

TCL Multi Inverter air conditioner

Service Manual

Models

FMA-09CHSD/DVI	FMA-12CHSD/DVI
FMA-09CRD/DVI(Q4)	FMA-12CRD/DVI(Q4)
FMA-18CRD/DVI(Q4)	FMA-09D5RD/DVI
FMA-12D5RD/DVI	FMA-18D5RD/DVI
FMA-18I2HD/DVO	FMA-27I3HD/DVO
FMA-30I4HD/DVO	

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1. Important Notice

This service manual is intended for use by individuals possessing adequate backgrounds of electrical, electronic and mechanical experience. Any attempt to repair the appliance may result in personal injury and property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with its use.

The information, specifications and parameter are subject to change due to technical modification or improvement without any prior notice. The accurate specifications are presented on the nameplate label.

How to order spare parts

To have your order filled promptly and correctly, please furnish the following information:

1. Model No. with Indoor or Outdoor
2. No. in the Explosion View
3. Part Name
4. The quantity you ordered

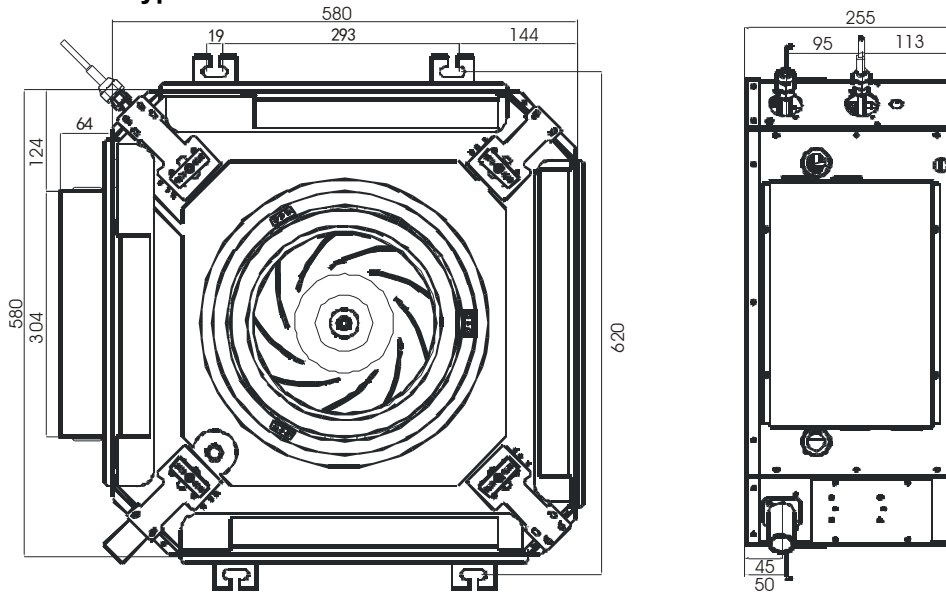
2. Product Dimensions

Indoor Unit:
Wall split type

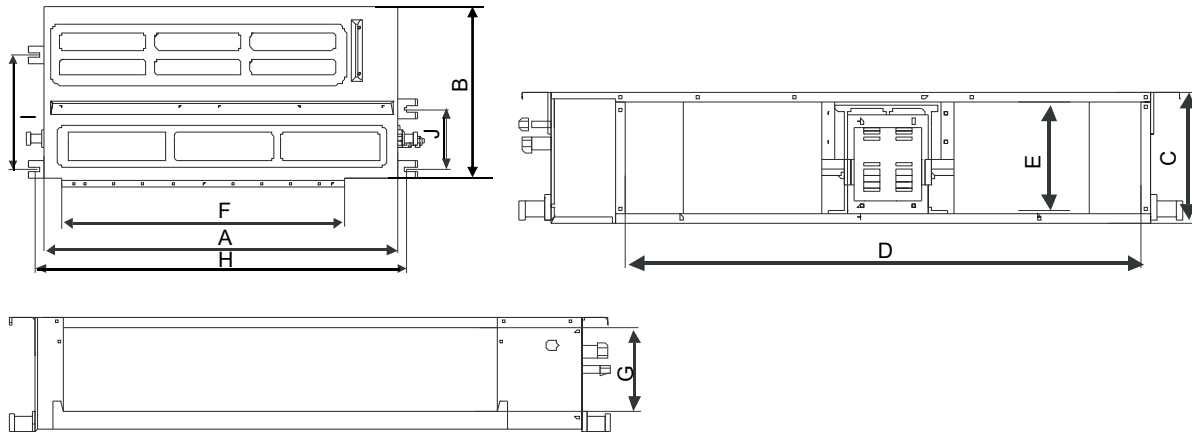


Model	A	B	C
FMA-09CHSD/DVI	770	205	250
FMA-12CHSD/DVI	770	205	250

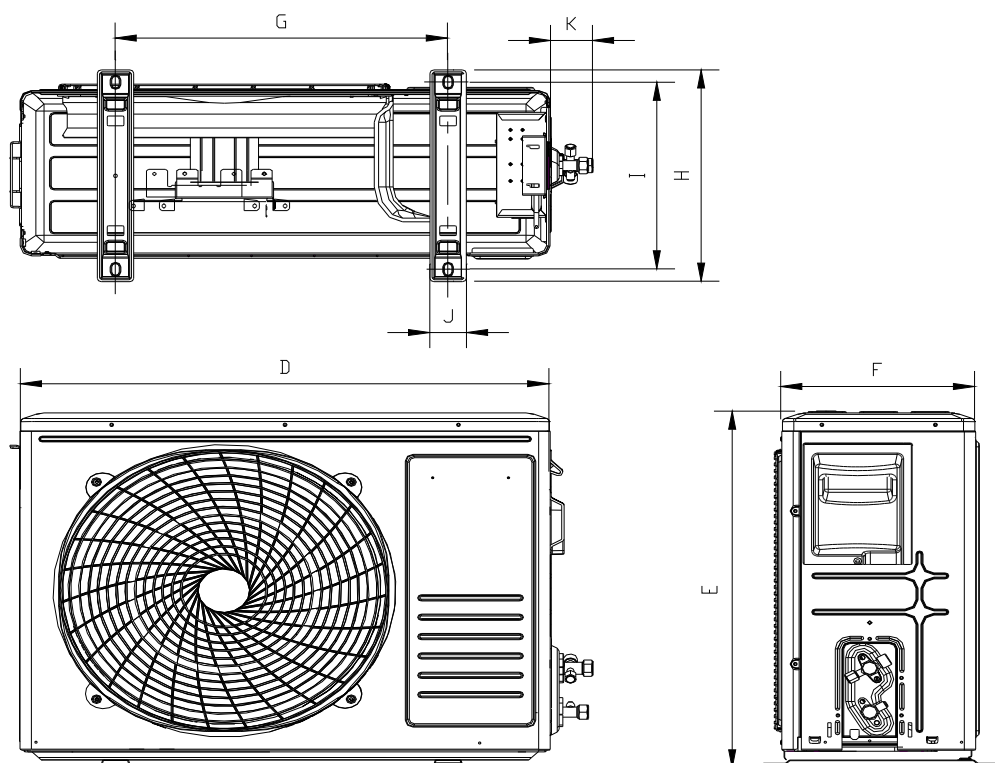
Cassette type



Duct type

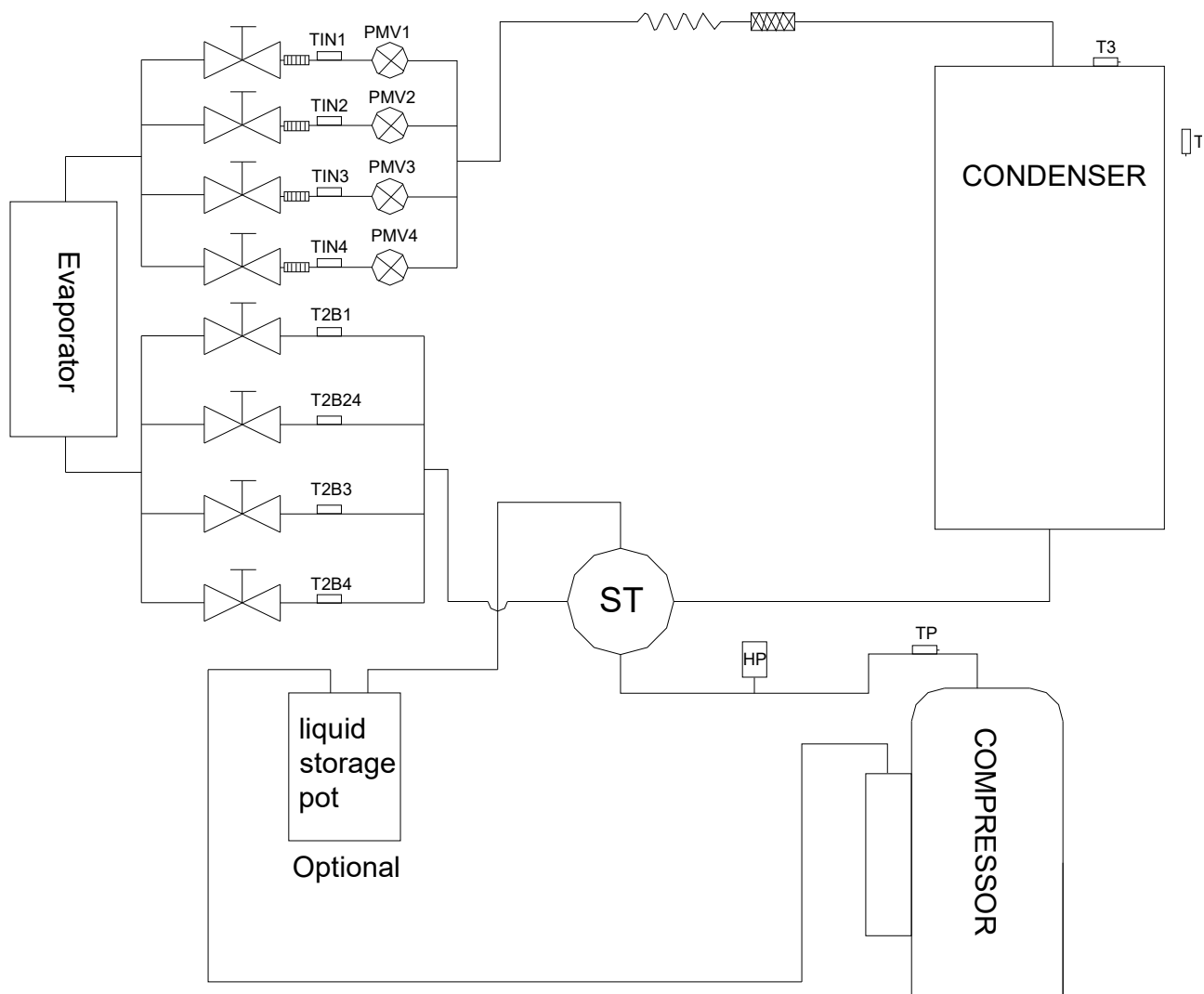


Model	A	B	C	D	E	F	G	H	I	J
7/9/12K	700	447	200	570	172	510	140	738	298	158
18K	920	447	200	790	172	730	140	958	298	158

Outdoor Unit:

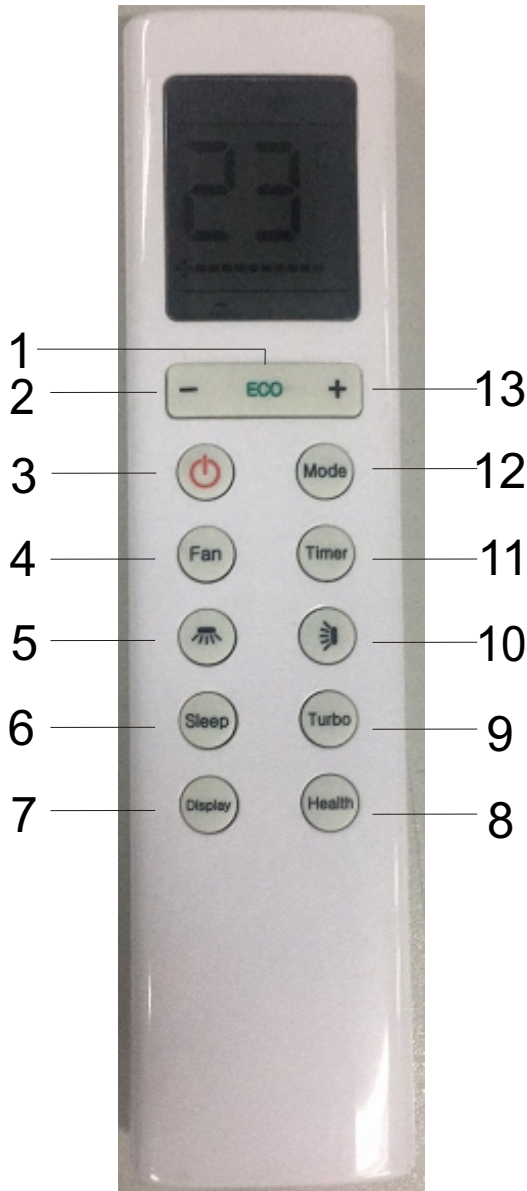
Model	Outdoor unit							
	D	E	F	G	H	I	J	K
FMA-18I2HD/DVO	780	605	290	521	360	327.5	55	56
FMA-27I3HD/DVO	900	650	315	623	374	347	61	56
FMA-30I4HD/DVO	940	910	340	600	400	375	80	56

3. Refrigeration cycle diagram



4. OPERATION DETAILS

Remote controller



- 1 ECO button**
In cooling mode, press this button, the temperature will increase 2°C on the base of setting temperature: In heating mode, press this button, the temperature will decrease 2°C on the base of setting temperature.
- 2 TEMP DOWN button**
Decrease the temperature or time by 1 unit.
- 3 ON/OFF button**
To switch the conditioner on and off.
- 4 FAN SPEED button**
To select the fan speed of auto/low/mid/high.
- 5 SWING button**
To activate or deactivate of the movement of the "DEFLECTORS" .---Side wind
- 6 SLEEP button**
To activate the function "SLEEP" .
- 7 DISPLAY button**
To switch on/off the LED display (if present)
- 8 HEALTH button**
To switch - on /off HEALTHY function. It is a button which controls the ionizer or plasma generator only for inverter type.
- 9 TURBO button**
In cooling mode, press this button, the unit will give the maximum cooling temperature with 16°C
In heating mode, press this button, the unit will give the maximum heating temperature with 31°C.
- 10 SWING button**
To activate or deactivate of the movement of the "DEFLECTORS" .---up and down
- 11 TIMER button**
To set automatic switching-on/off.
- 12 MODE button**
To select the mode of operation.
- 13 TEMP UP button**
Increase the temperature or time by 1 unit.

Note: Each mode and relevant function will be further specified in following pages.

Remote Control

The remote controller is not presetting as Cooling Only Air Conditioner or Heat Pump by manufacturer. Each time after the remote controller replace batteries or is energized, the arrowhead will flashes on the front of "Heat" or "Cool" on LCD of the remote controller.

User can preset the remote controller type depending on the air conditioner type you have purchased as follows:

Press any button when the arrowhead flashes on the front of "Cool", Cooling Only is set.

Press any button when the arrowhead flashes on the front of "Heat", Heat Pump is set.

If you don't press any button within 10 seconds, the remote controller is preset as Heat Pump automatically.

Note :

If the air conditioner you purchased is a Cooling Only one, but you preset the remote controller as Heat Pump, it doesn't bring any matter. But if the air conditioner you purchased is a Heat Pump one, and you preset the remote controller as Cooling Only, then you CAN NOT preset the Heating operation with the remote controller.

Electronic Controller

1. Safety Protection

(1) Time Delay for Safety protection

- 3 minutes delay for compressor ---The compressor is ceased for 3minutes before restarting to balance the pressure in the refrigeration cycle in order to protect the compressor.
- 150 seconds delay for 4-way valve---The 4-way valve will be ceased for 150 seconds late after compressor to prevent the refrigerant-gas abnormal noise when the HEATING operation is OFF or switch to the other operation mode.

(2) Discharge temperature protection

There is a temperature sensor on discharge pipe, when temperature on discharge pipe exceeded the limit 115°C, system control will shut down the compressor and the display board will show the error code.

(3) Lower voltage protection

When AC voltage <160V, DC voltage<170V, unit will be shut down for protection and recover while the AC voltage >170 V, DC voltage >190V.

(4) Over voltage protection

When AC voltage > 275V, DC voltage >400V unit will be shut down and recover while AC voltage<255V, DC voltage<390 V.

(5) Over current protection

When the current of outdoor unit is overload, controller will drop the operation frequency or shut down the unit immediately and show error code.

(6) Condenser temperature protection

When condenser temperature $\geq 65^{\circ}\text{C}$ and keep 10s, the air conditioner will shut down, and show error code, and recover while condenser temperature<52°C and the compressor stop for 3minutes.

(7) **IPM** module protection

IPM module has high temperature & over current protection itself, if there is signal feedback to IPM, the outdoor unit will shut down, LED on outdoor PCB will show the error code.

(8) Evaporator freeze protection.

When evaporator temperature<2°C, the controller will drop compressor operate frequency.

When evaporator temperature<0°C and keep 1 minute, the expand valve of the unit will stop.

When all of the operating unit enter freeze protect, the compressor will stop and recover while evaporator temperature and stop for 3 minutes.

2. "Feel" Mode Operation

- (1) When the "Feel" mode is selected, the operation mode and initial temperature set are determined by the initial room temperature at start-up of the operation except to turn off the air conditioner and operates it again.
- (2) If the unit have activate the AUTO restart, when the power off and supply again, the unit will judge the condition again and enter the "Feel" mode.
- (3) If the mode is change to "Feel" from other mode, the "Feel" mode doesn't operate until compressor stop for more than 3 minutes.

Mode	Initial Room Temperature	Initial Set Temperature
COOLING	RT=26°C	23°C
DRY	26°C>RT \geq 20°C	RT-2°C
HEATING	RT<20°C	23°C
Fan	RT<20°C	RT

- In the “Feel” mode, when the controller receives the up or down signal of temperature, the set temperature can adjust by 1°C upper or lower. The biggest you can adjust by 2°C upper or lower.

3. “COOLING” Mode Operation

(1) Compressor frequency control

According to difference room temperature and set temperature ($\delta t = RT - ST$), running frequency of compressor is controlled by electronic controller. When room temperature is much higher than set temperature, the compressor will start at a high frequency, and as room temperature goes down, the compressor running frequency will go down. When room temperature is lower than set temperature, the compressor will run at very low frequency. In general, unit will change its running frequency according to δt to make room temperature closing to set temperature.

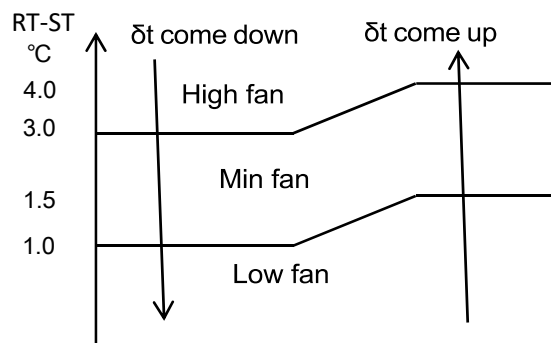
(2) Outdoor temperature affects running frequency of the compressor

Outdoor temperature affect compressor's running frequency. Difference inlet temperature of outdoor unit is adapted by difference compressor running frequency. While outdoor temperature is about 30°C, the compressor will run in high frequency.

If unit run in “cooling” mode and outdoor temperature is less than -2°C, the controller will shut down compressor and show error code, while the ambient temperature is over 1°C, the compressor will run automatically.

(3) Auto fan control in cooling mode

In cooling mode (include cooling in “Feel” mode), fan speed is determined by δt , as the following diagram:



4. “DRY” Mode Operation

- (1) The system for DRY operation used the same refrigerant circle as the cooling one.
- (2) When the system operates in DRY mode, at first it operates in cooling mode, the set temperature (ST) is “RT-2°C”. After that, the system will operate in cooling mode with lowest fan speed. During the course of this operation, you can't use remote controller to adjust the fan speed but you can control the vane direction.
- (3) In the dry mode, when $RT \leq 12^\circ\text{C}$, the compressor will stop and operates again at $RT \geq 14^\circ\text{C}$.

5. “HEATING” Mode Operation (available for Heat Pump only)

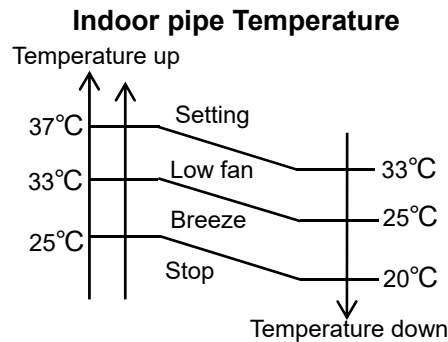
(1) Frequency control

Same as the frequency control in cooling mode, the running frequency of compressor is controlled by controller. Unit change its running frequency according to δt to make the room temperature closing to the set temperature.

(2) Indoor fan motor control

1) Cold Air Prevention Control

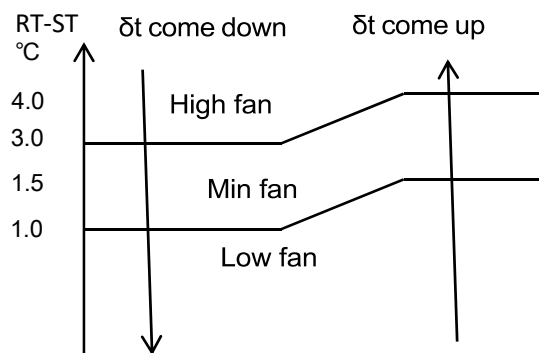
- The function is intended to prevent cold air from being discharged when heating mode selected or while in defrosting.
- The indoor fan speed will be controlled as following.



- In heating operation, if air conditioner turn off, the indoor fan motor will run most for 30 seconds since the stop of compressor.

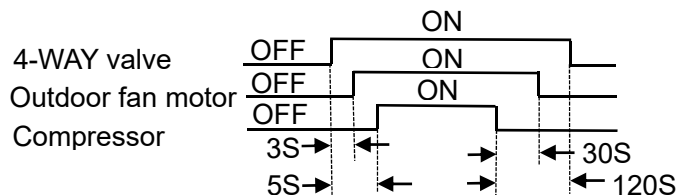
2) Auto fan control (heating)

In heating mode (include in "feel" mode) , fan speed is determined by δt as the following:



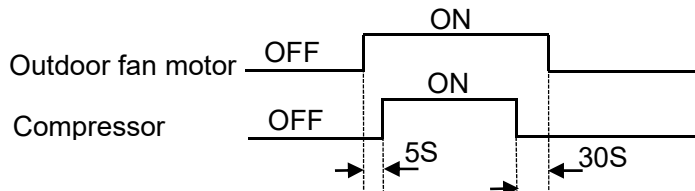
(3) 4-way valve control

In heating mode, 4-way valve will power on ahead of compressor for 8 seconds, and cut off for 2 minutes later than compressor. 4-way valve will not power off unless the machine to be switched off, mode changed or on the process of defrosting.



(4) Outdoor fan motor control

In heating mode, the outdoor fan motor will power on ahead of compressor 5 seconds, and cut off for 30seconds later than compressor.



(5) Defrosting

Defrosting is controlled by the microprocessor.

When the unit operate 30 minutes accumulated and the compressor operation more than 3 minutes continuously, one of the following conditions is satisfied, unit comes into defrosting:

- When $\text{FrostDeg} \geq -5^{\circ}\text{C}$, and $\text{OPT} \leq -5^{\circ}\text{C}$, the .2 times defrosting interval time is 45 minutes.
- When $-10^{\circ}\text{C} \leq \text{FrostDeg} < -5^{\circ}\text{C}$, and $\text{OPT} < \text{FrostDeg}$, the .2 times defrosting interval time is 45 minutes.

