

# APRI Series Rooftop Inverter Unit Technical & Service Manual Volume 3

**208-230V/1/60Hz**  
(50Hz on selected models)



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# **MAINTENANCE**

# MAINTENANCE

## 1 MALFUNCTION TABLE

### 1.1 MAIN CONTROL MALFUNCTION

Table 1 Fault Display on Wired Controller

No.	Error code	Malfunction name	Origin of malfunction signal	Control description
1	E1	High pressure protection	High pressure switch	When unit detects the high pressure switch is cut off for 3s successively, high pressure protection will occur. All the loads (except the 4-way valve in heating mode) will be switched off. In this case, all the buttons and remote control signals except ON/OFF button will be disabled and cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this protection.
2	E2	Freeze protection	Evaporator temperature sensor	If detecting that the evaporator temperature is lower than protective temperature value after the unit has been running for a period of time under cooling or dry mode, the unit will report this fault, in which case the compressor and condenser fan motor will be stopped. The unit will not run until evaporator temperature is higher than the protective temperature value and the compressor is stopped for 3min.
3	E3	Low pressure protection	Low pressure switch	If it is detected within 30s successively that the low-pressure switch is cut off under ON or standby state, the unit will report low pressure protection. If the fault occurs successively 3 times within 30min, the unit cannot be recovered automatically.
		Refrigerant lacking protection	/	If the unit reports system refrigerant lacking within 10min after turning on the unit, the unit will stop operation. If the fault occurs successively 3 times, the unit cannot be recovered automatically.
		Refrigerant recycling mode	/	If enter refrigerant recycling mode through special operation, E3 will be displayed. After exiting refrigerant recycling mode, the code will disappear.
4	E4	Compressor high discharge temperature protection	Compressor discharge temperature is high	If unit detects that the discharge temperature is higher than protective temperature value, the unit will report high discharge temperature protection. If the protection occurs over 6 times, the unit cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this protection.
5	E6	Communication malfunction	Communication between mainboards	If the mainboard does not receive data from the other mainboards, communication malfunction will be reported. If there is communication abnormality between display board (wired controller) and the unit, communication malfunction will be reported too.
6	E8	Malfunction of evaporator fan motor	Evaporator fan motor	If the unit does not receive signal from evaporator fan motor for 30s successively when the fan motor is operating, evaporator fan motor malfunction will be reported. In this case, the unit can automatically resume operation after stopping. If the malfunction occurs 6 times within one hour, the unit cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this malfunction.



No.	Error code	Malfunction name	Origin of malfunction signal	Control description
7	E9	Full water protection	Water level switch	If cut-off of water level switch is detected for 8s successively once energized, the system will enter full water protection. In this case, switch off the unit and then switch it on to eliminate this malfunction.
8	F0	Malfunction of indoor ambient temperature sensor at air return port	Indoor ambient temperature sensor	If the indoor ambient temperature sensor is detected of open circuit or short circuit for 5s successively, indoor ambient temperature sensor malfunction will be reported. The unit can automatically resume operation after the malfunction disappears. If indoor ambient temperature sensor malfunction occurs in fan mode, only the error code is displayed and the unit can work normally.
9	F1	Malfunction of evaporator temperature sensor	Evaporator temperature sensor	If the indoor evaporator temperature sensor is detected of open circuit or short circuit for 5s successively, evaporator temperature sensor malfunction will be reported. The unit can automatically resume operation after the malfunction disappears. If evaporator temperature sensor malfunction occurs in fan mode, only the error code is displayed and the indoor unit can work normally.
10	F2	Malfunction of condenser temperature sensor	Condenser temperature sensor	If the condenser temperature sensor is detected of open circuit or short circuit for 5s successively, condenser temperature sensor malfunction will be reported. The unit can automatically resume operation after the malfunction disappears. If condenser temperature sensor malfunction occurs in fan mode, only the error code is displayed and the unit can work normally.
11	F3	Malfunction of outdoor ambient temperature sensor	Outdoor ambient temperature sensor	If the outdoor ambient temperature sensor is detected of open circuit or short circuit for 5s successively, outdoor ambient temperature sensor malfunction will be reported. The unit can automatically resume operation after the malfunction disappears. If outdoor ambient temperature sensor malfunction occurs in fan mode, only the error code is displayed and the indoor unit can work normally.
12	F4	Malfunction of discharge temperature sensor	Discharge temperature sensor	If the discharge temperature sensor is detected of open circuit or short circuit for 5s successively after the compressor has been operating for 3min, discharge temperature sensor malfunction will be reported. The unit can automatically resume operation after the malfunction disappears.
13	F5	Malfunction wired controller temperature sensor	Wired controller	If the wired controller detects open circuit or short circuit of its temperature sensor for 5s successively, wired controller temperature sensor malfunction will be reported.
14	ee	Malfunction of drive memory chip	Drive board	If the memory chip of drive board is broken, the unit cannot be started. The unit cannot be recovered automatically. If the malfunction cannot be eliminated after switching off the unit and then energizing the unit for several times, please replace the drive board.
15	H3	Compressor overload protection	Compressor overload switch	If it is detected within 3s successively that the overload switch is cut off under ON or standby state, the unit will report overload protection. If the fault occurs successively 3 times, the unit cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this protection.

No.	Error code	Malfunction name	Origin of malfunction signal	Control description
16	H4	Overload protection	Evaporator temperature, condenser temperature	If unit detects that the tube temperature is higher than protective temperature value, the unit will report overload protection. The unit will not restart operation until tube temperature is lower than the protective temperature value and the compressor is stopped for 3min. If the protection occurs over 6 times, the unit cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this protection.
17	H6	Malfunction of condenser fan motor	Condenser fan motor	If the unit does not receive signal from condenser fan motor for 30s successively when the fan motor is operating, condenser fan motor malfunction will be reported. In this case, the unit can automatically resume operation after stopping. If the malfunction occurs 6 times within one hour, the unit cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this malfunction.
18	U7	Direction changing malfunction of 4-way valve	4-way valve	After the compressor starts operation in heating mode, if the unit detects the difference between evaporator temperature and indoor ambient temperature is lower than the protective value for 10min successively, direction changing malfunction of 4-way valve will be reported and the outdoor unit will stop operation. The unit can automatically resume operation in the first two malfunctions. If the malfunction occurs 3 times, the unit cannot be recovered automatically. Switch off the unit or re-energize the unit after cutting off power to eliminate this malfunction.
19	P6	Communication malfunction between main control board and drive board	Communication between main control board and drive board	If the outdoor main control board does not receive data from drive board, communication malfunction between main control and drive will be reported. This malfunction can be eliminated automatically.
20	EE	Malfunction of main control memory chip	Main control board	If the memory chip of main control board is broken, the unit cannot be started. The unit cannot be recovered automatically. If the malfunction cannot be eliminated after switching off the unit and then energizing the unit for several times, please replace the outdoor main control board.

## 1.2 DESCRIPTION OF DRIVE MALFUNCTION

Main board dual 8 numeral tube Display Codes for Unit

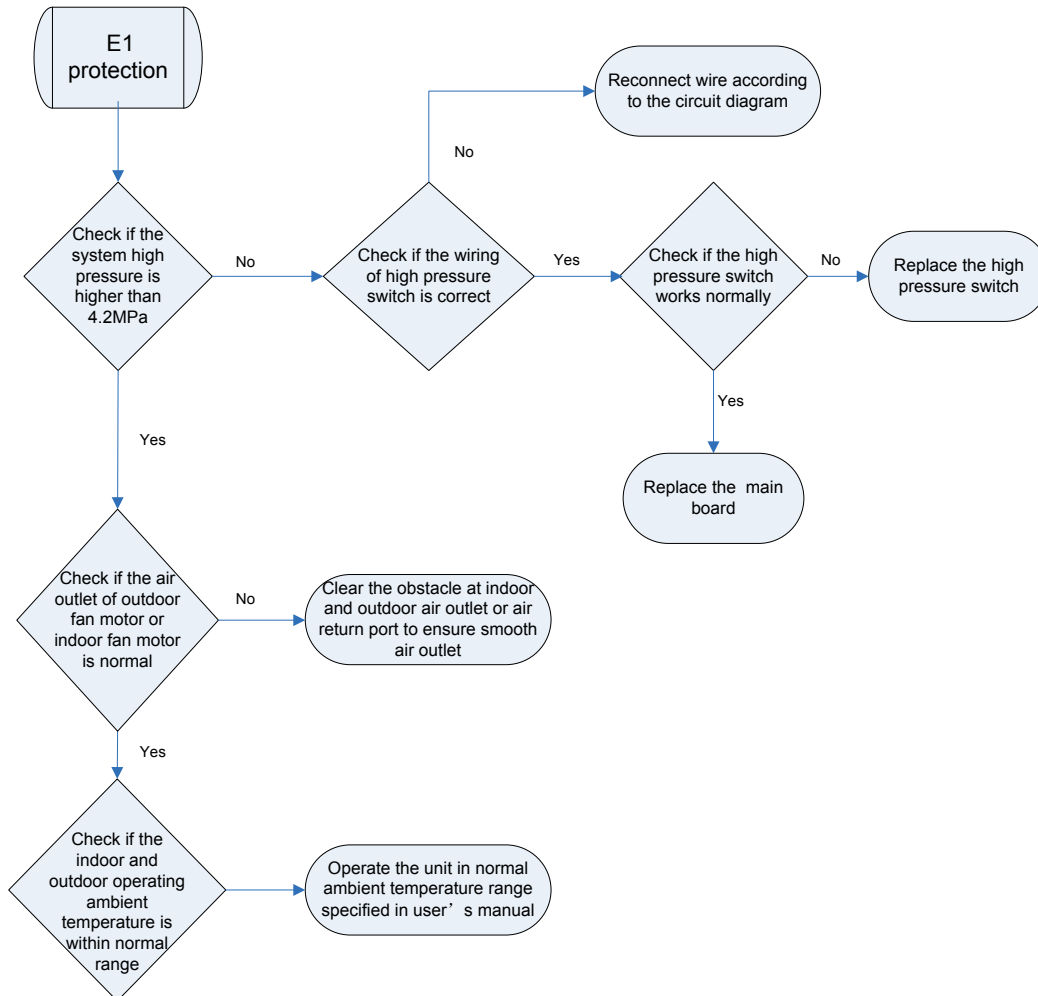
Malfunction Item	Wired Controller Display	Unit display of dual 8 numeral tube
DC busbar over-voltage protection	PH	PH
IPM or PFC over-temperature protection	P8	P8
Current sense circuit error	Pc	Pc
IPM or PFC temperature sensor error	P7	P7
Compressor current protection	P5	P5
DC busbar under-voltage protection	PL	PL
Compressor startup failure	Lc	Lc
Drive module reset	P0	P0

