none"> <li>• <b>Do not install the unit in the locations listed below.</b> <ul style="list-style-type: none"> <li>• Locations where carbon fiber, metal powder or any powder is floating.</li> <li>• Locations where any substances that can affect the unit such as sulphide gas, chloride gas, acid and alkaline can occur.</li> <li>• Vehicles and ships.</li> <li>• Locations where cosmetic or special sprays are often used.</li> <li>• Locations with direct exposure to oil mist and steam such as kitchen and machine plant.</li> <li>• Locations where any machines which generate high frequency harmonics.</li> <li>• Locations with salty atmospheres such as coastlines.</li> <li>• Locations with heavy snow.</li> <li>• Locations where the unit is exposed to chimney smoke.</li> </ul> </li> </ul>

⚠ CAUTION	
<p>⊘ <b>Do not install the outdoor unit in the locations listed below.</b></p> <ul style="list-style-type: none"> <li>Locations where discharged hot air or operating sound of the outdoor unit can bother neighborhood.</li> <li>Locations where outlet air of the outdoor unit blows directly to animals or plants. The outlet air may cause adverse impact on plants, etc.</li> <li>Locations where vibration and operation sound generated by the outdoor unit can affect seriously (on the wall or at the place near bed room).</li> <li>Locations where vibration can be amplified and transmitted due to insufficient strength of structure.</li> <li>Locations where an equipment affected by high harmonics is placed (TV set or radio receiver is placed within 5m).</li> <li>Locations where drainage cannot run off safely. It can affect surrounding environment and cause a complaint.</li> </ul> <p><b>Do not install the unit where corrosive gas (such as sulfurous acid gas etc.) or combustible gas (such as thinner and petroleum gases) can accumulate or collect, or where volatile combustible substances are handled.</b></p> <p>Corrosive gas can cause corrosion of heat exchanger, breakage of plastic parts and etc. And combustible gas can cause fire.</p> <p><b>Do not use the base flame for outdoor unit which is corroded or damaged due to long periods of operation.</b></p> <p>Using an old and damaged base flame can cause the unit falling down and cause personal injury.</p> <p><b>Do not touch the suction or aluminum fin on the outdoor unit.</b></p> <p>This may cause injury.</p>	<ul style="list-style-type: none"> <li><b>Do not install the outdoor unit in a location where insects and small animals can inhabit.</b></li> </ul> <p>Insects and small animals can enter the electric parts and cause damage or fire. Instruct the user to keep the surroundings clean.</p> <ul style="list-style-type: none"> <li><b>Do not install nor use the system close to the equipment that generates electromagnetic fields or high frequency harmonics.</b></li> </ul> <p>Equipment such as inverters, standby generators, medical high frequency equipments and telecommunication equipments can affect the system, and cause malfunctions and breakdowns. The system can also affect medical equipment and telecommunication equipment, and obstruct its function or cause jamming.</p> <ul style="list-style-type: none"> <li><b>Do not use any materials other than a fuse with the correct rating in the location where fuses are to be used.</b></li> </ul> <p>Connecting the circuit with copper wire or other metal thread can cause unit failure and fire.</p> <ul style="list-style-type: none"> <li><b>Do not touch any buttons with wet hands.</b></li> </ul> <p>It can cause electric shocks.</p> <ul style="list-style-type: none"> <li><b>Do not touch any refrigerant pipes with your hands when the system is in operation.</b></li> </ul> <p>During operation the refrigerant pipes become extremely hot or extremely cold depending on the operating condition, and it can cause burn injury or frost injury.</p> <ul style="list-style-type: none"> <li><b>Do not put anything on the outdoor unit and operating unit.</b></li> </ul> <p>This may cause damage of the object or injury due to the fall of the object.</p>

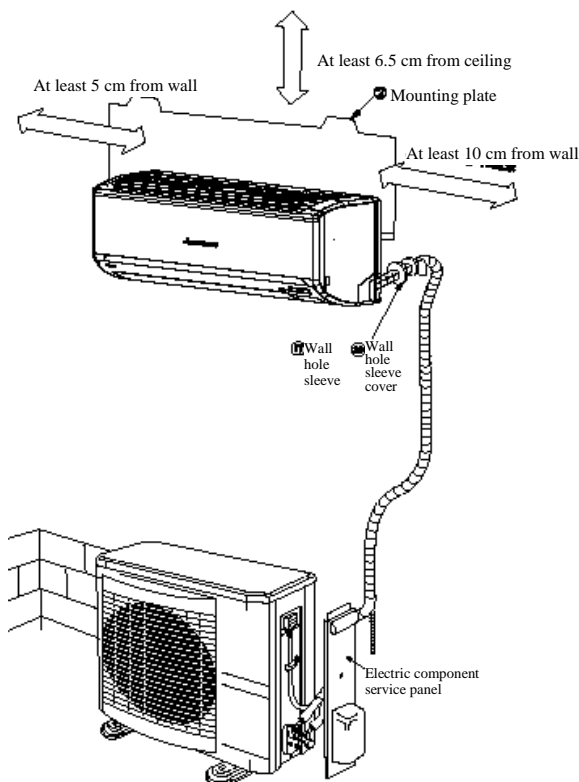
## 5.1 Selection of installation location

### Indoor unit

- Where there are no obstructions and where cool air and warm air can blow in the room.
- Where the indoor unit or wall does not vibrate and where is strong.
- Where there is adequate space for servicing. (The space mentioned below is safe.)
- Where wire and pipe mounting is convenient.
- Where direct sunlight and strong light do not hit the unit.
- Where water from the unit can drain easily.
- Where there is at least 1 meter distance from the TV set or radio. (Otherwise, it may interfere with TV reception or produce noise.)

### Outdoor unit

- Where rain, snow and sunlight do not directly hit the unit, and where there is enough air circulation.
  - Where blasts of cold or hot air and noise do not bother the neighbors.
  - Where there are installation and servicing conditions.
  - A location where vibrations are not enhanced and where is strong.
- ✕ Please avoid the following locations.
- A location near the room, etc. to prevent the operating noise from causing trouble.
  - Where there are possibilities of flammable gas leaks.
  - Where there is constant exposure to harsh winds.

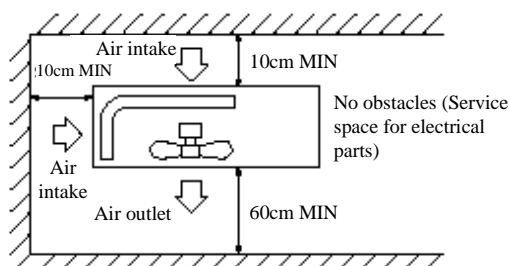


## Selection of installation location

- The appliance must be installed at a location with the vents and air intake being 10cm away from walls.

(In case the fence is 1.2m or above in height, or is overhead, the sufficient space between the unit and wall shall be secured.)

- When the unit is installed, the space of the following dimension shall be secured.



### ⚠ Caution

If the wall is 1.2m or above in height or there is a ceiling, the sizes should be greater than those indicated above.

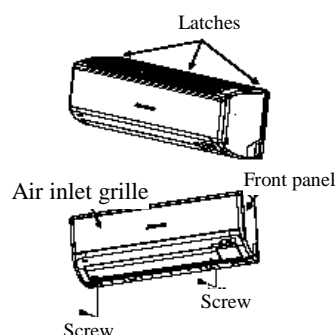
## How to remove and install the front panel

### ○ Removal

- ① Remove the air inlet grille.
- ② Remove the 2 screws securing the front panel.
- ③ Remove the 3 latches on the upper part of the front panel and remove the front panel from the unit.

### ○ Installation

- ① Remove the air filter.
- ② Cover the unit with the front panel.
- ③ Tighten the 2 screws to secure the front panel.
- ④ Mount the air filter.
- ⑤ Mount the air inlet grille.

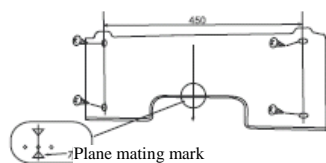


## 5.2 Installation of indoor unit

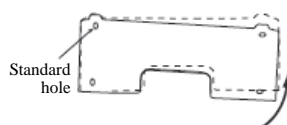
### Mounting of mounting plate

### Fixing the mounting plate

Firstly find the position of support or columella in the wall. Check that the mounting location is level and then fix the unit more securely.



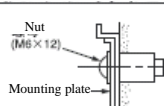
- In the loose state, use four screws to adjust the mounting plate horizontally.



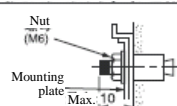
- Turn the mounting plate with the standard hole as the center to make it level.

### Fixing on the concrete wall

#### Using nut retainer

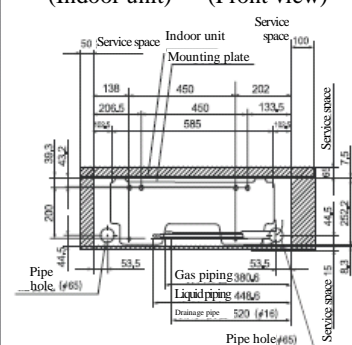


#### Using screw retainer



### Setting the relationship between plate and indoor unit

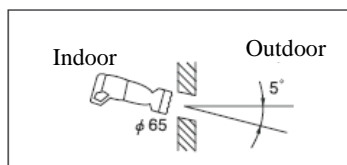
#### Installation space (Indoor unit) (Front view)



## Installation of indoor unit

### Drilling holes and securing sleeve (optional)

Drilling a hole with  $\Phi 65$  whole core drill



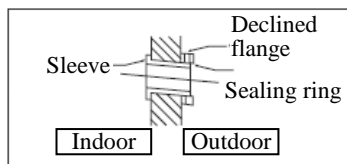
- Use the whole core drill to drill a hole.

Mounting the sleeve.

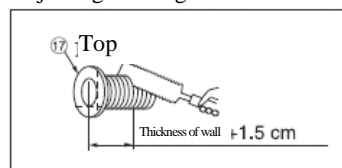


- Insert the sleeve.

Sketch of state after mounting

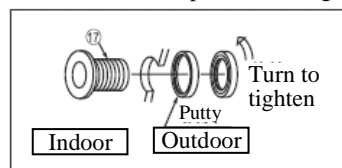


Adjusting the length of the sleeve



- If the rear pipe is pulled out, cut the lower part and right side of the axle collar

Sleeve Declined plate Sealing ring



### ⚠ Caution

Drill a hole at an angle of 5°

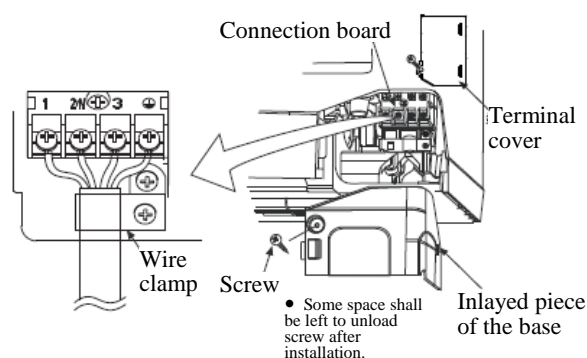
### Preparation for installation of indoor unit

#### Preparation for mounting of electric wire

- ① Open the air inlet grille.
- ② Remove the cover.
- ③ Open the wire clamp.
- ④ Connect the electric wire to the connection board securely.
  - 1) Connect the electric wire to the connection board securely. If the electric wire is not fixed completely, the contacting will be poor, thus causes risk, as the connection board may heat which causes fire.
  - 2) Please note that the number of terminals of the indoor and outdoor connections should not be confused.
  - 3) Use the wire clamp to connect the electric wire.
- ⑤ Connect the electric wire through the wire clamp.
- ⑥ Secure the cover.
- ⑦ Close the air inlet grille.

### ⚠ Caution

In case of failure of wiring connection, the indoor unit will stop running, the RUN lamp will light up, and the TIMER lamp will flash.

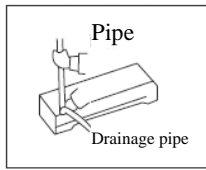


Use cables for interconnection wiring to avoid loosening of the wires.  
 CENELEC code for cables required fild cables.  
 H05RNR4G 1.5(example) or 24IEc57  
 H Harmonized cable type  
 05 300/500volts  
 N Natural-and/or synth,rubber wire insulation  
 R polychlorene rubber conductors insulation  
 R stranded core  
 4or5 Number of conductors  
 G One conductor the cable is the earth conductor (yellow/green)  
 1.5 Section of copper wire(mm<sup>2</sup>)

## Mounting pipe support

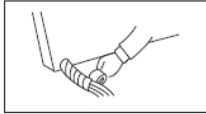
- Precautions for connection to the left and to center/rear [Top view]

### Pipe shaping

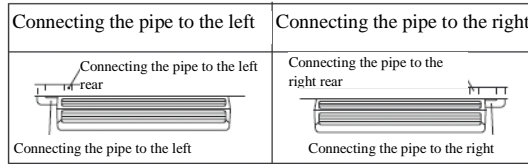


- Hold the root segment of the pipe, pull out the pipe, and shape the extended section.

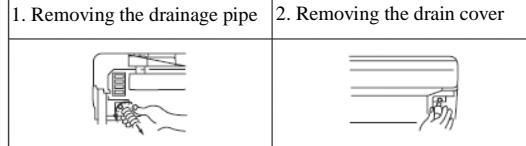
### Insulation tape winding



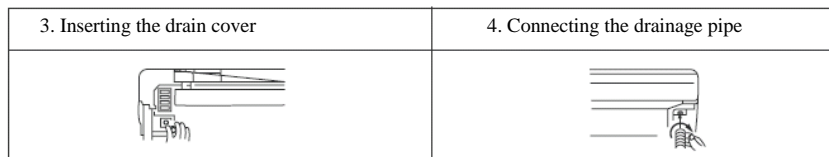
- Wind the section extending to outdoor with exterior insulation tape.
- Be sure to wind the wiring and the piping together with exterior insulation tape.
- To apply the exterior insulation tape, be sure to begin from the lower part of the piping to avoid intrusion of rain.



### [Steps for drainage pipe displacement]



- Turn the drainage pipe to remove it.
- Remove it by hand or with pliers.



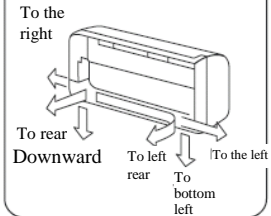
- Use the hexagon wrench to securely insert the drain cover removed in Step 2.

Note: If it is not inserted securely enough, water leakage may occur.

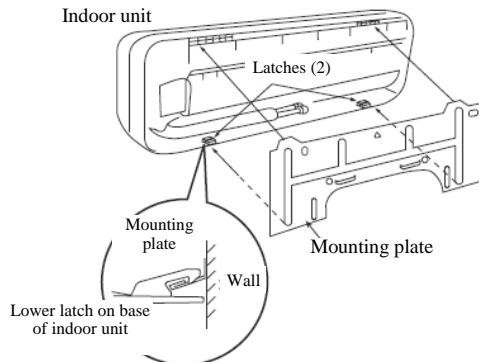
- Securely insert the drainage pipe and make it rotate.

Note: If it is not inserted securely enough, water leakage may occur.

The pipe can be connected to the rear, left, left rear, bottom left, right or bottom right.



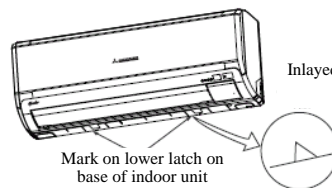
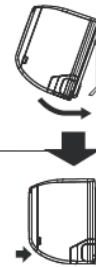
### Securing the indoor unit



- How to remove the indoor unit from the mounting plate
- ① Push the lower latch on the base of the indoor unit upwards on the mark. (The lower latch can be removed from the mounting plate.)
- ② Push the indoor unit upwards to remove the indoor unit from the mounting plate.

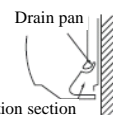
### Mounting steps

- ① Pull the pipe through the hole in the wall, and hang the upper section of the indoor unit on the mounting plate.
- ② Gently push the lower section and secure the unit.



Inlaid piece of the base (Right)

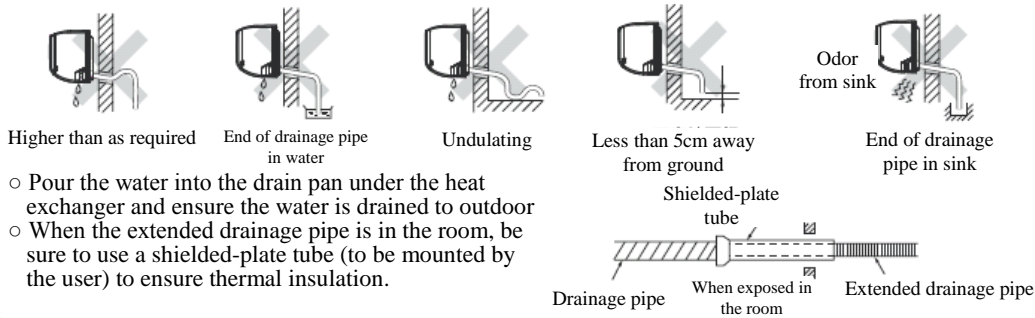
The air conditioner has a drain pan collecting dew mounted on the back. Never put power cord on the drain pan.



### Drainage pipe

- Mount the drainage pipe at a downward angle.
- Avoid the following drainage pipe connections.

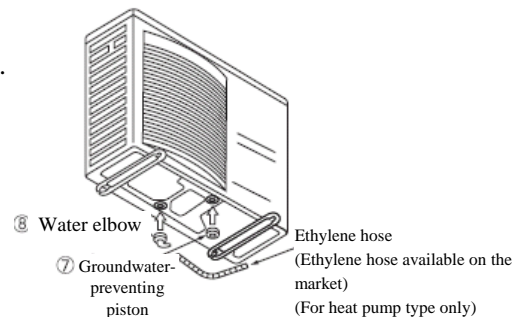
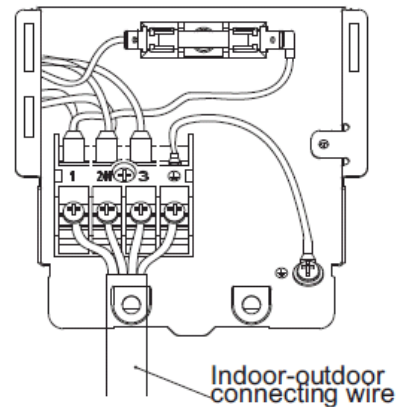
**Caution** After all mounting steps, check whether the drain is proper. Otherwise, water leakage may occur.



- Pour the water into the drain pan under the heat exchanger and ensure the water is drained to outdoor
- When the extended drainage pipe is in the room, be sure to use a shielded-plate tube (to be mounted by the user) to ensure thermal insulation.

## 5.3 Installation of outdoor unit

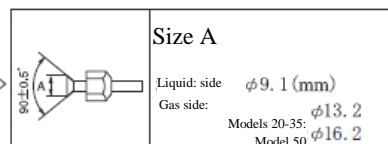
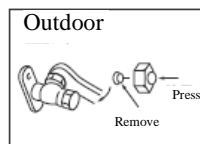
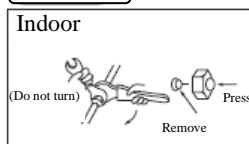
- Make sure that the unit is stable in installation. Fix the unit to stable base.
- When installing the unit at higher place or where it could be toppled by strong winds, secure the unit firmly with foundation bolts, wire, etc.
- Perform wiring, making wire terminal numbers conform to terminal numbers of indoor unit terminal block.
- Connect using ground screw located near  $\oplus$  mark.
- Never install the water elbow when the temperature is below 0°C for several days in a row.



## 5.4 Pipe connection

Before pipe connection, cover the pipes with tape, etc. to prevent dust, sand, etc. from entering.

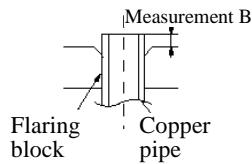
### Preparation



**Caution**  
Do not apply refrigerating machine oil to the flared surface.

- Screw off the flare nut (liquid and gas sides)
- Screw off the flare nut (liquid and gas sides)
- Mount the flare nut screwed off onto the pipe to be connected to form a trumpet shape.

## ● Flaring



Model	Copper pipe diameter	Measurement B(mm)		
		Clutch type flare tool for R410A	Conventional (R22) flare tool	
			Clutch type	Wing nut type
SRK20/25/35/50MA-S	φ 8.35	0.0~0.5	1.0~1.5	1.5~2.0
SRK20/25/35MA-S	φ 9.52	0.0~0.5	1.0~1.5	1.5~2.0
SRK50MA-S	φ 12.7	0.0~0.5	1.0~1.5	2.0~2.5

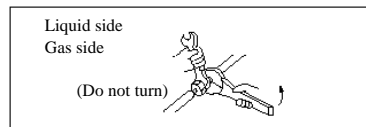
Use a flare tool designed for R410A or a conventional flare tool. Please note that measurement B (protrusion from the flaring block) will vary depending on the type of flare tool in use. If a conventional flare tool is used, please use a copper pipe gauge or a similar instrument to check protrusion so that you can keep measurement B to a correct value.

### ⚠ Caution

Do not apply excess torque to the flared nuts. Otherwise, the flared nuts may crack depending on the conditions and refrigerant leak may occur.

## Connection

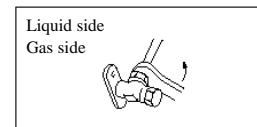
### Indoor



- Connect the pipes on both liquid and gas sides.
- Tighten the nuts to the following torque.

Liquid side (φ 6.35) : 14.0~18.0N·m (1.4~1.8kgf·m)  
 Gas side (φ 9.52) : 34.0~42.0N·m (3.4~4.2kgf·m)  
 (φ 12.7) : 49.0~61.0N·m (4.9~6.1kgf·m)

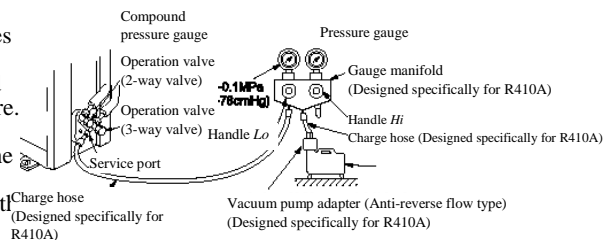
### Outdoor



- Connect the pipes on both liquid and gas sides.
- All torques are the same as on the indoor liquid side.

## Air purging

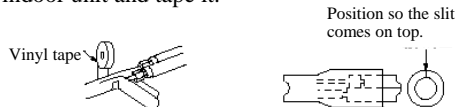
- ① Secure all flare nuts on both indoor and outdoor sides to prevent leaks from the pipes.
- ② Connect the operation valves, charge hose, manifold valve and vacuum pump as shown in the right figure.
- ③ Fully open Handle *Lo* for the manifold valve, and pump a vacuum for over 15 minutes. Ensure that the meter is indicating -76cmHg (-0.1MPa).
- ④ After vacuuming, fully open the operation valve (both liquid and gas sides) with a hexagon wrench.
- ⑤ Ensure that there are no gas leaks from the joints in the indoor and outdoor units.



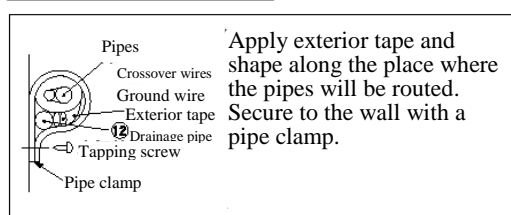
- Since the system uses service ports differing in diameter from those found on the conventional models, a charge hose (for R22) presently in use is not applicable. Please use one designed specifically for R410A.
- Please use an anti-reverse flow type vacuum pump adapter so as to prevent vacuum pump oil from running back into the system. Oil running back into an air-conditioning system may cause the refrigerant cycle to break down.

## Heat insulation for joints

Cover the joint with insulation material for the indoor unit and tape it.



## Finish and fixing



## Earthing Work

- Earth work shall be carried out without fail in order to prevent electric shock and noise generation.
- The connection of the earth cable to the following substances causes dangerous failures, therefore it shall never be done. (City water pipe, Town gas pipe, TV antenna, lightning conductor, telephone line, etc.)



### Moving or removing the appliance

- In order to meet the requirement of environmental protection, pump down (recovering refrigerant) is required.
- The effect of pump down is to return the refrigerant from the indoor unit to the outdoor unit when the pipes are removed from the main frame. (Pump down method)
  - ① Connect the charge hose to the service port.
  - ② Liquid side: Close the liquid valve with a hexagon wrench.  
Gas side: Fully open the gas valve  
Cooling operation (If the room temperature is too low, run the HI POWER cooling.)
  - ③ When the pressure gauge indicates 0.01Mpa, stop cooling and close the gas valve.

### Safe disposal of product after the useful life

- The safe, comfortable useful life of the product is 10 years.
- Some products may be used even after the normal useful life is expired.
- For the destruction or disposal of the product and waste after the useful life has expired, the impact on safety and environment must be considered.

### Installation test check points

Check the following points after completion of the installation, and before turning on the power. Conduct a test run and ensure that the unit operates properly.

At the same time, explain to the customer how to use the unit and how to take care of the unit following the installation manual.

#### After installation

- ☐ The power supply voltage is correct as the rating.
- ☐ No gas leaks from the joints of the operation valve.
- ☐ Power cables and crossover wires are securely fixed to the terminal block.
- ☐ Operation valve is fully open.
- ☐ The pipe joints for indoor and outdoor pipes have been insulated.

When the air conditioner is restarted or when changing the operation, the unit will not start operating for approximately 3minutes. This is to protect the unit and it is not a malfunction.

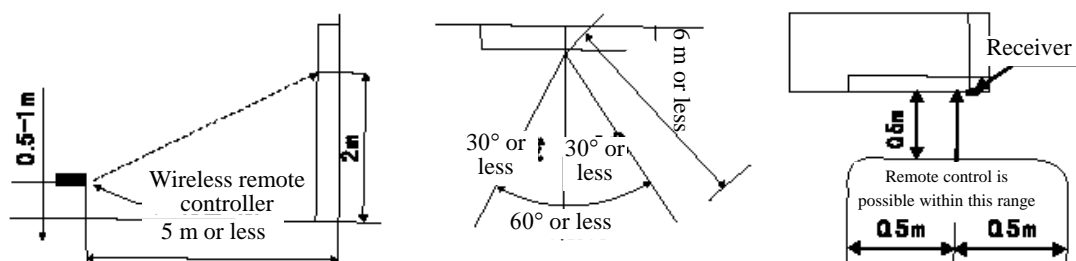
#### Test run

- ☐ Air conditioning and heating are normal.
- ☐ No abnormal noise.
- ☐ Water drains smoothly.
- ☐ Protective functions are not working.
- ☐ The remote control is normal.
- ☐ Operation of the unit has been explained to the customer.

(Three-minute restart preventive timer)

## 5.5 Precautions for wireless remote controller operation:

(1) Effective distance of wireless remote controller:



(2) Precautions:

- ① The remote controller should be correctly facing the receiver of the air conditioner for manipulation.
- ② The typical coverage is indicated in the left illustration. It may be increased or decreased depending on the installation.
- ③ The coverage may be decreased or even nil, if the receiver is exposed to strong light, such as direct sunlight, illumination, etc., or covered by dust or used behind a curtain, etc.



### 5.6 Standard running data:

		SRK20MA-S	SRK25MA-S	SRK35MA-S	SRK50MA-S
High pressure (MPa)	Cooling	-	-	-	-
	Heating	2.2~2.9	2.2~2.9	2.0~3.2	2.4~3.6
Low pressure (MPa)	Cooling	1.0~1.2	1.0~1.2	0.9~1.2	0.8~1.2
	Heating	-	-	-	-
Temp. difference between inlet and outlet air of indoor unit (°C)	Cooling	9~10	9~11	8~14	10~16
	Heating	9~15	9~16	10~21	10~22
Operating current (A)	Cooling	1.4~4.1	1.4~6.0	1.3~6.6	2.0~10.8
	Heating	1.7~5.6	1.7~6.1	1.7~6.6	2.0~13.8

Notes: ① The above data complies with the standard:

and is measured at the following ambient temperature:

indoor side: cooling.....27°CDB, 19°CWB; heating.....20°CDB

outdoor side: cooling.....35°CDB, 24°CWB; heating.....7°CDB, 6°CWB

② The length of the pipe between the indoor and outdoor units is 5 meters in the test. The length of the pipe supplied with the appliance may vary.

## 6. MAINTENANCE

### 6.1 Electrical parts failure diagnosis method

#### (1) Precautions:

- ① Be sure to switch off the power before disassembling and checking the air conditioner.

Maintenance of the indoor unit should commence 1 minute after the power is switched off.

With respect to maintenance of the outdoor unit, the major circuit (electrolytic capacitor), which may be charged, should be fully discharged before the maintenance.

- ② When removing the circuit board, do not vigorously press the circuit board or the bonded parts.
- ③ When unplugging the plug connector, do not drag the electric wire and be sure to hold the plug frame.

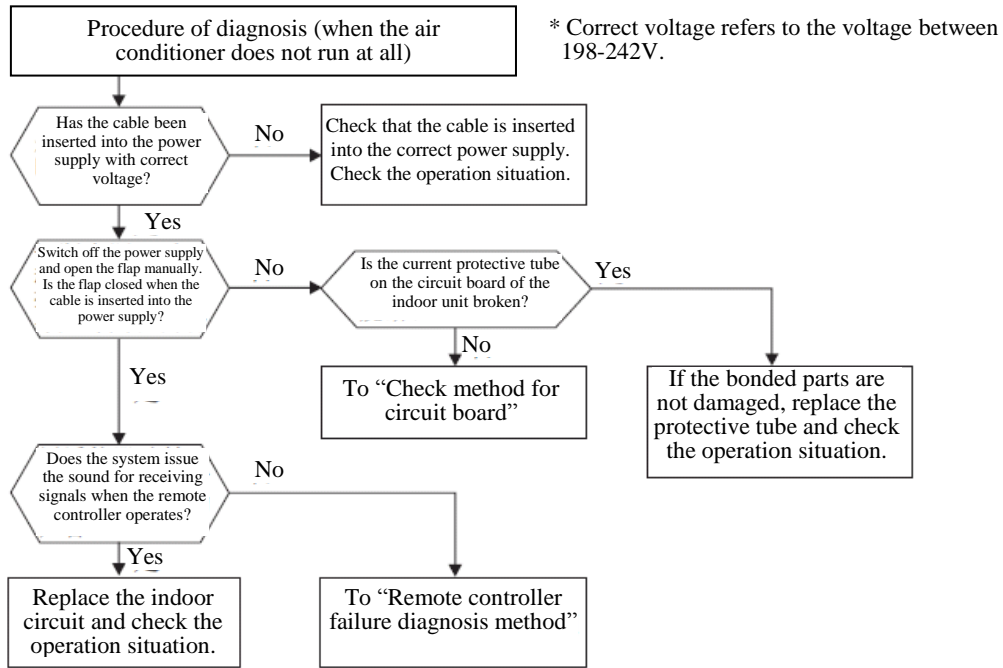
#### (2) Matters to be confirmed before diagnosis:

- ① Have you asked the user about the details of the failure?
- ② Does the air conditioner run? Does the self-diagnosis have any indication?
- ③ Is the voltage of the power socket correct?
- ④ Is the connection between the indoor and outdoor units wrong?
- ⑤ Is the outdoor refrigerant disconnecting valve opened?

(3) Procedure of diagnosis (when the air conditioner can't run at all). When the air conditioner runs but malfunctions, follow the procedure described in (4).

