DUCTED AIR HANDLER & CONDENSER
SERVICE MANUAL

Models Covered:

ACiQ-12-AHB
ACiQ-18-AHB
ACiQ-30-AHB
ACiQ-36-AHB
ACiQ-48-AHB
ACiQ-60-AHB

ACiQ-12-EHPB
ACiQ-18-EHPB
ACiQ-24-EHPB
ACiQ-30-EHPB
ACiQ-36-EHPB
ACiQ-48-EHPB
ACiQ-18-HPB
ACiQ-24-HPB
ACiQ-30-HPB
ACiQ-36-HPB
ACiQ-60-HPB

ACiQ-36-HPC

VERSION DATE: 06-08-24

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1. Indoor Unit - Air Handler Type

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1. Model Reference

Refer to the following table to determine the speci c indoor and outdoor unit model number of your purchased equipment.

Indoor Unit Model		Outdoor Unit Model	Capacity (Btu/h)	Power Supply
AHU	ACiQ-12-AHB	ACiQ-12-EHPB	12k	1Ph, 208/230V~, 60Hz
	ACiQ-18-AHB	ACiQ-18-EHPB	18k	
		ACiQ-18-HPB		
	ACiQ-24-AHB	ACiQ-24-HPB	24k	
		ACiQ-24-EHPB		
	ACiQ-30-AHB	ACiQ-30-EHPB	30k	
		ACiQ-30-HPB		
	ACiQ-36-AHB	ACiQ-36-EHPB	36k	
		ACiQ-36-HPB		
		ACiQ-36-HPC		
	ACiQ-48-AHB	ACiQ-48-HPB	48k	
		ACiQ-48-EHPB		
	ACiQ-60-AHB	ACiQ-60-EHPB	60k	
		ACiQ-60-HPB		

2. External Appearance

2.1 Indoor Unit

Air handler

2.2 Outdoor Unit

Single Fan Outdoor Unit	Double Fan Outdoor Unit

Indoor Unit-Air Handler

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1. Feature

1.1 Full Multi-position installation

- This AHU is capable of up ow, down ow, horizontal left, or horizontal right con gurations.

1.2 Installation Convenience

- It simpli es the air ow volume adjustment process and saves lots of installation efforts. The traditional adjustment method needs the installers to manually set the motor speed, according to the installation instruction and ducting design. It takes lots of time if this thing doesn't go well and decreases the marginal pro ts.

1.3 Easy Fault Code Checking

- Thanks to advanced mutual data communication technology, the AHU system can intelligently self-detecting the failure cause and generate a corresponding code.
- Installer or user can easily check the fault code displayed on the electric function board by just opening the lid.
- It helps you proactively determine the failure cause, prepare for repairing parts ahead of eld maintenance work, greatly improve the work ef ciency.

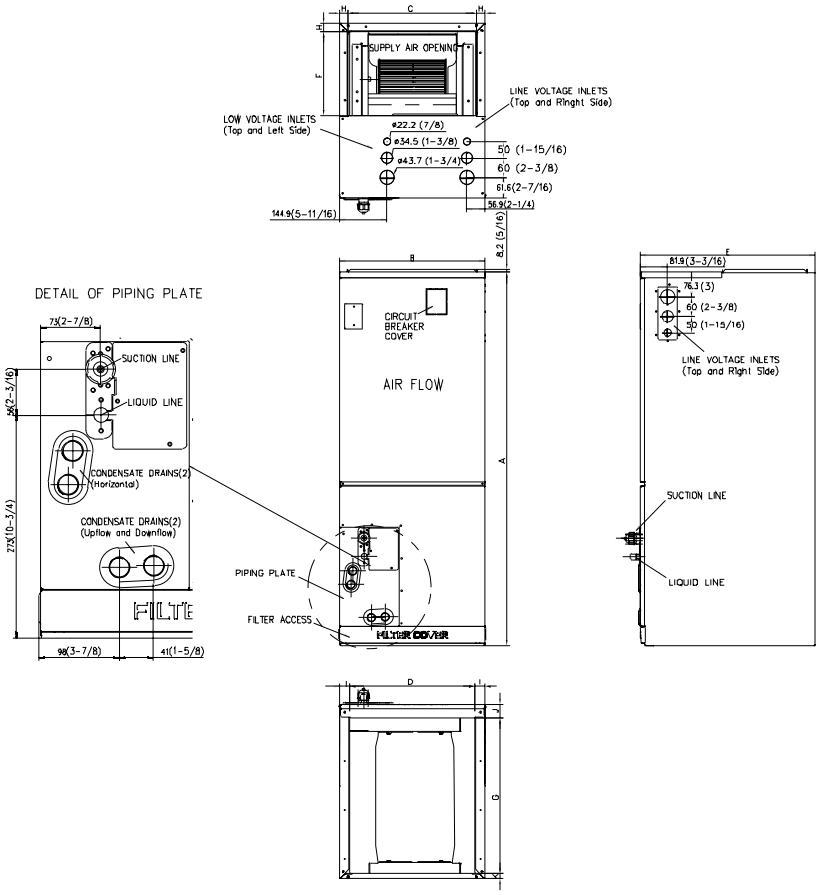
1.4 Nitrogen Charge and Leakage Check Valve

- ACiQ AHU indoor unit is standard with Nitrogen injection to maintain positive pressure of the indoor unit. It is easy to check from the check valve whether there is leakeage in the evaporator or not.

1.5 Automatic Airflow Adjustment

- During the operation, when the dust lter or evaporator is clogged with dust, the load of the system and motor torque increases. The MPU(microprocessor) on the unit can detect this change and adjust the fan speed to keep the CFM stable.

2. Dimensional Drawings

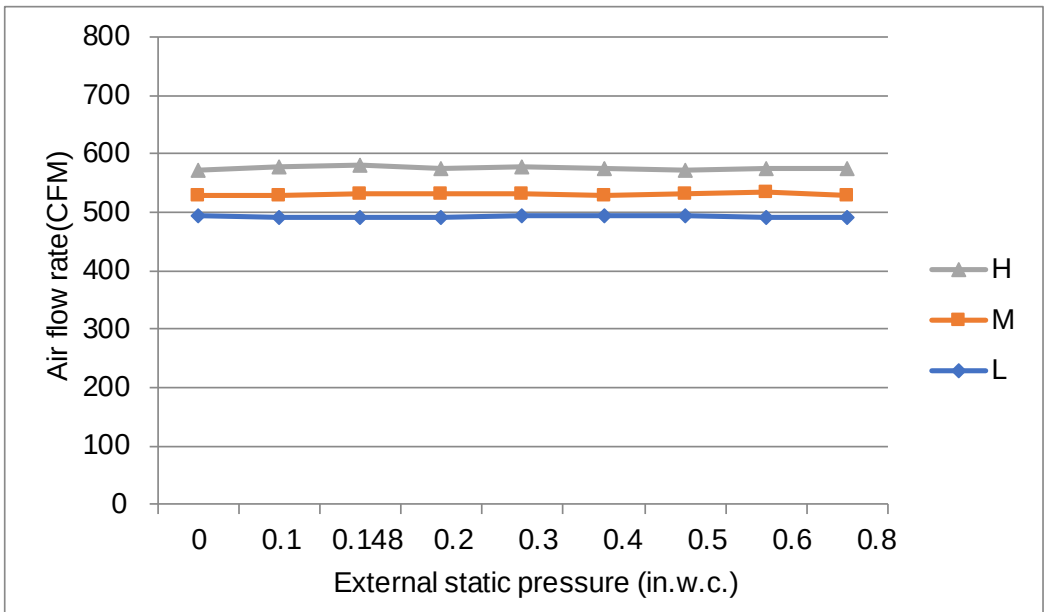


Dimensions / Model		12K/18k/24k		30k/36/48k		60k	
		inch	mm	inch	mm	inch	mm
A	Model Height	45	1143	49	1245	53	1346
B	Model Width	17-1/2	445	21	534	24-1/2	622
C	Supply Air Opening Width	15-5/8	397	19-1/8	486	22-5/8	575
D	Return Air Opening Width	15-1/8	384	18-5/8	473	22-1/8	562
E	Model Depth	21	534	21	534	21	534
F	Supply Air Opening Depth	10-1/4	260	10-1/4	260	10-1/4	260
G	Return Air Opening Depth	18-3/4	476	18-3/4	476	18-3/4	476
H	Supply Air Opening Clearance	15/16	24	15/16	24	15/16	24
I	Return Air Opening Side Clearance	1-1/4	32	1-1/4	32	1-1/8	28
J	Return Air Opening Front Clearance	1-1/2	38	1-5/8	41	1-5/8	41
K	Return Air Opening Back Clearance	5/8	16	5/8	16	3/4	19

6. Fan Performance

6.1 ACiQ-12-AHB & ACiQ-18-AHB

Vertical, Horizontal Right, Horizontal Left



Use the remote controller

1.Indoor unit need to turn off for 5 minutes then power on(all of setting need to nish within 10 minutes)

2.Keep push for 7 seconds with ON/OFF and FAN SPEED togher to get in Engineer mode

3.Choose channel 23(for cooling) and 25(for heating) with UP and Down button

4.After choose channel 23 or 25 then keep push ON/OFF for 2 seconds to select -41, -40,……, -1, 0, 1,2,3……19 20(reference the matrix list to identify the relative CFM)

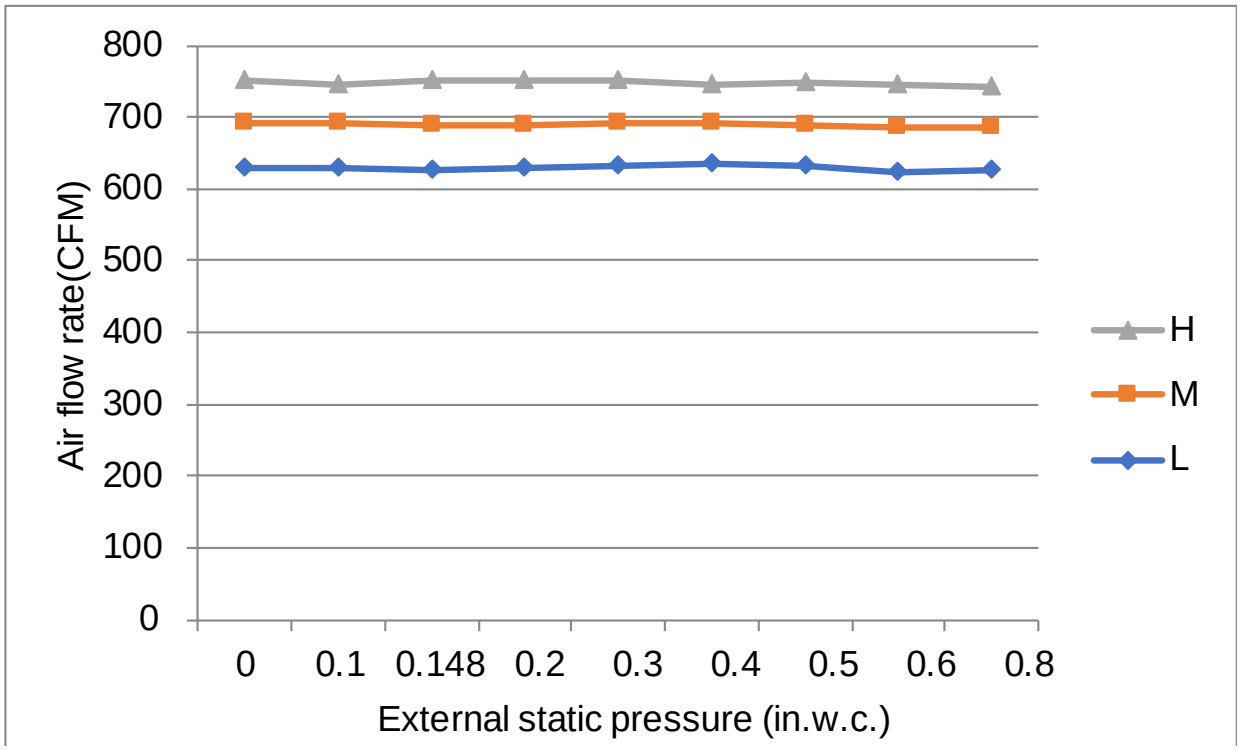
5.Push the button OK to con rm the adjustment value,the display board will display with CS mean success(for setting),then disconnect power after 5 seconds

Cooling	Default	-1	-2	-3	-4	-5	-6	-7
Turbo	618	598	578	558	538	518	498	478
High	576	556	536	516	496	476	456	436
Medium	529	509	489	469	449	429	418	418
Low	488	468	448	428	408	400	400	400
Cooling	Default	-8	-9 ~ -40	+1	+2	+3	+4	+5 ~ +20
Turbo	618	458	453	635	635	635	635	635
High	576	435	435	596	616	618	618	618
Medium	529	418	418	549	569	589	600	600
Low	488	400	400	508	528	548	568	582

Heating	Default	-1	-2	-3	-4	-5	-6 ~ -40	+1	+2
Turbo	565	545	525	505	485	465	453	585	605
High	541	521	501	481	461	441	435	561	581
Medium	435	418	418	418	418	418	418	455	475
Low	400	400	400	400	400	400	400	420	440
Heating	Default	+3	+4	+5	+6	+7	+8	+9	+10~+20
Turbo	565	625	635	635	635	635	635	635	635
High	541	601	618	618	618	618	618	618	618
Medium	435	495	515	535	555	575	595	600	600
Low	400	460	480	500	520	540	560	580	582

6.2 **ACiQ-24-AHB**

Vertical, Horizontal Right, Horizontal Left



Use the remote controller

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2.Keep push for 7 seconds with ON/OFF and FAN SPEED togher to get in Engineer mode

3.Choose channel 23(for cooling) and 25(for heating) with UP and Down button

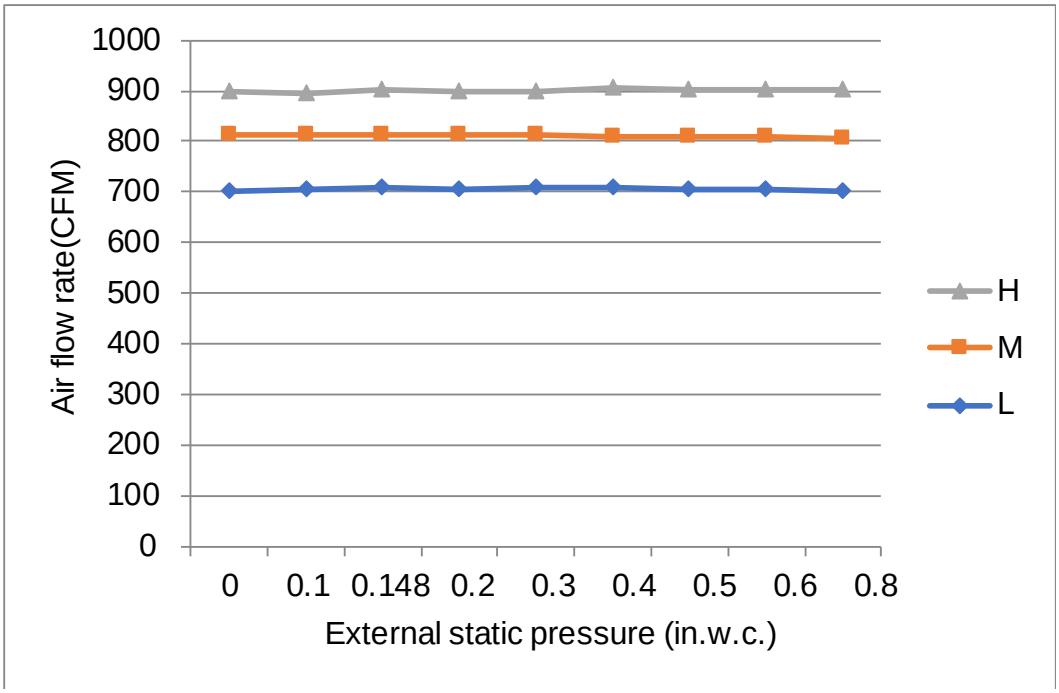
4.After choose channel 23 or 25 then keep push ON/OFF for 2 seconds to select -41, -40,……, -1, 0, 1,2,3……19 20(reference the matrix list to identify the relative CFM)

5.Push the button OK to con rm the adjustment value,the display board will display with CS mean success(for setting),then disconnect power after 5 seconds

Cooling	Default	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
Turbo	988	804	784	764	744	724	704	684	664	644	624
High	894	739	719	699	679	659	639	619	599	579	559
Medium	806	674	654	634	614	594	574	554	534	514	494
Low	712	609	589	569	549	529	509	489	469	449	429
Cooling	Default	-11	-12	-13	-14	-15	-16	-17	-18	-19~-40	+1
Turbo	988	604	584	564	544	524	504	484	464	453	844
High	894	539	519	499	479	459	439	435	435	435	779
Medium	806	474	454	434	418	418	418	418	418	418	714
Low	712	409	400	400	400	400	400	400	400	400	649
Cooling	Default	+2	+3	+4	+5	+6	+7	+8	+9~+20		
Turbo	988	853	853	853	853	853	853	853	853		
High	894	799	819	835	835	835	835	835	835		
Medium	806	734	754	774	794	814	818	818	818		
Low	712	669	689	709	729	749	769	789	800		

6.3 **ACiQ-30-AHB**

Vertical, Horizontal Right, Horizontal Left



Use the remote controller

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2.Keep push for 7 seconds with ON/OFF and FAN SPEED togher to get in Engineer mode

3.Choose channel 23(for cooling) and 25(for heating) with UP and Down button

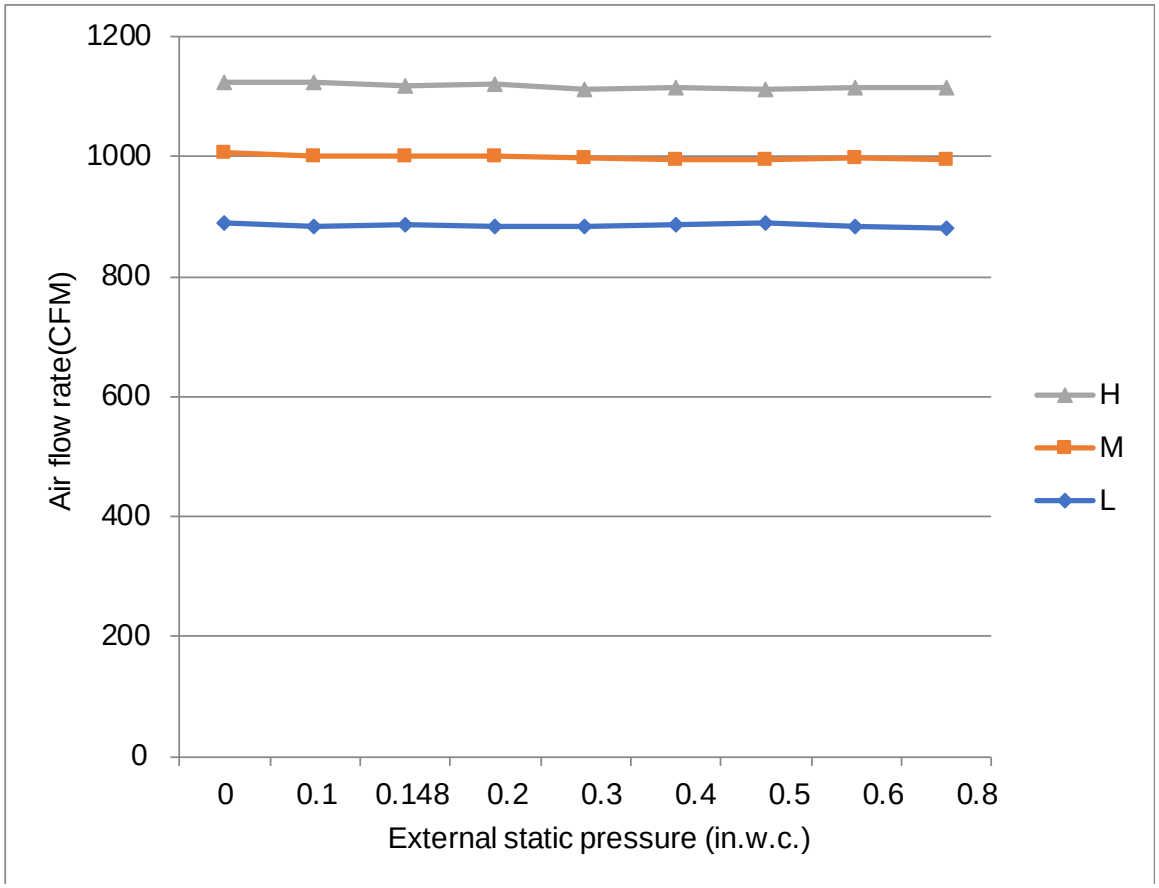
4.After choose channel 23 or 25 then keep push ON/OFF for 2 seconds to select -41, -40,……, -1, 0, 1,2,3……19 20(reference the matrix list to identify the relative CFM)

5.Push the button OK to con rm the adjustment value,the display board will display with CS mean success(for setting),then disconnect power after 5 seconds

Cooling	Default	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11
Turbo	988	968	948	928	908	888	868	848	828	808	788	768
High	894	874	854	834	814	794	774	754	734	714	694	674
Medium	806	786	766	746	726	706	686	666	646	626	606	586
Low	712	692	672	652	632	612	592	572	552	532	512	492
Cooling	Default	-12	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22
Turbo	988	748	728	708	688	668	648	628	608	588	568	548
High	894	654	634	614	594	574	554	534	514	494	474	454
Medium	806	566	546	526	506	486	466	446	426	418	418	418
Low	712	472	452	432	412	400	400	400	400	400	400	400
Cooling	Default	-23	-24	-25	-26	+1	+2	+3	+4	+5	+6	+7
Turbo	988	528	508	488	468	988	1008	1028	1048	1068	1071	1071
High	894	435	435	435	435	894	914	934	954	974	994	1014
Medium	806	418	418	418	418	806	826	846	866	886	906	926
Low	712	400	400	400	400	712	732	752	772	792	812	832
Cooling	Default	+8	+9	+10	+11	+12	+13	+14	+15	+16	+17~+20	
Turbo	988	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	
High	894	1034	1053	1053	1053	1053	1053	1053	1053	1053	1053	
Medium	806	946	966	986	1006	1026	1035	1035	1035	1035	1035	
Low	712	852	872	892	912	932	952	972	992	1012	1018	

6.4 **ACiQ-36-AHB**

Vertical, Horizontal Right, Horizontal Left



Use the remote controller

1.Indoor unit need to turn off for 5 minutes then power on(all of setting need to nish within 10 minutes)

2.Keep push for 7 seconds with ON/OFF and FAN SPEED togher to get in Engineer mode

3.Choose channel 23(for cooling) and 25(for heating) with UP and Down button

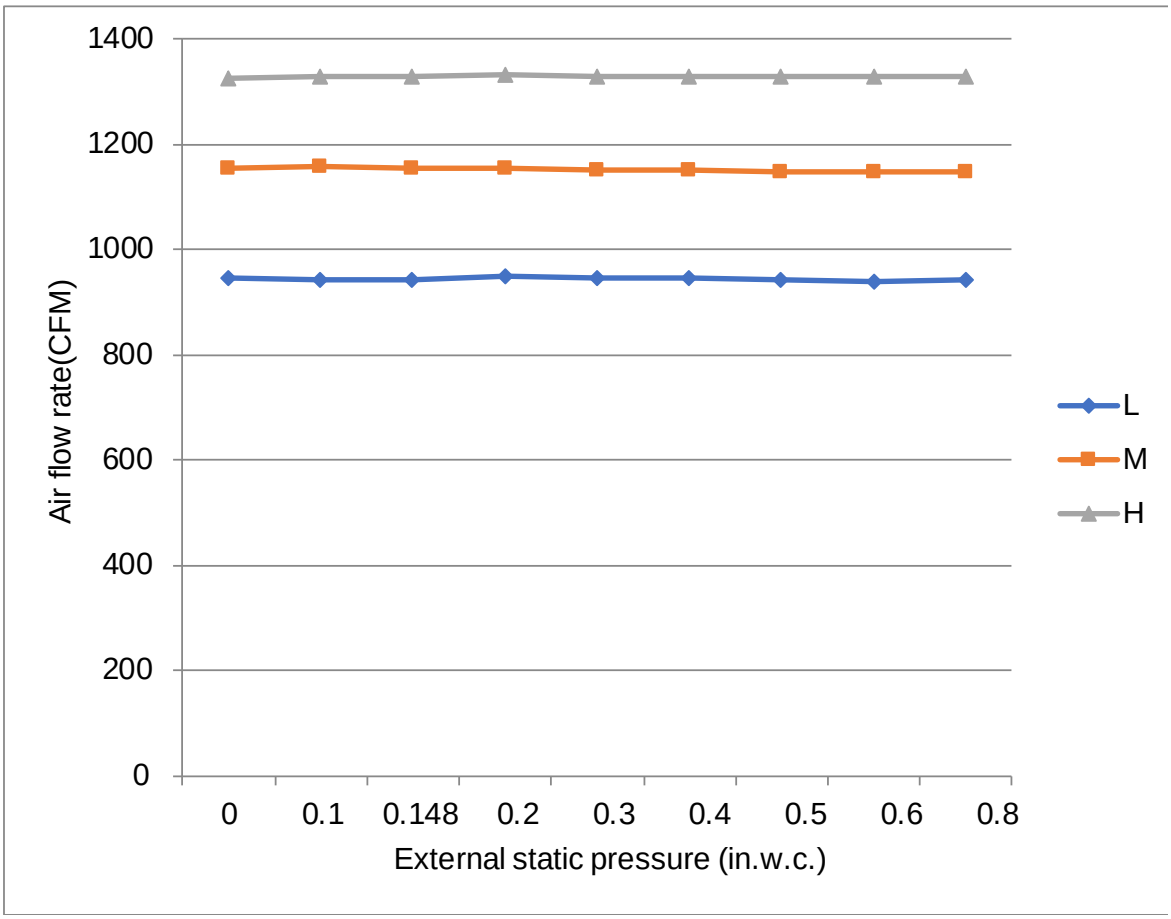
4.After choose channel 23 or 25 then keep push ON/OFF for 2 seconds to select -41, -40,……, -1, 0, 1,2,3……19 20(reference the matrix list to identify the relative CFM)

5.Push the button OK to con rm the adjustment value,the display board will display with CS mean success(for setting),then disconnect power after 5 seconds

Cooling	Default	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
Turbo	1188	1168	1148	1128	1108	1088	1068	1048	1028	1008	988	968	948
High	1082	1062	1042	1022	1002	982	962	942	922	902	882	862	842
Medium	971	951	931	911	891	871	851	831	811	791	771	751	731
Low	865	845	825	805	785	765	745	725	705	685	665	645	625
Cooling	Default	-13	-14	-15	-16	-17	-18	-19	-20	-21	-22	-23	-24
Turbo	1188	928	908	888	868	848	828	808	788	768	748	728	708
High	1082	822	802	782	762	742	722	702	682	662	642	622	602
Medium	971	711	691	671	651	631	611	591	571	551	531	511	491
Low	865	605	585	565	545	525	505	485	465	445	425	405	400
Cooling	Default	-25	-26	-27	-28	-29	-30	-31	-32	-33	-34	-35	-36
Turbo	1188	688	668	648	628	608	588	568	548	528	508	488	468
High	1082	582	562	542	522	502	482	462	442	435	435	435	435
Medium	971	471	451	431	418	418	418	418	418	418	418	418	418
Low	865	400	400	400	400	400	400	400	400	400	400	400	400

6.5 **ACiQ-48-AHB**

Vertical, Horizontal Right, Horizontal Left



Use the remote controller

1.Indoor unit need to turn off for 5 minutes then power on(all of setting need to nish within 10 minutes)

2.Keep push for 7 seconds with ON/OFF and FAN SPEED togher to get in Engineer mode

3.Choose channel 23(for cooling) and 25(for heating) with UP and Down button

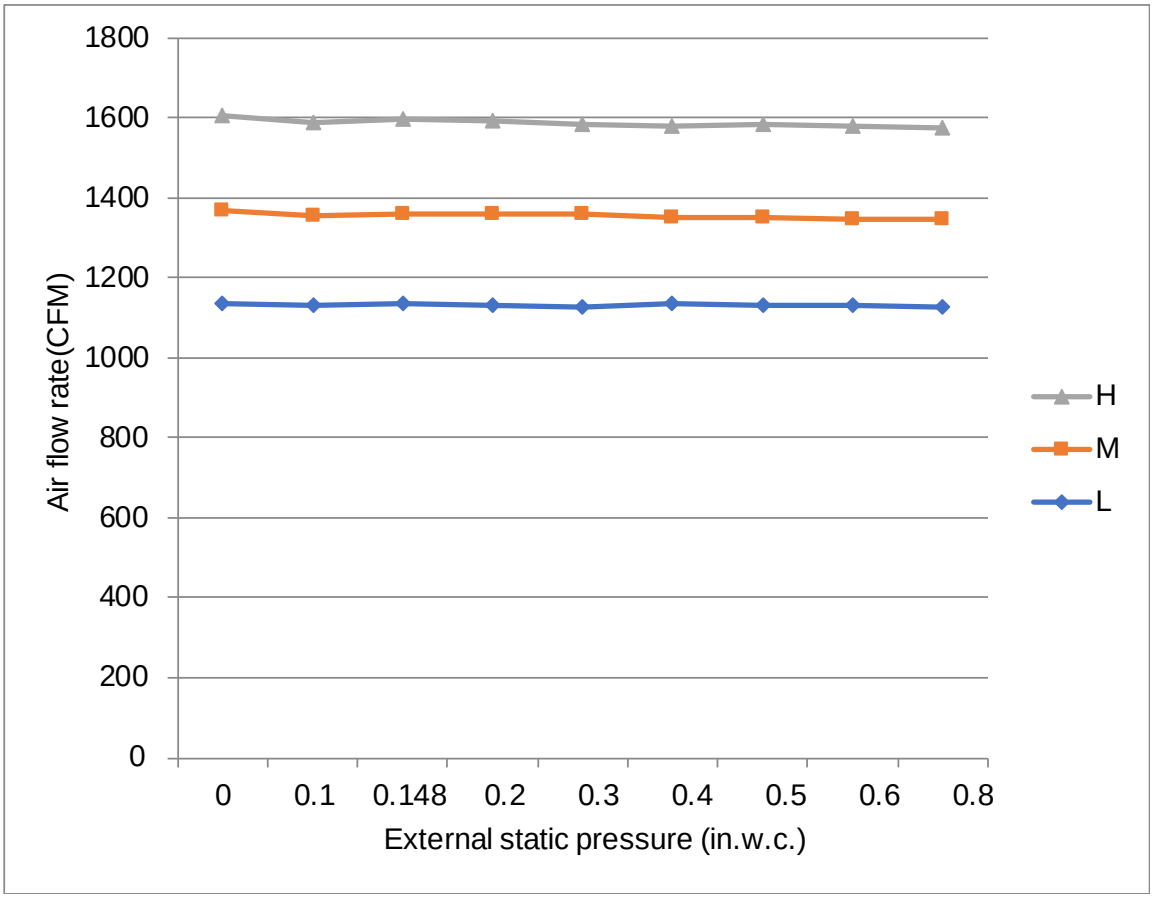
4.After choose channel 23 or 25 then keep push ON/OFF for 2 seconds to select -41, -40,……, -1, 0, 1,2,3……19 20(reference the matrix list to identify the relative CFM)

5.Push the button OK to con rm the adjustment value,the display board will display with CS mean success(for setting),then disconnect power after 5 seconds

Cooling	Default	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
Turbo	1471	1451	1431	1411	1391	1371	1351	1331	1311	1291	1271
High	1282	1262	1242	1222	1202	1182	1162	1142	1122	1102	1082
Medium	1094	1074	1054	1034	1014	994	974	954	934	914	894
Low	906	886	866	846	826	806	786	766	746	726	706
Cooling	Default	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20
Turbo	1471	1251	1231	1211	1191	1171	1151	1131	1111	1091	1071
High	1282	1062	1042	1022	1002	982	962	942	922	902	882
Medium	1094	874	854	834	814	794	774	754	734	714	694
Low	906	686	666	646	626	606	586	566	546	526	506
Cooling	Default	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30
Turbo	1471	1051	1031	1011	991	971	951	931	911	891	871
High	1282	862	842	822	802	782	762	742	722	702	682
Medium	1094	674	654	634	614	594	574	554	534	514	494
Low	906	486	466	465	465	465	465	465	465	465	465

6.6 **ACiQ-60-AHB**

Vertical, Horizontal Right, Horizontal Left



Use the remote controller

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2.Keep push for 7 seconds with ON/OFF and FAN SPEED togher to get in Engineer mode

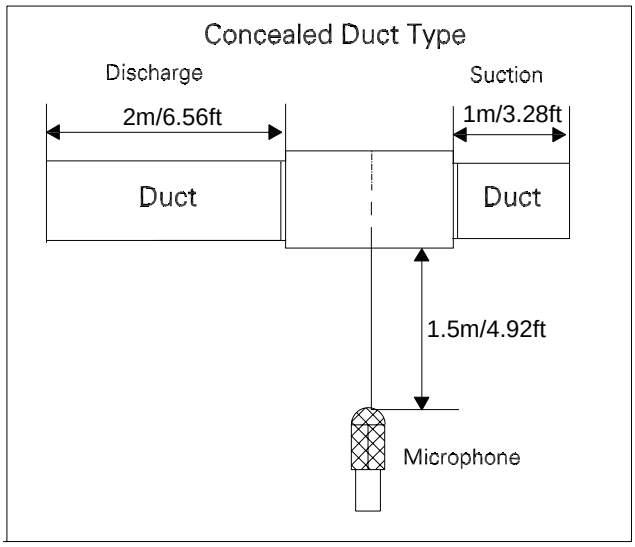
3.Choose channel 23(for cooling) and 25(for heating) with UP and Down button

4.After choose channel 23 or 25 then keep push ON/OFF for 2 seconds to select -41, -40,……, -1, 0, 1,2,3……19 20(reference the matrix list to identify the relative CFM)

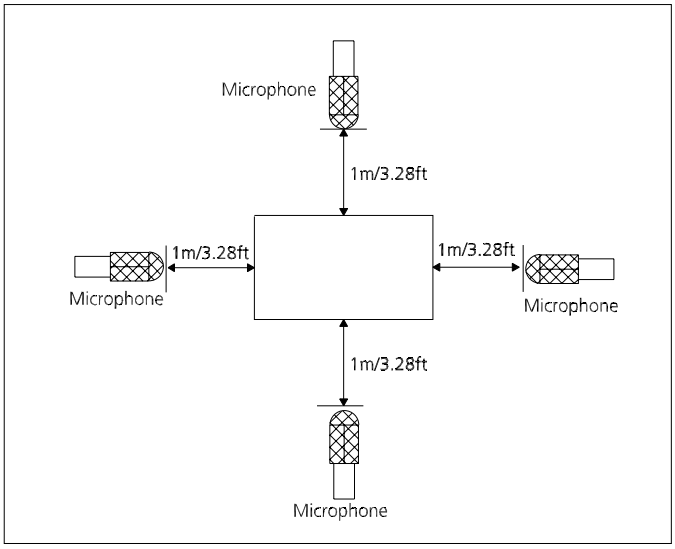
5.Push the button OK to con rm the adjustment value,the display board will display with CS mean success(for setting),then disconnect power after 5 seconds

Cooling	Default	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
Turbo	1806	1786	1766	1746	1726	1706	1686	1666	1646	1626	1606
High	1582	1562	1542	1522	1502	1482	1462	1442	1422	1402	1382
Medium	1359	1339	1319	1299	1279	1259	1239	1219	1199	1179	1159
Low	1135	1115	1095	1075	1055	1035	1015	995	975	955	935
Cooling	Default	-11	-12	-13	-14	-15	-16	-17	-18	-19	-20
Turbo	1806	1586	1566	1546	1526	1506	1486	1466	1446	1426	1406
High	1582	1362	1342	1322	1302	1282	1262	1242	1222	1202	1182
Medium	1359	1139	1119	1099	1079	1059	1039	1019	999	979	959
Low	1135	915	895	875	855	835	815	795	775	755	735
Cooling	Default	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30
Turbo	1806	1386	1366	1346	1326	1306	1286	1266	1246	1226	1206
High	1582	1162	1142	1122	1102	1082	1062	1042	1022	1002	982
Medium	1359	939	919	899	879	859	839	819	799	779	759
Low	1135	715	695	694	694	694	694	694	694	694	694

7. Noise Criterion Curves



Horizontal installation



Vertical installation

(H= 0.5 × (height of unit+1))

Notes:

-Sound measured at 1.5m/4.92ft(Horizontal installation) /1m/3.28ft(Vertical installation) away from the center of the unit.

-Data is valid at free eld condition

-Data is valid at nominal operation condition

-Reference acoustic pressure OdB = 20µPa

-Sound level will vary depending on a range of factors such as the construction -(acoustic absorption coef cient) of particular room in which the equipment is installed.

-The operating conditions are assumed to be standard.

ACiQ-12-AHB & ACiQ-18-AHB

ACiQ-24-AHB

ACiQ-30-AHB

ACiQ-36-AHB

ACiQ-48-AHB

ACiQ-60-AHB

8. Electrical Characteristics

Capacity (Btu/h)		12K/18k	24k	30k
Power (indoor)	Phase	1	1	1
	Frequency And Volt	208/230V,60Hz		
Power (Outdoor)	Phase	1	1	1
	Frequency And Volt	208/230V,60Hz		
Max. Fuse	Indoor unit(A)	15	15	15
	Outdoor unit(A)	20	30	35
Indoor unit Power line	Line quantity	3	3	3
	Line diameter(AWG)	16/1.5mm²	16/1.5mm²	16/1.5mm²
Outdoor unit Power line	Line quantity	3	3	3
	Line diameter(AWG)	14/2.5mm²	12/4.0mm²	12/4.0mm²
Outdoor-indoor Signal line	Line quantity	2	2	2
	Line diameter(AWG)	20/0.5mm²	20/0.5mm²	20/0.5mm²
Thermostat Signal line	Line quantity			
	Line diameter(AWG)	18/1.0mm²	18/1.0mm²	18/1.0mm²

Capacity (Btu/h)		36k	48k	60k
Power (indoor)	Phase	1	1	1
	Frequency And Volt	208/230V,60Hz		
Power (Outdoor)	Phase	1	1	1
	Frequency And Volt	208/230V,60Hz		
Max. Fuse	Indoor unit(A)	15	15	15
	Outdoor unit(A)	40	50	60
Indoor unit Power line	Line quantity	3	3	3
	Line diameter(AWG)	16/1.5mm²	16/1.5mm²	16/1.5mm²
Outdoor unit Power line	Line quantity	3	3	3
	Line diameter(AWG)	12/4.0mm²	10/6.0mm²	10/6.0mm²
Outdoor-indoor Signal line	Line quantity	2	2	2
	Line diameter(AWG)	20/0.5mm²	20/0.5mm²	20/0.5mm²
Thermostat Signal line	Line quantity			
	Line diameter(AWG)	18/1.0mm²	18/1.0mm²	18/1.0mm²

Capacity (Btu/h)		18k hyper Heat	24k hyper Heat	30k hyper Heat
Power (indoor)	Phase	1	1	1
	Frequency And Volt	208/230V,60Hz		
Power (Outdoor)	Phase	1	1	1
	Frequency And Volt	208/230V,60Hz		
Max. Fuse	Indoor unit(A)	15	15	15
	Outdoor unit(A)	20	35	35
Indoor unit Power line	Line quantity	3	3	3
	Line diameter(AWG)	16/1.5mm²	16/1.5mm²	16/1.5mm²
Outdoor unit Power line	Line quantity	3	3	3
	Line diameter(AWG)	12/4.0mm²	12/4.0mm²	12/4.0mm²
Outdoor-indoor Signal line	Line quantity	2	2	2
	Line diameter(AWG)	20/0.5mm²	20/0.5mm²	20/0.5mm²
Thermostat Signal line	Line quantity			
	Line diameter(AWG)	18/1.0mm²	18/1.0mm²	18/1.0mm²

Capacity (Btu/h)		36k hyper Heat*1	36k hyper Heat*2	48k hyper Heat	60k hyper Heat
Power (indoor)	Phase	1	1	1	1
	Frequency And Volt	208/230V,60Hz			
Power (Outdoor)	Phase	1	1	1	1
	Frequency And Volt		208/230V,60Hz		
Max. Fuse	Indoor unit(A)	15	15	15	15
	Outdoor unit(A)	35	50	50	60
Indoor unit Power line	Line quantity	3	3	3	3
	Line diameter(AWG)	16/1.5mm²	16/1.5mm²	16/1.5mm²	16/1.5mm²
Outdoor unit Power line	Line quantity	3	3	3	3
	Line diameter(AWG)	10/6.0mm²	8/8.0mm²	8/8.0mm²	8/8.0mm²
Outdoor-indoor Signal line	Line quantity	2	2	2	2
	Line diameter(AWG)	20/0.5mm²	20/0.5mm²	20/0.5mm²	20/0.5mm²
Thermostat Signal line	Line quantity				
	Line diameter(AWG)	18/1.0mm²	18/1.0mm²	18/1.0mm²	18/1.0mm²

36k hyper Heat*1 is match with ACiQ-36-HPC.

36k hyper Heat*2 is match with ACiQ-36-HPB.

9. Electrical Wiring Diagrams

IDU Capacity (Btu/h)	IDU Wiring Diagram
12k~60k	16023000013937

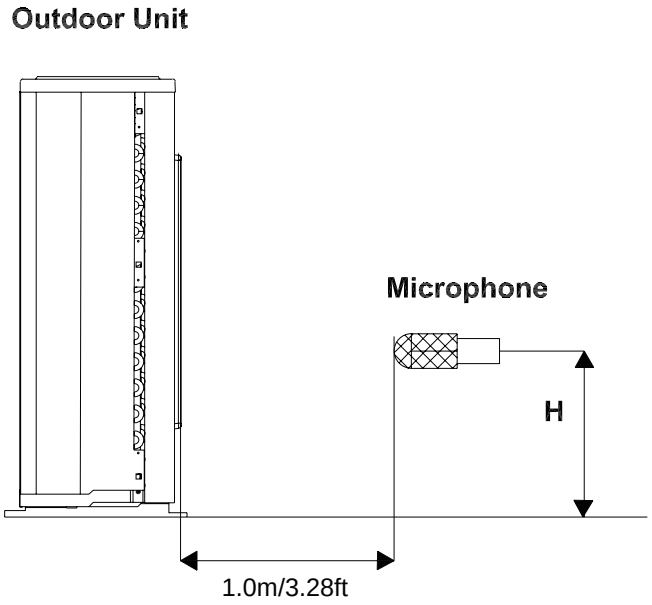
Abbreviation	Paraphrase
Y/G	Yellow-Green Conductor
CAP	Indoor Fan Capacitor
FAN	Indoor Fan Motor
ECM	Indoor ECM Motor
TO CCM Comm.Bus	Central Controller
T1	Indoor Room Temperature Sensor
T2A	Indoor Coil Inlet Temperature Sensor
T2B	Indoor Coil Outlet Temperature Sensor
T2	Indoor Coil Temperature Sensor

1. Dimensional Drawings

Please check the corresponding dimensional drawing according to the panel plate.

Outdoor Unit Model	Panel Plate
ACiQ-12-EHPB	X330
ACiQ-18-EHPB	X330
ACiQ-18-HPB	X430
ACiQ-24-HPB	D30
ACiQ-24-EHPB	X430
ACiQ-30-EHPB	D30
ACiQ-30-HPB	D30
ACiQ-36-EHPB	D30
ACiQ-36-HPC	X630
ACiQ-36-HPB	E30
ACiQ-48-HPB	E30
ACiQ-48-EHPB	E30
ACiQ-60-EHPB	E30
ACiQ-60-HPB	E30

4. Noise Criterion Curves



Note: H= 0.5 × height of outdoor unit

Notes:

-Sound measured at 1.0m/3.25ft away from the center of the unit.

-Data is valid at free eld condition

-Data is valid at nominal operation condition

-Reference acoustic pressure OdB=20μPa

-Sound level will vary depending on arrange off actors such as the construction (acoustic absorption coef cient) of particular room in which the equipment is installed.

-The operating conditions are assumed to be standard.

ACiQ-12-EHPB & ACiQ-18-EHPB

ACiQ-24-EHPB

ACiQ-30-EHPB

ACiQ-36-EHPB

ACiQ-48-EHPB

ACiQ-60-EHPB

ACiQ-18-HPB

ACiQ-24-HPB

ACiQ-30-HPB

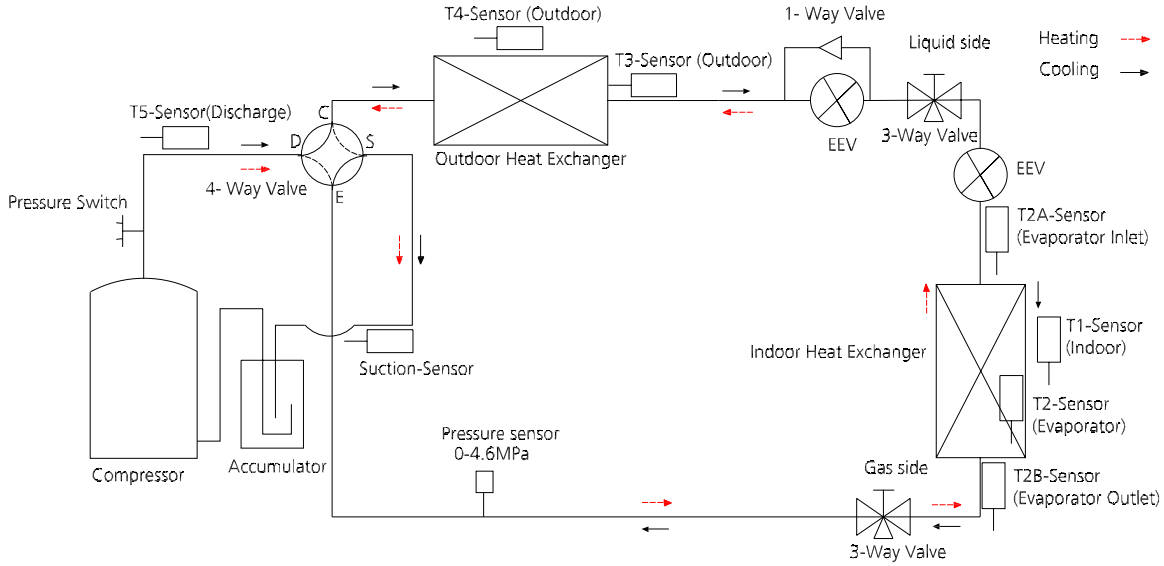
ACiQ-36-HPB

ACiQ-48-HPB

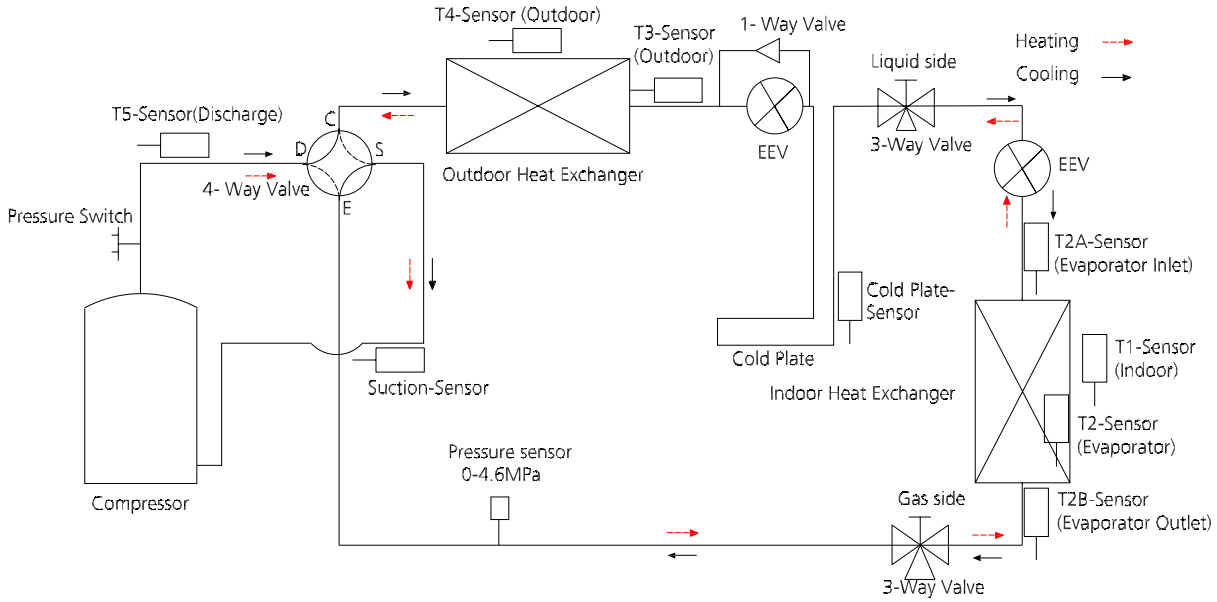
ACiQ-60-HPB

ACiQ-36-HPC

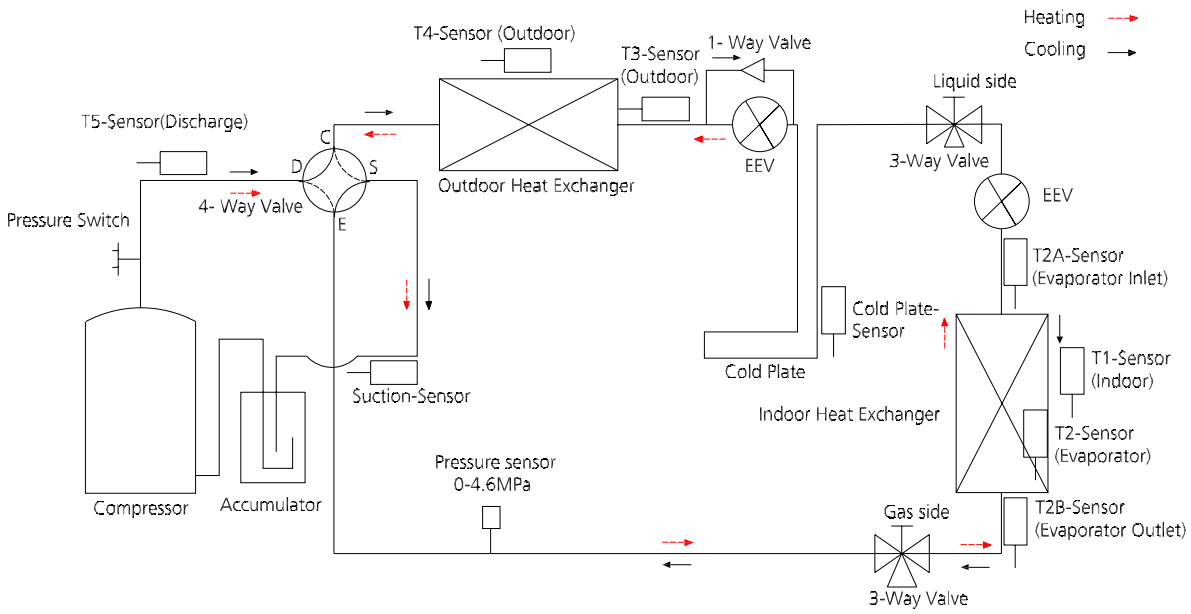
5. Refrigerant Cycle Diagrams



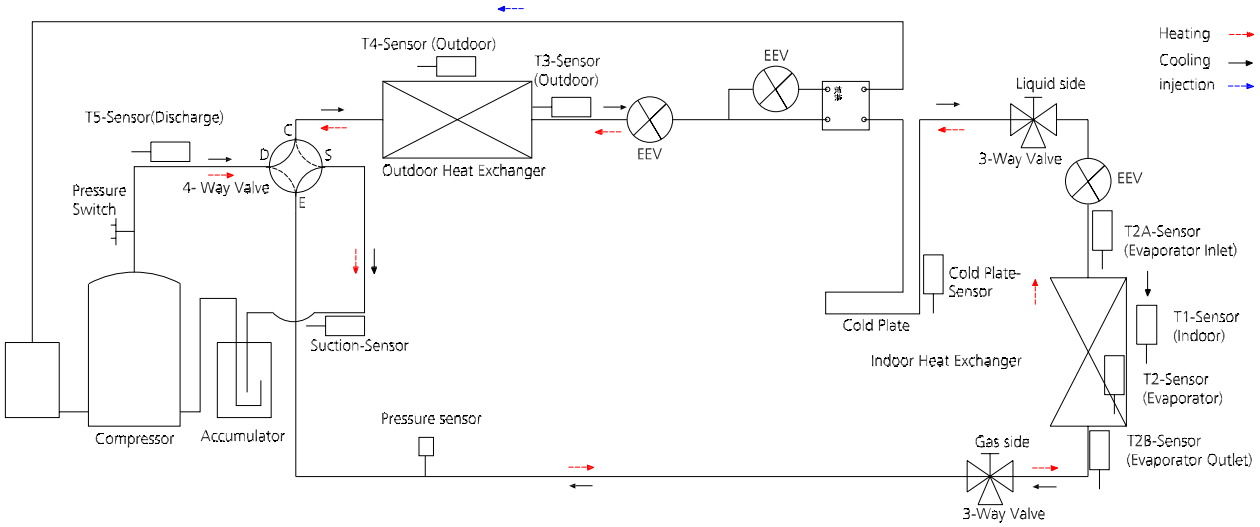
Model No.	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
ACiQ-12-EHPB & ACiQ-18-EHPB	19(3/4)	9.52(3/8)	7.5/24.6	30/98.4	0	20/65.6	65g/m (0.69oz/ft)



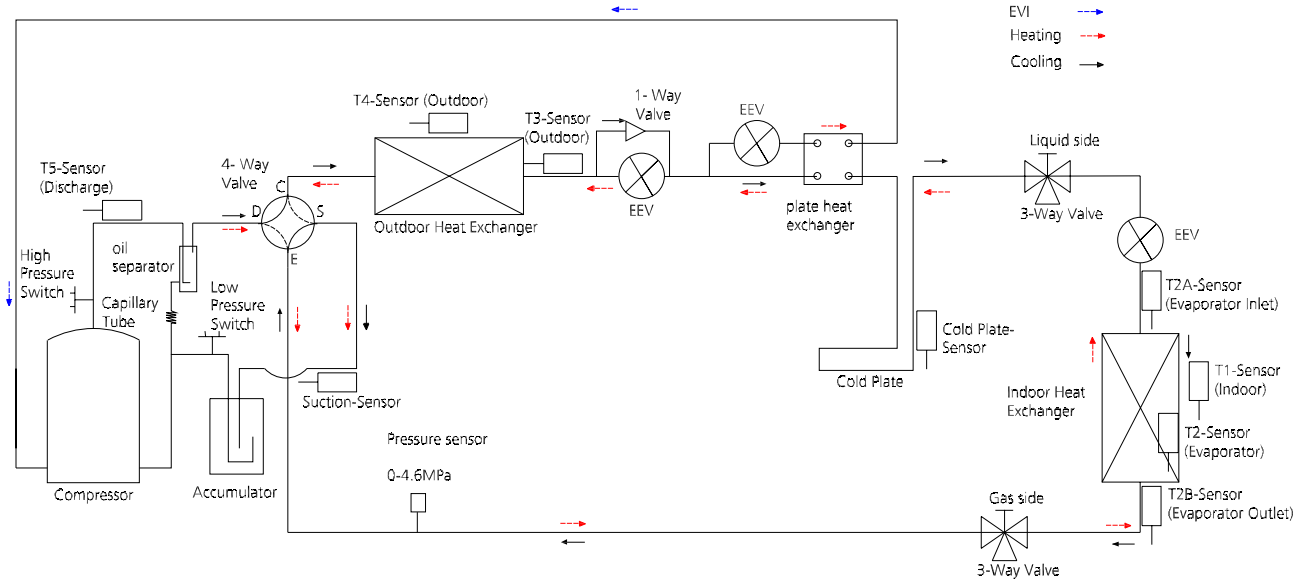
Model No.	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
ACiQ-24-HPB	19(3/4)	9.52(3/8)	7.5/24.6	50/164	0	25/82	65g/m (0.69oz/ft)
ACiQ-30-EHPB	19(3/4)	9.52(3/8)	7.5/24.6	50/164	0	25/82	



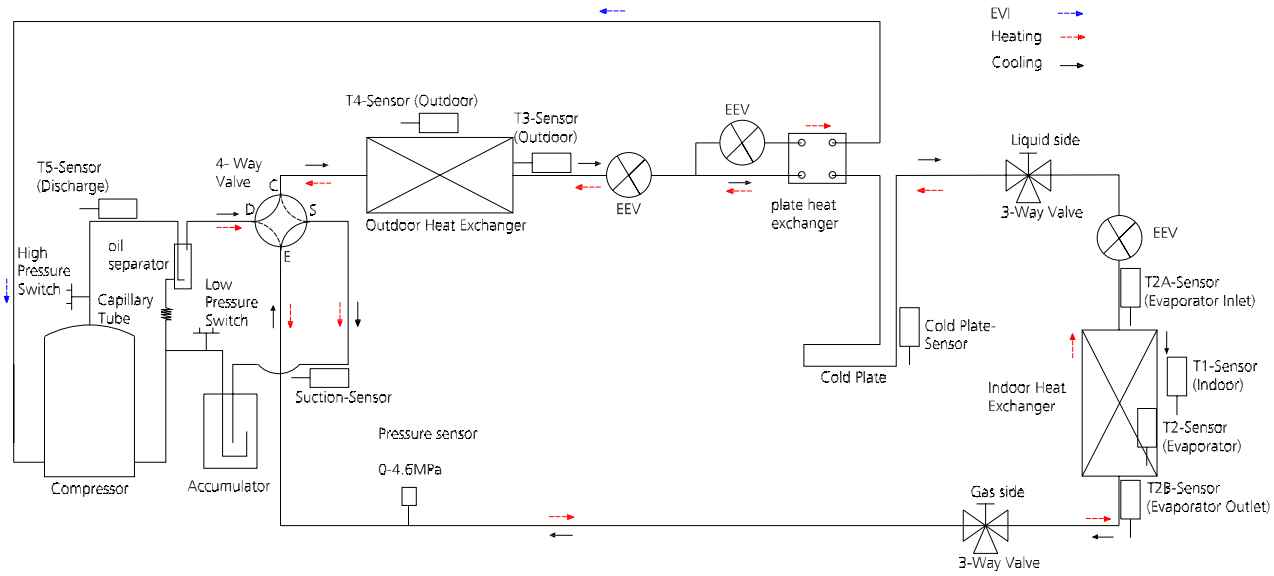
Model No.	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
ACiQ-18-HPB	19(3/4)	9.52(3/8)	7.5/24.6	30/98.4	0	20/65.6	65g/m (0.69oz/ft)
ACiQ-24-EHPB	19(3/4)	9.52(3/8)	7.5/24.6	50/164	0	25/82	
ACiQ-30-HPB	19(3/4)	9.52(3/8)	7.5/24.6	50/164	0	25/82	
ACiQ-36-EHPB	19(3/4)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	
ACiQ-48-EHPB	19(3/4)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	
ACiQ-60-EHPB	22(7/8)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	



Model No.	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
ACiQ-36-HPC	19(3/4)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	65g/m (0.69oz/ft)



Model No.	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
ACiQ-36-HPB	19(3/4)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	65g/m (0.69oz/ft)
ACiQ-48-HPB	19(3/4)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	



55K

Model No.	Pipe Size (Diameter:ø) mm(inch)		Piping length (m/ft)		Elevation (m/ft)		Additional Refrigerant
	Gas	Liquid	Rated	Max.	Rated	Max.	
ACiQ-60-HPB	22(7/8)	9.52(3/8)	7.5/24.6	65/213	0	30/98.4	65g/m (0.69oz/ft)

6. Electrical Wiring Diagrams

ODU Model	ODU Wiring Diagram
ACiQ-12-EHPB & ACiQ-18-EHPB	16022000036289
ACiQ-18-HPB	16022000036171
ACiQ-24-EHPB	
ACiQ-24-HPB	16022000036170
ACiQ-30-HPB	
ACiQ-30-EHPB	
ACiQ-36-EHPB	
ACiQ-36-HPC	16022000040551
ACiQ-36-HPB	16022000036969
ACiQ-48-HPB	
ACiQ-60-HPB	
ACiQ-48-EHPB	16022000036169
ACiQ-60-EHPB	

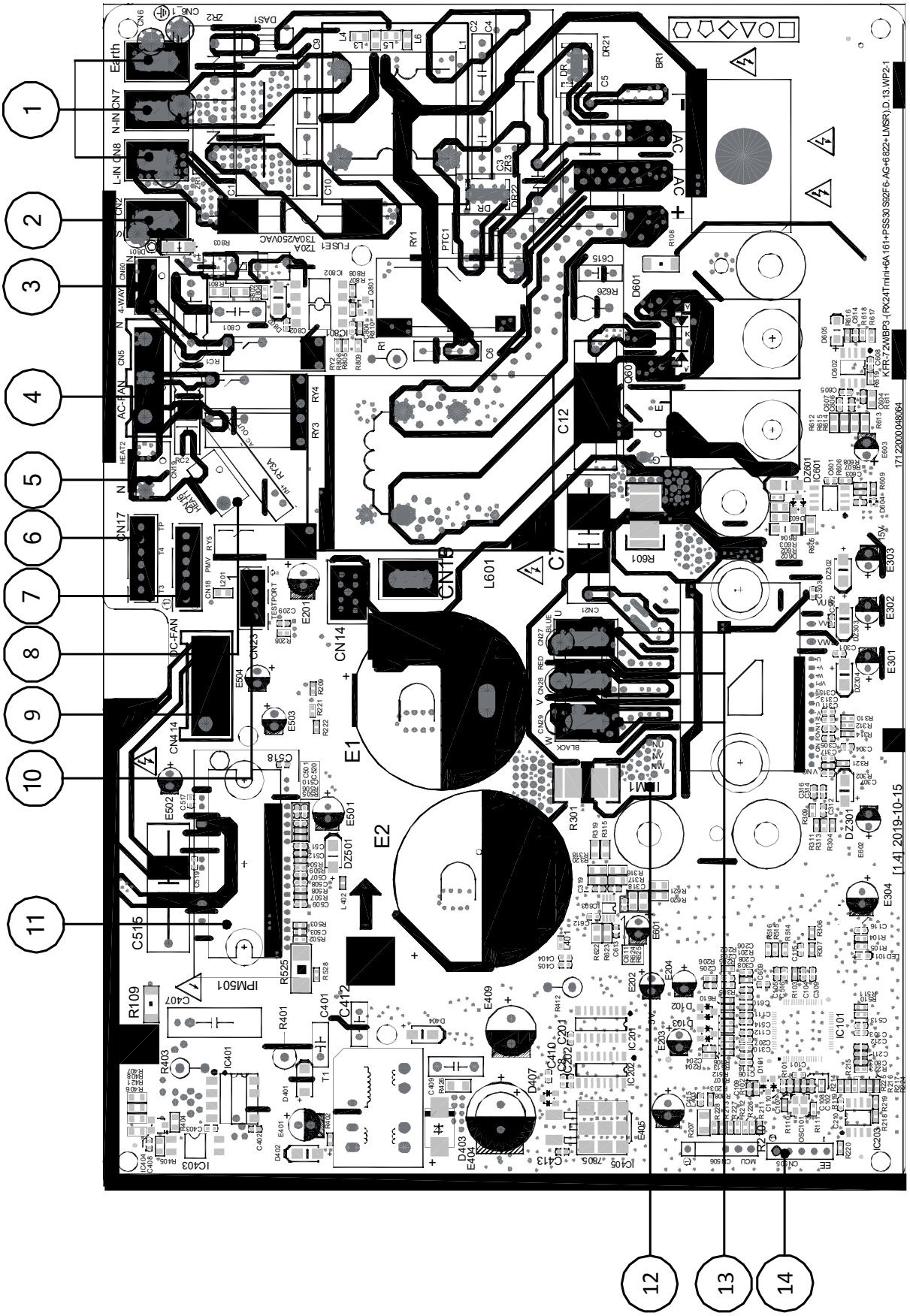
ODU Model	ODU Main Printed Circuit Board	Inverter Module Printed Board	24V Printed Board
ACiQ-12-EHPB & ACiQ-18-EHPB	17122000046453	/	17122000054047
ACiQ-18-HPB	17122000048064	/	17122000054047
ACiQ-24-EHPB			
ACiQ-24-HPB	17122000047742	/	17122000054047
ACiQ-30-HPB			
ACiQ-30-EHPB			
ACiQ-36-EHPB			
ACiQ-36-HPC	17122300007152	/	17122000054047
ACiQ-36-HPB	17122000037804	17122000042012	17122000054047
ACiQ-48-HPB			
ACiQ-48-EHPB			
ACiQ-60-HPB			
ACiQ-60-EHPB			

Outdoor unit printed circuit board diagram: 17122000044714, 17122000048121,17122000046453

No.	Name	CN#	Meaning
1	CN1A	CN3	Earth: connect to Ground
		CN1	N_in: connect to N-line (208-230V AC input)
		CN2	L_in: connect to L-line (208-230V AC input)
		CN16	S: connect to indoor unit communication
2	HEAT1	CN17	connect to compressor heater, 208-230V AC when is ON
3	4-WAY	CN60	connect to 4 way valve, 208-230V AC when is ON.
4	HEAT2	CN15	connect to chassis heater, 208-230V AC when is ON
5	AC-FAN	CN25	connect to AC fan
6	PMV	CN31	connect to Electric Expansion Valve
7	TESTPORT	CN6	used for testing
8	TP T4 T3	CN21/CN22	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
9	DC-FAN	CN7	connect to DC fan
10	FAN_IPM	IPM 501	IPM for DC fan
11	W	CN28	connect to compressor
	V	CN29	0V AC (standby)
	U	CN30	10-200V AC (running)
12	COMP_IPM	IPM 301	IPM for compressor

Note: This section is for reference only. Please take practicality as standard.

