

Floor-Standing Type(E Series)

Model: MFE-60CE, MFE-60AE

Part 1. Product Features

With a spiral shape, the computer-aided simulation designed air passage system can efficiently reduce noise.

The “Soft touch” membrane switch allows more comfortable and convenient operation.

It is convenient to operate the air-conditioner as it has both manual control and remote control functions.

The air-conditioner starts and operates at an ultra-low voltage.

Part 2. Specification

R22

Model			MFE-60CE	MFE-60AE
Power supply		Ph-V-Hz	3Ph / 380V~ / 50Hz	3Ph / 380V~ / 50Hz
Cooling	Capacity	Btu/h	60000	60000
	Input	W	6300	6300
	Rated current	A	11.0	11.0
	EER	Btu/w.h	9.5	9.5
Heating	Capacity	Btu/h	—	60500+14500
	Input	W	—	6300+4200
	Rated current	A	—	11.0+7.3
	COP	Btu/w.h	—	9.6
Moisture Removal		L/h	5.5	5.5
Max. input consumption		W	7550	7550+4200
Max. current		A	13.5	13.5+7.3
Starting current		A	69	110
Compressor	Model		C-SB453H8A	ZR72KC-TFD-522
	Type		Scroll	Scroll
	Brand		SANYO(DaLian)	Copeland
	Capacity	Btu/h	60560	59300
	Input	W	5430	5248
	Rated current(RLA)	A	9.3	9.2
	Locked rotor Amp(LRA)	A	74	74
	Thermal protector		Internal	Internal
	Capacitor	uF	—	—
	Refrigerant oil	ml	1700	1774
Indoor fan motor	Model		YDK160-8-L / YDK160-8-LD	YDK160-8-L / YDK160-8-LD
	Brand		Xijiao / Deshun	Xijiao / Deshun
	Input	W	383 /330 /285	383 /330 /285
	Capacitor	uF	9.0uF/≥450VAC	9.0uF/≥450VAC
	Speed(hi/mi/lo)	r/min	600/530/460	600/530/460
Indoor coil	Number of rows		3	3
	Tube pitch(a)x row pitch(b)	mm	25.4*22	25.4*22
	Fin spacing	mm	1.5	1.5
	Fin type (code)		Hydrophilic aluminium	Hydrophilic aluminium
	Tube outside dia.and type	mm	Φ9.53, innergroove tube	Φ9.53, innergroove tube
	Coil length x height x width	mm	482*813*66	482*813*66
	Number of circuits		10	10
Indoor air flow (Hi/Mi/Lo)		m3/h	2200/1940/1690	2200/1940/1690

Indoor noise level (Hi/Mi/Lo)		dB(A)	53/50/47	53/50/47
Indoor unit	Dimension (W*H*D)	mm	600*1900*358	600*1900*358
	Packing (W*H*D)	mm	685*1985*450	685*1985*450
	Net/Gross weight	kg	65/75	65/75
Outdoor fan motor	Model		YDK65-6-WL; YDK65-6F-WL	YDK65-6-WL; YDK65-6F-WL
	Brand		Welling	Welling
	Input	W	148+138	148+138
	Capacitor	uF	4.0uF/≥450VAC *2	4.0uF/≥450VAC *2
	Speed	r/min	800	800
Outdoor coil	Number of rows		2	2
	Tube pitch(a)x row pitch(b)	mm	25.4*22	25.4*22
	Fin spacing	mm	1.5	1.5
	Fin type (code)		Unhydrophilic aluminium	Unhydrophilic aluminium
	Tube outside dia.and type	mm	Φ9.53,innergroove tube	Φ9.53,innergroove tube
	Coil length x height x width	mm	924*1220*44	924*1220*44
	Number of circuits		8	8
Outdoor air flow		m ³ /h	5220	5220
Outdoor noise level		dB(A)	58	58
Outdoor unit	Dimension(W*H*D)	mm	940*1245*360	940*1245*360
	Packing (W*H*D)	mm	1020*1370*435	1020*1370*435
	Net/Gross weight	kg	114/129	116/131
Refrigerant type R22		g	R22/4400g	R22/5000g
Design pressure		MPa	2.6	2.6
Refrigerant piping	Liquid side/ Gas side	mm(inch)	12.7/19(1/2"-3/4")	12.7/19(1/2"-3/4")
	Max. refrigerant pipe length	m	30	30
	Max. difference in level	m	10	10
Connection wiring			No	No
Plug type			No	No
Controller			Remote	Remote
Operation temp		°C	17~30	17~30
Ambient temp		°C	18~45	—7~45
Application area		m ²	100-130	100-130
Qty' per 20' /40' /40'HQ		set	20/43/48	20/43/48

Notes: 1. Nominal cooling capacities are based on the following conditions:

Indoor temp: 27°CDB, 19°CWB; Outdoor temp: 35°CDB;

2. Nominal heating capacities are based on the following conditions:

Indoor temp: 20°CDB; Outdoor temp: 7°CDB, 6°CWB;

3. Actual noise level may differ, depending on the room structure, etc, since these noise values are from an anechoic room.

Part 3. Circuit principles

3.1 Technical data

The temperatures for the start-up and shutdown of the compressor during cooling:

Compressor	Set at 17°C	Set at 25°C	Set at 30°C
ON	18 ± 1.5°C	26 ± 1.5°C	31 ± 1.5°C
OFF	16 ± 1.5°C	24 ± 1.5°C	29 ± 1.5°C
DIFF	1~2°C	1~2°C	1~2°C

Anti-low-temperature control accuracy (during cooling)

OFF (protection temperature): $-0 \pm 1.5^{\circ}\text{C}$

ON (resuming temperature): $10 \pm 1.5^{\circ}\text{C}$

3.2. Description of functions

3.2.1 Testing of operation function

Press the “Testing Operation” key at the same time when turning on the air-conditioner, the air-conditioner will go into the testing operation immediately according to the current settings (mode, air speed, swing) for one hour independent of the set temperature.