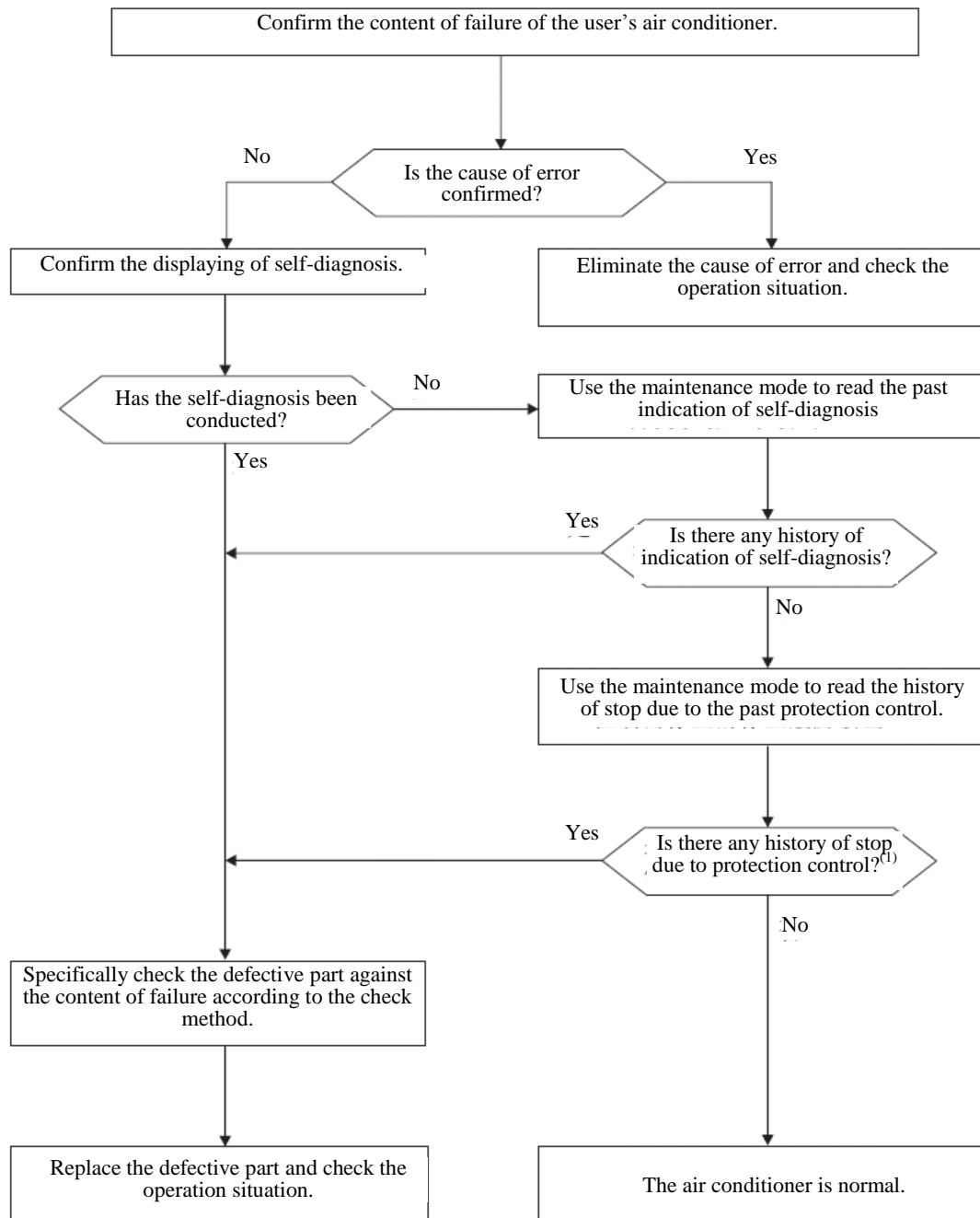
**Important** The air conditioner does not run at all when all of the following are met.

- ① The RUN lamp does not light up;
- ② The flap does not open;
- ③ The motor of the indoor fan does not rotate;
- ④ The self-diagnosis does not have indication.



#### (4) Procedure of failure diagnosis (when the air conditioner can run)

Note: (1) When only stop data is indicated, the air conditioner is normal. However, when the same protection is triggered repeatedly (more than 3 times), which becomes the user's complaint, it should be judged according to the content of failure.



## (5) Indication of self-diagnosis

When the air conditioner stops abnormally, the cause is indicated with lamps. Three minutes after abnormal stop, use the remote controller to start the appliance. The error indication will disappear and the appliance will commence operation<sup>(2)</sup>.

Note: (2) It can't be restarted with the remote controller 3 minutes after abnormal stop. The abnormal stop disappears when the power of the air conditioner is switched off.

		Indoor indication			Content of error	Main cause	Indication (flash, light up) conditions
		RUN lamp	TIMER lamp	Temp. indication			
Indoor unit	Sensors	Flash 1 time	Light up	06	Indoor heat exchanger sensor error	Wire break of indoor heat exchanger sensor, poor plug contacting	When the appliance does not operate after the power is switched on, the temperature measured is below -28°C for over 15 min. No indication during operation. During operation, the temperature measured is below -28°C for over 40 min. The air conditioner stops and the error is indicated.
		Flash 2 times	Light up	-	Room temperature sensor error	Wire break of room temperature sensor, poor joint contacting	When the appliance does not operate after the power is switched on, the temperature measured is below -45°C for over 15 sec. No indication during operation.
	Others	Flash 5 times	Light up		Input voltage error	Input voltage is too high or too low.	
		Flash 6 times	Light up	16	Indoor fan motor error	Defective indoor fan motor, poor plug contacting, defective indoor circuit board	When the indoor fan is operating, the rotate speed measured is below 300 rpm for over 30 sec. The air conditioner stops and the error is indicated.
		-	-	01	Display communication error	Break of display connecting wire, failure, poor joint contacting	
Outdoor unit	Sensors	Continuous flashing	Flash 1 time	38	Outdoor air temp. sensor error	Wire break of outdoor air temp. sensor, poor joint contacting	When the power is switched on, within 20 sec. during which the appliance does not operate or after the compressor runs for 2 min. ~ 2 min. and 20 sec., the temperature measured is below -55°C for over 15 sec. No indication during operation.
		Continuous flashing	Flash 2 times	37	Outdoor heat exchanger liquid pipe sensor error	Wire break of outdoor heat exchanger liquid pipe sensor, poor joint connection	When the power is switched on, within 20 sec. during which the appliance does not operate or after the compressor runs for 2 min. ~ 2 min. and 20 sec., the temperature measured is below -55°C for over 15 sec. No indication during operation.
		Continuous flashing	Flash 4 times	39	Compressor vent-pipe sensor error	Wire break of vent-pipe sensor, poor joint contacting	When the rotational frequency of over 0 rps of outdoor unit lasts for 9 min.; the temperature measured by the vent-pipe sensor is below 7°C for over 15 sec. After the compressor runs for 10 min. ~ 10 min. and 20 sec., the temperature measured is below -25 °C for over 15 sec. The air conditioner stops and the error is indicated.
		Continuous flashing	Flash 5 times	53	Air suction pipe sensor error (multi-split system)		
	Other s	Light up	Flash 1 time	42	Power cut for current protection	Missing phase, short circuit and lock of compressor, defective outdoor circuit board, defective EEV, disconnecting valve closed	When the compressor is started, the output current of the inverter (current of compressor) exceeds the setting The air conditioner stops and the error is indicated.
		Light up	Flash 2 times	59	Outdoor unit error	No connection or wire break of compressor, disconnecting valve closed, over heat running of compressor, wire break of vent-pipe sensor, poor joint contacting, defective EEV, insufficient refrigerant	The current value of the motor in the initial excitation is lower than 1A; The compressor is forced to stop, which is caused by protection control of outdoor unit and which occurs over 3 times within 20 min. after power is switched on; Five sec. after the power is switched on, the DC voltage is abnormal (less than about DC210V); The voltage reduces when the compressor is running; The inverter stops immediately when the failure of outdoor unit is detected.
		Light up	Flash 3 times	58	Current safety	Protection control of outdoor inverter	The input current value of the outdoor inverter exceeds the control value. The inverter stops immediately when the failure is detected.
		Light up	Flash 4 times	51	Power module error	Short circuit of power transistor, Over current protection	
		Light up	Flash 5 times	36	Compressor over heat protection	To prevent over heat of compressor in running, deterioration of refrigerant, deterioration of refrigerating machine oil, winding damage of compressor motor, etc.	Temperature measured by vent-pipe sensor $\geq 110^{\circ}\text{C}$ : the compressor stops; $100^{\circ}\text{C} \leq$ Temperature measured by vent-pipe sensor $< 110^{\circ}\text{C}$ : the frequency of the compressor reduces; $90^{\circ}\text{C} \leq$ Temperature measured by vent-pipe sensor $< 100^{\circ}\text{C}$ : the compressor keeps the frequency; Temperature measured by vent-pipe sensor $< 90^{\circ}\text{C}$ : the inverter restores the regulation frequency.
		Light up	Flash 6 times	05	Serial transfer error protection	Break of connecting wire, poor contacting, defective indoor and outdoor circuit boards, strong external interference	The indoor circuit board can't receive signals from the outdoor circuit board for 10 sec. after the power is switched on or for over 1 min. and 50 sec. at other times.
		Light up	Flash 7 times	48	Outdoor fan error	Error of outdoor fan motor, poor joint contacting, defective outdoor circuit board	The rotational frequency of the outdoor fan motor is below 75 rpm for over 30 sec. and this occurs 3 times. The air conditioner stops and the error is indicated.
		Light up	Continuous flashing	35	Cool room high pressure protection control		When the temperature measured by the outdoor heat exchanger liquid pipe sensor is abnormal, the compressor stops or reduces to keep the frequency, etc.
		Flash 5 times	Light up	47	Controllable silicon voltage error		
		Flash 7 times	Light up	57	Cooling cycle protection	Running with low refrigerant, running with disconnecting valve closed, poor 4-way valve switching, defective indoor sensor	Five min. after the compressor is started, the actual rotate speed is $\geq 50$ and the temperature measured by the indoor sensor meets the following condition for 5 min.: Cooling (inlet air $-4^{\circ}\text{C} <$ heat exchanger) or cooling (heat exchanger $<$ inlet air $+6^{\circ}\text{C}$ ).
		Flash 2 times	Flash 2 times	60	Locked-rotor, rotor lock	Defective compressor, defective circuit board of outdoor unit	The state out of control is detected when the compressor is started. The inverter stops immediately after the detection.

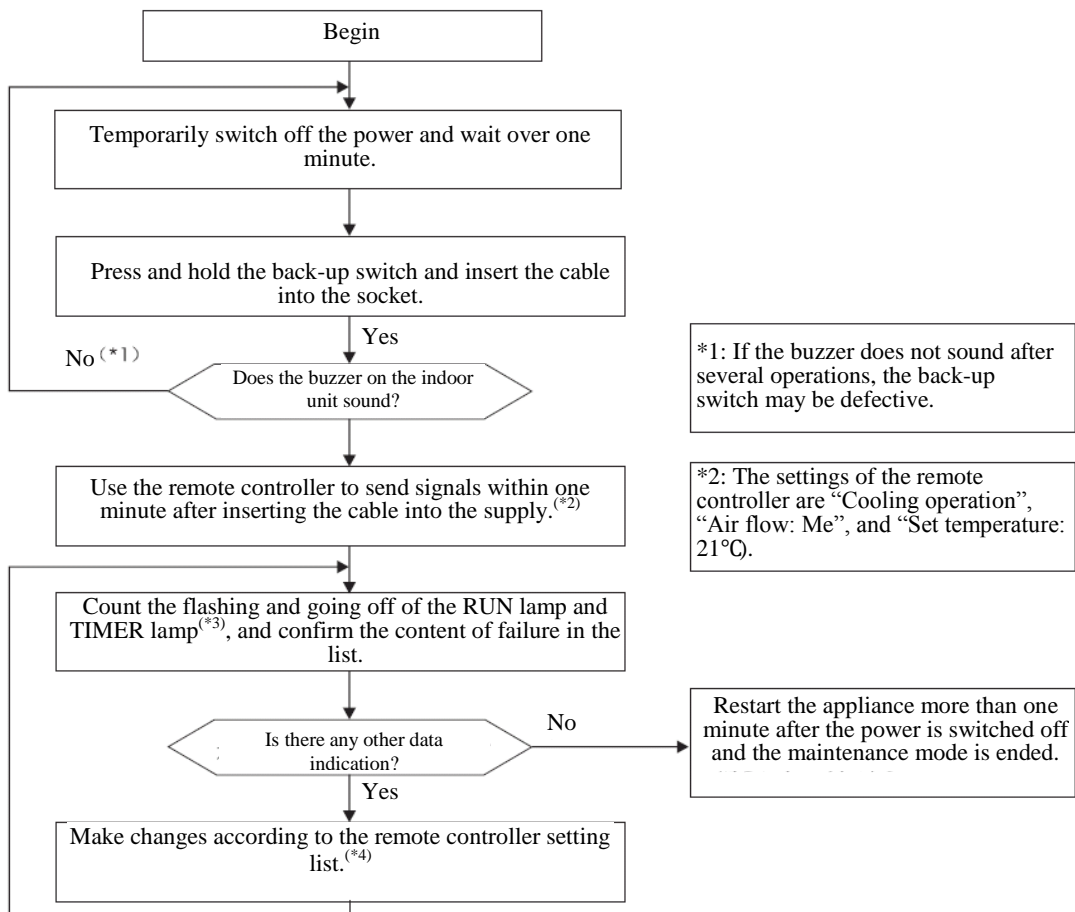
#### (6) Service mode (failure mode reading function)

The air conditioner records the past error indication and protection stops (service data). If the indication of self-diagnosis can't be confirmed, it can be confirmed through service data to grasp the condition when the error occurs.

##### (a) Terms

Term	Description
Service mode	Service mode refers to indicating service data with the lamp on the display board through the operation of the indoor controller described in (b).
Service data	Refers to the content of past error indication and protection stops of the air conditioner. The controller of the indoor unit uses nonvolatile memory (the data stored will not disappear even after the power is cut) to memorize the past error indication and protection stops of the air conditioner. Service data is composed of self-diagnosis data and stop data.
Self-diagnosis data	Refers to the indication data of causes of past stops of the indoor unit (self-diagnosis indication). Data of last 5 times can be memorized and the older data is deleted automatically. It also includes the temperatures measured by the various sensors (room temperature, indoor heat exchanger, outdoor liquid pipe, and outdoor temperature discharge pipe sensors) and information of the remote controller (operation switching and air flow changes). More detailed data can be confirmed.
Stop data	Data of causes of past stops due to protection control, etc. in the air conditioner. If only stop data is indicated, the system will be restored automatically. (The indication will be restored automatically after the appliance enters the stop mode normally). Data of last 10 times can be memorized and the older data is deleted automatically. (Important) If only stop data is indicated, the air conditioner is normal. However, when the same protection repeats (more than 3 times), it will become the cause of user's complaint.

##### (b) Indication sequence of service modes

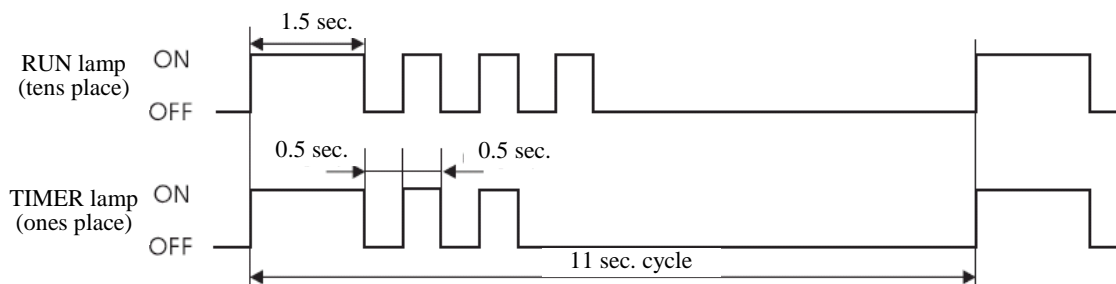


\*3: Counting of flashing in service mode: 1.5 sec. light-up (beginning signal) and number of continuous flashes (Number of continuous flashes excluding the 1.5 sec. light-up (beginning signal)).

- Safe current (heating safety I) (for example, the stop code is “32”)

RUN lamp (tens place) flashes 3 times and TIMER lamp (ones place) flashes 2 times:

$3 \times 10 + 2 \times 1 = 32$ . The code 32 “Safe current (heating safety I)” can be read from the list.



\*4: In the service mode, set the remote controller (operation switching, air flow setting, and temperature setting) according to the table below. When sending signals to the main frame of the air conditioner, the service data indication will change.

#### ① Self-diagnosis data

What is self-diagnosis data?

Refers to the indication data of causes of past stops of the indoor unit (self-diagnosis indication). Data of last 5 times can be memorized and the older data is deleted automatically. It also includes the temperatures measured by the various sensors (room temperature, indoor heat exchanger, outdoor liquid pipe, and outdoor temperature discharge pipe sensors) and information of the remote controller (operation switching and air flow changes). More detailed data can be confirmed.

As shown in the table below, for different operating modes, temperature settings and air flow settings of the remote controller, different contents are indicated.

Settings of remote controller		
Operation switching	Air flow switching	Content of output data
Cooling	Me	Indicates the causes of past stops (error code) indicated in the past
	Hi	Indicates the temperature measured by the room temperature sensor when the error code was indicated
	Auto	Indicates the temperature measured by the indoor heat exchanger sensor when the error code was indicated
Heating	Lo	Indicates the information on the remote controller when the error code was indicated
	Me	Indicates the temperature measured by the outdoor air temp. sensor when the error code was indicated
	Hi	Indicates the temperature measured by the outdoor heat exchanger sensor when the error code was indicated
	Auto	Indicates the temperature measured by the discharge pipe sensor when the error code was indicated

Setting of remote controller	Indicates the time number of indication data of previous errors
Temperature setting	
21°C	
22°C	
23°C	
24°C	
25°C	

(Example)

Settings of remote controller			Indication data
Operation switching	Air flow switching	Temperature setting	
Cooling	Me	21°C	Indicates the cause of stop indicated last time (error code)
		22°C	Indicates the cause of stop indicated second to last time (error code)
		23°C	Indicates the cause of stop indicated third to last time (error code)
		24°C	Indicates the cause of stop indicated fourth to last time (error code)
		25°C	Indicates the cause of stop indicated fifth to last time (error code)

## ② Stop data

Settings of remote controller			Indication data
Operation switching	Air flow switching	Temperature setting	
Cooling	Lo	21°C	Indicates the cause of the last stop due to protection control, etc. (stop code)
		22°C	Indicates the cause of second to last stop due to protection control, etc. (stop code)
		23°C	Indicates the cause of third to last stop due to protection control, etc. (stop code)
		24°C	Indicates the cause of fourth to last stop due to protection control, etc. (stop code)
		25°C	Indicates the cause of fifth to last stop due to protection control, etc. (stop code)
		26°C	Indicates the cause of sixth to last stop due to protection control, etc. (stop code)
		27°C	Indicates the cause of seventh to last stop due to protection control, etc. (stop code)
		28°C	Indicates the cause of eighth last stop due to protection control, etc. (stop code)
		29°C	Indicates the cause of ninth to last stop due to protection control, etc. (stop code)
		30°C	Indicates the cause of tenth to last stop due to protection control, etc. (stop code)

### (c) List of error codes and stop codes (for all models)

No. of flashes in service mode		Stop code or error code	Category	Content of failure		Cause	Conditions	Error indication	Automatic restoration
RUN lamp (tens place)	TIMER lamp (ones place)			Class					
Off	Off	0	Normal	-		-	-	-	-
Flash 1 time	Flash 1 time	11	Power cut	Start of compressor program	Compressor lock Short circuit of compressor wiring Output missing phase of compressor Defective circuit board of outdoor unit	The cause of final failure is power cut after the compressor fails to start after 42 continuous attempts.	O (twice)	O	
	Flash 2 times	12		Below 20 rps	Disconnecting valve closed Output missing phase of compressor Defective EEV				
	Flash 3 times	13		Over 20 rps	Disconnecting valve closed Output missing phase of compressor Defective compressor Defective EEV				
	Flash 4 times	14		Over voltage (DC350V)	Defective outdoor circuit board Error of power supply				
	Flash 5 times	15		Short circuit of power transistor (high voltage side)	Defective circuit board of outdoor unit Damage of mains transformer				
	Flash 6 times	16		Circuit failure due to power cut	Defective circuit board of outdoor unit Damage of mains transformer				
Flash 2 times	Flash 1 time	21	Failure of outdoor unit	Abnormal result of PWM algorithm	Wiring break of compressor Damage of mains transformer	The result of PWM algorithm (0%) lasts for over 3 min.	O	-	
	Flash 2 times	22		Input below 2A (PWM above 90%)	Wiring break of compressor Defective outdoor circuit board				
	Flash 3 times	23		3 abnormal stops within 20 min.	Disconnecting valve closed Output missing phase of compressor Defective EEV Insufficient refrigerant				
	Flash 8 times	28		Different voltage	Defective power supply engineering				
	Flash 9 times	29		Low voltage	Defective power supply engineering Defective outdoor circuit board				
	Flash 7 times	27	Error of outdoor fan motor	Error of outdoor fan motor (for DC motor only)	Defective outdoor fan motor Poor plug contacting Defective outdoor circuit board	75 rpm lasts for over 30 sec.	O (thrice)	O	
Flash 3 times	Flash 1 time	31	Safe current	Cooling safe current I	Excessive refrigerant	Safe current stops in the safe current I mode during cooling operation.	-	O	
					Compressor lock				
	Flash 2 times	32		Heating safe current I	Excessive refrigerant	Safe current stops in the safe current I mode during heating operation.	-	O	
					Compressor lock				
	Flash 3 times	33		Cooling safe current II	Excessive refrigerant	Safe current stops in the safe current II mode during cooling operation.	-	O	
					Compressor lock				
	Flash 4 times	34		Heating safe current II	Excessive refrigerant	Safe current stops in the safe current II mode during heating operation.	-	O	
					Compressor lock				
	Flash 5 times	35		Cooling safe current III	Excessive refrigerant	Safe current stops in the safe current III mode during cooling operation.	-	O	
					Compressor lock				
	Flash 6 times	36		Heating safe current III	Excessive refrigerant	Safe current stops in the safe current III mode during heating operation.	-	O	
					Compressor lock				



	Flash 7 times	37		Heating safe current III +3A	Excessive refrigerant	Safe current stops in the safe current III+3A mode during heating operation.	-	O
					Compressor lock			

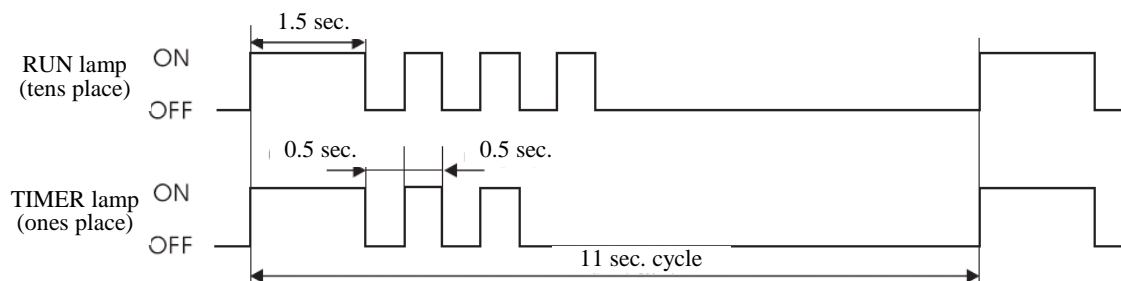
No. of flashes in service mode		Stop code or error code	Category	Content of failure	Cause	Conditions	Error indication	Automatic restoration
RUN lamp (tens place)	TIMER lamp (ones place)			Class				
Flash 4 times	Flash 1 time	41	Safe current	Cooling overload 1 (outdoor temp. 36~40°C)	Excessive refrigerant Compressor lock Operation with overload	Stops in the overload 1 mode during cooling operation.	-	O
	Flash 2 times	42		Heating overload 1 (outdoor temp. 5~12°C)	Excessive refrigerant Compressor lock Operation with overload	Stops in the overload 1 mode during heating operation.	-	O
	Flash 3 times	43		Cooling overload 2 (outdoor temp. 40~45°C)	Excessive refrigerant Compressor lock Operation with overload	Stops in the overload 2 mode during cooling operation.	-	O
	Flash 4 times	44		Heating overload 2 (outdoor temp. 12~17°C)	Excessive refrigerant Compressor lock Operation with overload	Stops in the overload 2 mode during heating operation.	-	O
	Flash 5 times	45		Cooling overload 3 (outdoor temp. 45~°C)	Excessive refrigerant Compressor lock Operation with overload	Stops in the overload 3 mode during cooling operation.	-	O
	Flash 6 times	46		Heating overload 3 (outdoor temp. 17~°C)	Excessive refrigerant Compressor lock Operation with overload	Stops in the overload 3 mode during heating operation.	-	O
Flash 5 times	Off	50	Compressor over heat	125°C	Insufficient refrigerant Defective vent-pipe sensor Disconnecting valve closed	The value of vent-pipe sensor exceeds the setting.	O (twice)	O
Flash 6 times	Off	60	Error of indoor and outdoor communication	Can't receive signals for 1 min. and 55 sec. continuously (reply in communication)	Defective power supply Power wire, signal cable and signal cabling error Defective indoor and outdoor circuit boards	The outdoor unit can't correctly detect signals from the indoor unit for 1 min. and 55 sec. continuously.	-	O
	Flash 1 time	61		Defective indoor and outdoor connection	Poor indoor and outdoor connection Defective indoor and outdoor circuit boards	After the power is switched on, the indoor unit can't correctly detect signals from the outdoor unit for 10 sec. continuously.	O	-
	Flash 2 times	62		Serial signal transmission error	Defective indoor and outdoor circuit boards Wrong operation of electromagnetic noise	The indoor unit can't correctly detect signals from the outdoor unit for 1 min. and 55 sec. continuously.	O (thrice)	O
Flash 7 times	Flash 1 time	71	Rotor lock	Below 16 rps	Defective compressor Output missing phase of compressor Defective EEV Operation with overload Defective outdoor circuit board	The compressor, after starting, stops after the rotor is locked when the rotational frequency is below 16 rps.	-	O
	Flash 2 times	72		Above 16 rps	Defective compressor Output missing phase of compressor Defective EEV Operation with overload Defective outdoor circuit board	Stops after the rotor is locked when the rotational frequency is above 16 rps	-	O
	Flash 3 times	73		Poor phase position switching (U phase)	Defective compressor Compressor wiring break Short circuit of compressor wiring Defective outdoor circuit board	The cause of final failure is rotor locked after the compressor fails to start after 42 continuous attempts.	O (twice)	O
	Flash 4 times	74		Poor phase position switching (V phase)	Defective compressor Compressor wiring break Short circuit of compressor wiring Defective outdoor circuit board	The cause of final failure is rotor locked after the compressor fails to start after 42 continuous attempts.	O (twice)	O
	Flash 5 times	75		Poor phase position switching (W phase or not determined)	Defective compressor Compressor wiring break Short circuit of compressor wiring Defective outdoor circuit board	The cause of final failure is rotor locked after the compressor fails to start after 42 continuous attempts.	O (twice)	O
	Flash 6 times	76		Start of compressor program (within 4 sec. after phase position switching)	Defective compressor Compressor wiring break Short circuit of compressor wiring Defective outdoor circuit board	The cause of final failure is rotor locked after the compressor fails to start after 42 continuous attempts.	O (twice)	O
Flash 8 times	Off	80	Protection control operation	Error of fan motor of indoor unit	Defective fan motor Poor socket connection Defective indoor circuit board	When the air conditioner is operating and the indoor fan motor is ON, the rotational frequency of the indoor fan motor is below 300 rps for over 30sec.	O	-
	Flash 1 time	81		Vent-pipe sensor error (abnormal stop)	Wire break of vent-pipe sensor Poor socket contacting	After the outdoor rotational frequency is 0 rps for 9 min. continuously, the discharge pipe sensor data sends wire break signals for over 15 sec. (below 7°C)	O (4 times)	O
	Flash 2 times	82		Indoor heat exchanger sensor error (abnormal stop)	Wire break of indoor heat exchanger sensor Poor socket contacting	The temperature is below -20°C for 40 min. continuously during heating operation. (The compressor stops.)	O	-
	Flash 3 times	83		Heat exchanger liquid pipe sensor error (abnormal stop)	Wire break of heat exchanger liquid pipe sensor Poor socket contacting	The temperature is below -50°C for 40 min. continuously during heating operation. (The compressor stops.)	O	-
	Flash 4 times	84		Condensation prevention control	High indoor humidity Defective humidity sensor	The condensation prevention control operates.	-	O
	Flash 5 times	85		Defrost control	Reduced indoor air flow Wire break of indoor heat exchanger sensor	During cooling operation, the condensation prevention control operates and the compressor stops.	-	O
	Flash 6 times	86		High pressure control	Overload in heating Reduced indoor air flow Short circuit of indoor heat exchanger sensor	During heating operation, the high pressure control operates and the compressor stops.	-	O
	Flash 7 times	87		Compressor over heat protection control	Insufficient refrigerant Defective vent-pipe sensor Disconnecting valve closed	The over heat protection control of the compressor operates and the compressor stops.	-	O
	Flash 8 times	88		Cooling cycle system protection control	Disconnecting valve closed Insufficient refrigerant	The cooling cycle system protection control operates.	-	O

Notes: (1) The number of flashes in service mode excludes the 1.5 sec. light-up (beginning signal).

(See the following example.)

- Safe current (heating safety I) (for example, the stop code is “32”)
 

RUN lamp (tens place) flashes 3 times and TIMER lamp (ones place) flashes 2 times:  
 $3 \times 10 + 2 \times 1 = 32$ . The code 32 “Safe current (heating safety I)” can be read from the list.



(2) Abnormal stop indication: - No indication (automatic restoration only)

O With indication

Indication with ( ) means the number of automatic restorations for the same cause, with error indication.

Indication without ( ) means one error indication occurs.

