

# TECHNICAL DATA & SERVICE MANUAL



INDOOR UNIT:

**CAF97R5IAA**  
**CAF127R5IAA**  
**CAF187R5IAA**

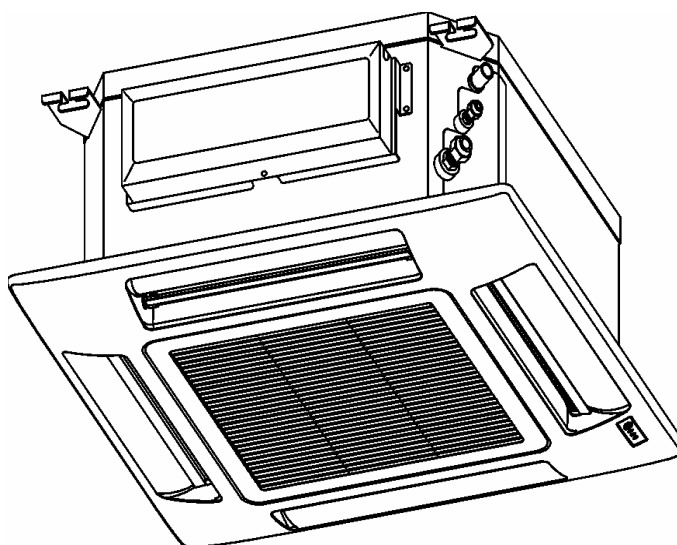
**CAF98MR5IAA**  
**CAF128MR5IAA**

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## SPLIT SYSTEM AIR CONDITIONER

| Model No.   | Product Code No. |
|-------------|------------------|
| CAF97R5IAA  | 38.7106.005      |
| CAF127R5IAA | 38.7106.006      |
| CAF187R5IAA | 38.7106.007      |

|              |             |
|--------------|-------------|
| CAF98MR5IAA  | 38.7106.015 |
| CAF128MR5IAA | 38.7106.016 |





## 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

CAF 97/127 R5IAA - CAF 98/128 MR5IAA

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

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

|                    |                                           |
|--------------------|-------------------------------------------|
| <b>Performance</b> |                                           |
| Capacity           | See catalogue with the requested matching |
| Air circulation    | High/Med./Low m³/h 700/600/500            |

|                                         |                                             |
|-----------------------------------------|---------------------------------------------|
| <b>Features</b>                         |                                             |
| 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                               |
| Air Filter                              | Washable, Anti-Mold                         |
| Power noise level                       | High/Med./Low dB-A 53/49/46                 |
| 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 / -----                            |

|                                |               |          |    |      |
|--------------------------------|---------------|----------|----|------|
| <b>Dimensions &amp; Weight</b> |               |          |    |      |
| Dimensions                     | Unit          | Height   | mm | 273  |
|                                |               | Width    | mm | 575  |
|                                |               | Depth    | mm | 575  |
|                                | Ceiling panel | Height   | mm | 64   |
|                                |               | Width    | mm | 730  |
|                                |               | Depth    | mm | 730  |
| Package dimensions             | Unit          | Height   | mm | 380  |
|                                |               | Width    | mm | 744  |
|                                |               | Depth    | mm | 650  |
|                                |               | Volume   | m³ | 0,18 |
|                                | Ceiling panel | Height   | mm | 110  |
|                                |               | Width    | mm | 800  |
|                                |               | Depth    | mm | 800  |
|                                |               | Volume   | m³ | 0,07 |
| Weight                         | Unit          | Net      | kg | 16,5 |
|                                |               | Shipping | kg | 21   |
|                                | Ceiling panel | Net      | kg | 2,50 |
|                                |               | Shipping | kg | 4,70 |

## CAF 187 R5IAA

|                     |                     |
|---------------------|---------------------|
| <b>Power source</b> | 220 - 240 V ~ 50 Hz |
|---------------------|---------------------|

|                       |       |
|-----------------------|-------|
| <b>Voltage rating</b> | 230 V |
|-----------------------|-------|

|                    |                                           |
|--------------------|-------------------------------------------|
| <b>Performance</b> |                                           |
| Capacity           | See catalogue with the requested matching |
| Air circulation    | High/Med./Low m³/h 790/660/580            |

|                                         |                                             |
|-----------------------------------------|---------------------------------------------|
| <b>Features</b>                         |                                             |
| 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                               |
| Air Filter                              | Washable, Anti-Mold                         |
| Power noise level                       | High/Med./Low dB-A 54/49/46                 |
| Refrigerant tubing connections          | Flare type                                  |
| Refrigerant                             | Narrow tube mm(in.) 6,35 (1/4)              |
| tube diameter                           | Wide tube mm(in.) 12,7 (1/2)                |
| Refrigerant                             | R410A                                       |
| Refrigerant tube kit / Air clean filter | Optional / -----                            |

| Dimensions & Weight |               |          |    |      |
|---------------------|---------------|----------|----|------|
| Dimensions          | Unit          | Height   | mm | 273  |
|                     |               | Width    | mm | 575  |
|                     |               | Depth    | mm | 575  |
|                     | Ceiling panel | Height   | mm | 64   |
|                     |               | Width    | mm | 730  |
|                     |               | Depth    | mm | 730  |
| Package dimensions  | Unit          | Height   | mm | 380  |
|                     |               | Width    | mm | 744  |
|                     |               | Depth    | mm | 650  |
|                     |               | Volume   | m3 | 0,18 |
|                     | Ceiling panel | Height   | mm | 110  |
|                     |               | Width    | mm | 800  |
|                     |               | Depth    | mm | 800  |
|                     |               | Volume   | m3 | 0,07 |
| Weight              | Unit          | Net      | kg | 18,2 |
|                     |               | Shipping | kg | 22,7 |
|                     | Ceiling panel | Net      | kg | 2,50 |
|                     |               | Shipping | kg | 4,70 |

