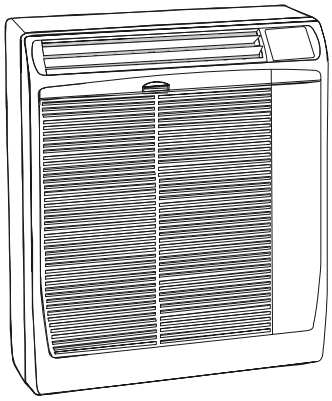
TECHNICAL DATA
& SERVICE MANUAL

INDOOR UNIT: KAF94R5TA-

SPLIT SYSTEM AIR CONDITIONER

Model No.	Product Code No.
KAF94R5TA-	387105948



KAF94R5TA-

0.8180.359.0 06/2005

IMPORTANT!
Please read before installation

This air conditioning system meets strict safety and operating standards.
For the installer or service person, it is important to install or service the system so that 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.
- The unit must be supplied with a dedicated electrical line.

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 sale/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

- During installation, connect before the refrigerant system and then the wiring one; proceed in the reverse orden when removing the units.

WARNING **When wiring**

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

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked, to ensure the grounding.
- 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 and death**.
- **Ground the unit** following local electrical codes.
- The Yellow/Green wire cannot be used for any connection different from the ground connection.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.
- Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.
- Do not use multi-core cable when wiring the power supply and control lines. Use separate cables for each type of line.

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 aluminium 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-weight. It may be necessary to build a strong wooden or metal frame to provide added support.

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

... In moist or uneven locations
Use a raised concrete base to provide a solid level foundation for the outdoor unit.
This prevents damage and abnormal vibrations.

... In area with strong 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
- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them; screw by hand and then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

NOTE:
Depending on the system type, liquid and gas lines may be either narrow or wide. Therefore, to avoid confusion, the refrigerant tubing for your particular model is specified as narrow tube for liquid, wide tube for gas.

When servicing
- Turn the power OFF at the main power board 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 the work, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.
- Ventilate the room during the installation or testng the refrigeration system; make sure that, after the installation, no gas leaks are present, because this could produce toxic gas and dangerous if in contact with flames or heat-sources.

Table of Contents

1. SPECIFICATIONS

1-1 Unit Specifications

KAF94R5TA-

Power source	220 - 240 V ~ 50 Hz

Voltage rating	230 V

Performance			Cooling	Heating
Capacity			See catalogue with the requested matching	
Air circulation	High/Med./Low	m^3/h	400 / 360 / 300	

Features			
Controls/Temperature controls			Microprocessor/ I.C. thermostat
Control unit			Wireless remote control unit
Timer			ON/OFF 24 hours
Fan speed			3 and Auto
Airflow direction		Horizontal	Manual
		Vertical	Manual
Air Filter			Washable, Anti-Mold
Power noise level	High/Med./Low	dB(A)	51 / 48 / 42
Refrigerant tubing connections			Flare type
Refrigerant	Narrow tube	mm(in.)	6.35 (1/4)
tube diameter	Wide tube	mm(in.)	9.52 (3/8)
Refrigerant			R410A
Refrigerant tube kit / Air clean filter			Optional / Optional

Dimensions & Weight			
Unit dimensions	Height	mm	700
	Width	mm	560
	Depth	mm	200
Package dimensions	Height	mm	770
	Width	mm	620
	Depth	mm	265
Weight	Net	kg	18
	Shipping	kg	20
Shipping volume		m^3	0,13

DATA SUBJECT TO CHANGE WITHOUT NOTICE

1-2 Major Component Specifications

KAF94R5TA-

Controller PCB				
Part No.				WSA - 128
Controls				Microprocessor
Control circuit fuse				250 V - 3.15 A

Remote Control Unit				
				RC-2 (RC) - RC-7 (RC)

Fan & Fan Motor				
Type				Cross - flow
Q'ty ……. Dia. and lenght			mm	1…. Ø 100 / L 410
Fan motor model…Q'ty				K35406-M01892…1
No. of poles…rpm (230 V, High)				4…1196
Nominal output			W	27
Running Amps			A	0.12
Power input			W	26
Coil resistance (Ambient temp. 25 °C)			Ω	GRY-WHT: 545÷630 WHT-VLT: 92÷105 VLT-YEL: 62÷71 GRY-BRN: 78÷90
Safety devices	Type			Thermal protection
	Operating temp.	Open	°C	150 ± 10
		Close		Automatic
Run capacitor			µF	1
			VAC	450

Heat Exch. Coil			
Coil			Aluminium plate fin / Copper tube
Rows			1
Fin pitch		mm	1,4
Face area		m²	0,185

Thermistor (Coil sensor TH1)			
Type			NTC sensor
Resistance (at 25 °C)		κΩ	10 ± 3%

Thermistor (Room sensor TH2)			
Type			NTC sensor
Resistance (at 25 °C)		κΩ	10 ± 5%

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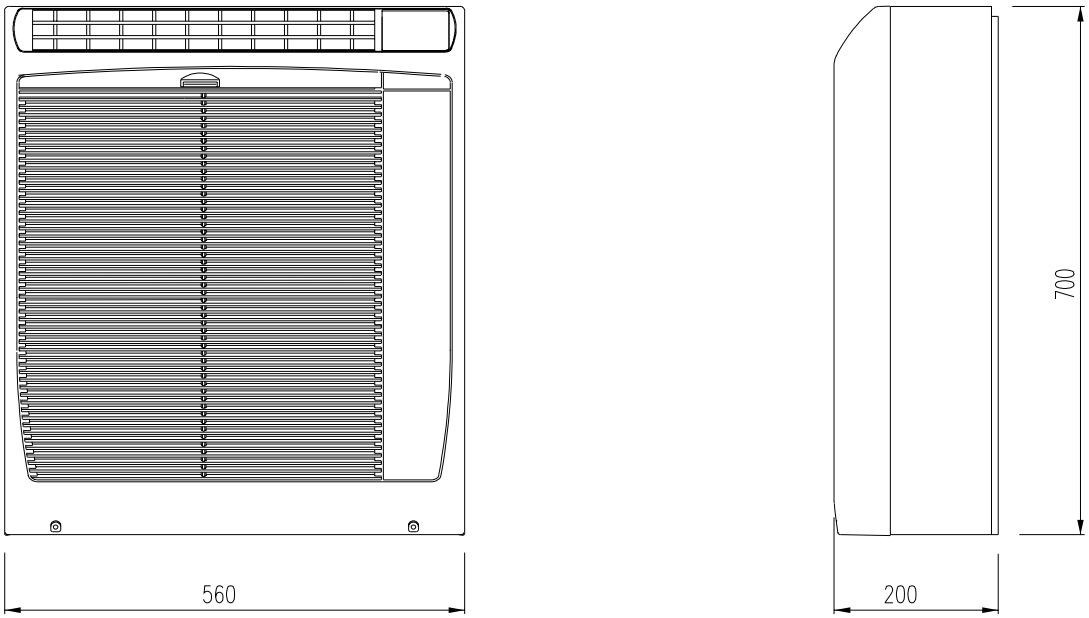
2. DIMENSIONAL DATA

