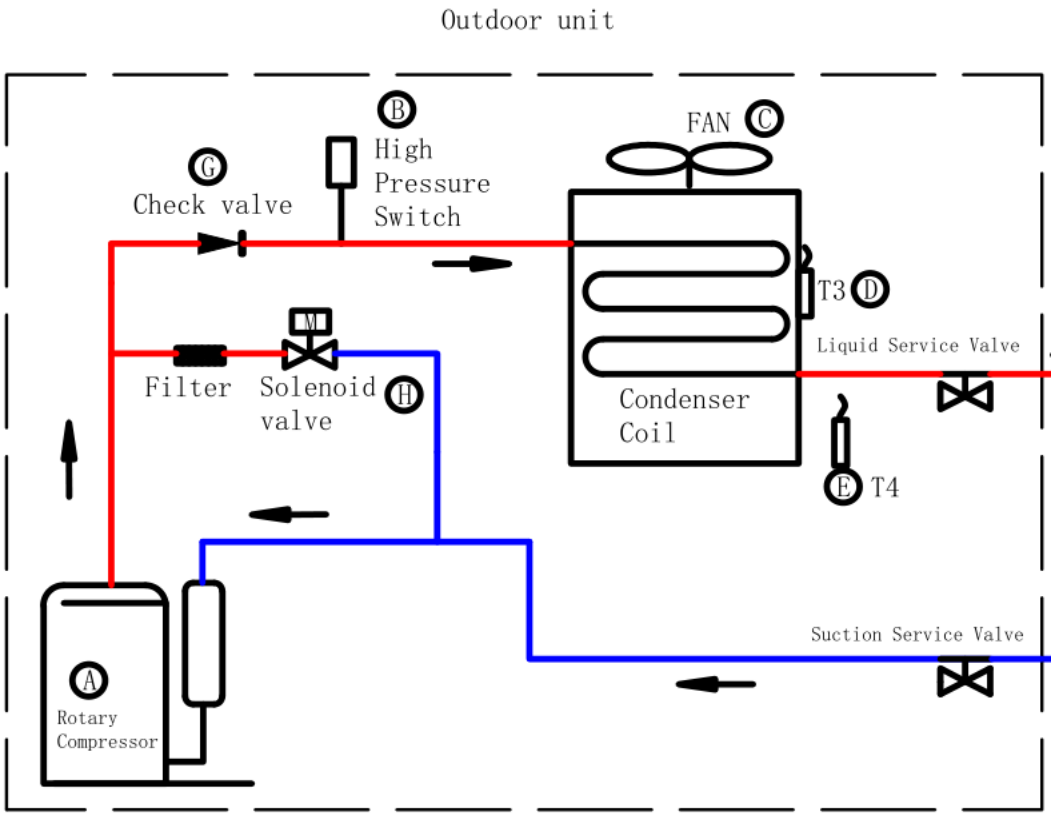
# Service Manual

PART 1 Product instructions

## 2.1 Refrigerant Circuit

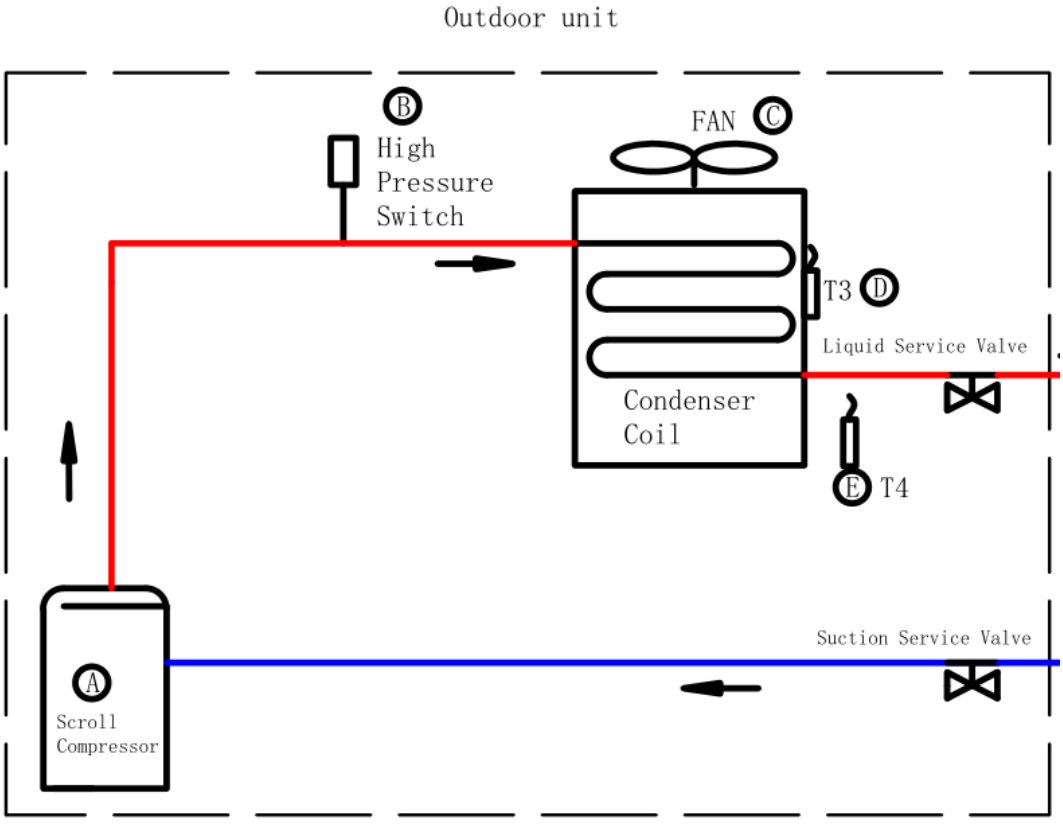
| No. in diagram | Symbol | Part Name | Major function |
|---|---|---|---|
| A | Rotary Comp. | Rotary Compressor | Inverter compressor is operated in multi-steps according to PT. |
| B | HPS | High pressure switch | Used to high pressure protection when up to 580 PSIG and recovery when below to 435PSIG. |
| 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