## 1-2 Major Component Specifications

### CAF 97/127 R5IAA - CAF 98/128 MR5IAA

| Controller PCB       |            |                |
|----------------------|------------|----------------|
| Part No.             | CAF97R5I   | CB-XRV93EH     |
|                      | CAF127R5I  | CB-XRV123EH    |
|                      | CAF98MR5I  | CB-XMRV94EH    |
|                      | CAF128MR5I | CB-XMRV124EH   |
| Controls             |            | Microprocessor |
| Control circuit fuse |            | 250 V - 3,15 A |

| Remote Control Unit | CAF97/127R5I  | RCS-4HVPN4EX  | RCS-4MHVPNW4EX |
|---------------------|---------------|---------------|----------------|
|                     | CAF98/128MR5I | RCS-4MHVPN4EX |                |

| Fan & Fan Motor                                    |                 |                 |                            |
|----------------------------------------------------|-----------------|-----------------|----------------------------|
| Type                                               |                 | Centrifugal fan |                            |
| Q'ty .....                                         | Dia. and lenght | mm              | 1.... Ø 280 / L 166        |
| Fan motor model...Q'ty                             |                 |                 | K35407 M01972 ...1         |
| No. of poles...rpm (230 V, High / 2nd / 3rd / Low) |                 |                 | 4... 870 / 720 / 600 / 270 |
| Running Amps                                       |                 | A               | 0,27                       |
| Power input                                        |                 | W               | 61                         |
| Coil resistance (Ambient temp. 20 °C )             |                 | Ω               | BLU-BRN: 33,9÷39,1         |
|                                                    |                 |                 | BLU-BLK: 325÷374           |
|                                                    |                 |                 | BLK-GRY: 78,7÷90,5         |
|                                                    |                 |                 | GRY-RED: 49,7÷57,2         |
|                                                    |                 |                 | RED-WHT/YEL: 155÷178       |
| Safety devices                                     | Type            |                 | Internal thermal protector |
|                                                    | Operating temp. | Open °C         | 150 ± 10                   |
|                                                    |                 | Close           | Automatic                  |
| Run capacitor                                      | μF              |                 | 2                          |
|                                                    | VAC             |                 | 400                        |

| 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            | 1                                 |
| Fin pitch       | mm 1,3                            |
| face area       | m2 0,258                          |

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## CAF 187 R5IAA

| Controller PCB       |  |                |
|----------------------|--|----------------|
| Part No.             |  | CB-XRV184EH    |
| Controls             |  | Microprocessor |
| Control circuit fuse |  | 250 V - 3,15 A |

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

| Fan & Fan Motor                                    |                      |    |  |                            |
|----------------------------------------------------|----------------------|----|--|----------------------------|
| Type                                               |                      |    |  | Centrifugal fan            |
| Q'ty ..... Dia. and lenght                         | mm                   |    |  | 1.... Ø 280 / L 166        |
| Fan motor model...Q'ty                             |                      |    |  | K35407 M01972 ...1         |
| No. of poles...rpm (230 V, High / 2nd / 3rd / Low) |                      |    |  | 4... 950 / 790 / 700 / 300 |
| Running Amps                                       | A                    |    |  | 0,27                       |
| Power input                                        | W                    |    |  | 61                         |
| Coil resistance (Ambient temp. 20 °C )             | $\Omega$             |    |  | BLU-BRN: 33,9÷39,1         |
|                                                    |                      |    |  | BLU-BLK: 325÷374           |
|                                                    |                      |    |  | BLK-GRY: 78,7÷90,5         |
|                                                    |                      |    |  | GRY-RED: 49,7÷57,2         |
| Safety devices                                     | Type                 |    |  | RED-WHT/YEL: 155÷178       |
|                                                    | Operating temp. Open | °C |  | Internal thermal protector |
|                                                    | Close                |    |  | 150 ± 10                   |
| Run capacitor                                      | $\mu$ F              |    |  | Automatic                  |
|                                                    | VAC                  |    |  | 2                          |
|                                                    |                      |    |  | 400                        |

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

| Heat Exch. Coil |    |                                   |
|-----------------|----|-----------------------------------|
| Coil            |    | Aluminium plate fin / Copper tube |
| Rows            |    | 1                                 |
| Fin pitch       | mm | 1,3                               |
| face area       | m2 | 0,258                             |

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### 1-3 Other Component Specifications

CAF 97/127 R5IAA  
CAF 98/128 MR5IAA  
CAF 187 R5IAA

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

|                                      |                |                            |
|--------------------------------------|----------------|----------------------------|
| <b>Thermistor ( Coil sensor TH1)</b> |                | <b>DTN-C583G3U-TKS121B</b> |
| Resistance                           | $\kappa\Omega$ | 0 °C: $188,0 \pm 4\%$      |

|                                      |                |                            |
|--------------------------------------|----------------|----------------------------|
| <b>Thermistor ( Room sensor TH2)</b> |                | <b>DTN-C502H3T-TKS128B</b> |
| Resistance                           | $\kappa\Omega$ | 25 °C: $5,0 \pm 3\%$       |