- c. When $-13^{\circ}\text{C} \leq \text{FrostDeg} < -10^{\circ}\text{C}$, and $\text{OPT} < \text{FrostDeg}$, the .2 times defrosting interval time is 45 minutes.
- d. When $-15^{\circ}\text{C} \leq \text{FrostDeg} < -13^{\circ}\text{C}$, and $\text{OPT} < \text{FrostDeg}$, the .2 times defrosting interval time is 65 minutes.
- e. When $-15^{\circ}\text{C} \leq \text{FrostDeg} < -10^{\circ}\text{C}$, and $\text{OPT} < \text{FrostDeg}$, the .2 times defrosting interval time is 75 minutes.
- f. When $\text{FrostDeg} < -15^{\circ}\text{C}$, and $\text{OPT} < -15^{\circ}\text{C}$, the .2 times defrosting interval time is 75 minutes.

$$\text{FrostDeg} = C \cdot \text{OAT} - \alpha$$

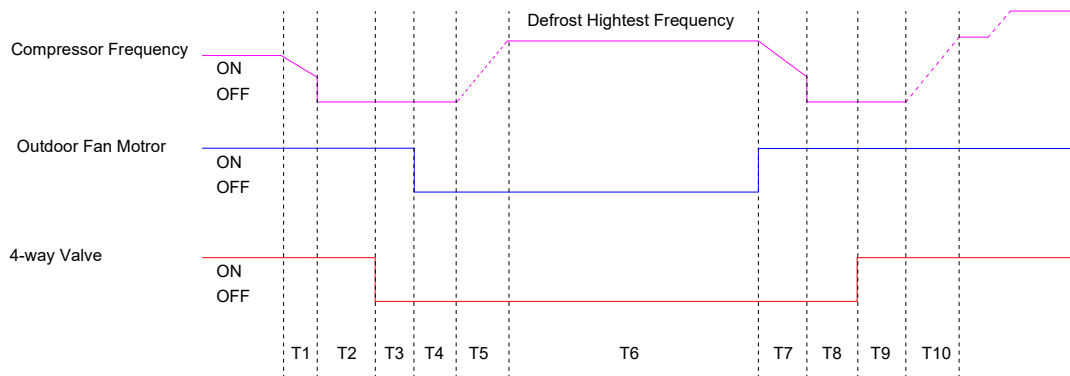
OAT: Outdoor environment temperature.

When $\text{OAT} < 0^{\circ}\text{C}$, $C=0.8$, when $\text{OAT} \geq 0^{\circ}\text{C}$, $C=0.6$

$$\alpha=8$$

Before the air con comes into defrosting, compressor running frequency drop down to a lower frequency firstly, then the compressor shuts down.

In defrosting, all protection function are available.



T	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Times	Drop frequency or stop	50s	5s	5s	Rise frequency	2-11Min	Stop Defrost	50s	10s	Rise frequency

In defrosting, LED showing by winking.

No matter what AC come into or out of defrosting, indoor fan motor speed is the same as Cold Air Prevention Control.

While one of the following conditions is satisfied, unit comes out of defrosting and shifts to heating mode:

- a. Outdoor coil Temperature (OPT) $> 5^{\circ}\text{C}$ and keeps 30 seconds.
- b. Outdoor coil Temperature (OPT) $> 10^{\circ}\text{C}$ and keeps 2 seconds.
- c. Continue 11minutes defrost Operation.

(5) Indoor exchanger overheat protection

When Indoor exchanger Temperature (IPT) is higher than 54°C , unit comes into indoor exchanger overheat protection. The compressor drops its frequency.

If $\text{IPT} \geq 65^{\circ}\text{C}$ and keep for 30 seconds, control system shut down compressor, and recover while IPT drop less than 52°C .

5. "SLEEP" mode

When the SLEEP button is pressed, the AC operates as following:

- The indoor fan speed is set at low speed, the power lamp and the sleep lamp is on, the display of temperature will close after 30 seconds.
- When selecting COOLING/DRY operation with SLEEP mode, the set temperature will be raised by 1°C 1 hour later and by 2°C 2 hour later, after 3 hours, the set temperature will be raise by 3°C and keeps 2hours. And then the temperature is Set+ 2°C , after 1 hour, the

temperature is set temperature and keep.

- When selecting HEATING operation with SLEEP mode, the set temperature will be dropped by 1°C 1 hour later and 2°C 2 hours later, after 3 hours, the set temperature will be dropped by 3°C and keep 2 hours. And then the temperature is Set-2°C, after 1 hour, the temperature is set temperature and keep.

6. EMERGENCY Operation

When the EMERGENCY Operation switch is pressed, “Beep” a short sound, COOLING mode is selected, two short sound the HEATING mode selected, and a long sound the unit off of 3s.

During the unit operation in emergency operation, when the unit receive the signal of remote controller, the unit will operates by remote.

When the remote controller missing, failed or the batteries run down, press the EMERGENCY Operation switch on front of the indoor unit for function test.

NOTE: Do not press the EMERGENCY Operation switch during normal operation.

7. AUTO-RESTART Function (Option)

While air conditioner is operating in one mode, all of its operation data, such as working mode, preset temperature etc. would be memorized into IC by main PCB. If power supply cut off due to reasons and recover again, the AUTO-RESTART function will set synchronously and the air conditioner would work at the same mode as before.

Auto-restart Pre-setting (optional):

If Auto-restart function is needed, follow the steps below to activate this function:

- 1) Pulling the air-con's plug out of socket.
- 2) Pressing and holding the Emergency button (ON/OFF) on the indoor, then insert the plug into the socket again.
- 3) Keep pressing the Emergency button for more than 10 seconds until three short beeps heard, the Auto-restart function been activated.
- 4) When the unit in operation, press the timer button 10 times in 8s, the Auto-restart function will be active, if the Auto-restart is active, the Auto-restart off.

8. Water pump control(cassette and duct type)

When the unit operates in cool or dry mode, the water pump operates, once the compressor off or change to other mode, the water pump stop after 10 minutes.

Anytime, when the unit check the water full, the water pump operates, the unit stop and display the water full code. When the water full eliminate, the water pump will stop after 10 minutes.

When check the water pump switch open for 8 seconds continuous, enter water full protection, and check the water pump switch on for 180 seconds continuous, the water full protection exit.

9. Protection and Failure Display

- When protection display is available, controller will show error code, digital LED shows error code and setting temperature by turns.
- If there is more than one failure, it will show error codes according to the error list sequence.
- To insure the signal communication of indoor and outdoor unit, any failure code relates to outdoor unit will remain display for 2 minutes maximum after it's recovered.
- Among all the failure codes, sensor failure can be recovery automatically once it comes normal.

● Error list

Failure Type	Indoor LED Code	CASSETTE				Outdoor light blink time (n)
		LED1	LED2	LED3	LED4	
Indoor and outdoor communication failure	E0	●	●	●	⊙	7
Outdoor communication failure	EC	⊙	⊙	●	●	15
Indoor room temperature sensor (IRT)	E1	●	●	⊙	●	25
Indoor coil temperature sensor (IPT)	E2	●	●	⊙	⊙	26
Outdoor coil temperature sensor (OPT)	E3	●	⊙	●	●	10
IPM over current protect	E4	●	⊙	●	⊙	40
Compressor phase-deficient operation						34
Model configuration wrong	E5	●	⊙	⊙	●	29
Indoor fan motor fault	E6	●	⊙	⊙	⊙	21
Outdoor temperature sensor	E7	⊙	●	●	●	9
Exhaust temp. sensor	E8	⊙	●	●	⊙	11
IPM drive and module fault	E9	⊙	●	⊙	●	30
Outdoor fan motor fault (DC motor)	EF	⊙	⊙	⊙	⊙	16
Current sensor fault	EA	⊙	●	⊙	⊙	13
Indoor EEPROM fault	EE	⊙	⊙	●	⊙	27
Outdoor EEPROM fault	EE	⊙	⊙	⊙	●	19
Temp. switch fault (on top of the compressor)	EP	-	-	-	-	8
Voltage sensor fault	EU	○	●	●	⊙	12
Outlet temperature sensor A fault	Ey	○	●	⊙	●	47
Outlet temperature sensor B fault						48
Inlet temperature sensor A fault	En	○	●	⊙	⊙	51
Inlet temperature sensor B fault						52

● Protection display code list:

Protection Type	Indoor LED Code	CASSETTE				Outdoor light blink time (n)
		LED1	LED2	LED3	LED4	
Overvoltage /lower voltage protection	P1	○	●	●	○	2
Overcurrent protection	P2	○	●	○	●	3
Overvoltage protection	P3	○	●	○	○	24
Discharge over temperature	P4	○	○	●	●	4
Too cool protection in cooling mode	P5	-	-	-	-	32
Overheat protection in cooling mode	P6	○	○	○	●	5
Overheat protection in heating mode	P7	○	○	○	○	33
Outdoor over temperature / lower temperature protection	P8	-	-	-	-	31
Drive protection (software control)	P9	-	-	-	-	6
Module protection (hardware control)	P0	-	-	-	-	1
Model different	PA	●	●	○	○	-
Water full protect	D3	●	○	○	⊙	-

○--light ●--off ⊙—flash

- Outdoor failure display

There is a LED on outdoor power board, it blinks 1s ON and 1s OFF while compressor standby and it always light (ON) while compressor running; If there is failure happened on ODU, The indicator (LED) alerts the fault in a cycle as such that it is bright for 0.5 seconds, dark for 0.5 seconds, blinks “n” times and then dark for 3 seconds. For details as table below.

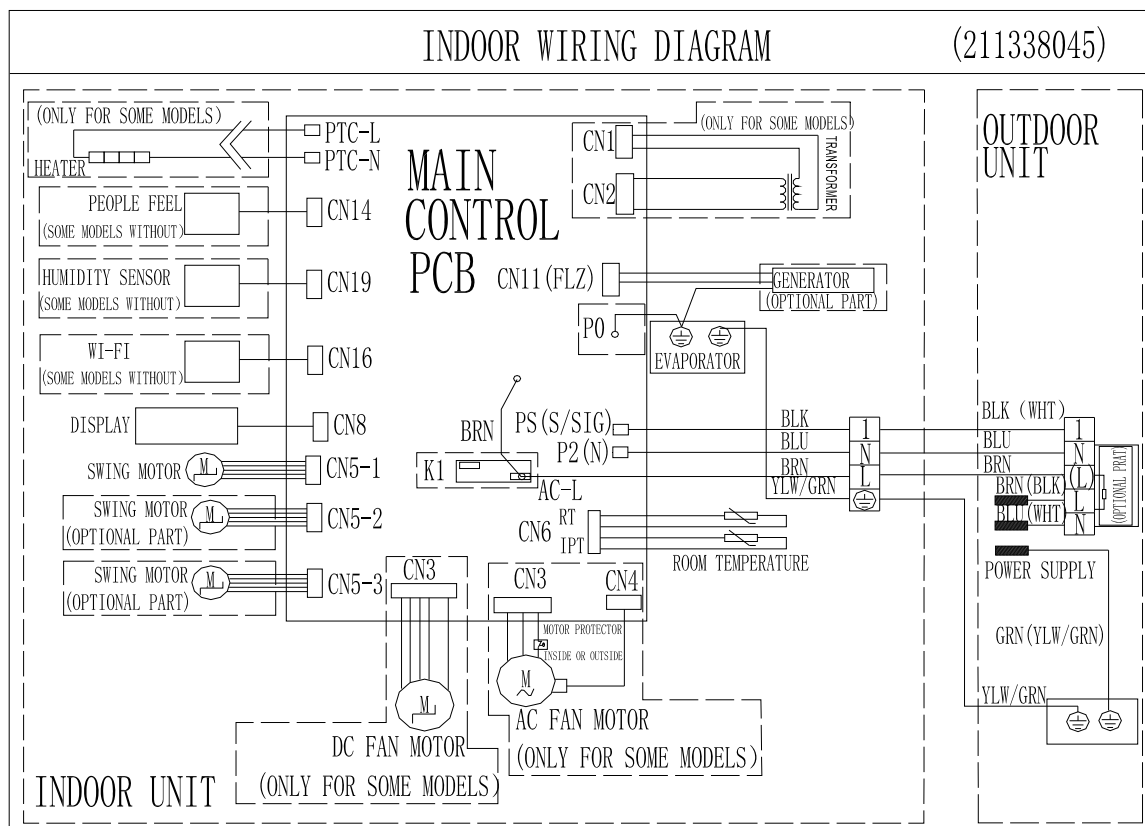
Display on outdoor power source board:

blink time (n)	Failure
1	IPM protection
2	Over voltage /lower voltage
3	Overcurrent
4	Exhaust over temperature protection
5	Outdoor coil over temperature protection
6	Drive fault and protection (V1, VP1)
7	Communication fault with indoor unit
8	Compressor overheat fault (compressor top switch)
9	Short-circuit / open-circuit fault of outdoor temperature sensor
10	Short circuit / open-circuit fault of outdoor heat exchanger temperature
11	Short-circuit / open-circuit fault of exhaust temperature sensor
12	Voltage sensor fault
13	Current sensor fault
14	IPM fault
15	Communication fault between power source board and IPM
16	No feedback from DC fan motor(outdoor unit)
17	Defrost state

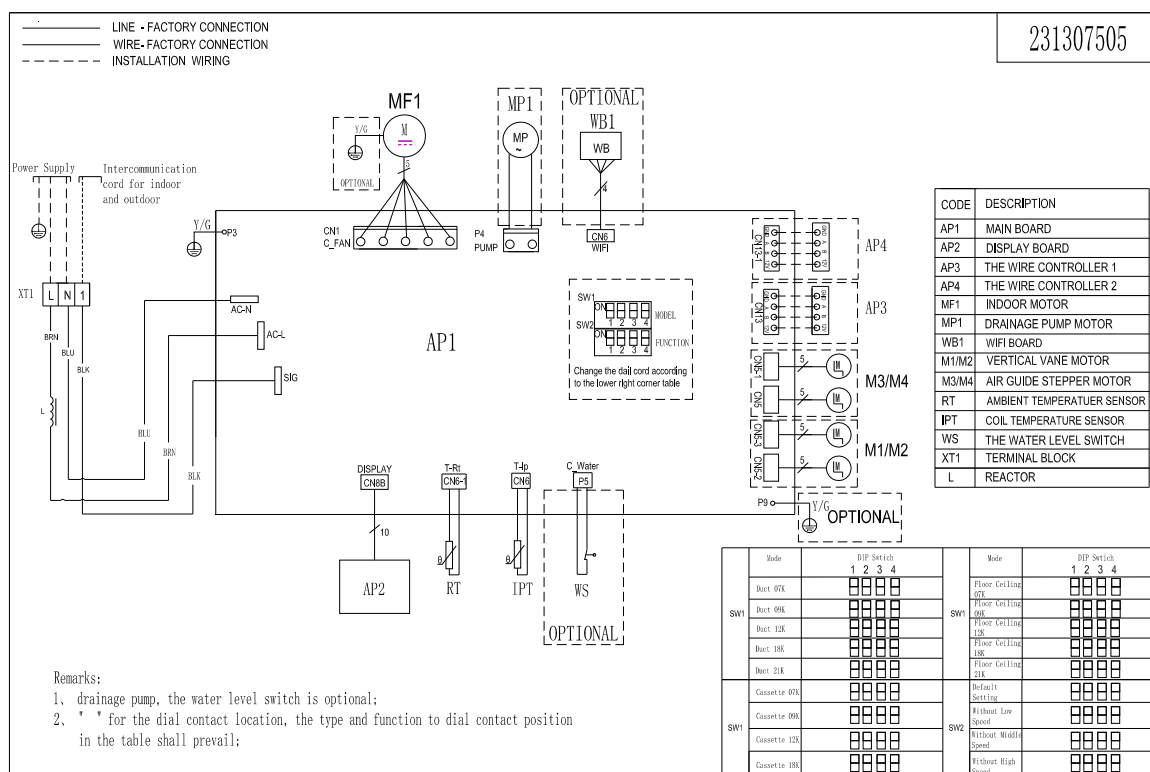
5. Wiring diagram

INDOOR UNIT:

