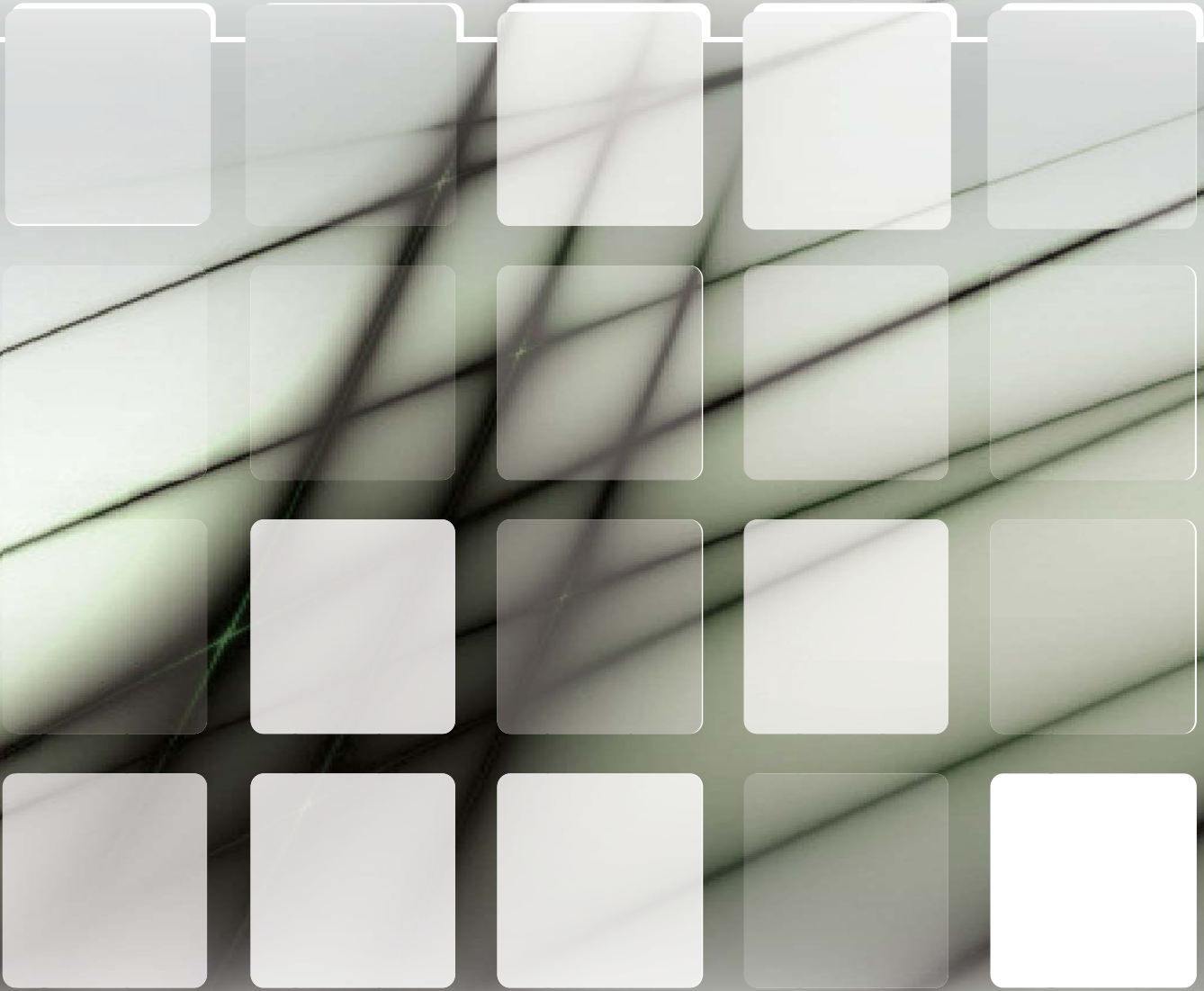


APRI Series Rooftop Inverter Unit 18 SEER Technical Manual

230V/1/50-60Hz



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- 1. Rooftop Package Unit introduction**
- 2. Nomenclature**
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Rooftop Package Unit

1. Rooftop package unit introduction

1.1 Modules Range

2 models: Heat pumb:3 TR, 5TR



3TR



5TR

1.2 Adopt high reliable Copland compressor

- Better Liquid Handling

Radial compliance allows the scroll members to separate in the presence of liquid refrigerant, thus, providing protection against liquid damage.

- Greater Efficiency

With axial compliance, optimized force between two scrolls can be obtained, leading to high efficiency over the entire operating range.

World famous scroll compressor with quick reactivity and operation stable. Compressor staging is controlled directly by the control temperature , high EER.

1.3 Provide easy access to system components for maintenance and service.

1.4 Flexible installation, on rooftop or ground are available. Anywhere removable as requirement with fixed.

■ **Model Number Nomenclature**

CODE	NAME
C/O	Cooling Only
Hor.& Dow.	Horizontal & Downflow Units (Optional)
Hor.	Horizontal Units
Dow.	Downflow Units
H/P	Heat Pump

Rooftop Package Unit

3. Specifications

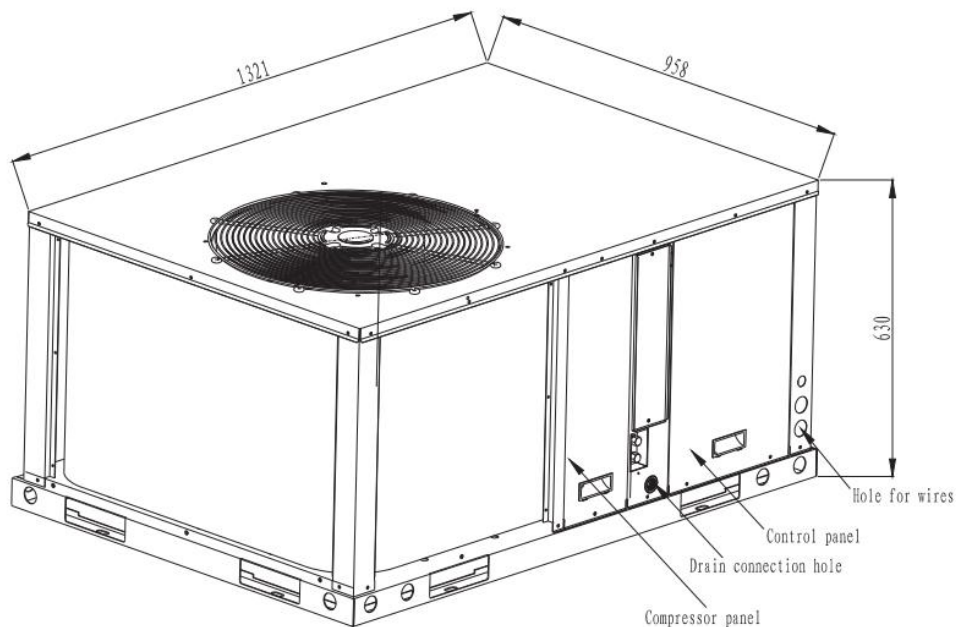
Model type		APRI836J0A-GT1140	APRI860J0A-GMI160
Nominal ton	Tons	3	5
Power	voltage/phase/frequency	230V/1/60	230V/1/60
Applicable voltage	Max.	253	253
	Min.	187	187
Capacity	Cooling(Btu/h)	36000	55000
	Input (W)	3180	5200
	Heating(Btu/h)	36500	54000
	Input (W)	3130	5150
Performance	EER/COP(Btu/h .W)	11.3	10.6
	SEER(Btu/h. W)	19.0	17.0
	COP(Btu/h W)	11.7	10.5
Dimensions	Length(mm)	1321	1486
	Width(mm)	958	1086
	Height (mm)	630	840
Net weight (Kg)		140	136
Gross weight (Kg)		144	140
Packing dimension: LxWxH		1323*950*660	1323*950*660
Stuffing QTY		84	48
Refrigerant type		R410A	R410A
Flow control		EXV	EXV
Compressor	ATM240D57UFT	MNB42FCKMC-L	MNB42FCKMC-L
	Brand	GMCC	Mitsubishi
	Type	Twin-rotary DC Inverter	Twin-rotary DC Inverter
	Capacity (W)	7190	13780
	Input (W)	1935	4040
	Refrigerant oil (ml)	670	1400
Outdoor coil	Rows	2	2
	Fins per inch	17	17
	Fin Type	Hydrophilic	Hydrophilic
	Fin Color	Blue	Blue
	Tube diameter(mm)	φ7	φ7
Indoor coil	Rows	4	4
	Fins per inch	17	17
	Fin Type	Hydrophilic	Hydrophilic
	Fin Color	Gold	Gold
	Tube diameter(mm)	φ7	φ7
Outdoor fan	Quantity used/diameter(mm)	1/560	1/600
	Type	Axial	Axial
	Motor type	DC motor	DC motor

Rooftop Package Unit

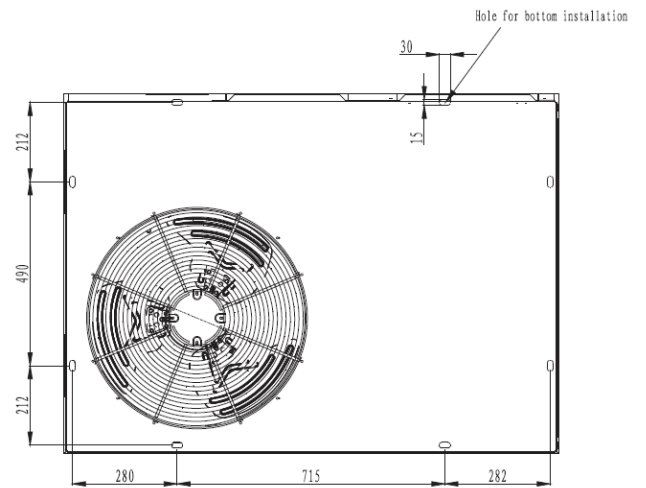
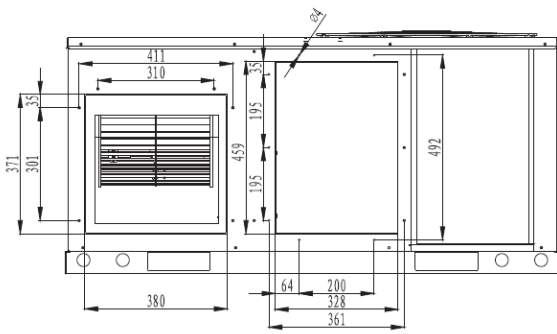
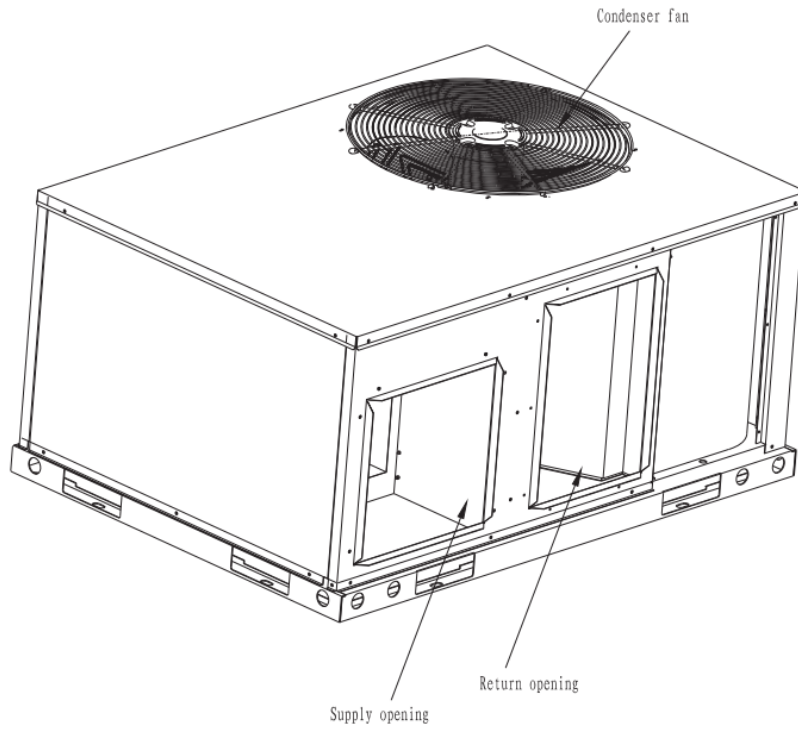
	Quantity motors/power(kW)	1/0.11	1/0.23
	Motor RPM	850	1100
	Total nominal CFM	2400	4000
Indoor fan	Quantity used/diameter(in.)	1/10*10	1/10*10
	Type	Centrifugal	Centrifugal
	Motor type	DC motor	DC motor
	Quantity motors/power(kW)	1/0.2	1/0.33
	Total nominal CFM	1180	1560
Outdoor Static Pressure (Pa)	standard	0	0
Indoor Static Pressure (Pa)	standard (without filter)	57	70
Cooling Operation Range	°F	61	66
Heating Operation Range	°F	63-118	63-118