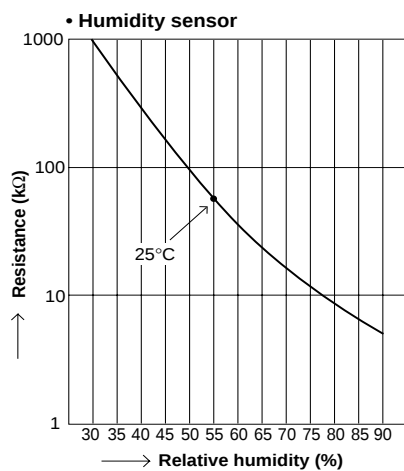
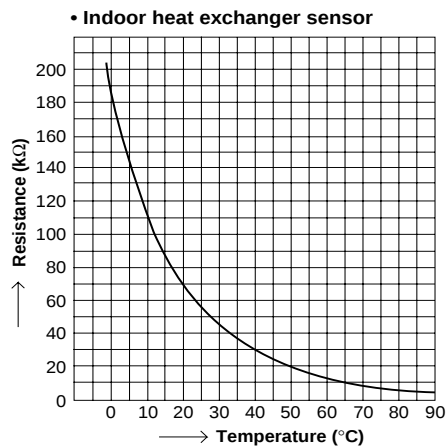
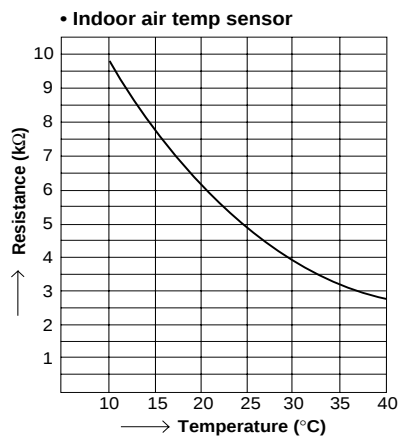
|                                          |                |                                     |
|------------------------------------------|----------------|-------------------------------------|
| <b>Thermistor ( Humidity sensor TH3)</b> |                | <b>C7-M3-SY</b>                     |
| Resistance                               | $\kappa\Omega$ | 25°C - 60% RH ( $\pm 5\%$ RH): 31,0 |

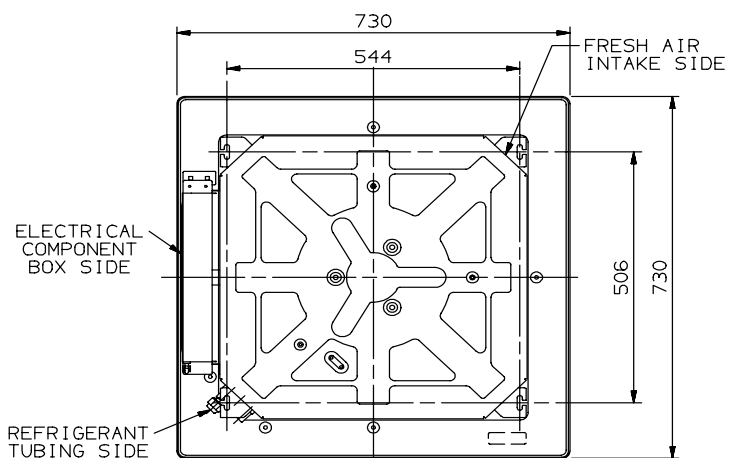
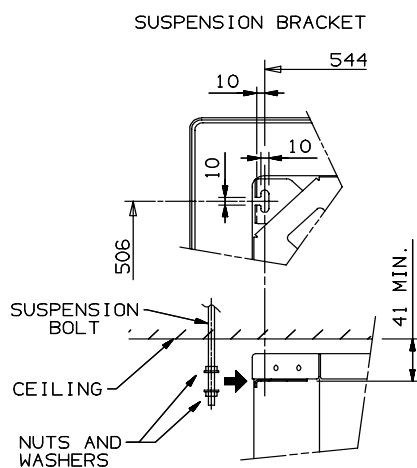
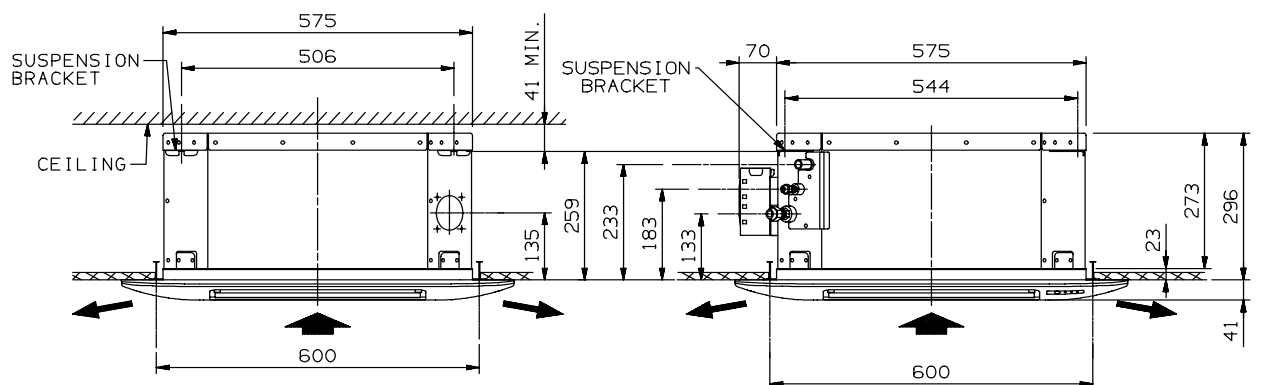
|                     |                  |                           |
|---------------------|------------------|---------------------------|
| <b>Drain pump</b>   |                  |                           |
| Model               |                  | PC 309564003              |
| Rating              | Voltage<br>Input | 220-240 V - 50 Hz<br>14 W |
| Total head capacity |                  | 0,4 l/min                 |