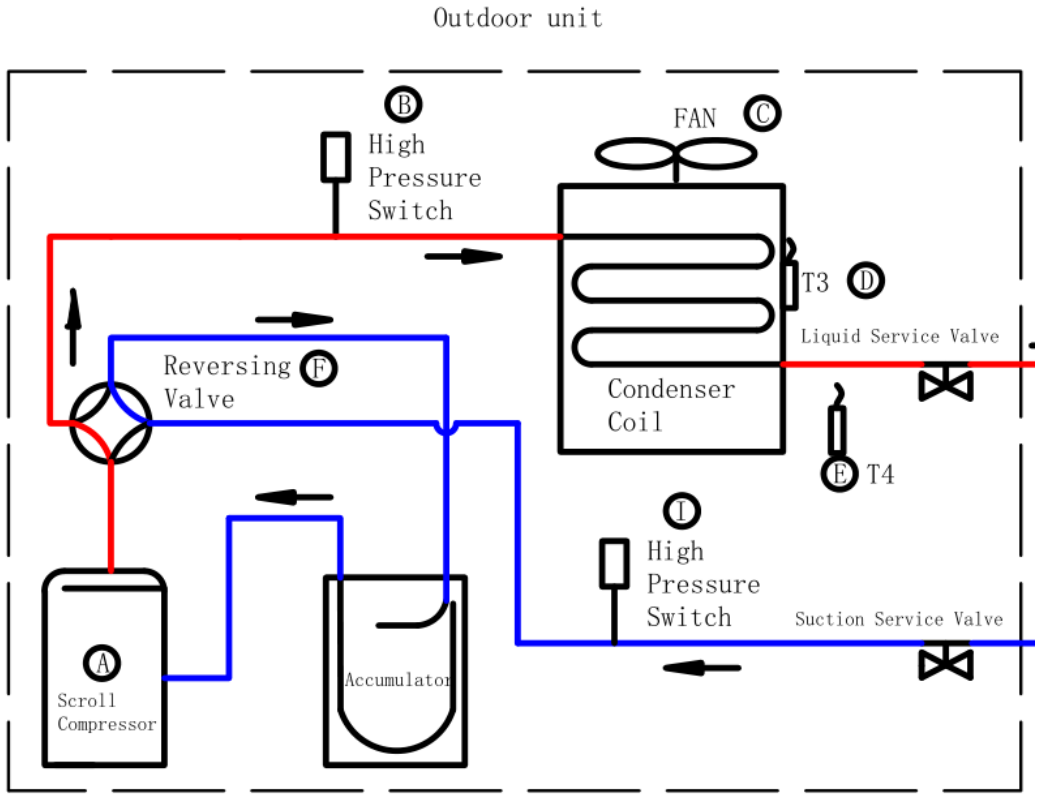


**2.1 Refrigerant Circuit**

## AC system with Scroll compressor

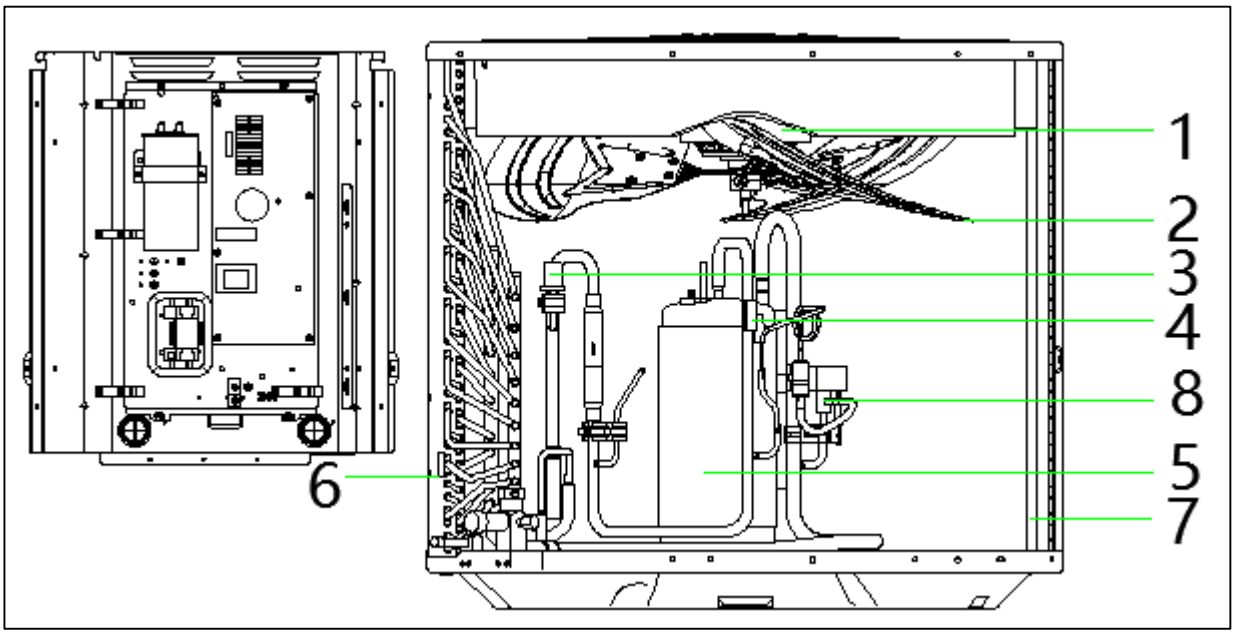



## HP system with Scroll compressor

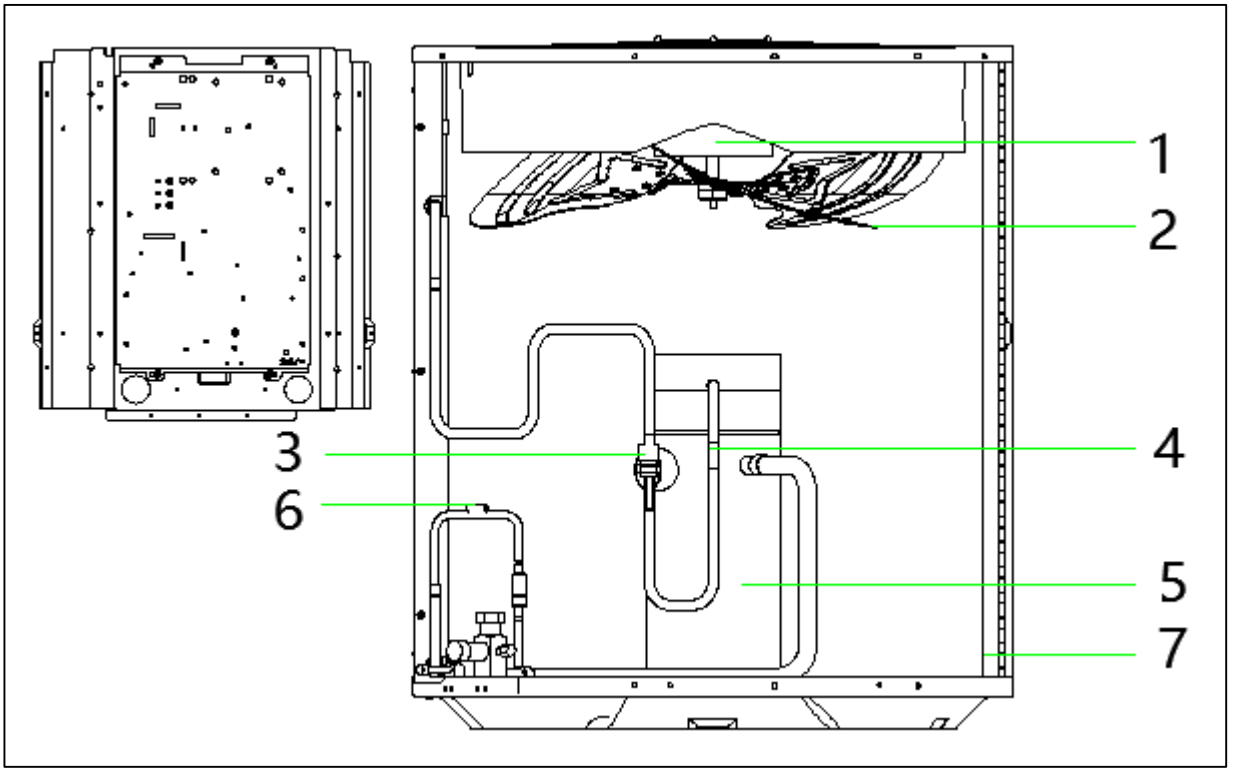


**2.2 Functional Part**

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

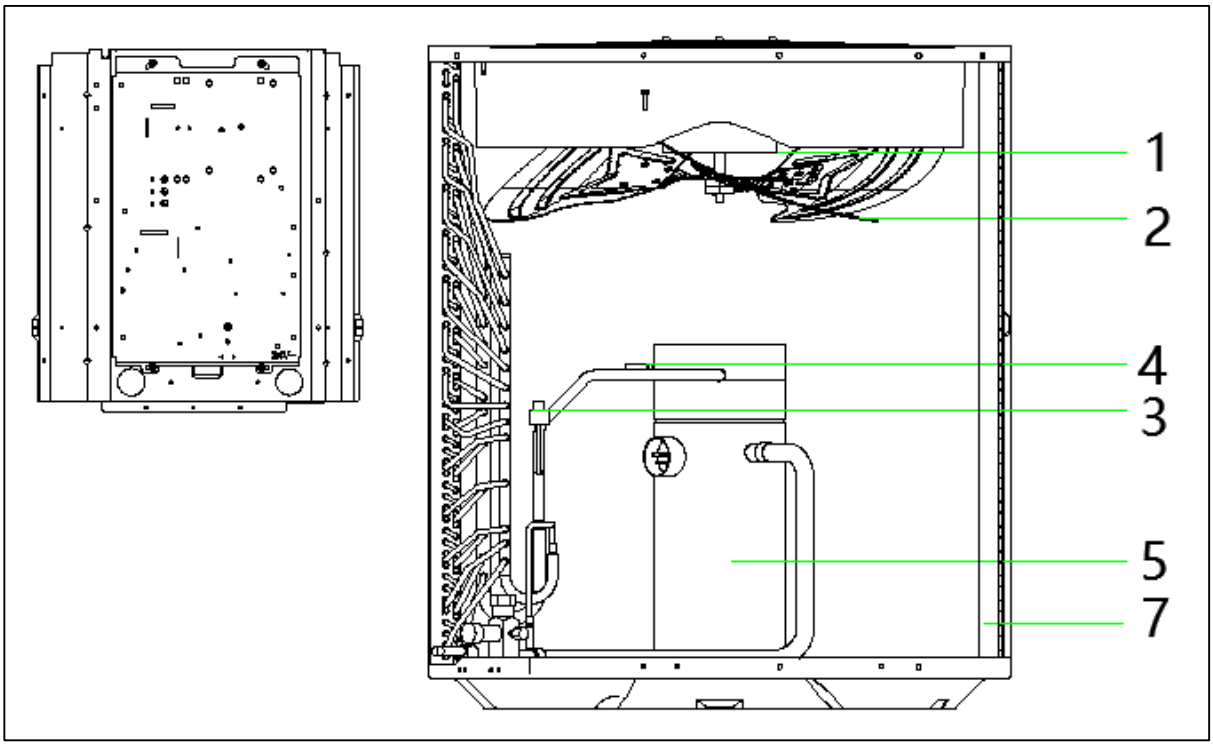



**13.4 AC 160**

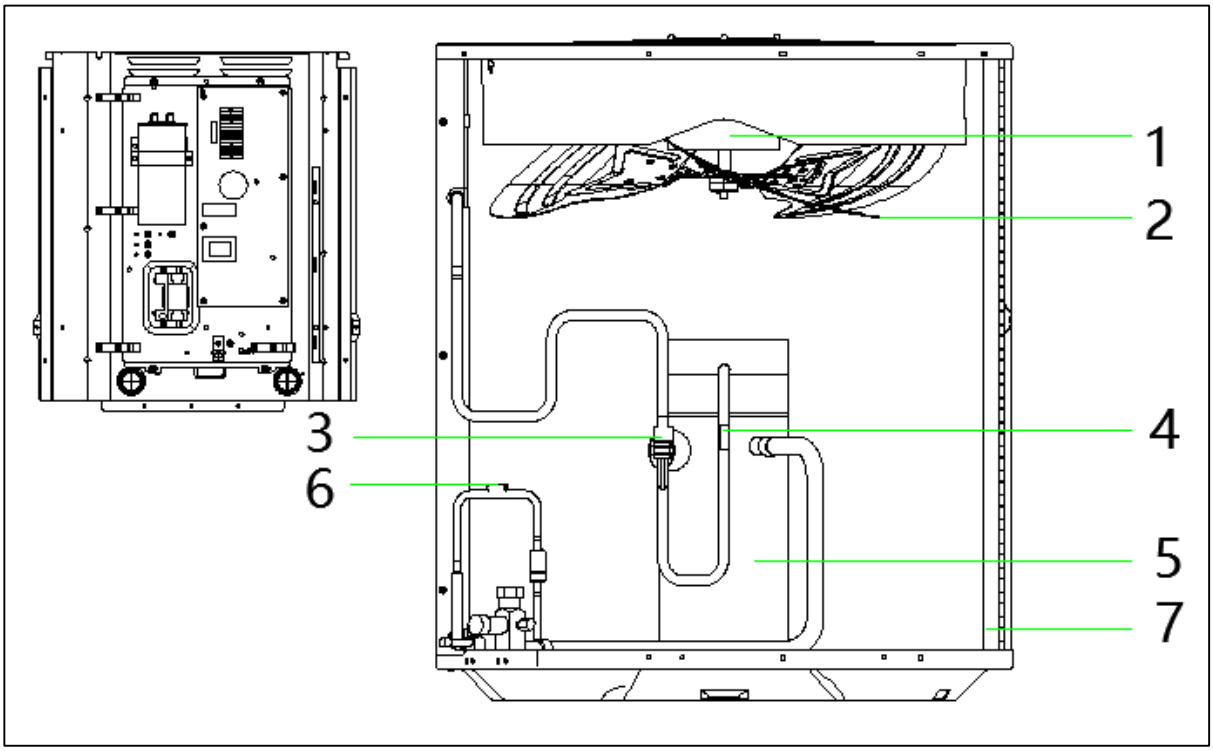


## 2.2 Functional Part

### 13.4 AC 120/140

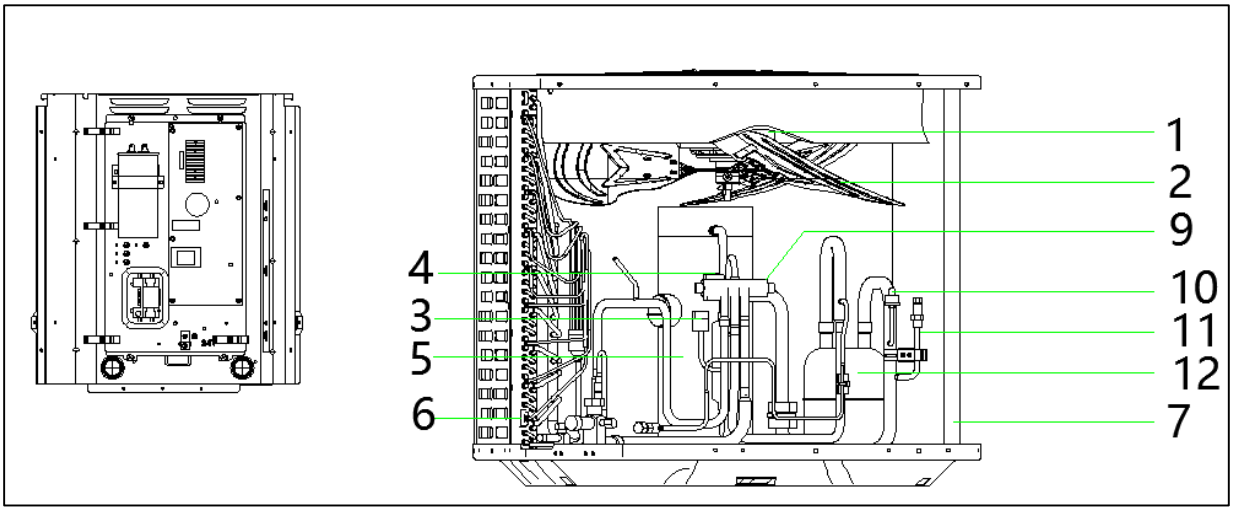



### 14.3 AC 160

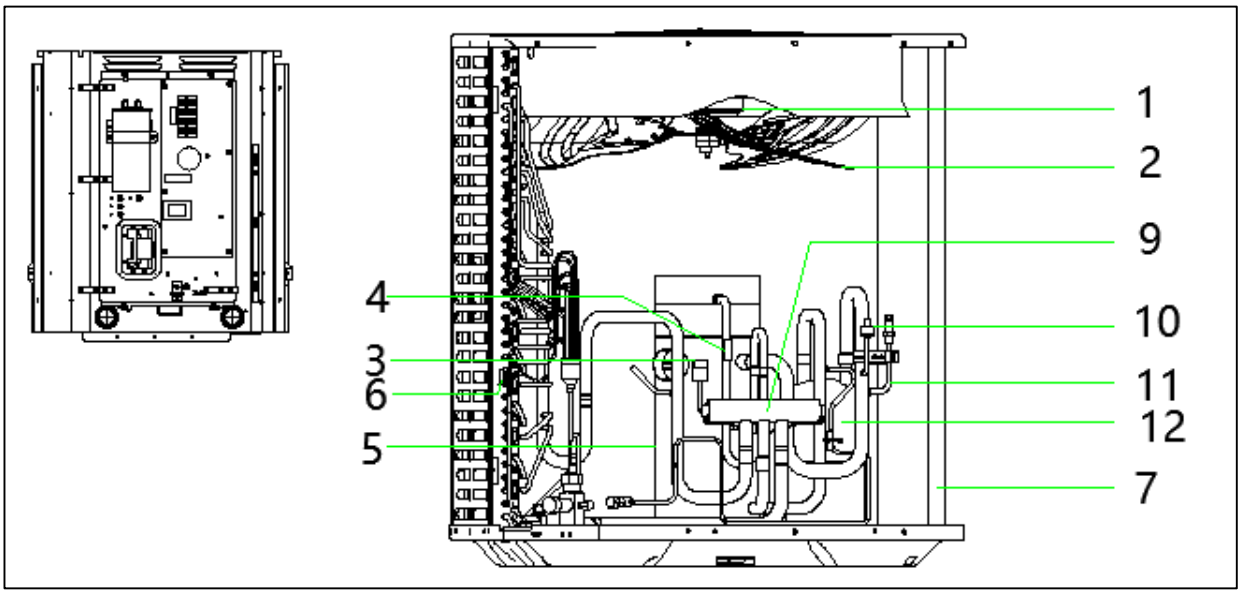


## 2.2 Functional Part

### 14.3 HP 53/71/90




### 14.3 HP 105/120/140/160



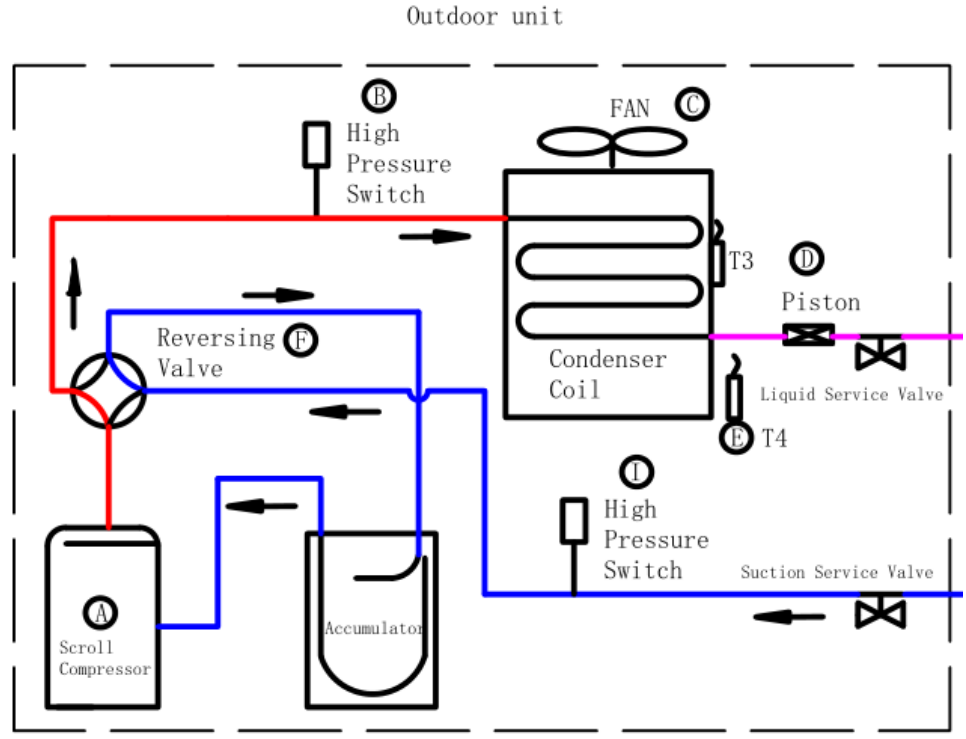
**2.2 Functional Part**

| 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

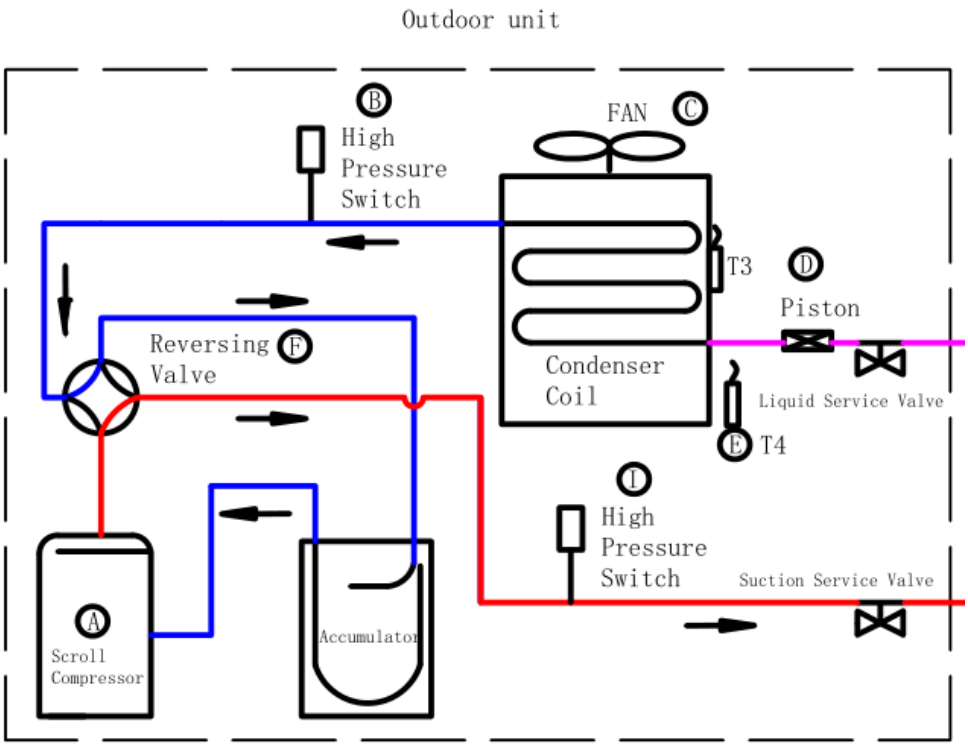
Cooling Operation/Cooling Oil Return Operation/Defrost Operation

- High pressure gas
- High pressure liquid
- Low pressure

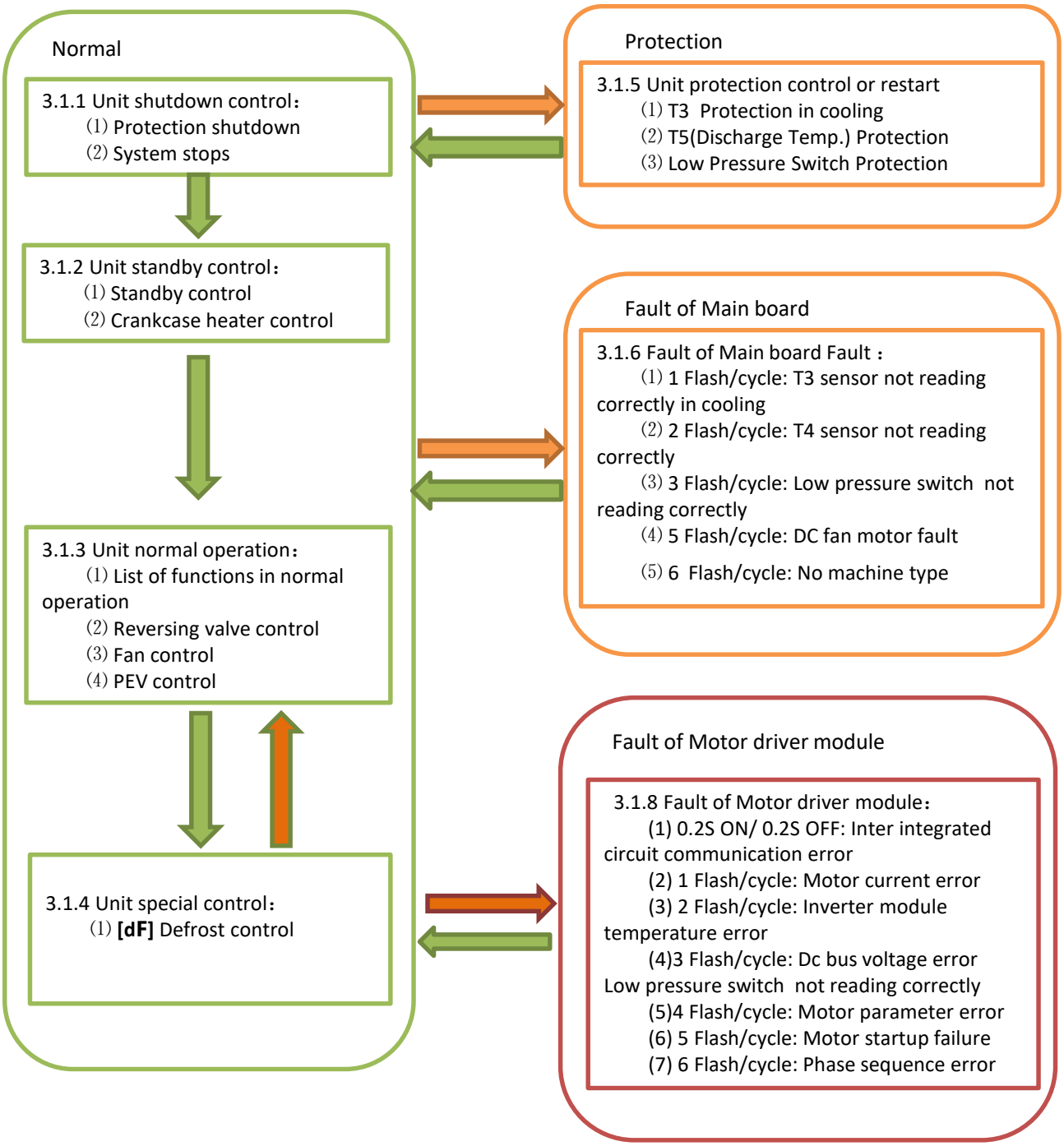



Heating Operation/Heating Oil Return Operation

- 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).

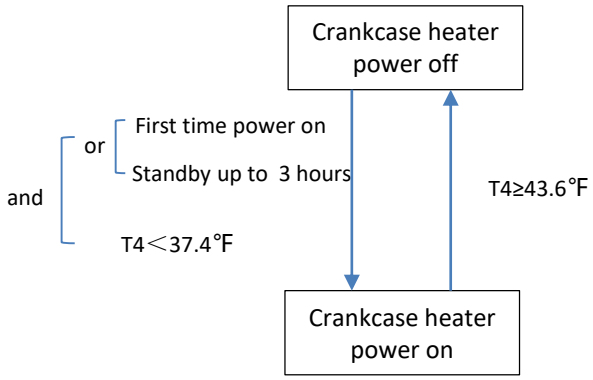
### 3.1.2 Unit standby control

(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.<br>Controlled by T3. |

[Heating]

| Symbol | Part Name | Major function |
|---|---|---|
| RV | The Reversing Valve | ON |
| Fan | Outdoor fan motor | 10 speeds ECM motor.<br>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.

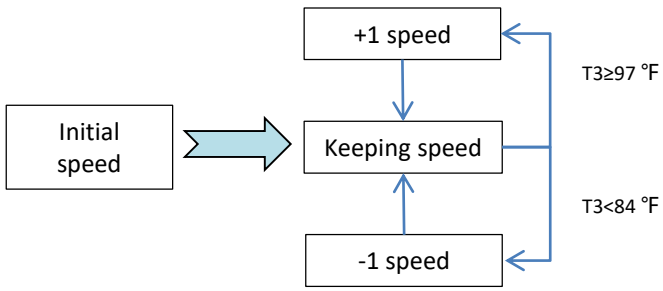
●Heating:

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.

