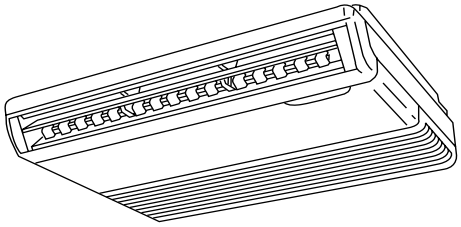
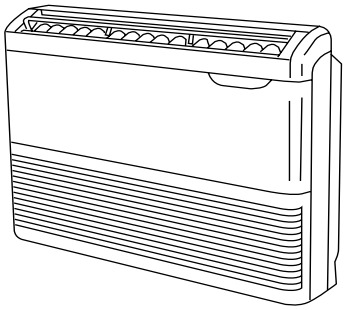
TECHNICAL DATA
& SERVICE MANUAL

INDOOR UNIT: KPAF128C5TAA
KPAF188C5TAA
KPAF228C5TAA

SPLIT SYSTEM AIR CONDITIONER

Model No.	Product Code No.
KPAF128C5TAA	387105979
KPAF188C5TAA	387105980
KPAF228C5TAA	387105981





0.8180.570.0 04/2009

IMPORTANT!
Please read before installation

This air conditioning system meets strict safety and operating standards.
For the installer or service person, it is important to install or service the system so that it operates safely and efficiently.

For safe installation and trouble-free operation, you must:
- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.
- The unit must be supplied with a dedicated electrical line.

WARNING

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

CAUTION

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

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

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

SPECIAL PRECAUTIONS

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

WARNING **When wiring**

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY 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 then 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.

Table of Contents

1. SPECIFICATIONS

1-1 Unit Specifications

KPAF128C5TAA

Power source	220 - 240V ~ 50Hz

Voltage rating	230 V - 50 Hz

Performance			Cooling
	Capacity		See catalogue with the requested matching
	Air circulation (High)	m^3/h	700

Features				
	Controls/Temperature controls			Microprocessor/ I.C. thermostat
	Control unit			Wireless remote control unit
	Timer			ON/OFF 24 hours
	Fan speed			3 and Auto
	Airflow direction			Auto (Remote control)
	Air Filter			Washable, easy acces, long life (2500 hr.)
	Power noise level	High	dB-A	55
	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

Dimensions & Weight				
	Unit dimensions	Height	mm	680
		Width	mm	900
		Depth	mm	190
	Package dimensions	Height	mm	770
		Width	mm	995
		Depth	mm	280
	Weight	Net	kg	23,5
		Shipping	kg	31,5
	Shipping volume		m^3	0,21

DATA SUBJECT TO CHANGE WITHOUT NOTICE

KPAF188C5TAA

Power source	220 - 240V ~ 50Hz

Voltage rating	230 V - 50 Hz

Performance		Cooling
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
Fan speed				3 and Auto
Airflow direction				Auto (Remote control)
Air Filter				Washable, easy acces, long life (2500 hr.)
Power noise level	High/Med./Low		dB-A	56/52/47
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 control				Capillary tube

Dimensions & Weight				
Unit dimensions	Height		mm	680
	Width		mm	900
	Depth		mm	190
Package dimensions	Height		mm	770
	Width		mm	995
	Depth		mm	280
Weight	Net		kg	23,5
	Shipping		kg	31,5
Shipping volume			m^3	0,21

DATA SUBJECT TO CHANGE WITHOUT NOTICE

KPAF228C5TAA

Power source	220 - 240V ~ 50Hz

Voltage rating	230 V - 50 Hz

Performance		Cooling
Capacity		See catalogue with the requested matching
Air circulation (High/Med./Low)	m^3/h	830/760/665

Features			
Controls/Temperature controls			Microprocessor/ I.C. thermostat
Control unit			Wireless remote control unit
Timer			ON/OFF 24 hours
Fan speed			3 and Auto
Airflow direction			Auto (Remote control)
Air Filter			Washable, easy acces, long life (2500 hr.)
Power noise level	High/Med./Low	dB-A	60/57/54
Refrigerant tubing connections			Flare type
Refrigerant	Narrow tube	mm(in.)	6,35 (1/4)
tube diameter	Wide tube	mm(in.)	15,88 (5/8)
Refrigerant			R410A
Refrigerant control			Capillary tube

Dimensions & Weight			
Unit dimensions	Height	mm	680
	Width	mm	900
	Depth	mm	190
Package dimensions	Height	mm	770
	Width	mm	995
	Depth	mm	280
Weight	Net	kg	23,5
	Shipping	kg	31,5
Shipping volume		m^3	0,21

DATA SUBJECT TO CHANGE WITHOUT NOTICE

1-2 Major Component Specifications

KPAF128C5TAA

Controller PCB		
Part No.		SAC ON-OFF IDU
Controls		Microprocessor
Control circuit fuse		250 V - 3,15 A
Jumper setting JP1..JP5		2,54mm-5pcs

Remote Control Unit	SAC W-REM

Fan & Fan Motor			
Type			Cross - flow
Q'ty ……. Dia. and lenght		mm	2…. Ø 130 / L 180
Fan motor model…Q'ty			K48407-M01596…1
No. of poles…rpm (230 V, High)			4…1160
Nominal output		W	21
Running Amps		A	0,29
Power input		W	65
Coil resistance (Ambient temp. 25 °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		Thermal protection
	Operating temp. Open	°C	145 ± 5
	Close		Automatic
Run capacitor		µF	1.5
		VAC	440

Flap Motor		
Type		Stepping motor
Model		MP24Z2
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	1,5
face area	m^2	0,177

DATA SUBJECT TO CHANGE WITHOUT NOTICE

KPAF188C5TAA

Controller PCB		
Part No.		SAC ON-OFF IDU
Controls		Microprocessor
Control circuit fuse		250 V - 3,15 A
Jumper setting JP1..JP5		2,54mm-5pcs

Fan & Fan Motor				
Type				Cross - flow
Q'ty ……. Dia. and lenght			mm	2…. Ø 130 / L 180
Fan motor model…Q'ty				K48410-MO1597…1
No. of poles…rpm (230 V, High)				4…1280
Nominal output			W	31,5
Running Amps			A	0,34
Power input			W	72
Coil resistance (Ambient temp. 25 °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			Thermal protection
	Operating temp.	Open	°C	145 ± 5
		Close		Automatic
Run capacitor			µF	2,0
			VAC	440

Flap Motor		
Type		Stepping motor
Model		MP24Z2
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	m^2	0,192

DATA SUBJECT TO CHANGE WITHOUT NOTICE

KPAF228C5TAA

Controller PCB			
Part No.			SAC ON-OFF IDU
Controls			Microprocessor
Control circuit fuse			250 V - 3,15 A
Jumper setting JP1..JP5			2,54mm-5pcs

Fan & Fan Motor			
Type			Cross - flow
Q'ty ……. Dia. and lenght		mm	2…. Ø 130 / L 180
Fan motor model…Q'ty			K48410-M01598…1
No. of poles…rpm (230 V, High)			4…1370
Nominal output		W	35
Running Amps		A	0,35
Power input		W	74
Coil resistance (Ambient temp. 25 °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		Thermal protection
	Operating temp. Open	°C	145 ± 5
	Close		Automatic
Run capacitor		µF	2,0
		VAC	440

Flap Motor			
Type			Stepping motor
Model			MP24Z2
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		m^2	0,192

