Service Manual

PART 1 Product instructions

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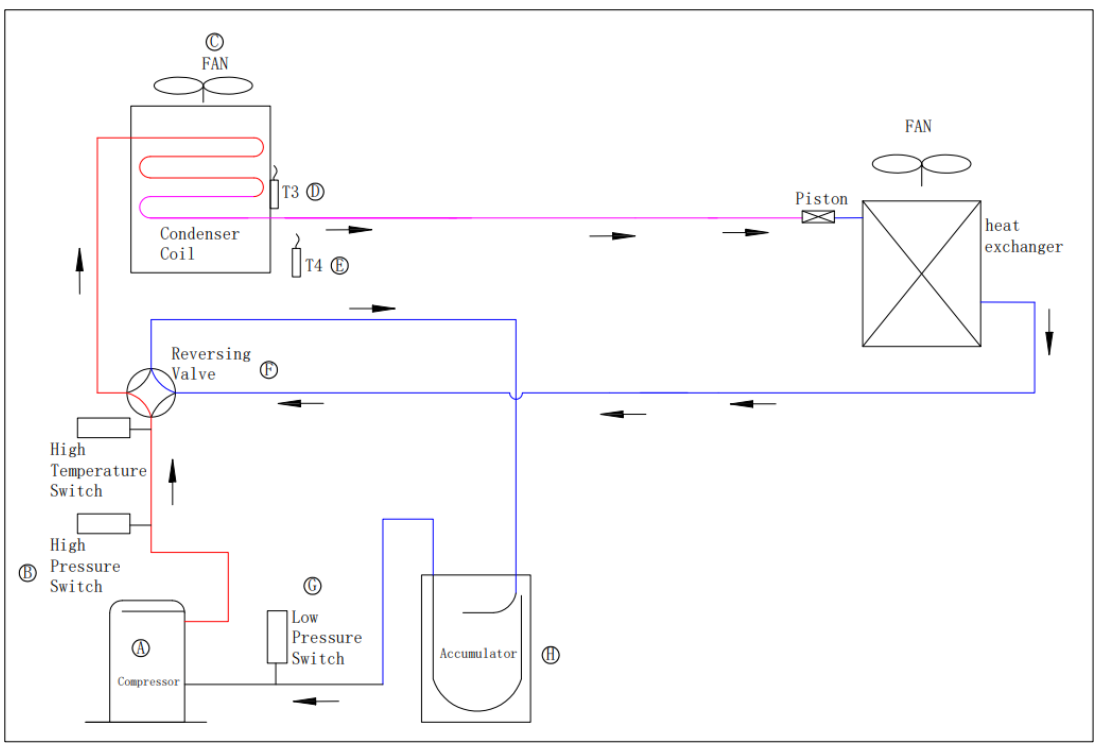
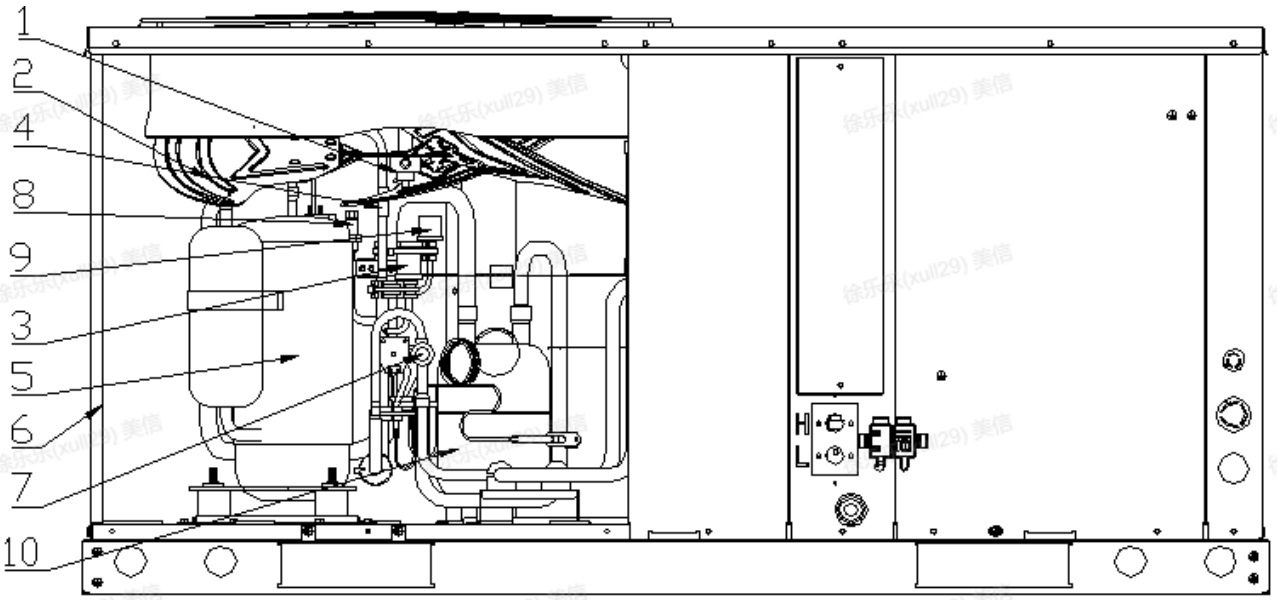
2.1 Refrigerant Circuit

No. in diagram	Symbol	Part Name	Major function
A	Comp.	Compressor	Compresses and drives the refrigerant.
B	HPS	High pressure switch	Used to high pressure protection when up to 609 PSIG and recovery when below to 464 PSIG.
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	LPS	Low pressure switch	Used to low pressure protection when below to 20 PSIG and recovery when up to 44 PSIG.
H	Accumulator	Accumulator	Store the liquid component of the refrigerant and reduce the load of the condenser.

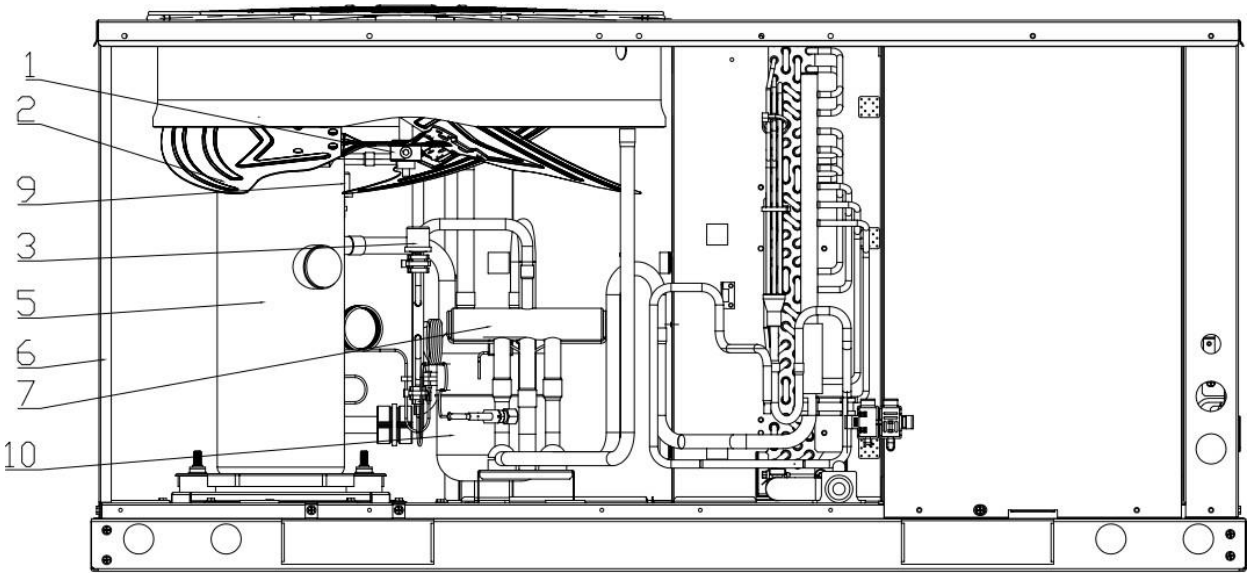


2.2 Functional Part

13.4H 71/90

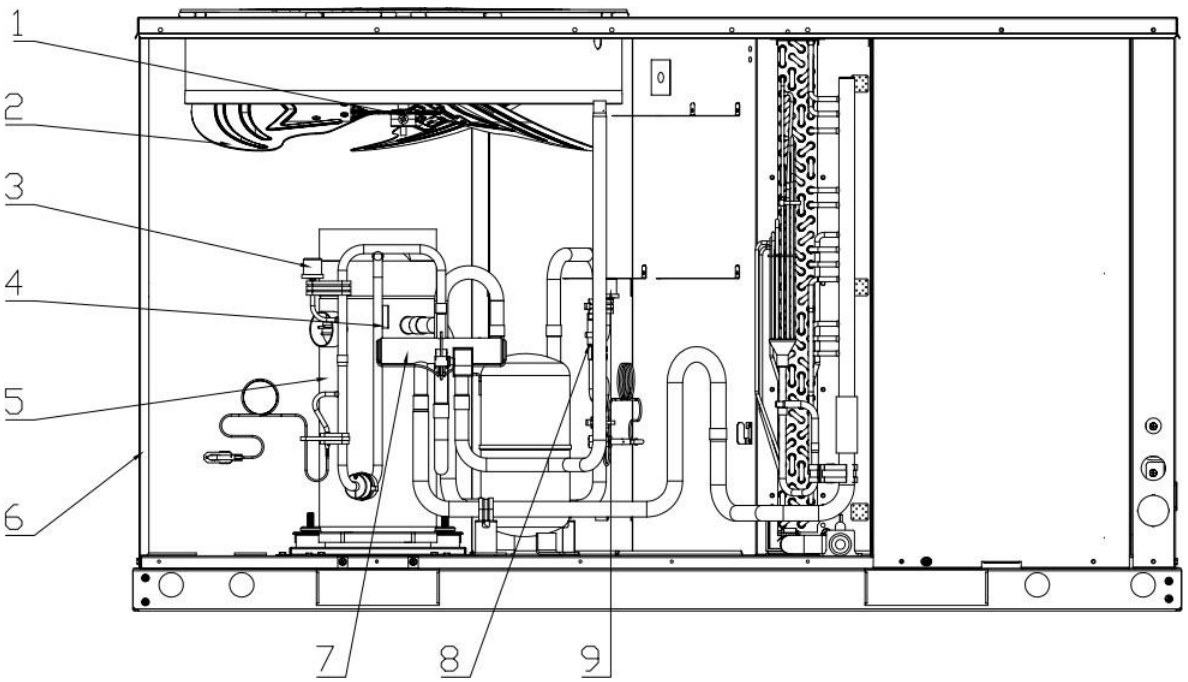


13.4 H 105

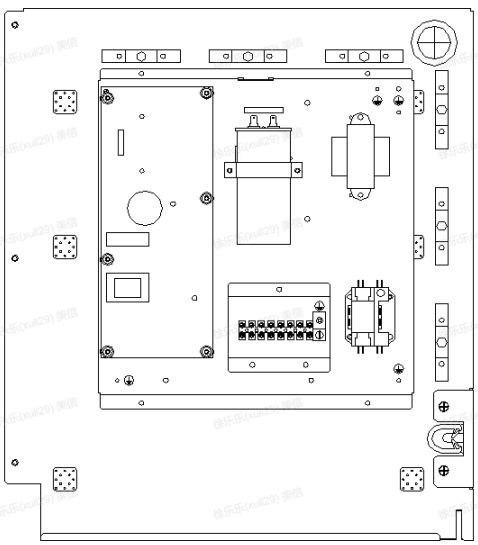


2.2 Functional Part

13.4 H 120/140/160



13.4 H Electric control box for 71/90/105/120/140/160



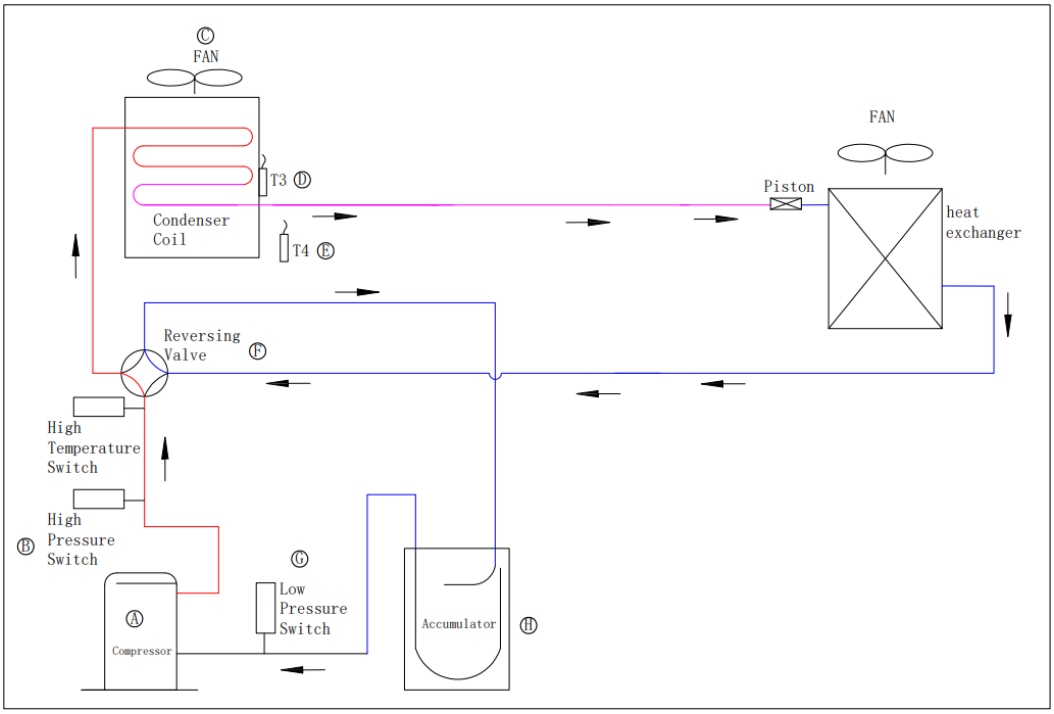
2.2 Functional Part

No.indiagram	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	COIL	Condenser coil
7	RV	The Reversing Value
8	FPA	Fusible plug assembly
9	PS	Pressuer switch
10	Accumulator	Accumulator

2.3 Refrigerant Flow Chart

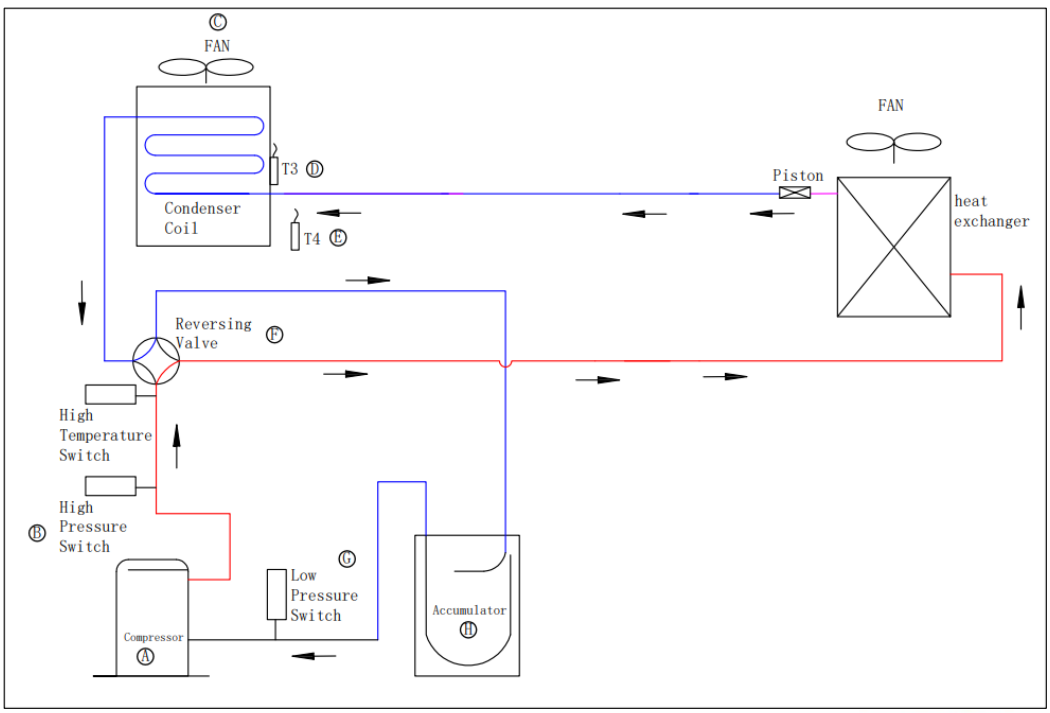
Cooling Operation/Cooling Oil Return Operation/Defrost Operation

