

TECHNICAL DATA & SERVICE MANUAL

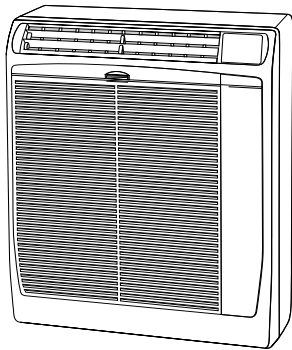


**INDOOR UNIT: KAF97R5IAA
KPAF127R5IAA
KPAF187R5IAA
KPAF247R5IAA**

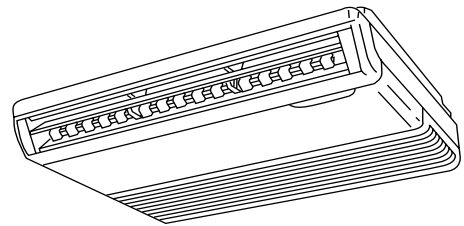
SPLIT SYSTEM AIR CONDITIONER

Model No.	Product Code No.
KAF97R5IAA	38.7105.973

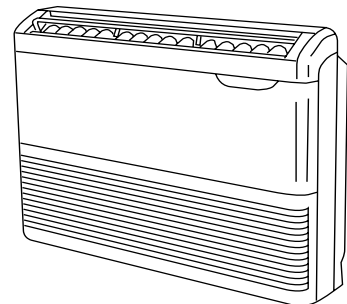
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KPAF187R5IAA	38.7105.975
KPAF247R5IAA	38.7105.976



KAF97R5IAA



KPAF127/187/247R5IAA





RoHS

This product does not contain any hazardous substances prohibited by the RoHS Directive.



WARNING

You are requested to use RoHS compliant parts for maintenance or repair.
You are requested to use lead-free solder.

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 order when removing the units.

WARNING

When wiring



ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY 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

Make sure the ceiling 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 testing 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.

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1. SPECIFICATIONS

1-1 Unit Specifications

KAF97R5I

Power source	220 - 240 V ~ 50 Hz
---------------------	---------------------

Voltage rating	230 V
-----------------------	-------

Performance	
Capacity	See catalogue with the requested matching
Air circulation	High/Med./Low m ³ /h 425/390/320

Features	
Controls/Temperature controls	Microprocessor/ I.C. thermostat
Control unit	Wireless remote control unit
Timer	ON/OFF 24 hours & Daily program, 1-hour OFF
Fan speed	3 and Auto /1(Hi)
Airflow direction	Vertical manual orizzontal manual
Air Filter	Washable, Anti-Mold
Power noise level	High/Med./Low dB-A 51/48/42
Refrigerant tubing connections	Flare type
Refrigerant tube diameter	Narrow tube mm(in.) 6,35 (1/4) Wide tube mm(in.) 9,52 (3/8)
Refrigerant	R410A
Refrigerant tube kit / Air clean filter	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

KPAF127R5I

Power source	220 - 240 V ~ 50 Hz
---------------------	---------------------

Voltage rating	230 V
-----------------------	-------

Performance	
Capacity	See catalogue with the requested matching
Air circulation	High/Med./Low m ³ /h 700/590/500

Features		
Controls/Temperature controls	Microprocessor/ I.C. thermostat	
Control unit	Wireless remote control unit	
Timer	ON/OFF 24 hours & Daily program, 1-hour OFF	
Fan speed	3 and Auto /1(Hi)	
Airflow direction	Vertical	Auto
	Orizzontal	Manual
Air Filter	Washable, Anti-Mold	
Power noise level	High/Med./Low dB-A 55/51/46	
Refrigerant tubing connections	Flare type	
Refrigerant tube diameter	Narrow tube mm(in.)	6,35 (1/4)
	Wide tube mm(in.)	9,52 (3/8)
Refrigerant	R410A	
Refrigerant tube kit / Air clean filter	Optional / -----	

Dimensions & Weight			
Unit dimensions	Height	mm	680
	Width	mm	900
	Depth	mm	190
Package dimensions	Height	mm	813
	Width	mm	1011
	Depth	mm	296
Weight	Net	kg	23,5
	Shipping	kg	31,5
Shipping volume		m ³	0,24

DATA SUBJECT TO CHANGE WITHOUT NOTICE

KPAF187R5I

Power source	220 - 240 V ~ 50 Hz
---------------------	---------------------

Voltage rating	230 V
-----------------------	-------

Performance	
Capacity	See catalogue with the requested matching
Air circulation	High/Med./Low m ³ /h 720/615/515

Features		
Controls/Temperature controls	Microprocessor/ I.C. thermostat	
Control unit	Wireless remote control unit	
Timer	ON/OFF 24 hours & Daily program, 1-hour OFF	
Fan speed	3 and Auto /1(Hi)	
Airflow direction	Vertical	Auto
	Orizzontal	Manual
Air Filter	Washable, Anti-Mold	
Power noise level	High/Med./Low dB-A 56/52/47	
Refrigerant tubing connections	Flare type	
Refrigerant tube diameter	Narrow tube mm(in.)	6,35 (1/4)
	Wide tube mm(in.)	12,7 (1/2)
Refrigerant	R410A	
Refrigerant tube kit / Air clean filter	Optional / -----	

Dimensions & Weight			
Unit dimensions	Height	mm	680
	Width	mm	900
	Depth	mm	190
Package dimensions	Height	mm	813
	Width	mm	1011
	Depth	mm	296
Weight	Net	kg	23,5
	Shipping	kg	31,5
Shipping volume		m ³	0,24

DATA SUBJECT TO CHANGE WITHOUT NOTICE

KPAF247R5I

Power source	220 - 240 V ~ 50 Hz
---------------------	---------------------

Voltage rating	230 V
-----------------------	-------

Performance	
Capacity	See catalogue with the requested matching
Air circulation	High/Med./Low m ³ /h 900/800/650

Features	
Controls/Temperature controls	Microprocessor/ I.C. thermostat
Control unit	Wireless remote control unit
Timer	ON/OFF 24 hours & Daily program, 1-hour OFF
Fan speed	3 and Auto /1(Hi)
Airflow direction	Vertical Auto Orizzontal Manual
Air Filter	Washable, Anti-Mold
Power noise level	High/Med./Low dB-A 58/55/52
Refrigerant tubing connections	Flare type
Refrigerant tube diameter	Narrow tube mm(in.) 6,35 (1/4) Wide tube mm(in.) 15,88 (5/8)
Refrigerant	R410A
Refrigerant tube kit / Air clean filter	Optional / -----

Dimensions & Weight			
Unit dimensions	Height	mm	680
	Width	mm	900
	Depth	mm	190
Package dimensions	Height	mm	813
	Width	mm	1011
	Depth	mm	296
Weight	Net	kg	23,5
	Shipping	kg	31,5
Shipping volume		m ³	0,24

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1-2 Major Component Specifications

KAF97R5I

Controller PCB	
Part No.	CB-FRV93EH
Controls	Microprocessor
Control circuit fuse	250 V - 3,15 A

Remote Control Unit	RCS-4HVPN4EX
---------------------	--------------

Fan & Fan Motor	
Type	Cross - flow
Q'ty Dia. and length	mm 1.... Ø 100 / L 410
Fan motor model...Q'ty	K35406 M01892 ... 1
No. of poles...rpm (230 V, Hi / Me / Lo)	4... 425 / 390 / 320
Running Amps	A 0,12
Power input	W 26
Coil resistance (Ambient temp. 20 °C)	Ω GRY-WHT: 545÷630 WHT-VLT: 92÷105 VLT-YEL: 62÷71 GRY-BRN: 78÷90
Safety devices	Type Internal thermal protector
Operating temp. Open	°C 150 ± 10
Close	Automatic
Run capacitor	μF 1,5
	VAC 440

Heat Exch. Coil	
Coil	Aluminium plate fin / Copper tube
Rows	1
Fin pitch	mm 1,4
face area	m ² 0,185

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KPAF127R5I

Controller PCB	
Part No.	CB-FTRV123EH
Controls	Microprocessor
Control circuit fuse	250 V - 3,15 A

Remote Control Unit	RCS-4HVPN4EX
---------------------	--------------

Fan & Fan Motor	
Type	Cross - flow
Q'ty Dia. and length	mm 2.... Ø 130 / L 180
Fan motor model...Q'ty	K48407 M01596 ... 1
No. of poles...rpm (230 V, High / 2nd / 3rd / Low)	4... 1160 / 970 / 810 / 580
Running Amps	A 0,29
Power input	W 65
Coil resistance (Ambient temp. 20 °C)	Ω GRY-WHT: 298÷343 WHT-PNK: 421÷485 WHT-VLT: 93,5÷108 VLT-ORG: 93,5÷108 ORG-YEL: 211÷243
Safety devices	Type Internal thermal protector
	Operating temp. Open °C 145 ± 5
	Close Automatic
Run capacitor	μF 2
	VAC 440

Flap Motor	
Type	Stepping motor
Model	MP24GA2
Rating	DC 12 V
Coil resistance (Ambient temp. 25 °C)	Ω 400±7%

Heat Exch. Coil	
Coil	Aluminium plate fin / Copper tube
Rows	2
Fin pitch	mm 1,8
face area	m2 0,192

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KPAF187R5I

Controller PCB	
Part No.	CB-FTRV184EH
Controls	Microprocessor
Control circuit fuse	250 V - 3,15 A