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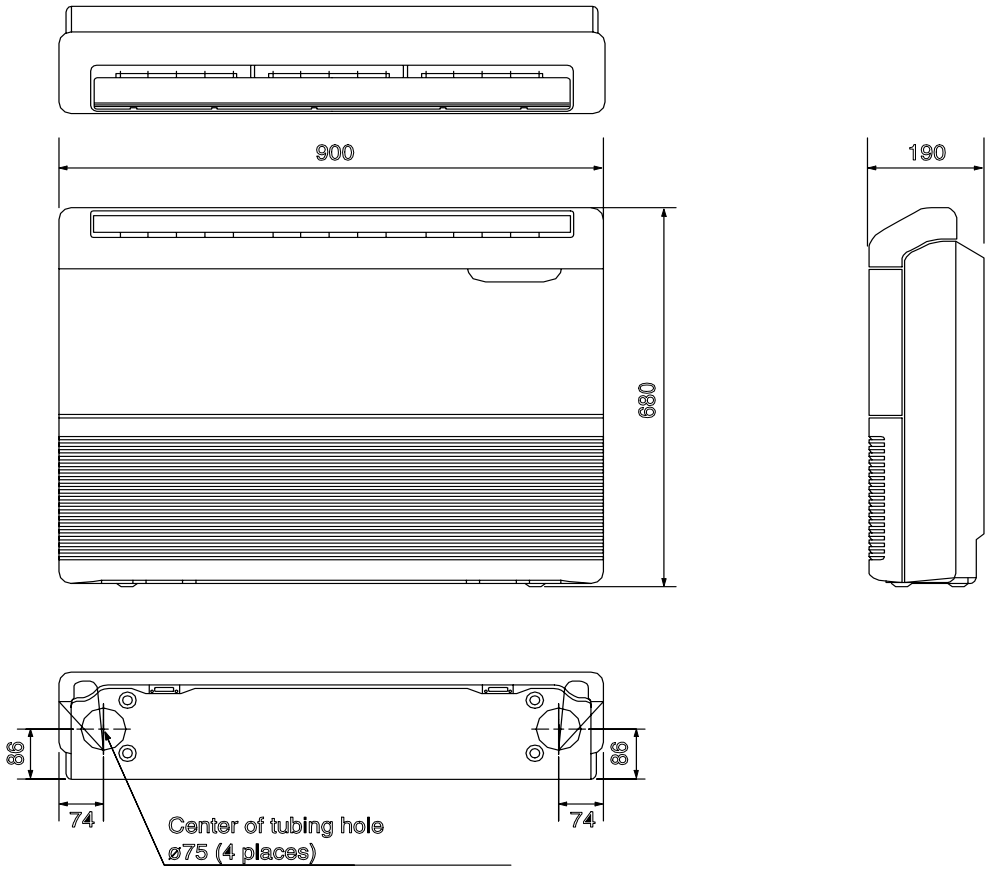
1-3 Other Component Specifications

