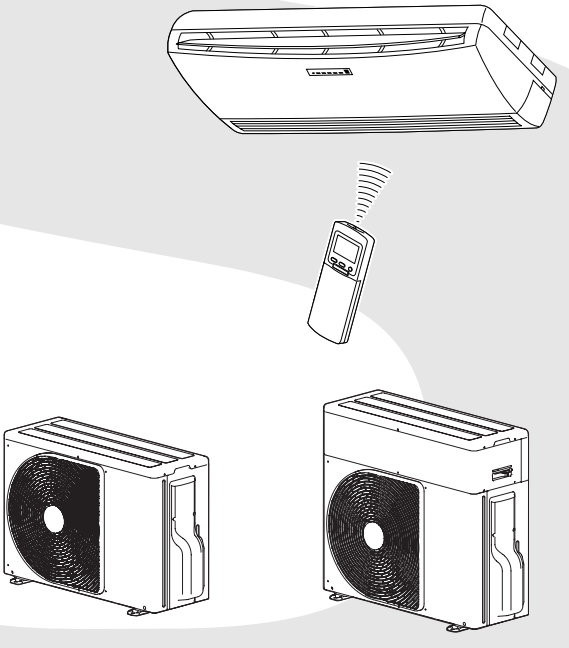
TOSHIBA

FILE NO. SVM-06021

AIR-CONDITIONER

UNDER CEILING / CONSOLE TYPE

RAS-18GFHP-ES2 / RAS-18GAH-ES2
RAS-18GFP-ES2 / RAS-18GA-ES2
RAS-24GFHP-ES2 / RAS-24GAH-ES2
RAS-24GFP-ES2 / RAS-24GA-ES2



18 Class **24 Class**

June, 2006

FILE NO. SVM-06021

CONTENTS

- This air conditioner is charged with HFC (R-410A) that does not deplete the Ozone layer.
- This air conditioner requires special service tools for the refrigerant R-410A.

1. SPECIFICATIONS

ITEM \ MODEL			RAS-18GFHP-ES2 RAS-18GAH-ES2				RAS-18GFP-ES2 RAS-18GA-ES2		RAS-24GFHP-ES2 RAS-24GAH-ES2				RAS-24GFP-ES2 RAS-24GA-ES2	
			Cooling		Heating		Cooling		Cooling		Heating		Cooling	
Capacity			220V	240V	220V	240V	220V	240V	220V	240V	220V	240V	220V	240V
		kW	5.00	5.10	5.70	5.75	5.30	5.35	6.20	6.30	7.0	7.10	6.80	6.85
Power source		Phase	1∅											
		V	220 – 240											
		Hz	50											
Power consumption		W	1960	2010	1830	1880	1950	2040	2515	2570	2430	2530	2640	2790
Power factor		%	99	96	97	90	98	92	91	88	85	83	95	91
Running current	Indoor	A	0.4						0.45					
	Outdoor	A	8.60	8.30	8.20	8.30	8.60	8.80	12.13	11.77	12.57	12.18	12.15	12.35
Starting current		A	36				33		54				54	
Moisture removal		lit/h	2.0						2.5				2.7	
Noise	Indoor (H/M/L)	db	43/41/39/37/36						46/44/42/39/37					
	Outdoor	db	52	53	53	54	51	52	56	57	57	58	56	57
Refrigerant	Name of refrigerant		R-410A											
	Rated amount	kg	1.15				1.26		1.90			1.70		
Refrigerant control			Capillary tube											
Interconnection pipe	Gas side size	mm	12.70											
	Connection type		Flare connection											
	Liquid side size	mm	6.35											
	Connection type		Flare connection											
	Maximum length (One way)	m	15*1											
			20*2						25*2					
	Maximum height difference	m	8						10					
INDOOR UNIT			**RAS-18GFHP-ES2**				**RAS-18GFP-ES2**		**RAS-24GFHP-ES2**				**RAS-24GFP-ES2**	
Dimensions	Width	mm	1093											
	Height	mm	633											
	Depth	mm	208											
Net weight		kg	23											
Evaporator type			Finned tube											
Indoor fan type			Multi blade fan											
Air volume	High fan	m^3/h	800		800		800		900		930		900	
	Medium fan	m^3/h	680		700		680		750		760		750	
	Low fan	m^3/h	580		650		580		550		660		650	
Fan motor output		W	50											
Air filter			Washable -filter											
OUTDOOR UNIT			**RAS-18GAH-ES2**				**RAS-18GA-ES2**		**RAS-24GAH-ES2**				**RAS-24GA-ES2**	
Dimensions	Width	mm	780				780		780					
	Height	mm	550				550		715					
	Depth	mm	290				290		290					
Net weight		kg	44				39		52				52	
Condenser type			Finned tube											
Outdoor fan type			Propeller fan											
Airflow volume		m^3/h	2350	2450	2350	2450	2120	2200	2400	2550	2400	2550	2400	2550
Fan motor output		W	42				42		42					
Compressor	Model		PA225X2CS-4KU1						PA290X3CS-4MU1					
	Output	W	1500						2160					
Safety device			IOL, Td Sensor				IOL		IOL, Td Sensor				IOL	
Louver type			Automatic louver											
Usable outdoor temperature range°C			15 ~ 43		–10 ~ 24		21 ~ 43		15 ~ 43		–10 ~ 24		21 ~ 43	

Note *1 Chargeless pipe.
*2 Maximum pipe.

Note : 1

- Capacity is based on the following temperature conditions.

Temperature \ Condition		JIS B615-1	
		Cooling	Heating
Indoor unit inlet air temperature	(DB)	27°C	20°C
	(WB)	19°C	15°C
Outdoor unit inlet air temperature	(DB)	35°C	7°C
	(WB)	24°C	6°C

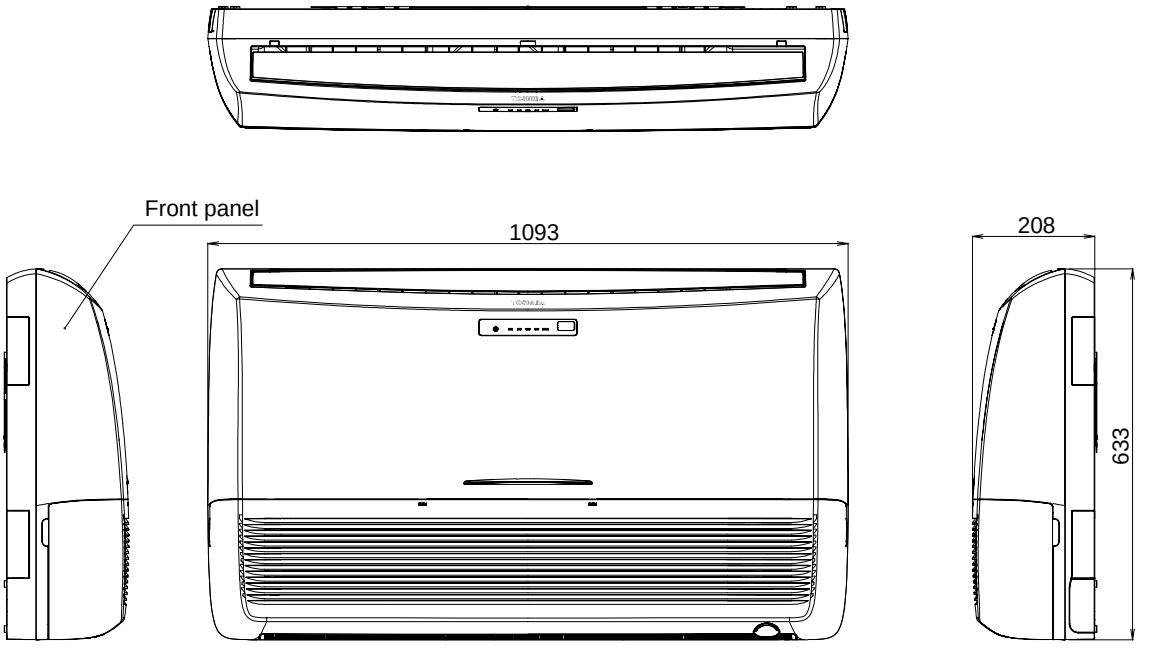
Note : 2

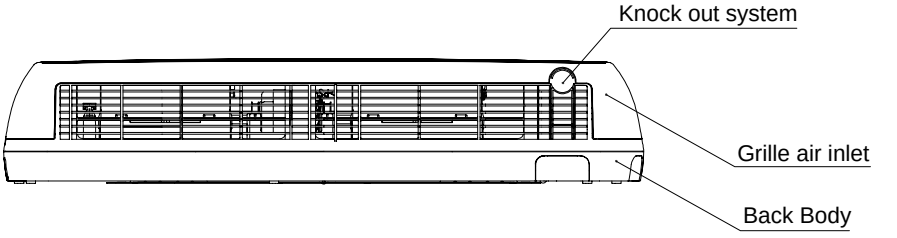
- Charge refrigerant according to the table below.

	Refrigerant	RAS-18GFHP-ES2 / RAS-18GAH-ES2 RAS-18GFP-ES2 / RAS-18GA-ES2	RAS-24GFHP-ES2 / RAS-24GAH-ES2 RAS-24GFP-ES2 / RAS-24GA-ES2
*1	No need to charge refrigerant	15m or less	15m or less
*2	Need to charge refrigerant	Over 15m up to 20m (20g/m)	Over 15m up to 25m (30g/m)

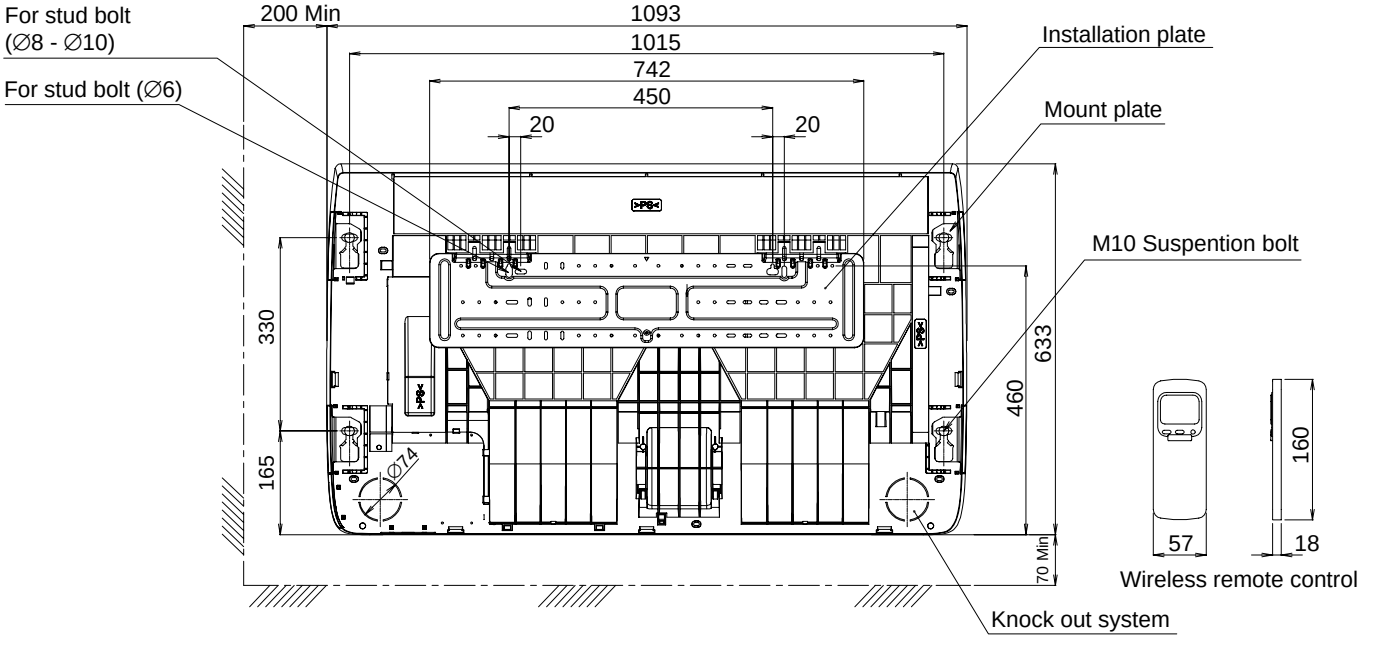
2. CONSTRUCTION VIEWS

2-1. Indoor Unit

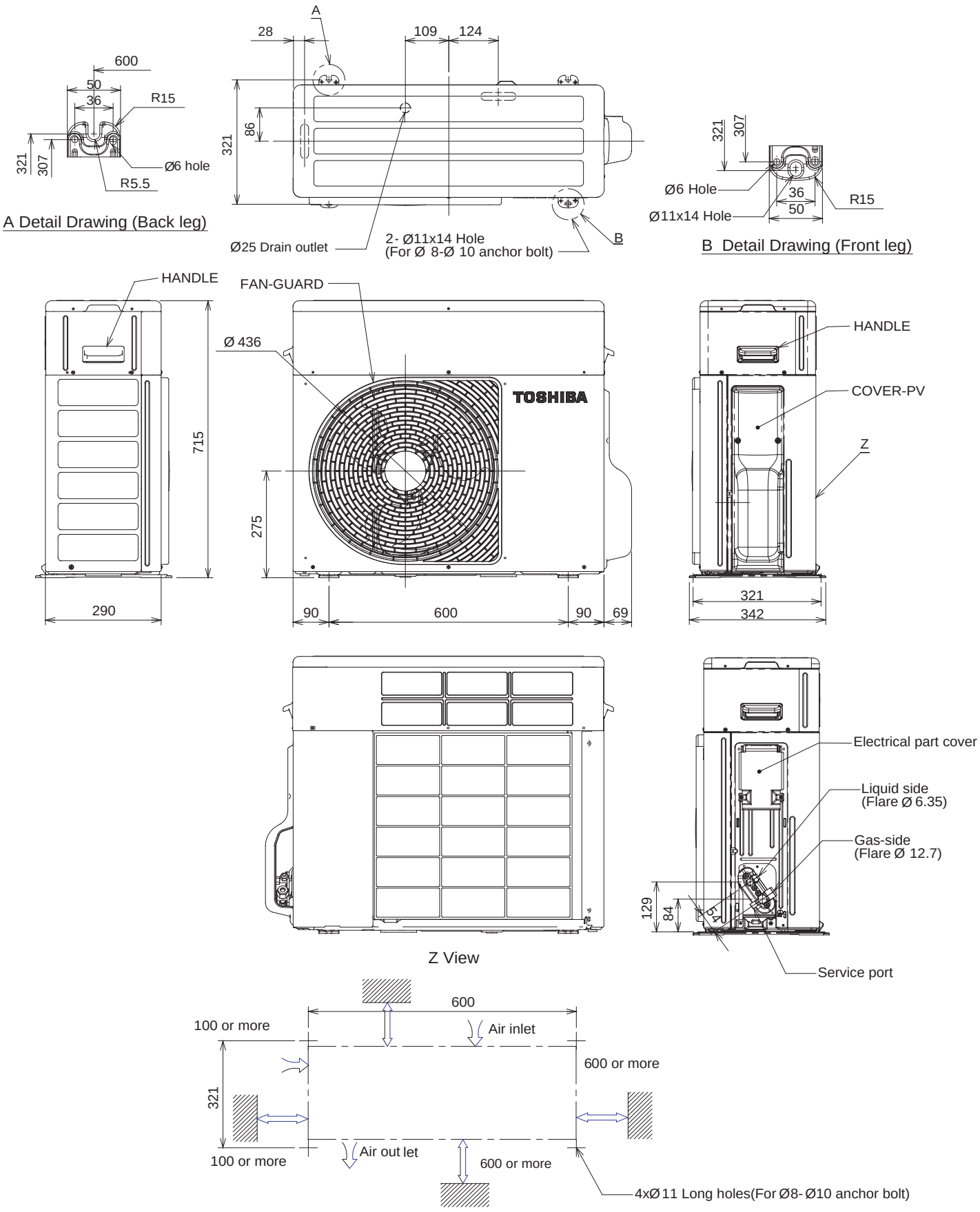




UNDER CEILING & CONSOLE INSTALLATION

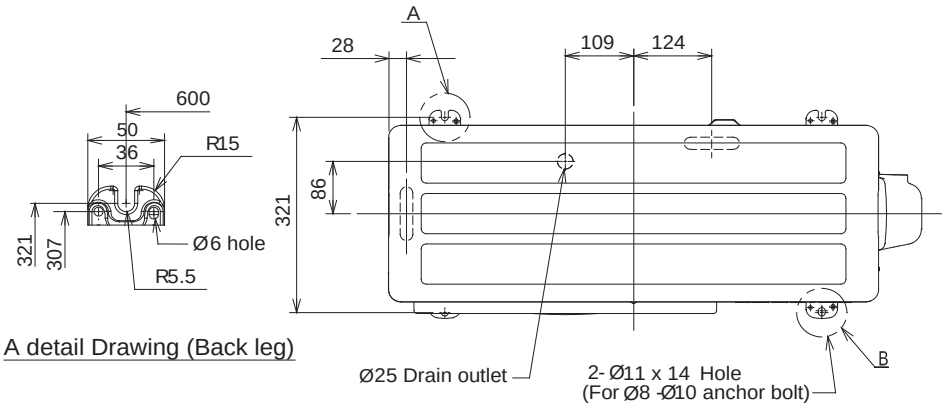


2.2 Outdoor Unit (24 Class)

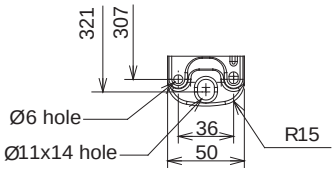


Installation dimension

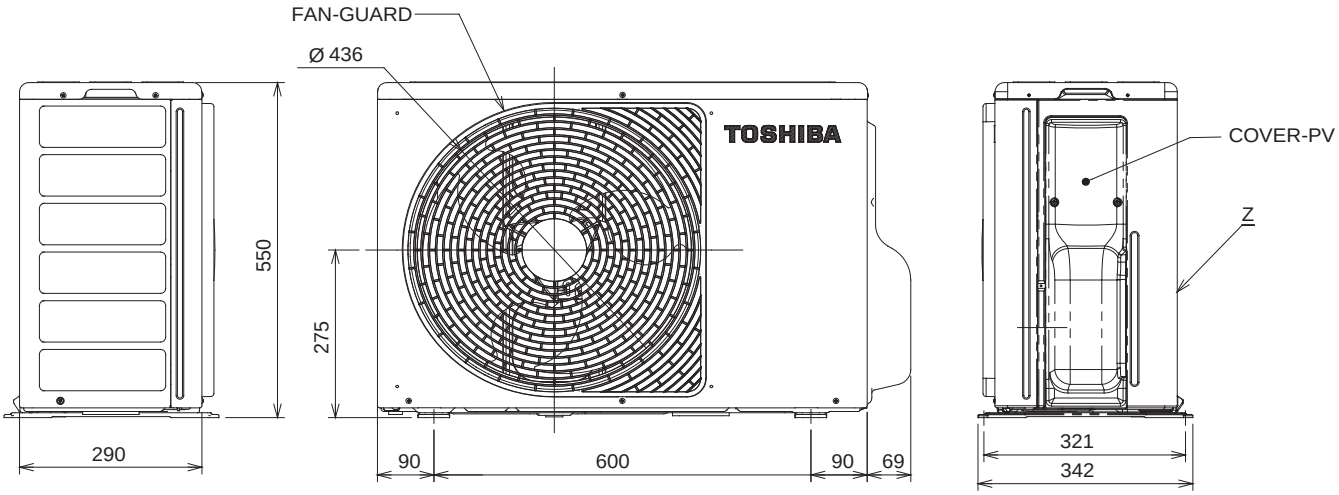
2.3 Outdoor Unit (18 Class)

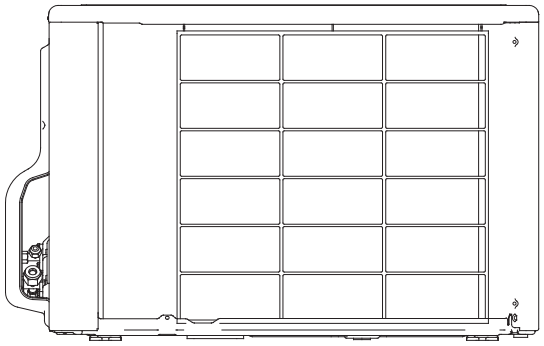


A detail Drawing (Back leg)

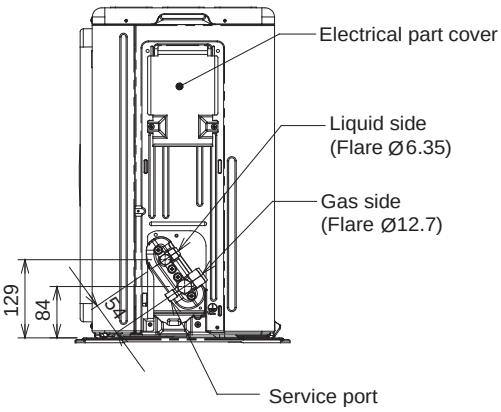


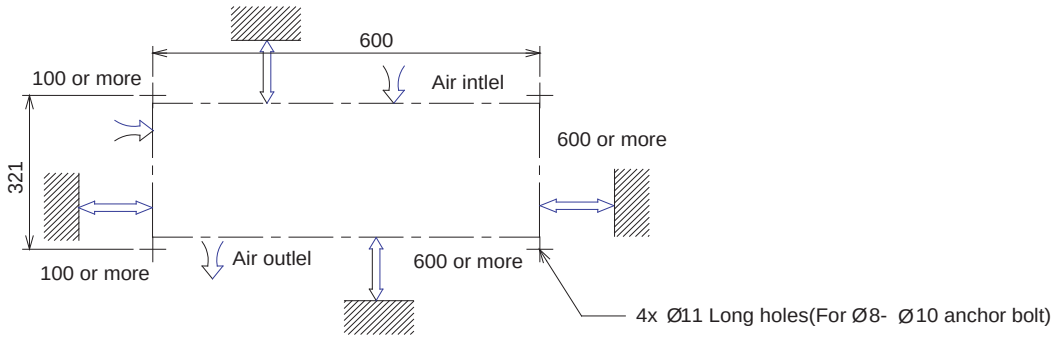
B Detail Drawing (Front leg)





Z View

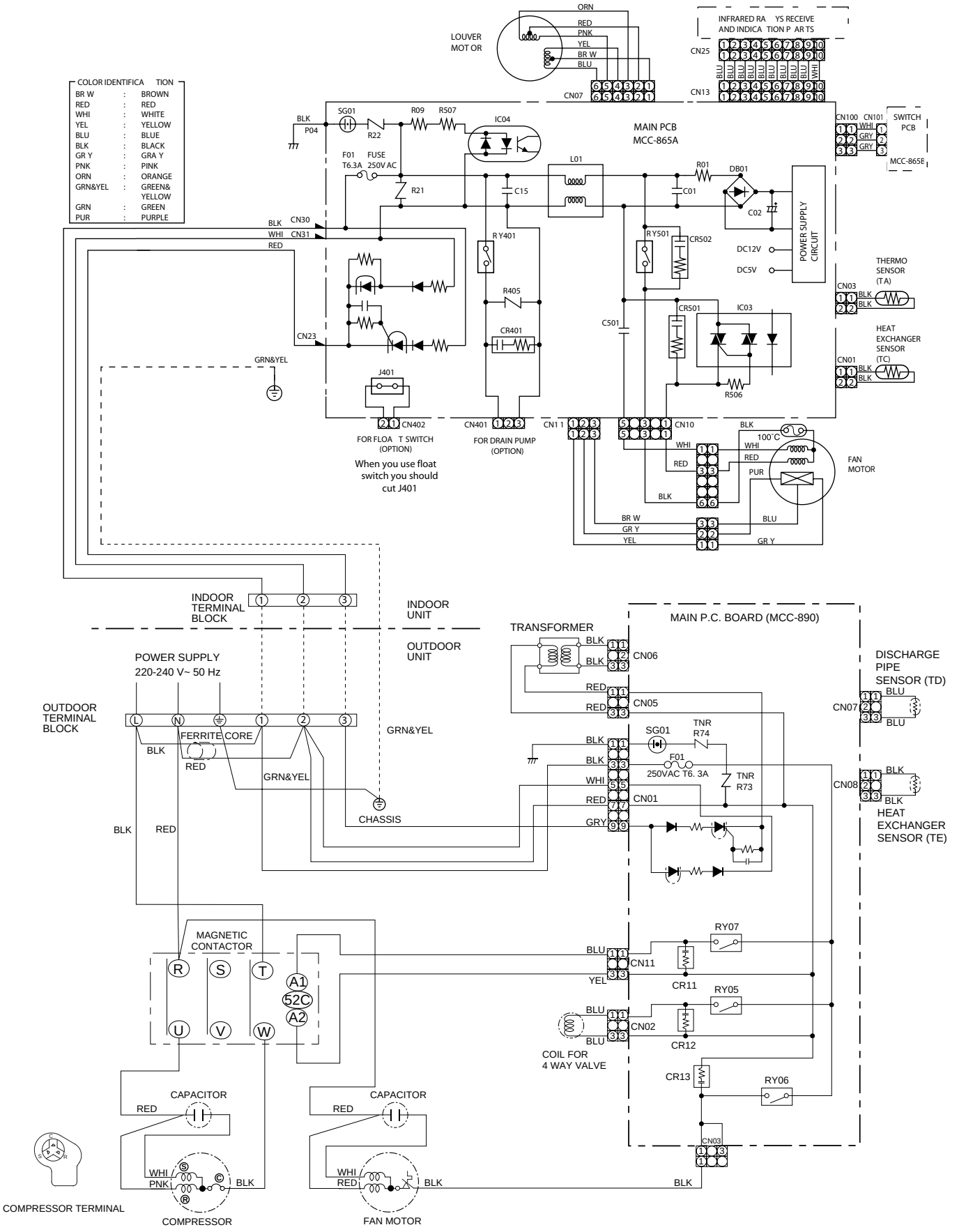




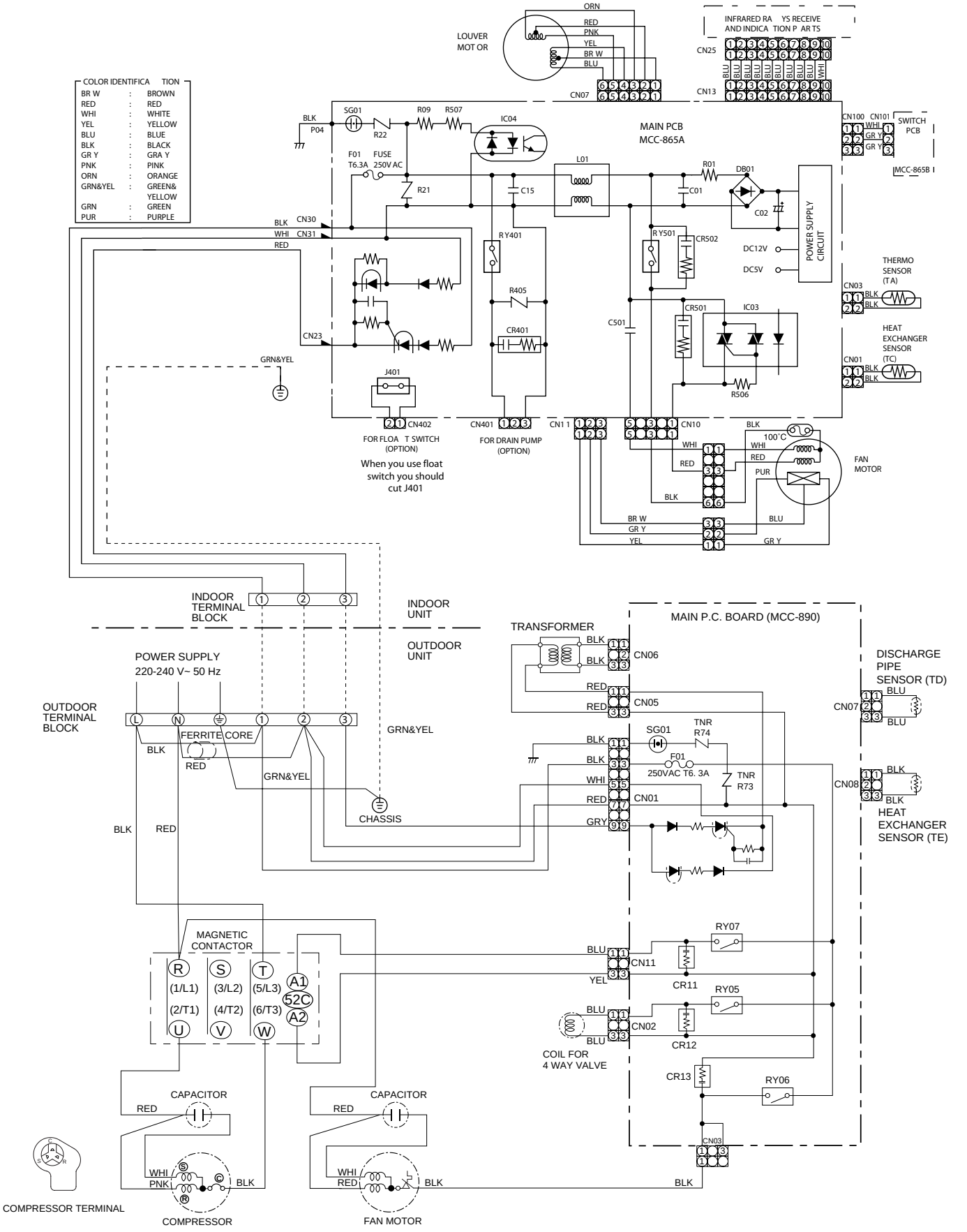
Installation dimension

3. WIRING DIAGRAM

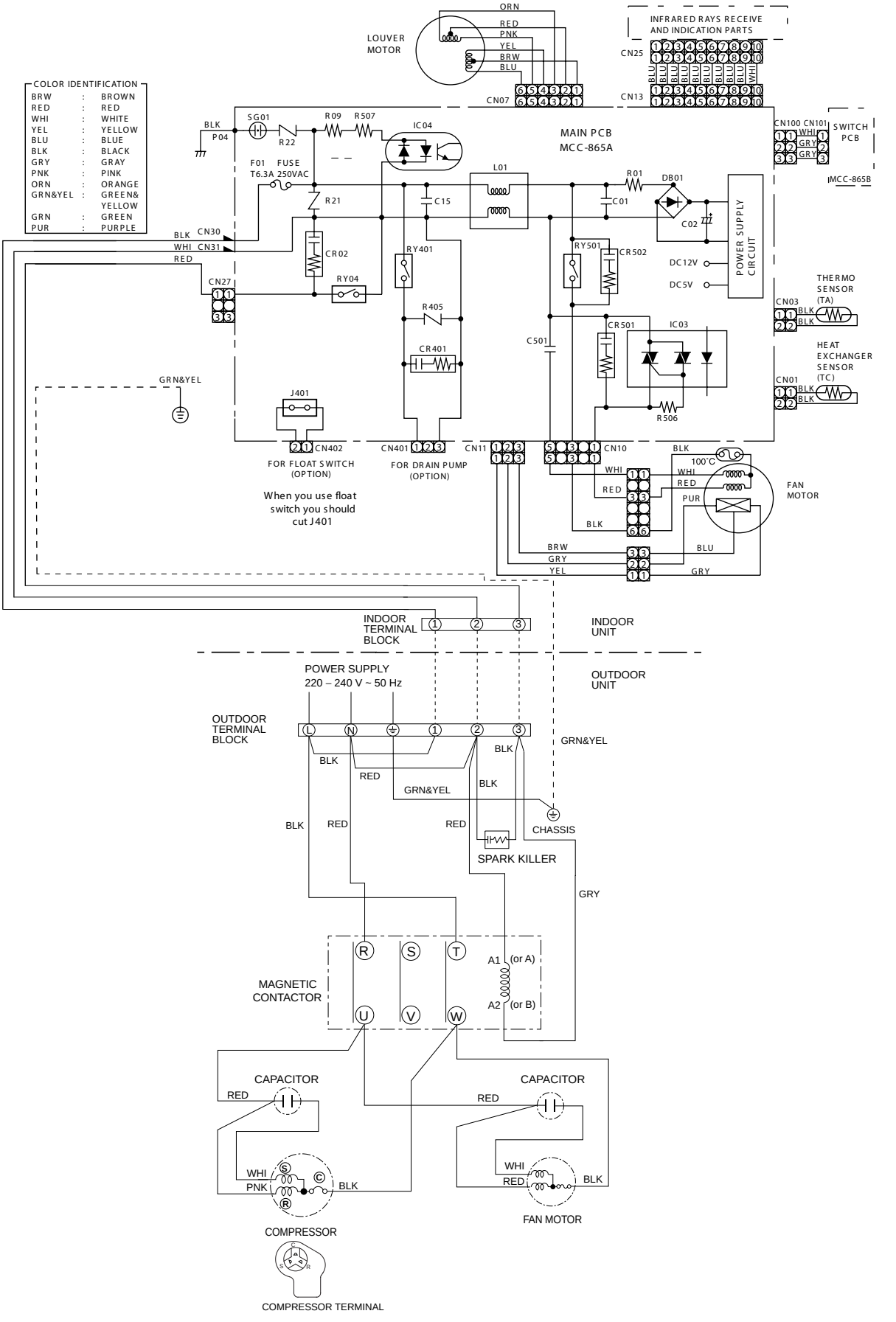
3-1. RAS-18GFHP-ES2 / RAS-18GAH-ES2



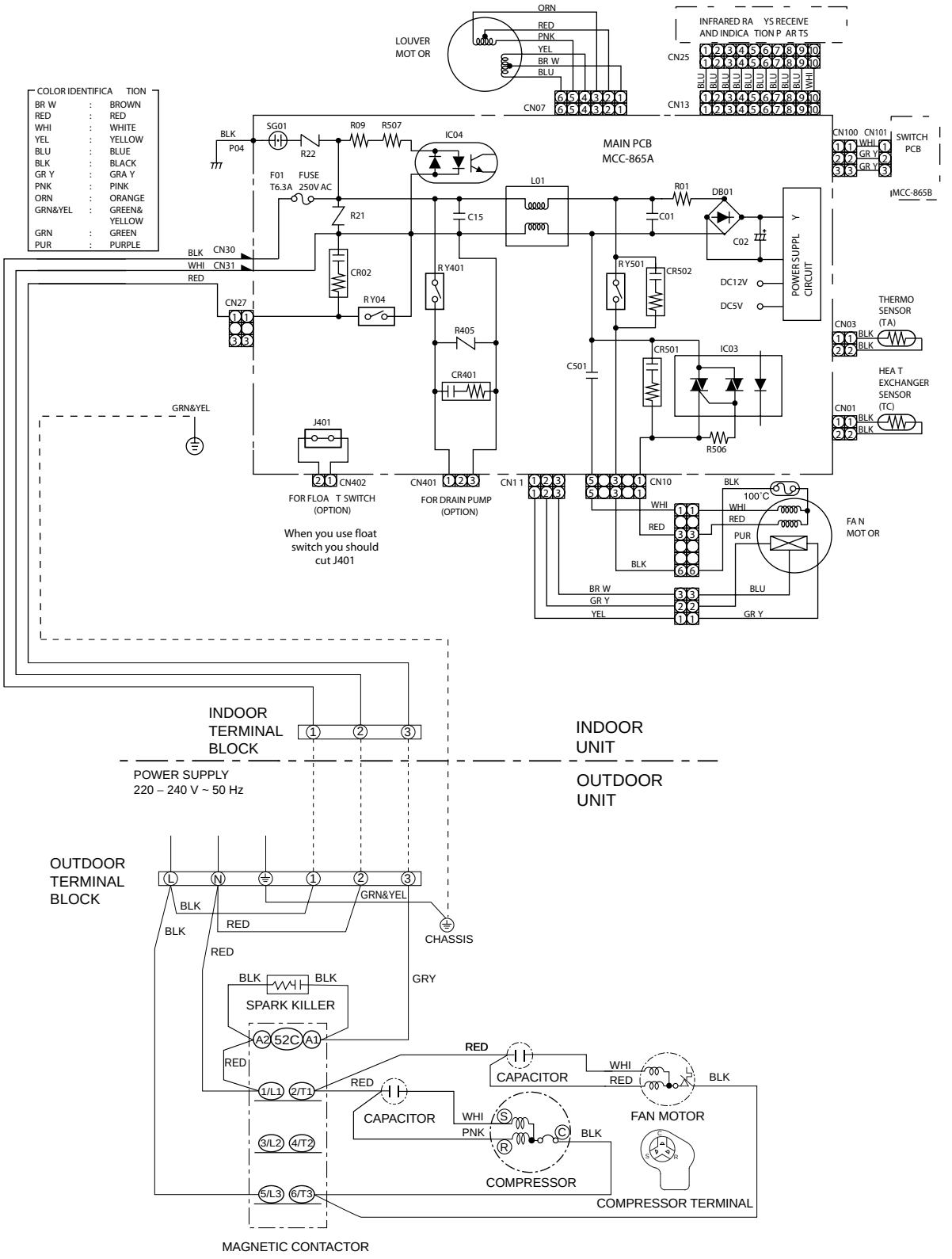
3-2. RAS-24GFHP-ES2 / RAS-24GAH-ES2



3-3. RAS-18GFP-ES2 / RAS-18GA-ES2



3-4. RAS-24GFP-ES2 / RAS-24GA-ES2



4. SPECIFICATION OF ELECTRICAL PARTS

4-1. Indoor Unit (RAS-24GFHP-ES2, RAS-18GFHP-ES2)