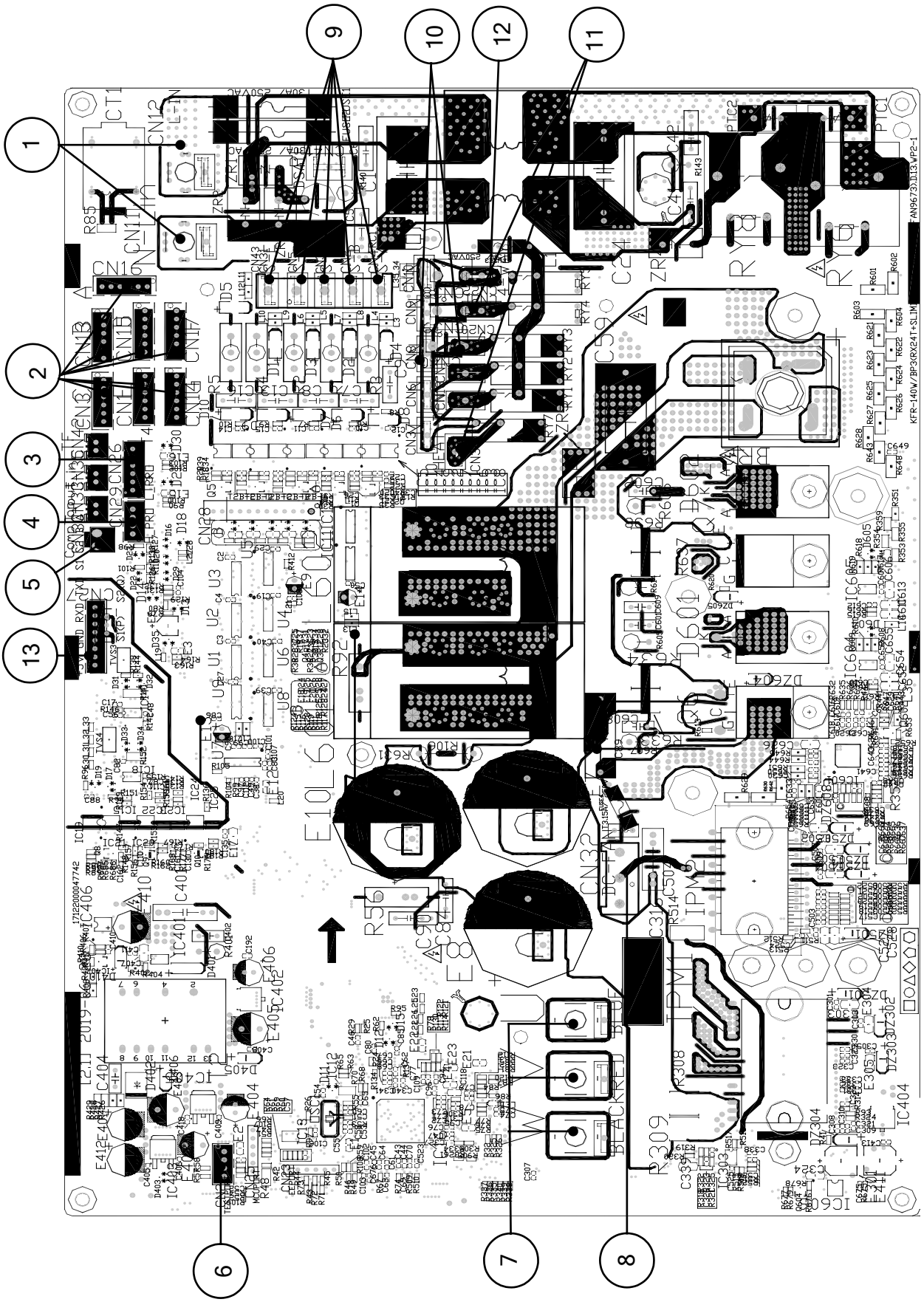
Outdoor unit printed circuit board diagram: 17122000048064& 17122000048066



No.	Name	CN#	Meaning
1	Power Supply	CN6	Earth: connect to Ground
		CN7	N_in: connect to N-line (208-230V AC input)
		CN8	L_in: connect to L-line (208-230V AC input)
2	S	CN2	S: connect to indoor unit communication
3	4-WAY	CN60	connect to 4 way valve, 208-230V AC when is ON.
4	AC-FAN	CN5	connect to AC fan
5	HEAT2	CN19	connect to chassis heater, 208-230V AC when is ON
6	TP T4 T3	CN17	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
7	PMV	CN18	connect to Electric Expansion Valve
8	HEAT1	CN16	connect to compressor heater, 208-230V AC when is ON
9	DC-FAN	CN414	connect to DC fan
10	TESTPORT	CN23	used for testing
11	FAN_IPM	IPM501	IPM for DC fan
12	COMP_IPM	IPM1	IPM for compressor
13	U	CN27	connect to compressor
	V	CN28	0V AC (standby)
	W	CN29	200-300V AC (running)
14	EE_PORT	CN505	EEPROM programer port

Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122000047742

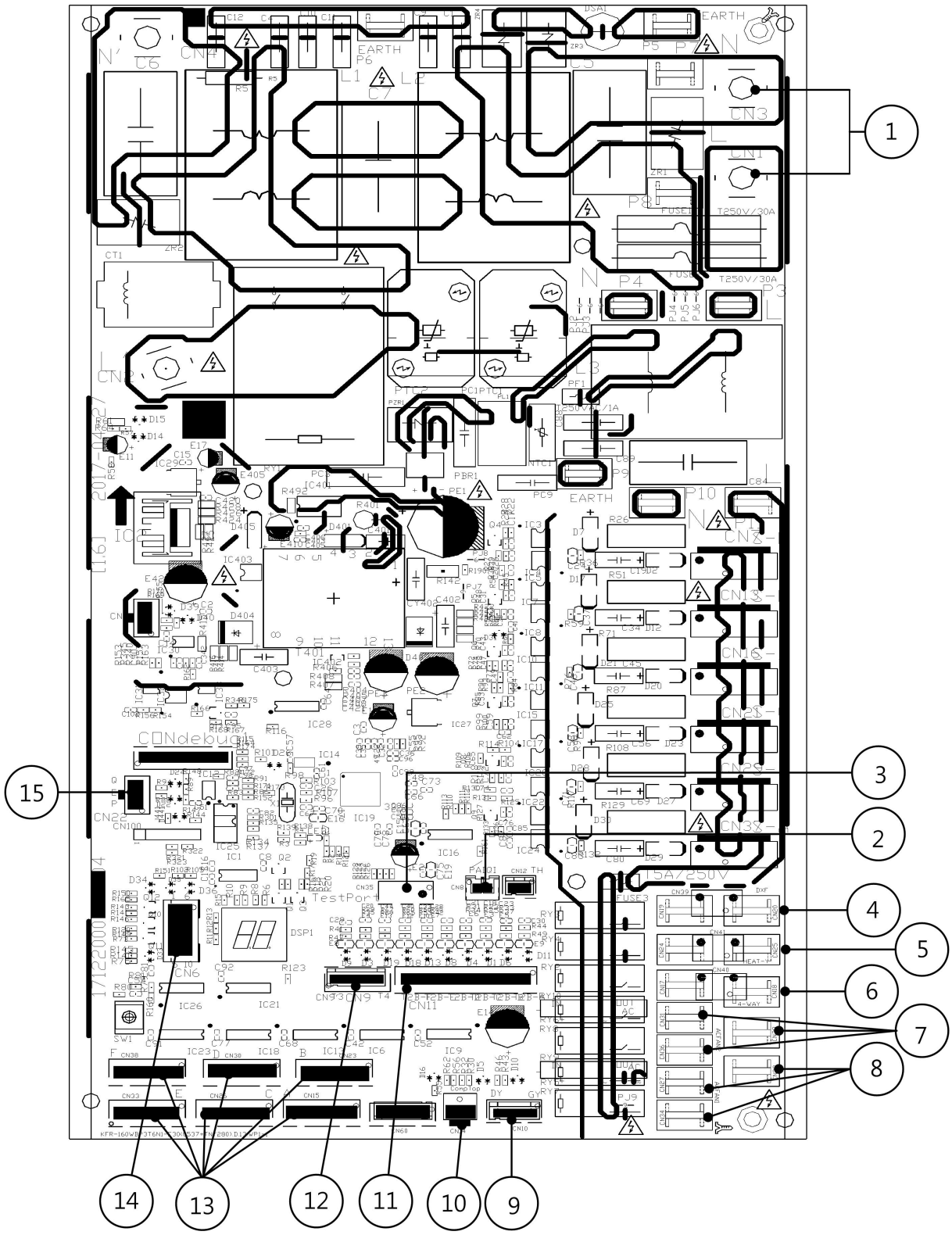


No.	Name	CN#	Meaning
1	Power Supply	CN11	N_in: connect to N-line (208-230V AC input)
		CN12	L_in: connect to L-line (208-230V AC input)
2	EEV-A	CN16	connect to electric expansion valve
	EEV-B	CN13	
	EEV-C	CN3	
	EEV-D	CN15	
	EEV-E	CN1	
	EEV-F	CN17	
	EEV-G	CN14	
3	T3 T4 TP	CN26	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
4	H-PRO,L-RPO	CN29	connect to high and low pressure swtich(pin1-pin2&pin3-pin4:5VDC pulse wave)
5	OLP TEMP. SENSOR	CN30	connect to compressor top temp. sensor (5VDC Pulse wave)
6	TESTPORT	CN24	used for testing
7	COMPRESSOR	U	connect to compressor
		V	0V AC (standby)
		W	10-200V AC (running)
8	DC-FAN	CN32	connect to DC fan
9	S-E	CN31	S: connect to indoor unit communication(pin1-pin2: 24VDC Pulse wave; pin2-pin3: 208-230V AC input)
	S-D	CN5	
	S-C(mono)	CN34	
	S-B	CN2	
	S-A	CN4	

No.	Name	CN#	Meaning
10	HEAT_D	CN8	connect to the heater, 208-230V AC when is ON
		CN20	
11	HEAT_Y	CN21	
		CN36	
12	4-WAY	CN38	connect to 4 way valve, 208-230V AC when is ON.
13	/	CN27	connect to key board CN1

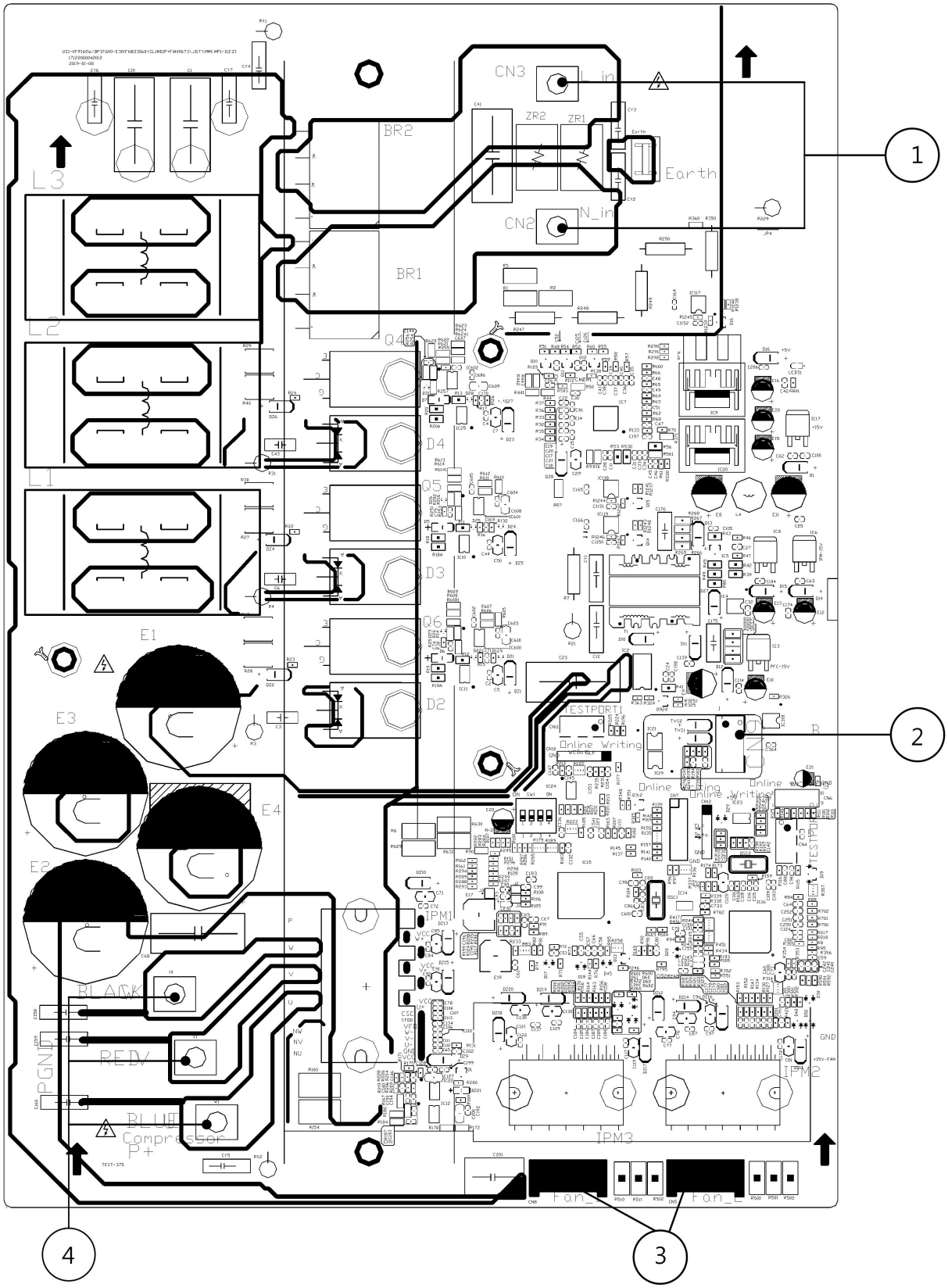
Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122000037804



No.	Name	CN#	Meaning
1	Power Supply	CN1	L1_in: connect to L1-line (230V AC input)
		CN3	L2_in: connect to L2-line (230V AC input)
2	TP	CN8	Exhaust temp. sensor TP
3	TESTPORT	CN35	used for testing
4	HEAT1	CN19/CN20	connect to chassis heater, 208-230V AC when is ON
5	HEAT2	CN24/CN25	connect to compressor heater, 208-230V AC when is ON
6	4-WAY	CN17/CN18	connect to 4 way valve, 208-230V AC when is ON.
7	AC-FAN2	CN31/CN36/CN28	connect to AC fan2
8	AC-FAN1	CN27/CN34/CN32	connect to AC fan1
9	H-PRO/L-PRO	CN10	connect to low&high pressure switch
10	Compressor Top	CN14	connect to compressor top temperature sensor
11	T2B	CN11	connect to pipe temp. sensor T2B
12	T4 T3	CN9	connect to pipe temp. sensor T3, ambient temp. sensor T4
13	PMV	CN15/CN23/CN26/ CN30/CN33/CN38	connect to Electric Expansion Valve(A~F)
14	/	CN6	connect to IPM&PFC board CN9
15	PQE	CN22	Communication to indoor unit

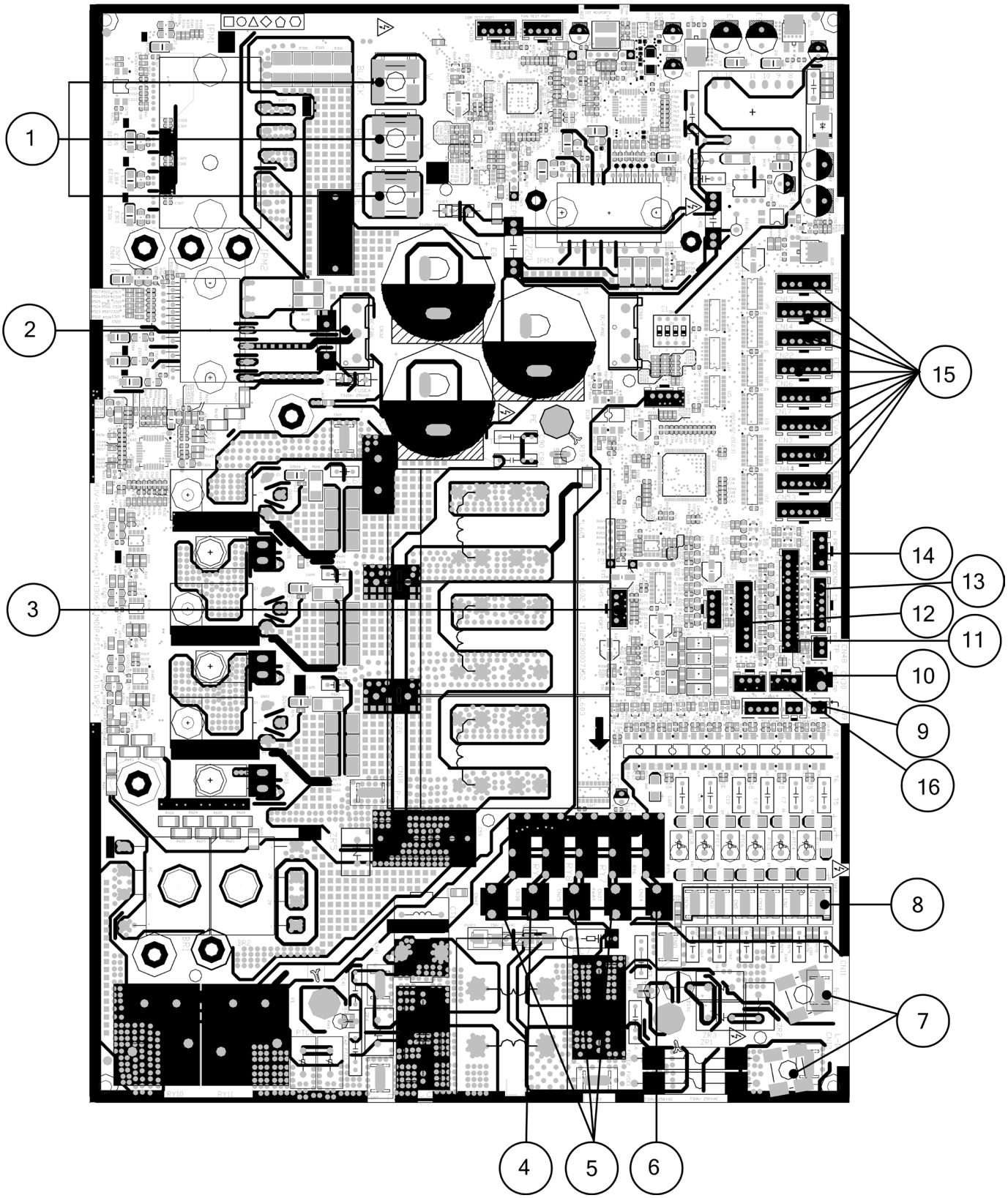
Outdoor unit IPM board diagram: 17122000042012



No.	Name	CN#	Meaning
1	Power Supply	CN3	connect to main board L-Out
		CN2	connect to main board N-Out
2	/	CN9	connect to main board CN6
3	FAN_DC	FAN_1/FAN_2	connect to outdoor DC fan 1& DC fan 2
4	CN_COMP	U1	connect to compressor
		V1	
		W1	

Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122300007152

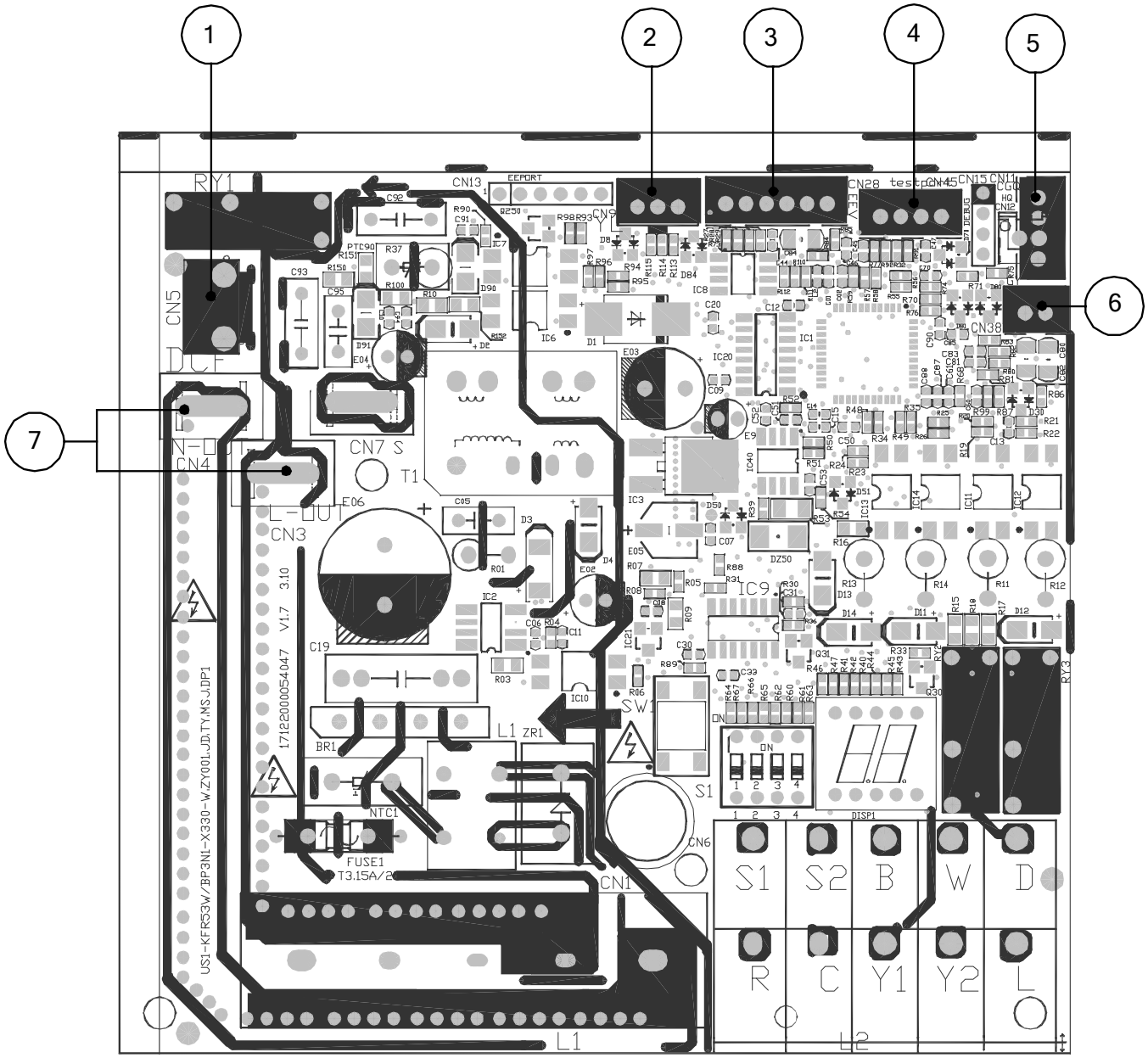


No.	Name	CN#	Meaning
1	COMPRESSOR	W	connect to compressor; 0V AC (standby); 10-310V AC (running)
		V	
		U	
2	DC-FAN	CN32	connect to DC fan
3	TESTPORT	CN45	used for testing
4	HEAT_Y	CN38	connect to compressor heater, 208-230V AC when is ON
5	4-WAY	CN37	connect to 4 way valve 1, 208-230V AC when is ON.
		CN25	connect to 4 way valve 2, 208-230V AC when is ON.
		CN42	connect to 4 way valve 3, 208-230V AC when is ON.
6	HEAT_D	CN24	connect to chassis heater, 208-230V AC when is ON
7	Power Supply	CN11	N_in: connect to N-line (208-230V AC input)
		CN12	L_in: connect to L-line (208-230V AC input)
8	S-A	CN43	S: connect to indoor unit communication(pin1-pin2: 24VDC Pulse wave; pin2-pin3: 208-230V AC input)
	S-B		
	S-C		
	S-D		
	S-E		
	S-F		
9	TBH-IN TBH-OUT T3B TF	CN9	connect to cold plate inlet temp. sensor TBH-IN, cold plate outlet temp. sensor TBH-OUT, condenser coil middle temp. sensor T3B, refrigerant tube inlet temp. sensor TF
10	OLP TEMP. SENSOR	CN30	connect to compressor top temp. sensor (5VDC Pulse wave)
11	T2B	CN28	connect to evaporator coil outlet temperature sensor T2B
12	/	CN27	connect to key board CN1
13	T3 T4 TP	CN26	connect to condenser coil temp. sensor T3, ambient temp. sensor T4, exhaust temp. sensor TP
14	H-PRO,L-RPO	CN29	connect to high and low pressure switch(pin1-pin2&pin3-pin4:5VDC pulse wave)

No.	Name	CN#	Meaning
15	EEVA	CN17	connect to electric expansion valve
	EEVB	CN16	
	EEVC	CN22	
	EEVD	CN14	
	EEVE	CN13	
	EEVF	CN1	
	EEV1	CN53	
	EEV2	CN44	
	EEV3	CN3	
16	H_YL	CN49	connect to high pressure sensor

Note: This section is for reference only. Please take practicality as standard.

Outdoor unit printed circuit board diagram: 17122000054047



No.	Name	CN#	Meaning
1	/	CN5	connect to one-way solenoid valve
2	/	CN9	connect to pressure sensor (5VDC)
3	/	CN28	connect to electric expansion valve (12VDC)
4	TESTPORT	CN45	used for testing (5VDC)
5	/	CN11	connect to suction temp. sensor, cold plate temp. sensor (5VDC)
6	H-PRO	CN38	connect to high pressure switch (5VDC)
7	Power Supply	CN3	connect to main board L-Out
		CN4	connect to main board N-Out

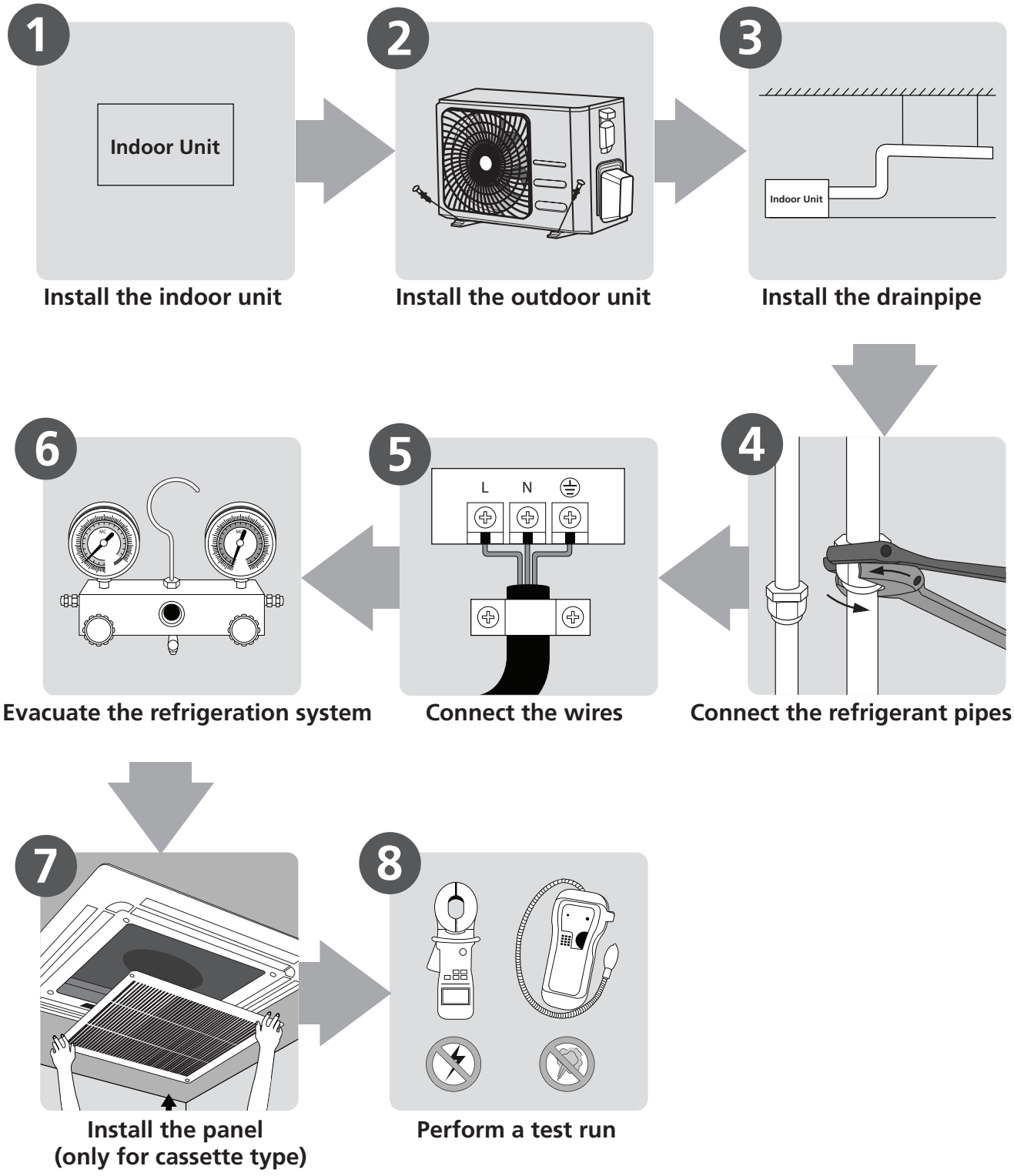
Note: This section is for reference only. Please take practicality as standard.

Installation

Contents

1. Installation Overview
2. Location Selection
3. Indoor Unit Installation
4. Outdoor Unit Installation
5. Drainage Pipe Installation
6. Refrigerant Pipe Installation
7. Vacuum Drying and Leakage Checking
8. Additional Refrigerant Charge
9. Engineering of Insulation
10. Engineering of Electrical Wiring
11 Test Operation

1. Installation Overview



2. Location selection

2.1 Unit location selection can refer to installation manual.

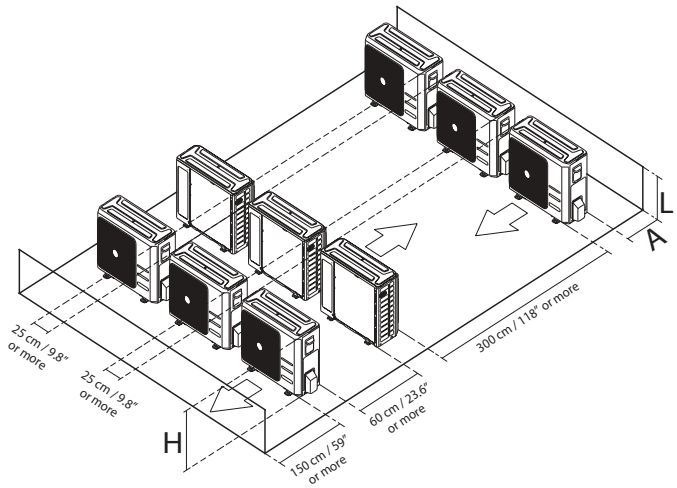
2.2 DO NOT install the unit in the following locations:

- Where oil drilling or fracking is taking place.
- Coastal areas with high salt content in the air.
- Areas with caustic gases in the air, such as near hot springs.
- Areas with power fluctuations, such as factories.
- Enclosed spaces, such as cabinets.
- Areas with strong electromagnetic waves.
- Areas that store flammable materials or gas.
- Rooms with high humidity, such as bathrooms or laundry rooms.
- If possible, DO NOT install the unit where it is exposed to direct sunlight.

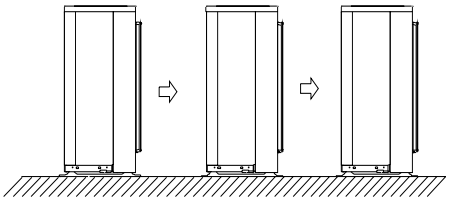
2.3 Rows of series installation

The relations between H, A and L are as follows.

	L	A
L ≤ H	L ≤ 1/2H	25 cm / 9.8" or more
	1/2H < L ≤ H	30 cm / 11.8" or more
L > H	Can not be installed	

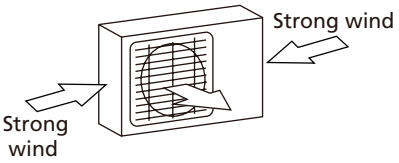


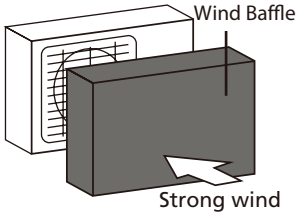
DO NOT install the rows of series like following figure.



2.4 If the unit is exposed to heavy wind:

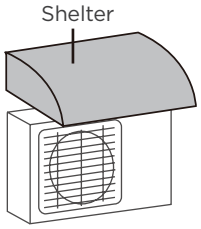
- Install unit so that air outlet fan is at a 90° angle to the direction of the wind. If needed, build a barrier in front of the unit to protect it from extremely heavy winds.





2.5 If the unit is frequently exposed to heavy rain or snow:

Build a shelter above the unit to protect it from the rain or snow. Be careful not to obstruct air flow around the unit.



2.6 If the unit is frequently exposed to salty air (seaside):

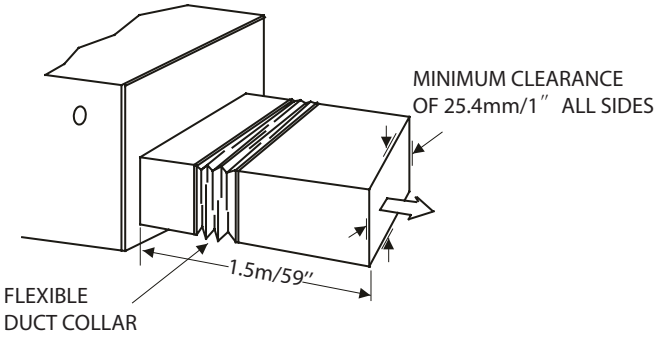
Use outdoor unit that is specially designed to resist corrosion.

3. Indoor Unit Installation(AHU)

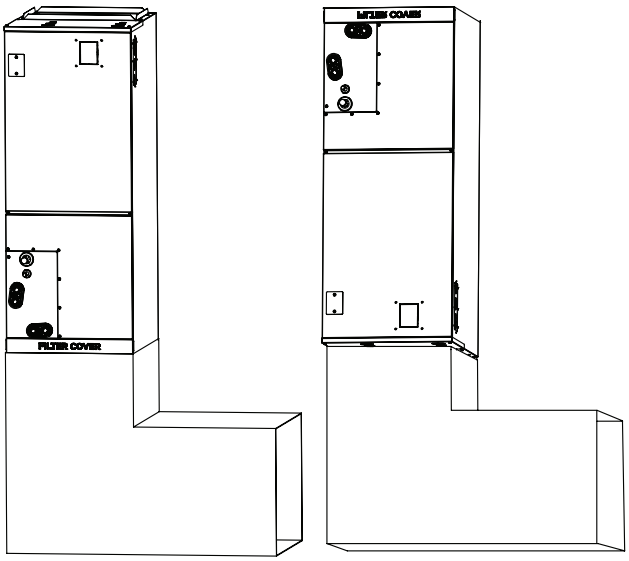
3.1 Service space for indoor unit

Horizontal installation

Plenum Clearances:



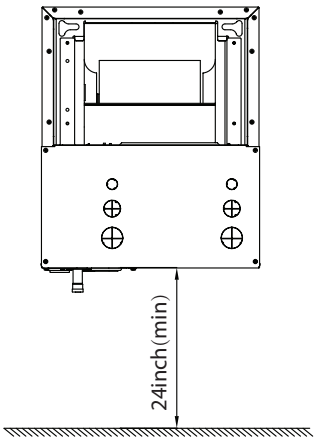
Vertical installation



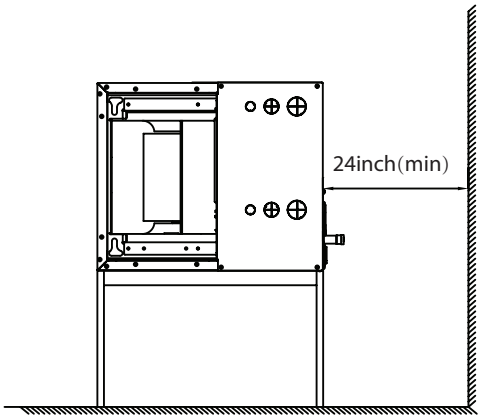
When installed vertically (upward or downward), the lower end of the air outlet needs to be connected to the L-shaped metal air duct and fastened by screws.

3.2 Installation place

Vertical installation



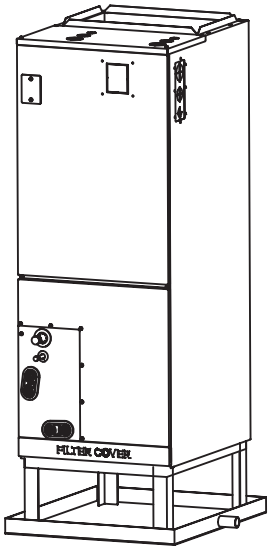
Horizontal installation



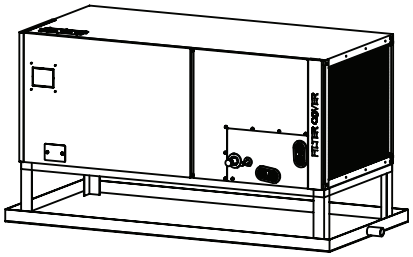
3.2 Install the main body

The unit may be installed in one of the upflow, downflow, horizontal left or horizontal right orientations.

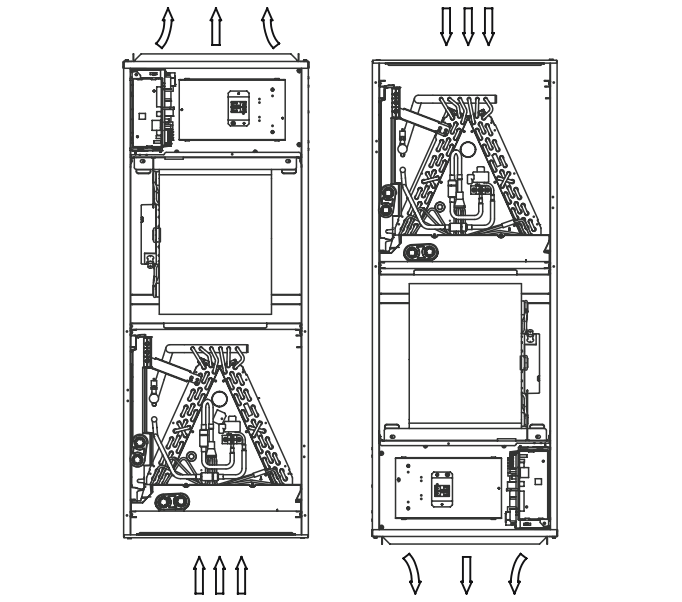
Vertical installation

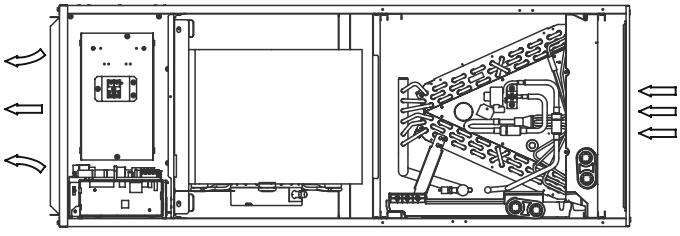


Horizontal installation

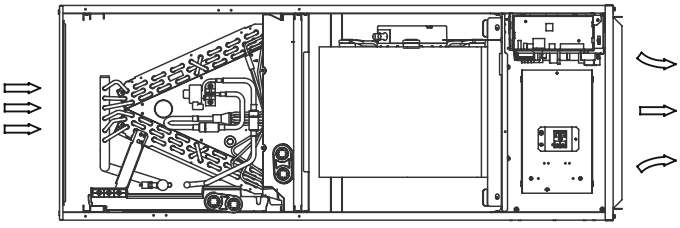


NOTE: For installation, an drain pan(not supplied) must be installed.





horizontal left



horizontal right

Note: Vertical up and horizontal left installation does not need to change the direction of evaporator.

Regular installation instructions

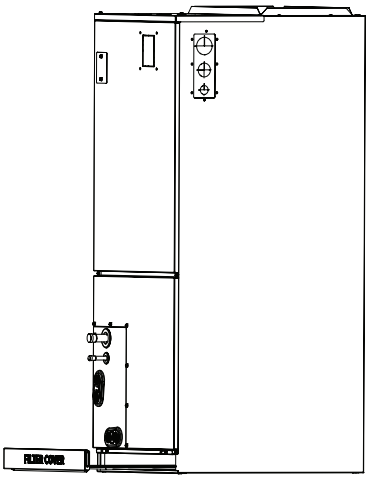
Please follow these steps to perform Vertical up installation and Horizontal left installation:

1. Open the upper cover.
2. Open the cover of the electronic control box.
3. Connect the wire according to the wiring diagram.
4. Connect the pipes.
5. Install the drainage pipes

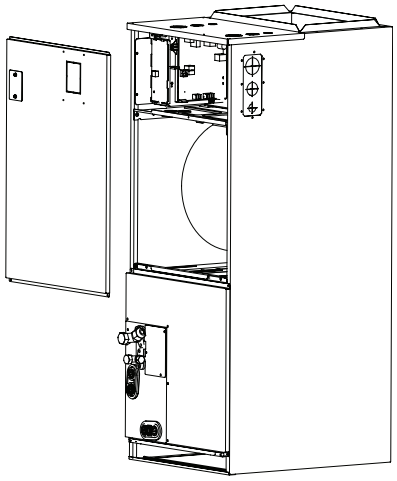
Reversing installation instructions

For the Horizontal left installation and vertical down installation, the direction of the evaporator should be changed and the drain pan should be removed first. Please do it according to the following steps:

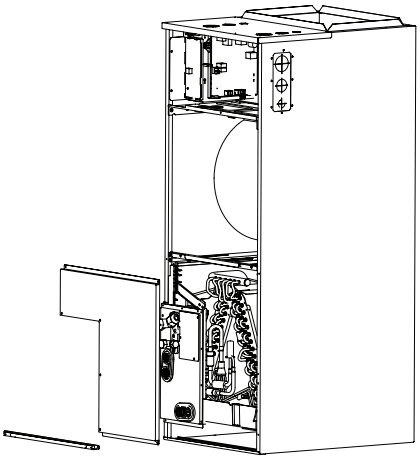
1. Remove the fixed plate of the filter ,then take the filter off.



2. Remove the upper cover assembly.



3. Remove evaporator cover plate.



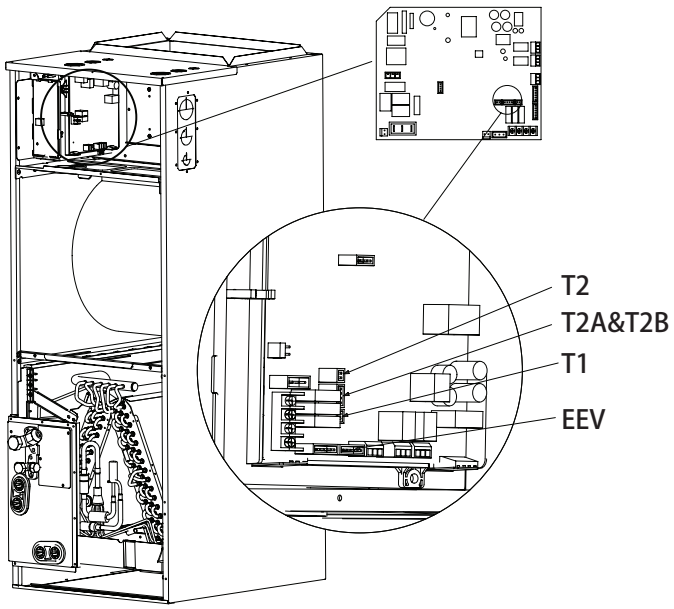
4. Unplug temperature sensors T1,T2,T2A,T2B and electronic expansion valve(EEV) from the control board.

T1: Room temperature sensor

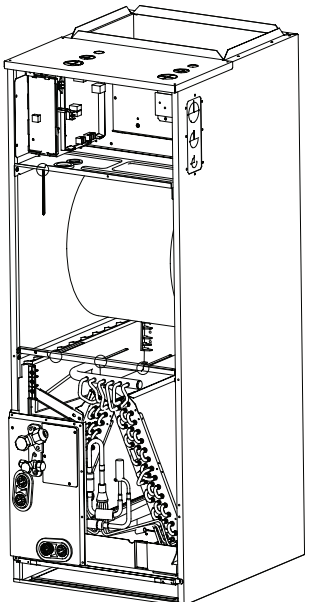
T2: Evaporator central temperature sensor

T2A: Evaporator input temperature sensor(only available for some models)

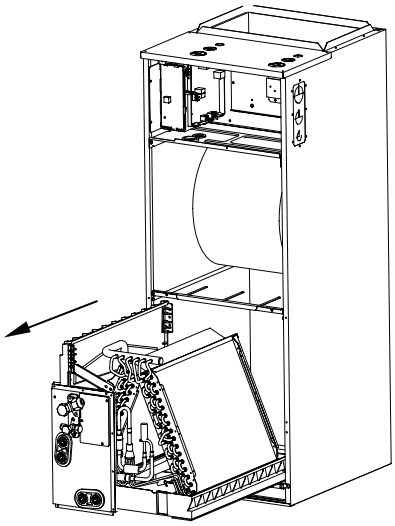
T2B: Evaporator output temperature sensor(only available for some models)



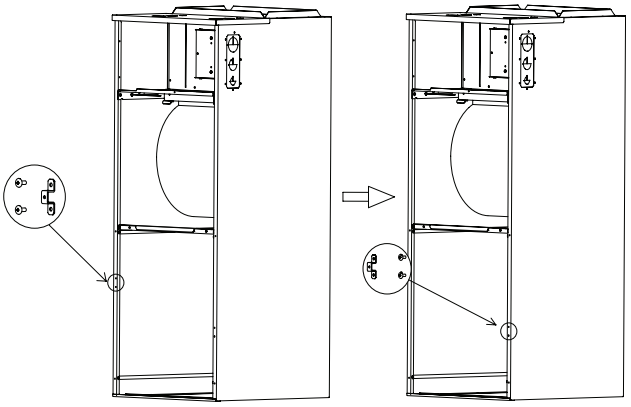
5. Remove T1,T2,T2A,T2B sensor,EEV wire ties.



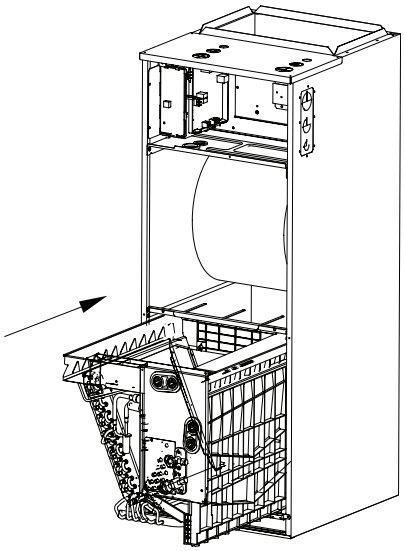
6. Take out the evaporator and drain pan and rotate 180°.



7. Adjust the position of the mounting parts.

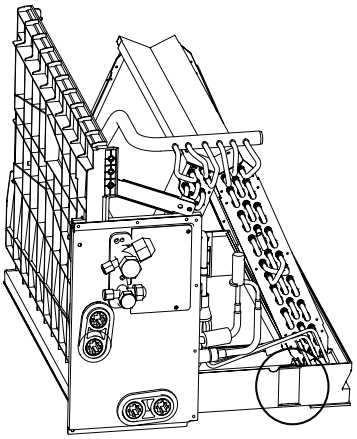


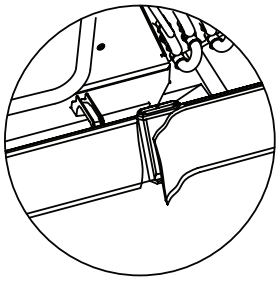
8. Reinstall the evaporator and drain pan.



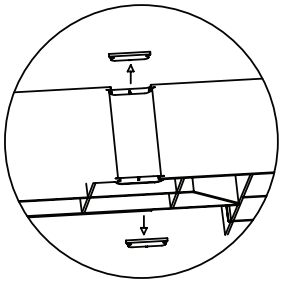
8. Reinstall T1,T2,T2A,T2B sensor plug and electronic expansion valve(EEV) and tie up the sensor wires.

Note: The wire body needs to pass through the wire groove from the drain pan and be stuck on the hook of the drain pan.

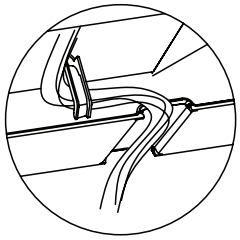




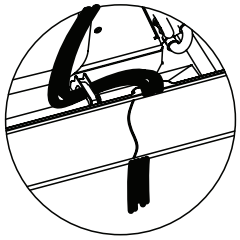
Cut the foam gasket.



Remove knockouts as shown in the figure.

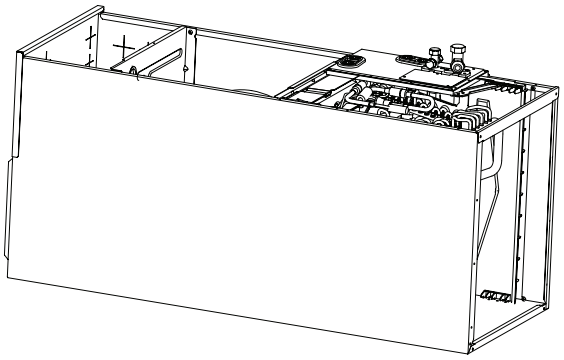


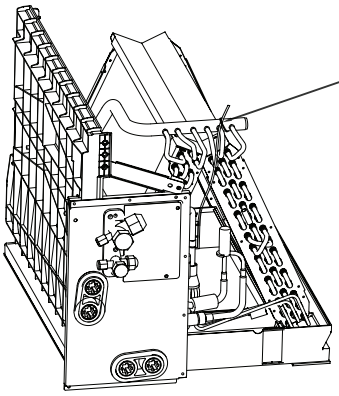
Hook the wire into the buckle and go down from the wire slot.



Replace foam gaster over wires.

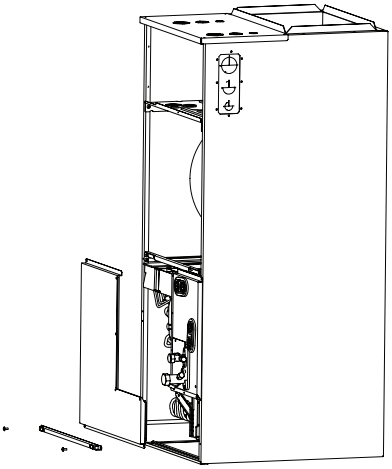
10. The evaporator is assembled in place.





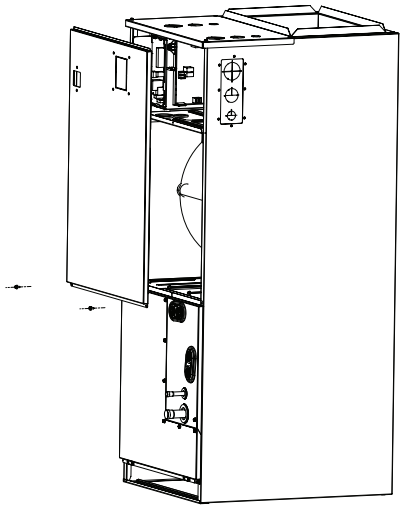
Use cable ties to fix the room temperature sensor as shown in the figure.

11. Reinstall evaporator cover plate.

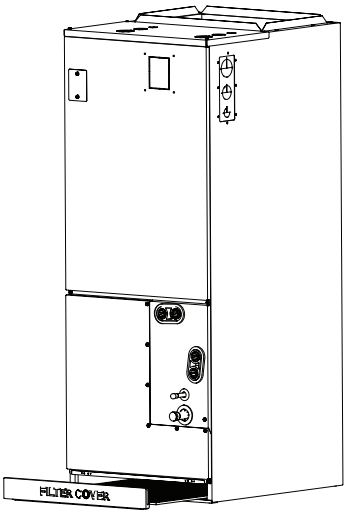


12. Connect the wire according to the wiring diagram.

13. Reassemble the upper cover.



14. Reinstal the flter and flter cover plate.



15. Connect the pipes.

16. Install the drainage pipes.

3.3 Install the Electric Auxiliary Heat Module (for some models)(not supplied)

Accessories

Name	Shape	Quantity
Manual		2
Seal sponge		1
Screw		7
Rubber cap		1
Electric auxiliary heating wiring diagram	/	1
Air switch label	/	1

NOTE:

Installation must be performed by an authorized dealer or specialist. Please make necessary protection when installing the unit.

Specification series of electric auxiliary heat module:

3kW,5kW,8kW,10kW, 15kw, 20kW,25kW.

The electric auxiliary heat module is only used for installation on the AHU internal machine.

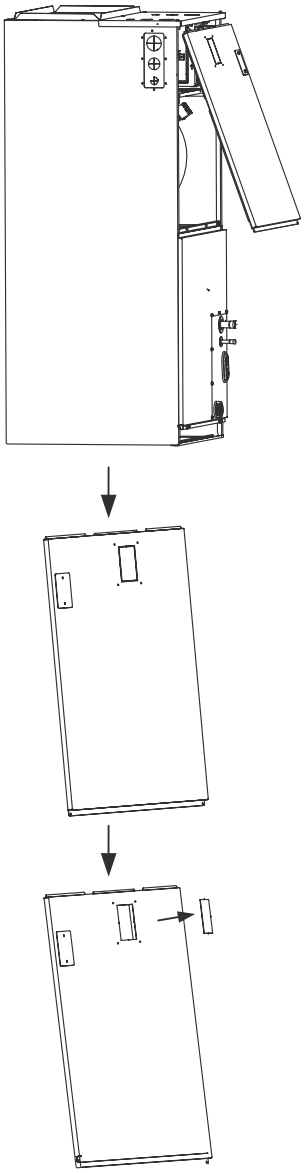
If the unit needs to be equipped with electric auxiliary heat module, please check the electric auxiliary heat module specification that can be matched with the unit first to avoid unnecessary consequences caused by improper matching.

Selection and matching of internal machine and electric auxiliary heating components.

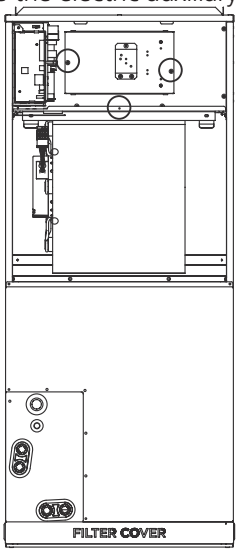
MODEL (Btu./h)	3kW	5kW	8kW	10kW	15kW	20kW	25kW
12K	Y	Y	Y	Y	-	-	-
18K	Y	Y	Y	Y	-	-	-
24K	-	Y	Y	Y	Y	-	-
30K	-	Y	Y	Y	Y	-	-
36K	-	Y	Y	Y	Y	Y	-
48K	-	-	Y	Y	Y	Y	-
60K	-	-	-	Y	Y	Y	Y

Electric Auxiliary Heat Module installation and wiring operation

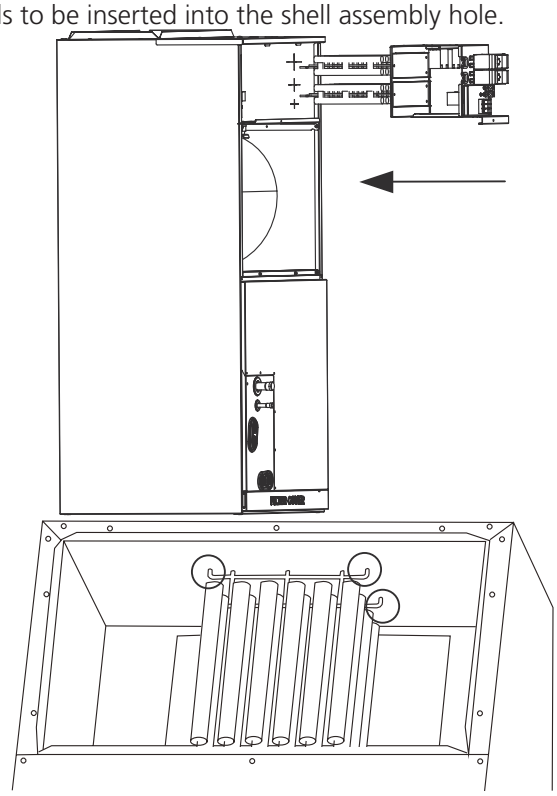
1. Remove the upper cover and use professional tools to remove the knock-out holes of the upper cover.



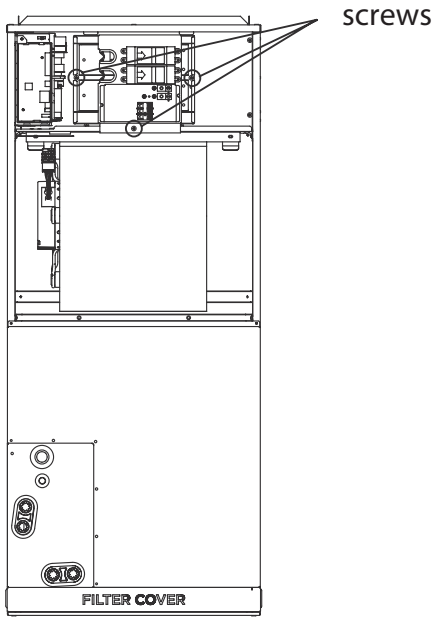
2. Remove the terminal block and power cord, loosen the screws, and remove the electric auxiliary heating cover.



3. Install the electric auxiliary heating assembly into the chassis shell from the front, and note that the front end needs to be inserted into the shell assembly hole.



4. Tighten the mounting screws.

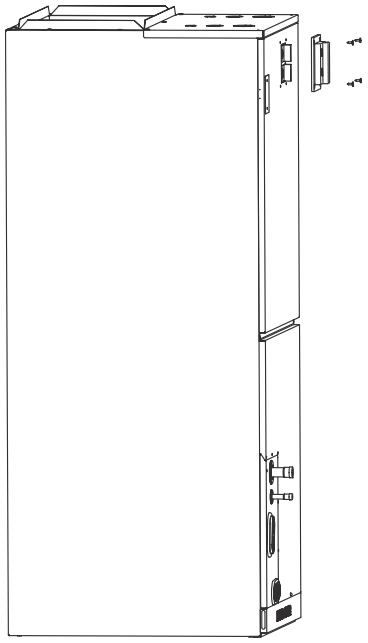


5. Wiring according to the wiring nameplate.

6. Tape the wiring diagram to the inside cover wiring is completed for future reference and maintenance.

7. Install the upper cover.

8. Install silicone breaker cover.



9. After installing the electric auxiliary heat module, apply the circuit breaker label near the silicone breaker cover that was just applied.

After the electric heating wiring is connected, please confirm before power on:

- Check all wiring and ensure reliable connection of wire body.
- Check the electric heating fixing screw, and the screw is fixed reliably.
- The size selection of power wire meets the power supply requirements.

Specifications	Number of circuit breakers	Number of relays	Number of power cord groups	Number of power cord grounding screws
3kW	1	1	2	2
5kW	1	1	2	2
8kW	1	2	2	2
10kW	1	2	2	2
15kW	2	3	3	3
20kW	2	4	3	3
25kW	3	5	4	4

NOTE:

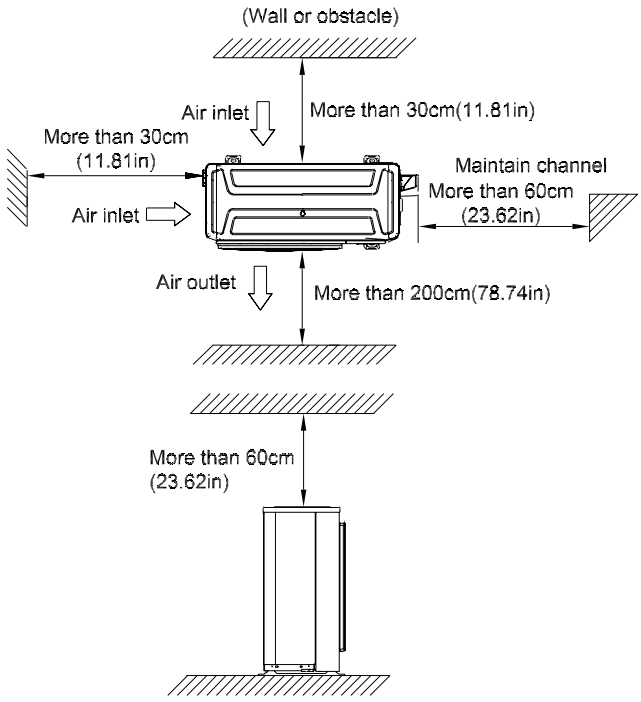
- Electric auxiliary heating wiring diagram packed with the accessories.
- If branch circuit wire length exceeds 100 ft, consult NEC 210-19a to determine maximum wire length. Use 2% voltage drop.

Auxiliary Heater Electrical Data

Heater part No.	Heater kW	Internal Circuit Protection	CIRCUIT 1			CIRCUIT 2			CIRCUIT 3		
			Heater Amps	MCA (1)	MOCP (2)	Heater Amps	MCA (1)	MOCP (2)	Heater Amps	MCA (1)	MOCP (2)
EAH-03B(UL)	3	Ckt Bkr	10.8/12.0	14.0/16.0	15.0/20.0	/	/	/	/	/	/
EAH-05B(UL)	5	Ckt Bkr	18.0/20.0	23.0/27.0	25.0/30.0	/	/	/	/	/	/
EAH-08B(UL)	8	Ckt Bkr	28.8/32.0	37.0/42.0	40.0/45.0	/	/	/	/	/	/
EAH-10B(UL)	10	Ckt Bkr	36.0/40.0	46.0/53.0	50.0/60.0	/	/	/	/	/	/
EAH-15B(UL)	15	Ckt Bkr	18.0/20.0	23.0/27.0	25.0/30.0	36.0/40.0	46.0/53.0	50.0/60.0	/	/	/
EAH-20B(UL)	20	Ckt Bkr	36.0/40.0	46.0/53.0	50.0/60.0	36.0/40.0	46.0/53.0	50.0/60.0	/	/	/
EAH-25B(UL)	25	Ckt Bkr	18.0/20.0	23.0/27.0	25.0/30.0	36.0/40.0	46.0/53.0	50.0/60.0	36.0/40.0	46.0/53.0	50.0/60.0

4. Outdoor unit installation

4.1 Service space for outdoor unit



4.2 Install drain joint(Heat pump unit only)

Before bolting the outdoor unit in place, you must install the drain joint at the bottom of the unit.

Note that there are two different types of drain joints depending on the type of outdoor unit.

If the drain joint comes with a rubber seal(see Fig. A), do the following:

1. Fit the rubber seal on the end of the drain joint that will connect to the outdoor unit.

2. Insert the drain joint into the hole in the base pan of the unit.

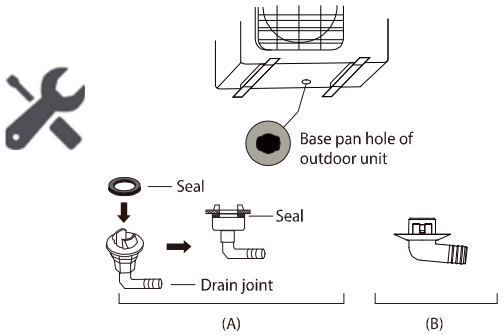
3. Rotate the drain joint 90° until it clicks in place facing the front of the unit. **For some panel plates, you need to use tool.**

4. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.

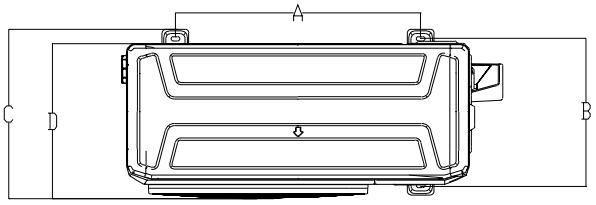
If the drain joint doesn't come with a rubber seal (see Fig. B), do the following:

1. Insert the drain joint into the hole in the base pan of the unit. The drain joint will click in place.

2. Connect a drain hose extension (not included) to the drain joint to redirect water from the unit during heating mode.



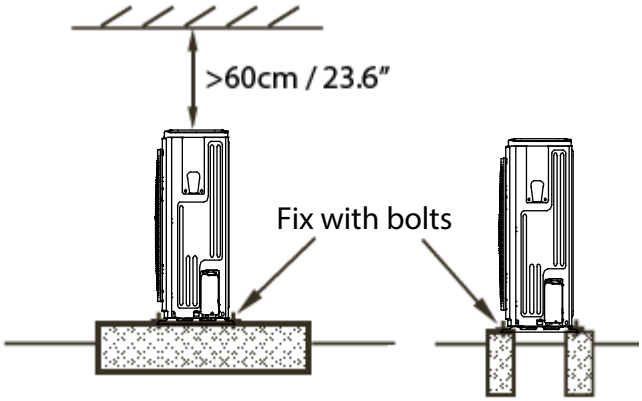
4.3 Bolt pitch



Panel Plate	Unit	D	A	B	C
X2	mm	303	452	286	314
	inch	11.93	17.80	11.26	12.36
X3	mm	330	511	317	346
	inch	12.99	20.12	12.48	13.62
X4	mm	342	663	354	394
	inch	13.46	26.1	13.94	15.5
X6	mm	375	615	397	440
	inch	14.76	24.2	15.6	17.3
D30	mm	410	673	403	455
	inch	16.14	26.50	15.87	17.9
E30	mm	415	634	404	457
	inch	16.34	24.96	15.9	17.99
590	mm	350	590	378	400
	inch	13.78	23.23	14.88	15.75

4.4 Install Outdoor Unit

Fix the outdoor unit with anchor bolts(M10)



Caution

Since the gravity center of the unit is not at its physical center, so please be careful when lifting it with a sling.

Never hold the inlet of the outdoor unit to prevent it from deforming.

Do not touch the fan with hands or other objects.

Do not lean it more than 45, and do not lay it sidelong.

Make concrete foundation according to the specifications of the outdoor units.

Fasten the feet of this unit with bolts firmly to prevent it from collapsing in case of earthquake or strong wind.

5. Drainage Pipe Installation

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

5.1 Installation principle

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

5.2 Key points of drainage water pipe installation

1. Considering the pipeline route and elevation.
   - Before installing condensate water pipeline, determine its route and elevation to avoid intersection with other pipelines and ensure slope is straight.
2. Drainage pipe selection
   - The drainage pipe diameter shall not small than the drain hose of indoor unit
   - According to the water flowrate and drainage pipe slope to choose the suitable pipe, the water flowrate is decided by the capacity of indoor unit.

Relationship between water flowrate and capacity of indoor unit

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

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

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

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

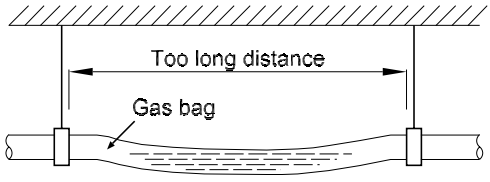
Attention: Adopt PVC40 or bigger pipe to be the main pipe.

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

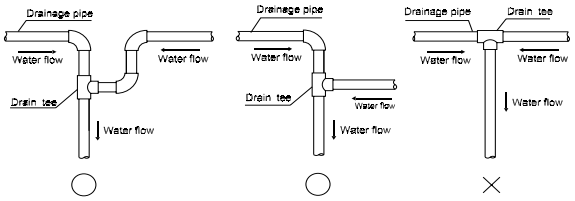
PVC pipe	Reference value of inner diameter of pipe (mm)	Allowable maximum water flowrate (l/h)	Remark
PVC25	20	220	For branch pipe
PVC32	25	410	
PVC40	31	730	Could be used for confluence pipe
PVC50	40	1440	
PVC63	51	2760	
PVC75	67	5710	
PVC90	77	8280	

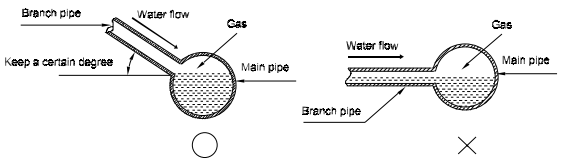
Attention: Adopt PVC40 or bigger pipe to be the main pipe.

3. Individual design of drainage pipe system
   - The drainage pipe of air conditioner shall be installed separately with other sewage pipe, rainwater pipe and drainage pipe in building.
   - The drainage pipe of the indoor unit with water pump should be apart from the one without water pump.
4. Supporter gap of drainage pipe
   - In general, the supporter gap of the drainage pipe horizontal pipe and vertical pipe is respectively 1m~1.5m and 1.5m~2.0m.
   - Each vertical pipe shall be equipped with not less than two hangers.
   - Overlarge hanger gap for horizontal pipe shall create bending, thus leading to air block.



5. The horizontal pipe layout should avoid converse flow or bad flow

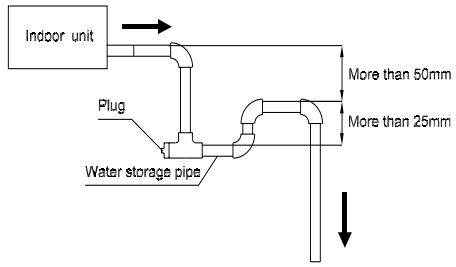




- The correct installation will not cause converse water flow and the slope of the branch pipes can be adjusted freely
- The false installation will cause converse water flow and the slope of the branch pipe can not be adjusted.

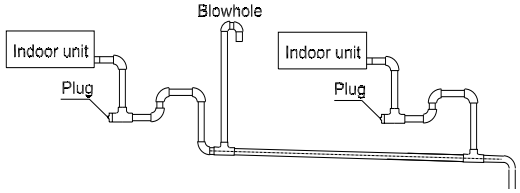
6. Water storage pipe setting

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



7. Blowhole setting

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



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

5.3 Insulation work of drainage pipe

Refer the introduction to the insulation engineering parts.

6. Refrigerant Pipe Installation

6.1 Maximum length and drop height

Ensure that the length of the refrigerant pipe, the number of bends, and the drop height between the indoor and outdoor units meets the requirements shown in the following table.

Capacity(kBtu/h)	Max. Length (m/ft)	Max. Elevation (m/ft)
<15	25/82	10/32.8
15-23	30/98.4	20/65.6
24~35	50/164	25/82
36~60	65/213.3	30/98.4

Caution:

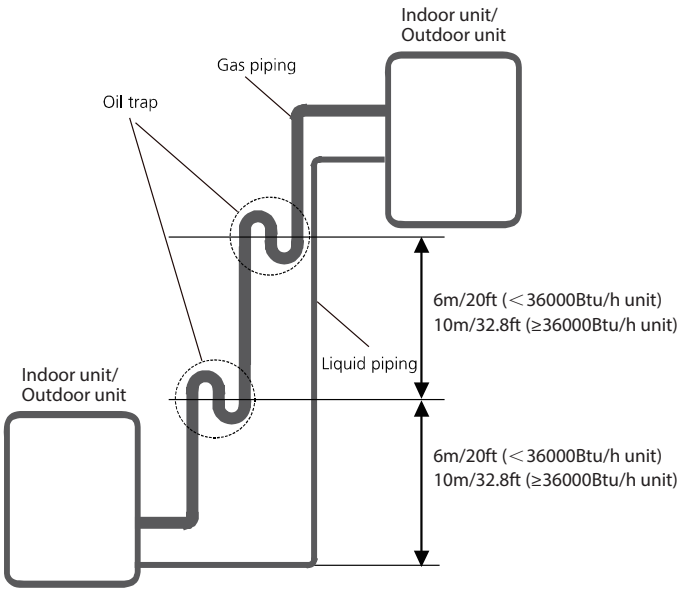
1. The capacity test is based on the standard length and the maximum permissive length is based on the system reliability.