KAF94R5TA-

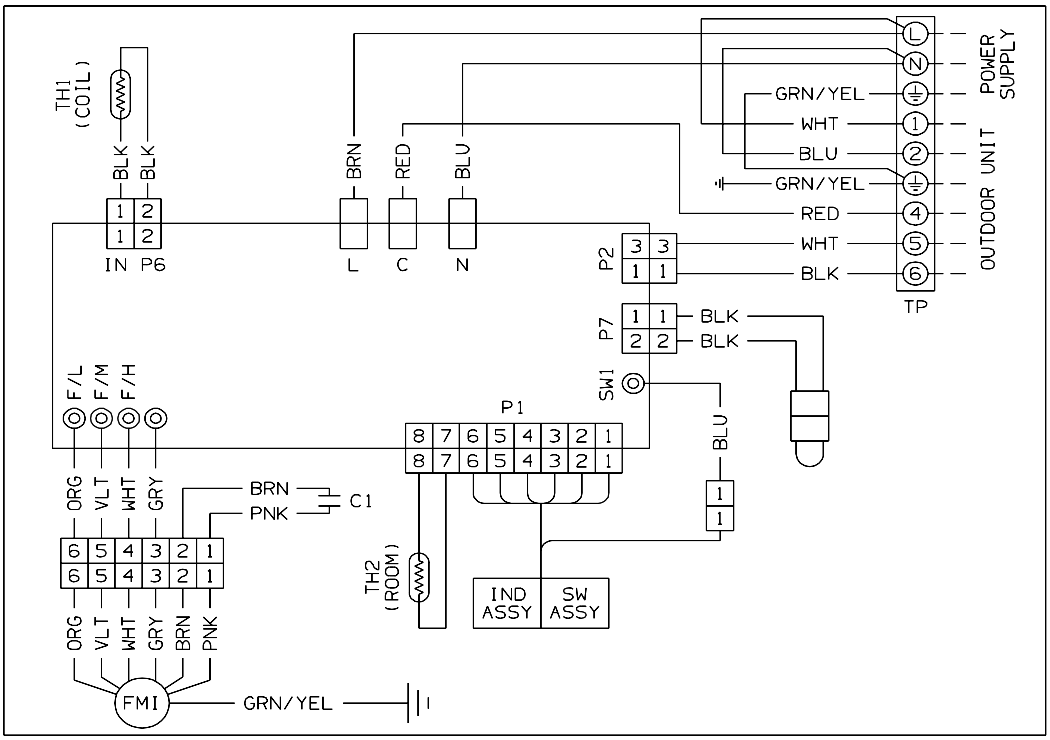


Unit: mm

3. ELECTRICAL DATA

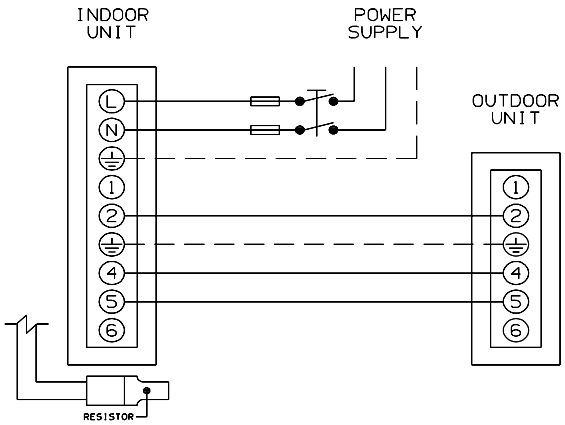
3-1 Electric Wiring Diagrams

KAF94R5TA-

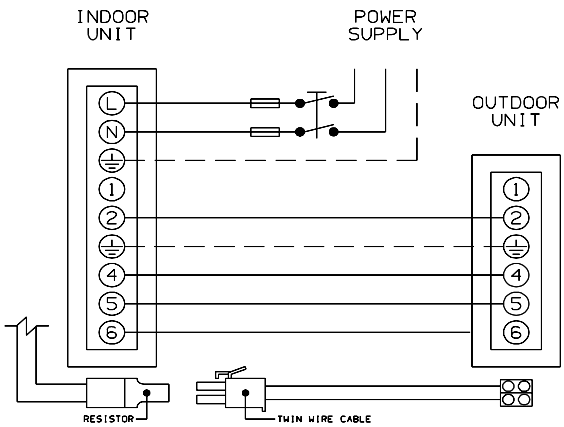


3-2 System Wiring Diagrams

Cooling only Models



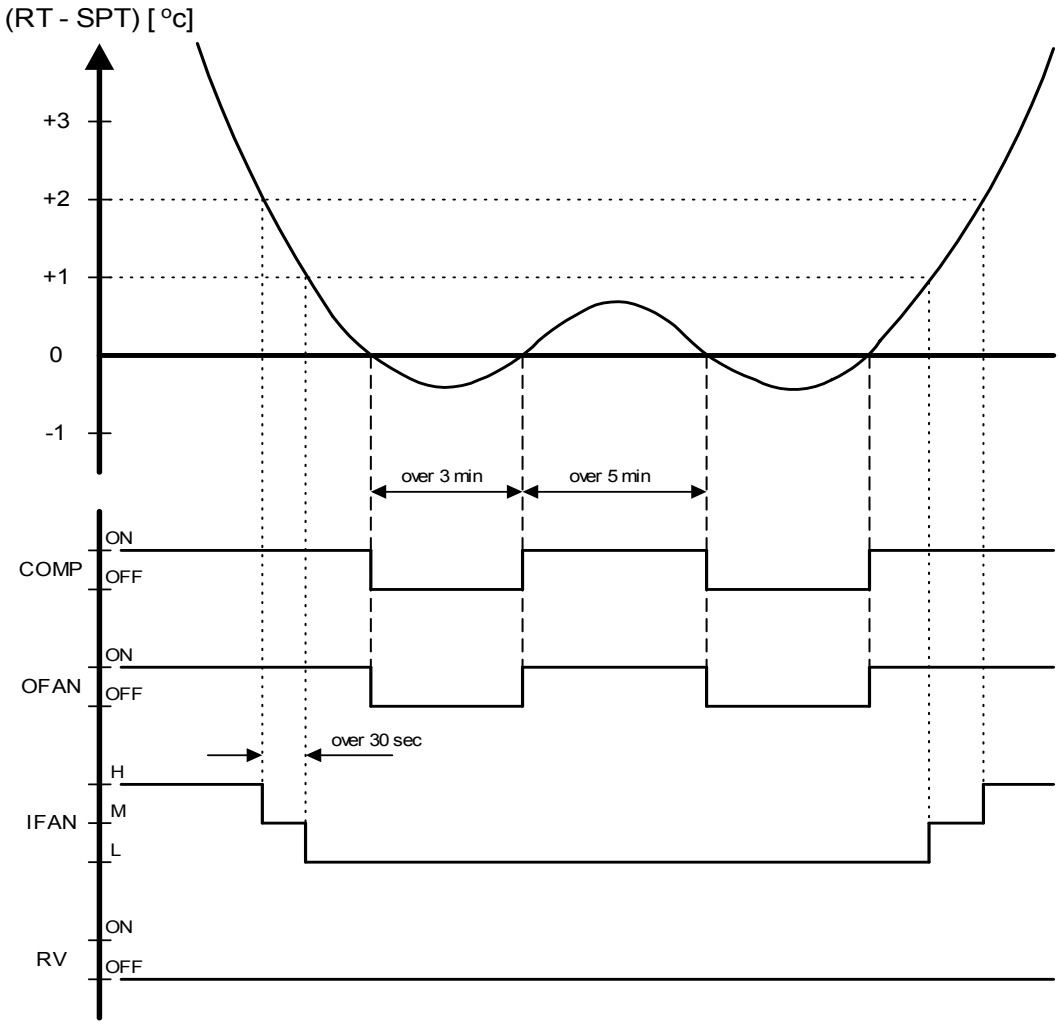
Heat Pump Models



Heat Pump Models: disconnect the resistor from the indoor unit twin wire cable and connect the suppied twin wire cable instead.

4. FUNCTION

4-1 Cool Mode Operation

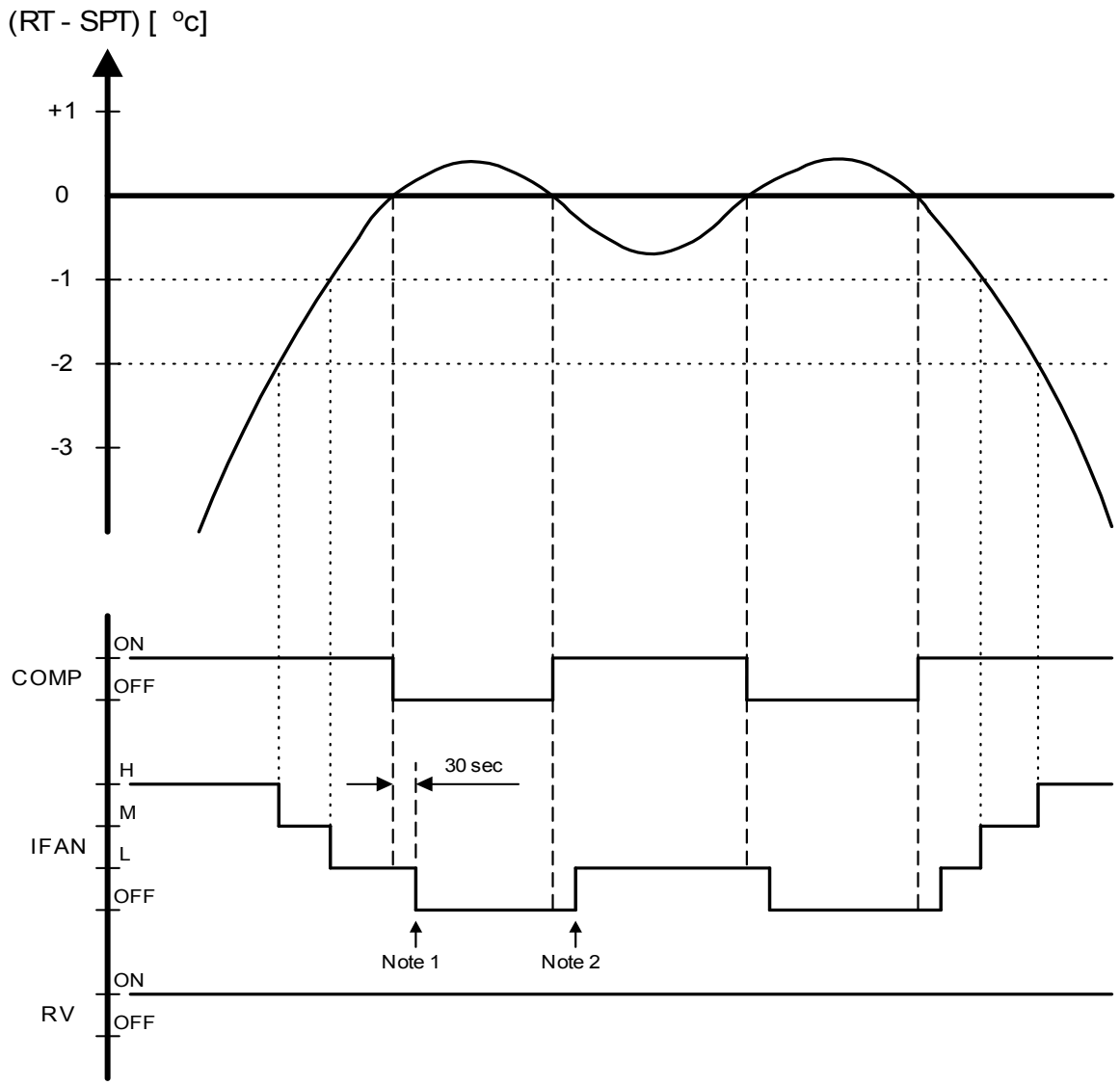


In Cool Mode, the operation of the Compressor (COMP), Outdoor Fan (OFAN) and Indoor Fan (IFAN) are determined by the difference between the Room Temperature (RT) and the Set Point Temperature (SPT) as in the graph above.

Notes:

1. In this graph, the IFAN is operating in the "Auto Fan Speed" setting. If the user has selected the low, medium or high fan speed, the IFAN will run constantly at that speed only.
2. In addition to the value of (RT-SPT), the operations of the relays are also controlled by protection delays. For example, (a) the minimum On/Off time of the COMP is 5 min and 3 min respectively, and (b) the IFAN can change speed only after it has operated at the same speed for 30 sec.

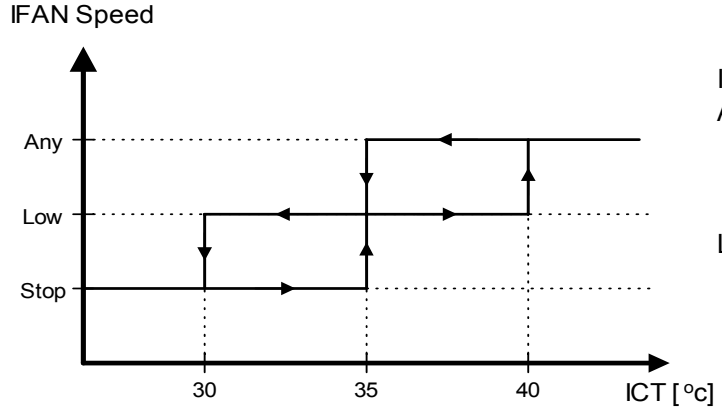
4-2 Heat Mode Operation



The Heat Mode operation is similar to the Cool Mode operation. The COMP, OFAN and IFAN are mainly controlled by the value of (RT – SPT). In the graph above, the IFAN is operating in Auto Fan speed mode. Therefore, the IFAN speed changes automatically according to the (RT - SPT).

Note 1: The 30s IFAN operation is for purging the heat from the in-coil after COMP has stopped.

Note 2: The IFAN will not be turned on until the in-coil temperature is high enough (as shown in the graph below) to prevent the unit from supplying cool air.