During the period of testing operation, indication of “Testing” is added and others (except the time clock) remain unchanged. The air-conditioner will not respond to any other keys except the “ON/OFF” key, “Transfer” key, and “Testing Operation” key.

After turning the air-conditioner into testing operation, cancel the setting and indication of timing, then press “Transfer” key to switch over the indications of time and the temperatures at three temperature-responding points. The details are as follows:

Press “Transfer” key for the first time to indicate the temperature at the first temperature-responding point.

Press “Transfer” key for the second time to indicate the temperature at the second temperature-responding point.

Press “Transfer” key for the third time to indicate the temperature at the third temperature-responding point.

Press “Transfer” key for the fourth time to indicate time.

When the reaction temperature is being indicated, the indication of time will be resumed if the “Transfer” key has not been pressed for 10 seconds. The indication of temperatures makes use of time indication sections. The forms are as follows:

Temperature-responding points	Names of temperature-responding points	Contents of indication	
		Time sections	Minute sections
T ₁	Indoor returning air	T ₁	Temperature
T ₂	Indoor evaporator	T ₂	Temperature
T ₃	Outdoor pipe temperature	T ₃	Temperature

Notes: ① “:” means no indication.

② The range of temperature testing is -19°C to $+70^{\circ}\text{C}$. The positive and negative indications of temperature: “-“ means negative and “+” positive.

③ If, after the air-conditioner goes into testing operation, the “ON/OFF” key is pressed, the air-conditioner will end the testing operation and return to waiting condition.

When the “Testing Operation” key is pressed again, the testing operation will be cancelled and the air-conditioner will resume its original normally set operation. Otherwise, after the testing operation ends automatically one hour later, the air-conditioner will resume its original normally set operation.

3.2.2 Trouble and protection indication functions

- A. Under a certain protection condition, the system will first indicate the trouble code for 5 seconds in the time section, and then change to normal indication. In the testing condition, when the “Transfer” key is pressed, the following will be indicated successively: Time-T1-T2-T3-Protection code-Time clock.... Other indications and responses are normal.
- B. Under a certain trouble condition, the system will first indicate the trouble code for 5 seconds in the time section and indicate “Checking” meanwhile. In addition to the indication of the original operation condition, the system will indicate “Checking”, and then switch over to time clock indication (others remain unchanged);
Under the testing condition, when the “Transfer” key is pressed, the following will be indicated successively: Time-T1-T2-T3-Trouble code-Time clock.... Other indications are normal.
During a trouble period, the air-conditioner will not respond to any other keys except the “ON/OFF” key, the “Testing” key and the “Transfer” key. After the trouble is eliminated, the air-conditioner will operate normally.
- C. Ten seconds after the trouble or protection is eliminated, the trouble or protection condition will be eliminated and normal indication and operation condition resumed.
- D. Codes of trouble and protection:

Table 2

Types	Contents	Codes
Protection	Overload of compressor (reserved)	P02
Protection	Too low a temperature of indoor evaporator (cooling)	P03
Trouble	Open-circuit and short-circuit of temperature sensors	E01
Trouble	Over current of compressor (reserved)	E02
Trouble	Under-current of compressor (first power-on checking) (reserved)	E03
Trouble	Protection of outdoor unit	E04

Notes: LED flashes at a frequency of 2 Hz during the trouble period, and it gives normal indication during the protection period.

Waiting indication:

If operation condition is not set for the air-conditioner, there will be no indication for operation mode and the liquid crystal display will indicate only Waiting and Time Clock.

3.2.3 Protection function

3.2.3.1 Basic protection function

Protection for the safe start-up of the compressor

When power is switched on, the compressor does not need 3-minute protection in its first start-up. After starting the compressor, when you want to start it again under any mode or restart it after shutdown, you have to wait for 3 minutes before starting it. The compressor will automatically stop during the switching-over between cooling and heating, but it will not stop during defrosting.

No matter in what situation, after the start-up of the compressor,

- 1) If the compressor is only in cooling mode, the outdoor fan will be turned off when the current is 1.5 times higher than the rated current. The protection condition is P02 and others remain unchanged.

After the shutdown of the outdoor fan, if the current of the compressor is 1.3 times lower than the rated current, the outdoor fan will be turned on again and the normal operation is resumed.

- 2) If the current is 2 times higher than the rated current for a period of 5 minutes, the compressor will be shut down and others remain unchanged.

The compressor will restart 3 minutes later.

- 3) Over-current refers to a situation in which the current is 2 times higher than the rated current for 3 seconds. During the period of over-current, the whole air-conditioner will be shut down and code E02 will be indicated and LED will flash. The compressor will restart 3 minutes later.

3.2.3.2 Protection functions of the outdoor unit

A. Protection condition

High port level

B. Protection actions

When protection occurs, the indoor and outdoor units will be shut down immediately, the output will be controlled, and LED will flash rapidly and indicate the protection and trouble codes (see 3.2.14 for details)

C. Resuming to normal condition

When the port level is low, the compressor will resume to its original operation mode.

3.2.3.3 High temperature protection function of the condenser

During cooling, the compressor will be shut down if $T3 \geq 65^{\circ}\text{C}$ and its operation will be allowed if $T3 < 60^{\circ}\text{C}$.

Other functions:

3.2.4 Self-diagnosis function of the system

The system can carry out simple self-diagnoses.

For example, open-circuit and short-circuit checking of pipe temperature (during heating, no open-circuit checking of T2 will be performed; when in cooling-only mode or out-defrosting mode, no open-circuit and short-circuit checking of T3 will be performed) and various protection checking.

