

*Euro-Line*®

**TECHNICAL & SERVICE MANUAL**

FC512HL - AE512SH

---

**SPLIT SYSTEM AIR CONDITIONER**

## Important!

### Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

**For safe installation and trouble-free operation, you must:**

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.



**WARNING**

This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.



**CAUTION**

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

### If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

### In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

### Special Precautions

**WARNING**

#### When Wiring



**ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.**

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause accidental injury or death.
- Ground the unit following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.

### When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

### When Installing...

#### ...In a Ceiling or Wall

Make sure the ceiling/wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.

#### ...In a Room

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.

#### ...In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

#### ...In an Area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

#### ...In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

### When Connecting Refrigerant Tubing

- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

### When Servicing

- Turn the power off at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

### Others



**CAUTION**

- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm upon completing installation that no refrigerant gas is leaking. If escaped gas comes in contact with a stove, gas water heater, electric room heater or other heat source, it can produce dangerously toxic gas.

# Table of Contents

	Page
<b>1. OPERATING RANGE</b> .....	1
<b>2. SPECIFICATIONS</b>	
2-1. Unit Specifications .....	2
2-2. Major Component Specifications .....	3
2-3. Other Component Specifications .....	5
<b>3. DIMENSIONAL DATA</b> .....	6
<b>4. REFRIGERANT FLOW DIAGRAM</b> .....	8
<b>5. PERFORMANCE DATA</b>	
5-1. Performance charts .....	9
5-2. Air Throw Distance Chart .....	10
5-3. Cooling Capacity .....	12
5-4. Heating Capacity .....	13
<b>6. ELECTRICAL DATA</b>	
6-1. Electrical Characteristics .....	14
6-2. Electric Wiring Diagram .....	15
<b>7. FUNCTION</b>	
7-1. Room Temperature Control .....	17
7-2. Dry Operation .....	19
7-3. Automatic Switching between Cooling and Heating .....	19
7-4. Freeze Prevention .....	20
7-5. Overload Prevention .....	21
7-6. Cold Draft Prevention .....	22
7-7. Defrosting Operation .....	23
<b>8. TROUBLESHOOTING</b>	
8-1. Check before and after troubleshooting .....	25
8-2. Air conditioner does not operate .....	26
8-3. Some part of air conditioner does not operate .....	30
8-4. Air conditioner operates, but abnormalities are observed .....	32
8-5. If a sensor is defective .....	34
<b>9. CHECKING ELECTRICAL COMPONENTS</b>	
9-1. Measurement of Insulation Resistance .....	35
9-2. Checking Continuity of Fuse on PCB Ass'y .....	36
9-3. Checking Motor Capacitor .....	36
<b>10. DISASSEMBLY PROCEDURE FOR INDOOR UNIT</b>	
10-1. Removing Air Intake Grille .....	37
10-2. Removing Side Panels .....	38
10-3. Access and Removal of Electrical Component Box .....	38
10-4. Removing Flap Motor .....	39
10-5. Removing Evaporator (=Indoor Heat Exchange Coil) .....	39
10-6. Removing Fan and Fan Motor .....	41

# 1. OPERATING RANGE

	<b>Temperature</b>	<b>Indoor Air Intake Temp.</b>	<b>Outdoor Air Intake Temp.</b>
Cooling	Maximum	32°C D.B. / 23°C W.B.	43°C D.B.
	Minimum	19°C D.B. / 14°C W.B.	19°C D.B.
Heating	Maximum	27°C D.B.	24°C D.B. / 18°C W.B.
	Minimum	16°C D.B.	- 8°C D.B. / - 9°C W.B.

## 2. SPECIFICATIONS

### 2-1. Unit Specifications

Indoor Unit     **SAP-FC512HL**  
 Outdoor Unit   **AE512SH**

<b>Power Source</b>		220-240V ~ 50Hz									
<b>Voltage rating</b>		220/230/240 V									
<b>Performance</b>		Cooling		Heating							
Capacity	kW	3.30	/	3.35	/	3.35	3.90	/	3.90	/	4.00
	BTU/h	11,300	/	11,400	/	11,400	13,300	/	13,300	/	13,600
Air circulation (High)	m <sup>3</sup> /h	700									
Moisture removal (High)	Liters/h	1.8		—							
<b>Electrical Rating</b>		Cooling		Heating							
Available voltage range	V	198 ~ 264									
Running amperes	A	5.9	/	5.9	/	6.0	6.1	/	6.1	/	6.2
Power input	W	1,260	/	1,290	/	1,330	1,300	/	1,320	/	1,370
Power factor	%	97	/	95	/	92	97	/	94	/	92
C.O.P.	W/W	2.6	/	2.6	/	2.5	3.0	/	3.0	/	2.9
Compressor locked rotor amperes	A	32	/	33	/	35	32	/	33	/	35
<b>Features</b>											
Controls / Temperature control		Microprocessor / I.C. thermostat									
Control unit		Wireless remote control unit									
Timer		ON/OFF 24 hours & Daily program, 1-hour OFF									
Fan speeds		Indoor / Outdoor		3 and Auto / 1(Hi)							
Airflow direction (Indoor)		Horizontal		Manual							
		Vertical		Auto							
Air filter		Washable, Anti-Mold									
Compressor		Rotary (Hermetic)									
Refrigerant / Amount charged at shipment		g		R22 / 1,230							
Refrigerant control		Capillary tube									
Operation sound		Indoor : Hi / Me / Lo		dB-A		44 / 40 / 35					
		Outdoor : Hi		dB-A		48					
Refrigerant tubing connections		Flare type									
Max. allowable tubing length at shipment		m		7.5							
Refrigerant tube diameter		Narrow tube		mm (in.)		6.35(1/4)					
		Wide tube		mm (in.)		12.7(1/2)					
Refrigerant tube kit / Air Clean Filter		Optional / Optional									
<b>Dimensions &amp; Weight</b>				Indoor Unit		Outdoor Unit					
Unit dimensions		Height		mm		680					
		Width		mm		900					
		Depth		mm		190					
Package dimensions		Height		mm		296					
		Width		mm		1,011					
		Depth		mm		813					
Weight		Net		kg		23.5					
		Shipping		kg		30.0					
Shipping volume		m <sup>3</sup>				0.24					
						0.18					

**Remarks:**

Rating conditions are:

- Cooling : Indoor air temperature 27°C D.B. / 19°C W.B.  
 Outdoor air temperature 35°C D.B. / 24°C W.B.
- Heating : Indoor air temperature 20°C D.B.  
 Outdoor air temperature 7°C D.B. / 6°C W.B.

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

## 2-2. Major Component Specifications

### 2-2-1. Indoor Unit

Indoor Unit **FC512HL**

<b>Controller PCB</b>		
Part No.		POW-K126GHS-(C)
Controls		Microprocessor
Control circuit fuse		250 V 3.15 A
<b>Remote Control Unit</b>		RCS-6HPS3E
<b>Fan &amp; Fan Motor</b>		
Type		Cross-flow
Q'ty ... Dia. and length	mm	2 ... ø130 / L180
Fan motor model ... Q'ty		K48407-M01596 ... 1
No. of poles ... rpm (230 V, High)		4 ... 1,160
Nominal output	W	20
Coil resistance (Ambient temp. 20°C)	Ω	GRY-WHT : 314±7% WHT-PNK : 444±7% WHT-VLT : 98.9±7% VLT-ORG : 98.9±7% ORG-YEL : 223±7%
Safety devices	Type	Internal protector
	Operating temp.	145±5
	Open	°C
	Close	Automatic reclosing
Run capacitor	μF	1.5
	VAC	440
<b>Flap Motor</b>		
Model		M2LJ24ZE31
Rating		AC 208 / 230 V, 50 / 60 Hz
No. of poles ... rpm		8 ... 2.5 / 3.0
Nominal output	W	3 / 2.5
Coil resistance (Ambient temp. 20°C)	kΩ	16.45 ± 15%
<b>Heat Exch. Coil</b>		
Coil		Aluminum plate fin / Copper tube
Rows		2
Fin pitch	mm	1.8
Face area	m <sup>2</sup>	0.192

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

## 2-2-2. Outdoor Unit

Outdoor Unit **AE512SH**

<b>Controller PCB</b>		POW-C96GH		
<b>Compressor</b>				
Type		Rotary (Hermetic)		
Compressor model		C-R110H5H 80619445-S		
Nominal output	W	1,100		
Compressor oil ... Amount	cc	SUNISO 4GSD-T ... 550		
Coil resistance (Ambient temp. 25°C)	Ω	C-R : 1.962 C-S : 5.38		
Safety devices	Type	External(OLR A)	External(OLR T)	
	Overload relay	MRA98596-9201	CS-7C115	
	Operating temp.	Open °C	145±5	115±3
		Close °C	69±11	95±5
Operating amp.(Ambient temp. 25°C)	Trip in 6 to 16 sec. at 21A		—	
Run capacitor	μF	25.0		
	VAC	400		
Crank case heater	—			
<b>Fan &amp; Fan Motor</b>				
Type		Propeller		
Q'ty ... Dia.		1 ... ø400		
Fan motor model ... Q'ty		K35610-M01402 ... 1		
No. of poles ... rpm (230 V, High)		6 ... 760		
Nominal output	W	20		
Coil resistance (Ambient temp. 20°C)	Ω	BRN-WHT : 256±7% YEL-WHT : 227±7% PNK-YEL : 103±7%		
Safety devices	Type	Internal protector		
	Operating temp.	Open °C	150±10	
		Close °C	Automatic reclosing	
Run capacitor	μF	2.0		
	VAC	440		
<b>Heat Exch. Coil</b>				
Coil		Aluminum plate fin / Copper tube		
Rows		2		
Fin pitch	mm	1.6		
Face area	m <sup>2</sup>	0.301		
<b>External Finish</b>		Acrylic baked-on enamel finish		

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

## 2-3. Other Component Specifications

Indoor Unit **FC512HL**

<b>Thermistor (Room sensor TH2)</b>		<b>KTEC-35-S6</b>	
Resistance	kΩ	10°C 10.0 ± 4%	30°C 4.0 ± 4%
		15°C 7.9 ± 4%	35°C 3.3 ± 4%
		20°C 6.3 ± 4%	40°C 2.7 ± 4%
		25°C 5.0 ± 4%	50°C 1.8 ± 4%

<b>Thermistor (Coil sensor TH1)</b>		<b>PBC-41E-S14</b>	
Resistance	kΩ	-20°C 40.1 ± 5%	20°C 6.5 ± 5%
		-10°C 24.4 ± 5%	30°C 4.4 ± 5%
		0°C 15.3 ± 5%	40°C 3.0 ± 5%
		10°C 9.9 ± 5%	50°C 2.1 ± 5%

<b>Transformer (TR)</b>		<b>ATR-J105</b>	
Rating	Primary	AC 230V, 50/60Hz	
	Secondary	19V, 0.526A	
	Capacity	10VA	
Coil resistance	Ω (at 21°C)	Primary (WHT – WHT):	205 ± 10%
		Secondary (BRN – BRN):	2.0 ± 10%
Thermal cut-off temp.		150°C	

Outdoor Unit **AE512SH**

<b>Power Relay (PR)</b>		<b>DFU24D1-F (M)</b>	
Coil rating		DC 24V	
Coil resistance	Ω (at 20°C)	650 ± 10%	
Contact rating		AC 250V, 20A	

<b>Thermostat (Defrost thermo. 23D)</b>		<b>TRS02-12MSR</b>	
Operating temp.	°C	ON	12 ± 2
		Diff.	8 deg. below

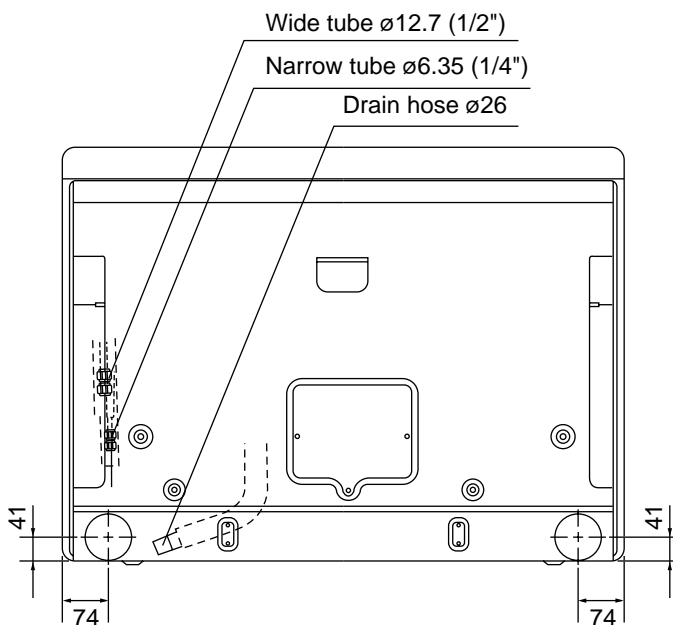
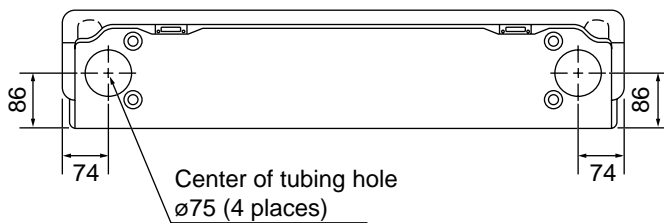
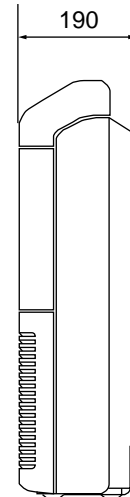
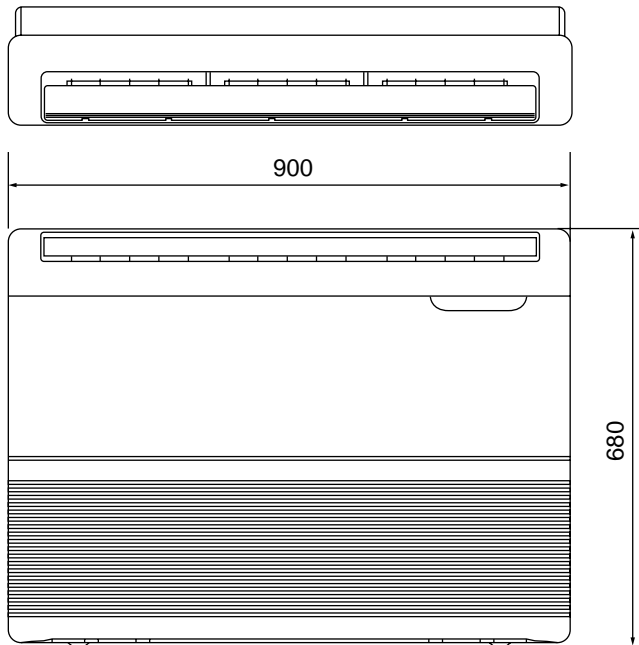
<b>4-way Valve (Solenoid coil)</b>		<b>LB60012 (Coil), V26-110B (Valve)</b>	
Coil rating		AC 220/240V, 50Hz, 6W	
Coil resistance	Ω (at 20°C)	1,740 ± 7%	

<b>PTC Thermistor (TH)</b>		<b>TDK 101YV</b>	
Resistance	Ω (at 25°C)	100 ± 20%	

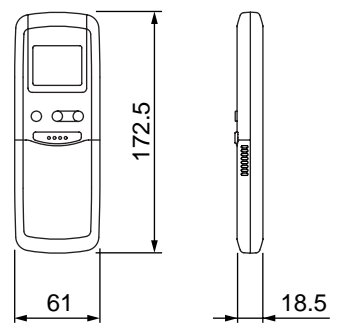


### 3. DIMENSIONAL DATA

Indoor Unit FC512HL

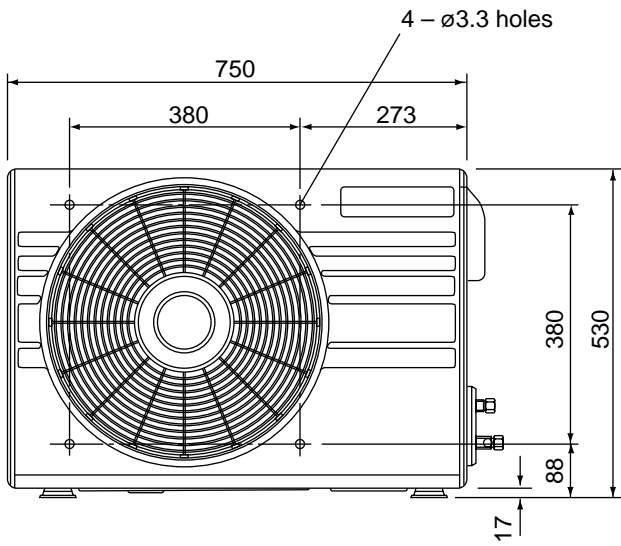
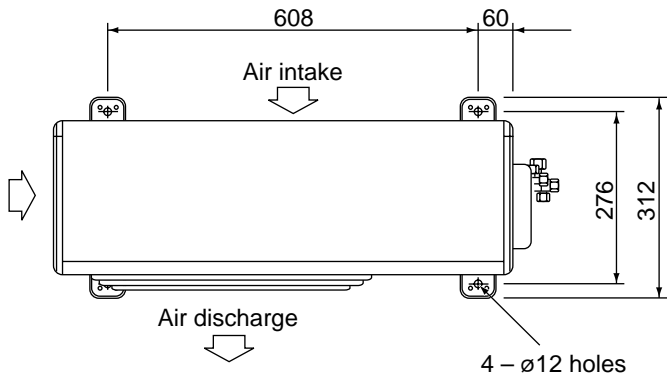