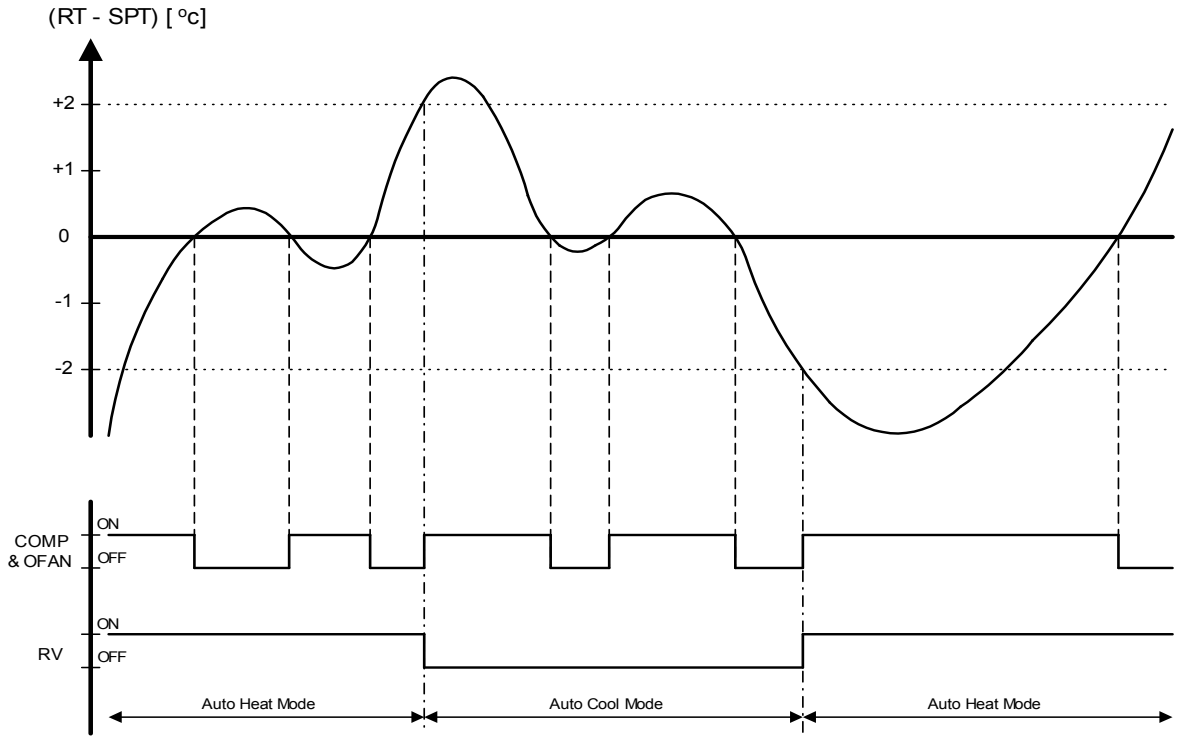


ICT = In-coil Temperature

Any = Hi, Med or Low fan speed which is selected by the user. In Auto Fan Speed Mode, the fan speed is selected by the unit automatically instead.

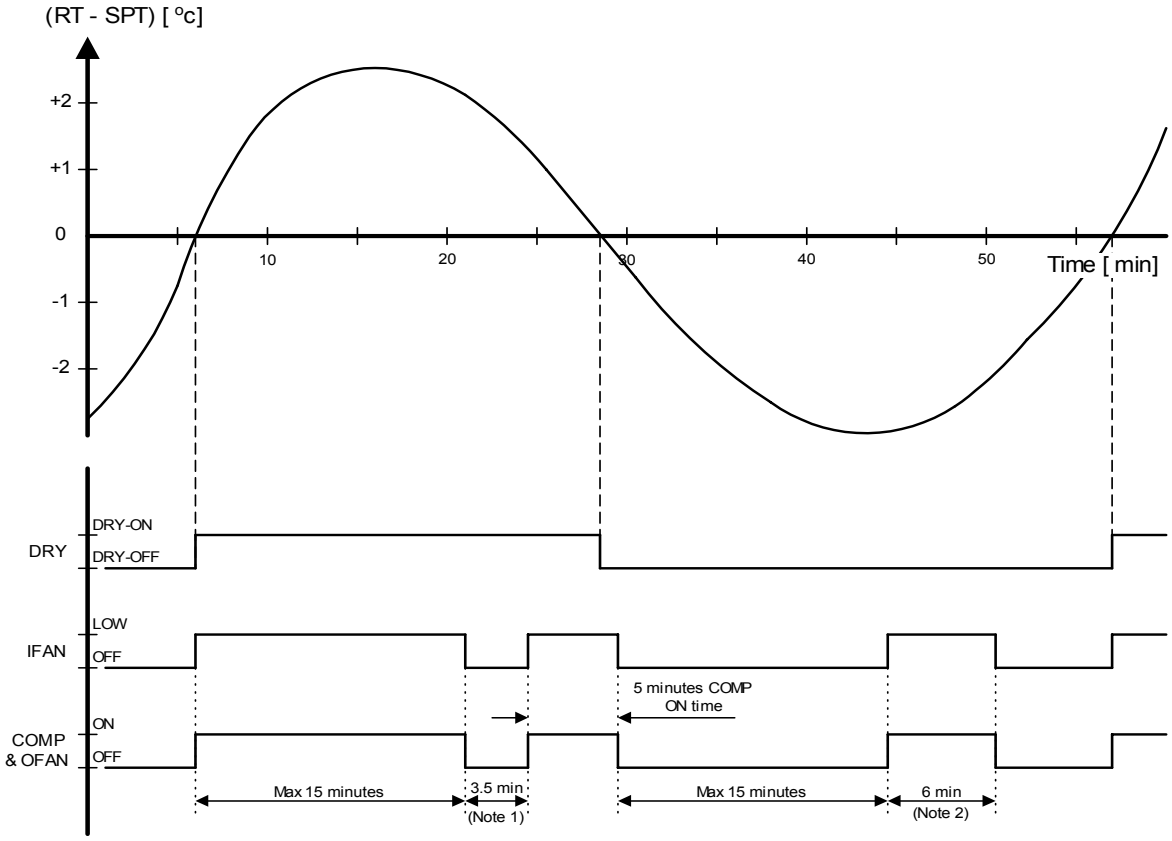
Low = The indoor fan is forced to operate at low speed

4-3 Auto (Cool/Heat) Mode Operation



In Auto Mode, the unit switches between the Auto Cooling Mode and Auto Heating Mode automatically to maintain the room temperature (RT) at the set point temperature (SPT).

4-4 Dry Mode Operation



In Dry Mode, the unit operates in a mild cool mode to lower the humidity of the room. In order to maintain a high efficiency in the drying operation without over lowering the room temperature excessively, the Dry Mode is different from the Cool Mode in two ways.

1. The IFAN is forced to operate at low speed only. And, the IFAN is turned off with the COMP.
2. The unit operates in either the "Dry-on" state or the "Dry-off" state. If RT = SPT, the unit will operate in "Dry-off" state. The COMP is forced to operate for 6 min after it has stopped working for 15 min. If RT > SPT, the unit will operate in "Dry-on" state. The COMP is forced off for 3.5 min after it has been working for 15 min.

Note 1: COMP is forced off in Dry-on state.
Note 2: COMP is forced to operate in Dry-off state.

4-5 Fan Mode Operation

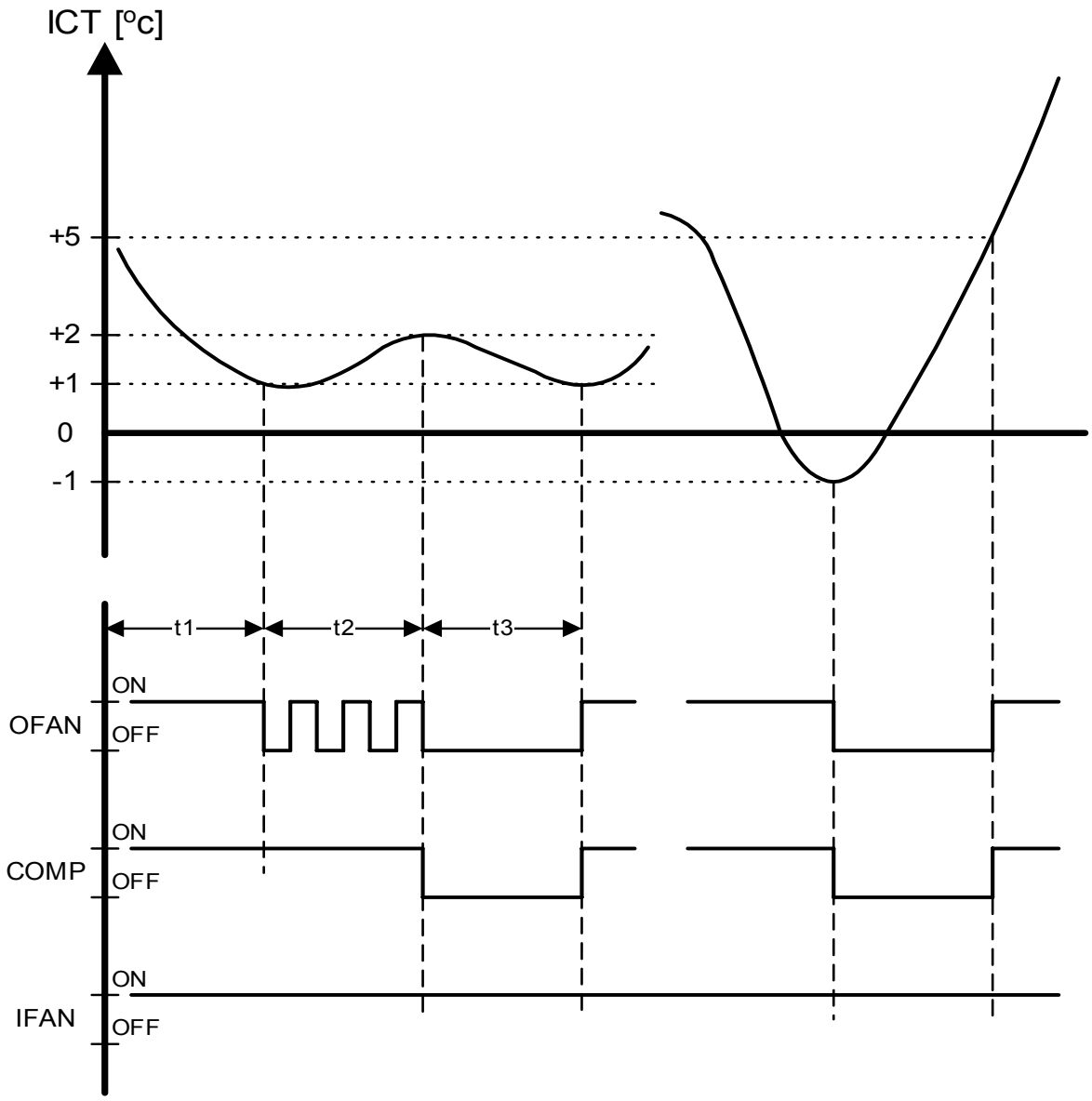
In Fan Mode, the indoor fan is turned on to improve the air circulation in the room. COMP and OFAN remain OFF all the time.

Note: If the user has selected the Auto Fan Speed setting, the IFAN speed would be selected by the unit automatically according to the difference between RT and SPT, as in Cool Mode.