2. Oil traps

-If oil flows back into the outdoor unit's compressor, this might cause liquid compression or deterioration of oil return. Oil traps in the rising gas piping can prevent this.

-An oil trap should be installed every 6m(20ft) of vertical suction line riser (<36000Btu/h unit).

-An oil trap should be installed every 10m(32.8ft) of vertical suction line riser (≥36000Btu/h unit).



6.2 The procedure of connecting pipes

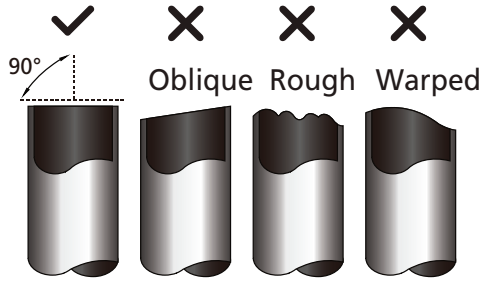
1.Choose the pipe size according to the specification table.

2.Confirm the cross way of the pipes.

3.Measure the necessary pipe length.

4.Cut the selected pipe with pipe cutter

- Make the section flat and smooth.

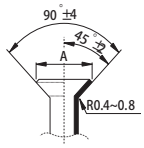


5. Insulate the copper pipe

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

6. Flare the pipe

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

Pipe diameter (inch(mm))	Flare dimension A (mm/inch)		Flare shape
	Min	Max	
1/4" (6.35)	8.4/0.33	8.7/0.34	
3/8" (9.52)	13.2/0.52	13.5/0.53	
1/2" (12.7)	16.2/0.64	16.5/0.65	
5/8" (15.9)	19.2/0.76	19.7/0.78	
3/4" (19)	23.2/0.91	23.7/0.93	
7/8" (22)	26.4/1.04	26.9/1.06	

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

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

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

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

10. Set the wall conduit

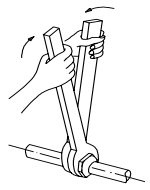
11. Set the supporter for the pipe.

12. Locate the pipe and fix it by supporter

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

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

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

Pipe Diameter	Torque N.m(lb.ft)	Sketch map
1/4" (6.35)	18~20 (13.3~14.8)	
3/8" (9.52)	32~39 (23.6~28.8)	
1/2" (12.7)	49~59 (36.1~43.5)	
5/8" (15.9)	57~71 (42~52.4)	
3/4" (19)	67~101 (49.4~74.5)	
7/8" (22)	85-110 (62.7-81.1)	

7. Vacuum Drying and Leakage Checking

7.1 Purpose of vacuum drying

- Eliminating moisture in system to prevent the phenomena of ice-blockage and copper oxidation.

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

7.2 Selection of vacuum pump

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

7.3 Operation procedure for vacuum drying

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

7.3.1 Ordinary vacuum drying

1. When conduct first vacuum drying, connect pressure gauge to the infusing mouth of gas pipe and liquid pipe, and keep vacuum pump running for 1hour (vacuum degree of vacuum pump shall be reached -755mmHg).

2. If the vacuum degree of vacuum pump could not reach -755mmHg after 1 hour of drying, it indicates that there is moisture or leakage in pipeline system and need to go on with drying for half an hour.

3. If the vacuum degree of vacuum pump still could not reach -755mmHg after 1.5 hours of drying, check whether there is leakage source.

4 . Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

7.3.2 Special vacuum drying

The special vacuum drying method shall be adopted when:

1. Finding moisture during flushing refrigerant pipe.

2. Conducting construction on rainy day, because rain water might penetrated into pipeline.

3. Construction period is long, and rain water might penetrated into pipeline.

4. Rain water might penetrate into pipeline during construction.

Procedures of special vacuum drying are as follows:

1. Vacuum drying for 1 hour.

2. Vacuum damage, filling nitrogen to reach 0.5Kgf/cm^2 .

Because nitrogen is dry gas, vacuum damage could achieve the effect of vacuum drying, but this method could not achieve drying thoroughly when there is too much moisture. Therefore, special attention shall be drawn to prevent the entering of water and the formation of condensate water.

3. Vacuum drying again for half an hour.

If the pressure reached -755mmHg, start to pressure leakage test. If it cannot reached the value, repeat vacuum damage and vacuum drying again for 1 hour.

4. Leakage test: After the vacuum degree reaches -755mmHg, stop vacuum drying and keep the pressure for 1 hour. If the indicator of vacuum gauge does not go up, it is qualified. If going up, it indicates that there is moisture or leak source.

8. Additional Refrigerant Charge

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

	Diameter of liquid pipe (mm(inch))	Formula
R410A(Throttling part in the indoor unit)	6.35(1/4)	V=30(0.32)g/m(oz/ft)×(L-standard pipe length)
	9.52(3/8)	V=65(0.69)g/m(oz/ft)×(L-standard pipe length)
	12.7(1/2)	V=115(1.23)g/m(oz/ft)×(L-standard pipe length)
R410A(Throttling part in the outdoor unit)	6.35(1/4)	V=15(0.16)g/m(oz/ft)×(L-standard pipe length)
	9.52(3/8)	V=30(0.32)g/m(oz/ft)×(L-standard pipe length)
	12.7(1/2)	V=65(0.69)g/m(oz/ft)×(L-standard pipe length)
R32	6.35(1/4)	V=12(0.13)g/m(oz/ft)×(L-standard pipe length)
	9.52(3/8)	V=24(0.26)g/m(oz/ft)×(L-standard pipe length)
	12.7(1/2)	V=40(0.42)g/m(oz/ft)×(L-standard pipe length)

V: Additional refrigerant charge volume.

L : The length of the liquid pipe.

Note:

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

9 . Engineering of Insulation

9.1 Insulation of refrigerant pipe

1. Operational procedure of refrigerant pipe insulation

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

2. Purpose of refrigerant pipe insulation

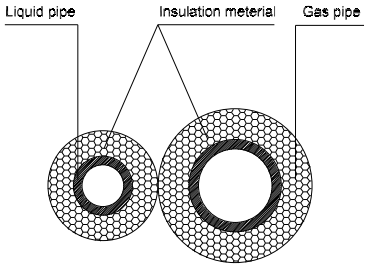
- During operation, temperature of gas pipe and liquid pipe shall be over-heating or over-cooling extremely. Therefore, it is necessary to carry out insulation; otherwise it shall debase the performance of unit and burn compressor.
- Gas pipe temperature is very low during cooling. If insulation is not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

3. Insulation material selection for refrigerant pipe

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

4. Installation highlights of insulation construction

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



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

9.2 Insulation of drainage pipe

1. Operational procedure of refrigerant pipe insulation

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

2. Purpose of drainage pipe insulation

The temperature of condensate drainage water is very low. If insulation is not enough, it shall form dew and cause leakage to damage the house decoration.

3. Insulation material selection for drainage pipe

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

4. Installation and highlights of insulation construction

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

10. Engineering of Electrical Wring

1. Highlights of electrical wiring installation

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

Table: Minimum Cross-Sectional Area able of Power and Signal Cables

For North America:

Rated Current of Appliance (A)	AWG
≤ 6	18
6 - 10	16
10 - 16	14
16 - 25	12
25 - 32	10

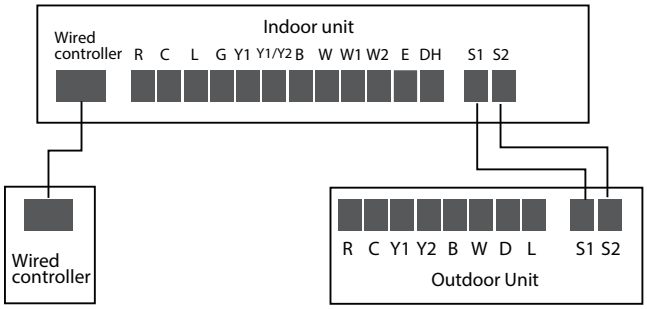
For the other regions:

Rated Current of Appliance (A)	Nominal Cross-Sectional Area(mm^2)
≤ 6	0.75
6 - 10	1
10 - 16	1.5
16 - 25	2.5
25 - 32	4
32 - 45	6

2. Specific wiring method

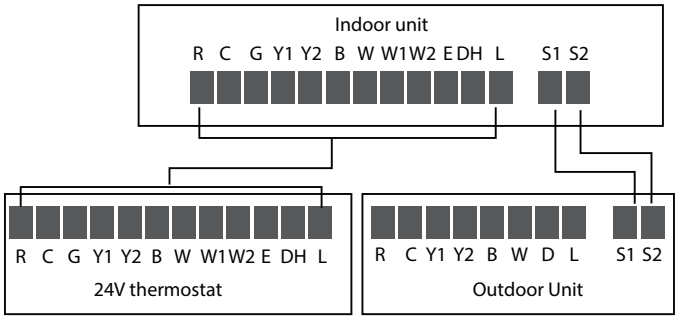
Connection method A:

Refer to the wiring method of internal and external machine communication and wired controller as follows:



Connection method B:

To use a 24V thermostat, you need to refer to the following wiring:

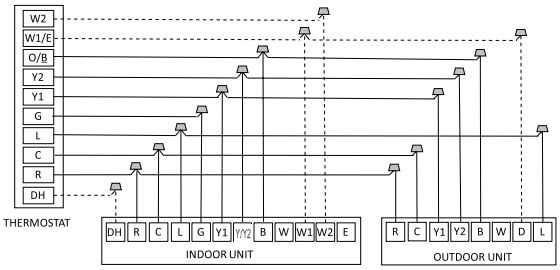


NOTE: The wiring method of the thermostat and the internal machine refers to the wiring of the non-communication scheme.

Connection method C:

Non-communication scheme wiring reference

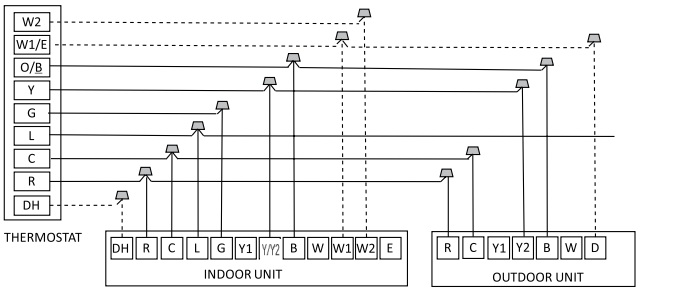
- Wiring for 4H and 2C thermostat



S4-2 Default on, DH function off. Turn switch off to activate DH function.

S4-1 Default on, W1 and W2 shorted for single stage Aux heat operation. Turn off to separate stages.

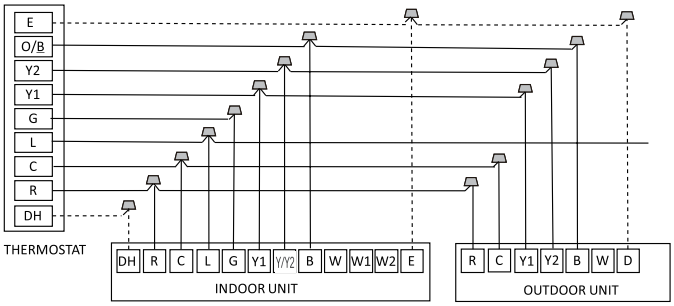
- Wiring for 3H and 1C thermostat



S4-2 Default on, DH function off. Turn switch off to activate DH function.

S4-1 Default on, W1 and W2 shorted for single stage Aux heat operation. Turn off to separate stages.

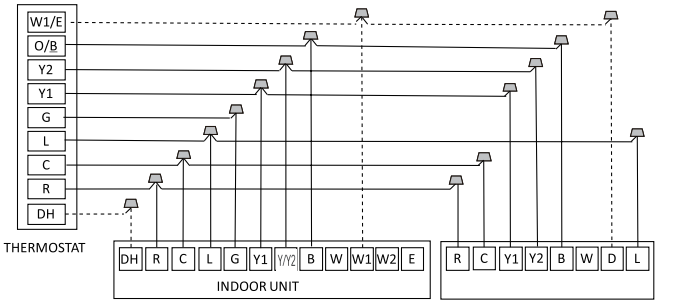
- Wiring for 3H and 2C thermostat



S4-2 Default on, DH function off. Turn switch off to activate DH function.

Emergency heating control two groups of electric heating at the same time

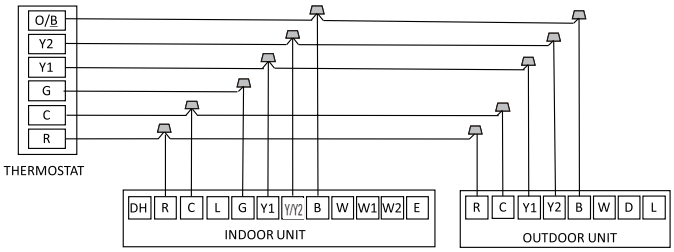
- Wiring for 3H and 2C thermostat



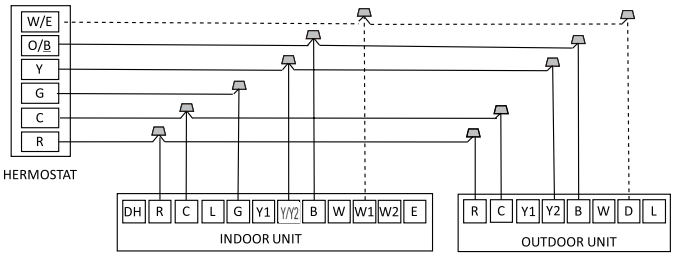
S4-2 Default on, DH function off. Turn switch off to activate DH function.

S4-1 Default on, W1 and W2 shorted for single stage Aux heat operation. Turn off to separate stages.

- Wiring for 2H and 2C thermostat

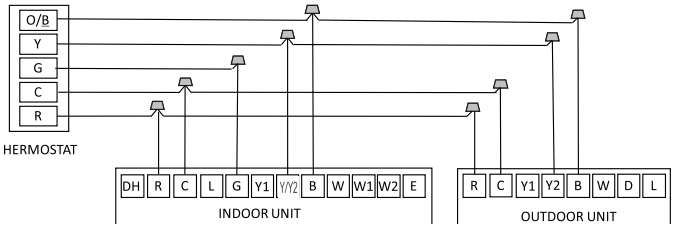


- Wiring for 2H and 1C thermostat

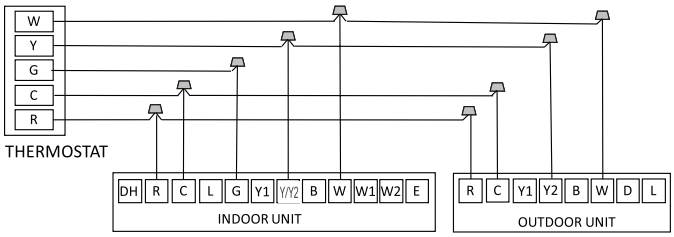


S4-1 Default on, W1 and W2 shorted for single stage Aux heat operation. Turn off to separate stages.

- Wiring for 1H and 1C thermostat



- Wiring for 1H and 1C thermostat



Note:

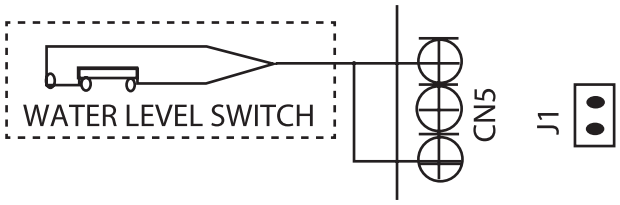
When the indoor and outdoor unit is connected without communication (connection mode C), indoor sensor fault and fan fault, the indoor unit plate outputs L signal to the temperature controller, and the temperature controller shall send out stop command to the outdoor unit .

If the temperature controller provided by the customer is not equipped with the output stop instruction of the outdoor unit , the outdoor units are not allowed to run in the non-communication mode. Please use connection mode B.

3. Optional function wiring

3.1 Condensate overflow switch

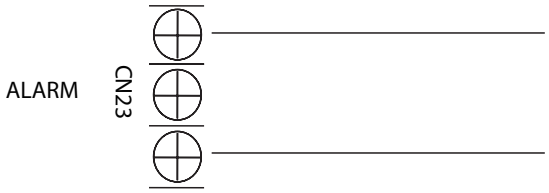
The unit will accommodate a remote condensate overflow switch. To enable, remote jumper J1, and connect the installer provided condensate overflow device to CN5 per below. When an overflow condition is present, the device should open connection signaling the unit to turn off the system.



3.2 The fault warning

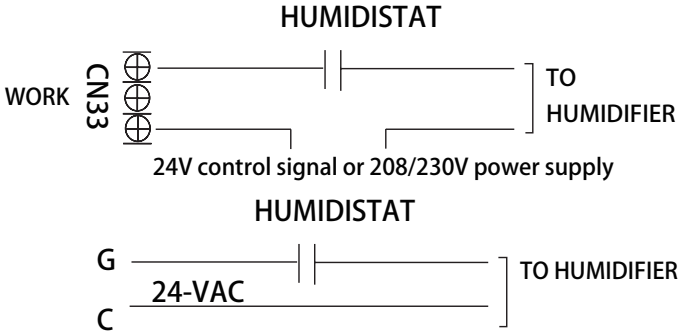
Alarm output:

An alarm output(CN33) can be utilized if actions are required when a fault is present. This is a passive outlet port, so you will need to input a voltage signal. The relay is normally-open for normal operation, and closed when a fault condition is active.

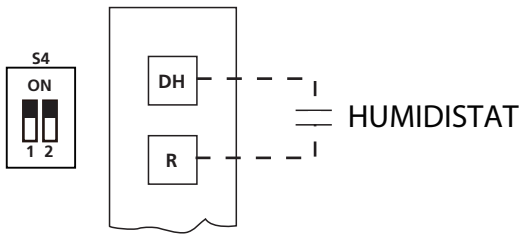


3.3 Humidification control wiring

- To connect a humidifier, utilize the passive signal "WORK" output (CN23) port as well as the G and C wires on the controller, and wire the humidistat and humidifier per above wiring diagram. When the fan is running, the CN23 relay will be closed, which will allow power to the humidifier when the humidistat is below humidity setpoint. If the thermostat or zone controller has an HUM interface, connect the humidifier directly to the HUM and C ports.



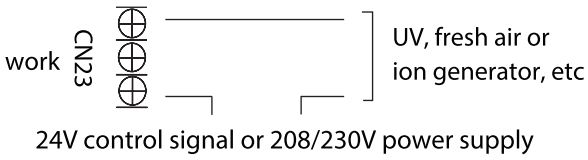
3.4 Dehumidification control wiring



Dehumidification control requires indirect humidifier at DH and R. Set S4-2 as OFF. When the humidity rises and exceeds the set value of the humidifier, the 24V signal of DH changes to 0V, the cooling system starts the dehumidification operation, and the air volume drops to 80% of the nominal cooling air volume.

3.5 UV, fresh air or negative ion wiring

The WORK port is linked with the fan. When the fan is running, the relay is closed; if an active 24V signal is required, it can be directly connected to the G and C ports.



4. Control Logic

Indoor unit Connector

Connector	Purpose
R	24V Power Connection
C	Common
G	Fan Control
Y1	Low Cooling
Y/Y2	High Cooling
B	Heating Reversing Valve
W	Heating Control
W1	Stage 1 Electric heating
W2	Stage 2 Electric heating
E/AUX	Emergency heating
DH/DS/BK	Dehumidification/Zoning control
L	System Fault Signal

Outdoor unit Connector

Connector	Purpose
R	24V Power Connection
C	Common
Y1	Low Cooling
Y2	High Cooling
B	Heating Reversing Valve
W	Heating Control
D	Defrost Control
L	System Fault Signal

11. Test Operation

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

2. Please confirm the following points before the test operation.

- The indoor unit and outdoor unit are installed properly.
- Piping and wiring are properly connected.
- Ensure that there are no obstacles near the inlet and outlet of the unit that might cause poor performance or product malfunction.
- The refrigeration system does not leak.
- The drainage system is unimpeded and draining to a safe location.
- The heating insulation is properly installed.
- The grounding wires are properly connected
- The length of the piping and the added refrigerant stow capacity have been recorded.
- The power voltage is the correct voltage for the air conditioner.

CAUTION: Failure to perform the test run may result in unit damage, property damage or personal injury.

3. Test Run Instructions

1. Open both the liquid and gas stop valves.

2. Turn on the main power switch and allow the unit to warm up.

3. Set the air conditioner to COOL mode, and check the following points.

Indoor unit

- Double check to see if the room temperature is being registered correctly.
- Ensure the manual buttons on the indoor unit works properly.
- Check to see that the drainage system is unimpeded and draining smoothly.
- Ensure there is no vibration or abnormal noise during operation.

Outdoor unit

- Check to see if the refrigeration system is leaking.
- Make sure there is no vibration or abnormal noise during operation.
- Ensure the wind, noise, and water generated by the unit do not disturb your neighbors or pose a safety hazard.

4. Drainage Test

a. Ensure the drainpipe flows smoothly. New buildings should perform this test before finishing the ceiling.

b. Turn on the main power switch and run the air conditioner in COOL mode.

c. Check to see that the water is discharged. It may take up to one minute before the unit begins to drain depending on the drainpipe.

d. Make sure that there are no leaks in any of the piping.

e. Stop the air conditioner. Turn off the main power switch and reinstall the test cover.

Maintenance

Contents

1. First Time Installation Check 2

2 Refrigerant Recharge 4

3 Re-Installation 5

3.1 Indoor Unit 5

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1. First Time Installation Check

Air and moisture trapped in the refrigerant system affects the performance of the air conditioner by:

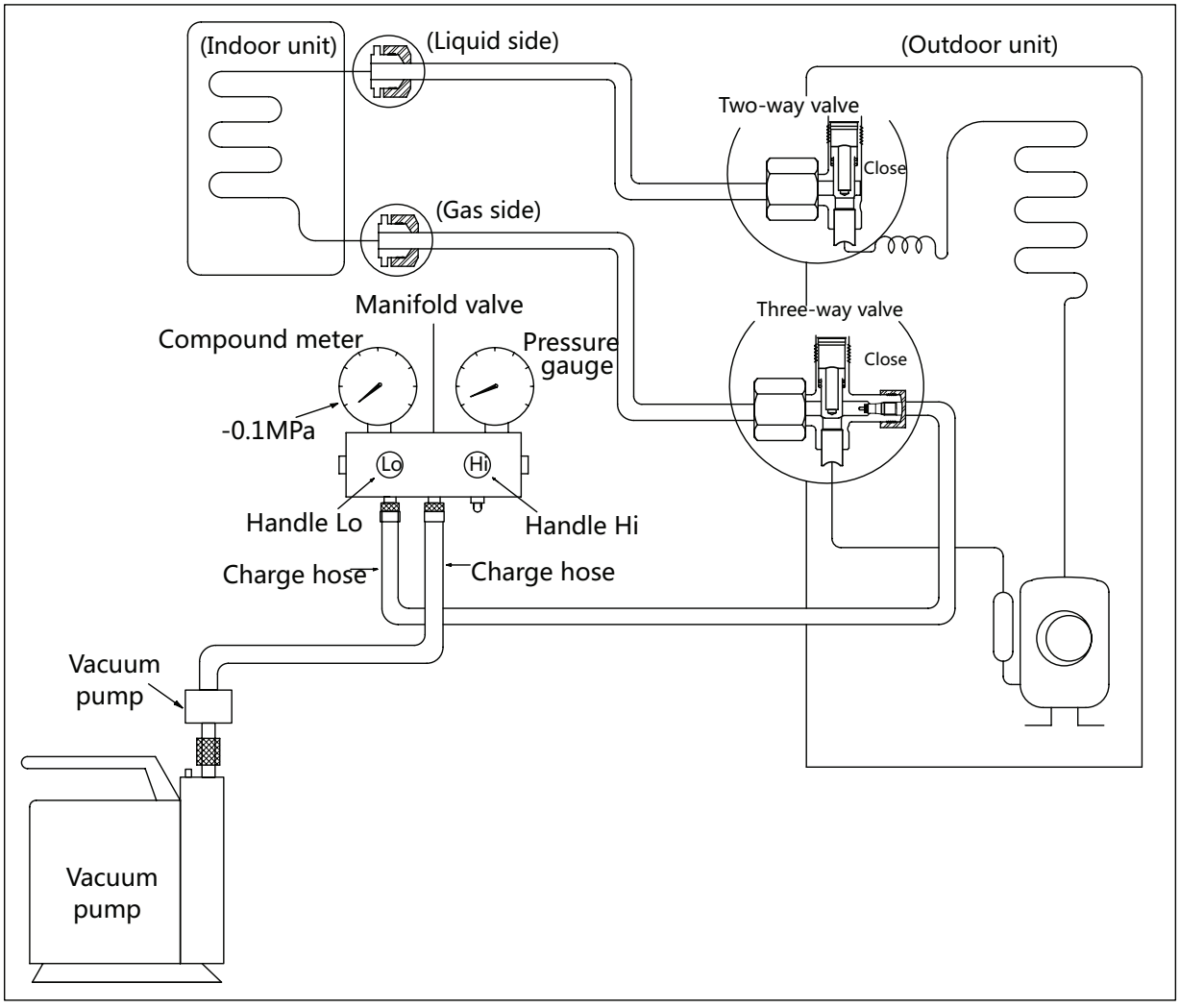
- Increasing pressure in the system.
- Increasing the operating current.
- Decreasing the cooling or heating efficiency.
- Congesting the capillary tubing due to ice build-up in the refrigerant circuit.
- Corroding the refrigerant system.

To prevent air and moisture from affecting the air conditioner's performance, the indoor unit, as well as the pipes between the indoor and outdoor unit, must be be leak tested and evacuated.

Leak test (soap water method)

Use a soft brush to apply soapy water or a neutral liquid detergent onto the indoor unit connections and outdoor unit connections. If there is gas leakage, bubbles will form on the connection.

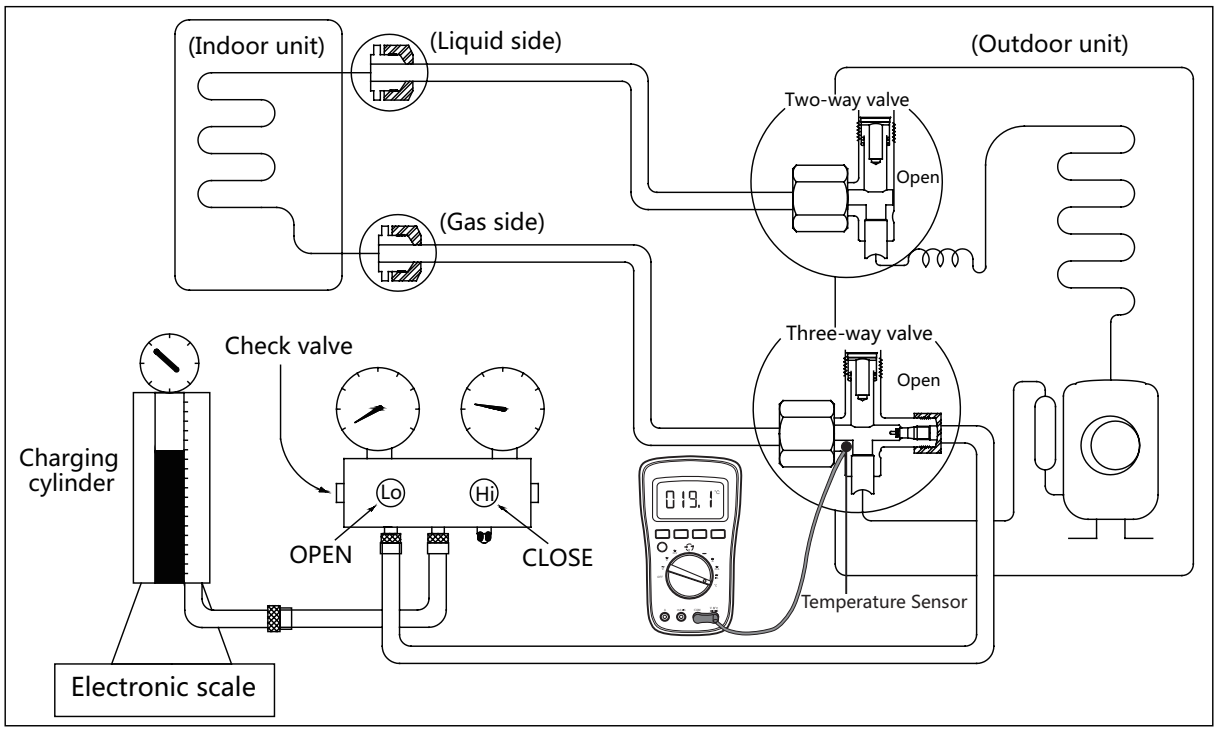
Air purging with vacuum pump



Procedure:

1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
2. Connect the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
3. Connect another charge hose to the vacuum pump.
4. Fully open the Handle Lo manifold valve.
5. Using the vacuum pump, evacuate the system for 30 minutes.
   a. Check whether the compound meter indicates -0.1 MPa (14.5 Psi).
      - If the meter does not indicate -0.1 MPa (14.5 Psi) after 30 minutes, continue evacuating for an additional 20 minutes.
      - If the pressure does not achieve -0.1 MPa (14.5 Psi) after 50 minutes, check for leakage.
      - If the pressure successfully reaches -0.1 MPa (14.5 Psi), fully close the Handle Lo valve, then cease vacuum pump operations.
   b. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check wether there is gas leakage.
6. Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
   a. Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
   b. Remove the charge hose from the 3-way valve.
7. Fully open the 2- and 3-way valves and tighten the cap of the 2- and 3-way valves.

2. Refrigerant Recharge



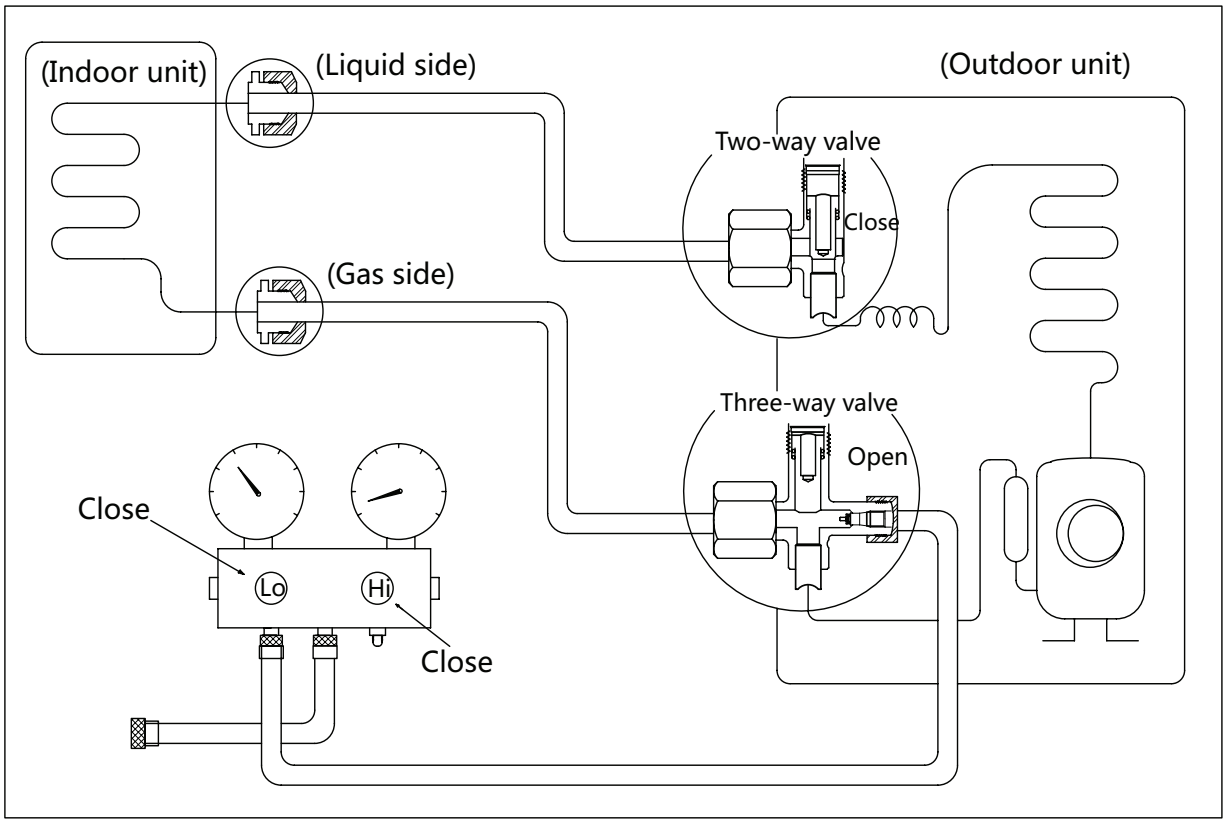
Procedure:

1. Close both 2- and 3-way valves.
2. Slightly connect the Handle Lo charge hose to the 3-way service port.
3. Connect the charge hose to the valve at the bottom of the cylinder.
4. If the refrigerant is R410A/R32, invert the cylinder to ensure a complete liquid charge.
5. Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with push pin Handle Lo to the service port of 3-way valve..
6. Place the charging cylinder onto an electronic scale and record the starting weight.
7. Fully open the Handle Lo manifold valve, 2- and 3-way valves.
8. Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
9. When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm, the value of pressure refers to chapter Appendix), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
10. Mount the caps of service port and 2- and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 18 N.m.
12. Check for gas leakage.

3. Re-Installation

3.1 Indoor Unit

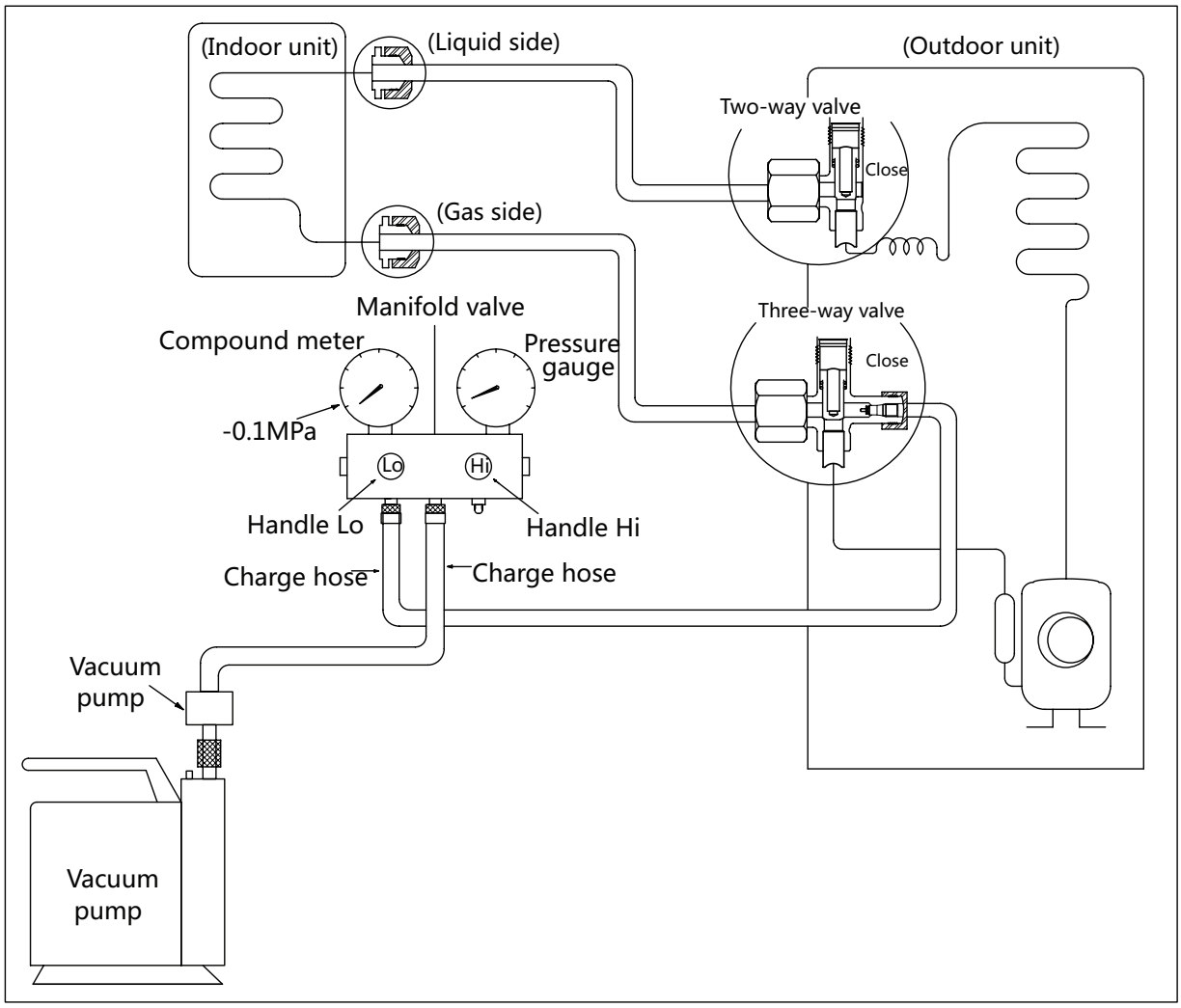
Collecting the refrigerant into the outdoor unit



Procedure:

1. Confirm that the 2- and 3-way valves are opened.
2. Connect the charge hose with the push pin of Handle Lo to the 3-way valve's gas service port.
3. Open the Handle Lo manifold valve to purge air from the charge hose for 5 seconds and then close it quickly.
4. Close the 2-way valve.
5. Operate the air conditioner in cooling mode. Cease operations when the gauge reaches 0.1 MPa (14.5 Psi).
6. Close the 3-way valve so that the gauge rests between 0.3 MPa (43.5 Psi) and 0.5 MPa (72.5 Psi).
7. Disconnect the charge set and mount the caps of service port and 2- and 3-way valves.
8. Use a torque wrench to tighten the caps to a torque of 18 N.m.
9. Check for gas leakage.

Air purging with vacuum pump



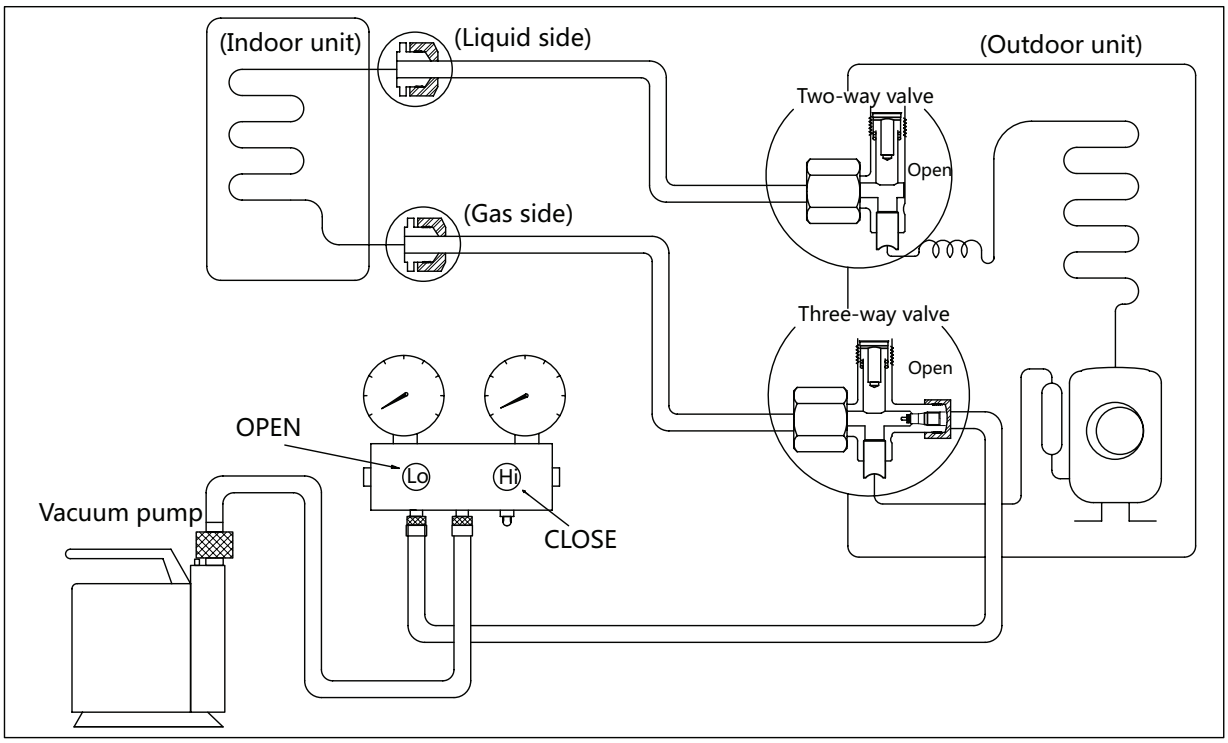
Procedure:

1. Tighten the flare nuts of the indoor and outdoor units, and confirm that both the 2- and 3-way valves are closed.
2. Connect the charge hose with the push pin of Handle Lo to the gas service port of the 3-way valve.
3. Connect another charge hose to the vacuum pump.
4. Fully open the Handle Lo manifold valve.
5. Using the vacuum pump, evacuate the system for 30 minutes.
   a. Check whether the compound meter indicates -0.1 MPa (14.5 Psi).
      - If the meter does not indicate -0.1 MPa (14.5 Psi) after 30 minutes, continue evacuating for an additional 20 minutes.
      - If the pressure does not achieve -0.1 MPa (14.5 Psi) after 50 minutes, check for leakage.
      - If the pressure successfully reaches -0.1 MPa (14.5 Psi), fully close the Handle Lo valve, then cease vacuum pump operations.

   b. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check wether there is gas leakage.
6. Loosen the flare nut of the 3-way valve for 6 or 7 seconds and then tighten the flare nut again.
   a. Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
   b. Remove the charge hose from the 3-way valve.
7. Fully open the 2- and 3-way valves and tighten the cap of the 2- and 3-way valves.

3.2 Outdoor Unit

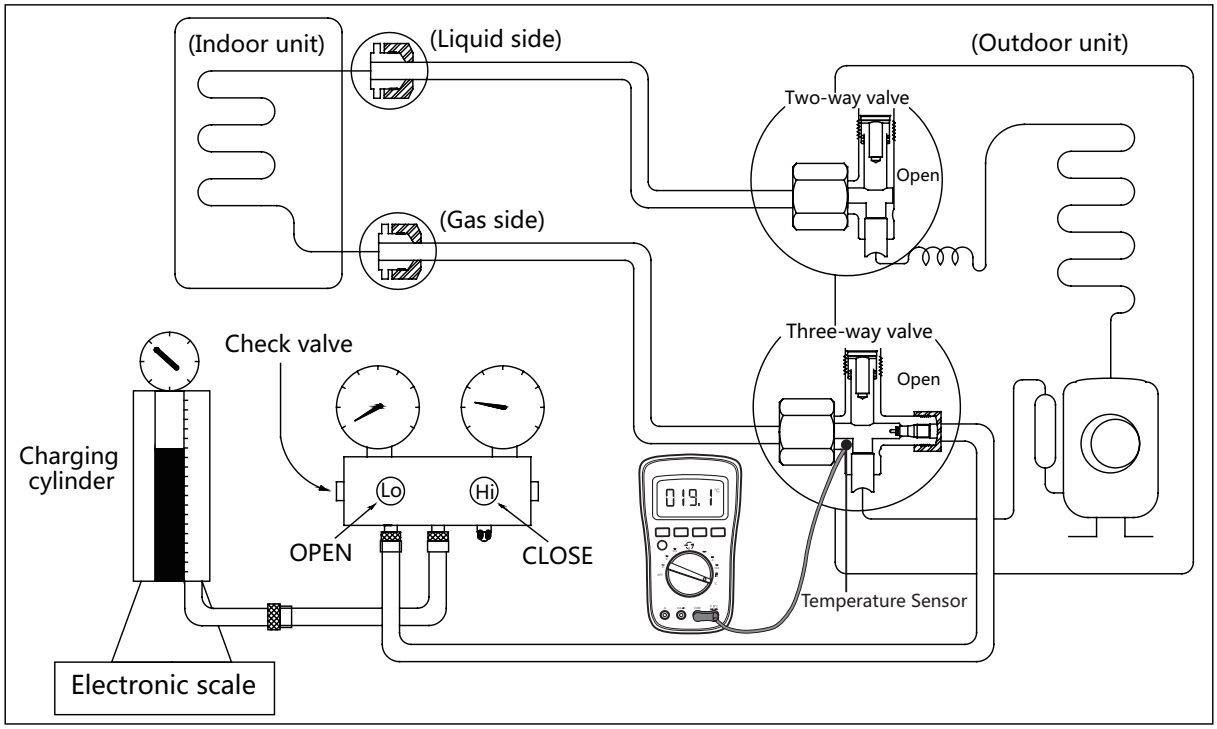
Evacuation for the whole system



Procedure:

1. Confirm that the 2- and 3-way valves are opened.
2. Connect the vacuum pump to the 3-way valve's service port.
3. Evacuate the system for approximately one hour. Confirm that the compound meter indicates -0.1 MPa (14.5Psi).
4. Close the valve (Low side) on the charge set and turn off the vacuum pump.
5. Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check whether there is gas leakage.
6. Disconnect the charge hose from the vacuum pump.
7. Mount the caps of service port and 2- and 3-way valves.
8. Use a torque wrench to tighten the caps to a torque of 18 N.m.

Refrigerant charging



Procedure:

1. Close both 2- and 3-way valves.
2. Slightly connect the Handle Lo charge hose to the 3-way service port.
3. Connect the charge hose to the valve at the bottom of the cylinder.
4. If the refrigerant is R410A/R32, invert the cylinder to ensure a complete liquid charge.
5. Open the valve at the bottom of the cylinder for 5 seconds to purge the air in the charge hose, then fully tighten the charge hose with push pin Handle Lo to the service port of 3-way valve..
6. Place the charging cylinder onto an electronic scale and record the starting weight.
7. Fully open the Handle Lo manifold valve, 2- and 3-way valves.
8. Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
9. When the electronic scale displays the correct weight (refer to the gauge and the pressure of the low side to confirm, the value of pressure refers to chapter Appendix), turn off the air conditioner, then disconnect the charge hose from the 3-way service port immediately..
10. Mount the caps of service port and 2- and 3-way valves.
11. Use a torque wrench to tighten the caps to a torque of 18 N.m.
12. Check for gas leakage.

Note: 1. Mechanical connectors used indoors shall comply with local regulations.

2. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.

Product Features

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1. Display Function

Mode	Priority	G	Y1	Y/Y2	B	W	W1	W2	E/AUX	DH/DS/BK	Display
Shut down	/	0	0	0	0	0	0	0	0	*	00
Fan	7	1	0	0	*	0	0	0	0	*	01
Cooling 1	6	*	1	0	0	0	0	0	0	1	02
Cooling 2		*	*	1	0	0	0	0	0	1	03
Drying 1		*	1	0	0	0	0	0	0	0	04
Drying 2		*	*	1	0	0	0	0	0	0	05
Heating 1	5	*	1	0	1	0	0	0	0	1	06
Heating 2		*	*	1	1	0	0	0	0	1	07
Heating 2		*	*	*	*	1	0	0	0	1	
Electric heating 1	3	*	0	0	*	0	1	0	0	*	08
Electric heating 1		*	0	0	*	0	0	1	0	*	
Electric heating 2		*	0	0	*	0	1	1	0	*	09
Heating 1+Electric heating 1	4	*	1	0	1	0	1	0	0	1	10
Heating 1+Electric heating 1		*	1	0	1	0	0	1	0	1	
Heating 2 +Electric heating 1		*	*	1	1	0	1	0	0	1	
Heating 2 +Electric heating 1		*	*	*	*	1	1	0	0	1	
Heating 2 +Electric heating 1		*	*	1	1	0	0	1	0	1	
Heating 2 +Electric heating 1		*	*	*	*	1	0	1	0	1	
Heating 1+Electric heating 2		*	1	0	1	0	1	1	0	1	11
Heating 2+Electric heating 2		*	*	1	1	0	1	1	0	1	
Heating 2+Electric heating 2		*	*	*	*	1	1	1	0	1	
Emergency heating	1	*	*	*	*	*	*	*	1	*	12
Heating zone control	2	*	1	0	1	0	*	*	0	0	13
Heating zone control		*	*	1	1	0	*	*	0	0	
Heating zone control		*	*	*	*	1	*	*	0	0	

NOTICE:

1 : signal

0 : no signal

*: 1 or 0

If the input does not meet the above, press shutdown for processing.

2. Safety Features

Compressor three-minute delay at restart

Compressor functions are delayed for up to ten seconds upon the first startup of the unit, and are delayed for up to three minutes upon subsequent unit restarts.

Automatic shutoff based on discharge temperature

If the compressor discharge temperature exceeds a certain level for nine seconds, the compressor ceases operation.

Inverter module protection

The inverter module has an automatic shutoff mechanism based on the unit's current, voltage, and temperature. If automatic shutoff is initiated, the corresponding error code is displayed on the indoor unit and the unit ceases operation.

Indoor fan delayed operation

- When the unit starts, the indoor fan will operate after a period of setting time.
- If the unit is in heating mode, the indoor fan is regulated by the anti-cold wind function.

Compressor preheating

Preheating is automatically activated when T4 sensor is lower than setting temperature.

Sensor redundancy and automatic shutoff

- If one temperature sensor malfunctions, the air conditioner continues operation and displays the corresponding error code, allowing for emergency use.
- When more than one temperature sensor is malfunctioning, the air conditioner ceases operation.

3. Basic Functions

3.1 Abbreviation

Unit element abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of evaporator
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
TP	Compressor discharge temperature
TS	Setting temperature
Tsc	Adjusted setting temperature

In this manual, such as CDIFTEMP, HDIFTEMP2,TEH2, TCE1, TCE2...etc., they are well-setting parameter of EEPROM.

3.2 Fan Mode

When fan mode is activated:

- The outdoor fan and compressor are stopped.
- Temperature control is disabled and no temperature setting is displayed.
- The indoor fan speed can be set to low, medium, high, turbo and auto.
- Auto fan: In fan-only mode, AC operates the same as auto fan in cooling mode with the temperature set at 24°C(75°F).
- Under 24V control, when only G signal is available, when switching from heating mode or emergency heating mode to fan mode, T4<10°C(50°F), the heating mode is sent to the outdoor; when T4>12°C(53.6 °F), the normal outdoor control is resumed, the fan mode is sent to the outdoor.

3.3 Cooling Mode

3.3.1 Compressor Control

- If the following conditions are satisfied, the compressor ceases operation.
  - When the frequency value calculated by the GA algorithm is negative compensation.
  - Protection time for temperature shutdown is more than ten minutes.
  - T1 is lower than or equal to (Tsc-CDIFTEMP).
- If one of the following conditions is satisfied, not judge protective time.
  - Compressor running frequency is more than test frequency.
  - When compressor running frequency is equal to test frequency, T4 is more than 15°C(59 °F) or T4 fault.
  - Change setting temperature.
  - Turning on/off Turbo or Silent function.
  - Various frequency limit shutdown occurs.

3.3.2 Indoor Fan Control

1) In cooling mode, the indoor fan operates continuously. The fan speed can be set to low, medium, high, turbo and auto.

2) Auto fan action in cooling mode:

- Descent curve
  - When T1-Tsc is lower than or equal to 3.5°C/6.3°F, fan speed reduces to high;
  - When T1-Tsc is lower than or equal to 1°C/1.8°F, fan speed reduces to medium;

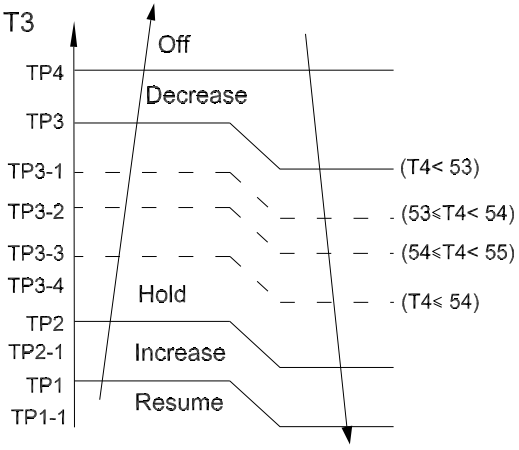
- When T1-Tsc is lower than or equal to 0.5°C/0.9°F, fan speed reduces to low;

- Rise curve
  - When T1-Tsc is higher than 1°C/1.8°F, fan speed increases to medium;
  - When T1-Tsc is higher than 1.5°C/2.7°F, fan speed increases to high;
  - When T1-Tsc is higher than 4°C/7.2°F, fan speed increases to turbo.

3.3.3 Outdoor Fan Control

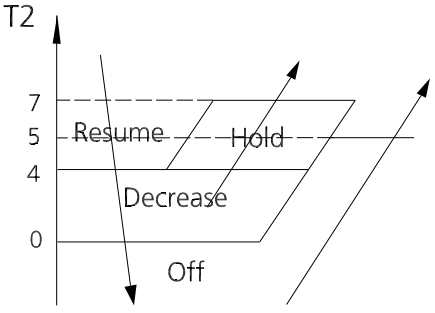
- The outdoor unit will be run at different fan speed according to T4 and compressor frequency.
- For different outdoor units, the fan speeds are different.

3.3.4 Condenser Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level at 0.04Hz/s.
- Hold: Keep the current frequency.
- Increase: Increase the running frequency to the higher level at 1Hz/s
- Resume: No limitation for frequency.

3.3.5 Evaporator Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level per 1 minute.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

3.4 Heating Mode(Heat Pump Units)

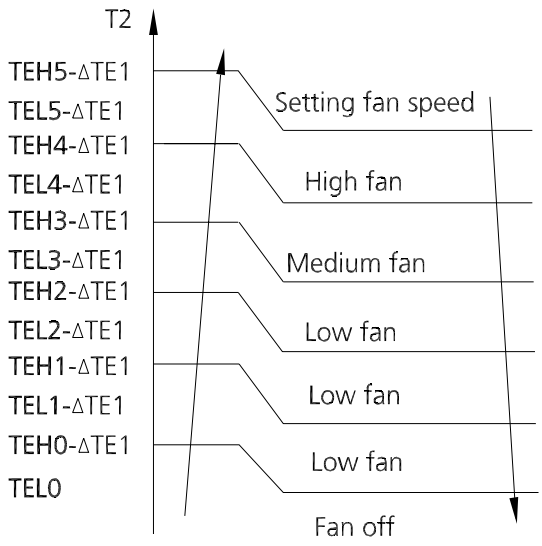
3.4.1 Compressor Control

- If the following conditions are satisfied, the compressor ceases operation.
  - When the frequency value calculated by the GA algorithm is negative compensation.
  - Protection time for temperature shutdown is more than ten minutes.
  - T1 is higher than or equal to Tsc+ HDIFTEMP2.
- If one of the following conditions is satisfied, not judge protective time.
  - Compressor running frequency is more than test frequency.
  - Compressor running frequency is equal to test frequency, T4 is more than 15°C(59 °F) or T4 fault.
  - Change setting temperature.
  - Turning on/off Turbo or Silent function.
- When the current is higher than the predefined safe value, surge protection is activated, causing the compressor to cease operations.

3.4.2 Indoor Fan Control:

1) In heating mode, the indoor fan operates continuously. The fan speed can be set to low, medium, high,turbo and auto.

- Anti-cold air function
  - The indoor fan is controlled by the indoor temperature T1 and indoor unit coil temperature T2.



ΔTE1=0

2) Auto fan action in heating mode:

- Rise curve
  - When T1-Tsc is higher than -1.5°C/-2.7°F, fan speed reduces to high;
  - When T1-Tsc is higher than 0°C/0°F, fan speed reduces to medium;
  - When T1-Tsc is higher than 0.5°C/0.9°F, fan speed reduces to low;
- Descent curve
  - When T1-Tsc is lower than or equal to 0°C/0°F, fan speed increases to medium;
  - When T1-Tsc is lower than or equal to -1.5°C/-2.7°F, fan speed increases to high;
  - When T1-Tsc is lower than or equal to -3°C/-5.4°F, fan speed increases to turbo.

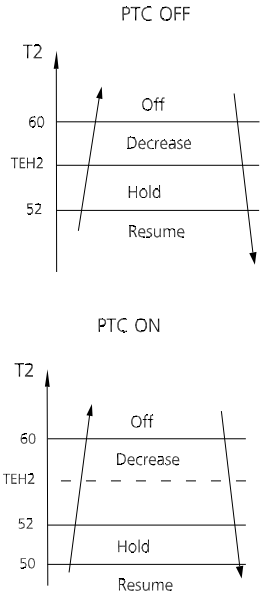
3.4.3 Outdoor Fan Control:

- The outdoor unit will be run at different fan speed according to T4 and compressor frequency.
- For different outdoor units, the fan speeds are different.

3.4.4 Defrosting mode

- The unit enters defrosting mode according to the temperature value of T3 and T4 as well as the compressor running time.
- In defrosting mode, the compressor continues to run, the indoor and outdoor motor will cease operation, the defrost light of the indoor unit will turn on, and the "dF" symbol is displayed.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1.
  - T3 maintained above TCDE2 for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.
- If T4 is lower than or equal to -22°C(-7.6 °F) and compressor running time is more than TIMING_ DEFROST_TIME, if any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - Unit runs for 10 minutes consecutively in defrosting mode.
  - T3 rises above 10°C/50°F.
- If any one of the following conditions is satisfied, the unit enters defrosting mode
  - If T3 or T4 is lower than -3°C/26.6°F for 30 seconds, Ts-T1 is lower than 5°C and compressor running time is more than EE_TIME_DEFROST7.
  - If T3 or T4 is lower than -3°C/26.6°F for 30 seconds and compressor running time is more than EE_ TIME_DEFROST7+30 minutes.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1+4°C/7.2°F.
  - T3 maintained above TCDE2+4°C/7.2°F for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.

3.4.5 Evaporator Coil Temperature Protection



- Off: Compressor stops.
- Decrease: Decrease the running frequency to the lower level per 20 seconds.
- Hold: Keep the current frequency.
- Resume: No limitation for frequency.

3.5 Auto Mode

- This mode can be selected with the remote controller and the temperature setting can be adjusted between 16°C~30°C.
- In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of **Δ**T (**Δ**T =T1-TS).

ΔT	Running mode
ΔT>2°C(3.6°F)	Cooling
-3℃(-5.4°F)<ΔT≤2°C(3.6°F)	Fan-only
ΔT≤-3°C(-5.4°F)	Heating*

Heating*: In auto mode, cooling only models run the fan

- Indoor fan will run at auto fan speed.
- If the machine switches mode between heating and

cooling, the compressor will keep stopping for certain time and then choose mode according to **Δ**T.

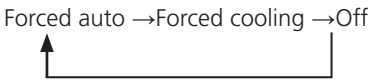
3.6 Drying Mode

- In drying mode, AC operates the same as auto fan in cooling mode.
- All protections are activated and operate the same as they do that in cooling mode.
- Low Room Temperature Protection

If the room temperature is lower than 10°C/50°F, the compressor ceases operations and does not resume until room temperature exceeds 12°C/53.6°F.

3.7 Forced Operation Function

Press the AUTO/COOL button, the AC will run as below sequence:



- Forced cooling mode:

The compressor and outdoor fan continue to run and the indoor fan runs at breeze speed. After running for 30 minutes, the AC will switch to auto mode with a preset temperature of 24°C(76°F).

- Forced auto mode:

Forced auto mode operates the same as normal auto mode with a preset temperature of 24°C(76°F).

- The unit exits forced operation when it receives the following signals:
  - Switch off
  - Changes in:
    - mode
    - fan speed
    - sleep mode
    - Follow me

3.8 Timer Function

- The timing range is 24 hours.
- Timer On. The machine turns on automatically at the preset time.
- Timer Off. The machine turns off automatically at the preset time.
- Timer On/Off. The machine turns on automatically at the preset On Time, and then turns off automatically at the preset Off Time.
- Timer Off/On. The machine turns off automatically at the preset Off Time and then turns on automatically at the preset On Time.
- The timer does not change the unit operation mode. If the unit is off now, it does not start up immediately after the "timer off" function is set. When the setting time is reached, the timer LED switches off and the unit running mode remains unchanged.
- The timer uses relative time, not clock time

3.9 Sleep Function

- The sleep function is available in cooling, heating, or auto mode.
- The operational process for sleep mode is as follows:
  - When cooling, the temperature rises 1°C/1.8°F (to not higher than 30°C/86°F) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at low speed.
  - When heating, the temperature decreases 1°C/1.8°F(to not lower than 16°C/60.8°F) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at low speed. Anti-cold wind function takes priority.
- The operating time for sleep mode is 8 hours, after which, the unit exits this mode.
- The timer setting is available in this mode.

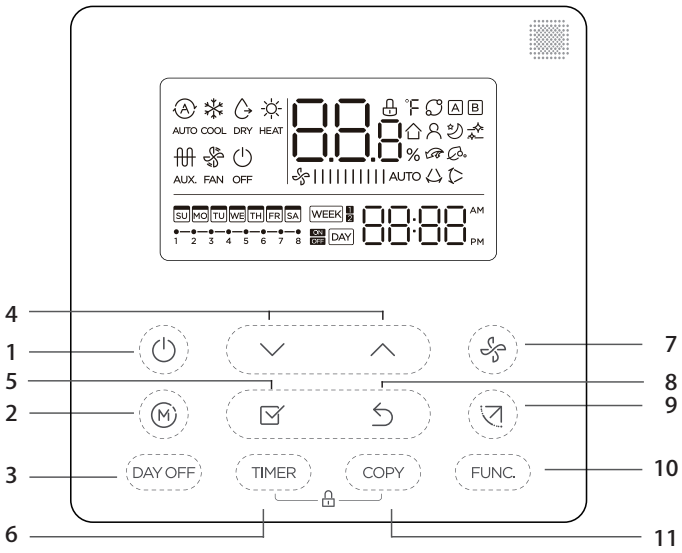
3.10 Auto-Restart Function

- The indoor unit has an auto-restart module that allows the unit to restart automatically. The module automatically stores the current settings and in the case of a sudden power failure, will restore those setting automatically within 3 minutes after power returns.

4. Remote Controller Functions

4.1 LCD Wired Remote Controller- KJR-120X/TFBG-E(Standard)

i) Buttons and Functions



1. POWER button

Turn on of turn off the unit.

2 MODE button

Used to select the operation mode: Auto / Cooling / Drying / Heating / Fan;

3. DAY OFF/DEL button

To set 1 to 2 hours delay off for each day or a whole day off in a weekly timer schedule.

4. Adjust button

To set temperature, time and timer

5. CONFIRM button

To confirm an setting or call up the superior menu

6. TIMER button

To set timer on and timer off time of one day

7. FAN SPEED button

Used to select the fan speed.

8. BACK button

Back to previous operation or superior menu

9. Swing Button

Press to active vertical swing, hold for horizontal swing

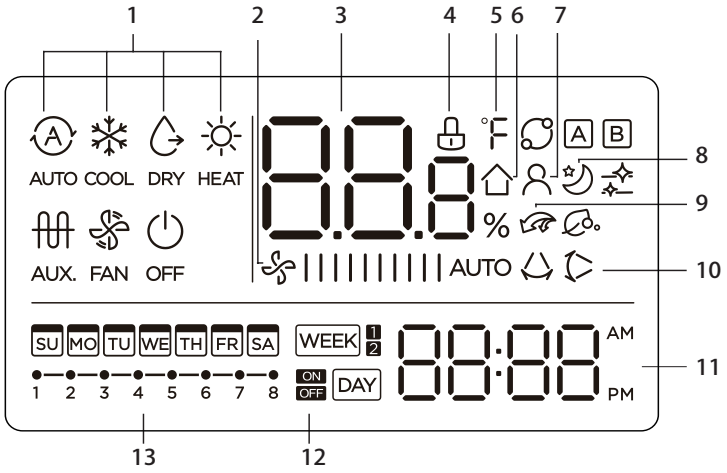
10. FUNC. button

Press the FUNC. button to set the turbo or rotating or Ifeel function.

11. COPY button

To copy timer setting of one day to another in weekly schedule setting.

ii) LCD Screen



1 Operation mode indication

2 Fan speed indication

3 Temperature display

4 Lock indication

5 °C / °F indication

6 Room temperature indication

7 Follow Me function indication

8 Sleep mode indication

9 Electric Auxiliary Heat/Turbo function indication(some models)

NOTE: AHU models only have turbo functions.

10 Left-right swing indication (some models)

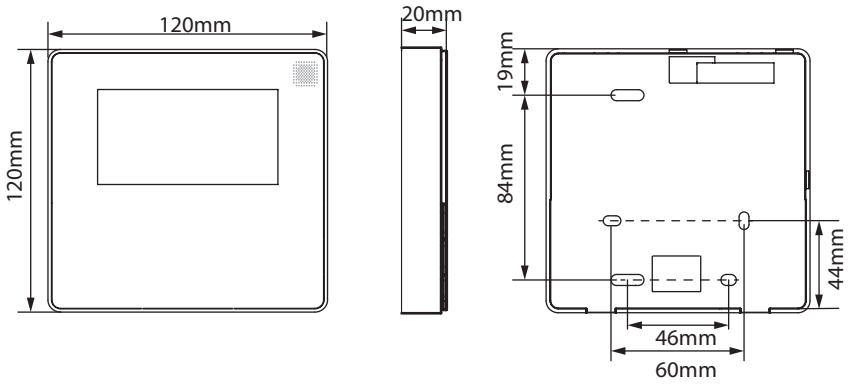
11 Clock display

12 On/Off timer

13 Timer display

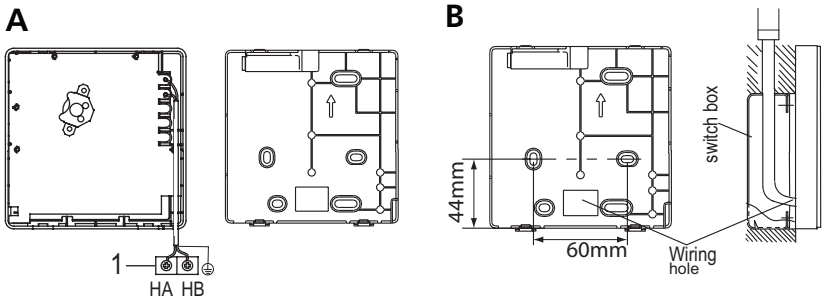
iii) Installation

- **Dimensions**



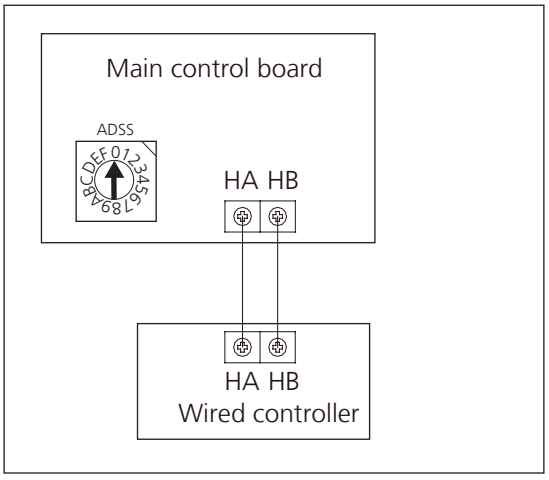
1) Connection

- **Wire with the indoor unit:**

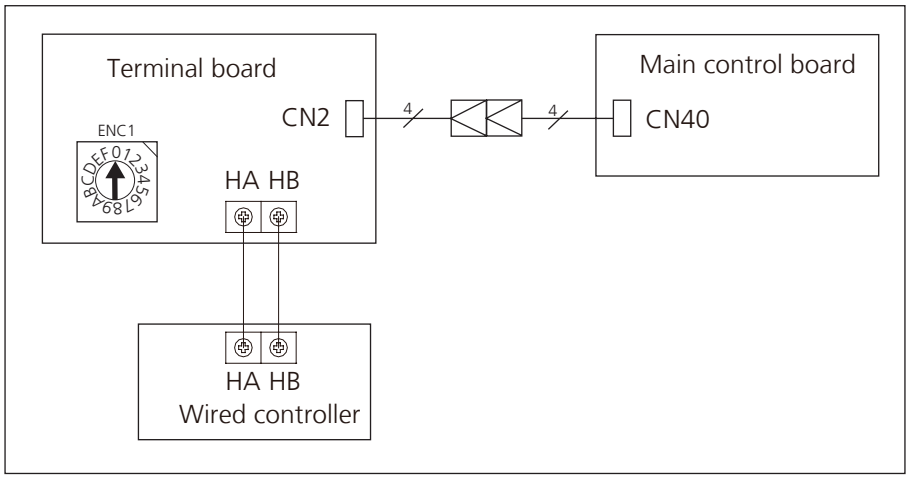


- 1: Indoor Unit.
- 2: Notch the part for the wiring to pass through with a nipper tool.
- Connect the terminals on the remote controller (HA ,HB), and the terminals of the indoor unit. (HA ,HB). (HA and HB do not have polarity.)