3.2.5 4-air speed of the indoor unit

When high fan is set, the indoor fan will operate at high speed.

When middle fan is set, the indoor fan will operate at middle speed (3-second high speed quick start-up).

When low fan is set, the indoor fan will operate at low speed (3-second high speed quick start-up).

When auto fan is set, the indoor air speed is as follows (under ventilation mode, the auto fan is fixed at middle speed):

Under cooling mode: ambient temperature – set temperature $\geq 4^{\circ}\text{C}$ High fan

$2^{\circ}\text{C} \leq$ ambient temperature – set temperature $< 4^{\circ}\text{C}$ Middle fan

ambient temperature – set temperature $< 2^{\circ}\text{C}$ Low fan

Under heating mode:

ambient temperature – set temperature $\geq 4^{\circ}\text{C}$ High fan

$2^{\circ}\text{C} \leq$ set temperature – ambient temperature $< 4^{\circ}\text{C}$ Middle fan

set temperature – ambient temperature $< 2^{\circ}\text{C}$ Low fan

**Return difference: 1°C

3.2.6 Compatibility function

Cooling and heating is compatible with cooling only.

Low port level is the working mode for cooling and heating, and high port level is the working mode for cooling only.

Under cooling only mode, when handling the auto mode, the air-conditioner will just have the functions of cooling and ventilation only.

3.2.7 Quick checking function

A. Selection of quick checking working mode

When the power-on judging port is at low level, the mode is quick checking mode; when the power-on judging port is at high level, the mode is normal working mode.

B. Under quick checking working mode

First step: The indoor main board output sends out a one-second-wide high level in turns;

Second step: The air-conditioner goes into the normal waiting condition, but when the compressor starts, there will be no three-minute time delay protection.

3.2.8 Selection of defrosting mode

When the port is at low level, the outdoor defrosting mode will be selected. The indoor defrosting timer does not count the time and there is no defrosting action.

When the port is at high level, the indoor defrosting mode will be selected. The indoor defrosting timer works according to item (3).

3.2.9 Input of outdoor defrosting condition

When the port is at high level, the outdoor defrosting works and when the port is at low level, there is no defrost.

When outdoor defrosting mode is selected and outdoor defrosting works, the indoor fan will be turned off (during heating, it is in anti-cold air operation mode).

3.2.10 Output of one-way solenoid valve

Under heating operation, if $T1 \geq -3^{\circ}\text{C}$, the one-way solenoid valve will close, so that the air-conditioner can perform normal heating; and if $T2 \leq -5^{\circ}\text{C}$, power will be switched off, resulting in the switching-off of the one-way solenoid valve, so that the air-conditioner can adjust the flow rate of the capillary.

3.2.11 An outdoor fan added to 5HP cabinet-type air-conditioner

During cooling, when $T3 \geq 33^{\circ}\text{C}$, two fans will operate simultaneously.

When $T3 \leq 30^{\circ}\text{C}$, fan 1 (upper fan) will operate.

During heating, when $T4 \leq 16^{\circ}\text{C}$, two fans will operate simultaneously.

When $T4 \geq 18^{\circ}\text{C}$, fan 2 (lower fan) will operate.

3.2.12 Output of the light-emitting strip installed in the air outlet.

The light-emitting strip emits green light during cooling, dehumidifying and ventilation, and it emits no light during shutdown.

The light-emitting strip will emit green light when power is switched on for the first time and it will flash when the air-conditioner has trouble.

3.2.13 Locking key

After setting the operation mode, you can lock the current operation mode.

Pressing this key for the first time will lock the input of other keys of the air-conditioner; pressing this key for the second time will allow the input of other keys; and pressing this key for the third time will again lock the input of other keys of the air-conditioner. You can switch over these two conditions repeatedly.

3.2.14 LEDs for the indication of outdoor trouble

In normal operation, LEDs emit no light and they will flash at a frequency of 5 Hz when trouble occurs. Their codes are listed in the following table:

Table 3

Type	Contents	LED1	LED2	LED3	Indication
Trouble	Phase sequence	Flash	Off	Off	E04
Trouble	Lack of phase	Flash	Off	Off	E04
Trouble	Protection of high and low pressure	Flash	Off	Off	E04
Trouble	Overload of current	Off	Off	Flash	E04
Trouble	Open-circuit and short-circuit trouble of T3	Off	Flash	Flash	E04
Trouble	Open-circuit and short-circuit trouble of T4	Off	Flash	Off	E04
Trouble	High temperature protection of condenser	Flash	Flash	Flash	E04

3.2.15 Outdoor temperature T4

Cooling only air-conditioner: No outdoor temperature T4.

Cooling and heating air-conditioner: Three-phase model has outdoor temperature T4.

3.2.16 High pressure

3.3 Others

3.3.1 Unless timing is set, shutting down the air-conditioner under any mode will turn it into normal waiting condition (when timing is set, refer to the “Handling of timing” for details of shutdown) and the display will have no other indications than those for Time Clock and “Waiting” (LED flashes).