4-6 Protection Operations in Cool and Dry Modes

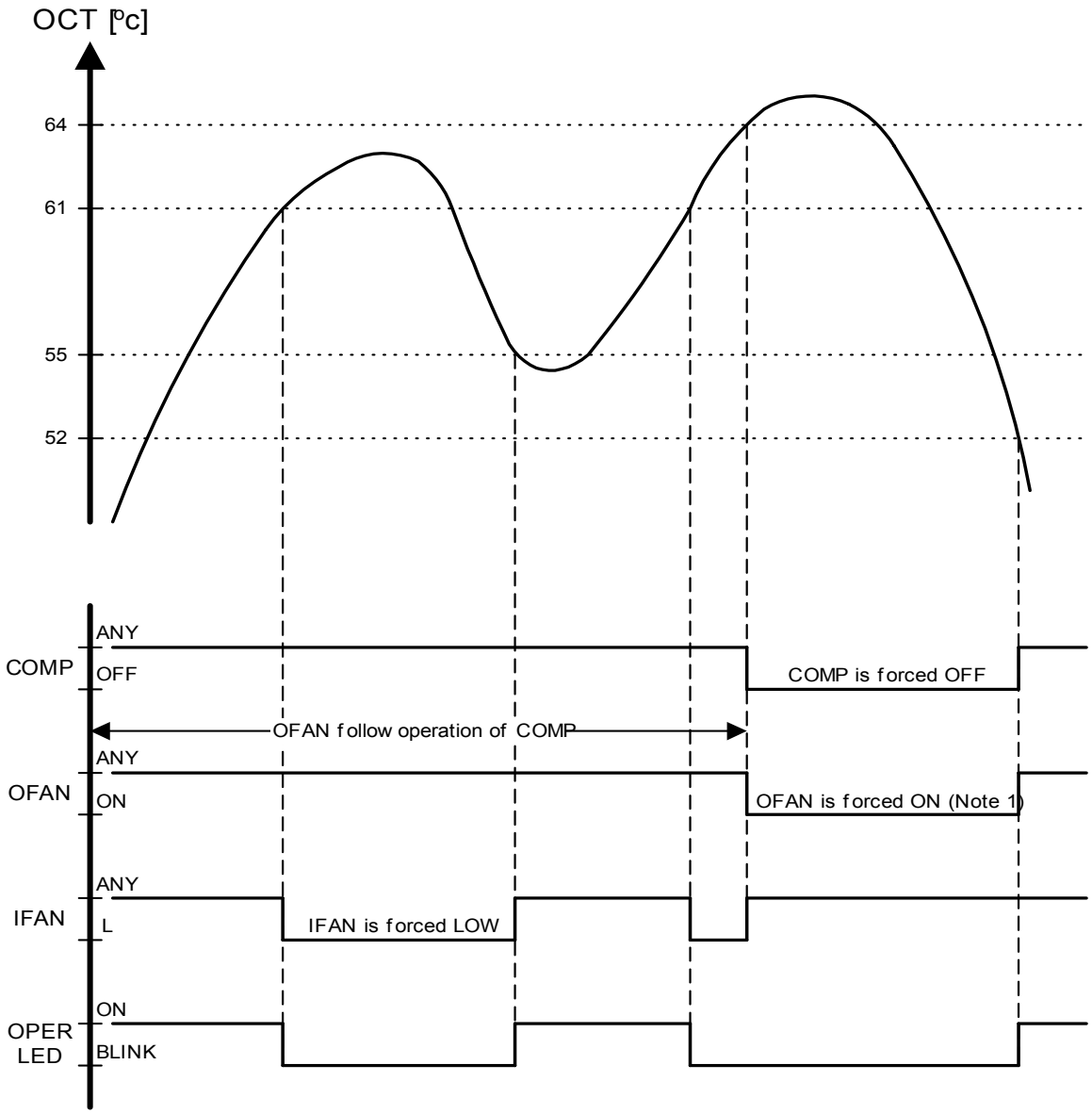
1. Indoor Coil Defrost Protection

   The in-coil defrost protection can prevent the ice formation at the in-coil when the ambient temperature is low.



2. Outdoor Coil High Pressure Protection

The out-coil high pressure protection prevent the build up of high pressure at the out-coil during cooling operation.

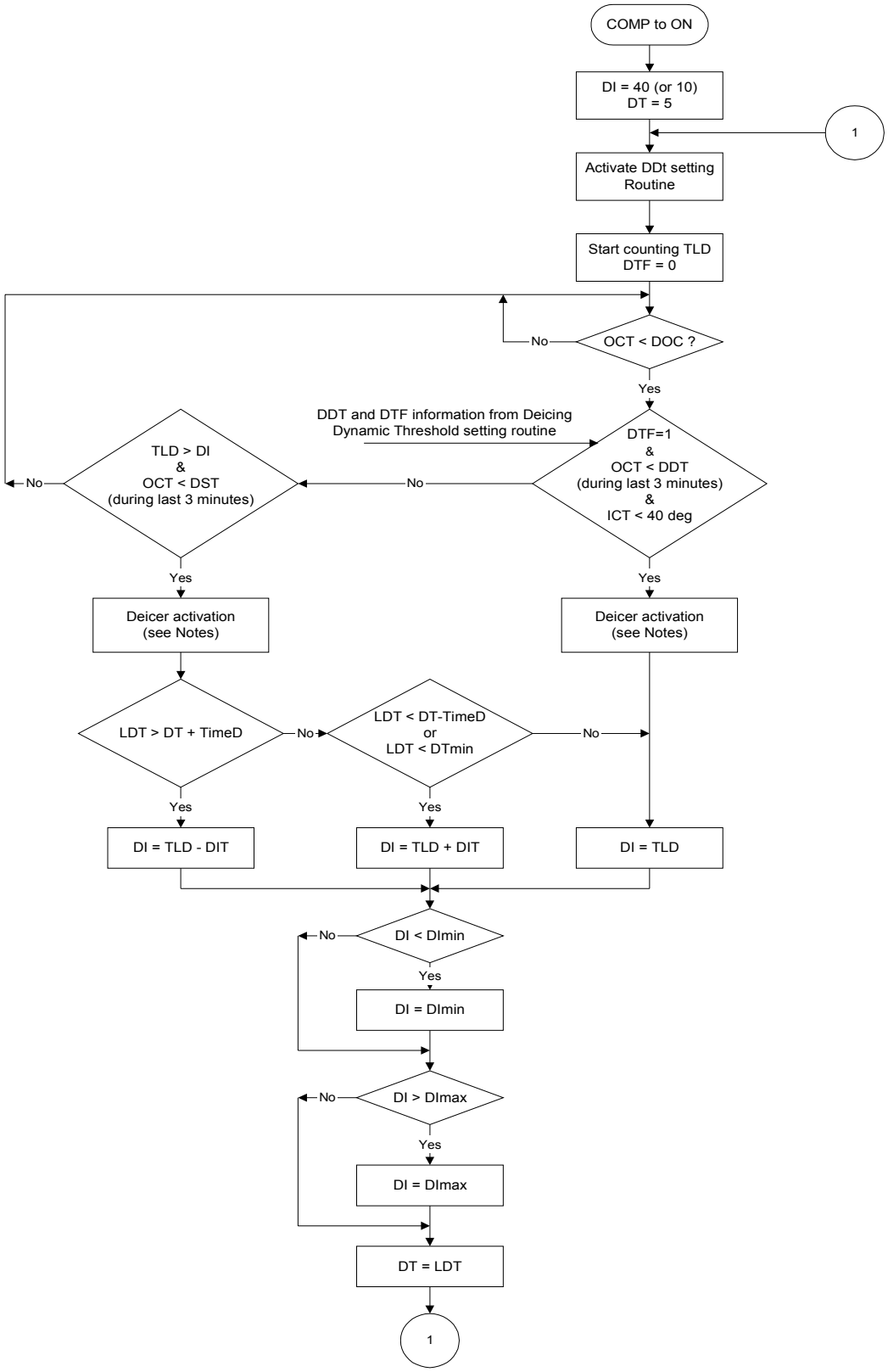


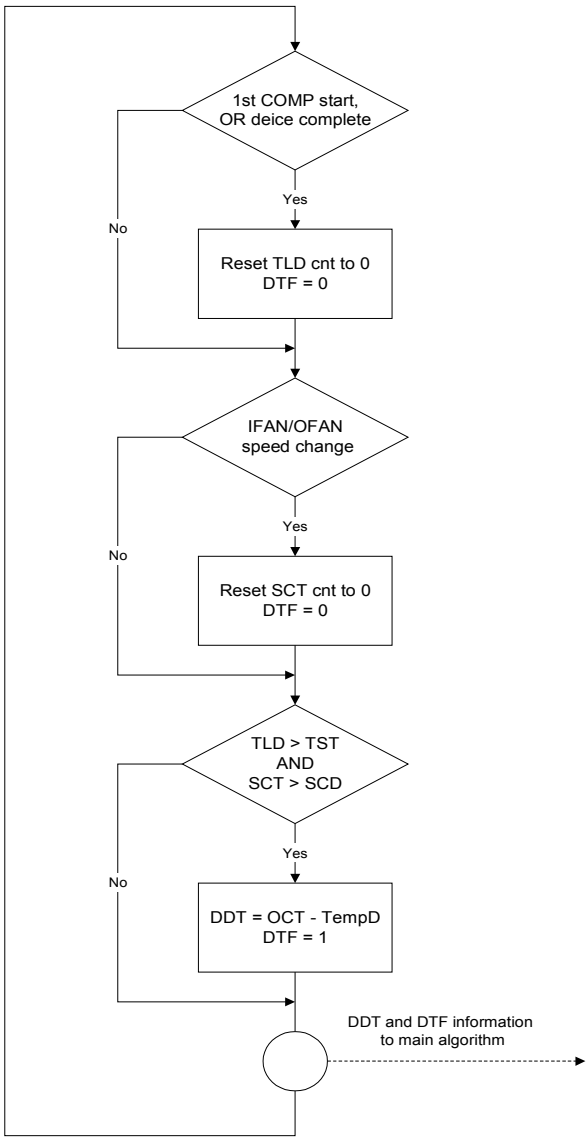
Note 1: In some applications, the outdoor fan and the compressor are controlled together by the COMP relay output from the controller. In this case, it will take more time for the out-coil to cool down during the high pressure protection, because the outdoor fan will be turned off with the compressor instead of working as in the graph above.

4-7 Protection Operations in Heat Mode

1. Outdoor Coil Deice Protection

The deice process is controlled by an Ice Detection Algorithm (IDA). The IDA is an unique control algorithm incorporated to maintain optimal utilization of the heat pump capacity, especially in below-zero outdoor temperature condition. The out-coil deicing will be activated not only by static temperature detection as normally done, but also while ice forming is detected on the out-coil.