Malfunction Item	Wired Controller Display	Unit display of dual 8 numeral tube
Compressor motor desynchronizing	H7	H7
Phase loss	Ld	Ld
Drive-to-main-control communication error	P6	P6
IPM protection	H5	H5
Compressor overload protection	H3	H3
AC current protection (input side)	PA	PA
Charging circuit error	PU	PU
DC fan error	H6	H6
Input AC voltage abnormality	PP	PP
Driving board memory chip error	ee	ee
Condenser Fan DC busbar under voltage protection	H6	AL
Condenser Fan DC busbar over voltage protection	H6	AH
Condenser Fan AC current protection (input side)	H6	AA
Condenser Fan IPM module protection	H6	A1
Condenser Fan PFC abnormality	H6	AF
Condenser Fan startup failure	H6	AC
Condenser Fan Missing phase	H6	Ad
Condenser Fan Drive module resetting	H6	A0
Condenser Fan current protection	H6	UL
Condenser Fan power protection	H6	UP
Condenser Fan Current sensor malfunction	H6	AE
Condenser Fan motor in loss of synchronization	H6	AJ
Malfunction from Condenser Fan driving part to main-control communication	H6	A6
Overheat protection of Condenser Fan radiator	H6	A8
Condenser Fan radiator sensor malfunction	H6	A9
Condenser Fan Drive Storage chip malfunction	H6	An
Condenser Fan Charge circuit malfunction	H6	AU
Condenser Fan AC input voltage abnormality	H6	AP
Condenser Fan drive board environment temperature sensor malfunction	H6	Ar
Condenser Fan AC contactor protection or input zero crossing error	H6	U9

# 2 FLOW CHART OF TROUBLESHOOTING

## 2.1 TROUBLESHOOTING FLOW CHART OF MAIN CONTROL MALFUNCTION

### ◆ E1 High Pressure Protection



### ◆ E2 Freeze Protection

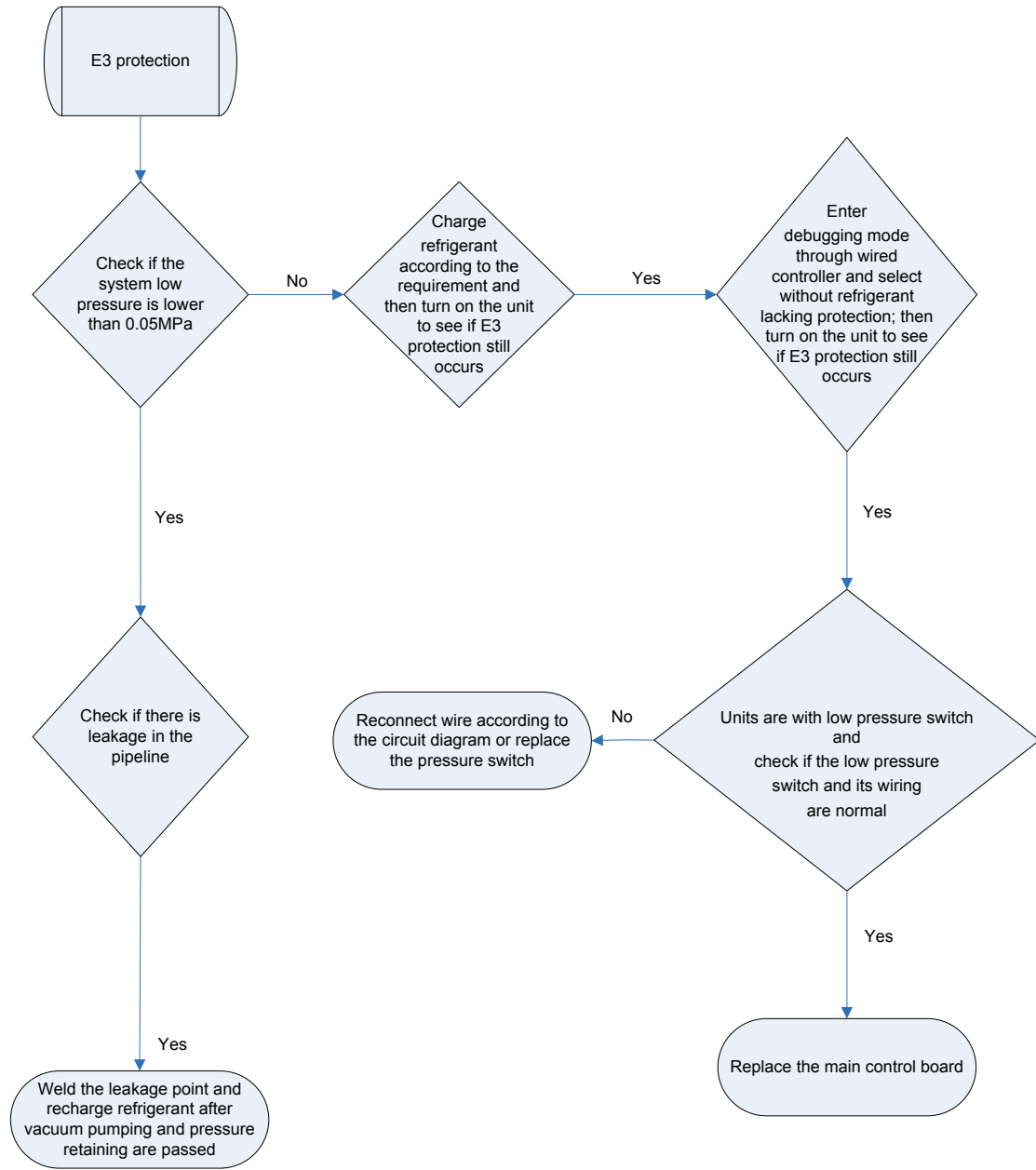
Freeze protection is normal protection but not abnormal malfunction. If freeze protection occurs frequently during operation, please check if the indoor filter is with filth blockage or if the indoor air outlet is abnormal. The user is required to clean the filter, check the air outlet and air return pipe periodically to ensure smooth air return and air outlet.

### ◆ E3 stands for three statuses:

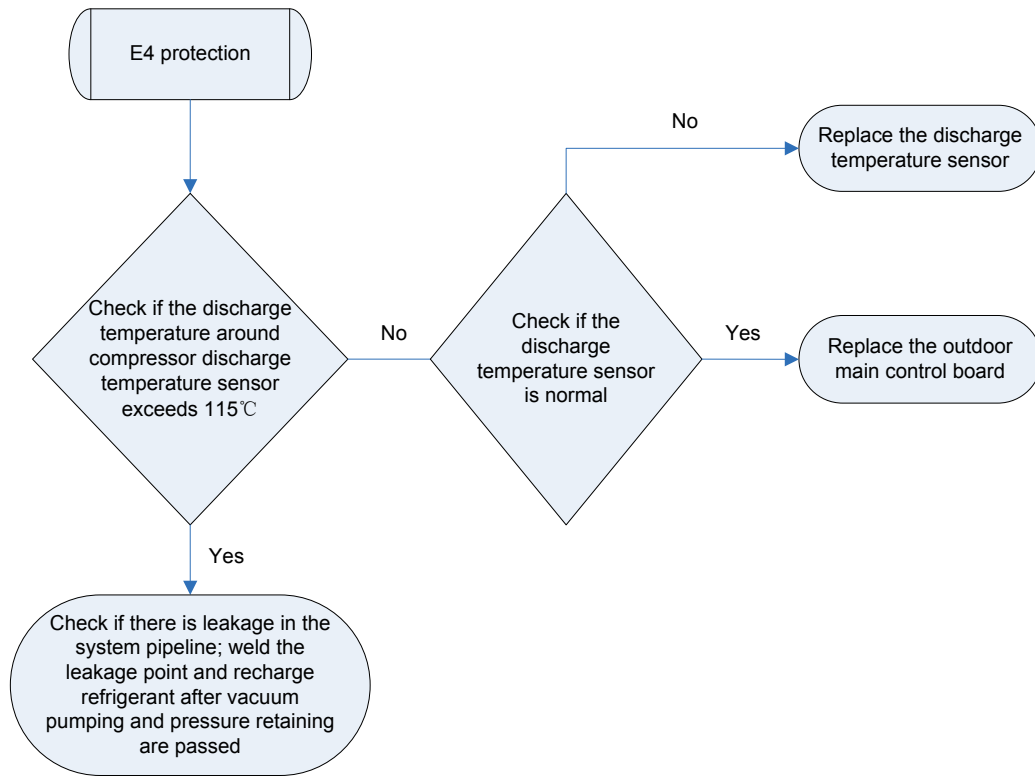
- (1) Low pressure protection;
- (2) Refrigerant lacking protection;
- (3) Refrigerant recycling mode;

1) If enter refrigerant recycling mode through special operation, the displayed E3 is not an error code. It will be eliminated when exiting refrigerant recycling mode.