Remote Control Unit	RCS-4MHVPNW4EX
---------------------	----------------

Fan & Fan Motor	
Type	Cross - flow
Q'ty Dia. and length	mm 2.... Ø 130 / L 180
Fan motor model...Q'ty	K48410 M01597 ...1
No. of poles...rpm (230 V, High / 2nd / 3rd / Low)	4... 1280 / 1095 / 920 / 590
Running Amps	A 0,34
Power input	W 72
Coil resistance (Ambient temp. 20 °C)	Ω GRY-WHT: 194÷223 WHT-PNK: 238÷274 WHT-VLT: 80,1÷92,2 VLT-ORG: 80,1÷92,2 ORG-YEL: 200÷230
Safety devices	Type Internal thermal protector
Operating temp. Open	°C 145 ± 5
Close	Automatic
Run capacitor	μF 2
	VAC 440

Flap Motor	
Type	Stepping motor
Model	MP24GA2
Rating	DC 12 V
Coil resistance (Ambient temp. 25 °C)	Ω 400±7%

Heat Exch. Coil	
Coil	Aluminium plate fin / Copper tube
Rows	2
Fin pitch	mm 1,8
face area	m2 0,192

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KPAF247R5I

Controller PCB	
Part No.	CB-FTRV244EH
Controls	Microprocessor
Control circuit fuse	250 V - 3,15 A

Remote Control Unit	RCS-4MHVPNW4EX
---------------------	----------------

Fan & Fan Motor	
Type	Cross - flow
Q'ty Dia. and length	mm 2.... Ø 130 / L 180
Fan motor model...Q'ty	K48410 M01598 ...1
No. of poles...rpm (230 V, High / 2nd / 3rd / Low)	4... 1370 / 1230 / 990 / 540
Running Amps	A 0,35
Power input	W 74
Coil resistance (Ambient temp. 20 °C)	Ω GRY-WHT: 124÷144
	WHT-PNK: 255÷294
	WHT-VLT: 69,3÷79,8
	VLT-ORG: 69,3÷79,8
	ORG-YEL: 200÷233
Safety devices	Type Internal thermal protector
	Operating temp. Open °C 145 ± 5
	Close Automatic
Run capacitor	µF 2
	VAC 440

Flap Motor	
Type	Stepping motor
Model	MP24GA2
Rating	DC 12 V
Coil resistance (Ambient temp. 25 °C)	Ω 400±7%

Heat Exch. Coil	
Coil	Aluminium plate fin / Copper tube
Rows	3
Fin pitch	mm 0,6
face area	m2 0,155

DATA SUBJECT TO CHANGE WITHOUT NOTICE

1-3 Other Component Specifications

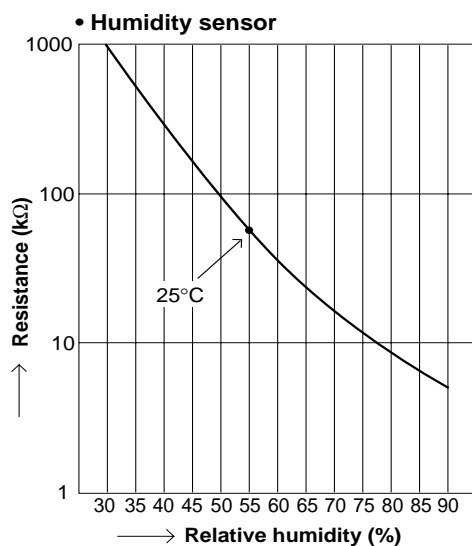
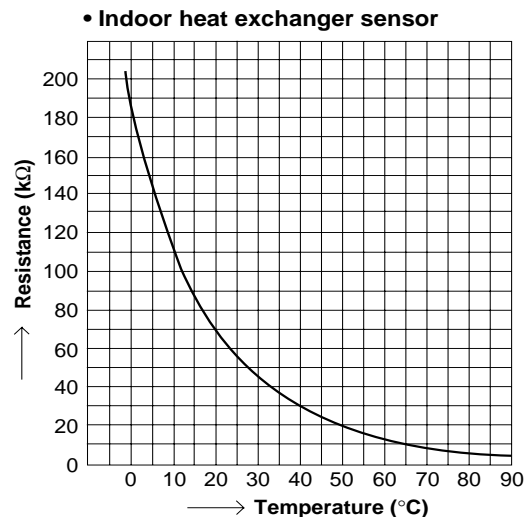
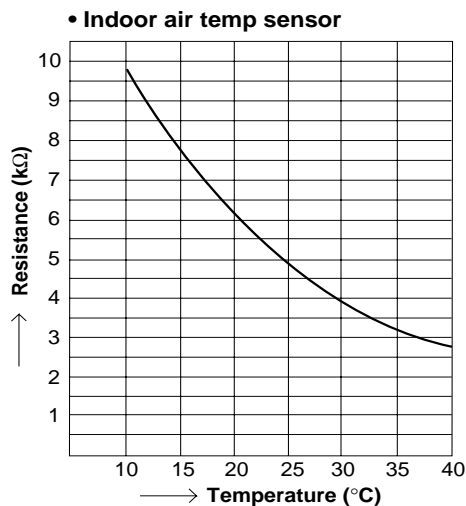
KAF97R5I
KPAF127/187/247R5I

Trasformer (TR)		ATR-I55
Rating	Primary Secondary Capacity	AC 230 V, 50/60 Hz 13.7 V - 0.4 A 5.48 VA
Coil resistance	Ω (at 25°C)	Primary (WHT-WHT): $307 \pm 10\%$ Secondary (BRN-BRN): $1.8 \pm 10\%$
Thermal cut-off temp.		150°C

Thermistor (Coil sensor TH1)		DTN-C583G3U-TKS121B
Resistance	$k\Omega$	0 °C: $188,0 \pm 4\%$

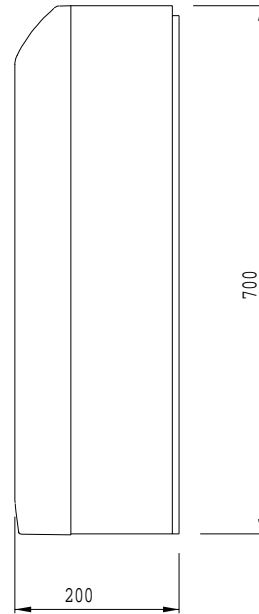
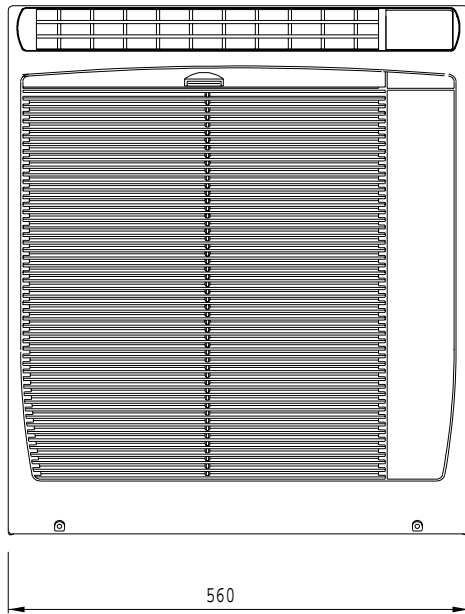
Thermistor (Room sensor TH2)		DTN-C502H3T-TKS128B
Resistance	$k\Omega$	25 °C: $5,0 \pm 3\%$

Thermistor (Humidity sensor TH3)		C7-M3-SY
Resistance	$k\Omega$	25°C - 60% RH ($\pm 5\%$ RH): 31,0



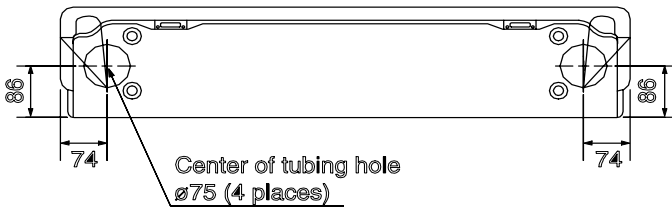
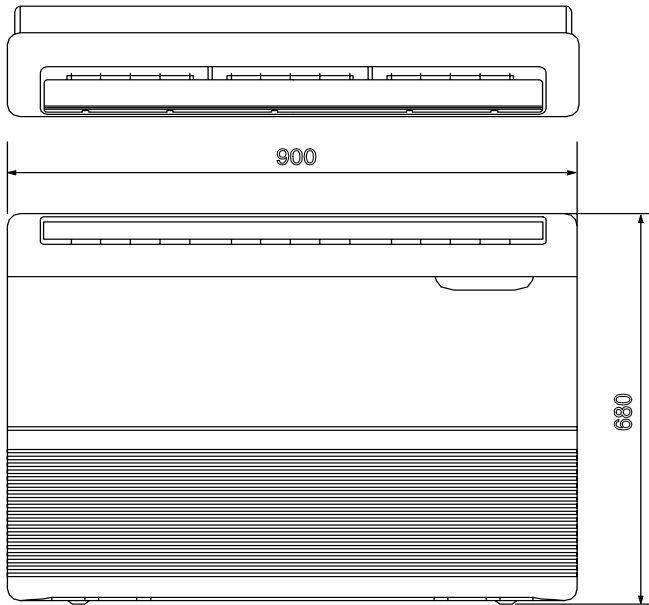
2. DIMENSIONAL DATA