Explanation:

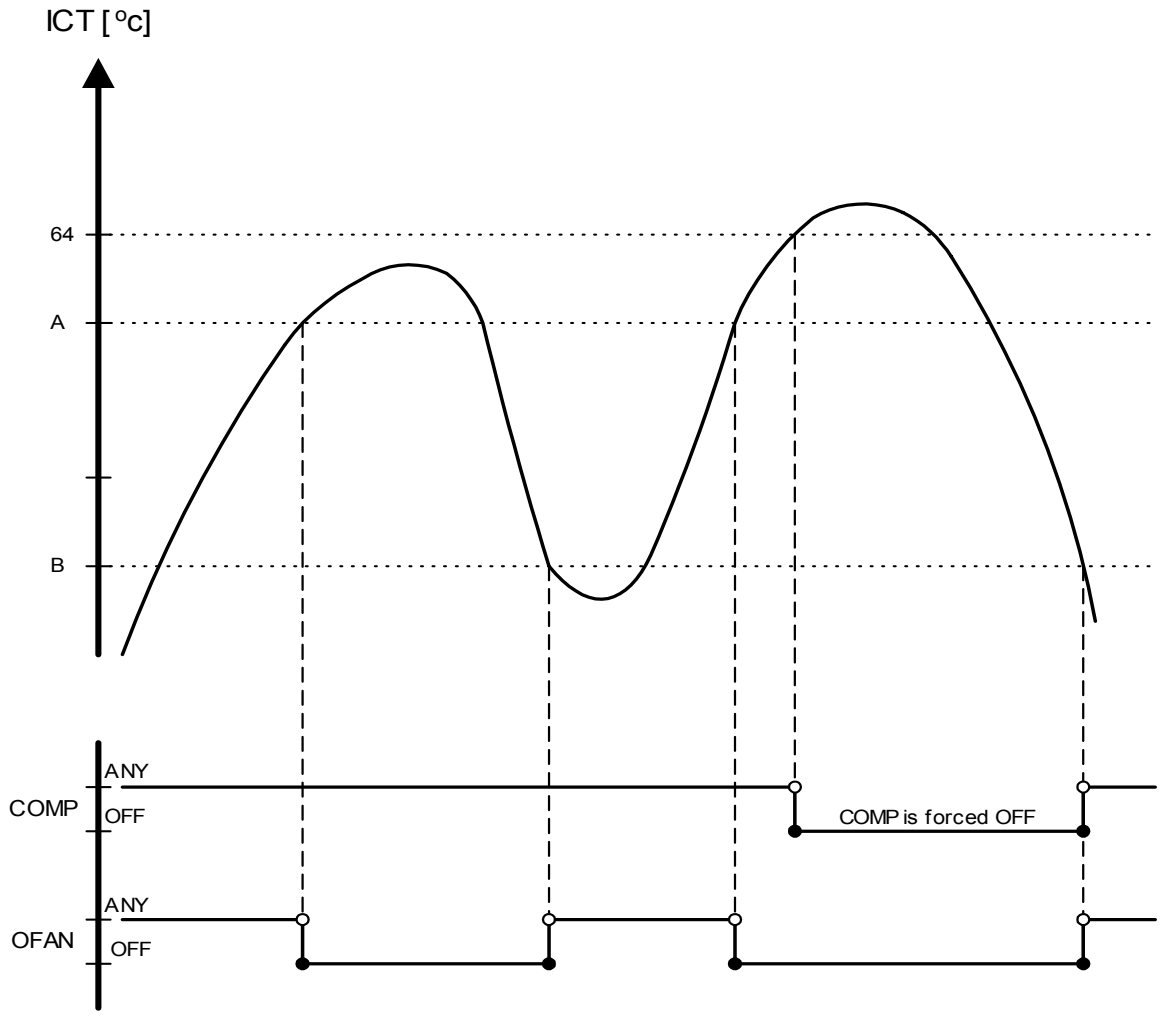
The "Ice Forming Detection" will be done by two algorithms –

1. In Dynamic Temp Detection, the ice formation will be detected by
   (i) Compare the OCT with a Deicing Dynamic Temperature Threshold, and
   (ii) Detect the drop in ICT which accompany the ice formation.
2. The Static Temp Detection will be done by comparing the OCT with a Deicing Static Temperature Threshold.

The Deicing Data Record is used to determine the time delay between two deicing cycles. In general, the time delay will be increased if the last deicing cycle can be completed quickly.

2 Indoor Coil High Pressure Protection in Heat Mode

The in-coil high pressure protection prevent the build up of high pressure at the in-coil during heating operation.



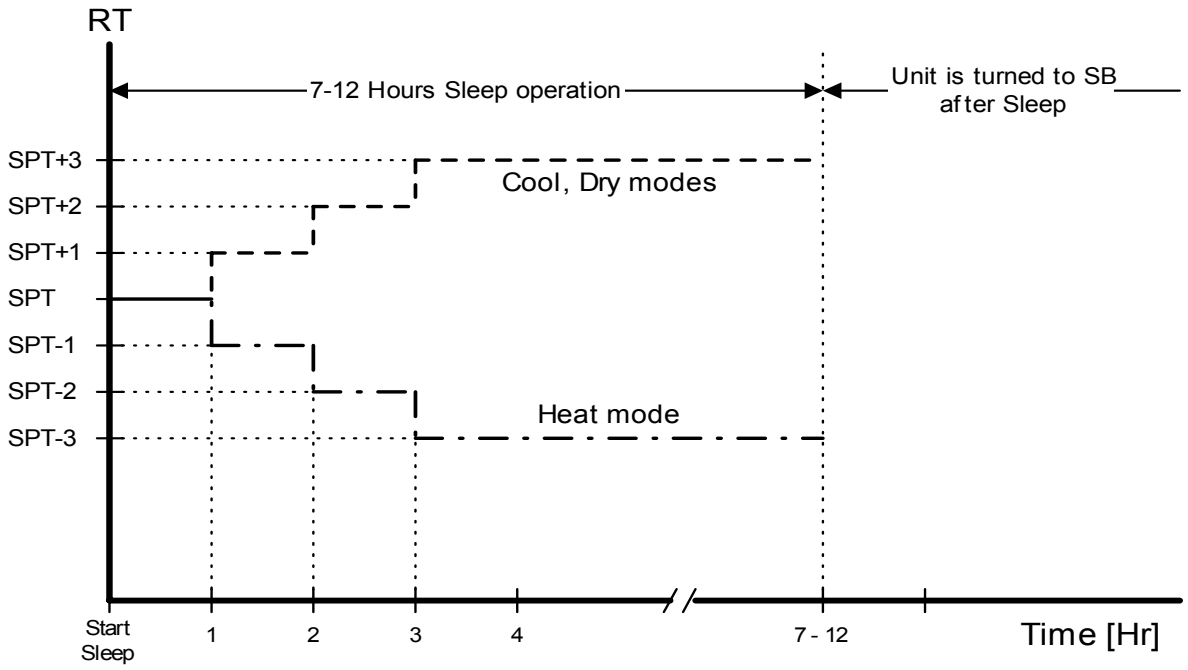
Note:

The operation temperatures shown as A and B in the chart differ by models.

	WSA-78	WSA-98	WSA-128
A	50	54	58
B	42	45	50

4-8 Sleep Function

Room temperature is automatically controlled to compensate for body temperature variations while sleeping. This mode of operation is designed for maximal comfort in both COOL and HEAT modes.



4-9 Daily Timer Function

Unit can be programmed to be ON and OFF automatically at preset time everyday, by using a remote controller. The resolutions of the ON/OFF timers are 10 min.

4-10 IFEEL Function

This feature is provided if the unit is used together with a remote controller with the I-FEEL function. When this function is selected, the remote controller sends the room temperature measured by its build-in thermistor to the air con for more accurate temperature control

4-11 Manual Unit Control and Led Indicator

The push button switch and the LED indicators on the display panel let the user to control the unit operation without a remote controller. Their operations are provided below.

LED indicators:

STAND BY INDICATOR	1. Lights up when the Air Conditioner is connected to power and ready to receive the R/C commands 2. Blinks continuously in case of any thermistor failure.
OPERATION INDICATOR	1. Lights up in operation mode (Note: OFF in standby mode). 2. Blinks for 0.5 sec., to announce that a R/C infrared signal has been received and stored. 3. Blinks continuously during • OCT High Pressure Protection Mode • Deicing in Heating Mode
TIMER INDICATOR	1. Lights up during Timer and Sleep operation. 2. Active On/Off timer setting will become invalid after a power failure. When this happens, the unit is forced to restart in STBY mode, and the Timer Indicator is blinked continuously until (i) the unit is switched to OPER Mode again, or (ii) any message from the R/C is received.

Push Button switches:

MODE BUTTON (Cool, Heat, SB)	Use to cycle the operation mode of the A/C unit among COOL, HEAT and SB modes, without using the R/C. Every time this switch is pressed, the next operation mode is selected, in the order : SB => Cool Mode => Heat Mode => SB => ...

4-12 Recovery from Power Failure

Last unit settings (SPT, operation mode, louver settings, etc) are saved in the EEPROM in the unit. In case of power failure, these settings are restored automatically.

5. TROUBLESHOOTING

5-1 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.

a) 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.

b) Check inter-unit wiring.

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

c) Check power supply.

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

d) 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.

5-2 Air conditioner does not operate

5-2-1 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 2MΩ or less, insulation is defective (“NO”).

WARNING

*Set circuit breaker to OFF.

① Remove inter-unit wires from terminal plate in outdoor unit.
- Measure insulation resistance of outdoor unit.

NO → Insulation of outdoor unit is defective.
- Measure insulation resistance of electrical parts in outdoor unit.

② Remove inter-unit wires from terminal plate in indoor unit. Then, pull the power plug out of the wall outlet
- Measure insulation resistance of indoor unit.

NO → Insulation of indoor unit is defective.
- Measure insulation resistance of electrical parts in indoor unit.

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

- There is a possibility of short circuit.

- Check capacity of circuit breaker.

  Capacity of circuit breaker is suitable.

NO → Replace with suitable one (larger capacity).

- Measure resistance of outdoor fan motor winding.

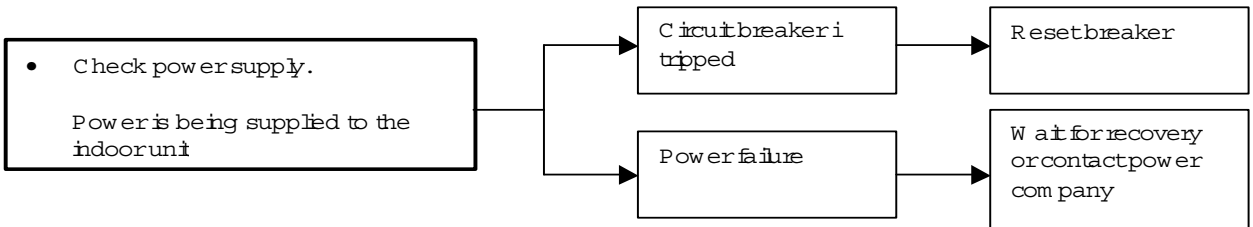
In case of Heating operation :

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

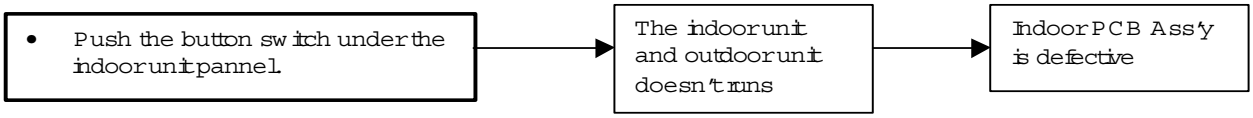
- Measure resistance of compressor motor winding.

5-2-2 Neither indoor nor outdoor unit runs.