(3) Automatic restoration: - No indication

O With indication

#### (d) Remote controller information list

##### 1) Operation switching

Indication in service mode	Operation switching status at the time of abnormal stop
RUN lamp (Operation switching)	
0	AUTO
1	DRYING
2	COOLING
4	HEATING

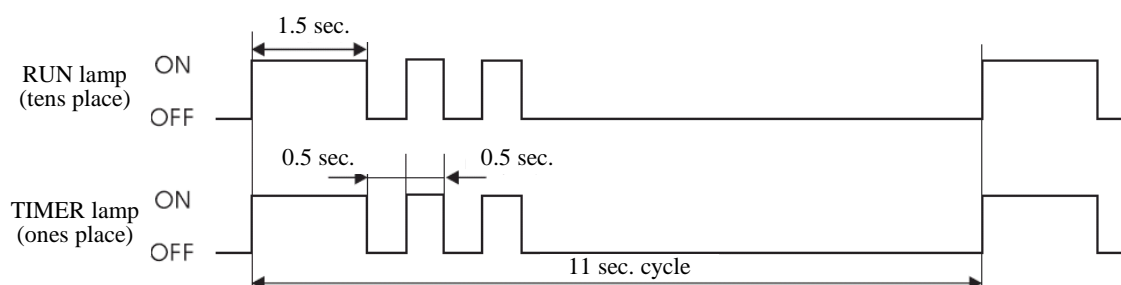
##### 2) Air flow switching

Indication in service mode	Air flow switching status at the time of abnormal stop
TIMER lamp (Air flow switching)	
0	AUTO
2	HI
3	ME
4	LO
6	HI POWER
7	ECONO

\* If there is no data recorded (the error code is normal), the information on the remote controller is as showed in the table below:

Settings of remote controller	Indication when the error code is normal
Operation switching	AUTO
Air flow switching	AUTO

(Example): Operation switching: Cooling, Air flow switching: HI



(e) List of temperatures measured by room temperature sensor, indoor heat exchanger sensor, outdoor air temp. sensor, and outdoor heat exchanger liquid pipe sensor

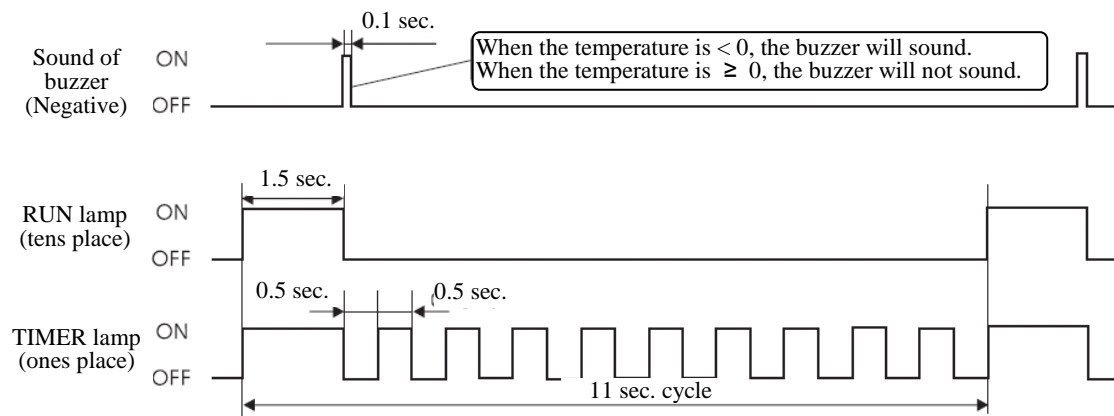
Unit: °C

Does the buzzer sound? (Sound means negative)	RUN lamp (tens place)	TIMER lamp (ones place)									
		0	1	2	3	4	5	6	7	8	9
Yes (Sounds for 0.1 sec.)	6	-60	-61	-62	-63	-64					
	5	-50	-51	-52	-53	-54	-55	-56	-57	-58	-59
	4	-40	-41	-42	-43	-44	-45	-46	-47	-48	-49
	3	-30	-31	-32	-33	-34	-35	-36	-37	-38	-39
	2	-20	-21	-22	-23	-24	-25	-26	-27	-28	-29
	1	-10	-11	-12	-13	-14	-15	-16	-17	-18	-19
	0		-1	-2	-3	-4	-5	-6	-7	-8	-9
No (Not sound)	0	0	1	2	3	4	5	6	7	8	9
	1	10	11	12	13	14	15	16	17	18	19
	2	20	21	22	23	24	25	26	27	28	29
	3	30	31	32	33	34	35	36	37	38	39
	4	40	41	42	43	44	45	46	47	48	49
	5	50	51	52	53	54	55	56	57	58	59
	6	60	61	62	63	64	65	66	67	68	69
	7	70	71	72	73	74	75	76	77	78	79
	8	80	81	82	83	84	85	86	87	88	89
	9	90	91	92	93	94	95	96	97	98	99

\* If there is no data recorded (the error code is normal), the information of each sensor is as showed in the table below:

Name of sensor	Value displayed by the sensor when the error code is normal
Temperature measured by room temperature sensor	-19°C
Temperature measured by indoor heat exchanger sensor	-64°C
Temperature measured by outdoor air temp. sensor	-64°C
Temperature measured by outdoor heat exchanger liquid pipe sensor	-64°C

(Example): Temperature measured by room temperature sensor, indoor heat exchanger sensor, outdoor air temp. sensor and outdoor heat exchanger liquid pipe sensor: “-9°C”



(f) List of temperatures of compressor vent-pipe

Unit: °C

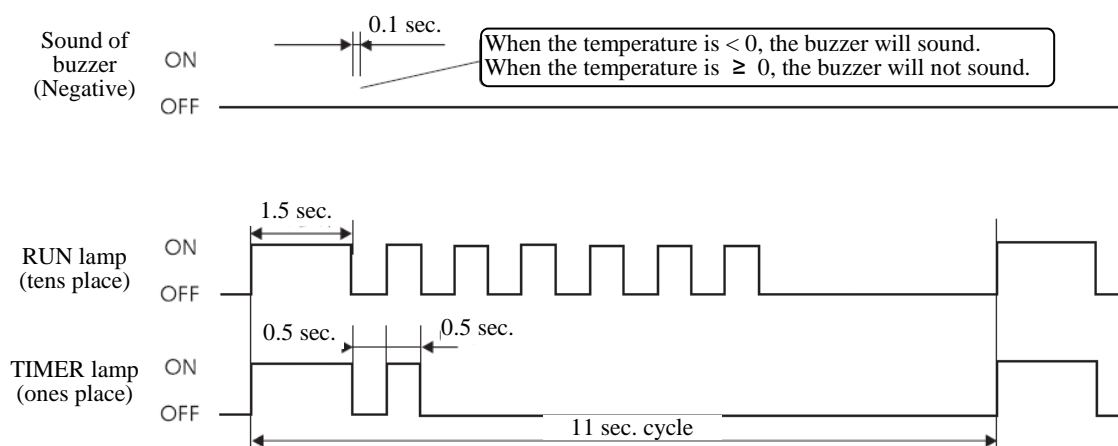
Does the buzzer sound? (Sound means negative)	RUN lamp (tens place)	TIMER lamp (ones place)									
		0	1	2	3	4	5	6	7	8	9
Yes (Sounds for 0.1 sec.)	3	-60	-62	-64							
	2	-40	-42	-44	-46	-48	-50	-52	-54	-56	-58
	1	-20	-22	-24	-26	-28	-30	-32	-34	-36	-38
	0		-2	-4	-6	-8	-10	-12	-14	-16	-18
No (Not sound)	0	0	2	4	6	8	10	12	14	16	18
	1	20	22	24	26	28	30	32	34	36	38
	2	40	42	44	46	48	50	52	54	56	58
	3	60	62	64	66	68	70	72	74	76	78
	4	80	82	84	86	88	90	92	94	96	98
	5	100	102	104	106	108	110	112	114	116	118
	6	120	122	124	126	128	130	132	134	136	138
	7	140	142	144	146	148	150				

\* If there is no data recorded (the error code is normal), the information of each sensor is as showed in the table below:

Name of sensor	Value displayed by the sensor when the error code is normal
Temperature measured by vent-pipe sensor	-64°C

(Example): Temperature of compressor vent-pipe: “122°C”

\* The temperature data of compressor vent-pipe should be two times the reading. (The following, 61 x 2= “122°C”)

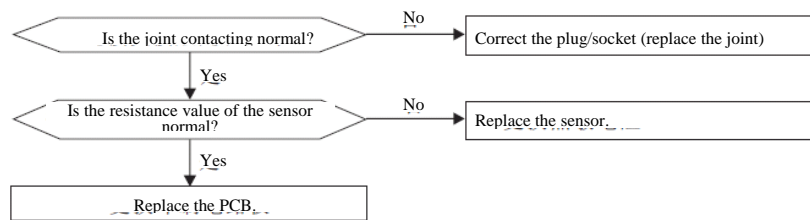


## Check data recording sheet

Customer					Model				
Date									
Equipment name									
Complaint									
Settings of remote controller			Content of indication data		Indication result			Content of indication	
Temp. setting	Operation switching	Air flow switching			Buzzer (yes/no)	RUN lamp (no. of times)	TIMER lamp (no. of times)		
21	Cooling	Me	Code of last error						
		Hi	Temp. measured by room temp. sensor of last error						
		Auto	Temp. measured by indoor heat exchanger sensor of last error						
	Heating	Lo	Info of remote controller of last error						
		Me	Temp. measured by outdoor air temp. sensor of last error						
		Hi	Temp. measured by outdoor heat exchanger liquid pipe sensor of last error						
		Auto	Temp. measured by discharge pipe sensor of last error						
22	Cooling	Me	Code of second to last error						
		Hi	Temp. measured by room temp. sensor of second to last error						
		Auto	Temp. measured by indoor heat exchanger sensor of second to last error						
	Heating	Lo	Info of remote controller of second to last error						
		Me	Temp. measured by outdoor air temp. sensor of second to last error						
		Hi	Temp. measured by outdoor heat exchanger liquid pipe sensor of second to last error						
		Auto	Temp. measured by discharge pipe sensor of second to last error						
23	Cooling	Me	Code of third to last error						
		Hi	Temp. measured by room temp. sensor of third to last error						
		Auto	Temp. measured by indoor heat exchanger sensor of third to last error						
	Heating	Lo	Info of remote controller of third to last error						
		Me	Temp. measured by outdoor air temp. sensor of third to last error						
		Hi	Temp. measured by outdoor heat exchanger liquid pipe sensor of third to last error						
		Auto	Temp. measured by discharge pipe sensor of third to last error						
24	Cooling	Me	Code of fourth to last error						
		Hi	Temp. measured by room temp. sensor of fourth to last error						
		Auto	Temp. measured by indoor heat exchanger sensor of fourth to last error						
	Heating	Lo	Info of remote controller of fourth to last error						
		Me	Temp. measured by outdoor air temp. sensor of fourth to last error						
		Hi	Temp. measured by outdoor heat exchanger liquid pipe sensor of fourth to last error						
		Auto	Temp. measured by discharge pipe sensor of fourth to last error						
25	Cooling	Me	Code of fifth to last error						
		Hi	Temp. measured by room temp. sensor of fifth to last error						
		Auto	Temp. measured by indoor heat exchanger sensor of fifth to last error						
	Heating	Lo	Info of remote controller of fifth to last error						
		Me	Temp. measured by outdoor air temp. sensor of fifth to last error						
		Hi	Temp. measured by outdoor heat exchanger liquid pipe sensor of fifth to last error						
		Auto	Temp. measured by discharge pipe sensor of fifth to last error						
21	Cooling	Lo	Code of last stop						
Code of second to last stop									
Code of third to last stop									
Code of fourth to last stop									
Code of fifth to last stop									
Code of sixth to last stop									
Code of seventh to last stop									
Code of eighth to last stop									
Code of ninth to last stop									
Code of tenth to last stop									
Judgment								Checker	
Remark									

## (7) Check method according to the content of failure

### Error of sensor (Wire break of sensor and poor joint contacting)



## • List of temperatures and resistance properties of sensor

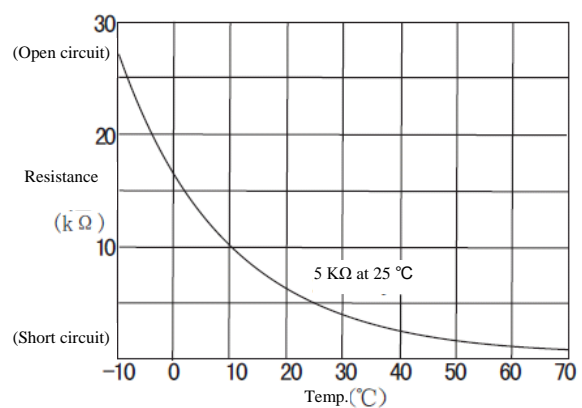
<Temperature of vent-pipe of outdoor compressor>

Temp. (°C)	Resistance(KΩ)	Temp. (°C)	Resistance(KΩ)
0	164	70	8.7
5	127	75	7.3
10	99	80	6.2
15	78	85	5.3
20	62	90	4.5
25	50	95	3.9
30	40	100	3.3
35	32	105	2.9
40	26	110	2.5
45	21	115	2.2
50	17	120	1.9
55	14	125	1.6
60	12	130	1.4
65	10	135	1.3

## • Curve and table of temperatures and resistance properties of sensors

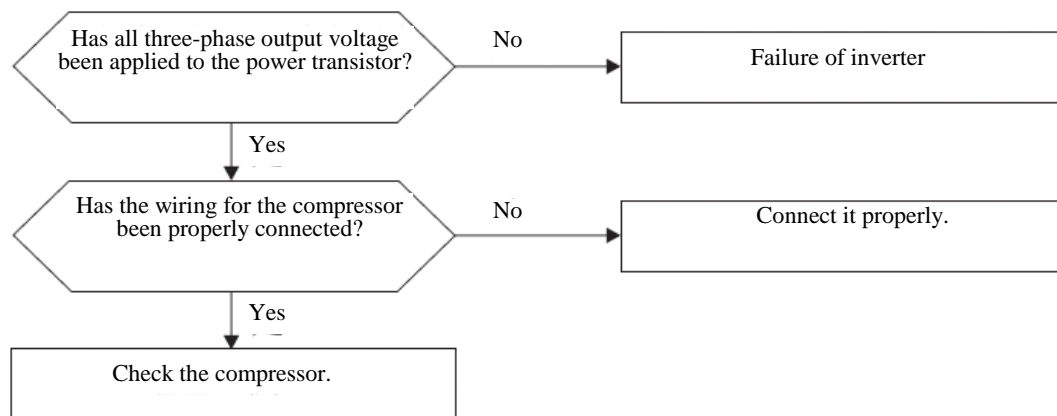
<Room temperature sensor, heat exchanger (indoor and outdoor) sensors, and outdoor air temp. sensor >

Temp. (°C)	Resistance(KΩ)	Temp. (°C)	Resistance(KΩ)
-20	49	35	3.2
-15	37	40	2.6
-10	28	45	2.1
-5	21.4	50	1.7
0	16.5	55	1.4
5	12.8	60	1.2
10	10	65	1
15	7.8	70	0.8
20	6.2	75	0.7
25	5	80	0.6
30	4		

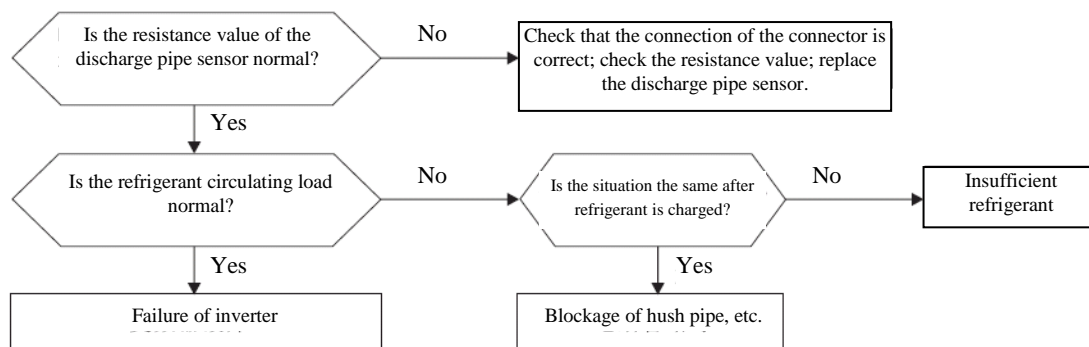




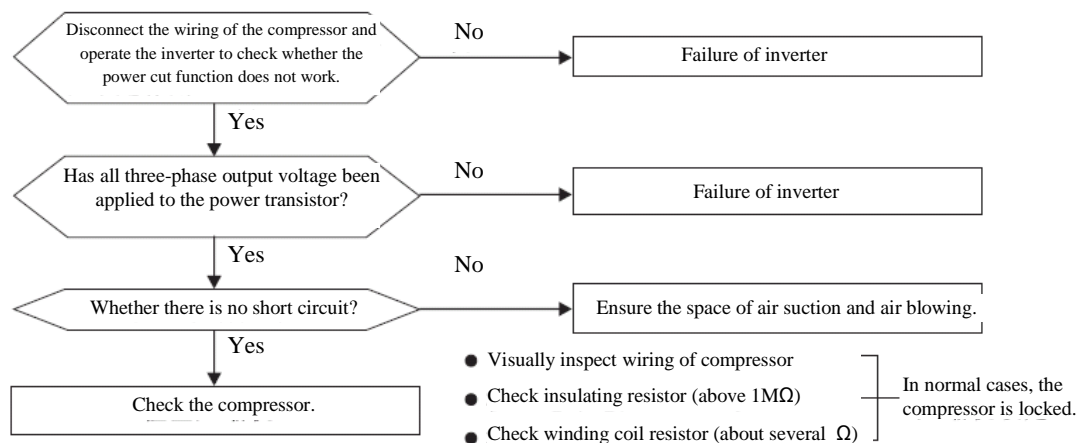
**Error of outdoor unit (Damage of power transistor, wiring break of compressor)**



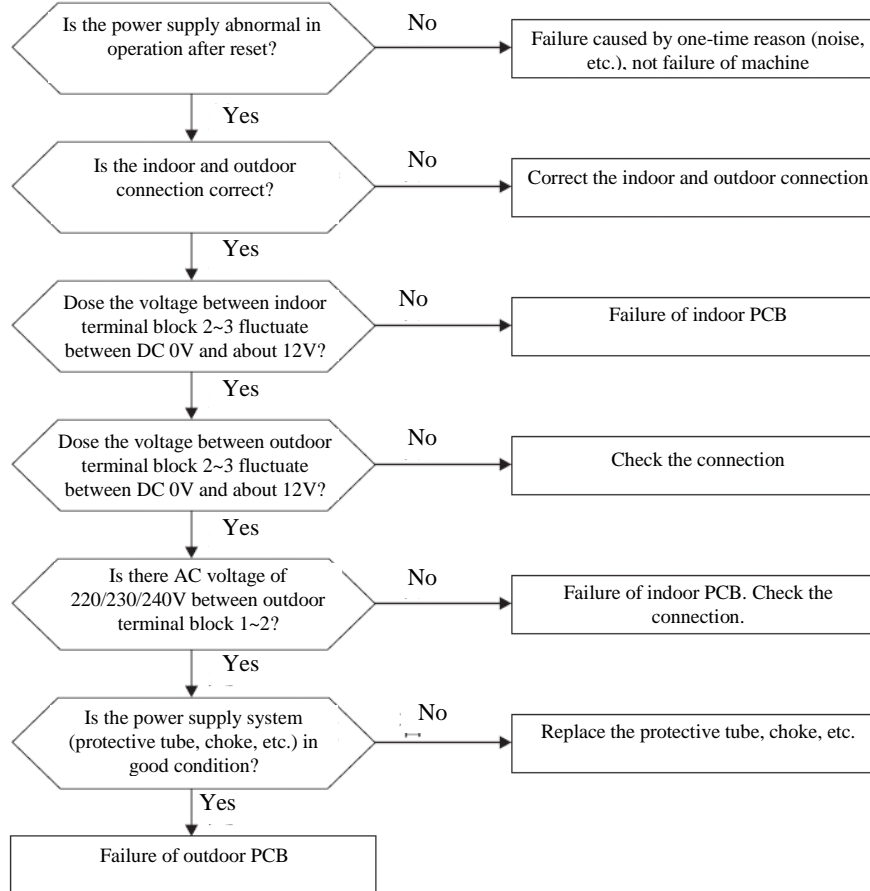
**Compressor over heat (Insufficient refrigerant, failure of discharge pipe sensor)**



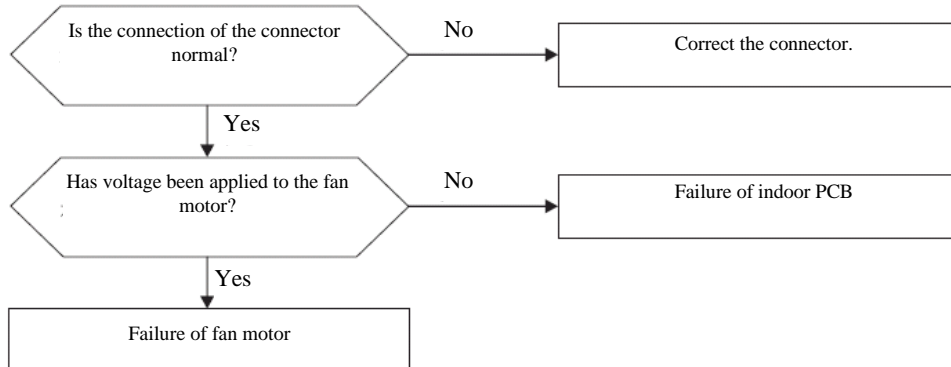
**Power cut (Open-phase of output terminal of compressor, compressor lock)**



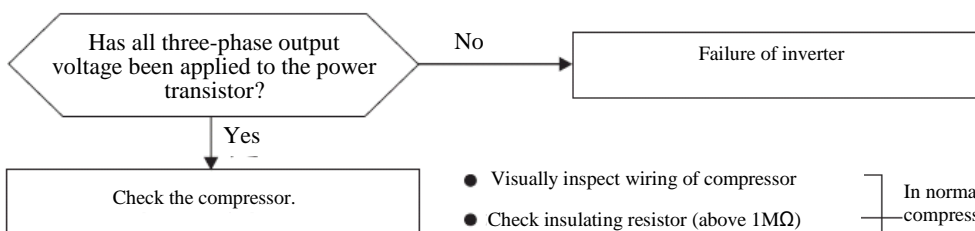
**Serial signal transmission error** (Wrong power supply and signal cable connection, failure of indoor and outdoor PCB, error of power supply system)



**Indoor fan motor error** (Failure of fan motor, failure of indoor PCB)

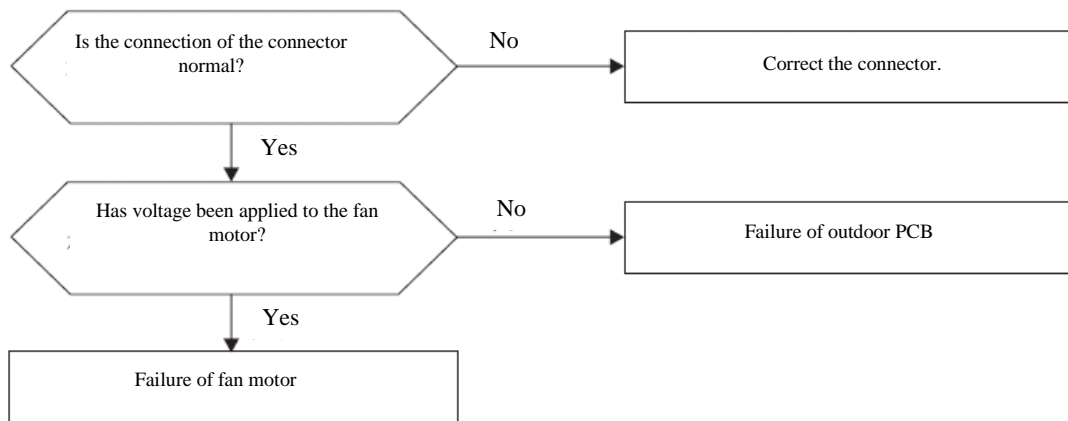


**Compressor lock** (Failure of compressor, failure of outdoor PCB)



- Visually inspect wiring of compressor
  - Check insulating resistor (above 1MΩ)
  - Check winding coil resistor (about several Ω)
- In normal cases, the compressor is locked.

**Outdoor fan motor error (Failure of fan motor, failure of outdoor PCB)**



**(8) Actions in case of short circuit and wire break of sensor**

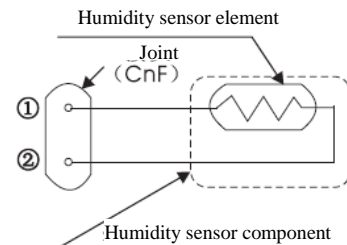
**(a) Indoor unit**

Sensor	Operation type	Actions	
		Short circuit	Wire break
Room temp. sensor	Cooling	Become the compressor continuous operation instruction	No compressor operation instruction obtained
	Heating	No compressor operation instruction obtained	Become the compressor continuous operation instruction
Heat exchanger sensor	Cooling	Usual operation of system is possible.	No compressor operation instruction obtained (frost prevention)
	Heating	High pressure control mode (inverter stop instruction)	Heat-retaining (stop of indoor fan)
Humidity sensor <sup>(1)</sup>	Cooling	① in the table below	② in the table below
	Heating	Usual operation of system is possible.	

Note: (1) Only Model 50 has a humidity sensor.

**① Actions of humidity sensor**

Failure mode		Reading of control input circuit	Operation of air conditioner
Wire break	① wire break	Humidity reading 0%	Operating in drying mode
	② wire break	Humidity reading 0%	Operating in drying mode
	①② wire break	Humidity reading 0%	Operating in drying mode
Short circuit	① and ② short circuit	Humidity reading 100%	Operating in cooling mode

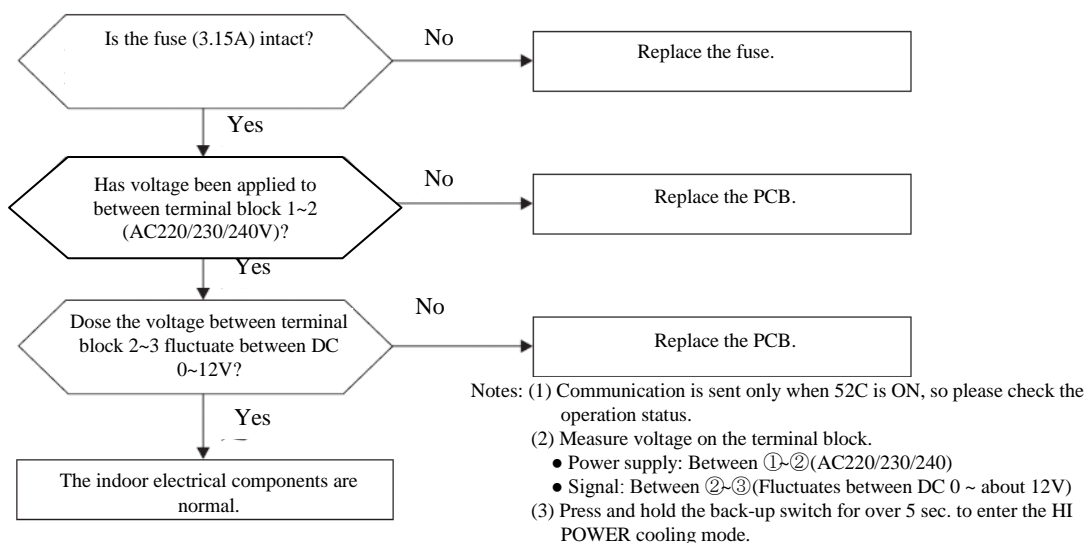


Note: Do not use an instrument for power-on inspection of the humidity sensor. Accidents may occur if DC is applied.

**(b) Outdoor unit**

Sensor	Operation type	Actions	
		Short circuit	Wire break
Heat exchanger liquid pipe sensor	Cooling	Usual operation of system is possible.	Usual operation of system is possible.
	Heating	The defrosting does not function.	10 min. defrosting about once an hour
Outdoor air temp. sensor	Cooling	Usual operation of system is possible.	Usual operation of system is possible.
	Heating	The defrosting does not function.	10 min. defrosting about once an hour
Compressor vent-pipe sensor	All modes	Compressor over heat protection is impossible. (The unit can run.)	The compressor stops. (The inverter does not output.)

## (9) Check method for indoor electrical components

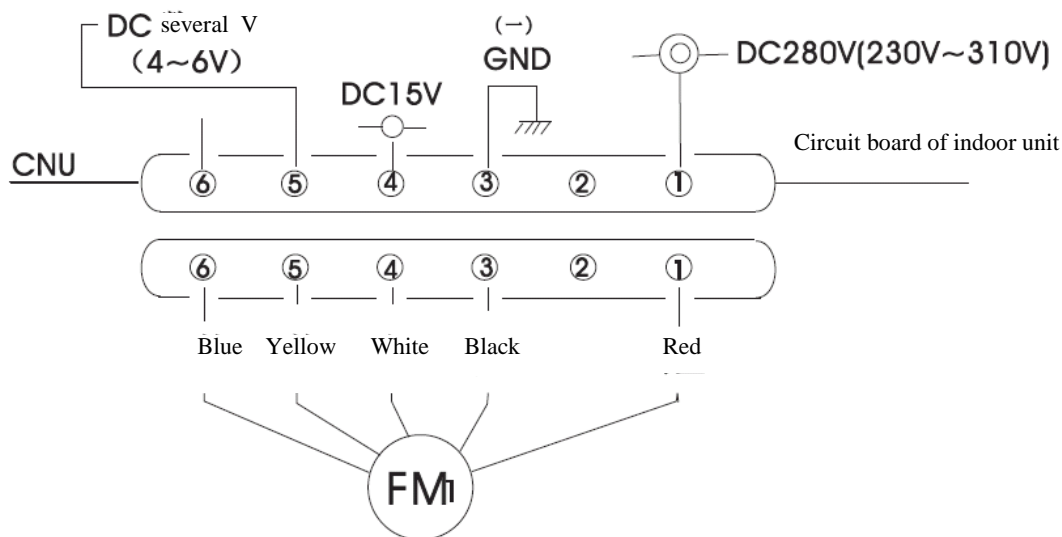


## (10) Check method for indoor fan motor (DC motor)

Method for checking whether the fan motor or the circuit board malfunctions when the indoor fan motor is abnormal

### 1) Output check of indoor PCB

- Unplug the wire from the power socket.
  - Remove the panel and the cable socket for the fan motor.
  - Plug the cable into the power supply and press the ON/OFF button; the machine runs and the voltage shown in the figure below outputs for about 30 sec.; if the error is detected, it indicates that the circuit board is basically normal and the fan motor malfunctions.
- If there is no voltage as shown in the figure below at contact pins ①, ④ and ⑤ of the socket, it indicates that the indoor circuit board malfunctions and the fan motor is basically normal.

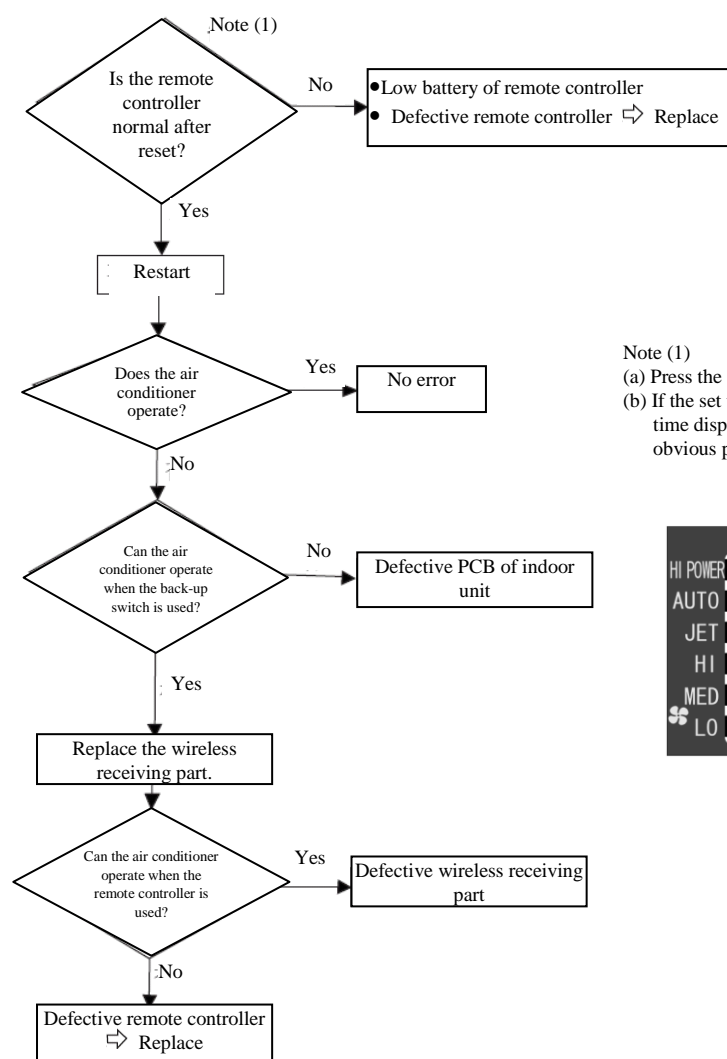


### 2) Check of resistance value of DC fan motor

Measurement point	Resistance value in normal cases
①-③ (red and black)	Above 25MΩ
④-③ (white and black)	Above 30MΩ

- Notes: (1) Remove the fan motor and measure without power.  
 (2) The fan motor is abnormal if the measurement is below the normal value.