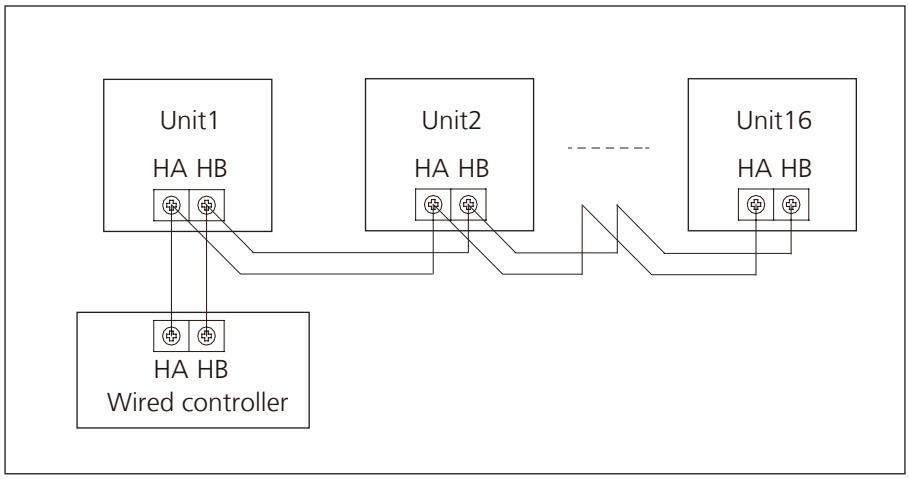
For some models: The wired controller connects to main control board directly.



For some models: The wired controller connects to terminal board, terminal board connects to main control board.



2) Address setting

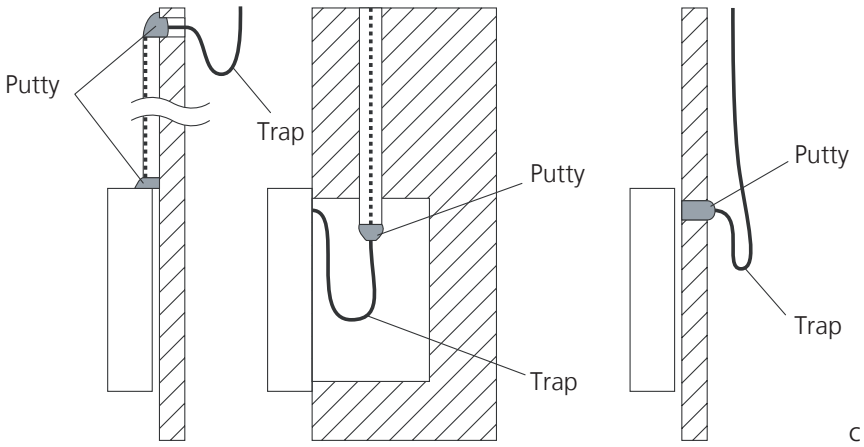


a. One non-polarity controller can control up to 16 indoor units.

b. When the non-polarity controller is connected to several units, every air-conditioner in network has only one network address to distinguish each other.

c. Address code of air-conditioner in LAN is set by code switch ENC1(Duct and Ceiling& Floor) or ADSS(Cassette) of the indoor unit, and the set range is 0-15.

d. Note: The indoor units are controlled at the same time, not independently. The purpose of setting network address is identify the unit when error occurs.



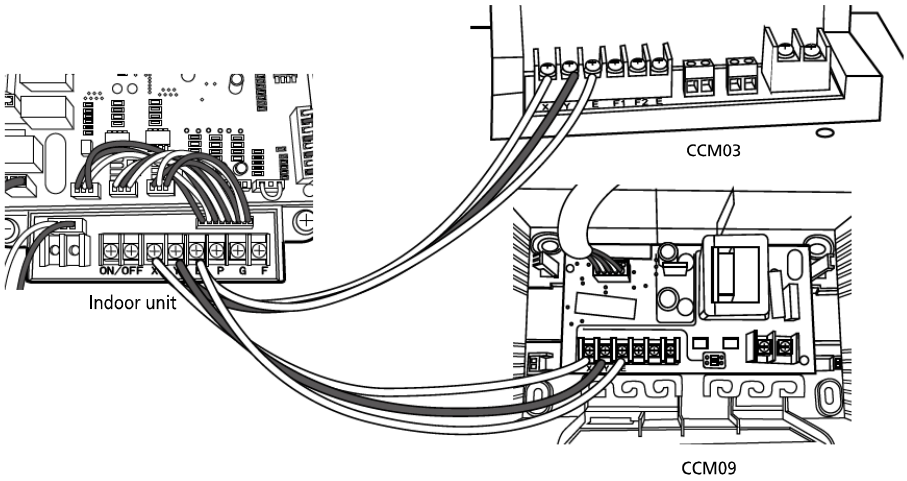
c

Note: DO NOT allow water to enter the remote control. Use the trap and putty to seal the wires.

4.2 Centralized Controller

1) Connection

For Light commercial air conditioner with XYE port, it can be directly connected to Centralized Controller (CCM03, CCM09).



2) Address setting

When setting the address, please make sure the unit is powered off. The address can be set from 0 to 63 by the switch. Turn on the unit, then the address will be effective.

SWITCH	FOR CCM UNIT ADDRESS	
S2 + S1	ON 1 2	ON 1 2
ADDRESS	0~15	16~31
Factory Setting	✓	
S2 + S1	ON 1 2	ON 1 2
ADDRESS	32~47	48~63
Factory Setting		

Note: For light commercial aire conditioner with XYE port, it can be also connected to BMS (Building Management System).

If there is any CAC (central air conditioner) connecting with the central controller at the same time, please set the address from largest (63,62,61…), since the CAC units could obtain address automatically from the smallest (00,01,02…)

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1. Safety Caution

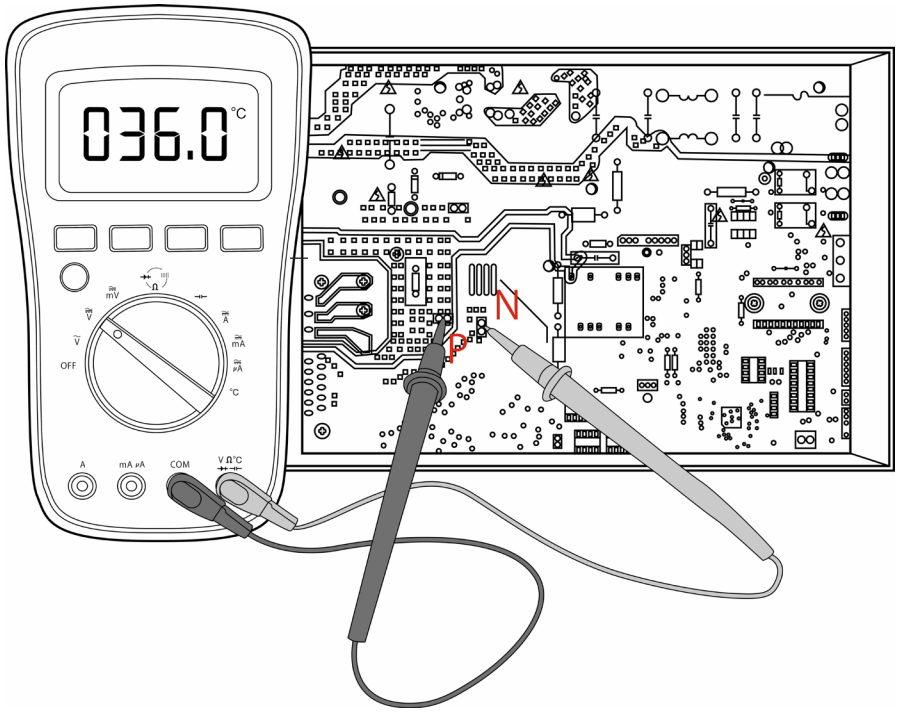
WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. While checking indoor/outdoor PCB, please equip oneself with antistatic gloves or wrist strap to avoid damage to the board.

WARNING

Electricity remains in capacitors even when the power supply is off. Ensure the capacitors are fully discharged before troubleshooting.

Test the voltage between P and N on back of the main PCB with multimeter. If the voltage is lower than 36V, the capacitors are fully discharged. For models that cannot be measured, wait 5 minutes after the power supply is off to ensure that the capacitors are fully discharged.



Note: This picture is for reference only. Actual appearance may vary.

2. General Troubleshooting

2.1 Error Display (Indoor Unit)

When the indoor unit encounters a recognized error, the operation lamp will flash in a corresponding series, the timer lamp may turn on or begin flashing, and an error code will be displayed. These error codes are described in the following table:

Display	Error Information	Solution
EH00	Indoor unit EEPROM parameter error	TS21
EL01	Indoor / outdoor unit communication error	TS22
EL16	Communication malfunction between adapter board and outdoor main board	TS47
EH03	The indoor fan speed is operating outside of the normal range(for some models)	TS23
EH60	Indoor room temperature sensor T1 is in open circuit or has short circuited	TS25
EH61	Evaporator coil temperature sensor T2 is in open circuit or has short circuited	TS25
EH62	Evaporator coil temperature sensor T2B is in open circuit or has short circuited	TS25
EH65	Evaporator coil temperature sensor T2A is in open circuit or has short circuited	TS25
EL0C	Refrigerant Leakage Detection	TS26
EH0b	Communication error between indoor two chips	TS46
EH0E	Water-level alarm malfunction	TS27
EC53	Outdoor room temperature sensor T4 is in open circuit or has short circuited	TS25
EC52	Condenser coil temperature sensor T3 is in open circuit or has short circuited	TS25
EC54	Compressor discharge temperature sensor TP is in open circuit or has short circuited	TS25
EC56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited(for free-match indoor units)	TS25
EC51	Outdoor unit EEPROM parameter error	TS21
EC07	The outdoor fan speed is operating outside of the normal range(for some models)	TS23
PC00	IPM malfunction or IGBT over-strong current protection	TS28
PC01	Over voltage or over low voltage protection	TS29
PC02	Top temperature protection of compressor or High temperature protection of IPM module	TS32
PC04	Inverter compressor drive error	TS30

PC03	High pressure protection or low pressure protection (for some models)	TS31
EC0d	Outdoor unit malfunction	TS33
PC0L	Low ambient temperature protection	TS40
FL09	Mismatch between the new and old platforms	TS47

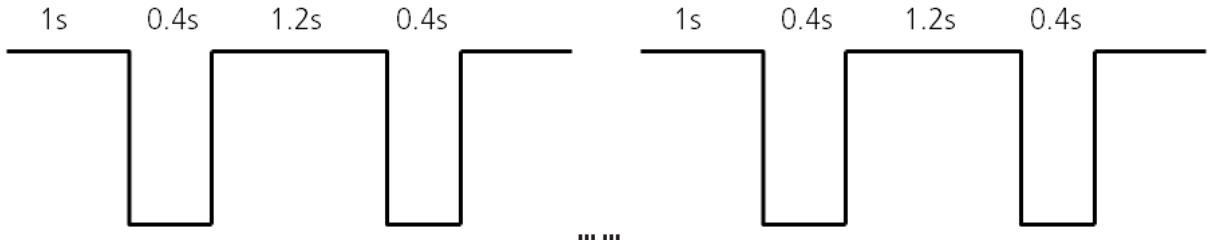
For other errors:

The display board may show a garbled code or a code undefined by the service manual. Ensure that this code is not a temperature reading.

Troubleshooting:

Test the unit using the remote control. If the unit does not respond to the remote, the indoor PCB requires replacement. If the unit responds, the display board requires replacement.

LED flash frequency:



2.2 Error Display on Two Way Communication Wired Controller

Display	Malfunction or Protection	Solution
EHb3	Communication error between wire controller and indoor unit	TS48

The other error codes displayed on the wire controller are same from those on the unit.

2.3 Error Display (For Some Outdoor Unit)

Display	Malfunction or Protection	Solution
EC 51	Outdoor EEPROM malfunction	TS21
EL 01	Indoor / outdoor units communication error	TS22
EL 16	Communication malfunction between adapter board and outdoor main board	TS47
PC 00	IPM module protection	TS28
PC 02	Top temperature protection of compressor or High temperature protection of IPM module	TS32
PC 06	Temperature protection of compressor discharge	TS45
PC 08	Outdoor overcurrent protection	TS35
PC 0R	High temperature protection of condenser	TS44
PC 0F	PFC module protection	TS37
PC 10	Outdoor unit low AC voltage protection	TS29
PC 11	Outdoor unit main control board DC bus high voltage protection	TS29
PC 12	Outdoor unit main control board DC bus high voltage protection /341 MCE error	TS29
PC 30	High pressure protection	TS42
PC 31	Low pressure protection	TS31
PC 40	Communication malfunction between IPM board and outdoor main board	TS34
PC 41	Outdoor compressor current sampling circuit failure	TS48
PC 43	Outdoor compressor lack phase protection	TS39
PC 44	Outdoor unit zero speed protection	TS35
PC 45	Outdoor unit IR chip drive failure	TS40
PC 46	Compressor speed has been out of control	TS35
PC 49	Compressor overcurrent failure	TS35
EC 52	Condenser coil temperature sensor T3 is in open circuit or has short circuited	TS25
EC 53	Outdoor room temperature sensor T4 is in open circuit or has short circuited	TS25
EC 54	Compressor discharge temperature sensor TP is in open circuit or has short circuited	TS25
EC57	Refrigerant pipe temperature sensor error	TS25
EC 5C	High pressure sensor is in open circuit or has short circuited	TS25
EC 71	Over current failure of outdoor DC fan motor	TS25
EC 72	Lack phase failure of outdoor DC fan motor	TS38
EC 73	Zero-speed failure of outdoor DC fan motor	TS23
EC 07	Outdoor fan speed has been out of control	TS23
PC 0L	Low ambient temperature protection	TS40
LC 06	High temperature protection of IPM module	TS32
EC 55	Outdoor IPM module temperature sensor fault	TS41
PH 90	High temperature protection of evaporator	--
PH 91	Low temperature protection of evaporator	--

3. Outdoor Unit Point Check Function

- A check switch is included on the outdoor PCB.
- Push SW1 to check the unit's status while running. The digital display shows the following codes each time the SW1 is pushed.

Number of Presses	Display	Remark
00	Normal display	Displays running frequency, running state, or malfunction code Defrosting mode: "dF" or alternative displays between running frequency and "dF" (ach appears for 0.5s.) Forced cooling mode: the LED displays "FC" or alternative displays between running frequency and "FC" (each appears for 0.5s).
01	Indoor unit capacity demand code	Actual data*HP*10 If capacity demand code is higher than 99, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "5.0",it means the capacity demand is 15. the digital display tube show "60",it means the capacity demand is 6.0) GA algorithm models display "--"
02	The frequency after the capacity requirement adapter	If the value is higher than 99, the digital display tube will show single digit and tens digit.
03	Room temperature (T1)	If the temp. is lower than 0 degree, the digital display tube will show "0".If the temp. is higher than 70 degree, the digital display tube will show "70".
04	Indoor unit evaporator temperature (T2)	If the temp. is lower than -9 degree, the digital display tube will show "-9".If the temp. is higher than 70 degree, the digital display tube will show "70". If the indoor unit is not connected, the digital display tube will show: "--"
05	Condenser pipe temp.(T3)	
06	Outdoor ambient temp.(T4)	
07	Compressor discharge temp. (TP)	The display value is between 0~199 degree. If the temp. is lower than 0 degree, the digital display tube will show "0". If the temp. is higher than 99 degree, the digital display tube will show single digit and tens digit. (For example, the digital display tube show "0.5",it means the compressor discharge temp. is 105 degree. the digital display tube show "1.6",it means the compressor discharge temp. is 116 degree)
08	AD value of current	The display value is a hex number. For example, the digital display tube shows "Cd", it means AD value is 205.
09	AD value of voltage	
10	Indoor unit running mode code	Standby:0,Cooling:1, Heating:2, Fan only 3, Drying:4, Forced cooling:6, Defrost:7
11	Outdoor unit running mode code	
12	EXV open angle	Actual data/4. If the value is higher than 99, the digital display tube will show single digit and tens digit. For example, the digital display tube show "2.0",it means the EXV open angle is 120×4=480p.)

<table>
<tr><td rowspan="8">13</td><td rowspan="8">Frequency limit symbol</td><td>Bit7</td><td>Frequency limit caused by IGBT radiator</td><td rowspan="8">The display value is a hex number. For example, the digital display show 2A, then Bit5=1, Bit3=1, and Bit1=1.

This means that a frequency limit may be caused by T4, T3, or the current.</td></tr>
<tr><td>Bit6</td><td>Reserved</td></tr>
<tr><td>Bit5</td><td>Reserved</td></tr>
<tr><td>Bit4</td><td>Frequency limit caused by low temperature of T2.(LH00)</td></tr>
<tr><td>Bit3</td><td>Frequency limit caused by T3.(LC01)</td></tr>
<tr><td>Bit2</td><td>Frequency limit caused by TP.(LC02)</td></tr>
<tr><td>Bit1</td><td>Frequency limit caused by current(LC03)</td></tr>
<tr><td>Bit0</td><td>Frequency limit caused by voltage (LC05)</td></tr>
<tr><td>14</td><td>Outdoor unit fan speed</td><td colspan="3">If it is higher than 99, the digital display tube will show single digit and tens digit. (For example, the digital display tube show “2.0”,it means the fan speed is 120.) This value is multiplied by 8, and it is the current fan speed: 120*8=960</td></tr>
<tr><td>15</td><td>The average value of the temperature values detected by the high and low pressure sensors in the last 10 seconds of the compressor frequency calculation period</td><td colspan="3" rowspan="2">The displayed value is the actual value plus 60 (that is, when the displayed value is 10, the actual value is -50). When the displayed value is higher than 99, the digital display tube will show single digit and tens digit. (if it displays 2.0, it means 120)

When there is no pressure sensor, it is displayed as --</td></tr>
<tr><td>16</td><td>The temperature value detected by the high and low pressure sensor</td></tr>
<tr><td>17</td><td>AD value detected by the high and low pressure sensor</td><td colspan="3">The display value is a hex number.

For example, the digital display tube shows “Cd”, it means AD value is 205.

When there is no pressure sensor, it is displayed as --</td></tr>
<tr><td>18</td><td>The currently running communication protocol version</td><td colspan="3">00-99</td></tr>
</table>

4. Information Inquiry

- To enter engineer mode, in power-on or standby mode, and in non-locked state, press the key combination “ON/OFF + Air Speed” for 7s:
- After entering the engineer mode, the remote control will display icons of “Auto, Cool, Dry, Heat”, and the Battery icon; at the same time, it will also display the numeric code of the current engineer mode (for the initial engineer mode, the numeric code displayed is 0), and all other icons are inactive.
- In engineer mode, the value of the current numeric code can be adjusted circularly through the Up/Down key, with the setting range of 0 to 30. Each time the current numeric code is adjusted, the special code of the engineer mode will be transmitted with a delay of 0.6s. The code can also be transmitted by pressing “OK”, and the special code of the engineer mode sent contains information of the currently displayed numeric code (if the numeric code is 0, the code to enter the engineer mode will be transmitted).
- In engineer mode, other keys or operations are invalid except for the On/Off key, the Up/Down key, the OK key or executing the operation to exit the engineer mode.

Code	Query Content	Advanced Function Setting
0	Error code	
1	T1 temperature	press "On/Off" for 2s to enter the Power Down Memory Selector, the code displayed is “Ch”, press "OK" to send the Query Power Down Memory Selector code; press the Up/Down key to select 1 or 0 and press “OK” to confirm, 1 indicates that the power down memory exists, and 0 indicates that no power down memory exists; and press "On/Off" for 2s to exit.(Set within 1 minute after power on)
2	T2 temperature	press "On/Off" for 2s to enter the Internal Fan Control Selector after the pre-set temperature is reaches, the code displayed is “Ch”, press "OK" to send the Query Internal Fan Control Selector code; press the Up/Down key to select 1 to 13: 1 - Stop the fan, 2 - Min. air speed, 3 - Set the air speed, 4 - Termal stop for 4min running for 1min, 5 - Termal stop for 8min running for 1min, 6 - Termal stop for 16min running for 1min, 7 - Termal stop for 24min running for 1min, 8 - Termal stop for 48min running for 1min, 9 - Termal stop for 15min running for 2.5min, 10 - Termal stop for 30min running for 2.5min, 11 - Termal stop for 60min running for 2.5min, 12-Set fan after reaching temperature, but set fan to auto fan stop fan and 13- minimum fan after reaching temperature, but set fan to auto fan stop fan, press “OK” to confirm, and press “On/Off” for 2s to exit.(Item 5~11 are valid for some models)(Set within 1 minute after power on)
3	T3 temperature	press "On/Off" for 2s to enter the Mode Selector, press the Up/Down key to select CH (cool and heat, Auto + Cool + Dry + Heat + Fan), CC (Auto+ Cool + Dry + Fan) , press "OK" to confirm, and the mode selected can be memorized when the remote control is powered down and powered on; and press "On/Off" for 2s to exit. When the remote control does not burn any parameters, the mode setting will not be memorized. (Set within 1 minute after power on)
4	T4 temperature	press the "On/Off" for 2s to enter the Min. Set Temperature Selector, press the Up/Down key to select "16°C~24°C", press "OK" to confirm, and the Min. Set Temperature can be memorized when the remote control is powered on and power lost; and press "On/Off" for 2s to exit. When the remote control does not burn any parameters, the min. set temperature will not be memorized.(Set within 1 minute after power on)
5	TP temperature	press "On/Off" for 2s to enter the Max. Set Temperature Selector, press the Up/Down key to select "25°C~30°C", press "OK" to confirm, and the Max. Set Temperature can be memorized when the remote control is powered on and power lost; and press "On/Off" for 2s to exit. When the remote control does not burn any parameters, the max. set temperature will not be memorized.(Set within 1 minute after power on)

6	Compressor Target Frequency FT	press "On/Off" for 2s to enter Cooling Or Heating Priority Selector, the code displayed is “Ch”, press "OK" to send the Query Cooling Or Heating Priority Selector code; press the Up/Down key to select, H indicates that there is heating priority and C indicates cooling priority Press "OK" to confirm, and press "On/Off" for 2s to exit.
7	Compressor Running Frequency Fr	/
8	Current dL	/
9	Current AC Voltage Uo	/
10	Current indoor capacity test state Sn	/
11	/	press "On/Off" for 2S to enter the Min. Desired Cooling Frequency Selector, the code displayed is Ch, press "OK" to send the Query Min. Desired Cooling Frequency Selector code; press the Up/Down key to select the minimum cooling frequency desired and press "OK" to confirm; press "On/Off" for 2s to exit.(for some models)
12	Set Speed Pr of the outdoor fan	press "On/Off" for 2s to enter the Min. Desired Heating Frequency Selector, the code displayed is “Ch”, press "OK" to send the Query Min. Desired Heating Frequency Selector code; press the Up/Down key to select the min. desired heating frequency value, press "OK" to confirm; and press the "On/Off" for 2s to exit.(for some models)
13	Opening Lr of EEV	/
14	Actual Running Speed ir of the indoor fan	/
15	Indoor Humidity Hu	press "On/Off" for 2s to enter the Outdoor Forced Running Frequency Selector, the code displayed is “Ch”, press "OK" to send the Query Outdoor Forced Running Frequency Selector code; press the Up/Down key to select the outdoor forced running frequency, then press "OK" to confirm; and press "On/Off" for 2s to exit.(for some models)
16	Set Temperature TT after compensation	press "On/Off" for 2s to enter One-Key Recovery, the code displayed is “rS”, then press "OK" to send the One-Key Recovery code, the mode selector of the remote control will recover to "Cooling and heating"; and press "On/Off" for 2s to exit.(for some models)
17	/	nA
18	/	/
19	DC bus voltage	press "On/Off" for 2s to enter the Cooling Frequency Threshold Settings; press the Up/Down key to select the cooling frequency threshold, press "OK" to confirm; and press the "On/Off" for 2s to exit. (Set within 1 minute after power on)
20	Indoor Target Frequency oT	/
21		press "On/Off" for 2s to enter the Cooling Temperature Compensation Value Settings, the code displayed is “Ch”, then press "OK" to send the Query Cooling Temperature Compensation Value code; press the Up/Down key to select the cooling temperature compensation value, then press "OK"; and press "On/Off" for 2s to exit.

22	/	press "On/Off" for 2s to enter the Heating Temperature Compensation Value Settings, the code displayed is "Ch", press "OK" to send the Query Heating Temperature Compensation Value code; press the Up/Down key to select the heating temperature compensation value, then press "OK"; and press "On/Off" for 2s to exit.
23	/	press "On/Off" for 2s to enter the Cooling Max Fan Speed Settings, the code displayed is "Ch", press "OK" to send the Query Cooling Max Fan Speed code; press the Up/Down key to select the cooling max fan speed, then press "OK"; and press "On/Off" for 2s to exit.
24	/	press "On/Off" for 2s to enter the Cooling Min Fan Speed Settings, the code displayed is "Ch", press "OK" to send the Query Cooling Min Fan Speed code; press the Up/Down key to select the cooling min fan speed, then press "OK"; and press "On/Off" for 2s to exit.
25	/	press "On/Off" for 2s to enter the Heating Max Fan Speed Settings, the code displayed is "Ch", press "OK" to send the Query Heating Max Fan Speed code; press the Up/Down key to select the heating max fan speed, then press "OK"; and press "On/Off" for 2s to exit.
26	/	press "On/Off" for 2s to enter the Heating Min Fan Speed Settings, the code displayed is "Ch", press "OK" to send the Query Heating Min Fan Speed code; press the Up/Down key to select the heating min fan speed, then press "OK"; and press "On/Off" for 2s to exit.
27	/	press "On/Off" for 2s to enter the Defrosting Settings, press the Up/Down key to select, A0 indicates ordinary defrosting and A1 indicates harsh defrosting; Press "OK" to confirm, and press "On/Off" for 2s to exit.
28	Reserved	Reserved
29		
30		

- In Channel 1~30 settings of the engineer mode, long press the On/off key to return the previous engineer mode.

Exit of engineer mode:

1)In engineer mode, press the key combination of "On/Off + Air speed" for 2s;

2)The engineer mode will be exited if there are no valid key operations for continuous 60s.

Error code of engineer mode

Display	Error Information
EH00	Indoor unit EEPROM parameter error
EL01	Indoor / outdoor unit communication error
EL16	Communication malfunction between adapter board and outdoor main board
EH03	The indoor fan speed is operating outside of the normal range
EC51	Outdoor unit EEPROM parameter error
EC52	Condenser coil temperature sensor T3 is in open circuit or has short circuited
EC53	Outdoor room temperature sensor T4 is in open circuit or has short circuited
EC54	Compressor discharge temperature sensor TP is in open circuit or has short circuited
EC55	IGBT temperature sensor TH is in open circuit or has short circuited
EC56	Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited(for free-match indoor units)
EC0d	Outdoor unit malfunction
EH60	Indoor room temperature sensor T1 is in open circuit or has short circuited
EH61	Evaporator coil temperature sensor T2 is in open circuit or has short circuited
EH62	Evaporator coil temperature sensor T2B is in open circuit or has short circuited
EH65	Evaporator coil temperature sensor T2A is in open circuit or has short circuited
EC07	The outdoor fan speed is operating outside of the normal range(
EH0b	Communication error between indoor two chips
EL0C	Refrigerant leak detected
EH0E	Water-level alarm malfunction
PL09	Mismatch between the new and old platforms
PC00	IPM malfunction or IGBT over-strong current protection
PC01	Over voltage or over low voltage protection
PC02	Top temperature protection of compressor or High temperature protection of IPM module
PC04	Inverter compressor drive error
PC08	Outdoor current protection
PC03	Pressure protection
PC0L	Outdoor low ambient temperature protection
PH90	Evaporator coil temperature over high protection
PH91	Evaporator coil temperature over low Protection
PC0R	Condenser high temperature protection

5. Error Diagnosis and Troubleshooting Without Error Code

WARNING

Be sure to turn off unit before any maintenance to prevent damage or injury.

5.1 Remote maintenance

SUGGESTION: When troubles occur, please check the following points with customers before field maintenance.

No.	Problem	Solution
1	Unit will not start	TS15 - TS16
2	The power switch is on but fans will not start	TS15 - TS16
3	The temperature on the display board cannot be set	TS15 - TS16
4	Unit is on but the wind is not cold(hot)	TS15 - TS16
5	Unit runs, but shortly stops	TS15 - TS16
6	The unit starts up and stops frequently	TS15 - TS16
7	Unit runs continuously but insufficient cooling(heating)	TS15 - TS16
8	Cool can not change to heat	TS15 - TS16
9	Unit is noisy	TS15 - TS16

5.2 Field maintenance

	Problem	Solution
1	Unit will not start	TS17 - TS18
2	Compressor will not start but fans run	TS17 - TS18
3	Compressor and condenser (outdoor) fan will not start	TS17 - TS18
4	Evaporator (indoor) fan will not start	TS17 - TS18
5	Condenser (Outdoor) fan will not start	TS17 - TS18
6	Unit runs, but shortly stops	TS17 - TS18
7	Compressor short-cycles due to overload	TS17 - TS18
8	High discharge pressure	TS17 - TS18
9	Low discharge pressure	TS17 - TS18
10	High suction pressure	TS17 - TS18
11	Low suction pressure	TS17 - TS18
12	Unit runs continuously but insufficient cooling	TS17 - TS18
13	Too cool	TS17 - TS18
14	Compressor is noisy	TS17 - TS18

1.Remote Maintenance	Electrical Circuit							Refrigerant Circuit							
Possible causes of trouble	Power failure	The main power tripped	Loose connections	Faulty transformer	The voltage too high or too low	The remote control is powered off	Broken the remote control	Dirty air filter	Dirty condenser fins	The setting temperature is higher/lower than the room's(cooling/heating)	The ambient temperature is too high/low when the mode is cooling/heating	Fan mode	SILENCE function is activated(Optional function)	Frosting and defrosting frequently
Unit will not start	☆	☆	☆	☆										
The power switch is on but fans will not start			☆	☆	☆									
The tempreture on the playboard cannot be setted						☆	☆							
Unit is on but the wind is not cold(hot)										☆	☆	☆		
Unit runs, but shortly stops					☆					☆	☆			
The unit startup and stop frequently					☆						☆			☆
Unit runs continuously but insufficient cooling(heating)								☆	☆	☆	☆		☆	
Cool can not change to heat														
Unit is noisy														
Test method / remedy	Test voltage	Close the power switch	Inspect connections - tighten	Change the transformer	Test voltage	Replace the battery of the remote control	Replace the remote control	Clean or replace	Clean	Adjust the setting temperature	Turn on the AC later	Adjust to cool mode	Turn off the SILENCE funciton	Turn on the AC later

1.Remote Maintenance	Others						
Possible causes of trouble	Heavy load condition	Loosen hold down bolts and / or screws	Bad airproof	The air inlet or outlet of either unit is blocked	Interference from cell phone towers and remote boosters	Shipping plates remain attached	
Unit will not start							
The power switch is on but fans will not start					☆		
The temperature on the display board cannot be set							
Unit is on but the wind is not cold(hot)							
Unit runs, but shortly stops							
The unit starts up and stops frequently				☆			
Unit runs continuously but insufficient cooling(heating)	☆		☆	☆			
Cool can not change to heat							
Unit is noisy		☆				☆	
Test method / remedy	Check heat load	Tighten bolts or screws	Close all the windows and doors	Remove the obstacles	Reconnect the power or press **ON/OFF** button on remote control to restart operation	Remove them	

2.Field Maintenance	Refrigerant Circuit																			Others					
Possible causes of trouble	Compressor stuck	Shortage of refrigerant	Restricted liquid line	Dirty air filter	Dirty evaporator coil	Insufficient air through evaporator coil	Overcharge of refrigerant	Dirty or partially blocked condenser	Air or incompressible gas in refrigerant cycle	Short cycling of condensing air	High temperature condensing medium	Insufficient condensing medium	Broken compressor internal parts	Inefficient compressor	Expansion valve obstructed	Expansion valve or capillary tube closed completely	Leaking power element on expansion valve	Poor installation of feeler bulb	Heavy load condition	Loosen hold down bolts and / or screws	Shipping plates remain attached	Poor choices of capacity	Contact of piping with other piping or external plate
Unit will not start																							
Compressor will not start but fans run	☆																						
Compressor and condenser (outdoor) fan will not start																							
Evaporator (indoor) fan will not start																							
Condenser (Outdoor) fan will not start																							
Unit runs, but shortly stops		☆	☆				☆	☆								☆	☆						
Compressor short-cycles due to overload		☆					☆	☆															
High discharge pressure							☆	☆	☆	☆	☆	☆											
Low discharge pressure		☆												☆									
High suction pressure							☆							☆				☆	☆				
Low suction pressure		☆	☆	☆	☆	☆									☆	☆	☆						
Unit runs continuously but insufficient cooling		☆	☆	☆	☆	☆		☆	☆	☆				☆					☆			☆	
Too cool																							
Compressor is noisy							☆						☆							☆	☆		☆

Test method / remedy	Replace the compressor	Leak test	Replace restricted part	Clean or replace	Clean coil	Check fan	Change charged refrigerant volume	Clean condenser or remove obstacle	Purge, evacuate and recharge	Remove obstruction to air flow	Remove obstruction in air or water flow	Remove obstruction in air or water flow	Replace compressor	Test compressor efficiency	Replace valve	Replace valve	Replace valve	Fix feeler bulb	Check heat load	Tighten bolts or screws	Remove them	Choose AC of lager capacity or add the number of AC	Rectify piping so as not to contact each other or with external plate

2.Field Maintenance	Electrical Circuit														
Possible causes of trouble	Power failure	Blown fuse or varistor	Loose connections	Shorted or broken wires	Safety device opens	Faulty thermostat / room temperature sensor	Wrong setting place of temperature sensor	Faulty transformer	Shorted or open capacitor	Faulty magnetic contactor for compressor	Faulty magnetic contactor for fan	Low voltage	Faulty stepping motor	Shorted or grounded compressor	Shorted or grounded fan motor
Unit will not start	☆	☆	☆	☆	☆			☆							
Compressor will not start but fans run				☆		☆			☆	☆				☆	
Compressor and condenser (outdoor) fan will not start				☆		☆				☆					
Evaporator (indoor) fan will not start				☆					☆		☆				☆
Condenser (Outdoor) fan will not start				☆		☆			☆		☆				☆
Unit runs, but shortly stops										☆		☆			
Compressor short-cycles due to overload										☆		☆			
High discharge pressure															
Low discharge pressure															
High suction pressure															
Low suction pressure															
Unit runs continuously but insufficient cooling															
Too cool						☆	☆								
Compressor is noisy															
Test method / remedy	Test voltage	Inspect fuse type & size	Inspect connections - tighten	Test circuits with tester	Test continuity of safety device	Test continuity of thermostat / sensor & wiring	Place the temperature sensor at the central of the air inlet grille	Check control circuit with tester	Check capacitor with tester	Test continuity of coil & contacts	Test continuity of coil & contacts	Test voltage	Replace the stepping motor	Check resistance with multimeter	Check resistance with multimeter

6. Quick Maintenance by Error Code

If you do not have the time to test which specific parts are faulty, you can directly change the required parts according the error code.

You can find the parts to replace by error code in the following table.

Part requiring replacement	Error Code									
	EH00	EL01	EH03	EH60	EH61	EH62	EH65	EL0C	EH0E	EC53
Indoor PCB	✓	✓	✓	✓	✓	✓	✓	✓	✓	x
Outdoor PCB	x	✓	x	x	x	x	x	x	x	✓
Indoor fan motor	x	x	✓	x	x	x	x	x	x	x
T1 sensor	x	x	x	✓	x	x	x	x	x	x
T2 Sensor	x	x	x	x	✓	x	x	x	x	x
T2B Sensor	x	x	x	x	x	✓	x	x	x	x
T2A Sensor	x	x	x	x	x	x	✓	x	x	x
T3 Sensor	x	x	x	x	x	x	x	x	x	x
T4 Sensor	x	x	x	x	x	x	x	x	x	✓
Reactor	x	✓	x	x	x	x	x	x	x	x
Compressor	x	x	x	x	x	x	x	x	x	x
Additional refrigerant	x	x	x	x	x	x	x	✓	x	x
Water-level switch	x	x	x	x	x	x	x	x	✓	x
Water pump	x	x	x	x	x	x	x	x	✓	x

Part requiring replacement	EC54	EC51	EC5C	EC52	EC 07/71 /72/73	PC00	PC01	PC02	PC04	PC03
Indoor PCB	x	x	x	x	x	x	x	x	x	x
Outdoor PCB	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Outdoor fan motor	x	x	x	x	✓	✓	x	✓	✓	x
T3 Sensor	x	x	x	✓	x	x	x	x	x	x
TP Sensor	✓	x	x	x	x	x	x	x	x	x
Pressure sensor	x	x	✓	x	x	x	x	x	x	x
Reactor	x	x	x	x	x	x	✓	x	x	x
Compressor	x	x	x	x	x	✓	x	x	✓	x
IPM module board	x	x	x	x	x	✓	✓	✓	✓	x
Low pressure protector	x	x	x	x	x	x	x	x	x	✓
Additional refrigerant	x	x	x	x	x	x	x	x	x	✓

Part requiring replacement	E416	EH0b	PC06	PC08/44/49	PC0A	PC0F
Indoor PCB	x	✓	x	x	x	x
Outdoor PCB	✓	x	✓	✓	✓	✓
Outdoor fan motor	x	x	x	✓	✓	x
T3 Sensor	x	x	x	x	✓	x
TP Sensor	x	x	✓	x	x	x
Pressure sensor	x	x	x	x	x	x
Reactor	x	x	x	✓	x	✓
Compressor	x	x	x	x	x	x
IPM module board	x	x	x	✓	x	x
Data adapter board	✓	✓	x	x	x	x
High pressure valve assy	x	x	✓	x	x	x
High pressure protector	x	x	x	x	x	x
Low pressure protector	x	x	x	x	x	x
Additional refrigerant	x	x	✓	x	✓	x

Part requiring replacement	PC41	PC43	PC10/11/12	PC30	PC31	PC40
Indoor PCB	x	x	x	x	x	x
Outdoor PCB	✓	✓	✓	✓	✓	✓
Outdoor fan motor	x	x	x	✓	x	x
T3 Sensor	x	x	x	x	x	x
TP Sensor	x	x	x	x	x	x
Pressure sensor	x	x	x	x	x	x
Reactor	x	x	✓	x	x	x
Compressor	x	✓	x	x	x	x
IPM module board	x	x	✓	x	x	✓
Data adapter board	x	x	x	x	x	x
High pressure valve assy	x	x	x	x	x	x
High pressure protector	x	x	x	✓	x	x
Low pressure protector	x	x	x	x	✓	x
Additional refrigerant	x	x	x	x	✓	x
Electric control box	x	x	x	x	x	✓

7. Troubleshooting by Error Code

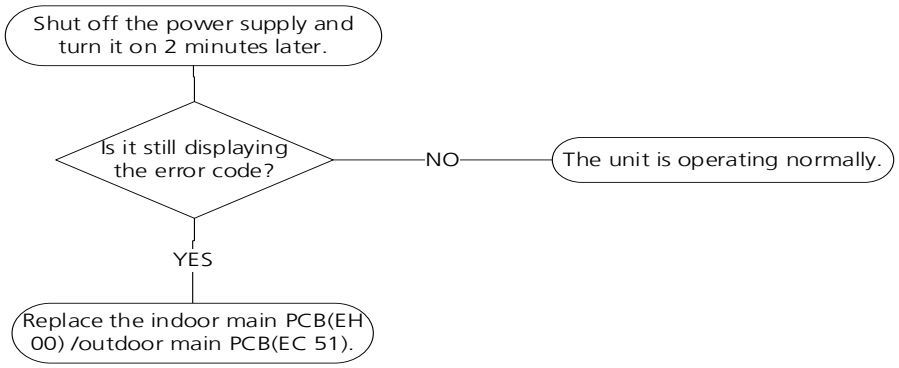
7.1 EH 00 / EC 51 (EEPROM Parameter Error Diagnosis and Solution)

Description: Indoor or outdoor PCB main chip does not receive feedback from EEPROM chip.

Recommended parts to prepare:

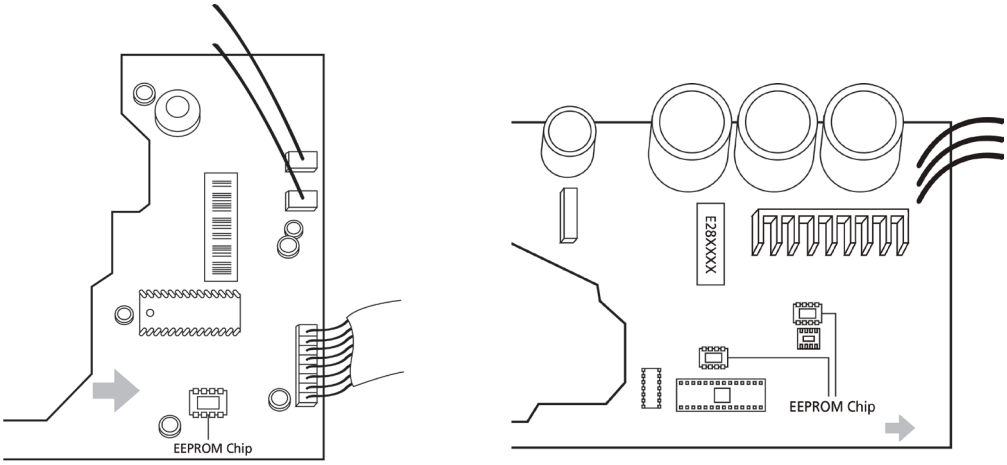
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:



Remarks:
EEPROM: A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage.

The location of the EEPROM chip on the indoor and outdoor PCB is shown in the following two images:



This pictures are only for reference, actual appearance may vary.

Troubleshooting and repair of compressor driven chip EEPROM parameter error and communication error between outdoor main chip and compressor driven chip are same as EC 51.

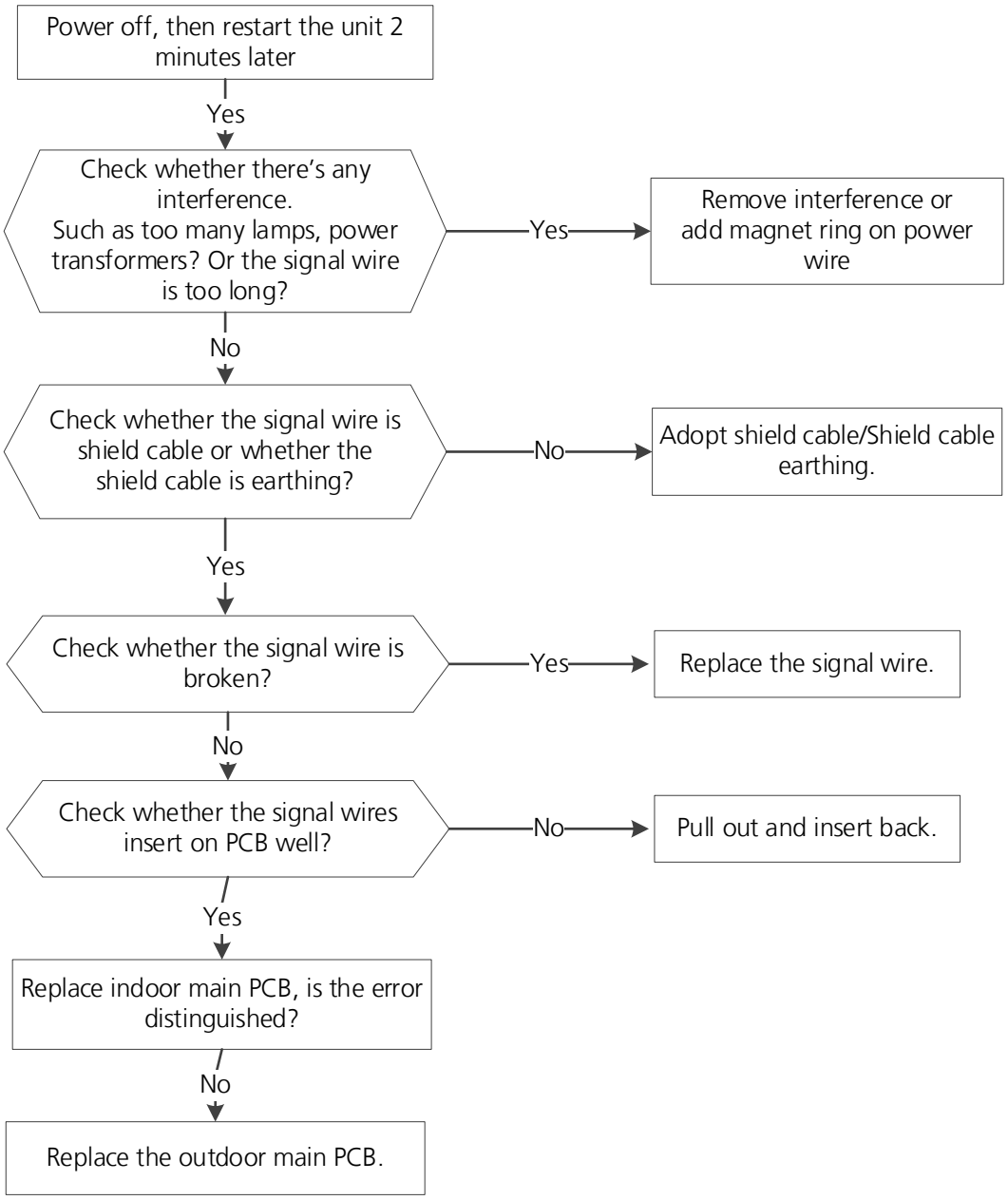
7.2 EL 01 (Indoor and Outdoor Unit Communication Error Diagnosis and Solution)

Description: Indoor unit can not communicate with outdoor unit

Recommended parts to prepare:

- Signal wires
- Magnet ring
- Indoor PCB
- Outdoor PCB

Troubleshooting and repair:



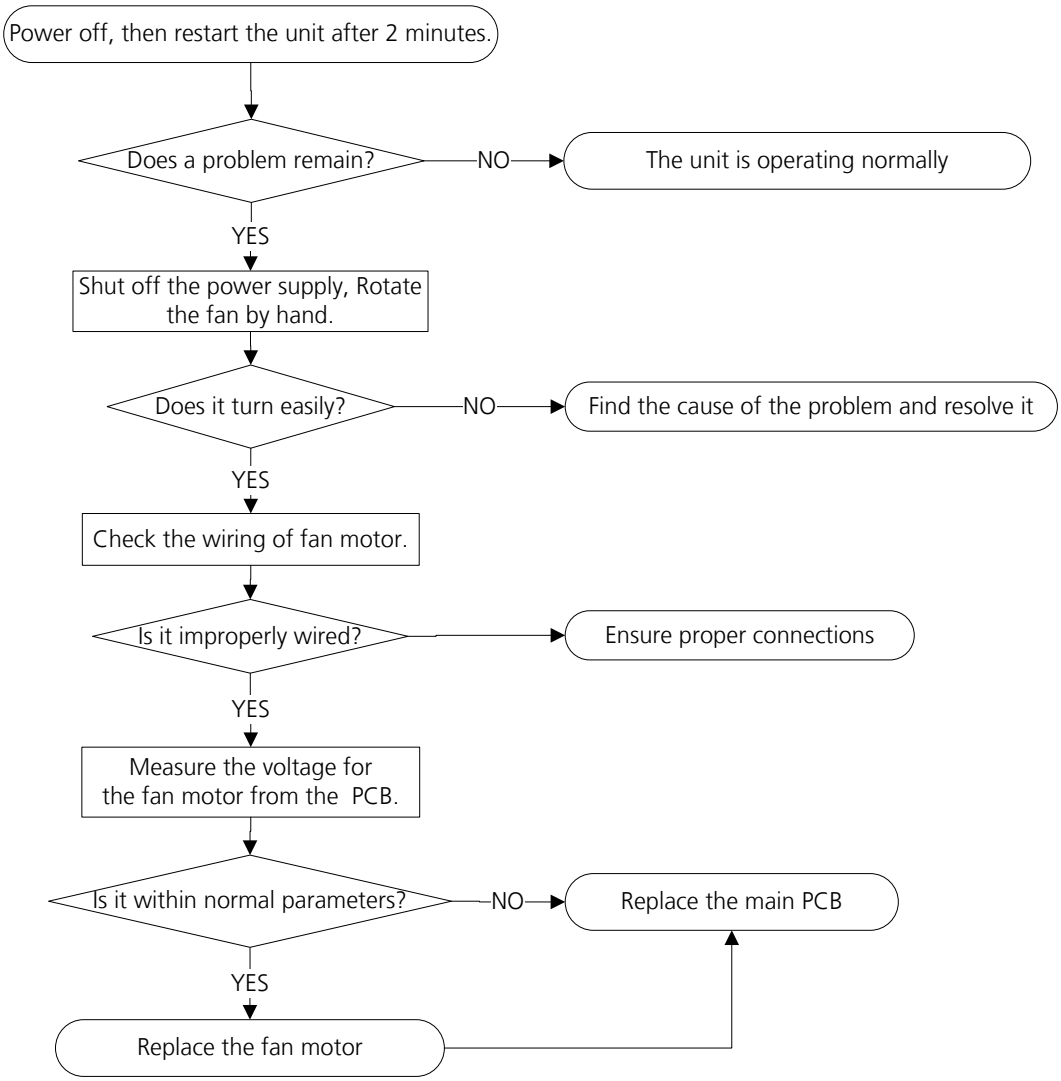
7.3 EH 03 / EC 07 (Fan Speed Is Operating Outside of Normal Range)/EC 71(Over Current Failure of Outdoor DC Fan Motor)/ EC73(Zero-speed failure of outdoor DC fan motor) Diagnosis and Solution

Description: When indoor / outdoor fan speed keeps too low or too high for a certain time, the unit ceases operation and the LED displays the failure.

Recommended parts to prepare:

- Connection wires
- Fan assembly
- Fan motor
- PCB

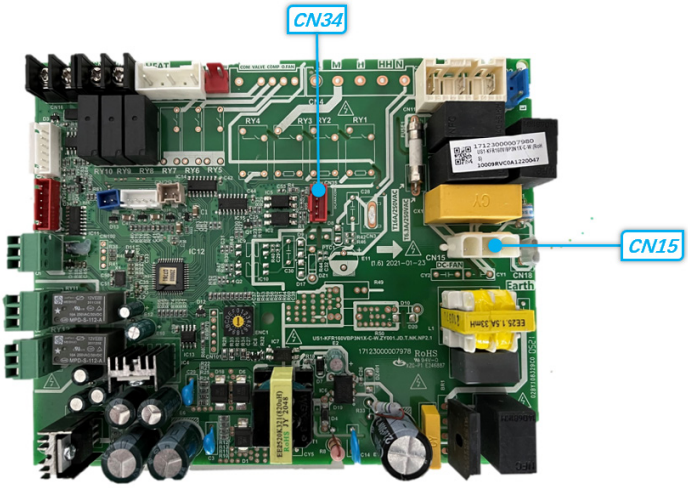
Troubleshooting and repair:



Index:

1. Indoor DC Fan Motor(control chip is in fan motor)

Power on and when the unit is in standby, measure the voltage of pin1&pin2 of CN15, pin3 of CN34 in fan motor connector. If the value of the voltage is not in the range showing in below table, the PCB must has problems and need to be replaced.



CN34

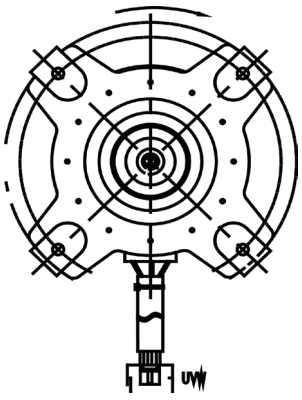
NO.	Color	Signal	Voltage
1	/	/	
2	Black	GND	
3	Orange	PWM	5-12VDC
4	Blue	FG	0-12VDC

CN15

NO.	Color	Signal	Voltage
1	Yellow		208/230VAC
2	Black		208/230VAC
3	Yellow-Green	GND	

2. Outdoor DC Fan Motor (control chip is in outdoor PCB)

Release the UVW connector. Measure the resistance of U-V, U-W, V-W. If the resistance is not equal to each other, the fan motor must has problems and need to be replaced. otherwise the PCB must has problems and need to be replaced.



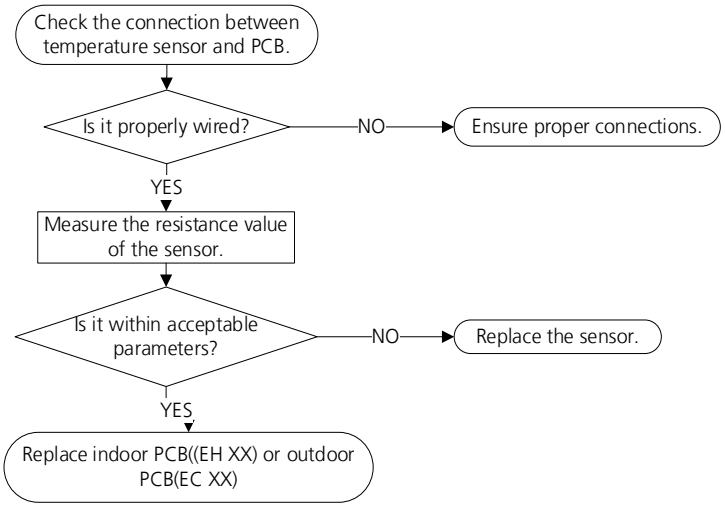
7.4 EH 60/EH 61/EH 62/ EH 65/ EC 53/EC 52/EC 54/EC 56/EC 57/EC 50/EC 5C (Open Circuit or Short Circuit of Temperature Sensor Diagnosis and Solution)

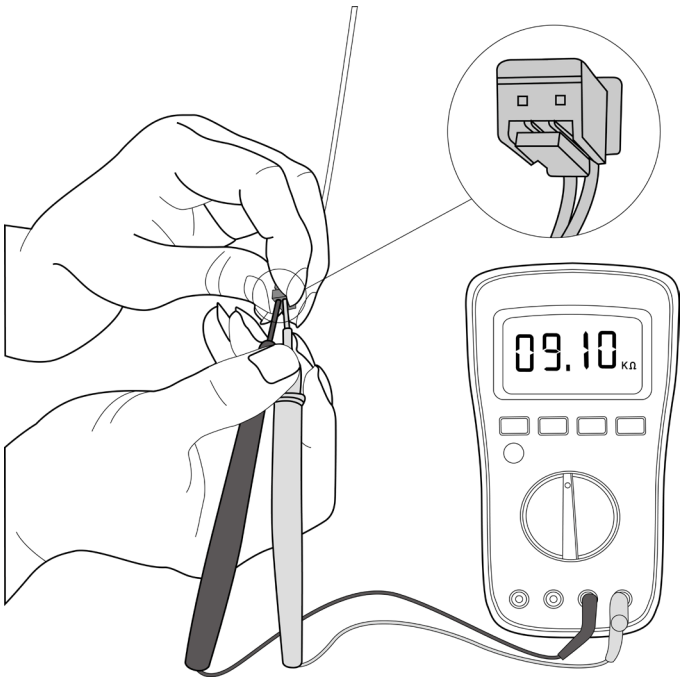
Description: If the sampling voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure.

Recommended parts to prepare:

- Connection wires
- Sensors
- PCB

Troubleshooting and repair:





This picture and the value are only for reference, actual appearance and value may vary

7.5 EL 0C (Refrigerant Leakage Detection Diagnosis and Solution)

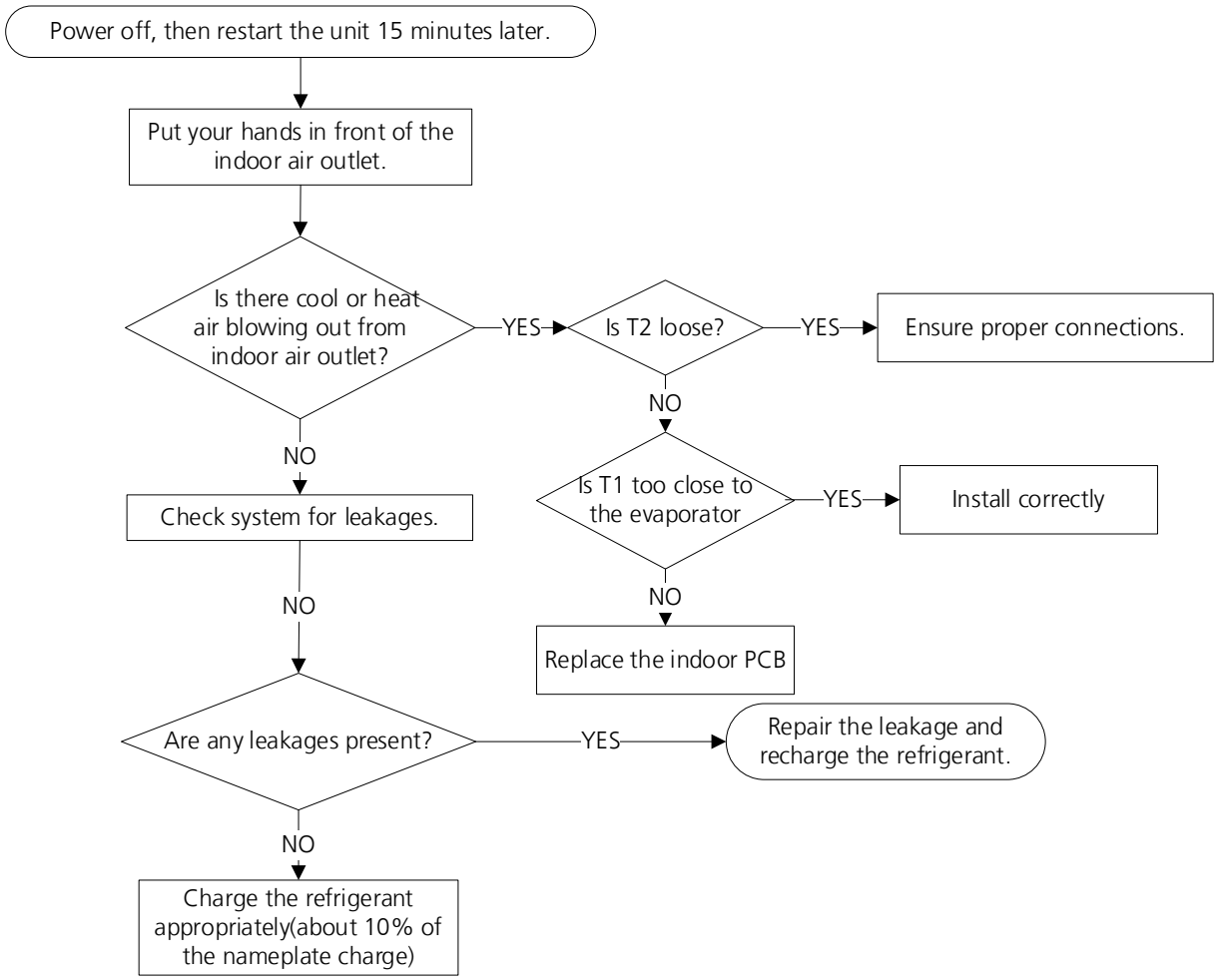
Description:

Judging the abnormality of the refrigeration system according to the number of compressor stops and the changes in operating parameters caused by excessive exhaust temperature.

Recommended parts to prepare:

- Indoor PCB
- Additional refrigerant

Troubleshooting and repair:

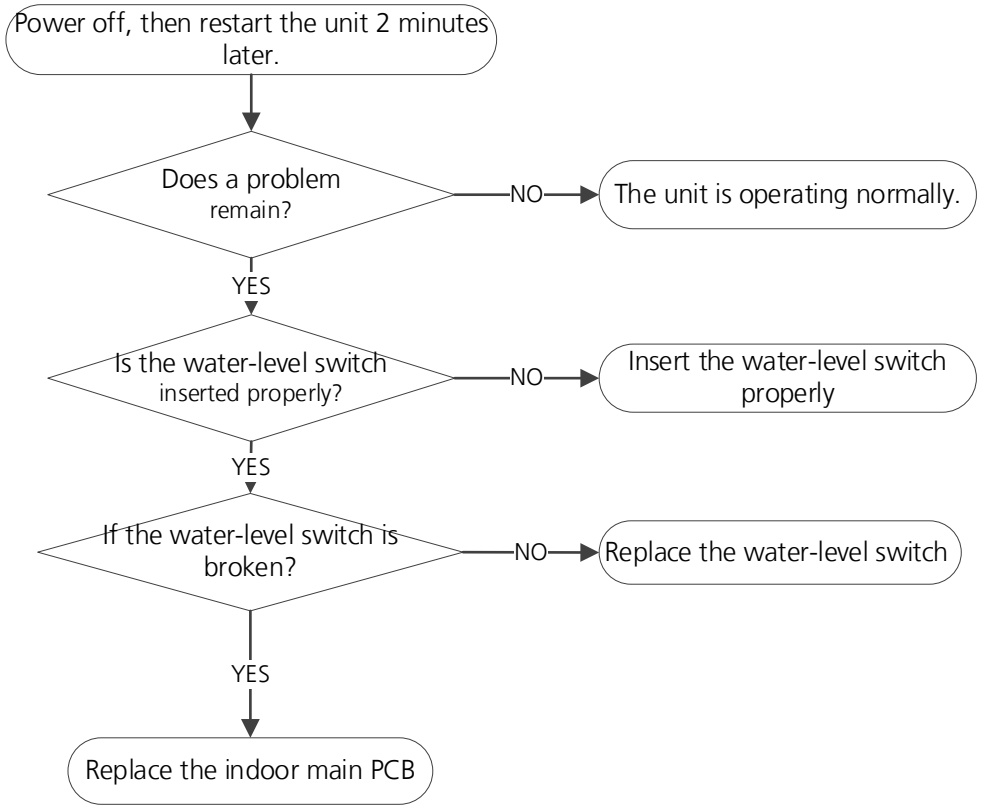


7.6 EH 0E(Water-Level Alarm Malfunction Diagnosis and Solution)

Description: If the sampling voltage is not 5V, the LED displays the failure code.

Recommended parts to prepare:

- Connection wires
- Water-level switch
- Indoor PCB



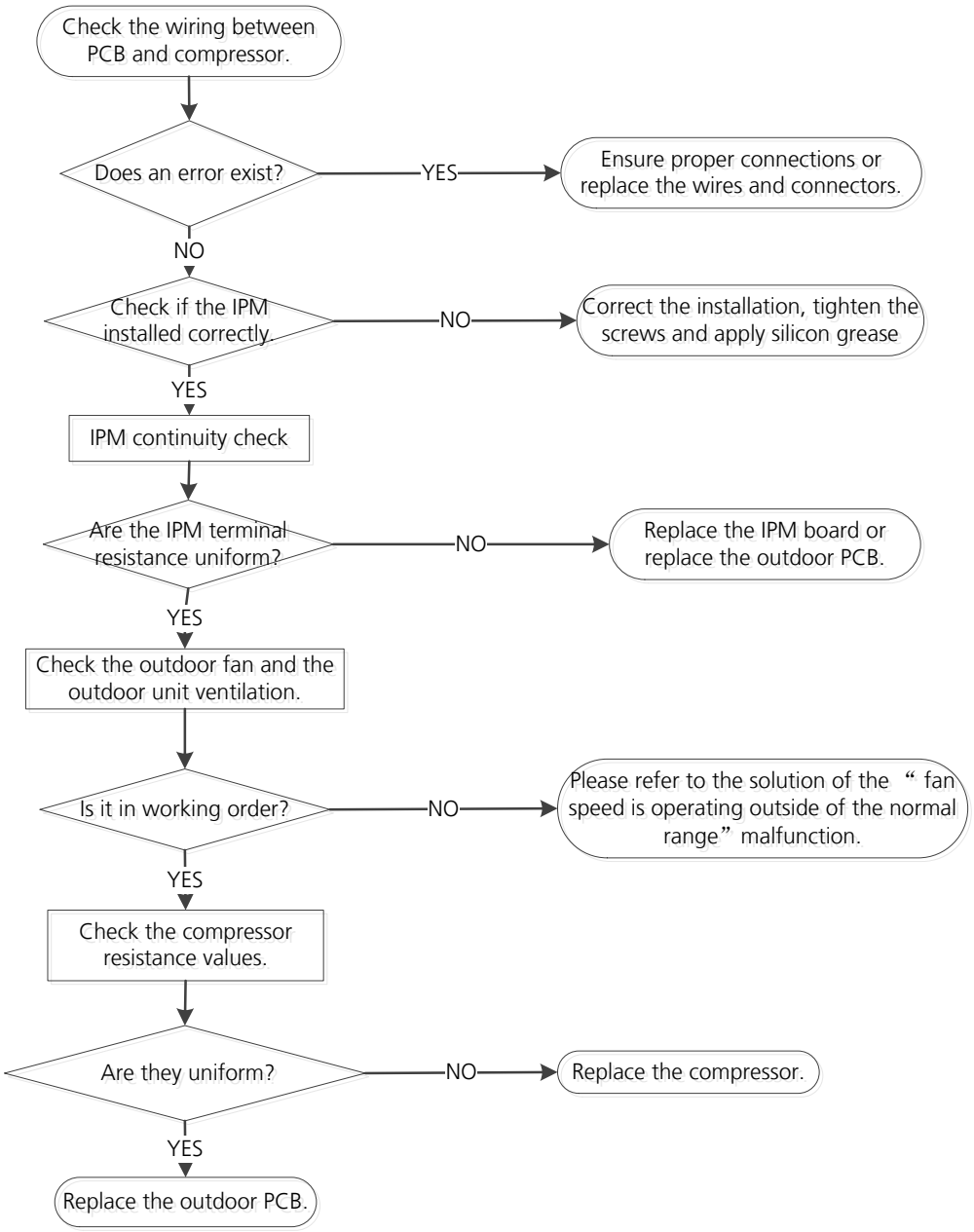
7.7 PC 00(IPM malfunction or IGBT over-strong current protection Diagnosis and Solution)

Description: When the voltage signal the IPM sends to the compressor drive chip is abnormal, the display LED shows "PC 00" and the AC turn off.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB

Troubleshooting and repair:



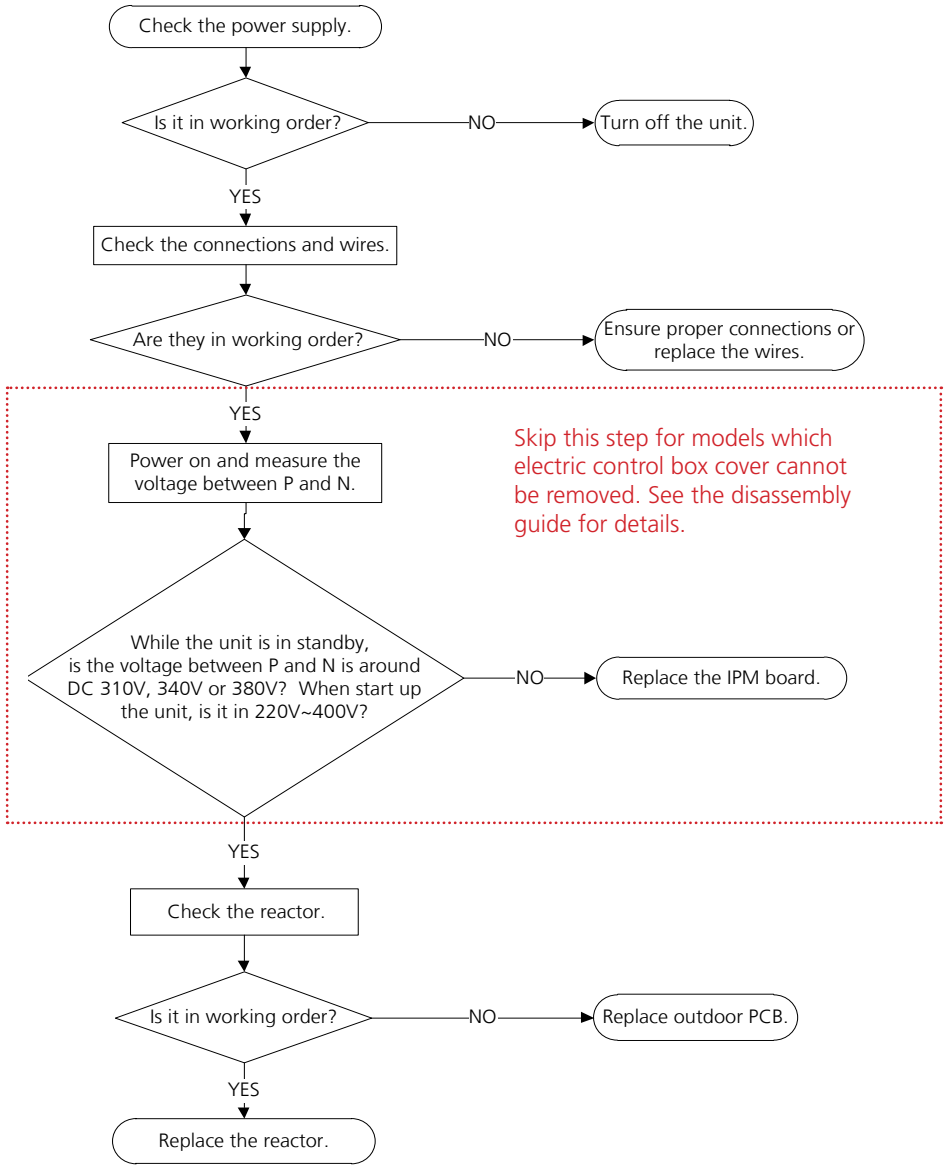
7.8 PC 01(Over voltage or too low voltage protection)/PC 10(Outdoor unit low AC voltage protection)/PC 11(Outdoor unit main control board DC bus high voltage protection)/PC 12(Outdoor unit main control board DC bus high voltage protection /341 MCE error) Diagnosis and Solution

Description: Abnormal increases or decreases in voltage are detected by checking the specified voltage detection circuit.