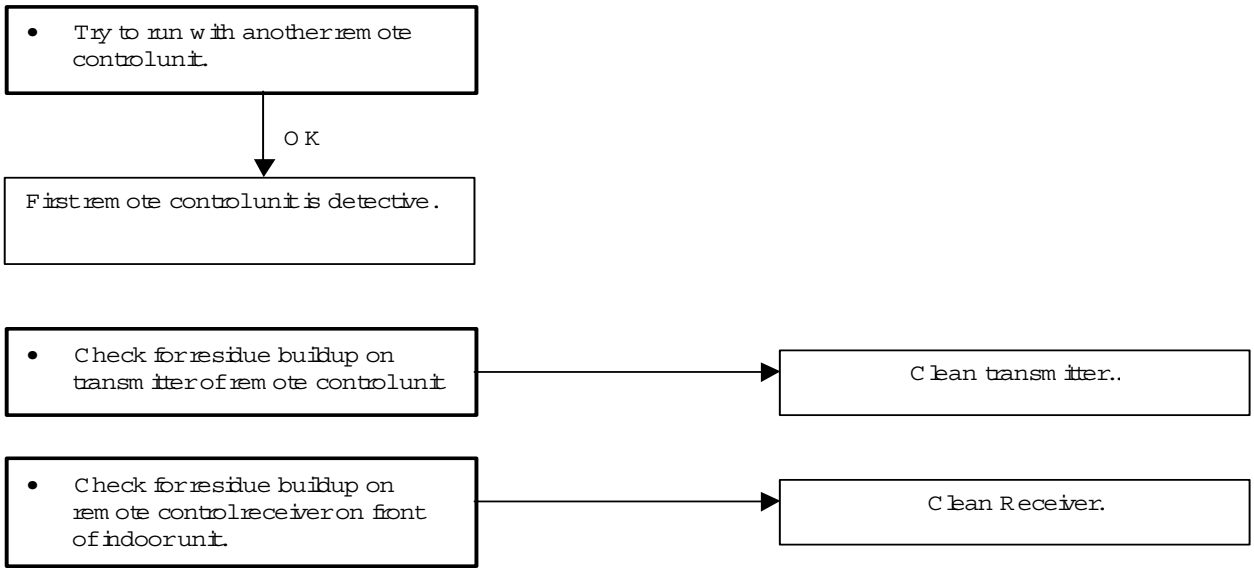
A. Power is not supplied



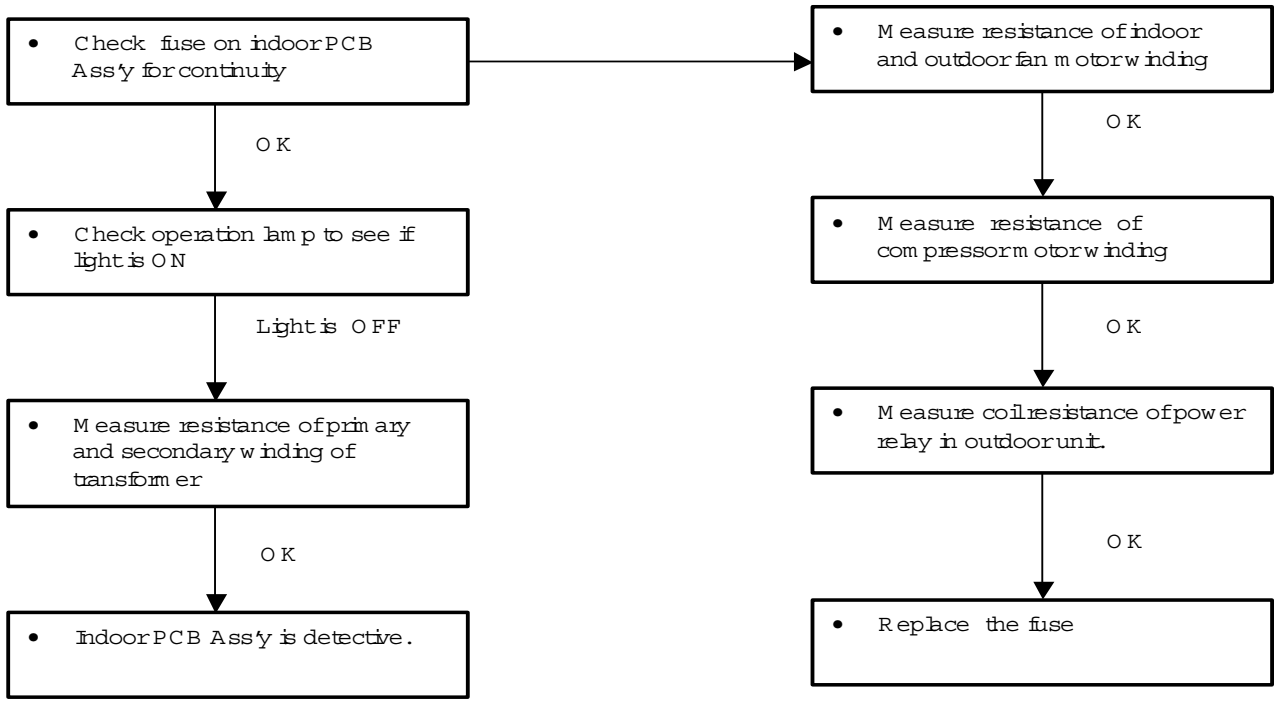
B. Check "Push bottom" selector in the indoor unit.



C. Check remote control unit



D. Check fuse on the indoor PCB Ass'y

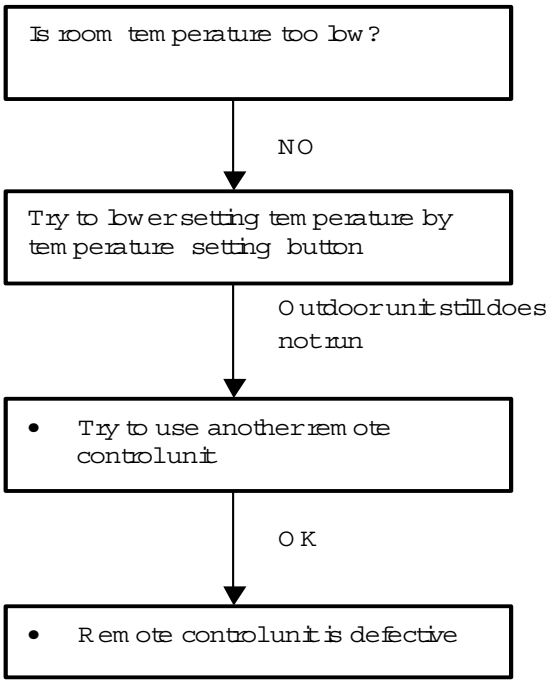


E. Check TIMER on the remote control unit

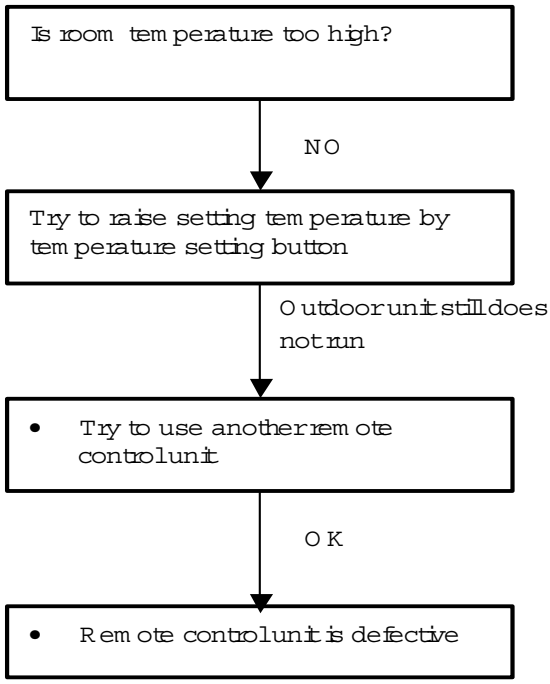
5-2-3 Only outdoor unit does not run.

A Check setting temperature

COOL



HEAT

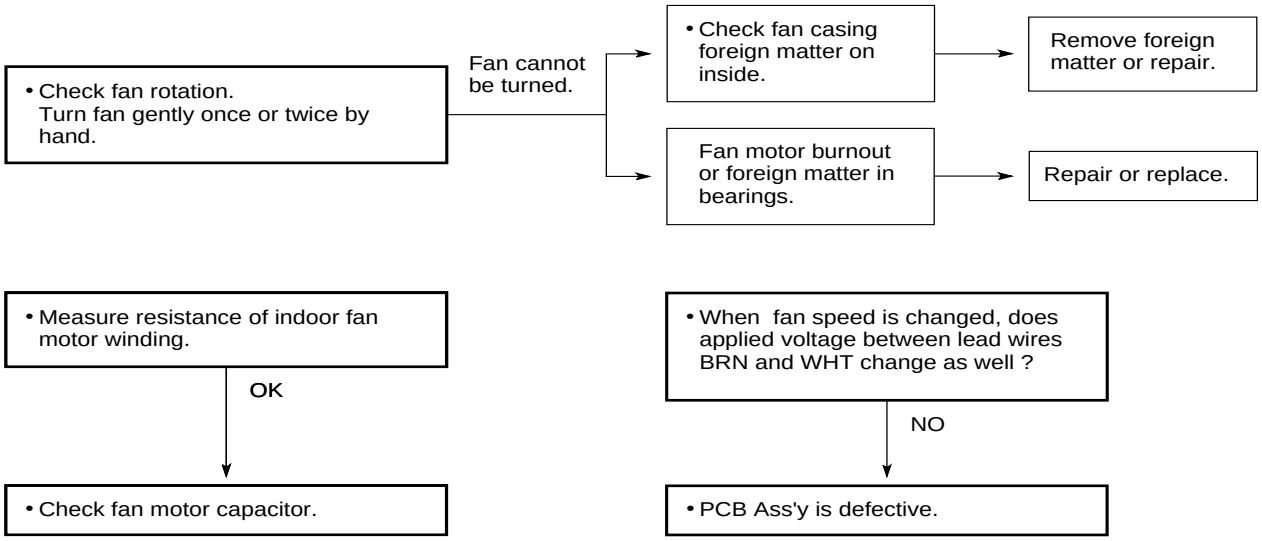


5-2-4 Only indoor unit does not run.