Wall split type: FMA-09CHSD/DVI FMA-12CHSD/DVI

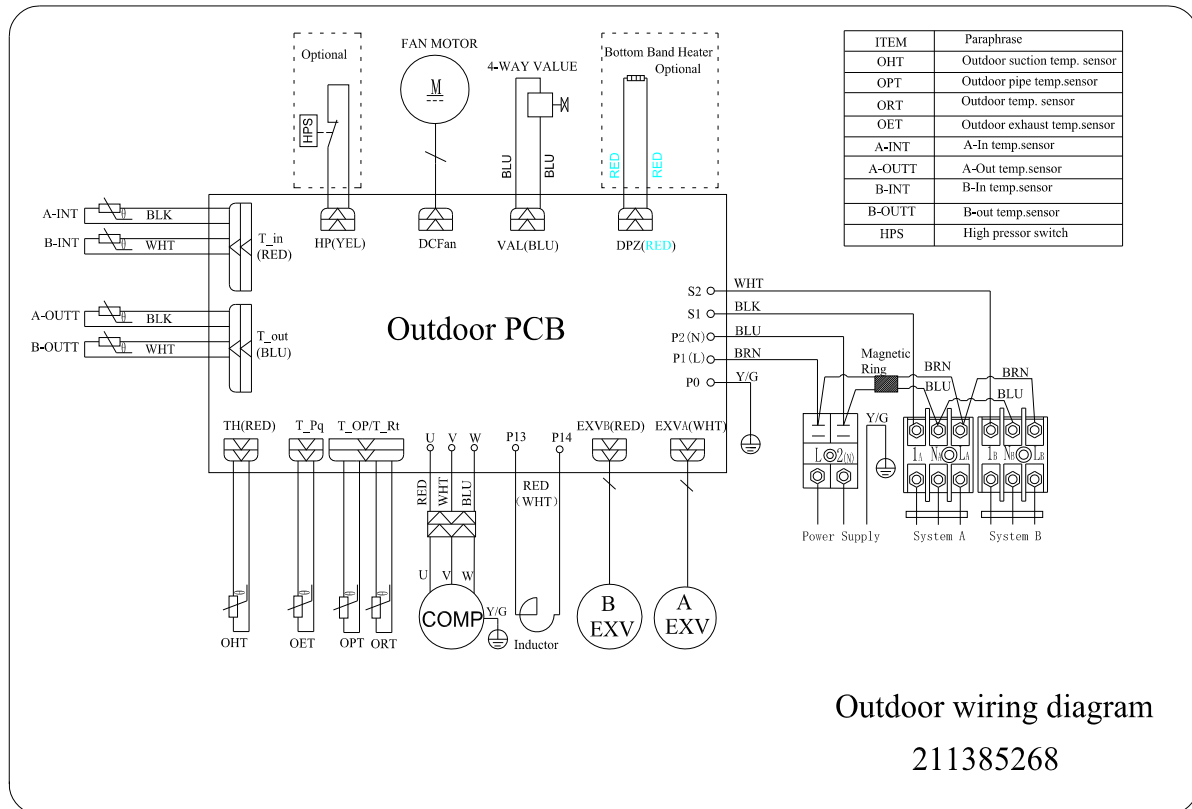


Cassette, Duct type: FMA-09CRD/DVI(Q4) FMA-12CRD/DVI(Q4) FMA-18CRD/DVI(Q4)
FMA-09D5RD/DVI FMA-12D5RD/DVI FMA-18D5RD/DVI

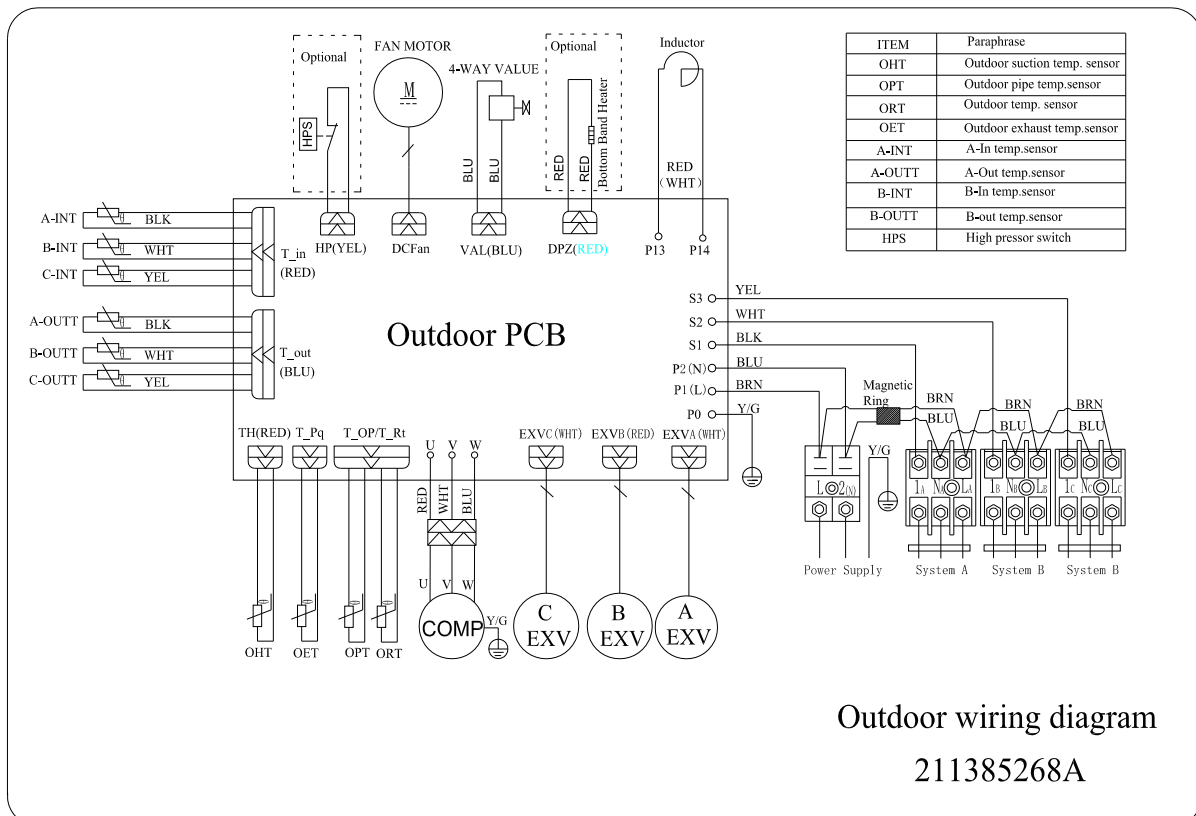


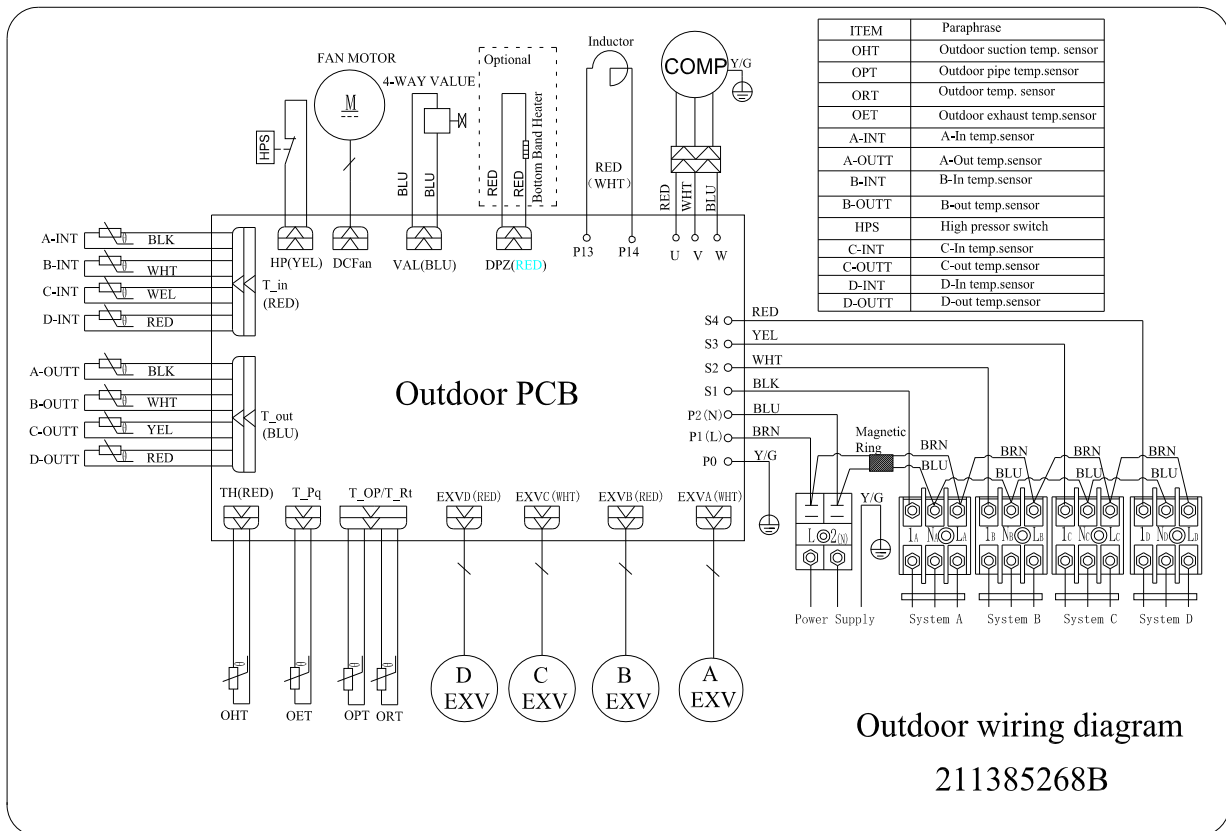
OUTDOOR UNIT

ONE TO 2 TYPE: FMA-18I2HD/DVO



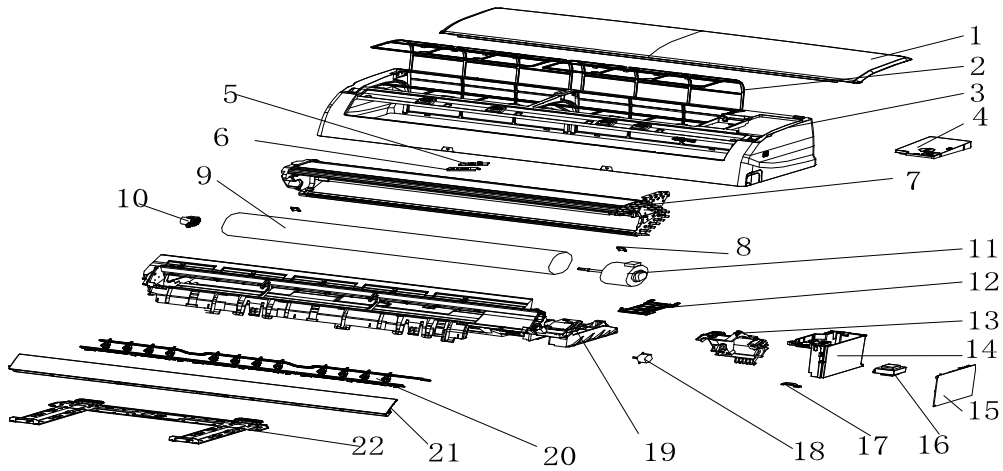
ONETO 3TYPE: FMA-27I3HD/DVO



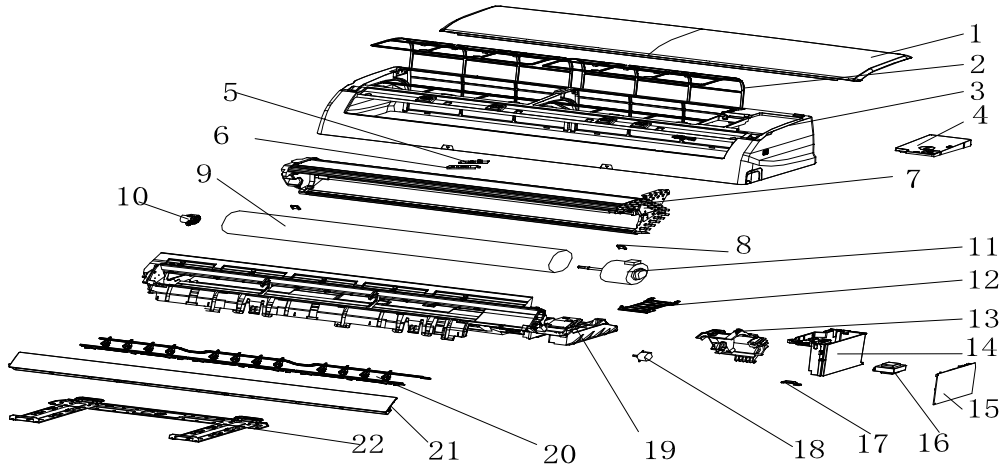
ONE TO 4 TYPE: FMA-30I4HD/DVO

6. Explosion view and parts

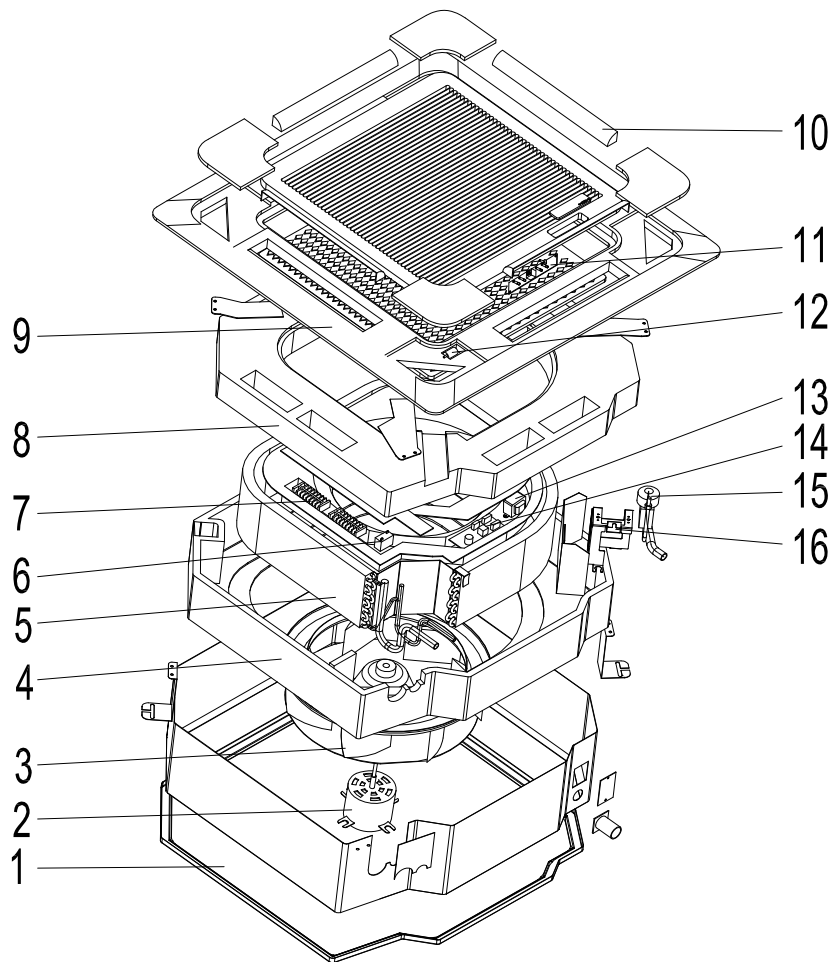
Indoor Unit- FMA-09CHSD/DVI



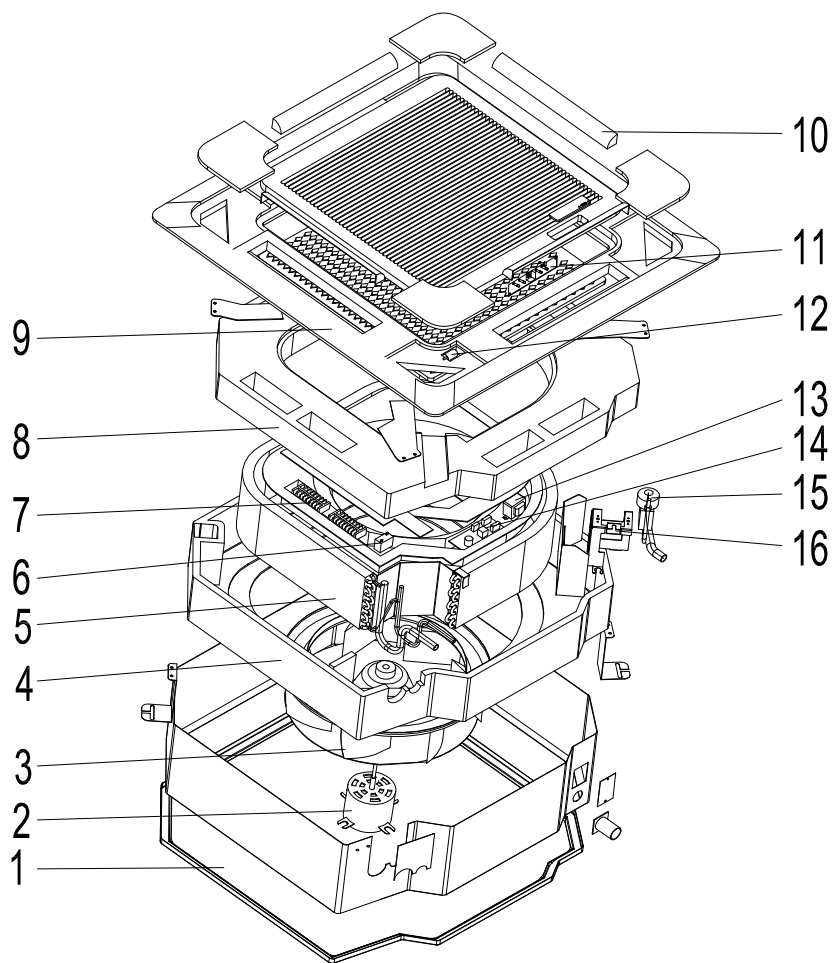
No.	Part No.	Part Name	Q'ty	Remark
1	41106-002236	Front Panel	1	
2	42008-000037	Air Filter	2	
3	41106-002371	Face Frame	1	
4	41201-000068	Electrical Box Cover	1	
5	31102-000084	Display PCB	1	
6	42003-000001	Display PCB Box	1	
7	92011-002804	Evaporator	1	
8	41108-000066	Screw Cover	1	
9	42004-000039	Cross Fan	1	
10	42007-000001	Bearing Mount	1	
11	22001-000262	Indoor Motor	1	
12	41101-000242	In And Out Pipe Fixer	1	
13	42003-000060	Indoor Motor Cover	1	
14	41105-000104	Electrical Box	1	
15	31101-000186	Main PCB	1	
16	/	Transformer	/	
17	42001-000103	Cable Clamp	1	
18	22001-000313	Vane Motor	1	
19	41199-002735	Base	1	
20	41101-000081	Vertical Vane Assembly	2	
21	41103-000225	Vane	1	
22	41109-000042	Installation Plate	1	
23	10104-100014	Indoor Sensor Assembly	1	Not shown in Explosion view
24	22013-000777	Remote Controller	1	
25	A1101-008680	Indoor Carton	1	
26	41110-000221	Left Foaming	1	
27	41110-000260	Right Foaming	1	

Indoor Unit- FMA-12CHSD/DVI

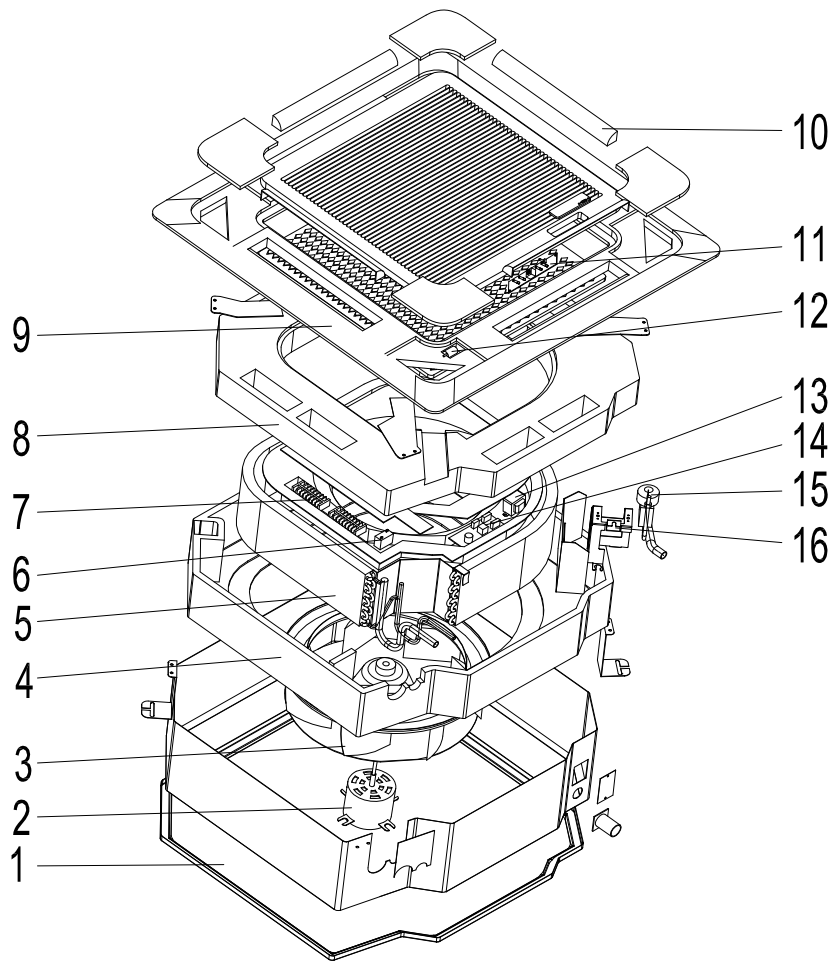
No.	Part No.	Part Name	Q'ty	Remark
1	41106-002236	Front Panel	1	
2	42008-000037	Air Filter	2	
3	41106-002371	Face Frame	1	
4	41201-000068	Electrical Box Cover	1	
5	31102-000084	Display PCB	1	
6	42003-000001	Display PCB Box	1	
7	92011-002804	Evaporator	1	
8	41108-000066	Screw Cover	1	
9	42004-000039	Cross Fan	1	
10	42007-000001	Bearing Mount	1	
11	22001-000262	Indoor Motor	1	
12	41101-000242	In And Out Pipe Fixer	1	
13	42003-000060	Indoor Motor Cover	1	
14	41105-000104	Electrical Box	1	
15	31101-000186	Main PCB	1	
16	/	Transformer	/	
17	42001-000103	Cable Clamp	1	
18	22001-000313	Vane Motor	1	
19	41199-002735	Base	1	
20	41101-000081	Vertical Vane Assembly	2	
21	41103-000225	Vane	1	
22	41109-000042	Installation Plate	1	
23	10104-100014	Indoor Sensor Assembly	1	Not shown in Explosion view
24	22013-000777	Remote Controller	1	
25	A1101-008681	Indoor Carton	1	
26	41110-000221	Left Foaming	1	
27	41110-000260	Right Foaming	1	

Indoor Unit- FMA-09CRD/DVI(Q4)

No.	Part No.	Part Name	Q'ty	Remark
1	/	indoor chasiss	1	
2	22001-000197	indoor motor	1	
3	230701325	indoor fan	1	
4	/	base of evaporator	1	
5	/	evaporator	1	
6	/	capacitor of indoor motor	1	
7	11304-100017	terminal	1	
8	/	drain pan	1	
9	A2007-000108	panel	1	
10	/	vane	4	
11	32801-000002	display PCB	1	
12	230901537	swing motor	1	
13	22011-000001	Inductor	1	
14	31101-000604	Indoor main PCB	1	
15	230901539	pump	1	
16	230901538	water level switch	1	
17	22013-000777	remote controller	1	Not shown in Explosion view
18	10104-100052	Indoor pipe sensor	1	
19	10104-100051	Indoor room sensor	1	

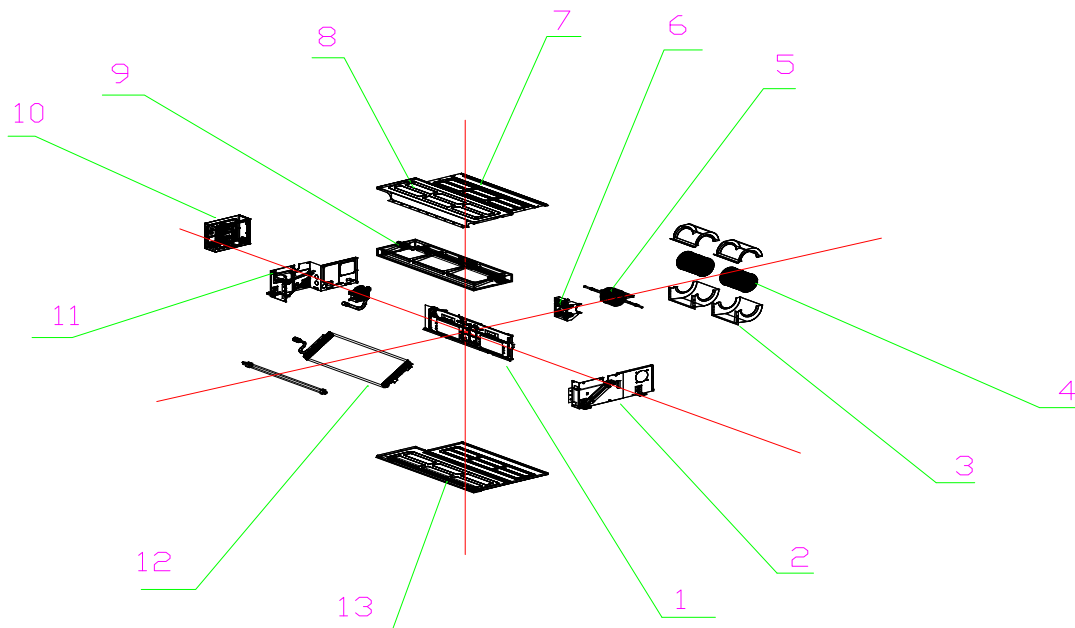
Indoor Unit- FMA-12CRD/DVI(Q4)

No.	Part No.	Part Name	Q'ty	Remark
1	/	indoor chasiss	1	
2	22001-000197	indoor motor	1	
3	230701325	indoor fan	1	
4	/	base of evaporator	1	
5	/	evaporator	1	
6	/	capacitor of indoor motor	1	
7	11304-100017	terminal	1	
8	/	drain pan	1	
9	A2007-000108	panel	1	
10	/	vane	4	
11	32801-000002	display PCB	1	
12	230901537	swing motor	1	
13	22011-000001	Inductor	1	
14	31101-000604	Indoor main PCB	1	
15	230901539	pump	1	
16	230901538	water level switch	1	
17	22013-000777	remote controller	1	Not shown in Explosion view
18	10104-100052	Indoor pipe sensor	1	
19	10104-100051	Indoor room sensor	1	

Indoor Unit- FMA-18CRD/DVI(Q4)

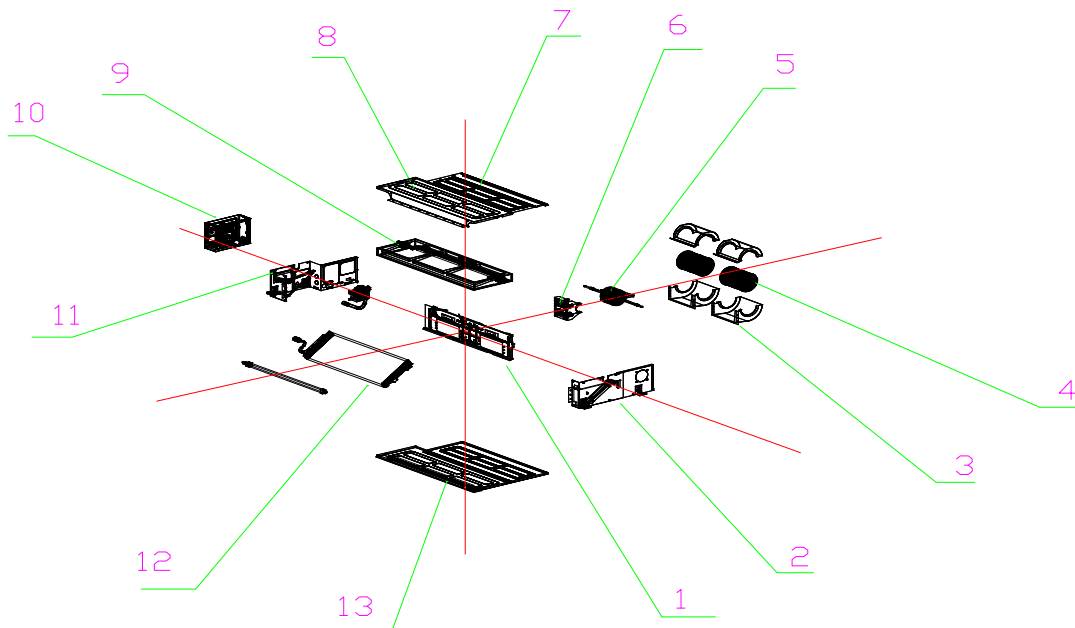
No.	Part No.	Part Name	Q'ty	Remark
1	/	indoor chasiss	1	
2	22001-000197	indoor motor	1	
3	230701325	indoor fan	1	
4	/	base of evaporator	1	
5	/	evaporator	1	
6	/	capacitor of indoor motor	1	
7	11304-100017	terminal	1	
8	/	drain pan	1	
9	A2007-000108	panel	1	
10	/	vane	4	
11	32801-000002	display PCB	1	
12	230901537	swing motor	1	
13	22011-000001	Inductor	1	
14	31101-000604	Indoor main PCB	1	
15	230901539	pump	1	
16	230901538	water level switch	1	
17	22013-000777	remote controller	1	Not shown in Explosion view
18	10104-100052	Indoor pipe sensor	1	
19	10104-100051	Indoor room sensor	1	

