R410A

Commercial Air Conditioners

Service Manual

V8 Series VRF

220-240V ~ 50Hz

MV8M-80WV2N1

MV8M-100WV2N1

MV8M-120WV2N1

MV8M-140WV2N1

MV8M-160WV2N1

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Part 1

General Information

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1 Indoor and Outdoor Unit Capacities

1.1 Indoor Units

1.1.1 Standard indoor units

Table 1-1.1: Standard indoor unit abbreviation codes

Abbreviation code	Type
Q1	One-way Cassette
Q2	Two-way Cassette
Q4C	Compact Four-way Cassette
Q4	Four-way Cassette
T3	Arc Duct
T2	Medium Static Pressure Duct

Abbreviation code	Type
T1	High Static Pressure Duct
G	Wall-mounted
DL	Ceiling & Floor
F	Floor Standing (Exposed/Concealed)
FS	Floor Standing

Table 1-1.2: Standard indoor unit capacity range

Capacity		Capacity index	Q1	Q2	Q4C	Q4	T3	T2	T1	G	DL	F	FS
kW	HP												
1.5	0.5	15	—	—	15	—	15	15	—	—	—	—	—
1.8	0.6	18	18	—	—	—	—	—	—	—	—	—	—
2.2	0.8	22	22	22	22	—	22	22	—	22	—	22	—
2.8	1	28	28	28	28	28	28	28	—	28	—	28	—
3.6	1.25	36	36	36	36	36	36	36	—	36	36	36	—
4.5	1.6	45	45	45	45	45	45	45	—	45	45	45	—
5.6	2	56	56	56	56	56	56	56	—	56	56	56	—
6.3	2.25	63	—	—	63	—	—	—	—	—	—	—	—
7.1	2.5	71	71	71	—	71	71	71	71	71	71	71	—
8.0	3	80	—	—	—	80	80	80	80	80	80	80	—
9.0	3.2	90	—	—	—	90	90	90	90	90	90	—	—
10.0	3.6	100	—	—	—	100	100	—	—	—	—	—	—
11.2	4	112	—	—	—	112	112	112	112	—	112	—	—
12.5	4.5	125	—	—	—	—	—	125	—	—	—	—	—
14.0	5	140	—	—	—	140	—	140	140	—	140	—	—
16.0	6	160	—	—	—	160	—	160	160	—	160	—	—

1.1.2 Fresh air processing unit

Table 1-1.3: Fresh air processing unit capacity range

Capacity	11.2kW	12.5kW	14kW
Capacity index	112	125	140

1.2 Heat recovery ventilator

Table 1-1.4: Heat recovery ventilator capacity range

Airflow rate	200m³/h	300m³/h	400m³/h	500m³/h	800m³/h	1000m³/h	1500m³/h	2000m³/h

1.3 Outdoor Units

Table 1-1.5: Outdoor unit capacity range

Capacity(kW)	Model Name
7.2	MV8M-80WV2N1
9.0	MV8M-100WV2N1
12.3	MV8M-120WV2N1
14.0	MV8M-140WV2N1
15.5	MV8M-160WV2N1

2 External Appearance

2.1 Indoor Units

2.1.1 Standard indoor units

Table 1-2.1: Standard indoor unit appearance

One-way Cassette Q1 	Two-way Cassette Q2 
Compact Four-way Cassette Q4C 	Four-way Cassette Q4 
Arc Duct T3 	Medium Static Pressure Duct T2 
High Static Pressure Duct T1 	Floor Standing FS 
Wall-mounted G 	Ceiling & Floor DL 
Floor Standing F 	

2.1.2 Fresh air processing unit

Table 1-2.2: Fresh air processing unit appearance

Fresh Air Processing Unit FA 	Small Airflow Rate Fresh Air Processing Unit FA 

2.2 Heat Recovery Ventilator

Table 1-2.3: Heat recovery ventilator appearance

Heat Recovery Ventilator 

2.3 Outdoor Units

Table 1-2.4: outdoor unit appearance

80/100/120/140/160 model


3 Nomenclature

3.1 Indoor Units

3.1.1 Standard indoor units

V8 indoor units

M	I	H	18	Q1	N18
①	②	③	④	⑤	⑦

Legend		
No.	**Code**	**Remarks**
1	M	Midea
2	I	VRF indoor unit
3	H	Function code H: HyperLink function
4	18	Capacity index (the capacity in kW multiplied by 10)
5	Q1	Indoor unit type Q1: One-way Cassette Q2: Two-way Cassette Q4C: Compact Four-way Cassette Q4: Four-way Cassette T3: Arc Duct T2: Medium Static Pressure Duct T1: High Static Pressure Duct G: Wall-mounted DL: Ceiling & Floor F: Floor Standing (Exposed/Concealed) FS: Floor Standing
6	-	Power supply Omit: 1 phase, 220-240V, 50Hz H: 1 phase, 220-240V, 50/60Hz
7	N18	Refrigerant type (N18: R410A&R32)

DC Indoor Units

M I 2 - 22 Q1 D N1
① ② ③ ④ ⑤ ⑥ ⑧

Legend		
No.	**Code**	**Remarks**
1	M	Midea
2	I	VRF indoor unit
3	2	Generation code 2: The 2nd generation 3: The 3rd generation
4	22	Capacity index (the capacity in kW multiplied by 10)
5	Q1	Indoor unit type Q1: One-way Cassette Q2: Two-way Cassette Q4C: Compact Four-way Cassette Q4: Four-way Cassette T2: Medium Static Pressure Duct T1: High Static Pressure Duct G: Wall-mounted DL: Ceiling & Floor F: Floor Standing
6	D	Series category (D: DC series)
7	-	Power supply Omit: 1 phase, 220-240V, 50Hz H: 1 phase, 220-240V, 50/60Hz
8	N1	Refrigerant type (N1: R410A)

AC indoor units

MDV - D 18 - Q4 / N1 E (B)
① ② ③ ④ ⑤ ⑥ ⑦

Legend		
No.	**Code**	**Remarks**
1	MDV	Midea
2	D	VRF indoor unit
3	18	Capacity index (the capacity in kW multiplied by 10)
4	Q1	Indoor unit type Q1: One-way Cassette Q2: Two-way Cassette Q4C: Compact Four-way Cassette Q4: Four-way Cassette T2: Medium Static Pressure Duct T1: High Static Pressure Duct G: Wall-mounted DL: Ceiling & Floor F: Floor Standing
5	N1	Refrigerant N1: R410A
6	E	Design Code
7	(B)	Second Generation

3.1.2 Fresh air processing unit

M I 2 - 140 FA D N1 - S
① ② ③ ④ ⑤ ⑥ ⑧ ⑨

Legend		
No.	**Code**	**Remarks**
1	M	Midea
2	I	VRF indoor unit
3	2	The 2nd generation VRF DC indoor unit
4	140	Capacity index (the capacity in kW multiplied by 10)
5	FA	Indoor unit type FA: Fresh Air Processing Unit
6	D	Series category (D: DC series)
7	-	Power supply Omit: 1 phase, 220-240V, 50Hz H: 1 phase, 220-240V, 50/60Hz
8	N1	Refrigerant type (N1: R410A)
9	S	Product series S: Small Airflow Rate

3.1.3 Heat recovery ventilator

AC Series

HRV - 200
① ②

Legend		
No.	**Code**	**Remarks**
1	HRV	Heat recovery ventilator
2	200	Airflow in m^3/h

DC Series

HRV - D 200
① ② ③

Legend		
No.	**Code**	**Remarks**
1	HRV	Heat recovery ventilator
2	D	Series category (D: DC series)
3	200	Airflow in m^3/h

3.2 Outdoor Units

M	V8	M	-	140	W	V2	N1
①	②	③		③	④	⑤	⑦

Legend		
No.	**Code**	**Remarks**
1	M	Midea MV8M-120WV2RN1
2	V8	The 8th generation VRF
3	M	Mini VRF
3	140	Capacity index (the capacity in kW multiplied by 10)
4	W	Unit category (W: VRF outdoor unit)
5	V2	Type (V2: All DC inverter)
6	-	Power supply omit:220-240V, ~, 50Hz H:220-240V, 3N~, 50/60Hz
7	N1	Refrigerant type (N1: R410A)

4 Combination Ratio

$$\text{Combination ratio} = \frac{\text{Sum of capacity indexes of the indoor units}}{\text{Capacity index of the outdoor units}}$$

Table 1-5.1: Indoor and outdoor unit combination ratio limitations

Type	Minimum combination ratio	Maximum combination ratio		
		Standard indoor units only	Fresh air processing units only	Fresh air processing units and standard indoor units together
V8 Series outdoor units	50%	130%[1,2,3] or 160%[1,2,3]	100%	100%[4]

Notes:

1. All the indoor units connected should be indoor units with ø5mm size copper tube heater exchanger. This limitation is to avoid too big indoor unit exchanger cause reliability and performance problem.
2. If all indoor units in system are V8 Series the total combination ratio must not exceed 160%. If there are non V8 series indoor unit in system the total combination ratio must not exceed 130%
3. Piping between farthest indoor unit and first indoor branch joint should less than 40m.
4. When fresh air processing units are installed together with standard indoor units, the total capacity of the fresh air processing units must not exceed 30% of the total capacity of the outdoor units and the total combination ratio must not exceed 100%.

Table 1-5.2: Combinations of indoor and outdoor units

Outdoor unit capacity		Sum of capacity indexes of connected indoor units (standard indoor units only)	Sum of capacity indexes of connected indoor units (fresh air processing units and standard indoor units together)	Maximum number of connected indoor units
model	Capacity index			
80	72	36 to 93.6	36 to 72	5
100	90	45 to 117	45 to 90	6
120	123	61.5 to 159.9	61.5 to 123	8
140	140	70 to 182	70 to 140	10
160	155	77.5 to 201.5	77.5 to 155	11

5 Selection Procedure

5.1 Procedure

Step 1: Establish design conditions

Design temperature and humidity (indoor and outdoor)
Required heat load of each room
System peak load
Piping length, level differences
Indoor unit specifications (type and quantity)

Step 2: Select indoor units

Decide indoor unit safety factor

Select indoor unit models ensuring that:
Indoor unit capacity corrected for indoor air temperature WB[1] ≥ Required heat load × Indoor unit safety factor

Step 3: Select outdoor units

Determine required total heat load on outdoor units

Use the sum of the peak load of each room

Use the system peak load

Provisionally select outdoor unit capacity based on combination ratio limitations

Confirm that the number of indoor units connected to the outdoor units is within limitation

Correct cooling and heating capacities of the outdoor units for the following items:
Outdoor air temperature / Indoor air temperature WB / Combination ratio / Piping length, level difference / Piping heat loss / Frost accumulation (for heating capacity only)

Is corrected outdoor unit capacity ≥ Required total heat load on outdoor units?

No

Yes

VRF system selection is complete

Notes:

1. If the indoor design temperature falls between two temperatures listed in the indoor unit's capacity table, calculate the corrected capacity by interpolation. If the indoor unit selection is to be based on total heat load and sensible heat load, select indoor units which satisfy not only the total heat load requirements of each room but also the sensible heat load requirements of each room. As with total heat capacity, the sensible heat capacity of indoor units should be corrected for indoor temperature, interpolating where necessary. For the indoor unit capacity tables, refer to the indoor unit technical manuals.

5.2 Example

The following is a selection example based on total heat load for cooling.

Figure 1-5.1: Room plan

<table>
<tr><td rowspan="3">Room A</td><td>Room B</td><td>Room C</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Room D</td></tr>
</table>

Step 1: Establish design conditions

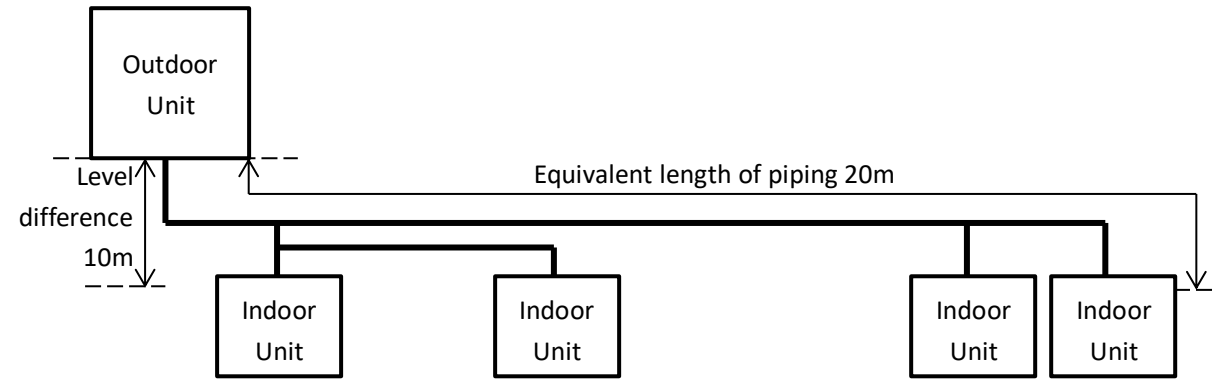
- Indoor air temperature 25°C DB, 18°C WB; outdoor air temperature 33°C DB.
- Determine peak load of each room and system peak load. As shown in Table 1-5.1, the system peak load is 10.5kW.

Table 1-5.1: Required heat load of each room (kW)

Time	Room A	Room B	Room C	Room D	Total
9:00	2.5	1.6	1.6	1.6	7.3
12:00	3.2	2.4	2.4	2.4	10.4
14:00	3.1	2.4	2.4	2.6	**10.5**
16:00	3.1	2.3	2.3	2.3	10

- The maximum piping lengths and level differences in this example are as given in Figure 1-5.2.

Figure 1-5.2: System diagram



- Indoor unit type for all rooms: Medium Static Pressure Duct (T2).

Step 2: Select indoor units

- In this example, a safety factor is not used (i.e. the safety factor is 1).
- Select indoor unit models using the medium static pressure duct cooling capacity table. Each indoor unit's corrected capacity needs to be greater than or equal to the peak load of the relevant room. The selected indoor units are shown in Table 1-5.3.

Table 1-5.2: Extract from medium static pressure duct (T2) cooling capacity table

Model	Capacity index	Indoor air temperature													
		14°C WB		16°C WB		18°C WB		19°C WB		20°C WB		22°C WB		24°C WB	
		20°C DB		23°C DB		26°C DB		27°C DB		28°C DB		30°C DB		32°C DB	
		TC	SC	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC
T2	22	1.5	1.4	1.8	1.5	2.1	1.6	2.2	1.6	2.3	1.7	2.4	1.5	2.4	1.5
	28	1.9	1.7	2.3	1.9	2.6	2.1	2.8	2.1	3.0	2.1	3.1	2.0	3.1	1.9
	36	2.5	2.1	2.9	2.3	3.4	2.5	3.6	2.6	3.8	2.7	4.2	2.8	3.9	2.3
	45	3.1	2.6	3.7	2.8	4.2	3.1	4.5	3.2	4.8	3.2	4.9	3.1	5.1	2.9
	56	3.9	3.0	4.6	3.3	5.3	3.6	5.6	3.7	5.9	3.8	6.2	3.7	6.2	3.4
	71	4.9	3.9	5.8	4.3	6.7	4.7	7.1	4.9	7.5	4.8	7.8	4.6	7.8	4.3
	80	5.5	4.4	6.6	4.9	7.5	5.3	8.0	5.5	8.4	5.5	8.8	5.2	8.8	4.8
	90	6.2	5.3	7.3	5.8	8.4	6.3	9.0	6.4	9.6	6.5	9.9	6.1	9.9	5.7
	112	7.7	6.4	9.1	7.1	10.5	7.7	11.2	7.8	11.9	8.1	12.5	7.8	12.5	7.4
	140	9.7	7.8	11.3	8.6	13.2	9.6	14.0	9.8	14.8	9.8	15.7	9.7	15.4	8.8

Abbreviations:
TC: Total capacity (kW); SC: Sensible capacity (kW)

Table 1-5.3: Selected indoor units

	Room A	Room B	Room C	Room D
Peak heat load (kW)	3.1	2.4	2.4	2.6
Selected indoor unit	MI2-36T2DHN1	MI2-28T2DHN1	MI2-28T2DHN1	MI2-28T2DHN1
Corrected TC (kW)	3.6	2.8	2.8	2.8

Step 3: Select outdoor units

- Determine the required total heat load from the indoor units to the outdoor unit based on either the sum of the peak loads of each room or the system peak load. In this example, it is determined based on the system peak load. Therefore, the required heat load is 10.5kW.
- Provisionally select an outdoor unit using the sum of the capacity indexes (CIs) of the selected indoor units (as shown in Table 1-5.4), ensuring that the combination ratio is between 50% and 130%. Refer to Table 1-5.5. As the sum of CIs of the indoor units is 120, all outdoor units are potentially suitable except 80 and 100 model. Start from the smaller, which is the 120 model.

Table 1-5.4: Sum of indoor unit capacity indexes

Model	Capacity Index	No. of units
MI2-28T2DHN1	36	1
MI2-22T2DHN1	28	3

Sum of CIs	120

Table 1-5.5: Combinations of Indoor and outdoor units

Outdoor unit capacity		Sum of capacity indexes of connected indoor units (standard indoor units only)
model	Capacity index	
80	72	36 to 93.6
100	90	45 to 117
120	123	61.5 to 159.9
140	140	70 to 182
160	155	77.5 to 201.5

- The number of connected indoor units is 4 and the maximum number of connected indoor units on the 120 model outdoor unit is 8, so the number of connected indoor units is within the limitation.
- Calculate the corrected capacity of the outdoor unit:
  a) The sum of the indoor unit CIs is 120 and the CI of the 120 model outdoor unit is 123, so the combination ratio is 120 / 123 = 97.5%.
  b) Using the outdoor unit's cooling capacity table, interpolate to obtain the capacity ("B") corrected for outdoor air temperature, indoor air temperature, and combination ratio. Refer to Tables 1-5.6 and 1-5.7.

Table 1-5.6: Extract from Table 2-8.7 MV8M-120WV2N1 cooling capacity

CR	Outdoor air temp. (°C DB)	Indoor air temp. (°C DB / °C WB)	
		25.8 / 18.0	
		TC	PI
		kW	kW
100%	31	11.4	3.0
	33	11.4	3.3
	35	11.4	3.5
90%	31	10.2	2.6
	33	10.2	2.8
	35	10.2	3.0

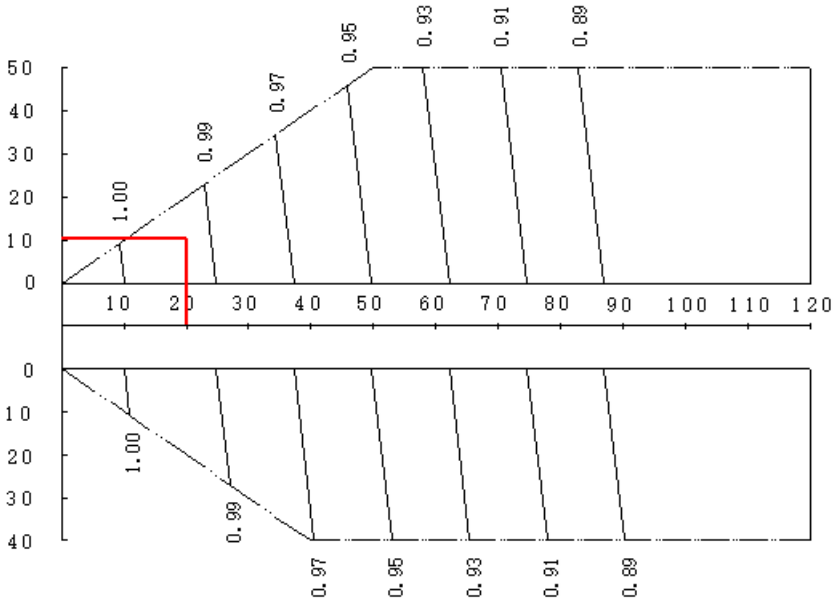
Table 1-5.7: Cooling capacity calculated by interpolation

CR	Outdoor air temp. (°C DB)	Indoor air temp. (°C DB / °C WB)	
		25.8 / 18.0	
		TC	PI
		kW	kW
130%			
	33	11.4	3.3
	B = 11.1[1]		
120%	33	10.2	2.8

Notes:
1. 10.2 + (11.4 – 10.2) × (97.5– 90) / (100 – 90) =11.1

c) Find the correction factor for piping length and level difference ("K1")

Figure 1-5.3: Mini rate of change in cooling capacity



Notes:

1. The horizontal axis shows equivalent length of piping between farthest indoor unit and first outdoor branch joint; the vertical axis shows the largest level difference between indoor unit and outdoor unit. For level differences, positive values indicate that the outdoor unit is above the indoor unit, negative values indicate that the outdoor unit is below the indoor unit.

d) Calculate the corrected capacity of MV8M-120WV2N1 ("C") by using K1:

$$C = B \times K1 = 11.1 \times 0.99 = 10.99kW$$

- The corrected capacity 10.99kW is larger than required total heat load 10.5kW, so selection is complete. (In the event that the corrected capacity is lower than the required total heat load, Step 3 should be repeated from the point where the outdoor unit capacity is provisionally selected.)

Part 2

Component Layout and Refrigerant Circuits

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2 Piping Diagrams 21

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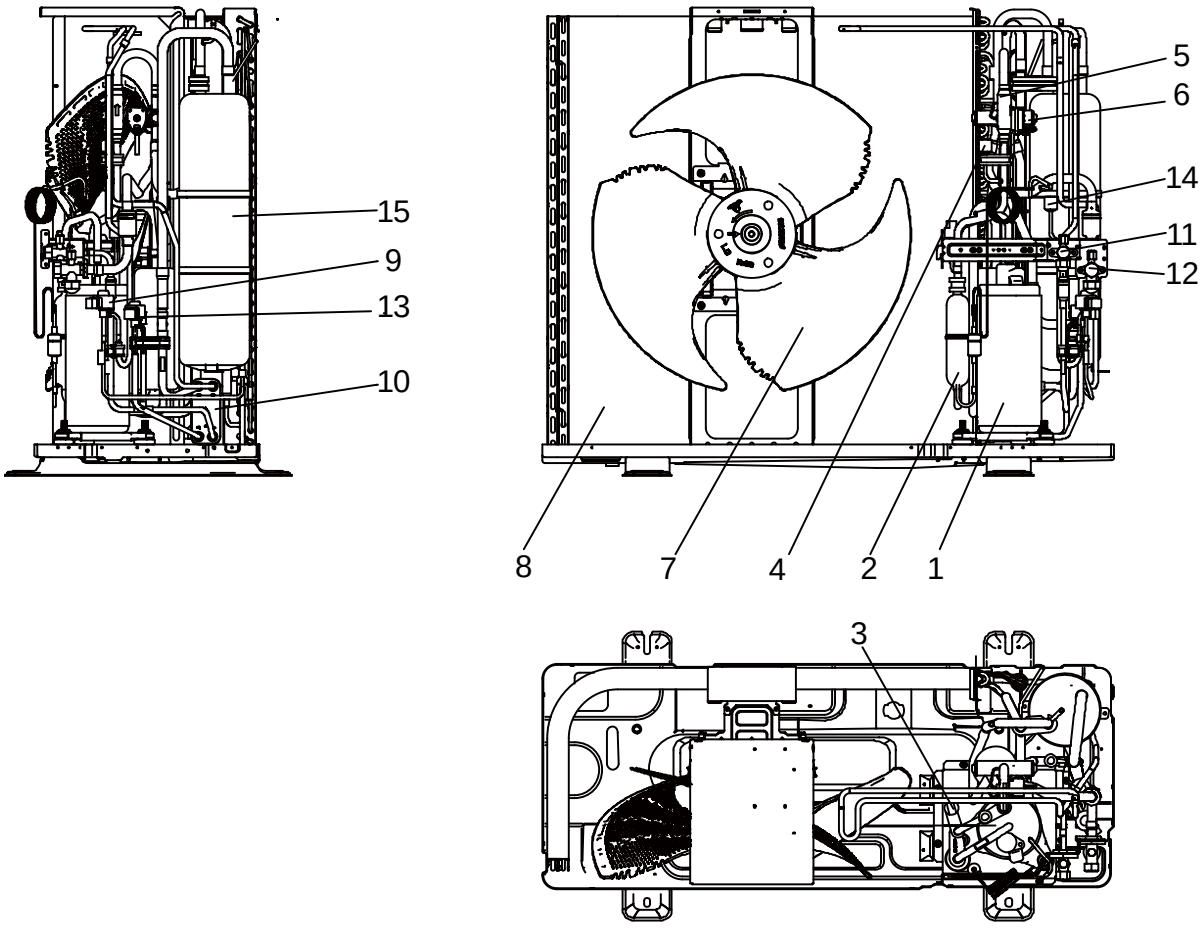
1 Layout of Functional Components

1.1 80/100 model layout of functional components

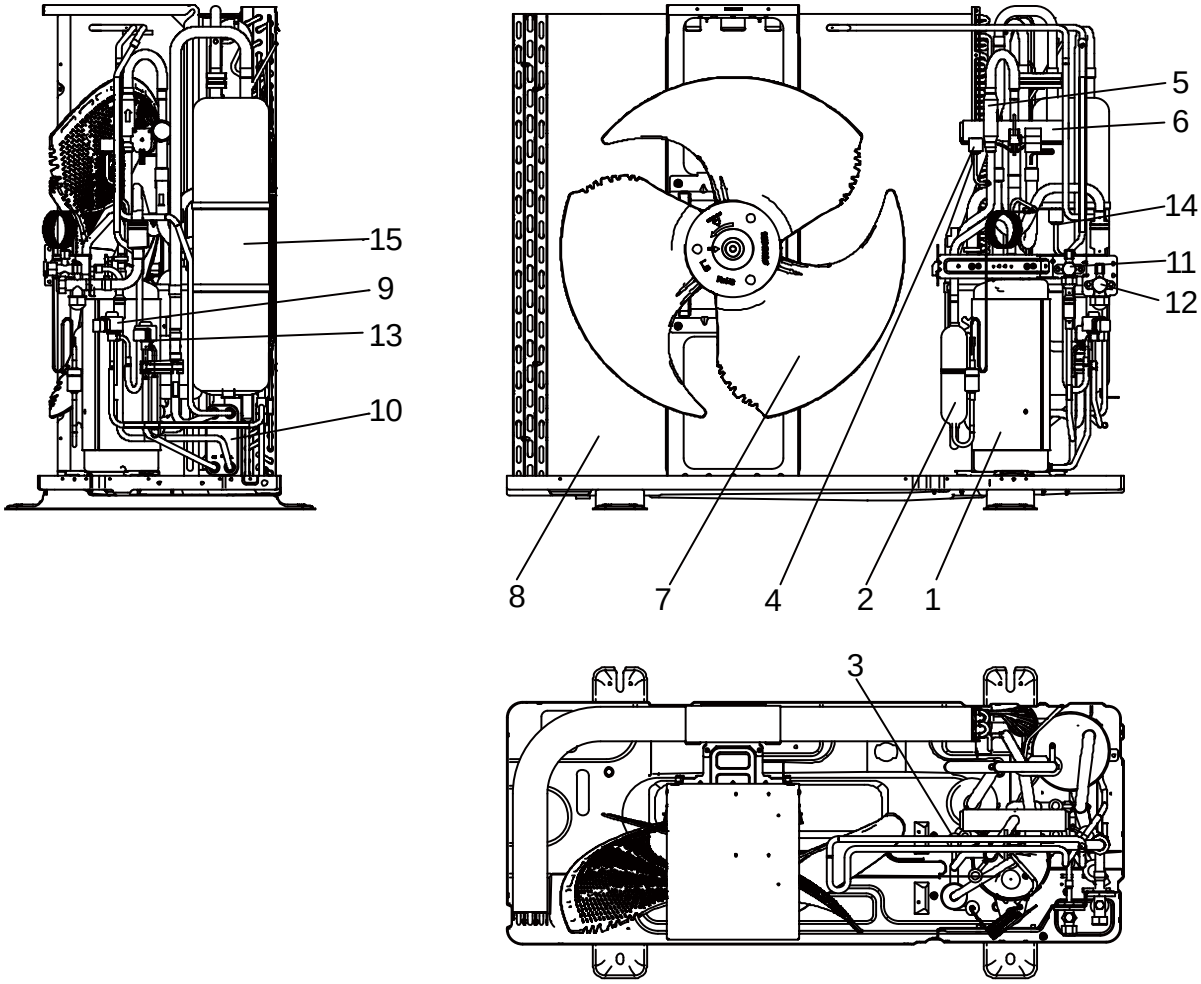
Figure 2-1.1: 80/100 model layout of functional components



Legend			
No.	**Parts name**	**No.**	**Parts name**
1	Compressor	9	Electronic expansion valve (EEVA)
2	Oil separator	10	Plate heat exchanger
3	High pressure switch	11	Stop valve (liquid side)
4	High pressure sensor	12	Stop valve (gas side)
5	Check value	13	Electronic expansion valve (EEVC)
6	Four-way valve(ST1)	14	Low pressure sensor
7	Fan	15	Gas-liquid separator
8	Heat exchanger		
9	Electronic expansion valve (EEVA)		

1.2 120/140/160 model layout of functional components

Figure 2-1.2:120/140/160 model layout of functional components

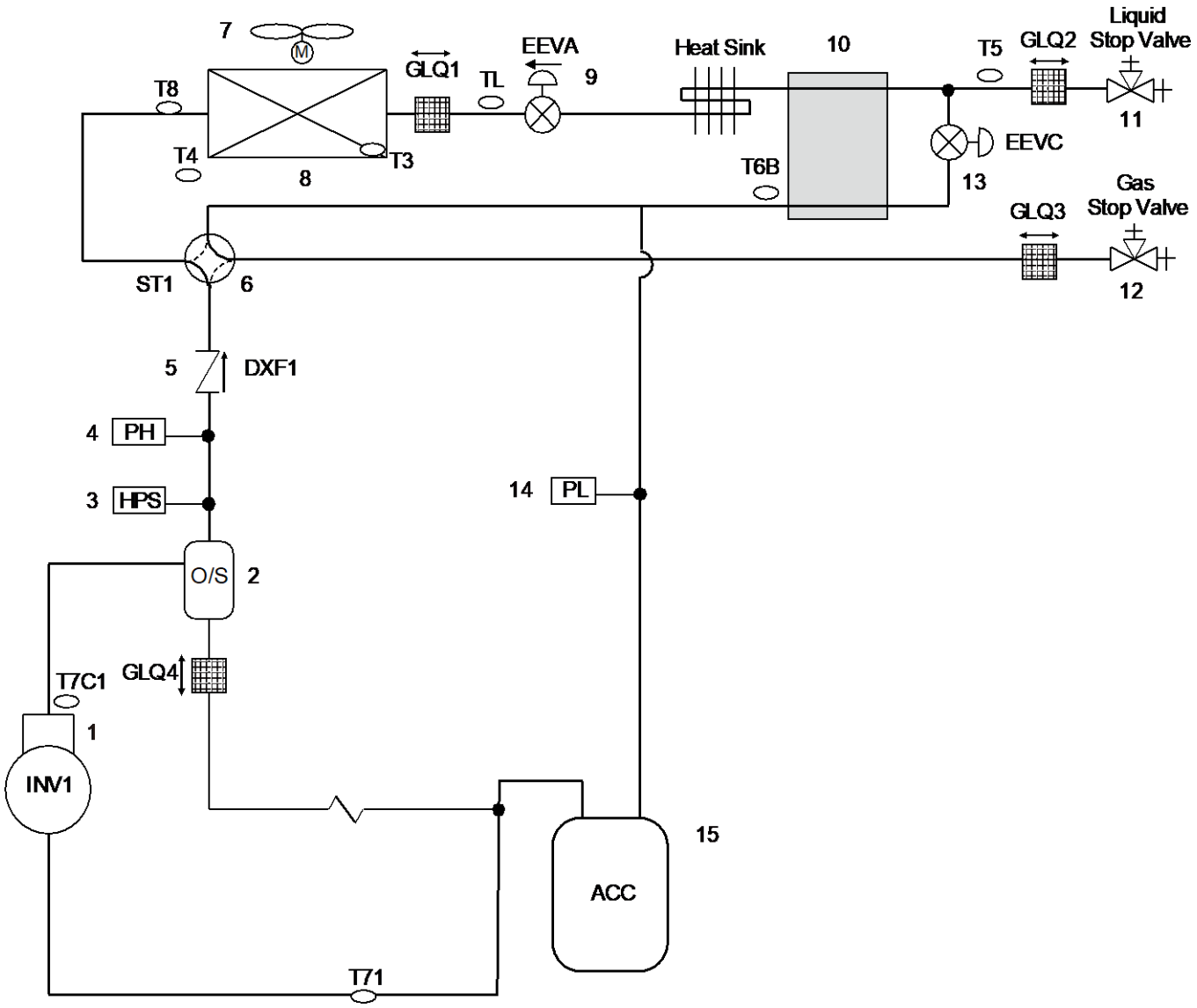


Legend			
No.	**Parts name**	**No.**	**Parts name**
1	Compressor	9	Electronic expansion valve (EEVA)
2	Oil separator	10	Plate heat exchanger
3	High pressure switch	11	Stop valve (liquid side)
4	High pressure sensor	12	Stop valve (gas side)
5	Check value	13	Electronic expansion valve (EEVC)
6	Four-way valve(ST1)	14	Low pressure sensor
7	Fan	15	Gas-liquid separator
8	Heat exchanger		
9	Electronic expansion valve (EEVA)		

2 Piping Diagrams

2.1 80/100 model piping diagram

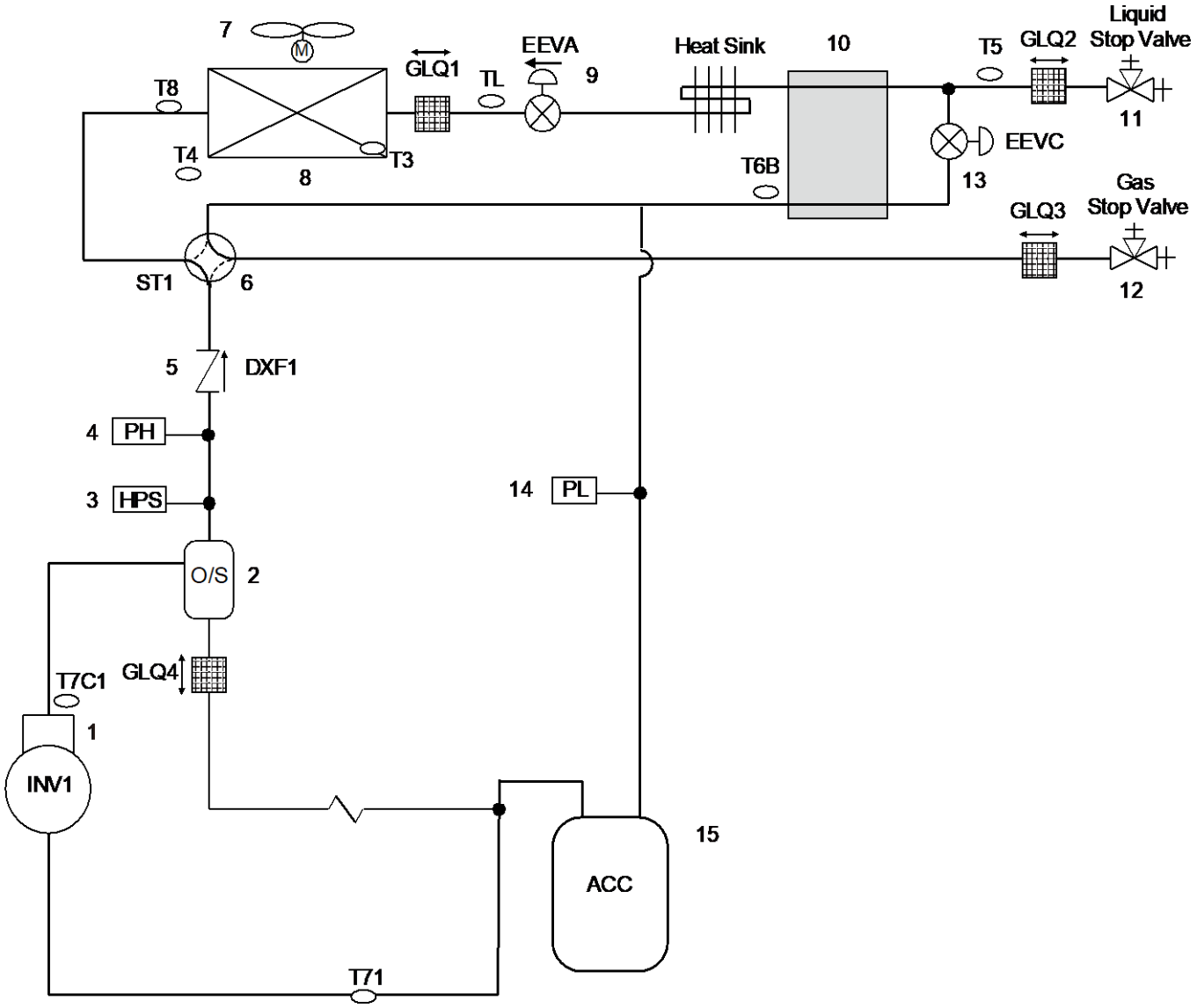
Figure 2-2.1: 80/100 model piping diagram



Legend				
No.	**Parts name**		**No.**	**Parts name**
1	Compressor		13	Electronic expansion valve (EEVC)
2	Oil separator		14	Low pressure sensor
3	High pressure switch		15	Gas-liquid separator
4	High pressure sensor		**Sensor Code**	**Description**
5	Check value		T3	Heat exchanger pipe temperature sensor
6	Four-way valve(ST1)		T4	Outdoor ambient temperature sensor
7	Fan		T5	Liquid pipe temperature sensor
8	Heat exchanger		T6B	Plate heat exchanger outlet temperature sensor
9	Electronic expansion valve (EEVA)		T7C1	Discharge temperature sensor
10	Plate heat exchanger		T71	Suction temperature sensor
11	Stop valve (liquid side)		T8	Condenser inlet temperature sensor
12	Stop valve (gas side)		TL	Condenser outlet temperature sensor

2.2 120/140/160 model piping diagram

Figure 2-2.2: 120/140/160 model piping diagram



Legend			
No.	**Parts name**	**No.**	**Parts name**
1	Compressor	13	Electronic expansion valve (EEVC)
2	Oil separator	14	Low pressure sensor
3	High pressure switch	15	Gas-liquid separator
4	High pressure sensor	**Sensor Code**	**Description**
5	Check value	T3	Heat exchanger pipe temperature sensor
6	Four-way valve(ST1)	T4	Outdoor ambient temperature sensor
7	Fan	T5	Liquid pipe temperature sensor
8	Heat exchanger	T6B	Plate heat exchanger outlet temperature sensor
9	Electronic expansion valve (EEVA)	T7C1	Discharge temperature sensor
10	Plate heat exchanger	T71	Suction temperature sensor
11	Stop valve (liquid side)	T8	Condenser inlet temperature sensor
12	Stop valve (gas side)	TL	Condenser outlet temperature sensor

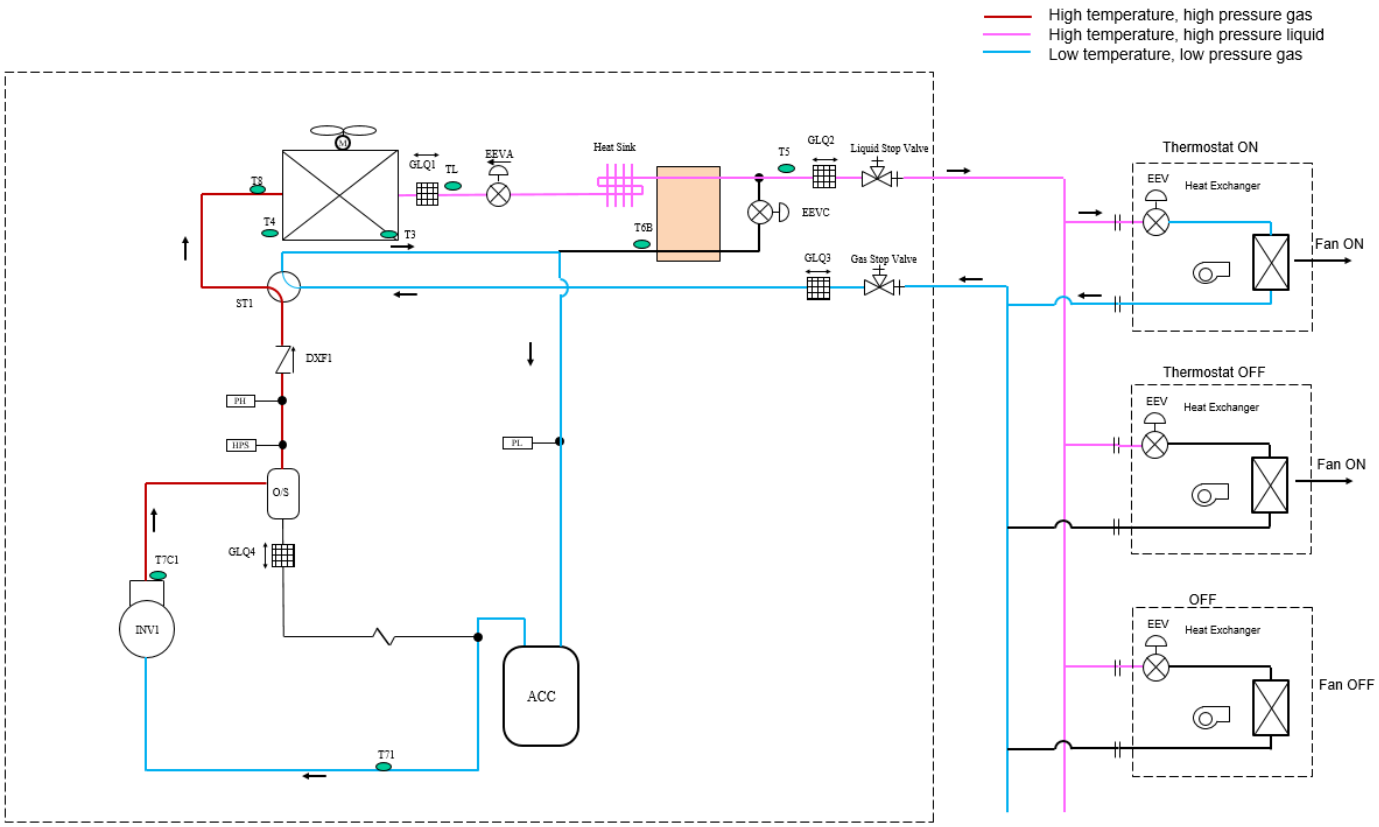
2.3 Key components

1. **Oil separator:**
   Separates oil from gas refrigerant pumped out of the compressor and quickly returns it to the compressor. Separation efficiency is up to 99%.
2. **Gas-liquid separator:**
   Separates liquid refrigerant from gas refrigerant, stores liquid refrigerant and oil to protect compressor from liquid hammering.
3. **Electronic expansion valve (EEVA):**
   Controls refrigerant flow and reduces refrigerant pressure.
4. **Four-way valve:**
   Controls heat exchanger function. When open, the heat exchanger functions as an evaporator; When closed, the heat exchanger functions as a condenser. Refer to part 3, “Heat Exchanger Control”.
5. **Plate heat exchanger:**
   In cooling mode, it can improve super-cooling degree and the super-cooled refrigerant can achieve better heat exchange in indoor units. In heating mode, the refrigerant comes from the plate heat exchanger going to the compressor can increase the refrigerant volume and improve the heating capacity in low ambient temperature. Refrigerant volume in plate heat exchanger is controlled according to temperature different between plate heat exchanger inlet and outlet or the temperature different between discharge temperature and target discharge temperature.
6. **High pressure switch:**
   Regulate system pressure. When system pressure rises above the upper limit, the high pressure switch turn off, stopping the compressor. When the high pressure protection recovers, the compressor restarts.
7. **High/Low pressure sensor**
   Used to detect the system high/low pressure.

