

Airwell

Service Manual

Fixed Speed Light Commercial Series

FCF Indoor Units	Outdoor Units
AWSI-FCF036-N12	AWAU-YOF036-C12
AWSI-FCF048-N12	AWAU-YOF048-C12
AWSI-FCF060-N12	AWAU-YOF060-C12

REFRIGERANT

R410A

COOL ONLY

SM FCF 60Hz 1-A.1 GB

FEB, 2014

Part 1 General Information	1
Part 2 Indoor Units	8
Part 3 Outdoor Units.....	23
Part 4 Installation.....	38
Part 5 Electrical Control System	56

※The specifications, designs, and information in this book are subject to change without notice for product improvement.

Part 1

General Information

1. Model Lists	2
2. External Appearance	3
2.1 Indoor Units	3
2.2 Outdoor Units.....	3
3. Product specification	4
4. Features.....	7

1. Model Lists

1.1 Indoor Units

R410A (capacity multiplied by 1000Btu/h)

Type	Function	36	48	60
Ceiling-floor	Cooling only	●	●	●

1.2 Outdoor Units

Universal Outdoor unit Model	Compressor type	Compressor Brand	Matched indoor units
AWAU-YOF036-C12	Rotary	Mitsubishi	AWSI-FCF036-N12
AWAU-YOF048-C12	Scroll	Sanyo	AWSI-FCF048-N12
AWAU-YOF060-C12	Scroll	Sanyo	AWSI-FCF060-N12

2. External Appearance

2.1 Indoor Units



2.2 Outdoor Units



3. Product specification

Model Indoor Unit			AWSI-FCF036-N12
Model Outdoor Unit			AWAU-YOF036-C12
Installation Method of Pipe			Flared
Characteristics	Units		Cooling Heating
Rated Capacity	kW		10.55 /
Input power	kW		3.94 /
EER/Energy Label	W/W		2.68/D /
Power supply	V/Ph/Hz		220-1-60
Circuit breaker rating	A		25
INDOOR	Fan type & quantity		Centrifugal fan x3
	Fan speeds	H/M/L	RPM
	Air flow ⁽³⁾	H/M/L	m3/hr
	External static pressure	Min-Max	Pa
	Sound pressure level ⁽⁵⁾	H/M/L	dB(A)
	Moisture removal		l/hr
	Condensate drain tube I.D		mm
	Dimensions	WxHxD	mm
	Weight		kg
	Package dimensions	LxWxH	mm
	Packaged weight		kg
	Stacking height		units
	OUTDOOR	Refrigerant control	
Compressor type. model		Rotary	
Fan type & quantity		Axial x 1	
Fan speeds		H/L	RPM
Air flow		H/L	m3/hr
Sound pressure level ⁽⁵⁾		H/L	dB(A)
Dimensions		WxHxD	mm
Weight			kg
Package dimensions		LxWxH	mm
Packaged weight			kg
Stacking height			units
Refrigerant type		R410A	
Refrigerant charge (standard connecting tubing length)		kg(5m)	
Additional charge per 1 meter		gr / 1m	
Connections between units		Liquid line	In.(mm)
		Suction line	In.(mm)
	Max.tubing length	m.	
	Max.height difference	m.	
Operation control type			Remote control

Model Indoor Unit			AWSI-FCF048-N12
Model Outdoor Unit			AWAU-YOF048-C12
Installation Method of Pipe			Flared
Characteristics		Units	Cooling Heating
Rated Capacity		kW	14.07 /
Input power		kW	5.58 /
EER/Energy Label		W/W	2.52/E /
Power supply		V/Ph/Hz	220-1-60
Circuit breaker rating		A	30
INDOOR	Fan type & quantity		Centrifugal fan x4
	Fan speeds	H/M/L	RPM
	Air flow ⁽³⁾	H/M/L	m3/hr
	External static pressure	Min-Max	Pa
	Sound pressure level ⁽⁵⁾	H/M/L	dB(A)
	Moisture removal		l/hr
	Condensate drain tube I.D		mm
	Dimensions	WxHxD	mm
	Weight		kg
	Package dimensions	LxWxH	mm
	Packaged weight		kg
	Stacking height		units
	OUTDOOR	Refrigerant control	
Compressor type. model		Scroll	
Fan type & quantity		Axial x 1	
Fan speeds		H/L	RPM
Air flow		H/L	m3/hr
Sound pressure level ⁽⁵⁾		H/L	dB(A)
Dimensions		WxHxD	mm
Weight			kg
Package dimensions		LxWxH	mm
Packaged weight			kg
Stacking height			units
Refrigerant type		R410A	
Refrigerant charge (standard connecting tubing length)		kg(5m)	
Additional charge per 1 meter		gr / 1m	
Connections between units		Liquid line	In.(mm)
		Suction line	In.(mm)
	Max.tubing length	m.	
	Max.height difference	m.	
Operation control type			Remote control

Model Indoor Unit			AWSI-FCF060-N12	
Model Outdoor Unit			AWAU-YOF060-C12	
Installation Method of Pipe			Flared	
Characteristics		Units	Cooling Heating	
Rated Capacity		kW	16.12 /	
Input power		kW	6.3 /	
EER/Energy Label		W/W	2.56/E /	
Power supply		V/Ph/Hz	220-1-60	
Circuit breaker rating		A	35	
INDOOR	Fan type & quantity		Centrifugal fan x4	
	Fan speeds	H/M/L	RPM	1400/1220/1090
	Air flow ⁽³⁾	H/M/L	m3/hr	2300/1900/1700
	External static pressure	Min-Max	Pa	/
	Sound pressure level ⁽⁵⁾	H/M/L	dB(A)	56/52/48
	Moisture removal		l/hr	5.0
	Condensate drain tube I.D		mm	ODΦ25
	Dimensions	WxHxD	mm	1650x675x235
	Weight		kg	39
	Package dimensions	LxWxH	mm	1725x313x755
	Packaged weight		kg	45
	Stacking height		units	7
	OUTDOOR	Refrigerant control		/
Compressor type. model		Scroll		
Fan type & quantity		Axial x 1		
Fan speeds		H/L	RPM	1095
Air flow		H/L	m3/hr	7400
Sound pressure level ⁽⁵⁾		H/L	dB(A)	65
Dimensions		WxHxD	mm	710x843x710
Weight			kg	80
Package dimensions		LxWxH	mm	738x738x872
Packaged weight			kg	85
Stacking height			units	2
Refrigerant type			R410A	
Refrigerant charge (standard connecting tubing length)		kg(5m)	2.2	
Additional charge per 1 meter		gr / 1m	40	
Connections between units		Liquid line	In.(mm)	3/8"(Φ9.52)
	Suction line	In.(mm)	3/4"(Φ19)	
	Max.tubing length	m.	50	
	Max.height difference	m.	25	
Operation control type			Remote control	

4. Features

New condensing unit-2nd generation is an upgraded series compared with 1st generation condensing unit. This news series has below outstanding improvements and features.

1. Elegant appearance (Various appearance to choose), Customer can choose 3 colors of outlook: GREY, SILVER GREY, CHAMPAGNE & choose 2 colors of air return grille: PLASTIC, STEEL
2. Much better performance and efficiency.
3. Compact body with more competitive loading capacity.
4. Reliable and well-known compressors (Copeland).
5. 24V control start-up, safety.
6. We adapt throttle device adopts piston installed in indoor unit, easy to maintain.
7. Easy to install the unit.
8. Match ceiling and floor indoor unit

Part 2

Indoor Units

Ceiling & Floor Type.....9

Ceiling & Floor Type

1. Features.....	10
2. Dimensions	11
3. Service Space.....	12
4. Wiring Diagrams	13
5. Electric Characteristics	14
6. Sound Levels	14
7. Accessories.....	15
8. The Specification of Power	15
9. Field Wiring	16
10. Exploded View and Spare Part list	17

1. Features

1.1. New design, more modern and elegant appearance.

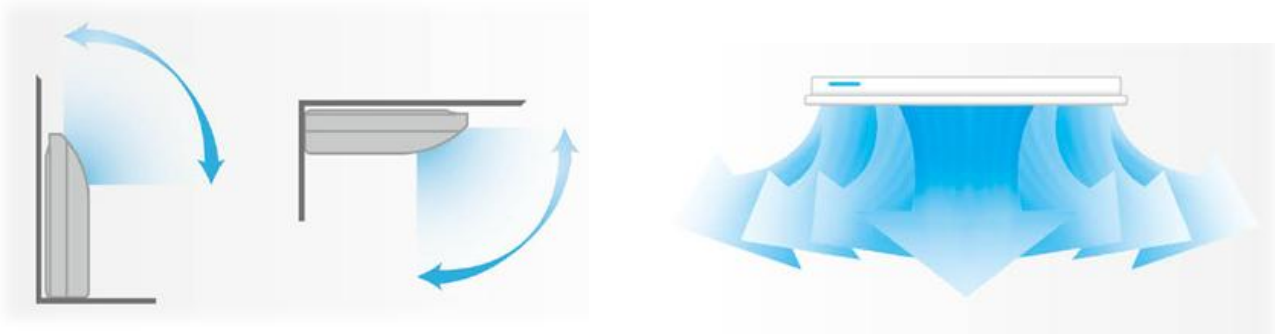


1.2. Convenient installation

- The ceiling type can be easily installed into a corner of the ceiling even if the ceiling is very narrow
- It is especially useful when installation of an air conditioner in the center of the ceiling is impossible due to a structure such as one lighting.

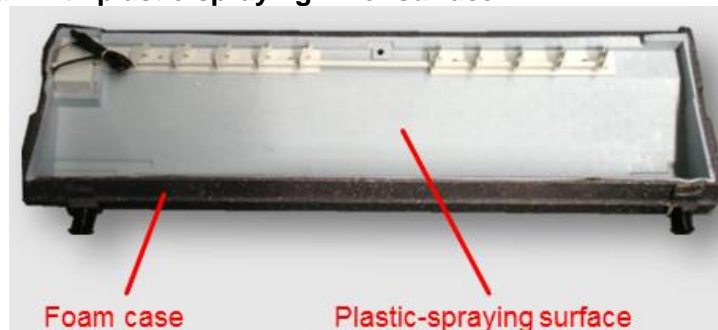
1.3. Two direction auto swing (vertical & horizontal) and wide angle air flow,

- Air flow directional control minimizes the air resistance and produces wider air flow to vertical direction.
- The range of horizontal air discharge is widened which secures wider air flow distribution to provide more comfortable air circulation no matter where the unit is set up



1.4. Three level fan speed, more humanism design, meets different air-supply requirement.

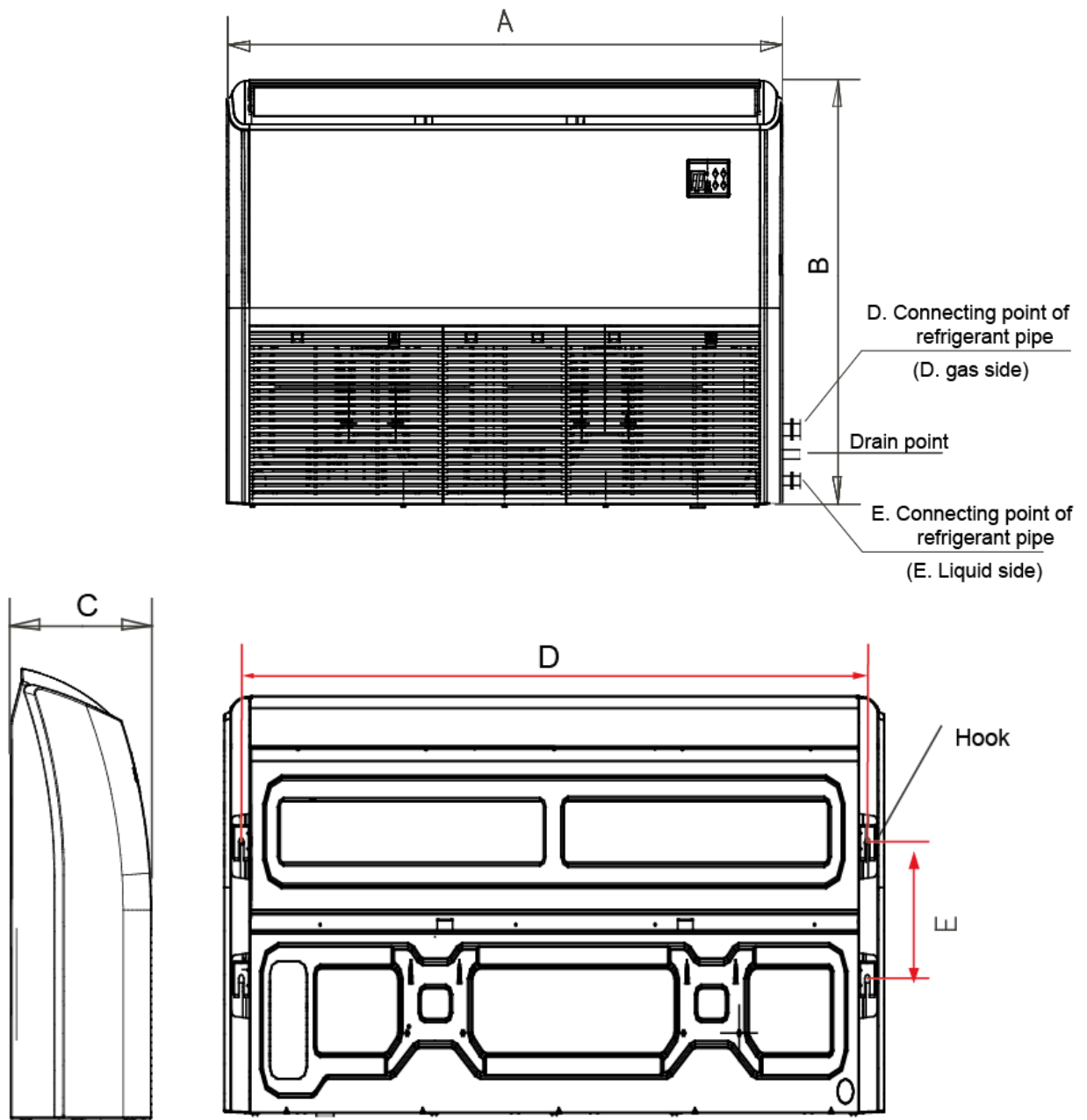
1.5. New foam drain pan with plastic-spraying inner surface



1.6. Easy operation.

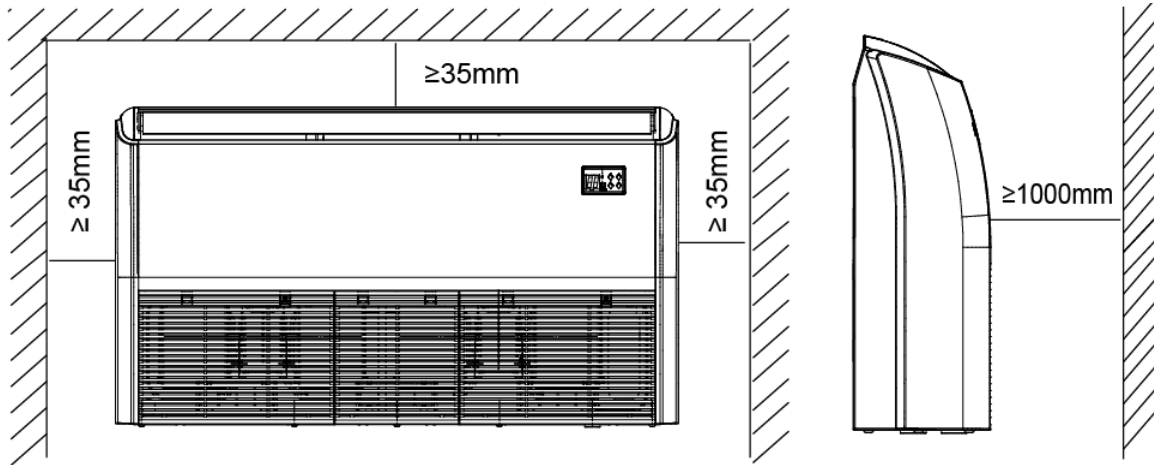
1.7. Remote control and optional wired control method.

2. Dimensions



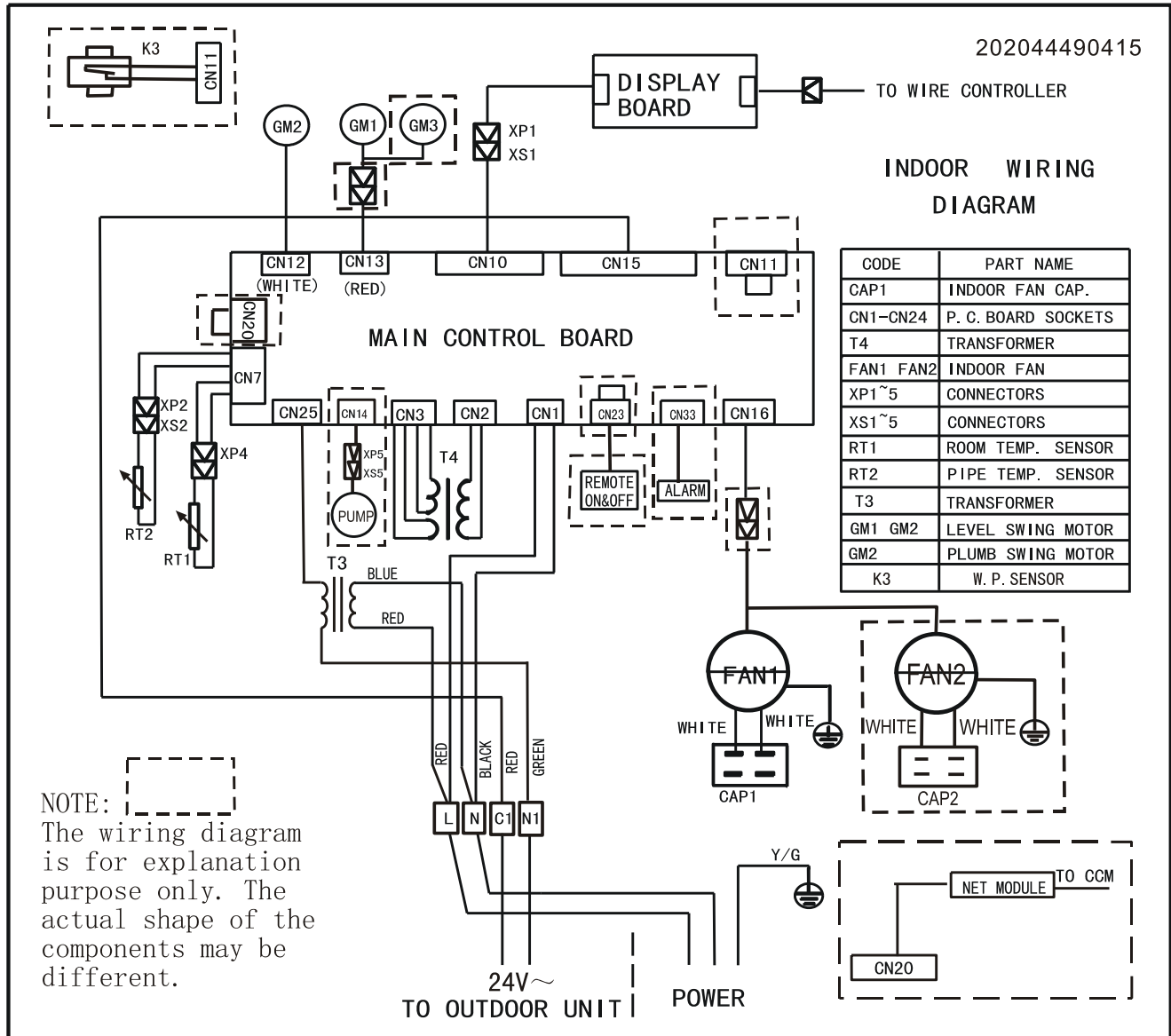
Model	A	B	C	D	E
AWSI-FCF036-N12	1285	675	235	1200	220
AWSI-FCF048-N12	1650	675	235	1565	220
AWSI-FCF060-N12	1650	675	235	1565	220