3.3.2 Types of temperature sensors

Ambient temperature sensor TSE-103 [R(25)=10k, B(0,50)=4100, Appearance D5×20]

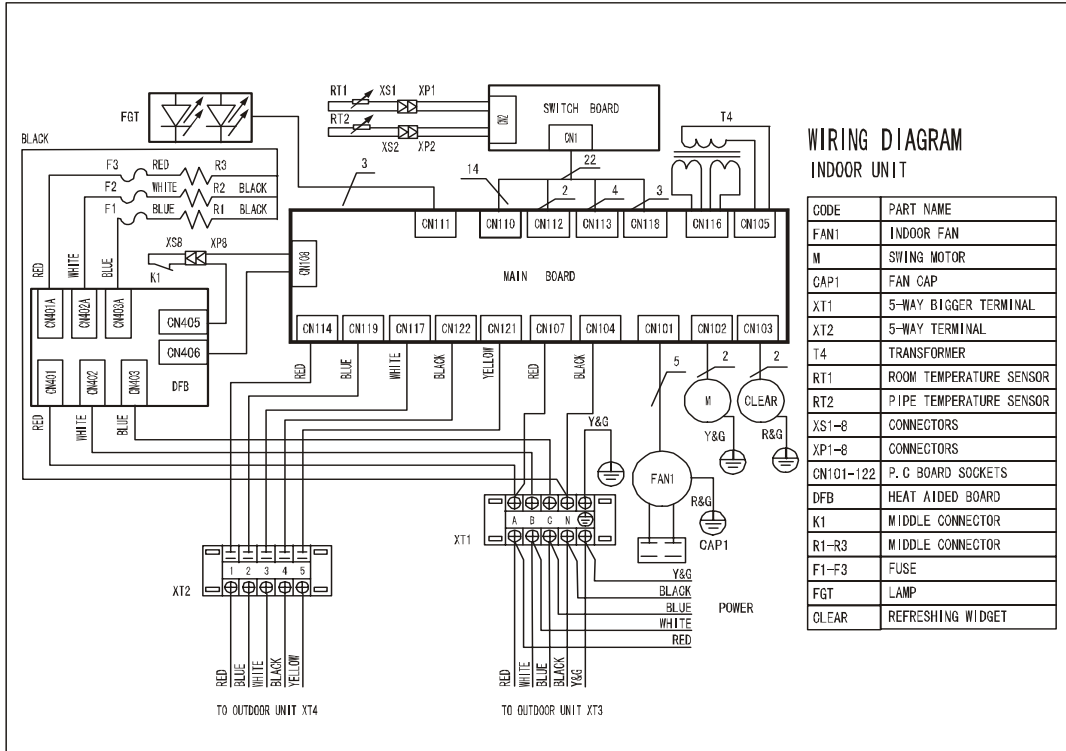
Evaporator sensor TSE-103 [R(25)=10k, B(0,50)=4100, Appearance D6×20]

3.3.3 Ambient temperature sensors will be checked up about every 5 seconds. When the indoor evaporator is in cooling, the outdoor temperature sensor will be checked up every 1 minute and when the indoor evaporator is in heating, the outdoor temperature sensor will be checked up every 1 second.

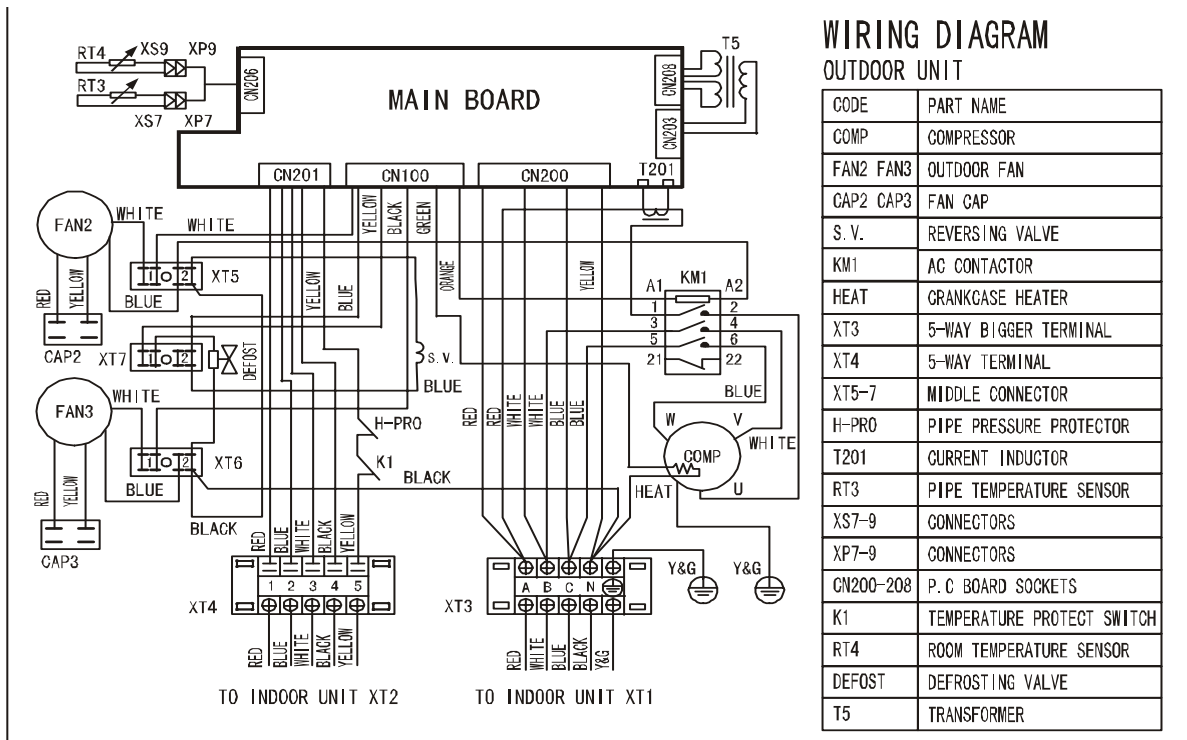
3.3.4 All of the temperature judging or controlling points have a return difference of 1°C, if not pointed out particularly.

