Service manual

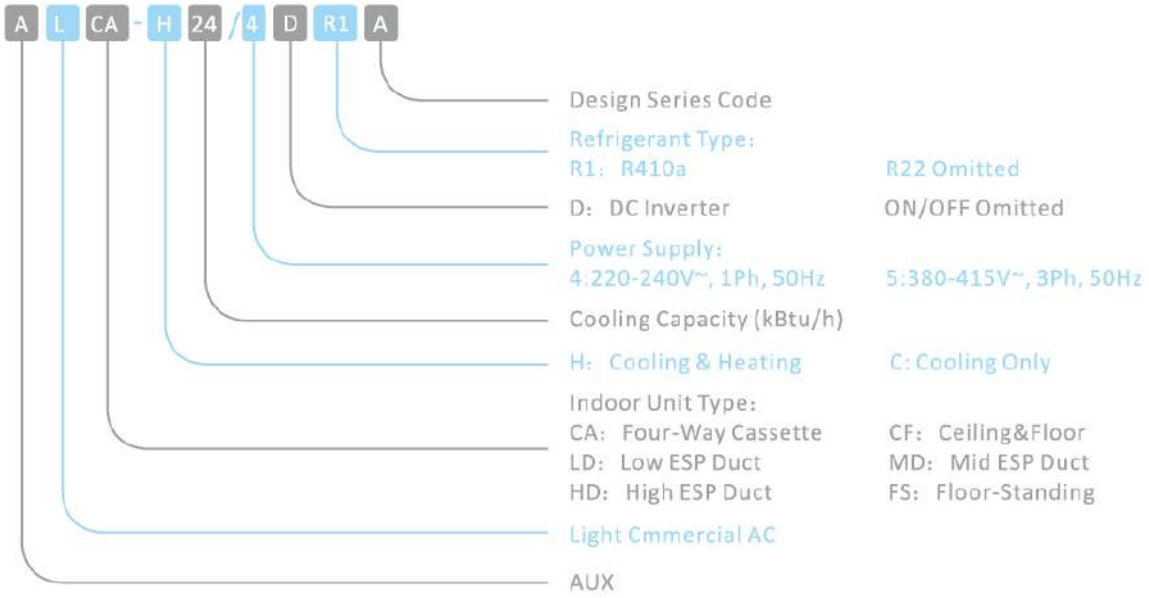
(DC Inverter 1 Drive 1 50Hz R410a)

Contents

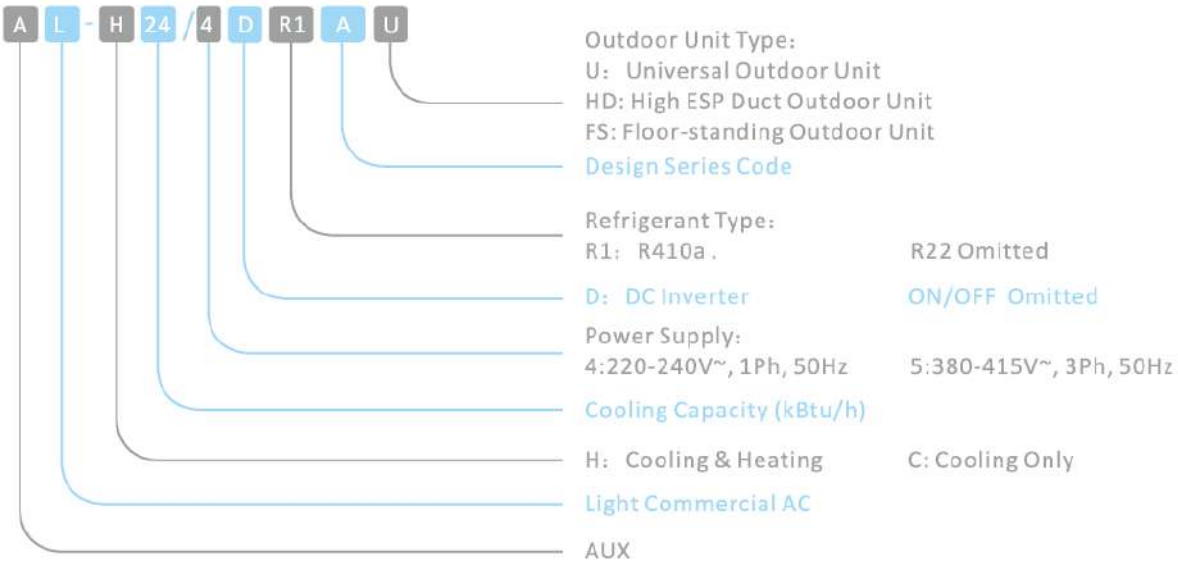
Part 1General description

1. Nomenclature

Indoor Unit:



Outdoor Unit:



2. Unit appearance

<table>
<tr><th>Series</th><th colspan="5">Picture of the indoor unit</th></tr>
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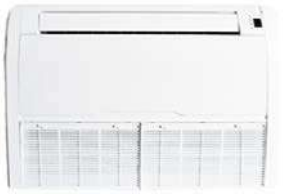
<tr><td rowspan="2">Ceiling &Floor</td><td>  </td><td colspan="2">  </td><td colspan="2">  </td></tr>
<tr><td>18k Btu/h</td><td colspan="2">24k Btu/h</td><td colspan="2">36k Btu/h</td><td>48k Btu/h</td><td>60k Btu/h</td></tr>
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<tr><td>18k Btu/h</td><td>24k Btu/h</td><td>36k Btu/h</td><td>48k Btu/h</td><td colspan="2">60k Btu/h</td></tr>
</table>

Capacity (BTU)	18000	24000	36000	48000	60000
Outdoor Unit					
	18/4	24/4	36/4	48/5	60/5

Part 2 Indoor unit

Four-way cassette

1. Feature

DC Inverter type Four-way cassette unit (heat pump), is installed under the ceiling, compared with Floor &Standing type A/C, it has following advantages: saving room space; Ceiling installation combining with the decoration, makes the room more elegant; Flexible installation in anywhere in the ceiling and 4-direction blowing, makes the indoor temperature is even and makes you feel more comfortable, so Cassette type A/C is a perfect replacing Product of Floor & Standing type A/C.

Application occasions:

Small super market, restaurant, office, meeting room, villa meeting room, family bedroom and so on, and it can even be used as the updating Product for modern residential A/C.

Features:

◇Concealed design, ceiling installation, room space saving, it is very suitable for family or office occasion;

◇With Setting or Auto two operation modes, four-way blowing, strong circulating wind, multi wind speed, the cooling or heating capacity can reach to each corner of the room;

◇One-step formed shell by mold, appearance is elegant;

◇Special insulation design, achieves high heat insulation efficiency, and no condensation on shell;

◇Built-in drain pump, drain-head height is up to 1.2meters, creating the ideal solution for perfect water drainage, also construction and installation is much easier and convenient;

◇Long term air filter, wash period is two times longer than normal filter, and maintenance is free;

◇3D helix air blade ensures the air flow sufficiently, reduces the unit thickness, and reduces the operation noise greatly;

◇Integrated electric control box, the E-box is safely covered by metal plate, for better fire-resistance; It is easy to repair the control part.

◇Plastic drip tray adopts innovative foam-PS combined with plastic technical, the thickness of plastic reaches 1mm, avoid any leakage;

◇Ingenious hook design, the panel is convenient to install or remove;

◇Fresh air intake design, leading in fresh air to improve indoor air quality anytime;

◇Auto-restart function;

◇Standard remote controller and optional wired controller;

◇Failure automatic detection, if there is a failure, the indicator will flash and the failure code will display on the wired controller, the failure cause is easier to be found.

Function introduction

Function	Name	ALCA-H*/4DR1A			ALCA-H*/5DR1A	
		18	24	36	48	60
Protection Function	high pressure protection	—	—	—	○	○
	low pressure protection	—	—	—	○	○
	over-current protection of compressor	○	○	○	○	○
	over-high temperature of condenser middle	○	○	○	○	○
	over-high discharge temperature of compressor	○	○	○	○	○
	Phase protection	—	—	—	—	—
	Heating over-heat protection	○	○	○	○	○
	Anti-freeze protection	○	○	○	○	○
	Sensor failure alarm	○	○	○	○	○
	Error code display function	○	○	○	○	○
Comfortable Function	Cooling	○	○	○	○	○
	Heating	○	○	○	○	○
	3 fan speed	○	○	○	○	○
	static pressure adjustable	—	—	—	—	—
	Auto-restart (optional)	○	○	○	○	○
	Anti-cold wind	○	○	○	○	○
	Blow exhaust heat	○	○	○	○	○
	Timer	○	○	○	○	○
Opretating display	clock display	○	○	○	○	○
	operating mode display	○	○	○	○	○
	fan speed display	○	○	○	○	○
	defrosting display	○	○	○	○	○
	timing on/off display	○	○	○	○	○
	wind guiding angle display	—	—	—	—	—
	sleeping display	○	○	○	○	○
Operation mode	Auto operation	○	○	○	○	○
	Dehumidify operation	○	○	○	○	○
	Auto defrosting	○	○	○	○	○
	Ventilation function	○	○	○	○	○
	Low temperature cooling function	—	—	—	—	—
Health function	Removable air filter	○	○	○	○	○
	fresh air function preserved	○	○	○	○	○
Installation adaptability	Optional left and right water drain	—	—	—	—	—
	Optional left and right connection Auxiliary pipe	—	—	—	—	—
	Optional rear and downward air return	—	—	—	—	—
	Installation instruction plate is available	○	○	○	○	○

Remarks: ○ Stands for "YES"　　— Stands for "NO"

2. Specification

Model	Indoor		ALCA-H18/4DR1A	ALCA-H24/4DR1A	ALCA-H36/4DR1A
	Panel		MB13	MB12	MB12
	Outdoor		AL-H18/4DR1A(U)	AL-H24/4DR1A(U)	AL-H36/4DR1A(U)
Power Supply		V~,Hz, Ph	220~240,50,1	220~240,50,1	220~240,50,1
Capacity	Cooling	Btu/h	5220-17400-19140	26500-24000-7200	40000-36000-10800
		W	1530-5100-5610	7920-7200-2160	11000-10000-3000
	Heating	Btu/h	20260-19100-4780	29700-27000-6750	43125-37500-11250
		W	5900-5600-1400	8690-7900-1975	13225-11500-3450
Electric Data	Rated Cooling Power Input	W	2050-1580-470	2880-2215-665	4012-3086-926
	Rated Heating Power Input	W	2010-1550-460	2813-2164-649	4118-3168-950
	Rated Cooling Current	A	9.81-7.55-2.25	13.78-10.60-3.21	19.19-14.77-4.45
	Rated Heating Current	A	9.62-7.40-2.20	13.44-10.36-3.11	19.71-15.16-4.55
Performance	EER	W/W	3.23	3.25	3.24
	COP	W/W	3.62	3.65	3.63
Indoor Fan Motor	Model		YDK30-6E1	XD30A	YDK45-6 Q
	Brand		Sinjun	Sinjun	Sinjun
	Output Power x Fan quantity	W	30×1	30×1	45×1
	Capacitor	uF	2.0	3	4
	Speed (Hi/Mi/Lo)	r/min	835/7660/685	500/430/320	650/520/450
Indoor Coil	a.Number Of Row		2	2	2
	b.Tube Pitch(a)x Row Pitch(b)	mm	20.5×12.7	20.5×12.7	20.5×12.7
	c.Fin Pitch	mm	1.5	1.6	1.4
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.and Material	mm	φ7， Inner grooved	φ7， Inner grooved	φ7， Inner grooved
	f.Coil Length x Height x Width	mm	1352×205×25.4	2014×205×25.4	2014×205×25.4
	g.Heat Exchanging Area	m^2	5.76	9.43	12.00
Indoor Unit	Indoor Air Flow (Hi/Mi/Lo)	m^3/h	750/650/580	1100/880/770	1500/1200/1050
	Noise Level(Hi/Mi/Lo)	dB(A)	46/41/39	45/42/36	48/45/39
	Net Dimension (W*H*D)	mm	570×570×260	835×835×250	835×835×250
	Packing Dimension (W*H*D)	mm	650×650×290	900×900×330	900×900×330
	Net Weight	Kg	17	24	24
	Gross Weight	Kg	20	27.5	27.5
Panel	Net Dimension (W*H*D)	mm	650×650×55	950×950×55	950×950×55

	Packing Dimension (W*H*D)	mm	710×710×80	1000×1000×100	1000×1000×100
	Net weight	Kg	3	5	5
	Gross weight	Kg	5	7	7
Refrigerant Pipe	Liquid Side	mm	6.35(1/4)	9.52(3/8)	9.52(3/8)
	Gas Side	mm	12.7(1/2)	15.88(5/8)	15.88(5/8)
	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)	R3/4in(DN20)
	Max. Refrigerant Pipe Length	m	20	25	30
	Max. Difference In Level	m	10	15	20
Operation Temperature Range		℃	16~32	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring(Indoor)	mm^2	$3×1mm^2$	$3×1mm^2$	$3×1mm^2$
	Power Wiring(Outdoor)	mm^2	$3×2.5mm^2$	$3×2.5mm^2$	$3×2.5mm^2$
	Signal Wiring	mm^2	$2×1mm^2$	$2×1mm^2$	$2×1mm^2$
Wireless Remote Controller			YKR-L/300E	YKR-L/300E	YKR-L/300E
Application Area		m^2	21-35	28-47	42-70
Qty'per 20'& 40'&40HQ(Only For Reference)		Set	57/120/144	39/76/96	30/70/76

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃.
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

Model	Indoor		ALCA-H48/5DR1A	ALCA-H60/5DR1A
	Panel		MB12	MB12
	Outdoor		AL-H48/5DR1A(U)	AL-H60/5DR1A(U)
Power Supply		V~,Hz, Ph	380~415,50,3	380~415,50,3
Capacity	Cooling	Btu/h	51800-48000-14400	63000-60000-18000
		W	15120-14000-4200	16800-16000-4800
	Heating	Btu/h	56100-51000-17850	69300-63000-22050
		W	17050-15500-5425	19800-18000-6300
Electric Data	Rated Cooling Power Input	W	5582-4294-1288	6479-4984-1495
	Rated Heating Power Input	W	5461-4201-1260	6429-4945-1484
	Rated Cooling Current	A	9.84-7.57-2.27	11.18-8.60-2.57
	Rated Heating Current	A	9.68-7.45-2.23	10.95-8.42-2.54
Performance	EER	W/W	3.26	3.21
	COP	W/W	3.69	3.64
Indoor Fan Motor	Model		XD80A	XD80A
	Brand		Sinjun	Sinjun
	Output Power x Fan quantity	W	80×1	80×1
	Capacitor	uF	6	6
	Speed (Hi/Mi/Lo)	r/min	695/585/495	695/585/495
Indoor Coil	a.Number Of Row		2	2
	b.Tube Pitch(a)x Row Pitch(b)	mm	20.5×12.7	20.5×12.7
	c.Fin Pitch	mm	1.4	1.4
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.and Material	mm	φ7， Inner grooved	φ7， Inner grooved
	f.Coil Length x Height x Width	mm	2014×246×25.4	2014×246×25.4
	g.Heat Exchanging Area	m^2	14.66	14.66
Indoor Unit	Indoor Air Flow (Hi/Mi/Lo)	m^3/h	1800/1440/1260	1800/1440/1260
	Noise Level(Hi/Mi/Lo)	dB(A)	50/47/41	50/47/41
	Net Dimension (W*H*D)	mm	835×835×290	835×835×290
	Packing Dimension (W*H*D)	mm	900×900×370	900×900×370
	Net Weight	Kg	26.5	26.5
	Gross Weight	Kg	30.5	30.5
Panel	Net Dimension (W*H*D)	mm	950×950×55	950×950×55
	Packing Dimension (W*H*D)	mm	1000×1000×100	1000×1000×100
	Net weight	Kg	5	5
	Gross weight	Kg	7	7
Refrigerant Pipe	Liquid Side	mm	9.52(3/8)	9.52(3/8)
	Gas Side	mm	19.05(3/4)	19.05(3/4)

	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)
	Max. Refrigerant Pipe Length	m	50	50
	Max. Difference In Level	m	30	30
Operation Temperature Range		℃	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring(Indoor)	mm^2	$3×1mm^3$	$3×1mm^3$
	Power Wiring(Outdoor)	mm^2	$5×1.5mm^3$	$5×1.5mm^3$
	Signal Wiring	mm^2	$2×1mm^2$	$2×1mm^2$
Wireless Remote Controller			YKR-L/300E	YKR-L/300E
Application Area		m^2	56-93	64-107
Qty'per 20'& 40'&40HQ(Only For Reference)		Set	26/54/54	26/54/54

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃.
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

3. Capacity Amendment

3.1 Running range

Cooling capacity (Btu/h)		12000	18000	24000	36000	48000	60000
Power supply		220-240V~/50Hz			380-415V 3N~/50Hz		
Voltage		187~242V			320~420V		
Ambient temperature	Cooling	16~49℃					
	Heating	-15~24℃					

3.2Amendment coefficient of cooling capacity under different indoor/outdoor DB/WB temperatureK1

Indoor air inlet temperature℃		Outdoor air inlet DB temperature℃				
DB	WB	25	30	35	40	43
23	16	0.98	0.94	0.89	0.85	0.82
25	18	1.05	1	0.95	0.90	0.87
27	19	1.1	1.05	1	0.95	0.91
28	20	1.12	1.07	1.02	0.96	0.93
30	22	1.19	1.13	1.08	1.02	0.99
32	24	1.26	1.20	1.15	1.08	1.05

Actual cooling capacity calculation:

Actual cooling capacity=amendment coefficient of cooling capacity × nominal cooling capacity

——nominal cooling capacity could be found from the performance parameters list

——amendment coefficient of cooling capacity could be found from table above.

3.3 Amendment coefficient of heating capacity under different indoor/outdoor DB/WB temperature K2

Indoor air inlet DB temperature ℃	Outdoor air inlet WB temperature ℃						
	-15	-10	-5	0	7	10	15
15	0.64	0.71	0.77	0.8	1.04	1.1	1.16
20	0.59	0.66	0.72	0.76	1	1.06	1.12
25	0.55	0.62	0.69	0.71	0.96	1	1.07

Actual heatingcapacity calculation:

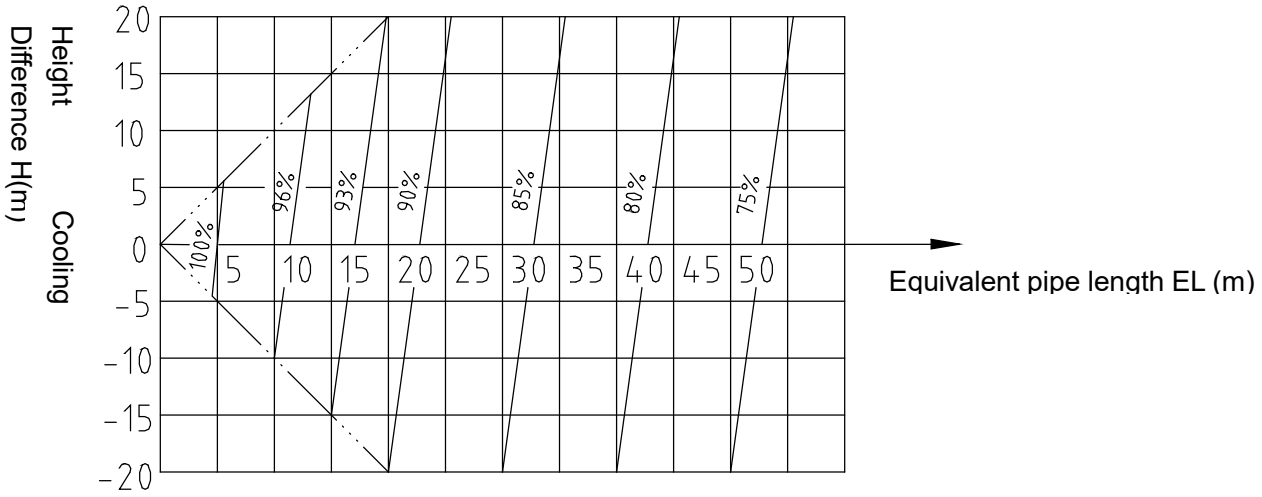
Actual heating capacity=amendment coefficient of heating capacity × nominal heating capacity

——nominal heating capacity could be found from the performance parameters list

——amendment coefficient of heating capacity could be found from table above.

3.4 Amendment coefficients of heating and cooling capacity under different height drop K3

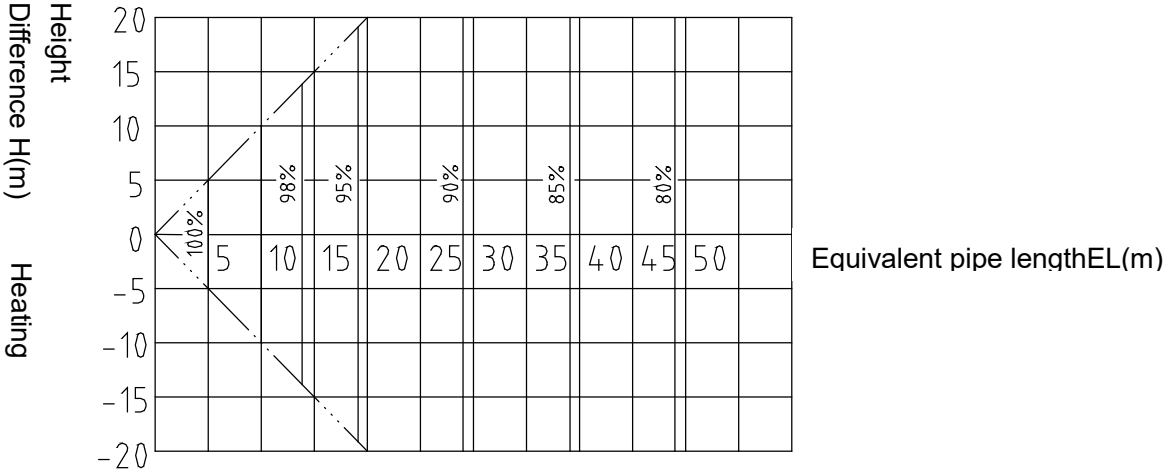
Different Cooling Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit － Height of Indoor Unit

Different Heating Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit － Height of Indoor Unit

3.5 Correction capability

Cooling capacity = nominal cooling capacity xK1xK3

Heating capacity = nominal heating capacity xK2xK3

3.6 Equivalent Pipe length conversion

Equivalent pipe length means converting pipe elbow to straight pipe length after considerate the pressure loss.

Bend and Oil Loop Conversion tablet

Type / Pipe Dia.(mm)	Bend	Oil Loop
6.35	0.10	0.7
9.52	0.18	1.3
12.70	0.20	1.5
15.88	0.25	2.0
19.05	0.35	2.4
22.02	0.40	3.0

Equivalent Pipe length L＝Actual Pipe length L+ Bend Qty× Equivalent pipe bend length+ Oil Loop Qty × Equivalent Oil Loop length

Sample:

ALCA-H48/5 Actual Pipe length is 25 meters, Gas pipe diameter is 19.05mm. If there's 5 bends and 2 oil loops during the installation, then the equivalent pipe length should be:

L=25+0.35×5+2.4×2=31.5(m)

◇Specification of Connection Pipe for Indoor Unit and Outdoor Unit

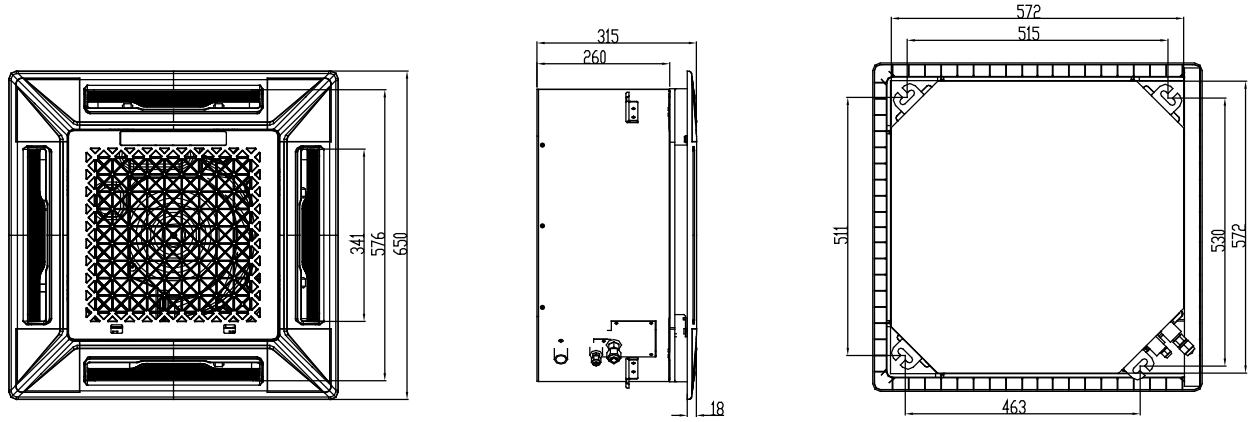
Cooling Capacity(Btu/h)		18000	24000	36000	48000	60000
Connection Pipe (mm)	Liquid Pipe	Φ6.35	Φ9.52		Φ9.52	
	Gas Pipe	Φ12.7	Φ15.88		Φ19.05	
Max. Length		20	25	30	50	
Max. Height (m)		15	15	20	30	
Max. Bend Qty		5	8	8	10	
Extra R410a per meter when the pipe length is more than 5 meter (kg)		0.05	0.05	0.05	0.07	

Caution:

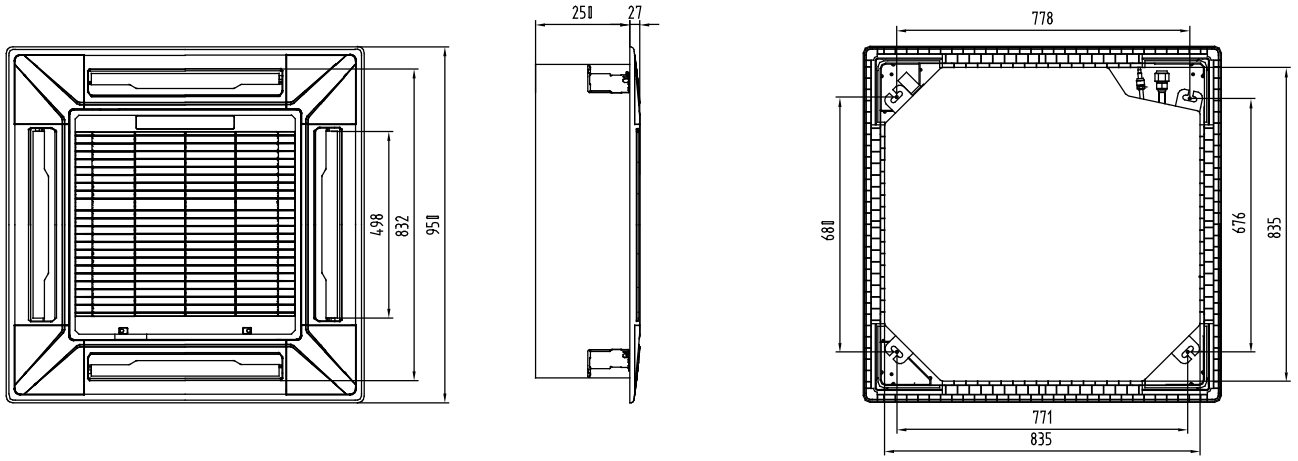
1. The standard Pipe length is 5m, if the pipe length is less than this then no additional charging is necessary. If the pipe length is more than this then you should charge more refrigerant into the system according to the above Charging Data
2. The thickness of the pipe is 0.6-1.0, bearing pressure is 4.2MPa;
3. If the connection pipe is too long, the cooling capacity and stability would be decreased. And the more bend quantity, the resistance in the piping system would be bigger, then the cooling and heating capacity would be decreased even lead to compressor broken. We suggest you to use the shortest connection pipe according to the pipe length parameter in this manual.If the height difference between outdoor and indoor unit is more than 5m, an oil trap should be installed in the gas pipe for every 10 meters.

4. Dimension

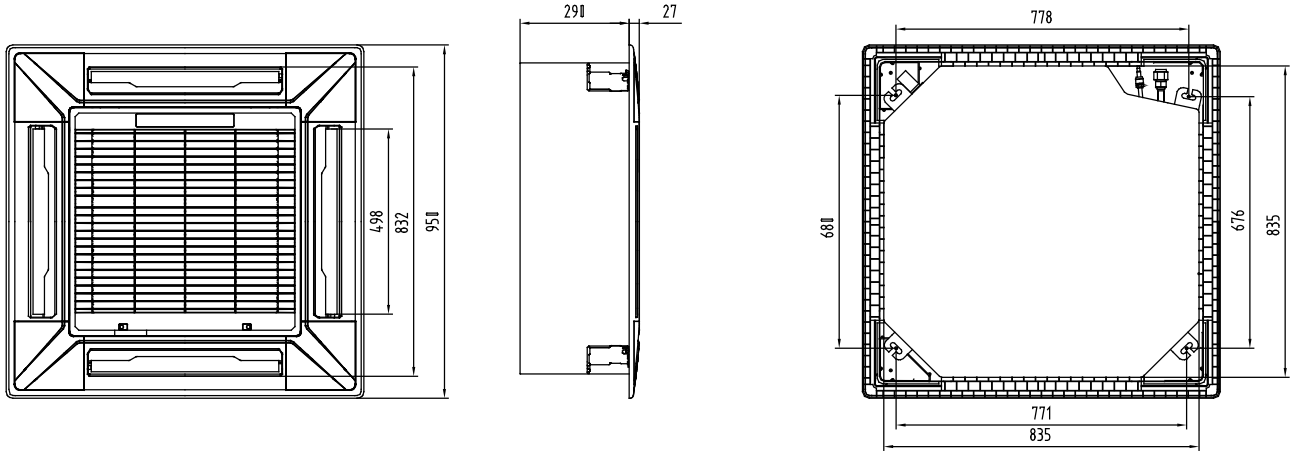
ALCA-H18/4DR1A



ALCA-H24/4DR1A, ALCA-H36/4DR1A



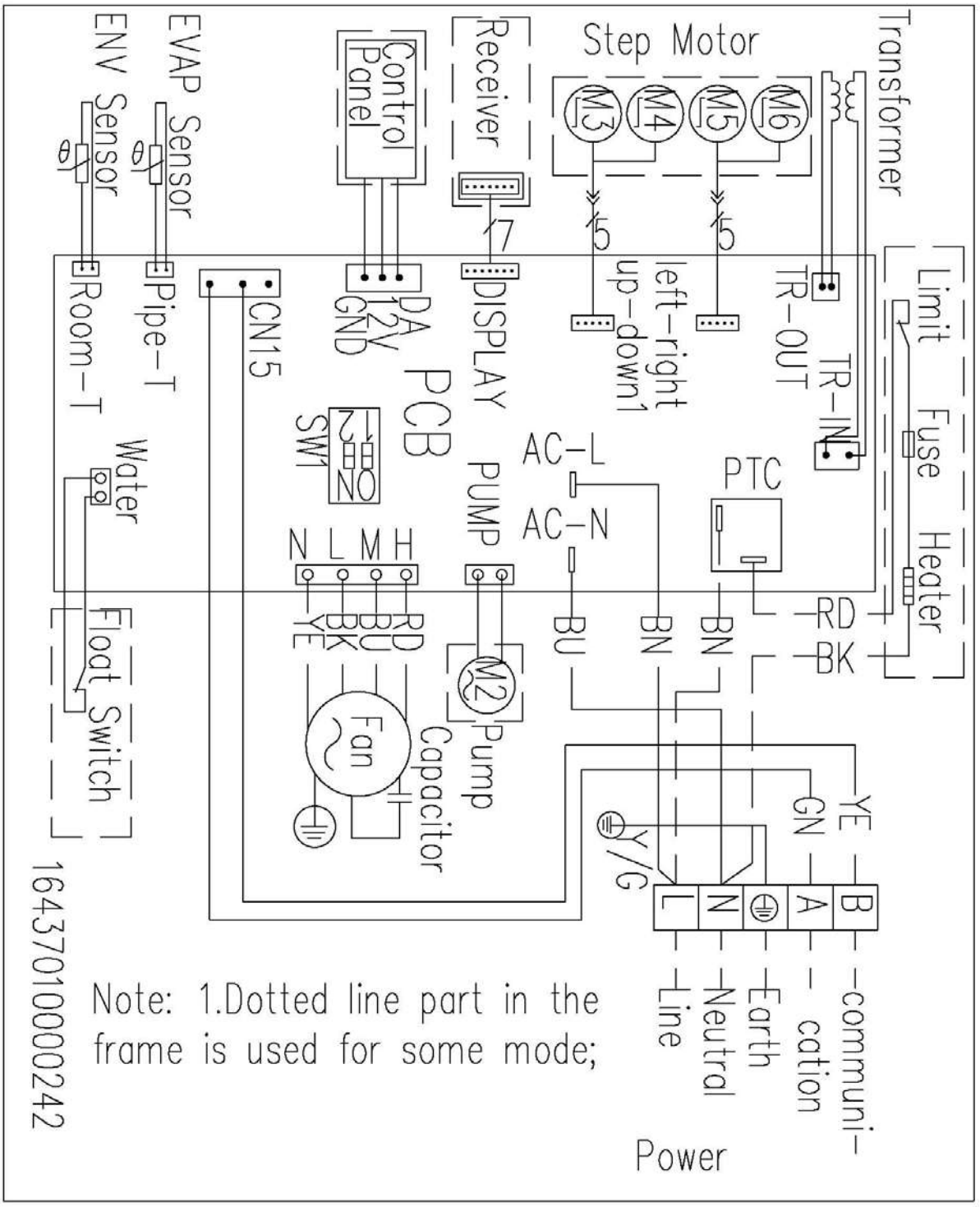
ALCA-H48/5DR1A, ALCA-H60/5DR1A



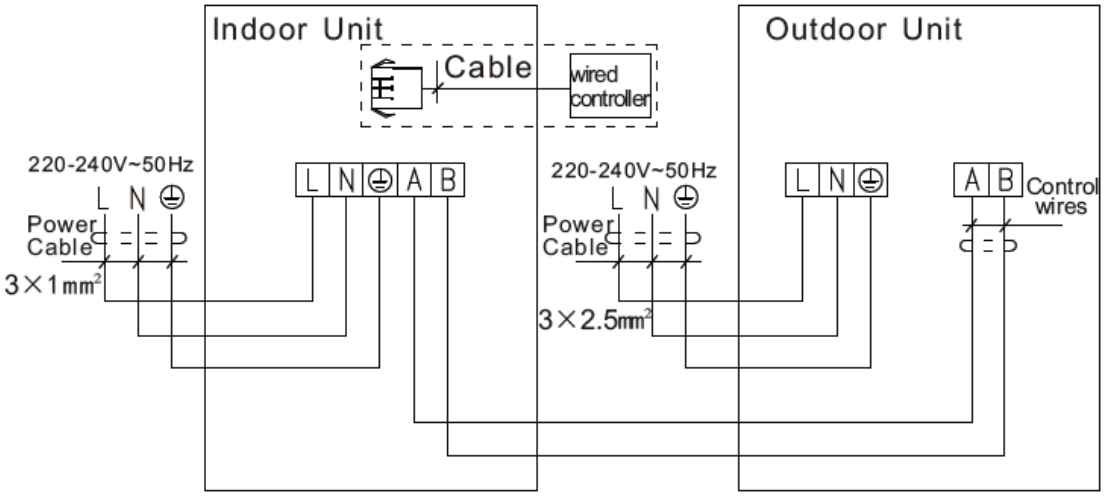
5. Electrical wiring and connection

Electrical connection

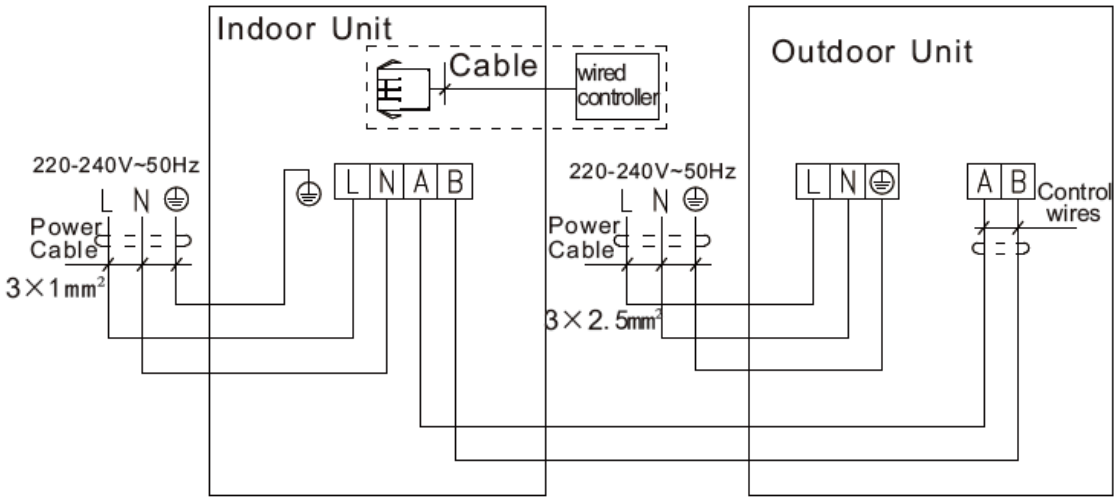
ALCA-H18/4DR1A, ALCA-H24/4DR1A, ALCA-H36/4DR1A,ALCA-H48/5DR1A, ALCA-H60/5DR1A



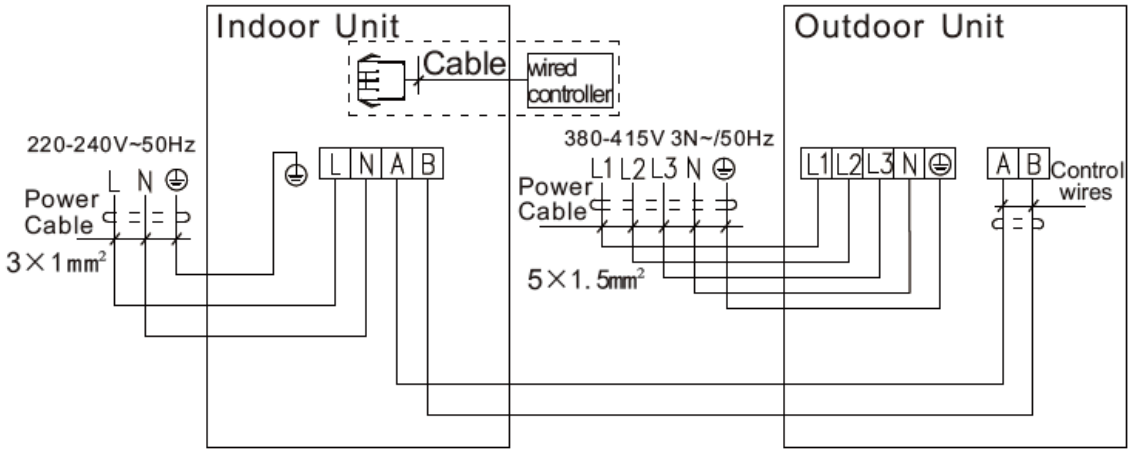
ALCA-H18/4DR1A



ALCA-H24/4DR1A, ALCA-H36/4DR1A



ALCA-H48/5DR1A, ALCA-H60/5DR1A

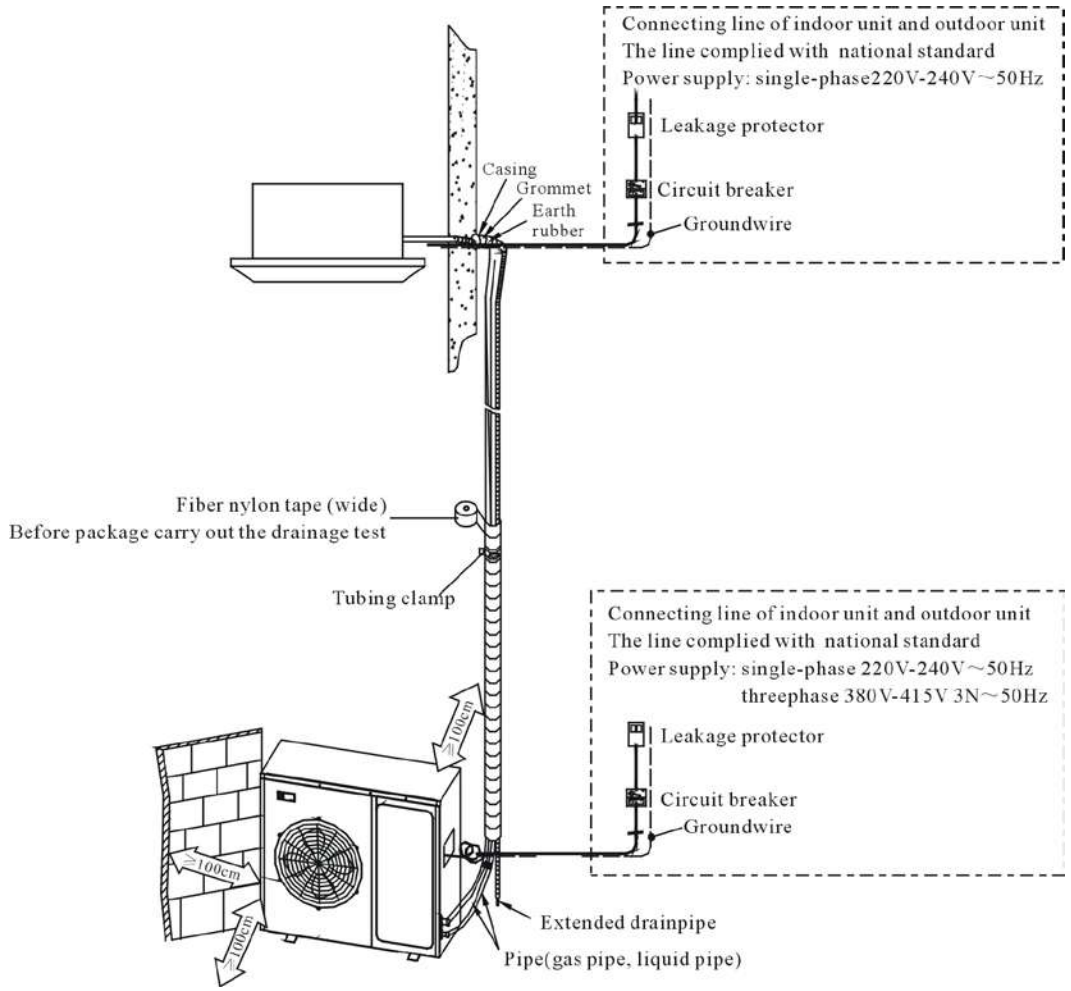


6. Installation

6.1 Preparation before installation

Please buy following spare parts from your local market before installation	Besides general implements, other implements are needed when connecting the pipe
Hung bolts M12, 4 pcs	Acetylene cylinders, oxygen cylinders (when longer pipe used it should be welded)
Drainage pipe PVC	One set pipe cut machine. (cut copper pipe)
Copper connecting pipe	Refrigerant cans, electronic balance (when longer pipe used additional gas should be charged)
Adhesive belt (big size) 5 pcs, (small size) 5 pcs	Pressure gauges, pipe clamp, welding torch, 2B silver electrode
Heat insulation material used to connect copper pipe (PE foam material, its thickness is more than 8mm)	Wrench 2 pcs, one of them is with adjustable torque wrench (42N.m,65N.m,100N.mm)
Power cable, electrical wire between indoor and outdoor unit(Must be in accordance with the wire diameter in the wiring diagram)	Nitrogen cylinder (in order to prevent oxidation when welding, using Nitrogen to replace the air)

6.2 Installation drawing



6.3 Installation precaution

◇ Hanging location should be able to support the unit's weight, there should be no increase in noiseand vibration. If the hanging location needs reinforcement, it should be reinforced before installation;

◇ Choose the space above the ceiling that can put the indoor unit inside;

◇ The location should be easy for drainage;

◇ The unit should not be installed in the heat source, steam source oil mist places (such as machine room, kitchen, laundry room, mechanical workshop, etc.) in order to avoid performance degradation, electric shock, plastic parts corrosion which lead to unit broken;

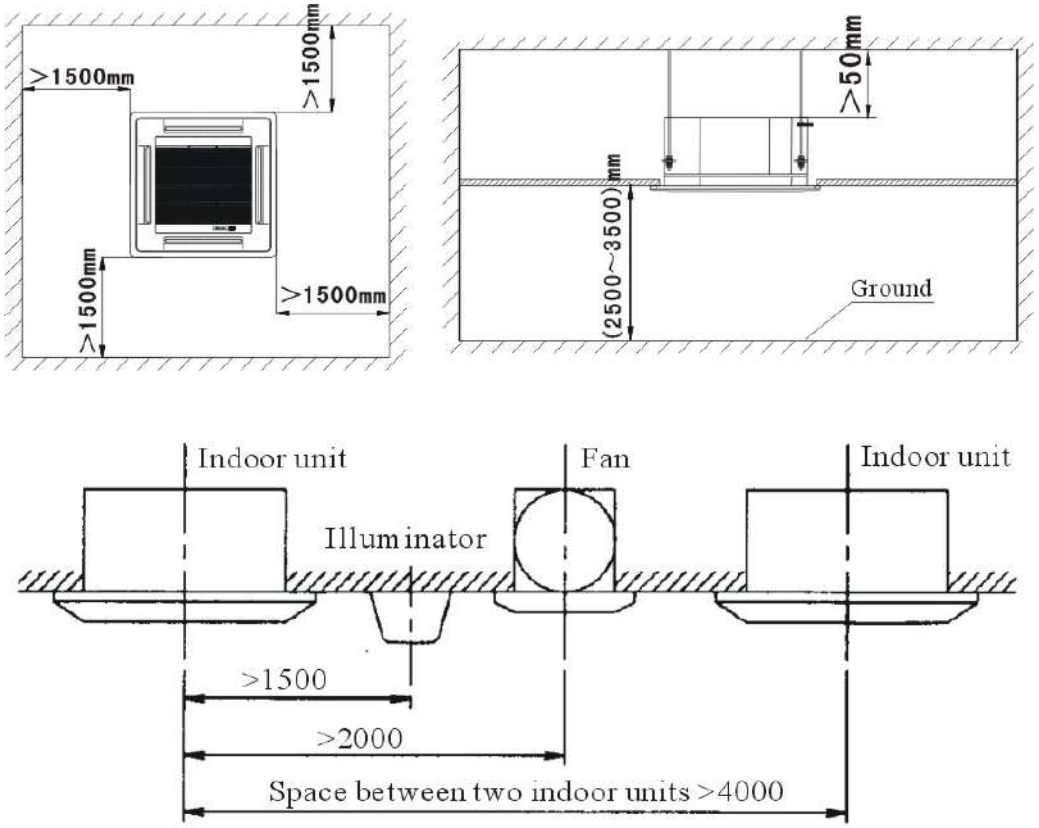
◇ Choose the location at least 1 meter away from TV and radio, in order to avoid interference to them

◇ There is no obstacles getting in the way of air circulation, cold air can evenly spread to all corners of the room;

◇ In order to facilitate maintenance and repair, there should be certain distance between indoor unit and obstacles;

◇ Refrigerant R22 is used for this unit, which is non-flammable and non-toxic gas. As the proportion of refrigerant is bigger than air, so if it leaks the gas will be filled on the ground. Therefore, if the units mounted on a closed room there must be good ventilation to prevent suffocation. In case of leakage of refrigerant, units should immediately stop running, and contact with maintenance personnel in time. There must be no fire at the site, because the refrigerant will turn to harmful gas when get to the fire.

6.4 The distance between indoor unit and obstacle

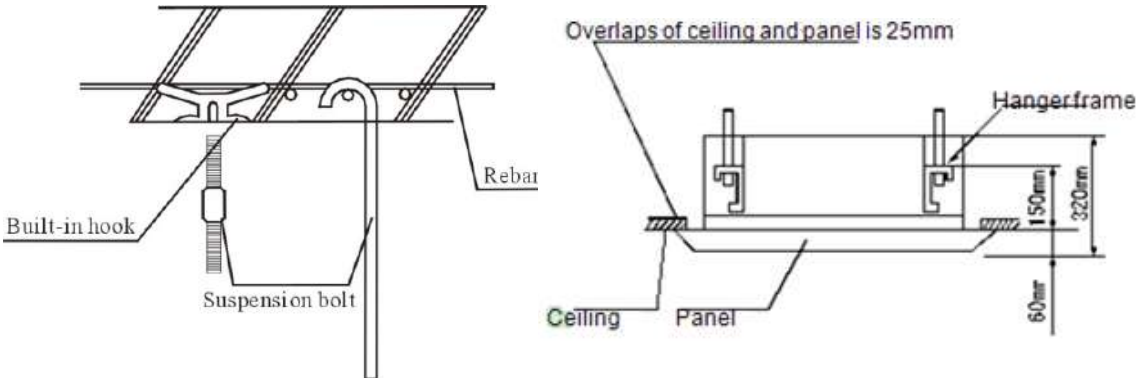


6.5 Indoor unit suspension

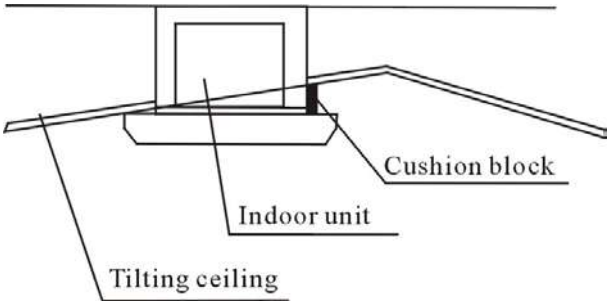
◇ Select the suspension foundation:
The suspension foundation is a structure of either wooden frame or reinforced concrete. It must be firm and reliable to bear at least 4 times weight of itself and capable of bearing vibration for long periods.

◇ Fixing of suspension foundation:

◇ Fix the suspension bolts either as shown in the picture or by a steel or wooden bracket.



◇ If this unit is installed on a sloping ceiling, a cushion block should be installed between the ceiling and the air outlet panel, in order to ensure that the unit is installed on a level surface.
This is as shown in the drawing as follows:

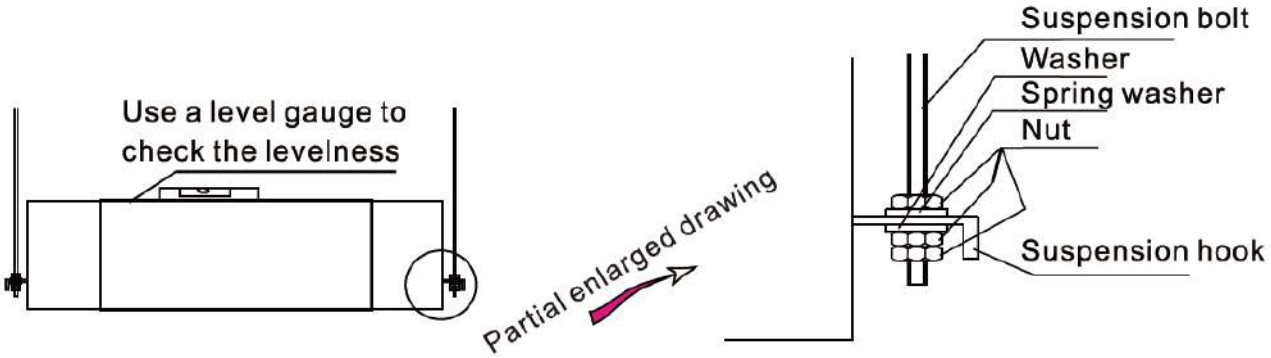


◇ Adjust the relative position of the suspension hook on the suspension bolt so that the unit can be in level position in all directions. Check with a level gauge after the installation is complete in order to ensure that the indoor unit is horizontal, otherwise it will cause water leakage, air leakage etc.

◇ Tighten the bolt and ensure that four hooks are in close contact with the nuts and washers, and the unit is suspended firmly and reliably onto the hooks.

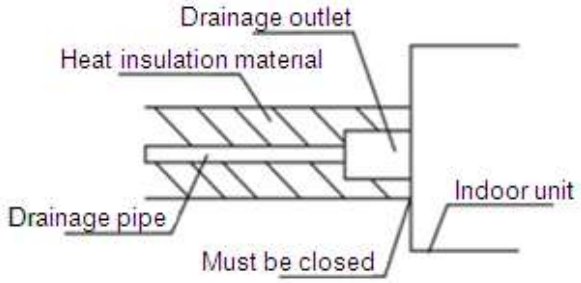
◇ After the unit is installed ensure it is secure and does not shake or sway.

◇ Ensure that the centre of the indoor unit is in alignment with the centre of the opening in the ceiling.