3. Service Space



4. Wiring Diagrams

AWSI-FCF036-N12 AWSI-FCF048-N12 AWSI-FCF060-N12



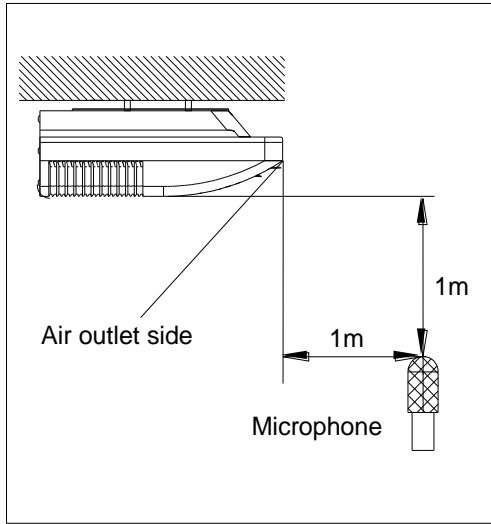
5. Electric Characteristics

Model	Indoor Units				Power Supply
	Hz	Voltage	Min.	Max.	MFA
AWSI-FCF036-N12	60	220-230V	198V	242V	16
AWSI-FCF048-N12	60	220-230V	198V	242V	16
AWSI-FCF060-N12	60	220-230V	198V	242V	16

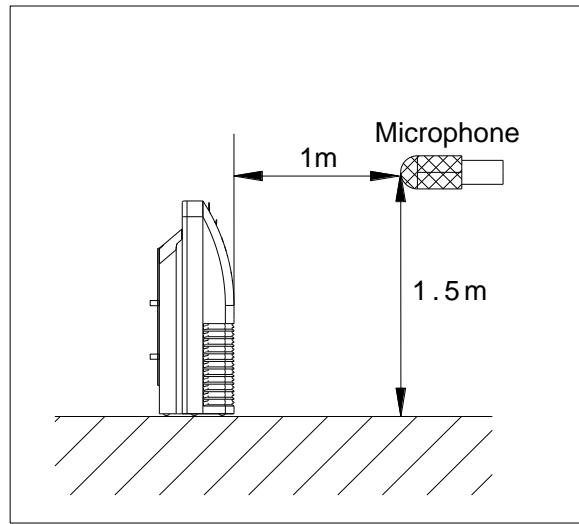
Note:

MFA: Max. Fuse Amps. (A)

6. Sound Levels










Ceiling



Floor

Model	Noise level dB(A)		
	H	M	L
AWSI-FCF036-N12	55	51	48
AWSI-FCF048-N12	56	52	48
AWSI-FCF060-N12	56	52	48

7. Accessories

	Name	Shape	Quantity
Remote controller & Its holder(The product you have might not be provided the following accessories)	1. Remote controller		1
	2. Remote controller holder		1
	3. Mounting screw (ST2.9x10-C-H)		2
	4. Alkaline dry batteries (AM4)		2
Others	5. Owner's manual		1
	6. Installation manual		1
	7. Remote controller manual		1

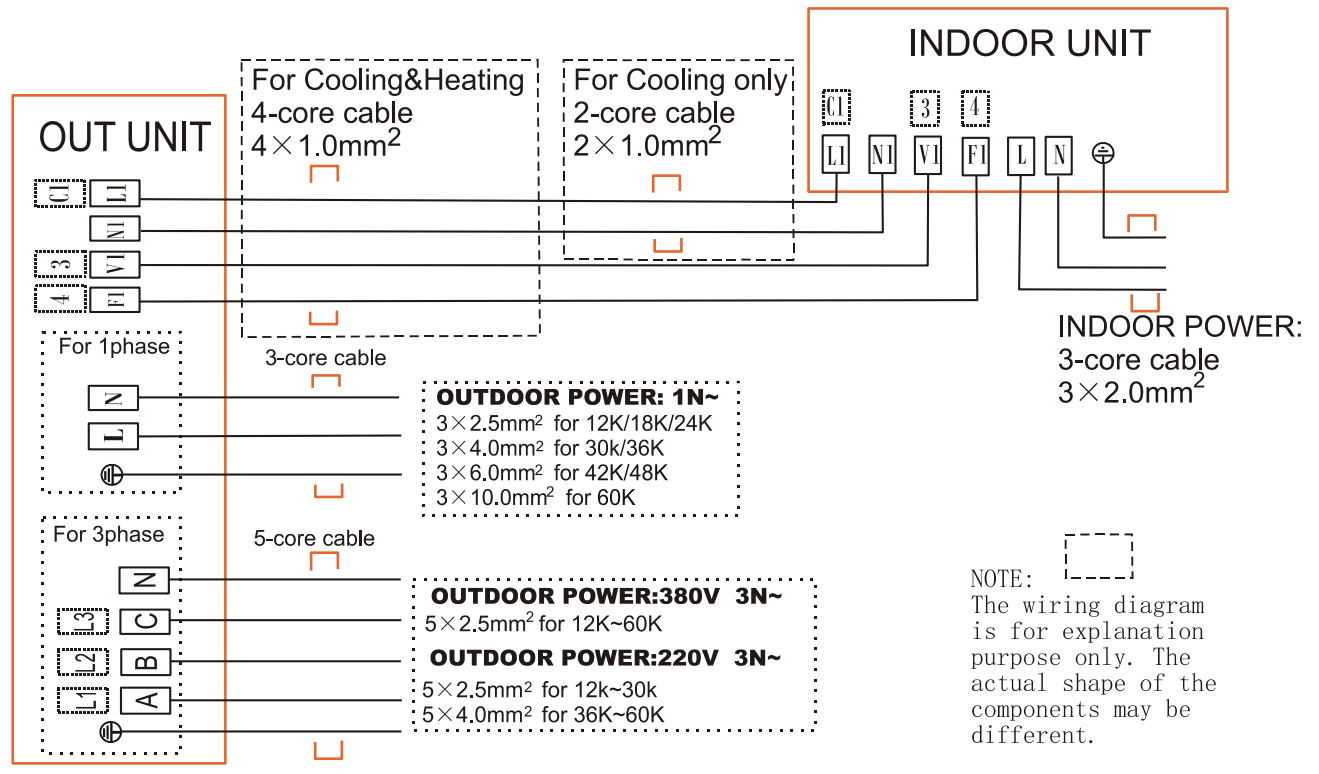
8. The Specification of Power

Type (Cooling only)		36000 Btu/h	48000 Btu/h	60000 Btu/h	
Power	Indoor unit	Phase	1- Phase	1- Phase	1- Phase
		Frequency and Voltage	220-230V~,60Hz	220-230V~,60Hz	220-230V~,60Hz
	Outdoor unit	Phase	1- Phase	1- Phase	1- Phase
		Frequency and Voltage	220-230V~,60Hz	220-230V~,60Hz	220-230V~,60Hz
Indoor Circuit Breaker/ Fuse (A)		20/16	20/16	20/16	
Outdoor Circuit Breaker/ Fuse (A)		50/30	60/45	60/50	
Indoor Unit Power Wiring (mm ²)		3x2.0	3x2.0	3x2.0	
Indoor/Outdoor Connecting Wiring (mm ²)		Ground Wiring	4.0	6.0	10.0
		Outdoor Unit Power Wiring	3X4.0	3X6.0	3X10.0
		Strong Electric Signal	————	————	————
		Weak Electric Signal	2x1.0	2x1.0	2x1.0

9. Field Wiring

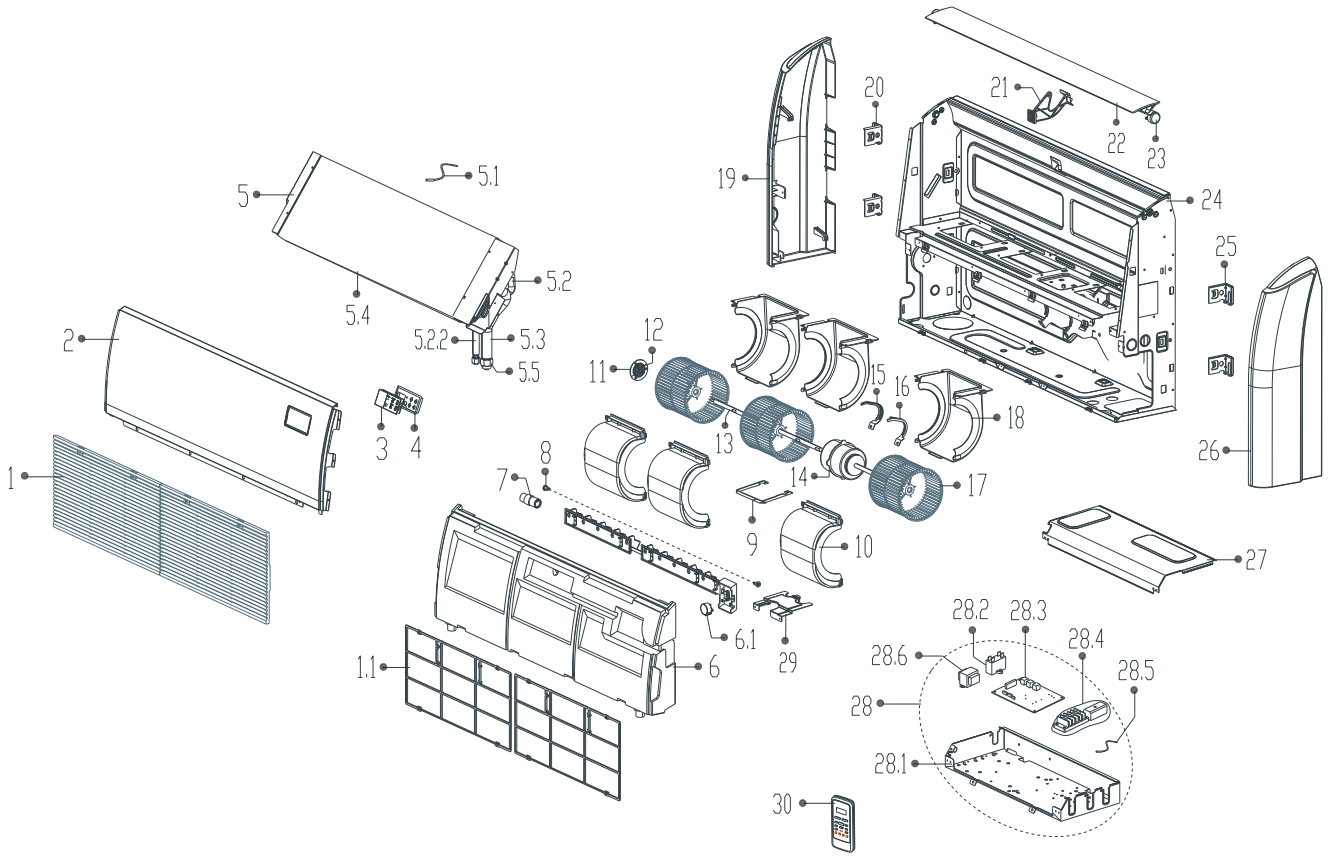
AWSI-FCF036-N12 AWSI-FCF048-N12 AWSI-FCF060-N12

Air Condition Link-Circuit



10. Exploded View and Spare Part list

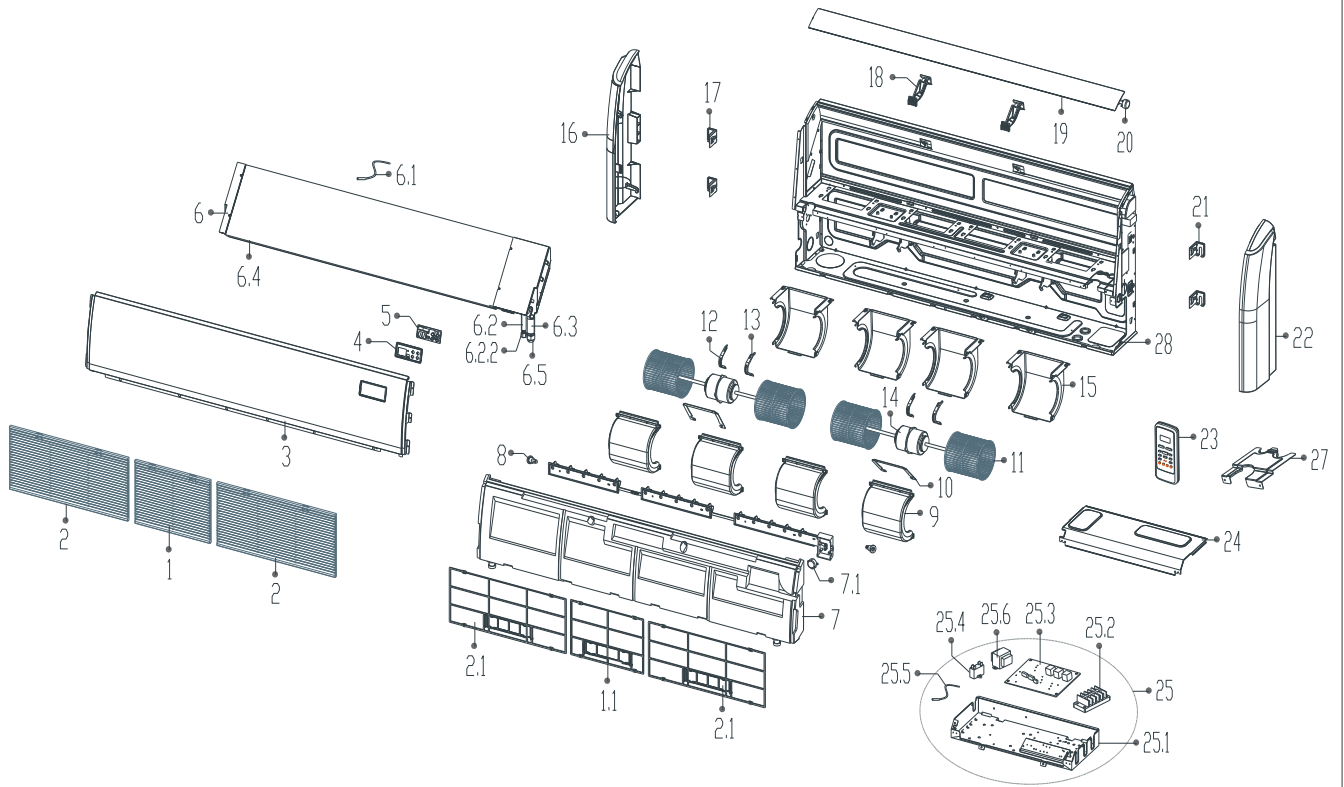
Exploded View of indoor unit: AWSI-FCF036-N12



Spare part list of indoor unit: AWSI-FCF036-N12

No.	Part Name	Qty	BOM Code	No.	Part Name	Qty	BOM Code
1	Air inlet grille assembly I	2	201144790015	16	Fan motor axes clamp (left)	1	201280200005
1.1	Air filter I	1	201144790024	17	Centrifugal fan	3	201144690083
2	Top cover assembly	1	2012444A0012	18	Volute shell (below)	3	201144690033
3	Display board assembly	1	2013447A0064	19	Right cover	1	201144790017
4	Display installation box	1	2011447A0009	20	Right hook	2	201244790033
5	Evaporator assembly	1	201544490268	21	Supporter of louver	1	201144790018
5.1	Pipe temperature sensor assembly	1	202301300111	22	Louver	1	201144490040
5.2	Input pipe assembly	1	201644490328	23	Louver motor	1	202400200162
5.2.2	Throttle valve	1	201600801136	24	Chassis assembly	1	201244490046
5.3	Output pipe assembly	1	201644490315	25	Left hook	2	201244790034
5.4	Evaporator	1	201544490252	26	Left cover	1	201144790019
5.5	Copper nut	1	201600320004	27	Cover of electronic control box	1	201244490048
6	Water collector	1	202244490015	28	Electronic control box assembly	1	203344490059
6.1	Louver motor (vertical)	1	202400200100	28.1	Electronic control box	1	201244790050
7	Coupling	1	202970790001	28.2	Capacitor	1	202401100505
8	Insulated axis	2	201132590888	28.3	Main control board assembly	1	201344790051
9	Fan motor fixing board	1	201244590001	28.4	Wire joint	1	202301450130
10	Volute shell (above)	3	201144690032	28.5	Ambient temperature sensor assembly	1	202301310072
11	Bearing fixing board	1	201287000011	28.6	Transformer	1	202300930220
12	Bearing base	1	202732400001	28.6	Transformer	1	202300900552
13	Connecting shaft	1	202501180103	29	Pipe clamp board	1	201244790047
14	Asynchronous motor	1	202400401329	30	Remote controller	1	203355091552
15	Fan motor axes clamp (right)	1	201280200006				

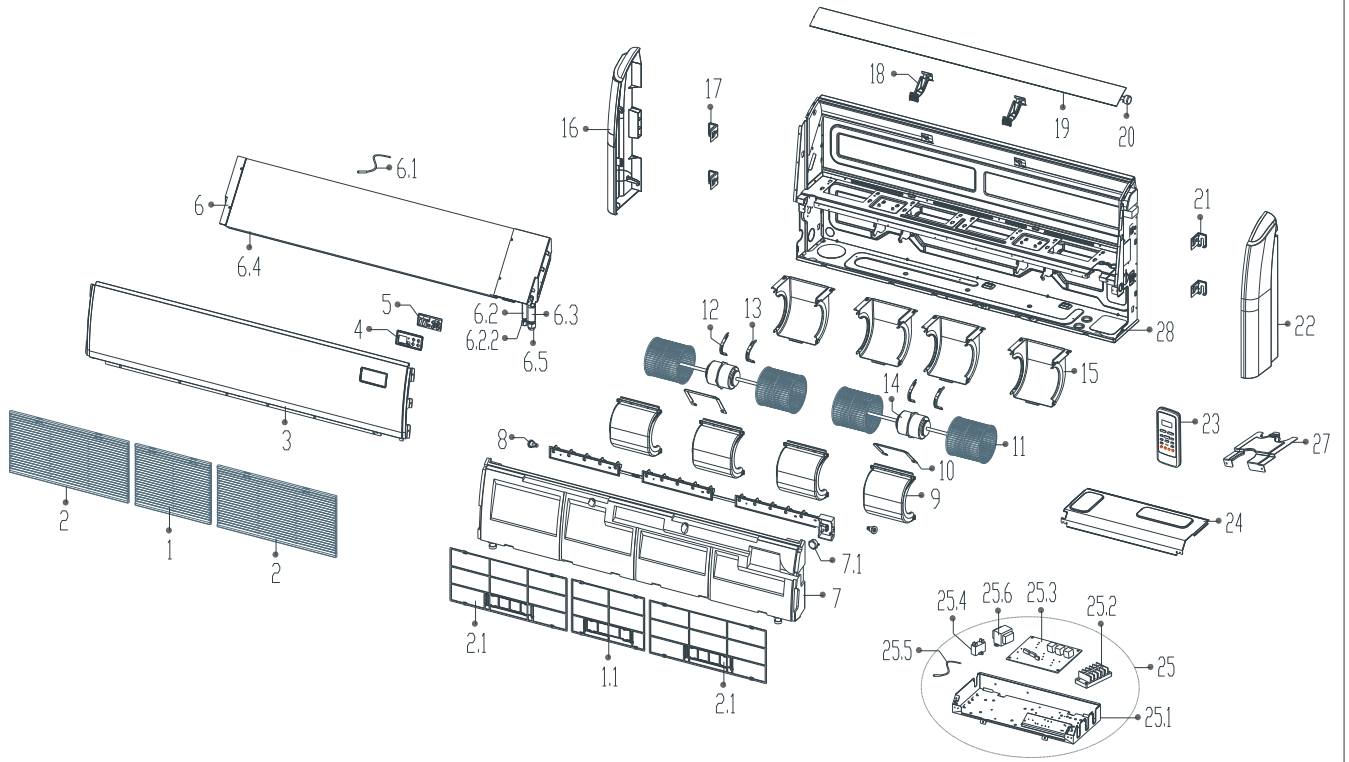
Exploded View of indoor unit: AWSI-FCF048-N12



Spare part list of indoor unit: AWSI-FCF048-N12

No.	Part Name	Qty	BOM Code	No.	Part Name	Qty	BOM Code
1	Air inlet grille assembly II	1	201144790014	14	Asynchronous motor	2	202400401365
1.1	Air filter I	1	201144790023	15	Volute shell (below)	4	201144690033
2	Air inlet grille assembly I	2	201144790015	16	Right cover	1	201144790017
2.1	Air filter II	1	201144790024	17	Right hook	2	201244790033
3	Top cover assembly	1	2012447A0016	18	Supporter of louver	2	201144790018
4	Display installation box	1	2011447A0009	19	Louver	1	201144790006
5	Display board assembly	1	2013447A0064	20	Louver motor	1	202400200162
6	Evaporator assembly	1	201544690193	21	Left hook	2	201244790034
6.1	Pipe temperature sensor assembly	1	202301300111	22	Left cover	1	201144790019
6.2	Input pipe assembly	1	201644690258	23	Remote controller	1	203355091552
6.2.2	Throttle valve	1	201600800183	24	Cover of electronic control box	1	201244490048
6.3	Output pipe assembly	1	201644690249	25	Electronic control box assembly	1	203344790044
6.4	Evaporator	1	201544690184	25.1	Electronic control box	1	201244790050
6.5	Copper nut	1	201600320004	25.2	Wire joint	1	202301450130
7	Water collector	1	202244790001	25.3	Main control board assembly	1	201344790051
7.1	Louver motor	1	202400200100	25.4	Capacitor	2	202401190019
8	Insulated axis	2	201132590888	25.5	Ambient temperature sensor assembly	1	202301310072
9	Volute shell (above)	4	201144690032	25.6	Transformer	1	202300930220
10	Fan motor fixing board	2	201244590001	25.6	Transformer	1	202300900552
11	Centrifugal fan	4	201144690083	27	Pipe clamp board	1	201244790047
12	Fan motor axes clamp	2	201280200006	28	Chassis assembly	1	201244790049
13	Fan motor axes clamp (left)	2	201280200005				