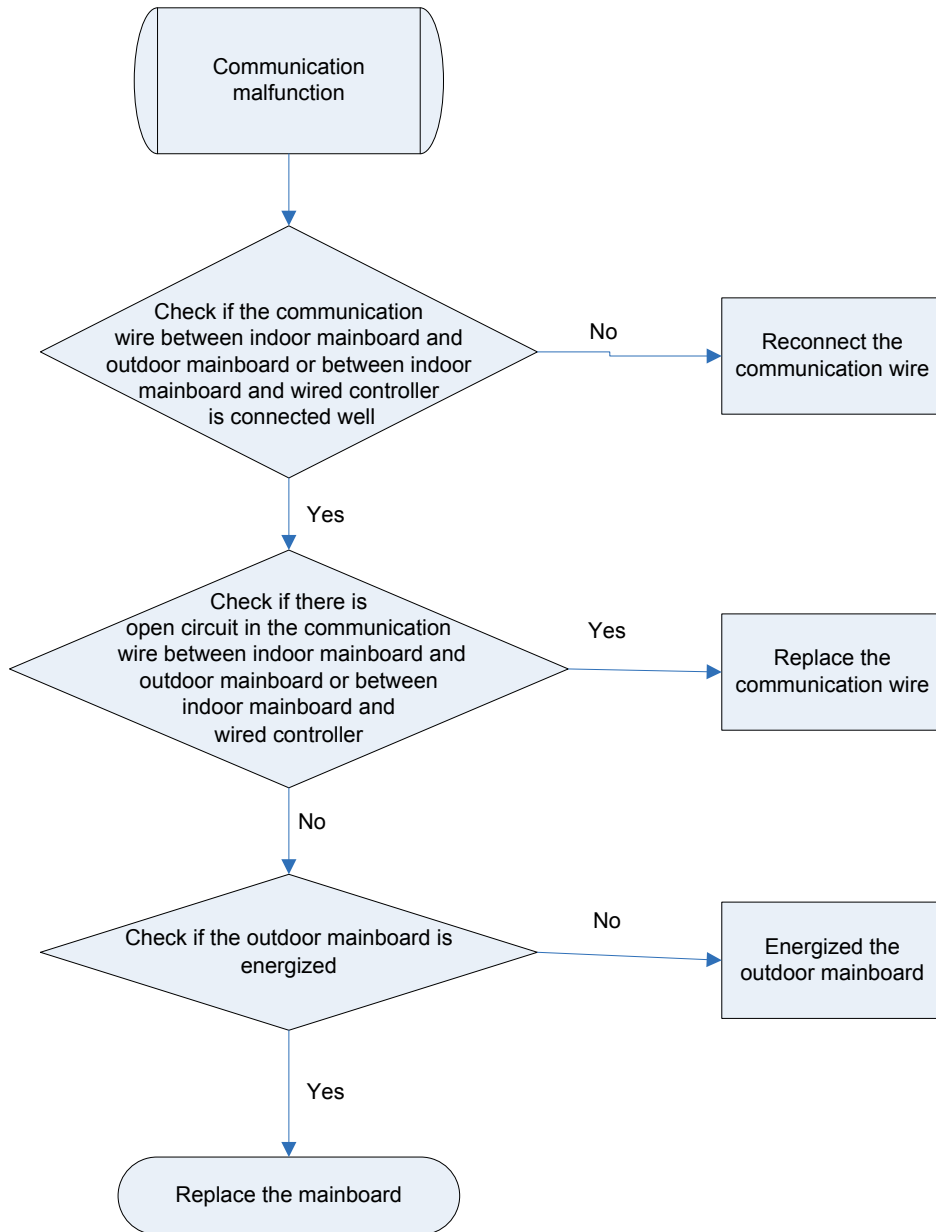
2) If you do not want to have refrigerant lacking protection, you can enter the debugging mode through wired controller and then cancel the refrigerant lacking protection mode.



