ComfortStar®
Orbitseries

DC_INVERTER_SYSTEM
TECHNICAL MANUAL

CC-MAH

380V/50~60Hz/3

CONDENSING UNITS

Revision V 2303

AHRI CERTIFIED® www.ahridirectory.org
Unitary Small AC
AHRI Standard 210/240
Certification applies only when the complete system is listed with AHRI.

c UL us LISTED

Model Numbers:

CC-MAH005-3PS1,CC-MAH006-3PS1,CC-MAH007-3PS1,CC-MAH008-3PS1,CC-MAH009-3PS1
CC-MAH010-3PS1,CC-MAH011-3PS1,CC-MAH012-3PS1,CC-MAH013-3PS1

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WARNING

- Installation MUST conform with local building codes or, in the absence of local codes, with the National Electrical Code NFPA70/ANSI C1-1993 or current edition and Canadian Electrical Code Part1 CSA C.22.1.
- The information contained in the manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments
- Installation or repairs made by unqualified persons can result in hazards to you and others.
- Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury and/or death.

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Part A.General information

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2. Outdoor units

1. CC-MAH introduction

1.1 Modules Range

9 models: 12.5kW, 14kW, 16kW, 18kW, 20kW, 22.4kW, 26kW, 28kW, 33.5kW.

12.5kW, 14kW, 16kW, 18kW

20kW, 22.4kW

26kW, 28kW, 33.5kW

1.2 Several core technologies make system high efficiency

1.2.1 High Efficiency DC inverter compressor

- High pressure chamber
  - Has small suction refrigerant super heat, refrigerant volume efficiency is high
  - Has large refrigerant discharge buffer volume, Low vibration and noise
- Neodymium permanent magnet rotor, has powerful magnetic force, large torque and high efficiency
- Concentrated winding, improving low frequency efficiency

1.2.2 High Efficiency DC motor

- High efficiency DC fan motor is from well-known brand
- Low noise and high efficiency because of high-density wire winding engineering
- Brushless with built-in sensor

1.2.3 Stepless Control

- DC fan motor can be stepless controlled by outdoor PCB according to system's operating temperature. And it is able to reduce the energy consumption and maintain the system in the best performance.

1.2.4 180˚ Sine Waveform Control

- The perfect combination of 180˚ Sine waveform rotor frequency drive control technology and excellent IPM inverters reduces the reactive loss of motor-driven, increases motor efficiency by 12%.

1.2.5 CCT Inner-grooved Tube

- CCT (Continuous Cooling Transformation) inner-grooved copper tube has high thermometric conductivity. Its inner-grooved fins break the refrigerant flow boundary layer to enhance refrigerant disturbance to increase heat-exchanging efficiency.

1.2.6 2-in-1 Refrigerant Flow Path Design

- Thanks to the 2-in-1 refrigerant flow path design, the liquid refrigerant volume proportion in the condenser outlet is highly increased, so the indoor unit's will produce more heat (or cool).

1.2.7 Super cooling Flow Path Design.

- Super cooling flow path design, separates the refrigerant inlet and outlet, increase the super cooling degree, reduce the effect of high temperature inlet gas refrigerant to low temperature outlet liquid refrigerant, therefore, the system efficiency will be greatly increased.

1.2.8 Cross Flow Fins.

- Has low air resistance and great heat transfer coefficient
- Frosting improved, frost on the heat exchanger will be well-distributed, easy for defrosting.

1.2.9 Optimized internal structure.

- Thanks to the optimization pipeline design, 5% pressure drop is reduced.
- EER and COP increase, because of evaporating temperature increase and compressor work decrease.

1.2.10 Refrigerant cooling design for electric control.

- Integrated electronic control board to reduce the probability of failure.
- Refrigerant cooling function can make sure the electric control part work in the best condition.

1.3 Benefits for users

1.3.1 Excellent in EER and COP

- Thanks to DC devices (compressor and motor), piping optimization design and new control logic, system's EER and COP are observably increase.

1.3.2 Outstanding comfort ability

- CC-MAH system have excellent cooling & heating performance, thanks to the high efficiency DC fan motor, DC compressor and optimized refrigerant flow control logic.
- Precisely room temperature control by adopting large pulse EXV. Indoor temperature fluctuation can be maintained within 0.5 ˚C, offers outstanding comfort ability.

1.3.3 Wide operation range.

- Cooling operating temperature is up to 55˚C, suitable for the hot region.
- Heating operating temperature is down to -20˚C. In the cold winter, CC-MAH system can stably produce heat.

1.3.4 6 important technology to reduce noise

- Brushless DC motor
- Streamline air duct design
- Anti-vibration fan blade
- 180˚ Sine Waveform Control
- Circuit Silencer
- Low noise compressor

1.3.5 Fan reversal protection

- In standby mode, if the outdoor fan motor is rotating in opposite direction at a high speed by the wind or other natural factors, the unit can’t start so as to keep the fan motor from broken down. It will start when the fan motor speed slow down.

1.3.6 Intelligent defrosting program

- Program starts only when unit needs to. Whereas conventional unit's defrosting timing & duration is fixed, causing fluctuations in temperature and personal comfort.

1.3.7 Flexible for all kinds of rooms

- 11 types &68 models of indoor units, suitable for all kinds of rooms.

1.3.8 Environment friendly

- Refrigerant R410A (HFC), low carbon footprint, no harm to Ozone.

1.4 Benefits for installers

1.4.1 New wired controller

- Bidirectional communication. Indoor unit's operating parameters (error code, temperature, address) can be inquired and displayed on the controller.

- Compact design
- 3" screen with white background light
- Timer function
- Electrical standard dimensions
- User can check the error code and inquiry unit status very easy, safe and convenient.

1.4.2 Addressing methods

- 2 addressing methods:
- Automatically addressing: system will distribute address to indoor unit automatically
- Manually setting by wireless remote controller or wired controller (available for some indoor units)
- Automatic addressing will reduce artificial faults by 35% and 5% manual works.
    - 54% system failure was caused by communication faults.
    - 65% communication faults were caused by address problems.
    - Most of the address problems were: address setting forgotten, wrong settings, address repeat.

1.4.3 LED display on the PCB

- LED display on the PCB, it can show system's operation status and error codes.

1.4.4 Oil control technology

- Core oil control technology makes system safety & reliable.

1.4.5 Heavy duty coating

- The new application method of the anti-corrosion coating significantly improved thickness.
- Special coating can be customized to prevent rusting and spoiling.

1.4.6 3-phase power protector (Optional device)

- Protect the outdoor unit from instable voltage.

1.4.7 Easy installation

- Easy for the outdoor unit to transporting to roof floor by elevator due to its compact size.
- Communication wire length can be up to 1000m.

1.4.8 Long pipe & height difference.

- The longest pipe: 60m
- Height deference:
    - Maximum 30m, when outdoor units are higher than indoor units
    - Maximum 20m, when outdoor units are lower than indoor units
- Height difference between indoor units: 8m
- Length from first indoor distributor to last indoor unit: 20m

1.4.9 Use 2-core shielded wire as signal wire

- Saves installation cost.
- Reduces manual works.

1.5 Doctor Kit (Maintenance software)

1.5.1 Easy to use and install

- Doctor Kit includes: 1 software and RS485-USB converter, easy to install
- Graphical interfaces, easy to use

1.5.2 Data monitoring

- We can use computer to inquiry outdoor unit's operating status, error codes when connecting to Doctor Kit.
- Compressors, sensors, valves operating parameter can be real-time monitored.

1.5.3 System operating curve

- System operating parameter curve can be real-time displayed.
- Commissioning results can be reported.

1.5.4 Troubleshooting

- Built-in with troubleshooting instruction, user can follow the instruction to solve the problem when error happens.
- User can also print out the instruction and take it to site to solve the problem step by step.

1.5.5 Automatic Data Backup

- Automatic Data Backup: all operating data will be saved on hard disk automatically. Data file can be exported easily by software.
- When system failure, user can send the data file to CC-MAH, their engineer will check and guide you to solve the problem.

1.5.6 Useful tools

- Input the liquid pipe diameter and length, software will calculate the additional refrigerant charge volume.
- Charge volume can be saved for future reference.
- Discharge pressure can be monitored when charging refrigerant.

2. Outdoor units

External appearance

12.5kW/14kW/16kW/18kW


20kW/22.4kW


26kW/28kW/33.5kW


Part. B Outdoor units

1. Specifications
2. Dimensions
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1. Specifications

1.1 Outdoor unit (12.5kW, 14kW)

Model name			CC-MAH005-3PS1	CC-MAH006-3PS1
Power supply			380~415V-3ph-50Hz	380~415V-3ph-50Hz
Max. connected indoor units		Pcs	7	8
Cooling	Capacity	kW	12.5	14
		Btu/h	42000	47800
		RT	3.5	4.0
	Power input	kW	3.38	3.80
	EER	W/W	3.70	3.68
Heating	Capacity	kW	14	16
		Btu/h	47000	54000
		RT	4.0	4.5
	Power input	kW	3.26	3.97
	COP	W/W	4.29	4.03
Max. input consumption		kW	6.3	6.3
Max. current		A	10	10
Capacity adjustment range			50%~130%	50%~130%
DC Inverter compressor	Quantity		1	1
	Type		DC /Twin-rotary	DC /Twin-rotary
	Brand		Highly	Highly
	frequency range	Hz	15～120Hz	15～120Hz
	Crankcase heater	W	35	35
Compressor oil	Model		RMM68EA	RMM68EA
	Original oil volume	ml	850	850
Fan motor	Type		DC	DC
	Brand		Panasonic/Nidec	Panasonic/Nidec
	Quantity		2	2
	Insulation class		E	E
	Protection class		IPX4	IPX4
	Power output	W	100*2	100*2
Fan blade	Material		ASG20	ASG20
	Type		Axial	Axial
	Drive		Direct-driven	Direct-driven
	Fan Quantity		2	2
	Air flow	m^3/h	6000	6000
	Vane Quantity		3	3
Outdoor coil	Fin type		Hydrophilic Aluminum	Hydrophilic Aluminum
	Tube outside diameter	mm	ϕ7.94	ϕ7.94
	Tube type		Inner-grooved copper tube	Inner-grooved copper tube
Refrigerant	Type		R410a	R410a
	Volume	kg	3450	3800
	Throttle type		EXV	EXV
Dimension (W*H*D)	Net	mm	975×1335×400	975×1335×400
	Packing	mm	1010×1445×415	1010×1445×415
Weight	Net	kg	86.6	86.6
	Gross	kg	96.4	96.4

Model name			CC-MAH005-3PS1	CC-MAH006-3PS1
Outdoor sound level		dB(A)	56	56
Maximum operating pressure		MPa	4.5	4.5
Pipe size	Liquid pipe	mm	ϕ 9.52(flaring nut)	ϕ 9.52(flaring nut)
	Gas pipe	mm	ϕ 15.88(flaring nut)	ϕ 15.88(flaring nut)
Max. pipe length	Total pipe length	m	100	100
	From OU to farthest IU	m	70	70
	From 1st indoor distributor to farthest IU	m	20	20
Max.vertical length	Between OU & IU (OU above IU)	m	30	30
	Between OU & IU (OU below IU)	m	20	20
	Between IUs	m	8	8
Connection wire	Power wire size	mm^2	5*2.5	5*2.5
	Signal wire type		3-core shielded cable	3-core shielded cable
	Signal wire size	mm^2	1	1
Cooling	Outdoor side	°C	-5~55	-5~55
	Indoor side	°C	16~32	16~32
Heating	Outdoor side	°C	-20~30	-20~30
	Indoor side	°C	16~32	16~32

Notes:

1).....The cooling conditions: indoor temp.: 27˚C DB (80.6˚F), 19˚C WB (60˚F) outdoor temp.: 35˚C DB (95˚F) equivalent pipe length: 5m drop length: 0m.

