SPLIT AIR CONDITIONERS

Service Manual

ComfortStar®

BAH5 SERIES

IMPORTANT NOTE:

Read this manual carefully before operating your new air conditioning unit. Make sue to save this manual for future reference.

Please check the applicable models, technical data, F-GAS(if any) and manufacturer information from the "Owner's Manual" in the packaging of the outdoor unit.

Service Manual

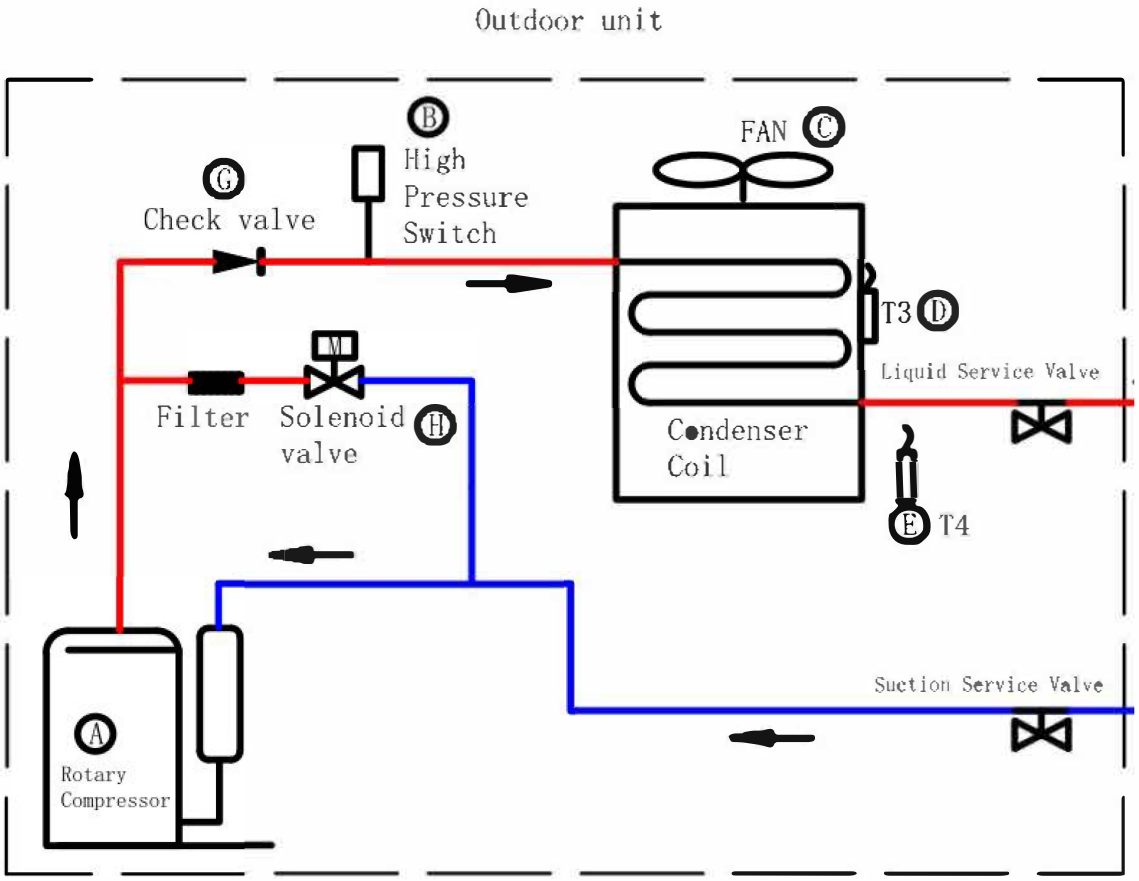
PART 1 Product instructions

2. System Instruction

2.1 Refrigerant Circuit

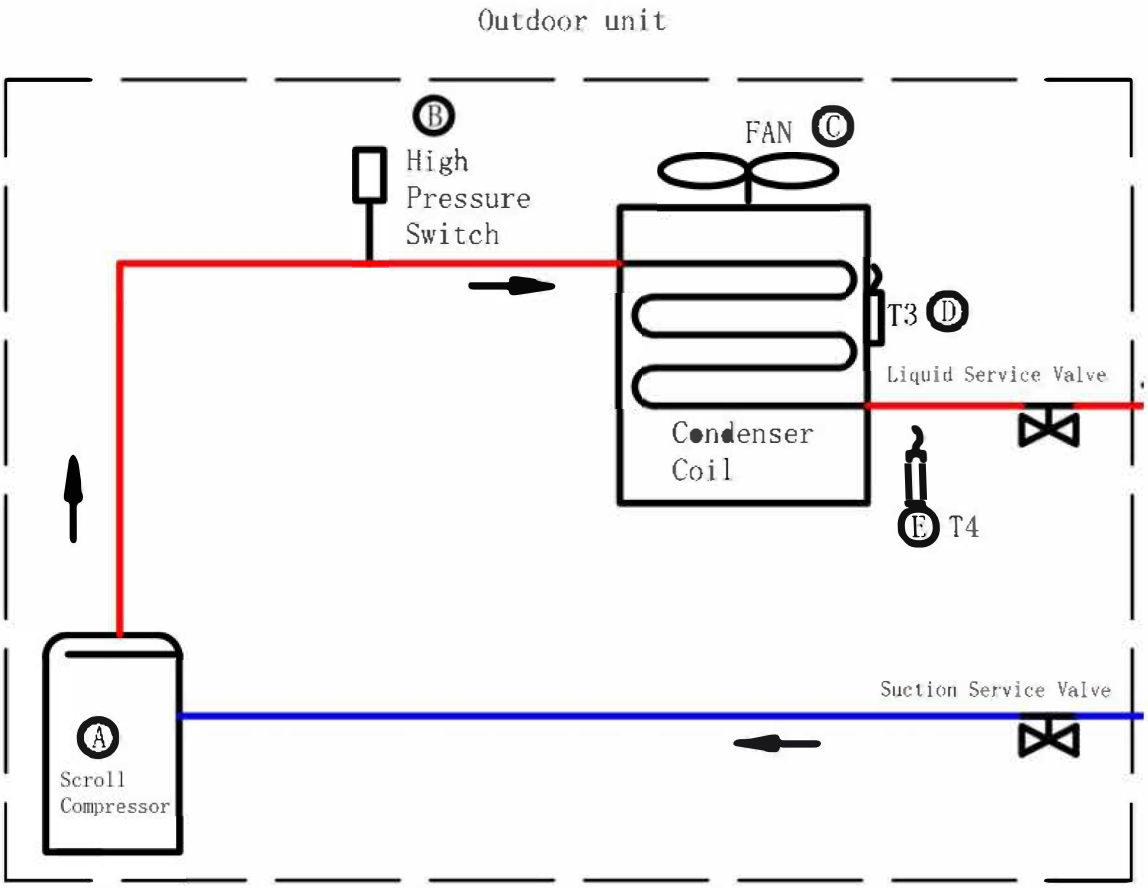
No. in diagram	Symbol	Part Name	Major function
A	Rotary Comp.	Rotary Compressor	Inverter compressor is operated in multi-steps according to PT.
B	HPS	High pressure switch	Used to high pressure protection when up to 580 PSIG and recovery when below to 435PSIG.
C	Fan	Fan of outdoor	Used to help heat exchange by 10-speeds ECM motor.
D	T3	Condenser coil temperature sensor	Used to discharge temperature protection and Fan control in cooling mode, and defrost control.
E	T4	Ambient temperature sensor	Used to ambient protection and Fan control in cooling mode, and defrost control.
F	RV	The Reversing Valve	Used to switch mode between cooing and heating.
G	CV	Check Valve	Open during cooling and shutoff during heating by itself.
H	PEV	Pressure Equalizer Valve	To ensure pressure balance before compressor starts
I	LPS	Low pressure switch	Used to low pressure protection when below to 20 PSIG and recovery when up to 43.5PSIG.