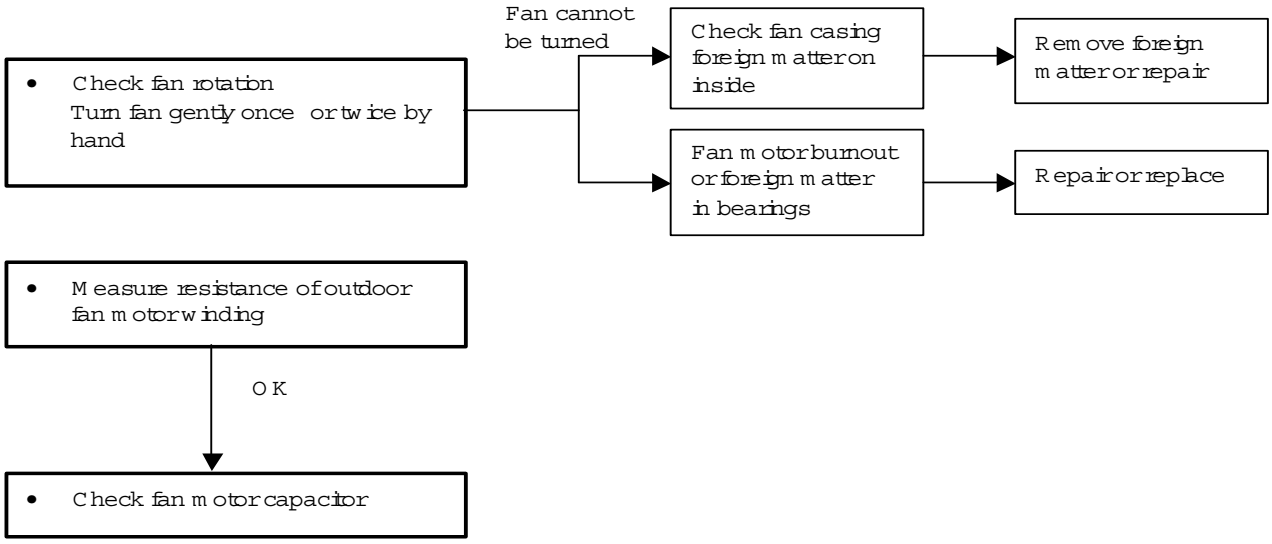
Indoor PCB Assy is defective

5-3 Some part of air conditioner does not operate

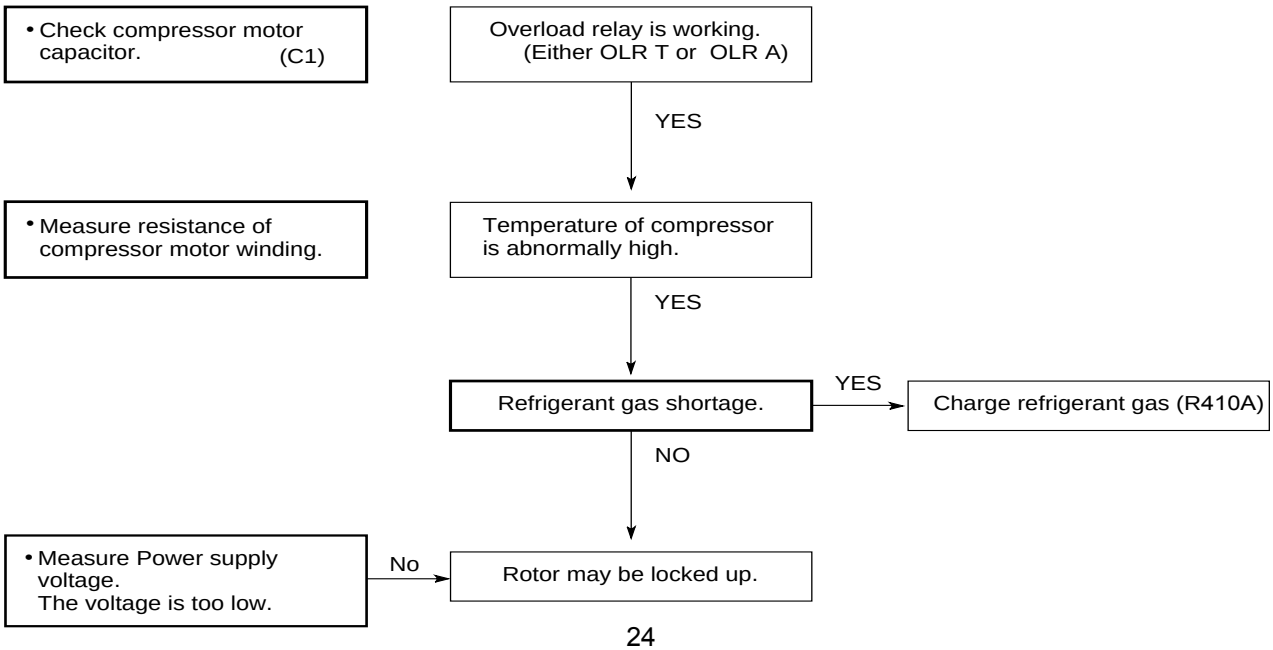
5-3-1 Only indoor fan does not run.



5-3-2 Only outdoor fan does not run.

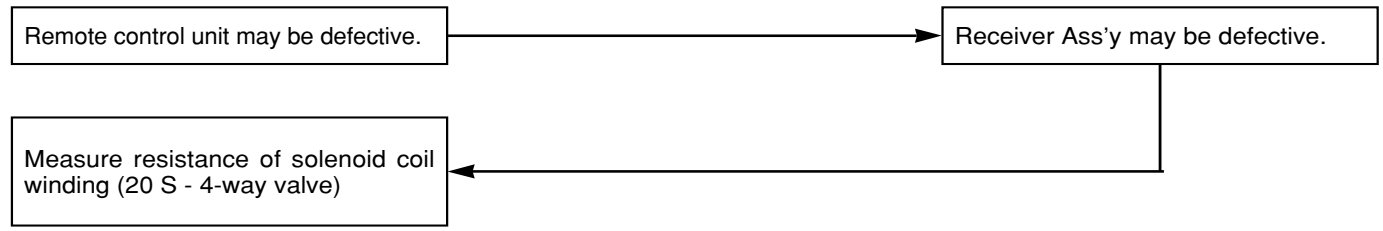


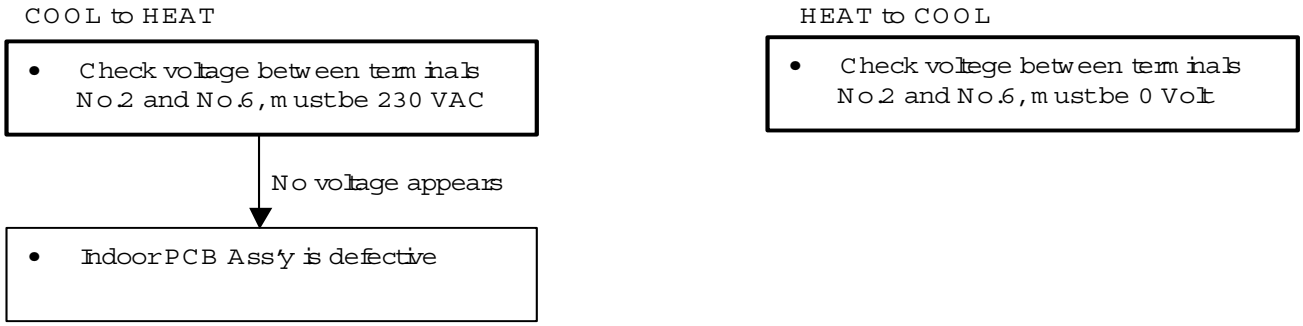
5-3-4 Only compressor does not run.

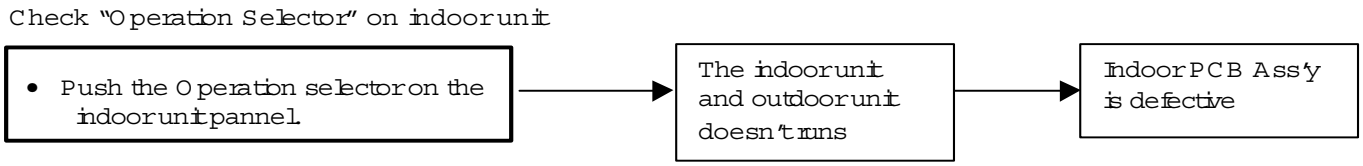


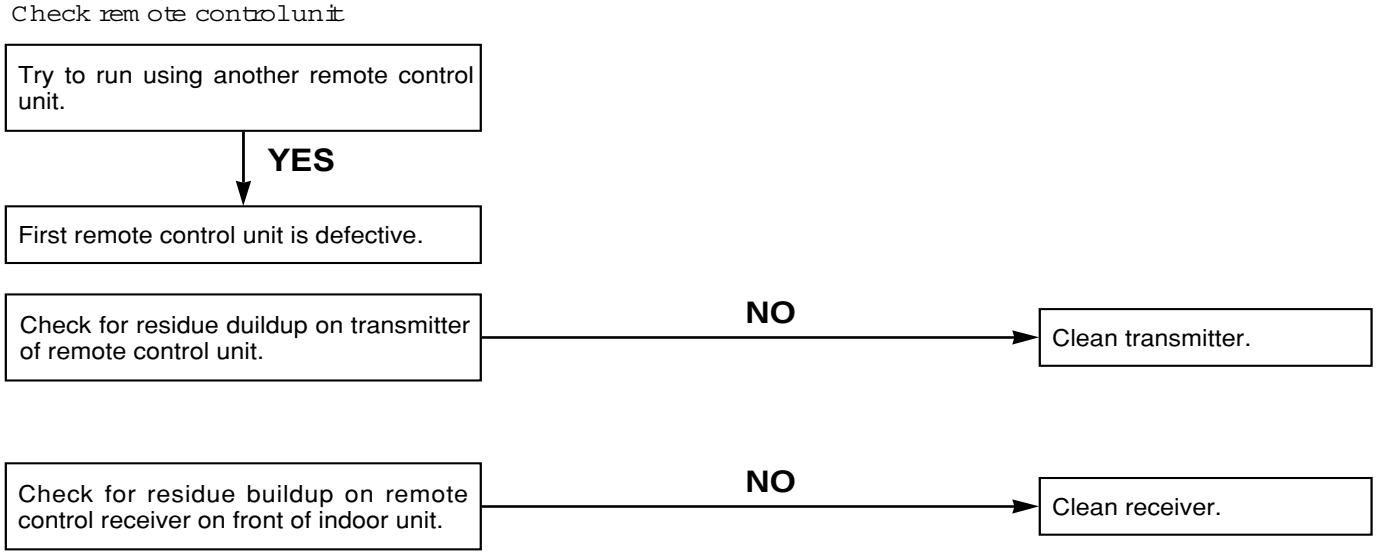
5-4 Air conditioner operates, but abnormalities are observed

5-4-1 Operation does not switch from HEAT to COOL (or COOL to HEAT).