Recommended parts to prepare:

- Power supply wires
- IPM module board
- PCB
- Reactor

Troubleshooting and repair:



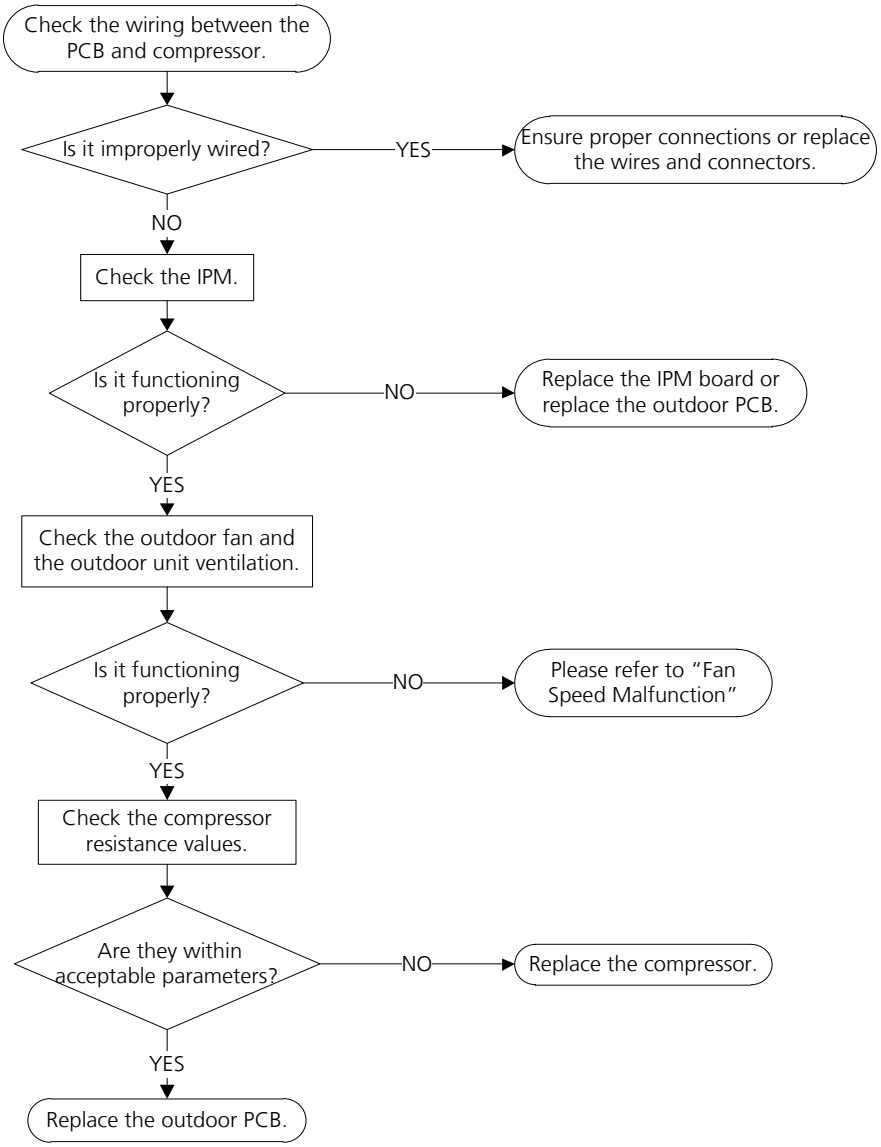
7.9 PC 04(Inverter compressor drive error Diagnosis and Solution)

Description: An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection and so on.

Recommended parts to prepare:

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB

Troubleshooting and repair:



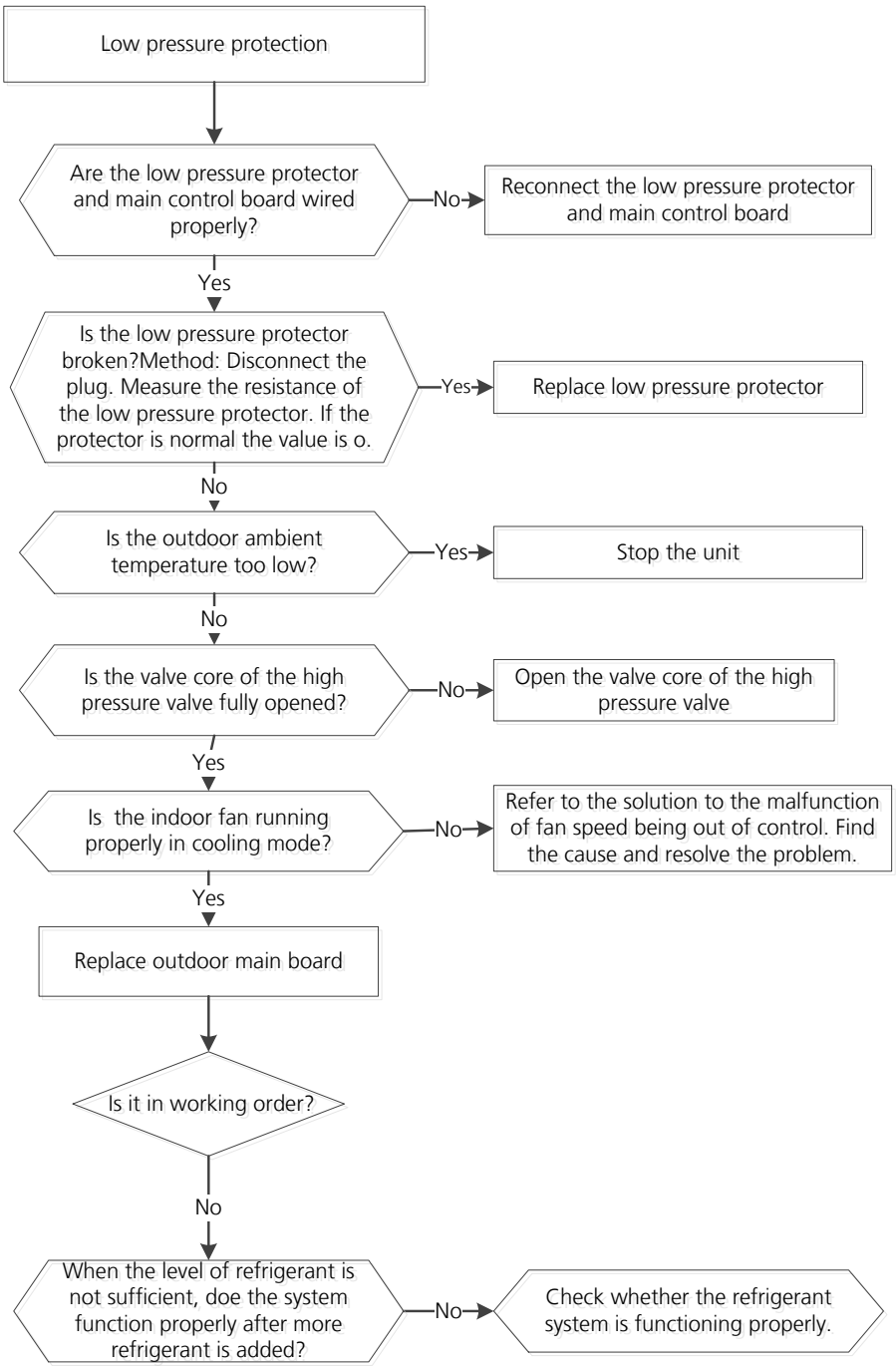
7.10 PC 03/PC 31(Low Pressure Protection Diagnosis and Solution)

Description: If the sampling voltage is not 5V, the LED displays a failure code.

Recommended parts to prepare:

- Connection wires
- Low pressure protector
- Indoor fan assembly
- Outdoor PCB

Troubleshooting and repair:



7.11 PC 02/LC 06(Top temperature protection of compressor or High temperature protection of IPM module diagnosis and solution)

Description: For some models with overload protector, If the sampling voltage is not 5V, the LED will display the failure.

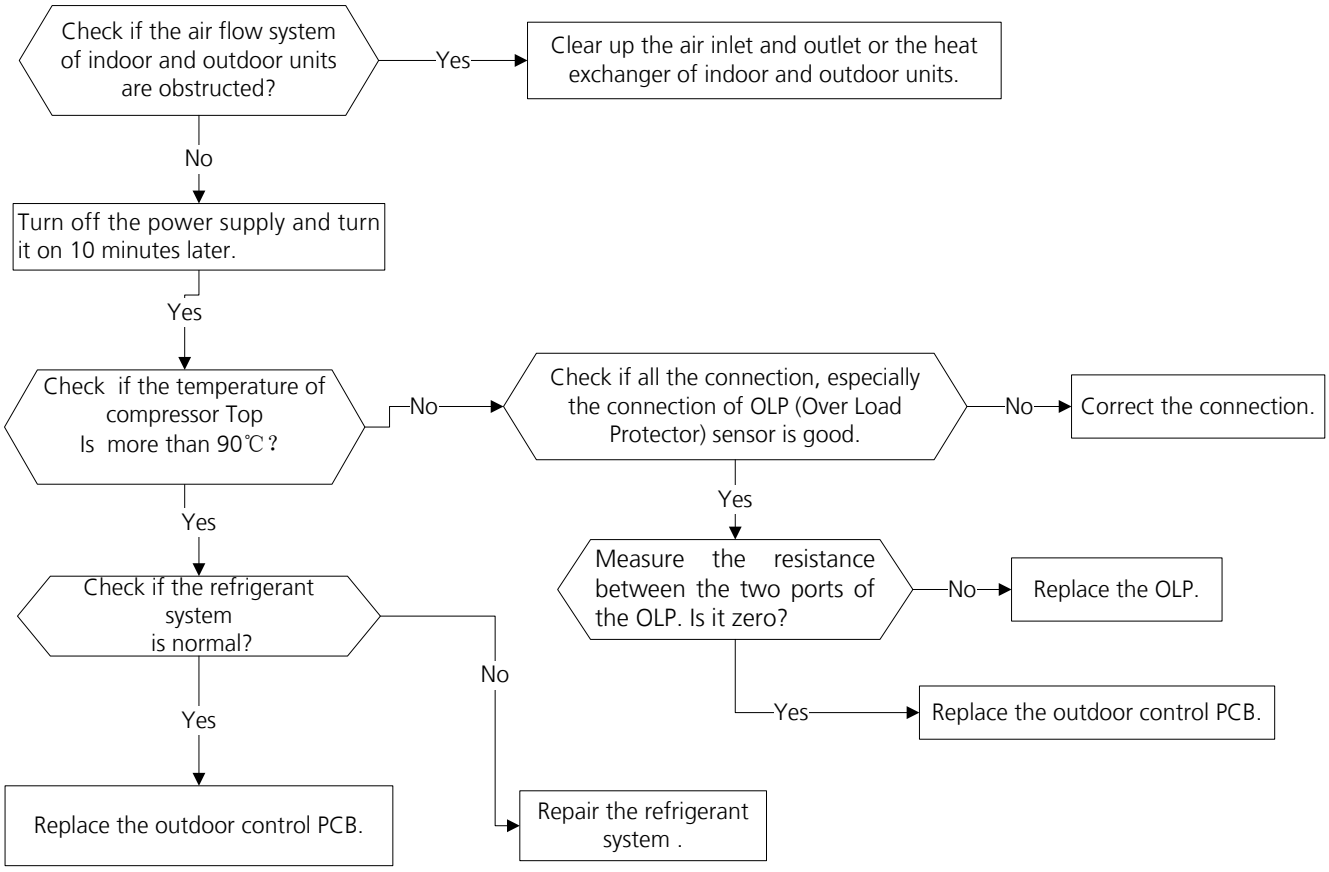
If the temperature of IPM module is higher than a certain value, the LED displays the failure code.

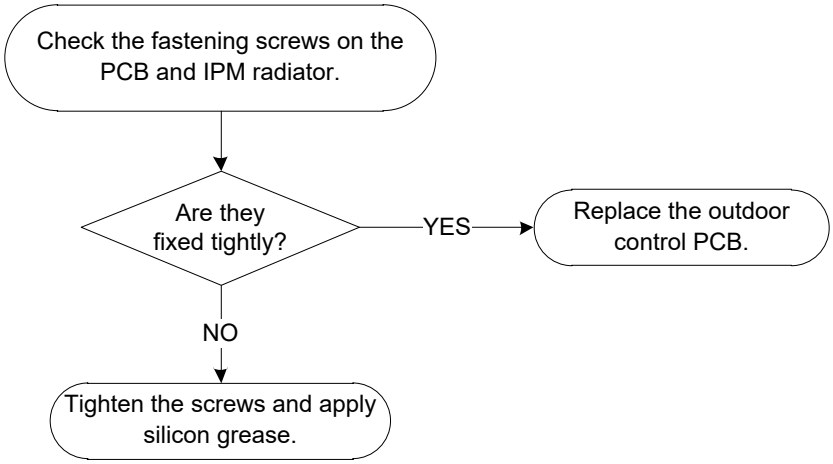
Models without overload protector should be diagnosed according to the second flowchart.

Recommended parts to prepare:

- Connection wires
- Outdoor PCB
- IPM module board
- High pressure protector
- System blockages

Troubleshooting and repair:





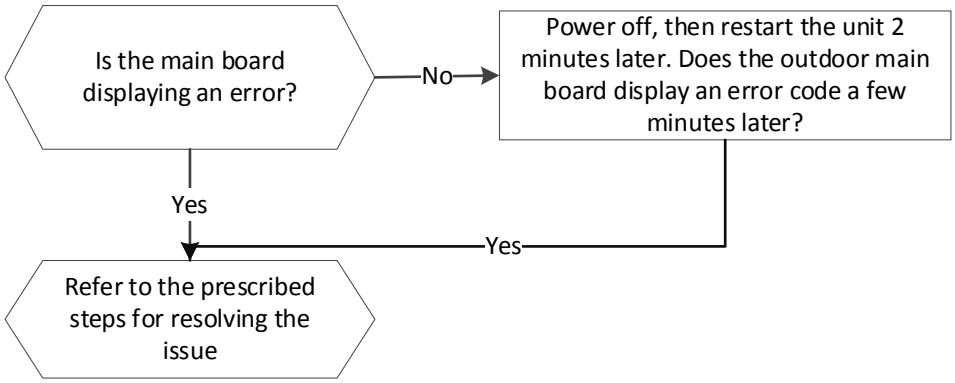
7.12 EC 0d(Outdoor unit malfunction Diagnosis and Solution)

Description: The indoor unit detect the outdoor unit is error.

Recommended parts to prepare:

- Outdoor unit

Troubleshooting and repair:



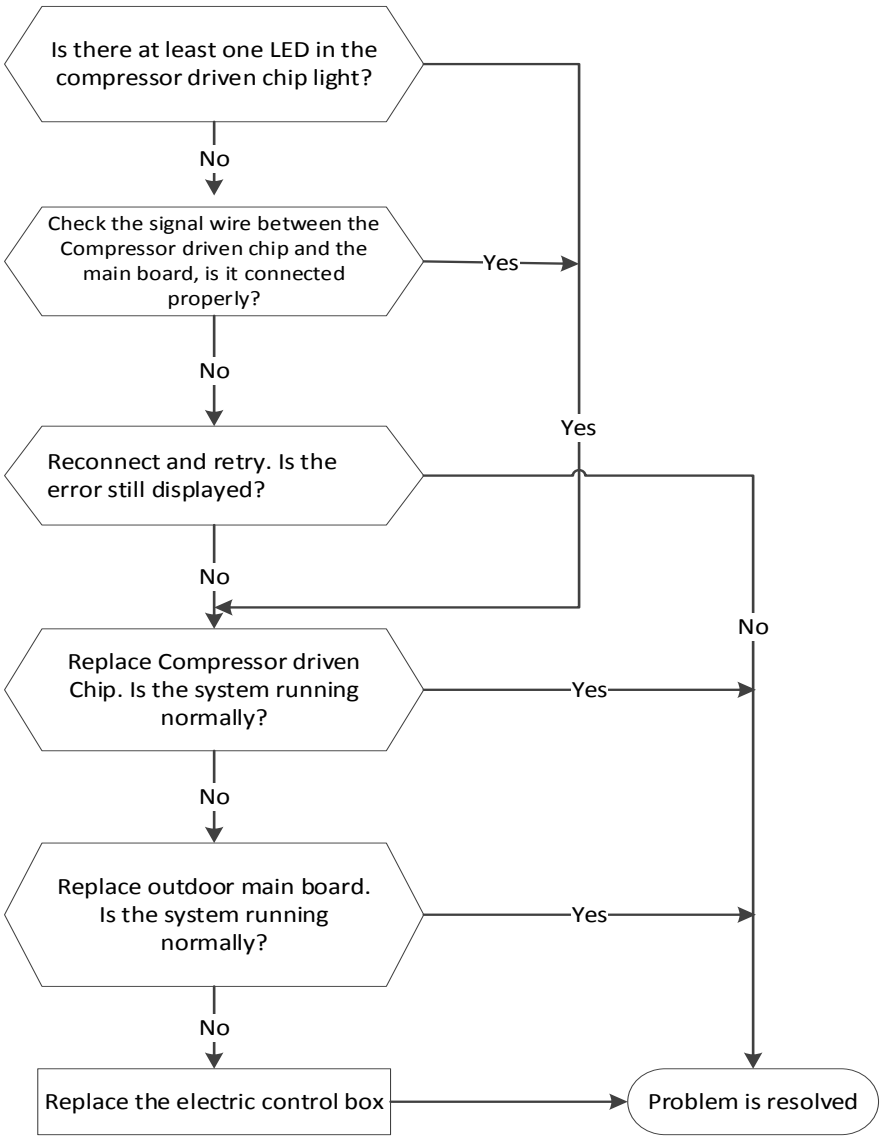
7.13 PC 40(Communication error between outdoor main PCB and IPM board diagnosis and solution)

Description: The main PCB cannot detect the IPM board.

Recommended parts to prepare:

- Connection wires
- IPM board
- Outdoor main PCB
- Electric control box

Troubleshooting and repair:



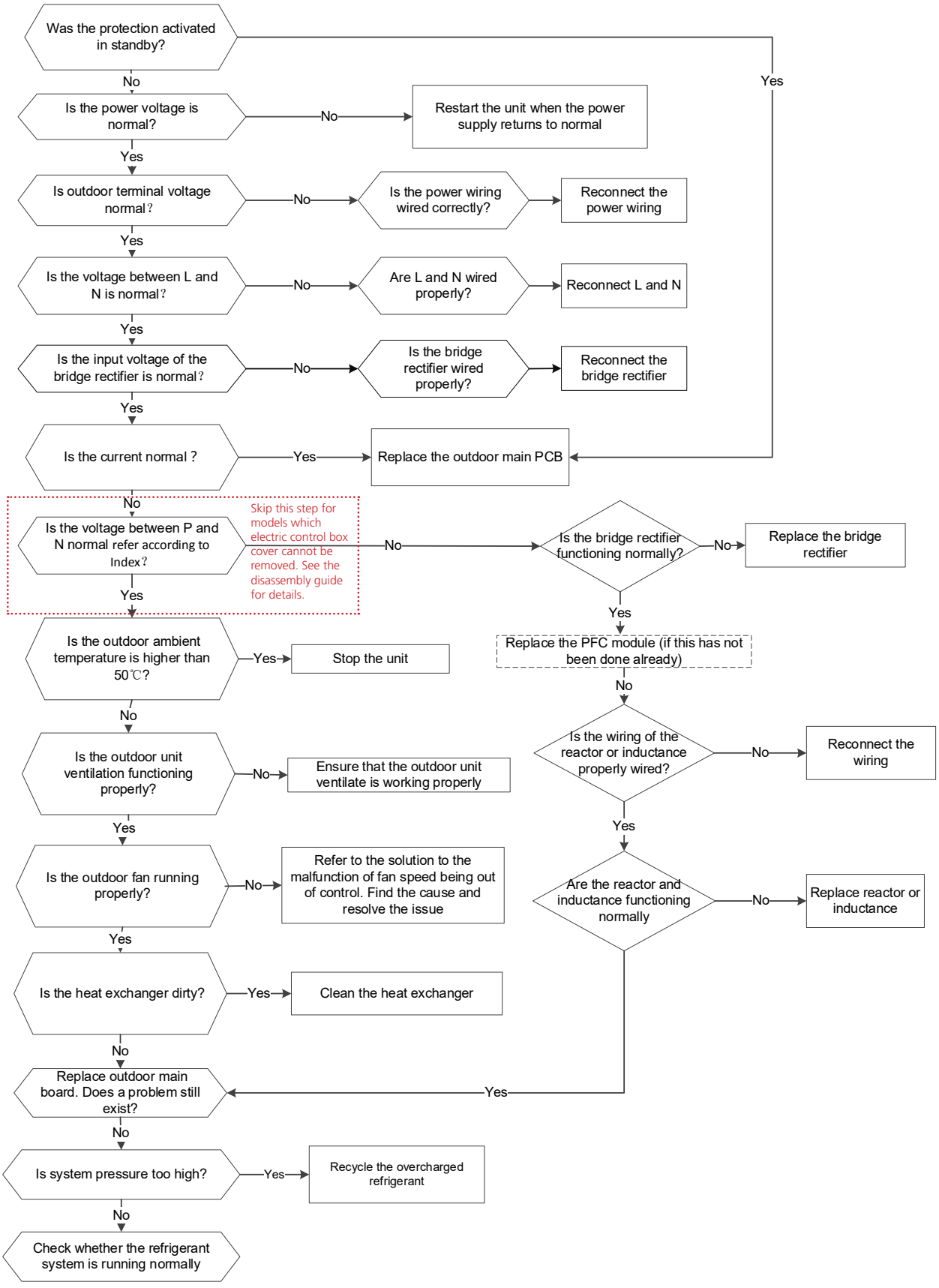
7.14 PC 08(Current overload protection)/PC 44(Outdoor unit zero speed protection)/ PC 46(Compressor speed has been out of control)/PC 49(Compressor overcurrent failure) diagnosis and solution

Description: An abnormal current rise is detected by checking the specified current detection circuit.

Recommended parts to prepare:

- Connection wires
- Rectifier
- PFC circuit or reactor
- Blocked refrigeration piping system
- Pressure switch
- Outdoor fan
- IPM module board
- Outdoor PCB

Troubleshooting and repair:


Was the protection activated in standby?
Yes
No
Is the power voltage is normal?
No
Restart the unit when the power supply returns to normal
Yes
Is outdoor terminal voltage normal?
No
Is the power wiring wired correctly?
Reconnect the power wiring
Yes
Is the voltage between L and N is normal?
No
Are L and N wired properly?
Reconnect L and N
Yes
Is the input voltage of the bridge rectifier is normal?
No
Is the bridge rectifier wired properly?
Reconnect the bridge rectifier
Yes
Is the current normal ?
Yes
Replace the outdoor main PCB
No
Is the voltage between P and N normal refer according to Index?
Skip this step for models which electric control box cover cannot be removed. See the disassembly guide for details.
No
Is the bridge rectifier functioning normally?
No
Replace the bridge rectifier
Yes
Replace the PFC module (if this has not been done already)
No
Is the outdoor ambient temperature is higher than 50℃?
Yes
Stop the unit
No
Is the wiring of the reactor or inductance properly wired?
No
Reconnect the wiring
Yes
Is the outdoor unit ventilation functioning properly?
No
Ensure that the outdoor unit ventilate is working properly
Yes
Are the reactor and inductance functioning normally
No
Replace reactor or inductance
Is the outdoor fan running properly?
No
Refer to the solution to the malfunction of fan speed being out of control. Find the cause and resolve the issue
Yes
Is the heat exchanger dirty?
Yes
Clean the heat exchanger
No
Replace outdoor main board. Does a problem still exist?
Yes
No
Is system pressure too high?
Yes
Recycle the overcharged refrigerant
No
Check whether the refrigerant system is running normally

7.15 PC 0F(PFC module protection diagnosis and solution)

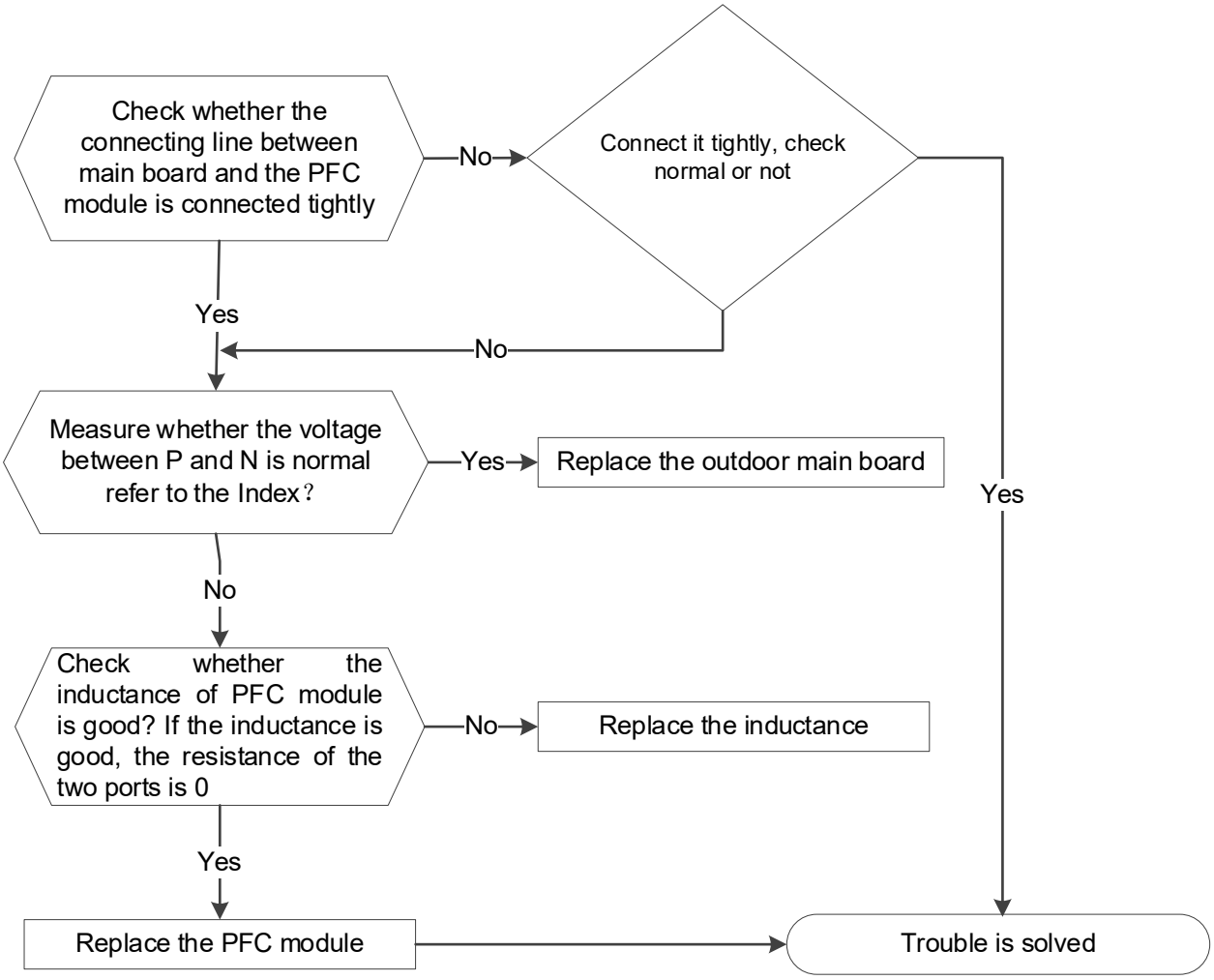
Description: When the voltage signal that IPM send to compressor drive chip is abnormal, the LED displays the failure code and the AC turns off.

Recommended parts to prepare:

- Connection wires
- Inductance
- Outdoor main PCB
- PFC module

Troubleshooting and repair:

At first test the resistance between every two ports of U, V, W of IPM and P, N. If any result of them is 0 or close to 0, the IPM is defective. Otherwise, please follow the procedure below:



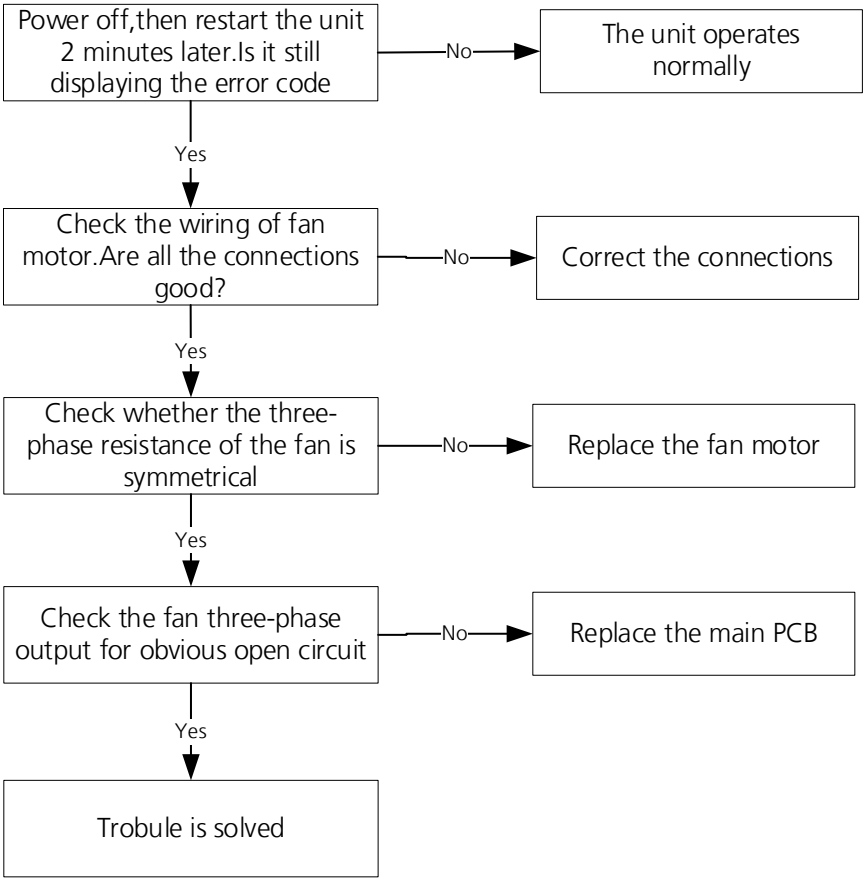
7.16 EC 72 (Lack phase failure of outdoor DC fan motor diagnosis and solution)

Description: When the three-phase sampling current of the DC motor is abnormal, especially when the current of one or more phases is always small and almost 0, the LED displays the failure code.

Recommended parts to prepare:

- Connection wire
- Fan motor
- Outdoor PCB

Troubleshooting and repair:



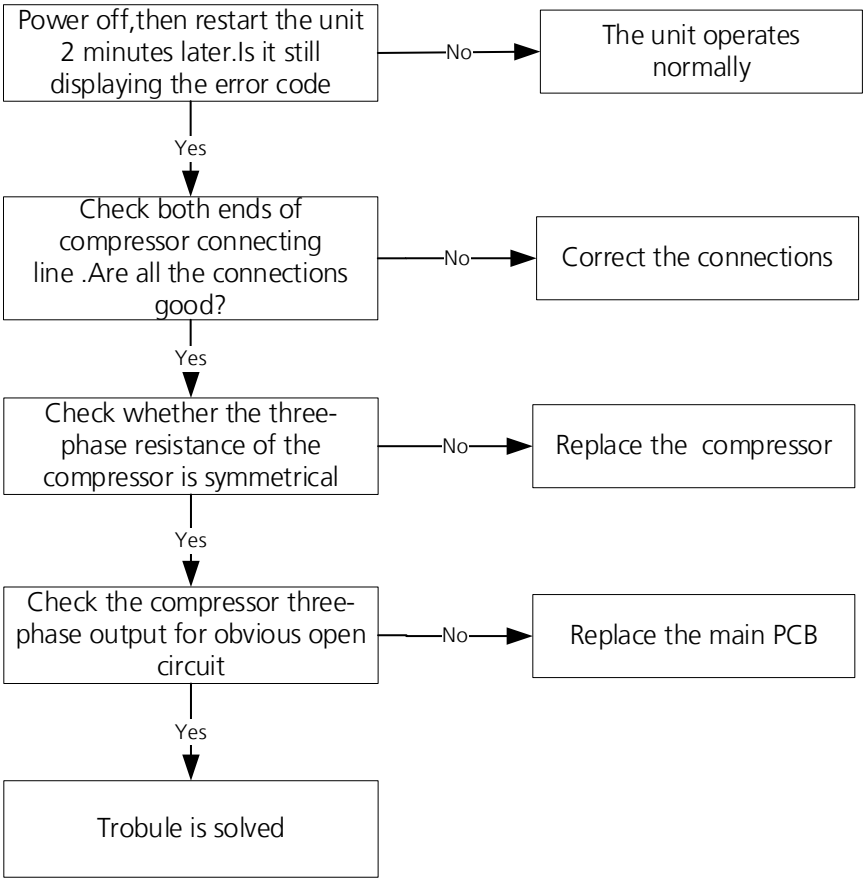
7.17 PC 43 (Outdoor compressor lack phase protection diagnosis and solution)

Description: When the three-phase sampling current of the compressor is abnormal, especially when the current of one or more phases is always small and almost 0, the LED displays the failure code

Recommended parts to prepare:

- Connection wire
- Compressor
- Outdoor PCB

Troubleshooting and repair:



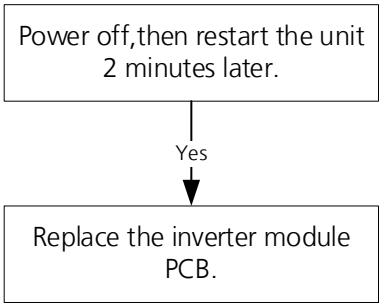
7.18 PC 45 (Outdoor unit IR chip drive failure) diagnosis and solution

Description: When the IR chip detects its own parameter error, the LED displays the failure code when power on.

Recommended parts to prepare:

- Inverter module PCB.

Troubleshooting and repair:



7.19 PC 0L (Low ambient temperature protection)

Description: It is a protection function. When compressor is off, outdoor ambient temperature(T4) is lower than -35°C. for 10s, the AC will stop and display the failure code.

When compressor is on, outdoor ambient temperature(T4) is lower than -40°C.for 10s, the AC will stop and display the failure code.

When outdoor ambient temperature(T4) is no lower than -32°C.for 10s, the unit will exit protection.

7.20 EC55 (Outdoor IPM module temperature sensor fault) diagnosis and solution

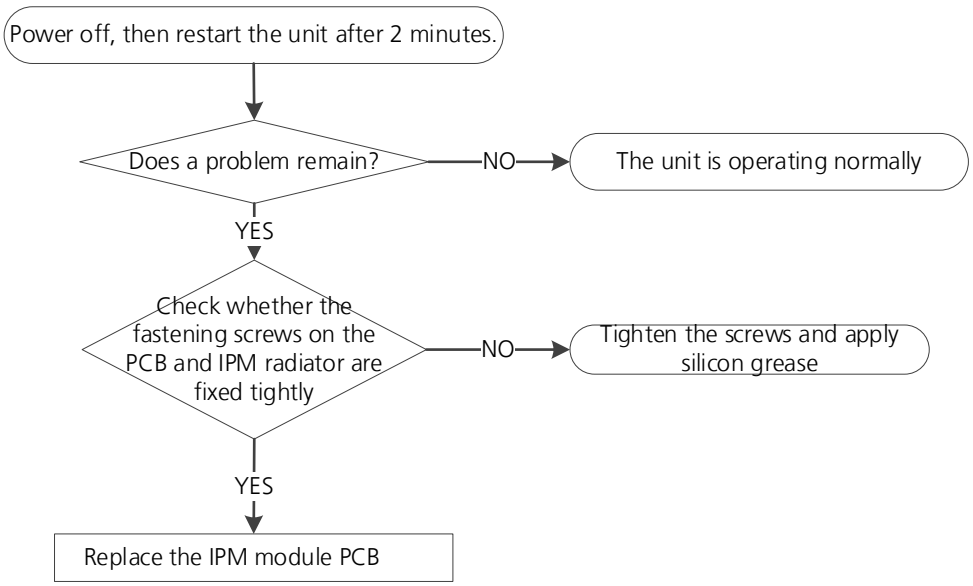
Description: If the sampling voltage is 0V or 5V, the LED displays the failure code.

Recommended parts to prepare:

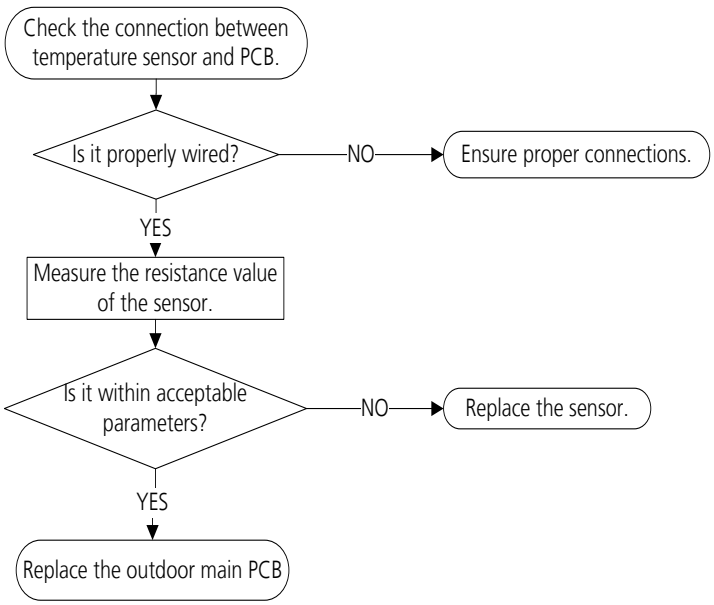
- IPM module PCB
- Connection wires
- Sensors
- Outdoor main PCB

Troubleshooting and repair:

If the radiator has no sensor, follow the steps below to resolve,



If the radiator has a sensor(TH), follow the steps below to resolve,



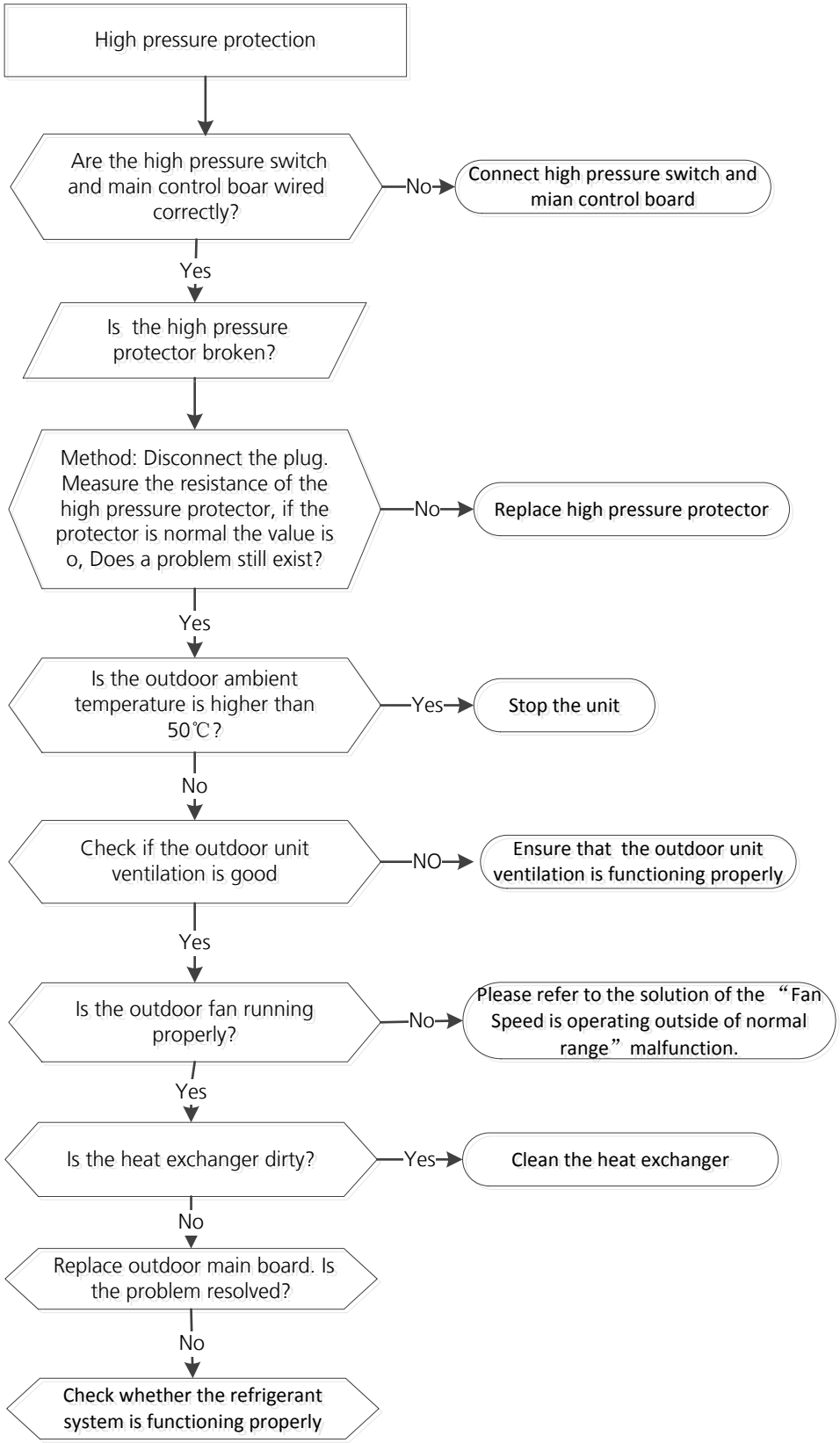
7.21 PC 03/PC 30 (High pressure protection diagnosis and solution)

Description: Outdoor pressure switch cut off the system because high pressure is higher than 4.4 MPa

Recommended parts to prepare:

- Connection wires
- Pressure switch
- Outdoor fan
- Outdoor main PCB

Troubleshooting and repair:


High pressure protection
Are the high pressure switch and main control boar wired correctly?
No
Connect high pressure switch and mian control board
Yes
Is the high pressure protector broken?
Method: Disconnect the plug. Measure the resistance of the high pressure protector, if the protector is normal the value is o, Does a problem still exist?
No
Replace high pressure protector
Yes
Is the outdoor ambient temperature is higher than 50℃?
Yes
Stop the unit
No
Check if the outdoor unit ventilation is good
NO
Ensure that the outdoor unit ventilation is functioning properly
Yes
Is the outdoor fan running properly?
No
Please refer to the solution of the "Fan Speed is operating outside of normal range" malfunction.
Yes
Is the heat exchanger dirty?
Yes
Clean the heat exchanger
No
Replace outdoor main board. Is the problem resolved?
No
Check whether the refrigerant system is functioning properly

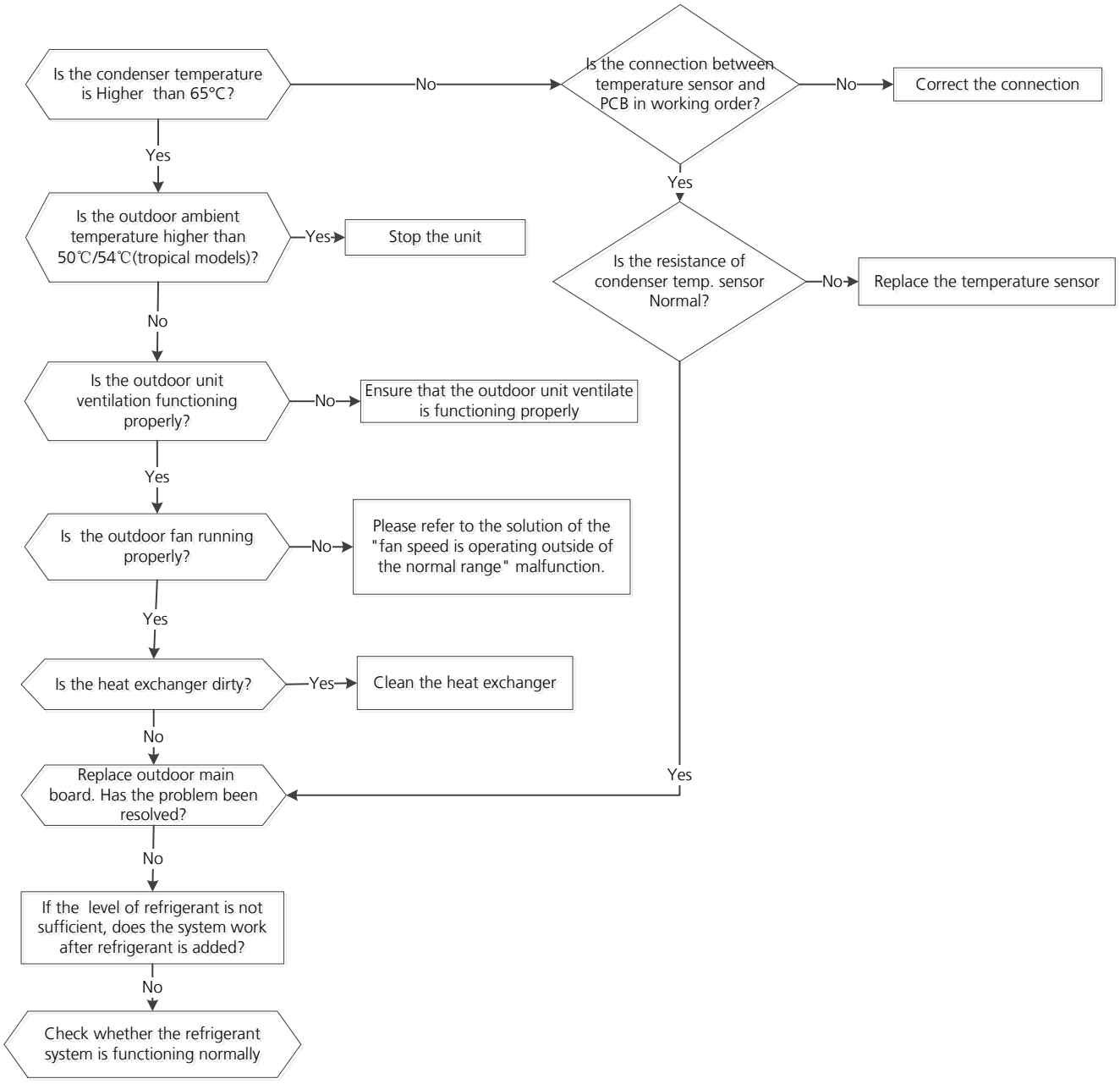
7.22 PC 0A (High temperature protection of condenser diagnosis and solution)

Description: When the outdoor pipe temperature is more than 65°C, the unit stops. It starts again only when the outdoor pipe temperature is less than 52°C.

Recommended parts to prepare:

- Connection wires
- Condenser temperature sensor
- Outdoor fan
- Outdoor main PCB
- Refrigerant

Troubleshooting and repair:



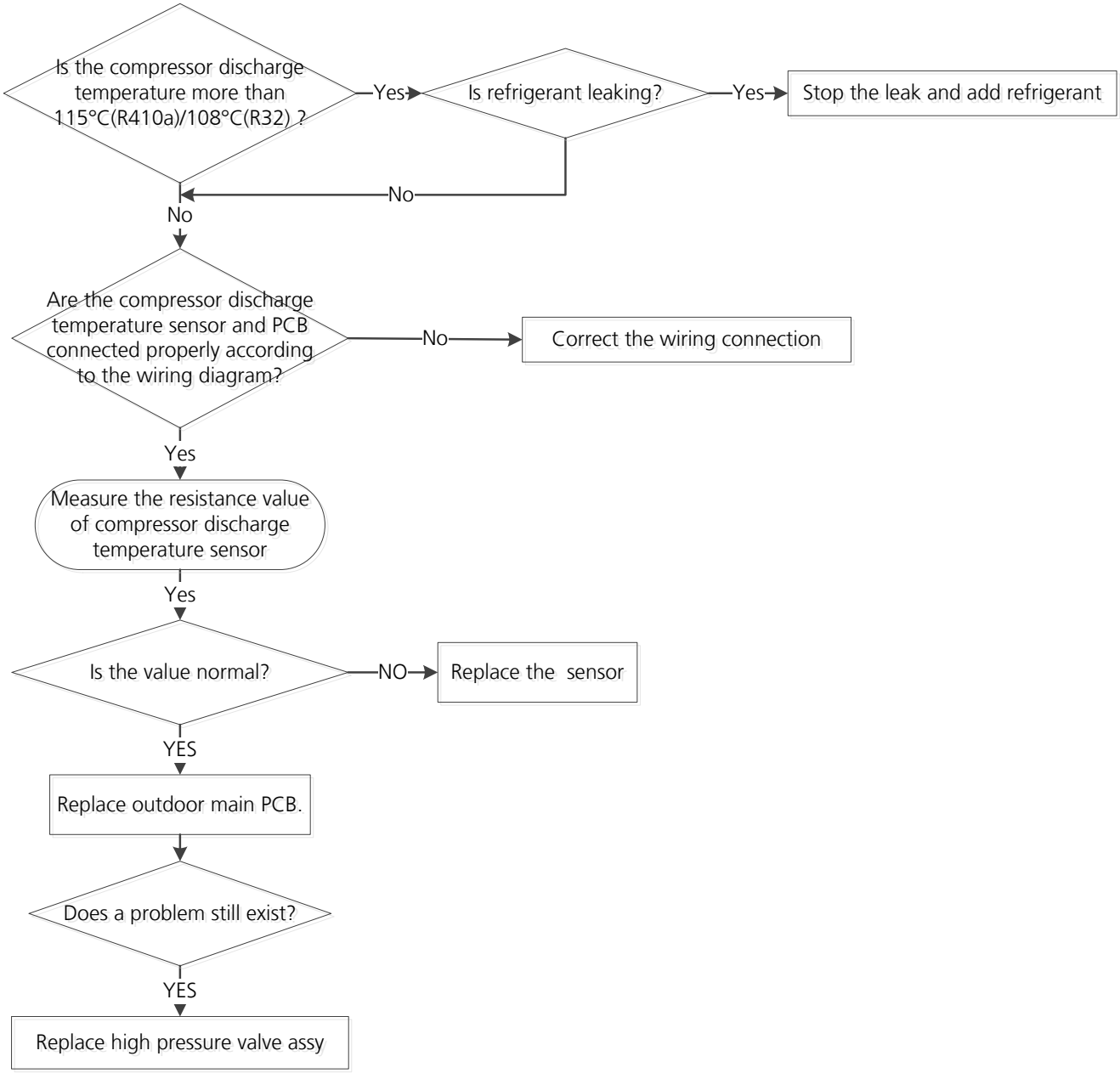
7.23 PC 06 (Discharge temperature protection of compressor diagnosis and solution)

Description: If the compressor discharge temperature exceeds a certain level for nine seconds, the compressor ceases operation, the LED displays the failure code

Recommended parts to prepare:

- Connection wires
- Discharge temperature sensor
- Additional refrigerant
- Outdoor main PCB

Troubleshooting and repair:



Note: For certain models, outdoor unit uses combination sensor, T3,T4 and TP are the same of sensor. This picture and the value are only for reference, actual appearance and value may vary.

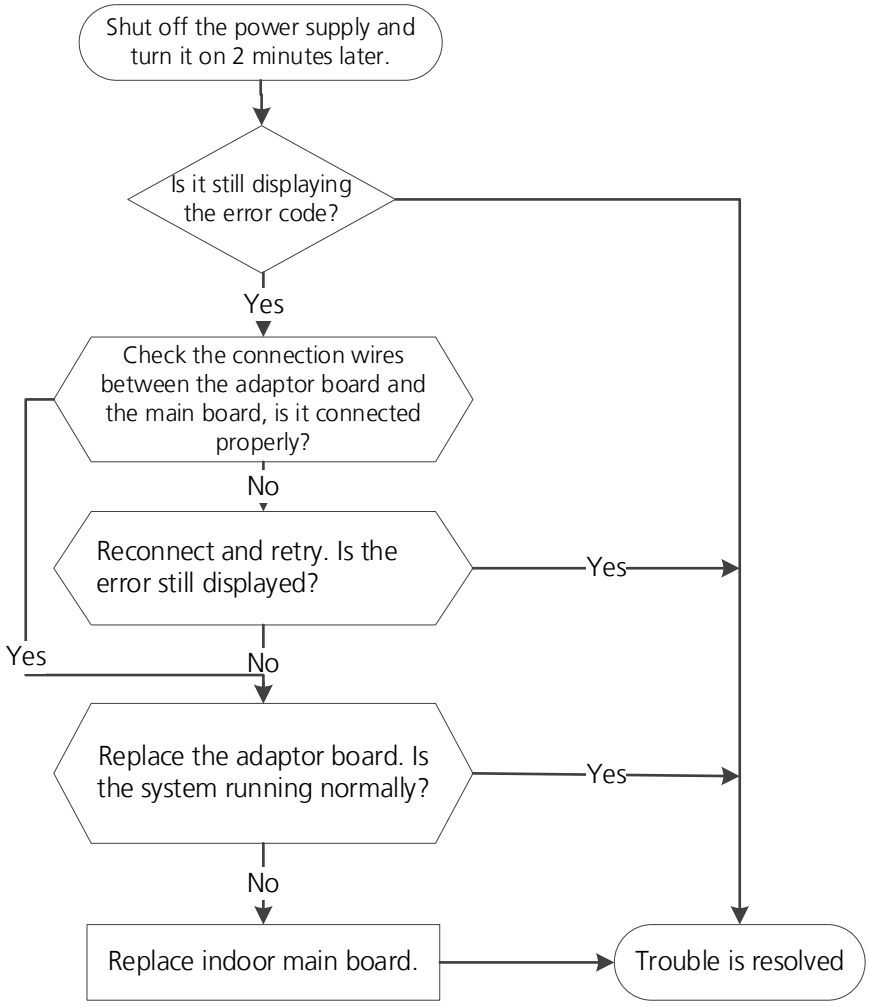
7.24 EH 0b(Communication error between indoor two chips diagnosis and solution)

Description: Indoor PCB main chip does not receive feedback from another chip.

Recommended parts to prepare:

- Indoor main board
- Adapter board

Troubleshooting and repair:



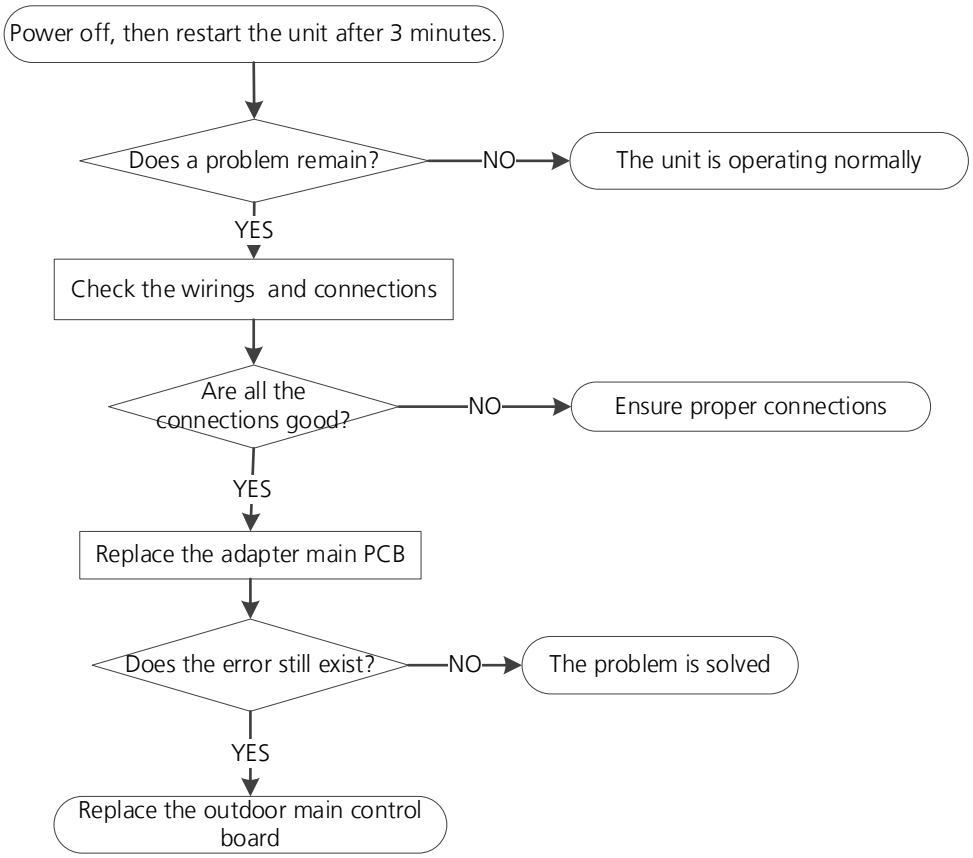
7.25 EL 16(Communication malfunction between adapter board and outdoor main board diagnosis and solution)

Description: The adapter PCB cannot detect the main control board.

Recommended parts to prepare:

- Connection wires
- Adapter board
- Outdoor main PCB

Troubleshooting and repair:



7.26 FL 09 (Indoor and outdoor mismatch malfunction diagnosis and solution)

Description: Indoor and outdoor units are mismatched, the LED displays this code. Please replace the matching indoor or outdoor unit.

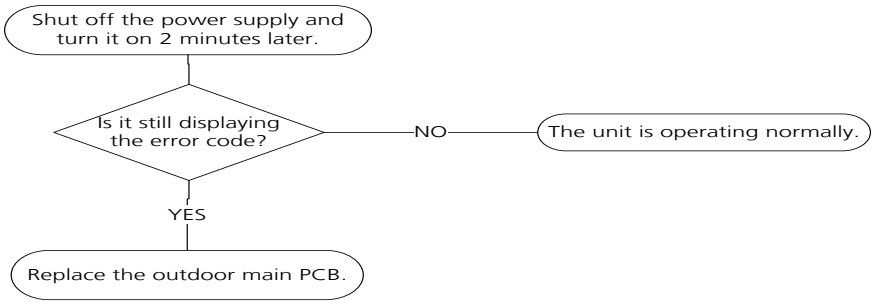
7.27 PC 41(Outdoor compressor current sampling circuit failure diagnosis and solution)

Description: Three-phase sampling offset voltage error, the static bias voltage is normally 2.5V

Recommended parts to prepare:

- Outdoor main PCB

Troubleshooting and repair:



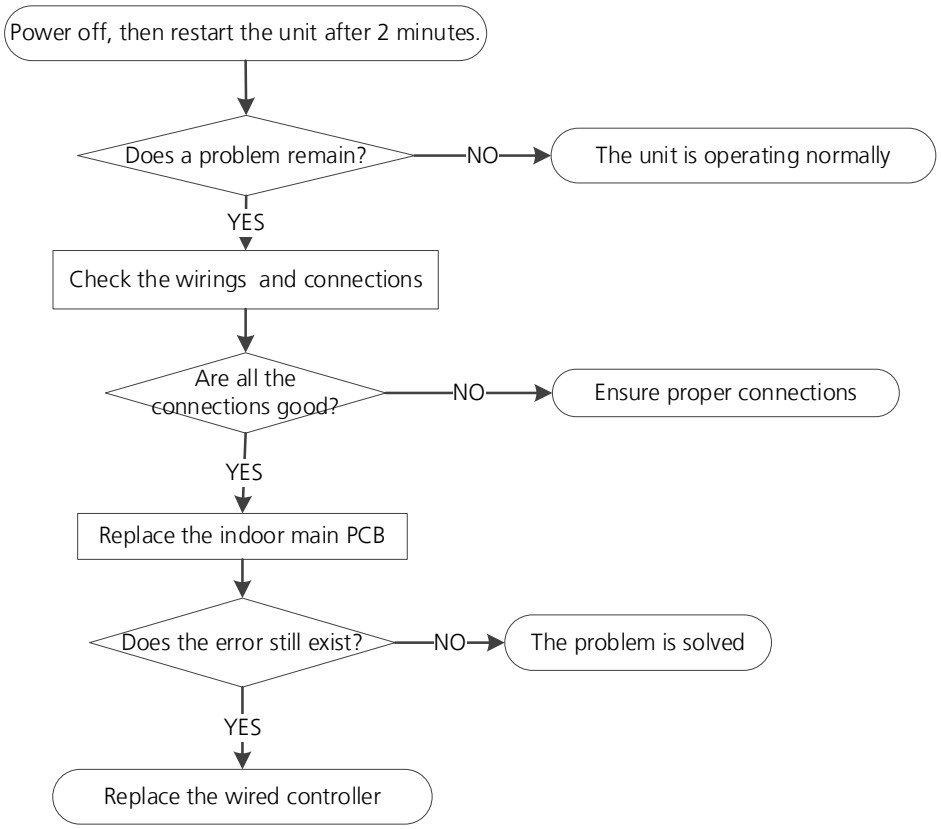
7.28 EH b3 (Communication error between wired controller and indoor unit Diagnosis and Solution

Description: If Indoor PCB does not receive feedback from wired controller, the error displays on the wired controller

Recommended parts to prepare:

- Connection wires
- Indoor PCB
- Wired controller

Troubleshooting and repair:



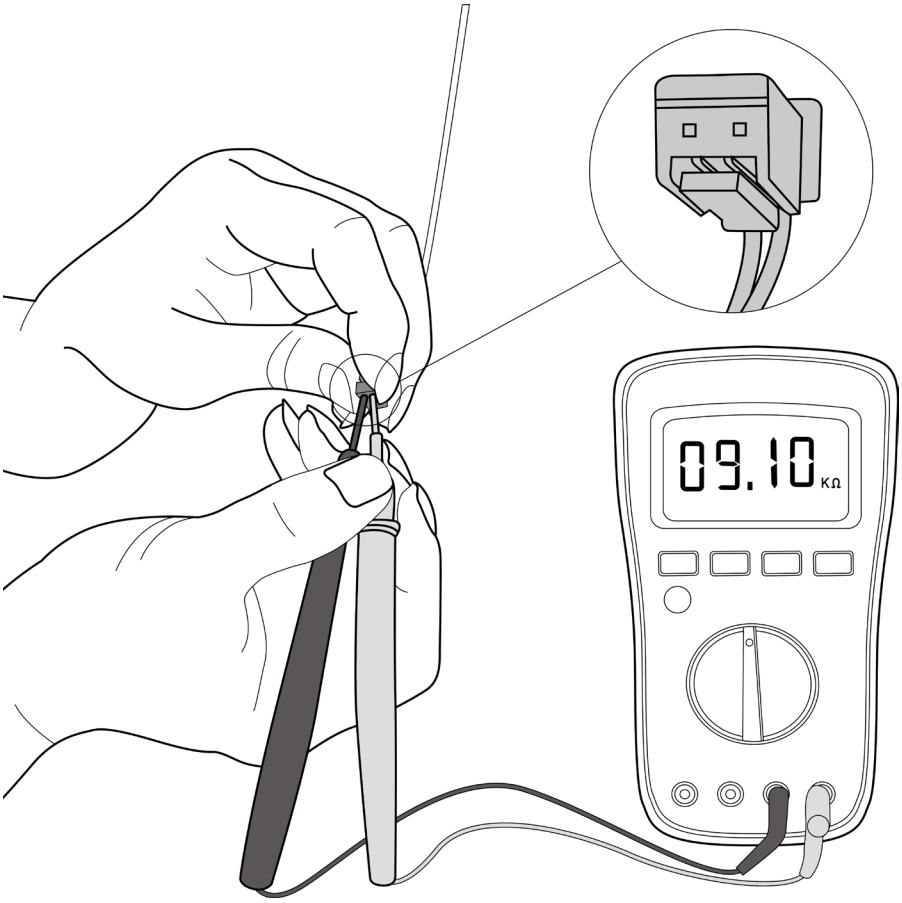
8. Check Procedures

8.1 Temperature Sensor Check

WARNING

Be sure to turn off all power supplies or disconnect all wires to avoid electric shock. Operate after compressor and coil have returned to normal temperature in case of injury.

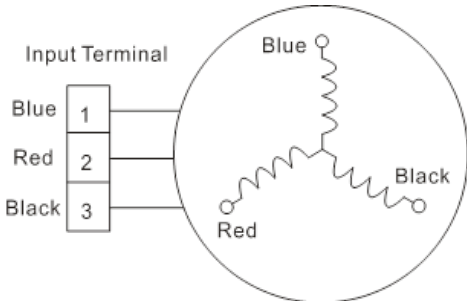
1. Disconnect temperature sensor from PCB (Refer to Chapter 5. Indoor Disassembly and Chapter 6. Outdoor Disassembly).
2. Measure the resistance value of the sensor using a multi-meter.
3. Check corresponding temperature sensor resistance value table (Refer to Chapter 8. Appendix).



Note: The picture and the value are only for reference, actual condition and specific value may vary.

8.2 Compressor Check

1. Disconnect the compressor power cord from outdoor PCB (Refer to Chapter 6. Outdoor Unit Disassembly)).
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.

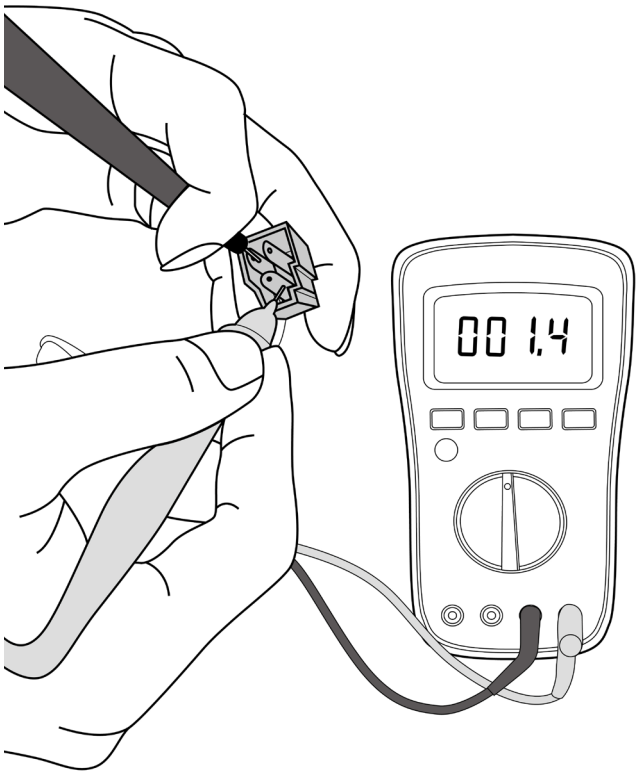


Resistance Value	ASM135D23UFZ	ATM115D43UFZ2	ASN98D22UFZ	ATQ360D1UMU
Blue-Red	1.75Ω	1.87Ω	1.57Ω	0.37Ω
Blue-Black				
Red-Black				

Resistance Value	ATF235D22UMT ATF250D22UMT KTF250D22UMT	ATF310D43UMT	KSK103D33UEZ3	ASM98D32UFZ
Blue-Red	0.75Ω	0.65Ω	2.13Ω	2.2Ω
Blue-Black				
Red-Black				

Resistance Value	ASN140D21UFZ KSN140D21UFZ	ASK89D29UEZD	KTM240D57UMT	KSN140D58UFZ
Blue-Red	1.28Ω	1.99Ω	0.62Ω	1.86Ω
Blue-Black				
Red-Black				

Resistance Value	KTF310D43UMT	ATN150D30UFZA KTM240D43UKT	KTM240D46UKT2	KTQ420D1UMU ATQ420D1SN5A1 EAPQ420D1UMUA EAPQ440D1UMUA
Blue-Red	0.65Ω	1.03Ω	1.04Ω	0.37Ω
Blue-Black				
Red-Black				



Note: The picture and the value are only for reference, actual condition and specific value may vary.

8.3 IPM Continuity Check

WARNING

Electricity remains in capacitors even when the power supply is off.
Ensure the capacitors are fully discharged before troubleshooting.