Exploded View of indoor unit: AWSI-FCF060-N12



Spare part list of indoor unit: AWSI-FCF060-N12

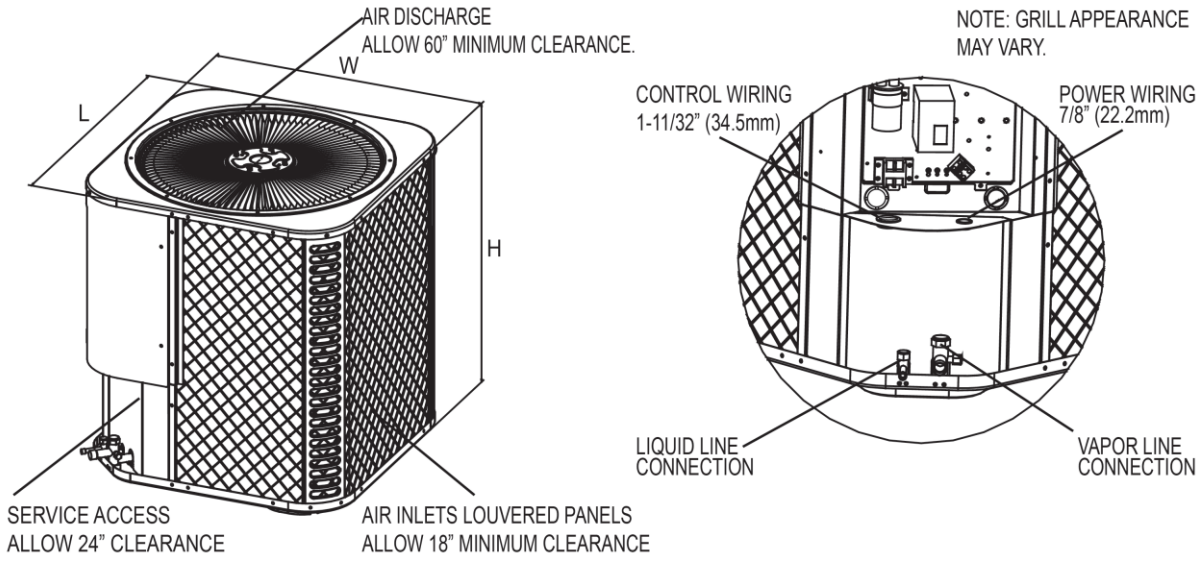
No.	Part Name	Qty	BOM Code	No.	Part Name	Qty	BOM Code
1	Air inlet grille assembly II	1	201144790014	14	Asynchronous motor	2	202400401365
1.1	Air filter I	1	201144790023	15	Volute shell (below)	4	201144690033
2	Air inlet grille assembly I	2	201144790015	16	Right cover	1	201144790017
2.1	Air filter II	1	201144790024	17	Right hook	2	201244790033
3	Top cover assembly	1	2012447A0016	18	Supporter of louver	2	201144790018
4	Display installation box	1	2011447A0009	19	Louver	1	201144790006
5	Display board assembly	1	2013447A0064	20	Louver motor	1	202400200162
6	Evaporator assembly	1	201544790138	21	Left hook	2	201244790034
6.1	Pipe temperature sensor assembly	1	202301300111	22	Left cover	1	201144790019
6.2	Input pipe assembly	1	201644790183	23	Remote controller	1	203355091552
6.2.2	Throttle valve	1	201600801283	24	Cover of electronic control box	1	201244490048
6.3	Output pipe assembly	1	201644790185	25	Electronic control box assembly	1	203344790044
6.4	Evaporator	1	201544790139	25.1	Electronic control box	1	201244790050
6.5	Copper nut	1	201600320004	25.2	Wire joint	1	202301450130
7	Water collector	1	202244790001	25.3	Main control board assembly	1	201344790051
7.1	Louver motor	1	202400200100	25.4	Capacitor	2	202401190019
8	Insulated axis	2	201132590888	25.5	Ambient temperature sensor assembly	1	202301310072
9	Volute shell (above)	4	201144690032	25.6	Transformer	1	202300930220
10	Fan motor fixing board	2	201244590001	25.6	Transformer	1	202300900552
11	Centrifugal fan	4	201144690083	27	Pipe clamp board	1	201244790047
12	Fan motor axes clamp (right)	2	201280200006	28	Chassis assembly	1	201244790049
13	Fan motor axes clamp (left)	2	201280200005				

Part 3

Outdoor Units

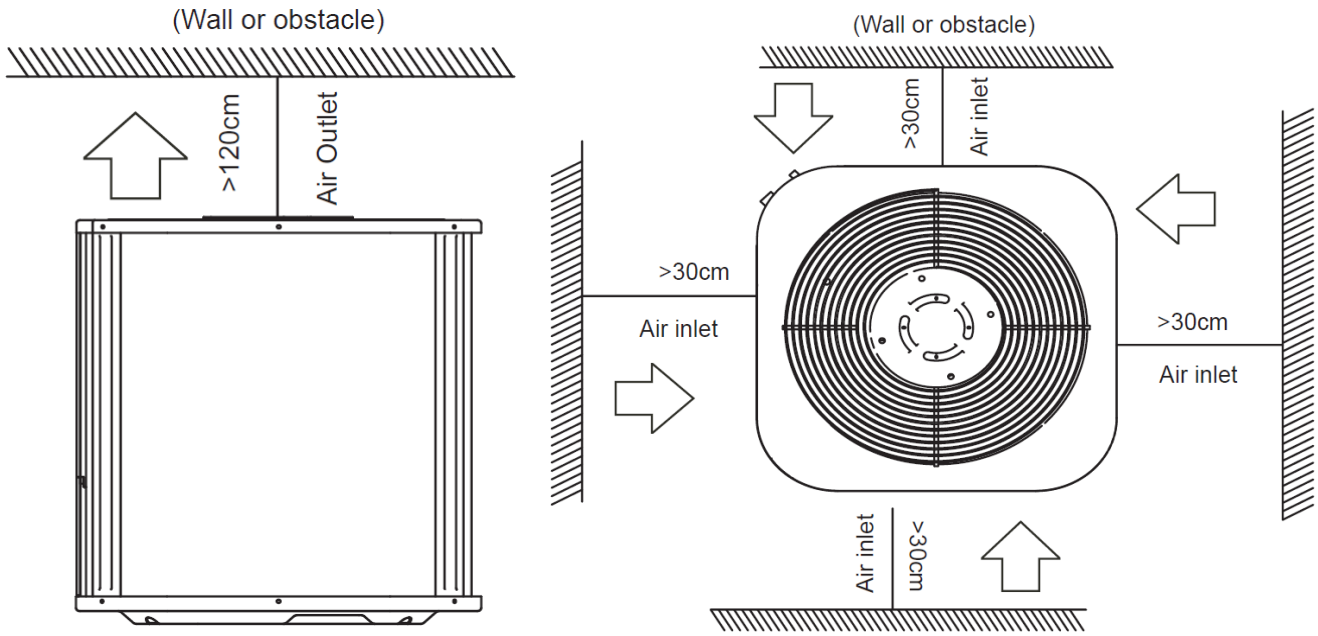
1. Dimensions	24
2. Service Space	25
3. Piping Diagrams	26
4. Wiring Diagrams	27
5. Electric Characteristics	29
6. Operation Limits	30
7. Sound Levels	31
8. Exploded View and Spare Part list	32

1. Dimensions



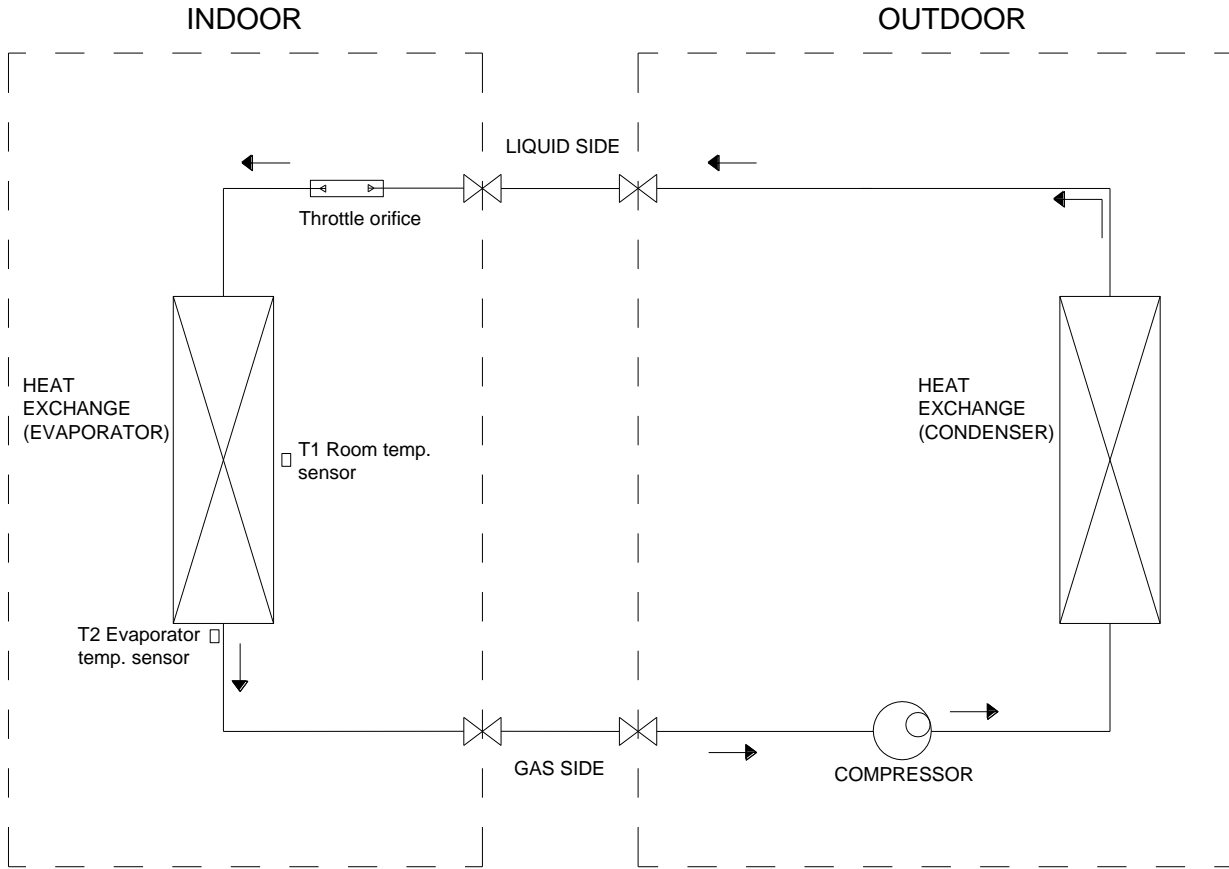
Model	Dimensions (Inches)			Refrigerant Connection Service Valve Size	
	"H" in [mm]	"W" in [mm]	"L" in [mm]	Liquid in	Vapor in
AWAU-YOF036-C12	29-7/8[759]	23-5/8[600]	23-5/8[600]	3/8	3/4
AWAU-YOF048-C12	29-7/8[759]	28[710]	28[710]	3/8	3/4
AWAU-YOF060-C12	33-3/16[843]	28[710]	28[710]	3/8	3/4