3 Refrigerant Flow Diagrams

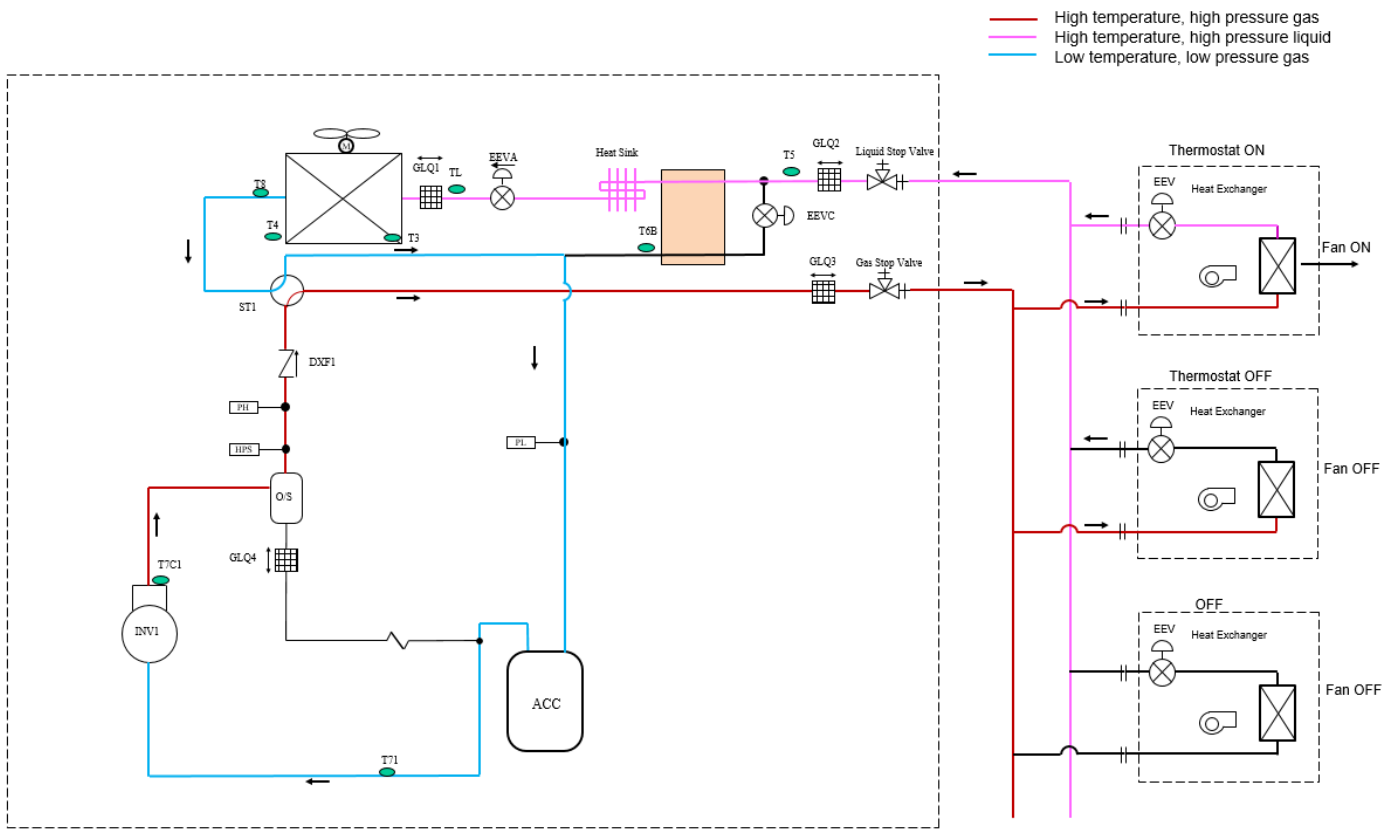
3.1 Cooling operation

Figure 2-3.1: Refrigerant flow during cooling operation



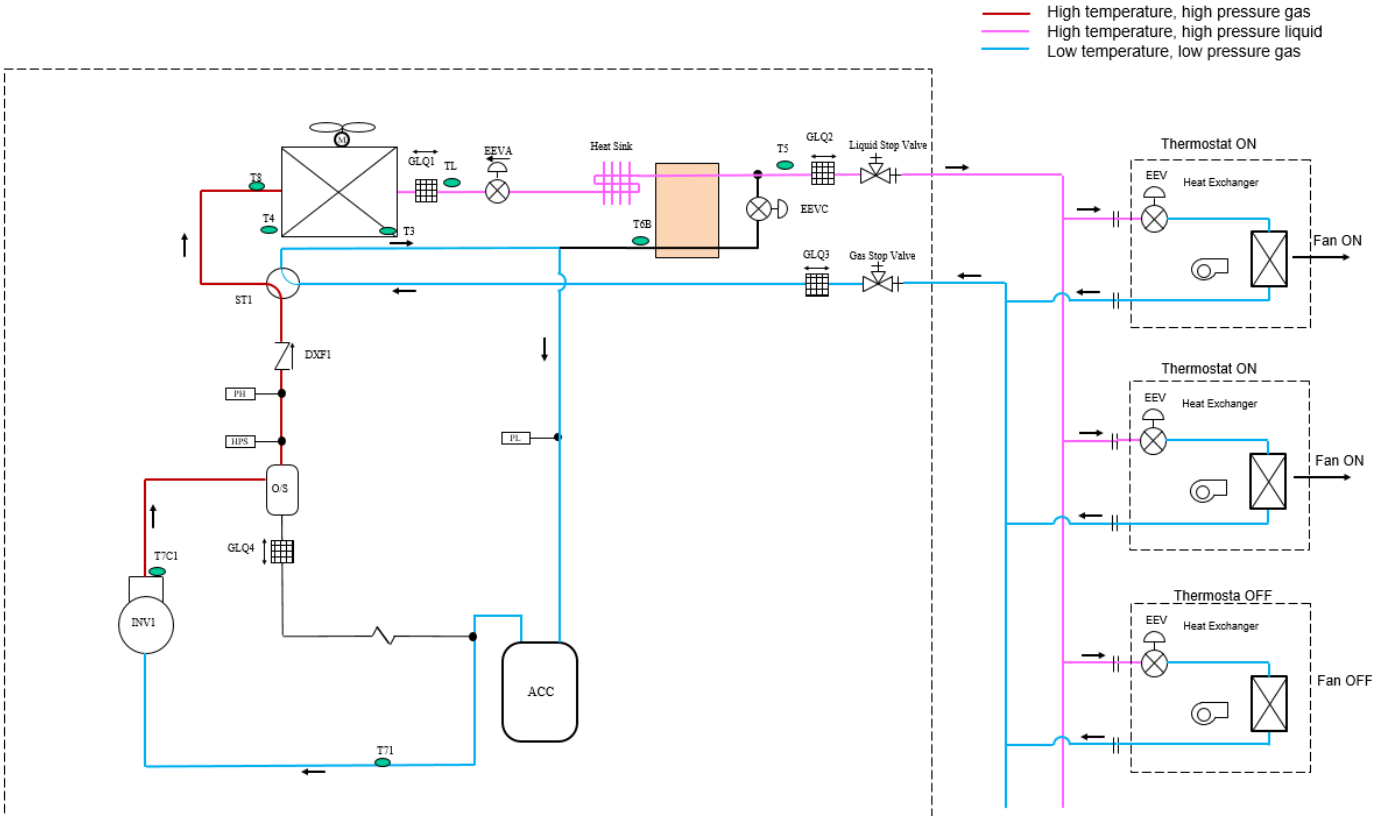
3.2 Heating operation

Figure 2-3.2: Refrigerant flow during heating operation



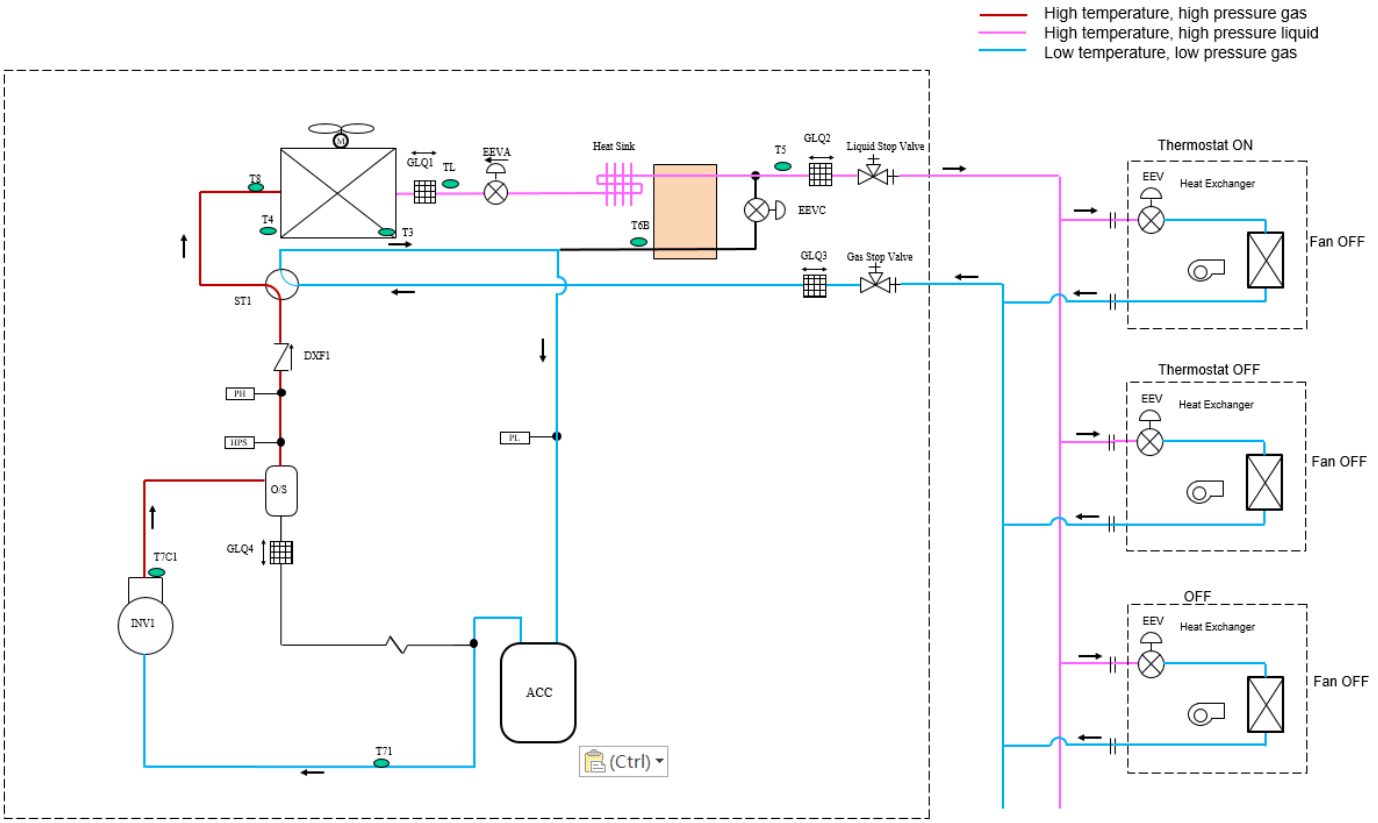
3.3 Oil return operation in cooling mode

Figure 2-3.3: Refrigerant flow during oil return operation in cooling mode



3.4 Oil return operation in heating mode and defrosting operation (4-way valve change direction)

Figure 2-3.4: Refrigerant flow during oil return operation in heating mode and defrosting operation (4-way valve change direction)



Part 3

Control

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6 Protection Control..... 36

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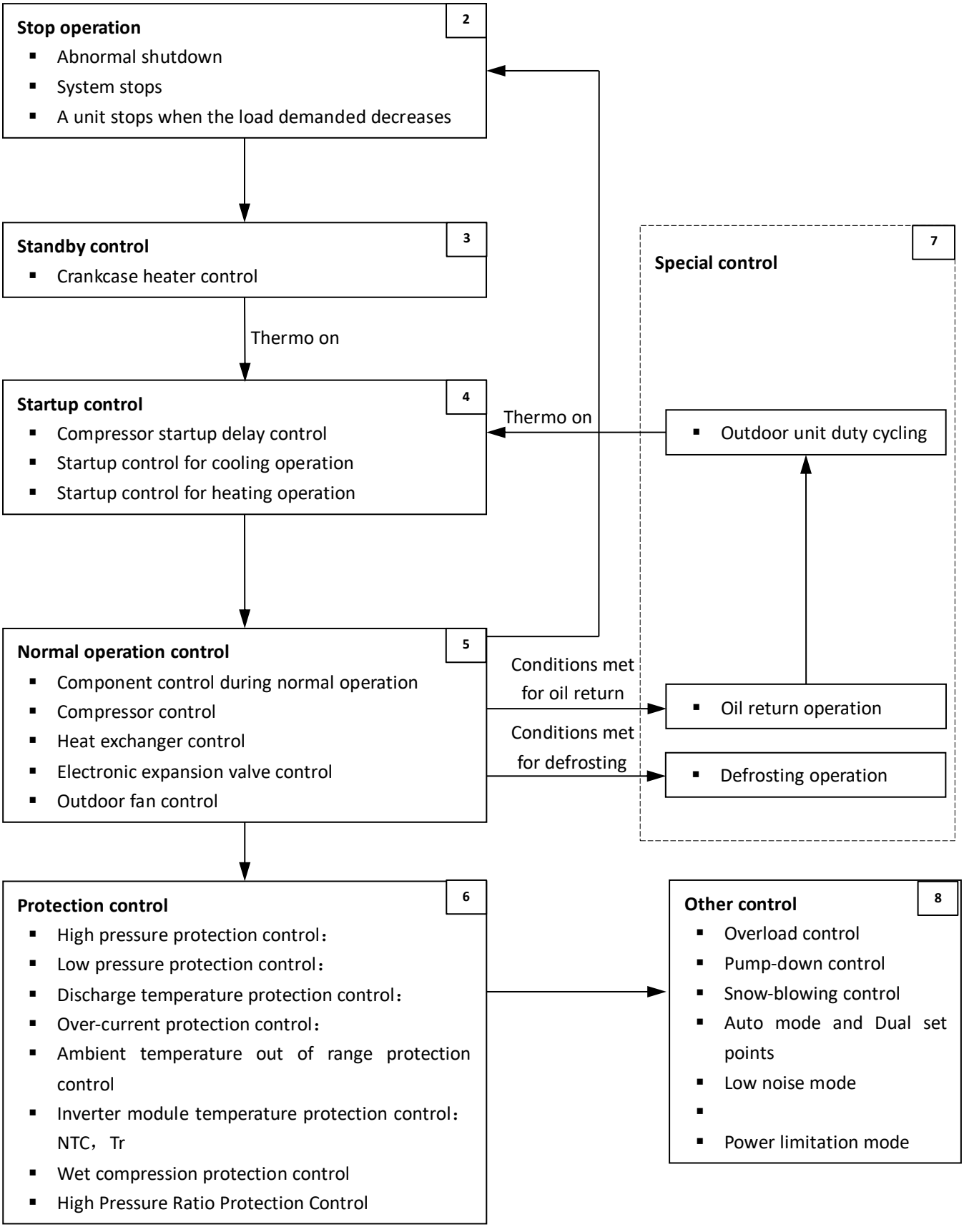
8 Other Control 41

1 General Control Scheme Flowchart

Sections 2 to 8 on the following pages detail when each of the controls in the flowchart below is activated.



Legend
Numbers in the top right-hand corners of boxes indicate the relevant section of text on the following pages.

2 Stop Operation

The stop operation occurs for one of the three following reasons:

1. Abnormal shutdown: in order to protect the compressors, if an abnormal state occurs，the system will makes a 'stop with thermos-off' operation and an error code will be displayed on the outdoor unit digital displays.
2. The system stops when the set temperature of all indoor unit has been reached, or all indoor units has stop or error.
3. The ambient temperature is greater than 30°C and the number of Thermo ON indoor unit is 0.

Table 3-2.1: Component control during stop operation

Part Name		Symbol	Stop control
ODU	Inverter compressor A	INV1	OFF
	Inverter fan 1	FANA	Keeps for 2 min, then OFF
	Four way valve	ST1	Holds
	Electronic expansion valve	EEVA	cooling mode: 120pls heating mode: 0pls
	Electronic expansion valve	EEVC	0pls

3 Standby Control

3.1 Crankcase Heater Control

The crankcase heater is used to prevent refrigerant from mixing with compressor oil when the compressors are stopped. The crankcase heater is controlled mainly according to the minimum of discharge temperatures.

When the minimum of discharge temperatures is above 45°C, the crankcase heater is off;

When the minimum of discharge temperatures is below 40°C, the crankcase heater turns on if one of the three following conditions is matched:

1. The first time powered on
2. In defrost operation
3. Ambient temperature < 10 °C and the compressor stops for more than 4 hours

4 Startup Control

4.1 Startup Frequency Control

During the start-up process, the control of the compressor and the heat exchange mode is uniformly judged by the outdoor unit, and the electronic expansion valve and solenoid valve are self-judged by the salve unit according to its own sensor status.

During the start-up process, the compressor frequency is based on the displacement frequency of the 60cc compressor, and convert it to actual frequency.

4.2 Compressor Startup Delay Control

In initial startup control, compressor startup is delayed for 3 minutes in order to let the outdoor unit search for the indoor units' addresses.

In restart control (except in oil return operation and defrosting operation), compressor startup is delayed such that a minimum of 3 minutes and a maximum of 12 minutes has elapsed since the compressor stopped, in order to prevent frequent compressor on/off and to equalize the pressure within the refrigerant system.

4.3 Startup Control for Cooling Operation

Table 3-4.1: Component control during startup in cooling mode

Component		Wiring diagram label	Before startup[1]	Startup control				
				STEP1	STEP2	STEP3	STEP4	STEP5
ODU	Inverter compressor A	INV1	0Hz	0Hz	0Hz	0Hz	Initial step for 60S, then+4Hz×Nodu / 20S. (Until it reaches (Pc-Pe)_min ≥ 0.4MPa)	adjust according to the high pressure and low pressure etc.
	Inverter fan 1	FANA	0 Step	If T4 exceeds the operating range, off 2min after the 12th gear is operated for 2min, and then off after 3 cycles at most	0 step	0 step	Start: 0 step, then adjust according to the high pressure and low pressure	PI control
	Four way valve	ST1	Maintains previous position	Maintains previous position	Determined based on the initial mode of the heat exchanger			
	Electronic expansion valve	EEVA	0pls	Compressor operation： T4<5℃ 480P EEV：135pls； T4≥5℃ 480P EEV：320pls； Compressor not operation, 0pls				
		EEVC	0pls	0pls			Compressor operation, 17pls→ +8pls per 20S based on high pressure or discharge temperature. Compressor not operation, 0pls.	
IDU	Fan	Fan	0 step	Setting speed by owners				
	Electronic expansion valve	EEV	0pls	0pls			Maintain 120pls for 2min	
Ending conditions			60S	T4≥-15 and T4≤55	30s	30s	(Pc-Pe)_min≥0.4MPa or 120s	End if startup time arrives 5 min or the minimum superheat of discharge temperature ≥10°C or Tc_max > 50°C.

4.4 Startup Control for Heating Operation

Table 3-4.2: Component control during startup in heating mode

Component		Wiring diagram label	Before startup	Startup control				
				STEP1	STEP2	STEP3	STEP4	STEP5
ODU	Inverter compressor A	INV1	0Hz	0Hz	0Hz	0Hz	Initial step for 60S, then+4Hz×Nodu / 20. (Until it reaches (Pc-Pe)_min ≥ 0.3MPa)	Adjust according to the high pressure and low pressure etc.
	Inverter fan 1	FANA	0 Step	0 step	0 step	0 step	Start: 0 step, then adjust by the high pressure and low pressure	PI control
	Four way valve	ST1	Maintains previous position	Maintains previous position		Determined based on the initial mode of the heat exchanger		
	Electronic expansion valve	EEVA	0pls	0pls			Evaporator, adjusted according to the difference between ambient temperature and low-pressure saturation temperature.	
		EEVC	0pls	0pls			Compressor operation, 17pls→ +8pls per 20S based on high pressure or low pressure etc. Compressor not operation, 0pls.	
IDU	Fan	Fan	0 step	Setting speed by owners(Anti-cold wind function is effective)				
	Electronic expansion valve	EEV	300pls	300pls		Maintain 300pls for 3min		
Ending conditions			60S	T4≤30	30s	30s	Pc-Pe>0.3MPa or 300s	End if startup time arrives 10 min or the minimum superheat of discharge temperature≥10°C for 5min or Tc_max > 50°C.

5 Normal Operation Control

5.1 Component Control during Normal Operation

Table 3-5.1: Outdoor unit component control during normal operation

Component	Wiring diagram label	Cooling	Heating
Inverter compressor A	COMP(A)	PI control, High pressure protection, Low pressure protection, Discharge temperature protection, Inverter Over-current protection control, Inverter module temperature protection control, Wet compression protection control, High Pressure Ratio Protection Control	
Inverter fan 1	FANA	PI control	PI control
Electronic expansion valve	EEVA	Sub-cooling control	ODU superheat control, discharge pipe temperature superheat control
	EEVC	Superheat control	Superheat control
Four-way valve	ST1	OFF	ON

Table 3-5.2: Indoor unit component control during normal operation

Component		Cooling	Heating
Fan	Thermo ON unit	Remote controller setting	Remote controller setting
	Stopping unit	OFF	OFF
	Thermo OFF unit	Remote controller setting	Remote controller setting
Electronic expansion valve (EEV)	Thermo ON unit	Superheat control	Subcooling control
	Stopping unit	0pls	56pls / 72pls/ (according setting)
	Thermo OFF unit	0pls	56pls / 72pls/ (according setting)

5.2 Compressor Control

Cooling operation

Compressor frequency is PI controlled to keep low pressure at target temperature.
Te: Low pressure equivalent saturation temperature (°C)
Tes: Target Te value.
Tes will be decided by Te setting, if you choose Auto that means except Te setting, the Tes would be adjusted according to the ambient temperature, refrigerant pipe length, etc.

Table 3-5.7: Te setting

Setting	0	1	2	3(Default)	4	5	6	7	8
Tes(C)	-3 Fixed	0 Fixed	3 Fixed	6 Auto	7 Fixed	8 Fixed	9 Fixed	10 Fixed	11 Fixed

Heating operation

Compressor frequency is PI controlled to keep high pressure at target temperature.
Tc: High pressure equivalent saturation temperature (°C)
Tcs: Target Tc value.
Tcs will be decided by Tc setting, if you choose Auto that means except Tc setting, the Tcs would be adjusted according to the ambient temperature, refrigerant pipe length, etc.

Table 3-5.8: Tc setting

Setting	0	1	2	3	4	5	6(Default)	7
Tcs(C)	41 Fixed	42 Fixed	43 Fixed	44 Fixed	45 Auto	46 Fixed	48 Fixed	51 Fixed

5.3 Heat Exchanger Control

The master outdoor unit check status of the outdoor unit heat exchanger and then control four-way valve, fan and EEVA.

5.5 Electronic Expansion Valve Control

5.5.1EEVA control

The positions of electronic expansion valves EEVA are controlled in steps from 0/0 (fully closed) to 480/2880 (fully open).

5.5.1.1 Outdoor unit heat exchanger is performed via the evaporator

This function is used to exert PI control on the electronic expansion valve EEVA so that the minimum of discharge temperatures (T7C_min) will become T7CS.

T7CS=3*PR +17 + Tc

T7CS: Target discharge temperature value

T7C_min: the minimum of discharge temperatures

Tc: High pressure equivalent saturation temperature (°C)

PR: pressure ratio, Pr = (Pc+0.11)/(Pe+0.1)

5.5.1.2 Outdoor unit heat exchanger is performed via the condenser

This function is used to exert PI control on the electronic expansion valve EEVA so that the condenser outlet subcooled degree (SC) will become constant.

SC = Tc – TL

SC: Condenser outlet subcooled degree (°C)

TL: Condenser outlet temperature (°C)

Tc: High pressure equivalent saturated

5.5.2 EEVC control

The positions of electronic expansion valves EEVC are controlled in steps from 0 (fully closed) to 480 (fully open).

In order to make the maximum use of the Microchannel heat exchanger, this function is used to exert PI control on the electronic expansion valve EEVC so that the Microchannel heat exchanger outlet superheated degree(SH)or discharge temperature(T7C1/T7C2) will become constant.

SH = T6B – Te

SH: Microchannel heat exchanger outlet superheated degree (°C)

Te: Low pressure equivalent saturation temperature (°C)

T6B: Microchannel heat exchanger outlet temperature.

5.6 Outdoor Fan Control

The speed of the outdoor unit fans is adjusted in steps, as shown in Table 3-5.9

Fan speed index	Fan speed (rpm)		Note	
	80-100 model	120-160 model	cooling	heating
			Stop operation, Startup or defrosting control[1]	Startup or defrosting control[1]
0	0	0		
1	210	210		
2	210	210		
3	210	210		
4	240	240		
5	280	280		
6	320	320		
7	360	360		
8	410	410	80-160 model	80-160 model
9	460	460		
10	510	510		
11	570	570		
12	630	630	80-160 model	80-160 model
13	690	690		
14	730	730		
15	760	760		
16	780	780		
17	830	830		
18	860	860		
19		880		

Notes:

1. For example: When Stop operation, Startup or defrosting in cooling mode, the maximum Fan speed index of 120 model can be achieved is 8.
2. Standard step means the max. step in standard static pressure mode (0Pa default)

Table 3-5.10 Upper limit fan step in static pressure mode

Cooling

Static Pressure mode \ model	80	100	120	140	160
0Pa(default)	14	14	15	15	15
10Pa	15	15	16	16	16
20Pa	16	16	17	17	17
30Pa	17	17	18	18	18
35Pa	18	18	19	19	19

Heating

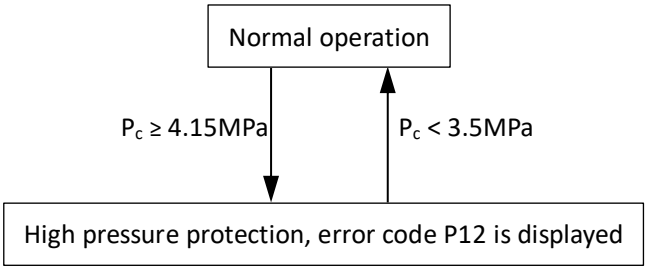
Static Pressure mode \ model	80	100	120	140	160
0Pa(default)	15	15	16	16	16
10Pa	16	16	17	17	17
20Pa	17	17	18	18	18
30Pa	18	18	19	19	19
35Pa	19	19	20	20	20

6 Protection Control

6.1 High Pressure Protection Control

This control protects the system from abnormally high pressure and protects the compressors from transient spikes in pressure.

Figure 3-6.1: High pressure protection control



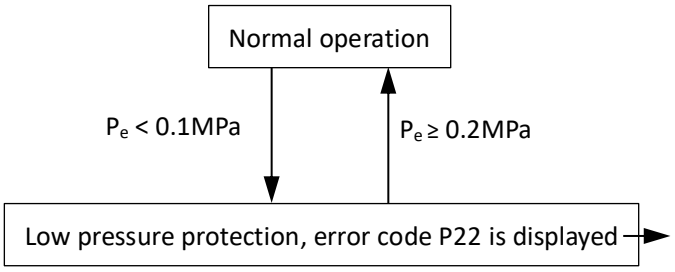
Notes:

1. P_c: Discharge pressure

6.2 Low Pressure Protection Control

This control protects the system from abnormally low pressure and protects the compressors from transient drops in pressure.

Figure 3-6.3: Low pressure protection control in cooling operation



When P22 protection occurs 3 times in 60 minutes, the P25 error is displayed. When an P25 error occurs, a manual system restart is required before the system can resume operation.

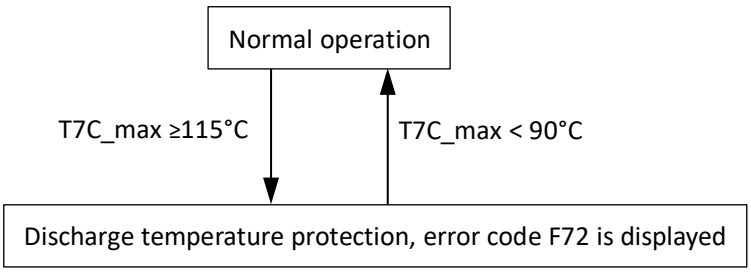
Notes:

1. P_e: Suction pressure

6.3 Discharge Temperature Protection Control

This control protects the compressors from abnormally high temperatures and transient spikes in temperature. It is performed for each compressor.

Figure 3-6.5: Discharge temperature protection control



Notes:

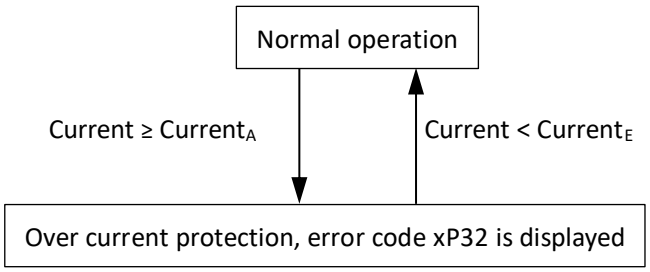
1. T7C_max: Max temperature of compressor discharge temperatures

When the Max temperature of compressor discharge temperature rises above 115°C the system displays F72 protection and all units stop running. When F72 protection occurs 3 times in 100 minutes, the F7A error is displayed. When an F7A error occurs, a manual system restart is required before the system can resume operation.

6.4 Over-current Protection Control

Over current protection control is performed to prevent tripping due to transient inverter over-current. It protects the compressors from abnormally high currents. It is performed for each compressor.

Figure 3-6.6: Over-current protection control

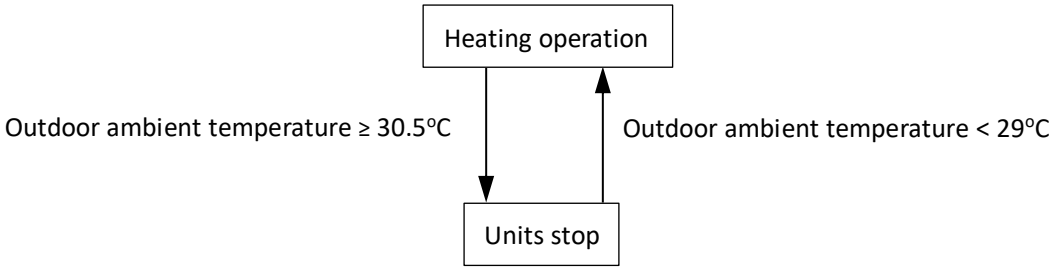


Model		80	100	120	140	160
V8	CurrentA(A)	14	15	19	20	21
	CurrentE(A)	9	10	14	15	16

6.5 Ambient temperature out of range protection control

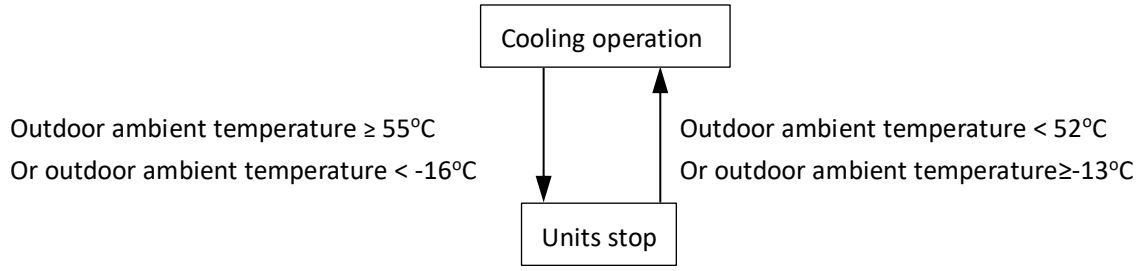
When the outdoor ambient temperature rises above 30.5°C heating mode is disabled to prevent the mechanical load on compressors becoming too high and to prevent low compression ratios which can result in insufficient compressor internal oil lubrication.

Figure 3-6.7: Disable heating control



When the outdoor ambient temperature rises above 55°C or outdoor ambient temperature drops below -16°C, cooling mode is disabled to protect the compressor.

Figure 3-6.8: Disable cooling control



Notes:

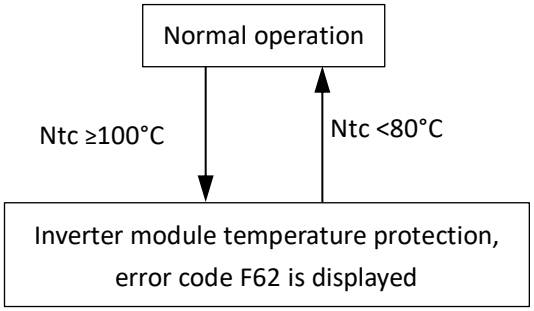
1. If the indoor unit operates in cooling mode below -5 ° C, the temperature of the indoor unit's air outlet may be lower than 0 degrees.

6.6 Inverter Module Temperature Protection Control

This control protects the compressors from abnormally high currents and protects the inverter modules from abnormally high temperatures. It is performed for each compressor and inverter module.

6.6.1 Error code F62

Figure 3-6.9: Inverter module temperature protection control



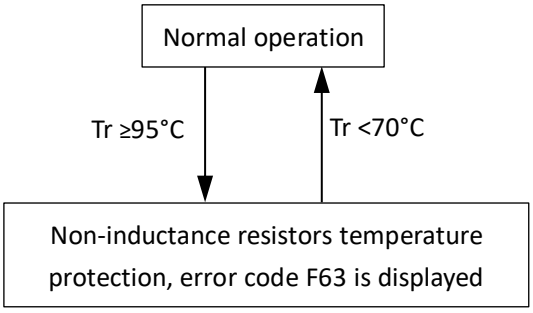
When F62 protection occurs 3 times in 100 minutes, the F6A error is displayed. When a F6A error occurs, a manual system restart is required before the system can resume operation.

Notes:

1. Ntc: Inverter module temperature

6.6.2 Error code F63

Figure 3-6.10: Non-inductance resistors temperature protection control



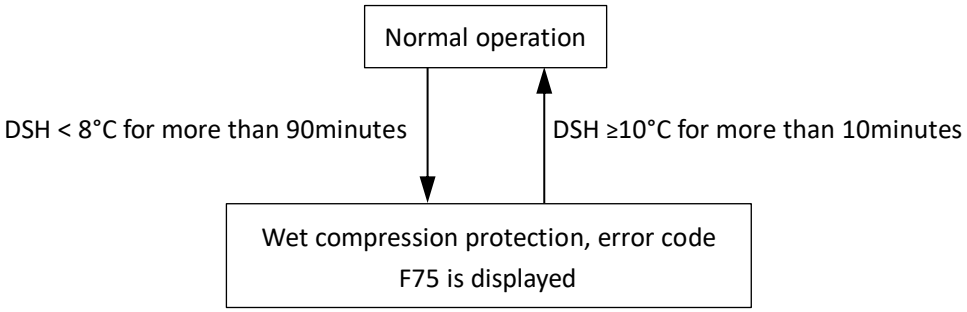
Notes:

2. Tr: Non-inductance resistors temperature

6.7 Wet Compression Protection Control

This protection is used to prevent compressor from damaging for the long time wet compression so that it can't be lubricated well. This control is performed for each compressor.

Figure 3-6.10: Wet compression protection control



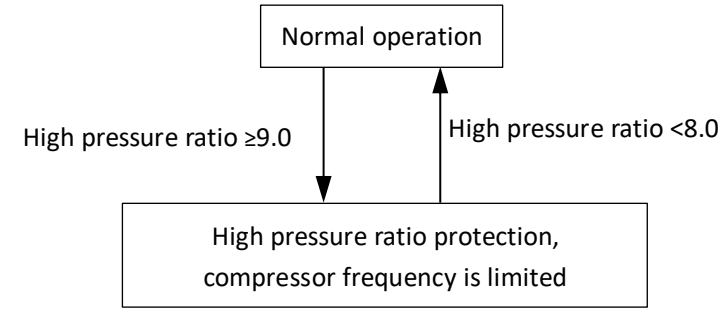
Notes:

1. DSH: Superheat of discharge temperature

6.8 High Pressure Ratio Protection Control

This high pressure ratio protection control is used to prevent the activation of protection devices due to abnormal increase of high pressure ratio, and to protect compressors against the transient increase of high pressure ratio. It is performed for entire system.

Figure 3-6.11: High pressure ratio protection control



Notes:

1. P_c: Discharge pressure P_e: Suction pressure
2. Pressure Ratio = (Pc+0.11)/(Pe+0.10)

7 Special Control

7.1 Oil Return Operation

In order to prevent compressors from running out of oil, the oil return operation is conducted to recover oil that has flowed out of the compressor(s) and into the piping system. This operation is performed for all units including units that are in standby.

When the outdoor unit is running in Oil Return Operation, the digital display on outdoor main PCB will display “d0”.

7.1.1 Cooling Mode Oil Return Control

Timing of oil return operation:

- Calculated oil discharge has reached to specified level. The higher the compressor frequency step is, the more oil discharge.
- Initial cumulative compressor operating time reaches 2 hours.
- Cumulative compressor operating time reaches 8 hours.

Tables 3-7.1 and Tables 3-7.2 show component control during oil return operation in cooling mode.

Table 3-7.1: Outdoor unit control during oil return operation in cooling mode

Component		Wiring diagram label	Cooling oil return control			
			STEP1	STEP2	STEP3	STEP4
ODU	Inverter compressor A	INV1	PI control	PI control, the minimum step is as follows: 80-100 model 26Hz 120-160 model 45Hz	PI control, initial ODU number is decided	PI control
	Inverter fan 1	FANA	PI control			
	Four way valve	ST1	OFF			
	Electronic expansion valve	EEVA	PI control	480pls	PI control	
		EEVC	OFF , then 17 pls	17 pls	17 pls	PI control
Ending conditions			End if startup time arrives 180S.	End if startup time arrives 6 min or the compressor discharge volume ≥ Target value for 4min.	After 20S.	After 2 min.

Cooling indoor unit		500P EEV
FAN	Thermo ON unit	Keep the previous fan speed
	Thermo OFF unit	
	Stop or Fan	
Electronic expansion valve (EEV)	Thermo ON unit	Superheat control
	Thermo OFF unit	80pls
	Stop or Fan	80pls

7.1.2 Heating Oil Return Control

It's basically identical with defrosting operation, refer to 7.2 Defrosting Operation

7.2 Defrosting Operation

In order to recover heating capacity, the defrosting operation is conducted when the outdoor unit heat exchanger is performing as an evaporator. The defrosting operation is controlled according to outdoor ambient temperature, outdoor heat exchanger temperature, indoor heat exchanger temperature and outdoor units running time. When the outdoor unit is running in defrosting, the digital display on outdoor main PCB will display "df".

Reverse Cycle Defrosting Operation

Timing of reverse cycle defrosting operation:

- Te <-2°C and T4<20°C, meeting either of the points below:
  1) When there is an obviously drop in the temperature of outdoor unit heat exchanger outlet
  2) When cumulative operating time after the latest defrosting control arrives an hour
- Compulsive defrosting or oil return set manually after PI control 1min.

Table 3-7.3: Outdoor unit component control during defrosting operation

Component		Wiring diagram label	Defrosting operation control		
			Control before Defrosting	Defrosting control	Control after Defrosting
ODU	Inverter compressor A	INV1	Reduce frequency step	80-160 model:70Hz	Reduce frequency step ,then Startup control ,then PI control
	Inverter fan 1	FANA	PI control	Initial OFF But if the high pressure is larger than 2.6MPa , turn to 3 Step ； the high pressure is larger than 2.7MPa , turn to 6 Step or higher	Initial step then PI control
	Four way valve	ST1	ON	OFF	ON
	Electronic expansion valve	EEVA	480pls		
		EEVC	0pls	0pls	17pls, then PI control
Ending conditions			End if Pc-Pe<0.4MPa, Maximum 120S	Defrost completion condition judgment, maximum time is 9min	9min

Defrosting control time is no less than 135Sec and fulfill one of the conditions below:

- Pc-max ≥ 3.0MPa.
- Total defrosting control time has reached 9 minutes.
- T3_min >Target value for a certain time.

Table 3-7.4: Indoor unit component control during defrosting operation

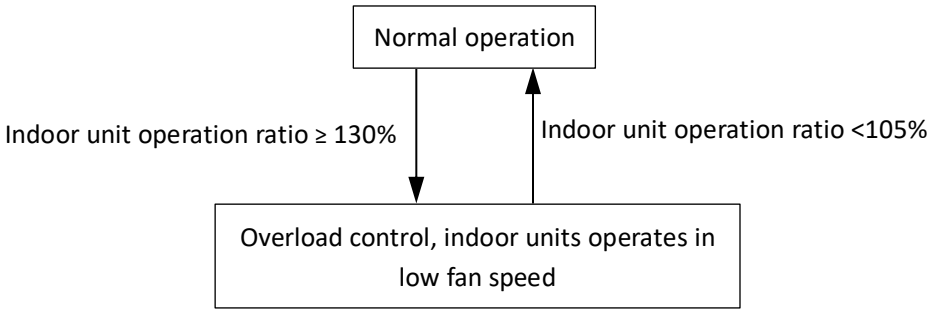
Heating indoor unit (ODU operates cooling main operation)		500PEEV
FAN	Thermo ON unit	OFF
	Thermo OFF unit	OFF
	Stop	OFF
Electronic expansion valve (EEV)	Thermo ON unit	Within 2min: 480pls 2-4min: 300pls After 4min: 120pls
	Thermo OFF unit	
	Stop or error stop	

8 Other Control

8.1 Overload control

Overload control is used to maintain comfort requirement (i.e. outlet air temperature) and keep proper system pressure.

Figure 3-8.1: Overload control



Notes:

1. Indoor unit operation ratio = Indoor unit operates capacity index (in the same mode)/ outdoor unit capacity index

8.2 Vacuum control

This control is used to open solenoid valves and electronic expansion valves in the whole system.

- During the vacuum work, the high/low pressure sensor error and low pressure protection should be ineffective (Use short connectors if not).
- The four-way valve is OFF, and compressors or fans are prohibited to run.

8.3 Auto Snow-blowing Control

Auto snow-blowing control is used to prevent the fans of stopped outdoor units from destroying by heavy snow.

Timing of auto snow-blowing operation:

T4≤3°C and outdoor units stops time elapse for TA.

Table 3-8.3: Snow-blowing control

Model	Fan Step	TA: Level a (Menu mode n261)	TA: Level b (Menu mode n262)	Disabled (Menu mode n260, default)
80-160 model	15	30min	15min	/

When T4＞3°C or the outdoor unit starts operation, the time accumulated for auto snow-blowing is reset to 0.

8.4 Low Noise Mode

Low noise mode is used to decrease the noise produced by outdoor units. There are 5 kinds of low noise mode: Silent mode1~ Silent mode5. When low noise mode activating, both the fan step and compressor are limited.

Table 3-8.4: Low noise mode

ODU model		Silent mode 1		Silent mode 2		Silent mode 3		Silent mode 4		Silent mode 5	
		Max. Fan step	Max. frequency step	Max. Fan step	Max. frequency step	Max. Fan step	Max. frequency step	Max. Fan step	Max. frequency step	Max. Fan step	Max. frequency step
80	Cooling	13	72	12	64	11	57	10	49	8	41
	Heating	15	76	13	67	12	58	11	49	10	40
100	Cooling	13	82	12	75	11	67	10	60	8	50
	Heating	15	82	13	73	12	62	11	51	10	40
120	Cooling	15	64	13	57	12	49	11	42	9	35
	Heating	16	62	15	55	13	47	12	40	11	32
140	Cooling	15	69	13	62	12	56	11	49	9	42
	Heating	16	71	15	62	13	54	12	45	11	37
160	Cooling	15	76	13	68	12	58	11	51	9	42
	Heating	16	75	15	66	13	58	12	49	11	41

Table 3-8.4: Low noise mode (continue)

8.5 Power Limitation Mode

The energy saving mode is used to limit the system power. It can be used to limit the line selection current or to reduce the peak current.