No.	Parts name	Type	Specifications
1	Fan motor (for indoor)	AFP-220-50-4A	Output (Rated) 50W, 220-240V
2	Thermo sensor (TA-sensor)	———	10kΩ at 25°C
3	DC-DC transformer (T01)	SWT-47	DC 390V, Secondary DC 12V, 7V
4	Microcomputer	TMP87CM40AN	
5	Heat exchanger sensor (TC-sensor)	———	10kΩ at 25°C
6	Line filter (L01)	SS11V-R07190	19mH, AC0.7A
7	Diode (DB01)	D3SBA60	4A, 600V
8	Capacitor (C02)	EKMH401VSN470MP20S	47μF, 400V
9	Fuse (F01)	TSCR	T6.3A, 250V
10	Varistor (R21, R22)	15G561K	560V
11	Resistor (R01)	RF-2TK5R6	5.6Ω, 2W
12	Louver motor	MP35EA12	Output (Rated) 2W, 6poles, 4phase, DC 12V

4-2. Outdoor Unit (RAS-24GAH-ES2)

No.	Parts name	Type	Specifications		
1	Compressor	PA290X3CS-4MU1	Output (Rated) 2200W, 2poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				1.13	2.10
2	Fan motor (for outdoor)	FG-240-42A-1	Output (Rated) 42W, 4poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				128	126
3	Running capacitor (for fan motor)	451305L	AC 450V, 3.0μF		
4	Running capacitor (for compressor)	RS44B506U0218S	AC 440V, 50μF		
5	Solenoid coil (for 4-way valve)	VHV (STF)	AC 220 ~ 240V		
6	Thermo sensor	TE / TD	10kΩ at 25°C / 50kΩ at 25°C		
7	Magnetic contactor	CLK-35J	220 ~ 240V, 50Hz		
8	Transformer	TT-05	220 ~ 240V		
9	Microcontroller	TMP47C840N			
10	Varistor (R73, R74)	15G471K	470V		
11	Fuse (F01)	TSCR	T6.3A, 250V		

4-3. Outdoor Unit (RAS-18GAH-ES2)

No.	Parts name	Type	Specifications		
1	Compressor	PA225X2CS-4KU1	Output (Rated) 1500W, 2poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				1.54	2.48
2	Fan motor (for outdoor)	FG-240-42A-1	Output (Rated) 42W, 4poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω) (at 20°C)	Red-Black	White-Black
				128	126
3	Running capacitor (for fan motor)	451305L	AC 450V, 3.0μF		
4	Running capacitor (for compressor)	RS44B506U0218S	AC 440V, 50μF		
5	Solenoid coil (for 4-way valve)	VHV (STF)	AC 220 – 240V		
6	Thermo sensor	TE / TD	10kΩ at 25°C / 50kΩ at 25°C		
7	Magnetic contactor	CLK-26J	220 – 240V, 50Hz		
8	Transformer	TT-05	220 – 240V		
9	Microcomputer	TMP47C840N			
10	Varistor (R73, R74)	15G471K	470V		
11	Fuse (F01)	TSCR	T6.3A, 250V		

4-4. Indoor Unit (RAS-24GFP-ES2, RAS-18GFP-ES2)

No.	Parts name	Type	Specifications
1	Fan motor (for indoor)	AFS-220-31-4A	AC 200 – 240V, 31W
2	Thermo sensor (TA-sensor)	———	10 kΩ at 25°C
3	Micro Power Module (M01)	μRM1260V	DC 390 V, Secondary DC 12 V
4	Microcontroller	TMP87CM40AN	
5	Heat exchanger sensor (TC-sensor)	———	10 kΩ at 25°C
6	Line filter (L01)	LC*SS11V-06270	27mH, 600mA
7	Diode (DB01)	D3SBA60	4 A, 600 V
8	Capacitor (C63)	KMH400VSSN47M22S	4.7μF, 400 V
9	Fuse (F01)	BET6.3A	T6.3 A, 250 V
10	Varistor (R21, R22)	TND15G561K	560 V
11	Resistor (R319)	RF-2TK5R6	5.6Ω , 2 W
12	Louver motor	35BYJ46	Output (Rated) 2 W, 10 poles, 1 phase, DC 12 V
13	Relay : (RY04)	G5NB-1A	Coil DC 12V, 16.7mA, Contact AC 250V, 1A

4-5. Outdoor Unit (RAS-24GA-ES2)

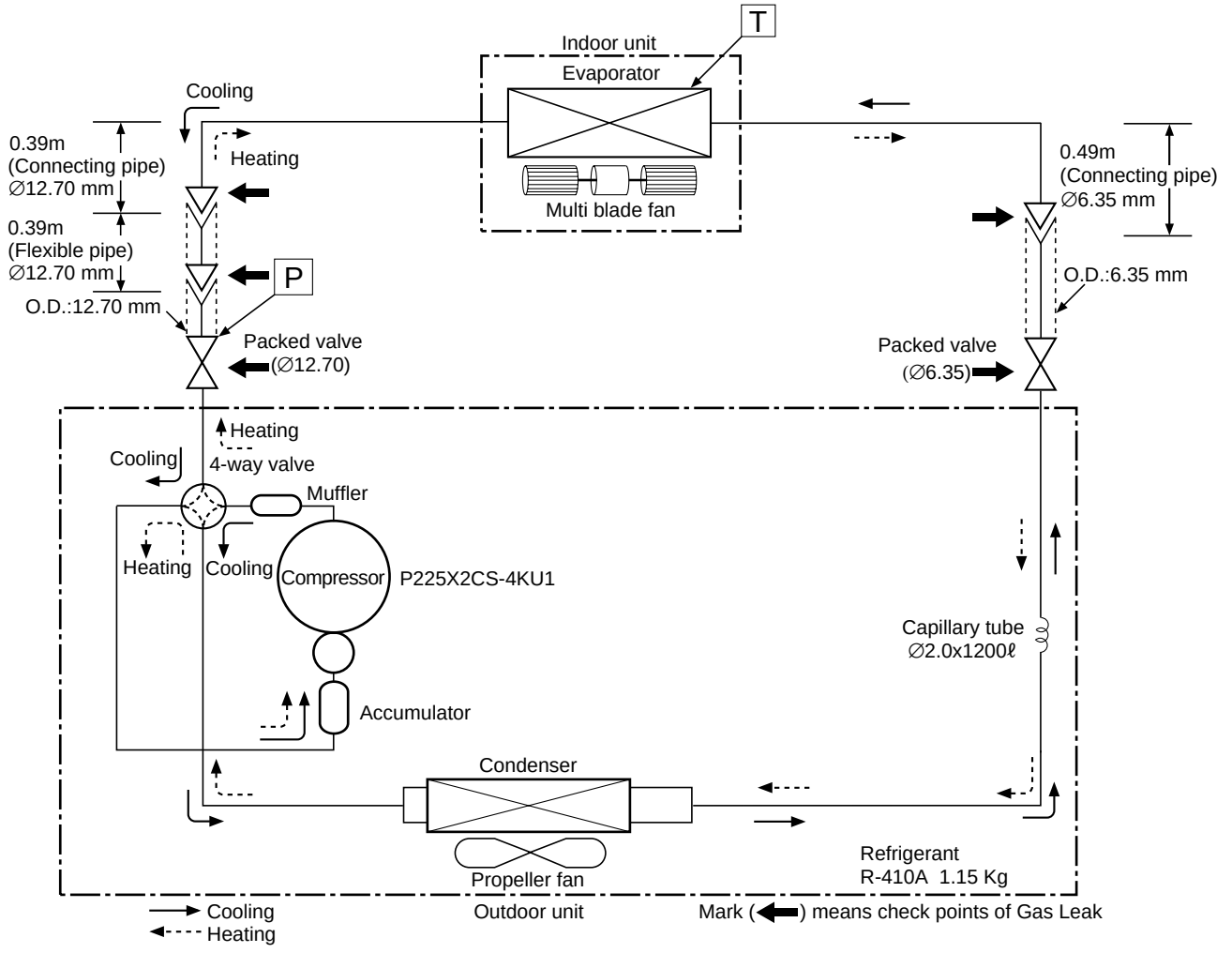
No.	Parts name	Type	Specifications		
1	Compressor	PA290X3CS-4MU1	Output (Rated) 2200W, 2poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω)	Red-Black	White-Black
			(at 20°C)	1.13	2.10
2	Fan motor (for outdoor)	FG-240-42A	Output (Rated) 42W, 4poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω)	Red-Black	White-Black
			(at 20° C)	128	126
3	Running capacitor (for fan motor)	451305L	AC 450V, 3.0μF		
4	Running capacitor (for compressor)	RS44B506U0218S	AC 440V, 50μF		
5	Magnetic contactor	CLK-35J	220 – 240V, 50Hz		

4-6. Outdoor Unit (RAS-18GA-ES2)

No.	Parts name	Type	Specifications		
1	Compressor	PA225X2CS-4KU1	Output (Rated) 1500W, 2poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω)	Red-Black	White-Black
			(at 20°C)	1.54	2.48
2	Fan motor (for outdoor)	WLF-240-42A-1	Output (Rated) 42W, 6poles, 1 phase, 220 – 240V, 50Hz		
			Winding resistance (Ω)	Red-Black	White-Black
			(at 20°C)	188	289
3	Running capacitor (for fan motor)	451205L	AC 450V, 2.0μF		
4	Running capacitor (for compressor)	RS44B506U0218S	AC 440V, 50μF		
5	Magnetic contactor	CLK-26J	220 – 240V, 50Hz		

5. REFRIGERATION CYCLE DIAGRAM

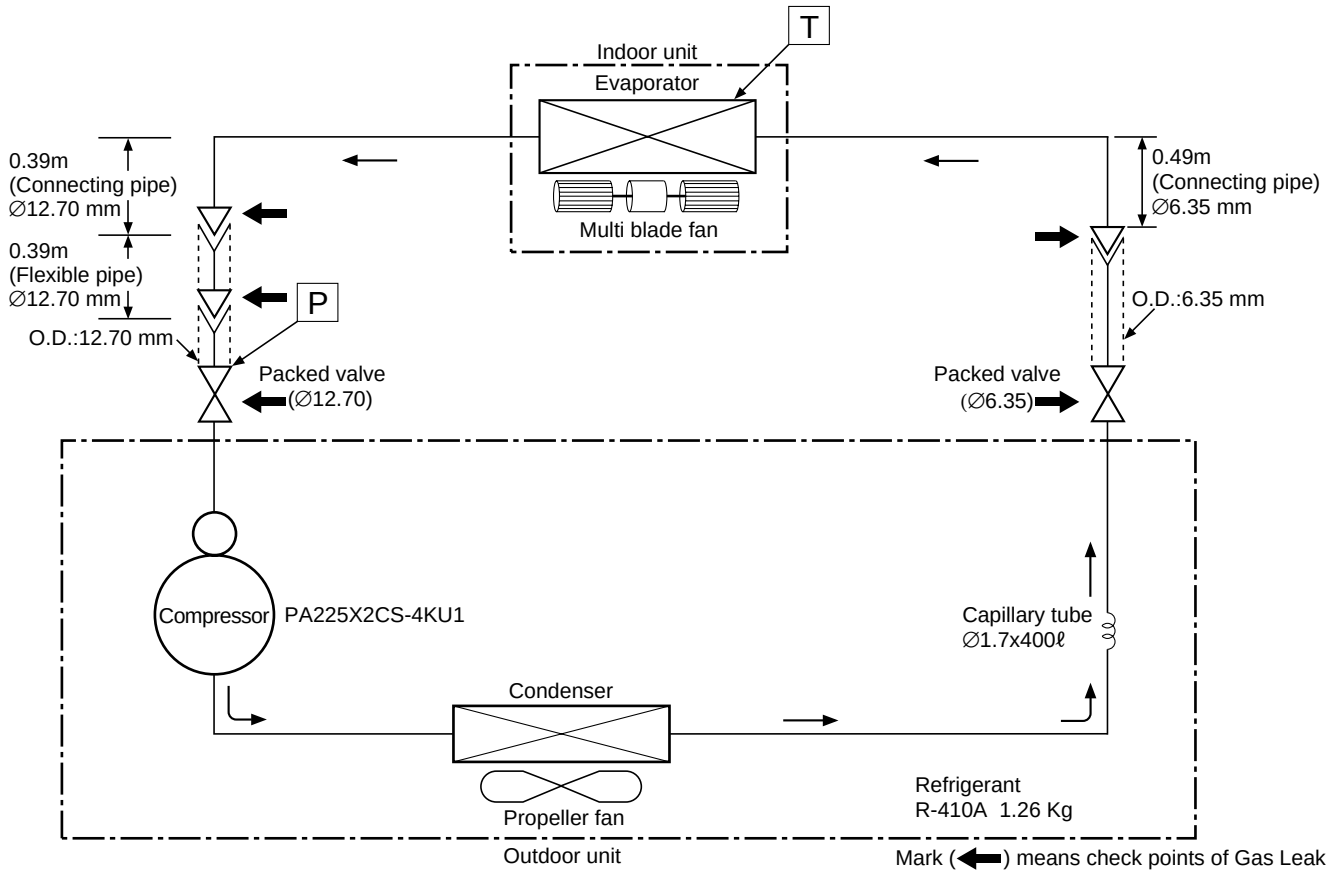
5-1. RAS-18GFHP-ES2 / RAS-18GAH-ES2



50Hz		Standard pressure P (MPaG)	Surface temp. of heat exchanger interchanging pipe T (°C)	Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
					Indoor	Outdoor
Heating	Standard	2.7	45.0	High	20/–	7/6
	High temperature*1	3.0 ~ 3.8	49.0 ~ 58.0	Low	27/–	24/18
	Low temperature	2.0	34.0	High	20/–	–10/–10
Cooling	Standard	0.9	10.0	High	27/19	35/24
	High temperature	1.0	15.0	High	32/23	43/26
	Low temperature	0.6	1.0	Low	21/15	21/15

Note : Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor.)
*1 : During heating overload, the high temperature limit control operation is included.

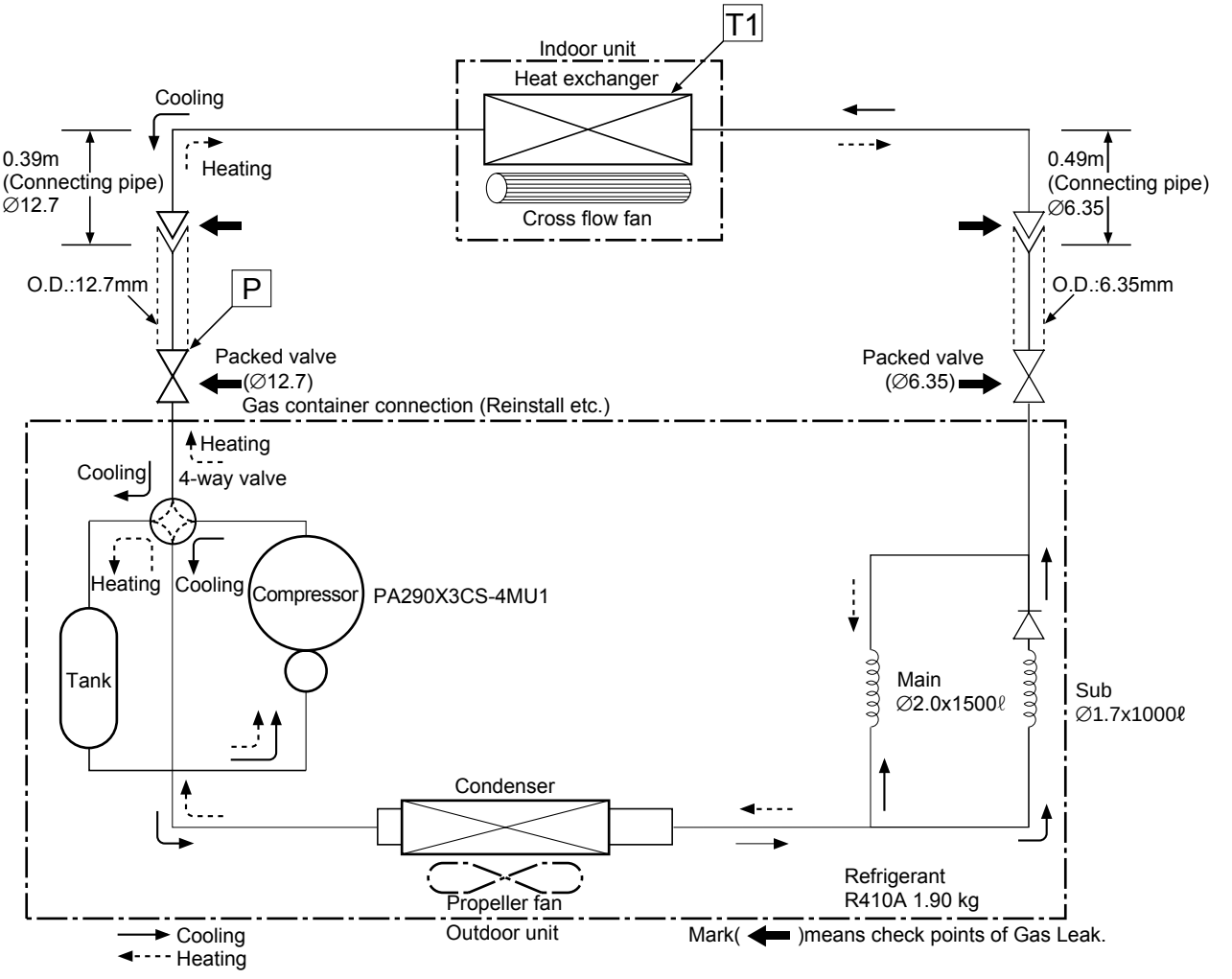
5-2. RAS-18GFP-ES2 / RAS-18GA-ES2



50Hz		Standard pressure P (MPaG)	Surface temp. of heat exchanger interchanging pipe T (°C)	Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
					Indoor	Outdoor
Cooling	Standard	1.1	10.0	High	27/19	35/24
	High temperature	1.2	13.0	High	32/23	43/26
	Low temperature	0.6	2.0	Low	21/15	21/15

Note : Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor.)

5-3. RAS-24GFHP-ES2 / RAS-24GAH-ES2



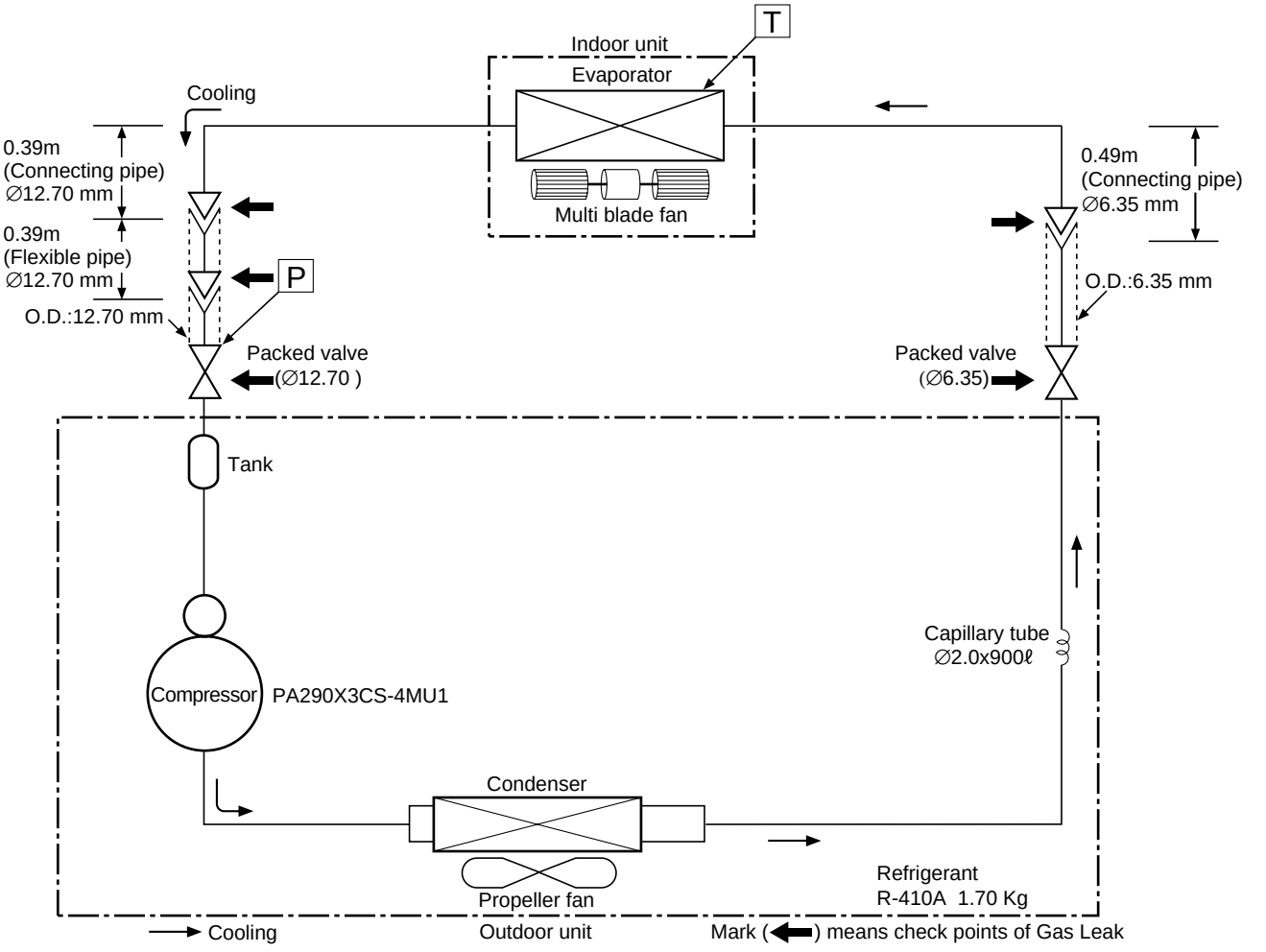
50Hz		Standard pressure P (MPaG)	Surface temp. of heat exchanger interchanging pipe T1 (°C)	Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
					Indoor	Outdoor
Heating	Standard	3.0	48.2	High	20/–	7/6
	Overload*1	3.93	56.4	Low	27/–	24/18
	Low temperature	2.17	38.4	High	20/–	–10/–10
Cooling	Standard	3.03	8.7	High	27/19	35/24
	Overload	4.02	12.1	High	32/23	43/26
	Low temperature	2.1	0.3	Low	21/15	21/15

Note :

- Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor)

*1 • During heating overload operation, a value for the high temperature limit control operation is included.

5-4. RAS-24GFP-ES2 / RAS-24GA-ES2

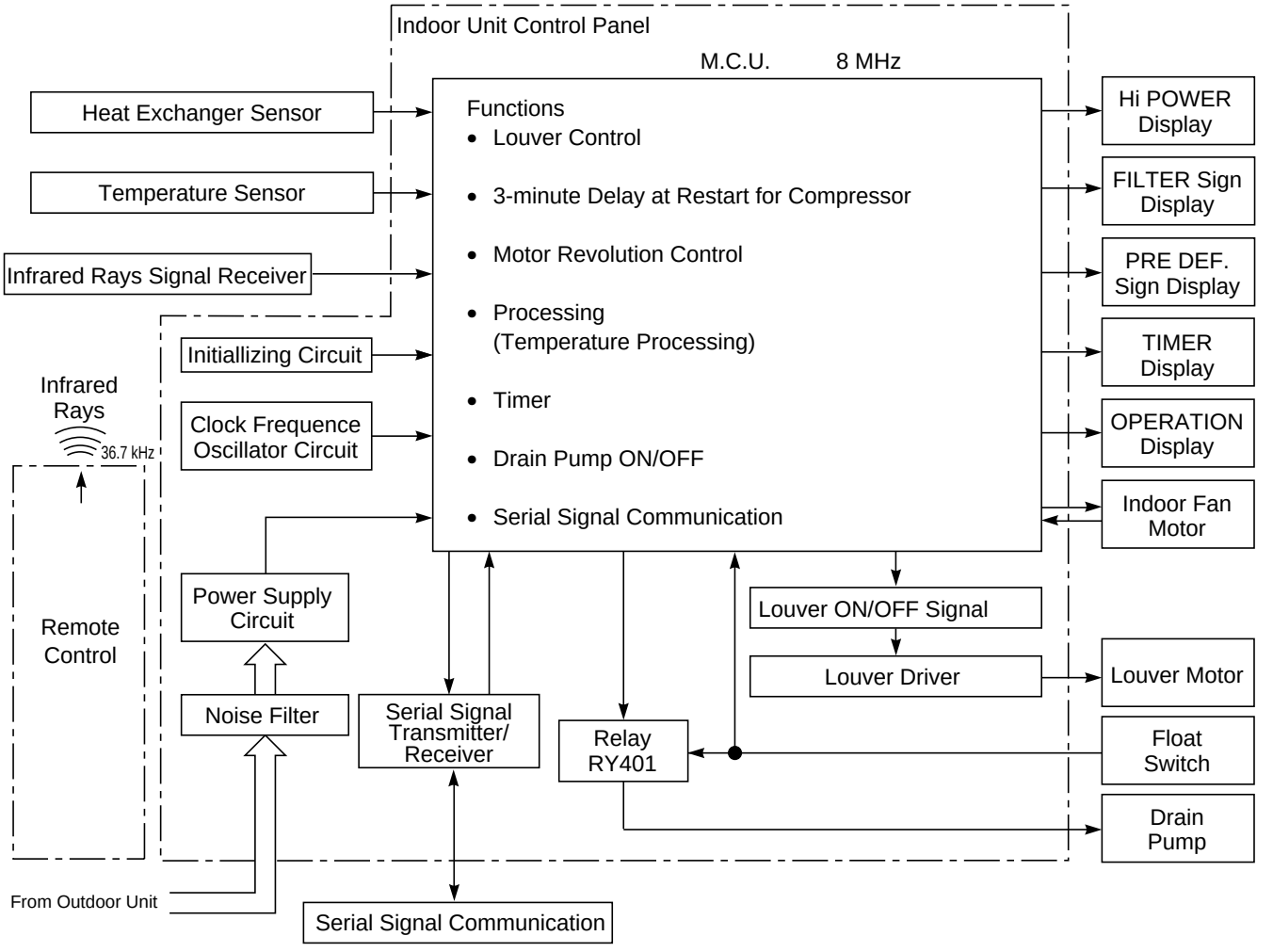


50Hz		Standard pressure P (MPaG)	Surface temp. of heat exchanger interchanging pipe T (°C)	Fan speed (indoor)	Ambient temp. conditions DB/WB (°C)	
					Indoor	Outdoor
Cooling	Standard	3.183	7.0	High	27/19	35/24
	High temperature	4.040	11.7	High	32/23	43/26
	Low temperature	1.651	-0.4	Low	21/15	21/15

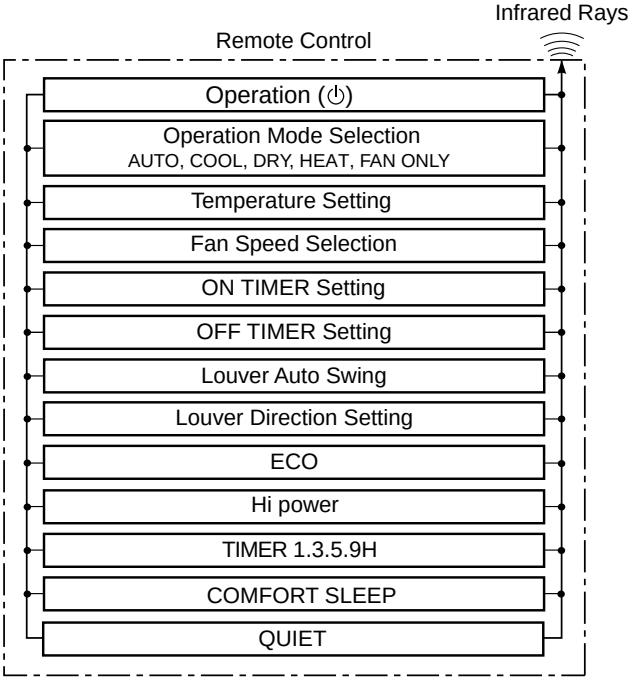
Note : Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor.)

6. CONTROL BLOCK DIAGRAM

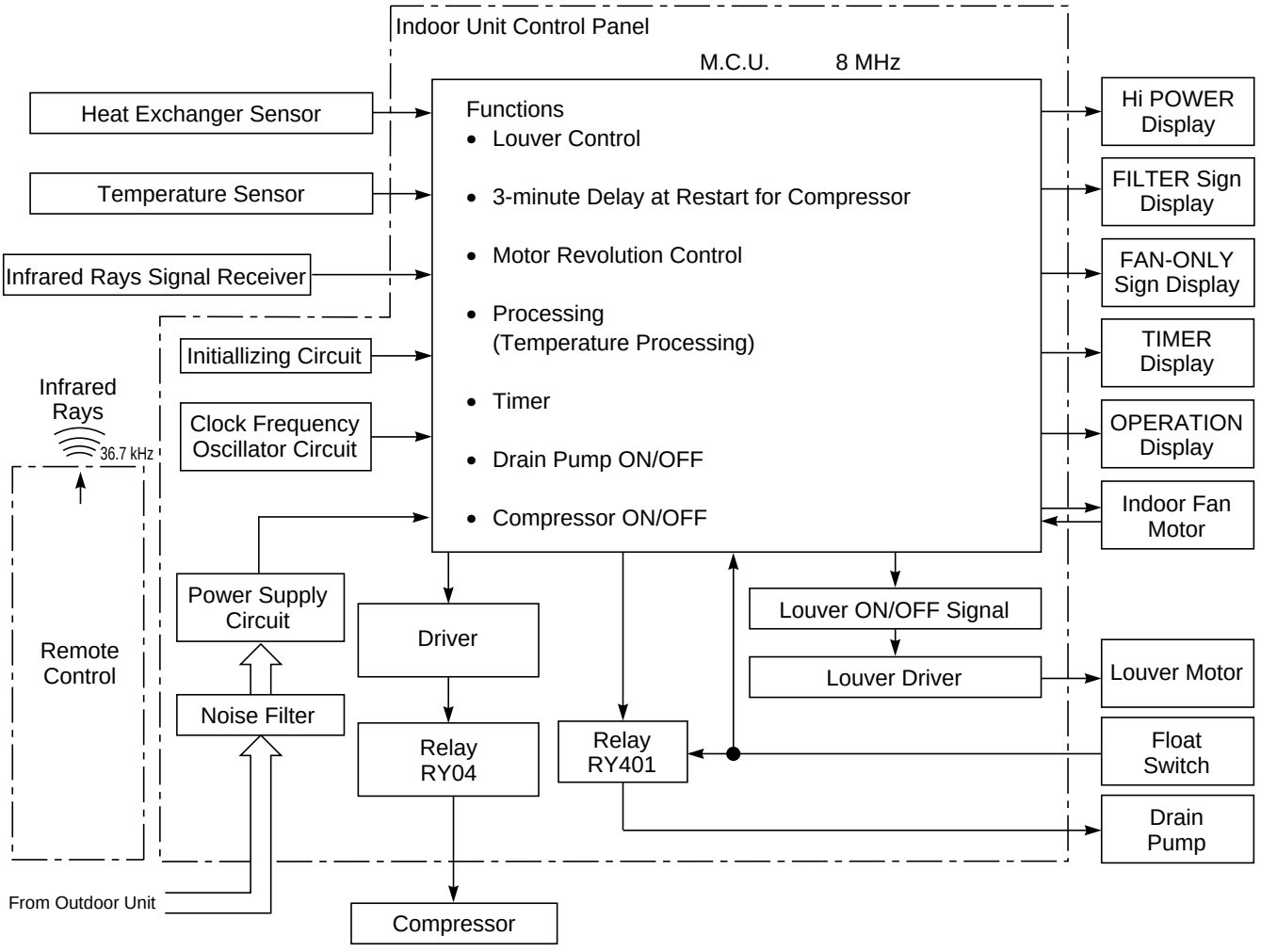
6-1. RAS-18GFHP-ES2, RAS-24GFHP-ES2



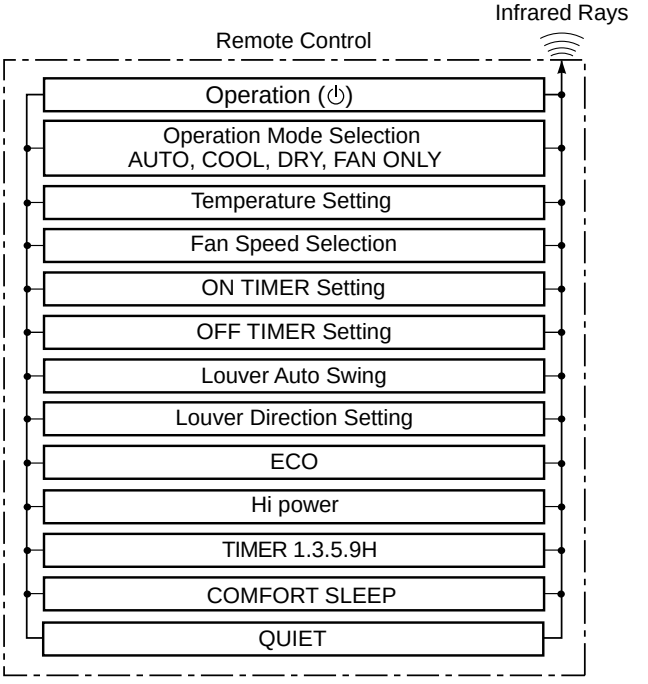
REMOTE CONTROL



6-2. RAS-18GFP-ES2, RAS-24GFP-ES2



REMOTE CONTROL



7. OPERATION DESCRIPTION

7-1. Outline of Air Conditioner Control

This is a fixed capacity type air conditioner, which uses a AC motor for an indoor fan. The AC motor drive circuit is mounted in the indoor unit. And electrical parts which operate the compressor and the outdoor fan motor, are mounted in the outdoor unit.
The air conditioner is mainly controlled by the indoor unit controller. The controller operates the indoor fan motor based upon commands transmitted by the remote control and transfers the operation commands to the outdoor unit controller.
The outdoor unit controller receives operation commands from the indoor unit, and operates the outdoor fan motor and the compressor.

(1) Role of indoor unit controller
The indoor unit controller receives the operation commands from the remote control and executes them.
- Temperature measurement at the air inlet of the indoor heat exchanger by the indoor temperature sensor
- Temperature setting of the indoor heat exchanger by the heat exchanger sensor
- Louver motor control
- Indoor fan motor operation control
- LED display control
- Transferring of operation commands to the outdoor unit
- Receiving of information of the operation status and judging of the information or indication of error

(2) Role of outdoor unit controller
The outdoor unit controller receives the operation commands from the indoor controller and executes them.
- Compressor operation control
- Operation control of outdoor fan motor

} Operations according to the commands from the indoor unit

- Turning off the compressor and outdoor fan when the outdoor unit receives the shutdown command
- Defrost control in heating operation (Temperature measurement by the outdoor heat exchanger and control for the four-way valve and the outdoor fan motor) *Heat pump Model only.

7-1-1. Louver control

(1) Vertical air flow louver
Position of veritcal air flow louver is automatically controlled according to the operation mode. Besides, position of vertical air flow louver can be arbitrarily set by pressing [FIX] button.
The louver position which is set by [FIX] button is stored in the microcomputer, and the louver is automatically set at the stored position for the next operation.