2. Service Space

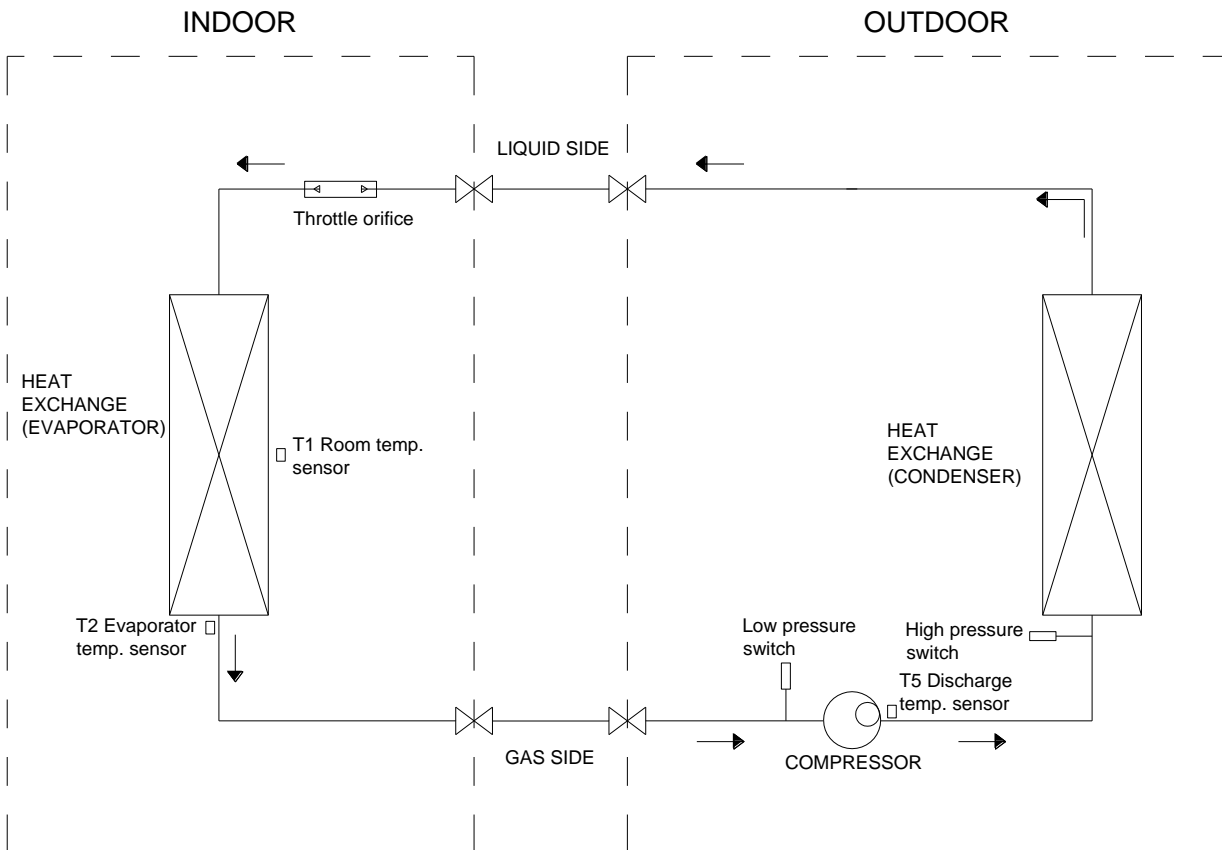


3. Piping Diagrams

AWAU-YOF036-C12

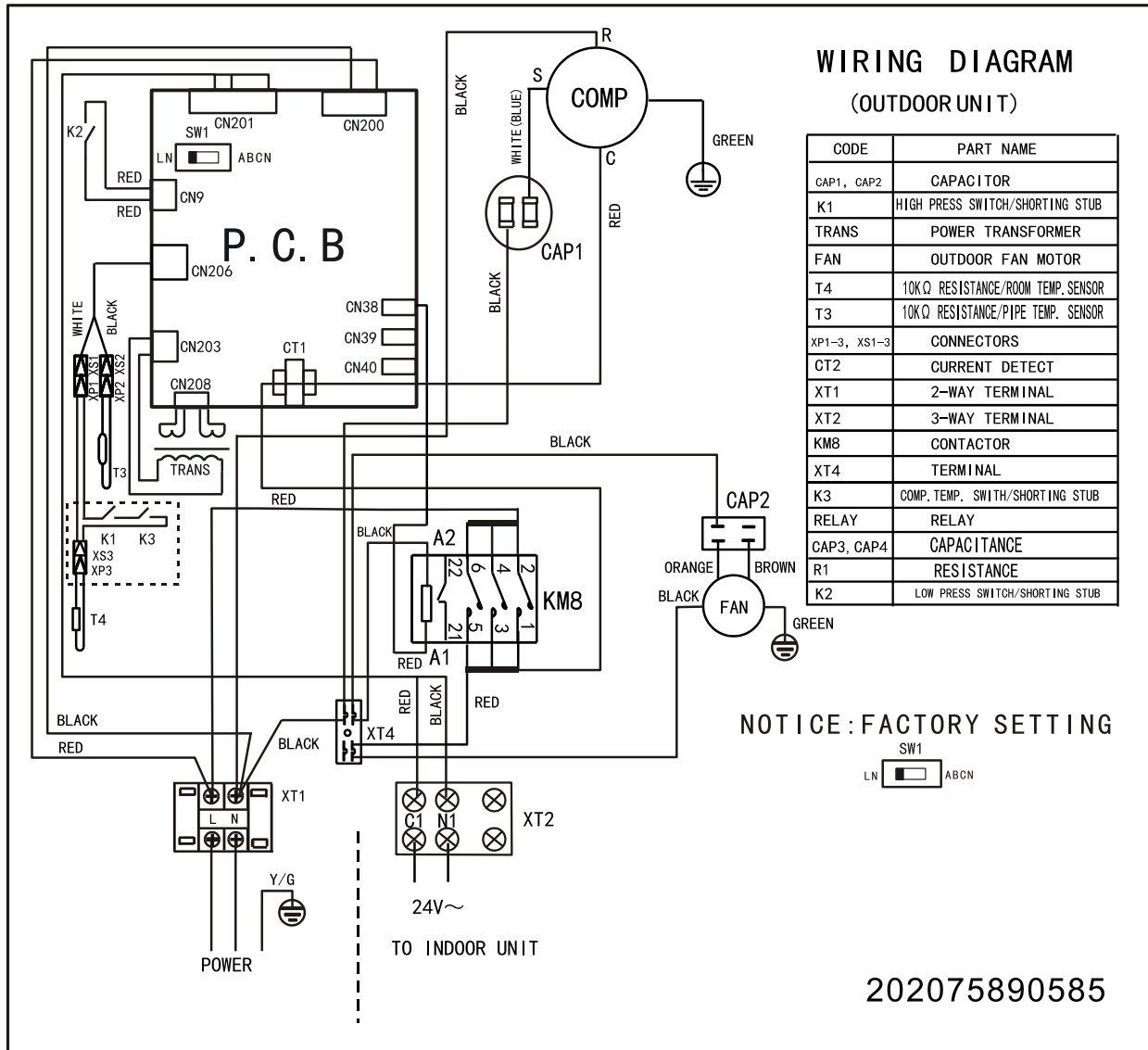


AWAU-YOF048-C12 AWAU-YOF060-C12

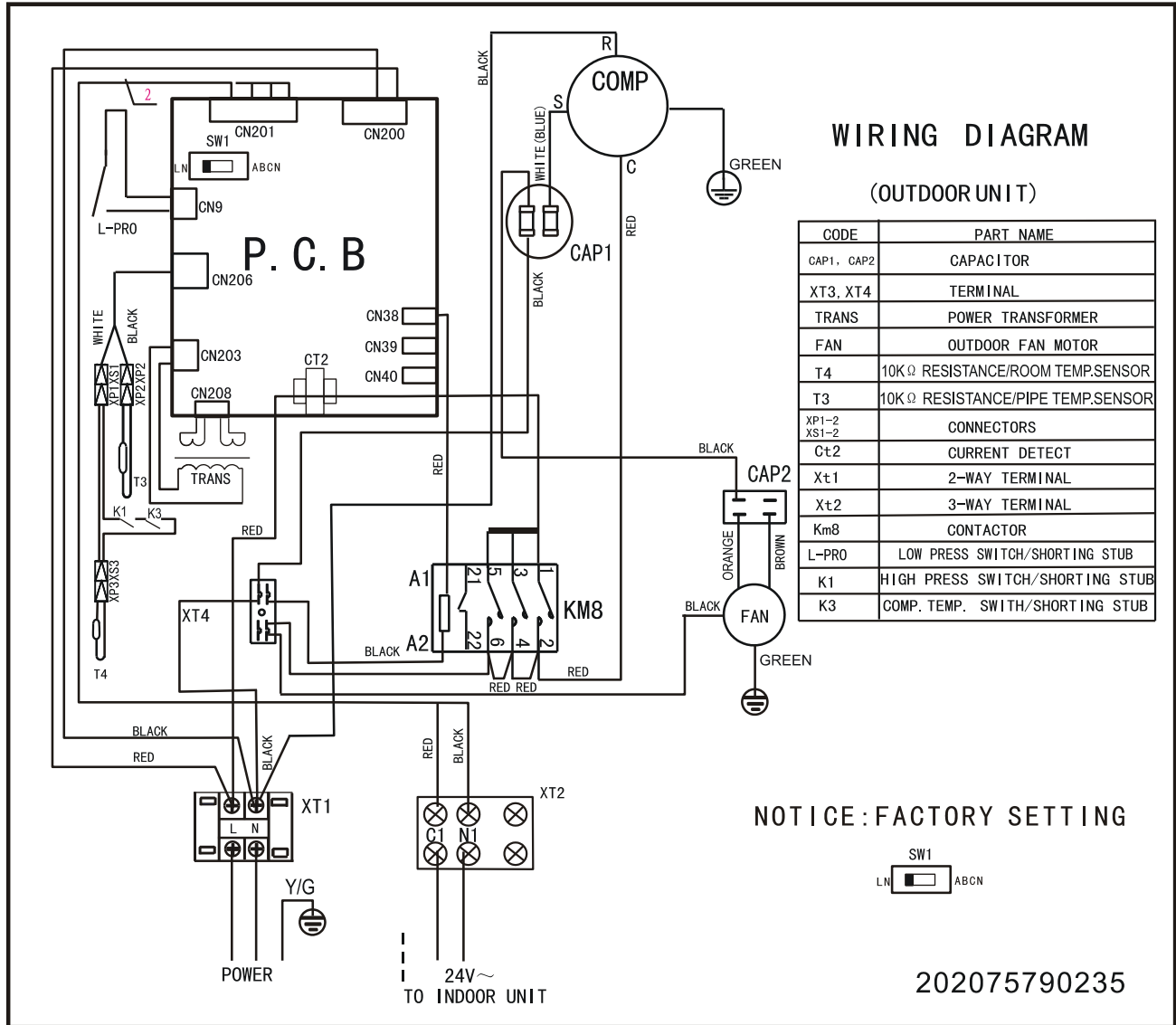


4. Wiring Diagrams

AWAU-YOF036-C12 AWAU-YOF060-C12



AWAU-YOF048-C12

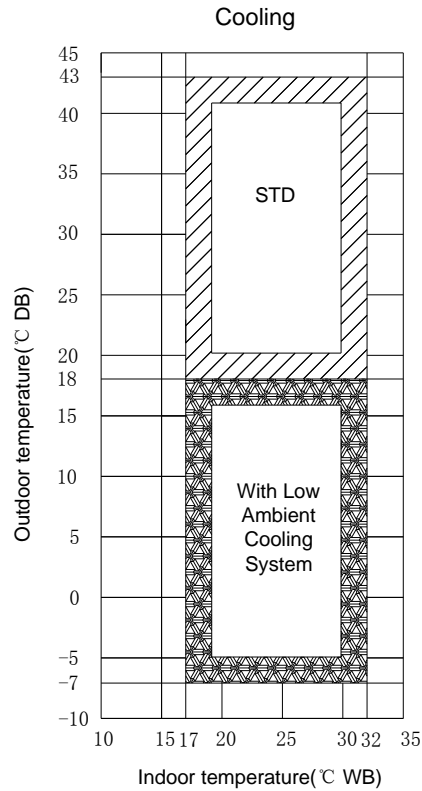


5. Electric Characteristics

Model	Outdoor Unit			
	Hz	Voltage	Min.	Max.
AWAU-YOF036-C12	60	220-230V	198V	242V
AWAU-YOF048-C12	60	220-230V	198V	242V
AWAU-YOF060-C12	60	220-230V	198V	242V

6. Operation Limits

Mode \ Temperature	Cooling operation
Room temperature	17°C ~ 32°C
Outdoor temperature	18°C ~ 43°C
	(-7°C ~ 43°C: For the models with low temperature cooling system)

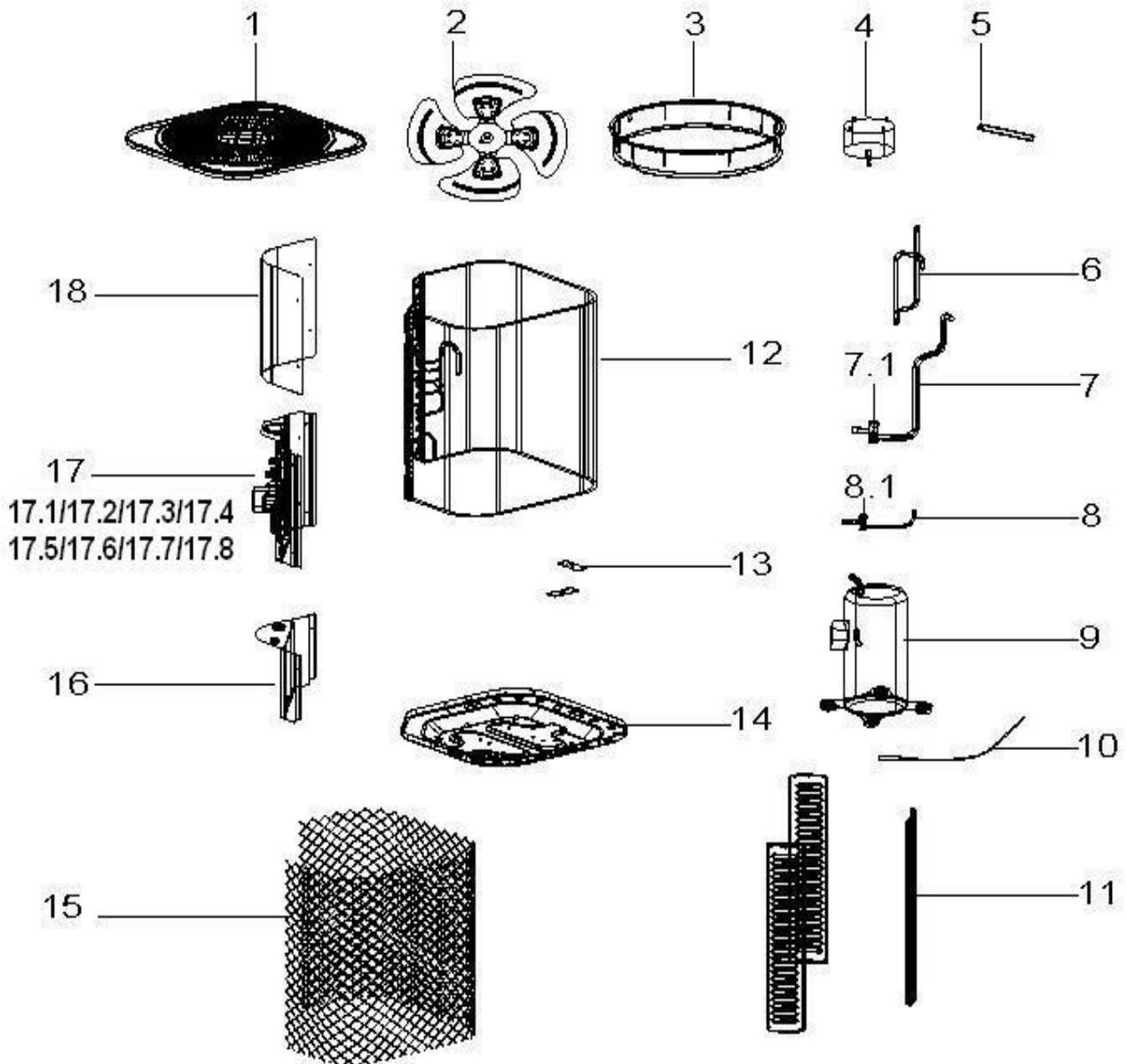


7. Sound Levels

Model	Noise level dB(A)
AWAU-YOF036-C12	65
AWAU-YOF048-C12	65
AWAU-YOF060-C12	65

8. Exploded View and Spare Part list

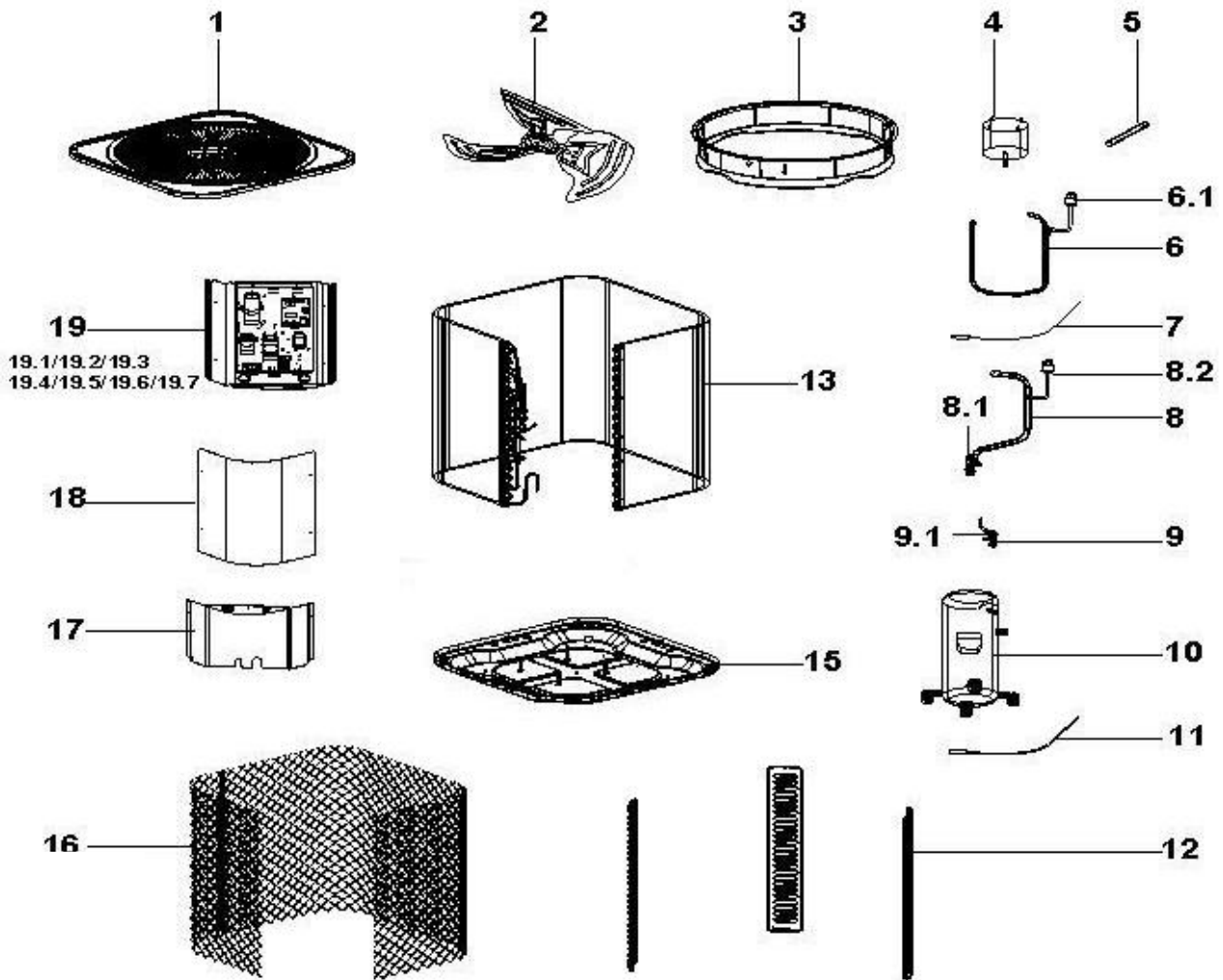
Exploded View of outdoor unit: AWAU-YOF036-C12



Spare part list of outdoor unit: AWAU-YOF036-C12

No.	Part Name	Qty	BOM Code	No.	Part Name	Qty	BOM Code
1	Top cover assembly	1	201275590116	14	Chassis assembly	1	201275790248
2	Axial flow fan	1	201200390017	15	Rear net	1	201175790017
3	Ventilation ring	1	201175390003	16	Underside board assembly	1	201275690029
4	Asynchronous motor	1	202400400273	17	Electronic control box assembly	1	203375890203
5	Wire guide pipe	1	201175290001	17.1	Installation plate of electric parts	1	201275790149
6	Discharge pipe	1	201675591176	17.2	Main control board assembly	1	201375790079
7	Gas valve assembly	1	201675591178	17.3	AC contactor	1	202300830082
7.1	Valve body	1	201601600313	17.4	Transformer	1	202300900083
8	Liquid valve assembly	1	201675591131	17.5	Wire joint	1	202301450122
8.1	Valve body	1	201601600312	17.5	Wire joint	1	202301450131
9	Compressor	1	201401500360	17.5	Wire joint	1	202301450121
10	Compressor wire assembly	1	202402220188	17.6	Capacitor	1	202401190043
11	Supporting board	3	201275790116	17.7	Installation plate of electric parts	1	201275790148
12	Condenser assembly	1	201575790078	17.8	Capacitor	1	202401000073
13	Non-slip pads I	2	202775390000	18	Side board	1	201275290040

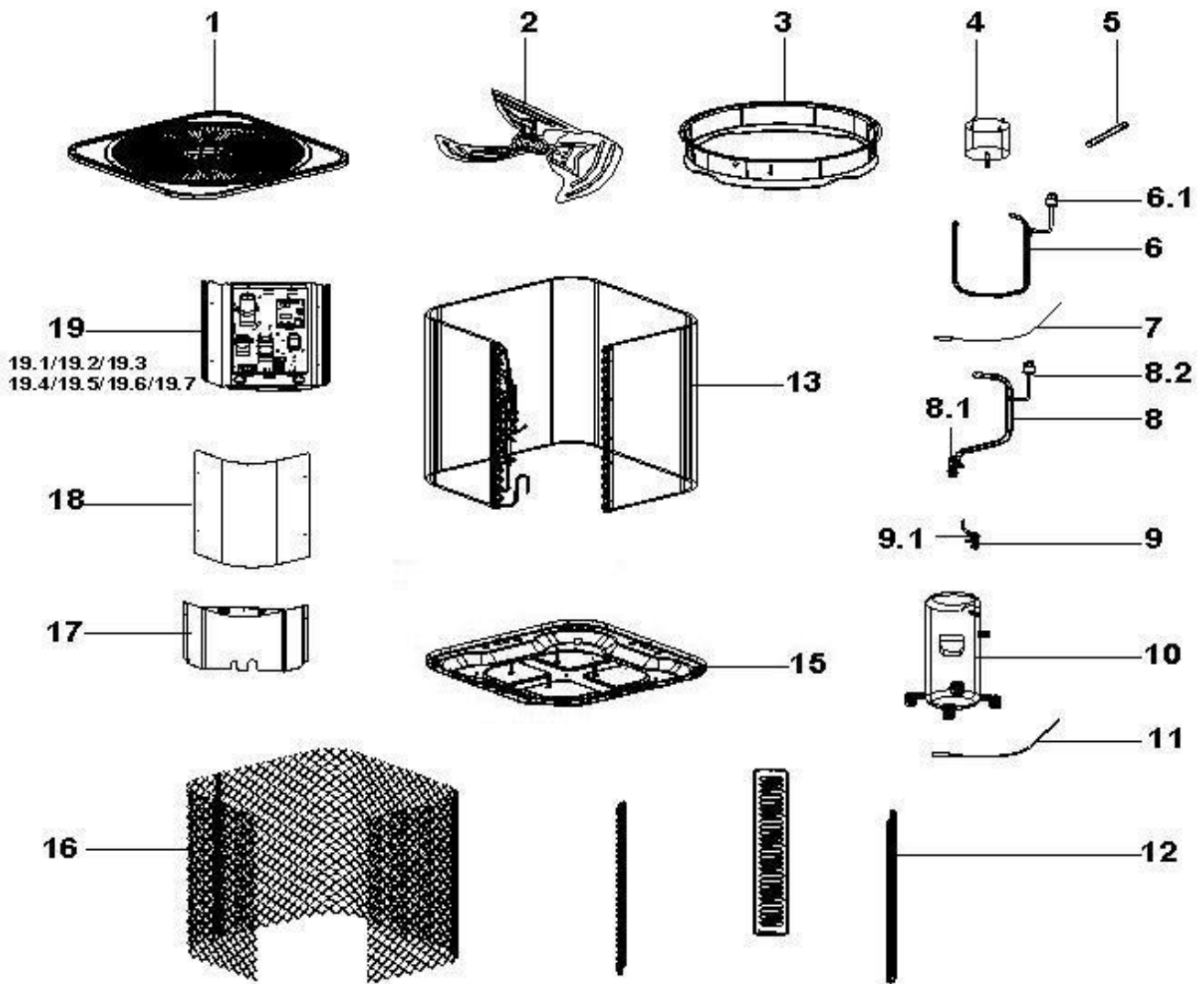
Exploded View of outdoor unit: AWAU-YOF048-C12



Spare part list of outdoor unit: AWAU-YOF048-C12

No.	Part Name	Qty	BOM Code	No.	Part Name	Qty	BOM Code
1	Top cover assembly	1	201275790093	13	Condenser assembly	1	201575790123
2	Axial flow fan	1	201200390014	15	Chassis assembly	1	201275790122
3	Ventilation ring	1	201175490004	16	Rear net	1	201175790015
4	Asynchronous motor	1	202400400576	17	Underside board assembly	1	201275690029
5	Wire guide pipe	1	201175490001	18	Side board	1	201275290040
6	Discharge pipe assembly	1	201675790981	19	Electronic control box assembly	1	203375790139
6.1	Pressure switch	1	202301820020	19.1	Installation plate of electric parts	1	201275490035
7	Discharge temperature sensor	1	202301610024	19.2	Installation plate of electric parts	1	201275790180
8	Gas valve assembly	1	201675890929	19.3	AC contactor	1	202300830082
8.1	Valve body	1	201601600313	19.4	Wire joint	1	202301450131
8.2	Pressure switch	1	202301820021	19.4	Wire joint	1	202301450122
9	Liquid valve assembly	1	201675591131	19.4	Wire joint	1	202301450121
9.1	Valve body	1	201601600312	19.5	Capacitor	1	202401000073
10	Compressor	1	201400700623	19.5	Capacitor	1	202401100994
11	Compressor wire assembly	1	202495590005	19.6	Main control board assembly	1	201375790079
12	Supporting board	1	201275790188	19.7	Transformer	1	202300900083
12	Supporting board	3	201275790116				