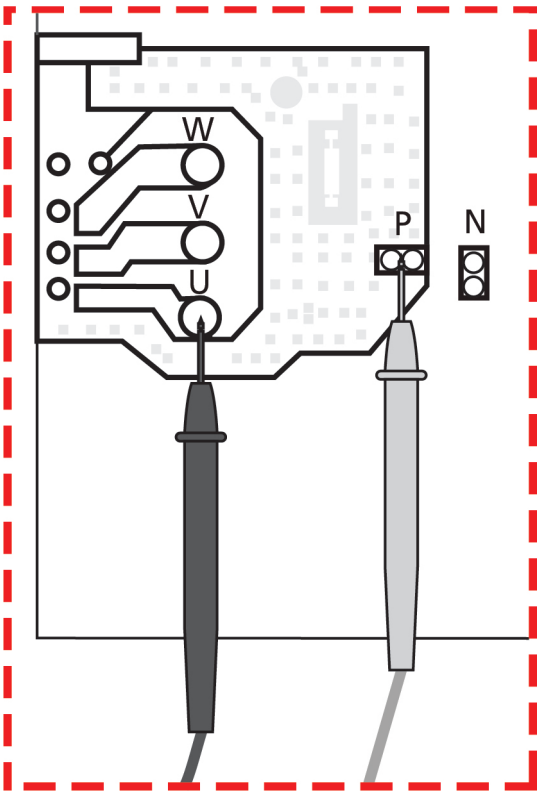
1. Turn off outdoor unit and disconnect power supply.
2. Discharge electrolytic capacitors and ensure all energy-storage unit has been discharged.
3. Disassemble outdoor PCB or disassemble IPM board.
4. Measure the resistance value between P and U(V, W, N); U(V, W) and N.

Digital tester		Resistance value	Digital tester		Resistance value
(+)Red	(-)Black		(+)Red	(-)Black	
P	N	∞ (Several MΩ)	U	N	∞ (Several MΩ)
	U		V		
	V		W		
	W		-		

Or test the conductivity of IPM with diode mode.

Needle-type Tester		Normal Value	Needle-type Tester		Normal Value
Red	Black		Red	Black	
P	U	Open-circuit	N	U	0.3-0.5V
	V			V	
	W			W	

Needle-type Tester		Normal Value	Needle-type Tester		Normal Value
Black	Red		Black	Red	
P	U	0.3-0.5V	N	U	Open-circuit
	V			V	
	W			W	



Note: The picture and the value are only for reference, actual condition and specific value may vary.

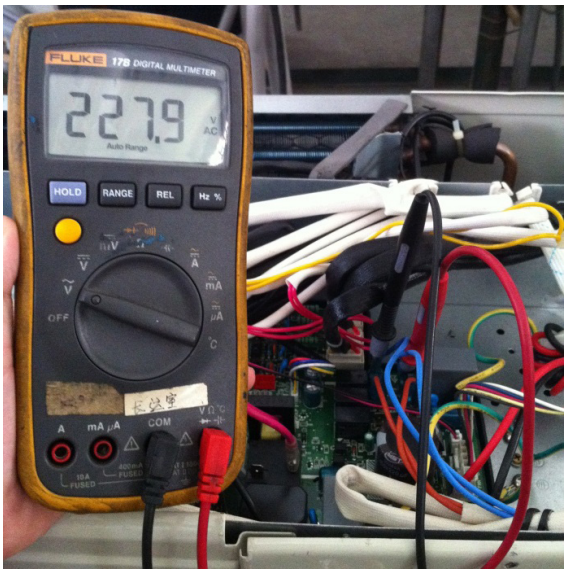
8.4 Normal voltage of P and N

208-240V(1-phase)
In standby
around 310VDC
In operation
>310VDC

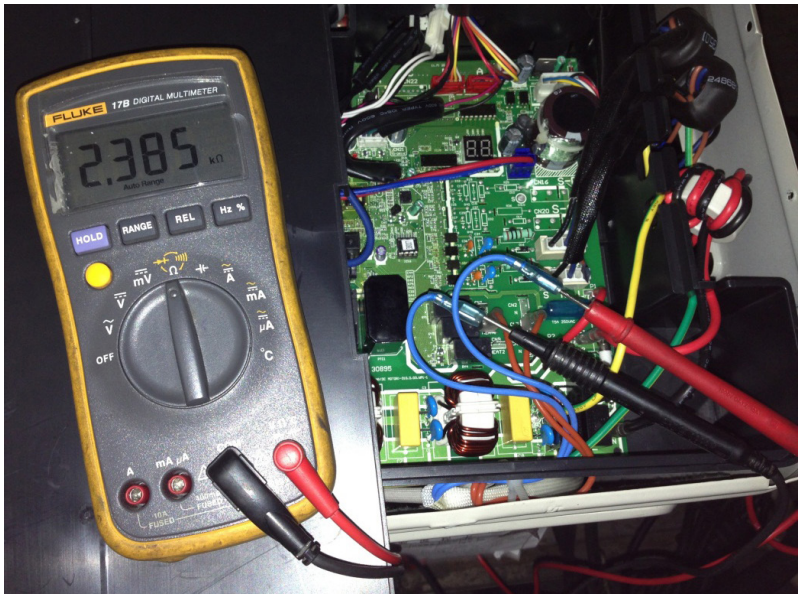
8.5 4-way Valve Check

1. Power on, use a digital tester to measure the voltage, when the unit operates in cooling, it is 0V. When the unit operates in heating, it is about 230VAC.

If the value of the voltage is not in the range, the PCB must have problems and need to be replaced.



2 Turn off the power, use a digital tester to measure the resistance. The value should be 1.8~2.5 KΩ.

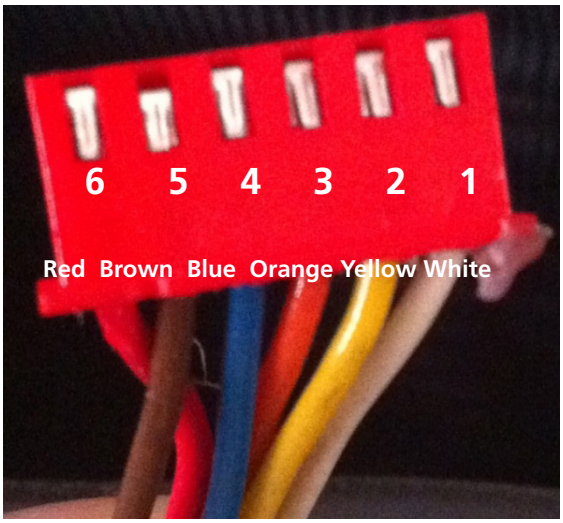


8.6 EEV Check

WARNING

Electricity remains in capacitors even when the power supply is off.
Ensure the capacitors are fully discharged before troubleshooting.

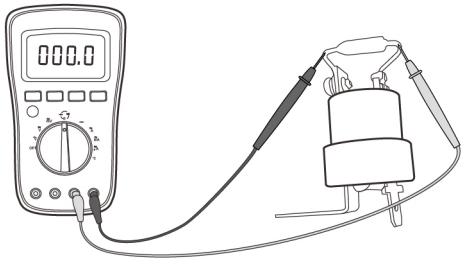
1. Disconnect the connector from outdoor PCB.
2. Measure the resistance value of each winding using a multi-meter.
3. Check the resistance value of each winding in the following table.



Color of lead winding	Normal Value
Red- Blue	About 50Ω
Red - Yellow	
Brown-Orange	
Brown-White	

8.7 Fuse of Electric Auxiliary Heat Module Check(Optional)

1. Disassemble the fuse from electric auxiliary heat module.
2. Use the multimeter signal gear to check whether there is a signal, if not, fuse is broken.



Indoor Unit Disassembly-Air Handle

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1.1 Electrical Parts 2

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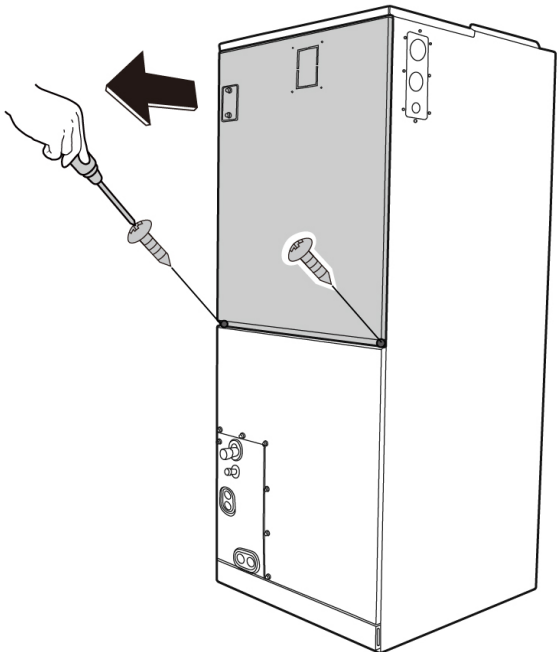
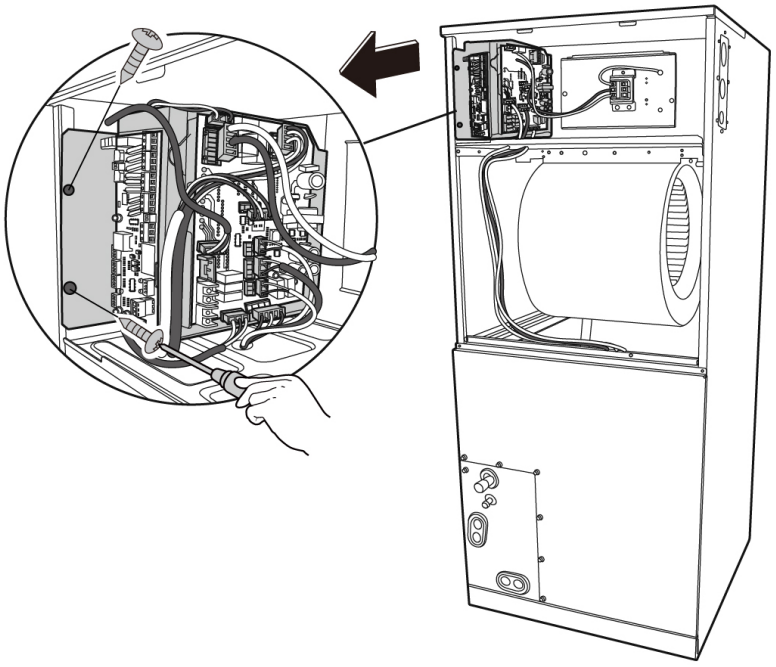
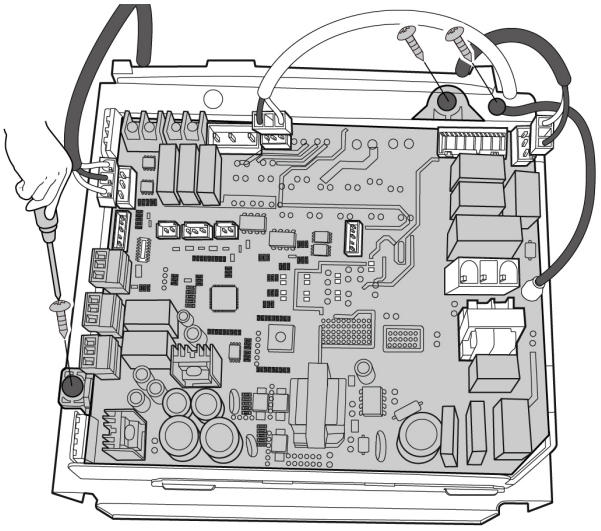
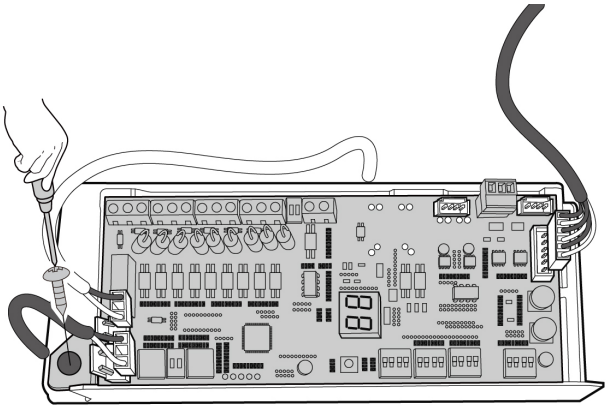
1. Indoor Unit Disassembly

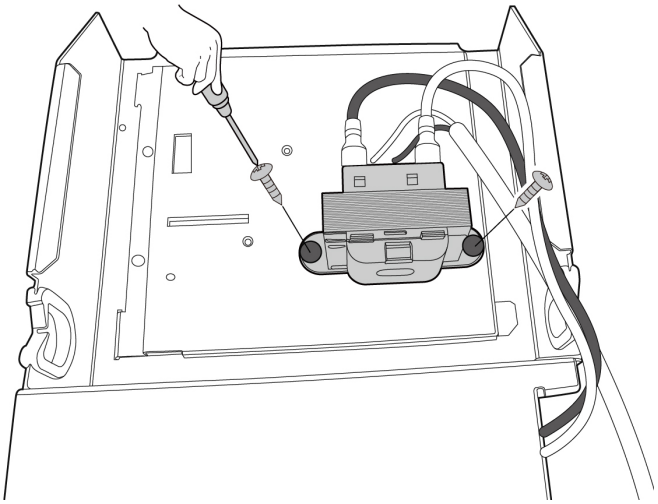
1.1 Electrical Parts (Antistatic gloves must be worn.)

Procedure	Illustration
1) Remove 2 screws of the upper cover Plate assembly and then remove the it. (see CJ_AHU_001)	 CJ_AHU_001
2) Remove 2 screws and unplug the plugs. (see CJ_AHU_002) 3) Pull out the electric control box subassembly.(see CJ_AHU_002)	 CJ_AHU_002

Note: This section is for reference only. Actual unit appearance may vary.

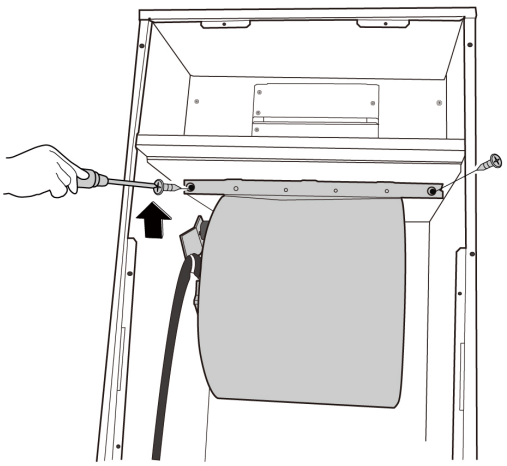
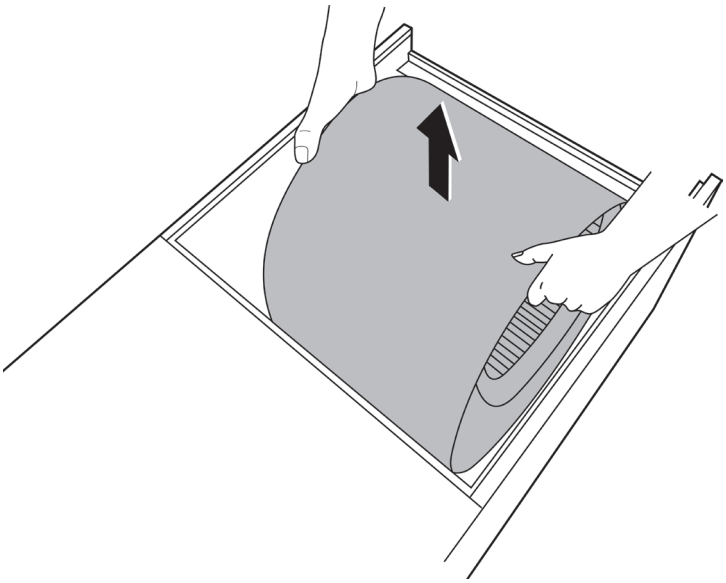
Procedure	Illustration
4) Release 2 fixing screws and 1earthing screw.(see CJ_AHU_003) 5) Unplug the plugs and then remove the main control board subassembly. (see CJ_AHU_003)	 **CJ_AHU_003**
6) Release 1 fixing screw of the data transfer module control board to remove it. (see CJ_AHU_004)	 **CJ_AHU_004**

Note: This section is for reference only. Actual unit appearance may vary.

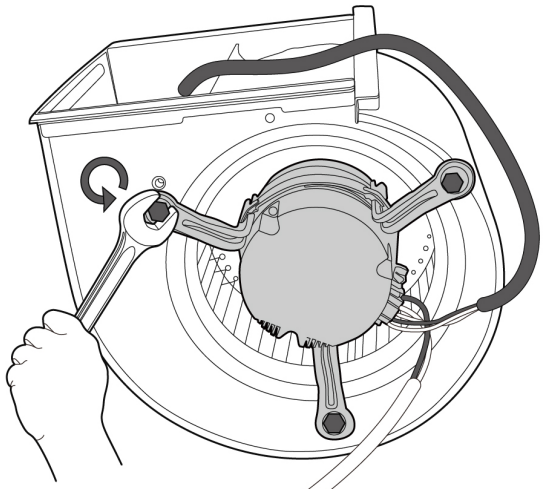
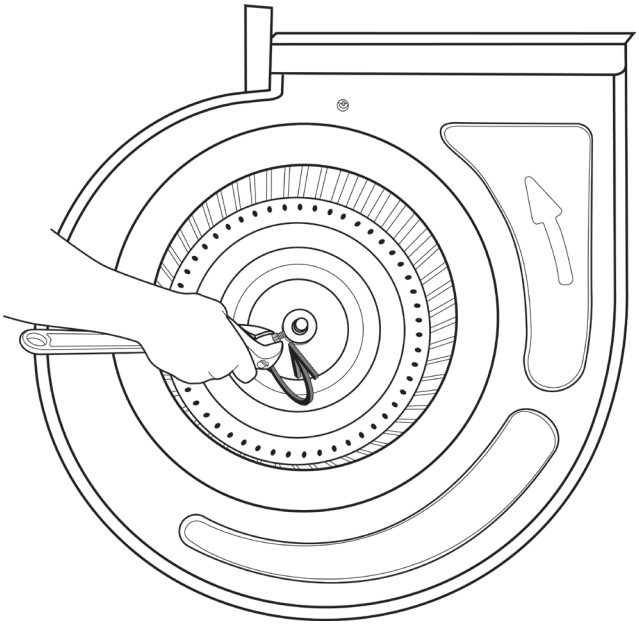
Procedure	Illustration
7) Release 2 screws and then remove the transformer. (see CJ_AHU_005)	 CJ_AHU_005

Note: This section is for reference only. Actual unit appearance may vary.

1.2 Fan Motor and Fan

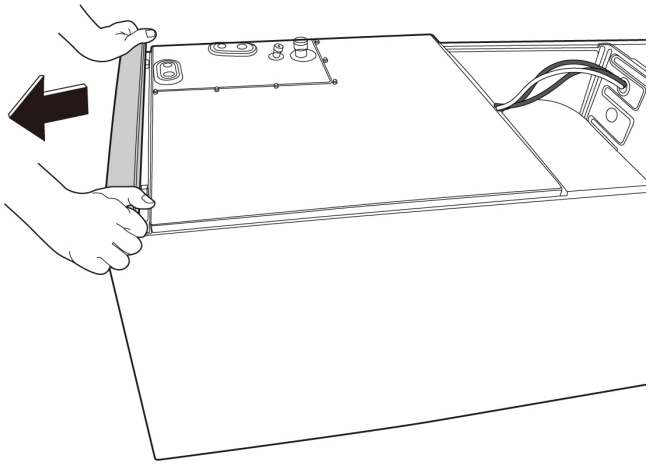
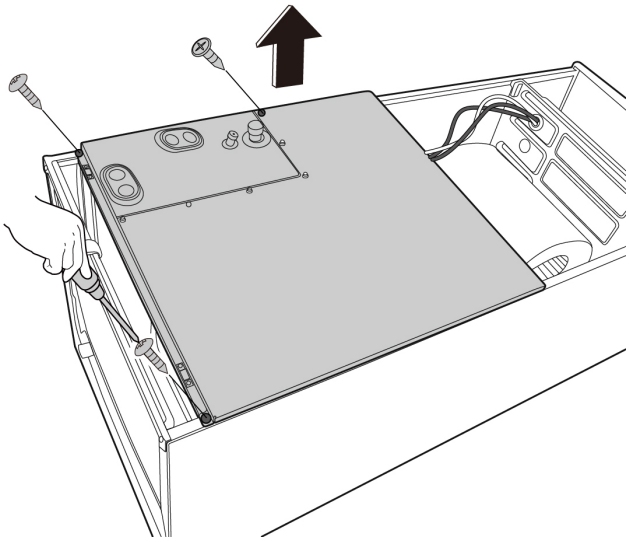
Procedure	Illustration
1) Remove 2 screws of fan assembly (see CJ_AHU_006)	 CJ_AHU_006
2) Take out the fan assembly (see CJ_AHU_007)	 CJ_AHU_007

Note: This section is for reference only. Actual unit appearance may vary.

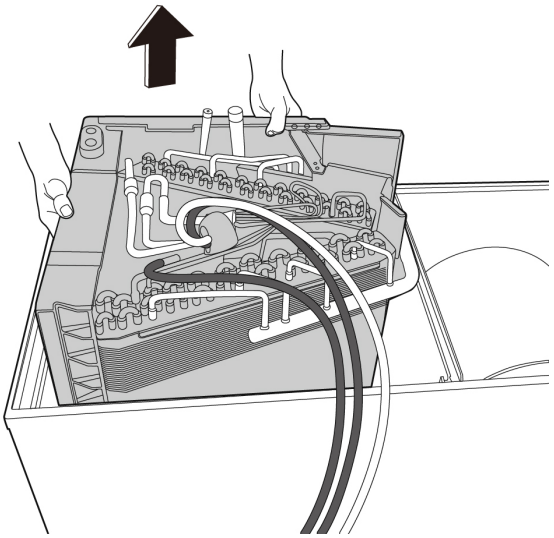
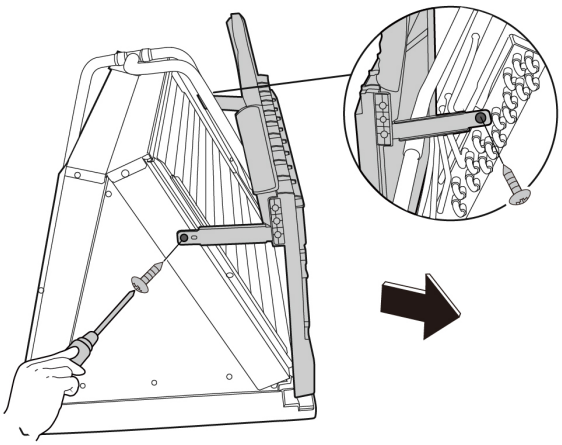
Procedure	Illustration
3) Release 3 nuts fixing the fan motor and then take out the fan motor. (see CJ_AHU_008)	 CJ_AHU_008
4) Release the 1 nut fixing the fan and then take out the fan. (see CJ_AHU_009)	 CJ_AHU_009

Note: This section is for reference only. Actual unit appearance may vary.

1.4 Evaporator

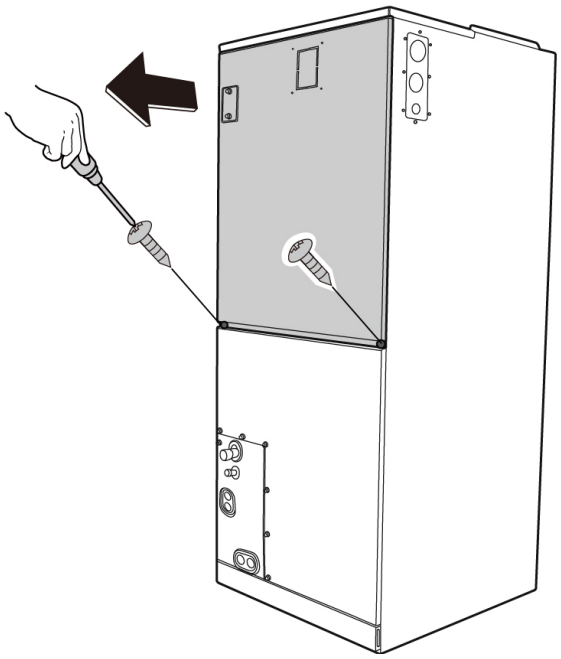
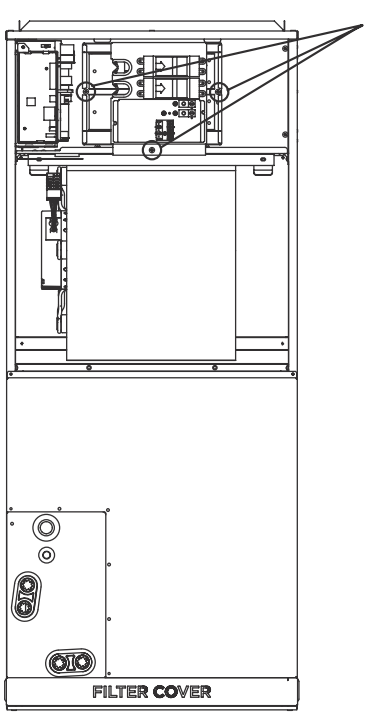
Procedure	Illustration
1) Remove the cover plate (see CJ_AHU_010)	 CJ_AHU_010
2) Remove 3 screws of cover plate assembly(below) (see CJ_AHU_011)	 CJ_AHU_011

Note: This section is for reference only. Actual unit appearance may vary.

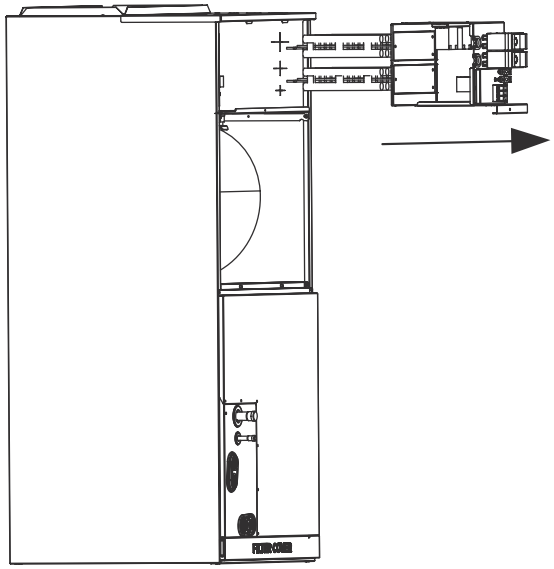
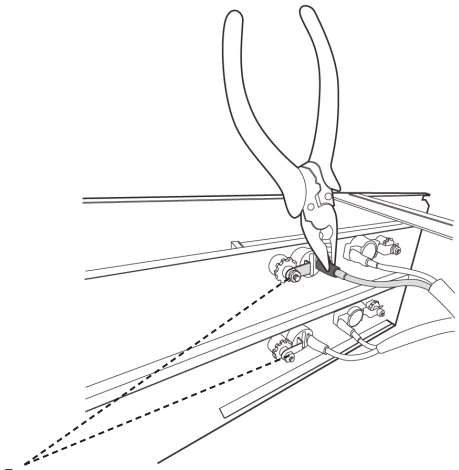
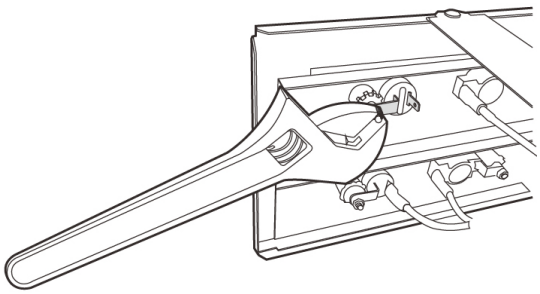
Procedure	Illustration
3) Take out the evaporator(with water collector assembly). (see CJ_AHU_012)	 CJ_AHU_012
4) Remove 2 screws of water collector assembly.(see CJ_AHU_013) 4) Release evaporator and the water collector assembly.	 CJ_AHU_013

Note: This section is for reference only. Actual unit appearance may vary.

1.5 Electric Auxiliary Heat Module (Optional)

Procedure	Illustration
1) Remove 2 screws of the upper cover Plate assembly and then remove the it. (see CJ_AHU_001)	 CJ_AHU_001
2) Remove 3 fixing screws. (see CJ_ AHU_014)	 CJ_AHU_014

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
3) Pull out the auxiliary heat module. (see CJ_AHU_015)	 CJ_AHU_015
4) Pull out the wire connect to the fuse with needle-nose pliers(see CJ_AHU_016) Note: Qty of EAH-03B&EAH-05B is 1, Qty of EAH-08B&EAH-10B is 2, Qty of EAH-15B is 3, Qty of EAH-20B is 4, Qty of EAH-25B is 5.	 CJ_AHU_016
5) Loosen the retaining nut, and then remove the fuse. (see CJ_AHU_017)	 CJ_AHU_017

Note: This section is for reference only. Actual unit appearance may vary.

Outdoor Unit Disassembly

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1. Outdoor Unit Disassembly

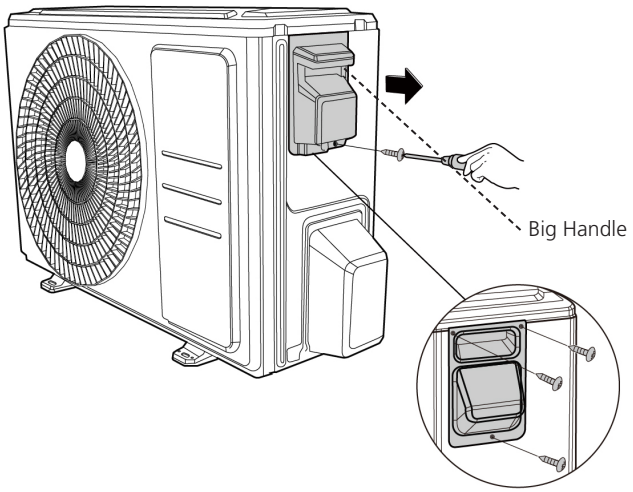
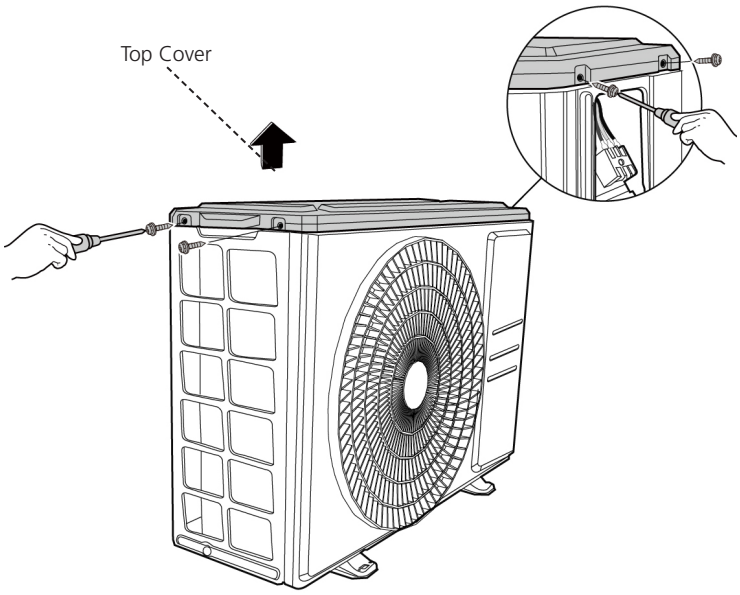
1.1 Outdoor Unit Table

Outdoor Unit Model	Panel Plate	PCB Board
ACiQ-12-EHPB & ACiQ-18-EHPB	X330	PCB Board 11
ACiQ-18-HPB	X430	PCB Board 3
ACiQ-24-HPB	D30	PCB Board 14
ACiQ-24-EHPB	X430	PCB Board 3
ACiQ-30-EHPB	D30	PCB Board 14
ACiQ-30-HPB	D30	PCB Board 14
ACiQ-36-EHPB	D30	PCB Board 14
ACiQ-36-HPC	X630	PCB Board 16
ACiQ-36-HPB	E30	PCB Board 8
ACiQ-48-HPB	E30	PCB Board 8
ACiQ-48-EHPB	E30	PCB Board 8
ACiQ-60-EHPB	E30	PCB Board 8
ACiQ-60-HPB	E30	PCB Board 8

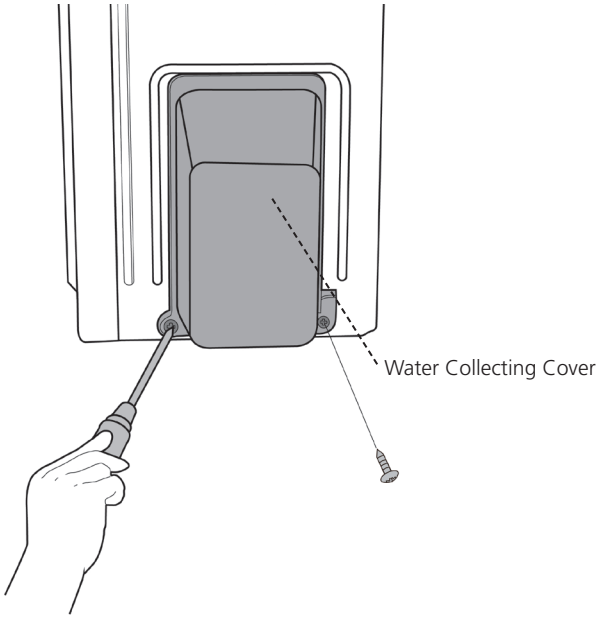
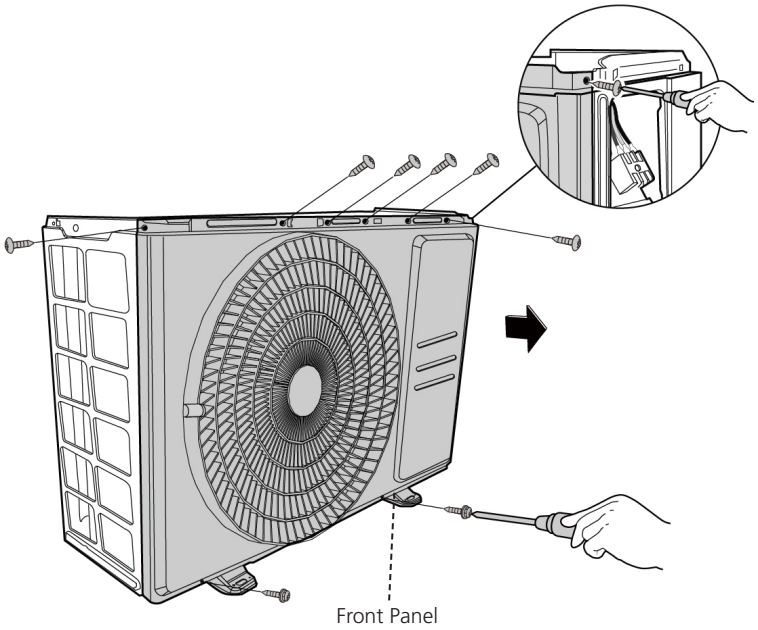
2. Outdoor Unit Disassembly

2.1 Panel Plate

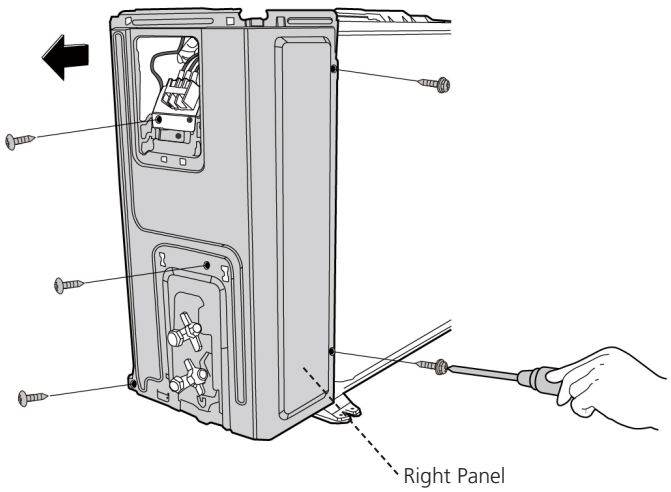
1. X230/X330

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screw of the big handle and then remove the big handle (1 screws) (see CJ_X230_001).	 **CJ_X230_001**
3) Remove the screws of the top cover and then remove the top cover (4 screws). One of the screws is located underneath the big handle (see CJ_X230_002).	 **CJ_X230_002**

Note: This section is for reference only. Actual unit appearance may vary.

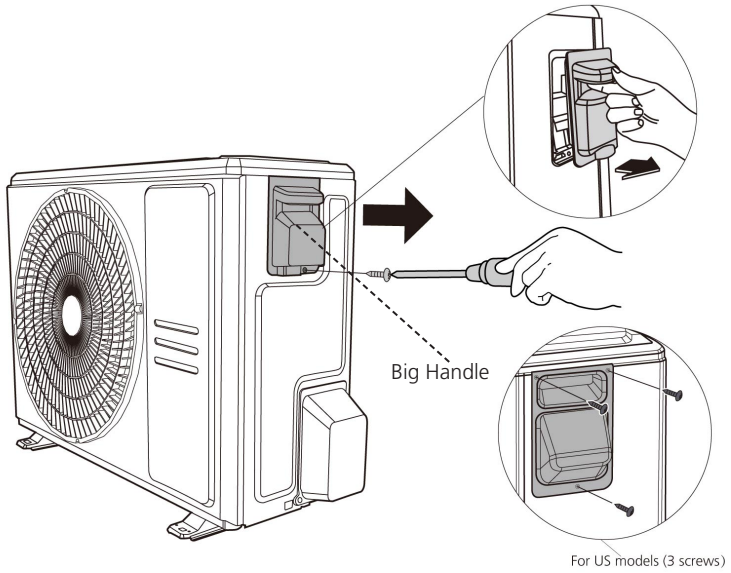
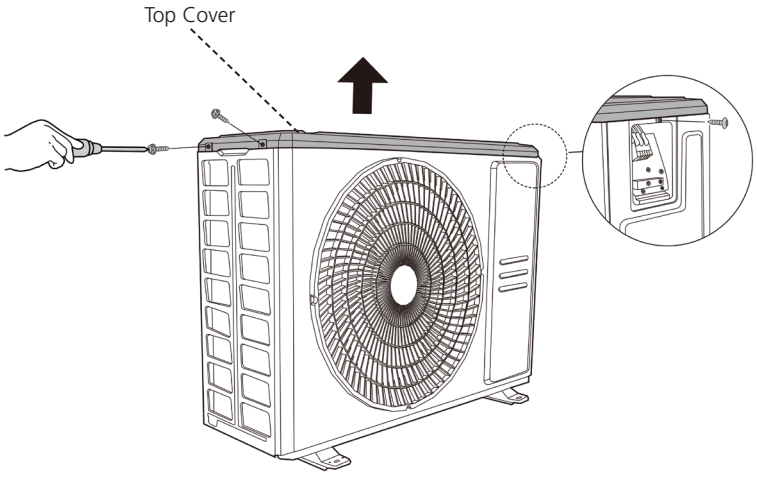
Procedure	Illustration
4) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_X230_003).	 **CJ_X230_003**
5) Remove the screws of the front panel and then remove the front panel (7 screws(onoff models) or 9 screws(inverter models) (see CJ_X230_004).	 **CJ_X230_004**

Note: This section is for reference only. Actual unit appearance may vary.

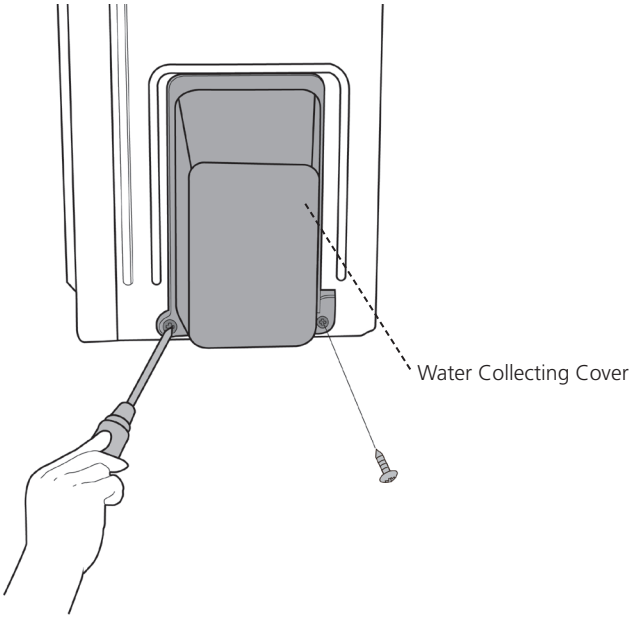
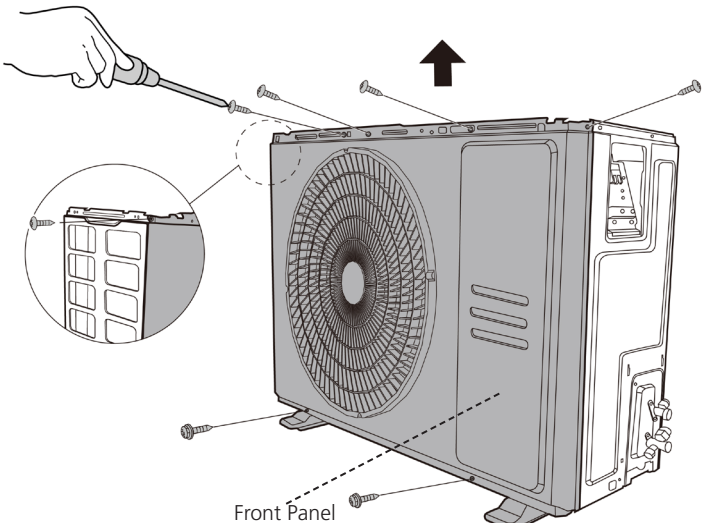
Procedure	Illustration
6) Remove the screws of the right panel and then remove the right panel (5 screws) (see CJ_X230_005).	 **CJ_X230_005**

Note: This section is for reference only. Actual unit appearance may vary.

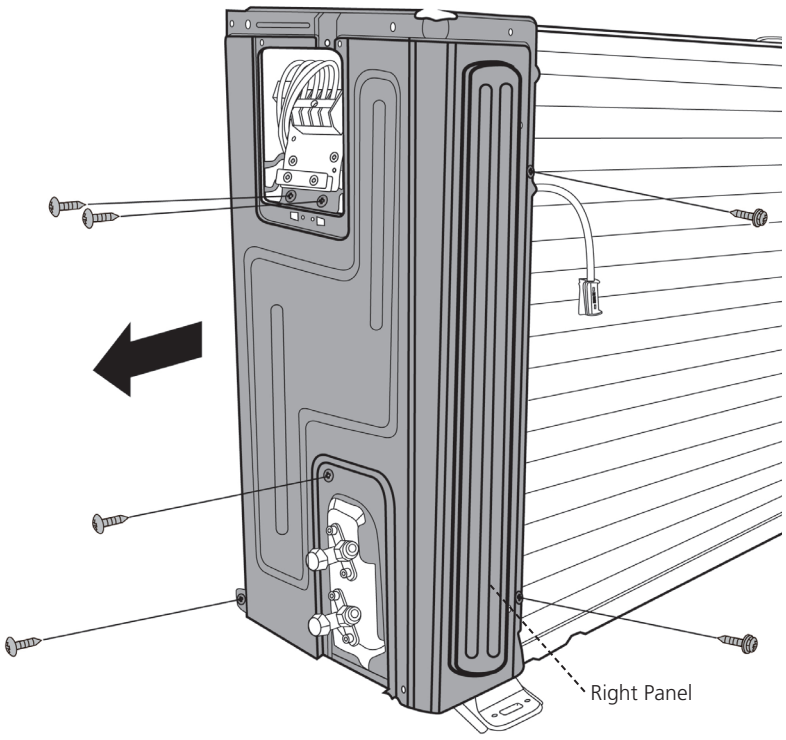
2.X430

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screw of the big handle and then remove the big handle (1 screw) (see CJ_X430_001).	 **CJ_X430_001**
3) Remove the screws of the top cover and then remove the top cover (3 screws). One of the screws is located underneath the big handle (see CJ_X430_002).	 **CJ_X430_002**

Note: This section is for reference only. Actual unit appearance may vary.

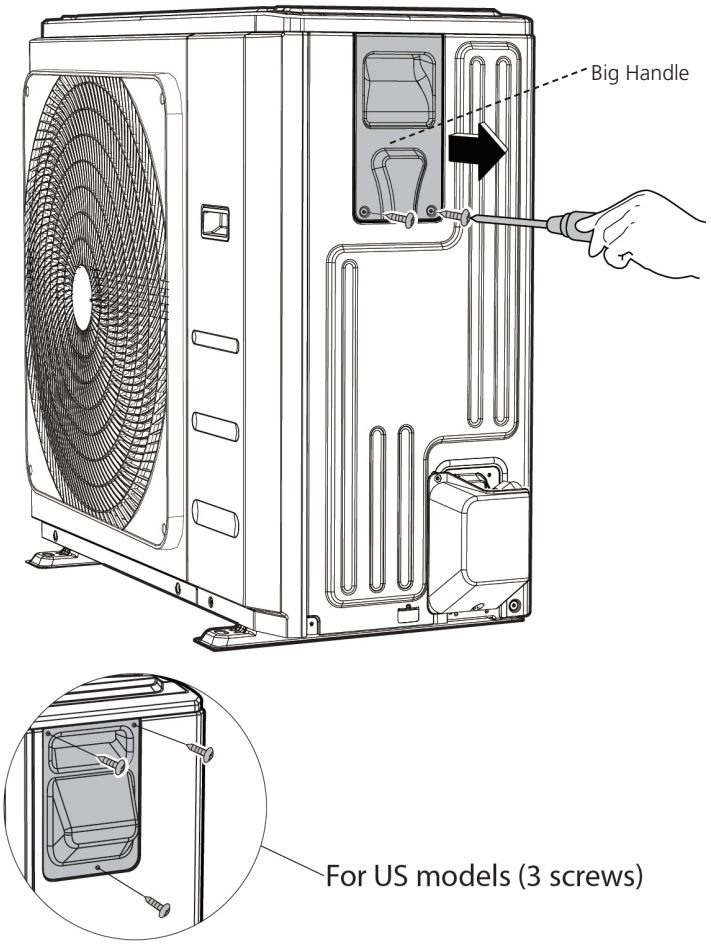
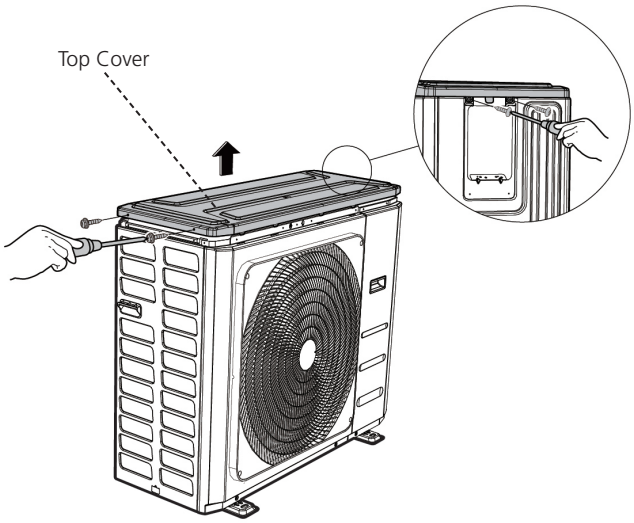
Procedure	Illustration
4) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_X430_003).	 **CJ_X430_003**
5) Remove the screws of the front panel and then remove the front panel (7 screws(onoff models) or 9 screws(inverter models) (see CJ_X430_004).	 **CJ_X430_004**

Note: This section is for reference only. Actual unit appearance may vary.

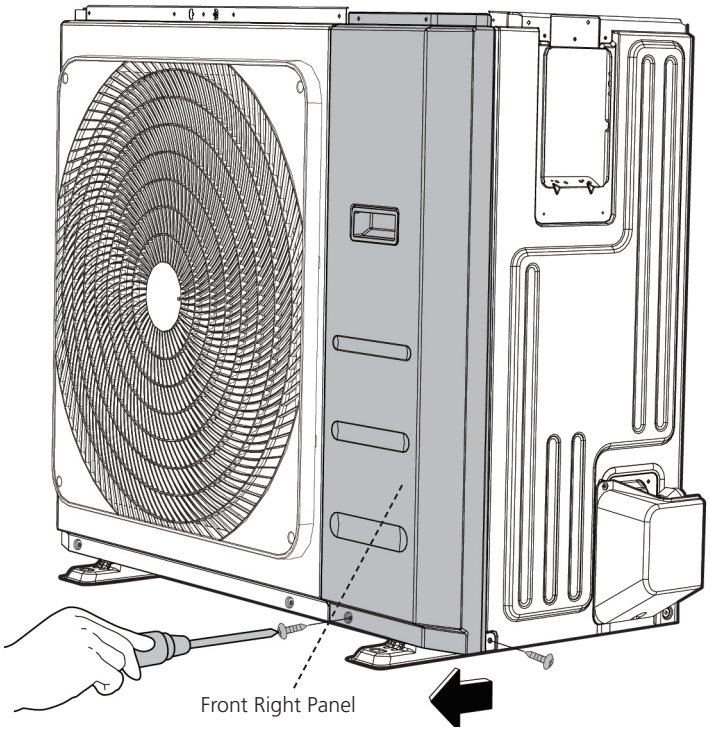
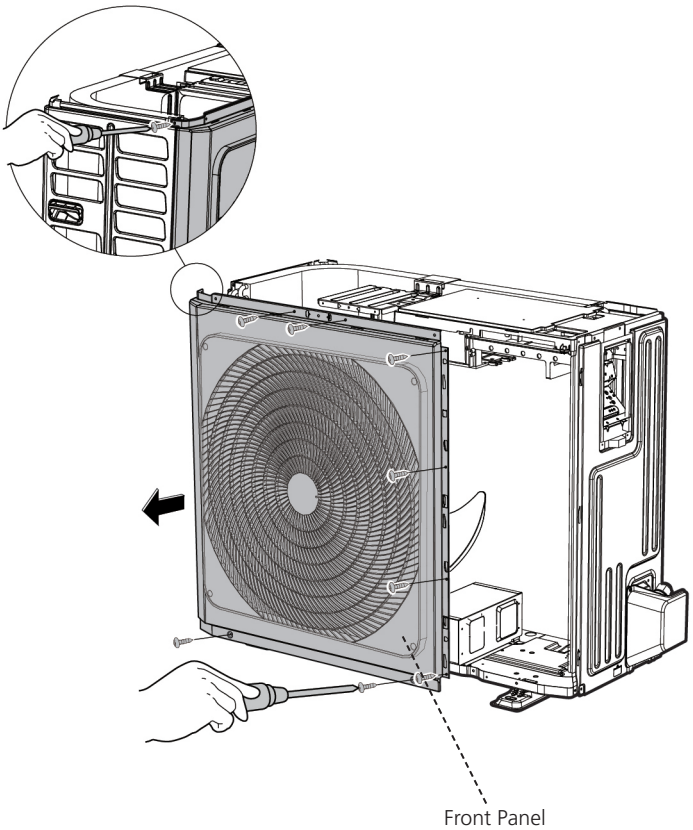
Procedure	Illustration
6) Remove the screws of the right panel and then remove the right panel (6 screws) (see CJ_X430_005).	 **CJ_X430_005**

Note: This section is for reference only. Actual unit appearance may vary.

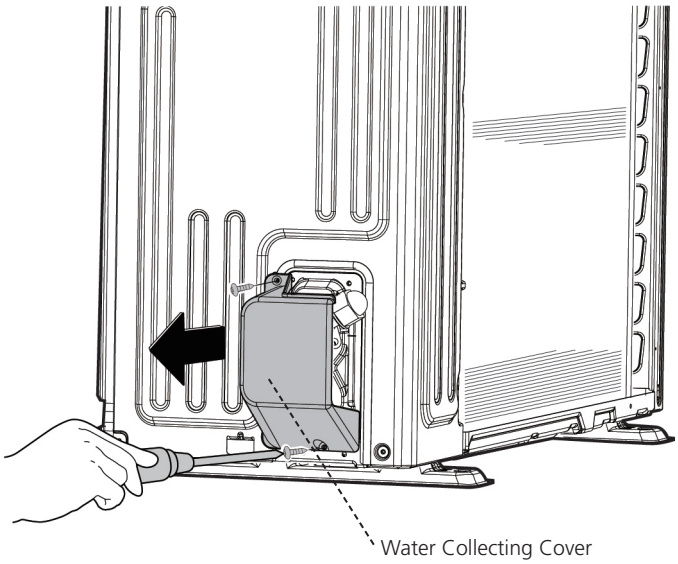
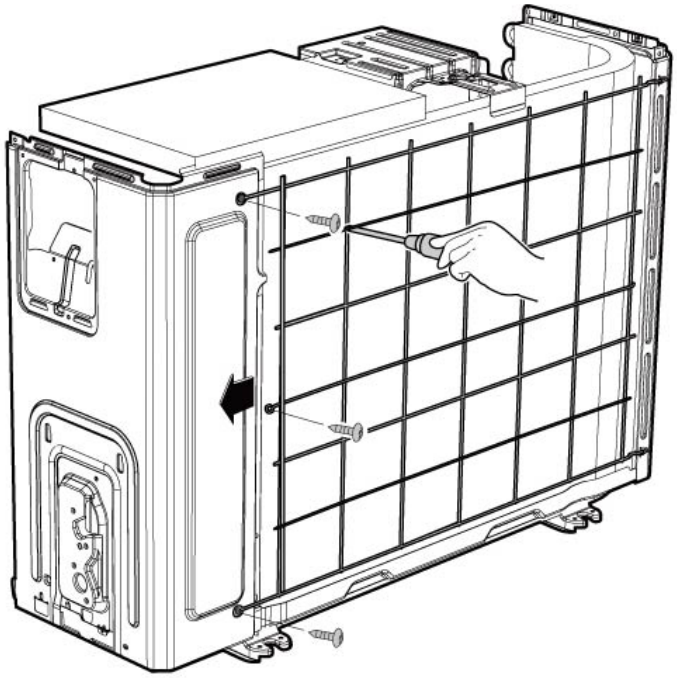
3. D30

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the big handle and then remove the big handle (2 screws) (see CJ_D30_001).	 **CJ_D30_001**
3) Remove the screws of the top cover and then remove the top cover (4 screws). Two of the screws is located underneath the big handle (see CJ_ D30_002).	 **CJ_D30_002**

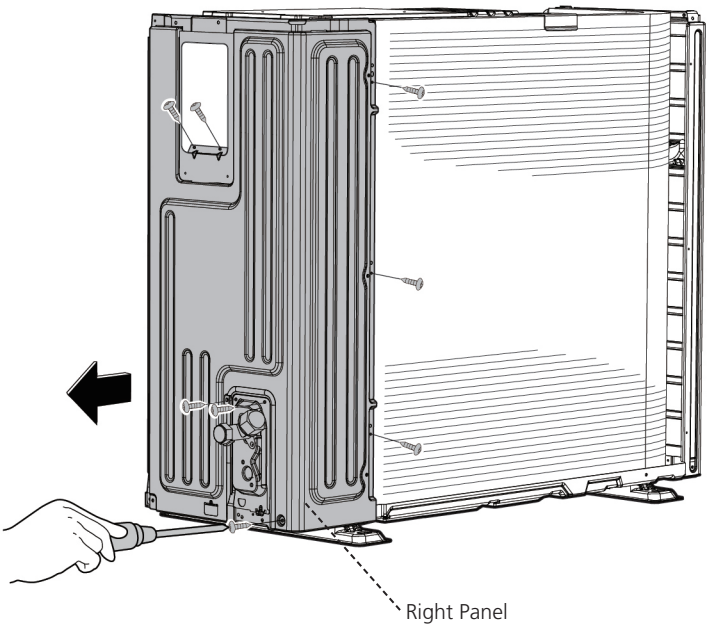
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
4) Remove the screws of the front right panel and then remove the front right panel (2 screws) (see CJ_D30_003).	 CJ_D30_003
5) Remove the screws of the front panel and then remove the front panel (9 screws) (see CJ_D30_004).	 CJ_D30_004

Note: This section is for reference only. Actual unit appearance may vary.

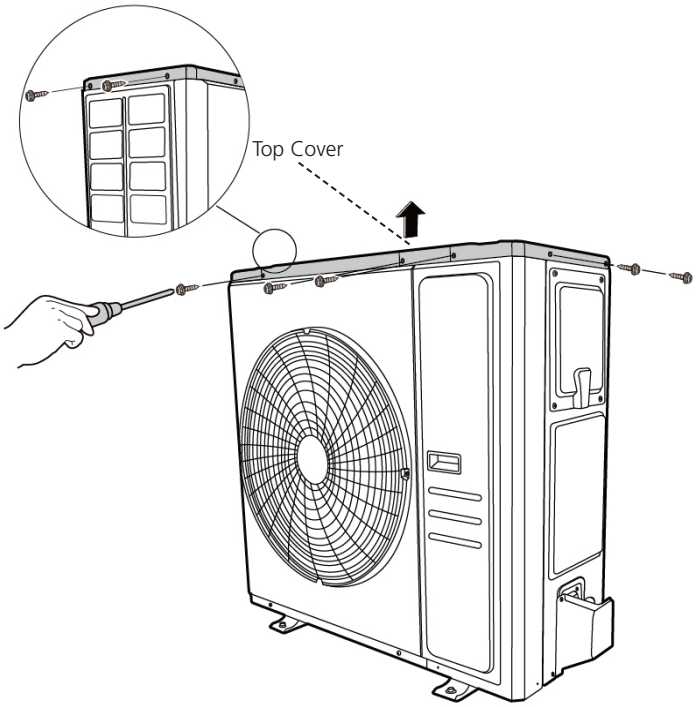
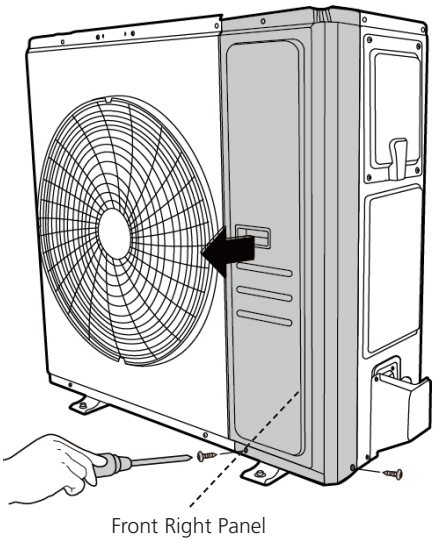
Procedure	Illustration
6) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_D30_005).	 **CJ_D30_005**
7) Remove the screws of the rear net and then remove the rear net (2 screws) (see CJ_D30_006). (for some models)	 **CJ_D30_006**

Note: This section is for reference only. Actual unit appearance may vary.

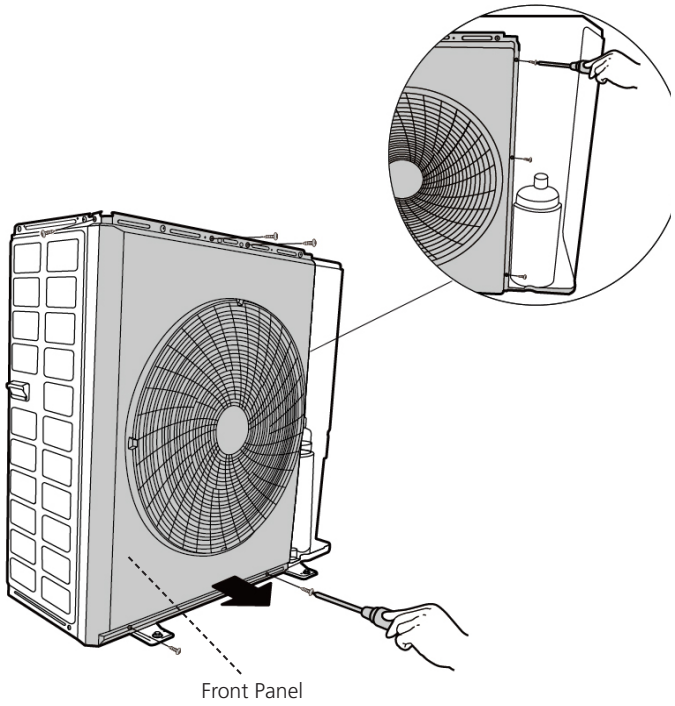
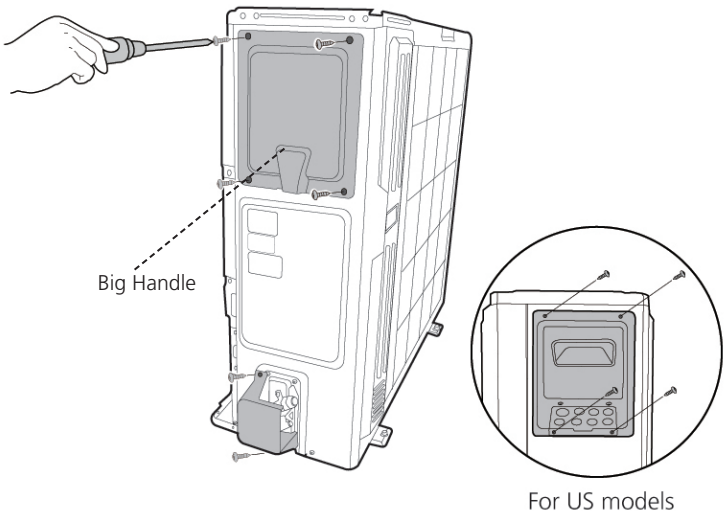
Procedure	Illustration
8) Remove the screws of the right panel and then remove the right panel (8 screws) (see CJ_D30_007).	 CJ_D30_007

Note: This section is for reference only. Actual unit appearance may vary.

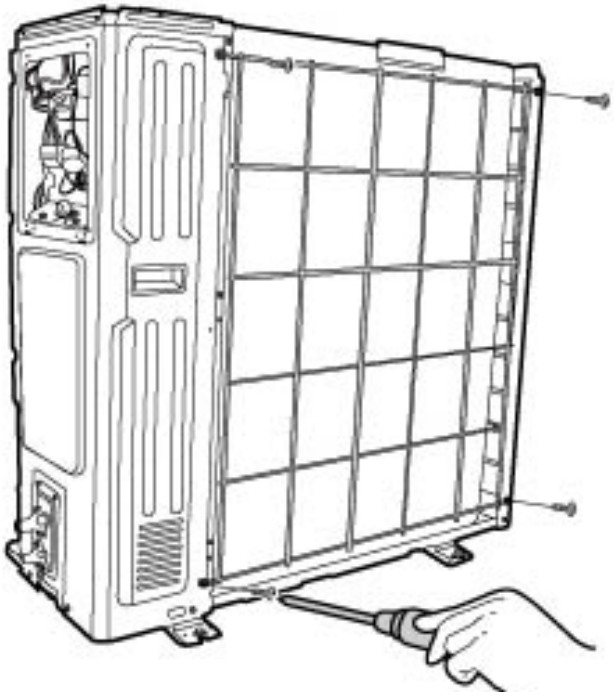
4. X630

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the top cover and then remove the top cover (7 screws). (see CJ_X630_001). 3) Remove the screws of the front right panel and then remove the front right panel (2 screws) (see CJ_X630_002).	 **CJ_X630_001**  **CJ_X630_002**

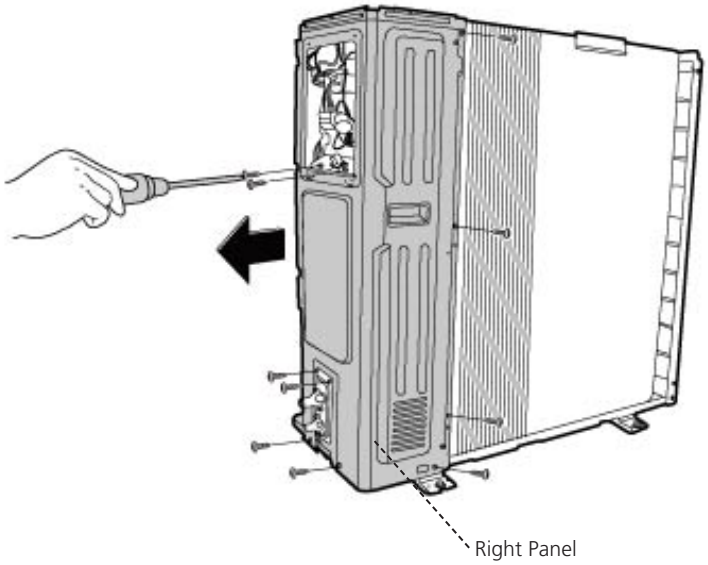
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
4) Remove the screws of the front panel and then remove the front panel (8 screws) (see CJ_X630_003).	 **CJ_X630_003**
5) Remove the screws of the big handle and then remove the big handle (4 screws) (see CJ_X630_004).	 **CJ_X630_004**

Note: This section is for reference only. Actual unit appearance may vary.

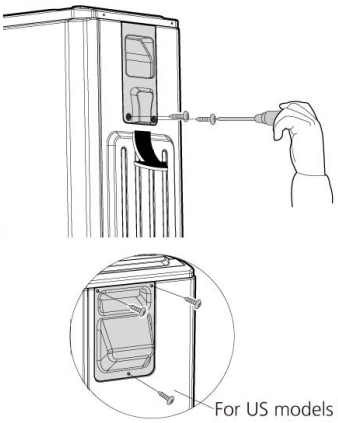
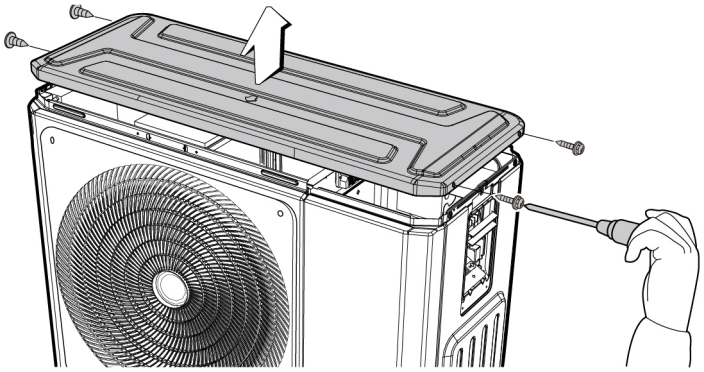
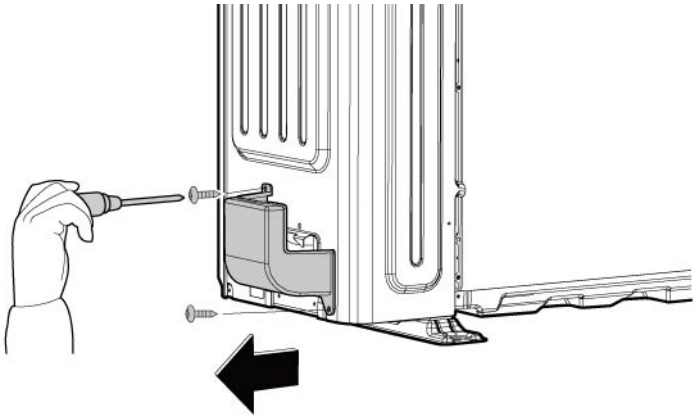
Procedure	Illustration
6) Remove the screws of water collecting cover and then remove the water collecting cover (2 screws) (see CJ_X630_005).	**CJ_X630_005**
7) Remove the screws of the rear net and then remove the rear net (4 screws) (see CJ_X630_006). (for some models)	 **CJ_X630_006**

Note: This section is for reference only. Actual unit appearance may vary.

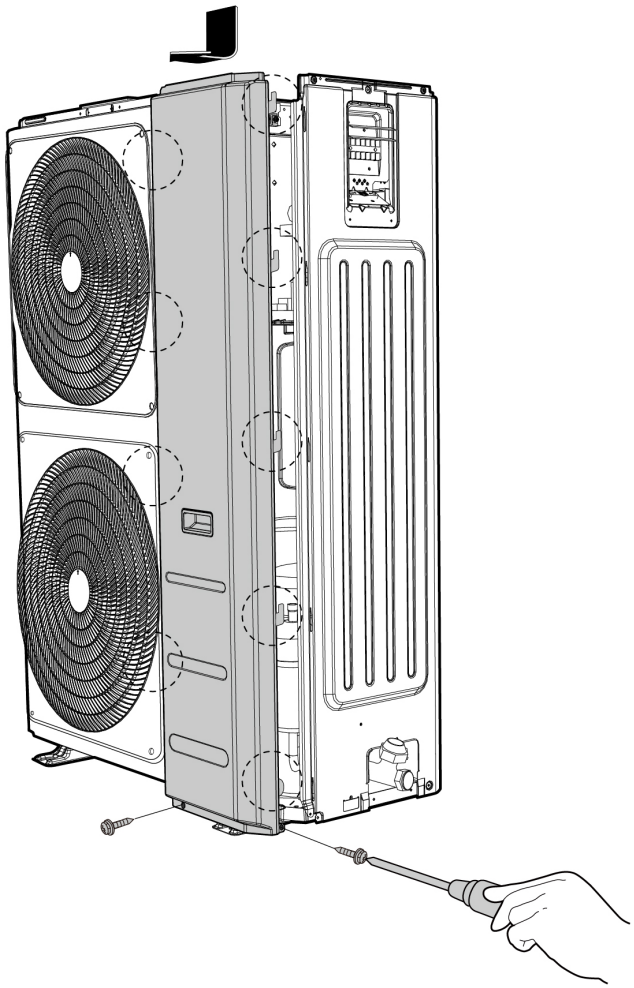
Procedure	Illustration
8) Remove the screws of the right panel and then remove the right panel (10 screws) (see CJ_X630_007).	 CJ_X630_007

Note: This section is for reference only. Actual unit appearance may vary.