(2) Swing
If [SWING] button is pressed when the indoor unit is in operation, the vertical air flow louver starts swinging. When [SWING] button is pressed, it stops swinging.

7-1-2. Indoor fan control (AC Fan motor)

(1) The indoor fan is operated by the stepless speed change AC motor.

(2) For air flow level, speed of the indoor fan motor is controlled in five steps (LOW, LOW$^+$, MED, MED$^+$ and HIGH). If AUTO mode is selected, the fan motor speed is automatically controlled by the difference between the preset temperature and the room temperature.

$$LOW^+ = \frac{LOW+MED}{2}$$

$$MED^+ = \frac{MED+HIGH}{2}$$

Table 7-1-1

			FAN TAP														
OPERATION MODE		Cooling			UH	H	M+		M		L+	L	L-	L	SUL/SL-		
		Heat	UH	H				M	L+	L	L-		UL				SUL/SL-
		Fan only				H	M+		M		L+	L	L-				
		Dry					M+		M		L+	L	L-	UL		SUL	
Model	RAS-18GFHP Series	rpm	1120			1060	1030	970	950	820		800	650		600		500
		Air flow volume (m^3/h)	830			800	770	720	700	600		580	450		410		320
	RAS-18GFP Series	rpm	–		1120	1060	1030	–	900	–	820	800	650		600		–
		Air flow volume (m^3/h)	–		830	800	770	–	680	–	600	580	450		410		–
	RAS-24GFHP Series	rpm	1210			1170	1090	1020	1000	860		850	700	690	640		540
		Air flow volume (m^3/h)	930			900	920	760	750	660		650	490	480	440		350
	RAS-24GFP Series	rpm	–		1210	1170	1090	–	1000	–	860	850	700	690	640		–
		Air flow volume (m^3/h)	–		930	900	810	–	750	–	660	650	490	480	440		–

7-2. Description of Operation Circuit

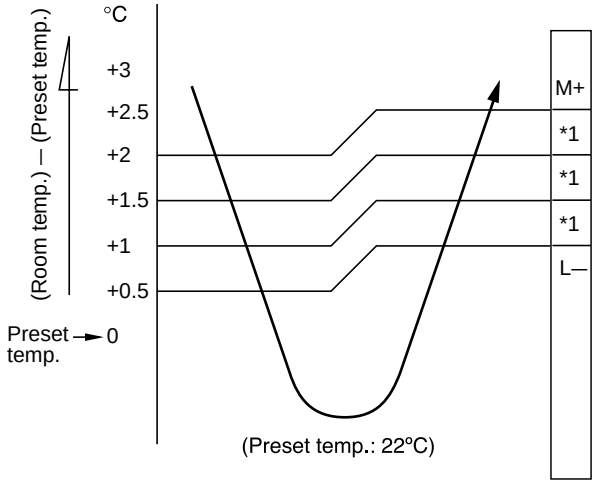
(1) When turning on the breaker, the operation lamp blinks. This means that the power is on (or the power supply is cut off.)

(2) When pressing [⏻] button on the remote control, receiving beep sounds from the indoor unit, and the next operation is performed together with opening the vertical air flow louver.

(3) Once the operation mode is set, it is memorized in the microcontroller so that the previous operation can be effected thereafter simply by pressing [⏻] button.

7-2-1. Fan only operation ([MODE] button on the remote control is set to the fan only operation.)

(1) When [FAN] button is set to AUTO, the indoor fan motor operates as shown in Fig. 7-2-1. When [FAN] button is set to LOW, LOW⁺, MED, MED⁺ or HIGH, the motor operates with a constant air flow.



NOTE :

*1: The values marked with *1 are calculated and controlled by the difference in motor speed between M+ and L–.

(2) The Hi POWER, ECO and COMFORT SLEEP operation cannot be set.

Fig. 7-2-1 Setting of air flow [FAN:AUTO]

7-2-2. Cooling operation ([MODE] button on the remote control is set to the cooling operation.)

(1) The compressor, 4-way valve, outdoor fan and operation display on the remote control are controlled as shown in Fig. 7-2-2.

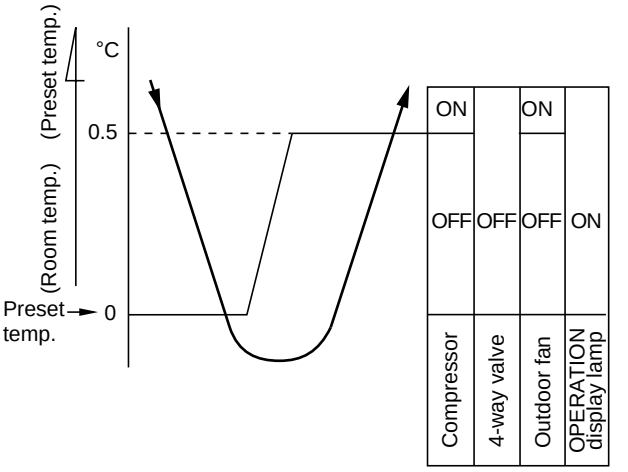
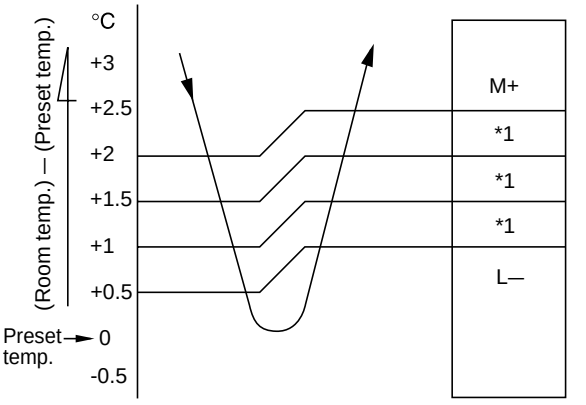


Fig. 7-2-2

(2) When [FAN] button is set to AUTO, the indoor fan motor operates as shown in Fig. 7-2-3. When [FAN] button is set to LOW, LOW⁺, MED, MED⁺ or HIGH, the motor operates with a constant air flow.



NOTE :

*1: The values marked with *1 are calculated and controlled by the difference in motor speed between M+ and L–.

Fig. 7-2-3 Setting of air flow [FAN:AUTO]

7-2-3. Dry operation ([MODE] button on the remote control is set to the dry operation.)

(1) The compressor, 4-way valve, outdoor fan and operation display on the remote control are controlled as shown in Fig. 7-2-4.

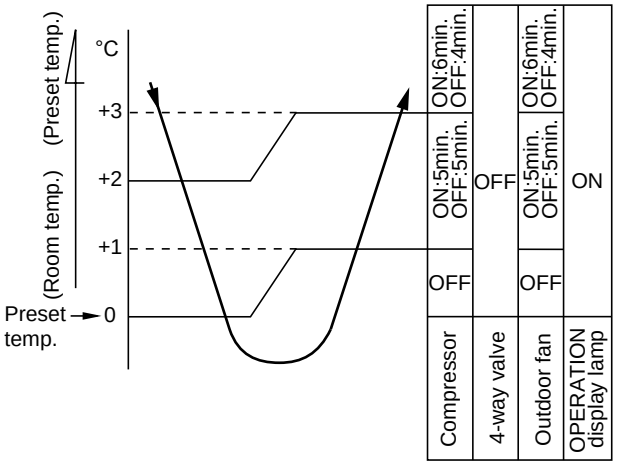


Fig. 7-2-4

(2) The microcontroller turns the compressor on and off at the regular intervals (4 to 6 minutes). While the compressor is turning off, the indoor fan motor operates in the SUPER LOW position.
The pattern of operation depending on the relation between room temperature and preset temperatures is shown in Fig. 7-2-5.

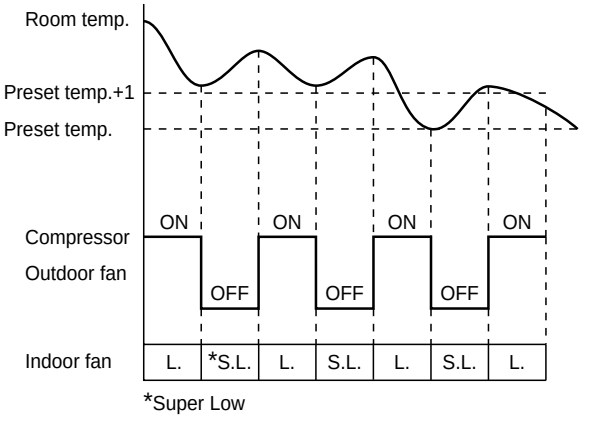


Fig. 7-2-5

(3) [FAN] button on the remote control is set to AUTO only.

(4) The ECO and Hi POWER operations can not be set.

7-2-4. Heating operation *Heating and cooling model only ([MODE] button on the remote control is set to the heating operation.)

(1) The compressor, 4-way valve, outdoor fan and operation display on the remote control are controlled as shown in Fig. 7-2-6.

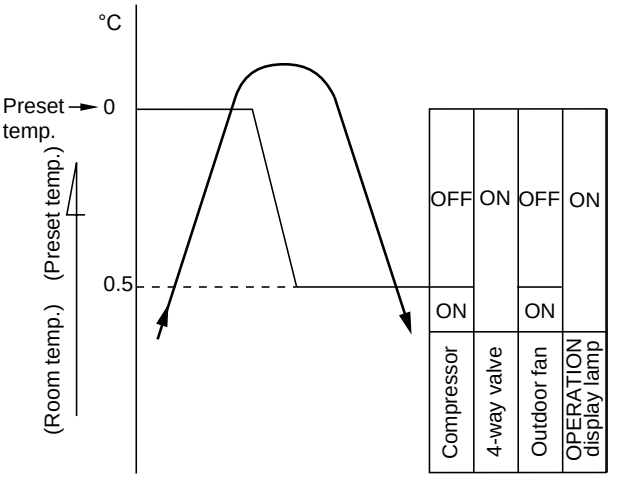
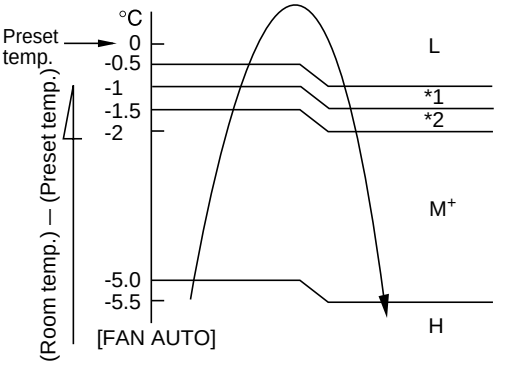


Fig. 7-2-6

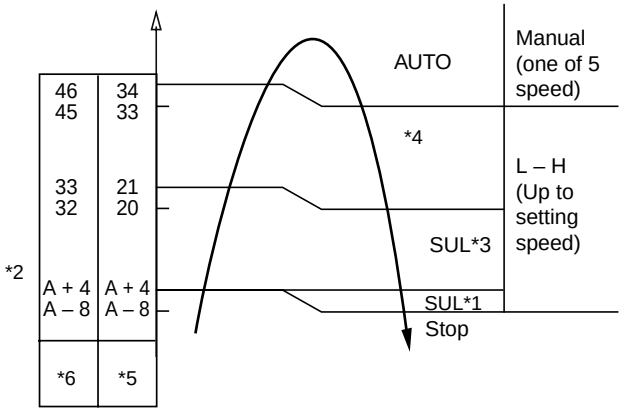
(2) When [FAN] button is set to AUTO, the indoor fan motor operates as shown in Fig. 7-2-7. When [FAN] button is set to LOW, LOW+, MED, MED+ or HIGH, the motor operates with a constant air flow.



*1, *2 : The values marked with *1 and *2 are calculated and controlled by the difference in motor speed between M+ and L.

Fig. 7-2-7 Setting of air flow [FAN:AUTO]

(3) The indoor heat exchanger restricts revolving speed of the fan motor to prevent a cold draft. The upper limit of the revolving speed is shown in Fig. 7-2-8 and Table 7-2-1.



NOTES :

*1: The fan stops for 2 minutes after thermostat-OFF.

*2: A is 24°C when the preset temperature is 24°C or more and A is the preset temperature when it is under 24°C.

*3: SUL means Super Ultra Low.

*4: Calculated from difference in motor speed between SUL and HIGH.

Fig. 7-2-8 Cold draft preventing control

*5 and *6:

Table 7-2-1

Fan speed	*5 Starting period	*6 Stabilized period
AUTO	• Up until 12 minutes passed after starting the unit • From 12 to 25 minutes passed after starting the unit and room temperature is 3°C lower than preset temperature	• From 12 to 25 minutes passed after starting the unit and room temperature is between preset temperature and 3°C lower than preset temperature • 25 minutes or more passed after starting the unit
Manual (L – H)	• Room temperature < Preset temperature –4°C	• Room temperature ≧ Preset temperature –3.5°C

7-2-5. Automatic operation
([MODE] button on the remote control is set to the automatic operation.)

(1) One of 3 operations (Cooling, Fan only or Heating) is selected according to difference between the preset temperature and the room temperature at which the automatic operation has started, as shown in Fig. 7-2-9. The Fan only operation continues until the room temperature reaches a level at which another mode is selected.

(2) Temporary Auto
When the TEMPORARY button on the indoor unit is pushed, the preset temperature is fixed at 24°C and the indoor unit is controlled as shown in Fig. 7-2-9.

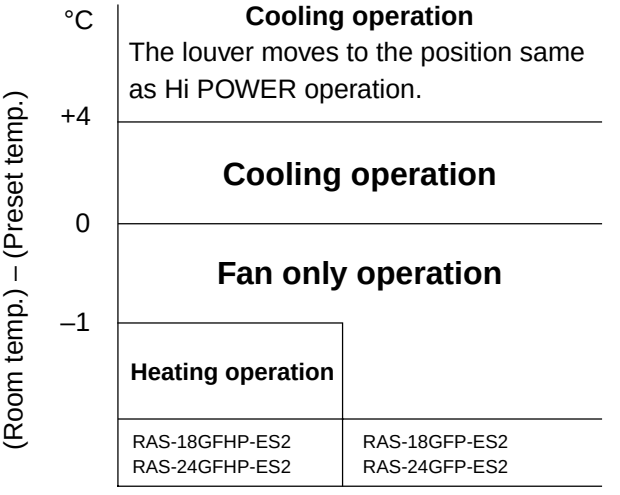


Fig. 7-2-9

7-3. Hi POWER Mode ([Hi POWER] button on the remote control is pressed.)

When [Hi POWER] button is pressed while the indoor unit is in Auto, Cooling or Heating operation, Hi POWER mark is indicated on the display of the remote control and the unit operates as follows.

(1) Automatic operation
- The indoor unit operates in according to the current operation.

(2) Cooling operation
- The setting temperature drops 3°C. (The value of the setting temperature on the remote control does not change.)
- If the room temperature is higher than the setting temperature by 3.5°C or more, the horizontal louver moves to the Hi POWER position automatically. Then when the room temperature is 1°C less than the setting temperature the horizontal louver returns automatically.
- FAN speed : [AUTO]
  If the room temperature is higher than the setting temperature by 3.5°C or more, the air conditioner operates at maximum airflow level. If the room temperature is higher than the setting temperature by less than 3.5°C, the air conditioner operates at normal airflow level.
- FAN speed : One of 5 levels
  If the room temperature is higher than the setting temperature by 3.5°C or more, the air conditioner operates at higher consecutive airflow level. If the room temperature is higher than the setting temperature by less than 3.5°C, the air conditioner operates at normal airflow level.

(3) Heating operation
- The preset temperature increases 2°C, (The value of the preset temperature on the remote control does not change.)
- The indoor unit operates in normal heating mode except the preset temperature is higher (+2°C).

(4) The Hi POWER mode can not be set in Dry or Fan only operation.

7-4. High-Temperature Limit Control *Heat pump model only

The microcontroller detects the indoor heat exchanger temperature to prevent pressure of a refrigerating cycle from increasing excessively.
The compressor and outdoor fan motor are controlled as shown in Fig. 7-4-1.

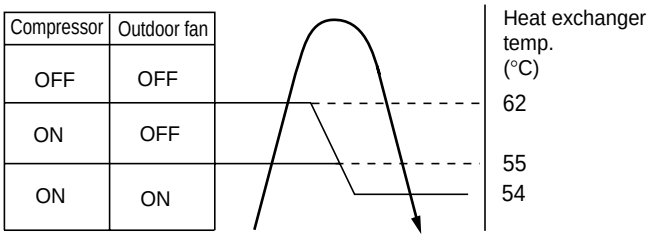


Fig. 7-4-1

7-5. Low-Temperature Limit Control

The microcontroller detects the indoor heat exchanger temperature to prevent the indoor heat exchanger from freezing.
The compressor and outdoor fan motor are controlled as shown in Fig. 7-5-1.

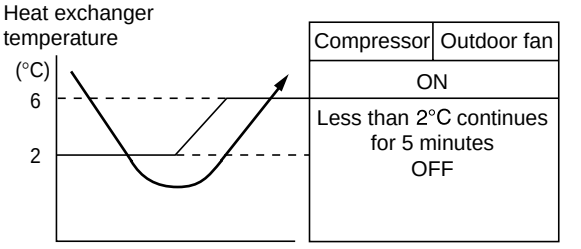


Fig. 7-5-1

7-6. Defrost Operation *Heat pump model only

When the indoor unit is in heating operation, if the refrigerant evaporation temperature detected by the outdoor heat exchanger sensor is under the specified temperature, the outdoor unit starts the defrosting operation. At this time, the 4-way valve relay and the outdoor fan motor are turned off. The indoor fan motor is also turned off by the cold draft preventing control of the indoor microcomputer. Then, [PRE. DEF.] lamp on the indoor unit comes on.
The defrosting operation stops and the 4-way valve relay, outdoor fan motor and the indoor fan motor are turned on automatically when the refrigerant evaporation increases to the specified temperature, or when the defrosting time is over 12 minutes.

7-6-1. Defrost starting condition

A-Zone : If -10°C > Teo ≥ – 18°C, defrost will start when.
Teo - Te ≥ 2.5°C at teat 20 sec or
~ 30 min after operation.

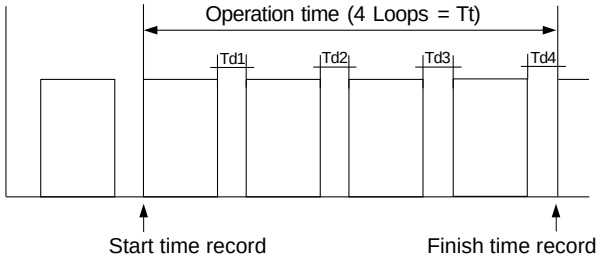
B-Zone : If Te ≤ –18°C, defrost start instantaneously (Suddenly) 00 ~ 25 min ofter operation

C-Zone : If -2ºC ≥ Teo ≥ –10°C defrost will start when Teo - Te ≤ –3°C at least 20 sec or ~ 60 min after operation.

7-6-2. Defrost finish condition.

1) If Te ≥ 3°C at least 60 sec -->4 way value on.
2) If Te ≥ 8°C --> 4 way value on.

Timing



Defrost time rate : (Td/Tt) x 100
Heating time rate : (Tt - Td) x Tt

Fig. 7-6-2

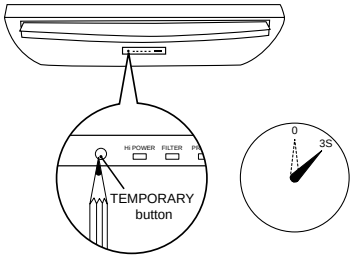
7-7. Auto Restart Function

The indoor unit is equipped with an automatic restarting function which allows the unit to restart operating with the set operating conditions in the event of power supply being accidentally shut down. The operation will resume without warning three minutes after power is restored.
This function is not set to work when shipped from the factory. Therefore it is necessary to set it to work.

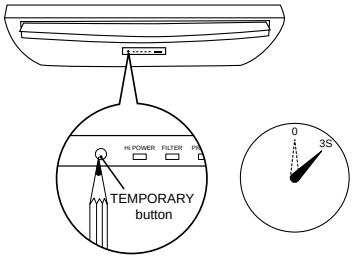
7-7-1. How to set auto restart function

To set the auto restart function, proceed as follows:
The power supply to the unit must be on; the function will not set if the power is off.
Push the [TEMPORARY] button located in the center of the front panel continuously for three seconds.
The unit receives the signal and beeps three times.
The unit then restarts operating automatically in the event of power supply being accidentally shut down.

When the unit is on standby (Not operating)

Operation	Motions
Push [TEMPORARY] button for more than three seconds. 	The unit is on standby. ↓ The unit starts to operate. The green lamp is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. The lamp changes from green to orange. If the unit is not required to operate at this time, push [TEMPORARY] button once more or use the remote control to turn it off.

When the unit is in operation

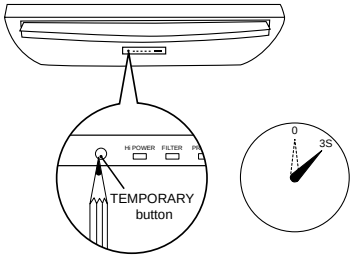
Operation	Motions
Push [TEMPORARY] button for more than three seconds. 	The unit is in operation. The green lamp is on. ↓ The unit stops operating. The green lamp is turned off. ↓ After approx. three seconds, The unit beeps three times. If the unit is required to operate at this time, push [TEMPORARY] button once more or use the remote control to turn it on.

- While this function is being set, if the unit is in operation, the orange lamp is on.
- This function can not be set if the timer operation has been selected.
- When the unit is turned on by this function, the louver will not swing even though it was swinging automatically before shutting down.
- While the filter check lamp is on, the TEMPORARY button has the function of filter reset button.

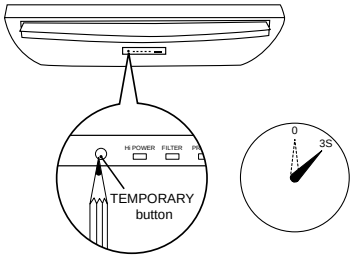
7-7-2. How to cancel auto restart function

To cancel auto restart function, proceed as follows:
Repeat the setting prodedure: the unit receives the signal and beeps three times.
The unit will be required to be turned on with the remote control after the main power supply is turned off.

When the unit is on standby (Not operating)

Operation	Motions
Push [TEMPORARY] button for more than three seconds. 	The unit is on standby. ↓ The unit starts to operate. The orange lamp is on. ↓ After approx. three seconds, The unit beeps three times and continues to operate. The lamp changes from orange to green. If the unit is not required to operate at this time, push [TEMPORARY] button once more or use the remote control to turn it off.

When the unit is in operation

Operation	Motions
Push [TEMPORARY] button for more than three seconds. 	The unit is in operation. The orange lamp is on. ↓ The unit stops operating. The orange lamp is turned off. ↓ After approx. three seconds, The unit beeps three times. If the unit is required to operate at this time, push [TEMPORARY] button once more or use the remote control to turn it on.

- While this function is being set, if the unit is in operation, the orange lamp is on.

7-7-3. Power failure during timer operation

When the unit is in Timer operation, if it is turned off because of power failure, the timer operation is cancelled. Therefore, set the timer operation again.

7-8. Filter Check Lamp

When the elapsed time reaches 1000 hours, the filter check lamp indicates. After cleaning the filters, turn off the filter check lamp.

7-8-1. How to turn off filter check lamp

(1) Press [FILTER] button on the remote control.
(2) Push [TEMPORARY] button on the indoor unit.

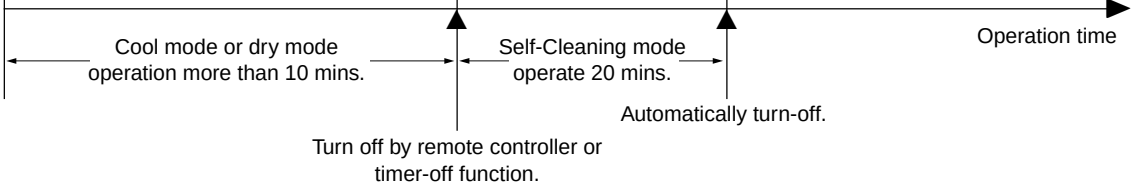
Note:

If [TEMPORARY] button is pushed while the filter check lamp is not indicating, the indoor unit will start the Automatic Operation.

7-9. Self-Cleaning function

Self-Cleaning function is designed to reduce humidity that causes mold to form inside the air conditioning unit. This advanced, efficient system reduces moisture in the coil. When air conditioner is turned off, the internal fan activates and dries the moisture in the coil for 20 minutes, then it turns off automatically.

Operation display	ON	OFF	OFF
FCU fan	ON rpm is depend on presetting.	ON rpm is SL speed.	OFF
FCU louver	OPEN	CLOSE	CLOSE
Timer display	ON or OFF depend on presetting of timer function.	ON	ON or OFF depend on presetting of timer function.
Compressor	ON or OFF depend on presetting per room temperature.	OFF	OFF
CDU fan	ON or OFF depend on presetting per room temperature.	OFF	OFF



- **The Self-Cleaning function is set as default at ex-factory.**
- **Self-Cleaning operation can stop manually by press [⏻] button of the remote control two more time.**

7-9-1. How to cancel Self-Cleaning function

To cancel the Self-Cleaning function, proceed as follows:

- Press [TEMPORARY] button one time or use remote control to turn on air conditioner. The OPERATION display will show in orange color (When AUTO-RESTART is ON) or green color (When AUTO-RESTART is OFF).
- Hold down the [TEMPORARY] button for more than 20 seconds. (The air conditioner will stop suddenly when the [TEMPORARY] button is pressed but keep holding it continue. Then will beep 3 times in the first 3 seconds but it is not related to Self-Cleaning function)
- After holding about 20 seconds, the air conditioner will beep 5 times without any blinking of display.
- The Self-Cleaning Operation had been cancelled.

Remarks

- Per setting of Self-Cleaning function above, AUTO-RESTART function had been cancelled. To set AUTO-RESTART again, please follow item 7-8-1.

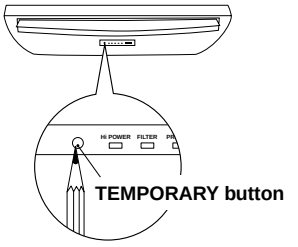
7-9-2. How to set Self-Cleaning function.

To set the Self-Cleaning function, proceed as follows.

- Press [TEMPORARY] button one time or use remote control to turn on air conditioner. The OPERATION display will show in orange color (When AUTO-RESET is ON) or green color (When AUTO-RESTART is OFF).
- Hold down the [TEMPORARY] button for more than 20 seconds. (The air conditioner will stop suddenly when the [TEMPORARY] button is pressed but keep holding it continue. Then will beep 3 times is the first 3 seconds but it is not related to Self-Cleaning function)
- After holding about 20 seconds, the air conditioner will beep 5 times and OPERATION display blinks 5 times.
- The Self-Cleaning function had been set.

Remarks

- Per setting of Self-Cleaning function above, AUTO-RESTART function had been cancelled. To set AUTO-RESTART again, please follow item 7-8-1.



7-10. QUIET Mode

Quiet mode is the system which, control the revolving speed of indoor fan to work constantly at lower than speed L. In addition, noise level of indoor unit is less than usual.

When the [QUIET] button is pressed, the fan of the indoor unit will be restricted the revolving speed at speed L - until the [QUIET] button is pressed once again (cancel Quiet mode).

Remarks :

1. Quiet mode is unable to work in dry mode.
2. Quiet mode is appropriate to work with less cooling load and less heating load condition. Because of the fan speed L- may cause not enough the cooling capacity or heating capacity.

7-11. COMFORT SLEEP mode

The principles of comfort sleep mode are:

- Quietness for more comfortable.
- Save energy by changing room temperature automatically.
- The air condition can shut down by itself automatically.

Remarks:

1. Comfort sleep mode will not operate in dry mode and fan only mode.
2. Comfort sleep mode is appropriate to work with less cooling load and less heating load condition. Because of the fan speed L- may cause not enough the cooling capacity or heating capacity.

7-11-1. Cooling mode

- The fan speed of indoor unit operates automatically, it relates with the compressor's operation.

Compressor's Operation	Fan Speed
ON	L-
OFF	SL

- The preset temperature will increase 1°C after the Comfort sleep mode has operated for 1 hour and the temperature will increase another 1°C after the comfort sleep mode has operated for 2 hour. (The value of the preset temperature on the remote control does not change.)
- Press the [COMFORT SLEEP] button to choose the operating hours. Repeat pressing to select the hours. (1hr, 3hr, 5hr or 9hr)
- If the [COMFORT SLEEP] button is pressed again means cancel comfort sleep mode.

7-11-2. Heating mode

- The fan speed of indoor unit operates automatically, it relates with the compressor's operation.

Compressor's Operation	Fan Speed
ON	L-
OFF	SL

- The preset temperature will drop down 1°C after the comfort sleep mode has operated for 1 hour and the temperature will decrease another 1°C after the comfort sleep mode has operated for 2 hour. (The value of the preset temperature on the remote control. dose not change.)
- Press the [COMFORT SLEEP] button to choose the operating hours. Repeat pressing to select the hours. (1hr, 3hr, 5hr or 9 hr)
- If the [COMFORT SLEEP] button is pressed again means cancel comfort sleep mode.

8. INSTALLATION PROCEDURE

8-1. Safety Cautions

For general public use

Power supply cord of Outdoor unit shall be more than 4 mm^2 (H07RN-F or 245IEC66 : polychloroprene sheathed flexible cord) or 3.5 mm^2 (AWG-12).

CAUTION **New Refrigerant Air conditioner Installation**

- **THIS AIR CONDITIONER USES THE NEW HFC REFRGERANT (R-410A), WHICH DOES NOT DESTROY THE OZONE LAYER.**

R-410A refrigerant is apt to be affected by impurity such as water, oxidizing membranes, and oils because the pressure of R-410A refrigerant is approx. 1.6 times of refrigerant R-22. As well as the adoption of this new refrigerant, refrigerating machine oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating machine oil does not enter into the refrigerating cycle of a new-refrigerant air conditioner.
To avoid mixing refrigerant and refrigerating machine oil, the sizes of charging port connecting sections on the main unit are different from those for the conventional refrigerant, and different size tools are also required. Accordingly, special tools are required for the new refrigerant (R-410A) as shown below. For connecting pipes, use new and clean piping materials with high-pressure withstand capabilities, designed for R-410A only, and ensure that water or dust does not enter. Moreover, do not use any existing piping as its pressure withstand may be insufficient, and may contain impurities.

CAUTION **To Disconnect the Appliance from the Main Power Supply**

This appliance must be connected to the main power supply by means of a circuit breaker or a switch with a contact separation of at least 3 mm.
If this is not possible, a power supply plug with earth must be used. This plug must be easily accessible after installation. The plug must be disconnected from the power supply socket in order to disconnect the appliance completely from the mains.

DANGER

- FOR USE BY QUALIFIED PERSONS ONLY.
- TURN OFF MAIN POWER SUPPLY BEFORE ATTEMPTING ANY ELECTRICAL WORK. MAKE SURE ALL POWER SWITCHES ARE OFF. FAILURE TO DO SO MAY CAUSE ELECTRIC SHOCK.
- CONNECT THE CONNECTING CABLE CORRECTLY. IF THE CONNECTING CABLE IS CONNECTED WRONGLY, ELECTRIC PARTS MAY BE DAMAGED.
- CHECK THE EARTH WIRE THAT IT IS NOT BROKEN OR DISCONNECTED BEFORE INSTALLATION.
- DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION.
- TO PREVENT OVERHEATING THE INDOOR UNIT AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEATORS, FURNACE, STOVES, ETC.
- WHEN MOVING THE AIR-CONDITIONER FOR INSTALLING IT IN ANOTHER PLACE AGAIN, BE VERY CAREFUL NOT TO GET THE SPECIFIED REFRIGERANT (R-410A) WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CYCLE. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CYCLE BECOMES ABNORMALLY HIGH AND IT RESULTINGLY CAUSES BURST OF THE PIPE AND INJURIES ON PERSONS.
- IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED BY FIRE OR SOMETHING ELSE, IT CAUSES GENERATION OF POISONOUS GAS.

WARNING

- Never modify this unit by removing any of the safety guards or bypassing any of the safety interlock switches.
- Do not install in a place which cannot bear the weight of the unit. Personal injury and property damage can result if the unit falls.
- Before doing the electrical work, attach an approved plug to the power supply cord. Also, make sure the equipment is properly earthed.
- Appliance shall be installed in accordance with national wiring regulations. If you detect any damage, do not install the unit. Contact your TOSHIBA dealer immediately.

CAUTION

- Exposure of unit to water or other moisture before installation could result in electric shock. Do not store it in a wet basement or expose to rain or water.
- After unpacking the unit, examine it carefully for possible damage.
- Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of the unit or where noise and discharged air might disturb neighbors.
- To avoid personal injury, be careful when handling parts with sharp edges.
- Please read this installation manual carefully before installing the unit. It contains further important instructions for proper installation.

REQUIREMENT OF REPORT TO THE LOCAL POWER SUPPLIER

Please make absolutely sure that the installation of this appliance is reported to the local power supplier before installation. If you experience any problems, or if the installation is not accepted by the supplier, the service agency will take adequate countermeasures.

Remark per EMC Directive 89/336/EEC

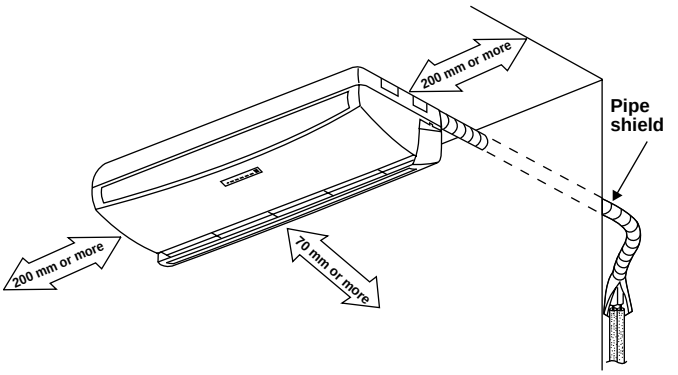
To prevent flicker impressions during the start of the compressor (technical process) following installation conditions do apply.

1. The power connection for the air conditioner has to be done at the main power distribution. This distribution has to be of an impedance.
   Normally the required impedance is reached at a 32A fusing point. Air conditioner fuse has to be 16A max.!
2. No other equipment should be connected to this power line.
3. For detailed installation acceptance, please contact your power supplier whether its restriction does apply for products like washing machines, air conditioners or electrical ovens.
4. For power details of the air conditioner, refer to the rating plate of the product.

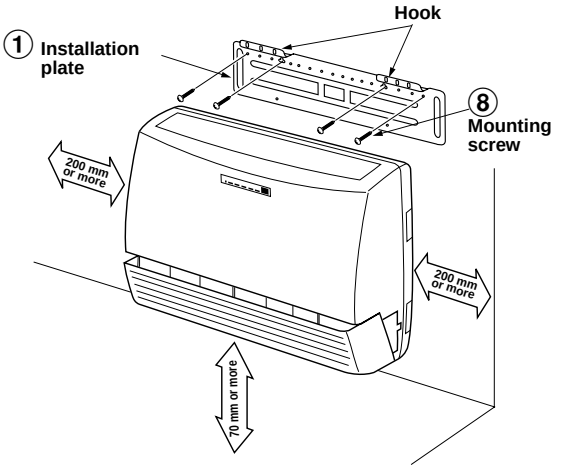
8-2. Installation Diagram of Indoor and Outdoor Units

For installation of the indoor unit, use the Paper pattern, which is inside the package box cover.