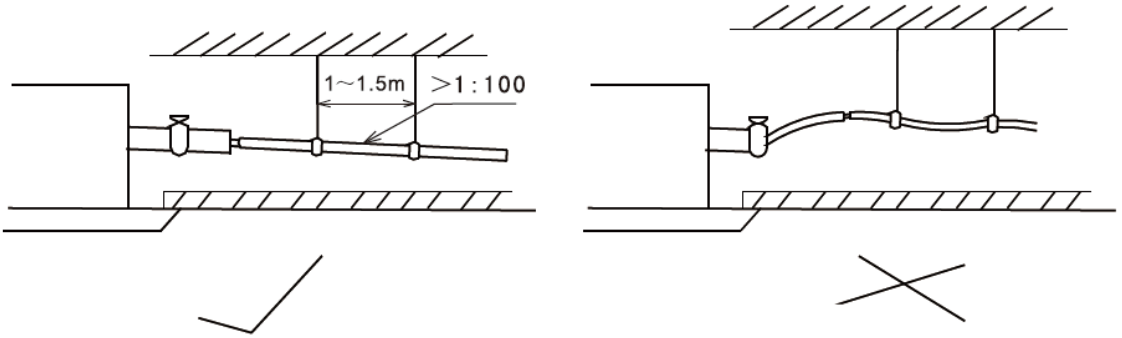


6.6 Drainage pipe installation

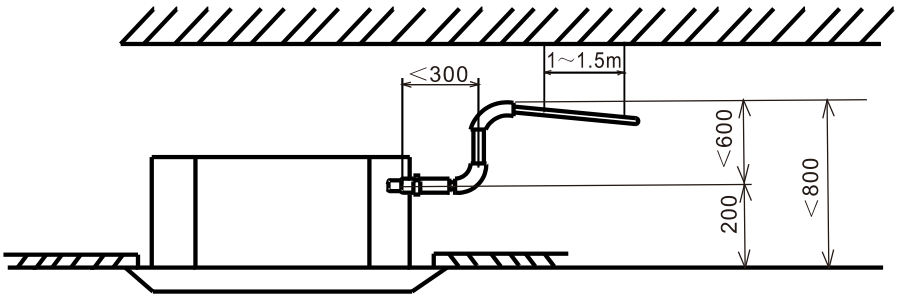
The drain pipe should be properly insulated to prevent the generation of condensation.Heat insulation material: the thickness of rubber insulation pipe should be more than 8mm



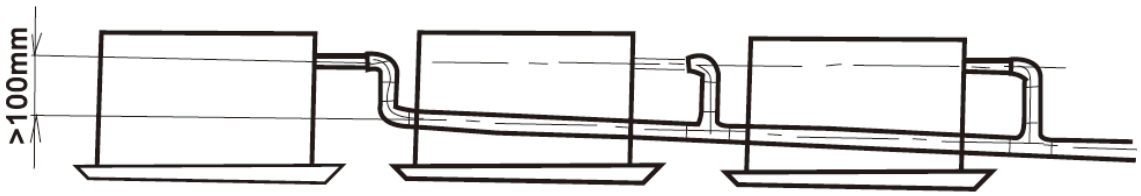
◇ Drainage pipe must have a downward gradient (1 / 50 1 / 100).If the drain pipe is installed ups and downs, it will cause water backflow or leakage etc.



◇ The unit has a drain pump which will lift up to 1200mm. However after the pump stops the water still in the pipe will drain back and may overflow the drain tray causing a water leak. For this reason please install the drain pipe as shown



◇ When draining multiple units into a common drain line, this common drain should be installed about 100mm below each units drain outlet, as shown in the drawing.

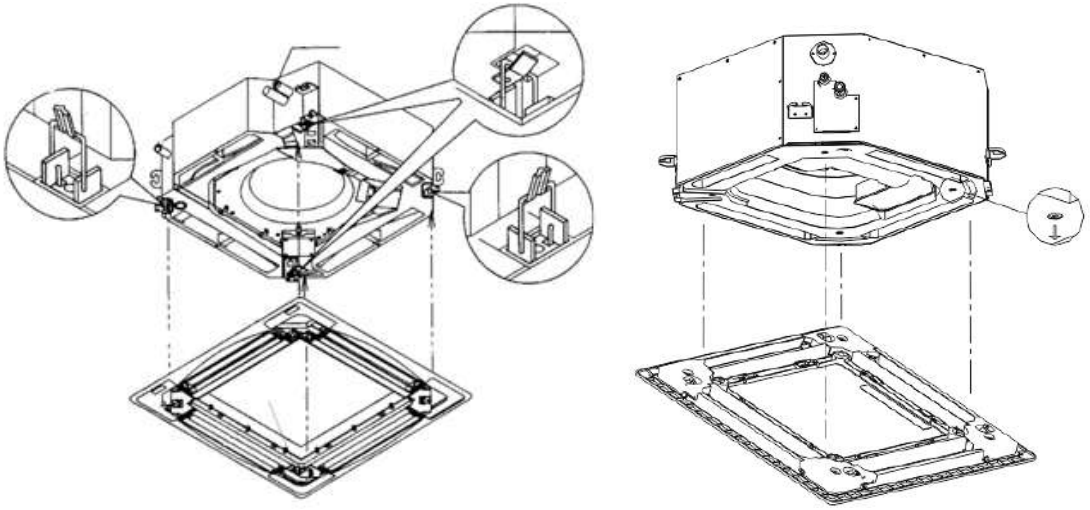


◇ When finish installation please carry out the drainage test to ensure that the water flow through the pipeline fluently, and carefully observe the junction to ensure that there is no water leakage. If the unit is installed in the newly built house, strongly recommend that this test taken before the ceiling

installation. Even it is the heating only unit, this test is unavoidable.

6.7 Panel installation

As to the MB12or MB13 panel please refer to the following picture, the panel has four hooks which attach to corresponding hangers on the unit and the panel should be positioned using these first. The panel is then fixed into position by four bolts which are accessed through the four corner panels on the grille.

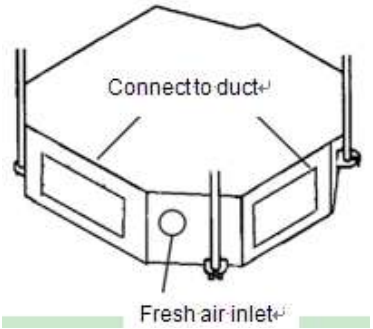


Notes:

When installing please ensure that the position of swing motor is in accordance with the position of the pipes of the unit.

6.8 Connect duct, fresh air ventilation

In order to meet different customers' requirements and their different usage environment, 3hp and 5hp indoor unit reserves one fresh air ventilation hole and four duct connection holes. The fresh air can be introduced from outside or through duct.



◇ Fresh air ventilation: In the corner of the unit there is a circular fresh air connection hole, if users want this feature, please cut down the circular metal sheet and connect it to the duct. Fresh air replacement hole is connected to the return air inlet of the indoor unit, when in the process of operation due to the negative pressure, the fresh air can be introduced from outside.

◇ Connect to duct: There are four rectangular connection holes on the four sides of the unit. If users what to connect it to the duct, please close the outlet to the side which needs connecting to the duct as well as cut down the rectangular metal sheet.

Notes:

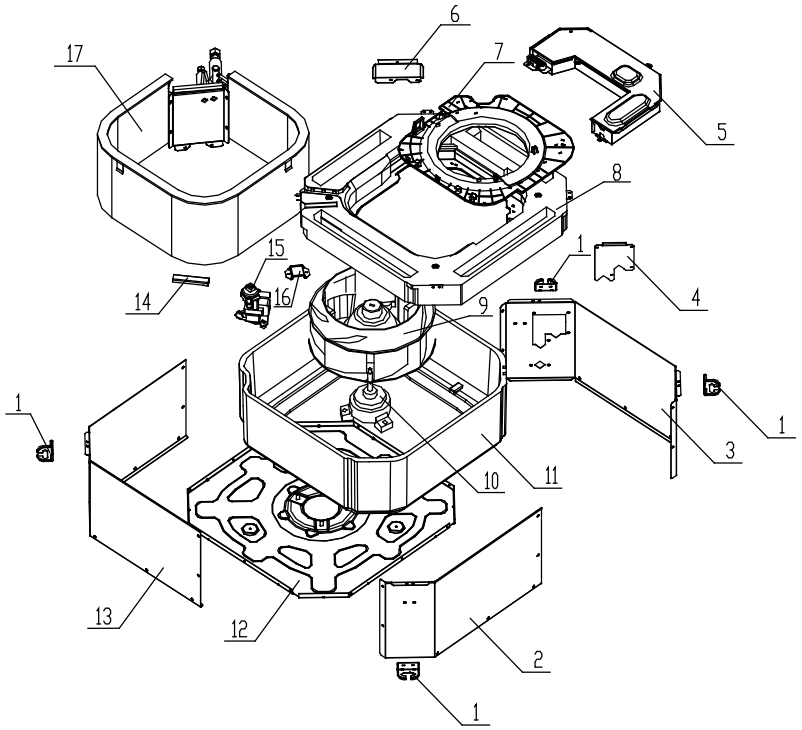
1.Only under special usage that it is allowed to connect to duct pipe and the length of the duct pipe should

be less than 5 meters.

2. Using the duct that can prevent frost and noise.
3. Using heat insulation material to seal the junction between duct and the unit.

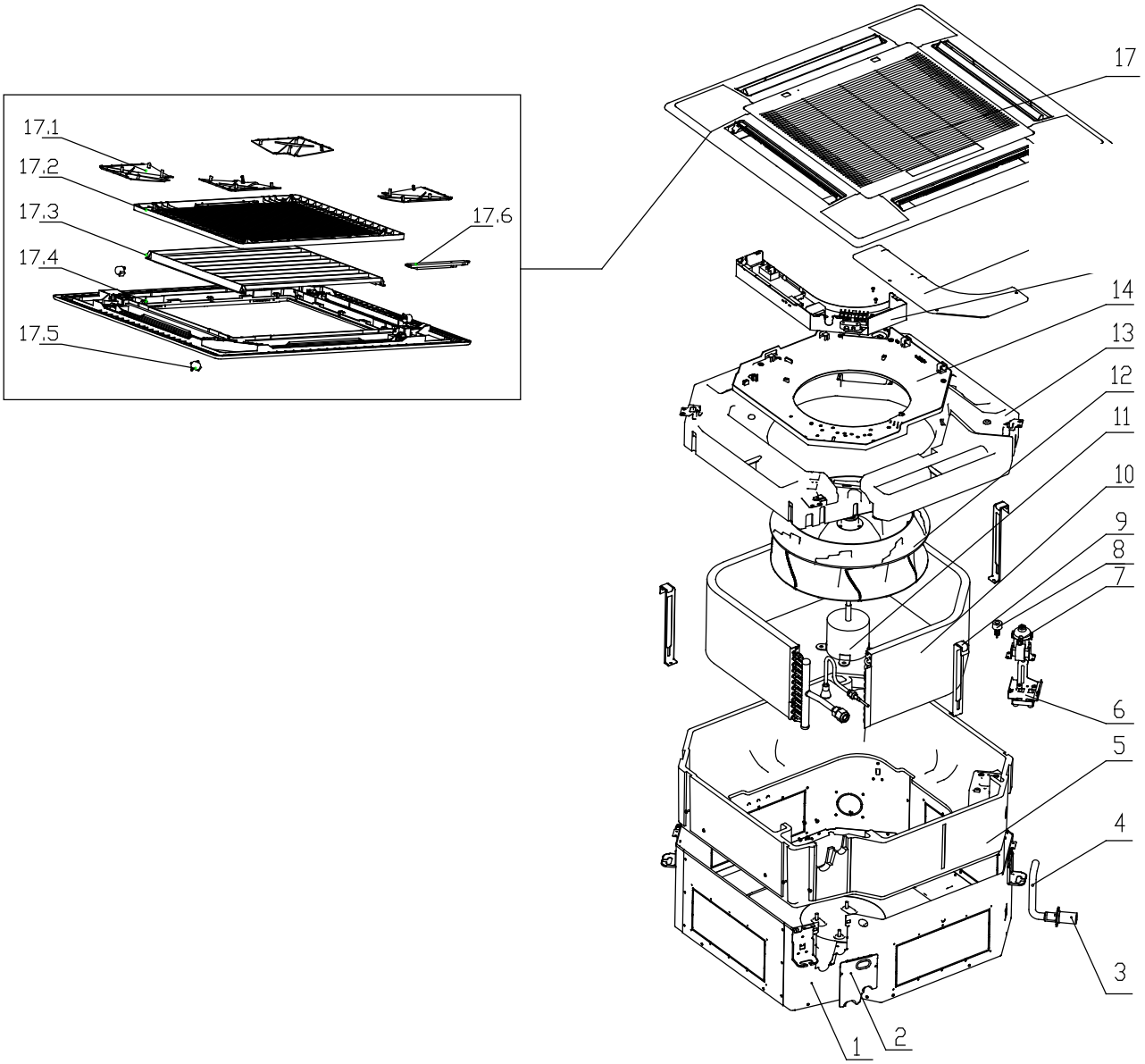
7. Explode view

ALCA-H18/4DR1A



No.	Chinese Name	Part Name	Quantity	Remark
1	挂耳	Hook	4	
2	□板 C	Coaning C	1	
3	□板 B	Coaning B	1	
4	出管口□板	Valve board	1	
5	□控□成	Electric assembly	1	
6	□控盒 C	Display board	1	
7	□□圈 ABS	Guide wind loop assembly	1	
8	接水□□成	Defrosting pan	1	
9	□□	Wind wheel	1	
10	YDK-30A	Fan motor	1	
11	底□泡沫□件	Chassis foam assembly	1	
12	底□□件	Chassisassembly	1	
13	□板 A	Coaning A	1	
14	□□□ ABS	Sensor 1	1	
15	排水□□件	Pump assembly	1	
16	□□板	Wire fastener	1	
17	蒸□器□成	Evaporator assembly	1	

ALCA-H24/4DR1A, ALCA-H36/4DR1A,
ALCA-H48/5DR1A, ALCA-H60/5DR1A



ALCA-H24/4DR1A

N0.	Chinese name	Part Name	Quantity	Remark
1	□金套件	Sheet metal suite	1	
1.1	□板 A	Coaning A	2	
1.2	□板 B	Coaning B	1	
1.3	□板 C	Coaning C	1	
1.4	底□□件	Chassis assembly	1	
1.5	挂□	hook	4	
1.6	□□扣	Wire fastener	5	
1.7	□机□固定板	Power line fixed plate	1	
2	□板	Valve plate	1	

3	塑料排水□管	Drain pipe	1	
4	塑料排水□管(橡胶)	Drain flexible pipe (Drain pump)	1	
5	底□泡沫□件	Chassis foam assembly	1	
6	水□支架	Drain pump support	1	
7	排水□	Drain pump	1	PLD-1200
8	浮子开关	Float switch	1	
9	蒸□器挂□(□涂)	Evaporator hook	3	
10	蒸□器□成	Evaporator assembly	1	
11	□机(三速)	Fan motor	1	XD30A
12	□□	Wind wheel	1	ϕ470×147(3P)
13	接水□□件	Defrosting pan	1	
14	□□圈	Guide wind loop assembly	1	
15	□控盒□成	Electric box assembly	1	
15.1	□控盒	Electric box	1	
15.2	控制板	PCB board	1	QRD-SN3F(18-60)K(485)-SYE1(SY)
15.3	(ROHS)□□器	Transformer	1	TDB-14-B4B(PTC)
15.4	□容	capacitance	1	3.0μF/450VAC/70/2000h
15.5	端子板	TerminaL board	1	4 位(600V 4mm2)LNAB(45 度)
16	□控盒盖	Electric control box cover	1	
17	面板 MB12(英文)	Panel MB12	1	
17.1	面板□角盖板	Panel cover board	2	
17.2	回□格□□件	Return-air grille assembly	2	
17.3	空气□□网	Air filter	1	
17.4	面板□框□件	Panel frame assembly	1	
17.4.1	面板□框	Panel frame	1	
17.4.2	□□叶片	Wind-guiding blade	4	
17.5	步□□机	Step motor	4	24BYJ48-2
17.6	□示灯板	Display board	1	SX-DISP-01

ALCA-H36/4DR1A

N0.	Chinese name	Part Name	Quantity	Remark
1	□金套件	Sheet metal suite	1	
1.1	□板 A	Coaning A	2	
1.2	□板 B	Coaning B	1	
1.3	□板 C	Coaning C	1	

1.4	底□□件	Chassis assembly	1	
1.5	挂□	hook	4	
1.6	□□扣	Wire fastener	5	
1.7	□机□固定板	Power line fixed plate	1	
2	□板	Valve plate	1	
3	塑料排水□管	Drain pipe	1	
4	塑料排水□管(橡胶)	Drain flexible pipe (Drain pump)	1	
5	底□泡沫□件	Chassis foam assembly	1	
6	水□支架	Drain pump support	1	
7	排水□	Drain pump	1	PLD-1200
8	浮子开关	Float switch	1	
9	蒸□器挂□(□涂)	Evaporator hook	3	
10	蒸□器□成	Evaporator assembly	1	
11	□机(三速)	Fan motor	1	YDK45-6Q
12	□□	Wind wheel	1	ϕ470×147(3P)
13	接水□□件	Defrosting pan	1	
14	□□圈	Guide wind loop assembly	1	
15	□控盒□成	Electric box assembly	1	
15.1	□控盒	Electric box	1	
15.2	控制板	PCB board	1	QRD-SN3F(18-60)K(485)-SYE 1(SY)
15.3	(ROHS)□□器	Transformer	1	TDB-14-B4B(PTC)
15.4	□容	capacitance	1	3.0μF/450VAC/70/2000h
15.5	端子板	TerminaL board	1	4 位(600V 4mm2)LNAB(45 度)
16	□控盒盖	Electric control box cover	1	
17	面板 MB12(英文)	Panel MB12	1	
17.1	面板□角盖板	Panel cover board	2	
17.2	回□格□□件	Return-air grille assembly	2	
17.3	空气□□网	Air filter	1	
17.4	面板□框□件	Panel frame assembly	1	
17.4.1	面板□框	Panel frame	1	
17.4.2	□□叶片	Wind-guiding blade	4	
17.5	步□□机	Step motor	4	24BYJ48-2
17.6	□示灯板	Display board	1	SX-DISP-01

ALCA-H48/5DR1A, ALCA-H60/5DR1A

N0.	Chinese name	Part Name	Quantity	Remark
1	□金套件	Sheet metal suite	1	
1.1	□板 A	Coaning A	2	
1.2	□板 B	Coaning B	1	

1.3	□板 C	Coaning C	1	
1.4	底□□件	Chassis assembly	1	
1.5	挂□	hook	4	
1.6	□□扣	Wire fastener	5	
1.7	□机□固定板	Power line fixed plate	1	
2	□板	Valve plate	1	
3	塑料排水□管	Drain pipe	1	
4	塑料排水□管(橡胶)	Drain flexible pipe (Drain pump)	1	
5	底□泡沫□件	Chassis foam assembly	1	
6	水□支架	Drain pump support	1	
7	排水□	Drain pump	1	PLD-1200
8	浮子开关	Float switch	1	
9	蒸□器挂□(□涂)	Evaporator hook	3	
10	蒸□器□成	Evaporator assembly	1	
11	□机(三速)	Fan motor	1	XD80A
12	□□	Wind wheel	1	ϕ470×170 (3P)
13	接水□□件	Defrosting pan	1	
14	□□圈	Guide wind loop assembly	1	
15	□控盒□成	Electric box assembly	1	
15.1	□控盒	Electric box	1	
15.2	控制板	PCB board	1	QRD-SN3F(2S)-SYE1
15.3	(ROHS)□□器	Transformer	1	TDB-8-B(PTC)
15.4	□容	capacitance	1	6.0μF/450VAC/70/2000h
15.5	端子板	TerminAL board	1	
16	□控盒盖	Electric control box cover	1	
17	面板 MB12(英文)	Panel MB12	1	
17.1	面板□角盖板	Panel cover board	2	
17.2	回□格□□件	Return-air grille assembly	2	
17.3	空气□□网	Air filter	1	
17.4	面板□框□件	Panel frame assembly	1	
17.4.1	面板□框	Panel frame	1	
17.4.2	□□叶片	Wind-guiding blade	4	
17.5	步□□机	Step motor	1	24BYJ48-2
17.6	□示灯板	Display board	1	SX-DISP-01

Ceiling & floor type

1. Feature

Ceiling& Foor type A/C (Heat pump) can be installed under the ceiling and also on the floor. Compared with normal Floor &Standing type A/C, it can be hoisted under the ceiling,saving room space, it is also the updating Product for Floor & Standing type A/C.

Application occasions:
Small super market, restaurant, office, meeting room, villa living room, family bedroom, and it can even be used as the updating Product for modern residential A/C.

Features:
◇ Suspended ceiling, installation under ceiling, saving room space, it is very suitable for family or office place;
◇ Convenient and flexible for indoor unit installation, can be installed under the ceiling or on the floor;
◇ With Setting or Auto two operation modes, multi fan speed, makes you feel more comfortable;
◇ Shell was formed by mold, and the appearance is “slim”, “elegant”, “fashion” and “comfortable”;
◇ Special insulation design, achieves high heat insulation efficiency and no condensation on shell;
◇ Long term air filter, the wash period is two times longer than normal filter, maintenance is free;
◇ Adopting low noise centrifugal fan, strong wind but quiet operation, the silence design achieves harmony residential living;
◇ All the installation and maintenance can be done in the bottom of unit, saving the maintenance space;
◇ Standard remote controller and optional wired controller;
◇ Failure automatic detection, if there is a failure, the indicator will flash and the failure code will display on the wired controller, the failure cause is easier to be found..
◇ Filter to dismantle to wash convenience, don't need to make use of any tool, can move to dismantle to filter a net to clean.
◇ Ultra slim design, the thickness only 205 mm, and have vertical and horizontal swing function.

Function introduction

Function	Name	ALCF-H*/4DR1A			ALCF-H*/5DR1A	
		18	24	36	48	60
Protection Function	high pressure protection	—	—	—	○	○
	low pressure protection	—	—	—	○	○
	over-current protection of compressor	○	○	○	○	○
	over-high temperature of condenser middle	○	○	○	○	○
	over-high discharge temperature of compressor	○	○	○	○	○
	Phase protection	—	—	—	—	—
	Heating over-heat protection	○	○	○	○	○
	Anti-freeze protection	○	○	○	○	○
	Sensor failure alarm	○	○	○	○	○
	Error code display function	○	○	○	○	○
Comfortable Function	Cooling	○	○	○	○	○
	Heating	○	○	○	○	○
	3 fan speed	○	○	○	○	○
	static pressure adjustable	—	—	—	—	—
	Auto-restart (optional)	○	○	○	○	○
	Anti-cold wind	○	○	○	○	○
	Blow exhaust heat	○	○	○	○	○
	Timer	○	○	○	○	○
Opretating display	clock display	○	○	○	○	○
	operating mode display	○	○	○	○	○
	fan speed display	○	○	○	○	○
	defrosting display	○	○	○	○	○
	timing on/off display	○	○	○	○	○
	wind guiding angle display	—	—	—	—	—
	sleeping display	○	○	○	○	○
Operation mode	Auto operation	○	○	○	○	○
	Dehumidify operation	○	○	○	○	○
	Auto defrosting	○	○	○	○	○
	Ventilation function	○	○	○	○	○
	Low temperature cooling function	—	—	—	—	—
Health function	Removable air filter	○	○	○	○	○
	fresh air function preserved	—	—	—	—	—
Installation adaptability	Optional left and right water drain	—	—	—	—	—
	Optional left and right connection Auxiliary pipe	—	—	—	—	—
	Optional rear and downward air return	—	—	—	—	—
	Installation instruction plate is available	—	—	—	—	—

Note: “○” means have this function, “—”means have no this function

2. Specfication

Model	Indoor		ALCF-H18/4DR1A	ALCF-H24/4DR1A	ALCF-H36/4DR1A
	Outdoor		AL-H18/4DR1A(U)	AL-H24/4DR1A(U)	AL-H36/4DR1A(U)
Power Supply		V~,Hz, Ph	220~240,50,1	220~240,50,1	220~240,50,1
Capacity	Cooling	Btu/h	20000-18000-5500	26500-24000-7200	40000-36000-10800
		W	5610-5100-1530	7920-7200-2160	11000-10000-3000
	Heating	Btu/h	20140-19000-4750	29700-27000-6750	43125-37500-11250
		W	5936-5600-1400	8690-7900-1975	13225-11500-3450
Electric Data	Rated Cooling Power Input	kW	2053-1579-474	2880-2215-665	4012-3086-926
	Rated Heating Power Input	kW	2011-1547-464	2813-2164-649	4118-3168-950
	Rated Cooling Current	A	9.81-7.55-2.25	13.78-10.60-3.21	19.19-14.77-4.45
	Rated Heating Current	A	9.62-7.40-2.20	13.44-10.36-3.11	19.71-15.16-4.55
Performance	EER	W/W	3.23	3.25	3.24
	COP	W/W	3.62	3.65	3.63
Indoor Fan Fotor	Model		YSK-40W-4	YSK-70W-4	YSK-70W-4
	Brand		Weiling	Weiling	Weiling
	Output Power x Fan quantity	W	40x1	70x1	70x1
	Capacitor	uF	2.5	4	4
	Speed (Hi/Mi/Lo)	r/min	1250/1100/900	1386/1108/970	1386/1108/970
Indoor Coil	a.Number Of Row		3	3	3
	b.Tube Pitch(a)x Row Pitch(b)	mm	20.5×12.7	20.5×12.7	22×19.05
	c.Fin Spacing	mm	1.6	1.6	1.6
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.and Material	mm	φ7， Inner grooved	φ7， Inner grooved	φ7.94， Inner grooved
	f.Coil Length x Height x Width	mm	599×246×38.1	950×246×38.1	950×242×57.15
	g.Heat Exchanging Area	m^2	6.30	10.00	15.02
Indoor Unit	Indoor Air Flow (Hi/Mi/Lo)	m^3/h	850/680/595	1200/960/840	1500/1200/1050
	Noise Level(Hi/Mi/Lo)	dB(A)	43/40/34	46/43/38	50/47/41
	Net Dimension (W*H*D)	mm	930×660×205	1280×660×205	1280×660×205
	Packing Dimension (W*H*D)	mm	1010×720×290	1360×720×280	1360×720×280
	Net Weight	Kg	25	32	33
	Gross Weight	Kg	28	37	38
Refrigerant Pipe	Liquid Side	mm	6.35(1/4)	9.52(3/8)	9.52(3/8)
	Gas Side	mm	12.7(1/2)	15.88(5/8)	15.88(5/8)

	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)	R3/4in(DN20)
	Max. Refrigerant Pipe Length	m	20	30	30
	Max. Difference In Level	m	15	15	20
Operation Temperature Range		℃	16~32	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring(Indoor)	mm^2	3×1mm^2	3×1mm^2	3×1mm^2
	Power Wiring(Outdoor)	mm^2	3×2.5mm^2	3×2.5mm^2	3×2.5mm^2
	Signal Wiring	mm^2	2×1mm^2	2×1mm^2	2×1mm^2
Wireless Remote Controller			YKR-L/300E	YKR-L/300E	YKR-L/300E
Application Area		m^2	21-35	28-47	42-70
Qty'per 20'& 40'&40HQ(Only For Reference)		Set	54/115/142	50/100/124	40/84/96

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃。
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

Model	Indoor		ALCF-H48/5DR1A	ALCF-H60/5DR1A
	Outdoor		AL-H48/5DR1A(U)	AL-H60/5DR1A(U)
Power Supply		V~,Hz,Ph	380~415,50,3	380~415,50,3
Capacity	Cooling	Btu/h	51800-48000-14400	63000-60000-18000
		W	15120-14000-4200	16800-16000-4800
	Heating	Btu/h	56100-51000-17850	69300-63000-22050
		W	17050-15500-5425	19800-18000-6300
Electric Data	Rated Cooling Power Input	kW	5582-4294-1288	6479-4984-1495
	Rated Heating Power Input	kW	5461-4201-1260	6429-4945-1484
	Rated Cooling Current	A	9.84-7.57-2.27	11.18-8.60-2.57
	Rated Heating Current	A	9.68-7.45-2.23	10.95-8.42-2.54
Performance	EER	W/W	3.26	3.21
	COP	W/W	3.69	3.64
Indoor Fan Fotor	Model		YSK-105W-4	YSK-105W-4
	Brand		Weiling	Weiling
	Output Power x Fan quantity	W	105	105
	Capacitor	uF	5	4
	Speed (Hi/Mi/Lo)	r/min	1387/1108/970	1387/1108/970

Indoor Coil	a.Number Of Row		3	3
	b.Tube Pitch(a)x Row Pitch(b)	mm	20.5×12.7	22×19.05
	c.Fin Spacing	mm	1.6	1.6
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.and Material	mm	φ7， Inner grooved	φ7.94， Inner grooved
	f.Coil Length x Height x Width	mm	1300×246×38.1	1300×242×57.15
	g.Heat Exchanging Area	m^2	13.69	20.55
Indoor Unit	Indoor Air Flow (Hi/Mi/Lo)	m^3/h	1800/1440/1260	1800/1440/1260
	Noise Level(Hi/Mi/Lo)	dB(A)	51/48/42	51/48/42
	Net Dimension (W*H*D)	mm	1631×660×205	1630×660×205
	Packing Dimension (W*H*D)	mm	1710×720×290	1710×720×290
	Net Weight	Kg	44	44
	Gross Weight	Kg	50	50
Refrigerant Pipe	Liquid Side	mm	9.52(3/8)	9.52(3/8)
	Gas Side	mm	19.05(3/4)	19.05(3/4)
	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)
	Max. Refrigerant Pipe Length	m	50	50
	Max. Difference In Level	m	30	30
Operation Temperature Range		℃	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring(Indoor)	mm^2	$3×1mm^3$	$3×1mm^3$
	Power Wiring(Outdoor)	mm^2	$5×1.5mm^3$	$5×1.5mm^3$
	Signal Wiring	mm^2	$2×1mm^2$	$2×1mm^2$
Wireless Remote Controller			YKR-L/300E	YKR-L/300E
Application Area		m^2	56-93	64-107
Qty'per 20'& 40'&40HQ(Only For Reference)		Set	24/50/53	24/50/53

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃。
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

3. Capacity amendment

3.1 Running range

Cooling capacity (Btu/h)		12000	18000	24000	36000	48000	60000
Power supply		220-240V~/50Hz			380-415V 3N~/50Hz		
Voltage		187~242V			320~420V		
Ambient temperature	Cooling	16~49℃					
	Heating	-15~24℃					

3.2Amendment coefficient of cooling capacity under different indoor/outdoor DB/WB temperatureK1

Indoor air inlet temperature℃		Outdoor air inlet DB temperature℃				
DB	WB	25	30	35	40	43
23	16	0.98	0.94	0.89	0.85	0.82
25	18	1.05	1	0.95	0.90	0.87
27	19	1.1	1.05	1	0.95	0.91
28	20	1.12	1.07	1.02	0.96	0.93
30	22	1.19	1.13	1.08	1.02	0.99
32	24	1.26	1.20	1.15	1.08	1.05

Actual cooling capacity calculation:

Actual cooling capacity=amendment coefficient of cooling capacity × nominal cooling capacity

——nominal cooling capacity could be found from the performance parameters list

——amendment coefficient of cooling capacity could be found from table above.

3.3 Amendment coefficient of heating capacity under different indoor/outdoor DB/WB temperature K2

Indoor air inlet DB temperature ℃	Outdoor air inlet WB temperature ℃						
	-15	-10	-5	0	7	10	15
15	0.64	0.71	0.77	0.8	1.04	1.1	1.16
20	0.59	0.66	0.72	0.76	1	1.06	1.12
25	0.55	0.62	0.69	0.71	0.96	1	1.07

Actual heating capacity calculation:

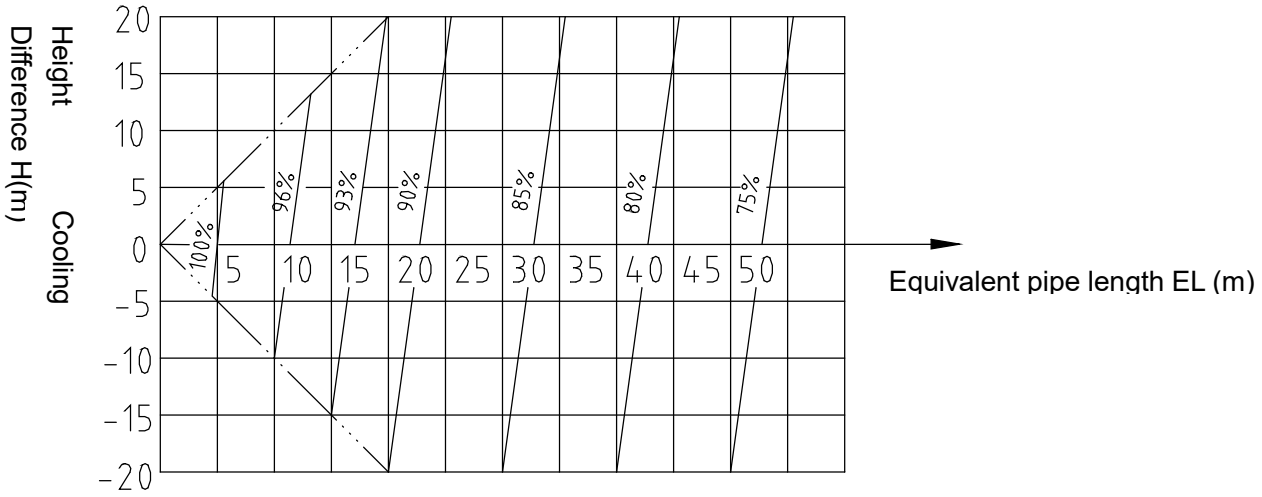
Actual heating capacity=amendment coefficient of heating capacity × nominal heating capacity

——nominal heating capacity could be found from the performance parameters list

——amendment coefficient of heating capacity could be found from table above.

3.4 Amendment coefficients of heating and cooling capacity under different height drop K3

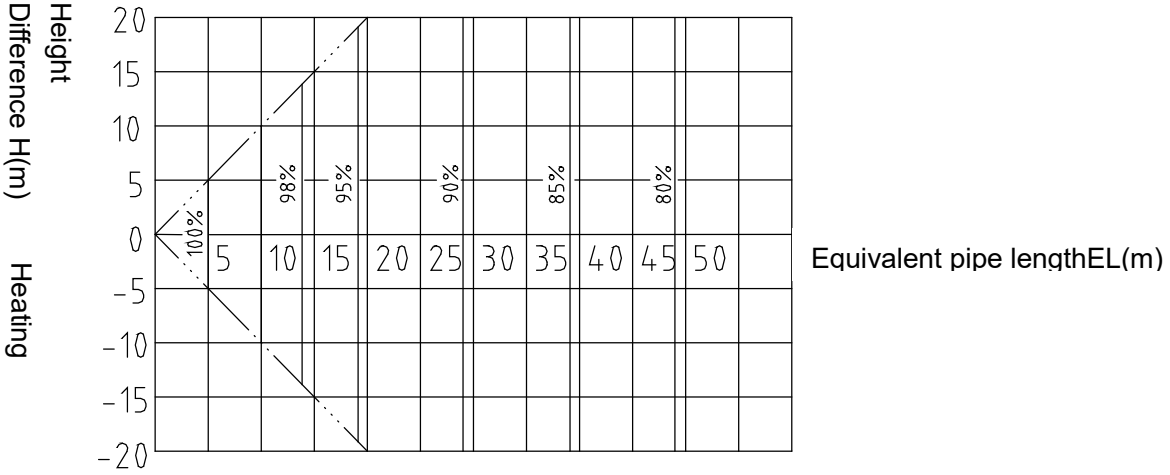
Different Cooling Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit － Height of Indoor Unit

Different Heating Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit － Height of Indoor Unit

3.5 Correction capability

Cooling capacity = nominal cooling capacity xK1xK3

Heating capacity = nominal heating capacity xK2xK3

3.6 Equivalent Pipe length conversion

Equivalent pipe length means converting pipe elbow to straight pipe length after considerate the pressure loss.

Bend and Oil Loop Conversion tablet

Type / Pipe Dia.(mm)	Bend	Oil Loop
6.35	0.10	0.7
9.52	0.18	1.3
12.70	0.20	1.5
15.88	0.25	2.0
19.05	0.35	2.4
22.02	0.40	3.0

Equivalent Pipe length L＝Actual Pipe length L+ Bend Qty× Equivalent pipe bend length+ Oil Loop Qty × Equivalent Oil Loop length

Sample:

ALCA-H48/5 Actual Pipe length is 25 meters, Gas pipe diameter is 19.05mm. If there's 5 bends and 2 oil loops during the installation, then the equivalent pipe length should be:

L=25+0.35×5+2.4×2=31.5(m)

◇Specification of Connection Pipe for Indoor Unit and Outdoor Unit

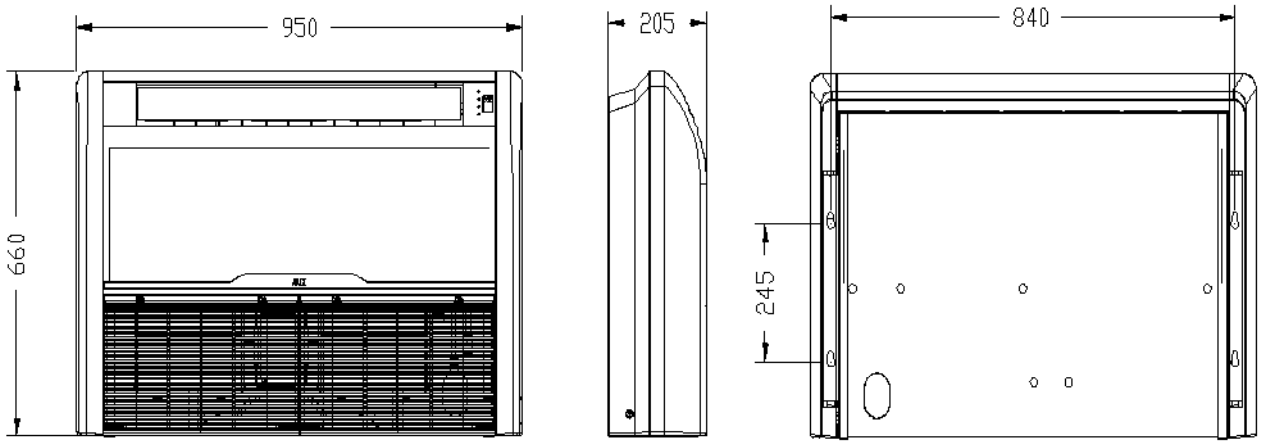
Cooling Capacity(Btu/h)		18000	24000	36000	48000	60000
Connection Pipe (mm)	Liquid Pipe	Φ6.35	Φ9.52		Φ9.52	
	Gas Pipe	Φ12.7	Φ15.88		Φ19.05	
Max. Length		20	30	30	50	
Max. Height (m)		15	15	20	30	
Max. Bend Qty		5	8	8	10	
Extra R410a per meter when the pipe length is more than 5 meter (kg)		0.05	0.05	0.05	0.07	

Caution:

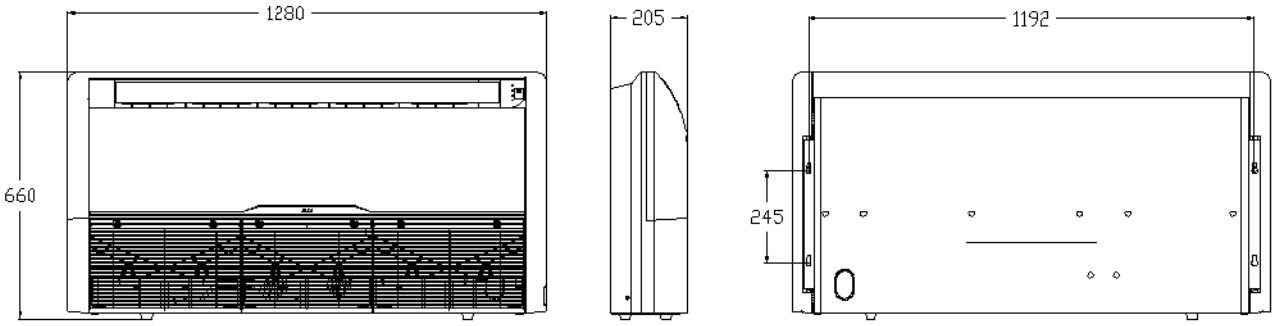
1. The standard Pipe length is 5m, if the pipe length is less than this then no additional charging is necessary. If the pipe length is more than this then you should charge more refrigerant into the system according to the above Charging Data
2. The thickness of the pipe is 0.6-1.0, bearing pressure is 4.2MPa;
3. If the connection pipe is too long, the cooling capacity and stability would be decreased. And the more bend quantity, the resistance in the piping system would be bigger, then the cooling and heating capacity would be decreased even lead to compressor broken. We suggest you to use the shortest connection pipe according to the pipe length parameter in this manual.If the height difference between outdoor and indoor unit is more than 5m, an oil trap should be installed in the gas pipe for every 10 meters.

4. Dimension

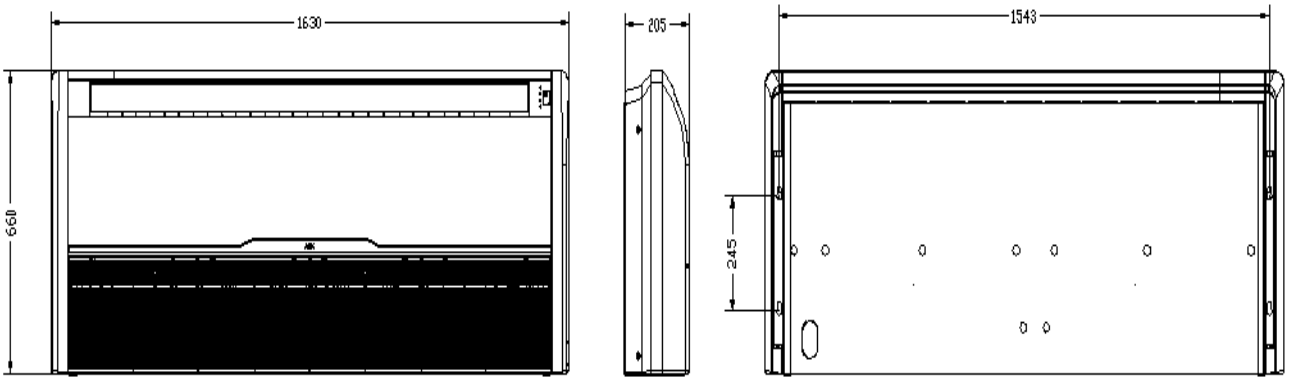
ALCF-H18/4DR1A



ALCF-H24/4DR1A, ALCF-H36/4DR1A

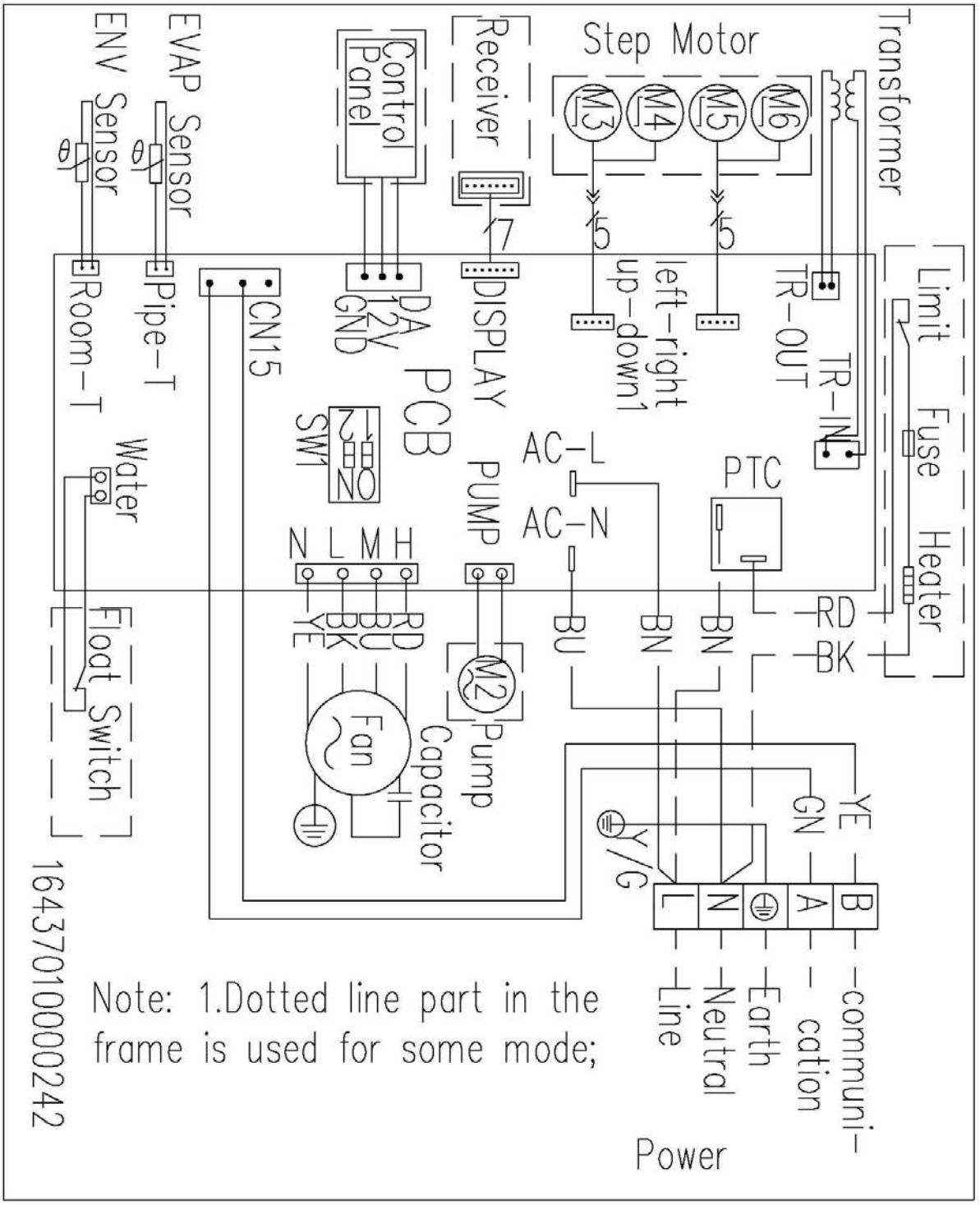


ALCF-H48/5DR1A, ALCF-H60/5DR1A

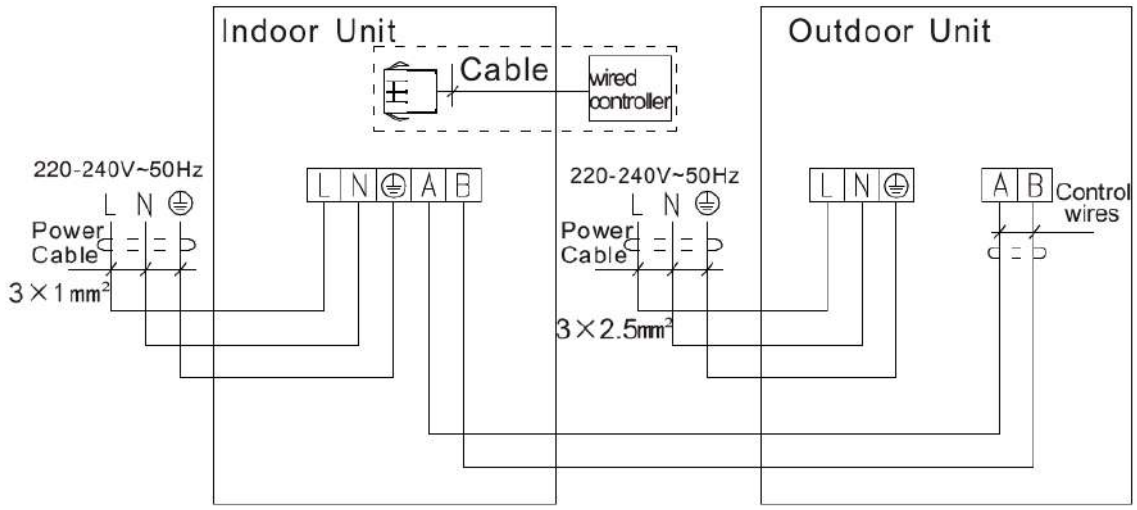


5. Electrical wiring diagram between indoor and outdoor unit

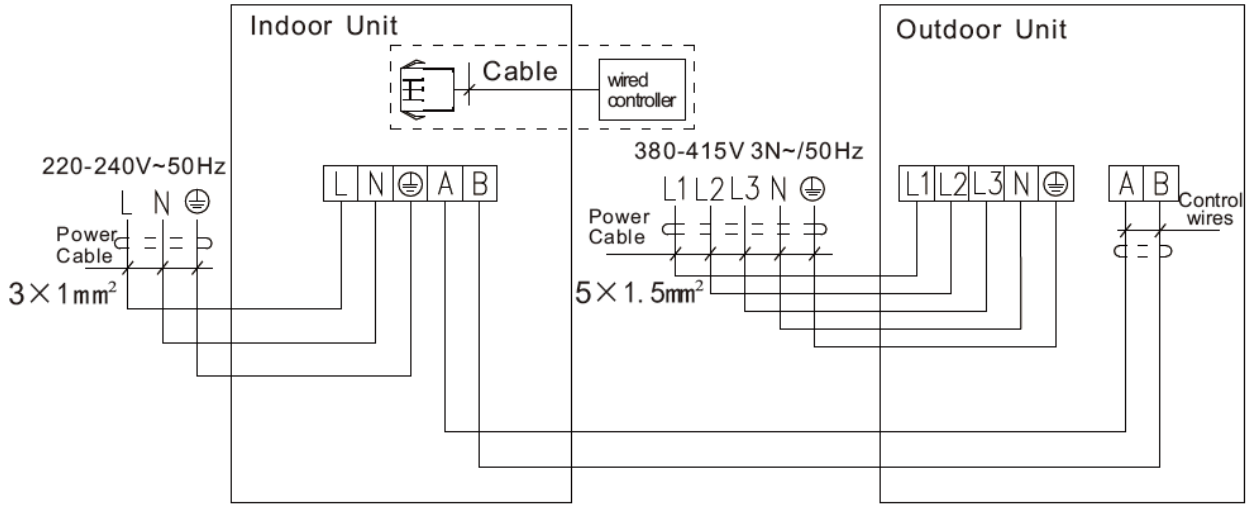
ALCF-H18/4DR1A, ALCF-H24/4DR1A, ALCF-H36/4DR1A, ALCF-H48/5DR1A,ALCF-H60/5DR1A



ALCF-H18/4DR1A, ALCF-H24/4DR1A, ALCF-H36/4DR1A



ALCF-H48/5DR1A, ALCF-H60/5DR1A

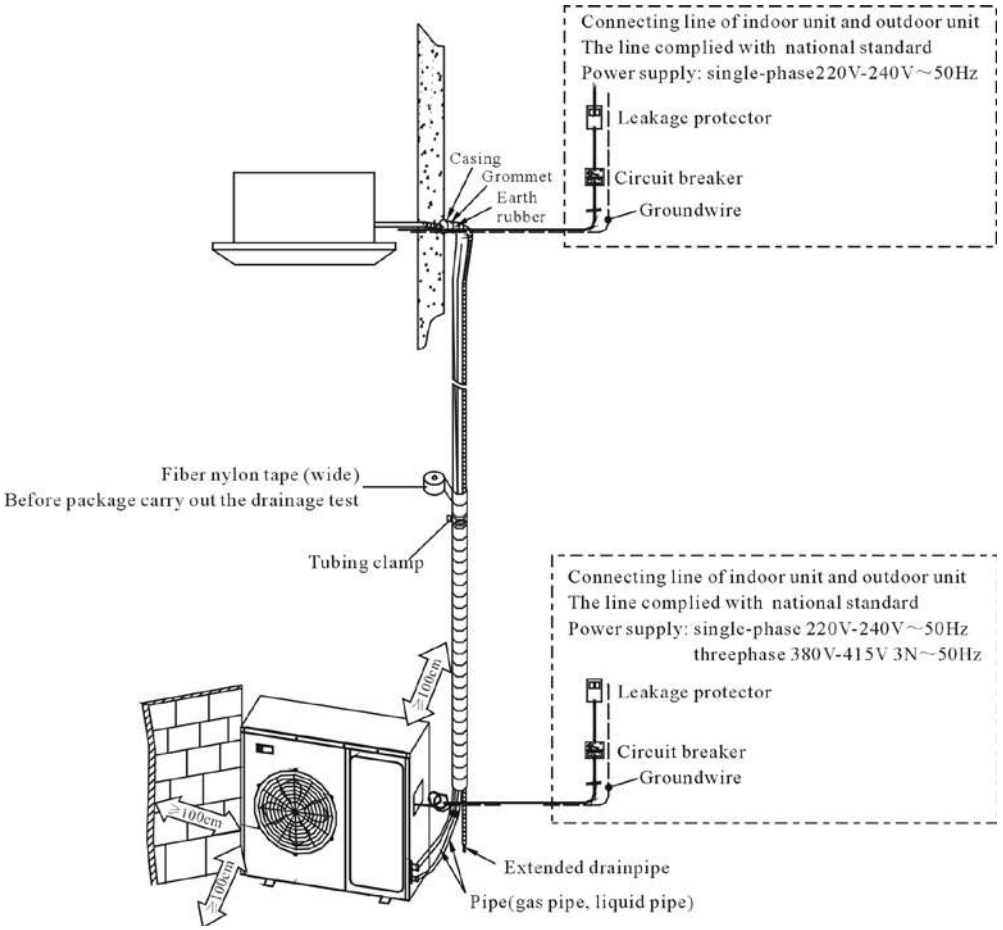


6. Installation

6.1 Preparation and equipments before installation

Please buy following spare parts from your local market before installation	Besides general implements, other implements are needed when connecting the pipe
Hung bolts M12, 4 pcs	Acetylene cylinders, oxygen cylinders (when longer pipe used it should be welded)
Drainage pipe PVC	One set pipe cut machine. (cut copper pipe)
Copper connecting pipe	Refrigerant cans, electronic balance (when longer pipe used additional gas should be charged)
Adhesive belt (big size) 5 pcs, (small size) 5 pcs	Pressure gauges, pipe clamp, welding torch, 2B silver electrode
Heat insulation material used to connect copper pipe (PE foam material, its thickness is more than 8mm)	Wrench 2 pcs, one of them is with adjustable torque wrench (42N.m,65N.m,100N.mm)
Power cable, electrical wire between indoor and outdoor unit(Must be in accordance with the wire diameter in the wiring diagram)	Nitrogen cylinder (in order to prevent oxidation when welding, using Nitrogen to replace the air)

6.2Installation drawing



6.3 Installation precaution

◇ Hanging location should be able to support the unit's weight, there should be no increase in noise and vibration. If the hanging location needs reinforcement, it should be reinforced before installation;

◇ Choose the space above the ceiling that can put the indoor unit inside;

◇ The location should be easy for drainage;

◇ The unit should not be installed in the heat source, steam source oil mist places (such as machine room, kitchen, laundry room, mechanical workshop, etc.) in order to avoid performance degradation, electric shock, plastic parts corrosion which lead to unit broken;

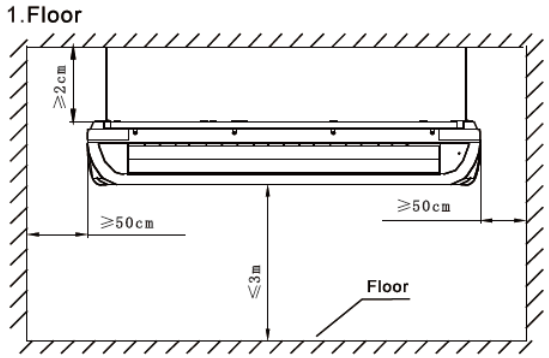
◇ Choose the location at least 1 meter away from TV and radio, in order to avoid interference to them

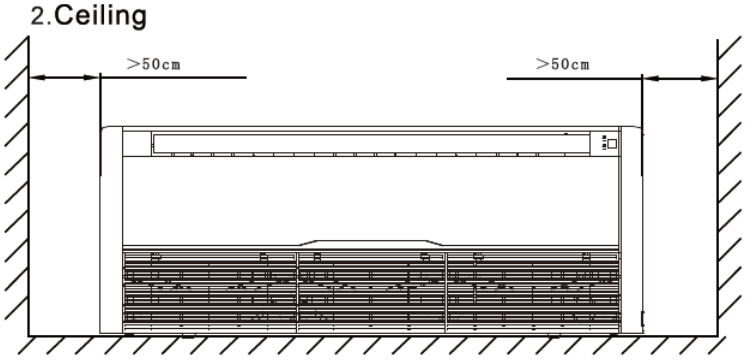
◇ There is no obstacles getting in the way of air circulation, cold air can evenly spread to all corners of the room;

◇ In order to facilitate maintenance and repair, there should be certain distance between indoor unit and obstacles;

◇ Refrigerant R22 is used for this unit, which is non-flammable and non-toxic gas. As the proportion of refrigerant is bigger than air, so if it leaks the gas will be filled on the ground. Therefore, if the units mounted on a closed room there must be good ventilation to prevent suffocation. In case of leakage of refrigerant, units should immediately stop running, and contact with maintenance personnel in time. There must be no fire at the site, because the refrigerant will turn to harmful gas when get to the fire.