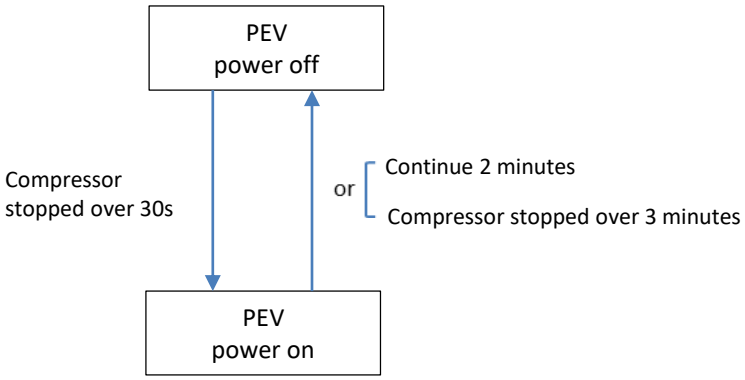
[Heating]

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**

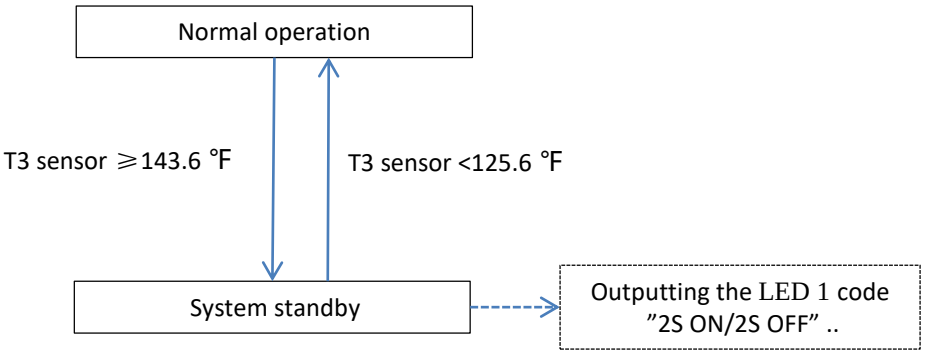
● The Demand Defrost Control (DDC) monitors the ODU coil temperature using thermistor (T3). A second thermistor (T4) monitors outdoor ambient temperature. Based on these parameters, as well as accumulative running time and Standby time, the DDC calculates proper initiation of defrost.

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

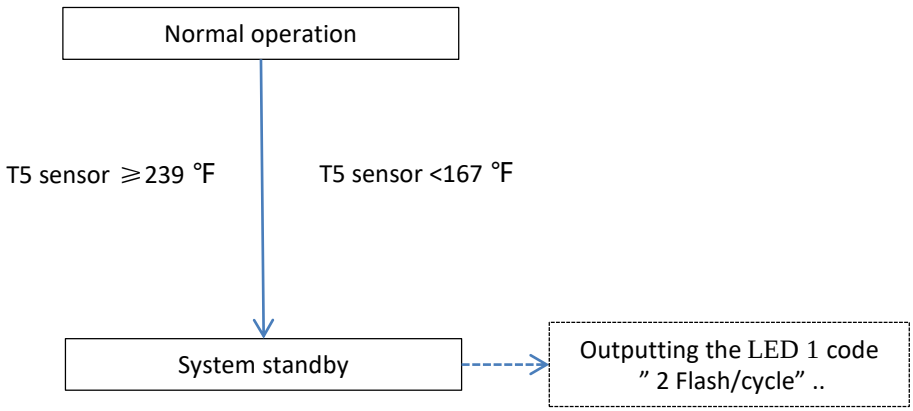
1. After T3 is achieved.
   --T4≥19℉ T3<32 ℉ and lasted for 60 minutes
2. After T4 is achieved.
   --T3<28℉ and lasted for 65 minutes
   _"Standby time" is 2 hours, T3<28℉ when starting and lasted for 15 minutes

### 3.1.7 Unit protection control or restart：

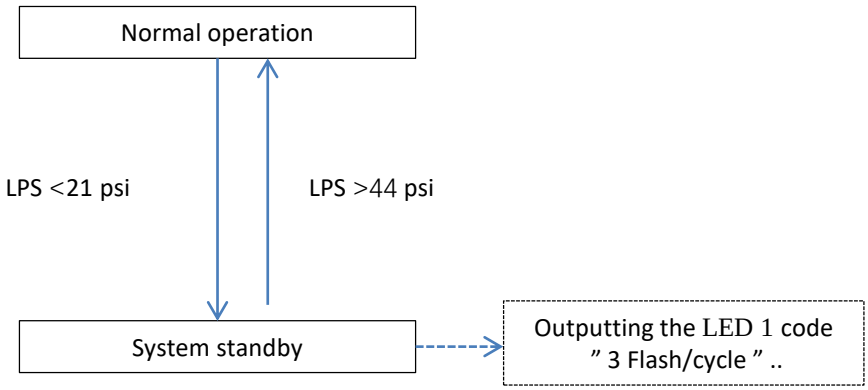
(1) **T3 Protection in cooling**




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




(3) **Low Pressure Switch Protection**

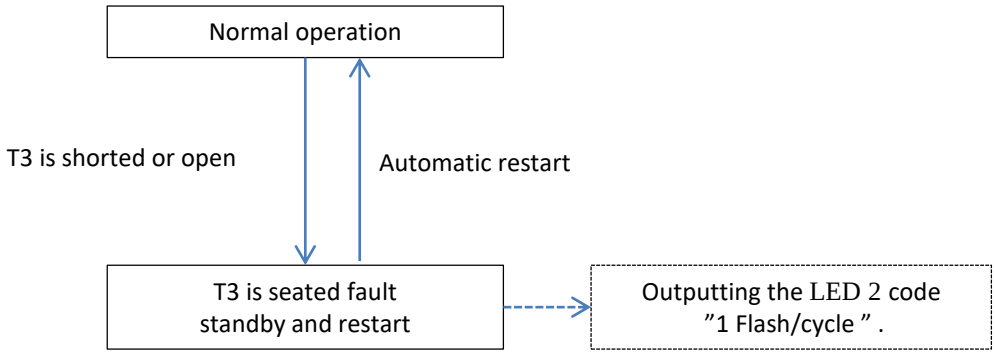


### 3.1.6 Fault of Main board：

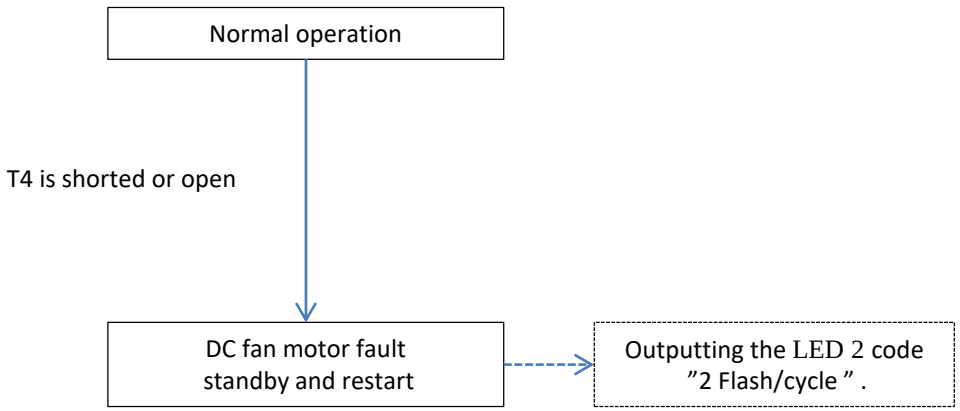
| No. | Operation LED | Protection code | Protection control description | Supposed cause |
|---|---|---|---|---|
| 1 | LED2 | 1 Flash/cycle | T3 sensor not reading correctly in cooling | T3 sensor is not properly placed/High pressure switch fault |
| 2 | LED2 | 2 Flash/cycle | T4 sensor not reading 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：

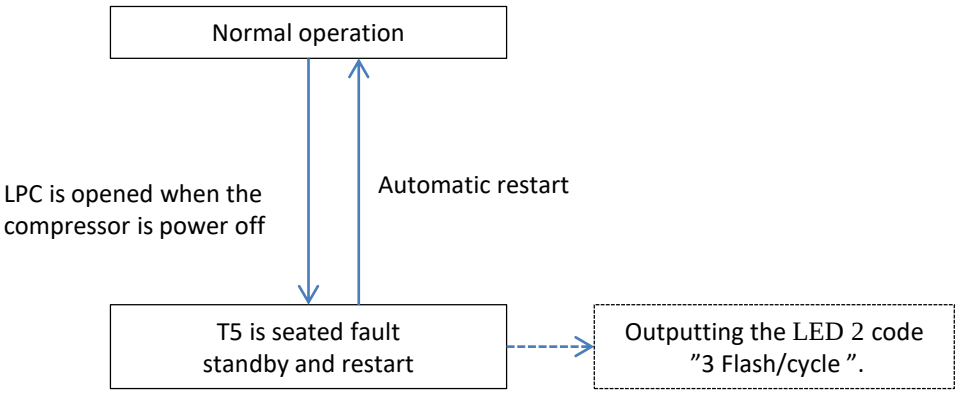
(1) **T3 sensor not reading correctly in cooling**




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

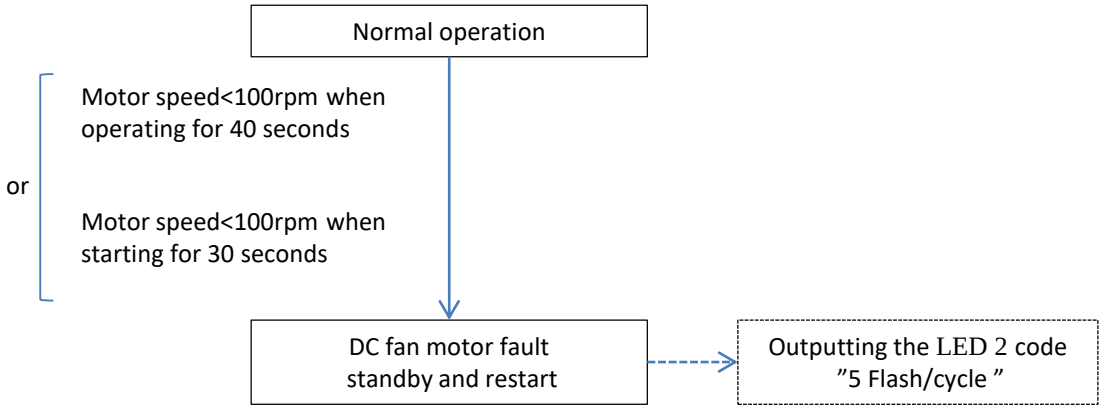



(3) **LPC open**



**3.1.7 Unit protection control or restart：**

**⑷ 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 |

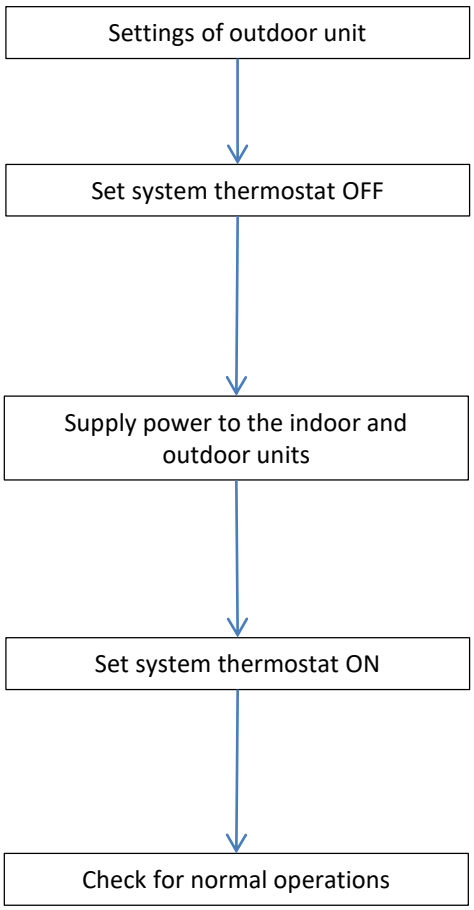
## 4.1 Test operation

### 4.1.1 Checks before test operation

| No. | Checkpoints | Cautions or warnings |
|---|---|---|
| 1 | Are all units securely installed? | Dangerous for turning over during storm<br>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<br>abnormal operation |
| 4 | Are all air inlets and outlets of the indoor and outdoor units unobstructed? | Poor cooling<br>Poor heating |
| 5 | Does the drain flow out smoothly? | Pipeline water leak |
| 6 | Is piping adequately heat-insulated? | Pipeline water leak<br>Poor capacity |
| 7 | Have the connections been checked for air tight test and vacuum drying? | Poor capacity<br>abnormal operation |
| 8 | Is a proper quantity of refrigerant charged? | Poor capacity<br>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<br>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**°F

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

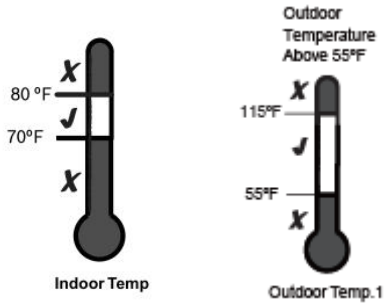
**Weigh-in charging method**

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

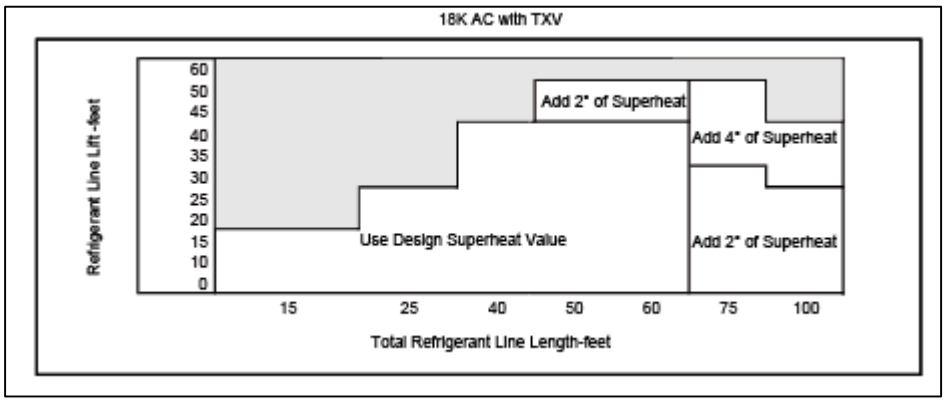
**Design superheat with TXV throttle**

| 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 |
| 85 | 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 |
| 85 | 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

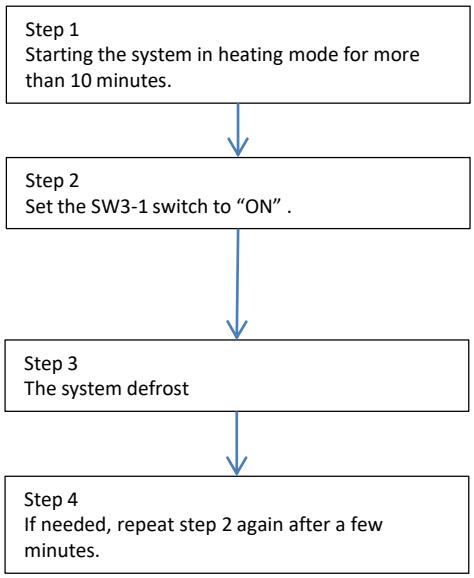
| R410A Refrigerant Superheat Chart | | | | | | | |
|---|---|---|---|---|---|---|---|
| Suction Temp (°F) | Final Superheat (°F) | | | | | | |
| | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| | Suction Gauge Pressure (PSI) | | | | | | |
| 40 | 105 | 101 | 97 | 93 | 89 | 86 | 82 |
| 42 | 109 | 105 | 101 | 97 | 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

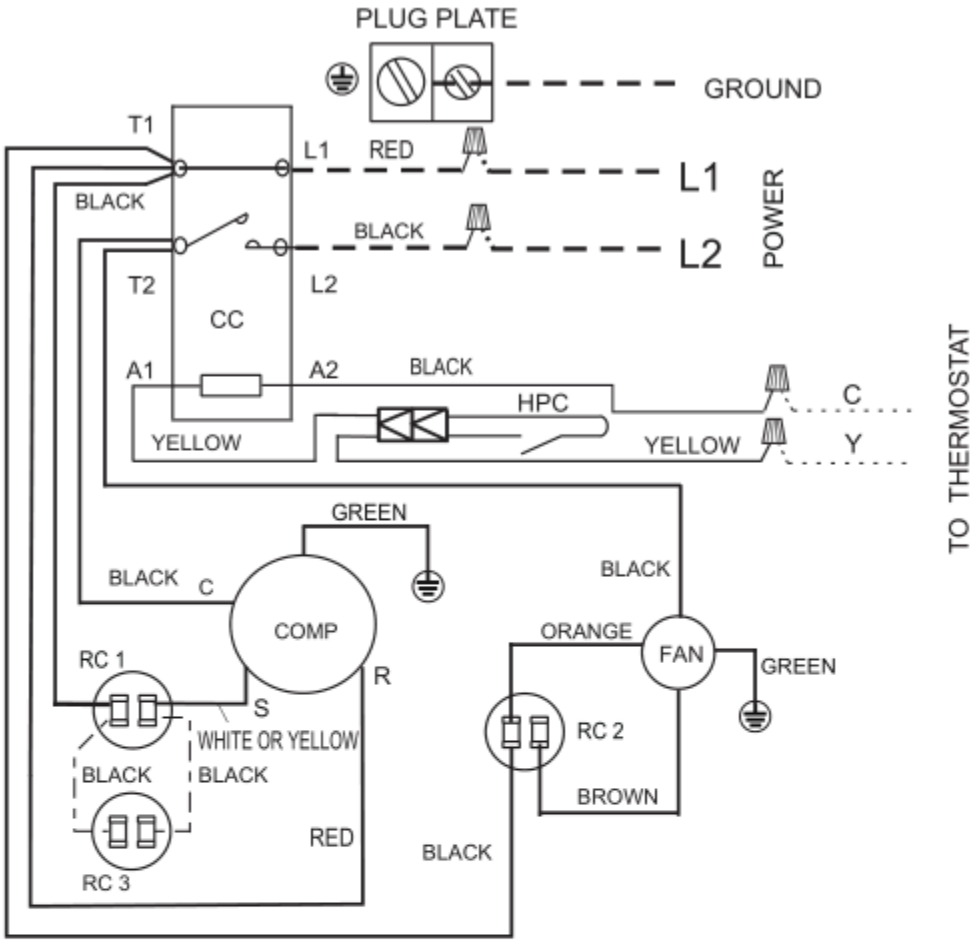
### 4.1.4 Manual defrost




Note:
Defrost will exit automatically.