(Under Ceiling Installation)

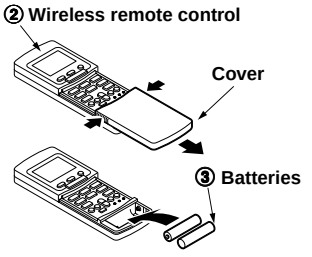


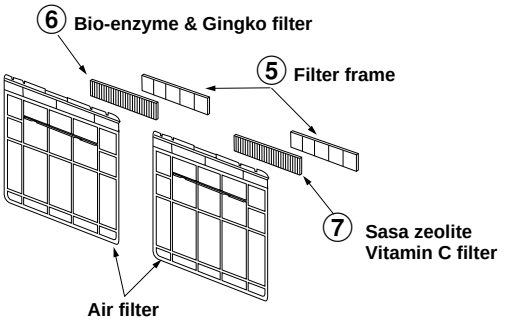
(Console Installation)

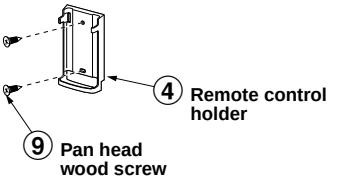


Before install the wireless remote control

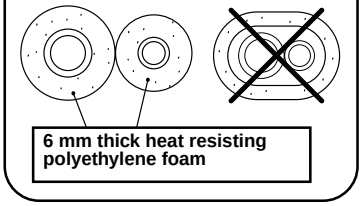
- **With the remote control cover open, load the batteries supplied correctly, observing their polarity.**

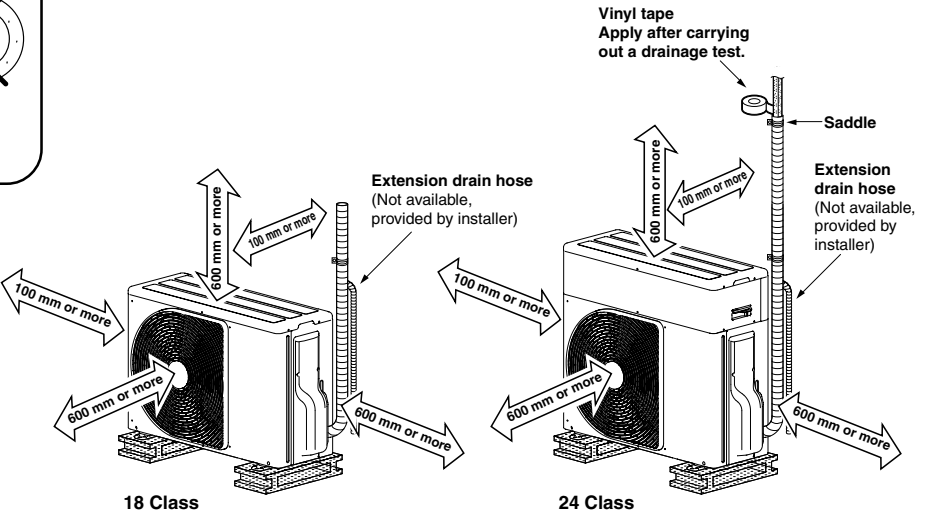






Insulate the refrigerant pipes separately with insulation, not together.





8-3. Installation

8-3-1. Optional installation parts

Part Code	Parts name	Q'ty
Ⓐ	Refrigerant piping Liquid side : ∅6.35 mm Gas side : ∅12.70 mm	One each
Ⓑ	Pipe insulating material (polyethylene foam, 6 mm thick)	1
Ⓒ	Putty, PVC tapes	One each

<Fixing bolt arrangement of outdoor unit>

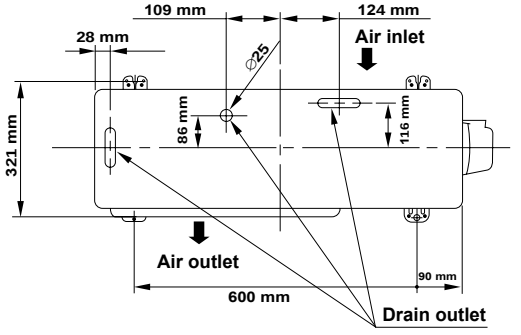
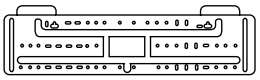
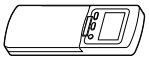
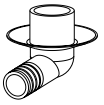
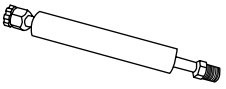
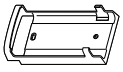
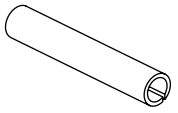


Fig. 8-3-1

- Secure the outdoor unit with fixing bolts and nuts if the unit is likely to be exposed to a strong wind.
- Use ∅8 mm or ∅10 mm anchor bolts and nuts.
- If it is necessary to drain the defrost water, attach drain nipple 10 to the bottom plate of the outdoor unit before installing it.

8-3-2. Accessory and installation parts

Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)	Part No.	Part name (Q'ty)
①	 Installation plate x 1	⑤	 Filter frame x 2	⑨	 Pan head wood screw ∅3.1 x 16 ℓ x 2
②	 Wireless remote control x 1	⑥	 Bio-enzyme & Gingko filter x 1	⑩	 Drain nipple x 1 (Packaged with the outdoor unit)
③	 Battery x 2	⑦	 Sasa zeolite Vitamin C filter x 1	⑪	 Flexible pipe x 1
④	 Remote control holder x 1	⑧	 Mounting screw ∅4 x 25 ℓ x 8	⑫	 Pipe shield x 1

Others : Owner's manual, Installation manual

8-3-3. Installation/Servicing tools

<Changes in the product and components>

In the case of an air conditioner using R-410A, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve (3 way valve) has been changed. (1/2 UNF 20 threads per inch)

- In order to increase the pressure withstand strength of the refrigerant piping, flare processing diameter and size of opposite side of flare nuts have been changed. (for copper pipes with nominal dimensions 1/2 and 5/8)

New tools for R-410A	Applicable to R-22 model		Changes
Gauge manifold	×		As pressure is high, it is impossible to measure by means of conventional gauge. In order to prevent any other refrigerant from being charged, each port diameter has been changed.
Charge hose	×		In order to increase pressure withstand strength, hose materials and port size have been changed (to 1/2 UNF 20 threads per inch). When purchasing a charge hose, be sure to confirm the port size.
Electronic balance for refrigerant charging	○		As pressure is high and gasification speed is fast, it is difficult to read the indicated value by means of a charging cylinder, as air bubbles occur.
Torque wrench (nominal dia. 1/2, 5/8)	×		The size of opposing flare nuts has been increased. Incidentally, a common wrench is used for nominal diameters 1/4 and 3/8.
Flare tool (clutch type)	○		By increasing the clamp bar's receiving hole, strength of spring in the tool has been improved.
Gauge for projection adjustment	—		Used when flare is made with a conventional flare tool.
Vacuum pump adapter	○		Connected to conventional vacuum pump. It is necessary to use an adapter to prevent vacuum pump oil from flowing back to the charge hose. The charge hose connecting part has two ports: one for conventional refrigerant (7/16 UNF 20 threads per inch) and one for R-410A. If the vacuum pump mineral oil mixes with R-410A, a sludge may occur and damage the equipment.
Gas leakage detector	×		Exclusive for HFC refrigerant.

- Incidentally, the “refrigerant cylinder” comes with the refrigerant designation (R-410A) and protector coating in the U. S ARI specified rose color (ARI color code: PMS 507).
- Also, the “charge port and packing for refrigerant cylinder” require 1/2 UNF 20 threads per inch corresponding to the port size of the charge hose.

8-4. Indoor Unit

8-4-1. Installation place

- A place which provides the spaces around the indoor unit as shown in the above diagram.
- A place where there is no obstacle near the air inlet and outlet.
- A place that allows easy installation of the piping to the outdoor unit.
- A place which allows the Front panel to be opened.

CAUTION

- Direct sunlight or fluorescent light to the indoor unit's wireless receiver should be avoided.
- The microprocessor in the indoor unit should not be too close to RF noise sources.
  (For details, see the owner's manual.)

<Remote control>

- A place where there are no obstacles such as a curtain that may block the signal from the indoor unit.
- Do not install the remote control in a place exposed to direct sunlight or close to a heating source, such as a stove.
- Keep the remote control at least 1 m apart from the nearest TV set or stereo equipment. (This is necessary to prevent image disturbances or noise interference.)
- The location of the remote control should be determined as shown below.

<Remote control usage>

- Under Ceiling Installation

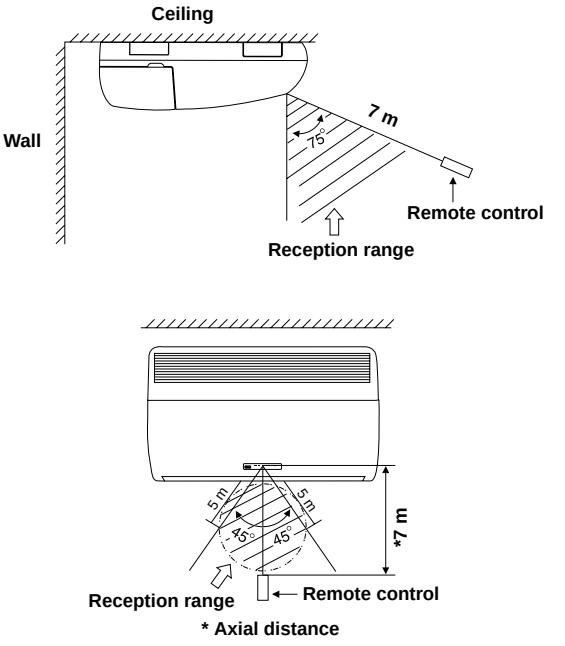


Fig. 8-4-1

- Console Installation

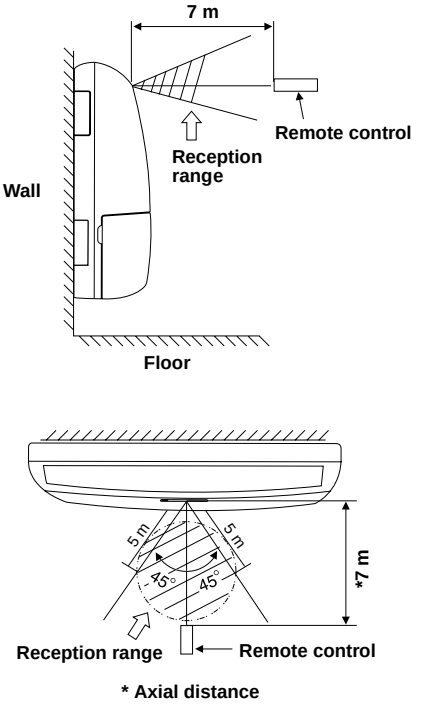


Fig. 8-4-2

NOTICE

The Paper pattern is inside the package box cover. Do not bend and dispose of it before installing.

8-4-2. Before installation

<Remove the Air inlet grille>

1. Open the Air inlet grille with both hands.
2. Loosen three screws for fixing the Panel arm. Do not remove the screws at this time.

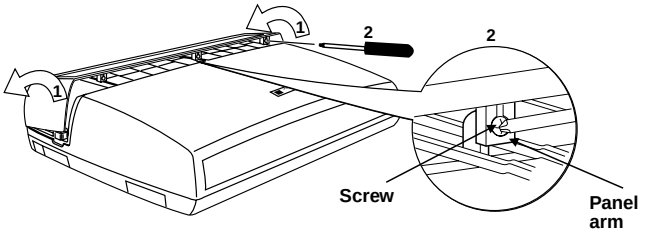


Fig. 8-4-3

3. First, move the Air inlet grille upward, then turn it backwards.
4. Remove the Grille stopper from the axis of the Front panel. After that, remove the Air inlet grille
5. Remove the Panel arms from the Front panel.

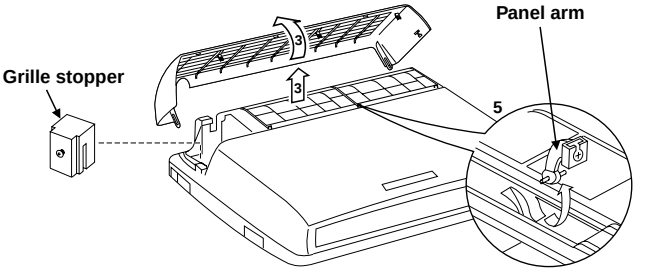


Fig. 8-4-4

8-4-3. After installation

<Install the Air inlet grille>

1. Insert the three Panel arms on the Air inlet grille and fix each securely by screws.

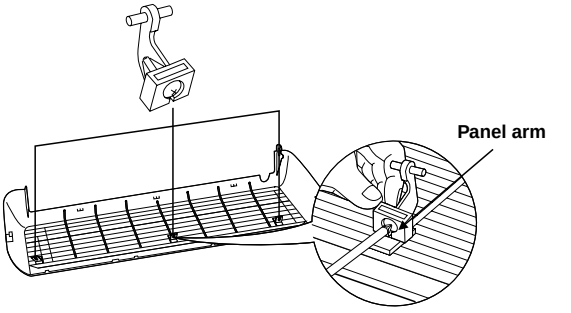


Fig. 8-4-5

CAUTION

- The screws that fixed with Panel arms must not be loose.

2. Set the Air inlet grille arm to the axis of the Front panel.
3. Insert the Grille stopper to the correct position and fix it securely with screws.
4. Push the Air inlet grille to the correct position.

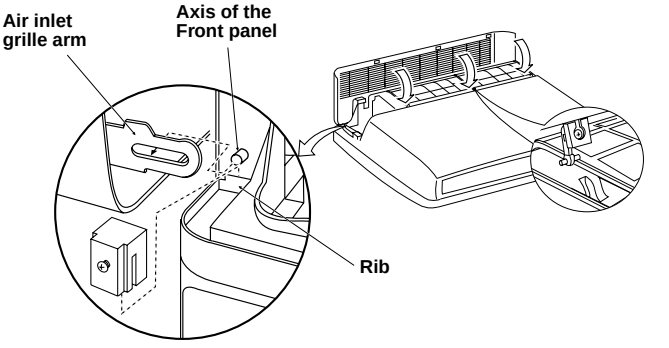


Fig. 8-4-6

8-4-4. Under ceiling installation

For the installation of the indoor unit, use the Paper pattern, which is inside the package box cover.

<Install the Suspension bolts>

- Install the suspension bolts so that it can support the indoor unit.

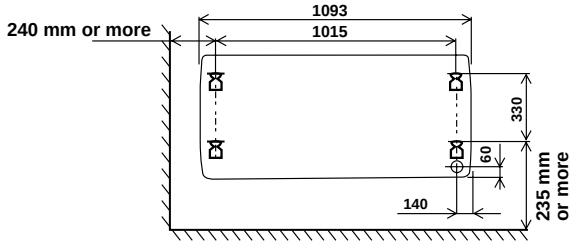


Fig. 8-4-7

- Adjust distance to ceiling before installation.

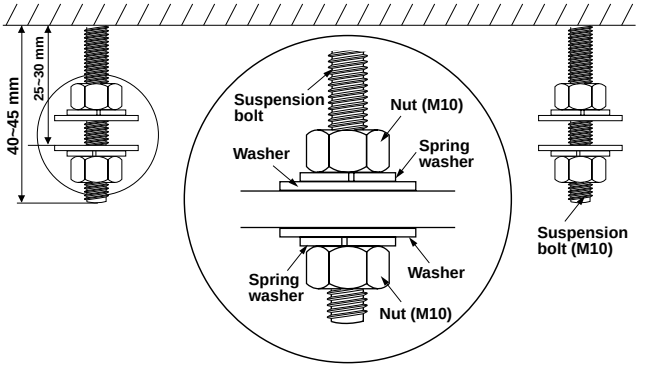


Fig. 8-4-8

<Install the indoor unit>

1. Remove the Side covers and the Installation plate ①.
2. Insert the Suspension bolts into the metal fittings of the indoor unit.
3. Set to nuts, spring washers and washers on both sides of the metal fittings and then move the indoor unit backward.
4. Secure it with the M10 Nuts. (4pcs)
5. Attach the Side covers to the unit.

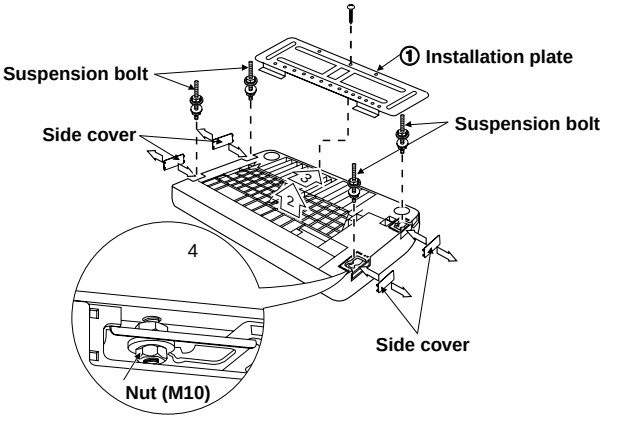


Fig. 8-4-9

<Condition for installation>

- The unit must not decline more than 15 mm in either axis.

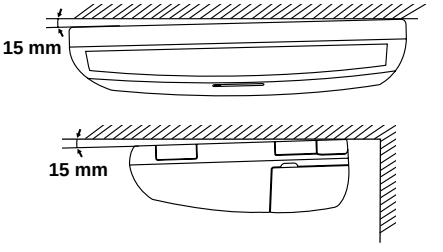


Fig. 8-4-10

<Piping and Drain hose installation>

- The piping direction can be 4 ways as illustrated.
- The Drain hose is only one way.

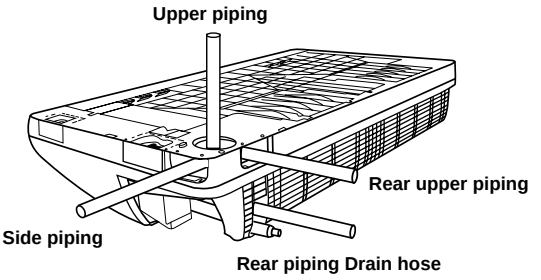


Fig. 8-4-11

- How to install the Drain hose.

1. Remove the two screws and the Drain band.
2. Cut a slit for the drain hose hole.

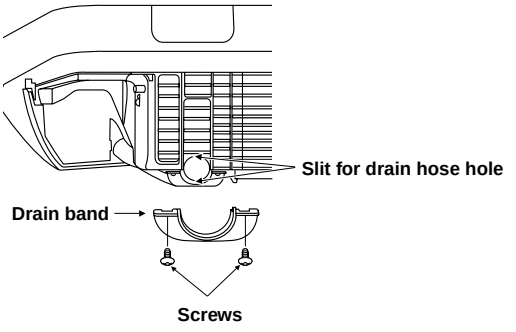


Fig. 8-4-12

3. Place the Drain hose on the U- shape space and secure it with the Drain band and two screws.

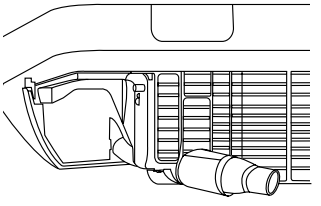


Fig. 8-4-13

- Rear side piping with Drain hose. (Recommended direction)

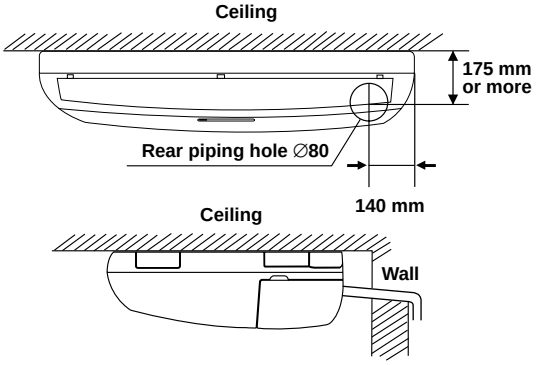


Fig. 8-4-14

1. Cut or remove the determined direction slit or cover.
2. Pipes and the Drain hose should be fixed together by the Drain band with two screws.

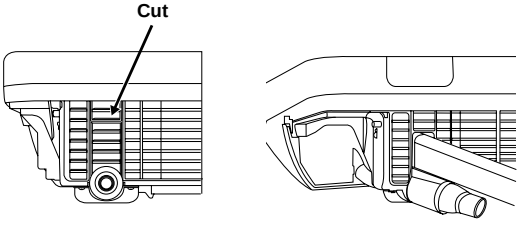


Fig. 8-4-15

- Other direction piping.

1. Cut the slit of connecting only upper direction.

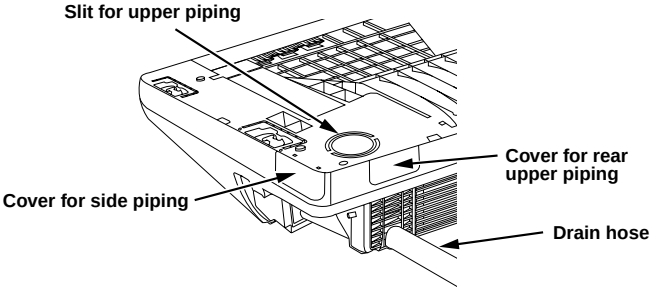


Fig. 8-4-16

2. Connect the Flexible pipe ⑪ to the large pipe (Gas side).

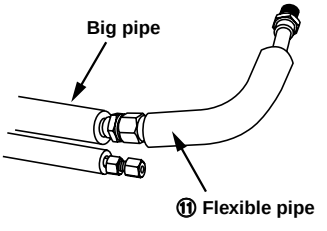


Fig. 8-4-17

8-4-5. Console installation

- Select the terminal of Selector-SW from [C position] to [F position].

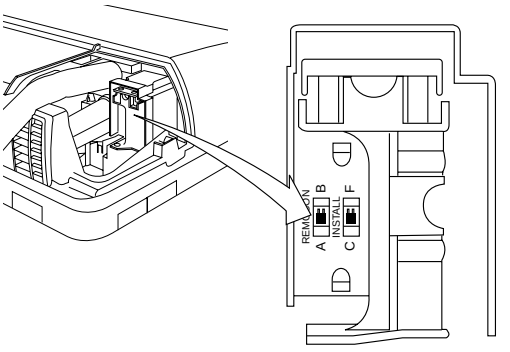


Fig. 8-4-18

<Cutting a hole and mounting the installation plate>

- When installing the rear piping, determine the pipe hole position, drill the pipe hole (∅80 mm) at a slight downward slant to the outdoor side.
- For mounting of the Installation plate ①, use the Paper pattern, which is inside the package box cover.

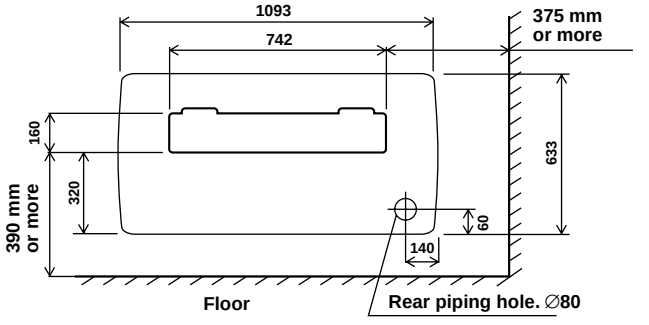


Fig. 8-4-19

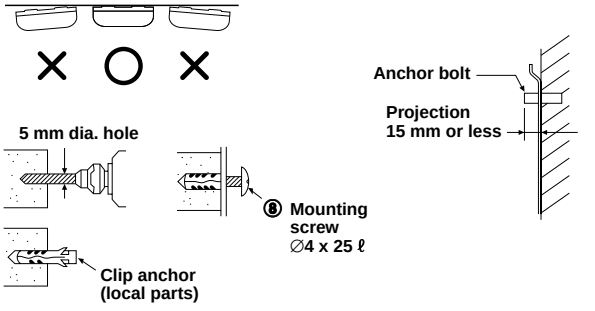


Fig. 8-4-20

CAUTION

Failure to firmly install the unit may result in personal injury and property damage if the unit falls.

- In case of block, brick, concrete or similar type walls, make 5 mm dia. holes in the wall.
- Insert clip anchors for appropriate Mounting screws ⑧.

NOTE:

- Secure four corners and lower parts of the Installation plate ① with 6 to 8 mounting screws to install it.

<Install the indoor unit>

- Install the Installation plate ① at the wall according to the Paper pattern.
- Hang the indoor unit on the hooks of the Installation plate ①.
- Fix the lower portion of the indoor unit with Mounting screws ⑧ (2 places).

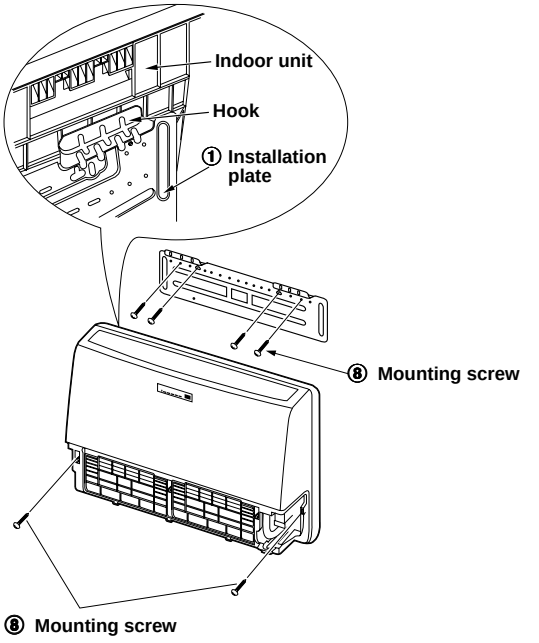


Fig. 8-4-21

<Condition for installation>

- The unit must not decline more than 15 mm in either axis.

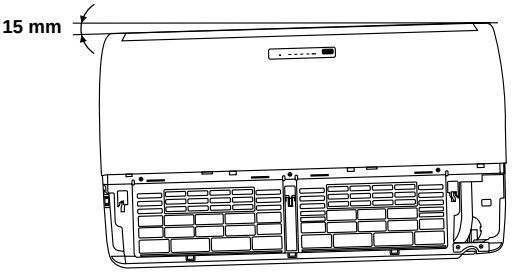


Fig. 8-4-22

<Piping and Drain hose installation>

- The piping direction can be the following 3 ways with the Drain hose.
- Each piping direction should be connected with the Flexible pipe ⑪.

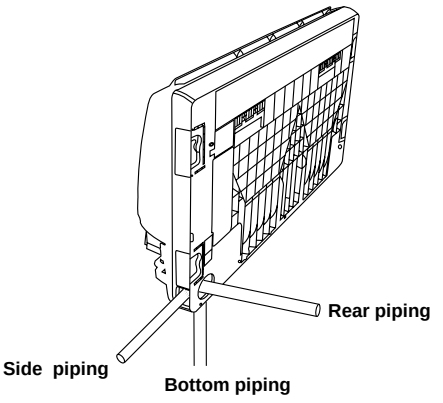


Fig. 8-4-23

- Cut or remove the determined direction slit or cover.

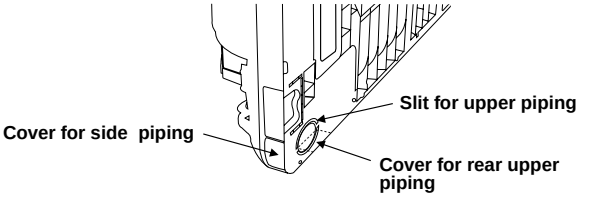


Fig. 8-4-24

8-4-6. Wiring connection

<How to connect the connecting cable>

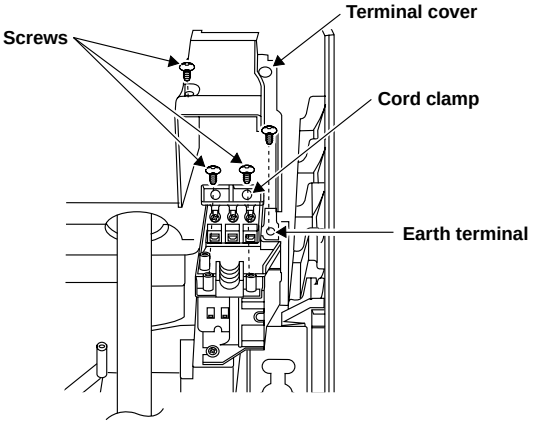


Fig. 8-4-25

1. Remove the Terminal cover and the Cord clamp.
2. Insert the connecting cable into the pipe hole on the wall.
3. Insert the connecting cable fully into the Terminal block and secure it tightly with the screw.
   Tightening torque: 1.2 N·m (0.12kgf·m)
4. Fix the connecting cable by the Cord clamp with two screws.
5. Fix the Terminal cover.

<Stripping length of the connecting cable>

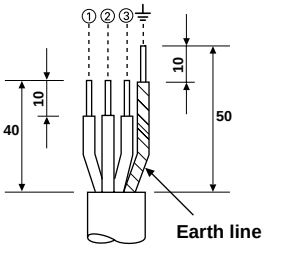


Fig. 8-4-26

NOTE:

Use strand wire only.

- Wire type : More than 1.5 mm² (H07RN-F or 245 IEC66) or 1.3 mm² (AWG-16)

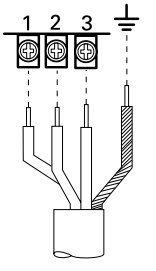


Fig. 8-4-27

NOTE:

Connect the earth line to the metallic part (⏚ mark) located at the side of 3P terminal.

8-4-7. Pipe shield for flare nut connection

Joints in liquid and gas pipes of the indoor unit should be insulated with an attached Pipe shield ⑫.

<How to install the Pipe shield>

1. Cut the Pipe shield ⑫ to appropriate length.
2. Set the Pipe shield ⑫.
3. In case of a ceiling installation, orient the slit at the top of the pipe.
4. Fix the Pipe shield ⑫ with vinyl tape.

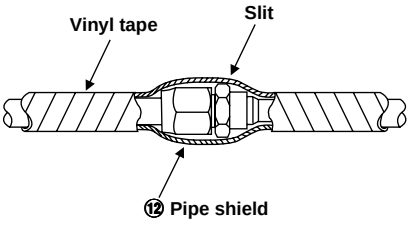


Fig. 8-4-28

8-4-8. Drainage

1. Run the Drain hose sloping downward.

NOTE:

- The hole should be made at a slight downward slant on the outdoor side.

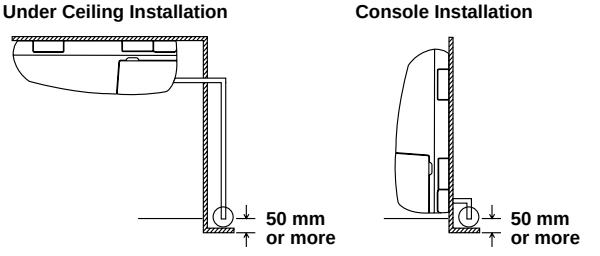


Fig. 8-4-29

NOTICE

In the case of upward drainage from the unit, (Under Ceiling Installation), it is necessary to use Drain pump kit of optional part.

CAUTION

1. Do not raise the Drain hose.
2. Do not put the Drain hose into water.
3. Do not form the Drain hose into a wave shape.
4. Do not put the Drain hose end in the drainage ditch.

2. Open the louver manually and put some water into it. Then check the flow of water from the Drain hose.

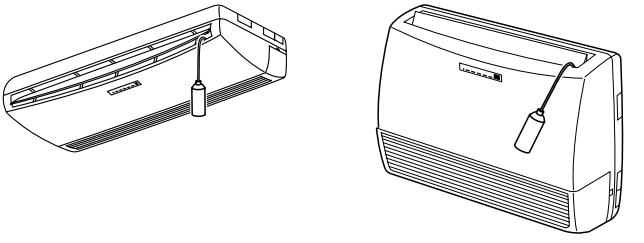


Fig. 8-4-30

3. When connecting the Extension drain hose, insulate the connecting part of Extension drain hose with the Pipe shield.

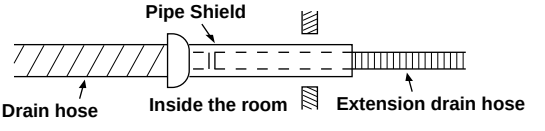


Fig. 8-4-31

CAUTION

Arrange the drain pipe for proper drainage from the unit.
Improper drainage can result in dew-dropping.
(Provided by customer)

8-5. Outdoor Unit

8-5-1. Installation place

- A place which provides the spaces around the outdoor unit as shown in the left diagram.
- A place which can bear the weight of the outdoor unit and does not allow an increase in noise level and vibration.
- A place where the operation noise and discharged air do not disturb your neighbors.
- A place which is not exposed to a strong wind.
- A place free of a leakage of combustible gases.
- A place which does not block a passage.
- When the outdoor unit is to be installed in an elevated position, be sure to secure its feet.
- An allowable length of the connecting pipe is up to 15 m (Refer to the table of **TO CHARGE REFRIGERANT** for detail.)
- An allowable height level is up to 8 m.
- A place where the drain water does not raise any problem.

CAUTION

1. Install the outdoor unit without anything blocking the air discharging.
2. When the outdoor unit is installed in a place always exposed to strong wind like a coast or on a high storey of a building, secure the normal fan operation using a duct or a wind shield.
3. Especially in windy area, install the unit to prevent the admission of wind.
4. Installation in the following places may result in trouble.
   Do not install the unit in such places.
   - A place full of machine oil.
   - A saline-place such as the coast.
   - A place full of sulfide gas.
   - A place where high-frequency waves are likely to be generated as from audio equipment, welders, and medical equipment.

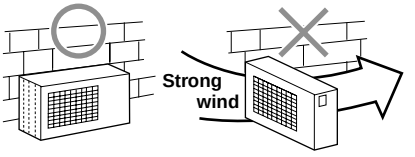


Fig. 8-5-1

8-5-2. Refrigerant piping connection

1. Cut the pipe with a pipe cutter.

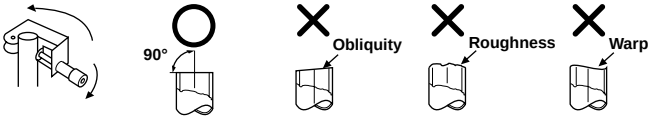


Fig. 8-5-2

2. Insert a flare nut into the pipe, and flare the pipe.

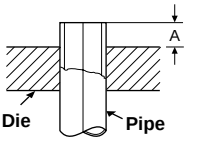


Fig. 8-5-3

Projection margin in flaring : A (Unit : mm)

Outer dia. of copper pipe	A	
	Rigid	Imperial
6.35	1.0 to 1.5	1.5 to 2.0
12.70	1.0 to 1.5	2.0 to 2.5

<Tightening connection>

Align the centers of the connecting pipes and tighten the flare nut as far as possible with your fingers. Then tighten the nut with a spanner and torque wrench as shown in the figure.

CAUTION

- Do not apply excess torque, otherwise the nut may crack depending on the conditions.

(Unit : N·m)

Outer dia. of copper pipe	Tightening torque
∅6.35 mm	16 to 18 (1.6 to 1.8 kgf·m)
∅12.70 mm	50 to 62 (5.0 to 6.2 kgf·m)

- **Tightening torque of flare pipe connections**

The operating pressure of R-410A is higher than that of R-22 (Approx. 1.6 times). It is therefore necessary to tighten firmly flare pipe connecting sections (which connect the indoor and outdoor units) up to the specified tightening torque. Incorrect connections may not only cause a gas leakage, but also damage the refrigerant cycle.

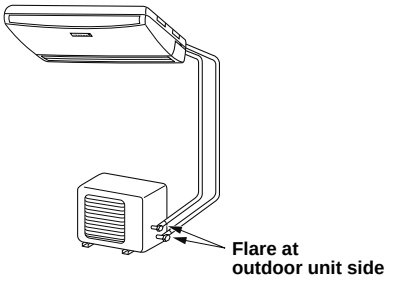


Fig. 8-5-4

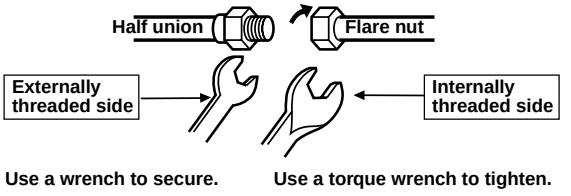


Fig. 8-5-5

CAUTION

- **KEEP IMPORTANT 4 POINTS FOR PIPING WORK**

(1) Take away dust and moisture (Inside of the connecting pipes).
(2) Tight connection (between pipes and unit).
(3) Evacuate the air in the connecting pipes using VACUUM PUMP.
(4) Check gas leak (connected points).

8-5-3. Evacuating

After the piping has been connected to the indoor unit, you can perform the air purge together at once.

AIR PURGE
Evacuate the air in the connecting pipes and in the indoor unit using vacuum pump. Do not use the refrigerant in the outdoor unit.
For details, see the manual of the vacuum pump.

<Using a vacuum pump>

Be sure to use a vacuum pump with counter-flow prevention function so that inside oil of the pump does not flow backward into pipes of the air conditioner when the pump stops. (If inside oil of the vacuum pump enters into the air conditioner which adopts R-410A, a trouble of the refrigeration cycle may be caused.)