Indoor Unit- FMA-09D5RD/DVI



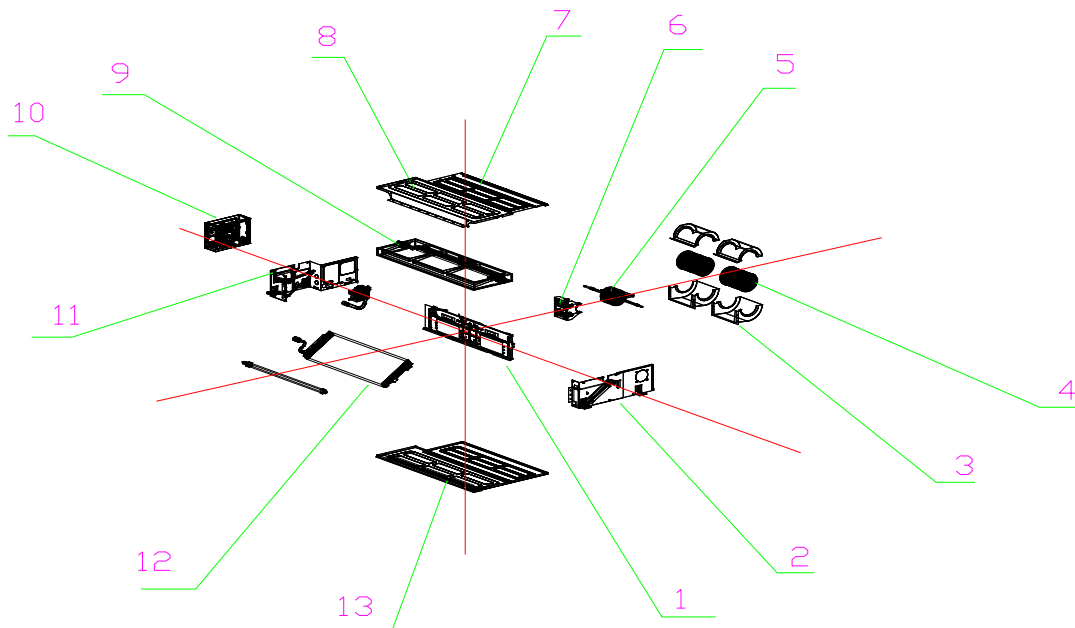
No.	Part No.	Part Name	Q'ty	Remark
1	41399-000037	Median plate	1	
2	41205-000112	Left plate assembly	1	
3	41304-000022	Up foam shell	2	
		Down foam shell	2	
4		Indoor fan	2	
5	22001-000173	Indoor fan motor	1	
6	41214-000173	Supporter for fan motor	1	
7	41214-000252	Air inlet plate	1	
8	230801031	Base plate	1	
9	41308-000006	Drain tray assembly	1	
10	41105-000107	Electronic box	1	
11	41205-000008	Right plate assembly	1	
12	92011-003045	Evaporator subassembly	1	
13	41399-000008	Top cover	1	
14	31101-000604	Main pcb	1	Not shown in Explosion view
15	32901-000002	Display PCB	1	
16	22013-000777	Remote Controller	1	
17	10104-100051	Room sensor	1	
18	10104-100049	Pipe sensor	1	

Indoor Unit- FMA-12D5RD/DVI



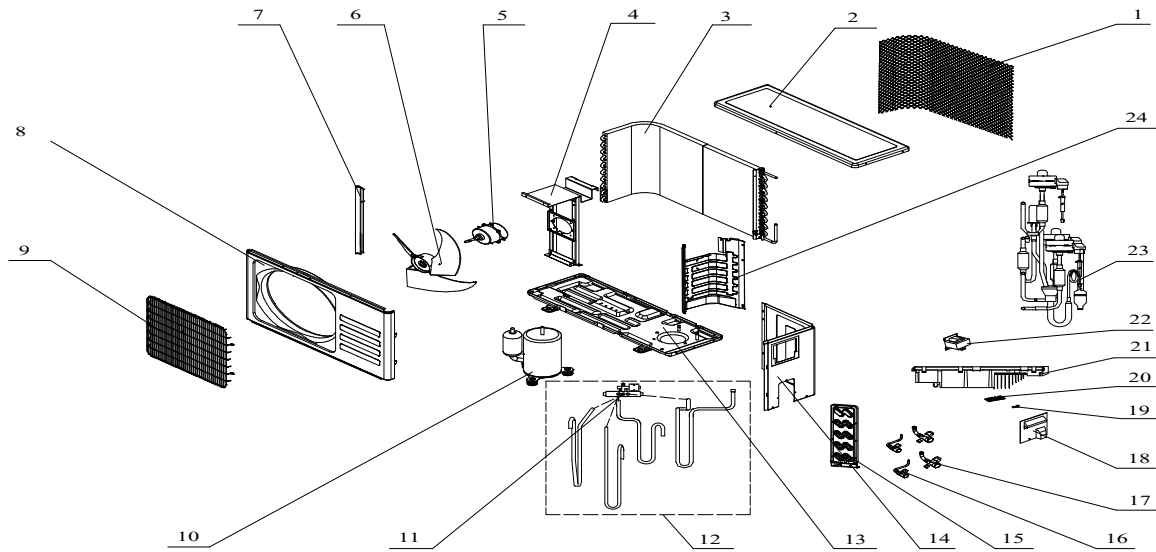
No.	Part No.	Part Name	Q'ty	Remark
1	41399-000037	Median plate	1	
2	41205-000112	Left plate assembly	1	
3	41304-000022	Up foam shell	2	
		Down foam shell	2	
4		Indoor fan	2	
5	22001-000173	Indoor fan motor	1	
6	41214-000173	Supporter for fan motor	1	
7	41214-000252	Air inlet plate	1	
8	230801031	Base plate	1	
9	41308-000006	Drain tray assembly	1	
10	41105-000107	Electronic box	1	
11	41205-000008	Right plate assembly	1	
12	92011-003045	Evaporator subassembly	1	
13	41399-000008	Top cover	1	
14	31101-000604	Main pcb	1	Not shown in Explosion view
15	32901-000002	Display PCB	1	
16	22013-000777	Remote Controller	1	
17	10104-100051	Room sensor	1	
18	10104-100049	Pipe sensor	1	

Indoor Unit- FMA-18D5RD/DVI



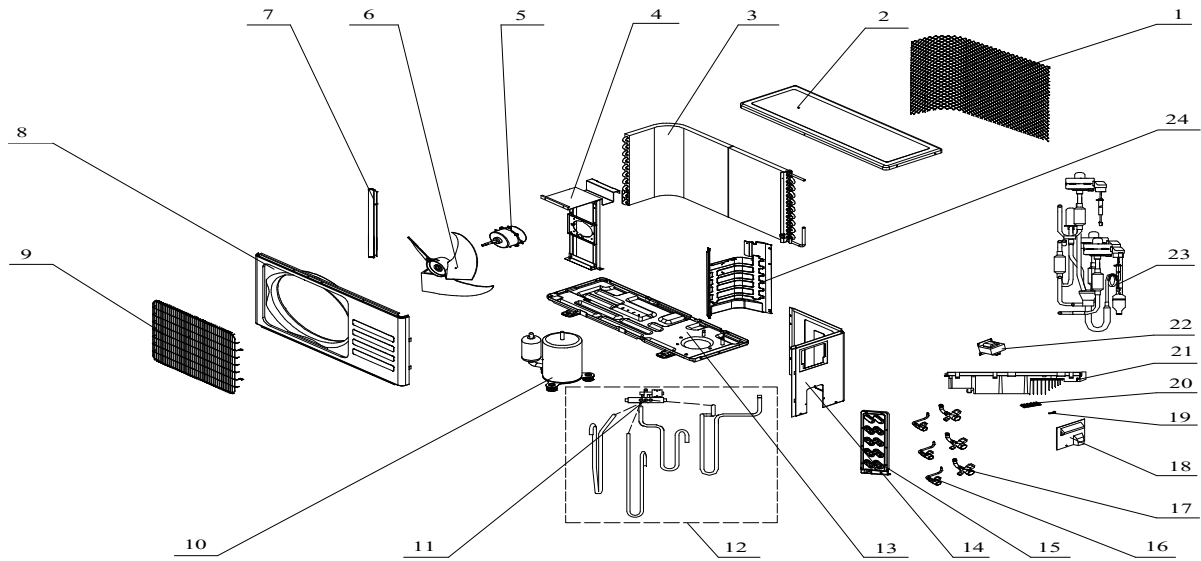
No.	Part No.	Part Name	Q'ty	Remark
1	41399-000036	Median plate	1	
2	41205-000112	Left plate assembly	1	
3	41214-000704	Up foam shell	2	
	41214-000705	Down foam shell	2	
4	42004-000149	Indoor fan	2	
5	22001-000173	Indoor fan motor	1	
6	41214-000174	Supporter for fan motor	1	
7	41214-000253	Air inlet plate	1	
8	230801032	Base plate	1	
9	41308-000007	Drain tray assembly	1	
10	41105-000107	Electronic box	1	
11	41205-000008	Right plate assembly	1	
12	92011-003075	Evaporator subassembly	1	
13	41399-000007	Top cover	1	
14	31101-000604	Main pcb	1	Not shown in Explosion view
15	32901-000002	Display PCB	1	
16	22013-000777	Remote Controller	1	
17	10104-100051	Room sensor	1	
18	10104-100049	Pipe sensor	1	

Outdoor Unit - FMA-18I2HD/DVO



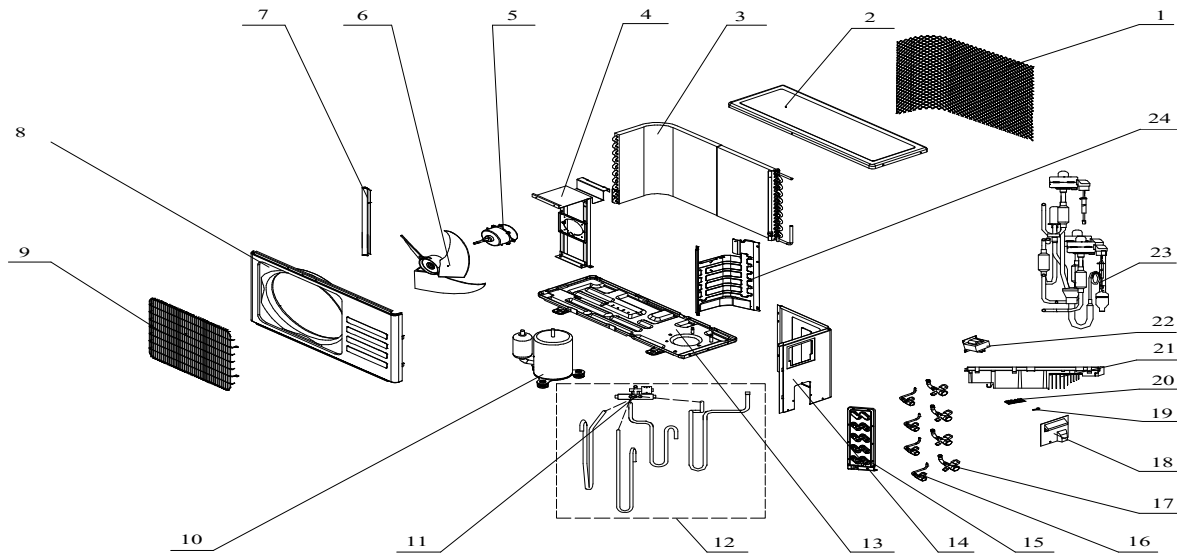
No.	Part No.	Part Name	Q'ty	Remark
1	42011-000118	Grille	1	
2	41207-000022	Top cover	1	
3	92011-000676	Condenser	1	
4	41203-000043	Outdoor motor supporter	1	
5	22001-000042	Outdoor motor	1	
6	42004-000071	Propeller fan	1	
7	41205-000128	Left grille supporter	2	
8	41206-000036	Front plate	2	
9	42011-000086	Fan guard	1	
10	92014-000353	Compressor	1	
11	92008-000209	4-way valve	1	
12	92007-000942	4-way valve assembly	1	
13	41202-000029	Base	1	
14	41205-000053	Right plate	1	
15	92008-000152	Two-way valve	2	
16	41204-000025	Valve supporter	1	
17	92008-000150	Three-way valve	2	
18	41201-000005	Electrical box cover	1	
19	42001-000110	Cable clamp	2	
20	11304-100061	Terminal	1	
	11304-100029	Terminal	2	
21	31201-000924	Outdoor PCB assembly	1	
22	22011-000014	Inductor	1	
23	92007-003062	Electronic expand valve assembly	1	
24	41208-000161	Partition plate	1	
25	10104-100044	Sensor Assembly	1	Not shown in explosion view
26	10104-100037	Discharge Temp. sensor	1	
27	A1401-000014	Base carton	1	
28	A1201-009327	Cabinet carton	1	
29	A1202-000028	Base foaming	1	
30	41213-000021	Cover foaming	1	

Outdoor Unit - FMA-27I3HD/DVO



No.	Part No.	Part Name	Q'ty	Remark
1	42011-000111	Grille	1	
2	41207-000020	Top cover	1	
3	92011-000655	Condenser	1	
4	41203-000041	Outdoor motor supporter	1	
5	22001-000083	Outdoor motor	1	
6	42004-000069	Propeller fan	1	
7	41205-000127	Left grille supporter	1	
8	41206-000033	Front plate	1	
9	42011-000087	Fan guard	1	
10	92014-000357	Compressor	1	
11	92008-000207	4-way valve	1	
12	92007-000952	4-way valve assembly	1	
13	41299-001314	Base	1	
14	41205-000051	Right plate	1	
15	92008-000152	Two-way valve	3	
16	41204-000023	Valve supporter	1	
17	92008-000150	Three-way valve	3	
18	41201-000001	Electrical box cover	1	
19	42001-000046	Cable clamp	1	
	42001-000109	Cable clamp	1	
20	11304-100029	Terminal	1	
	11304-100061	Terminal	1	
21	31201-000938	Outdoor PCB assembly	1	
22	22011-000004	Inductor	1	
23	92007-003061	Electronic expand valve	1	
24	41208-000160	Partition plate	1	Not shown in explosion view
25	10104-100040	Sensor assembly	1	
26	A2005-000489	Base carton	1	
27	A1201-009328	Cabinet carton	1	
28	A1204-000102	Base foaming	1	
29	41214-000571	Cover foaming	1	

Outdoor Unit - FMA-32I4HD/DVO



No.	Part No.	Part Name	Q'ty	Remark
1	42011-000121	Grille	1	
2	41399-000010	Top cover	1	
3	92011-001724	Condenser	1	
4	41203-000027	Outdoor motor supporter	1	
5	22001-000070	Outdoor motor	1	
6	42004-000095	Propeller fan	1	
7	41205-000123	Left grille supporter	1	
8	41206-000021	Front plate	1	
9	42011-000103	Fan guard	1	
10	92014-000465	Compressor	1	
11	92008-000207	4-way valve	1	
12	92007-000939	4-way valve assembly	1	
13	41202-000207	Base	1	
14	41205-000050	Right plate	1	
15	41204-000009	Valve supporter	1	
16	92008-000152	Two-way valve	4	
17	92008-000150	Three-way valve	4	
18	41201-000001	Electrical box cover	1	
19	42001-000109	Cable clamp	1	
20	11304-100029	Terminal	1	
	11304-100061	Terminal	1	
21	31201-000940	Outdoor PCB assembly	1	
22	22011-000015	Inductor	1	
23	92007-003057	Electronic expand valve	1	
24	41208-000162	Partition plate	1	
25	10104-100046	Sensor assembly	1	Not shown in explosion view
26	A1201-009329	Cabinet carton	1	
27	A1402-000028	Left foaming	1	
28	A1402-000027	Right foaming	1	

7. Precaution

7.1 SAFETY RULES AND RECOMMENDATIONS FOR THE INSTALLATION

- Read this guide before installing and using the appliance.
- During the installation of the indoor and outdoor units the access to the working area should be forbidden to children.
Unforeseeable accidents could happen.
- Make sure that the base of the outdoor unit is firmly fixed.
- Check that air cannot enter the refrigerant system and check for refrigerant leaks when moving the air conditioner.
- Check that air cannot enter the refrigerant system and check for refrigerant leaks when moving the air conditioner.
- The ratings of the fuse installed in the built in-control unit are T 5A / 250V.
- The user must protect the indoor unit with a fuse of suitable capacity for the maximum input current or with another overload protection device.
- Ensure that the mains voltage corresponds to that stamped on the rating plate. Keep the switch or power plug clean. Insert the power plug correctly and firmly into the socket, thereby avoiding the risk of electric shock or fire due to insufficient contact.
- Check that the socket is suitable for the plug, otherwise have the socket changed.
- The appliance must be fitted with means for disconnection from the supply mains having a contact separation in all poles that provide full disconnection under over voltage category III conditions, and these means must be incorporated in the fixed wiring in accordance with the wiring rules.
- The air conditioner must be installed by professional or qualified persons. Do not install the appliance at a distance of less than 50 cm from inflammable substances (alcohol, etc.) Or from pressurized containers (e.g. spray cans).
- If the appliance is used in areas without the possibility of ventilation, precautions must be taken to prevent any leaks of refrigerant gas from remaining in the environment and creating a danger of fire.
- The packaging materials are recyclable and should be disposed of in the separate waste bins. Take the air conditioner at the end of its useful life to a special waste collection center for disposal.
- Only use the air conditioner as instructed in this booklet. These instructions are not intended to cover every possible condition and situation. As with any electrical household appliance, common sense and caution are therefore always recommended for installation, operation and maintenance.
- The appliance must be installed in accordance with applicable national regulations.
- Before accessing the terminals, all the power circuits must be disconnected from the power supply.
- The appliance shall be installed in accordance with national wiring regulations.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children

without supervision.

7.2 SAFETY RULES AND RECOMMENDATIONS FOR THE USER

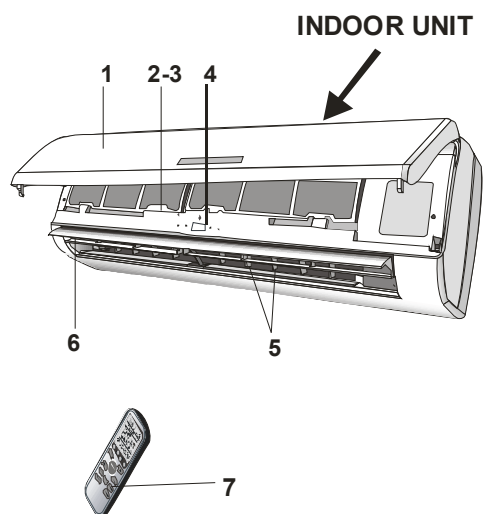
- Do not try to install the conditioner alone; always contact specialized technical personnel. Cleaning and maintenance must be carried out by specialized technical personnel. In any case disconnect the appliance from the mains electricity supply before carrying out any cleaning or maintenance.
- Ensure that the mains voltage corresponds to that stamped on the rating plate. Keep the switch or power plug clean. Insert the power plug correctly and firmly into the socket, thereby avoiding the risk of electric shock or fire due to insufficient contact.
- Do not pull out the plug to switch off the appliance when it is in operation, since this could create a spark and cause a fire, etc.
- This appliance has been made for air conditioning domestic environments and must not be used for any other purpose, such as for drying clothes, cooling food, etc.
- The packaging materials are recyclable and should be disposed of in the separate waste bins. Take the air conditioner at the end of its useful life to a special waste collection center for disposal.
- Always use the appliance with the air filter mounted. The use of the conditioner without air filter could cause an excessive accumulation of dust or waste on the inner parts of the device with possible subsequent failures.
- The user is responsible for having the appliance installed by a qualified technician, who must check that it is earthed in accordance with current legislation and insert a thermomagnetic circuit breaker.
- The batteries in remote controller must be recycled or disposed of properly. Disposal of Scrap Batteries --- Please discard the batteries as sorted municipal waste at the accessible collection point.
- Never remain directly exposed to the flow of cold air for a long time. The direct and prolonged exposition to cold air could be dangerous for your health. Particular care should be taken in the rooms where there are children, old or sick people.
- If the appliance gives off smoke or there is a smell of burning, immediately cut off the power supply and contact the Service Centre.
- The prolonged use of the device in such conditions could cause fire or electrocution.
- Have repairs carried out only by an authoritative Service Centre of the manufacturer. Incorrect repair could expose the user to the risk of electric shock, etc.
- Unhook the automatic switch if you foresee not to use the device for a long time. The airflow direction must be properly adjusted.
- The flaps must be directed downwards in the heating mode and upwards in the cooling mode.
- Only use the air conditioner as instructed in this booklet. These instructions are not intended to cover every possible condition and situation. As with any electrical household appliance, common sense and caution are therefore always recommended for installation, operation and maintenance.
- Ensure that the appliance is disconnected from the power supply when it will remain inoperative for a long period and before carrying out any cleaning or maintenance.
- Selecting the most suitable temperature can prevent damage to the appliance.

7.3 SAFETY RULES AND PROHIBITIONS

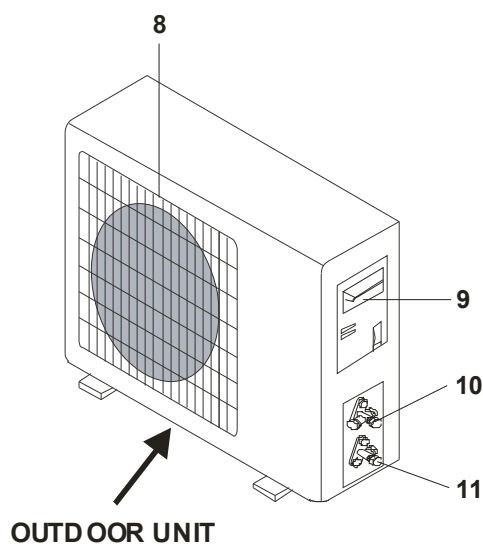
- Do not bend, tug or compress the power cord since this could damage it. Electrical shocks or fire are probably due to a damaged power cord. Specialized technical personnel only must replace a damaged power cord.
- Do not use extensions or gang modules.
- Do not touch the appliance when barefoot or parts of the body are wet or damp.
- Do not obstruct the air inlet or outlet of the indoor or the outdoor unit. The obstruction of these openings causes a reduction in the operative efficiency of the conditioner with possible consequent failures or damages.
- In no way alter the characteristics of the appliance.
- Do not install the appliance in environments where the air could contain gas, oil or sulphur or near sources of heat.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Do not climb onto or place any heavy or hot objects on top of the appliance.
- Do not leave windows or doors open for long when the air conditioner is operating.
- Do not direct the airflow onto plants or animals.
- A long direct exposition to the flow of cold air of the conditioner could have negative effects on plants and animals.
- Do not put the conditioner in contact with water. The electrical insulation could be damaged and thus causing electrocution.
- Do not climb onto or place any objects on the outdoor unit
- Never insert a stick or similar object into the appliance. It could cause injury.
- Children should be supervised to ensure that they do not play with the appliance. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

8. Names of parts

Wall split type

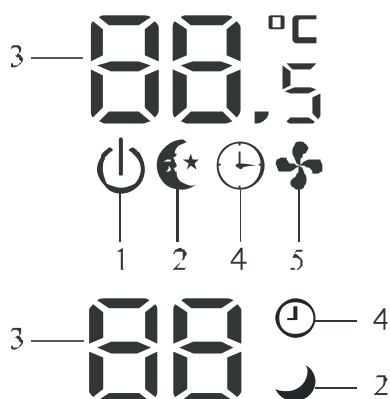


Indoor unit	
No.	Name
1	Front panel
2	Air filter
3	Special filter(option)
4	Display PCB
5	Vertical vane
6	Horizontal vane
7	Remote controller