4. Dimensions

4.1 3Tons H/P Units

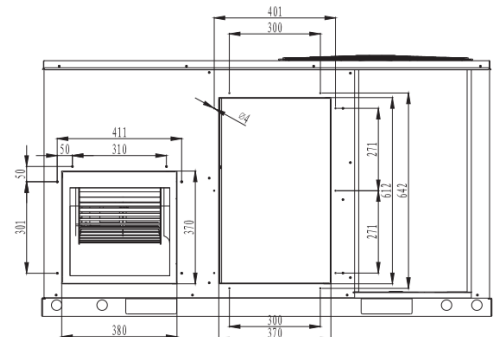
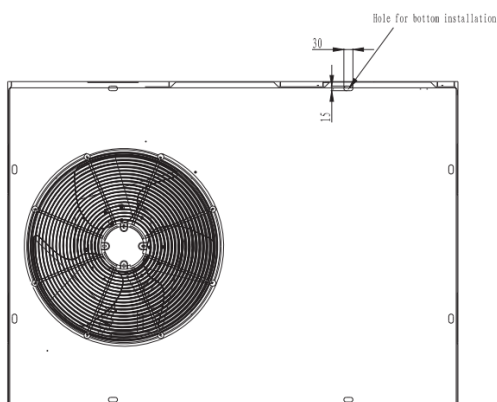
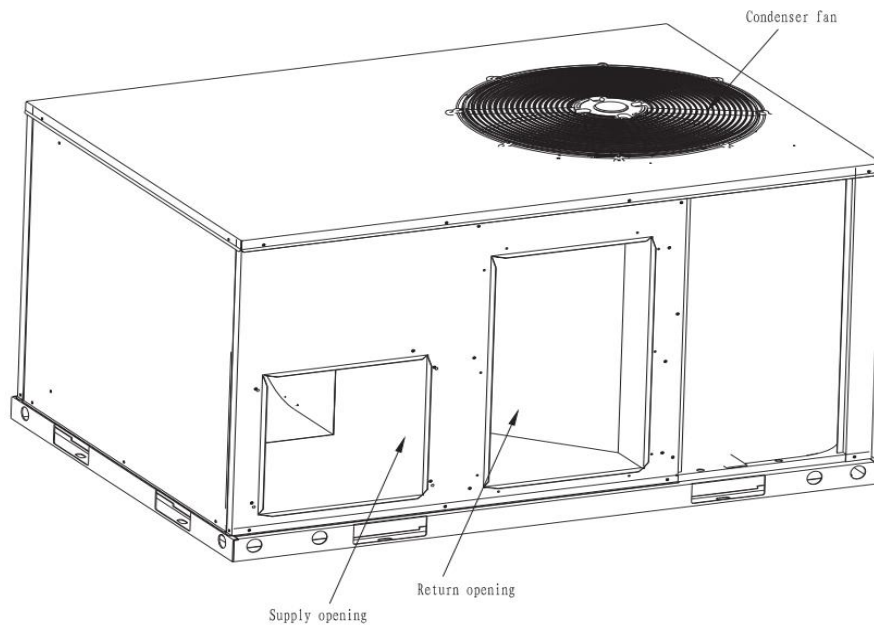
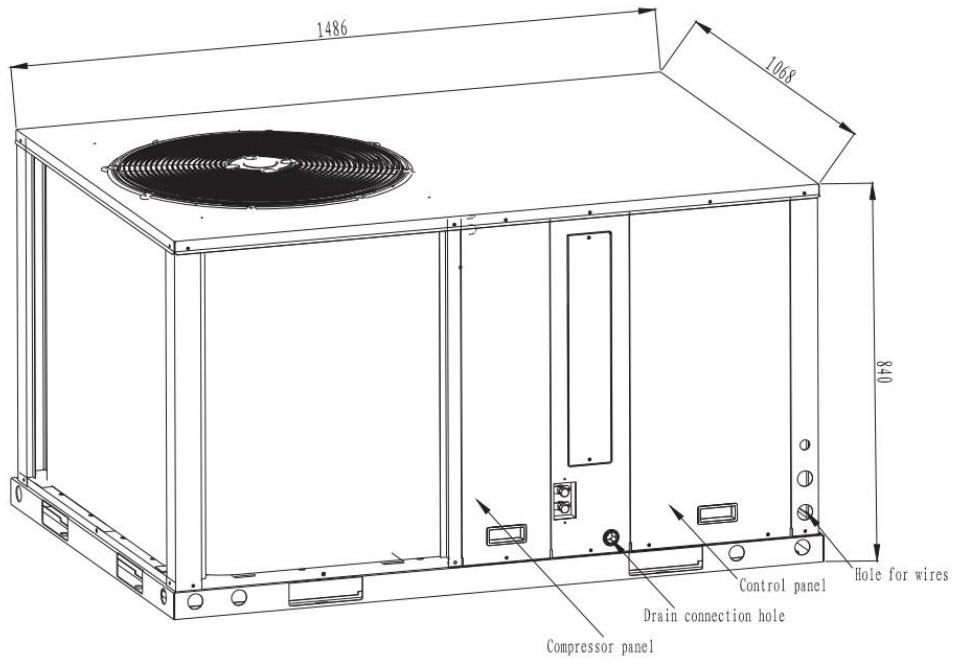


Rooftop Package Unit



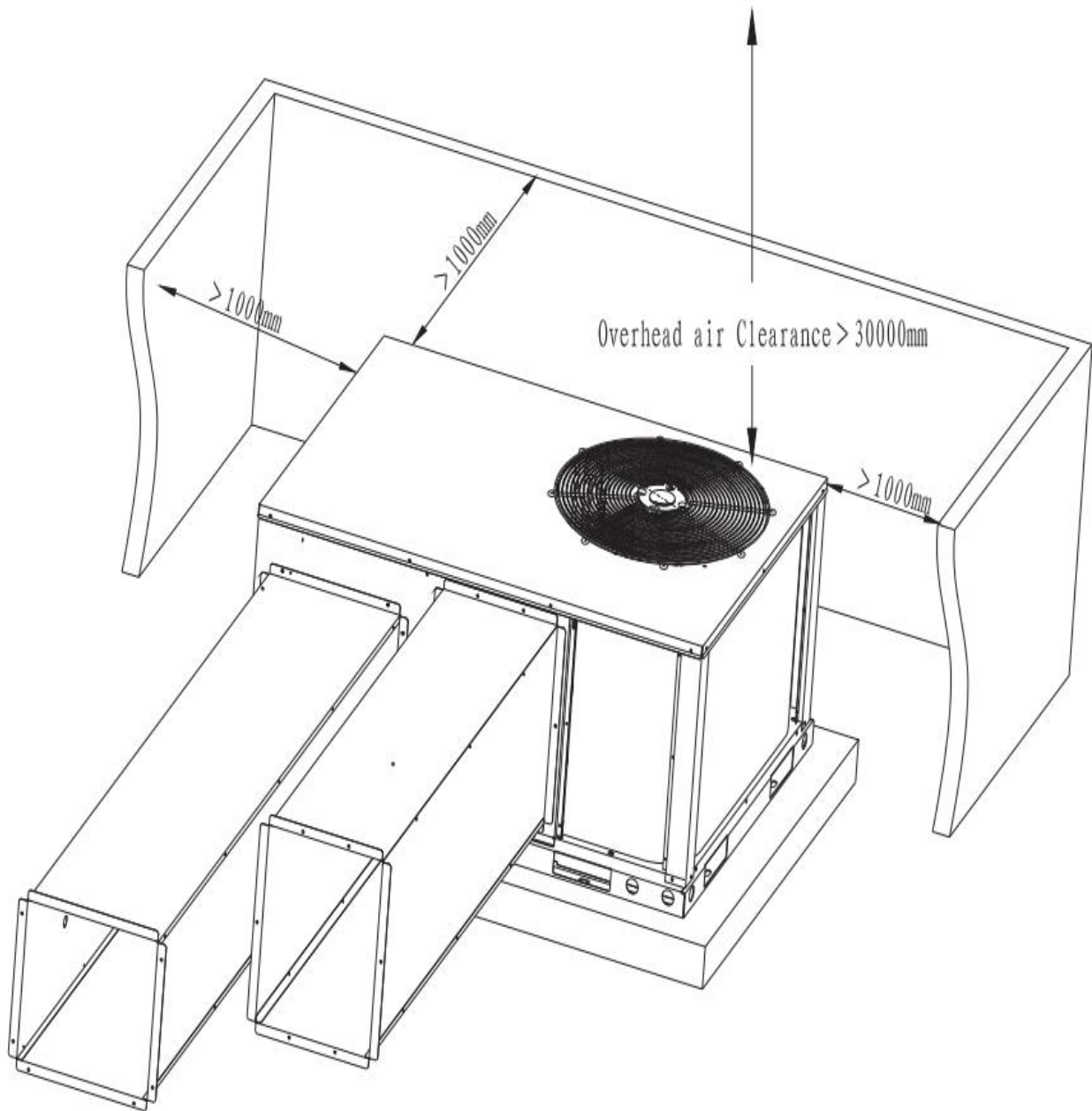
Rooftop Package Unit

5Tons H/P Units



Rooftop Package Unit

4.2 Installation base dimension



5. Electric characteristics

Nominal ton		3TONS	5TONS
Model type		H/P	H/P
Type of flow		Hor.	Hor.
Unit main power	VOL	208-230V	208-230V
	Hz	60	60
Applicable voltage	Max.	253	253
	Min.	187	187
Compressor motor	STC	15	21
	RNC	8.85	14.8
	IPT	1.94	3.96
Evaporator fan motor	RNC	1.3	2.8
	IPT	0.18	0.35
Condenser fan motor	RNC	0.9	1.5
	IPT	0.11	0.23

- VOL: Unit Power Supply Rated Voltage (V)
- HZ: Frequency (HZ)
- STC: Starting Current (A)
- RNC: Running Current (A)
- IPT: Input (kw)