KAF97R5I



Unit: mm

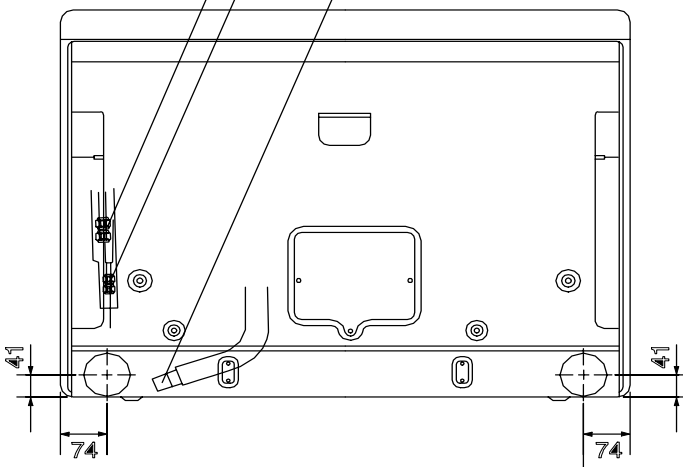
KPAF127/187/247R5I



FCI35AHL d. 9,52 (3/8)
 FCI55AHL d. 12,7 (1/2)
 Wide Tube FCI70AHL d. 15,88 (5/8)

Narrow tube ø6.35 (1/4")

Drain hose ø26

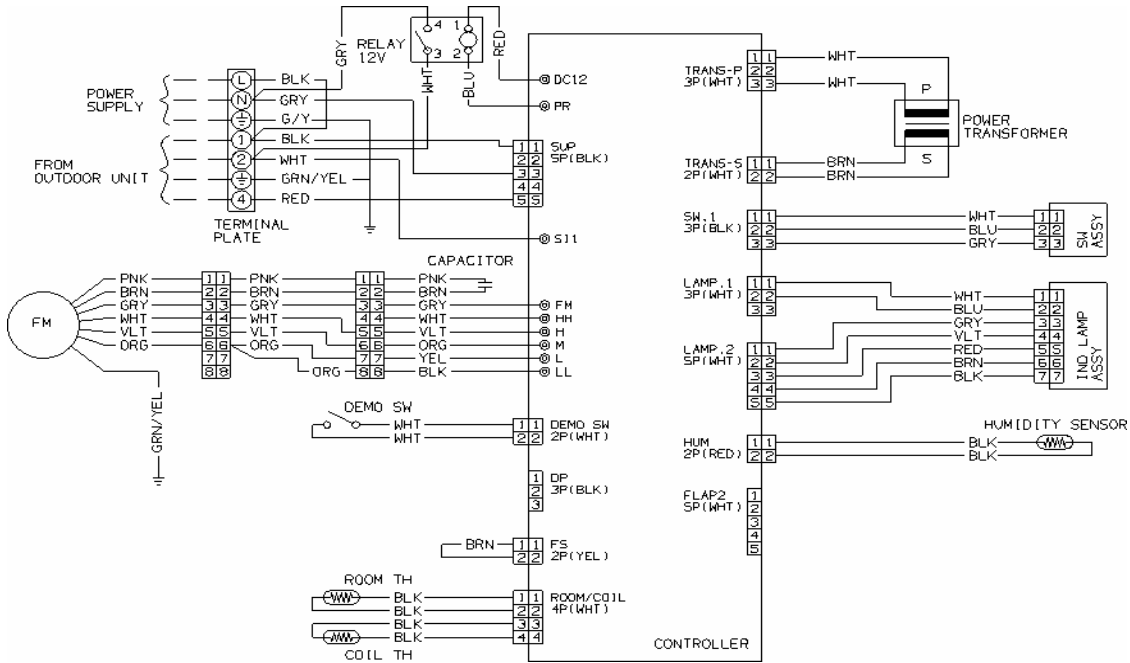


Unit: mm

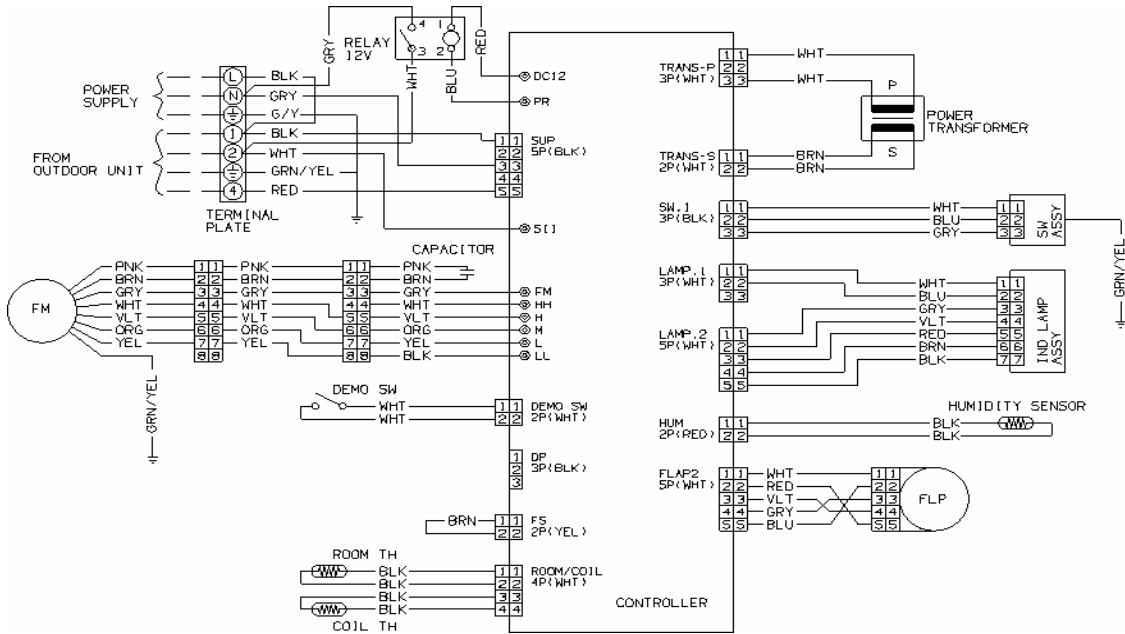
3. ELECTRICAL DATA

3-1 Electric Wiring Diagrams

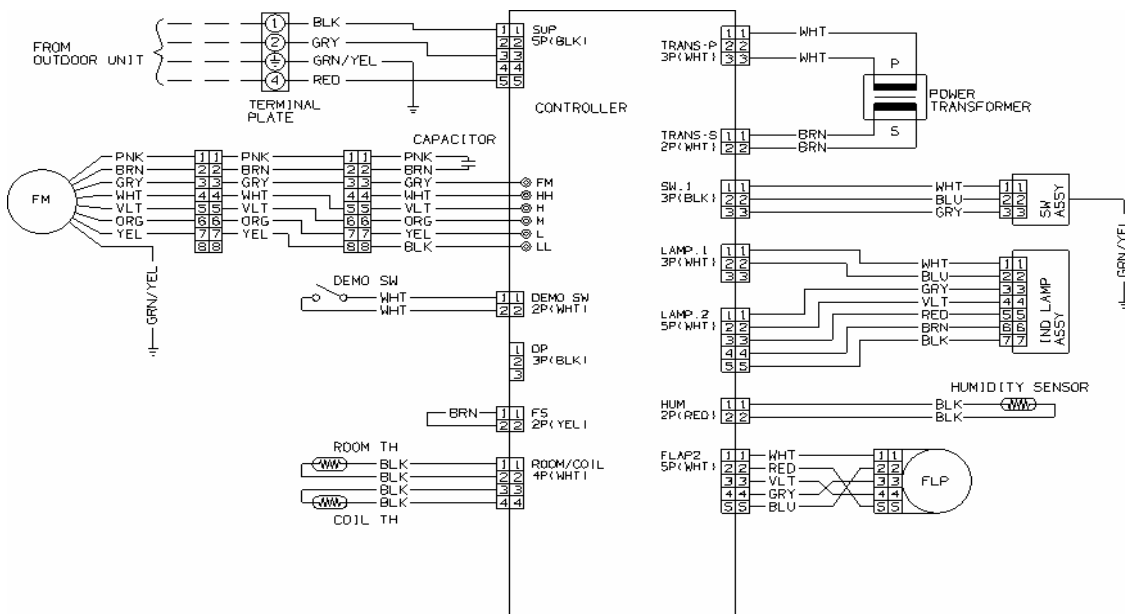
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KPAF187/247R5I