Exploded View of outdoor unit: AWAU-YOF060-C12



Spare part list of outdoor unit: AWAU-YOF060-C12

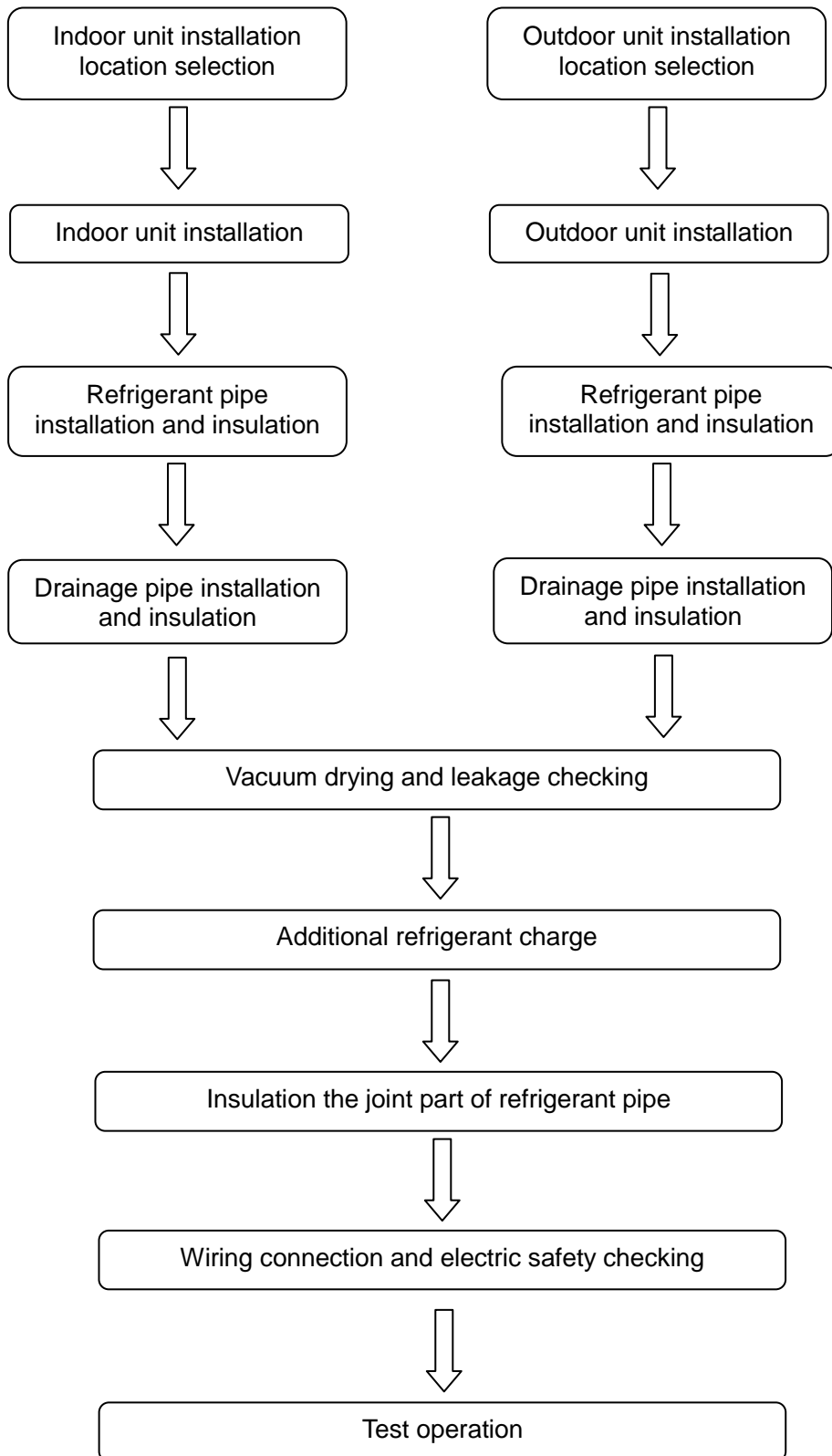
No.	Part Name	Qty	BOM Code	No.	Part Name	Qty	BOM Code
1	Top cover assembly	1	201275790093	13	Condenser assembly	1	201575890121
2	Axial flow fan	1	201200390014	15	Chassis assembly	1	201275790122
3	Ventilation ring	1	201175490004	16	Rear net	1	201175890002
4	Asynchronous motor	1	202400400576	17	Underside board assembly	1	201275790195
5	Wire guide pipe	1	201175490001	18	Side board	1	201275290040
6	Discharge pipe assembly	1	201675890930	19	Electronic control box assembly	1	203375890207
6.1	Pressure switch	1	202301820020	19.1	Installation plate of electric parts	1	201275490035
7	Discharge temperature sensor	1	202301610024	19.2	Installation plate of electric parts	1	201275790180
8	Gas valve assembly	1	201675890929	19.3	AC contactor	1	202300830082
8.1	Valve body	1	201601600313	19.4	Wire joint	1	202301450122
8.2	Pressure switch	1	202301820021	19.4	Wire joint	1	202301450131
9	Liquid valve assembly	1	201675591131	19.4	Wire joint	1	202301450121
9.1	Valve body	1	201601600312	19.5	Capacitor	1	202401000073
10	Compressor	1	201400700624	19.5	Capacitor	1	202401100994
11	Compressor wire assembly	1	202475890081	19.6	Main control board assembly	1	201375790079
12	Supporting board	1	201275790188	19.7	Transformer	1	202300900083
12	Supporting board	3	201275890071				

Part 4

Installation

1. Installation Procedure.....	39
2. Location selection	40
3. Indoor unit installation	41
4. Outdoor unit installation (Top Discharge Unit)	44
5. Refrigerant pipe installation	46
6. Drainage pipe installation	47
7. Vacuum Drying and Leakage Checking.....	51
8. Additional refrigerant charge	52
9. Engineering of insulation.....	53
10. Engineering of electrical wiring.....	54
11. Test operation	54

1. Installation Procedure



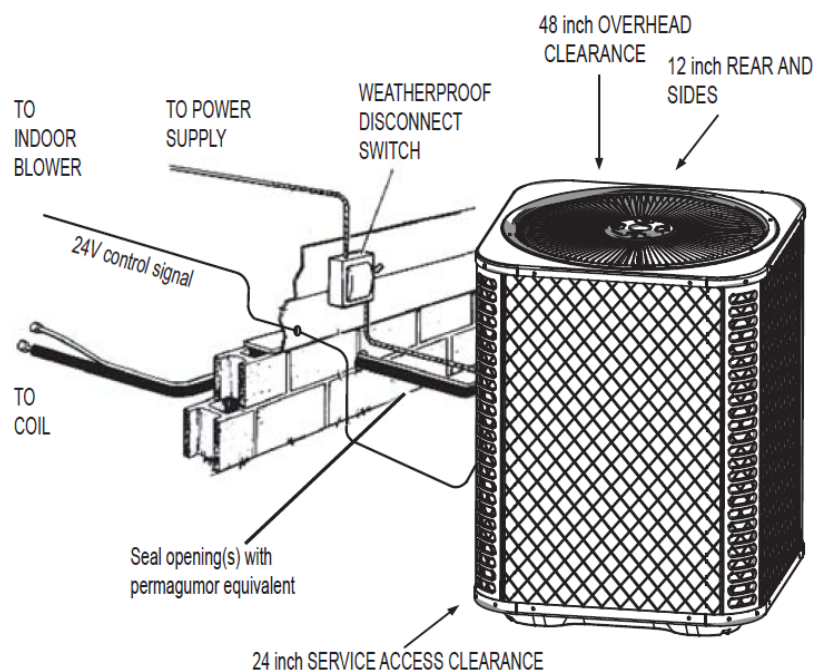
2. Location selection

2.1 Indoor unit location selection

- The place shall easily support the indoor unit's weight.
- The place can ensure the indoor unit installation and inspection.
- The place can ensure the indoor unit horizontally installed.
- The place shall allow easy water drainage.
- The place shall easily connect with the outdoor unit.
- The place where air circulation in the room should be good.
- There should not be any heat source or steam near the unit.
- There should not be any oil gas near the unit
- There should not be any corrosive gas near the unit
- There should not be any salty air neat the unit
- There should not be strong electromagnetic wave near the unit
- There should not be inflammable materials or gas near the unit
- There should not be strong voltage vibration.

2.2 Outdoor unit location selection

- The place shall easily support the outdoor unit's weight.
- Locate the outdoor unit as close to indoor unit as possible
- The piping length and height drop can not exceed the allowable value.
- The place where the noise, vibration and outlet air do not disturb the neighbors.
- There is enough room for installation and maintenance.
- The air outlet and the air inlet are not impeded, and not face the strong wind.
- It is easy to install the connecting pipes and cables.
- There is no danger of fire due to leakage of inflammable gas.
- It should be a dry and well ventilation place
- The support should be flat and horizontal
- Do not install the outdoor unit in a dirty or severely polluted place, so as to avoid blockage of the heat exchanger in the outdoor unit.
- If is built over the unit to prevent direct sunlight, rain exposure, direct strong wend, snow and other scraps accumulation, make sure that heat radiation from the condenser is not restricted.

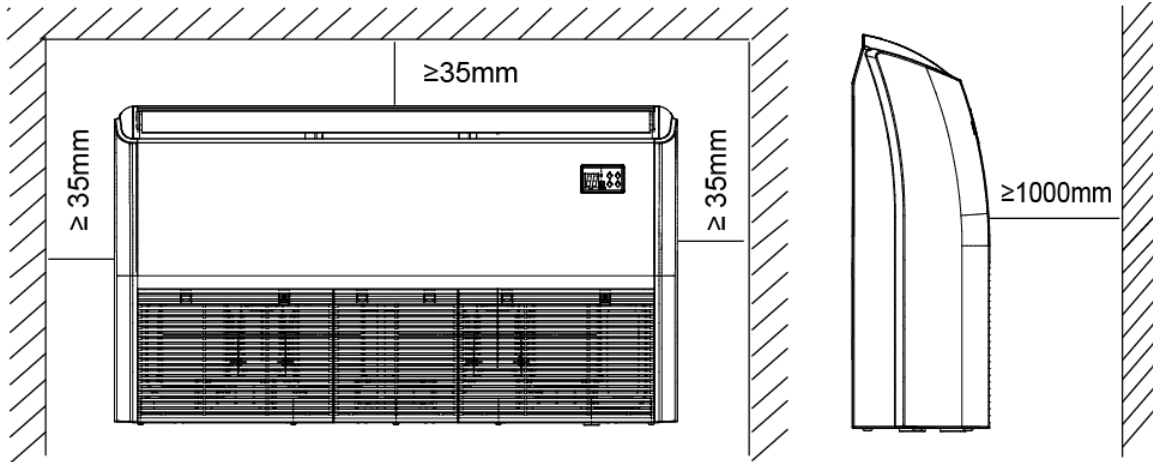


NOTE: All outdoor wiring must be weatherproof

3. Indoor unit installation

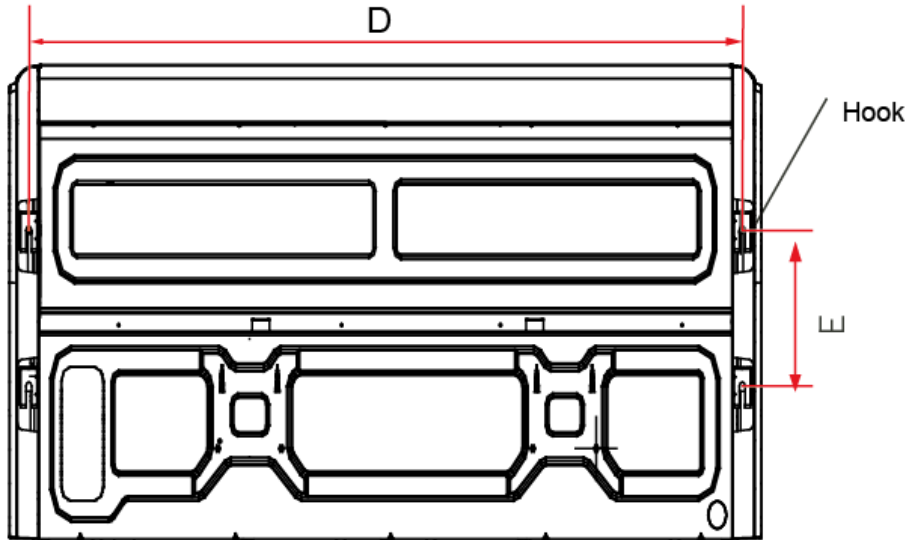
3.1 Ceiling & floor indoor unit installation

3.1.1 Service space for indoor unit



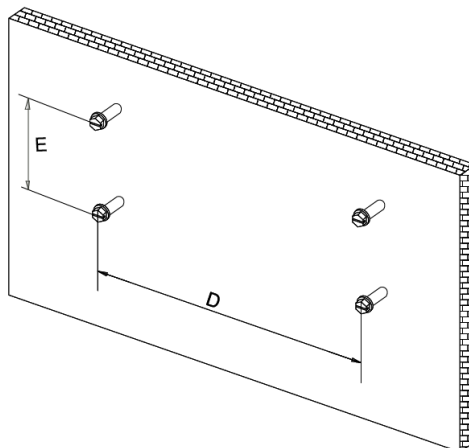
3.1.2 Bolt pitch

① Ceiling installation



Model	D	E
AWSI-FCF036-N12	1200	220
AWSI-FCF048-N12	1200	220
AWSI-FCF060-N12	1565	220

② Wall-mounted installation



3.1.3 Install the pendant bolt

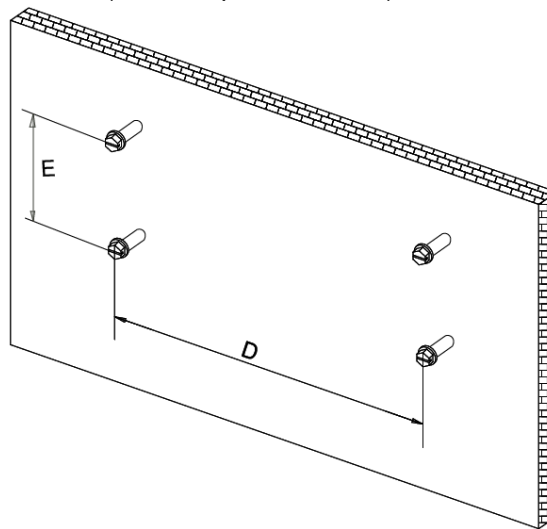
① Ceiling installation

Select the position of installation hooks according to the hook holes positions showed in upper picture. Drill four holes of $\text{Ø}12\text{mm}$, 45~50mm deep at the selected positions on the ceiling. Then embed the expansible hooks (fittings).



② Wall-mounted installation

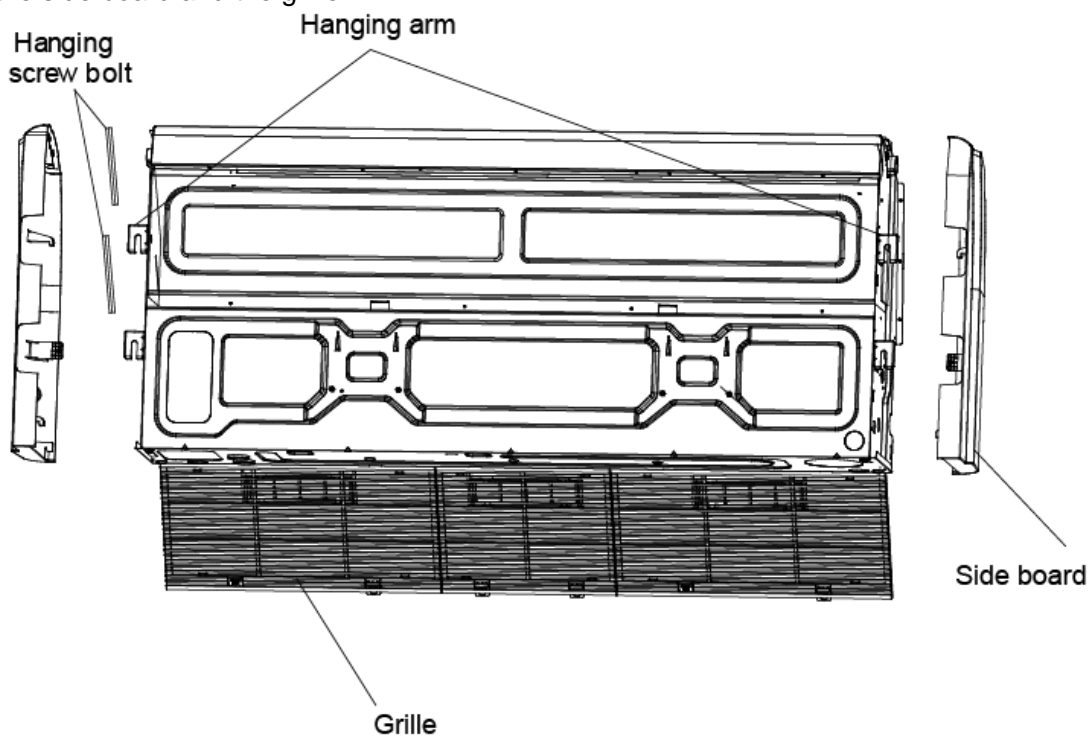
Install the tapping screws onto the wall.(Refer to picture below)



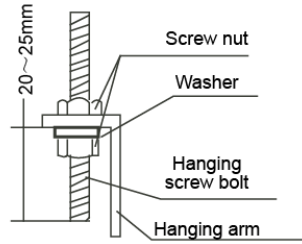
3.1.4 Install the main body

① Ceiling installation (The only installation method for the unit with drain pump)

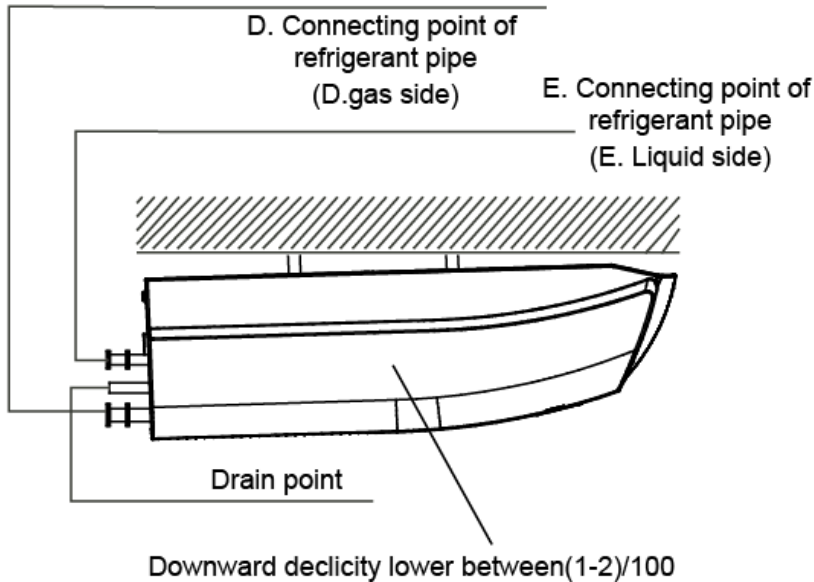
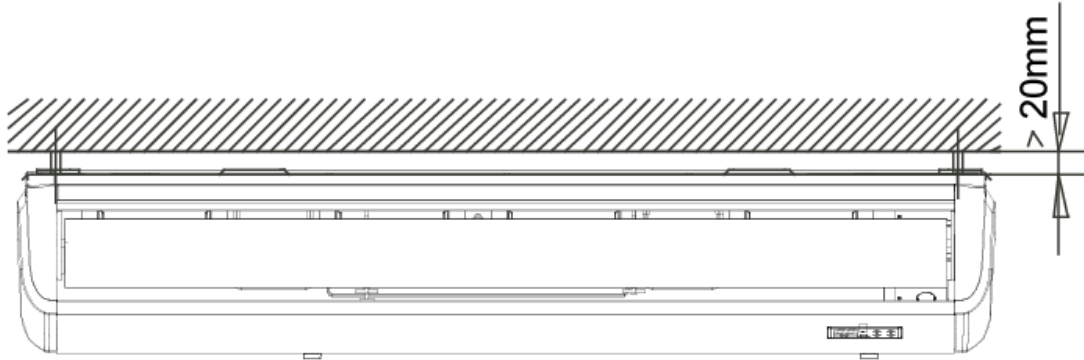
Remove the side board and the grille.



Locate the hanging arm on the hanging screw bolt. Prepare the mounting bolts on the unit.

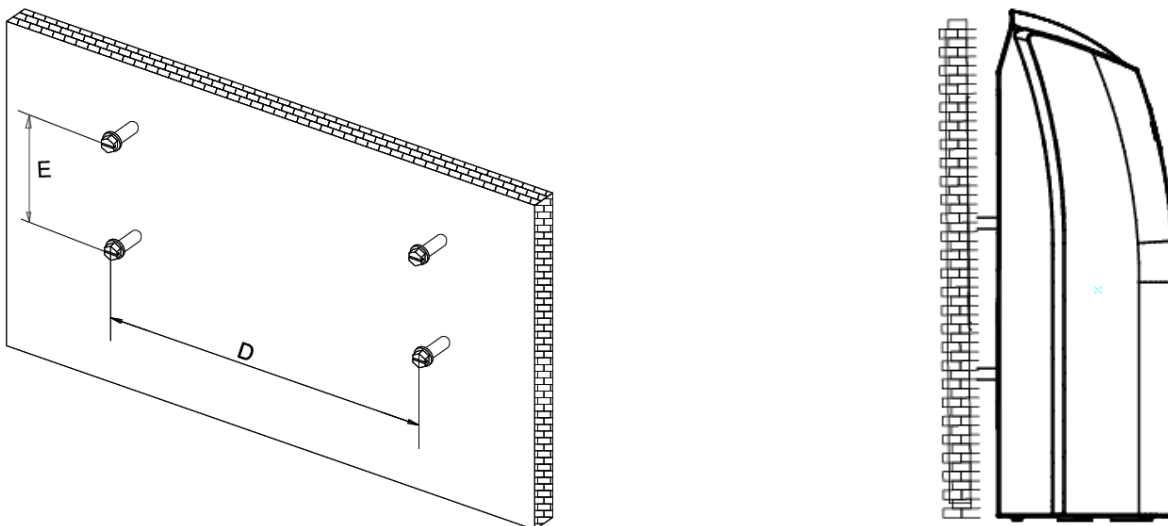


Put the side panels and grilles back.



