



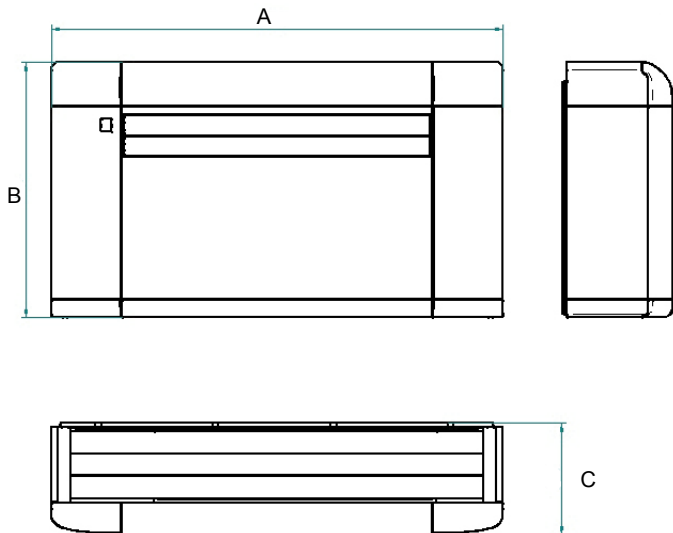
**TECHNICAL MANUAL 2009
MONOBLOCK AIR CONDITIONER
IL BELLO**

Serie / Series / Serie / Serie	
TECHNICAL MANUAL MONOBLOCK	
Emissione / Issue Ausgabe / Emission	Sostituire / Supersade Ersetzt / Remplace
9 - 2009	-
Catalogo / Catalogue / Katalog / Catalogne	
MTE0100990320-00	

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1. Dimensions



Model	A mm	B mm	C mm	Weight kg
IL BELLO	948	537	230	41

Note:

The external pipes have two different diameters; use Ø160 mm for air inlet side and Ø150 mm for air out let side.

2. Rated technical data

	Unit	IL BELLO
Cooling capacity	W(Btu/h)	2460 (8400)
Heating capacity	W(Btu/h)	2750 (9377)
Rated voltage	V	230
Frequency	Hz	50
Absorbed power in cooling	W	980
Absorbed current in cooling	A	4.3
Absorbed power in heating	W	860
Absorbed current in heating	A	3.8
EER label (Cooling Mode)	ABDCDEFG	B
EER lable (Heating Mode)	ABDCDEFG	B
Indoor Air flow	m ³ /h	400
Outdoor Air low	m ³ /h	400
Noise lever (SPL)	dB(A)	See table
Dehumidification capacity	L/24h	16.3
Optional temperature (remote control)	°C	18-30
Maximum external temperature ***	°C	+43
Minimum external temperature HP ****	°C	-5
Fuse (T3,15L)	V	250
Refrigerant / R410a	G	640
Dimension H/W/D	cm	58/100/23.5
Net Weight	Kg	45

**The above data could be changed in order to improve the performance.

*** The machine can work at T3 condition, with max out door temperature 52°C but the cooling performance will be reduced.

**** The machine can work at -15°C, but the Heating performance will be reduced.

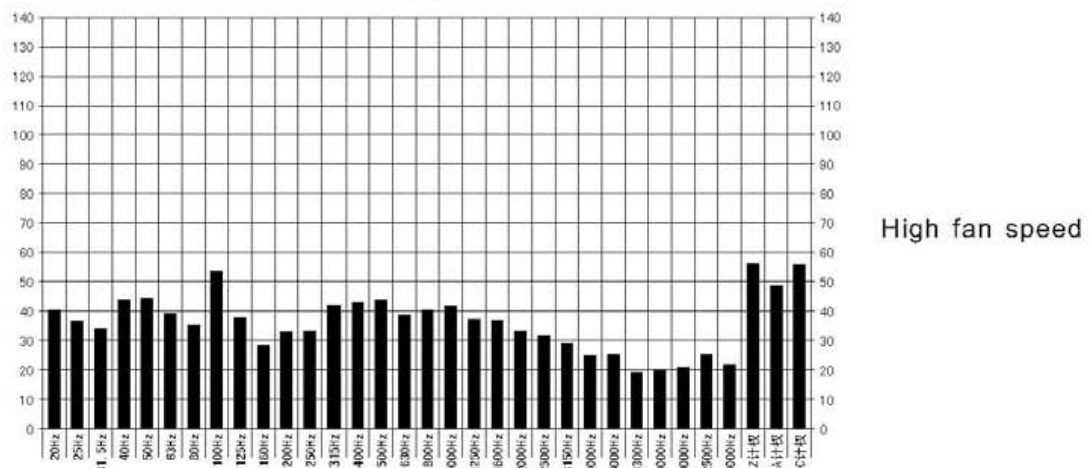
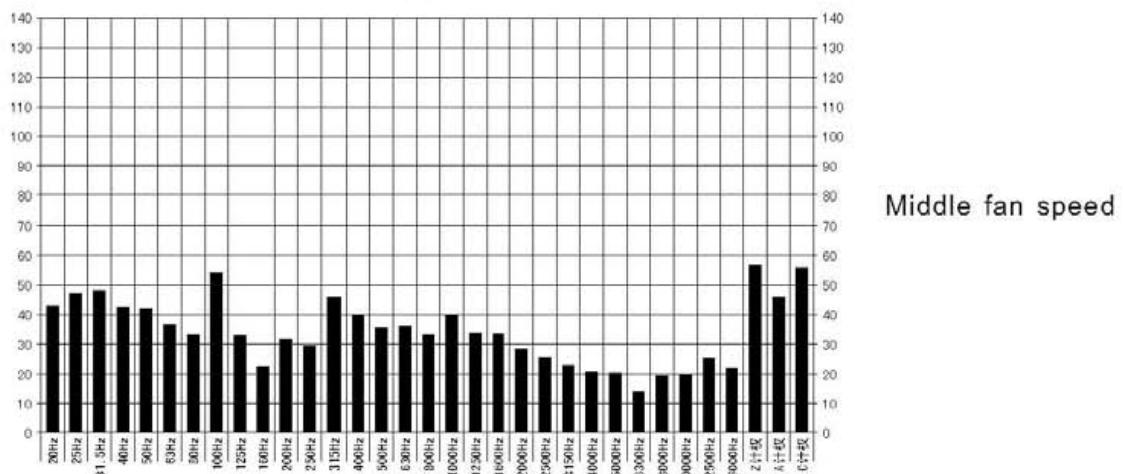
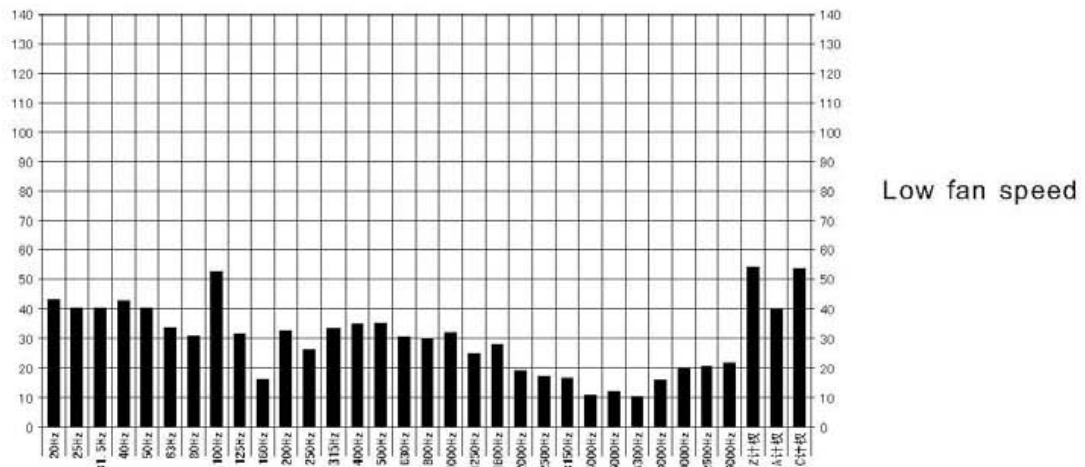
3. Noise level (Indoor – Outdoor)