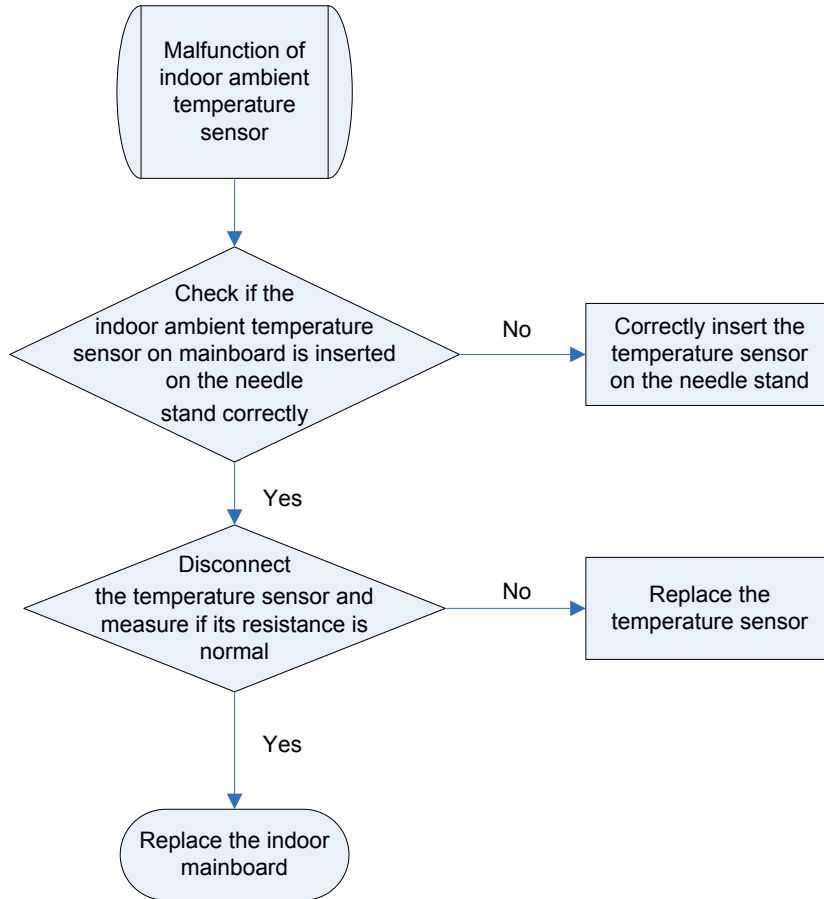
◆ E4 Discharge Protection



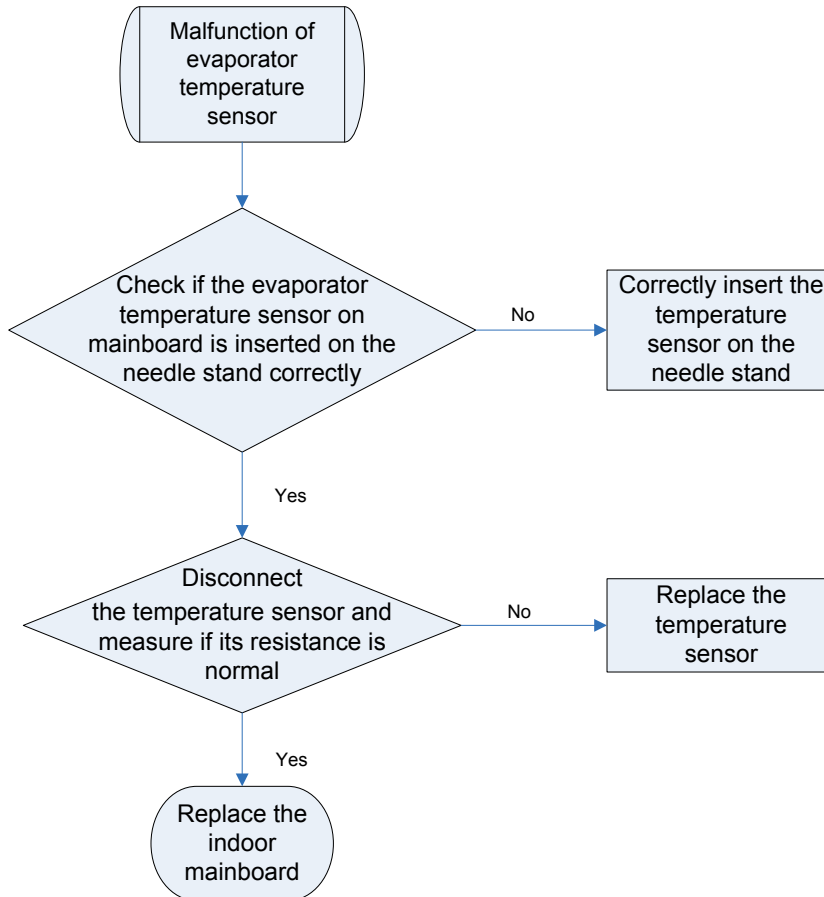
◆ E6 Communication Malfunction



◆ F0 Malfunction of Indoor Ambient Temperature Sensor

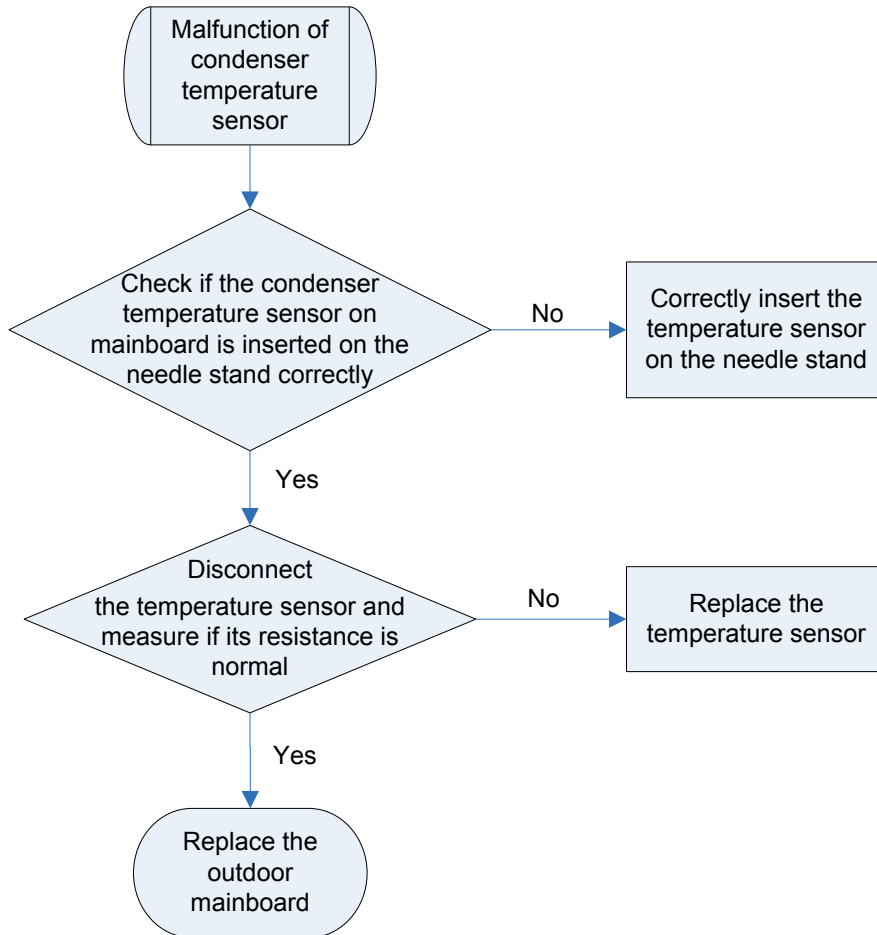


◆ F1 Malfunction of Evaporator Temperature Sensor

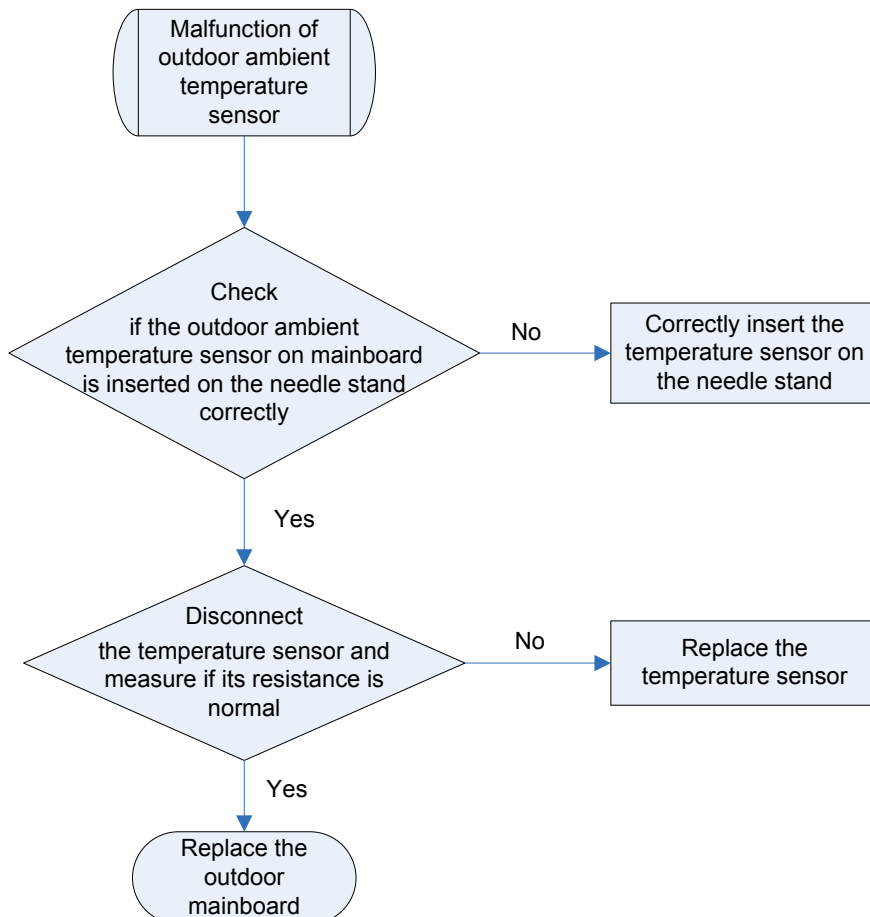




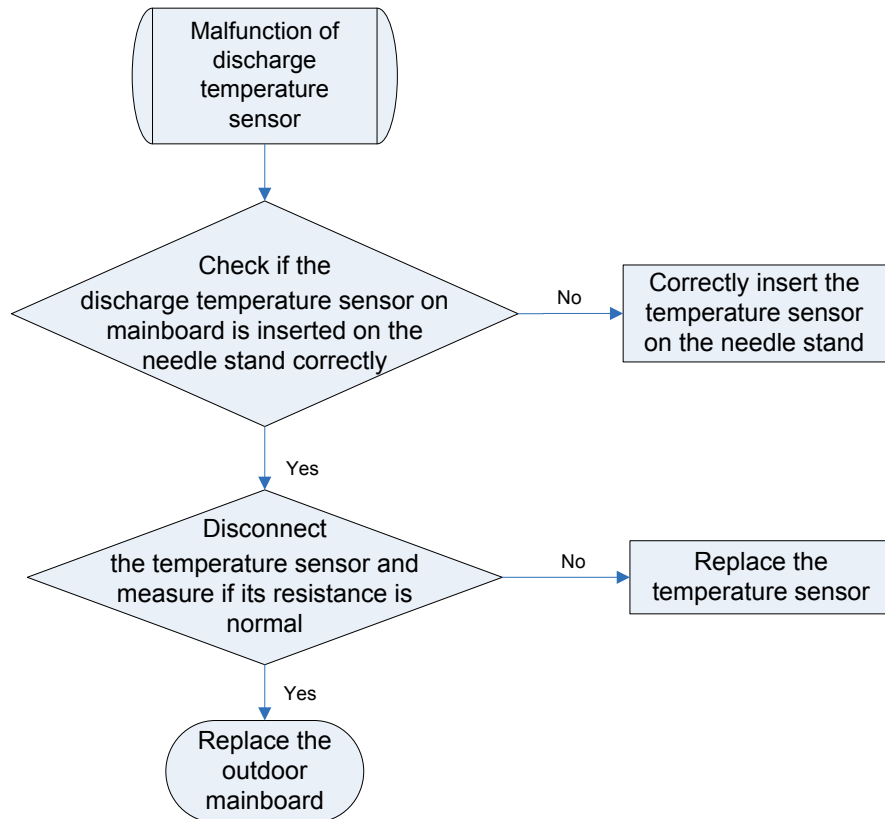
◆ F2 Malfunction of Condenser Temperature Sensor



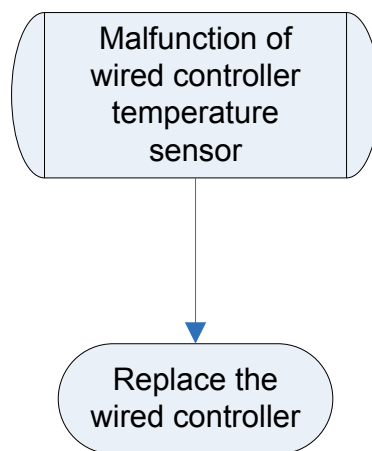
◆ F3 Malfunction of Outdoor Ambient Temperature Sensor



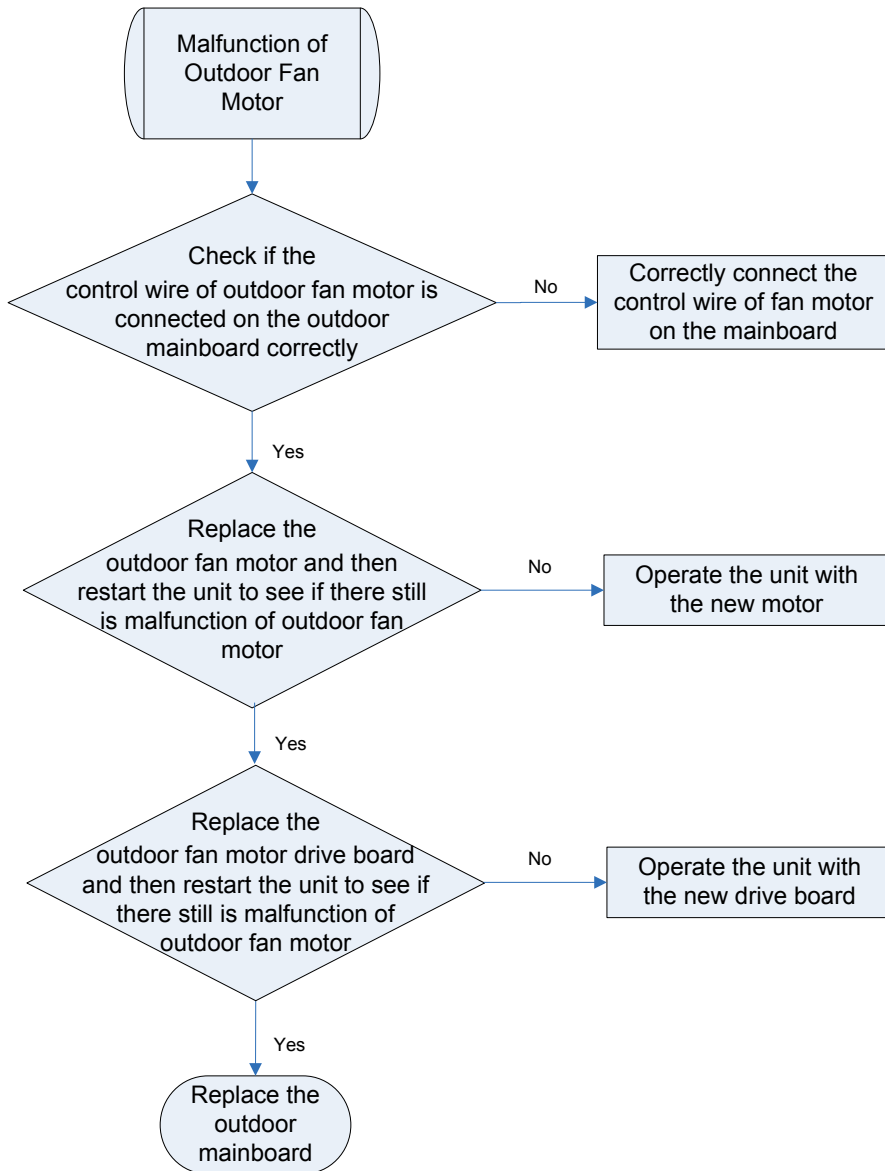
◆ F4 Malfunction of Discharge Temperature Sensor