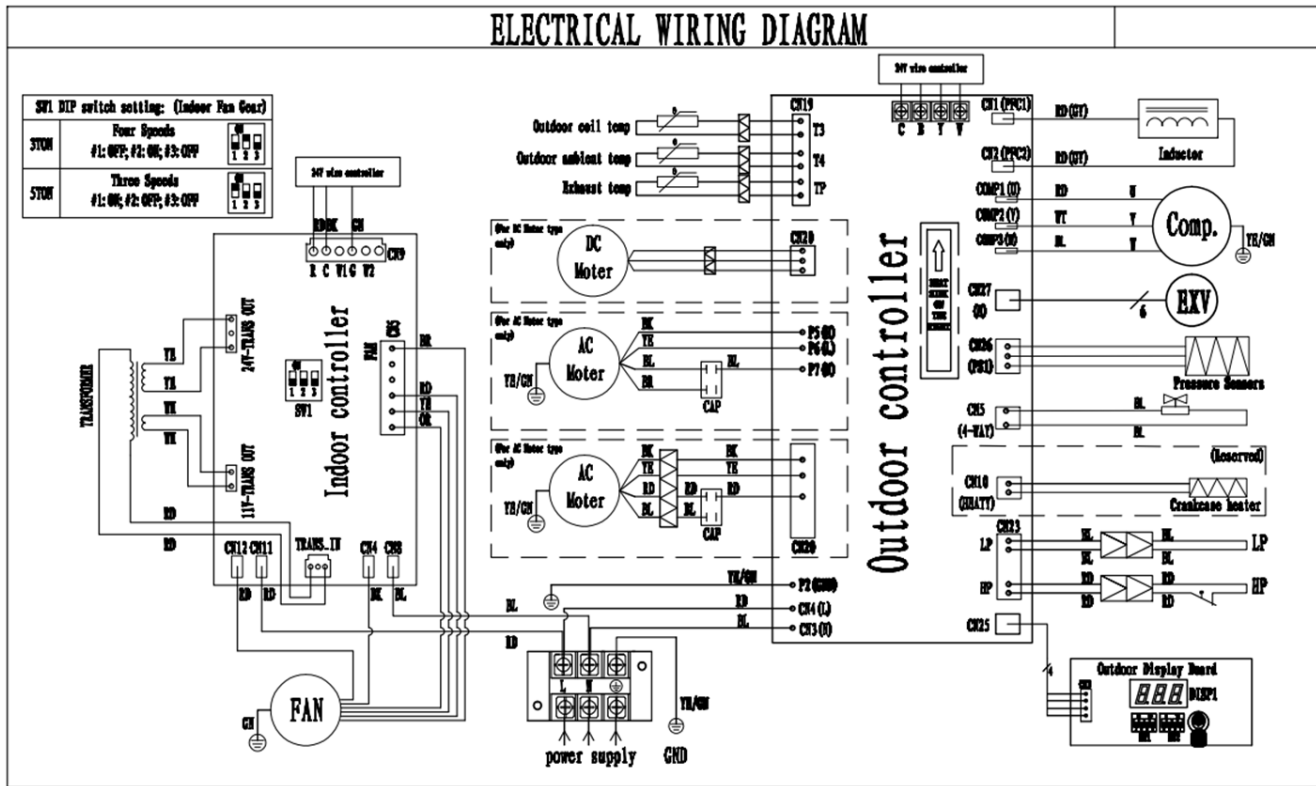
Main Power Supply

Model type		Unit main power	Main power switch	Fuse	Wires for power supplies	Type of wires
3Tons	C/O H/P	220V 1N ~ 60Hz	50A	40A	3×16mm ² +2×10mm ²	3×UL1015 5AWG 2×UL1015 7AWG
4Tons	C/O H/P	220V 1N ~ 60Hz	50A	40A	3×16mm ² +2×10mm ²	3×UL1015 5AWG 2×UL1015 7AWG
5Tons	C/O H/P	220V 1N ~ 60Hz	63A	50A	3×16mm ² +2×10mm ²	3×UL1015 5AWG 2×UL1015 7AWG

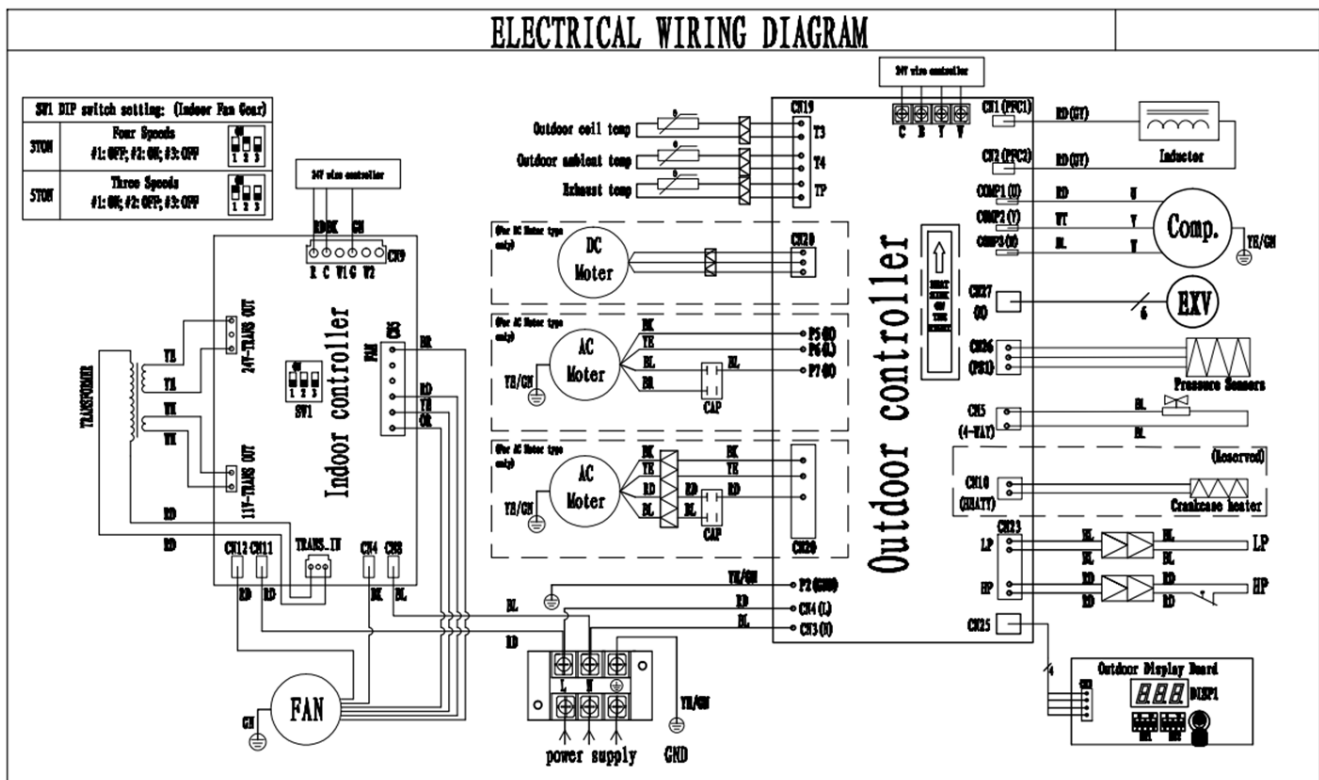
Rooftop Package Unit

6. Wiring diagrams and field wiring

APRI836J0A-GTI140



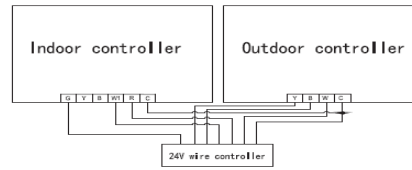
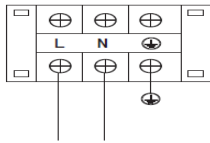
APRI860J0A-GMI160



Field wiring

- Power supply (For Inverter Units)

220V 1N ~ 60Hz
3/4/5 Tons H/P



W / W1: Heat relay
B: Changover valve
Y: Compressor contactor
G: Fan relay
LH: Low wind fan relay
C: 24VAC common
R: Power

Fig.6-3

- Suggestion: Thermostat choose electrical thermostat series of honeywell, such as RTH111、RTH2300/RTH221、TH5220D.

7. Accessories

Name of accessories	Qty	Shape
Manual	1	
Drain pipe	1	
Snap ring	1	
Drain joint	1	

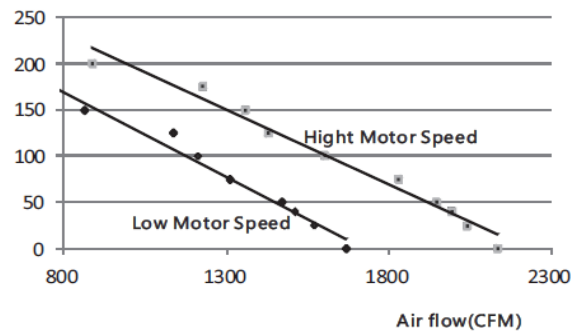
8. Static pressure and air flow

Air flow APRI836(APRI860)

For 220V 1N ~ 60Hz
3 Tons H/P Units

Static pressure (Pa)	Hight Motor Speed		LOW Motor Speed	
	Air flow (CFM)	Brake power (kW)	Air flow (CFM)	Brake power (kW)
0	2133	297	1668	229
25	2037	293	1571	224
40	1990	291	1510	221
50	1945	289	1471	219
75	1830	284	1310	214
100	1600	276	1214	208
125	1428	270	1138	204
150	1358	264	866	193
175	1228	259	730	187
200	889	245	-	-

Static pressure(Pa)

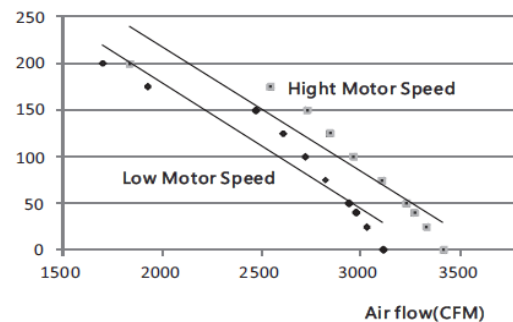


- Curve diagram of static pressure, air flow volumn

For 220V 1N ~ 60Hz
5 Tons H/P Units

Static pressure (Pa)	Hight Motor Speed		LOW Motor Speed	
	Air flow (CFM)	Brake power (kW)	Air flow (CFM)	Brake power (kW)
0	3416	647	3112	549
25	3329	639	3030	543
40	3270	633	2977	539
50	3228	629	2941	536
75	3108	616	2821	525
100	2964	601	2720	519
125	2843	590	2608	509
150	2727	590	2472	499
175	2546	575	1928	464
200	1834	510	1700	449