6.4 The distance between indoor unit and obstacle





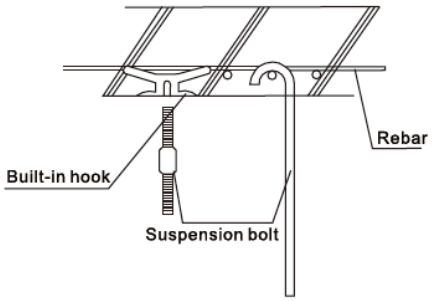
6.5 Indoor unit suspension

◇ Select the suspension foundation

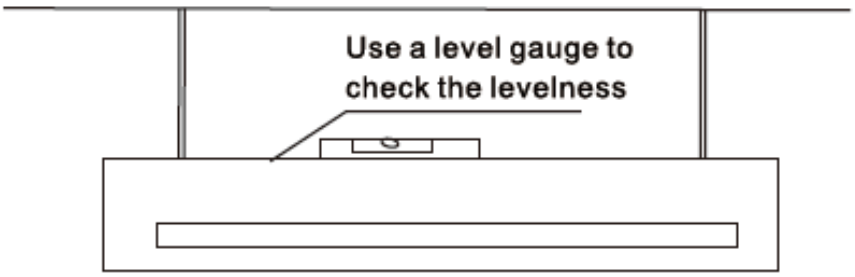
◇ The suspension foundation is a structure of either wooden frame or reinforced concrete. It must be firm and reliable to bear at least 4 times weight of itself and capable of bearing vibration for long periods;

Fixing of suspension foundation

◇ Fix the suspension bolts either as shown in the picture or by a steel or wooden bracket;



◇ Adjust the relative position of the suspension hook on the suspension bolt so that the unit can be in level position in all directions. Check with a level gauge after the installation is complete in order to ensure that the indoor unit is horizontal, otherwise it will cause water leakage, air leakage etc.

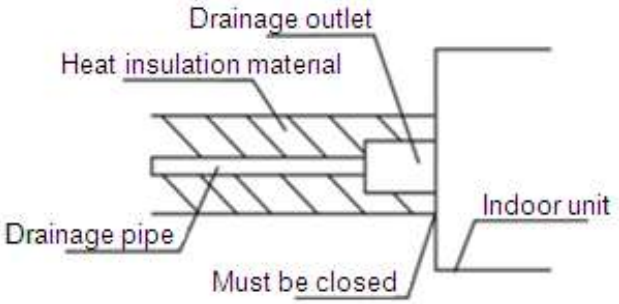


◇ Tighten the bolt and ensure that four hooks are in close contact with the nuts and washers, and the unit is suspended firmly and reliably onto the hooks.

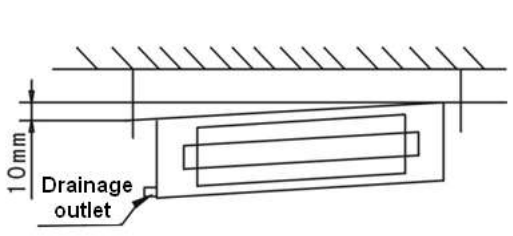
◇ After the unit is installed ensure it is secure and does not shake or sway.

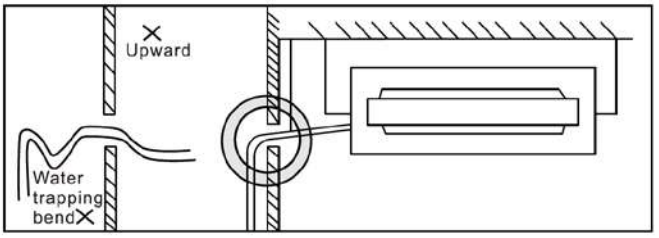
6.6 Drainage pipe installation

The drain pipe should be properly insulated to prevent the generation of condensation. Heat insulation material: the thickness of rubber insulation pipe should be more than 8mm



◇Drainage pipe must have a downward gradient (1 / 50 1 / 100).If the drain pipe is installed ups and downs, it will cause water backflow or leakage etc.

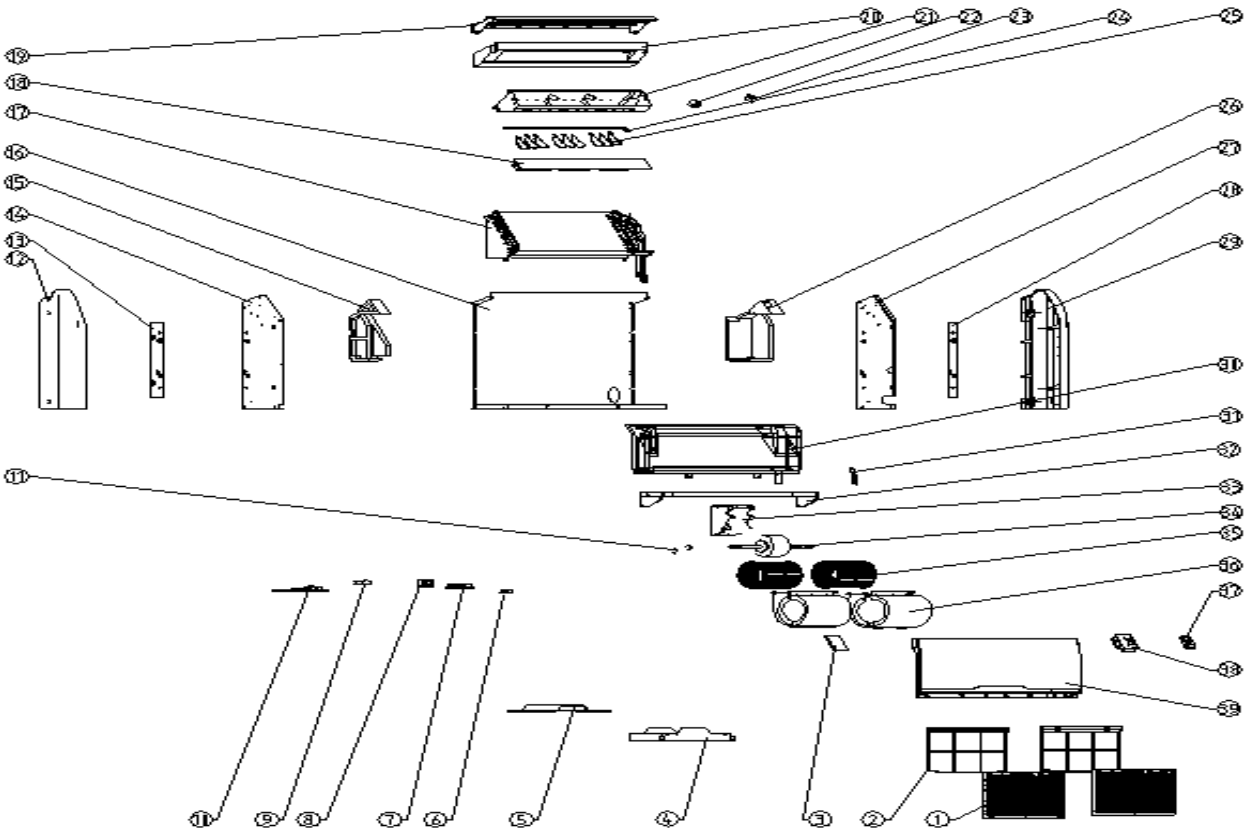




◇When finish installation please carry out the drainage test to ensure that the water flow through the pipeline fluently, and carefully observe the junction to ensure that there is no water leakage at the junction. If the unit is installed in the newly built house, strongly recommend that this test taken before the CFiling installation. Even it is the heating only unit, this test is unavoidable.

7. Explode view

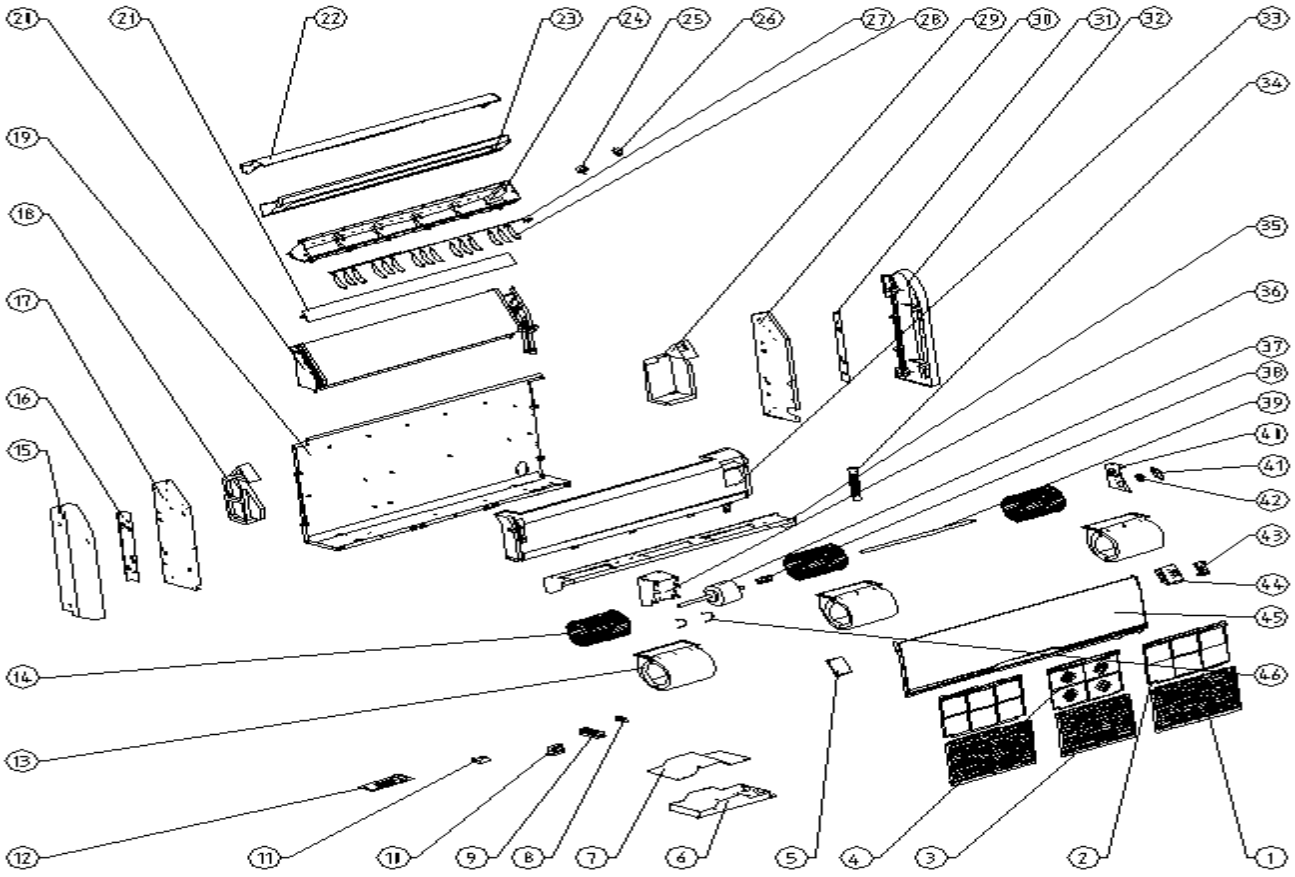
ALCF-H18/4DR1A



No.	Chinese Name	Part Name	Quantity
1	□网	Air-inlet filter	2
2	格□	Air-inlet grill(white)	2
3	左装□板	Left side adornment plank	1
4	□控盒	The electricity controls a box	1
5	□控盒盖	The electricity controls a box of cover	1
6	□□座 双□	Compress tightly electric wire seat	1
7	端子板 5 位(600V 4mm2)AB	Terminal board	1
8	(ROHS)□□器 TDB-14-B4B(PTC)	Transformer	1
9	(ROHS)□容 2.5μF/450V A.C	Capacitor	1
10	R 控制板 QRD-SN3F(18-60)K(485)-SYE1(SY)	PCB board	1
11	□机 YSK-40W-4	Motor	1
12	左盖板	The left side covers	1
13	左挂架	Left suspend plate	1
14	左□板□件	Bracket board welding assembly of left-hand	1
15	左泡沫	Left foam	1
16	背板□件	Chassis welding assembly	1
17	蒸□器□成	Evaporator assembly	1

18	□□□	Sway a breeze leaf	1
19	□盖板	The crest covers plank	1
20	□泡沫	Topmost foam	1
21	□□架	Air guide louver assembly	1
22	步□□机 35BYJ46-QC50	Step motor	1
23	(ROHS)步□□机 35BYJ46-QC120	Step motor	1
24	垂直叶片□杆 A	Connect a pole	1
25	垂直叶片	Perpendicular blade	9
26	右泡沫	Right foam	1
27	右□板□件	Bracket board welding assembly of right-hand	1
28	右挂架	Right suspend plate	1
29	右盖板	The Right side covers	1
30	集水□□件	Draining tray	1
31	排水保温管	Drain pipe	1
32	□机固定板	Volute fixing board	1
35	□□□件	Centrifugal fan assembly	2
36	上□壳	Top plastics	2
	下□壳	Low plastics	2
37	R □示灯板	Display board	1
38	□示盒	Display board cover	1
39	面板	Front panel	1

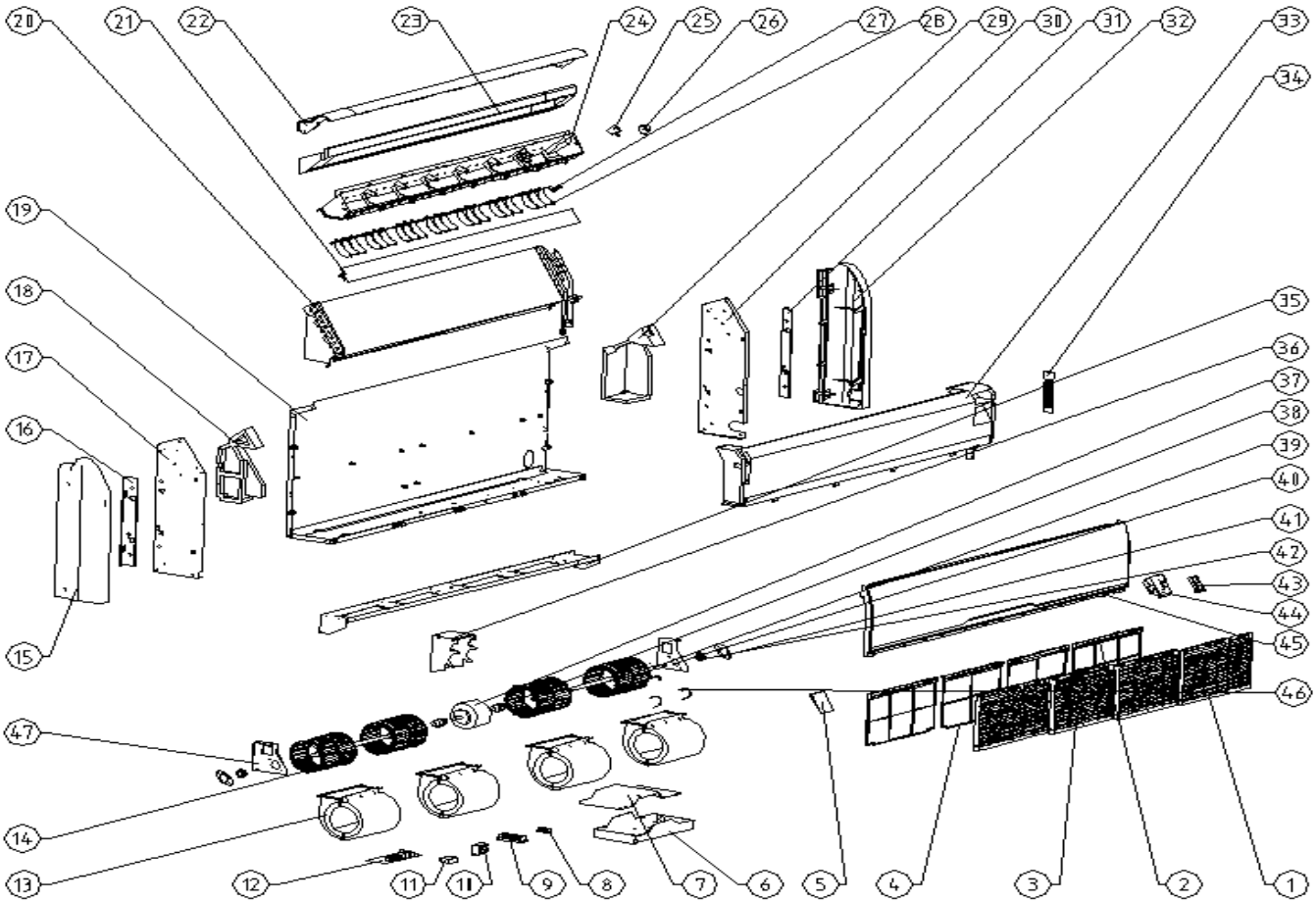
ALCF-H24/4DR1A, ALCF-H36/4DR1A



N0.	Chinese name	Part Name	Quantity
1	滤网	Air-inlet filter	2
2	格栅	Air-inlet grill(white)	2
3	中滤网	In the center filter net	1
4	中格栅	Air-inlet grill(white)	1
5	左装饰板	Left side adornment plank	1
6	电控盒	The electricity controls a box	1
7	电控盒盖	The electricity controls a box of cover	1
8	压线座双联	Compress tightly electric wire seat	1
	压线盖双联	Compress tightly electric wire cover	1
9	端子板 5 位(600V 4mm2)AB	Terminal board	1
10	(ROHS)变压器 TDB-14-B4B(PTC)	Transformer	1
11	(ROHS)电容 4μF/450V A.C	Capacitor	1
12	R 控制板 QRD-SN3F(18-60)K(485)-SYE1(SY)	PCB board	1
13	上蜗壳	Top plastics	3
	下蜗壳	Low plastics	3
14	风轮组件	Centrifugal fan assembly	1
15	左盖板	The left side covers	1
16	左挂架	Left suspend plate	1
17	左侧板组件	Bracket board welding assembly of left-hand	1
18	左泡沫	Left foam	1
19	背板组件	Chassis welding assembly	1
20	蒸发器总成	Evaporator assembly	1
21	导风门	Sway a breeze leaf	1
22	顶盖板	The crest covers plank	1
23	顶泡沫	Topmost foam	1
24	导风架	Air guide louver assembly	1
25	步进电机 35BYJ46-QC120	Step motor	1
26	(ROHS)步进电机 35BYJ46-QC50	Step motor	1
27	垂直叶片连杆 A	Connect a pole	1
	垂直叶片连杆 B	Connect a pole	1
28	垂直叶片	Perpendicular blade	15
29	右泡沫	Right foam	1
30	右侧板组件	Bracket board welding assembly of right-hand	1
31	右挂架	Right suspend plate	1
32	右盖板	The Right side covers	1
33	集水盘组件	Draining tray	1
34	排水保温管 QR-120N/A	Drain pipe	1
35	电机固定板	Volute fixing board	1
36	电机 YSK-70W-4	Motor	1
38	联轴器 Φ15	Motor coupling	1

39	加长轴	Motor lengthen axes	1
40	轴承固定座	Bearing base	1
41	橡胶轴承压板	Bearing top cover	1
42	橡胶轴承	Rubber bearings	1
43	R 显示灯板 SX-DISP(ZDJ)-02-SYE1	Display board	1
44	显示盒	Display board cover	1
45	面板	Front panel	1

ALCF-H48/5DR1A, ALCF-H60/5DR1A



N0.	BOM Code	Chinese name	Part Name	Quantity
1	16420012000002	滤网	Air-inlet filter	2
2	16420010000002	格栅	Air-inlet grill(white)	2
3	16420012000003	中滤网	In the center filter net	2
4	16420010000003	中格栅	Air-inlet grill(white)	2
5	16420015000002	左装饰板	Left side adornment plank	1
6	16421038000207	电控盒	The electricity controls a box	1
7	16421038000208	电控盒盖	The electricity controls a box of cover	1
8	11220544000008	压线座双联	Compress tightly electric wire seat	1
		压线盖双联	Compress tightly electric wire cover	1

9	16427001000010	端子板 5 位(600V 4mm2)AB	Terminal board	1
10	16422005000033	(ROHS)变压器 TDB-14-B4B(PTC)	Transformer	1
11	11330010000095	(ROHS)电容 5μF/450V A.C	Capacitor	1
12	11222009002538	R 控制板 QRD-SN3F(18-60)K(485)-SYE1(SY)	PCB board	1
13	16444002000014	上蜗壳	Top plastics	4
	16444002000015	下蜗壳	Low plastics	4
14	16321006000021	风轮组件	centrifugal fan assembly	4
15	16420014000007	左盖板	The left side covers	1
16	16421001000029	左挂架	Left suspend plate	1
17	16321006000005	左侧板组件	Bracket board welding assembly of left-hand	1
18	16428001000034	左泡沫	Left foam	1
19	16321006000033	背板组件	Chassis welding assembly	1
20	16324005000058	蒸发器总成(片距 1.6)	Evaporator assembly	1
21	16420005000004	导风门	Sway a breeze leaf	1
22	16420014000015	顶盖板	The crest covers plank	1
23	16428001000022	顶泡沫	Topmost foam	1
24	16420006000006	导风架	Air guide louver assembly	1
25	16430001000018	步进电机 35BYJ46-QC120	Step motor	1
26	16430001000022	(ROHS)步进电机 35BYJ46-QC50	Step motor	1
27	16420008000003	垂直叶片连杆 A	Connect a pole	1
	16420008000005	垂直叶片连杆	Connect a pole	1
28	16420007000008	垂直叶片	Perpendicular blade	21
29	16428001000035	右泡沫	Right foam	1
30	16321006000006	右侧板组件	Bracket board welding assembly of right-hand	1
31	16421001000030	右挂架	Right suspend plate	1
32	16420014000008	右盖板	The Right side covers	1
33	16321006000007	集水盘组件	Draining tray	1
34	16432019000004	排水保温管 QR-120N/A	Drain pipe	1
35	16421002000187	ALCF-H42/5 电机固定板	Volute fixing board	1
36,37,46	16430001000026	电机 YSK-105W-4	Motor	1
38	16444007000001	联轴器 Φ15	Motor coupling	2
39	16444007000003	加长轴	Motor lengthen axes	2
40	16421002000011	轴承固定座	Bearing base	1
41	16421002000219	橡胶轴承压板	Bearing top cover	2
42	16432016000033	橡胶轴承	Rubber bearings	2
43	11222023000333	R 显示灯板 SX-DISP(ZDJ)-02-SYE1	Display board	1
44	16420017000002	显示盒	Display board cover	1
45	16420013000017	面板	Front panel	1
47	16421002000189	轴承固定座	Bearing base	1
48	16421002000011	轴承固定座	Bearing base	1

Ducted Type Indoor Unit

1. Feature

Duct type air conditioner (Heat pump), named for the Duct can be installed to Connect with air outlet and inlet. Medium ESP Duct type (50~80Pa).

Application occasions:
Small super market, hotel, restaurant, office, meeting room and so on.

Features:
◇Conceal design, the unit is installed inside of ceiling, doesn't take room space, suitable for family and office place;
◇With Setting or Auto two operation modes, multi speed wind, makes you feel more comfortable;
◇There are red and white two teminals for motor wiring, users can adjust the ESP by changing the terminals to meet different requirements, simple and convenient;Medium ESP Duct is 50/80Pa, the default setting is 50Pa;
◇Special insulation design, achieces high heat insulation efficiency, and no condensation on shell;
◇Low noise centrifugal fan, strong wind but quiet operation;
◇Auto restart;
◇Standard wired controller and optional remote controller;
◇Failure automatic detection, if there is a failure, the indicator will flash and the failure code will display on the wired controller, the failure cause is easier to be found.

Function introduction

Function	Name	ALMD-H*/4DR1A			ALMD-H*/5DR1A	
		18	24	36	48	60
Protection Function	high pressure protection	—	—	—	○	○
	low pressure protection	—	—	—	○	○
	over-current protection of compressor	○	○	○	○	○
	over-high temperature of condenser middle	○	○	○	○	○
	over-high discharge temperature of compressor	○	○	○	○	○
	Phase protection	—	—	—	—	—
	Heating over-heat protection	○	○	○	○	○
	Anti-freeze protection	○	○	○	○	○
	Sensor failure alarm	○	○	○	○	○
	Error code display function	○	○	○	○	○
Comfortable Function	Cooling	○	○	○	○	○
	Heating	○	○	○	○	○
	3 fan speed	○	○	○	○	○
	static pressure adjustable	—	—	—	—	—
	Auto-restart (optional)	○	○	○	○	○
	Anti-cold wind	○	○	○	○	○
	Blow exhaust heat	○	○	○	○	○
	Timer	○	○	○	○	○
Opretating display	clock display	○	○	○	○	○
	operating mode display	○	○	○	○	○
	fan speed display	○	○	○	○	○
	defrosting display	○	○	○	○	○
	timing on/off display	○	○	○	○	○
	wind guiding angle display	—	—	—	—	—
	sleeping display	○	○	○	○	○
Operation mode	Auto operation	○	○	○	○	○
	Dehumidify operation	○	○	○	○	○
	Auto defrosting	○	○	○	○	○
	Ventilation function	○	○	○	○	○
	Low temperature cooling function	—	—	—	—	—
Health function	Removable air filter	○	○	○	○	○
	fresh air function preserved	○	○	○	○	○
Installation adaptability	Optional left and right water drain	—	—	—	—	—
	Optional left and right connection Auxiliary pipe	—	—	—	—	—
	Optional rear and downward air return	—	—	—	—	—
	Installation instruction plate is available	—	—	—	—	—

Note: “○” means have this function, “—”means have no this function

2. Specfication

Model	Indoor		ALMD-H18/4DR1A	ALMD-H24/4DR1A	ALMD-H36/4DR1A
	Outdoor		AL-H18/4DR1A(U)	AL-H24/4DR1A(U)	AL-H36/4DR1A(U)
Power Supply		V~,Hz, Ph	220-240/50/1	220-240/50/1	220-240/50/1
Capacity	Cooling	Btu/h	19100-17400-5220	26500-24000-7200	40000-36000-10800
		W	5610-5100-1530	7920-7200-2160	11000-10000-3000
	Heating	Btu/h	20200-19100-4800	29700-27000-6750	43125-37500-11250
		W	5940-5600-1400	8690-7900-1975	13225-11500-3450
Electric Data	Rated Cooling Power Input	kW	2053-1579-474	2880-2215-665	4012-3086-926
	Rated Heating Power Input	kW	2011-1547-464	2813-2164-649	4118-3168-950
	Rated Cooling Current	A	9.81-7.55-2.25	13.78-10.60-3.21	19.19-14.77-4.45
	Rated Heating Current	A	9.62-7.40-2.20	13.44-10.36-3.11	19.71-15.16-4.55
Performance	EER	W/W	3.23	3.25	3.24
	COP	W/W	3.62	3.65	3.63
Indoor Fan Fotor	Model		YSK160-4	YSK160-4	YSK180-4
	Brand		Sanxiang/Weiling	Sanxiang/Kangbao	Kangbao
	Output Power x Fan quantity	W	100	160	180
	Capacitor	uF	3	2.5	6
	Speed (Hi/Mi/Lo)	r/min	910/860/840	1050/1000/910	1200/1120/1060
Indoor Coil	a.Number Of Row		2	3	3
	b.Tube Pitch(a)x Row Pitch(b)	mm	20.5×12.7	20.5×12.7	20.5×12.7
	c.Fin Spacing	mm	1.5	1.6	1.6
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.and Material	mm	φ7， Inner grooved	φ7， Inner grooved	φ7， Inner grooved
	f.Coil Length x Height x Width	mm	625×369×25.4	625×369×38.1	625×369×38.1
	g.Heat Exchanging Area	m^2	6.98	9.87	9.87
Indoor Unit	Indoor Air Flow	m^3/h	950/760/665	1200/960/840	1500/1200/1050
	Noise Level	dB(A)	44/41/35	47/44/38	50/47/41
	External Static Pressure	Pa	50/80	50/80	50/80
	Net Dimension (W*H*D)	mm	890×785×290	890×785×290	890×785×290
	Packing Dimension (W*H*D)	mm	1100×870×360	1100×870×360	1100×870×360
	Net Weight	Kg	34	36	36
	Gross Weight	Kg	40	42	42
Refrigerant Pipe	Liquid Side	mm	6.35(1/4)	9.52(3/8)	9.52(3/8)
	Gas Side	mm	12.7(1/2)	15.88(5/8)	15.88(5/8)
	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)	R3/4in(DN20)
	Max. Refrigerant Pipe Length	m	20	30	30
	Max. Difference In Level	m	15	15	20
Operation Temperature Range		℃	16~32	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring(Indoor)	mm^2	3×1mm^2	3×1mm^2	3×1mm^2
	Power Wiring(Outdoor)	mm^2	3×2.5mm^2	3×2.5mm^2	3×2.5mm^2
	Signal Wiring	mm^2	2×1mm^2	2×1mm^2	2×1mm^2
Wireless Remote Controller			XK-02	XK-02	XK-02

Application Area	m^2	21-35	28-47	42-70
Qty'per 20'& 40'&40HQ(Only For Reference)	Set	42/90/111	42/90/108	36/72/87

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃。
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

Model	Indoor		ALMD-H48/5DR1A	ALMD-H60/5DR1A
	Outdoor		AL-H48/5DR1A(U)	AL-H60/5DR1A(U)
Power Supply		V~,Hz,Ph	380-415/50/3	380-415/50/3
Capacity	Cooling	Btu/h	51800-48000-14400	63000-60000-18000
		W	15120-14000-4200	16800-16000-4800
	Heating	Btu/h	56100-51000-17850	69300-63000-22050
		W	17050-15500-5425	19800-18000-6300
Electric Data	Rated Cooling Power Input	kW	5582-4294-1288	6479-4984-1495
	Rated Heating Power Input	kW	5461-4201-1260	6429-4945-1484
	Rated Cooling Current	A	9.84-7.57-2.27	11.18-8.60-2.57
	Rated Heating Current	A	9.68-7.45-2.23	10.95-8.42-2.54
Performance	EER	W/W	3.26	3.21
	COP	W/W	3.69	3.64
Indoor Fan Fotor	Model		YSK180-4	YSK180-4
	Brand		Kangbao	Kangbao
	Output Power x Fan quantity	W	180	180
	Capacitor	uF	6	6
	Speed (Hi/Mi/Lo)	r/min	1200/1120/1060	1200/1120/1060
Indoor Coil	a.Number Of Row		3	3
	b.Tube Pitch(a)x Row Pitch(b)	mm	20.5×12.7	20.5×12.7
	c.Fin Spacing	mm	1.6	1.6
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.and Material	mm	φ7， Inner grooved	φ7， Inner grooved
	f.Coil Length x Height x Width	mm	985×369×38.1	985×369×38.1
	g.Heat Exchanging Area	m^2	15.56	15.56
Indoor Unit	Indoor Air Flow	m^3/h	2000/1600/1400	2000/1600/1400
	Noise Level	dB(A)	53/50/44	53/50/44
	External Static Pressure	Pa	50/80	50/80
	Net Dimension (W*H*D)	mm	1250×785×290	1250×785×290
	Packing Dimension (W*H*D)	mm	1460×870×360	1460×870×360
	Net Weight	Kg	52	52
	Gross Weight	Kg	59	59
Refrigerant Pipe	Liquid Side	mm	9.52(3/8)	9.52(3/8)
	Gas Side	mm	19.05(3/4)	19.05(3/4)

	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)
	Max. Refrigerant Pipe Length	m	50	50
	Max. Difference In Level	m	30	30
Operation Temperature Range		℃	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring(Indoor)	mm^2	$3×1mm^3$	$3×1mm^3$
	Power Wiring(Outdoor)	mm^2	$5×1.5mm^3$	$5×1.5mm^3$
	Signal Wiring	mm^2	$2×1mm^2$	$2×1mm^2$
Wireless Remote Controller			XK-02	XK-02
Application Area		m^2	56-93	64-107
Qty'per 20'& 40'&40HQ(Only For Reference)		Set	21/44/50	21/44/50

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃。
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

3. Capacity amendment

3.1 Running range

Cooling capacity (Btu/h)		12000	18000	24000	36000	48000	60000
Power supply		220-240V~/50Hz			380-415V 3N~/50Hz		
Voltage		187~242V			320~420V		
Ambient temperature	Cooling	16~49℃					
	Heating	-15~24℃					

3.2Amendment coefficient of cooling capacity under different indoor/outdoor DB/WB temperatureK1

Indoor air inlet temperature℃		Outdoor air inlet DB temperature℃				
DB	WB	25	30	35	40	43
23	16	0.98	0.94	0.89	0.85	0.82
25	18	1.05	1	0.95	0.90	0.87
27	19	1.1	1.05	1	0.95	0.91
28	20	1.12	1.07	1.02	0.96	0.93
30	22	1.19	1.13	1.08	1.02	0.99
32	24	1.26	1.20	1.15	1.08	1.05

Actual cooling capacity calculation:
Actual cooling capacity=amendment coefficient of cooling capacity × nominal cooling capacity
——nominal cooling capacity could be found from the performance parameters list
——amendment coefficient of cooling capacity could be found from table above.

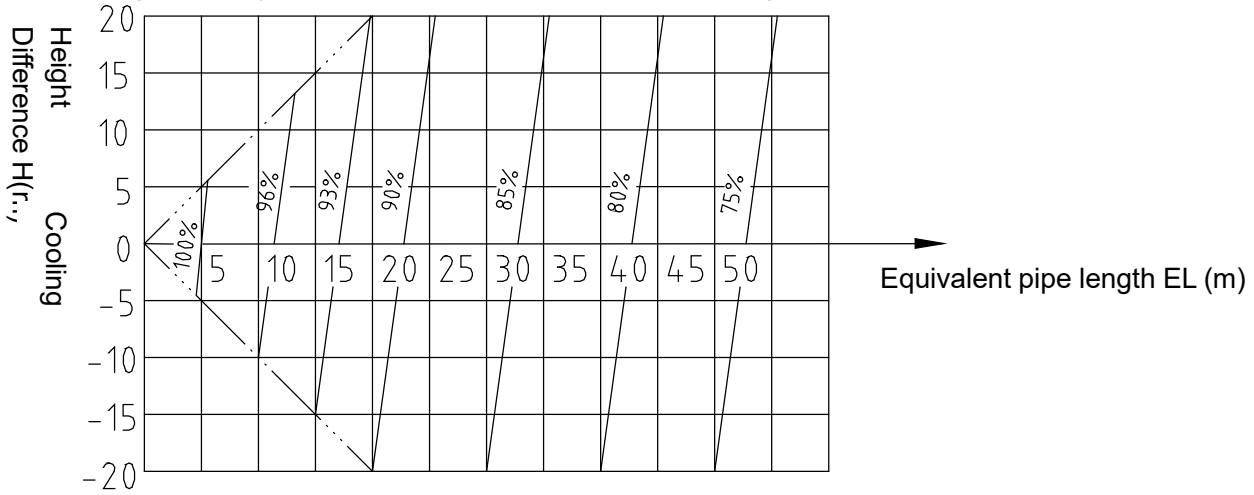
3.3 Amendment coefficient of heating capacity under different indoor/outdoor DB/WB temperature K2

Indoor air inlet DB temperature ℃	Outdoor air inlet WB temperature ℃						
	-15	-10	-5	0	7	10	15
15	0.64	0.71	0.77	0.8	1.04	1.1	1.16
20	0.59	0.66	0.72	0.76	1	1.06	1.12
25	0.55	0.62	0.69	0.71	0.96	1	1.07

Actual heating capacity calculation:
Actual heating capacity=amendment coefficient of heating capacity × nominal heating capacity
——nominal heating capacity could be found from the performance parameters list
——amendment coefficient of heating capacity could be found from table above.

3.4 Amendment coefficients of heating and cooling capacity under different height drop K3

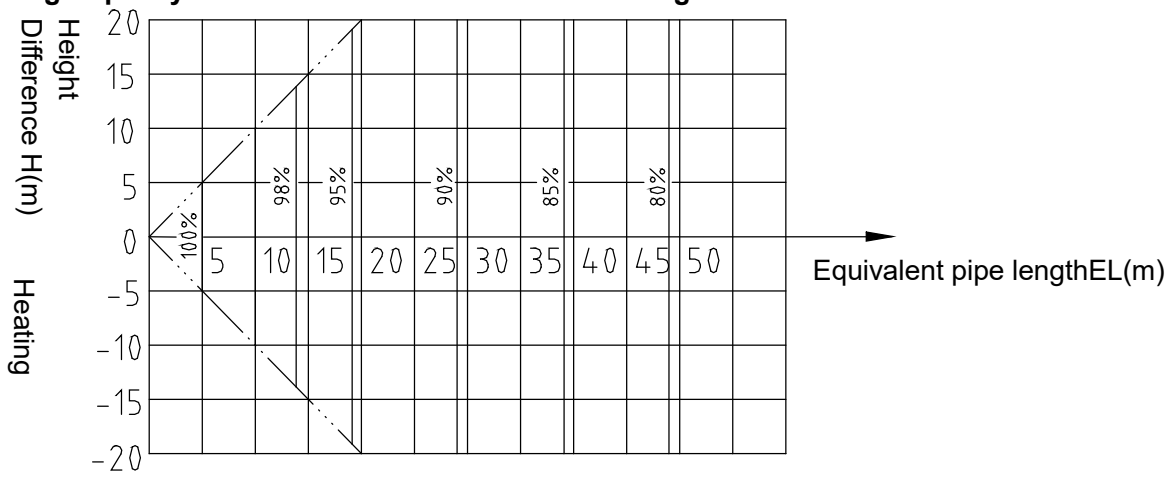
Different Cooling Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit — Height of Indoor Unit

Different Heating Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit — Height of Indoor Unit

3.5 Correction capability

Cooling capacity = nominal cooling capacity xK1xK3
Heating capacity = nominal heating capacity xK2xK3

3.6 Equivalent Pipe length conversion

Equivalent pipe length means converting pipe elbow to straight pipe length after considerate the pressure loss.

Bend and Oil Loop Conversion tablet

Type / Pipe Dia.(mm)	Bend	Oil Loop
6.35	0.10	0.7
9.52	0.18	1.3
12.70	0.20	1.5
15.88	0.25	2.0
19.05	0.35	2.4
22.02	0.40	3.0

Equivalent Pipe length L＝Actual Pipe length L+ Bend Qty× Equivalent pipe bend length+ Oil Loop Qty × Equivalent Oil Loop length

Sample:
ALCA-H48/5 Actual Pipe length is 25 meters, Gas pipe diameter is 19.05mm. If there's 5 bends and 2 oil loops during the installation, then the equivalent pipe length should be:
L=25+0.35×5+2.4×2=31.5(m)

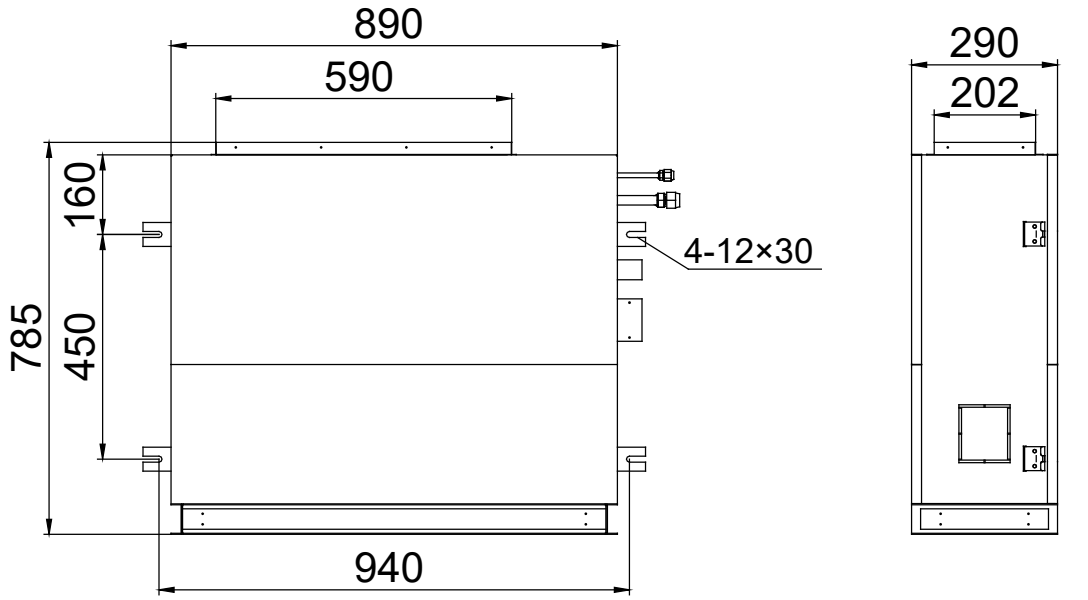
◇Specification of Connection Pipe for Indoor Unit and Outdoor Unit

Cooling Capacity(Btu/h)		18000	24000	36000	48000	60000
Connection Pipe (mm)	Liquid Pipe	Φ6.35	Φ9.52		Φ9.52	
	Gas Pipe	Φ12.7	Φ15.88		Φ19.05	
Max. Length		20	25	30	50	
Max. Height (m)		10	15	20	30	
Max. Bend Qty		5	8	8	10	
Extra R410a per meter when the pipe length is more than 5 meter (kg)		0.05	0.05	0.05	0.07	

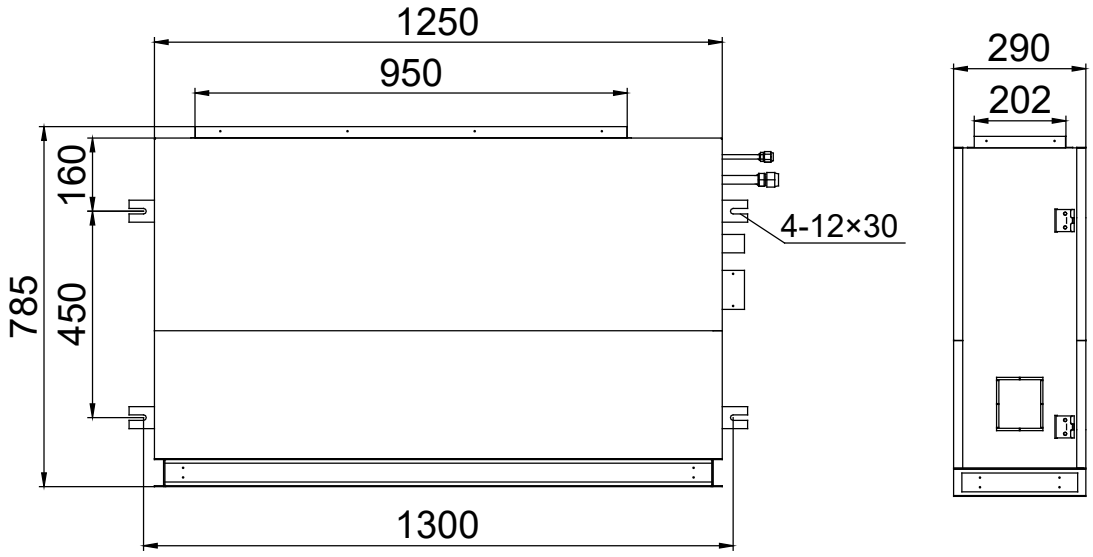
Caution:
1. The standard Pipe length is 5m, if the pipe length is less than this then no additional charging is necessary. If the pipe length is more than this then you should charge more refrigerant into the system according to the above Charging Data
2. The thickness of the pipe is 0.6-1.0, bearing pressure is 4.2MPa;
3. If the connection pipe is too long, the cooling capacity and stability would be decreased. And the more bend quantity, the resistance in the piping system would be bigger, then the cooling and heating capacity would be decreased even lead to compressor broken. We suggest you to use the shortest connection pipe according to the pipe length parameter in this manual.If the height difference between outdoor and indoor unit is more than 5m, an oil trap should be installed in the gas pipe for every 10 meters.