- High pressure gas
- High pressure liquid
- Low pressure



Heating Operation/Heating Oil Return Operation

- High pressure gas
- High pressure liquid
- Low pressure



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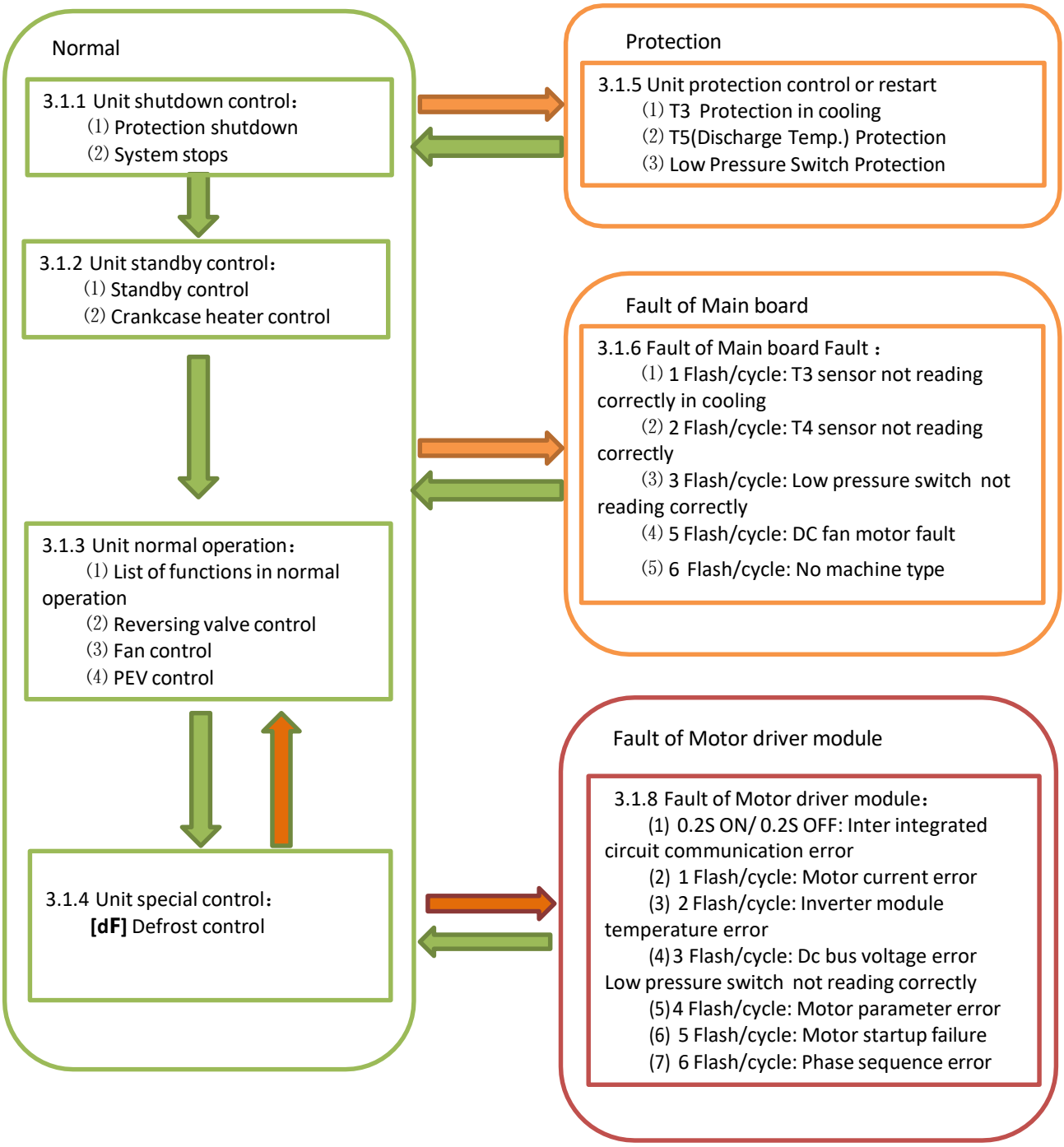
3.1 Function General



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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).

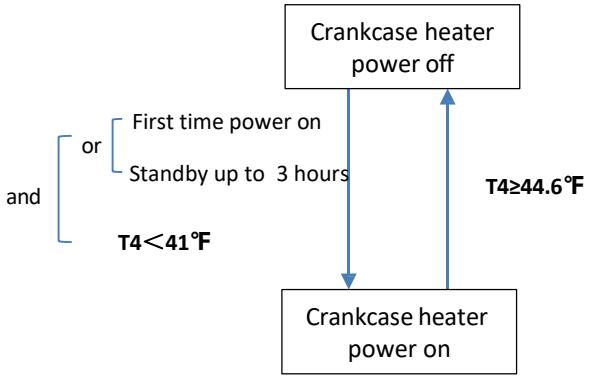
3.1.2 Unit standby control

(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 T3**

(2) Reversing valve control

The heat pump need “B” signal of 24V wires.

● Cooling:

The reversing valve is off during cooling.

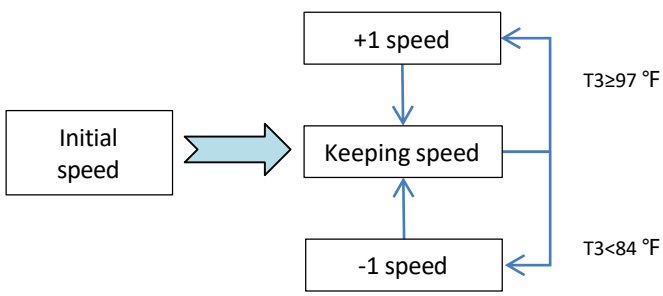
● Heating:

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.

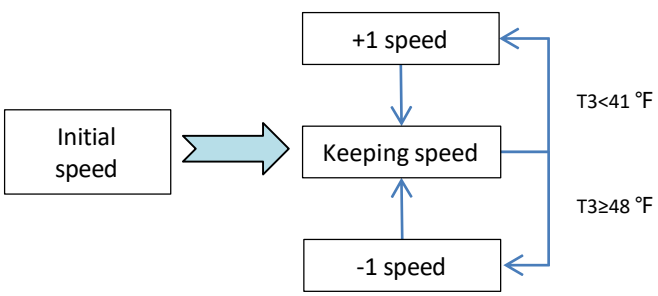
(3) Fan control

[Cooling]



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

[Heating]

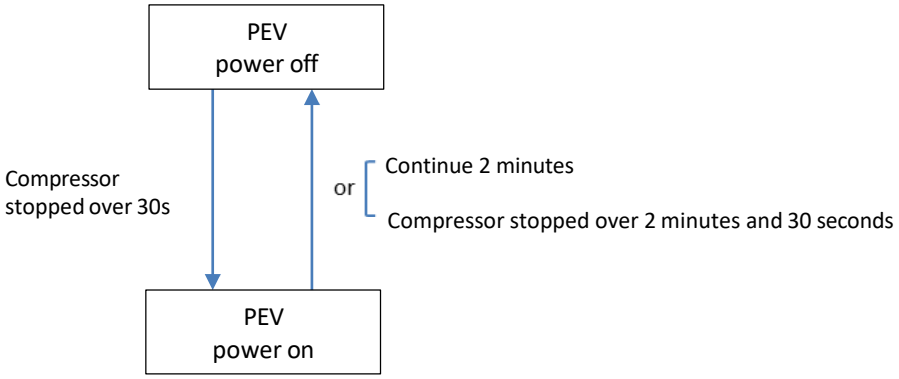


Note: ±1 speed/25 seconds,10 speeds ECM motor.

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

[dF] Defrost control

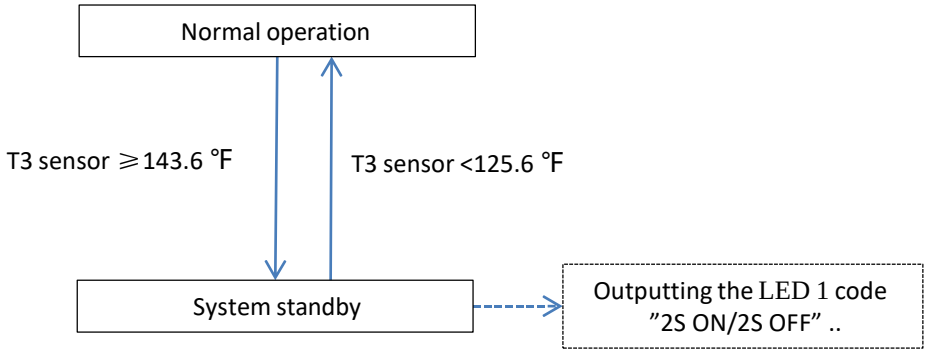
● The Demand Defrost Control (DDC) monitors the coil temperature using thermistor (T3). A second thermistor (T4) monitors outdoor ambient temperature. Based on these parameters, as well as accumulative running time and Standby time, the DDC calculates proper initiation of defrost.

● Any of three conditions is required to enter defrost:

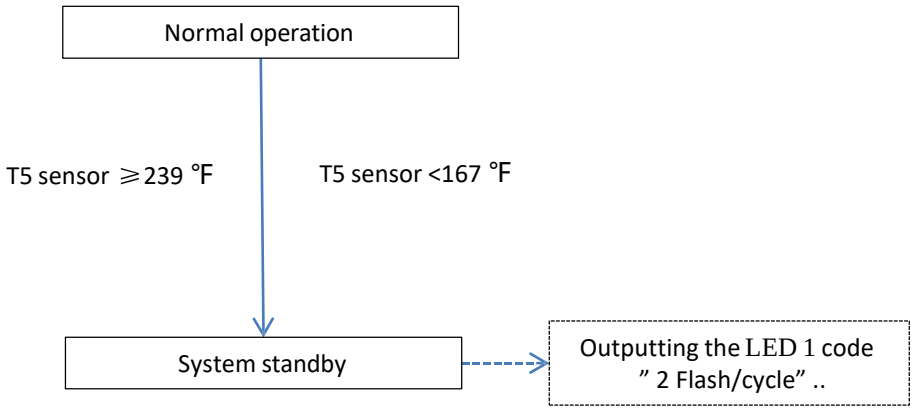
—— T3<32 ℉ and lasted for 60 minutes
—— T4<37℉ and lasted for 65 minutes
—— ”Standby time” is 2 hours, T3<28℉ when starting and lasted for 15 minutes

3.1.5 Unit protection control or restart：

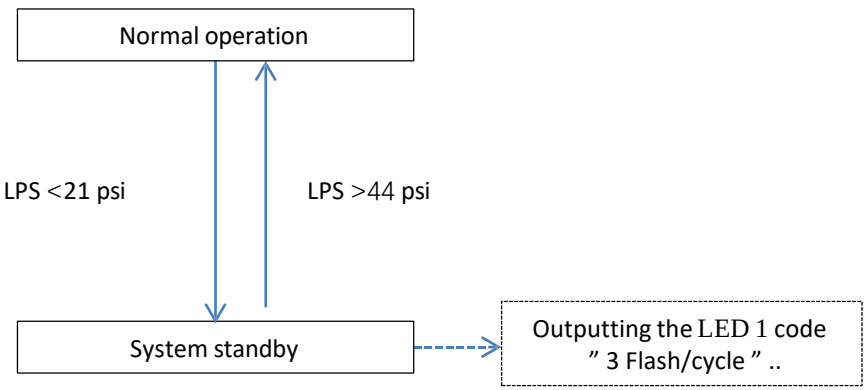
(1) **T3 Protection in cooling**



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



(3) **Low Pressure Switch Protection**

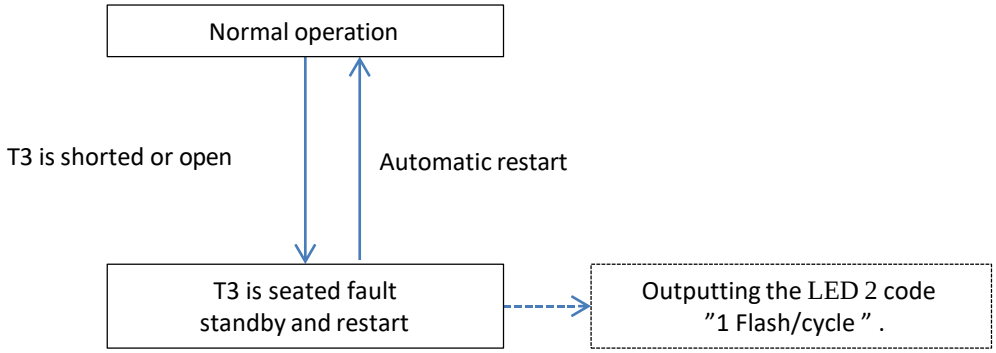


3.1.6 Fault of Main board：

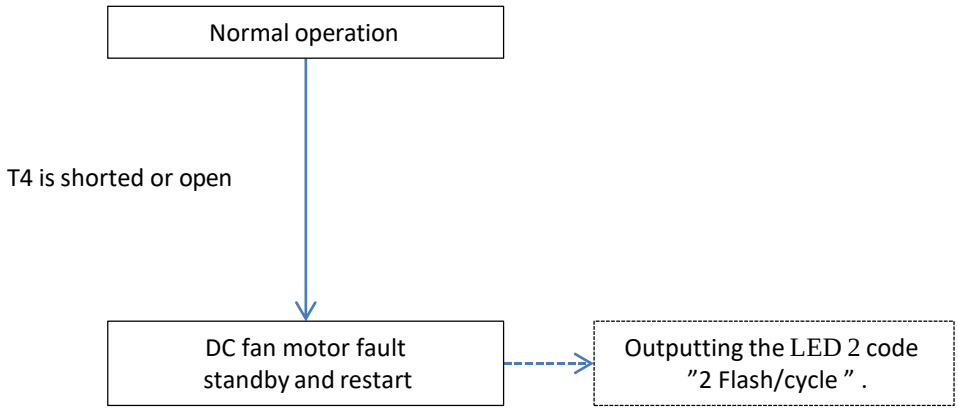
No.	Operation LED	Protection code	Protection control description	Supposed cause
1	LED2	1 Flash/cycle	T3 sensor not reading correctly in cooling	T3 sensor is not properly placed/High pressure switch fault
2	LED2	2 Flash/cycle	T4 sensor not reading correctly	T4 sensor is not properly placed/High pressure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

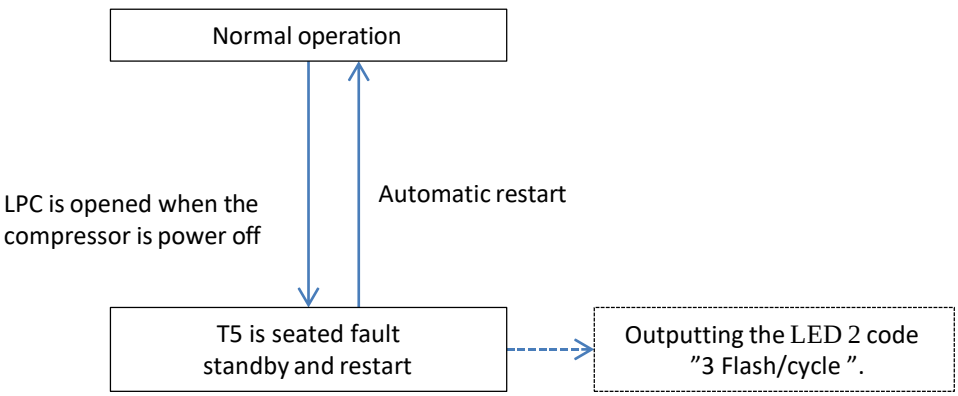
(1) **T3 sensor not reading correctly in cooling**