4. PERFORMANCE DATA

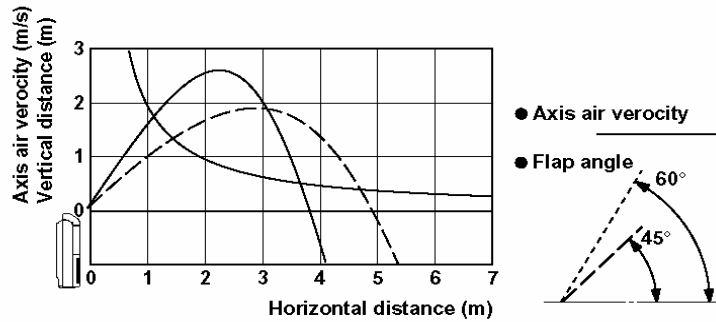
4-1 Air Throw Distance Chart

KPAF127R5I

Floor Mounted

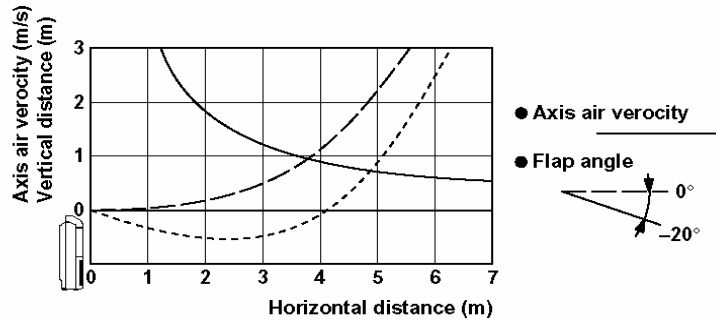
Cooling

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



Heating

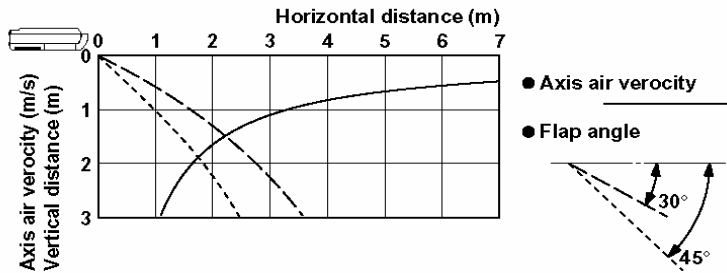
Room air temp. : 20°C
Fan speed : High



Ceiling Mounted

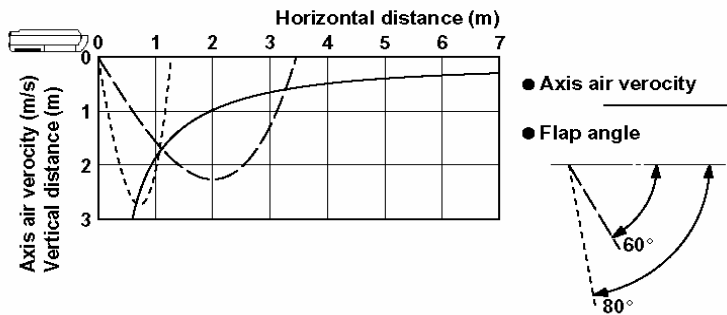
Cooling

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



Heating

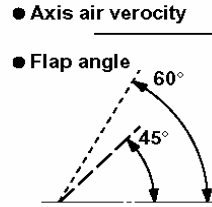
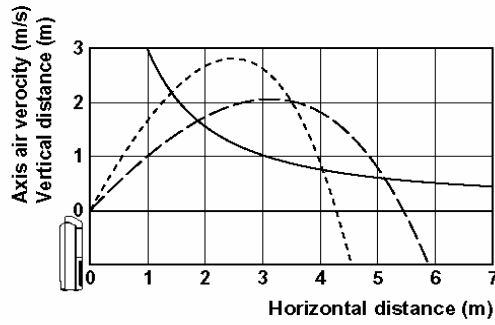
Room air temp. : 20°C
Fan speed : High



Floor Mounted

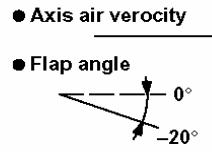
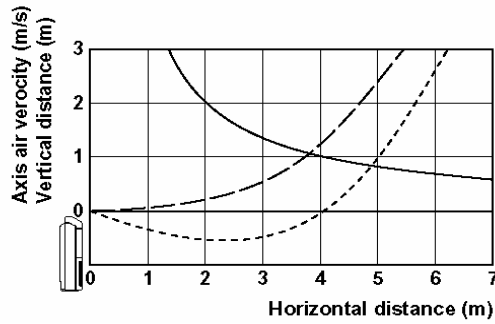
Cooling

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



Heating

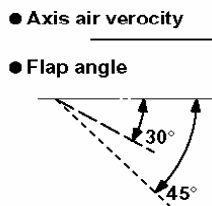
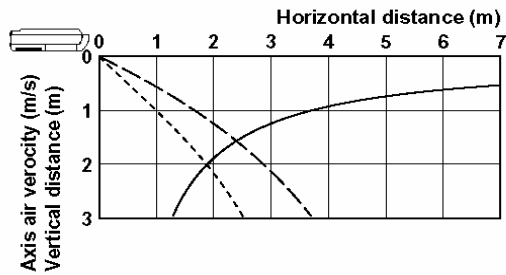
Room air temp. : 20°C
 Fan speed : High



Ceiling Mounted

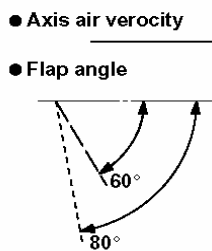
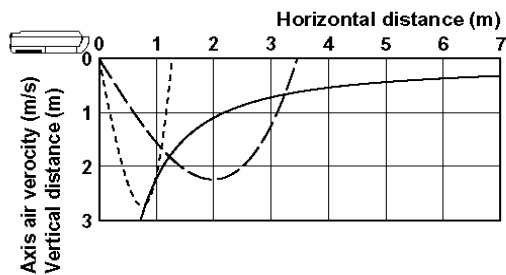
Cooling

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



Heating

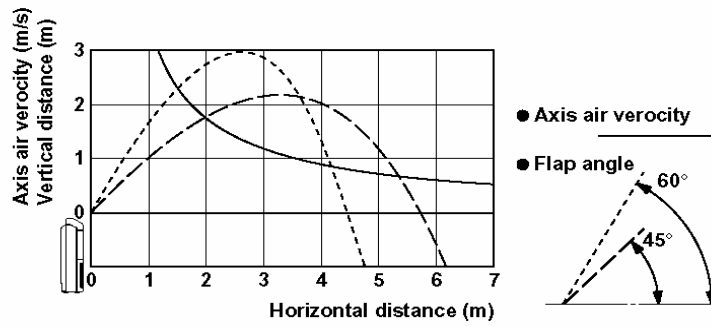
Room air temp. : 20°C
 Fan speed : High



Floor Mounted

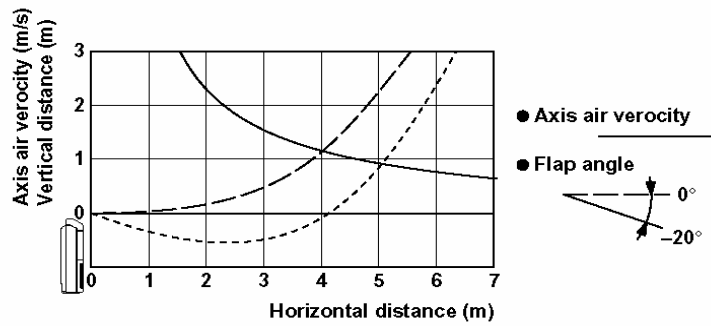
Cooling

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



Heating

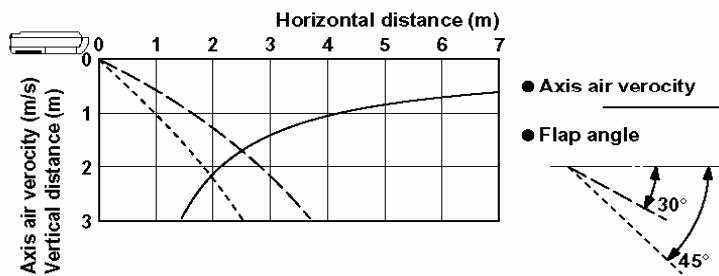
Room air temp. : 20°C
 Fan speed : High



Ceiling Mounted

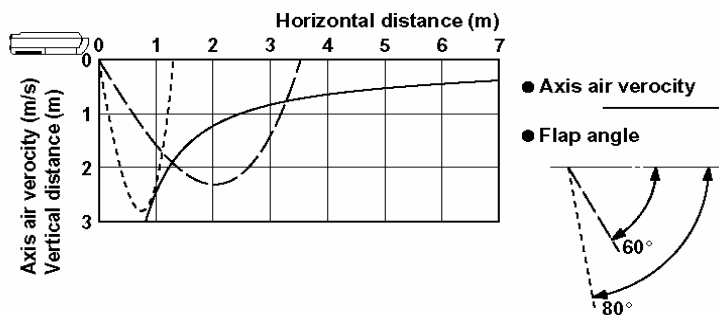
Cooling

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



Heating

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



5. FUNCTIONS

5-1 Operation Functions

■ Functions of the main unit controller

- ① **OFF** : • Used to stop the unit when the remote controller is unavailable.
• Used when service inspection is performed.
- ② **ON** : • During normal operation: Starts operation from the remote controller.
• Emergency operation: When the remote controller is unavailable, moving this switch from the OFF position to the ON position starts automatic operation (AUTO - 23°set temp).
- ③ **TEST** : • Used when operating performance are checked.
• Used when pump-down is carried out. (Operates at the rated frequency. At this time, the main unit lamp flashes, and the remote controller signal cannot be received.)
- ④ **DEMO** : • This function is for shop displays. Ordinarily it is not used.
• Used during servicing.

■ AUTO cooling/heating operation

● Selecting the operation mode

- 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.

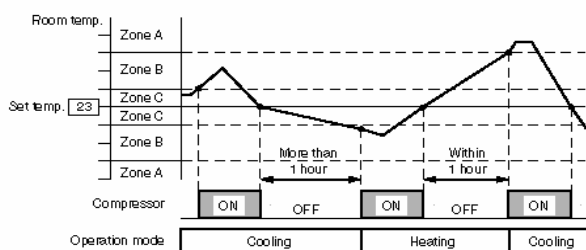
Room temp. \geq Set temp. \rightarrow COOL

Room temp. $<$ Set temp. \rightarrow HEAT

- As shown by the example in the figure below, with AUTO cooling/heating operation, the mode changes between Heating and Cooling mode according to changes in the relationship between the current room temperature and the set temperature.