4. Dimension

ALMD-H18/4DR1A, ALMD-H24/4DR1A, ALMD-H36/4DR1A

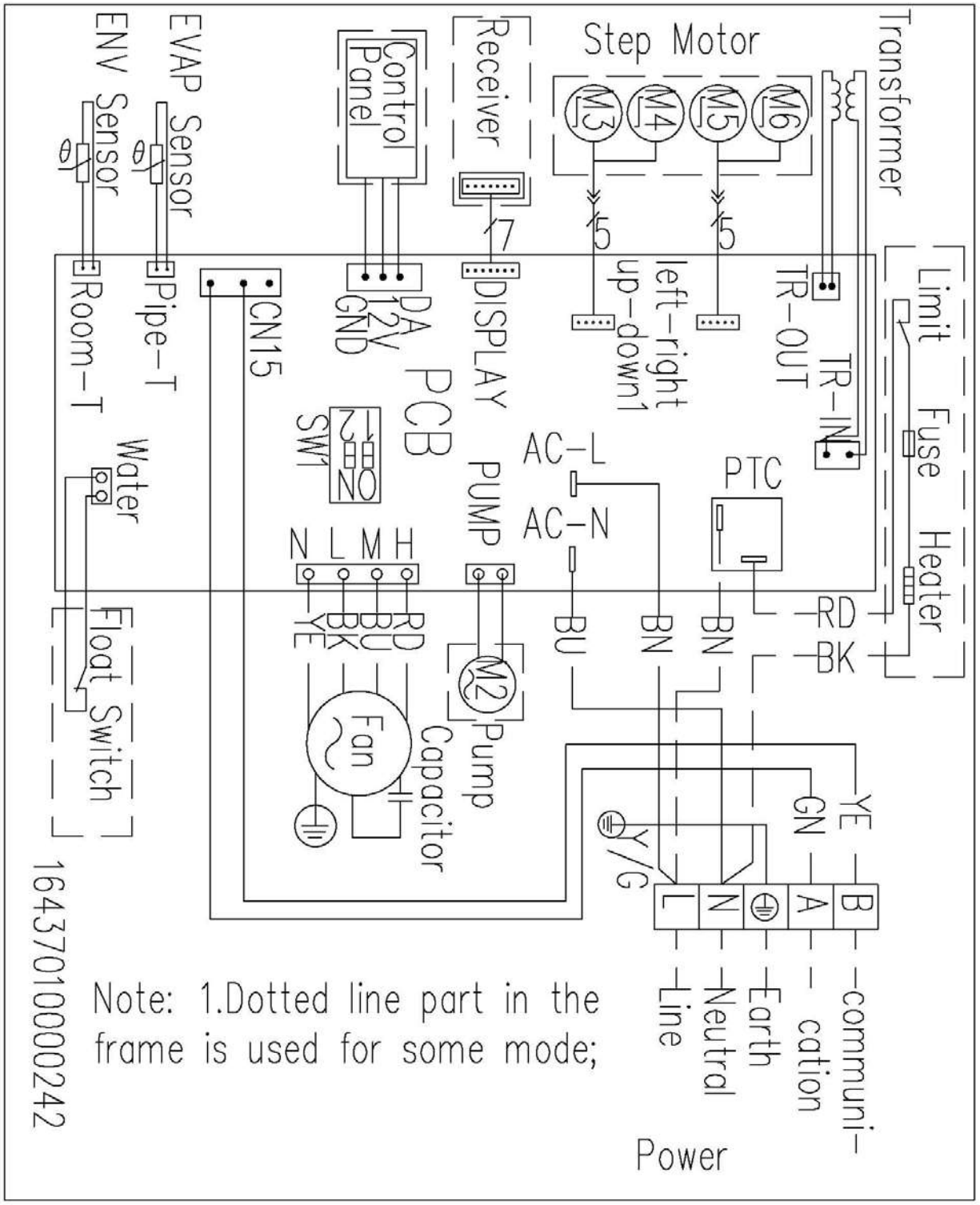


ALMD-H48/5DR1A,ALMD-H60/5DR1A

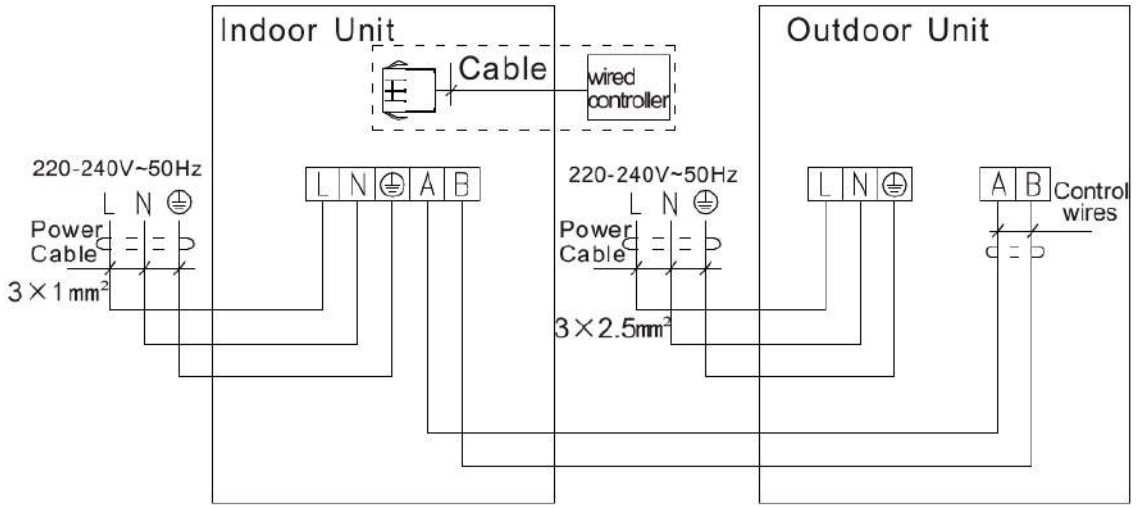


5. Electrical wiring and connection

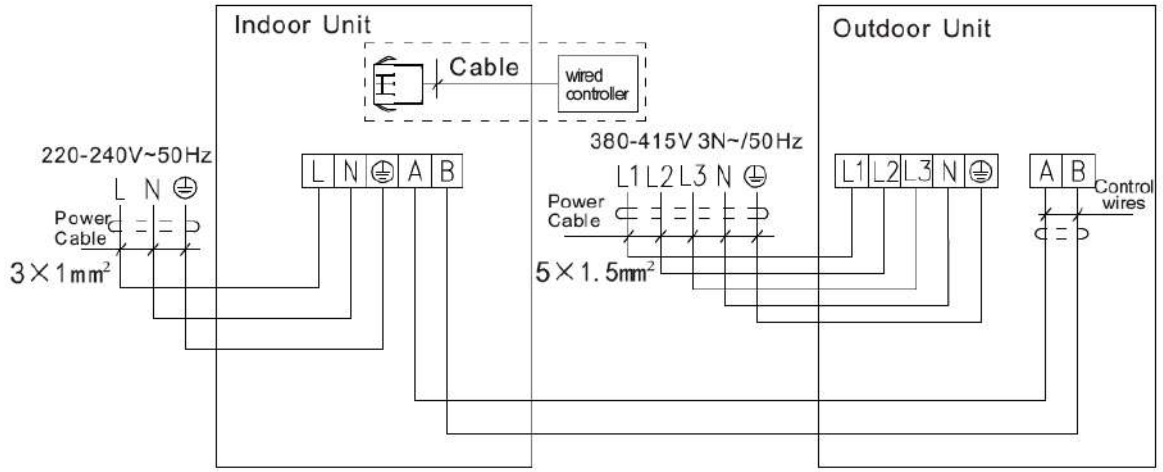
ALMD-H18/4DR1A, ALMD-H24/4DR1A, ALMD-H36/4DR1A, ALMD-H48/5DR1A,ALMD-H60/5DR1A



ALMD-H18/4DR1A, ALMD-H24/4DR1A, ALMD-H36/4DR1A

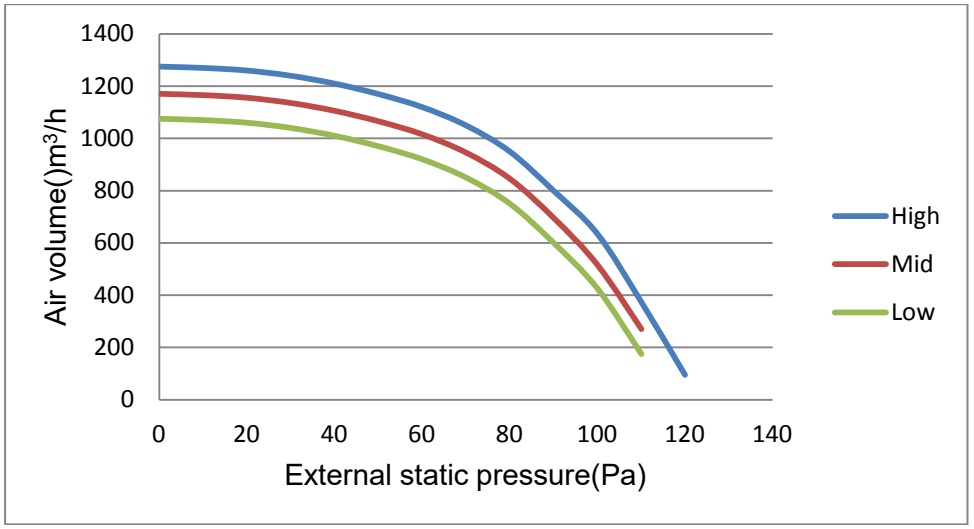


ALMD-H48/5DR1A, ALMD-H60/5DR1A

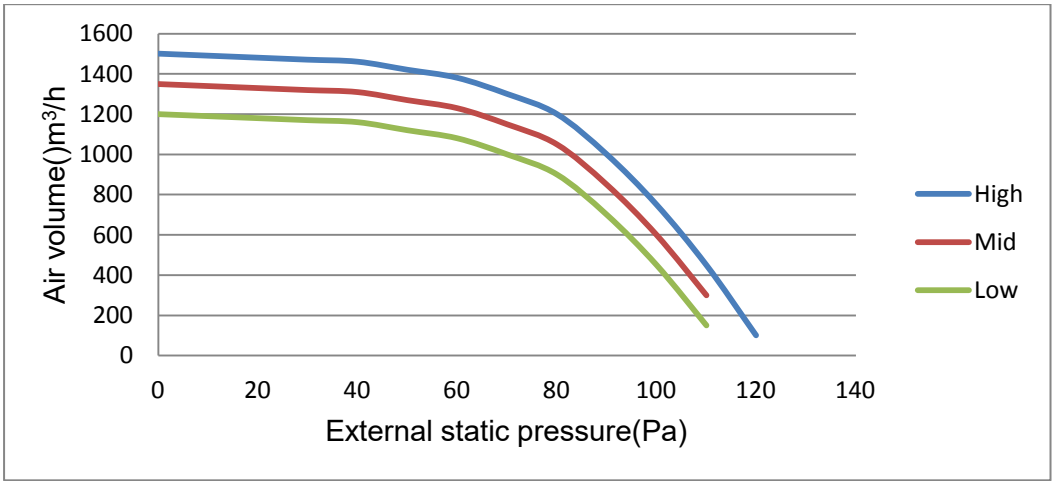


6. Fan Performance

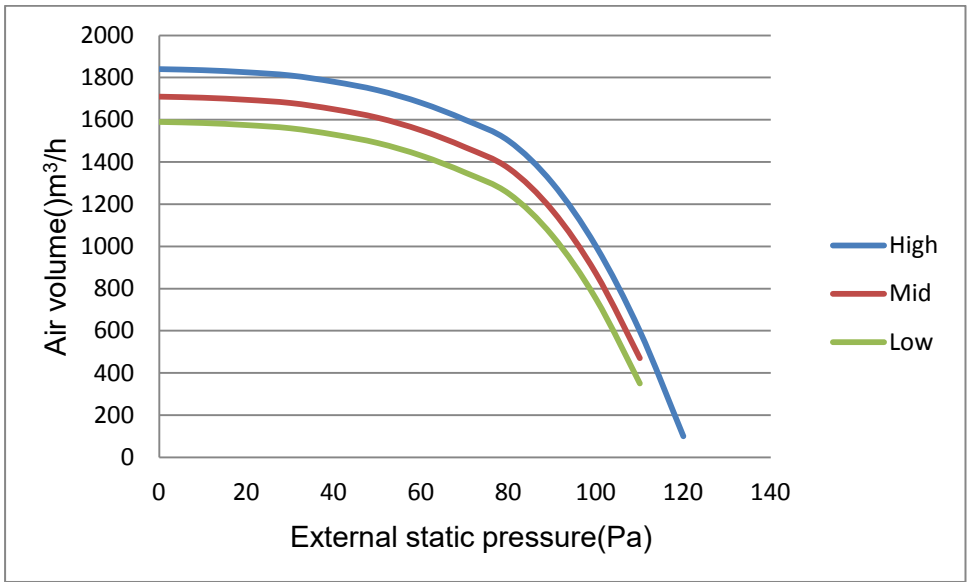
ALMD-H18/4DR1A



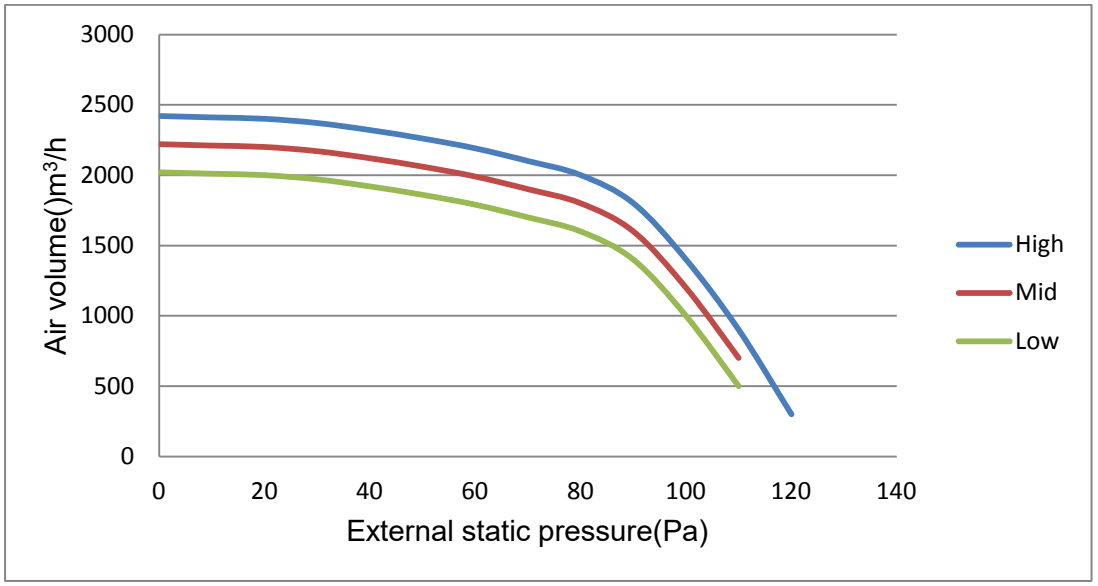
ALMD-H24/4DR1A



ALMD-H36/4DR1A



ALMD-H48/5DR1A, ALMD-H60/5DR1A

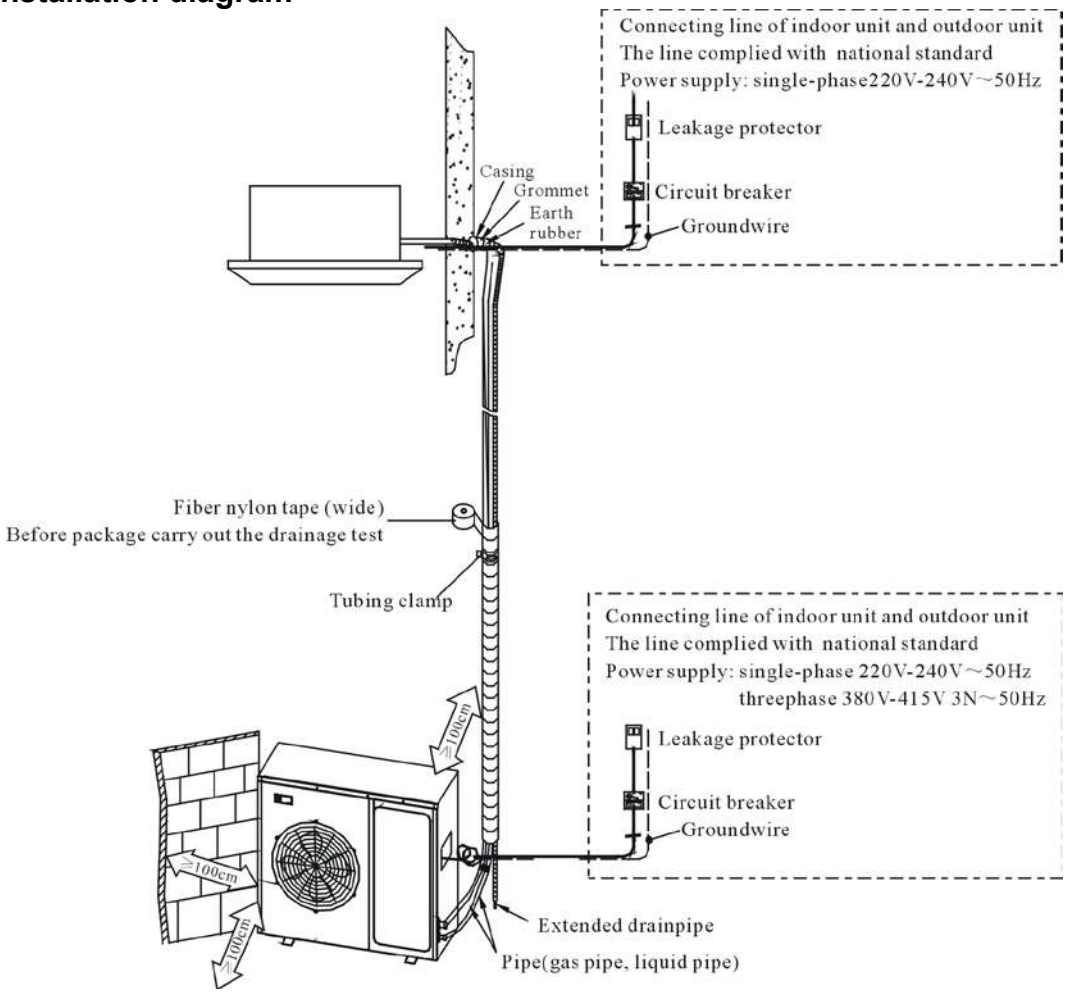


7. Installation

7.1 Preparation and equipments before installation

Please buy following spare parts from your local market before installation	Besides general implements, other implements are needed when connecting the pipe
Hung bolts M12, 4 pcs	Acetylene cylinders, oxygen cylinders (when longer pipe used it should be welded)
Drainage pipe PVC	One set pipe cut machine. (cut copper pipe)
Copper connecting pipe	Refrigerant cans, electronic balance (when longer pipe used additional gas should be charged)
Adhesive belt (big size) 5 pcs, (small size) 5 pcs	Pressure gauges, pipe clamp, welding torch, 2B silver electrode
Heat insulation material used to connect copper pipe (PE foam material, its thickness is more than 8mm)	Wrench 2 pcs, one of them is with adjustable torque wrench (42N.m,65N.m,100N.mm)
Power cable, electrical wire between indoor and outdoor unit(Must be in accordance with the wire diameter in the wiring diagram)	Nitrogen cylinder (in order to prevent oxidation when welding, using Nitrogen to replace the air)

7.2 Installation diagram



7.3 Installation precaution

◇Hanging location should be able to support the unit's weight, there should be no increase in noise and vibration. If the hanging location needs reinforcement, it should be reinforced before installation;

◇Choose the space above the ceiling that can put the indoor unit inside;

◇The location should be easy for drainage;

◇The unit should not be installed in the heat source, steam source oil mist places (such as machine room, kitchen, laundry room, mechanical workshop, etc.) in order to avoid performance degradation, electric shock, plastic parts corrosion which lead to unit broken;

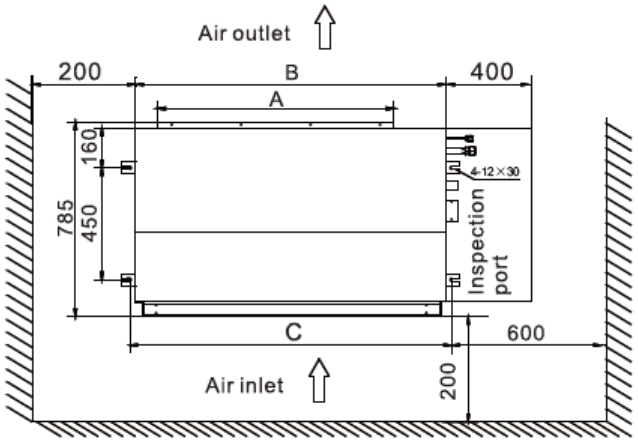
◇Choose the location at least 1 meter away from TV and radio, in order to avoid interference to them

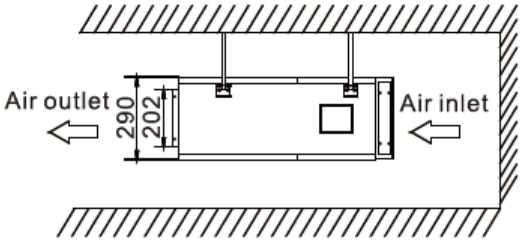
◇There is no obstacles getting in the way of air circulation, cold air can evenly spread to all corners of the room;

◇In order to facilitate maintenance and repair, there should be certain distance between indoor unit and obstacles;

◇Refrigerant R22 is used for this unit, which is non-flammable and non-toxic gas. As the proportion of refrigerant is bigger than air, so if it leaks the gas will be filled on the ground. Therefore, if the units mounted on a closed room there must be good ventilation to prevent suffocation. In case of leakage of refrigerant, units should immediately stop running, and contact with maintenance personnel in time. There must be no fire at the site, because the refrigerant will turn to harmful gas when get to the fire.

7.4 The distance between indoor unit and obstacle





Type	A	B	C
18000BTU	590	890	940
24000BTU			
30000BTU			
36000BTU			
48000BTU	950	1250	1300
60000BTU			

7.5 Indoor unit suspension

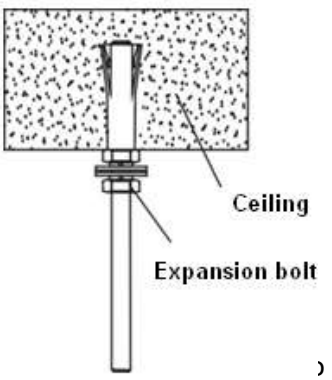
◇Select the suspension foundation
The suspension foundation is a structure of either wooden frame or reinforced concrete. It must be firm and reliable to bear at least 4 times weight of itself and capable of bearing vibration for long periods;

◇Fixing of suspension foundation
Fix the suspension bolts either as shown in the picture or by a steel or wooden bracket;

◇Adjust the relative positions of the suspension hooks to ensure the indoor unit is level in all directions. Use a spirit level to ensure this, otherwise water leakage, air leakage etc. will be resulted;

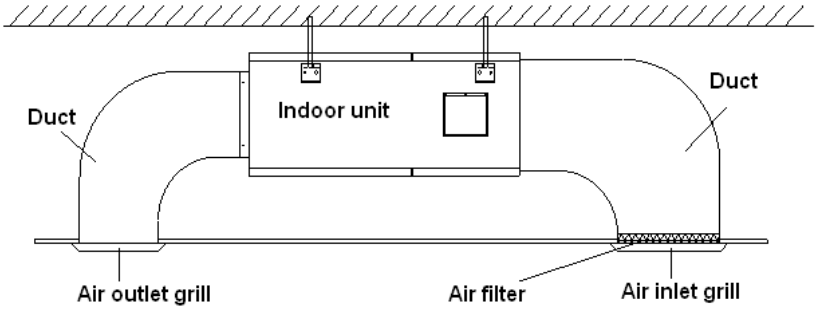
◇Tighten the nuts and ensure that the hooks are tightly connected to the nuts phenomenon of virtual hanging;

◇After the unit is installed ensure it is secure and does not shake or sway.



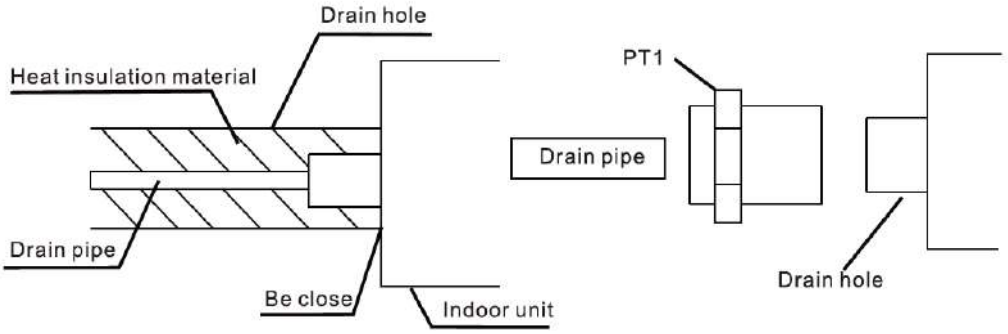
7.6 Duct pipeline installation

◇Using canvas to connect between indoor unit and duct pipeline, in order to save unnecessary vibration, as to the detail connection method please refer to the following picture.



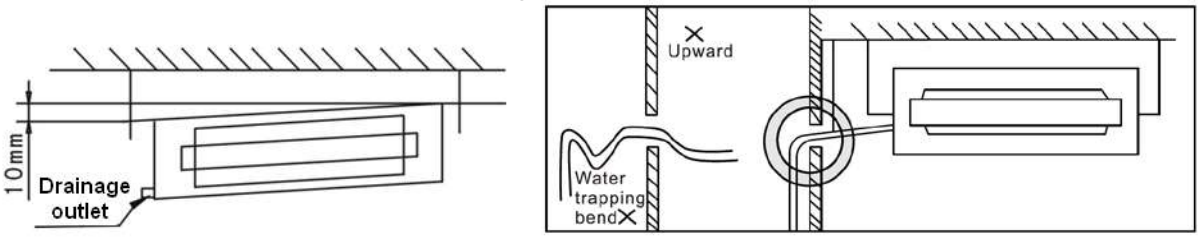
7.7 Drainage pipe

◇Drainage pipes must be wrapped with heat insulation materials, otherwise it will cause frost or droplets, see picture as follows:



Heat insulation material: rubber insulation pipe with the thickness of more than 8mm

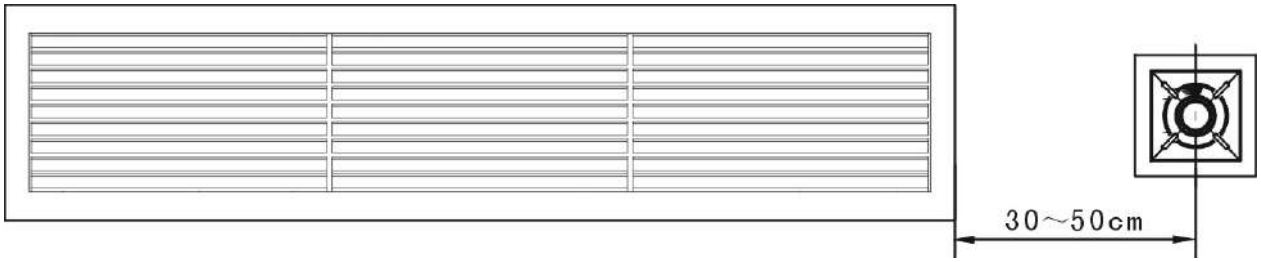
◇Drainage pipe must have a downward gradient (1 / 50 1 / 100).If the drain pipe is installed ups and downs, it will cause water backflow or leakage etc.



◇When finish installation please carry out the drainage test to ensure that the water flow through the pipeline fluently, and carefully observe the junction to ensure that there is no water leakage at the junction. If the unit is installed in the newly built house, strongly recommend that this test taken before the CFiling installation. Even it is the heating only unit, this test is unavoidable.

7.8 Remote controller receiver

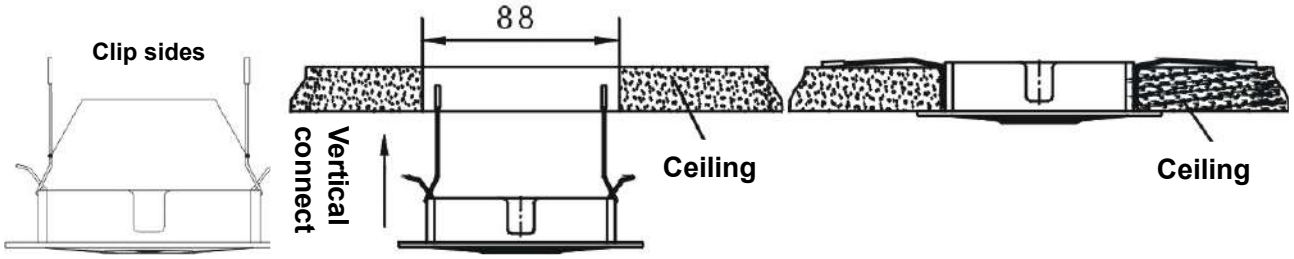
◇Installation site: recommend that the receiver is mounted with the distance of 30~50 cm to the indoor unit air outlet(on your choice as well), while must ensure that the receiver can get the signal that the remote controller sends, please refer to the following installation picture:



◇Mounting hole set up: please use certain instrument to dig a square hole with 88*88mm on the ceiling

◇Remote controller receiver installation.

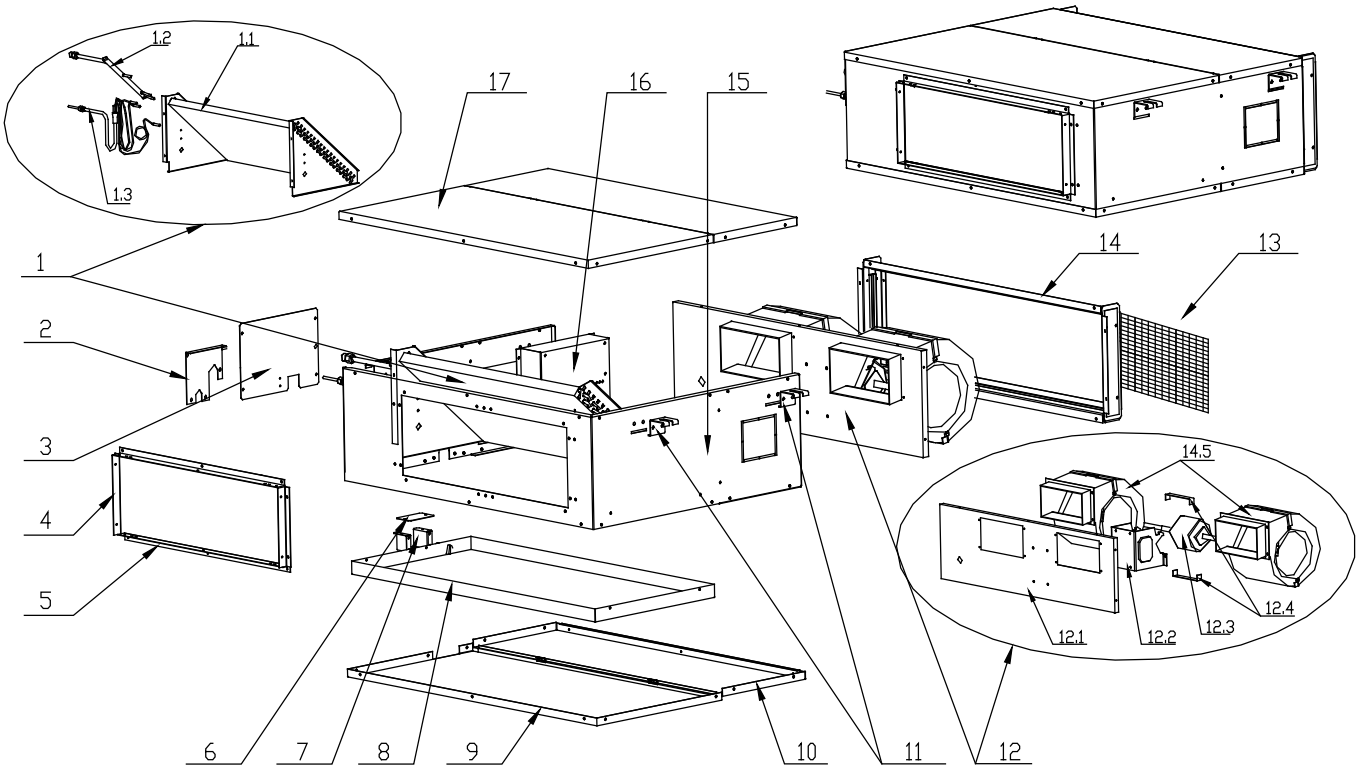
Hold the two sides (with clip sides) of the receiver, set the spring clip in the vertical way then put it into the mounting hole, if the two sides of the receiver is in the same level with the ceiling the installation is finished.



◇Signal line connection: connect the wire of remote controller receiver to the CN-DISP terminal board on PCB of indoor unit wire box then fix it.

8. Explode view

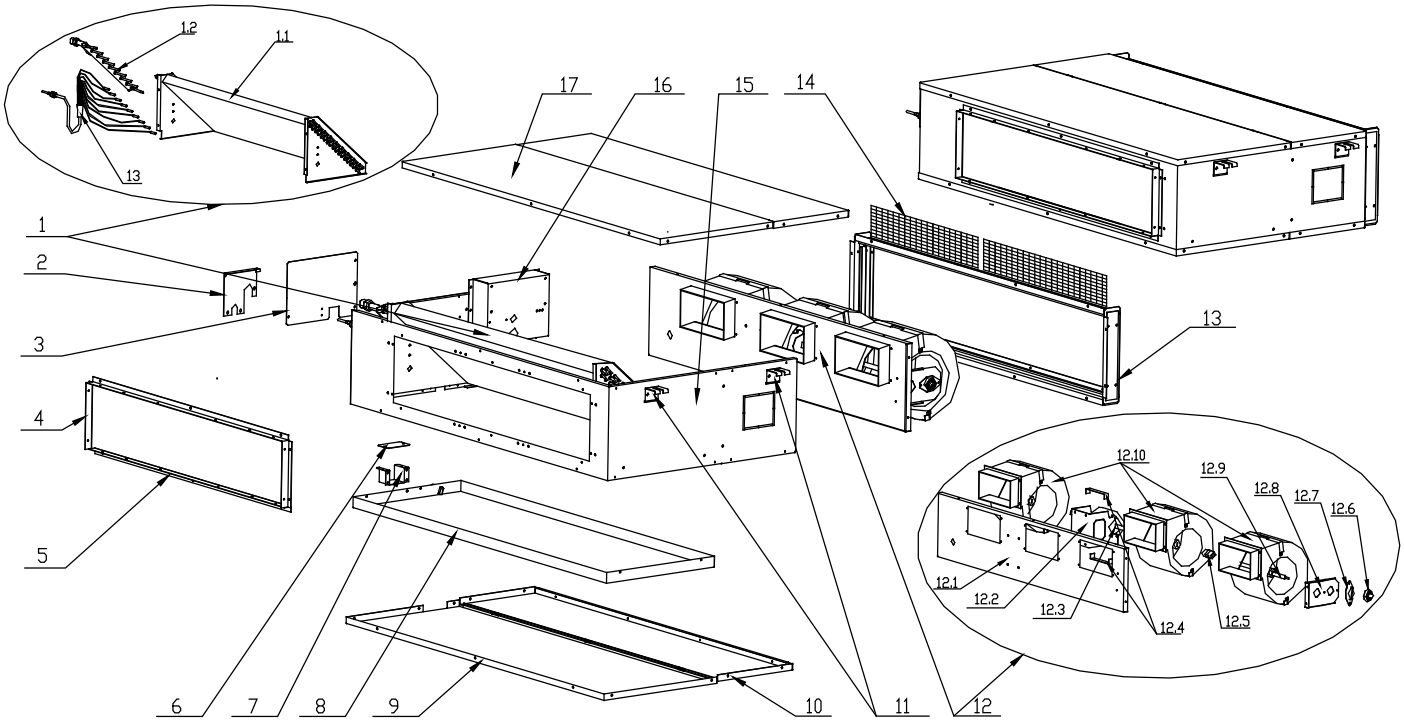
ALMD-H18/4DR1A, ALMD-H24/4DR1A, ALMD-H36/4DR1A



N0.	Chinese Name	Part Name	Quantity	Remark
1	蒸发器总成	Evaporator part	1	
1.1	蒸发器组件	Evaporator assembly	1	
1.2	蒸发器出气管组件	Evaporator liquid input pipe assembly	1	
1.3	蒸发器进液管组件	Evaporator gas output pipe assembly	1	
2	阀板	Valve board	1	
3	电控盒盖	Cover for electric components	1	
4	出风法兰A	Air outlet flange A	2	
5	出风法兰B	Air outlet flange B	2	
6	排水管保护板B	Drainpipe bracket B	1	
7	排水管保护板A	Drainpipe bracket A	1	
8	凝水盘组件	Drip tray assembly	1	
9	底板	Chassis	1	
10	回风盖板	Air inlet cover board	2	
11	吊钩	Pothook	4	
12	蜗壳固定板组件	Centrifugal fan fasten board assembly	1	
12.1	蜗壳固定板	Centrifugal fan fasten board	1	
12.2	电机架组件	Motor bracket assembly	1	
12.3	室内风扇电机	Fan motor	1	YSK100-4-50 G
12.4	电机抱攀	Fan motor fixity	2	
12.5	离心风机	Centrifugal fan motor assembly	2	
13	空气过滤器	Air filter	1	850×245×7

14	过滤网滑道组件	slideway assembly	1	
14.1	左右滑道组件	Left&Right slideway assembly	2	
14.2	上下滑道组件	Up&down slideway assembly	2	
14.3	左右过滤器法兰	Left&Right france	2	
14.4	上下过滤器法兰	Up&down france	2	
15	围板	Boarding	1	
16	电控盒总成	Electric assembly	1	
16.1	控制板	PCB board	1	QRD-SN3F(18-60)K(485)-SYE1(SY)
16.2	变压器	Transformer	1	TDB-14-B4B(PTC)
16.3	回风温度传感器	Sensor 15K3950 1	1	
16.4	盘管温度传感器	Sensor 20K3950 2	1	
16.5	端子板 5位	Terminal board	1	
16.6	电控盒组件	Electric components box	1	
17	顶盖板	Top cover board	1	

ALMD-H48/5DR1A, ALMD-H60/5DR1A



N0.	Chinese Name	Part Name	Quantity	Remark
1	蒸发器总成	Evaporator part	1	
1.1	蒸发器组件	Evaporatorassembly	1	
1.2	蒸发器集气管组件	Evaporator liquid input pipeassembly	1	
1.3	蒸发器进液管组件	Evaporator gas output pipe assembly	1	
2	阀板	Valveboard	1	
3	电控盒盖	Cover for electric components	1	
4	出风法兰A	Air outlet flange A	2	
5	出风法兰B	Air outlet flange B	2	
6	排水管保护板B	Drainpipe bracket B	1	
7	排水管保护板A	Drainpipe bracket A	1	
8	凝水盘组件	Drip trayassembly	1	
9	底板	Chassis	1	
10	回风盖板	Air inlet cover board	2	
11	吊钩	Pothook	4	
12	蜗壳固定板组件	Centrifugal fan fasten boardassembly	1	
12.1	蜗壳固定板	Centrifugal fan fasten board	1	
12.2	电机架组件	Motor bracketassembly	1	
12.3	室内风扇电机	Fan motor	1	YSK-180-4P
12.4	电机抱攀	Fan motor fixity	2	
12.5	联轴器Φ14	Coupling	1	
12.6	橡胶轴承	Rubber axletree	1	
12.7	橡胶轴承压板	Rubber axletree board	1	
12.8	橡胶轴承支架	Rubber axletreebracket	1	
12.9	加长轴	Axes	1	ϕ14×470
12.10	离心风机	Centrifugal fan motor assembly	3	
13	过滤网滑道组件	slidewayassembly	1	
13.1	左右滑道组件	Left&Right slidewayassembly	2	
13.2	上下滑道组件	Up&downslidewayassembly	2	
13.3	左右过滤器法兰	Left&Rightfrance	2	
13.4	上下过滤器法兰	Up&down france	2	
14	空气过滤器	Air filter	2	
15	围板	Boarding	1	
16	电控盒总成	Electric assembly	1	
16.1	控制板	PCB board	1	QRD-SN3F-HCE1
16.2	变压器 QC2-E1	Transformer	1	
16.3	回风温度传感器	Sensor 5K3470 1	1	
16.4	盘管温度传感器	Sensor 5K3470 2	1	
16.5	端子板 5位	Terminal board	1	
16.6	电控盒组件	Electric components box	1	
17	顶盖板	Top cover board	1	

Part 3 Universal outdoor unit

1. Feature

◇Made of rare earth permanent magnetic material, the rotor could change speed by changingthe DC voltage, thus overcome the electromagnetic noise and rotor loss of AC inverter compressor, achieves high efficiency as well as low noise.

◇AUX DC Inverter Air Conditioner adopts the advanced 180 sine wave DC Inverter driving technology.

◇AUX DC Inverter Air Conditioner adopts PD frequency control technology to well control the room temperature.

◇Adjusting with EXV, the whole unit could achieve quick cooling/heating and the minimum temperature fluctuation of indoor unit.

◇Defrost Control: AUX DC Inverter Air Conditioner adopts intelligent defrosting technology that detect the frosting thickness, promotes the comfort when heating.

◇Auto-restart;

◇The universal series using RS485 communication control between indoor and outdoor units, more reliable and easy to install, no need to special training for installation workers.

◇With multiple protection, the compressor could well run in reasonable operation range.

◇After adding the self-diagnose function and digital tube display function, the outdoor unit could be easily identify the reason of the fault.

2. Specification

Model			AL-H18/4DR1A(U)	AL-H24/4DR1A(U)	AL-H36/4DR1A(U)
Power Supply		V~, Hz,Ph	220~240,50,1	220~240,50,1	220~240,50,1
Max. Input Consumption		W	2400	3470	4360
Max. Current		A	12.1	18.0	19.8
Capacity	Cooling	Btu/h	19100-17400-5220	27000-24000-7400	40000-36000-10800
		W	5610-5100-1530	7920-7200-2160	11000-10000-3000
	Heating	Btu/h	20200-19100-4800	29700-27000-6800	43125-37500-11250
		W	5940-5600-1400	8690-7900-1975	13225-11500-3450
DC Inverter Compressor	Model		ATD141RDPA8JTA	ATL232UDPC9AQ	DA250S2C-30MT
	Type		ROTARY	ROTARY	ROTARY
	Brand		Shanghai Hitachi	Shanghai Hitachi	GMCC
	Capacity	W	5560	6520	7690
	Input	W	1255	2070	2120
	Frequency range	Hz	16.7-120	20-240	12-120
	Rated Current(RLA)	A	4.2	8.8	8.85
	Locked Rotor Amp(LRA)	A	30	32	45
	Refrigerant Oil	ml	480 (68HES-H)	630 (HAF68D1C)	820 (ESTER OIL VG74)
Outdoor Fan Motor	Model		CW65A	CW85B	YDK120-6
	Brand		weiling	TDE	Weiling
	Output Power x Fan quantity	W	30×1	85×1	120×1
	Capacitor	uF	1.5	4	5
	Speed	r/min	850/720/570	840/700/560	830/720/620
Coil	a.Number Of Row		2	1.5	2
	b.Tube Pitch(a)x Row Pitch(b)	mm	22×19.05	22×19.05	22×19.05
	c.Fin Pitch	mm	1.4	1.4	1.6
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.And Material	mm	φ7， Inner grooved	φ7.94， Inner grooved	φ7.94， Inner grooved
	f.Coil Length x Height x Width	mm	835×506×38.1	740×660×38.1	836×761×38.1
	g.Heat Exchanging Area	㎡	18.4	18.6	27.23
Air Flow Volume		CFM	1529	2206	2294
		m^3/h	2600	3750	3900
Noise Level		dB(A)	55	58	60
Dimension(W×D×H)	Net	mm	800×286×530	890×320×670	900×320×790
	Packing	mm	920x400x620	1020×430×770	1030×430×850
Weight	Net	kg	37.5	51	62
	Gross	kg	40	54.5	67
Refrigerant Type/Quantity	Type		R410A	R410A	R410A
	Charged Volume	kg	1.05	1.45	1.9
Design Pressure		MPa	4.4	4.4	4.4
Refrigerant Piping	Liquid Side	mm	6.35(1/4)	9.52(3/8)	9.52(3/8)
	Gas Side	mm	12.7(1/2)	15.88(5/8)	15.88(5/8)
	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)	R3/4in(DN20)

	Max. Length	m	20	30	30
	Max. Height	m	15	15	20
Operation Temperature Range		℃	16~32	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring（Indoor）	mm^2	$3×1mm^2$	$3×1mm^2$	$3×1mm^2$
	Power Wiring（Outdoor）	mm^2	$3×2.5mm^2$	$3×2.5mm^2$	$3×2.5mm^2$
	Signal Wiring	mm^2	$2×1mm^2$	$2×1mm^2$	$2×1mm^2$
Application Area		m^2	21-35	28-47	42-70
Stuffing Quantity	20/40/40H	Unit	102/204/272	102/204/204	56/112/168

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃。
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

Model			AL-H48/5DR1A(U)	AL-H60/5DR1A(U)
Power Supply		V~,Hz,Ph	380~415,50,3	380~415,50,3
Max. Input Consumption		W	7300	7700
Max. Current		A	12.3	13.0
Capacity	Cooling	Btu/h	51800-48000-14400	63000-60000-18000
		W	15120-14000-4200	16800-16000-4800
	Heating	Btu/h	56100-51000-17850	69300-63000-22050
		W	17050-15500-5425	19800-18000-6300
DC Inverter Compressor	Model		ATQ420D2UMU	ATQ420D2UMU
	Type		ROTARY	ROTARY
	Brand		GMCC	GMCC
	Capacity	W	13100	13100
	Input	W	3420	3420
	Frequency range	Hz	12-120	12-120
	Rated Current(RLA)	A	6.9	6.9
	Locked Rotor Amp(LRA)	A	44	44
	Refrigerant Oil	ml	1400 (POE VG74)	1400 (POE VG74)
Outdoor Fan Motor	Model		WC55-6	WC55-6
	Brand		weiling	weiling
	Output Power x Fan quantity	W	55×2	55×2
	Capacitor	uF	3×2	3×2
	Speed	r/min	780/660/530	780/660/530
Coil	a.Number Of Row		2	2

	b.Tube Pitch(a)x Row Pitch(b)	mm	22×19.05	22×19.05
	c.Fin Pitch	mm	1.6	1.6
	d.Fin Material		Hydrophilic aluminum fin	Hydrophilic aluminum fin
	e.Tube Outside Dia.And Material	mm	φ7.94， Inner grooved	φ7.94， Inner grooved
	f.Coil Length x Height x Width	mm	954×1320×38.1	954×1320×38.1
	g.Heat Exchanging Area	㎡	54.84	54.84
Air Flow Volume		CFM	3765	3765
		m^3/h	6400	6400
Noise Level		dB(A)	56	56
Dimension(W×D×H)	Net	mm	940×368×1366	940×368×1366
	Packing	mm	1080×460×1500	1080×460×1500
Weight	Net	kg	110	110
	Gross	kg	118	118
Refrigerant Type/Quantity	Type		R410A	R410A
	Charged Volume	kg	3.7	3.7
Design Pressure		MPa	4.4	4.4
Refrigerant Piping	Liquid Side	mm	9.52(3/8)	9.52(3/8)
	Gas Side	mm	19.05(3/4)	19.05(3/4)
	Drainage	mm	R3/4in(DN20)	R3/4in(DN20)
	Max. Length	m	50	50
	Max. Height	m	30	30
Operation Temperature Range		℃	16~32	16~32
Ambient Temperature Range(Cooling/Heating)		℃	16~49/-15~24	16~49/-15~24
Connection Wiring	Power Wiring（Indoor）	mm^2	$3×1mm^3$	$3×1mm^3$
	Power Wiring（Outdoor）	mm^2	$5×1.5mm^3$	$5×1.5mm^3$
	Signal Wiring	mm^2	$2×1mm^2$	$2×1mm^2$
Application Area		m^2	56-93	64-107
Stuffing Quantity	20/40/40H	Unit	27/54/54	27/54/54

Note:

1. Working condition of the cooling capacity measured: Inside the room DB temperature 27℃,WB temperature19℃;Outside of the room DB temperature 35℃,WB temperature 24℃;Working condition of the heating capacity measured:Inside the room DB temperature 20℃,Outside of the room DB temperature 7℃,WB temperature 6℃。
2. Parameters above are all measured when the connecting pipe is 5 meters.
3. Parameters above may be modified as product improvement. We keep the right to change the product specifications without prior notice, please take the parameters listed on the nameplate as criterion.

3. Capacity Amendment

3.1 Running range

Cooling capacity (Btu/h)		12000	18000	24000	36000	48000	60000
Power supply		220-240V~/50Hz			380-415V 3N~/50Hz		
Voltage		187~242V			320~420V		
Ambient temperature	Cooling	16~49℃					
	Heating	-15~24℃					

3.2Amendment coefficient of cooling capacity under different indoor/outdoor DB/WB temperatureK1

Indoor air inlet temperature℃		Outdoor air inlet DB temperature℃				
DB	WB	25	30	35	40	43
23	16	0.98	0.94	0.89	0.85	0.82
25	18	1.05	1	0.95	0.90	0.87
27	19	1.1	1.05	1	0.95	0.91
28	20	1.12	1.07	1.02	0.96	0.93
30	22	1.19	1.13	1.08	1.02	0.99
32	24	1.26	1.20	1.15	1.08	1.05

Actual cooling capacity calculation:
Actual cooling capacity=amendment coefficient of cooling capacity × nominal cooling capacity
——nominal cooling capacity could be found from the performance parameters list
——amendment coefficient of cooling capacity could be found from table above.

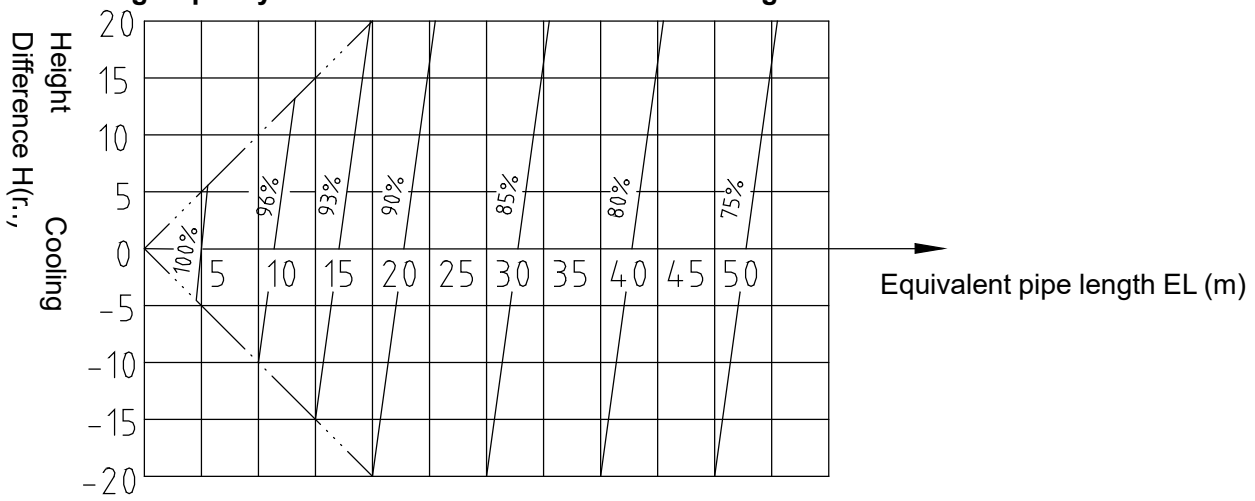
3.3 Amendment coefficient of heating capacity under different indoor/outdoor DB/WB temperature K2

Indoor air inlet DB temperature ℃	Outdoor air inlet WB temperature ℃						
	-15	-10	-5	0	7	10	15
15	0.64	0.71	0.77	0.8	1.04	1.1	1.16
20	0.59	0.66	0.72	0.76	1	1.06	1.12
25	0.55	0.62	0.69	0.71	0.96	1	1.07

Actual heating capacity calculation:
Actual heating capacity=amendment coefficient of heating capacity × nominal heating capacity
——nominal heating capacity could be found from the performance parameters list
——amendment coefficient of heating capacity could be found from table above.

3.4 Amendment coefficients of heating and cooling capacity under different height drop K3

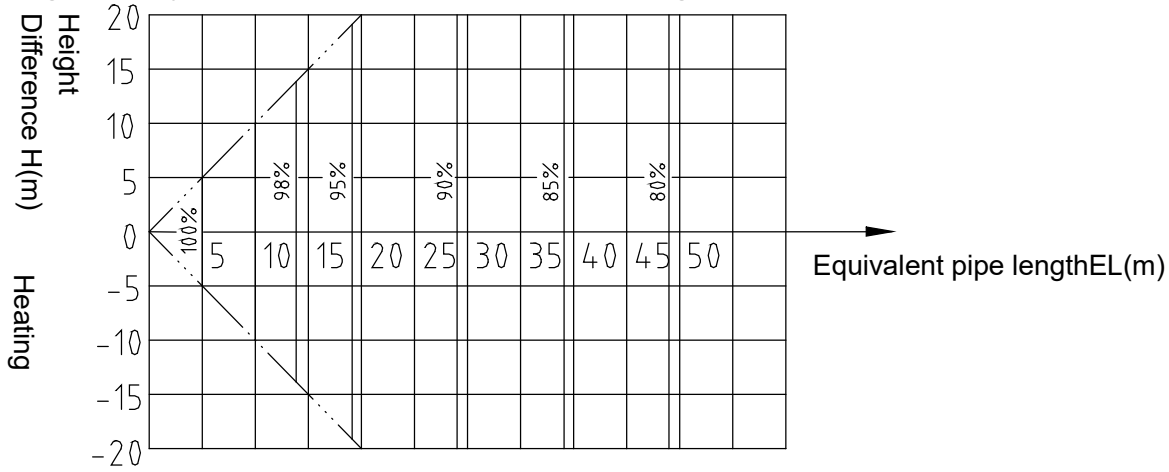
Different Cooling Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit — Height of Indoor Unit

Different Heating Capacity modified coefficients at different height:



Note:

H = Height of Outdoor Unit — Height of Indoor Unit

3.5 Correction capability

Cooling capacity = nominal cooling capacity xK1xK3
Heating capacity = nominal heating capacity xK2xK3

3.6 Equivalent Pipe length conversion

Equivalent pipe length means converting pipe elbow to straight pipe length after considerate the pressure loss.