② Wall-mounted installation

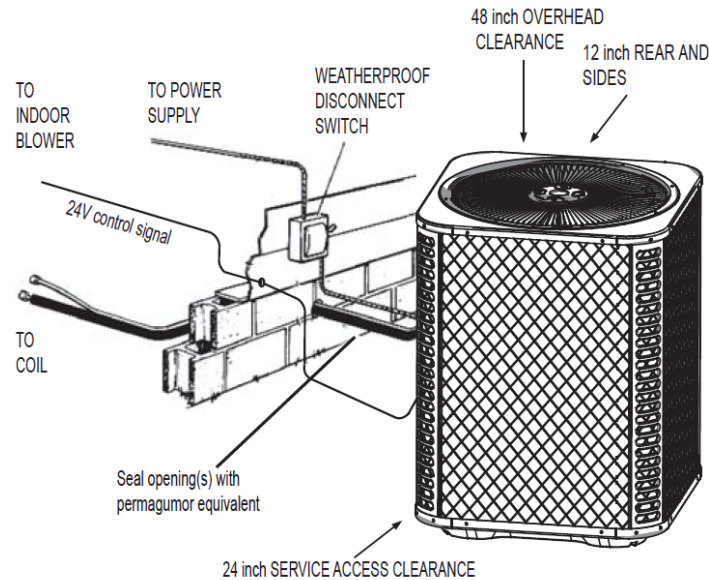
Hang the indoor unit by insert the tapping screws into the hanging arms on the main unit. (The bottom of body can touch with floor or suspended, but the body must install vertically.)



4. Outdoor unit installation (Top Discharge Unit)

4.1 Location selection

Before starting the installation, select and check the suitability of the location for both the indoor and outdoor unit. Observe all limitations and clearance requirements. The outdoor unit must have sufficient clearance for air entrance to the condenser coil, for air discharge and for service access.



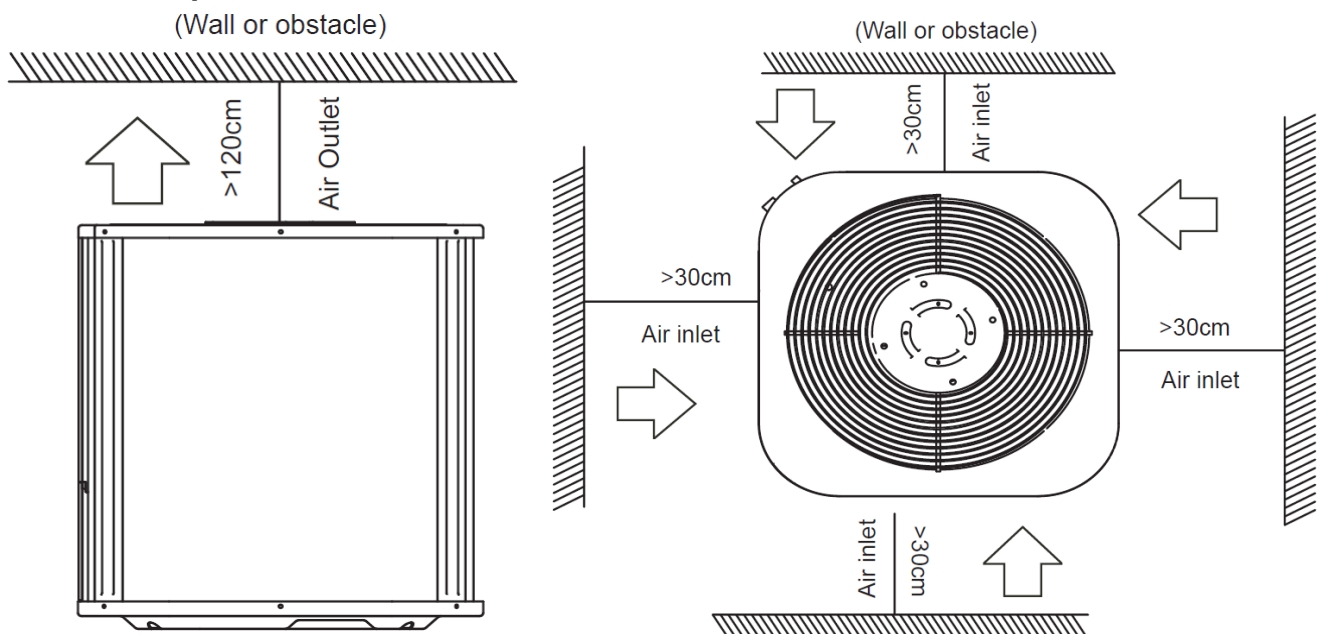
NOTE:All outdoor wiring must be weatherproof

Note: For multiple unit installations, units must be spaced a minimum of 18 inches apart. (Coil face to coil face.)

If the unit is to be installed on a hot sun exposed roof or a black-topped ground area, the unit should be raised sufficiently above the roof or ground to avoid taking the accumulated layer of hot air into the outdoor unit.

Provide an adequate structural support.

4.2 Service space for outdoor unit



4.3 Install the Unit

On ground installation

The unit may be installed at ground level on a solid base that will not shift or settle, causing strain on the refrigerant lines and possible leaks. Maintain the clearances shown in Fig.5 and install the unit in a level position.

Normal operating sound levels may be objectionable if the unit is placed directly under windows of certain rooms (bedrooms, study, etc.).

Top of unit discharge area must be unrestricted for at least 6 feet above the unit.

Warning: The outdoor unit should not be installed in an area where mud or ice could cause personal injury. Elevate the unit sufficiently to prevent any blockage of the air entrances by snow in areas where there will be snow accumulation. Check the local weather bureau for the expected snow accumulation in your area. Isolate the unit from rain gutters to avoid any possible wash out of the foundation.

On roof installation

When installing units on a roof, the structure must be capable of supporting the total weight of the unit, including a padded frame unit, rails, etc., which should be used to minimize the transmission of sound or vibration into the conditioned space.

Factory preferred tie-down method (Optional)

Note:

These instructions are intended as a method to tie-down system to cement slab as a securing procedure for high and areas. It is recommended to check Local codes for tie-down methods and protocols.

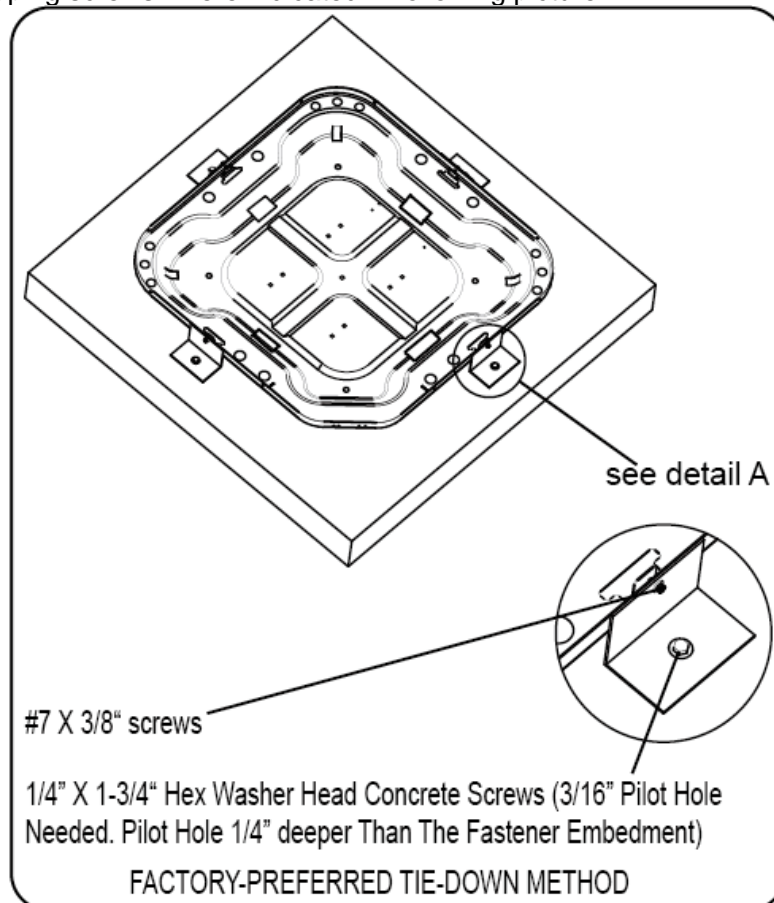
Step 1: Prior to installing clear pad of debris.

Step 2: Ensure cement pad is level.

IMPORTANT: Then cement pad must be made of HVAC-approved materials and must be the proper thickness to accommodate fasteners.

Step 3: Center unit onto pad.

Step 4: Fasten 4 L-shaped stainless steel braces onto cabinet base using 4 1/4" * 1/2" Hex washer head stainless steel self-tapping screws where indicated in following picture.



IMPORTANT: Do not use screws longer than indicated 1/4" * 2/3" and make sure that the brace is attached on center of base bar where indicated in Fig.7. Damage will occur to system.

Step 5: Drill 4 holes into cement base ensuring holes are 2 1/2"dp.

Step 6: Assemble unit to cement pad using 4 1/4" * 2" Hex washer head cement screws make sure not to over tighten.

Step 7: Finish unit assembly process as indicated in installation manual.

REQUIRED PARTS LIST	
NOTE: ALL PARTS ACAILABLE THROUGH LOCAL HARDWARE SUPPL.	
DESCRIPTION	QUANTITY
1/4" X 3/8" Hex Washer Head Concrete Screws	4
1/8" X 1-1/2" X W (width of unit +4") Metal straps	4
3/8" Washers	4

5. Refrigerant pipe installation

5.1 Maximum pipe length and height drop

Considering the allowable pipe length and height drop to decide the installation position. Make sure the distance and height drop between indoor and outdoor unit not exceeded the date in the following table.

Capacity	Max. Length	Max. Elevation
36,000Btu/h	30m	20m
>36,000Btu/h	50m	25m

5.2 The procedure of connecting pipes

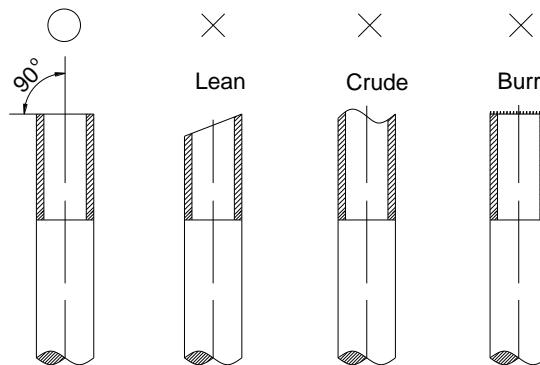
5.2.1 Choose the pipe size according to the specification table.

5.2.2 Confirm the cross way of the pipes.

5.2.3 Measure the necessary pipe length.

5.2.4 Cut the selected pipe with pipe cutter

- Make the section flat and smooth.



5.2.5 Insulate the copper pipe

- Before test operation, the joint parts should not be heat insulated.

5.2.6 Flare the pipe

- Insert a flare nut into the pipe before flaring the pipe
- According to the following table to flare the pipe

Pipe diameter	Flare dimension A (mm)		Flare shape
	Min	Max	
1/4" (6.35)	8.3	8.7	
3/8" (9.52)	12.0	12.4	
1/2" (12.7)	15.4	15.8	

5/8" (15.9)	18.6	19.1	
3/4" (19)	22.9	23.3	

- After flared the pipe, the opening part must be seal by end cover or adhesive tape to avoid duct or exogenous impurity come into the pipe.

5.2.7 Drill holes if the pipes need to pass the wall.

5.2.8 According to the field condition to bend the pipes so that it can pass the wall smoothly.

5.2.9 Bind and wrap the wire together with the insulated pipe if necessary.

5.2.10 Set the wall conduit

5.2.11 Set the supporter for the pipe.

5.2.12 Locate the pipe and fix it by supporter

- For horizontal refrigerant pipe, the distance between supporters should not be exceed 1m.
- For vertical refrigerant pipe, the distance between supporters should not be exceed 1.5m.

5.2.13 Connect the pipe to indoor unit and outdoor unit by using two spanners.

- Be sure to use two spanners and proper torque to fasten the nut, too large torque will damage the bellmouthing, and too small torque may cause leakage. Refer the following table for different pipe connection.

Pipe Diameter	Torque		Sketch map
	(kgf.cm)	(N.cm)	
1/4" (6.35)	144~176	1420~1720	
3/8" (9.52)	333~407	3270~3990	
1/2" (12.7)	504~616	4950~6030	
5/8" (15.9)	630~770	6180~7540	
3/4" (19)	990~1210	9270~11860	

6. Drainage pipe installation

Install the drainage pipe as shown below and take measures against condensation. Improperly installation could lead to leakage and eventually wet furniture and belongings.

6.1 Installation principle

- Ensure at least 1/100 slope of the drainage pipe
- Adopt suitable pipe diameter
- Adopt nearby condensate water discharge

6.2 Key points of drainage water pipe installation

6.2.1 Considering the pipeline route and elevation

- Before installing condensate water pipeline, determine its route and elevation to avoid intersection with other pipelines and ensure slope is straight.

6.2.2 Drainage pipe selection

- The drainage pipe diameter shall not small than the drain hose of indoor unit

- According to the water flowrate and drainage pipe slope to choose the suitable pipe, the water flowrate is decided by the capacity of indoor unit.

Relationship between water flowrate and capacity of indoor unit

Capacity (x1000Btu)	Water flowrate (l/h)
12	2.4
18	4
24	6
30	7
36	8
42	10
48	12
60	14

According to the above table to calculate the total water flowrate for the confluence pipe selection.

For horizontal drainage pipe (The following table is for reference)

PVC pipe	Reference value of inner diameter of pipe (mm)	Allowable maximum water flowrate (l/h)		Remark
		Slope 1/50	Slope 1/100	
PVC25	20	39	27	For branch pipe
PVC32	25	70	50	
PVC40	31	125	88	Could be used for confluence pipe
PVC50	40	247	175	
PVC63	51	473	334	

Attention: Adopt PVC40 or bigger pipe to be the main pipe.

For Vertical drainage pipe (The following table is for reference)

PVC pipe	Reference value of inner diameter of pipe (mm)	Allowable maximum water flowrate (l/h)	Remark
PVC25	20	220	For branch pipe
PVC32	25	410	
PVC40	31	730	Could be used for confluence pipe
PVC50	40	1440	
PVC63	51	2760	
PVC75	67	5710	
PVC90	77	8280	

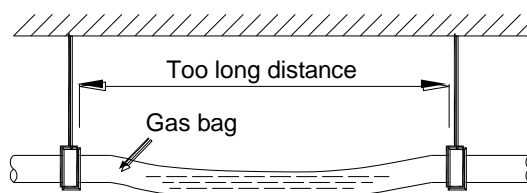
Attention: Adopt PVC40 or bigger pipe to be the main pipe.

6.2.3 Individual design of drainage pipe system

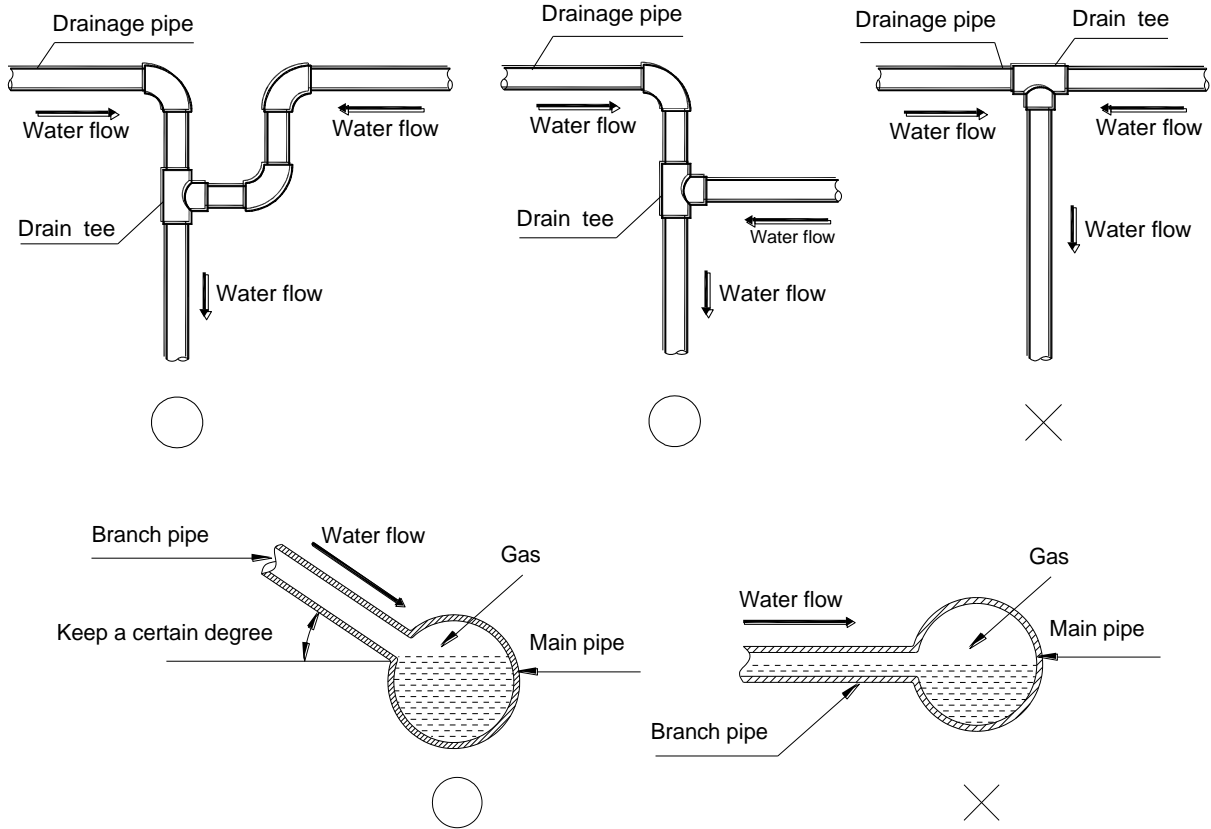
- The drainage pipe of air conditioner shall be installed separately with other sewage pipe, rainwater pipe and drainage pipe in building.
- The drainage pipe of the indoor unit with water pump should be apart from the one without water pump.

6.2.4 Supporter gap of drainage pipe

- In general, the supporter gap of the drainage pipe horizontal pipe and vertical pipe is respectively 1m~1.5m and 1.5m~2.0m.
- Each vertical pipe shall be equipped with not less than two hangers.
- Overlarge hanger gap for horizontal pipe shall create bending, thus leading to air block.



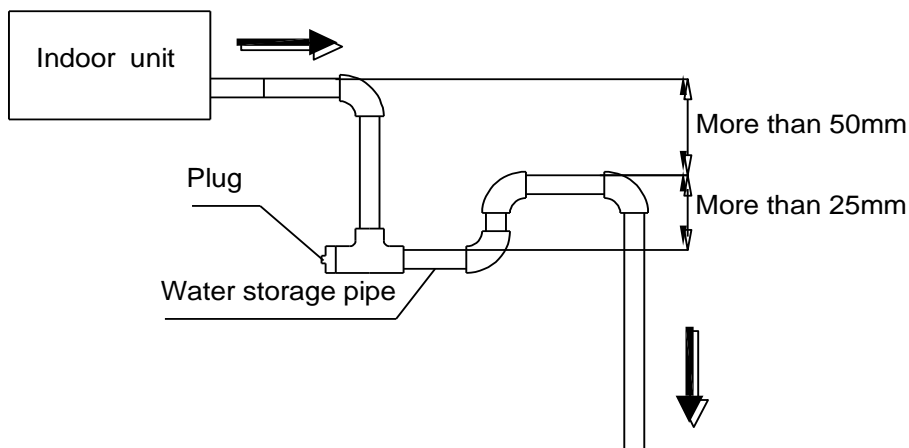
6.2.5 The horizontal pipe layout should avoid converse flow or bad flow



- The correct installation will not cause converse water flow and the slope of the branch pipes can be adjusted freely
- The false installation will cause converse water flow and the slope of the branch pipe can not be adjusted.