Remote control unit

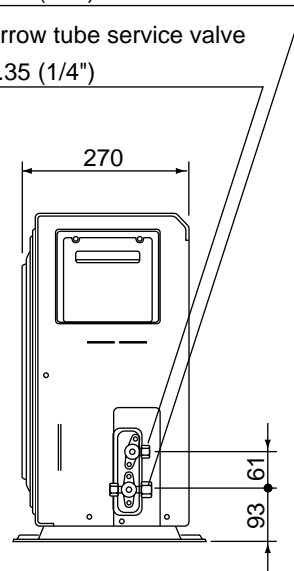


Unit : mm

Outdoor Unit **AE512SH**



Wide tube service valve  
 $\phi 12.7$  (1/2")  
 Narrow tube service valve  
 $\phi 6.35$  (1/4")

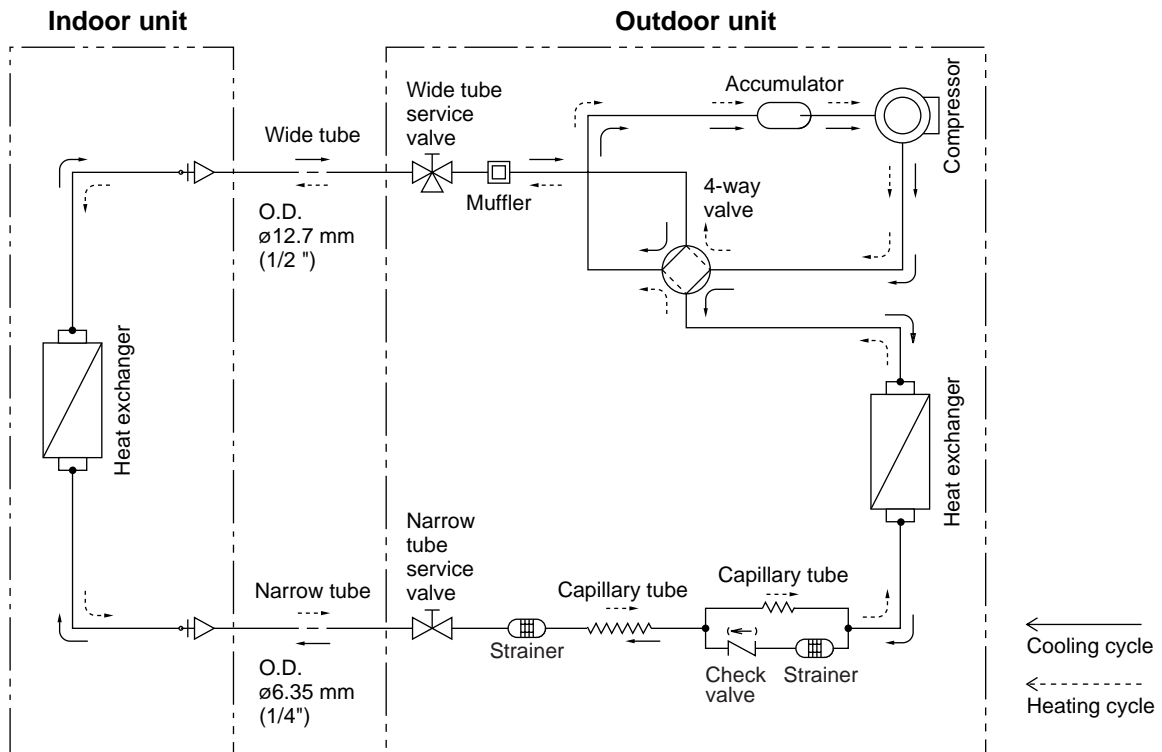


Unit : mm

# 4. REFRIGERANT FLOW DIAGRAM

Indoor Unit **FC512HL**

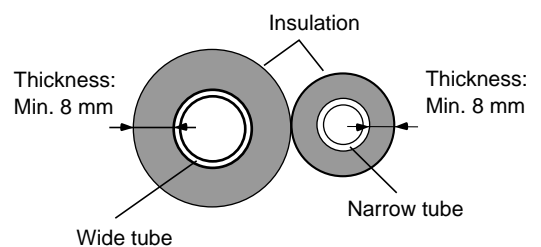
Outdoor Unit **AE512SH**



## Insulation of Refrigerant Tubing

### IMPORTANT

Because capillary tubing is used in the outdoor unit, both the wide and narrow tubes of this air conditioner become cold. To prevent heat loss and wet floors due to dripping of condensation, **both tubes must be well insulated** with a proper insulation material. The thickness of the insulation should be a min. 8 mm.

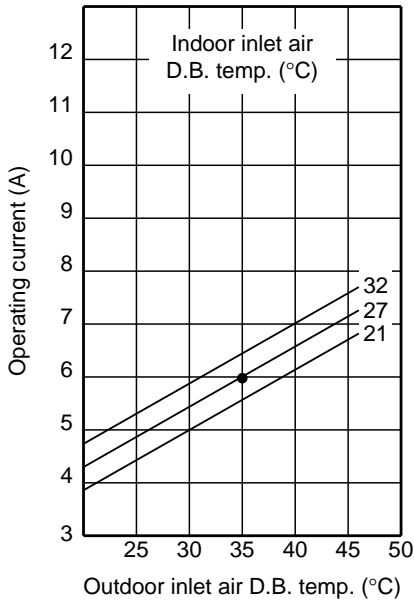


# 5. PERFORMANCE DATA

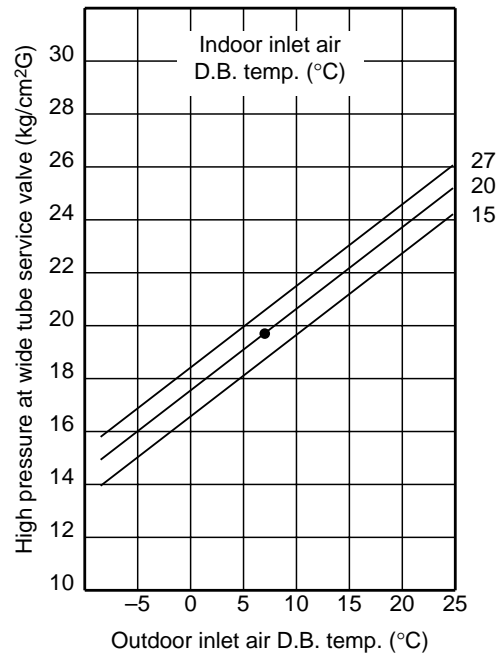
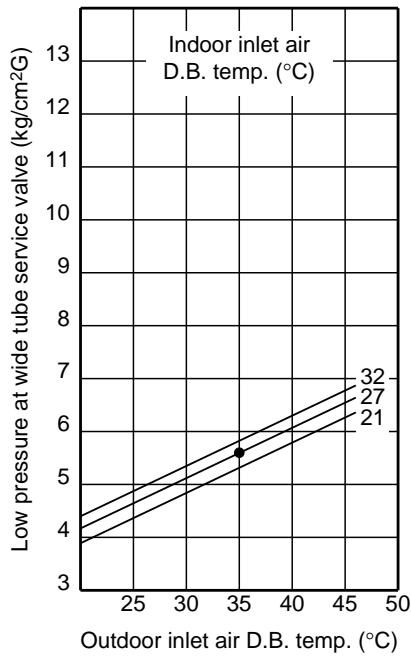
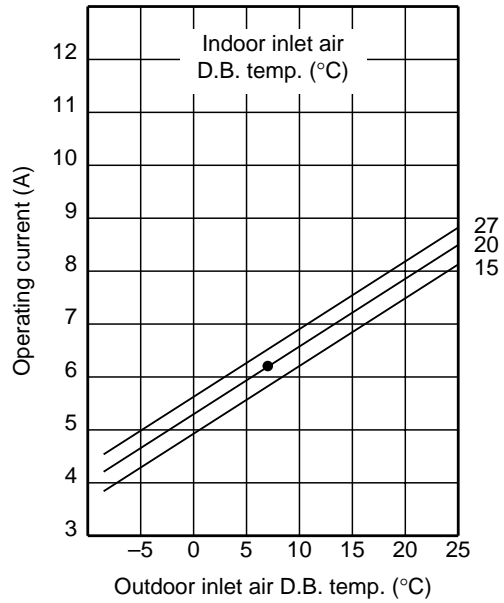
## 5-1. Performance charts

Indoor Unit **FC512HL**  
 Outdoor Unit **AE512SH**

Cooling Characteristics



Heating Characteristics



### NOTE

Overload prevention operates to protect the air conditioner when outdoor ambient temperature reaches extremely high in heating mode. (Refer to "8-5 Overload prevention")

● ..... Points of Rating condition

Black dots in above charts indicate the following rating conditions.

Cooling: Indoor air temperature 27°C D.B./19°C W.B.  
 Outdoor air temperature 35°C D.B./24°C W.B.

Heating: Indoor air temperature 20°C D.B.  
 Outdoor air temperature 7°C D.B./6°C W.B.

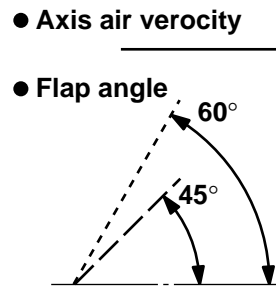
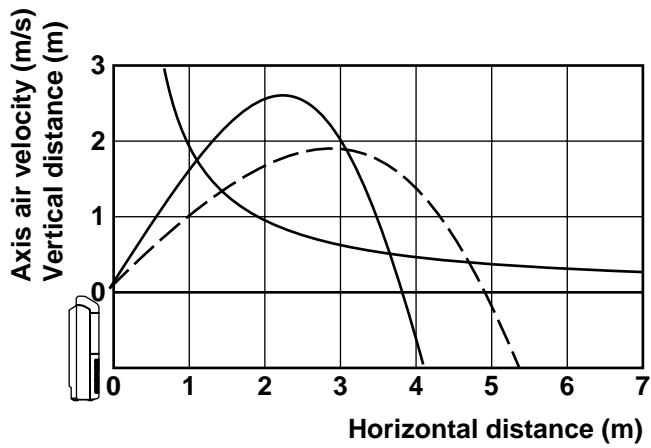
## 5-2. Air Throw Distance Chart

Indoor Unit FC512HL

### ■ Floor mounted

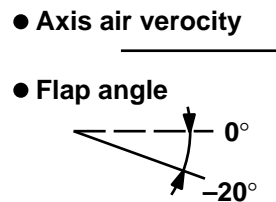
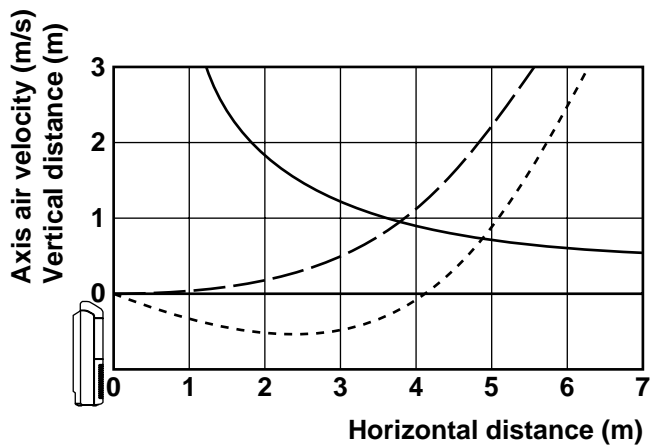
#### Cooling

Room air temp. : 27°C  
Fan speed : High



#### Heating

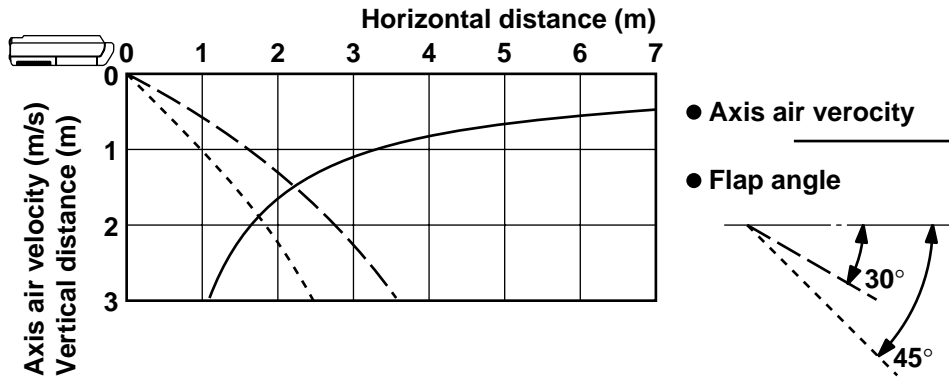
Room air temp. : 20°C  
Fan speed : High



■ Ceiling mounted

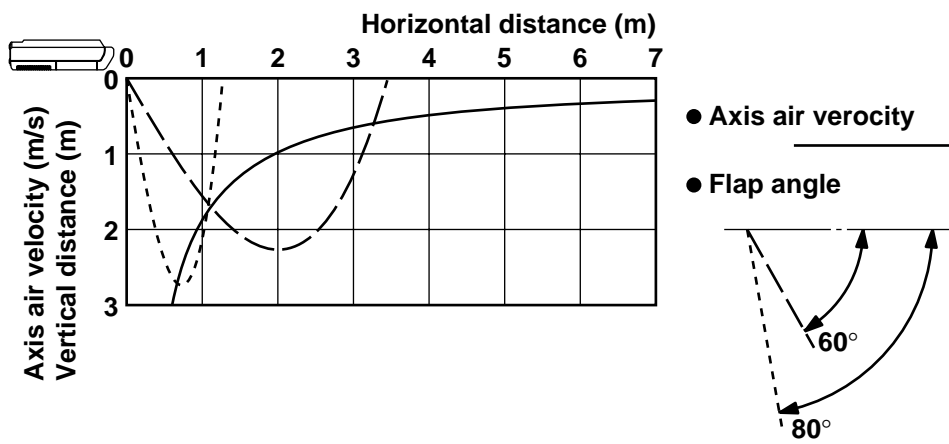
Cooling

Room air temp. : 27°C  
 Fan speed : High



Heating

Room air temp. : 20°C  
 Fan speed : High



### 5-3. Cooling Capacity

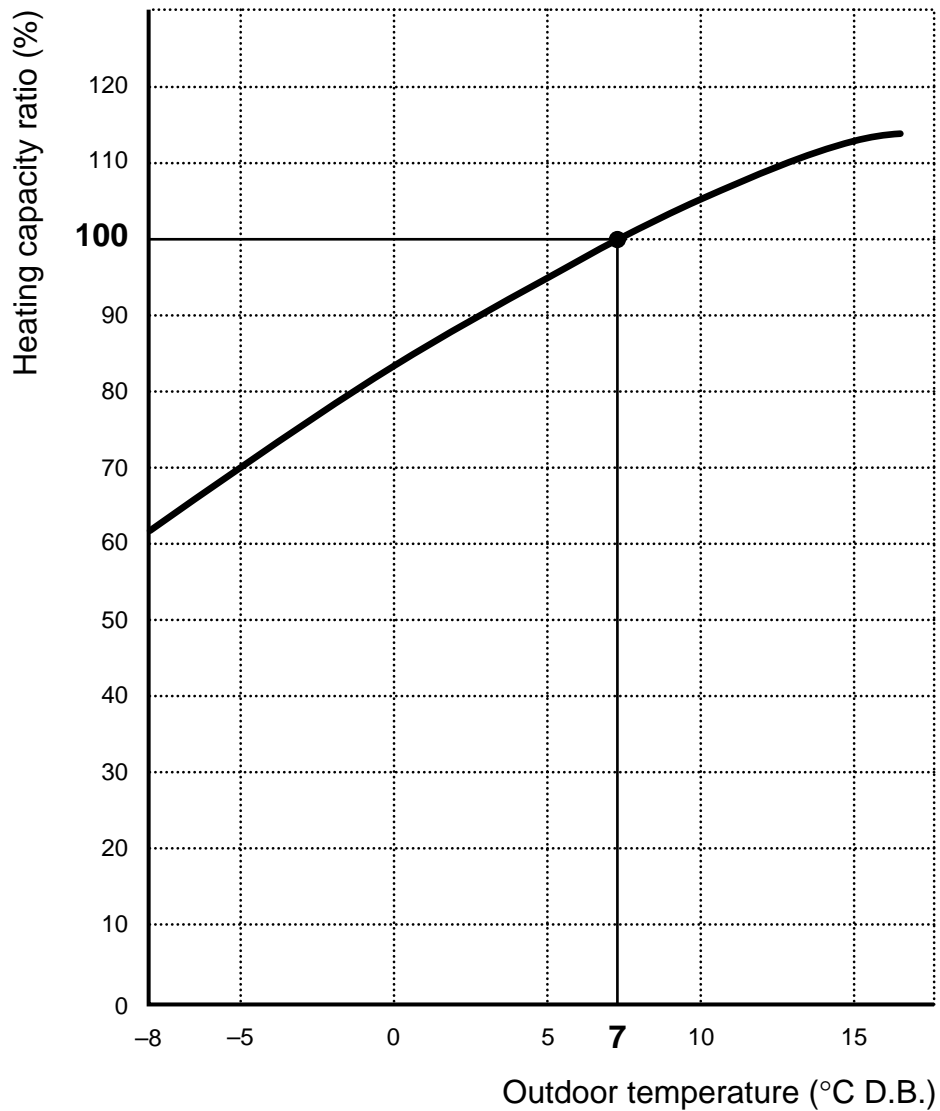
Indoor Unit **FC512HL**  
 Outdoor Unit **AE512SH**