Bend and Oil Loop Conversion tablet

Type / Pipe Dia.(mm)	Bend	Oil Loop
6.35	0.10	0.7
9.52	0.18	1.3
12.70	0.20	1.5
15.88	0.25	2.0
19.05	0.35	2.4
22.02	0.40	3.0

Equivalent Pipe length L＝Actual Pipe length L+ Bend Qty× Equivalent pipe bend length+ Oil Loop Qty ×

Equivalent Oil Loop length

Sample:

ALCA-H48/5 Actual Pipe length is 25 meters, Gas pipe diameter is 19.05mm. If there's 5 bends and 2 oil loops during the installation, then the equivalent pipe length should be:

L=25+0.35×5+2.4×2=31.5(m)

◇Specification of Connection Pipe for Indoor Unit and Outdoor Unit

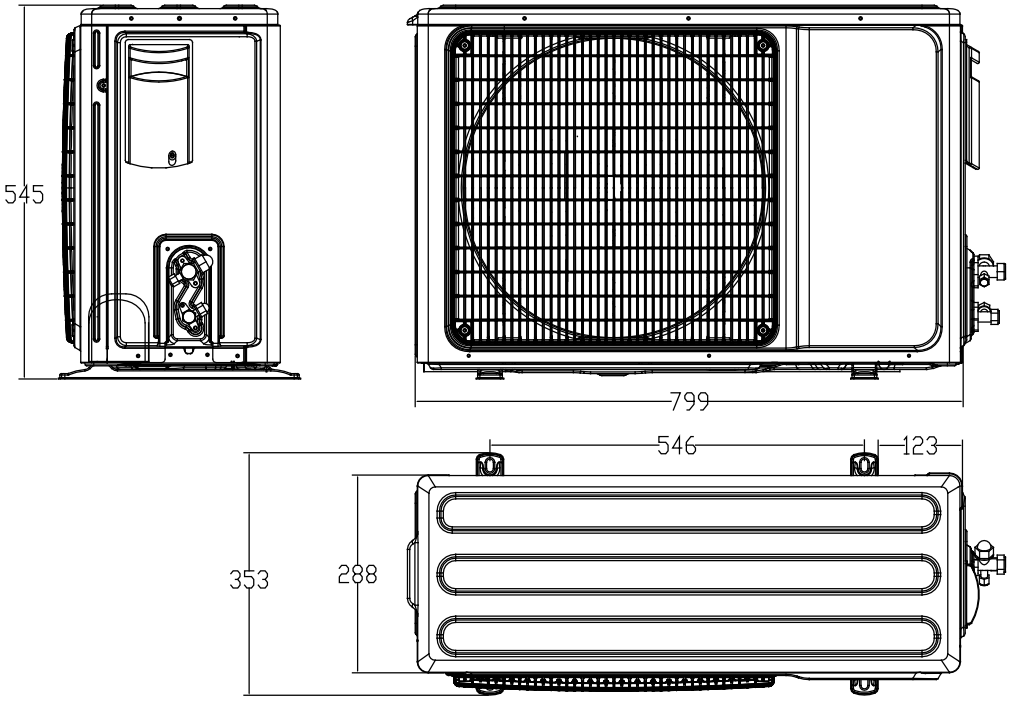
Cooling Capacity(Btu/h)		18000	24000	36000	48000	60000
Connection Pipe (mm)	Liquid Pipe	Φ6.35	Φ9.52		Φ9.52	
	Gas Pipe	Φ12.7	Φ15.88		Φ19.05	
Max. Length		20	25	30	50	
Max. Height (m)		15	15	20	30	
Max. Bend Qty		5	8	8	10	
Extra R410a per meter when the pipe length is more than 5 meter (kg)		0.05	0.05	0.05	0.07	

Caution:

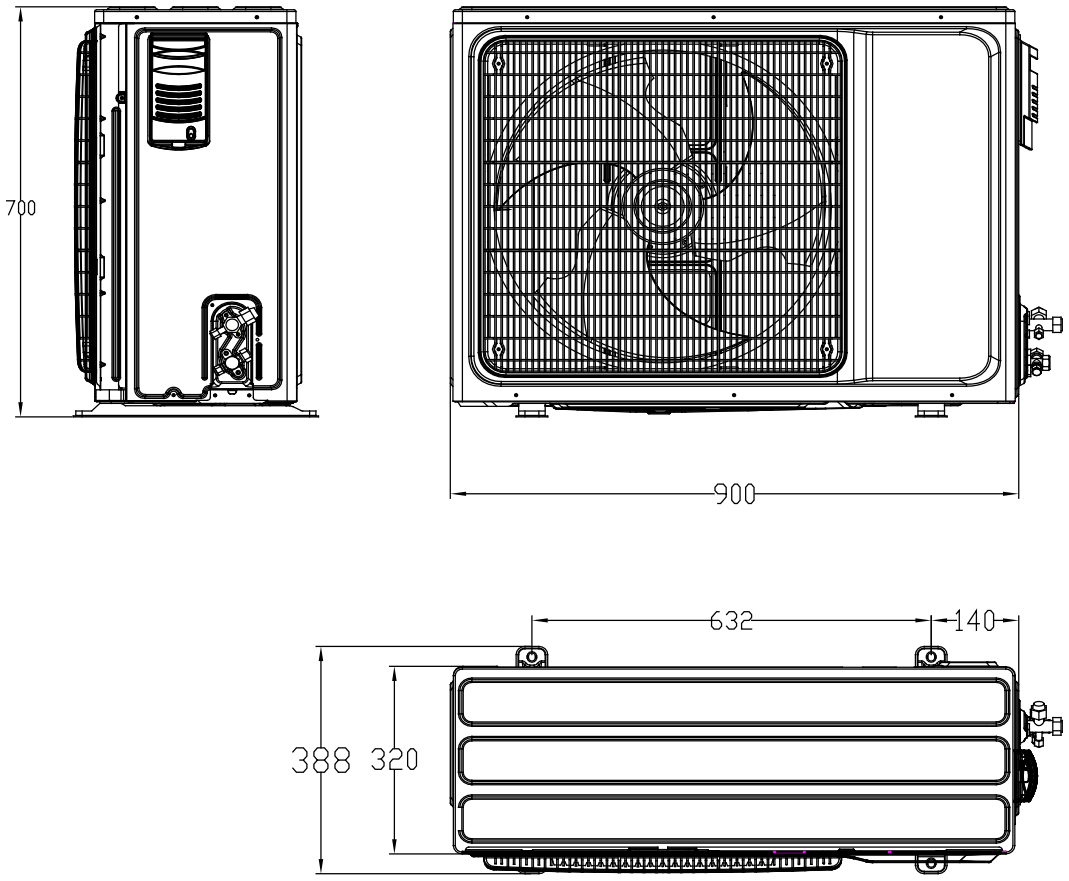
1. The standard Pipe length is 5m, if the pipe length is less than this then no additional charging is necessary. If the pipe length is more than this then you should charge more refrigerant into the system according to the above Charging Data
2. The thickness of the pipe is 0.6-1.0, bearing pressure is 4.2MPa;
3. If the connection pipe is too long, the cooling capacity and stability would be decreased. And the more bend quantity, the resistance in the piping system would be bigger, then the cooling and heating capacity would be decreased even lead to compressor broken. We suggest you to use the shortest connection pipe according to the pipe length parameter in this manual.If the height difference between outdoor and indoor unit is more than 5m, an oil trap should be installed in the gas pipe for every 10 meters.

4. Dimension

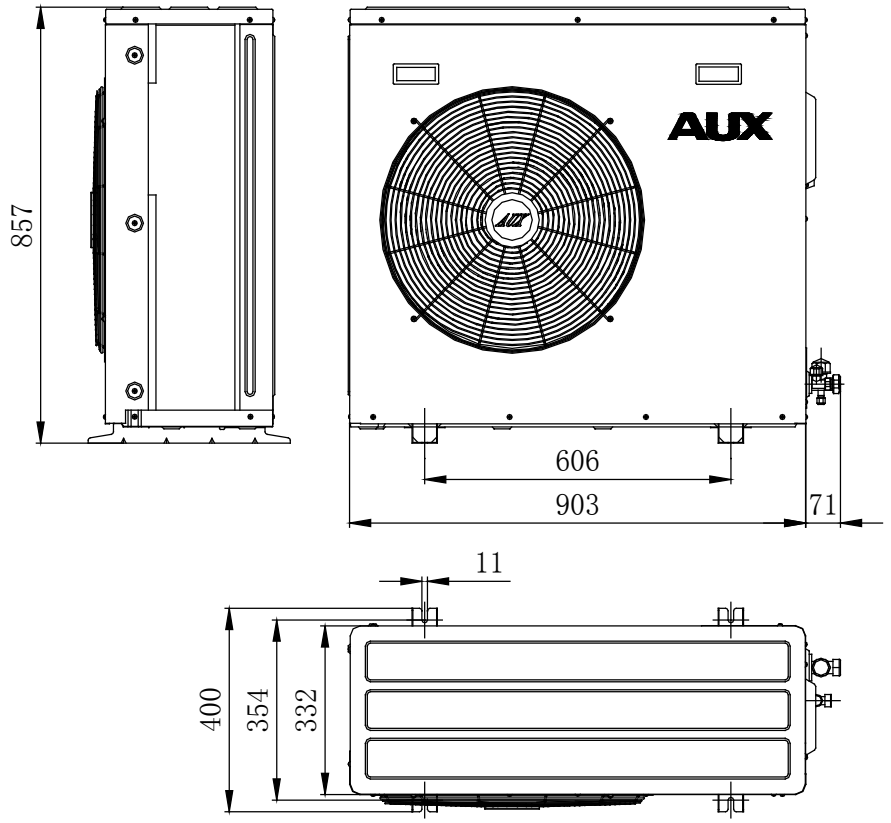
AL–H18/4DR1A(U)



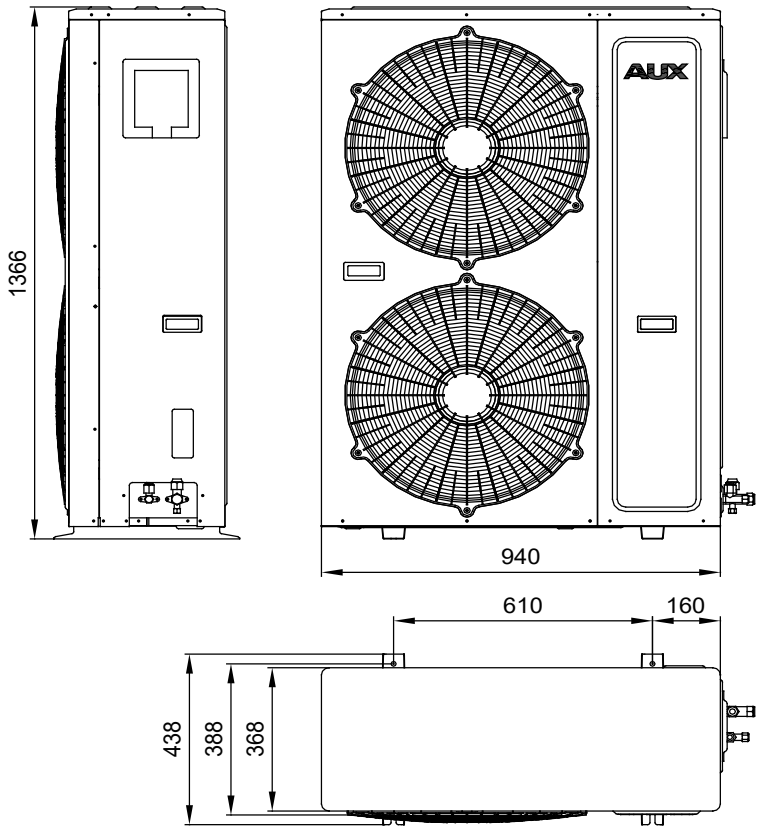
AL–H24/4DR1A(U)



AL–H36/4DR1A(U)

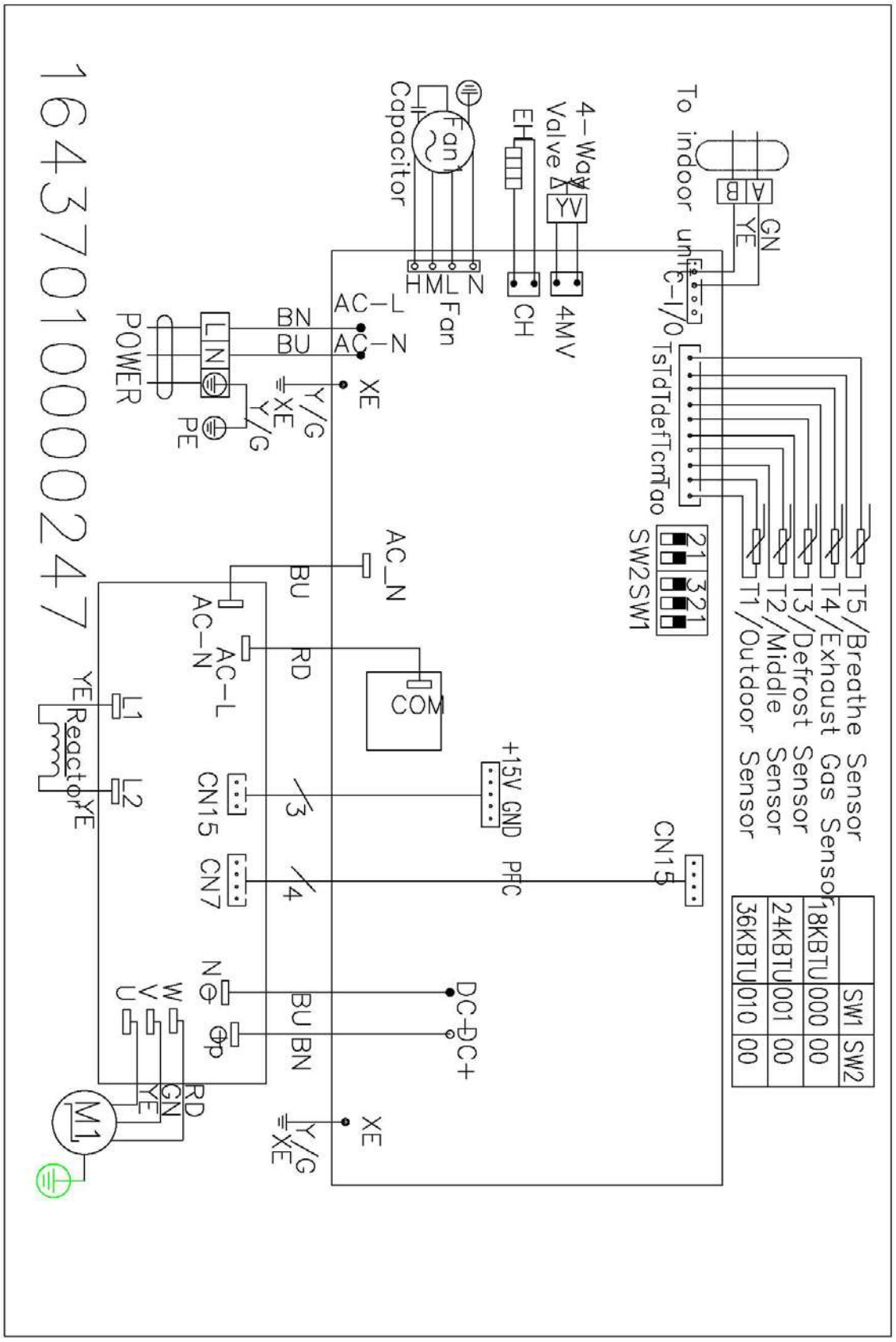


AL–H48/5DR1A(U), AL–H60/5DR1A(U)

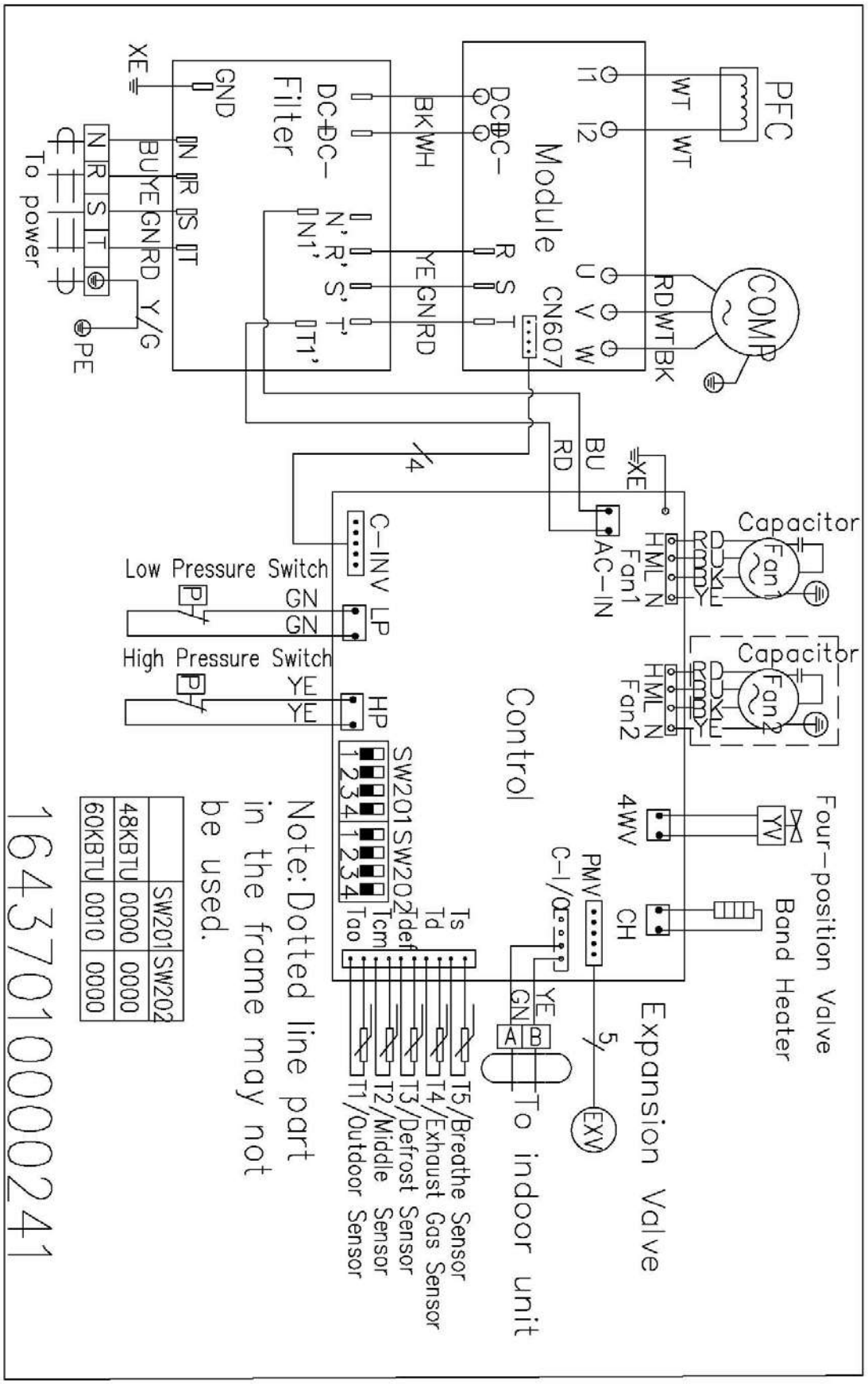


5. Electrical wiring and connection

AL–H18/4DR1A(U), AL–H24/4DR1A(U), AL–H36/4DR1A(U)

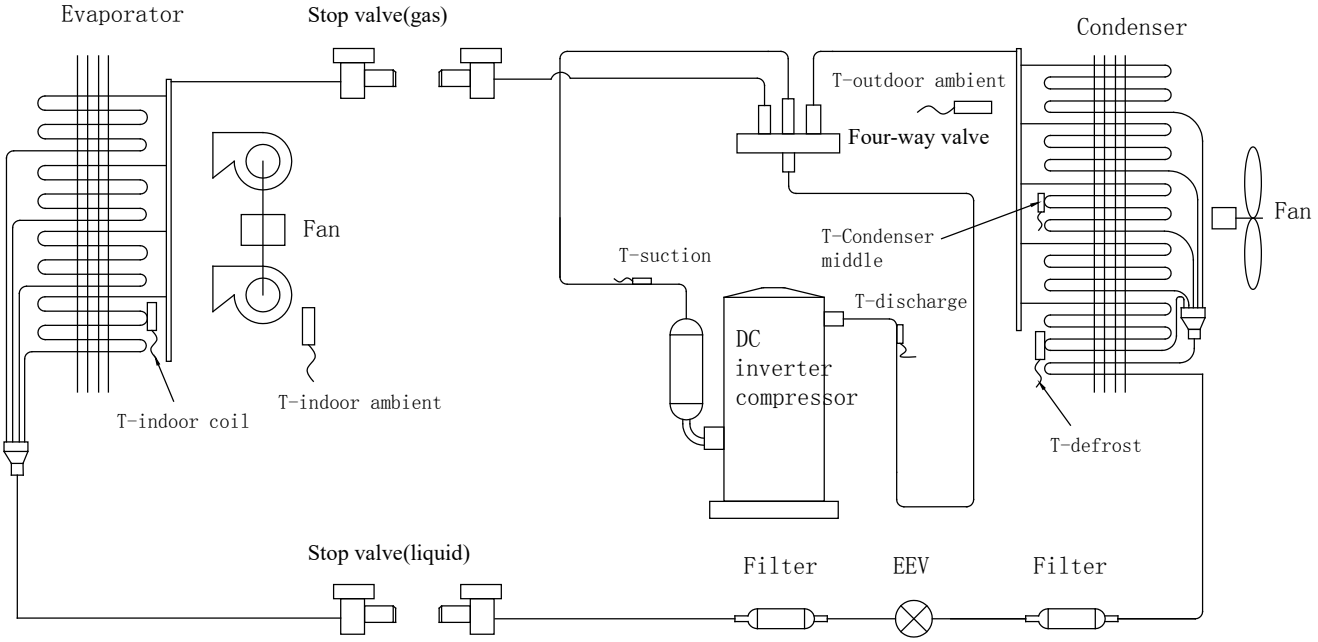


AL–H48/5DR1A(U),AL–H60/5DR1A(U)

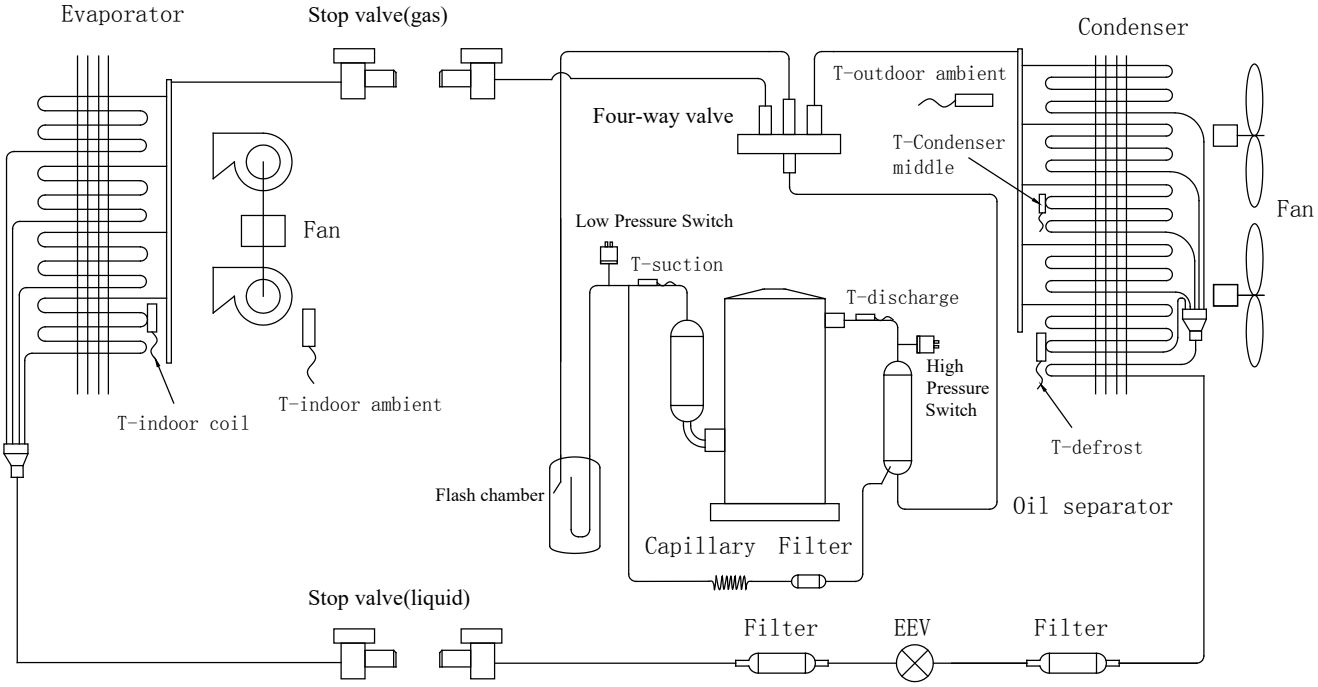


6. System Diagram

AL-H18/4DR1A(U) , AL-H24/4DR1A(U), AL-H36/4DR1A(U)

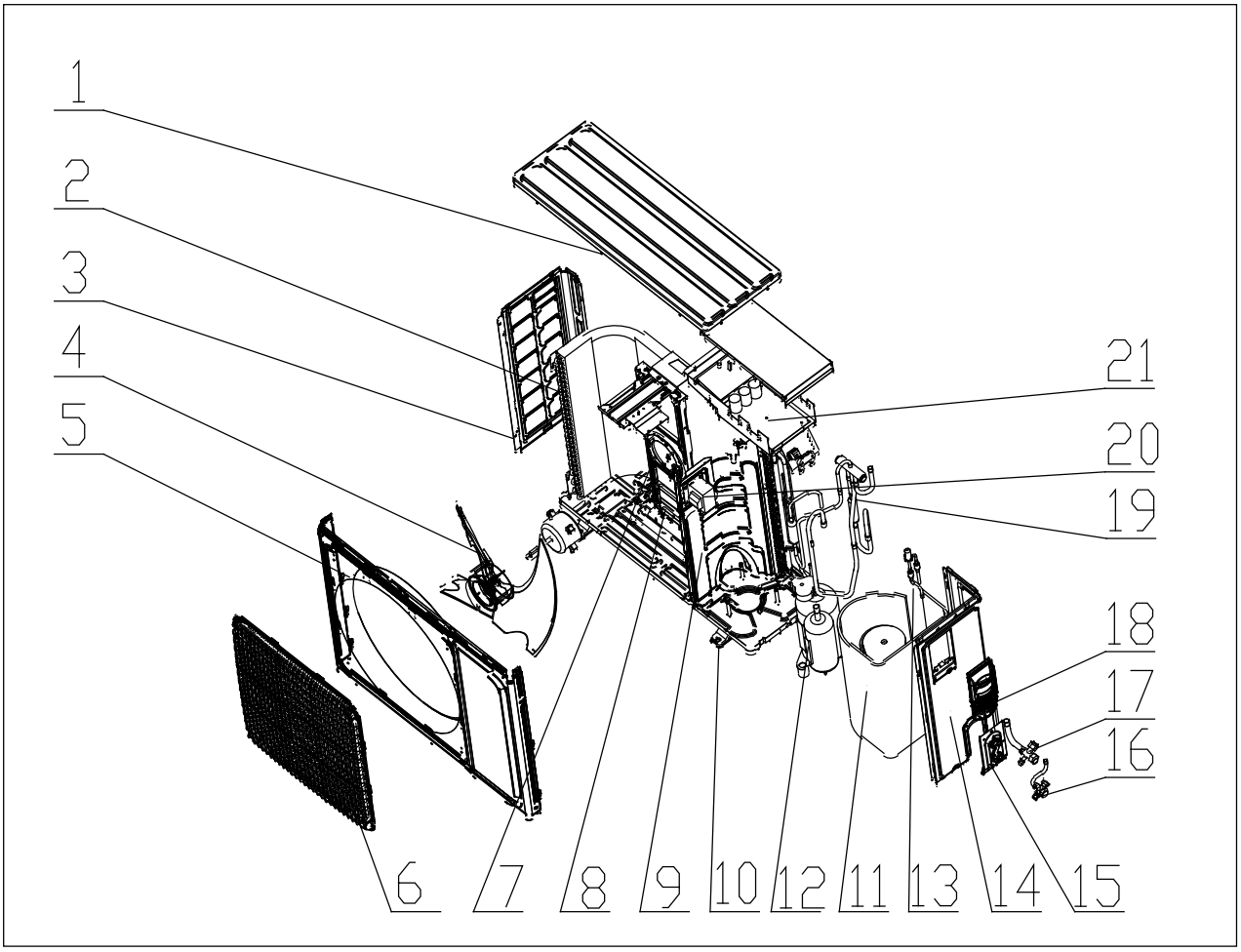


AL-H48/5DR1A(U) , AL-H60/5DR1A(U)



7. Explore View

AL-H18/4DR1A(U), AL-H24/4DR1A(U)



AL-H18/4DR1A(U)

N0.	Chinese Name	Part Name	Quantity	Remark
1	□盖板	Top cover board	1	
2	冷凝器□成	condenser assembly	1	
3	左□板	Left-hand board	1	
4	□流□叶	Axial-flow wind leaves	1	420*148.8
5	面板	Big panel	1	
6	面板网罩	Net for big panel	1	
7	室外□扇□机	Outdoor Motor	1	□机 CW65A
8	□机架□件	Motor bracket assembly	1	
9	隔□立板	Wind-defending vertical board	1	
10	底□□件	Chassis assembly	1	
11	□□机消音棉	Compressor mute cotton	1	
11.1	□□机机□消音棉	Compressor around mute cotton	1	
11.2	□□机机外□消音棉	Compressor outside mute cotton	1	
11.3	□□机□消音棉	Compressor top mute	1	

		cotton		
12	□□机	Compressor	1	ATD141RDPA8JTA
13	□子膨□□□件	Electronic expansion valves assembly	1	
13.1	□ □ 器 φ6×φ6.35-70	Filter	2	
13.2	□子膨□□套件 1.65C-60	Electronic expansion valve	1	1.65C-60
14	右□板	Right-hand board	1	
15	□板	Stop valve board	1	
16	截止□□件 1/2in	Stop valve 1/2in	1	
17	截止□□件 1/4in	Stop valve 1/4in	1	
18	□器盖板	Cover for electric components	1	
19	四通□管路□件	Four-way valve assembly	1	
19.1	四通□	Four-way valve	1	DHF7/240V/470/R410a
20	□抗器	Reactor	1	DK20-5d2-50
21	控制器□成	Electric control assembly	1	
21.1	端子板	Terminal board	1	3 位 (600V 4mm2)
21.2	端子板 2 位	Terminal board	1	(600V 2.5mm2)
21.3	□机□容	Capacitor for fan motor	1	4μF
21.4	控制板	Main Control board	1	DCZ-SW1T1(24-36)K-SYE1(SY)
21.5	室外□□散□器□件	Heatsink for modular driver	1	
21.6	温度□感器	Temperature sensor	1	XH10 白 0.9m(组件)

AL-H24/4DR1A(U)

N0.	Chinese Name	Part Name	Quantity	Remark
1	顶盖板	Top cover board	1	
2	冷凝器总成	condenser assembly	1	
2.1	冷凝器组件	condenser part	1	
3	左侧板	Left-hand board	1	
4	轴流风叶	Axial-flow wind leaves	1	440*150.6
5	面板	Big panel	1	
6	面板网罩	Net for big panel	1	
7	室外风扇电机	Outdoor Motor	1	CW70A
8	电机架组件	Motor bracket assembly	1	
9	隔风立板	Wind-defending vertical board	1	
10	底盘组件	Chassis assembly	1	
11	压缩机消音绵	Compressor mute cotton	1	

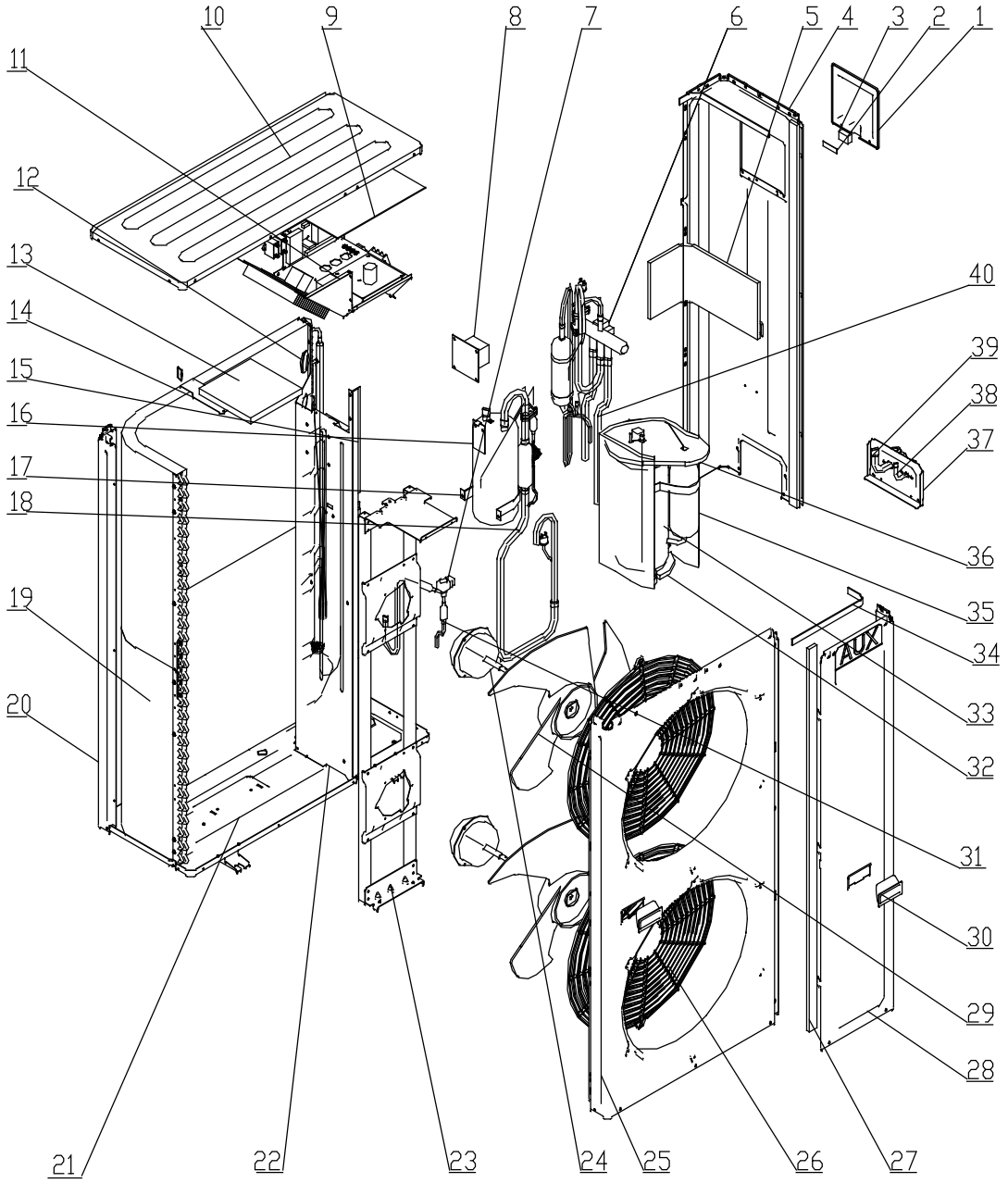
11.1	R72W/BPS-4 压缩机机外围消音绵 A	Compressor outside mute cotton	1	
11.2	DA250 压缩机顶盖消音棉	Compressor top mute cotton	1	
11.3	DA250 压缩机机围消音棉	Compressor around mute cotton	1	
12	压缩机	Compressor	1	ATL232UDPC9AQ
13	电子膨胀阀组件	Electronic expansion valve	1	
13.1	过滤器	Filter	2	φ6.35×φ9.52-70(R410a)
13.2	电子膨胀阀阀体	EXV body	1	DPF(Q)2.0(R410a)
13.3	电子膨胀阀线圈	EXV coil	1	QA(Q)2.0 L=1000
14	右侧板	Right-hand board	1	
15	阀板	Stop valve board	1	
16	截止阀组件 3/8in	Stop valve 3/8in	1	
17	截止阀组件 5/8in	Stop valve 5/8in	1	
18	电器盖板	Cover for electric components	1	
19	四通阀管路组件	Four-way valve assembly	1	
19.1	四通阀	Four-way valve loop	1	DHF7/240V/470/R410a (12.3)
20	电抗器	Reactor	1	DK25-5-50A
21	控制器总成	Electric assembly	1	
21.1	端子板	Terminal board	1	3 位 (600V 4mm2)
21.2	端子板 2 位	Terminal board	1	(600V 2.5mm2)
21.3	风机电容	Capacitor for fan motor	1	4μF
21.4	控制板	Main Control board	1	DCZ-SW1T1(24-36)K-SYE1(SY)
21.5	室外驱动散热器组件	Heatsink for modular driver	1	
21.6	温度传感器	Temperature sensor	1	XH10 白 0.9m(组件)

AL-H36/4DR1A(U)

N0.	Chinese Name	Part Name	Quantity	Remark
1	□盖板	Top cover board	1	
2	冷凝器□成	condenser assembly	1	
2.1	冷凝器□件	condenser part	1	
3	左□板	Left-hand board	1	
4	□流□叶	Axial-flow wind leaves	1	482*152.1
5	面板	Big panel	1	
6	面板网罩	Net for big panel	1	
7	室外□扇□机	Outdoor Motor	1	YDK120-6
8	□机架□件	Motor bracketassembly	1	

9	隔□立板	Wind-defending vertical board	1	
10	底□□件	Chassis assembly	1	
11	□□机消音□	Compressor mute cotton	1	
11.1	R72W/BPS-4 □□机机外□消音□ A	Compressor outsidemute cotton	1	
11.2	DA250 □□机□盖消音棉	Compressor top mute cotton	1	
11.3	DA250 □□机机□消音棉	Compressor around mute cotton	1	
12	□□机	Compressor	1	DA250S2C-30MT
13	□子膨□□□件	Electronic expansion valve	1	
13.1	□□器	Filter	2	ϕ 6.35×φ9.52-70(R410a)
13.2	□子膨□□□体	EXV body	1	DPF(Q)2.0(R410a)
13.3	□子膨□□□圈	EXV coil	1	QA(Q)2.0 L=1000
14	右□板	Right-hand board	1	
15	□板	Stop valve board	1	
16	截止□□件 3/8in	Stop valve 3/8in	1	
17	截止□□件 5/8in	Stop valve 5/8in	1	
18	□器盖板	Cover for electric components	1	
19	四通□管路□件	Four-way valve assembly	1	
19.1	四通□	Four-way valve loop	1	DHF-11(R410A)
20	□抗器	Reactor	1	DK25-5-50A
21	控制器□成	Electric assembly	1	
21.1	端子板	Terminal board	1	3 位 (600V 4mm2)
21.2	端子板 2 位	Terminal board	1	(600V 2.5mm2)
21.3	□机□容	Capacitor for fan motor	1	5 μ F
21.4	控制板	Main Control board	1	DCZ-SW1T1(24-36)K-SYE1(SY)
21.5	室外□□散□器□件	Heatsink for modular driver	1	
21.6	温度□感器	Temperature sensor	1	XH10 白 0.9m(□件)

AL-H48/5DR1A(U), AL-H60/5DR1A(U)



N0.	Chinese Name	Part Name	Quantity	Remark
1	□器盖板	Cover for electric components	1	
2	□□□片	Insulation Gasket	1	
3	□器盖板防水海□	cotton	2	
4	右□板	Right-hand board	1	
5	聚氨□消音□板 1	silencing cotton	1	
6	四通□向□□圈	Four-way valve loop	1	
7	□子膨□□□圈	EXV coil	1	QA(Q)3.0 L=1496
8	□抗器	Reactor	1	DK-5mH-30A

9	保温□板 1	insulation cotton	1	
10	□盖板	Top cover board	1	
11	控制器□成	Electric assembly	1	
11.1	温度□感器	Temperature sensor	1	XH101.3m(□件)
11.2	通□□ 2 芯 0.22m	Communication wire	1	(XH4Y-J)
11.3	油温加□□	Oil heating tape	1	220V/33W
11.4	R □机□容	Capacitor for fan motor	2	3.0 μF/450VAC/70/2000h/P2
11.5	模□板	Driver Modular	1	DC-SW1C3S-XESE1(6MK-380)
11.6	□波板	Filter board	1	DC-SW1C3S-XESE1(16LB-380)
11.7	CJ 控制板	Main control board	1	DCZ-SW1T1(48-60)K-SYE1
12	□□胶圈	Rubber ring for lines	1	
13	保温□板 2	insulation cotton	1	
14	冷凝器固定板(双排)	Condenser Regular	1	
15	聚氨□消音□板 2	silencing cotton	1	
16	气液分离器	Flash chamber	1	QFQ-3.3L(A-07)
17	气分抱攀	Flash chamber cover	1	
18	回气管部件	Return air pipe assembly	1	
19	冷凝器□成	Condenser assembly	1	
20	立柱	Column	1	
21	底□□成	Chassis assembly	1	
22	隔□立板	Wind-defending vertical board	1	
23	□机架□件	Motor bracket assembly	1	
24	室外□机	Outdoor Motor	2	(三速) WC55-6
25	大面板	Big panel	1	
26	塑料网罩	Net for big panel	1	
27	聚氨□消音□板 4	silencing cotton	2	
28	小面板	Small panel	1	
29	□流□叶	Axial-flow wind leaves	2	ϕ525×135
30	挖手	Hand digging	3	
31	膨□□管□件	Electronic expansion valves assembly	1	
31.1	□子膨□□□体	Electronic expansion valve	1	DPF(Q)3.0(R410a)
31.2	□□器	Filter	2	ϕ 8 × ϕ 9.52-66(R410a)
31.3	□子膨□□□圈	EXV coil	1	QA(Q)3.0 L=1496
32	消音棉□□机底部	Compressor mute cotton	1	
33	□□机	Compressor	1	ATQ420D1UMU
34	PE 保温□板	PE insulation cotton	2	
35	消音棉□□机机□	Compressor mute cotton	1	
36	消音棉□□机□盖	Compressor mute cotton	1	
37	□板	Stop valve assembly	1	
38	截止□ 3/8in	Stop valve 3/8in	1	
39	截止□ 3/4in	Stop valve 3/4in	1	
40	四通□管路□件	Four-way valve assembly	1	

8. Installation

8.1 Preparation and equipments before installation

Please buy following spare parts from your local market before installation	Besides general implements, other implements are needed when connecting the pipe
Hung bolts M12, 4 pcs	Acetylene cylinders, oxygen cylinders (when longer pipe used it should be welded)
Drainage pipe PVC	One set pipe cut machine. (cut copper pipe)
Copper connecting pipe	Refrigerant cans, electronic balance (when longer pipe used additional gas should be charged)
Adhesive belt (big size) 5 pcs, (small size) 5 pcs	Pressure gauges, pipe clamp, welding torch, 2B silver electrode
Heat insulation material used to connect copper pipe (PE foam material, its thickness is more than 8mm)	Wrench 2 pcs, one of them is with adjustable torque wrench (42N.m,65N.m,100N.mm)
Power cable, electrical wire between indoor and outdoor unit(Must be in accordance with the wire diameter in the wiring diagram)	Nitrogen cylinder (in order to prevent oxidation when welding, using Nitrogen to replace the air)

Select installation position of outdoor unit

◇The site shall be strong enough to bear its weight, prevent noise and vibration.

◇The site shall be ensured to avoid direct sunshine, if necessary set a Havelock above the outdoor unit.

◇The site shall be easy to drainage the rain water and the frost water.

◇The site shall be ensured that the outdoor unit will not be covered by snow LDring the winter season.

◇The site shall be ensured that the outlet is not facing the strong wind.

◇The site shall be ensured that outlet air and operation noise will not affect the neighbors' daily life.

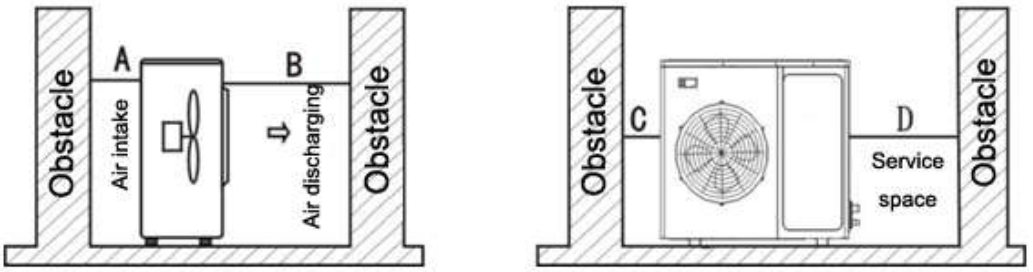
◇The site shall be ensured that the outdoor unit will not be affected by the garbage and oil mist.

Warning :

If outdoor unit working under such environment which contains oil (including machine oil) salt(marine areas), sulfide gas (hot springs and oil refinery areas), those substance may lead to the failure work of the outdoor unit.

Maintenance and ventilation space

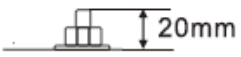
◇The site shall be easy for ventilation then the outdoor unit can inhale and discharge air easily. What's more please reserve enough space for maintenance.



Note: Require A＞300mm; B＞1500mm; C＞300mm; D＞500mm;

Outdoor unit installation

◇Use size M10 bolt and nut to fasten the outdoor unit tightly on the bracket, keep it in the horizontal level. The suitable length for bolt shall 20mm over the base level, in order to minimize vibration please do set a rubber shock absorber.



◇If the outdoor unit is mounted on the wall or on the rooftop, in order to prevent earthquake and strong wind please fasten it as tightly as possible.

◇Set a drainage channel to ensure the condensing water can drain out smoothly.

◇To avoid that only four angles metal sheet to support the outdoor unit.

Transport

When the outdoor unit is to be lifted, please use two slings longer than 8m and insert cushioning material between the slings and outdoor unit to avoid damaging the casing.

8.2 Connection piping installation

Piping installation precaution

Please choose the phosphorus deoxidation seamless copper pipe as the piping.

◇If use the lengthen piping needs welding:

Please welding before fasten the nut, when welding using nitrogen gas to replace the air in the pipe in order to prevent oxidation.

◇If there are many points to be welded when installing the lengthen piping, please set a filter in the pipe(buy from local market)

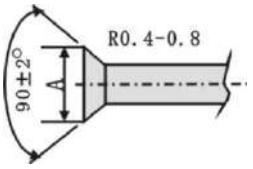
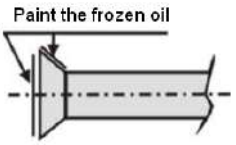
◇Please use nitrogen gas or air to remove the dust and water in the pipe,

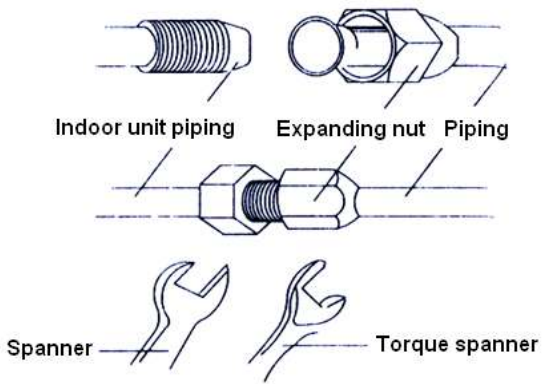
◇Please lay out the piping according to the tend towards of the piping, but it is not allowed more than 3 times curved at the same point of the pipe(if do like this the pipe will become rigid)

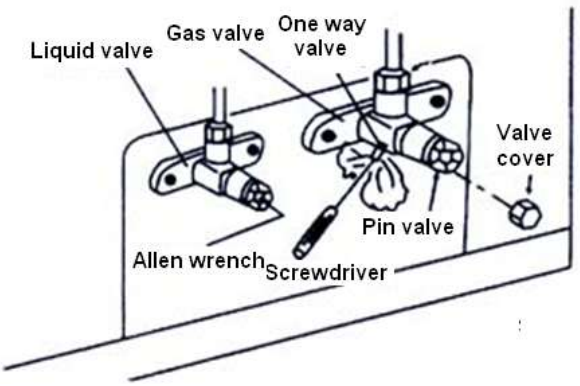
◇Pipe bending machine is used during the process of bending the pipe, the curvature shall not be too small or it will affect the refrigerant flow.

Piping specification selection

As to the detail selection please take reference to the cooling capacity adjust index figure during different installation situations.

Piping diameter	Tighten torque	Expanding size (A)	Expanding shape	Paint the frozen oil
1/4in(φ6.35mm)	15-19(N·m)	8.3-8.7mm		
3/8in(φ9.52mm)	35-40(N·m)	12.0-12.4mm		
1/2in(φ12.7mm)	50-60(N·m)	15.4-15.8mm		
5/8in(φ15.88mm)	62-76(N·m)	18.6-19.0mm		
3/4in(φ19.05mm)	70-75(N·m)	22.9-23.3mm		





Piping connection

◇Using expanding machine to expand accessories, the size of horn shown in the above figure:

◇Paint a thin layer of frozen oil at both inside and outside part of the expanding.

◇Make the expanding right to the screw thread shape connection of the indoor unit, using hands to tighten the nut then using a wrench to tighten the nut again, the tighten torque as follows figure.

◇Take out the cover of the indoor unit gas valve and liquid valve, make the expanding right to the stop valve of outdoor unit, using hands to tighten the nut then using a wrench to tighten the nut again, the tighten torque as follows figure.

Equivalent pipe length conversion

Equivalent pipe length meansconverting pipe elbow to straight pipe length after considerate the pressure loss.

Elbow and Oil loop conversion tablet

Type Pipe Dia.(mm)	Bend	Oil Loop
6.35	0.10	0.7
9.52	0.18	1.3
12.70	0.20	1.5
15.88	0.25	2.0
19.05	0.35	2.4
22.02	0.40	3.0

Equivalent pipe length L＝ActualPipe length L+ Bend Qty× Equivalent pipe bend length+ Oil Loop Qty × Equivalent Oil Loop length

Sample:

ALCA-H42A5/C5 Actual Pipe length is 25 meters, Gas pipe diameter is 19.05mm. If there's 5 bends and 2 oil loops during the installation, then the equivalent pipe length should be:

L=25+0.35×5+2.4×2=31.5(m)

◇Specification of connection pipe for indoor unit and outdoor unit

Cooling Capacity(Btu/h)		18000	24000	36000	48000	60000
Connection Pipe (mm)	Liquid Pipe	Φ6.35	Φ9.52		Φ9.52	
	Gas Pipe	Φ12.7	Φ15.88		Φ19.05	
Max. Length(m)	Liquid Pipe Dia.	Φ6.35	Φ9.52		Φ9.52	
	Gas Pipe Dia.	Φ12.7	Φ15.88		Φ19.05	
	Max. Length	20	30		50	
Max. Height (m)		15	20		30	
Max. Bend Qty		5	8		10	

Emptying or vacuum

Before charging the refrigerant to the system, to ensure that there is no impurities, water or non-condensable gas. So, emptying and vacuum operation should be carried out.

◇Vacuum: when process this operation please be sure that the connection pipe is tightened up.

1. Screw off the cover of maintenance valve connection, connect the pressure gauge to the connection of maintenance valve
2. Connect the vacuum pump to the pressure gauge, turn on the vacuum pump and pressure gauge to process the vacuum operation toward the indoor unit and piping, while to ensure that the absolute pressure is no less than 50Pa after this operation.
3. Turn off the pressure gauge and vacuum pump to keep the pressure in the same level in 20 minutes.

◇Emptying: when process this operation, please disconnect the high pressure valve with liquid valve.

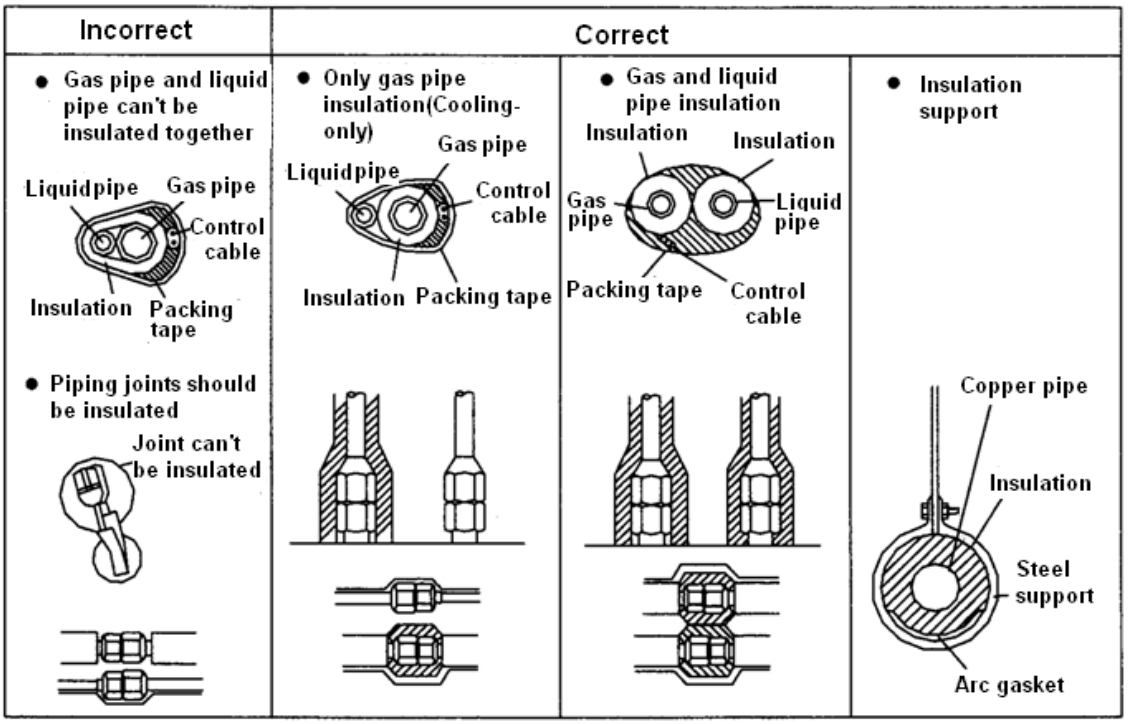
1. Connect the gas valve of the stop valve to the thimble side of the rubber hoses, the other side of rubber hoses should be connected to the refrigerant tank.
2. Open the refrigerant tank valve, using the refrigerant inside the tank with high speed to empty the air in the indoor unit and the connection piping. When the outlet air becomes mist (it feels cold by touching it), then the air is emptied.
3. When ensure that the air is emptied, connect and tighten the high pressure valve of outdoor unit stop valve and liquid side connection pipe, keep this state more than 10 seconds.
4. Use soapy what to test each connection junctions (including lengthen piping welding junction)
5. Confirmed that there is no leakage, turn off the valve of refrigerant tank, take down the rubber hose as well.

◇Turn on the high-low pressure valve of the outdoor unit.

After vacuum and emptying, screw back the cover of the maintenance valve of outdoor unit low pressure valve, screw off the high-low pressure valve of the outdoor unit (note: shall totally turned off). Connect the refrigerant to the system.

Heat insulation package of piping

◇ Use heat insulation material with good insulation performanCF to wrap the pipe.