AC system with Rotary compressor

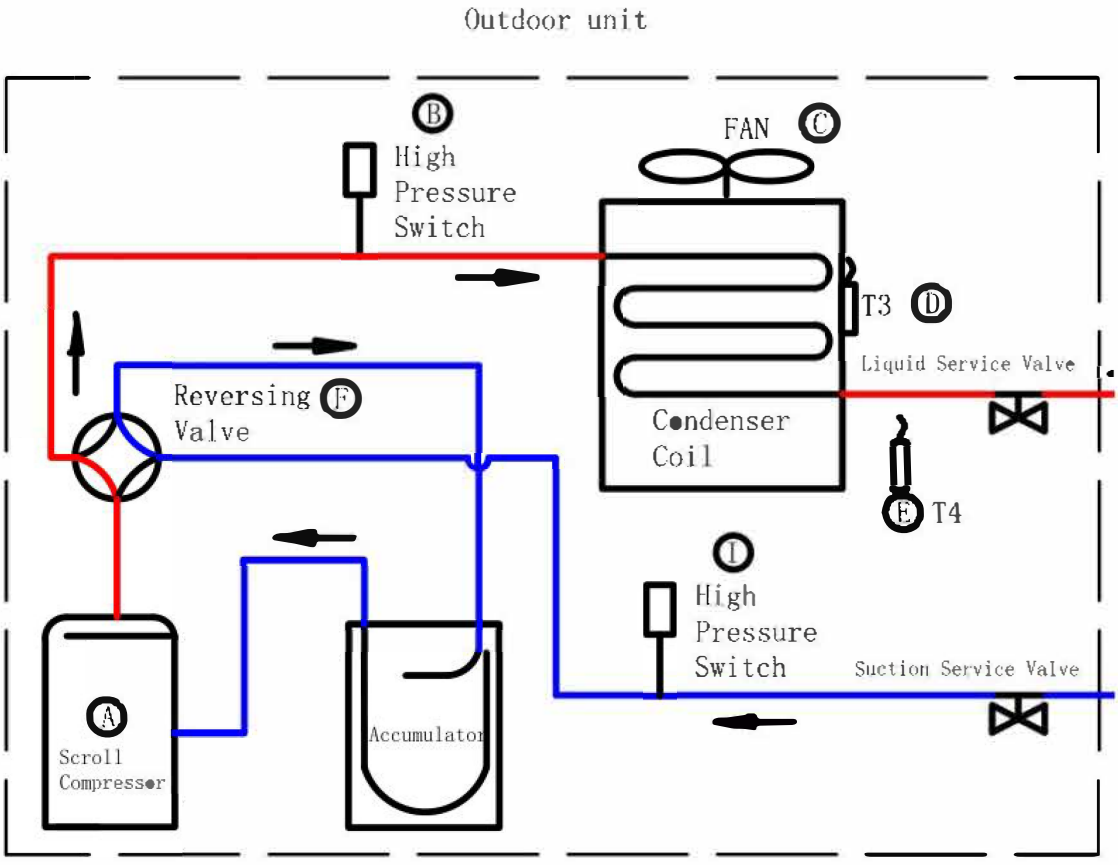


2.1 Refrigerant Circuit

AC system with Scroll compressor

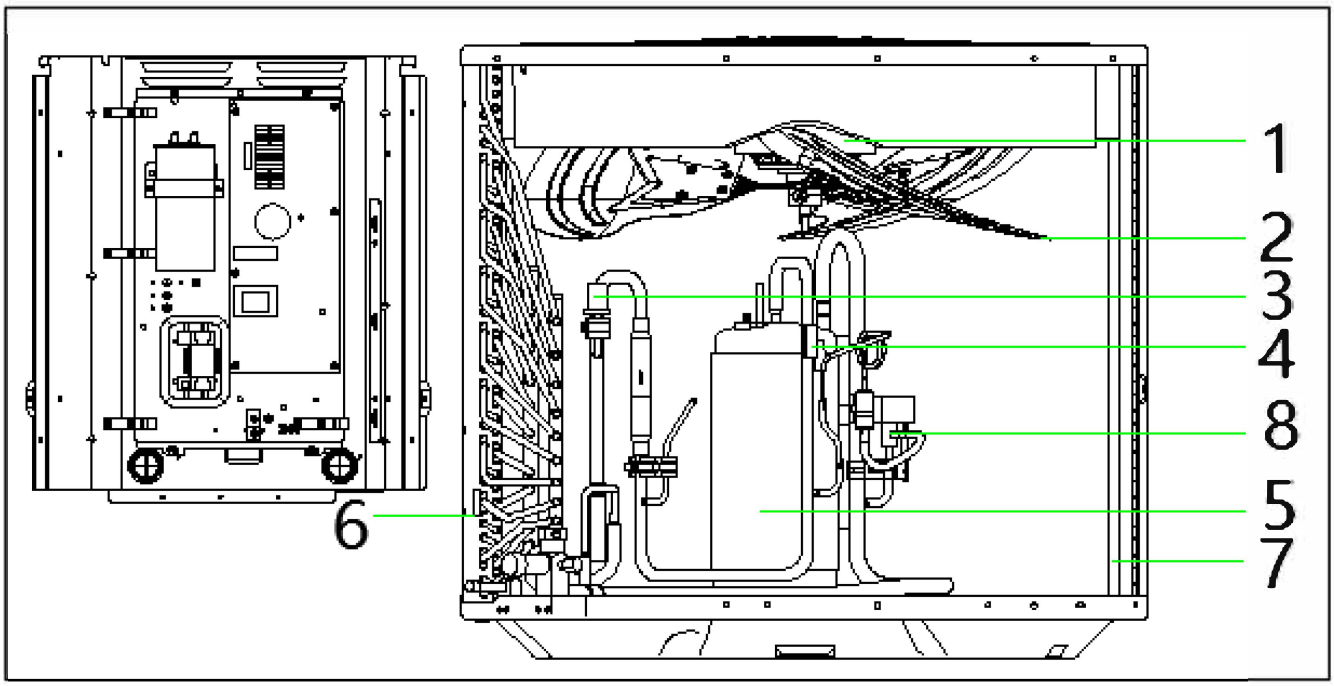


HP system with Scroll compressor

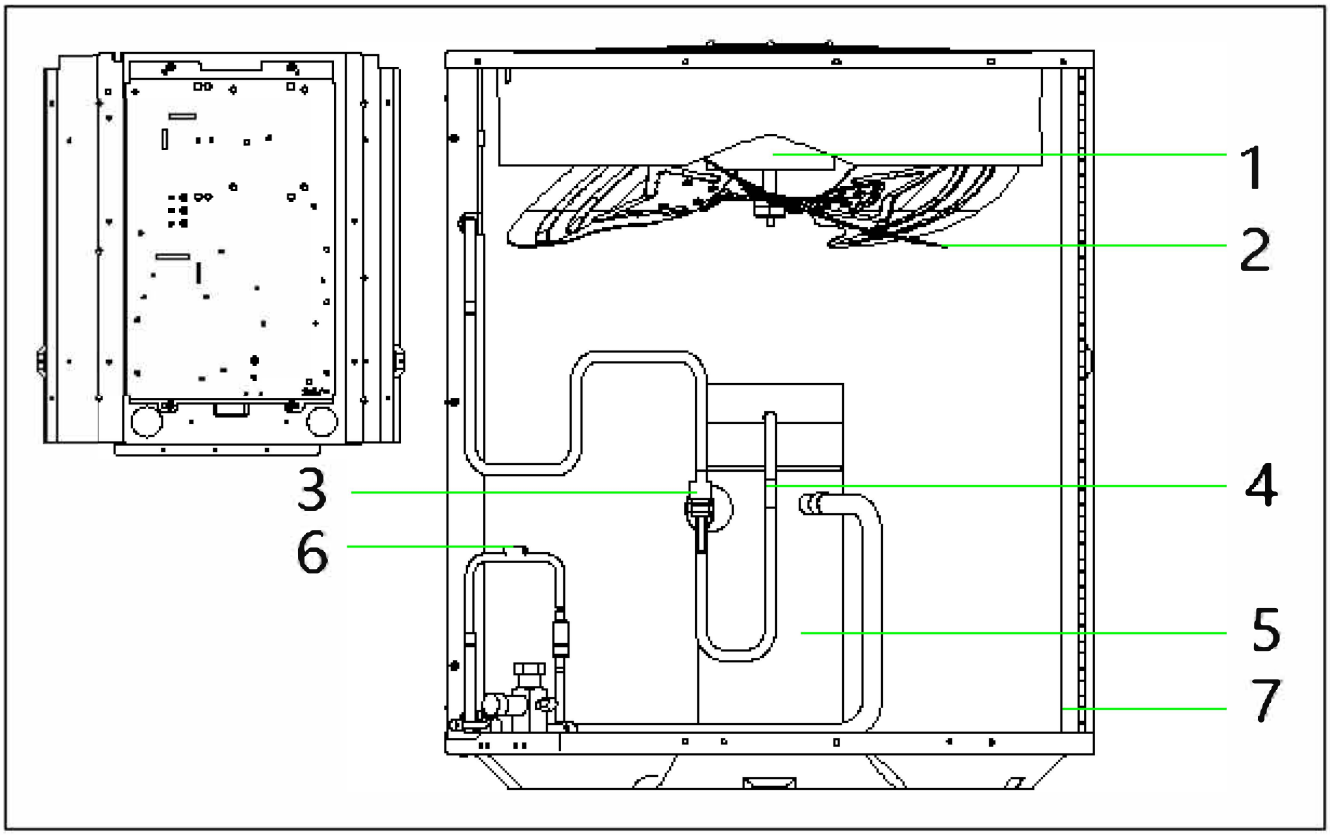


2.2 Functional Part

13.4 AC 53/71/90/105, 14.3AC 53/71/90

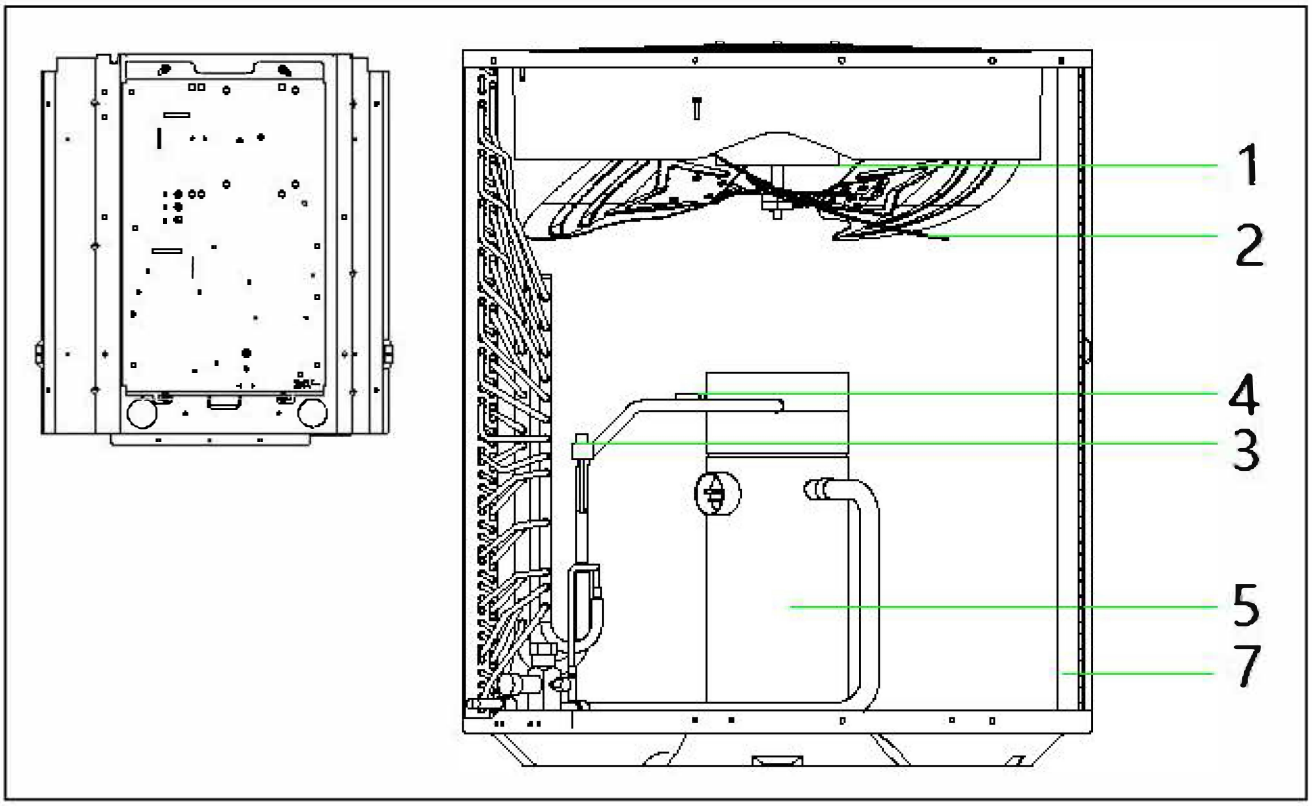


13.4 AC 160

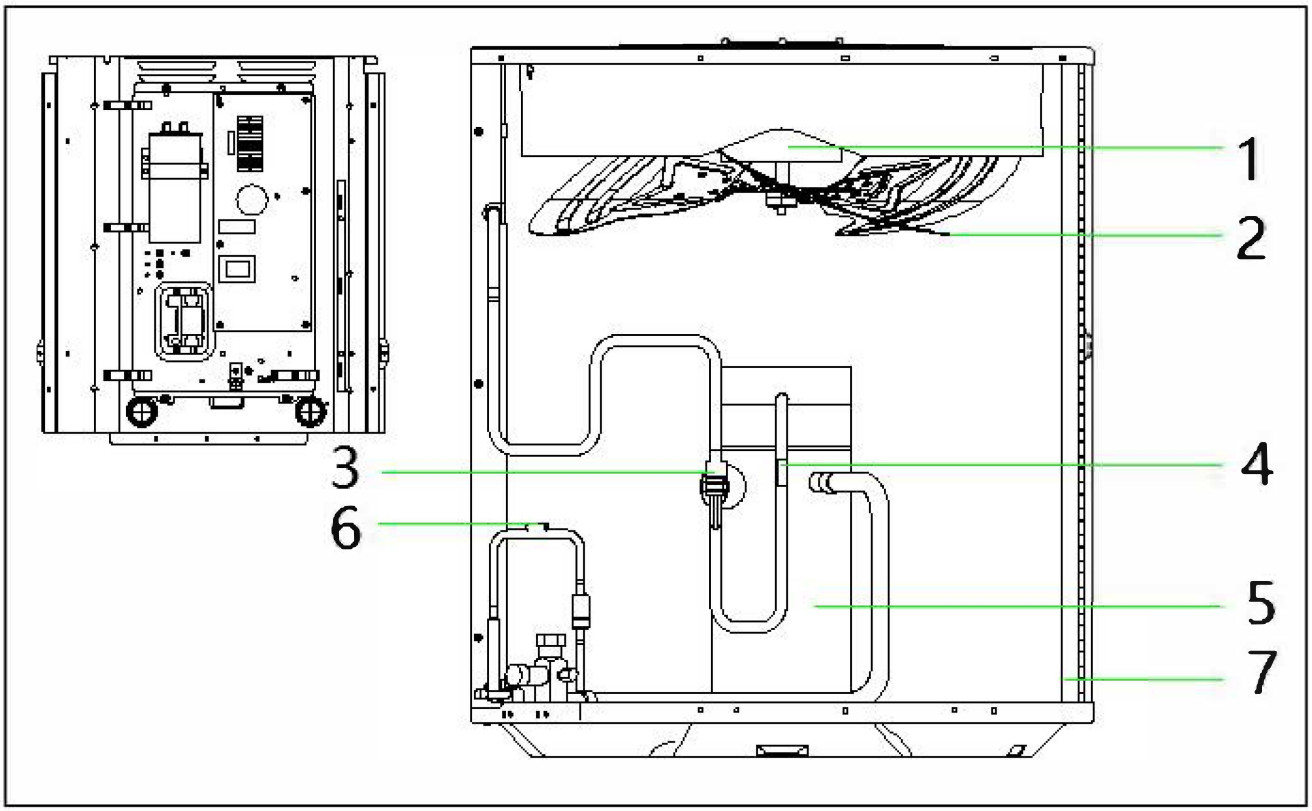


2.2 Functional Part

13.4 AC 120/140

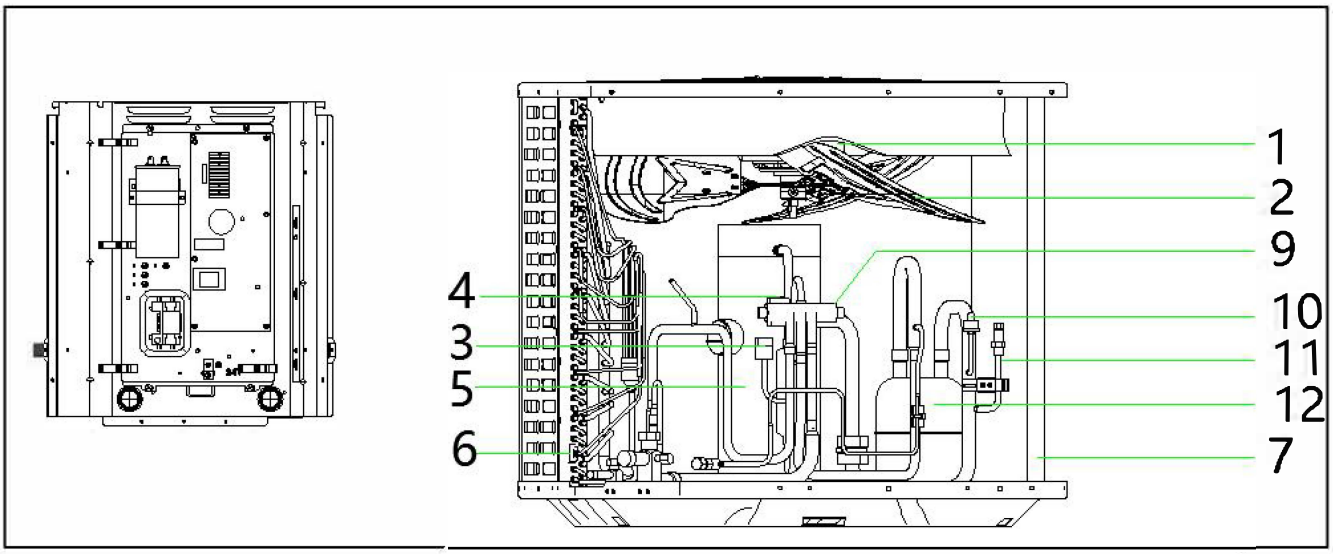


14.3 AC 160

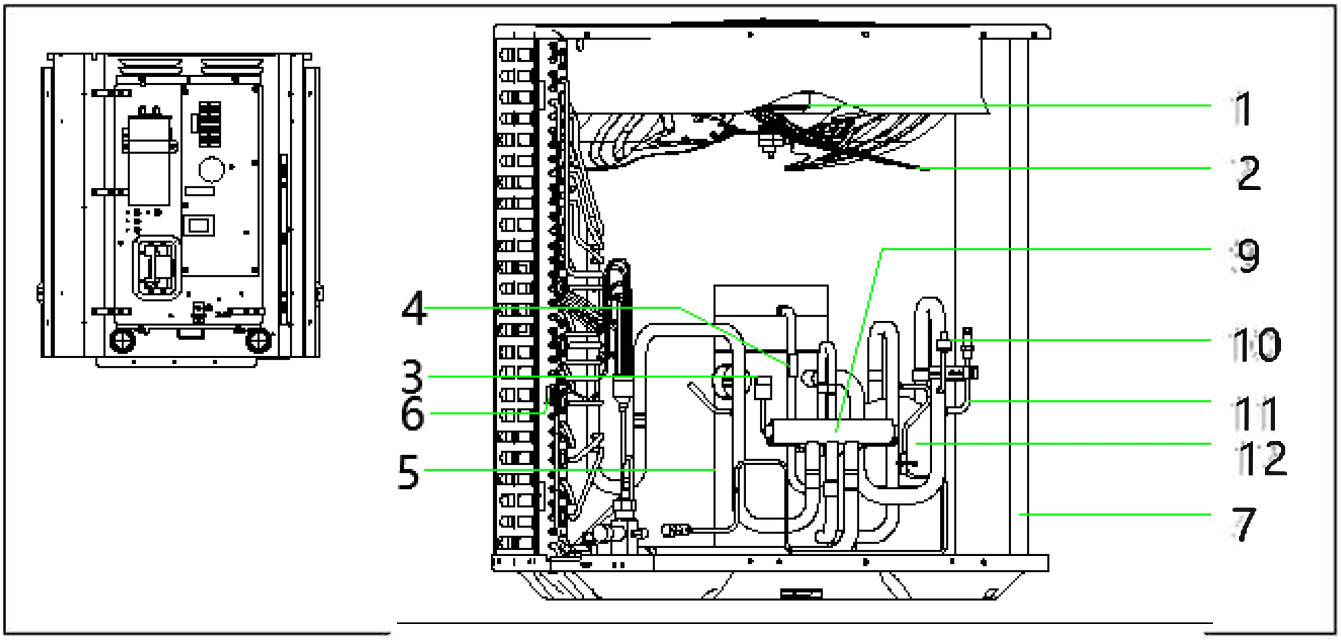


2.2 Functional Part

14.3 HP 53/71/90



14.3 HP 105/120/140/160



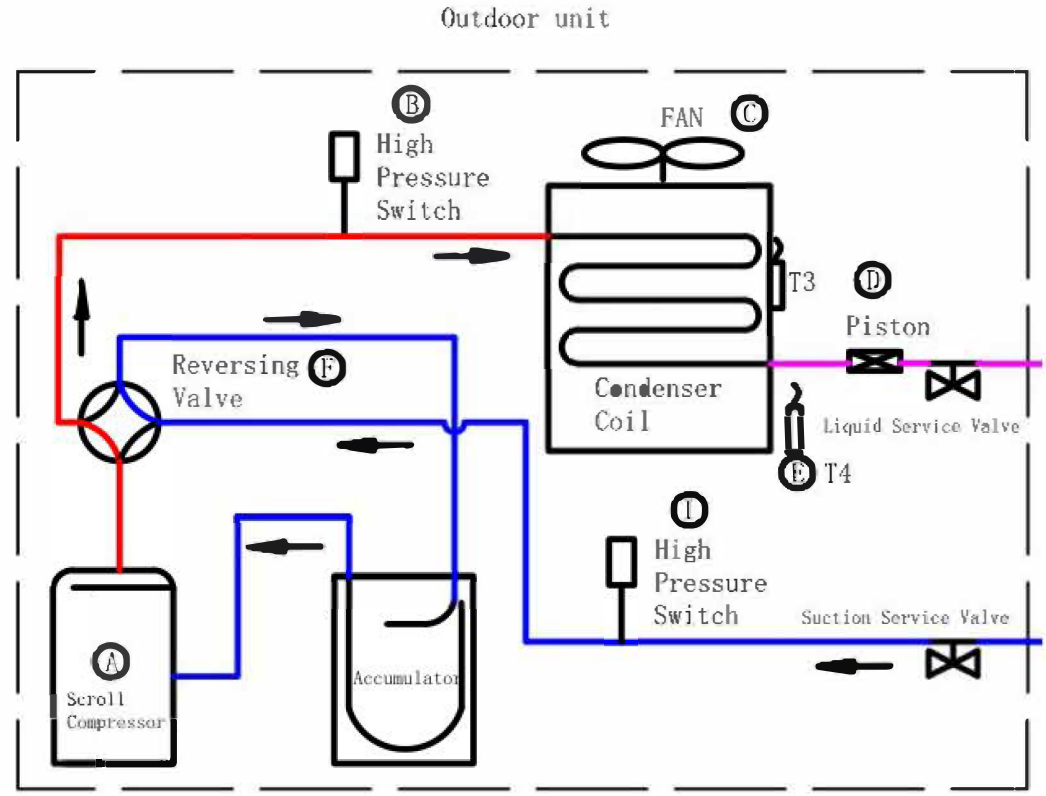
2.2 Functional Part

No. in diagram	Symbol	Part Name
1	Motor	Fan motor
2	Fan	Fan of outdoor
3	HPS	High pressure switch
4	DTS	Discharge Temperature switch
5	Comp.	Compressor
6	T3	Condenser coil temperature sensor
7	COIL	Condenser coil
8	PEV	Pressure Equalizer Valve
9	RV	The Reversing Valve
10	PS	Pressure switch
11	FPA	Fusible plug assembly
12	Accumulator	Accumulator

2.3 Refrigerant Flow Chart

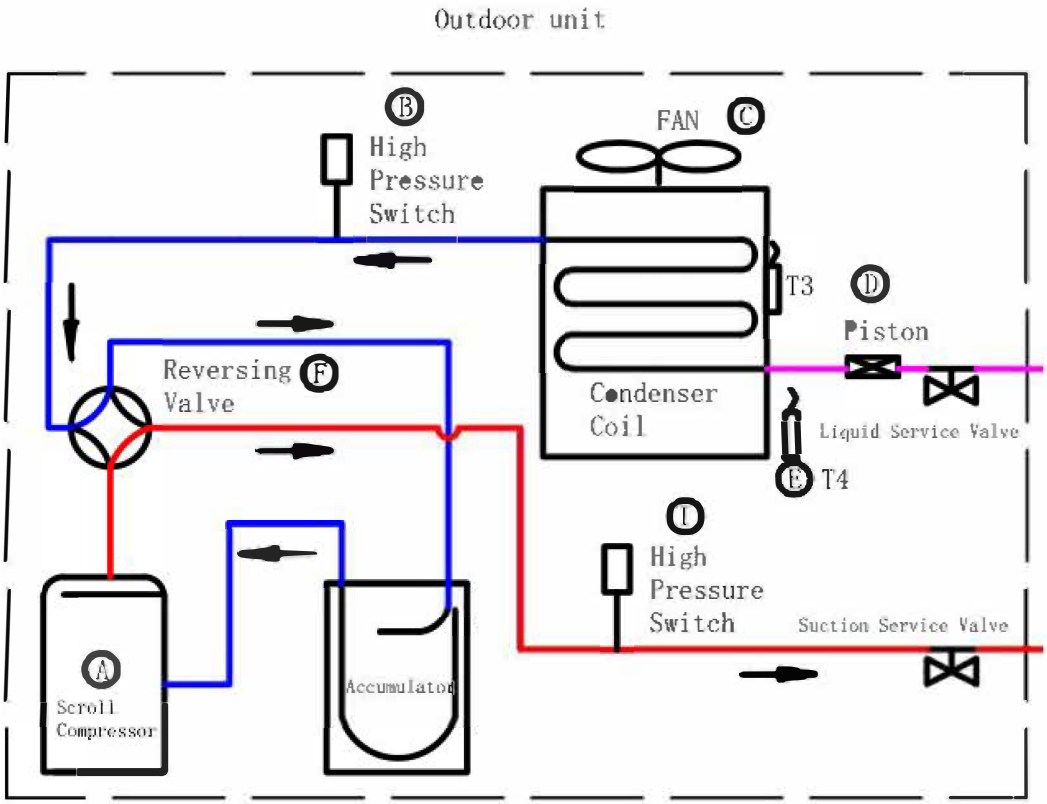
Cooling Operation/Cooling Oil Return Operation/Defrost Operation

- High pressure gas
- High pressure liquid
- Low pressure

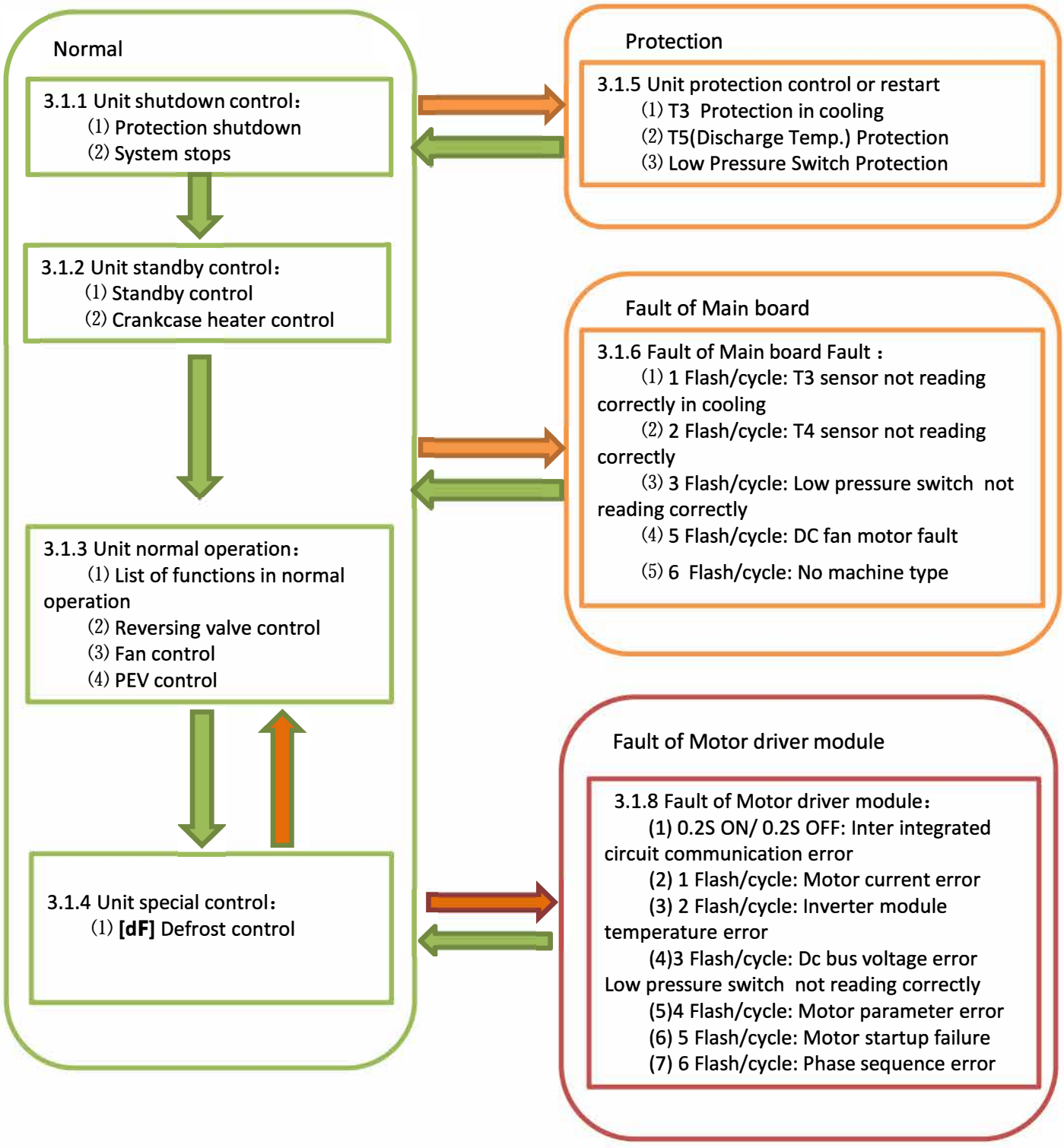


Heating Operation/Heating Oil Return Operation

- High pressure gas
- High pressure liquid
- Low pressure



3.1 Function General



3.1.1 Unit shutdown control

(1) Unit protection shutdown

To protect the outdoor unit, our system will shut down when there is something abnormal. Also the LED 1(Red) or LED 2(Green) would show the fault code when fault present.

(2) Thermostat satisfied shutdown

Anytime system is in unit standby, LED 1 (Red) will flash slowly (2s ON and 2s off).

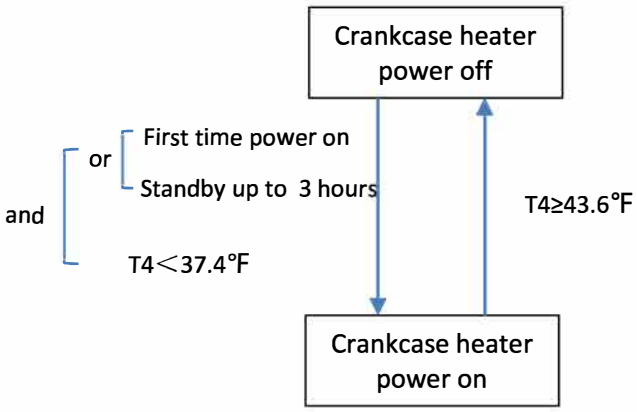
3.1.2 Unit standby control

(1) Standby control

When compressor stopped, the outdoor fan would stop immediately.
Before compressor start, the outdoor fan motor will run at least 15 seconds.

(2) Crankcase heater control

Here is the condition for crankcase heater control.



T4 is the Ambient temperature .

3.1.3 Unit normal operation

Anytime the compressor is operating, the digital tube will show the frequency of compressor.

(1) List of functions in normal

[Cooling]

Symbol	Part Name	Major function
RV	The Reversing Valve	OFF
Fan	Outdoor fan motor	10 speeds ECM motor. Controlled by T3.

[Heating]

Symbol	Part Name	Major function
RV	The Reversing Valve	ON
Fan	Outdoor fan motor	10 speeds ECM motor. Controlled by T4 and compressor speed

(2) Reversing valve control control

The heat pump need "B" signal of 24V wires.

●Cooling:

The reversing valve is off during cooling.

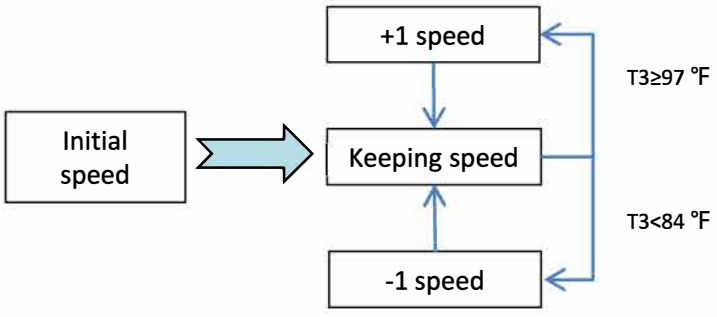
●Heating:

The reversing valve is on during heating and heating standby.

▲Special control: The reversing valve will delay about 1 minute when the first heating starting for reversing reliability.

(3) Fan control

[Cooling]



Note: ±1 speed/25 seconds,10 speeds ECM motor.

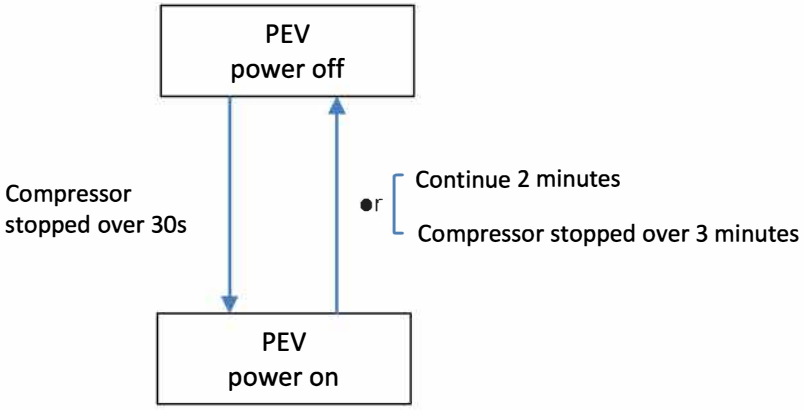
[Heating]

Fan when heating maintains 10 speed

3.1.3 Unit Normal operation

⑷ PEV control

The PEV's function is to help equalize the refrigerant pressures on the high and low sides prior to compressor operation . You will hear a "hissing" sound every time after the compressor stops, this is the PEV equalizing the pressure.



3.1.4 Unit special control

(1) **[dF] Defrost control**

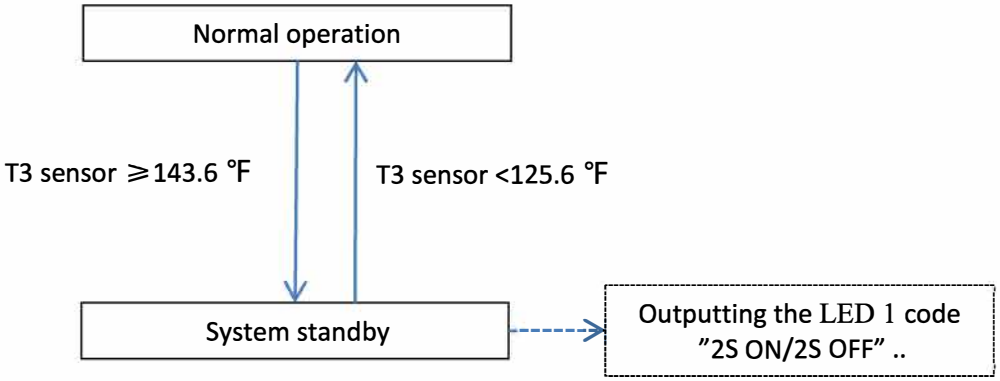
● The Demand Defrost Control (DDC) monitors the ODU coil temperature using thermistor (T3). A second thermistor (T4) monitors outdoor ambient temperature. Based on these parameters, as well as accumulative running time and Standby time, the DDC calculates proper initiation of defrost.