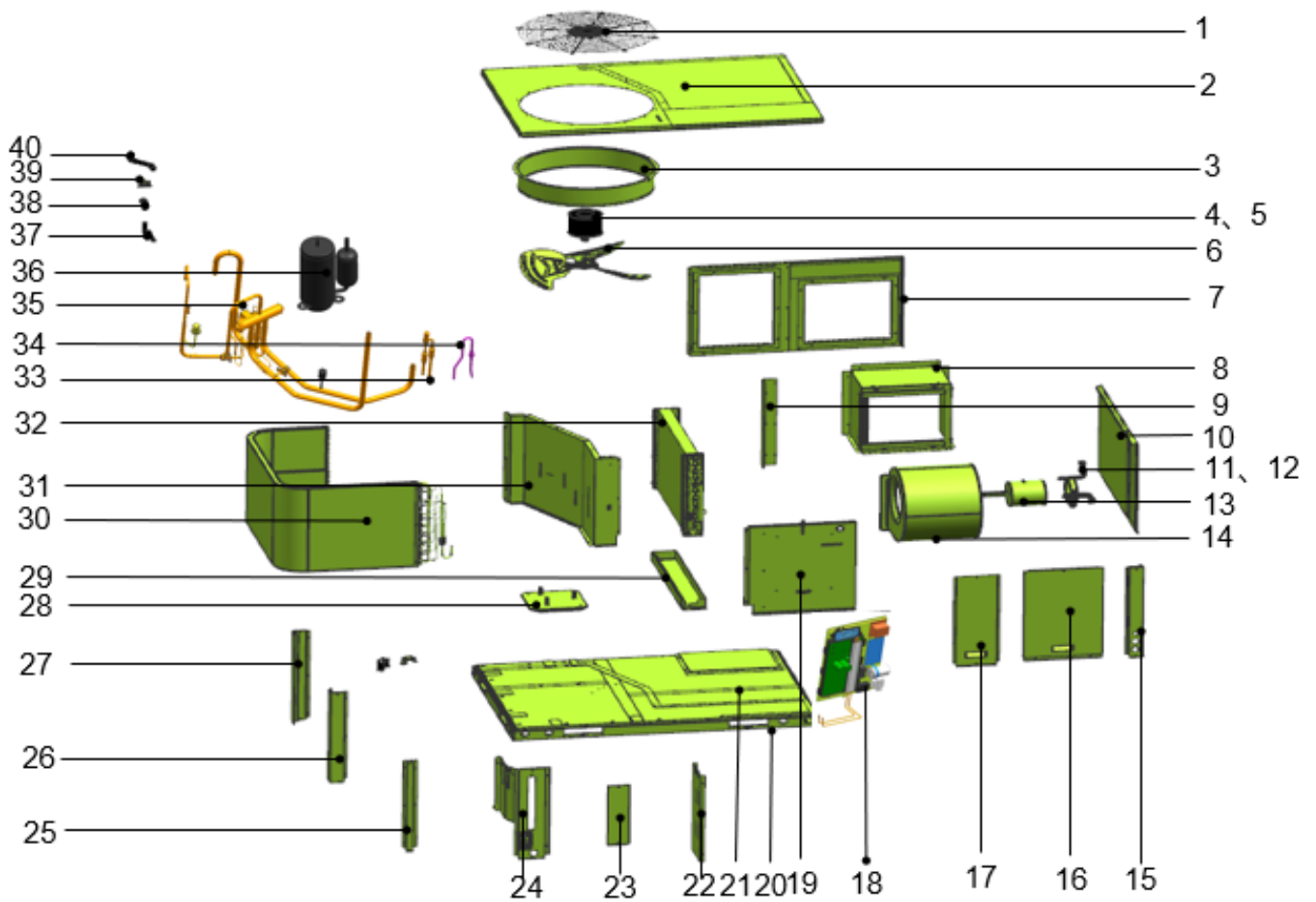
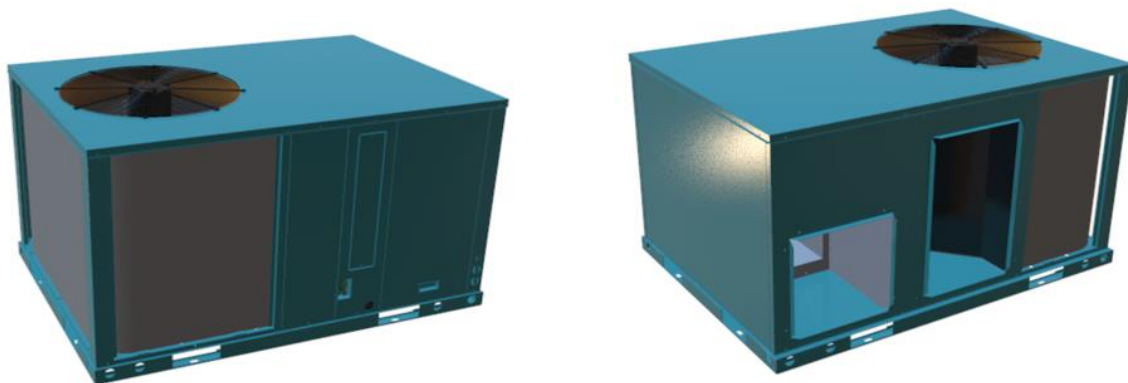
Static pressure(Pa)



- Curve diagram of static pressure, air flow volumn

9. Exploded view

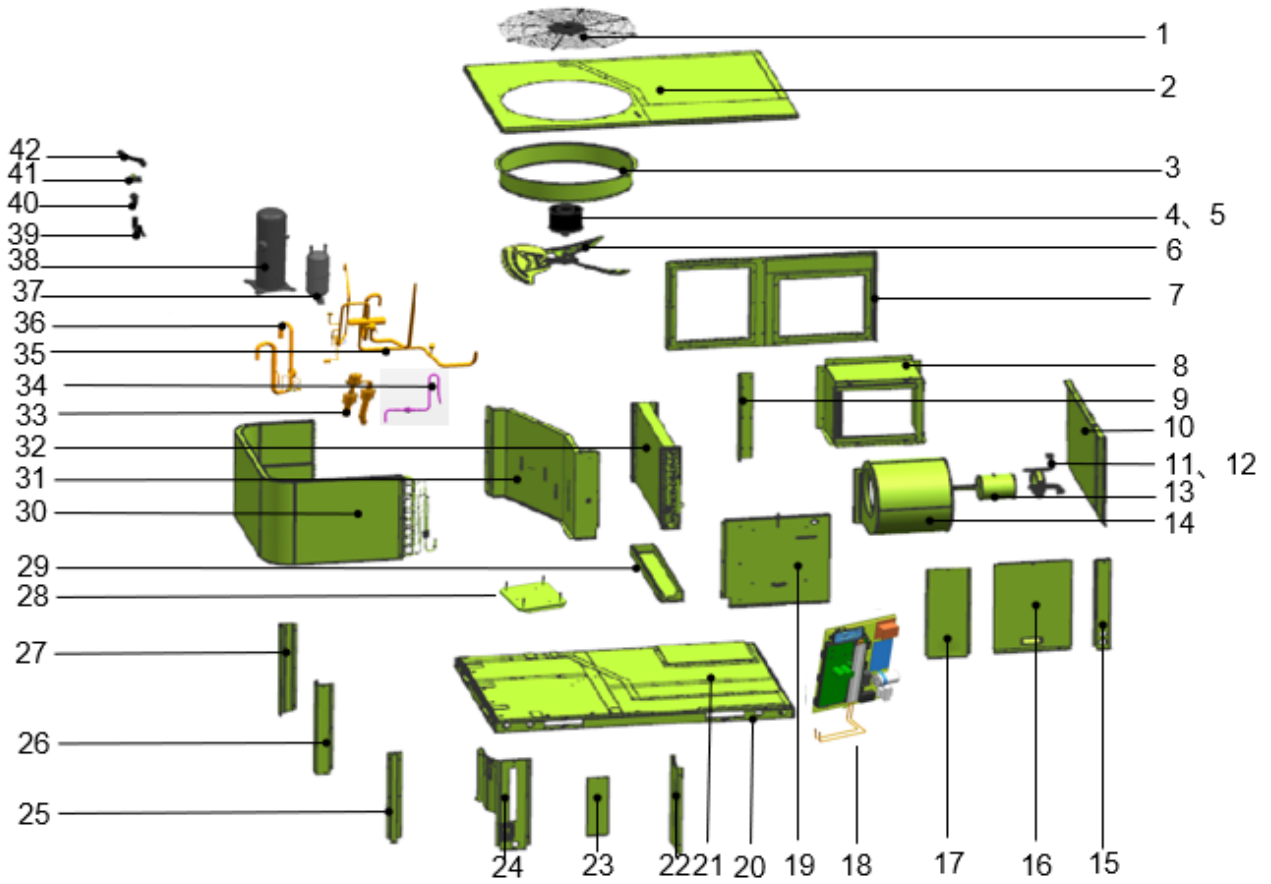
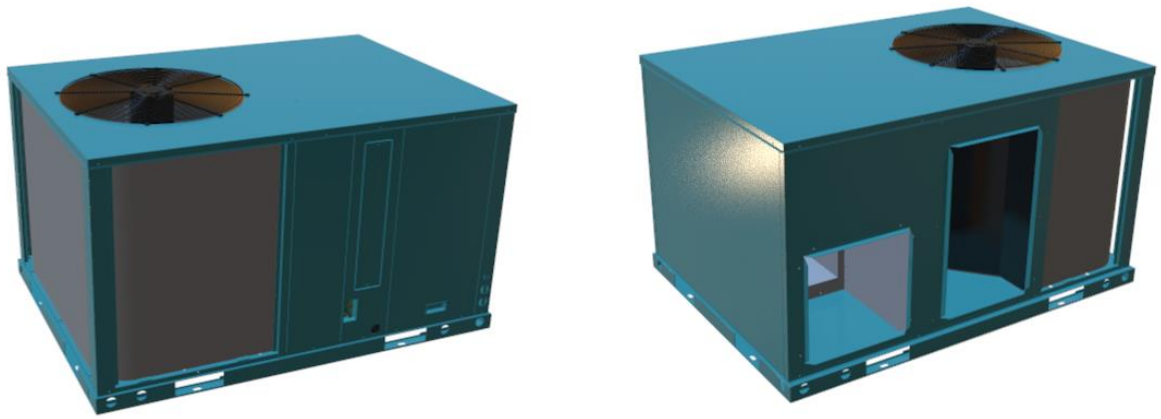
APRI836J0A-GTI140



Rooftop Package Unit

No.	Part Name	Quantity	No.	Part Name	Quantity
1	Outer fan grille	1	21	Bottom plate with cotton component	1
2	Top cover cotton component	1	22	Electronically controlled sealing plate welding parts	1
3	Air guide ring assembly	1	23	Sealing plate cotton assembly	1
4	Outdoor fan motor	1	24	Front column applicator assembly 2	1
5	Outdoor fan motor pedestal	1	25	Front column 1	1
6	Axial fan blade	1	26	Left column 1	1
7	Air outlet side panel cotton assembly	1	27	Left column 2	1
8	Air duct component	1	28	Compressor base weldment	1
8.1	Air duct side plate 1	1	29	Water tray cotton assembly	1
8.2	Air duct side plate 2	1	30	Condenser unit	1
8.3	Indoor fan motor upper plate	1	31	Middle partition cotton assembly 1	1
8.4	Indoor fan motor down plate	1	32	Evaporator component	1
8.5	Indoor fan motor rear plate	1	33	TXV component	1
9	Evaporator sealing plate with cotton component	1	33.1	Electronic expansion valve	1
10	Right side panel cotton component	1	34	Piston component	1
11	Indoor fan motor fixed ring	1	34.1	One way piston	1
12	Indoor fan motor fixed girder components	3	35	Four way valve weilding components	1
13	Indoor fan motor	1	35.1	Discharge pipe components	1
14	Indoor fan motor volute	1	35.1.1	Needle valve	1
15	Front column applicator assembly 3	1	35.1.2	High Pressure Switch	1
16	Inner cover cotton assembly	1	35.2	Air return pipe	1
17	Outer cover	1	35.2.1	Needle valve assembly	1
18	Electric control box components	1	35.3	Four way valve component	1
18.1	Main PCB pedestal	1	35.3.1	4-way valve	1
18.2	Transformer	1	35.4	Pressure sensor	1
18.3	Electric control board assembly(Outdoor PCB)	1	36	Inverter compressor	1
18.4	Display board	1	37	Drainage elbow	1
18.5	Indoor PCB	1	38	Water outlet port	1
18.6	Reactor	1	39	Drain connector	1
19	Middle partition cotton assembly 2	1	40	Rubber tube	1
20	Bottom girder component	1			