Thermistor (Coil sensor TH1)		
Resistance	KΩ	10 ± 3%

Thermistor (Room sensor)		**NTC-THERMISTOR**
Resistance	kΩ	10 at 25 °C

2. DIMENSIONAL DATA

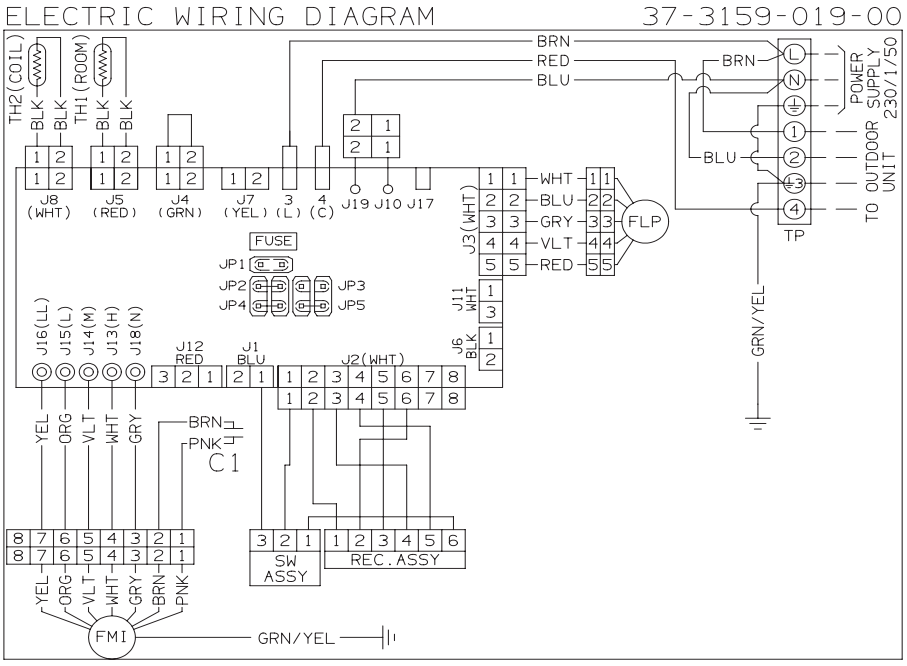


Units: mm

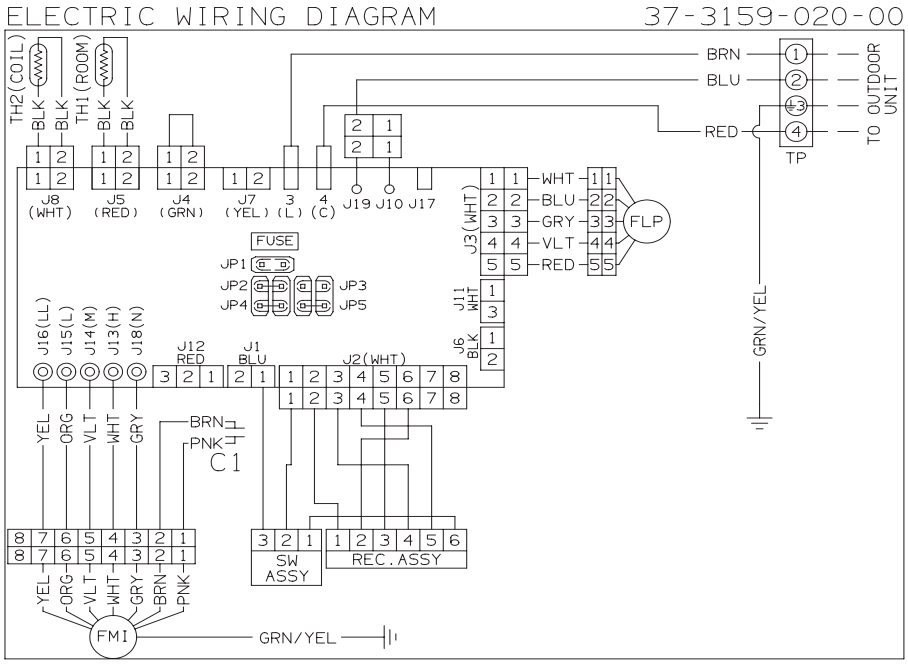
3. ELECTRICAL DATA

3-1 Electric Wiring Diagram

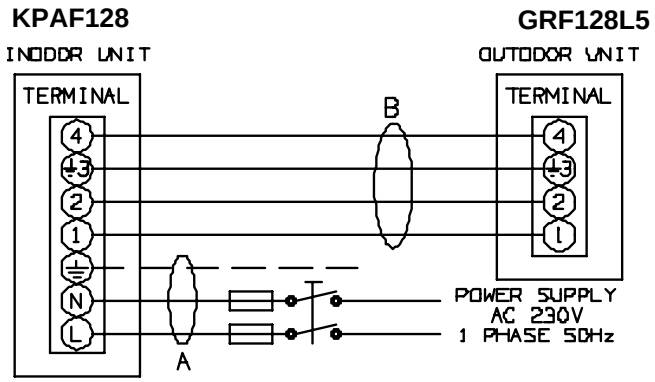
KPAF128C5TAA



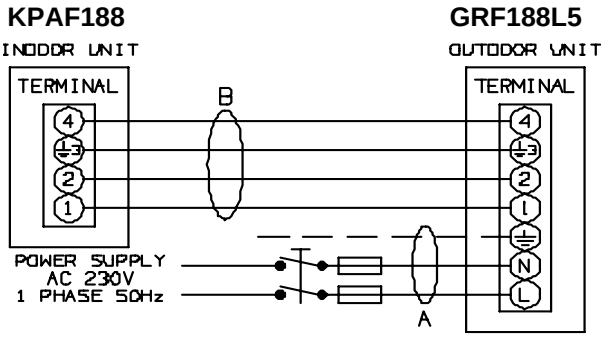
KPAF188C5TAA **KPAF228C5TAA**



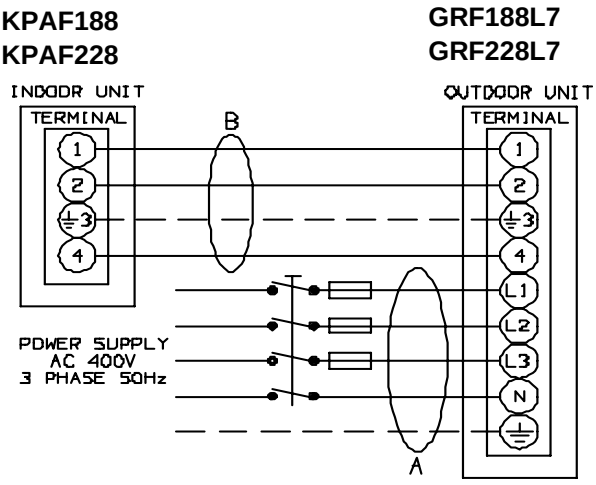
3-2 Wiring System Diagram



1-phase



3-phase

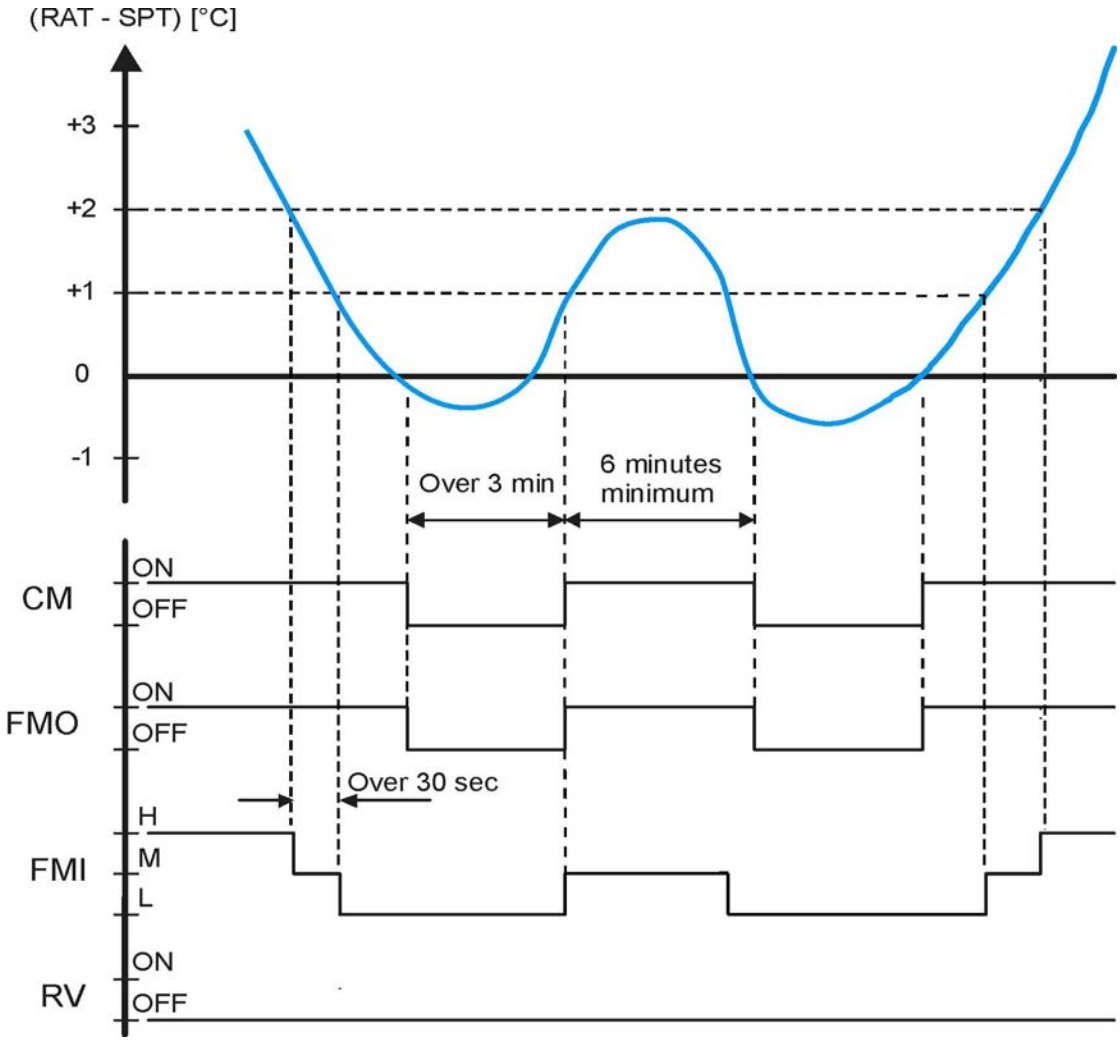


model	A power supply		B control line		delayed fuse
	m	mm^2	m	mm^2	
GRF128	15	1,5	15	1,5	10 A
GRF188	15 (85 *)	2,5	25	1,5	16 A
GRF228	15 (65 *)		20		

* 3 Phase version

4.FUNCTION

4-1 Cool Mode Operation



In Cooling Mode, the operation of the compressor (CM), Outdoor Fan (FMO) and Indoor Fan (FMI) are determined by the difference between the room air temperature (RAT) and the set point temperature (SPT) as shown in the graph.

NOTES

1. In this graph, the FMI is operating with the “Auto Fan Speed” setting. If the user has selected the Low, Medium or High fan speed, the FMI will run constantly at that speed only.

2. In addition to the temperature difference of above, the operations of the main components (CM, FMO, FMI) is also controlled by protection delays. That is: - the minimum off time of compressor is 3 minutes. -
- the minimum off time of compressor is 3 minutes. -
- the indoor fan can change speed only after it has operated at the same speed for 30 sec if in AUTO and 1 sec for the other settings (High, Med, Low).

4-2 Dry Mode Operation

Dry operation remove moisture from indoor air running, in cooling mode, at a low level without reducing the ambient temperature. This is done cycling ON and OFF indoor and outdoor units according to below.

ROOM TEMP	DRY LEVEL	
≥ SPT+2°C	LEVEL 0	Operation according to COOLING mode
< SPT+2°C ≥ SPT-1°C	LEVEL 1	CM on FMO on FMI switches between L and LL (30 seconds) RV off
< SPT-1°C ≥ 15°C	LEVEL 2	CM switches 9 minutes off and 3 minutes on FMO switches 9 minutes off and 3 minutes ON FMI switches off and L during CM operation RV off
< 15°C	DRY OFF ZONE	CM off FMO off FMI off RV off

SPT = Set Point Temperature

4-3 Fan Mode Operation

With this mode, the indoor fan is turned on while CM, FMO and RV stay off all the time. The user can select between 3 speeds: HIGH, MEDIUM and LOW.

4-4 Auto Fan speed

With this option selected, the indoor fan speed changes automatically according to the difference between the detected air temperature (RAT sensor) and the set point (SPT):

COOLING MODE

2 ≤ (RAT – SPT):	HIGH speed
1 ≤ (RAT – SPT) < 2:	MEDIUM speed
(RAT – SPT) < 1:	LOW speed

NOTE
SPT = Set Point Temperature

4-5 Forced Mode

In this mode the system operates (COOLING mode – fixed settings) or is switched off by means of the MODE button of the indoor unit control board. The operation modes can be selected pressing the button in a cyclic way (OFF ð COOL ð OFF…). The settings are:

SET POINT temperature = 25°C
FAN SPEED = HIGH

4-6 Protection operations in Cool and Dry Mode

This protection prevents ice formation on the indoor coil heat exchanger. The protection is activated by the indoor coil temperature (ICT sensor) and only after 6 minutes of compressor operation. This protection acts in 2 levels:

LEVEL 1

INDOOR FAN SPEED: ANY (as selected from remote controller)
COMPRESSOR: ON
OUTDOOR FAN: cycling (30 seconds ON ⇨ 30 seconds OFF).