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

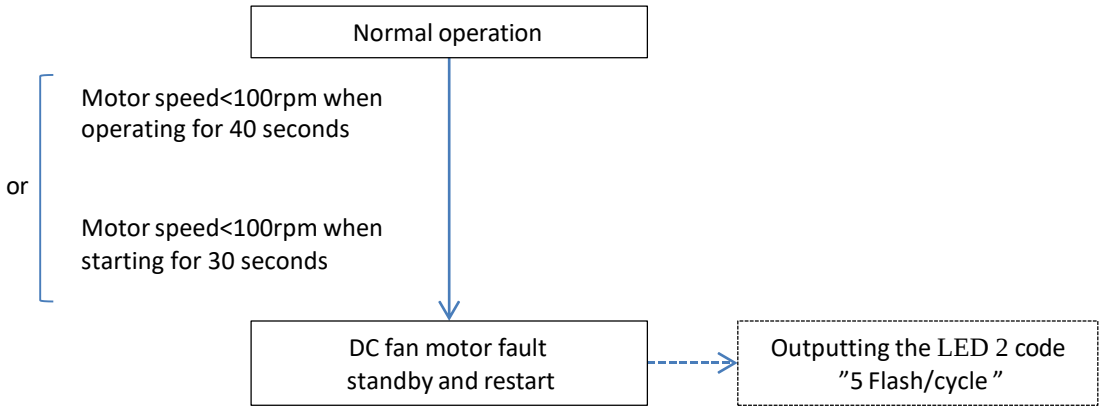


(3) **LPC open**



3.1.7 Unit protection control or restart：

⑷ OFAN 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	Do the supply power wirings connected Normally? Including the earth wiring.	Dangerous if electric leakage occurs
8	Does the earth leakage circuit breaker connected normally?	Dangerous if electric leakage occurs
9	Do the wirings of 24V signal connected according to wiring diagram? Including the thermostat wiring and setting.	abnormal operation
10	Is the supply voltage conform to the specifications on the name plate?	abnormal operation Damage unit
11	Are the cable sizes as specified and according to local regulations?	Damage of cables

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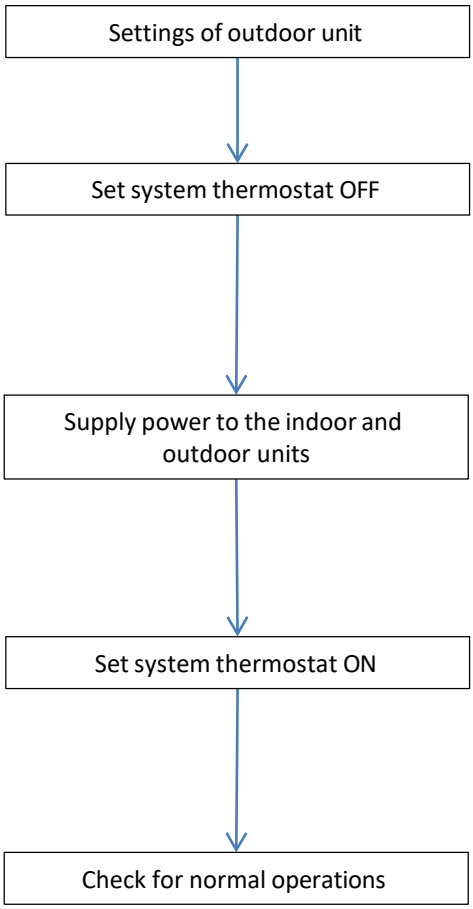
4.1 Test operation

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”)

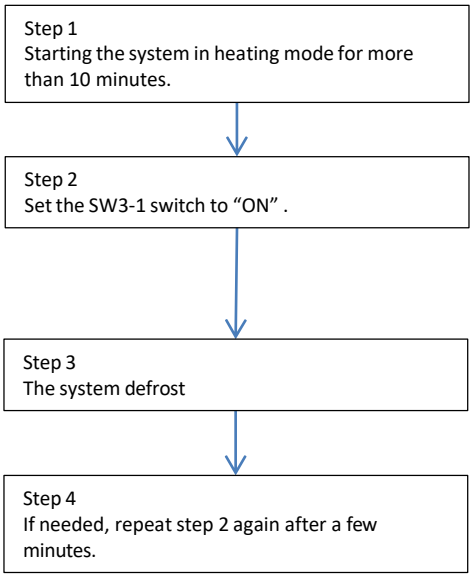
Note:
In a normal condition, the LED1 flesh slowly (2S ON/2S OFF) and LED2 steady on.

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

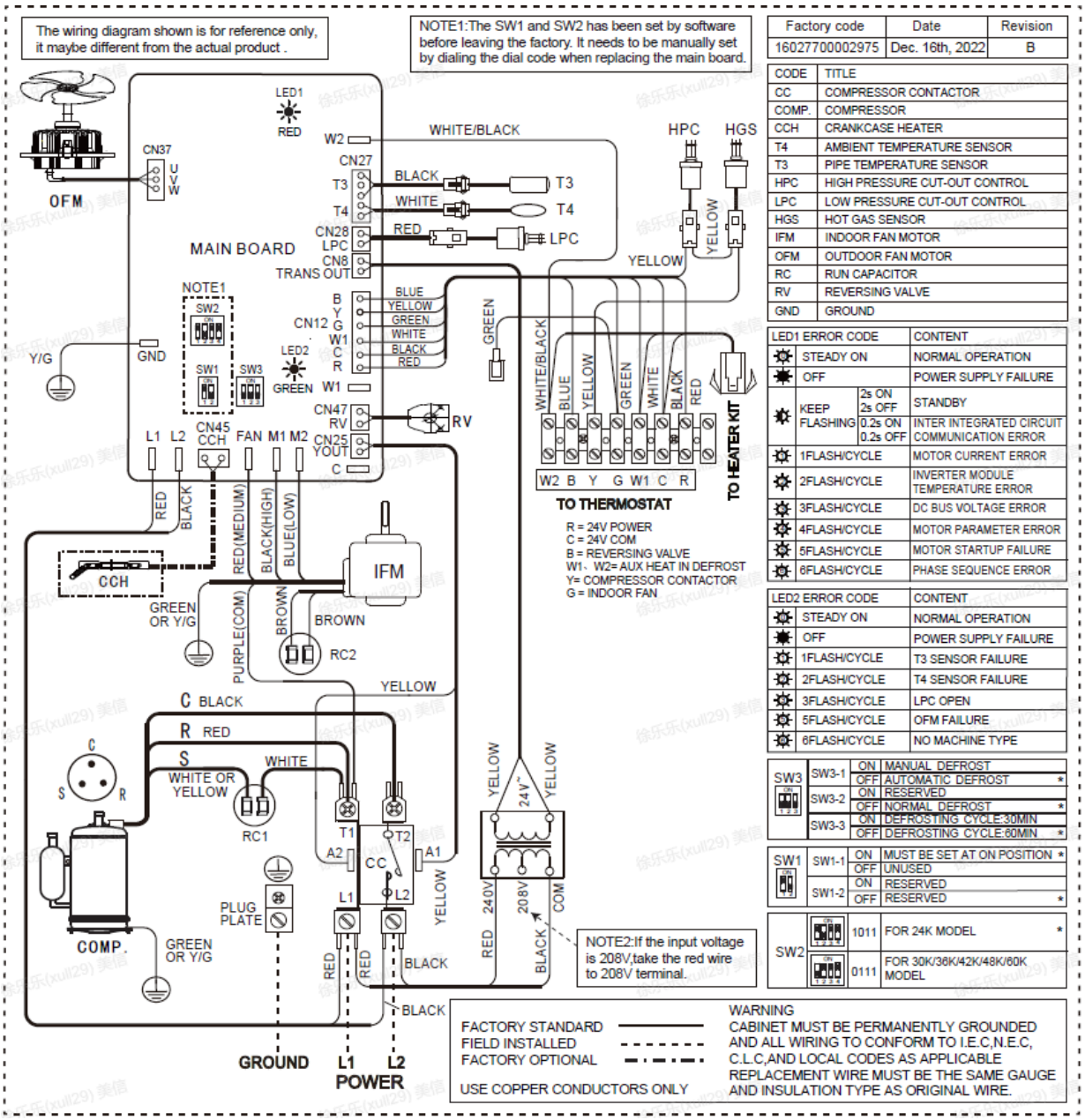
4.1 Test operation

4.1.3 Manual defrost



Note:
Defrost will exit automatically.

4.2 Setting by DIP switches



Factory code	Date	Revision
16027700002975	Dec. 16th, 2022	B

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

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

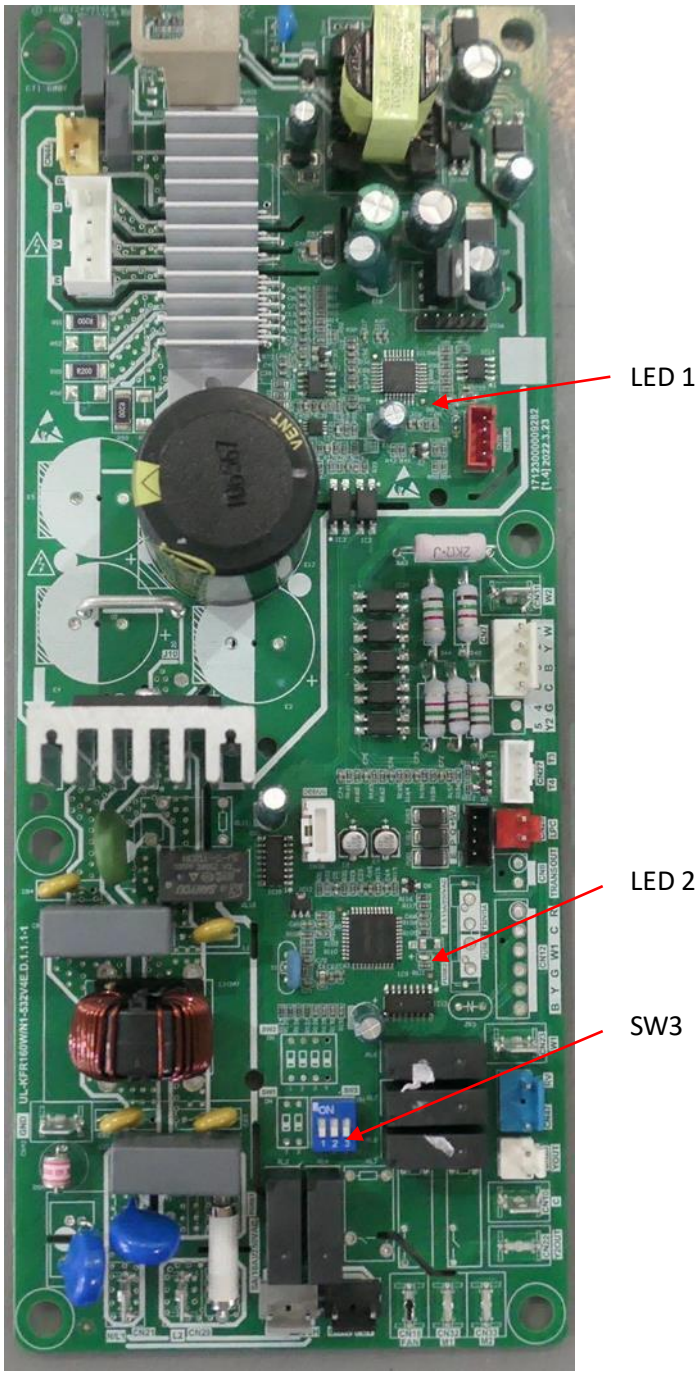
SW3	SW3-1	ON	MANUAL DEFROST
		OFF	AUTOMATIC DEFROST *
	SW3-2	ON	RESERVED
		OFF	NORMAL DEFROST *
	SW3-3	ON	DEFROSTING CYCLE:30MIN
		OFF	DEFROSTING CYCLE:60MIN *
SW1	SW1-1	ON	MUST BE SET AT ON POSITION *
		OFF	UNUSED
	SW1-2	ON	RESERVED
		OFF	RESERVED *
SW2		1011	FOR 24K MODEL *
		0111	FOR 30K/36K/42K/48K/60K MODEL

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 *

SW1	SW1-1	ON	MUST BE SET AT ON POSITION *
		OFF	UNUSED
	SW1-2	ON	RESERVED
		OFF	RESERVED *

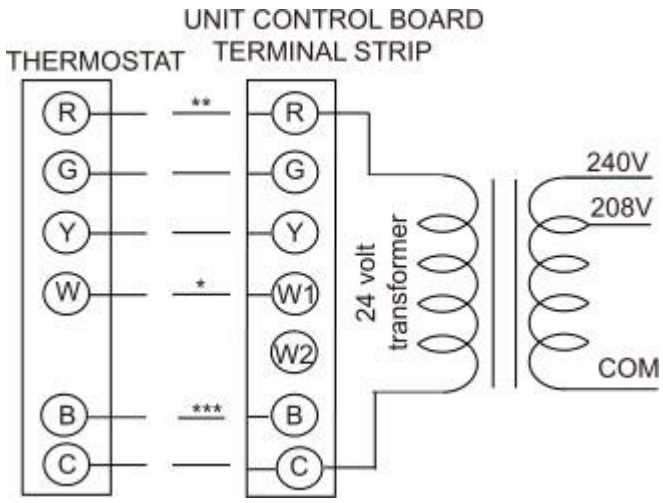
SW2		1011	FOR 24K MODEL *
		0111	FOR 30K/36K/42K/48K/60K MODEL

4.3 LED position indication



4.4 Thermostat

Thermostat should be mounted on an inside wall about 58” from floor and will not be affected by unconditioned air, sun and/or heat exposure. Follow the instruction carefully because there are many wiring requirements.



*** B wire be used with heat pump system only, reversing valve energizes at the heating mode, and cut off at the cooling mode.

** Minimum wire size of 18 AWG wire should be used for all field installed 24 volt wire.

* Only required on units with supplemental electric heat.

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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】

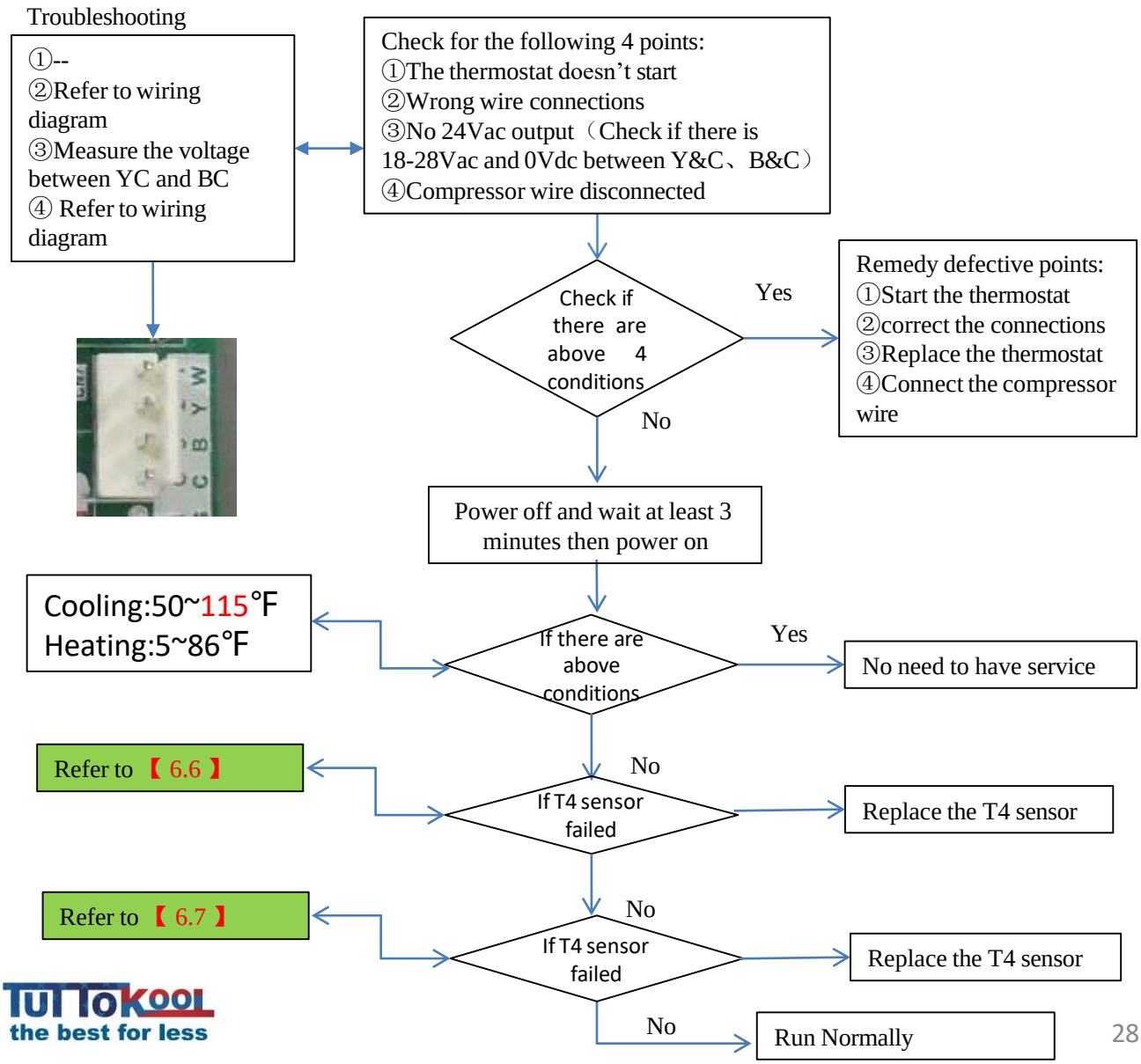
Replace compressor or motor

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:	