Part 4 .Wiring Diagram

1. MFE-60AE Indoor unit

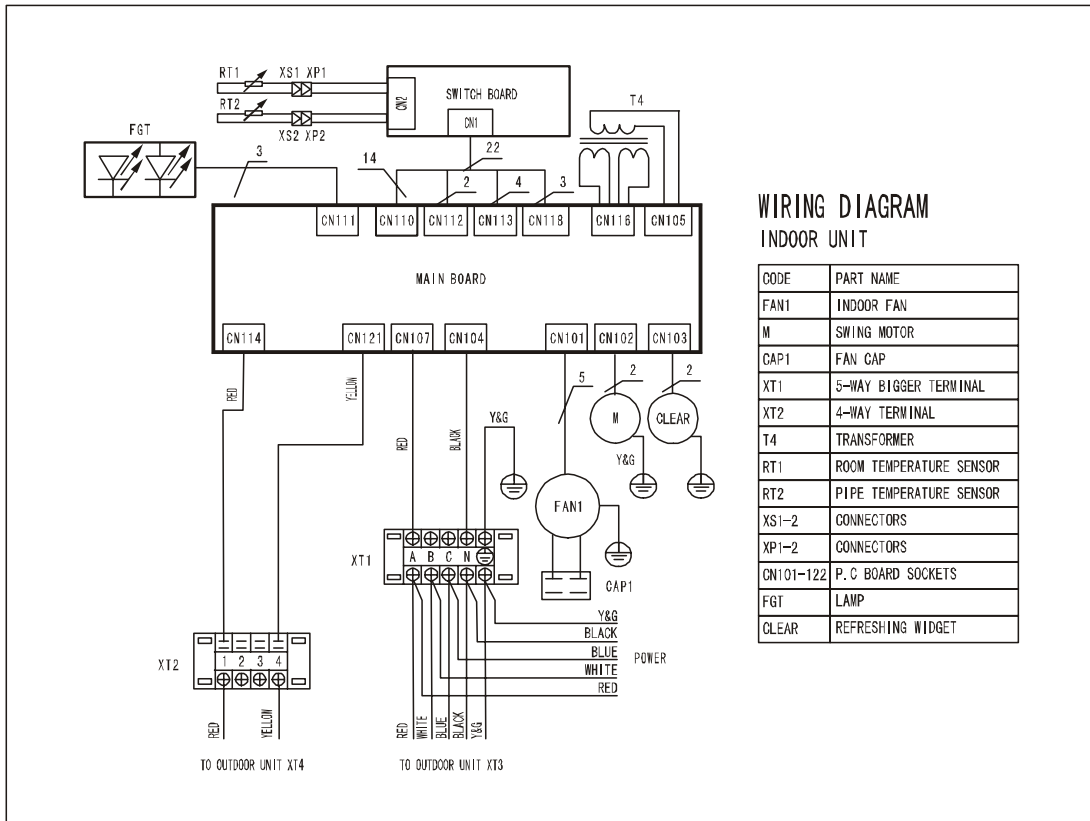


Outdoor unit

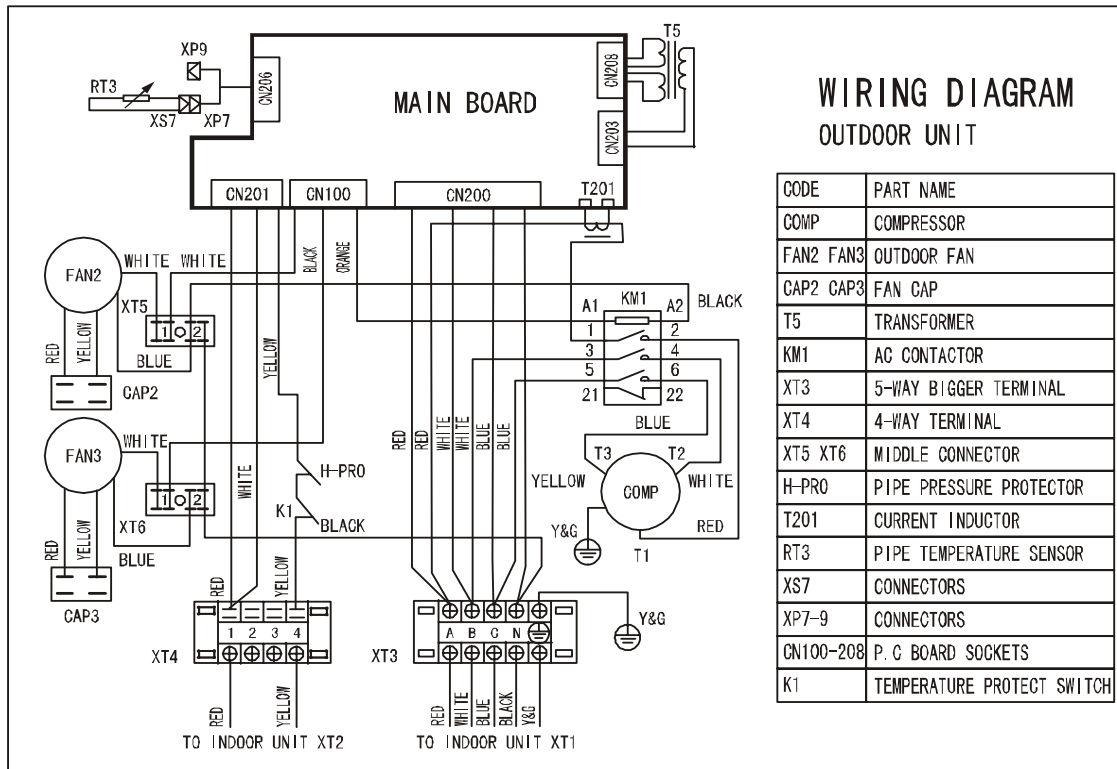


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Indoor unit



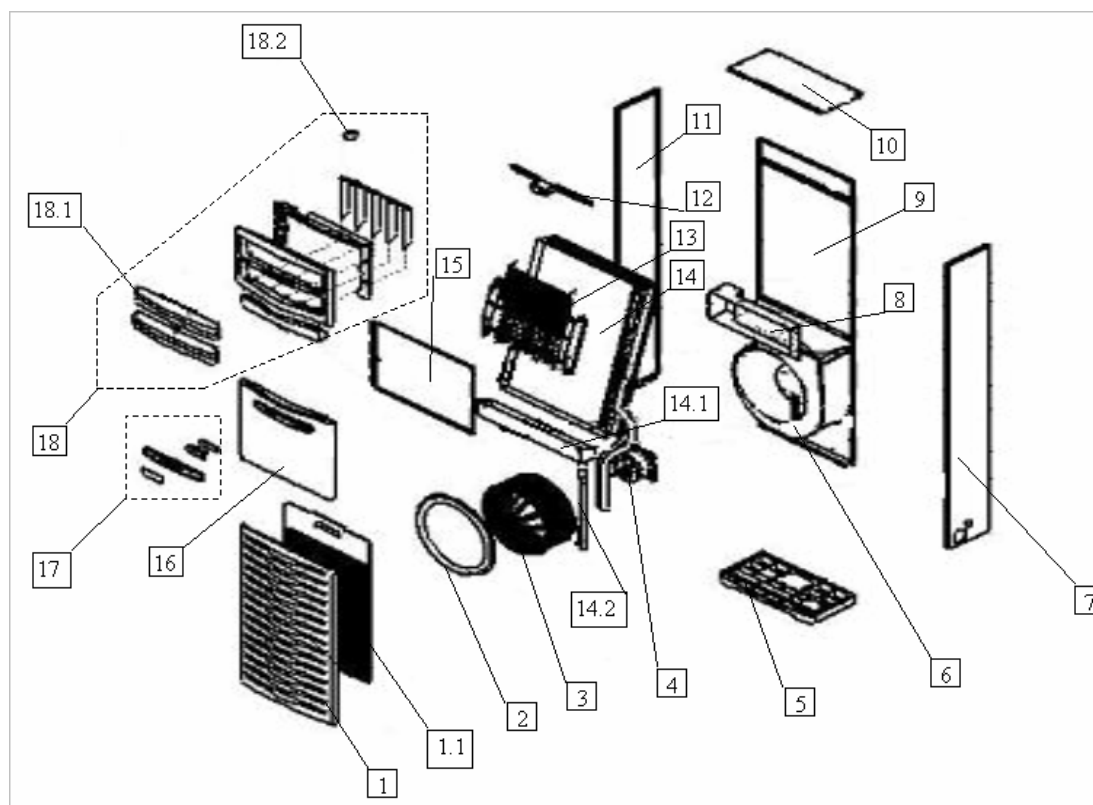
Outdoor unit



Part 5 Exploded view

1. MFE-60AE

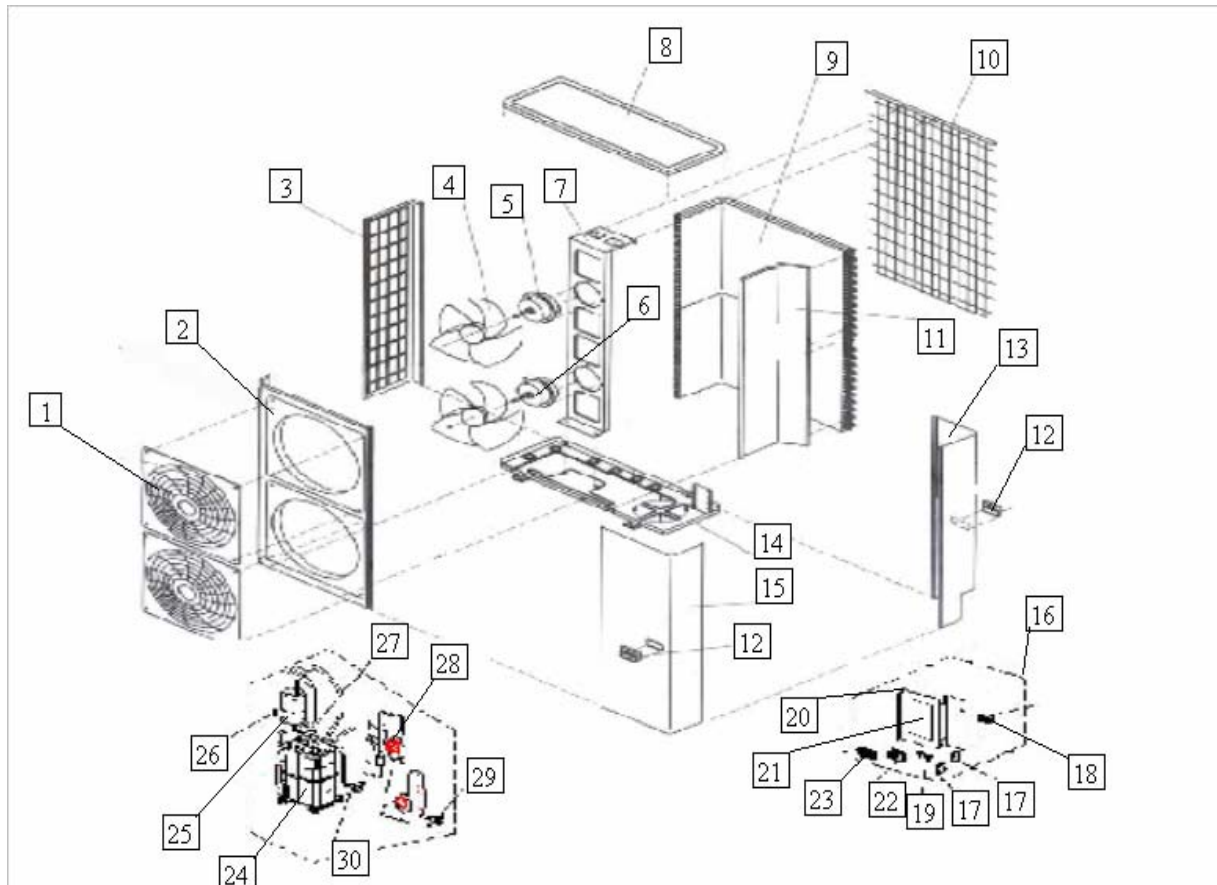
Indoor unit



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Grille	1	12.3	Negative ion engender	1
1.1	Air filter	1	13	Electric heater	
2	Wind inlet guide	1	14	Evaporator assy	1
3	Centrifugal fan	1	14.1	Water collector	1
4	Fan motor	1	14.2	Drain pipe	1
5	Chassis	1	14.3	Inlet pipe for evaporator	1
6	Volute Shell	1	14.4	Outlet pipe for evaporator	1
7	Right cover	1	15	Front cover	1
8	Electric box part	1	16	Front panel	1