APRI860J0A-GMI160



Rooftop Package Unit

No.	Part Name	Quantity	No.	Part Name	Quantity
1	Outer fan grille	1	21	Bottom plate with cotton component	1
2	Top cover cotton component	1	22	Electronically controlled sealing plate welding parts	1
3	Air guide ring assembly	1	23	Sealing plate cotton assembly	1
4	Outdoor fan motor	1	24	Front column applicator assembly 2	1
5	Outdoor fan motor pedestal	1	25	Front column 1	1
6	Axial fan blade	1	26	Left column 1	1
7	Air outlet side panel cotton assembly	1	27	Left column 2	1
8	Air duct component	1	28	Compressor base weldment	1
8.1	Air duct side plate 1	1	29	Water tray cotton assembly	1
8.2	Air duct side plate 2	1	30	Condenser unit	1
8.3	Indoor fan motor upper plate	1	31	Middle partition cotton assembly 1	1
8.4	Indoor fan motor down plate	1	32	Evaporator component	1
8.5	Indoor fan motor rear plate	1	33	TXV component	1
9	Evaporator sealing plate applicator assembly	1	33.1	Electronic expansion valve	1
10	Right side panel cotton component	1	34	Piston component	1
11	Indoor fan motor fixed ring	1	34.1	One way piston	1
12	Indoor fan motor fixed girder components	3	35	Four way valve weilding components	1
13	Indoor fan motor	1	35.1	Discharge pipe components	1
14	Indoor fan motor volute	1	35.1.1	Needle valve	1
15	Front column applicator assembly 3	1	35.1.2	High Pressure Switch	1
16	Inner cover cotton assembly	1	35.2	Four way valve component	1
17	Outer cover	1	35.2.1	4-way valve	1
18	Electric control box components	1	35.3	Pressure sensor	1
18.1	Main PCB pedestal	1	36	Suction pipe	1
18.2	Transformer	1	36.1	Needle valve	1
18.3	Electric control board assembly(Outdoor PCB)	1	37	Gas-liquid seperator	1
18.4	Display board	1	38	Inverter compressor	1
18.5	Indoor PCB	1	39	Drainage elbow	1
18.6	Reactor	1	40	Water outlet port	1
19	Middle partition cotton assembly 2	1	41	Drain connector	1
20	Bottom girder component	1	42	rubber tube	1

10. Troubleshooting

The fault codes as follows:

Digital display	Fault or protect definition
E4	Failure in temperature sensor T4
E6	Failure in temperature sensor T3 in condenser
E8	Failure in temperature sensor T5 on exhaust pipe
E9	AC over voltage / under voltage.
E10	Failure in EEPROM of outdoor unit
E12	Failure in sensor on IPM
E13	Failure in pressure sensor of HLP
E14	T3/T5 condenser sensor disconnected
E15	Malfunction of HPS high pressure switch
H0	Failure in communication between outdoor main control and branch control
H1	Abnormal turn-off or failure in rebooting due to the high temperature of T3 in condenser (Cooling)
H2	Abnormal turn-off or failure in rebooting due to malfunction of high pressure switch
H3	Abnormal turn-off or failure in rebooting due to high pressure in condenser (heating)
H4	Abnormal turn-off or failure in rebooting due to high temperature in IPM modules
H5	Abnormal turn-off or failure in rebooting due to low pressure of refrigerant
H6	Abnormal turn-off or failure in rebooting due to high temperature in T5 exhaust pipe
H7	Abnormal turn-off or failure in rebooting due to abnormal refrigerant status in compressor
H8	T3 condenser sensor disconnected
H12	TP condenser sensor disconnected
P1	Protection of high pressure switch
P2	Protection of running of refrigerant in low pressure (cooling)
P3	Overcurrent protection
P4	Protection of T5 exhaust pipe for high temperature
P5	Protection of T3 condenser for high temperature (cooling)
P6	Protection of IPM
P8	Excessive IPM temperature protection
P9	Failure in DC motor and fan
P12	standby due to abnormal refrigerant status in compressor
P13	standby due to abnormal high pressure in condenser (heating)
P14	high compression ratio protection
P15	low compression ratio protection
P16	Failure in starting due to inadequate ambient temperature

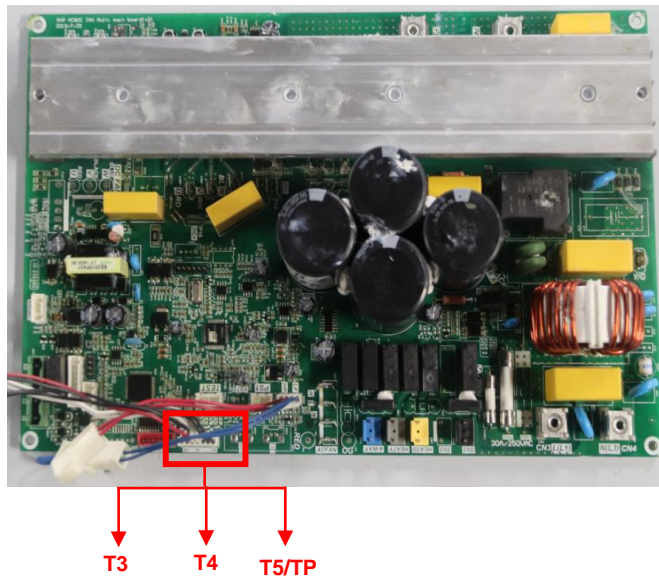
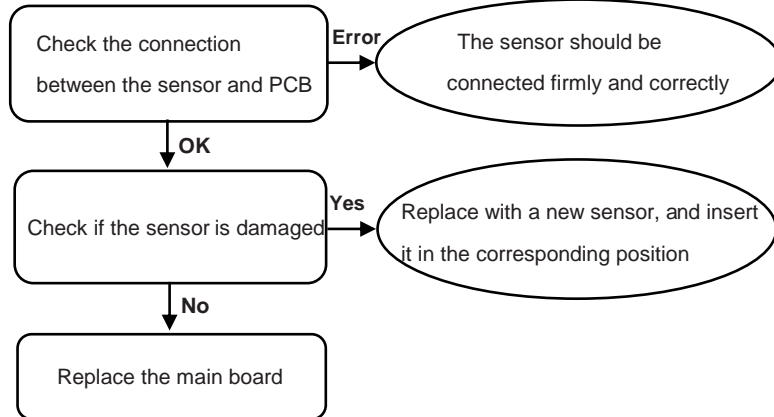
Rooftop Package Unit

L1	DC cable bus low/high voltage protection
L2	DC High Voltage rotation
L4	Problems of MCE / synchronization / starting of compressor
L5	no speed
L7	Protection of compressor due to phase loss
L8	Compressor stalling
L9	Restriction on frequency for high pressure in condensation
LA	Restriction on frequency for problems of electrical pressure
LC	Restriction on frequency for inadequate temperature of condenser T3
LD	Restriction on frequency for inadequate exhaust temperature of sensor T5
LE	Restriction on frequency of IPM for high temperature or inadequate temperature
LF	Current frequency limiting
d0	oil return
dF	Defrosting
dH	Forced running

E4/E6/E8 (T4/T3/T5 temperature sensors error)

Diagnosis

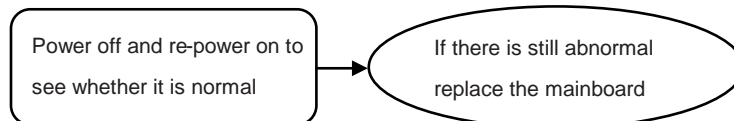
Handling



E10 (EEPROM failure)

Diagnosis

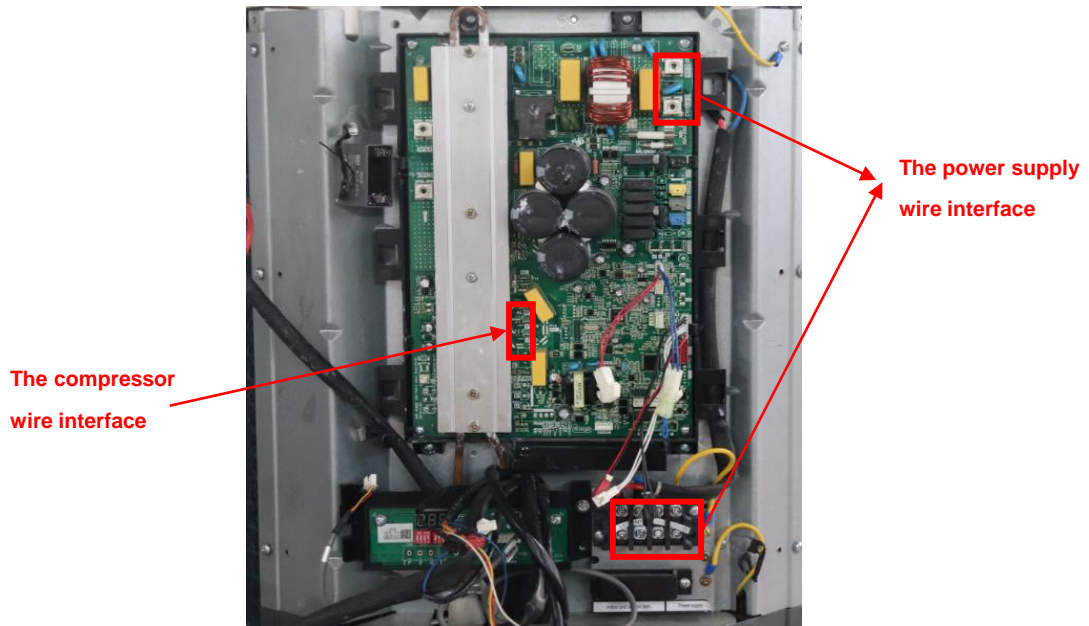
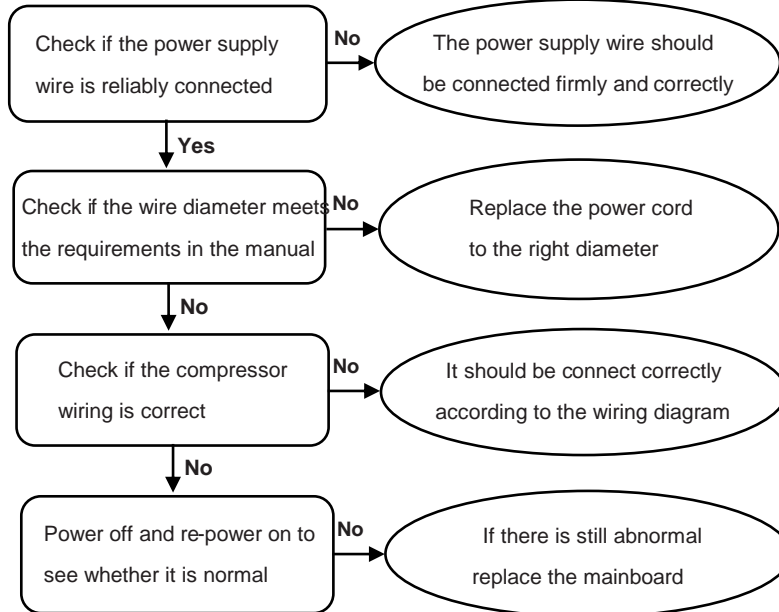
Handling



E9 (AC overvoltage/undervoltage protection)

Diagnosis

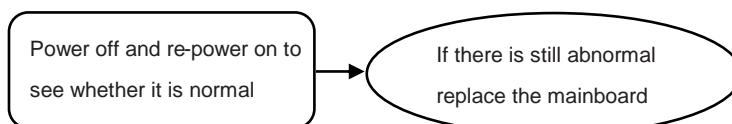
Handling



E12 (IPM modular sensor error)