1. Connect the charge hose from the manifold valve to the service port of the gas side packed valve.
2. Connect the charge hose to the port of the vacuum pump.
3. Open fully the low pressure side handle of the gauge manifold valve.
4. Operate the vacuum pump to start for evacuating. Perform evacuating for about 15 minutes if the piping length is 20 meters. (15 minutes for 20 meters) (Assuming a pump capacity of 27 liters per minute.) Then confirm that the compound pressure gauge reading is –101 kPa (–76 cmHg).
5. Close the low pressure side valve handle of gauge manifold.
6. Open fully the valve stem of the packed valves (both sides of Gas and Liquid).
7. Remove the charging hose from the service port.
8. Securely tighten the caps on the packed valves.

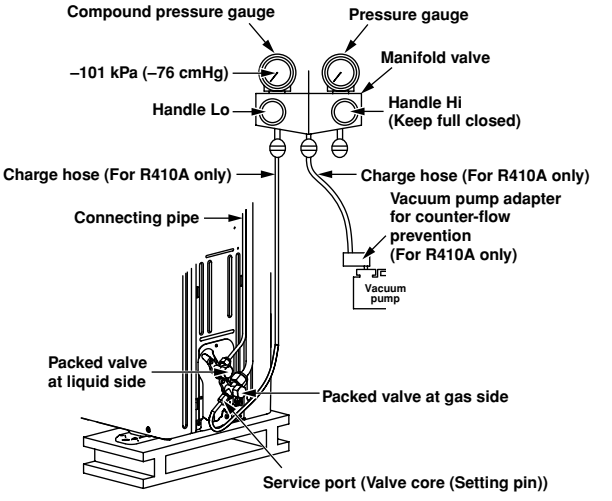


Fig. 8-5-6

TO CHARGE REFRIGERANT		
	RAS-18GFHP-ES2 / 18GAH-ES2 RAS-18GFP-ES2 / 18GA-ES2	RAS-24GFHP-ES2 / 24GAH-ES2 RAS-24GFP-ES2 / 24GA-ES2
No need to charge refrigerant	15 m or less	15 m or less
Need to charge refrigerant	Over 15 m up to 20 m (20g/m)	Over 15 m up to 25 m (20g/m)

<Packed valve handling precautions>

- Open the valve stem all the way out; but do not try to open it beyond the stopper.
- Securely tighten the valve stem cap with torque in the following table:

Pipe side	Tightening torque	A
Gas side (∅12.70 mm)	50 to 62 N·m (5.0 to 6.2 kgf·m)	4 mm
Liquid side (∅6.35 mm)	16 to 18 N·m (1.6 to 1.8 kgf·m)	Same as Gas side
Service port	9 to 10 N·m (0.9 to 1.0 kgf·m)	

- Hexagonal wrench : A (Unit : mm)

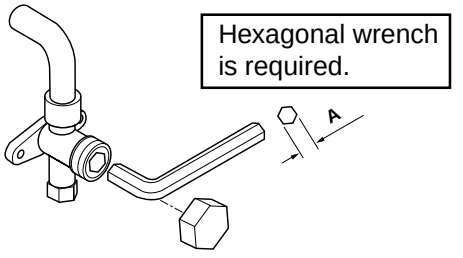


Fig. 8-5-7

8-5-4. Wiring connection

1. Remove the electric parts cover from the outdoor unit.
2. Connect the connecting cable to the terminal as identified with their respective matched numbers on the terminal block of indoor and outdoor unit.
3. When connecting the connecting cable to the outdoor unit terminal, make a loop as shown in the installation diagram of indoor and outdoor unit, to prevent water coming in the outdoor unit.
4. Insulate the unused cords (conductors) from any water coming in the outdoor unit. Proceed them so that they do not touch any electrical or metal parts.

<Stripping length of connecting cable>

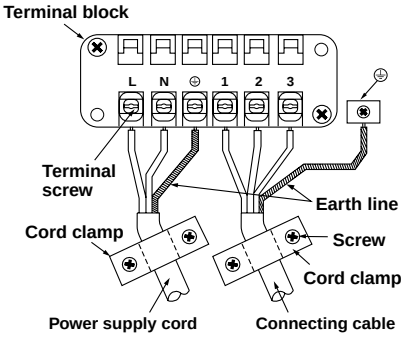


Fig. 8-5-8

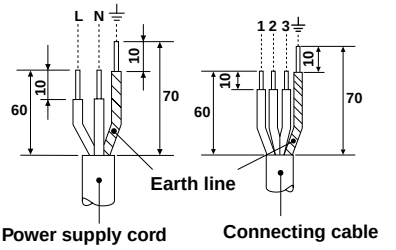


Fig. 8-5-9

	RAS-18GFHP-ES2 / 18GAH-ES2 RAS-18GFP-ES2 / 18GA-ES2	RAS-24GFHP-ES2 / 24GAH-ES2 RAS-24GFP-ES2 / 24GA-ES2
Power source	50 Hz, 220 – 240 V Single phase	
Maximum running current	16A	18A
Plug socket & fuse rating	20A	
Power cord	4 mm² (H07RN-F or 245 IEC 66) or 3.5 mm² (AWG-12)	

CAUTION

- Wrong wiring connection may cause some electrical parts burn out.
- Be sure to comply with local codes on running the wire from indoor unit to outdoor unit (size of wire and wiring method etc).
- Every wire must be connected firmly.

NOTE: Connecting cable

- Wire type : More than 1.5 mm² (H07RN-F or 245 IEC66) or 1.3 mm² (AWG-16)

8-6. How to Set Remote Control Selector Switch

When two indoor units ae installed in seperated rooms, there is no need to change the selector switch.

<Remote control selector switch>

- When two indoor units are installed in the same room or the adjacent two rooms, they may be controlled simultaneously with a single remote control. To prevent this, set either unit and its remote control to B setting. (Both units are set to A setting before shipment.)
- The remote control signal is not recived when the indoor unit setting is different from the remote control one.

1. Set the remote control selector switch with the indoor unit.

1) Turn the circuit breaker of the main power switch off before setting the selector switch.
2) Remove the Air inlet grille. (Refer to page 35, 8-4-2)

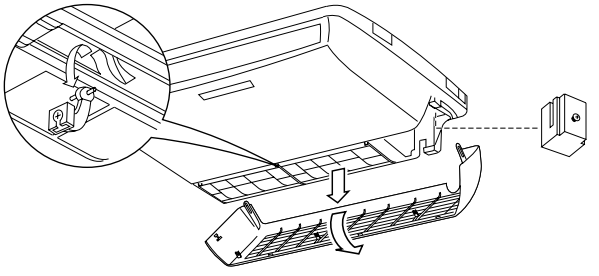


Fig. 8-6-1

3) Select the terminal of selector switch from [A position] to [B position].

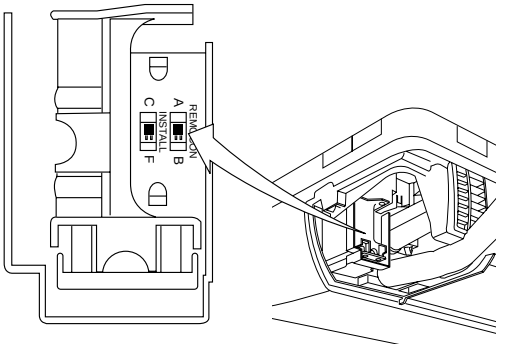


Fig. 8-6-2

2. Set the remote control selector switch with the remote control

[B] is indicated on the liquid crystal display when setting remote control selector switch to B. [A] is not indicated on the display even if the selector switch is set to A.

1) Load the remote control with the batteries.
2) Press the [CHECK] button using something with sharp point. (The preset temperature on the remote control changes to [00].)
3) Press the [MODE] button while pressing the [CHECK] button, [B] is indicted at the right of the present temperature display.

- To reset the switch to the [A] setting, press the [MODE] button again while pressing the [CHECK] button.

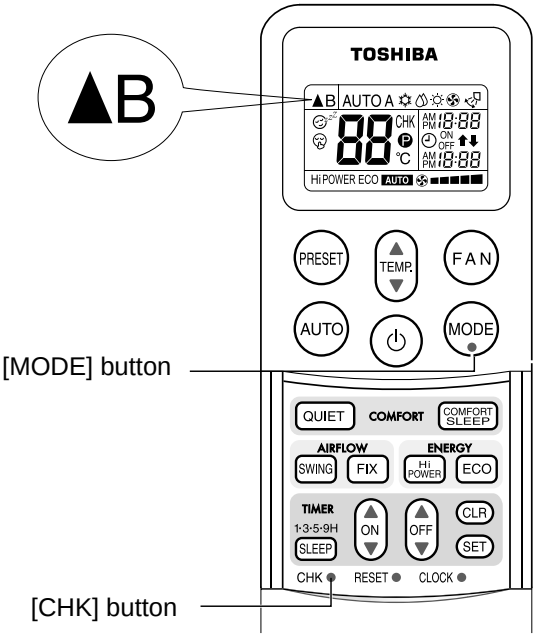


Fig. 8-6-3

3. Confirm that the indoor unit can operate with the new setting.

8-7. How to Use Drain Pump Kit of Option

In the case of upward drainage from the unit (Under ceiling installation). It is necessary to use Drain pump kit of option parts. By using a Drain pump kit, it becomes possible to raise 300 mm from a ceiling side. Please follow the installation manual of Drain pump kit (TCB-DP10CE) attachment.

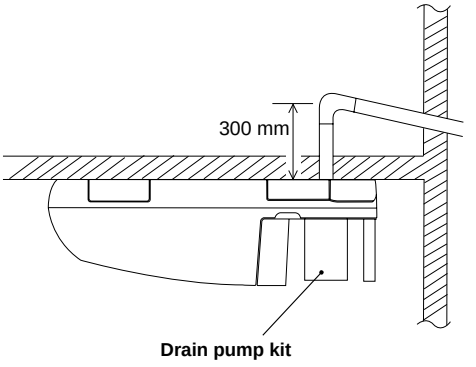


Fig. 8-7-1

8-8. Others

8-8-1. Gas leak test

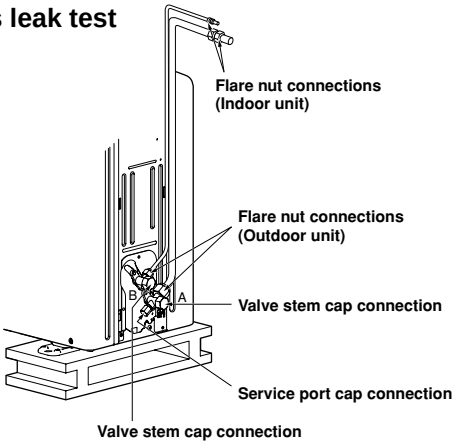


Fig. 8-8-1

- Check the flare nut connections, valve stem cap connections and service port cap connections for gas leak with a leak detector or soap water.

8-8-2. Test operation

To switch the TEST RUN (COOL) mode, press TEMPORARY button for 10 sec.
(The beeper will make a short beep.)

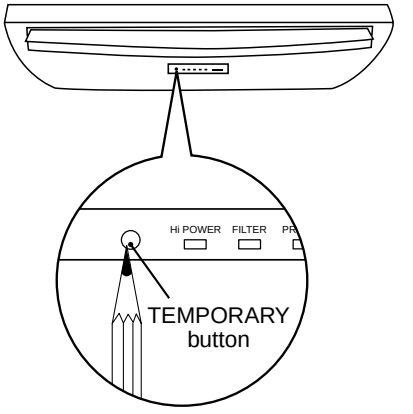


Fig. 8-8-2

8-8-3. Auto restart setting

This product is designed so that, after a power failure, it can restart automatically in the same operating mode as before the power failure.

Information

The product was shipped with Auto Restart function in the off position. Turn it on as required.

<How to set the auto restart>

- Press and hold the TEMPORARY button for about 3 seconds. After 3 seconds, the electronic beeper makes three short beeps to tell you the Auto Restart has been selected.
- To cancel the Auto Restart, follow the steps described in the section Auto Restart Function of the Owner's Manual.

9. TROUBLESHOOTING CHART

9-1. Troubleshooting Procedure

Follow the details of **9-2. Basic Check Items**.
If there is no trouble corresponding to 9-2, check whether or not there are faulty parts following **9-4. Self-Diagnosis by Remote Control**.

9-2. Basic Check Items

9-2-1. Power supply voltage

The line voltage must be AC 220 – 240V. If it is not within this range, the air conditioner may not operate normally.

9-2-2. Incorrect cable connection between indoor and outdoor units

The indoor unit is connected to the outdoor unit with 4 cables. Check that the indoor and outdoor units have been properly connected with terminals assigned the same numbers. If the connectors are not properly connected, the outdoor unit will not operate normally, or OPERATION lamp and TIMER lamp will blink (5Hz).

9-2-3. Program control

The microcomputer operates as shown in Table 9-2-1 to control the air conditioner. If there are any operational problems, check whether or not the problems correspond to Table 9-2-1. If they correspond to the Table, they are not problems with the air conditioner, but they are indispensable operations to control and maintain the air conditioner properly.

Table 9-2-1

No.	Operation of Air Conditioner	Descriptions
1	When the main power supply is turned on, the OPERATION lamp on the indoor unit blinks.	The OPERATION lamp blinks to indicate that power is turned on. If the [⏻] button is pressed, the lamp stops blinking.
2	The indoor fan motor speed does not change in the Dry operation.	The indoor fan motor speed is automatically controlled in the Dry operation.
3	The compressor is not turned off even though the room temperature is in the range that the compressor is turned off.	The compressor has a function that it is not turned off for 3 minutes after it is turned on even though the room temperature is in the range that the compressor is turned off.
4	The compressor is not turned on and off even though the thermo control is operated in the Dry operation.	In the Dry operation, the compressor is turned on and off automatically at the regular intervals, independent of the thermo control.
5	The PRE-DEF. lamp is indicated when the Heating operation starts.	The PRE-DEF. lamp is indicated during the Defrosting operation or if the indoor heat exchanger temperature is low when the Heating operation starts. At this time, the indoor fan motor stops to prevent cold air from blowing in the room.
6	The outdoor fan motor stops in the Heating operation.	When the indoor heat exchanger temperature is high, the outdoor fan motor is stopped by the high-temperature limit control operation.
7	The compressor is not turned on even though the room temperature is in the range that the compressor is turned on.	The compressor is not turned on in the restart delay timer (3-minutes timer) operation. It is also not turned on after the power supply is turned on because of this timer operation.
8	The operation mode changes in the Automatic operation.	In Automatic operation, the room temperature is detacted every 15 minutes and the operation mode is changed according to difference between the room temperature and the preset temperature.
9	The Fan only operation continues in the Automatic operation.	When the room temperature is in the range (Preset temperature ± 1°C), the Fan only operation is selected.
10	The Hi-POWER operation does not work.	This operation does not work when the unit is in the Dry operation or Fan only operation.

9-3. Primary Judgement

9-3-1. Role of indoor unit controller

The indoor unit controller receives the operation commands from the remote control and executes them.

- Temperature measurement at the air outlet of the indoor heat exchanger by the indoor temperature sensor
- Temperature setting of the indoor heat exchanger by the heat exchanger sensor
- Louver motor control
- Indoor fan motor operation control
- LED display control
- Transferring of operation commands to the outdoor unit

9-3-2. Failure diagnosis

The indoor unit diagnoses the operation condition and indicates the information of the self-diagnosis with the lamps on the display panel of the indoor unit.

Table 9-3-1

	Lamps	Self-diagnosis
A	OPERATION lamp is blinking. (1Hz)	Power failure (when the power supply is turning on)
B	OPERATION lamp is blinking. (5Hz)	Thermo sensor (TA) short or break
C	OPERATION lamp is blinking. (5Hz)	Heat exchanger sensor (TC) short or break
D	OPERATION lamp is blinking. (5Hz)	Indoor fan motor lock or failure
E	OPERATION lamp is blinking. (5Hz)	Indoor P.C. board failure
F	OPERATION and TIMER lamps are blinking. (5Hz)	Wrong wiring of connecting cable
G	OPERATION, TIMER and PRE-DEF. (or FAN ONLY or cooling only model) lamps are blinking.	• Gas shortage or other refrigerant cycle trouble • Heat exchanger sensor open, break or short • Overload relay or thermostat trouble of compressor
H	OPERATION, TIMER and PRE-DEF. (or FAN ONLY or cooling only model) lamps are blinking.	Cycle failure

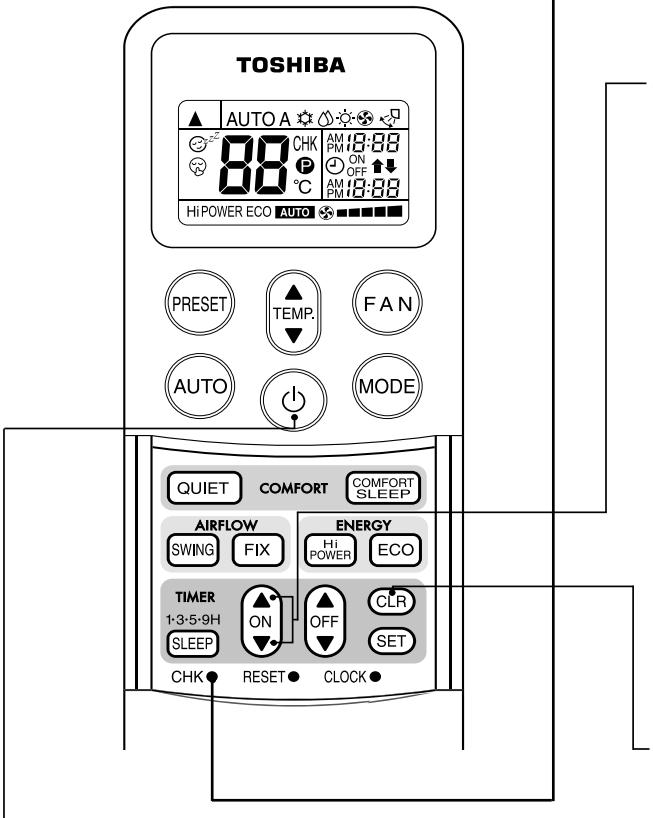
Table 9-3-2 Diagnosis by detective operation

Symptom	Check		Primary judgement
The remote control does not work.	Turn off the power supply once, then turn it on. Try to operate the remote control.	The remote control still does not work.	The indoor unit (and/or remote control) is/are defective.
		The remote control works.	OK.
The outdoor fan does not rotate.	The compressor operates.		The outdoor unit (Outdoor fan motor) is defective.
	The compressor does not operate.		An internal part of the compressor is defective.

9-4. Self-Diagnosis by Remote Control (Check Code)

(1) If the lamps are indicated as shown B to G in Table 9-3-1, exchanger the self-diagnosis by the remote control.
(2) When the remote control is set to the service mode, the indoor controller diagnoses the operation condition and indicate the information of the self-diagnosis on the display of the remote control with the check codes. If a fault is detected, all lamps on the indoor unit will blink at 5 Hz and it will beep for 10 seconds (Pi, Pi, Pi....). The timer lamp usually blinks (5 Hz) during the self-diagnosis.

9-4-1. How to use remote control in service mode



(1) Press [CHK] button with a tip of pencil to set the remote control to the service mode.
- "00" is indicated on the display of the remote control.
- The timer lamp on the indoor unit blinks continuously. (5 times per 1 sec.)

(2) Press [TIMER ▲] button.
If there is no fault with a code, the indoor unit will beep once (Pi) and the display of the remote control will change as follows:

→ 00 → 01 → 02 ··· 1d → 1E → 22 →

- Check the unit with all 35 check codes (00 to 22). as shown in Table 9-4-1.
- Press [TIMER ▼] button to change the check code backwards.

If there is a fault, the indoor unit will beep for 10 seconds (Pi, Pi, Pi...).
Note the check code on the display of the remote control.
- 2-digits alphanumeric will be indicated on the display.
- All lamps on the indoor unit will blink. (5 times per 1 sec.)

(3) Press [CLR] button. After service finish for clear service code in memory.
- "7F" is indicated on the display of the remote control.

(4) Press [⏻] button to release the service mode.
- The display of the remote control returns to as it was before service mode was engaged.

- Alphanumeric characters are used for the check code.

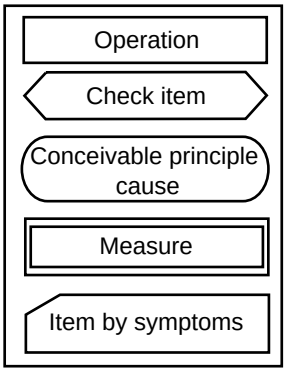
5	is 5.	6	is 6.
A	is A.	b	is B.
C	is C.	d	is D.

* This illustration is only for Heat pump model.
For Cooling only model, there is not the (☼) symbol.

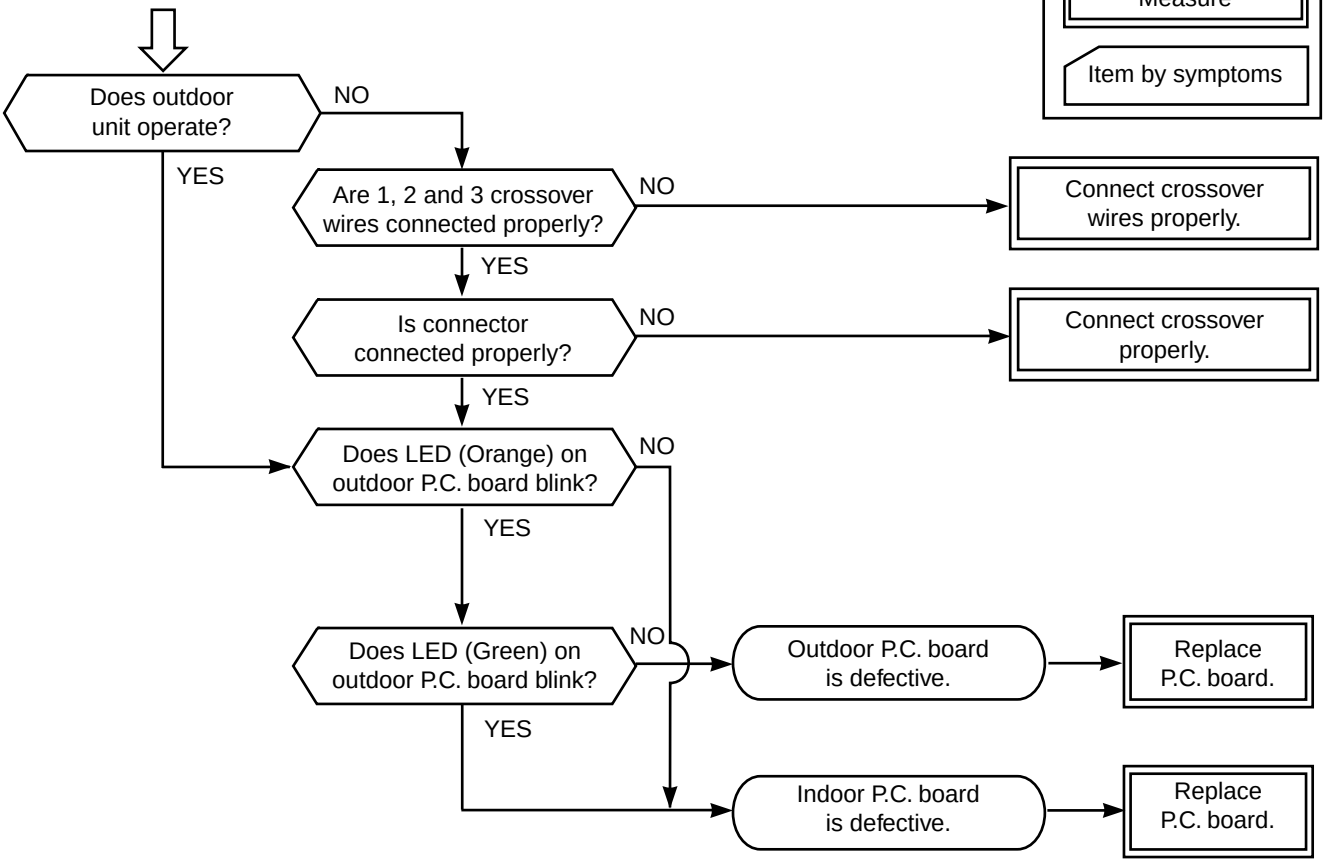
Table 9-4-1

Block level		Diagnosis function				Judgement and action
Check code	Block	Check code	Symptom	Unit status	Condition	
00	Indoor P.C. board	0C	The indoor thermo sensor (TA) is defective. Disconnection or short-circuit	Operation continues.	The lamp on the indoor unit blinks when error is defected.	1. Check the indoor thermo sensor (TA). 2. Check the indoor P.C. board.
		0d	The indoor heat exchanger sensor (TC) is defective. Disconnection or short-circuit	Operation continues.	The lamp on the indoor unit blinks when error is defected.	1. Check the indoor heat exchanger sensor (TC). 2. Check the indoor P.C. board.
		11	The indoor fan motor or its circuit is defective.	All off	The lamp on the indoor unit blinks when error is defected.	1. Check the connector circuit of the indoor fan motor (CN10). 2. Check the indoor fan motor. 3. Check the indoor P.C. board.
		12	The part other than the above parts on the indoor P.C. board is defective. EEPROM access error	Operation continues.	The lamp on the indoor unit blinks when error is defected.	1. Check the indoor P.C. board. (EEPROM and peripheral circuits)
		21	IOL operation	All off	The lamp on the indoor unit blinks when error is defected.	Overload operation of refrigerating cycle
01	Cable connection	04	The serial signals can not be transmitted and received between indoor and outdoor units. • The crossover wire is connected wrongly. • The serial signal transmitting circuit on the outdoor P.C. board is defective. • The serial signal receiving circuit on the indoor P.C. board is defective.	Operation continues.	The lamp on the indoor unit blinks when error is defected.	1. In the case of the outdoor unit not operating at all; • Check the crossover cable and connect it properly. • Check the outdoor P.C. board. 2. In the case of the outdoor unit operating normally; • Check whether or not both of serial LED (Green) and serial LED (Orange) is blinking. If the serial LED (Green) is not blinking, check the outdoor P.C. board. If the serial LED (Orange) is not blinking, check the indoor P.C. board.
		05	The operation command signals are not transmitted from the indoor unit to the outdoor unit.	Operation continues.	The lamp on the indoor unit blinks when error is defected. And it returns to the normal condition when recovering from errors.	If the operation command signals continue to be transmitted between ② and ③ of the indoor terminal block, replace the outdoor P.C. board.
02	Outdoor P.C. board	18	The outdoor thermo sensor (TE) is defective. Disconnection or short-circuit	All off	The lamp on the indoor unit blinks when error is defected.	1. Check the outdoor thermo sensor (TE). 2. Check the outdoor P.C. board.
		19	The outdoor heat exchanger (TD) sensor is defective. Disconnection or short-circuit	All off	The lamp on the indoor unit blinks when error is defected.	1. Check the outdoor heat exchanger sensor (TD). 2. Check the outdoor P.C. board.
03	Other parts (including compressor)	07	The reply serial signal has been transmitted when starting the unit, but stops being transmitted shortly after. 1. Compressor thermo operation • Gas shortage • Gas leak 2. Instantaneous power failure	Operation continues .	The lamp on the indoor unit blinks when error is defected. And it returns to the normal condition when recovering from errors.	1. Repeatedly turn the indoor unit on and off with the interval of approx. 10 to 40 minutes. (The check code is not indicated during operation.) And supply gas. (Check gas leak.) 2. The indoor unit operates normally during the check. If the reply serial signal continues to be transmitted between 2 and 3 of the indoor terminal block, replace the outdoor P.C. board. If the signal stops between them, replace the indoor P.C. board.
		1E	The discharge temperature is over 120°C.	All off	The lamp on the indoor unit blinks when error is defected.	1. Check the heat exchanger sensor (TD). 2. Gas purging
		20	The IOL operation is defective.	All off	The lamp on the indoor unit blinks when error is detected.	When turning on the unit, the normal phase (RST) is detected but T-R waveform has not been detected for 120 seconds or more.

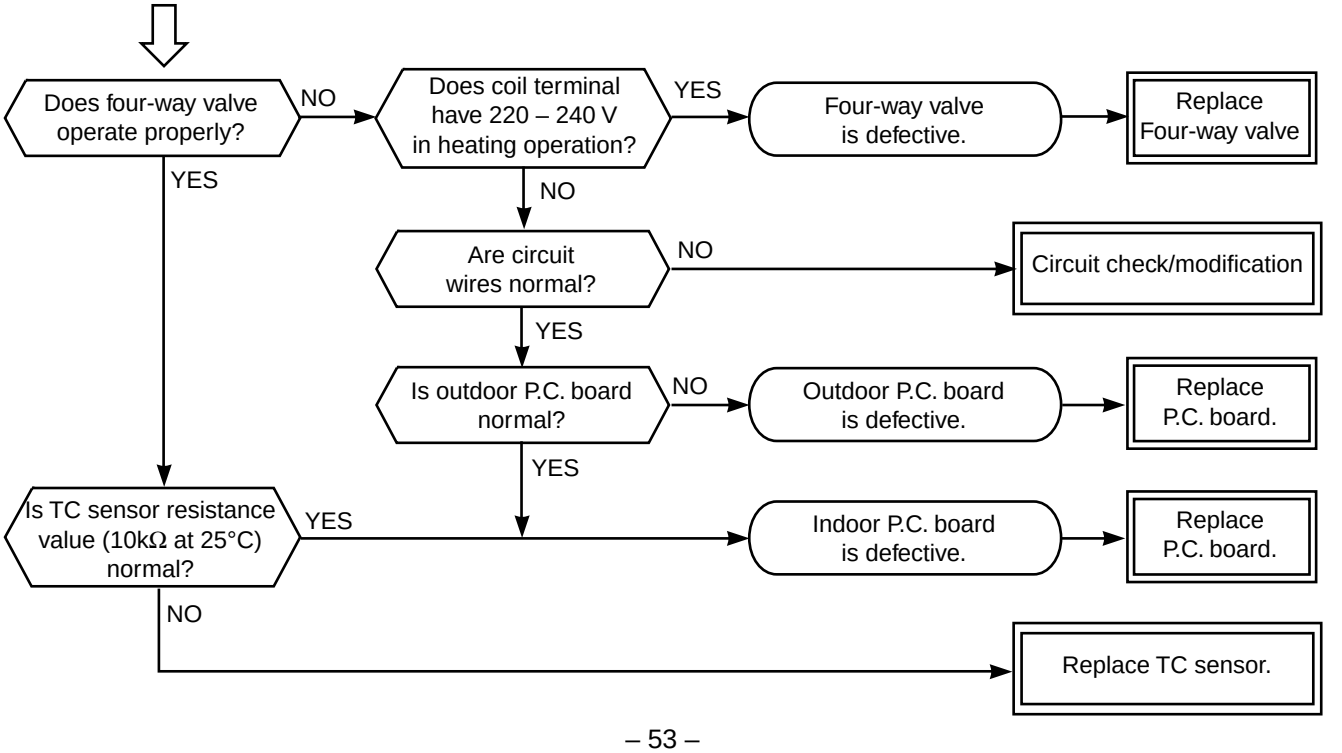
9-5. How to Diagnose Faulty Parts



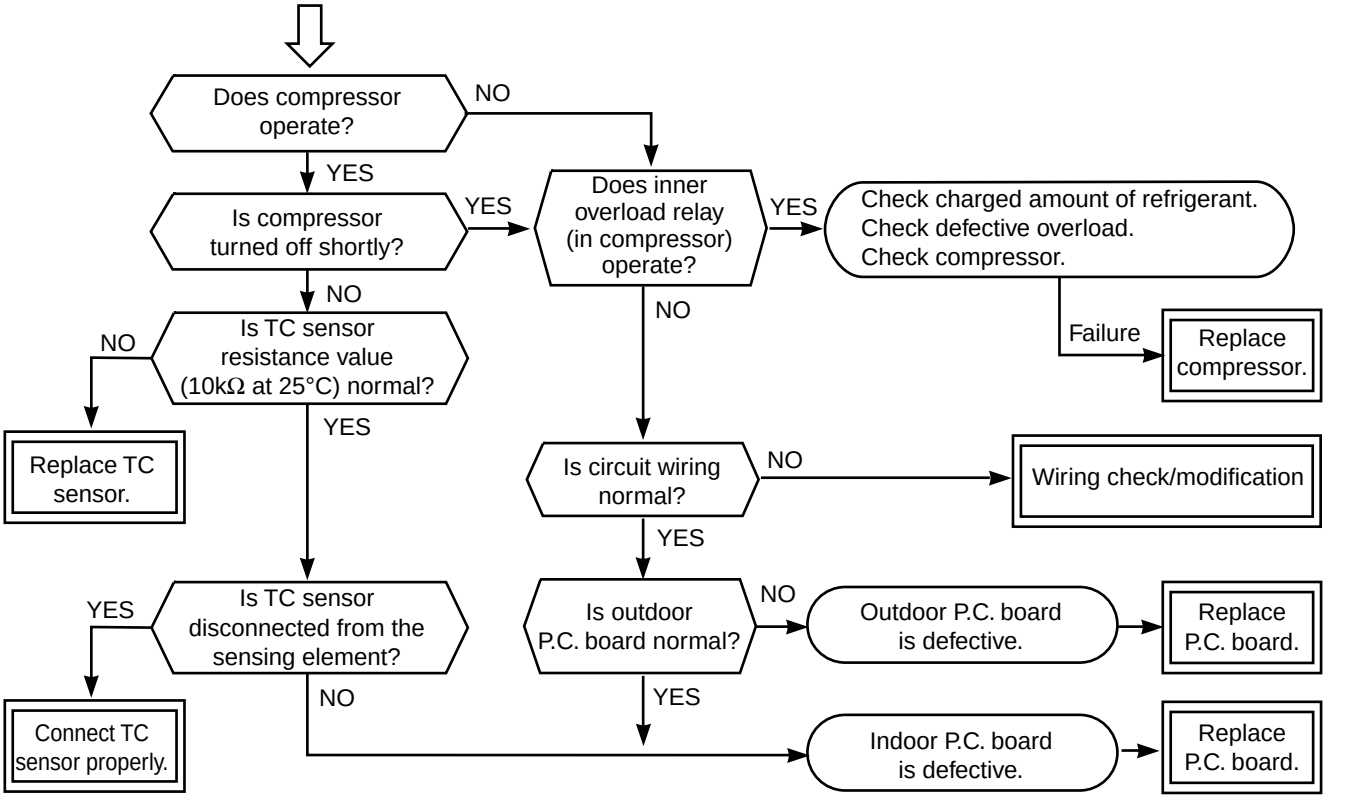
[04 Serial signal error]



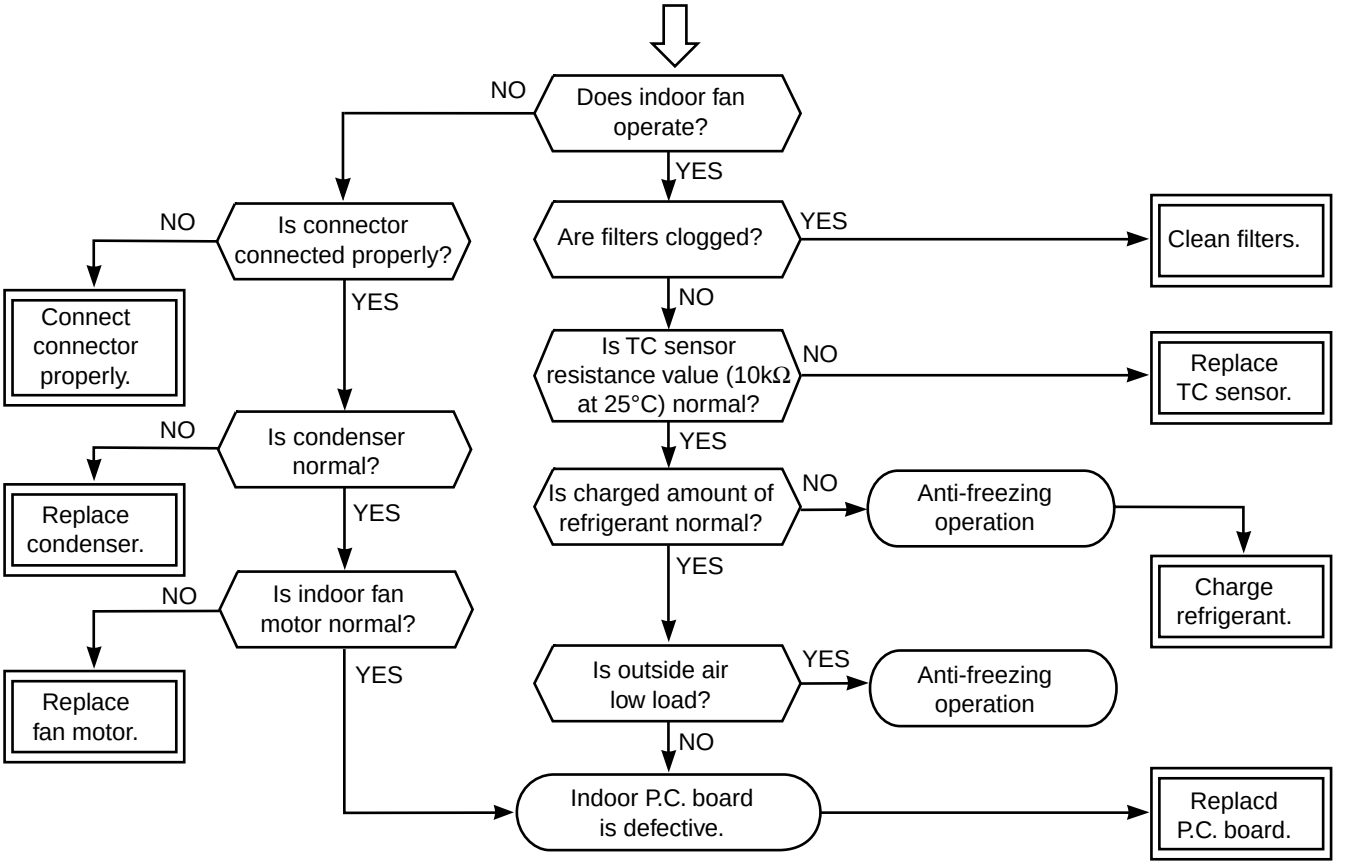
[08 Four-way valve error]