Table 3-8.5: Power limitation mode

Power limitation mode setting	Power limitation mode level	Correction factor
n23 40 ~n23 100	n23 40	40%
	n23 41	41%
	n23 42	42%
	~	
	n23 98	98%
	n23 99	99%
	n23 100 (Default)	100%

Part 4

Field Settings

1. Overview 44

2. Digital display and button settings 44

3. System Parameter Check 54

1. Overview

This chapter describes how the system configuration can be implemented once the installation is completed, and other relevant information.

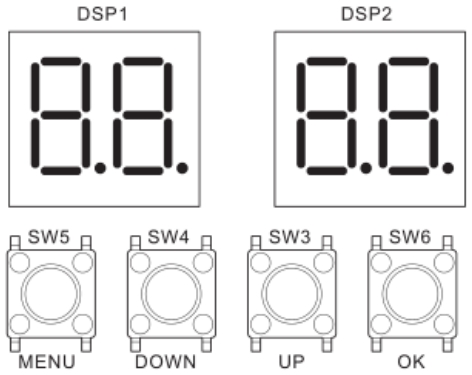
It contains the following information:

- Implement field settings
- Using the Check function

INFORMATION

The installation personnel should read this chapter.

2. Digital display and button settings



2.1 Digital display output

Table 4-2.1: Digital display output

Outdoor unit state		Parameters displayed on DSP1	Parameters displayed on DSP2
Standby		The address of outdoor unit	The number of indoor units in communication with the outdoor units
Normal operation	For single compressor units	---	Running speed of the compressor in rotations per second
Other operation state		Operation state code	Operation state step
Error or protection		Placeholder and error or protection cod	
In menu mode		Display menu mode code	
System check		Display system check code	

2.2 Function of buttons SW3 to SW6

Table 4-2.2 Function of buttons SW3 to SW6

Button	Function
SW3(UP)	In menu mode: previous and next buttons for menu modes.
SW4(DOWN)	Not in menu mode: previous and next buttons for system check information.
SW5(MENU)	Enter / exit menu mode.
SW6(OK)	Confirm to enter specified menu mode.

2.3 Menu mode

Only master unit has the full menu functions, slave units only have error codes check and cleaning functions.

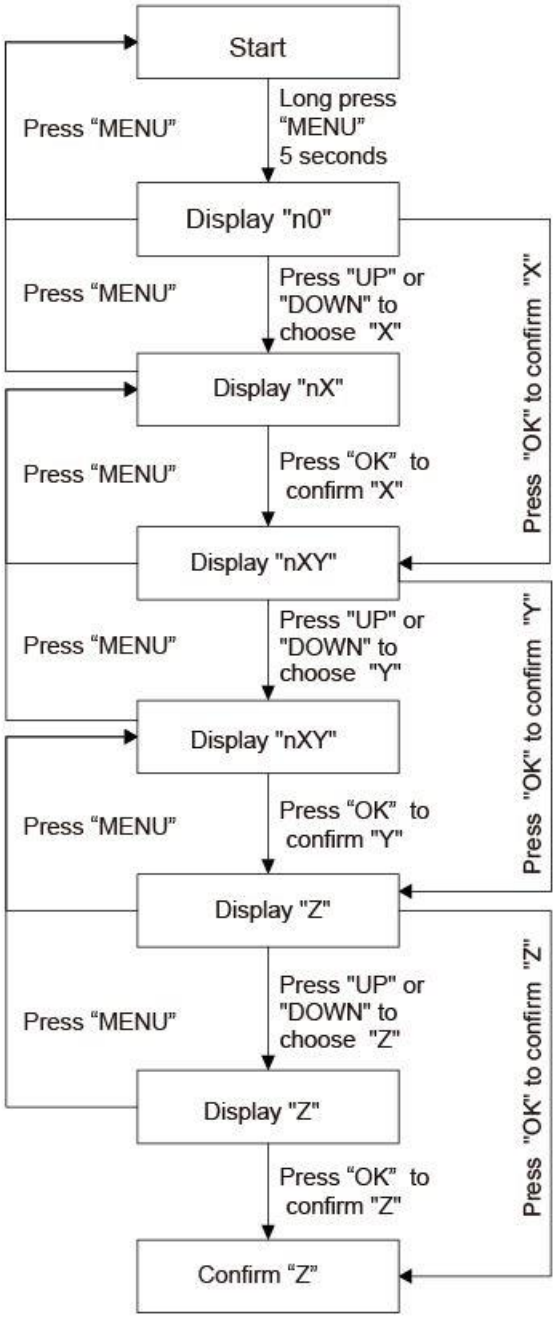
1. Long press SW5 "MENU" button for 5 seconds to enter menu mode, and the digital display displays "n0".
2. Press SW3 / SW4 "UP / DOWN" button to select the first level menu "n1", "n2", "n3", "n4","n5","n9"or "nc".
3. Press SW6 "OK" button to enter specified first level menu, for example, enter "n2" mode.
4. Press SW3 / SW4 "UP / DOWN" button to select the second level menu from "n20" to "n28".
5. Press SW6 "OK" button to enter specified second level menu, for example, enter "n22" mode.
6. Press SW3 / SW4 "UP / DOWN" button to select the specified menu, for example , from "0" to"6"
7. Press SW6 "OK" button to enter specified menu mode. For example, enter "2" mode.

⚠ CAUTION

- Operate the switches and push buttons with an insulated stick (such as a closed ball-point pen) to avoid touching of live parts.

Menu mode selection flowchart:

Figure 4-2.1 Menu mode selection flowchart:



Menu mode function:

Table 4-2.3 Menu mode function:

First level menu	Second level menu	Specified menu mode	Description	Default
n0 (Information query)	0 (History error)	0	Query History error (last ten error codes)	-
		1	Cleaning history error	
	1 (address)	0	Query Indoor unit's address	
		2	Query the address of Indoor unit in power-off condition	
	2	1	Driver's version(compressor and fan displayed in turn)	
	4	-	Accumulated running time of compressor	
n1 (Installation and commissioning)	1[1] (System test)	0	Cooling Test	-
		1	Heating Test	
		2	Test running	
	2[1] (Refrigerant recovery)	0	Recycle Refrigerant to outdoor unit	
		1	Recycle Refrigerant to indoor unit	
		2	Balance system refrigerant	
	5	-	Vacuum mode[2]	
	6	-	Setting the VIP IDU address (Default:No.63)	
n2 (Mode setting)	0[1] (Priority mode)	0	Automatic priority mode	√
		1	Cooling priority mode	-
		2	VIP indoor unit voting priority mode	
		3	In response to heating mode only	
		4	In response to cooling mode only	
		5	Heating priority mode	
		6	Change over	
		7	Voting priority mode	
		8	First on priority mode	
		9	Capability requirements priority mode	
	1 (Silent mode)	0	Non silent mode	√
		1	Silent mode 1	-
		2	Silent mode 2	
		3	Silent mode 3	
		4	Silent mode 4	
		5	Silent mode 5	

Notes:

1. For details of mode, refer to *2.4 Special mode introduction*
2. This setting must be performed when vacuumizing.

Table 4-2.3 Menu mode function(continue)

First level menu	Second level menu	Specified menu mode	Description	Default
n2 (Mode setting)	2 (static pressure)	0	0Pa static pressure	√
		1	10Pa static pressure	-
		2	20Pa static pressure	
		3	30Pa static pressure	
		4	35Pa static pressure	
	3 (Power limitation mode)	40	Power limitation mode, Maximum current =MCA * setting value	-
		41		
		42		
		~		
		98		
		99		
		100		√
	4 (Meta)	0	Meta function unavailable	-
		1	Meta function available	√
	5 (°C or °F)	0	Celsius will be enable on display	√
		1	Fahrenheit will be enable on display	-
	8 (Dry contact)	0	Dry contact closing effective	√
		1	Dry contact opening effective	-
n3 (Installation parameters)	2[1] (Level difference)	0	0m level difference between indoor unit and outdoor unit	√
		1	20m level difference between indoor unit and outdoor unit	-
		2	40m level difference between indoor unit and outdoor unit	
		3	50m level difference between indoor unit and outdoor unit	
n4 (address and communication)	1	-	Set Network address of Outdoor unit	0
	2	-	Set number of indoor units	1
	4	0	Auto addressing (indoor and outdoor units address)	-
		1	Clear address (indoor and outdoor units address, network address)	
	5 (communication protocol)	0	V8 communication protocol (RS-485 (P Q) communication)	√
		1	Non-V8 communication protocol (RS-485 (P Q E) communication)	-
		2	HyperLink (M1 M2) communication -IDUs uniform power supplied	
		3	HyperLink (M1 M2) communication -IDUs separate power supplied	

Notes:

1. If the horizontal height of the outdoor unit is higher than that of the indoor units, it needs to be set to improve the reliability of the system.

Table 4-2.3 Menu mode function(continue)

First level menu	Second level menu	Specified menu mode	Description	Default
n5[1] (Backup)	1 (Sensors)	0	Sensors backup running unavailable	-
		1	Sensors backup running available (Manual)	√
		2	Sensors backup running available (Automatic)	-
	2 (Backup operation time)	0	Backup operation time setting(1 day)	-
		1	Backup operation time setting(2 days)	
		2	Backup operation time setting(3 days)	
		3	Backup operation time setting(4 days)	
		4	Backup operation time setting(5 days)	
		5	Backup operation time setting(6 days)	
		6	Backup operation time setting(7 days)	√
n6 (evaporation and condensation temperature)	0 (target evaporation temperature of the indoor unit)	0	-3°C	-
		1	0°C	
		2	3°C	
		3	6°C	√
		4	7°C	-
		5	8°C	
		6	9°C	
		7	10°C	
		8	11°C	
	2 (target condensation temperature of the indoor unit)	0	41°C	-
		1	42°C	
		2	43°C	
		3	44°C	
		4	45°C	
		5	46°C	
		6	48°C	√
		7	51°C	-
n8	7 (Low noise defrosting)	0	Low noise defrosting mode unavailable	√
		1	Low noise defrosting mode available	-
	9 (Self-cleaning)	0	Self-cleaning unavailable	√
		1	Self-cleaning available	-
n9	5	-	Release central controller emergency stop statue	-
	7	0	Digital electricity meter	√
		1	Pulse electricity meter	-

Notes:

1. Only one sensor backup can be started at the same time

Table 4-2.3 Menu mode function(continue)

First level menu	Second level menu	Specified menu mode	Description	Default
nc[1] (Dry contact function)	0	0	Dry contact 1 function selection (Force cooling only)	-
		1	Dry contact 1 function selection (Force heating only)	
		2	Dry contact 1 function selection (Force incapacity requirements)	
		3	Dry contact 1 function selection (Force stop)	√
	1	0	Dry contact 2 function selection (Force cooling only)	-
		1	Dry contact 2 function selection (Force heating only)	
		2	Dry contact 2 function selection (Force incapacity requirements)	
		3	Dry contact 2 function selection (Force stop)	√
	2(Customized)	0	Dry contact 3 function selection (Operation signal)	-
		1	Dry contact 3 function selection (Alarm signal)	√
		2	Dry contact 3 function selection (Compressor running signal)	-
		3	Dry contact 3 function selection (Defrosting signal)	
		4	Dry contact 3 function selection (Refrigerant leakage signal)	

Notes:

Using with setting [n2-8-0] or [n2-8-1].

2.4 Special mode introduction

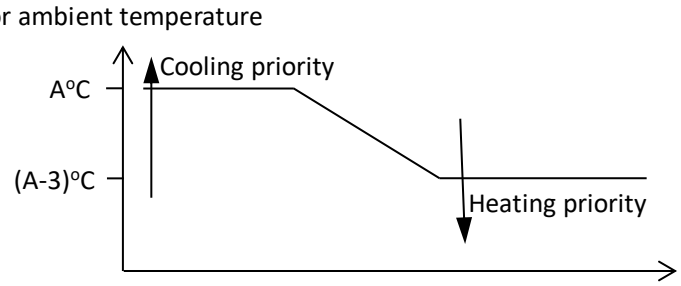
2.4.1 Priority mode setting

Priority mode can only be set on the master unit. When an indoor unit is in mode conflict with the outdoor units the unit displays the mode conflict error. The digital display on indoor main PCB will display error code E0.

There are ten priority mode options:

1. **Auto priority mode (default):** In auto priority mode, the outdoor unit will operate in heating priority mode or cooling priority mode according to the outdoor ambient temperature.
   In this function, the mode switching temperature is **A**, and A can be set by menu [*n2-9-0/1/2]*
   a) When the outdoor ambient temperature is below (**A-3**)℃, the outdoor units run in heating priority mode. The heating priority mode does not change until the outdoor ambient temperature is above **A**℃.
   b) When the outdoor ambient temperature is above **A**℃, the outdoor units run in cooling priority mode. The cooling priority mode does not change until the outdoor ambient temperature is below (**A-3**)℃.
   c) When the outdoor units restart under the outdoor ambient between (**A-3**)℃ and **A**℃, the outdoor units run the same priority as before the last stop.
   d) When the outdoor unit is initial startup under outdoor ambient temperature between (**A-3**)℃ and **A**℃, the outdoor units run in heating priority mode.

Figure 4-2.2: Auto priority mode control



2. **Cooling priority mode**:
   a) **During heating operation:** If an indoor unit requests cooling, the outdoor units stop and then restart in cooling mode after 5 minutes. Indoor units requesting cooling then start in cooling mode and indoor units requesting heating display the mode conflict error.
   b) **During cooling operation:** If an indoor unit requests heating, the outdoor units ignore the request and continue to run in cooling mode. The indoor unit requesting heating displays the mode conflict error. If all the indoor units requesting cooling are later turned off and one or more indoor units are still requesting heating, the outdoor units restart in heating mode after 5 minutes and any indoor units requesting heating then start in heating mode.
3. **Heating priority mode:**
   a) **During cooling operation:** If an indoor unit requests heating, the outdoor units stop and then restart in heating mode after 5 minutes. Indoor units requesting heating then start in heating mode and indoor units requesting cooling display the mode conflict error.
   b) **During heating operation:** If an indoor unit requests cooling, the outdoor units ignore the request and continue to run in heating mode. The indoor unit requesting cooling displays the mode conflict error. If all the indoor units requesting heating are later turned off and one or more indoor units are still requesting cooling, the outdoor units restart in cooling mode after 5 minutes and any indoor units requesting cooling then start in cooling mode.
4. **VIP priority mode:** The default VIP address is 63, the VIP address also can be changed through menu mode“n1-6”.
   In VIP priority mode, if the VIP indoor unit is operating, the outdoor units will operate in the mode of the VIP indoor unit. In the meantime indoor units, which are in a mode different to that of the VIP unit, will display the mode conflict error (E0).

5. **Changeover mode:** Before using this mode, you need to set the VIP indoor unit address. The default VIP address is 63, the VIP address also can be changed through menu mode“n1-6”.
   In changeover mode, if the VIP indoor unit is operating, the outdoor units will operate in the mode of the VIP indoor unit. The other units in the system will follow the mode of the VIP indoor unit, so there will be no mode conflict.
   In the changeover mode, the VIP indoor unit can select the auto mode, so that the system can run the auto mode, and other indoor unit can follow the VIP indoor unit without mode conflict.
6. **Voting priority mode:** In voting priority mode, the outdoor units operate in whichever of heating and cooling modes is being requested by the larger number of indoor units.
7. **First on priority mode:** The outdoor units will operate in the mode of the indoor unit (first open in the system). In the meantime indoor units, which are in a mode different to that of the first open unit, will display the mode conflict error (E0).
8. **Capability requirements priority mode:** In Capability requirements priority mode, the outdoor units operate in whichever of heating and cooling modes is being requested by the larger Capability requirements of indoor units.
9. **Heating only mode:** The outdoor units only operate in heating mode. Indoor units requesting heating operate in heating mode. Indoor units requesting cooling or in fan only mode display the mode conflict error.
10. **Cooling only mode:** The outdoor units only operate in cooling mode. Indoor units requesting cooling operate in cooling mode; indoor units in fan only mode operate in fan only mode. Indoor units requesting heating display the mode conflict error.

2.4.2 System test

1. Cooling Test/ Heating Test

After the outdoor unit enter this mode, all indoor units in the system are forced to run cooling or heating mode, which is consistent with the normal operation.

How to exit test:

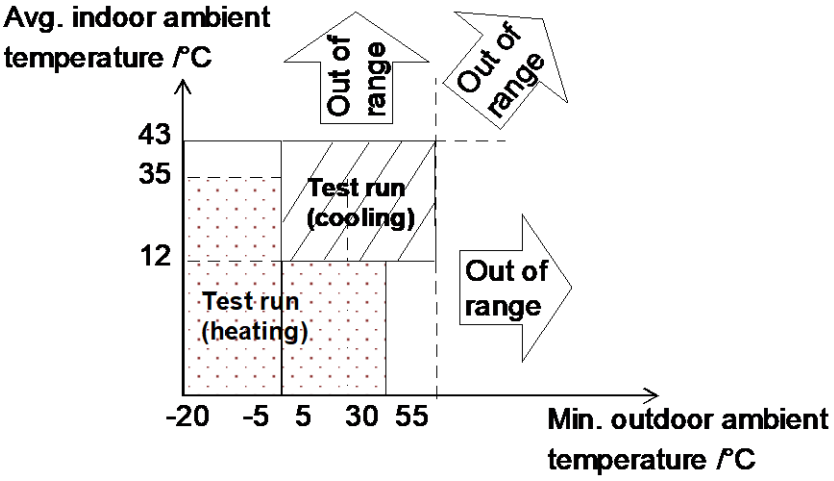
a) Press and hold the OK key for 5s to exit
b) Automatic exit in case of failure during operation
c) Automatic exit after 240 minutes of test.

2. Test running

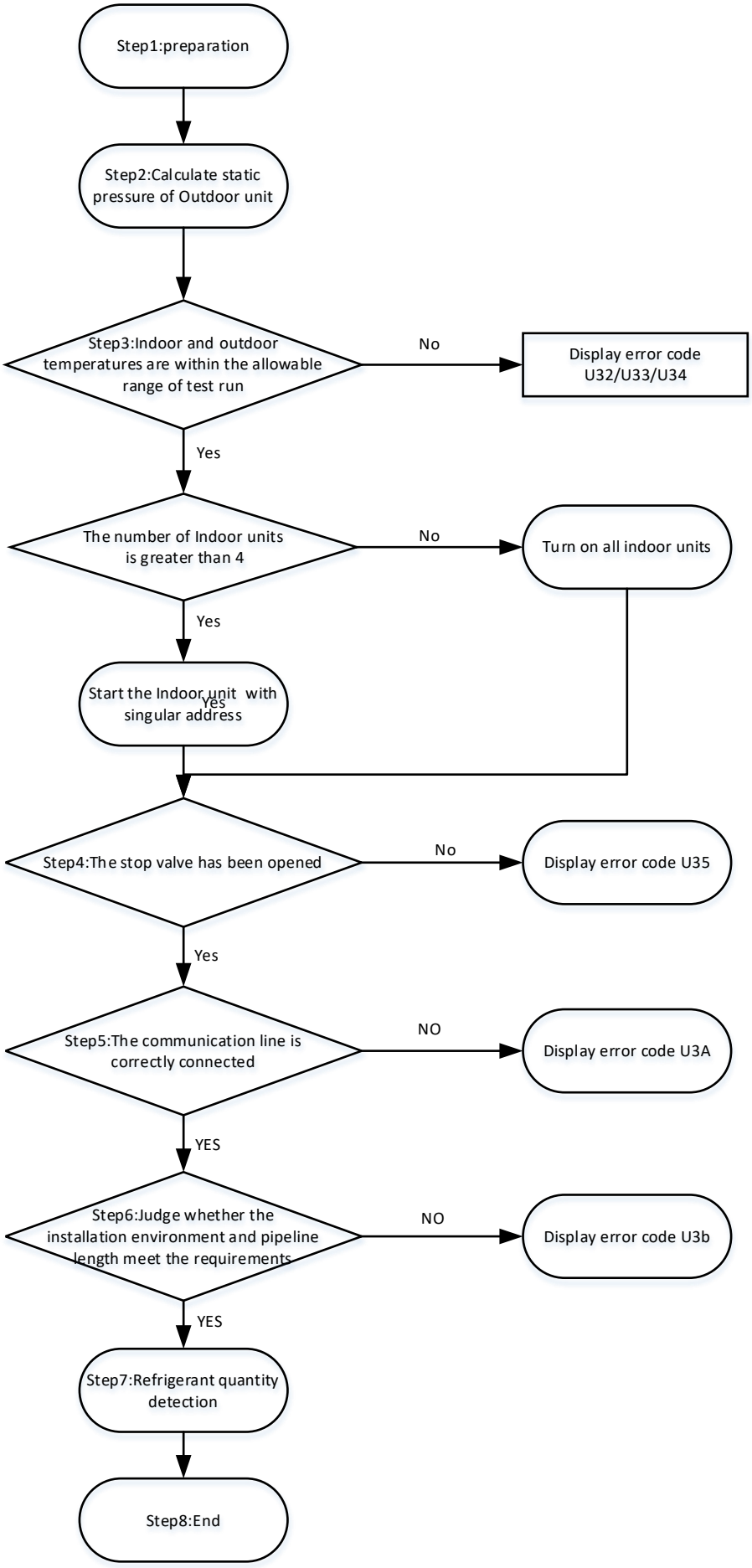
This operation checks and determines the following items:

a) Check if there is a wiring error (with the communication check of the indoor unit)
b) Check if the stop valve is open
c) Determine the length of the pipe

The test run can be carried out when the ambient temperature is within the required range as follow.



There are 8 steps in the test running, and the specific process is as follow:



Notes: After the fault is removed, long press the OK key for 5 seconds to restart the test run.

2.4.3 Refrigerant recovery

In this mode, the operation process is as follows:

a) Refrigerant recovery to outdoor unit:

(1) First, close the liquid pipe stop valve and keep the gas pipe stop valve open;

(2) Menu setting [n1-2-0], the system enters the refrigerant recovery mode, when the digital display alternately "End" and the system low pressure value, close the gas pipe stop valve.

b) Refrigerant recovery to indoor unit:

(1) First, manually close the liquid pipe stop valve and keep the gas pipe stop valve open;

(2) Menu setting [n1-2-1], the system enters the refrigerant recovery mode, when the digital display alternately displays "End" and the system low pressure value, close the gas pipe stop valve.

c) Balance system refrigerant:

(1) Ensure that both the gas pipe stop valve and the liquid pipe stop valve are open.

(2) Menu setting [n1-2-2], the system enters the Balance system refrigerant mode.

3. System Parameter Check

3.1 UP / DOWN system check button

Before pressing UP or DOWN button, allow the system to operate steadily for more than an hour. On pressing UP or DOWN button, the parameters listed in below table will be displayed in sequence.

Table 4-3.1 system check list:

DSP1 content	Parameters displayed on DSP2	Remarks
----	"Standby (ODU address + IDU quantity) /frequency/special status"	
0.--	Outdoor unit address	0
1.--	Outdoor unit capacity	Actual value = value displayed (HP)
2.--	Number of outdoor units	1
3.--	Number of indoor units	1-11
4.--	Reserved	
5.--	Target frequency of this ODU	Displacement frequency(1)
6.--	Reserved	
7.--	Inverter compressor actual frequency(Hz)	Actual value = value displayed
8.--	Reserved	
9.--	Operating mode	0: OFF
		2: Cooling
		3: Heating
10.--	Fan speed index (rpm)	Actual value = value displayed
11.--	Reserved	
12.--	Indoor heat exchanger pipe (**T2**) average temperature (°C)	Actual value = value displayed
13.--	Indoor heat exchanger pipe (**T2B**) average temperature (°C)	Actual value = value displayed
14.--	Main heat exchanger pipe (**T3**) temperature (°C)	Actual value = value displayed
15.--	Outdoor ambient (**T4**) temperature (°C)	Actual value = value displayed
16.--	Liquid pipe (**T5**) temperature (°C)	Actual value = value displayed
17.--	Reserved	
18.--	Plate heat exchanger outlet pipe (**T6B**) temperature (°C)	Actual value = value displayed
19.--	Inverter compressor discharge (**T7C1**)temperature (°C)	Actual value = value displayed
20.--	Reserved	
21.--	Inverter compressor suction (**T71**) temperature (°C)	Actual value = value displayed
22.--	Reserved	
23.--	(**T8**) temperature (°C)	Actual value = value displayed
24.--	Inverter module heatsink (**Ntc**)temperature (°C)	Actual value = value displayed
25.--	Reserved	
26.--	Outdoor Heat exchanger liquid (**TL**)temperature (°C)	Actual value = value displayed
27.--	Discharge superheat degree (°C)	Actual value = value displayed
28.--	Primary current(A)	Actual value = value displayed /10
29.--	Inverter compressor current (A)	Actual value = value displayed /10
30.--	Reserved	

Table 4-3.1 system check list(continue):

DSP1 content	Parameters displayed on DSP2	Remarks
31.--	EEVA position	Actual value = value displayed × 24
32.--	Reserved	
33.--	EEVC position	Actual value = value displayed × 4
34.--	Reserved	
35.--	Compressor discharge pressure (MPa)	Actual value = value displayed × 0.01
36.--	Compressor suction pressure(MPa)	Actual value = value displayed × 0.01
37.--	Number of indoor units online	Actual value = value displayed
38.--	Number of indoor units operating	Actual value = value displayed
39.--	Heat exchanger status(Outdoor unit)	【0】OFF
		【1】C1:Cooling mode
		【2】Reserved
		【3】Reserved
		【4】E1:Heating mode
		【5】Reserved
		【6】Reserved
40.--	Special state	【0】No special mode
		【1】Oil return
		【2】Defrost
		【3】Start-up
		【4】Stop
		【5】Quick check
		【6】Self cleaning
41.--	Silent mode	0~5 ,5 represents the most silent
42.--	Static pressure mode	【0】0Pa
		【1】10Pa
		【2】20Pa
		【3】30Pa
		【4】35Pa
43.--	Tes(°C)	Actual value = value displayed(2)
44.--	Tcs(°C)	Actual value = value displayed(2)
45.--	DC Voltage (V)	Actual value = value displayed
46.--	AC Voltage (V)	Actual value = value displayed
47.--	Number of cooling mode IDUs	Actual value = value displayed
48.--	Number of heating mode IDUs	Actual value = value displayed
49.--	Capacity of cooling mode IDUs (HP)	Actual value = value displayed
50.--	Capacity of heating mode IDUs (HP)	Actual value = value displayed
51.--	Refrigerant volume judgment	【0】:No result
		【1】:Significantly insufficient
		【2】:insufficient
		【3】:Normal
		【4】:excessive
		【5】:Significantly excessive

Table 4-3.1 system check list(continue):

DSP1 content	Parameters displayed on DSP2	Remarks
52.--	Dirty blockage rate (outdoor heat exchanger)	0~10, 10 represents the worst
53.--	Fan historical error	
54.--	Software version	
55.--	Most recent error or protection code	
56.--	Reserved	
57.--	Reserved	
58.--	Reserved	
-- --	--	End

Notes:

(1) Need to convert to current compressor output volume. For 8-10kW: compressor output volume is 24, Target frequency = Actual frequency * 24 / 60; for 12-16kW: compressor output volume is 42, Target frequency = Actual frequency * 42 / 60..

(2) Te: Low pressure equivalent saturation temperature (°C) Tes: Target Te value.
Tc: High pressure equivalent saturation temperature (°C) Tcs: Target Tc value.

Part 5

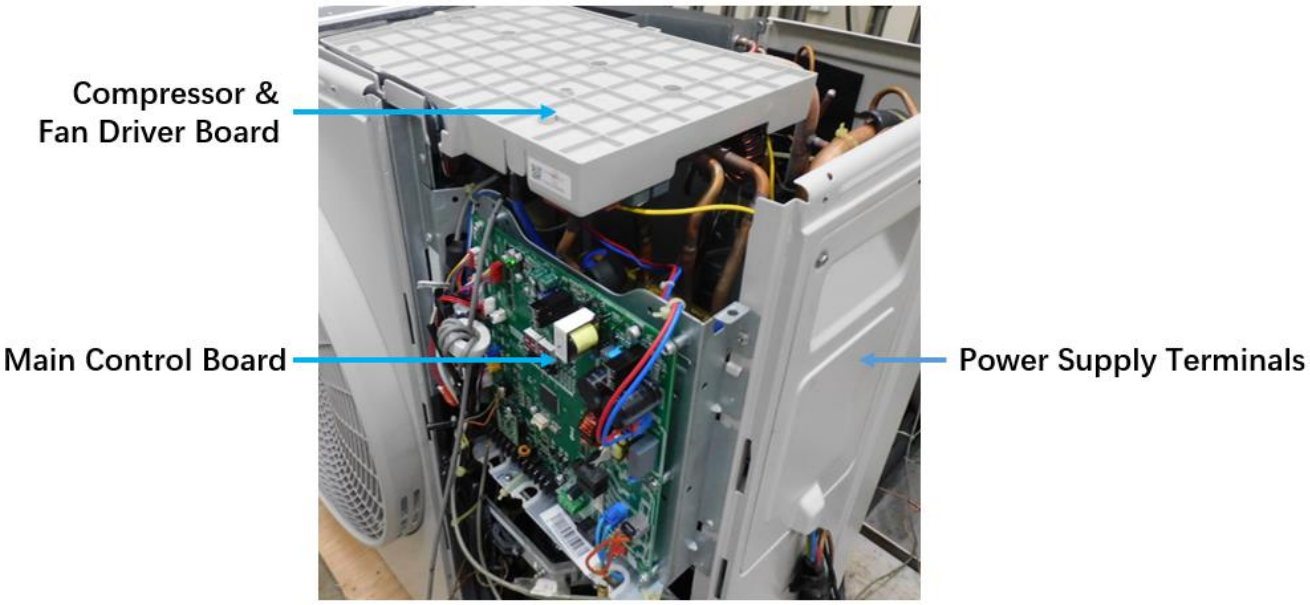
Electrical Components and Wiring Diagrams

1. Outdoor Unit Electric Control Box Layout 58
2. Outdoor Unit Main Control Board 60
3. Compressor & Fan drive board 64
4. Wiring Diagrams 66

1. Outdoor Unit Electric Control Box Layout

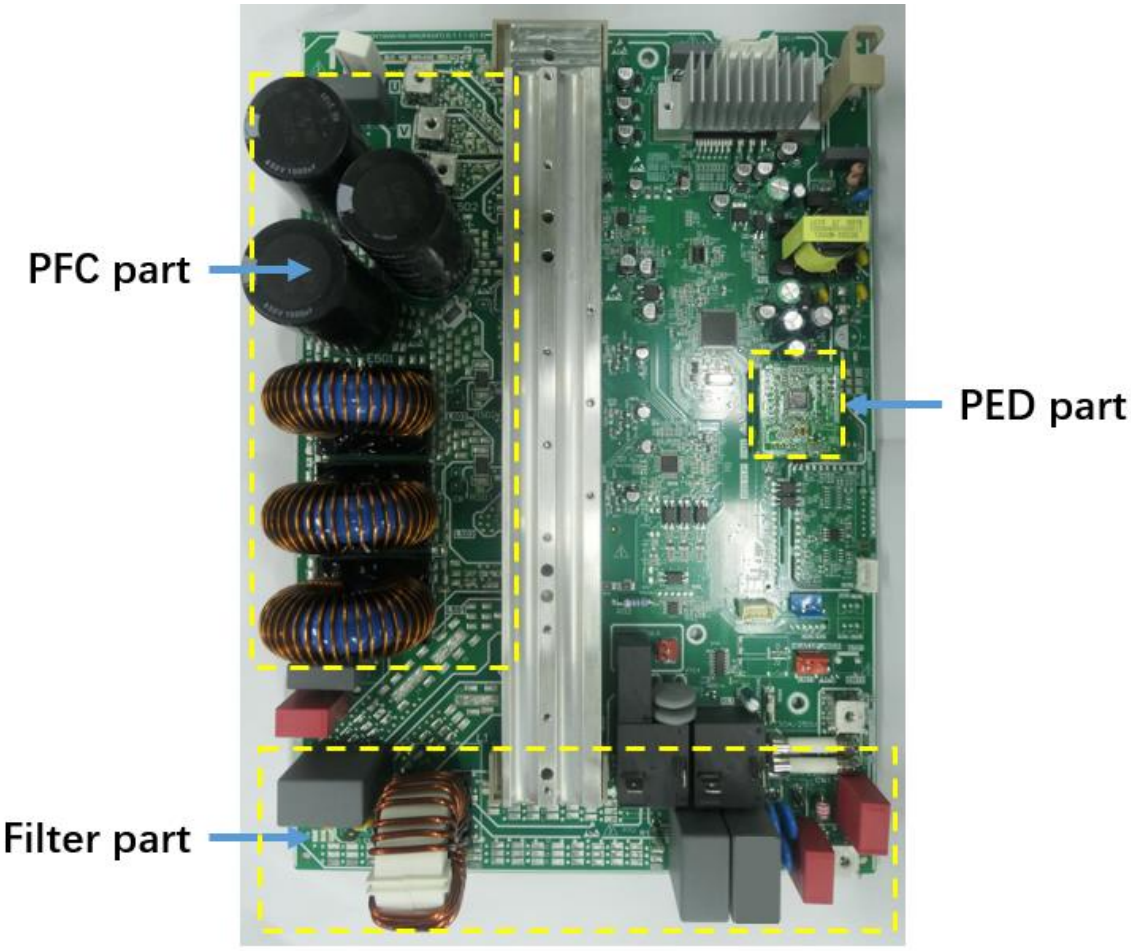
1.1 Electric control box

Figure 5-1.2: Electric control box



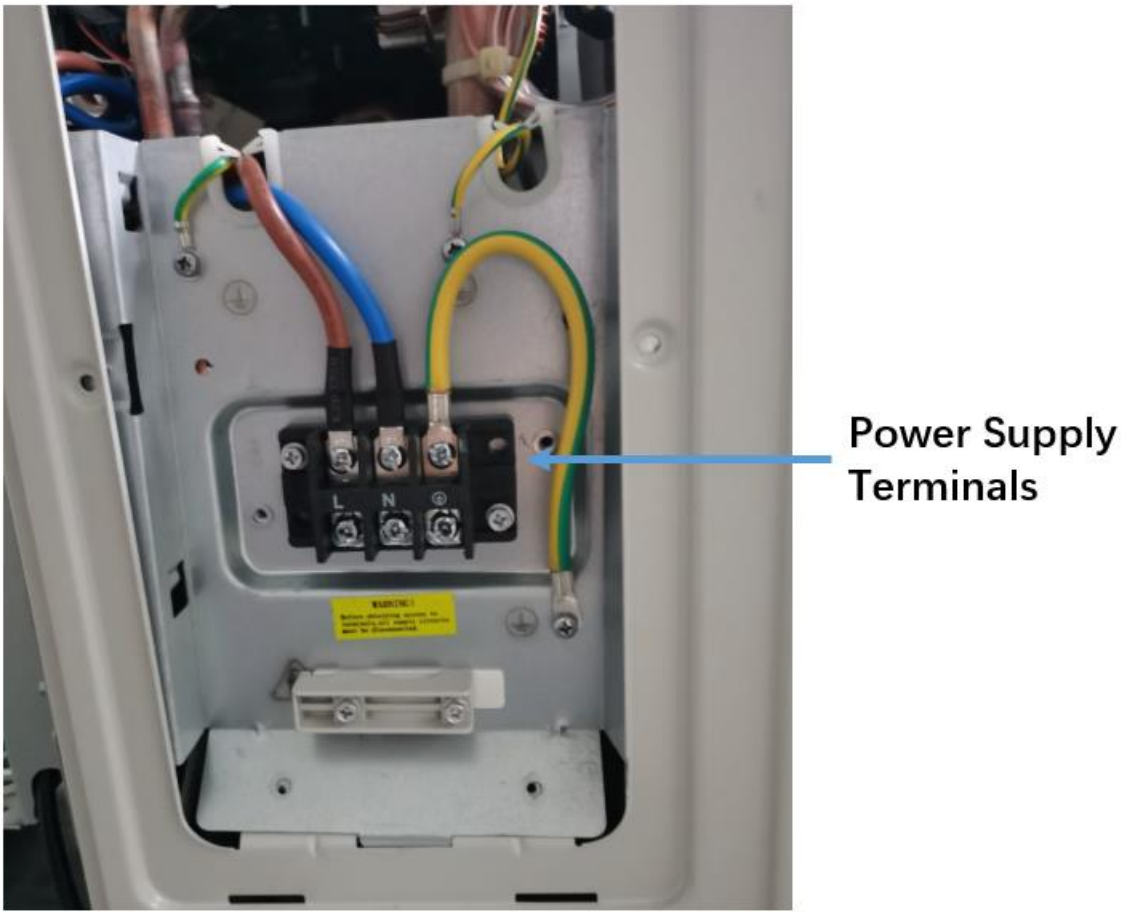
1.2 Compressor & Fan Driver Board

Figure 5-1.2: Compressor & Fan Driver Board



1.3 Power Supply Terminals

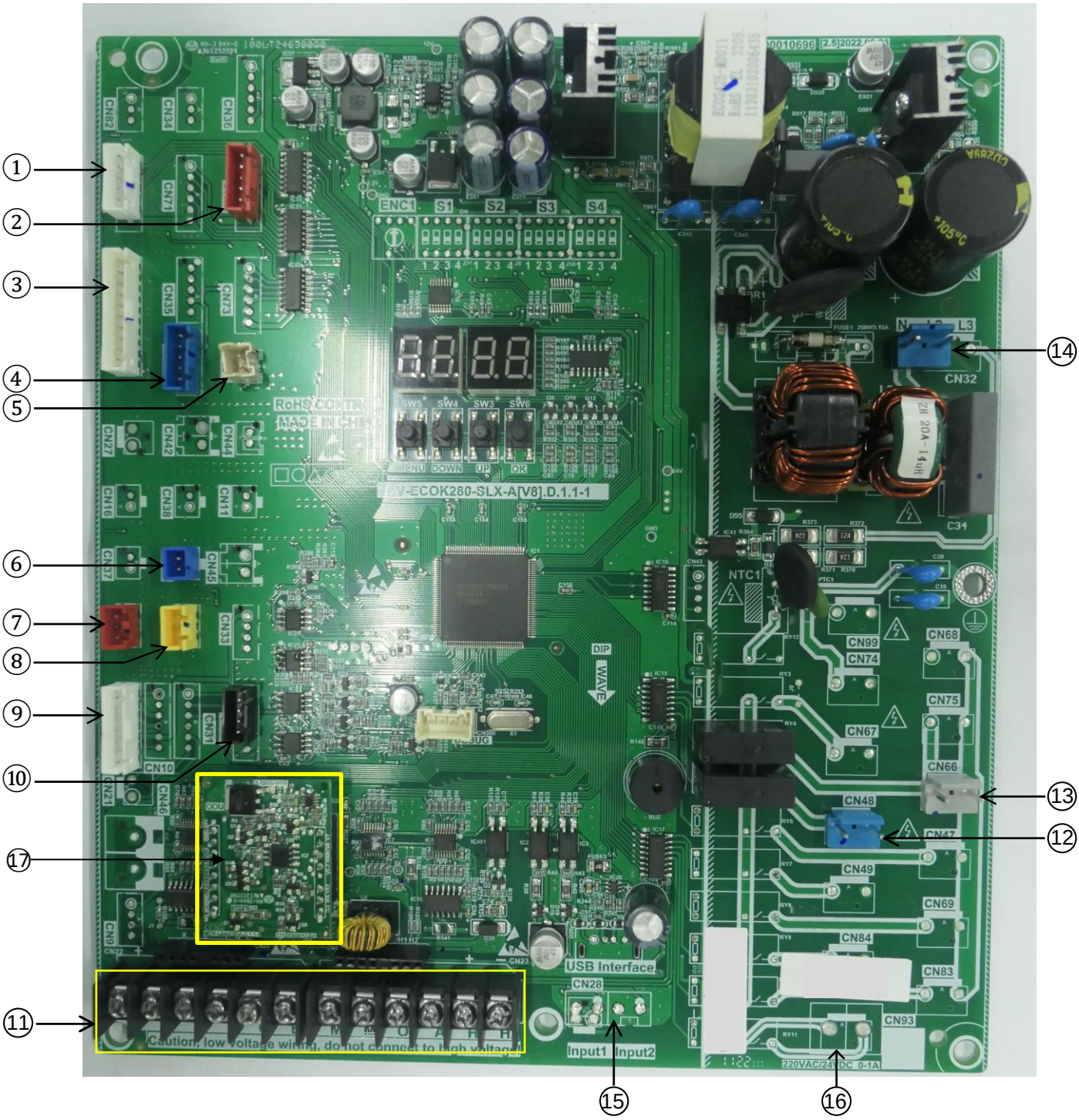
Figure 5-1.4: Power Supply Terminals



2. Outdoor Unit Main Control Board

2.1 Outdoor unit main Control Board ports

Figure 5-2.1: Outdoor unit main Control Board ports[1]



Notes:

Label descriptions are given in *Table 5-2.1: Main Control Board port*

.