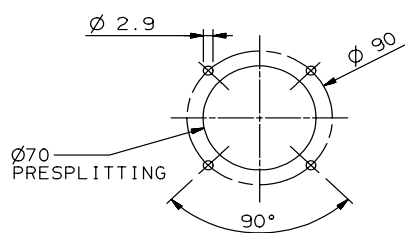
|                            |  |                     |
|----------------------------|--|---------------------|
| <b>Safety float switch</b> |  |                     |
| Model                      |  | BI 1300 2725        |
| Contact rating             |  | 230 V AC/DC - 0,5 A |



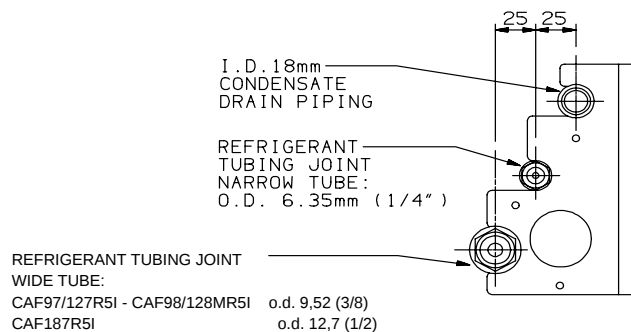
## 2. DIMENSIONAL DATA



FRESH AIR INTAKE PORT



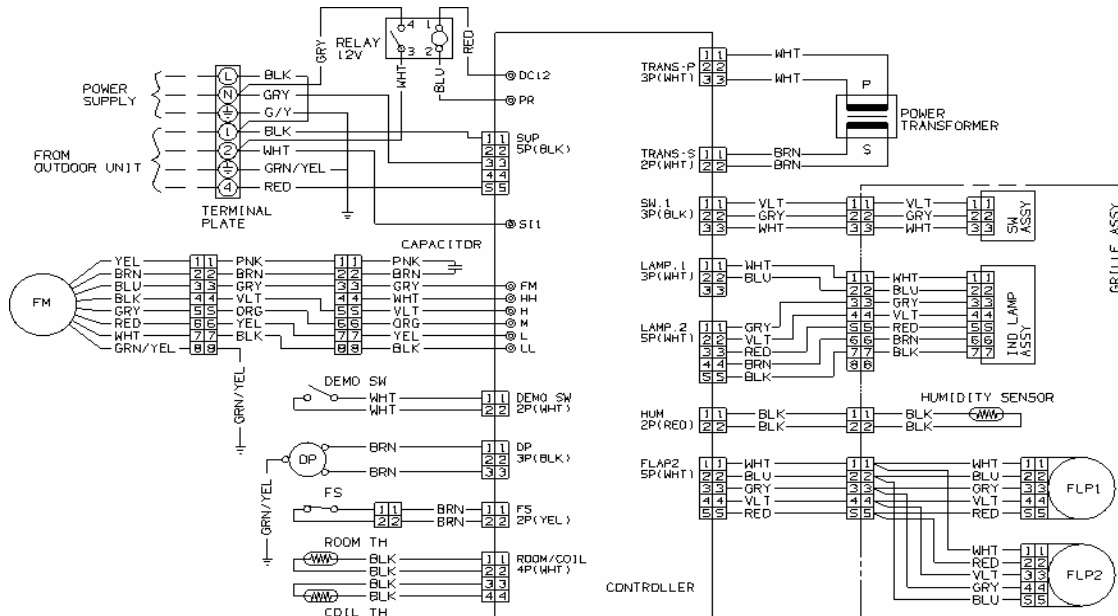
REFRIGERANT TUBING SIDE



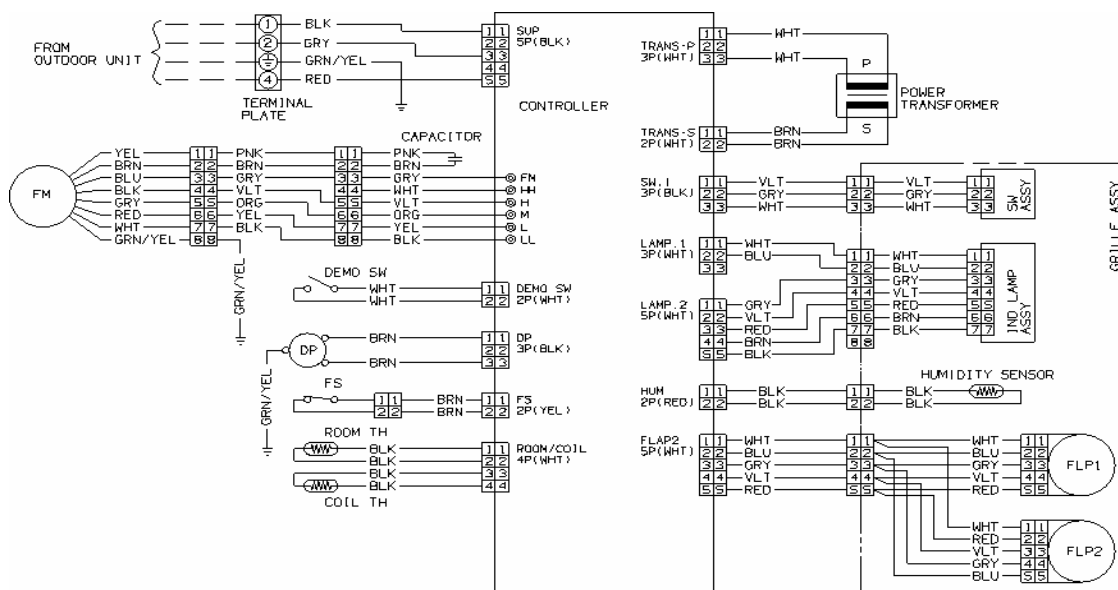
# 3. ELECTRICAL DATA

## 3-1 Electric Wiring Diagrams

CAF 97/127 R5IAA



CAF 187 R5IAA  
CAF 98/128 MR5IAA



## 4. FUNCTIONS

### 4-1 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°C 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

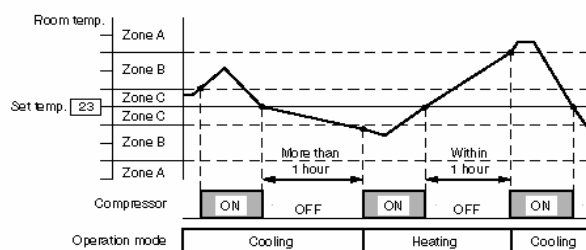
- When AUTO mode is selected, the microprocessor calculates the difference between the set temperature and the room temperature, and automatically switches to Cooling or Heating mode.

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.

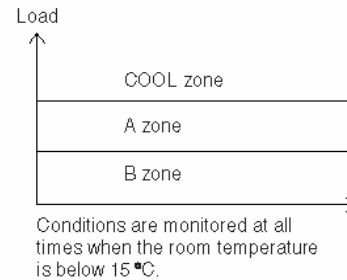


#### ■ SENSOR DRY

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.