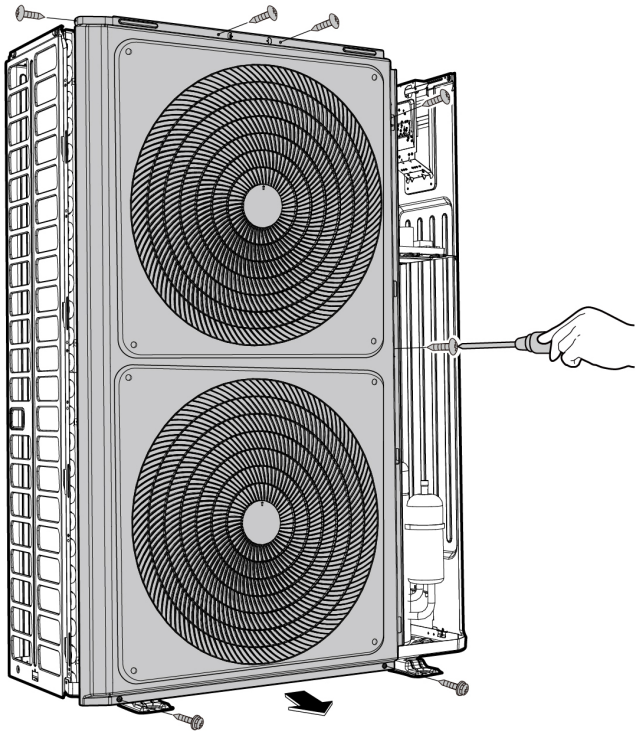
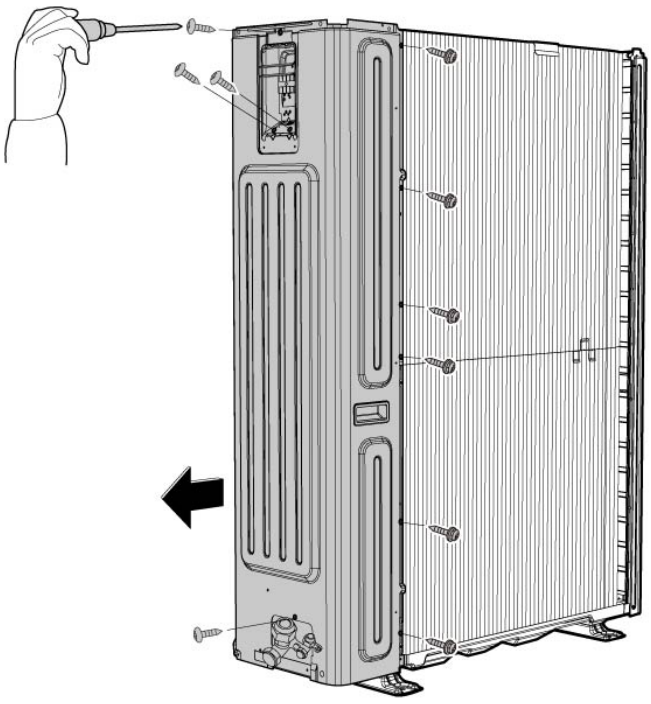
4. E30/590

Procedure	Illustration
1) Turn off the air conditioner and the power breaker. 2) Remove the screws of the big handle and then remove the big handle (2 screws) (see CJ_E30_001).	 **CJ_E30_001**
3) Remove the screws of the top cover and then remove the top cover (4 screws). Two of the screws is located underneath the big handle (see CJ_E30_002).	 **CJ_E30_002**
4) Remove the screws of water collecting cover and then remove the water collecting cover (2 screw) (see CJ_E30_003).	 **CJ_E30_003**

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
1) Remove the screws of the front right panel and then remove the front right panel (2 screws) (see CJ_E30_004).	 CJ_E30_004

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
2) Remove the screws of the front panel and then remove the front panel (7 screws) (see CJ_E30_005).	 CJ_E30_005
3) Remove the screws of the right panel and then remove the right panel (10 screws) (see CJ_E30_006).	 CJ_E30_006

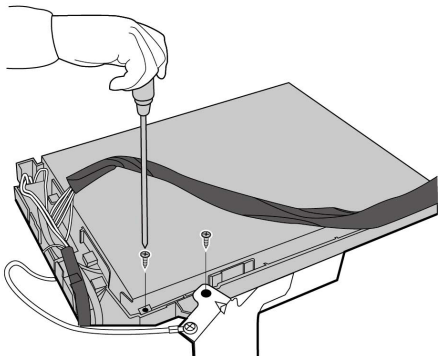
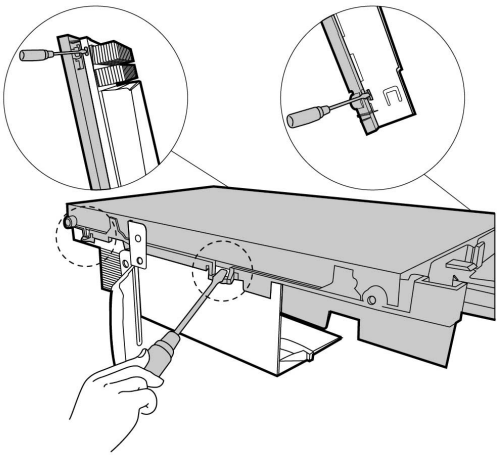
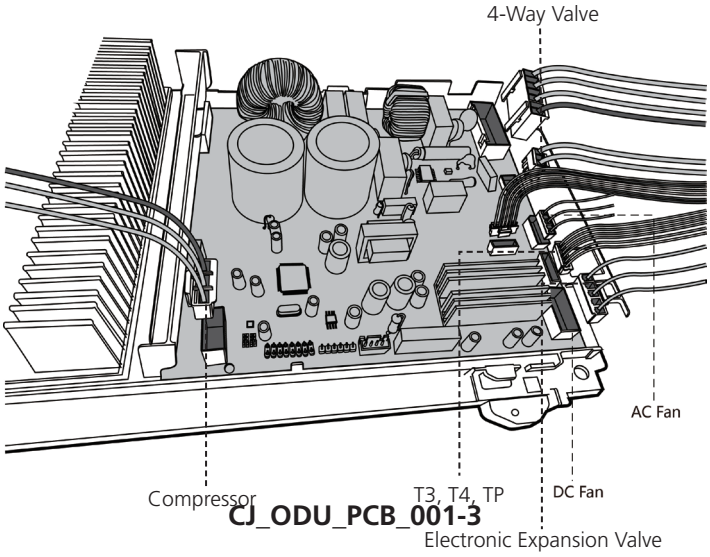
Note: This section is for reference only. Actual unit appearance may vary.

2.2 Electrical parts

WARNING: Antistatic gloves must be worn when you disassemble the electronic box.

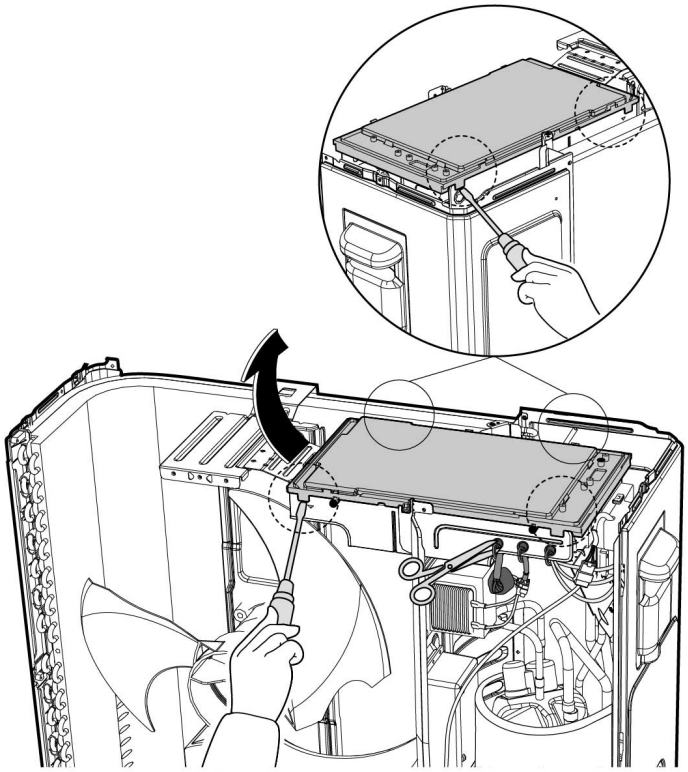
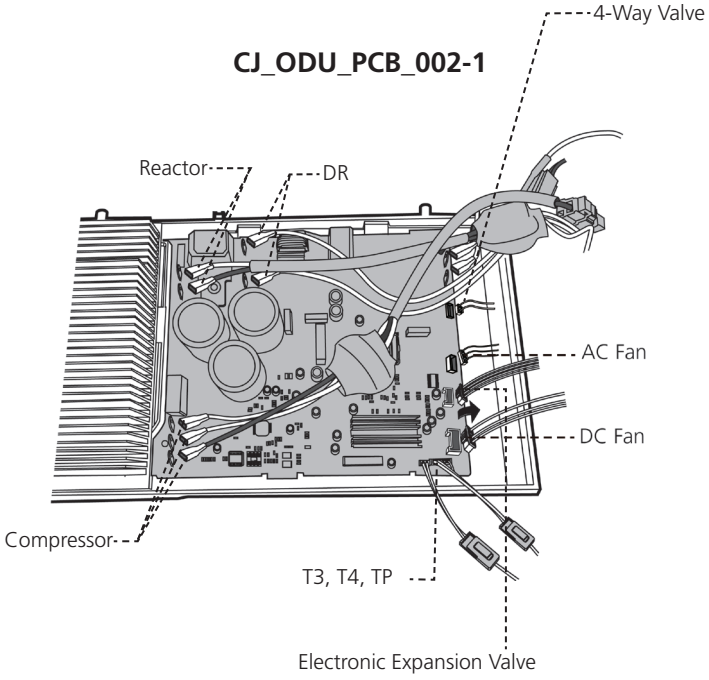
Note: Remove the air outlet grille(refer to 3.1 Panel Plate) before disassembling electrical parts.

1. PCB board 1

Procedure	Illustration
1) Remove the screws of the top cover. (2 screws) (see CJ_ODU_PCB_001-1).	 **CJ_ODU_PCB_001-1**
2) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_001-2).	 **CJ_ODU_PCB_001-2**
3) Disconnect the connector for fan motor from the electronic control board (see CJ_ODU_PCB_001-3). 4) Remove the connector for the compressor (see CJ_ODU_PCB_001-3). 5) Pull out the two blue wires connected with the four way valve (CJ_ODU_PCB_001-3). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (CJ_ODU_PCB_001-3). 7) Disconnect the electronic expansion valve wire (CJ_ODU_PCB_001-3). 8) Then remove the electronic control board.	 **CJ_ODU_PCB_001-3**

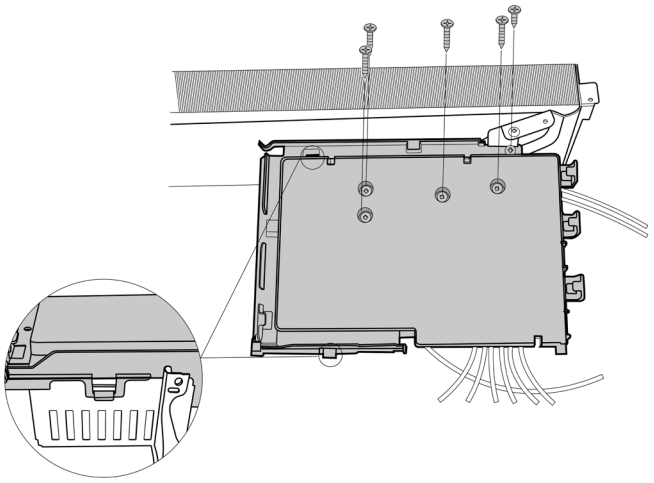
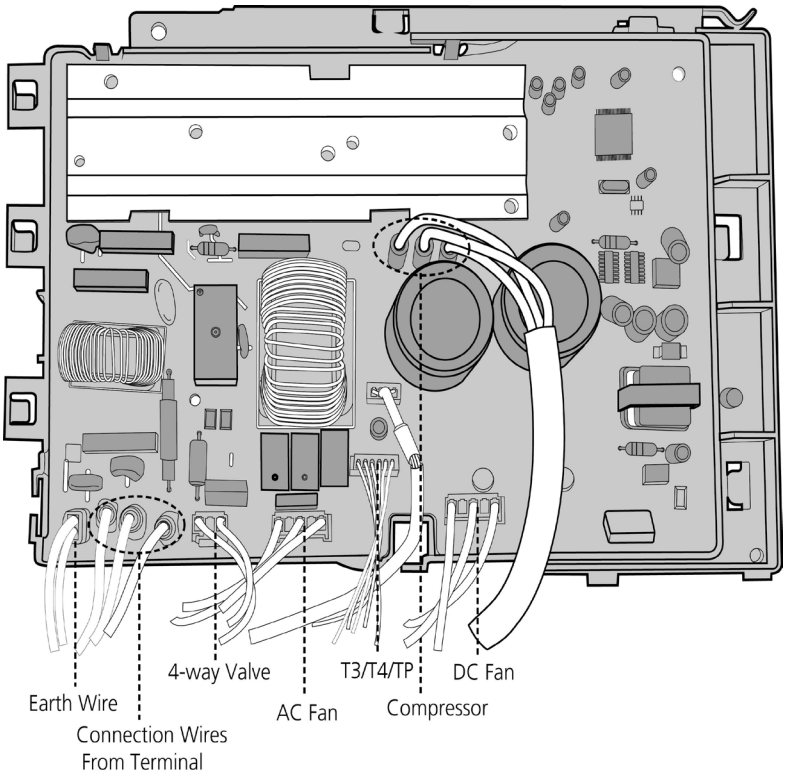
Note: This section is for reference only. Actual unit appearance may vary.

2. PCB board 2

Procedure	Illustration
1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_002-1).	 CJ_ODU_PCB_002-1
2) Disconnect the connector for fan motor from the electronic control board (see CJ_ODU_PCB_002-2). 3) Remove the connector for the compressor (see CJ_ODU_PCB_002-2). 4) Pull out the two blue wires connected with the four way valve (see CJ_ODU_PCB_002-2). 5) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ODU_PCB_002-2). 6) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_PCB_002-2). 7) Then remove the electronic control board.	 CJ_ODU_PCB_002-2

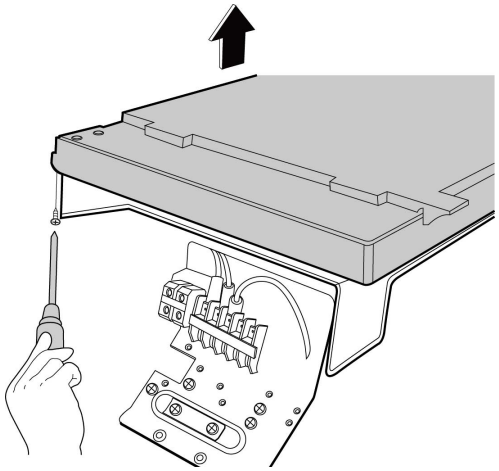
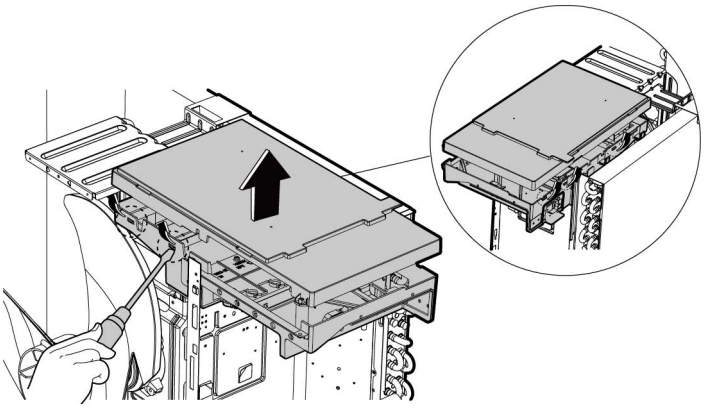
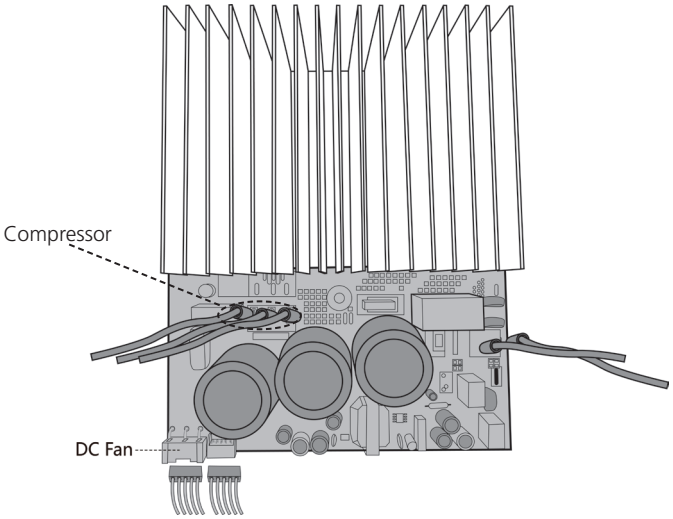
Note: This section is for reference only. Actual unit appearance may vary.

3. PCB board 3

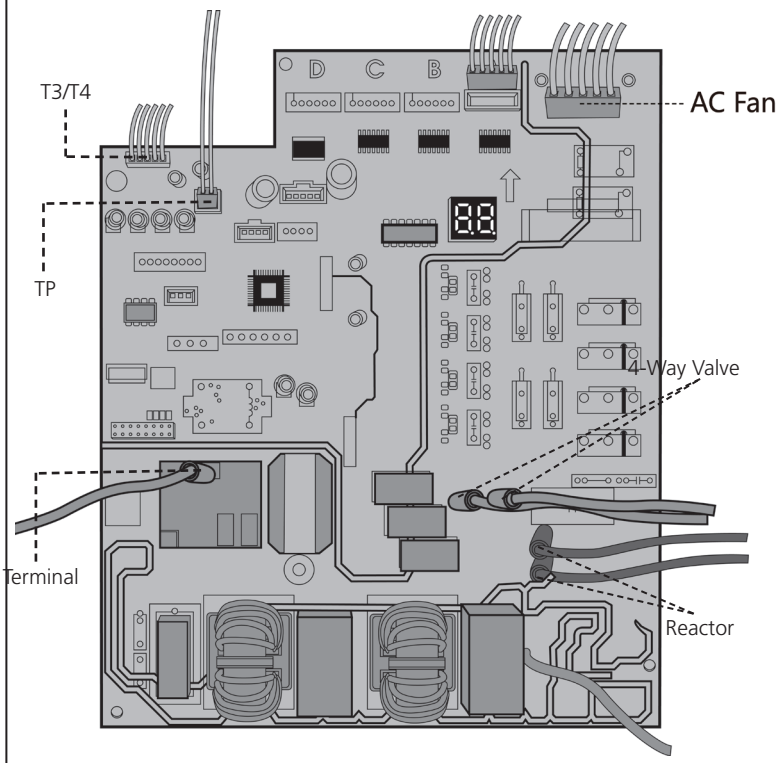
Procedure	Illustration
1) Remove the screws and unfix the hooks, then open the electronic control box cover (5 screws and 2 hooks)(see CJ_ODU_PCB_003-1). Note:Electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	 **CJ_ODU_PCB_003-1**
2) Remove all of connectors (see Fig CJ_ODU_PCB_003-2). 3) Then remove the electronic control box subassembly. Note: When replacing the electronic control box subassembly with a new one, pay attention to applying thermal paste on the heat sink.	 **CJ_ODU_PCB_003-2**

Note: This section is for reference only. Actual unit appearance may vary.

4. PCB board 4

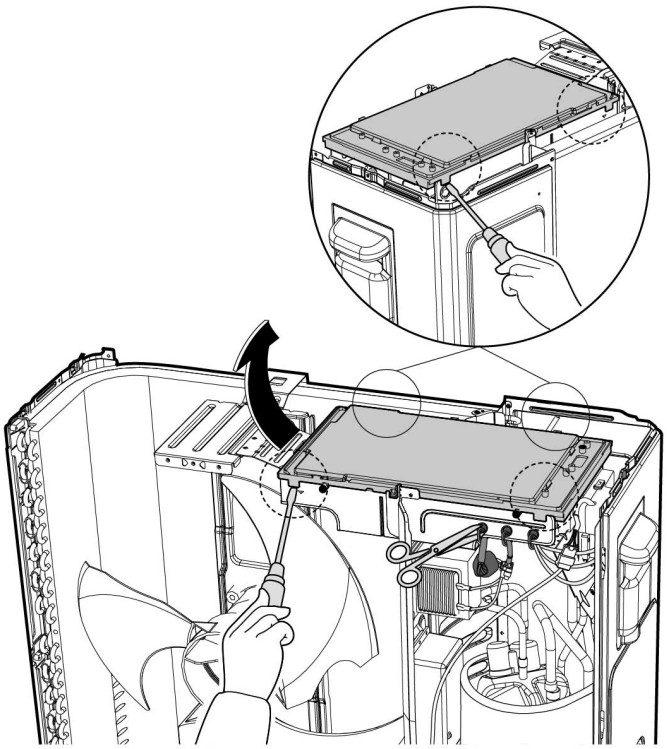
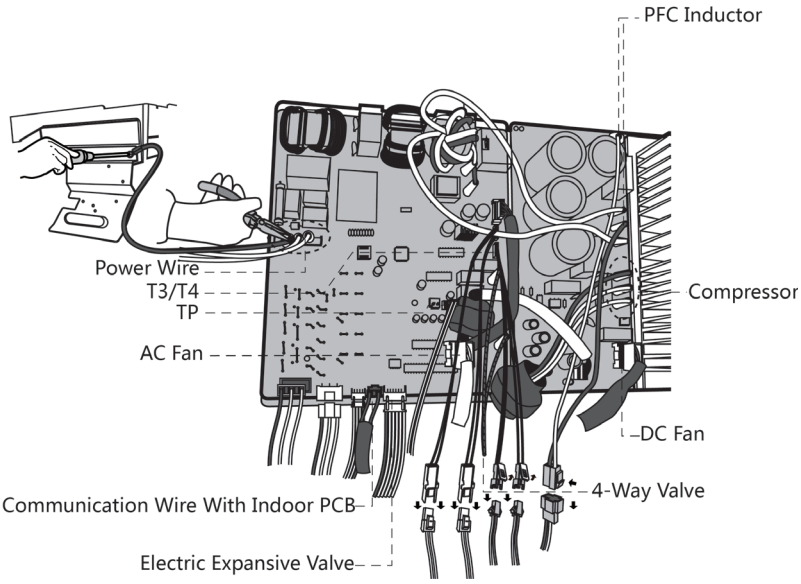
Procedure	Illustration
1) Remove the screws of the top cover. (1 screws) (see CJ_ODU_PCB_004-1).	 CJ_ODU_PCB_004-1
2) Unfix the hooks and then open the electronic control box cover (5 hooks) (see CJ_ODU_PCB_004-2).	 CJ_ODU_PCB_004-2
3) Disconnect the connector for fan motor from the IPM board (see CJ_ODU_PCB_004-3). 4) Remove the connector for the compressor (see CJ_ODU_PCB_004-3).	 CJ_ODU_PCB_004-3

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
5) Pull out the wire connected with the terminal. (see CJ_ODU_PCB_004-4). 6) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ODU_PCB_004-4). 7) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_PCB_004-4). 8) Remove the connector for 4-way valve. (see Fig CJ_ODU_PCB_004-4). 9) Remove the connector for the reactor (see Fig CJ_ODU_PCB_004-4). 10)Then remove the electronic control box (see Fig CJ_ODU_PCB_004-4).	 **CJ_ODU_PCB_004-4**

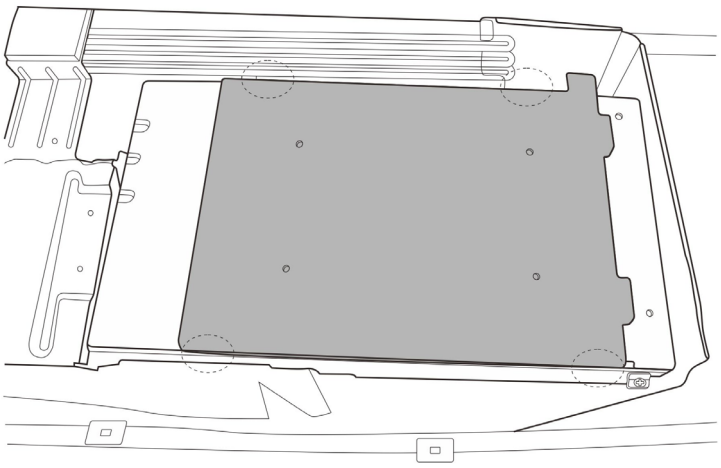
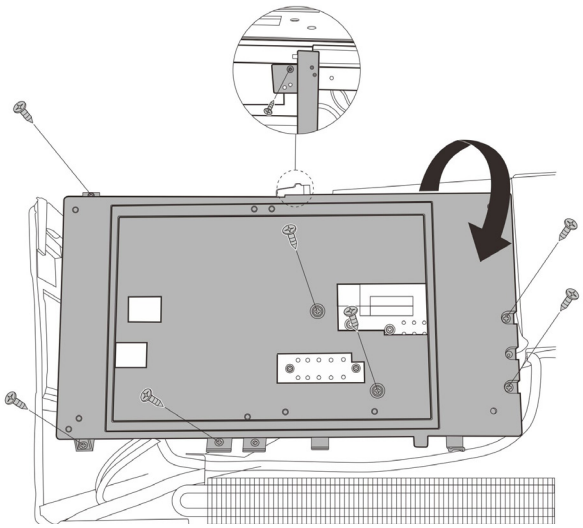
Note: This section is for reference only. Actual unit appearance may vary.

5. PCB board 5

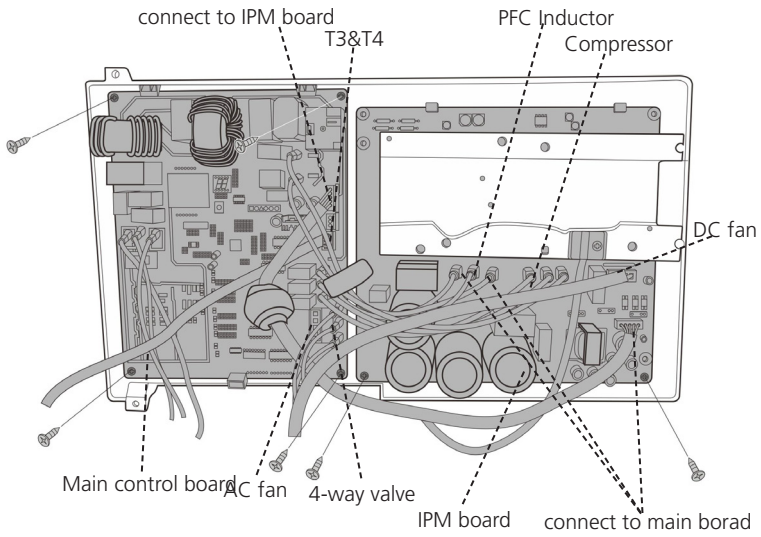
Procedure	Illustration
1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_005-1).	 CJ_ODU_PCB_005-1
2) Disconnect the connector for outdoor DC fan from the electronic control board (see CJ_ODU_ PCB_005-2). 3) Remove the connector for the compressor (see CJ_ODU_PCB_005-2). 4) Pull out the two blue wires connected with the four way valve (see CJ_ODU_PCB_005-2). 5) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP) (see CJ_ ODU_PCB_005-2). 6) Disconnect the electronic expansion valve wire (see Fig CJ_ODU_ PCB_005-2). 7) Disconnect the communication wire indoor PCB (see Fig CJ_ODU_ PCB_005-2). 8) Disconnect the PFC inductor (see Fig CJ_ODU_PCB_005-2). 9) Then remove the electronic control box (see CJ_ODU_PCB_005-2).	 CJ_ODU_PCB_005-2

Note: This section is for reference only. Actual unit appearance may vary.

6. PCB board 6

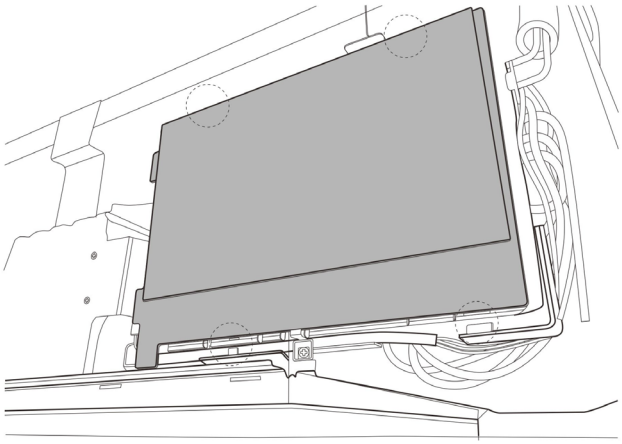
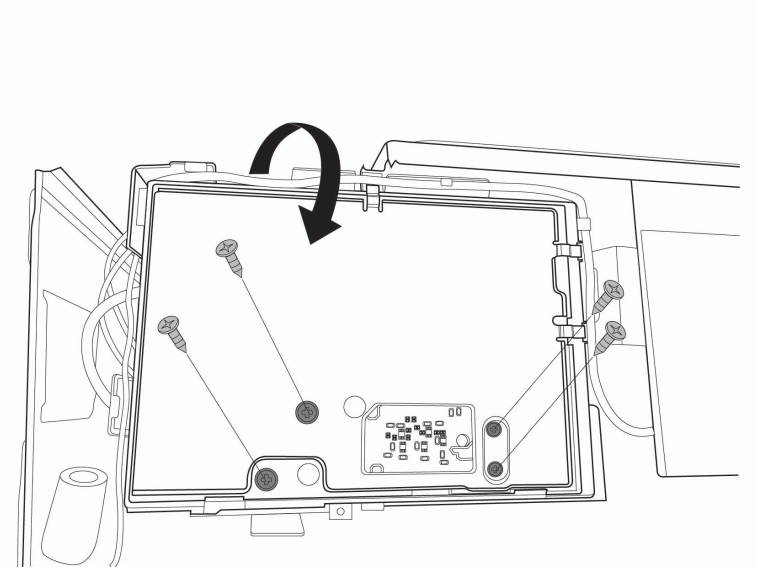
Procedure	Illustration
1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_006-1).	 CJ_ODU_PCB_006-1
2) Remove 8 screws on the electronic control board and then turn over the electronic control board (see CJ_ODU_PCB_006-2). Note:Electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	 CJ_ODU_PCB_006-2

Note: This section is for reference only. Actual unit appearance may vary.

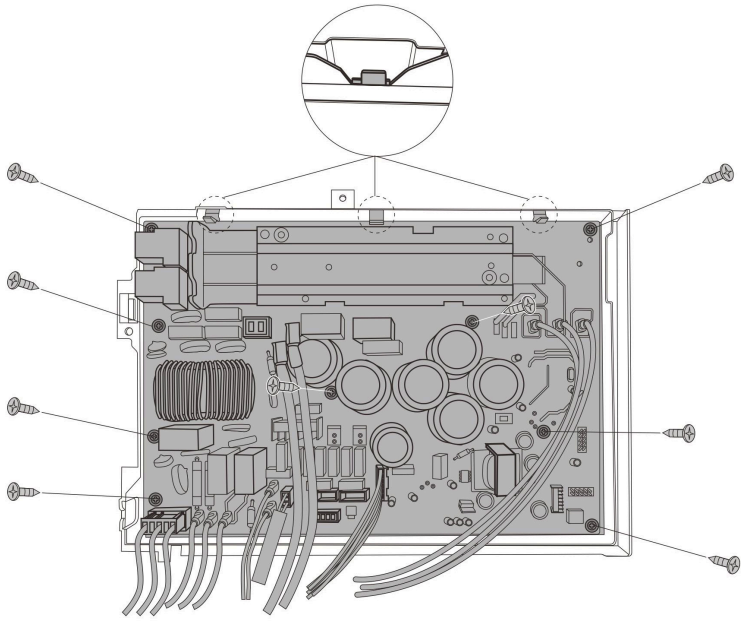
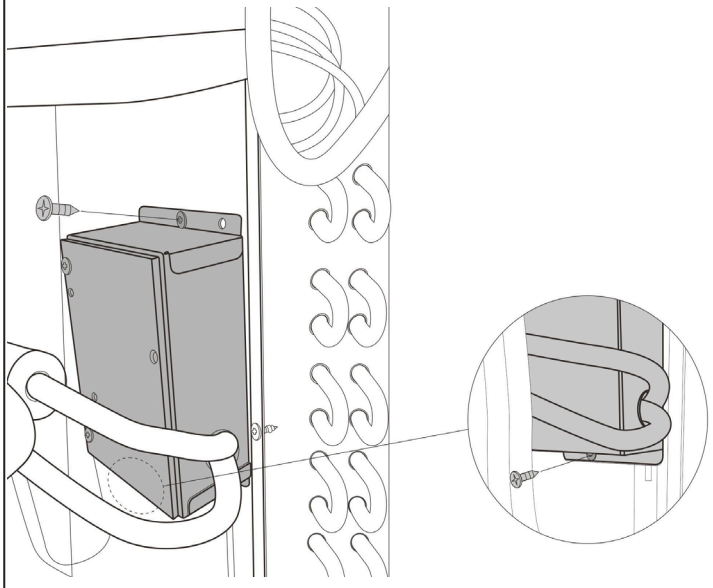
Procedure	Illustration
3) Pull out the two blue wires connected with the four way valve. (see CJ_ODU_PCB_006-3)(for heat pump models) 4) Pull out connectors of the condenser coil temp. sensor(T3),outdoor ambient temp. sensor(T4) and discharge temp. sensor(TP). (see CJ_ODU_PCB_006-3) 5) Disconnect the electronic expansion valve wire. (see Fig CJ_ODU_ PCB_006-3)(for some models) 6) Remove four screws and unfix the 3 hooks and then remove the main control board. (see CJ_ODU_ PCB_006-3) 7) Disconnect the connector for outdoor DC fan from the IPM board. (see CJ_ODU_PCB_006-3)(for some models) 8) Remove the connector for the compressor. (see CJ_ODU_PCB_006-3) 9) Remove the connector for the PFC Inductor. (see CJ_ODU_PCB_006-3) 10)Pull out 3 connectors between IPM board and main control board.(see CJ_ODU_PCB_006-3) 11)Remove two screws and unfix the 4 hooks and then remove the IPM board. (see CJ_ODU_PCB_006-3) Note: When replacing the IPM board with a new one, pay attention to applying thermal paste on the heat sink.	 **CJ_ODU_PCB_006-3**

Note: This section is for reference only. Actual unit appearance may vary.

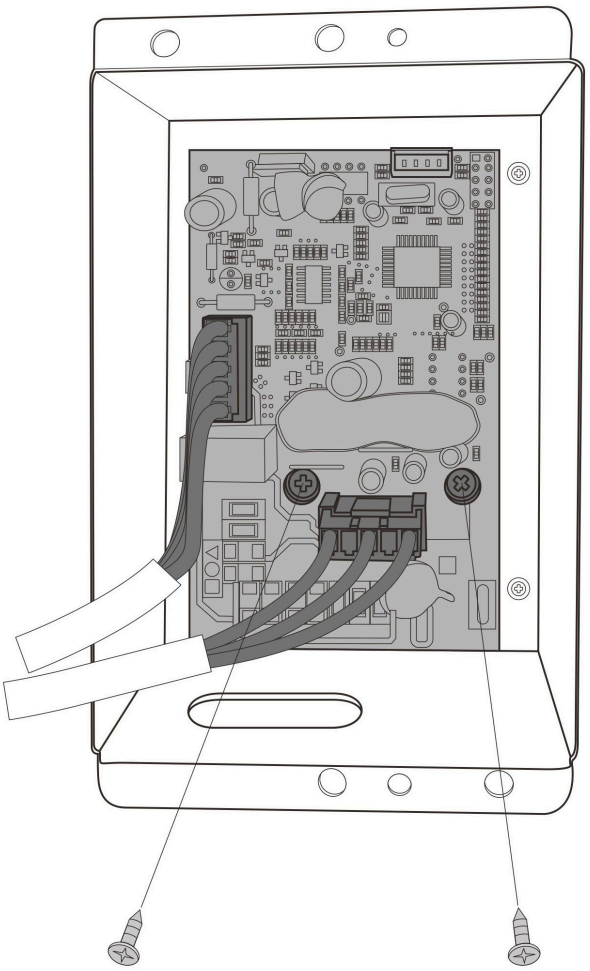
7. PCB board 7

Procedure	Illustration
1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_007-1).	 CJ_ODU_PCB_007-1
2) Remove 4 screws on the electronic control board and then remove the electronic control box subassembly. (see CJ_ODU_PCB_007-2). Note:Electronic installing box cannot be opened, so the voltage between P and N cannot be measured.	 CJ_ODU_PCB_007-2

Note: This section is for reference only. Actual unit appearance may vary.

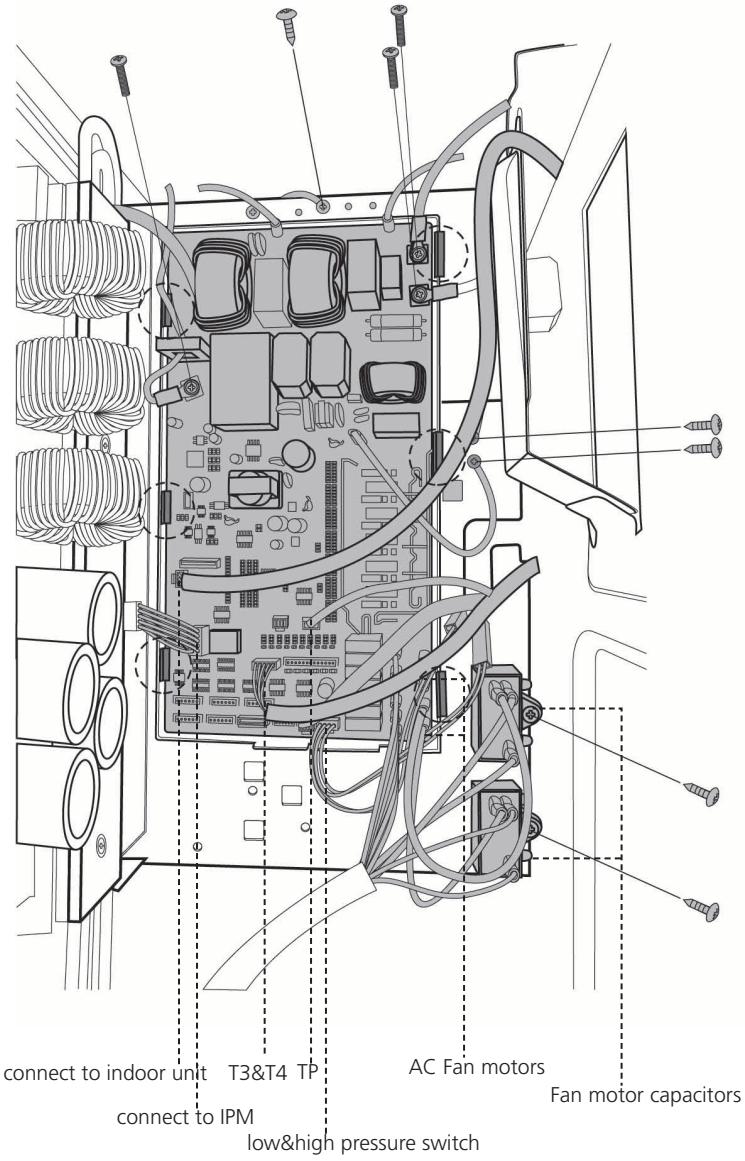
Procedure	Illustration
3) Pull out the connectors (see CJ_ ODU_PCB_007-3). 4) Remove the 9 screws and unfix the 3 hooks and then remove the electronic control board(see CJ_ ODU_PCB_007-3). 5) Remove two screws and then remove the electronic control box subassembly on partition board assembly. (see CJ_ODU_PCB_007-4).	 **CJ_ODU_PCB_007-3**  **CJ_ODU_PCB_007-4**

Note: This section is for reference only. Actual unit appearance may vary.

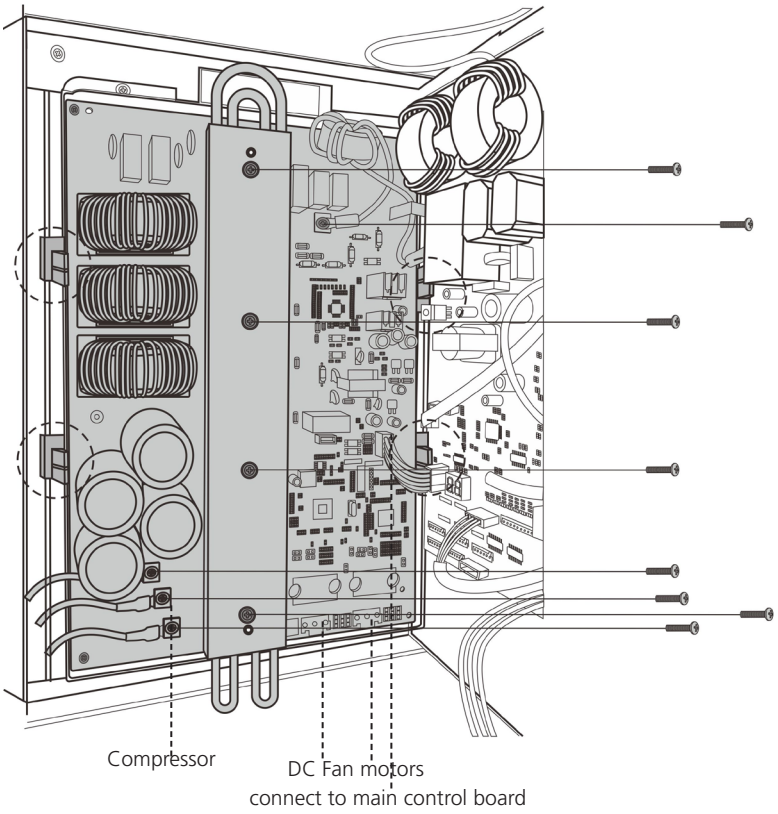
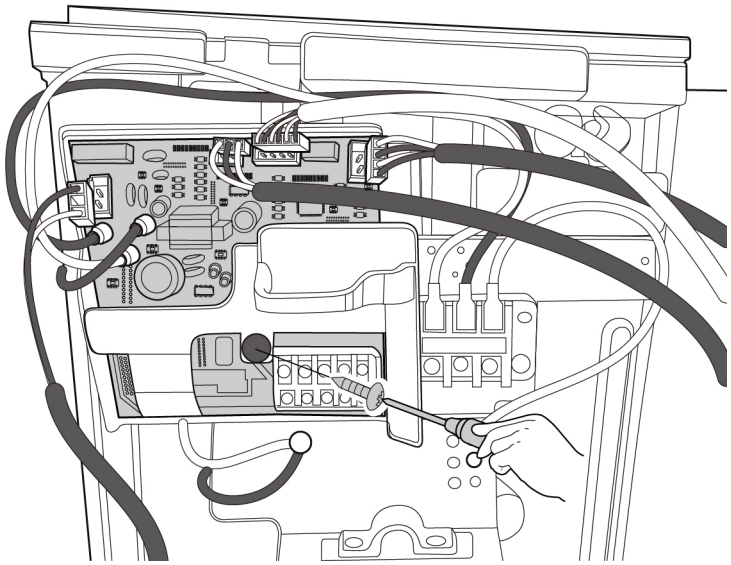
Procedure	Illustration
6) Remove two screws and two connectors and then remove the inverter control board (see CJ_ODU_PCB_007-5).	 CJ_ODU_PCB_007-5

Note: This section is for reference only. Actual unit appearance may vary.

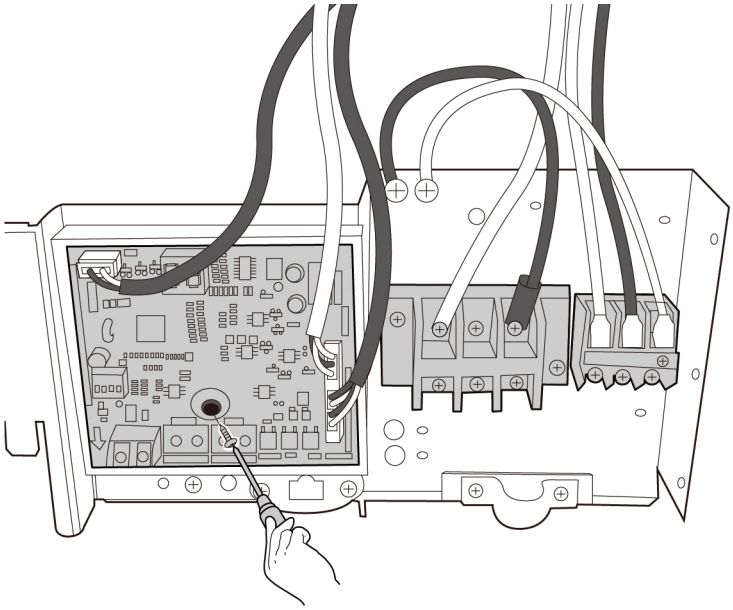
8. PCB board 8

Procedure	Illustration
1) Remove 2 screws to disconnect the power supply wires. (see CJ_ODU_PCB_008-1) 2) Remove 3 screws to disconnect ground wires. (see CJ_ODU_PCB_008-1) 3) Disconnect the wires connected to main control board. (see CJ_ODU_PCB_008-1) 4) Disconnect the wires between main control board and IPM module board. (see CJ_ODU_PCB_008-1) 5) Remove the 4 screws and unfix the 6 hooks and then remove the main control board.(see CJ_ODU_PCB_008-1) 6) Remove 1 screw to remove the fan motor capacitor(1 screw for each capacitor).(see CJ_ODU_PCB_008-1).	 **CJ_ODU_PCB_008-1**

Note: This section is for reference only. Actual unit appearance may vary.

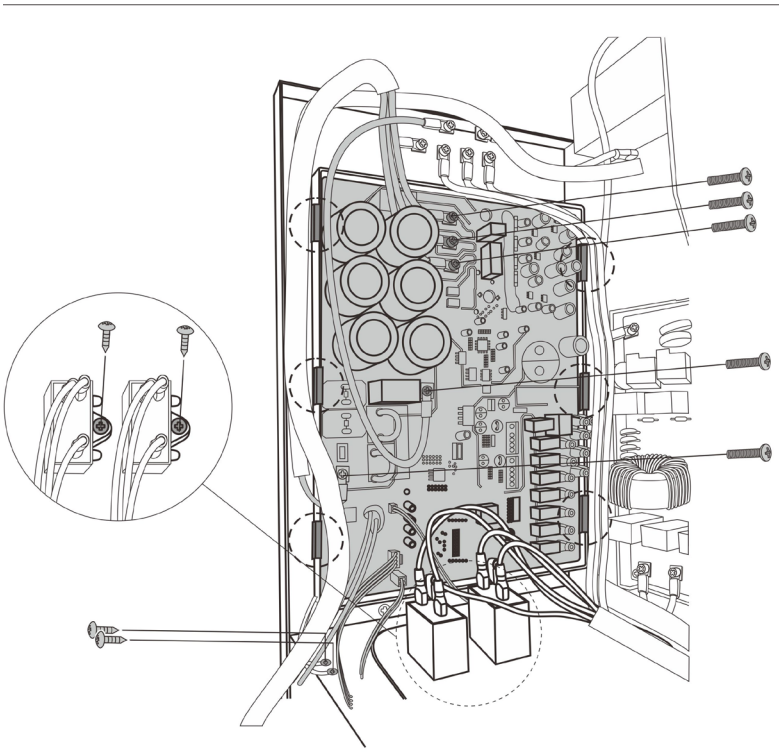
Procedure	Illustration
1) Remove 2 screws to disconnect the power supply wires. (see CJ_ODU_PCB_008-2) 2) Remove 3 screws to disconnect the wires connected to the compressor. (see CJ_ODU_PCB_008-2) 3) Remove 3 screws to remove the radiator.(see CJ_ODU_PCB_008-2) 4) Disconnect the wires between IPM module board and main control board. (see CJ_ODU_PCB_008-2) 5) Remove the 4 screws and unfix the 4 hooks and then remove the IPM moduel board.(see CJ_ODU_PCB_008-2)	 **CJ_ODU_PCB_008-2**
6) Remove the 1 screw and disconnect the wires and then remove the 24V board.(see CJ_ODU_PCB_008-3)(for some models)	 **CJ_ODU_PCB_008-3(for some models)**

Note: This section is for reference only. Actual unit appearance may vary.

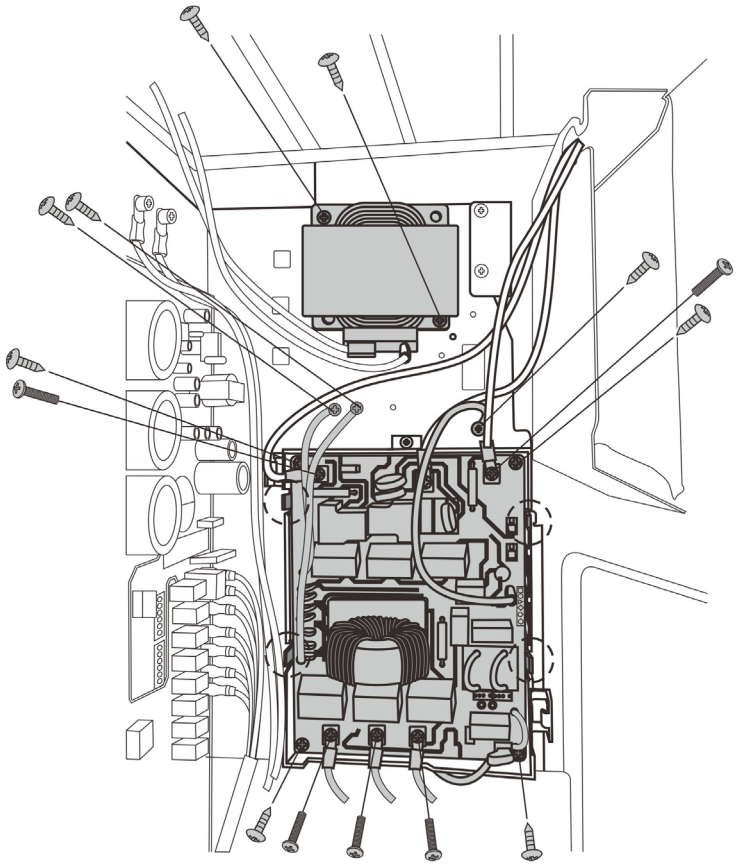
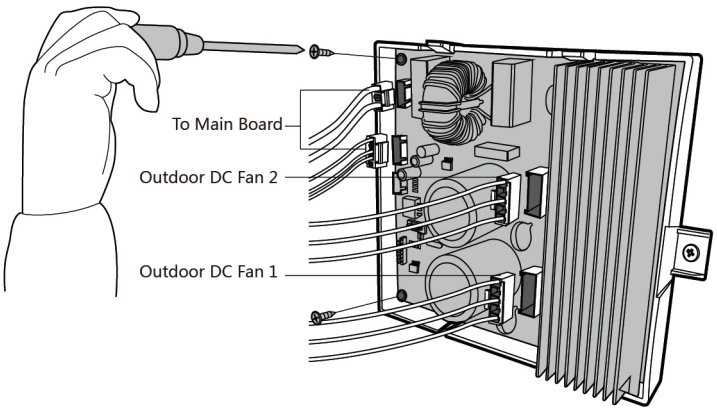
Procedure	Illustration
1) Remove the 1 screw and disconnect the wires and then remove the key board.(see CJ_ODU_PCB_008-4)(for some models)	 CJ_ODU_PCB_008-4(for some models)

Note: This section is for reference only. Actual unit appearance may vary.

9. PCB board 9

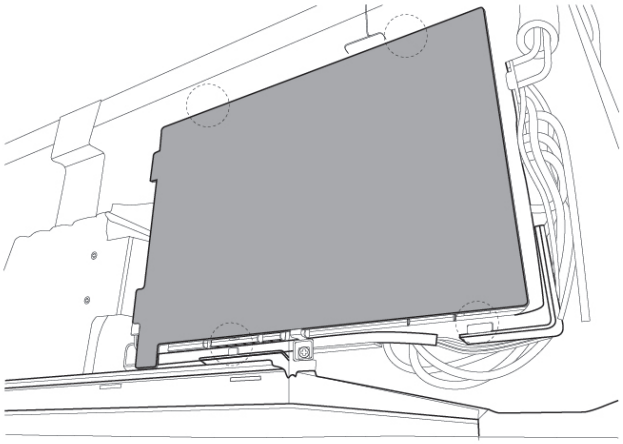
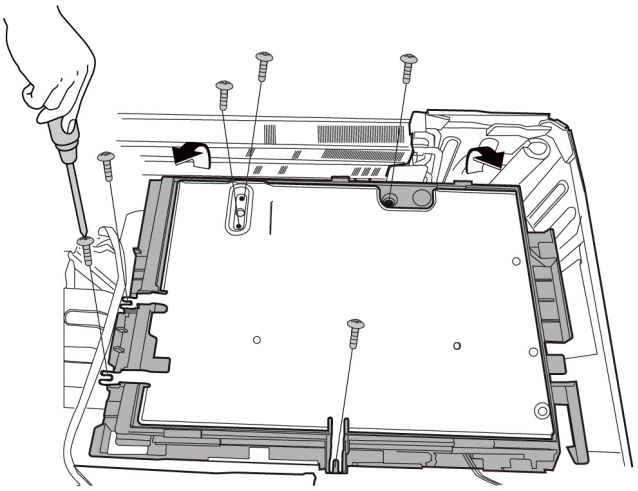
Procedure	Illustration
2) Remove 3 screws to disconnect the wires connected to the compressor. (see CJ_ODU_PCB_009-1) 3) Remove 2 screws to disconnect the power supply wires. (see CJ_ODU_PCB_009-1) 4) Disconnect the wires connected to main control board. (see CJ_ODU_PCB_009-1) 5) Remove the 4 screws and unfix the 6 hooks and then remove the main control board.(see CJ_ODU_PCB_009-1) 6) Remove the screw of the fan capacitor and then remove it (1 screw for each capacitor). (see CJ_ODU_PCB_009-1)	 CJ_ODU_PCB_009-1

Note: This section is for reference only. Actual unit appearance may vary.

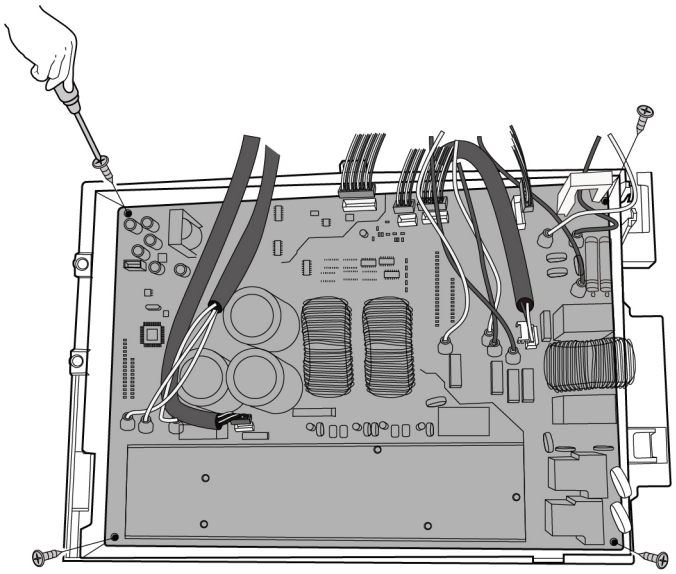
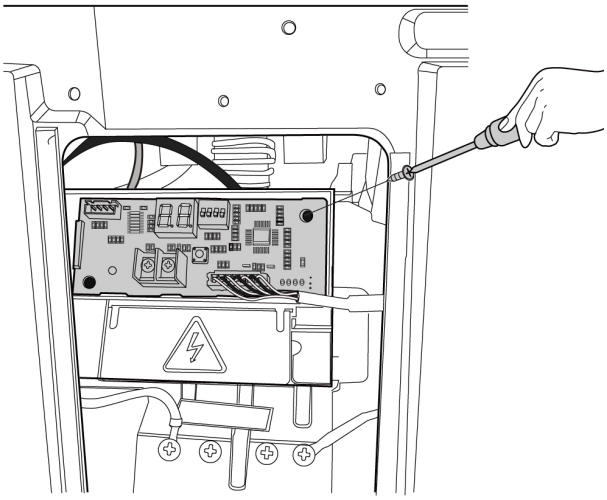
Procedure	Illustration
7) Remove 3 screws to disconnect the power supply wires. (see CJ_ODU_PCB_009-1) 8) Remove 3 screws to disconnect ground wires. (see CJ_ODU_PCB_009-1) 9) Disconnect the wires connected to main control board. (see CJ_ODU_PCB_009-2) 10)Remove the 4 screws and unfix the 4 hooks and then remove the filter board.(see CJ_ODU_PCB_009-2) 11)Remove the 2 screws of the reactor and then remove it . (see CJ_ODU_PCB_009-2)	 **CJ_ODU_PCB_009-2**
12)Disconnect the wires connected to main control board. (see CJ_ODU_PCB_009-3)(for some models) 13)Remove the 2 screws and then remove the DC motor driver board. (see CJ_ODU_PCB_009-3)(for some models)	 **CJ_ODU_PCB_009-3 (for some models)**

Note: This section is for reference only. Actual unit appearance may vary.

10. PCB board 10

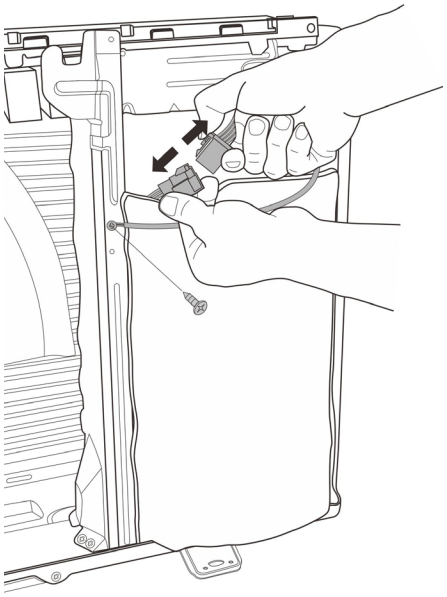
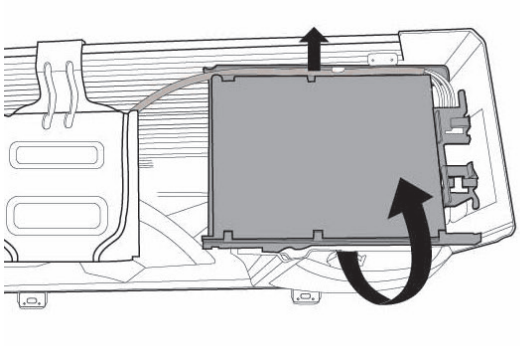
Procedure	Illustration
1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_010-1).	 CJ_ODU_PCB_010-1
2) Remove 6 screws on the electronic control board and then remove the electronic control box subassembly. (see CJ_ODU_PCB_010-2). Note:Electronic installing box cannot be opened, so the voltage between P and N cannot be measured.	 CJ_ODU_PCB_010-2

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
3) Pull out the connectors (see CJ_ ODU_PCB_010-3). 4) Remove the 4 screws and then remove the electronic control board(see CJ_ODU_PCB_010-3). Note: When replacing the main control board with a new one, pay attention to applying thermal paste on the heat sink.	 **CJ_ODU_PCB_010-3**
5) Pull out the connector, remove one screw and then remove the key board subassembly on terminal board. (see CJ_ODU_PCB_010-4) (for some models).	 **CJ_ODU_PCB_010-4**

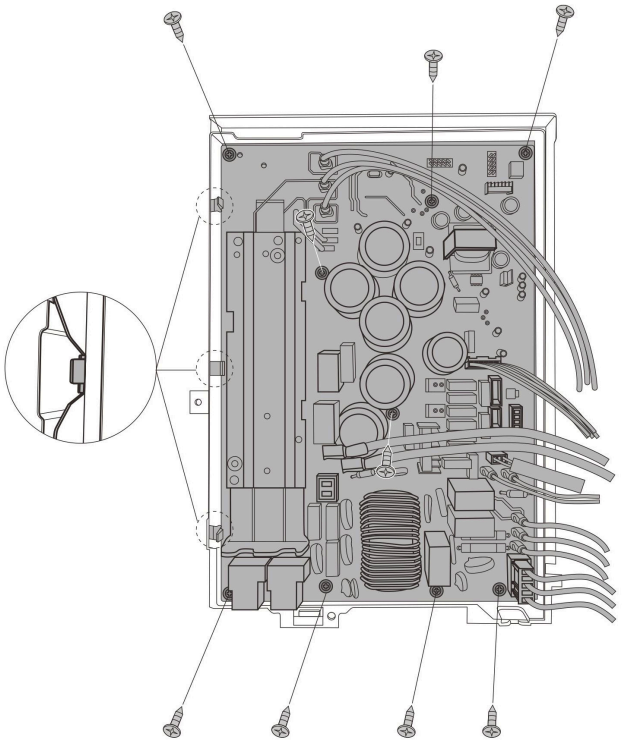
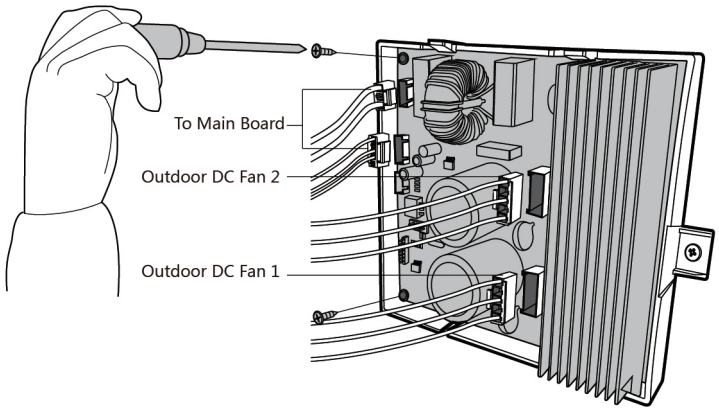
Note: This section is for reference only. Actual unit appearance may vary.

11. PCB board 11

Procedure	Illustration
1) Disconnect the connector for compressor and release the ground wire(1 screw). (see CJ_ODU_PCB_011-1). 2) Remove the electronic control box subassembly. (see CJ_ODU_PCB_011-2). Note:Electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	 **CJ_ODU_PCB_011-1**  **CJ_ODU_PCB_011-2**

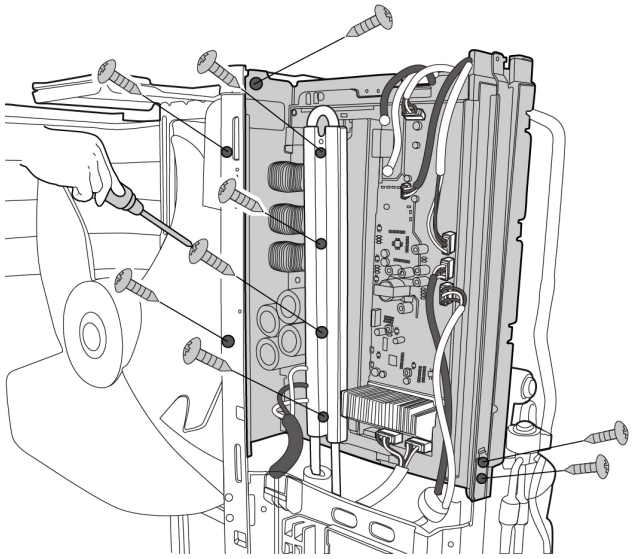
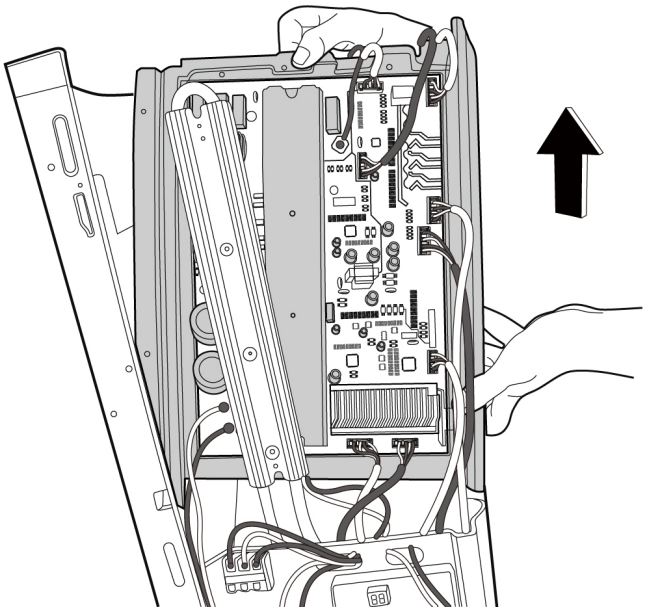
Note: This section is for reference only. Actual unit appearance may vary.

12. PCB board 12

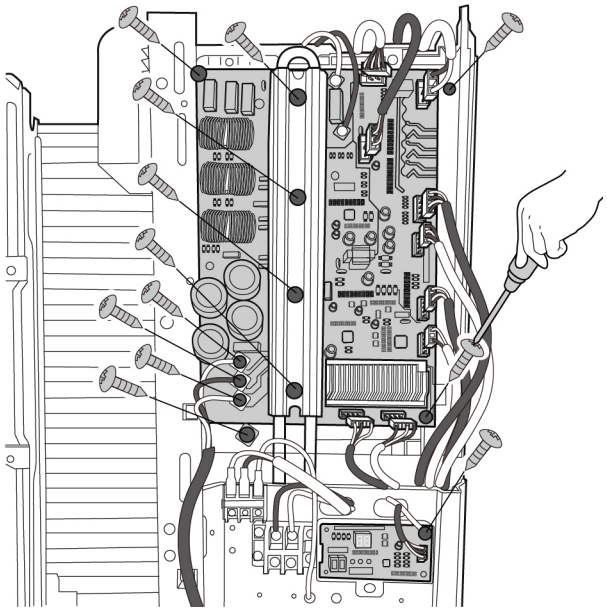
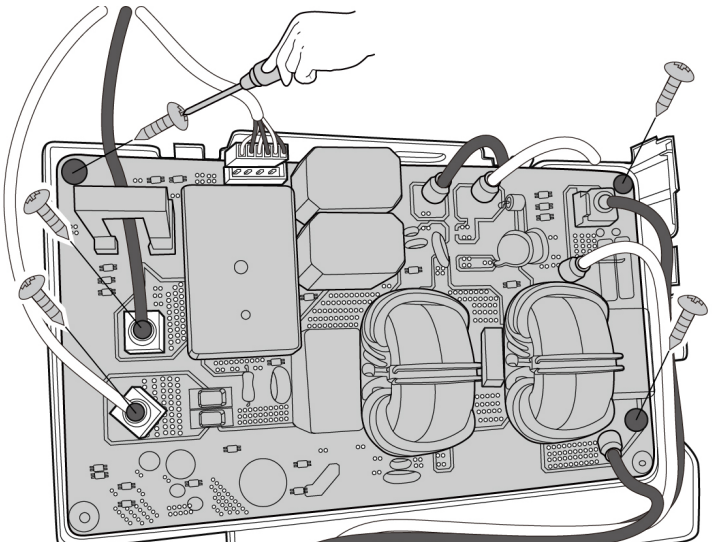
Procedure	Illustration
1) Pull out the connectors (see CJ_ ODU_PCB_012-1). 2) Remove the 9 screws and unfix the 3 hooks and then remove the electronic control board(see CJ_ ODU_PCB_012-2).	 **CJ_ODU_PCB_012-1**
3) Disconnect the wires connected to main control board. (see CJ_ODU_ PCB_012-2)(for some models) 4) Remove the 2 screws and then remove the DC motor driver board. (see CJ_ODU_PCB_012-2)(for some models)	 **CJ_ODU_PCB_012-2 (for some models)**

Note: This section is for reference only. Actual unit appearance may vary.