LEVEL 2

INDOOR FAN SPEED: ANY (as selected from remote controller)
COMPRESSOR: OFF for at least 6 minutes and until ICT ≥ 8°C
OUTDOOR FAN: OFF for at least 6 minutes and until ICT ≥ 8°C

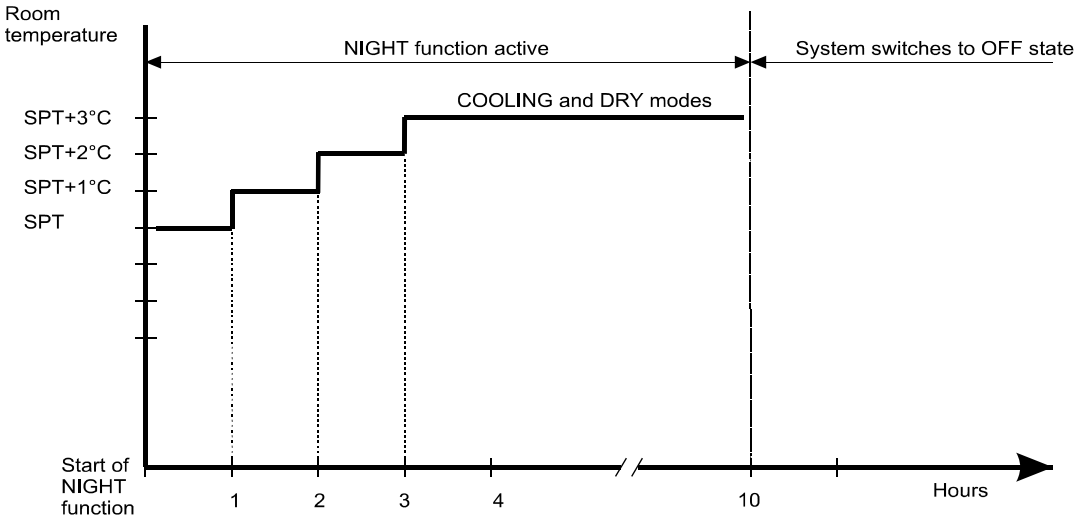
The system exit this protection routine when ICT temperature rises above 8°C.

4-7 I FEEL Function

As standard configuration the air conditioner operates detecting the room temperature through the sensor equipped in the wireless remote controller (icon I FEEL shown on the display). This feature provides a personalised environment since the temperature can be detected where the remote controller is located.
It is possible to de-activate this option pressing the I FEEL button on the remote controller.
In this case the I FEEL icon is no longer displayed and room temperature is detected through the sensor included in the indoor unit.

4-8 NIGHT Function

When this function is active, room temperature changes automatically to compensate for body temperature variations while sleeping. After 10 hours of operation system switches automatically to OFF state.



4-9 Diagnostic

With this feature is possible to have a visual signal that a trouble is occurring.
This mode is always active and the signalling is made through the display board LEDS .
In case of no troubles the LEDS status follows its normal function.

NOTES

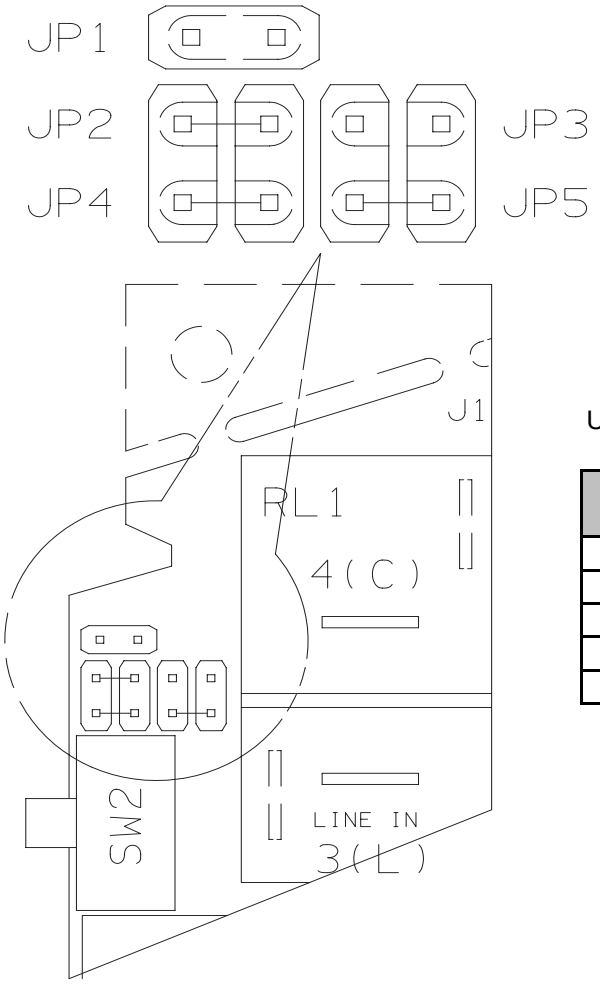
- The troubles are showed according a priority list that is in case of more than one trouble present, is always showed, at first, the one with the highest priority (1 ⇨ 2⇨ 3 etc).
- Sensor damaged means a situation where sensor is short-circuited or opened.
- In case of damaged sensors, the system (CM, FMO, FMI etc), if in OFF state, does not start.
- WRONG MODE SELECTED means a situation where the operating mode chosen with remote controller does not comply with the one allowed by jumpers settings.

Priority	TROUBLE	LEDS status			Effects
		LD1(stby)	LD2(opr)	LD3(timer)	
2	RAT damaged	F	O	O	System does not operate
3	ICT damaged	F	F	O	
4	WRONG MODE SELECTED	F	F	F	System does not operate

O = LED off
● = LED on
F = LED blinking

4-10 JUMPERS CONFIGURATION

Jumpers are located on the indoor PCB near the MODE button.



Unit is shipped with jumpers set according to the following table:

JUMPER	STATUS
JP1	open
JP2	closed
JP3	open
JP4	closed
JP5	closed

4-11 Contacts for Building Automation

4-11.1 INPUT CONTACT (J4 - green)

The status of this input affects system operation according to the following:

Contact OPEN : system does not operate (always OFF) – inputs from wireless remote controller are not processed

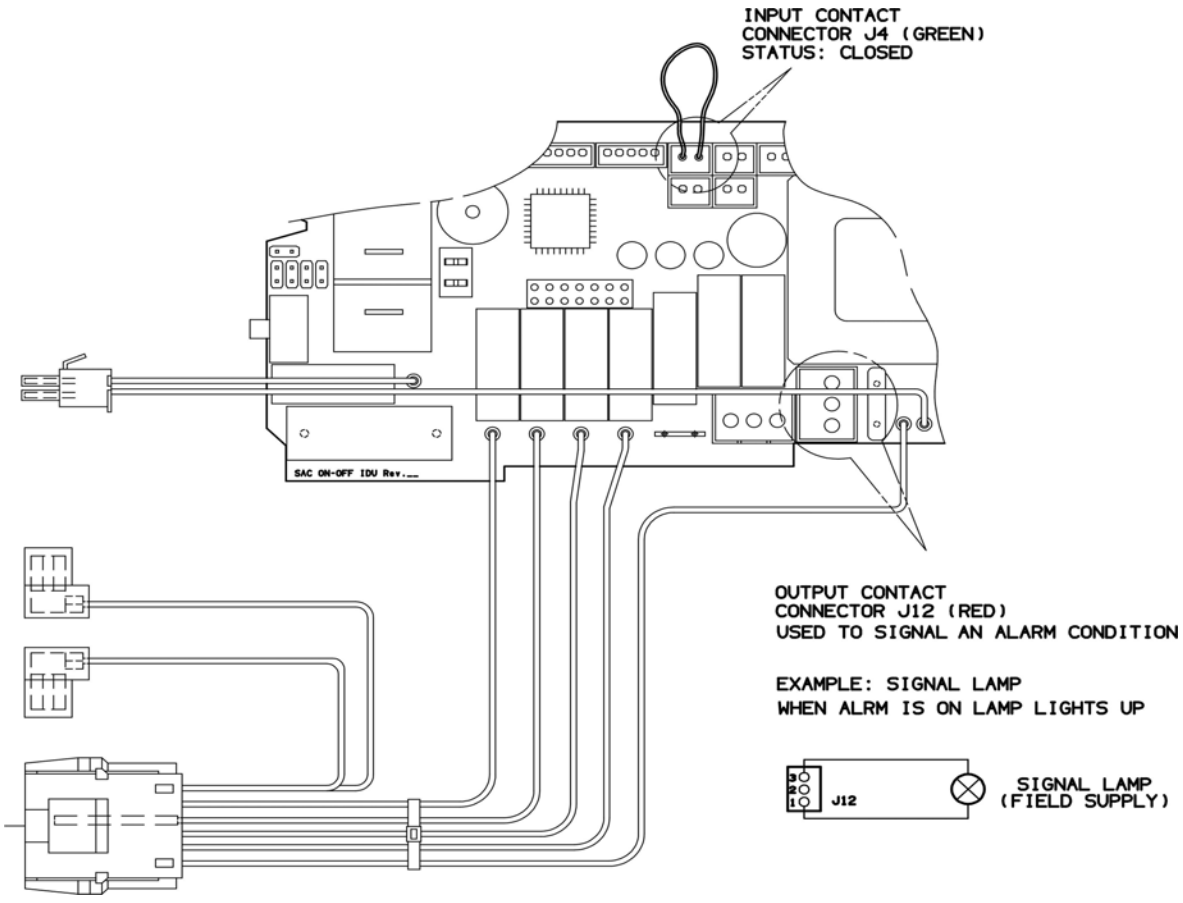
Contact CLOSED: system operates in the normal way according to the inputs coming from wireless remote controller