●Any one of three conditions is required to enter defrost:

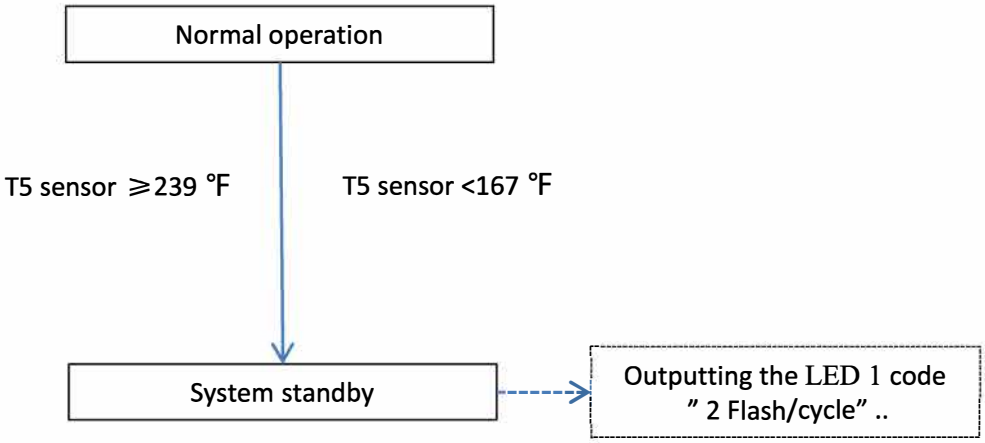
1. After T3 is achieved.
   --T4≥19℉ T3<32 ℉ and lasted for 60 minutes
2. After T4 is achieved.
   --T3<28℉ and lasted for 65 minutes
   _"Standby time" is 2 hours, T3<28℉ when starting and lasted for 15 minutes

3.1.7 Unit protection control or restart:

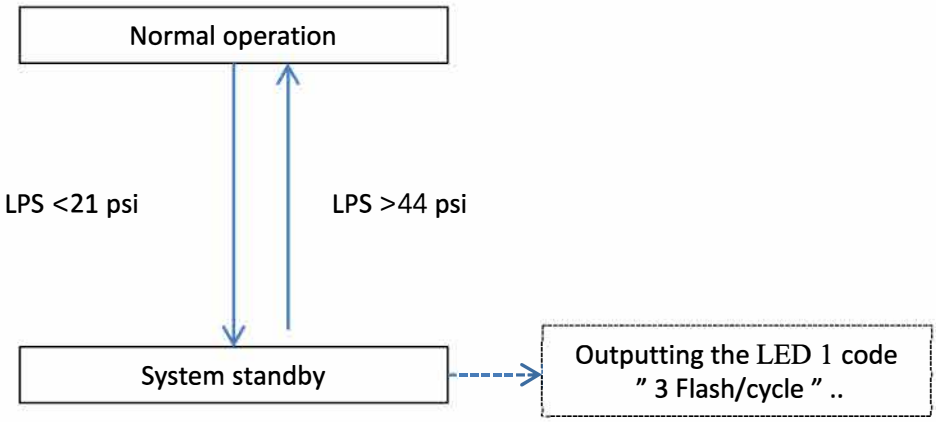
(1) **T3 Protection in cooling**



(2) **T5(Discharge Temp.) Protection**



(3) **Low Pressure Switch Protection**

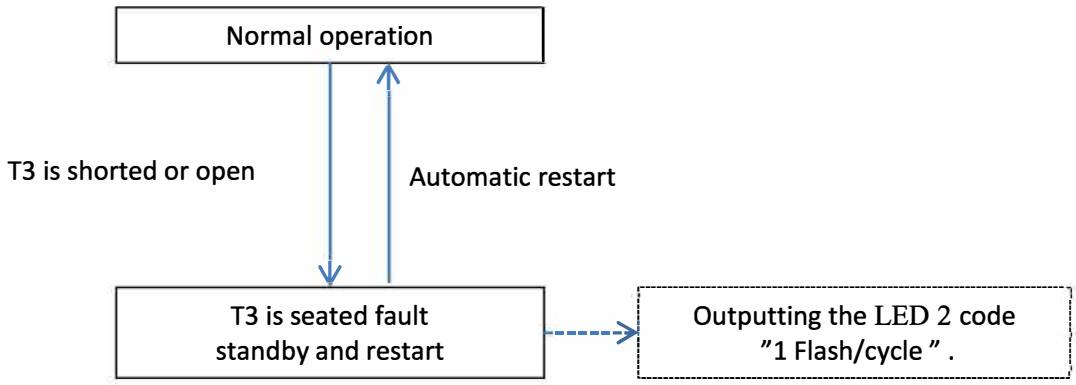


3.1.6 Fault of Main board：

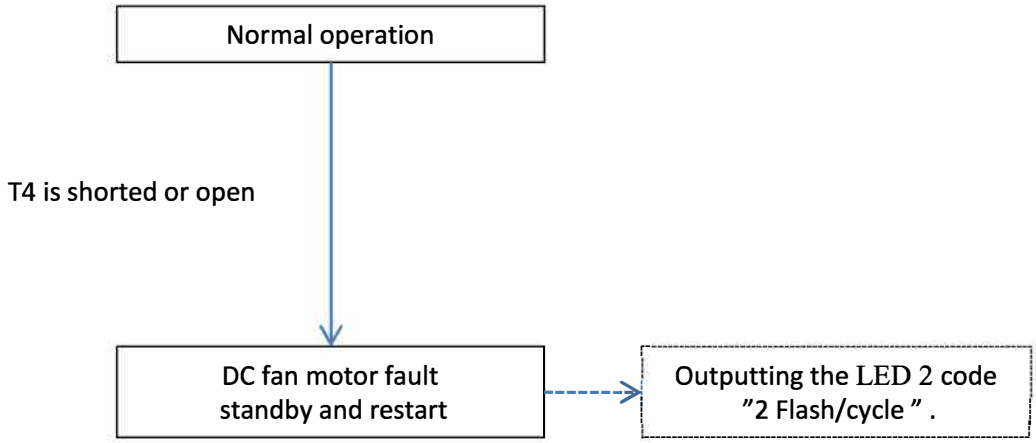
No.	Operation LED	Protection code	Protection control description	Supposed cause
1	LED2	1 Flash/cycle	T3 sensor not reading correctly in cooling	T3 sensor is not properly placed/High pressure switch fault
2	LED2	2 Flash/cycle	T4 sensor not reading correctly	T4 sensor is not properly placed/High pressure switch fault/ Discharge temp. switch open
3	LED2	3 Flash/cycle	Low pressure switch not reading correctly	Low pressure switch is not properly connected.
4	LED2	5 Flash/cycle	DC fan motor fault	Motor fault/severe weather (fan rpm too low due to wind)
5	LED2	6 Flash/cycle	Phase sequence error	Speed message isn't wrote in main board

3.1.7 Unit protection control or restart:

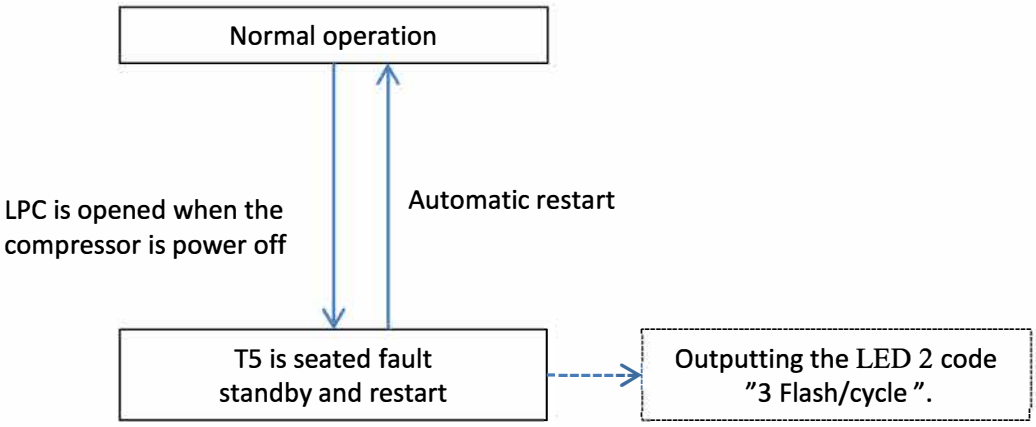
(1) **T3 sensor not reading correctly in cooling**



(2) **T4 sensor not reading correctly**

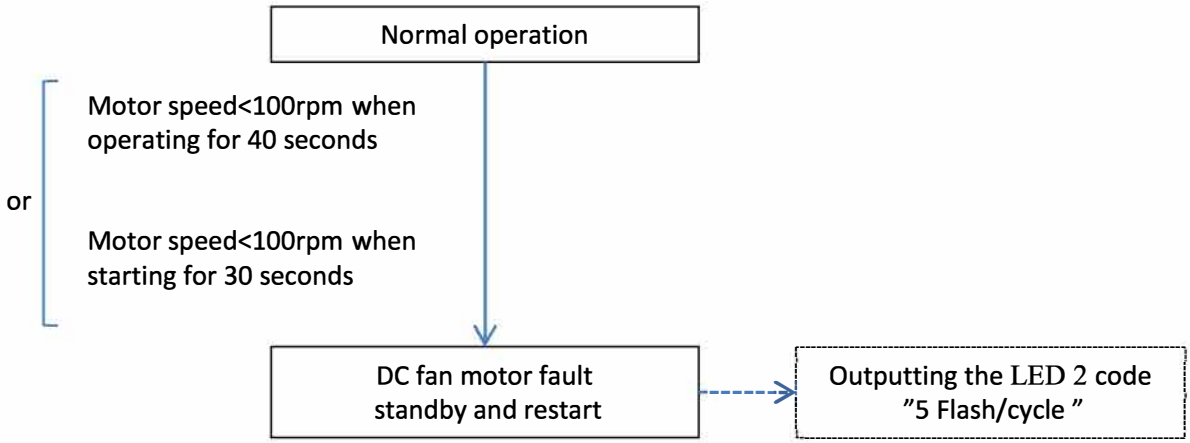


(3) **LPC open**



3.1.7 Unit protection control or restart：

(4) OFM Failure



3.1.8 Fault of Motor driver module：

No.	Operation LED	Protection code	Protection control description	Supposed cause
1	LED1	0.2S ON/0.2S OFF	Inter integrated circuit communication error	Main board is broken
2	LED1	1 Flash/cycle	Motor current error	Motor shaft is stuck or Motor is broken
3	LED1	2 Flash/cycle	Inverter module temperature error	Motor is broken
4	LED1	3 Flash/cycle	Dc bus voltage error	Check out the power supply
5	LED1	4 Flash/cycle	Motor parameter error	Main board is broken or motor type is wrong
6	LED1	5 Flash/cycle	Motor startup failure	Check out the Motor
7	LED1	6 Flash/cycle	Phase sequence error	Check out the Motor supply wring

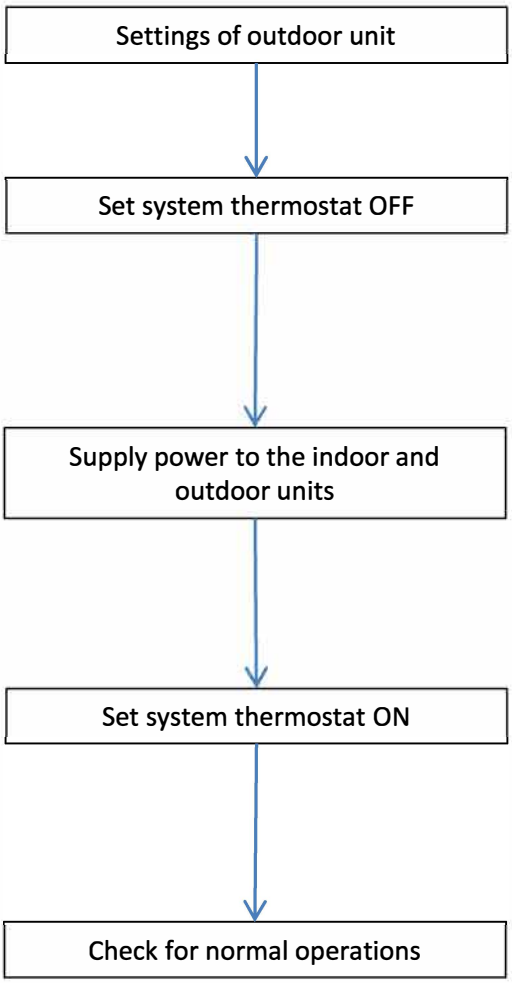
4.1 Test operation

4.1.1 Checks before test operation

No.	Checkpoints	Cautions or warnings
1	Are all units securely installed?	Dangerous for turning over during storm Possible damage to pipe connections
2	Is the earth wire installed according to the applicable local standard?	Dangerous if electric leakage occurs
3	Are the condenser unit installed according to location restrictions requirement?	Poor capacity abnormal operation
4	Are all air inlets and outlets of the indoor and outdoor units unobstructed?	Poor cooling Poor heating
5	Does the drain flow out smoothly?	Pipeline water leak
6	Is piping adequately heat-insulated?	Pipeline water leak Poor capacity
7	Have the connections been checked for air tight test and vacuum drying?	Poor capacity abnormal operation
8	Is a proper quantity of refrigerant charged?	Poor capacity abnormal operation
9	Are the service valve open fully?	abnormal operation
10	Do the supply power wirings connected Normally? Including the earth wiring.	Dangerous if electric leakage occurs
11	Does the earth leakage circuit breaker connected normally?	Dangerous if electric leakage occurs
12	Do the wirings of 24V signal connected according to wiring diagram? Including the thermostat wiring and setting.	abnormal operation
13	Is the supply voltage conform to the specifications on the name plate?	abnormal operation Damage unit
14	Are the cable sizes as specified and according to local regulations?	Damage of cables

4.1 Test operation

4.1.2 Turn power on



Note:
Make field setting if needed.
(For the setting procedure, refer to information in "4.2.2 Setting by DIP switches")

Note:
In a normal condition, the LED1 flesh slowly (2S ON/2S OFF) and LED2 steady on.

Note:
Be sure to turn the power on 1 hour before starting operation when the ambient temperature is below **70**℉

Note:
Check operations
Check for the 24V signal from thermostat
Check for operation mode
Check for the digital display shows the compressor frequency

4.1 Test operation

4.1.3 Charging Refrigerant

(1) Charging method selection

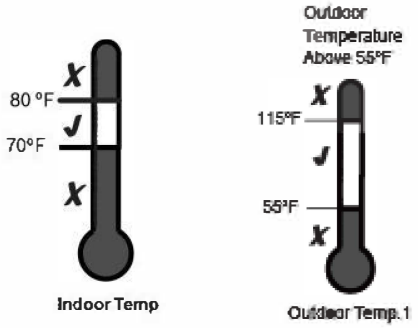
Weigh-in charging method

Use weigh-in charging method the initial installation, or anytime a system charge is being replaced. Weigh-in charging method can also be used when power is not available to the equipment site or operating conditions (Indoor/Outdoor temperatures) are out of range to verify with the subcooling charging method.

For mixed system, when have to use weigh-in method for charging, it is important to return in the spring or summer to accurately charge the system in the cooling mode when outdoor ambient temperature is above 55℉.

Superheating charging method

Superheating (in cooling mode) is the only recommended method of charging above 55℉outdoor ambient temperature, especially the mixed system.



Note：. When the temperature is >=115F, it must be charged by weighing

(2) Based charging (Condenser charging)

There is some refrigerant when unit come out from factory. The value can be found on nameplate.

(3) Calculate additional charging of refrigerant line length

The factory charge in the outdoor unit is sufficient for 15 feet of standard size refrigerant line, need to add refrigerant if the pipe beyond 15 feet.

Calculate the additional refrigerant to be charged:

=(L-15)*0.6

L=Total length (feet) of liquid line (3/8``)

*If liquid line is less than 15ft, don`t need to do it.

4.1 Test operation

(4) Method for charging mode

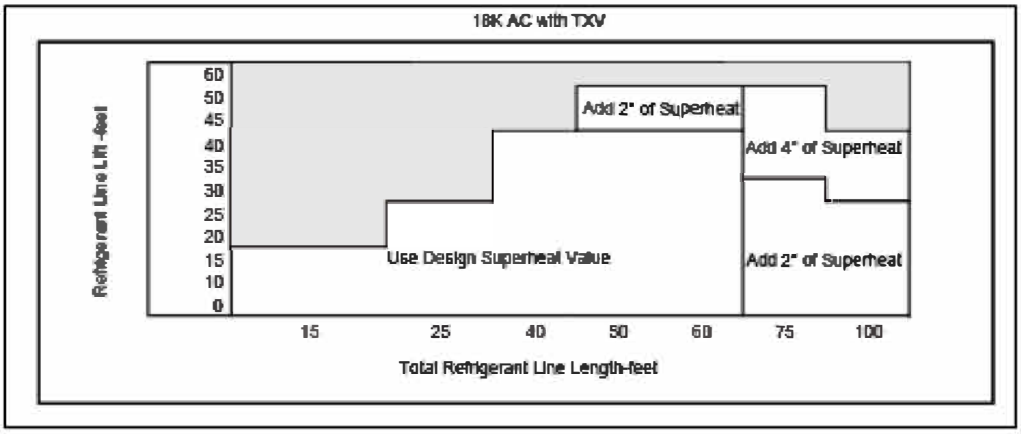
Design superheat with TXV throttle

Outdoor DB (°F)	Indoor Unit Inlet DB/WB (°F)					
	95/79	90/75	85/71	80/67	75/63	70/58
115	13	12	11	11	10	9
110	13	11	10	10	10	9
105	12	11	10	10	9	8
100	11	10	10	10	9	8
95	11	10	10	9	8	8
90	11	10	10	9	8	8
86	12	10	9	9	8	8
80	13	11	9	9	8	8
75	14	12	9	8	7	5
70	10	9	8	6	5	5
65	7	6	6	6	5	5
60	6	5	5	5	5	5
55	6	5	5	5	5	5

Design superheat with piston throttle

Outdoor DB (°F)	Indoor Unit Inlet DB/WB (°F)					
	95/79	90/75	85/71	80/67	75/63	70/58
115	16	11	6	5	5	5
110	18	13	8	5	5	5
105	20	15	10	5	5	5
100	23	17	13	7	5	5
95	25	20	15	9	5	5
90	27	22	17	12	5	5
86	29	24	19	14	8	5
80	25	20	16	11	7	5
75	22	18	14	9	5	5
70	22	18	13	8	5	5
65	21	17	13	8	5	5
60	20	16	12	7	5	5
55	19	15	11	5	5	5

Determine the final superheat value using total Line Length and Lift measured in 5.3 and the charts below



For more information, plese go to read installation manual

4.1 Test operation

(4) Method for charging mode

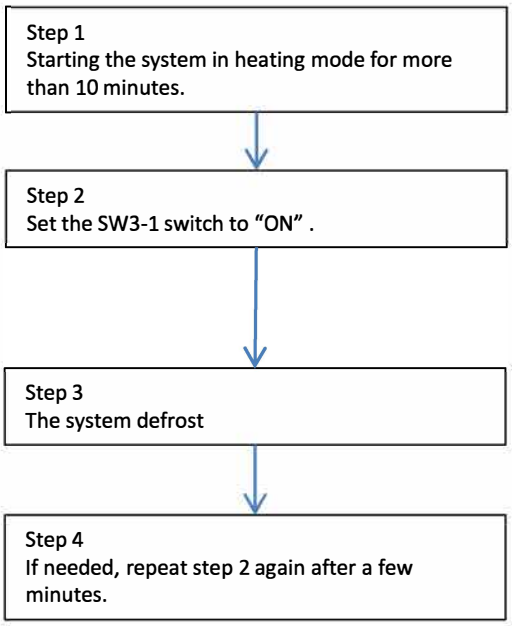
R410A Refrigerant Superheat Chart							
Suction Temp (°F)	Final Superheat (°F)						
	6	8	10	12	14	16	18
	Suction Gauge Pressure (PSI)						
40	105	101	97	93	89	86	82
42	109	105	101	97	93	89	86
44	114	109	105	101	97	93	89
46	118	114	109	105	101	97	93
48	123	118	114	109	105	101	97
50	128	123	118	114	109	105	101
52	133	128	123	118	114	109	105
54	138	133	128	123	118	114	109
56	143	138	133	128	123	118	114
58	148	143	138	133	128	123	118
60	153	148	143	138	133	128	123
62	159	153	148	143	138	133	128
64	164	159	153	148	143	138	133
66	170	164	159	153	148	143	138
68	176	170	164	159	153	148	143
70	182	176	170	164	159	153	148
72	188	182	176	170	164	159	153

Notes:

1. If superheating is low, remove refrigerant. If superheating is high, add refrigerant.
2. If superheat >30℉, please check if there are abnormal condition for insulation, high humidity, high room temperature. Also check if discharge superheat>60 ℉ or there is fault code. Replace TXV if everything is normal.
3. If superheat <5℉, please check if there are abnormal on blower motor speed or low room temperature. Also check if discharge superheat<40 ℉or there is fault code. Replace TXV if everything is normal.
4. Before adjusting system charge: allow the system to run for 10 minutes, then press the force button and let the system run for ~20 minutes to ramp up to 100%, then you can begin charging.

4.1 Test operation

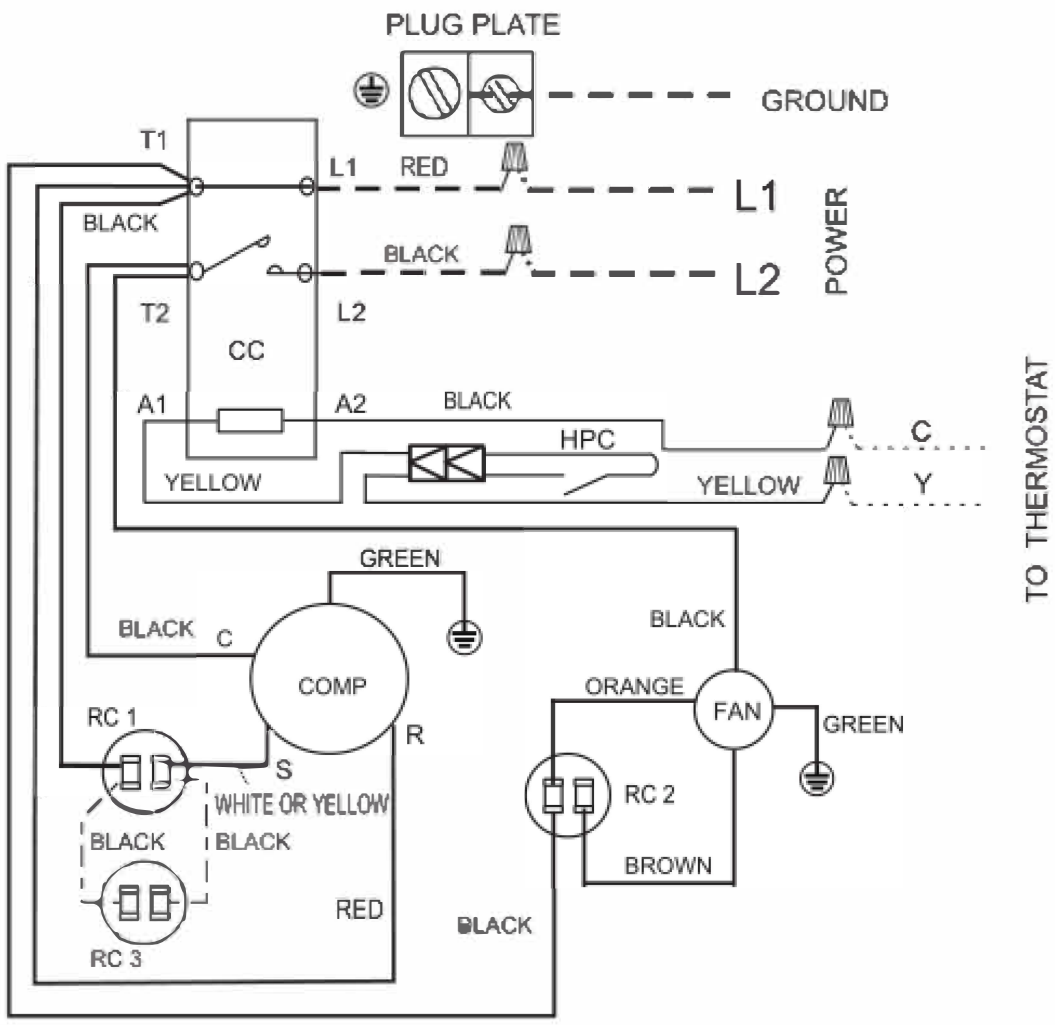
4.1.4 Manual defrost



Note:
Defrost will exit automatically.