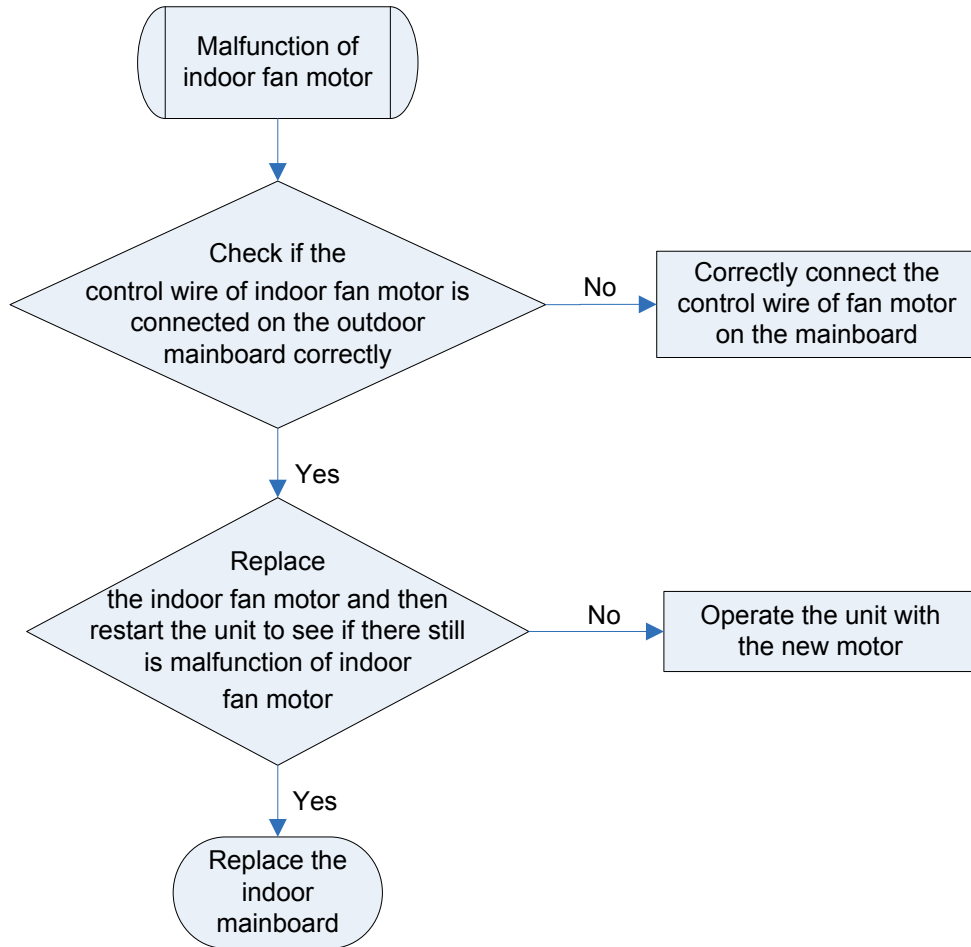
◆ F5 Malfunction of Wired Controller Temperature Sensor



◆ H6 Malfunction of Outdoor Fan Motor

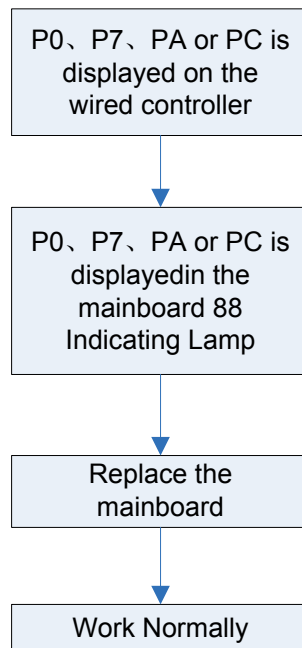


◆ E8 Malfunction of Indoor Fan Motor

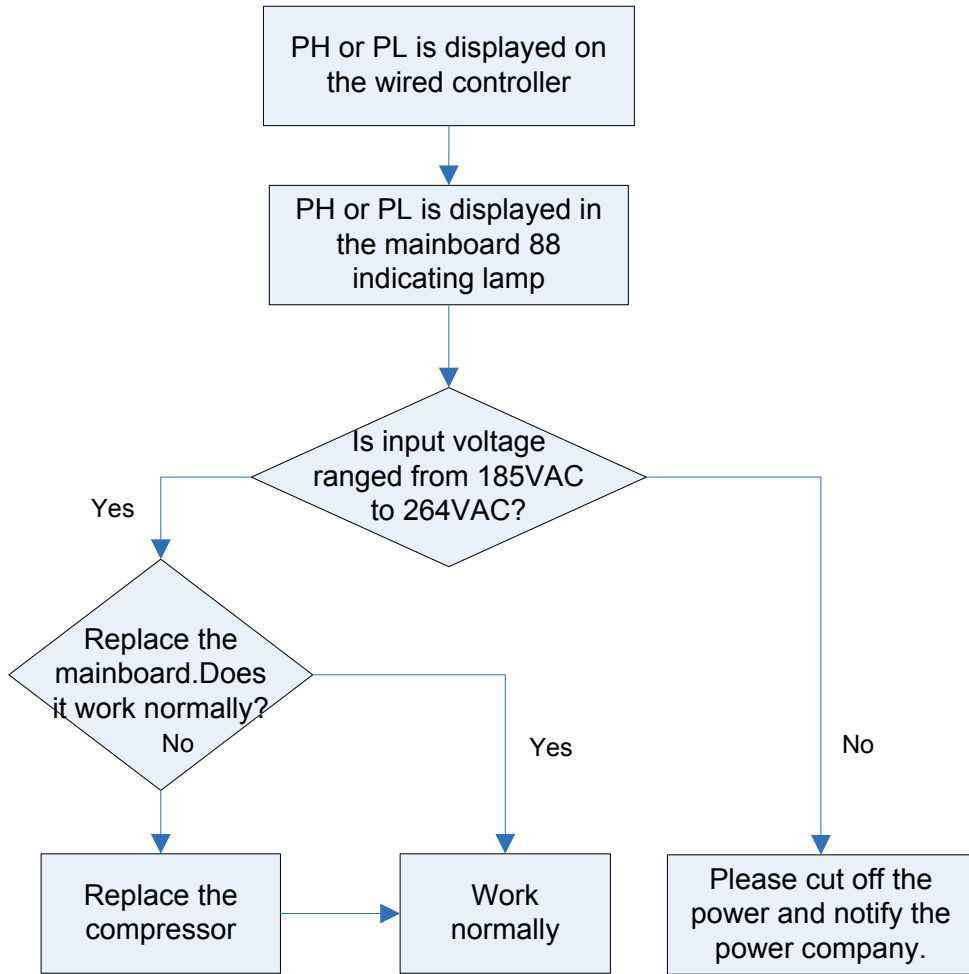


**2.2 TROUBLESHOOTING FLOW CHART OF DRIVE MALFUNCTION**

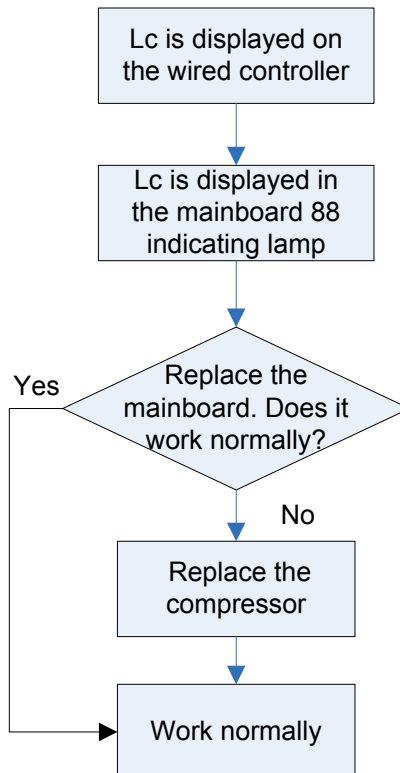
- ◆ P0 Drive module reset
- ◆ P7 IPM temperature sensor error
- ◆ PA AC current protection (input side)
- ◆ PC Current sense circuit error



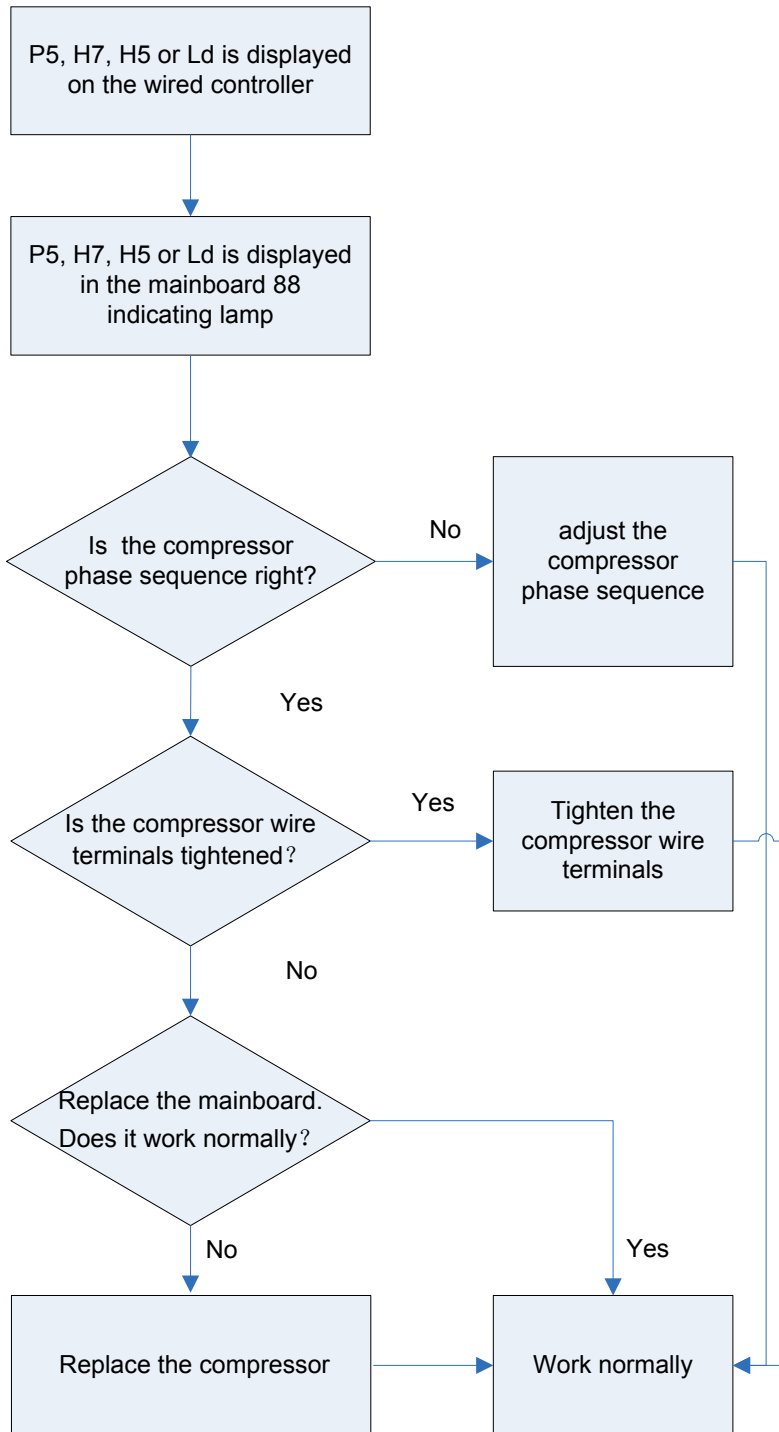
- ◆ PH DC busbar over-voltage protection
- ◆ PL DC busbar under-voltage protection