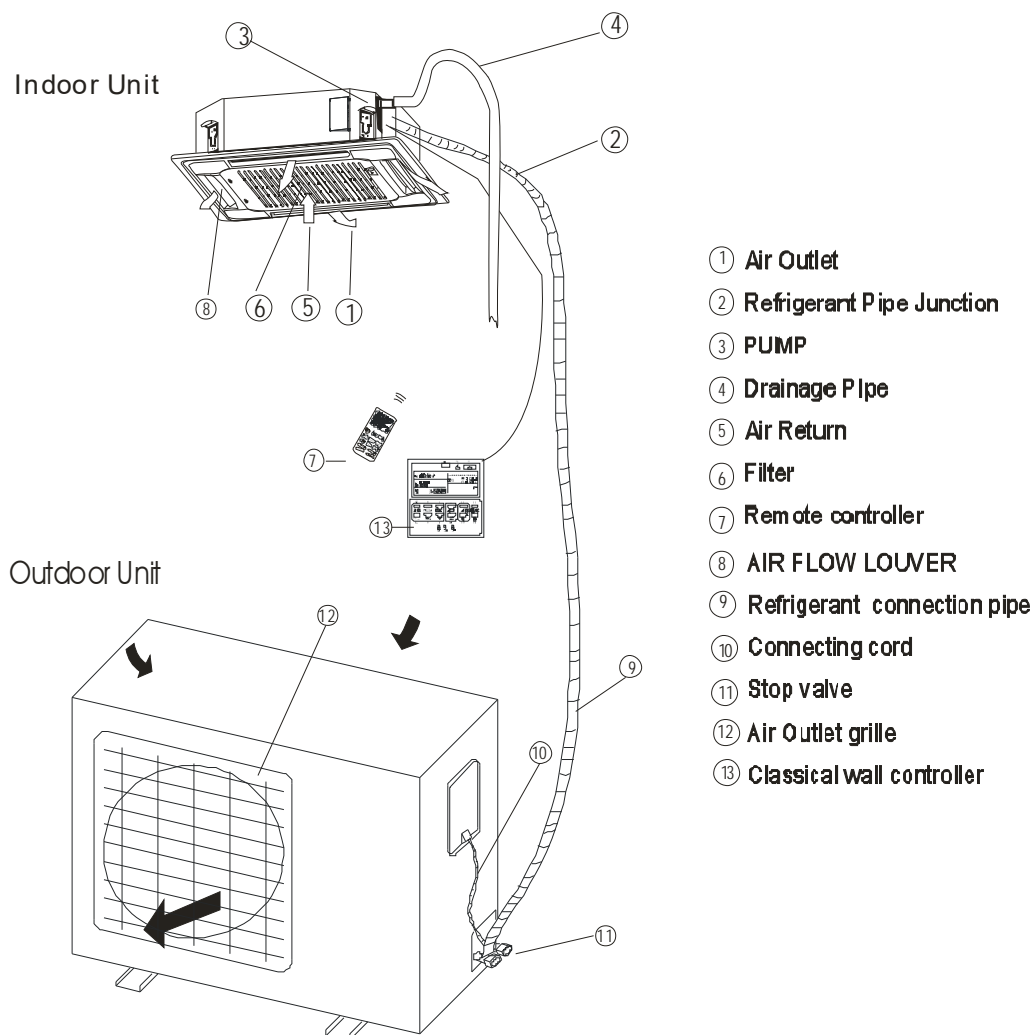
Outdoor unit	
No.	Name
8	Air outlet grille
9	Electronic box cover
10	2-way valve
11	3-way valve

Display



No.	Name
1	Power
2	Sleep
3	Temperature display
4	Timer
5	Run

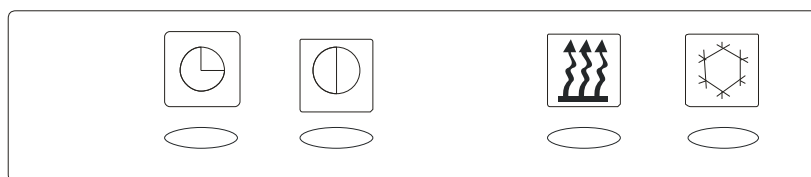
Cassette type



Display



INFRARED SIGNAL
RECEIVER



LIGHTING ON :



Timer indicator



Operation indicator




PRE-DEF indicator



Pump indicator

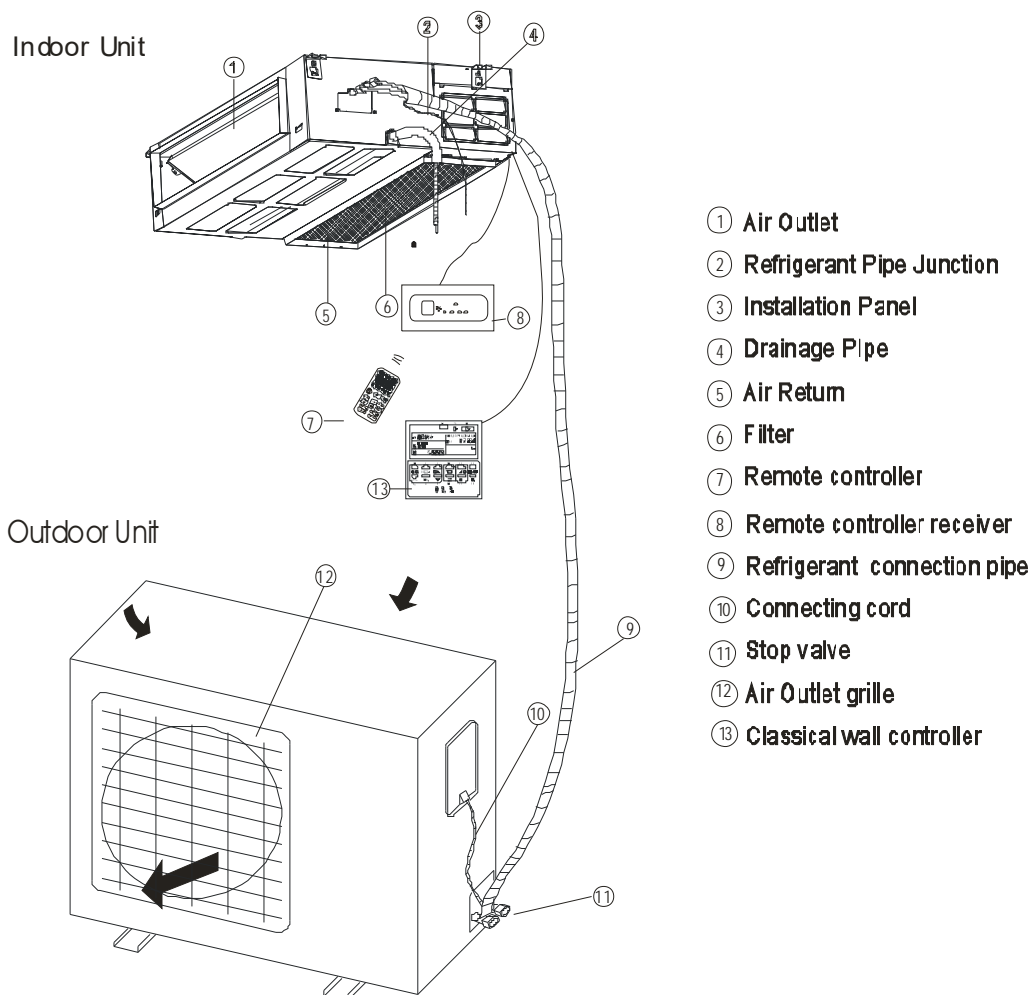
Timer indicator  : ON when preset time for switching ON/OFF the unit

Operation indicator  : ON when the unit is power on

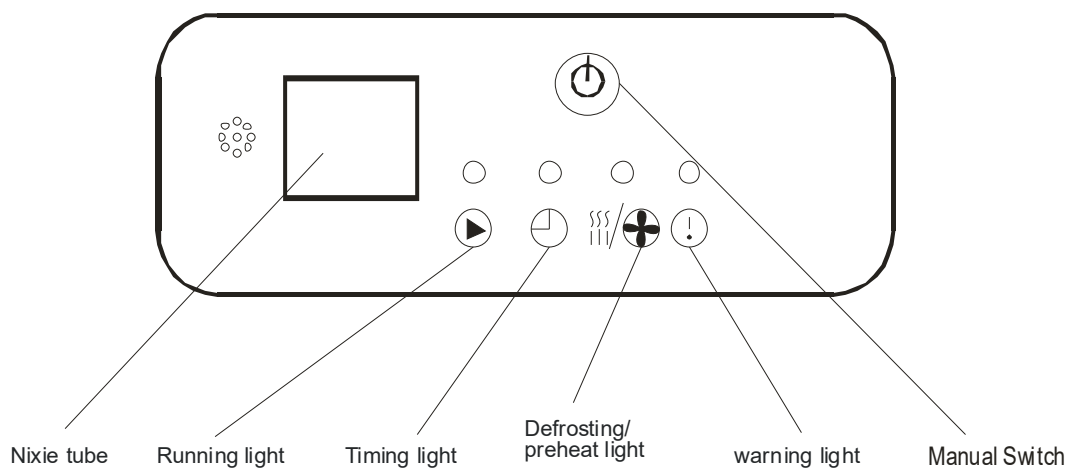
PRE-DEF indicator  : ON when the unit prevent cool air flowing in room.

Pump indicator  : ON when the water level is high

Duct type



DISPLAY

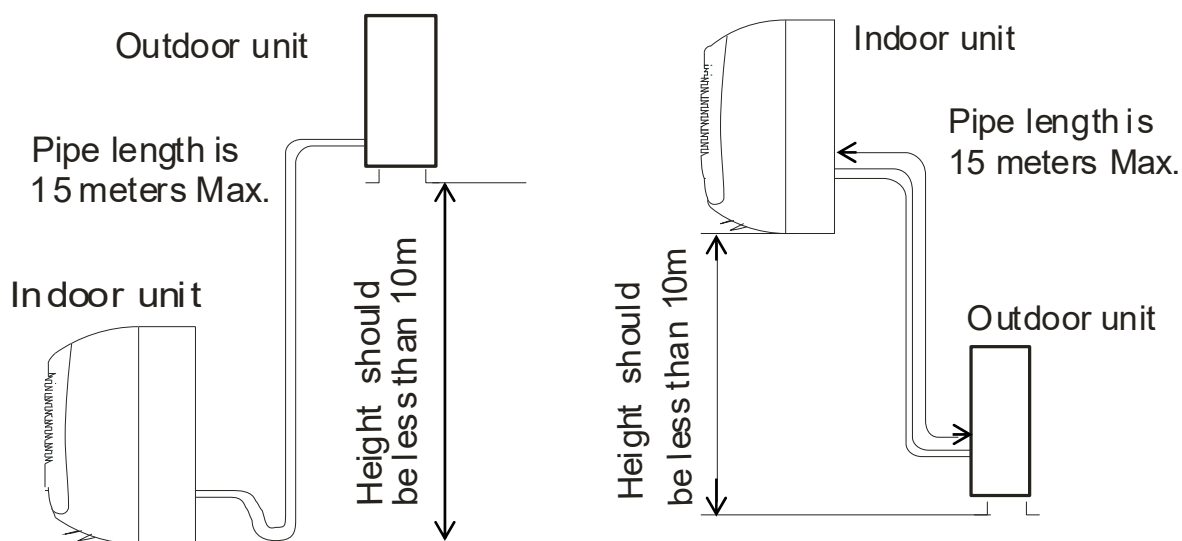


9. Installation manual

9.1 Installation Details

Connecting pipe length

Model	Pipe size(Inch)	
	Liquid	Gas
FMA-09CHSD/DVI FMA-12CHSD/DVI	1/4	3/8
FMA-09CRD/DVI(Q4) FMA-12CRD/DVI(Q4) FMA-09D5RD/DVI FMA-09D5RD/DVI	1/4	3/8
FMA-18CRD/DVI(Q4) FMA-18D5RD/DVI	1/4	1/2



Mode	Standard length: m	Refrigerant piping Max. length: m A	Additional refrigerant B Calculation: $\times g = Bg/m(A-5m)$
9K	3.0	15	20g/m
12K	3.5	15	20g/m
18K	5.0	15	30g/m

Connecting cables

The power cord should be selected according to the following specifications sheet.

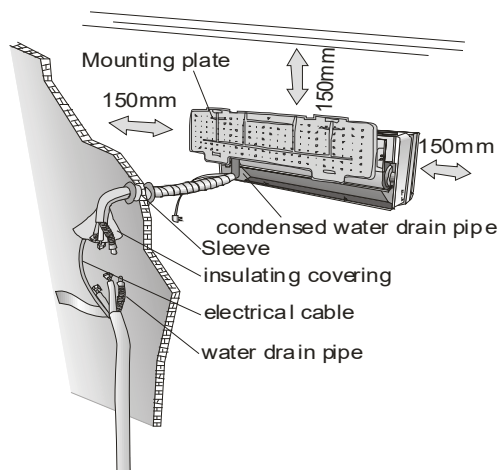
Appliance Amps	Wire Size
5	AWG21/0.75 mm ²
10	AWG18/1.0 mm ²
13	AWG15 /1. 5 mm ²
18	AWG14/1.6 mm ²
25	AWG12/2.0 mm ²
30	AWG10/2.5 mm ²

9.2 Installation for the first time

Indoor unit

Wall type:

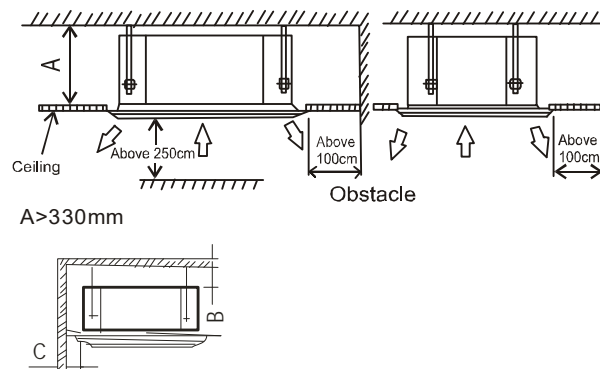
- Install the indoor unit level on a strong wall that is not subject to vibrations
- The inlet and outlet ports should not be obstructed: the air should be able to blow all over the room.
- Do not install the unit near a source of heat, steam, or flammable gas.
- Install the unit near an electric socket or private circuit.
- Do not install the unit where it will be exposed to direct sunlight.
- Install the unit where connection between indoor and outdoor unit is as easy as possible.
- Install the unit where it is easy to drain the condensed water.
- Check the machine operation regularly and leave the necessary spaces as shown in the picture.
- Install the indoor unit where the filter can be easily accessible.
- Install the indoor unit in the room to be air conditioning, avoiding to installation in corridors or communal areas.



- Install the indoor unit at a height of at least 2.5m from the ground.

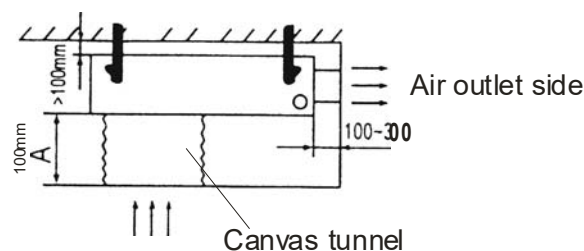
Cassette type:

- Be sure to lead the refrigerant pipes, drain pipes and connection wires out to its connection location before hanging the unit if the opening on the ceiling has been decided.
- Confirm sizes of the indoor unit and ceiling opening with the attached installation paper pattern. (Please fix the paper pattern below the body with M5X16 screws (4).



Wall material	Flammable material	Fire-proof or nonflammable materials	Fire-proof structure
B	Above 5cm	Above 5cm	Above 5cm
C	Above 100cm	Above 100cm	-

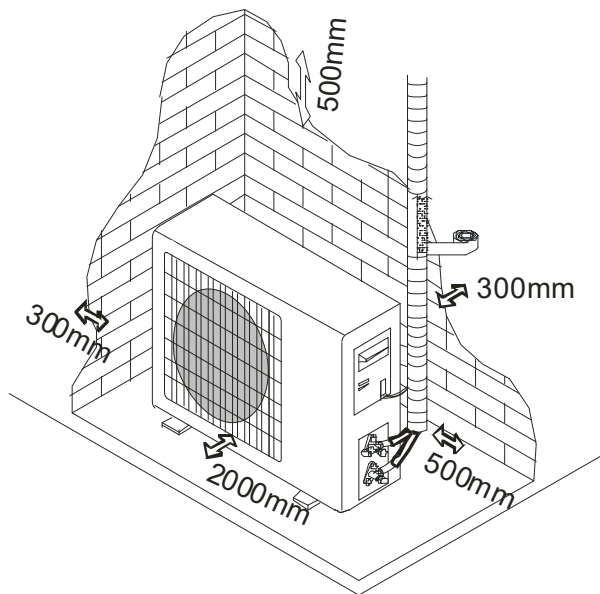
Duct



OUTDOOR UNIT

- Do not install the outdoor unit near sources of heat, steam or flammable gas.
- Do not install the unit in too windy or dusty places.
- Do not install the unit where people often pass. Select a place where the air discharge and operating sound level will not disturb the neighbours.
- Avoid installing the unit where it will be exposed to direct sunlight (other wise use a protection, if necessary, that should not interfere with the air flow).
- Leave the spaces as shown in the picture for
- The air to circulate freely.
- Install the outdoor unit in a safe and solid place.
- If the outdoor unit is subject to vibration, place rubber gaskets onto the feet of the unit.

Minimum space to be left (mm) showing in the picture.

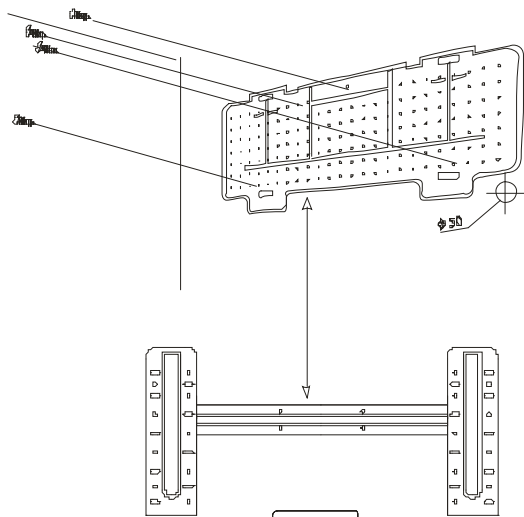


To install, proceed as follows:

9.2.1 Installation of the mounting plate.

Wall split type:

1. By using a level, put the mounting plate in a perfect square position vertically and horizontally.
2. Drill 32mm deep holes in the wall to fix the plate.
3. Insert the plastic anchors into the hole.
4. Fix the mounting plate by using the provided tapping screws.
5. Check that the mounting plate is correctly fixed.

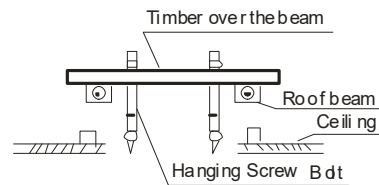


Note: The shape of the mounting plate may be different from the one above, but installation method is similar.

Cassette and Duct type:

Wooden construction

Put the square timber over the roof beam, then install the hanging screw bolts.



For finished concrete bricks

Install the hanging hook with expansible bolt into the concrete deep to 45~50mm to prevent loose.

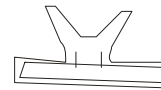


New Concrete Bricks

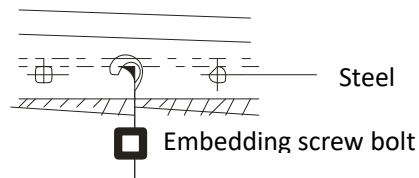
Inlaying or embedding the screw bolts.



(Blade shape insertion)



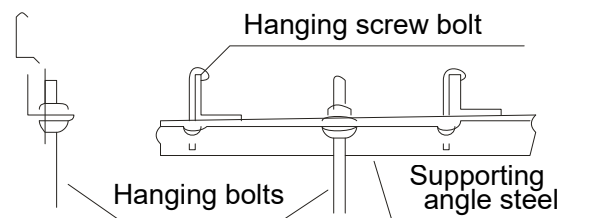
(Slide insertion)



(Pipe hanging and embedding screw bolt)

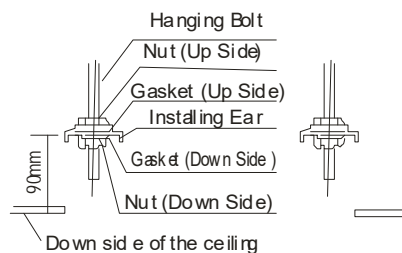
Steel roof beam structure

Install the supporting angle steel.



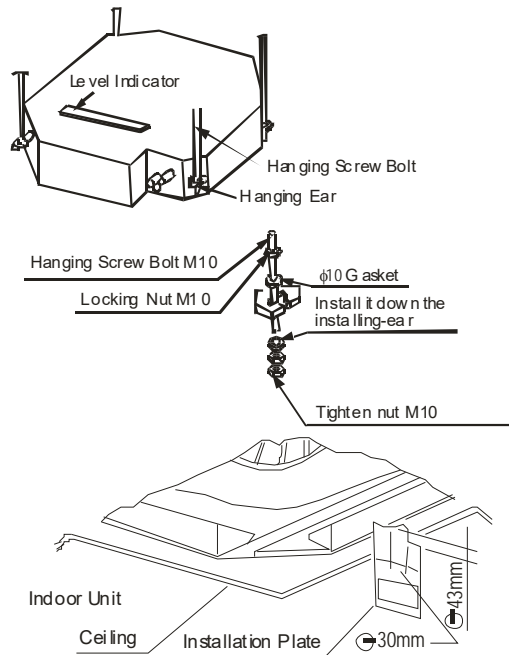
Overhanging the indoor unit

Adjust the gasket (down side) to 90mm over the ceiling.

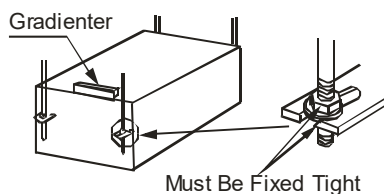


Install the hanging bolt into T groove of the hanging tool. Overhang the indoor unit and ensure it is level using a level indicator.

cassette

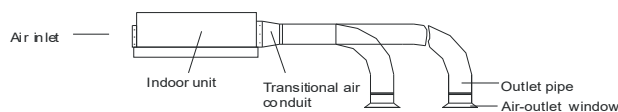


Duct



How to mount outlet pipe.

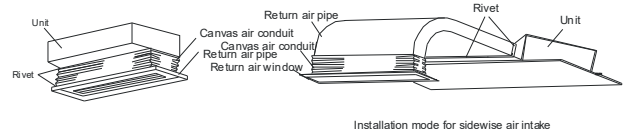
- Generally, we have two types of outlet pipe available, i.e. rectangular or round ones.
- Rectangular air conduit can be directly connected to air outlet of indoor unit by rivets. For outlet dimensions, see outline drawing of the unit.
- Round air conduit should be connected to a piece of transitional air conduit before it is connected to air outlet of indoor unit, the other end of it can be separately connected to air conduit window or connected to air conduit window after air flow diversion, and the total length should not be over 6m. As shown in figure below, air speeds at all air outlets should be set to basically consistent so as to meet the room air-conditioning requirements.



Installation method for return air pipe

- In case sidewise air intake is adopted, return air pipe should be fabricated and rivet-connected to return air orifice, and the other end of it should be connected to return air window.

- In case of underside air intake, purchase or fabricate a section of pleated canvas air conduit serving as transition joint for return air orifice and return air window. in this way, it can be freely adjusted according to height of indoor ceiling board; in addition, during operation of the unit, canvas air conduit may avoid vibration of ceiling board, as shown in figure below.



9.2.2 Drilling a hole in the wall for the piping

- 1) Decide where to drill the hole in the wall for the piping (if necessary) according to the position of the mounting plate

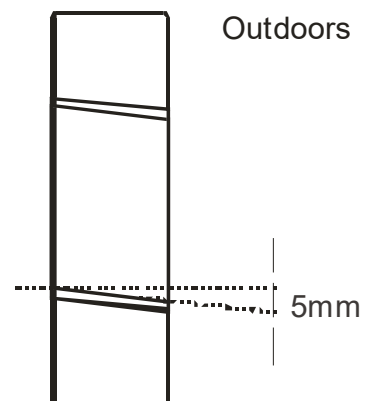
- 2) Install a flexible flange through the hole in the wall to keep the latter intact and clean.

The hole must slope downwards towards the exterior.

Note: Keep the drain pipe down towards the direction of the wall hole, otherwise leakage may occur.

Indoors

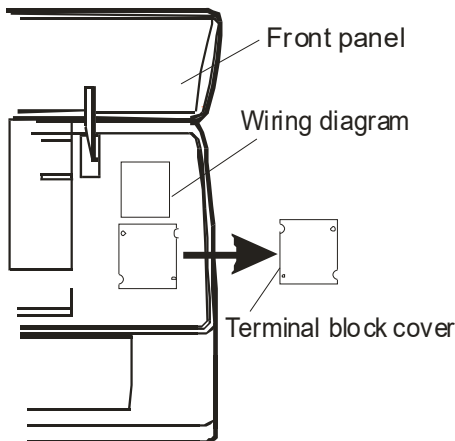
Outdoors



9.2.3 Electrical connections---Indoor unit

- 1).Lift the front panel.
- 2).Take off the cover as indicated in the picture (by removing a screw or by breaking the hooks).
- 3).For the electrical connections, see the circuit diagram on the right part of the unit under the front panel.
- 4).Connect the cable wires to the screw terminals by following the numbering. Use wire size suitable to the electric power input (see name plate on the unit) and according to all current national safety code requirements.
- 5).The cable connecting the outdoor and indoor units must be suitable for outdoor use.
- 6).The plug must be accessible also after the appliance has been installed so that it can be pulled out if necessary.