4-11.2 OUTPUT CONTACT (J12)

This connector is directly tied to the contact (normally open) of a power relay which activates every time the following alarm condition occur:

- RAT damaged
- ICT damaged

In this case when alarm happens, on poles 1 and 3 of J12 connector, 220 VAC-50Hz are available.
Max electrical load: **1A- 240VAC**



4-12 Maintenance

Changing the Address of the Air Conditioner

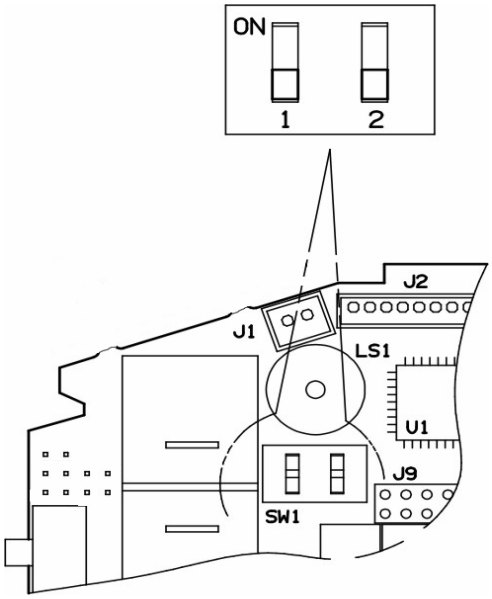
In case of more than one air conditioner operating in the same room, it may be necessary to assign an address to each unit in order to avoid operation conflicts. Address is set acting on the dip-switches located on the indoor PCB and on the remote controller. The PCB settings must match the corresponding ones on the wireless remote controller.

How to change address of the air conditioner

Dip switch is located on the indoor PCB near the buzzer.
Set the PCB to the address desidered

UNIT ADDRESS	SETTINGS SW1	SW2
1	off	off
2	off	on
3	on	off
4	on	on

As default switches SW1 and SW2 are in off status
(PCB factory state).

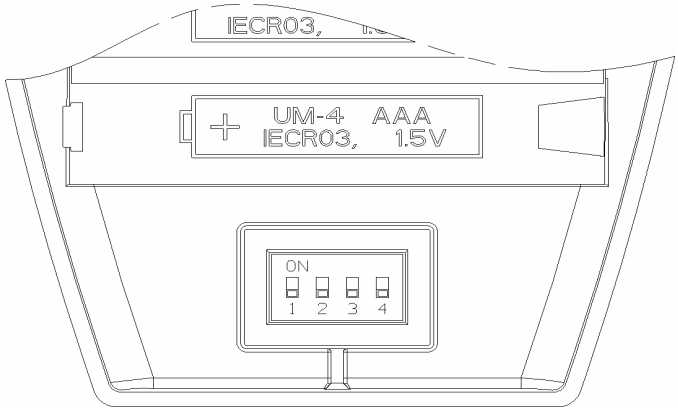


How to change address on Remote Control Unit

Dip switch is located on the battery compartment.

1) Pull out the door and remove the batteries.
2) Set the switch SW1 and SW2 according to the indoor PCB settings (do not act on SW3 and SW4)
3) Insert the batteries and pull on the door

As default switches SW1 and SW2 are in off status (remote controller factory state).



5. TROUBLESHOOTING

5-1 Check Before and After Troubleshooting

(A) Check power supply wiring.

- Check the power supply wires are correctly connected.

(B) Check power supply.

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

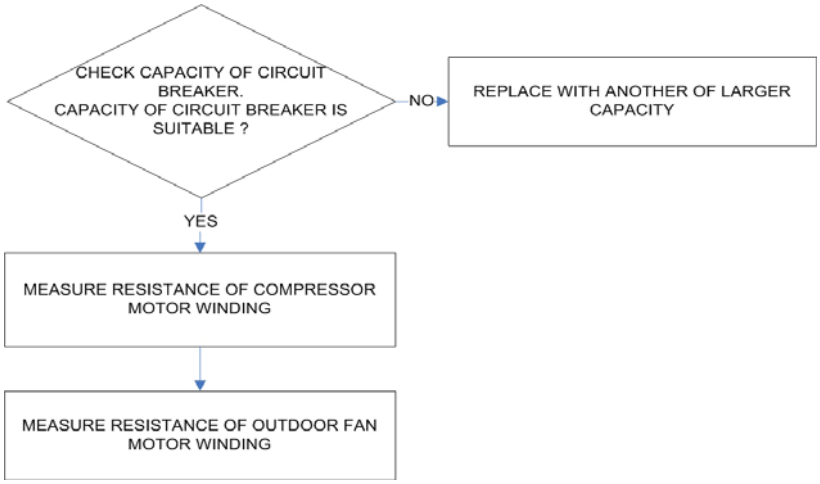
• WARNING: If the following troubleshooting must be done with power supplied, be careful not to touch any uninsulated live part that can cause *eletric shock*

5-2 Circuit Breaker Trips or Fuse Blows

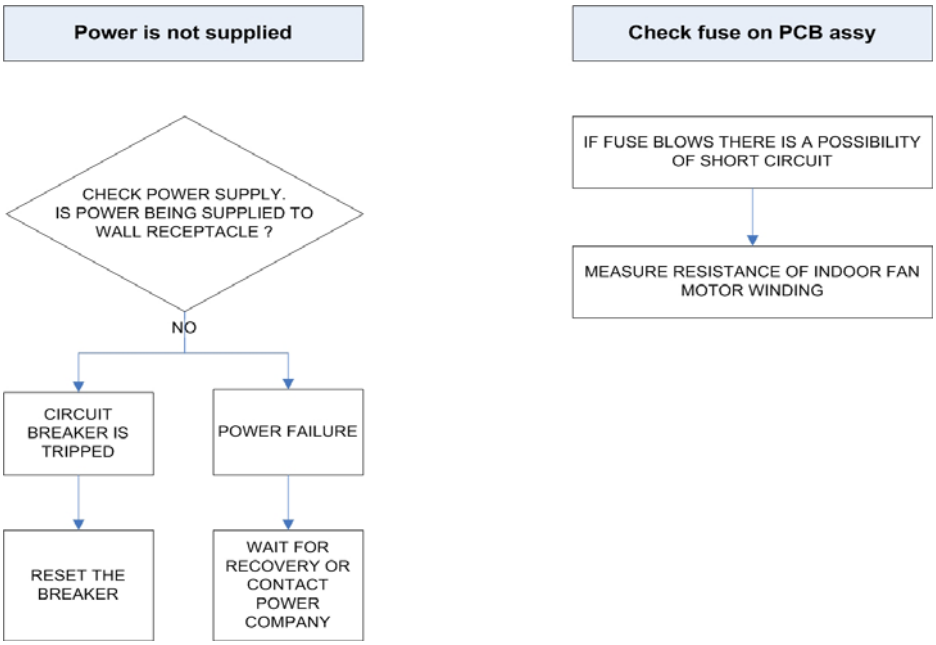
- When circuit breaker is set to ON, it trips in a few moments. Resetting is not possible.
- Measure insulation resistance. There is a possibility of ground fault.
  If resistance value is 1 Mohm or less, insulation is defective.