**4.2 Field setting**

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




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

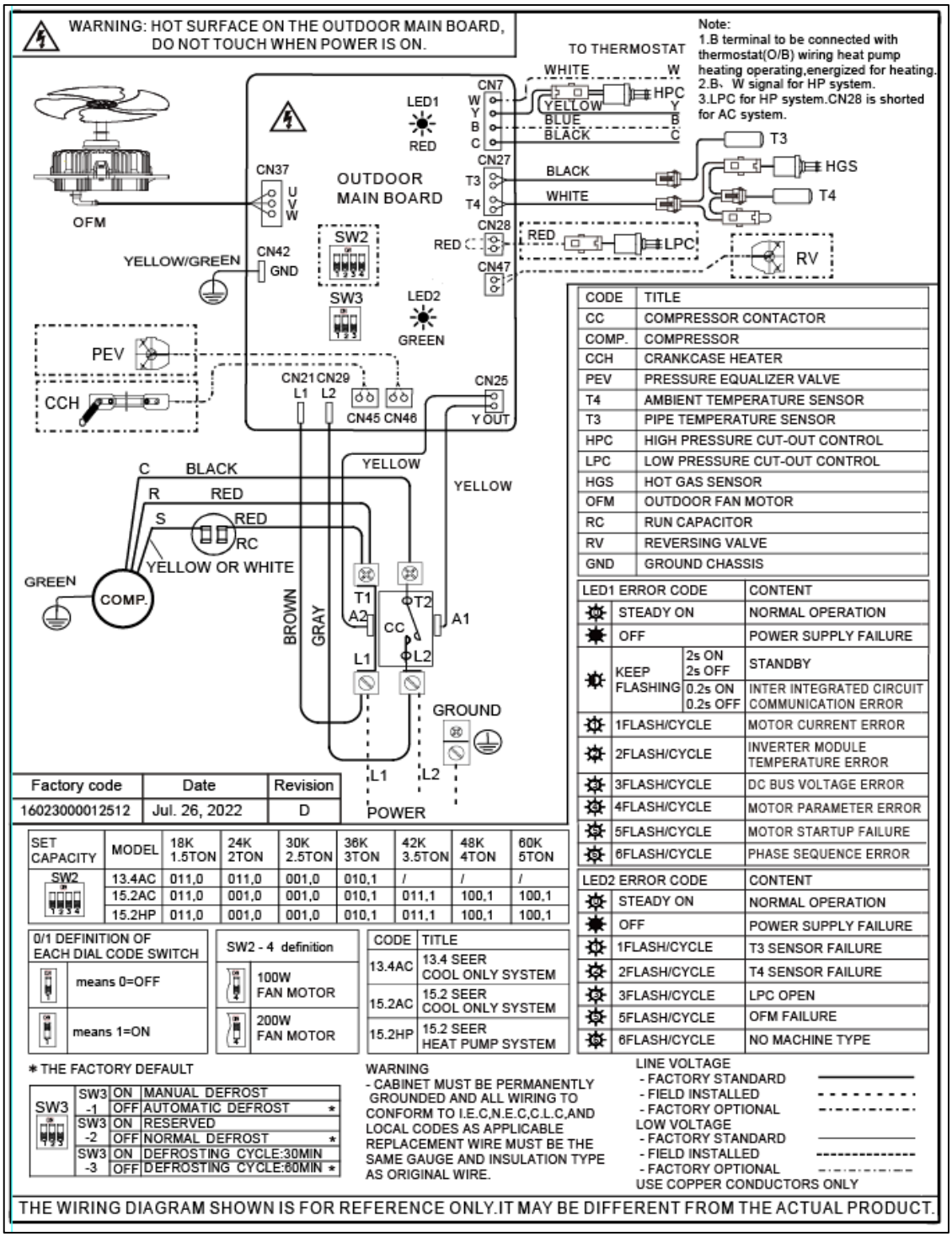
USE COPPER CONDUCTORS ONLY

| | |
|---|---|
| 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

**4.2 Field setting**

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




| 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 |

| Factory code | Date | Revision |
|---|---|---|
| 16023000012512 | Jul. 26, 2022 | D |

| 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 |

| 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 |
| 15.2AC | 15.2 SEER COOL ONLY SYSTEM |
| 15.2HP | 15.2 SEER HEAT PUMP SYSTEM |

* THE FACTORY DEFAULT

| SW3 | | | |
|---|---|---|---|
| SW3 -1 | ON | MANUAL DEFROST | |
| | OFF | AUTOMATIC DEFROST | * |
| SW3 -2 | ON | RESERVED | |
| | OFF | NORMAL DEFROST | * |
| SW3 -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

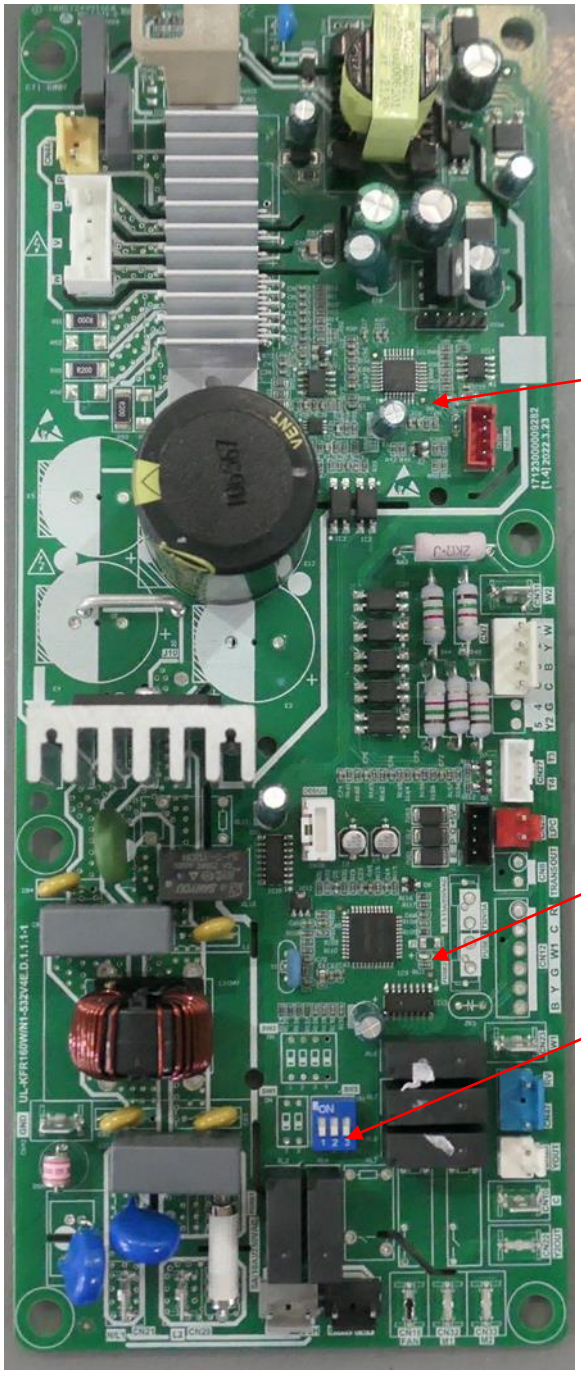
LOW VOLTAGE
- FACTORY STANDARD
- FIELD INSTALLED
- FACTORY OPTIONAL

USE COPPER CONDUCTORS ONLY

THE WIRING DIAGRAM SHOWN IS FOR REFERENCE ONLY.IT MAY BE DIFFERENT FROM THE ACTUAL PRODUCT.

**4.2 Field setting**

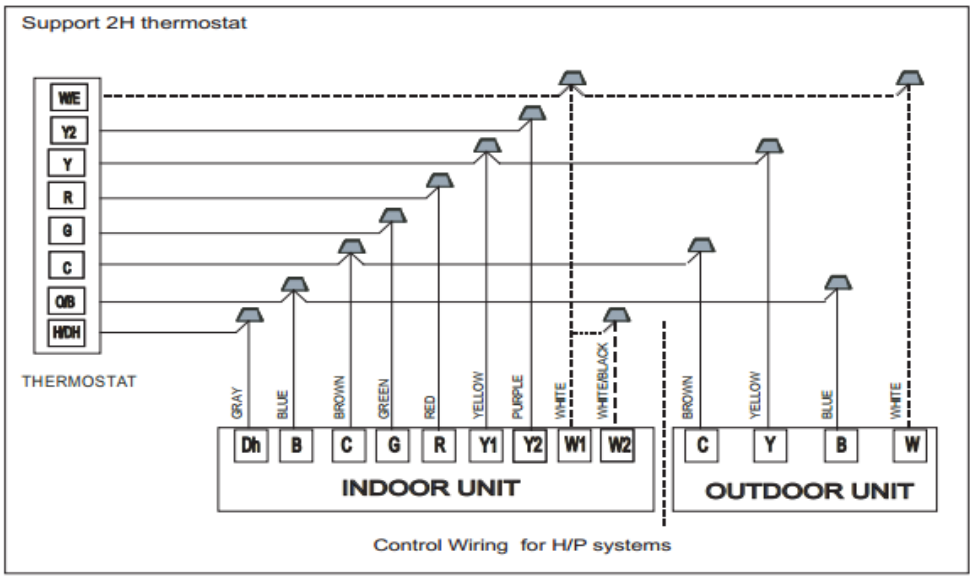
4.2.2 DIP switch position indication ---2/3TON

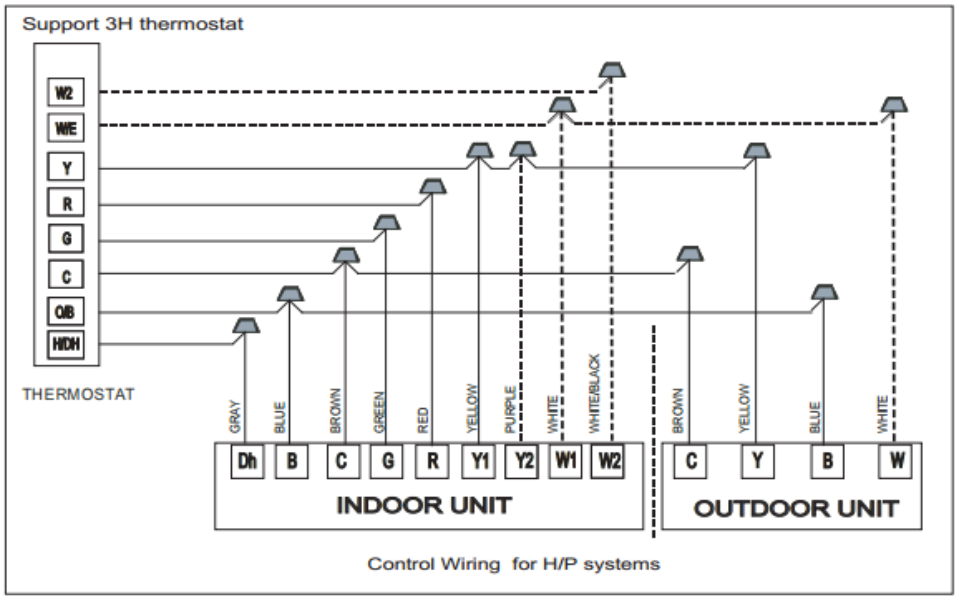


### 4.3 Thermostat

Note: B signal need thermostat programming settings.

#### 4.3.1 Control wiring




*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.*

## 5.1 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）<br>• Abnormal power input<br>• 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】

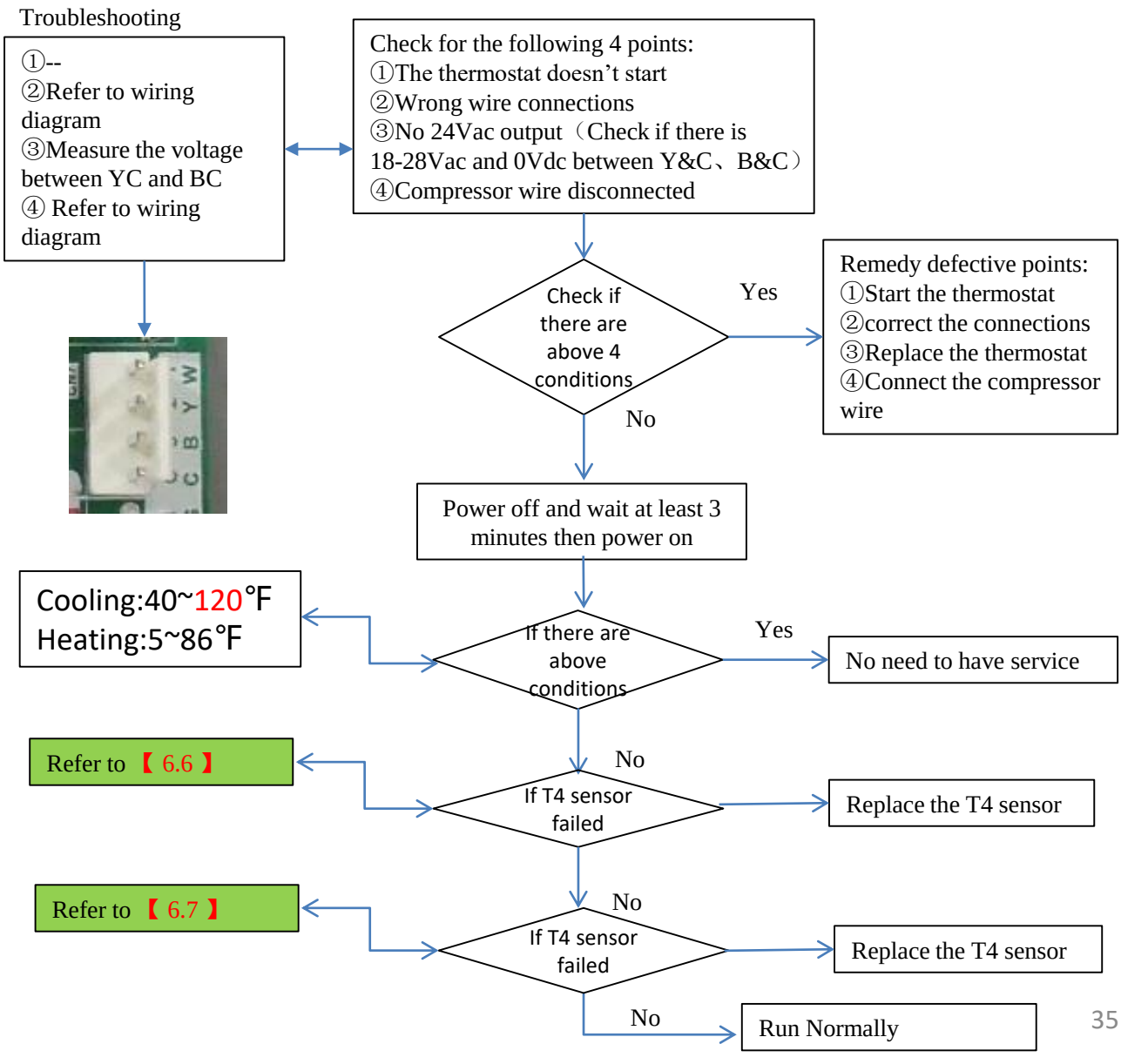
Replace compressor or motor

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<br>• Wrong wire connections between thermostat and unit<br>• Damaged thermostat<br>• Disconnect the compressor wire（could be caused after service） |
| Notes: | |
| | |