4.2 Field setting

4.2.1 Setting by DIP switches---13.4AC 42/48/60K



LINE VOLTAGE
FACTORY STANDARD ——————
FIELD INSTALLED - - - - - - -
FACTORY OPTIONAL – — – —

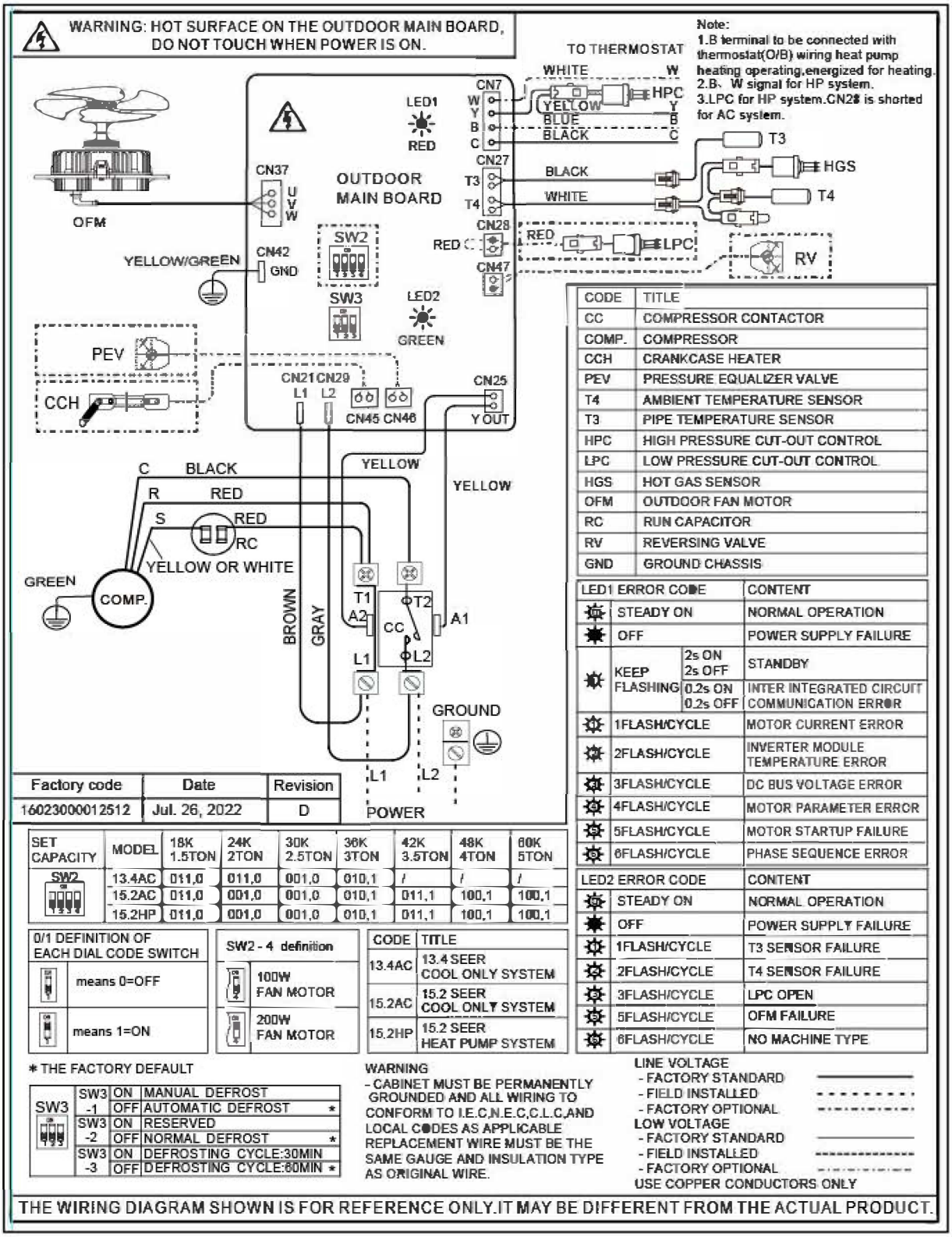
LOW VOLTAGE
FACTORY STANDARD ——————
FIELD INSTALLED - - - - - - -
FACTORY OPTIONAL – — – —
USE COPPER CONDUCTORS ONLY

HPC	HIGH PRESSURE CUT-OUT CONTROL
CC	COMPRESSOR CONTACTOR
COMP	COMPRESSOR
RC 1	RUN CAPACITOR 1
RC 2	RUN CAPACITOR 2
RC 3	RUN CAPACITOR 3

WARNING: CABINET MUST BE PERMANMENTLY GOUNDED AND ALL WIRING TO CONFORM TO I.E.C,N.E.C,C.E.C,C.L.C,AND LOCAL CODES AS APPLICABLE REPLACEMENT WIRE MUST BE THE SAME GAUGE AND INSULATION TYPE AS ORIGINAL WIRE

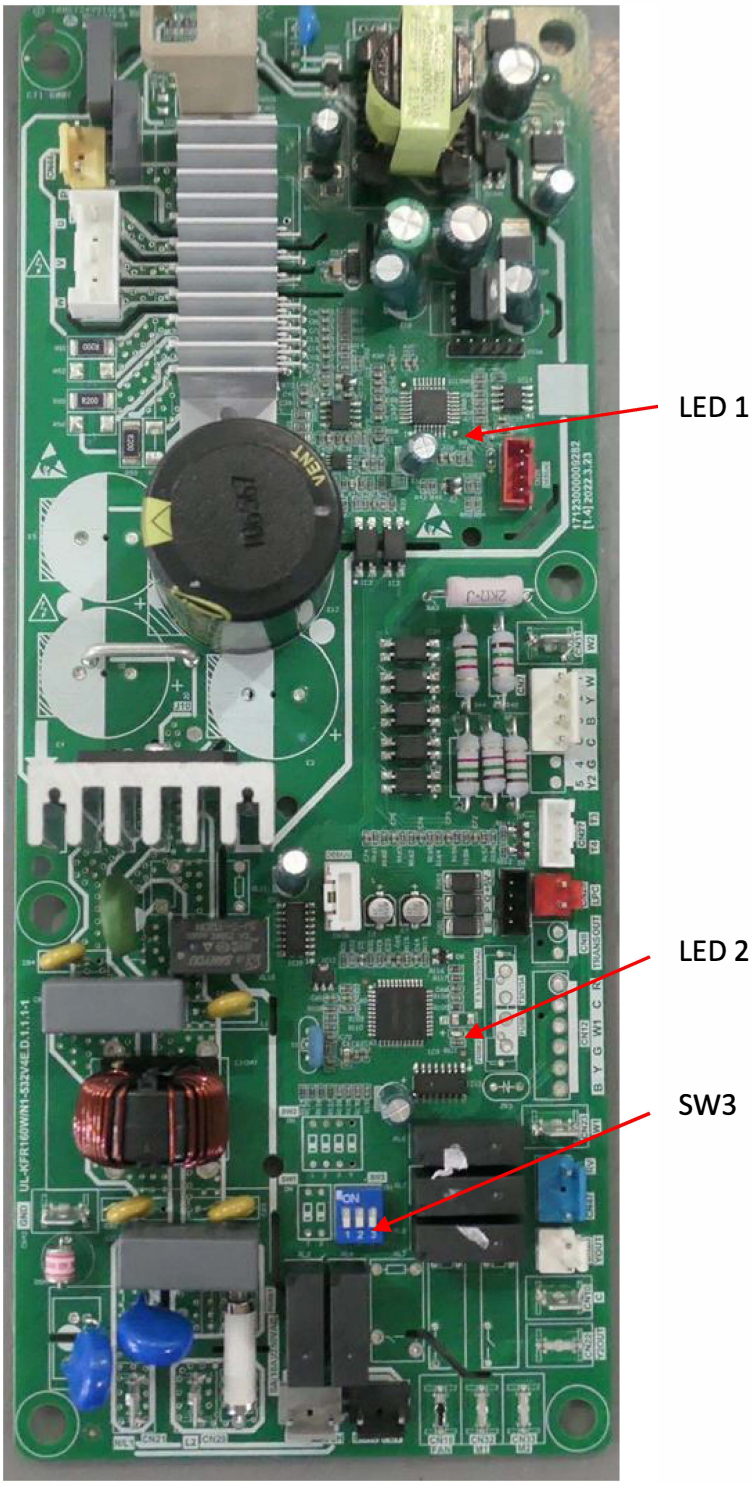
4.2 Field setting

4.2.1 Setting by DIP switches---4/5TON



4.2 Field setting

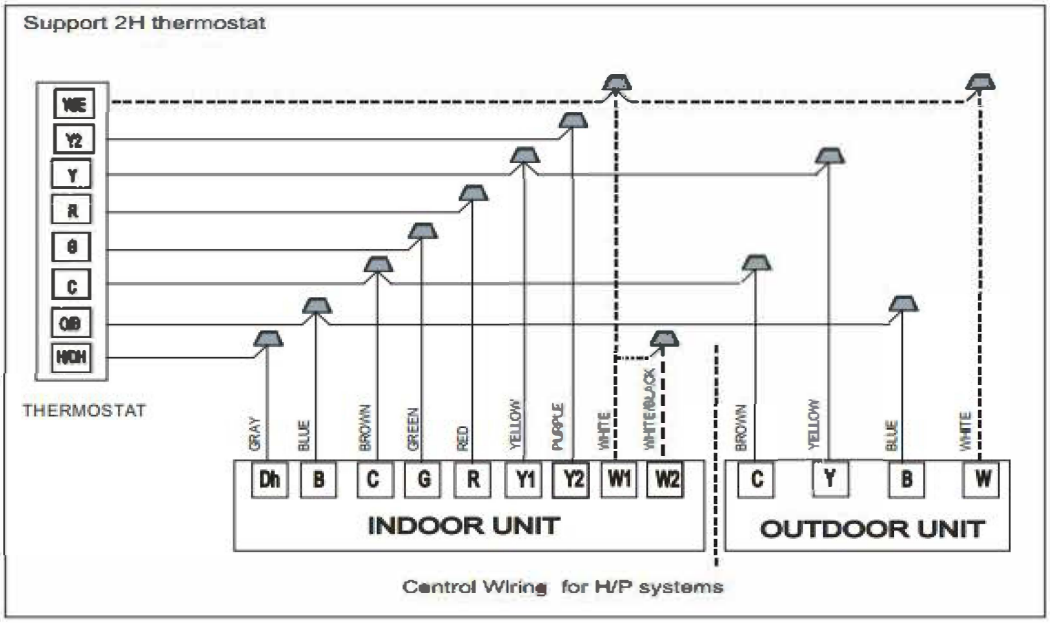
4.2.2 DIP switch position indication ---2/3TON



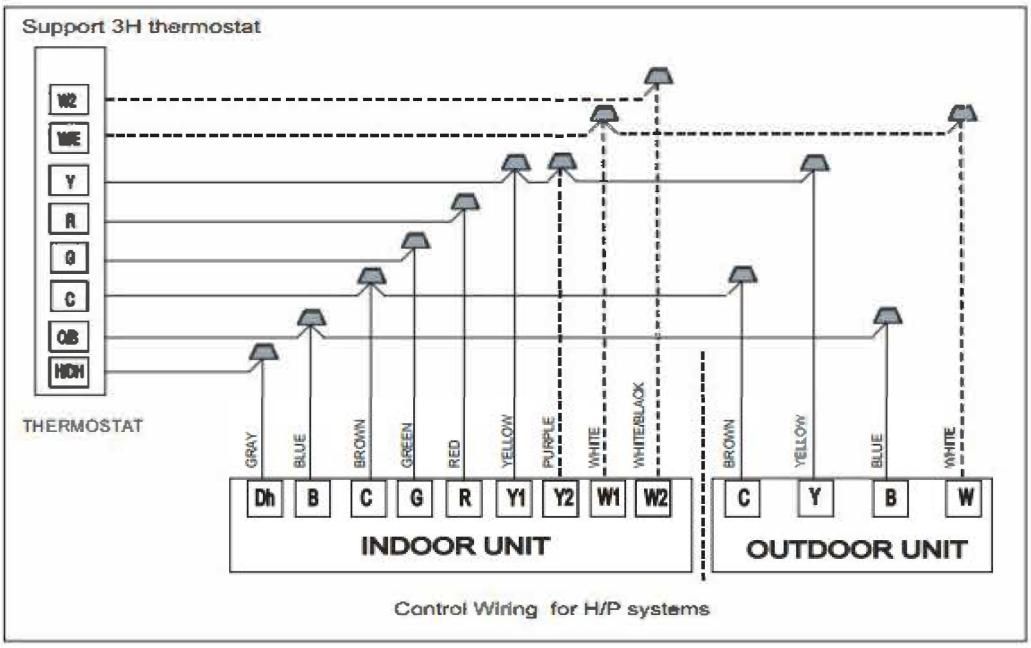
4.3 Thermostat

Note: B signal need thermostat programming settings.

4.3.1 Control wiring



Control Wiring for H/P systems



Control Wiring for H/P systems

Notes:

- *Be sure power supply agrees with equipment nameplate.*
- *Power wiring and grounding of equipment must comply with local codes.*
- *Low voltage wiring to be No. 18 AWG minimum conductor.*
- *"- - - - - - - -" Field installed electric auxiliary heat connection*
- *Single-stage auxiliary heating (Supported by 2H thermostat)*

- *Twin-stage auxiliary heating (Supported by 3H thermostat)*
- *W: Electric auxiliary heat signal.*
- *W1:The first stage Field installed electric auxiliary heat signal.*
- *W2:The second stage Field installed electric auxiliary heat signal.*
- *The outdoor unit W signal is connected to the Electric auxiliary heat or the first stage Electric auxiliary heat.*

5. Intelligent Troubleshooting

5.1 diagnosis system introduction

There are two types of auxiliary diagnosis code in system: Main board code and Motor driver module code

5.1.1 Fault of Main board

No.	Operation LED	Protection code	Protection control description	Supposed cause
1	LED2	1 Flash/cycle	T3 sensor not reading correctly in cooling	T3 sensor is not properly placed/High pressure switch fault
2	LED2	2 Flash/cycle	T4 sensor not reading correctly	T4 sensor is not properly placed/High pressure switch fault/ Discharge temp. switch open
3	LED2	3 Flash/cycle	Low pressure switch not reading correctly	Low pressure switch is not properly connected.
4	LED2	5 Flash/cycle	DC fan motor fault	Motor fault/severe weather (fan rpm too low due to wind)
5	LED2	6 Flash/cycle	No machine type	Speed message isn't wrote in main board

5.1.2 Fault of Motor driver module **:**

No.	Operation LED	Protection code	Protection control description	Supposed cause
1	LED1	0.2S ON/0.2S OFF	Inter integrated circuit communication error	Main board is broken
2	LED1	1 Flash/cycle	Motor current error	Motor shaft is stuck or Motor is broken
3	LED1	2 Flash/cycle	Inverter module temperature error	Motor is broken
4	LED1	3 Flash/cycle	Dc bus voltage error	Check out the power supply
5	LED1	4 Flash/cycle	Motor parameter error	Main board is broken or motor type is wrong
6	LED1	5 Flash/cycle	Motor startup failure	Check out the Motor
7	LED1	6 Flash/cycle	Phase sequence error	Check out the Motor supply wring

Note:

1. These fault codes will be displayed on the digital tube until the issue is resolved.

5.2 Symptom-based Troubleshooting

5.2.1 LED1/LED2 OFF

Issue	LED1/LED2 OFF
Model	All
Fault name	/
Classify	Power/electric issue
Possible cause	• Frequently power off and power on （within 3 minutes） • Abnormal power input • Abnormal wire connections
Notes:	

Troubleshooting

Check for the following 4 points:
①If frequently power off and power on(within 3 minutes)
② If the supply power is normal
③ If wiring diagram to insure all wire

Note:
① to ①
② to ②

The same below

Check If there are above conditions

Yes

Remedy defective points:
①Power off at least 3 minutes then power on
②The supply power range should **be 187V-253V**
③Refer to wiring diagram to insure all wire connections are correct.

No

Check whether the power supply is short-circuited to ground

Yes

Replace the power cord

No

Check If compressor or motor is shorted to ground

Refer to 【6.10/6.11】

Replace compressor or motor

Replace the control board

5.2 Symptom-based Troubleshooting

5.2.2 System does not start operation

Issue	System does not start operation
Model	All
Fault name	/
Classify	Thermostat fault
Possible cause	• The thermostat doesn't start • Wrong wire connections between thermostat and unit • Damaged thermostat • Disconnect the compressor wire（could be caused after service）
Notes:	

Troubleshooting

①--
②Refer to wiring diagram
③Measure the voltage between YC and BC
④ Refer to wiring diagram

Check for the following 4 points:
①The thermostat doesn't start
②Wrong wire connections
③No 24Vac output（Check if there is 18-28Vac and 0Vdc between Y&C、B&C）
④Compressor wire disconnected

Check if there are above 4 conditions

Yes → Remedy defective points:
①Start the thermostat
②correct the connections
③Replace the thermostat
④Connect the compressor wire

No → Power off and wait at least 3 minutes then power on

Cooling:40~120℉
Heating:5~86℉

If there are above conditions

Yes → No need to have service

No → If T4 sensor failed

Refer to 【 6.6 】

Yes → Replace the T4 sensor

No → If T4 sensor failed

Refer to 【 6.7 】

Yes → Replace the T4 sensor

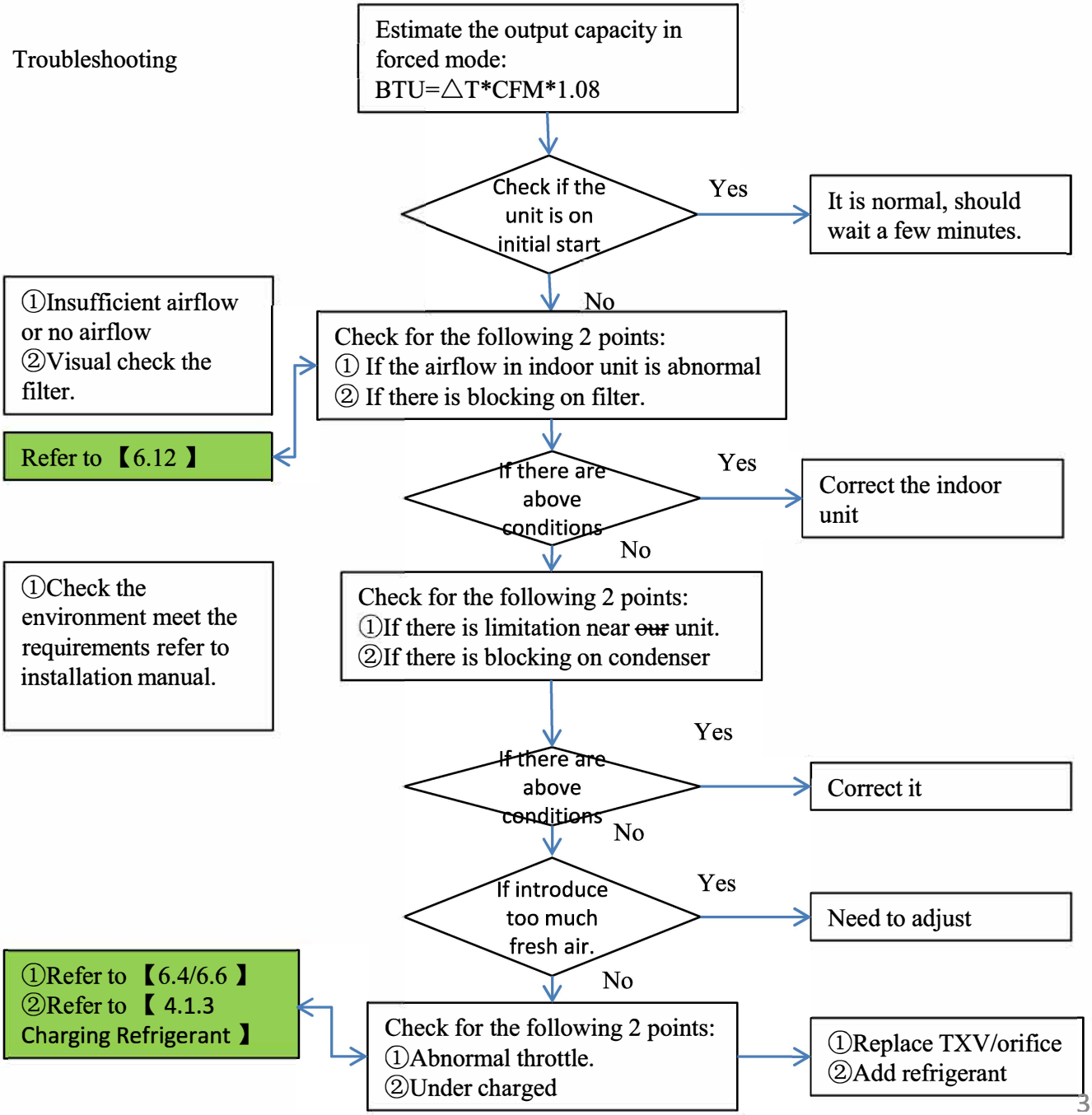
No → Run Normally

5.2 Symptom-based Troubleshooting

5.2.3 Capacity is low

Issue	Capacity is low
Model	All
Name	/
Classify	System fault
Possible cause	• Poor heat dissipation in indoor unit • Poor heat dissipation in outdoor unit • Under charged • First start