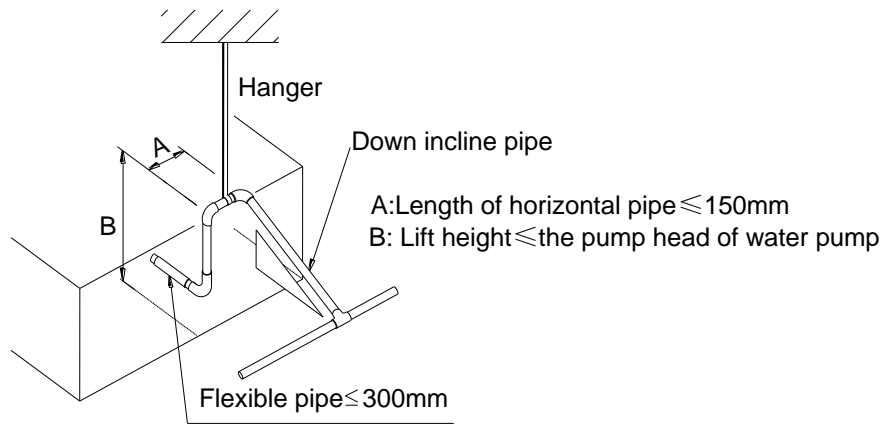
6.2.6 Water storage pipe setting

- If the indoor unit has high extra static pressure and without water pump to elevate the condensate water, such as high extra static pressure duct unit , the water storage pipe should be set to avoid converse flow or blow water phenomena.



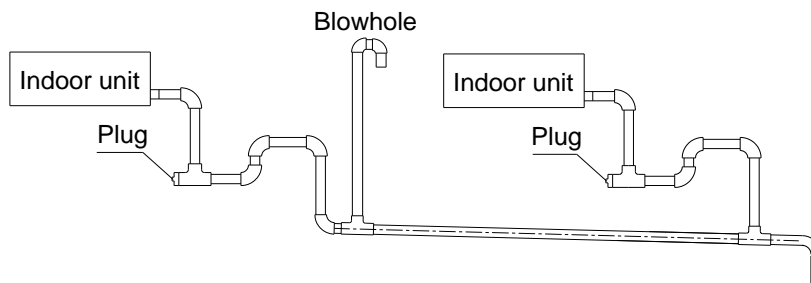
6.2.7 Lifting pipe setting of indoor unit with water pump

- The length of lifting pipe should not exceed the pump head of indoor unit water pump.
 Pump head of big four way cassette: 750mm
 Pump head of compact four way cassette: 500mm
- The drainage pipe should be set down inclined after the lifting pipe immediately to avoid wrong operation of water level switch.
- Refer the following picture for installation reference.



6.2.8 Blowhole setting

- For the concentrated drainage pipe system, there should design a blowhole at the highest point of main pipe to ensure the condensate water discharge smoothly.
- The air outlet shall face down to prevent dirt entering pipe.
- Each indoor unit of the system should be installed it.
- The installation should be considering the convenience for future cleaning.



6.2.9 The end of drainage pipe shall not contact with ground directly.

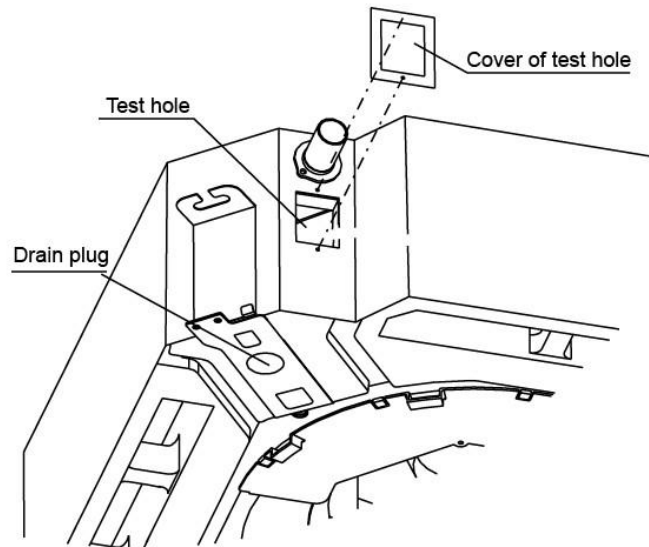
6.3 Drainage test

6.3.1 Water leakage test

After finishing the construction of drainage pipe system, fill the pipe with water and keep it for 24 hours to check whether there is leakage at joint section.

6.3.2 Water discharge test

1. Natural drainage mode(the indoor unit with outdoor drainage pump)
 - Infuse above 600ml water through water test hole slowly into the water collector, observe whether the water can discharge through the transparent hard pipe at drainage outlet.
2. Pump drainage mode
 - 2.1 Disconnect the plug of water level switch, remove the cover of water test hole and slowly infuse about 2000ml water through the water test hole, be sure that the water will not touch the motor of drainage pump.



- 2.2 Power on and let the air conditioner operate for cooling. Check operation status of drainage pump, and then connect the plug of water level switch, check the operation sound of water pump and observe whether the water can discharge through the transparent hard pipe at drainage outlet. (In light of the length of drainage pipe, water shall be discharged about 1 minute delayed)
- 2.3 Stop the operation of air conditioner, power off the power supply and put the cover of water test hole back to the original place.
- After stopped the air conditioner 3 minutes, check whether there is anything abnormal. If drainage pipes have not been distributed properly, over back-flow water shall cause the flashing of alarm indicator at remote-controlled receiving board and even water shall run over the water collector.
 - Continuously infusing water until water level alarmed, check whether the drainage pump could discharge water at once. If water level does not decline under warning water level 3 minutes later, it shall cause shutdown of unit. When this situation happens, the normal startup only can be recovered by turning down power supply and eliminating accumulated water.

Note: Drain plug at the main water-containing plate is used for eliminating accumulated water in water-containing plate when maintaining air conditioner fault. During normal operation, the plug shall be filled in to prevent leakage.

6.4 Insulation work of drainage pipe

Refer the introduction to the insulation engineering parts.

7. Vacuum Drying and Leakage Checking

7.1 Purpose of vacuum drying

- Eliminating moisture in system to prevent the phenomena of ice-blockage and copper oxidation. Ice-blockage shall cause abnormal operation of system, while copper oxide shall damage compressor.
- Eliminating the non-condensable gas (air) in system to prevent the components oxidizing, pressure fluctuation and bad heat exchange during the operation of system.

7.2 Selection of vacuum pump

- The ultimate vacuum degree of vacuum pump shall be -756mmHg or above.
- Precision of vacuum pump shall reach 0.02mmHg or above.

7.3 Operation procedure for vacuum drying

Due to different construction environment, two kinds of vacuum drying ways could be chosen, namely ordinary vacuum drying and special vacuum drying.

7.3.1 Ordinary vacuum drying

Additional refrigerant charge

1. When conduct first vacuum drying, connect pressure gauge to the infusing mouth of gas pipe and liquid pipe, and keep vacuum pump running for 1hour (vacuum degree of vacuum pump shall be reached -755mmHg).
2. If the vacuum degree of vacuum pump could not reach -755mmHg after 1 hour of drying, it indicates that there is moisture or leakage in pipeline system and need to go on with drying for half an hour.
3. If the vacuum degree of vacuum pump still could not reach -755mmHg after 1.5 hours of drying, check whether there is leakage source.
4. Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

7.3.2 Special vacuum drying

The special vacuum drying method shall be adopted when:

1. Finding moisture during flushing refrigerant pipe.
2. Conducting construction on rainy day, because rain water might penetrated into pipeline.
3. Construction period is long, and rain water might penetrated into pipeline.
4. Rain water might penetrate into pipeline during construction.

Procedures of special vacuum drying are as follows:

1. Vacuum drying for 1 hour.
2. Vacuum damage, filling nitrogen to reach 0.5Kgf/cm² .
Because nitrogen is dry gas, vacuum damage could achieve the effect of vacuum drying, but this method could not achieve drying thoroughly when there is too much moisture. Therefore, special attention shall be drawn to prevent the entering of water and the formation of condensate water.
3. Vacuum drying again for half an hour.
If the pressure reached -755mmHg, start to pressure leakage test. If it cannot reached the value, repeat vacuum damage and vacuum drying again for 1 hour.
3. Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

8. Additional refrigerant charge

- After the vacuum drying process is carried out, the additional refrigerant charge process need to be performed.
- The outdoor unit is factory charged with refrigerant. The additional refrigerant charge volume is decided by the diameter and length of the liquid pipe between indoor and outdoor unit. Refer the following formula to calculate the charge volume.

Diameter of liquid pipe (mm)	Φ6.35	Φ9.52
Formula	$V=20g \times (L-5)$	$V=40g \times (L-5)$

V: Additional refrigerant charge volume (g).

L : The length of the liquid pipe (m).

Note:

- Refrigerant may only be charged after performed the vacuum drying process.
- Always use gloves and glasses to protect your hands and eyes during the charge work.
- Use electronic scale or fluid infusion apparatus to weight refrigerant to be recharged. Be sure to avoid extra refrigerant charged, it may cause liquid hammer of the compressor or protections.
- Use supplementing flexible pipe to connect refrigerant cylinder, pressure gauge and outdoor unit. And The refrigerant should be charged in liquid state. Before recharging, The air in the flexible pipe and manifold gauge should be exhausted.
- After finished refrigerant recharge process, check whether there is refrigerant leakage at the connection joint part.(Using gas leakage detector or soap water to detect).

9. Engineering of insulation

9.1 Insulation of refrigerant pipe

9.1.1 Operational procedure of refrigerant pipe insulation

Cut the suitable pipe → insulation (except joint section) → flare the pipe → piping layout and connection → vacuum drying → insulate the joint parts

9.1.2 Purpose of refrigerant pipe insulation

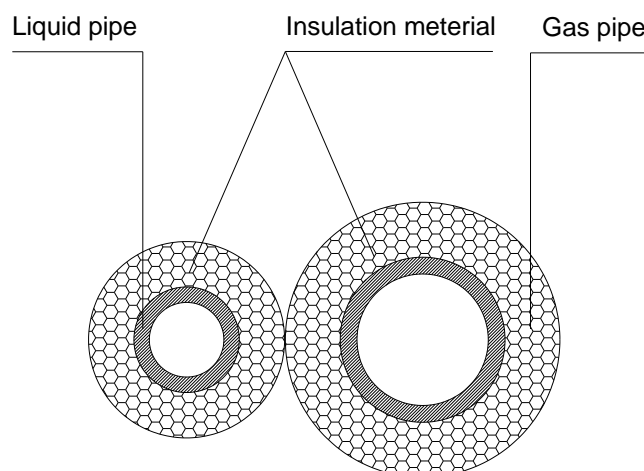
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- Gas pipe temperature is very low during cooling. If insulation is not enough, it shall form dew and cause leakage.
- Temperature of gas pipe is very high (generally 50-100°C) during heating. Insulation work must be carried out to prevent hurt by carelessness touching.

9.1.3 Insulation material selection for refrigerant pipe

- The burning performance should over 120°C
- According to the local law to choose insulation materials
- The thickness of insulation layer shall be above 10mm. If in hot or wet environment place, the layer of insulation should be thicker accordingly.

9.1.4 Installation highlights of insulation construction

- Gas pipe and liquid pipe shall be insulated separately, if the gas pipe and liquid pipe were insulated together; it will decrease the performance of air conditioner.



- The insulation material at the joint pipe shall be 5~10cm longer than the gap of the insulation material.
- The insulation material at the joint pipe shall be inserted into the gap of the insulation material.
- The insulation material at the joint pipe shall be banded to the gap pipe and liquid pipe tightly.
- The linking part should be use glue to paste together
- Be sure not bind the insulation material over-tight, it may extrude out the air in the material to cause bad insulation and cause easy aging of the material.

9.2 Insulation of drainage pipe

9.2.1 Operational procedure of refrigerant pipe insulation

Select the suitable pipe → insulation (except joint section) → piping layout and connection → drainage test → insulate the joint parts

9.2.2 Purpose of drainage pipe insulation

The temperature of condensate drainage water is very low. If insulation is not enough, it shall form dew and

cause leakage to damage the house decoration.

Insulation material selection for drainage pipe

- The insulation material should be flame retardant material, the flame retardancy of the material should be selected according to the local law.
- Thickness of insulation layer is usually above 10mm.
- Use specific glue to paste the seam of insulation material, and then bind with adhesive tape. The width of tape shall not be less than 5cm. Make sure it is firm and avoid dew.

9.2.3 Installation and highlights of insulation construction

- The single pipe should be insulated before connecting to another pipe, the joint part should be insulated after the drainage test.
- There should be no insulation gap between the insulation material.

10. Engineering of electrical wiring

10.1 Highlights of electrical wiring installation

- All field wiring construction should be finished by qualified electrician.
- Air conditioning equipment should be grounded according to the local electrical regulations.
- Current leakage protection switch should be installed.
- Do not connect the power wire to the terminal of signal wire.
- When power wire is parallel with signal wire, put wires to their own wire tube and remain at least 300mm gap.
- According to table in indoor part named "the specification of the power" to choose the wiring, make sure the selected wiring not small than the date showing in the table.
- Select different colors for different wire according to relevant regulations.
- Do not use metal wire tube at the place with acid or alkali corrosion, adopt plastic wire tube to replace it.
- There must be not wire connect joint in the wire tube If joint is a must, set a connection box at the place.
- The wiring with different voltage should not be in one wire tube.
- Ensure that the color of the wires of outdoor and the terminal No. are same as those of indoor unit respectively.

11. Test operation

11.1 The test operation must be carried out after the entire installation has been completed.

11.2 Please confirm the following points before the test operation.

- The indoor unit and outdoor unit are installed properly.
- Tubing and wiring are correctly completed.
- The refrigerant pipe system is leakage-checked.
- The drainage is unimpeded.
- The ground wiring is connected correctly.
- The length of the tubing and the added stow capacity of the refrigerant have been recorded.
- The power voltage fits the rated voltage of the air conditioner.
- There is no obstacle at the outlet and inlet of the outdoor and indoor units.
- The gas-side and liquid-side stop valves are both opened.
- The air conditioner is pre-heated by turning on the power.

11.3 Test operation

Set the air conditioner under the mode of "COOLING" by remote controller, and check the following points.

Indoor unit

- Whether the switch on the remote controller works well.
- Whether the buttons on the remote controller works well.
- Whether the air flow louver moves normally.

-
- Whether the room temperature is adjusted well.
 - Whether the indicator lights normally.
 - Whether the temporary buttons works well.
 - Whether the drainage is normal.
 - Whether there is vibration or abnormal noise during operation.

Outdoor unit

- Whether there is vibration or abnormal noise during operation.
- Whether the generated wind, noise, or condensed of by the air conditioner have influenced your neighborhood.
- Whether any of the refrigerant is leaked.

Part 5

Electrical Control System

1. Electrical Control Function.....	57
2. Troubleshooting.....	62

1. Electrical Control Function

1.1 Definition

T1: Room Air Thermistor (RAT)

T2: Indoor Coil Thermistor (ICT)

T3: Outdoor Coil Thermistor (OCT)

T4: Outdoor Air Thermistor (OAT)

T5: Compressor Discharge Thermistor (CTT)

1.2 Main Protection

1.2.1 3 minutes Delay at restart for compressor.

1.2.2 Sensor protection at open circuit and breaking disconnection.

1.2.3 Phase check function

If the phase sequence is detected wrong or lack of 1 or 2 phase, the unit won't start and there is error code displayed on outdoor PCB.

1.2.4 Low pressure check function

The low pressure switch should be always closed. If it is open, the system will stop until the fault is cleared. During defrosting procedure, 4 minutes after defrosting ends and 5 minutes after compressor is on in heating mode, low pressure switch won't be checked.

Note: The system will not check if the protection could be cleared in 30 seconds after the protection occurs. If this protection occurs 3 times, it won't recover automatically until the main power is cut off.

1.2.5 Over-current protection

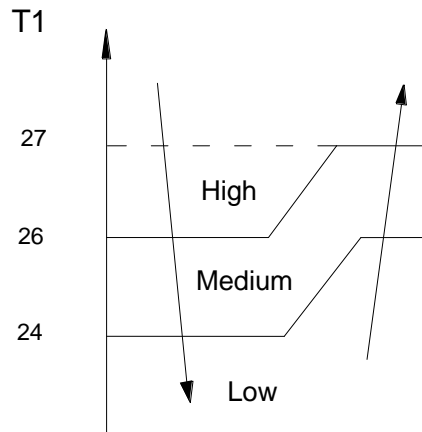
When compressor is running, if the current is over twice of the rated for 3 seconds, the compressor will stop and an error code will be displayed on the outdoor PCB. If the current becomes normal, the compressor will restart after 3 minutes.

Note: The current won't be checked within 3 seconds after the compressor starts. The system will not check if the protection could be cleared in 30 seconds after the protection occurs.

1.3 Operation Modes and Functions

1.3.1 Fan mode

- (1) Outdoor fan and compressor stop.
- (2) Temperature setting function is disabled, and no setting temperature is displayed.
- (3) Indoor fan can be set to high/med/low/auto.
- (4) The louver operates same as in cooling mode.
- (5) Auto fan:

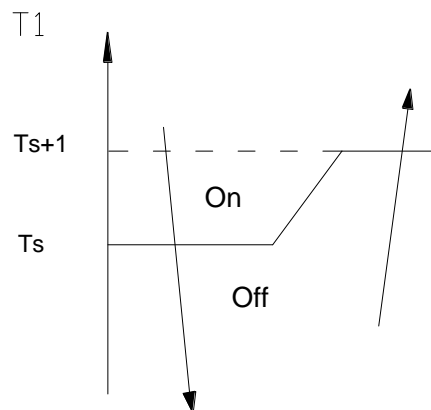


1.3.2 Cooling Mode

1.3.2.1 Compressor running rules

Once the compressor starts up, it will follow the below rules:

When indoor room temperature $T1$ is lower than T_s , the compressor and outdoor fan will shut off. When $T1$ is higher than T_{s+1} , the compressor and outdoor fan will start up.



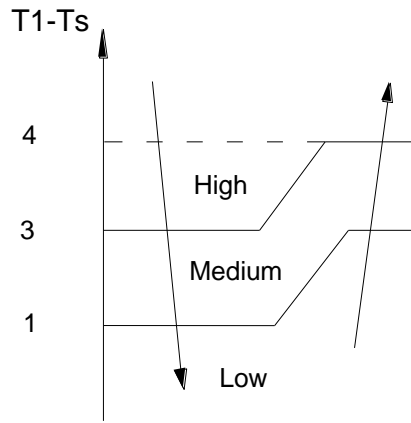
1.3.2.2 Outdoor fan running rules

The On-off outdoor units have single fan speed. The outdoor fan will run following the compressor except when AC is in evaporator high temperature protection in heating mode, condenser high temperature protection in cooling mode, defrosting mode and the current protection.

1.3.2.3 Indoor fan running rules

In cooling mode, indoor fan runs all the time and the speed can be selected as high, medium, low and auto.

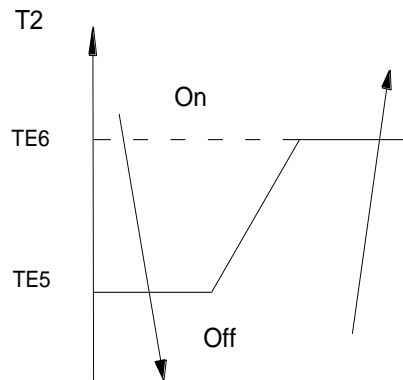
The auto fan:



1.3.2.4 Low evaporator coil temperature T2 protection

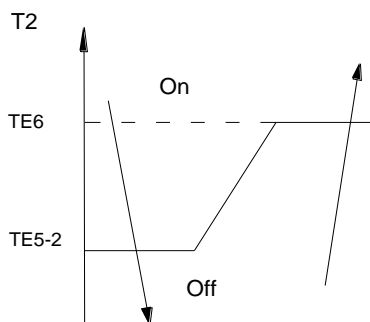
AC will enter T2 protection if any of the following conditions is satisfied.

Condition 1:



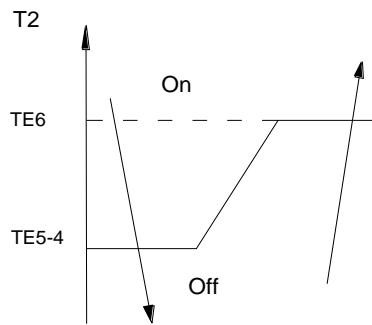
When the evaporator coil temp. T2 keeps lower than TE5 for 30 minutes, the compressor and outdoor fan will shut off. When T2 is higher than TE6, the compressor and outdoor fan will restart up.

Condition 2:



When the evaporator coil temp. T2 keeps lower than TE5-2 for 20 minutes, the compressor and outdoor fan will shut off. When T2 is higher than TE6, the compressor and outdoor fan will restart up.

Condition 3:



When the evaporator coil temp. T2 keeps lower than TE5-4 for 8 minutes, the compressor and outdoor fan will shut off. When T2 is higher than TE6, the compressor and outdoor fan will restart up.