The Noise test is done in semi reverberant room, with ambient noise level 27 dB(A), the structure is not perfectly appropriate for the double ducted machine, for this reason the noise level is correct around -3, 5 dB(A) calculated.

SPL (Sound Pressure Level) dB(A)	MIN Speed	MED Speed	Max Speed
Indoor Fan Mode	36,7	41,4	45,1
Indoor Cooling / Heating Mode	41,2	44,5	46,7
Out Door pipes	44,8	44,8	44,8

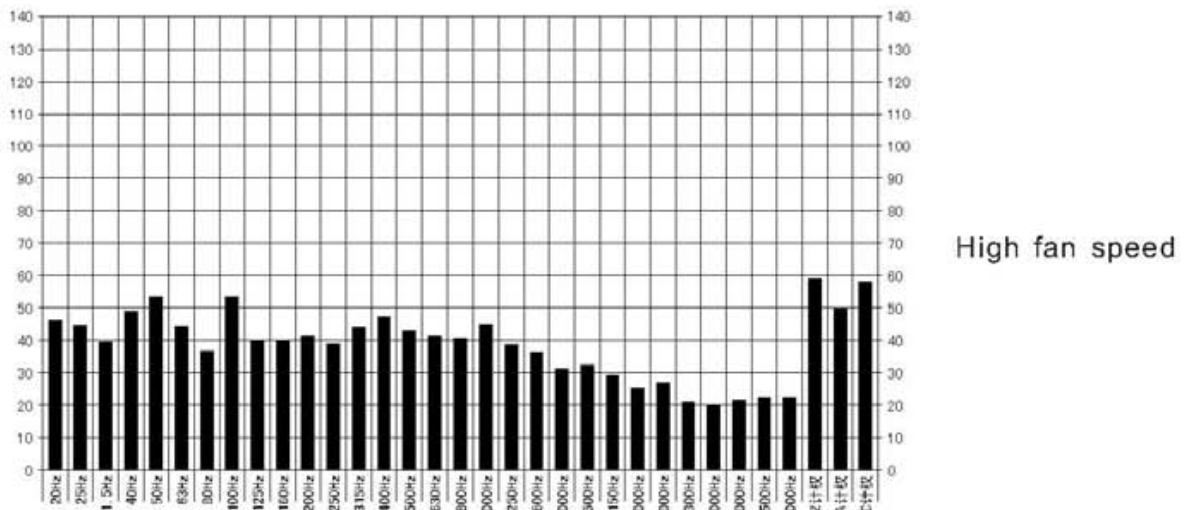
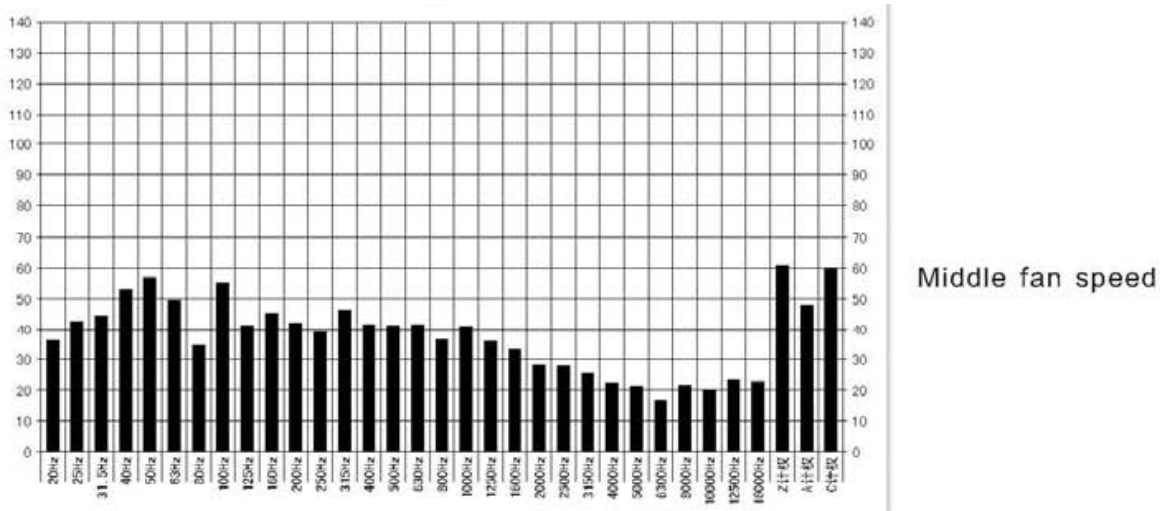
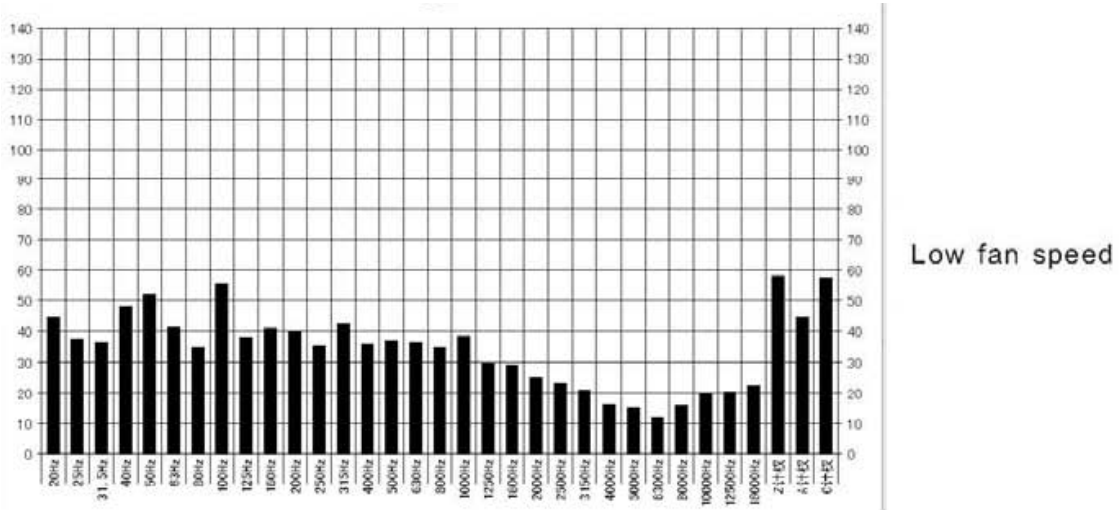
3.1. Noise level (Indoor Fan Mode)