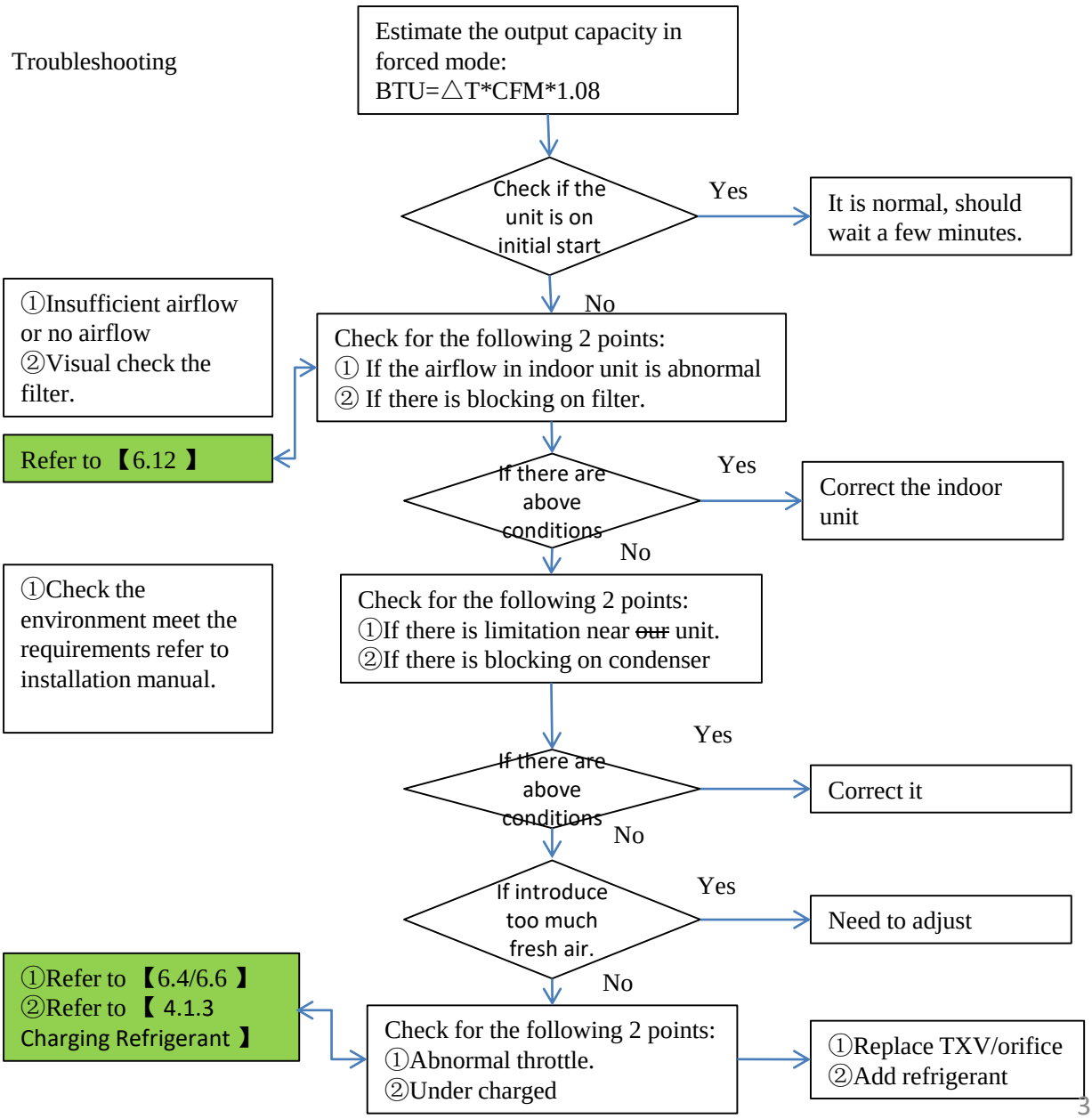


## 5.2 Symptom-based Troubleshooting

### 5.2.3 Capacity is low

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

Troubleshooting

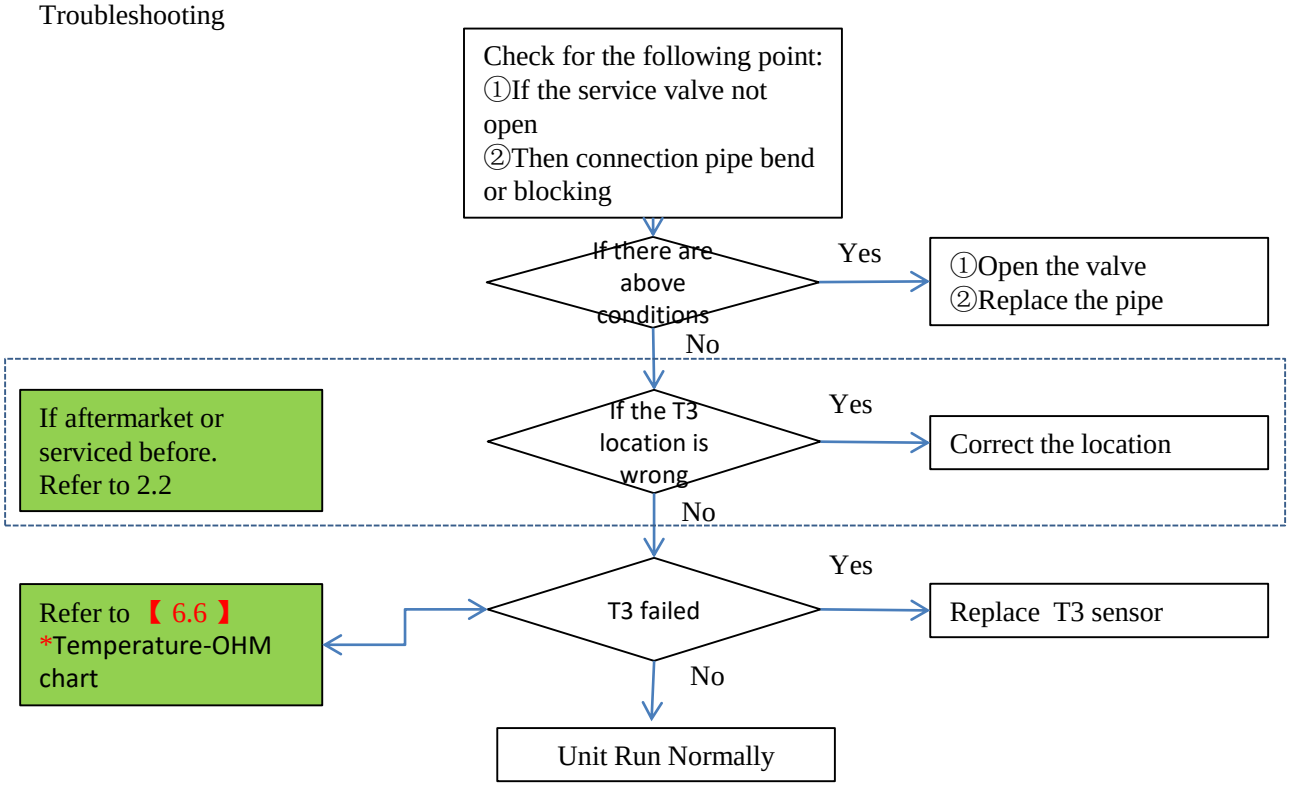


## 5.3 Troubleshooting by Main board Fault code

### 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**<br>• Faulty T3 sensor<br>• Service valves not open |
| | |
| | |

Troubleshooting

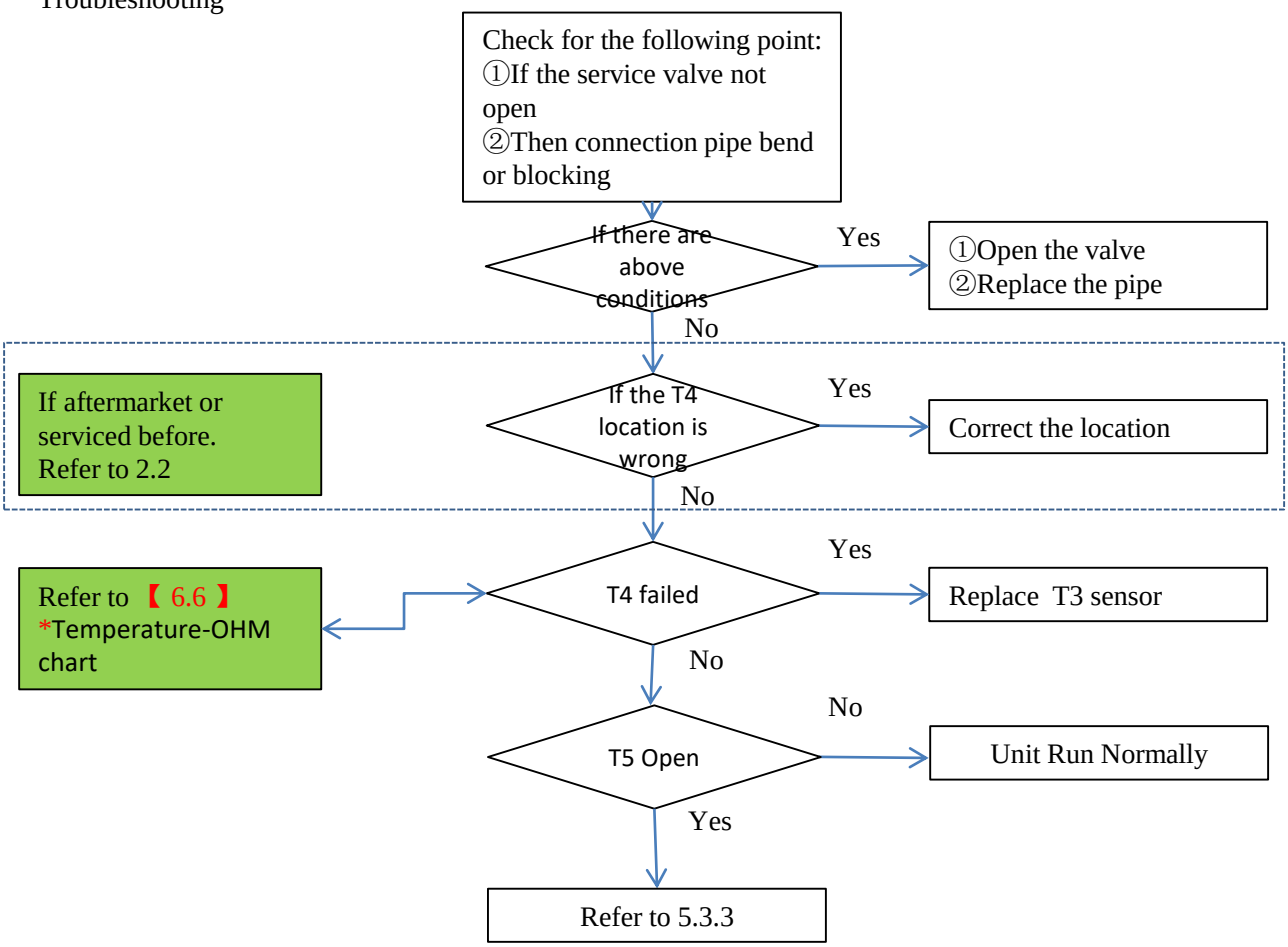


### 5.3 Troubleshooting by Main board Fault code

#### 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**<br>• Faulty T4 sensor<br>• Discharge Temperature switch open |
| | |
| | |

Troubleshooting

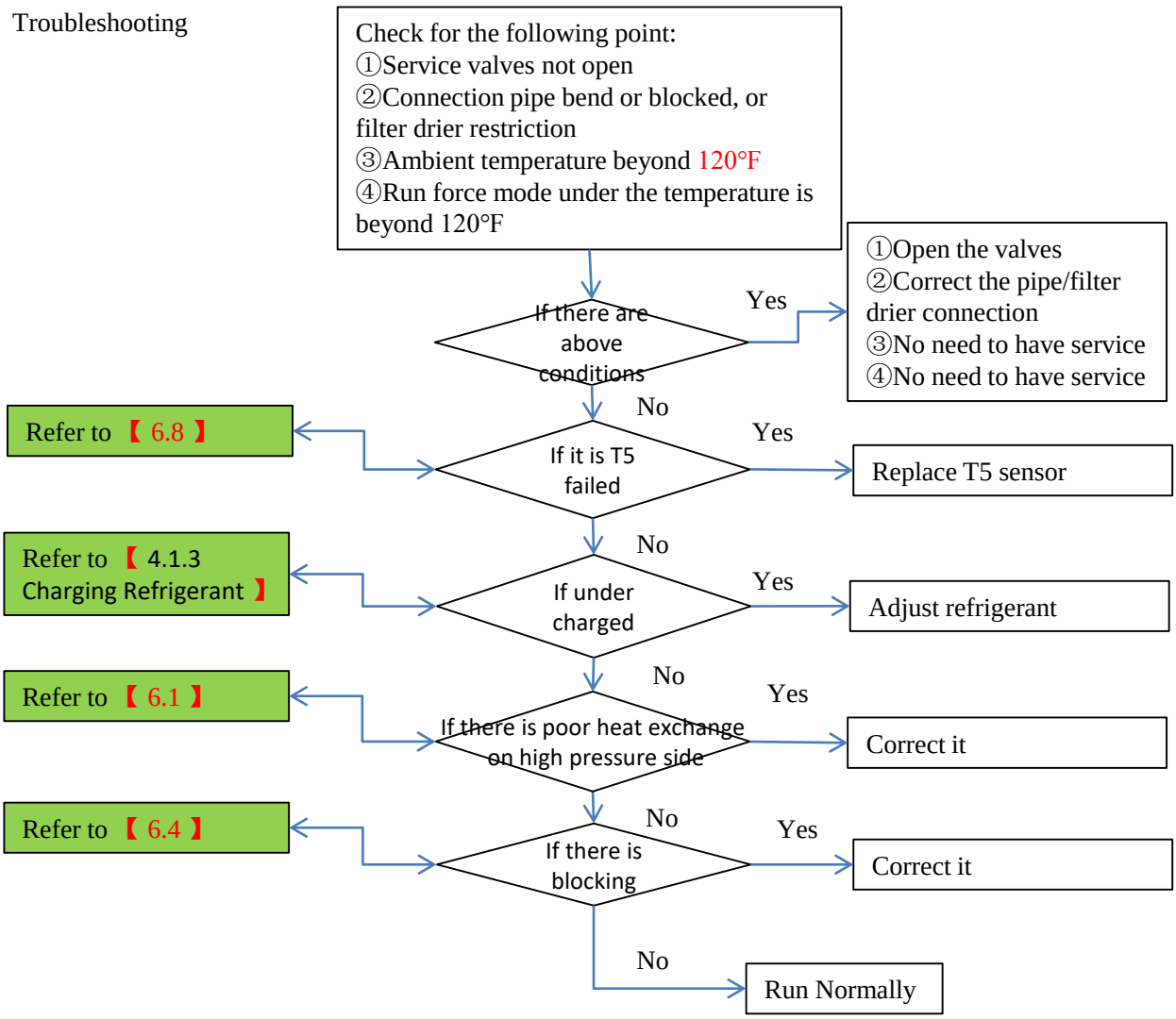


### 5.3 Troubleshooting by Main board Fault code

#### 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**<br>• **Under charged**<br>• Service valves not open/filter drier restriction<br>• Indoor unit motor stopped abnormally / poor heat exchange (**heating mode**)<br>• **Poor heat exchange on outdoor unit（cooling mode)** |
| | |
| | |

Troubleshooting

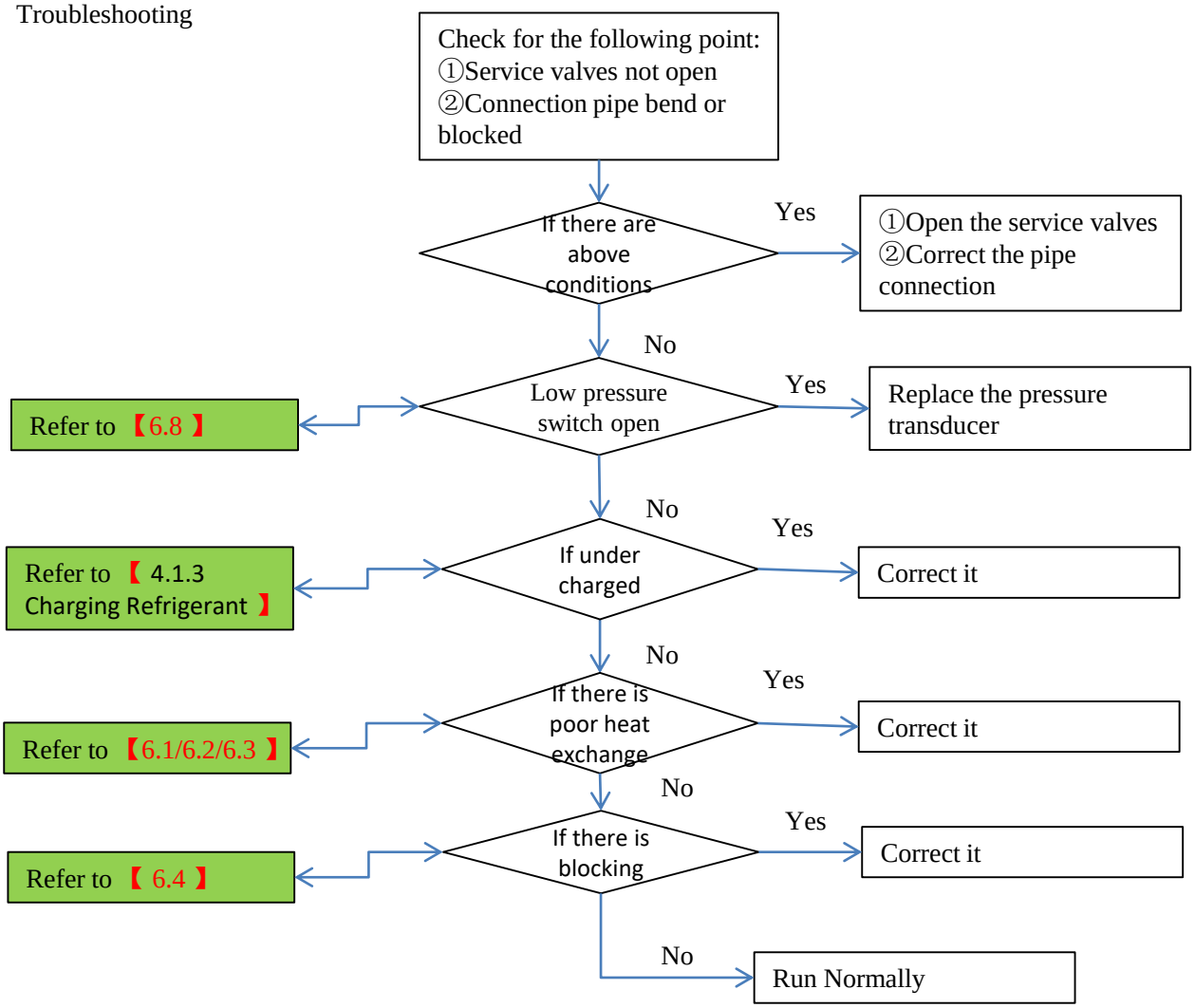


## 5.3 Troubleshooting by Main board Fault code

### 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<br>• **TXV/EEV/filter drier/indoor coil blocked**<br>• Service valves not open<br>• Under charged |
| | |
| | |