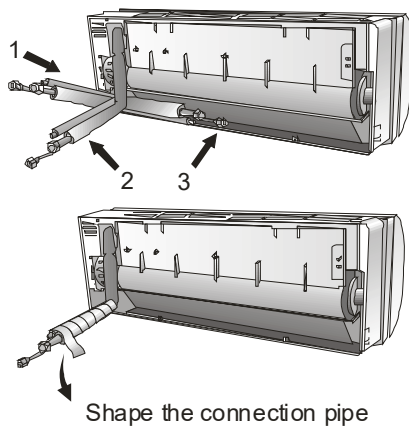
- 7).An efficient earth connection must be ensured.
- 8).If the power cable is damaged, it must be replaced by an authorized Service Centre.



9.2.4 Refrigerant piping connection

The piping can be run in the 3 directions indicated by numbers in the picture. When the piping is run in direction 1 or 3, cut a notch along the groove on the side of the indoor unit with a cutter.

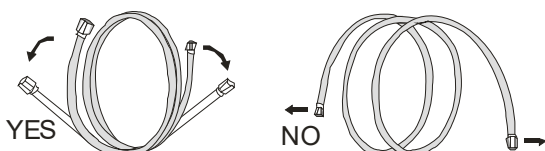
Run the piping in the direction of the wall hole and bind the copper pipes, the drain pipe and the power cables together with the tape with the drain pipe at the bottom, so that water can flow freely.



Shape the connection pipe

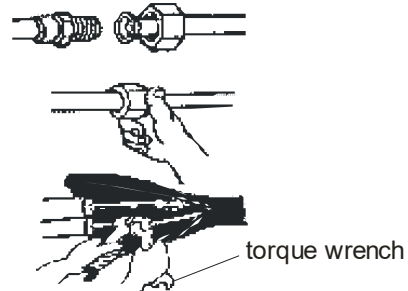
9.2.5 Connecting the pipes.

- Do not remove the cap from the pipe until connecting it, to avoid dampness or dirt from entering.
- If the pipe is bent or pulled too often, it will become stiff. Do not bend the pipe more than three times at one point.
- When extending the rolled pipe, straighten the pipe by unwinding it gently as shown in the picture.



9.2.6 Connections to the indoor unit

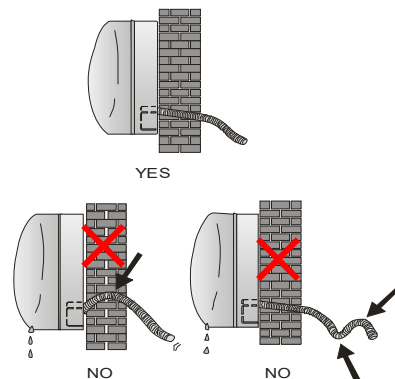
- 1).Remove the indoor unit pipe cap (check that there is no debris inside).
- 2).Insert the flare nut and create a flange at the extreme end of the connection pipe.
- 3).Tighten the connections by using two wrenches working in opposite directions.



9.2.7 Indoor unit condensed water drainage

The indoor unit condensed water drainage is fundamental for the success of the installation.

- 1).Place the drain hose below the piping, taking care not to create siphons.
 - 2).The drain hose must slant downwards to aid drainage.
 - 3).Do not bend the drain hose or leave it protruding or twisted and do not put the end of it in water. If an extension is connected to the drain hose, ensure that it is lagged when it passes into the indoor unit.
 - 4).If the piping is installed to the right, the pipes, power cable and drain hose must be lagged and secured onto the rear of the unit with a pipe connection.
- Insert the pipe connection into the relative slot.
 - Press to join the pipe connection to the base.

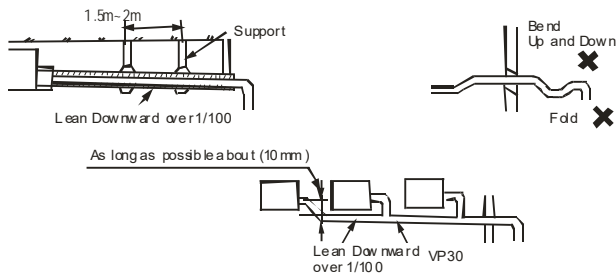


For Cassette and Duct type

- The drain pipe of indoor unit must have the

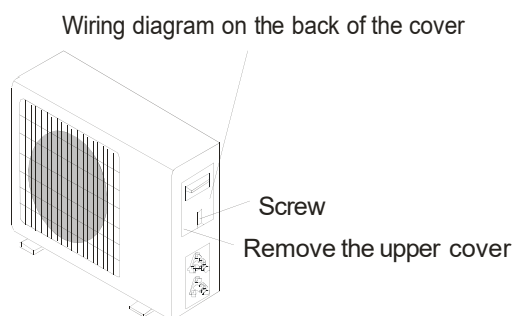
heat insulation , or it will condense dew, as well as the connections of the indoor unit.

- The declivity of the drain pipe downwards should not be over 1/100, and no winding and bending.
- The total length of the drain pipe when pulled out transversely shall not exceed 20m , when the pipe is over long, a prop stand must be installed every 1.5 to 2m to prevent winding.
- Refer to the following figures about the installation of the pipes.
- Do not impose any pressure on the connection part of the drainage pipe.



9.2.8 Electronic connections of outdoor unit

1. Take the cover away.
2. Connect the cable wires to the terminal board using the same numbering as in the indoor unit.
3. For the electrical connections, see the wiring diagram on the back of the cover
4. Fasten the cables with a cable-clamp.
5. An efficient earth connection must be ensured.
6. Replace the covers.

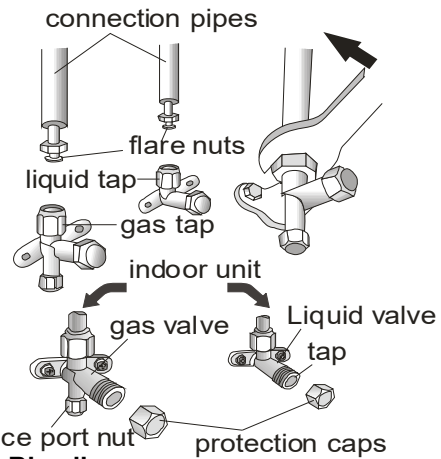


Outdoor unit

9.2.9 Connecting the pipe of outdoor unit

Screw the flare nuts to the outdoor unit coupling with the same tightening procedures described for the indoor unit.

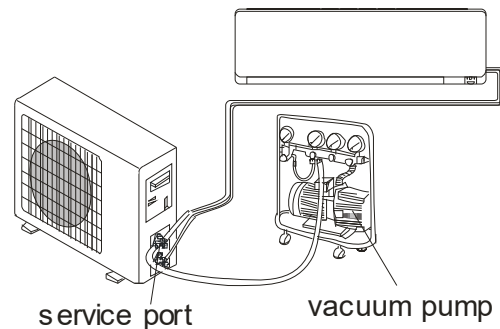
Note: If the tightening torque is not sufficient, there will probably be some leakage. With excessive tightening torque there will also be some leakage, as the flange could be damaged.



9.2.10 Bleeding

Air and humidity left inside the refrigerant circuit can cause compressor malfunction. After having connected the indoor and outdoor units, bleed the air and humidity from the refrigerant circuit by using a vacuum pump.

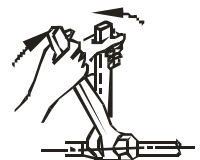
The air and humidity left inside the refrigerant circulation can cause compressor malfunction. After having connected the indoor and outdoor units, bleed the air and humidity from the refrigerant circulation using a vacuum pump.



Notice

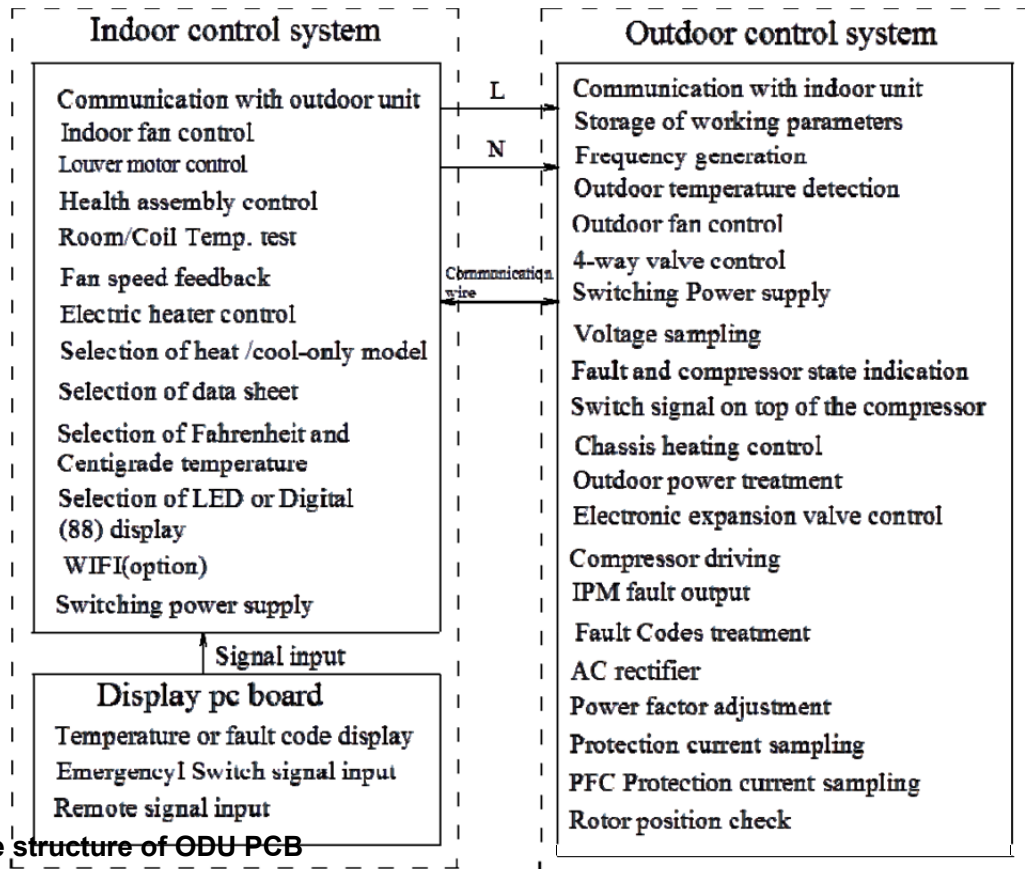
According to installation conditions, overlarge wrenched Torch will destroy the nut. (Unit. N.cm)

Pipe	Tightening torque(N.M)
1/4"	15-20
3/8"	31-35
1/2"	35-45
5/8"	75-80



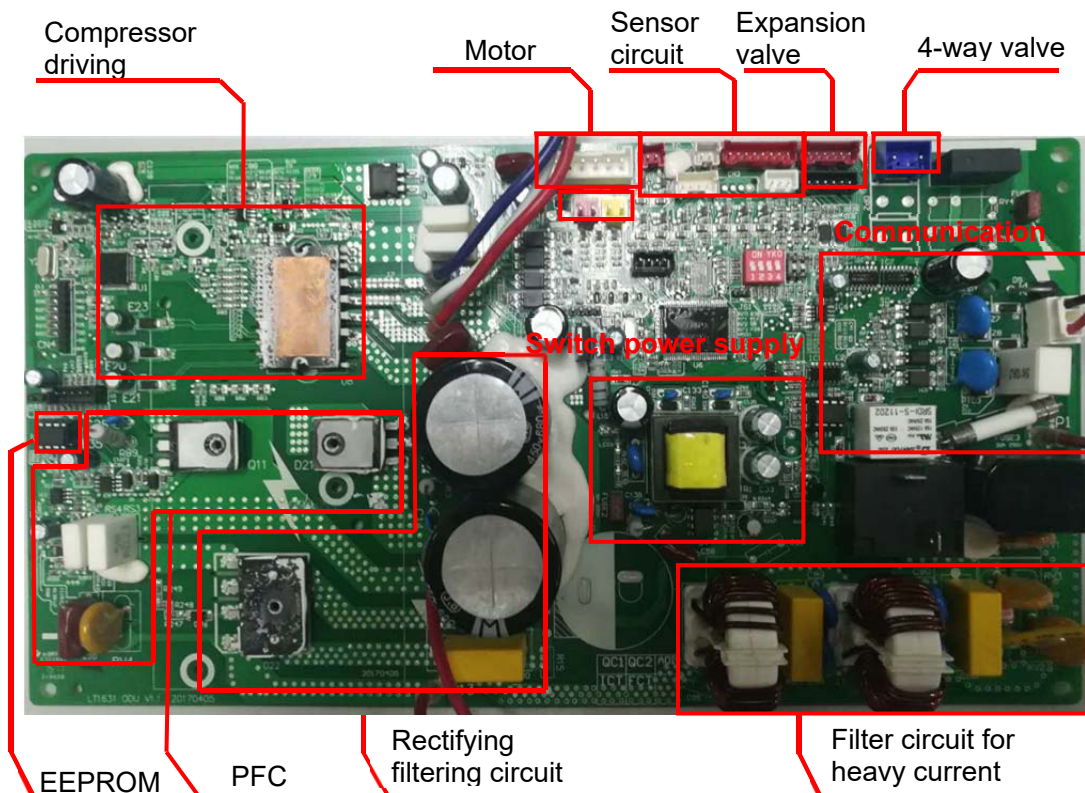
10. Trouble shooting

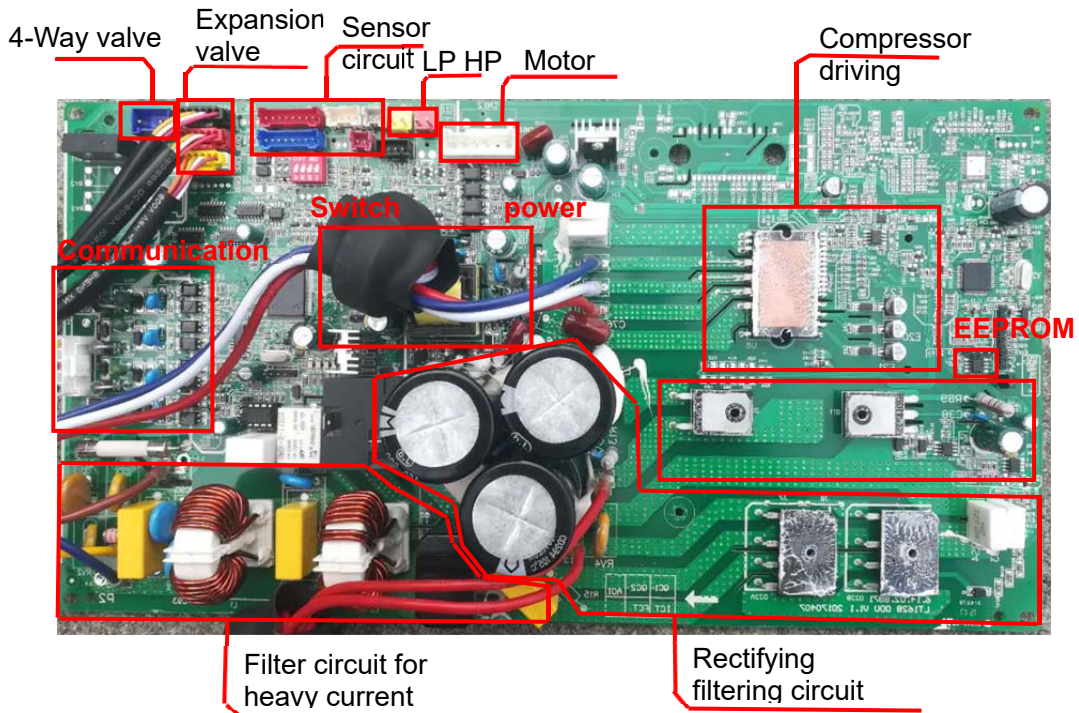
10.1 Outdoor control diagram



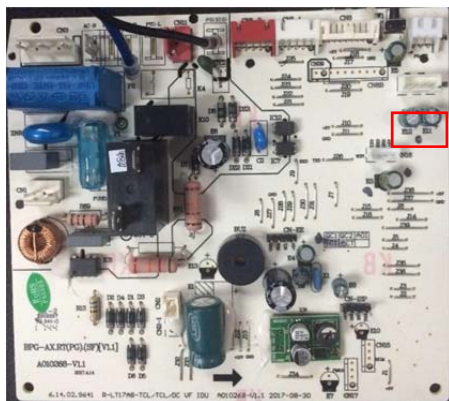
10.2 The structure of ODU PCB

ONE TO 2 TYPE



ONE TO 3/4 TYPE:**10.3 Examples of repairing****10.3.1 Display E1 or E2****Reasons:**

- 1) The sensor connection terminal loose or not plugged in.

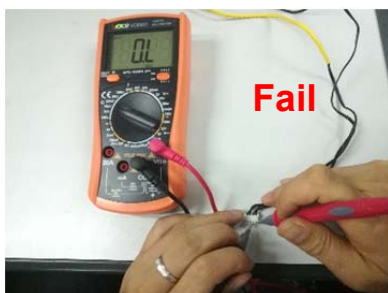


Wall type
type/Duct type

Solution: Check the connector of sensor and slot (CN6, CN6-1, CN6-2), if loose or not plugged in, please connect again.

- 2) Room temperature sensor (IRT) and Indoor pipe (coil) temperature sensor (IPT) damage (short or broken).

Solution: check the resistance of the sensor wall type R (25°C) =5 kΩ, cassette and duct type R (25°C) =5 kΩ, if short or broken please replace it.



Fail

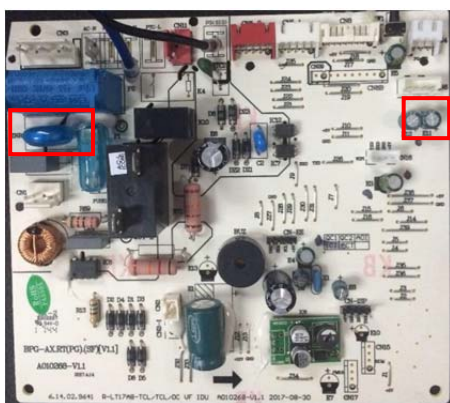


OK

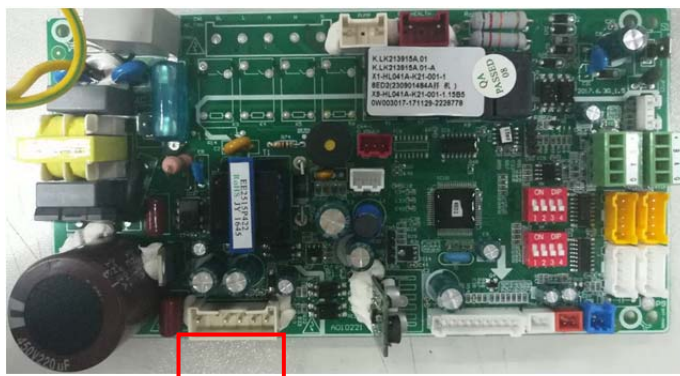
3) The PCB fail.

Solution: Replace the indoor main PCB.

10.3.2 Display E6

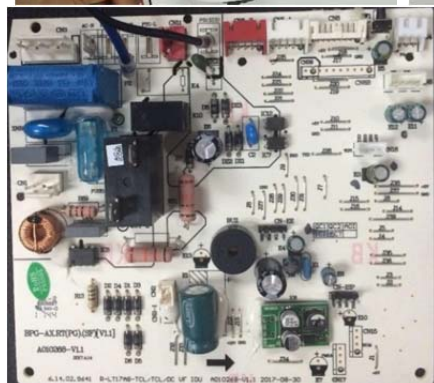
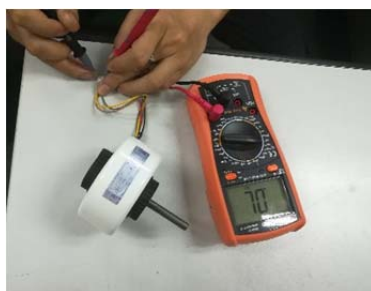
Reasons:

1) The indoor motor connection terminal loose or not plugged in.



Solution: Check the connector of indoor motor and slot (CN3) and (CN4), if loose or not plugged in, please connect again.

2) The indoor motor damage.

Solution: Check and replace the motor.

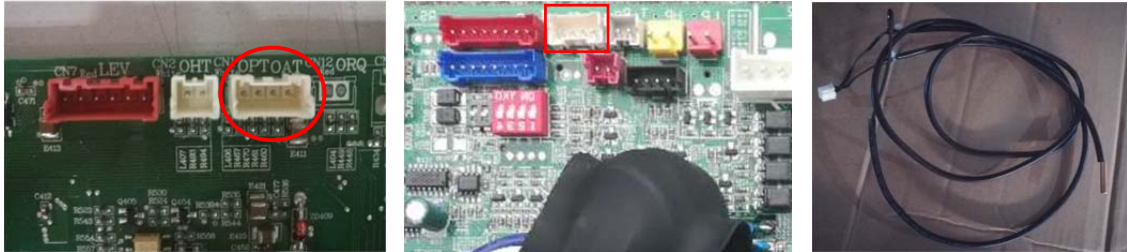
3) The indoor main PCB damage.

**Solution:** Replace the indoor main PCB.

10.3.3 Display E3, E7

Reasons:

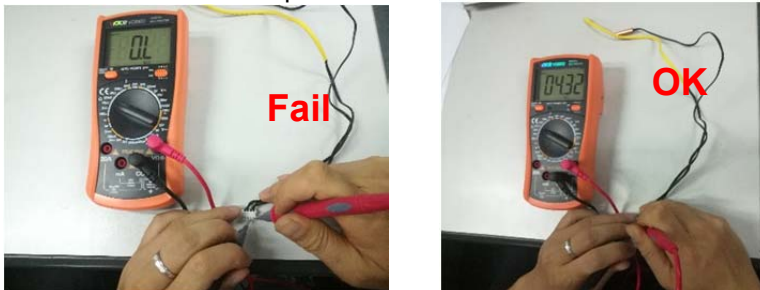
- 1) Outdoor pipe temp sensor, outdoor temp sensor & exhaust temp sensor connection terminal loose or not plugged in.



Solution: Check the connector of sensor and slot, if loose or not plugged in, please connect again.

- 2) Outdoor pipe temp sensor, outdoor temp sensor & exhaust temp sensor damage (short or broken).

Solution: Check and replace the sensor.



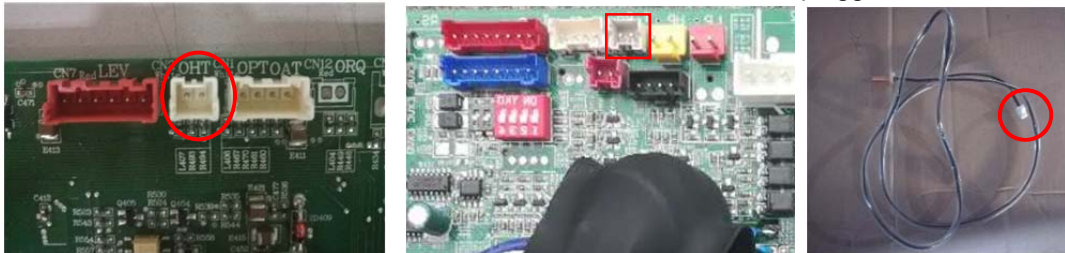
- 3) Outdoor PCB damage.

Solution: Check and replace the outdoor PCB.