Indoor noise test fan mode (■ dB(A))



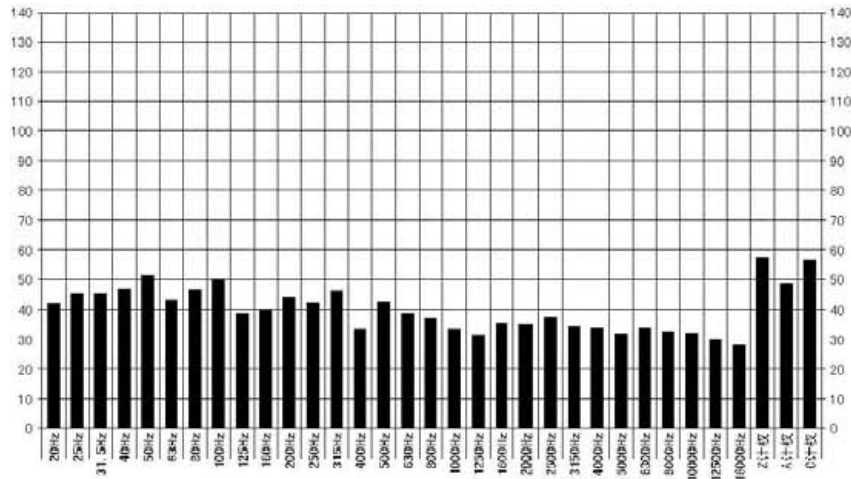
3.2. Noise level (Indoor cooling mode)

Indoor noise test in cooling mode (■ dB(A))