##### 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.

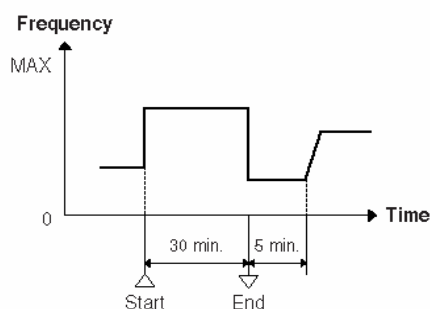
This function is set with the HIGH POWER button on the remote controller.

(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

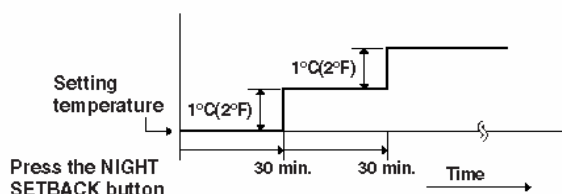
Green

## ■ 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.

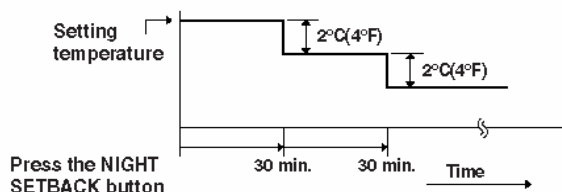
### ● COOL and DRY modes

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.



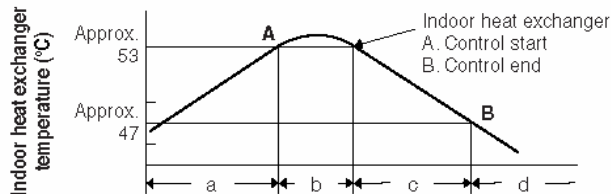
## ■ Timer backup

- 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.

## 4-2 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.

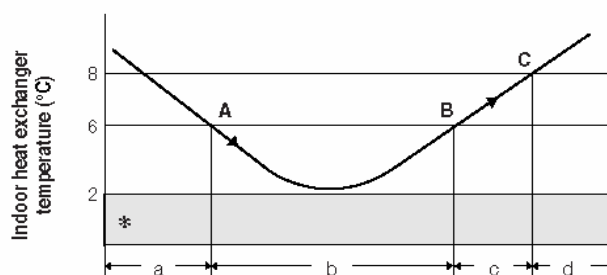


- Area: Automatic capacity control
- When Point A has been exceeded, the operation frequency is reduced by a certain proportion.
- Area: Frequency increase is prohibited.
- At Point B and below, overload prevention is ended and control is the same as in the a area.

### ■ 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.

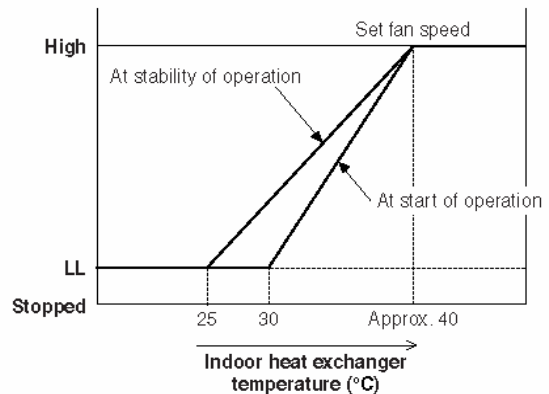
#### NOTE

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.