240V Single Phase 50Hz

RATING CAPACITY		3.35 kW						
AIR FLOW RATE		700 m <sup>3</sup> /h						
EVAPORATOR		CONDENSER						
ENT. TEMP. °C		OUTDOOR AMBIENT TEMP. °C						
W.B.	D.B.		20	25	30	35	40	45
15		TC	3.38	3.23	3.08	2.93	2.76	2.54
		CM	0.90	0.97	1.04	1.12	1.22	1.32
	21	SHC	2.42	2.35	2.28	2.21	2.13	2.03
	23	SHC	2.77	2.70	2.63	2.56	2.48	2.38
	25	SHC	3.11	3.04	2.97	2.91	2.76	2.54
	27	SHC	3.38	3.23	3.08	2.93	2.76	2.54
	29	SHC	3.38	3.23	3.08	2.93	2.76	2.54
	31	SHC	3.38	3.23	3.08	2.93	2.76	2.54
17		TC	3.62	3.46	3.31	3.15	2.96	2.72
		CM	0.92	1.00	1.07	1.15	1.25	1.35
	21	SHC	2.07	1.99	1.92	1.86	1.77	1.67
	23	SHC	2.41	2.34	2.27	2.20	2.12	2.02
	25	SHC	2.76	2.69	2.62	2.55	2.47	2.37
	27	SHC	3.10	3.03	2.96	2.89	2.81	2.71
	29	SHC	3.45	3.38	3.31	3.15	2.96	2.72
	31	SHC	3.62	3.46	3.31	3.15	2.96	2.72
19		TC	3.85	3.69	3.52	# 3.35	3.15	2.90
		CM	0.95	1.03	1.10	1.18	1.29	1.39
	21	SHC	1.69	1.62	1.56	1.49	1.41	1.31
	23	SHC	2.04	1.97	1.90	1.83	1.75	1.65
	25	SHC	2.39	2.32	2.25	2.18	2.10	2.00
	27	SHC	2.73	2.66	2.59	2.53	2.45	2.35
	29	SHC	3.08	3.01	2.94	2.87	2.79	2.69
	31	SHC	3.43	3.36	3.29	3.22	3.14	2.90
21		TC	4.08	3.91	3.73	3.55	3.34	3.07
		CM	0.98	1.06	1.13	1.22	1.32	1.43
	23	SHC	1.67	1.60	1.53	1.46	1.39	1.29
	25	SHC	2.01	1.94	1.88	1.81	1.73	1.63
	27	SHC	2.36	2.29	2.22	2.16	2.08	1.98
	29	SHC	2.71	2.64	2.57	2.50	2.42	2.33
	31	SHC	3.05	2.98	2.92	2.85	2.77	2.67
23		TC	4.33	4.15	3.95	3.73	3.49	3.25
		CM	1.00	1.09	1.16	1.25	1.36	1.46
	25	SHC	1.62	1.55	1.49	1.41	1.33	1.25
	27	SHC	1.97	1.90	1.83	1.76	1.67	1.59
	29	SHC	2.31	2.25	2.18	2.10	2.02	1.94
	31	SHC	2.66	2.59	2.52	2.45	2.37	2.29

TC : Total Cooling Capacity (kW)  
 SHC : Sensible Heat Capacity (kW)  
 CM : Compressor Input (kW)

## 5-4. Heating Capacity



### NOTE

- 1) ●... Point of Rating condition  
Black dot in the chart indicate the following rating condition.  
Indoor : 20°C D.B.  
Outdoor : 7°C D.B. / 6°C W.B.
- 2) Above characteristics indicate instantaneous operation, which does not take into account defrost operation.
- 3) Fan speed : High
- 4) Because this air conditioner heats a room by drawing in the heat of the outside air (heat pump system), the heating efficiency will fall off when the outdoor temperature is very low. If sufficient heat cannot be obtained with this air conditioner, use another heating appliance in conjunction with it.



# 6. ELECTRICAL DATA

## 6-1. Electrical Characteristics

Indoor Unit     **FC512HL**  
 Outdoor Unit   **AE512SH**

### COOLING

			Indoor Unit	Outdoor Unit		Complete Unit
			Fan Motor	Fan Motor	Compressor	
Performance at			220 – 240V ~ 50Hz			
Rating Conditions	Running Amps.	A	0.28 / 0.29	0.30 / 0.32	5.3 / 5.4	5.9 / 6.0
	Power Input	kW	0.060 / 0.070	0.066 / 0.076	1.13 / 1.18	1.26 / 1.33
Full Load Conditions	Running Amps.	A	0.28 / 0.29	0.30 / 0.32	6.8 / 6.6	7.4 / 7.2
	Power Input	kW	0.060 / 0.070	0.066 / 0.076	1.43 / 1.46	1.56 / 1.61

Rating Conditions : Indoor Air Temperature 27°C D.B. / 19°C W.B.  
 Outdoor Air Temperature 35°C D.B.

Full Load Conditions : Indoor Air Temperature 32°C D.B. / 23°C W.B.  
 Outdoor Air Temperature 43°C D.B.

### HEATING

			Indoor Unit	Outdoor Unit		Complete Unit
			Fan Motor	Fan Motor	Compressor	
Performance at			220 – 240V ~ 50Hz			
Rating Conditions	Running Amps.	A	0.28 / 0.29	0.30 / 0.32	5.5 / 5.6	6.1 / 6.2
	Power Input	kW	0.060 / 0.070	0.066 / 0.076	1.17 / 1.22	1.30 / 1.37
Full Load Conditions	Running Amps.	A	0.28 / 0.29	0.30 / 0.32	8.0 / 7.7	8.6 / 8.3
	Power Input	kW	0.060 / 0.070	0.066 / 0.076	1.71 / 1.68	1.84 / 1.83

Rating Conditions : Indoor Air Temperature 20°C D.B.  
 Outdoor Air Temperature 7°C D.B. / 6°C W.B.

Full Load Conditions : Indoor Air Temperature 27°C D.B.  
 Outdoor Air Temperature 24°C D.B. / 18°C W.B.

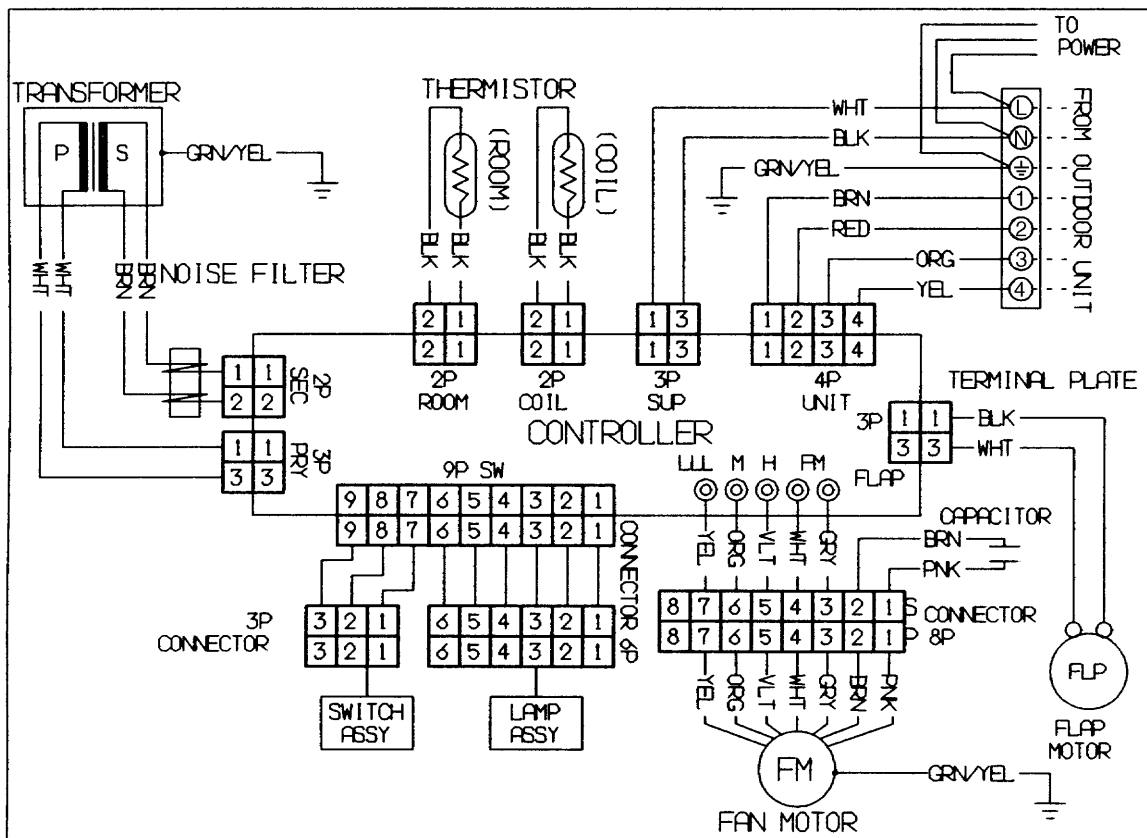
## 6-2. Electric Wiring Diagrams

Indoor Unit FC512HL



**WARNING**

To avoid electrical shock hazard, be sure to disconnect power before checking, servicing and/or cleaning any electrical parts.

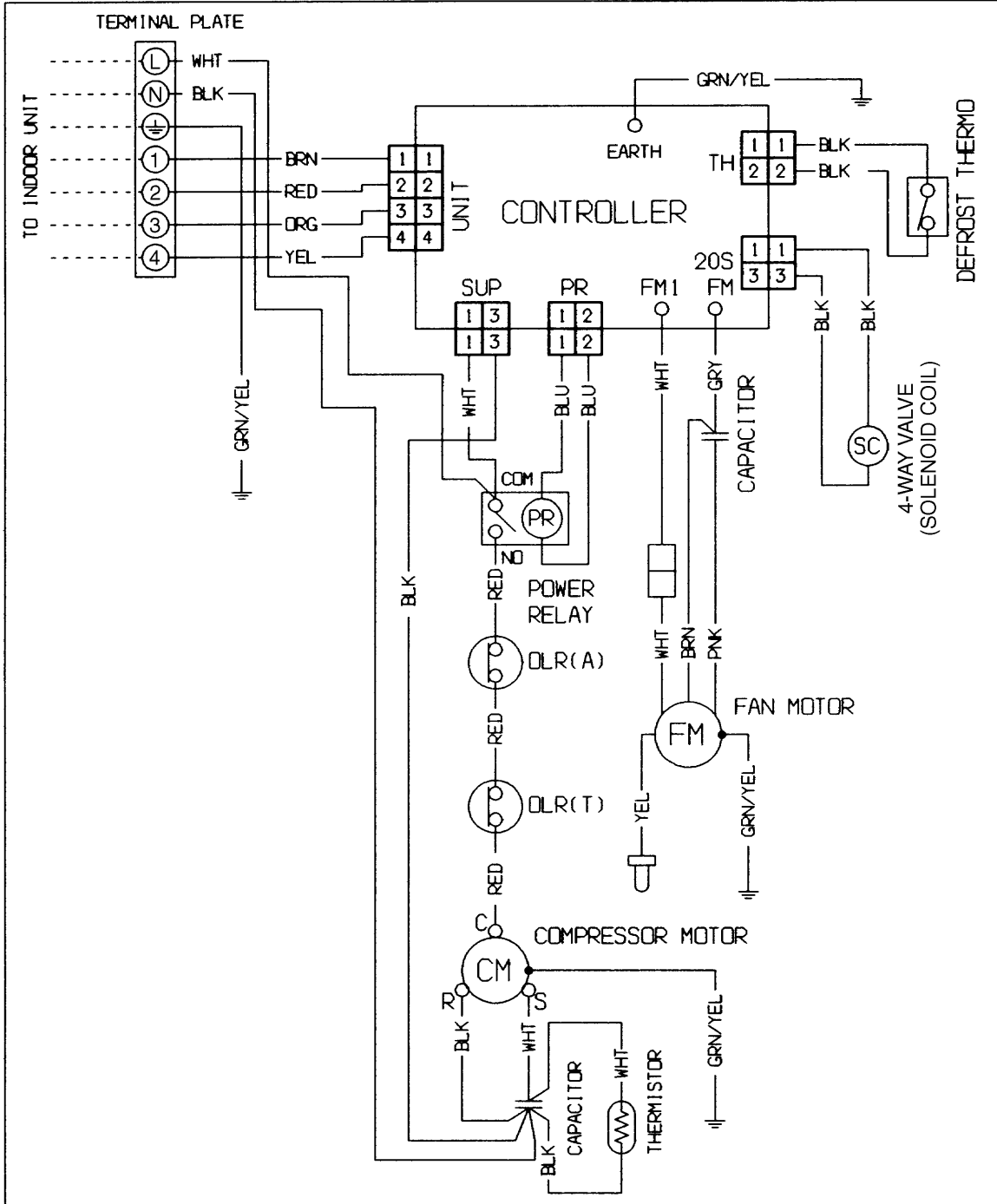


8512-5253-445XX-0



**WARNING**

To avoid electrical shock hazard, be sure to disconnect power before checking, servicing and/or cleaning any electrical parts.