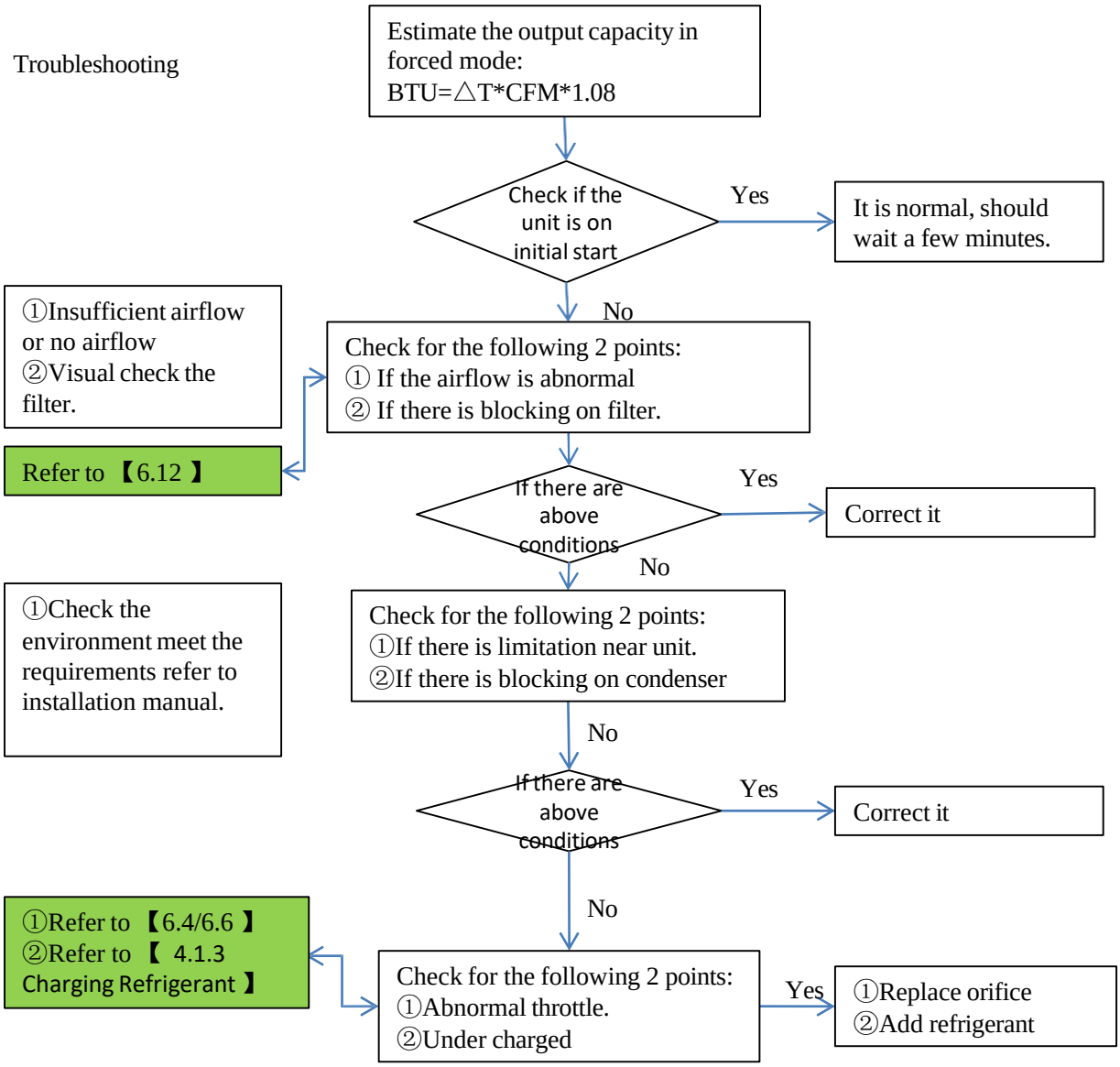


5.2 Symptom-based Troubleshooting

5.2.3 Capacity is low

Issue	Capacity is low
Model	All
Name	/
Classify	System fault
Possible cause	• Poor heat dissipation of the evaporator • Poor heat dissipation of the condenser • Under charged • First start

Troubleshooting

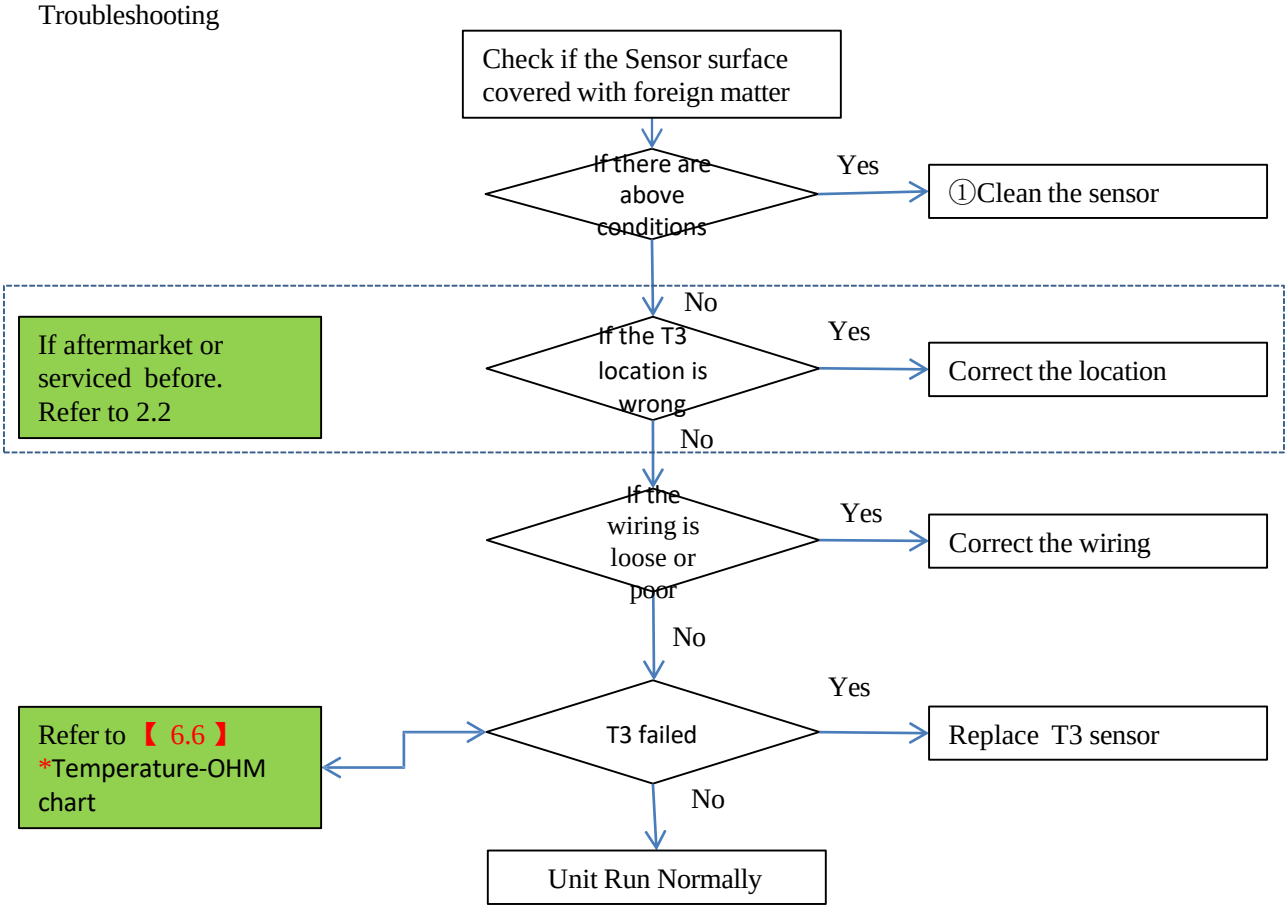


5.3 Troubleshooting by Main board Fault code

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 • The wiring terminal is loose or poor • The Sensor surface covered with foreign matter

Troubleshooting

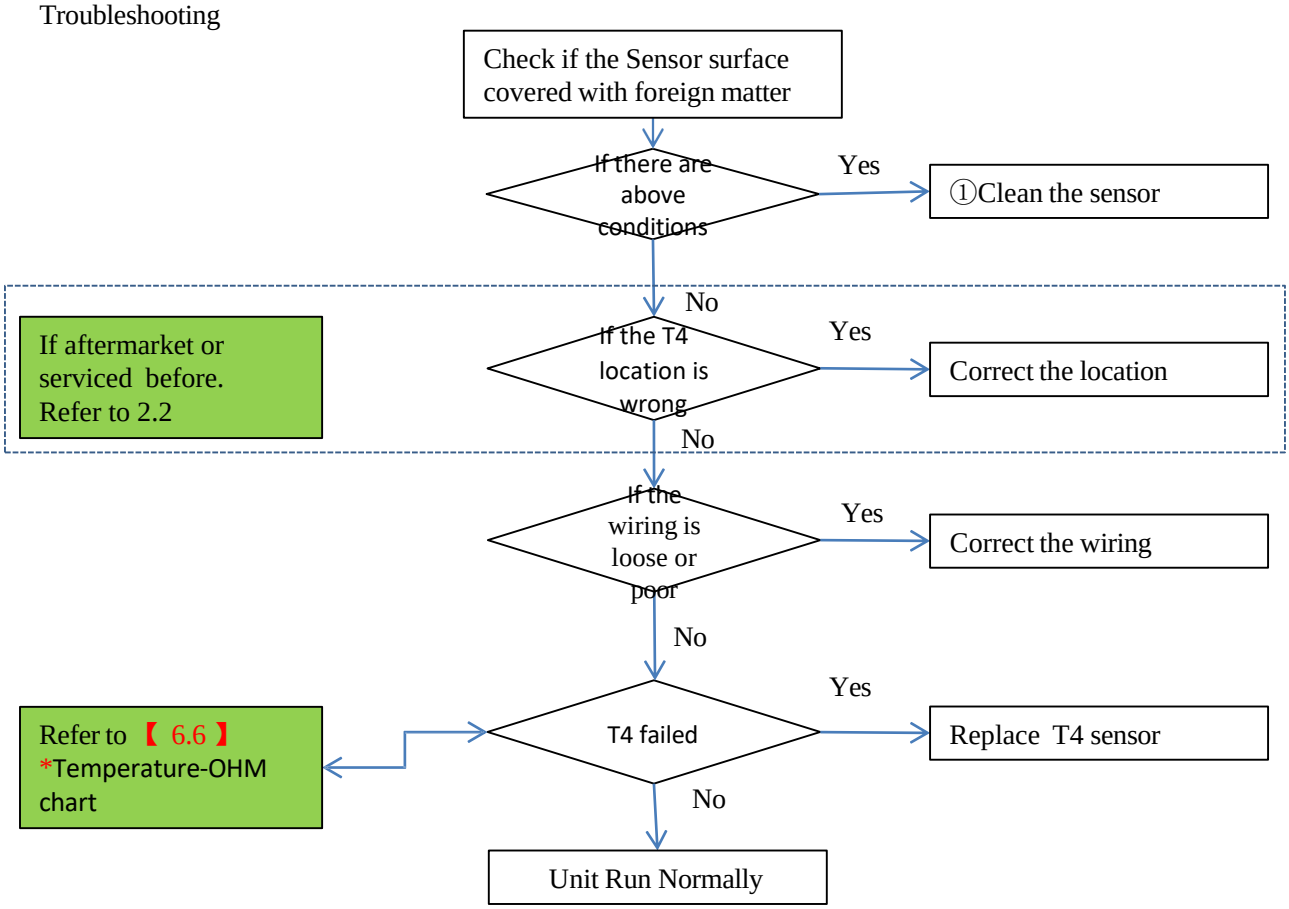


5.3 Troubleshooting by Main board Fault code

5.3.2 LED2-2 Flash/cycle

Faulty code	LED2-2 Flash/cycle
Model	All
Name	T4 sensor not reading correctly in cooling
Classify	System fault
Possible cause	• **Wrong location of T4 sensor** • Faulty T4 sensor • The wiring terminal is loose or poor • The Sensor surface covered with foreign matter

Troubleshooting

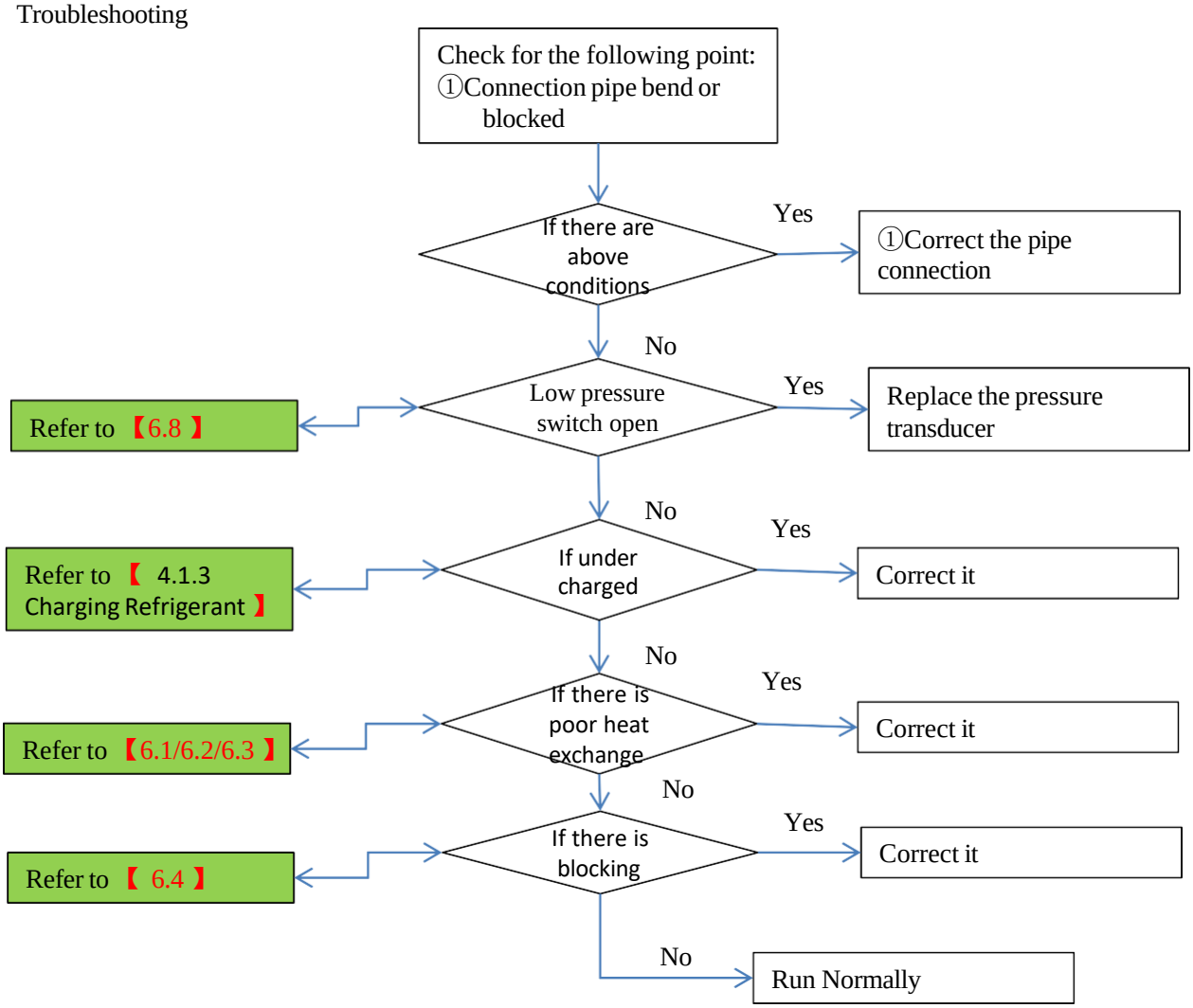


5.3 Troubleshooting by Main board Fault code

5.3.3 LED2-3 Flash/cycle

Faulty code	LED2-3 Flash/cycle
Mode	All
Name	Low pressure protection
Classify	System fault
Possible cause	• Indoor fan stopped abnormally / poor heat exchange • **orifice/filter drier/indoor coil blocked** • Under charged