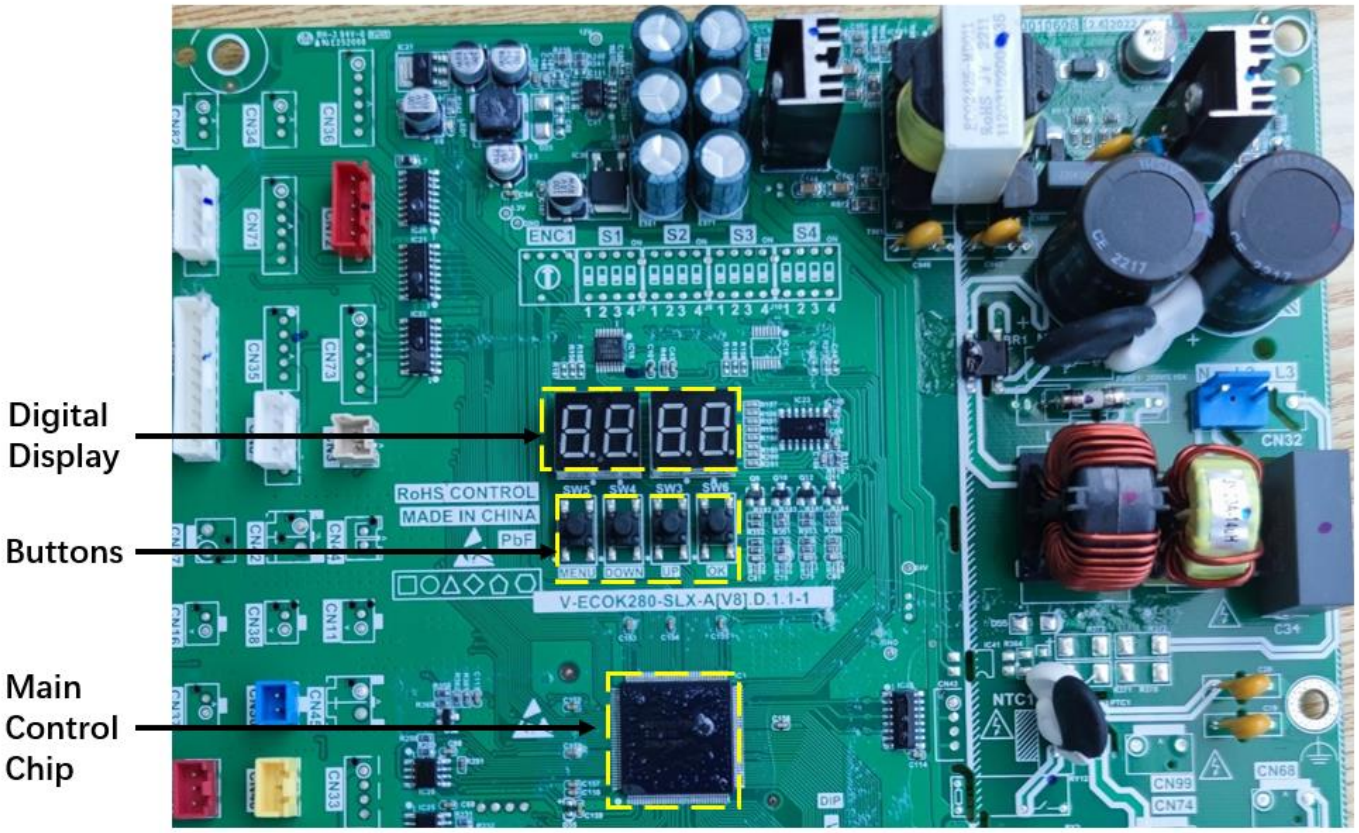
Table 5-2.1: Main Control Board port

Label in Figure 5-2.1	Port code	Content	Port voltage
1	CN70	EEVA drive port	12Vdc
2	CN72	EEVC drive port	12Vdc
3	CN4	Liquid pipe inlet temperature sensor(**T5**) /Plate heat exchanger outlet temperature sensor(**T6B**) /Suction temperature sensor 1 (**T71**) /Discharge temperature sensor 1 (**T7C1**) (**From top to bottom**)	3.3Vdc
4	CN8	Condenser inlet temperature sensor(**T8**) /Main exchanger pipe temperature sensor(**T3**) (**From top to bottom**)	3.3Vdc
5	CN3	Condenser outlet temperature sensor(**TL**)	3.3Vdc
6	CN30	Outdoor ambient temperature sensor(**T4**)	3.3Vdc
7	CN41	Low pressure sensor	5Vdc
8	CN40	High pressure sensor	5Vdc
9	CN26	Communication port to Compressor & Fan Drive Board	5Vdc+12Vdc
10	CN14	Communication port to data transfer module	12Vdc
11	CN22/CN23	Communication port	0-5V DC (varying)
12	CN48	Four-way valve drive ports(**ST1**)	220Vac
13	CN66	Power supply to compressor crankcase heater	220Vac
14	CN32	Power input of main board	220Vac
15	CN28	Reserved	-
16	CN93	Reserved	-
17	-	HyperLink board	-

2.2 Outdoor unit main Control Board components

2.2.1 Layout

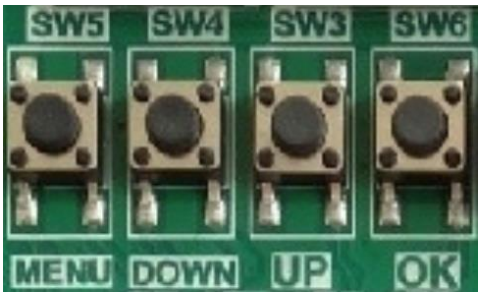
Figure 5-2.2: Outdoor unit main Control Board components



2.2.2 Function of buttons SW3 to SW6

Table 5-2.2: Function of buttons SW3 to SW6

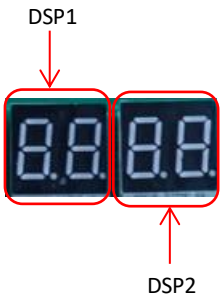
Button	Function
SW3 (UP)	In menu mode: previous and next buttons for menu modes. Not in menu mode: previous and next buttons for system check information.
SW4 (DOWN)	
SW5 (MENU)	Enter / exit menu mode.
SW6 (OK)	Confirm to enter specified menu mode.



2.2.3 Digital display output

Table 5-2.3: Digital display output in different operating states

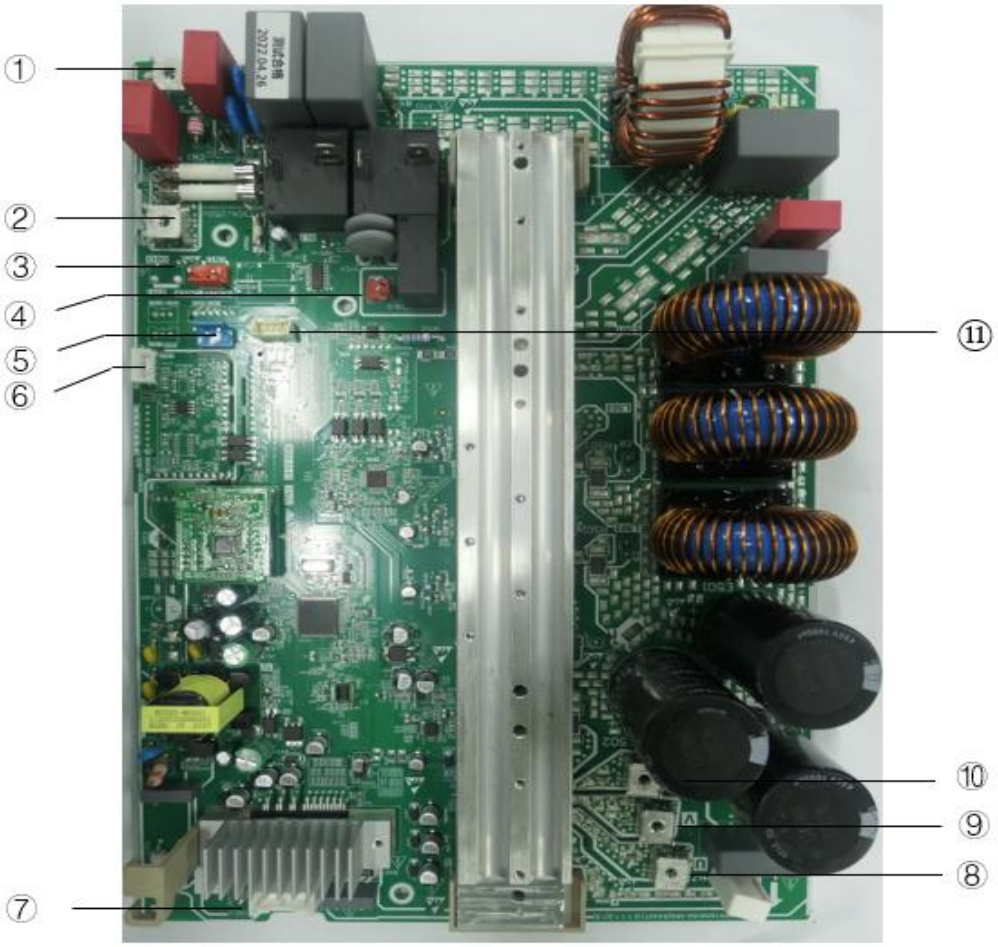
Outdoor unit state		Parameters displayed on DSP1	Parameters displayed on DSP2
Standby		The address of outdoor unit	The number of indoor units in communication with the outdoor units
Normal operation	For single compressor units	--	Running speed of the compressor in rotations per second
Other operation state		Operation state code	Operation state step
Error or protection		Placeholder and error or protection cod	
In menu mode		Display menu mode code Refer to *Table 4-2.3 Menu mode function:*	
System check		Display system check code Refer to *Table 4-3.1 system check list*	



3. Compressor & Fan drive board

3.1 Compressor & Fan drive board ports

Figure 5-3.1: 3.1 Compressor & Fan drive board ports[1]



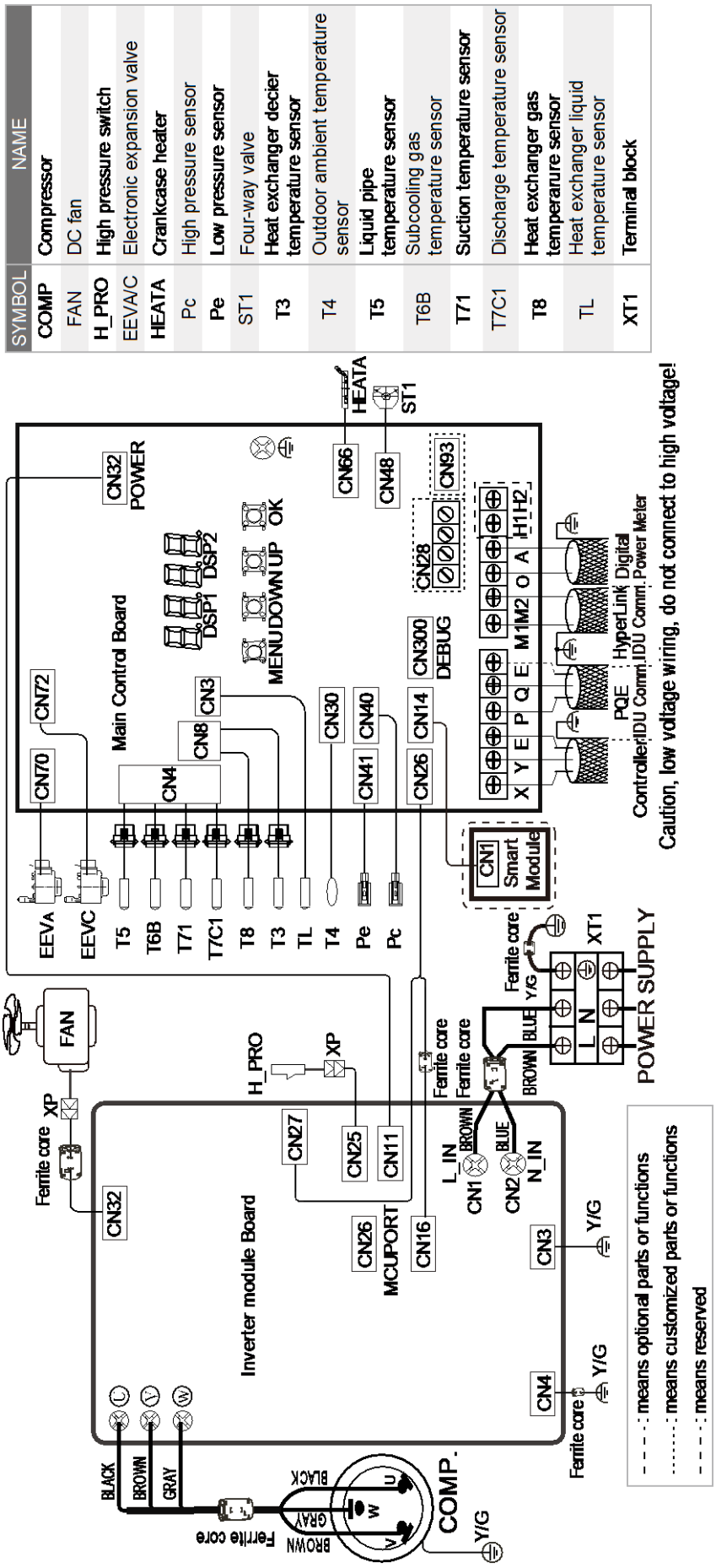
Notes:
Label descriptions are given in *Table 5-3.1: Compressor & Fan drive board ports*
.

Table 5-3.1: Compressor & Fan drive board ports

Label in Figure 5-2.1	Port code	Content	Port voltage
1	CN2	Power input port N	AC 220-240V
2	CN1	Power input port L	AC 220-240V
3	CN11	Main Control Board Power input port	AC 220-240V
4	CN16	Relay control input port	12V DC
5	CN25	Connect to high pressure switch	0-5V DC
6	CN27	Communication port to main control board	0-5V DC
7	CN32	Power supply to DC Fan	0-380V DC (varying according to frequency)
8	U	Power output U of inverter module to compressor	0-380V DC (varying according to frequency)
9	V	Power output V of inverter module to compressor	0-380V DC (varying according to frequency)
10	W	Power output W of inverter module to compressor	0-380V DC (varying according to frequency)
11	CN26	DEBUG	0-5V DC

4. Wiring Diagrams

Figure 5-3.1: V8 Mini outdoor unit wiring diagram



Part 6 Diagnosis and Troubleshooting

1 Error Code Table 68

2 Error in Main Control 73

3 Error in Compressor Driver 137

4 Error in Fan Drive 147

5 Appendix 156

1 Error Code Table

1.1 Outdoor Error code table

Table 6-1.1 Outdoor Error code table

Error code	Error description	Remarks	Manual re-start required[2]
A01	Emergency shutdown	Outdoor unit's fault	NO
AA1	Inverter driver board does not match the main control board	Outdoor unit's fault	NO
C21	Communication error between indoor and outdoor unit	communication failure	NO
C26	Number of indoor units detected by outdoor unit has decreased or less than the setting amount	communication failure	NO
C28	Number of indoor units detected by outdoor unit has increased or more than the setting amount	communication failure	NO
1C41	Communication Error between main control board and inverter driver board	communication failure	NO
E41	Outdoor ambient temperature sensor (T4) error(open/short)	sensor error	NO
F31	Plate heat exchanger outlet temperature sensor(T6B) error(open/short)	sensor error	NO
F41	Main heat exchanger pipe temperature sensor (T3) error(open/short)	sensor error	NO
F62	Inverter driver board temperature (Tf) protection	Temperature proteection	NO
F63	Non-inductive resistance temperature(Tr)protection	Temperature proteection	NO
F6A	F62 protection occurs 3 times in 100 minutes	Temperature proteection	YES
F71	Discharge temperature sensor(T7C1) error (open/short)	sensor error	YES
F72	Discharge temperature(T7C1) protection	Temperature proteection	NO
F75	Compressor discharge insufficient superheat protection	Temperature proteection	NO
F7A	F72 protection occurs 3 times in 100 minutes	Temperature proteection	YES
F91	Liquid pipe temperature sensor (T5) error (open/short)	sensor error	NO
FA1	Outdoor Heat exchanger gas temperature sensor (T8) error (open/short)	sensor error	NO
FC1	Outdoor heat exchanger liquid temperature sensor (TL) error (open/short)	sensor error	NO
Fd1	Compressor suction temperature sensor (T71) error (open/short)	sensor error	NO
1L01	1L1* error occurs 3 times in 60 minutes.	power-on again	YES
1L--	Compressor error, "--" refer to Table 6-1.3 Compressor drive error code table	Troubleshoot errors according to the Service Manual	YES
1J01	1J1* error occurs 10 times in 60 minutes	power-on again	YES

Error code	Error description	Remarks	Manual re-start required[2]
1J--	Fan motor error, "--" refer to Table 6-1.4 Fan motor error code table	Troubleshoot errors according to the Service Manual	YES
P11	High pressure sensor error	sensor error	NO
P12	High pressure protection	Pressure protection	NO
P13	High pressure switch protection	Pressure protection	NO
P14	P12 protection occurs 3 times in 60 minutes	Pressure protection	YES
P21	Low pressure sensor error	Sensor error	YES
P22	low pressure protection	Pressure protection	NO
P24	Abnormal rise of low pressure	Pressure protection	NO
P25	P22 protection occurs 3 times in 100 minutes	Pressure protection	YES
1P32	Compressor high DC bus current protection	Current protection	NO
1P33	1P32 protection occurs 3 times in 100 minutes	Current protection	YES
P51	High AC voltage protection	Voltage protection	NO
P52	Low AC voltage protection	Voltage protection	NO
P53	Phase B and N of the power cable are connected to the opposite protection	Power protection	YES
P54	DC bus low voltage protection	Voltage protection	NO
P55	DC bus ripple over protection	Power protection	YES
1P56	Inverter driver board DC bus low voltage error	Power protection	YES
1P57	Inverter driver board DC bus high voltage error	Power protection	YES
1P58	Inverter driver board DC bus excessively high voltage error	Power protection	YES
1P59	Inverter module busbar voltage drop protection	Power protection	YES
P71	EEPROM error	E party error	YES
Pb1	HyperLink overcurrent error	Overcurrent protection	YES
1b01	Electronic expansion valve (EEVA) error	missing Connection	YES
3b01	Electronic expansion valve (EEVC) error	missing Connection	YES
bA1	HyperLink cannot open or close indoor unit's Electronic expansion valve	System error	YES

1.2 Installation and debugging error code table

Table 6-1.2 Installation and debugging error code table

Error code	Error description	Remarks	Manual re-start required[2]
U11	Outdoor unit model is not set	System configuration	YES
U12	Outdoor unit Capacity setting error	System configuration	YES
U21	System contains the old Indoor Unit with old platforms	System configuration	YES
U31	The test run was never successful, and did not run within 30 minutes after power-on	Pilot run	YES
U32	Outdoor temperature out of operating range	Pilot run	YES
U33	Indoor temperature out of operating range	Pilot run	YES
U34	Outdoor and indoor temperature out of operating range	Pilot run	YES
U35	Liquid side stop valve is not opened	Pilot run	YES
U37	Gas side stop valve is not opened	Pilot run	YES
U38	Outdoor unit has No address	Outdoor Unit set	YES
U3A	The refrigerant pipe connection is not consistent with the communication cable	Pilot run	NO
U3b	The installation environment is abnormal	Pilot run	YES
U3C	The VIP indoor unit is not set (valid in Changeover priority mode)	Pilot run	NO
U4x	Overconnection ratio contains U41-U46	System configuration	YES

1.3 Compressor drive error code table

Table 6-1.3 Compressor drive error code table

Error code	Error description	Remarks	Manual re-start required[2]
1L1E	Hardware overcurrent	current overload error	NO
1L11	Software overcurrent		NO
1L12	Software overcurrent protection last 30s		NO
1L2E	Module overtemperature protection	Over-temperature error	NO
1L3E	Low bus voltage error	Power supply error	NO
1L31	High bus voltage error		NO
1L32	The bus voltage is excessively high		NO
1L43	The current sampling bias is abnormal	Hardware error	NO
1L45	Motor code mismatch		YES
1L46	IPM protection		NO
1L47	Module type mismatch		YES
1L5E	Startup failed	Control error	NO
1L51	Out-of-step error	Control error	NO
1L52	Locked-rotor protection	Motor error	NO
1L6E	Compressor motor lack of phase protection	Diagnosis error	NO
1LbE	High voltage switch action	Certification error	NO
1Lb7	Other check exceptions/908 diagnosis error		NO

1.4 Fan motor error code table

Table 6-1.4 Fan motor error code table

Code	Error description	Remarks	Manual re-start required2
1J1E	Hardware overcurrent	current overload error	NO
1J11	Software overcurrent		NO
1J12	Software overcurrent protection last 30s		NO
1J2E	Module overtemperature protection	Over-temperature error	NO
1J3E	Low bus voltage error	Power supply error	NO
1J31	High bus voltage error		NO
1J32	The bus voltage is excessively high		NO
1J43	The current sampling bias is abnormal	Hardware error	NO
1J45	Motor code mismatch		YES
1J46	IPM protection		NO
1J47	Module type mismatch		YES
1J5E	Startup failed	Control error	NO
1J51	Out-of-step error		NO
1J52	Locked-rotor protection		NO
1J6E	Motor lack of phase protection	Diagnosis error	NO

1.5 Status prompt code table

Table 6-1.5 Status prompt code table

Status code	Code description	Remarks	Manual re-start required2
d0x	Oil return,"x" is the current step node	Status hint	NO
dfx	Defrost, "x" is the current step node	Status hint	NO
d11	The outdoor ambient temperature exceeds the upper limit (Heating mode)	Status hint	NO
d12	The outdoor ambient temperature exceeds the lower limit (Heating mode)	Status hint	NO
d13	The outdoor ambient temperature exceeds the upper limit (Cooling mode)	Status hint	NO
d14	The outdoor ambient temperature exceeds the lower limit (Cooling mode)	Status hint	NO
d31	Refrigerant judgment: no result	Status hint	NO
d32	Refrigerant quantity judgment:Significantly excessive	Status hint	NO
d33	Refrigerant quantity judgment:Slightly excessive	Status hint	NO
d34	Refrigerant quantity judgment:normal	Status hint	NO
d35	Refrigerant quantity judgment:Slightly insufficient	Status hint	NO
d36	Refrigerant quantity judgment:Significantly insufficient	Status hint	NO
d41	System exist no power indoor unit, HyperLink is controlling this indoor unit's valve	Status hint	NO

Note: the above non-error code, no troubleshooting

2 Error in Main Control

2.1 A01: emergency shutdown of Outdoor Units

2.1.1 Digital display output

2.1.2 Description

- Compressor protection shut down
- All Outdoor Units stop running

2.1.3 Trigger / recover condition

(1)Check menu N28 = 0:

- Trigger condition:Dry contact x(main control board CN55/CN56)is short-circuited
- Recover condition:remove Dry contact x short-circuited
- Reset method:Resume automatically

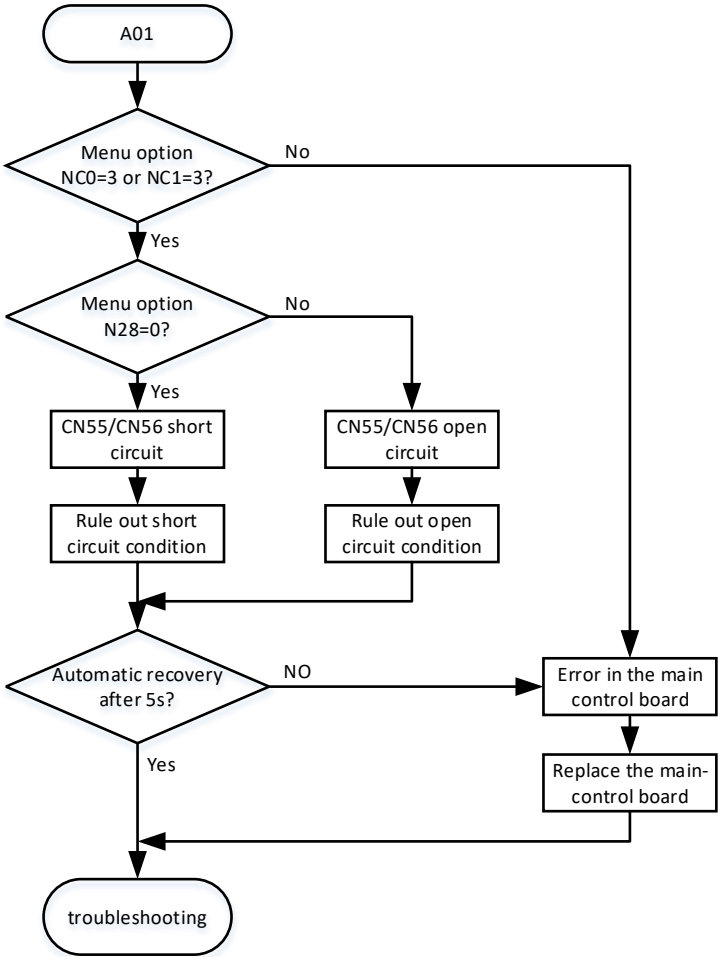
(2)Check menu N28 = 1 :

- Trigger condition:Dry contact x(PCB CN55/CN56)is open-circuited
- Recover condition:remove Dry contact x short-circuited
- Reset method:Resume automatically

2.1.4 Possible causes

- Damaged outdoor unit main control board.
- Centralized controller command

2.1.5 Procedure


A01
Menu option NC0=3 or NC1=3?
No
Yes
Menu option N28=0?
No
Yes
CN55/CN56 short circuit
CN55/CN56 open circuit
Rule out short circuit condition
Rule out open circuit condition
Automatic recovery after 5s?
NO
Yes
Error in the main control board
Replace the main-control board
troubleshooting

2.2 AA1: Inverter driver board does not match the main control board

2.2.1 Digital display output

2.2.2 Description

- Inverter driver board does not match the main control board
- All units stop running.
- Error code is displayed on the unit with the error

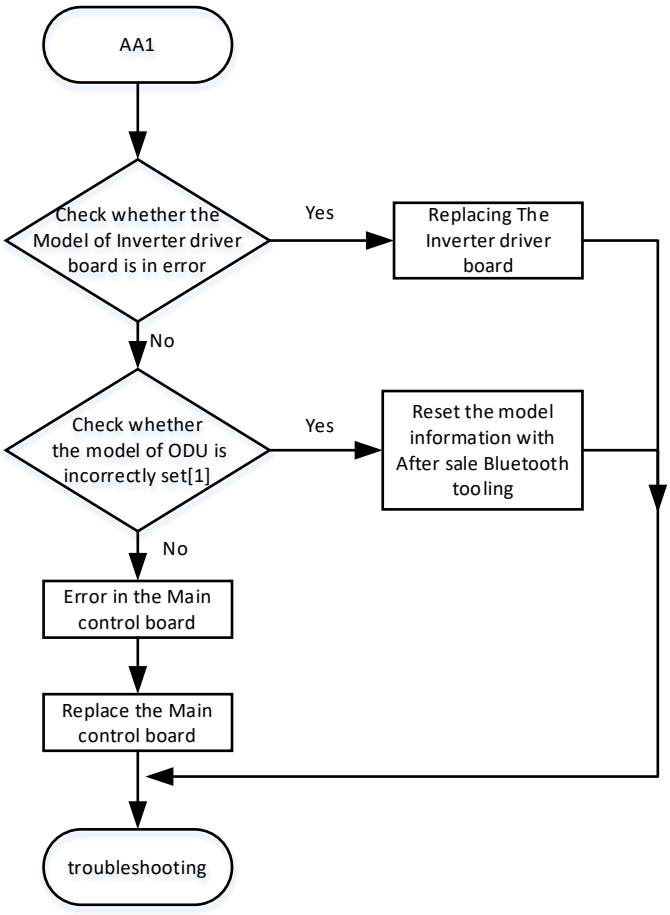
2.2.3 Trigger / recover condition

- Trigger condition:the internal driver parameters of the module board do not match Outdoor Units
- Recover condition:the internal driver parameters of the module board match Outdoor Units
- Reset method: Rectify the error and power-on again

2.2.4 Possible causes

- Model error of Inverter driver board
- The model of Outdoor Unit is incorrectly set.
- Main control board is damaged

2.2.5 Procedure



Notes:
[1]. Use after-sale Bluetooth tooling connect with outdoor unit can check the model of ODU.

2.3 bA1: HyperLink cannot open or close IDU's Electronic expansion valve

2.3.1 Digital display output

2.3.2 Description

- When some IDUs are powered off, HyperLink fail to close their EEV.
- All units stop running.
- Error code is only displayed on the outdoor unit

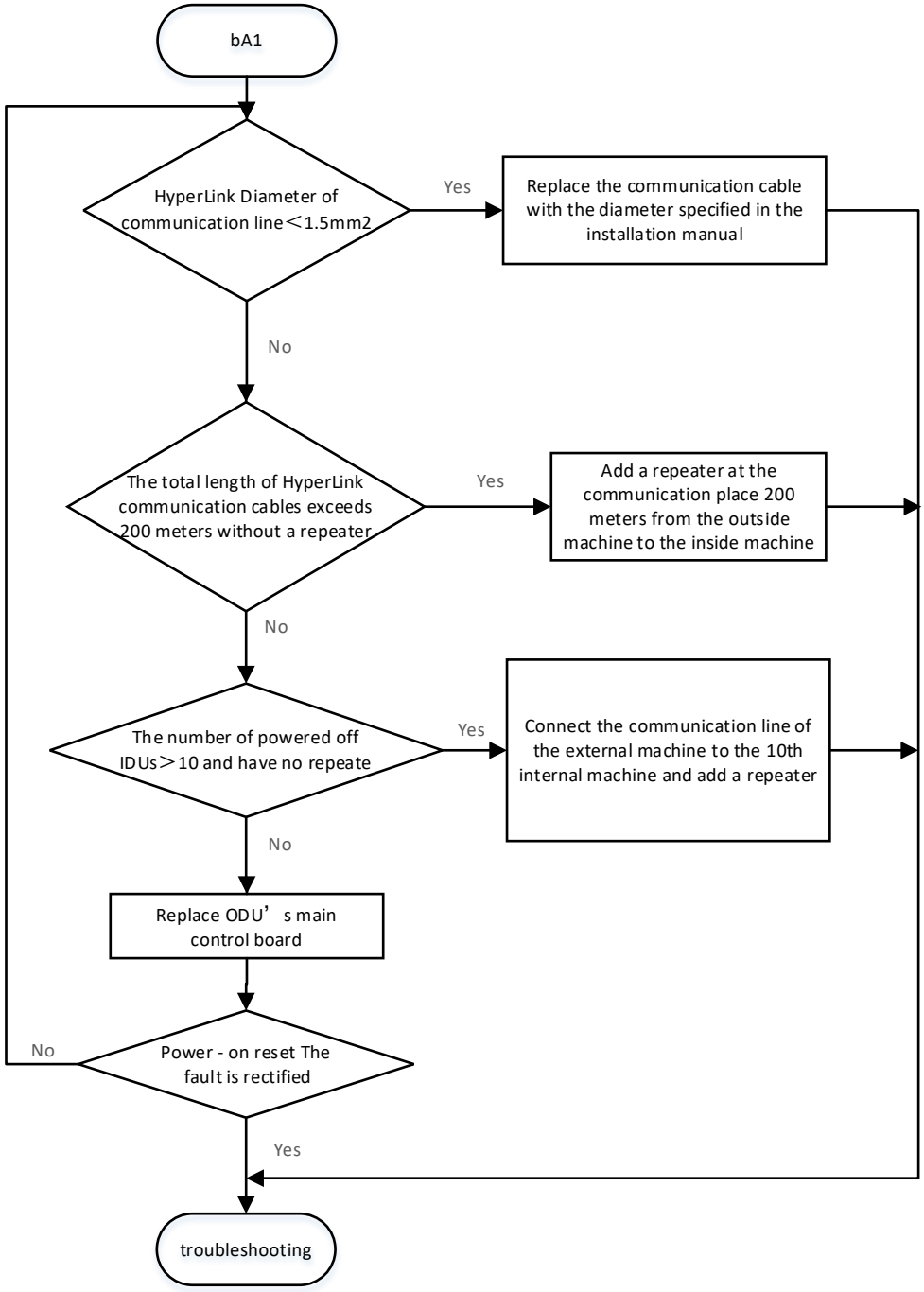
2.3.3 Trigger / recover condition

- Trigger condition:when some IDUs in the system are powered off, HyperLink board voltage＜17V
- Recover condition: HyperLink board voltage＞17V
- Reset method: Resume manually
-

2.3.4 Possible causes

- HyperLink Diameter of communication line＜1.5mm^2;
- The total length of HyperLink communication cables exceeds 200 meters without a repeater;
- The number of powered off IDUs＞10 and have no repeater:
- Indoor main control board is damaged;
- Outdoor main control board is damaged.

2.3.5 Procedure



2.4 U38: Outdoor Unit has no address.

2.4.1 Digital display output

Description

- Outdoor Unit has no address.
- The ODU with error can not run.
- The outdoor unit cannot communicate with indoor units.

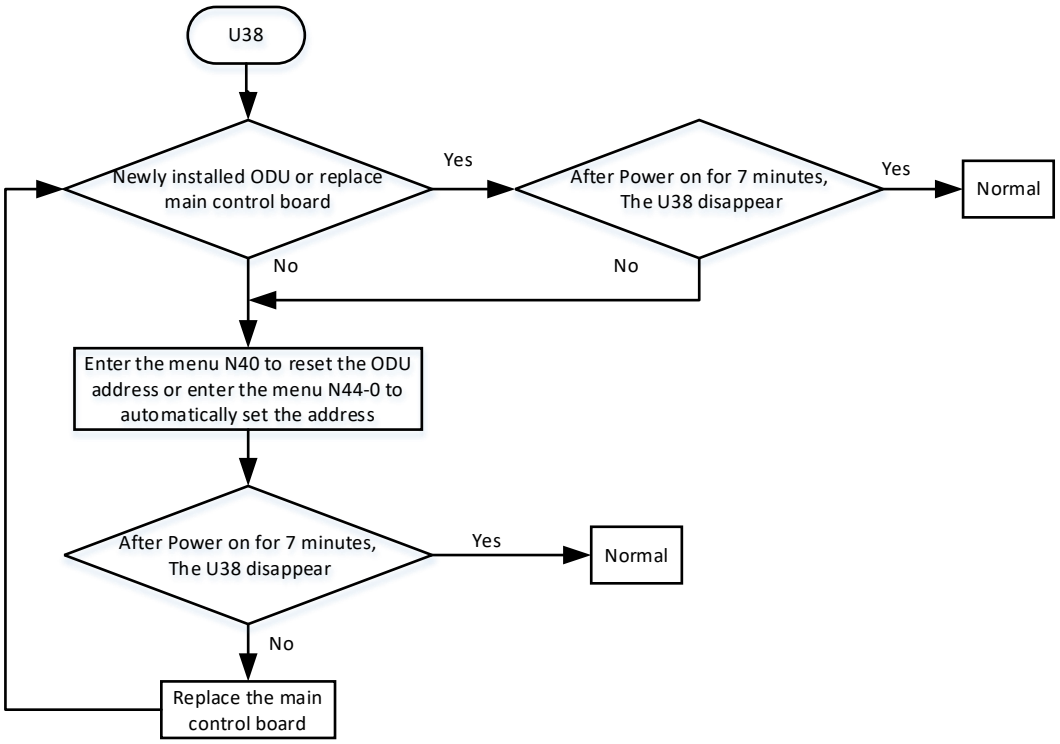
2.4.2 Trigger / recover condition

- Trigger condition: The ODU's address is not set
- Recover condition: Enter the menu N40 to reset the outdoor unit address. The outdoor unit address is 0.
- Reset method: Resume manually

2.4.3 Possible causes

- The ODU's address is not set
- Outdoor main control board is damaged

2.4.4 Procedure



Notes:

[1]After setting the outdoor unit address, waiting for 30 seconds then, powering off the ODU, next waiting another 30 seconds, and then powering on the ODU again.

2.5 C21: Communication error between IDU and ODU.

2.5.1 Digital display output

2.5.2 Description

- Communication error between IDU and ODU
- All units stop running.
- Error code is only displayed on the outdoor unit.

2.5.3 Trigger / recover condition

- Trigger condition:20 minutes after the outdoor unit is power on,the communication signal from the IDU cannot be received by ODU for two minutes
- Recover condition: the ODU receives the communication signal from the IDU.
- Reset method: Resume automatically

2.5.4 Possible causes

(1)PQ communication is adopted

- The three-core shield cable is not in use or the shield layer is not grounded.
- The communication cable is not tightened or the surface contact of the wiring block is poor
- Communication cable is disturbed by strong electromagnetic wave
- The communication cable is disconnected or in bad contact due to various reasons
- Communication cables are not connected hand in hand or the PQE cable sequence is incorrect
- The address of an IDU is incorrect
- Indoor main control board is damaged.
- Outdoor main control board is damaged.

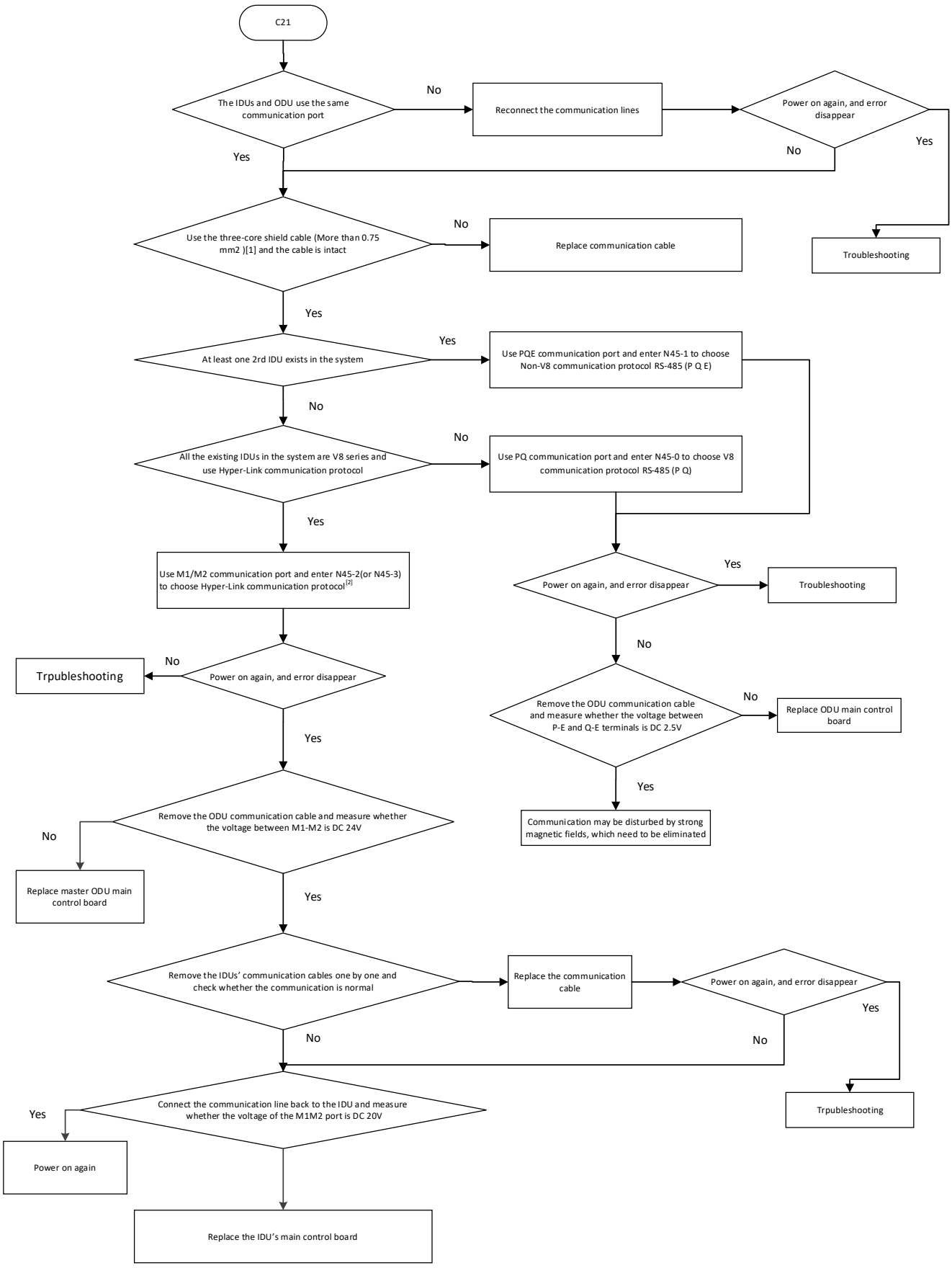
(2)M1M2 communication is adopted

- The communication cable is not tightened or the surface contact of the wiring block is poor
- Communication line is disturbed by strong electromagnetic wave
- The communication cable is disconnected or in bad contact due to various reasons
- The address of an IDU is incorrect
- Indoor main control board is damaged.
- Outdoor main control board is damaged.

[1] If Hyper-Link communication is used, the communication wire diameter should be 1.5mm^2

[2] N45-2 IDUs uniform power supplied; N45-3-IDUs separate power supplied

2.5.5 Procedure



Note:

[1] If Hyper-Link communication is used, the communication wire diameter should be 1.5mm^2

[2] N45-2 IDUs uniform power supplied; N45-3-IDUs separate power supplied

2.6 C26 Abnormal reduction in the number of indoor units

2.6.1 Digital display output

2.6.2 Description

- The number of online indoor units is smaller than the configured number
- All units stop running.
- Error code is only displayed on the outdoor unit

2.6.3 Trigger / recover condition

- Trigger condition:

  N0: The number of IDU set by ODU; N1: The number of online machines.

  (1)During operation, N1 < N0 and lasts for 2 minutes

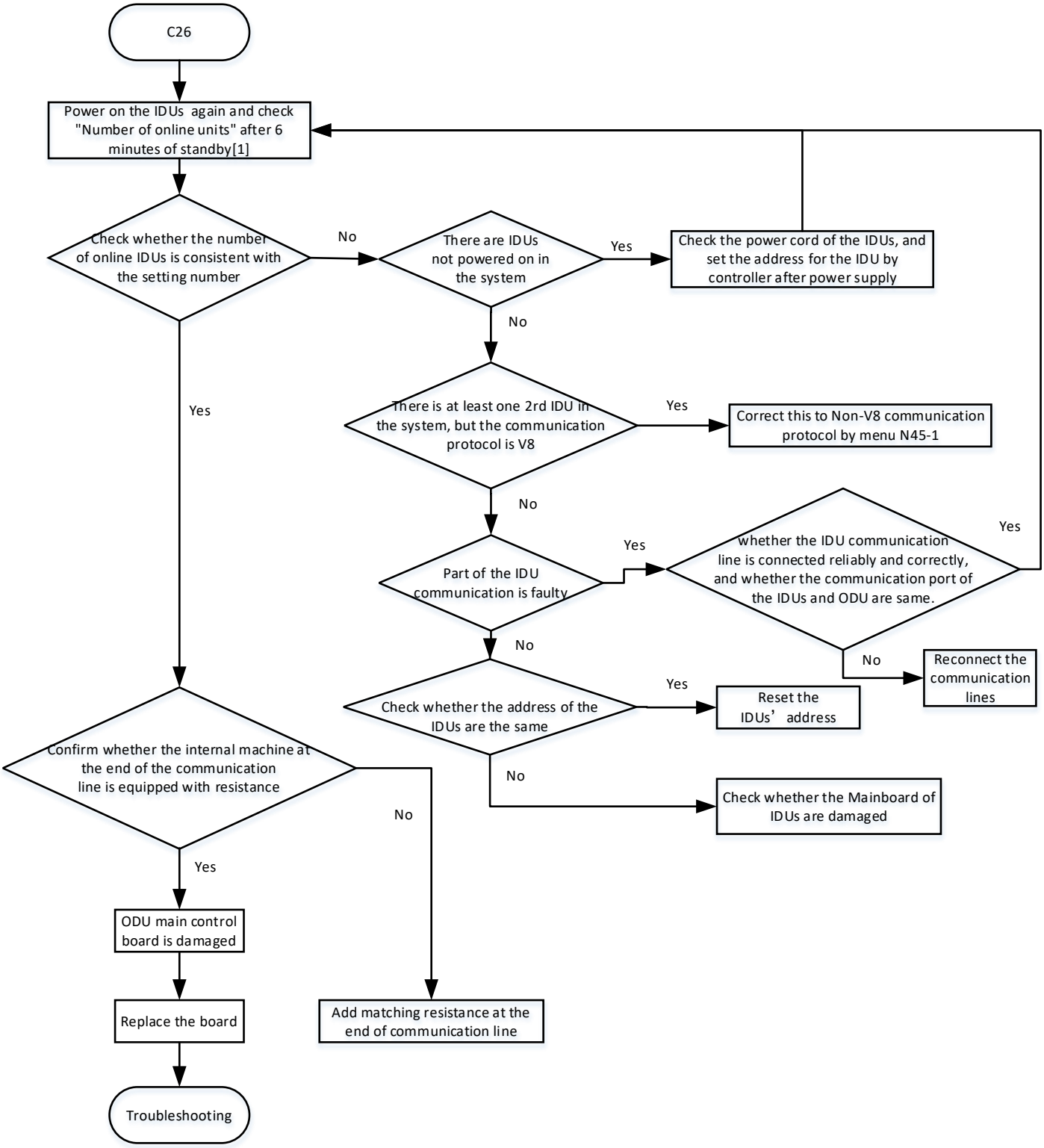
  (2) After the first power-on, N1<N0 within 20 minutes, ODU can not start starts and display that error
- Recover condition:

  N1 = N0 for 60 seconds
- Reset method: Resume automatically

2.6.4 Possible causes

- The three-core shield cable is not in use or the shield layer is not grounded.
- The communication cable is not tightened or the surface contact of the wiring block is poor
- Communication cable is disturbed by strong electromagnetic wave
- The communication cable is disconnected or in bad contact due to various reasons
- Communication cables are not connected hand in hand or the PQE cable sequence is incorrect
- The address of an indoor unit is incorrect
- Indoor main control board is damaged.
- Outdoor main control board is damaged.
- The number of IDU set by ODU is inconsistent with the actual number of IDU

2.6.5 Procedure



Note:

[1] Check the Number of indoor units (set by outdoor unit) refer to the ***Part 4*** - *4.4.1*

2.7 C28: Abnormal increase in the number of indoor units

2.7.1 Digital display output

2.7.2 Description

- Abnormal increase in the number of indoor units
- All units stop running.
- Error code is only displayed on the outdoor unit

2.7.3 Trigger / recover condition

- Trigger condition:

  N0: The number of IDU set by ODU; N1: The number of online machines.