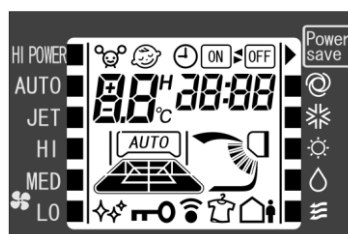
## (11) Remote controller failure diagnosis procedure



Note (1)

(a) Press the ACL switch on the remote controller.

(b) If the set temperature displayed is 0°C and the current time displayed is 12:00, it indicates there are no obvious problems.



## (12) Check method for outdoor unit

### 1) Circuit diagram of 20, 25 and 35MA-S outdoor units

#### ATTENTIONS OF DETECTING ELECTRONIC CONTROL

BECAUSE OF SMEARING MOISTUREPROOF GLUE BEHIND THE PRINTING CIRCUIT BOARD.  
SO YOU NEED TO SCRAPE OFF THE GLUE WHERE YOU WANT TO DETECT VOLTAGE IN THIS CASE.

#### SOME TESTPOINTS OF VOLTAGE AS FOLLOW

IF FINDING TESTPOINTS, YOU CAN REFER TO PRINTING TO PRINTING TYPEFACE ON THE BOARD.

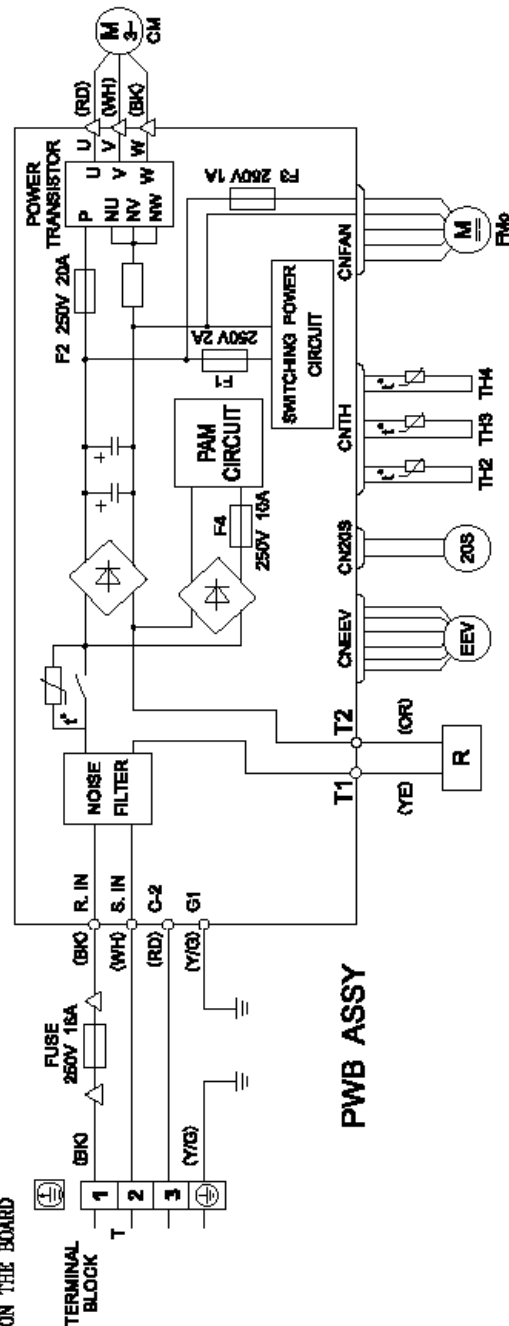
- (1) POWER SUPPLY (AC230V)  
AC INPUT OF RECTIFYING TUBE.
- (2) POWER SUPPLY (DC280V)  
DC OUTPUT OF RECTIFYING TUBE.
- (3) THE OUTPUT OF FREQUENCY CONVERSION  
DETECTING THE VOLTAGE OF COMPRESSOR ON U, V, W END
- (4) THE VOLTAGES OF CONTROL CIRCUIT  
THE MARK OF DC20V, DC15V, DC13V, DC5V,  
DC2.5V ON THE BOARD

#### △ HIGH VOLTAGE-ATTENTION

THERE IS HIGH VOLTAGE IN THE ELECTRONIC CONTROL BOARD.  
IF REPLACING ELECTRONIC CIRCUIT, YOU NEED TO CUT OFF THE POWER SUPPLY AFTER 5 MINUTE DISCHARGE.

CM	COMPRESSOR MOTOR
FM6	OUTDOOR FAN MOTOR
EEV	VALVE, BODY(EXT) (WINDING)
TH2	HEAT EXCHANGE SENSOR
TH3	OUTDOOR TEMPERATURE SENSOR
TH4	DISCHARGE PIPE TEMPERATURE SENSOR
L	REACTOR
20S	VALVE, S(4WAY) (WINDING)

MARK	COLOUR
BK	BLACK
WH	WHITE
RD	RED
GR	GREEN
YG	YELLOW



## 2) Circuit diagram of 50MA-S outdoor unit

# ATTENTIONS OF DETECTING ELECTRONIC CONTROL

BECAUSE OF SMEARING MOISTUREPROOF GLUE BEHIND  
THE PRINTING CIRCUIT BOARD.

**SO YOU NEED TO SCRAPE OFF THE GLUE WHERE YOU WANT TO DETECT VOLTAGE IN THIS CASE.**

### SOME TESTPOINTS OF VOLTAGE AS FOLLOW

IF FINDING TESTPOINTS, YOU CAN REFER TO PRINTING  
TO PRINTING TYPEFACE ON THE BOARD.

- (1) POWER SUPPLY (AC230V)  
AC INPUT OF RECTIFYING TUBE
- (2) POWER SUPPLY (DC280V)  
DC OUTPUT OF RECTIFYING TUBE
- (3) THE OUTPUT OF FREQUENCY CONVERTER

- (4) THE VOLTAGES OF CONTROL CIRCUIT  
DETECTING THE VOLTAGE OF COMPRESSOR ON U, V, W END

THE MARK OF DC20V, DC15V, DC13V, DC5V,

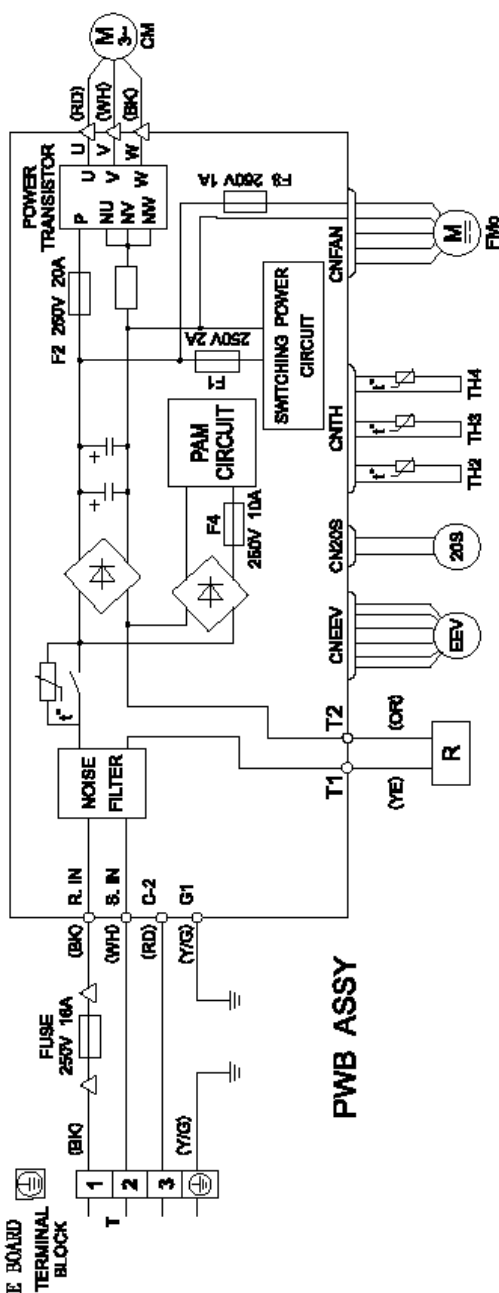
DC2. 5V ON THE BOARD

CM	COMPRESSOR MOTOR
FMo	OUTDOOR FAN MOTOR
EEV	VALVE, BODY (EXP. (WINDING))
Th2	HEAT EXCHANGE SENSOR
Th3	OUTDOOR TEMPERATURE SENSOR
Th4	DISCHARGE PIPE TEMPERATURE SENSOR
L	REACTOR
2OS	VALVE, S (4WAY) (WINDING)

MARK	COLOUR
BK	BLACK
WH	WHITE
RD	RED
GR	GREEN
YG	YELLOW

## ⚠ HIGH VOLTAGE-ATTENTION

THERE IS HIGH VOLTAGE IN THE ELECTRONIC CONTROL BOARD.  
IF REPLACING ELECTRONIC CIRCUIT, YOU NEED TO CUT OFF  
THE POWER SUPPLY AFTER 5 MINUTE DISCHARGE.



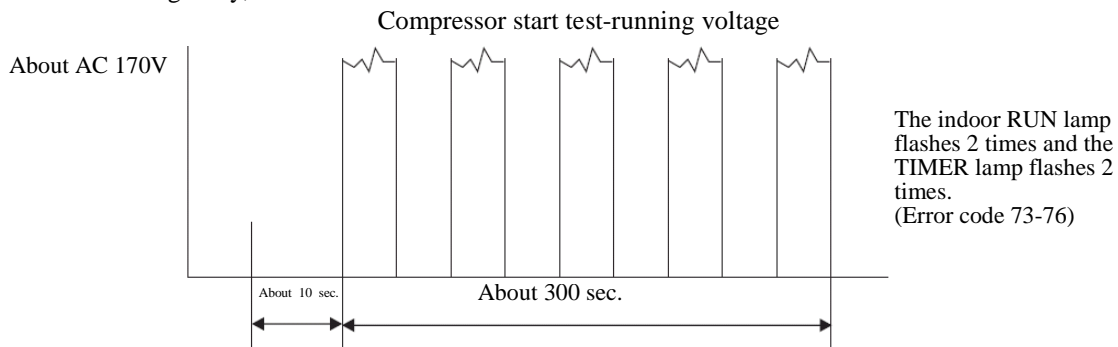
### (13) Check method for outdoor circuit board (inverter)

Make confirmation after checking that the indoor circuit board is normal.

(I) Use a multimeter to conduct inspection.

- a) Unplug the plug.
- b) Remove the output cables U, V and W (to the compressor) of the power transistor.  
(Note: The inspection of inverter can be conducted only after the capacitor is discharged and after making sure the residual voltage is below 10V.)
- c) Insert the plug and press and hold the back-up switch for over 5 sec. till the appliance commences operation.
- d) Measure the voltages between U and V, V and W, and W and U of the power transistor with the analogue instrument within the range of AC1000V.

If the voltages between U and V, V and W, and W and U as shown in the following figure can be detected regularly, it indicates the outdoor circuit board is normal.



Press and hold the switch on the main frame for over 5 sec. [ON]

The indoor RUN lamp flashes 2 times and the TIMER lamp flashes 2 times. (Error code 73-76)

Note (1) After the one-time output one minute after this power transistor outputs voltage, the error of the indoor unit is detected.

### (II) Judgment through defective inverter detector (MRE part number: SA01927)

#### 1) Detector setting procedure

- a. Switch off the power supply (turn off the switch).
- b. Remove the output (power transistor) U, V and W of the inverter (control) circuit board from the connection of the compressor.
- c. Connect the wires of the detector (U=Red, V=White, W=Black) to the terminal wires of the power transistor.

#### 2) Judging the operation method

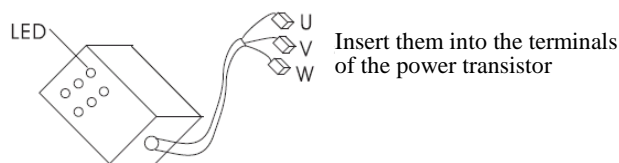
- a. Insert the plug and press and hold the back-up switch for over 5 sec. till the appliance commences operation.
- b. Confirm the flashing and ON status of the 6 LEDs. The flashing and ON status, which repeats for 300 sec., is shown below:  
Flash (about 3 sec.)  $\longleftrightarrow$  On (about 5 sec.) The flashing stops for one minute and then repeats for 300 sec.

c. Judge according to the flashing and ON status of the LEDs.

Flashing and ON status of LEDs	6 LEDs flash at the same time.	6 LEDs go off or several LEDs flash or light up.
Inverter	Normal	Defective

- d. Let it operate for a while and the error will be indicated (the indoor RUN lamp flashes 2 times and the TIMER lamp flashes 2 times). The output of the inverter stops.

Note: The terminals of the power transistor that control the circuit board are mounted on the back of the control casing. Remove the control circuit board before connection.



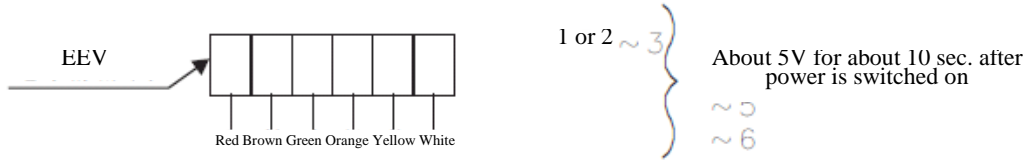


#### (14) Check method for EEV

After the power is switched on, check the opening of the EEV and the sound and voltage within 10 sec. of operation.

[In operation, only the opening is changed and the voltage can't be measured.]

- 1) If sound of the EEV is heard, it indicates the EEV is basically good.
- 2) If no sound of the EEV is heard, measure the output voltage.



- 3) If there is voltage, it indicates the circuit board is normal.
- 4) If there is voltage and the EEV can't operate (or has no sound), it indicates that the EEV is defective.
- 5) Check method for EEV coil: Measure the resistance value between the terminals with a multimeter.

Measurement point		Resistance value in normal cases
6-wire EEV	5-wire EEV	46±4Ω (at 20°C)
①-④ (red and orange)	①-③ (red and green)	
①-⑥ (red and white)	①-④ (red and orange)	
②-③ (brown and green)	①-⑤ (red and yellow)	
②-⑤ (brown and yellow)	①-⑥ (red and white)	

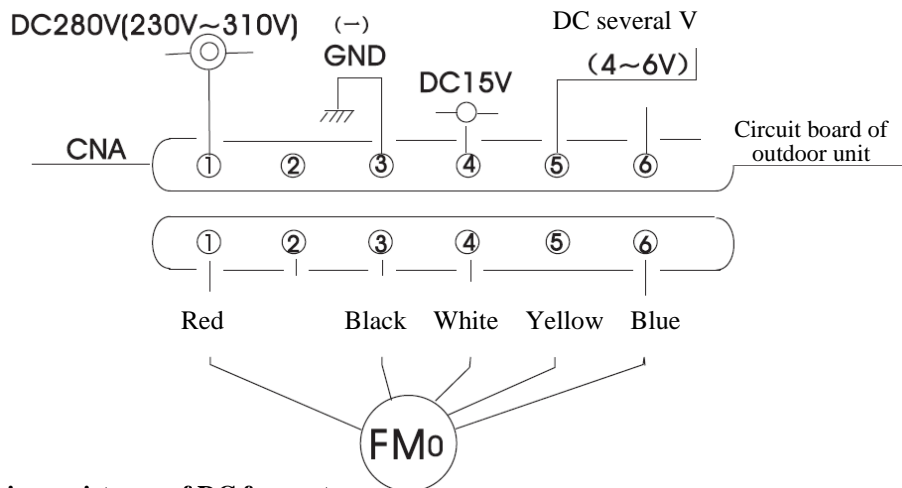
#### (15) Check method for outdoor fan motor (DC motor)

- Failure diagnosis method for outdoor circuit board or motor when the fan motor can't operate
- Check it after confirming the indoor unit is normal.

##### (I) Output check of outdoor circuit board

- 1) Unplug the plug.
- 2) Remove the plug CAN for the outdoor fan motor.
- 3) Insert the plug and press and hold the back-up switch for over 5 sec. (ON) till the indoor unit commences operation. If, 20 sec. after the back-up switch is turned ON, the contact pin No. ② of the plug as shown in the following figure outputs voltage for about 30 sec., it indicates the circuit board is basically normal and the fan motor malfunctions. If there is no voltage output, it indicates the circuit board malfunctions and the fan motor is basically normal.

Note (1) After the one-time output another 30 seconds after the contact pin ② of the plug outputs voltage for 3 minutes, the error of the indoor unit is detected.



##### (II) Checking resistance of DC fan motor

Measure the resistance between the terminals with a multimeter.

Measurement point	Resistance value in normal cases
①-③ (red and black)	Above 25MΩ
④-③ (white and black)	Above 30MΩ

- Notes: (1) Remove the fan motor and measure without power.  
(2) The fan motor is abnormal if the measurement is below the normal value.

## 6.2 Servicing

### (1) Evacuation

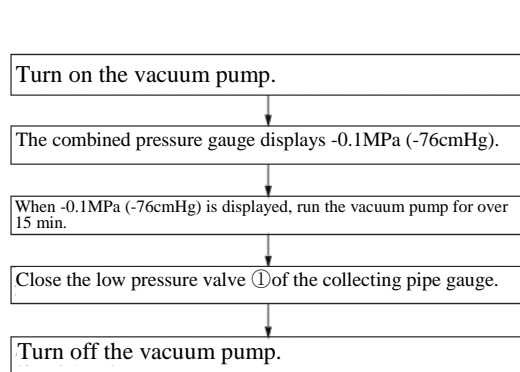
Evacuation refers to the process of purging non-condensable gas, air, water, etc. from the refrigerant equipment with a vacuum pump.

The R410A refrigerant is highly water insoluble, therefore even a little water left in the refrigerant equipment will be frozen, which causes the so-called water blockage.

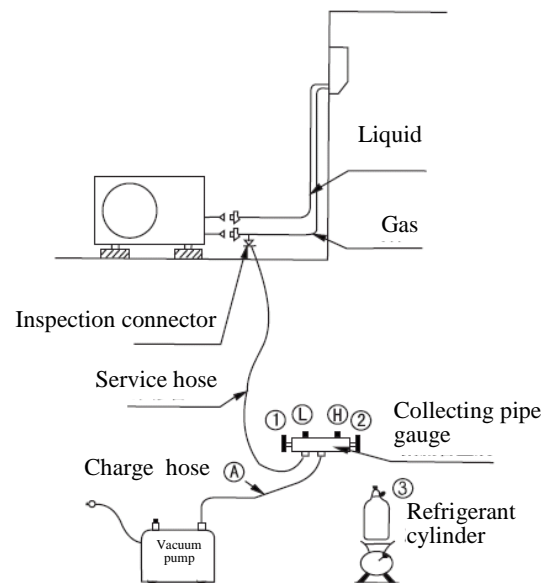
The refrigeration oil of the compressor is esterification oil or synoil which has strong hygroscopicity, so deposit may be formed easily when foreign matters enter, which causes many inexplicable faults.

#### ● Evacuation procedure

- Check whether there is internal pressure in the machine. If there is any, use the inspection connector to eliminate it.
- Connect the service hose of the collecting pipe gauge to the gas and liquid pipes.
- Connect the vacuum pump to the charge hose ①. Conduct evacuation repeatedly in the following order.



- Notes: (1) Never use the pressure of the refrigerant to purge the air.  
(2) Never use the compressor for evacuation.  
(3) Never operate the compressor in the vacuum mode.



### (2) Refrigerant charging

**In case of leakage of R410A, be sure to discharge it all, evacuate the machine till the acceptance value is reached, and charge new refrigerant according to the specified weight. Never add refrigerant.**

- Discharge all refrigerant from the machine and evacuate the machine.  
Note: It is unreasonable to add refrigerant without evacuation, as this will cause insufficient or excessive charging.
- Retain the collecting pipe gauge, and connect the refrigerant cylinder to the machine.
- Record the weight of the refrigerant cylinder on the scale. This is necessary to ensure the amount of refrigerant to be charged.
- Purge the air in the charge hose ①.  
Loosen the connection between the charge hose ① and the collecting pipe gauge; open the valve ③ for several seconds; and tighten the connection immediately after the gas blown from the loose part is observed.
- After the air is released from the charge hose ①, open the valves ① and ③ and the refrigerant gas will immediately flow from the cylinder into the machine. Ensure the refrigerant cylinder is kept vertical to allow the gas to flow into the machine.
- The refrigerant will not move several procedures after it is charged into the system. In such case, start the compressor to start the cooling cycle, till the machine is fully charged with gas of the specified weight.
- After the amount of refrigerant is determined, close the valve ③.
- Remove the charge hose from the machine. Cover the valve mouth of the refrigerant pipe with the blanking cover and tighten it.
- Use the gas leak detector to check for any leakage along the piping.
- Start the air conditioner, and ensure that its operation, the high/low pressure and temperature difference between inlet air and outlet air, etc. are normal.

## 7 Service Manual for Air Conditioners with Refrigerant Piping Mounted/Using R410A Refrigerant

(The following is selected from the document published by The Japanese Refrigeration and Air Conditioning Industry Association)

### 7.1 Overview

#### 7.1.1 R410A Refrigerant

##### (1) Using R410A in air conditioners

In 1974, scientists found that the ozone in the upper stratosphere (about 20-40 km away from the ground) may be damaged by ozone depleting substances such as CFC (chlorofluorocarbon) and HCFC (hydrochlorofluorocarbon), etc. From then on, many countries have taken various measures to protect the ozone layer.

As a kind of HCFC, the conventional refrigerant (R22) used in air conditioners will damage the ozone layer. Therefore, in accordance with the international protocols (i.e. Protocols of Montreal (Ozone Depleting Substances)) and the relevant laws and regulations of the various countries, other refrigerants that will not damage the ozone layer must be used to substitute R22.

Refrigerants composed of hydrogen (H), fluorine (F) and carbon (C) are called HFC which will not damage the ozone layer. R410A is a kind of HFC, with a pressure higher than R22 by about 1.6 times and a performance about the same as R22 at the same temperature of refrigerant.

##### (2) Chemical properties of R410A

###### a) Chemical stability

Like R22, R410A is a harmless, inflammable refrigerant with stable chemical properties.

However, just like R22, with a specific gravity of vapor heavier than that of air, if R410A is leaked to a closed room, it will be distributed at a low level and cause oxygen starvation. If R410A is directly exposed to fire, it may produce poisonous gas, so be sure to dispose of it in a place with good ventilation.

###### b) Compositional variation (property of false azeotropic point)

R410A is a kind of false azeotropic mixture refrigerant composed of R32 and R125. The “false azeotropic” condition refers to the dew point curve and the boiling point curve-gas-liquid balanced curve (constant pressure) are located at each other’s peak respectively. Multi-component refrigerant with this chemical property will not change in ingredients basically even when its state is changed, such as becoming vapor (or condensation). Therefore, even in case of gas refrigerant leakage at a position during pipe mounting, the ingredients of the circulating refrigerant will keep unchanged basically.

Therefore, R410A can basically be disposed of as a single component refrigerant similar to R22. However, with respect to the charging of R410A, in consideration of the little changes in ingredients during the conversion from gaseous to liquid state when it is put into the cylinder, it should be charged in liquid state.

###### c) Property of pressure

As shown in Table 2, the vapor pressure of R410A is higher than that of R22 by 1.6 times at the same temperature, so be sure to use the tools and materials designed specifically for R410A that can bear high pressure for installation and servicing.

Table 1 Comparison of thermo-physical properties between R410A and R22

Ingredient (wt%)	R410A R22/R125 (50/50)	R22 R22 (100)
Molecular weight	72.6	86.5
Boiling point (°C)	-51.4	-40.8
Vapor pressure (25°C, MPa)	1.56	0.94
Density of saturated vapor (25°C, kg/m <sup>3</sup> )	64.0	44.4
Inflammability	Inflammable	Inflammable
Ozone depletion potential (ODP)	0	0.055
Global warming potential (GWP)	1730	1700

Source: Thermo-physical Properties List, NIST REFPROP V5.10, etc. prepared by JRAIA.

Table 2 Comparison of pressure of saturated vapor between R410A and R22  
Unit: MPa

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

Source: Thermo-physical Properties List, NIST REFPROP V5.10, etc. prepared by JRAIA.

### (3) Lubricants for R410A

Mineral oil, AB (Alkybenzene), etc. are widely used as the lubricants for R22. R410A is not easily dissolved in conventional lubricants such as mineral oil, etc. and such lubricants likely stay in refrigerant cycle, so ester, ether and other synoil in which R410A is highly dissoluble are generally used. However, such synoil has high hygroscopicity, so they must be handled more carefully than conventional lubricants. In addition, if such synoil is mixed with mineral oil, AB (Alkybenzene), etc., this may cause deterioration, thus blocks the hush pipe or causes failure of compressor.

Therefore, never mix these synoil.

#### 7.1.2 Safety of installation/servicing

The pressure of R410A is higher than that of R22 by about 1.6 times, so unreasonable installation/servicing may cause severe consequences. Therefore, be sure to use tools and materials designed specifically for R410A, conduct installation/ servicing carefully, and pay attention to the following precautions.

1) Never use refrigerants other than R410A in air conditioners designed to use R410A.

2) In case of refrigerant gas leakage during installation/ servicing, be sure to provide sufficient ventilation.

If the refrigerant gas is exposed to fire, poisonous gas may be produced.

3) Prevent air or vapor from entering the refrigerant cycle when installing or removing air conditioners. Otherwise, the pressure in the refrigerant cycle may become exceptionally high, which will cause fracture of equipment or personal injury.

4) After the installation is completed, check that there is no refrigerant gas leakage.

If the refrigerant gas is leaked to the room and comes into contact with the fire in the fan driven heater, small heating stove, etc., it may produce poisonous gas.

5) If an air conditioner charged with large amount of refrigerant (such as a multi-functional air conditioner) is installed in a small room, be sure to take more care and ensure that the concentration will not exceed the limit even in case of refrigerant leakage.

In case the refrigerant is leaked and its concentration exceeds the limit, oxygen starvation may be caused.

6) Be sure to conduct installation or removal according to the Installation Manual.

Incorrect installation may cause failure of refrigerant, water leakage, electric shocks, fire, etc.

7) Unauthorized operation of air conditioners may be very dangerous. In case of failure of the machine, please call the qualified air conditioner technician or electrician.

Incorrect servicing may cause water leakage, electric shocks, fire, etc.

## 7.2 Mounting refrigerant pipes

### 7.2.1 Piping materials and joints used

Refrigerant pipes are mounted mainly with copper pipes and joints. Be sure to select and mount copper pipes and joints suitable for refrigerant. In addition, be sure to use clean copper pipes and joints and try to keep their inner walls clean.

#### (1) Copper pipes

Be sure to use seamless copper pipes made of copper or copper alloy. Copper pipes with residual oil less than 40mg/10m are ideal. Do not use fractured, distorted or discolored copper pipes (especially in respect of inner walls). Otherwise, the filth may block the EEV or hush pipe.

As the pressure of air conditioners using R410A is higher than that of air conditioners using R22, be sure to select appropriate materials.

The thickness of copper pipes for R410A is shown in Table 3. Never use copper pipes with a thickness less than 0.8mm.

Table 3 Thickness of annealed copper pipes

		Thickness (mm)	
Rating diameter	Outside diameter (mm)	R410A	[Reference] R22
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.70	0.80	0.80
5/8	15.88	1.00	1.00

## (2) Joints

Copper pipes use flared joints or sleeve joints. Be sure to clean them before use.

### a) Flared joints

Flared joints are used to connect copper pipes that can't be used for piping as their outside diameter exceeds 20mm. In such case, sleeve joints may also be used.

The sizes of ends of flared pipes, ends of flared joints and flare nuts are shown in Tables 5~8 (see pages 112 and 113). In addition, double-ended loose joints, single end loose joints, pipe tee joints and corner joints are generally used. (See Figure 1.)

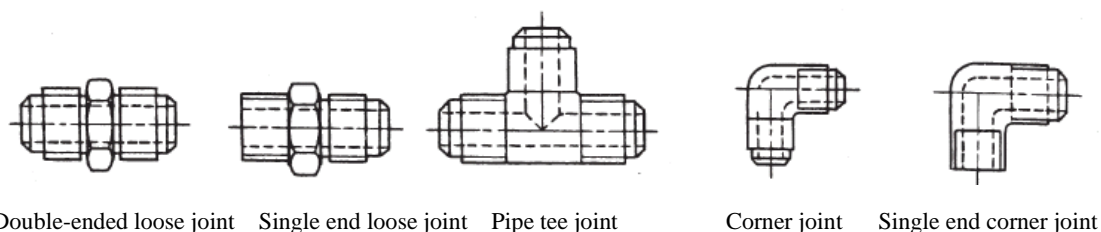


Figure 1 Flared joints

### b) Sleeve joints

Sleeve joints need welding for connection and are mainly used for pipes with a diameter exceeding 20mm. The thicknesses of sleeve joints are shown in Table 4. Sleeve joints, corner joints and pipe tee joints are generally used. (See Figure 2.)

Table 4 Min. thickness of sleeve joints

Rating diameter	Reference outside diameter of sleeve joints (mm)	Min. joint thickness (mm)
1/4	6.35	0.50
3/8	9.52	0.60
1/2	12.70	0.70
5/8	15.88	0.80

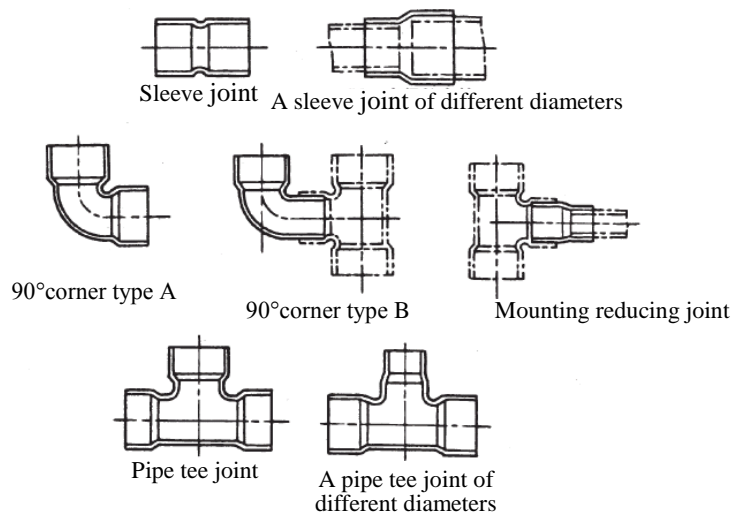


Figure 2 Sleeve joints

## 7.2.2 Handling of piping materials

When mounting refrigerant pipes, be careful to prevent water or dust from entering the pipes, do not use oil other than the lubricant used in the air conditioner and avoid refrigerant leakage. Use dehydrated lubricant for piping. Be sure to use airtight cover or similar cover gasket to seal the container for storage.