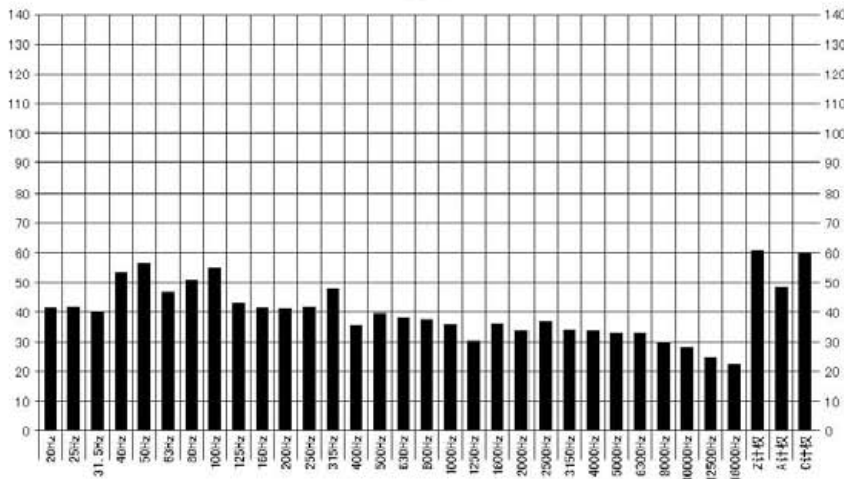


3.3. Noise level (Outdoor cooling mode)

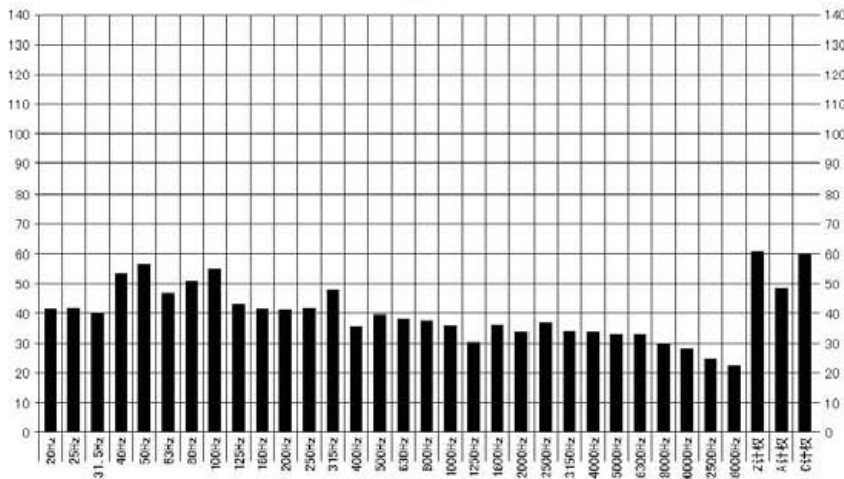
Outdoor noise test in cooling mode (■ dB(A))



Low indoor fan speed

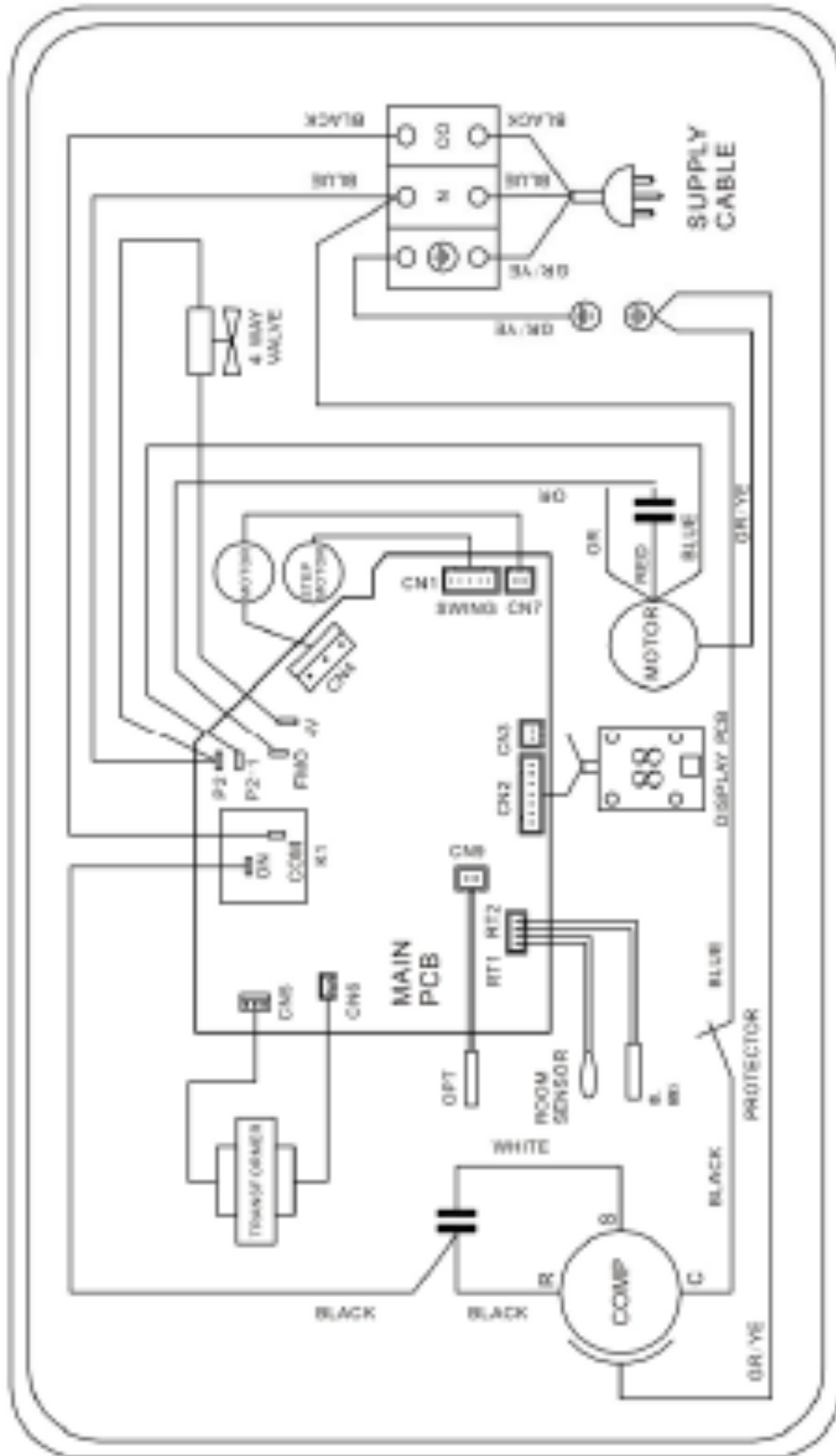


Middle indoor fan speed



Middle indoor fan speed

4. Electric wiring



5. Description of software operation

5.1 Main technical index

PCB should be according with the following conditions:

- Measured from the receiver, the receiving distance of remote control $\leq 8\text{m}$, receiving angle $\leq 60^\circ$ cone angle;
- Discrepancy of temperature control $\leq \pm 1^\circ\text{C}$;
- Discrepancy of time control $\leq 5\text{min}/24\text{h}$;
- Discrepancy of fan speed: $\pm 10\text{rpm}$;
- Rated power supply: $\text{AC}230 \pm 20\%$, $\sim 50\text{Hz}$;
- PCB should accord with RoHS.