Example

Example of operation in AUTO mode with the set room temperature at 23°C.

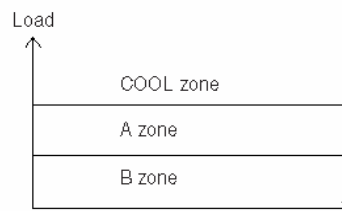


■ SENSOR DRY

During DRY operation, the system adjusts the room temperature and fan speed according to the conditions in the room, in order to maintain a comfortable room environment.

SENSOR DRY operation

- DRY operation is as shown in the figure below.



Conditions are monitored at all times when the room temperature is below 15°C.

DRY A

The compressor operation frequency varies.
The indoor fan operates with 1/f fluctuation.

DRY B

The compressor operates at a low operating frequency.
The indoor fan operates with 1/f fluctuation.

Monitor

- Monitoring operation takes place when the room temperature is below 15°C, or more than 3°C below the set temperature.
- When the monitoring range is entered, the compressor stops, and the indoor fan operates with 1/f fluctuation.

NOTE

The Sensor Dry operation during the Low Ambient Cooling Mode (outside air temperature: 15°C or lower) is as follows.

DRY A and DRY B

The compressor operates a cycle of 3 minutes ON and 6 minutes OFF repeatedly.

■ PAM- α control

- In order to further improve inverter performance, control is switched between PWM control at low operation speeds, and PAM control at high operation speeds, making the most effective use of power.

■ HIGH POWER

This function acts to raise the power but keeps the AC system in the same operating mode.

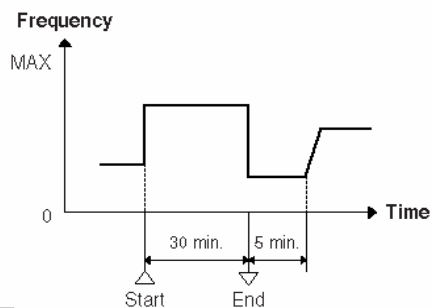
This function is set with the HIGH POWER button on the remote controller.

(It can be set regardless of the temperature and fan speed settings.)

● HIGH POWER operation from remote controller

The unit operates at maximum output for 30 minutes, regardless of the desired temperature.

The fan speed is 1 step above "High."



NOTE

- When HIGH POWER operation ends, the unit operates at low Hz for 5 minutes, regardless of the thermostat OFF conditions.
- When in DRY mode, operation is in the cooling zone.

■ Lamp colors

OPERATION lamp

HEAT operation	Red
DRY operation	Orange
COOL operation	Green
FAN operation	Green
DEFROSTING operation	Red and Orange alternately

TIMER lamp

Green

QUIET lamp

Green

ION lamp

Green

■ Timer backup

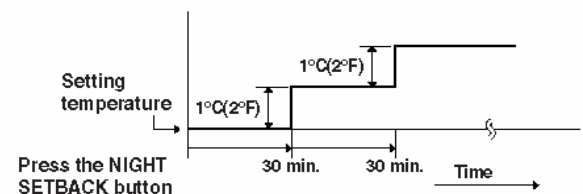
- Operation stops if there are no operator controls for 25 hours or longer after unit operation switched from OFF to ON by use of ON timer operation.

■ NIGHT SETBACK

- When NIGHT SETBACK operation is set, the temperature and fan speed settings will be adjusted automatically to allow comfortable sleep.
- When NIGHT SETBACK operation is set, "☺" mark appears on the remote controller. The main unit display lamp also becomes dimmer.

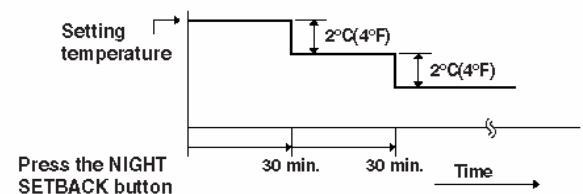
● COOL and DRY modes

When the night setback mode is selected, the air conditioner automatically raises the temperature setting 1°C when 30 minutes have passed after the selection was made, and then another 1°C after another 30 minutes have passed, regardless of the indoor temperature when night setback was selected. This enables you to save energy without sacrificing comfort. This function is convenient when gentle cooling is needed.



● HEAT mode

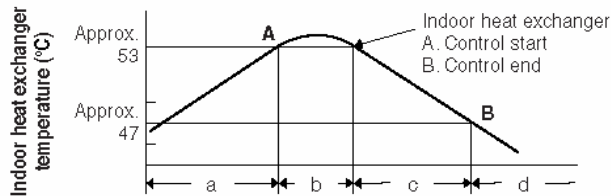
When the night setback mode is selected, the air conditioner automatically lowers the temperature setting 2°C when 30 minutes have passed after the selection was made, and then another 2°C after another 30 minutes have passed, regardless of the indoor temperature when night setback was selected. This enables you to save energy without sacrificing comfort. This function is convenient when gentle heating is needed.



5-2 Protective Functions

■ Overload prevention during heating

During HEAT operation, the temperature of the indoor heat exchanger is used to control the frequency and lessen the load on the compressor before the protective device is activated.

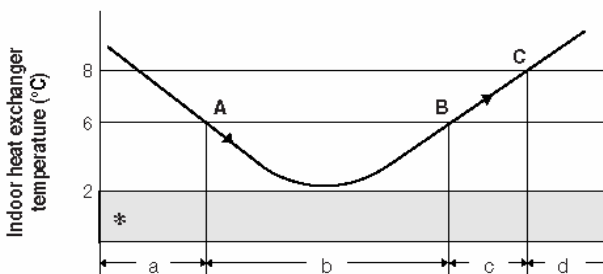


- Area: Automatic capacity control
- When Point A has been exceeded, the operation frequency is reduced by a certain proportion.
- Area: Frequency increase is prohibited.
- At Point B and below, overload prevention is ended and control is the same as in the a area.

■ Freeze prevention

During COOL or DRY operation, freezing is detected and operation is stopped when the temperature of the indoor heat exchanger matches the conditions below.

- Freeze-prevention operation is engaged when the temperature of the indoor heat exchanger is below 6 °C.
- Restart after freeze-prevention operation occurs when the temperature of the indoor heat exchanger reaches 8 °C or above.



- Area: Automatic capacity control
- When the temperature drops below Point A, the operation frequency is reduced by a certain proportion.
- Area: Frequency increase is prohibited.
- When the temperature reaches Point C or above, freezing prevention is ended and control is the same as in the a area.

* When the temperature drops to below 2 °C (continuously for 2 minutes or longer), the compressor stops. Once the freeze condition is detected, the air conditioner will work less than the maximum frequency until it is turned off.

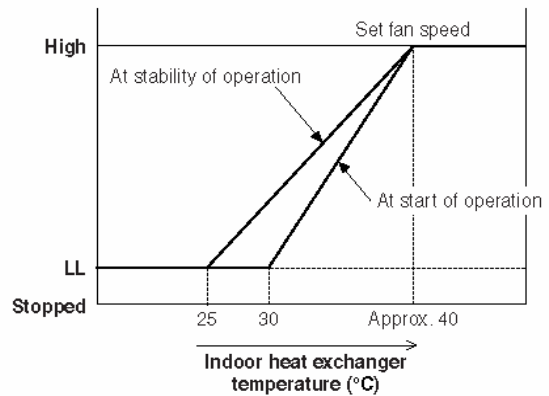
NOTE

The Freeze Prevention Control during the Low Ambient Cooling Mode (outside air temperature: 15 °C or lower) is as follows.

- The compressor stops when the temperature of indoor heat exchanger becomes less than 2 °C.
- The compressor restarts when the temperature of indoor heat exchanger becomes 8 °C or higher.

■ Cold-air prevention during heating

During heating, the fan speed is set to "LL" (very low) or stopped. As the temperature of the indoor heat exchanger rises, the fan speed is changed to the set speed.



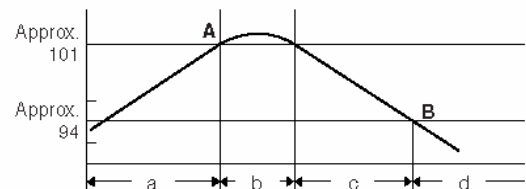
NOTE

- The fan speed is forcibly changed to "LL" beginning 30 seconds after the thermostat turns OFF.
- At stability of operation refers to operation when the room temperature has approached the set temperature.
- When HEAT operation starts, the indoor fan is stopped until the temperature of the indoor heat exchanger reaches 20 °C or higher, or until the room temperature reaches 15 °C or higher.

■ Compressor discharge temperature control

This function controls the operation frequency to prevent the compressor discharge temperature from rising more than a specified temperature.