Troubleshooting

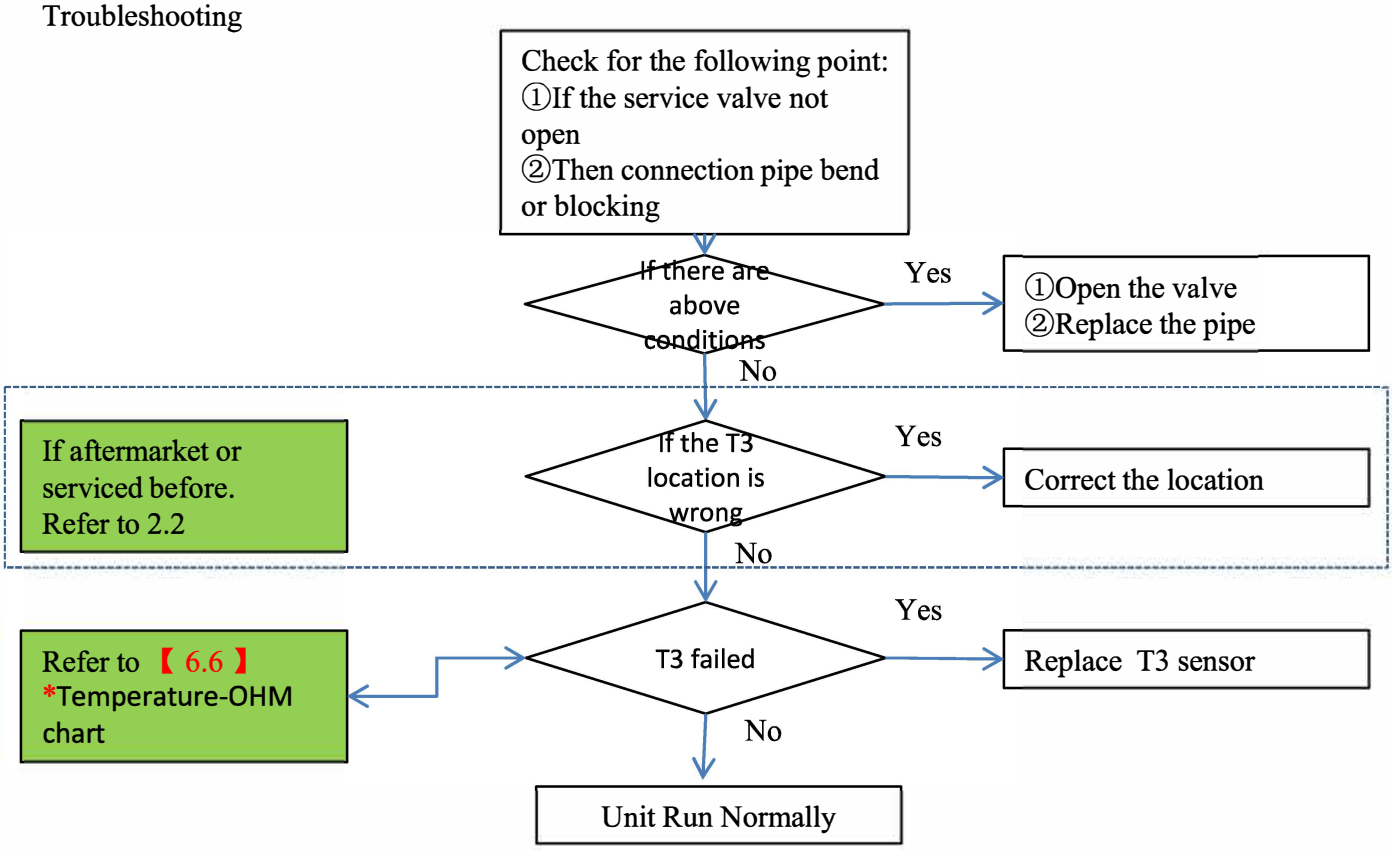


5.3 Troubleshooting by Main board Fault code

5.3.1 LED2-1 Flash/cycle

Faulty code	LED2-1 Flash/cycle
Model	All
Name	T3 sensor not reading correctly in cooling
Classify	System fault
Possible cause	• **Wrong location of T3 sensor** • Faulty T3 sensor • Service valves not open

Troubleshooting

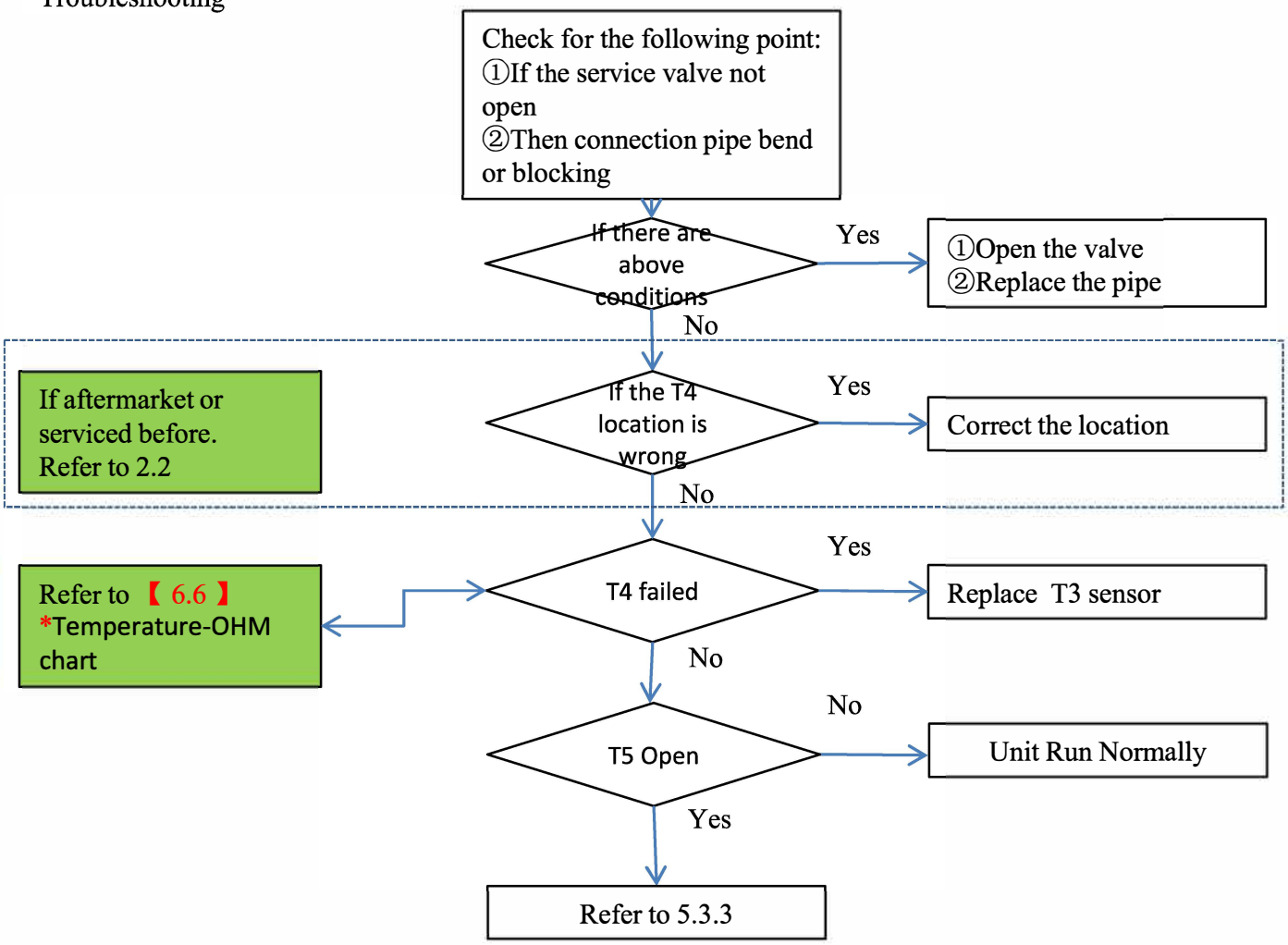


5.3 Troubleshooting by Main board Fault code

5.3.2 LED2-2 Flash/cycle

Faulty code	LED2-2 Flash/cycle
Model	All
Name	T4 sensor not reading correctly/Discharge Temperature switch (T5)open
Classify	System fault
Possible cause	• **Wrong location of T4 sensor** • Faulty T4 sensor • Discharge Temperature switch open

Troubleshooting

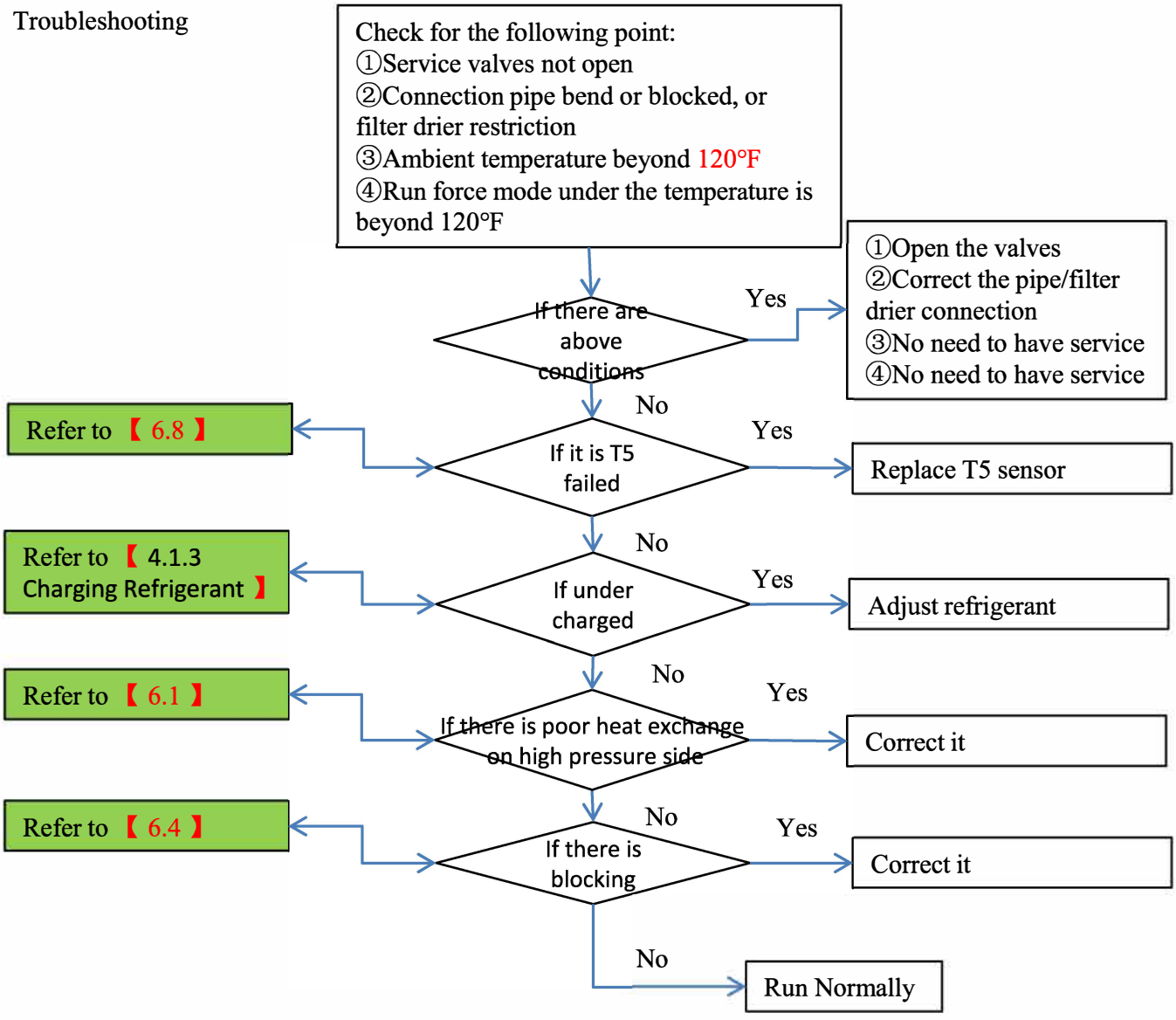


5.3 Troubleshooting by Main board Fault code

5.3.3 LED2-2 Flash/cycle

Faulty code	LED2-2 Flash/cycle
Model	All
Name	Compressor discharge temperature (T5) protection
Classify	System fault
Possible cause	• **TXV/EEV/filter drier blocked** • **Under charged** • Service valves not open/filter drier restriction • Indoor unit motor stopped abnormally / poor heat exchange (**heating mode**) • **Poor heat exchange on outdoor unit（cooling mode)**

Troubleshooting

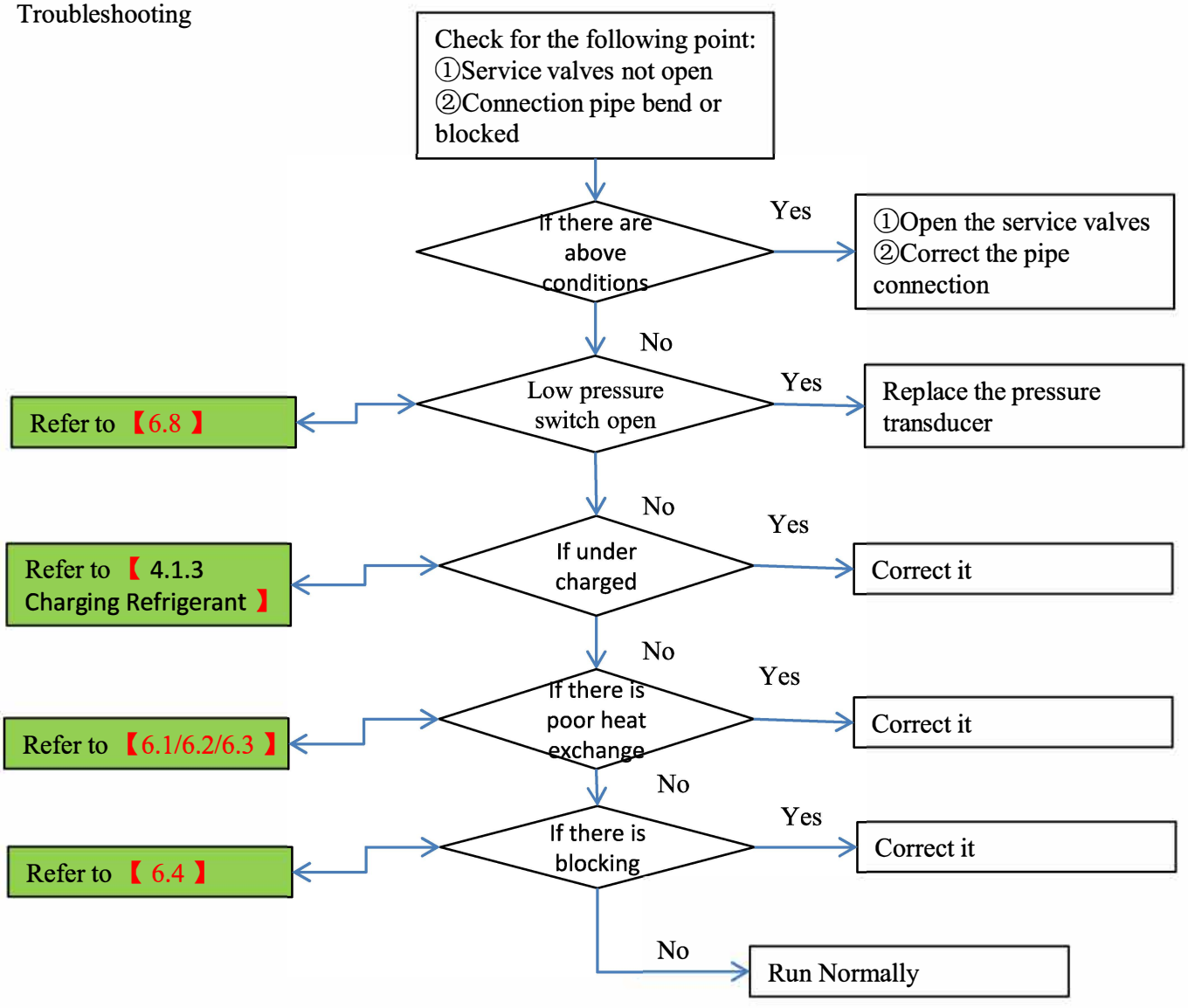


5.3 Troubleshooting by Main board Fault code

5.3.4 LED2-3 Flash/cycle

Faulty code	LED2-3 Flash/cycle
Mode	All
Name	Low pressure protection
Classify	System fault
Possible cause	• Indoor unit motor stopped abnormally / poor heat exchange • **TXV/EEV/filter drier/indoor coil blocked** • Service valves not open • Under charged

Troubleshooting

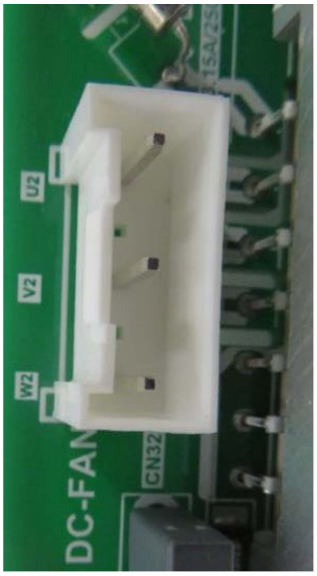


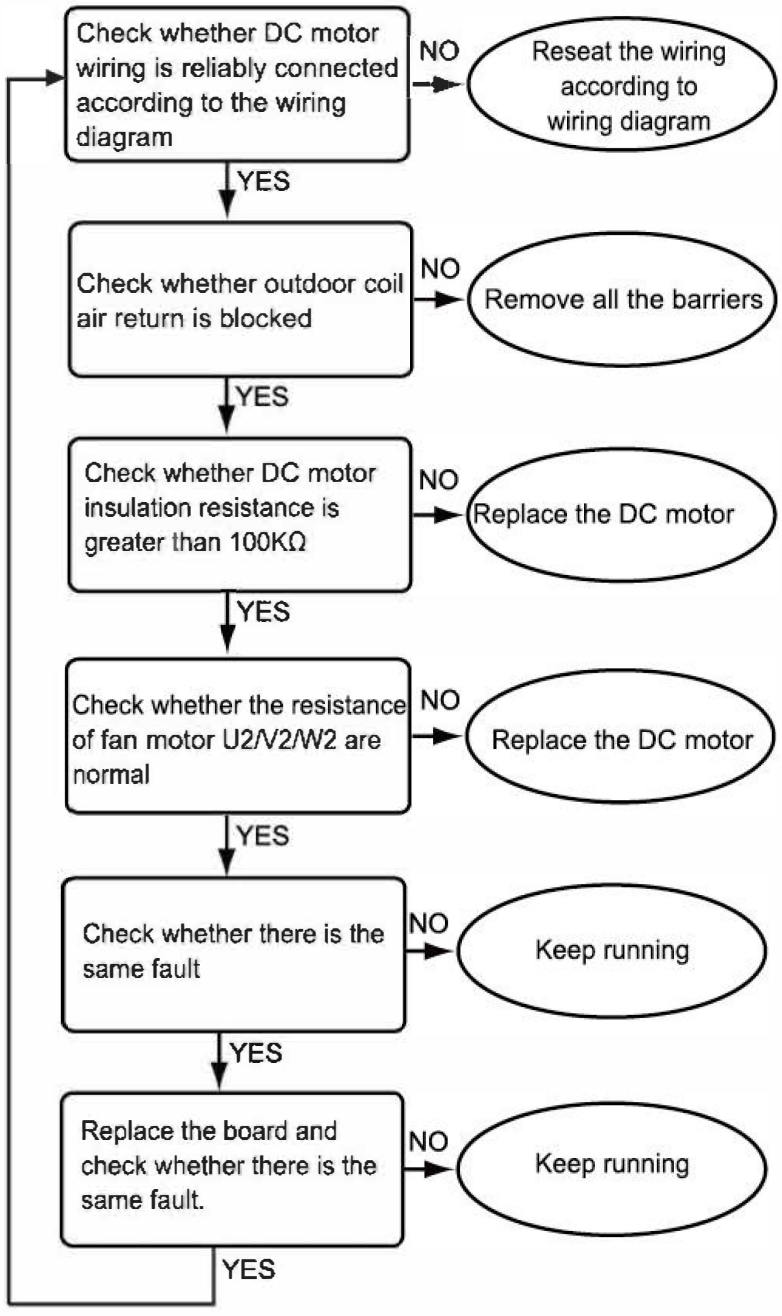
5.3 5.3 Troubleshooting by Main board Fault code

5.3.5 LED2-5 Flash/cycle

Faulty code	LED2-5 Flash/cycle
Model	All
Name	DC fan motor fault
Classify	Electric issue
Possible cause	• Start electromagnetic interference • Motor failed • Electric issue

Troubleshooting





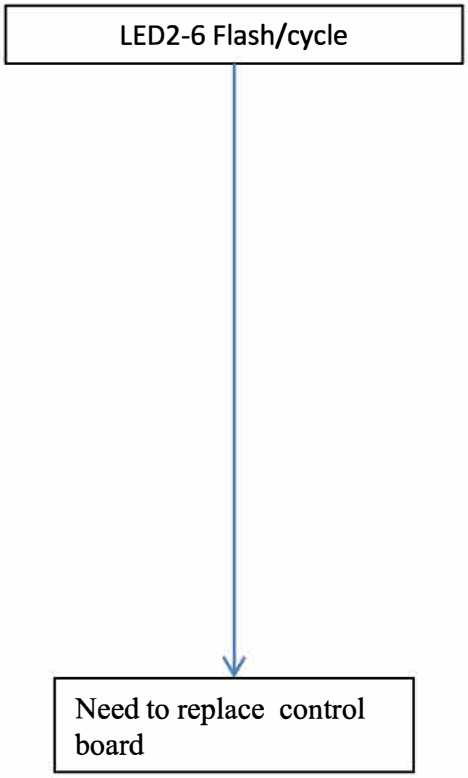
Refer to 【6. 10】

5.3 Troubleshooting by Main board Fault code

5.3.5 LED2-6 Flash/cycle

Faulty code	LED2-6 Flash/cycle
Model	All
Name	No machine type
Classify	Electric issue
Possible cause	• Speed message isn't wrote in main board • Control board broken

Troubleshooting

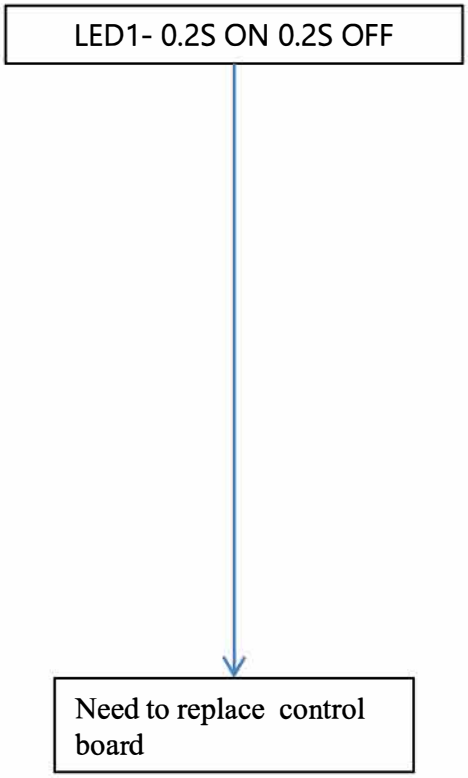


5.4 Troubleshooting by Motor driver module code

5.4.1 LED1- 0.2S ON 0.2S OFF

Faulty code	LED1- 0.2S ON 0.2S OFF
Model	all
Name	Inter integrated circuit communication error fault
Classify	Electric issue
Possible cause	• Motor driver module poor contact • Control board broken