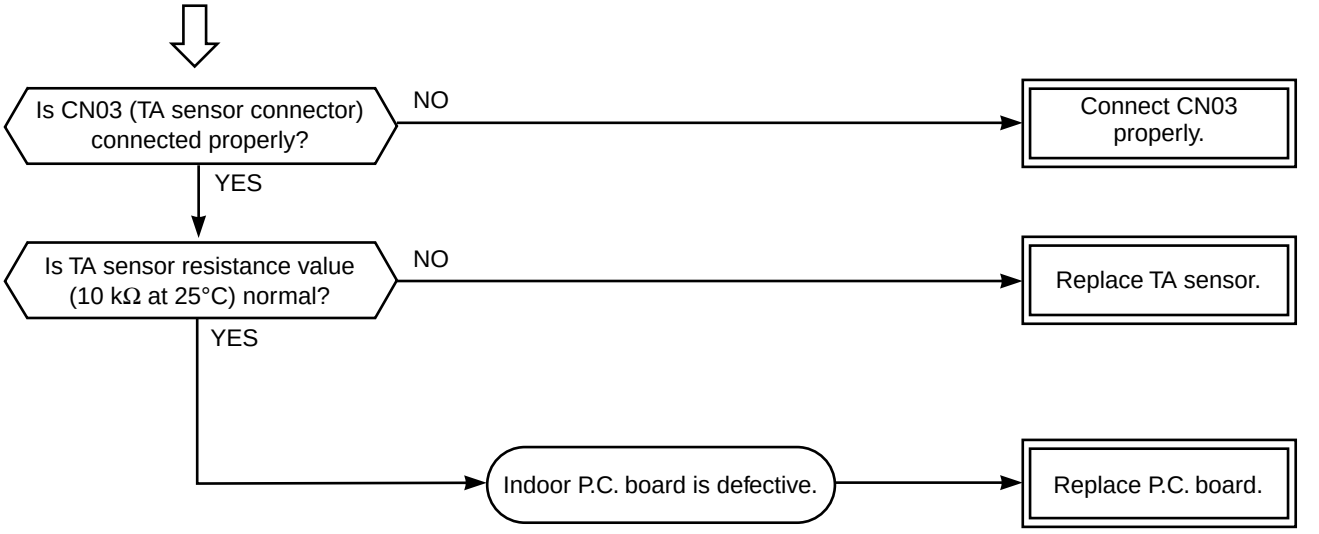
[09 Other cycle error] (1)



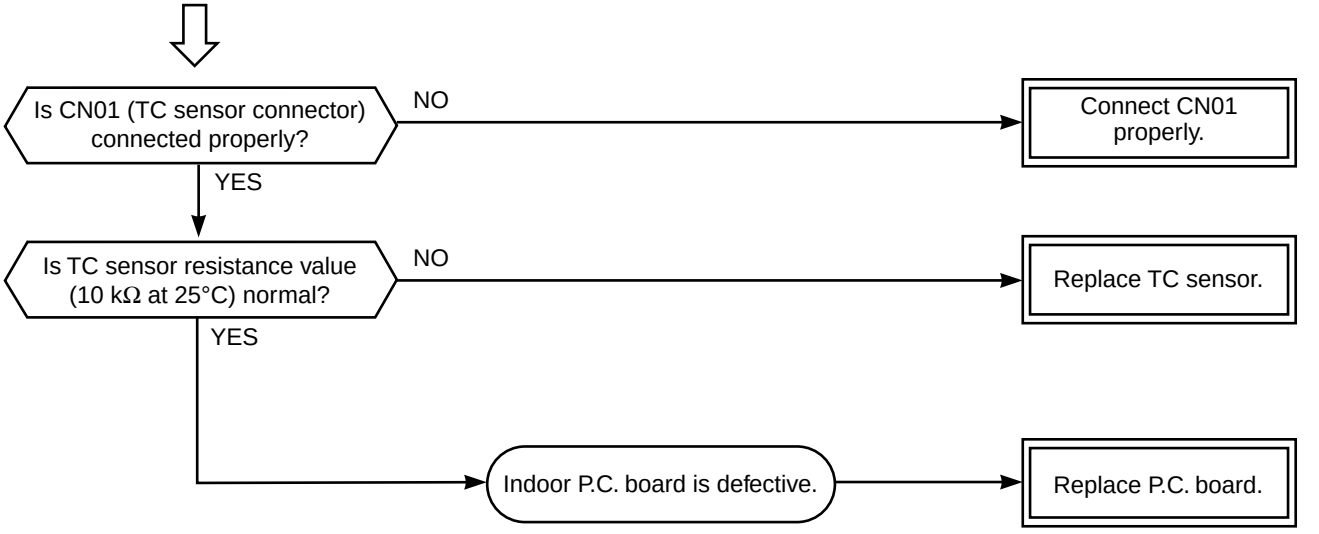
[09 Other cycle error] (2)



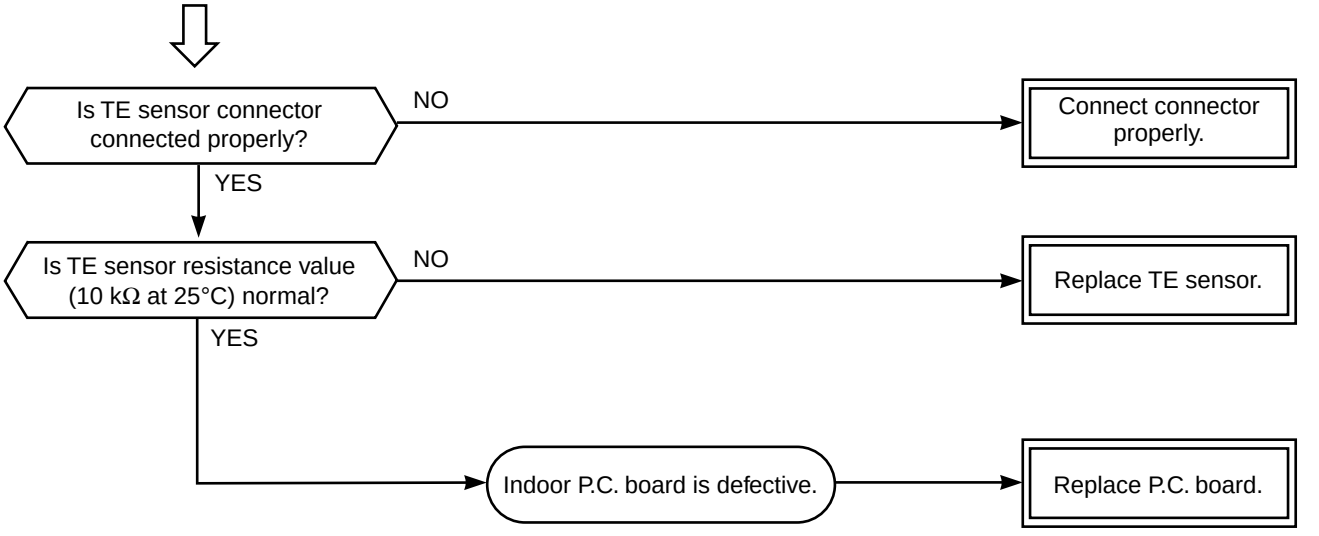
[0C Indoor TA sensor error]



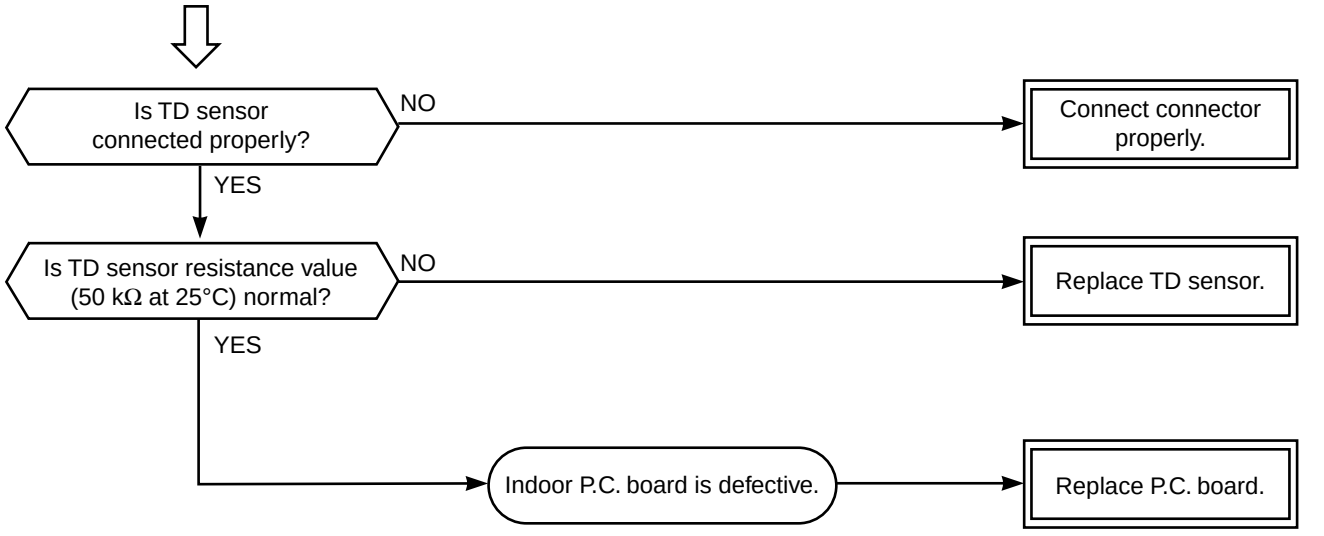
[0d Indoor TC sensor error]



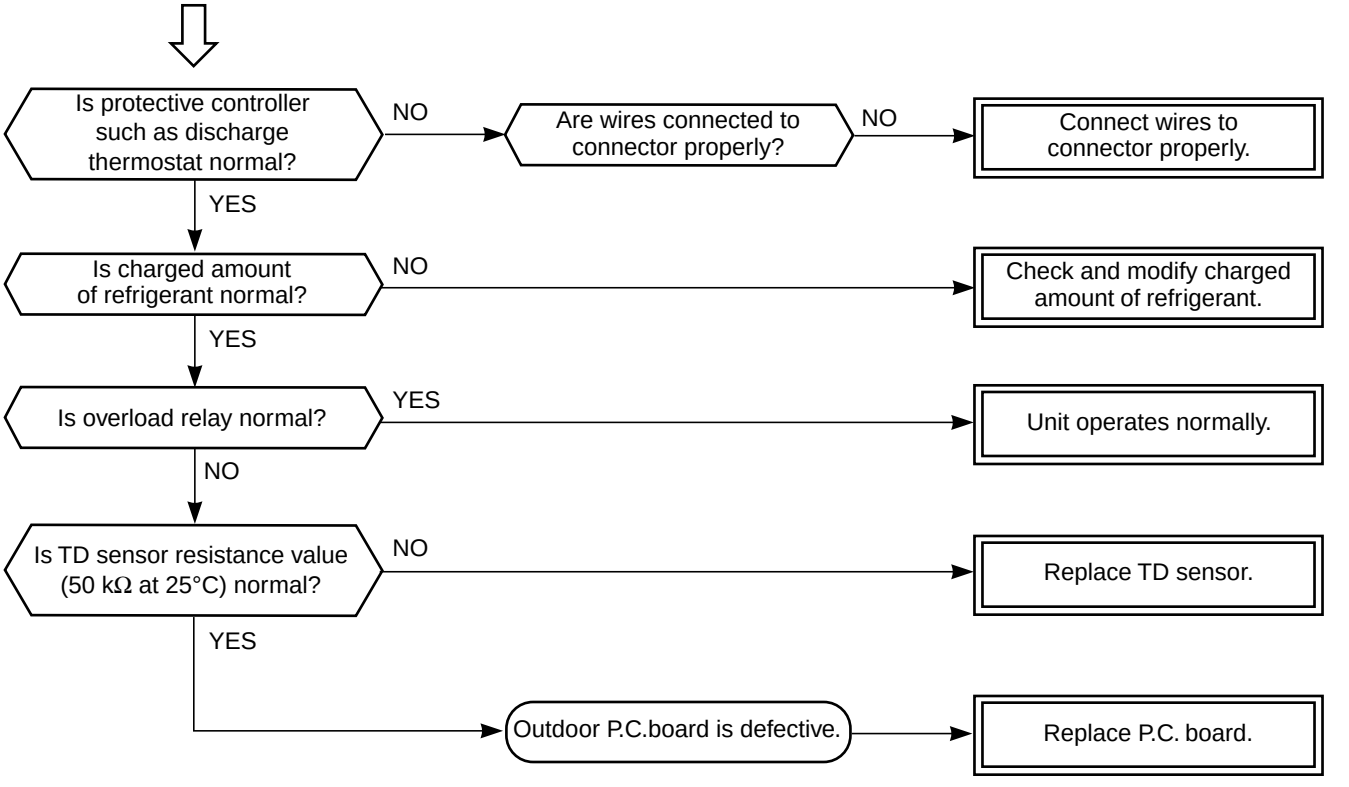
[18 outdoor TE sensor error]



[19 outdoor TD sensor error]



[1E Discharge temp. error]

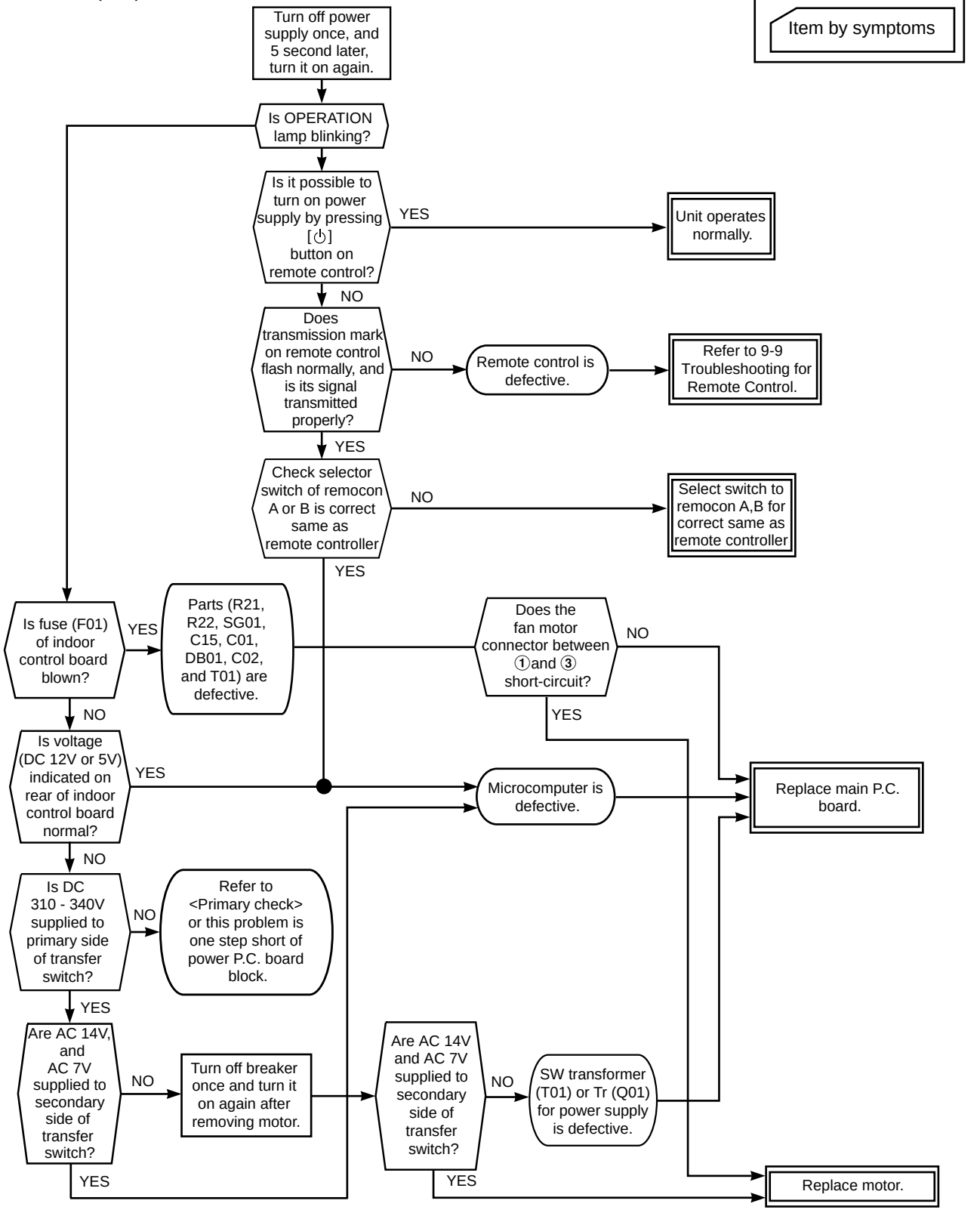


9-6. Troubleshooting for Indoor Unit

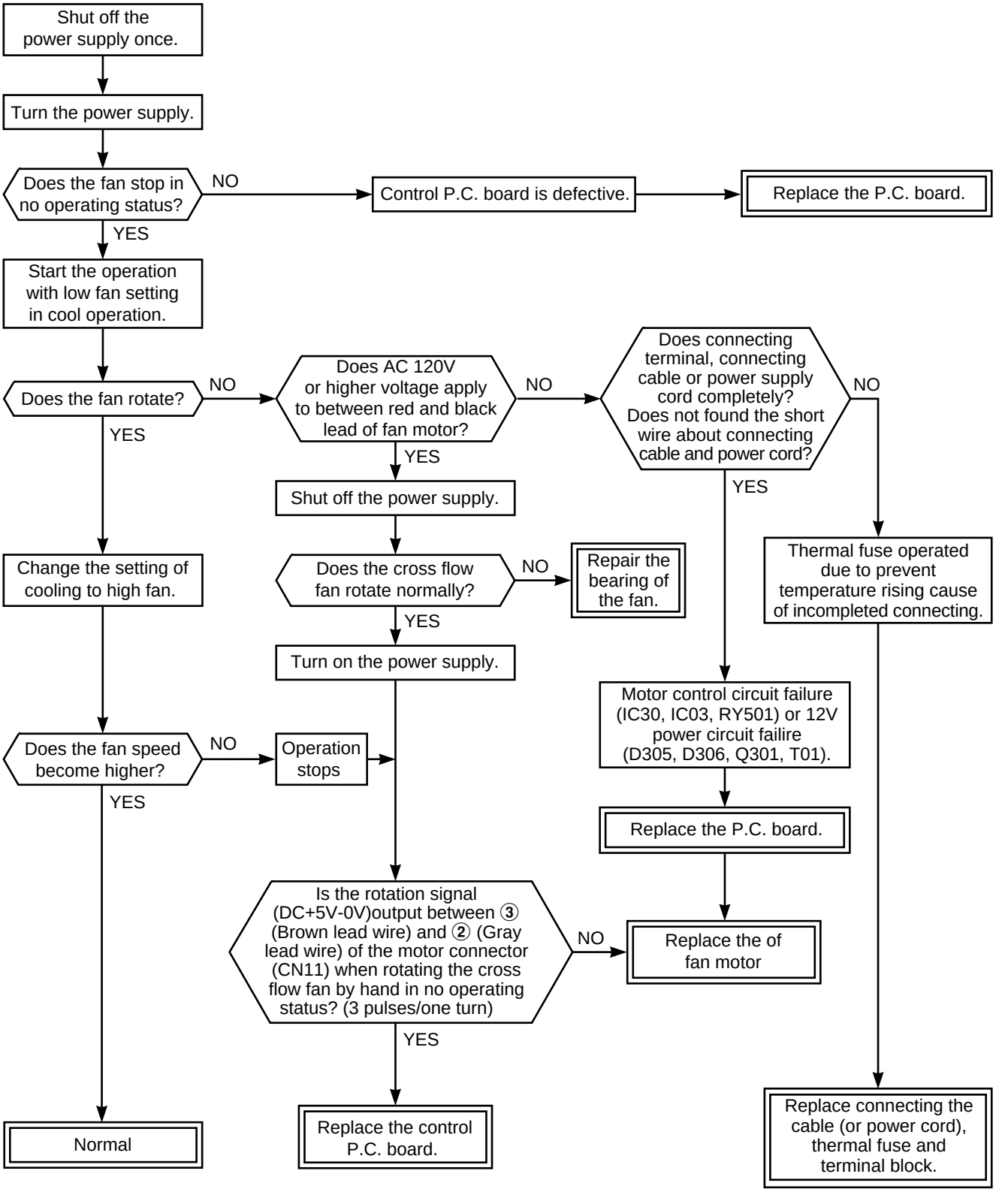
9-6-1. Power can not be turned on. (The unit does not operate at all.)

<Primary check>

(1) Is the supply voltage normal?
(2) Is the connection to the AC output OK?
(3) Are the connection of the primary side and the secondary side of the power transformer inserted into the P.C. board?
(4) Is the fuse (F01) blown?



9-6-2. Only indoor fan motor does not operate.



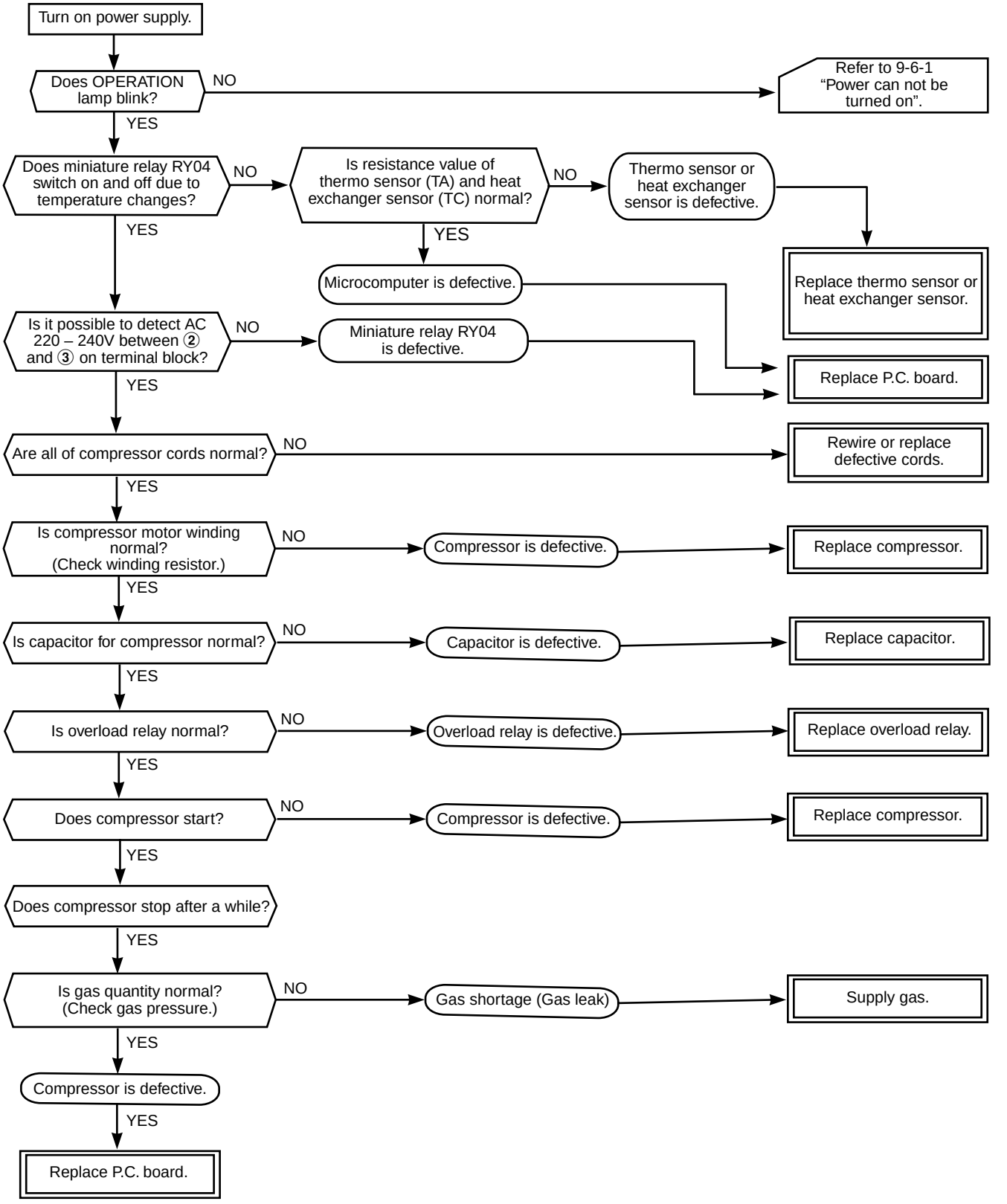
9-6-3. Compressor does not operate.

<Primary check>

(1) Is the preset temperature higher than the room temperature in cooling operation?
(2) Is the crossover cable connected properly?

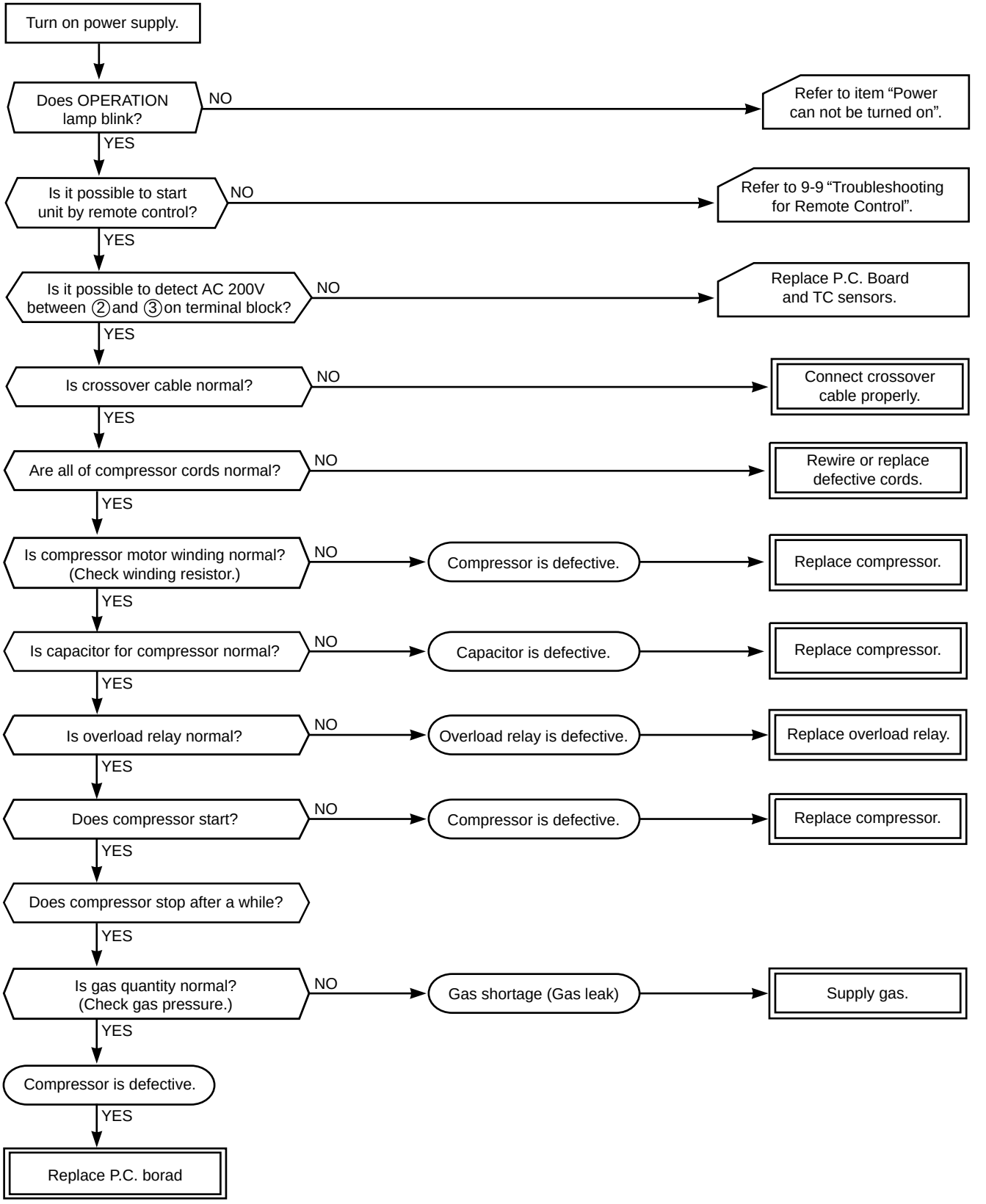
<Inspection procedure>

-Cooling only model-



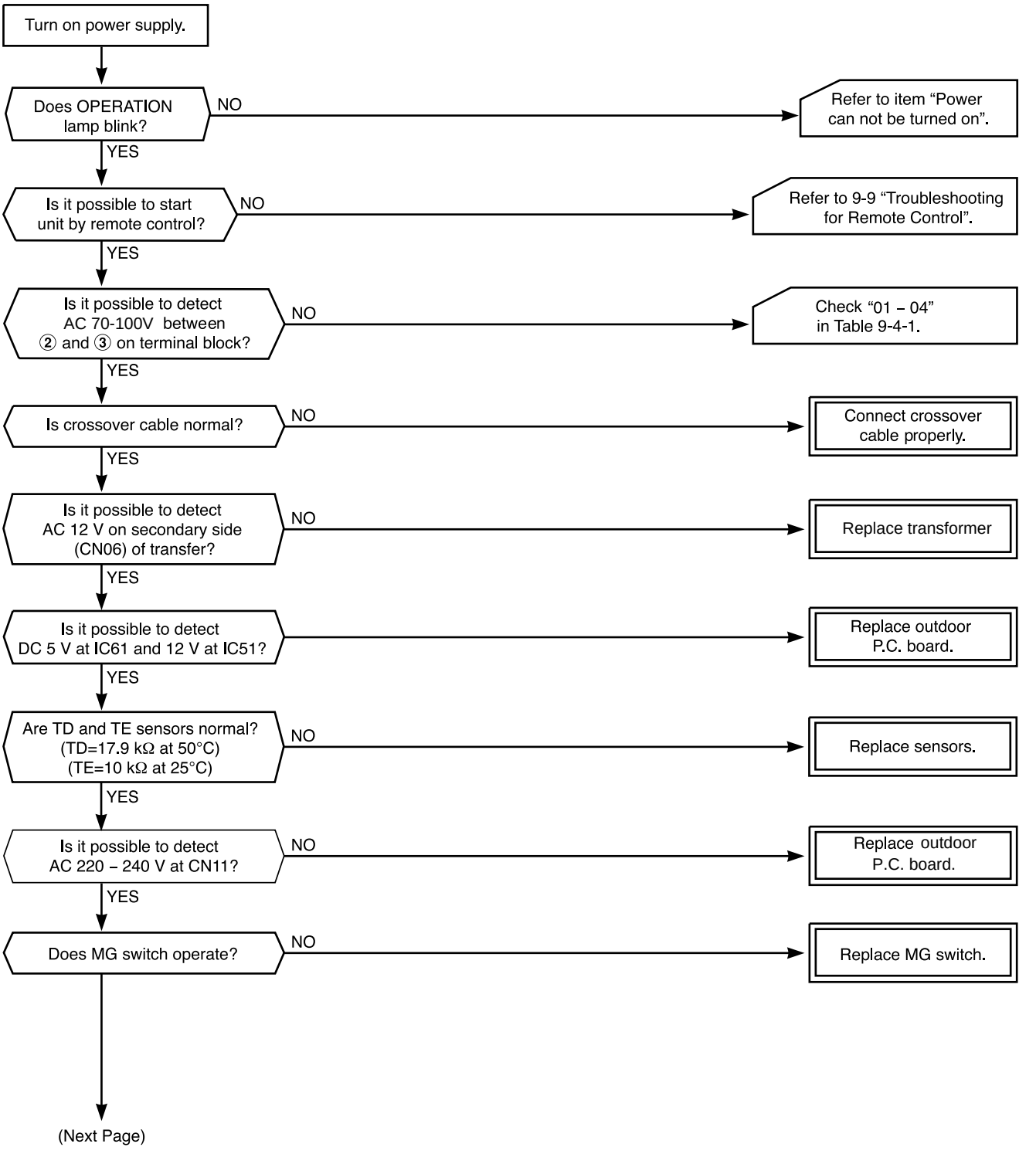
<Inspection procedure>

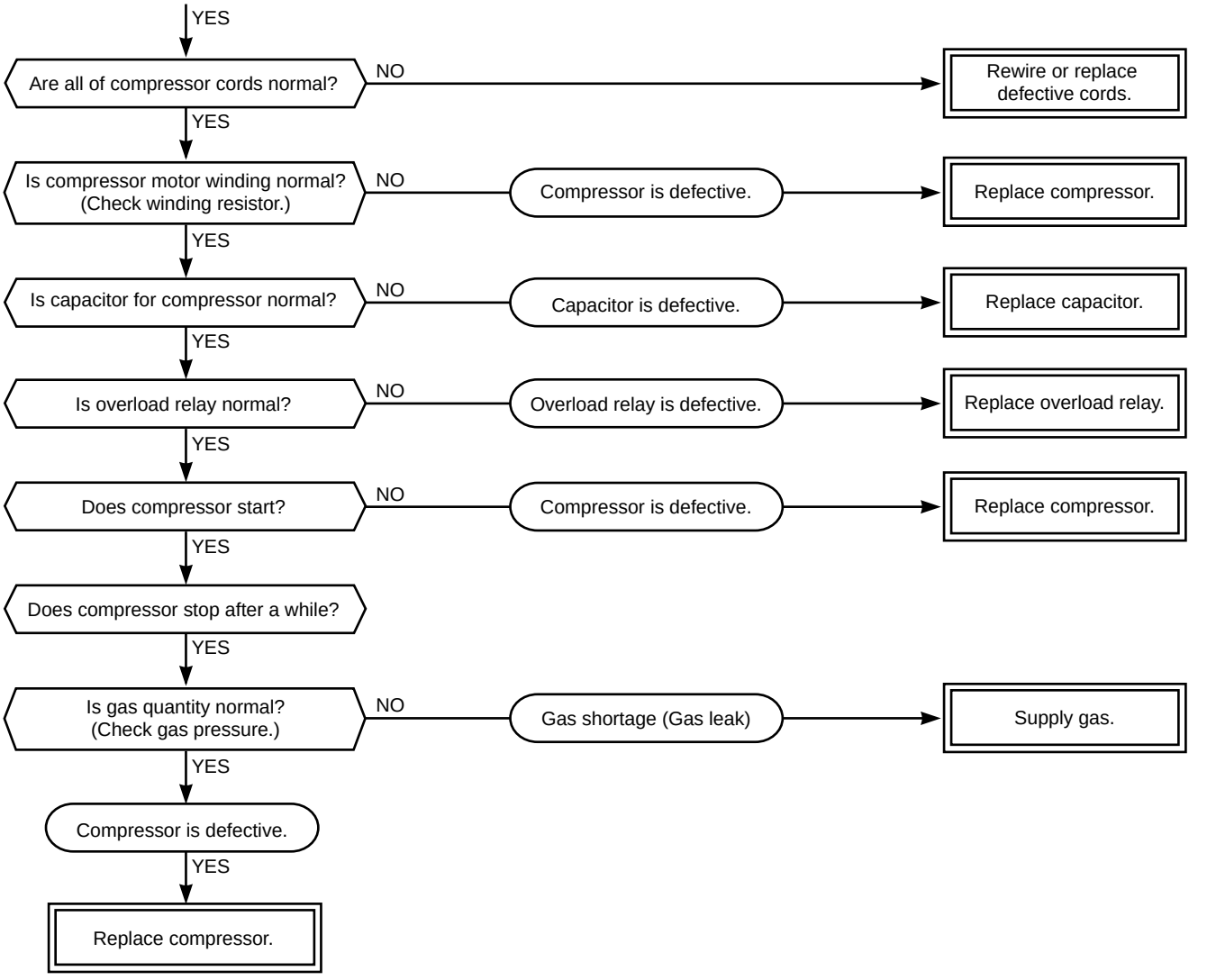
- Colling model -



<Inspection procedure)

- Heating model -




YES
Are all of compressor cords normal?
NO
Rewire or replace defective cords.
YES
Is compressor motor winding normal? (Check winding resistor.)
NO
Compressor is defective.
Replace compressor.
YES
Is capacitor for compressor normal?
NO
Capacitor is defective.
Replace capacitor.
YES
Is overload relay normal?
NO
Overload relay is defective.
Replace overload relay.
YES
Does compressor start?
NO
Compressor is defective.
Replace compressor.
YES
Does compressor stop after a while?
YES
Is gas quantity normal? (Check gas pressure.)
NO
Gas shortage (Gas leak)
Supply gas.
YES
Compressor is defective.
YES
Replace compressor.