5.2 Definition

- RT: room temperature.
- IPT: indoor coil temperature.
- ST: setting temperature, range $18 \sim 30^\circ\text{C}$
- OPT: outdoor coil temperature.
- NTC data: $R25 = 5.0\text{K} \pm 1\%$ $B25/50 = 3470 \pm 1\%$

5.3 Mode introduction

5.3.1 Auto mode

After running the unit by ON/OFF key or choose the auto running mode by remote control, it will fix its running mode by judging room temperature (see below table):

Indoor temp.	Indoor temp. $\leq 20^\circ\text{C}$	$20^\circ\text{C} < \text{Indoor temp.} \leq 25^\circ\text{C}$	Indoor temp. $\geq 25^\circ\text{C}$
Running mode	Heating	Fan	Cooling
Standard fixed setting temperature	20°C	22°C	25°C

5.3.2 Cooling mode

5.3.2.1 Setting temperature : $18^\circ\text{C} \sim 30^\circ\text{C}$.

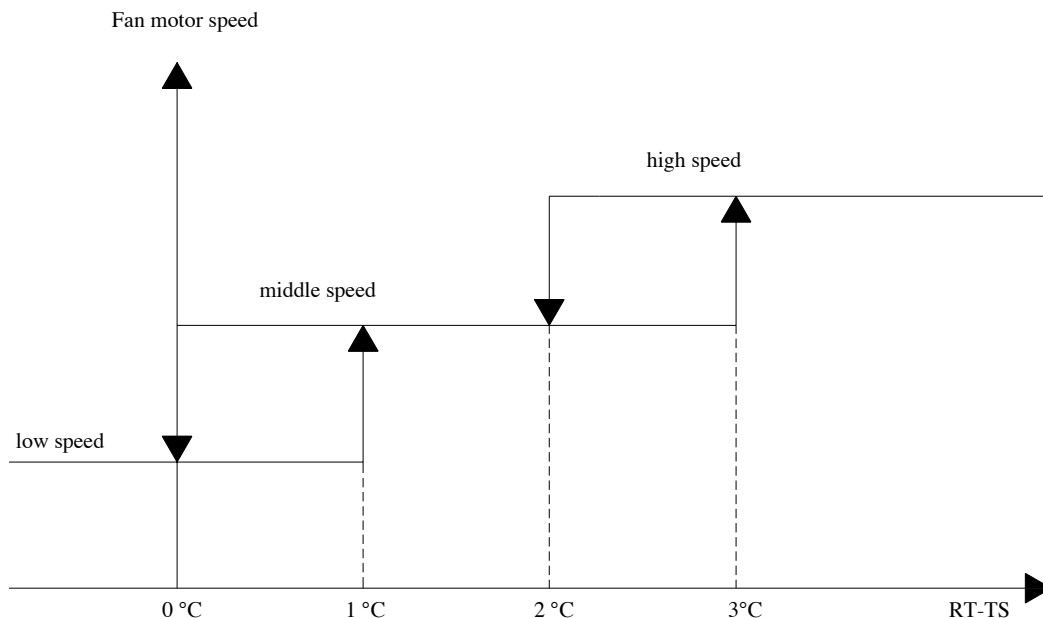
5.3.2.2 Working conditions of compressor:

- Compressor works when $\text{RT} \geq \text{ST} + 1^\circ\text{C}$;
- Compressor stops when $\text{RT} \leq \text{ST} - 1^\circ\text{C}$;
- $-1^\circ\text{C} < \text{RT} - \text{ST} < +1^\circ\text{C}$, compressor maintains the original state

5.3.2.3 The working condition of four-way valve: out of electric power supply

5.3.2.4 The working condition of outdoor unit fan motor: start and close as same time as the compressor.

5.3.2.5 Fan speed and temperature.



5.3.3 Dehumidify mode

5.3.3.1 Setting temperature: 18°C ~ 30°C.

5.3.3.2 Work conditions: Action will accord to the indoor temperature and the setting temperature.

NO	Conditions	Indoor fan motor	Outdoor fan motor	Compressor	Four-way valve
1	$RT \geq Ts$	Fix in low speed fan	Keep running	Keep running	Out of electric power supply
2	$RT \leq Ts$	Fix in low speed fan	Works for 10 minutes and then stops for 6 minutes		

Note: During dehumidify, after going into the dehumidify cycle, it will not judge again according to the RT.

5.3.3.3 When $RT \leq 14^\circ\text{C}$, forbid to dehumidify, indoor fan speed is in low speed when $RT > 16^\circ\text{C}$, rework again.

5.3.3.4 Four-way valve: Out of electric power supply.

5.3.3.5 Fan motor of outdoor unit: Start and stop as same time as the compressor.

5.3.4 Heating mode

5.3.4.1 Setting temperature: 18°C ~ 30°C

5.3.4.2 Conditions of compressor working:

a) Compressor starts condition: $RT \leq TS + 1^\circ\text{C}$

b) Compressor stops condition: $RT > TS + 3^\circ\text{C}$;