  (1) During operation, N1 >N0 and lasts for 2 minutes

  (2) After the first power-on, N1>N0 within 20 minutes, ODU can not start starts and display the error

- Recover condition:

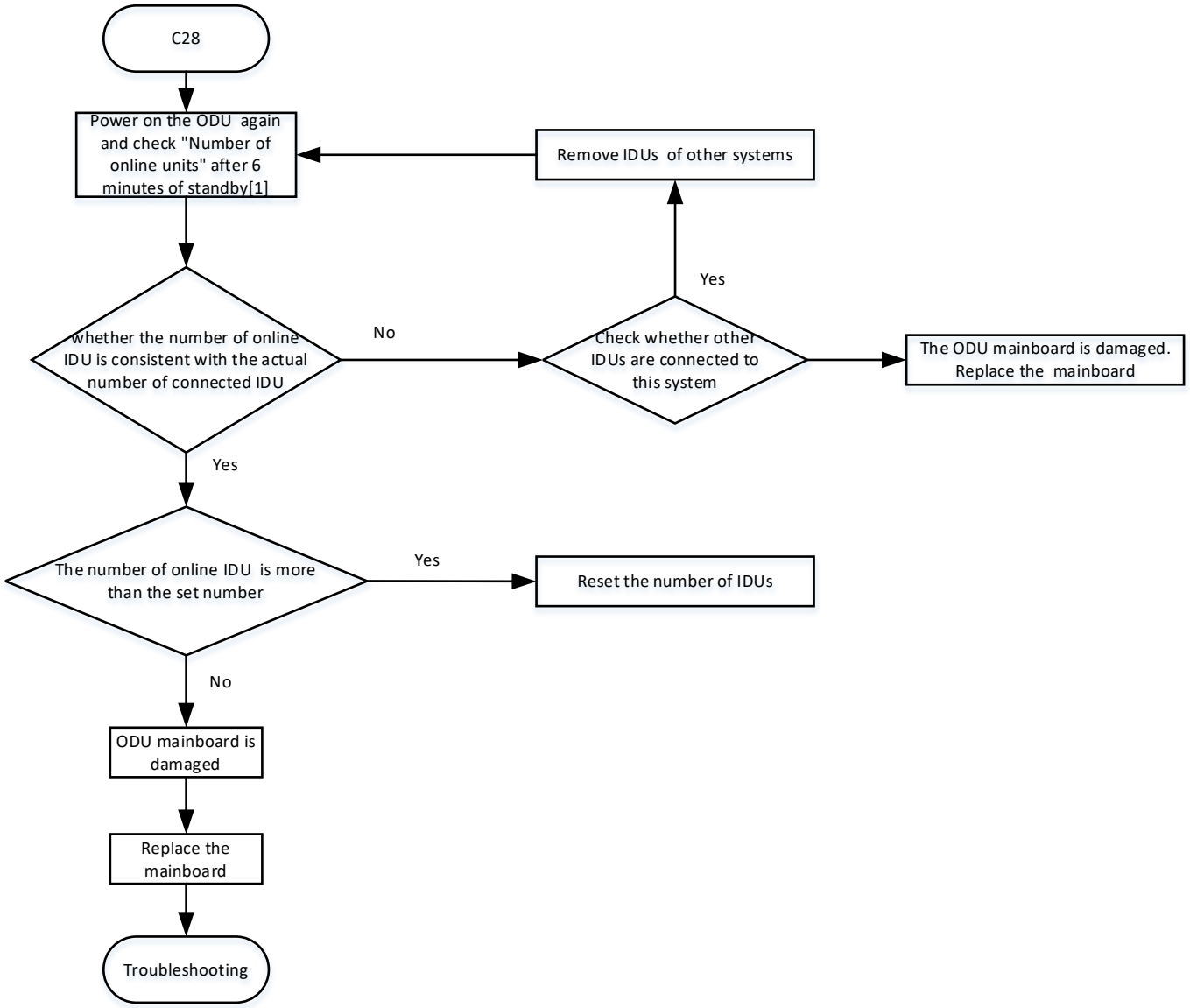
  N1 = N0 for 60 seconds

- Reset method: Resume automatically.

2.7.4 Possible causes

- The three-core shield cable is not in use or the shield layer is not grounded.
- The communication cable is not tightened or the surface contact of the wiring block is poor
- Communication cable is disturbed by strong electromagnetic wave
- The communication cable is disconnected or in bad contact due to various reasons
- Communication cables are not connected hand in hand or the PQE cable sequence is incorrect
- The address of an indoor unit is incorrect
- Indoor main control board is damaged.
- Outdoor main control board is damaged.
- The number of IDU set by ODU is inconsistent with the actual number of IDU

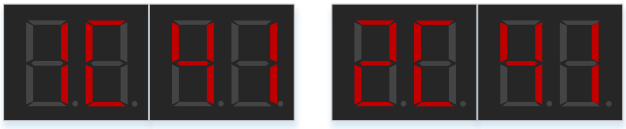
2.7.5 Procedure



Note:
[1] Check the Number of indoor units (set by outdoor unit) refer to the *Part 4 - 4.4.1*

2.8 1C41: Communication Error between main control board and inverter driver board

2.8.1 Digital display output



2.8.2 Description

- The communication between the main control board and inverter driver board is error
- All units stop running.

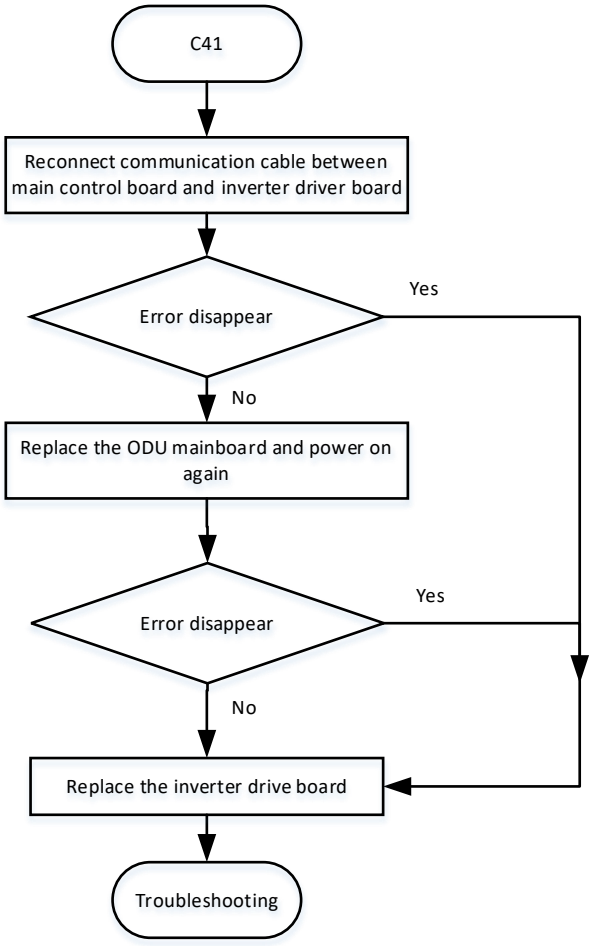
2.8.3 Trigger / recover condition

- Trigger condition: Communication between main control board and inverter driver board is interrupted for more than 2 minutes
- Recover condition:Communication between the main control board and No.x inverter driver board is restored
- Reset method: Resume automatically.

2.8.4 Possible causes

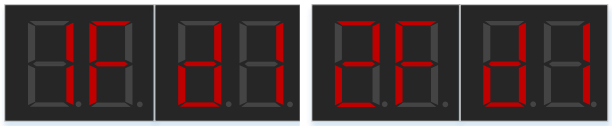
- Communication between main control board and No.x inverter driver board is interrupted
- No.x inverter driver board is damaged
- Main control board is damaged

2.8.5 Procedure



2.9 E41,F31,F41,F71,F91,FA1,FC1,Fd1: Temperature sensor error

2.9.1 Digital display output

Error code	Error description	Remarks	Digital display output
E41	Outdoor ambient temperature sensor (**T4**) error(open/short)	sensor error	
F31	Plate heat exchanger outlet temperature sensor(**T6B**) error(open/short)	sensor error	
F41	Main heat exchanger pipe temperature sensor (**T3**) error(open/short)	sensor error	
F71	Discharge temperature sensor(**T7C1/T7C2**) error (open/short)	sensor error	
F91	Liquid pipe temperature sensor (**T5**) error (open/short)	sensor error	
FA1	Outdoor Heat exchanger gas temperature sensor (**T8**) error (open/short)	sensor error	
FC1	Outdoor heat exchanger liquid temperature sensor (**TL**) error (open/short)	sensor error	
Fd1	Compressor suction temperature sensor (**T71/T72**) error (open/short)	sensor error	

2.9.2 Description

- All units stop running.
- Error code is displayed on the unit with the error

Trigger / recover condition

2.9.3

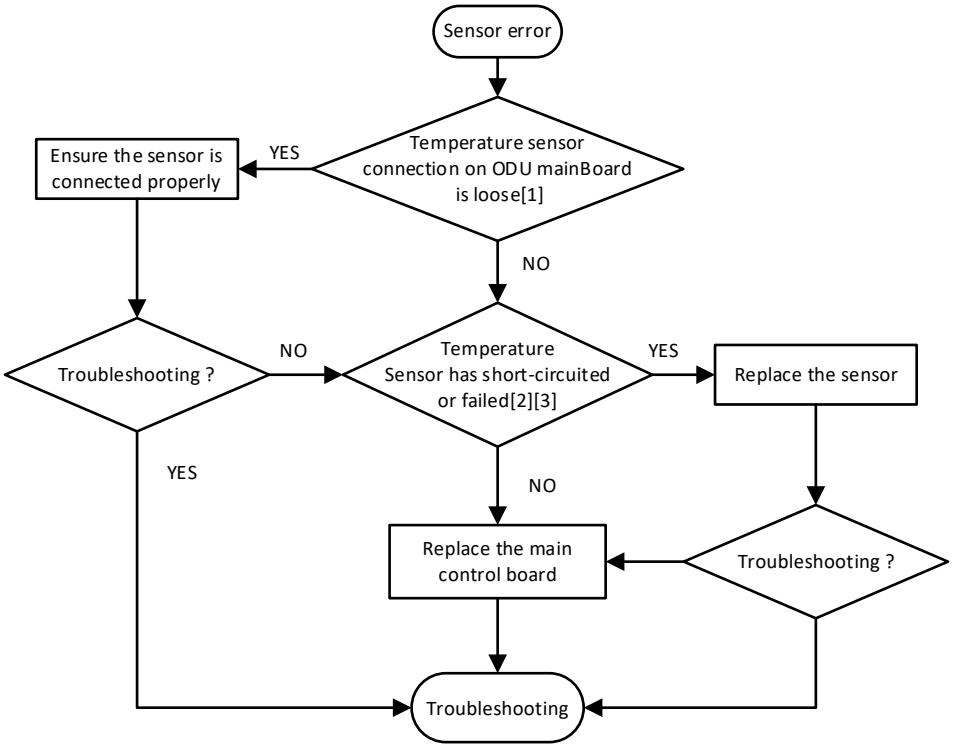
- Trigger condition:The main control board cannot obtain the normal AD value of the temperature sensor
- Recover condition:The main control board obtain the normal AD value of the temperature sensor
- Reset method: Resume automatically.

2.9.4 Possible causes

- The temperature sensor is not properly connected to the main control board.
- Sensor failure

- The main control board is damaged

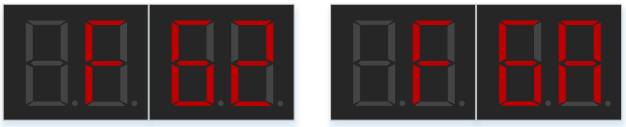
2.9.5 Procedure



Notes:
[1].The port on the main control board corresponding to the Temperature sensor refer to *Table5.3.1: Main Control Board port definition Table*.
[2].Measure sensor resistance. Removing the sensor and Use a multimeter to measure the sensor access resistance:If the resistance value is smaller than 0.5 kΩ(T7C1/T7C2 is 0.97 kΩ), the sensor is short-circuited, whereas, if the impedance is very higher than 380 kΩ (T7C1/T7C2 is 743 kΩ), the sensor is open-circuited(Refer to *Table 5.1.1: Temperature sensor temperature resistance characteristic table*)
[3]. Measure the voltage of the port on main control board. If the sensor resistance is normal, then use a multimeter to measure the port voltage: If the port voltage is not 3.3V with main control board is powered on, the main control board is damaged and needs to be replaced.

2.10 F62, F6A: Inverter driver board NTC overtemperature protection

2.10.1 Digital display output



2.10.2 Description

- All units stop running
- Error code is displayed on the unit with the error.

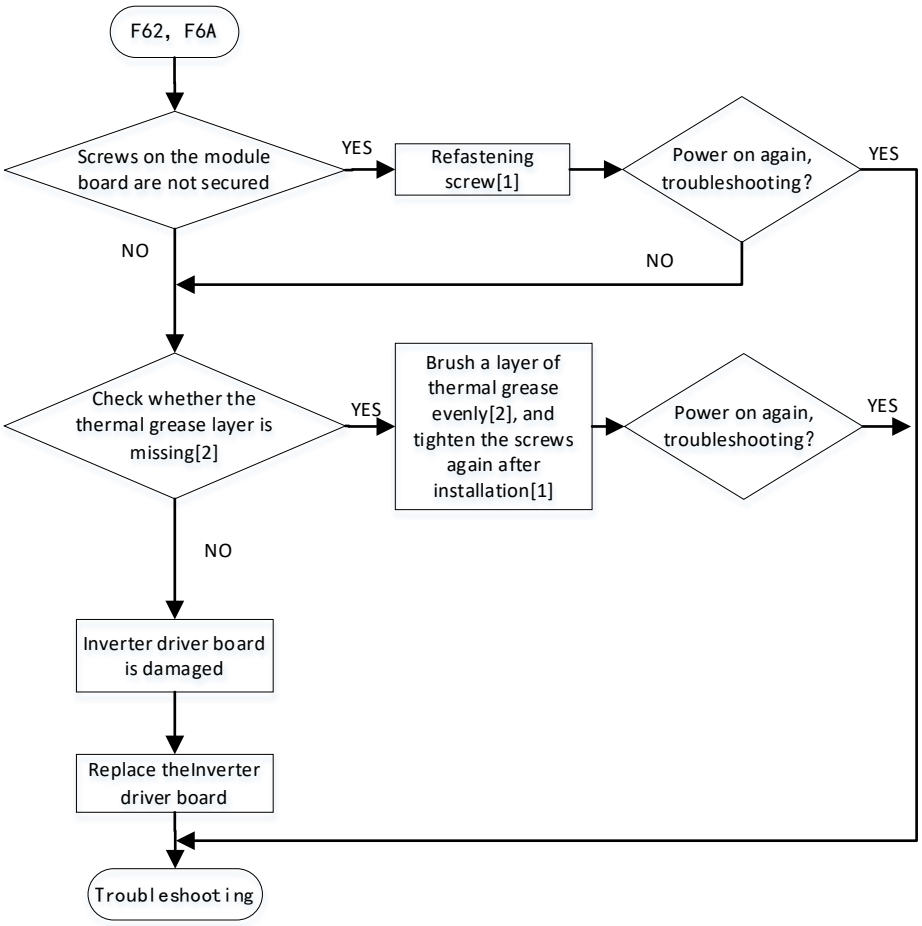
2.10.3 Trigger/ Recover condition

- Trigger condition:
  F62: The NTC temperature inside the compressor board or fan module is higher than 100 ° C
  F6A: F62 protection occurs 3 times in 100 minutes
- Recover condition: The NTC temperature is lower than 80 ° C
- Reset method:
  F62: Resume automatically
  F6A: Manually restart

2.10.4 Possible causes

- Inverter driver board is in poor contact with the radiator
- The thermal grease layer is missing
- Inverter driver board is damaged

2.10.5 Procedure



Notes:

[1] Reinstall the Inverter driver board refer to **Part 5** *-3.5 The installation guide of Compressor & Fan drive board*

[2]The thermal grease layer is located between the Inverter driver board and the radiator, and the thickness is about 0.2 mm.If the thermal grease layer is in poor condition, it is easy to lead to poor heat dissipation effect. You need to clean it and fill it again

2.11 F63: Non-inductive resistance Tr overtemperature protection

2.11.1 Digital display output

2.11.2 Description

- All units stop running
- Error code is displayed on the outdoor unit with the Error

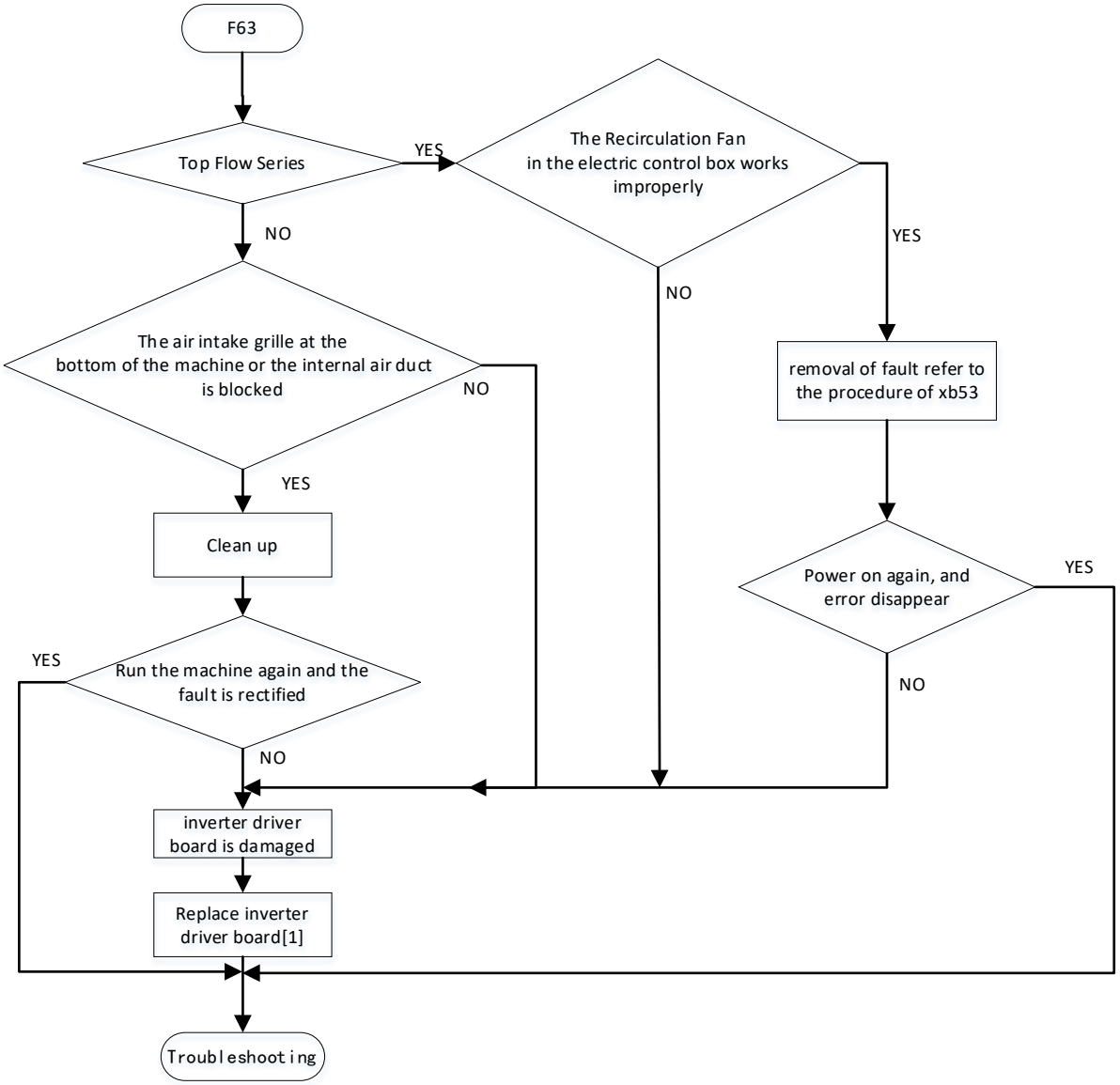
2.11.3 Trigger/ Recover condition

- Trigger condition: The non-inductive resistance temperature exceeds 95 ° C
- Recover condition: The non-inductive resistance temperature is lower than 70 ° C
- Reset method: Resume automatically

2.11.4 Possible causes

- The Recirculation Fan in the electric control box works improperly(Top Flow Series)
- The air intake grille at the bottom of the machine or the internal air duct is blocked(Side Flow Series)
- Inverter driver board is damaged

2.11.5 Procedure



Notes:
[1]. Reinstall the Inverter driver board refer to **Part 5**-*3.5 The installation guide of Compressor & Fan drive board*

2.12 F72, F7A: Discharge Temperature protection

2.12.1 Digital display output

2.12.2 Description

- Discharge Temperature is over the limit.
- All outdoor Unit stop running
- Error code is displayed on the unit with the error

2.12.3 Trigger / Recover condition

- Trigger condition:

  F72: Discharge Temperature (T7C1/T7C2) ≥ 115°C.

  F7A:F72 protection occurs 3 times in 100 minutes
- Recover condition: Discharge Temperature (T7C1/T7C2) < 90°C.
- Reset method:

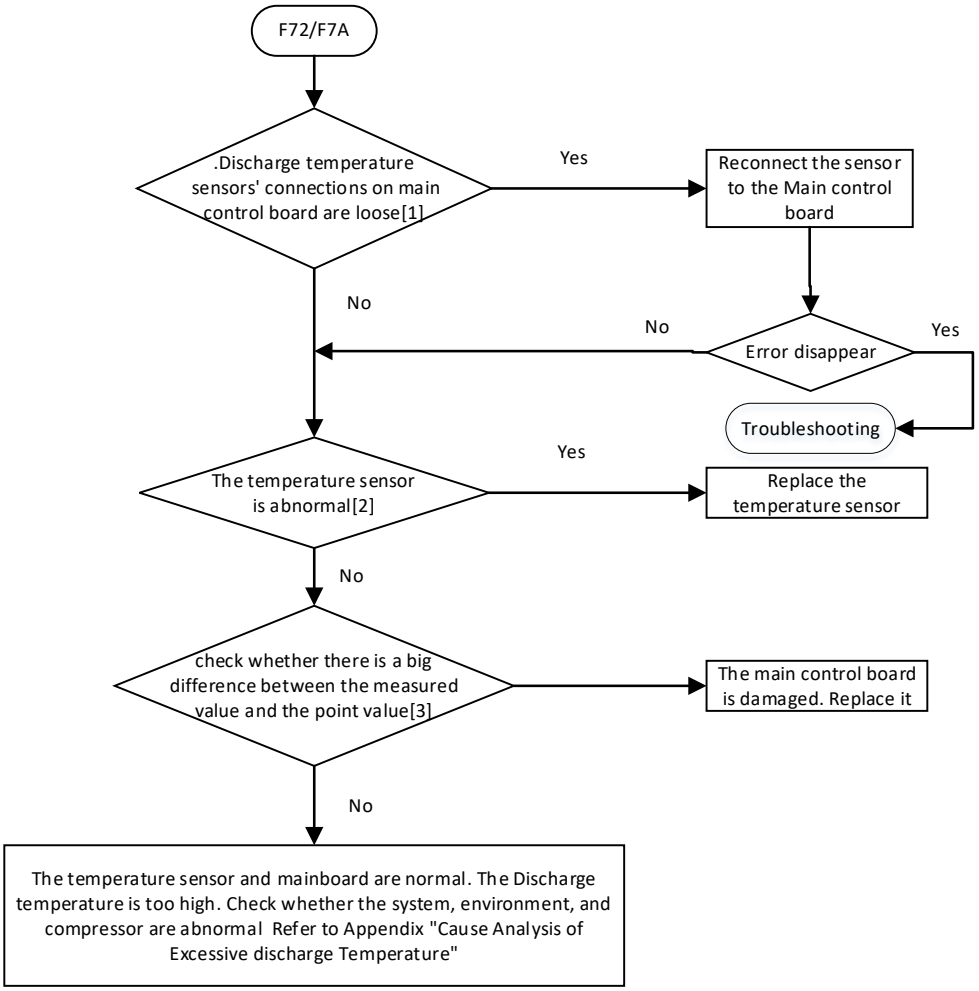
  F72: Resume automatically

  F7A: Manually restart

2.12.4 Possible causes

- The discharge temperature sensor temperature failure
- Main control board is damaged
- The discharge temperature sensor temperature is too high

2.12.5 Procdure



Notes:

[1] The main control board port of Discharge temperature sensor 1 (T7C1) is CN4 and Discharge temperature sensor 2(T7C2) is CN38:

[2] Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to "*Table 5.1.1: Temperature sensor temperature resistance characteristic table*"

[3] Use the temperature measuring tool to measure the Discharge temperature. Less refrigerant system results in higher Discharge temperature of the compressor, lower Discharge and suction pressure, lower current, and frost on the gas return pipe. These phenomena disappear when the system is replenished with normal refrigerant. Refer to *Table 5.2.1 and 5.2.2* "Normal Refrigerant System parameters" in Chapter 5 for normal system parameters.

2.13 F75: Compressor discharge insufficient superheat protection

2.13.1 Digital display output

2.13.2 Description

- Superheat degree of Compressor discharge temperature is too low, triggering protection shutdown
- Determination during operation of outdoor unit.
- All units stop running.
- The error code is displayed on the outdoor unit with error.

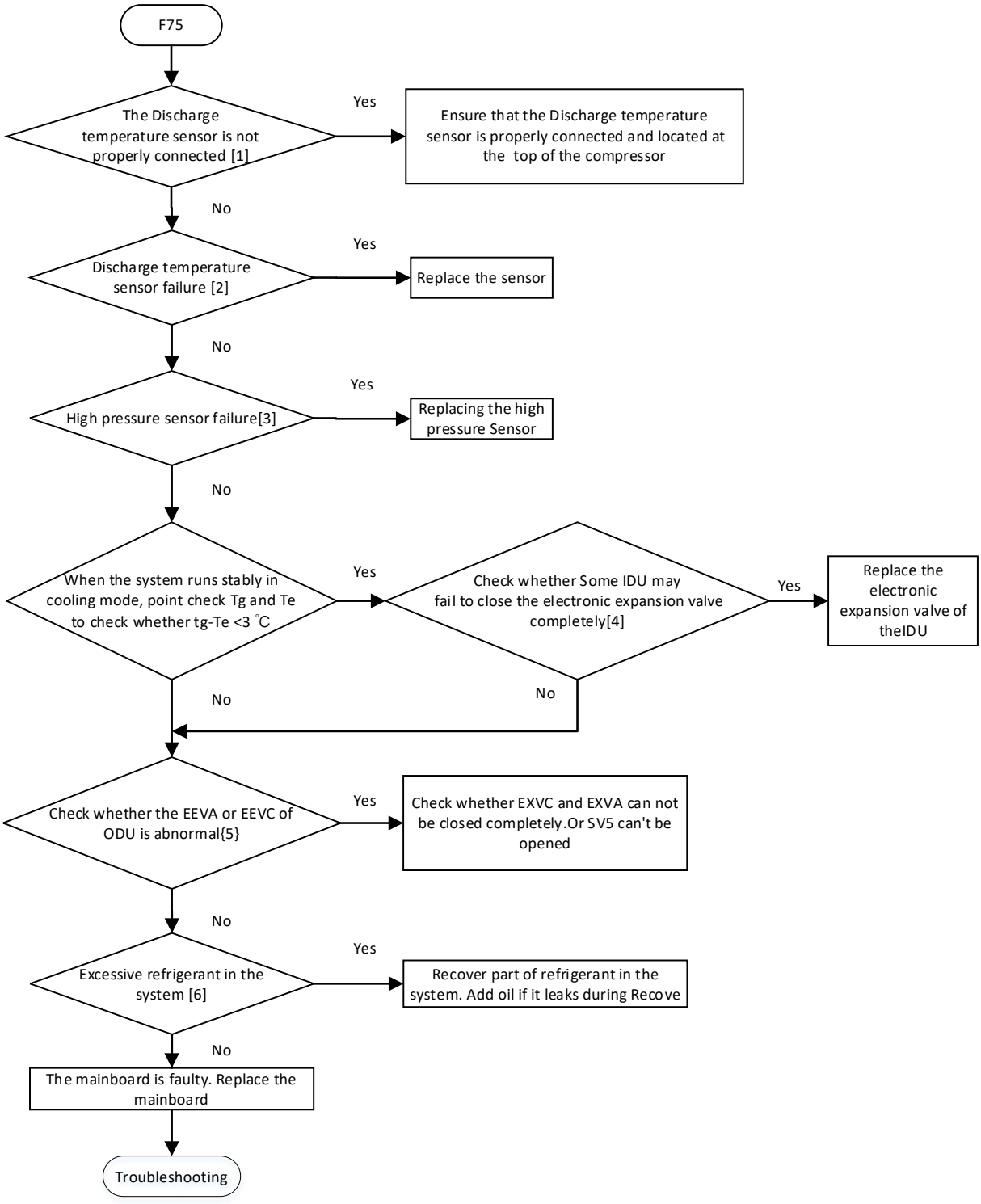
2.13.3 Trigger / recover condition

- Trigger condition:During the system operation, the discharge superheat of the compressor is lower than 6 ° C and lasts for more than 90 minutes
- Recover condition: Resume automatically after 30 seconds of downtime
- Reset method: Resume automatically

2.13.4 Possible causes

- Temperature sensor not connected properly or has malfunction.
- High pressure sensor not connected properly or has malfunction.
- Excess refrigerant.
- Some valves of ODU can’t be fully closed.
- Some valves of IDU can’t be fully closed.
- Outdoor main control board damaged.

2.13.5 Procedure



Notes:

[1] The main control board port of Discharge temperature sensor 1 (T7C1) is CN4 and Discharge temperature sensor 2(T7C2) is CN38:

[2] Measure sensor resistance. If the resistance is too low, the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 6-4.2 in Part 6, 4.1 "Temperature Sensor Resistance Characteristics "

[3] Measure the resistance among the three terminals of the pressure sensor. If the resistance is of the order of mega Ohms or infinite, the pressure sensor has failed.

[4] Close the IDU and check whether the temperature of the Gas pipe is too low or frosted or the evaporator is frosted

[5] If the following happens the EEVA or EEVC of ODU is abnormal

1. T6B-T6A<3°C and T6A-Te <3°C when EEVC minimum opening (0pls or 17pls)?
2. T8 -Te <2°C when EEVA minimum opening (0pls or 17pls) in heating mode?

[6] Excess refrigerant causes discharge temperature to be lower than normal, discharge pressure to be higher than normal and suction pressure to be higher than normal.Normal system parameters refer to *Table 5.2.1 and 5.2.2* "Normal Refrigerant System Parameters" in Chapter 5.

2.14 P11: High pressure sensor error

2.14.1 Digital display output

2.14.2 Description

- Open/short circuit error of high pressure sensor
- All units stop running.
- The error code is displayed on the Outdoor Unit with error.

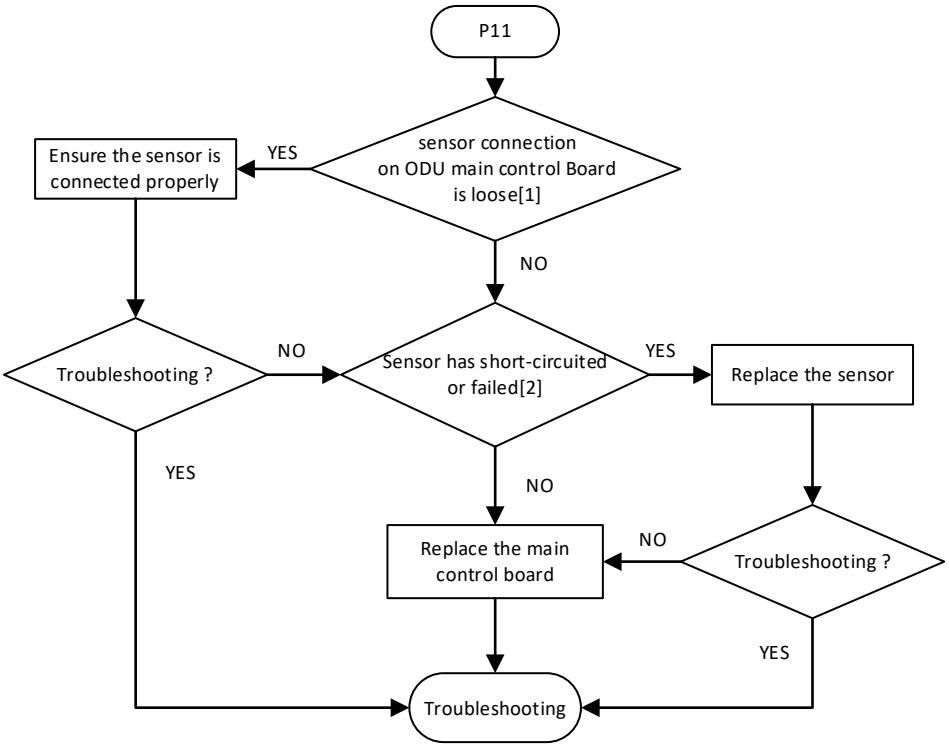
2.14.3 Trigger / recover condition

- Trigger condition:The main control board cannot obtain the normal AD value of the high pressure pressure sensor
- Recover condition:The main control board can obtain the normal AD value of the high pressure pressure sensor
- Reset method: Resume automatically.

2.14.4 Possible causes

- The high-pressure pressure sensor is not properly connected to the main control board, or it fails.
- The main control board is damaged

2.14.5 Procedure



Notes:

[1] The ports on the main control board corresponding to the high-pressure pressure sensor are CN40, please refer to **Table5.3.1:** *Main Control Board port definition Table*.

[2].Measure the voltage of the CN40 port.If the sensor is normal, use a multimeter to measure the port voltage; After the main control board is powered on, if the port voltage is not 3.3V, the main control board is damaged and needs to be replaced.

2.15 P12/P14:High pressure protection

2.15.1 Digital display output

2.15.2 Description

- P12: The high pressure is over the limit.
- P14: 3 times P12 in 100 minutes
- All units stop running
- Error code is displayed on the unit with the Error

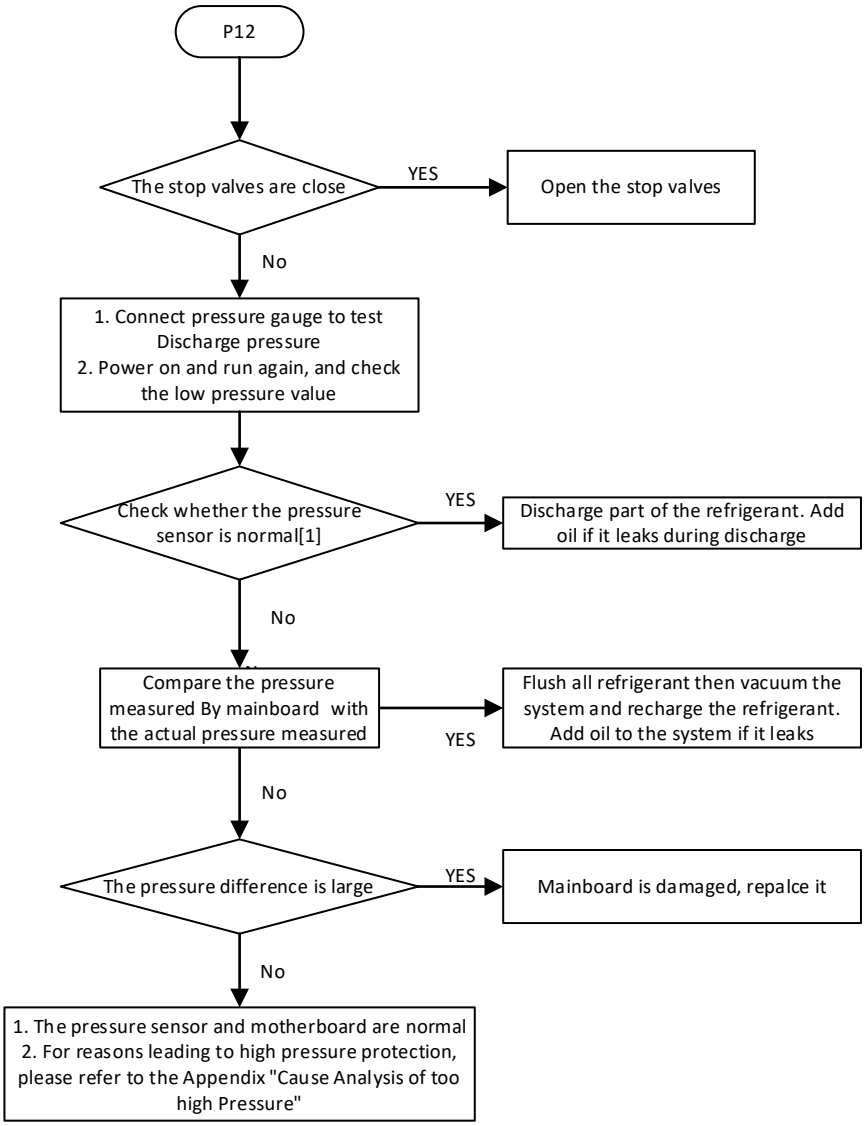
2.15.3 Trigger / recover condition

- Trigger condition:
  - P12: discharge pressure ≥ 4.15 MPa.
  - P14: P12 occurs 3 times within 100 minutes
- Recover condition:
  - P12: Cooling mode: discharge pressure< 3.5MPa
    Heating mode: discharge pressure< 3.1MPa
  - P14: Remove high pressure protection from Outdoor Unit
- Reset method:
  - P12: Resume automatically.
  - P14: Resume manually

2.15.4 Possible causes

- Outdoor unit stop valves are closed.
- Pressure sensor/switch not connected properly or has malfunction.
- Poor condenser heat exchange.
- Outdoor main control board damaged.
- Refer to Appendix "Cause Analysis of Excessive Discharge Pressure".

2.15.5 Procedure



Note:
[1] The high voltage sensor port is connected to the Outdoor Unit main control board port CN40
[2] Measure the resistance between the three terminals of the pressure sensor.If the resistance is megohm or infinite, the pressure sensor fails

2.16 P13: High pressure switch protection

2.16.1 Digital display output

2.16.2 Description

- All units stop running
- Error code is displayed on the unit with the Error

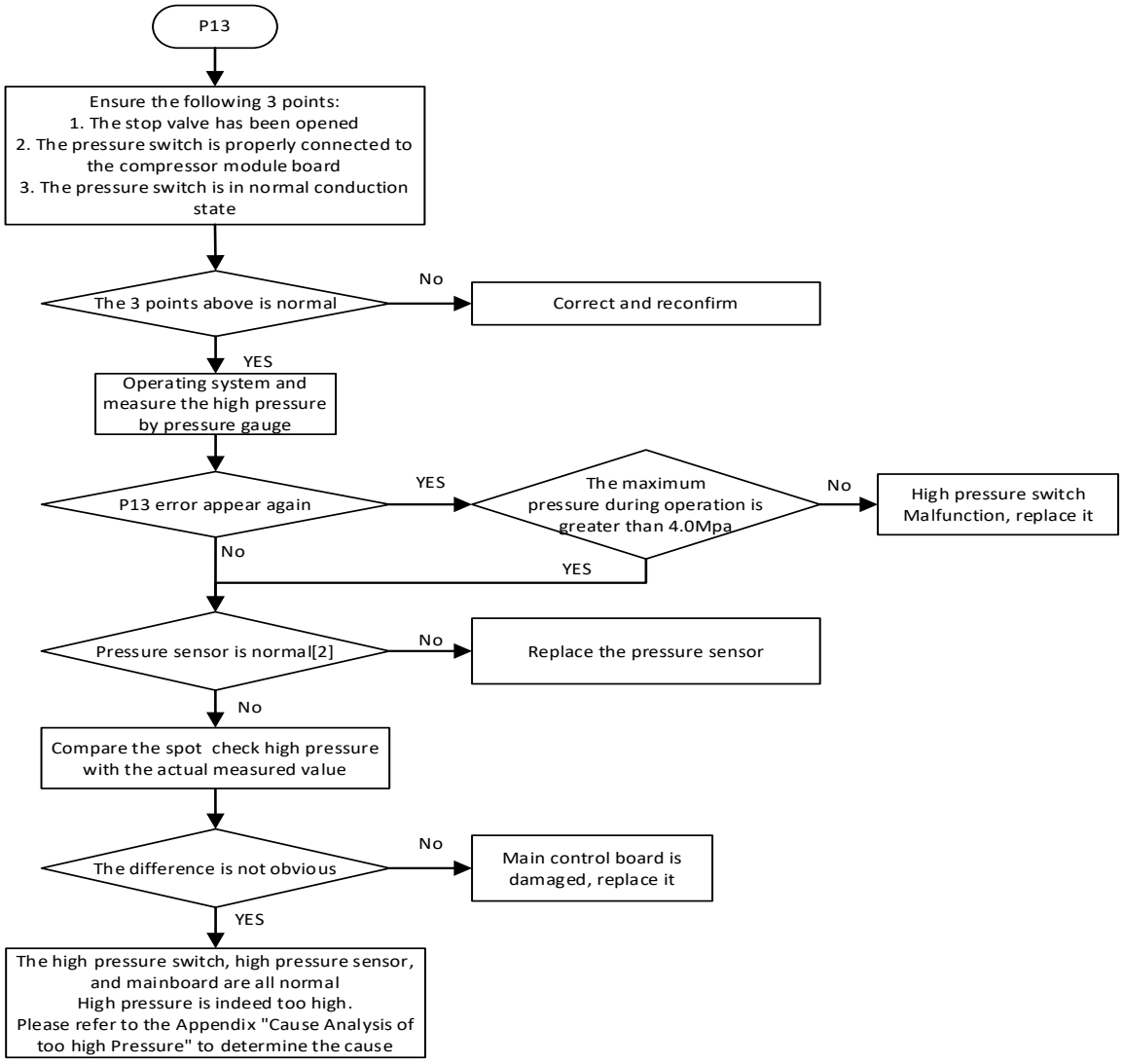
2.16.3 Trigger / recover condition

- Trigger condition: discharge pressure≥ 4.2MPa.
- Recover condition:discharge pressure< 3.0
- Reset method: Resume automatically.

2.16.4 Possible causes

- Outdoor unit stop valves are closed.
- Pressure switch not connected properly or has malfunction.
- Excess refrigerant.
- System contains air or nitrogen.
- High pressure side blockage.
- Poor condenser heat exchange.
- Outdoor main control board damaged.

2.16.5 Procedure



Note:

1. The High pressure switch port is connected to the Outdoor Unit Inverter driver board port CN21
2. To check whether the pressure sensor is abnormal, refer to the Appendix “Pressure Sensor Detection”

2.17 P21: Low pressure sensor error

2.17.1 Digital display output

2.17.2 Description

- Open/short circuit Error in suction pressure sensor
- All units stop running.
- Error code is only displayed on the slave unit with the error.