Diagnosis

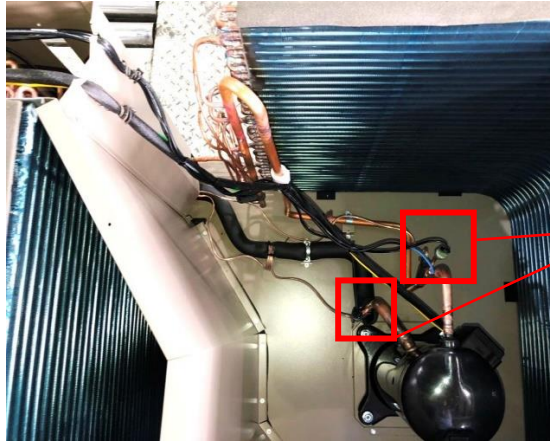
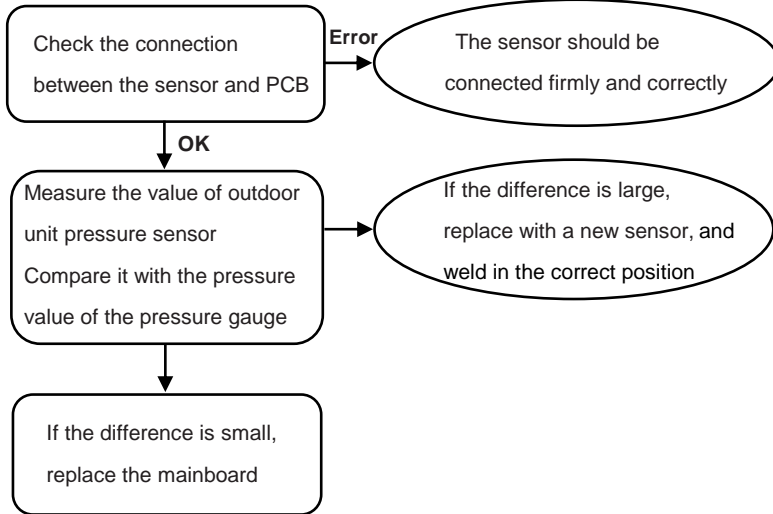
Handling



E13 (HP/LP Pressure sensor error)

Diagnosis

Handling

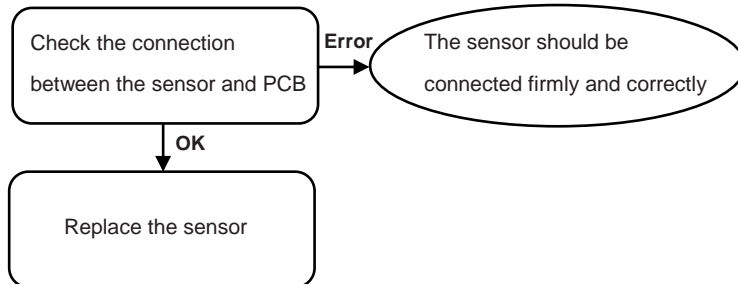


The pressure sensor should be soldered in the correct position

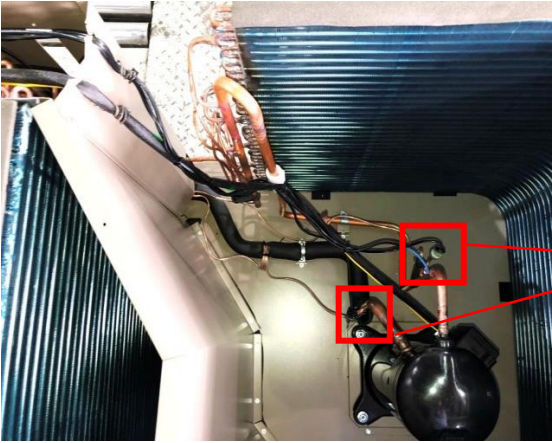
E14/H8/H12 (T3 or T5 sensor disconnect error)