Troubleshooting

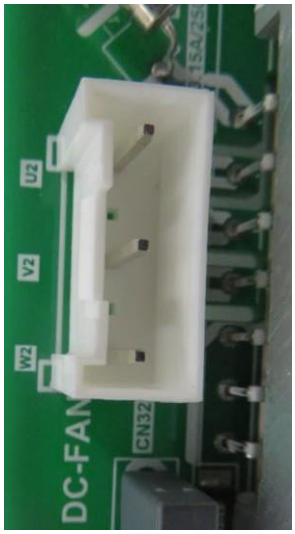


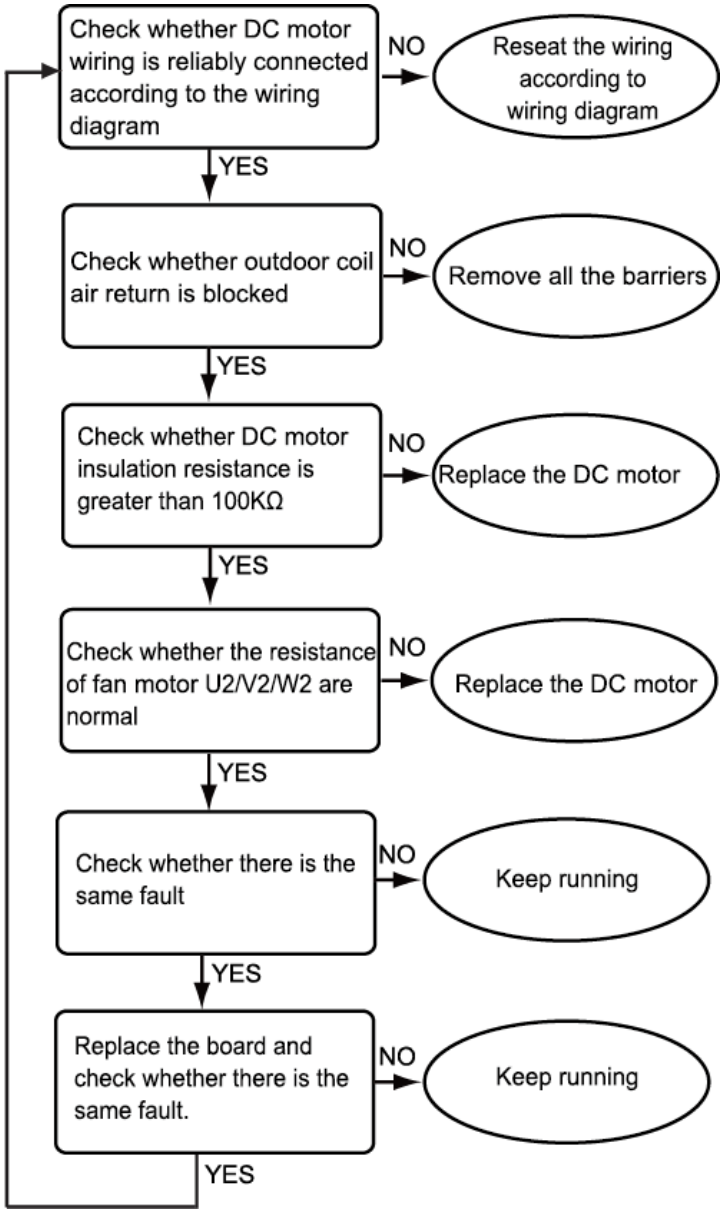
5.3 Troubleshooting by Main board Fault code

5.3.4 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】

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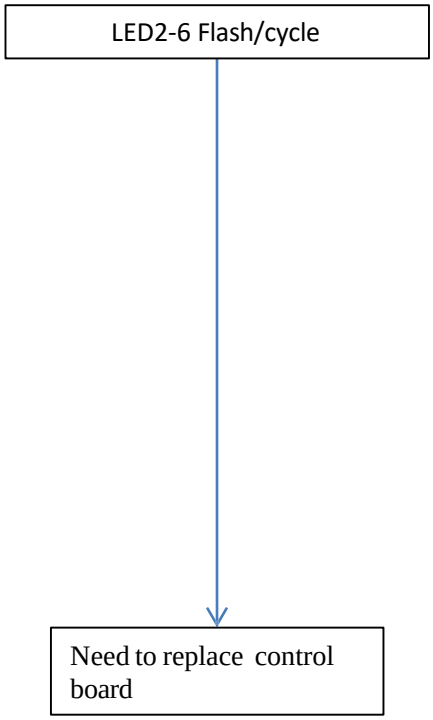
5.3 Troubleshooting by Main board Fault code