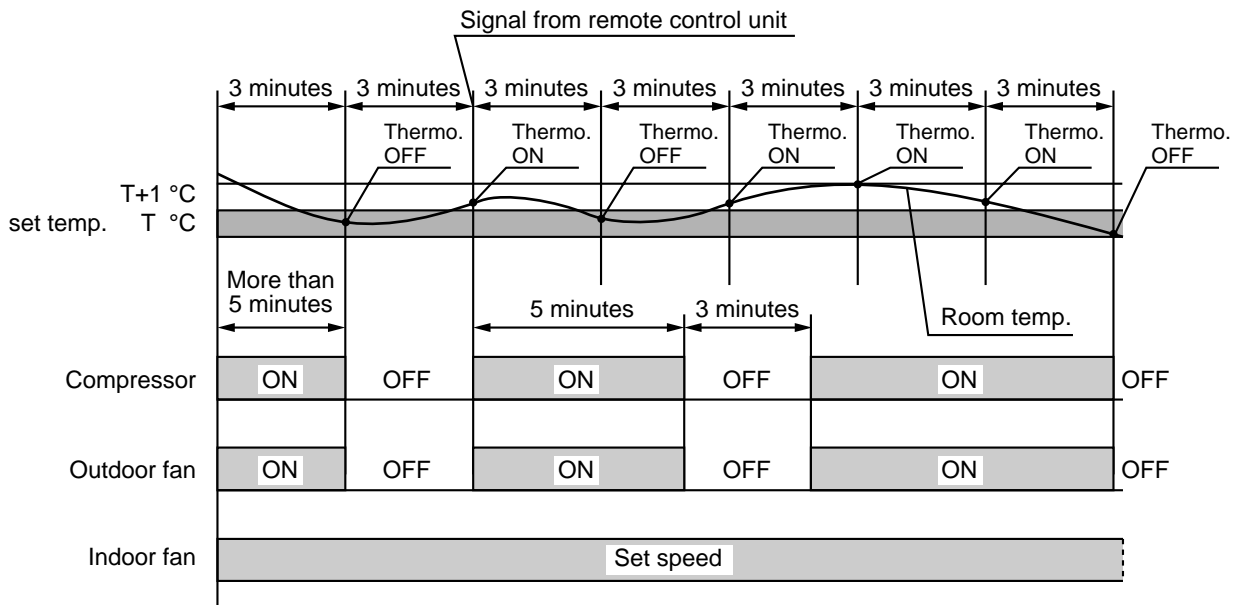
851-2-5253-359-XX-1

# 7. FUNCTION

## 7-1. Room Temperature Control

### ■ Cooling

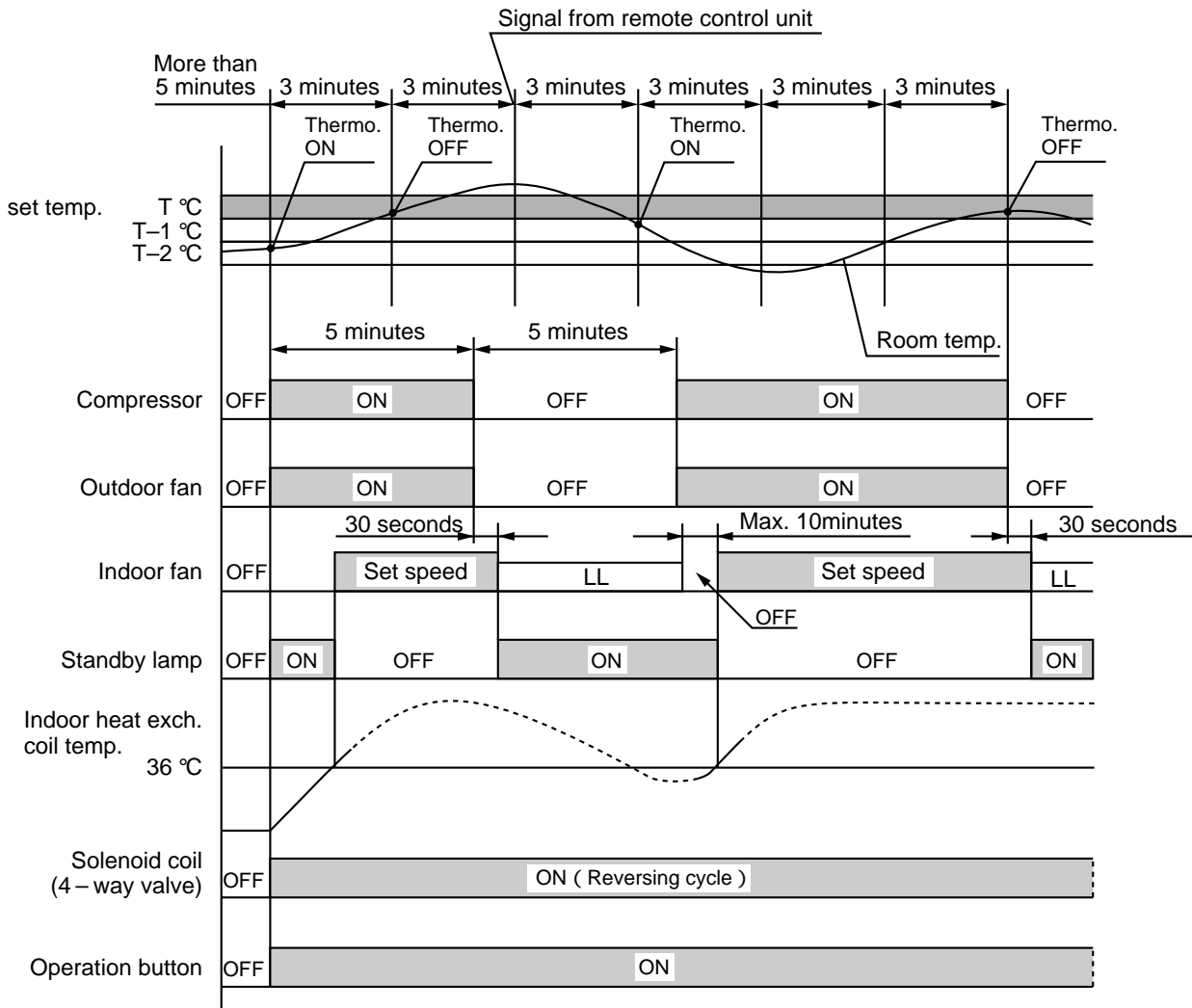
- Room temperature control is obtained by cycling the compressor ON and OFF under control of the room temperature sensor in the remote control unit.
- The room temperature (and other information) is transmitted every 3 minutes by the remote control unit to the controller in the indoor unit.



- The control circuit will not attempt to turn the compressor ON until the compressor has been OFF for at least 3 minutes. To protect the compressor from stalling out when trying to start against the high side refrigerant pressure, the control circuit has a built-in automatic time delay to allow the internal pressure to equalize.
- As a protective measure, the control circuit switches the compressor OFF after 5 minutes or more of compressor operation.
- Thermo. ON : When the room temperature is above T + 1°C (T°C is set temperature).  
Compressor → ON
- Thermo. OFF : When the room temperature is equal to or below set temperature T°C.  
Compressor → OFF

## ■ Heating

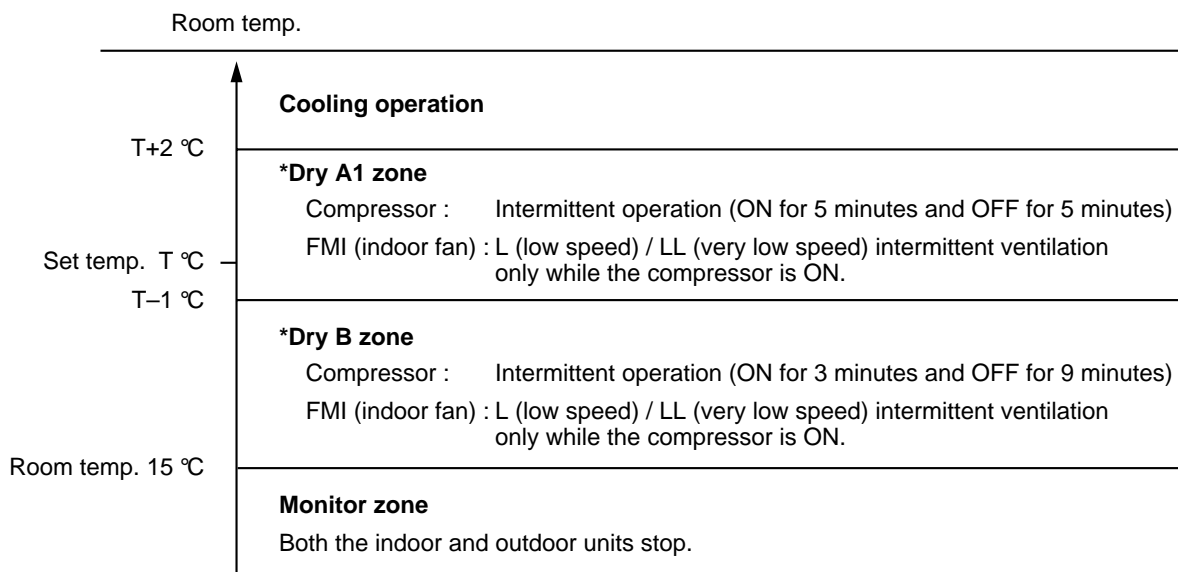
- Room temperature control is obtained by cycling the compressor ON and OFF under control of the room temperature sensor in the remote control unit.
- The room temperature (and other information) is transmitted every 3 minutes by the remote control unit to the controller in the indoor unit.



- The control circuit will not attempt to turn the compressor ON until the compressor has been OFF for at least 5 minutes. To protect the compressor from stalling out when trying to start against the high side refrigerant pressure, the control circuit has a built-in automatic time delay to allow the internal pressure to equalize.
- As a protective measure, the control circuit switches the compressor OFF after 5 minutes or more of compressor operation.
- Thermo. ON : When the room temperature is below  $T - 1^\circ\text{C}$  ( $T^\circ\text{C}$  is set temperature).  
Compressor  $\rightarrow$  ON
- Thermo. OFF : When the room temperature is equal to or above set temperature  $T^\circ\text{C}$ .  
Compressor  $\rightarrow$  OFF

## 7-2. Dry Operation (Dehumidification)

- Dry operation uses the ability of the cooling cycle to remove moisture from the air, but by running at low level to dehumidify without greatly reducing the room temperature. The air conditioner repeats the cycle of turning ON and OFF automatically as shown in the chart below according to the room temperature.



### NOTE

- Intermittent ventilation occurs by switching the indoor fan speed between L ↔ LL.
- Dry operation does not occur when the room temperature is under 15°C, which is the monitor zone.
- When the compressor stops, the indoor fan stops as well.

## 7-3. Automatic Switching between Cooling and Heating

- When AUTO mode is selected, the microprocessor calculates the difference between the set temperature and the room temperature, and automatically switches to COOLING or HEATING mode to maintain the desired temperature.

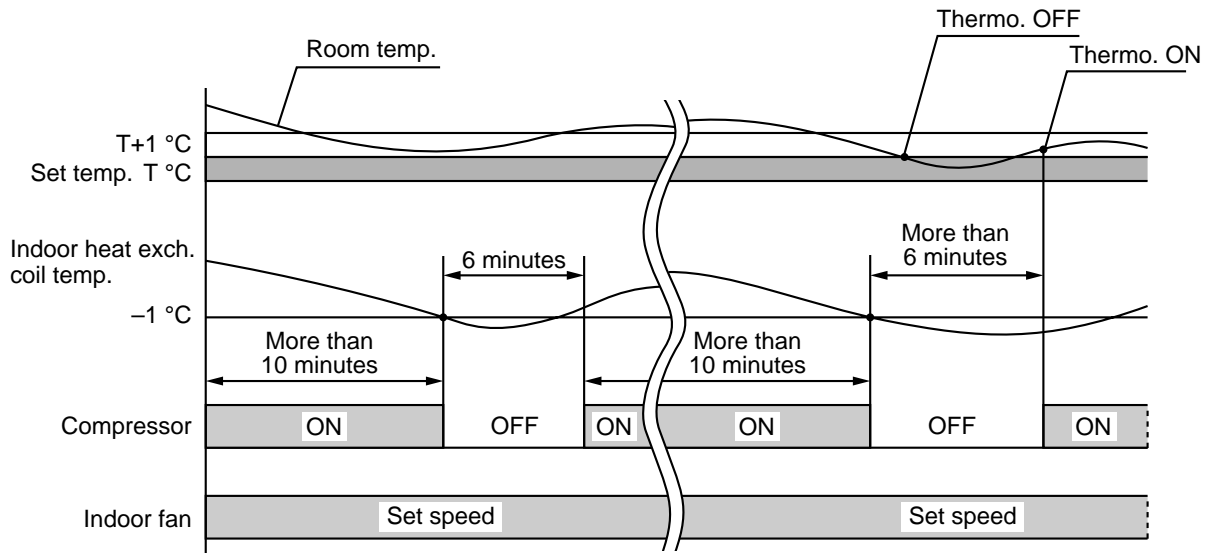
Room temp.  $\geq$  Set temp. → COOL

Room temp.  $<$  Set temp. → HEAT

This means that if the room temperature is **higher than** or **equal to** the set temperature, **COOLING** operation begins. If the room temperature is **lower than** the set temperature, **HEATING** operation begins.

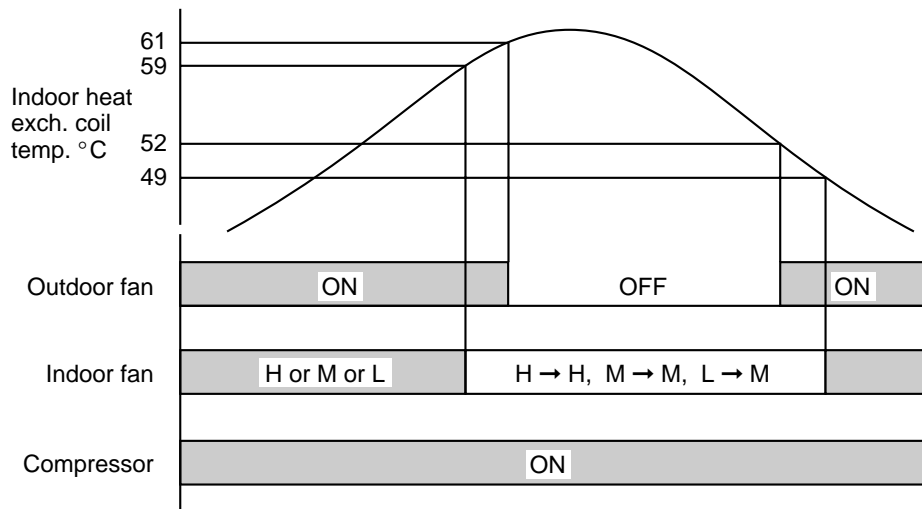
## 7-4. Freeze Prevention (Cooling)

- This function prevents freezing of the indoor heat exchange coil.
- When the compressor has been running for 10 minutes or more and the temperature of the indoor heat exchange coil falls below  $-1^{\circ}\text{C}$ , the control circuit stops the compressor for at least 6 minutes. The compressor does not start again until the temperature rises above  $8^{\circ}\text{C}$  or 6 minutes has elapsed.



## 7-5. Overload Prevention (Heating)

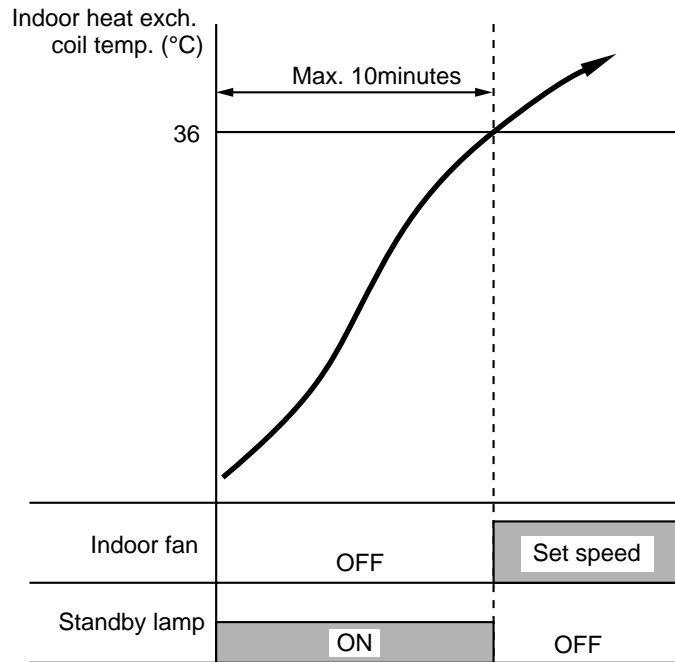
- This function prevents overheating of the indoor heat exchange coil.
- When the temperature of the indoor heat exchange coil rises above **59°C**, and if the indoor fan is L (low speed), then the fan speed changes from L (low speed) to M (medium speed).
- When the temperature of the indoor heat exchange coil rises above **61°C**, the outdoor fan stops.