10.3.4 Display E8

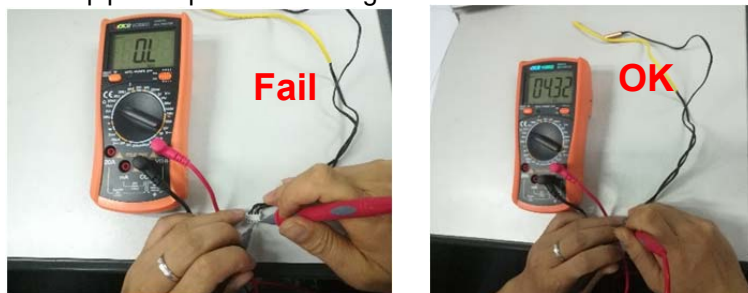
Reasons:

- 1) Outdoor discharge pipe temp sensor connection terminal loose or not plugged in.



Solution: Check the connector of sensor and slot, if loose or not plugged in, please connect again.

- 2) Outdoor pipe temp sensor damage.



Solution: Check and replace the sensor.

- 3) Outdoor PCB damage.

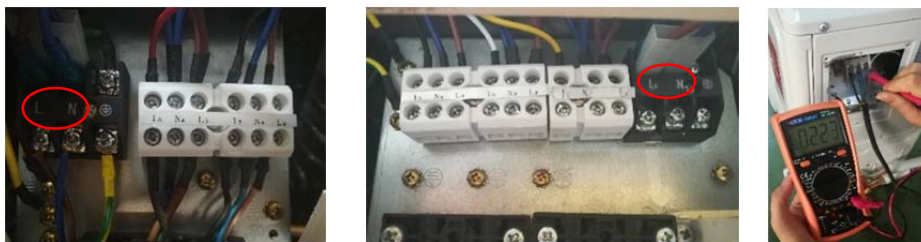
Solution: Check and replace the outdoor PCB.

10.3.5 Display E0,E5

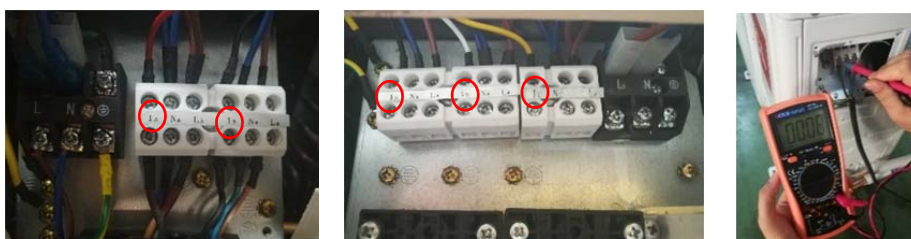
Reason: Indoor / outdoor communication damage.

Solution:

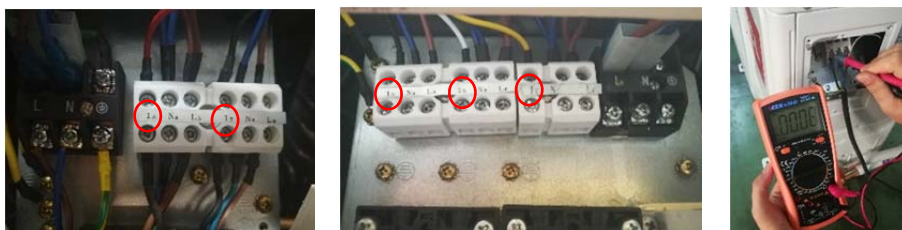
- 1) Check if the indoor and outdoor connections are correct. The terminal L and N which connect to indoor unit shall correspond to each other on indoor and outdoor units. Measure the voltage on outdoor terminal L and N (before display of E0 fault). If the voltage is "0", please replace indoor main PCB.



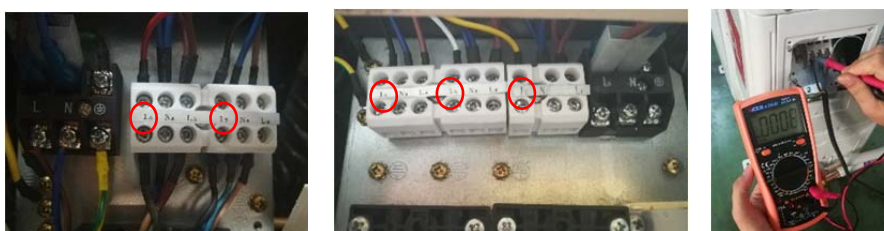
- 2) If the 1 & N which connect to indoor unit voltage is normal, measure the voltage between the outdoor terminal 1A, 1B, 1C, 1D and N. If the voltage change occurs between 0~24V (change pulse voltage), please replace indoor main PCB.



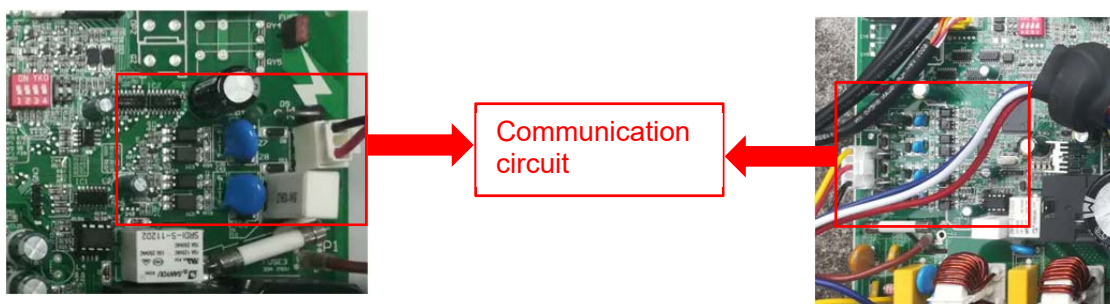
- 3) If the 1A, 1B, 1C, 1D & N which connect to indoor unit voltage is normal, measure the voltage between the outdoor terminal 1 and N. If the voltage change occurs between 0~12V (change pulse voltage), but there is no 24V, please replace the outdoor PCB.

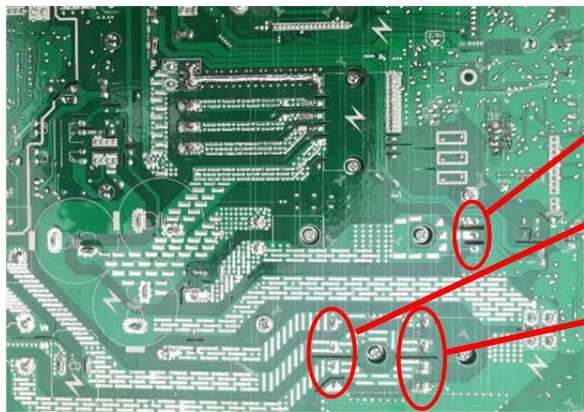


- 4) If the 1, 1A, 1B, 1C, 1D & N voltage is normal, measure the voltage between the outdoor terminal 1 and N. If the voltage has no change, firstly replace the indoor main PCB. If the fault remains unsolved, replace the outdoor PCB.



- 5) Communication fault if resistance or optical coupler broken, replace outdoor PCB.
Is there any burnt on PCB? If no, test the rectifier, FRD, IGBT etc. any component broken, replace PCB.



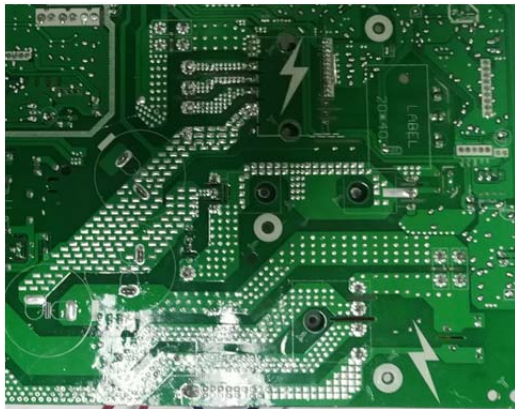


Any of 2 pins should be no short circuit

Any of 2 pins should be no short circuit

Any of 2 pins should be no short circuit

- 6) Test the DC voltage between DC+ and DC-. If the voltage is less than 50V approximately, please replace outdoor PCB.



DC+

DC-

10.3.6 Display EA

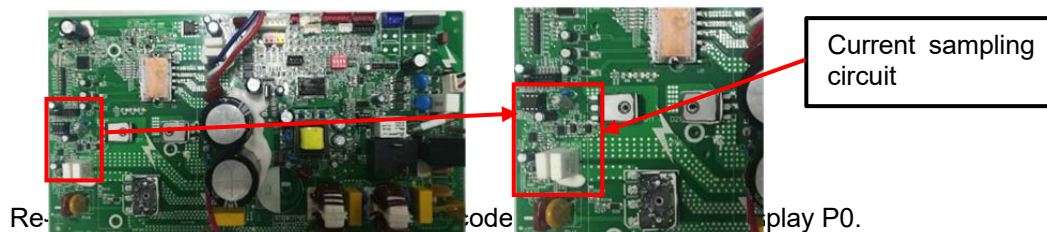
Reason: Current sensor fault.

Solution:

- 1) Check for refrigerant leakage, to find the leakage point and recharge the refrigerant.
- 2) Current sampling circuit broken on the outdoor PCB and replace outdoor PCB.

10.3.7 Display E9 (first display P0 or P9) Reason:

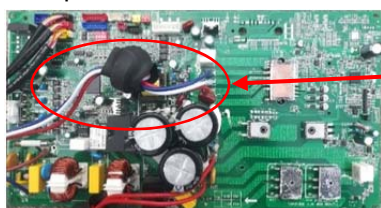
Outdoor PCB drive circuit damage. Solution:



Current sampling circuit

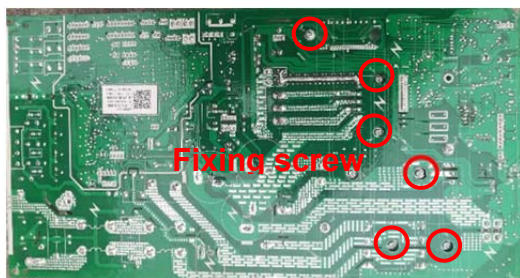
Re- code display P0.

- 1) If this code is displayed when the compressor is started for several seconds or even not started, check the compressor connection for correctness, if no insert wrong, replace outdoor PCB.



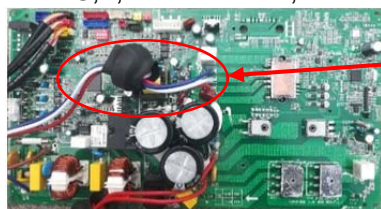
Compressor connection

- 2) Check if the outdoor module is tightly installed onto the radiating fins and if the silicone is applied evenly, fix the screws again if loose.



Heat radiation problem easily happened while the screw is not fixed tightly.

- 3) Check the system pressure, recharge refrigerant if the pressure is low, and discharge some refrigerant if the pressure is too high.
- 4) Check the outdoor ventilation and if there is any obstruction that affects the normal radiating of the air conditioner, and installation again.
- 5) If the above inspections are normal, but the fault remains unsolved, please replace the outdoor PCB. Re-energize and check the protection code on display. Firstly display P9.
 - a) Check the U, V, W connection, if is correctness or loose please connect again.



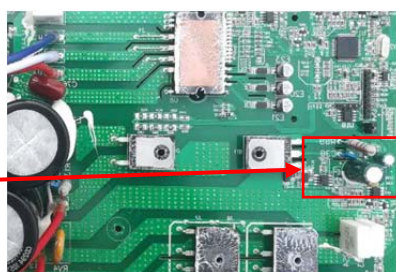
U, V, W connection

- b) If this code is displayed when the compressor is started for several seconds or even not started, check the compressor connection for correctness, if no insert wrong, replace outdoor PCB.

10.3.8 Display EU.

Reason: Voltage sensor damage.

Solution: Please replace outdoor PCB.



Voltage sensor

10.3.9 Display EE

Reason: EEPROM fault.

Solution: Shut down power supply and reenergize it, if the fault remains there, check the EEPROM installation, if no problem, please replace outdoor PCB.



EEPROM

10.3.10 Display CL

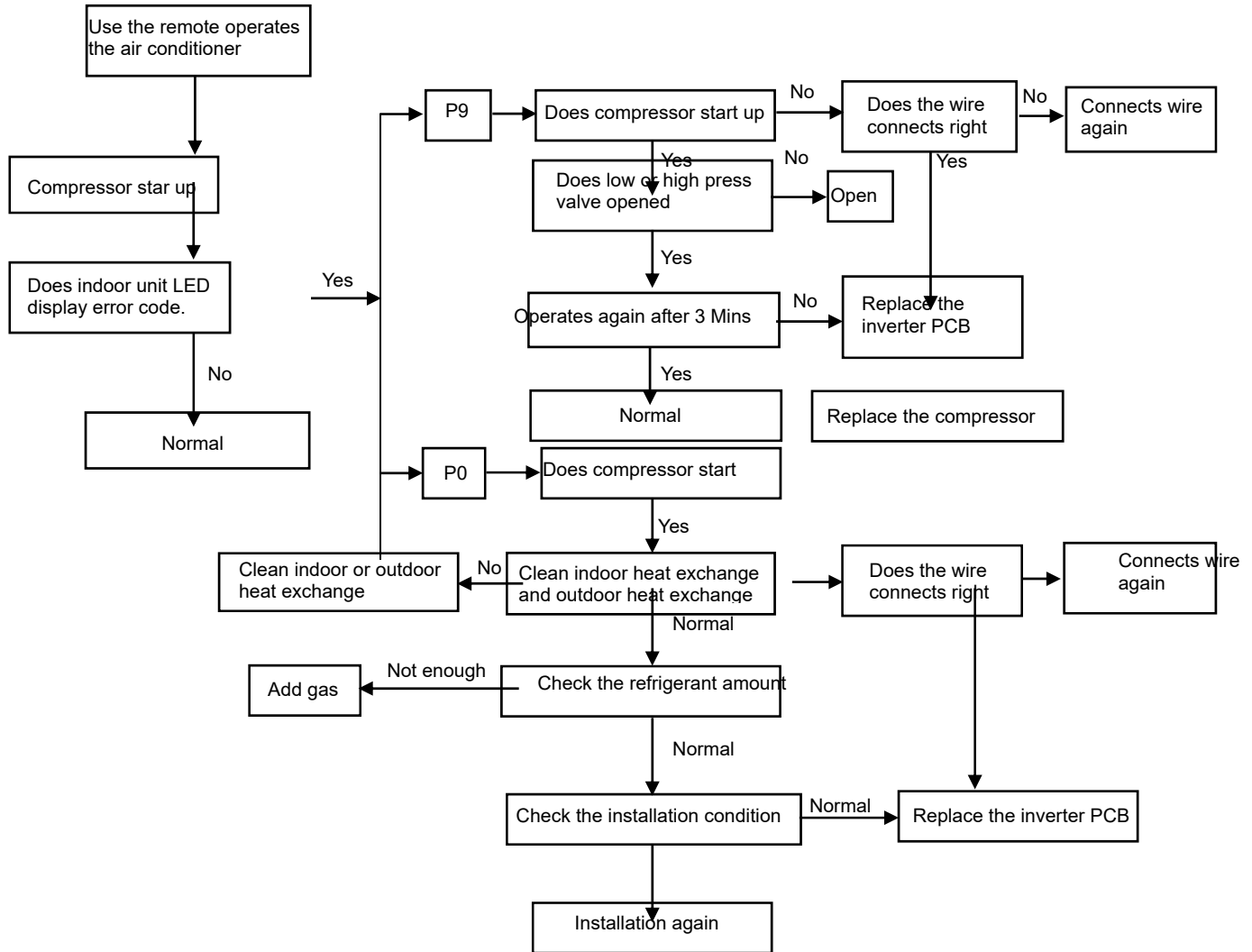
Cause: Air filter duty, the unit operation Cumulative time 500 hours, the controller will confirmation the filter dirty and display CL.

Solution: Clean the air filter then cut off the power and supply again.

10.4 MALFUNCTION (PARTS) CHECK METHOD

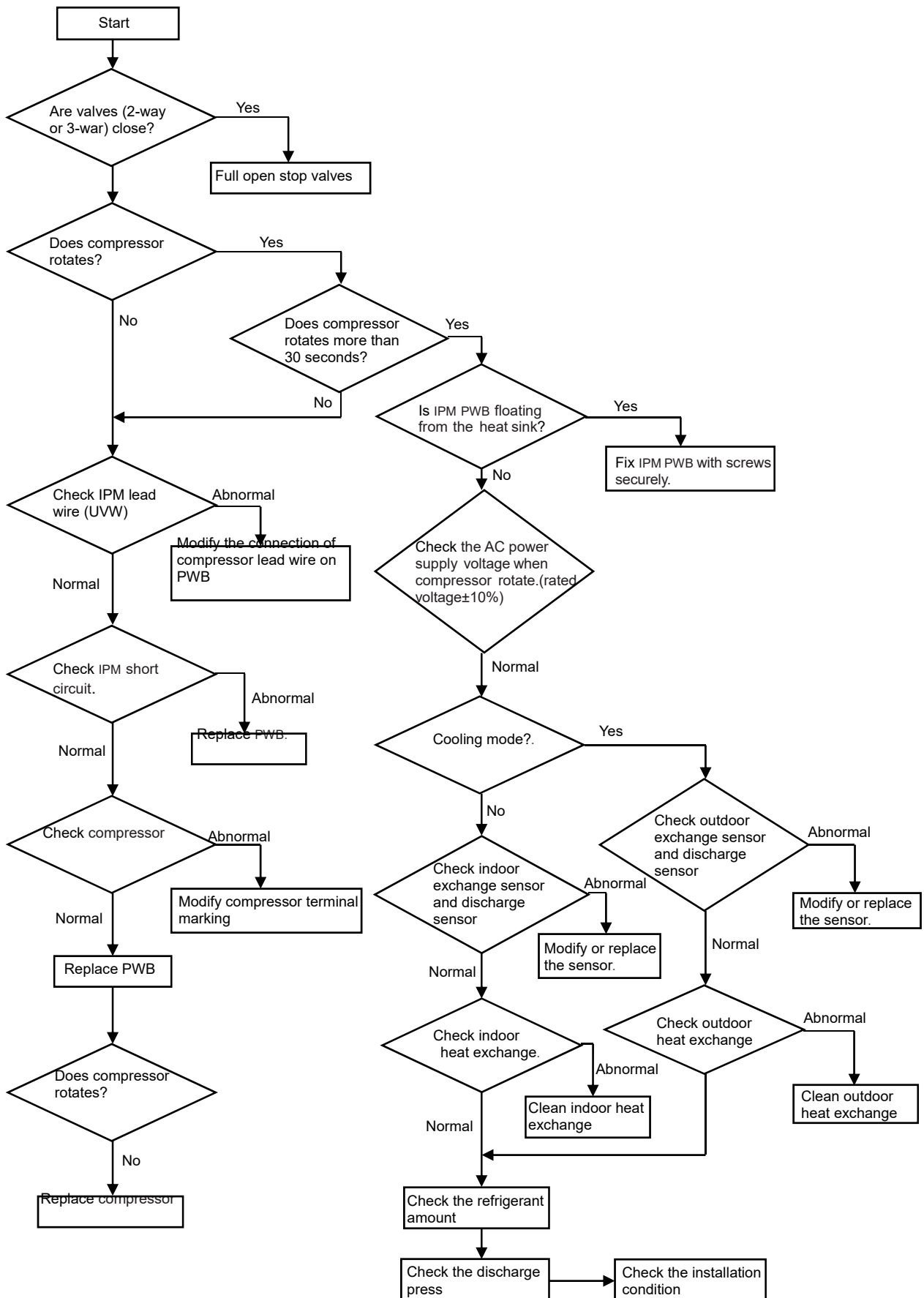
10.4.1 Procedure for determining defective outdoor unit IPM/compressor

The following flow chart shows a procedure for locating the cause of a malfunction when the compressor does not start up and a DC overcurrent indication error occurs.