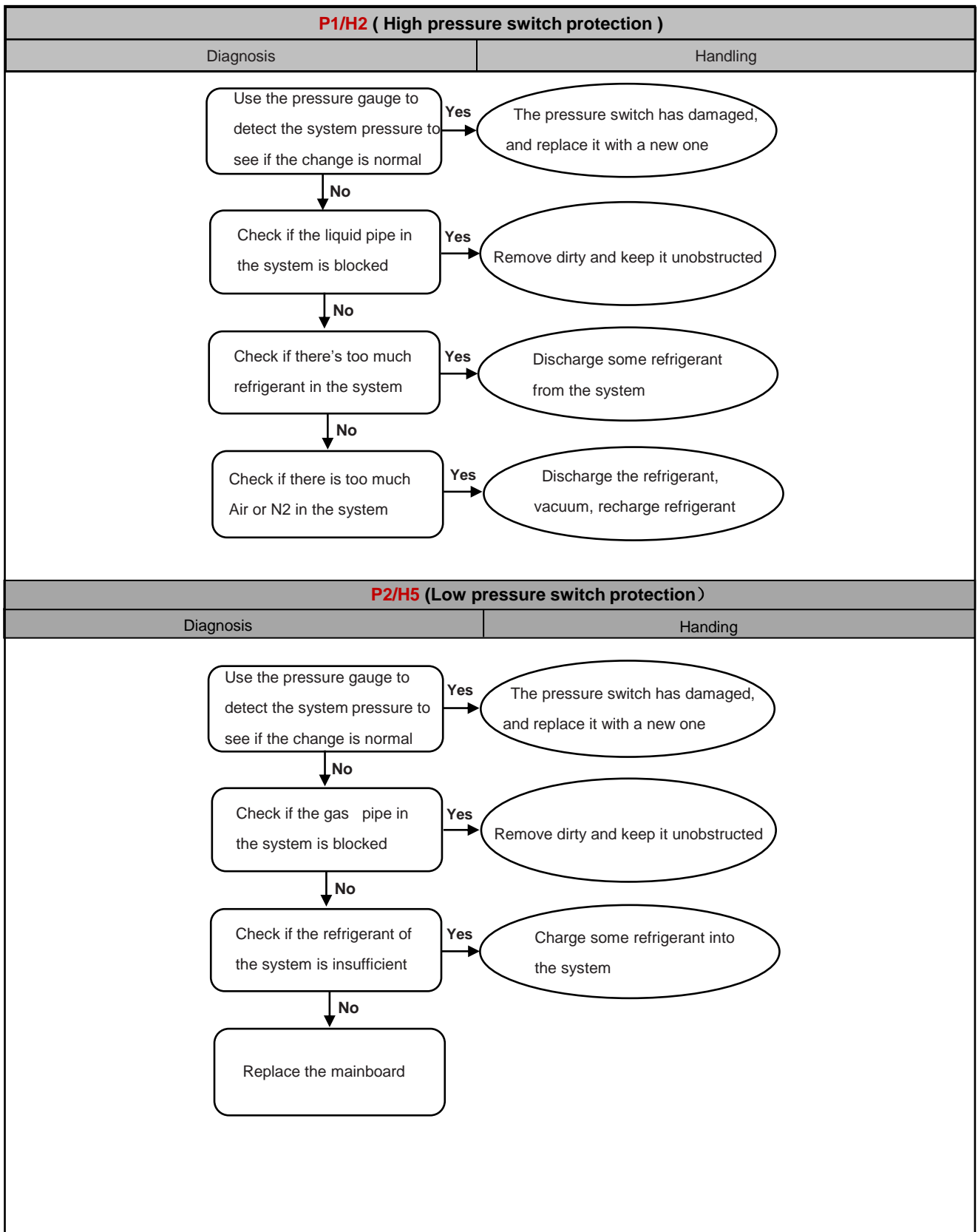
Diagnosis

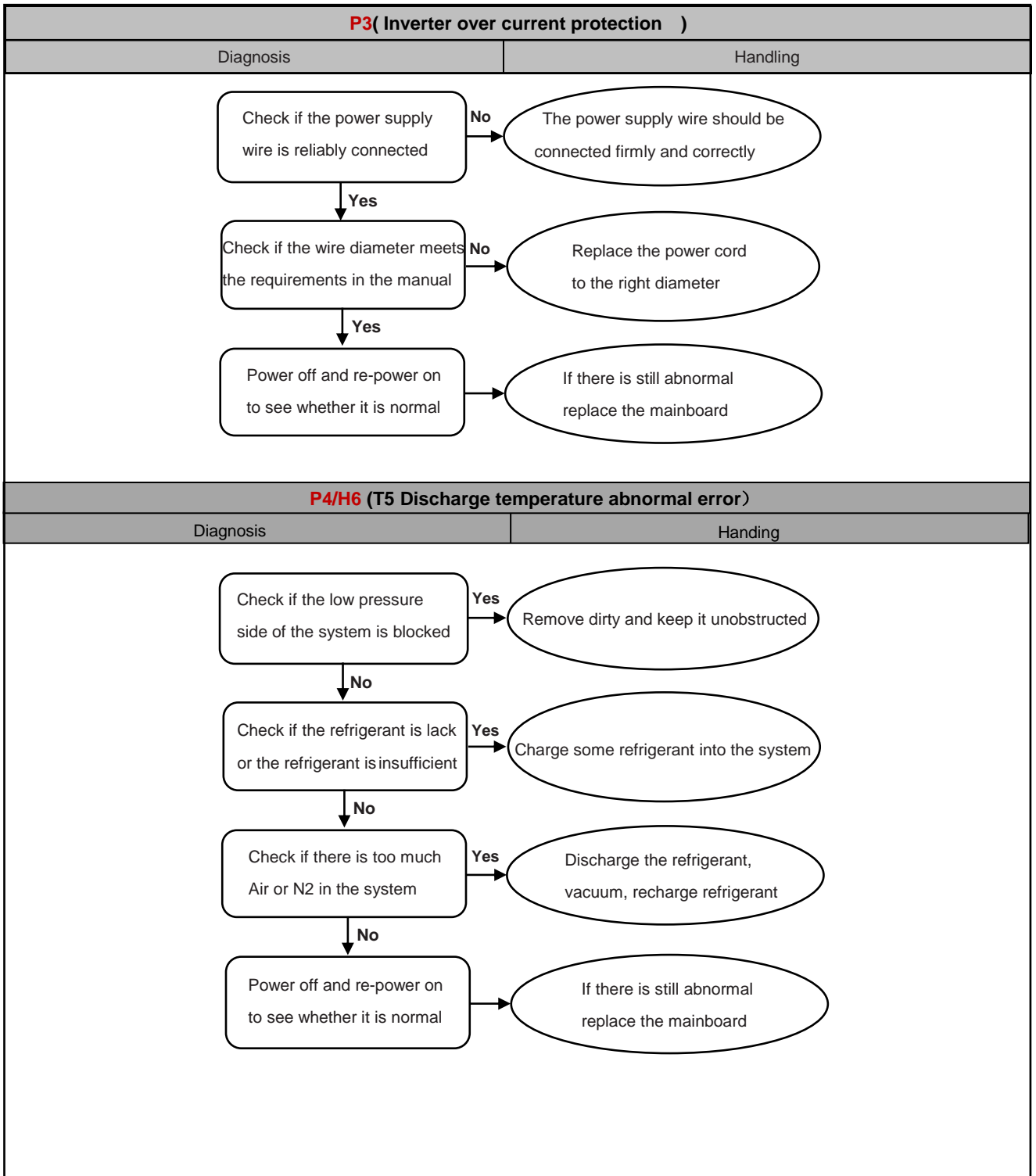
Handling

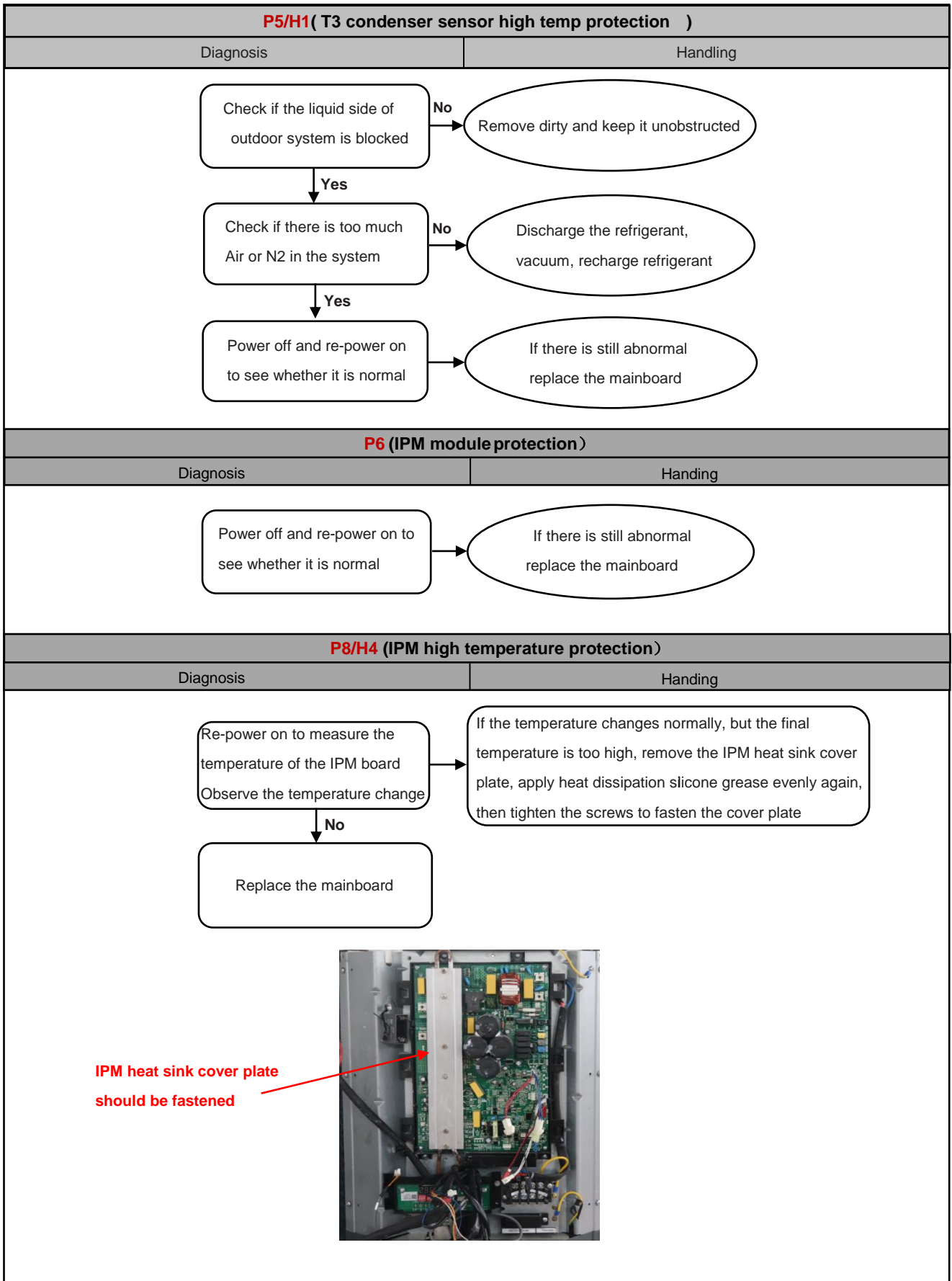


Rooftop Package Unit

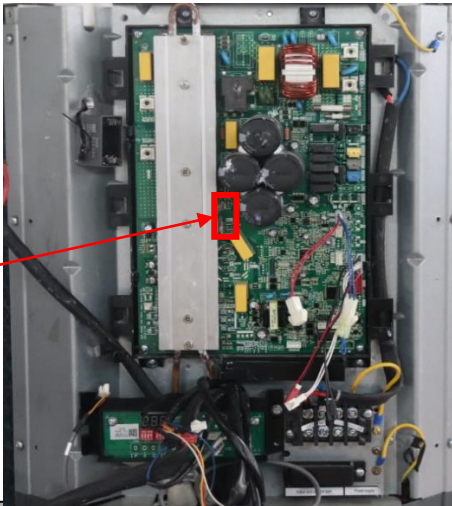
E15 (High pressure switchcondenser sensor disconnected)	
Diagnosis	Handling
<p>Check the connection between the switch and PCB</p> <p style="text-align: center;">↓ OK</p> <p>Try to short circuit the pressure switch</p> <p style="text-align: center;">↓</p> <p>If the error disappears, check if the switch is damaged</p>	<p>Error → The switch should be connected firmly and correctly</p> <p>→ If there is still abnormal, replace the mainboard</p> <p>→ If it is damaged, replace with a new one, and solder it in the correct position</p>
	
H0 (Communication error of main chip and IPM DSP)	
Diagnosis	Handling
<p>Power off and re-power on to see whether it is normal</p>	<p>→ If there is still abnormal replace the mainboard</p>