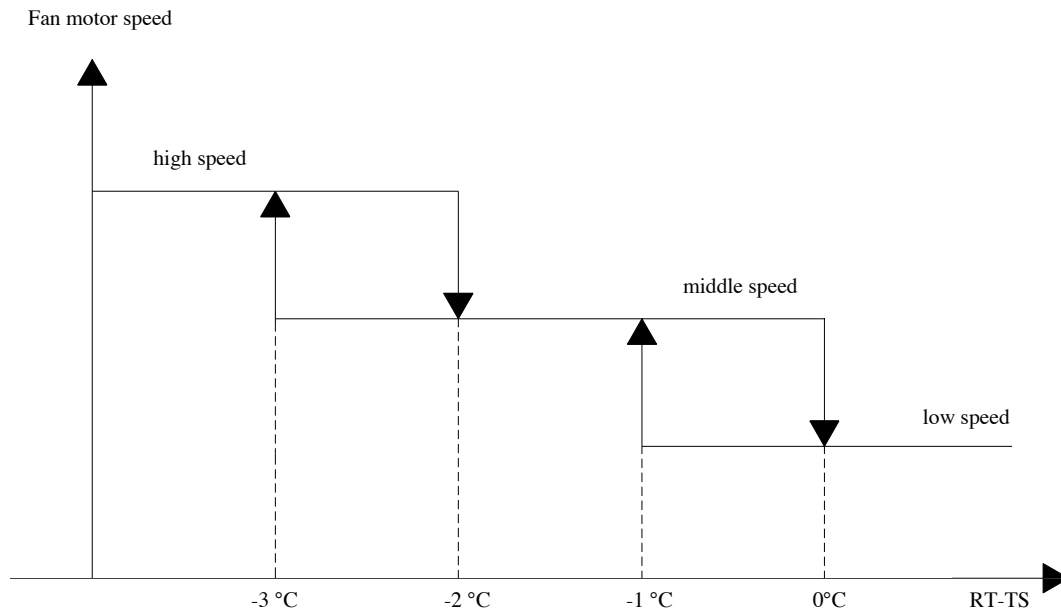
c) $+1^\circ\text{C} < ST - RT \leq +3^\circ\text{C}$, compressor maintains the original state

5.3.4.3 The first time turn on the unit, directly run the compressor, only after running in 3 minutes and then judge the temperature.

5.3.4.4 Working condition of four-way valve: Under the heating mode, the four-way valve keeps opening (including setting turn off, but except defrosting course). When mode turns into heating mode or unit is turned on, the four-way valve will open before 5 minutes compressor works. When mode turns out from the heating mode or unit is turned off, four-way valve will close after compressor stops 2 minutes.

5.3.4.5 Working state of outdoor motor: Start and stop as same time as the compressor (When system goes into the defrosting or over heating protection, it will run according to the defrosting or over heating protection way).

5.3.4.6 Indoor unit fan speed (see below fig.)



5.3.4.7 Anti cold wind function:

After go into the heating mode, when $IPT \geq 38^\circ\text{C}$, indoor fan motor will run according to the setting. When $IPT < 38^\circ\text{C}$, indoor fan motor will not run, after compressor runs for 60 seconds and then run the indoor fan motor.

In the heating mode, when continuously in one minute check the $OPT \leq -5^\circ\text{C}$ and compressor continuously runs over 5 minutes, and go into heating pump running or running 30 minutes after defrosting, if the above 3 conditions would satisfy at the same time, it will begin to defrost.

Defrosting relieve conditions:

After compressor runs 3 minutes and OPT rises up to 15°C , defrosting will relieve automatically, and go into the normal heating running. The defrosting time is not more than 12 minutes (including the compressor stop time). If the defrosting time over 12 minutes but temperature still does not up to 15°C , in this case, it will force to relieve the defrosting and go into normal heating.