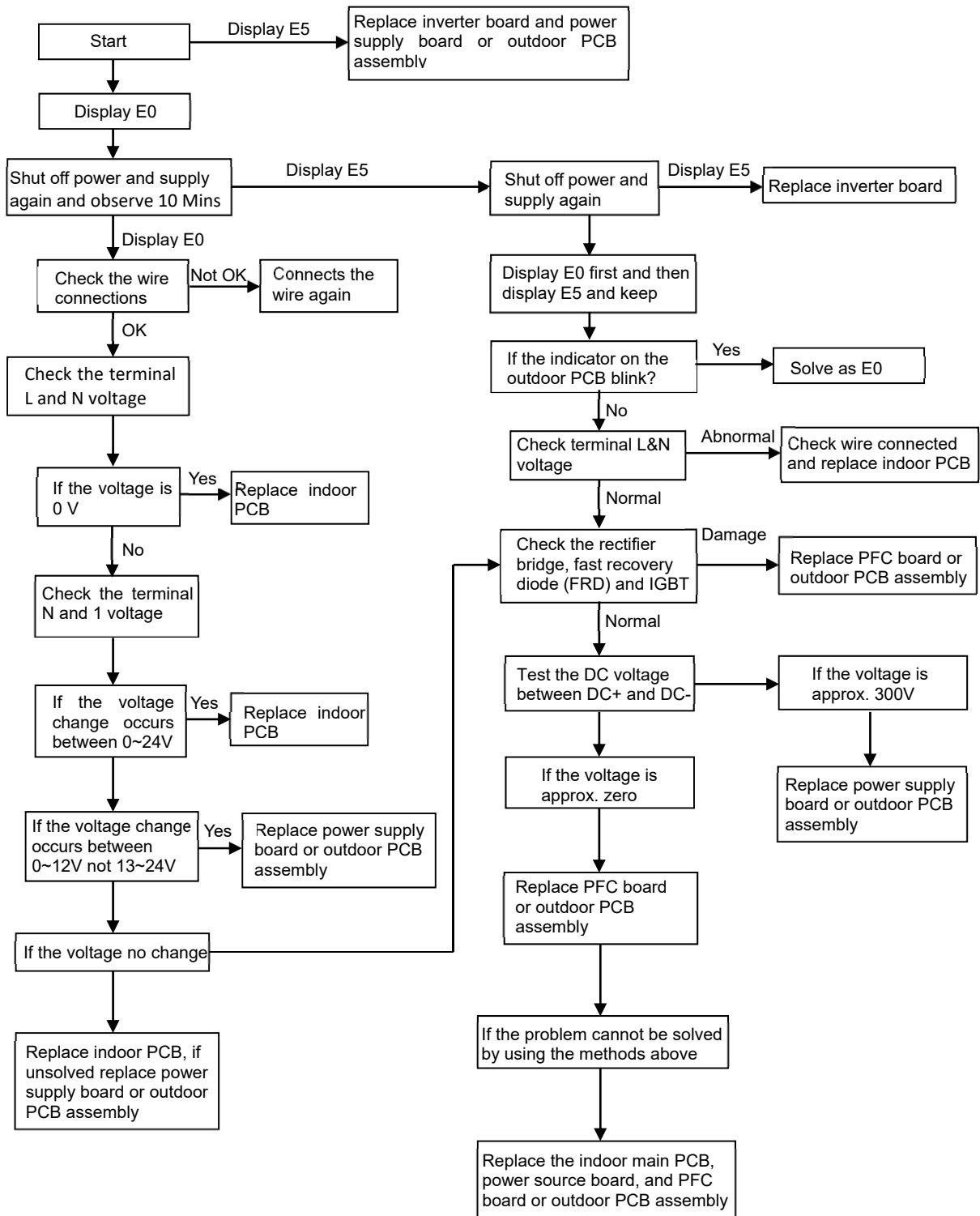


10.4.2 DC Over Current Error

Error memory is recorded



10.4.3 E0,E5 Error

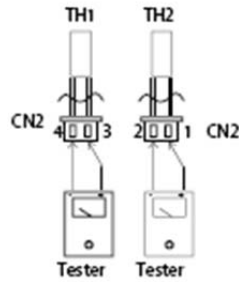


10.5 THERMISTOR TEMPERATURE CHARACTERISTICS

1. Indoor unit and outdoor exchange temperature and outside air temperature sensor temperature characteristics

TEMP. (°C)	Resistance (k Ohm)	Voltage of resistance	TEMP. (°C)	Resistance (k Ohm)	Voltage of resistance	TEMP. (°C)	Resistance (k Ohm)	Voltage of resistance
-30	63.513	4.628	15	7.447	2.968	60	1.464	1.115
-29	60.135	4.609	16	7.148	2.918	61	1.418	1.088
-28	56.956	4.589	17	6.863	2.868	62	1.374	1.061
-27	53.963	4.568	18	6.591	2.819	63	1.331	1.035
-26	51.144	4.547	19	6.332	2.769	64	1.290	1.009
-25	48.488	4.524	20	6.084	2.720	65	1.250	0.984
-24	45.985	4.501	21	5.847	2.671	66	1.212	0.960
-23	43.627	4.477	22	5.621	2.621	67	1.175	0.936
-22	41.403	4.452	23	5.404	2.572	68	1.139	0.913
-21	39.305	4.426	24	5.198	2.524	69	1.105	0.890
-20	37.326	4.399	25	5.000	2.475	70	1.072	0.868
-19	35.458	4.371	26	4.811	2.427	71	1.040	0.847
-18	33.695	4.343	27	4.630	2.379	72	1.009	0.825
-17	32.030	4.313	28	4.457	2.332	73	0.979	0.805
-16	30.458	4.283	29	4.292	2.285	74	0.950	0.785
-15	28.972	4.252	30	4.133	2.238	75	0.922	0.765
-14	27.567	4.219	31	3.981	2.192	76	0.895	0.746
-13	26.239	4.186	32	3.836	2.146	77	0.869	0.728
-12	24.984	4.152	33	3.697	2.101	78	0.843	0.710
-11	23.795	4.117	34	3.563	2.057	79	0.819	0.692
-10	22.671	4.082	35	3.435	2.012	80	0.795	0.675
-9	21.606	4.045	36	3.313	1.969	81	0.773	0.658
-8	20.598	4.008	37	3.195	1.926	82	0.751	0.641
-7	19.644	3.969	38	3.082	1.883	83	0.729	0.625
-6	18.732	3.930	39	2.974	1.842	84	0.709	0.610
-5	17.881	3.890	40	2.870	1.800	85	0.689	0.595
-4	17.068	3.850	41	2.770	1.760	86	0.669	0.580
-3	16.297	3.808	42	2.674	1.720	87	0.651	0.566
-2	15.565	3.766	43	2.583	1.681	88	0.633	0.552
-1	14.871	3.723	44	2.494	1.642	89	0.615	0.538
0	14.212	3.680	45	2.410	1.604	90	0.598	0.525
1	13.586	3.635	46	2.328	1.567	91	0.582	0.512
2	12.991	3.590	47	2.250	1.530	92	0.566	0.499
3	12.426	3.545	48	2.174	1.495	93	0.550	0.487
4	11.889	3.499	49	2.102	1.459	94	0.535	0.475
5	11.378	3.452	50	2.032	1.425	95	0.521	0.463
6	10.893	3.406	51	1.965	1.391	96	0.507	0.452
7	10.431	3.358	52	1.901	1.357	97	0.493	0.441
8	9.991	3.310	53	1.839	1.325	98	0.480	0.430
9	9.573	3.262	54	1.779	1.293	99	0.467	0.419
10	9.174	3.214	55	1.721	1.262	100	0.455	0.409
11	8.795	3.165	56	1.666	1.231			
12	8.433	3.116	57	1.613	1.201			
13	8.089	3.067	58	1.561	1.172			
14	7.760	3.017	59	1.512	1.143			

Resistance at 25°C: wall split type 5 kΩ, cassette and duct 10kΩ.



TH1: indoor room temperature sensor and outside air temperature sensor

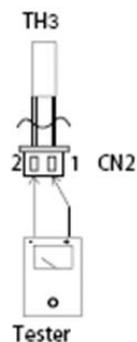
TH2: indoor exchange temperature sensor and outside exchange temperature sensor

Before measuring resistance, disconnect connectors as shown above.

2. Outdoor unit sensor temperature characteristics

TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)	TEMP. (°C)	R min (k Ohm)	R(t) (k Ohm)	R max (k Ohm)
-30	283.3	322.9	367.7	24	19.36	20.89	22.52	78	2.563	2.654	2.745
-29	267.4	304.4	346.3	25	18.55	20	21.54	79	2.481	2.567	2.654
-28	252.5	287.1	307.4	26	17.77	19.14	20.6	80	2.402	2.484	2.567
-27	238.5	270.9	307.4	27	17.03	18.32	19.7	81	2.327	2.404	2.483
-26	225.4	255.7	289.8	28	16.32	17.55	18.85	82	2.254	2.327	2.401
-25	213.1	241.4	273.3	29	15.65	16.81	18.04	83	2.183	2.253	2.323
-24	201.5	228	257.9	30	15	16.1	17.27	84	2.115	2.182	2.248
-23	190.6	215.5	243.4	31	14.39	15.43	16.54	85	2.05	2.113	2.176
-22	180.3	203.6	229.8	32	13.81	14.79	15.34	86	1.985	2.047	2.109
-21	170.7	192.5	217	33	13.25	14.18	15.17	87	1.922	1.983	2.045
-20	161.6	182.1	205	34	12.72	13.6	14.54	88	1.861	1.922	1.983
-19	153.1	172.3	193.7	35	12.21	13.05	13.93	89	1.802	1.862	1.923
-18	145	163.1	183.2	36	11.72	12.52	13.36	90	1.746	1.805	1.865
-17	137.5	154.4	173.2	37	11.26	12.01	12.81	91	1.692	1.75	1.809
-16	130.3	146.2	163.9	38	10.82	11.53	12.29	92	1.639	1.697	1.755
-15	123.6	138.5	155.1	39	10.29	11.07	11.78	93	1.589	1.646	1.703
-14	117.3	131.3	146.8	40	9.986	10.63	11.31	94	1.54	1.596	1.653
-13	111.3	124.4	139	41	9.6	10.21	10.85	95	1.493	1.549	1.604
-12	105.6	118	131.7	42	9.231	9.813	10.42	96	1.448	1.502	1.558
-11	100.3	111.9	124.7	43	8.878	9.43	10	97	1.404	1.458	1.512
-10	95.24	106.2	118.2	44	8.54	9.064	9.612	98	1.362	1.415	1.469
-9	90.49	100.8	112.1	45	8.217	8.714	9.233	99	1.321	1.373	1.426
-8	85.99	95.68	106.3	46	7.908	8.38	8.872	100	1.284	1.335	1.387
-7	81.75	90.86	100.8	47	7.612	8.06	8.526	101	1.245	1.296	1.348
-6	77.74	86.31	95.74	48	7.328	7.754	8.196	102	1.209	1.258	1.309
-5	73.94	82.01	90.88	49	7.057	7.461	7.88	103	1.173	1.222	1.272
-4	70.35	77.95	86.29	50	6.797	7.18	7.578	104	1.139	1.187	1.236
-3	66.96	74.11	81.96	51	6.548	6.912	7.289	105	1.105	1.153	1.202

-2	63.74	70.48	77.87	52	6.309	6.655	7.013	106	1.073	1.12	1.168
-1	60.69	67.05	74	53	6.08	6.409	6.748	107	1.042	1.089	1.136
0	57.81	63.8	70.34	54	5.861	6.173	6.495	108	1.013	1.058	1.104
1	55.08	60.72	66.88	55	5.651	5.947	6.253	109	0.9833	1.028	1.074
2	52.49	57.81	63.61	56	5.449	5.73	6.02	110	0.9553	0.9997	1.045
3	50.03	55.05	60.52	57	5.255	5.522	5.798	111	0.9283	0.9719	1.016
4	47.71	52.44	57.59	58	5.07	5.323	5.585	112	0.9021	0.9451	0.9892
5	45.5	49.97	54.82	59	4.891	5.132	5.381	113	0.8765	0.9191	0.9626
6	43.41	47.62	52.2	60	4.72	4.949	5.101	114	0.8524	0.894	0.9367
7	41.42	45.4	49.71	61	4.556	4.774	4.997	115	0.8087	0.8595	0.9117
8	39.53	43.2	42.33	62	4.398	4.605	4.817	116	0.8059	0.8461	0.8875
9	37.74	41.29	45.12	63	4.247	4.448	4.644	117	0.7837	0.8233	0.8641
10	36.04	39.39	43.01	64	4.101	4.288	4.479	118	0.7623	0.8012	0.8413
11	34.42	37.59	41	65	3.961	4.139	4.32	119	0.7415	0.7798	0.8193
12	32.89	35.87	39.1	66	3.827	3.995	4.167	120			
13	31.43	34.25	37.29	67	3.698	3.858	4.021	121	0.702	0.7386	0.7773
14	30.04	32.71	35.58	68				122	0.6631	0.7195	0.7572
15	29.72	31.24	33.95	69				123	0.6649	0.7007	0.7378
16				70	3.339	3.476	3.616	124	0.6472	0.6824	0.7189
17				71	3.229	3.359	3.491	125	0.6301	0.6647	0.7006
18	25.13	27.26	29.55	72	3.122	3.246	3.372	126	0.6135	0.6476	0.6829
19	24.05	26.07	28.23	73	3.02	3.138	3.257	127	0.5974	0.6309	0.6657
20	23.02	24.93	26.97	74	2.921	3.033	3.146	128	0.5818	0.6148	0.649
21	22.04	23.84	25.77	75	2.827	2.933	3.04	129	0.5667	0.5991	0.6328
22	21.1	22.81	24.63	76	2.735	2.836	2.938	130	0.5521	0.5839	0.6171
23	20.21	21.83	23.55	77	2.647	2.743	2.84				

R—Resistance**Resistance at 25°C: 20 kΩ****TH3: Outdoor unit discharge pipe sensor****Before measuring resistance, disconnect connectors as shown above.**

11. Introduction R32/R290 air conditioner installation

11.1 Introduction to Refrigerants R32 & R290

The refrigerants used for air conditioners are environmentally friendly hydrocarbons R32 and R290. The two kinds of refrigerants are combustible and odorless. Moreover, they can burn and explode under certain condition. However, there will be no risk of burning and explosion if you comply with the following table to install your air conditioner in a room with an appropriate area and use it correctly.

Compared with ordinary refrigerants, Refrigerants R32 & R290 are environmentally friendly and do not destroy the ozone sphere and that their values of greenhouse effect are also very low.

11.1.1 R32/R290 air conditioner installation area requirement

$m_1 = (4\text{m}^3) \times \text{LFL}$, $m_2 = (26\text{m}^3) \times \text{LFL}$, $m_3 = (130\text{m}^3) \times \text{LFL}$

Where LFL is the lower flammable limit in kg/m^3 , R290 LFL is 0.038kg/m^3 , R32 LFL is 0.306kg/m^3 .

For the appliances with a charge amount $m_1 < M < m_2$:

The maximum charge in a room shall be in accordance with the flowing: $M_{\max} = 2.5 \times (\text{LFL})^{(5/4)} \times h_0 \times A^{1/2}$

The required minimum floor area A_{\min} to install an appliance with refrigerant charge $M(\text{kg})$

Shall be in accordance with following: $A_{\min} = (M / (2.5 \times (\text{LFL})^{(5/4)} \times h_0)) ^2$

Where:

m_{\max} is the allowable maximum charge in a room, in kg;

M is the refrigerant charge amount in appliance, in kg;

A_{\min} is the required minimum room area, in m^2 ;

A is the room area, in m^2 ;

LFL is the lower flammable limit, in kg/m^3 ;

h_0 is the installation height of the appliance, in meters for calculating m_{\max} or A_{\min} , 1.8 m for wall mounted;

Table GG.1 - Maximum charge (kg)

Category	LFL (kg/m^3)	h_0 (m)	Floor area (m^2)						
			4	7	10	15	20	30	50
R290	0.038	0.6	0.05	0.07	0.08	0.1	0.11	0.14	0.18
		1	0.08	0.11	0.03	0.06	0.09	0.2	0.3
		1.8	0.15	0.2	0.24	0.29	0.34	0.41	0.53
		2.2	0.18	0.24	0.29	0.36	0.41	0.51	0.65
R32	0.306	0.6	0.68	0.9	1.08	1.32	1.53	1.87	2.41
		1	1.14	1.51	1.8	2.2	2.54	3.12	4.02
		1.8	2.05	2.71	3.24	3.97	4.58	5.61	7.254
		2.2	2.5	3.31	3.96	4.85	5.6	6.86	8.85

Table GG.2 - Minimum room area (m^2)

Category	LFL (kg/m^3)	h_0 (m)	Floor area (m^2)						
			4	7	10	15	20	30	50
R290	0.038		0.152kg	0.228kg	0.304kg	0.456kg	0.608kg	0.76kg	0.988kg
		0.6		82	146	328	584	912	1514
		1		30	53	118	210	328	555
		1.8		9	16	36	65	101	171
		2.2		6	11	24	43	68	115
R32	0.306		1.224kg	1.836kg	2.448kg	3.672kg	4.896kg	6.12kg	7.956kg
		0.6		29	51	116	206	321	543
		1		10	19	42	74	116	196
		1.8		3	6	13	23	36	60
		2.2		2	4	9	15	24	40

Caution:

- Please contact the nearest after-sale service center when maintenance is necessary. At the time of maintenance, the maintenance personnel must strictly comply with the Operation Manual provided by the corresponding manufacturer and any non-professional is prohibited to maintain the air conditioner.

- It is necessary to comply with the provisions of gas-related national laws and regulations.
- It is necessary to clear away the refrigerant in the system when maintaining or scrapping an air conditioner.
- When filling the combustible refrigerant, any of your rude operations may cause serious injury or injuries to human body or bodies and object or objects.
- A leak test must be done after the installation is completed.
- It is a must to do the safety inspection before maintaining or repairing an air conditioner using combustible refrigerant in order to ensure that the fire risk is reduced to minimum.

11.1.2 Installation Safety

11.1.2.1 Installation Safety Principles

Site Safety



Open Flames Prohibited



Ventilation Necessary

Operation Safety

Open Flames Prohibited



Mind Static Electricity Must wear protective clothing and anti-static gloves Don't use mobile phone

Installation Safety

- Refrigerant Leak Detector
- Appropriate Installation Location



The left picture is the schematic diagram of a refrigerant leak detector.

Caution:

- The installation should be in a well-ventilated condition location.
- When you installing or maintaining an air conditioner using Refrigerant R32/R290, the location should be free fire from open or any other goods temperature higher than 370°C for R290/548°C for R32 which easily produces open fire include welding, smoking, drying oven.
- When installing an air conditioner of R32/R290, it is necessary to take appropriate anti-static measures such as wear anti-static clothing and gloves.
- It is necessary to choose the location for installation or maintenance where in the air inlets and outlets of the indoor and outdoor units should be not surrounded by obstacles or close to any heat source or combustible and/or explosive environment.
- If the indoor unit suffers refrigerant leak during the installation, it is necessary to immediately turn off the valve of the outdoor unit and all the personnel should go out till the refrigerant leaks completely for 15 minutes. If the product is damaged, it is a must to carry such damaged product back to the maintenance station and it is prohibited to weld the refrigerant pipe or conduct other operations on the user's site.
- It is necessary to choose the place where the inlet and outlet air of the indoor unit is even.
- It is necessary to avoid the places where there are other electrical products, power switch plugs and sockets, kitchen cabinet, bed, sofa and other valuables right under the lines on two sides of the indoor unit.

Special tools:

Tool Name	Requirement(s) for Use
Mini Vacuum Pump	It should be an explosion-proof vacuum pump; can ensure certain precision and its vacuum degree should be lower than 10Pa.
Filling Device	It should be a special explosion-proof filling device; have certain precision and its filling deviation should be less than 5g.
Leak Detector	It should be calibrated regularly; and its annual leak rate should not exceed 10g.
Concentration Detector	<p>A) The maintenance site should be equipped with a fixed-type combustible refrigerant concentration detector and connected to a safeguard alarm system; its error must be not more than 5%.</p> <p>B) The installation site should be equipped with a portable combustible refrigerant concentration detector which can realize two-level audible and visual alarm; its error must be not more than 10%.</p> <p>C) The concentration detectors should be calibrated regularly.</p> <p>D) It is necessary to check and confirm the functions before using the concentration detectors.</p>
Pressure Gauge	<p>A) The pressure gauges should be calibrated regularly.</p> <p>B) The pressure gauge used for Refrigerant 22 can be used for Refrigerants R290 and R161; the pressure gauge used for R410A can be used for Refrigerant 32.</p>
Fire Extinguisher	It is necessary to carry fire extinguisher(s) when installing and maintaining an air conditioner. On the maintenance site, there should be two or more kinds of dry powder, carbon dioxide and foam fire extinguishers and that such fire extinguishers should be placed at stipulated positions, with eye-catching labels and in handy places.

Maintenance**1. Inspections before maintenance.****1) Inspection of maintenance environment**

- There should be no leaked refrigerant in the room before operation.
- It is only allowed to operate in a room which meets the area requirement on the nameplate.
- It is necessary to make the room keep a continuous ventilation state at the time of maintenance.
- The room in the maintenance should be free from fire or welding, smoking, drying oven or any other goods temperature higher than 370°C (R290)/548°C (R32) which easily produces fire.
- During the maintenance, it is necessary to ensure that any person's any mobile phone or any electronic product with radiation in the room is powered off.
- The maintenance area should be equipped with a drying powder or carbon dioxide fire extinguisher and that such fire extinguisher can work.

2) Inspection of maintenance equipment

- Check the maintenance equipment is applicable to the refrigerant or not and it is only allowed to use the professional equipment recommended by the air conditioner manufacturer.
- Check the refrigerant leak detector whether has been calibrated. The set maximum alarm concentration of the refrigerant leak detector should not exceed 25% of the lower explosion limit (LEL), the refrigerant leak detector must be working during maintenance.

5) Inspection of air conditioner

- It is necessary to ensure that the air conditioner is in reliable ground connection before maintenance.

- Make sure powered supply to air conditioner is off. Before maintenance, it is necessary to cut off the power and discharge the capacitor power which used in the air conditioner. If it is a must to need the power supply during the maintenance, it is necessary to do ongoing leak detection at the most dangerous position/point in order to avoid potential danger.
- Check the warning labels on the air conditioner whether are in good condition. It is necessary to replace the damaged or smeared warning labels.

3. Leak inspection before maintenance

Before maintenance, use the leak detector or concentration detector (pump-type) recommended by the corresponding air conditioner manufacturer to check the air conditioner leak or not.

Warning

If leak may exist, it is necessary to move all the fire out from the site or extinguish fire and then immediately shut off the air conditioner. Meanwhile, it is necessary to make sure well-ventilated.

4. Safety principles during the maintenance

- At the time of maintenance, it is necessary to ensure well-ventilation on the site.
- It is prohibited to use fire including welding, smoking or other purposes. It is prohibited to use mobile phones.
- At the time of maintenance, if the relative humidity is lower than 40%, it is necessary to wear anti-static clothing and gloves.
- If the combustible refrigerant is found leaking during the maintenance, it is a must to immediately take forced ventilation and plug up the leak source.
- If the product is damaged to the extent that it is a must to open the refrigerating system for maintenance, it is a must to carry the product back to the maintenance station for maintenance. (It is prohibited to weld the refrigerant pipe and do other operations on the user's site.)
- It is necessary to return the air conditioner to its initial state if it is necessary to provide visiting service again due to lacking spare part during the maintenance. Moreover, it is a must to ensure that the refrigerating system is in secure ground connection.
- If it is necessary to provide visiting service with a refrigerant cylinder, the volume of refrigerant filled in such refrigerant cylinder should not exceed the stipulated value. When such cylinder is stored in a vehicle or placed on the installation or maintenance site, it is necessary to place it vertically and securely and keep it away from any place where there is any heat source, combustion source, radiation source or electrical equipment.

5. Requirements for the site of maintenance-station

- The maintenance location should be well-ventilated, with leveled ground and not in a basement.
- The maintenance should be divided into welding and non-welding areas both of which should be labeled clearly. There should be a certain safety distance between the two areas. The maintenance location should be equipped with ventilating and air-exhausting equipment to prevent the refrigerant gas from aggregating.
- It is necessary to provide some relevant instruments such as combustible refrigerant leak detector and have a leak detecting instrument management system. It is necessary to confirm that the leak detector can work normally before maintenance.
- The main power switch should be set outside the maintenance location and equipped with protective (explosion-proof) devices.
- It is necessary to provide firefighting devices such as dry powder or carbon dioxide fire extinguisher appropriate for extinguishing the electrical fire and keep such firefighting devices in a usable condition.
- Temporary wires and sockets are prohibited on the maintenance location.

6. Requirements for fill the refrigerants

- It is necessary to use nitrogen to clear the cyclic system before operating the refrigerating system and vacuumize the outdoor unit for 30 minutes at least.
- It is necessary to ensure that there is no cross contamination among different refrigerants when the refrigerant filling device is used. The total length including the refrigerant pipeline should be as short as possible in order to reduce the residual refrigerant inside such pipeline.
- It is necessary to vertically place the refrigerant storage tanks.
- It is necessary to ensure that the refrigerating system is in ground connection before the refrigerant is filled.
- When filling the refrigerant, it is necessary to fill corresponding type and volume of refrigerant as per the requirements on the product nameplate and overfilling is prohibited.
- It is necessary to seal the system in a safe sealing way after maintaining the refrigerating system.
- It is necessary to ensure that the maintenance will not damage or reduce the safety protection grade of the original system.

7. In-maintenance welding

- It is necessary to ensure that the maintenance location is well-ventilated.
- Before welding the outdoor unit, it is a must to confirm that the refrigerating system has been drained and the system has been cleaned and ensure that there has been no refrigerant in the outdoor unit.
- It is necessary to close the stop valve of the outdoor unit when using a welding gun to do the maintenance work such as cutting and welding.

8. Maintenance of electrical components

- It is necessary to use a special leak detector to check whether the maintained electrical parts location have the leak refrigerant.
- It is not allowed to refit, remove or cancel any component with the safety protection function after finishing the maintenance process.
- When maintaining the sealed parts, it is necessary to turn off the power of air conditioner before opening the sealing cover. When power supply is needed, it is necessary to do the ongoing leak detection at the most dangerous position in order to prevent potential danger.
- It is necessary to specially note that the maintenance of electrical components will not affect the replacement of protective cover.
- In order to ensure that the sealing function is not damaged after maintenance or the sealing material will not lose the effect of preventing the combustible gas leak due to ageing. So the substitute components should meet the requirements recommended by the air conditioner manufacturer.

Warning

Before doing the trial operation after finishing the maintenance, it is a must to use a practical leak detector to inspect the leakage and reliability of ground connection in order to ensure that no refrigerant leakage and reliable ground connection.

The refrigerant storage tanks should be separately placed in a well-ventilated place at the temperature ranging from -10°C to 50°C and label them with warning labels.

9. Emergency Accident Handling

A maintenance station should establish emergency handling plans. It is necessary to take appropriate precautionary measures in work. For example, it is prohibited to enter the location with any kindling material and it is prohibited to wear clothing or shoes which easily produce static.

Handling suggestions when a large amount of combustible refrigerant leaks:

- It is necessary to immediately operate the ventilating equipment while cutting off other power supply and evacuating the affected personnel urgently from the location.
- It is necessary to inform near residents of evacuating for over 20 meters from the location, make

an alarm call, set the emergency area and prohibit irrelevant personnel and vehicles from approaching.

- The professional firefighters should wear anti-static clothing to handle the emergency on the site and cut off the source of leak.
- It is necessary to use nitrogen for blowing the site, especially the low-lying positions, clear away the residual combustible refrigerant gas from any area nearby and surrounding the leak point and use a handheld detector for detection and not clear the alarm until the concentration of refrigerant is zero.