Troubleshooting

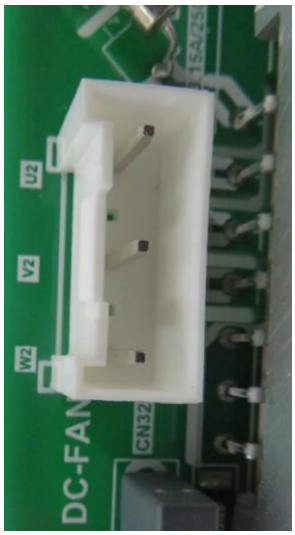


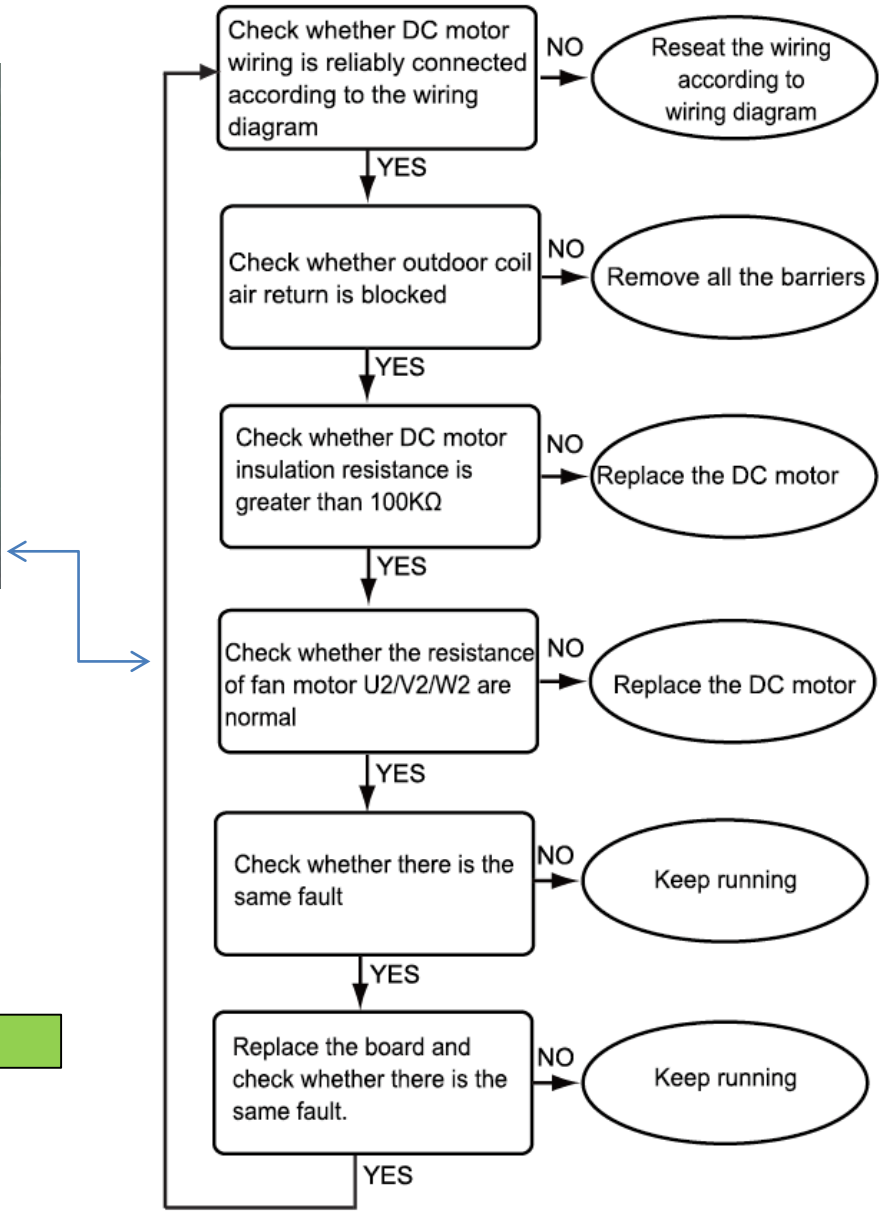
### 5.3 5.3 Troubleshooting by Main board Fault code