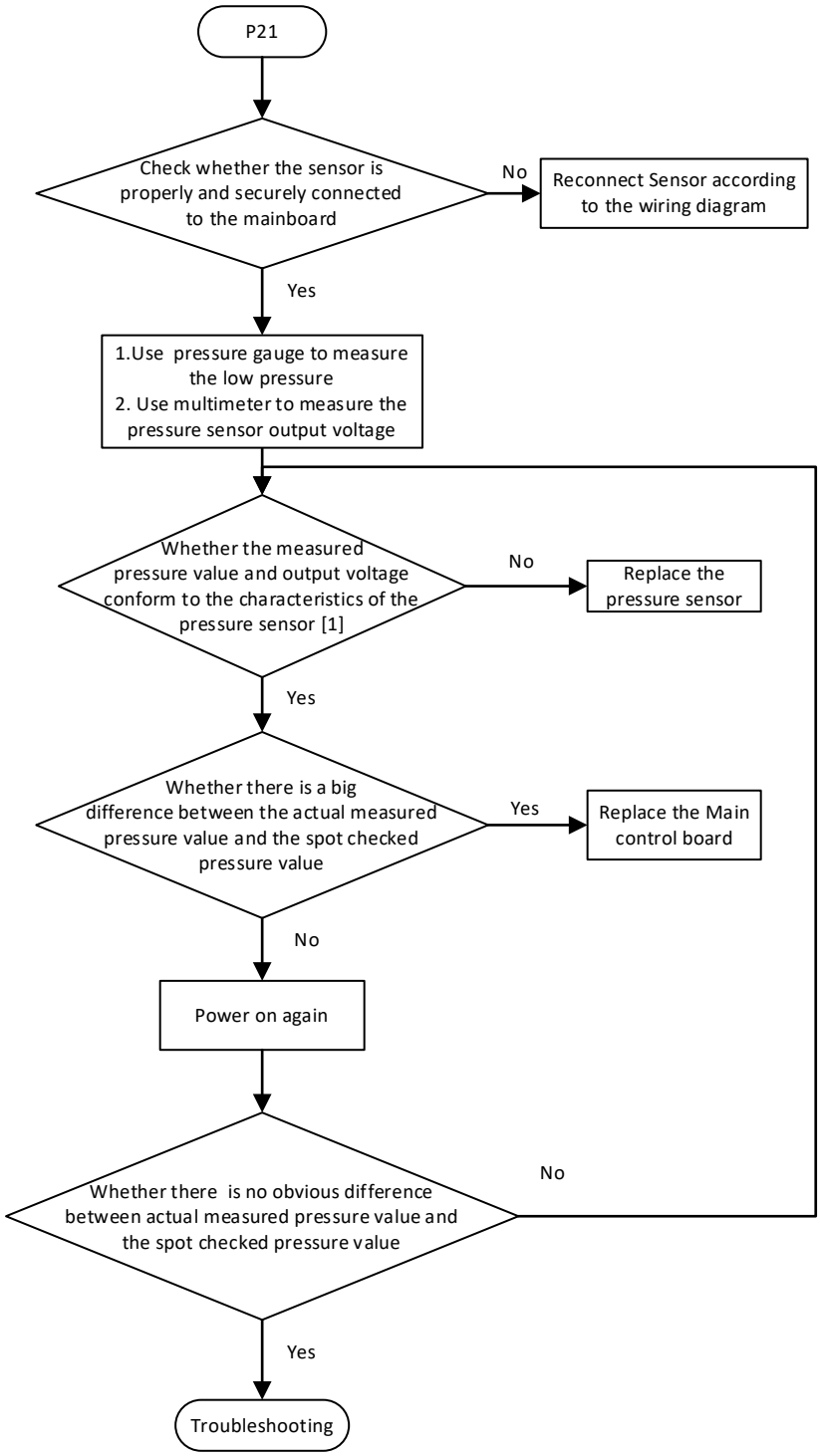
2.17.3 Trigger / recover condition

- Trigger condition:Abnormal values of the low-pressure sensor have been detected for 2 consecutive minutes
- Recover condition:Rectify the Error of the low-voltage sensor and power it on again
- Reset method:power it on again

2.17.4 Possible causes

- Suction pressure sensor has poor contact or it is damaged
- main control board is damaged
- The low pressure sensor is inversely connected to the high pressure sensor

2.17.5 Procedure



Note:

1. To check whether the pressure sensor is abnormal, refer to the Appendix “Pressure Sensor Detection”.

2.18 P22, P25: Low pressure protection

2.18.1 Digital display output

2.18.2 Description

- All units stop running.
- Error code is displayed on the unit with the error.

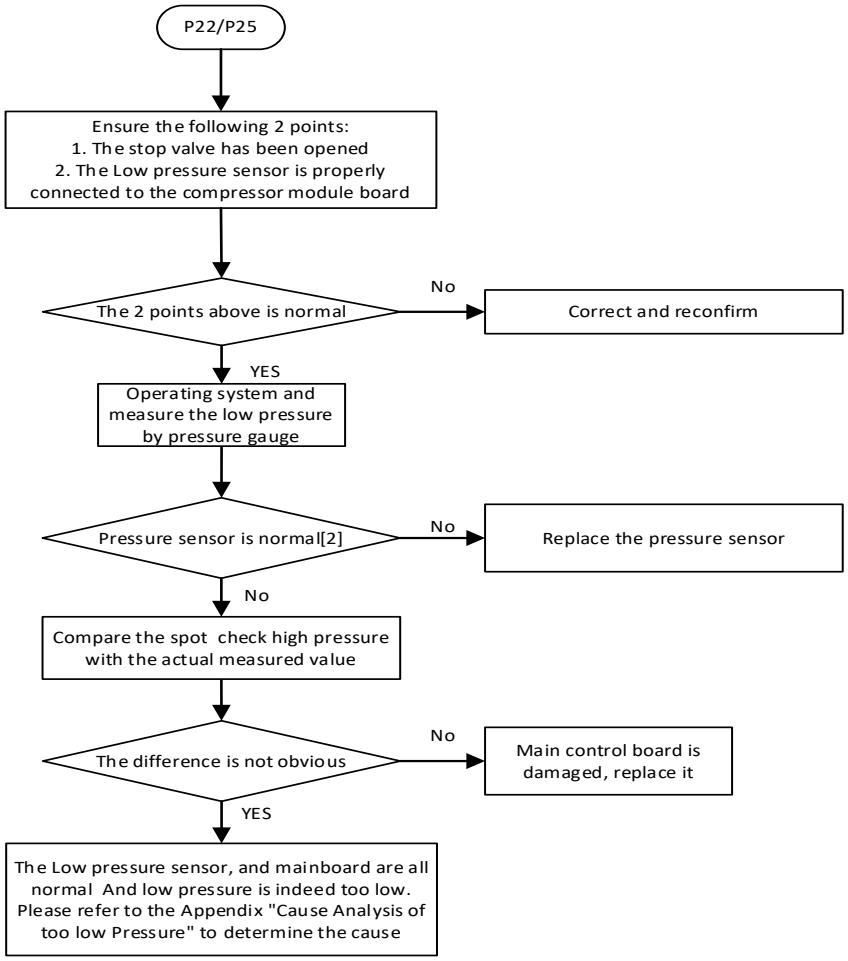
2.18.3 Trigger/ Recover condition

- Trigger condition:
  - P22: suction pressure < 0.07MPa.
  - P25: P22 occurs 3 times within 60 minutes
- Recover condition: Suction pressure >0.15MPa
- Reset method:
  - P22: Resume automatically
  - P25: Resume manually

2.18.4 Possible causes

- Outdoor unit stop valves are closed.
- Low pressure sensor is damaged
- Main control board of Outdoor Unit is damaged
- The actual pressure is too low

2.18.5 Procedure



Note:

1. The low pressure sensor port is connected to the Outdoor Unit main control board port CN41
2. To check whether the pressure sensor is abnormal, refer to the Appendix “Pressure Sensor Detection”.

2.19 P24: Abnormal elevation of low pressure

2.19.1 Digital display output

2.19.2 Description

- All units stop running.
- Error code is displayed on the unit with the error

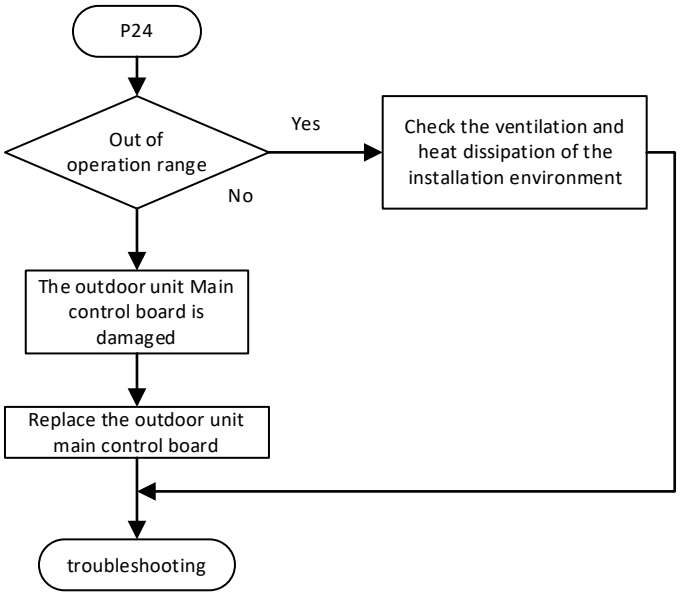
2.19.3 Trigger/ Recover condition

- Trigger condition:
  Suction pressure >1.6MPa and lasts 60 minutes
- Recover condition:
  The ODU shutdown and resume automatically after 1 minute.
- Reset method:
  Resume automatically

2.19.4 Possible causes

- Outdoor Unit out of range operation
- Main control board of Outdoor Unit is damaged

2.19.5 Procedure



2.20 1P32, 1P33: Compressor high DC bus current protection

2.20.1 Digital display output

2.20.2 Description

- The DC bus current of Compressor is too high, triggering protection shutdown
- All units stop running..
- Error code is displayed on the unit with the error.

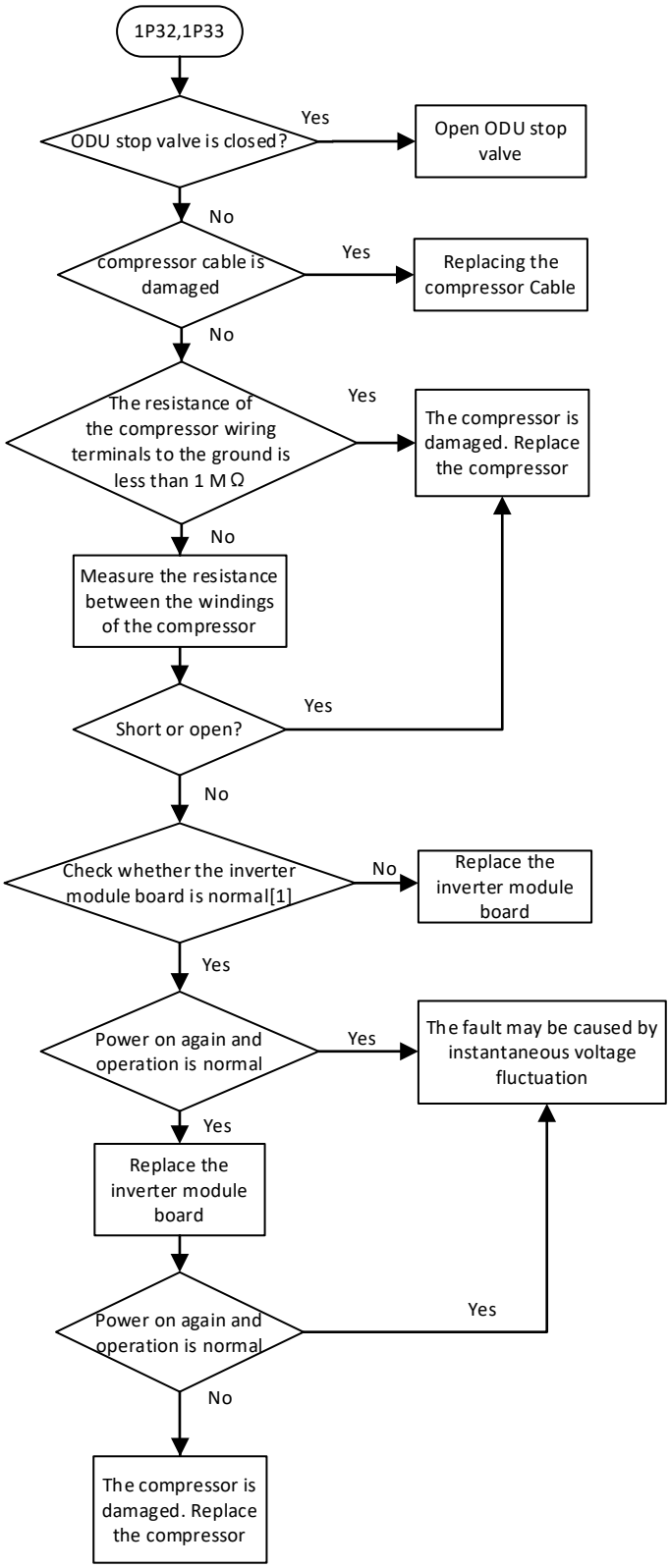
2.20.3 Trigger / recover condition

- Trigger condition:
  P32: During operation, the DC bus current of any compressor exceeds the upper limit
  P33: Within 100min, Compressor appears P32 for 3 times
- Recover condition:
  P32: The DC bus current of all compressors is lower than the recovery value
  P33: After the device is powered on again, release the lock
- Reset method:
  P32: Resume automatically
  P33: Resume manually

2.20.4 Possible causes

- The compressor is overload
- The motor coil inside the compressor is damaged and short-circuited
- The high-pressure pipe side is blocked.
- The inverter module board is damaged

2.20.5 Procedure



Note:

1. Refer to the Appendix “Measurement Guide for inverter Module Board”.

2.21 P51: High AC voltage protection

2.21.1 Digital display output

2.21.2 Description

- The AC voltage of the system is too high, triggering the protection shutdown
- All units stop running
- Error code is displayed on the unit with the error.

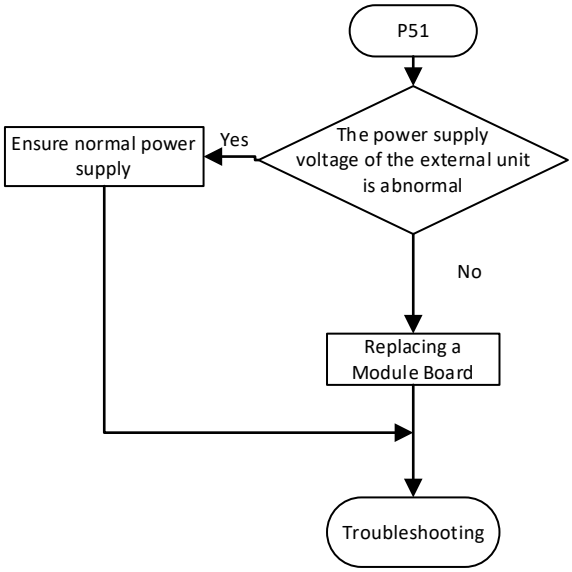
2.21.3 Trigger / recover condition

- Trigger condition:The AC voltage of Outdoor Unit over 265 V
- Recover condition: Wait 7/15/30min for each occurrence, and the AC voltage of Outdoor Unit drops below 250 V
- Reset method: Resume automatically.

2.21.4 Possible causes

- The power supply voltage is too high
- The module is damaged. The module is damaged

2.21.5 Procedure



2.22 P52: Low voltage protection

2.22.1 Digital display output

2.22.2 Description

- The AC voltage of the system is too low, triggering the protection shutdown
- All units stop running.
- Error code is displayed on the unit with the error

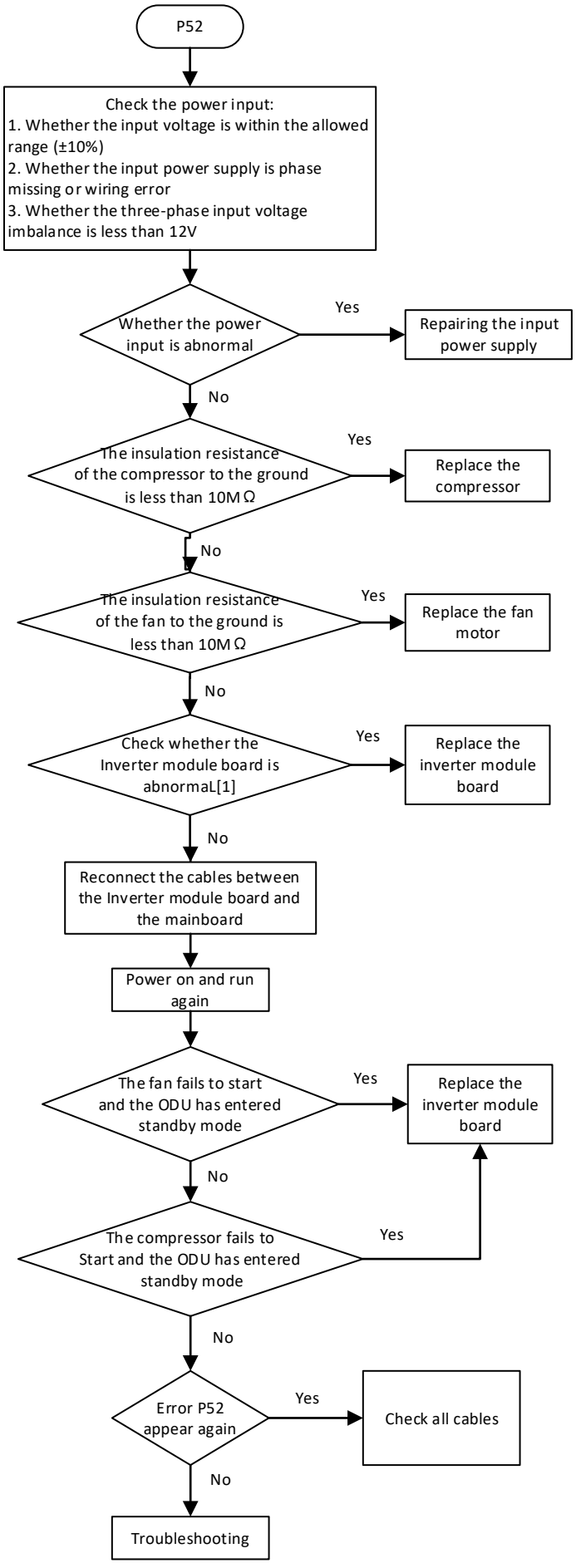
2.22.3 Trigger / recover condition

- Trigger condition:The Vac of Outdoor Unit less than 170 V
- Recover condition: Wait 7/15/30min for each occurrence, and the Vac of Outdoor Unit rises above 180 V
- Reset method: Resume automatically.

2.22.4 Possible causes

- The power supply voltage of the outdoor unit is abnormal or phase is missing
- Cables in the electric control box are loose
- Error in the high voltage circuit
- Inverter driver board is damaged

2.22.5 Procedure



Note:

1. Refer to the Appendix “Inverter Module Board Detection”.

2.23 P53: Phase B and N of the power cable are connected to the opposite protection

2.23.1 Digital display output

2.23.2 Description

- System zero line, phase line reverse connection
- All units stop running
- Error code is displayed on the unit with the error

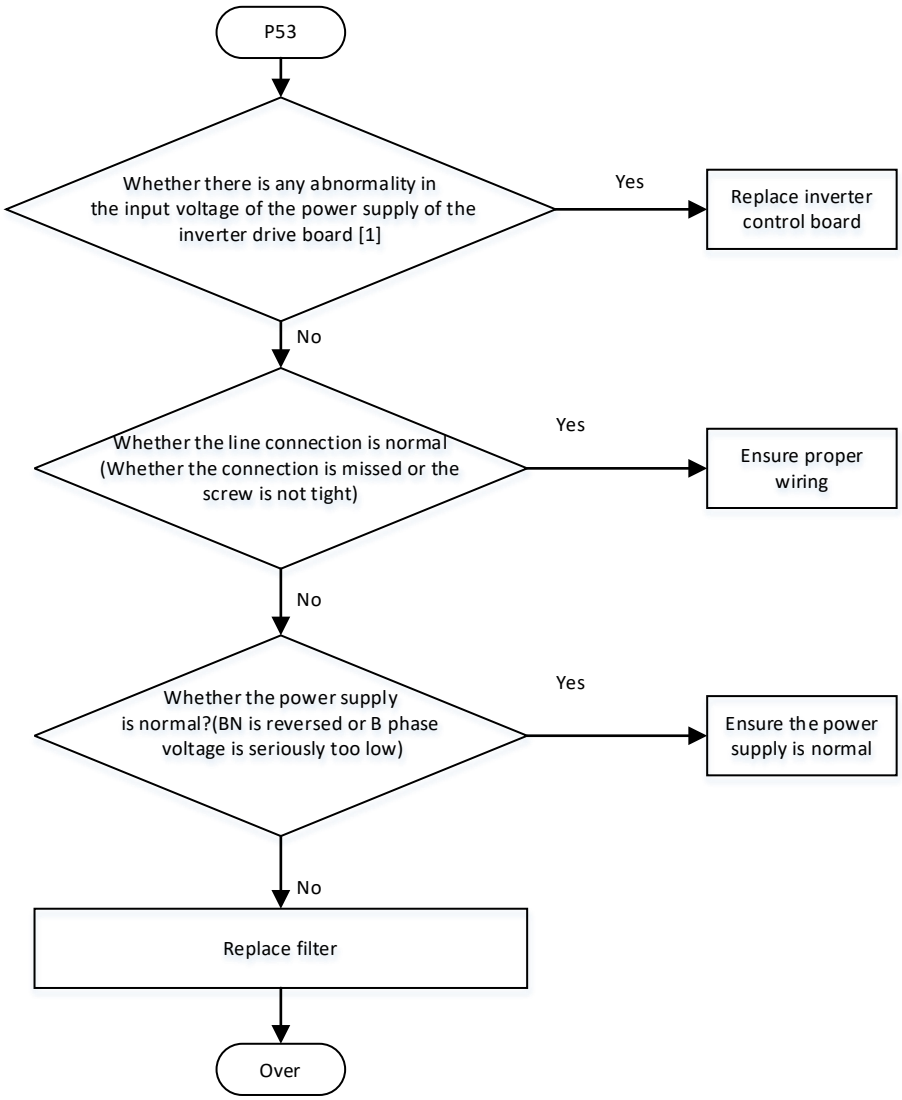
2.23.3 Trigger / recover condition

- Trigger condition: Phase B is connected to the zero line in reverse
- Recover condition: Three-phase power phase sequence detection is correct
- Reset method: Resume automatically

2.23.4 Possible causes

- Outdoor Uint power supply B N is inversely connected
- Cables in the electric control box are loose
- inverter driver board is damaged
- A phase or two of the system power supply has a large load, resulting in power supply voltage imbalance:
- The distribution phase imbalance of the grid exceeds 3% (phase Angle imbalance, or three-phase voltage imbalance, or both):

2.23.5 Procedure



Notes:

1. When the system is powered on, use a multimeter to measure the voltages of the power input terminals L1,2, and L3 of the inverter dirve board. Compare the voltages of L1-L2, L2-L3, and L1-L3.If basically equal, the power supply voltage is fine;If there is a difference of more than 10V, consider the power phase imbalance;If there is a difference of tens or even hundreds of volts, consider the power supply or the filter board has a problem.

2.24 P54: DC bus low voltage protection

2.24.1 Digital display output

2.24.2 Description

- The DC bus voltage of the compressor is too low
- All units stop running.
- Error code is displayed on the unit with the error

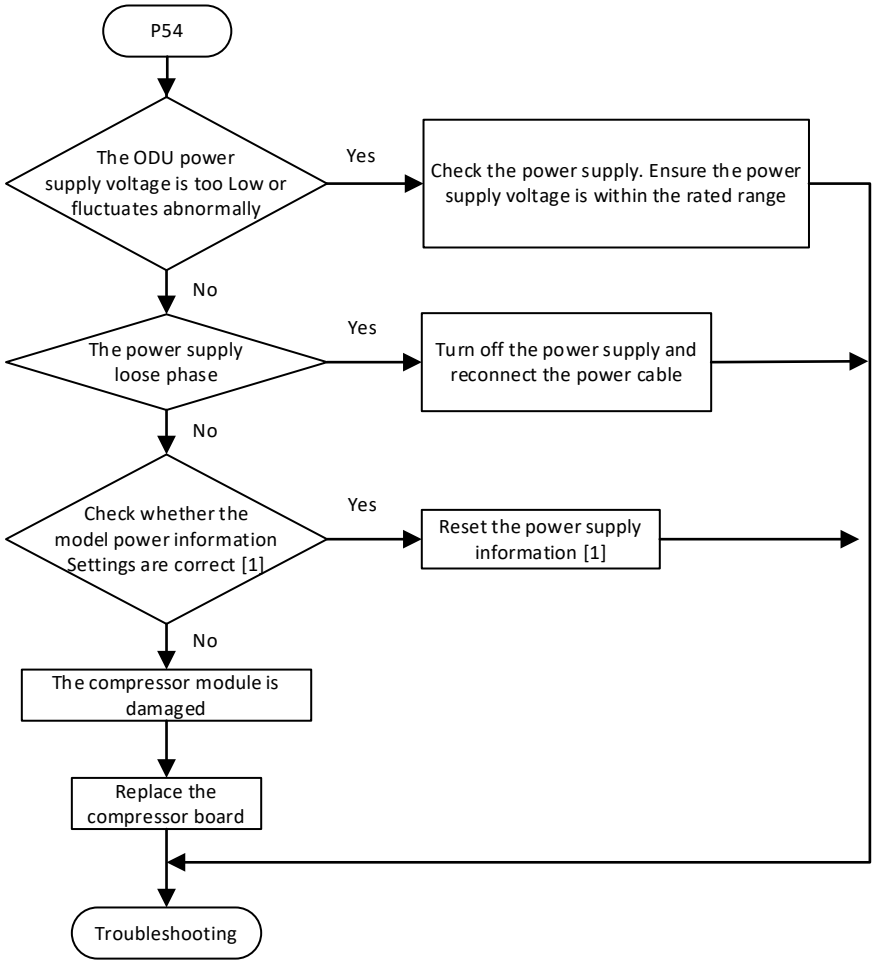
2.24.3 Trigger / recover condition

- Trigger condition: The DC bus voltage of the Outdoor Unit is lower than the threshold.
- Recover condition: The DC bus voltage of the external unit is recovered above the threshold.
- Reset method: Resume automatically

2.24.4 Possible causes

- The input voltage is too low
- The power supply loose phase
- The model power supply information is incorrectly configured
- Inverter driver board is damaged

2.24.5 Procedure



Note:[1] according to the power supply parameters

2.25 P55: Dc bus ripple over protection

2.25.1 Digital display output

2.25.2 Description

- The ripple of the dc bus on the module is over the limits.
- All units stop running.
- Error code is displayed on the unit with the error

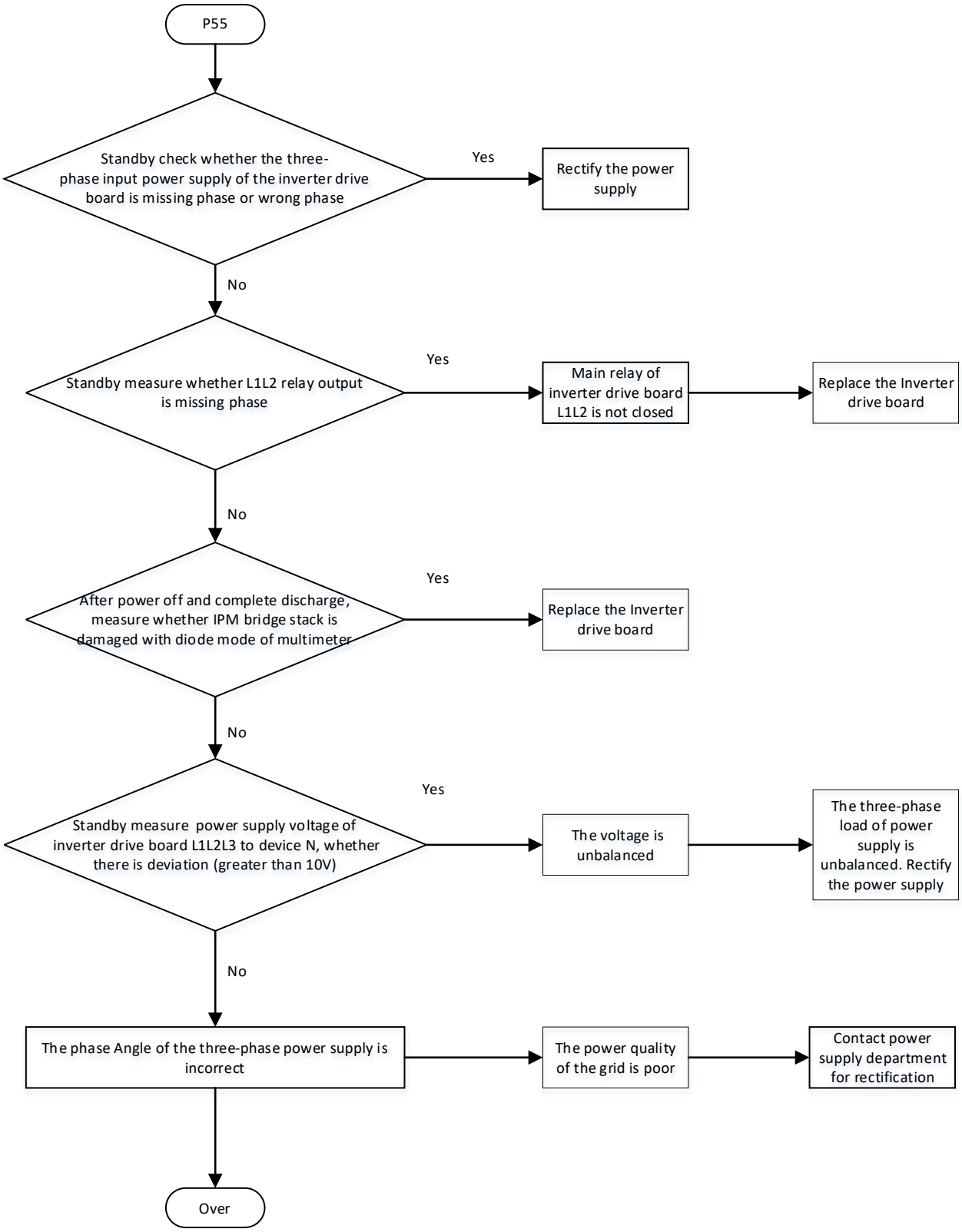
2.25.3 Trigger / recover condition

- Trigger condition: Power input is out of phase or the three-phase power supply is seriously unbalanced
- Recover condition: Three-phase power supply without phase loss
- Reset method: Resume automatically when fault exit condition reached

2.25.4 Possible causes

- The Outdoor Unit power supply is out of phase or seriously unbalanced
- Cables in the electric control box are loose
- Inverter driver board is damaged
- Power supply is abnormal.

2.25.5 Procedure



2.26 1P56: Inverter driver board DC bus voltage is too low

2.26.1 Digital display output

2.26.2 Description

- Inverter driver board DC bus voltage is too low
- All units stop running..
- Error code is displayed on the unit with the error

2.26.3 Trigger / recover condition

- Trigger condition: The inverter driver board upload L3E/J3E fails
- Recover condition: The inverter driver board does not upload L3E/J3E fails
- Reset method: Resume automatically.

2.26.4 Possible causes

- The Outdoor Unit power supply is too low or phase is missing
- Cables in the electric control box are loose
- Inverter driver board is damaged

2.26.5 Procedure

Troubleshoot according to J3E/L3E

2.27 1P57: Inverter driver board DC bus voltage is too high

2.27.1 Digital display output

2.27.2 Description

- Inverter driver board DC bus voltage is too high
- All units stop running..
- Error code is displayed on the unit with the error

2.27.3 Trigger / recover condition

- Trigger condition: The inverter driver board upload L31/J31 fails
- Recover condition: The inverter driver board does not upload L31/J31 fails
- Reset method: Resume automatically.

2.27.4 Possible causes

- The Outdoor Unit power supply is too high
- Inverter driver board is damaged

2.27.5 Procedure

Troubleshoot according to J31/L31

2.28 1P58: Inverter driver board DC bus voltage is seriously too high

2.28.1 Digital display output

2.28.2 Description

- Inverter driver board DC bus voltage is seriously too high
- All units stop running..
- The error is displayed separately on each Outdoor Unit.

2.28.3 Trigger / recover condition

- Trigger condition: The inverter driver board upload L32/J32 fails
- Recover condition: The inverter driver board does not upload L32/J32 fails
- Reset method: Resume automatically.

2.28.4 Possible causes

- The input voltage is too high, resulting in the high DC bus voltage
- The power grid voltage is too high
- Inverter driver board is damaged

2.28.5 Procedure

Troubleshoot according to J32/L32

2.29 P71: Error in EEPROM

2.29.1 Digital display output

2.29.2 Description

- The EEPROM parameter of the ODU main control board is incorrect
- All units stop running.
- Error code is displayed on the unit with the error

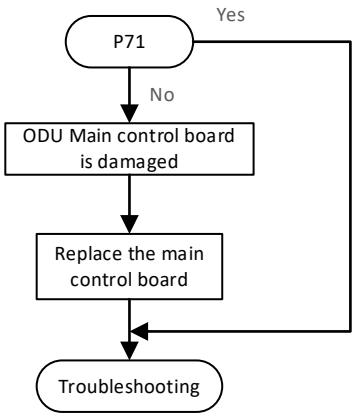
2.29.3 Trigger / recover condition

- Trigger condition:EEPROM parameter verification is incorrect
- Recover condition:EEPROM parameter verification is correct
- Reset method:Resume manually

2.29.4 Possible causes

- EEPROM units damaged:
- Main control board is damaged:

2.29.5 Procedure



2.30 Pb1: HyperLink overcurrent error

2.30.1 Digital display output

2.30.2 Description

- HyperLink overcurrent error
- All units stop running.
- Error code is displayed on master ODU.

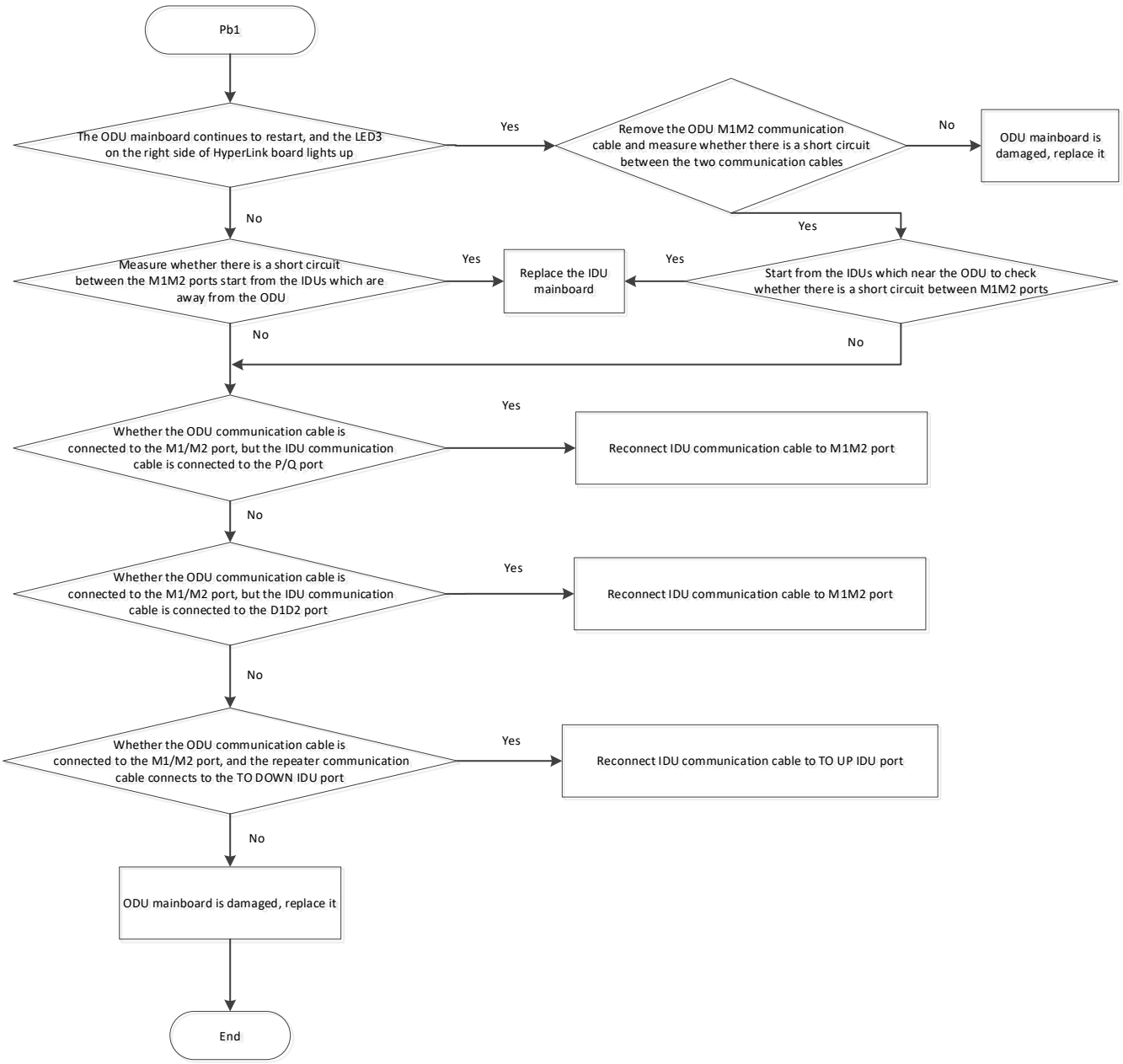
2.30.3 Trigger / recover condition

- Trigger condition:
  No IDU is in power down mode and the feedback voltage of the HyperLink board is > 1.5V for 120ms.
- Recover condition: HyperLink board feedback voltage < 0.2V
- Reset method: fault time < 2 hours, automatic recovery; If the fault time > 2 hours, power on again

2.30.4 Possible causes

- The M1M2 communication line of the master ODU is short-circuited.
- The M1M2 communication line of the master ODU is connected to other communication line (not M1M2) of the IDU.
- The M1M2 communication line of the master ODU is connected to port “TO DOWN IDU” of the repeater.
- Main control board is damaged

2.30.5 Procedure



2.31 xb01: The electronic expansion valve is in error

2.31.1 Digital display output

2.31.2 Description

- No.x electronic expansion valve's connection on main control board is missing(1 to 4 correspond to expansion valves A, B, C, and E respectively)
- All units stop running Electronic
- Error code is displayed on the outdoor unit with error.

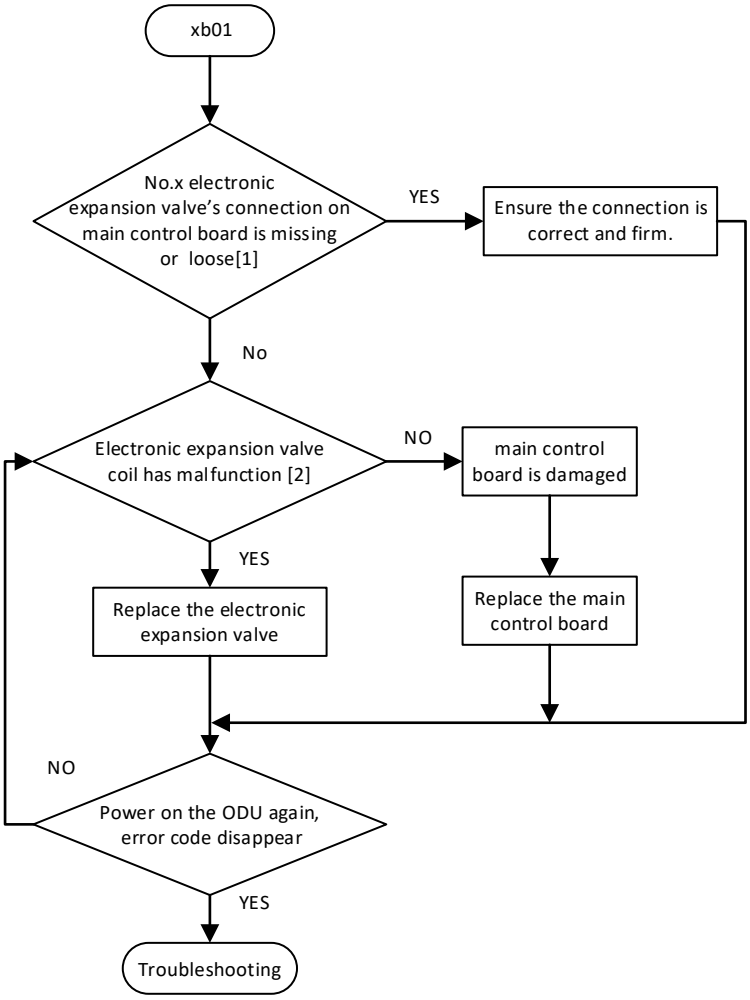
2.31.3 Trigger / recover condition

- Trigger condition: After the system is powered on, the outdoor unit cannot detect the signal of electronic expansion valve within 2 minutes.
- Recover condition: After the system is powered on again, the outdoor unit can detect the signal of electronic expansion valve.
- Reset method: Resume manually, and power on again.

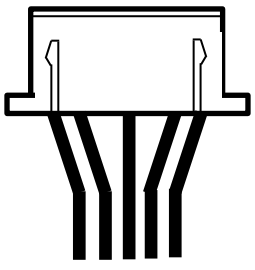
2.31.4 Possible causes

- Electronic expansion valve is not connected to main control board correctly.
- The electronic expansion valve coil is damaged
- The main control board is damaged.

2.31.5 Procedure



Notes:
[1] All models of ODU have electronic expansion valves A and C, which are connected to the main boards CN70 and CN72. Some models have electronic expansion valves B and E with CN71 and CN73 ports
[2] Schematic diagram of coil resistance measurement of electronic expansion valve and reference range of resistance



1 2 3 4 5

Model	80-160
The body coil	Valve A/C
Measurement point	resistance
1-5	40-50Ω
2-5	40-50Ω
3-5	40-50Ω
4-5	40-50Ω

2.32 U11: Outdoor unit model is not set

2.32.1 Digital display output

2.32.2 Description

- All units stop running
- Error code is displayed on the unit with the error

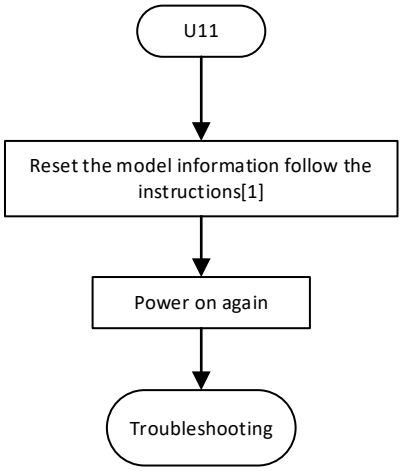
2.32.3 Trigger / recover condition

- Trigger condition: The model information is not set.
- Recover condition: The model information of the unit is set correctly
- Reset method: Resume manually

2.32.4 Possible causes

- The model information is not set

2.32.5 Procedure



Note:

[1] Use the Bluetooth module or Bluetooth after-sales kit

2.33 U12: Outdoor unit Capacity setting error

2.33.1 Digital display output

2.33.2 Description

- The capability information of outdoor unit is not set
- All units stop running
- Error code is displayed on the unit with the Error

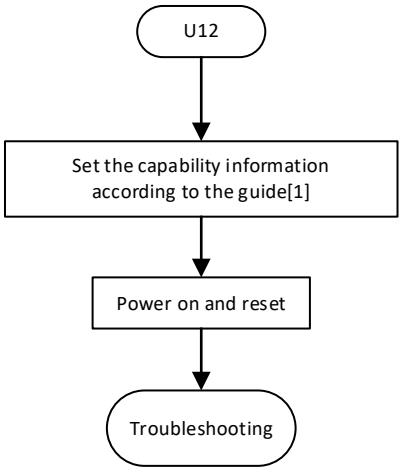
2.33.3 Trigger / recover condition

- Trigger condition: The capability information of outdoor unit is not set
- Recover condition: Reset the capability information of outdoor unit
- Reset method: Resume manually

2.33.4 Possible causes

- The capability information of outdoor unit is not set

2.33.5 Procedure



Note:

[1] Set the capability information according to the nameplate

2.34 U21: The indoor unit connection is incorrect

2.34.1 Digital display output

2.34.2 Description

- The indoor unit connection is incorrect
- All Outdoor units stop running
- Error is only displayed in main control board

2.34.3 Trigger / recover condition

- Trigger condition:

The following devices can be connected to the VRF system:

- Standard air-cooled indoor units
- AHU KIT
- Hydraulic module

The following join combinations are allowed:

- VRF Indoor Unit + AHU KIT
- VRF Indoor Unit + Hydraulic module
- VRF Indoor Unit

Apart from the above three combination modes, the system detects the combination of indoor units and reports the following failure prompt

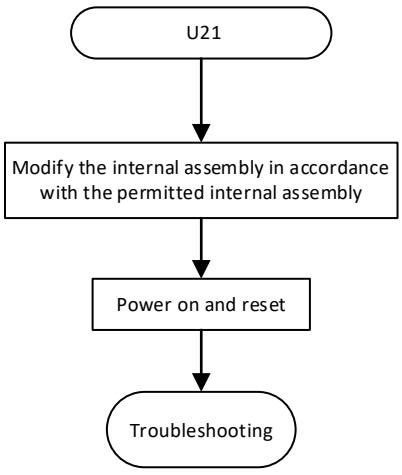
Error code	The system checks the connected Indoor Unit type
U21	The system is connected to the old Indoor Unit

- Recover condition:
  Correct Indoor Unit assembly is detected
- Reset method: Resume manually

2.34.4 Possible causes

- the Indoor Unit assembly does not meet the requirement

2.34.5 Procedure



2.35 U31: The test run was never successful

2.35.1 Digital display output

2.35.2 Description

- The test run was unsuccessful
- All units stop running
- Error code is only displayed on the outdoor unit.