Compressor discharge temperature (°C)

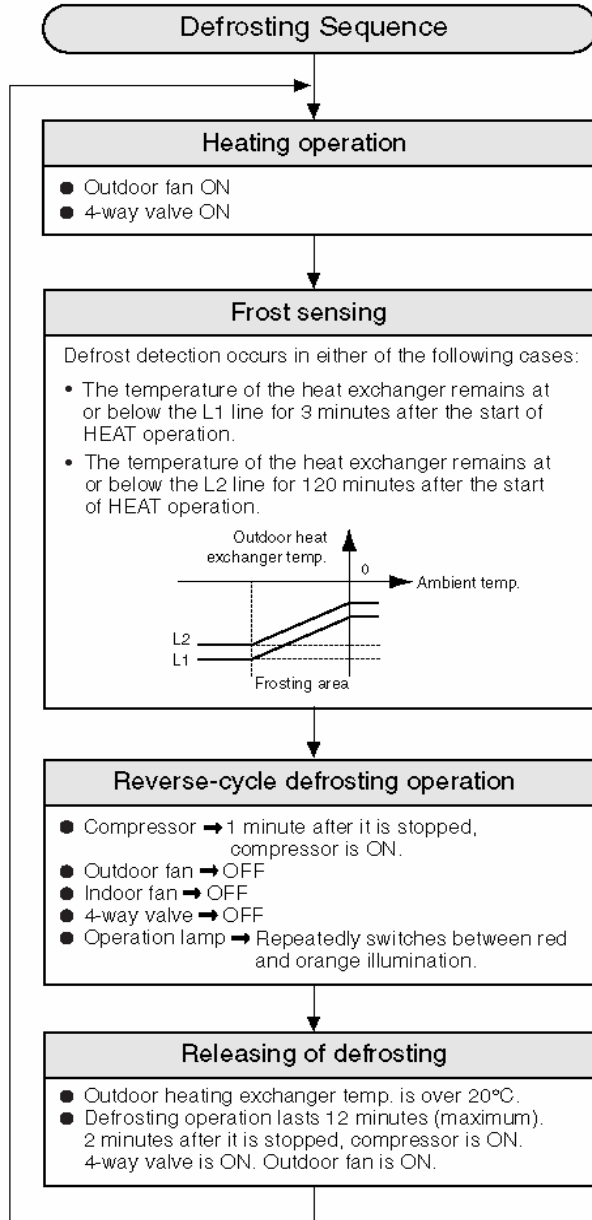


- Area: Automatic capacity control.
- When the temperature rises above Point A, the operation frequency is reduced at a specified rate.
- Area: Further frequency increase is prohibited.
- When the temperature falls below Point B, prevention of a rise in frequency is released and the air conditioner operates as in a area.

* The compressor will stop if the temperature of the compressor discharge exceeds 120 °C due to shortage of gas or other reason.

■ Defrost detection and release

● Reverse-Cycle Defrosting



NOTE

If the air conditioner is turned off during the defrosting cycle, it will continue defrosting and turn itself off after defrosting is completed.

■ CT (Peak current cut-off control)

- This function prevents the circuit breaker or fuse from operating to open the circuit. This function works when electrical current has increased due to an increase in the cooling / heating load, or to a decrease in the power supply voltage. In these cases, operation frequency is reduced or operation is interrupted automatically to control the electrical current for operation.
- When the cause of the increase in electrical current is rectified, the system will resume operation in the original mode.

(A)

	Cooling • Dry	Heating
Peak current cut-off trips	22.5	
Hz down	14.0	15.0

NOTE Electrical current setting for COOL operation is used during DEFROST operation.

■ Operation Cut-Off Control in abnormal ambient temperature

- The following three protective actions are available to prevent the compressor from operating with abnormal loads. At that time, they initiate thermo-off (stopping the outdoor unit) of the air conditioner.

● Mode : Cooling

Cut-off action	Thermo-off t : ambient temp	Thermo-on t : ambient temp
Low ambient temp. cut-off	$t \leq -22\text{ }^{\circ}\text{C}$	$t > -18\text{ }^{\circ}\text{C}$

● Mode : Heating

Cut-off action	Thermo-off t : ambient temp	Thermo-on t : ambient temp
High ambient temp. cut-off	$t \geq 25\text{ }^{\circ}\text{C}$	$t < 24\text{ }^{\circ}\text{C}$
Low ambient temp. cut-off	$t \leq -20\text{ }^{\circ}\text{C}$	$t > -16\text{ }^{\circ}\text{C}$

6. TEST RUN

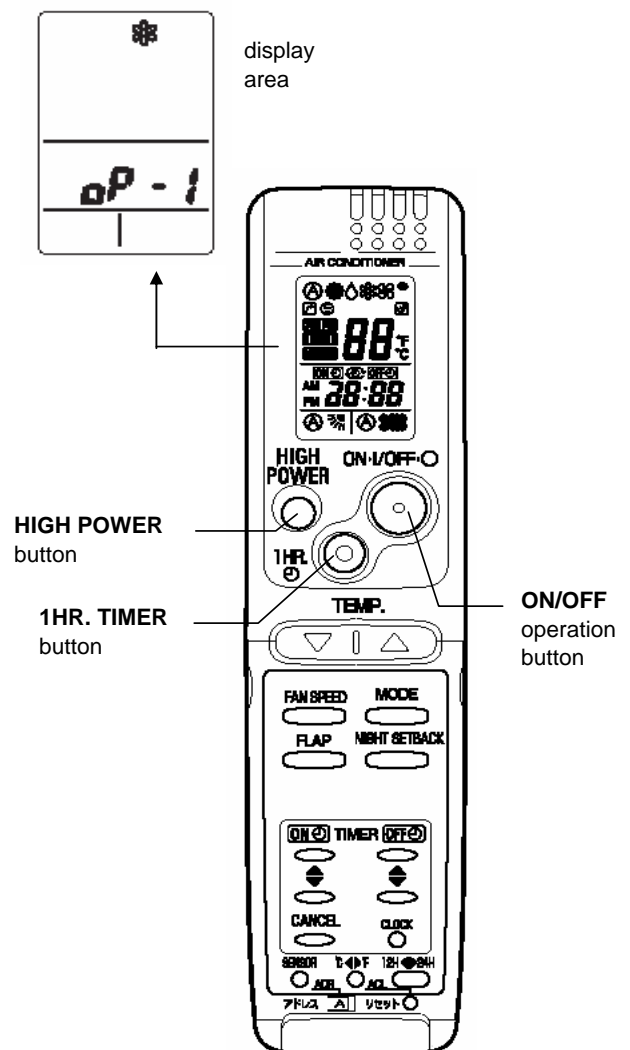
6-1 How to Test Run the Air Conditioner

After turning on power to the air conditioner, use the remote controller and follow the steps below to conduct the test run.

- (1) Set the remote controller in Test Run mode.
 - a) Press and hold the HIGH POWER button.
 - b) Then press and hold the 1HR TIMER button.
 - c) At the same time, press the ACL (reset) button once.
Use a pointed object such as the tip of a pen to press the ACL button.
 - After a few seconds, "❄" appears and "oP-1" blinks in the remote controller display area.
 - d) Release the 1HR TIMER button.
 - e) Release the HIGH POWER button.
- (2) Start Cooling mode test run by pressing the ON/OFF operation button of the remote controller.
 - This starts the fan producing uncooled forced air with the 3 indicator lamps (OPERATION lamp, TIMER lamp, and SERVICE lamp) on the main unit blinking.
 - After 3 minutes, the system shifts into cooling operation, and cool air will start to be felt. Cool mode test run is unaffected by the room temperature.
- (3) Press the ON/OFF operation button of the remote controller again to stop the test run.
- (4) Finally press the ACL (reset) button of the remote controller to release it from Test Run mode to return to normal mode.
 - "❄" and "oP-1" will disappear from the remote controller display area.

IMPORTANT

After the test run is completed, be sure to press the ACL (reset) button to return to normal mode. The air conditioner will not operate correctly if this is not done.



7. TROUBLESHOOTING

7-1 Precaution before Performing Inspection or Repair

- After checking the self-diagnostics monitor, turn the power OFF before starting inspection or repair.
- High-capacity electrolytic capacitors are used inside the outdoor unit controller (inverter). They retain an electrical charge (charging voltage DC 310V) even after the power is turned OFF, and some time is required for the charge to dissipate. Be careful not to touch any electrified parts before the controller LED (red) turns OFF.
If the outdoor controller is normal, approximately 30 seconds will be required for the charge to dissipate. However, allow at least 5 minutes for the charge to dissipate if there is thought to be any trouble with the outdoor controller.

7-2 Method of Self-Diagnostics

Follow the procedure below to perform detailed trouble diagnostics.

NOTE

- 1: If the operation lamp blinks every 0.5 seconds immediately when the power is turned ON, there is an external ROM (OTP data) failure on the indoor circuit board, or a ROM socket insertion problem, or the ROM has not been installed.
- 2: The failure mode is stored in memory even when the power is not ON. Follow the procedure below to perform diagnostics.

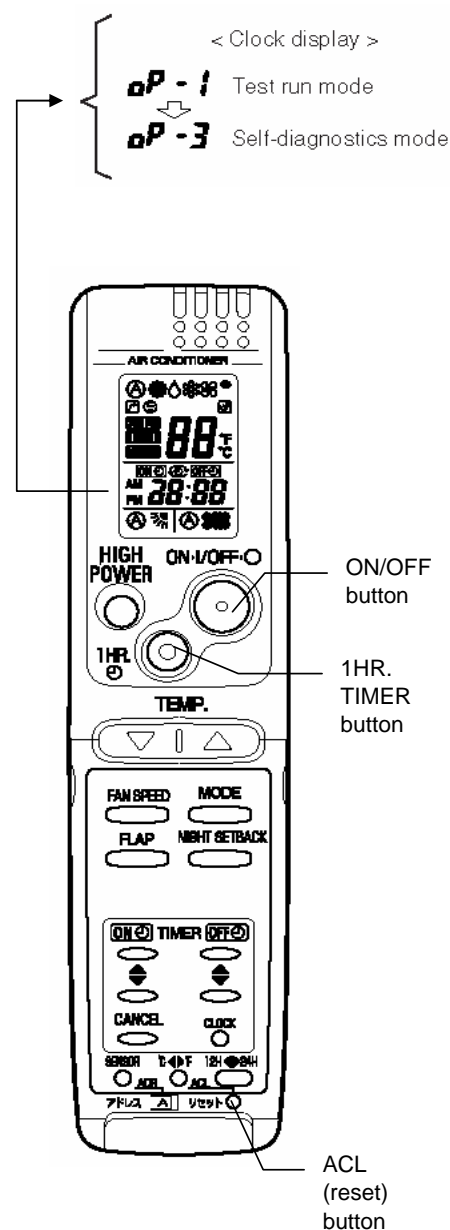
PROCEDURE

After turning on power to the air conditioner, use the remote controller and follow the steps below to execute self-diagnostics.