2).....The heating conditions: indoor temp.: 20˚C DB (68˚F), 15˚C WB (44.6˚F) outdoor temp.: 7˚C DB (42.8˚F) equivalent pipe length: 5m drop length: 0m.

3).....Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1.0 m. During actual operation, these values are normally somewhat higher as a result of ambient conditions.

4) The above data may be changed without notice for future improvement on quality and performance.

1.2 Outdoor unit (16kW, 18kW)

Model name			**CC-MAH007-3PS1**	**CC-MAH008-3PS1**
Power supply			380~415V-3ph-50Hz	380~415V-3ph-50Hz
Max. connected indoor units		Pcs	9	10
Cooling	Capacity	kW	16	18
		Btu/h	54000	61000
		RT	4.5	5.2
	Power input	kW	4.53	5.18
	EER	W/W	3.53	3.47
Heating	Capacity	kW	18	20
		Btu/h	61000	68000
		RT	5.2	5.7
	Power input	kW	4.61	5.02
	COP	W/W	3.91	3.98
Max. input consumption		kW	6.8	7.0
Max. current		A	7.6	12.5
Capacity adjustment range			50%-130%	50%-130%
DC Inverter compressor	Quantity		1	1
	Type		DC /Twin-rotary	DC /Twin-rotary
	Brand		Mitsubishi	Mitsubishi
	Frequency range	Hz	10~120Hz	10~120Hz
	Crankcase heater	W	35	35
Compressor oil	Model		FV50S	FV50S
	Original oil volume	ml	1100	1400
Fan motor	Type		DC	DC
	Brand		Panasonic/Nidec	Panasonic/Nidec
	Quantity		2	2
	Insulation class		E	E
	Protection class		IPX4	IPX4
	Power output	W	100*2	100*2
Fan blade	Material		ASG20	ASG20
	Type		Axial	Axial
	Drive		Direct-driven	Direct-driven
	Fan Quantity		2	2
	Air flow	m^3/h	6000	6000
	Vane Quantity		3	3
Outdoor coil	Fin type		Hydrophilic Aluminum	Hydrophilic Aluminum
	Tube outside diameter	mm	ϕ 9.52	ϕ 7
	Tube type		Inner-grooved copper tube	Inner-grooved copper tube
Refrigerant	Type		R410a	R410a
	Volume	kg	3800	4200
	Throttle type		EXV	EXV

Model name			CC-MAH007-3PS1	CC-MAH008-3PS1
Dimension (W*H*D)	Net	mm	975×1335×400	975×1335×400
	Packing	mm	1010x1445x415	1010x1445x415
Weight	Net	kg	90.1	94.7
	Gross	kg	100	104.4
Outdoor sound level		dB(A)	56	58
Maximum operating pressure		MPa	4.5	4.5
Pipe size	Liquid pipe	mm	ϕ 9.52(flaring nut)	ϕ 9.52(flaring nut)
	Gas pipe	mm	ϕ 15.88(flaring nut)	ϕ 19.05(flaring nut)
Max. pipe length	Total pipe length	m	100	100
	From OU to farthest	m	70	70
	From 1st indoor distributor to farthest IU	m	20	20
Max.vertical length	Between OU & IU (OU above IU)	m	30	30
	Between OU & IU (OU below IU)	m	20	20
	Between IUs	m	8	8
Connection wire	Power wire size	mm^2	5*2.5	5*2.5
	Signal wire type		3-core shielded cable	3-core shielded cable
	Signal wire size	mm^2	1	1
Cooling	Outdoor side	°C	-5~55	-5~55
	Indoor side	°C	16~32	16~32
Heating	Outdoor side	°C	-20~30	-20~30
	Indoor side	°C	16~32	16~32

Notes:

1).....The cooling conditions: indoor temp.: 27˚C DB (80.6˚F), 19˚C WB (60˚F) outdoor temp.: 35˚C DB (95˚F) equivalent pipe length: 5m drop length: 0m.

2).....The heating conditions: indoor temp.: 20˚C DB (68˚F), 15˚C WB (44.6˚F) outdoor temp.: 7˚C DB (42.8˚F) equivalent pipe length: 5m drop length: 0m.

3).....Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1.0 m. During actual operation, these values are normally somewhat higher as a result of ambient conditions.

4) The above data may be changed without notice for future improvement on quality and performance.

1.3 Outdoor unit (20kW, 22.4kW)

Model name			**CC-MAH009-3PS1**	**CC-MAH010-3PS1**
Power supply			380~415V-3ph-50Hz	380~415V-3ph-50Hz
Max. connected indoor units		Pcs	11	13
Performance data				
Cooling	Capacity	kW	20	22.4
		Btu/h	68200	76400
		RT	5.7	6.4
	Power input	kW	5.92	6.75
	EER	W/W	3.38	3.32
Heating	Capacity	kW	22	24
		Btu/h	75000	81800
		RT	6.3	6.8
	Power input	kW	5.35	5.62
	COP	W/W	4.11	4.27
Max. input consumption		kW	9.8	10.6
Max. current		A	15.8	17
Capacity adjustment range			50%-130%	50%-130%
Compressor data				
DC Inverter compressor	Quantity		1	1
	Type		DC /Twin-rotary	DC /Twin-rotary
	Brand		Mitsubishi	Mitsubishi
	Frequency	Hz	10～120	10～120
	Crankcase	W	35	35
Compressor oil	Model		FV50S	FV50S
	Original oil volume	ml	2300	2300
Fan data				
Fan motor	Type		Axial	Axial
	Brand		Yongan	Yongan
	Quantity		2	2
	Insulation class		B	B
	Protection class		IPX4	IPX4
	Power output	W	100*2	100*2
Fan blade	Material		ASG20	ASG20
	Type		Axial	Axial
	Drive		Direct-driven	Direct-driven
	Fan Quantity		2	2
	Air flow	m^3/h	8000	8000
	Vane Quantity		3	3
Physical data				
Outdoor coil	Fin type		Hydrophilic Aluminum	Hydrophilic Aluminum
	Tube outside diameter	mm	φ7	φ7
	Tube type		Inner-grooved copper tube	Inner-grooved copper tube
Refrigerant	Type		R410A	R410A
	Volume	kg	5300	5300
	Throttle type		EXV	EXV

Model name			CC-MAH009-3PS1	CC-MAH010-3PS1
Dimension (W*H*D)	Net	mm	1015*1430*450	1015*1430*450
	Packing	mm	1095*1545*485	1095*1545*485
Weight	Net	kg	112.7	112.7
	Gross	kg	126.8	126.8
Outdoor sound level		dB(A)	≤58	≤58
Maximum operating pressure		MPa	4.5	4.5
Piping & wiring data				
Pipe size	Liquid pipe	mm	φ9.52	φ9.52
	Gas pipe	mm	Φ19.05	Φ19.05
Max. pipe length	Total pipe length	m	100	100
	From OU to farthest	m	70	70
	From 1st indoor distributor to farthest IU	m	20	20
Max.vertical length	Between OU & IU (OU above IU)	m	30	30
	Between OU & IU (OU below IU)	m	20	20
	Between IUs	m	8	8
Connection wire	Power wire size	mm^2	5*6	5*6
	Signal wire type		2-core shielded cable	2-core shielded cable
	Signal wire size	mm^2	1	1
Operation temperature range				
Cooling	Outdoor side	℃	-5~55	-5~55
	Indoor side	℃	16~32	16~32
Heating	Outdoor side	℃	-20~30	-20~30
	Indoor side	℃	16~32	16~32

Notes:

1).....The cooling conditions: indoor temp.: 27˚C DB (80.6˚F), 19˚C WB (60˚F) outdoor temp.: 35˚C DB (95˚F) equivalent pipe length: 5m drop length: 0m.

2).....The heating conditions: indoor temp.: 20˚C DB (68˚F), 15˚C WB (44.6˚F) outdoor temp.: 7˚C DB (42.8˚F) equivalent pipe length: 5m drop length: 0m.

3).....Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1.0 m. During actual operation, these values are normally somewhat higher as a result of ambient conditions.

4) The above data may be changed without notice for future improvement on quality and performance.

1.4 Outdoor unit (26kW, 28kW, 33.5kW)

Model name			**CC-MAH011-3PS1**	**CC-MAH012-3PS1**	**CC-MAH013-3PS1**
Power supply			380~415V-3ph-50Hz	380~415V-3ph-50Hz	380~415V-3ph-50Hz
Max. connected indoor units		Pcs	15	16	19
Performance data					
Cooling	Capacity	kW	26	28	33.5
		Btu/h	88700	95500	114300
		RT	7.4	8.0	9.5
	Power input	kW	7.54	8.31	9.46
	EER	W/W	3.45	3.37	3.54
Heating	Capacity	kW	28.5	31.5	37.5
		Btu/h	97200	107500	128000
		RT	8.1	9.0	10.7
	Power input	kW	6.77	8.18	8.99
	COP	W/W	4.21	3.85	4.17
Max. input consumption		kW	11.5	13	13.8
Max. current		A	19	22.5	24
Capacity adjustment range			50%-130%	50%-130%	50%-130%
Compressor data					
DCInvertercompressor	Quantity		1	1	1
	Type		DC /Twin-rotary	DC /Twin-rotary	DC /Twin-rotary
	Brand		Mitsubishi	Mitsubishi	Mitsubishi
	Frequency	Hz	10～120	10～120	10～120
	Crankcase	W	35	35	35
Compressor oil	Model		FV50S	FV50S	FV50S
	Original oil	ml	2300	2300	2300
Fan data					
Fan motor	Type		Axial	Axial	Axial
	Brand		Nidec	Nidec	Nidec
	Quantity		2	2	2
	Insulation		E	E	E
	Protection		IP44	IP44	IP44
	Poweroutput	W	180*2	180*2	180*2
Fan blade	Material		ASG20	ASG20	ASG20
	Type		Axial	Axial	Axial
	Drive		Direct-driven	Direct-driven	Direct-driven
	Fan		2	2	2
	Air flow	m^3/h	10000	10000	10000
	Vane		4	4	4
Physical data					
Outdoor coil	Fin type		Hydrophilic Aluminum	Hydrophilic Aluminum	Hydrophilic Aluminum
	Tube outside diameter	mm	φ7	φ7	φ7
	Tube type		Inner-grooved copper	Inner-grooved copper tube	Inner-grooved copper tube
Refrigerant	Type		R410A	R410A	R410A
	Volume	kg	6100	8000	8000
	Throttle type		EXV	EXV	EXV

Model name			CC-MAH011-3PS1	CC-MAH012-3PS1	CC-MAH013-3PS1
Dimension (W*H*D)	Net	mm	1120*1549*528	1120*1549*528	1120*1549*528
	Packing	mm	1278*1703*560	1278*1703*560	1278*1703*560
Weight	Net	kg	142	154	154
	Gross	kg	162	174	174
Outdoor sound level		dB(A)	≤60	≤60	≤60
Maximum operating pressure		MPa	4.5	4.5	4.5
Piping & wiring data					
Pipe size	Liquid pipe	mm	φ9.52	φ12.7	φ12.7
	Gas pipe	mm	φ22.2	φ22.2	φ22.2
Max. pipe length	Total pipe length	m	120	120	120
	From OU to	m	70	70	70
	From 1st indoor distributor to	m	20	20	20
Max.vertical length	Between OU & IU (OU above	m	30	30	30
	Between OU & IU (OU below	m	20	20	20
	Between IUs	m	8	8	8
Connection wire	Power wire size	mm^2	5*6	5*6	5*6
	Signal wire type		2-core shielded cable	2-core shielded cable	2-core shielded cable
	Signal wire size	mm^2	1	1	1
Operation temperature range					
Cooling	Outdoor side	℃	-5~55	-5~55	-5~55
	Indoor side	℃	16~32	16~32	16~32
Heating	Outdoor side	℃	-20~30	-20~30	-20~30
	Indoor side	℃	16~32	16~32	16~32

Notes:

5).....The cooling conditions: indoor temp.: 27˚C DB (80.6˚F), 19˚C WB (60˚F) outdoor temp.: 35˚C DB (95˚F) equivalent pipe length: 5m drop length: 0m.