5-3 Circuit Breaker Trips in Several Minutes After Turning Air Conditioner On

1 • There is the possibility of short circuit.



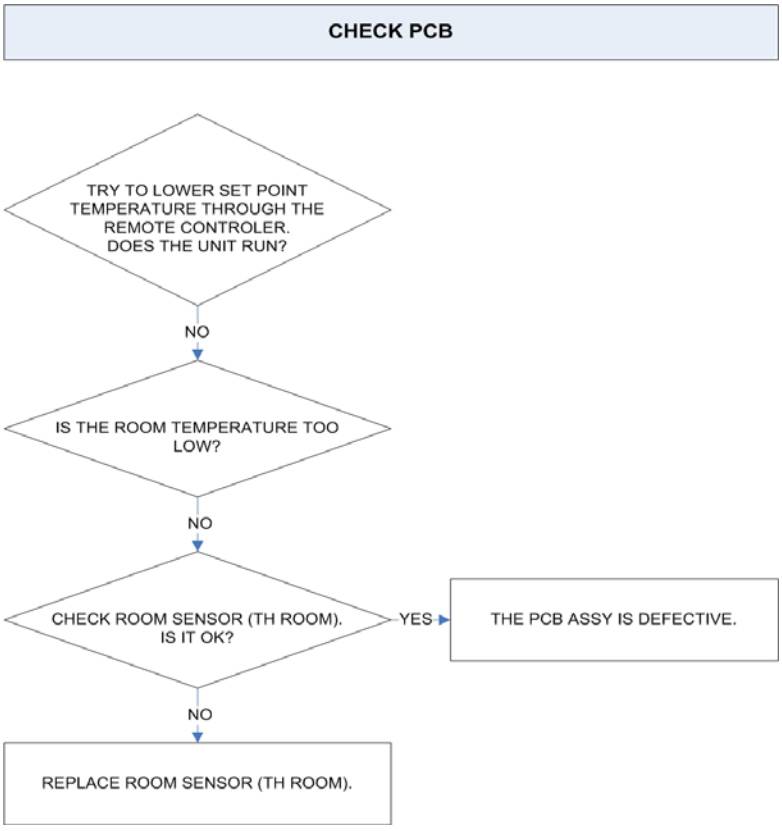
2 • The unit does not run.



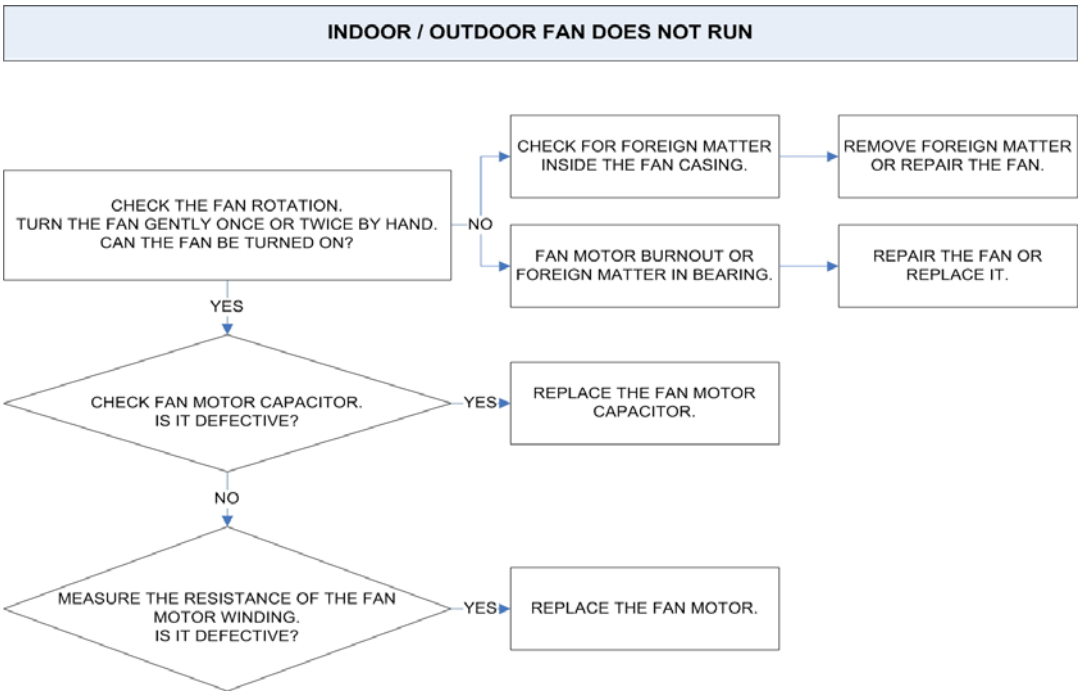
5-4 Unit and Compressor Do Not Run

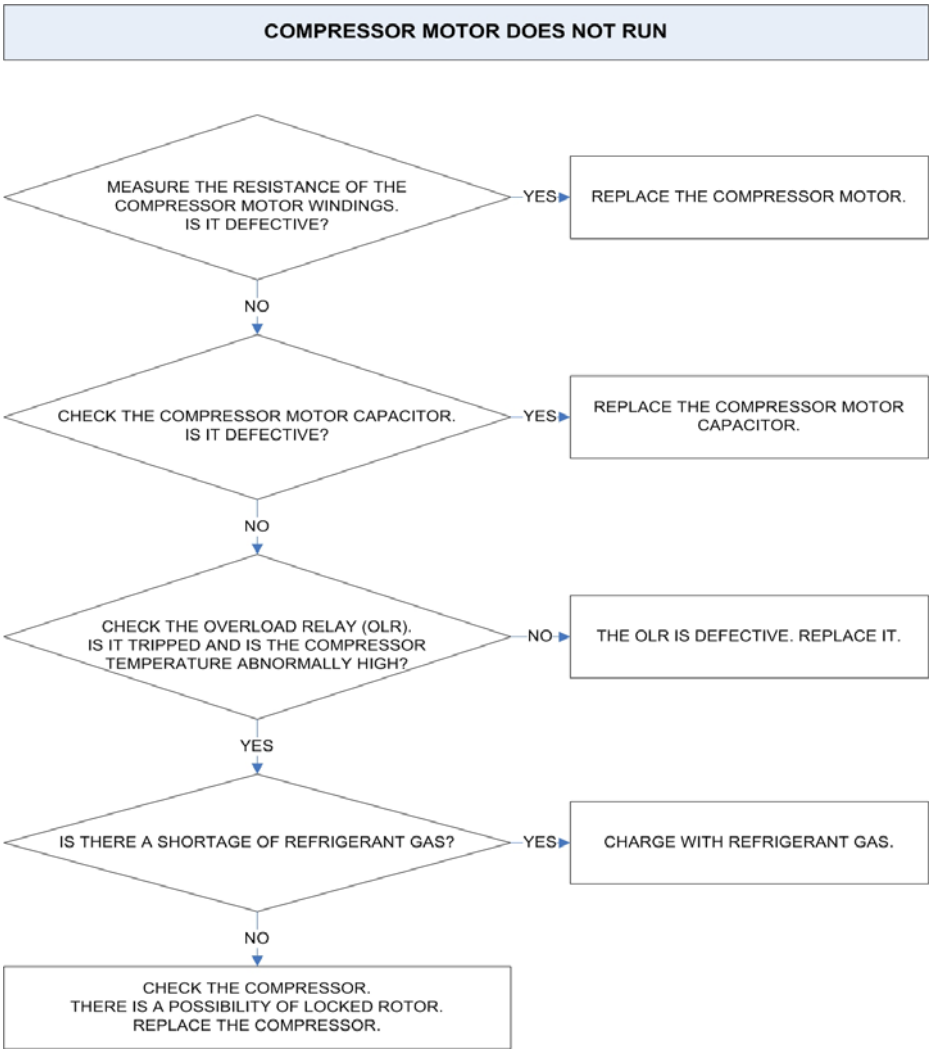
The unit does not run when air conditioner is in the follwing conditions:

• When the room temperature is below the setting temperature.
• During the protection modes.