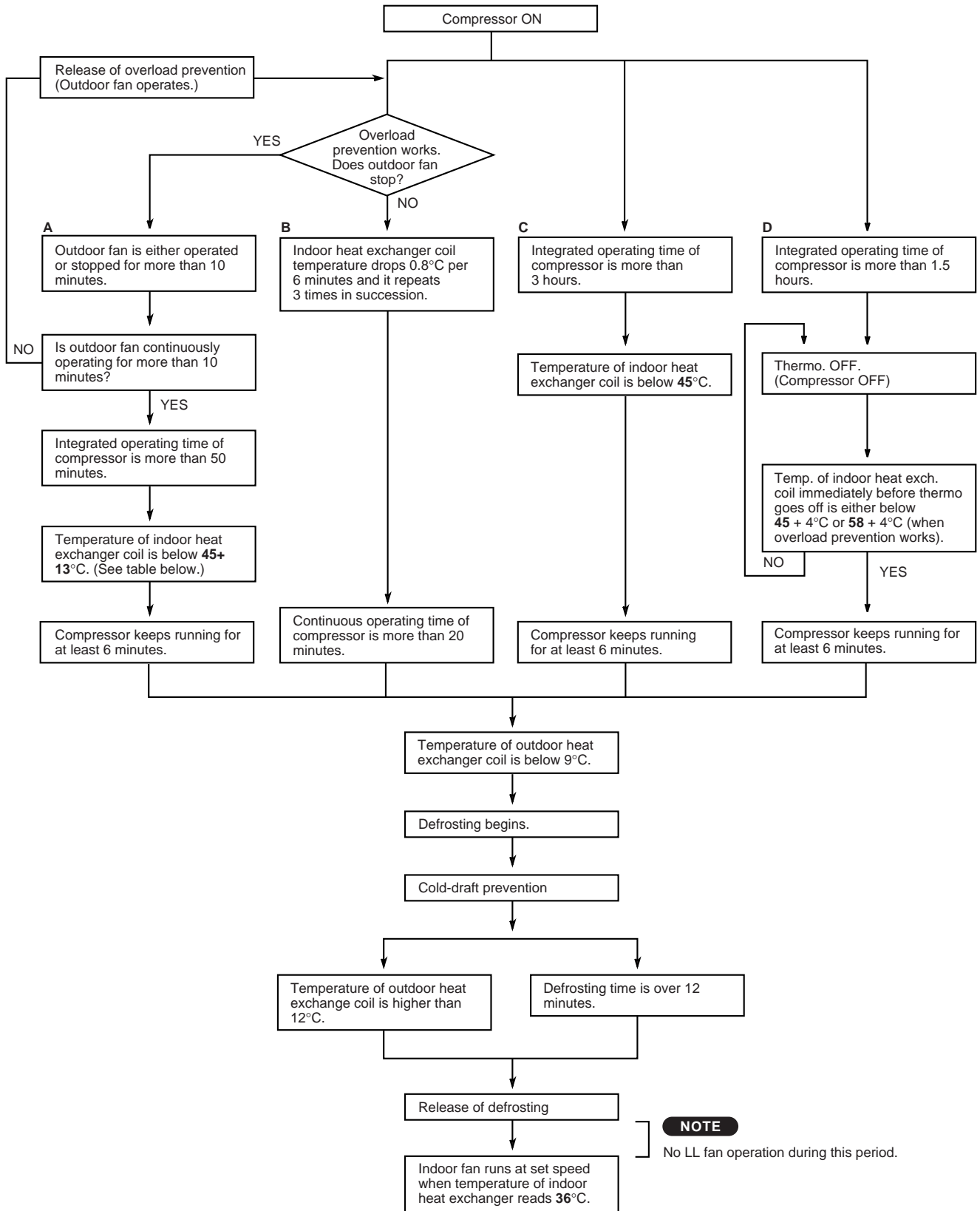
## 7-6. Cold Draft Prevention (Heating)

- This function controls indoor fan speed so a strong draft of cold air will not blow out before the indoor heat exchange coil have sufficiently warmed up.
- STANDBY lamp on front of the indoor unit lights up when this function is working.
- when 10 minutes has elapsed, the fan speed is automatically switched to set speed regardless of indoor heat exchange coil temperature.

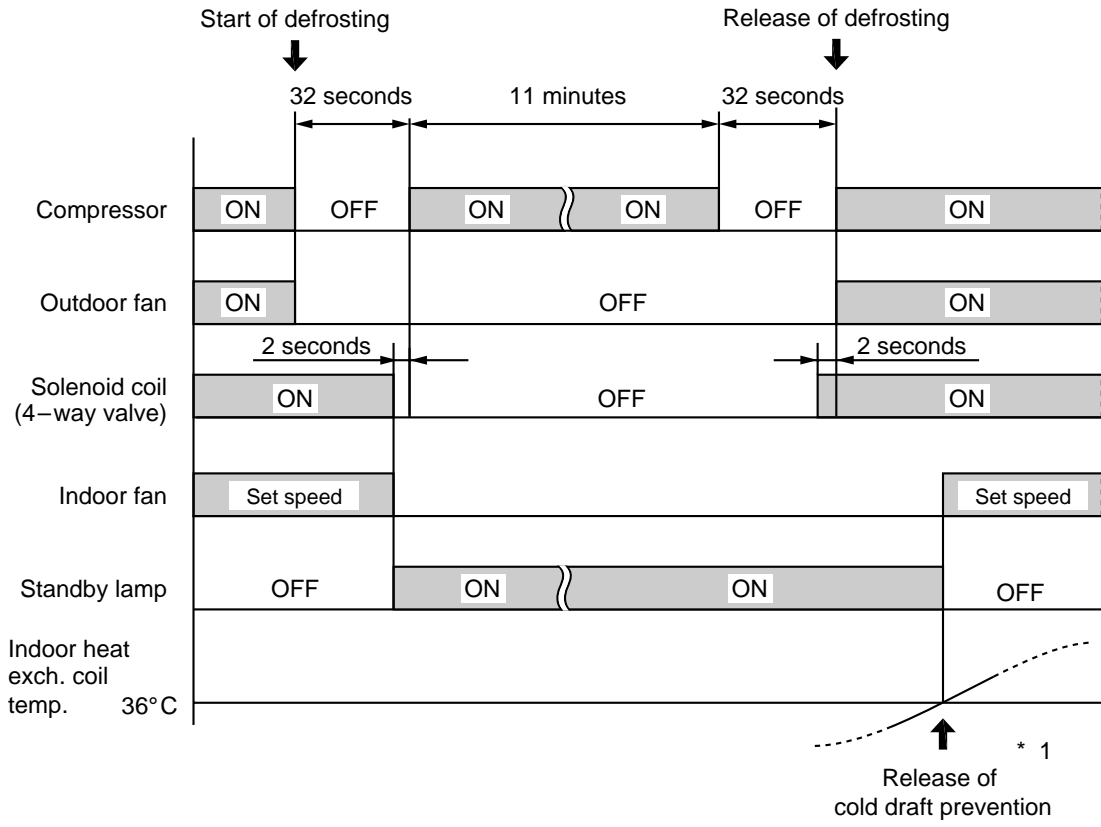


# 7-7. Defrosting Operation (Heating)

## ■ Defrosting Flowchart



■ Defrosting Mode Timing Chart



**NOTE**

\*1: Refer to "8-6 Cold Draft Prevention".

## 8. TROUBLESHOOTING

### 8-1. Check before and after troubleshooting

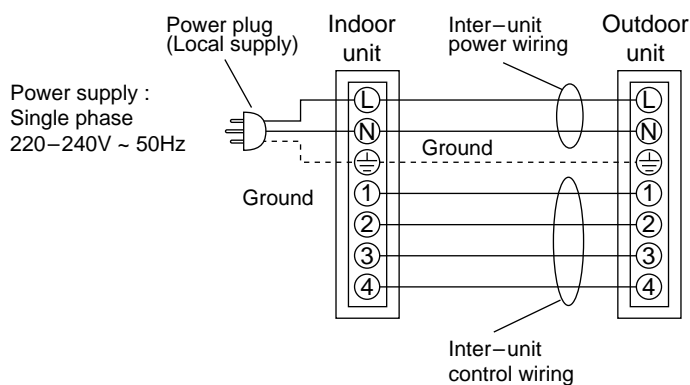


#### WARNING

Hazardous voltage can cause **ELECTRIC SHOCK** or **DEATH**. Disconnect power or turn off circuit breaker before you start checking or servicing.

#### 8-1-1. Check power supply wiring.

- Check that power supply wires are correctly connected to terminals **L** and **N** on the terminal plate in the indoor unit.



#### 8-1-2. Check inter-unit wiring.

- Check that inter-unit wiring is correctly connected to the outdoor unit from the indoor unit.

#### 8-1-3. Check power supply.

- Check that voltage is in specified range ( $\pm 10\%$  of the rating).
- Check that power is being supplied.

#### 8-1-4. Check lead wires and connectors in indoor and outdoor units.

- Check that coating of lead wires is not damaged.
- Check that lead wires and connectors are firmly connected.
- Check that wiring is correct.

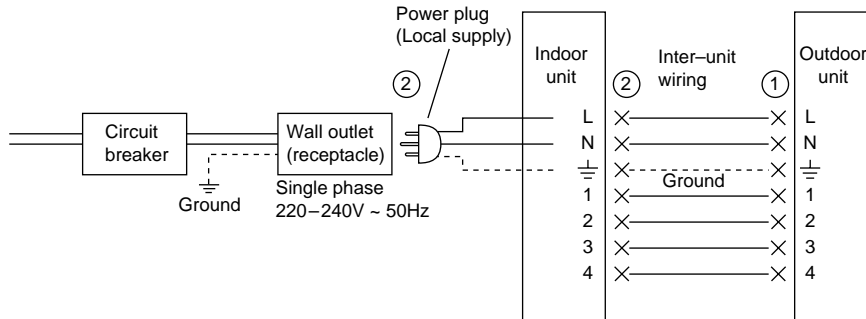
## 8-2. Air conditioner does not operate.

### 8-2-1. Circuit breaker trips (or fuse blows).

A. When the circuit breaker is set to ON, it is tripped soon. (Resetting is not possible.)

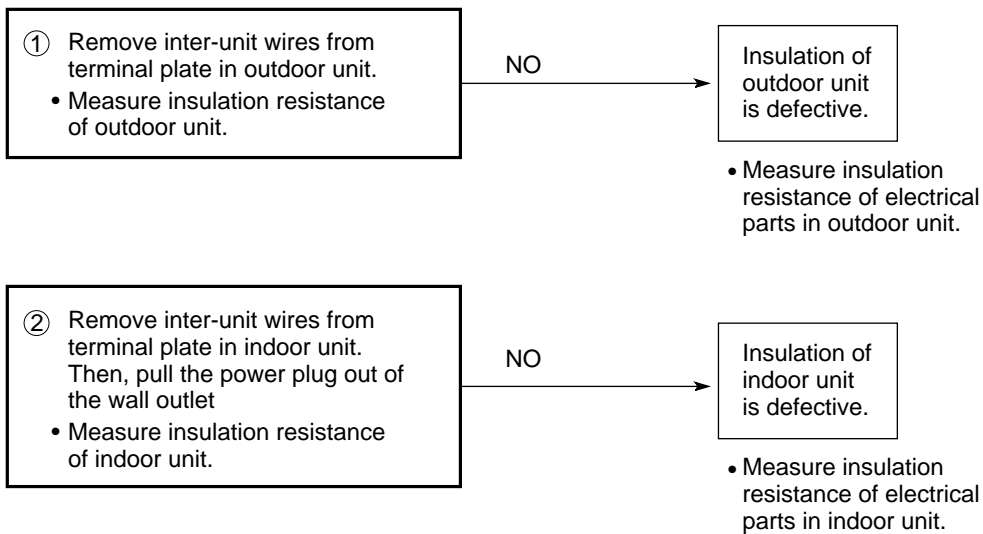
- There is a possibility of ground fault.
- Check insulation resistance.

If resistance value is  $2M\Omega$  or less, insulation is defective (“NO”).



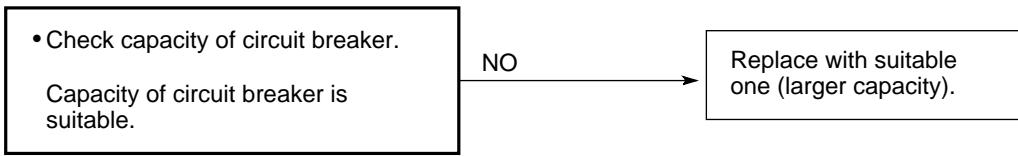
**WARNING**

\* Set circuit breaker to OFF.

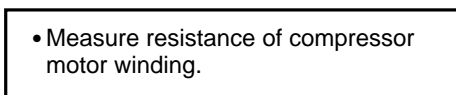
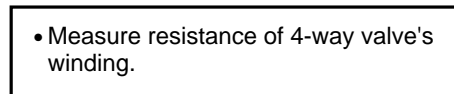
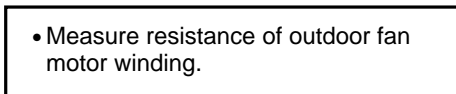


**B. Circuit breaker trips in several minutes after turning the air conditioner on.**

- There is a possibility of short circuit.

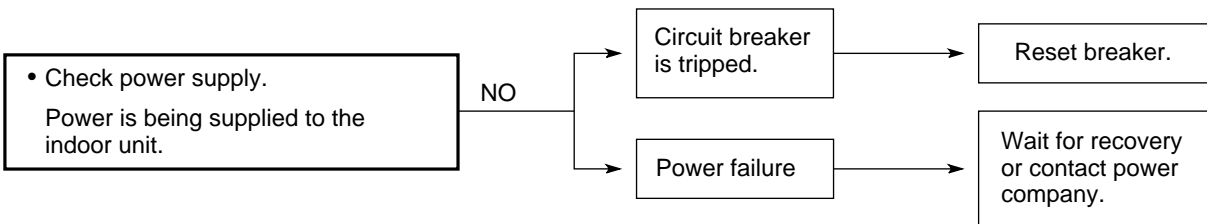


In case of Heating operation :

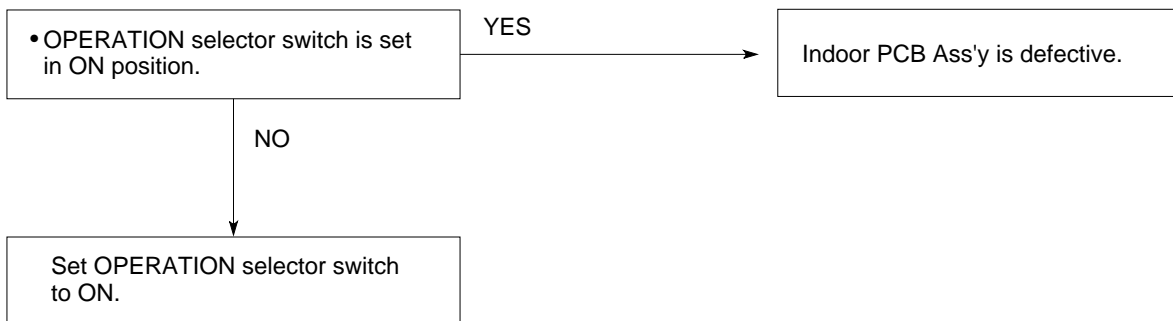


**8-2-2. Neither indoor nor outdoor unit runs.**

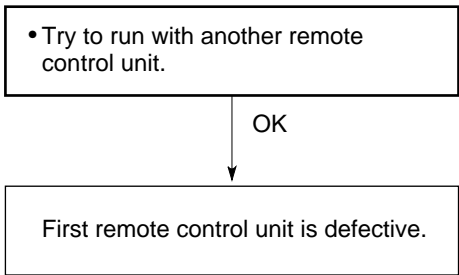
**A. Power is not supplied.**



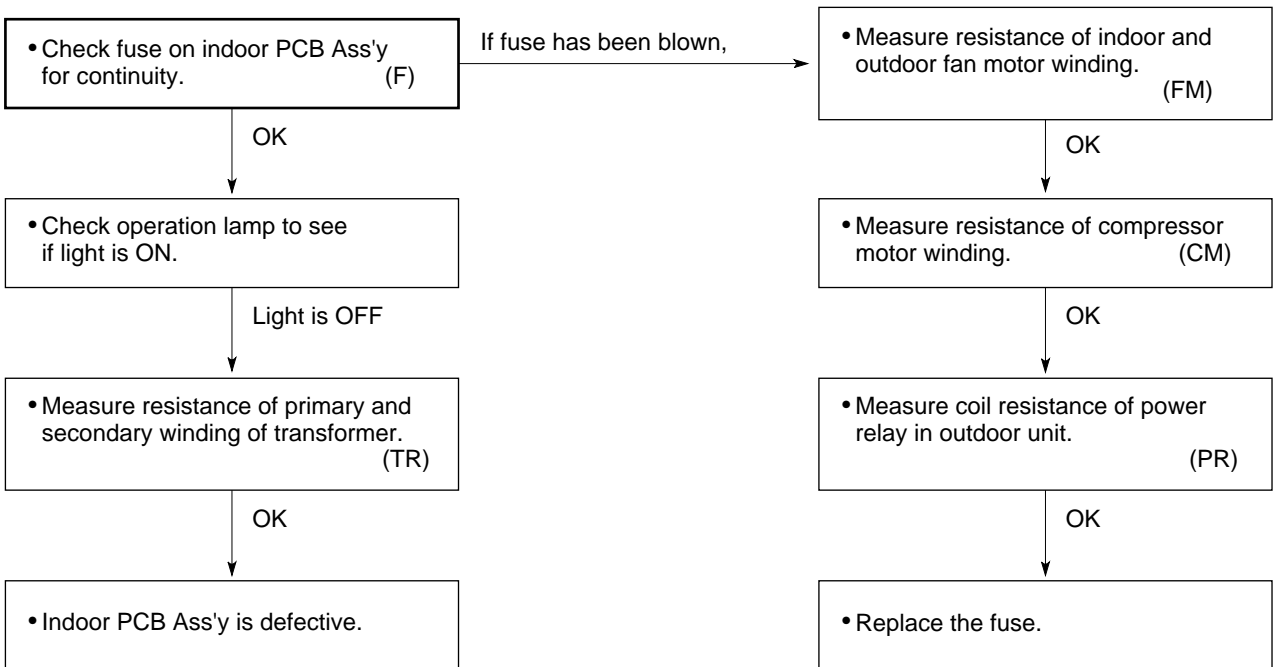
**B. Check "OPERATION selector" switch in the indoor unit.**