6).....The heating conditions: indoor temp.: 20˚C DB (68˚F), 15˚C WB (44.6˚F) outdoor temp.: 7˚C DB (42.8˚F) equivalent pipe length: 5m drop length: 0m.

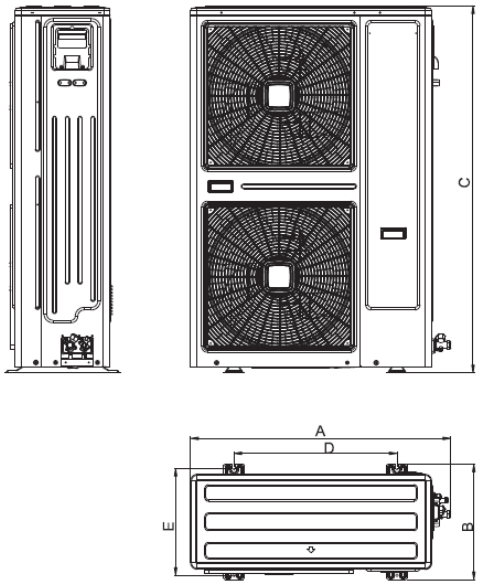
7).....Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1.0 m. During actual operation, these values are normally somewhat higher as a result of ambient conditions.

8) The above data may be changed without notice for future improvement on quality and performance.

2. Dimensions

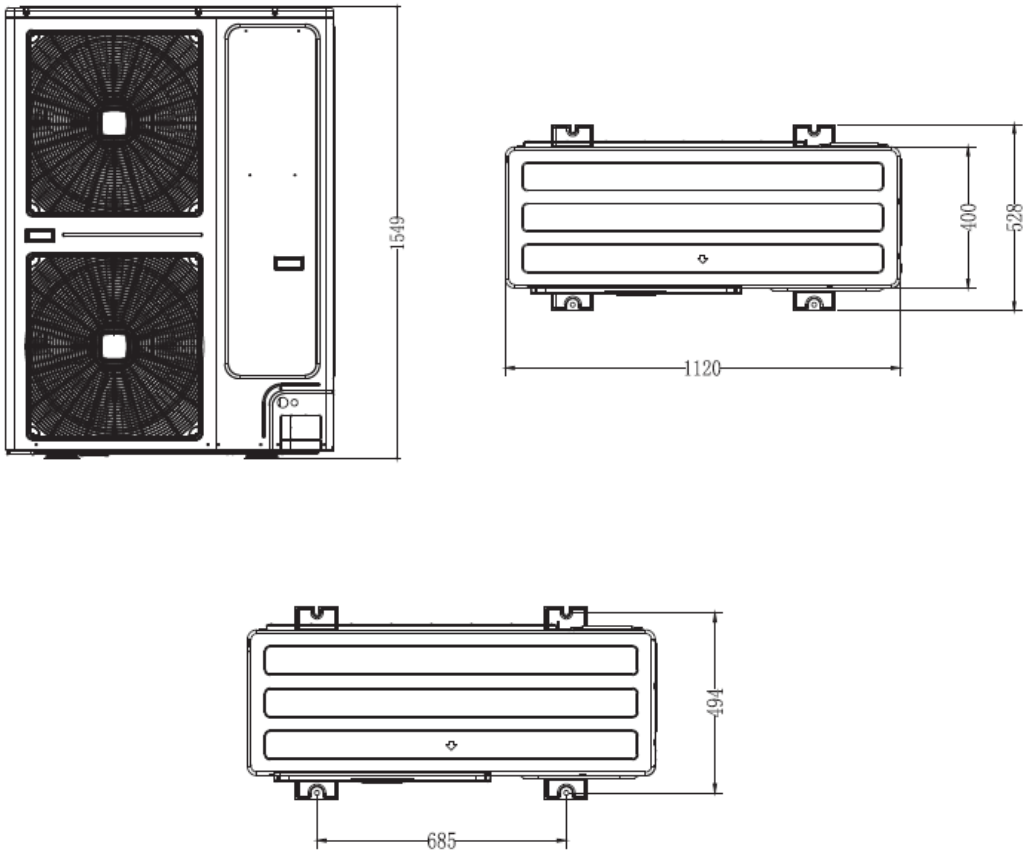
2.1 Units dimension

12.5kW, 14kW, 16kW, 18kW, 20kW, 22.4kW:

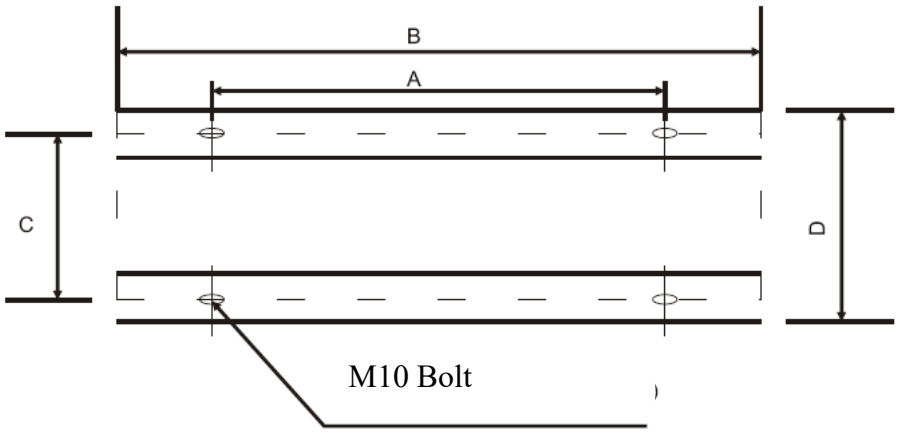


Model of outdoor unit \ Size code	A	B	C	D	E
200/224	1015	450	1430	636	417
125/140/160/180	975	400	1335	586	370

26kW, 28kW, 33.5kW:

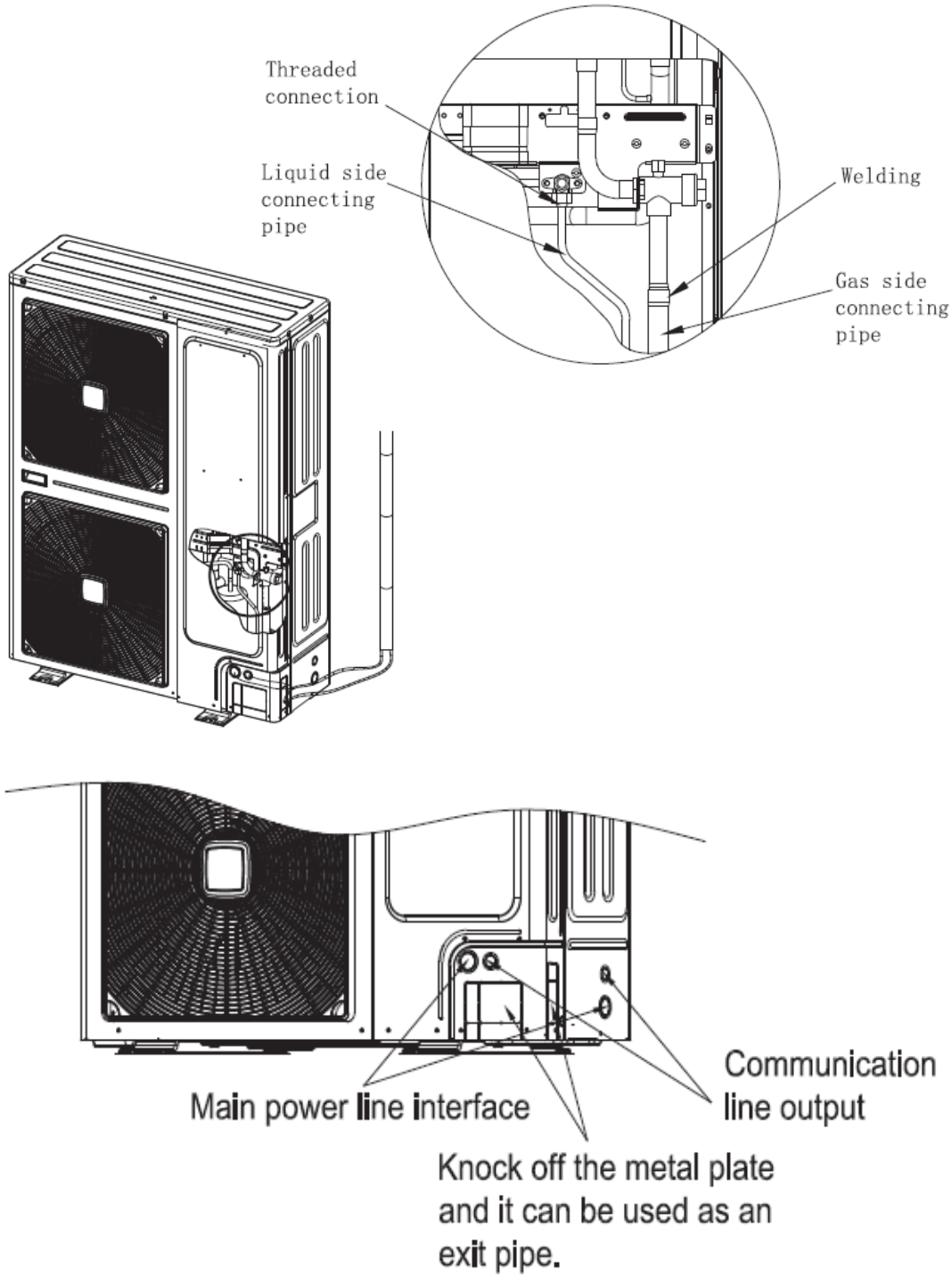


2.2 Installation base dimension



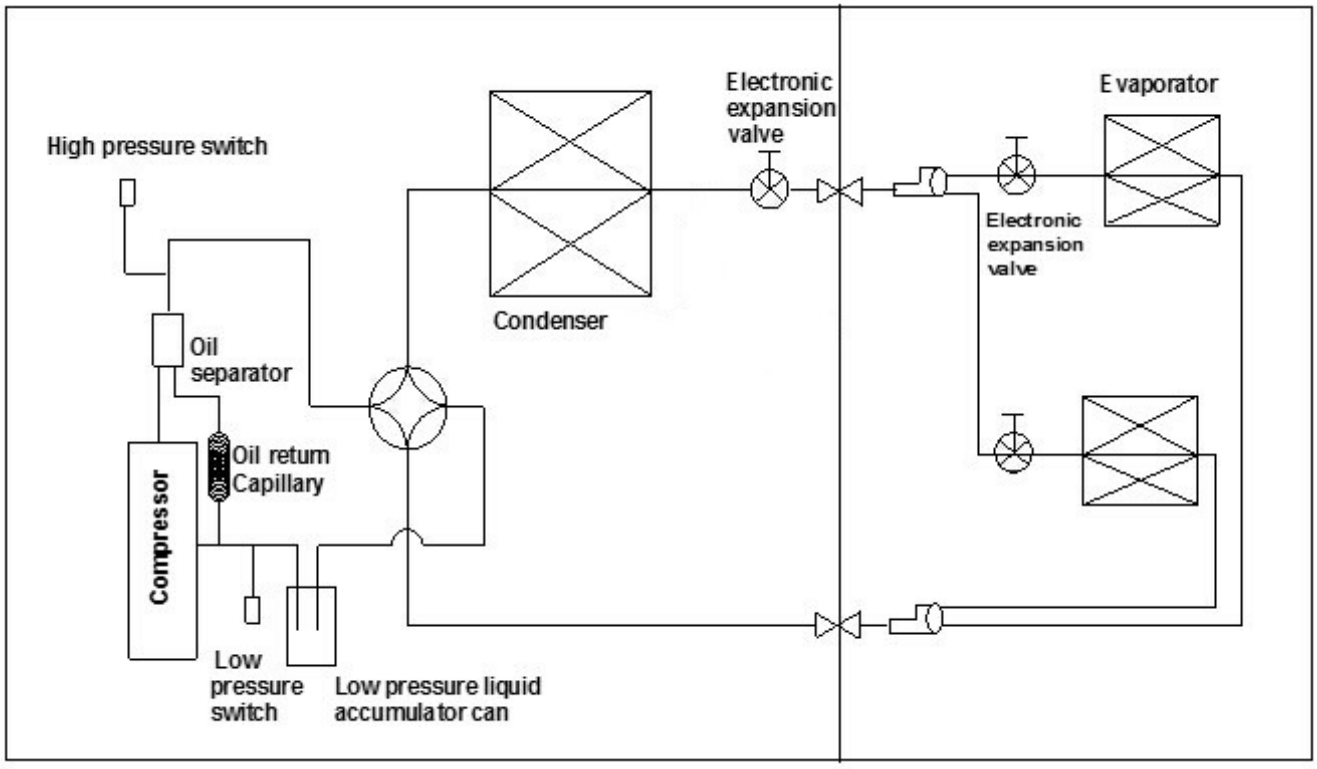
Model	Capacity	A(mm)	B(mm)	C (mm)	D (mm)
CC-MAH005-3PS1	12.5kW	586	880	370	424
CC-MAH006-3PS1	14kW				
CC-MAH007-3PS1	16kW				
CC-MAH008-3PS1	18kW				
CC-MAH009-3PS1	20kW	636	1000	417	460
CC-MAH010-3PS1	22.4kW				
CC-MAH011-3PS1	26kW	685	1100	494	560
CC-MAH012-3PS1	28kW				
CC-MAH013-3PS1	33.5kW				

2.3 Valve explanation



3. Outdoor refrigerant circuit diagram

3.1 Circuit diagram:



3.2 Key parts

3.2.1 Oil Separator

It is used to separate oil from high pressure & temperature gas refrigerant that is pumped out from compressor. The separation efficiency is up to 92%, it makes the oil return back to each compressor very soon.

3.2.2 Gas-liquid separator

It is used to store the liquid refrigerant and oil, it can protect the compressor from liquid hammer.

3.2.3 Four-way valve (ST)

Closes in cooling mode and opens in heating mode

3.2.4 EXV (Electromagnetic expansion valve)

a) Max. Open degree is 480 pulses.

b) Generally when system is electrified the EXV closes 700pulse first, then opens to 350 pulse and stand by. Then the unit is started, it opens to the right pulse.

c) When the running outdoor unit receives OFF signal, the EXV of auxiliary unit will stop while main unit is running and auxiliary unit is stopped at the same time. If all outdoor units are stopped, the EXV will close first, and then open to the pulse of stand-by.

3.2.5 High pressure switch

Protect the system when system pressure is up to 4.5MPa.

3.2.6 Low pressure switch

Protect the system when system pressure is low to 0.05MPa.

3.3 Key functions

3.3.1 Oil return program

a) When system start up for 140 minutes, oil return program will run. After that, every 8 hours continued operating this

program will run.

b) The program will last for 3 minutes.

c) The outdoor EXV open to 480 pulse.

d) Action of indoor Fan and EXV.

		Running indoor unit	Stop or standby indoor unit	Fan only indoor unit
Cooling mode	EXV	Keep degree unchanged	300 pulse	300pulse
	Fan	Keep on	Keep off	Keep on
Heating mode	EXV	Keep degree unchanged	480 pulse	/
	Fan	Anti-cold wind	Keep off	/

3.3.2 Forced cooling program

a) After pressing it once, all indoor units and outdoor units will start cooling, no matter what mode they are running on, no matter whether they are ON or OFF.

b) During forced cooling mode.

i. All indoor EXVs open to 480 pulses.

ii. All indoor fans are in high speed..

iii. All outdoor fan motors are ON.

iv. Outdoor EXV opens to 480 pulses.

c) When the process is last for 1h or the button is pressed again, program will quit.

3.3.3 Defrost program

a) When any module's condenser temperature (T3) <-2, last for 40minutes, this outdoor unit sends defrost order to outdoor unit.

b) Before defrost, save current EXV opening pulses. EXV opening pulses will be recover when defrost program ends.

c) During defrosting.

i. All indoor EXVs open to 480pulses.

ii. All indoor fans are anti-cold program.

iii. Compressor is ON.

iv. Outdoor fan motors are OFF

v. Outdoor EXVs open to 480pulses.

d) It ends when in the following conditions :

i. The defrosting time is up to 10 minutes.

ii. All module's condenser temperature (T3)≥15 ℃.

iii. T3≥7℃ last for 60 seconds.

e) After defrost.

i. All indoor units' EXV recover to save pulse.

ii. All indoor fans return to normal control.

iii. Compressor returns to normal control.

iv. All outdoor fan motors return to normal control.

v. Outdoor EXVs return to normal control..

4 Electric characteristics

Model	Outdoor Unit				Power Supply		Compressor	Fan Motor
	Hz	Voltage	Min.	Max.	TOC	MFC	LRC	Output
CC-MAH005-3PS1	50	380~415	342	437	10	20	/	0.1*2
CC-MAH006-3PS1	50	380~415	342	437	10	20	/	0.1*2
CC-MAH007-3PS1	50	380~415	342	437	11	20	/	0.1*2
CC-MAH008-3PS1	50	380~415	342	437	12.5	30	/	0.1*2
CC-MAH009-3PS1	50	380~415	342	437	15.8	30	/	0.1*2
CC-MAH010-3PS1	50	380~415	342	437	17	30	/	0.1*2
CC-MAH011-3PS1	50	380~415	342	437	19	30	/	0.18*2
CC-MAH012-3PS1	50	380~415	342	437	22.5	40	/	0.18*2
CC-MAH013-3PS1	50	380~415	342	437	24	40	/	0.18*2

Remark:

- *Min.: Permitted minimum operating voltage, lower than this value may damage the system*
- *Max.: Permitted maximum operating voltage, higher than this value may damage the system*
- *TOC: Total Over-Current (A)*
- *MFC: Maximum Fuse Current (A)*
- *LRC: Locked Rotor Current (A)*
- *Output: Fan motor rated power Output (kW)*

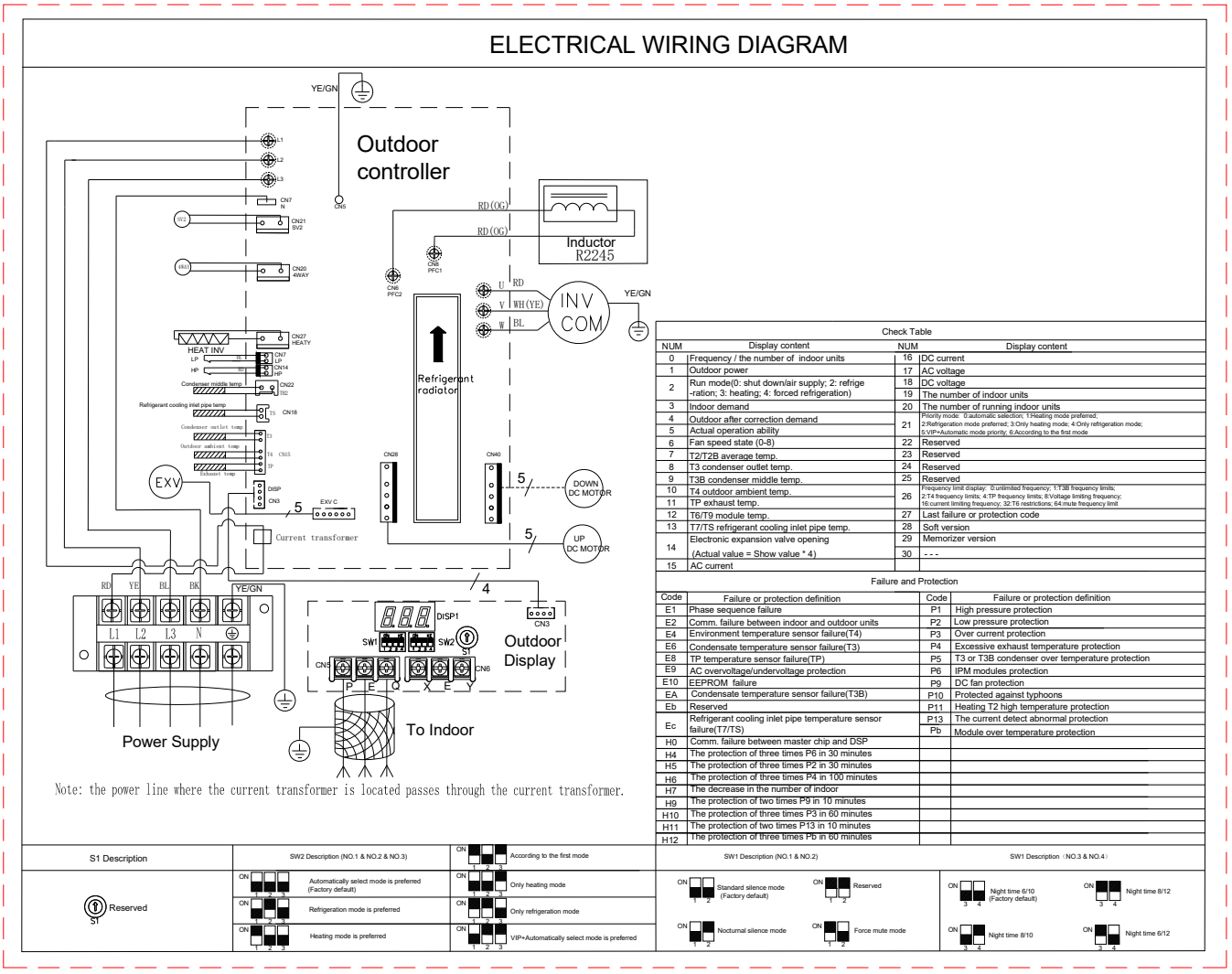
Notes:

- *RLC is based on the following conditions, indoor temperature 27˚C DB/19˚C WB, outdoor temperature 35˚C DB*
- *TOC means the total value of each Over-Current set.*
- *MSC means the Maximum current during the starting of compressor.*
- *Maximum allowable voltage variation between phases is 2%*
- *Selection wire size based on the larger value of MC or TOC*
- *MFC is used to select the circuit breaker and the ground fault circuit interrupter (earth circuit breaker).*

5 Outdoor unit wiring diagrams and field wiring

5.1 Outdoor unit electrical control box wiring diagram

- 12.5kW, 14kW, 16kW, 18kW, 20kW, 22.4kW:



Check Table

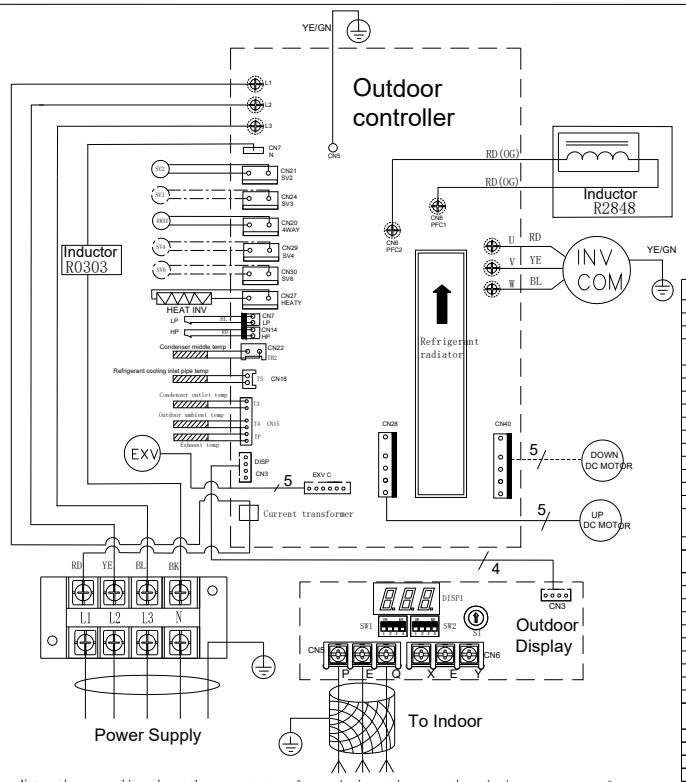
NUM	Display content	NUM	Display content
0	Frequency / the number of indoor units	16	DC current
1	Outdoor power	17	AC voltage
2	Run mode(0: shut down/air supply; 2: refrige -ration; 3: heating; 4: forced refrigeration)	18	DC voltage
		19	The number of indoor units
3	Indoor demand	20	The number of running indoor units
4	Outdoor after correction demand	21	Priority mode: 0:automatic selection; 1:Heating mode preferred; 2:Refrigeration mode preferred; 3:Only heating mode; 4:Only refrigeration mode; 5:VIP+Automatic mode priority; 6:According to the first mode
5	Actual operation ability		
6	Fan speed state (0-8)	22	Reserved
7	T2/T2B average temp.	23	Reserved
8	T3 condenser outlet temp.	24	Reserved
9	T3B condenser middle temp.	25	Reserved
10	T4 outdoor ambient temp.	26	Frequency limit display: 0:unlimited frequency; 1:T3B frequency limits; 2:T4 frequency limits; 4:TP frequency limits; 8:Voltage limiting frequency; 16:current limiting frequency; 32:T6 restrictions; 64:mute frequency limit
11	TP exhaust temp.		
12	T6/T9 module temp.	27	Last failure or protection code
13	T7/TS refrigerant cooling inlet pipe temp.	28	Soft version
14	Electronic expansion valve opening (Actual value = Show value * 4)	29	Memorizer version
		30	- - -
15	AC current		

Failure and Protection

Code	Failure or protection definition	Code	Failure or protection definition
E1	Phase sequence failure	P1	High pressure protection
E2	Comm. failure between indoor and outdoor units	P2	Low pressure protection
E4	Environment temperature sensor failure(T4)	P3	Over current protection
E6	Condensate temperature sensor failure(T3)	P4	Excessive exhaust temperature protection
E8	TP temperature sensor failure(TP)	P5	T3 or T3B condenser over temperature protection
E9	AC overvoltage/undervoltage protection	P6	IPM modules protection
E10	EEPROM failure	P9	DC fan protection
EA	Condensate temperature sensor failure(T3B)	P10	Protected against typhoons
Eb	Reserved	P11	Heating T2 high temperature protection
Ec	Refrigerant cooling inlet pipe temperature sensor failure(T7/TS)	P13	The current detect abnormal protection
		Pb	Module over temperature protection
H0	Comm. failure between master chip and DSP		
H4	The protection of three times P6 in 30 minutes		
H5	The protection of three times P2 in 30 minutes		
H6	The protection of three times P4 in 100 minutes		
H7	The decrease in the number of indoor		
H9	The protection of two times P9 in 10 minutes		
H10	The protection of three times P3 in 60 minutes		
H11	The protection of two times P13 in 10 minutes		
H12	The protection of three times Pb in 60 minutes		

- 26kW, 28kW, 33.5kW:

ELECTRICAL WIRING DIAGRAM



Check Table

NUM	Display content	NUM	Display content
0	Frequency / the number of indoor units	16	IDC current
1	Outdoor power	17	AC voltage
2	Run mode(0: shut down/air supply; 2: refrige -ration; 3: heating; 4: forced refrigeration)	18	DC voltage
		19	The number of indoor units
3	Indoor demand	20	The number of running indoor units
4	Outdoor after correction demand	21	Priority mode: 0:automatic selection; 1:Heating mode preferred; 2:Refrigeration mode preferred; 3:Only heating mode; 4:Only refrigeration mode; 5:VIP+Automatic mode priority; 6:According to the first mode
5	Actual operation ability		
6	Fan speed state (0-8)	22	Reserved
7	T2/T2B average temp.	23	Reserved
8	T3 condenser outlet temp.	24	Reserved
9	T3B condenser middle temp.	25	Reserved
10	T4 outdoor ambient temp.	26	Frequency limit display: 0:unlimited frequency; 1:T3B frequency limits; 2:T4 frequency limits; 4:TP frequency limits; 8:Voltage limiting frequency; 16:current limiting frequency; 32:T6 restrictions; 64:mute frequency limit
11	TP exhaust temp.		
12	T6/T9 module temp.	27	Last failure or protection code
13	T7/TS refrigerant cooling inlet pipe temp.	28	Soft version
14	Electronic expansion valve opening (Actual value = Show value * 4)	29	Memorizer version
		30	- - -
15	AC current		

Failure and Protection

Code	Failure or protection definition	Code	Failure or protection definition
E1	Phase sequence failure	P1	High pressure protection
E2	Comm. failure between indoor and outdoor units	P2	Low pressure protection
E4	Environment temperature sensor failure(T4)	P3	Over current protection
E6	Condensate temperature sensor failure(T3)	P4	Excessive exhaust temperature protection
E8	TP temperature sensor failure(TP)	P5	T3 or T3B condenser over temperature protection
E9	AC overvoltage/undervoltage protection	P6	IPM modules protection
E10	EEPROM failure	P9	DC fan protection
EA	Condensate temperature sensor failure(T3B)	P10	Protected against typhoons
Eb	Reserved	P11	Heating T2 high temperature protection
Ec	Refrigerant cooling inlet pipe temperature sensor failure(T7/TS)	P13	The current detect abnormal protection
		Pb	Module over temperature protection
H0	Comm. failure between master chip and DSP		
H4	The protection of three times P6 in 30 minutes		
H5	The protection of three times P2 in 30 minutes		
H6	The protection of three times P4 in 100 minutes		
H7	The decrease in the number of indoor		
H9	The protection of two times P9 in 10 minutes		
H10	The protection of three times P3 in 60 minutes		
H11	The protection of two times P13 in 10 minutes		
H12	The protection of three times Pb in 60 minutes		

S1 Description

Reserved

SW2 Description (NO.1 & NO.2 & NO.3)

- Automatically select mode is preferred (Factory default)
- Refrigeration mode is preferred
- Heating mode is preferred
- According to the first mode
- Only heating mode
- Only refrigeration mode
- VIP+Automatically select mode is preferred

SW1 Description (NO.1 & NO.2)

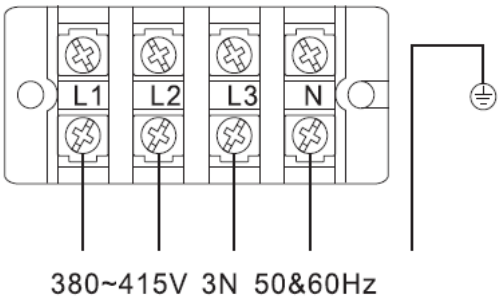
- Standard silence mode (Factory default)
- Reserved
- Nocturnal silence mode
- Force mute mode

SW1 Description（NO.3 & NO.4）

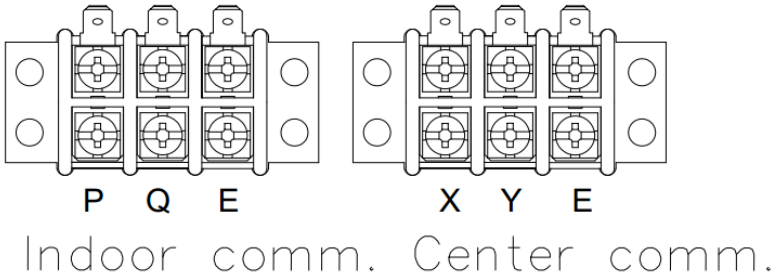
- Night time 6/10 (Factory default)
- Night time 8/12
- Night time 8/10
- Night time 6/12