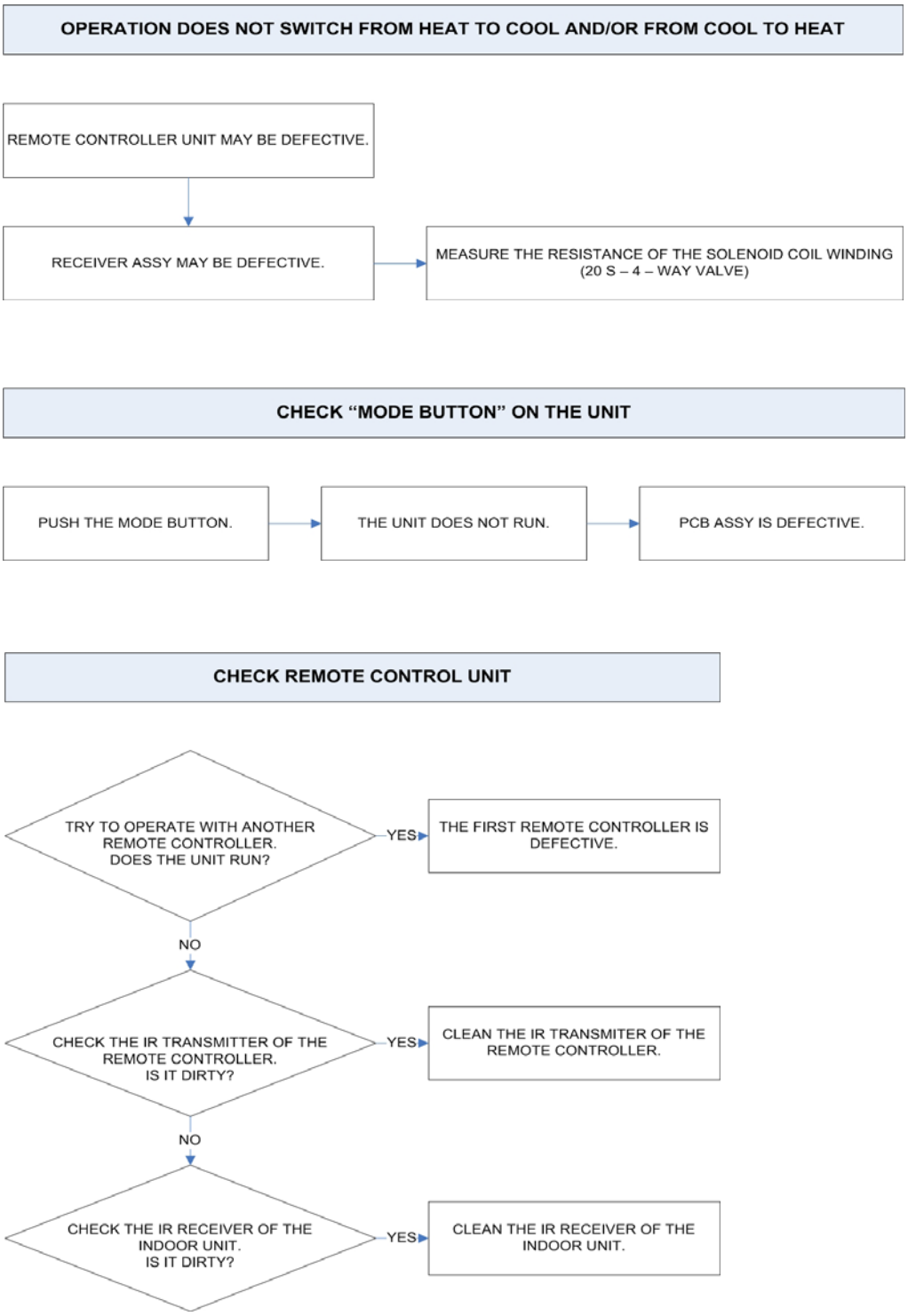


5-5 Some Parts of the Air Conditioner Do Not Operate

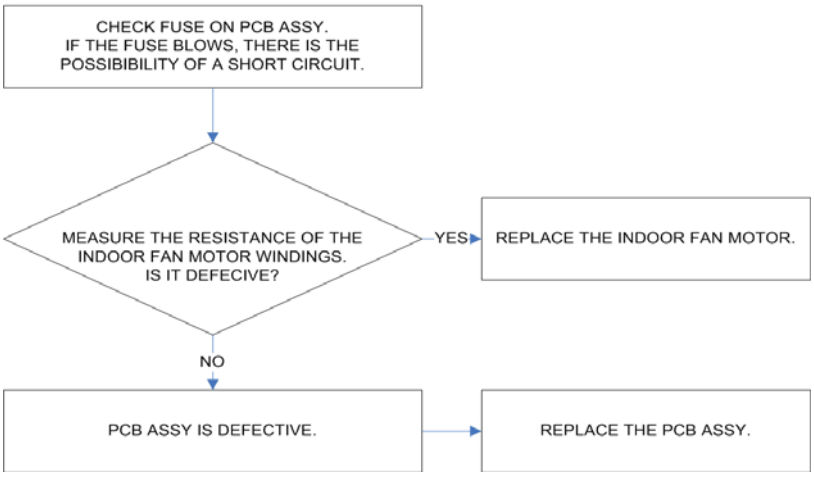




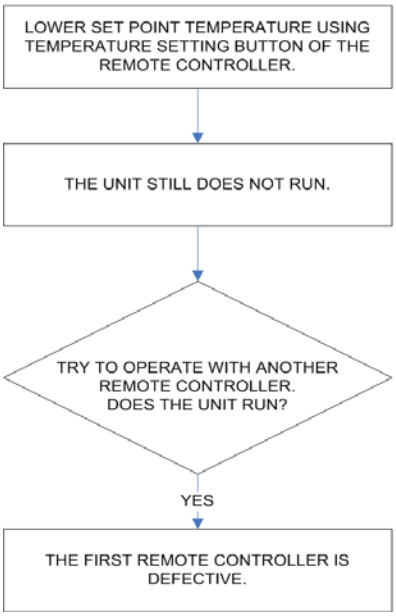
5-6 Air Conditioner Operates, but Abnormalities are Observed