1.3.3 Auto-mode

This mode can be chosen with remote controller and the setting temperature can be changed between 17~30°C.

In auto mode, the machine will choose cooling, heating or fan-only mode according to ΔT ($\Delta T = T1 - Ts$).

$\Delta T = T1 - Ts$	Running mode
$\Delta T > 2^\circ\text{C}$	Cooling
$-1 < \Delta T \leq 2^\circ\text{C}$	Fan-only
$\Delta T \leq -1^\circ\text{C}$	Heating

Indoor fan will run at auto fan of the relevant mode.

The louver operates same as in relevant mode.

If the machine switches mode between heating and cooling, the compressor will keep stopping for 15 minutes and then choose mode according to T1-Ts.

If the setting temperature is modified, the machine will choose running function again.

1.3.4 Drying mode

1.3.4.1 The indoor fan will keep running at low speed.

1.3.4.2 All protections are active and the same as that in cooling mode.

1.3.4.3 The louver operates the same as in cooling mode.

1.3.5 Timer function

1.3.5.1 Timing range is 24 hours.

1.3.5.2 Timer on. The machine will turn on automatically when reaching the setting time.

1.3.5.3 Timer off. The machine will turn off automatically when reaching the setting time.

1.3.5.4 Timer on/off. The machine will turn on automatically when reaching the setting "on" time, and then turn off automatically when reaching the setting "off" time.

1.3.5.5 Timer off/on. The machine will turn off automatically when reaching the setting "off" time, and then turn on automatically when reaching the setting "on" time.

1.3.5.6 The timer function will not change the AC current operation mode. Suppose AC is off now, it will not start up firstly after setting the “timer off” function. And when reaching the setting time, the timer LED will be off and the AC running mode has not been changed.

1.3.5.7 The setting time is relative time.

1.3.6 Economy function

1.3.6.1 It is valid in cooling, heating and auto mode.

1.3.6.2. Turning off, changing mode or setting fan speed will cancel economy function.

1.3.6.3 Operation process in sleep mode is as follow:

After pressing ECONOMIC or SLEEP button on the controller, the machine will go into economy mode.

When cooling, the setting temperature rises 1°C (be lower than 30°C) every hour, 2 hours later the setting temperature stops rising.

For heat pump models, when they are in heating, the setting temperature reduces 1°C (be higher than 17°C) every hour, 2 hours later the setting temperature stops reducing.

1.3.6.4 In this mode, the fan speed is forced into AUTO mode.

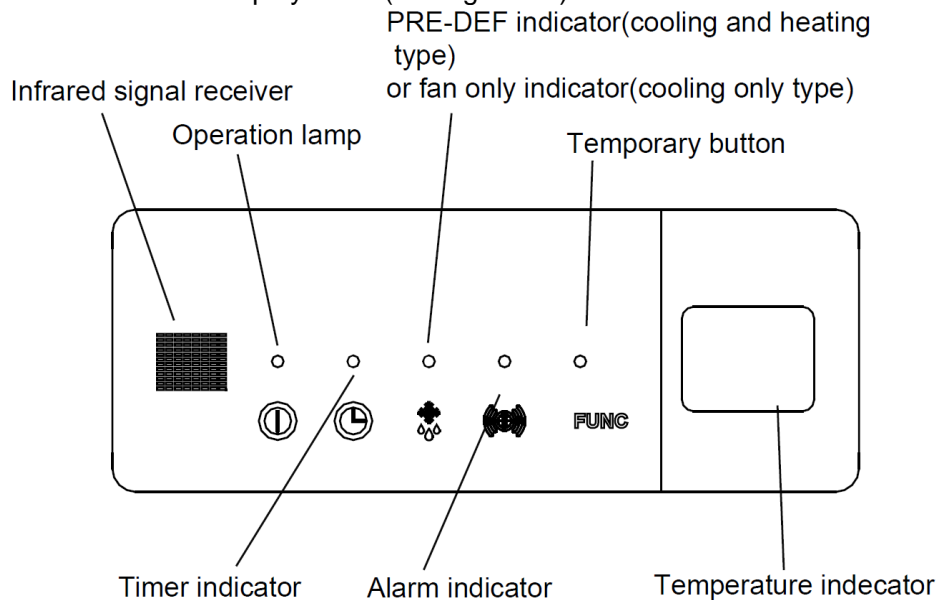
1.3.7 Auto-Restart function

The indoor unit is equipped with auto-restart function, which is carried out through an auto-restart module. In case of a sudden power failure, the module memorizes the setting conditions before the power failure. The unit will resume the previous operation setting (not including Swing function) automatically after 3 minutes when power returns.

2. Troubleshooting

2.1 Display board

2.1.1 Icon explanation on indoor display board(Ceiling& floor)



2.2 Indoor unit malfunction

During malfunction or protection, the indicators and digital LED displays as follow:

No	Operation	Timer	Def/Fan	Alarm	Digital LED Display	Malfunction or protection
1	X	☆	X	X	E2	Open-circuit and short-circuit trouble of T1
2	☆	X	X	X	E3	Open-circuit and short-circuit trouble of T2
4	☆	☆	X	X	E7	EEPROM malfunction
5	X	X	X	☆	E8	Full-water malfunction
O (on) X(off) ☆(flash at 5Hz)						

2.3 Outdoor unit malfunction

LEDs' for the indication of outdoor trouble

Type	Contents	LED1	LED2	LED3
Trouble	Protection of Low pressure(for 48k-60k models)	Flash	Flash	Off
Trouble	Overload of current	Off	Off	Flash
Trouble	Open-circuit and short-circuit trouble of T5 or protection of high pressure(for 48k-60k models)	Off	Flash	Off

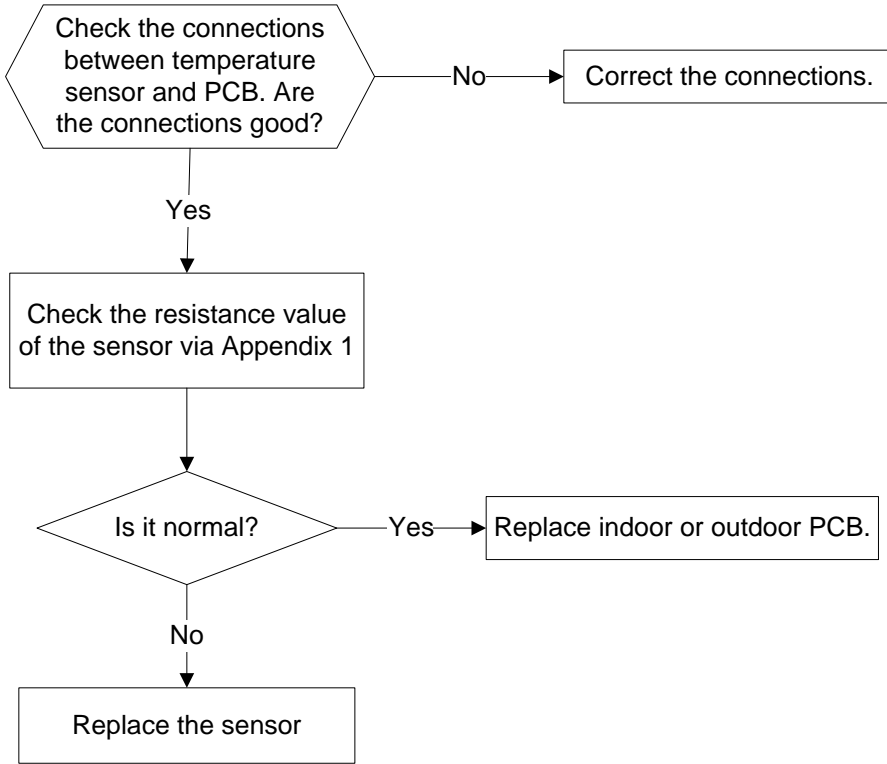
Note:

1. If the LED1-LED3 are flashing slowly, means the system is stand-by.

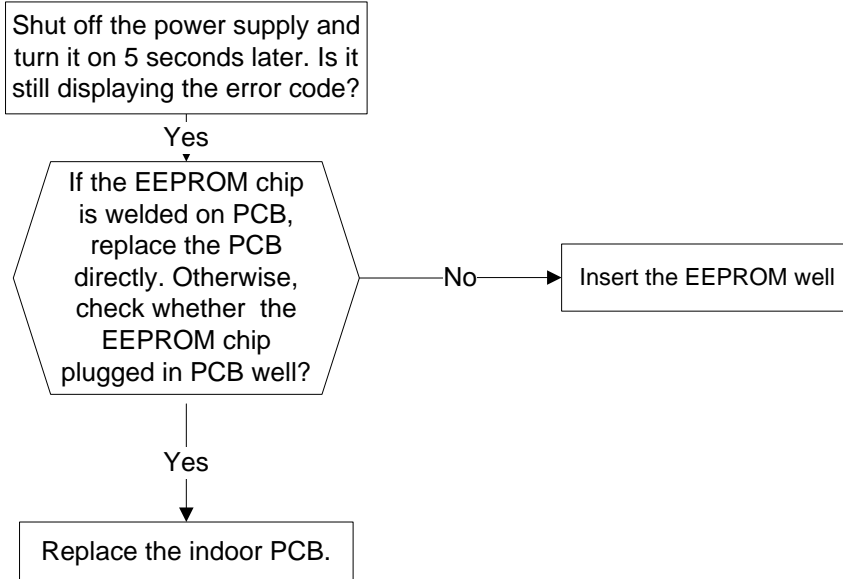
2.4 Solving steps for typical malfunction

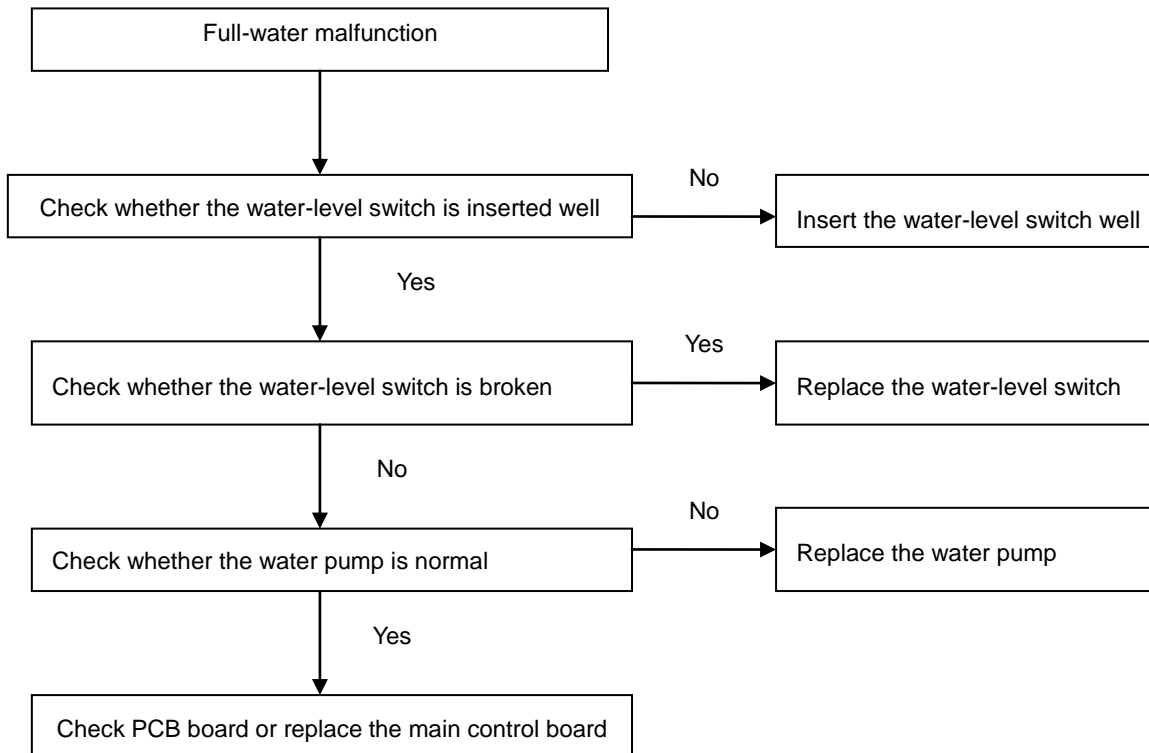
2.4.1 For the indoor unit

a. Open or short circuit of temperature sensor (E2,E3)



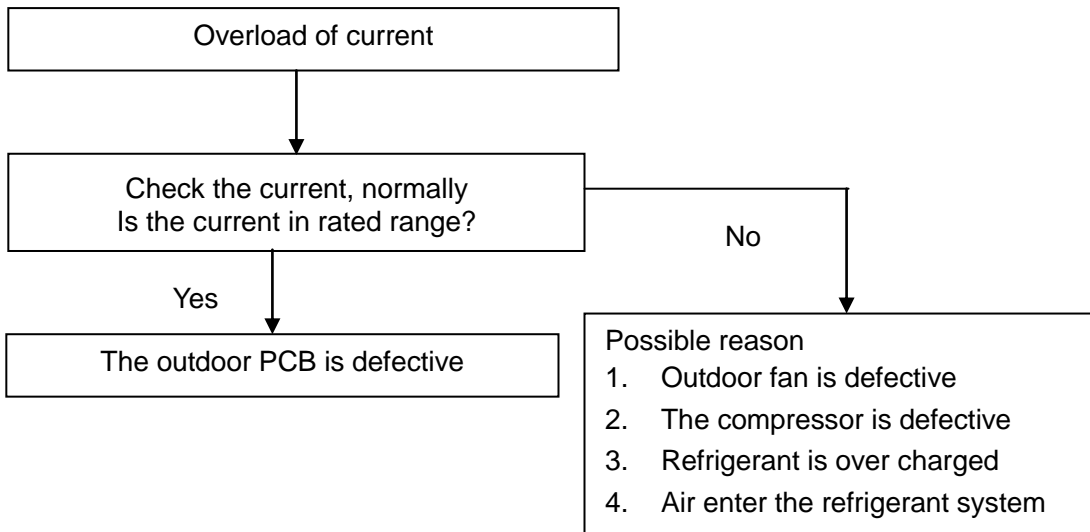
b. Indoor EEPROM malfunction(E7)



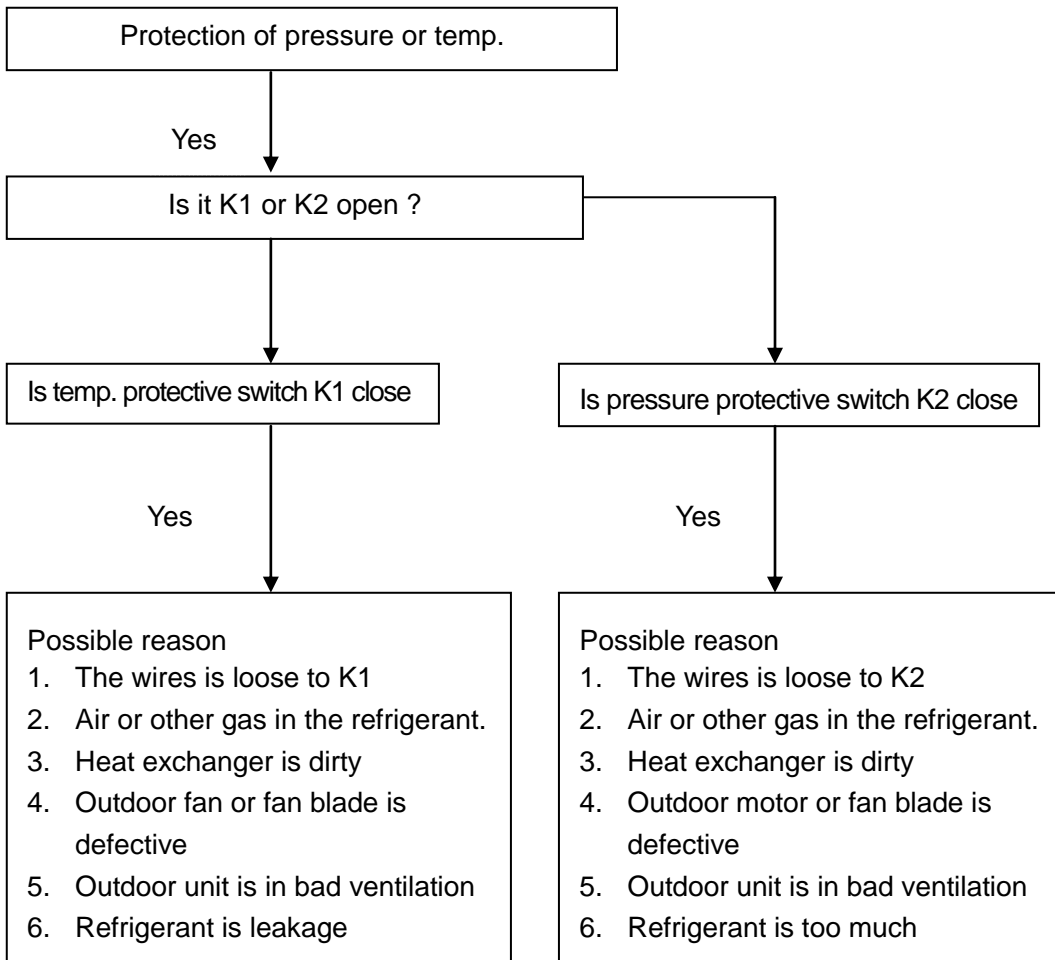
c. Full-water malfunction(E8)

2.4.3 For the outdoor unit

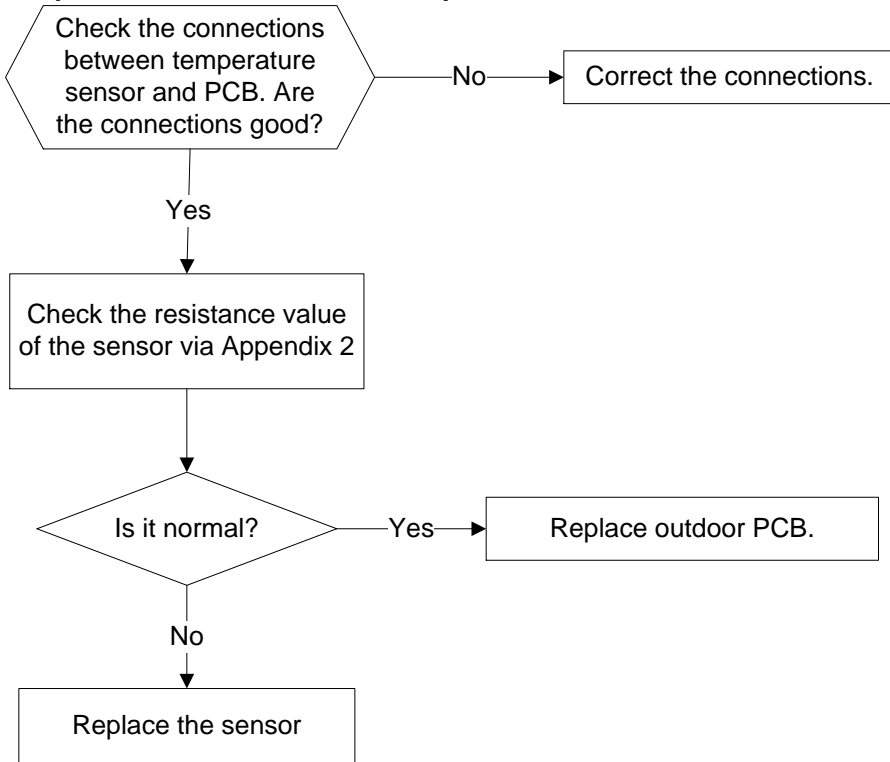
a. Overload of current



b. Protection of pressure or temp.



c. Open or short circuit of T5 temperature sensor



Appendix 1 Temperature Sensor Resistance Value Table (°C--K)

°C	K Ohm	°C	K Ohm	°C	K Ohm	°C	K Ohm
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5000	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.2190	25	10.0000	65	1.96532	105	0.54448
-14	79.3110	26	9.55074	66	1.89627	106	0.52912
-13	74.5360	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.48600
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44.0000	36	6.13059	76	1.34105	116	0.40060
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.21330	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.57050	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.32390
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.87950	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.27770
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.9180	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Appendix 2

Unit: °C---K				Discharge temp. sensor table			
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.86
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.94	112	2.63
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.3	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.82	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28	81	6.641	121	2.061
2	163.3	42	26.9	82	6.43	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.1	87	5.488	127	1.762
8	121	48	21.26	88	5.32	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294	B(25/50)=3950K	
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045	R(90°C)=5KΩ±3%	
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		



SERVICE MANUAL

Fixed Speed Light Commercial Series