### (1) Flaring procedure and precautions

#### a) Cutting pipes

Use a pipe cutter to cut the pipes slowly to avoid distortion.

#### b) Removing burrs and nicks

Burrs or nicks on the flared position may cause refrigerant leakage. Remove all burrs and clean the cutting surface carefully before mounting.

#### c) Inserting flare nuts

d) Flaring

Ensure to clean the clamps and copper pipes.

Use the clamping bars to conduct flaring correctly.

Use the flare tools for R410A or conventional flare tools.

The size of flaring varies depending on the kinds of flare tool. Please note that the size must be adjusted to “Size A” with the size adjustment scaled rule when using conventional flare tools.

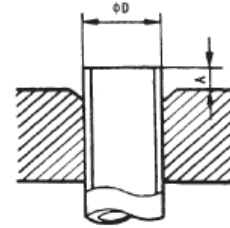


Figure 3 Flare tool

Table 5 R410A flaring sizes

Rating diameter	Outside diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A Clutch type	Conventional flare tools	
				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
5/8	15.88	1.0	0~0.5	1.0~1.5	2.0~2.5

Table 6 R22 flaring sizes

Rating diameter	Outside diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A Clutch type	Conventional flare tools	
				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
5/8	15.88	1.0	0~0.5	0.5~1.0	1.5~2.0

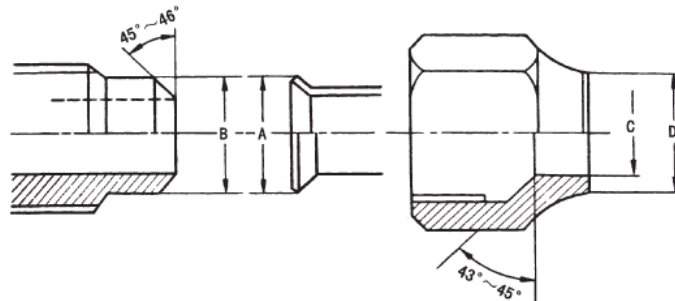


Figure 4 Relationship between flare nut and flaring sealing surface

Table 7 Sizes of R410A flaring and flare nut

[Unit: mm]

Rating diameter	Outside diameter	Thickness	Size				Width of flare nut
			A	B	C	D	
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
5/8	15.88	1.0	19.7	19.0	16.0	25	29

Table 8 Sizes of R22 flaring and flare nut

[Unit: mm]

Rating diameter	Outside diameter	Thickness	Size				Width of flare nut
			A	B	C	D	
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
5/8	15.88	1.0	19.4	19.0	16.0	23	27

## (2) Flaring procedure and precautions

- Ensure there is not any defect or dust, etc. on the flaring and connection.
- Correctly connect the flared surface and the joint axis.
- Use a torque wrench to tighten the flaring to the specified torque. The tightening torque for R410A is the same as that for R22. Insufficient torque may cause gas leakage. Excessive torque may cause the flare nut damaged and can't be removed. Please select the tightening torque of the value specified by the manufacturer. Table 9 shows the reference values.

Note: Apply the oil specified by the manufacturer on the flared surface. If other types of oil are used, it may cause deterioration of the lubricant and failure of the compressor.

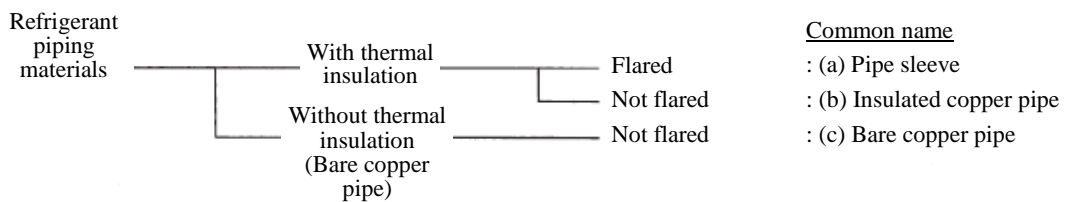
Table 9 Tightening torque for flaring for R410A [reference values]

Rating diameter	Outside diameter (mm)	Tightening torque N · m (kgf · cm)	Tightening torque of torque wrench available on the market N · m (kgf · cm)
1/4	6.35	14~18 (140~180)	16 (160), 18 (180)
3/8	9.52	33~42 (330~420)	42 (420)
1/2	12.70	50~62 (500~620)	55 (550)
5/8	15.88	63~77 (630~770)	65 (650)

## 7.2.3 Storage of piping materials

## (1) Types and storage of piping materials

The refrigerant piping materials for air conditioners are generally divided into the following types.



The pressure of R410A is higher than that of R22 by about 1.6 times, so be sure to use copper pipes of the thickness as shown in Table 3 (see Page 56) and try to keep them clean. Be careful in handling/storing copper pipes to avoid bending, distorting or damaging them. Be careful to prevent dust, water, etc. from entering the pipes.

Seal the pipe opening with caps, etc. Ensure the sealing is intact during storage. To store coated or bare copper pipes, use clamps, tape, etc. to fully seal the opening.

(2) Characteristics

a) Pipe sleeve

Copper pipes as R410A pipe sleeves must have a thickness as shown in Table 3 (see Page 59) and Tables 5 and 6 (see Page 61), and sizes of flaring and flare nuts different from those of R22. Therefore, be sure to select pipe sleeves suitable for R410A.

b) Insulated copper pipes

Before using insulated copper pipes, ensure their thickness is suitable for R410A.

c) Bare copper pipes

Be sure to use bare copper pipes of a thickness as shown in Table 3 (see Page 59) and try to keep them clean. The surface of bare copper pipes is exposed, so be especially careful to handle them and mark them to prevent misuse.

(3) Precautions before mounting

Pay attention to the following during pipe connection.

a) Before connecting to the appliance, use caps, etc. to seal all pipe opening.

b) Be especially careful in pipe mounting in rainy days.

If water enters the pipe, the lubricant may deteriorate, which causes failure of the appliance.

c) Connect the pipes as quickly as possible.

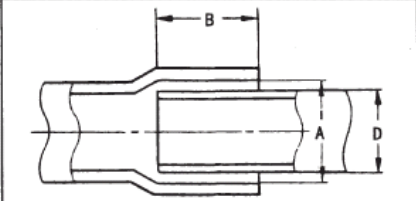
If the pipes are kept open for a long time, please fully charge them with nitrogen or use a vacuum pump for drying.

## 7.2.4 Welding

(1) Processing connection

Due to fusion cast between the surfaces of joints, which produces very high adhesive strength, be sure to leave adequate space for welding and keep adequate gap between the surfaces of joints. The minimum depth of penetration of joint of copper pipe, the outside diameter of inner pipe and the gap between the outer pipe and the inner pipe are shown in Table 10. If copper brazing filler is used, the pipe connection is the most secure when the gap is kept between about 0.05~0.1mm.

Table 10 Minimum depth of penetration and gap between copper pipe and joint

	Inside diameter of outer pipe D (mm)	Minimum depth of penetration B (mm)	Gap (A-D) x 1/2 (mm)
	5~8	6	0.05~0.35
	8~12	7	0.05~0.35
	12~16	8	0.05~0.45

\* When inserting the pipe, either process the end of the pipe or connect the pipe with a sleeve joint through welding.

(2) Brazing filler

a) Alloy brazing filler

Alloy mainly composed of silver and copper is used to bond iron, copper or copper alloy. In spite of its outstanding solderability, it's expensive.

b) Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to bond copper or copper alloy.

c) Low melting temperature solder

Alloy of tin and lead. Conventional solder. Due to its weak adhesive strength, it can't be used for refrigerant pipe welding.

\* Notes:

1) BCuP reacts with sulfur easily and produces a complex aqueous solution, which may cause gas leakage. Therefore, please use other types of brazing filler for SPA, etc. and apply paint on pipe surface.

2) If welding is needed during servicing, please use the same type of brazing filler.



### (3) Welding flux

#### a) Reasons for using welding flux

- To remove the oxide film and impurity from metal surface to help the flow of brazing filler.
- To prevent oxidization on metal surface in welding.
- To reduce the surface tension of brazing filler to make it better adhere to the treated metal.

#### b) Features of welding flux required

- The active temperature and welding temperature of the welding flux are the same.
- Due to the wide range of effective temperature, the welding flux is hard to carbonize.
- Slag is easily removed after welding.
- The corrosion of treated metal and brazing filler is slight.
- Good spreading property, harmless to human body.

As described above, the working of welding flux is complex, therefore an appropriate type of welding flux must be selected according to the type and shape of treated metal, type of brazing filler and welding mode, etc.

#### c) Types of welding flux

- Corrosion resistant welding flux

This type of welding flux is generally composed of borax and boric acid.

Suitable for welding temperature of above 800°C.

- Active welding flux

Most welding fluxes used for silver brazing are active welding fluxes.

The borax-boric acid compound is added with potassium fluoride, potassium chloride, sodium fluoride, etc., so it has enhanced oxide film removing ability.

\* Precautions:

- ① Remove the welding flux after welding.
- ② If the chlorine contained in the welding flux is left in the pipe, it may cause deterioration of lubricant. Therefore, do not use welding flux containing chlorine.
- ③ When adding water to the welding flux, do not use water containing chlorine (such as distilled water or ion exchange water).

### (4) Welding

Welding requires complicated technique and experience, so it must be operated by professionals.

In order to prevent the formation of oxide film in the pipe, conduct welding when the nitrogen (N<sub>2</sub>) is flowing.

<Welding method to prevent oxidation>

- a) Connect a reducing valve to the nitrogen cylinder.
- b) Charge nitrogen into the piping with a copper pipe and install a flowmeter on the nitrogen cylinder.
- c) Seal the gap between the piping and the inserted pipe to prevent return of nitrogen.
- d) When the nitrogen is flowing, be sure to keep the end of the piping open.
- e) Adjust the flow velocity of nitrogen. Use the reducing valve to keep it below 0.05m<sup>3</sup>/h or 0.02MPa (0.2kgf/cm<sup>2</sup>).
- f) After the above steps, keep the nitrogen flowing till the piping cools to a certain extent (that is, to the finger temperature).
- g) Remove all welding flux after welding.

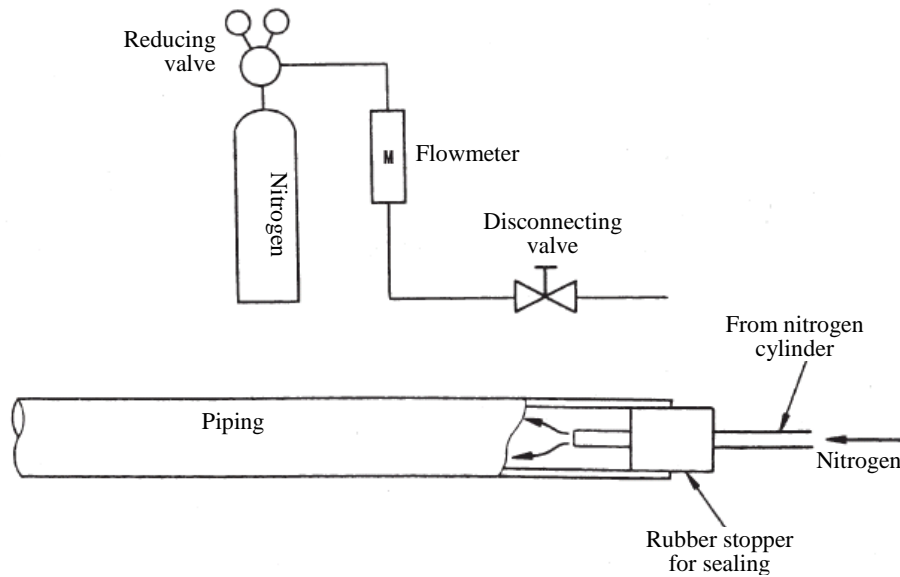


Figure 5 Preventing oxidation in welding

\* Precautions for welding

① General precautions

- 1) The weld strength should meet the requirement.
- 2) Keep air tightness under the pressure condition after the operation.
- 3) During welding, avoid damaging the components due to high temperature.
- 4) Do not allow the oxide or welding flux to block the refrigerant piping.
- 5) Prevent the welding portion from hindering the flow in the refrigerant circuit.
- 6) Avoid corrosion of the welding portion.

② Over heat prevention

Due to over heat, the inner and outer surfaces of the treated metal may be oxidized. Particularly, if the inside of the refrigerant circuit is oxidized due to over heat, the oxide film produced will severely damage the circuit. Therefore, keep the appropriate welding temperature and try to reduce the heating area during welding.

③ Over heat protection

In order to prevent damaging or downgrading the components near the welding position due to over heat, please take appropriate protection measures, such as using (1) a metal plate, (2) wet cloth, or (3) heat absorbent.

④ Movement during welding

Avoid any vibration during welding to prevent breaking or damaging the welded splice.

⑤ Oxidation prevention

In order to improve the efficiency of welding, several types of antioxidant available on the market may be used. However, the ingredients of such antioxidant may differ in thousands ways, and some may erode the piping materials or have negative impact on HFC refrigerants, lubricants, etc. Therefore, be especially careful in the use of antioxidants.

### 7.3 Installation, Removal and Servicing

#### 7.3.1 Tools for R410A

For air conditioners using R410A, in order to prevent charging other types of refrigerant accidentally, the diameter of the service opening of the control valve (3-way valve) for the outdoor unit is changed. In addition, in order to improve the compressive strength, the sizes of flaring and flare nut (for copper pipes, the rating diameters are 1/2 and 5/8) are also changed. Therefore, prepare the tools designed specifically for R410A as shown in (1) on Page 117 and the general tools as shown in (2) on Page 118 for installation/servicing.

(1) Tools designed specifically for R410A

a) Manifold pressure gauge

- As R410A has the property of high pressure, conventional tools can't be used.

Table 11 Difference between conventional high/low pressure gauge and pressure gauge for R410A

	Conventional pressure gauge	Pressure gauge designed specifically for R410A
High pressure gauge (Red)	-0.1~3.5MPa -76 cmHg~35 kgf/cm <sup>2</sup>	-0.1~5.3MPa -76 cmHg~53 kgf/cm <sup>2</sup>
Compound pressure gauge (Blue)	-0.1~1.7MPa -76 cmHg~17 kgf/cm <sup>2</sup>	-0.1~3.8MPa -76 cmHg~38 kgf/cm <sup>2</sup>

- In order to prevent charging other types of refrigerant accidentally, the shapes of the various ports of the branch manifold are changed.

Table 12 Difference between conventional branch manifold and branch manifold for R410A

	Conventional branch manifold	Branch manifold for R410A
Port size	7/16 UNF 20 screw threads per inch	1/2 UNF 20 screw threads per inch

b) Charge hose

- Due to the property of high pressure of R410A, the pressure impedance of the charge hose must be improved and the material is changed to HFC impedance type material. Furthermore, in order to comply with the sizes of the various ports of the branch manifold, the sizes of hose caps are also changed. In addition, in order to prevent gas pressure reaction, the charge hose with a valve mounted beside the hose cap may be used.

Table 13 Difference between conventional charge hose and charge hose for R410A

		Conventional charge hose	Charge hose for R410A
Pressure impedance	Normal pressure	3.4 MPa (34 kgf/cm <sup>2</sup> )	5.1 MPa (51 kgf/cm <sup>2</sup> )
	Breakdown pressure	17.2 MPa (172 kgf/cm <sup>2</sup> )	27.4 MPa (274 kgf/cm <sup>2</sup> )
Engineering material		NBR rubber	HNBR rubber With nylon coating inside
Size of hose cap		7/16 UNF 20 screw threads per inch	1/2 UNF 20 screw threads per inch

c) Electronic loadcell scale for charging refrigerant

- As a kind of HFC, due to the properties of high pressure and high vapor rate, R410A can't keep the liquid state and foam state of pneumatolytic refrigerant in the cylinder when the charging cylinder is used to charge R410A, and the value is difficult to read. Therefore, it is recommended to use an electronic loadcell scale for charging refrigerant.
- The electronic loadcell scale can measure the weight of the refrigerant cylinder though the 4 supporting points, therefore it has higher strength. The connection of the charge hose has two ports, one for R22 (7/16 UNF, 20 screw threads per inch) and one for R410A (1/2 UNF, 20 screw threads per inch), so it can be used to charge general refrigerants.
- There are two types of electronic loadcell scale for charging refrigerant, one for 10kg cylinders and one for 20kg cylinders.

Electronic loadcell scale for 10kg cylinders      precision ±2g

Electronic loadcell scale for 20kg cylinders      precision ±5g

- Refrigerant can be charged manually by opening/closing the valve.

d) Torque wrench (for rating diameters of 1/2 and 5/8)

- In order to enhance the pressure impedance, the size of flare nut is changed. Therefore the side-to-center distance of the torque wrench for R410A varies.

Table 14 Difference between conventional wrench and wrench for R410A

	Conventional torque wrench	Torque wrench for R410A
For 1/2 (side-to-center distance x torque)	24mm X 55N · m (550 kgf · cm)	26mm X 55N · m (550 kgf · cm)
For 5/8 (side-to-center distance x torque)	27mm x 65N · m (650 kgf · cm)	29mm x 65N · m (650 kgf · cm)

- e) Flare tool (clutch type)
- The flare tool for R410A has a big clamping bar receiving hole, so as to set the copper pipe portion protruding from the clamping bar during flaring to 0~0.5mm and have stronger elasticity for the increased torque of EEV. This type of flare tool can also be used for R22 copper pipes.
- f) Adjusting the scaled rule for the protruding portion (used when a conventional flare tool (including clutch type) is used for flaring)
- A scaled rule with the thickness of 1.0mm helps setting the protruding portion of the copper pipe in the clamp to 1.0~1.5mm.
- g) Vacuum pump adapter
- In order to prevent the vacuum pump oil from returning into the charge hose, be sure to use an adapter. The connection of the charge hose has two ports, one for conventional refrigerants (7/16 UNF, 20 screw threads per inch) and one for R410A. If the vacuum pump oil (mineral oil) is mixed with R410A, deposit may be produced, which will damage the appliance.
- h) Refrigerant cylinder
- According to the U.S.A regulations, refrigerant cylinders designed specifically for R410A are marked with the refrigerant name and have pink coating.
- i) Charging port and package for refrigerant cylinder
- According to the cap size of the charge hose, a charging port (1/2 UNF, 20 screw threads per inch) and corresponding package are required.
- j) Gas leakage detector
- Use a highly sensitive gas leakage detector designed specifically for HFC refrigerants. For R410A, the detection sensitivity is about 23g/ year.
- (2) Frequently used tools
- |   |                                     |
|---|-------------------------------------|
| a) Vacuum pump                                      | g) Hollow drill (Φ65 or 70)         |
| b) Torque wrench                                    | h) Hexagon wrench                   |
| For 1/4, side-to-center distance 17 mm x (16 N · m) | (side-to-center distance 4 or 5 mm) |
| (160 kgf · cm)                                      | i) Wrench or monkey wrench          |
| For 1/4, side-to-center distance 17 mm x (18 N · m) | j) Tapeline                         |
| (180 kgf · cm)                                      | k) Thermometer                      |
| For 3/8, side-to-center distance 22 mm x (42 N · m) | l) Clamping ammeter                 |
| (420 kgf · cm)                                      | m) Insulation resistance meter      |
| c) Pipe cutter                                      | (megameter)                         |
| d) Driller  | n) Circuit tester                   |
| e) Screw driver (+,-)                               | o) Pipe bender                      |
| f) Steel saw  |                                     |

(3) Applicability of tools for R410A to models using R22

Table 15 Applicability of tools for R410A to models using R22

	Tools for R410A	Applicability to models using R22
a)	Manifold pressure gauge	X
b)	Charge hose	X
c)	Electronic loadcell scale for charging refrigerant	O
d)	Torque wrench (rating diameter 1/2, 5/8)	X
e)	Flare tool (clutch type)	O
f)	Scaled rule for adjusting protruding portion*	O
g)	Vacuum pump adapter	O
h)	Refrigerant cylinder	X
i)	Charging port and package for refrigerant cylinder	X
j)	Gas leakage detector	X

\* Used when the conventional flare tool (clutch type) is used.

Note: If you have any questions, please consult your dealer.

### 7.3.2 New installation (when new refrigerant piping is used)

- (1) Use the vacuum pump to suction air and detect any gas leakage (see Figure 6)
  - a) Connect the charge hose to the outdoor unit. ①
  - b) Connect the charge hose to the vacuum pump adapter. ②  
Here, fully close the control valves. ③④
  - c) Push Handle *Lo* to the full open position ⑤ and turn on the power switch of the vacuum pump.  
In this step, evacuate the appliance (for about 10~15 minutes). For the time of evacuation, see the manual provided by the equipment manufacturer.
  - d) When the pointer of the compound pressure gauge indicates -0.1MPa (-76cmHg) ⑥, push Handle *Lo* to the full close position ⑤ and turn off the power switch of the vacuum pump.  
Keep the status for 1~2 minutes and ensure the pointer of the compound pressure gauge has not turned back.
  - e) Fully open the control valves. ③④
  - f) Disconnect the charge hoses. ①②
  - g) Tighten the cover on the service opening. ⑦
  - h) Secure the covers on the control valves and check for any gas leakage around the covers. ③④⑦

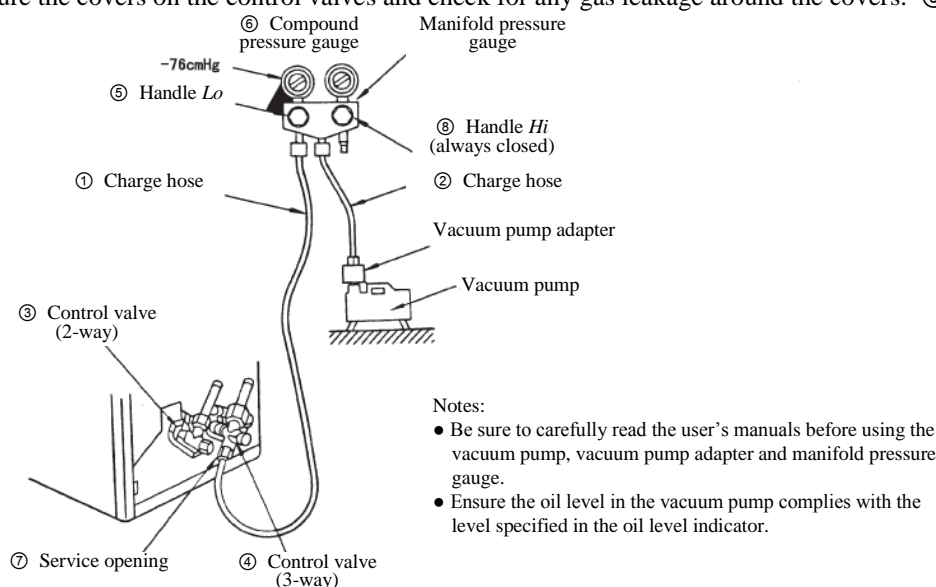


Figure 6 Evacuation structure of vacuum pump

- (2) The refrigerant pipe required for additional refrigerant charging should be longer than the standard pipe length. (After step e in (1) above, execute the following steps. See Figure 7.)
  - a) Put the refrigerant cylinder on the electronic loadcell scale and connect the charge hoses of the cylinder to the connection ports of the electronic loadcell scale.  
\* Note:  
Be sure to make setting so as to charge liquid. When a cylinder with syphon tube is used, you can charge liquid without turning the cylinder.
  - b) Connect the charge hose of the manifold pressure gauge to the connection port of the electronic loadcell scale. ③②
  - c) Open the valve of the refrigerant cylinder, and slightly open the charging valve and then close it. ①②
  - d) After zero position (0) adjustment, open the charging valve and open Valve *Lo* of the manifold pressure gauge to charge the liquid refrigerant. ②⑤  
(Please read the user's manual before using the electronic loadcell scale.)
  - e) If the specified amount of refrigerant can't be charged, charge more little by little through the cooling operation. (For the amount of each additional charging, see the operation manual prepared by the equipment manufacturer.) If the amount of the first charge is inadequate, charge for the second time with the same method as for the first charge after one minute.  
\* Note:  
Never charge large amount of liquid refrigerant at a time in the cooling mode, as the liquid refrigerant is charged from the gas side.

- f) After charging the liquid refrigerant into the air conditioner by closing the charging valve, fully close Valve *Lo* of the manifold pressure gauge to stop. ②⑤
- g) Quickly move the charge hose away from the service opening.⑥  
If the movement is slow, the circulating refrigerant may be leaked.
- h) Secure the covers of the service opening and control valve, and check for any gas leakage around the covers. ⑥⑦

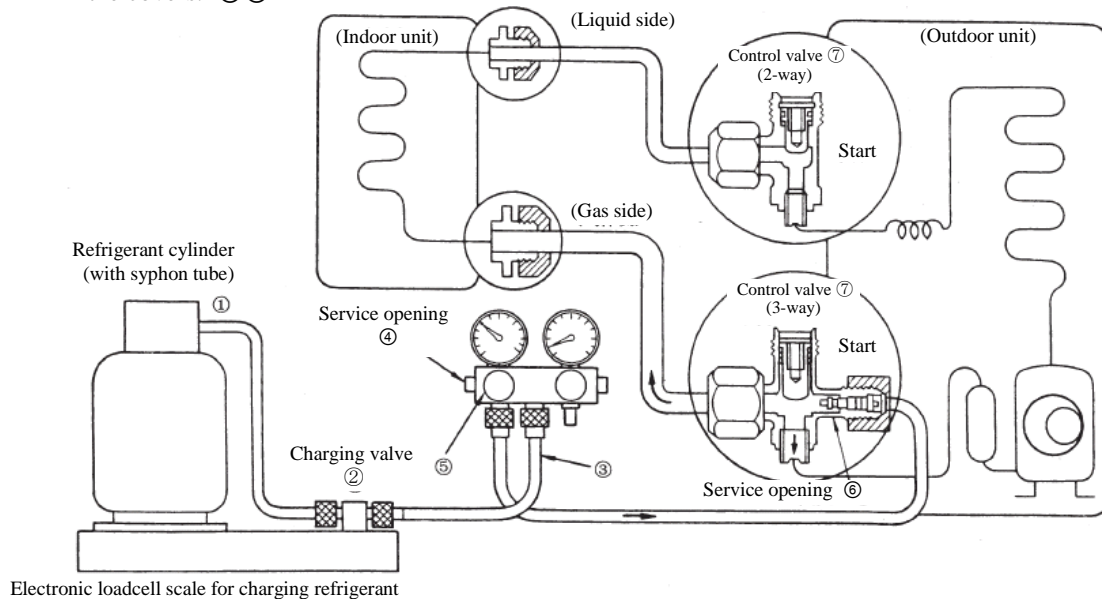


Figure 7 Structure for additional refrigerant charging

### 7.3.3 Removal (when new refrigerant piping is used)

#### (1) Removing the equipment

##### a) To recover refrigerant from the outdoor unit through evacuation

- Use the manifold pressure gauge designed specifically for R410A in evacuation.
- Recover refrigerant from the outdoor unit when the equipment is operating in the HI POWER cooling mode.

(For the steps and precautions for recovery, see the user's manual prepared by the equipment manufacturer.)

##### \* Precaution:

Use the refrigerant recovery device for outdoor unit in which evacuation is impossible.

##### b) To remove indoor unit/ outdoor unit

- Remove the pipes and wires between the indoor and outdoor units.
- Tighten the control valve and service opening of the outdoor unit to the specified torque.
- Tighten the flare nut with cap at the connection between the indoor and outdoor units to the specified torque.
- Remove the indoor unit/outdoor unit.

##### \* Precaution:

Be careful not to break the piping for the indoor unit when it is stored in the original place.

#### (2) Installing the equipment

##### a) According to the steps described in "7.3.2 New installation".

### 7.3.4 Replacing equipment (never use the existing refrigerant piping)

To replace an air conditioner using conventional refrigerant (R22) with one using the alternative refrigerant (R410A) or replace an air conditioner using the alternative refrigerant (R410A) with another using the alternative refrigerant (R410A), please use completely new refrigerant piping (1), otherwise the difference of pressure properties of refrigerants or the difference of lubricants may cause failure. (Not all air conditioners using R410A use the same type of lubricant.)

### 7.3.5 Refitting equipment

Do not charge the air conditioner which used the conventional refrigerant (R22) with the alternative refrigerant (R410A). Otherwise, the equipment may malfunction or such severe consequences as interruption of refrigerant cycle, etc.

### 7.3.6 Recharging refrigerant in servicing

If it is necessary to charge refrigerant, charge the specified amount of refrigerant by following these steps.

(For details, see the operation manual prepared by the equipment manufacturer.)

- 1) Connect the charge hose to the service opening of the outdoor unit.
- 2) Connect the charge hose to the vacuum pump adapter. Here, push the control valve to the full open position.
- 3) Push Handle *Lo* to the full open position (ON) and turn on the power switch of the vacuum pump.  
(For the time of evacuation, see the manual of the equipment manufacturer.)
- 4) When the pointer of the compound pressure gauge indicates  $-0.1\text{MPa}$  ( $-76\text{cmHg}$ ), push Handle *Lo* to the full close position and turn off the power switch of the vacuum pump. Keep the status for 1~2 minutes and ensure the pointer of the compound pressure gauge has not turned back,
- 5) According to the steps described in 7.3.2(2) (Pages 119-120), use the electronic loadcell scale to charge liquid refrigerant.

## 7.4 Refrigerant recovery

### 7.4.1 Recovery procedure

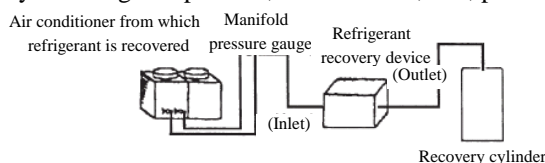
The following is the general procedure for recovering refrigerant. The recovery procedure varies depending on the type of refrigerant recovery device. The connection and disposal methods for different types of refrigerant recovery device may be different. Therefore, see the user's manual, etc. of the various equipment to learn the detailed operation information.

- (1) Check before the recovery procedure
  - a) Check the refrigerant recovery device
    - ① Gas leakage (Servicing is required when there is any failure.)
    - ② Oil extractor (for discharging residual oil)
    - ③ Weighing function, excessive charging prevention function (floating switch), moisture indicator, dryer and other ancillary functions of the recovery device (subject to adjustment or replacement when necessary).
    - ④ Circuit
  - b) Check the accessories to the refrigerant recovery device.
- (2) Preparation for the recovery procedure
  - a) Installing the refrigerant recovery device

The device should be installed in a place meeting the following requirements as far as possible.

    - ① Ambient temperature above  $0^{\circ}\text{C}$  and below  $40^{\circ}\text{C}$ .
    - ② Flat, dry floor.
    - ③ A position as near the air conditioner as possible.
  - b) Preparing a recovery cylinder

Use a compliant recovery cylinder suitable for recovering refrigerant.
  - c) Connecting to the power supply
  - d) Preparing the air conditioner for refrigerant recovery
    - ① If the air conditioner from which refrigerant is to be recovered can operate, evacuate the appliance to store the refrigerant in the outdoor unit (condenser side).
      - Evacuate the air conditioner after confirming the specifications of the air conditioner from which refrigerant is to be recovered.
    - ② If there are any blocking components, such as EEV, etc., please fully open such components.