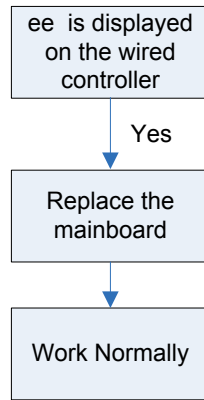
- ◆ P6 Drive-to-main-control communication error
- ◆ LC Compressor Startup Failure



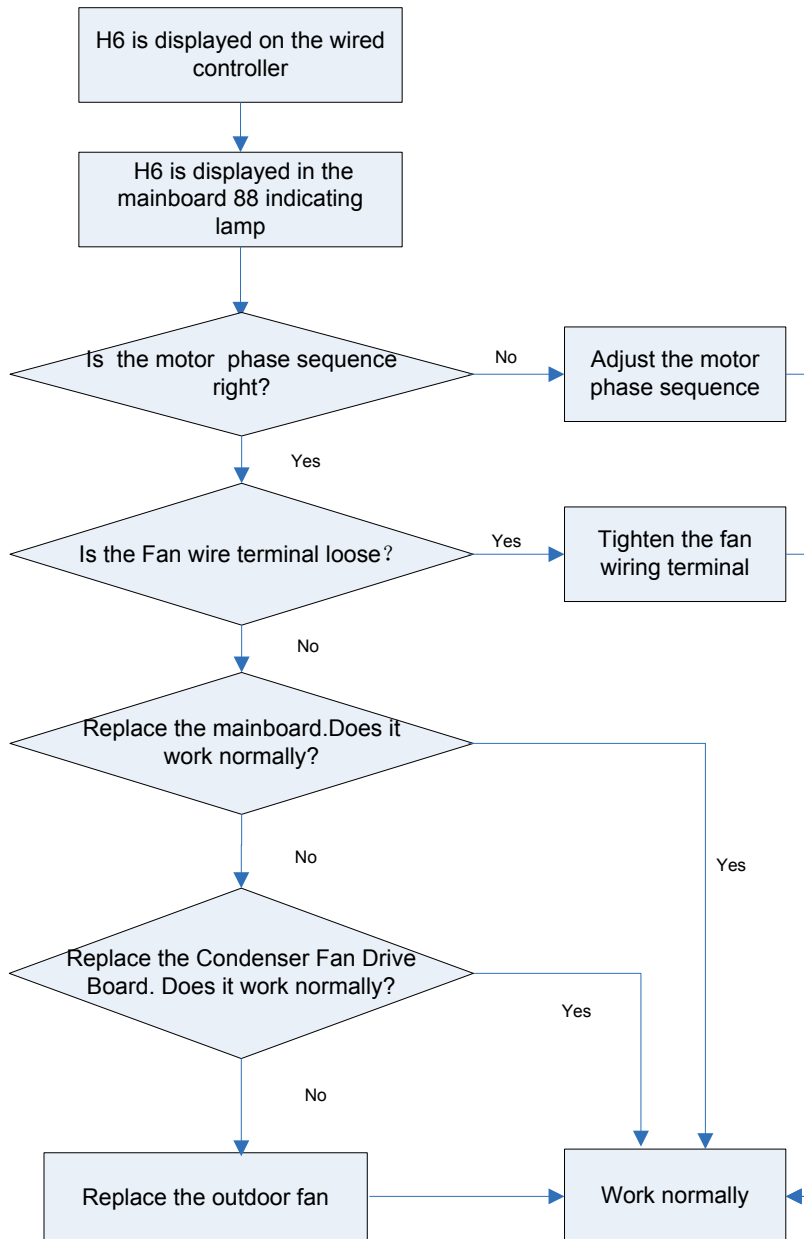
- ◆ P5 Compressor current protection
- ◆ H7 Compressor motor desynchronizing
- ◆ H5 IPM protection
- ◆ Ld Phase loss



◆ ee driving board chip error



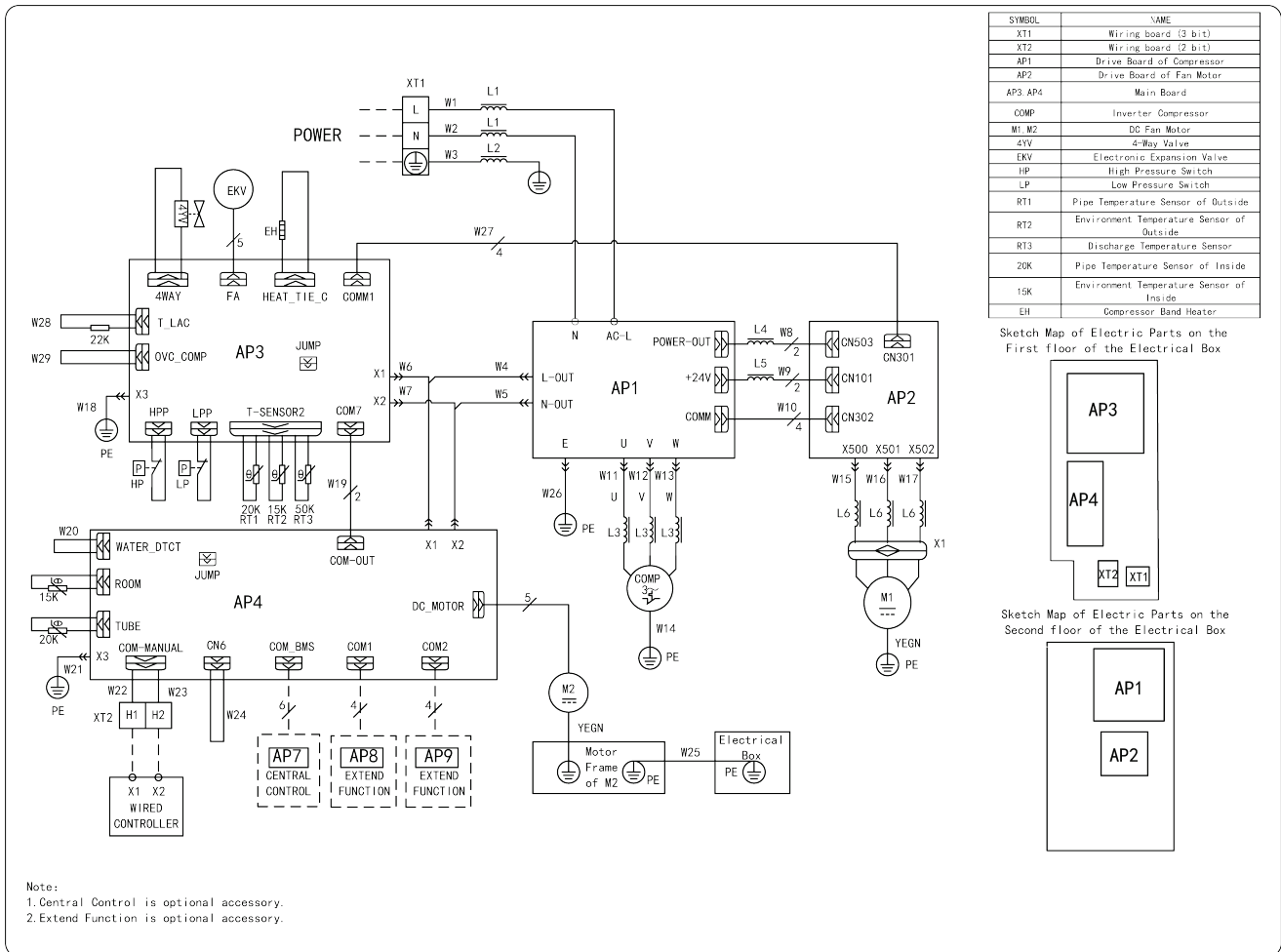
◆ H6 DC fan error



# 3 WIRING DIAGRAM

The actual wiring should always refer to the wiring diagram of the unit.