9-7. Troubleshooting for Wiring (Interconnect cable and Serial Signal Wire)

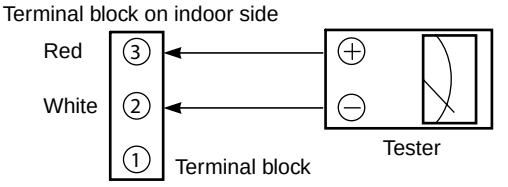
9-7-1. Outdoor unit does not operate.

<Inspection procedure>

(1) Is the voltage between ① and ② of the indoor terminal block varied?
(2) Are signals from the indoor unit to the outdoor unit transmitted correctly based upon the following diagram?

NOTE:
Measure the voltage for 2 minutes and 30 seconds after starting the unit.

Heatpump model



Normal condition : Voltage varied between AC70 ~ 100V
Abnormal condition : Voltage does not vary.

Cooling model

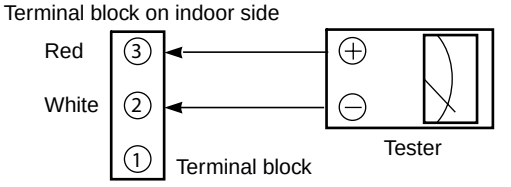


Fig. 9-7-1

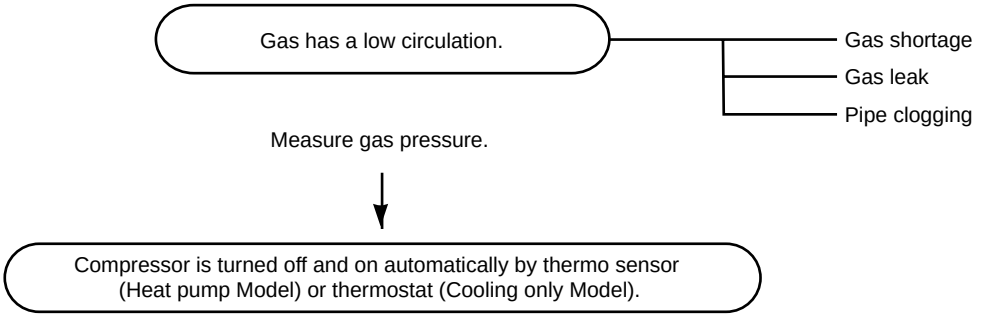
Normal condition : After start operated about 2 minutes and 30 seconds. Voltage between ② and ③ of the of the indoor's Terminal block should be equal AC 220 ~ 240V.

Abnormal condition : Don't found voltage AC 220 ~ 240V (For Asia model), AC 220V from terminal block (0V).

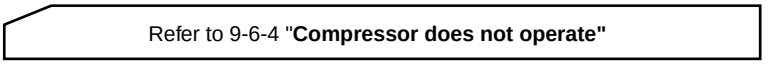
9-7-2. Outdoor unit stops a while after starting the unit.

<Confirmation procedure> Select one of 3 cases below and follow the procedure.

(1) The outdoor unit stops between 10 and 20 minutes passed after starting and it takes 10 minutes or more to restart the unit.



(2) The outdoor unit stops once, it would not operate until the power is turned on again.



(3) The outdoor unit stops between 10 minutes to 1 hour after starting and a check code is indicated on the remote control. (Check code 03-1E : Refer to Table 9-4-1.)

9-8. Troubleshooting for P.C. Board

9-8-1. How to check indoor P.C. board

<Cautions for handling P.C. board>

(1) When removing the front panel and the P.C. board, be sure to turn off the power supply.
(2) When removing the P.C. board, hold the edge of the P.C. board and do not apply force to the parts.
(3) When connecting or disconnecting the connectors on the P.C. board, hold the housing. Do not pull at lead wires.

<Inspection procedure>

(1) If the P.C. board is detective, check for disconnection, burn or discoloration of the copper foil pattern of the P.C. board.
(2) The P.C. board consists of the following 2 parts:
a. Main P.C. board parts:
Power relay, indoor fan motor drive circuit and control circuit, C.P.U. and peripheral circuits, buzzer drive circuit and buzzer.
b. Infrared rays parts:
Infrared rays receiving circuit

Check the defects of the P.C. board with Table 9-8-1.

Table 9-8-1 Inspection procedure

No.	Procedure	Check points	Causes
1	Turn off the power supply and remove the P.C. board assembly from electric parts base. Remove the connecting cables from the terminal block.	Check whenther or not the fuse (F01) is blown.	Impluse voltage was applied or the indoor fan motor short-circuited.
2	Remove the connector of the motor and turn on the power supply. If OPERATION lamp blinks (once per second), it is not neccessary to check steps (1 to 3) in the right next column.	Check power supply voltage; 1. Between TP3 and TP4 of CN30 and CN31 (220 – 240V AC) 2. Between + and – of C02 (DC310 – 340V) 3. Between 12V and GND 4. Between 5V and GND	1. The terminal block or the cross-over cable is connected wrongly. 2. The capacitor (C01 and C15), line filter (L01), resistor (R01), or the diode (DB01) is defective. 3. Q301, F02 and T01 are defective. 4. Q301, F03, IC07 and T01 are defective.
3	Press [⏻] button once to start the unit. (Do not set the mode to Fan Only or On-Timer operation.)	Check power supply voltage; <Heating and cooling model> 1. Between CN31 and CN23 (AC70 – 100V) <Cooling only model> 1. Between collector of Q33 and GND (for relay coil (DC12V)) 2. Between 2 and 3 of terminal block for connecting cable	<Heating and cooling model.> IC05 and IC06 are defective. <Cooling only model> 1. The wire of the relay coil (RY04) comes down or the relay drive (Q33) is defective. 2. CN27 or RY04 is connected wrongly.
4	Shorten the line of the restart delay timer and start unit.	Check whether or not all lamps (OPERATION, TIMER, PRE.-DEF. (or FAN ONLY), ECO and AUTO) are indicated for 3 seconds	The lamps are defective or the housing assembly (CN13) is defective.
5	Press [⏻] button once to start the unit. • Shorten the time of the restart delay timer. • Set the operation mode to COOL. • Set the fan speed level to AUTO. • Set the preset temperature much lower than the room temperature. (The unit (compressor) operates continuously in the above condition.)	1. Check whether or not the compressor operates. 2. Check whether or not the OPERATION lamp blinks.	1. The temperature of the indoor heat exchanger is extremely low. 2. The connection of the heat exchanger sensor is loose. (The connector is disconnected.) (CN01) 3. The heat exchanger sensor and the P.C. board are defective. (Refer to Table 9-8-2.) 4. The main P.C. board is defective.

No.	Procedure	Check points	Causes
6	If the above condition (No. 6) still continues, start the unit in the following condition. • Set the operation mode to HEAT. • Set the preset temperature much higher than room temperature.	1. Check whether or not the compressor operates. 2. Check whether or not the OPERATION lamp blinks.	1. The temperature of the indoor heat exchanger is extremely high. 2. The connector of the heat exchanger sensor short-circuited. (CN01) 3. The heat exchanger sensor and the P.C. board are defactive. (Refer to Table 9-8-2.) 4. The main P.C. board is defective.
7	Connect the motor connector to the motor and turn on the power supply. Start the unit in the following condition. • Set the operation mode to FAN. • Set the fan speed level to HIGH. (The unit (compressor) operates continuously in the above condition.)	1. Check it is impossible to detect the voltage between ② and ③ of the CN11. 2. The motor does not operate. (But it is possible to receive the signal from the remote control.) 2. The motor rotates but vibrates strongly.	1. The indoor fan motor is defective. (Protected operation of P.C. board) 2. The connection of the motor connector is loose. 3. The P.C. board is defective.

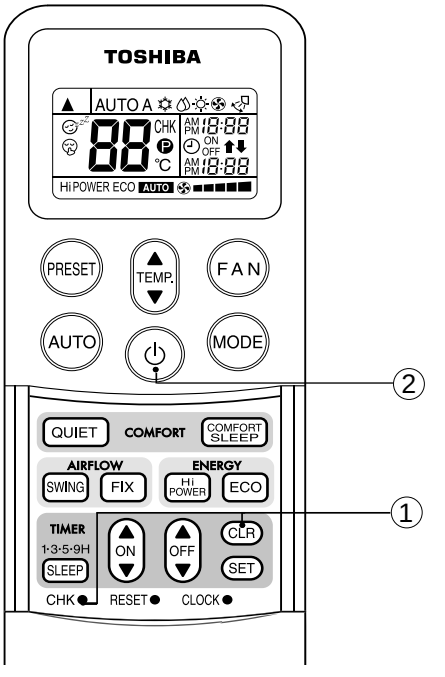
Table 9-8-2 Approximate resistance value of thermo sensor

(kΩ)

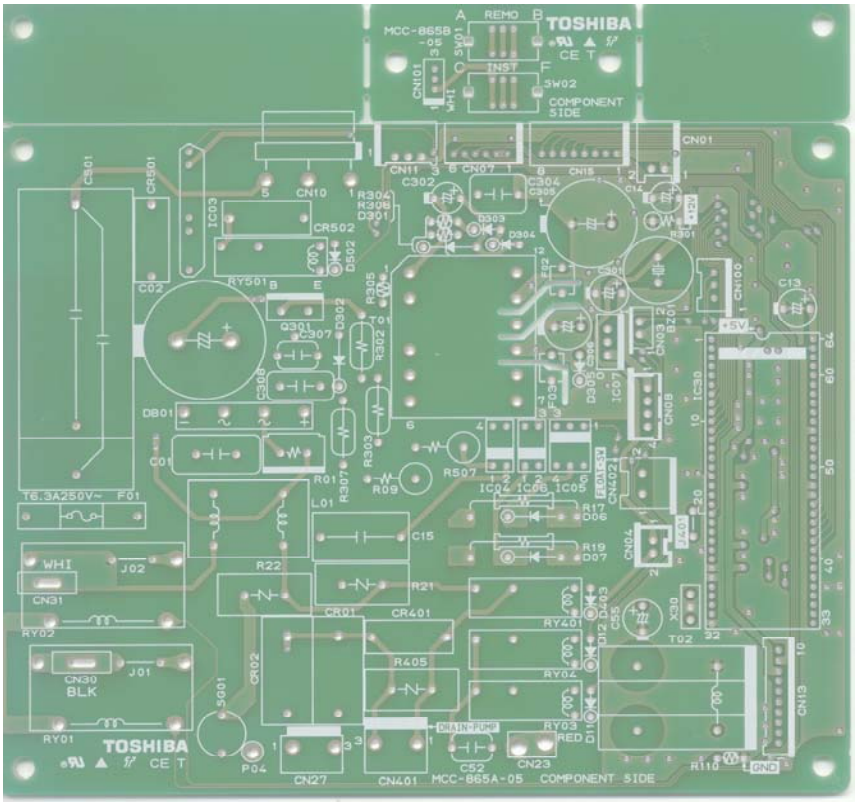
Temperature	0°C	10°C	20°C	25°C	30°C
Resistance value	35.8	20.7	12.6	10.0	7.92

9-8-2. How to Shorten Time of Restart Delay Timer

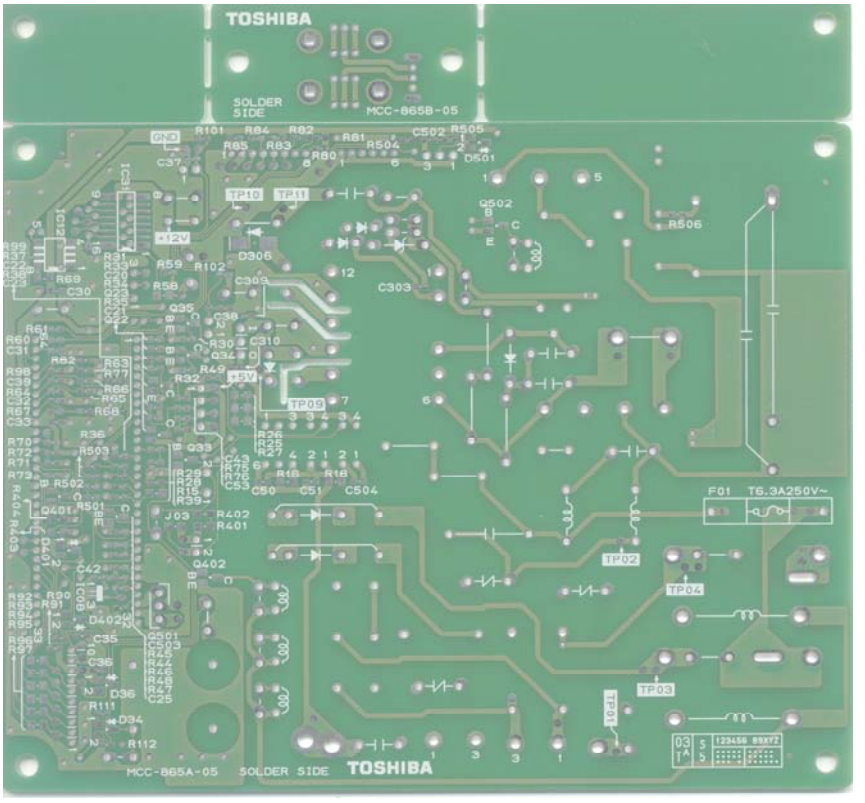
① Press [CLR] button while pressing [CHK] button with a tip of a pencil.
② Then press [⏻] button to transmit the signal to the indoor unit.



9-8-4. P.C. board layout

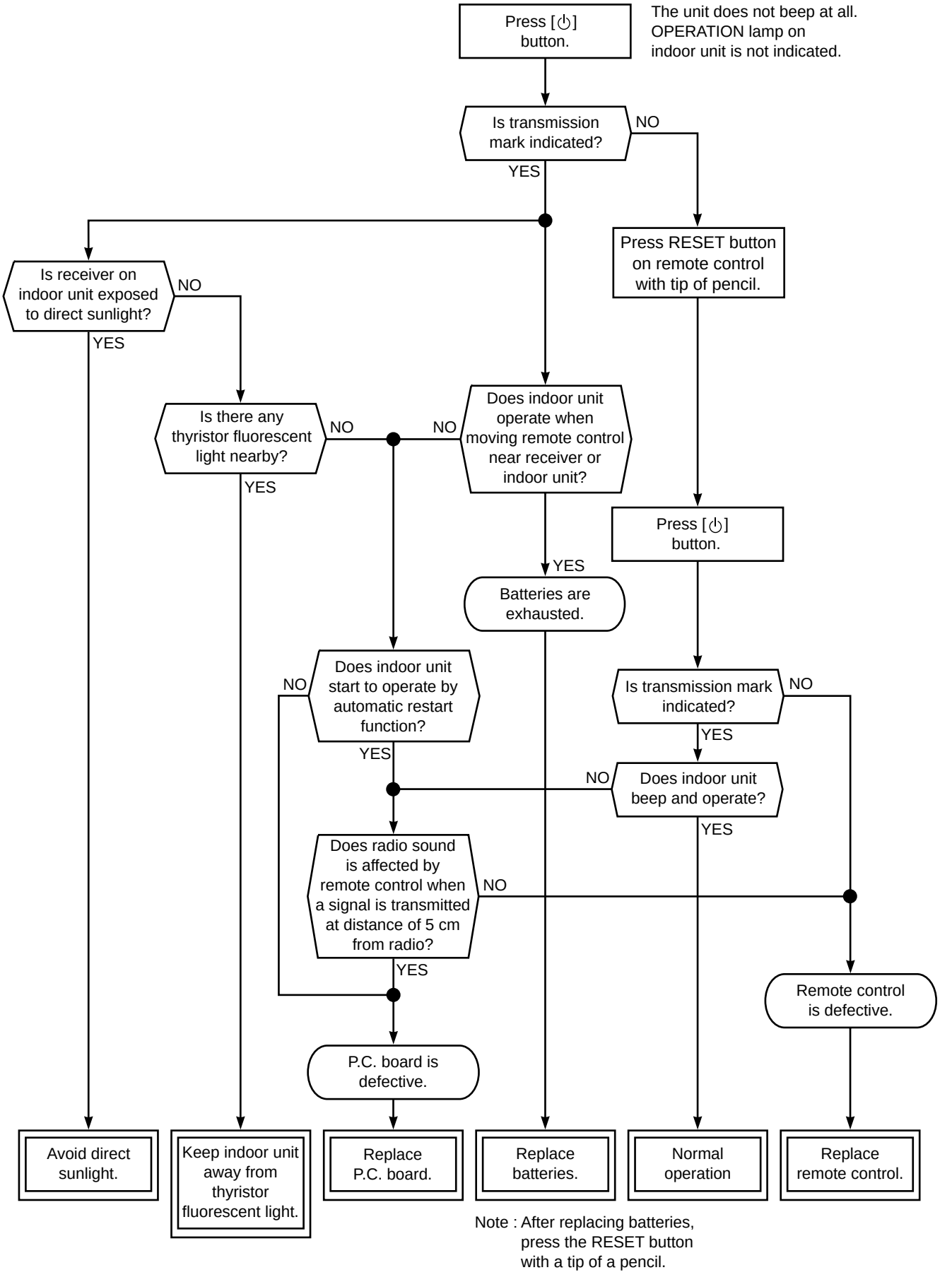


Top View



Bottom View

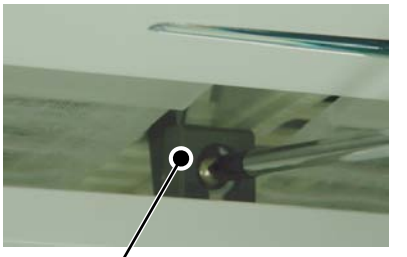
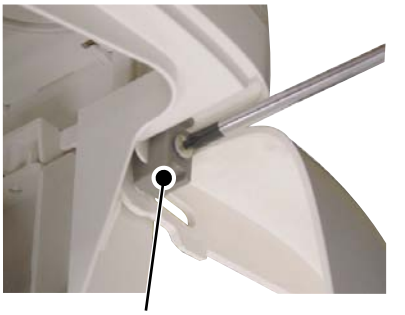
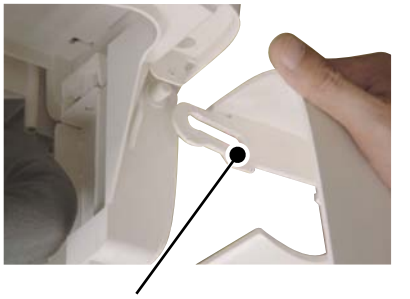
9-9. Troubleshooting for Remote Control

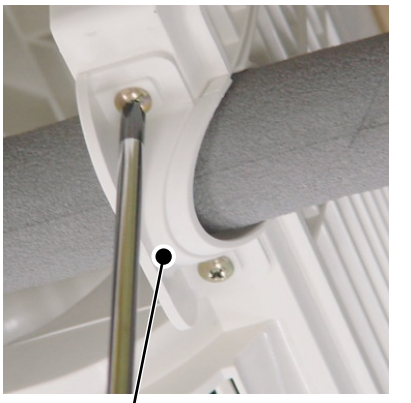
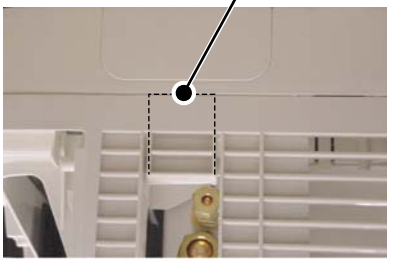
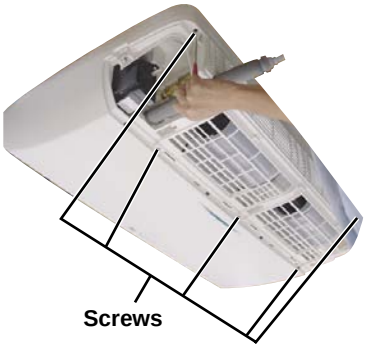


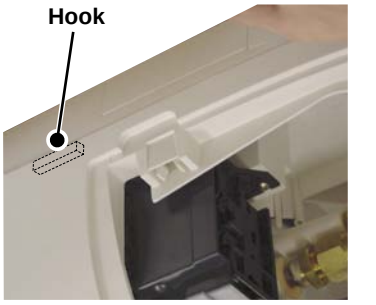
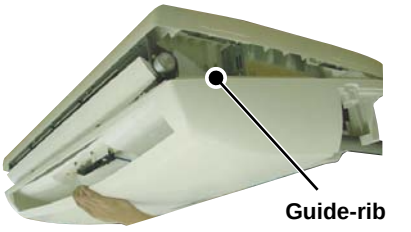
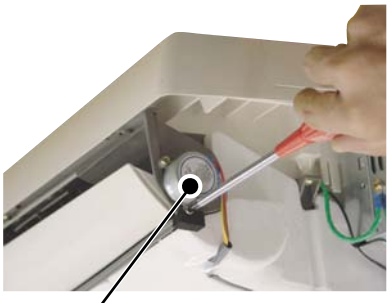
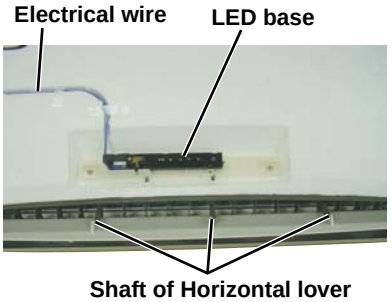
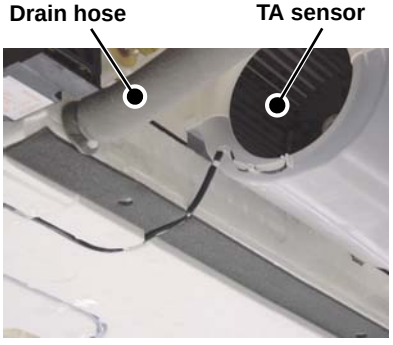
Note : After replacing batteries, press the RESET button with a tip of a pencil.

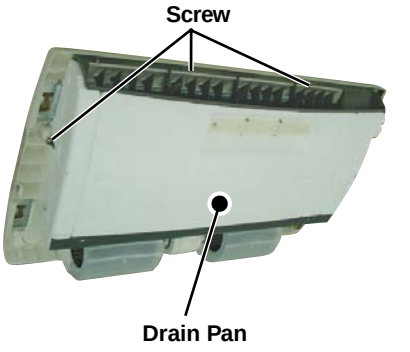
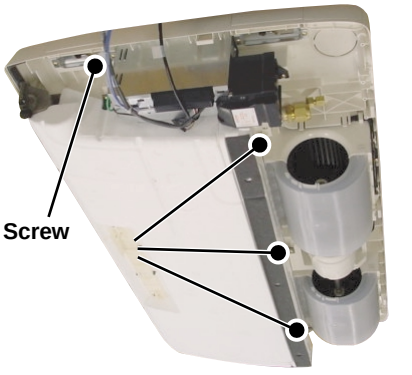
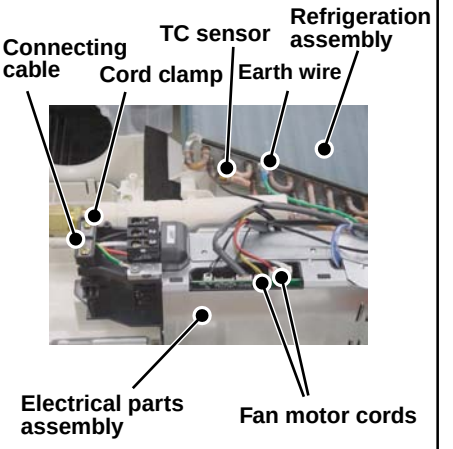
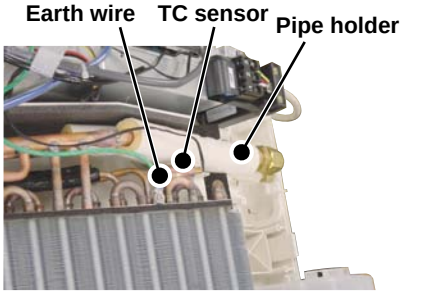
10. PARTS REPLACEMENT

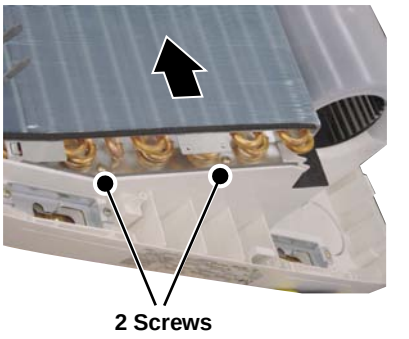
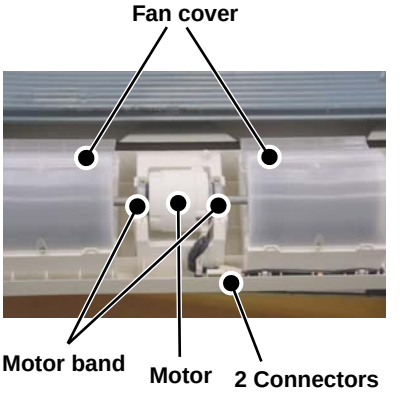
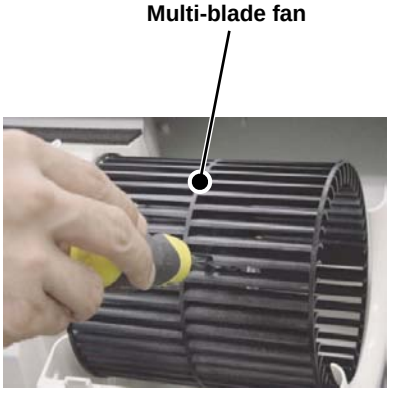
10-1. Indoor Unit

No.	Part name	Procedures	Remarks
①	Air Inlet grille	**<How to remove the Air inlet grille>** 1) Stop the operation of the Air conditioner and turn off its main power supply. 2) Open the Air inlet grille with both hands.	 **Air inlet grille**
		3) Unfasten 3 screws (about two to three rounds) for fixing the Panel arms. 4) Move the Air inlet grille toward.	 **Panel arm**
		5) Remove the Grille stopper from the axis of the Front panel. After that, remove the Air inlet grille.	 **Grille stopper**  **Air inlet grille** **Panel arm**
		6) Remove the Panel arms from the Front panel. **<How to install the Air inlet grille>** 1) Insert three Panel arms on the Air inlet grille and fix each securely by screws. 2) Set the Air inlet grille arm to the axis of the Front panel. (Refer to page 34, 8-4-3) 3) Insert the Grille stopper to the correct position and fix it securely with screws. 4) Push the Air inlet grille to the correct position.	

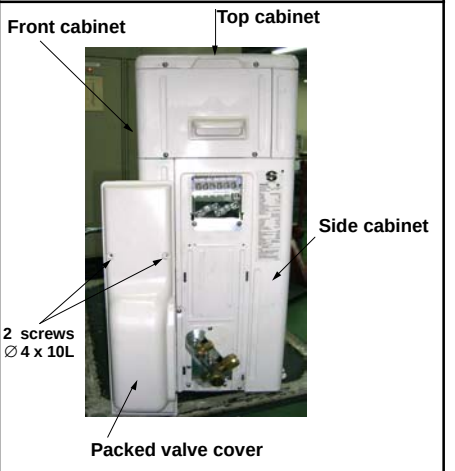
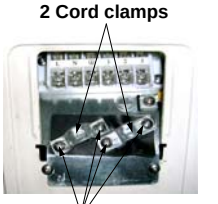
No.	Part name	Procedures	Remarks
②	Front panel	**<How to remove the Front panel>** 1) Remove the Air inlet grille. (①) 2) In case of the Drain hose is installed through the Front panel. : Remove the Drain band from the Front panel. : Cut away the Opening base for piping from Front panel and keep parts.	 Drain band Drain panel 
		3) Open 3 Cap screws and remove the screws.	Cap screws  Front Panel
		4) Remove 5 screws fixing the Front panel.	 Screws
		5) Remove the hooks of the Panel LED nearly side from the Drain pan.	
		(Continue)	

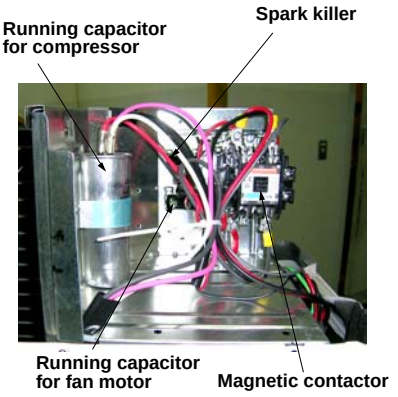
No.	Part name	Procedures	Remarks
②	Front panel	6) Remove both side hooks and remove the Front panel by turn to air inlet part direction. **<How to install the Front panel>** 1) In case of the Drain hose installation through the Front panel, install the opening base for piping in the Back body by a screw (M4 x 12). Prepare it by yourself. 2) Fit the Front panel in the Drain pan. Then fix it in the Drain pan with 2 hooks in the center of the air outlet. 3) Fix 5 hooks around the Front panel with conformation the Guide-rib is inserting into the Back body. 4) Fix 8 screws and close 3 Cap screws. 5) Install the Drain band into the Front panel. 6) Check the gap between the Front panel and the Back body.	 
③	Drain pan assembly	**<How to remove the Drain pan>** 1) Remove the Air inlet grille and the Front panel. (①, ②) 2) Remove the Louver motor from the Drain pan. 3) Remove the shaft of Horizontal louver. 4) Remove the LED base and Electrical wire. 5) Remove the TA sensor wire. 6) Remove the Drain hose. (Continue)	  

No.	Part name	Procedures	Remarks
③	Drain pan assembly	7) Remove 7 screws and remove the Drain pan assembly.	 
④	Electrical parts assembly	**<How to remove the Electrical parts assembly>** 1) Remove the Air inlet grille, the Front panel and the Drain pan assembly. (①, ②, ③) 2) Remove the Terminal cover. 3) Unfasten the screw of Cord clamp and disconnect the connecting cable. 4) Remove the Connector cover and disconnect the Fan motor cords. 5) Remove the TC sensor and earth wire from Refrigeration assembly. 6) Remove the Electrical parts assembly. **NOTE** : When install the electrical parts assembly, fix the screw after the Back body is fixed.	
⑤	Refrigeration assembly	**<How to remove the Refrigeration assembly>** 1) Remove the Air inlet grille, the Front panel and the Drain pan assembly. (①, ②, ③) 2) Stop the gas at the Outdoor unit. 3) Remove 2 pipes from the Refrigeration assembly. 4) Remove the TC sensor from holder. 5) Remove the pipe holder. 6) Remove the earth wire. (Continue)	

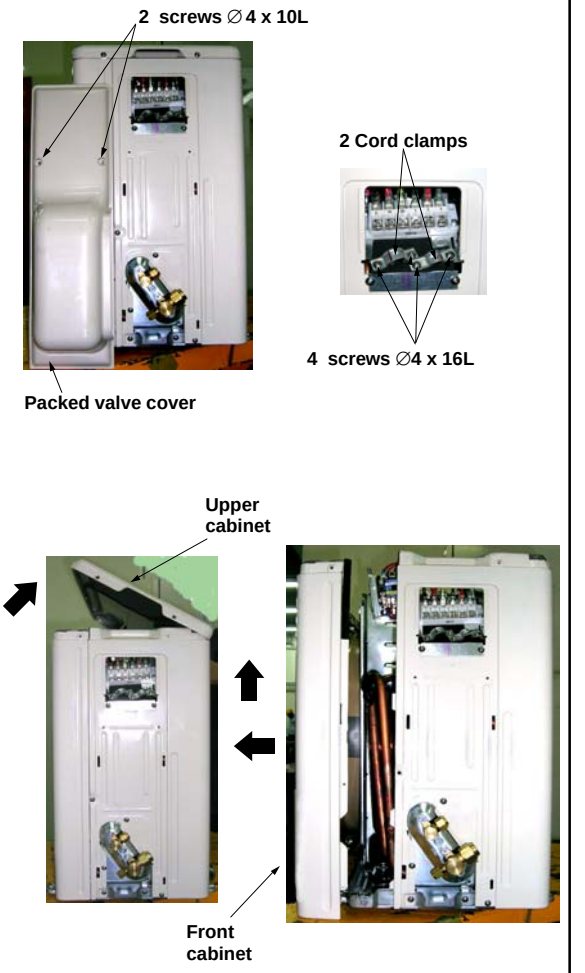
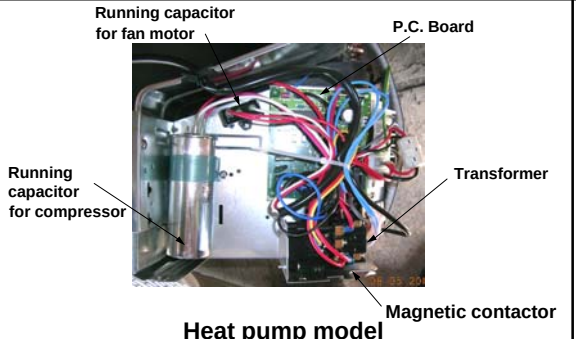
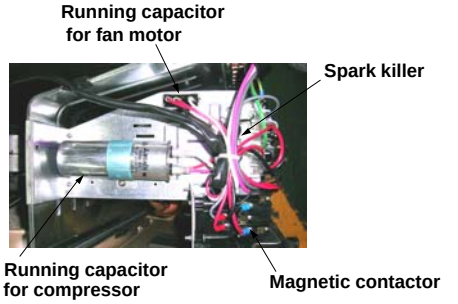
No.	Part name	Procedures	Remarks
⑤	Refrigeration assembly	7) Remove 2 screws and remove the refrigeration assembly with pushing it to right hand.	
⑥	Multiblade fan and Fan motor	**<How to remove the Multiblade fan and Fan motor>** 1) Remove the Air inlet grille and the Front panel. (①, ②) 2) Disconnect 2 connectors. 3) Remove the Fan covers. 4) Remove the Motor band with holding the Fan motor and then remove the Fan motor with the Multi-blade fans. 5) Unfasten the Set-screw and remove the Multi-blade fans.	 