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

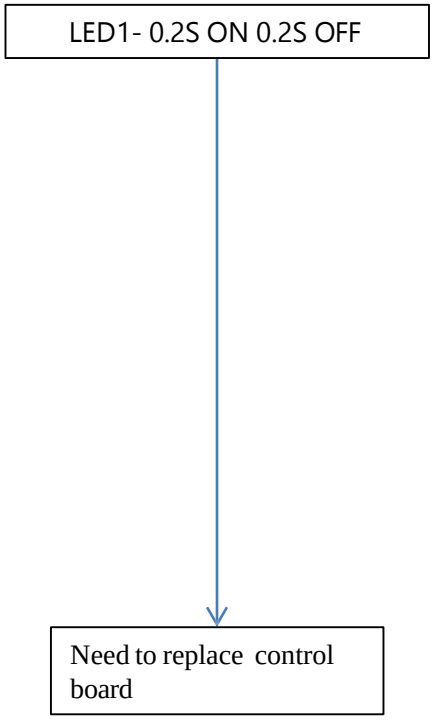


5.4 Troubleshooting by Motor driver module code

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

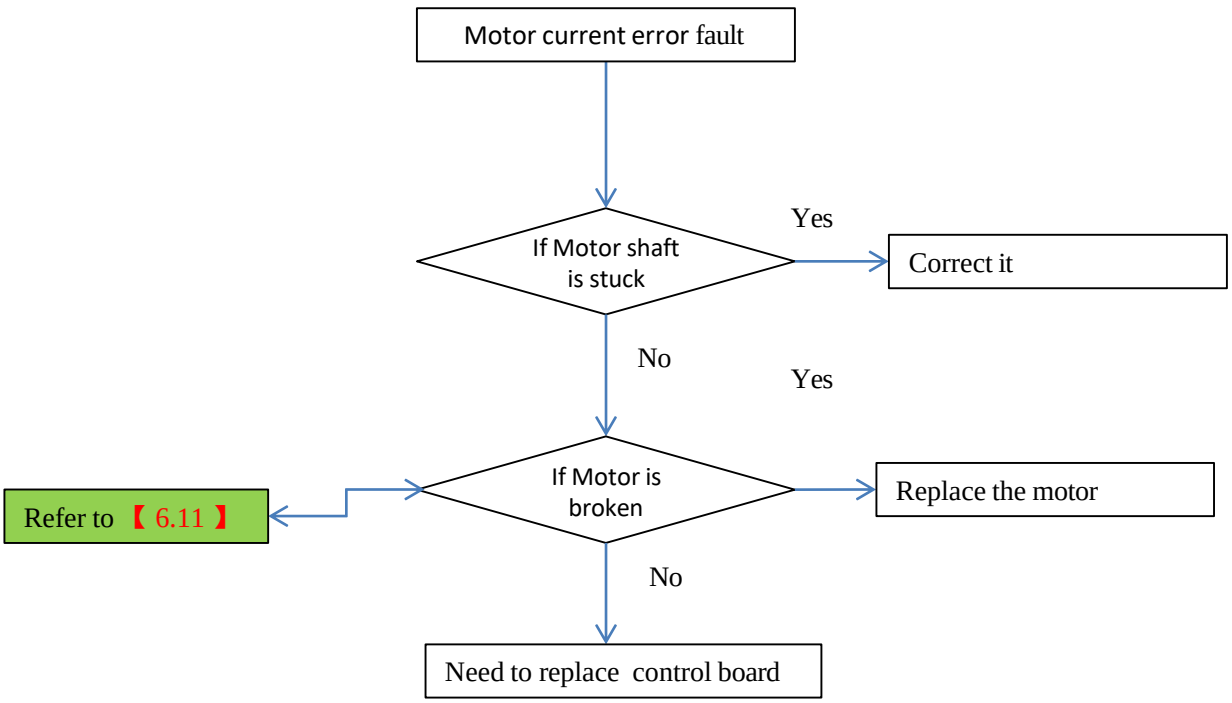


5.4 Troubleshooting by Motor driver module code

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

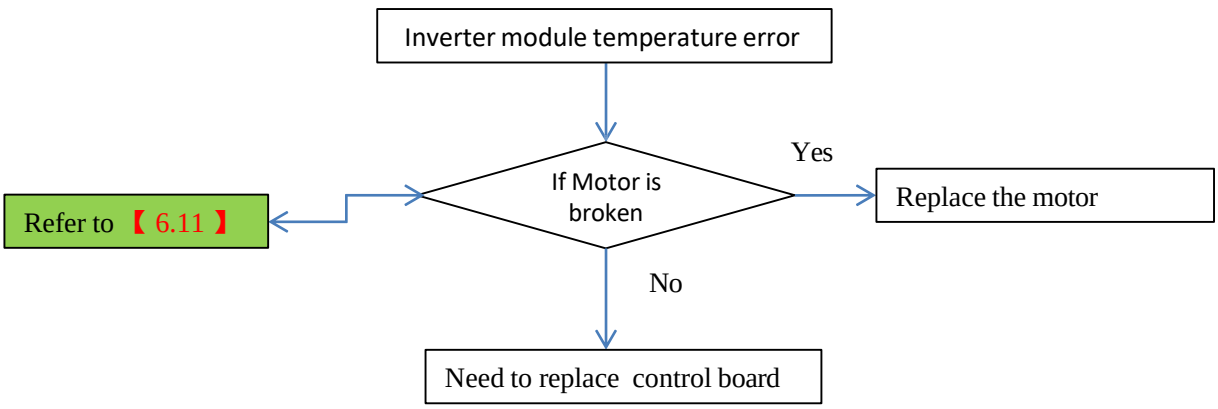


5.4 Troubleshooting by Motor driver module code

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

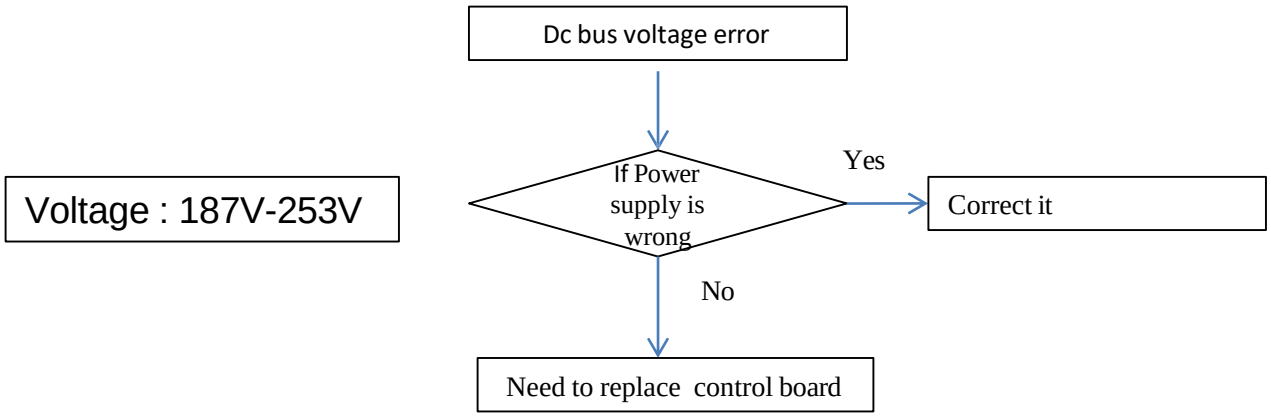


5.4 Troubleshooting by Motor driver module code

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

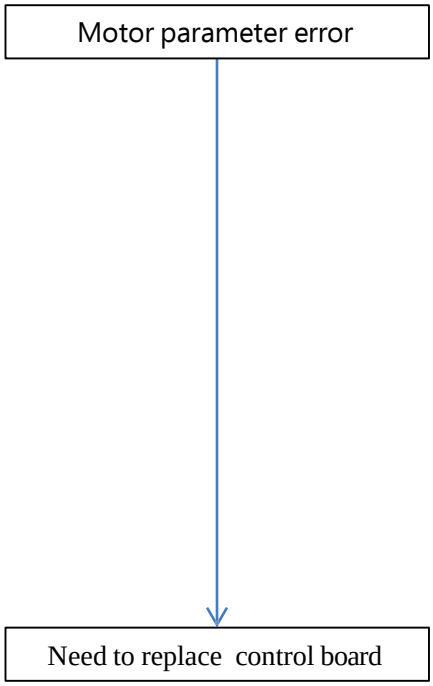


5.4 Troubleshooting by Motor driver module code

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

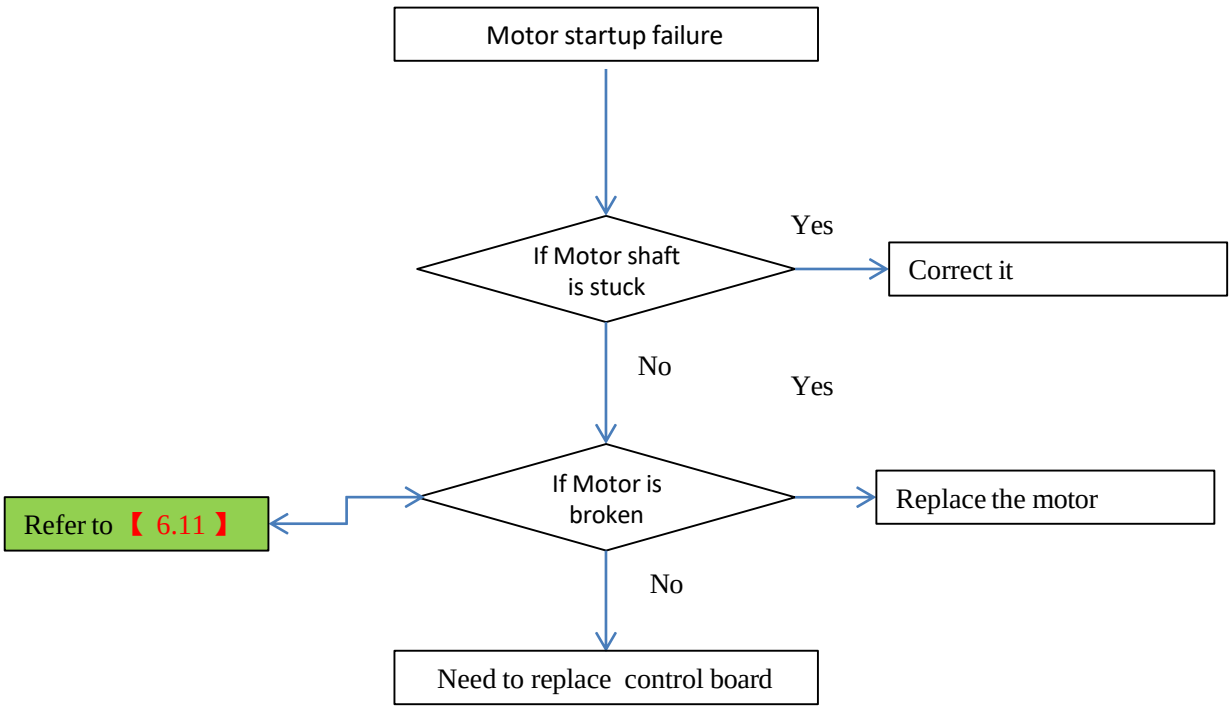


5.4 Troubleshooting by Motor driver module code

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

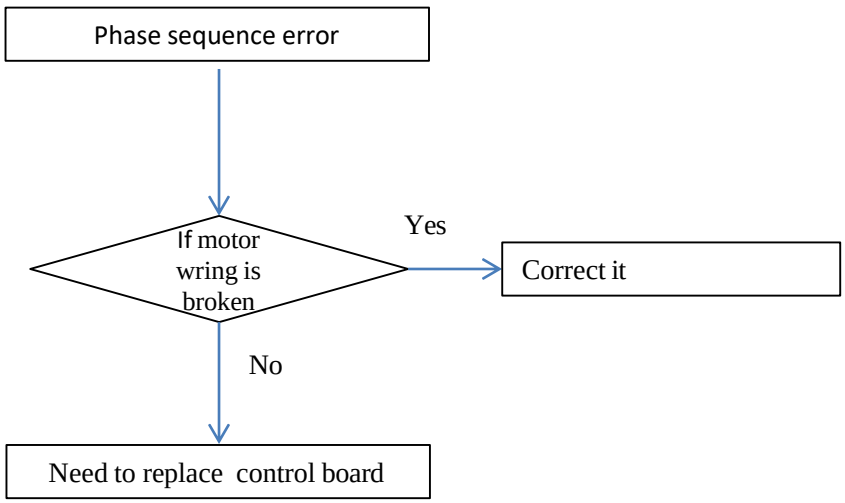


5.4 Troubleshooting by Motor driver module code

5.4.7 LED1--6 Flash/cycle

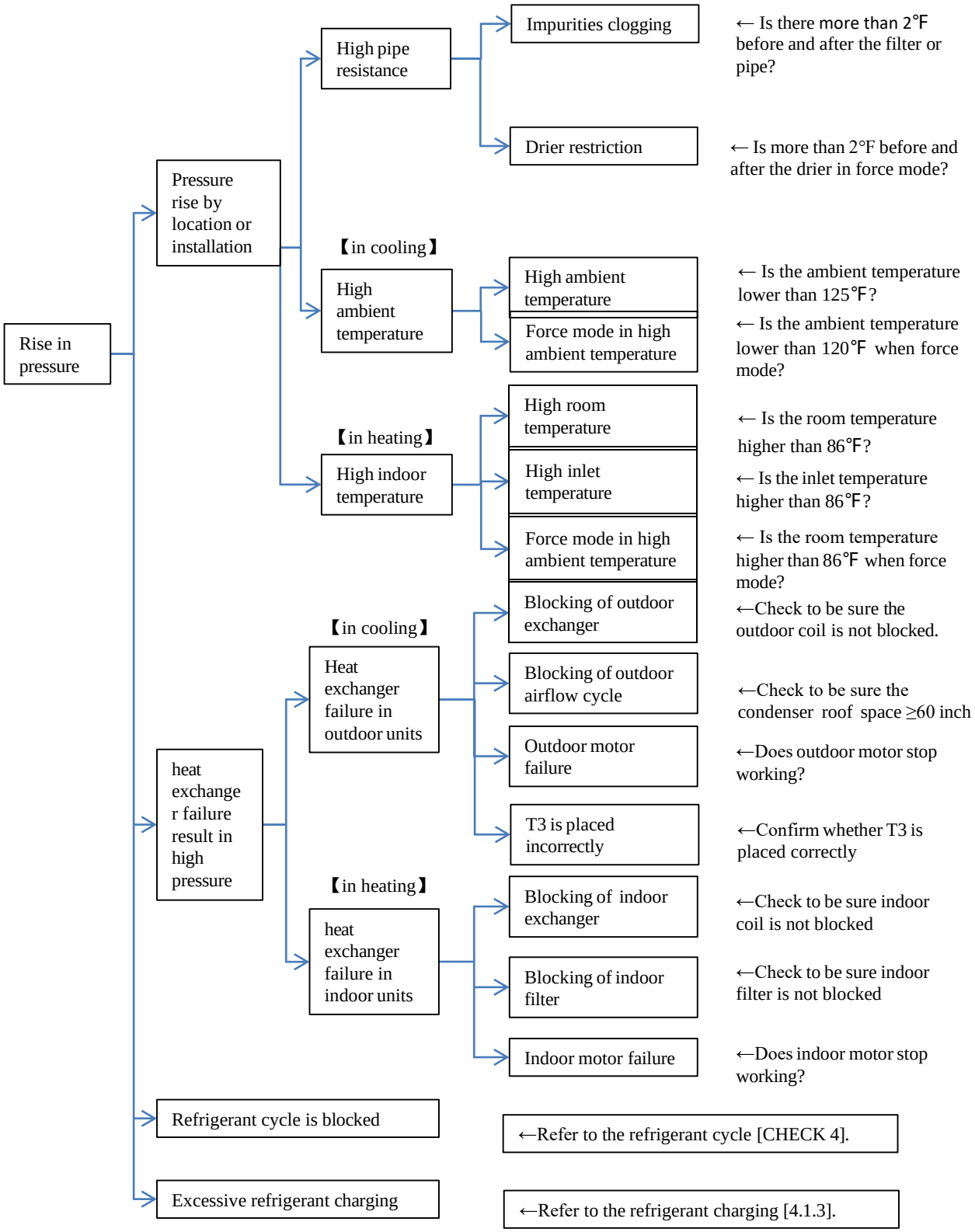
Faulty code	LED1—6 Flash/cycle
Model	all
Name	Phase sequence error
Classify	Electric issue
Possible cause	• Motor wring broken • Control board broken

Troubleshooting



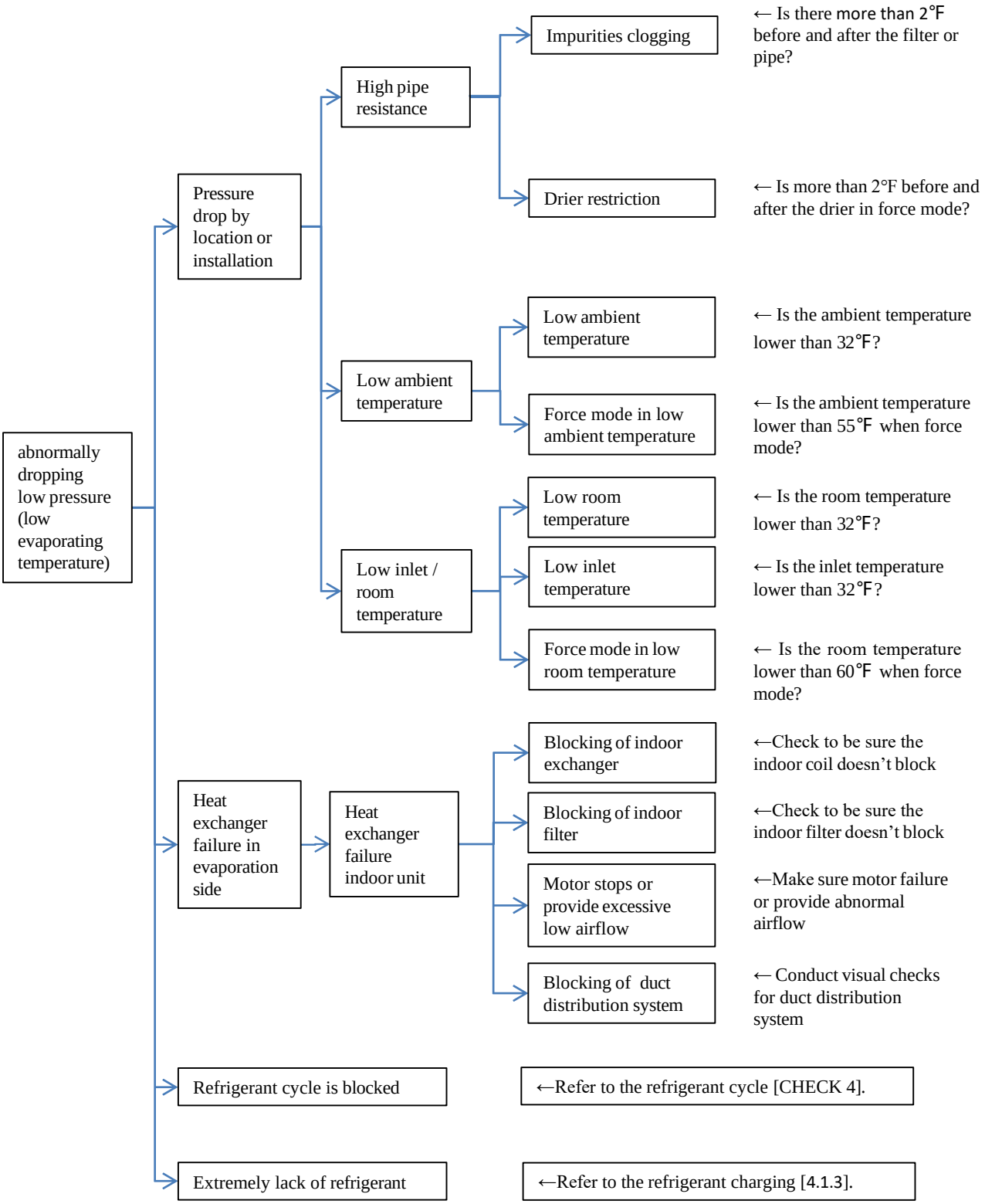
CHECK 1 6.1 Check for Causes of Rise in High Pressure

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.

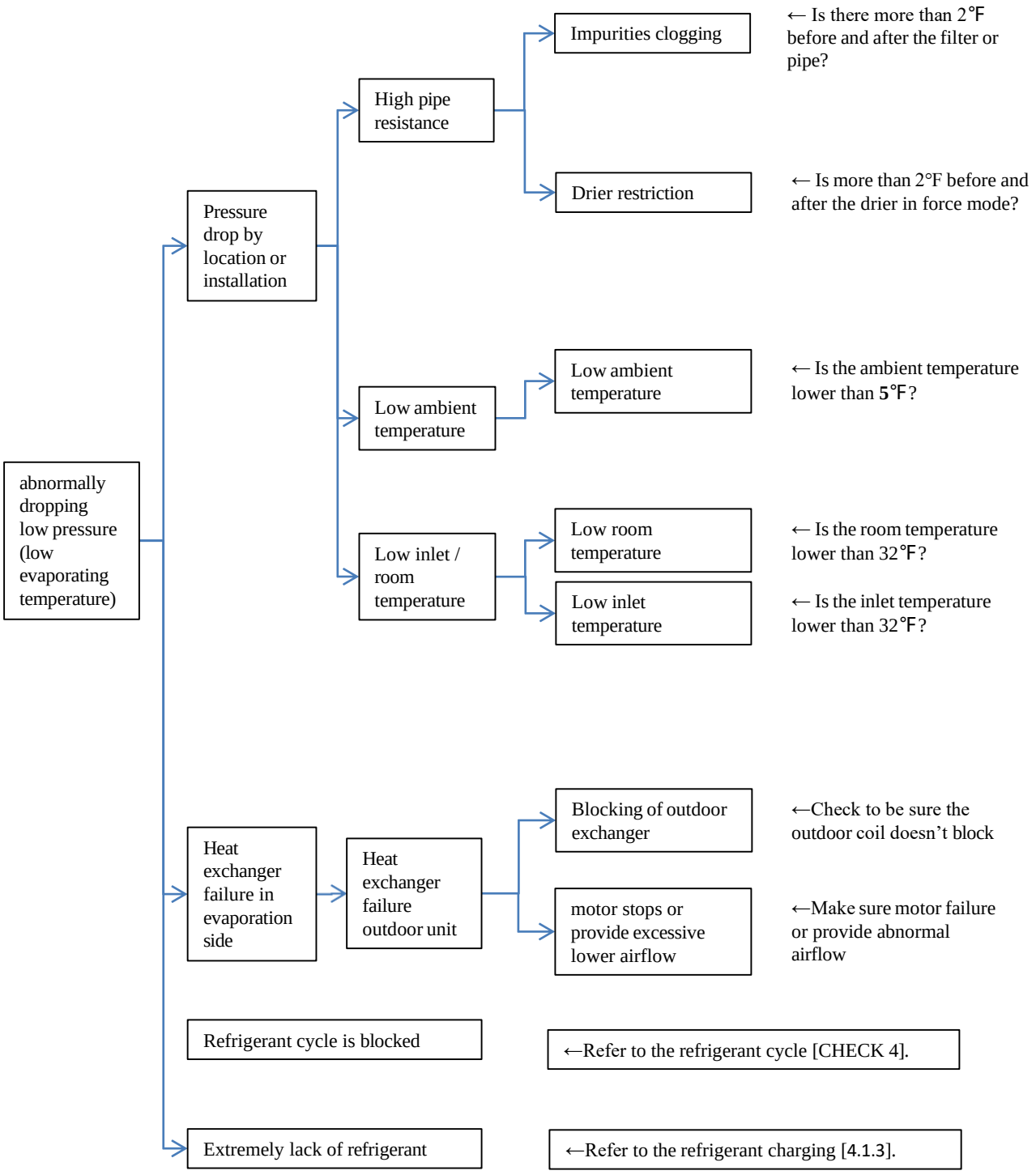


CHECK 2 6.2 Check for Causes of Dropping Low Pressure in cooling

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.