5.3.5 Fan mode

5.3.5.1 Compressor working state: stop

5.3.5.2 Four-way valve: out of electric power supply.

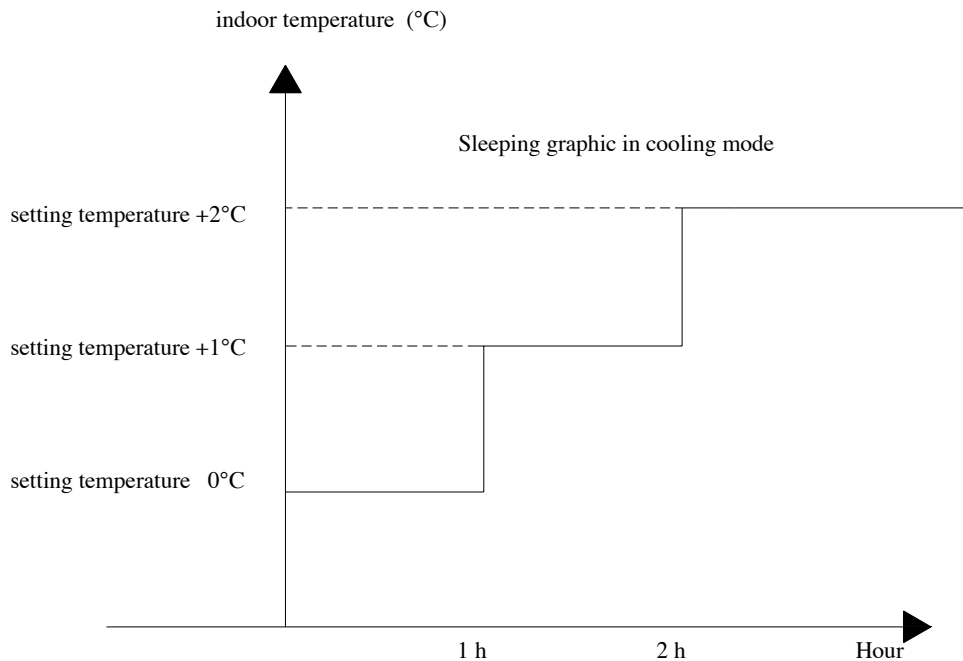
5.3.5.3 Outdoor unit fan motor: stop

5.3.5.4 Indoor unit fan motor: have auto, low, middle and high speed, same with the cooling mode.

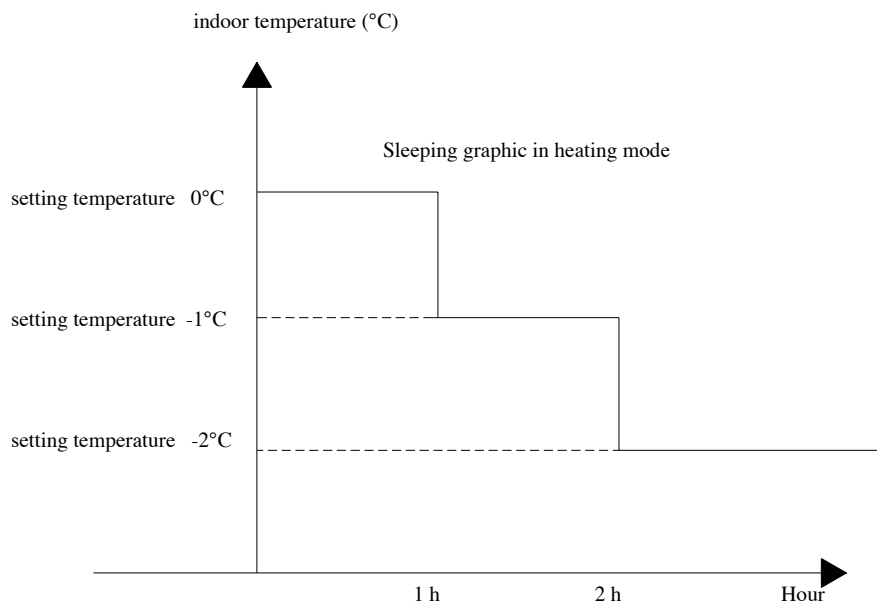
5.3.6 Sleeping mode

5.3.6.1 Sleeping running only take effect under the heating and cooling mode, or cooling/heating in the auto running mode.

5.3.6.2 Under the cooling mode, at the beginning of sleeping running, if environment temperature > setting temperature, the compressor, outdoor fan motor and indoor fan motor will be worked. The four-way valve will be closed. If environment temperature \leq setting temperature, it will directly go into the sleeping mode running (see the below graphic). Fan speed will be fixed to be low speed. Wind direction can be adjusted or stay on one position.



5.3.6.3 Under the heating mode, at the beginning of sleeping running, if environment temperature < setting temperature, the compressor, outdoor fan motor and indoor fan motor and four-way valve will be worked. If environment temperature \geq setting temperature, it will directly go into the sleeping mode running (see the below graphic). Fan speed will be fixed to be low speed. Wind direction can be adjusted or stay on one position.



5.3.7 Timer function

5.3.7.1 When the air conditioner is turned on, press the remote control to set the timer turn off.

When the unit is turned off, press the remote control to set the timer turn on.

5.3.7.2 The temperature rising key in the remote control is for one hour, press one time will increase one hour, 24 hours for one cycle. The temperature dropping key is for minute, press one time will increase 10 minutes, 60 minutes for one cycle.

5.3.7.3 Clock setting: Press the clock key on the remote control, and then press the temperature rising and dropping key, it will adjust the time. The temperature rising key in the remote control is for one hour, press one time will increase one hour, 24 hours for one cycle. The temperature dropping key is for minute, press one time will increase 10 minutes, 60 minutes for one cycle.

5.3.8 Emergency function (Not available for the user)

5.3.8.1 There is one emergency button on the machine. When the remote control is missed or damaged, can use this button to go into the auto running. If the unit stands by, press this button can turn on the machine and go into the auto mode running, indoor unit motor will run auto fan speed.

5.3.8.2 Press this button can turn off the machine when the machine is running.

5.3.8.3 During the emergency running, when receive the effective signal from the remote control, it will exit the emergency running and process the setting of the remote control.

5.4 Flap panel control

• Use the step motor to control the flap panel moving, run or stop according to the flap order.

5.5 Protection function

5.5.1 Compressor 3 minutes stop protection.

a) The first time connect with the electric power, the compressor will run at once.

b) After compressor stops every time, it must stop in 3 minutes enough only then to rework again (Except heating and defrost).

5.5.2 Anti-freeze protection in the cooling and dehumidify.

a) When continuously to check out $IPT \leq -1^{\circ}\text{C}$, compressor and outdoor fan motor will stop, indoor unit will maintain the original state and go into anti-freeze protection.

b) When $IPT \geq 8^{\circ}\text{C}$, and over the protection state for 3 minutes, compressor and outdoor fan motor will back to run and exit the anti-freeze protection state.

5.5.3 Over heat protection in the heating mode.

Under the heating mode:

a) When $IPT \geq 55^{\circ}\text{C}$, outdoor fan motor will stop.

b) When $IPT \leq 48^{\circ}\text{C}$, outdoor fan motor will back to run.

c) When $IPT \geq 64^{\circ}\text{C}$, compressor and outdoor fan motor will stop.

d) When $IPT \leq 48^{\circ}\text{C}$, back to the normal running (3 minutes later will run the compressor and outdoor fan motor.). In this case, four-way valve always opens and indoor fan motor always runs according to the setting.

5.5.4 Sensor damage protection

5.5.4.1 When RT sensor was damaged

a) When RT temperature is lower than -40°C or higher than 120°C , it is judged to be damaged and go into the protection mode, compressor will run the cycle of run 20 minutes and stop 5 minutes.

b) Will process the fan mode when in the auto mode.

Note: After the RT sensor was damaged, the light will flash with 1Hz frequency, or the unit will display **E1** on the panel.

5.5.4.2 When IPT sensor was damaged

When IPT is lower than -30°C or higher than 90°C , it is judged to be damaged;

Note: After IPT sensor was damaged, the light will flash with 0.5Hz frequency, or the unit will display **E2** on the panel.

5.5.4.3 When OPT or RT IPT sensor was damaged

In the heating mode, compressor runs every total for 50 minutes, and then defrosts 3 minutes.

Note: When RT and IPT sensor were damaged at the same time, it will handle according to RT situation.

5.5.5 Indoor PG motor failure protection

After indoor fan motor has electric power supply, continuously 5 seconds did not check the feedback pulse of motor, it will close the indoor fan motor and compressor, outdoor fan motor, valve and heating element, 10 seconds later, indoor unit fan motor run again, if still do not have fan speed feedback signal, and then go into indoor unit failure protection. Light will flash with Work 1.5S/Stop 0.5s frequency, or the unit will display **E3** on the panel.

5.5.6 Refrigerant insufficient protection

Under the cooling mode or cooling in the auto setting mode, compressor runs full of 20 minutes later, if indoor coil temperature \geq room temperature - 5°C , and time lasts to 40 minutes, unit would stop working and display **E4** on the panel.