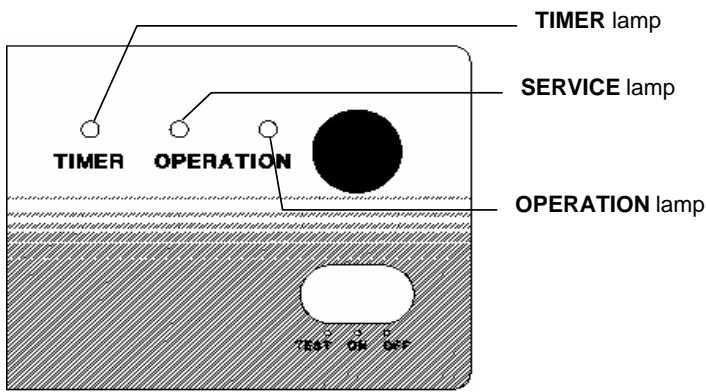
- Step 1: Press and hold the remote controller HIGH POWER button and 1 HR TIMER button. At the same time, press the ACL (reset) button. Use a pointed object such as the tip of a pen to press the ACL button. When this has been done, "oP-1" (test run) appears, blinking, in the remote controller clock display area.
- Step 2: Next, press the 1 HR TIMER button once to change the display from "oP-1" to "oP-3" (self-diagnostics). (The display continues to blink.)
- Step 3: Finally press the ON/OFF button to engage self-diagnostics mode.

- The self-diagnostics function utilizes the 3 indicator lamps on the main unit, in combinations of ON lamps, blinking lamps, and OFF lamps, to report the existence of sensor trouble or a protective operation. (The lamps blink or remain ON for 5 seconds, then turn OFF for 2 seconds.) Self-diagnostics is completed when the buzzer sounds 3 short beeps.
- A maximum of 3 self-diagnostics reports are displayed, for 5 seconds each, beginning with the most recent report. Following this display the lamps turn OFF. In order to view the self-diagnostics results again, press the ON/OFF button again.
- The 3 lamps remain OFF if no trouble has occurred.

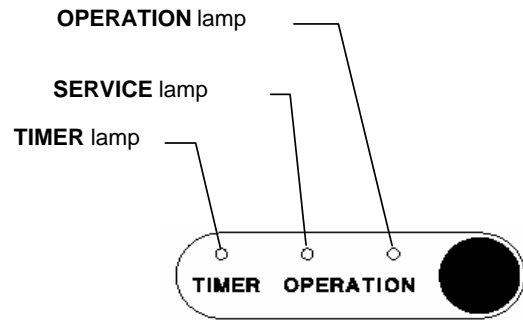
<IMPORTANT> After self-diagnostics is completed, be sure to press the ACL (reset) button to return to normal mode. The air conditioner will not operate if this is not done.



(1) Self-diagnostics lamps



KAF97R5I

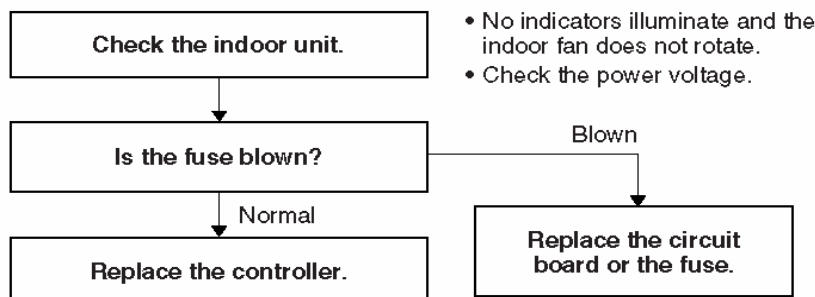


KPAF127/187/247R5I

+ Since the indications cover various units, the corresponding parts listed below may not be present in some models.

INDICATION ON IND.U.				× OFF	⚡ BLINKING	☀ ON
TMR	OPR	SRV	CODE	DIAGNOSIS CONTENTS	POSSIBLE MALFUNCTION	
×	⚡	×	S01	ROOM TEMPERATURE SENSOR TROUBLE	1 OPEN OR SHORT CIRCUIT IN SENSOR	
⚡	×	×	S02	INDOOR HEAT EXCHANGER TEMP.SENSOR TROUBLE	2 POOR CONTACT AT CONNECTOR OR OPEN CIRCUIT AT TERMINAL PRESS-FIT LOCATION (FOR HUMIDITY SENSOR THIS REPRESENTS SHORT-CIRCUIT DETECTION ONLY)	
⚡	⚡	×	S03	HUMIDITY SENSOR TROUBLE	3 INDOOR PCB FAILURE	
×	×	⚡	S04	-COMPRESSOR TEMPERATURE SENSOR TROUBLE	1 OPEN OR SHORT CIRCUIT IN SENSOR	
×	⚡	⚡	S05	-OUTDOOR HEAT EXCH.TEMP.SENSOR TROUBLE	2 POOR CONTACT AT CONNECTOR OR OPEN CIRCUIT AT TERMINAL PRESS-FIT LOCATION	
⚡	×	⚡	S06	-OUTDOOR AIR TEMPERATURE SENSOR TROUBLE	3 OUTDOOR PCB FAILURE	
⚡	⚡	⚡	S07	OUTDOOR CURRENT SENSOR ERROR	OUTDOOR PCB FAILURE	
×	☀	×	E01	INDOOR/OUTDOOR COMMUNICATIONS TROUBLE (SERIAL COMMUNICATIONS TROUBLE)	1 MIS-WIRING, 2 AC POWER FAILURE, 3 BLOWN FUSE, 4 POWER RELAY FAILURE, 5 INDOOR OR OUTDOOR PCB FAILURE	
☀	×	×	E02	-HIC CIRCUIT TROUBLE -POWER TR CIRCUIT TROUBLE	1 HIC OR POWER TR FAILURE, 2 OUTDOOR FAN NOT OPERATING, 3 INSTANTANEOUS POWER STOPPAGE, 4 SERVICE VALVE NOT OPENED, 5 OUTDOOR FAN BLOCKED, 6 CONTINUOUS OVERLOAD OPERATION, 7 COMPRESSOR FAILURE, 8 OUTDOOR PCB FAILURE	
☀	☀	×	E03	OUTDOOR UNIT EXTERNAL ROM TROUBLE	1 EXTERNAL ROM DATA FAILURE, 2 OUTDOOR PCB FAILURE	
×	×	☀	E04	CURRENT PEAK CUT	1 INSTANTANEOUS POWER STOPPAGE, 2 HIC OR POWER TR FAILURE, 3 OUTDOOR PCB FAILURE	
×	☀	☀	E05	-PAM CIRCUIT TROUBLE -ACTIVE CIRCUIT TROUBLE	1 OUTDOOR PCB FAILURE, 2 OUTDOOR POWER VOLTAGE TROUBLE	
☀	×	☀	E06	COMPRESSOR DISCHARGE TEMPERATURE OVERHEATING PREVENTION	1 ELECTRIC EXPANSION VALVE FAILURE, 2 CAPILLARY TUBE CHOKED, 3 INSUFFICIENT GAS, 4 CONTINUOUS OVERLOAD OPERATION, 5 OUTDOOR FAN NOT OPERATING, 6 OUTDOOR PCB FAILURE	
☀	☀	☀	E07	INDOOR FAN OPERATION TROUBLE	1 FAN MOTOR FAILURE, 2 CONNECTOR CONTACT FAILURE, 3 INDOOR PCB FAILURE	
⚡	☀	⚡	E08	-4 WAY VALVE SWITCHING TROUBLE -ZERO-CROSS TROUBLE	1 4 WAY VALVE FAILURE (HEAT PUMP MODELS ONLY), 2 OUTDOOR PCB FAILURE	
☀	⚡	⚡	E09	GASS-LOSS PREVENTION	1 SERVICE VALVE NOT OPENED, 2 INSUFFICIENT GAS	
☀	☀	⚡	E10	DC COMPRESSOR DRIVE CIRCUIT TROUBLE	1 OPEN PHASE, 2 OUTDOOR PCB FAILURE	
⚡	⚡	☀	E11	OUTDOOR DC FAN OPERATION TROUBLE	1 FAN MOTOR FAILURE, 2 CONNECTOR CONTACT FAILURE, 3 OUTDOOR PCB FAILURE	
⚡	☀	☀	E12	-OUTDOOR SYSTEM COMMUNICATIONS FAILURE -OUTDOOR HI-PRESSURE SW. OLR OPERATION -OUTDOOR POWER OPEN PHASE, OUTDOOR FREEZING	1 MIS-WIRING, 2 BLOWN FUSE, 3 POWER RELAY FAILURE, 4 OPEN PHASE, 5 OUTDOOR PCB FAILURE, 6 COMPRESSOR FAILURE	
☀	⚡	☀	E13	FREEZING-PREVENTION OPERATION	1 INDOOR FAN SYSTEM FAILURE, 2 INSUFFICIENT GAS, 3 OPERATION AT LOW TEMPERATURE	

(2) If the self-diagnostics function fails to operate



7-3 Checking the Indoor and Outdoor Units

(1) Checking the indoor unit

No.	Control	Check items (unit operation)
1	Use the remote controller to operate the unit in "TEST run" mode. To determine whether the mode is currently in "TEST run" mode, check the 3 indicator lamps on the unit. If all 3 are blinking, the current mode is "TEST run."	<ul style="list-style-type: none"> The rated voltage must be present between inter-unit wirings 1 and 2. Connect a 5 k ohm resistor between inter-unit wirings 2 and 3. When the voltage at both ends is measured, approximately 12 to 15V DC must be output and the multimeter pointer must bounce once every 8 seconds. Or instead of measuring the voltage, you can insert an LED jig and check that the LED flickers once every 8 seconds.