8.1	Main control board	1	17	Display box, Ass'y	1
8.2	Electric heating control board	1	17.7	Display box cover	1
8.3	Wire joint I, 5p	1	17.2	LCD displayer	1
8.4	Wire joint II, 5p	1	18	Air out frame assy	1
8.5	Wire clamp	1	18.1	Horizontal louver	6
8.6	Installing box for main board	1	18.2	Louver motor	1
8.7	E-Parts Box	1	18.3	Louver holder	4
8.8	Fan motor capacitor	1	18.4	Vertical louver I	2
8.9	Transformer	1	18.5	Vertical louver II	2
9	Rear cover	1	18.6	Vertical louver III	2

10	Top cover	1	19	E-part box cover	1
11	Left cover	1	20	Right front board for evaporator	1
12	Negative ion engender assy	1	21	Indoor temp sensor	1
12.1	Holder, negative ion engender	1	22	Evaporator temp sensor	1
12.2	Box, negative ion engender	1			

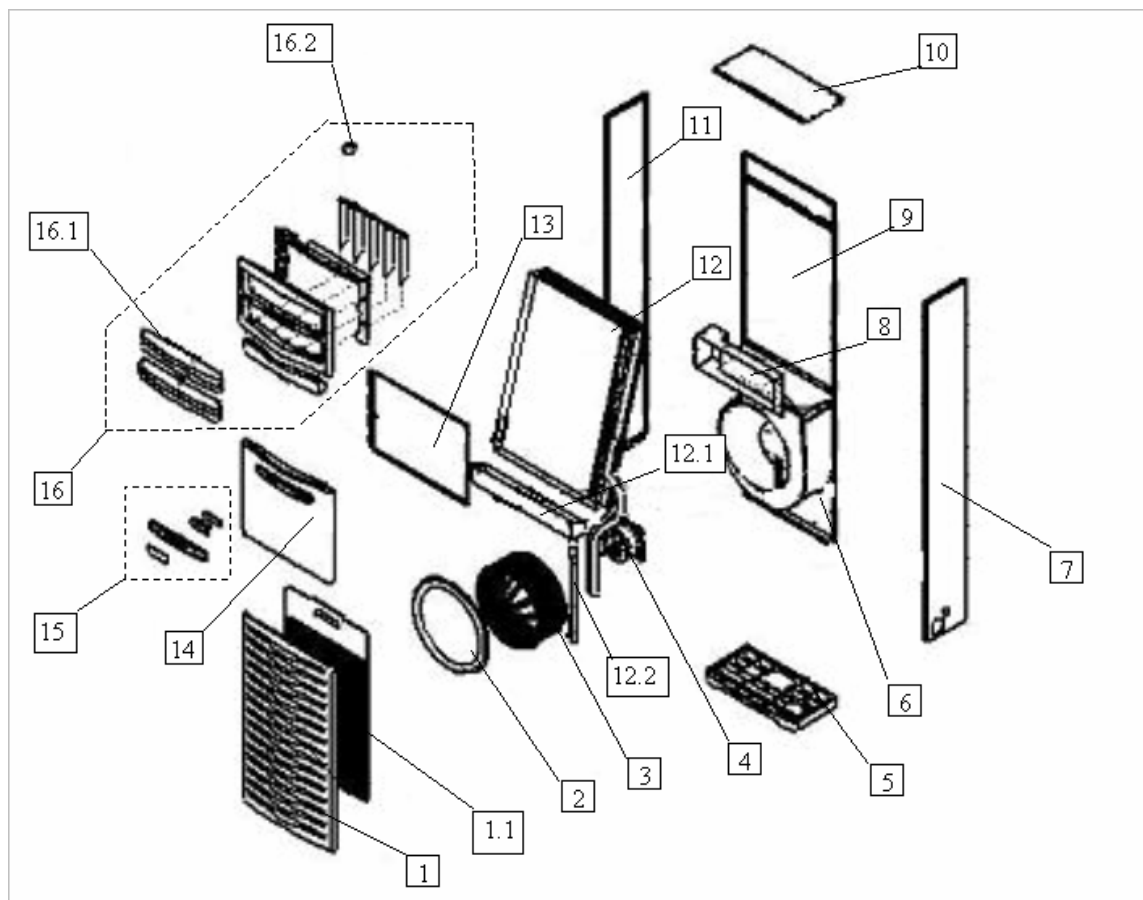
Outdoor unit



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Front net	2	19	Contactora	1
2	Front clapboard	1	20	Installation board for E-parts	1
3	Left clapboard	1	21	Main control board	1
4	Propeller fan	2		E-parts installation box	1
5	Fan Motor	1	22	Wire joint I , 5p	1
6	Fan Motor, down	1	23	Wire joint II, 5p	1
7	Holder for fan motor	1	24	Compressor	1
8	Cover	1		Compressor heater belt	1
9	Condenser	1	25	Refrigerant container	1
10	Rear Net	1	26	Fixing clamp, container	1
11	Separating board	1	27	4-Ways valve	1
12	Handle	2	28	Capillary pipe	1
13	Rear right clapboard	1	29	Liquid pipe valve	1
14	Chassis	1	30	Gas pipe valve	1
15	Front right clapboard	1	31	Outdoor temp sensor	1
16	Electric parts assy	1	32	Condenser temp sensor	1
17	Fan motor capacitor	2	33	Discharge temp sensor	1
18	Wire joint for multiplexer	1	34	Transformer	1