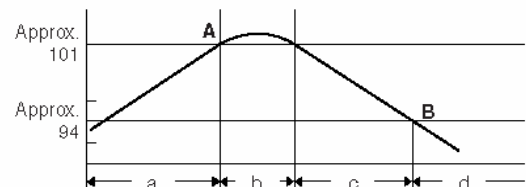
#### NOTE

- 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)

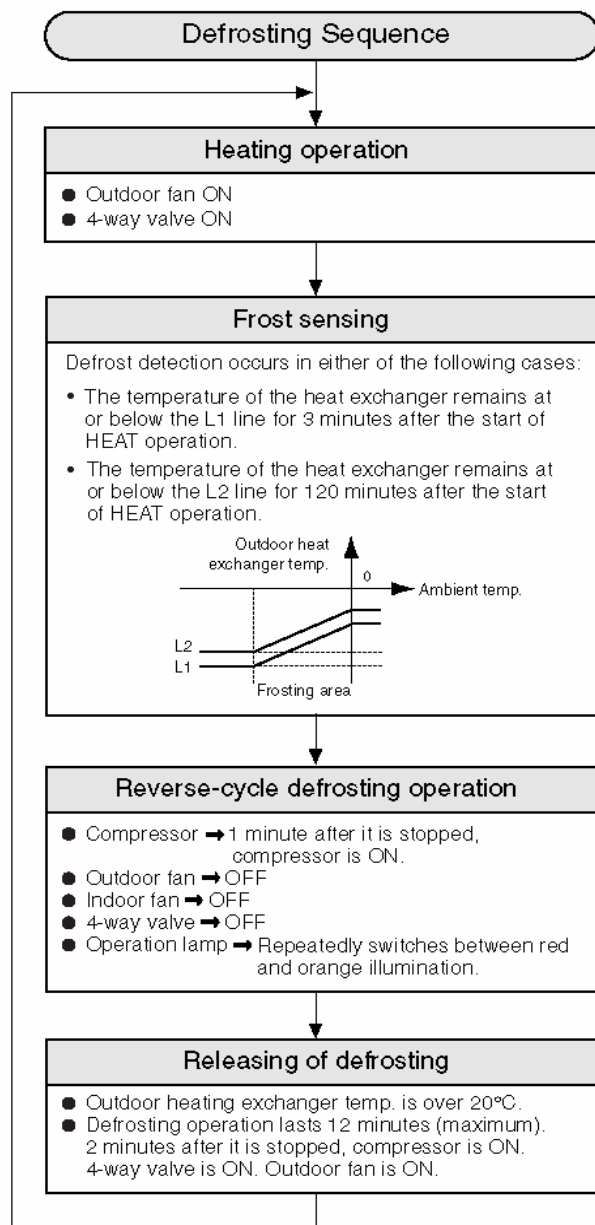


- Area: Automatic capacity control.
- When the temperature rises above Point A, the operation frequency is reduced at a specified rate.
- Area: Further frequency increase is prohibited.
- When the temperature falls below Point B, prevention of a rise in frequency is released and the air conditioner operates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

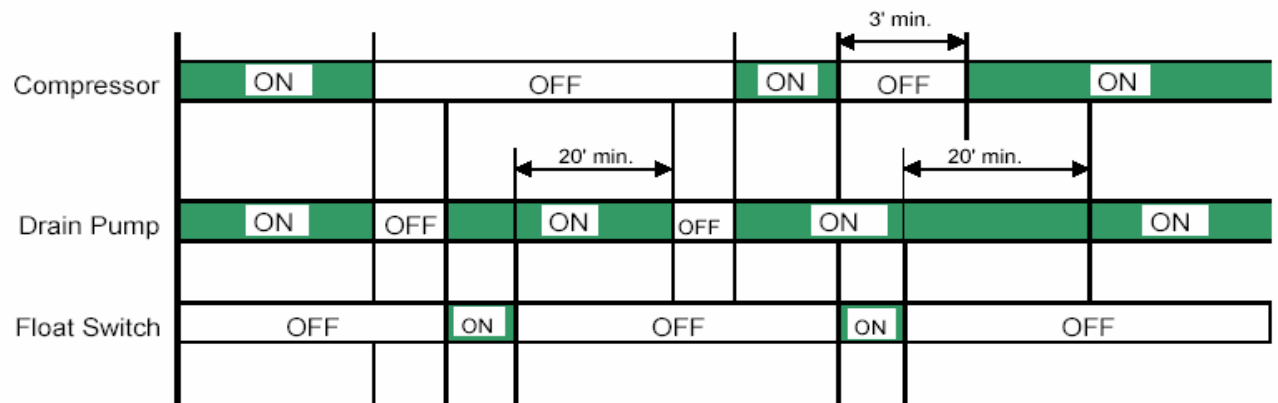
### ● Mode : Cooling

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

### ● Mode : Heating

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

### 4-3. Drain Pump and Float Switch



**NOTE:**

Either in Heating or another mode or the unit is stopped, when the float switch is turned ON, the drain pump operates for 20 minutes minimum

## 5. TEST RUN

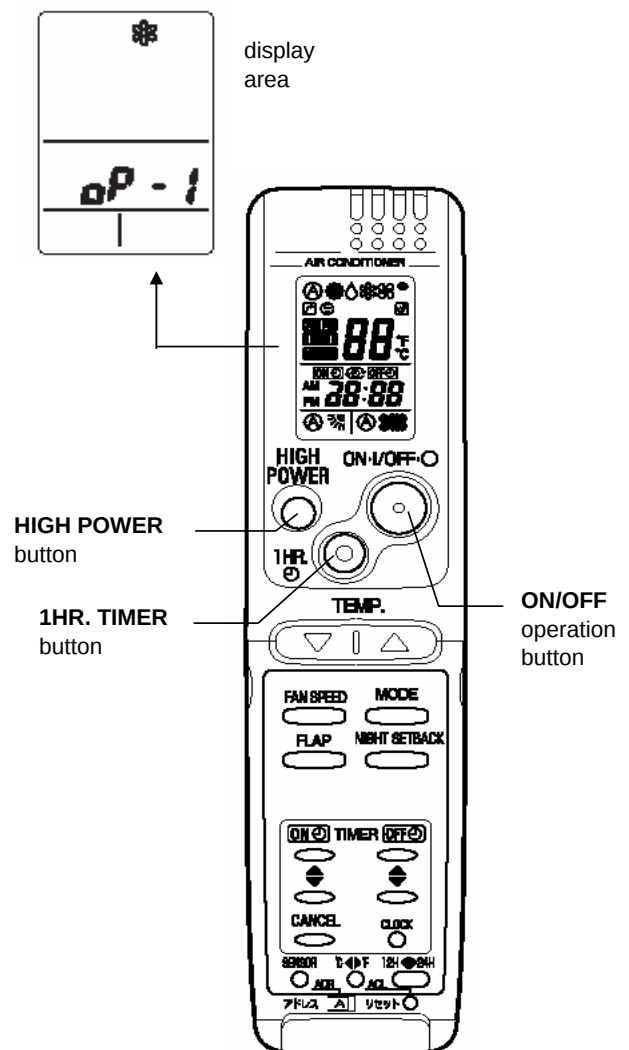
### 5-1 How to Test Run the Air Conditioner