Troubleshooting

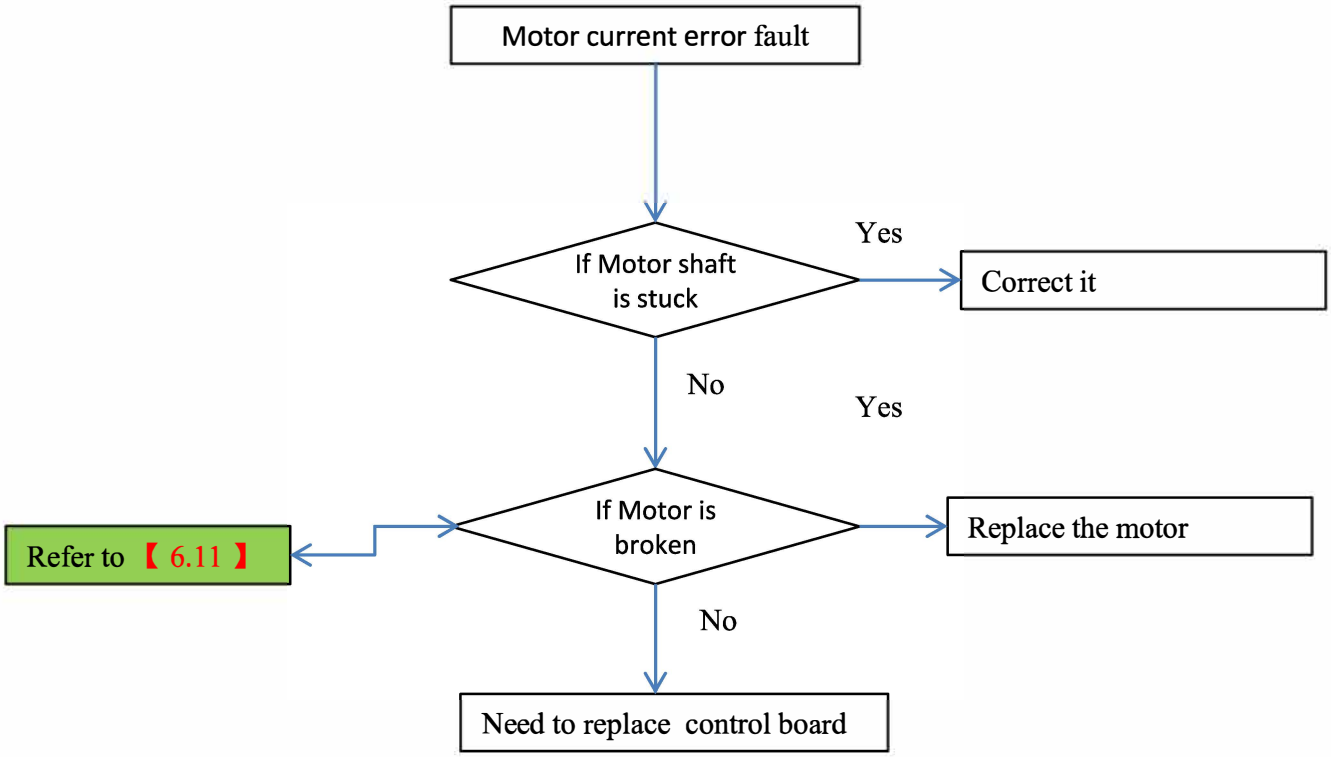


5.4 Troubleshooting by Motor driver module code

5.4.2 LED1--1 Flash/cycle

Faulty code	LED1--1 Flash/cycle
Model	all
Name	Motor current error fault
Classify	Electric issue
Possible cause	• Motor shaft stuck • Motor broken • Control board broken

Troubleshooting

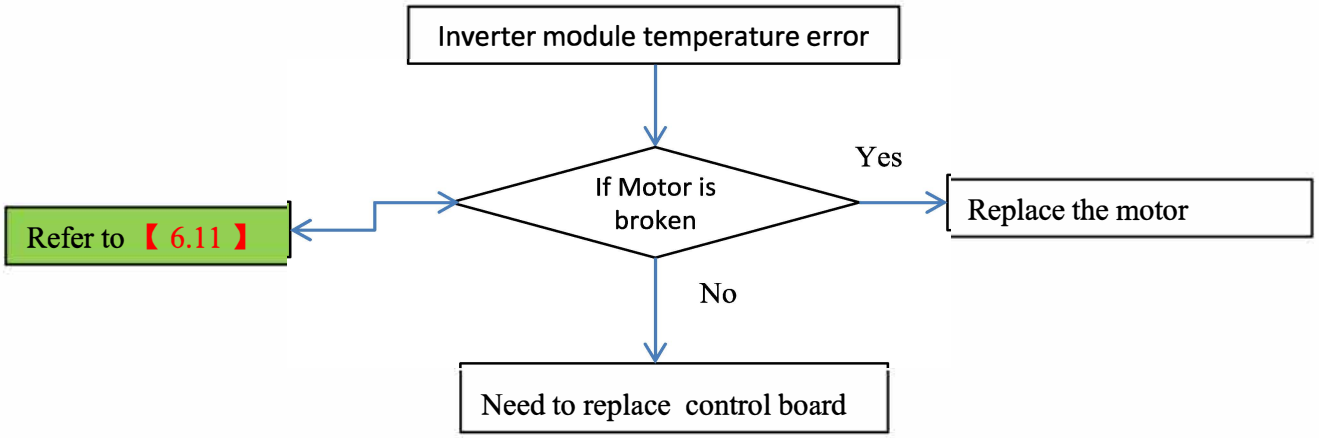


5.4 Troubleshooting by Motor driver module code

5.4.3 LED1--2 Flash/cycle

Faulty code	LED1—2 Flash/cycle
Model	all
Name	Inverter module temperature error
Classify	Electric issue
Possible cause	• Motor is broken • Control board broken

Troubleshooting

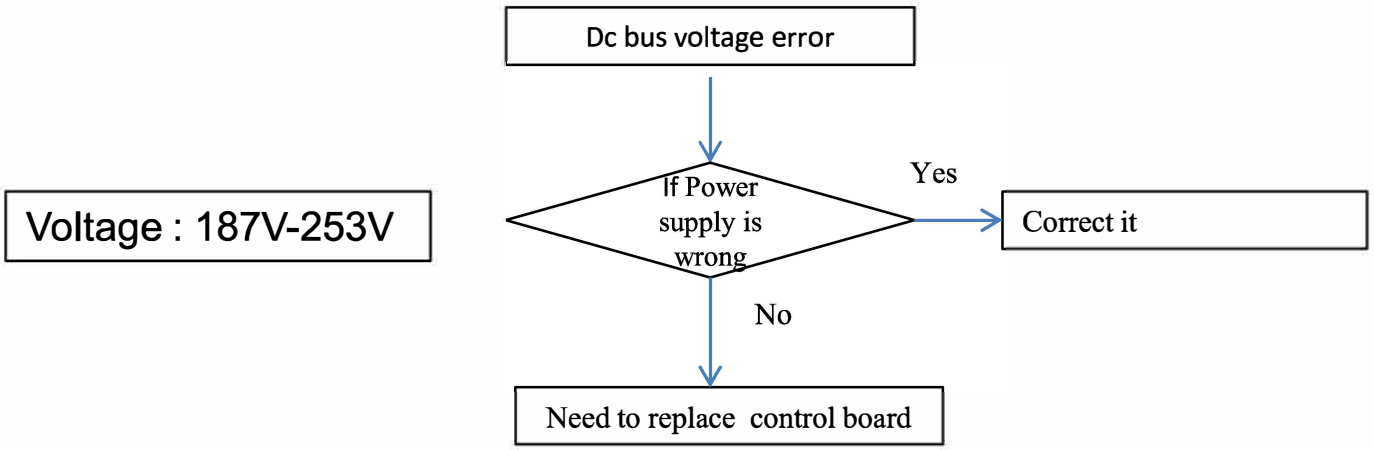


5.4 Troubleshooting by Motor driver module code

5.4.4 LED1--3 Flash/cycle

Faulty code	LED1—3 Flash/cycle
Model	all
Name	Dc bus voltage error
Classify	Electric issue
Possible cause	• Power supply wrong • Control board broken

Troubleshooting

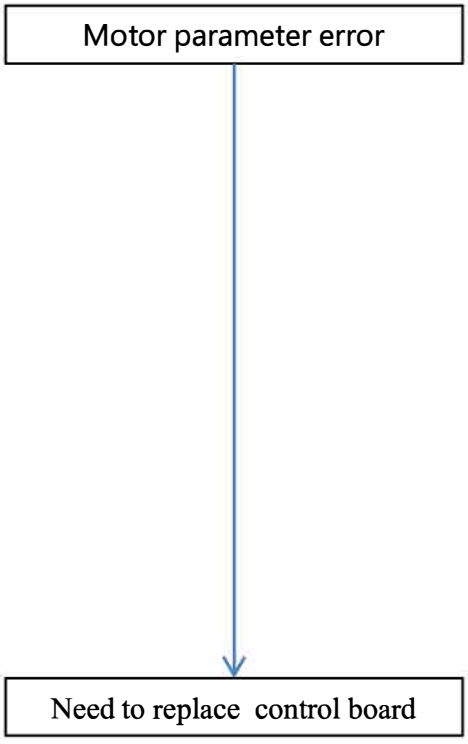


5.4 Troubleshooting by Motor driver module code

5.4.5 LED1--4 Flash/cycle

Faulty code	LED1—4 Flash/cycle
Model	all
Name	Motor parameter error
Classify	Electric issue
Possible cause	• Control board broken

Troubleshooting

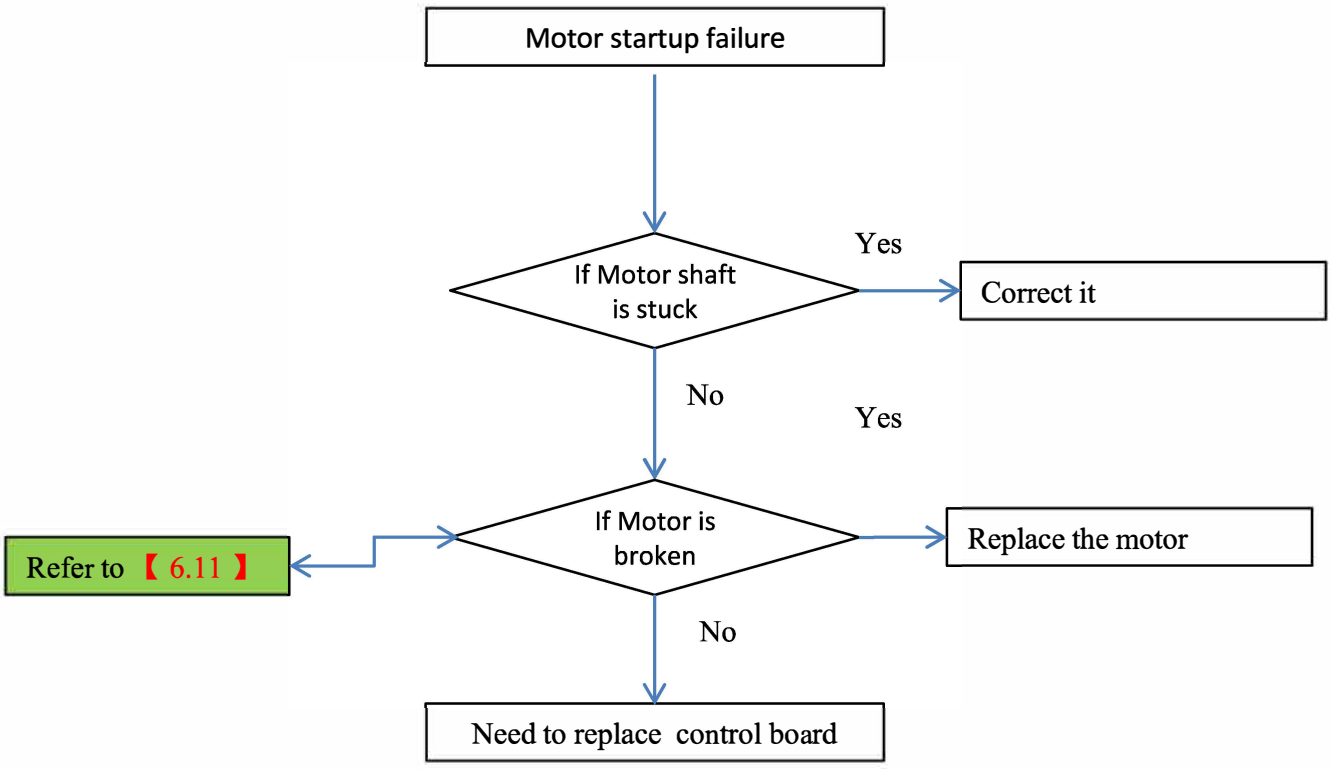


5.4 Troubleshooting by Motor driver module code

5.4.6 LED1--5 Flash/cycle

Faulty code	LED1—5 Flash/cycle
Model	all
Name	Motor startup failure
Classify	Electric issue
Possible cause	• Motor broken • Motor shaft stuck • Control board broken

Troubleshooting

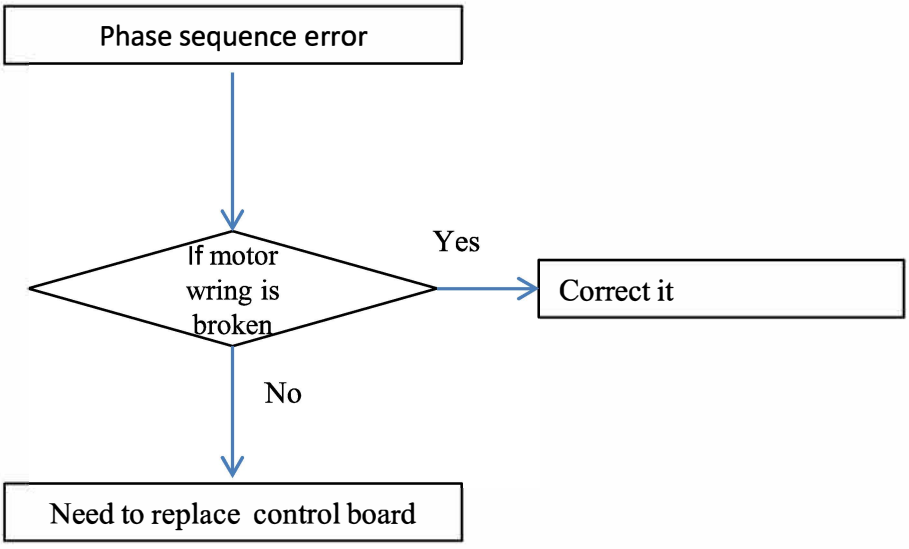


5.4 Troubleshooting by Motor driver module code

5.4.7 LED1--6 Flash/cycle

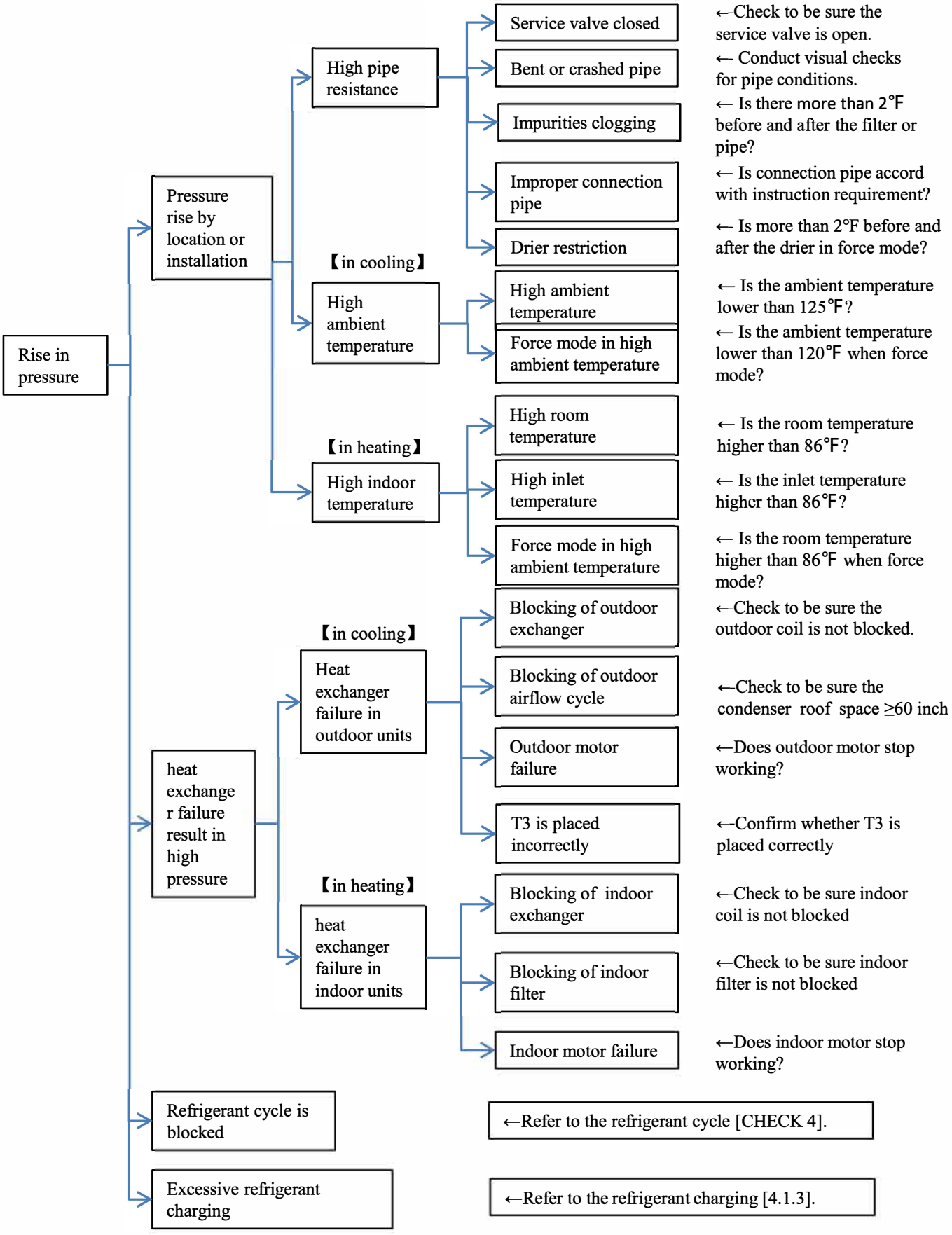
Faulty code	LED1—6 Flash/cycle
Model	all
Name	Phase sequence error
Classify	Electric issue
Possible cause	• Motor wring broken • Control board broken

Troubleshooting



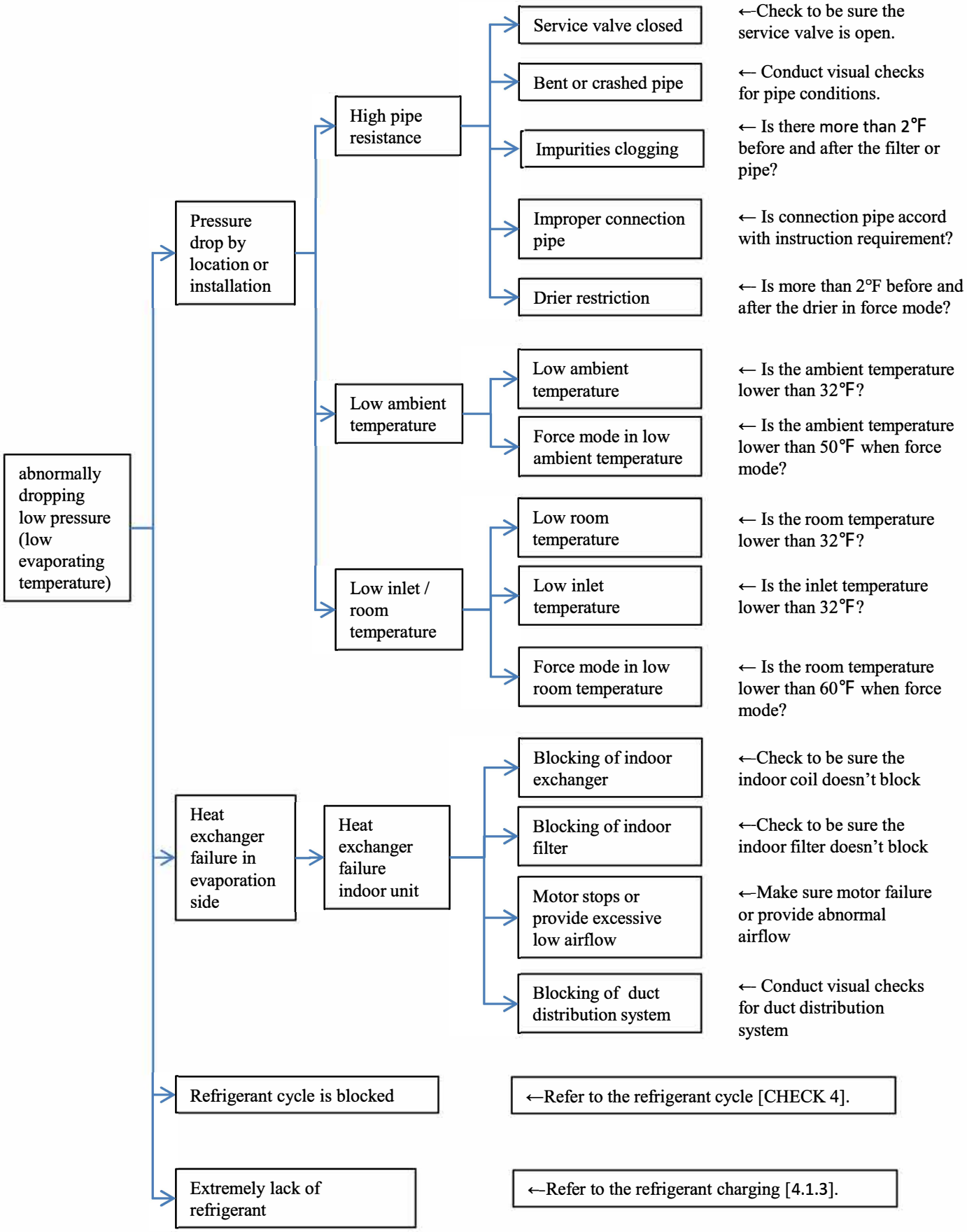
CHECK 1 6.1 Check for Causes of Rise in High Pressure

Note: 310-380PSIG head pressure is normal for heating in normal conditions operation. The pressure may be as high as 440PSIG at 40°F outdoor temperature or higher. Start-up or return oil stages during heating.