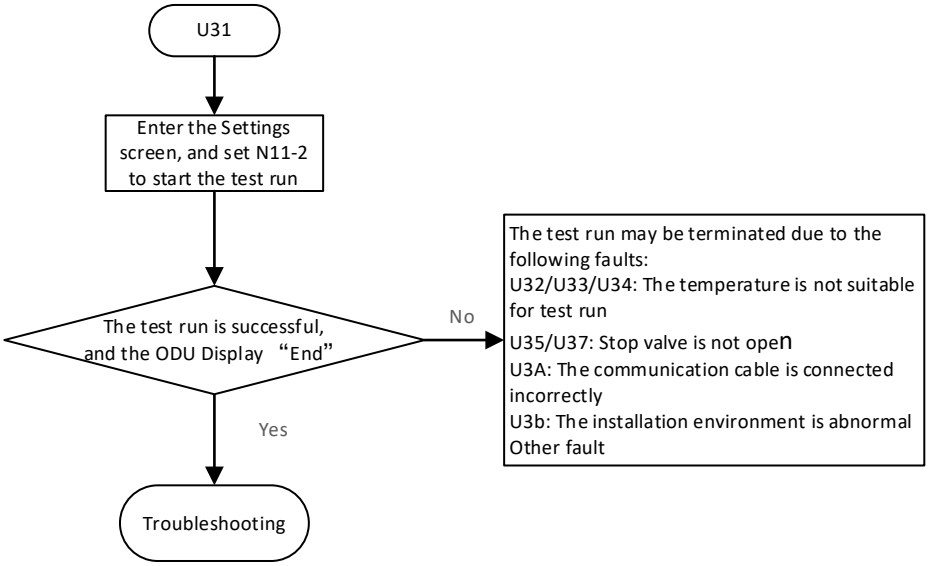
2.35.3 Trigger / Recover condition

- Trigger condition: The test run was unsuccessful
- Recover condition: The test run complete Successfully.
- Reset method: Resume manually

2.35.4 Possible causes

- The test run was unsuccessful

2.35.5 Procedure



2.36 U32, U33, U34: The temperature is not suitable for test run

2.36.1 Digital display output

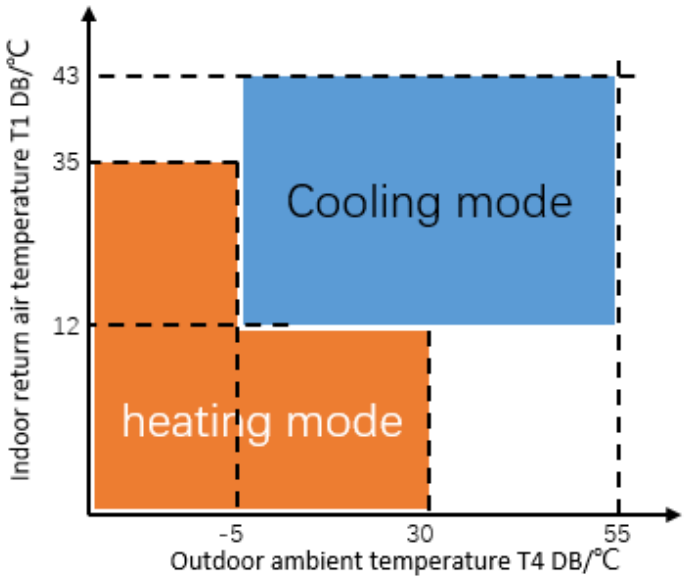
2.36.2 Description

- Ambient temperature is out the allowed range of test run
- All units stop running
- Error code is only displayed on Outdoor Unit

2.36.3 Trigger /Recover condition

- Trigger condition:
  After entering into test run, the outdoor unit estimates whether it is suitable for test run according to the indoor average return air temperature T1 and outdoor average ambient temperature T4(Refer to the following figure and table). If it is not suitable for test run, the outdoor unit displays an error code like “U32, U33, U34”

***Figure 2-4.1**: ambient temperature range of test run*



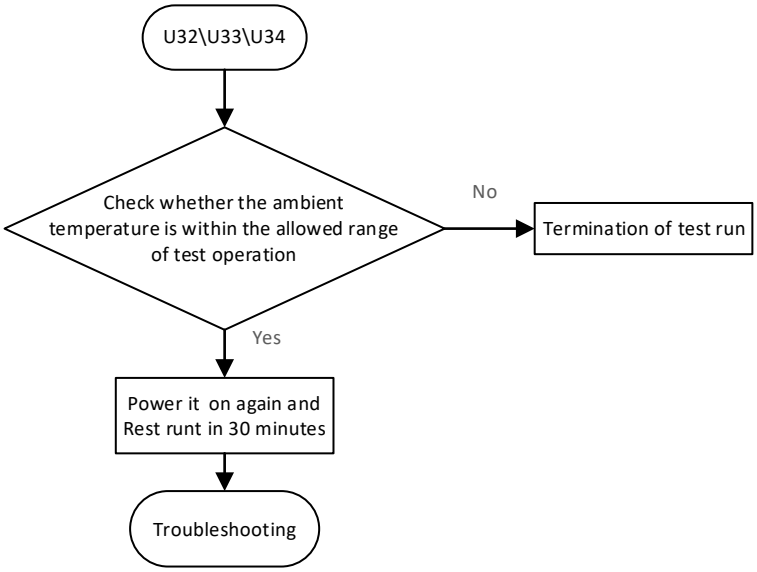
Error code	Description	
U32	The outdoor temperature is not suitable	Average T1<-12°C :T4min>30 °C or T4min<-30 °C Average T1≥12 °C : T4min>55 °C or T4min<-30 °C
U33	The indoor temperature is not suitable	T4min≤-5 °C: Average T1>35 °C T4min≥-5 °C: Average T1>43 °C
U34	The indoor and outdoor temperature is not suitable	Average T1>43 °C and T4min>55 °C

- Recover condition: Press the "OK" button on the main control board for 5 seconds to exit the rest run.
- Reset method: Resume manually

2.36.4 Possible causes

- The Temperature out of test run range

2.36.5 Procedure



2.37 U35, U37: Stop valve is not open

2.37.1 Digital display output

2.37.2 Description

- Stop valve is not open
- All units stop running
- Error code is only displayed on the outdoor unit.

2.37.3 Trigger/ Recover condition

- Trigger condition:

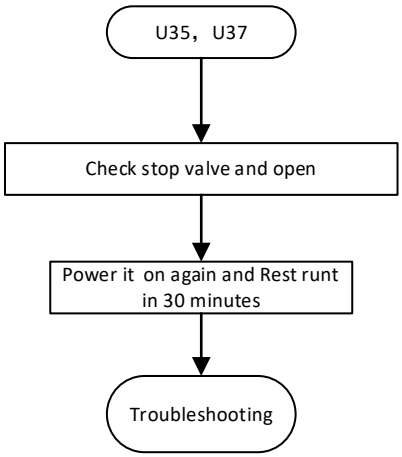
Error code	Description	
U35	The liquid side stop valve of the system is not opened	discharge pressure of heating mode≥ 3.9MPa
U37	The gas side stop valve of the system is not opened	suction pressure of cooling mode< 0. 12MPa

- Recover condition:
  Press the "OK" button on the main control board for 5 seconds to exit the test run.
- Reset method: Resume manually

2.37.4 Possible causes

- Stop valve is not open

2.37.5 Procedure



2.38 U3A: The communication cable is connected incorrectly

2.38.1 Digital display output

2.38.2 Description

- There are indoor unit in the communication system outside the refrigerant system.
- All units stop running
- Error code only displayed on the outdoor unit.

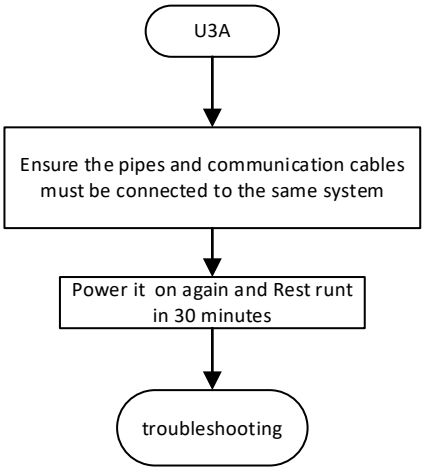
2.38.3 Trigger / Recover condition

- Trigger condition: There are indoor unit in the communication system outside the refrigerant system.
- Recover condition: Press the “OK” button on the main board for 5 seconds to exit the rest run.
- Reset method: Resume manually

2.38.4 Possible causes

- There are IDU in other refrigerant system connect with ODU by commication cable

2.38.5 Procedure



2.39 U3b: The installation environment is abnormal

2.39.1 Digital display output

2.39.2 Description

- During the test run, abnormal changes in ambient temperature are detected and the operation is stopped.
- All units stop running
- Error code only displayed on the outdoor unit.

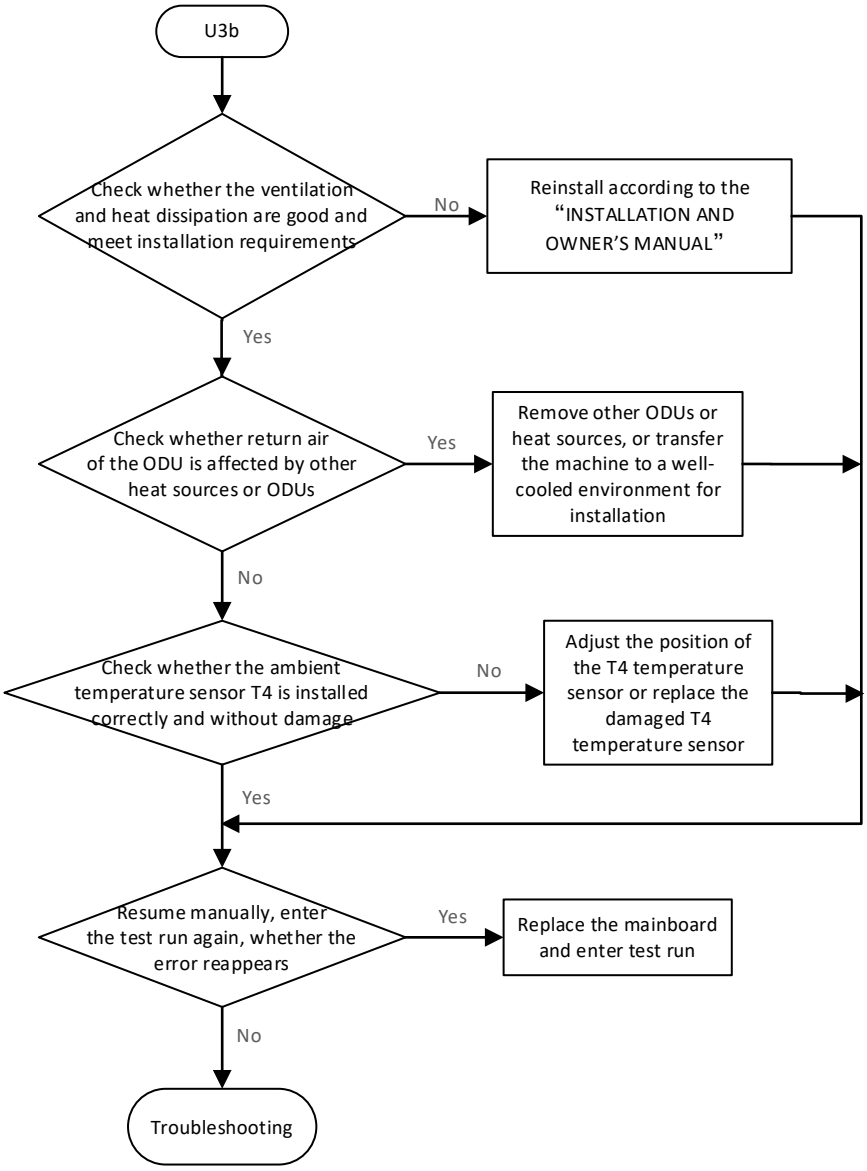
2.39.3 Trigger / Recover condition

- Trigger condition:
  ①Cooling mode: the return air temperature is detected to increase more than 10℃ during test run.
  ②Heating mode: the return air temperature is detected to decrease more than 10℃ during test run.
- Recover condition: Press the “OK” button on the main board for 5 seconds to exit the rest run.
- Reset method: Resume manually

2.39.4 Possible causes

- The installation environment of the IDU has poor ventilation and heat dissipation, and the outlet air and return air form short circuit
- Return air of the IDU is affected by other heat sources
- The return air temperature sensor of the IDU is improperly installed or damaged

2.39.5 Procedure



2.40 U3C: Changeover mode error

2.40.1 Digital display output

2.40.2 Description

- The ODU in changeover mode doesn't detect the signal of VIP IDU.
- ODUs stop running
- Error code only displayed on the outdoor unit.

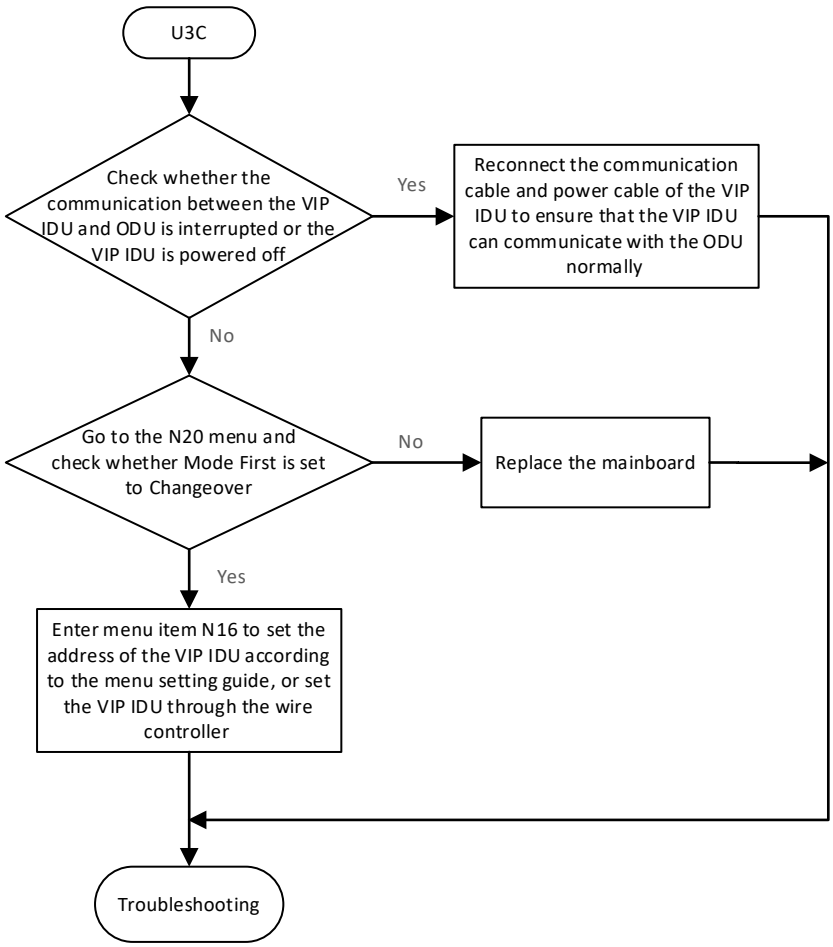
2.40.3 Trigger / Recover condition

- Trigger condition:
  ①The ODU in changeover mode , but the VIP address has not been set.
  ②The ODU in changeover mode doesn't detect the signal of VIP IDU(the VIP address has been set).
- Recover condition: The ODU in changeover mode detect the signal of VIP IDU.
- Reset method: Resume automatically

2.40.4 Possible causes

- The VIP address has not been set
- The communication between the VIP IDU and ODU is abnormal
- The mainboard of ODU is damaged.

2.40.5 Procedure



2.41 U4x: Overconnection ratio

2.41.1 Digital display output

2.41.2 Description

- Protection Overconnection ratio
- All units stop running

2.41.3 Trigger / Recover condition

- Trigger condition:

1) Code of Indoor Unit and type analysis

Code of Indoor Unit	Indoor Unit **A**	Indoor Unit **B**	Indoor Unit **C**	Indoor Unit **D**
Type of Indoor Unit	VRF Air-cooled indoor unit	Fresh Air Processing Uint	AHU KIT(Air outlet temperature control)	AHU KIT(Return air temperature control)

Error code	Description
U41	connection ratio A <45% or connection ratio A >135%
	connection ratio A+D <45% or connection ratio A+D >135%
U42	connection ratio B <45% or connection ratio B >105%
	connection ratio B+C >35%
U43	connection ratio C <45% or connection ratio C >105%
U44	connection ratio D <45% or connection ratio D >115%
U48	connection ratio A+B+C+D >135%

2) computing method of connection ratio:

Connection ratio A=total capacity of Online Indoor UnitA /total capacity of Outdoor Unit

Connection ratio B=total capacity of Online Indoor UnitB /total capacity of Outdoor Unit

Connection ratio C=total capacity of Online Indoor UnitC /total capacity of Outdoor Unit

Connection ratio D=total capacity of Online Indoor UnitD /total capacity of Outdoor Unit

Connection ratio A+D=total capacity of Online Indoor UnitA+ UnitD/total capacity of Outdoor Unit

Connection ratio B+C=total capacity of Online Indoor UnitB+ UnitC/total capacity of Outdoor Unit

Connection ratio A+B+C+D= total capacity of Online Indoor UnitA+ UnitB+ UnitC+ UnitD/total capacity of Outdoor Unit

- Recover condition:

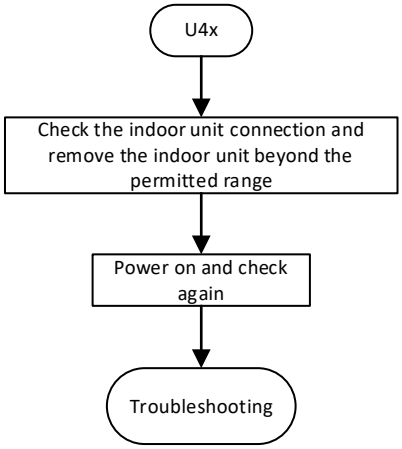
Indoor/Outdoor Unit connection rate within allowable range

- Reset method: Resume manually

2.41.4 Possible causes

Indoor/Outdoor Unit connection rate out of allowable range

2.41.5 Procedure



3 Error in Compressor Driver

3.1 1L1E: Hardware overcurrent

3.1.1 Digital display output

3.1.2 Description

- The current exceeds the OCP protection value (peak value) set by the hardware or the IPM module receives an FO signal
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again

3.1.3 Trigger / recover condition

(1)Current reaches OCP protection value:

- Trigger condition:Current reaches OCP protection value
- Recover condition:The compressor will stop after failure, and recover after one minute when the condition of failure exit is reached
- Reset method:The system automatically recovers one minute after the error exit condition is reached

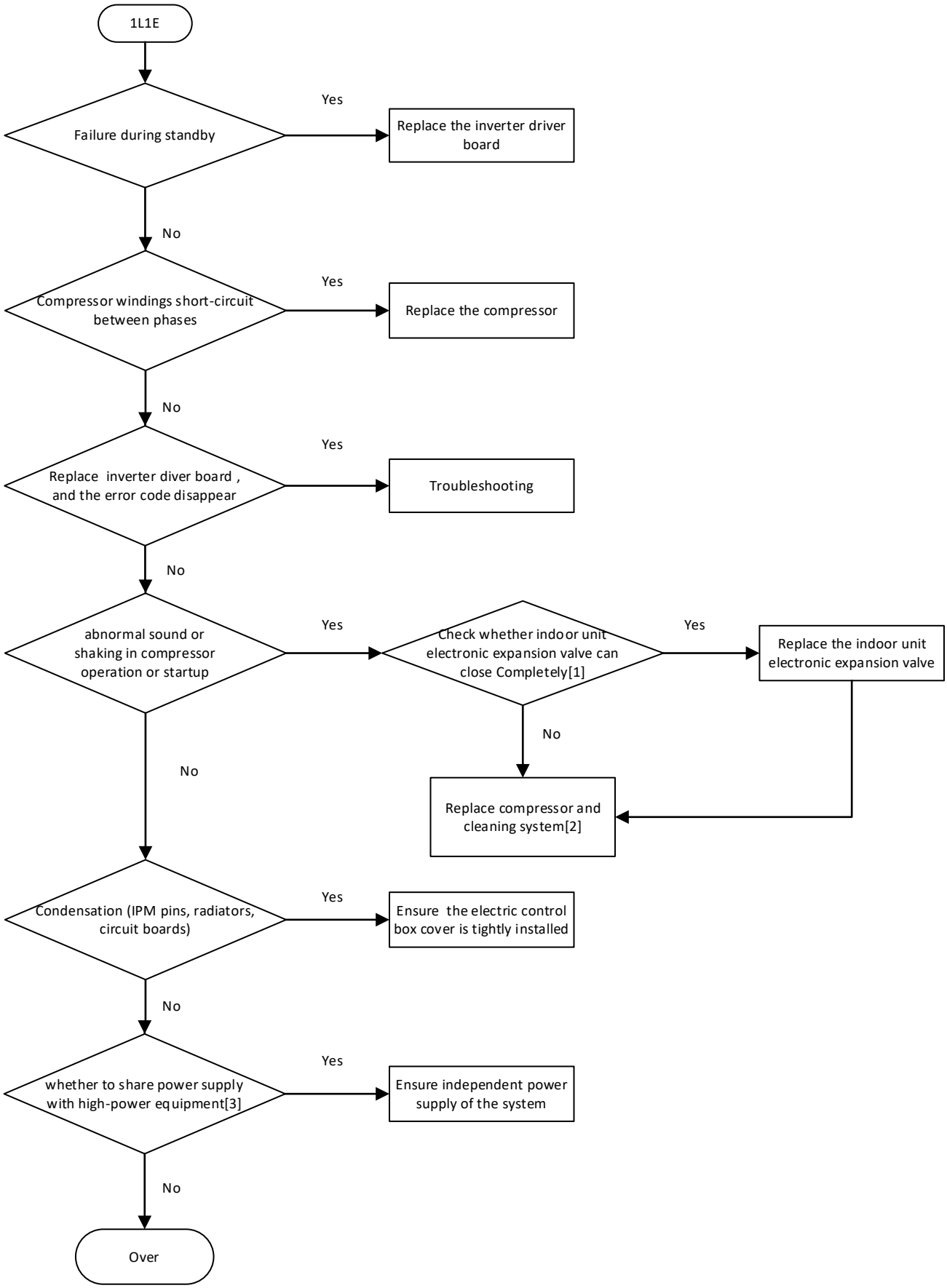
(2)Falling edge of FO signal or continuous low level is detected:

- Trigger condition: A falling edge or continuous low level of FO signal is detected.
- Recover condition: The FO signal becomes high level.
- Reset method: Resume automatically one minute after the error exit condition is reached.

3.1.4 Possible causes

- There are impurities in the refrigerant system or the compressor suddenly freezes the cylinder, resulting in abnormal current increase and triggering OCP:
- Compressor windings short-circuit between phases, resulting in instantaneous large current triggering OCP or FO:
- The OCP is triggered when the system power supply voltage falls or is interrupted for a short time:
- The IPM module condenses, causing a short circuit between control pins:
- Liquid refrigerant back to the compressor:
- Before starts the compressor has a certain speed:
- Module board is abnormal. (Idc operational amplifier circuit, OCP comparison circuit, PWM circuit, IPM, IGBT drive power circuit) Causes control out-of-step to generate high current to trigger OCP.

3.1.5 Procedure



Notes:

[1] Close the IDU and check whether the temperature of the Gas pipe is too low or frosted or the evaporator is frosted.

[2] Maybe there are impurities in the refrigerant system

[3] Voltage fluctuation occurs when high-power equipment is started

3.2 1L11, 1L12 : Software overcurrent

3.2.1 Digital display output

3.2.2 Description

- The current exceeds the OCP protection value set by the software.
- The compressor will shutdowm when the error occurs. If the error disappears one minute later, the compressor will start again.

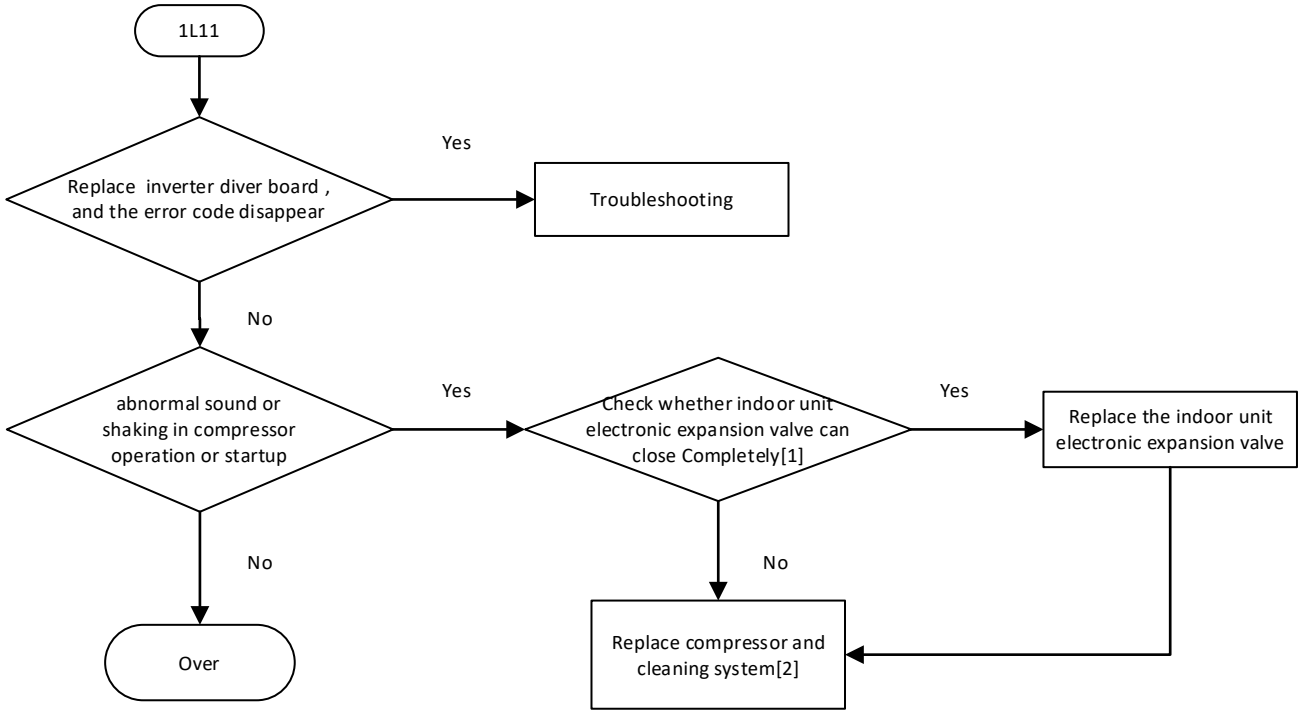
3.2.3 Trigger / recover condition

- Trigger condition:
  1L11: The compressor current exceeds the OCP protection value set by the software in three consecutive carrier periods
  1L12: Software overcurrent protection last 30s
- Recover condition: The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again
- Reset method:Resume automatically after reaching exit condition of Error

3.2.4 Possible causes

- There are impurities in the refrigerant system or the compressor suddenly jam the cylinder:
- The Idc op-amp sampling circuit on the module is abnormal:

3.2.5 Procedure



Notes:

[1] Close the IDU and check whether the temperature of the Gas pipe is too low or frosted or the evaporator is frosted.

[2] Maybe there are impurities in the refrigerant system

3.3 1L2E: Module overtemperature protection

3.3.1 Digital display output

3.3.2 Description

- The temperature of the IPM exceeds 105° C.
- The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again

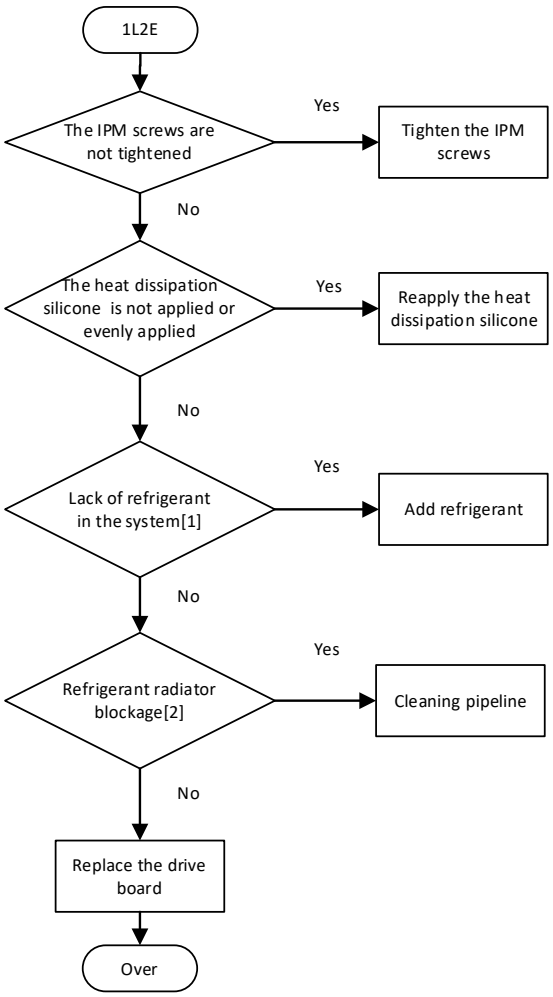
3.3.3 Trigger / recover condition

- Trigger condition:The temperature of the IPM exceeds 105° C
- Recover condition: the module temperature is lower than 105°
- Reset method:Resume automatically

3.3.4 Possible causes

- The IPM screws are not tightened, resulting in poor heat dissipation:
- The heat dissipation silicone for the IPM module is not evenly applied, resulting in poor heat dissipation:
- The refrigerant radiator is poor due to lack of refrigerant or the refrigerant radiator pipe is blocked:
- The welding of the refrigerant radiator is abnormal, resulting in poor heat dissipation
- The IPM temperature detection circuit is abnormal

3.3.5 Procedure



Notes:

[1] Less refrigerant system results in higher Discharge temperature of the compressor, lower Discharge and suction pressure, lower current, and frost on the gas return pipe. Refer to **Table 5.2.1 and 5.2.2** "Normal Refrigerant System parameters" in Chapter 5 for normal system parameters.

[2] Refer to radiator inlet and outlet temperature

3.4 1L3E: The bus voltage is too low

3.4.1 Digital display output

3.4.2 Description

- Bus voltage is lower than the low bus voltage protection threshold set by the software (350VDC).
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

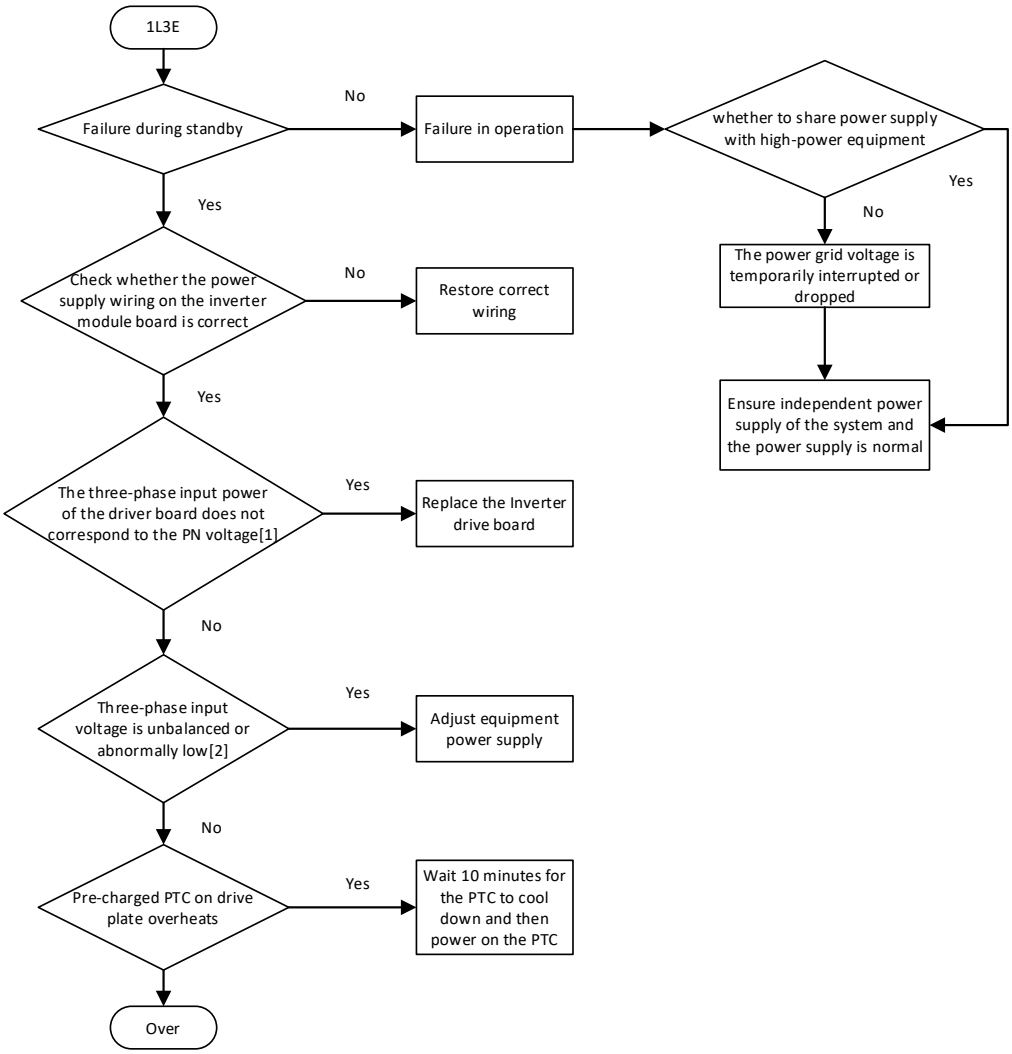
3.4.3 Trigger / recover condition

- Trigger condition: The bus voltage is lower than the bus voltage protection threshold set by the software.
- Recover condition: The bus voltage is higher than the low bus voltage protection threshold set by the software
- Reset method: Resume automatically after the error exit condition is reached.

3.4.4 Possible causes

- The input voltage is too low, resulting in the low bus voltage:
- Voltage sag or interruption, resulting in transient bus voltage is too low:
- The bus voltage detection circuit of the module is abnormal:

3.4.5 Procedure



Notes:

[1] Vdc=VAC*1.732, such as the corresponding PN Vdc=540VDC for the 380V input.

[2] Line voltage below 247VAC

3.5 1L31: The bus voltage is too high

3.5.1 Digital display output

3.5.2 Description

- Bus voltage is higher than the high bus voltage protection threshold set by the software (800VDC).
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

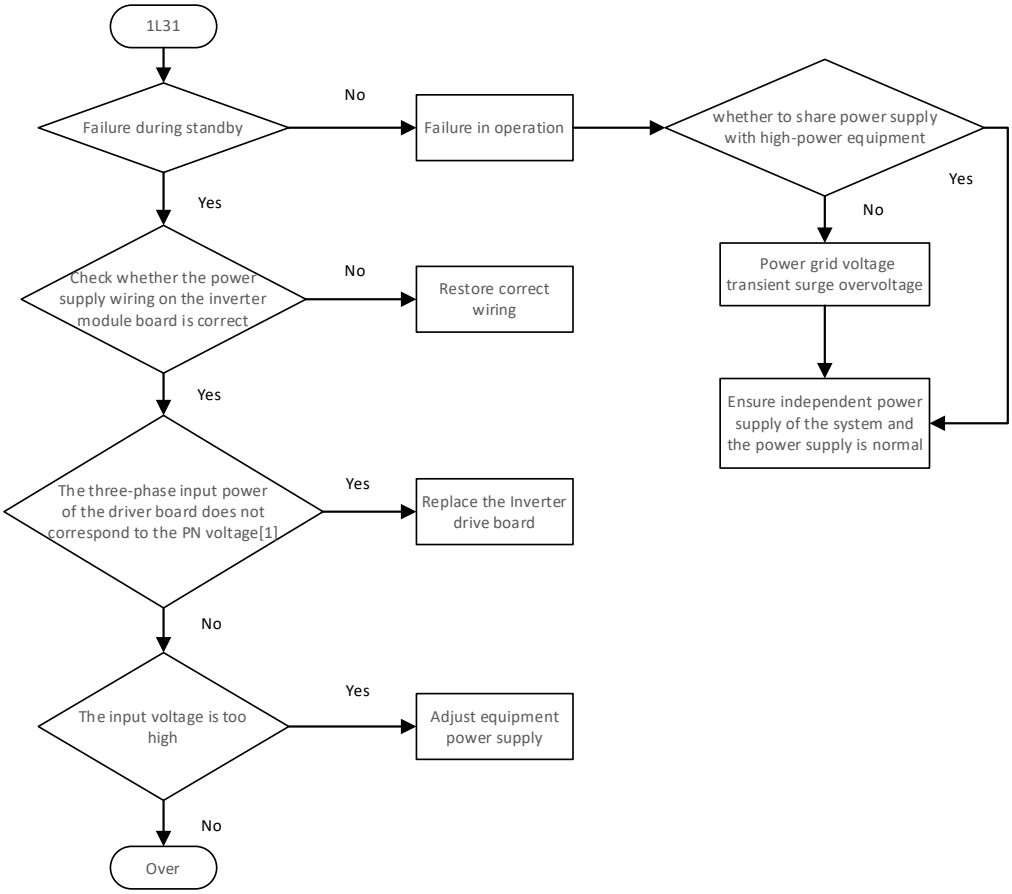
3.5.3 Trigger / recover condition

- Trigger condition:The bus voltage is higher than the software overvoltage protection threshold.
- Recover condition: the bus voltage is lower than the overvoltage protection threshold set by the software.
- Reset method: Resume automatically after the error exit condition is reached.

3.5.4 Possible causes

- The input voltage is too high, resulting in the high bus voltage;
- The power grid voltage is too high:
- The bus voltage detection circuit of the module is abnormal:

3.5.5 Procedure



Notes:

[1] Vdc=VAC*1.732, such as the corresponding PN Vdc=540VDC for the 380V input.

3.6 1L32: The bus voltage is excessively high

3.6.1 Digital display output

3.6.2 Description

- Bus voltage is higher than the high bus voltage protection threshold set by the software (820VDC).
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

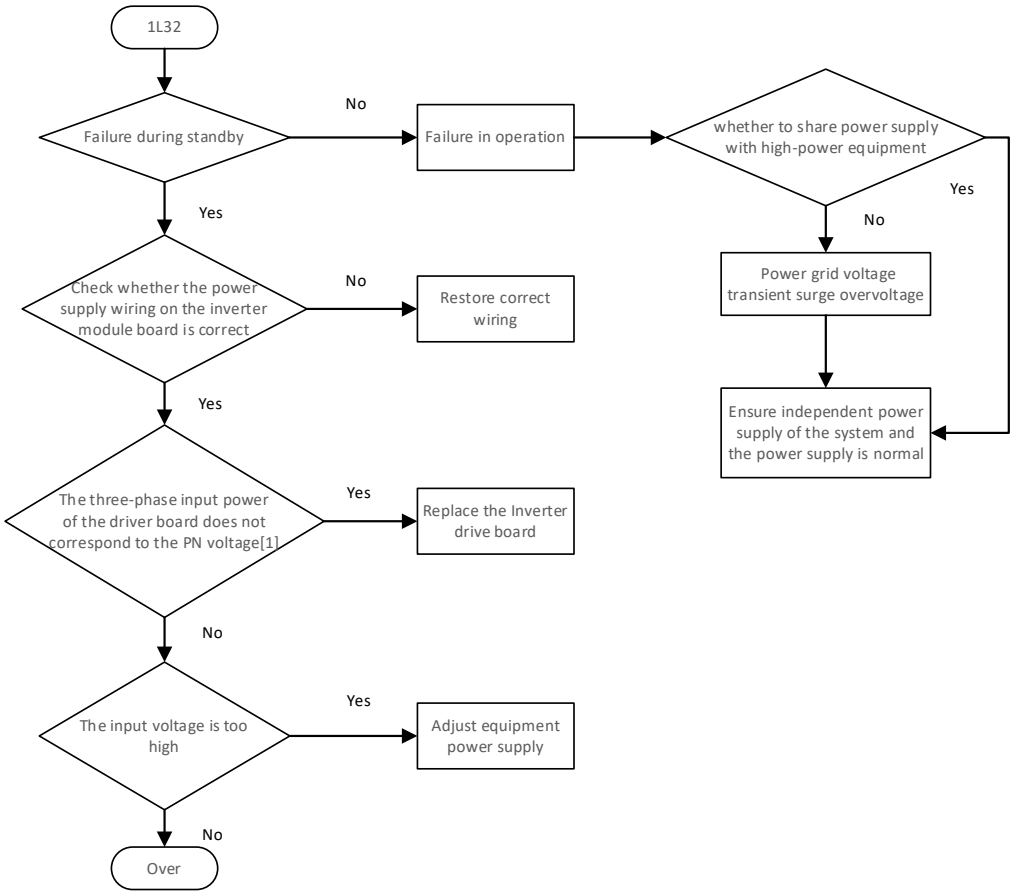
3.6.3 Trigger / recover condition

- Trigger condition: The bus voltage is too high, higher than the high bus voltage protection threshold set by the software (820VDC)
- Recover condition: The bus voltage is lower than the high bus voltage protection threshold.
- Reset method: Resume automatically after the error exit condition is reached.

3.6.4 Possible causes

- The input voltage is too high, resulting in the high bus voltage;
- The power grid voltage is too high:
- The bus voltage detection circuit of the module is abnormal:

3.6.5 Procedure



Notes:

[1] Vdc=VAC*1.732, such as the corresponding PN Vdc=540VDC for the 380V input.

3.7 1L43: The current sampling bias is abnormal.