- (3) Connecting the refrigerant recovery device
  - a) Connect the air conditioner from which refrigerant is to be recovered to the refrigerant recovery device.
    - ① With service opening (recovery port):  
Use the manifold pressure gauge to connect the charge hose to the service opening (recovery port).
    - ② Without service opening (recovery port):  
Use the needle valve to connect in a way similar to ①.
  - b) Connect the refrigerant recovery device to the recovery cylinder



- (4) Recovery procedure
- According to the instructions on refrigerant recovery device (see the operation manual supplied), operate the device to recover refrigerant.
  - Pay attention to the following during the operation.
    - Confirm that the refrigerant recovery device runs according to the requirements and the operation status is always monitored, so as to take correct actions in case of emergency.
    - During the operation, stay at the working site to ensure safety.
    - If you have to leave the working site due to irresistible reasons, confirm the recovery cylinder is not over charged before stopping the operation.
  - If, during the operation, the overcharge protection of the refrigerant recovery device is triggered and the device stops automatically, please replace with an empty recovery cylinder.
  - If the reading of the pressure gauge increases not long after the recovery is completed and the refrigerant recovery device stops automatically, please restart the device. If the device stops again, end the recovery.
- (5) Procedure after the recovery is completed
- Close the valves of the air conditioner from which refrigerant has been recovered, the refrigerant recovery device, and the recovery cylinder.
  - Disconnect the recovery cylinder for charging refrigerant and store it according to the regulations.

#### 7.4.2 Accessories/tools

A number of accessories/tools are used to recover R410A.

The following are standard accessories.

##### (1) Recovery cylinder

- Use the recovery cylinder specified by the equipment manufacturer.
- Be sure to use a removable cylinder compliant with the laws and regulations.
- Do not use a general cylinder as recovery cylinder.

Note 1: The cylinder used when R410A is bought is borrowed.

Note 2: The cylinder with a check valve used when R410A is bought can't be used as recovery cylinder.

- Types (divided by function)

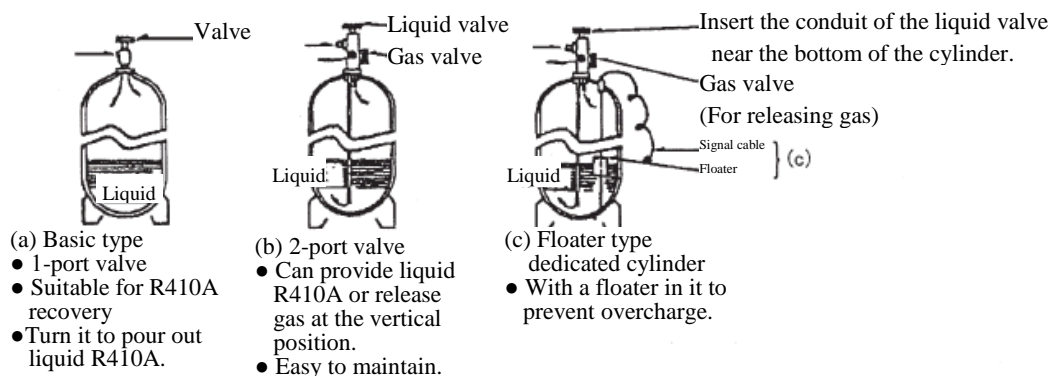


Figure 8 Types of cylinder

- Note

Laws prohibit recovery of R410A into discarded cylinders or one-way cylinders.

##### (2) Dryer

- A desiccant container used to remove water from R410A
- The dryer should be used as supplies.
- Before the installation, keep the dryer sealed.
- Used to protect the R410A recovery device.

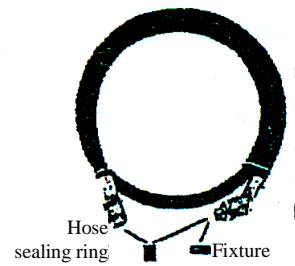
##### (3) Connection hose

- Charging port and charging port sealing ring
  - It is generally sold separately from the refrigerant cylinder.
  - The use of a two-port cylinder, which may have special diameter, should be confirmed by the manufacturer.
- Sealing rings are supplies.



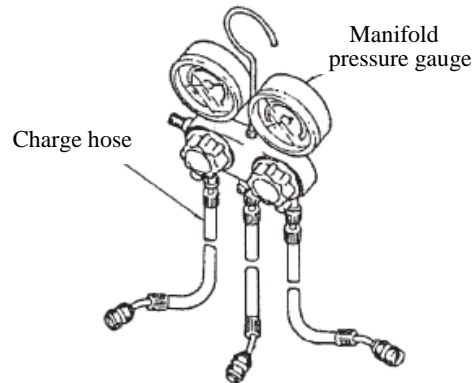
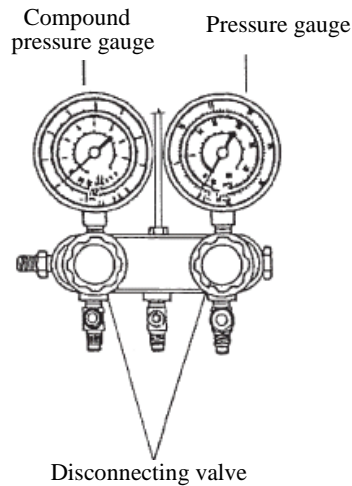


- b) Charge hose (pressure resistant fluorocarbon hose) and sealing ring
- Thickness 1/48, multiple lengths available
  - Hose with the pressure resistance property higher than 5.2MPa (52kg/cm<sup>2</sup>G)
  - In general, only one end has fixture.



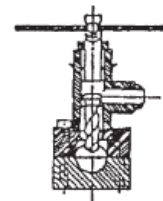
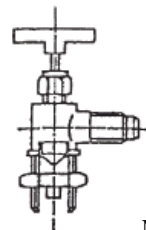
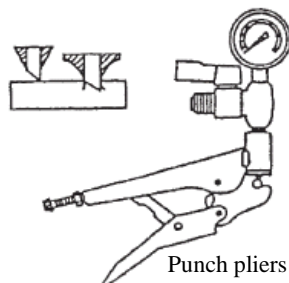
(4) Manifold pressure gauge

- The most important servicing tool for coolers and air conditioners
- It is widely used to check gas pressure when R410A is being charged/recovered.



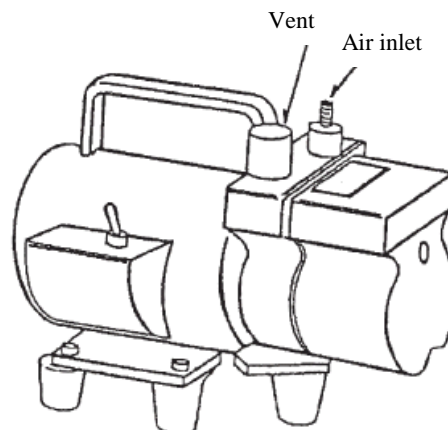
(5) Conduit needle valve

- To recover R410A from the equipment without gas charging or recovery port, use the tool to drill a hole in the copper pipe. There are a number of types available on the market which have different names.
- The edge of needle may be damaged easily, so such valve should be treated as semi-supplies.
- When the vacuum level rises, air will be absorbed into the hole easily. Therefore, please operate carefully.



(6) Vacuum pump

Used to evacuate the recovery device and the recovery cylinder.

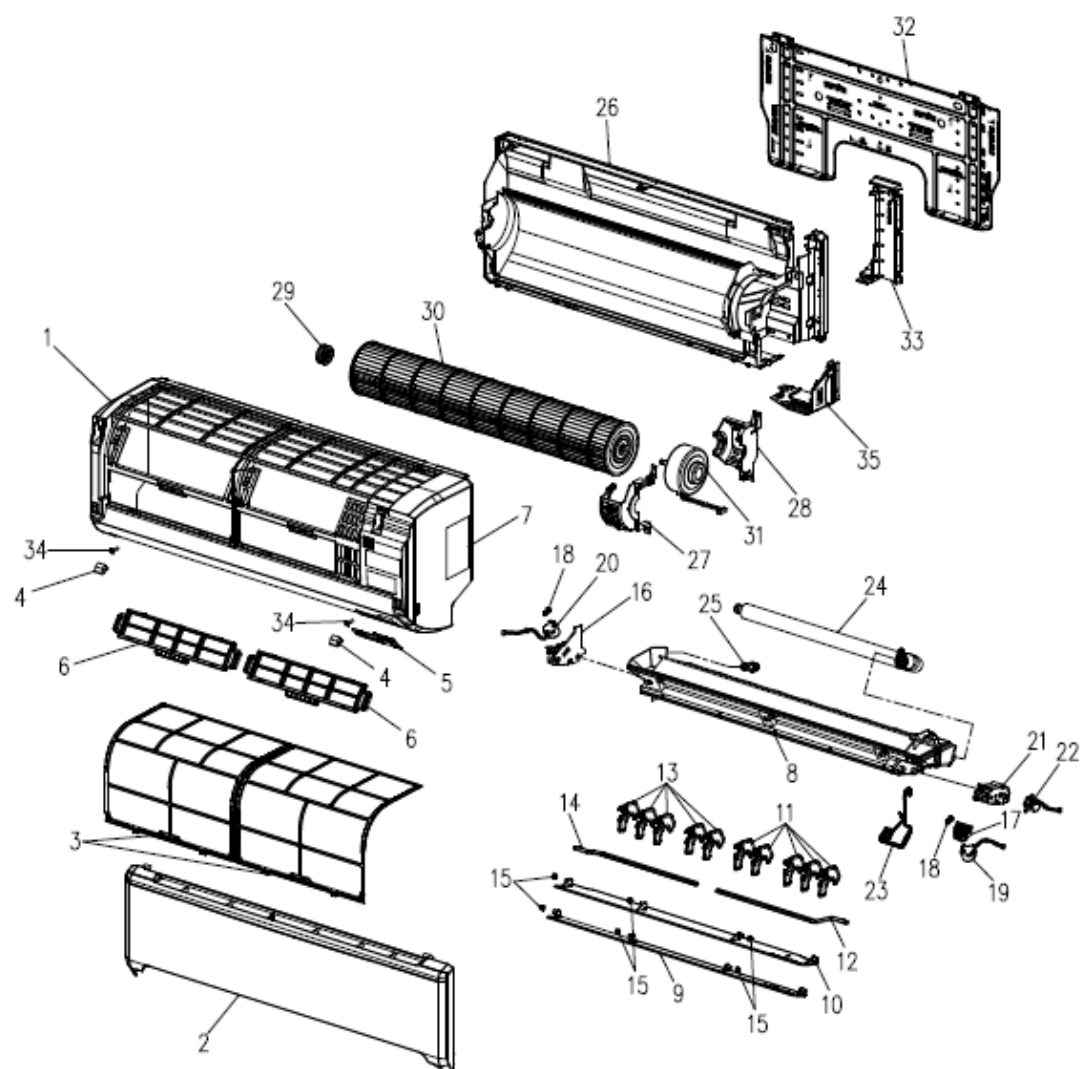


**8 MOUNT ASSEMBLY****8.1 Indoor unit****8.1.1 SRK20MA-S**

SRK20MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1-7	RYD102A033H	PANEL ASSY,FRONT	1
1	RYD122A057C	PANEL,FRONT	1
2	RYD435A056G	GRILLE,AIR INLET	1
3	RYD437A030	FILTER,AIR	2
4	RYD129A088A	CAP	2
5	RYD133A049	PLATE ASSY,ORNAMENT	1
6	RYD129A047	HOLDER,FILTER	2
7	RYD011F037	LABEL,MODEL NAME	1
8-26	RYD435A054A	GRILLE ASSY,AIR OUT	1
8	RYD435A055	GRILLE,AIR OUTLET	1
9	RYD436A033A	FLAP(A)	1
10	RYD436A034A	FLAP(B)	1
11-12	RYD436A035	LOUVER ASSY(R)	1
11	RYD436A037	LOUVER	5
12	RYD129A096	PLATE,CONNECTING(R)	1
13-14	RYD436A036	LOUVER ASSY(L)	1
13	RYD436A037	LOUVER	5
14	RYD129A097	PLATE,CONNECTING(L)	1

15	RYD935C005	COLLAR	6
16	RYD129A098	BRACKET,MOTOR(L)	1
17	RYD129A099	BRACKET,MOTOR(R)	1
18	RYD144A018	CRANK(C)	2
19	RYD512T002J	MOTOR,STEPPING	1
20	RYD512T002K	MOTOR,STEPPING	1
21-22	RYD129A100	BOX ASSY,GEAR	1
22	RYD512T019B	MOTOR,STEPPING	1
23	RYD504A028	HARNESS ASSY	1
24	RYD423A009	HOSE,DRAIN	1
25	SSA326A047	PLUG	1
26	RYD111A017A	BASE ASSY	1
27	RYD129A084	CASE,MOTOR(U)	1
28	RYD129A085	CASE,MOTOR(L)	1
29	RYG923C001	BEARING,PLANE	1
30	RYD431G002	IMPELLER	1
31	RYD512T022A	MOTOR,DC	1
32	RYD032A007A	PLATE,INSTALLATION	1
33	RYD129A103A	COVER(PIPE)	1
34	RYD913A003	SCREW,TAP	10
35	RYD132A011A	LID	1

# PANEL & FAN ASSY

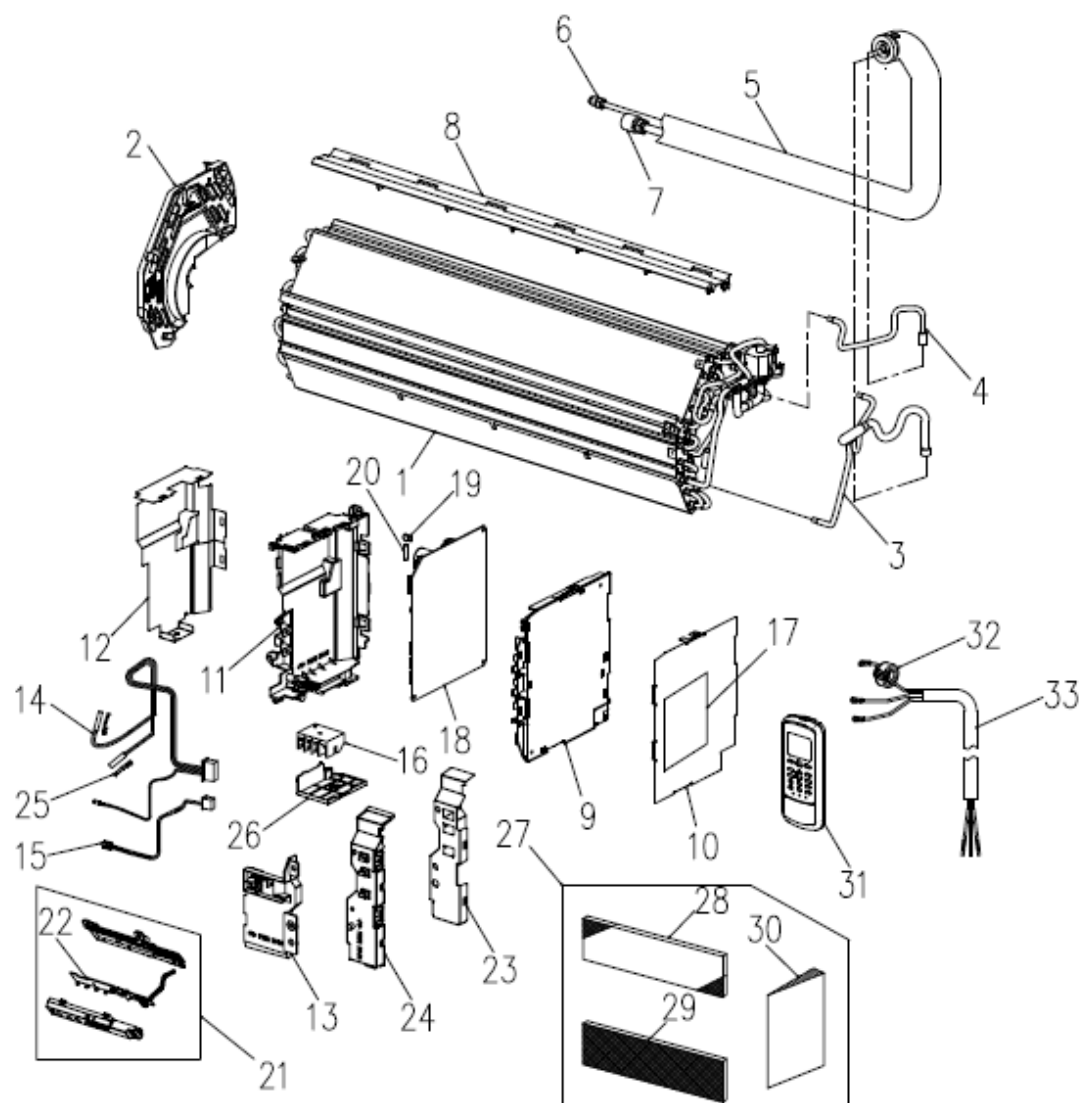


SRK20MA-S-HEAT EXCH.&CONTROL

NO.	Parts No	Parts Name	RE.Q
1-8	RYD301A057B	HEAT EXCH ASSY(AIR)	1
2	RYD129A093	BRACKET(L)	1
3	RYD315D031	HEADER ASSY	1
4	RYD321A139	PIPE	1
5-7	RYD321A140C	PIPE ASSY	1
6	RYG323F002	UNION,SOLDER	1
7	RYG323F002A	UNION,SOLDER	1
8	RYD129A089	PLATE,BAFFLE	1
9-20	RYD501A073H	CONTROL ASSY, UNIT	1
9-10	RYD142A083	BOX ASSY,CONTROL(R)	1
9	RYD142A081	BOX,CONTROL(R)	1
10	RYD132A006	COVER,CONTROL(R)	1
11-12	RYD142A082	BOX ASSY,CONTROL(L)	1
11	RYD142A080	BOX,CONTROL(L)	1
12	RYD132A007	COVER,CONTROL(L)	1
13	RYD129A092	COVER,BEND	1
14	RYD551A010	SENSOR ASSY	1
15	SSA551B017A	SENSOR(HUMIDITY)	1
16	RYG561B001A	BLOCK,TERMINAL	1
17	RYD011G020D	LABEL,WIRING	1

18-20	RYD505A048F	PWB ASSY	1
19	RYG555B002A	VARISTOR	1
20	RYG564A003	FUSE(CURRENT)	1
21	RYD503A016	DISPLAY ASSY	1
22	RYD505A016	PWB ASSY(DISPLAY)	1
23-24	RYD132A010	LID ASSY,CONTROL	1
23	RYD132A009	LID,CONTROL	1
24	RYD132A008	COVER,LID	1
25	RYA941F001	SPRING,LEAF	1
26	RYD129A104	COVER ASSY(TB)	1
27	RYD008A046B	PARTS SET	1
28	RYD437A004A	FILTER ASSY,CLEAN(PP,HEPA)	1
29	RYD437A010A	FILTER ASSY,CLEAN(PP,HEPA)	1
30	RYD012A193	MANUAL,INSTRUCTION&INS	1
31	RLA502A001D	CONTROL ASSY,REMOTE	1
32	SSA554D183	KILLER,NOISE	1
33	RYD566A092	CORD,POWER	1
( 34 )	RYD011H050	LIST,LABEL(ENERGY)	1

# HEAT EXCH & CONTROL



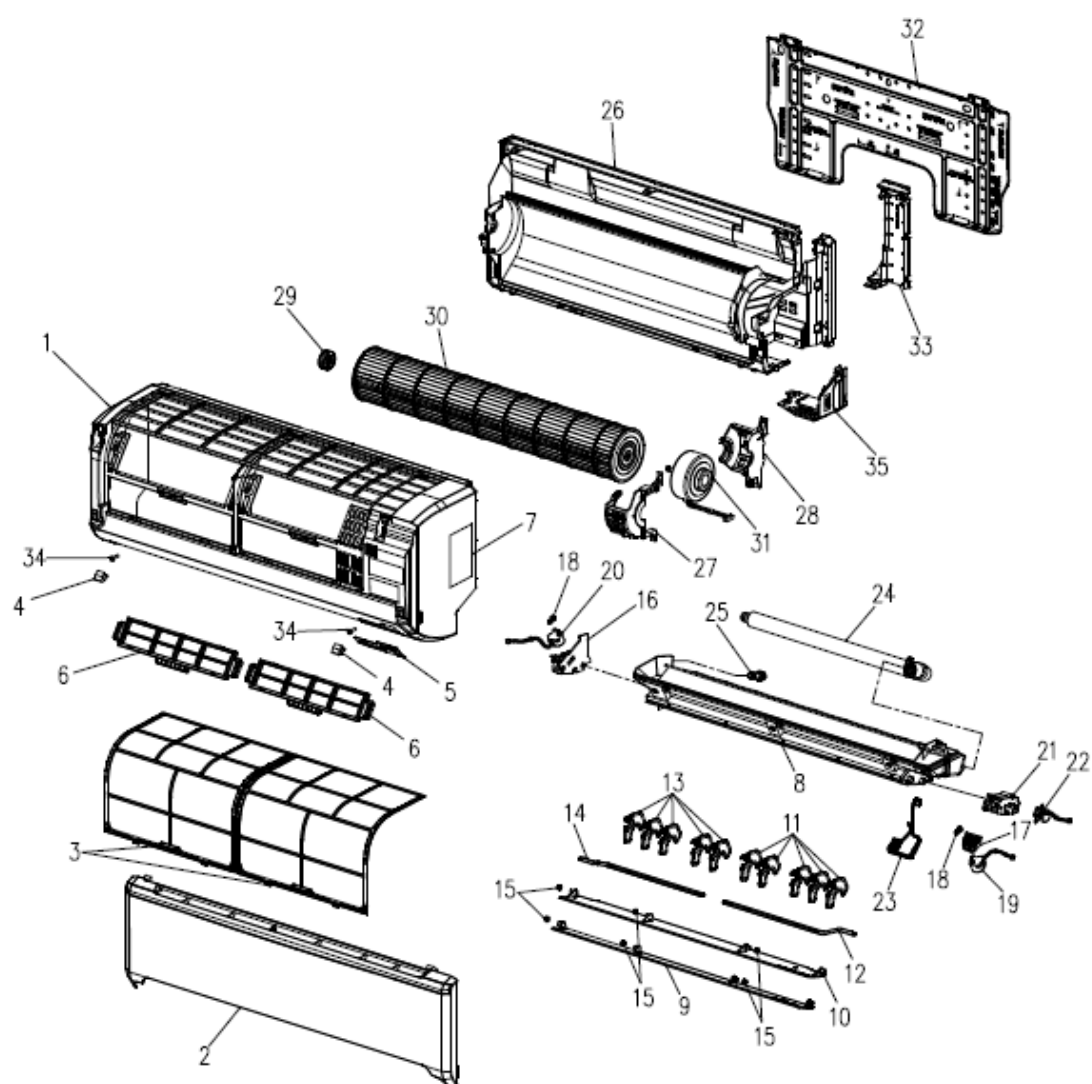
### 8.1.2 SRK25MA-S

SRK25MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1-7	RYD102A033H	PANEL ASSY,FRONT	1
1	RYD122A057C	PANEL,FRONT	1
2	RYD435A056G	GRILLE,AIR INLET	1
3	RYD437A030	FILTER,AIR	2
4	RYD129A088A	CAP	2
5	RYD133A049	PLATE ASSY,ORNAMENT	1
6	RYD129A047	HOLDER,FILTER	2
7	RYD011F037A	LABEL,MODEL NAME	1
8-26	RYD435A054A	GRILLE ASSY,AIR OUT	1
8	RYD435A055	GRILLE,AIR OUTLET	1
9	RYD436A033A	FLAP(A)	1
10	RYD436A034A	FLAP(B)	1
11-12	RYD436A035	LOUVER ASSY(R)	1
11	RYD436A037	LOUVER	5
12	RYD129A096	PLATE,CONNECTING(R)	1
13-14	RYD436A036	LOUVER ASSY(L)	1
13	RYD436A037	LOUVER	5
14	RYD129A097	PLATE,CONNECTING(L)	1
15	RYD935C005	COLLAR	6



16	RYD129A098	BRACKET,MOTOR(L)	1
17	RYD129A099	BRACKET,MOTOR(R)	1
18	RYD144A018	CRANK(C)	2
19	RYD512T002J	MOTOR,STEPPING	1
20	RYD512T002K	MOTOR,STEPPING	1
21-22	RYD129A100	BOX ASSY,GEAR	1
22	RYD512T019B	MOTOR,STEPPING	1
23	RYD504A028	HARNESS ASSY	1
24	RYD423A009	HOSE,DRAIN	1
25	SSA326A047	PLUG	1
26	RYD111A017A	BASE ASSY	1
27	RYD129A084	CASE,MOTOR(U)	1
28	RYD129A085	CASE,MOTOR(L)	1
29	RYG923C001	BEARING,PLANE	1
30	RYD431G002	IMPELLER	1
31	RYD512T022A	MOTOR,DC	1
32	RYD032A007A	PLATE,INSTALLATION	1
33	RYD129A103A	COVER(PIPE)	1
34	RYD913A003	SCREW,TAP	10
35	RYD132A011A	LID	1

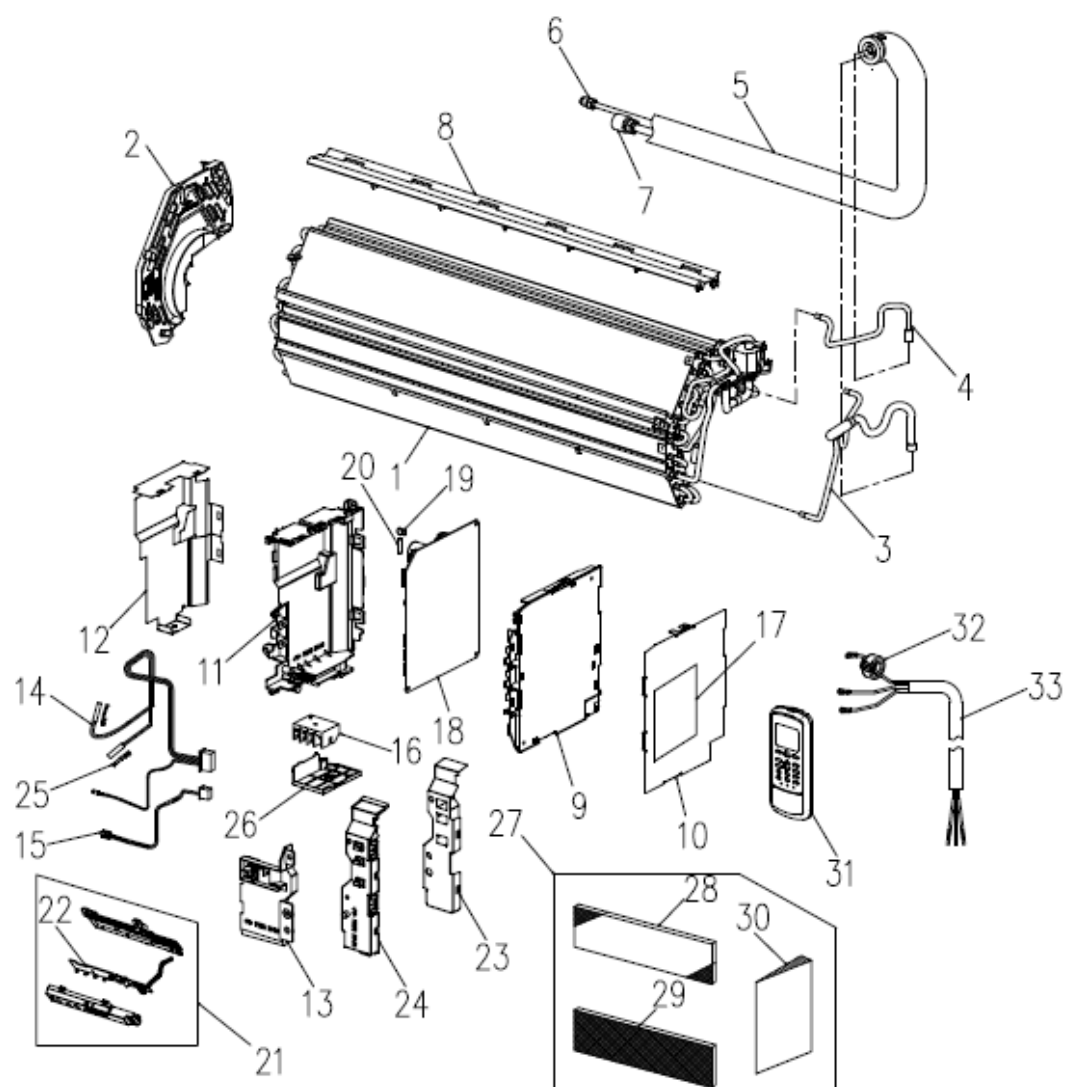
# PANEL & FAN ASSY



SRK25MA-S-HEAT EXCH.&CONTROL			
NO.	Parts No	Parts Name	RE.Q
1-8	RYD301A057B	HEAT EXCH ASSY(AIR)	1
2	RYD129A093	BRACKET(L)	1
3	RYD315D031	HEADER ASSY	1
4	RYD321A139	PIPE	1
5-7	RYD321A140C	PIPE ASSY	1
6	RYG323F002	UNION,SOLDER	1
7	RYG323F002A	UNION,SOLDER	1
8	RYD129A089	PLATE,BAFFLE	1
9-20	RYD501A073J	CONTROL ASSY, UNIT	1
9-10	RYD142A083	BOX ASSY,CONTROL(R)	1
9	RYD142A081	BOX,CONTROL(R)	1
10	RYD132A006	COVER,CONTROL(R)	1
11-12	RYD142A082	BOX ASSY,CONTROL(L)	1
11	RYD142A080	BOX,CONTROL(L)	1
12	RYD132A007	COVER,CONTROL(L)	1
13	RYD129A092	COVER,BEND	1
14	RYD551A010	SENSOR ASSY	1
15	SSA551B017A	SENSOR(HUMIDITY)	1
16	RYG561B001A	BLOCK,TERMINAL	1
17	RYD011G020D	LABEL,WIRING	1

18-20	RYD505A048G	PWB ASSY	1
19	RYG555B002A	VARISTOR	1
20	RYG564A003	FUSE(CURRENT)	1
21	RYD503A016	DISPLAY ASSY	1
22	RYD505A016	PWB ASSY(DISPLAY)	1
23-24	RYD132A010	LID ASSY,CONTROL	1
23	RYD132A009	LID,CONTROL	1
24	RYD132A008	COVER,LID	1
25	RYA941F001	SPRING,LEAF	1
26	RYD129A104	COVER ASSY(TB)	1
27	RYD008A046B	PARTS SET	1
28	RYD437A004A	FILTER ASSY,CLEAN(PP,HEPA)	1
29	RYD437A010A	FILTER ASSY,CLEAN(PP,HEPA)	1
30	RYD012A193	MANUAL,INSTRUCTION&INS	1
31	RLA502A001D	CONTROL ASSY,REMOTE	1
32	SSA554D183	KILLER,NOISE	1
33	RYD566A092	CORD,POWER	1
( 34 )	RYD011H050A	LIST,LABEL(ENERGY)	1