5.2 Field wiring

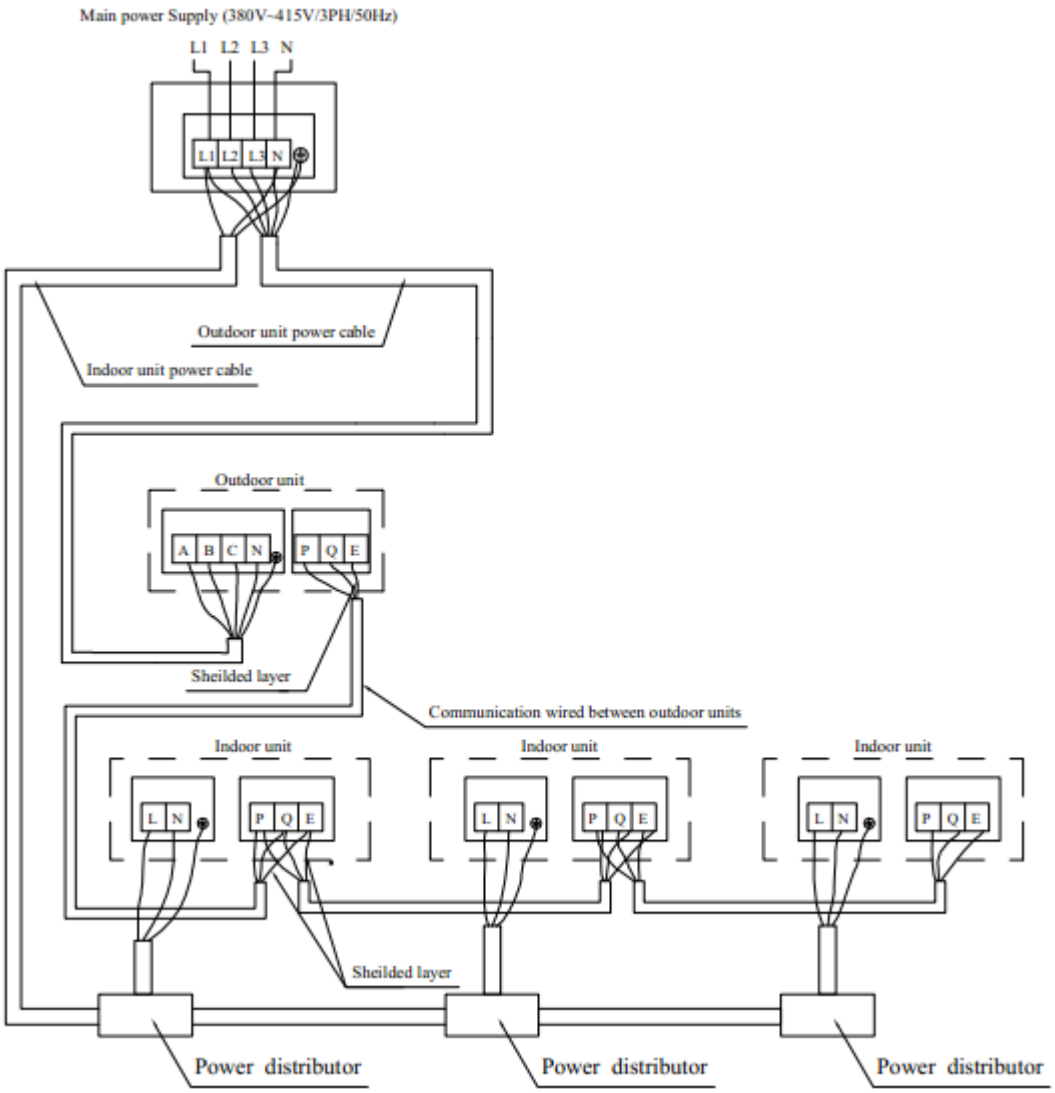
1) Power supply terminals



2) Communication terminals



3) Wiring between indoor and outdoor unit



Note:

a) The signal connecting line between indoor and outdoor units and indoor units has polarity. When connecting, be careful to prevent error connection.

b) Signal line shall adopt three-core shielded wire with an area above 0.75 mm^2.

c) Do not bind signal line and copper pipe together with belting.

d) Make sure that the shield metal layer should be grounded well indoor control box in order to prevent interference.

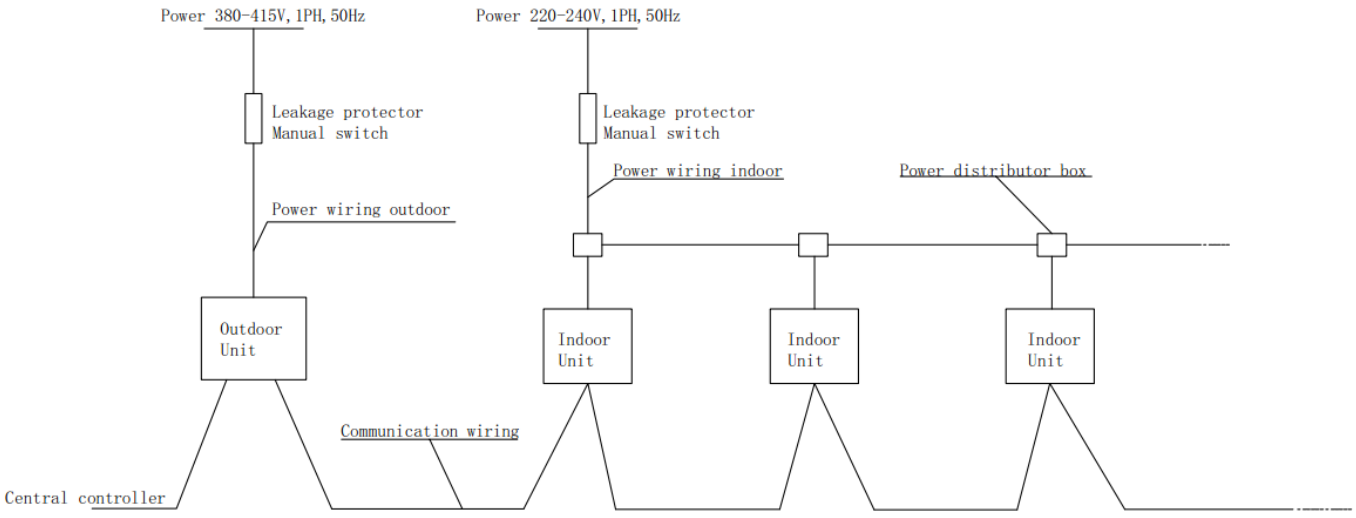
e) It's forbidden to connect 220V or above high-volt live wire to the communication terminal.

5.3 Outdoor unit power wiring

5.3.1 Separately power supply (without power facility)

Model name	Power supply	Minimum power cable diameter (L is cable length)		Manual switch		Circuit breaker
		Size (mm^2)	Ground wire (mm^2)	Capacity (A)	Fuse (A)	
CC-MAH005-3PS1	380~415V/3N/50Hz	5*2.5	2.5	10	20	0.1A under 0.1second
CC-MAH006-3PS1				10		
CC-MAH007-3PS1				11		
CC-MAH008-3PS1		5*6	6	12.5	30	
CC-MAH009-3PS1				15.8		
CC-MAH010-3PS1				17		
CC-MAH011-3PS1				19		
CC-MAH012-3PS1				22.5	40	
CC-MAH013-3PS1				24		

5.3.2 With power facilities:



Note:

- *Select power wire for these five models separately according to relevant standard.*
- *The wiring diameter and the length in the table indicate the condition that the voltage dropping range is within 2%. If the length exceeds the above figure, please select the wire diameter according to relevant standard.*

6 Operation limits

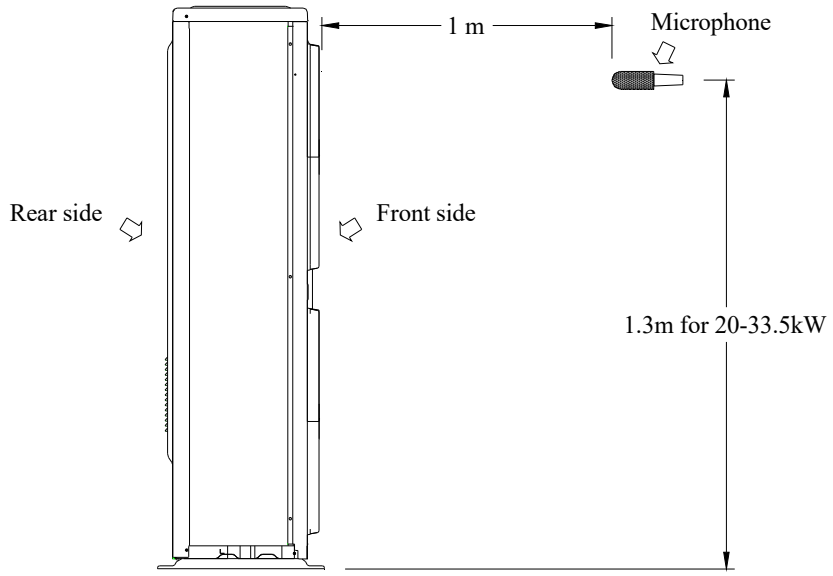
Operation mode	Outdoor temperature	Indoor temperature
Cooling	-5°C ~ 55°C	16°C ~ 32°C
Heating	-20°C ~ 30°C	16°C ~32°C

Notes:

If the unit is operating beyond above condition, protection device will be activated; even then the units will abnormality run.

7 Operation sound levels

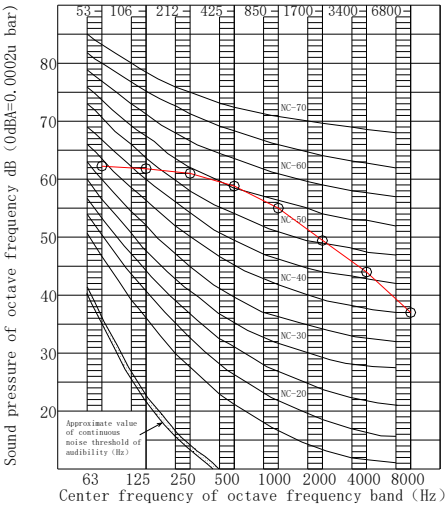
7.1 Testing method and sound levels



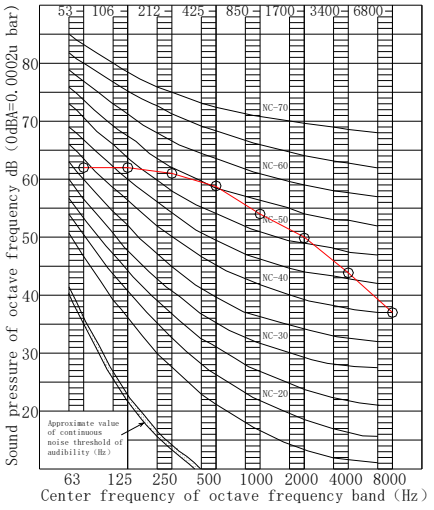
Test value

Outdoor unit	Sound level dB(A)
12.5kW	56
14kW	56
16kW	56
18kW	58
20kW	58
22.4kW	58
26kW	60
28kW	60
33.5kW	60

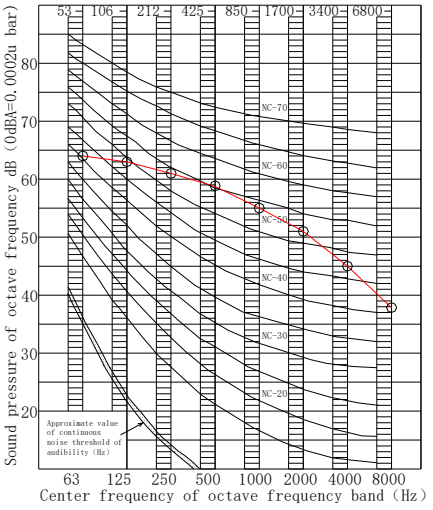
7.2 NC curve(Double click the diagram to check the CAD)



12.5/14 kW



16/18/20/22.4 kW



26/28/33.5 kW

8.Functional parts and safety devices

Table 1:

Item	Symbol	Name		CC-MAH005-3PS1	CC-MAH006-3PS1
Compressor	Inverter	Inverter compressor		ATH307CDPC8DQ	ATH307CDPC8DQ
	Compressor Safety OLP	Starting current		/	/
	CCH	Crank case heater		35W	
Motor and security devices	Motor	Fan motor	Model	DR-380-100-8	DR-380-100-8
			Output power	100W*2	100W*2
		Safety thermostat	On	110℃	
			Off	/	
	HP	High pressure switch		OFF:45(±1.5)kg/cm^2 ； ON:35(±2)kg/cm^2	
	LP	Low pressure switch		OFF: 0.5(±0.3)kg/cm^2 ； ON: 1.5(±0.5)kg/cm^2	
Temperature sensor	T3,T4	Temperature sensor (condenser outlet/ambient temperature)		25°C=5KΩ	
	Discharge thermostat	Thermostat (Inverter discharge)		/	
Functional parts	PMV	Electronic expansion valve		TS624C05(Sanhua) / D24FKS-9R(Yinzhou)	
	4-W/V	4-way valve		STF-19*12.7-R1(Dunan / Sanhua)	
	SV	Solenoid valve		FDF2A65 (Changheng Lusi)	