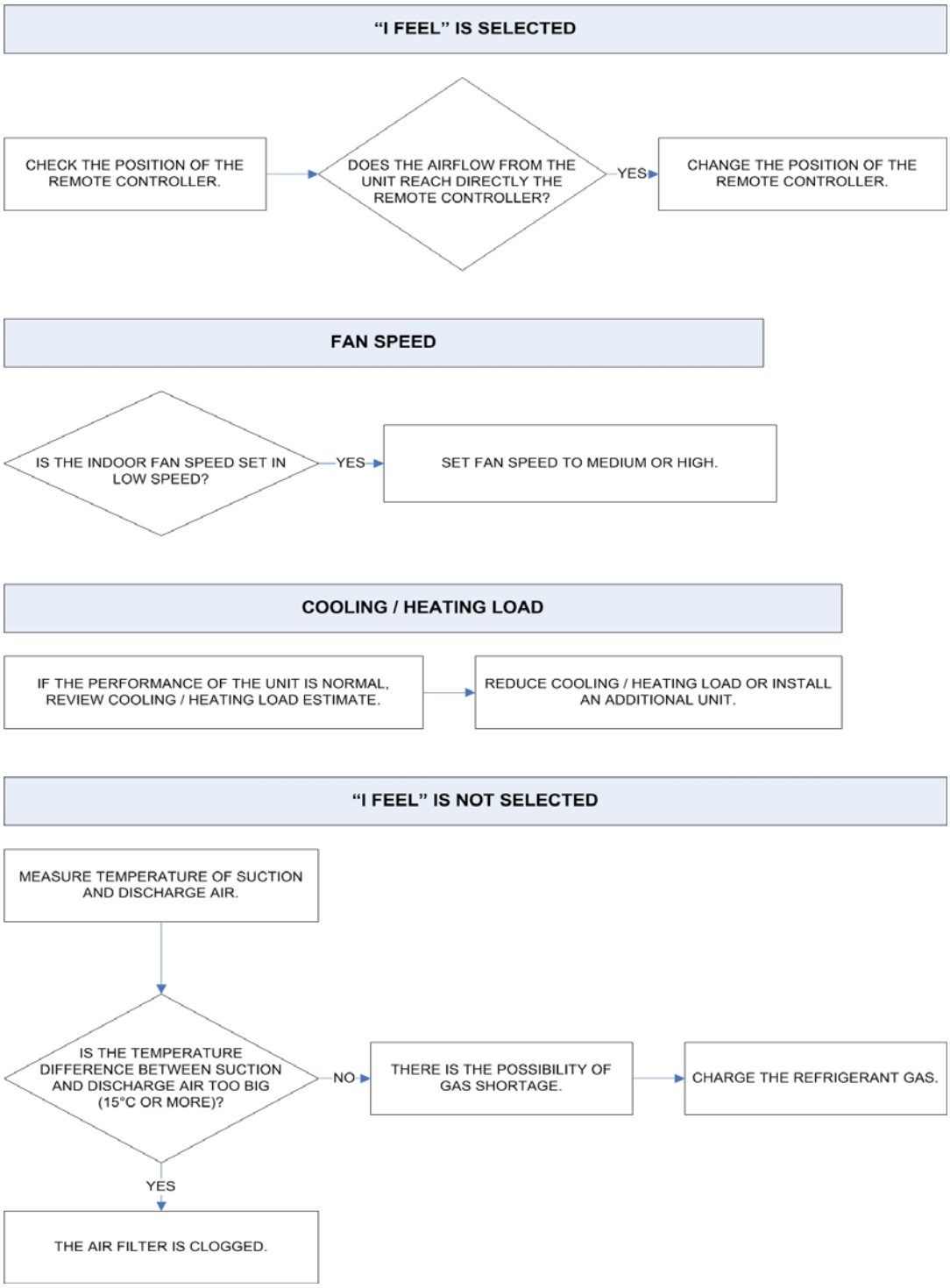
CHECK FUSE ON PCB ASSY IN THE UNIT



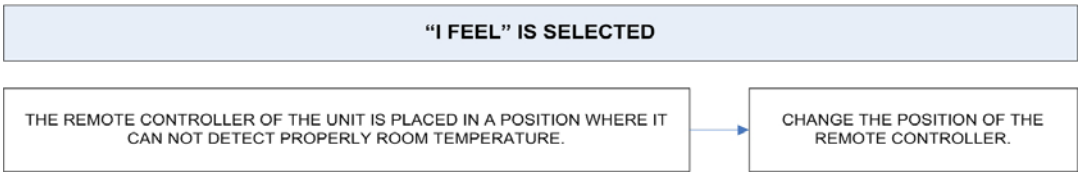
CHECK SETTING TEMPERATURE



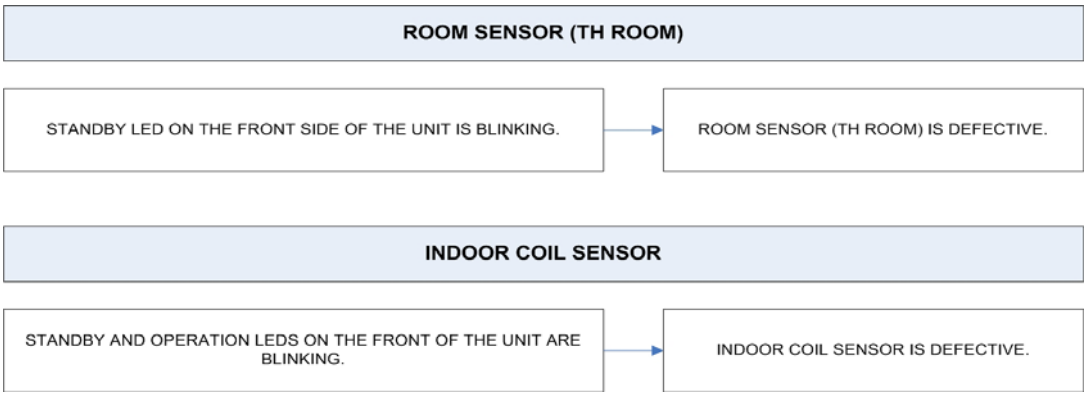
5-7 Poor Cooling



5-8 Excessive Cooling



5-9 A Sensor Is Defective



6. CHECKING ELETRICAL COMPONENTS

6-1 Measurement of Insulation Resistance

The insulation is in good condition if the resistance exceeds 1 MOhm

a) Power Supply Wires

Clamp the earthed wire of the power supply wires with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on either of the power wires (fig.1).
Then measure the resistance between the earthed wire and the other power wires (fig.1).

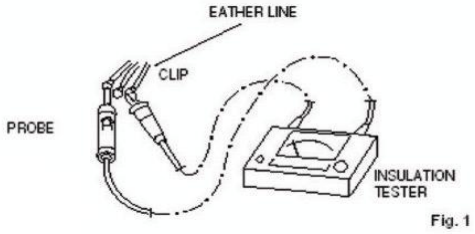


Fig. 1

b) Unit

Clamp an alluminium plate fin or copper tube with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on N terminal, and then on Lterminal the terminal plate (fig.2)

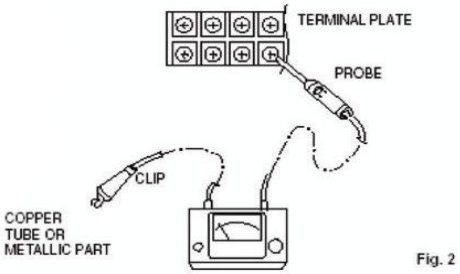


Fig. 2

c) Measurement of Insulation Resistance for Electrical Parts

Disconnect the lead wires of the disired electric part from terminal plate, PCB assy, capacitor, etc. Similary disconnect the connector. Then measure the insulation resistance (fig.1 to 4).
Refer to electric wiring diagram.

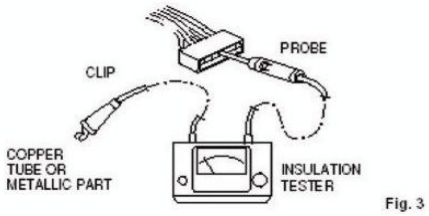


Fig. 3

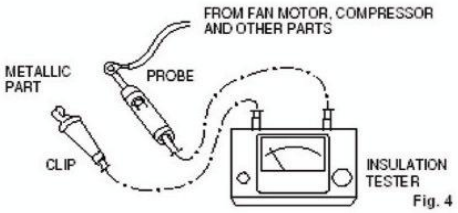


Fig. 4

NOTE

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

6-2 Checking Continuity of fuse on PCB assy

Remove PCB assy from electrical component box (fig.5)

Then pull out the fuse from PCB assy

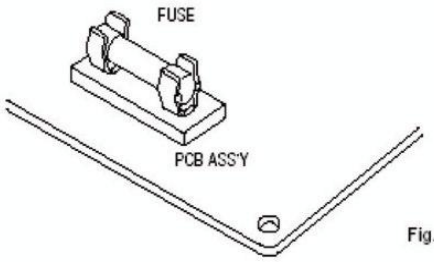


Fig. 5

Check continuity of fuse by the multimeter (fig.6)

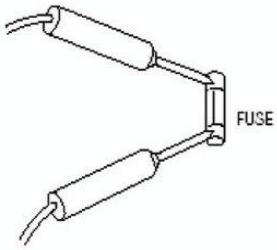


Fig. 6

6-3 Checking Motor Capacitor

Remove the lead wires from the capacitor terminals, and then place a probe on the capacitor terminals as shown in fig.7.
Observe the deflection of the pointer, setting the resistance measuring range of the multimeter to the maximum value.
The capacitor is "good" if the pointer bounces to a great extent and the gradually returns to its original position.
The range of deflection and deflection time deffer according to capacity of the capacitor.

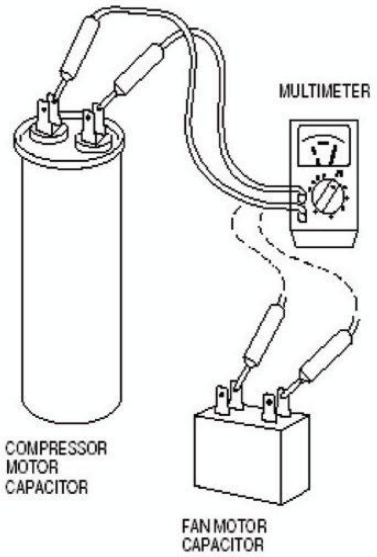


Fig. 7

Technibel Climatisation

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