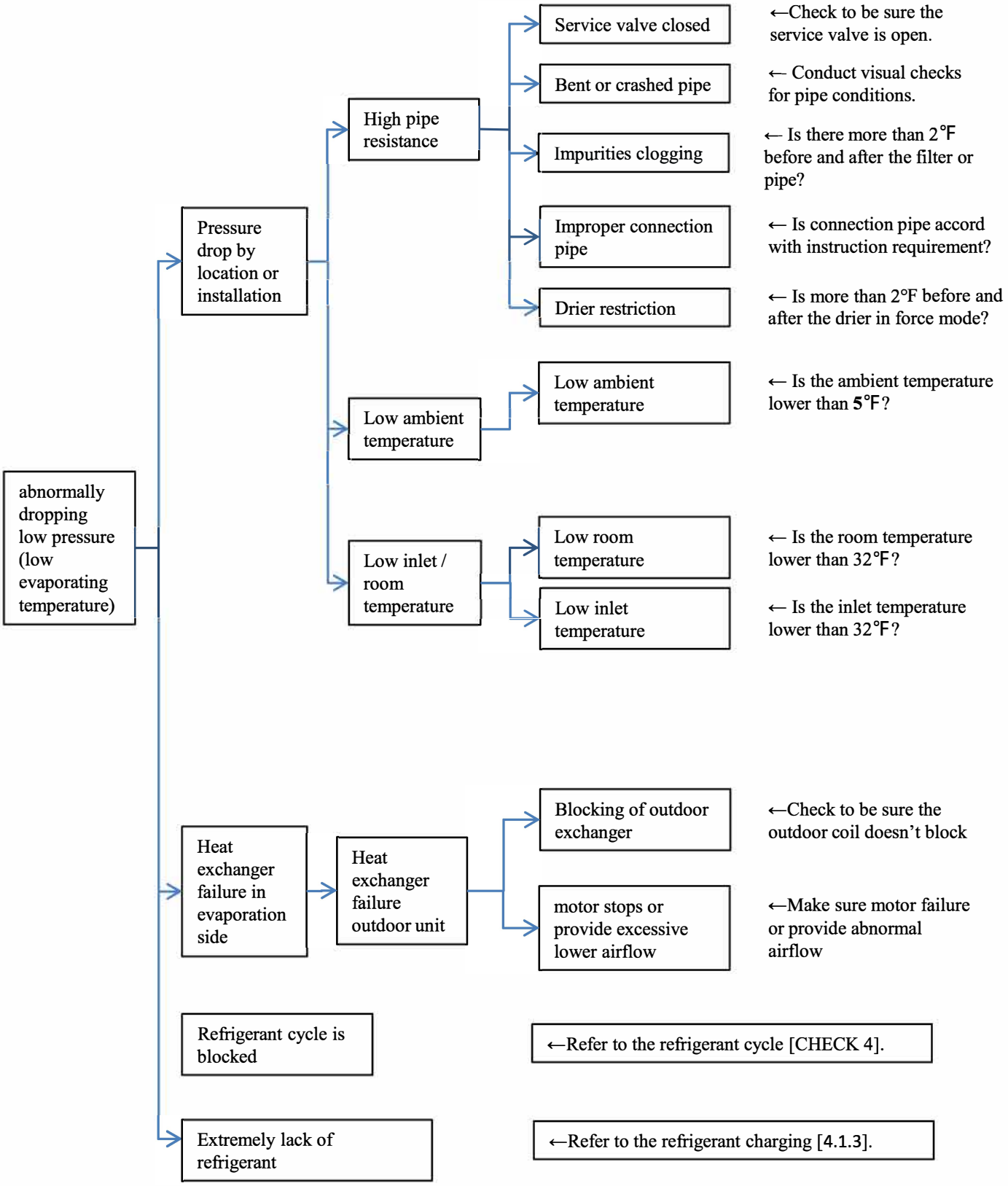


CHECK 2 6.2 Check for Causes of Dropping Low Pressure in cooling

Note: 110-140PSIG head pressure is normal in cooling conditions. The value may be lower/higher at maximum/minimum/limited frequency of compressor operation . Start-up or return oil stages.

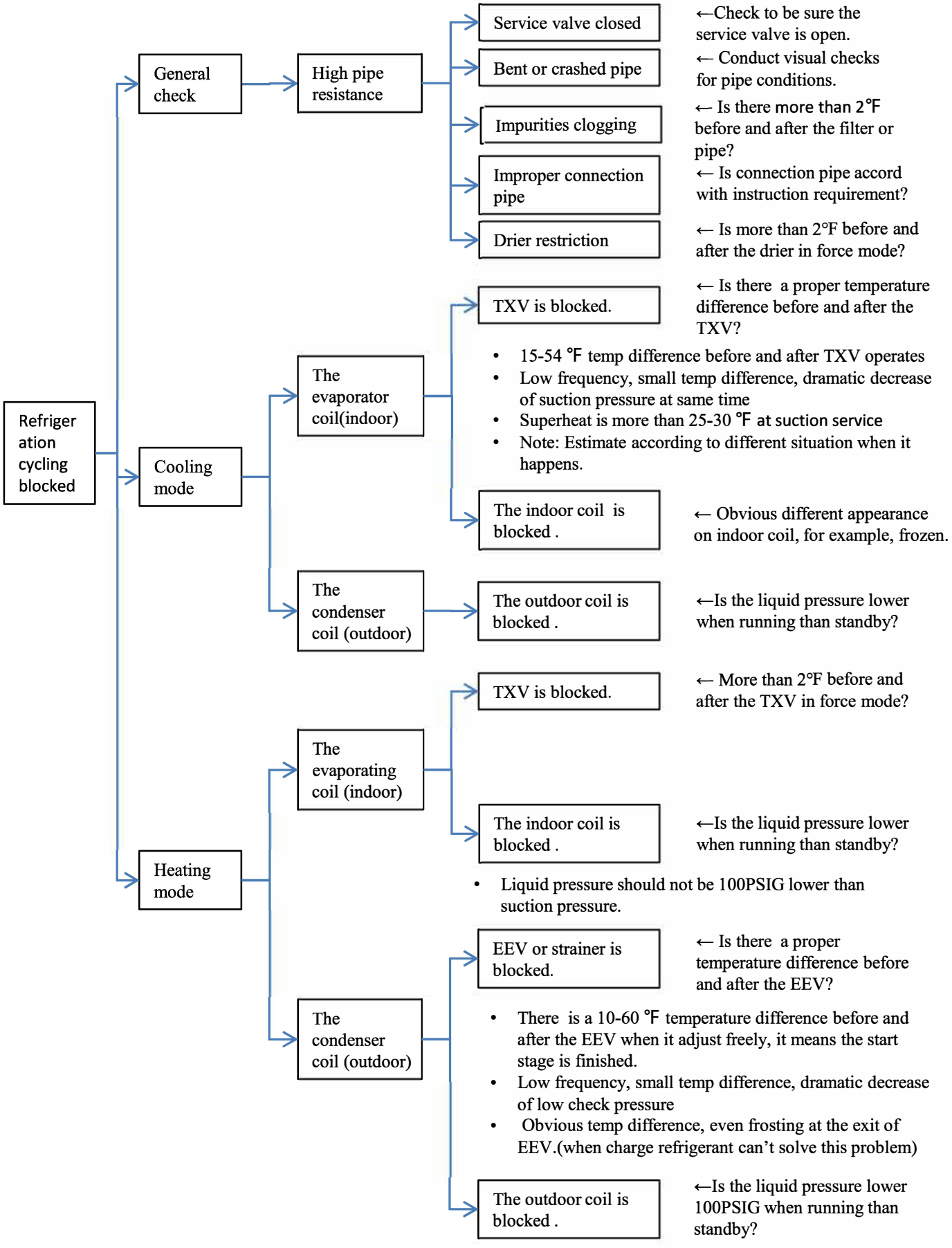


CHECK 3 6.3 Check for Causes of Dropping Low Pressure in heating

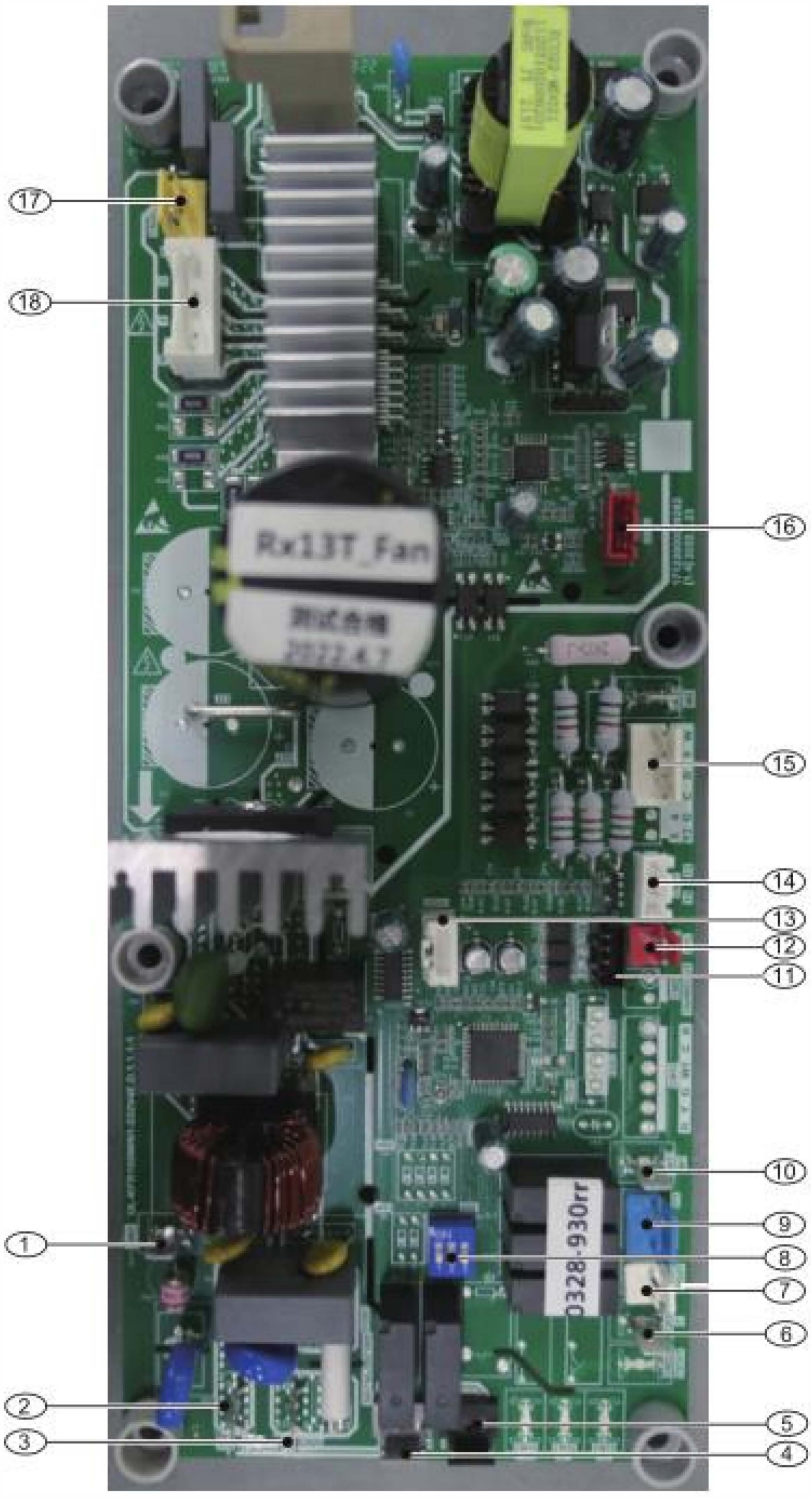


CHECK 4 6.4 Check for Causes of Refrigeration cycling blocked

Note: Check at normal and force mode operation, some problems will be more obvious.



CHECK 5 6.5 Check for control board



No.	Function description
1	GND port
2	Power input port
3	Power input port
4	Compressor crankcase heater port (heat pump only)
5	Pressure equalizer valve port (Rotary compressor only)
6	Reserve
7	Compressor contactor control port
8	SW3 Dip SWITCH:Defrost logic settings
9	Reversing valve port (heat pump only)
10	Reserve
11	Message port
12	Low pressure switch port (heat pump only)
13	Main board debug port
14	T3 T4 sensor port
15	Thermostat wire connections
16	Motor drive debug port
17	Reserve
18	DC motor port

*The photo is provided for reference purposes only, Layout and components will vary according to the unit specification.

CHECK 6 6.6 Check for Temperature Sensor（T3/T4）

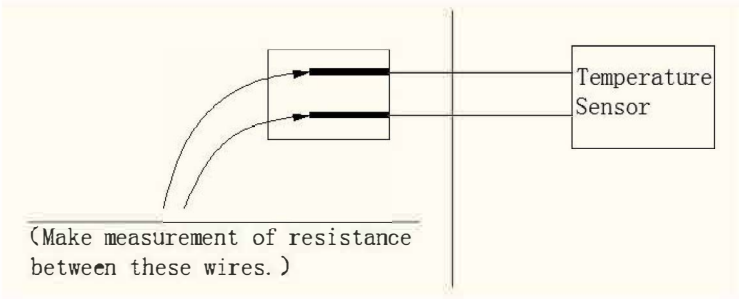
Check temp transducer（T3/T4）：
Compare the temperature checked (T3-3#/T4-4#/T5-5#, refer to 4.1.5), it's normal if the temperature difference was within 15℉ when standby.(need to avoid the waste heat affect T5/Tf when standby mode)

T3/T4: 77 ℉ --10KΩ

Normal
Yes → Work well
No

Ambient temp below -4℉?
Yes → Out of operating range. Do nothing
No

When power off and sensor unplugged



Resistance in thermistor meet the chart above?
No → Replace sensor
Yes

Check point parameter is same as the table on left?
No → Replace the control board
Yes

Refer to 【 Appendix 7 】

Note： low probability, caution in handling

Work normal

CHECK 7 6.7 Check for High Pressure Switch（HPS）

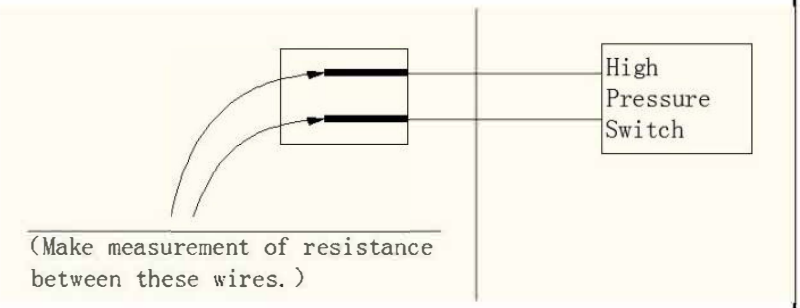
High Pressure Switch：
Whether the switch can start normally when start the machine

Start normally

Yes → Work well

No

When power off and pull up



High pressure switch secure, no wiring damages?

No → Reconnect/fix the wiring damages

Yes

R < 1Ω

No → abnormal pressure switch, replace it

Yes

Still in high pressure protection?

Yes → Should replace board

Note: low probability, caution in handling

No → Work well

Note:
Normal high pressure switch opens above 600PSIG, resets below 435PSIG.

CHECK 8 6.8 Check for Low Pressure Switch（LPS）

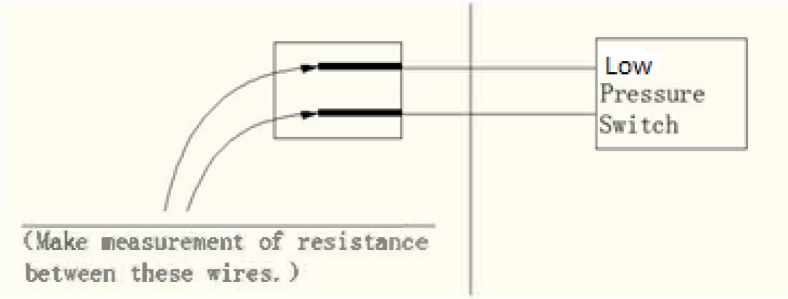
High Pressure Switch：
Whether the switch can start normally when start the machine

Start normally

Yes → Work well

No

When power off and pull up



High pressure switch secure, no wiring damages?

No → Reconnect/fix the wiring damages

Yes

R < 1Ω

No → abnormal pressure switch, replace it

Yes

Still in high pressure protection?

Yes → Should replace board

Note: low probability, caution in handling

No → Work well

Note:
Normal high pressure switch opens below 21PSIG, resets above 44PSIG.

CHECK 9 6.8 Check for Discharge Temperature Switch（T5）

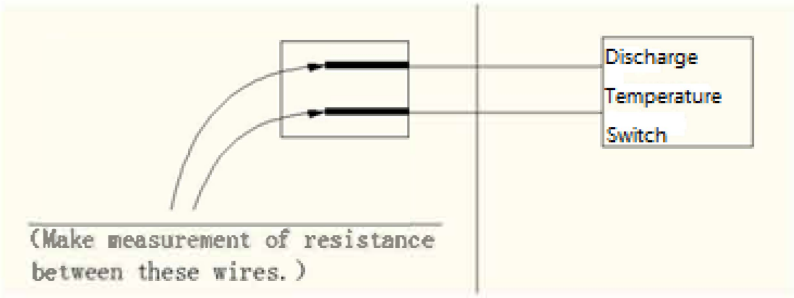
Discharge Temperature Switch：
Whether the switch can start normally when start the machine

Start normally

Yes → Work well

No

When power off and pull up



High pressure switch secure, no wiring damages?

No → Reconnect/fix the wiring damages

Yes

R < 1Ω

No → abnormal pressure switch, replace it

Yes

Still in high pressure protection?

Yes → Should replace board

Note: low probability, caution in handling

No → Work well

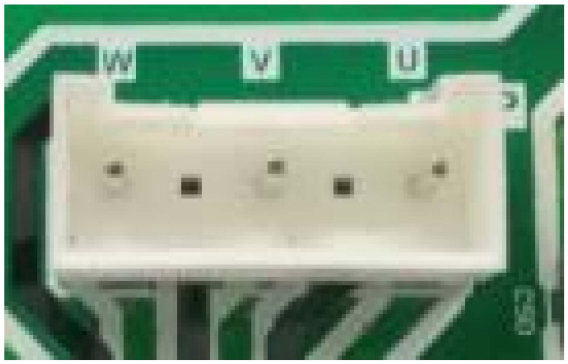
Note:
Normal discharge temperature switch opens above 239℉, resets below 167℉.

CHECK 10 6.10 Check for Condenser fan motor

Condenser fan motor:
Whether fan can start normally

Normal? — Yes → Work well

No → When power off, after 3minutes and unplugged



Normal motor winding? — No → Motor replace

Yes → If the ground resistance is normal? — No → Motor replace

Yes → If the motor current is normal — No → Motor replace

If the current is pulsating violently or abnormally beyond the "B" value

Yes → Check according to the condition of whole unit

Resistance (Ω)	100W/200W
Between U and V	<36
Between V and W	<36
Between W and U	<36
Between U/V/W and ground	>10M

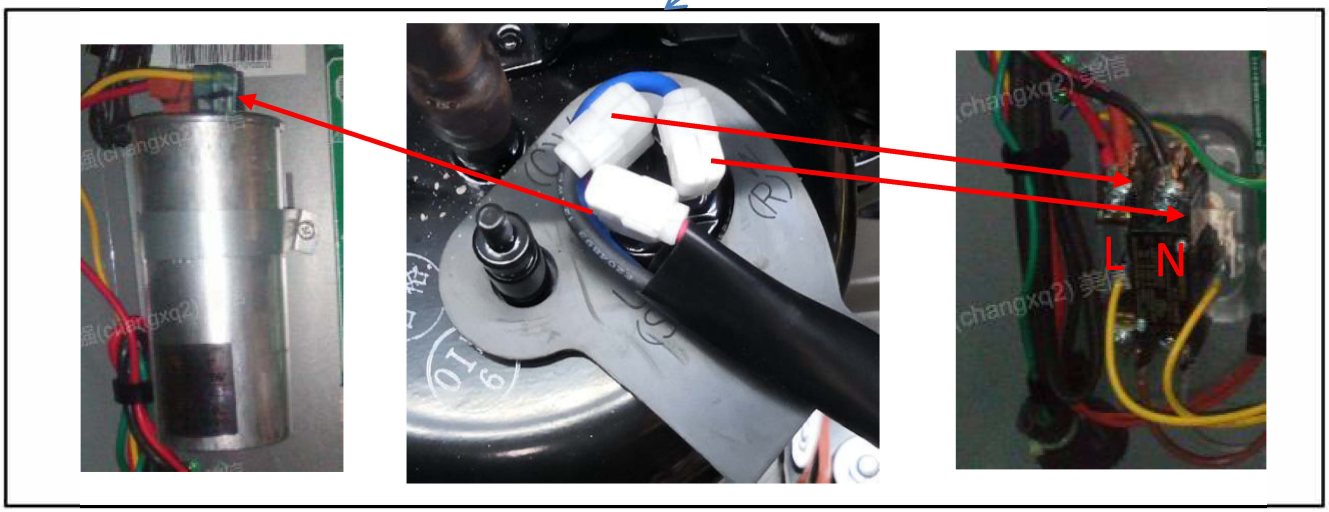
Motor output (W)	B(A)
100	1.6
200	2.2

CHECK 11 6.11 Check for Compressor

Compressor:
Whether compressor can start normally

Normal? — Yes → Work well

No → When power off, after 3minutes and unplugged



For Scroll compressor, supply wring is unitary, you can check it with colour (Red for L1, Black for L2, White for S)

Resistance (Ω)	Rotary	Scroll
Between R and C (L1 and L2)	<2	<2
Between C and S (L1 and S)	<2	<1
Between R and S (L2 and S)	<4	<1
Between U/V/W and ground	>10M	>10M

Normal compressor winding? — No → Compressor replace

Yes → If the ground resistance is normal? — No → Compressor replace

Yes → If the compressor current is normal — No → Compressor replace

If the current is pulsating violently or abnormally beyond the "B" value

Yes → Check according to the condition of whole unit

Model	1.5Ton	2Ton	2.5Ton	3Ton	3.5Ton	4Ton	5Ton
B(A)	10	12	13	17	20	23	30

CHECK 12 6.12 Check for indoor air flow

Indoor air flow:
Indoor air flow is normal/Check the capacity by BTU=△T*CFM***1.5** in force mode。

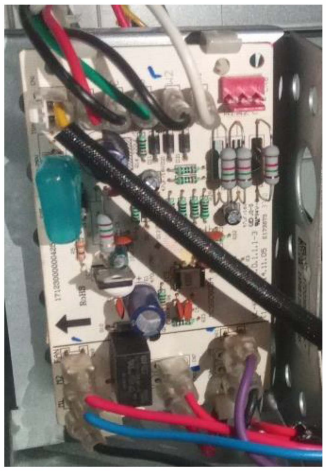
Check if the airflow is very small or no airflow

If It is normal

Yes → Work normally

No

Measure the power supply (L1&L2,red and black wire)



If there is blockage of the indoor duct

Yes → Clean the blockage

No

Check if there is 230V power supply

No → Correct the power supply

Yes

Check if there is 18-28Vac between CN1

No → Replace the transformer

Yes

Red and Brown wire of signal

If there is 18-28Vac between R&C terminal

No → Replace the control board

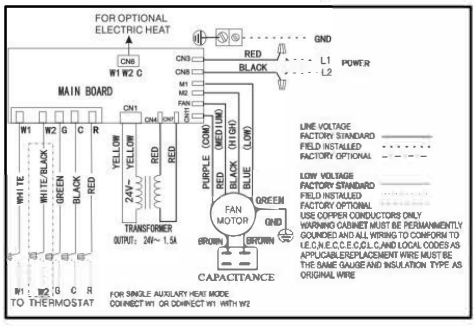
Yes

Green and Brown wire of signal

If there is 18-28Vac between G&C terminal

No → Check if the thermostat not calling or replace the thermostat

Yes



If there is 230Vac between CN11 & FAN

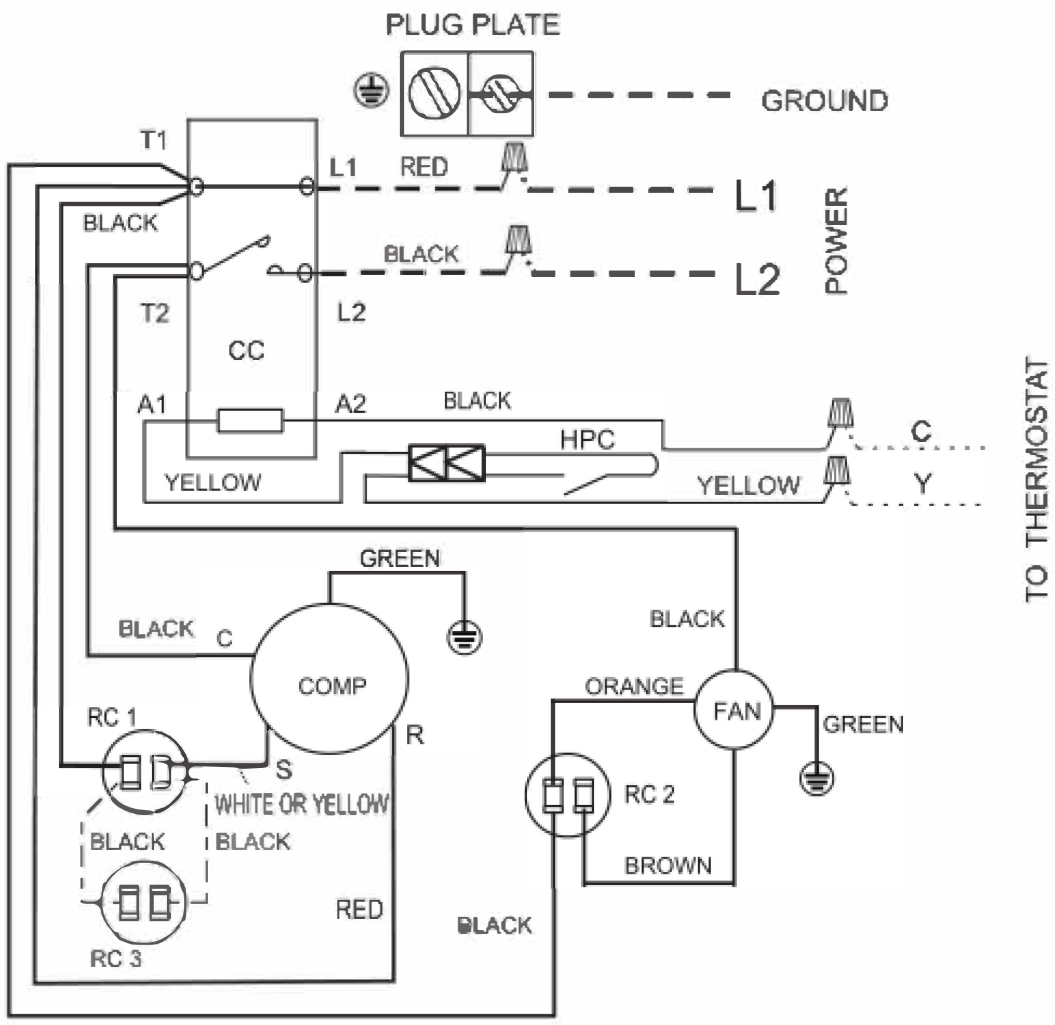
No → Replace the control board

Yes

Replace the motor.