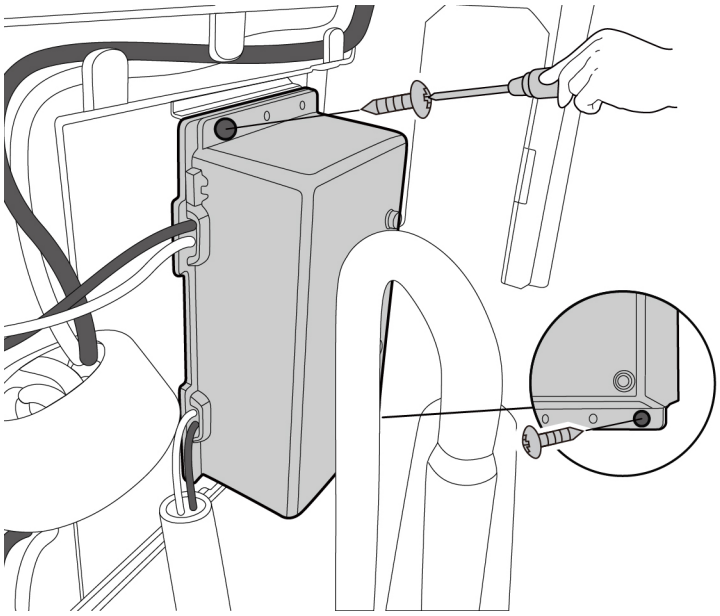
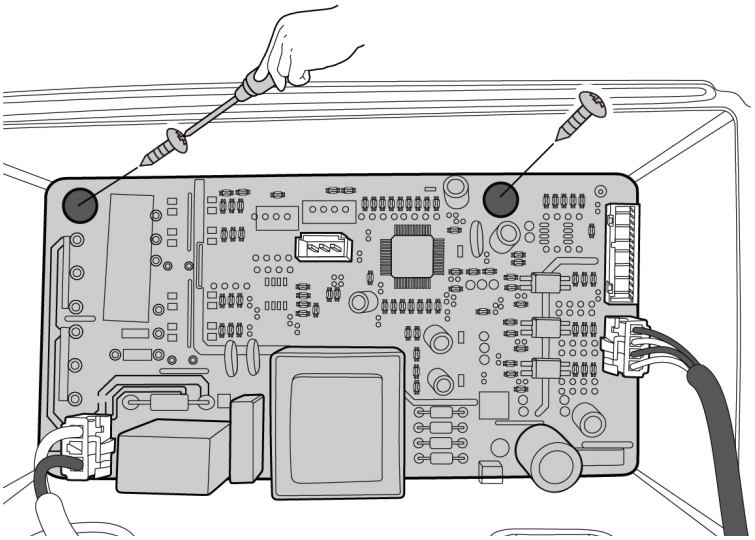
13. PCB board 13

Procedure	Illustration
1) Remove 4 screws unfix the radiator. (see CJ_ODU_PCB_013-1) 2) Remove 3 screws unfix the electronic control box assembly and partition board. (see CJ_ODU_PCB_013-1) 3) Remove 2 screws unfix the electronic control box assembly and terminal board subassembly. (see CJ_ODU_PCB_013-1)	 CJ_ODU_PCB_013-1
4) Move upward and slowly remove the electronic control box assembly. (CJ_ODU_PCB_013-2) (If you want to repair the electrical control box components, perform the steps 1 to 4;If you want to repair the main control board assembly, perform steps 5 to 7 below.)	 CJ_ODU_PCB_013-2

Note: This section is for reference only. Actual unit appearance may vary.

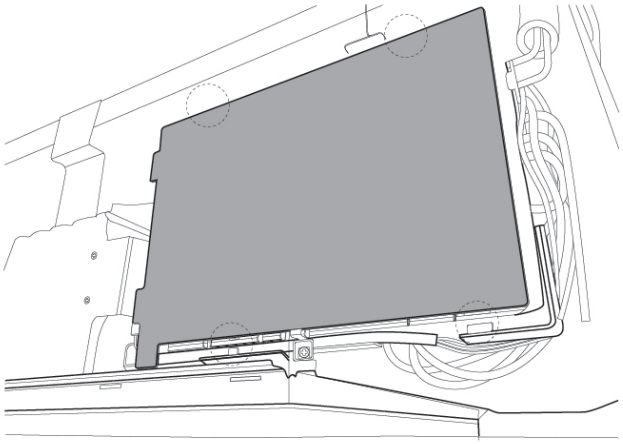
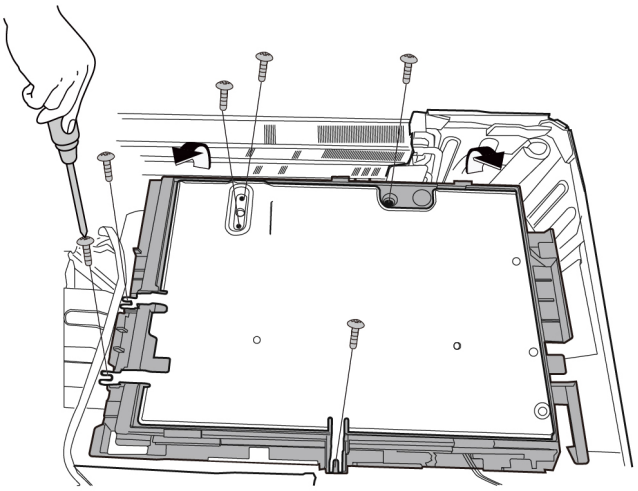
Procedure	Illustration
5) Disconnect the wires connected to main control board. (see CJ_ODU_PCB_013-3) 6) Remove the 4 screws and then remove the main control board.(see CJ_ODU_PCB_013-3) 7) Remove 1 screw to remove the key board .(see CJ_ODU_PCB_013-3).	 **CJ_ODU_PCB_013-3**
8) Disconnect the wires between filter board and main control board. (see CJ_ODU_PCB_013-4) 9) Remove the 3 screws and then remove the filter board.(see CJ_ODU_PCB_013-4) (Filter board is on the back of the electronic control box assembly)	 **CJ_ODU_PCB_013-4**

Note: This section is for reference only. Actual unit appearance may vary.

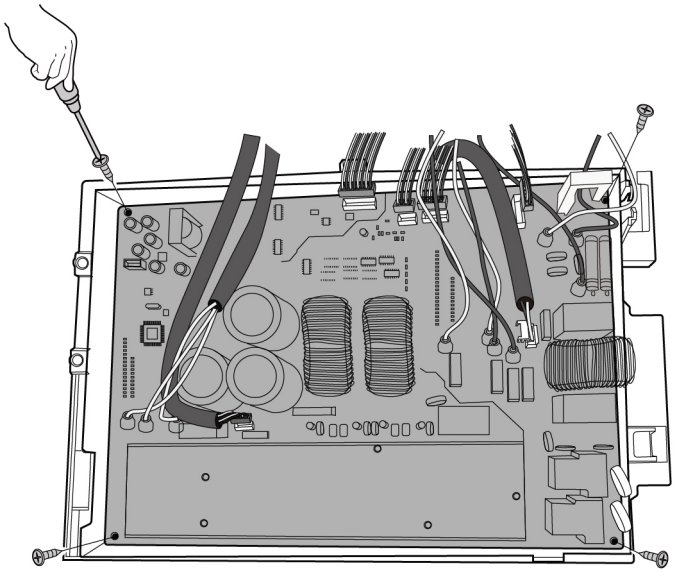
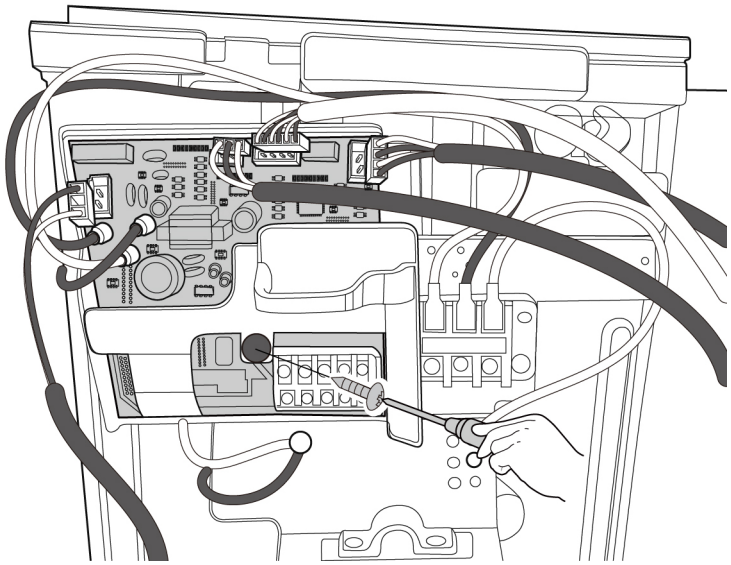
Procedure	Illustration
10)Remove the 2 screws and then remove the DR module box subassembly.(see CJ_ODU_PCB_013-5)(DR module box subassembly is on the back of the electronic control box assembly)(for some models)	 **CJ_ODU_PCB_013-5(for some models)**
11)Remove the 2 screws and then remove the DR module board.(see CJ_ODU_PCB_013-6)(for some models)	 **CJ_ODU_PCB_013-6(for some models)**

Note: This section is for reference only. Actual unit appearance may vary.

14. PCB board 14

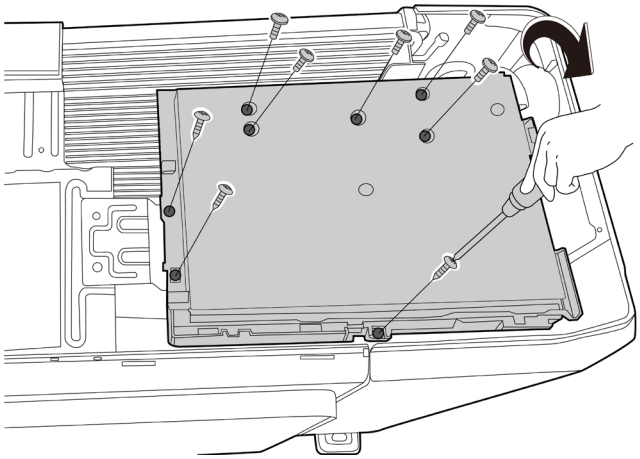
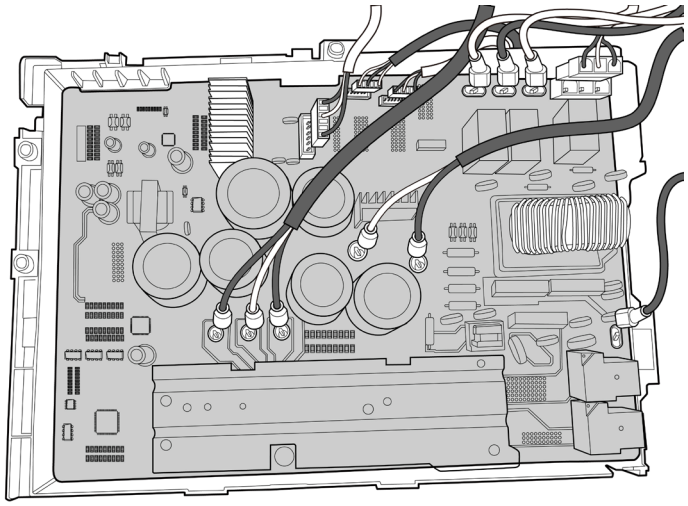
Procedure	Illustration
1) Unfix the hooks and then open the electronic control box cover (4 hooks) (see CJ_ODU_PCB_014-1).	 CJ_ODU_PCB_014-1
2) Remove 6 screws on the electronic control board and then remove the electronic control box subassembly. (see CJ_ODU_PCB_014-2). Note:Electronic installing box cannot be opened, so the voltage between P and N cannot be measured.	 CJ_ODU_PCB_014-2

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
3) Pull out the connectors (see CJ_ ODU_PCB_014-3). 4) Remove the 4 screws and then remove the electronic control board(see CJ_ODU_PCB_041-3). Note: When replacing the main control board with a new one, pay attention to applying thermal paste on the heat sink.	 **CJ_ODU_PCB_014-3**
5) Remove the 1 screw and disconnect the wires and then remove the 24V board.(see CJ_ODU_PCB_014-4)(for some models)	 **CJ_ODU_PCB_014-4(for some models)**

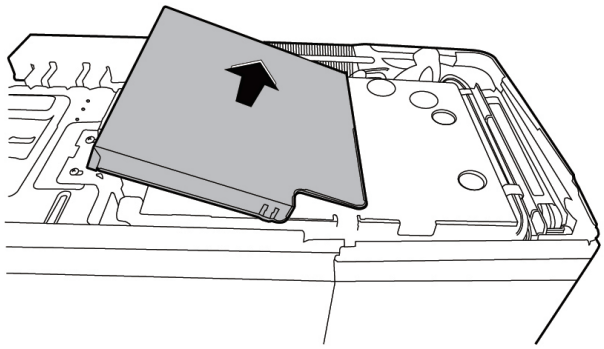
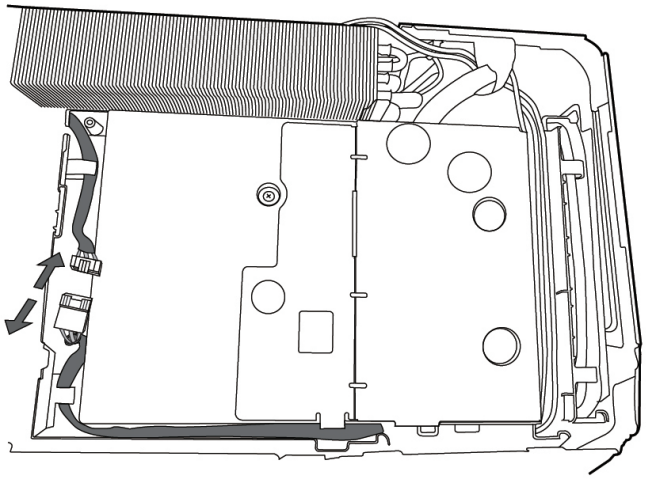
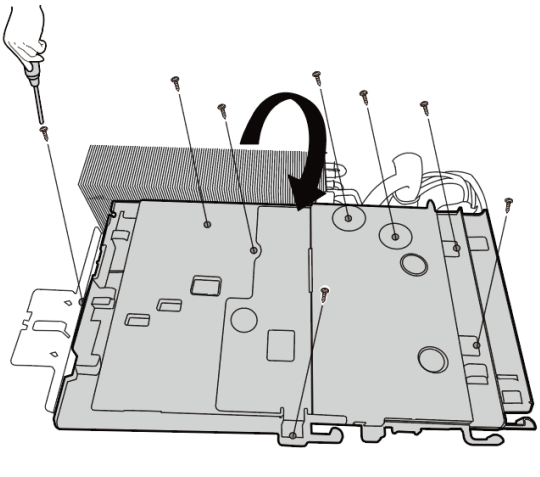
Note: This section is for reference only. Actual unit appearance may vary.

15. PCB board 15

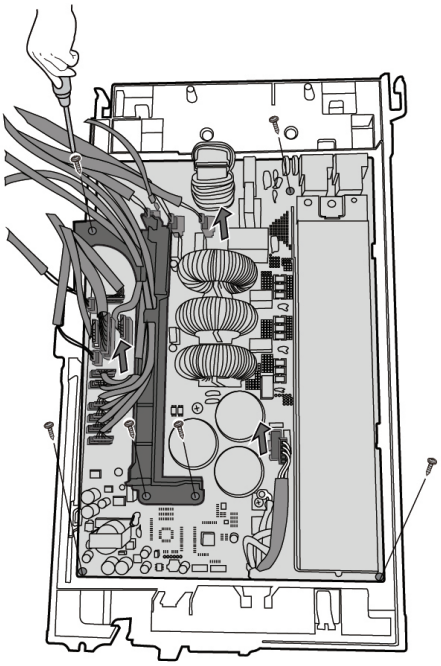
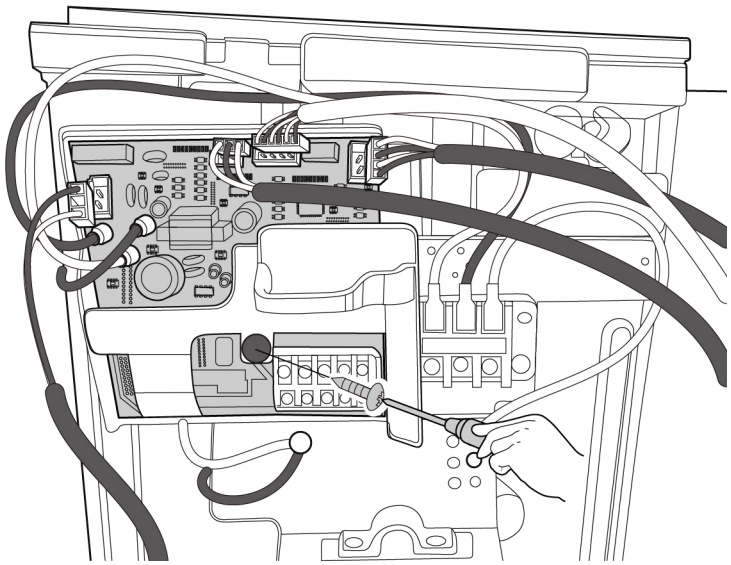
Procedure	Illustration
1) Remove the screws and unfix the hooks, then open the electronic control box cover (7 screws)(see CJ_ODU_PCB_015-1). Note:Electric control box cover cannot be removed, so the voltage between P and N cannot be measured.	 **CJ_ODU_PCB_015-1**
2) Remove all of connectors (see Fig CJ_ODU_PCB_015-2). 3) Unfix the 2 hooks and then remove the electronic control board. Note: When replacing the electronic control board with a new one, pay attention to applying thermal paste on the heat sink.	 **CJ_ODU_PCB_015-2**

Note: This section is for reference only. Actual unit appearance may vary.

16. PCB board 16

Procedure	Illustration
1) Remove the cover of electrical control box. (see CJ_ODU_PCB_016-1).	 CJ_ODU_PCB_016-1
2) Disconnect the fan motor connector. (see CJ_ODU_PCB_016-2).	 CJ_ODU_PCB_016-2
3) Remove eight fixing screws. 4) Ture over the electronic control box subassembly. (see CJ_ODU_PCB_016-3).	 CJ_ODU_PCB_016-3

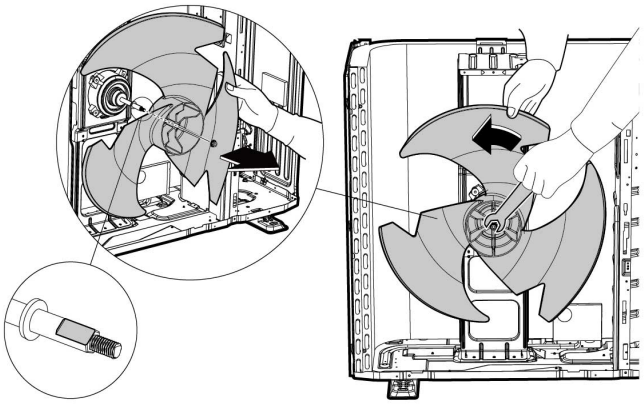
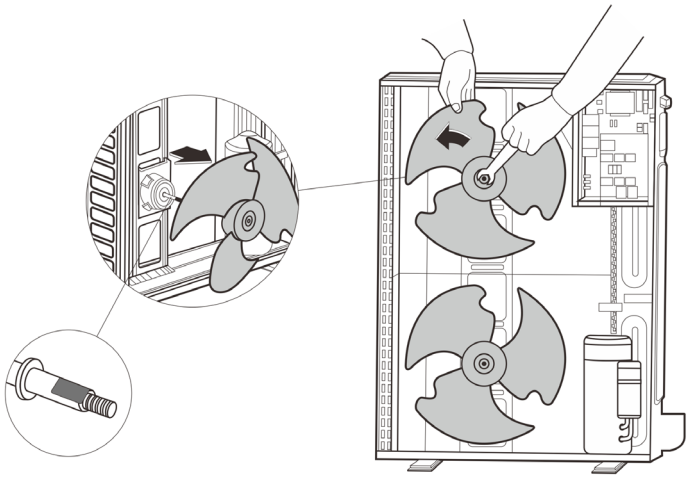
Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
5) Remove 3 screws and then remove the bracket. (see CJ_ODU_PCB_016-4). 6) Disconnect the connectors from the electronic control board (see CJ_ODU_PCB_016-4). 7) Remove 3 screws and then remove the electronic control board.(see CJ_ODU_PCB_016-4).	 **CJ_ODU_PCB_016-4**
8) Remove the 1 screw and disconnect the wires and then remove the 24V board.(see CJ_PCB_016-5).	 **CJ_ODU_PCB_016-5**

Note: This section is for reference only. Actual unit appearance may vary.

2.3 Fan Assembly

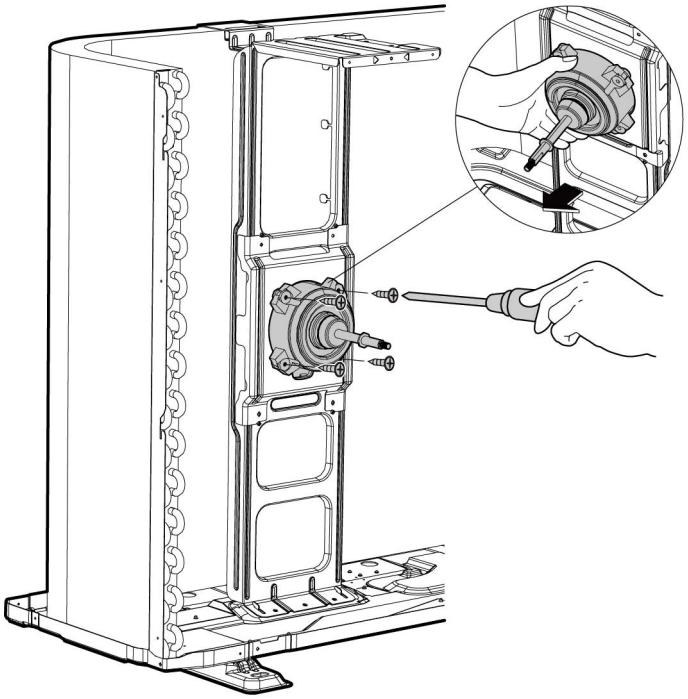
Note: Remove the panel plate (refer to 3.1 Panel Plate) before disassembling fan.

Procedure	Illustration
1) Remove the nut securing the fan with a spanner (see CJ_ODU_FAN_001-1&2). 2) Remove the fan.	 **CJ_ODU_FAN_001-1**  **CJ_ODU_FAN_001-2**

Note: This section is for reference only. Actual unit appearance may vary.

2.4 Fan Motor

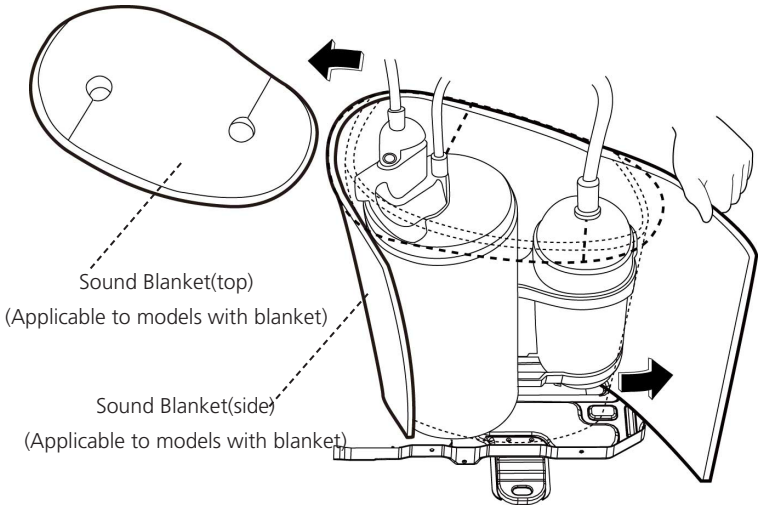
Note: Remove the panel plate and the connection of fan motor on PCB (refer to 3.1 Panel Plate and 3.2 Electrical parts) before disassembling fan motor.

Procedure	Illustration
3) Remove the fixing screws of the fan motor (4 screws) (see CJ_ODU_MOTOR_001). 4) Remove the fan motor.	 **CJ_ODU_MOTOR_001**

Note: This section is for reference only. Actual unit appearance may vary.

2.5 Sound blanket

Note: Remove the panel plate (refer to 3.1 Panel plate) before disassembling sound blanket.

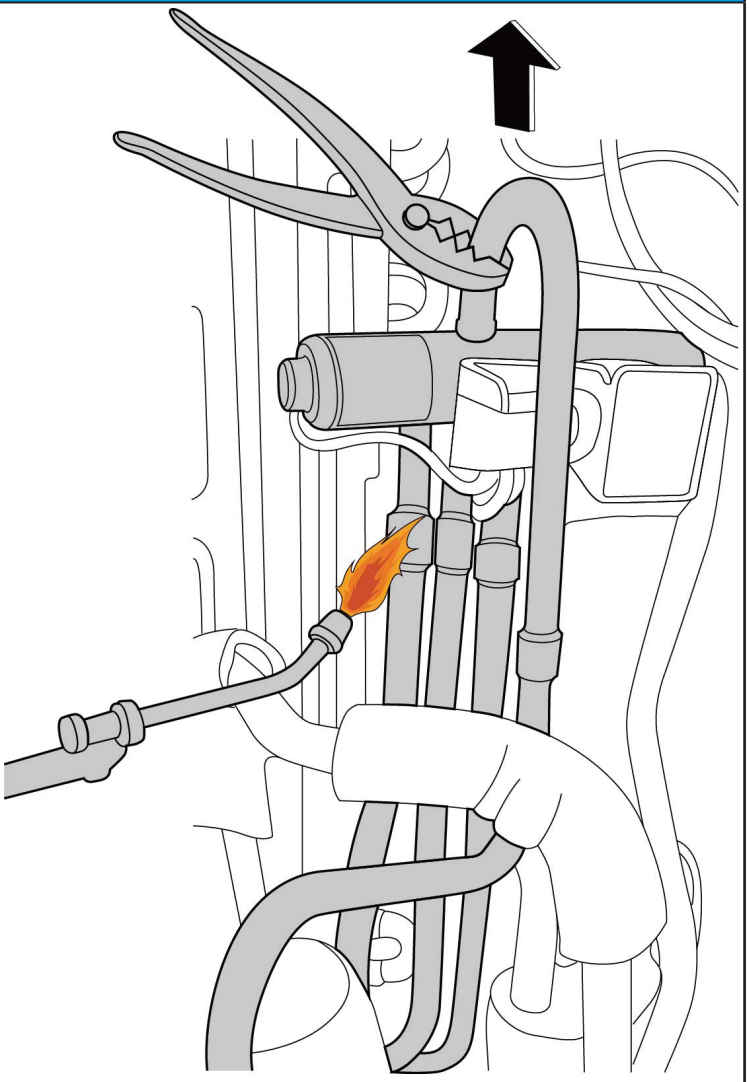
Procedure	Illustration
1) Remove the sound blanket (side and top) (see CJ_ODU_BLANKET_001).	 **CJ_ODU_BLANKET_001**

Note: This section is for reference only. Actual unit appearance may vary.

2.6 Four-way valve (for heat pump models)

WARNING: Evacuate the system and confirm that there is no refrigerant left in the system before removing the four-way valve and the compressor. (For R32 & R290, you should evacuate the system with the vacuum pump; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by professionals.)

Note: Remove the panel plate, connection of four-way valve on PCB (refer to 3.1 Panel plate and 3.2 Electrical parts) before disassembling sound blanket.

Procedure	Illustration
1) Heat up the brazed parts and then detach the the four-way valve and the pipe (see CJ_ODU_VALVE_001). 2) Remove the four-way valve assembly with pliers.	

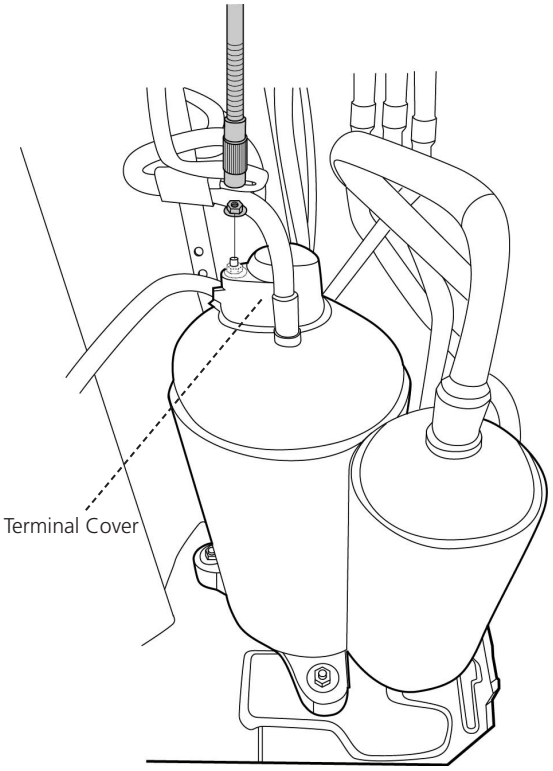
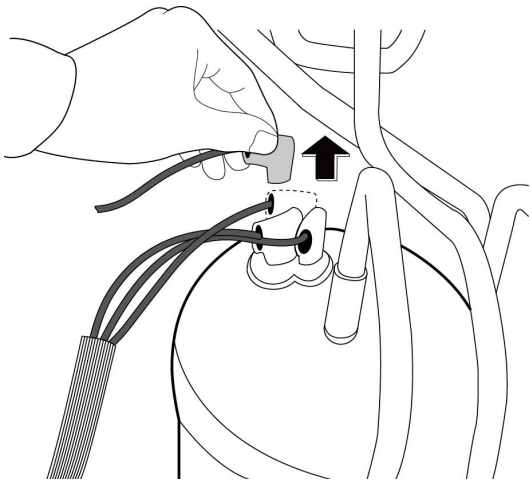
CJ_ODU_VALVE_001

Note: This section is for reference only. Actual unit appearance may vary.

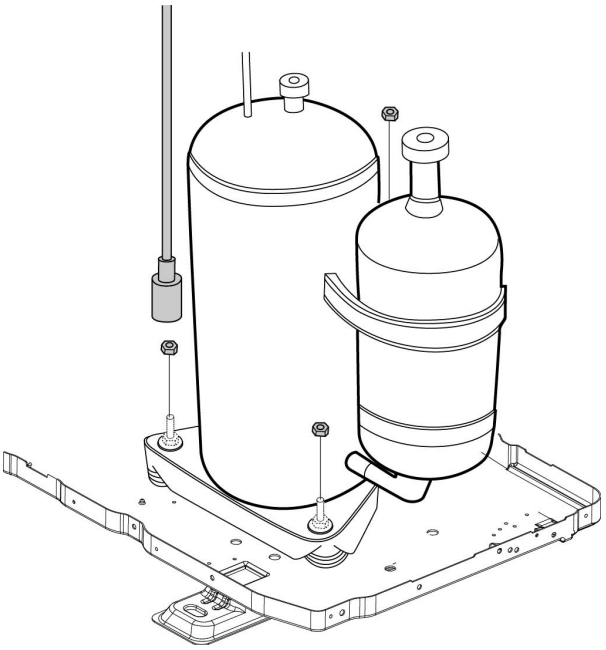
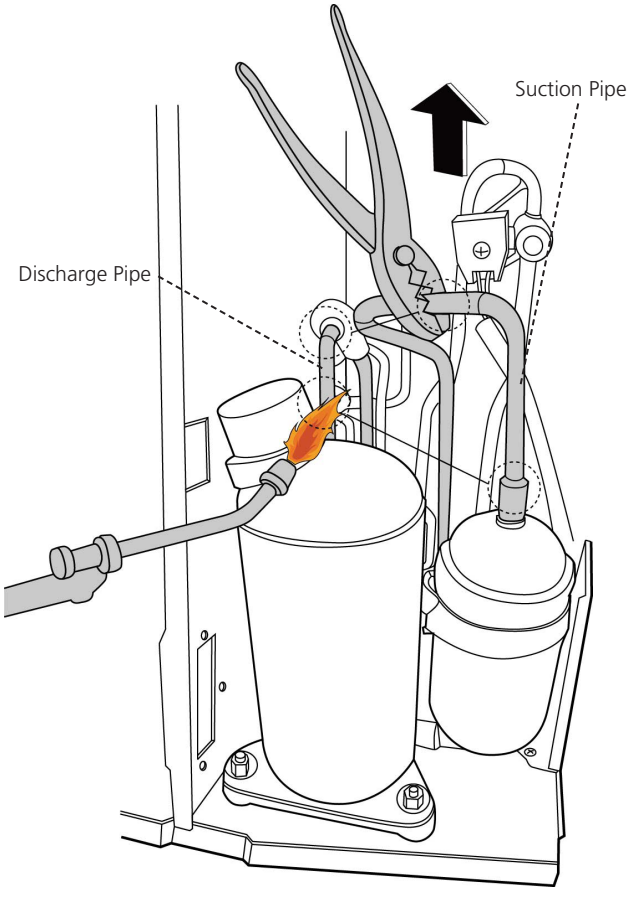
2.7 Compressor

WARNING: Evacuate the system and confirm that there is no refrigerant left in the system before removing the four-way valve and the compressor. (For R32 & R290, you should evacuate the system with the vacuum pump; flush the system with nitrogen; then repeat the two steps before heating up the brazed parts. The operations above should be implemented by professionals.)

Note: Remove the panel plate, connection of compressor on PCB (refer to 3.1 Panel plate and 3.2 Electrical parts) before disassembling sound blanket.

Procedure	Illustration
1) Remove the flange nut of terminal cover and remove the terminal cover (see CJ_ODU_COMP_001).	 CJ_ODU_COMP_001
2) Disconnect the connectors (see CJ_ODU_COMP_002).	 CJ_ODU_COMP_002

Note: This section is for reference only. Actual unit appearance may vary.

Procedure	Illustration
3) Remove the hex nuts and washers securing the compressor, located on the bottom plate (see CJ_ODU_COMP_003).	 CJ_ODU_COMP_003
4) Heat up the brazed parts and then remove the the discharge pipe and the suction pipe (see CJ_ODU_COMP_004). 5) Lift the compressor from the base pan assembly with pliers.	 CJ_ODU_COMP_004

Note: This section is for reference only. Actual unit appearance may vary.

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i) Temperature Sensor Resistance Value Table for T1,T2,T3 and T4 (°C – K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.83003	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.76647	108	226	0.49989
-11	12	66.0898	29	84	8.33566	69	156	1.70547	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.64691	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.59068	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.53668	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.48481	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.43498	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.38703	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.34105	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.29078	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.25423	118	244	0.37956
-1	30	37.1988	39	102	5.39689	79	174	1.2133	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.17393	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.13604	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.09958	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.06448	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.03069	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	0.99815	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.96681	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.93662	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.90753	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.8795	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.85248	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.82643	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.80132	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.77709	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.75373	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.73119	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.70944	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.44677	99	210	0.64862	139	282	0.22231

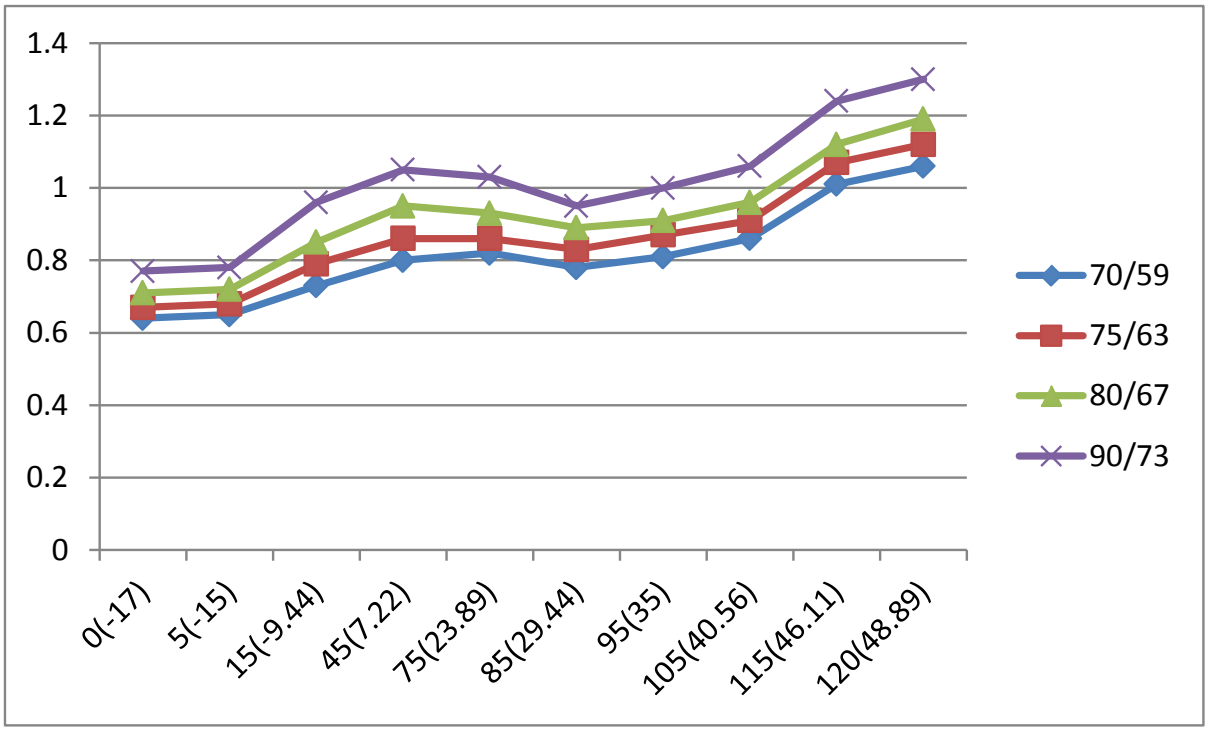
ii) Temperature Sensor Resistance Value Table for TP(for some units) (°C --K)

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.717
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			

iii) Pressure On Service Port

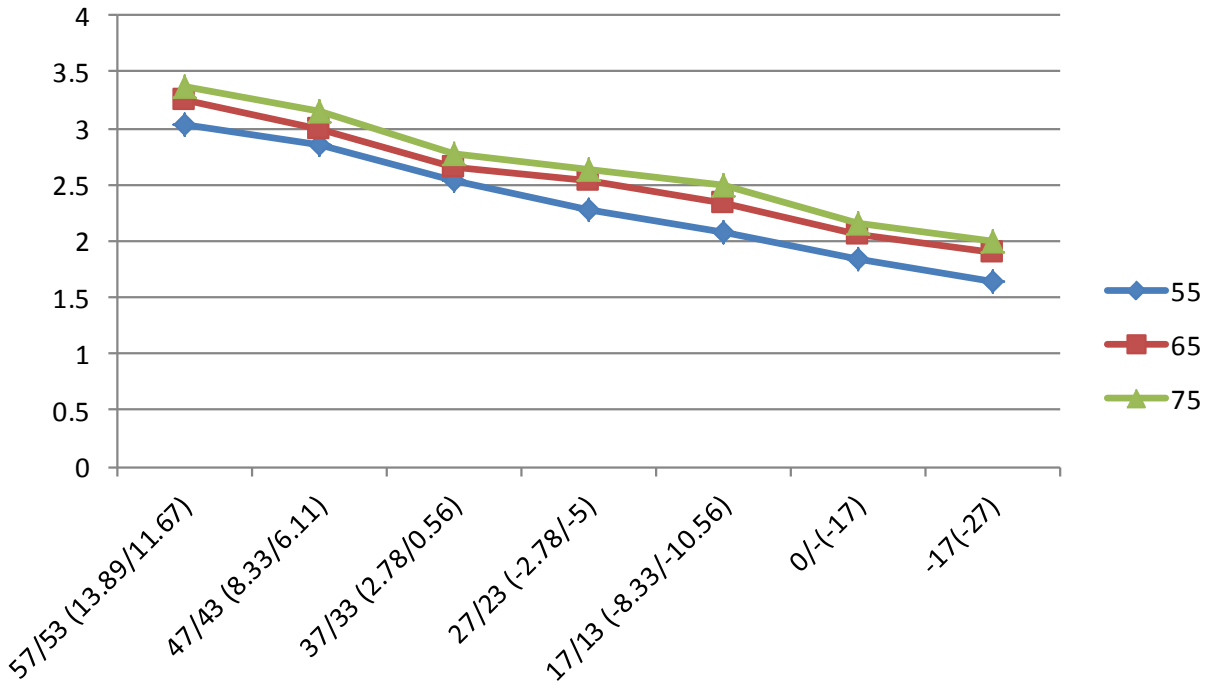
Cooling chart(R410A):

°F(°C)	ODU(DB) / IDU(DB/WB)	0(-17)	5(-15)	15 (-9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
BAR	70/59 (21.11/15)	6.4	6.5	7.3	8.0	8.2	7.8	8.1	8.6	10.1	10.6
	75/63 (23.89/17.22)	6.7	6.8	7.9	8.6	8.6	8.3	8.7	9.1	10.7	11.2
	80/67 (26.67/19.44)	7.1	7.2	8.5	9.5	9.3	8.9	9.1	9.6	11.2	11.9
	90/73 (32.22/22.78)	7.7	7.8	9.6	10.5	10.3	9.5	10.0	10.6	12.4	13.0
PSI	70/59 (21.11/15)	93	94	106	116	119	113	117	125	147	154
	75/63 (23.89/17.22)	97	99	115	125	124	120	126	132	155	162
	80/67 (26.67/19.44)	103	104	123	138	135	129	132	140	162	173
	90/73 (32.22/22.78)	112	113	139	152	149	138	145	154	180	189
MPa	70/59 (21.11/15)	0.64	0.65	0.73	0.8	0.82	0.78	0.81	0.86	1.01	1.06
	75/63 (23.89/17.22)	0.67	0.68	0.79	0.86	0.86	0.83	0.87	0.91	1.07	1.12
	80/67 (26.67/19.44)	0.71	0.72	0.85	0.95	0.93	0.89	0.91	0.96	1.12	1.19
	90/73 (32.22/22.78)	0.77	0.78	0.96	1.05	1.03	0.95	1	1.06	1.24	1.3



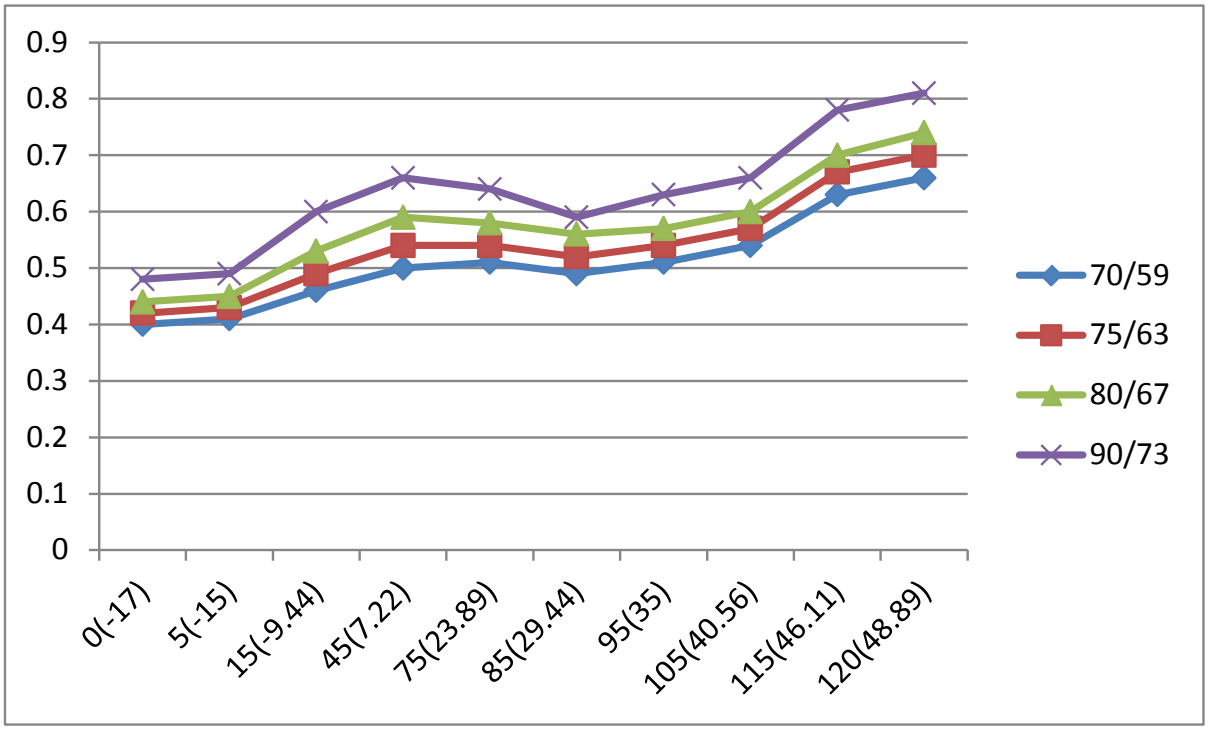
Heating chart(R410A):

°F(°C)	QDU(DB/WB) / IDU(DB)	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/-2 (-17/-19)	-17/-18 (-27/-28)
BAR	55(12.78)	30.3	28.5	25.3	22.8	20.8	18.5	16.5
	65(18.33)	32.5	30.0	26.6	25.4	23.3	20.5	19.0
	75(23.89)	33.8	31.5	27.8	26.3	24.9	21.5	20.0
PSI	55(12.78)	439	413	367	330	302	268	239
	65(18.33)	471	435	386	368	339	297	276
	75(23.89)	489	457	403	381	362	312	290
MPa	55(12.78)	3.03	2.85	2.53	2.28	2.08	1.85	1.65
	65(18.33)	3.25	3.00	2.66	2.54	2.33	2.05	1.90
	75(23.89)	3.38	3.15	2.78	2.63	2.49	2.15	2.00



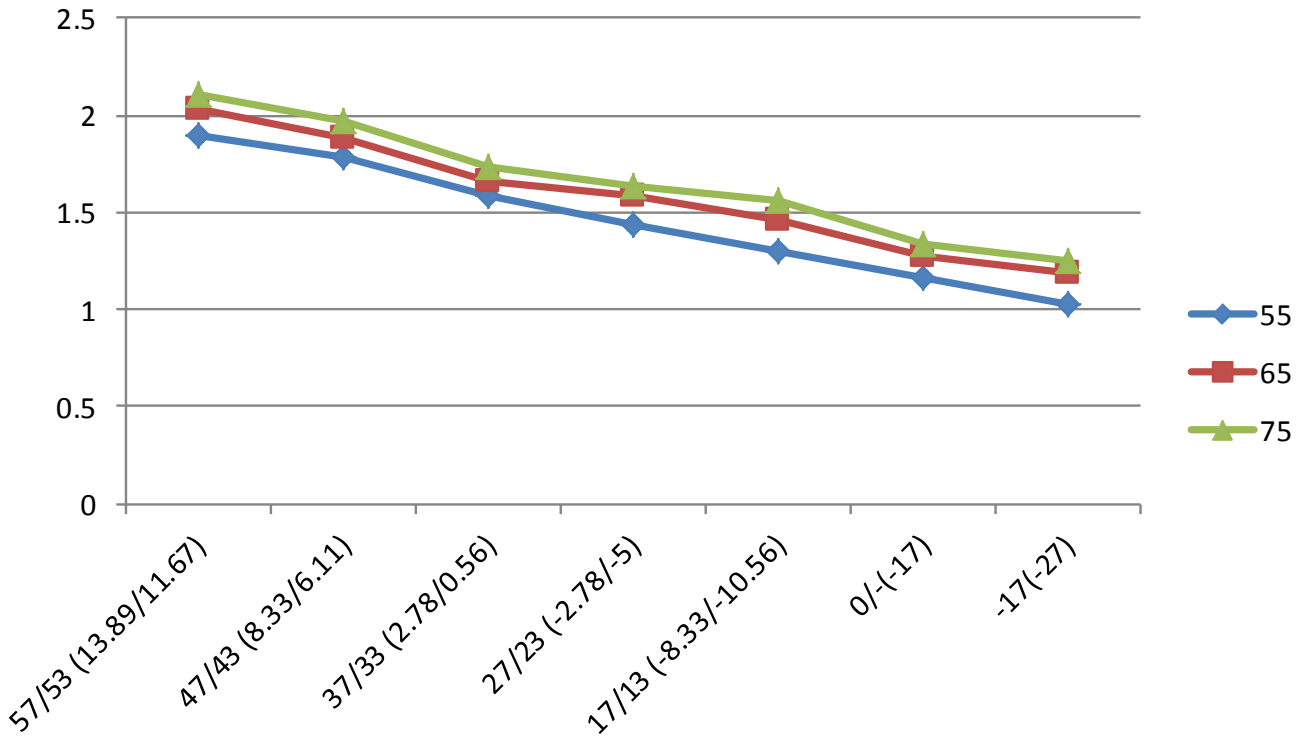
Cooling chart(R22):

°F(°C)	ODU(DB) / IDU(DB/WB)	0(-17)	5(-15)	15 (-9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
BAR	70/59 (21.11/15)	4.0	4.1	4.6	5.0	5.1	4.9	5.1	5.4	6.3	6.6
	75/63 (23.89/17.22)	4.2	4.3	4.9	5.4	5.4	5.2	5.4	5.7	6.7	7.0
	80/67 (26.67/19.44)	4.4	4.5	5.3	5.9	5.8	5.6	5.7	6.0	7.0	7.4
	90/73 (32.22/22.78)	4.8	4.9	6.0	6.6	6.4	5.9	6.3	6.6	7.8	8.1
PSI	70/59 (21.11/15)	58	59	67	73	74	71	74	78	91	96
	75/63 (23.89/17.22)	61	62	71	78	78	75	78	83	97	102
	80/67 (26.67/19.44)	64	65	77	86	84	81	83	87	102	107
	90/73 (32.22/22.78)	70	71	87	96	93	86	91	96	113	117
MPa	70/59 (21.11/15)	0.40	0.41	0.46	0.50	0.51	0.49	0.51	0.54	0.63	0.66
	75/63 (23.89/17.22)	0.42	0.43	0.49	0.54	0.54	0.52	0.54	0.57	0.67	0.70
	80/67 (26.67/19.44)	0.44	0.45	0.53	0.59	0.58	0.56	0.57	0.60	0.70	0.74
	90/73 (32.22/22.78)	0.48	0.49	0.60	0.66	0.64	0.59	0.63	0.66	0.78	0.81



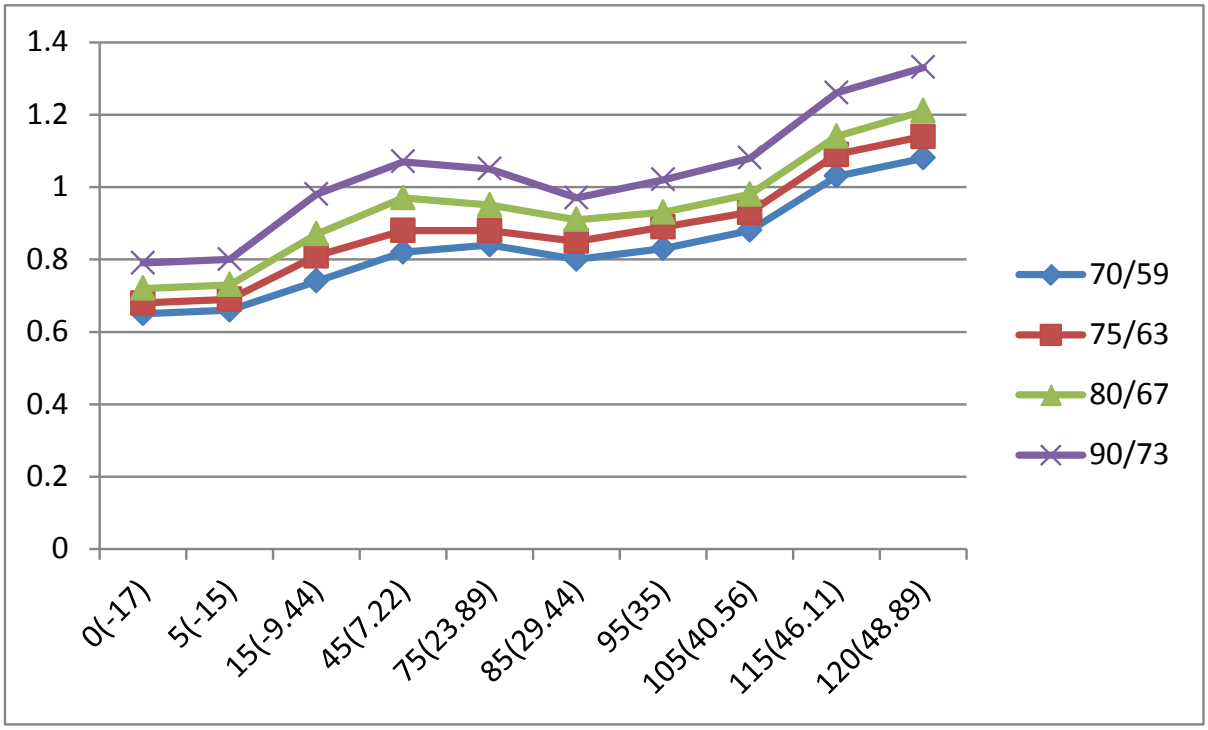
Heating chart(R22):

°F(°C)	QDU(DB/WB) / IDU(DB)	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/-2 (-17/-19)	-17/-18 (-27/-28)
BAR	55(12.78)	18.9	17.8	15.8	14.3	13.0	11.6	10.3
	65(18.33)	20.3	18.8	16.6	15.9	14.6	12.8	11.9
	75(23.89)	21.1	19.7	17.3	16.4	15.6	13.4	12.5
PSI	55(12.78)	274	258	229	207	189	168	149
	65(18.33)	294	273	241	231	212	186	172.6
	75(23.89)	306	286	251	238	226	194	181
MPa	55(12.78)	1.89	1.78	1.58	1.43	1.30	1.16	1.03
	65(18.33)	2.03	1.88	1.66	1.59	1.46	1.28	1.19
	75(23.89)	2.11	1.97	1.73	1.64	1.56	1.34	1.25



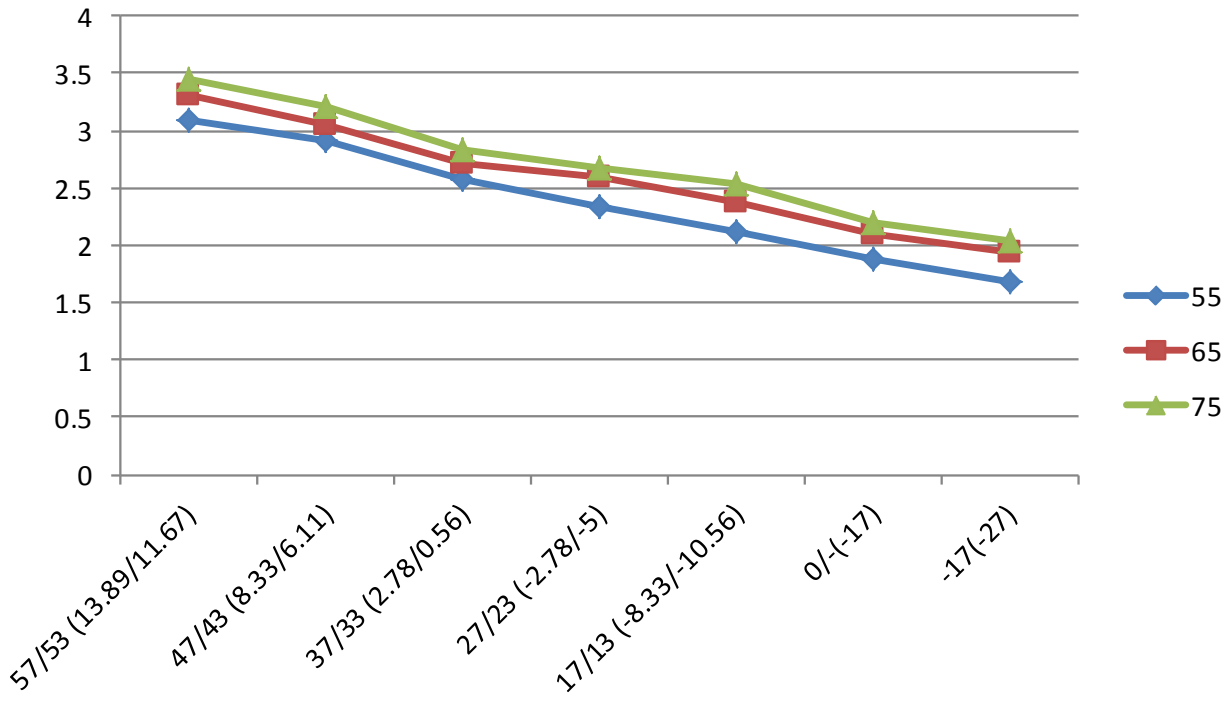
Cooling chart(R32):

°F(°C)	ODU(DB) / IDU(DB/WB)	0(-17)	5(-15)	15 (-9.44)	45 (7.22)	75 (23.89)	85 (29.44)	95 (35)	105 (40.56)	115 (46.11)	120 (48.89)
BAR	70/59 (21.11/15)	6.5	6.6	7.4	8.2	8.4	8.0	8.3	8.8	10.3	10.8
	75/63 (23.89/17.22)	6.8	6.9	8.1	8.8	8.8	8.5	8.9	9.3	10.9	11.4
	80/67 (26.67/19.44)	7.2	7.3	8.7	9.7	9.5	9.1	9.3	9.8	11.4	12.1
	90/73 (32.22/22.78)	7.9	8.0	9.8	10.7	10.5	9.7	10.2	10.8	12.6	13.3
PSI	70/59 (21.11/15)	95	96	108	118	121	115	119	128	150	157
	75/63 (23.89/17.22)	99	101	117	128	126	122	129	135	158	165
	80/67 (26.67/19.44)	105	106	125	141	138	132	135	143	165	176
	90/73 (32.22/22.78)	114	115	142	155	152	141	148	157	184	193
MPa	70/59 (21.11/15)	0.65	0.66	0.74	0.82	0.84	0.80	0.83	0.88	1.03	1.08
	75/63 (23.89/17.22)	0.68	0.69	0.81	0.88	0.88	0.85	0.89	0.93	1.09	1.14
	80/67 (26.67/19.44)	0.72	0.73	0.87	0.97	0.95	0.91	0.93	0.98	1.14	1.21
	90/73 (32.22/22.78)	0.79	0.80	0.98	1.07	1.05	0.97	1.02	1.08	1.26	1.33



Heating chart(R32):

°F(°C)	QDU(DB/WB) / IDU(DB)	57/53 (13.89/11.67)	47/43 (8.33/6.11)	37/33 (2.78/0.56)	27/23 (-2.78/-5)	17/13 (-8.33/-10.56)	0/-2 (-17/-19)	-17/-18 (-27/-28)
BAR	55(12.78)	30.9	29.1	25.8	23.3	21.2	18.9	16.8
	65(18.33)	33.2	30.6	27.1	25.9	23.8	20.9	19.4
	75(23.89)	34.5	32.1	28.4	26.8	25.4	21.9	20.4
PSI	55(12.78)	448	421	374	337	308	273	244
	65(18.33)	480	444	394	375	346	303	282
	75(23.89)	499	466	411	389	369	318	296
MPa	55(12.78)	3.09	2.91	2.58	2.33	2.12	1.89	1.68
	65(18.33)	3.32	3.06	2.71	2.59	2.38	2.09	1.94
	75(23.89)	3.45	3.21	2.84	2.68	2.54	2.19	2.04



System Pressure Table-R22

Pressure			Temperature		Pressure			Temperature	
Kpa	bar	PSI	°C	°F	Kpa	bar	PSI	°C	°F
100	1	14.5	-41.091	-41.964	1600	16	232	41.748	107.146
150	1.5	21.75	-32.077	-25.739	1650	16.5	239.25	43.029	109.452
200	2	29	-25.177	-13.319	1700	17	246.5	44.281	111.706
250	2.5	36.25	-19.508	-3.114	1750	17.5	253.75	45.506	113.911
300	3	43.5	-14.654	5.623	1800	18	261	46.706	116.071
350	3.5	50.75	-10.384	13.309	1850	18.5	268.25	47.882	118.188
400	4	58	-6.556	20.199	1900	19	275.5	49.034	120.261
450	4.5	65.25	-3.075	26.464	1950	19.5	282.75	50.164	122.295
500	5	72.5	0.124	32.223	2000	20	290	51.273	124.291
550	5.5	79.75	3.091	37.563	2050	20.5	297.25	52.361	126.250
600	6	87	5.861	42.550	2100	21	304.5	53.43	128.174
650	6.5	94.25	8.464	47.234	2150	21.5	311.75	54.48	130.064
700	7	101.5	10.92	51.656	2200	22	319	55.512	131.922
750	7.5	108.75	13.249	55.848	2250	22.5	326.25	56.527	133.749
800	8	116	15.465	59.837	2300	23	333.5	57.526	135.547
850	8.5	123.25	17.58	63.644	2350	23.5	340.75	58.508	137.314
900	9	130.5	19.604	67.287	2400	24	348	59.475	139.055
950	9.5	137.75	21.547	70.785	2450	24.5	355.25	60.427	140.769
1000	10	145	23.415	74.147	2500	25	362.5	61.364	142.455
1050	10.5	152.25	25.216	77.389	2550	25.5	369.75	62.288	144.118
1100	11	159.5	26.953	80.515	2600	26	377	63.198	145.756
1150	11.5	166.75	28.634	83.541	2650	26.5	384.25	64.095	147.371
1200	12	174	30.261	86.470	2700	27	391.5	64.98	148.964
1250	12.5	181.25	31.839	89.310	2750	27.5	398.75	65.852	150.534
1300	13	188.5	33.371	92.068	2800	28	406	66.712	152.082
1350	13.5	195.75	34.86	94.748	2850	28.5	413.25	67.561	153.610
1400	14	203	36.308	97.354	2900	29	420.5	68.399	155.118
1450	14.5	210.25	37.719	99.894	2950	29.5	427.75	69.226	156.607
1500	15	217.5	39.095	102.371	3000	30	435	70.042	158.076
1550	15.5	224.75	40.437	104.787					

System Pressure Table-R410A

Pressure			Temperature		Pressure			Temperature	
Kpa	bar	PSI	°C	°F	Kpa	bar	PSI	°C	°F
100	1	14.5	-51.623	-60.921	2350	23.5	340.75	38.817	101.871
150	1.5	21.75	-43.327	-45.989	2400	24	348	39.68	103.424
200	2	29	-36.992	-34.586	2450	24.5	355.25	40.531	104.956
250	2.5	36.25	-31.795	-25.231	2500	25	362.5	41.368	106.462
300	3	43.5	-27.351	-17.232	2550	25.5	369.75	42.192	107.946
350	3.5	50.75	-23.448	-10.206	2600	26	377	43.004	109.407
400	4	58	-19.953	-3.915	2650	26.5	384.25	43.804	110.847
450	4.5	65.25	-16.779	1.798	2700	27	391.5	44.592	112.266
500	5	72.5	-13.863	7.047	2750	27.5	398.75	45.37	113.666
550	5.5	79.75	-11.162	11.908	2800	28	406	46.136	115.045
600	6	87	-8.643	16.444	2850	28.5	413.25	46.892	116.406
650	6.5	94.25	-6.277	20.701	2900	29	420.5	47.638	117.748
700	7	101.5	-4.046	24.716	2950	29.5	427.75	48.374	119.073
750	7.5	108.75	-1.933	28.521	3000	30	435	49.101	120.382
800	8	116	0.076	32.137	3050	30.5	442.25	49.818	121.672
850	8.5	123.25	1.993	35.587	3100	31	449.5	50.525	122.945
900	9	130.5	3.826	38.888	3150	31.5	456.75	51.224	124.203
950	9.5	137.75	5.584	42.052	3200	32	464	51.914	125.445
1000	10	145	7.274	45.093	3250	32.5	471.25	52.596	126.673
1050	10.5	152.25	8.901	48.022	3300	33	478.5	53.27	127.886
1100	11	159.5	10.471	50.848	3350	33.5	485.75	53.935	129.083
1150	11.5	166.75	11.988	53.578	3400	34	493	54.593	130.267
1200	12	174	13.457	56.223	3450	34.5	500.25	55.243	131.437
1250	12.5	181.25	14.879	58.782	3500	35	507.5	55.885	132.593
1300	13	188.5	16.26	61.268	3550	35.5	514.75	56.52	133.736
1350	13.5	195.75	17.602	63.684	3600	36	522	57.148	134.866
1400	14	203	18.906	66.031	3650	36.5	529.25	57.769	135.984
1450	14.5	210.25	20.176	68.317	3700	37	536.5	58.383	137.089
1500	15	217.5	21.414	70.545	3750	37.5	543.75	58.99	138.182
1550	15.5	224.75	22.621	72.718	3800	38	551	59.591	139.264
1600	16	232	23.799	74.838	3850	38.5	558.25	60.185	140.333
1650	16.5	239.25	24.949	76.908	3900	39	565.5	60.773	141.391
1700	17	246.5	26.074	78.933	3950	39.5	572.75	61.355	142.439
1750	17.5	253.75	27.174	80.913	4000	40	580	61.93	143.474
1800	18	261	28.251	82.852	4050	40.5	587.25	62.499	144.498
1850	18.5	268.25	29.305	84.749	4100	41	594.5	63.063	145.513
1900	19	275.5	30.338	86.608	4150	41.5	601.75	63.62	146.516
1950	19.5	282.75	31.351	88.432	4200	42	609	64.172	147.510
2000	20	290	32.344	90.219	4250	42.5	616.25	64.719	148.494
2050	20.5	297.25	33.319	91.974	4300	43	623.5	65.259	149.466
2100	21	304.5	34.276	93.697	4350	43.5	630.75	65.795	150.431
2150	21.5	311.75	35.215	95.387	4400	44	638	66.324	151.383
2200	22	319	36.139	97.050	4450	44.5	645.25	66.849	152.328
2250	22.5	326.25	37.047	98.685	4500	45	652.5	67.368	153.262
2300	23	333.5	37.939	100.290					

System Pressure Table-R32

Pressure			Temperature		Pressure			Temperature	
Kpa	bar	PSI	°C	°F	Kpa	bar	PSI	°C	°F
100	1	14.5	-51.909	-61.436	1850	18.5	268.25	28.425	83.165
150	1.5	21.75	-43.635	-46.543	1900	19	275.5	29.447	85.005
200	2	29	-37.323	-35.181	1950	19.5	282.75	30.448	86.806
250	2.5	36.25	-32.15	-25.87	2000	20	290	31.431	88.576
300	3	43.5	-27.731	-17.916	2050	20.5	297.25	32.395	90.311
350	3.5	50.75	-23.85	-10.93	2100	21	304.5	33.341	92.014
400	4	58	-20.378	-4.680	2150	21.5	311.75	34.271	93.688
450	4.5	65.25	-17.225	0.995	2200	22	319	35.184	95.331
500	5	72.5	-14.331	6.204	2250	22.5	326.25	36.082	96.948
550	5.5	79.75	-11.65	11.03	2300	23	333.5	36.965	98.537
600	6	87	-9.150	15.529	2350	23.5	340.75	37.834	100.101
650	6.5	94.25	-6.805	19.752	2400	24	348	38.688	101.638
700	7	101.5	-4.593	23.734	2450	24.5	355.25	39.529	103.152
750	7.5	108.75	-2.498	27.505	2500	25	362.5	40.358	104.644
800	8	116	-0.506	31.089	2550	25.5	369.75	41.173	106.111
850	8.5	123.25	1.393	34.507	2600	26	377	41.977	107.559
900	9	130.5	3.209	37.777	2650	26.5	384.25	42.769	108.984
950	9.5	137.75	4.951	40.911	2700	27	391.5	43.55	110.39
1000	10	145	6.624	43.923	2750	27.5	398.75	44.32	111.776
1050	10.5	152.25	8.235	46.823	2800	28	406	45.079	113.142
1100	11	159.5	9.790	49.621	2850	28.5	413.25	45.828	114.490
1150	11.5	166.75	11.291	52.324	2900	29	420.5	46.567	115.821
1200	12	174	12.745	54.941	2950	29.5	427.75	47.296	117.133
1250	12.5	181.25	14.153	57.475	3000	30	435	48.015	118.427
1300	13	188.5	15.52	59.936	3050	30.5	442.25	48.726	119.707
1350	13.5	195.75	16.847	62.325	3100	31	449.5	49.428	120.970
1400	14	203	18.138	64.648	3150	31.5	456.75	50.121	122.218
1450	14.5	210.25	19.395	66.911	3200	32	464	50.806	123.451
1500	15	217.5	20.619	69.114	3250	32.5	471.25	51.482	124.668
1550	15.5	224.75	21.813	71.263	3300	33	478.5	52.15	125.87
1600	16	232	22.978	73.360	3350	33.5	485.75	52.811	127.060
1650	16.5	239.25	24.116	75.409	3400	34	493	53.464	128.235
1700	17	246.5	25.229	77.412	3450	34.5	500.25	54.11	129.398
1750	17.5	253.75	26.317	79.371	3500	35	507.5	54.748	130.546
1800	18	261	27.382	81.288					