10-2. Outdoor Unit (RAS-24GAH-ES2, RAS-24GA-ES2)

No.	Part name	Procedures	Remarks
①	Common procedure	1) Stop the operation of the air conditioner and turn off its main power supply or remove the power supply cord. 2) Remove the packed valve cover and the electrical parts cover (2 screws ∅ 4 x 10L) 3) Remove 2 cord clamps (4 screws ∅4 x 16L) and disconnect the power supply cord and connecting cable after removing 6 screwson on the terminal block and 1 ground screw on the electrical parts base. 4) Remove the top cabinet. (7 screws ∅ 4 x 10L) (Pulling out upward) 5) Remove the top cabinet. (2 screws ∅ 4 x 10L) (Pull the front right portion toward you, and remove it pulling out upward)	    

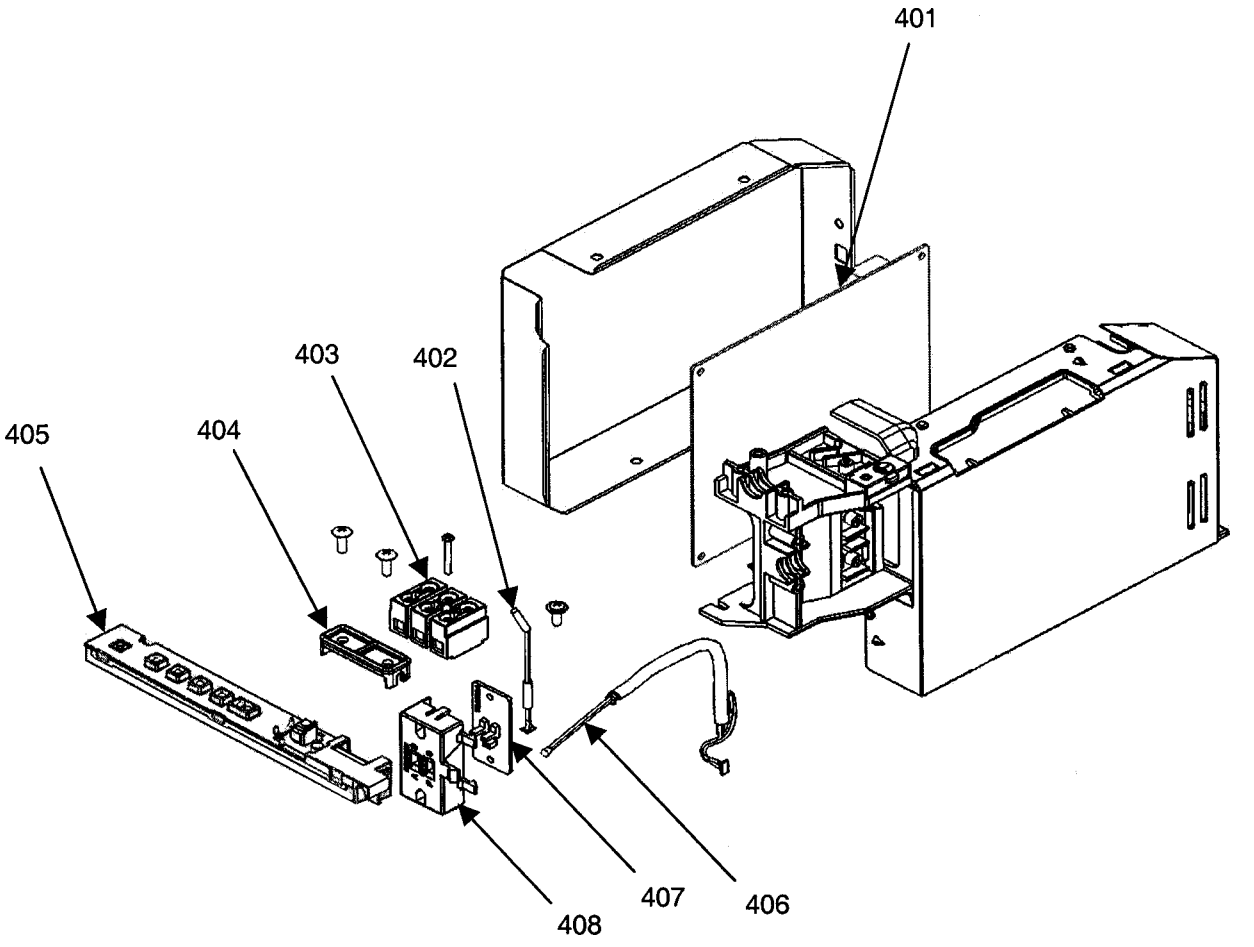
No.	Part name	Procedures	Remarks
②	Running capacitor for compressor	1) Perform the common procedure ① 2) Remove the capacitor band. (1 screw ∅4 x 10L) 3) Disconnect the lead wires from the capacitor terminal.	 Cooling only model
③	Running capacitor for fan motor	1) Perform the common procedure ① 2) Remove the fixing screw. (1 screw ∅4 x 10L) 3) Disconnect the lead wires from the capacitor terminal.	
④	Magnetic contactor	1) Perform the common procedure ① 2) Remove the fixing screw. (2 screws ∅4 x 16L) 3) Disconnect the lead wires from the terminal.	
⑤	Spark killer (Cooling only model)	1) Perform the common procedure ① 2) Remove the fixing screw. (1 screws ∅4 x 10L) 3) Disconnect the lead wires from the terminal.	

10-3 Outdoor Unit (RAS-18GAH-ES2, RAS-18GA-ES2)

No.	Part name	Procedures	Remarks
①	Common procedure	1) Stop the operation of the air conditioner and turn off its main power supply or remove the power supply cord. 2) Remove the packed valved cover and the electrical Parts cover (2 screws ∅4 x 10L) 3) Remove 2 cord clamps (4 screws ∅4 x 16L) and disconnect the power supply cord and connecting cable after removing 6 screws on the terminal block and 1 ground screw on the electrical parts base. 4) Remove the upper cabinet. (4 scerws ∅4 x 10L) (Pulling out upward) 5) Remove the front cabinet. (3 screws ∅4 x 10L) (Pull the front right protion toward you, and remove it pulling out upward.)	
②	Running capacitor for compressor	1) Perform the common procedure ① 2) Remove the capacitor band. (1 screw ∅4 x 10L) 3) Disconnect the lead wires from the capacitor terminal.	 Heat pump model
③	Running capacitor for fan motor	1) Perform the common procedure ① 2) Remove the fixing screw. (1 screw ∅4 x 10L) 3) Disconnect the lead wires from the capacitor terminal.	
④	Magnetic contactor	1) Perform the common procedure ① 2) Remove the fixing screw. (2 screws ∅4 x 10L) 3) Disconnect the lead wires from the terminal.	
⑤	Transformer (Heat pump model)	1) Perform the common procedure ① 2) Remove the fixing screw. (2 screws ∅4 x 10L) 3) Disconnect the housing from the P.C. Board.	 Cooling only model
⑥	P.C. Board (Heat pump model)	1) Perform the common procedure ① 2) Disconnect the lead wires from the P.C. Board. 3) Remove P.C.Board after unhooking 4 clams.	
⑦	Spark killer (Cooling only model)	1) Perform the common procedure ① 2) Remove the fixing screw. (1 screw ∅4 x 10L) 3) Disconnect the lead wires from the terminal.	

11. EXPLODED VIEWS AND PARTS LIST

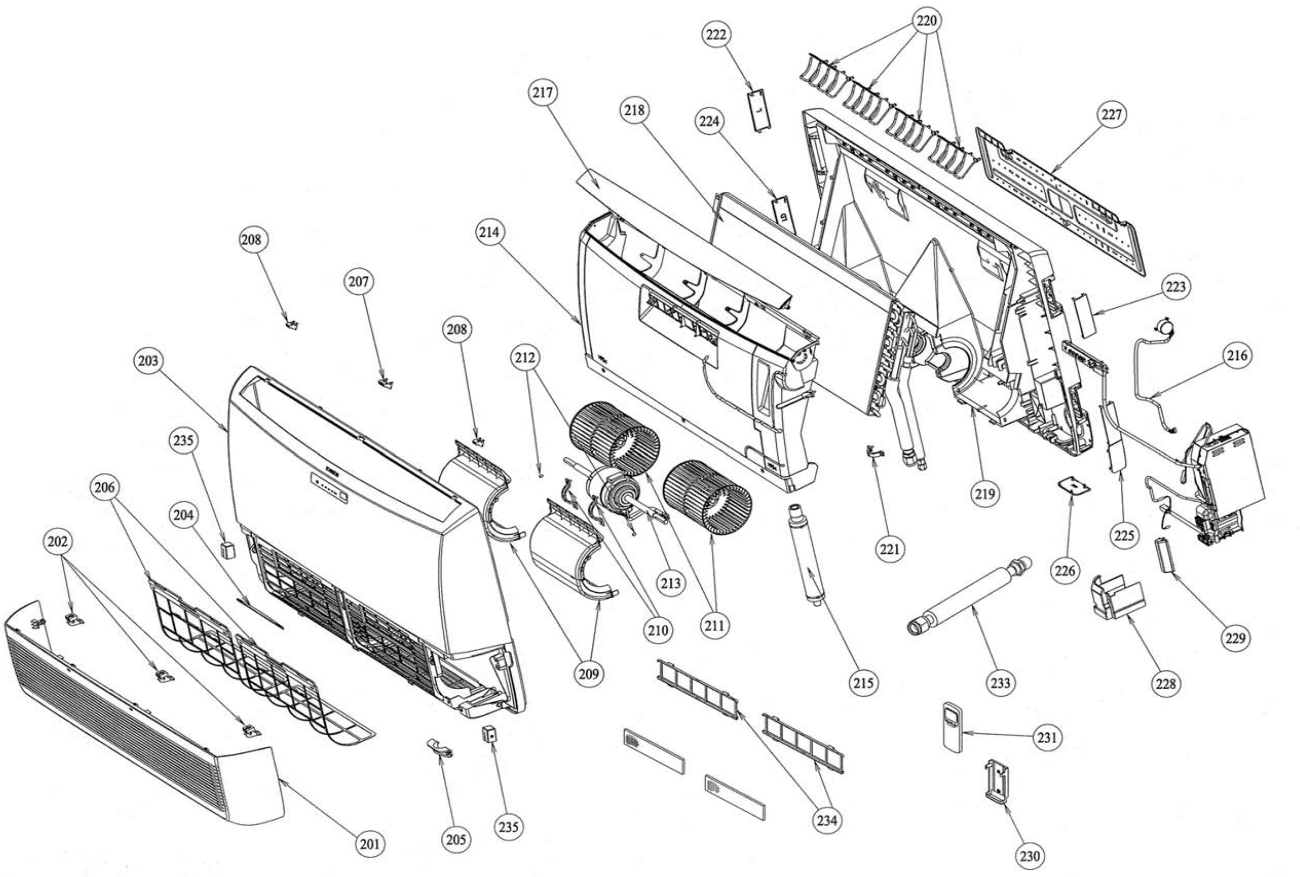
11-1. Indoor Unit (E-Parts Assy)



Location No.	Part No.	Description
401	43T69560	PC BOARD (FOR RAS-24GFHP-ES2)
401	43T69561	PC BOARD (FOR RAS-24GFP-ES2)
401	43T69562	PC BOARD (FOR RAS-18GFHP-ES2)
401	43T69563	PC BOARD (FOR RAS-18GFP-ES2)
402	43T50004	SENSOR; HEAT EXCHANGER
403	43T60002	TERMINAL BLOCK; 3P
404	43T62003	CORD CLAMP

Location No.	Part No.	Description
405	43T69315	DISPLAY UNIT
406	43T50302	TEMPERATURE SENSOR
407	43T69560	PC BOARD (FOR RAS-24GFHP-ES2)
407	43T69561	PC BOARD (FOR RAS-24GFP-ES2)
407	43T69562	PC BOARD (FOR RAS-18GFHP-ES2)
407	43T69563	PC BOARD (FOR RAS-18GFP-ES2)
408	43T08349	SWITCH COVER

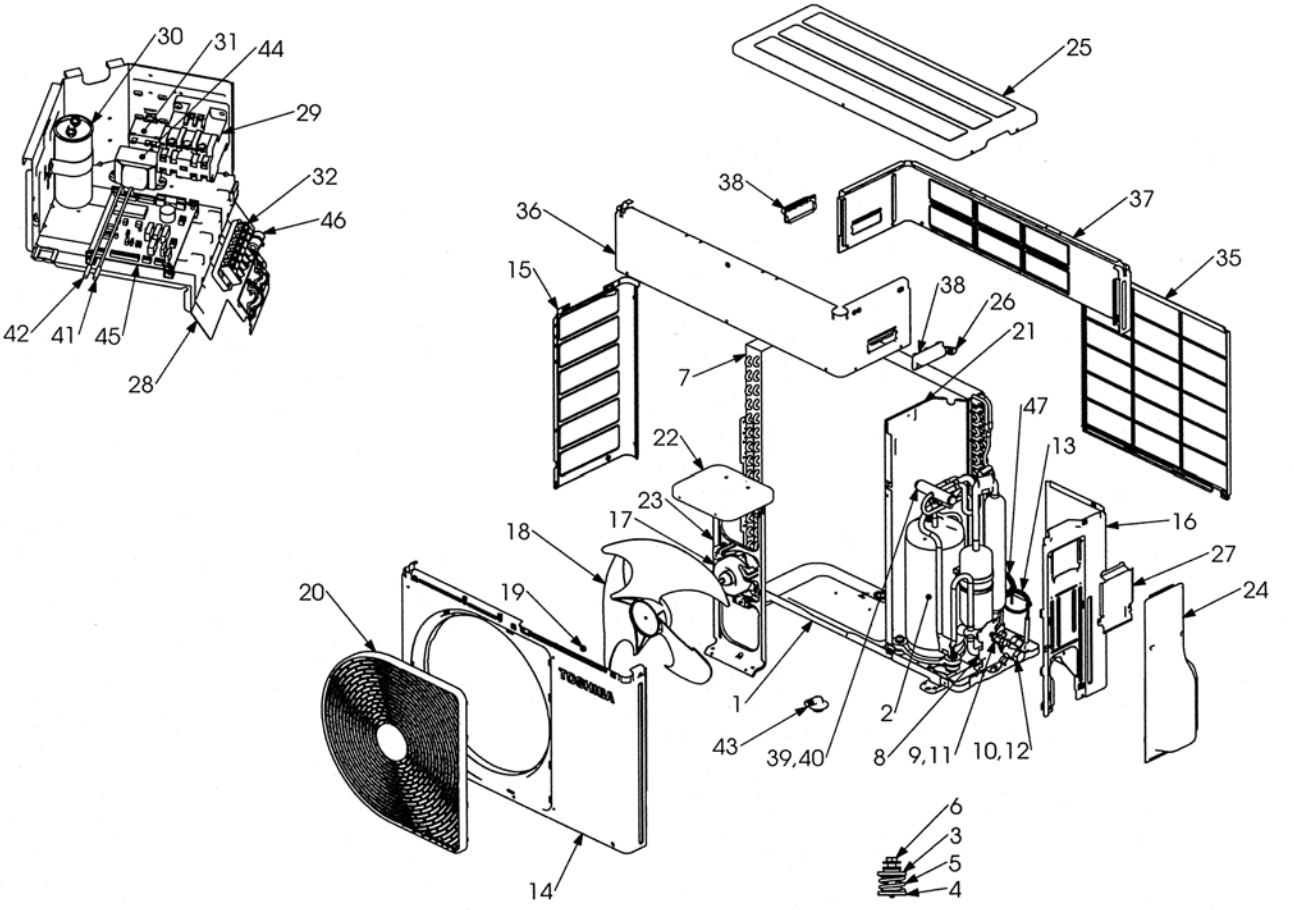
11-2. Indoor Unit



Location No.	Part No.	Description
201	43T09379	AIR-GRILLE
202	43T00357	PANEL ARM ASSY
203	43T00431	FRONT PANEL ASSY (FOR RAS-18,24GFP-ES2)
203	43T00432	FRONT PANEL ASSY (FOR RAS-18,24GFHP-ES2)
204	43T01306	MARK
205	43T79312	DRAIN BAND
206	43T80302	AIR FILTER
207	43T00433	CAP SCREW C
208	43T00434	CAP SCREW LR
209	43T20303	FAN COVER
210	43T20304	MOTOR BAND ASSY
211	43T20317	FAN ASSY (MULTIBLADE FAN)
212	43T19309	SCREW SET (D-T)
213	43T21369	FAN MOTOR
214	43T72309	DRAIN PAN ASSY
215	43T70311	DRAIN HOSE ASSY
216	43T19323	STEPPING MOTOR
217	43T09378	HORIZONTAL LOUVER FLOCK
218	43T44318	REFRIGERATION ASSY (FOR RAS-24GFHP-ES2,GFP-ES2)

Location No.	Part No.	Description
218	43T44319	REFRIGERATION ASSY (FOR RAS-18GFHP-ES2,GFP-ES2)
219	43T03344	BACK BODY ASSY
220	43T09314	VERTICAL LOUVER
221	43T49303	PIPE HOLDER
222	43T19324	COVER BODY L
223	43T19325	COVER BODY R
224	43T19328	COVER BODY LD
225	43T19326	BUSH BODY R
226	43T19327	BUSH BODY D
227	43T82308	INSTALLATION PLATE
228	43T60314	TERMINAL COVER
229	43T62303	CONNECTOR COVER
230	43T83003	HOLDER; REMOTE CONTROLLER
231	43T69421	WIRELESS-REMOCO (FOR RAS-18,24GFHP-ES2)
231	43T69422	WIRELESS-REMOCO (FOR RAS-18,24GFP-ES2)
233	43T49326	FLEXIBLE PIPE ASSY
234	43T80003	FILTER; FRAME
235	43T00365	ASM-GRILLE-STOPPER

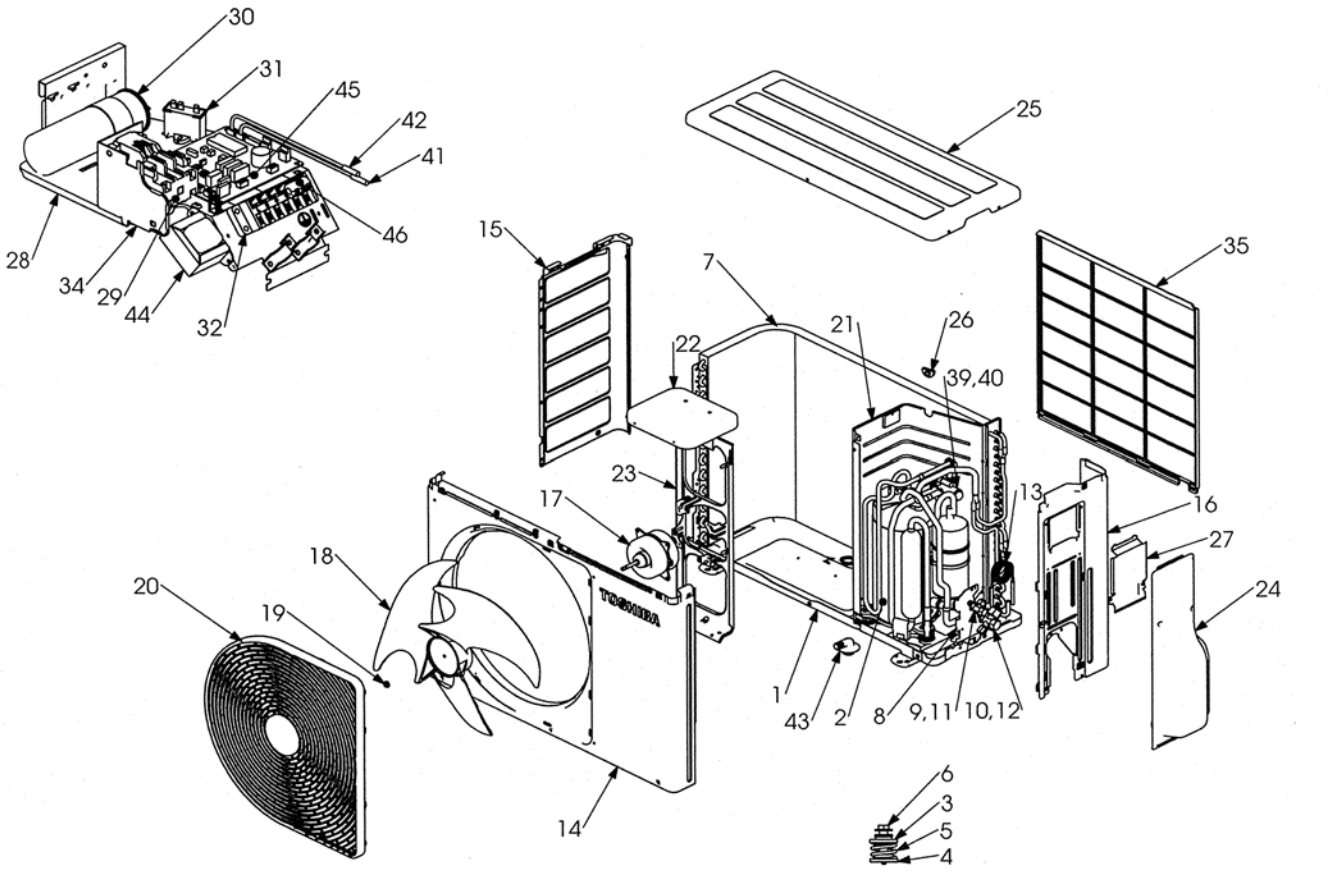
11-3. Outdoor Unit (RAS-24GAH-ES2)



Location No.	Part No.	Description
1	43T42324	BASE PLATE ASSEMBLY
2	43T41397	COMPRESSOR;PA290X3CS-4MU
3	43T49011	SPRING BASE(UPPER)
4	43T49012	SPRING BASE (LOWER)
5	43T49019	SPRING; BUFFER
6	43T97307	COMPRESSOR BOLT (M6)
7	43T43391	CONDENSER ASSEMBLY
8	43T00448	FIXING PLATE VALVE
9	43T46332	VALVE;PACKED 6.35 DIA
10	43T46335	VALVE;PACKED 12.7 DIA (H4)
11	43T47331	BONNET, 6.35 DIA
12	43T47333	BONNET, 12.70 DIA
13	43T47013	CAPILLARY TUBE; 2.0 DIA
14	43T00468	FRONT CABINET
15	43T00474	LEFT CABINET
16	43T00454	RIGHT CABINET
17	43T21378	FAN MOTOR;AC220-240V 50Hz
18	43T20319	PROPELLER FAN
19	43T47001	NUT FLANGE
20	43T19329	FAN GUARD
21	43T04302	PARTITION
22	43T39317	MOTOR BASE CONNECTION PLATE
23	43T39318	MOTOR BASE

Location No.	Part No.	Description
24	43T19330	PACKED VALVE COVER
25	43T00455	UPPER CABINET
26	43T96305	BUSHING
27	43T62325	ELECTRIC PART COVER
28	43T61306	ELECTRIC PARTS BASE
29	43T52301	SWITCH;MAGNET; CLK-35J
30	43T55340	MF CAPACITOR
31	43T55341	CAPACITOR;PLASTIC-FILM
32	43T60352	TERMINAL BLOCK; 6P
35	43T19331	FIN GUARD
36	43T00456	UPPER FRONT CABINET; A
37	43T00457	UPPER FRONT CABINET; B
38	43T71301	HANDLE
39	43T46337	4 WAY VALVE
40	43T46339	COIL;V-4WAY;AC220-240V 50Hz
41	43T69059	SENSOR; TE
42	43T69060	SENSOR; TD
43	43T79305	DRAIN NIPPLE
44	43T58301	TRANSFORMER; TT-05
45	43T69580	PC BOARD
46	43T60325	FILTER;CLAMP
47	43T47308	CAPILLARY TUBE; 1.0 DIA

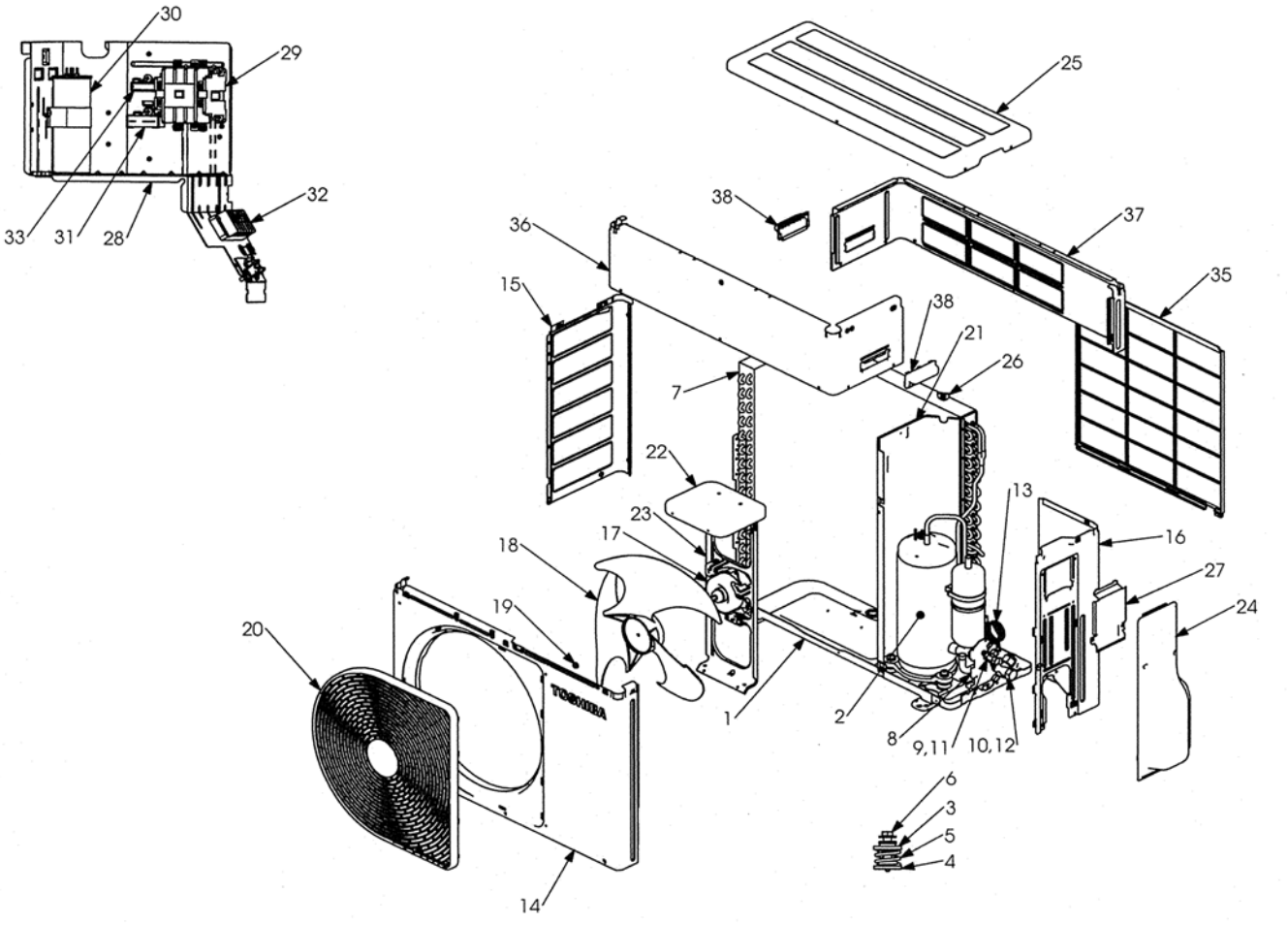
11-4. Outdoor Unit (RAS-18GAH-ES2)



Location No.	Part No.	Description
1	43T42324	BASE PLATE ASSEMBLY
2	43T41396	COMPRESSOR;PA225X2C-4KU1
3	43T49011	SPRING BASE(UPPER)
4	43T49012	SPRING BASE (LOWER)
5	43T49019	SPRING; BUFFER
6	43T97307	COMPRESSOR BOLT (M6)
7	43T43392	CONDENSER ASSEMBLY
8	43T00448	FIXING PLATE VALVE
9	43T46332	VALVE;PACKED 6.35 DIA
10	43T46335	VALVE;PACKED 12.7 DIA (H4)
11	43T47331	BONNET, 6.35 DIA
12	43T47333	BONNET, 12.70 DIA
13	43T47013	CAPILLARY TUBE; 2.0 DIA
14	43T00468	FRONT CABINET
15	43T00473	LEFT CABINET
16	43T00451	RIGHT CABINET ASSEMBLY
17	43T21378	FAN MOTOR;AC220-240V 50Hz
18	43T20319	PROPELLER FAN
19	43T47001	NUT FLANGE
20	43T19329	FAN GUARD
21	43T04301	PARTITION

Location No.	Part No.	Description
22	43T39317	MOTOR BASE CONNECTION PLATE
23	43T39318	MOTOR BASE
24	43T19330	PACKED VALVE COVER
25	43T00460	UPPER CABINER ASSEMBLY
26	43T96305	BUSHING
27	43T62325	ELECTRIC PART COVER
28	43T61307	ELECTRIC PARTS BASE
29	43T52302	MAGNETIC CONTACTOR;AC220-240V 50Hz
30	43T55340	MF CAPACITOR
31	43T55341	CAPACITOR;PLASTIC-FILM
32	43T60352	TERMINAL BLOCK; 6P
34	43T61305	MAGNETIC RELAY BASE
35	43T19331	FIN GUARD
39	43T46337	4 WAY VALVE
40	43T46339	COIL;V-4WAY;AC220-240V 50Hz
41	43T69059	SENSOR; TE
42	43T69060	SENSOR; TD
43	43T79305	DRAIN NIPPLE
44	43T58301	TRANSFORMER; TT-05
45	43T69580	PC BOARD
46	43T60325	FILTER;CLAMP

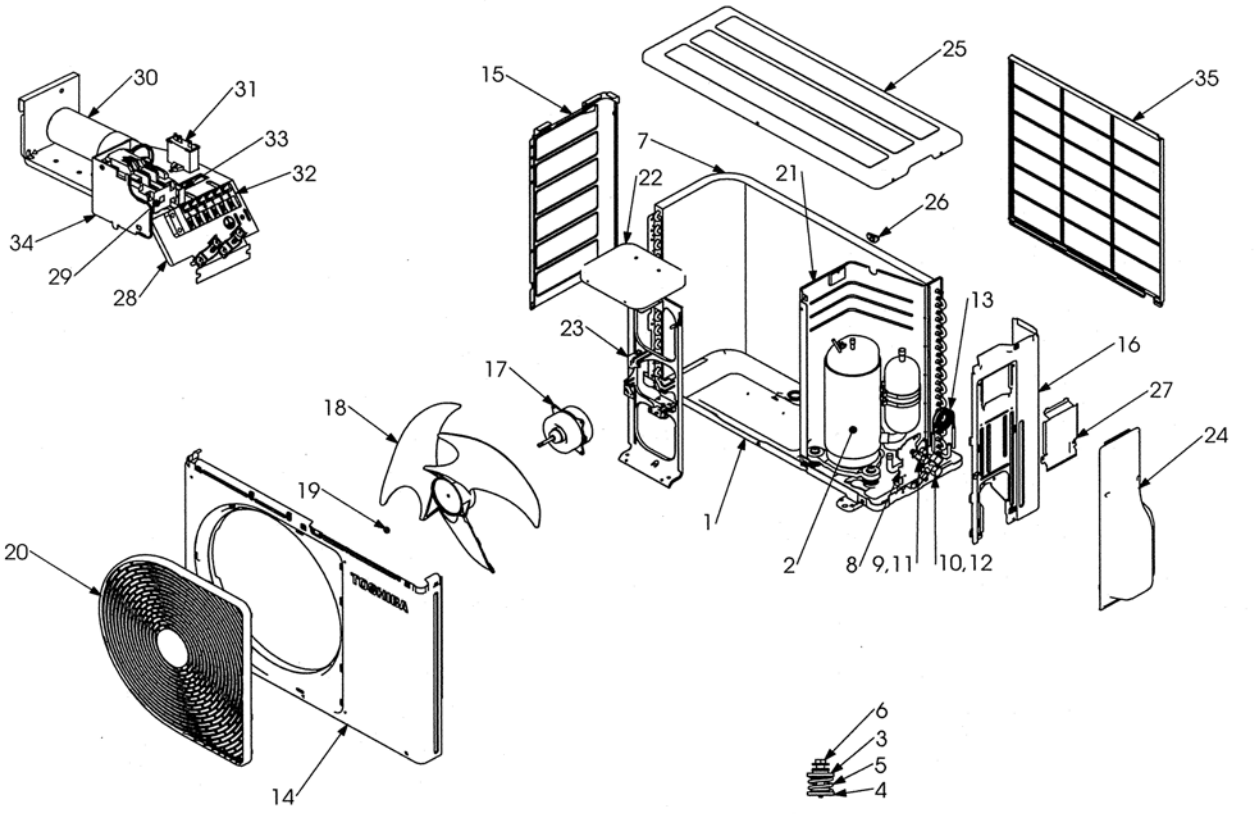
11-5. Outdoor Unit (RAS-24GA-ES2)



Location No.	Part No.	Description
1	43T42324	BASE PLATE ASSEMBLY
2	43T41397	COMPRESSOR;PA290X3CS-4MU
3	43T49011	SPRING BASE(UPPER)
4	43T49012	SPRING BASE (LOWER)
5	43T49019	SPRING; BUFFER
6	43T97307	COMPRESSOR BOLT (M6)
7	43T43390	CONDENSER ASSEMBLY
8	43T00448	FIXING PLATE VALVE
9	43T46332	VALVE;PACKED 6.35 DIA
10	43T46335	VALVE;PACKED 12.7 DIA (H4)
11	43T47331	BONNET, 6.35 DIA
12	43T47333	BONNET, 12.70 DIA
13	43T47013	CAPILLARY TUBE; 2.0 DIA
14	43T00468	FRONT CABINET
15	43T00474	LEFT CABINET
16	43T00454	RIGHT CABINET
17	43T21377	FAN MOTOR;AC220-240V 50Hz
18	43T20319	PROPELLER FAN
19	43T47001	NUT FLANGE

Location No.	Part No.	Description
20	43T19329	FAN GUARD
21	43T04302	PARTITION
22	43T39317	MOTOR BASE CONNECTION PLATE
23	43T39318	MOTOR BASE
24	43T19330	PACKED VALVE COVER
25	43T00455	UPPER CABINET
26	43T96305	BUSHING
27	43T62325	ELECTRIC PART COVER
28	43T61306	ELECTRIC PARTS BASE
29	43T52301	SWITCH;MAGNET; CLK-35J
30	43T55340	MF CAPACITOR
31	43T55341	CAPACITOR;PLASTIC-FILM
32	43T60352	TERMINAL BLOCK; 6P
33	43T33002	SPARK-KILLER
35	43T19331	FIN GUARD
36	43T00456	UPPER FRONT CABINET; A
37	43T00457	UPPER FRONT CABINET; B
38	43T71301	HANDLE

11-6. Outdoor Unit (RAS-18GA-ES2)



Location No.	Part No.	Description
1	43T42324	BASE PLATE ASSEMBLY
2	43T41396	COMPRESSOR;PA225X2C-4KU1
3	43T49011	SPRING BASE(UPPER)
4	43T49012	SPRING BASE (LOWER)
5	43T49019	SPRING; BUFFER
6	43T97307	COMPRESSOR BOLT (M6)
7	43T43389	CONDENSER ASSEMBLY
8	43T00448	FIXING PLATE VALVE
9	43T46332	VALVE;PACKED 6.35 DIA
10	43T46335	VALVE;PACKED 12.7 DIA (H4)
11	43T47331	BONNET, 6.35 DIA
12	43T47333	BONNET, 12.70 DIA
13	43T47014	CAPILLARY TUBE; 1.7DIA
14	43T00468	FRONT CABINET
15	43T00459	LEFT CABINET
16	43T00451	RIGHT CABINET ASSEMBLY
17	43T21345	FAN-MOTOR(Made in China)
18	43T20319	PROPELLER FAN

Location No.	Part No.	Description
19	43T47001	NUT FLANGE
20	43T19329	FAN GUARD
21	43T04301	PARTITION
22	43T39317	MOTOR BASE CONNECTION PLATE
23	43T39318	MOTOR BASE
24	43T19330	PACKED VALVE COVER
25	43T00460	UPPER CABINER ASSEMBLY
26	43T96305	BUSHING
27	43T62325	ELECTRIC PART COVER
28	43T61304	ELECTRIC PART BASE
29	43T52302	MAGNETIC CONTACTOR; AC220-240V 50Hz
30	43T55340	MF CAPACITOR
31	43T55324	CAPACITOR; PLASTIC-FILM
32	43T60352	TERMINAL BLOCK; 6P
33	43T33002	SPARK-KILLER
34	43T61305	MAGNETIC RELAY BASE
35	43T19331	FIN GUARD

T O S H I B A C A R R I E R (T H A I L A N D) C O . , L T D .

144/9 MOO 5, BANGKADI INDUSTRIAL PARK, TIVANON ROAD, TAMBOL BANGKADI,
AMPHUR MUANG, PATHUMTHANI 12000,THAILAND.