Under the heating mode or heating in the auto setting mode, compressor runs full of 20 minutes later, if indoor coil temperature \leq room temperature + 5°C, and time lasts to 40 minutes, unit would stop working and display **E4** on the panel.

5.5.7 Failure Code

Failure means the case which cannot rework by the system self adjust and must interrupt by human.

The code as below:

Failure situation	Light flash	Code
RT sensor failure	1/time	E1
IPT sensor failure	2/time	E2
Indor PG	Work 1.5S/Stop 0.5S	E3
Refrigerant insufficient protection	Work 1.5S/Stop 1S	E4

- RT: Room temperature
- IPT: Indoor coil temperature
- ST: Setting temperature, range 18°C ~ 30°C
- OPT: Outdoor coil temperature
- PTC data: R25 = 5.0K ± 1%, B25/50 = 3470 ± 1%

5.5.8 OPT failure protection

For the OPT sensor, it is used for the defrost function in heating mode. If OPT sensor works well, the unit will check the data from OPT sensor, then decide if go to defrost function. Please refer to 5.3.4. If there is failure with OPT sensor, the unit would work with automatic defrost function. See as below:

Automatic defrost function start condition:

Heating mode, and compressor continuously works for 25 minutes, if IPT - RT \leq 18°C, the unit would go to defrost function.

Automatic defrost function stop condition:

When the compressor works for 12 minutes, unit would stop defrost function.

6. Precaution

When using electrical appliances, basic safety precaution should always be followed:

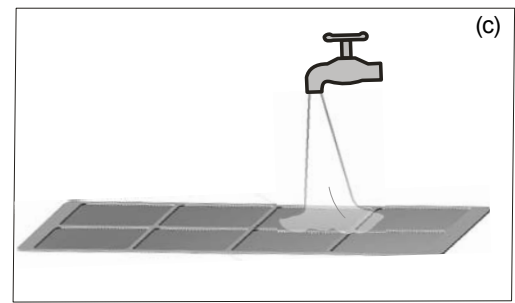
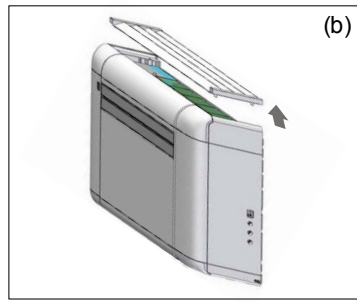
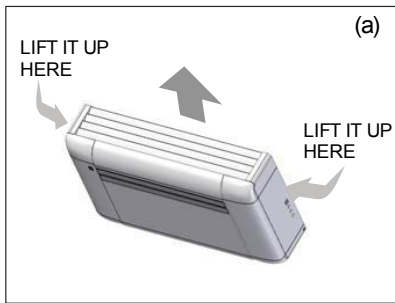
- Do not place objects on the product or allow objects to obstruct the inlet or outlet openings. Extreme care should be taken when any product is used by, or near children and pets, and whenever the product is left operating and unattended.

Please note:

Before operating the product, remove the air conditioner from its package and check it is in good condition.

- Do not let children play with the packaging, for example plastic bags.
- Do not operate any product with a damaged cord or plug, or after the air conditioner malfunctions, has been dropped, or damaged in any manner.
- Always operate the product from a power source of the same voltage, frequency and rating as indicated on the product identification plate.
- This air conditioner is not intended for use in wet or damp locations.
- Do not place the air conditioner near an open flame, cooking or heating appliance, or hot surface.
- Do not let the power cord hang over the edge of a table or counter. Arrange the power cord away from an area where it may be tripped over.
- Never place the power cord under a carpet or rug. Do not operate the air conditioner in areas where petrol, paint, or other flammable liquids are used or stored.
- Do not carry out any cleaning or maintenance or access internal parts until the air conditioner has been disconnected from the mains electricity supply.
- Avoid prolonged direct contact with the flow of the air from the air conditioner and the room being closed with no ventilating for a long period of time.

7. Ordinary maintenance



See pictures (a), (b), (c)

7.1 Filter cleaning:

The filters should be regularly cleaned to keep the air conditioner running efficiently. Clean the filters every two weeks.

How to proceed:

- Disconnection the air conditioner from the electrical supply.
- Extract the filter grating. (a) on the same direction of the arrow. Proceed to wash them (not use hot water) and only when are dried replace them in the same way.

ATTENTION:

Do not use the air conditioner without filters as it could seriously damage the air conditioner.

7.2 External cleaning:

- Disconnect the air conditioner from the electrical supply.
- Wipe external surfaces clean with a damp cloth only.
- Do not use an abrasive cloth and/or solvents, as this may damage the surfaces.
- Do not use excessively wet cloth or sponges, as water stagnation could damage the air conditioner and compromise safety.

8. Problem and solution

Problem possible causes

- The air conditioner does not work
- The air conditioner does not refrigerate the room
- Strange smell in the room. Water drips from the air conditioner.
- The remote control doest not work.
- The air conditioner does not work for 3 minutes when switched on.

8.1 Possible solutions

1. Wrong setting the timer / check it.
2. Problems on the power supply / check it
3. The filter could be dirty / clean it
4. The room temperature is too high / wait until the temperature goes down
5. The temperature is not properly set / check it
6. The grids could be obstructed / check and remove the eventual obstacles
7. Dampness in the room, coming from walls, carpet, furnishing or similar
8. Wrong installation of the air conditioner
9. Wrong connection of the drainage pipe
10. Exhausted batteries
11. Wrong insertion of the batteries inside the remote control
12. Protection of the air conditioner. Wait for 3 minutes and the air conditioner will start to work again.

REMARK:

If the supplied cord is damaged, it must be replaced again.

The max operation temperature for the air conditioner:

Max cooling: outdoor DB 43°C / WB 26°C, indoor DB 32°C / WB 23°C,

min heating: outdoor DB -5°C / WB -6°C, indoor DB 20°C



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