**C. Check remote control unit.**



**D. Check fuse on the indoor PCB Ass'y.**



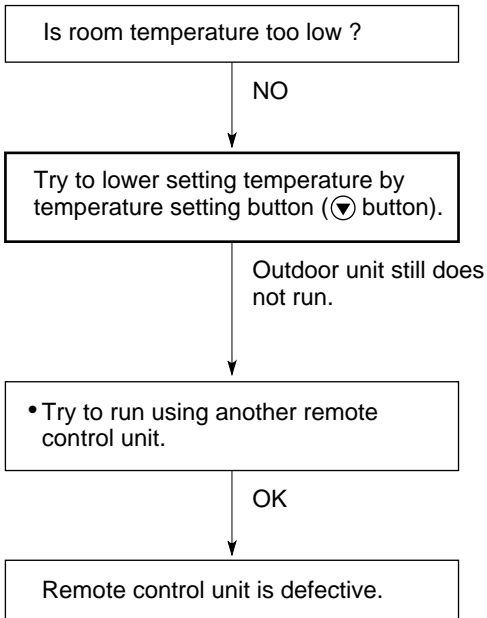
**E. Check TIMER on the remote control unit.**



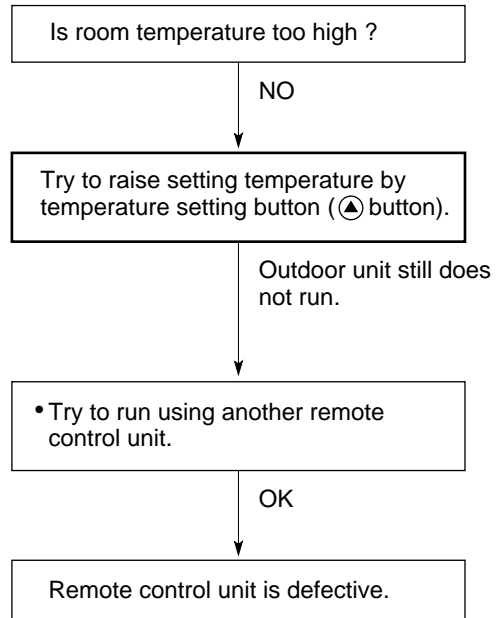
### 8-2-3. Only outdoor unit does not run.

#### A. Check setting temperature.

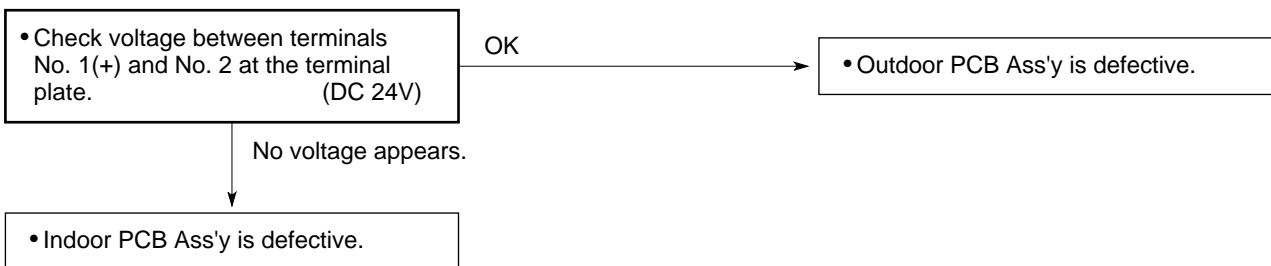
COOL



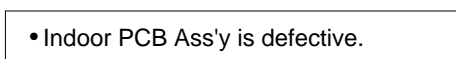
HEAT



#### B. Check PCB Ass'y in either indoor or outdoor unit.



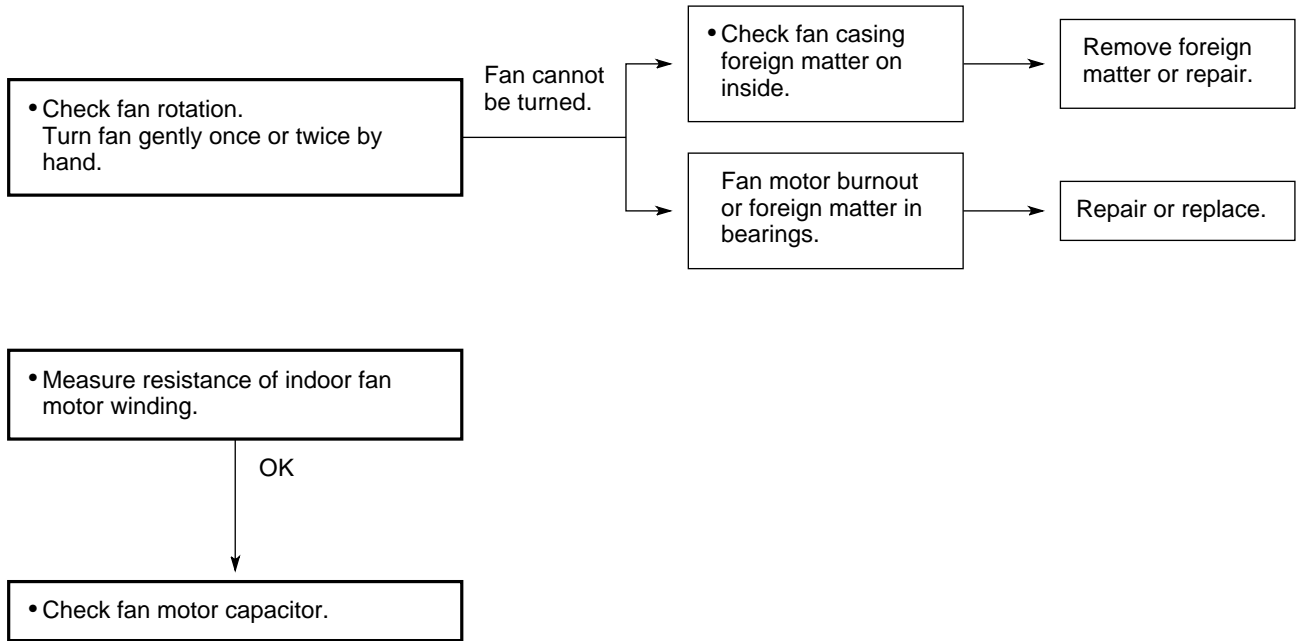
### 8-2-4. Only Indoor unit does not run.



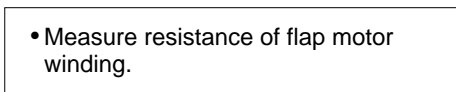


### 8-3. Some part of air conditioner does not operate.

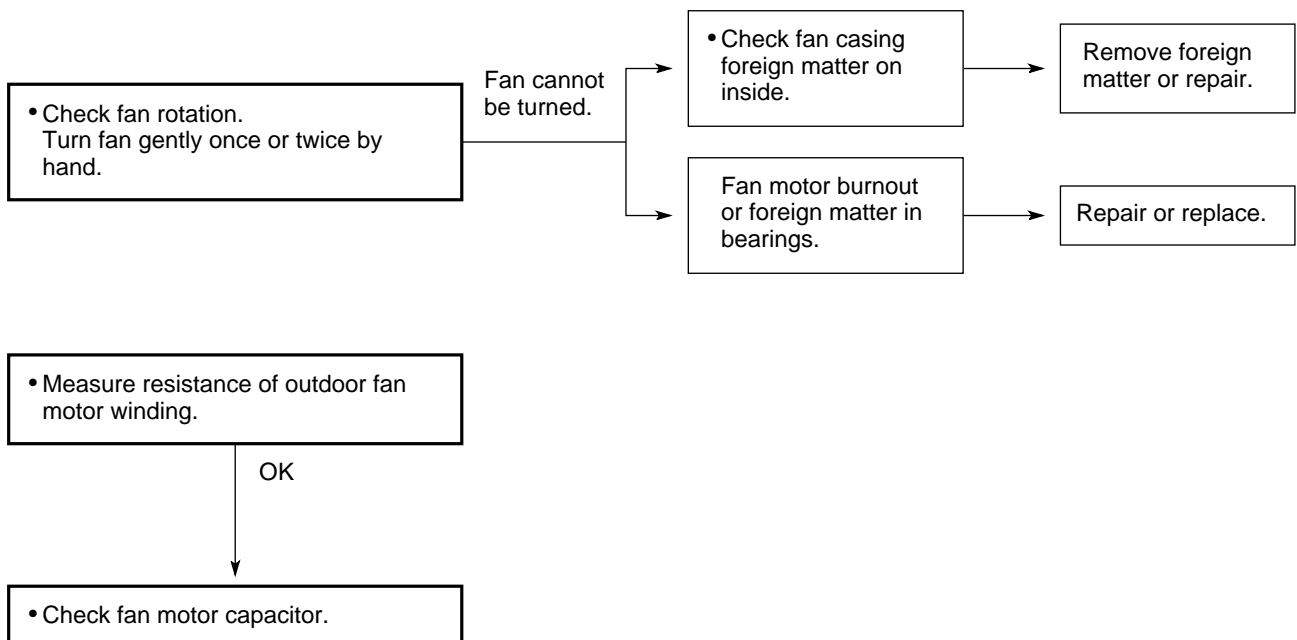
#### 8-3-1. Only indoor fan does not run.



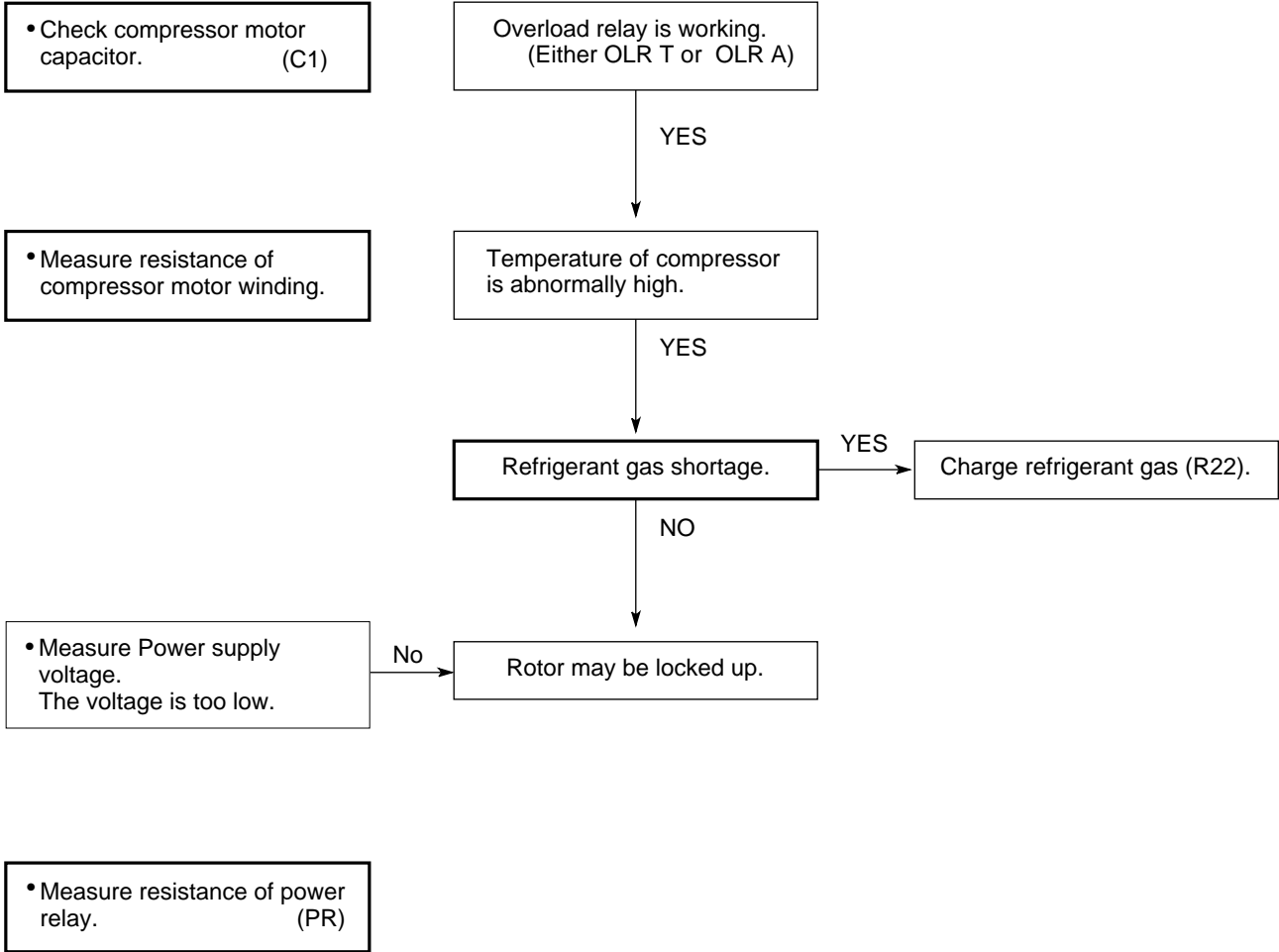
#### 8-3-2. Only flap motor does not run.



#### 8-3-3. Only outdoor fan does not run.



**8-3-4. Only compressor does not run.**



## 8-4. Air conditioner operates, but abnormalities are observed.

### 8-4-1. Operation does not switch from HEAT to COOL (or COOL to HEAT).

• Remote control unit may be defective.

Receiver in lamp Ass'y may be defective.

• Measure resistance of 4-way valve's winding.

#### COOL → HEAT

• Check voltage between terminals No. 1(+) and No. 3 at the terminal plate. (DC 24V)

OK

Outdoor PCB Ass'y is defective.