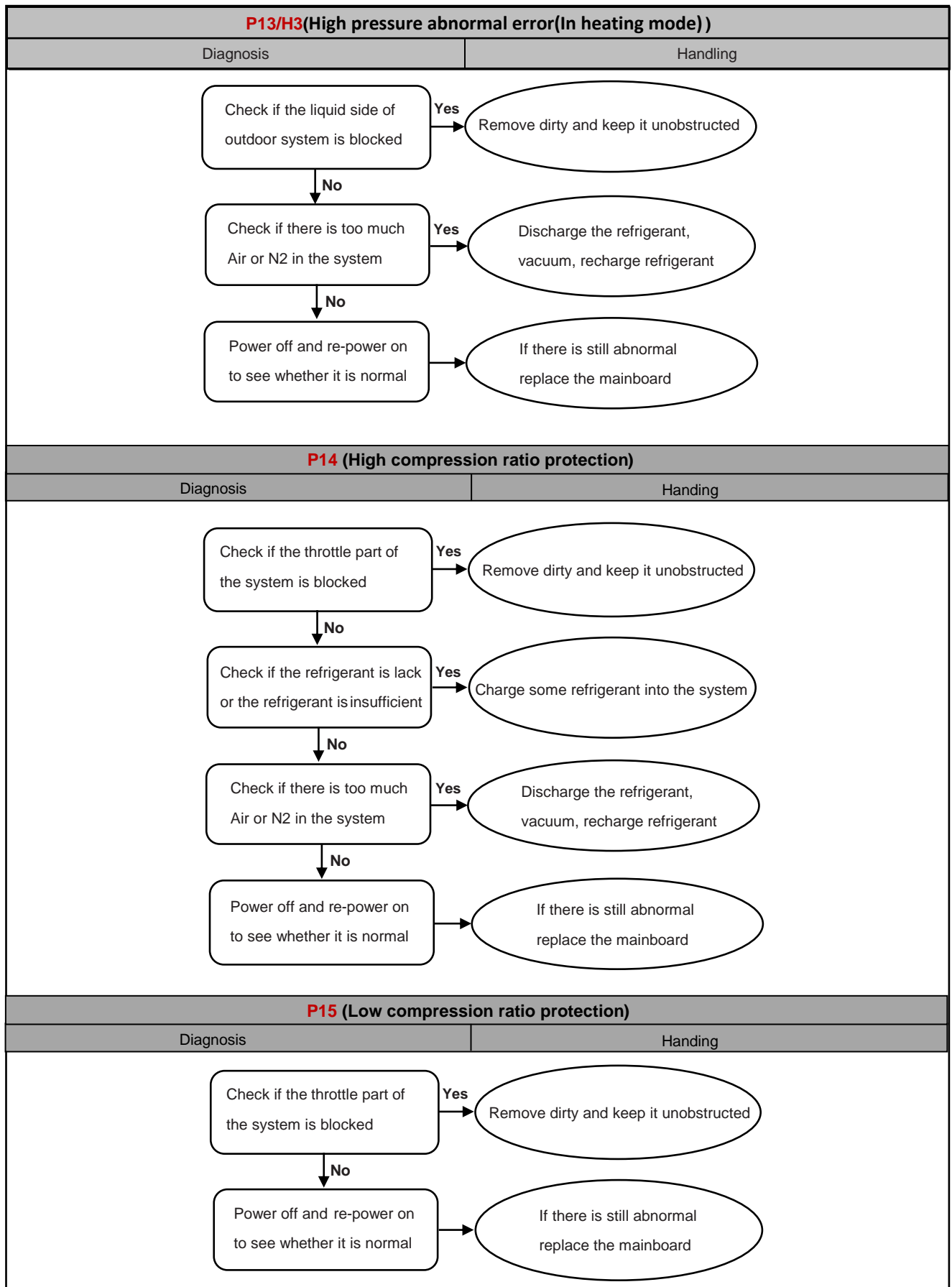




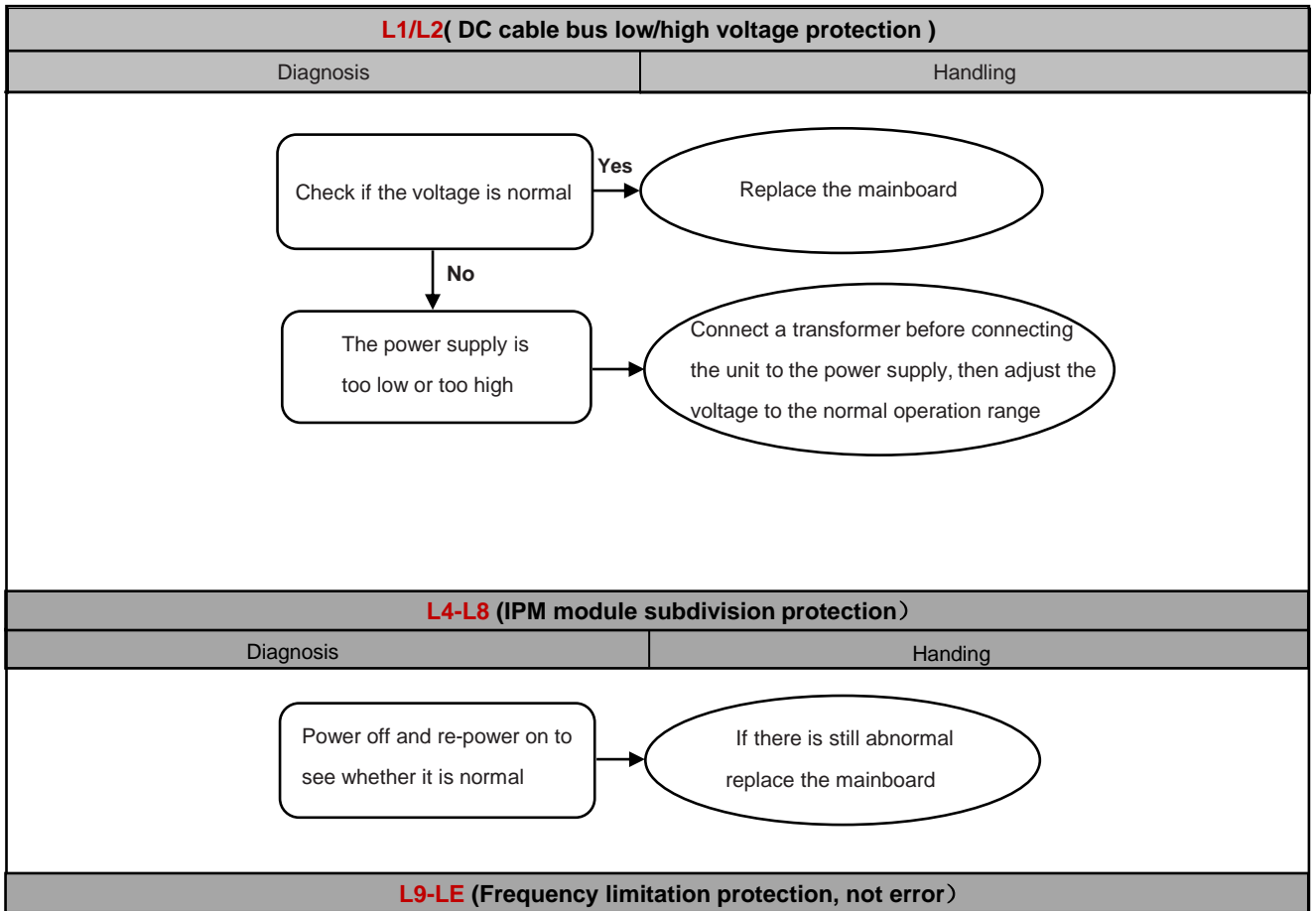


Rooftop Package Unit

P9 (DC fan motor error)	
Diagnosis	Handling
<p>Check if the DC fan motor wiring is correct</p> <p style="text-align: right;">No</p> <p style="text-align: center;">↓ Yes</p> <p>Power off and re-power on to see whether it is normal</p> <p style="text-align: right;">No</p> <p style="text-align: center;">↓ Yes</p> <p>Check if the DC fan motor is damaged</p>	<p style="text-align: center;">It should be connect correctly according to the wiring diagram</p> <p style="text-align: center;">Replace the mainboard</p> <p style="text-align: center;">If it is damaged, replace with a new one</p>
 <p style="color: red; font-weight: bold;">The DC fan motor wire interface</p>	
P12/H7 (Wet operation error)	
Diagnosis	Handling
<p>Power off and re-power on to see whether it is normal</p>	



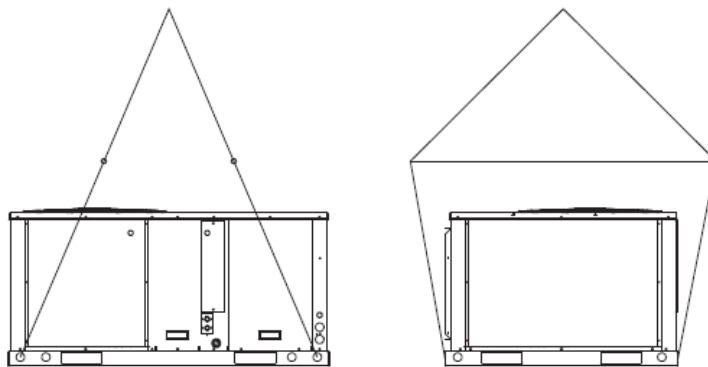
Rooftop Package Unit



11. Installation

1. Lifting

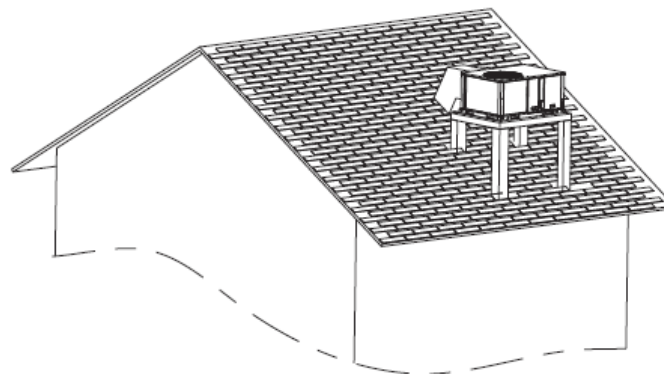
- Rigging cables should have adequate capability to resist 3 times weight of unit. Before lift, please check and ensure that hooks are holding tightly to unit and lifting angles are no less than 60°.
- Cloth material or hard-paper should be padded in the contact place between unit and rigging cable. Rigging cable should be entwined a round at the hook for prevent danger by cable slip because of weight unbalance.
- During lifting, anyone forbidden lingering under the lifting unit.



2. Rooftop unit

- For roof top applications using a field fabricated frame and ducts, use the following procedure:
- The frame must be located and secured by bolting or welding to the roof. Flashing is required.
- The hole in the roof must be prepared in advance of installing the unit.
- Secure the ducts to the roof.
- Place the unit on the frame or roof curb.
- Secure the unit to the frame or roof curb.
- Insulate any ductwork outside of the structure with at least two (2) inches of insulation and then weatherproof. There must be a weatherproof seal where the duct enters the structure.
- Complete the installation according to the instructions in the following sections of this manual.

Typical rooftop application with frame



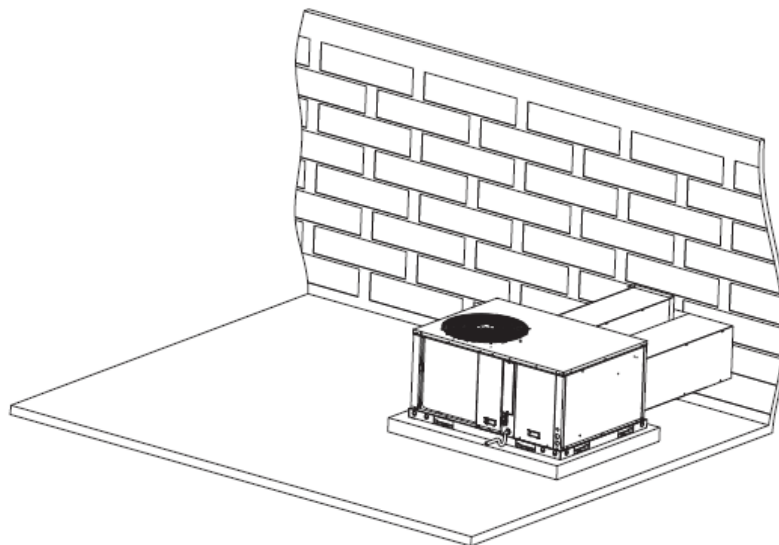
3. Ground level-horizontal unit

- For ground level installations, the unit should be positioned on a pad in the size of the unit or larger. The unit must be level on the pad. The pad must not come in contact with the structure. Be sure the outdoor portion of the supply and return air ducts are as short as possible.

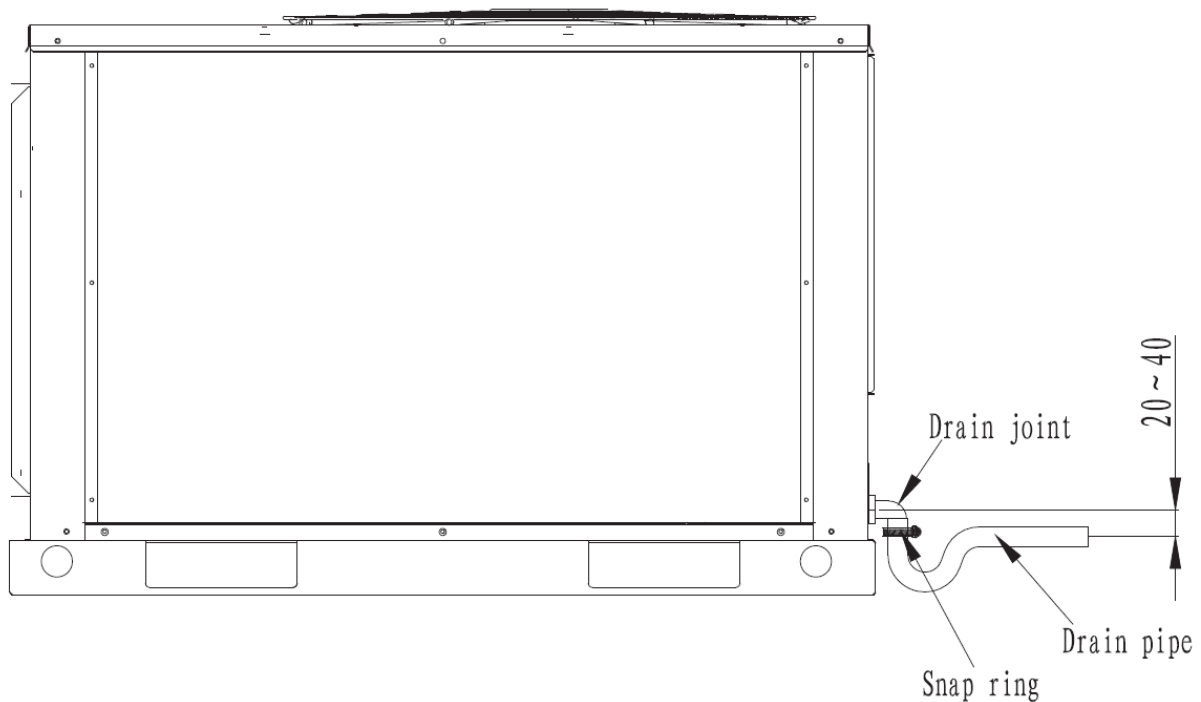
1

- Proceed with the installation as follows:
- Place the unit on the pad.
- Attach the supply and return air ducts to the unit.
- Insulate any ductwork outside of the structure with at least 2 inches of insulation and weatherproof. There must be a weatherproof seal where the duct enters the structure.

Typical ground level application



4. Condensate drain piping



Rooftop Package Unit

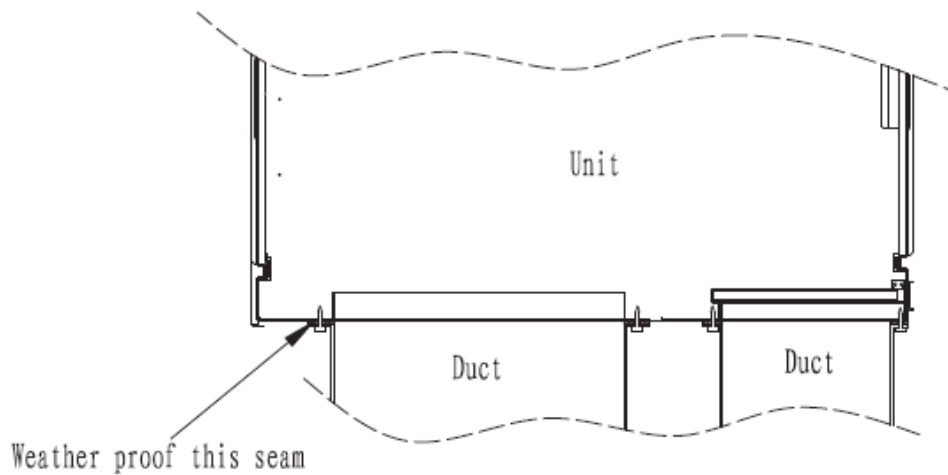
5. Ductwork

- **Attaching horizontal ductwork to unit**

- All conditioned air ductwork should be insulated to minimize heating and cooling duct losses. Use a minimum of two (2) inches of insulation with a vapor barrier. The outside ductwork
- must be weatherproofed between the unit and the building.
- When attaching ductwork to a horizontal unit, provide a flexible watertight connection to

💡 NOTE

Do not draw the canvas taut between the solid ducts.



12. Controller

- 24V conventional thermostat\wire controller
 - **Required components**
 - The following components are required: main power fuses, conduit coupling, and field supplied room thermostat.

Suggestion:Thermostat choose Non programmed electrical thermostat series of Honeywell such as RTH111, RTH2300/RTH221, TH5220D.





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