Notes

Drainage pipe and connection piping should be wrapped by heat insulation material respectively or there will be dew or leakage

During the high temperature working environment, our air conditioner is proved my dew conditioner experiment. But if it keeps on working during the high humidity (the dew temperature is more than23℃) environment which may lead to water leakage, in such condition please use following additional insulation material:

◇Glass fiber insulation material with the thickness between 10~20mm can be used.

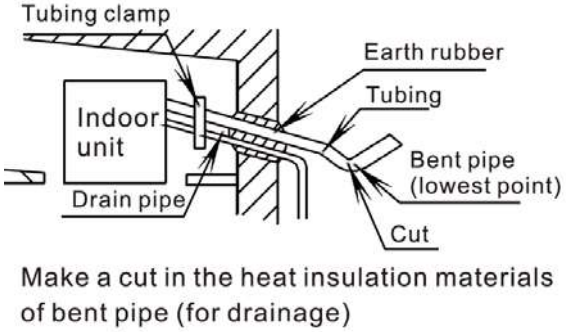
◇The part of indoor unit which get in touch with the back side of ceiling should pasted with insulation material.

◇Besides the previously more than 8mm thick insulation material, connection piping (both gas pipe and liquid pipe), drainage pipe should be wrapped by additional 10~30 mm thick insulation material.

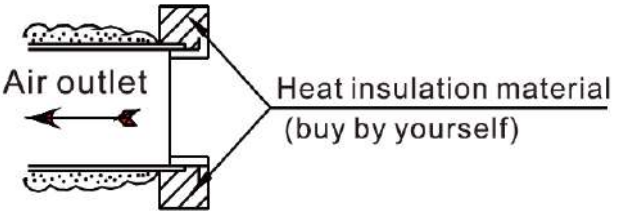
To seal the hole on the wall.

◇To prevent rainwater or other foreign bodies from entering the room and air-conditioner after installing the tubing and drain pipe, the gap between wall hole and tubing, drain pipe and electric wire should be sealed with mastic, sealant rubber or putty, or poor performance or leakage will result

◇If the outdoor unit is higher than indoor unit, tubing should be bent to ensure that the lowest point of the tubing is lower than the wall hole to prevent rainwater entering the room or air-conditioner along the piping system.



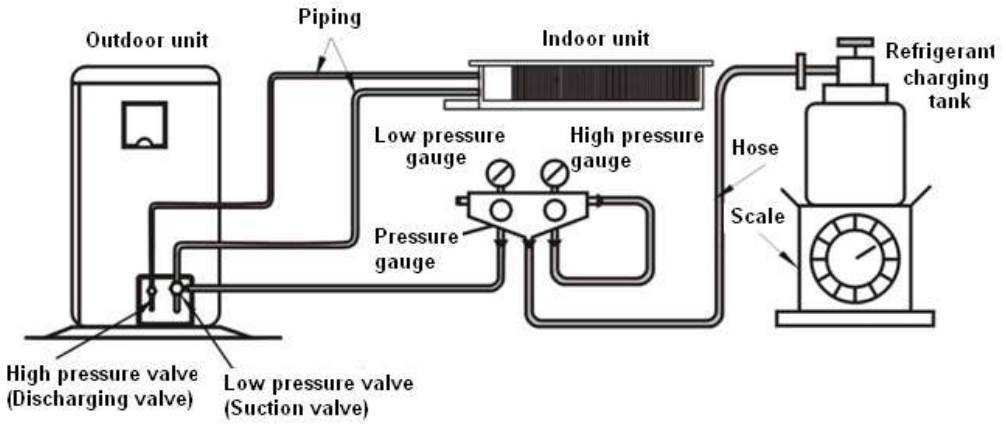
Make a cut in the heat insulation materials of bent pipe (for drainage)



Additional refrigerant charge

When pipe length exceeds 5m, please add refrigerant according to the table below:

Connection piping	Piping size)		Additional refrigerant charge amount (kg/m)
	Gas pipe	Liquid pipe	
Piping between indoor and outdoor unit	φ9.52×0.75mm	φ6.35×0.75mm	0.02
	φ12.7×1mm	φ6.35×0.75mm	0.02
	φ15.88×1mm	φ9.52×0.75mm	0.05
	φ19.05×1mm	φ9.52×0.75mm	0.07
	φ19.05×1mm	φ12.7×1mm	0.09



Oil grade and standard oil-filled volume of Compressor

Outdoor unit model	Brand	Compressor model	Oil type	Oil volume(cm^3)
AL-H18/4DR1A(U)	Shanghai Hitachi	ATD141RDPA8JT	68HES-H	480
AL-H24/4DR1A(U)	Shanghai Hitachi	ATL232UDPC9AU	68HES-H	630
AL-H36/4DR1A(U)	GMCC	DA250S2C-30MT	VG74	820
AL-H48/5DR1A(U)	GMCC	ATQ420D2UMU	VG74	1400
AL-H60/5DR1A(U)	GMCC	ATQ420D2UMU	VG74	1400

Others

Users to install the air conditioner at site shall ensure that the oil can return to the unit smoothly.

◇Horizontal pipes should incline toward the outdoor unit using a 20:1 slop.e

◇If there is a height difference between the indoor and outdoor unit, oil loops should be installed in the inter connecting gas (large) pipe;

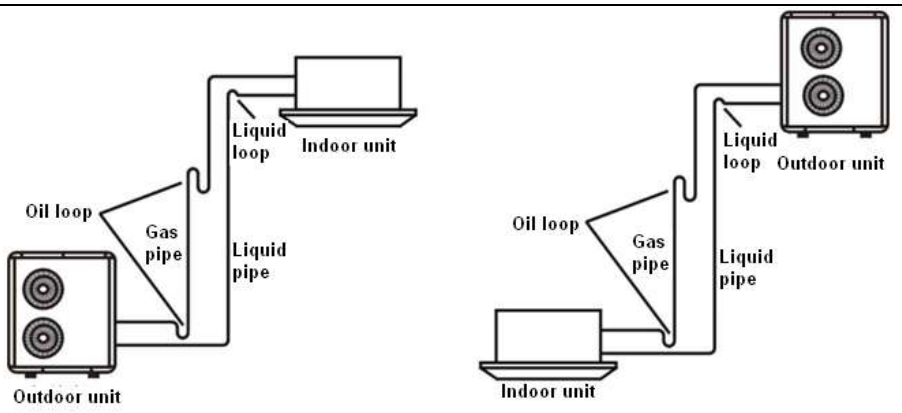
When the vertical pipe height difference is less than 5 meters, an oil loop should be installed at thebottom of the gas (large) pipe;

When the vertical pipe height difference is more than 5 meters, then for every 5 meters an oil loop mustbe installed at the bottom of the gas (large) pipe, and a short loop (liquid ring) should be installed at theexit of the indoor unit liquid (small) pipe;

When the connecting gas pipe vertical height difference is less than 5 meters but the constant risedistance is too long, an oil loop should be installed in the gas (large) pipe every 10 meters.

◇When the outdoor and indoor units are at the same elevation, the oil deposit bend and liquid ring donot need to be installed, if the horizontal connecting pipe length is less than 10 meters.

When the horizontal connecting pipe length is more than 10 metres, install an oil loop in the gas (large)pipe every 10 metres.



Note:
This chart is for explanation purposes. An actual installation will differ from this according to the site conditions.When making an oil trap the radius of the bend should be between 1.5 and 2 times the pipe diameter.

8.3. Electrical connection

8.3.1Electrical connection precaution

Warning	Installation of electric items must be carried out by qualified, professional technicians. An isolated circuitry should be fixed with whole-pole disconnection devices, which is with at least 3mm gap of touch point. . Power supply and indoor to outdoor connection should use special cable. Providing the necessity of installation or replacement, the professional technician of service store appointed by manufacturer must be required, while self-operation by users is prohibited.
	In case of any electric shock accident, the creepage protection devices /power supply on-off and breaker must be required with power supply.
	The specification of fuse for single phase control board is F5AL 250V, while for 3 phase control board, both indoor and outdoor unit, it is F3.15AL 250V。
	Machine must be earthed surely. If not, it'll be probably caused creepage.
	Equivalent 227IEC53(RVV) type of power cord of GB5023 or the excelled must be required. The cords should be fixed properly against broken, while ends/joints of cords is under outside force. Improper connection or fixation will cause disaster like fire….etc. Equivalent 245IEC57(YZW) type of power cord of GB5023 or the excelled must be used as connection line of indoor and outdoor.
Notice	The earth line is neither allowed to connect to gas pipe, water pipe or circuitry of telephone or lighting rod, nor to the earth line of other devices.
Others	Please fix power supply cord and connection wires of indoor and outdoor, in accordance with circuit diagram Fix the cords into terminal boards properly and safely with cable fixation tools to avoid any danger caused by the power cord under outside forces. After fixation, use bind tape (affixed) to bind wires avoiding any collision with other components like compressor, copper pipes…etc

8.3.2 Electrical connection

Wiring diagram of indoor & outdoor, refer to the section of part 1

Recommendation of power supply cord

Power supply:220V~,50Hz

Capacity (BTU)	Model	Power supply	Indoor power cable	Outdoor power	Signal wire
18000	**ALCA-H18/4DR1A ALCF-H18/4DR1A ALMD-H18/4DR1A**	Outdoor unit 220-240V~50Hz IndoorUnit 220-240V~50Hz separate	3×1mm2	3×2.5mm2	2×0.5mm2
24000	**ALCA-H24/4DR1A ALCF-H24/4DR1A ALMD-H24/4DR1A**		3×1mm2	3×2.5mm2	2×0.5mm2
36000	**ALCA-H36/4DR1A ALCF-H36/4DR1A ALMD-H36/4DR1A**		3×1mm2	3×4mm2	2×0.5mm2

Power supply 380V~415V 3N,50Hz

Capacity (BTU)	Model	Power supply	Indoor power cable	Outdoor power	Signal wire
48000	**ALCA-H48/5DR1A ALCF-H48/5DR1A ALMD-H48/5DR1A**	Outdoor unit 380-415V 3N~50Hz IndoorUnit 220-240V~50Hz separate	3×1mm2	5×2.5mm2	2×0.5mm2
60000	**ALCA-H60/5DR1A ALCF-H60/5DR1A ALMD-H60/5DR1A**				

Notice:

◇ Above mentioned power supply cord is the cable which connect air on-off of indoor to indoor/outdoor unit. Power supply cord of indoor/outdoor unit is the power supply cable connecting indoor and outdoor unit

◇ The section area of power supply cord core is minimized one. To avoid voltage pressure dropped down, while longer power supply cord needed, the section area should be enlarged for one gauge.

◇ The connection wires to indoor unit is the cable of 27IEC53(RVV) type, 300/500V; while the connection wires to outdoor unit and the connection wires from outdoor to indoor unit is the multi-end of cable (neoprene)of 245IEC57(YZW)type,300/500V. if the single core with double skin type of cable is chosen for installation,, please choose 1# gauge of section area and wrapped with special jacket for electrician.

◇ All of the ceiling/floor type unit is without accessorial electric heating

8.3.3wire connection

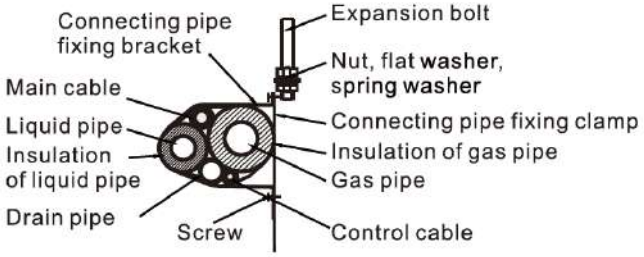
Remove electric control box cover of indoor unit, connect the wires in accordance with the electridiagram mentioned on the back of the cover. The wire ends must be tightly fixed into terminal boards without ease. The earth wire must be fixed into appointed position.

Outdoor wire connection

◇ Remove the electric item cover, which is positioned in the right side of outdoor unit, connect the wires in accordance with the electric diagram on the back of the cover.

◇ Be sure that pressing the wires tightly with the terminal boards while it through the board, the wire ends must be tightly fixed into terminal boards. The earth wire must be fixed into appointed position.

◇ After all the wire connected, bundle connection pipe, connection wires and drainage pipewith strips like mentioned drawing below:



Notice:

◇ Compressor of AL-H36/5DR1(U) , AL-H48/5DR1(U), AL-H60/5DR1(U) are 3 phase power supply with phase sequence protection in its outdoor control board. Please be careful with wire connection.

◇ Be sure do't make the drainage pipe flat while bundled.

8.4. Commissioning

After installation, machine can be started commissioning.

Check installation condition

◇ Check indoor/outdoor unit installation and wire connection in accordance with the requirement of service manual.

◇ Check the power supplying, diameter of wires, air on-off and make it sure that the items can be matched with machines and, earth wire connection safety.

◇ Check air inlet/outlet duct and make it sure that the items is clean, operating smoothly.

Commissioning

★ During winter, the first run of performance should be supplied power 8 hours in advance to warm-up the crankcase.

★ During winter, while after 8 hours power off, the performance test should be 2 and half hours power on later:

◇ Power on, run machine with cooling mode.

◇ After 3 minutes compressor protection, check if there is normal cooling air come from indoor unit and if there is abnormal noise come from indoor/outdoor units

◇ Configure the mode with "fan" and check if there is high air come from indoor unit.

◇ Operate "swing" mode, check if the louver is properly swaying.

◇ Press the other buttons on the remote controller and check if the complete unit is on proper working condition

◇ Operate machine 1 hour with "cooling" mode and check if the drainage system is on proper condition

◇ Switch the mode for "heating" and check if there is warm air come from indoor, if there is abnormal noise come from indoor/outdoor units

◇ After confirmation of normal working condition, press the "on-off" to stop running machine.

◇ Then and there, train the end users with operation, maintaining and special notice.

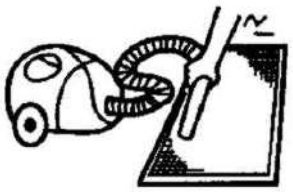
8.5Daily maintenance

Clean inhaler

◇ Before cleaning the filter, ensure the unit is switched off and the power is off;
◇ Forbidden to use water clean the filter , it will hurt PCB or get an electric shock;
◇ When cleaning filter net, be sure you are standing steady, if you use ladder or others, please be careful.

Washing filter net

◇ Use vacuum or water to clean the net;
◇ In order to ensure the best performance from your air conditioner clean the air filter regularly
◇ We recommend cleaning once a month or more frequently if required.
◇ When the filter is very dirty it can be washed in detergent and hot water (below 45℃);
◇ Ensure the filter is fully dry before reinstallation to avoid risk of electric shock or short circuiting;
◇ Do not dry the filter using direct sunlight;



Check at the beginning of each season

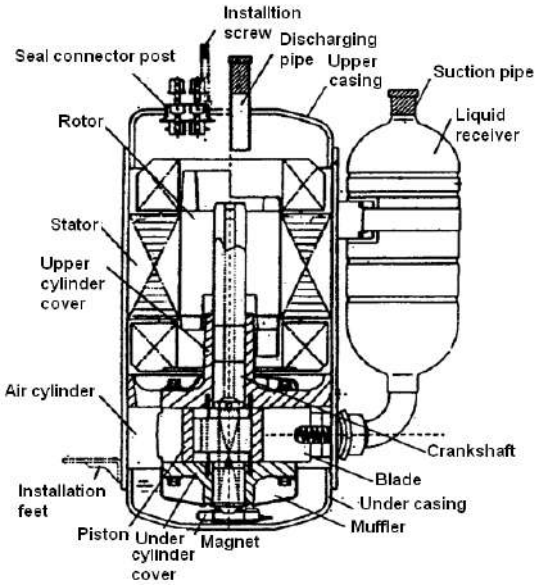
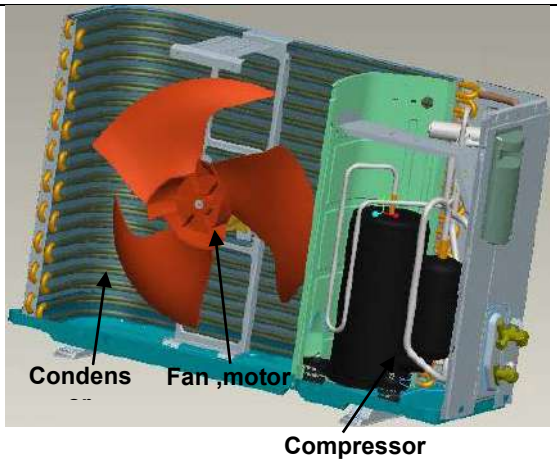
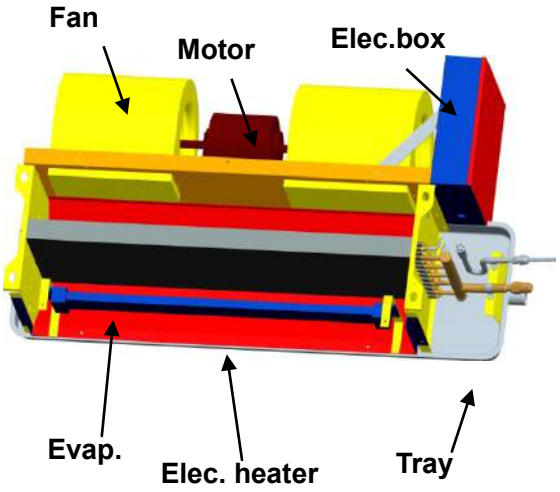
◇ Check whether there are no physical obstructions at the air inlet or outlet of either indoor or outdoor unit;
◇ Check whether there are some garbage at the water outlet;
◇ Check whether electrical cables are in good condition, particularly the earth cable;
◇ When power on, check weather letters display on the screen of the wired controller.
◇ When working in winter,must connect power for 8 hours before switch on unit.

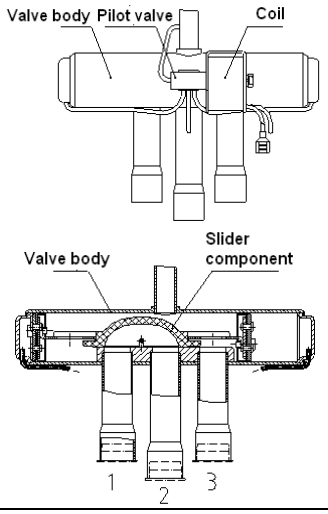
Check at the end of service season

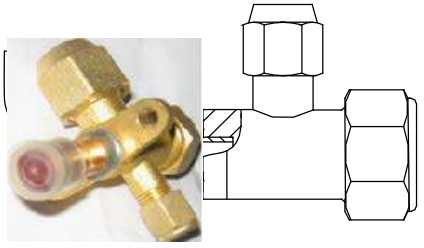
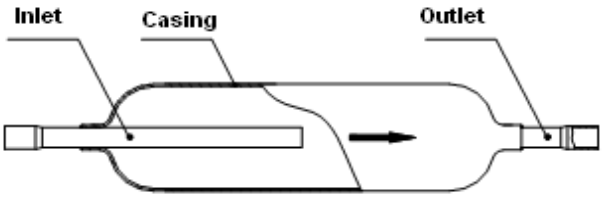
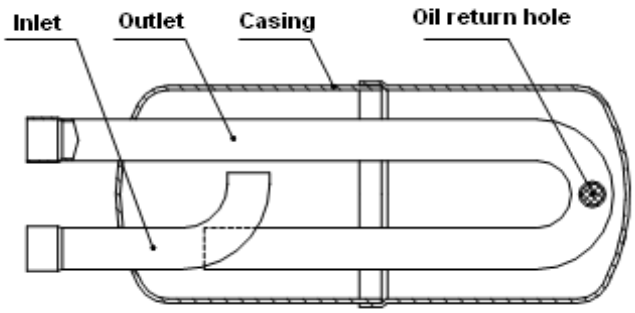
◇ Operate for 2-3 hours under the ventilation condition; remove the moisture of the indoor unit.;
◇ If not use air conditioner in a long time, please close the power to save energy, the letter will disappear on wired controller;
◇ Take the batteries out of remote controller;
◇ Suggest that use dustproof to cover the outdoor unit;

Part 4 Trouble shooting

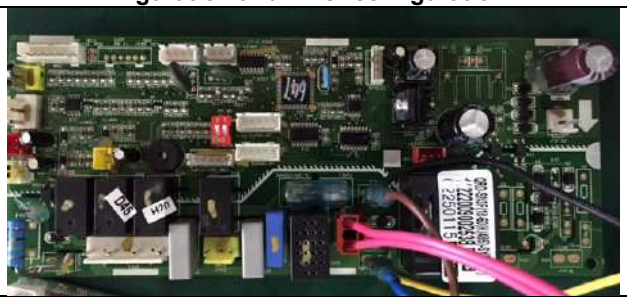
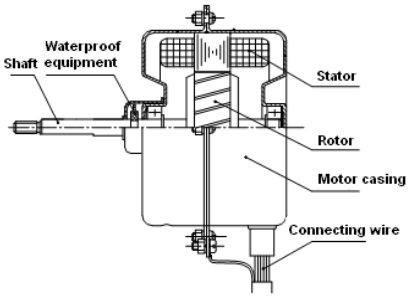
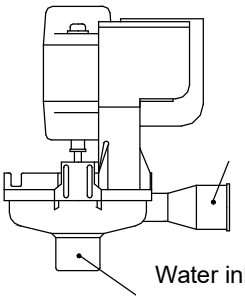
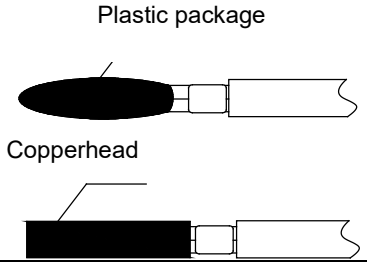
1. Main components of air conditioner

Appellation	Figuration and inner configuration	Instruction
Compressor		The function of compressor: after refrigerant evaporate in evaporator, compress the low temp and low pressure refrigerant gas, make the gas become high temp and high pressure gas, and then send the gas to condenser, make the refrigerant cycle, in this series products, all the compressors are complete hermetic compressor, in which motor and compressor are together.
Condenser (heat exchanger)		The function of condenser: Make the high temp and high pressure refrigerant gas discharged by compressor become liquid [make the gas heat exchange with air], (mark: when heating, condenser become evaporator)
Evaporator (heat exchanger)		Function of evaporator: Make the low pressure refrigerant liquid from capillary or expansion valve happen heat exchange with air

EXV (Electronic expansion valve)		Function of EXV: Utilize aperture and length change bring pressure gap, control refrigerant flow quantity and pressure. EXV is controlled by PCB, more precisely.
Four way valve		Function of 4 way valve: When change cooling mode into heating mode, it will change the flow direction of refrigerant; When heating, the valve get electricity(cooling without electricity), the slip assembly move to the right connect pipe 2 and 3, so change the flow direction.

Stop valve		Function: To stop or release refrigerant, only on/off, can't adjust or throttle
Muffler		Function: Eliminate the system noise
Gas and liquid separator		Function: Separate liquid and gas refrigerant, to protect the compressor

2. Electrical system main components

Appellation	Figuration and inner configuration	Instruction
PCB		Function: Via program to control the relay, make every components on/off according to temperature and pressure variety, so to realize automatic control
Fan motor		Function: Drive the fan, make the indoor and outdoor unit have heat exchange with air.
Pressure switch		Function: To avoid the air conditioner work in a abnormal pressure, making the air conditioner work safety.
Capacitor	 	Induce the single-phase motor produce gyre magnetic field, connect with the accessory winding, and participate in the operation.
Condensate pump		Only for Cassette, the pump head is 1.2 meter,the condensate pipe must have over 1/100 descend angle, after unit cooling or dehumidify stops running, the pump will still work 3 minutes to clean the condensate.
Sensor		Physical properties will change along with the temperature, pressure change,used for check temperature and pressure.

3. Poor efficiency explanation

During the process of using air conditioner, some phenomenon seems to be malfunction but actually not. Thus when cooling effect does not achieve to your expectation, the following factors have to be ruled out

Phenomenon	Causing explanation
High outside temperature and too many indoor individuals, even air conditioner runs at full-load operation, the wind blowing out from air outlet is cold, but it is difficult to lower the indoor temperature, this is not malfunction.	When the outdoor temperature is higher, more heat penetrates into indoor space, which increases the cooling load of AC. If there are too many individuals(for example 10 individuals) and every individual gives off 120W, totally 1200W, this will running out of half of AC cooling capacity, and the unit's cooling capacity this time is far from enough, indoor temperature is hard to lower down. It is normal phenomenon and do not mean useless of AC.
Power voltage is too low, causing AC uneasy to start and shut down after starting, or fuse be burned out etc.	It is not malfunction, need to find out the causing, if the causing is the electricity net voltage is too low, user should load a power manostat to keep voltage between 220V-380V for AC normally running
Select high wind speed but indoor temperature still at high side, air flow from the air outlet is too weak.	It is because air filter is too dirty or blocked making cooling capacity fail to be brought by air flow, causing cooling capacity inadequate. Take out filter and wash, the problem will be solved.
Select high wind speed, the vibration and sound of unit are severe.	Fan runs at high speed, severe vibration and sound of unit is normal phenomenon
Temperature controller adjusts improper and max cooling capacity is not utilized completely, thus indoor temperature can't lower down.	Adjust the temperature controller, and problem will be solved.
As for Heat pump air conditioner heating effect is not ideal during cold winter, this is normal phenomenon.	The lowest temperature is －7℃ when heating, below this temperature unit cannot heat effectively.
Improper installation will lead to indoor temperature uneven or bad cooling effect.	It is necessary to adjust AC installation position

4. Failure phenomenon

Phenomenon	Causing explanation
Mirage comes out from indoor unit	When the cold air from AC cools the indoor air
Noise	1. When air conditioner stops running, there will be some noise, and this is because the refrigerant flows contrarily. 2. AC expand or shrink according to temperature, causing harsh sounds 3. Liquid sound is from refrigerant flowing
Sometimes, the room is smelly	1. The AC itself will not be smelly, if it is smelly, it is because environment smell accumulated 2. Solution: clean the filter
when heating, there is no wind at the beginning of starting unit	1. It is to prevent cold air blowing, please be patient 2. The unit has auto-restart function, when it is repowered again, unit will run according to the mode which is set before the power off. (Note: default is closed)

5. Electric components malfunction inspection

No	Component name	Inspection methods
1	Compressor	Using multi-meter ohm phase, there is correct resistance value among windings (single phase compressor refers to specification, three phase compressor resistance approximately equal), resistance of winding should be infinite.
2	Control board	1. 1Check if any connection part of PCB loosen or drop off, printed tinsel and components have any burn, fade, breaking off or aging phenomenon, all joints exist short circuit phenomenon etc. 2. Test the circuit board system in the term of voltage, pulse on, resistance variation, by using testing meter. 3. Judge the output and input is normal or not according to electric principle diagram
3	Contactor	4. Press the contactor by hand, the contactor reacts immediately and without question 5. The contacting point of contactor has no burn and melt phenomenon 6. The winding has resistance value below 1000, but cannot be nil or infinite
4	4-ways valve winding	The winding has resistance value below 1000, but cannot be nil or infinite
5	Capacitor	7. No expansion phenomenon apparently 8. Measure capacitor by using capacitor phase of multi-meter(if the multi-meter has no capacitor phase, use ohm phase, contact the two terminal of meter to two feet of capacitor, and quickly switch positive pole and negative pole and reconnect, the resistance should display from nil to infinite quickly. The resistance can't change is always nil or infinite).
6	Sensor	9. Using multi-meter to measure resistance, find out temperature according to resistance table, the temperature should accord with sensor temperature. 10. Resistance cannot be nil or infinite
7	Motor	11. No burning trace apparently 12. Using multi-meter ohm phase, there is correct resistance value among windings (single phase compressor refers to specification, three phase compressor resistance approximately equal), resistance of winding should be infinite.

6. Failure code display

When AC has failure,outdoor control board、indoor digital tube and wire controller will display error codes.

Indoor unit error code:

Error code	Error code definition	Recovery or not	Problem possible reasons
A1	Indoor ambient temperature sensor failure	Yes	Indoor PCB is broken
			The fuse of indoor PCB is broken
			temperature sensor broken , or exceed test limit
A2	Temperature sensor about middle position of evaporator failure	Yes	Indoor PCB is broken
			The fuse of indoor PCB is broken
			temperature sensor broken , or exceed test limit
A5	Indoor water pump failure	Yes	Water pump no power
			Water pump switch short-circuit or unconnected
			Water pump is broken
			Drain pipe block or up lean
			Indoor PCB is broken
A8	Indoor unit ERRPROM module failure	No	Indoor unit PCB is broken
			Error module is broken.
A9	The communication between indoor unit and outdoor unit failed	No	The communication wire between indoor unit and outdoor unit is broken.
			Indoor unit power close
			Indoor PCB is broken
AA	The communication between indoor unit and wire controller failed	No	The communication wire between indoor unit
			and outdoor unit is broken.
			Indoor unit power close
			Indoor PCB is broken
			Wire controller is broken

Outdoor unit error code:

Error code	Error code definition	Recovery or not	Problem possible reasons
C1	Ambient temperature sensor “Tao”failure	Yes	Temperature sensor failure or test temperature exceed limit.
			Sensor connection is incorrect.
			Outdoor unit PCB failure.
C2	Defrosting temperature sensor “Tdef” failure	Yes	Temperature sensor failure or test temperature exceed limit.
			Sensor connection is incorrect.
			Outdoor unit PCB failure.
C3	Discharge temperature of inverter compressor "Td" failure	Yes	Temperature sensor failure or test temperature exceed limit.
			Sensor connection is incorrect.
			Outdoor unit PCB failure.

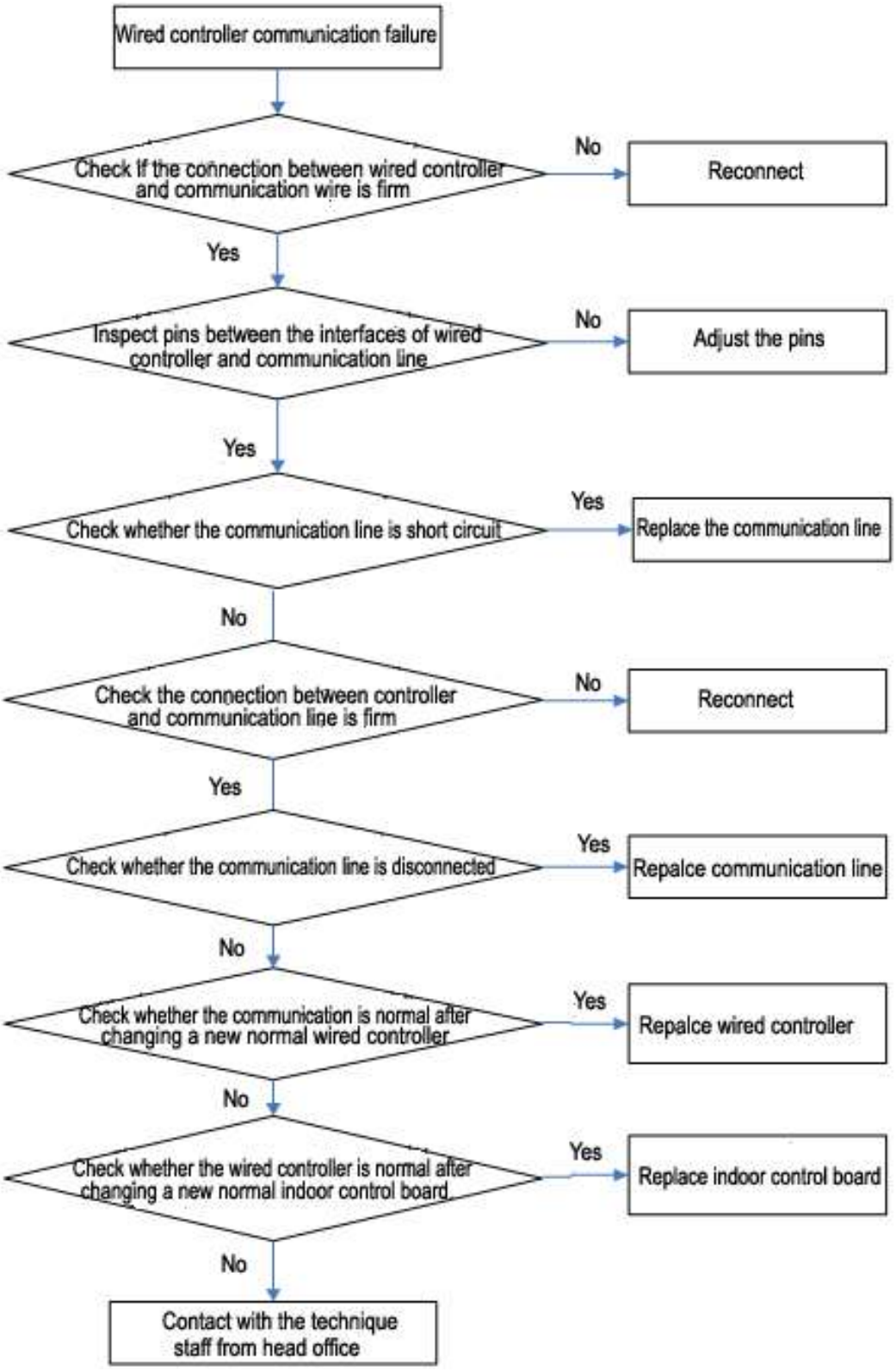
C6	Suction pipe temperature of compressor "Ts" failure	Yes	Temperature sensor failure or test temperature exceed limit.
			Sensor connection is incorrect.
			Outdoor unit PCB failure.
C8	Coil Center temperature sensor “Tcm” failure	Yes	Temperature sensor failure or test temperature exceed limit.
			Sensor connection is incorrect.
			Outdoor unit PCB failure.
H1	DC inverter compressor high pressure switch "HPS" failure	No	System pressure exceed high pressure switch limit
			High pressure switch failure
			Instantaneous power-off
			Stop valve closed
			Outdoor unit fan stop
			Outdoor unit air outlet block
			In heating mode indoor unit fan stop
			In heating mode indoor unit EXV block
H4	Low pressure switch "LPS" failure	Yes	System pressure lower than low pressure switch limit.
			Low pressure switch failure
			Instantaneous power-off
			Stop valve closed
			In cooling mode indoor unit EXV close or block
			In heating mode outdoor unit EXV close or block
			In heating mode outdoor unit fan stop
			In heating mode outdoor unit air outlet block
E1	4 way valve protection	Yes	4 way valve block
			Outdoor unit PCB failure
E3	DC inverter discharge temperature "Td" too high shutdown protection	No	System less refrigerant
			DC inverter Compressor failure
			Compressor air return filter block
			EXV open degree is small
			EXV block
			Gas pipe stop valve closed
			Liquid pipe stop valve closed
			System exhaust sensor failure
			Outdoor unit PCB failure
E8	Coil Center temperature sensor “Tcm”too high shutdown protection	Yes	System over refrigerant
			EXV open degree is small
			EXV block
			System exhaust sensor failure
			Outdoor unit PCB failure
J2	The communication between outdoor unit and indoor unit failure	Yes	The communication wire between indoor unit and outdoor unit disconnect, short circuit or connect incorrect.
			Indoor unit main power failed
			Indoor unit PCB failure
J3	The communication between PCB and INV module failure	Yes	The connection between driving module and main PCB failure
			The communication part of outdoor unit control PCB failure
			Frequency driving board failure
			Compressor failure

J4	The communication between main PCB and DC fan motor drive module failure	Yes	
			DC fan motor drive module failure
			DC fan failure
J7	Outdoor unit main control PCB ERROM module failure	No	Mail PCB failure
31	Module protection (F0)	Yes	Supply voltage below level let the current excessive
			Supply voltage exceed limit
			Outdoor fan stop or low speed
32	Module hardware protection	Yes	Supply voltage below level let the current excessive
			Supply voltage exceed limit
			Outdoor fan stop or low speed
33	Module software protection	Yes	Supply voltage below level let the current excessive
			Supply voltage exceed limit
			Outdoor fan stop or low speed
34	Compressor unconnected	Yes	The connect of driving module and DC inverter compressor incorrect
			Driving module failure
			Compressor failure
35	Compressor phase current overload protection	Yes	Compressor overload
			Compressor coil disconnect
			Inverter driving board failure
			Compressor failure
36	DC bus voltage over-voltage or under-voltage failure	Yes	Supply voltage below level
			Supply voltage exceed limit
			Driving module failure
37	Temperature sensor of drive module heat fins failure	Yes	Inverter driving board failure
38		Yes	Driving module failure
	Drive module high temperature limit frequency failure		Compressor failure
			Outdoor unit fan stop or low speed
39	Drive module high temperature shutdown protection	Yes	Driving module failure
			Compressor failure
			Temperature sensor failure
3E	DC inverter compressor running out of step	No	Once confirm the unrecoverable

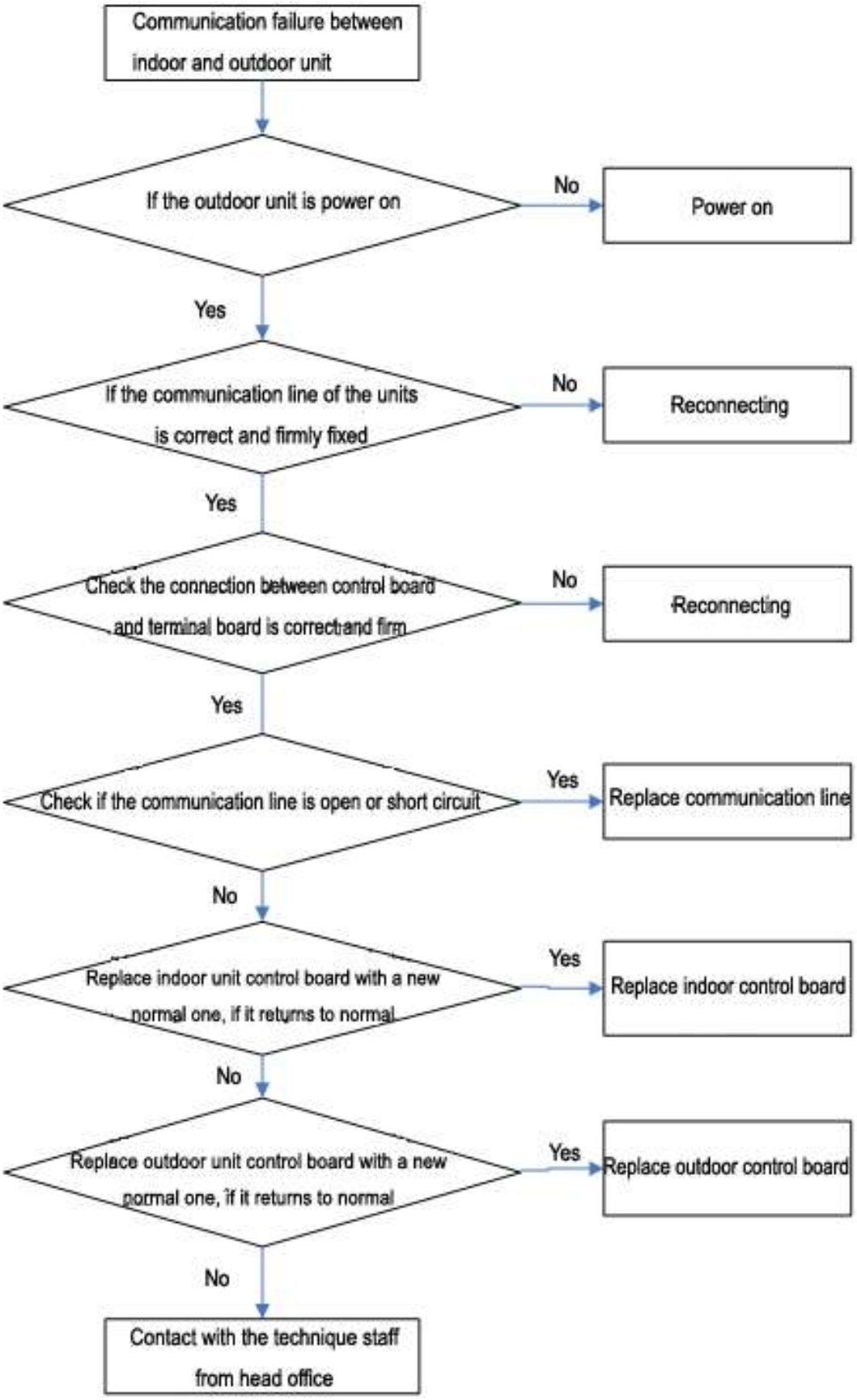
7. Failure analysis

7.1 Anylisis and Solution for Failure without Failure Code

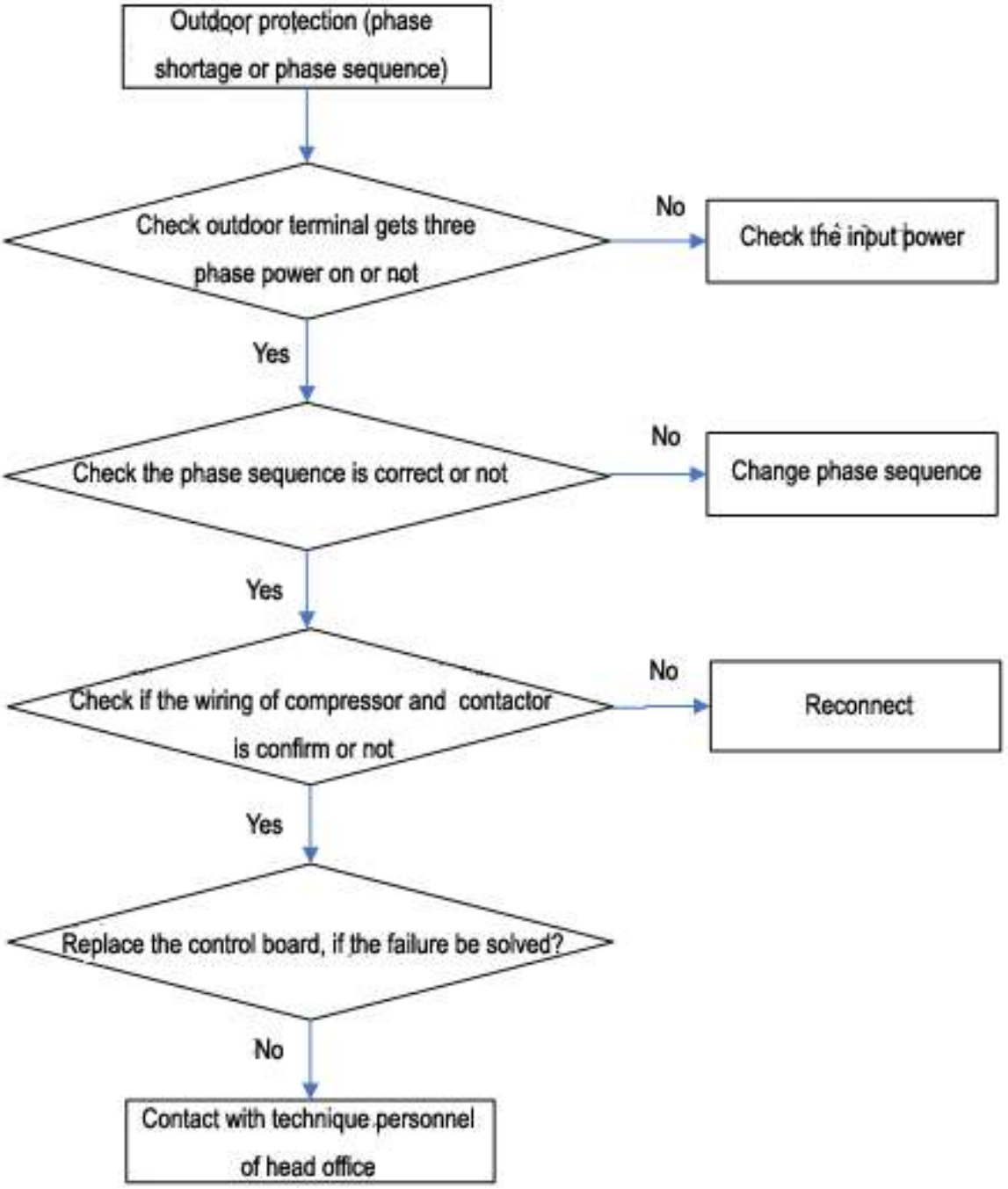
Wired controller communication failure



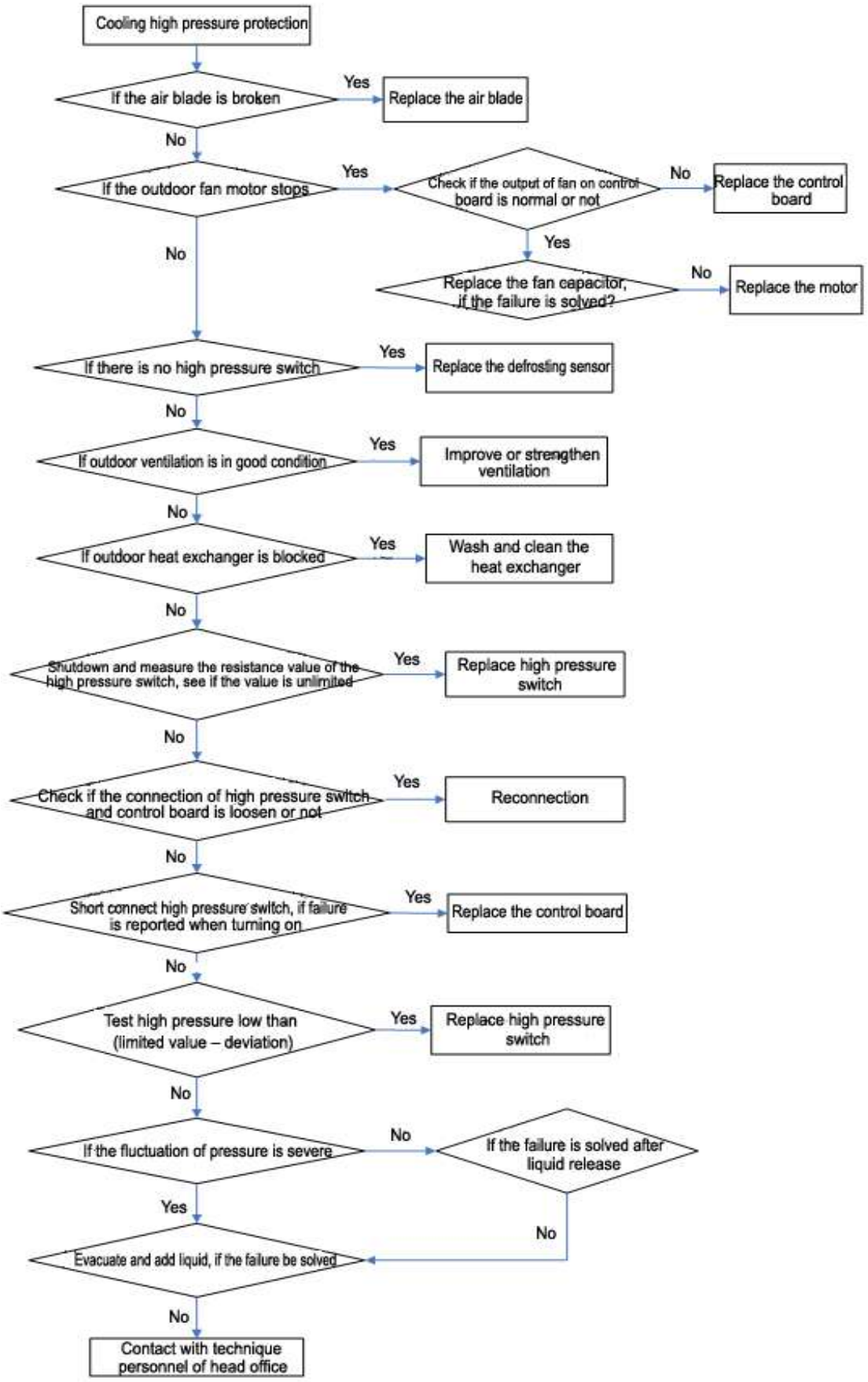
Communication failure between indoor and outdoor unit



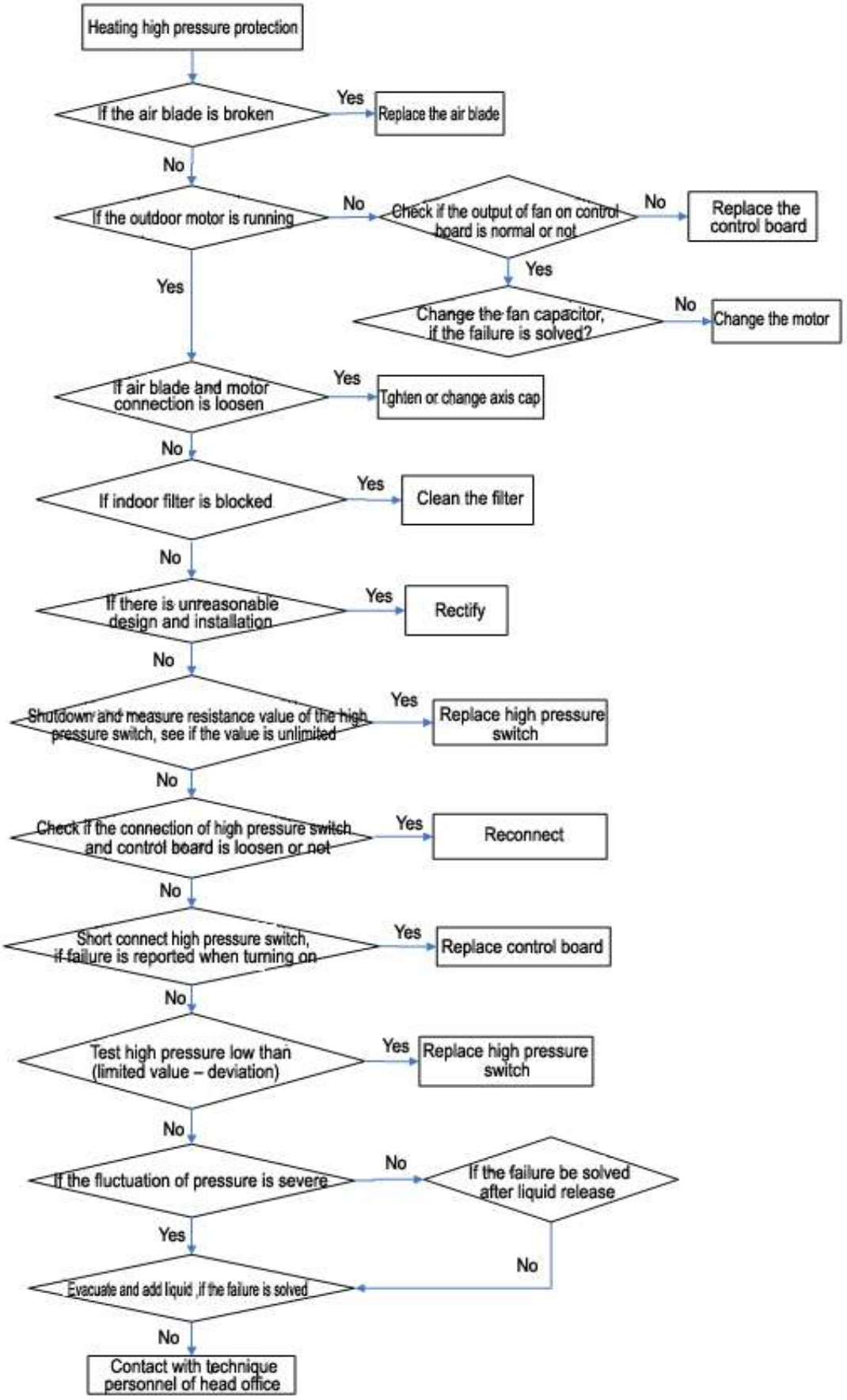
Outdoor protection(phase sequence)