PART 7 Appendix

Appendix 1 7.1 Wiring diagrams-42/48/60K



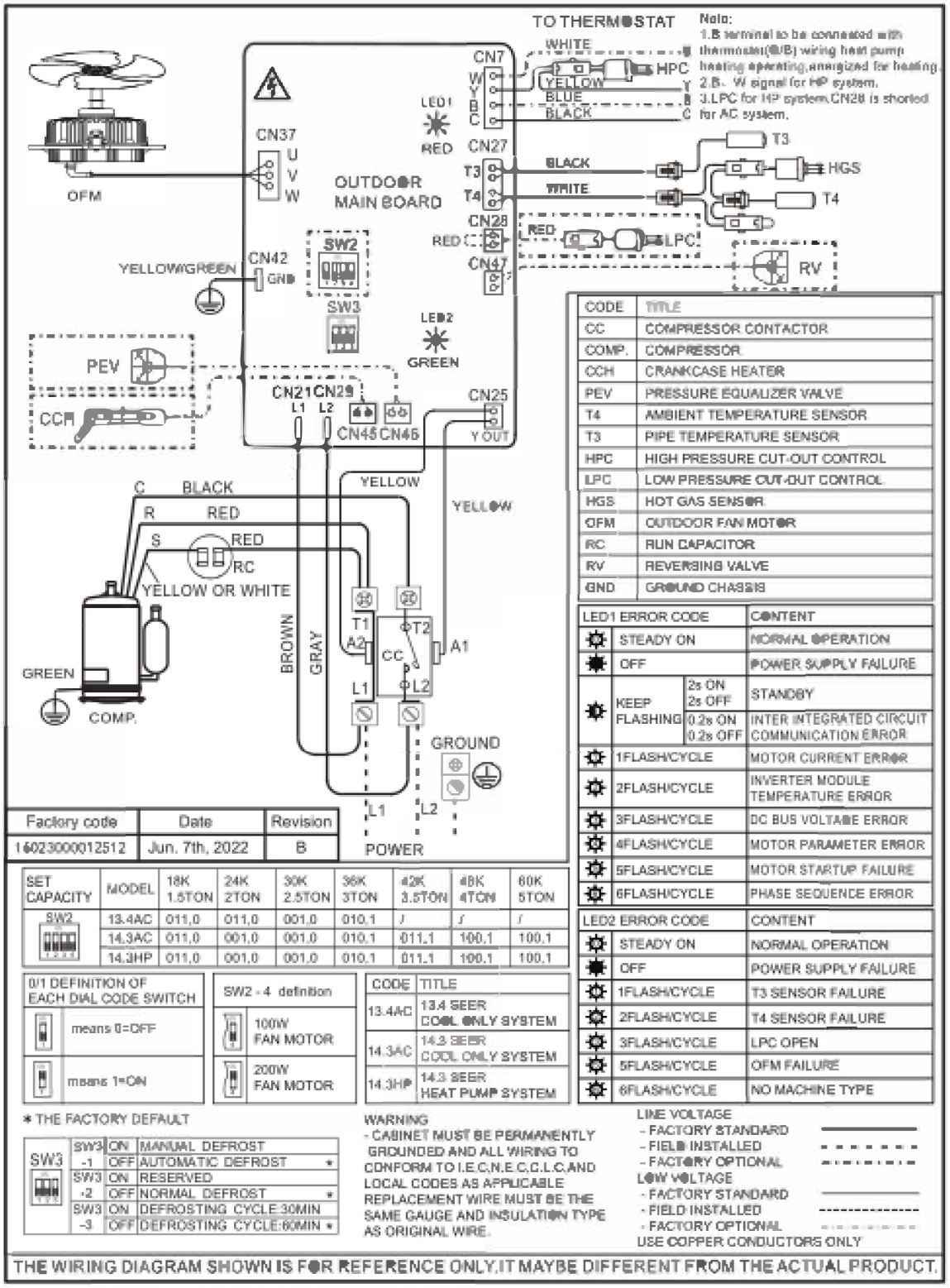
LINE VOLTAGE		LOW VOLTAGE	
FACTORY STANDARD	———	FACTORY STANDARD	———
FIELD INSTALLED	- - - - - - -	FIELD INSTALLED	- - - - - - -
FACTORY OPTIONAL	– — – —	FACTORY OPTIONAL	– — – —

USE COPPER CONDUCTORS ONLY

HPC	HIGH PRESSURE CUT-OUT CONTROL
CC	COMPRESSOR CONTACTOR
COMP	COMPRESSOR
RC 1	RUN CAPACITOR 1
RC 2	RUN CAPACITOR 2
RC 3	RUN CAPACITOR 3

WARNING: CABINET MUST BE PERMANMENTLY GOUNDED AND ALL WIRING TO CONFORM TO I.E.C,N.E.C,C.E.C,C.L.C,AND LOCAL CODES AS APPLICABLE REPLACEMENT WIRE MUST BE THE SAME GAUGE AND INSULATION TYPE AS ORIGINAL WIRE

Appendix 1 7.1 Wiring diagrams-for 18/24/30/36K



Factory code	Date	Revision
16023000012512	Jun. 7th, 2022	B

CODE	TITLE
CC	COMPRESSOR CONTACTOR
COMP.	COMPRESSOR
CCH	CRANKCASE HEATER
PEV	PRESSURE EQUALIZER VALVE
T4	AMBIENT TEMPERATURE SENSOR
T3	PIPE TEMPERATURE SENSOR
HPC	HIGH PRESSURE CUT-OUT CONTROL
LPC	LOW PRESSURE CUT-OUT CONTROL
HGS	HOT GAS SENSOR
OFM	OUTDOOR FAN MOTOR
RC	RUN CAPACITOR
RV	REVERSING VALVE
GND	GROUND CHASSIS

LED1 ERROR CODE		CONTENT
STEADY ON		NORMAL OPERATION
OFF		POWER SUPPLY FAILURE
KEEP FLASHING	2s ON 2s OFF	STANDBY
	0.2s ON 0.2s OFF	INTER INTEGRATED CIRCUIT COMMUNICATION ERROR
1FLASH/CYCLE		MOTOR CURRENT ERROR
2FLASH/CYCLE		INVERTER MODULE TEMPERATURE ERROR
3FLASH/CYCLE		DC BUS VOLTAGE ERROR
4FLASH/CYCLE		MOTOR PARAMETER ERROR
5FLASH/CYCLE		MOTOR STARTUP FAILURE
6FLASH/CYCLE		PHASE SEQUENCE ERROR

LED2 ERROR CODE	CONTENT
STEADY ON	NORMAL OPERATION
OFF	POWER SUPPLY FAILURE
1FLASH/CYCLE	T3 SENSOR FAILURE
2FLASH/CYCLE	T4 SENSOR FAILURE
3FLASH/CYCLE	LPC OPEN
5FLASH/CYCLE	OFM FAILURE
6FLASH/CYCLE	NO MACHINE TYPE

SET CAPACITY	MODEL	18K 1.5TON	24K 2TON	30K 2.5TON	36K 3TON	42K 3.5TON	48K 4TON	60K 5TON
SW2	13.4AC	011,0	011,0	001,0	010,1	/	/	/
	14.3AC	011,0	001,0	001,0	010,1	011,1	100,1	100,1
	14.3HP	011,0	001,0	001,0	010,1	011,1	100,1	100,1

0/1 DEFINITION OF EACH DIAL CODE SWITCH	
means 0=OFF	
means 1=ON	

SW2 - 4 definition	
100W FAN MOTOR	
200W FAN MOTOR	

CODE	TITLE
13.4AC	13.4 SEER COOL ONLY SYSTEM
14.3AC	14.3 SEER COOL ONLY SYSTEM
14.3HP	14.3 SEER HEAT PUMP SYSTEM

* THE FACTORY DEFAULT

SW3			
SW3	-1	ON	MANUAL DEFROST
		OFF	AUTOMATIC DEFROST *
	-2	ON	RESERVED
		OFF	NORMAL DEFROST *
	-3	ON	DEFROSTING CYCLE:30MIN
		OFF	DEFROSTING CYCLE:60MIN *

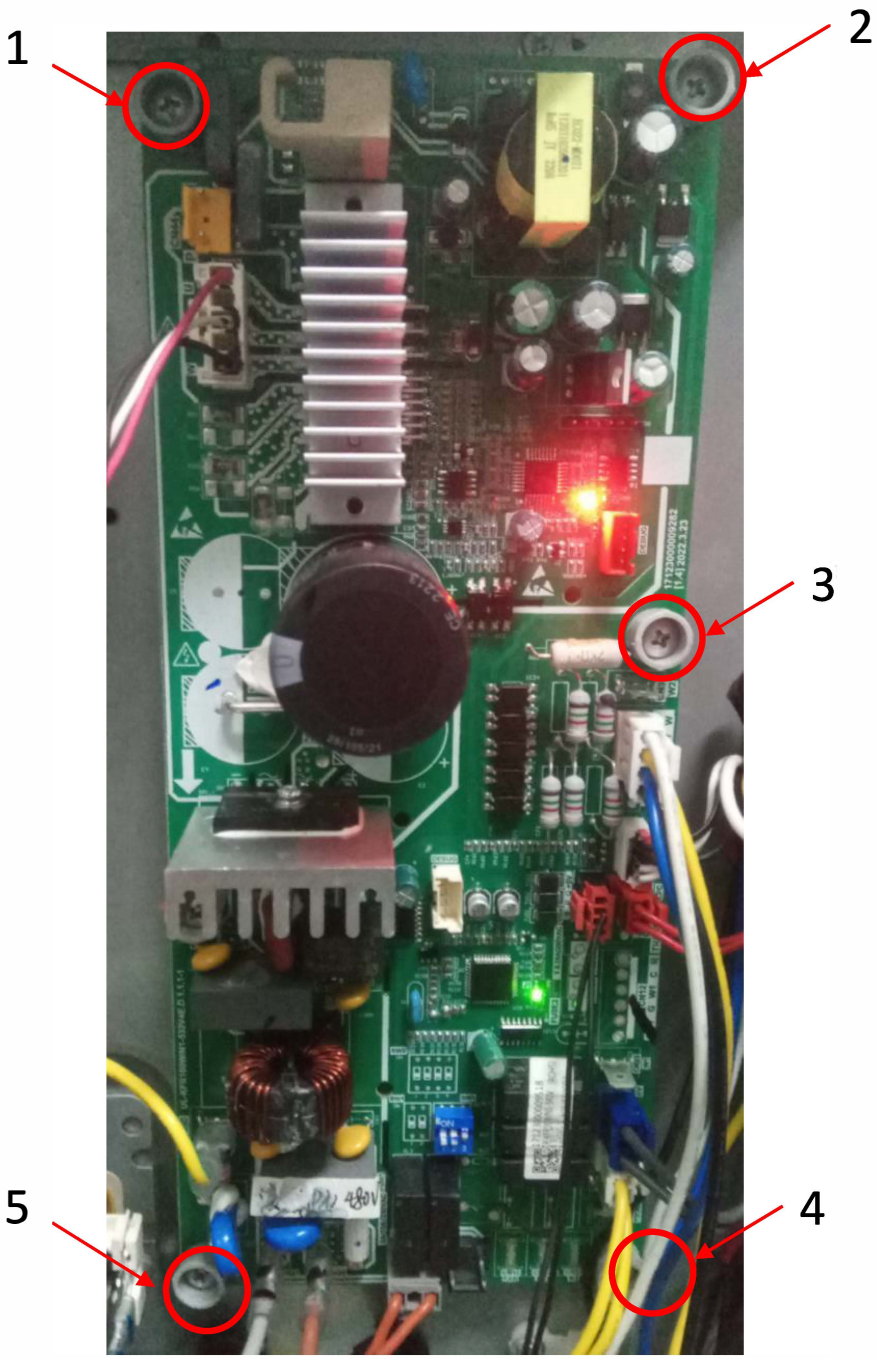
WARNING
- CABINET MUST BE PERMANENTLY GROUNDED AND ALL WIRING TO CONFORM TO I.E.C.,N.E.C.,C.L.C.AND LOCAL CODES AS APPLICABLE
REPLACEMENT WIRE MUST BE THE SAME GAUGE AND INSULATION TYPE AS ORIGINAL WIRE.

LINE VOLTAGE
- FACTORY STANDARD
- FIELD INSTALLED
- FACTORY OPTIONAL
LOW VOLTAGE
- FACTORY STANDARD
- FIELD INSTALLED
- FACTORY OPTIONAL
USE COPPER CONDUCTORS ONLY

THE WIRING DIAGRAM SHOWN IS FOR REFERENCE ONLY,IT MAYBE DIFFERENT FROM THE ACTUAL PRODUCT.

Appendix 2 7.2 Control board replacement procedure

1. Power off and wait at least 3 minutes before opening the electric control box.
2. Remove the wirings carefully.
3. Remove the **5** screws on the board (as shown by the red circle and the serial number)
4.Install the new board on the unit.
5.Fasten the **8** screws (Refer to Figure 1).
11.Reconnect the wires according to the wire diagram.
6.Set up the SW2 switches refer to the below chart.
7.Double check the wire connection, screws, thermal paste etc.



SW2 Setting details

SET CAPACITY	MODEL	18K 1.5TON	24K 2TON	30K 2.5TON	36K 3TON	42K 3.5TON	48K 4TON	60K 5TON
SW2 	13.4AC	011,0	011,0	001,0	010,1	/	/	/
	15.2AC	011,0	001,0	001,0	010,1	011,1	100,1	100,1
	15.2HP	011,0	001,0	001,0	010,1	011,1	100,1	100,1

Appendix 3 **7.3 Fault code introduction**

Fault code of moter driver module fault code

LED1 ERROR CODE			CONTENT
☼	STEADY ON		NORMAL OPERATION
✹	OFF		POWER SUPPLY FAILURE
☼	KEEP FLASHING	2s ON 2s OFF	IDLE
		0.2s ON 0.2s OFF	INTER INTEGRATED CIRCUIT COMMUNICATION ERROR
☼	1FLASH/CYCLE		MOTOR CURRENT ERROR
☼	2FLASH/CYCLE		INVERTER MODULE TEMPERATURE ERROR
☼	3FLASH/CYCLE		DC BUS VOLTAGE ERROR
☼	4FLASH/CYCLE		MOTOR PARAMETER ERROR
☼	5FLASH/CYCLE		MOTOR STARTUP FAILURE
☼	6FLASH/CYCLE		PHASE SEQUENCE ERROR

Fault code of System main control board

LED2 ERROR CODE		CONTENT
☼	STEADY ON	NORMAL OPERATION
✹	OFF	POWER SUPPLY FAILURE
☼	1FLASH/CYCLE	T3 SENSOR FAILURE
☼	2FLASH/CYCLE	T4 SENSOR FAILURE
☼	3FLASH/CYCLE	LPC OPEN
☼	5FLASH/CYCLE	OFM FAILURE

Appendix 4 7.4 Troubleshooting guide

SYSTEM FAULTS		WHAT TO CHECK MORE	POWER SUPPLY	HIGH VOLTAGE WIRING	I.D. CONTROL DEF.	COMPRESSOR CAPACITOR	O.D. FAN CAPACITOR	I.D. BLOWER CAPACITOR	CONTACTOR CONTACTS	LOW VOLTAGE WIRING	CONTROL TRANSFORMER	THERMOSTAT	CONTACTOR COIL	LOW VOLTAGE FUSE	STUCK COMPRESSOR	INEFFICIENT COMP.	REF. UNDERCHARGE	REF. OVERCHARGE	EXCESSIVE EVAP. LOAD	NONCONDENSABLES	O.D. AIR RECIRCULATION	RES. O.D. AIRFLOW	TXV STUCK OPEN	SUPERHEAT	RES. LD. AIRFLOW	RES. CIR. RESTRICTIONS	SOV COIL DEFECTIVE	SOV LEAKING	CHECK VALVE LEAKING	LPC SENSOR DEF.	DEFROST CONTROL DEF.	T4 TEMP. SENSOR DEF.	T3 TEMP. SENSOR DEF.	HPS CHAS SENSOR DEF.
REFRIGERANT CIRCUIT																																		
Head Pressure Too High	C																	P	P	S	P	S					S							
	H																	P	P	S					P	S								
Head Pressure Too Low	C															S	P						S	S		S	S		P				
	H															S	P						S	S		S	S	S	P				
Suction Pressure Too High	C															S		P	P					S			P		P				
	H															S								S			P						
Suction Pressure Too Low	C																P							S	P	S							
	H																P			S	S			S		S		S					
Liquid Refrig. Floodback (TXV)	C																						P						P				
	H																						P						P				
I.D. Coil Frosting	C																P			S	S												
	H																																
Compressor Runs Inadequate or No Cooling/Heating	C															S	P		S	S				S	P	S	S		S				
	H															S	P			S				S	P	S	S	S	S				
ELECTRICAL																																		
Compressor & O.D. Fan Won't Start	C	P	P				S	S	P	S	P	P																			S	S	S	S
	H	P	P					S	P	S		P																			S	S	S	S
Compressor Will Not Start But O.D. Fan Runs	C		P		P								P																					
	H		P		P		S				P		P																			S		S	
O.D. Fan Won't Start	C		P			P																												
	H		P			P																										S		
Compressor Hums But Won't Start	C				P		S						P																					
	H				P		S						P																					
I.D. Blower Won't Start	C	P	P	S			P		S	P	S		S																					
	H	P	P	S			P		S	P	S		S																					
DEFROST																																		
Unit Won't Initiate Defrost	C																																	
	H																											P		P		S	
Defrost Terminates on Time	C																																	
	H																P													P		S	
Unit Icing Up	C																																	
	H																P			S	S			S				P		P			

C- Cooling H - Heating P - Primary Causes S - Secondary Causes

C-cooling H-Heating P-Primary Causes S-Secondary Causes
Comp.-compressor RES.-Restrictions REF.-Refrigeration DEF.-Defective CIR.-Circuit EEV-Electronic expansion valve REV.-Reversing Valve PT-Pressure Transducer T3-Outdoor coil temp. sensor T4-Ambient temp. sensor T5-Comp. discharge temp. sensor Tf-Module radiator fin temp. sensor HPS-High pressure switch
RES I.D. AIRFLOW -Perhaps failue of fan motor or fan capacitor or filter
RES O.D. AIRFLOW -Perhaps failue of fan motor or fan capacitor or recirculation or blocking coil
RES O.D. RADIATOR-Perhaps failue of blocking radiator

Appendix 5 7.5 Temperature and Resistance Relationship Tables

Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ	Temperature °F	Resistance kΩ
-4	106.73	37	29.87	78	10	119	3.69
-3	103.25	38	29.22	79	9.5	120	3.61
-2	99.89	39	28.19	80	9.26	121	3.53
-1	96.65	40	27.39	81	9.03	122	3.45
0	93.53	41	26.61	82	8.81	123	3.36
1	90.53	42	25.85	83	8.59	124	3.3
2	87.62	43	25.12	84	8.38	125	3.23
3	84.83	44	24.42	85	8.17	126	3.16
4	82.13	45	23.73	86	7.97	127	3.1
5	79.52	46	23.07	87	7.78	128	3.03
6	77.01	47	22.42	88	7.59	129	2.96
7	74.58	48	21.8	89	7.4	130	2.9
8	72.24	49	21.2	90	7.22	131	2.84
9	69.98	50	20.61	91	7.05	132	2.78
10	67.8	51	20.04	92	6.88	133	2.72
11	65.69	52	19.49	93	6.72	134	2.67
12	63.65	53	18.96	94	6.56	135	2.61
13	61.68	54	18.44	95	6.4	136	2.56
14	59.78	55	17.94	96	6.25	137	2.5
15	57.95	56	17.45	97	6.1	138	2.45
16	56.17	57	16.98	98	5.96	139	2.4
17	54.46	58	16.52	99	5.82	140	2.36
18	52.8	59	16.08	100	5.68	141	2.3
19	51.2	60	15.65	101	5.55	142	2.25
20	49.65	61	15.23	102	5.42	143	2.21
21	48.16	62	14.83	103	5.3	144	2.16
22	46.71	63	14.43	104	5.18	145	2.12
23	45.31	64	14.05	105	5.06	146	2.08
24	43.95	65	13.68	106	4.94	147	2.03
25	42.64	66	13.32	107	4.83	148	1.99
26	41.38	67	12.97	108	4.72	149	1.96
27	40.15	68	12.64	109	4.61	150	1.91
28	38.97	69	12.31	110	4.51	151	1.86
29	37.82	70	11.99	111	4.41	152	1.84
30	36.71	71	11.68	112	4.31	153	1.8
31	35.64	72	11.38	113	4.21	154	1.77
32	34.6	73	11.09	114	4.12	155	1.73
33	33.59	74	10.8	115	4.03	156	1.7
34	32.61	75	10.53	116	3.94	157	1.66
35	31.67	76	10	117	3.85	158	1.63
36	30.76	77	10	118	3.77	159	1.6