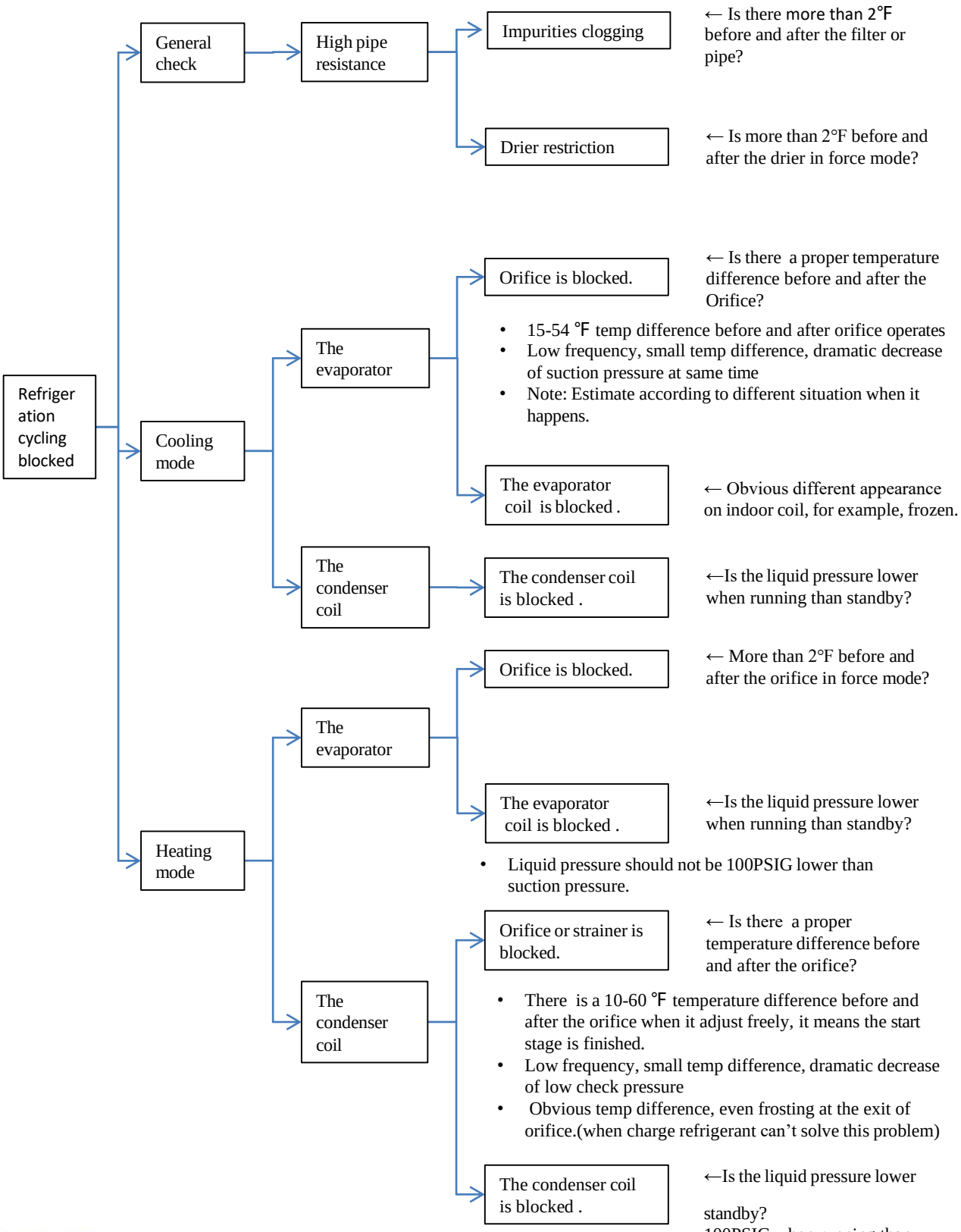


CHECK 3 6.3 Check for Causes of Dropping Low Pressure in heating

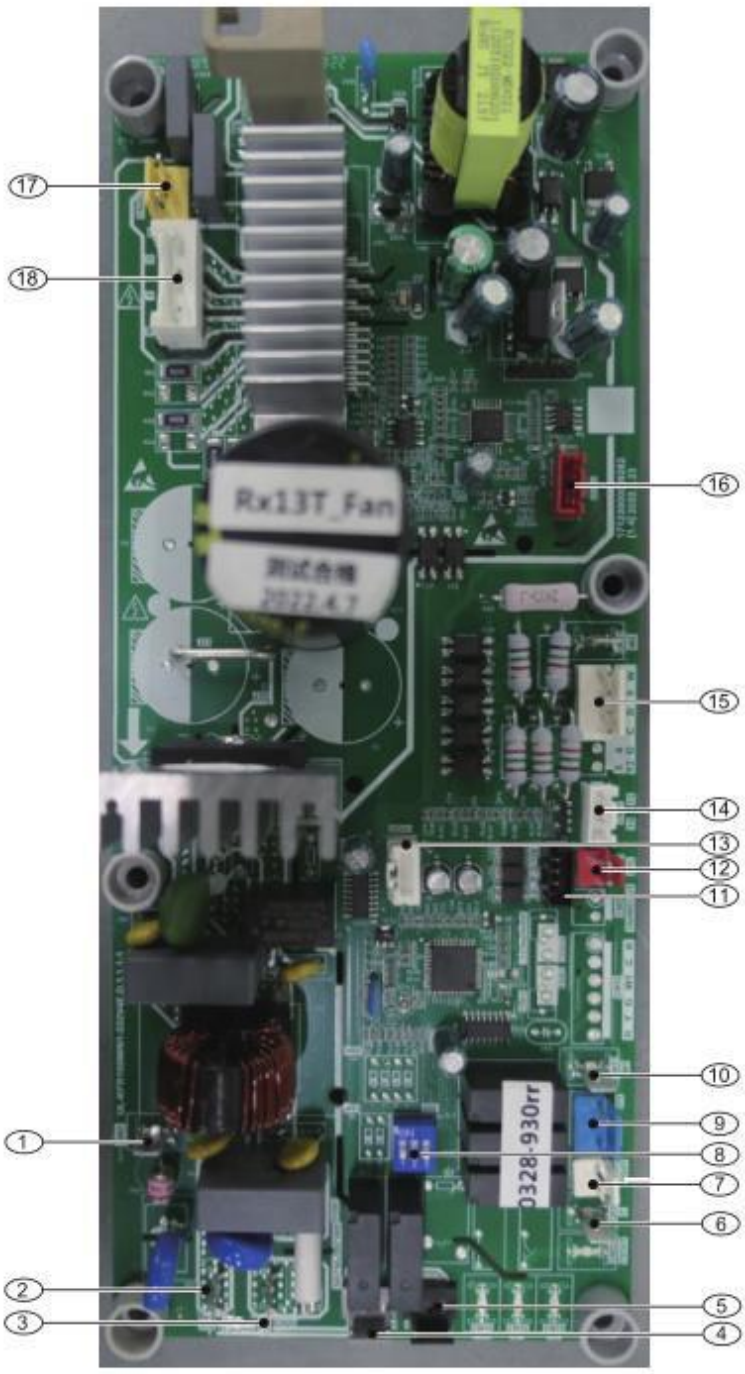


CHECK 4 6.4 Check for Causes of Refrigeration cycling blocked

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）

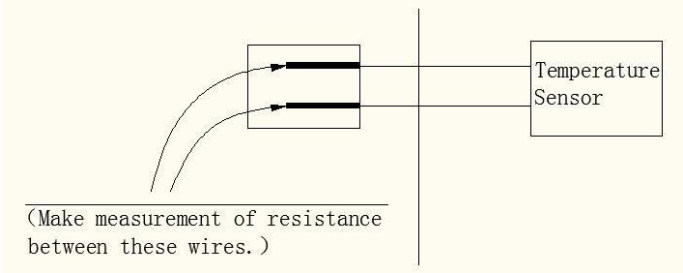
Check temp transducer（T3/T4）：
Compare the temperature checked (T3-3#/T4-4#/T5-5#, refer to 4.1.5), it's normal if the temperature difference was within 15℉ when standby.(need to avoid the waste heat affect T5/Tf when standby mode)

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

点检参数与左表是否一致?
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）

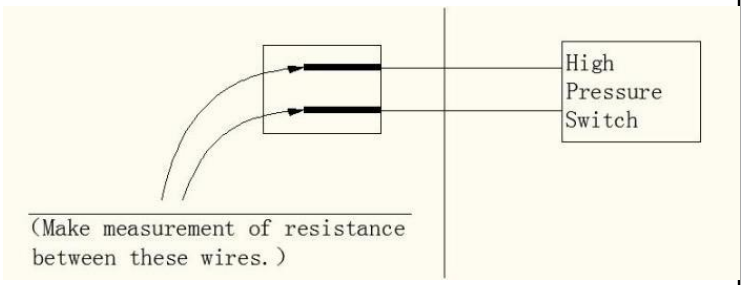
High Pressure Switch：
Whether the switch can start normally when start the machine

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）

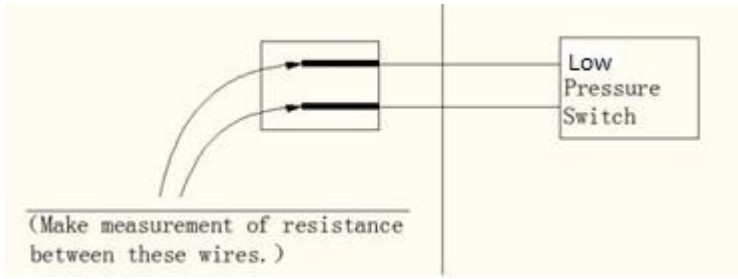
High Pressure Switch：
Whether the switch can start normally when start the machine

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）

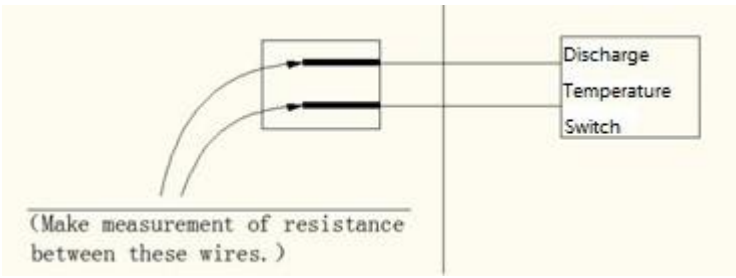
Discharge Temperature Switch：
Whether the switch can start normally when start the machine

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

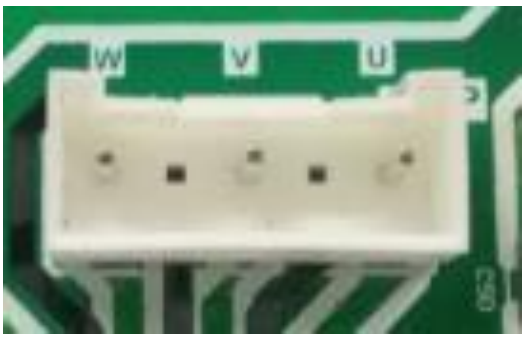
Note:
Normal discharge temperature switch opens above 239℉, resets below 167℉.

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



Resistance （Ω）	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

Motor output（W）	B(A)
200	2.2

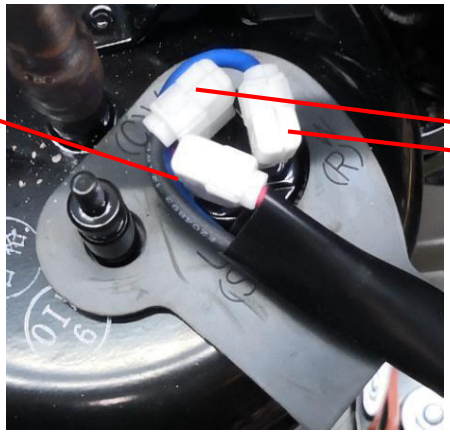
Yes → Check according to the condition of whole unit

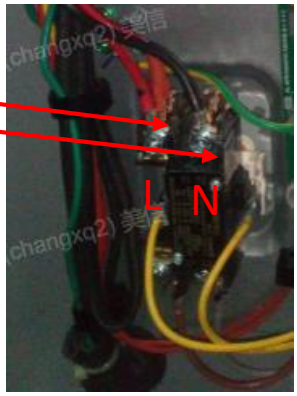
CHECK 11 6.11 Check for Compressor

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	2Ton	2.5Ton	3Ton	3.5Ton	4Ton	5Ton
B(A)	12	13	18	20	24	30

PART 7 Appendix

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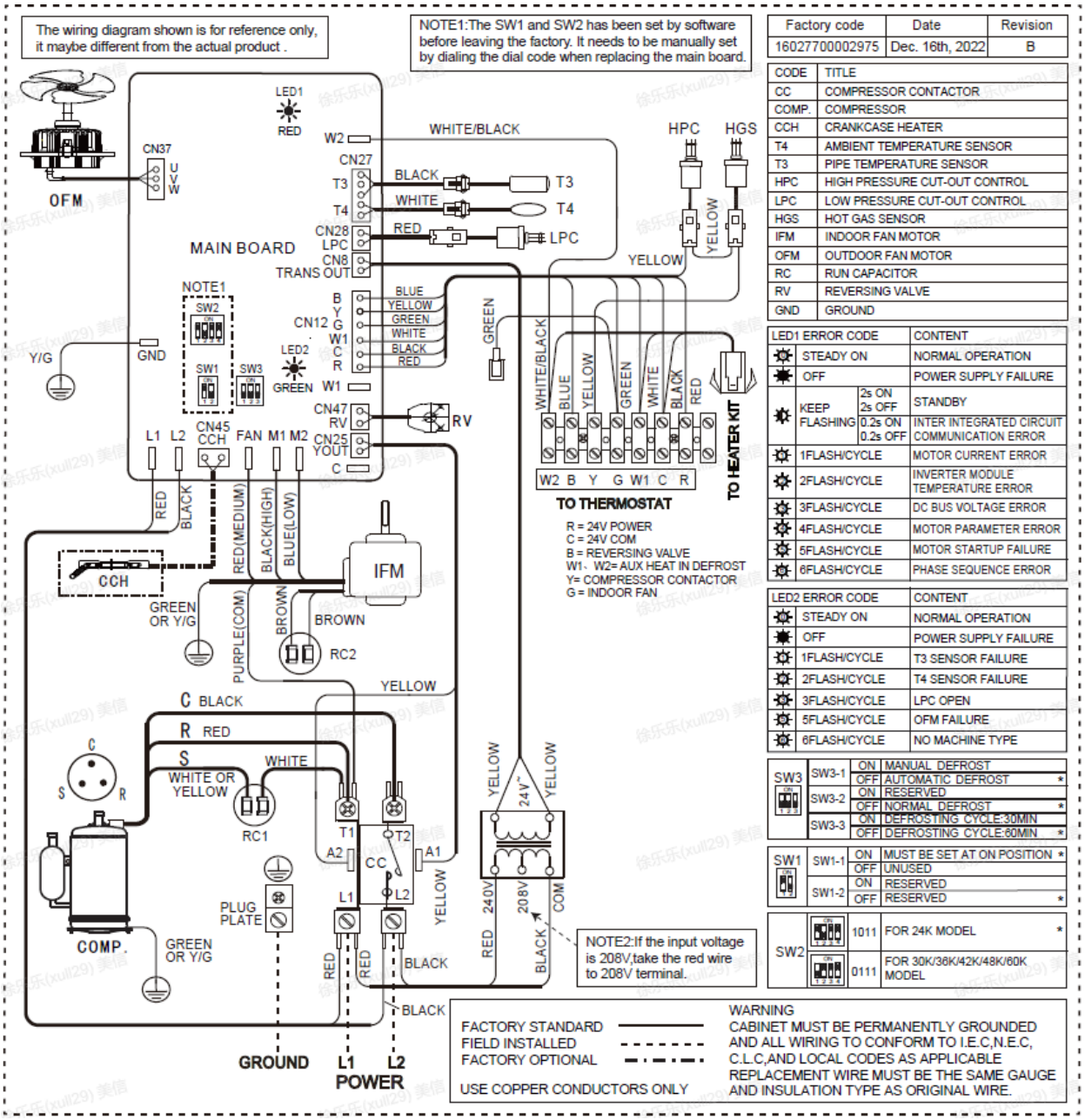
Appendix 1 7.1 Wiring diagrams for 24K



Factory code	Date	Revision
16027700002975	Dec. 16th, 2022	B

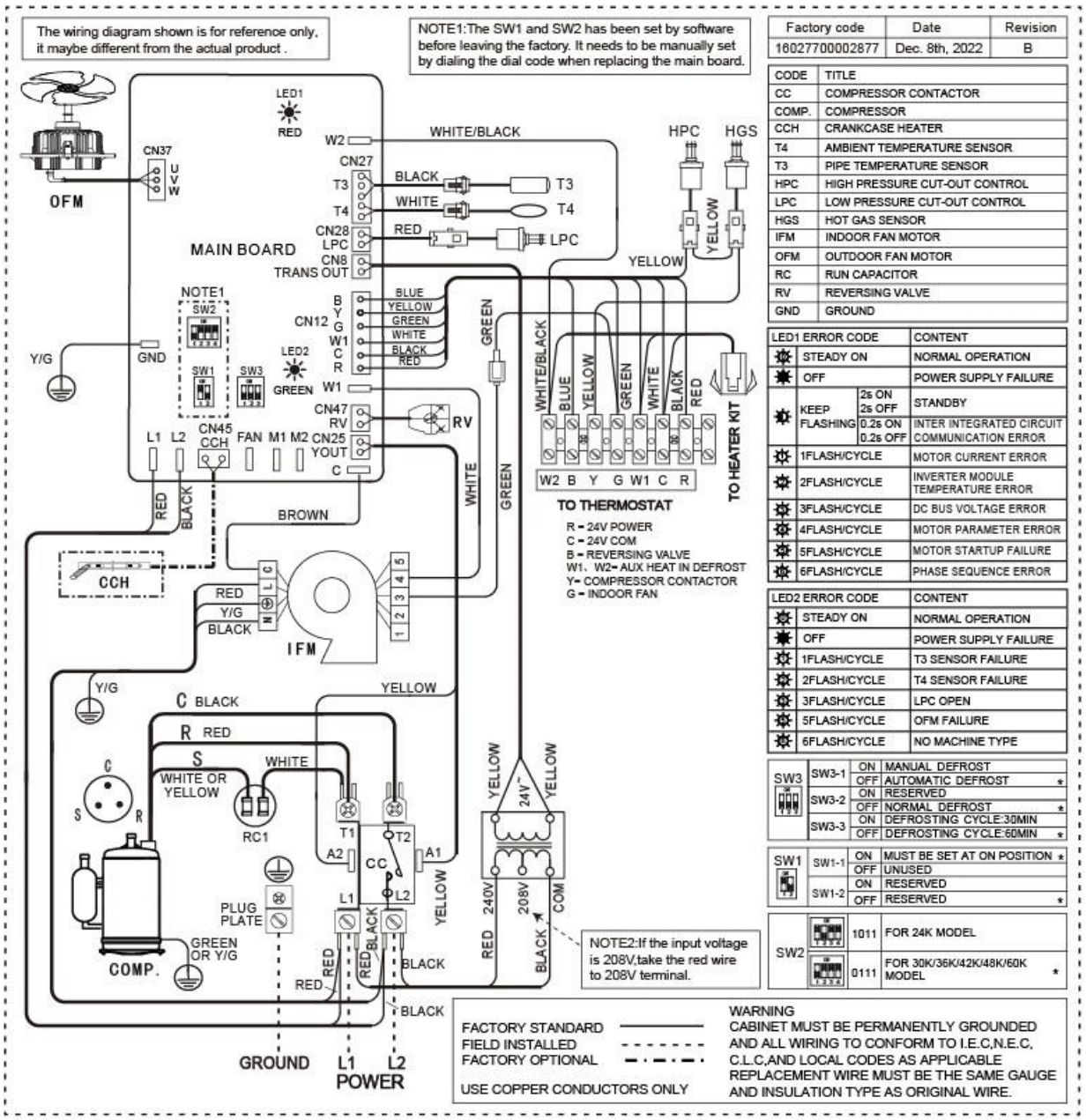
CODE	TITLE
CC	COMPRESSOR CONTACTOR
COMP.	COMPRESSOR
CCH	CRANKCASE HEATER
T4	AMBIENT TEMPERATURE SENSOR
T3	PIPE TEMPERATURE SENSOR
HPC	HIGH PRESSURE CUT-OUT CONTROL
LPC	LOW PRESSURE CUT-OUT CONTROL
HGS	HOT GAS SENSOR
IFM	INDOOR FAN MOTOR
OFM	OUTDOOR FAN MOTOR
RC	RUN CAPACITOR
RV	REVERSING VALVE
GND	GROUND