# HEAT EXCH & CONTROL

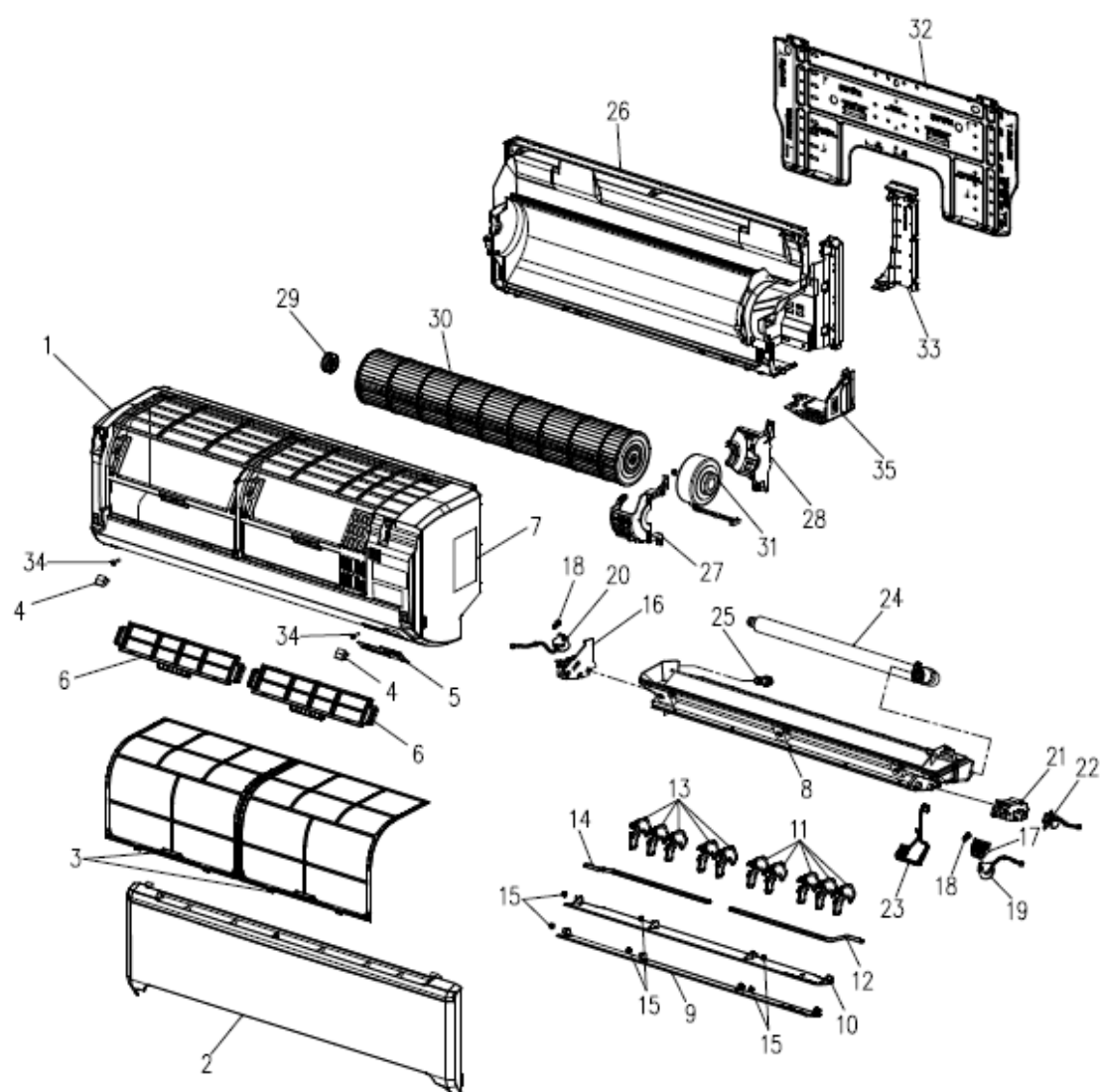


### 8.1.3 SRK35MA-S

SRK35MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1-7	RYD102A033H	PANEL ASSY,FRONT	1
1	RYD122A057C	PANEL,FRONT	1
2	RYD435A056G	GRILLE,AIR INLET	1
3	RYD437A030	FILTER,AIR	2
4	RYD129A088A	CAP	2
5	RYD133A049	PLATE ASSY,ORNAMENT	1
6	RYD129A047	HOLDER,FILTER	2
7	RYD011F037B	LABEL,MODEL NAME	1
8-26	RYD435A054A	GRILLE ASSY,AIR OUT	1
8	RYD435A055	GRILLE,AIR OUTLET	1
9	RYD436A033A	FLAP(A)	1
10	RYD436A034A	FLAP(B)	1
11-12	RYD436A035	LOUVER ASSY(R)	1
11	RYD436A037	LOUVER	5
12	RYD129A096	PLATE,CONNECTING(R)	1
13-14	RYD436A036	LOUVER ASSY(L)	1
13	RYD436A037	LOUVER	5
14	RYD129A097	PLATE,CONNECTING(L)	1
15	RYD935C005	COLLAR	6

16	RYD129A098	BRACKET,MOTOR(L)	1
17	RYD129A099	BRACKET,MOTOR(R)	1
18	RYD144A018	CRANK(C)	2
19	RYD512T002J	MOTOR,STEPPING	1
20	RYD512T002K	MOTOR,STEPPING	1
21-22	RYD129A100	BOX ASSY,GEAR	1
22	RYD512T019B	MOTOR,STEPPING	1
23	RYD504A028	HARNESS ASSY	1
24	RYD423A009	HOSE,DRAIN	1
25	SSA326A047	PLUG	1
26	RYD111A017A	BASE ASSY	1
27	RYD129A084	CASE,MOTOR(U)	1
28	RYD129A085	CASE,MOTOR(L)	1
29	RYG923C001	BEARING,PLANE	1
30	RYD431G002	IMPELLER	1
31	RYD512T022A	MOTOR,DC	1
32	RYD032A007A	PLATE,INSTALLATION	1
33	RYD129A103A	COVER(PIPE)	1
34	RYD913A003	SCREW,TAP	10
35	RYD132A011A	LID	1

# PANEL & FAN ASSY

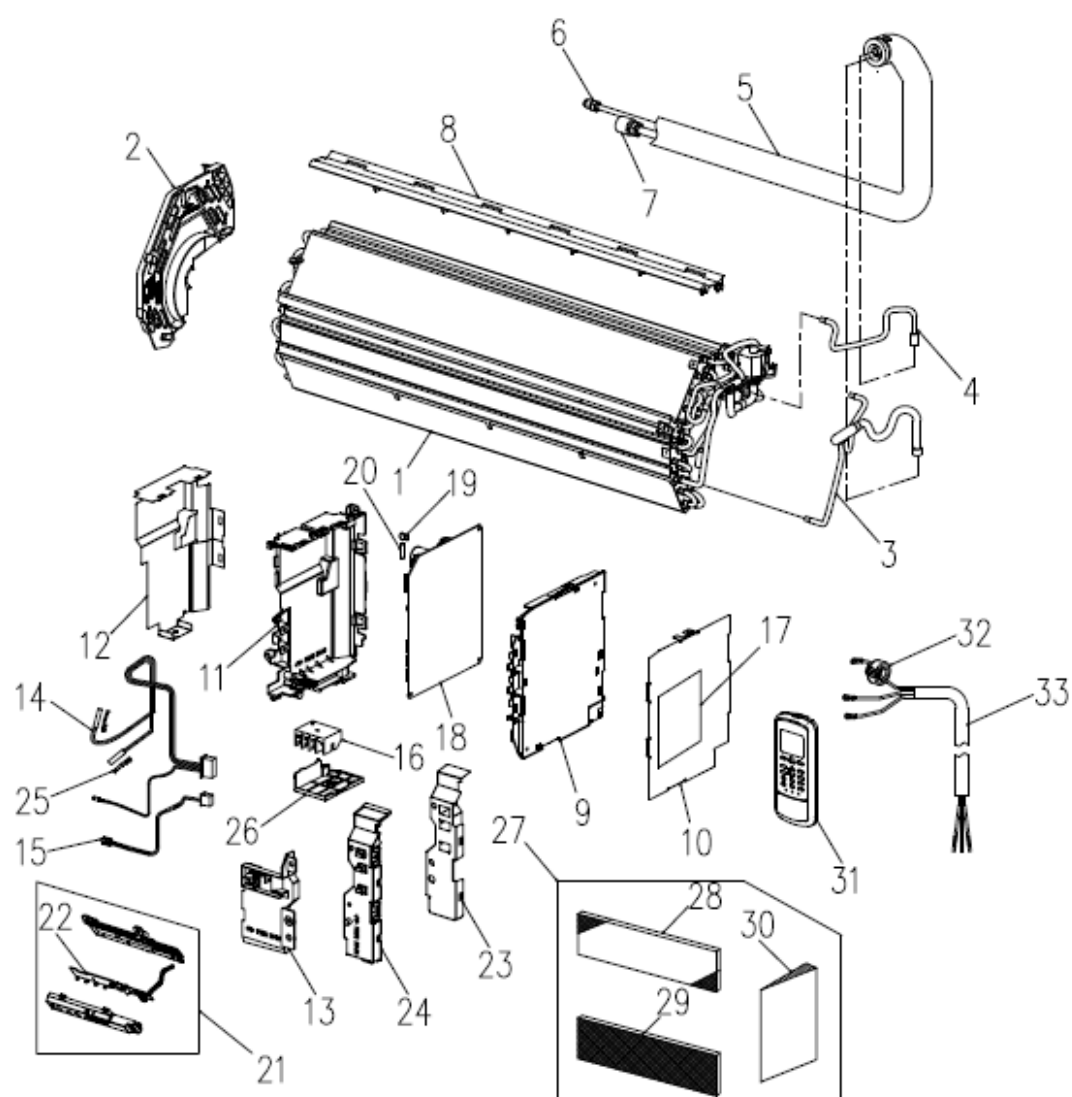




SRK35MA-S-HEAT EXCH.&CONTROL			
NO.	Parts No	Parts Name	RE.Q
1-8	RYD301A059F	HEAT EXCH ASSY(AIR)	1
2	RYD129A093	BRACKET(L)	1
3	RYD315D033	HEADER ASSY	1
4	RYD321A152	PIPE	1
5-7	RYD321A140C	PIPE ASSY	1
6	RYG323F002	UNION,SOLDER	1
7	RYG323F002A	UNION,SOLDER	1
8	RYD129A089	PLATE,BAFFLE	1
9-20	RYD501A073K	CONTROL ASSY, UNIT	1
9-10	RYD142A083	BOX ASSY,CONTROL(R)	1
9	RYD142A081	BOX,CONTROL(R)	1
10	RYD132A006	COVER,CONTROL(R)	1
11-12	RYD142A082	BOX ASSY,CONTROL(L)	1
11	RYD142A080	BOX,CONTROL(L)	1
12	RYD132A007	COVER,CONTROL(L)	1
13	RYD129A092	COVER,BEND	1
14	RYD551A010	SENSOR ASSY	1
15	SSA551B017A	SENSOR(HUMIDITY)	1
16	RYG561B001A	BLOCK,TERMINAL	1
17	RYD011G020D	LABEL,WIRING	1

18-20	RYD505A048H	PWB ASSY	1
19	RYG555B002A	VARISTOR	1
20	RYG564A003	FUSE(CURRENT)	1
21	RYD503A016	DISPLAY ASSY	1
22	RYD505A016	PWB ASSY(DISPLAY)	1
23-24	RYD132A010	LID ASSY,CONTROL	1
23	RYD132A009	LID,CONTROL	1
24	RYD132A008	COVER,LID	1
25	RYA941F001	SPRING,LEAF	1
26	RYD129A104	COVER ASSY(TB)	1
27	RYD008A046B	PARTS SET	1
28	RYD437A004A	FILTER ASSY,CLEAN(PP,HEPA)	1
29	RYD437A010A	FILTER ASSY,CLEAN(PP,HEPA)	1
30	RYD012A193	MANUAL,INSTRUCTION&INS	1
31	RLA502A001D	CONTROL ASSY,REMOTE	1
32	SSA554D183	KILLER,NOISE	1
33	RYD566A092	CORD,POWER	1
( 34 )	RYD011H050B	LIST,LABEL(ENERGY)	1

# HEAT EXCH & CONTROL

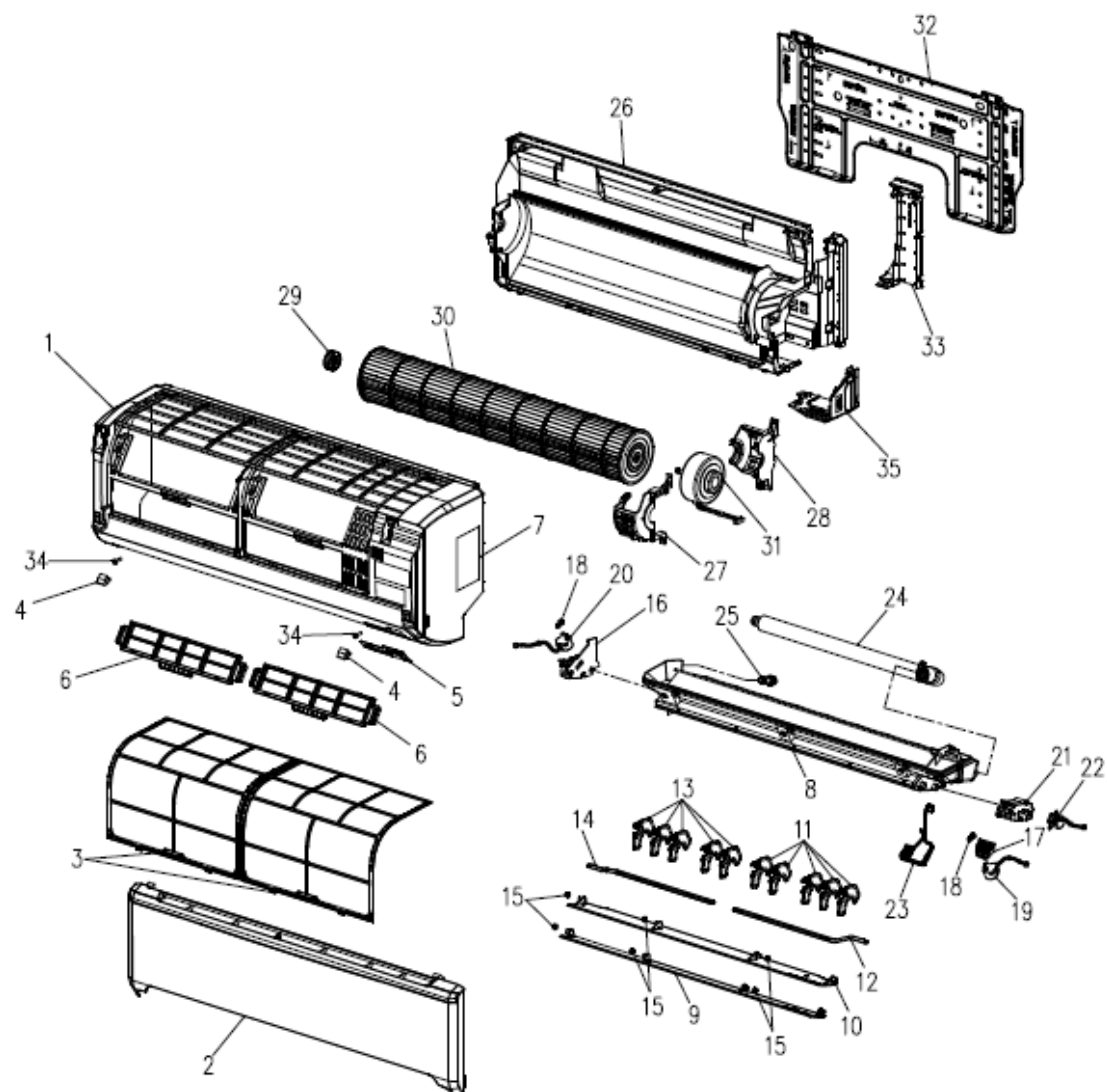


#### 8.1.4 SRK50MA-S

SRK50MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1-7	RYD102A033H	PANEL ASSY,FRONT	1
1	RYD122A057C	PANEL,FRONT	1
2	RYD435A056G	GRILLE,AIR INLET	1
3	RYD437A030	FILTER,AIR	2
4	RYD129A088A	CAP	2
5	RYD133A049	PLATE ASSY,ORNAMENT	1
6	RYD129A047	HOLDER,FILTER	2
7	RYD011F037C	LABEL,MODEL NAME	1
8-26	RYD435A054A	GRILLE ASSY,AIR OUT	1
8	RYD435A055	GRILLE,AIR OUTLET	1
9	RYD436A033A	FLAP(A)	1
10	RYD436A034A	FLAP(B)	1
11-12	RYD436A035	LOUVER ASSY(R)	1
11	RYD436A037	LOUVER	5
12	RYD129A096	PLATE,CONNECTING(R)	1
13-14	RYD436A036	LOUVER ASSY(L)	1
13	RYD436A037	LOUVER	5
14	RYD129A097	PLATE,CONNECTING(L)	1
15	RYD935C005	COLLAR	6

16	RYD129A098	BRACKET,MOTOR(L)	1
17	RYD129A099	BRACKET,MOTOR(R)	1
18	RYD144A018	CRANK(C)	2
19	RYD512T002J	MOTOR,STEPPING	1
20	RYD512T002K	MOTOR,STEPPING	1
21-22	RYD129A100	BOX ASSY,GEAR	1
22	RYD512T019B	MOTOR,STEPPING	1
23	RYD504A028	HARNESS ASSY	1
24	RYD423A009	HOSE,DRAIN	1
25	SSA326A047	PLUG	1
26	RYD111A017A	BASE ASSY	1
27	RYD129A084	CASE,MOTOR(U)	1
28	RYD129A085	CASE,MOTOR(L)	1
29	RYG923C001	BEARING,PLANE	1
30	RYD431G002	IMPELLER	1
31	RYD512T022A	MOTOR,DC	1
32	RYD032A007A	PLATE,INSTALLATION	1
33	RYD129A103A	COVER(PIPE)	1
34	RYD913A003	SCREW,TAP	10
35	RYD132A011A	LID	1

# PANEL & FAN ASSY

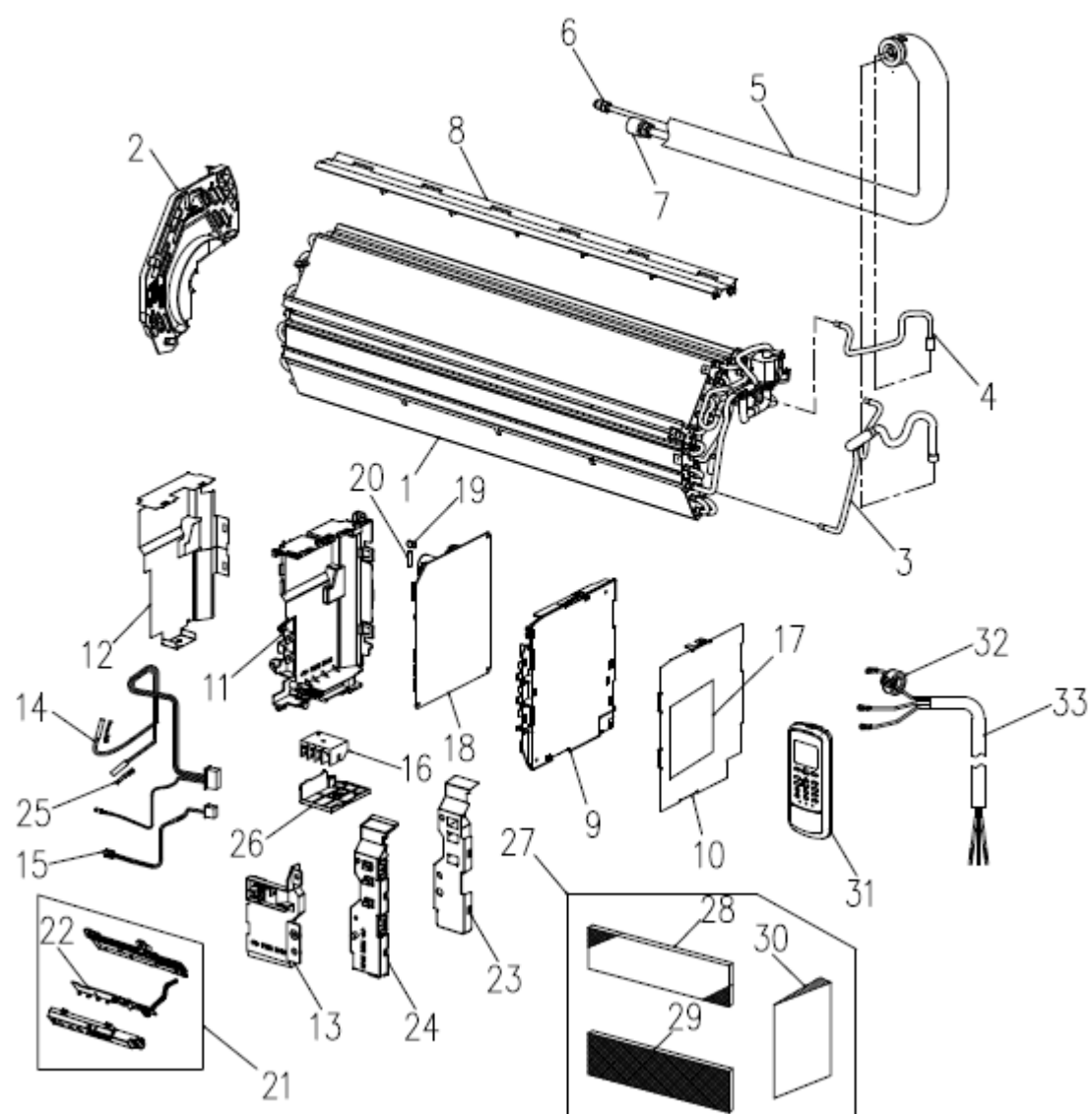


SRK50MA-S-HEAT EXCH.&CONTROL			
NO.	Parts No	Parts Name	RE.Q
1-8	RYD301A059B	HEAT EXCH ASSY(AIR)	1
2	RYD129A093	BRACKET(L)	1
3	RYD315D033	HEADER ASSY	1
4	RYD321A152	PIPE	1
5-7	RYD321A140B	PIPE ASSY	1
6	RYG323F002A	UNION,SOLDER	1
7	RYG323F002B	UNION,SOLDER	1
8	RYD129A089	PLATE,BAFFLE	1
9-20	RYD501A073L	CONTROL ASSY, UNIT	1
9-10	RYD142A083	BOX ASSY,CONTROL(R)	1
9	RYD142A081	BOX,CONTROL(R)	1
10	RYD132A006	COVER,CONTROL(R)	1
11-12	RYD142A082	BOX ASSY,CONTROL(L)	1
11	RYD142A080	BOX,CONTROL(L)	1
12	RYD132A007	COVER,CONTROL(L)	1
13	RYD129A092	COVER,BEND	1
14	RYD551A010	SENSOR ASSY	1
15	SSA551B017A	SENSOR(HUMIDITY)	1
16	RYG561B001A	BLOCK,TERMINAL	1
17	RYD011G020D	LABEL,WIRING	1

18-20	RYD505A048J	PWB ASSY	1
19	RYG555B002A	VARISTOR	1
20	RYD564A002	FUSE(CURRENT)	1
21	RYD503A016	DISPLAY ASSY	1
22	RYD505A016	PWB ASSY(DISPLAY)	1
23-24	RYD132A010	LID ASSY,CONTROL	1
23	RYD132A009	LID,CONTROL	1
24	RYD132A008	COVER,LID	1
25	RYA941F001	SPRING,LEAF	1
26	RYD129A104	COVER ASSY(TB)	1
27	RYD008A046B	PARTS SET	1
28	RYD437A004A	FILTER ASSY,CLEAN(PP,HEPA)	1
29	RYD437A010A	FILTER ASSY,CLEAN(PP,HEPA)	1
30	RYD012A193	MANUAL,INSTRUCTION&INS	1
31	RLA502A001D	CONTROL ASSY,REMOTE	1
32	SSA554D183	KILLER,NOISE	1
33	RYD566A092A	CORD,POWER	1
( 34 )	RYD011H050C	LIST,LABEL(ENERGY)	1



# HEAT EXCH & CONTROL



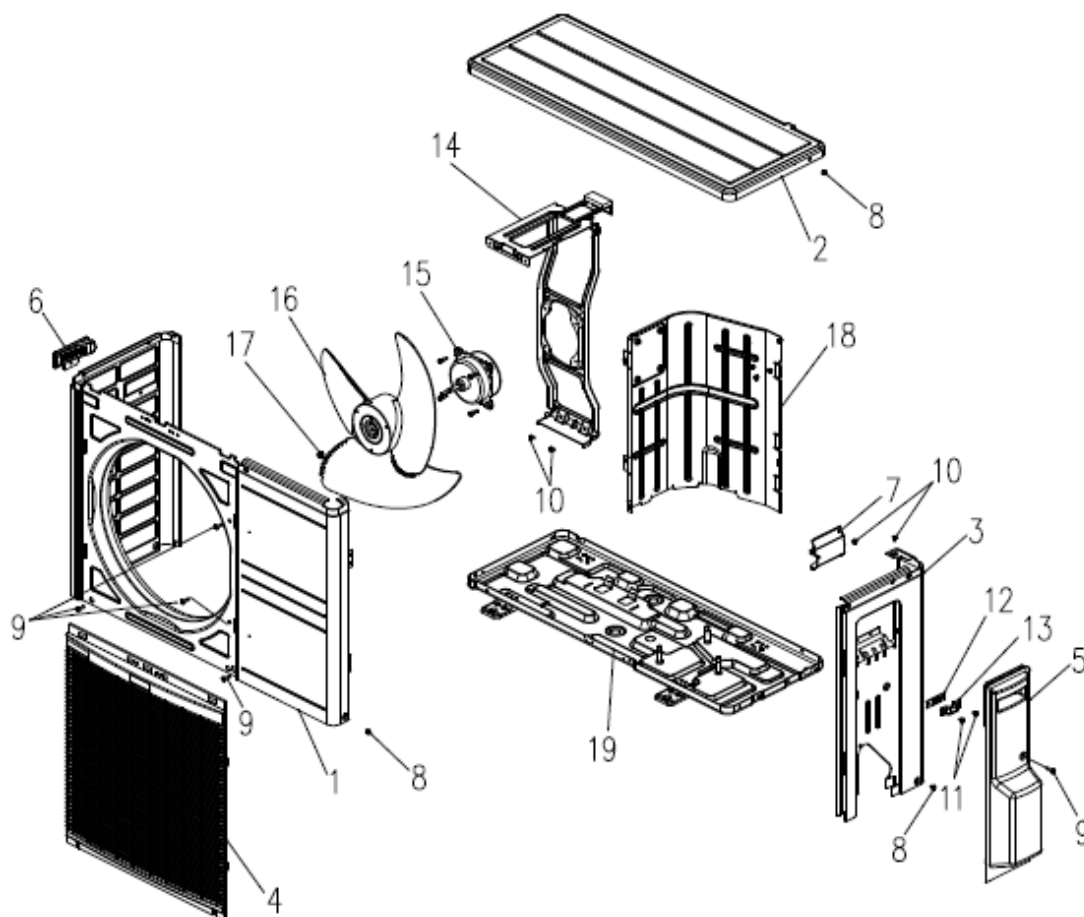
## 8.2 Outdoor unit

### 8.2.1 SRC20MA-S

SRC20MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1	RYF122A002	PANEL ASSY,FRONT	1
2	RYF124A001A	PANEL,TOP	1
3	RYF123A002	PANEL,SIDE(R)	1
4	RYF435A003A	GRILL ASSY,AIR OUT	1
5	RYF132A002	PANEL ASSY,SERVICE	1
6	RYF944B001	HANDLE	1
7	RYF142A013	COVER(TB)	1
8	RYF913A002	SCREW,TAP	12
9	RYF913A002A	SCREW,TAP	5
10	W010D04X008	TAP-SCREW,CRS-TRS 1	6
11	W010D04X012	TAP-SCREW,CRS-TRS 1	2
12	RYF129A006	PLATE	1
13	RYF937A002A	CLAMP,WIRE	1
14-18	RYF401A011G	FAN EQUIP ASSY	1
14	RYF116A006	BRACKET ASSY , MOTOR	1
15	RYF512T010	MOTOR,DC	1
16	RYF431B502	PROPELLER	1
17	SSA914B007AC	NUT,TH	1

18	RYF141A005	PLATE ,BAFFLE	1
19	RYF111A003F	BASE ASSY	1

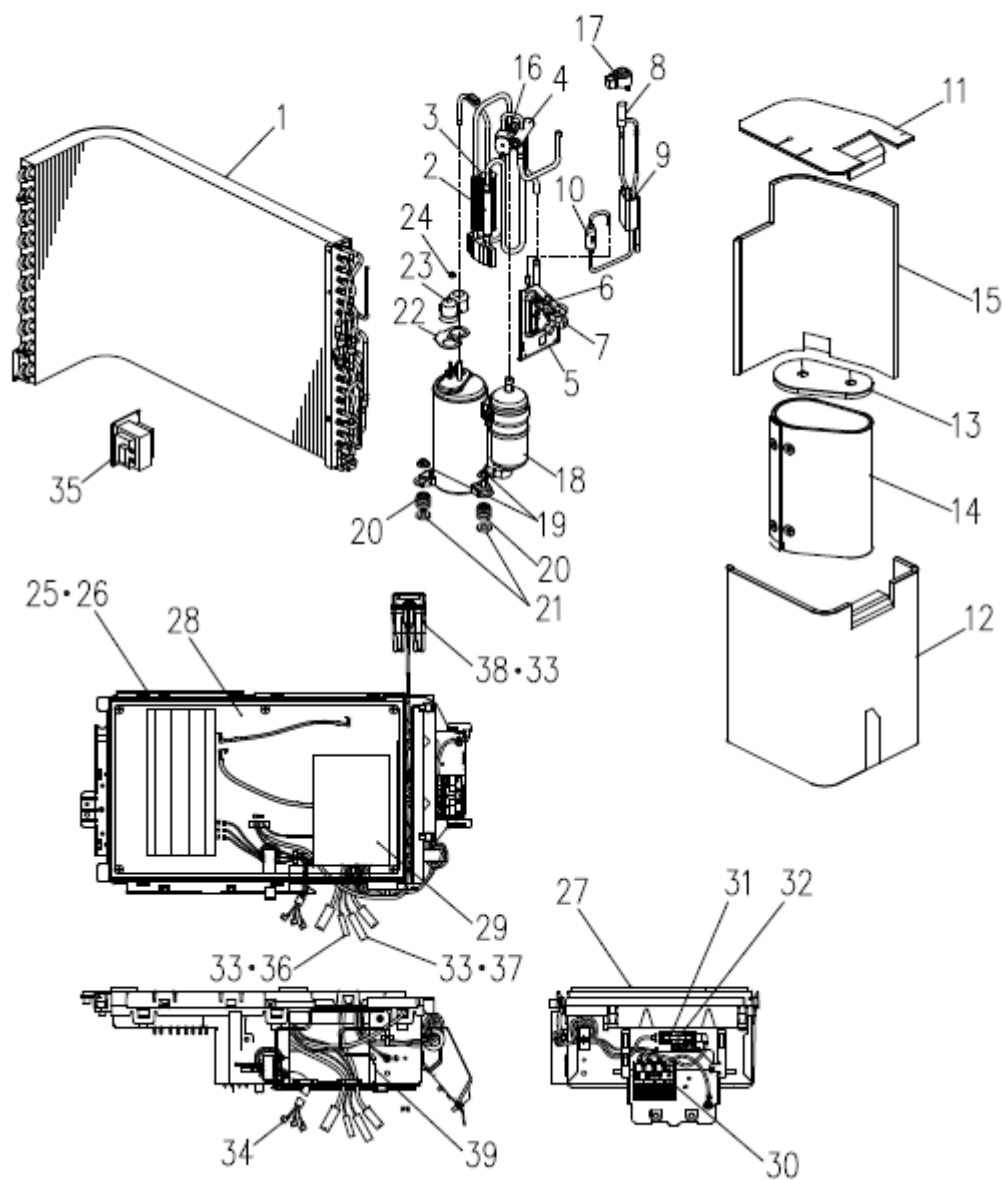
## PANEL & FAN ASSY



05000000 HEAT EXCHANGER CONTROL			
NO	PART NUMBER	PART NAME	QTY
1	DVE500110010	HEAT EXCHANGER (AIR)	1
23	DVE500110500	PIDING LOGS (MM)	1
2	DVE500510005	PIDING SHELL	1
2	DVE500510004	PIDING SHELL	1
1	DVE500000010	VALVE G (MM)	1
5	DVE511010000	BRACKET VALVE	1
2	DVE500110070	VALVE G (MM)	1
3	DVE500110000	VALVE G (MM)	1
2-10	DVE500110001	PIDING LOGS (EXHAUST)	1
2	0010000000000	VALVE BODY (EXHAUST)	1
2	DVE501500010	CAPILLARY	1
10	DVE500501000	STRAINER	1
11	DVE515100010	INSULATION COMP	1
10	DVE515100000	INSULATION COMP	1
10	DVE515100010	INSULATION COMP	1
11	DVE515100007	INSULATION COMP	1
15	DVE515100011	INSULATION COMP	1
10	DVE500000010	COIL COLENOID	1
13	0010000000000	COIL COLENOID	1
10	AUT0011000100	COMPRESSOR LOGS	1
10	001011000101	NUT FLANGE	2
20	DVE501100011	SHOULDER RUBBER	2
21	DVE500000010	RUBBER WHEELS	2
20	DVE500000010	PACKET COVER	1
20	DVE501500005	COVER TERMINAL	1
21	DVE501100000	NUT FLANGE	1
25-20	DVE500110005	CONTROL LOGS	1
25	DVE511010013	BOX LOGS (CONTROL)	1
20	DVE511010015	BOX LOGS (CONTROL (A))	1
23	DVE511010010	UP LOGS (CONTROL)	1
20	DVE500510000	PUMP LOGS	1
20	DVE501100000	LABEL WRING	1
20	DVE500100011	BLOCK TERMINAL	1
21	DVE500110000	HOLDER FLUO	1
20	DVE500110000	FLUO (CURRENT)	1
20	DVE551100000	SENSOR LOGS	1
21	DVE500110010	WRING LOGS	1
25	DVE551100011	REACTOR	1
20	DVE501100011	GRINDING LEAF	1
25	DVE500110001	GRINDING LEAF	1
20	DVE510011000	HOLDER SENSOR	1
20	DVE511010011	UP	1