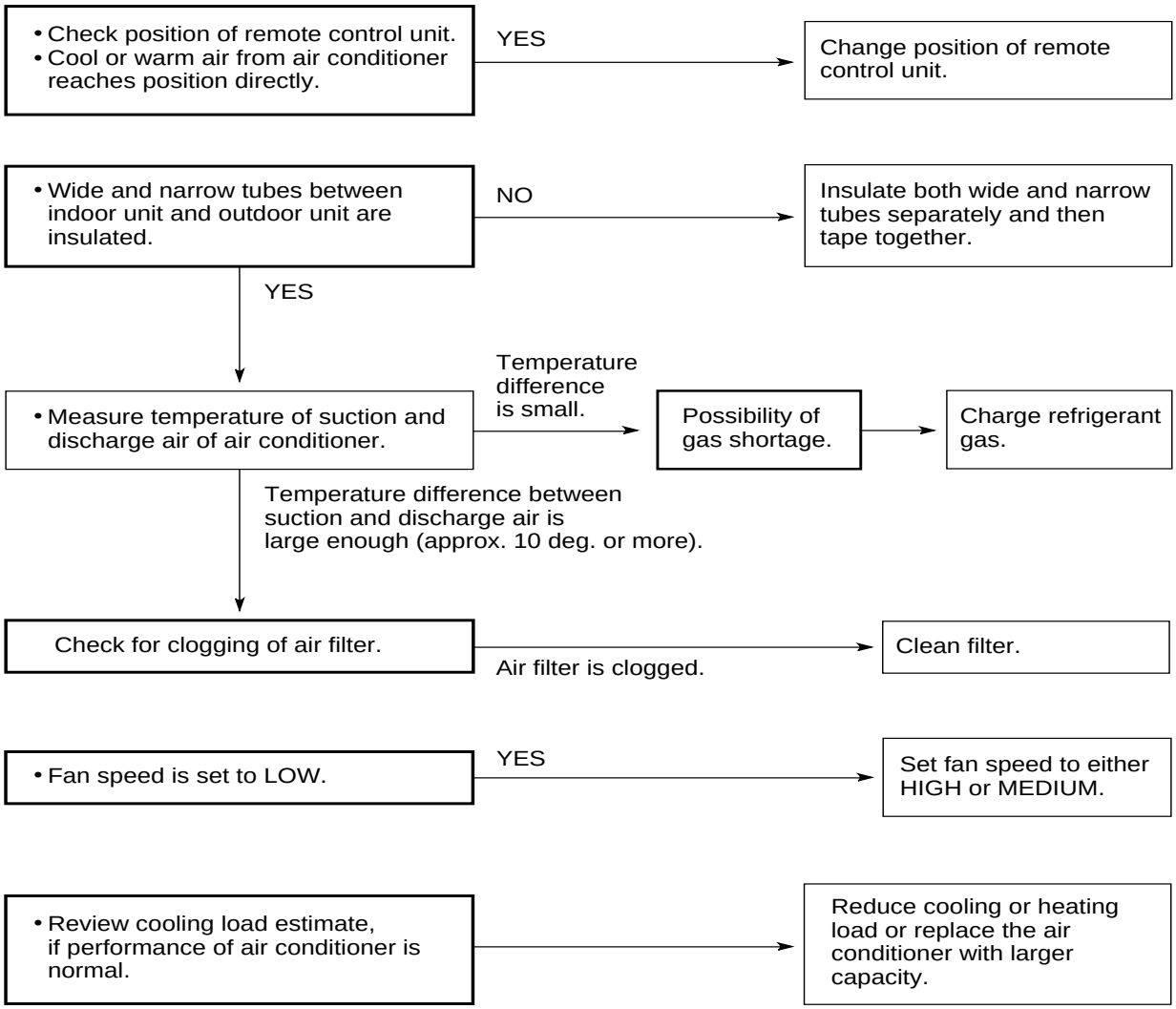




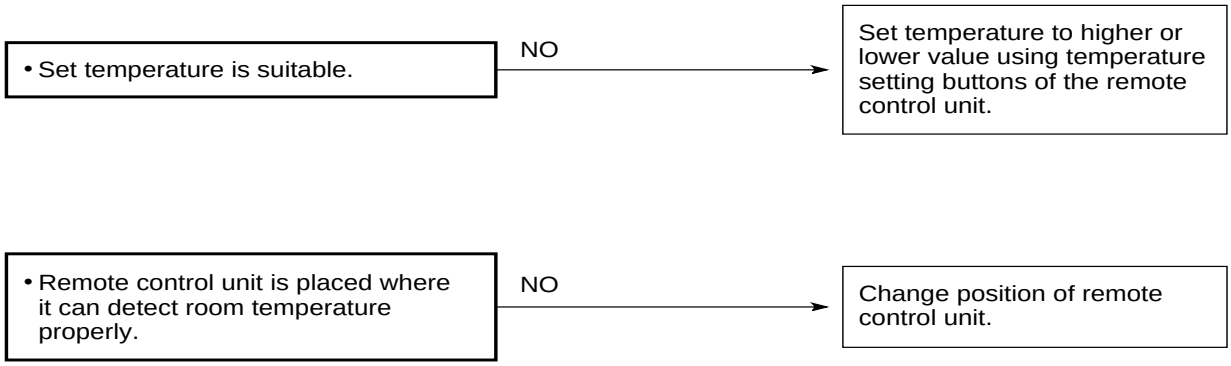




5-4-2 Poor cooling or heating.

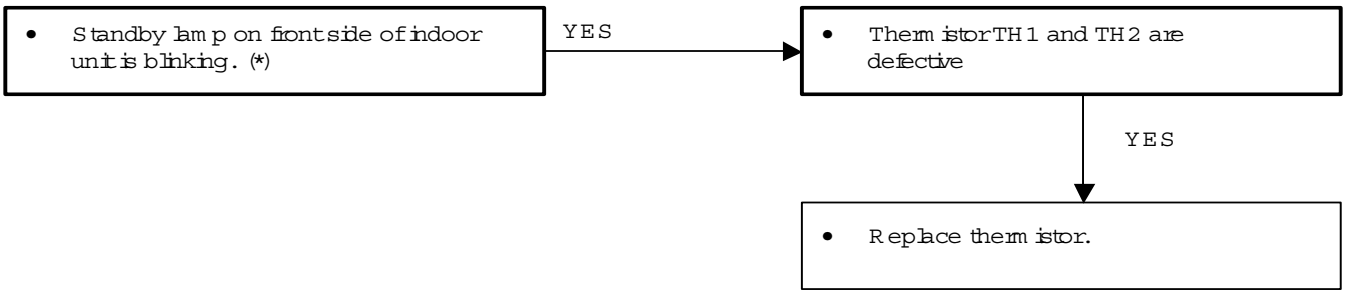


5-4-3 Excessive cooling or heating.



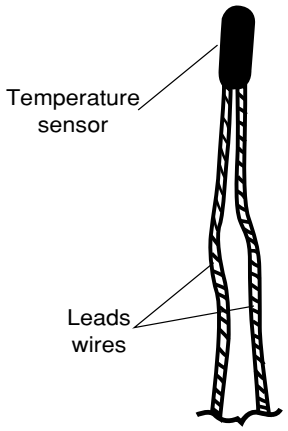
5-5 If a Sensor is defective

5-5-1 Thermistor (TH1 or TH2) is defective.



NOTE Allarm signal (*)

Stanby lamp on the front side of the indoor unit will blink when the thermistor is defective.
At the same time the outdoor unit will stop. Indoor operate only for ventilation.



6. CHECKING ELECTRICAL COMPONENTS

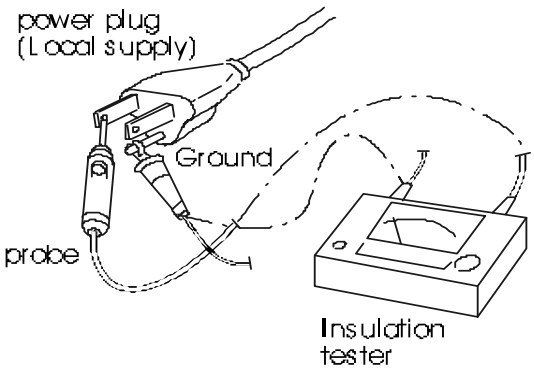
6-1 Measurement of Insulation Resistance

The insulation is good condition if the resistance exceeds 2MΩ

a) 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 resistance between the grounding and other power terminals (Fig 1)



NOTE

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

b) Indoor Unit

Clamp an aluminium plate fin or copper 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)

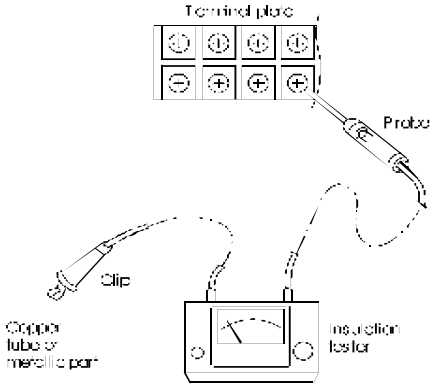


Fig. 2

c) Outdoor Unit

Clamp an aluminium plate fin or copper 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 ground line terminals should be skipped

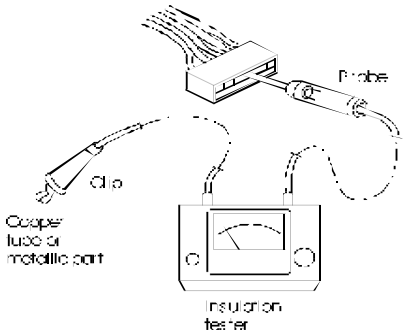


Fig. 3

d) 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. (Fig 3 and 4)

NOTE
Refer to Electric Wiring Diagram

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

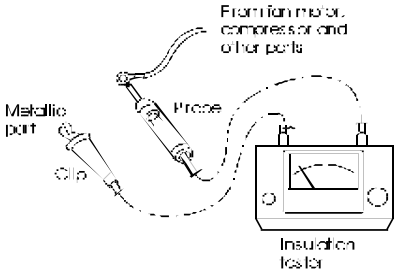


Fig. 4

6-2 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.

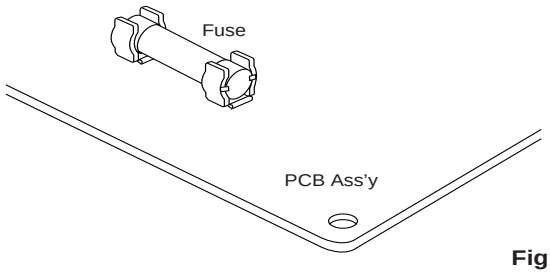


Fig. 5

6-3 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.

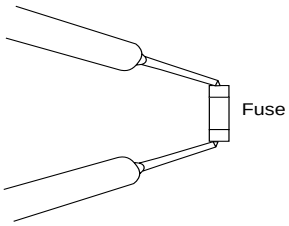


Fig. 6

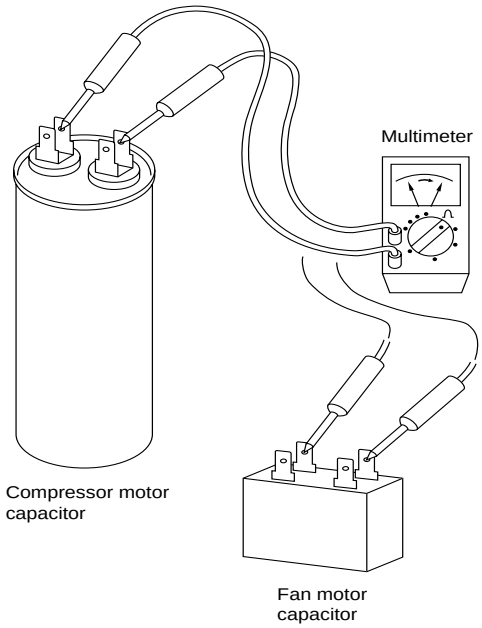


Fig. 7

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