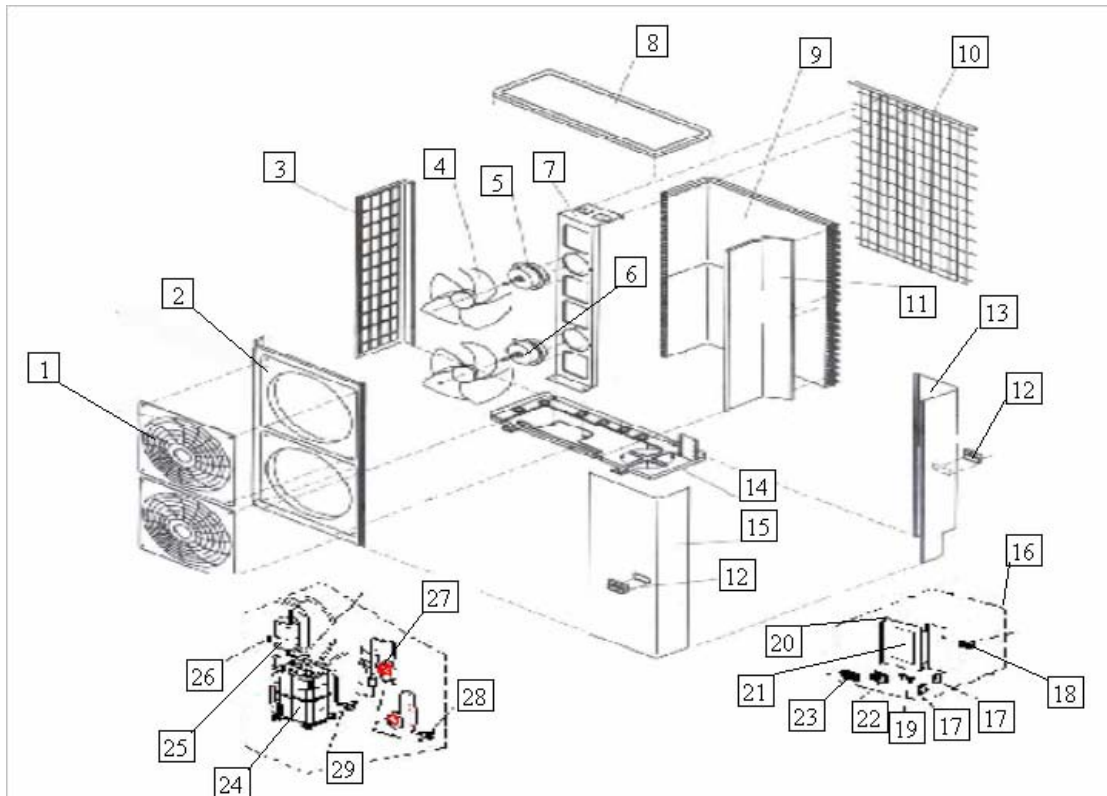
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Indoor unit



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Grille	1	12.3	Inlet pipe for evaporator	1
1.1	Air filter	1	12.4	Outlet pipe for evaporator	1
2	Wind inlet guide	1	13	Front cover	1
3	Centrifugal fan	1	14	Front panel	1
4	Fan motor	1	15	Display box, Ass'y	1
5	Chassis	1	15.1	Display box cover	1
6	Volute Shell	1	15.2	LCD displayer	1
7	Right cover	1	16	Air out frame assy	1
8	Electric box part	1	16.1	Horizontal louver	6
8.1	Main control board	1	16.2	Louver motor	1
8.2	Wire joint I, 5p	1	16.3	Louver holder	4
8.3	Wire joint II, 4p	1	16.4	Vertical louver I	2
8.4	Wire clamp	1	16.5	Vertical louver II	2
8.5	Installing box for main board	1	16.6	Vertical louver III	2
8.6	E-Parts Box	1	17	E-part box cover	1
8.7	Fan motor capacitor	1	18	Right front board for evaporator	1
8.8	Transformer	1	19	Indoor temp sensor	1
9	Rear cover	1	20	Evaporator temp sensor	1
10	Top cover	1	12.3	Inlet pipe for evaporator	1
11	Left cover	1	12.4	Outlet pipe for evaporator	1
12	Evaporator assy	1			

Outdoor unit



No.	Part Name	Quantity	No.	Part Name	Quantity
1	Front net	2	18	Wire joint for multiplexer	2
2	Front clashboard	1	19	Contactor	1
3	Left clashboard	1	20	Installation board for E-parts	1
4	Propeller fan	2	21	Main control board	1
5	Fan Motor	1	22	E-parts installation box	1
6	Fan Motor, down	1	23	Wire joint I , 5p	1
7	Holder for fan motor	1	24	Wire joint II, 4p	1
8	Cover	1	25	Compressor	1
9	Condenser	1	26	Refrigerant container	1
10	Rear Net	1	27	Fixing clamp, container	1
11	Separating board	1	28	Capillary pipe	1
12	Handle	2	29	Liquid pipe valve	1
13	Rear right clashboard	1	30	Gas pipe valve	1
14	Chassis	1	31	Condenser pipe temp sensor	1
15	Front right clashboard	1	32	Discharge temp sensor	1
16	Electric parts assy	1	33	Transformer	1
17	Fan motor capacitor	2			