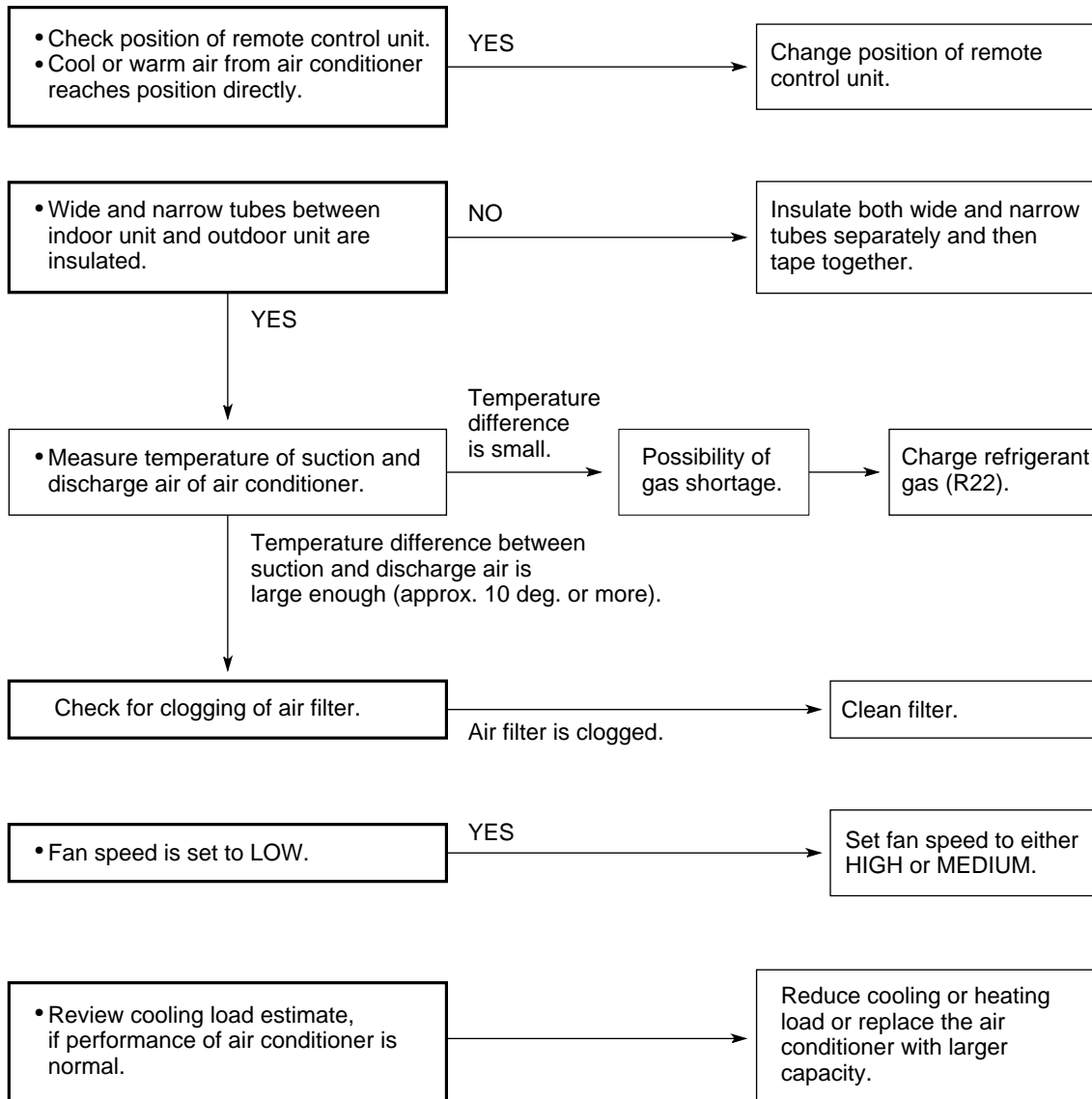
No voltage appears.

• Indoor PCB Ass'y is defective.

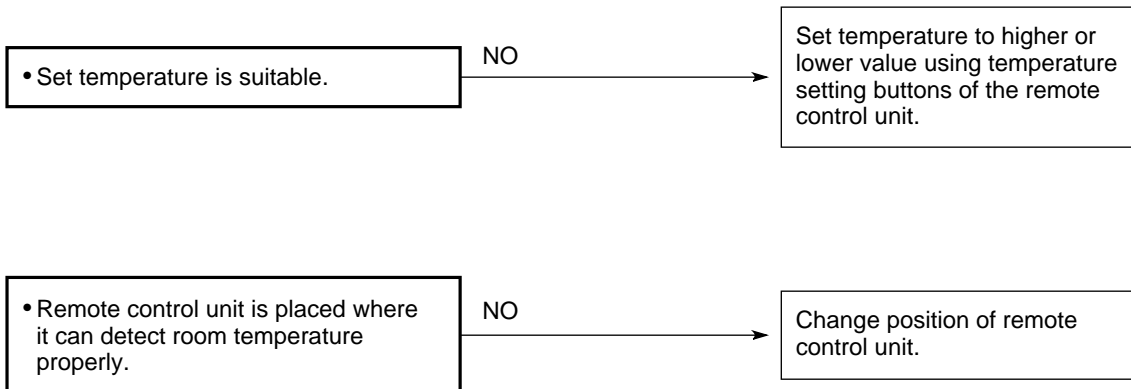
#### HEAT → COOL

• Check voltage between terminals No. 1(+) and No. 3 at the terminal plate. (0V)

### 8-4-2. Poor cooling or heating.

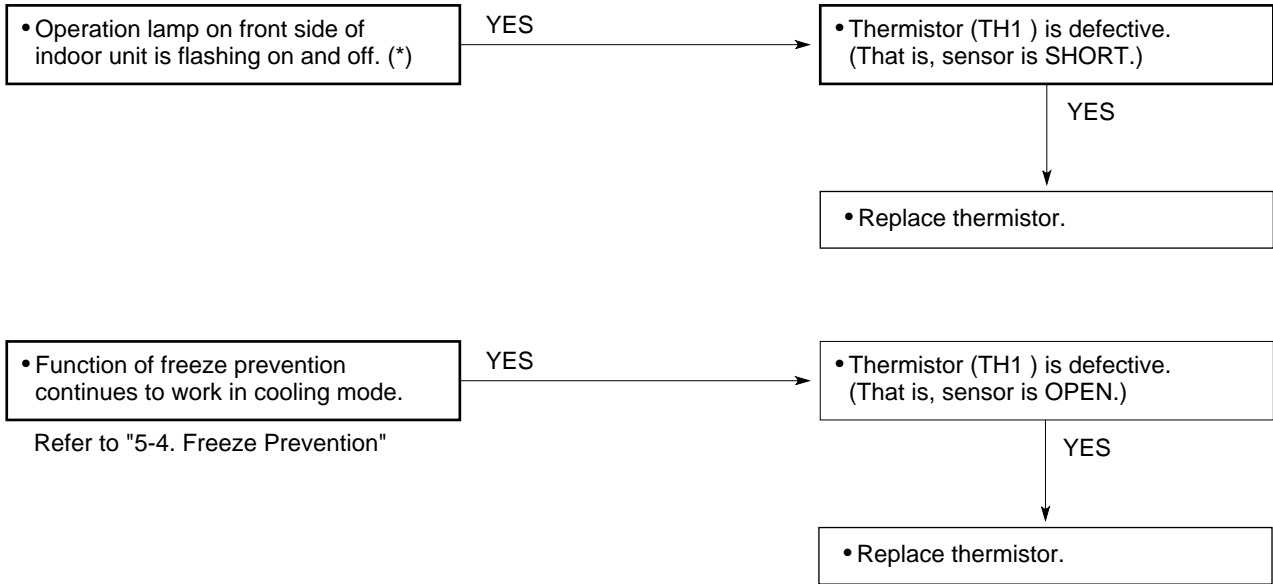


### 8-4-3. Excessive cooling or heating.



## 8-5. If a sensor is defective.

### 8-5-1. Indoor coil temp. thermistor (TH1) is defective.



#### **NOTE** Alarm Signal (\*)

Operation lamp on the front side of the indoor unit will flash on and off when the indoor coil thermistor is defective. (That is, sensor is SHORT). At the same time the outdoor unit will stop. Indoor unit will operate only for ventilation.

### 8-5-2. Room temp. thermistor (TH2) is defective.

#### A. Open

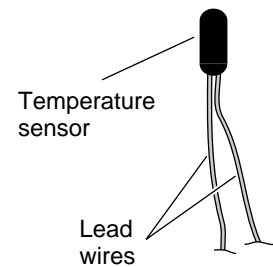
When thermistor opens, the air conditioner will be in the following conditions as the controller tries to detect extremely low room temperature.

- In Cooling mode: The air conditioner soon stops and will not start again. (Thermo.OFF) Neither outdoor fan nor compressor runs.
- In Heating mode: The air conditioner continues to operate (Thermo.ON). Both the outdoor fan and compressor do not stop. As a result, the room becomes too warm.

#### B. Short

When thermistor is short, the air conditioner will be in the following conditions as the controller tries to detect extremely high room temperature.

- In Cooling mode: The air conditioner continues to operate (Thermo.ON). Both the outdoor fan and compressor do not stop. As a result, the room becomes too cold.
- In Heating mode: The air conditioner soon stops and will not start again (Thermo.OFF). Neither outdoor fan nor compressor runs.



**Thermistor Structure**

#### **NOTE**

#### Definition of Open or Short Circuit of Sensor (Thermistor)

Open ... A lead wire is broken or disconnected or the circuit inside the temperature sensor is open .

Short ... The protective cover of a lead wire has been damaged, and the exposed wire is touching another metal part, or both lead wires have become exposed and are touching each other. Alternatively, the circuit inside the temperature sensor is closed.

# 9. CHECKING ELECTRICAL COMPONENTS

## 9-1. Measurement of Insulation Resistance

- The insulation is in good condition if the resistance exceeds  $2M\Omega$ .

### 9-1-1. Power Supply Wires

Clamp the grounding terminal of the power plug with a lead clip of the insulation resistance tester and measure the resistance by placing a probe on either of the two power terminals. (Fig. 1)

Then, also measure the resistance between the grounding and other power terminals. (Fig. 1)

### 9-1-2. Indoor Unit

Clamp an aluminum plate fin or copper tube with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on each terminal screw where power supply lines are connected on the terminal plate. (Fig. 2)

### 9-1-3. Outdoor Unit

Clamp an aluminum plate fin or copper tube with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on each terminal screw on the terminal plate. (Fig. 2)  
Note that the ground line terminal should be skipped for the check.

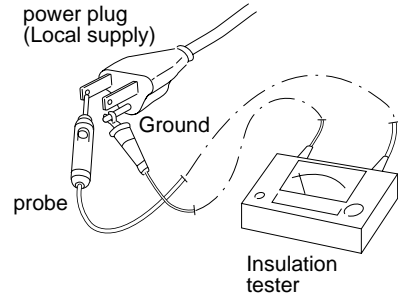
### 9-1-4. Measurement of Insulation Resistance for Electrical Parts

Disconnect the lead wires of the desired electric part from terminal plate, capacitor, etc. Similarly disconnect the connector. Then measure the insulation resistance. (Figs. 3 and 4)

**NOTE**

Refer to Electric Wiring Diagram.

If the probe cannot enter the poles because the hole is too narrow then use a probe with a thinner pin.



**NOTE**

The shape of the power plug may differ from that of the air conditioner which you are servicing.

Fig. 1

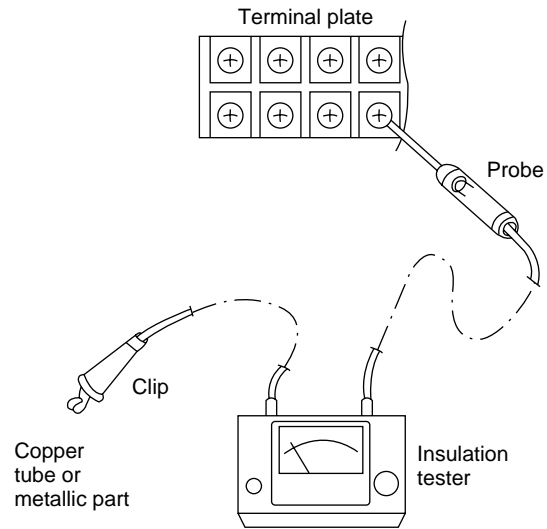


Fig. 2

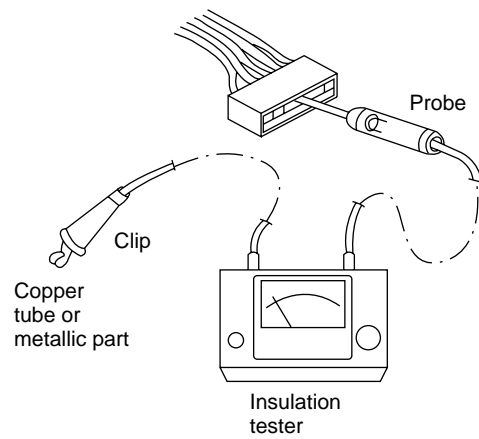


Fig. 3

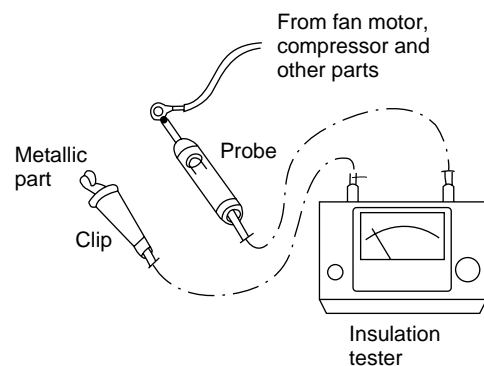


Fig. 4

## 9-2. Checking Continuity of Fuse on PCB Ass'y

- Remove the PCB Ass'y from the electrical component box. Then pull out the fuse from the PCB Ass'y. (Fig. 5)
- Check for continuity using a multimeter as shown in Fig. 6.

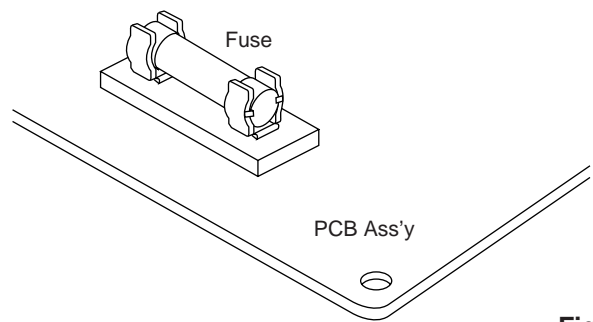


Fig. 5

## 9-3. Checking Motor Capacitor

Remove the lead wires from the capacitor terminals, and then place a probe on the capacitor terminals as shown in Fig. 7. Observe the deflection of the pointer, setting the resistance measuring range of the multimeter to the maximum value.

The capacitor is "good" if the pointer bounces to a great extent and then gradually returns to its original position.

The range of deflection and deflection time differ according to the capacity of the capacitor.

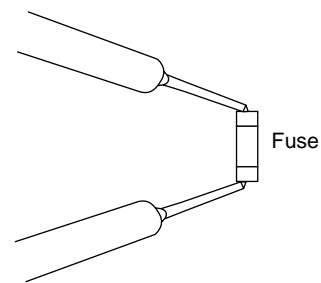


Fig. 6

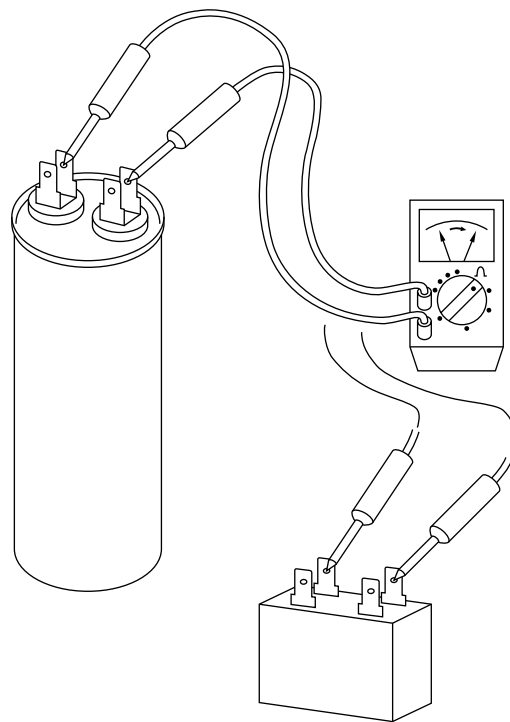


Fig. 7

## 10. DISASSEMBLY PROCEDURE FOR INDOOR UNIT



### IMPORTANT! Please Read Before Starting

#### Safety precautions for servicing the CEILING-MOUNTED indoor unit

- Before attempting to replace heavy and bulky parts such as the evaporator and fan motor, disconnect the indoor unit from the system and place it on the floor. Refer to the steps given below.
- When checking or servicing the air intake grille, side panels, or electrical component box, first check that power is completely disconnected. Pay utmost care that your working platform is stable enough. Also, do not drop any replaced parts and tools on the floor.