Table 2:

Item	Symbol	Name		CC-MAH007-3PS1	CC-MAH008-3PS1
Compressor	Inverter	Inverter compressor		MNB40FEQMC	MNB42FFDMC-L
	Compressor Safety OLP	Starting current		/	/
	CCH	Crank case heater		35W	35W
Motor and security devices	Motor	Fan motor	Model	DR-380-100-8	DR-380-100-8
			Output power	100W*2	100W*2
		Safety thermostat	On	110℃	
			Off	/	
	HP	High pressure switch		OFF:45(±1.5)kg/cm^2 ON:35(±2)kg/cm^2	
	LP	Low pressure switch		OFF: 0.5(±0.3)kg/cm^2 ON: 1.5(±0.5)kg/cm^2	
Temperature sensor	T3,T4	Temperature sensor (condenser outlet/ambient temperature)		25°C=5KΩ	
	Discharge thermostat	Thermostat (Inverter discharge)		/	
Functional parts	PMV	Electronic expansion valve		TS624C05(Sanhua)/D24FKS-9R(Yinzhou)	KV-32D210(Φ3.2) /TS632C03(Φ3.2)
	4-W/V	4-way valve		STF-19*12.7-R1(Dunan / Sanhua)	
	SV	Solenoid valve		FDF2A65 (Changheng Lusi)	

Table 3:

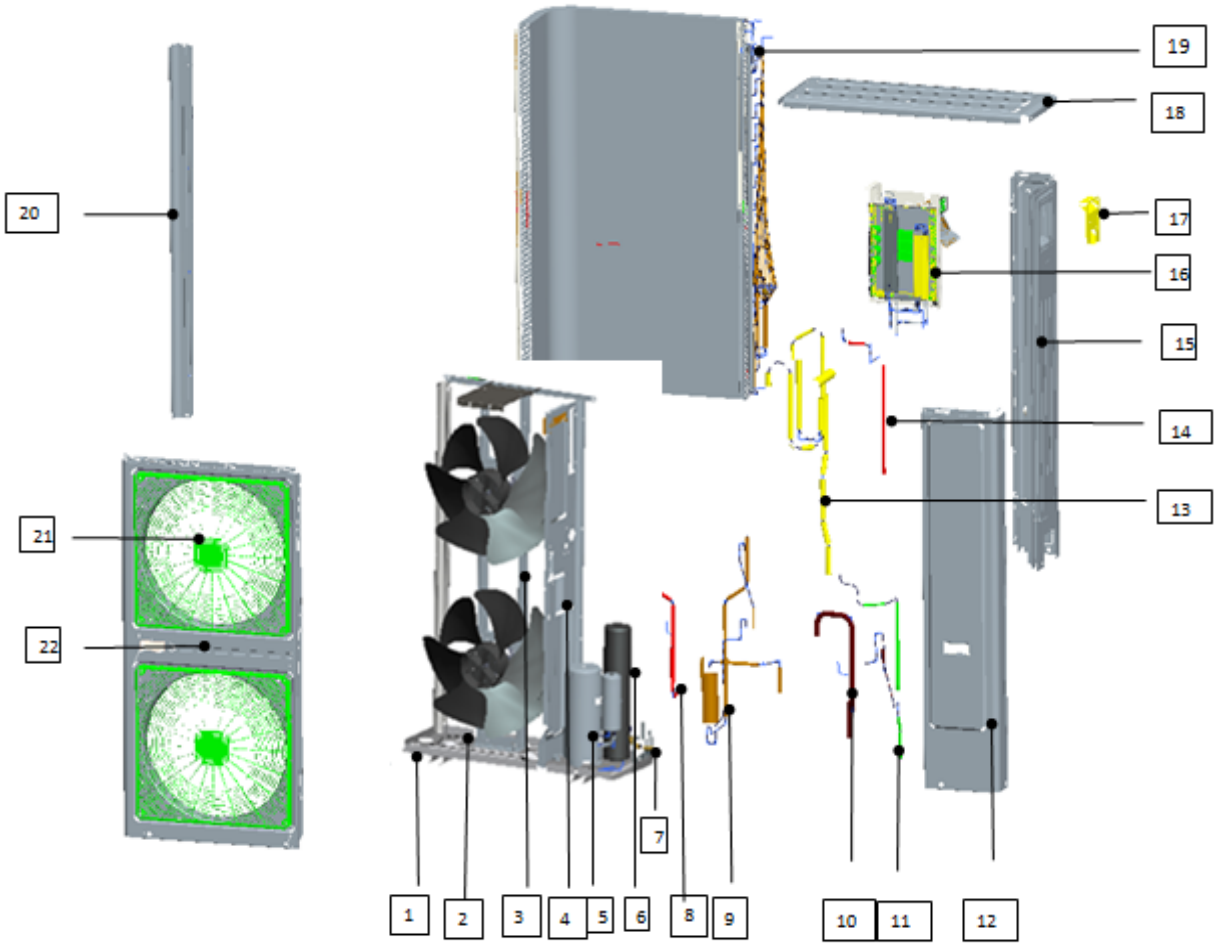
Item	Symbol	Name		CC-MAH009-3PS1	CC-MAH010-3PS1
Compressor	Inverter	Inverter compressor		LNB53FMKMC-L	LNB53FMKMC-L
	Compressor Safety OLP	Starting current		/	/
	CCH	Crank case heater		35W	
Motor and security devices	Motor	Fan motor	Model	DR-310-100-8-2	DR-310-100-8-2
			Output power	100*2	100*2
		Safety thermostat	On	110℃	
			Off	/	
	HP	High pressure switch		OFF:45(±1.5)kg/cm^2 ON:35(±2)kg/cm^2	
	LP	Low pressure switch		OFF: 0.5(±0.3)kg/cm^2 ON: 1.5(±0.5)kg/cm^2	
Temperature sensor	T3,T4	Temperature sensor (condenser outlet/ambient temperature)		25°C=5KΩ	
	Discharge thermostat	Thermostat (Inverter discharge)		/	
Functional parts	PMV	Electronic expansion valve		UKV-32D210(Hualu or Sanhua)	
	4-W/V	4-way valve		STF-0408G(Hualu);SHF-20A(Sanhua) SHF-20D-46-04(Sanhua);DHF-20\R410A(Chunhui)	
	SV	Solenoid valve		FDF2A65(Sanhua)	

Table 4:

Item	Symbol	Name		CC-MAH011-3PS1	CC-MAH012-3PS1	CC-MAH013-3PS1
Compressor	Inverter	Inverter compressor		LNB53FMKMC-L	LNB65FAGMC	LNB65FAGMC
	Compressor Safety OLP	Starting current		/	/	/
	CCH	Crank case heater		35W		
Motor and security devices	Motor	Fan motor	Model	DR-310-180-8	DR-310-180-8	DR-310-180-8
			Output power	180*2	180*2	180*2
		Safety thermostat	On	110℃		
			Off	/		
	HP	High pressure switch		OFF:45(±1.5)kg/cm^2 ON:35(±2)kg/cm^2		
	LP	Low pressure switch		OFF: 0.5(±0.3)kg/cm^2 ON: 1.5(±0.5)kg/cm^2		
Temperature sensor	T3,T4	Temperature sensor (condenser outlet/ambient temperature)		25°C=5KΩ		
	Discharge thermostat	Thermostat (Inverter discharge)		/		
Functional parts	PMV	Electronic expansion valve		UKV-32D210 (Hualu or Sanhua)		
	4-W/V	4-way valve		STF-0408G(Hualu);SHF-20A(Sanhua) SHF-20D-46-04(Sanhua);DHF-20\R410A(Chunhui)		
	SV	Solenoid valve		FDF2A73(Sanhua)		