#### 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<br>• Motor failed<br>• Electric issue |
| | |

Troubleshooting



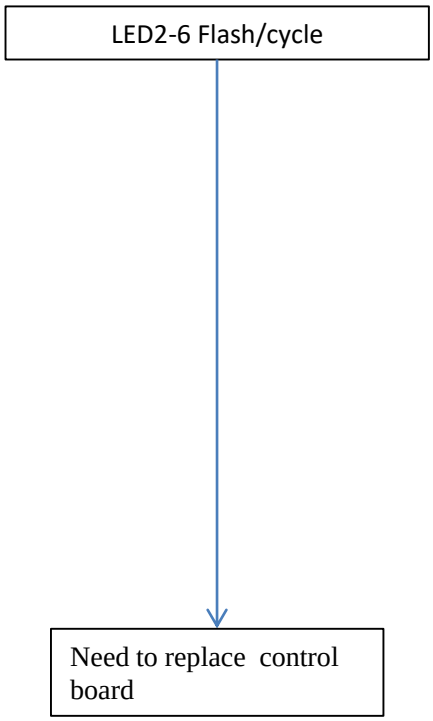

Refer to 【6. 10】

## 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<br>• Control board broken |
| | |

Troubleshooting

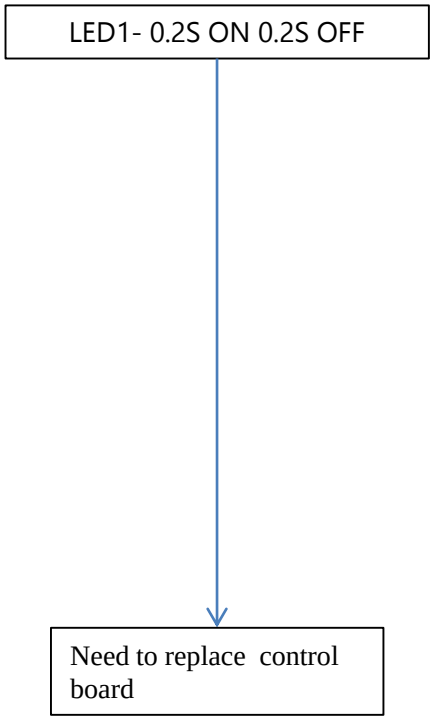


## 5.4 Troubleshooting by Motor driver module code

### 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<br>• Control board broken |
| | |
| | |

Troubleshooting

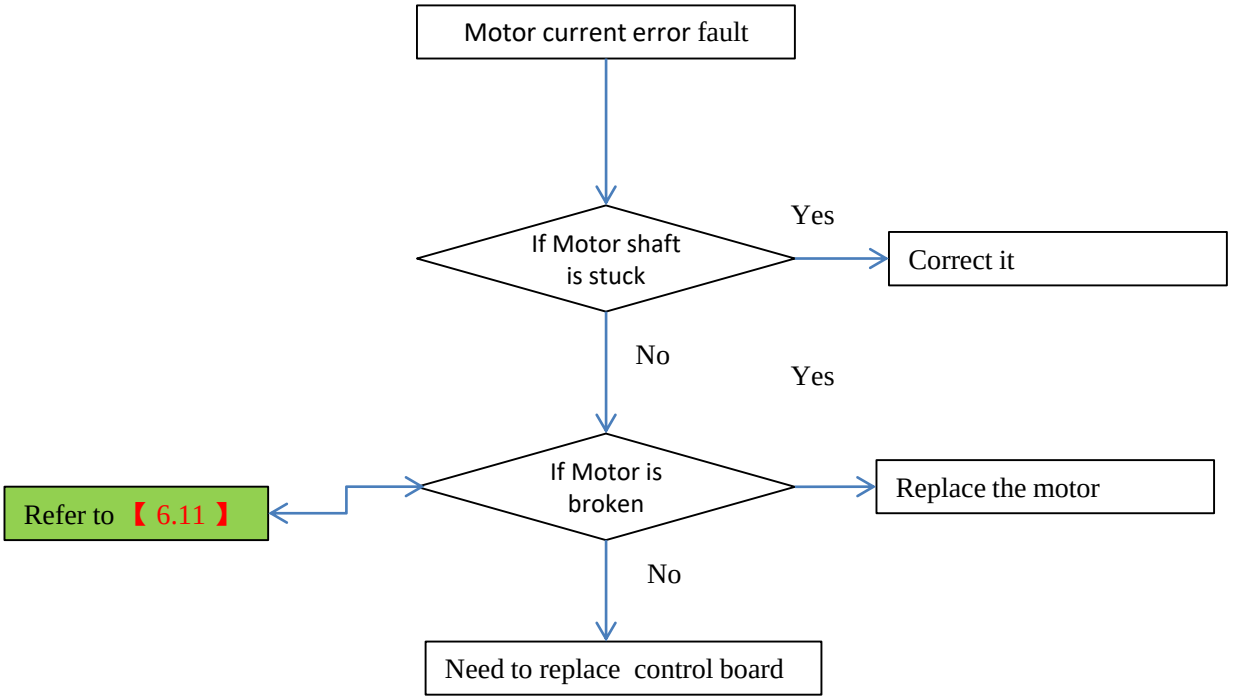


## 5.4 Troubleshooting by Motor driver module code

### 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<br>• Motor broken<br>• Control board broken |
| | |
| | |

Troubleshooting

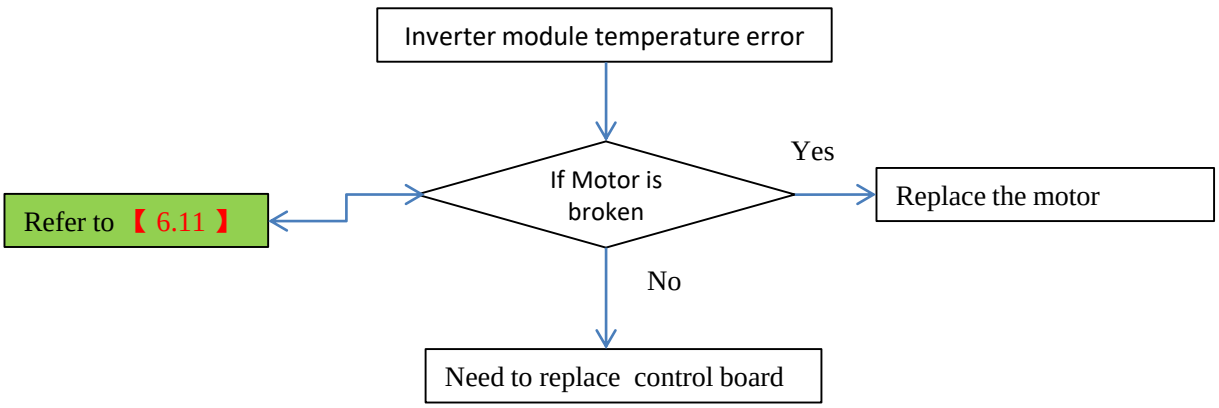


## 5.4 Troubleshooting by Motor driver module code

### 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<br>• Control board broken |
| | |
| | |

Troubleshooting

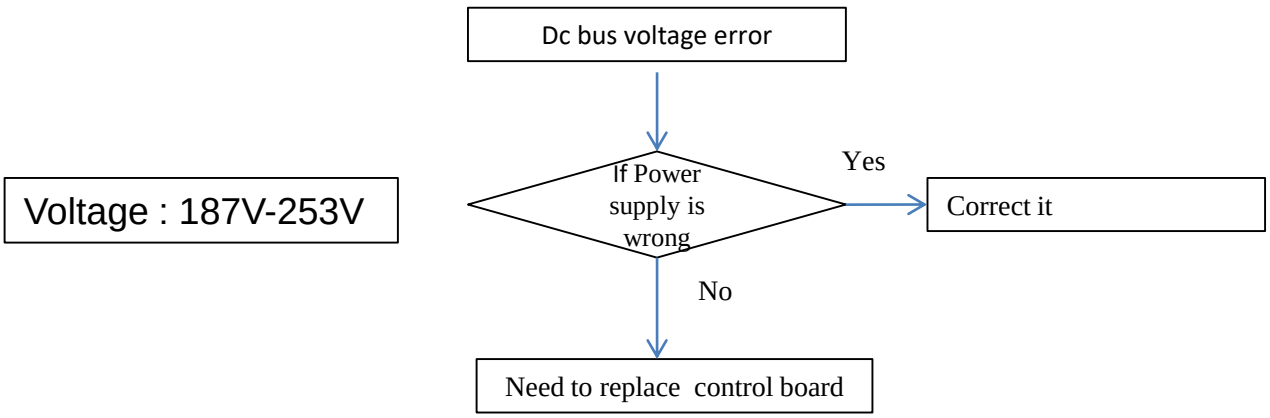


## 5.4 Troubleshooting by Motor driver module code

### 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<br>• Control board broken |
| | |
| | |

Troubleshooting

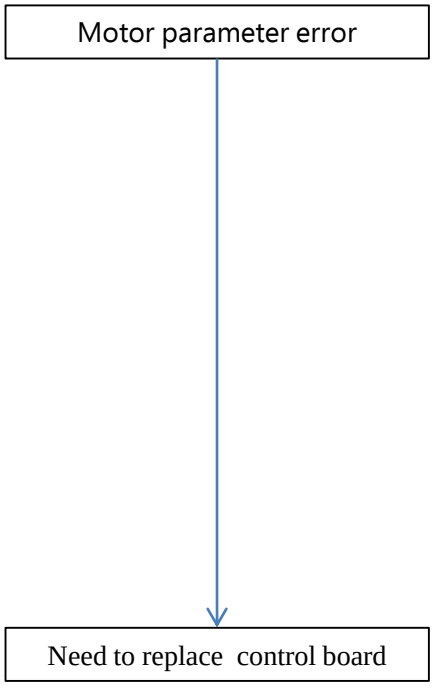


## 5.4 Troubleshooting by Motor driver module code

### 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

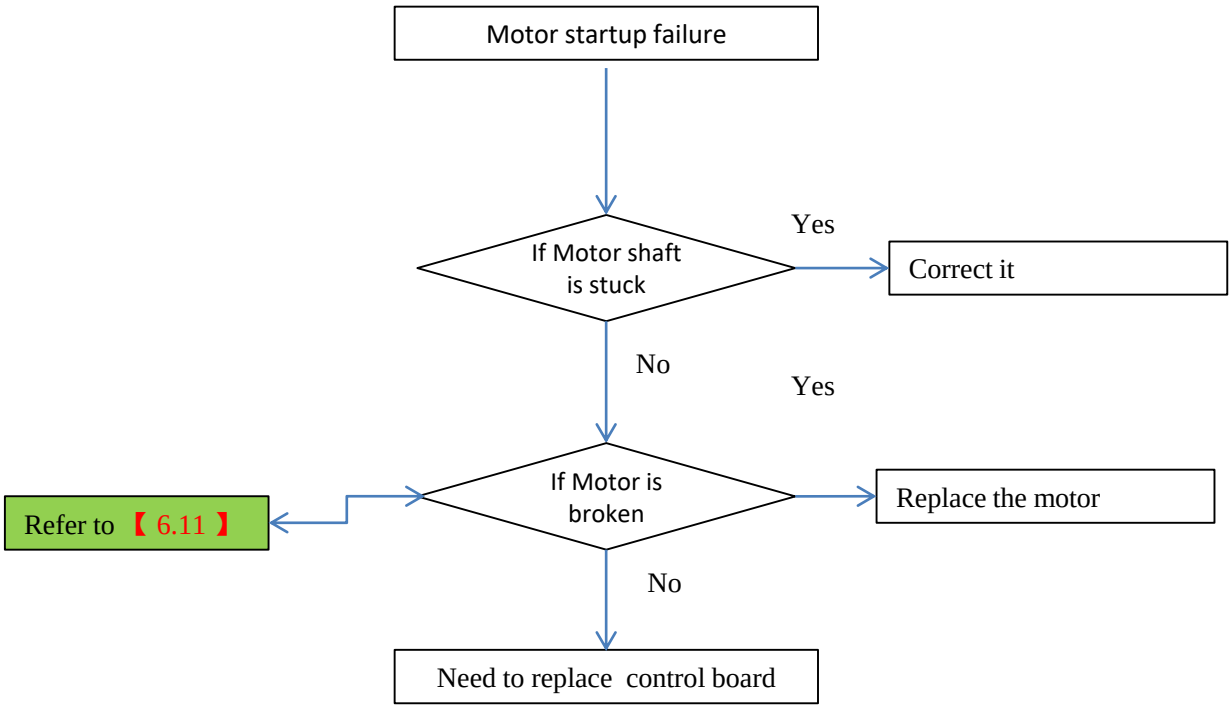


## 5.4 Troubleshooting by Motor driver module code

### 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<br>• Motor shaft stuck<br>• Control board broken |
| | |
| | |

Troubleshooting

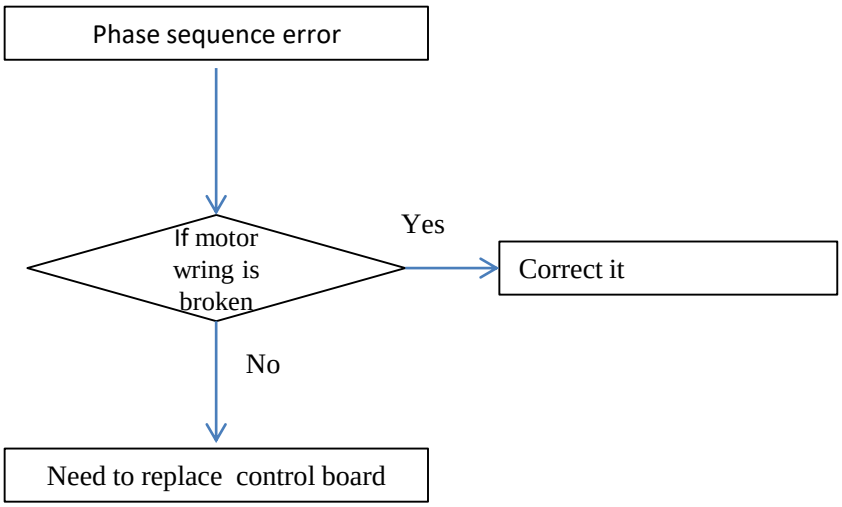


## 5.4 Troubleshooting by Motor driver module code

### 5.4.7 LED1--6 Flash/cycle

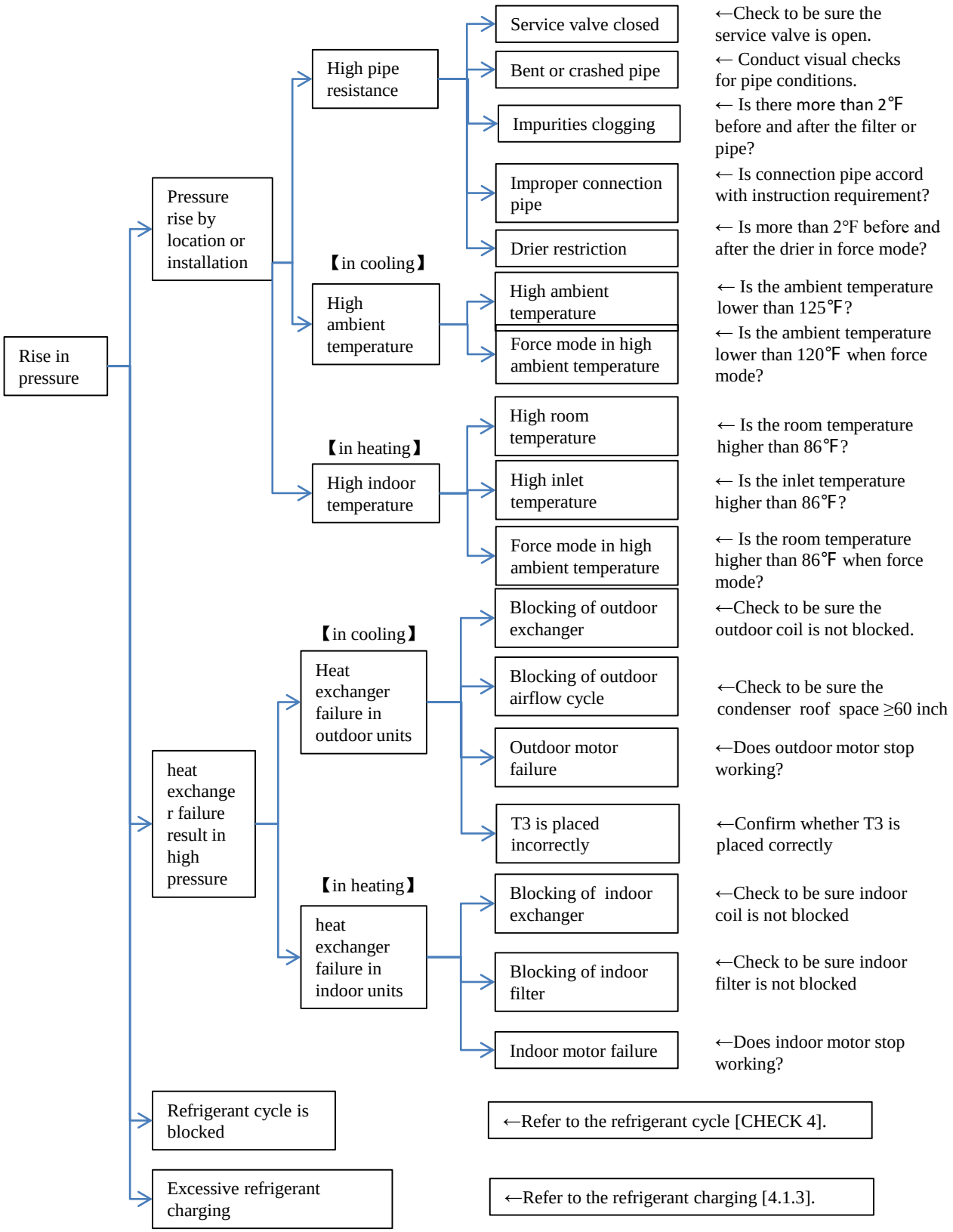
| | |
|---|---|
| Faulty code | LED1—6 Flash/cycle |
| Model | all |
| Name | Phase sequence error |
| Classify | Electric issue |
| Possible cause | • Motor wring broken<br>• Control board broken |
| | |
| | |

Troubleshooting



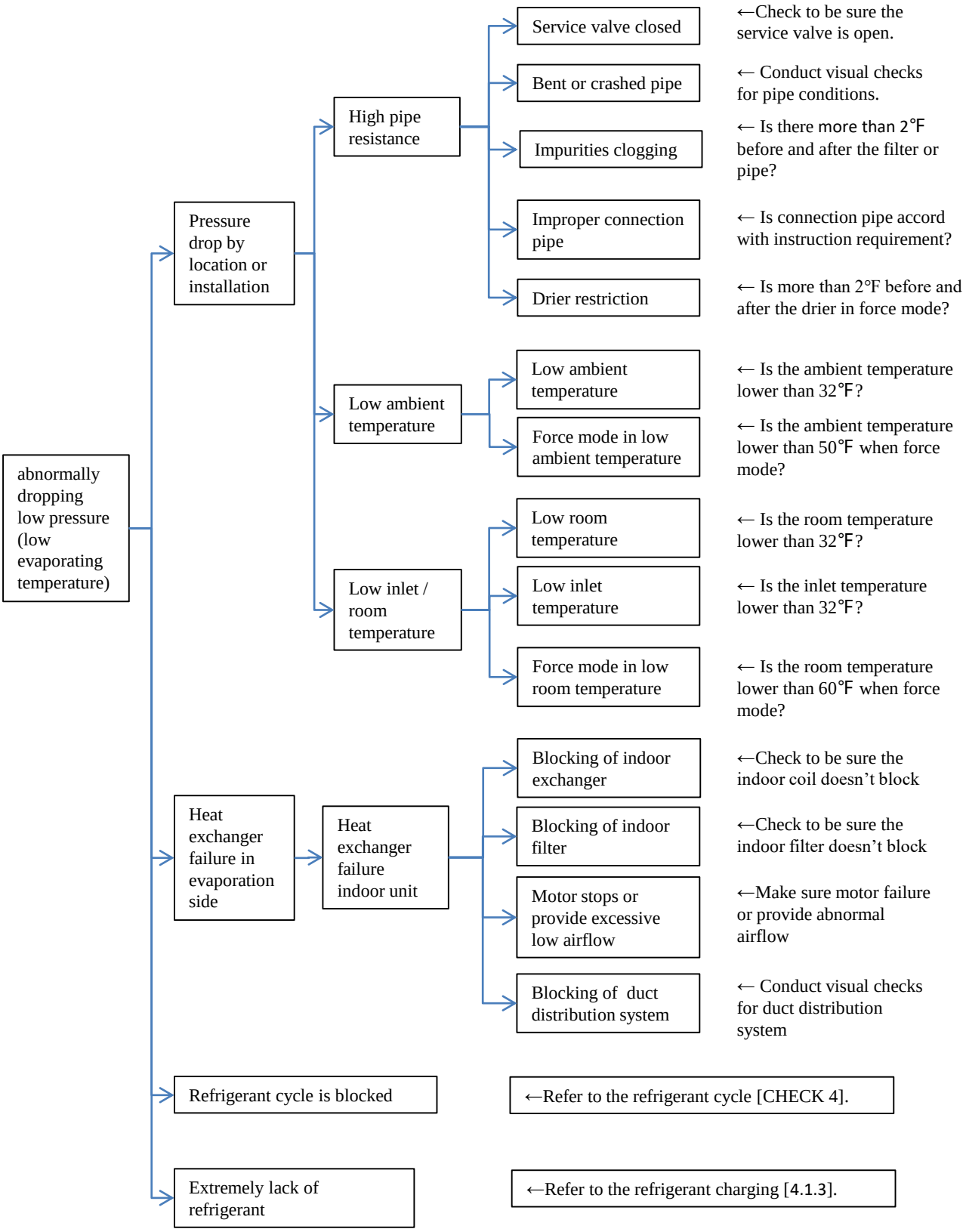
## CHECK 1 6.1 Check for Causes of Rise in High Pressure

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.

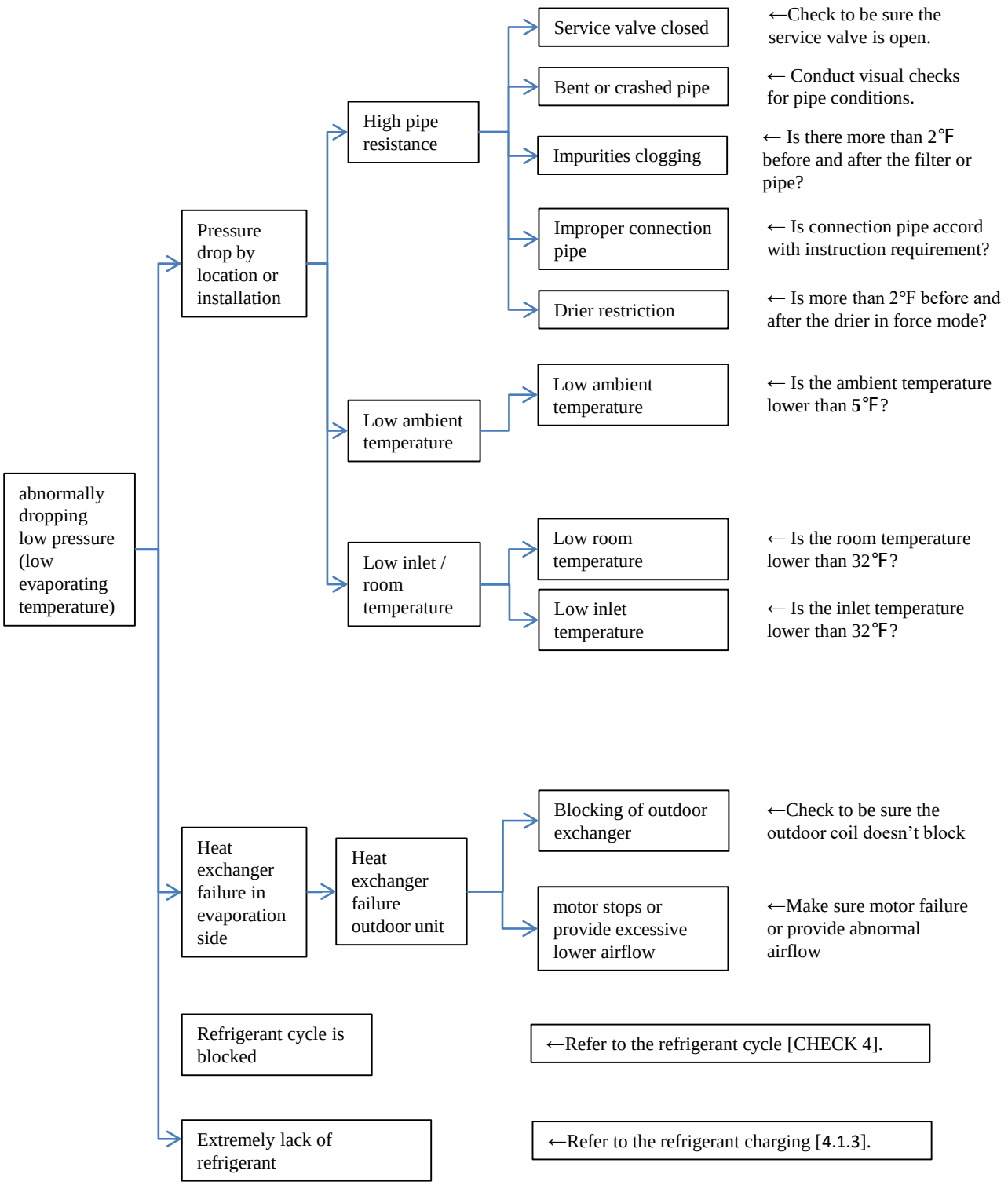


## CHECK 2 6.2 Check for Causes of Dropping Low Pressure in cooling

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.

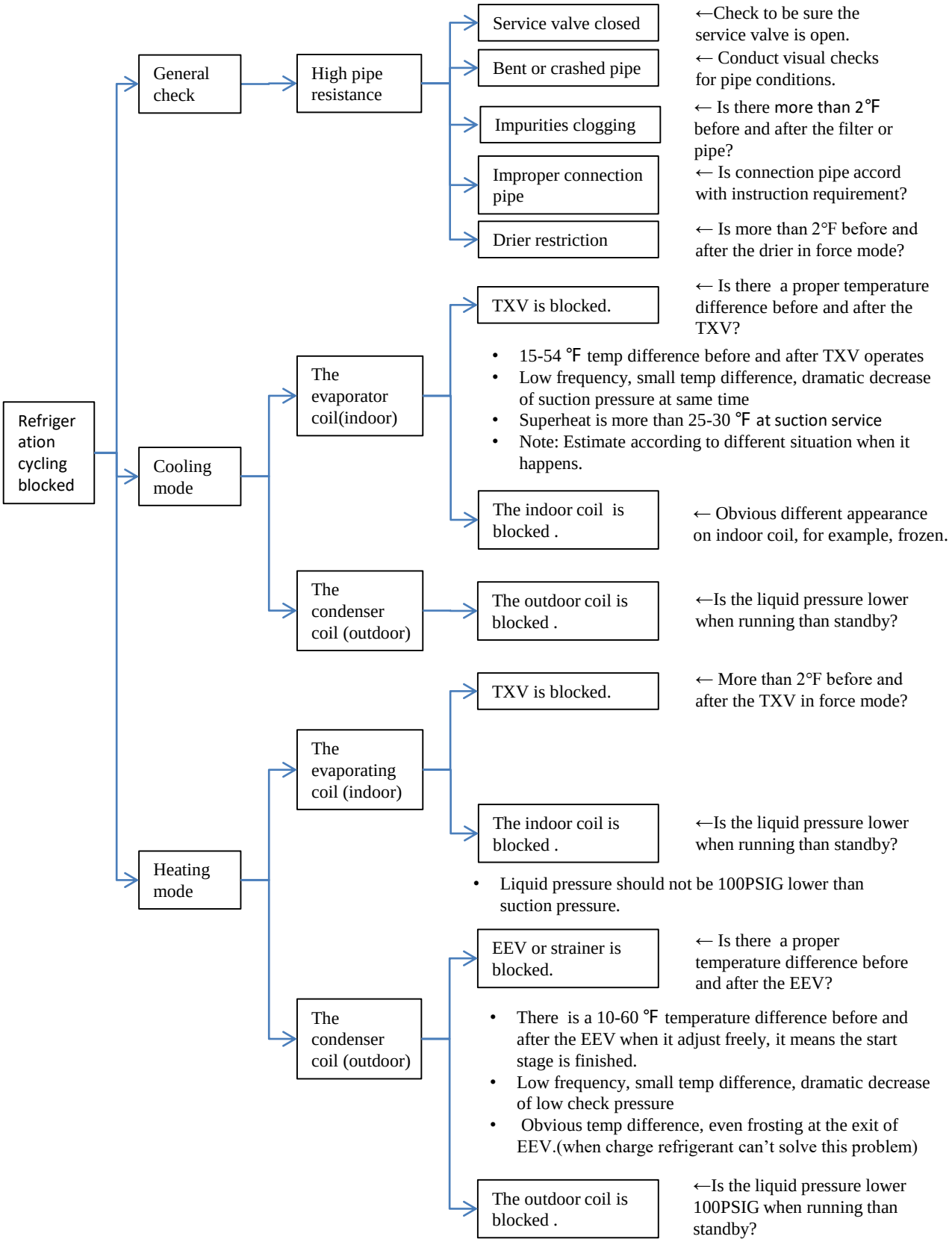


**CHECK 3** 6.3 Check for Causes of Dropping Low Pressure in heating

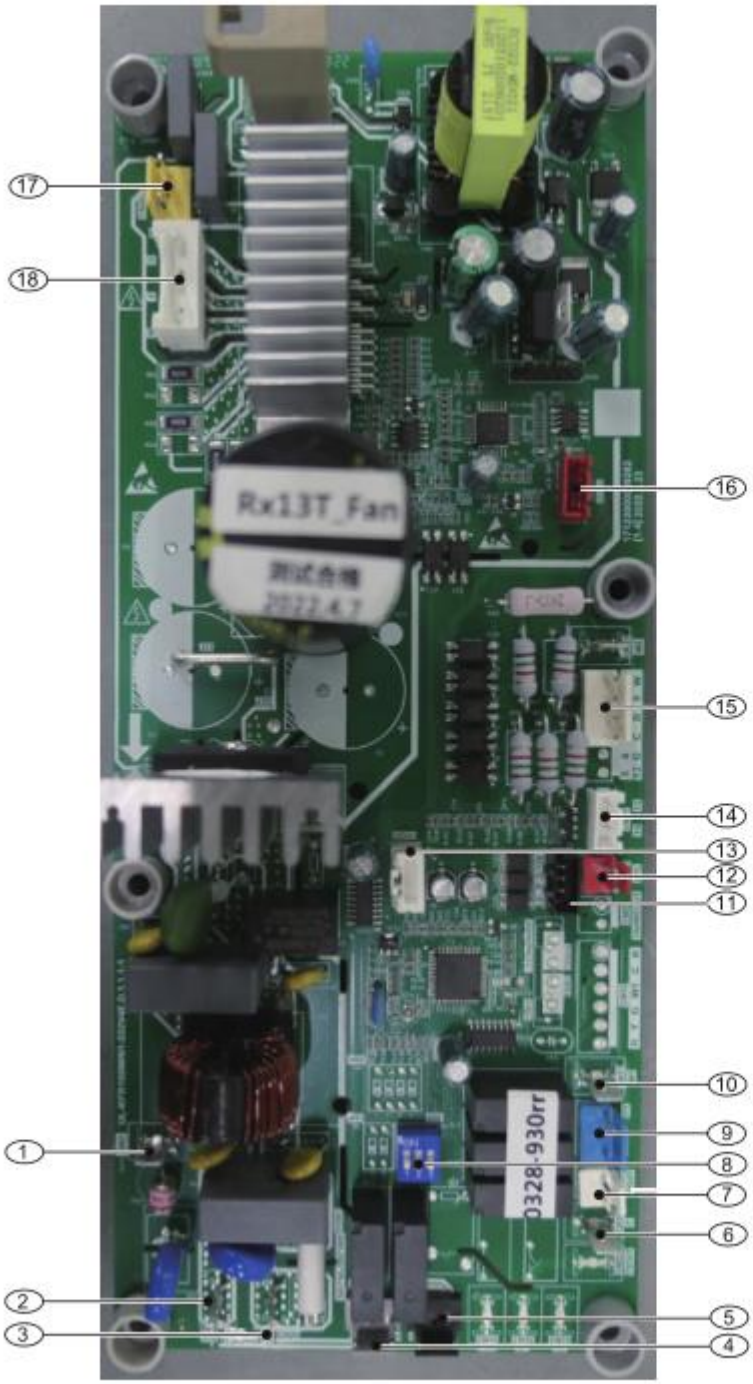


**CHECK 4** 6.4 Check for Causes of Refrigeration cycling blocked

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）

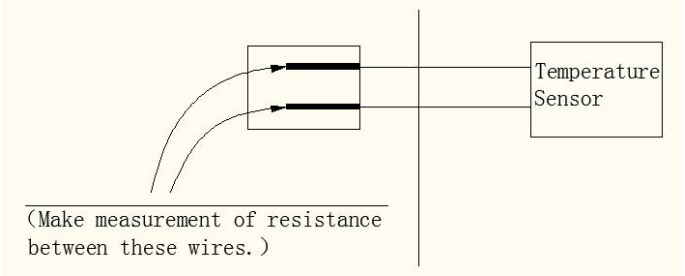
**Check temp transducer（T3/T4）：**
Compare the temperature checked (T3-3#/T4-4#/T5-5#, refer to 4.1.5), it's normal if the temperature difference was within 15℉ when standby.(need to avoid the waste heat affect T5/Tf when standby mode)