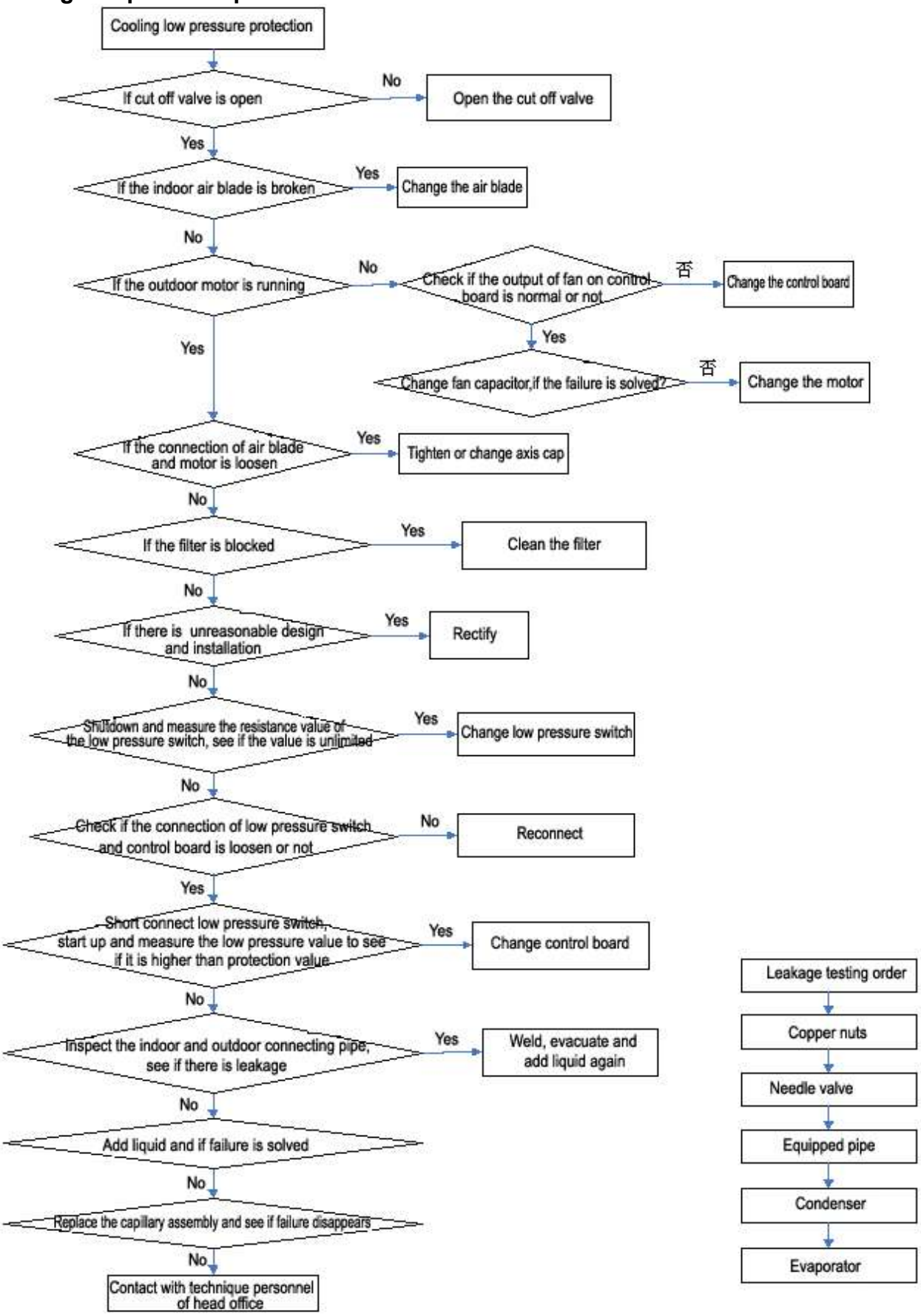
Cooling high pressure protection



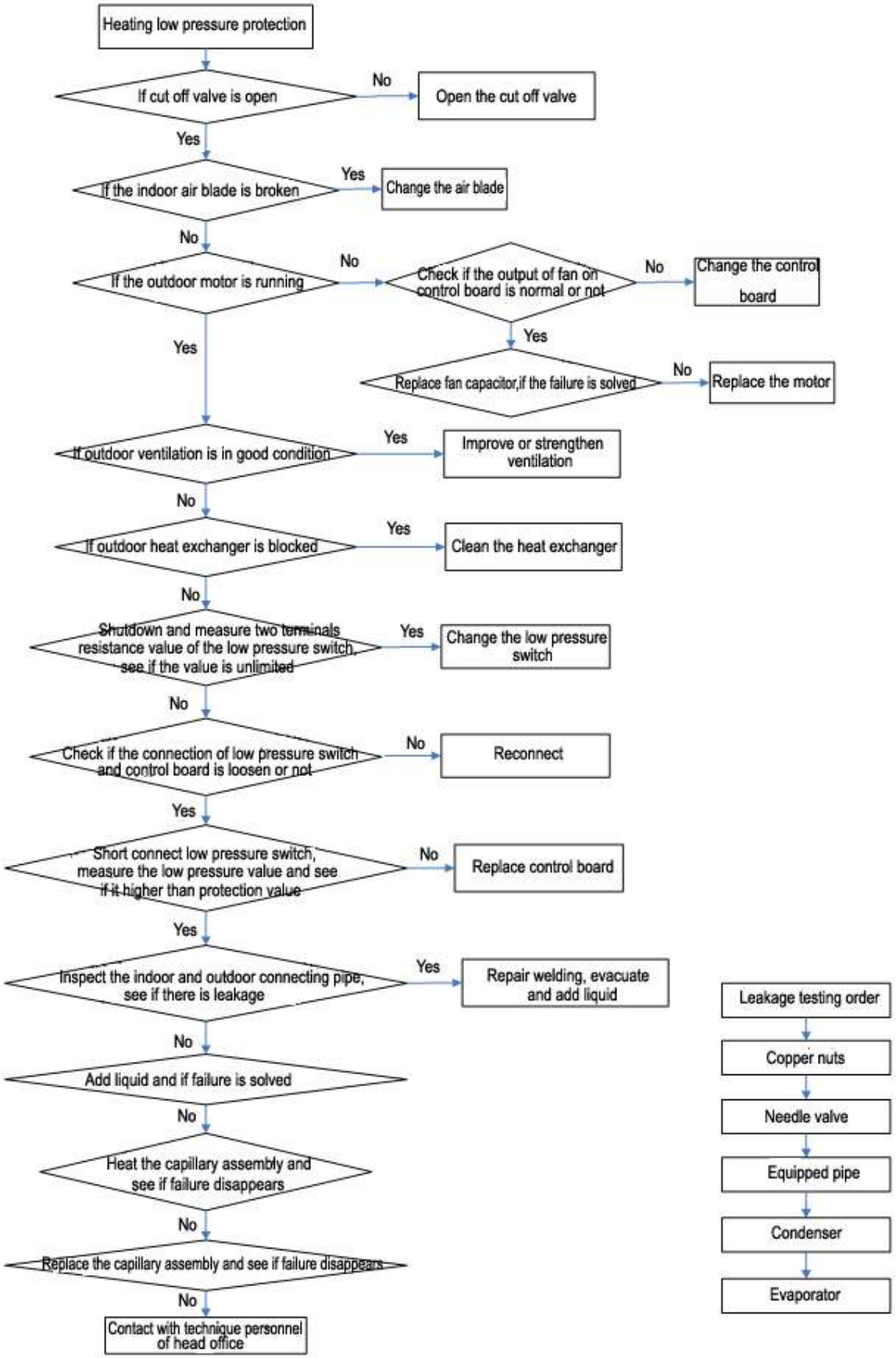
Heating high pressure protection



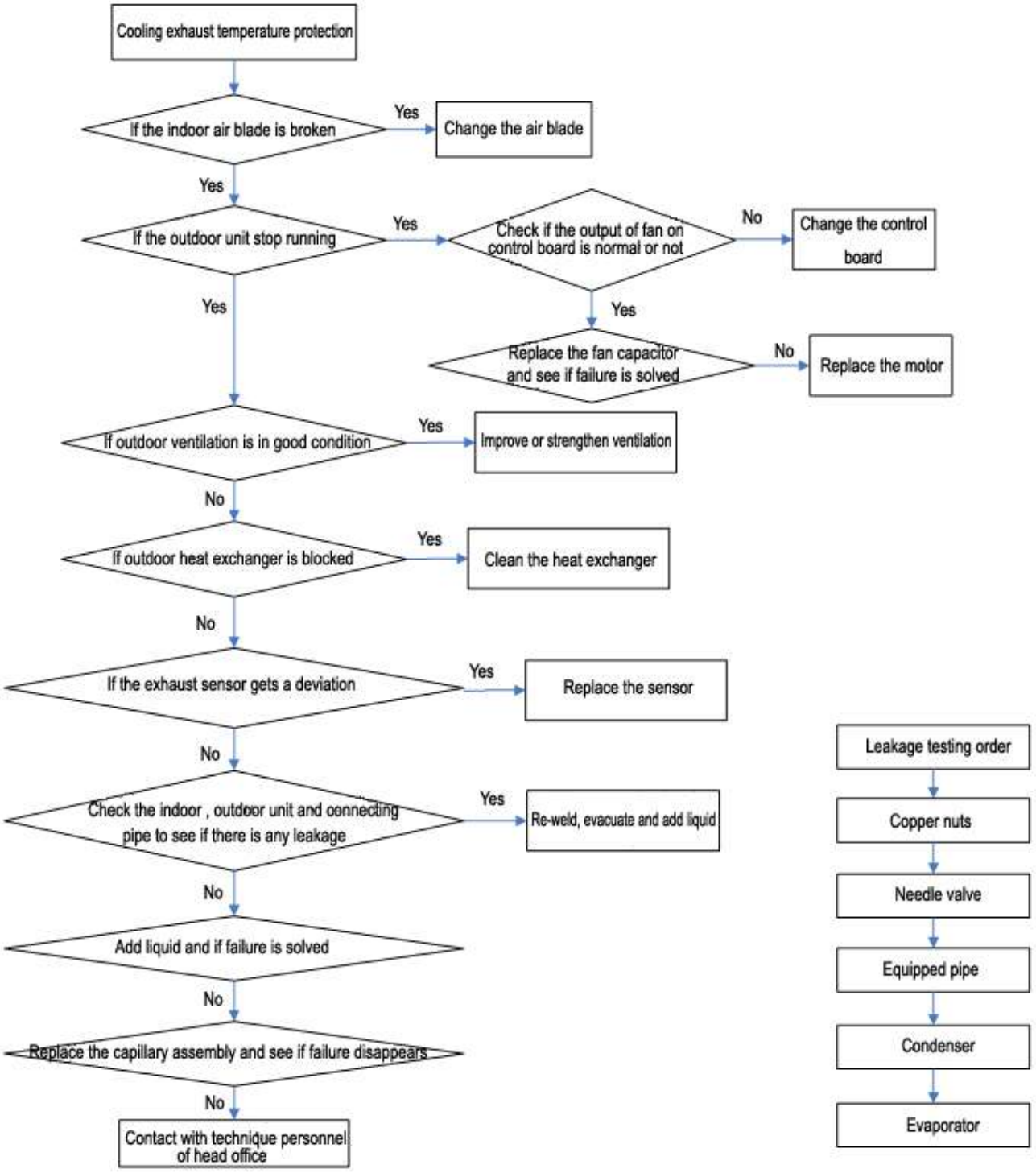
Cooling low pressure protection



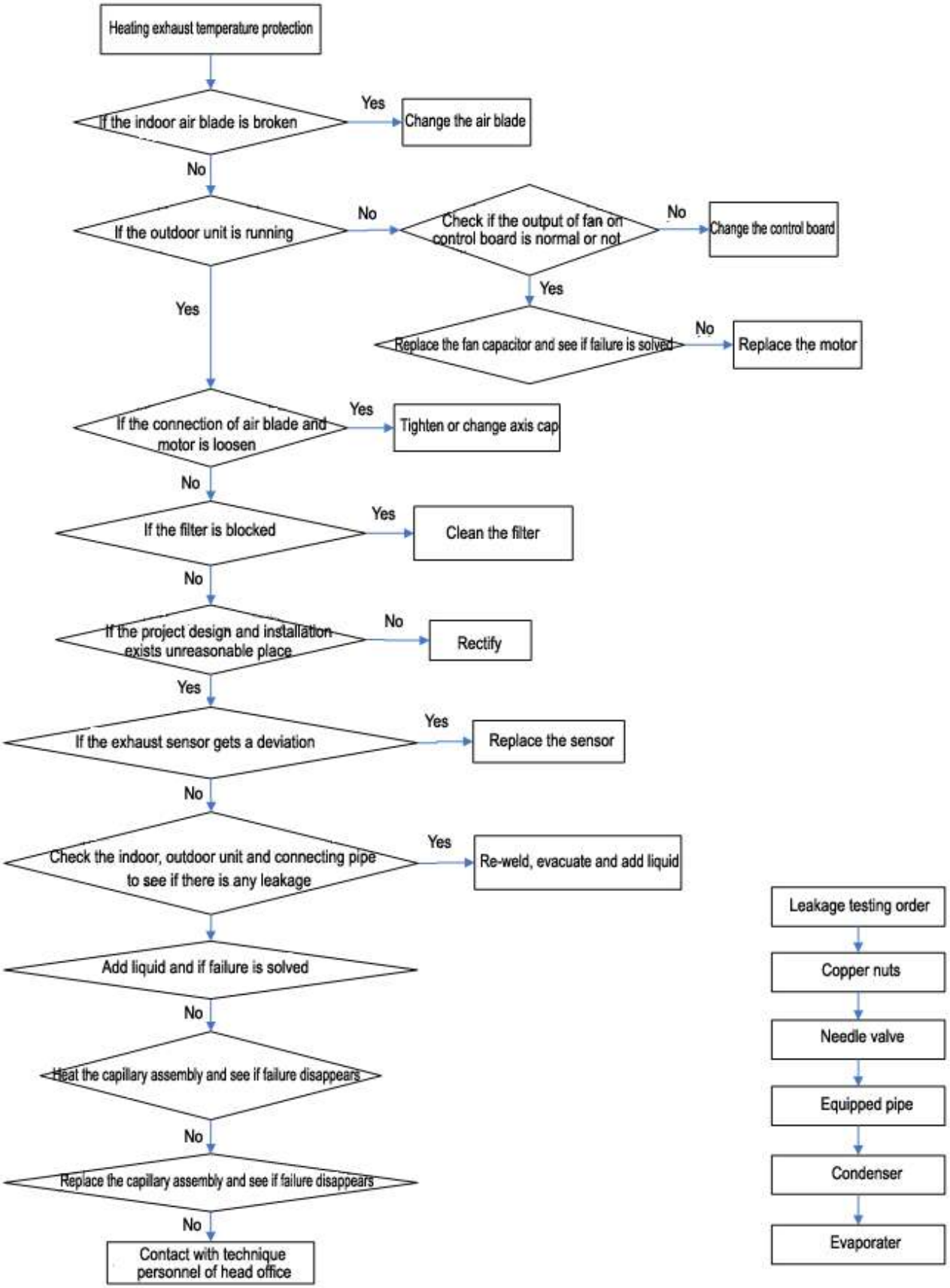
Heating low pressure protection



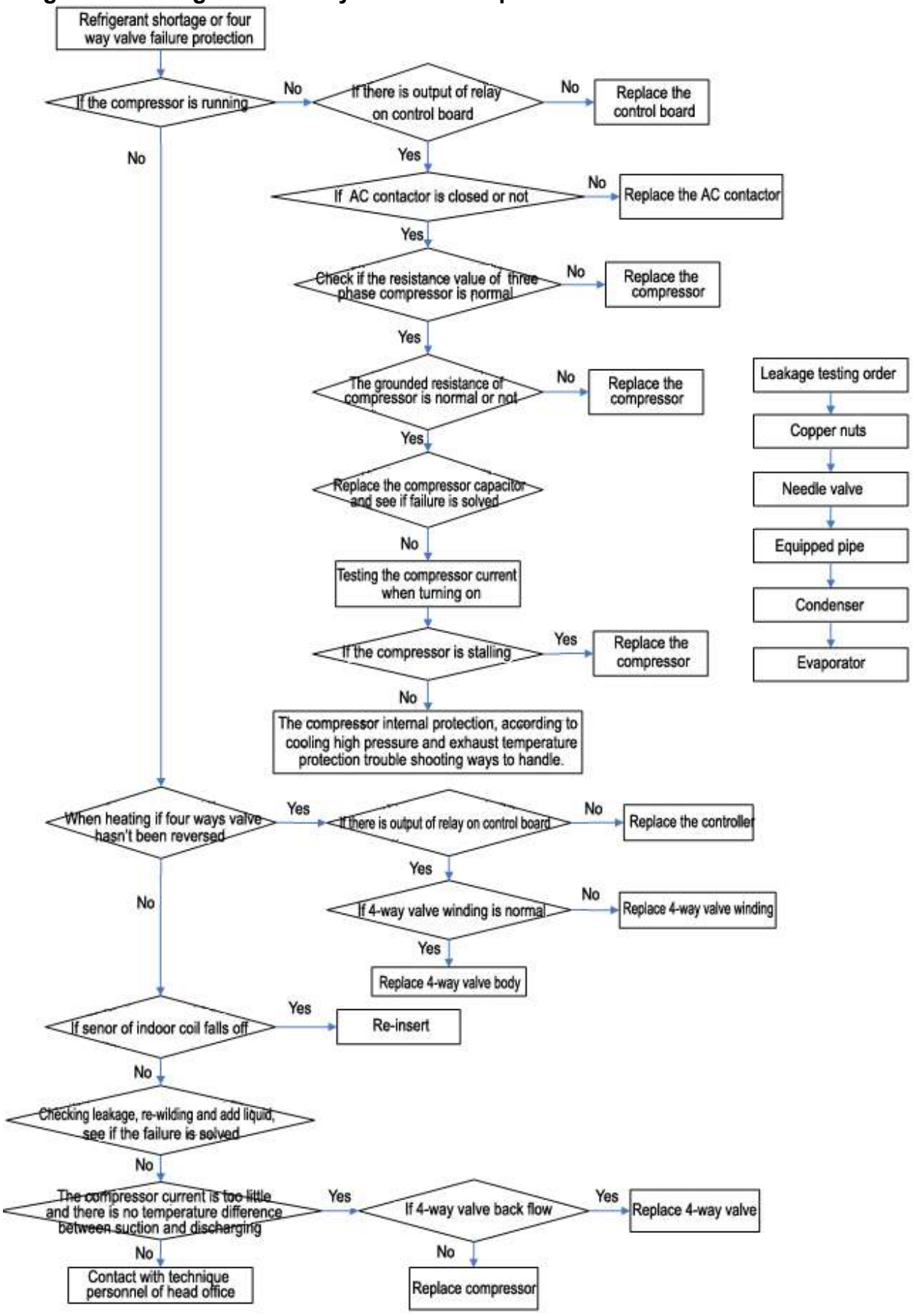
Cooling exhaust temperature protection



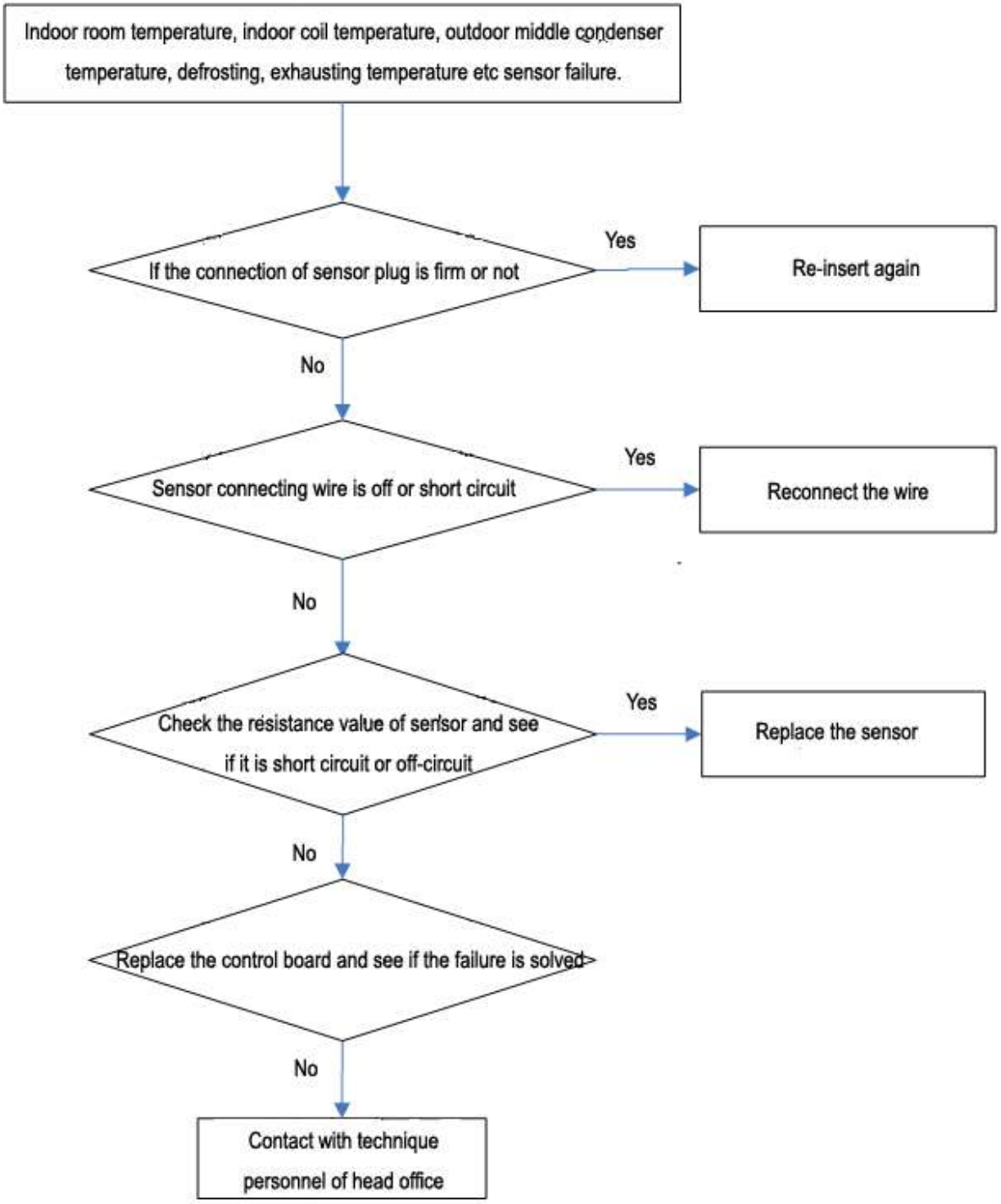
Heating exhaust temperature protection



Refrigerant shortage or four way valve failure protection

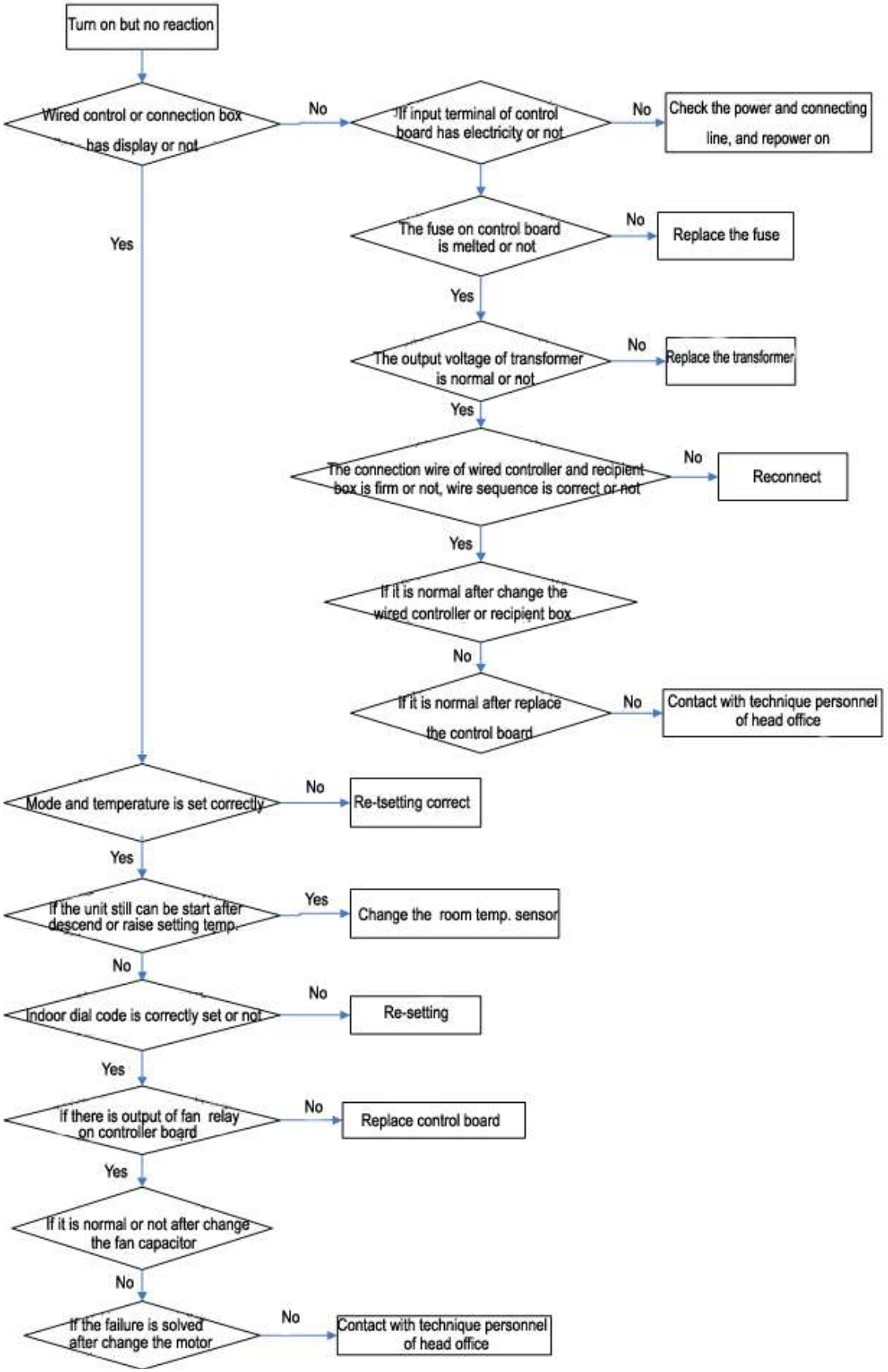


Sensor failure protection

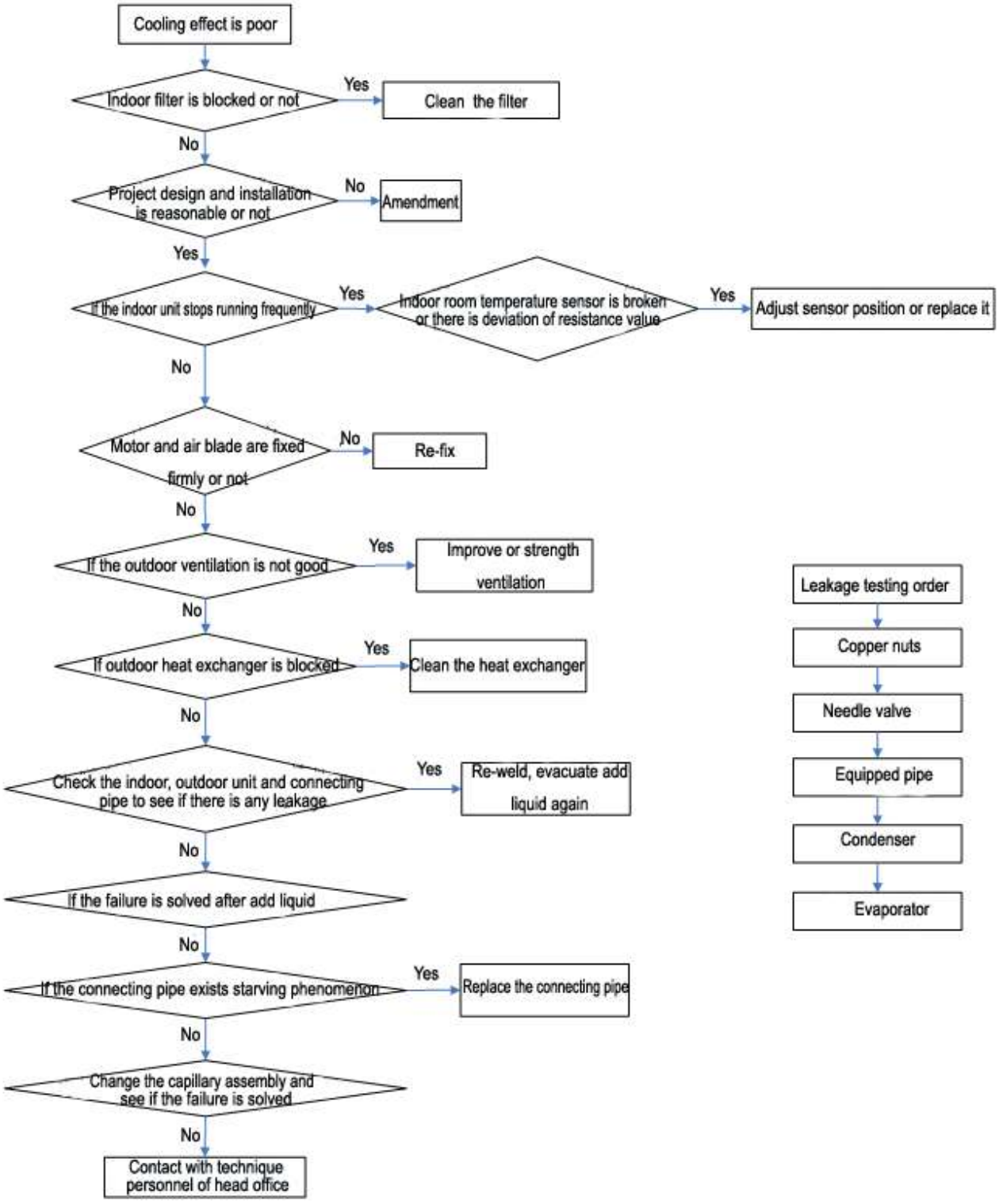


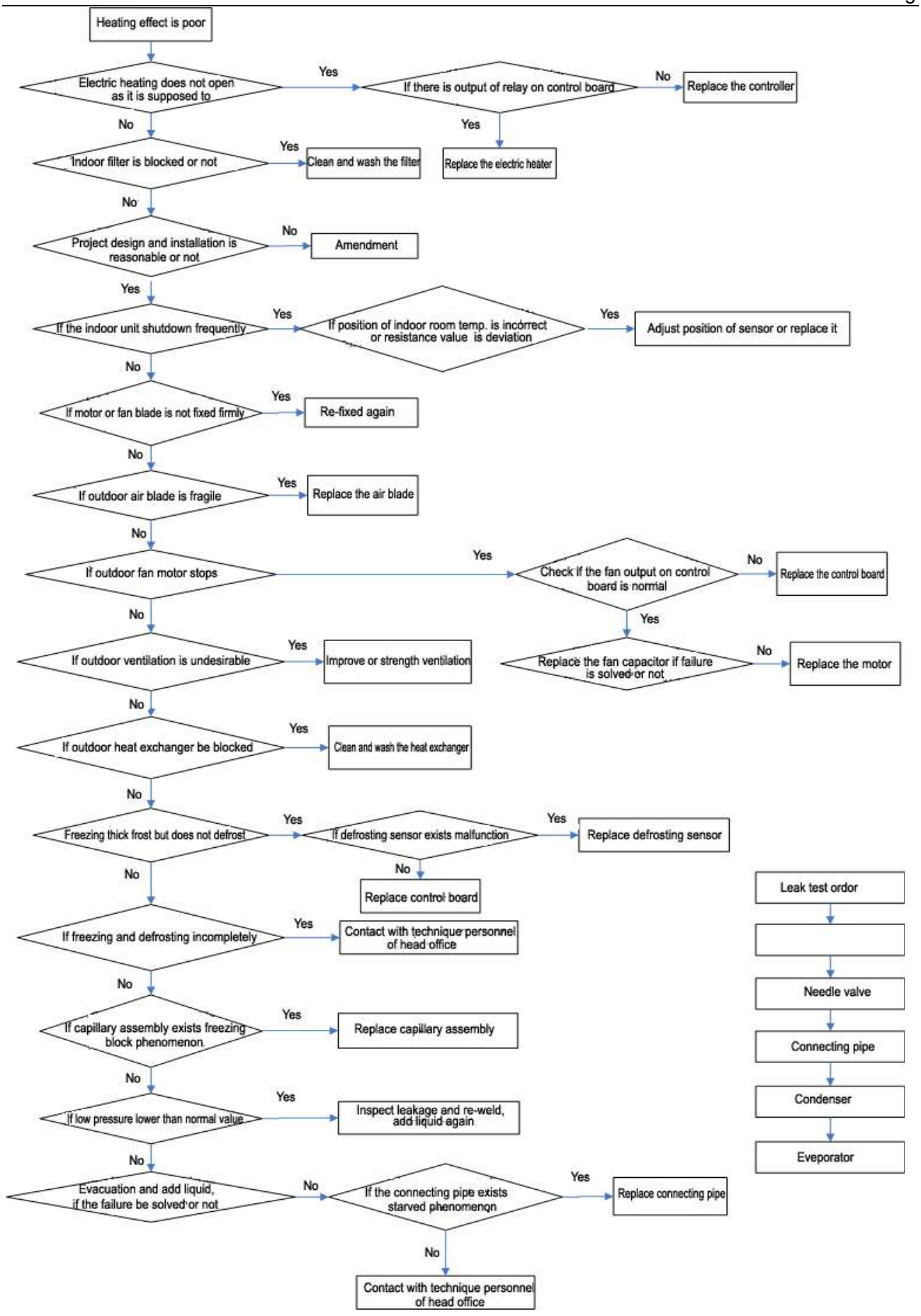
7.2 Anylisis and Solution for Failure without Failure Code

No action after power-on

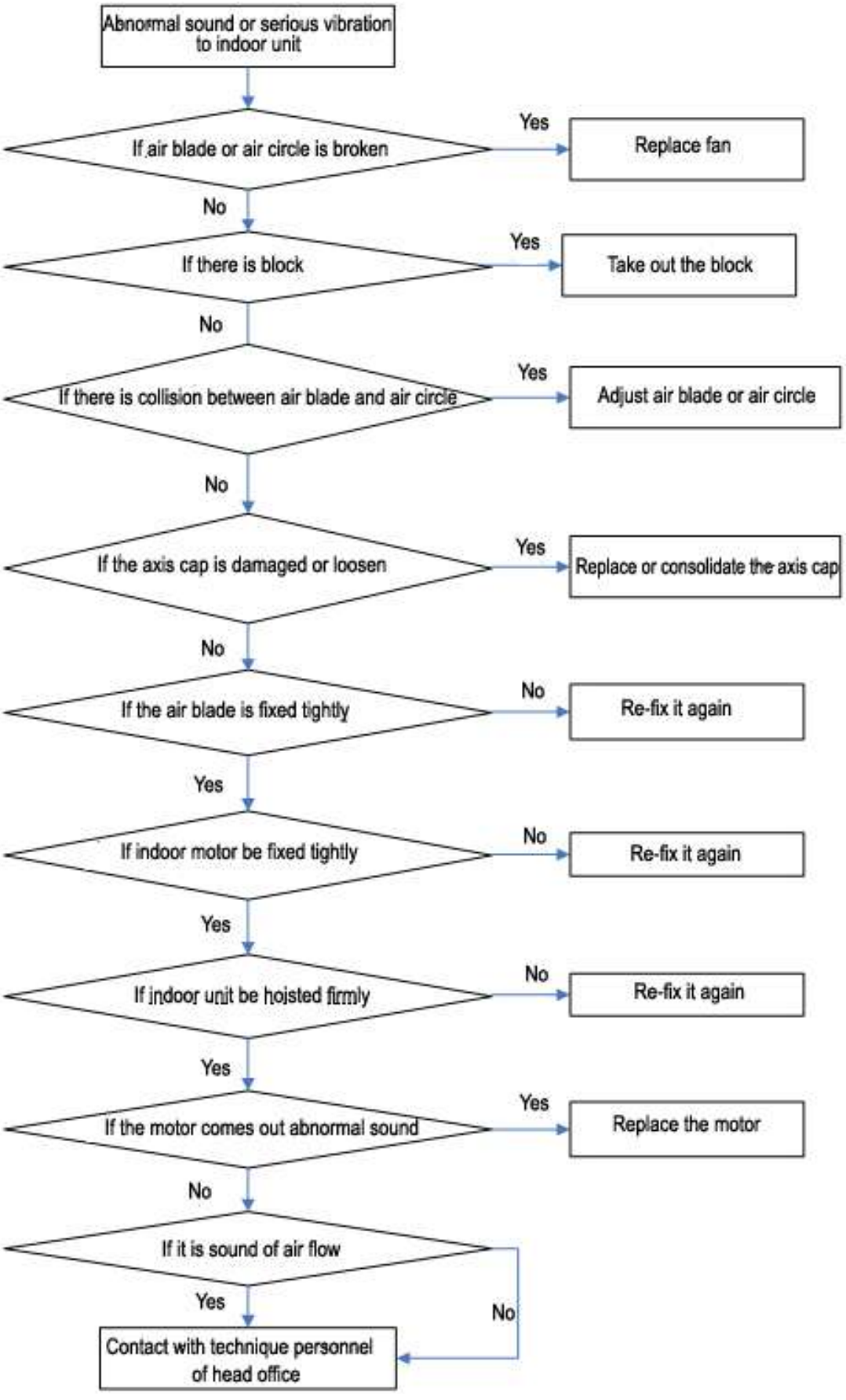


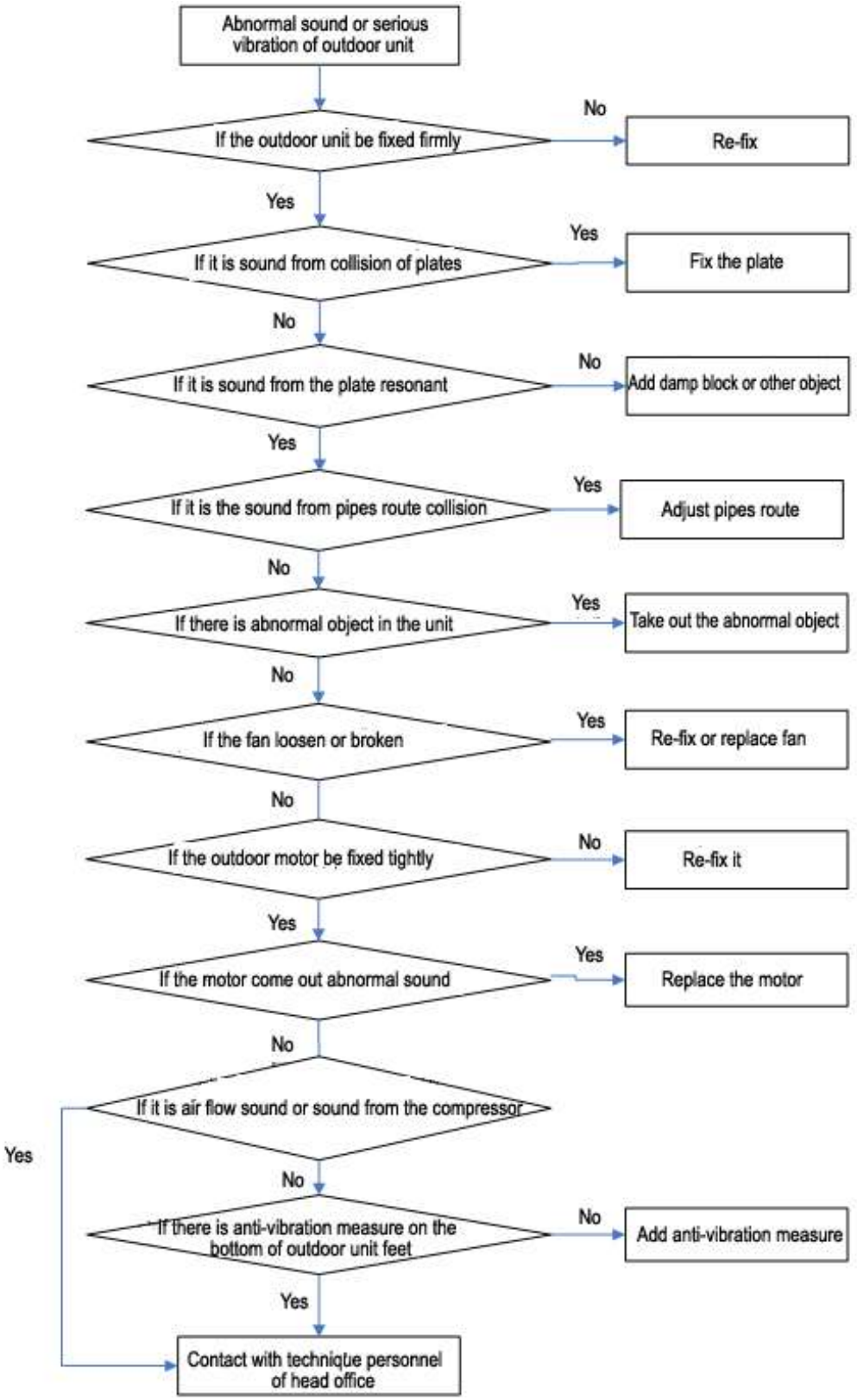
Poor effect


Cooling effect is poor
Indoor filter is blocked or not
Yes
Clean the filter
No
Project design and installation is reasonable or not
No
Amendment
Yes
If the indoor unit stops running frequently
Yes
Indoor room temperature sensor is broken or there is deviation of resistance value
Yes
Adjust sensor position or replace it
No
Motor and air blade are fixed firmly or not
No
Re-fix
No
If the outdoor ventilation is not good
Yes
Improve or strength ventilation
No
If outdoor heat exchanger is blocked
Yes
Clean the heat exchanger
No
Check the indoor, outdoor unit and connecting pipe to see if there is any leakage
Yes
Re-weld, evacuate add liquid again
No
If the failure is solved after add liquid
No
If the connecting pipe exists starving phenomenon
Yes
Replace the connecting pipe
No
Change the capillary assembly and see if the failure is solved
No
Contact with technique personnel of head office
Leakage testing order
Copper nuts
Needle valve
Equipped pipe
Condenser
Evaporator

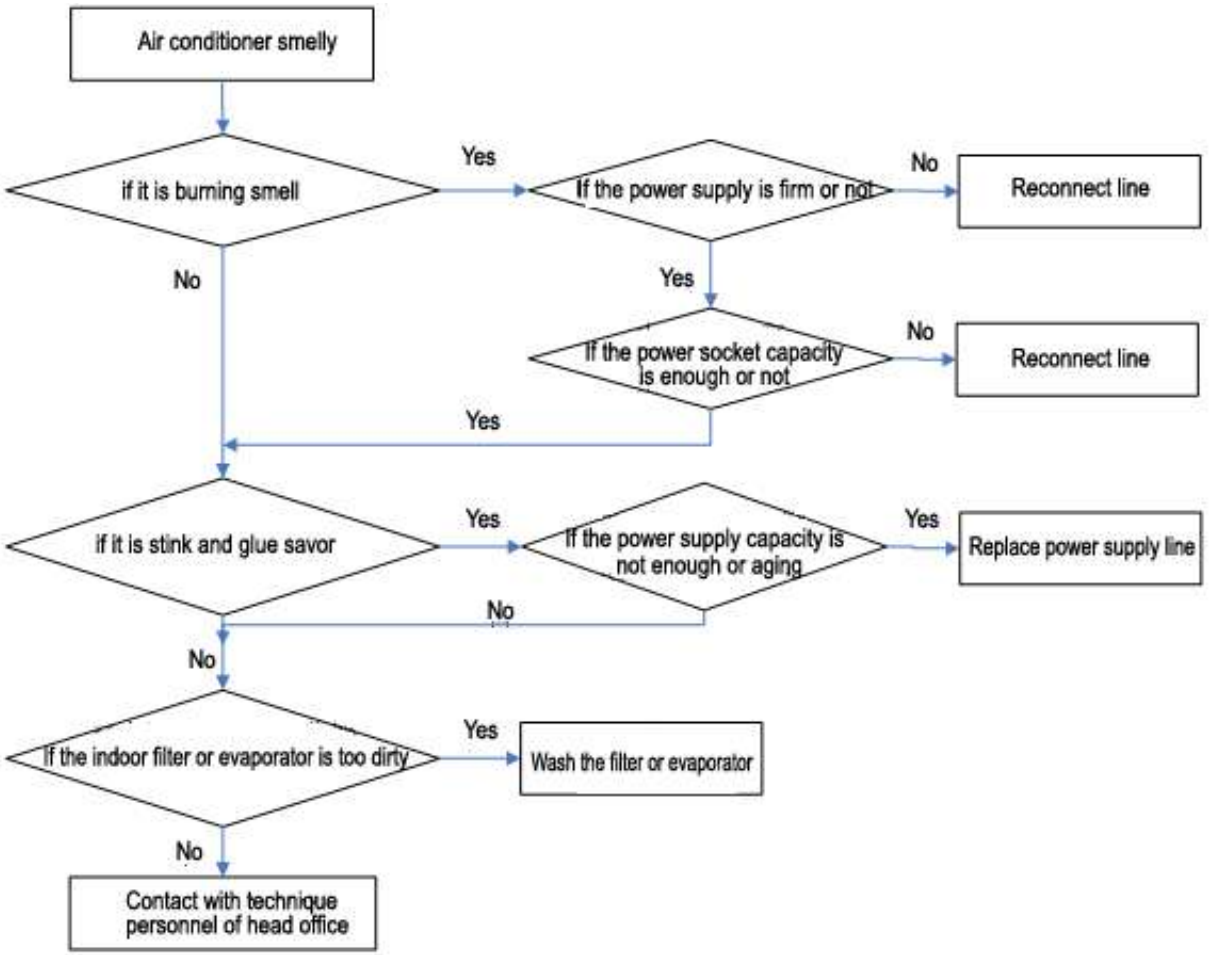

Heating effect is poor
Electric heating does not open as it is supposed to
Yes
If there is output of relay on control board
No
Replace the controller
Yes
Replace the electric heater
No
Indoor filter is blocked or not
Yes
Clean and wash the filter
No
Project design and installation is reasonable or not
No
Amendment
Yes
If the indoor unit shutdown frequently
Yes
If position of indoor room temp. is incorrect or resistance value is deviation
Yes
Adjust position of sensor or replace it
No
If motor or fan blade is not fixed firmly
Yes
Re-fixed again
No
If outdoor air blade is fragile
Yes
Replace the air blade
No
If outdoor fan motor stops
Yes
Check if the fan output on control board is normal
No
Replace the control board
Yes
Replace the fan capacitor if failure is solved or not
No
Replace the motor
No
If outdoor ventilation is undesirable
Yes
Improve or strength ventilation
No
If outdoor heat exchanger be blocked
Yes
Clean and wash the heat exchanger
No
Freezing thick frost but does not defrost
Yes
If defrosting sensor exists malfunction
Yes
Replace defrosting sensor
No
Replace control board
No
If freezing and defrosting incompletely
Yes
Contact with technique personnel of head office
No
If capillary assembly exists freezing block phenomenon
Yes
Replace capillary assembly
No
If low pressure lower than normal value
Yes
Inspect leakage and re-weld, add liquid again
No
Evacuation and add liquid, if the failure be solved or not
No
If the connecting pipe exists starved phenomenon
Yes
Replace connecting pipe
No
Contact with technique personnel of head office
Leak test ordor
Needle valve
Connecting pipe
Condenser
Eveporator

Abnormal sound or viberation

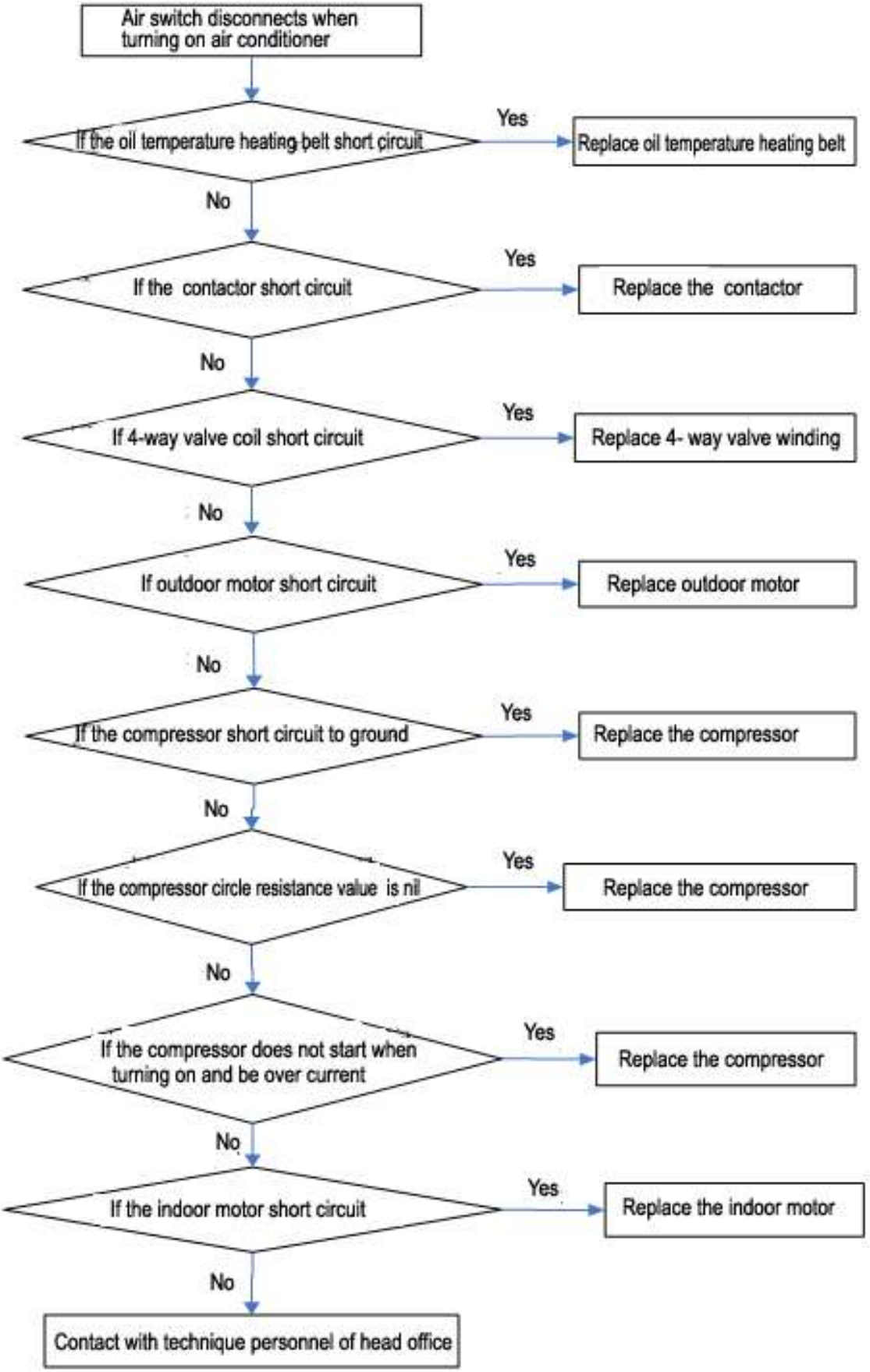



Abnormal sound or serious vibration of outdoor unit
If the outdoor unit be fixed firmly
No
Re-fix
Yes
If it is sound from collision of plates
Yes
Fix the plate
No
If it is sound from the plate resonant
No
Add damp block or other object
Yes
If it is the sound from pipes route collision
Yes
Adjust pipes route
No
If there is abnormal object in the unit
Yes
Take out the abnormal object
No
If the fan loosen or broken
Yes
Re-fix or replace fan
No
If the outdoor motor be fixed tightly
No
Re-fix it
Yes
If the motor come out abnormal sound
Yes
Replace the motor
No
If it is air flow sound or sound from the compressor
Yes
No
If there is anti-vibration measure on the bottom of outdoor unit feet
No
Add anti-vibration measure
Yes
Contact with technique personnel of head office

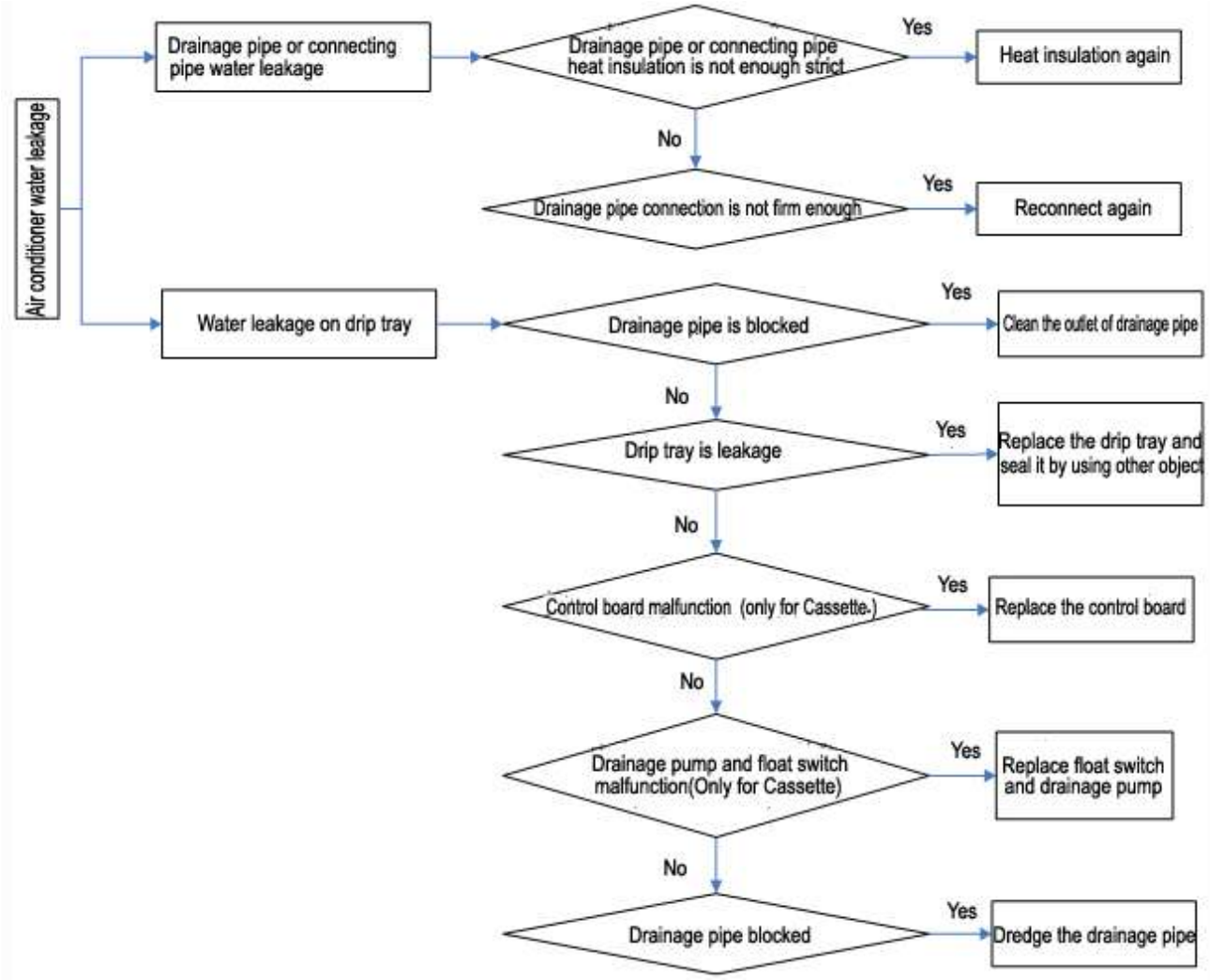
Abnormal odor



Air switch action when air conditioner starting up



Air conditioner water leakage



Part 5 Controller

1. General information

Remote controller, wired controller, display panel and receiver

Remote controller, wired controller, display panel and receiver					
	Available for all models above	Available for all models above	Available for Cassette indoor unit	Available for Ceiling&Floor indoor unit	Available for Duct indoor unit
Note	For Cassette and Ceiling & Floor indoor unit, remote controller is standard and wired controller is optional. For Duct indoor unit wired controller is standard,remote controller is optional(remote controller receiver will be necessaryer).				