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

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 *
SW1	SW1-1	ON	MUST BE SET AT ON POSITION *
		OFF	UNUSED
	SW1-2	ON	RESERVED
		OFF	RESERVED *
SW2		1011	FOR 24K MODEL *
		0111	FOR 30K/36K/42K/48K/60K MODEL

Appendix 1 7.1 Wiring diagrams for 30K



Factory code	Date	Revision
16027700002877	Dec. 8th, 2022	B

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

LED1 ERROR CODE		CONTENT
☼	STEADY ON	NORMAL OPERATION
✸	OFF	POWER SUPPLY FAILURE
☼	KEEP FLASHING 2s ON 2s OFF	STANDBY
☼	KEEP FLASHING 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

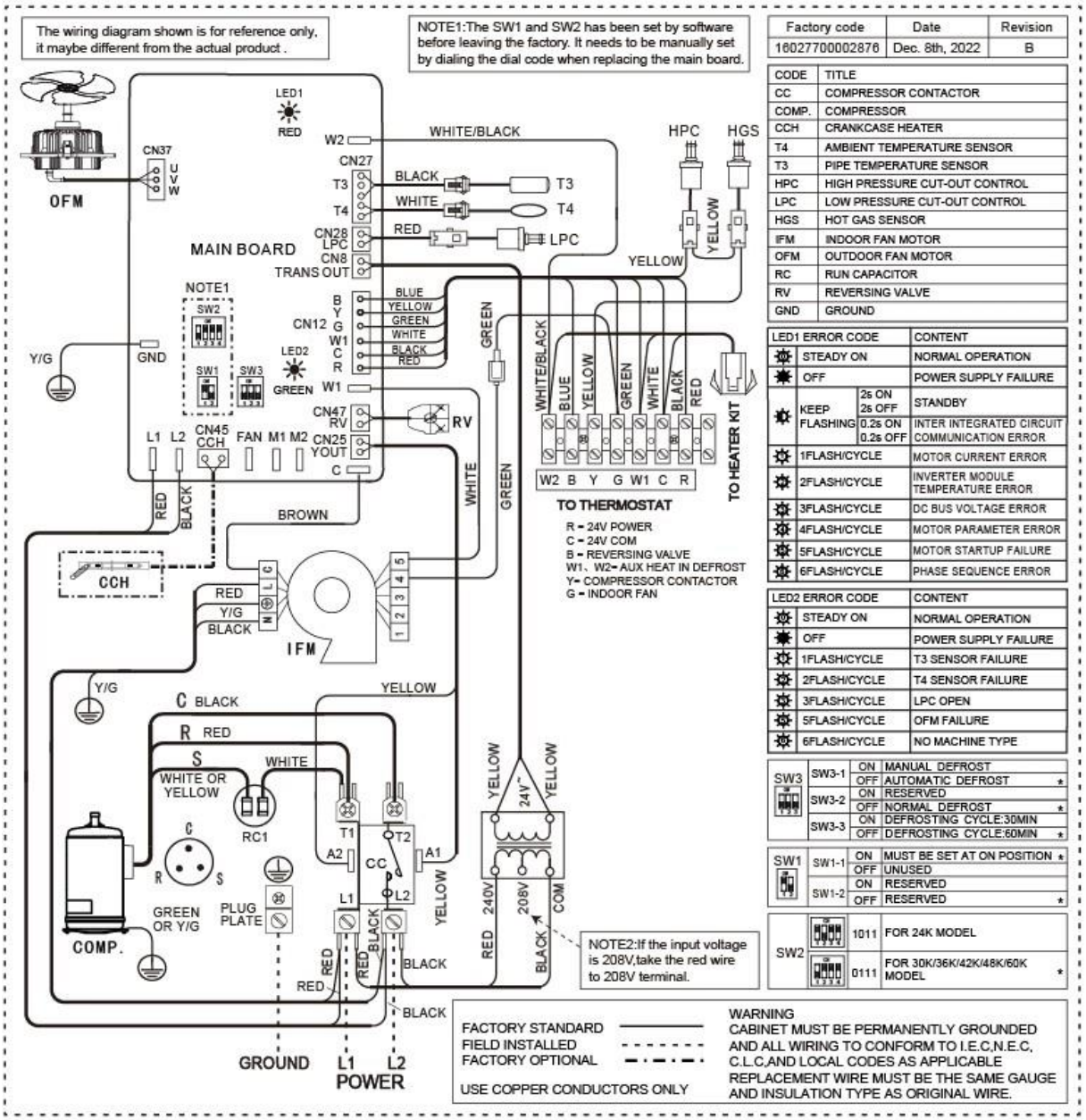
LED2 ERROR CODE	CONTENT
☼	STEADY ON	NORMAL OPERATION
✸	OFF	POWER SUPPLY FAILURE
☼	1FLASH/CYCLE	T3 SENSOR FAILURE
☼	2FLASH/CYCLE	T4 SENSOR FAILURE
☼	3FLASH/CYCLE	LPC OPEN
☼	5FLASH/CYCLE	OFM FAILURE
☼	6FLASH/CYCLE	NO MACHINE TYPE

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 *

SW1	SW1-1	ON	MUST BE SET AT ON POSITION *
		OFF	UNUSED
	SW1-2	ON	RESERVED
		OFF	RESERVED *

SW2	1011	FOR 24K MODEL
	0111	FOR 30K/36K/42K/48K/60K MODEL *

Appendix 1 7.1 Wiring diagrams for 36/60K



Factory code	Date	Revision
16027700002876	Dec. 8th, 2022	B

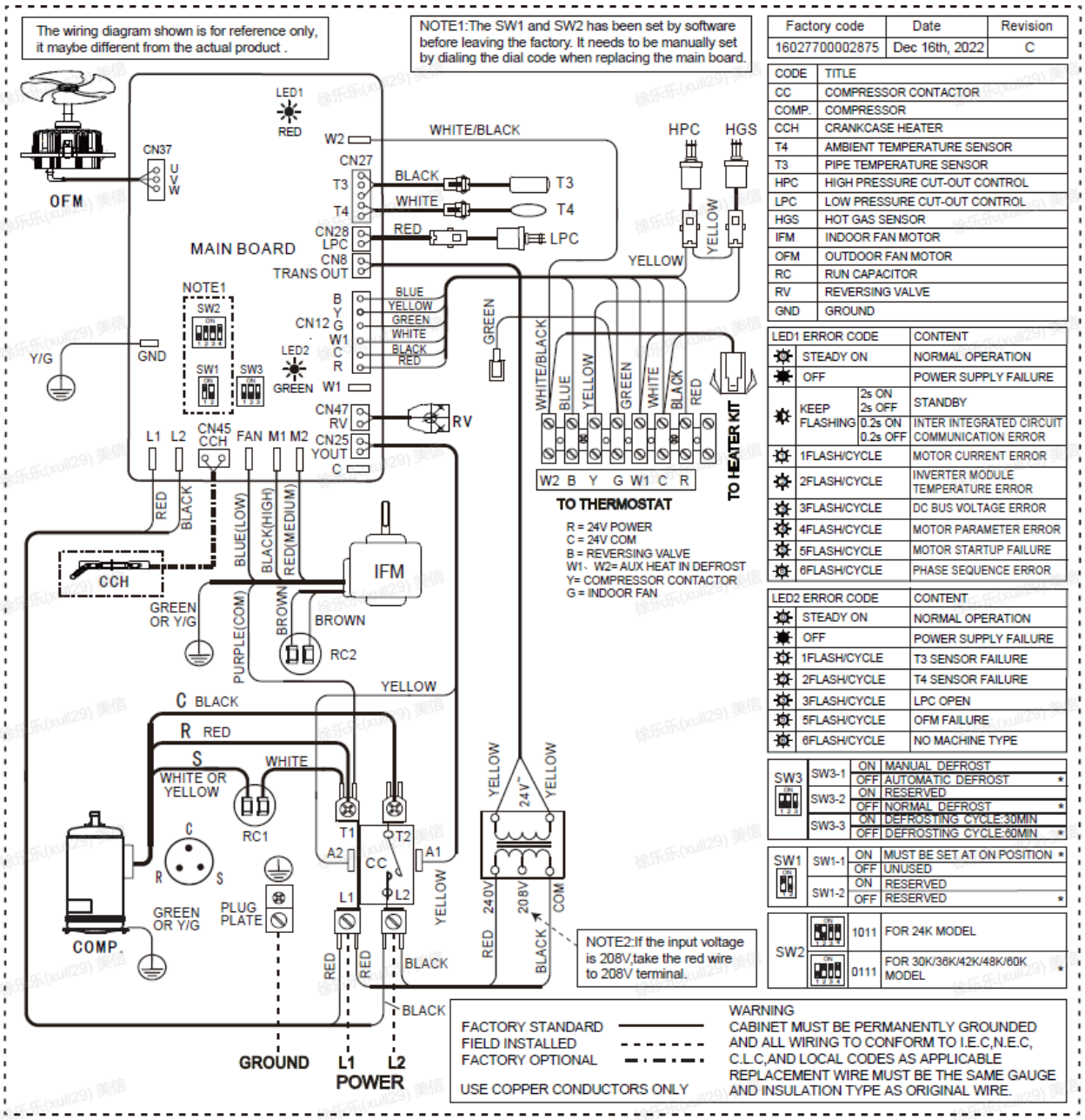
CODE	TITLE
CC	COMPRESSOR CONTACTOR
COMP.	COMPRESSOR
CCH	CRANKCASE HEATER
T4	AMBIENT TEMPERATURE SENSOR
T3	PIPE TEMPERATURE SENSOR
HPC	HIGH PRESSURE CUT-OUT CONTROL
LPC	LOW PRESSURE CUT-OUT CONTROL
HGS	HOT GAS SENSOR
IFM	INDOOR FAN MOTOR
OFM	OUTDOOR FAN MOTOR
RC	RUN CAPACITOR
RV	REVERSING VALVE
GND	GROUND

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

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 *
SW1	SW1-1	ON	MUST BE SET AT ON POSITION *
		OFF	UNUSED
	SW1-2	ON	RESERVED
		OFF	RESERVED *
SW2	1011		FOR 24K MODEL
	0111		FOR 30K/36K/42K/48K/60K MODEL *

Appendix 1 7.1 Wiring diagrams for 42/48K



Factory code	Date	Revision
16027700002875	Dec 16th, 2022	C

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

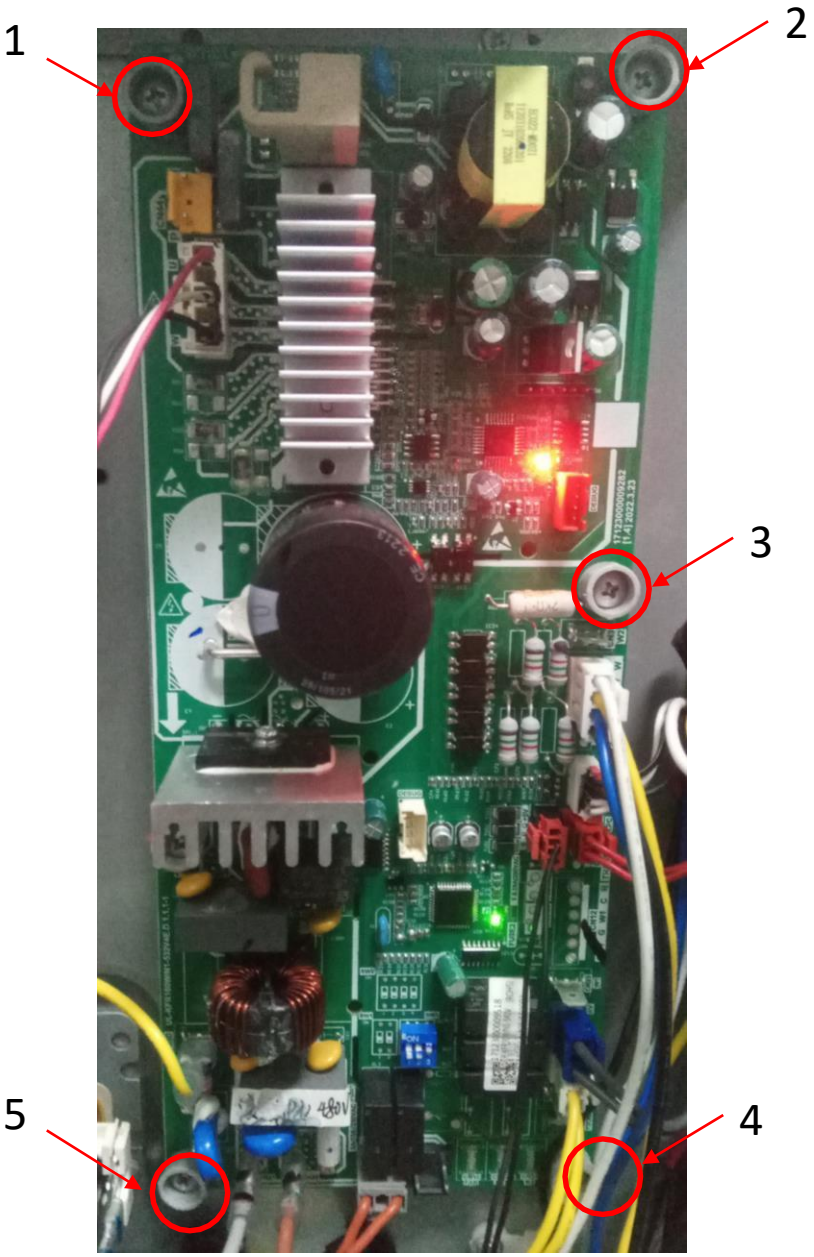
LED1 ERROR CODE			CONTENT
☼	STEADY ON		NORMAL OPERATION
✹	OFF		POWER SUPPLY FAILURE
☼	KEEP FLASHING	2s ON 2s OFF	STANDBY
		0.2s ON 0.2s OFF	INTER INTEGRATED CIRCUIT COMMUNICATION ERROR
☼	1FLASH/CYCLE		MOTOR CURRENT ERROR
☼	2FLASH/CYCLE		INVERTER MODULE TEMPERATURE ERROR
☼	3FLASH/CYCLE		DC BUS VOLTAGE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

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	*
SW1	SW1-1	ON	MUST BE SET AT ON POSITION	*
		OFF	UNUSED	
	SW1-2	ON	RESERVED	
		OFF	RESERVED	*
SW2		1011	FOR 24K MODEL	
		0111	FOR 30K/36K/42K/48K/60K MODEL	*

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 **5** screws (as shown by the red circle and the serial number).
6. Set up the SW1、SW2 and SW3 switches refer to the wire diagram.
7. Reconnect the wires according to the wire diagram.
8. Double check the wire connection, screws, thermal paste etc.



Appendix 3 **7.3 Fault code introduction**

Fault Code of Motor Driver Module

LED1 ERROR CODE			CONTENT
0	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
1	1FLASH/CYCLE		MOTOR CURRENT ERROR
2	2FLASH/CYCLE		INVERTER MODULE TEMPERATURE ERROR
3	3FLASH/CYCLE		DC BUS VOLTAGE ERROR
4	4FLASH/CYCLE		MOTOR PARAMETER ERROR
5	5FLASH/CYCLE		MOTOR STARTUP FAILURE
6	6FLASH/CYCLE		PHASE SEQUENCE ERROR

Fault Code of Main Control Module

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

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Appendix 4 7.4 Troubleshooting guide

SYSTEM FAULTS		WHAT TO CHECK MODE	POWER SUPPLY	HIGH VOLTAGE WIRING	I.D. CONTROL DEF.	COMPRESSR CAPACITOR	O.D. FAN CAPACITOR	I.D. BLOWER CAPACITOR	CONTACTOR CAPACITOR	LOW VOLTAGE CONTACTS	CONTROL TRANSFORMER	THERMOSTAT	CONTACTOR COIL	LOW VOLTAGE FUSE	STUCK COMPRESSOR	INEFFICIENT COMP.	REF. UNDERCHARGE	REF. OVERCHARGE	EXCESSIVE EVAP. LOAD	NONCONDENSABLES	RES. O.D. AIRFLOW	O.D. AIR RECIRCULATION	TXV STUCK OPEN	SUPERHEAT	RES. I.D. AIRFLOW	REF. CIR. RESTRICTION	SOV LEAKING	SOV COIL DEFECTIVE	CHECK VALVE LEAKING	LPC SENSOR DEF.	DEFROST CONTROL DEF.	T4 TEMP. SENSOR DEF.	T3 TEMP. SENSOR DEF.	HPC/MGS 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

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