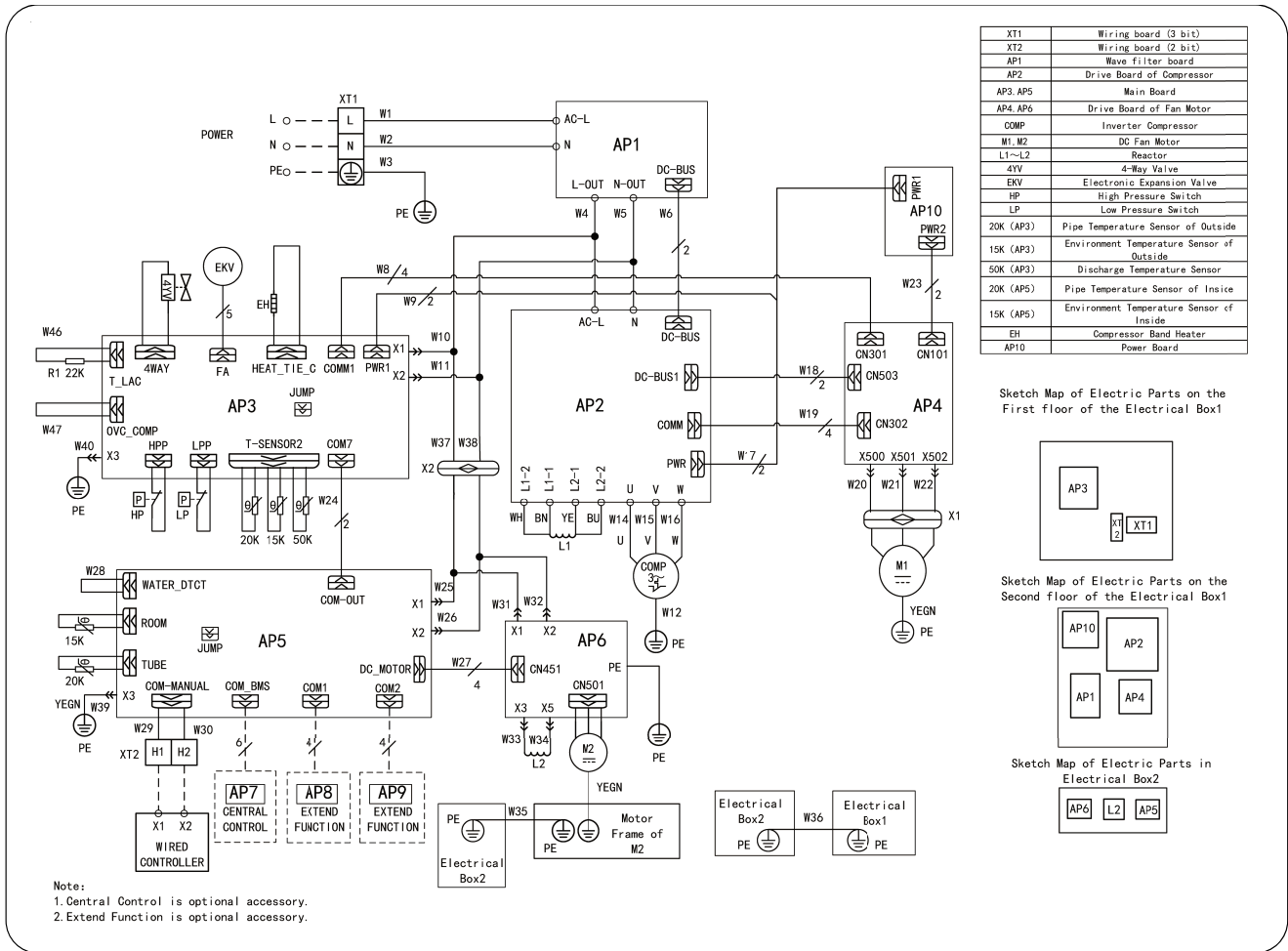
Model: APRI036P0A



**Note:** Above data is subject to change without notice.

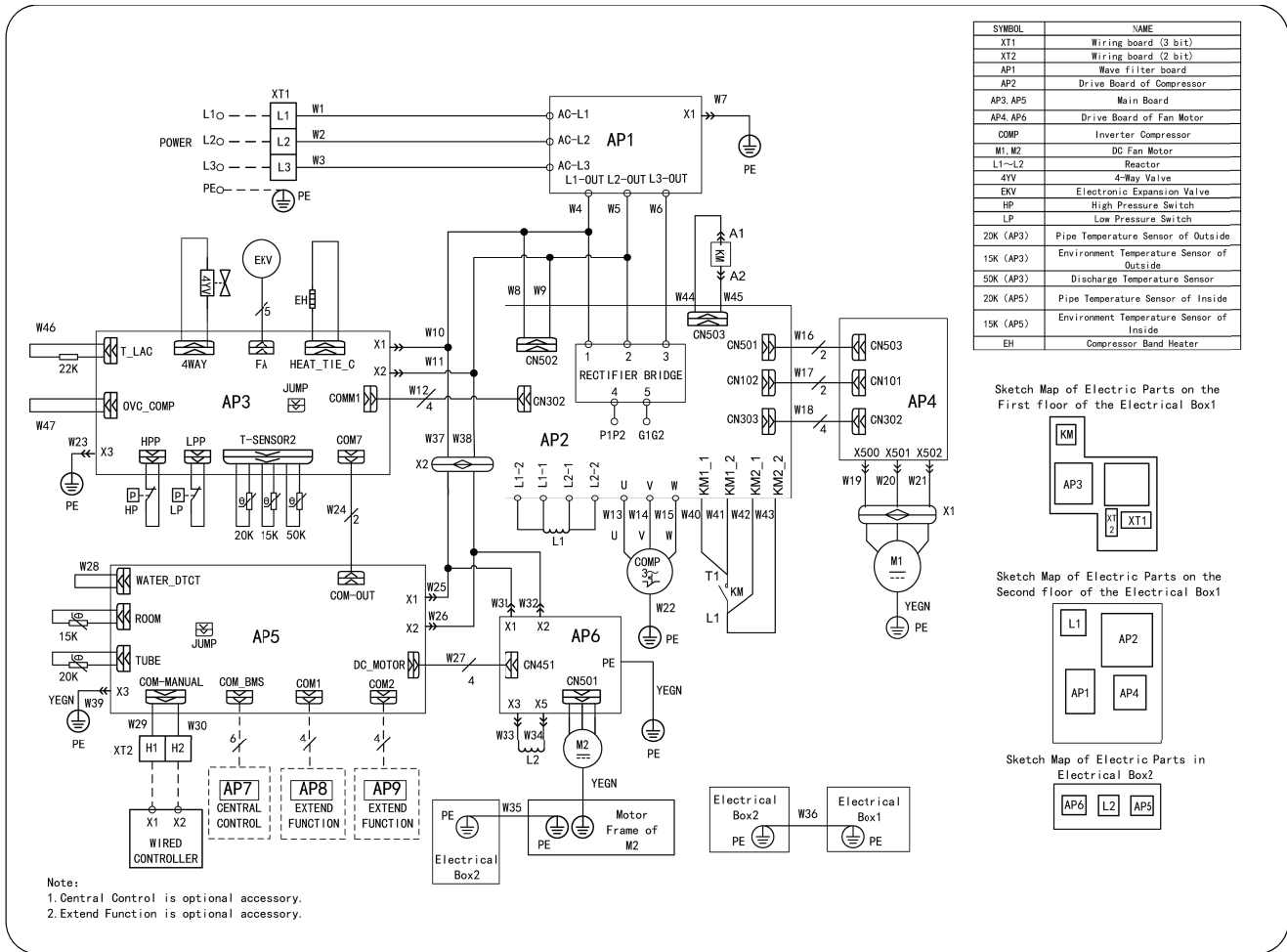


Model: APRI066P0A



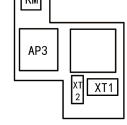
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Model: APRI066P4A

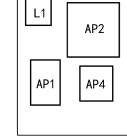


SYMBOL	NAME
XT1	Wiring board (3 bit)
XT2	Wiring board (2 bit)
AP1	Wave filter board
AP2	Drive Board of Compressor
AP3, AP5	Main Board
AP4, AP6	Drive Board of Fan Motor
COMP	Inverter Compressor
M1, M2	DC Fan Motor
L1~L2	Reactor
4V	4-Way Valve
EKV	Electronic Expansion Valve
HP	High Pressure Switch
LP	Low Pressure Switch
20K (AP3)	Pipe Temperature Sensor of Outside
15K (AP3)	Environment Temperature Sensor of Outside
50K (AP3)	Discharge Temperature Sensor
20K (AP5)	Pipe Temperature Sensor of Inside
15K (AP5)	Environment Temperature Sensor of Inside
EH	Compressor Band Heater

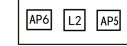
Sketch Map of Electric Parts on the First floor of the Electrical Box1