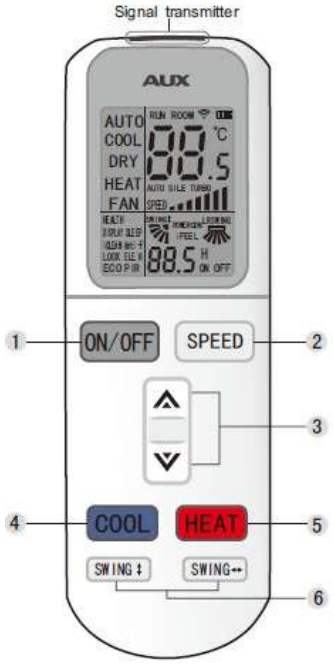
2. Remote Controller

2.1 Basic condition of remote controller

Name	Figure	Basic condition for operation
Remote controller		1.Power source Use 2 pcs No 7 batteries,working voltage:2.0V-5.0V; 2. Signal frequency:infrared frequency 38kHz; 3. Remote distance:max working distance is7m。
		Key operation introduction: 1.Temperature setting range 16℃-32℃; 2. when heating:When indoor coil temp. is lower than request, the fan will change into low speed,. After the temp. reach to the request temp.,it will change into setting fan speed.

2.2Function

Remote conntroller: L series



Note:

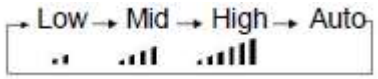
- Remotecontroller outsidebuttons only validwhen surfacecover isclosed.
- Twowhite buttonis onlyforaddressing set. If ithas beenset,remembernot toresetbyyourself.

1. “ON/OFF”button

*Pressthisbutton,theunitwillstartorstop,whichcan clearthe timer orsleepingfunction oflasttime.

2.“SPEED”button

*Pressthisbutton,speedwillchangeasbelow:



3.“∧/∨” button

*When press∧button, thesetting temperature will be increased by 0.5℃.When press ∨button, the setting temperaturewill bedecreasedby0.5℃.

*The temperaturewill bechanged quicklybypressingthe buttoncontinuouslyandsetting temperaturerangeis16℃ to 32℃.

4.“COOL”button

*Pressthe**COOL**button,youcandirectlyentercooling mode.

5.“HEAT”button

*Pressthe**HEAT**button,youcandirectlyentercooling mode.

* **Note:**cooling onlyunit hasno heatingfunction.

6.“SWING”button (SWING←→ andSWING↑↓)

Pressthis buttonto startup/down(left/right) swingfunction, press itagain,fixlouver position.

*Up/down(left/right)settingisonlyvalidinthismode;itwill not affectlouver positioninothermodes.

*Up/down (left/right)swing hasmemoryfunction, itcan keepprimarysettingwhen turn offthenturnon orswitchfromothermodesto primarymode.

7. “HEALTH” button

* Press this button; you can turn on or off the health function.

8. “SLEEP” button

* Press SLEEP button, the sleeping indicator light of indoor unit flashes on.
* The air-conditioner runs in sleeping mode for 10 hours and quiet sleep mode, recover back to former mode.
* The unit will turn off automatically if the timing mode is running out of time.
* Note: press the MODE or ON/OFF button, the remote controller clears sleeping mode away.

9. “iFEEL” button

* Press this button to set “iFEEL”function. The LCD shows the actual room temperature when the function set and it shows the setting temperature when the function cancelled.
* This function is invalid at Fan mode.

10.“DISPLAY” button

* In display mode, press button once, switch off “DISPLAY”, Press “DISPLAY” again, LCD will show ambient & setting temperature after flashing 5s. It's convenient for users to check ambient or setting temperature at any time in darkness.

11.“iCLEAN” button

* When remote controller is at the off state, press this button, the unit runs“iCLEAN”function .
* The purpose of this function is to clean dust on evaporator and dry the inside water of evaporator and to prevent theevaporator going moldy due to water deposition and boasting strange smell.
* After setting “iCLEAN” function, press“iCLEAN”button or“ON/OFF”button to quit.
* The clean function will stop working after about 30 minutes running without any operation.

12.“ELE.H”button(forauxiliaryelectricheatingIDU)

In heating mode,pressthisbutton,auxiliary electric heatingwillwork.

13.“Anti-FUNGUS”button

* The purpose ofthisfunctionisto drytheinsideofthe evaporatorandtopreventtheevaporatorfrom going mouldyduetowater deposition andthus dispersing strangesmell.

* To operatethe function:under “off” status oftheA/Cand theremotecontroller,press“**Anti-UNGUS**”button for onetime,thebuzzer keepbeepingfivetimesagain after five timesbeep, indicatingthatthisfunctionisready.

* To cancel the function:1.under“OFF”statusoftheA/Cand theremotecontroller,press“**Anti-FUNGUS**”buttonagain.

14.“SPOTSWING”button

*Pressthis button,thehorizontalwind directionvanescanswing automatically,whenyou have the desired vertical wind direction.

*Press “**SPOT SWING**”again,thehorizontal winddirectionvaneswill bestoppeddependonyou.

15.“ECO”button

*In coolingmode, pressthisbutton,theunitwillrun“**ECO**” economic operationmodewhichtakestheleast power consumption.

*Afterrunning for 8h,itwill automatically quit.Youcan press“**ECO**”buttononceagaintoquit.

*Note:Theunitwillturnoffautomaticallyifthetimingmodeisrunningout oftime.

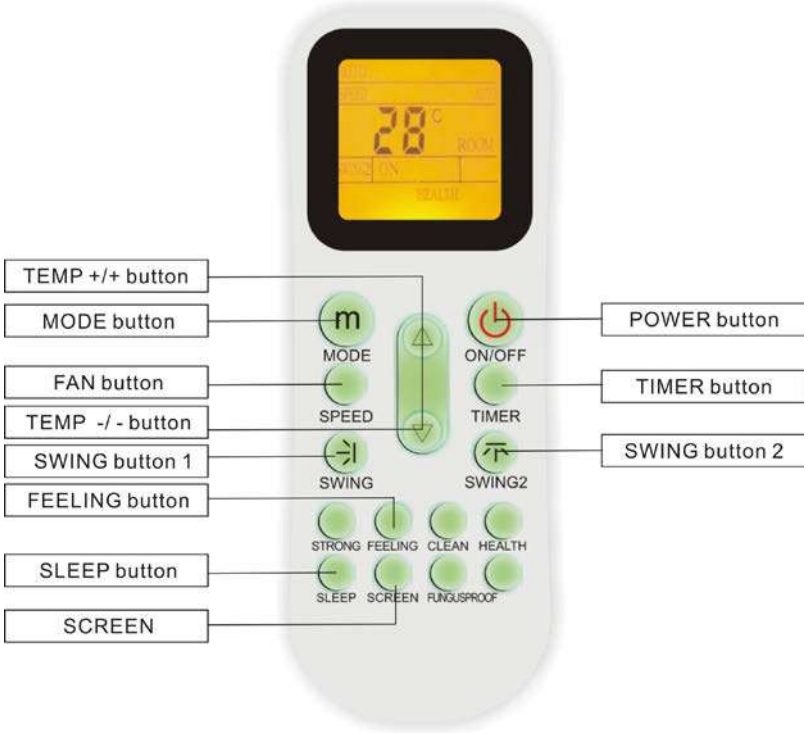
16.Twowhitebutton: Addressing set

*Withthecontroller off, pressing thetwowhite button simultaneouslymorethan10 secondsor more toenter addresssetting.Thisstatusdisplaysonlytemperature andtimeparameters,temperaturedisplayareashows “Serialnumber"parameters,therangeis0-99.Time displayareashows"Setvalue",therangeis0-255.The initialvalueis1.

* Bypressing “∧/∨”tosetserial number +and-. Parameterwithintheserialnumberdisplays from0to 99 incirculation.

* Bypressing“**ECO**” and“**iCLEAN**”to setvalue number+and-.Parameterswithinthevaluenumber displays from0 to255in circulation.After settingthe two numbers, presstheMODE button toconfirm sendingtoODU.

Remote conntroller: K series



POWER button:Switch the unit ON/OFF.

MODE button:Select mode , push the button one time, then the operation modes will change in turn as Auto-Cooling-Dehumidify-Heating

TEMP + button and **TEMP - button**: Temperature adjustment range: 16~32

FAN button: Change the fan speed will change in turn as: Low-Medium-High-Auto

SWING button 1: Press this button for the first time when operation, it will start the up and down swing function. Push the button for the second time, cancel the swing function.

SWING button 2: Press this button for the first time when operation, it will start the right and left swing function. Push the button for the second time, cancel the swing function.

Feeing button: Press this button for setting the feeling function.The LCD shows the actual room temperature when the function set and it shows the setting temperature when the function cancelled.The function is invalid when the appliance at the fan mode.

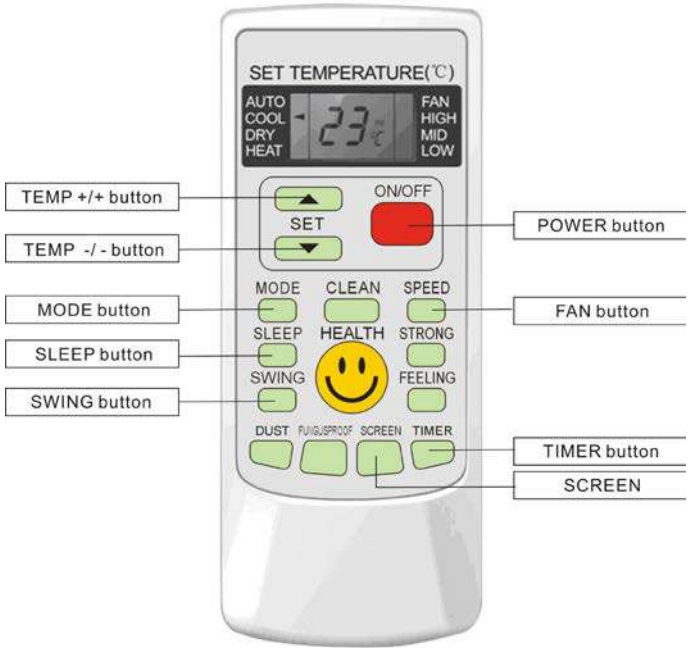
TIMER/CLOCK button:
Clock Setting: Normally display the clock set currently (display 12:00 for the first electrifying or resetting). When press the button for 5 seconds, the time display zone will flicker, then press【+】 and 【-】 button and to adjust hour that uses 12-hour clock including “A.M.” and “P.M.” time; press the button again to complete the setting.
Timer setting: Press the button to set TIMER ON/OFF , press the button then “ON” will flicker on the display screen. then press【+】 and 【-】 button and to adjust hour that uses 12-hour clock including “A.M.” and “P.M.” time; press the button again to complete the setting. The “OFF” setting is the same methods.
Remark: When setting functions such as mode, temperature, air port and air velocity, display screen displays all presetting parameters and remains constant; after reaching presetting time, air conditioner will automatically start as per presetting state.
After setting timing ON and OFF function, pressing button of 【Timer/Clock】can cancel timing setting.

SLEEP button:
1. Press the button to the sleeping indicator light of indoor unit flashes on;
2. After the setting of sleeping mode,the cooling operation enables the set temperature to increase 1℃ after 1 hour and another 1℃ auto matically after 1hour.
3. After the setting of sleeping mode,the heating operation enables the set temperature to drop 2℃ after 1 hour and another 2℃ auto matically after 1hour.
4. The air condition runs in sleeping mode for 7hours and stops automatically.

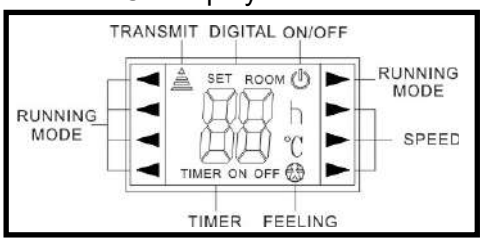
Remark:Press the mode or ON/OFF button,the remote controller clears sleeping mode away.

SCREEN button:Press the button to let the LCD display working or not by pressing the button.

Remote conntroller:H series



LCD display instruction



NOTE :
ON/OFF display:
when the remote controller is on the state, the LCD will be display or not.
Digital display:
Under the state of normal working, it displays setting temperature. While the feeling function is start, it will display room temperature, and under the state of timer mode, it will display

NOTE:Fan speed operation
When the air volume is greater, the noise will be higher, The wind temperature will rise when cooling mode,and drop when heating mode;
Please selecte the appropriate F speed, in order to achieve the more comfortable rest environment.

POWER button:Switch the unit ON/OFF.

MODE button:Select mode , push the button one time, then the operation modes will change in turn as Auto-Cooling-Dehumidify-Heating → → → →
TEMP + button and **TEMP - button**: Temperature adjustment range: 16~32

FAN button: Change the fan speed will change in turn as: Low-Medium-High-Auto

SWING button: Press this button for the first time when operation, it will start the swing function. Push the button for the second time, cancel the swing function. (The function is available matched with the concerned unit)

TIMER/CLOCK button:
Clock Setting: Normally display the clock set currently (display 12:00 for the first electrifying or resetting). When press the button for 5 seconds, the time display zone will flicker, then press【+】and 【-】button and to adjust hour that uses 12-hour clock including “A.M.” and “P.M.” time; press the button again to complete the setting.
Timer setting: Press the button to set TIMER ON/OFF , press the button then “ON” will flicker on the display screen. then press【+】 and 【-】 button and to adjust hour that uses 12-hour clock including “A.M.” and “P.M.” time; press the button again to complete the setting. The “OFF” setting is the same methods.
Remark: When setting functions such as mode, temperature, air port and air velocity, display screen displays all presetting parameters and remains constant; after reaching presetting time, air conditioner will automatically start as per presetting state.
After setting timing ON and OFF function, pressing button of 【Timer/Clock】can cancel timing setting.

SLEEP button:
1. Press the button to the sleeping indicator light of indoor unit flashes on;
2. After the setting of sleeping mode,the cooling operation enables the set temperature to increase 1℃ after 1 hour and another 1℃ auto matically after 1hour.
3. After the setting of sleeping mode,the heating operation enables the set temperature to drop 2℃ after 1 hour and another 2℃ auto matically after 1hour.
4. The air condition runs in sleeping mode for 7hours and stops automatically.

Remark: Press the mode or ON/OFF button,the remote controller clears sleeping mode away.

SCREEN button:Press the button to let the LCD display working or not by pressing the button.

3. Wired controller

3.1 Basic condition of wired controller

Name	Figure	Basic condition for operation
Wired controller		1. Power source:voltage DC 12V; 2. Work temperature range of PCB:(-10~+70)℃; 3. Work humidity range of PCB:RH20%~RH90%;

3.2 Function

Wired controller: XK-02

ON/OFF button:Switch the unit ON/OFF.

Mode button:Select mode , push the button one time, then the operation modes will change in turn as below: Auto-Cooling-Dehumidify-Heating

Temp +/- button: Press the button can adjust temperature. Temperature adjustment range: 16~32℃.

Fan button: Change the fan speed will change in turn as :Auto-Low-Medium-High-Auto

Swing button: Press this button for the first time when operation, it will start the swing function. Push the button for the second time, cancel the swing function. (The function is available matched with the concerned unit)

Health button: Press this button change to switch mode: Health mode.

SLEEP button:

1. Press the button to the sleeping indicator light of indoor unit flashes on;

2. After the setting of sleeping mode,the cooling operation enables the set temperature to increase 1℃ after 1 hour and another 1℃ auto matically after 1hour.
3. After the setting of sleeping mode,the heating operation enables the set temperature to drop 2℃ after 1 hour and another 2℃ auto matically after 1hour.
4. The air condition runs in sleeping mode for 7hours and stops automatically.

Remark: Press the mode or ON/OFF button,the remote controller clears sleeping mode away.

Timer button: Press the button to set Timer ON/OFF, press the button then “ON” will flicker on the display screen. then press 【Clock +/- button】and to adjust hour that uses 12-hour clock including “A.M.” and “P.M.” time; press the button again to complete the setting. The “OFF” setting is the same methods.

Remark: When setting functions such as mode, temperature, swing and fan speed, display screen displays all presetting parameters and remains constant; after reaching presetting time, air conditioner will automatically start as per presetting state.

After setting timing ON and OFF function, pressing button of 【Timer】can cancel timing setting.

Notes:

1. Time sequence of timing ON and OFF determines the order of “Timing ON-Timer OFF” and “Timer OFF- Timing ON”. If the both are the same or either one is the same as time of current clock, it is invalid to press “Timer” button to confirm presetting time; after it reaches the presetting time, it will implement corresponding timing operation.
2. After setting time of timing ON and OFF, pressing “Timer” button can cancel timing.
3. Enter into time setting state of timing function; if there is no input related to time within consecutive 10 seconds, cancel the operation, return to previous state and go on with current time.
4. Default time of timer ON is 08:00 and default time of timer OFF is 18:00.

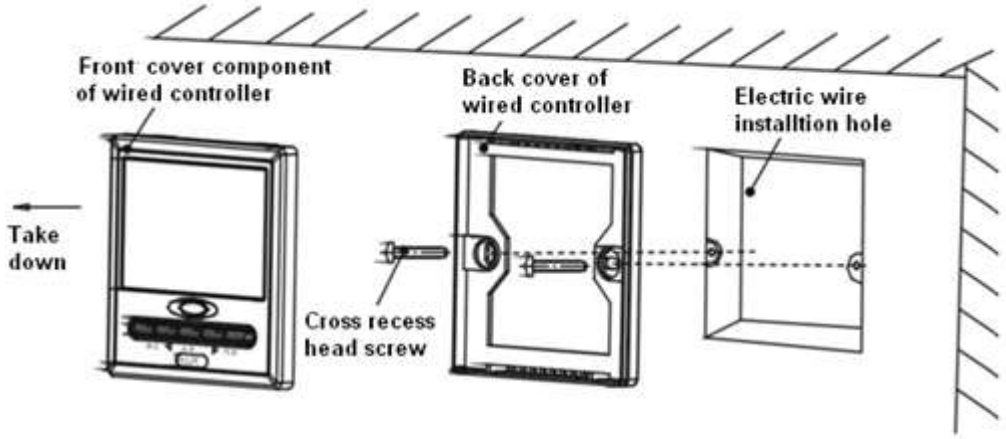
3.3 Installation of wired controller

◇First, take apart the base panel from the wired controller.;

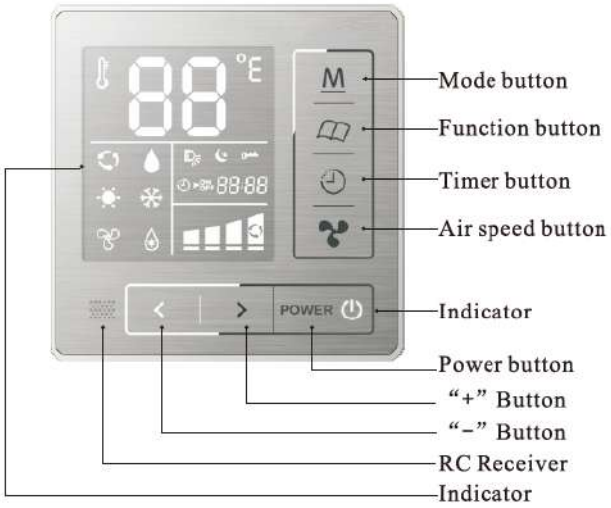
◇According to the two installation holes on the install board, use two screws to fix the base panel to the wall as shown below;

◇Ensure that the connecting cable of the controller is accessible before connecting the wired controller to the base panel.;

◇Join the wired controller connection cable to the indoor unit using the cable provided.



Wired controller: XK-05



Note: As these are touch buttons, please touch the center of each button to ensure it work effectively.
For example the "POWER" button shall be pressed on the letter "W".

1. "**POWER**" **button--On/Off button**

Press "**POWER**" button after connecting the power, this will turn on the operation indicator and set the air conditioner to operation mode.
Pressing "**POWER**" button again will turn off the operation indicator and set the air conditioner to standby mode.

2. "**>**" button and "**<**" button-- plus and minus buttons

- Depending on functions in different pages, pressing "**>**" or "**<**" buttons may be required for setting temperature, time and other parameters.
- When setting time, you may want to speed up the process by pressing and holding "**>**"or"**<**" for 2 seconds.
- If the "**>**" and "**<**" buttons are pressed simultaneously for 5 seconds or more, The control will be locked, displaying"🔒".No button operation (the receiver for remote control is still working) is possible when the control is locked.
- To unlock the control: Press "**>**" and "**<**" buttons simultaneously for 5 seconds or more, or turn on the power after turning it off ("🔒" will be canceled).

Note: Each press of the ">" button adds the value by 1; Each press of the "<" button minus the value by 1.

3. "M" **button--Mode button**

By pressing "M", you can switch the operation modes in the following sequence:
[Auto]→[Cool]→[Dry]→[Fan]→[Heat]→[Auto].
The initial temperature of each mode is set at 24℃. There is no set temperature under VENT mode and no automatic air flow under FAN mode.

Note: For units with which some of the above modes are not available, the sequence of the remaining modes is the same as those with all modes.

4. "📖" **--Functional Buttons**

- Sleep function setting

After the unit is turned on, each press of the "📖" button will activate the sleep function (the display of " " indicates the sleep function is activated).

5. " " **--Timer button**

●Press " " button once:

If the unit is turned on, the wire control will be switched to OFF time settingmode and display " OFF ".

If the unit is turned off, the wire control will be switched to ON time setting mode and display " OFF ".

When in time setting mode, the time column will display default time setting (4 hours after current time). Then, readjust the set time by pressing "**<**" or"**>**" button (holding those buttons can accelerate the adjustment).

Press the " " button again to confirm the setting, which will stop the flicker of the time column.

Note: If no button is pressed for 10 continuous seconds, the time setting will be canceled and the timer will return to where there is no time setting.

Pressing " " again or "**POWER**" after the setting is finished will quit the time setting. The corresponding timer icon will go out and the time column will display the system time.

●By pressing and holding " " button for 5 seconds, you can adjust the clock according to current time（ "88:88" ）Press the "**<**" or "**>**" to add or minus the hour with hour auto-increment (holding those buttons can accelerate the adjustment).

6. " " **Button--Air Speed Button**

By pressing " " , you can switch the air speeds in the following sequence [Auto]→[Low]→[Med]→[High]→[Auto]:

During forced operation, the air speed will be displayed as [Auto].

7. Indicator

It is used for indicating operation conditions.

When the unit is turned on: When the unit is in operation, the indicator will remain light; or it will start to "breathe" (become bright and dim alternatively) if there is no operation for 10 seconds.

When the unit is turned off: The indicator will go out.

8.Remote control receiver.

It is used for receiving remote control signals.

When operating, aim the emitter of remote controller toward the receiver within 8m away and send operation orders.

9. Other Functions

●Swing function

Start or stop the swing function after the remote control order is received.

The corresponding swing icon " " glows or goes out.

●Sleep function

This function can be set with " " (see the operation instruction of " " button for details) or remote controller after the unit is turned on.

●Lock Function

See the operation instruction of "**>**" and "**<**" buttons.

●Defrosting or oil return

When the " " symbol glows, the unit is in the process of automatic defrosting or oil return. This is not a failure of the unit.

●Trouble code display

When the screen displays the interface as shown in figure 1, the unit is reporting a trouble, with the temperature column displaying directly the trouble code, based on which the user may report the trouble to the local service department for repair.

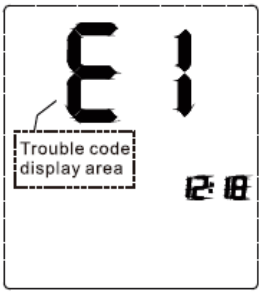


Figure 1) Trouble code display

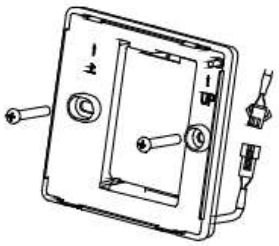
Installation of wired controller

1. Installation Diagram

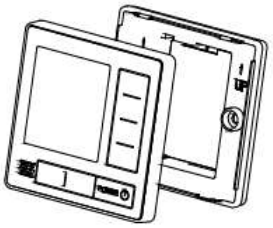
Step 1: Disconnect the power.

Step 2: Open the upper cover by turning the slot at the lower end of the wire control using a flat head screwdriver. If there are two control panels, pull off the wires between them.

Step 3: Connect the wires. Fasten the lower cover into the in the internal box inside the wall according to the direction shown (with the arrow pointing up) using the screws provided in the package box.



Step 4: Click the upper cover onto the lower cover according to the direct shown. If there are two control panels, connect the wire between them before closing the covers.



Part 6. Sensor resistance table

6.1 Coil temperature sensor resistance reference table

R25=20KΩ±1%							
B25/50=3950K ±1%							
Temp	resistance（KΩ）			(resist.tol)		(temp.tol)℃	
（℃）	Rmax	R（t） Normal	Rmin	MAX(+)	MIN(-)	MAX(+)	MIN(-)
-30	377.571	347.000	318.338	8.81	8.26	1.36	1.36
-29	354.642	326.228	299.608	8.71	8.16	1.35	1.35
-28	333.353	306.927	282.189	8.61	8.06	1.33	1.33
-27	313.547	288.957	265.927	8.51	7.97	1.32	1.32
-26	295.088	272.196	250.774	8.41	7.87	1.31	1.31
-25	277.860	256.541	236.582	8.31	7.78	1.30	1.30
-24	261.761	241.901	223.323	8.21	7.68	1.29	1.29
-23	246.699	228.193	210.873	8.11	7.59	1.27	1.27
-22	232.598	215.349	199.219	8.01	7.49	1.26	1.26
-21	219.385	203.304	188.260	7.91	7.40	1.25	1.25
-20	206.995	192.000	177.984	7.81	7.30	1.24	1.24
-19	195.360	181.376	168.317	7.71	7.20	1.23	1.23
-18	184.441	171.398	159.212	7.61	7.11	1.21	1.21
-17	174.193	162.025	150.667	7.51	7.01	1.20	1.20
-16	164.568	153.215	142.613	7.41	6.92	1.19	1.19
-15	155.527	144.932	135.048	7.31	6.82	1.17	1.18
-14	147.029	137.141	127.911	7.21	6.73	1.16	1.17
-13	138.912	129.812	121.205	7.01	6.63	1.15	1.15
-12	131.406	122.913	114.874	6.91	6.54	1.14	1.14
-11	124.346	116.418	108.921	6.81	6.44	1.12	1.13
-10	117.701	110.300	103.307	6.71	6.34	1.11	1.12
-9	111.446	104.536	98.003	6.61	6.25	1.10	1.11
-8	105.556	99.104	93.009	6.51	6.15	1.08	1.09
-7	100.007	93.983	88.288	6.41	6.06	1.07	1.08
-6	94.780	89.154	83.840	6.31	5.96	1.06	1.07
-5	89.852	84.598	79.632	6.21	5.87	1.05	1.06
-4	85.124	80.298	75.665	6.01	5.77	1.03	1.05
-3	80.746	76.240	71.910	5.91	5.68	1.02	1.03
-2	76.615	72.408	68.368	5.81	5.58	1.01	1.02
-1	72.717	68.789	65.019	5.71	5.48	1.00	1.01
0	69.037	65.370	61.847	5.61	5.39	0.98	1.00
1	65.563	62.139	58.852	5.51	5.29	0.97	0.99
2	62.280	59.084	56.012	5.41	5.2	0.96	0.97
3	59.180	56.196	53.330	5.31	5.1	0.94	0.96
4	56.248	53.463	50.785	5.21	5.01	0.93	0.95
5	53.428	50.879	48.381	5.01	4.91	0.92	0.94
6	50.810	48.432	46.098	4.91	4.82	0.91	0.93
7	48.335	46.117	43.940	4.81	4.72	0.89	0.91
8	45.993	43.924	41.895	4.71	4.62	0.88	0.90

9	43.776	41.847	39.951	4.61	4.53	0.87	0.89
10	41.678	39.879	38.112	4.51	4.43	0.86	0.88
11	39.691	38.015	36.365	4.41	4.34	0.84	0.87
12	37.809	36.247	34.710	4.31	4.24	0.83	0.85
13	36.026	34.571	33.136	4.21	4.15	0.82	0.84
14	34.338	32.982	31.646	4.11	4.05	0.80	0.83
15	32.736	31.474	30.228	4.01	3.96	0.79	0.82
16	31.218	30.043	28.883	3.91	3.86	0.78	0.81
17	29.778	28.685	27.606	3.81	3.76	0.77	0.79
18	28.411	27.395	26.390	3.71	3.67	0.75	0.78
19	27.115	26.170	25.236	3.61	3.57	0.74	0.77
20	25.885	25.007	24.137	3.51	3.48	0.73	0.76
21	24.717	23.902	23.094	3.41	3.38	0.72	0.75
22	23.607	22.851	22.099	3.31	3.29	0.70	0.73
23	22.554	21.853	21.156	3.21	3.19	0.69	0.72
24	21.553	20.903	20.255	3.11	3.1	0.68	0.71
25	20.600	20.000	19.400	3.00	3.00	0.66	0.70
26	19.734	19.141	18.549	3.10	3.09	0.69	0.72
27	18.909	18.323	17.739	3.20	3.19	0.72	0.75
28	18.123	17.545	16.970	3.30	3.28	0.74	0.78
29	17.374	16.804	16.238	3.40	3.37	0.77	0.80
30	16.660	16.098	15.541	3.49	3.46	0.80	0.83
31	15.979	15.426	14.879	3.59	3.55	0.82	0.85
32	15.329	14.785	14.248	3.68	3.63	0.85	0.88
33	14.709	14.175	13.647	3.77	3.72	0.88	0.91
34	14.117	13.593	13.075	3.86	3.80	0.90	0.93
35	13.553	13.038	12.531	3.95	3.89	0.93	0.96
36	13.013	12.508	12.012	4.04	3.97	0.95	0.98
37	12.499	12.003	11.517	4.13	4.05	0.98	1.01
38	12.007	11.521	11.045	4.21	4.13	1.01	1.04
39	11.537	11.062	10.595	4.30	4.21	1.03	1.06
40	11.088	10.622	10.166	4.38	4.29	1.06	1.09
41	10.659	10.203	9.757	4.46	4.37	1.09	1.11
42	10.248	9.803	9.367	4.55	4.45	1.11	1.14
43	9.856	9.420	8.994	4.63	4.52	1.14	1.17
44	9.480	9.054	8.638	4.71	4.60	1.17	1.19
45	9.121	8.705	8.298	4.79	4.67	1.19	1.22
46	8.778	8.371	7.973	4.86	4.75	1.22	1.24
47	8.449	8.051	7.663	4.94	4.82	1.24	1.27
48	8.134	7.745	7.367	5.02	4.89	1.27	1.30
49	7.832	7.453	7.083	5.09	4.96	1.30	1.32
50	7.543	7.173	6.812	5.16	5.03	1.32	1.35
51	7.267	6.905	6.553	5.24	5.10	1.35	1.37
52	7.002	6.649	6.305	5.31	5.17	1.38	1.40
53	6.747	6.403	6.068	5.38	5.24	1.40	1.43
54	6.504	6.168	5.841	5.45	5.30	1.43	1.45

55	6.270	5.942	5.623	5.52	5.37	1.46	1.48
56	6.046	5.726	5.415	5.59	5.43	1.48	1.50
57	5.831	5.519	5.216	5.66	5.50	1.51	1.53
58	5.625	5.321	5.025	5.72	5.56	1.53	1.56
59	5.428	5.131	4.842	5.79	5.62	1.56	1.58
60	5.238	4.948	4.667	5.86	5.69	1.59	1.61
61	5.055	4.773	4.499	5.92	5.75	1.61	1.63
62	4.880	4.605	4.338	5.98	5.81	1.64	1.66
63	4.712	4.444	4.183	6.05	5.87	1.67	1.68
64	4.551	4.289	4.035	6.11	5.93	1.69	1.71
65	4.396	4.140	3.893	6.17	5.98	1.72	1.74
66	4.247	3.998	3.756	6.23	6.04	1.75	1.76
67	4.103	3.861	3.625	6.29	6.10	1.77	1.79
68	3.966	3.729	3.500	6.35	6.15	1.80	1.81
69	3.833	3.603	3.379	6.41	6.21	1.82	1.84
70	3.706	3.481	3.263	6.46	6.26	1.85	1.87
71	3.583	3.364	3.152	6.52	6.32	1.88	1.89
72	3.466	3.252	3.045	6.58	6.37	1.90	1.92
73	3.352	3.144	2.942	6.63	6.42	1.93	1.94
74	3.243	3.040	2.843	6.68	6.47	1.96	1.97
75	3.138	2.940	2.748	6.74	6.53	1.98	2.00
76	3.037	2.844	2.657	6.79	6.58	2.01	2.02
77	2.940	2.751	2.569	6.84	6.63	2.04	2.05
78	2.846	2.662	2.485	6.89	6.67	2.06	2.07
79	2.756	2.577	2.403	6.95	6.72	2.09	2.10
80	2.669	2.494	2.325	7.00	6.77	2.11	2.13
81	2.585	2.415	2.250	7.04	6.82	2.14	2.15
82	2.504	2.338	2.178	7.09	6.86	2.17	2.18
83	2.426	2.264	2.108	7.14	6.91	2.19	2.20
84	2.351	2.193	2.041	7.19	6.96	2.22	2.23
85	2.279	2.125	1.976	7.24	7.00	2.25	2.26
86	2.209	2.059	1.914	7.28	7.04	2.27	2.28
87	2.142	1.995	1.854	7.33	7.09	2.30	2.31
88	2.077	1.934	1.796	7.37	7.13	2.33	2.33
89	2.014	1.875	1.740	7.42	7.17	2.35	2.36
90	1.954	1.818	1.687	7.46	7.22	2.38	2.39
91	1.895	1.763	1.635	7.50	7.26	2.41	2.41
92	1.839	1.710	1.585	7.55	7.30	2.43	2.44
93	1.785	1.659	1.537	7.59	7.34	2.46	2.46
94	1.732	1.609	1.490	7.63	7.38	2.48	2.49
95	1.681	1.561	1.446	7.68	7.43	2.51	2.52
96	1.632	1.515	1.402	7.72	7.47	2.54	2.54
97	1.585	1.471	1.360	7.76	7.51	2.56	2.57
98	1.539	1.428	1.320	7.80	7.55	2.59	2.59
99	1.495	1.386	1.281	7.85	7.59	2.62	2.62
100	1.452	1.346	1.243	7.89	7.63	2.64	2.64

101	1.411	1.307	1.207	7.93	7.68	2.67	2.67
102	1.371	1.270	1.172	7.98	7.72	2.70	2.70
103	1.332	1.233	1.137	8.02	7.76	2.72	2.72
104	1.295	1.198	1.104	8.07	7.81	2.75	2.75
105	1.258	1.164	1.070	8.11	8.11	2.77	2.77

6.2 Environment temperature sensor resistance reference table

R25 = 15.0 KΩ ± 3%							
B25/50 = 3950K ± 2%							
T [℃]	Rmin [KΩ]			T [℃]		Rmin [KΩ]	
-25.0	183.4	199.1	216.0	-8.0	70.54	75.10	79.88
-24.5	178.0	193.1	209.4	-7.5	68.69	73.10	77.71
-24.0	172.8	187.4	203.0	-7.0	66.90	71.15	75.61
-23.5	167.8	181.8	196.9	-6.5	65.17	69.27	73.57
-23.0	162.9	176.5	190.9	-6.0	63.48	67.44	71.59
-22.5	158.2	171.3	185.2	-5.5	61.84	65.67	69.66
-22.0	153.7	166.2	179.6	-5.0	60.25	63.95	67.80
-21.5	149.3	161.4	174.3	-4.5	58.71	62.27	65.99
-21.0	145.0	156.7	169.1	-4.0	57.21	60.65	64.24
-20.5	140.9	152.1	164.1	-3.5	55.75	59.08	62.54
-20.0	136.9	147.7	159.2	-3.0	54.34	57.55	60.89
-19.5	133.0	143.4	154.6	-2.5	52.96	56.06	59.29
-19.0	129.2	139.3	150.0	-2.0	51.63	54.62	57.73
-18.5	125.6	135.3	145.6	-1.5	50.33	53.22	56.22
-18.0	122.1	131.4	141.4	-1.0	49.07	51.86	54.76
-17.5	118.7	127.7	137.3	-0.5	47.84	50.54	53.33
-17.0	115.4	124.1	133.3	0.0	46.65	49.25	51.95
-16.5	112.2	120.6	129.5	0.5	45.49	48.00	50.61
-16.0	109.1	117.2	125.7	1.0	44.37	46.79	49.31
-15.5	106.1	113.9	122.1	1.5	43.27	45.61	48.04
-15.0	103.1	110.7	118.6	2.0	42.21	44.47	46.81
-14.5	100.3	107.6	115.3	2.5	41.17	43.36	45.62
-14.0	97.59	104.6	112.0	3.0	40.17	42.28	44.46
-13.5	94.94	101.7	108.8	3.5	39.19	41.23	43.33
-13.0	92.37	98.88	105.8	4.0	38.24	40.20	42.24
-12.5	89.87	96.16	102.8	4.5	37.31	39.21	41.17
-12.0	87.45	93.52	99.92	5.0	36.41	38.25	40.14
-11.5	85.11	90.96	97.13	5.5	35.53	37.31	39.13
-11.0	82.83	88.48	94.43	6.0	34.68	36.39	38.16
-10.5	80.63	86.07	91.81	6.5	33.85	35.51	37.21
-10.0	78.48	83.74	89.27	7.0	33.05	34.64	36.29
-9.5	76.41	81.48	86.82	7.5	32.26	33.80	35.39
-9.0	74.39	79.29	84.43	8.0	31.50	32.99	34.52
-8.5	72.43	77.16	82.12	8.5	30.75	32.19	33.67

9.0	30.03	31.42	32.84	32.0	10.69	11.09	11.49
9.5	29.33	30.67	32.04	32.5	10.47	10.86	11.26
10.0	28.64	29.94	31.26	33.0	10.24	10.63	11.03
10.5	27.97	29.22	30.50	33.5	10.03	10.41	10.80
11.0	27.32	28.53	29.77	34.0	9.816	10.20	10.59
11.5	26.69	27.86	29.05	34.5	9.609	9.987	10.37
12.0	26.07	27.20	28.35	35.0	9.408	9.782	10.16
12.5	25.47	26.56	27.67	35.5	9.211	9.581	9.957
13.0	24.89	25.94	27.01	36.0	9.019	9.385	9.758
13.5	24.32	25.33	26.37	36.5	8.831	9.194	9.563
14.0	23.76	24.74	25.74	37.0	8.648	9.007	9.372
14.5	23.22	24.17	25.13	37.5	8.469	8.824	9.185
15.0	22.69	23.61	24.54	38.0	8.294	8.645	9.003
15.5	22.18	23.06	23.96	38.5	8.123	8.471	8.825
16.0	21.68	22.53	23.40	39.0	7.957	8.300	8.651
16.5	21.19	22.02	22.85	39.5	7.794	8.134	8.481
17.0	20.72	21.51	22.32	40.0	7.635	7.971	8.315
17.5	20.26	21.02	21.80	40.5	7.479	7.812	8.152
18.0	19.80	20.55	21.30	41.0	7.328	7.657	7.993
18.5	19.36	20.08	20.80	41.5	7.179	7.505	7.838
19.0	18.94	19.63	20.33	42.0	7.034	7.356	7.686
19.5	18.52	19.19	19.86	42.5	6.893	7.211	7.537
20.0	18.11	18.75	19.40	43.0	6.755	7.069	7.391
20.5	17.71	18.33	18.96	43.5	6.619	6.930	7.249
21.0	17.33	17.93	18.53	44.0	6.487	6.795	7.110
21.5	16.95	17.53	18.11	44.5	6.358	6.662	6.974
22.0	16.58	17.14	17.70	45.0	6.232	6.532	6.841
22.5	16.22	16.76	17.30	45.5	6.108	6.405	6.711
23.0	15.87	16.39	16.91	46.0	5.988	6.282	6.584
23.5	15.53	16.03	16.53	46.5	5.870	6.160	6.459
24.0	15.19	15.68	16.16	47.0	5.755	6.042	6.337
24.5	14.87	15.33	15.80	47.5	5.642	5.926	6.218
25.0	14.55	15.00	15.45	48.0	5.532	5.812	6.101
25.5	14.23	14.67	15.12	48.5	5.424	5.701	5.987
26.0	13.91	14.36	14.80	49.0	5.319	5.593	5.875
26.5	13.61	14.05	14.49	49.5	5.216	5.486	5.766
27.0	13.31	13.74	14.18	50.0	5.115	5.382	5.659
27.5	13.02	13.45	13.88	50.5	5.016	5.280	5.553
28.0	12.73	13.16	13.59	51.0	4.919	5.180	5.450
28.5	12.45	12.88	13.31	51.5	4.825	5.083	5.350
29.0	12.18	12.60	13.03	52.0	4.732	4.987	5.251
29.5	11.92	12.34	12.76	52.5	4.642	4.894	5.155
30.0	11.66	12.08	12.49	53.0	4.553	4.802	5.060
30.5	11.41	11.82	12.23	53.5	4.467	4.713	4.968
31.0	11.17	11.57	11.98	54.0	4.382	4.625	4.877
31.5	10.93	11.33	11.73	54.5	4.300	4.540	4.789

55.0	4.219	4.457	4.703	78.0	1.857	1.993	2.138
55.5	4.139	4.374	4.618	78.5	1.826	1.961	2.103
56.0	4.061	4.293	4.534	79.0	1.796	1.929	2.070
56.5	3.985	4.214	4.452	79.5	1.766	1.898	2.037
57.0	3.911	4.137	4.373	80.0	1.737	1.867	2.005
57.5	3.839	4.062	4.295	80.5	1.709	1.837	1.973
58.0	3.767	3.988	4.218	81.0	1.681	1.808	1.942
58.5	3.698	3.916	4.143	81.5	1.653	1.779	1.912
59.0	3.630	3.845	4.070	82.0	1.626	1.750	1.882
59.5	3.563	3.776	3.998	82.5	1.600	1.722	1.852
60.0	3.498	3.708	3.927	83.0	1.574	1.695	1.824
60.5	3.434	3.642	3.859	83.5	1.548	1.668	1.795
61.0	3.371	3.577	3.791	84.0	1.524	1.642	1.767
61.5	3.310	3.513	3.725	84.5	1.499	1.616	1.740
62.0	3.250	3.450	3.660	85.0	1.475	1.590	1.713
62.5	3.191	3.389	3.596	85.5	1.451	1.565	1.687
63.0	3.134	3.329	3.534	86.0	1.428	1.541	1.661
63.5	3.077	3.271	3.473	86.5	1.406	1.517	1.636
64.0	3.022	3.213	3.413	87.0	1.383	1.493	1.611
64.5	2.968	3.157	3.354	87.5	1.361	1.470	1.586
65.0	2.915	3.102	3.297	88.0	1.340	1.447	1.562
65.5	2.863	3.048	3.241	88.5	1.319	1.425	1.538
66.0	2.813	2.995	3.185	89.0	1.298	1.403	1.515
66.5	2.763	2.943	3.131	89.5	1.278	1.381	1.492
67.0	2.714	2.892	3.078	90.0	1.258	1.360	1.470
67.5	2.666	2.842	3.026	90.5	1.238	1.340	1.448
68.0	2.620	2.793	2.975	91.0	1.219	1.319	1.426
68.5	2.574	2.745	2.925	91.5	1.200	1.299	1.405
69.0	2.529	2.698	2.876	92.0	1.181	1.279	1.384
69.5	2.485	2.652	2.828	92.5	1.163	1.260	1.364
70.0	2.442	2.607	2.781	93.0	1.145	1.241	1.343
70.5	2.399	2.563	2.734	93.5	1.128	1.222	1.324
71.0	2.358	2.519	2.689	94.0	1.110	1.204	1.304
71.5	2.317	2.477	2.645	94.5	1.093	1.186	1.285
72.0	2.278	2.435	2.601	95.0	1.077	1.168	1.266
72.5	2.239	2.394	2.558	95.5	1.060	1.151	1.248
73.0	2.200	2.354	2.516	96.0	1.044	1.134	1.229
73.5	2.163	2.315	2.475	96.5	1.028	1.117	1.212
74.0	2.126	2.276	2.435	97.0	1.013	1.100	1.194
74.5	2.090	2.238	2.395	97.5	0.9976	1.084	1.177
75.0	2.055	2.201	2.356	98.0	0.9826	1.068	1.160
75.5	2.020	2.165	2.318	98.5	0.9679	1.052	1.143
76.0	1.986	2.129	2.280	99.0	0.9535	1.037	1.127
76.5	1.953	2.094	2.244	99.5	0.9392	1.022	1.110
77.0	1.920	2.060	2.208	100.0	0.9252	1.007	1.095
77.5	1.888	2.026	2.172	100.5	0.9115	0.9922	1.079

101.0	0.8981	0.9778	1.064	103.5	0.8339	0.9093	0.9906
101.5	0.8848	0.9636	1.049	104.0	0.8218	0.8963	0.9767
102.0	0.8717	0.9497	1.034	104.5	0.8098	0.8835	0.9631
102.5	0.8589	0.9360	1.019	105.0	0.7981	0.8710	0.9497
103.0	0.8463	0.9225	1.005				

6.3 Exhaust temperature sensor 6.339K3954

R25=50KΩ±1%							
B25/50=3950K ±1%							
T [℃]	Rmin [KΩ]	T [℃]	Rmin [KΩ]	T [℃]	Rmin [KΩ]	T [℃]	Rmin [KΩ]
-20	449.9	464.7	479.9	20	61.68	62.44	63.20
-19	425.7	439.5	453.6	21	59.00	59.70	60.40
-18	402.9	415.7	428.8	22	56.44	57.09	57.74
-17	381.5	393.4	405.6	23	54.02	54.61	55.20
-16	361.3	372.3	383.6	24	51.70	52.25	52.80
-15	342.2	352.5	363.0	25	49.50	50.00	50.50
-14	324.3	333.9	343.7	26	47.37	47.87	48.37
-13	307.5	316.4	325.5	27	45.34	45.84	46.34
-12	291.5	299.8	308.3	28	43.41	43.91	44.41
-11	276.6	284.3	292.2	29	41.59	42.08	42.57
-10	262.4	269.6	276.9	30	39.84	40.33	40.82
-9	249.0	255.7	262.5	31	38.18	38.66	39.15
-8	236.5	242.7	249.0	32	36.59	37.07	37.55
-7	224.5	230.3	236.2	33	35.07	35.55	36.03
-6	213.3	218.7	224.2	34	33.64	34.11	34.58
-5	202.7	207.7	212.8	35	32.27	32.73	33.20
-4	192.7	197.3	202.0	36	30.95	31.41	31.87
-3	183.2	187.5	191.9	37	29.70	30.15	30.61
-2	174.3	178.3	182.4	38	28.50	28.95	29.40
-1	165.8	169.5	173.3	39	27.37	27.81	28.25
0	157.7	161.2	164.7	40	26.29	26.72	27.16
1	150.2	153.4	156.7	41	25.24	25.67	26.10
2	142.9	145.9	148.9	42	24.25	24.67	25.09
3	136.1	138.9	141.7	43	23.31	23.72	24.14
4	129.7	132.3	134.9	44	22.41	22.81	23.22
5	123.6	126.0	128.4	45	21.53	21.93	22.33
6	117.8	120.0	122.3	46	20.71	21.10	21.50
7	112.2	114.3	116.4	47	19.92	20.30	20.69
8	107.1	109.0	111.0	48	19.16	19.54	19.92
9	102.1	103.9	105.7	49	18.44	18.81	19.18
10	97.42	99.08	100.8	50	17.75	18.11	18.48
11	92.97	94.51	96.06	51	17.08	17.44	17.80
12	88.74	90.17	91.61	52	16.44	16.79	17.14
13	84.73	86.05	87.38	53	15.84	16.18	16.53
14	80.92	82.14	83.37	54	15.26	15.59	15.93
15	77.29	78.42	79.56	55	14.69	15.02	15.35
16	73.84	74.89	75.95	56	14.16	14.48	14.81
17	70.57	71.54	72.51	57	13.65	13.96	14.28
18	67.46	68.35	69.25	58	13.15	13.46	13.77
19	64.49	65.32	66.15	59	12.69	12.99	13.30

60	12.23	12.53	12.83	90	4.474	4.628	4.787
61	11.80	12.09	12.39	91	4.338	4.489	4.645
62	11.39	11.67	11.96	92	4.207	4.354	4.506
63	10.98	11.26	11.54	93	4.081	4.225	4.374
64	10.60	10.87	11.15	94	3.958	4.099	4.245
65	10.23	10.50	10.77	95	3.840	3.978	4.121
66	9.880	10.14	10.41	96	3.726	3.861	4.001
67	9.537	9.792	10.05	97	3.616	3.748	3.885
68	9.211	9.460	9.715	98	3.509	3.639	3.773
69	8.897	9.141	9.391	99	3.407	3.534	3.665
70	8.595	8.834	9.078	100	3.308	3.432	3.560
71	8.306	8.539	8.778	101	3.212	3.333	3.459
72	8.028	8.256	8.490	102	3.119	3.238	3.361
73	7.759	7.983	8.212	103	3.030	3.146	3.267
74	7.501	7.720	7.944	104	2.942	3.056	3.174
75	7.254	7.468	7.687	105	2.858	2.970	3.086
76	7.016	7.225	7.440	106	2.778	2.887	3.000
77	6.786	6.991	7.201	107	2.699	2.806	2.917
78	6.565	6.765	6.971	108	2.623	2.728	2.837
79	6.352	6.548	6.749	109	2.549	2.652	2.758
80	6.147	6.339	6.536	110	2.479	2.579	2.683
81	5.950	6.138	6.331	111	2.410	2.508	2.610
82	5.761	5.944	6.133	112	2.343	2.439	2.539
83	5.578	5.757	5.942	113	2.279	2.373	2.471
84	5.401	5.577	5.758	114	2.216	2.308	2.404
85	5.231	5.403	5.580	115	2.156	2.246	2.340
86	5.069	5.237	5.410	116	2.097	2.186	2.278
87	4.912	5.076	5.245	117	2.040	2.127	2.217
88	4.760	4.921	5.087	118	1.985	2.070	2.158
89	4.615	4.772	4.934	119	1.932	2.015	2.102
				120	1.880	1.962	2.047