### For Floor Installation

#### 10-1. Removing Air Intake Grille

- (1) Hold both ends and pull forward to open the air intake grille. (Fig. 1)
- (2) Remove the metal clips connecting the unit and the grille. First, with a screwdriver, loosen the \* marked screw a little at the right side clip (DO NOT loosen it too much, otherwise, the screw and small metal parts will fall off inside.), then press on the stopper and pull off. (Fig. 2)
- (3) Do the same procedure for the left metal clip.
- (4) Unlatch the 2 tabs on the lower part of the grille to take it off completely.

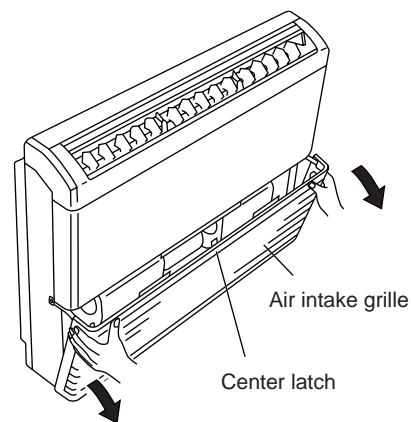


Fig.1

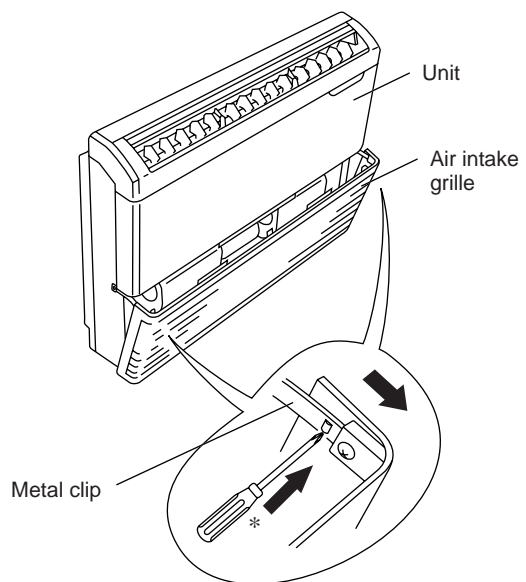


Fig.2



## 10-2. Removing Side Panels

- (1) Remove the 3 screws attaching the left side panel. (Fig. 3)
- (2) Note the position of the hook on the inside of the left side panel. To disengage the hook from the slot, slide down the panel for removal. (Fig. 3)
- (3) Do the same procedure for the right side panel.

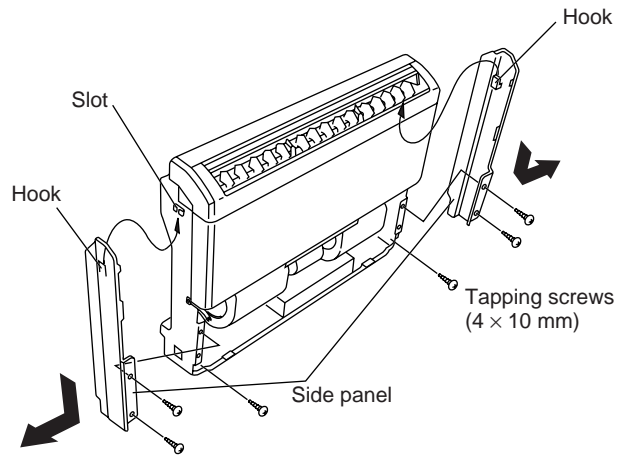


Fig.3

## 10-3. Access and Removal of Electrical Component Box



**WARNING**

**Hazardous voltage can cause ELECTRIC SHOCK or DEATH. Disconnect the power or turn off circuit breaker before you start checking or servicing.**

- (1) Remove the front screw with a screwdriver. (Fig. 4)
- (2) Slide the lid out and up. (Fig. 4)
- (3) Disconnect the wiring as necessary.
- (4) Remove the 4 screws, then pull out the electrical component box. (Fig. 5)

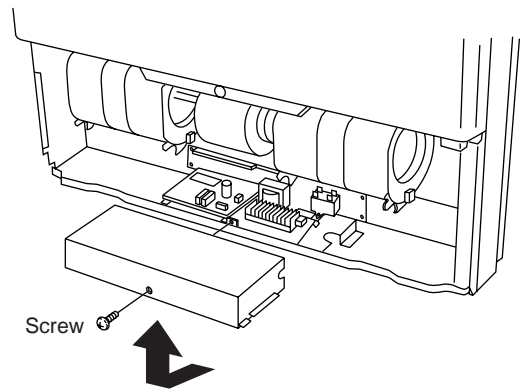


Fig.4

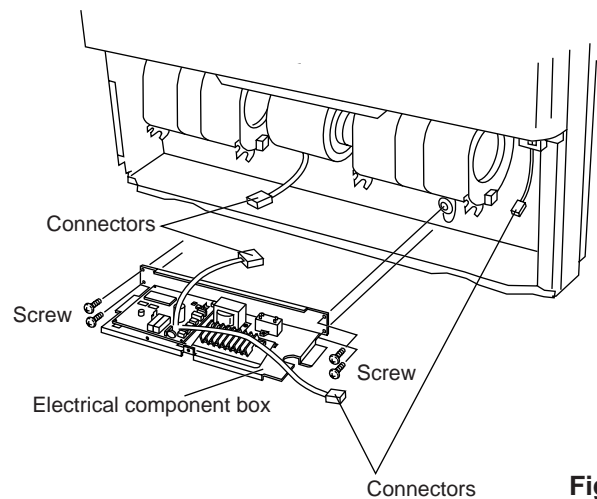


Fig.5

## 10-4. Removing Flap Motor

- (1) Remove the 3 screws used to mount the top panel.  
(Fig. 6)
- (2) While unlatching the 2 tabs inside the back of the top panel, lift the top panel diagonally in the direction of the arrow.(Fig. 6)
- (3) Remove the 2 screws to pull off the flap motor.  
The arm and cam come off together with the motor.  
(Fig. 7)

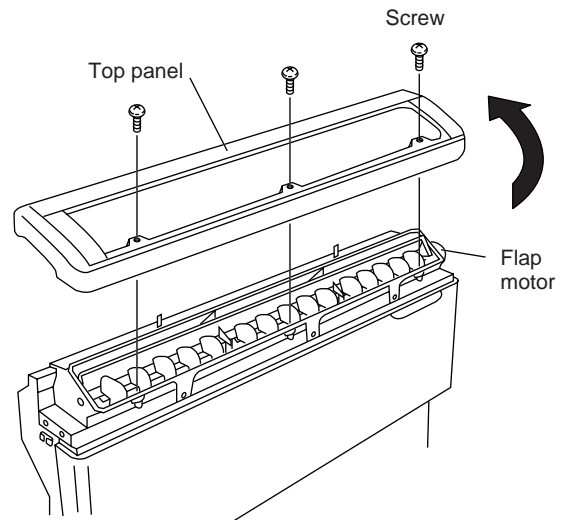


Fig.6

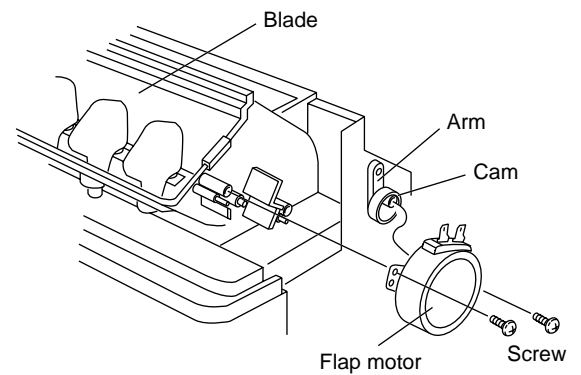


Fig.7

## 10-5. Removing Evaporator (=Indoor Heat Exchange Coil)

- (1) Remove the 7 screws used to mount the blades.  
(Fig. 8)
- (2) Lift the blades in the direction of the arrow.(Fig. 8)

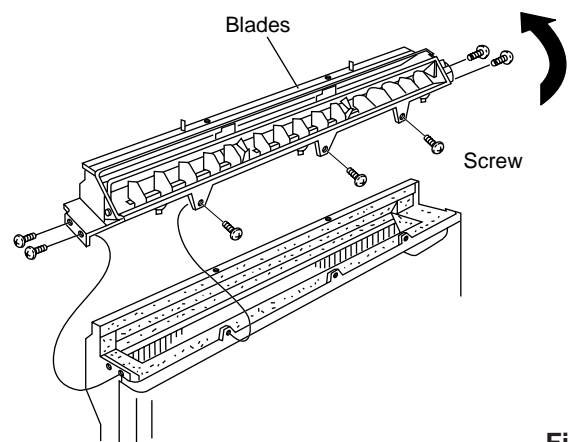


Fig.8

(3) Remove the 6 screws of the front panel and pull it toward you. (Fig. 9)

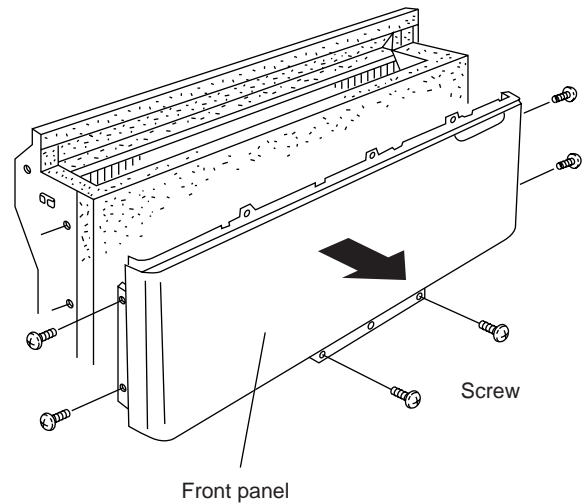


Fig.9

(4) Remove the 2 screws used to mount the evaporator. (Fig. 10)

(5) Remove the rubber cap to pull the thermistor out of the evaporator. (Fig. 10)

(6) Cut the plastic clamp securing the drain hose to the front fan casing. (Fig. 10)

(7) The evaporator is built into the drain pan. Pull out the drain pan together with the evaporator in the direction of the arrow. (Fig. 10)

**IMPORTANT**

The foamed polystyrene drain pan is fragile: DO NOT apply excessive force when removing it.

(8) The evaporator can be removed by sliding it out from the drain pan in the direction of the arrow. (Fig. 11)

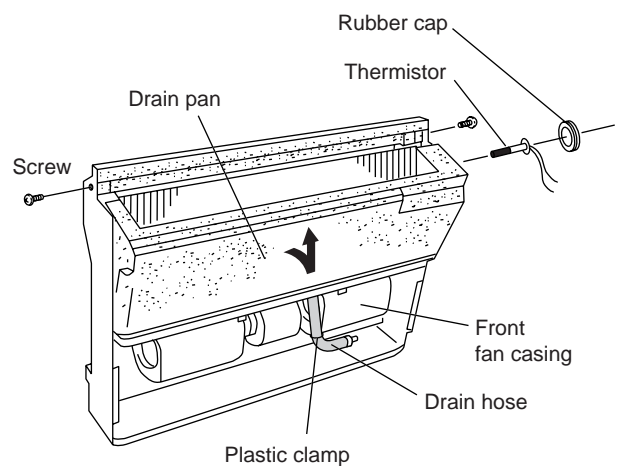


Fig.10

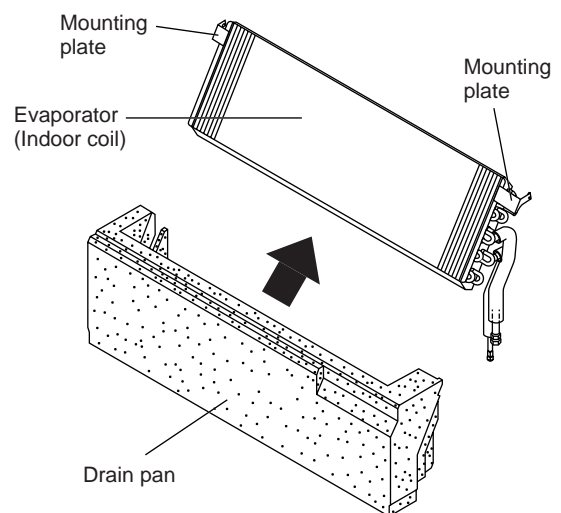


Fig.11

## 10-6. Removing Fan and Fan Motor

(1) Unlatch the 2 hooks on each side to take off the front fan casing. (Fig. 12)

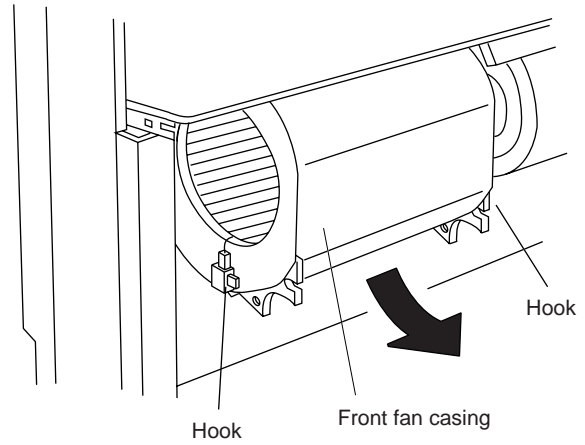


Fig.12

(2) Remove the 2 screws attaching the rear fan casing and then pull the fan casing out.

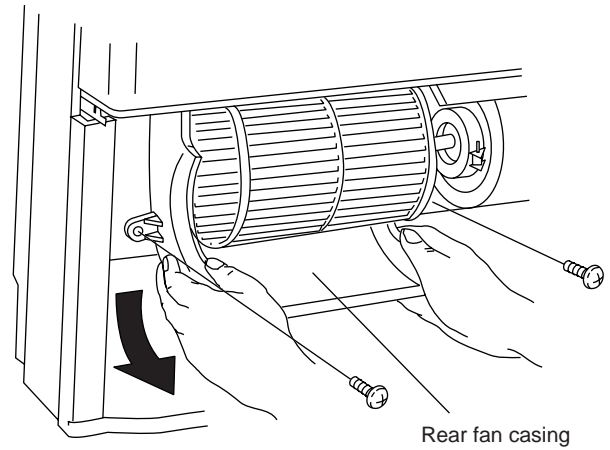


Fig.13

(3) Insert a hex wrench in the fan boss and turn it counterclockwise to loosen the centrifugal fan. The fan can be removed by sliding it to the left. (Fig. 14)

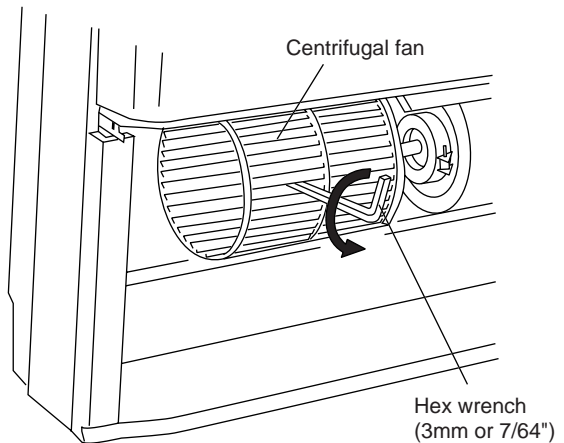


Fig.14

(4) Remove the 4 bolts to remove the fan motor from the frame. (Fig. 15)

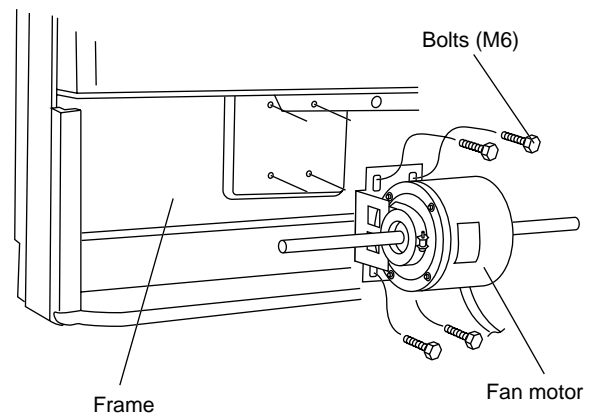


Fig.15

---

**argo**

**FILIBERTI**  
S.P.A.

**21040 Oggiona con S. Stefano (VA) - Via Per Solbiate, 49 - Italy**

Direzione e Uffici: Via Varese, 90 - 21013 GALLARATE (VA)

Tel. 0331/755.111 - Telex. 331060 ARGO I - FAX 0331/776.240

---