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.



## 6. TROUBLESHOOTING

### 6-1 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.

### 6-2 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.

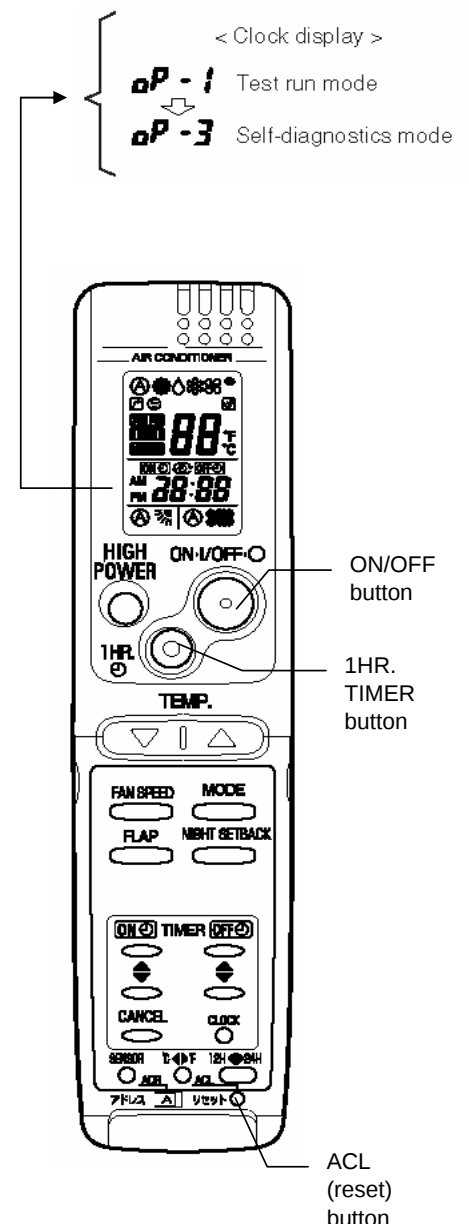
#### PROCEDURE

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

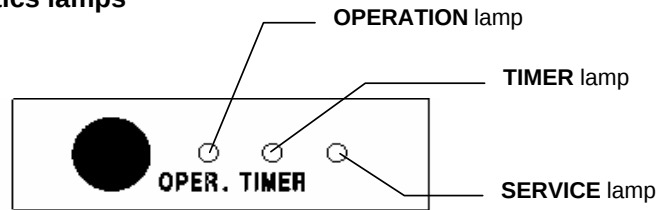
- Step 1: Press and hold the remote controller HIGH POWER button and 1 HR TIMER button. At the same time, press the ACL (reset) button. Use a pointed object such as the tip of a pen to press the ACL button. When this has been done, "oP-1" (test run) appears, blinking, in the remote controller clock display 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.



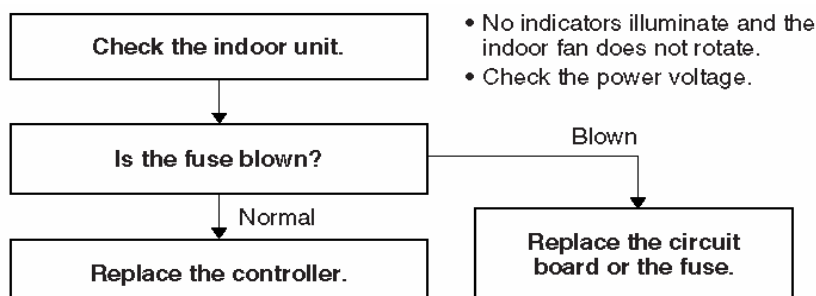
## (1) Self-diagnostics lamps



+ 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                                                                                                                                                                                                                 |
|----------------------|-----|-----|------|---------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OPR                  | TMR | 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<br>-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<br>-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<br>-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<br>-OUTDOOR HI-PRESSURE SW. OLR OPERATION<br>-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



## 6-3 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"> <li>The rated voltage must be present between inter-unit wirings 1 and 2.</li> <li>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.</li> </ul> <p>Or instead of measuring the voltage, you can insert an LED jig and check that the LED flickers once every 8 seconds.</p> |

- 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".

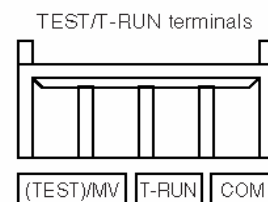
### (2) Checking the outdoor unit

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

- 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.