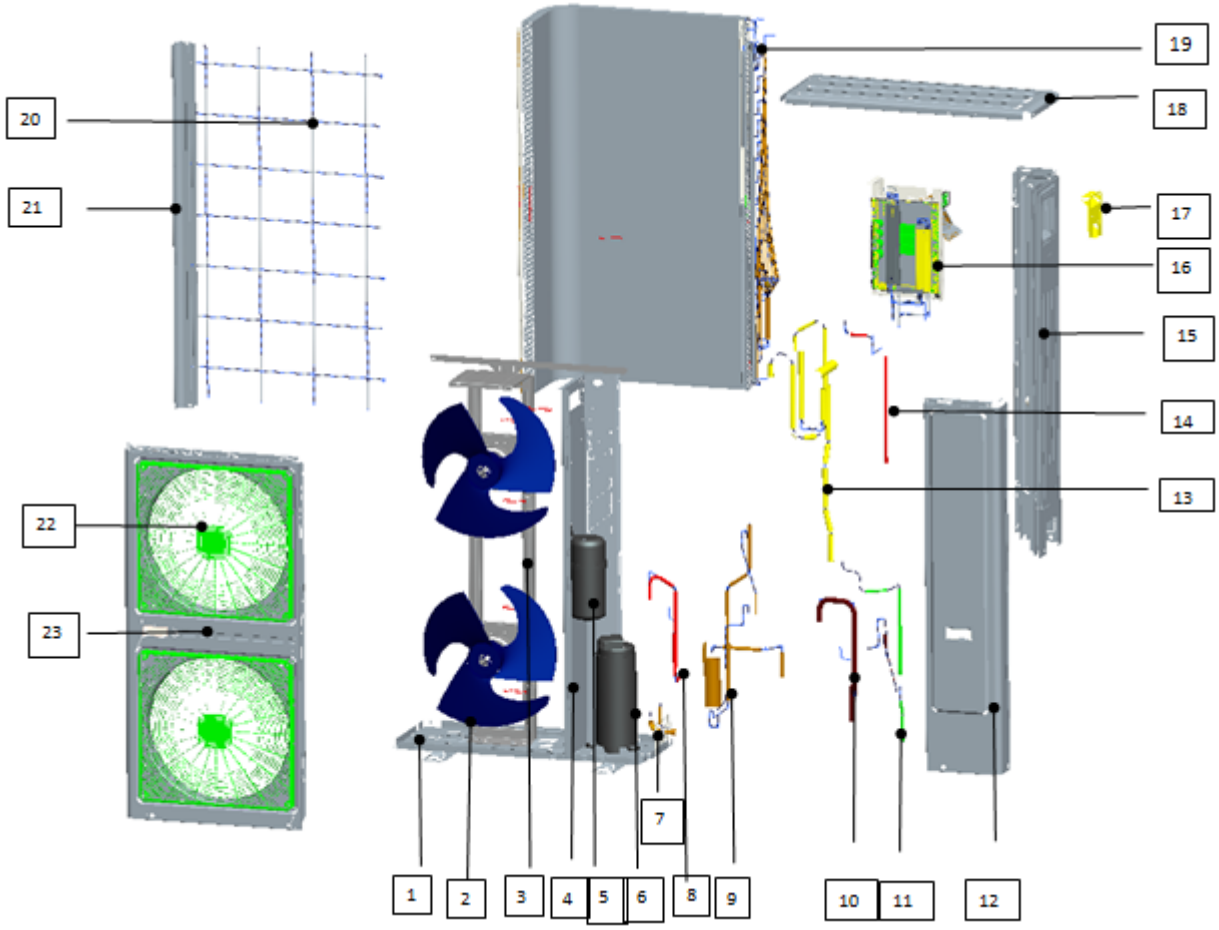
8 Exploded views

12.5kW, 14kW, 16kW, 18kW



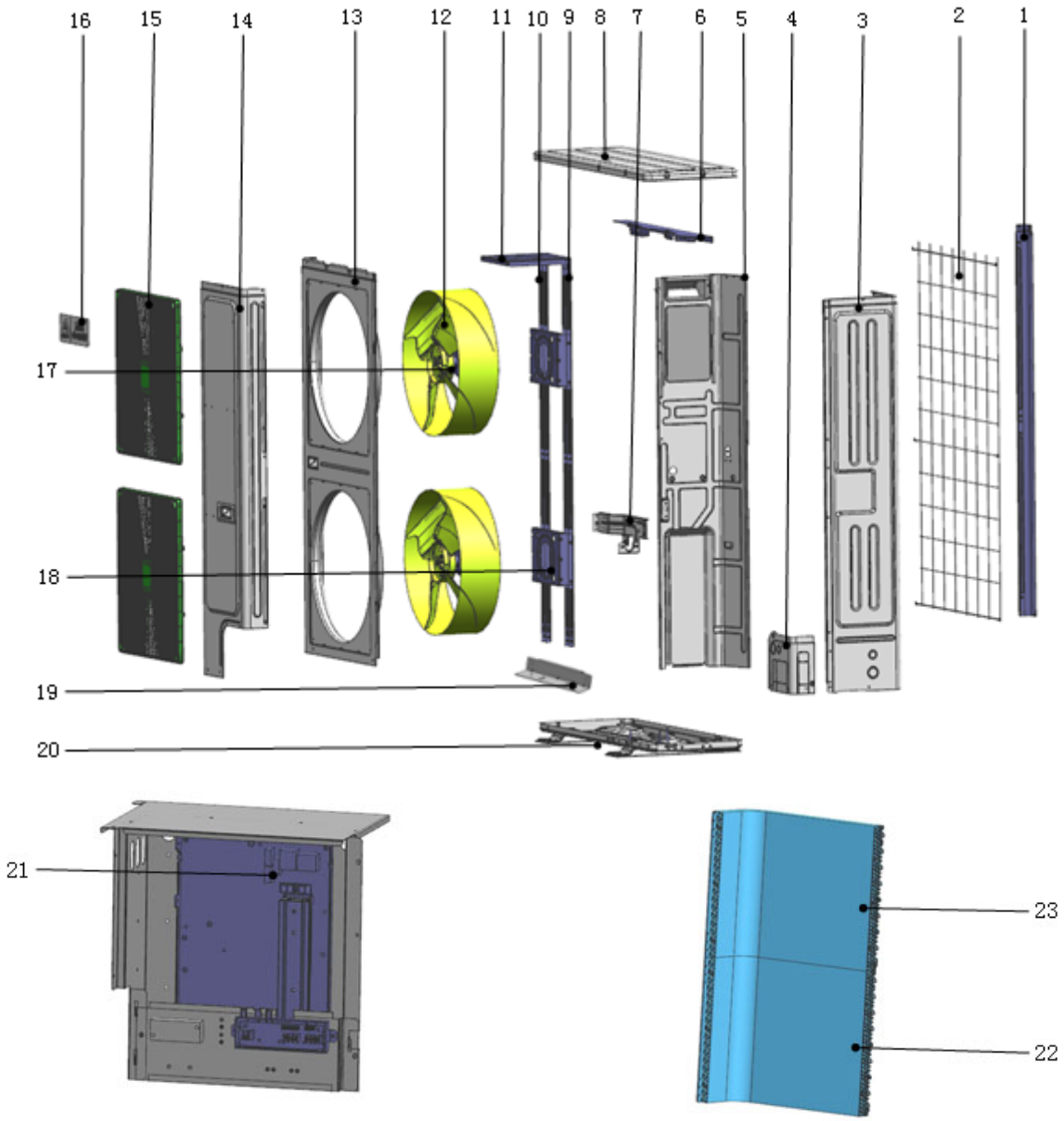
No.	Part name	Quantity	No.	Part name	Quantity
1	Chassis assy	1	13.1	4-way valve	1
2	Axial fan blade	2	13.2	4-way valve coil	1
3.1	Connection board of fan motor support	1	14	EXV assy	1
3.2	Fan motor support assy	1	14.1	EXV	1
3.3	Fan motor mounting plate assy	2	14.2	EXV coil	1
3.4	Fan motor fixed plate	1	15.1	Back plate	1
3.5	Fan motor support assy	1	15.2	Handler	1
3.6	Strengthen bar	1	16	Electrical control component	1
3.7	DC fan motor	2	16.1	Main PCB install base	1
4.1	Middle partition assembly	1	16.2	Terminal	1
4.2	Waterproof cover	1	16.3	Reactor	1
5	Inverter compressor	1	16.4	Display board install base	1
6	Gas-liquid separator	1	16.5	Display board	1
7.1	Stop valve	1	16.6	EC install box	1
7.2	Seat plate	1	16.7	Main PCB	1
7.3	Stop valve	1	16.8	Refrigerant cooling pipe cover	1
8	Discharge pipe assy1	1	16.9	Refrigerant cooling pipe assy	1
9	Discharge pipe assy2	1	17	Big handler	1
10	Suction pipe assy	1	18	Top cover	1
11	Filter assy	1	19	Condenser component	1
12.1	Right side panel	1	20	Stand column	1
12.2	Handler	1	21	Mesh enclosure	2
13	4-way valve assy	1	22	Front panel	1

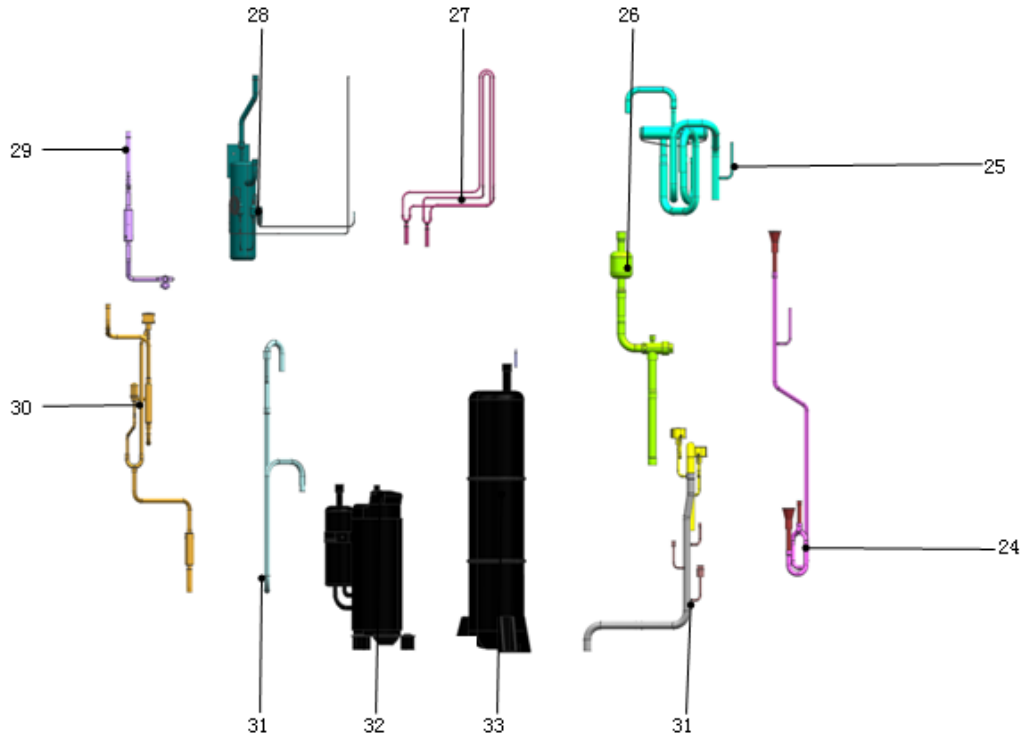
20kW, 22.4kW:



No.	Part name	Quantity	No.	Part name	Quantity
1	Chassis welding assembly	1	14.1	Electronic expansion valve coil	1
2	Axial-flow fan blade	2	14.2	Electronic expansion valve	1
3.1	Right motor bracket welding assembly	1	15	Right side panel sticking cotton component	1
3.2	Left motor bracket welding assembly	1	16	Outdoor electric control box assembly	1
3.3	Motor mounting plate assembly	2	16.1	Outdoor main PCB	1
3.4	Motor bracket base	1	16.2	Display board	1
3.5	Motor bracket top cover	1	16.3	Reactor	1
3.6	Motor bracket connecting plate welding assembly	1	16.4	Terminal	1
3.7	DC fan motor	2	16.5	Terminal mounting plate	1
4	Middle partition part	1		Radiator cover	1
5	Gas-liquid separator	1		Refrigerant cooling pipe assembly	1
6	Inverter compressor	1	17	Big handle stick cotton components	1
7.1	Stop valve DN8(T)	1	18	Top cover with cotton components	1
7.2	Stop valve DN16(T)	1	19	Condenser parts	1
7.3	Valve seat plate	1	19.1	Condenser	1
8	Compressor exhaust pipe parts	1	19.2	Flute tube assembly	1
9	Compressor exhaust pipe parts	1	19.3	Condenser shunt assembly	1
10	Compressor return pipe components	1	20	Protective net	1
11	Filter components	1	21	Column	1
12	Maintenance panel	1	22	Mesh cover	2
13	Four-way valve assembly	1	23	Front panel	1
13.1	4-way valve	1	24	Condenser temperature sensor	1
13.2	4-way valve coil	1	25	Discharge temperature sensor	1
14	Electronic expansion valve assembly	1	26	Ambient temperature sensor	1

26kW, 28kW, 33.5kW:





No.	Part name	Quantity	No.	Part name	Quantity
1	Column	1	21.3	Display board	1
2	Iron back net	1	21.4	Reactor	1
3	Right rear side panel assembly	1	22	Condenser	1
4	Pipe cover	1	23	Condenser	1
5	Middle partition parts	1	24	Three way component	1
6	Upper mounting plate	1	25	Four way valve welding assembly	1
7	Valve seat plate	1	25.1	4-way valve	1
8	Upper cover plate	1	25.2	4-way valve coil	1
9	Right motor bracket assembly	1	26	Low pressure ball valve assembly	1
10	Left motor bracket assembly	1	27	Refrigerant cooling pipe assembly	1
11	Motor bracket mounting plate	1	28	Oil separator welding assembly	1
12	Axial flow fan	2	29	High pressure stop valve assembly	1
13	Front panel	1	30	Electronic expansion valve assembly	1
14	Right front side plate assembly	1	30.1	Electronic expansion valve	1
15	Front net cover	2	30.2	Electronic expansion valve coil	1
17	Single axis outdoor DC motor	2	31	Exhaust pipe assembly	1
18	Motor mounting base	2	32	Frequency conversion compressor	1
19	Motor support plate	1	33	Gas liquid separator	1
20	Chassis assembly	1	34	Return air tube assembly	1
21	Electronic control unit	1	35	Discharge temperature sensor	1
21.1	Reactor	1	36	Ambient temperature sensor	1
21.2	Outdoor main PCB	1	37	Condenser temperature sensor	1