Sketch Map of Electric Parts on the Second floor of the Electrical Box1



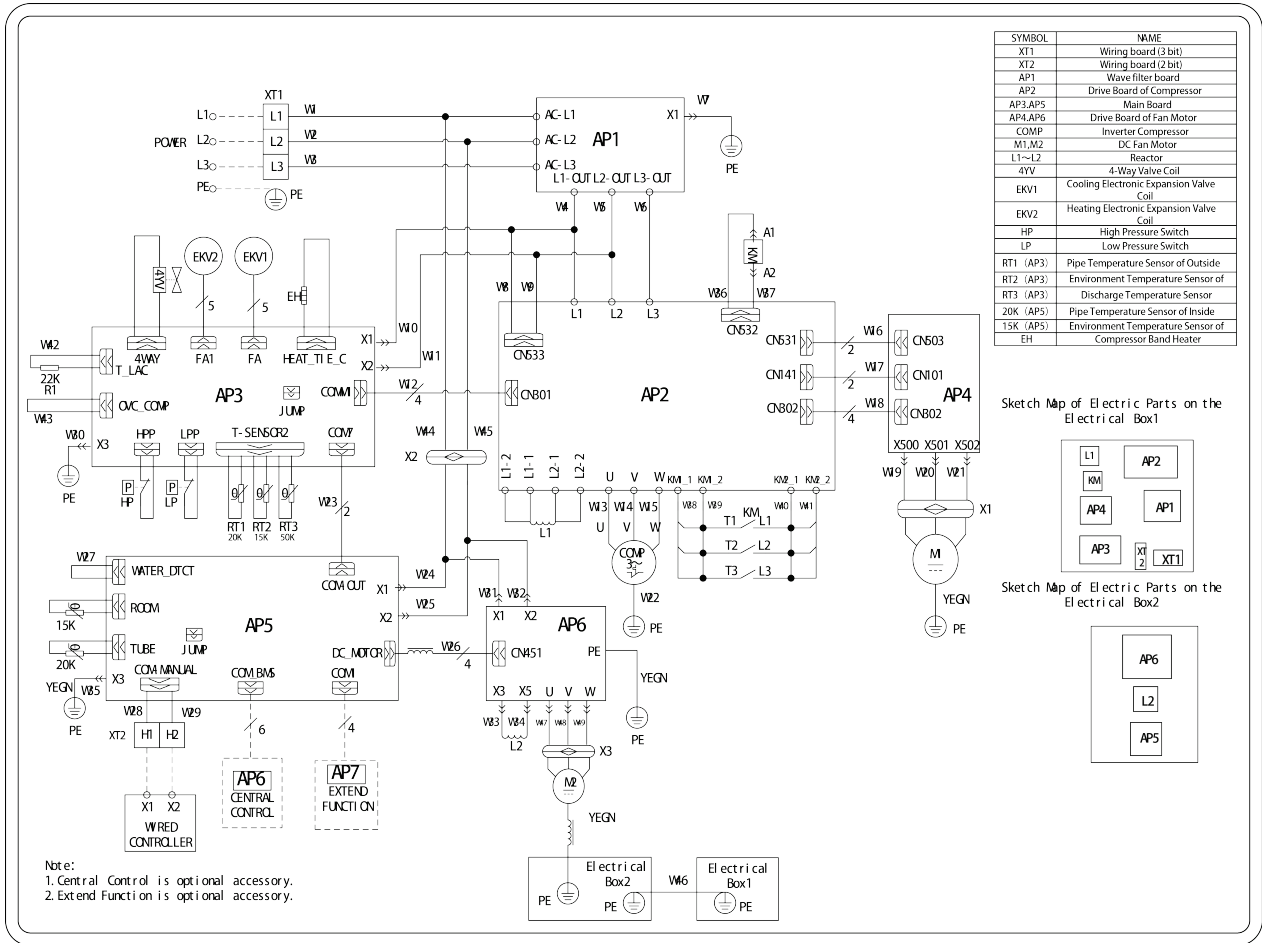
Sketch Map of Electric Parts in Electrical Box2



Note:  
 1. Central Control is optional accessory.  
 2. Extend Function is optional accessory.

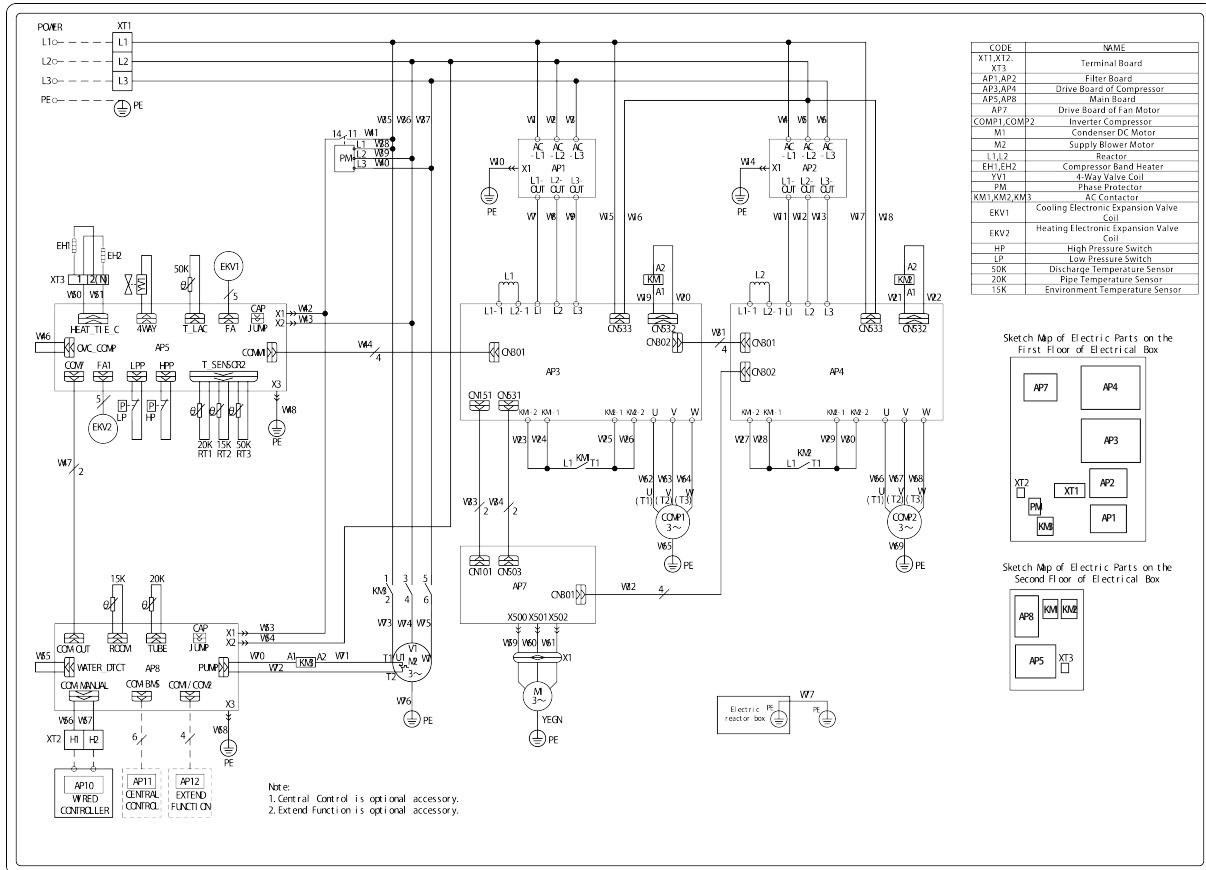
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Model: APRI120P4A



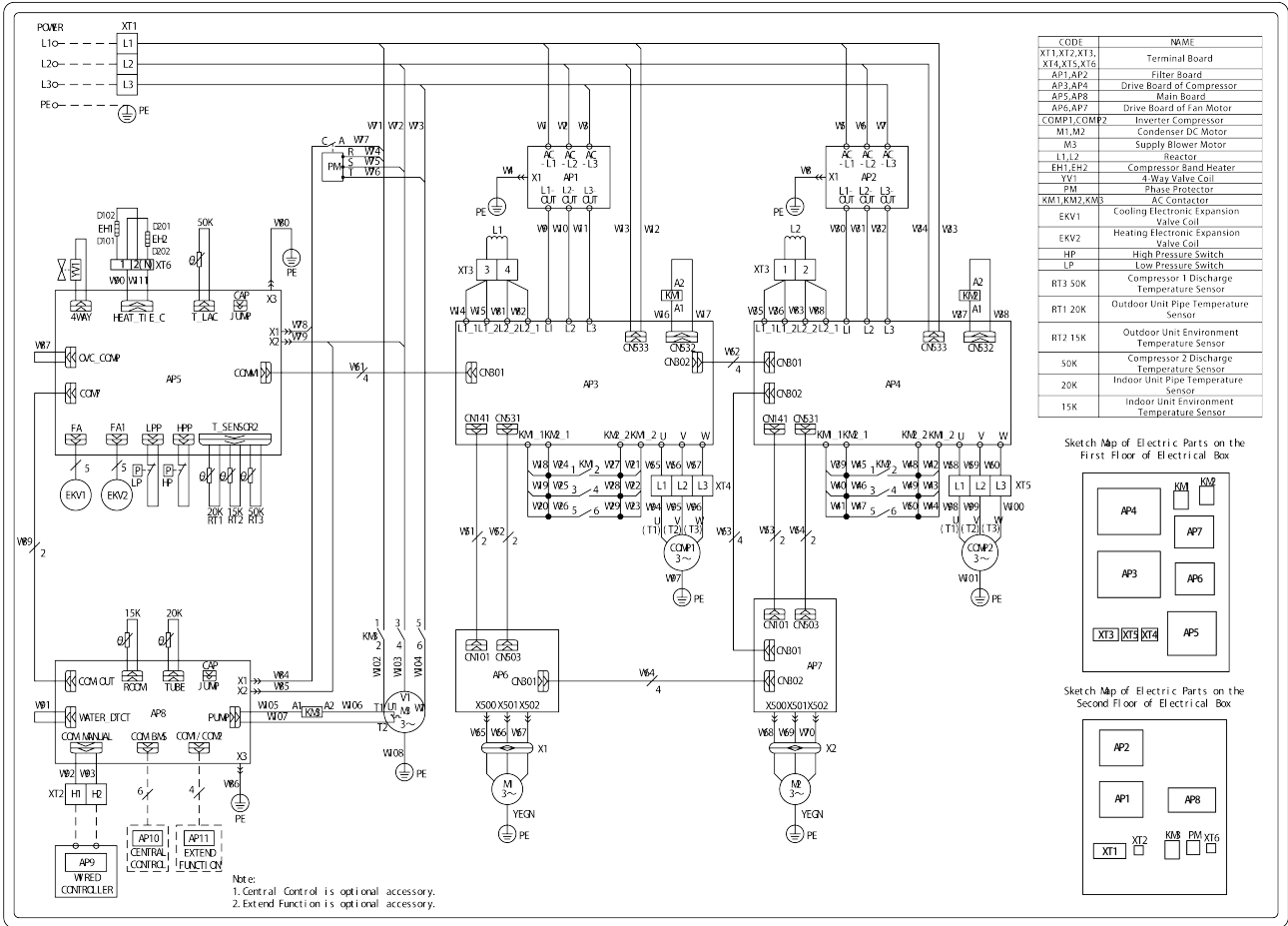
Note: Above data is subject to change without notice.

Model: APRI180P4A



**Note:** Above data is subject to change without notice.

Model: APRI240P4A



**Note:** Above data is subject to change without notice.



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