- If there are no problems with the above, then check the outdoor unit.
- For the "Test run" procedure, refer to 5.1" How to Test Run the Air Conditioner".

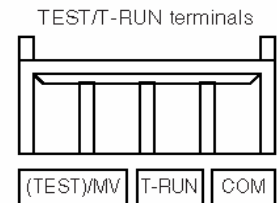
(2) Checking the outdoor unit

No.	Control	Check items (unit operation)
1	Apply the rated voltage between outdoor unit terminals 1 and 2.	<ul style="list-style-type: none"> The control panel LED (red) must illuminate.
2	Short-circuit the outdoor unit COM terminal to the T-RUN terminal.	<ul style="list-style-type: none"> The compressor, fan motor, and 4-way valve must all turn on.

- If there are no problems with the above, then check the indoor unit.

● Using the TEST/T-RUN terminals

T-RUN : Test run (compressor and fan motor turn ON).
 TEST/MV : Compresses time to 1/60th (accelerates operation by 60 times faster than normal).



(3) Checking the serial communications

→ Control 1

→ Control 2

⊗ --- OFF

⦿ --- Blinking

☀ --- Illuminated

Initial self-diagnostics			Short-circuit terminals 2 and 4 on the indoor unit terminal plate.			Short-circuit terminals 2 and 4 on the outdoor unit terminal plate.			Probable location of malfunction
Service (3)	Timer (2)	Operation (1)	Service (3)	Timer (2)	Operation (1)	Service (3)	Timer (2)	Operation (1)	
⊗	⊗	☀	⊗	⊗	☀	—	—	—	Indoor unit circuit board failure
			☀	⦿	☀	☀	⦿	☀	Outdoor unit circuit board failure
			☀	⦿	☀	⊗	⊗	☀	Failure (open circuit, contact failure, etc.) in the inter-unit wirings
☀	⦿	☀	—	—	—	—	—	Outdoor unit circuit board failure	

- Turn the power OFF before performing short circuiting procedures.
- Refer to the previous pages when performing system self-diagnostics.
- So that the check can be made quickly, indicators blink at first communication after power ON.
- Before performing the above checks, perform "TEST run" operation, and check that the rated voltage is output to terminals 1 and 2 on the outdoor unit. If it is not output, there is a failure related to the indoor unit power.

7-4 Noise Malfunction and Electromagnetic Interference

An inverter A/C operates using pulse signal control and high frequencies. Therefore, it is susceptible to the effects of external noise, and is likely to cause electromagnetic interference with nearby wireless devices.

A noise filter is installed for ordinary use, preventing these problems. However, depending on the installation conditions, these effects may still occur. Please pay attention to the points listed below.

(1) Noise malfunction

This refers to the application of high-frequency noise to the signal wires, resulting in abnormal signal pulses and malfunction.

Locations most susceptible to noise	Trouble	Correction
1. Locations near broadcast stations where there are strong electromagnetic waves 2. Locations near amateur radio (short wave) stations 3. Locations near electronic sewing machines and arc-welding machines	Either of the following trouble may occur. 1. The unit may stop suddenly during operation. 2. Indicator lamps may flicker.	(The fundamental concept is to make the system less susceptible to noise.) - Insulate for noise or distance from the noise source. - 1. Use shielded wires. 2. Move unit away from the noise source.

(2) Electromagnetic interference

This refers to noise generated by high-speed switching of the microcomputer and compressor. This noise radiates through space and returns to the electric wiring, affecting any wireless devices (televisions, radios, etc.) located nearby.

Locations most susceptible to noise	Trouble	Correction
1. A television or radio is located near the A/C and A/C wiring. 2. The antenna cable for a television or radio is located close to the A/C and A/C wiring. 3. Locations where television and radio signals are weak.	1. Noise appears in the television picture, or the picture is distorted. 2. Static occurs in the radio sound.	1. Select a separate power source. 2. Keep the A/C and A/C wiring at least 1 meter away from wireless devices and antenna cables. 3. Change the wireless device's antenna to a high-sensitivity antenna. 4. Change the antenna cable to a BS coaxial cable. 5. Use a noise filter (for the wireless device). 6. Use a signal booster.

8. CHECKING ELECTRICAL COMPONENTS

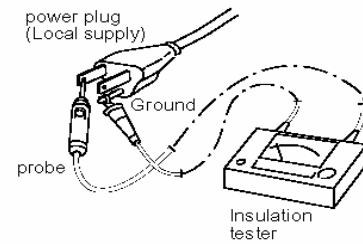
8-1 Measurement of insulation Resistance

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

8-1-1 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 both the two power terminals. (Fig. 1)

Then, also measure the 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.

Fig. 1

8-1-2 Indoor Unit

Clamp a metallic part of the unit 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)

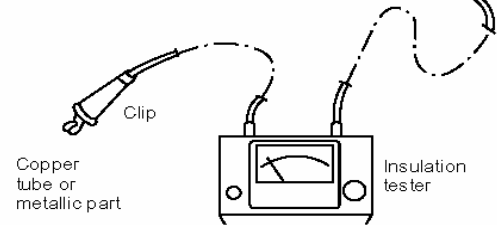
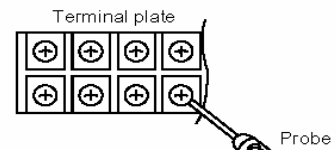


Fig. 2

8-1-3 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.

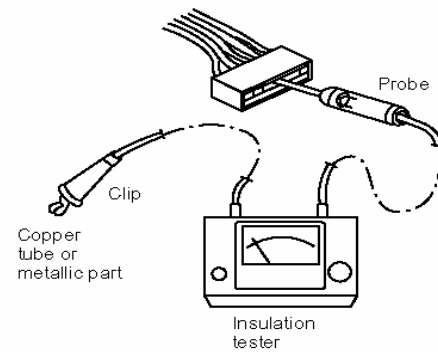


Fig. 3

8-1-4 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.

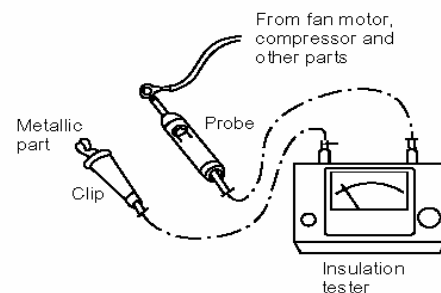


Fig. 4

8-2 Checking Continuity of fuse on PCB Assy

- 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.

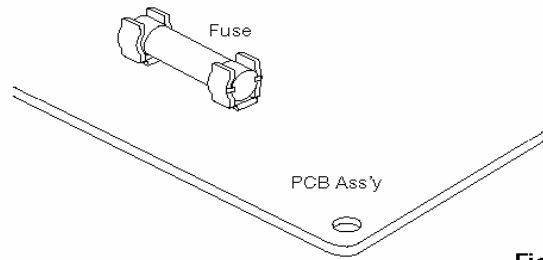


Fig. 5

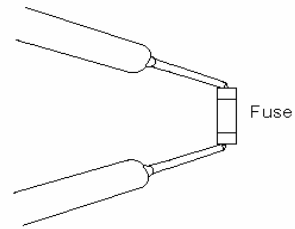


Fig. 6

8-3 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.

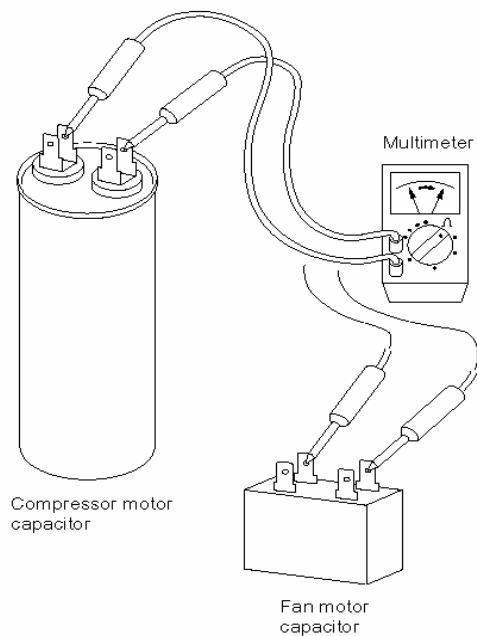


Fig. 7



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