## 6-4 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<br>2. Locations near amateur radio (short wave) stations<br>3. Locations near electronic sewing machines and arc-welding machines | Either of the following trouble may occur.<br>1. The unit may stop suddenly during operation.<br>2. Indicator lamps may flicker. | (The fundamental concept is to make the system less susceptible to noise.)<br>- Insulate for noise or distance from the noise source. -<br>1. Use shielded wires.<br>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.<br>2. The antenna cable for a television or radio is located close to the A/C and A/C wiring.<br>3. Locations where television and radio signals are weak. | 1. Noise appears in the television picture, or the picture is distorted.<br>2. Static occurs in the radio sound. | 1. Select a separate power source.<br>2. Keep the A/C and A/C wiring at least 1 meter away from wireless devices and antenna cables.<br>3. Change the wireless device's antenna to a high-sensitivity antenna.<br>4. Change the antenna cable to a BS coaxial cable.<br>5. Use a noise filter (for the wireless device).<br>6. Use a signal booster. |

## 7. CHECKING ELECTRICAL COMPONENTS

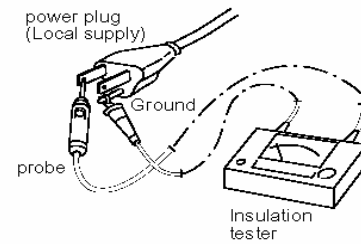
### 7-1 Measurement of insulation Resistance

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

#### 7-1-1. 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

#### 7-1-2. 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)

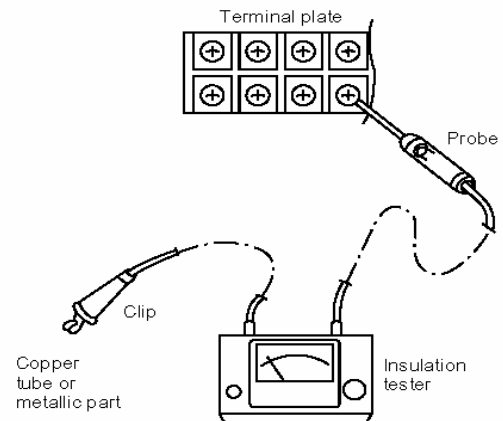


Fig. 2

#### 7-1-3. 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.

#### 7-1-4. 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.

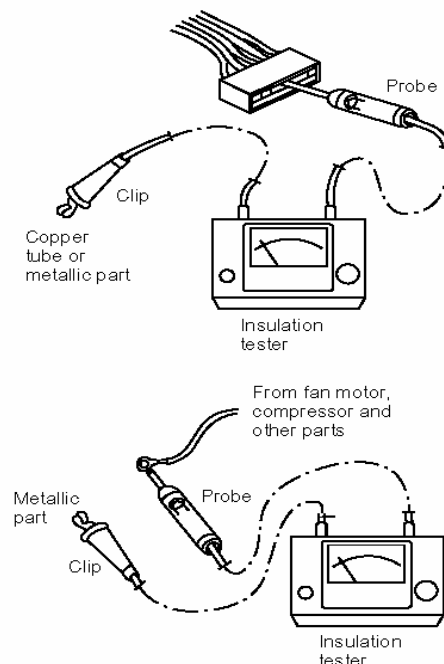


Fig. 3

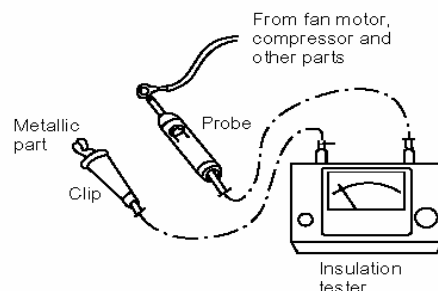


Fig. 4

## 7-2 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.

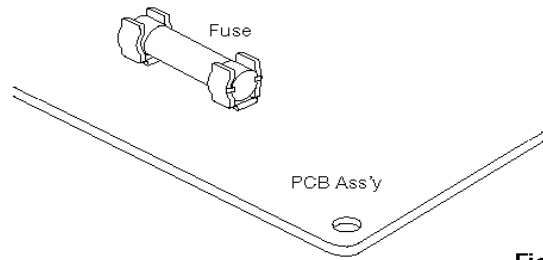


Fig. 5

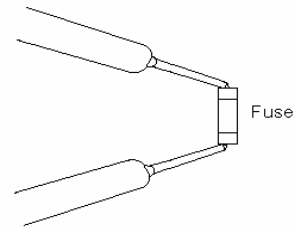


Fig. 6

## 7-3 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.

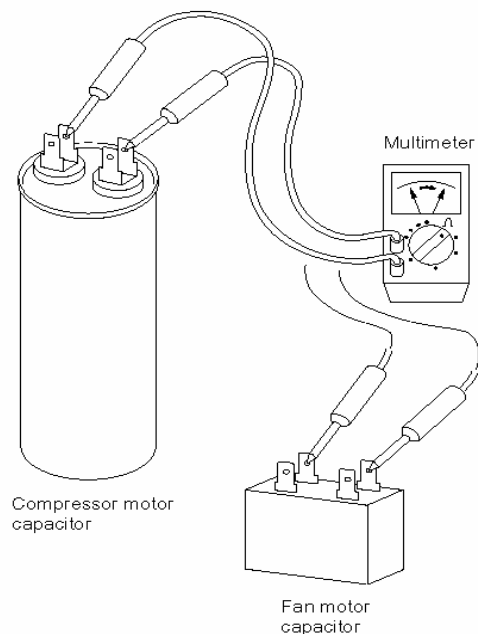


Fig. 7



R.D. 28 Reyrieux BP 131 - 01601 Trévoux CEDEX France  
Tél. 04.74.00.92.92 - Fax 04.74.00.42.00  
R.C.S. Bourg-en-Bresse B 759 200 728