**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

点检参数与左表是否一致?
No → Replace the control board

Note：low probability, caution in handling

Refer to 【Appendix 7】

Yes → Work normal

**CHECK 7** 6.7 Check for High Pressure Switch（HPS）

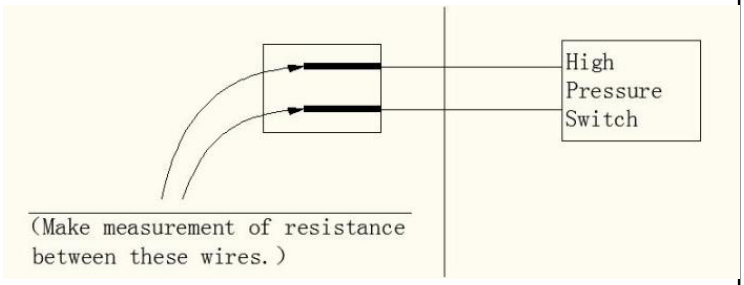
High Pressure Switch：
Whether the switch can start normally when start the machine

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）

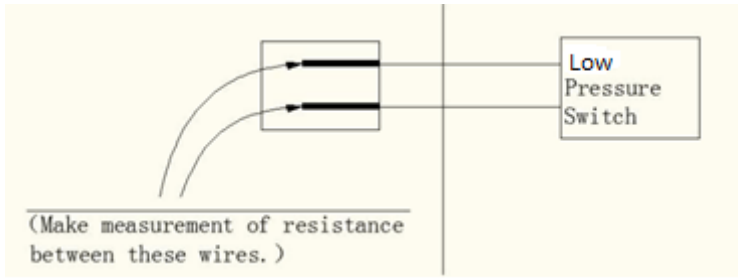
High Pressure Switch：
Whether the switch can start normally when start the machine

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）

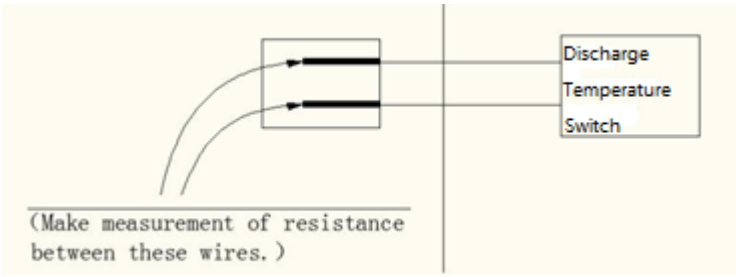
Discharge Temperature Switch：
Whether the switch can start normally when start the machine

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

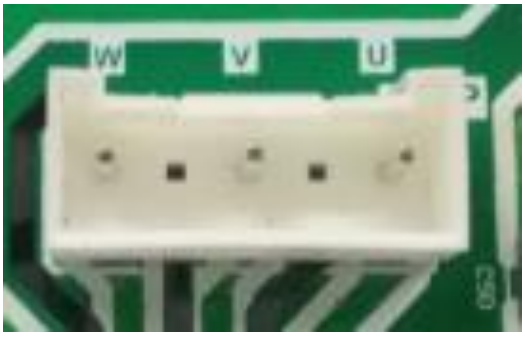
Note:
Normal discharge temperature switch opens above 239℉, resets below 167℉.

**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




| 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 |

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

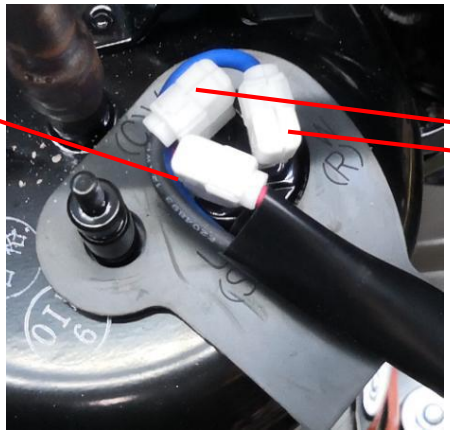
| Motor output（W） | B(A) |
|---|---|
| 100 | 1.6 |
| 200 | 2.2 |

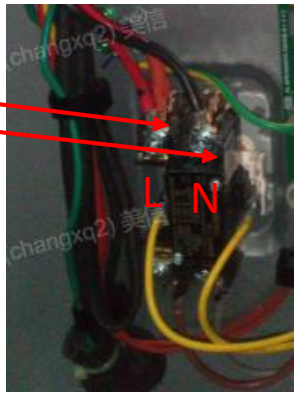
**CHECK 11** 6.11 Check for Compressor

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。

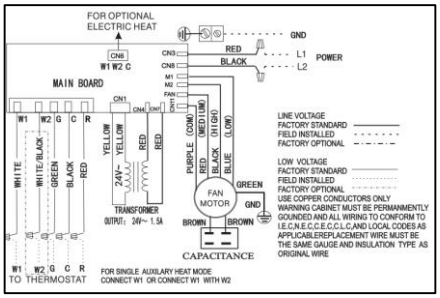
If It is normal
- Yes → Work normally
- No → If there is blockage of the indoor duct
  - Yes → Clean the blockage
  - No → Check if there is 230V power supply
    - No → Correct the power supply
    - Yes → Check if there is 18-28Vac between CN1
      - No → Replace the transformer
      - Yes → If there is 18-28Vac between R&C terminal
        - No → Replace the control board
        - Yes → 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.

Check if the airflow is very small or no airflow

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

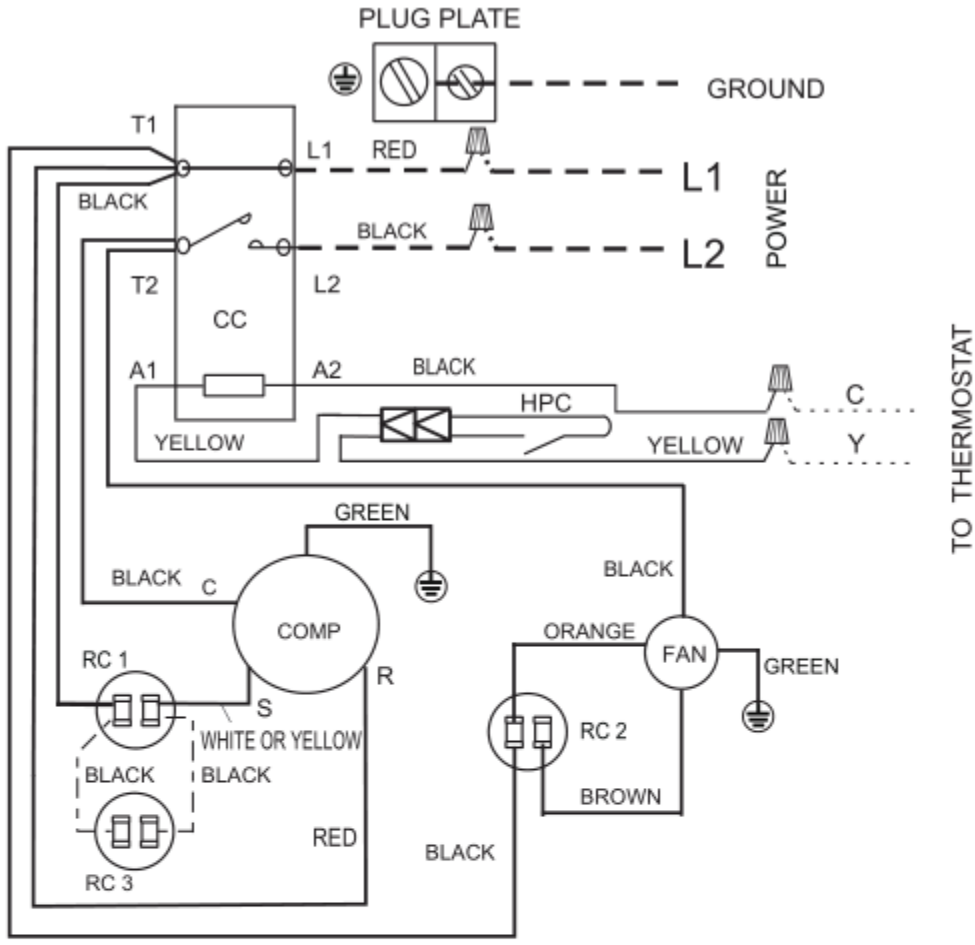
Red and Brown wire of signal

Green and Brown wire of signal



# PART 7 Appendix

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



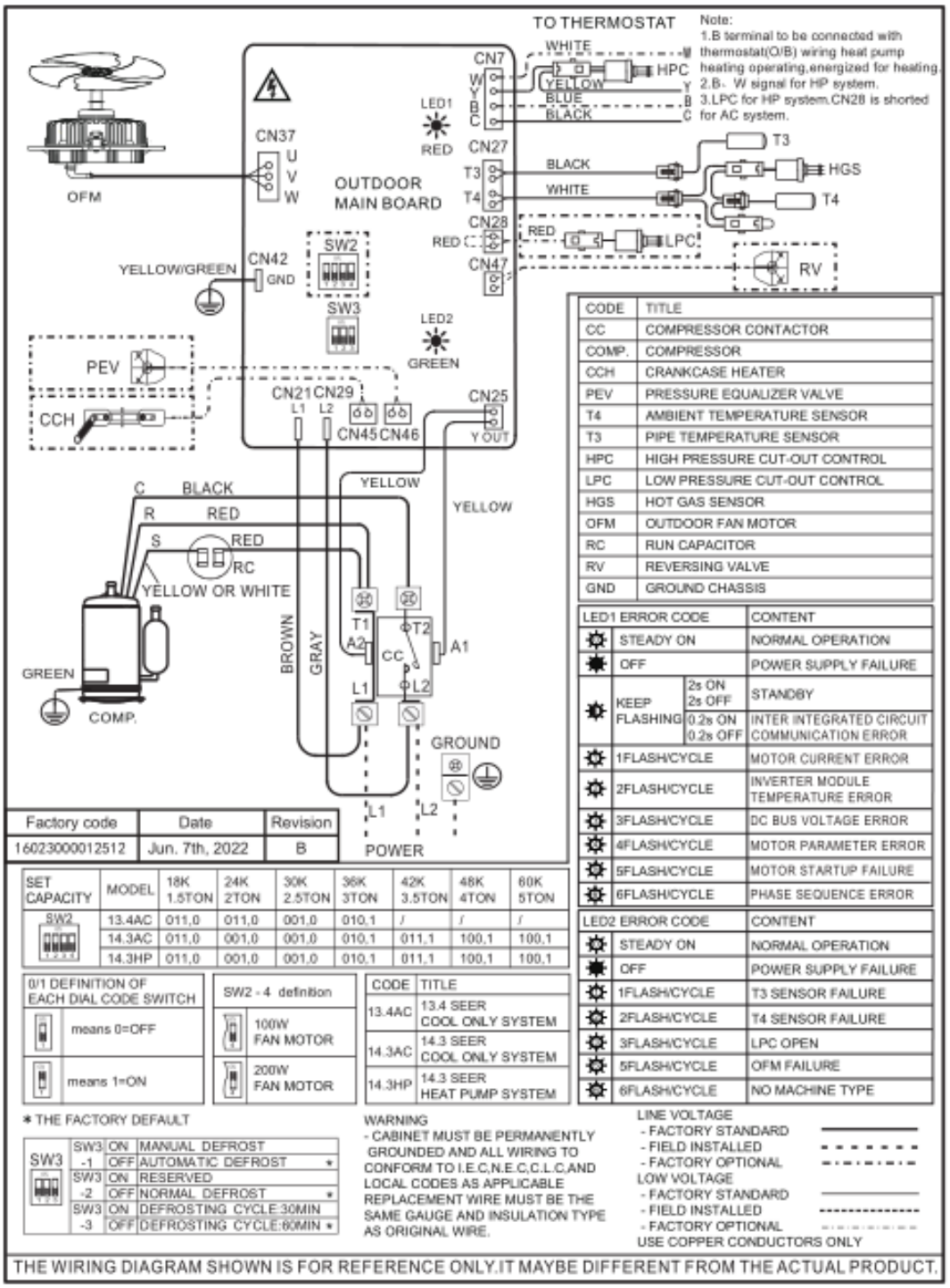

| LINE VOLTAGE | | LOW VOLTAGE | |
|---|---|---|---|
| FACTORY STANDARD | ——— | FACTORY STANDARD | ——— |
| FIELD INSTALLED | - - - - - - - | FIELD INSTALLED | - - - - - - - |
| FACTORY OPTIONAL | – — – — | FACTORY OPTIONAL | – — – — |

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




| 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 |

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

| 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 | * |
| SW3 -2 | ON | RESERVED | |
| | OFF | NORMAL DEFROST | * |
| SW3 -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

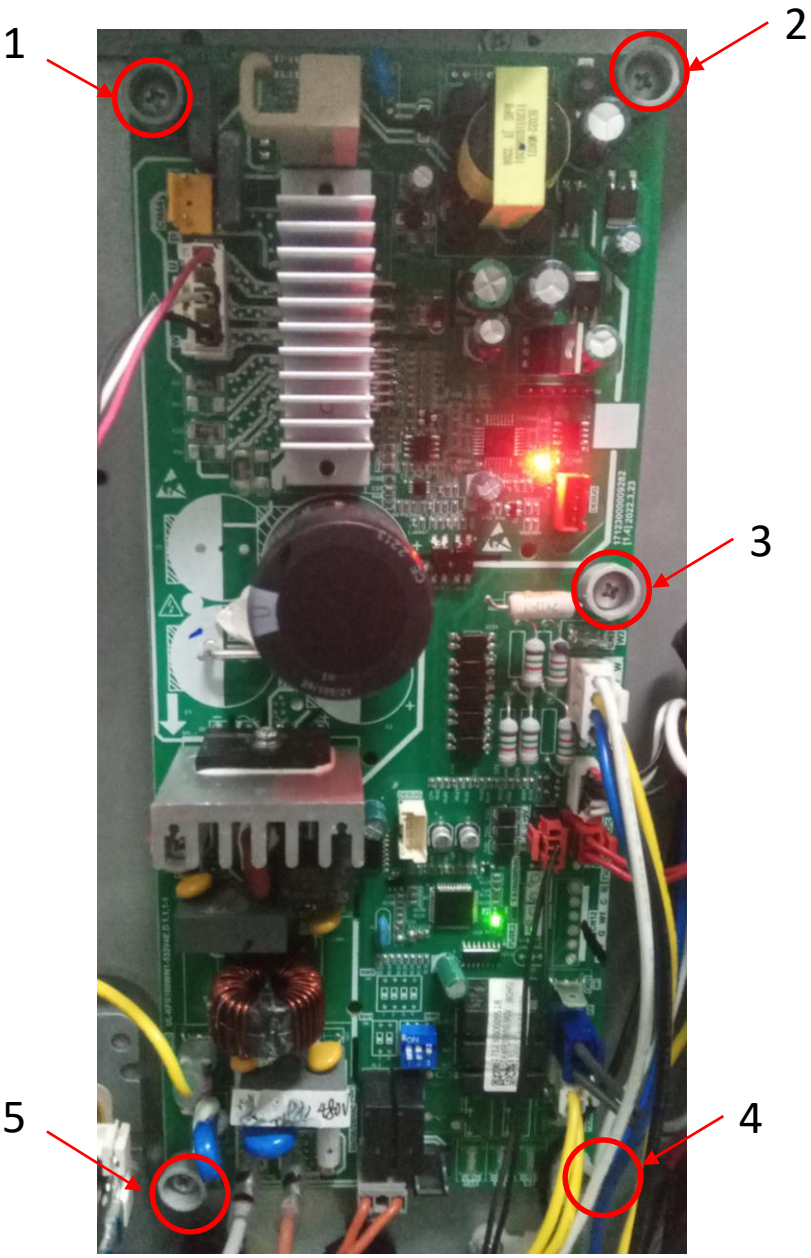
LOW VOLTAGE
- FACTORY STANDARD
- FIELD INSTALLED
- FACTORY OPTIONAL

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 ON 1 2 3 4 | 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. | COMPRESSR 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 | EXCESSIVE REF. OVERCHARGE | NONCONDENSABLES | EVAP. LOAD | O.D. AIR RECIRCULATION | RES. O.D. AIRFLOW | TXV STUCK OPEN | SUPERHEAT | RES. I.D. AIRFLOW | REF. CIR. RESTRICTIONS | SOV LEAKING | SOV COIL DEFECTIVE | CHECK VALVE LEAKING | LPC SENSOR DEF. | DEFROST CONTROL DEF. | T4 TEMP. SENSOR DEF. | T5 TEMP. SENSOR DEF. | HPC/HPS 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 | | | | | | | | | | | | | | | | | | | | | |
| | H | P | P | | | | | | S | P | S | | P | | | | | | | | | | | | | | | | | | S | 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 | 3.38 |
| 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 | 2.35 |
| 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 | 1.95 |
| 27 | 40.15 | 68 | 12.64 | 109 | 4.61 | 150 | 1.91 |
| 28 | 38.97 | 69 | 12.31 | 110 | 4.51 | 151 | 1.88 |
| 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 |