13	DVE01H0030	LABEL MODEL NAME	1
14	DVE01H0000	NOT LABEL ENERGY	
15	DVE00001000	PARTS STANDARD	1

## HEAT EXCH & CONTROL

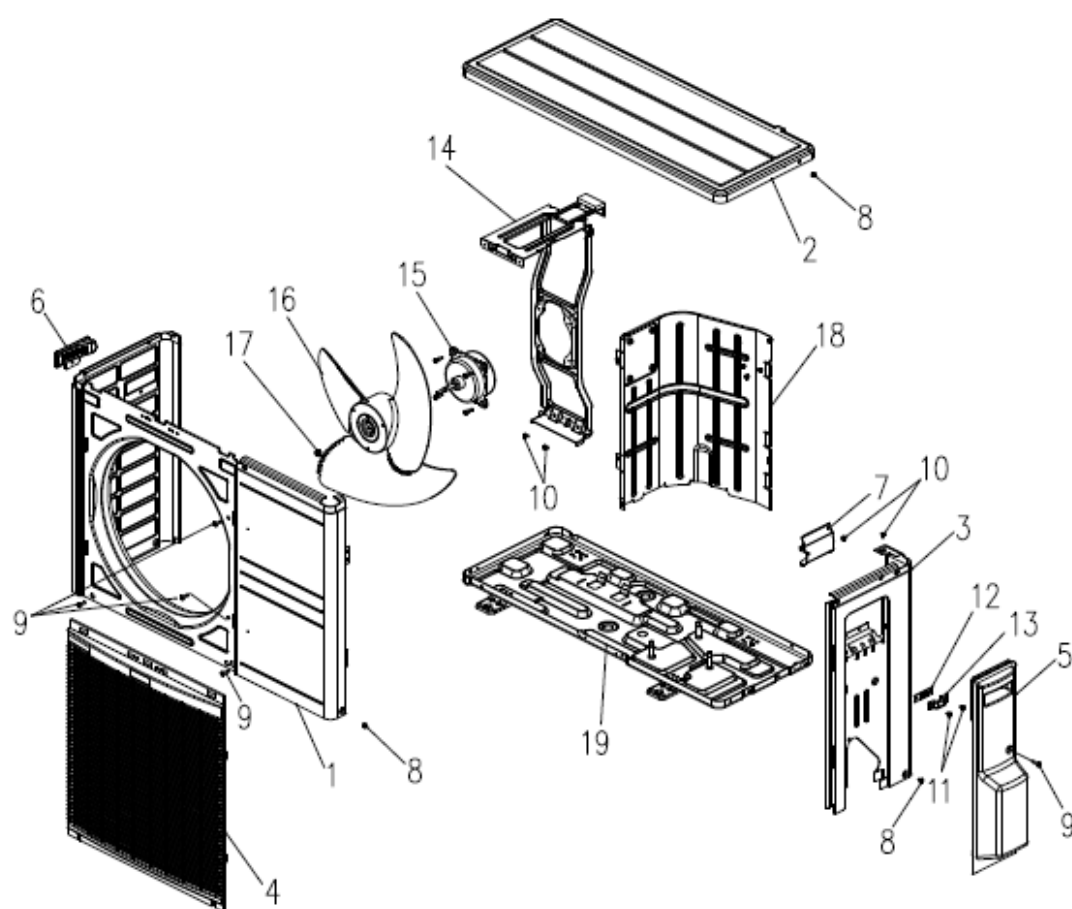


### 8.2.2 SRC25MA-S

SRC25MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1	RYF122A002	PANEL ASSY,FRONT	1
2	RYF124A001A	PANEL,TOP	1
3	RYF123A002	PANEL,SIDE(R)	1
4	RYF435A003A	GRILL ASSY,AIR OUT	1
5	RYF132A002	PANEL ASSY,SERVICE	1
6	RYF944B001	HANDLE	1
7	RYF142A013	COVER(TB)	1
8	RYF913A002	SCREW,TAP	12
9	RYF913A002A	SCREW,TAP	5
10	W010D04X008	TAP-SCREW,CRS-TRS 1	6
11	W010D04X012	TAP-SCREW,CRS-TRS 1	2
12	RYF129A006	PLATE	1
13	RYF937A002A	CLAMP,WIRE	1
14-18	RYF401A011G	FAN EQUIP ASSY	1
14	RYF116A006	BRACKET ASSY , MOTOR	1
15	RYF512T010	MOTOR,DC	1
16	RYF431B502	PROPELLER	1
17	SSA914B007AC	NUT,TH	1
18	RYF141A005	PLATE ,BAFFLE	1

19	RYF1111A003F	BASE ASSY	1
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## PANEL & FAN ASSY



PROCESS HEAT EXCHANGER CONTROL			
NO	P.I.N	P.I.N	REQ
1	DVE001A000	HEAT EXCHANGER	1
23	DVE001A0500	PIPING LOGS/CMH	1
2	DVE005A005	PIPE SHELL	1
2	DVE005A000	PIPE SHELL	1
4	DVE0000000	VALVE 0/CMH	1
5	DVE1A0A000	BRACKET VALVE	1
2	DVE001A070	VALVE 050/05/CMH	1
3	DVE001A000	VALVE 050/05/CMH	1
2-10	DVE001A000	PIPING LOGS/EXCH	1
2	001003505	VALVE BODY/EXCH	1
2	DVE015B000	CAPILLARY	1
10	DVE0053A000	STRAINER	1
11	DVE15B000	INSULATION COMP	1
10	DVE15B000	INSULATION COMP	1
10	DVE15B000	INSULATION COMP	1
11	DVE15B007	INSULATION COMP	1
15	DVE15B000	INSULATION COMP	1
10	DVE0005000	COIL COLENOID	1
13	00100050000	COIL COLENOID	1
10	AUT001A000B0	COMPRESSOR LOGS	1
10	00101A00000	NUT FLANGE	2
20	DVE01A0000	SHOULDER RUBBER	2
21	DVE0000000	RUBBER WASHER	2
20	DVE0000000	GASKET COVER	1
20	0010150005	COVER TERMINAL	1
21	DVE01A0000	NUT FLANGE	1
25-20	DVE501A0005	CONTROL LOGS	1
25	DVE1A0A007	BOX LOGS/CONTROL	1
20	DVE1A0A005	BOX LOGS/CONTROL (A)	1
23	DVE1A0A000B	UP LOGS/CONTROL	1
20	DVE005A0000	SWR LOGS	1
20	DVE01A0000B	LABEL WRING	1
20	DVE001B0000	BLOCK TERMINAL	1
21	DVE001A0000	HOLDER FLUGE	1
20	DVE001A0000	FLUGE (CURRENT)	1
20	DVE055A0000	SENSOR LOGS	1
21	DVE501A0000	WRING LOGS	1
25	DVE551B0000	REACTOR	1
20	DVE01A0000	ORRING LEAF	1
23	DVE01A0000	ORRING LEAF	1



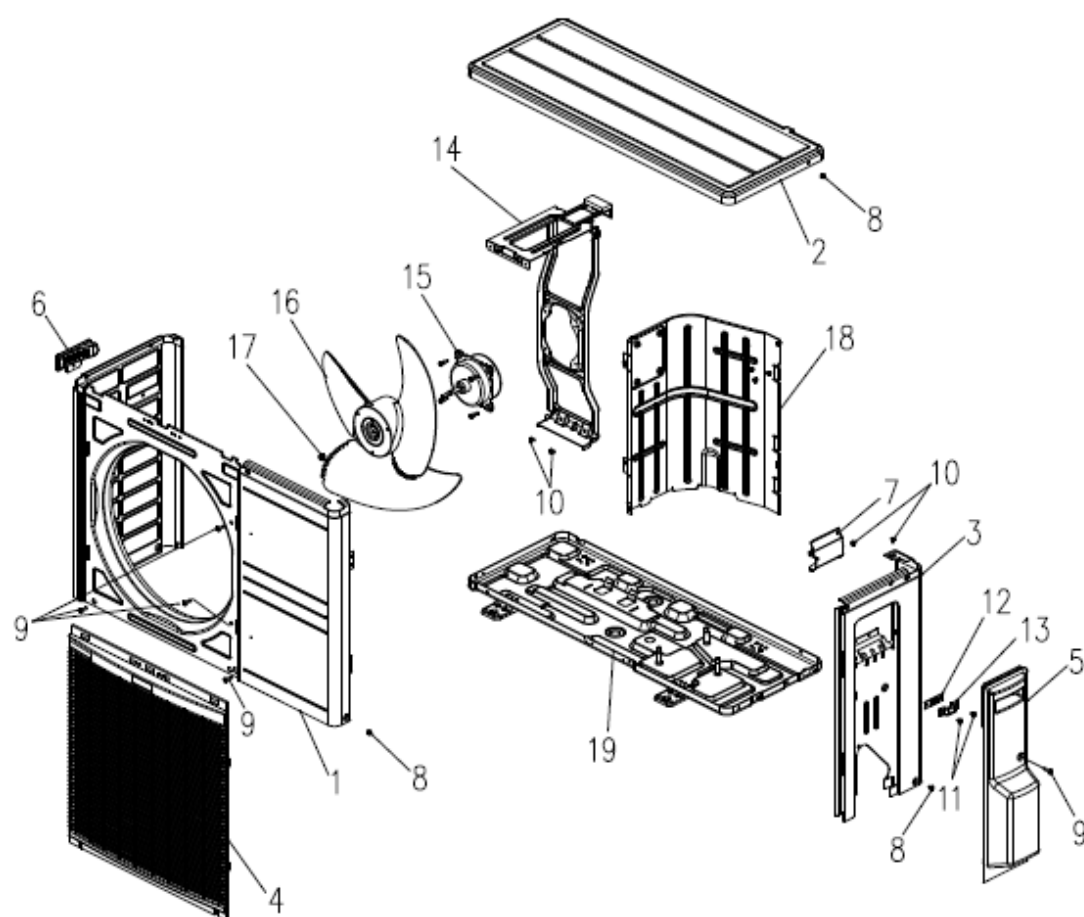


### 8.2.3 SRC35MA-S

SRC35MA-S-PANEL&FAN ASSY			
NO.	Parts No	Parts Name	RE.Q
1	RYF122A002	PANEL ASSY,FRONT	1
2	RYF124A001A	PANEL,TOP	1
3	RYF123A002	PANEL,SIDE(R)	1
4	RYF435A003A	GRILL ASSY,AIR OUT	1
5	RYF132A002	PANEL ASSY,SERVICE	1
6	RYF944B001	HANDLE	1
7	RYF142A013	COVER(TB)	1
8	RYF913A002	SCREW,TAP	12
9	RYF913A002A	SCREW,TAP	5
10	W010D04X008	TAP-SCREW,CRS-TRS 1	6
11	W010D04X012	TAP-SCREW,CRS-TRS 1	2
12	RYF129A006	PLATE	1
13	RYF937A002A	CLAMP,WIRE	1
14-18	RYF401A011G	FAN EQUIP ASSY	1
14	RYF116A006	BRACKET ASSY , MOTOR	1
15	RYF512T010	MOTOR,DC	1
16	RYF431B502	PROPELLER	1
17	SSA914B007AC	NUT,TH	1
18	RYF141A005	PLATE ,BAFFLE	1

19	RYF111A003F	BASE ASSY	1
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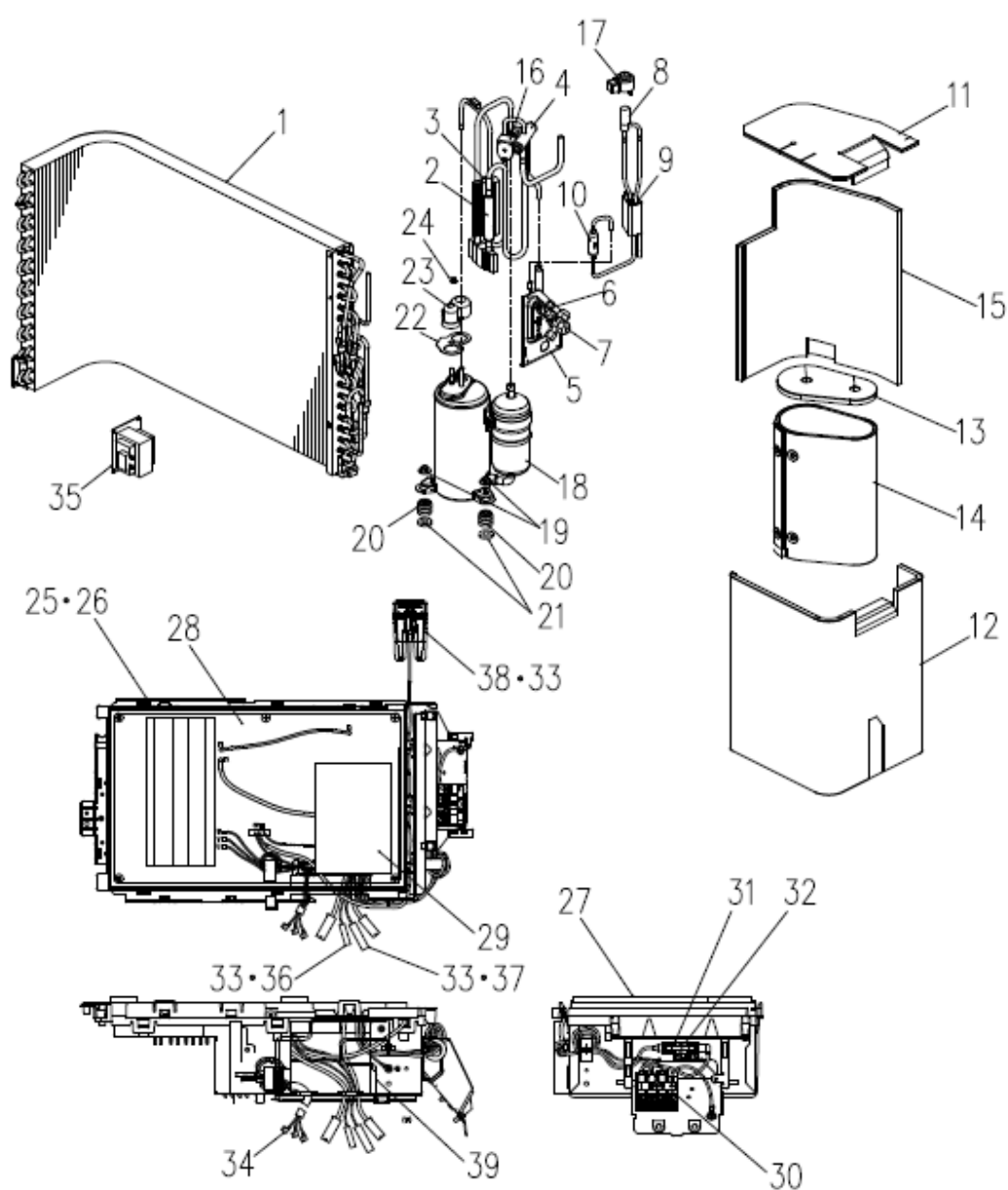
## PANEL & FAN ASSY



050055M-0 HEAT EXCHANGER CONTROL			
NO	PART NO	PART NAME	REQ
1	DVE500110003	HEAT EXCHANGER (AIR)	1
23	DVE500110500	PIDING LOGS (MM)	1
2	DVE500510005	PIDING SHELL	1
2	DVE500510004	PIDING SHELL	1
4	DVE500000010	VALVE G (MM)	1
5	DVE501010000	BRACKET VALVE	1
2	DVE500110030	VALVE G (MM)	1
3	DVE500110000	VALVE G (MM)	1
2-10	DVE500110004	PIDING LOGS (EXHAUST)	1
2	0010035004	VALVE BODY (EXHAUST)	1
2	DVE50150010	CAPILLARY	1
10	DVE505310000	OTRAINER	1
11	DVE51510010	INSULATION COMP	1
10	DVE51510000	INSULATION COMP	1
10	DVE51510010	INSULATION COMP	1
11	DVE51510007	INSULATION COMP	1
15	DVE51510011	INSULATION COMP	1
10	DVE50005010	COIL COLENOID	1
13	00100005010000	COIL COLENOID	1
10	AUT001100100	COMPRESSOR LOGS	1
10	00101100101	NUT FLANGE	2
20	DVE50110011	SHOULDER RUBBER	2
21	DVE50000010	RUBBER WHEEL	2
20	DVE50000010	RACKET COVER	1
20	DVE50130005	COVER TERMINAL	1
21	DVE50110000	NUT FLANGE	1
25-20	DVE501100105	CONTROL LOGS	1
25	DVE50110013	BOX LOGS (CONTROL)	1
20	DVE50110015	BOX LOGS (CONTROL)	1
23	DVE50110015	BOX LOGS (CONTROL)	1
20	DVE500510000	PIDING LOGS	1
20	DVE501100005	LABEL WIRING	1
20	DVE50110011	BLOCK TERMINAL	1
21	DVE50110000	HOLDER FLUKE	1
20	DVE50110000	FLUKE (CURRENT)	1
20	DVE50110000	SENSOR LOGS	1
21	DVE50110010	WIRING LOGS	1
25	DVE50110011	REACTOR	1
20	DVE50110011	ADDING LEAF	1
25	DVE50110011	ADDING LEAF	1
20	DVE50110000	HOLDER SENSOR	1
20	DVE50110011	LEAF	1

(10)	DVEG4H000P	LABEL MODEL NAME	
(11)	DVEG4H000P	NOT LABEL ENERGY	
(12)	DVEG000A000	PARTS STANDARD	

## HEAT EXCH & CONTROL



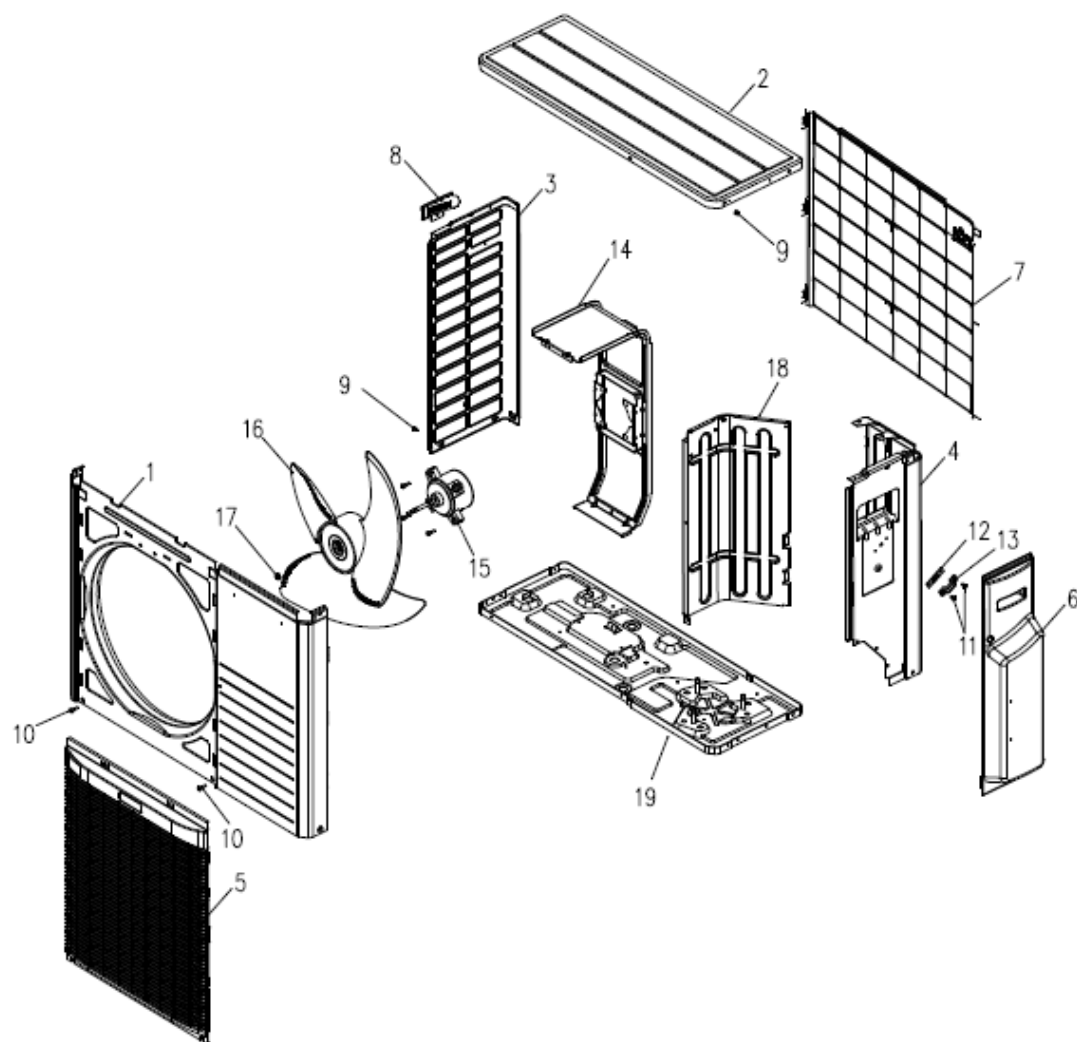
#### 8.2.4 SRC50MA-S

##### SRC50MA-S-PANEL&FAN ASSY

NO.	Parts No	Parts Name	RE.Q
1	RYC122A200	PANEL ASSY,FRONT	1
2	RYF124A200A	PANEL, TOP	1
3	RYC123A201	PANEL ASSY, SIDE(R)	1
4	RYC123A200	PANEL, SIDE(L)	1
5	RYF435A200A	GRILL ,AIR OUT	1
6	RYC132A200	PANEL ,SERVICE	1
7	RYC131A200	GUARD, FIN	1
8	RYS944B200	HANDLE	1
9	RYF913A002	SCREW, TAP	15
10	RYF913A002A	SCREW, TAP	6
11	W010D04X008	TAP-SCREW, CRS-TRS 1	4
12	RYF129A006	PLATE	1
13	RYF937A002A	CLAMP, WIRE	1
14-18	RYF401A504	FAN EQUIP ASSY	1
14	RYC116A200	BRACKET , MOTOR	1
15	RYF512T011	MOTOR, DC	1
16	RYF431B504	PROPELLER	1
17	SSA914B007AC	NUT, TH	1
18	RYF141A009	PLATE ASSY, BAFFLE	1

19	RYF111A002G	BASE ASSY	1
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## PANEL & FAN ASSY

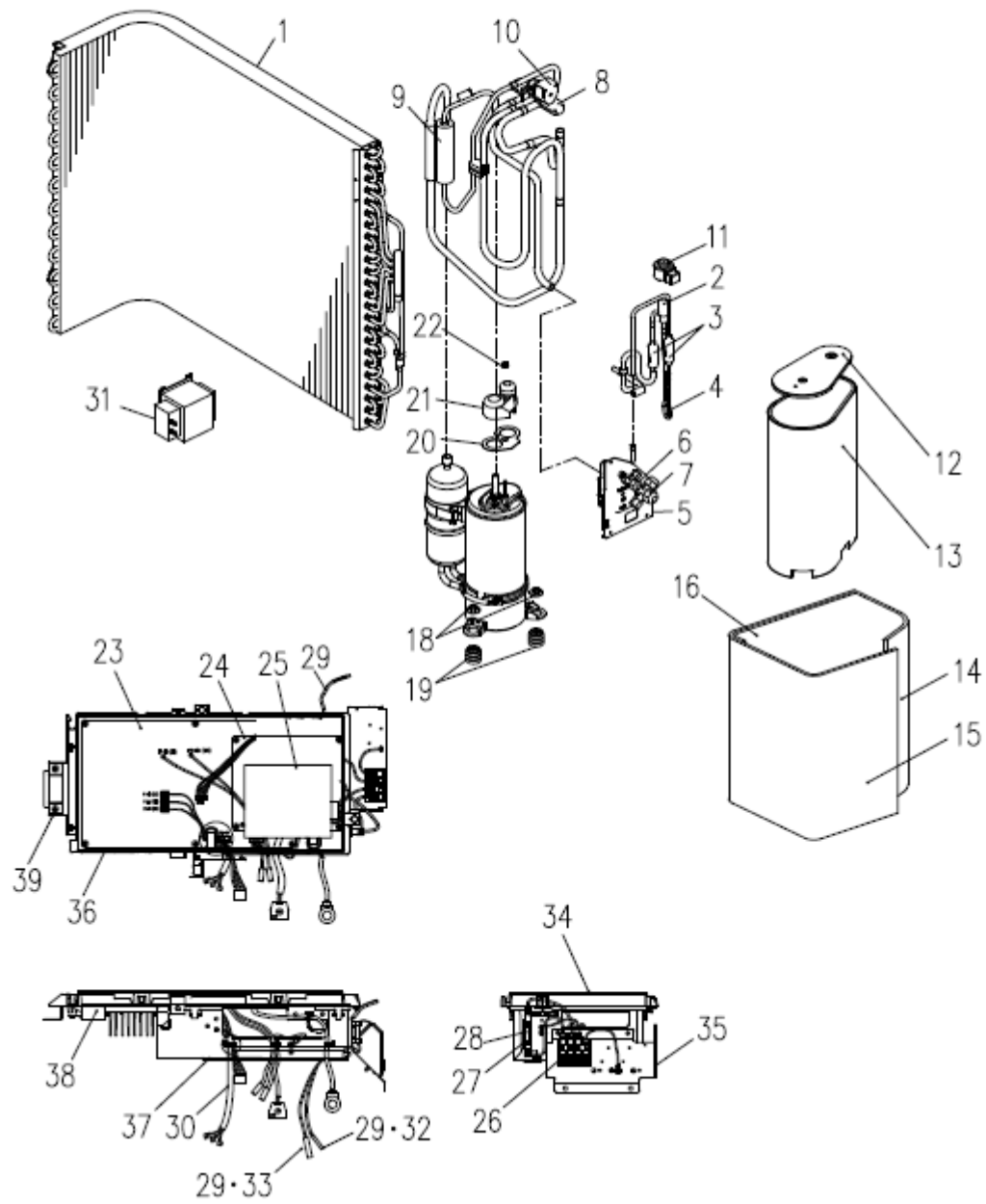


050504M-0 HEAT EXCHANGER CONTROL

NO	PART NO	PART NAME	REQ
1	BV500415031	HEAT EXCHANGER(MB)	1
2.1	BV500415001	PIPING 100V(CARB)	1
3	00100075051	VALVE BODY(EVR)	1
4	BV000531000	STRAINER	2
4	BV50150511	CAPILLARY	1
5.0	BV500415030	PIPING 100V(MMM)	1
5	BV011010005	BRACKET VALVE	1
6	BV500410101	VALVE SERV(05/1/10)	1
7	BV500410501	VALVE SERV(05/1/10)	1
8	00100000000	VALVE 0(MMM)	1
9	BV000510001	PIPE SUELL	1
10	BV500005011	COIL COLENOID	1
11	00100005010	COIL COLENOID	1
12	BV515100010	INSULATION COMP	1
13	BV515100011	INSULATION COMP	1
14	BV515100001	INSULATION COMP	1
15	BV515100003	INSULATION COMP	1
16	BV515100000	INSULATION COMP	1
17	MT0001010101	COMPRESSOR 100V	1
18	00100100101	NUT FLANGE	2
19	BV501100111	GROMMET RUBBER	2
20	BV50000010	GASKET COVER	1
21	00101310005	COVER TERMINAL	1
22	BV501100000	NUT FLANGE	1
23	BV550415030	CONTROL 100V	1
24	BV550515000	DWD 100V(MMM)	1
24	BV550515010	DWD 100V(OLD)	1
25	BV501105000	LABEL WIRING	1
26	BV050100011	BLOCK TERMINAL	1
27	BV050110000	HOLDER FLUKE	1
28	BV050110000	FLUKE(CURRENT)	1
29	BV0551100031	SOLENOID 100V	1
30	BV550110001	WIRING 100V	1
31	00155100000	RELATOR	1
32	BV100150001	SPRING LEAF	1
33	BV000150001	SPRING LEAF	1
34	BV5110100000	UP 100V/CONTROL	1
35	BV511010010	BOX 100V/CONTROL	1
36	BV511010000	BOX CONTROL(A)	1
37	BV511010001	BOX CONTROL(B)	1
38	BV510010001	COVER TERMINAL	1
39	BV511010001	BRACKET	1
(10)	BV5004150030	LABEL MODEL NAME	1
(11)	BV5004100000	LABEL MODEL(ENERGY)	1



## HEAT EXCH & CONTROL



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**VARIABLE FREQUENCY WALL MOUNTED TYPE ROOM AIR CONDITIONERS**



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