3.7.1 Digital display output

3.7.2 Description

- Bias calibration of the current sampling circuit is in error.ias calibration of the current sampling circuit is in error.
- After this error occurs, the compressor cannot start. Check whether the inverter driver board is in error.

3.7.3 Trigger / recover condition

- Trigger condition:The AD bias value of the current sampling circuit exceeds half of the AD value range.
- Recover condition:The AD bias value of the current sampling circuit is less than half of the AD range.
- Reset method: Resume automatically.

3.7.4 Possible causes

- The sampling circuit of the inverter drive board is abnormal

3.7.5 Procedure

- Replace the inverter drive board.

3.8 1L5E: Startup failed

3.8.1 Digital display output

3.8.2 Description

- The compressor fails to start
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

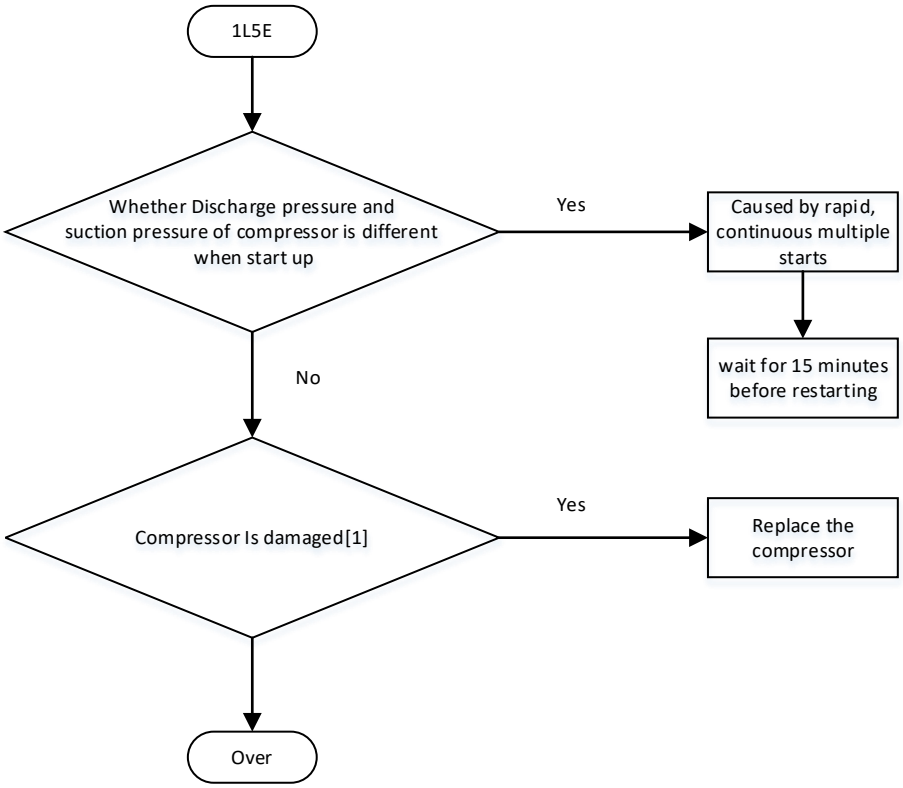
3.8.3 Trigger / recover condition

- Trigger condition:The compressor fails to start
- Recover condition: If the compressor fails to start and starts again successfully, the error will be rectified.
- Reset method: Resume automatically.

3.8.4 Possible causes

- Discharge pressure and suction pressure of compressor is different when start up:
- The compressor is stuck:

3.8.5 Procedure



Note:

[1] Abnormal sound or shaking in compressor when startup (Compressor stuck cylinder, or Impurities in the system)

3.9 1L52: Locked-rotor protection

3.9.1 Digital display output

3.9.2 Description

- The compressor is blocked.
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

3.9.3 Trigger / recover condition

- Trigger condition:The compressor is blocked.
- Recover condition:The blocking error is removed.
- Reset method: Resume automatically after the error exit condition is reached.

3.9.4 Possible causes

- The compressor is blocked due to impurities or lack of oil in the system.

3.9.5 Procedure

- Matching normal and faulty compressors if possible and replace the two compressors if the problem persists

3.10 1L6E: Compressor motor lack of phase protection

3.10.1 Digital display output

3.10.2 Description

- Compressor motor lack of phase protection.
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

3.10.3 Trigger / recover condition

- Trigger condition: The compressor cable is not connected or in poor contact.
- Recover condition: Check the cable connection of the compressor. After the cable connection is good, the error of missing phase protection is removed and recovered.
- Reset method: Resume automatically after the error exit condition is reached.

3.10.4 Possible causes

- The compressor cable is in poor contact or the terminal screw is not tightened.
- The inverter drive board is abnormal:

3.10.5 Procedure

① Check the UVW output connection line of the inverter drive board and the UVW connection line of the compressor:

② If possible connect the compressor with a normal inverter driver board to verify whether the original driver board is normal.If not , replace the inverter drive board.

4 Error in Fan Drive

4.1 1J1E: Hardware overcurrent

4.1.1 Digital display output

4.1.2 Description

- The current exceeds the OCP protection value (peak value) set by the hardware or the IPM module receives an FO signal
- The fan stops running after the error occurs. If the error disappears five seconds, the fan starts again

4.1.3 Trigger / recover condition

(1)Current reaches OCP protection value:

- Trigger condition:Current reaches OCP protection value
- Recover condition:The fan will stop after failure, and recover after five seconds when the condition of failure exit is reached
- Reset method:The system automatically recovers five seconds after the error exit condition is reached

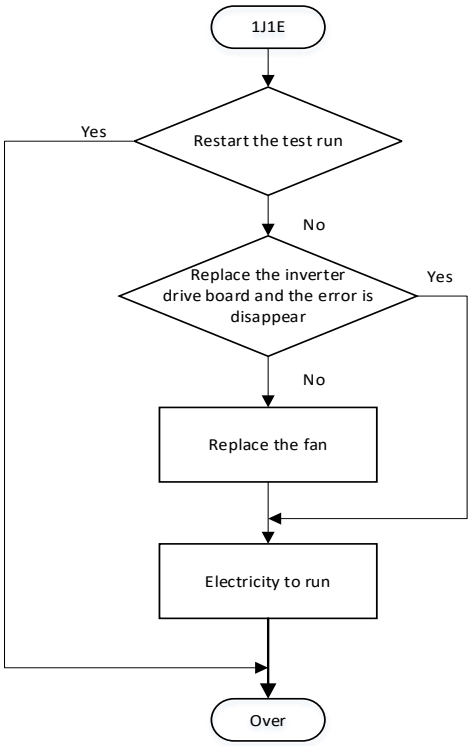
(2)Falling edge of FO signal or continuous low level is detected:

- Trigger condition: A falling edge or continuous low level of FO signal is detected.
- Recover condition: The FO signal becomes high level.
- Reset method: Resume automatically five seconds after the error exit condition is reached.

4.1.4 Possible causes

- The software out of control leads to fan running stall
- The fan is blocked or the internal coil is short-circuited
- The IPM of Inverter drive board(fan section) is damaged
- The circuits of Inverter drive board(fan section) are abnormal

4.1.5 Procedure



4.2 1J11, 1J12: Software overcurrent

4.2.1 Digital display output

4.2.2 Description

- The current exceeds the OCP protection value set by the software.
- The fan will stop when the error occurs. If the error disappears five seconds later, the fan will start again.

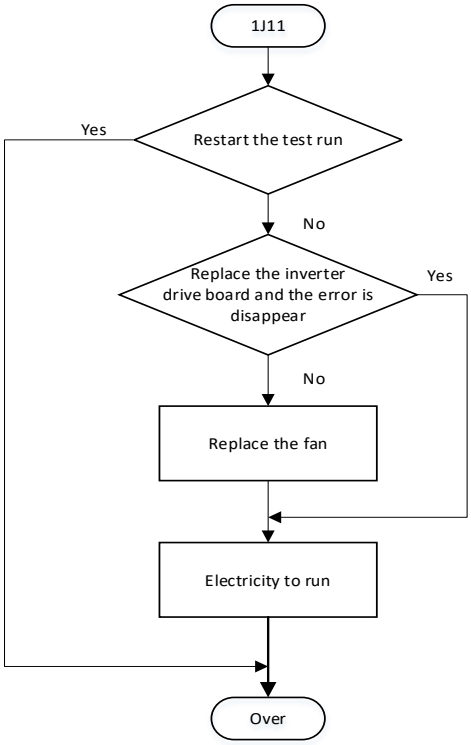
4.2.3 Trigger / recover condition

- Trigger condition:
  1J11: The fan current exceeds the OCP protection value set by the software in three consecutive carrier periods
  1J12: Software overcurrent protection last 30s
- Recover condition: The fan will stop when the error occurs. If the error disappears five seconds later, the fan will start again
- Reset method:Resume automatically after reaching exit condition of Error

4.2.4 Possible causes

- Severe fan wear.
- The software out of control leads to fan running stall.
- The driver or detection part of the inverter drive board is damaged.

4.2.5 Procedure



4.3 1J2E: Module overtemperature protection

4.3.1 Digital display output

4.3.2 Description

- The temperature of the IPM exceeds 105° .
- The fan stops running after the error. If the error disappears after five seconds, the fan starts again.

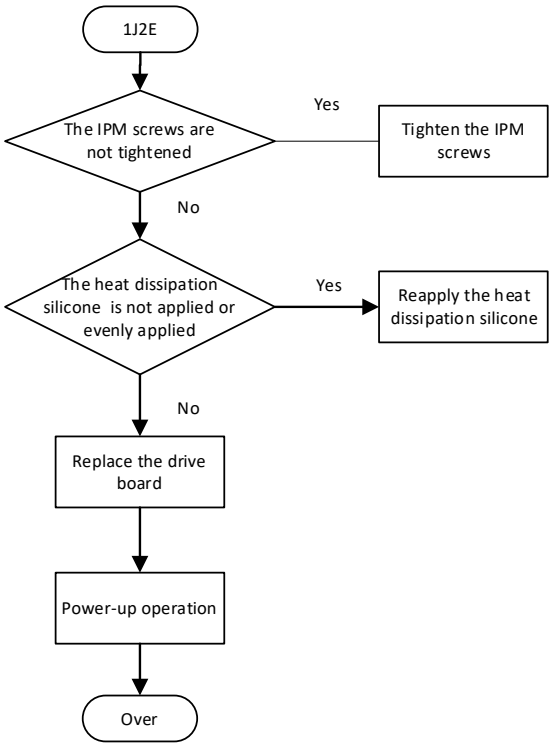
4.3.3 Trigger / recover condition

- Trigger condition:The temperature of the IPM exceeds 105 ° C
- Recover condition:After a error occurs, the fan is shut down. The fan will recover five seconds later when the error exit condition is reached (the module temperature is lower than 105 ° C).
- Reset method: Resume automatically after the error exit condition is reached.

4.3.4 Possible causes

- The IPM screws are not tightened, resulting in poor heat dissipation:
- The heat dissipation silicone for the IPM module is not evenly applied, resulting in poor heat dissipation:
- The IPM temperature detection circuit is abnormal

4.3.5 Procedure



4.4 1J3E: The bus voltage is too low

4.4.1 Digital display output

4.4.2 Description

- Bus voltage is lower than the low bus voltage protection threshold set by the software (350VDC).
- The fan stops running after the error occurs. If the error disappears five seconds later, the fan starts again.

4.4.3 Trigger / recover condition

- Trigger condition: The bus voltage is lower than the bus voltage protection threshold set by the software.
- Recover condition: The bus voltage is higher than the low bus voltage protection threshold set by the software
- Reset method: Resume automatically after the error exit condition is reached.

4.4.4 Possible causes

- The input voltage is too low, resulting in the low bus voltage:
- Voltage sag or interruption, resulting in transient bus voltage is too low:
- The bus voltage detection circuit of the module is abnormal:

4.4.5 Procedure

Troubleshoot according to 1L3E

4.5 1J31: The bus voltage is too high

4.5.1 Digital display output

4.5.2 Description

- Bus voltage is higher than the high bus voltage protection threshold set by the software (800VDC).
- The fan stops running after the error occurs. If the error disappears five seconds later, the fan starts again.

4.5.3 Trigger / recover condition

- Trigger condition: The bus voltage is higher than the software overvoltage protection threshold.
- Recover condition: The bus voltage is lower than the overvoltage protection threshold set by the software.
- Reset method: Resume automatically after the error exit condition is reached.

4.5.4 Possible causes

- The input voltage is too high, resulting in the high bus voltage;
- The power grid voltage is too high:
- The bus voltage detection circuit of the module is abnormal:

4.5.5 Procedure

Troubleshooting according to 1L31

4.6 1J32: The bus voltage is excessively high

4.6.1 Digital display output

4.6.2 Description

- Bus voltage is higher than the high bus voltage protection threshold set by the software (820VDC).
- The fan stops running after the error occurs. If the error disappears five seconds later, the fan starts again.

4.6.3 Trigger / recover condition

- Trigger condition: The bus voltage is too high, higher than the high bus voltage protection threshold set by the software (820VDC)
- Recover condition: The bus voltage is lower than the high bus voltage protection threshold.
- Reset method: Resume automatically after the error exit condition is reached.

4.6.4 Possible causes

- The input voltage is too high, resulting in the high bus voltage;
- The power grid voltage is too high:
- The bus voltage detection circuit of the module is abnormal:

4.6.5 Procedure

Troubleshooting according to 1L32

4.7 1J43: The current sampling bias is abnormal

4.7.1 Digital display output

4.7.2 Description

- Bias calibration of the current sampling circuit is in error.ias calibration of the current sampling circuit is in error.
- After this error occurs, the fan cannot start. Check whether the inverter driver board is in error.

4.7.3 Trigger / recover condition

- Trigger condition: The AD bias value of the current sampling circuit exceeds half of the AD value range.
- Recover condition: The AD bias value of the current sampling circuit is less than half of the AD range.
- Reset method: Resume automatically after the error exit condition is reached.

4.7.4 Possible causes

- The sampling circuit of the inverter drive board is abnormal

4.7.5 Procedure

- Replace the inverter drive board

4.8 1J5E: Startup failed

4.8.1 Digital display output

4.8.2 Description

- The fan fails to be started.
- The fan stops running after the error. If the error disappears after five seconds, the fan starts again.

4.8.3 Trigger / recover condition

- Trigger condition: Fan startup failure.
- Recover condition: If the fan fails to start, the fan restarts again and the error is rectified after the fan starts successfully.
- Reset method: Resume automatically after the fan starts successfully.

4.8.4 Possible causes

- fan motor stuck:
- The fan is started against the wind:
- The driver is abnormal:

4.8.5 Procedure

① Check whether the motor is stuck:
② Check whether there is a large headwind:
③ If possible, connecting a normal inverter drive board and the fan with error, check whether the fan is normal. Otherwise, replace the fan.

4.9 1J52: Locked-rotor protection

4.9.1 Digital display output

4.9.2 Description

- The fan is blocked.
- The fan stops running after the error. If the error disappears after five seconds, the fan starts again.

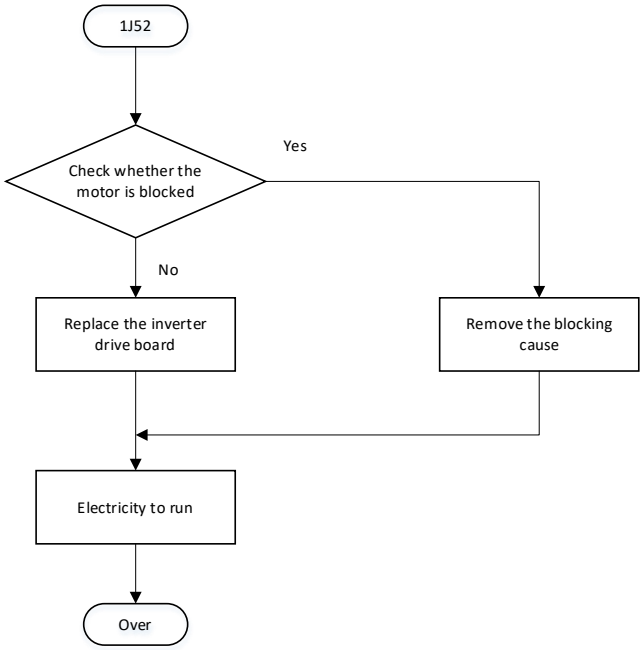
4.9.3 Trigger / recover condition

- Trigger condition: The fan is blocked.
- Recover condition: The blocking error is removed.
- Reset method: Resume automatically after the error exit condition is reached.

4.9.4 Possible causes

- The fan shaft is stuck.

4.9.5 Procedure



4.10 1J6E: Motor lack of phase protection

4.10.1 Digital display output

4.10.2 Description

- The fan has phase loss protection.
- The fan stops running after the error. If the error disappears after five seconds, the fan starts again.

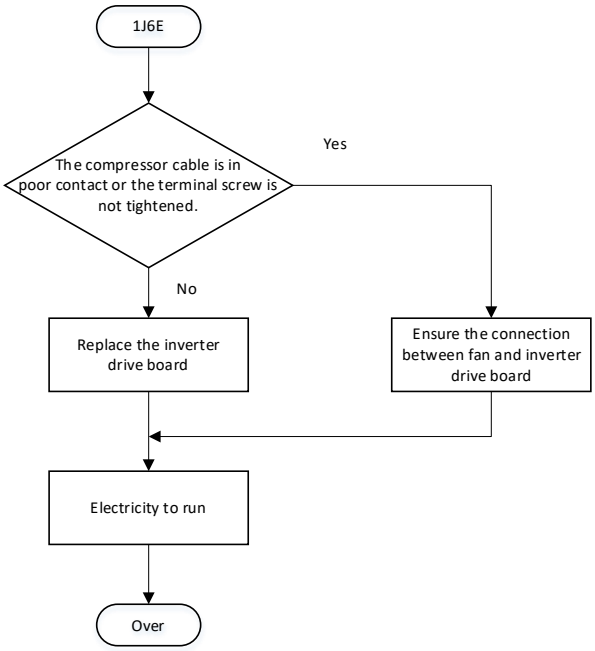
4.10.3 Trigger / recover condition

- Trigger condition:The fan cable is not connected or in bad contact.
- Recover condition:Check the fan wiring, after the wiring is good, the error of missing phase protection is removed.
- Reset method:Resume Automatically after the error exit condition is reached

4.10.4 Possible causes

- The compressor cable is in poor contact or the terminal screw is not tightened.
- The IPM of inverter drive board is damaged:

4.10.5 Procedure



5 Appendix

5.1 Resistance characteristics of temperature sensor

Table 6-5.1: Temperature probe symbol and position

Temperature probe symbol and position		The probe type
T3	Bottom of heat exchanger	Type A
T4	Outdoor ambient temperature	Type A
T5	Liquid pipe stop valve	Type A
T6A	Plate heat exchanger inlet pipe	Type A
T6B	Plate heat exchanger outlet pipe	Type A
T71	Inverter compressor A suction	Type A
T7C1	Inverter compressor A discharge	Type B
T8	Outdoor Heat exchanger gas pipe	Type A
TL	Outdoor Heat exchanger liquid pipe	Type A
Tg	Gas pipe stop valve	Type A
Tb	Electric control box cavity	Type A
Tr	Sampling resistance of inverter drive board	Type C
NTC	inverter drive board	Type C

Notes: Type A is mainly used for general pipe temperature and ambient temperature detection

Type B is mainly used for compressor discharge temperature detection

TypeC is mainly used for internal temperature detection of electronic control board

Table 6-5.2: Temperature sensor temperature resistance characteristic table

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
-20	115.3	542.7	532.2
-19	108.1	511.9	502.2
-18	101.5	483	474.1
-17	96.34	455.9	447.7
-16	89.59	430.5	423
-15	84.22	406.7	399.8
-14	79.31	384.3	378
-13	74.54	363.3	357.5
-12	70.17	343.6	338.2
-11	66.09	325.1	320.1
-10	62.28	307.7	303.1
-9	58.71	291.3	287.1
-8	56.37	275.9	272
-7	52.24	261.4	257.8
-6	49.32	247.8	244.4
-5	46.57	234.9	231.9
-4	44	222.8	220
-3	41.59	211.4	208.7
-2	39.82	200.7	198.2
-1	37.2	190.5	188.2
0	35.2	180.9	178.8

Table 6-5.2: Temperature sensor temperature resistance characteristic table (continues)

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
1	33.33	171.9	169.9
2	31.56	163.3	161.5
3	29.91	155.2	153.6
4	28.35	147.6	146.1
5	26.88	140.4	139.1
6	25.5	133.5	132.3
7	24.19	127.1	126
8	22.57	121	120
9	21.81	115.2	114.3
10	20.72	109.8	109
11	19.69	104.6	103.9
12	18.72	99.69	99.02
13	17.8	95.05	94.44
14	16.93	90.66	90.11
15	16.12	86.49	86
16	15.34	82.54	82.09
17	14.62	78.79	78.38
18	13.92	75.24	74.87
19	13.26	71.86	71.53
20	12.64	68.66	68.36
21	12.06	65.62	65.34
22	11.5	62.73	62.47
23	10.97	59.98	59.75
24	10.47	57.37	57.17
25	10	54.89	54.71
26	9.551	52.53	52.36
27	9.124	50.28	50.13
28	8.72	48.14	48.01
29	8.336	46.11	45.99
30	7.971	44.17	44.07
31	7.624	42.33	42.23
32	7.295	40.57	40.48
33	6.981	38.89	38.81
34	6.684	37.3	37.23
35	6.4	35.78	35.71
36	6.131	34.32	34.27
37	5.874	32.94	32.89
38	5.63	31.62	31.58
39	5.397	30.36	30.33
40	5.175	29.15	29.13
41	4.964	28	27.98
42	4.763	26.9	26.89
43	4.571	25.86	25.85

Table 6-5.2: Temperature sensor temperature resistance characteristic table (continues)

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
44	**4.387**	**24.85**	**24.85**
45	4.213	23.89	23.9
46	4.046	22.89	22.98
47	3.887	22.1	22.1
48	3.735	21.26	21.26
49	3.59	20.46	20.47
50	3.451	19.69	19.7
51	3.318	18.96	18.97
52	3.192	18.26	18.26
53	3.071	17.58	17.59
54	2.959	16.94	16.94
55	2.844	16.32	16.32
56	2.738	15.73	15.73
57	2.637	15.16	15.16
58	2.54	14.62	14.62
59	2.447	14.09	14.1
60	2.358	13.59	13.6
61	2.272	13.11	13.12
62	2.191	12.65	12.65
63	2.112	12.21	12.22
64	2.037	11.79	11.79
65	1.965	11.38	11.39
66	1.896	10.99	10.99
67	1.83	10.61	10.62
68	1.766	10.25	10.25
69	1.705	9.902	9.909
70	1.647	9.569	9.576
71	1.591	9.248	9.253
72	1.537	8.94	8.947
73	1.485	8.643	8.646
74	1.435	8.358	8.362
75	1.387	8.084	8.089
76	1.341	7.82	7.821
77	1.291	7.566	7.569
78	1.254	7.321	7.323
79	1.2133	7.086	7.088
80	1.174	6.859	6.858
81	1.136	6.641	6.64
82	1.1	6.43	6.432
83	1.064	6.228	6.23
84	1.031	6.033	6.033
85	0.9982	5.844	5.847
86	0.9668	5.663	5.667

Table 6-5.2: Temperature sensor temperature resistance characteristic table (continues)

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
87	0.9366	5.488	5.492
88	0.9075	5.32	5.322
89	0.8795	5.157	5.159
90	0.8525	5	5
91	0.8264	4.849	4.855
92	0.8013	4.703	4.705
93	0.7771	4.562	4.566
94	0.7537	4.426	4.431
95	0.7312	4.294	4.301
96	0.7094	4.167	4.176
97	0.6884	4.045	4.055
98	0.6682	3.927	3.938
99	0.6486	3.812	3.825
100	0.6297	3.702	3.716
101	0.6115	3.595	3.613
102	0.5939	3.492	3.514
103	0.5768	3.392	3.418
104	0.5604	3.296	3.326
105	0.5445	3.203	3.235
106	0.5291	3.113	3.148
107	0.5143	3.025	3.063
108	0.4999	2.941	2.982
109	0.486	2.86	2.902
110	0.4726	2.781	2.826
111	0.4596	2.704	2.747
112	0.447	2.63	2.672
113	0.4348	2.559	2.599
114	0.423	2.489	2.528
115	0.4116	2.422	2.46
116	0.4006	2.357	2.39
117	0.3899	2.294	2.322
118	0.3796	2.233	2.256
119	0.3695	2.174	2.193
120	0.3598	2.117	2.132
121	0.3504	2.061	2.073
122	0.3413	2.007	2.017
123	0.3325	1.955	1.962
124	0.3239	1.905	1.91
125	0.3156	1.856	1.859
126	0.3075	1.808	
127	0.2997	1.762	
128	0.2922	1.717	
129	0.2848	1.674	

Table 6-5.2: Temperature sensor temperature resistance characteristic table (continues)

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
130	0.2777	1.632	
131	0.2708		
132	0.2641		
133	0.2576		
134	0.2513		
135	0.2451		

5.2 Normal status parameter of refrigerant system

The parameters listed in Tables 5.2.1 and 5.2.2 need to be noted when the following conditions are met::

- The master can detect all indoor machines:
- The number of indoor units displayed for outdoor units is consistent with the actual installation.
- All stop valves have been opened and all indoor units' electronic expansion valve have been connected to their main control board:
- If the indoor unit connection rate is less than 100% and all indoor units are running.If the connection rate of the indoor unit is greater than 100%, the operating capacity of the indoor units is equal to the total capacity of the outdoor units.
- If the outdoor ambient temperature is high, and the system is in cooling mode and set the temperature to 17 ° C with high wind speed;
- If the outdoor ambient temperature is low, and the system is in heating mode and set to 30 ° C, high wind speed:
- The system runs properly for more than 30 minutes

Table 6-5.3: outdoor unit cooling mode parameters

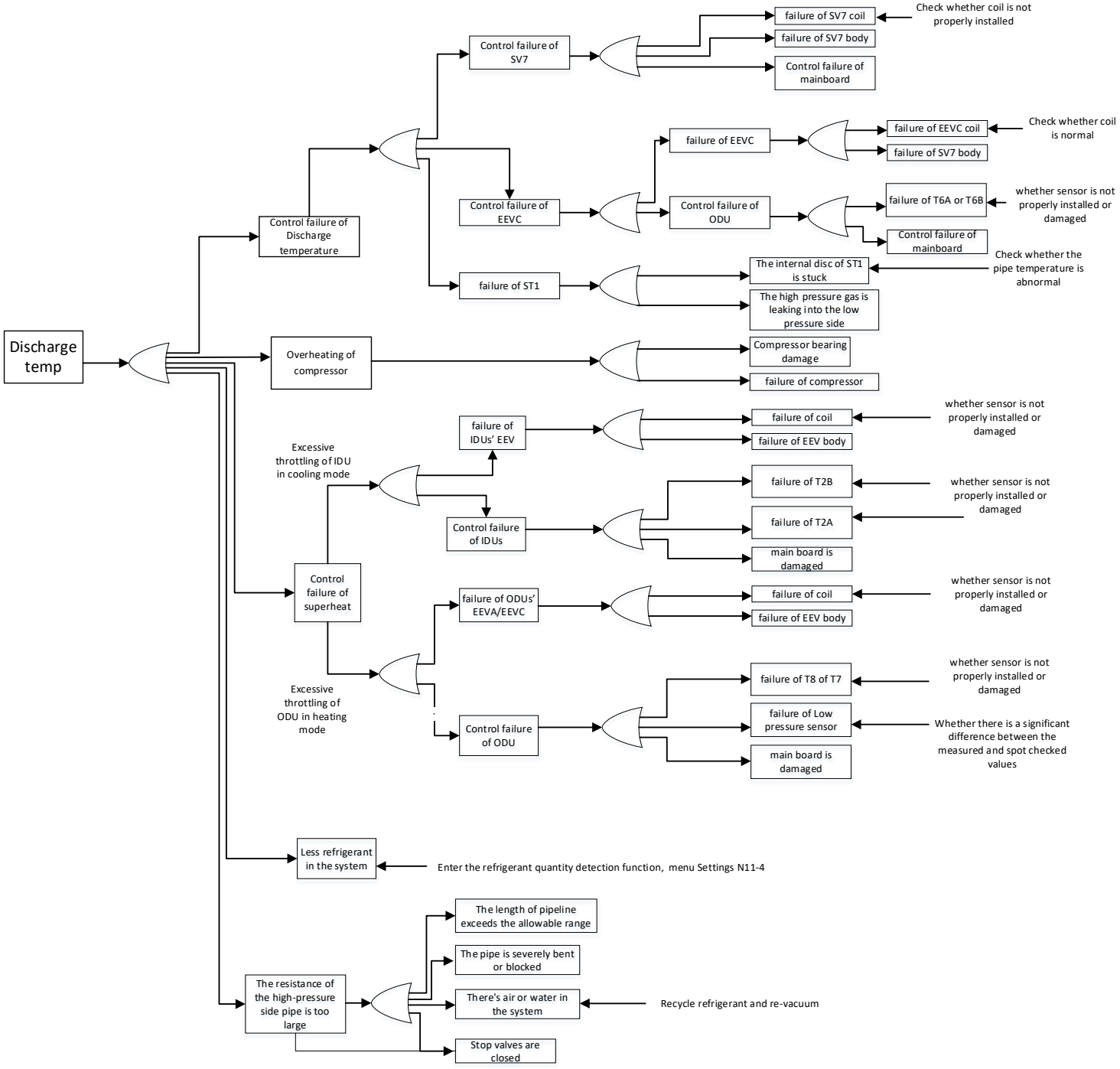
Outdoor ambient temperature	**°C**	< 10	10 to 26	26 to 31	31 to 41	> 41
Discharge temperature	**°C**	60-76	62-78	65-82	67-92	69-92
Discharge superheat	**°C**	17-30	17-33	17-34	17-36	10-32
discharge pressure	**MPa**	2.3-2.8	2.3-2.8	2.4-3.6	2.6-3.8	3.1-4.1
suction pressure	**MPa**	0.6-0.7	0.7-0.9	0.8-1.0	1.0-1.2	1.2-1.4

Table 6-5.4: outdoor unit heating mode parameters

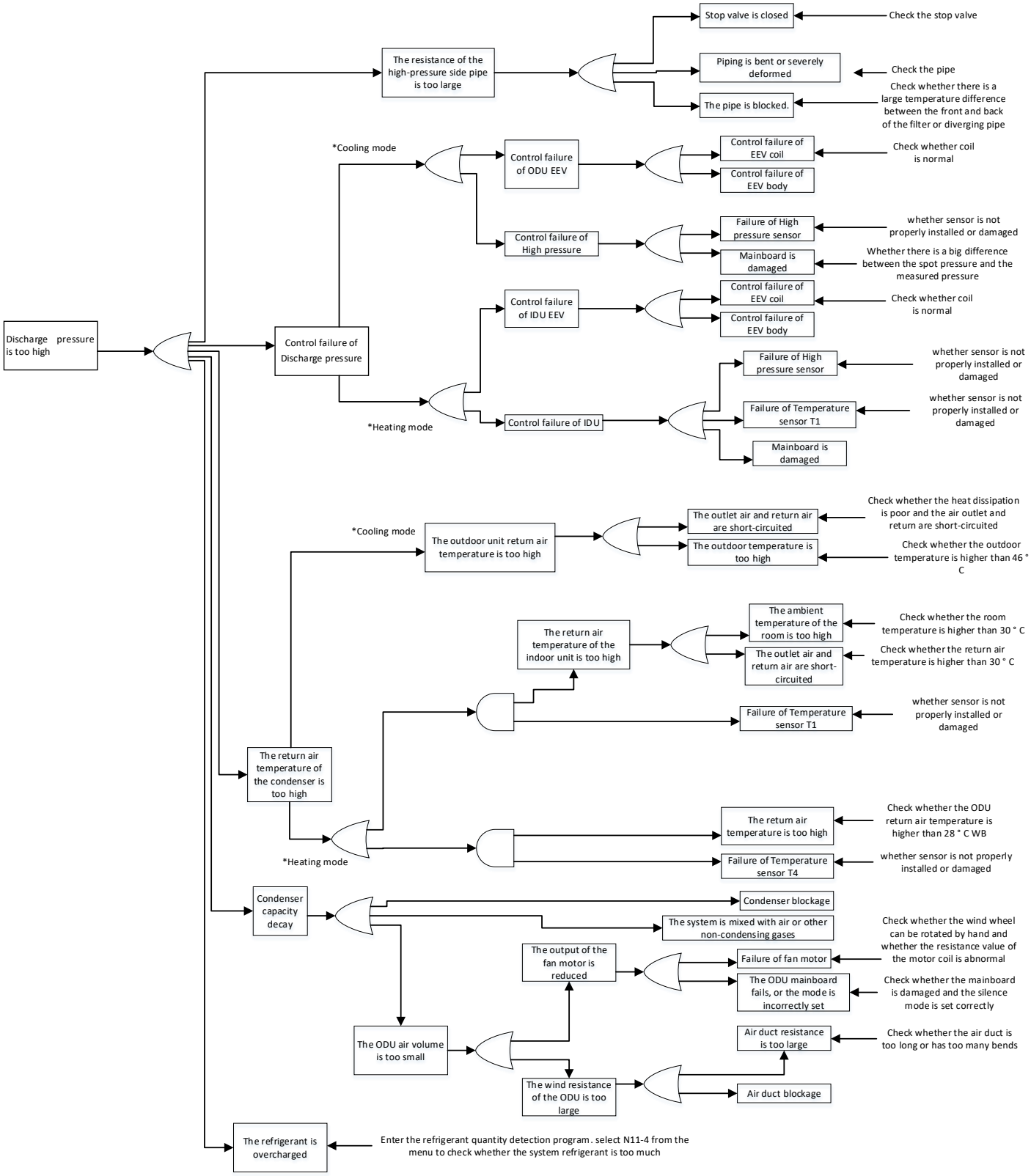
Outdoor temperature	**°C**	< -10	-10 to 10	0 to 5	5 to 10	10 to 17	> 17
Discharge temperature	**°C**	56-74	57-76	58-78	61-82	63-82	63-82
Discharge superheat	**°C**	17-35	17-35	17-35	17-33	14-33	14-33
discharge pressure	**MPa**	1.7-2.4	1.8-2.5	1.9-3.0	2.2-3.2	2.3-3.2	2.3-3.2
Back to the gas pressure	**MPa**	0.4-1.0	0.5-1.2	0.5-1.2	0.5-1.3	0.5-1.3	0.6-1.4

5.3 Analysis of the cause of system anomalies

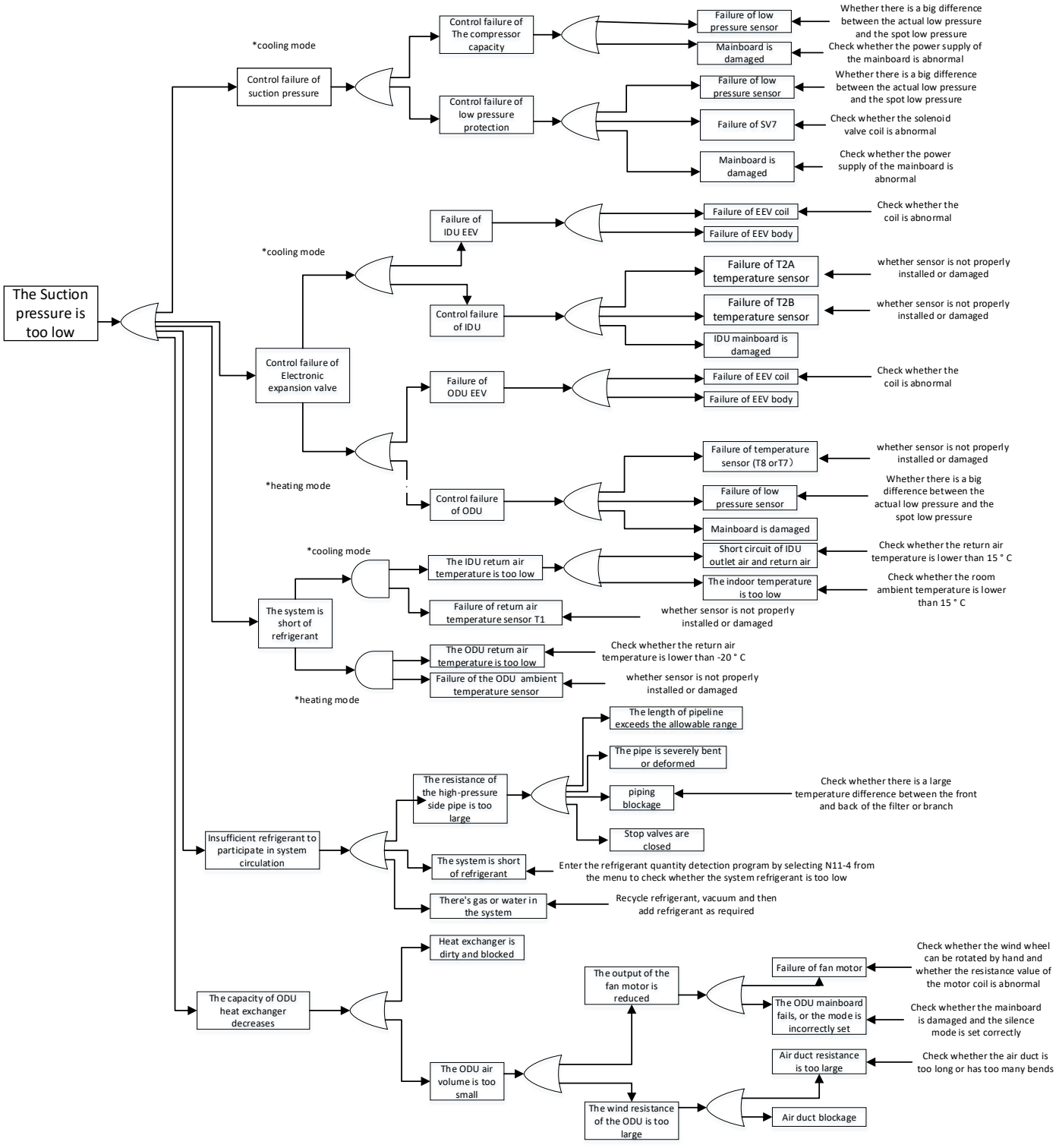
5.3.1 Cause Analysis of Excessive discharge Temperature



5.3.2 Cause Analysis of too high Pressure



5.3.3 Cause Analysis of too Low Pressure



5.4 Outdoor unit main Control Board ports table

Figure 6-5.1: Outdoor unit main Control Board ports

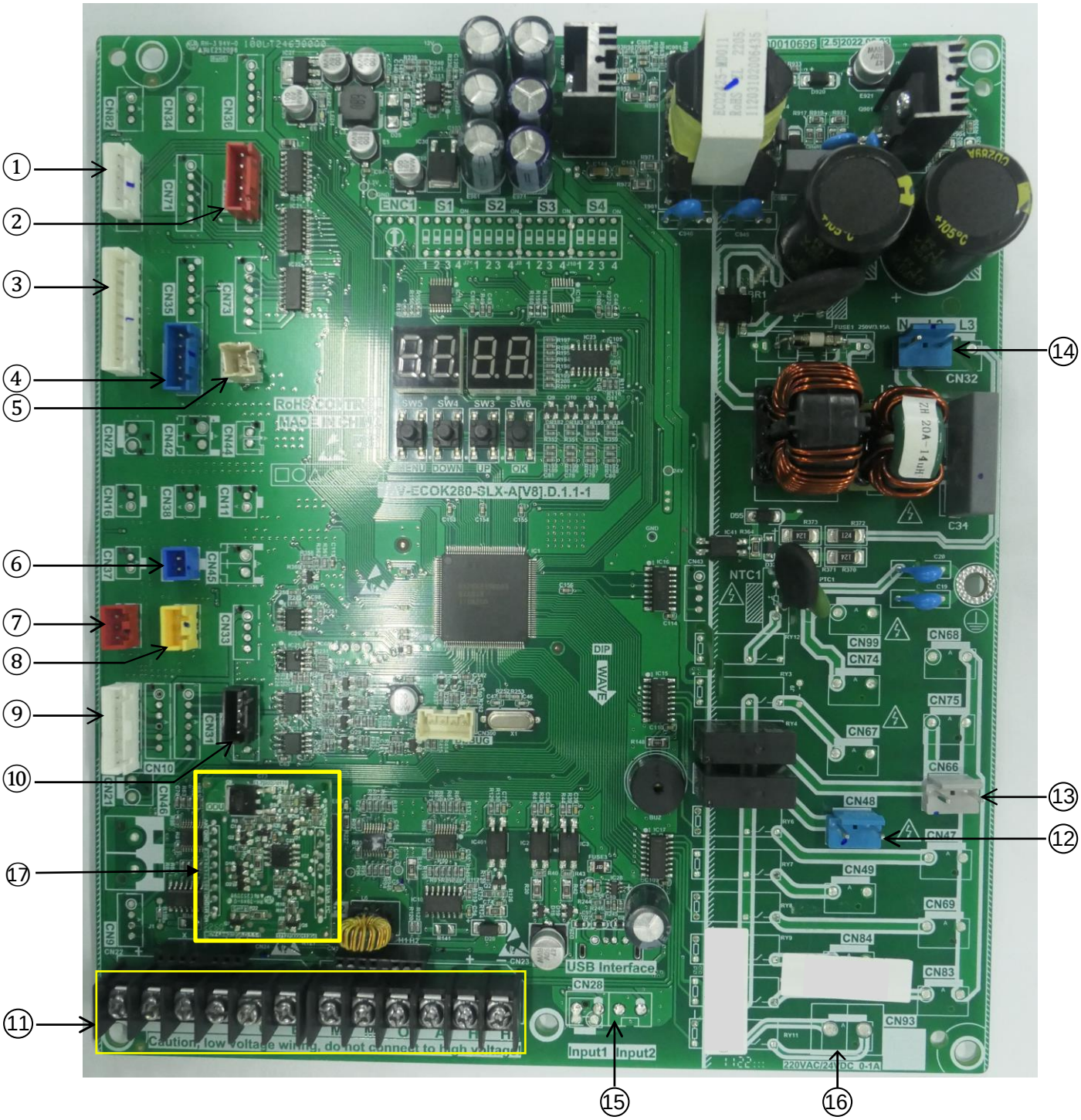


Table 6-5.5: Main Control Board port definition Table

Label in Figure 5-2.1	Port code	Content	Port voltage
1	CN70	EEVA drive port	12Vdc
2	CN72	EEVC drive port	12Vdc
3	CN4	Liquid pipe inlet temperature sensor(**T5**) /Plate heat exchanger outlet temperature sensor(**T6B**) /Suction temperature sensor 1 (**T71**) /Discharge temperature sensor 1 (**T7C1**) (**From top to bottom**)	3.3Vdc
4	CN8	Condenser inlet temperature sensor(**T8**) /Main exchanger pipe temperature sensor(**T3**) (**From top to bottom**)	3.3Vdc
5	CN3	Condenser outlet temperature sensor(**TL**)	3.3Vdc
6	CN30	Outdoor ambient temperature sensor(**T4**)	3.3Vdc
7	CN41	Low pressure sensor	5Vdc
8	CN40	High pressure sensor	5Vdc
9	CN26	Communication port to Compressor & Fan Drive Board	5Vdc+12Vdc
10	CN14	Communication port to data transfer module	12Vdc
11	CN22/CN23	Communication port	0-5V DC (varying)
12	CN48	Four-way valve drive ports(**ST1**)	220Vac
13	CN66	Power supply to compressor crankcase heater	220Vac
14	CN32	Power input of main board	220Vac
15	CN28	Reserved	-
16	CN93	Reserved	-
17	-	HyperLink board	-

5.5 Compressor & Fan drive board ports detection

5.5.1 Port reference and function definition of Compressor & Fan drive board

Figure 6-5.2: Compressor & Fan drive board ports

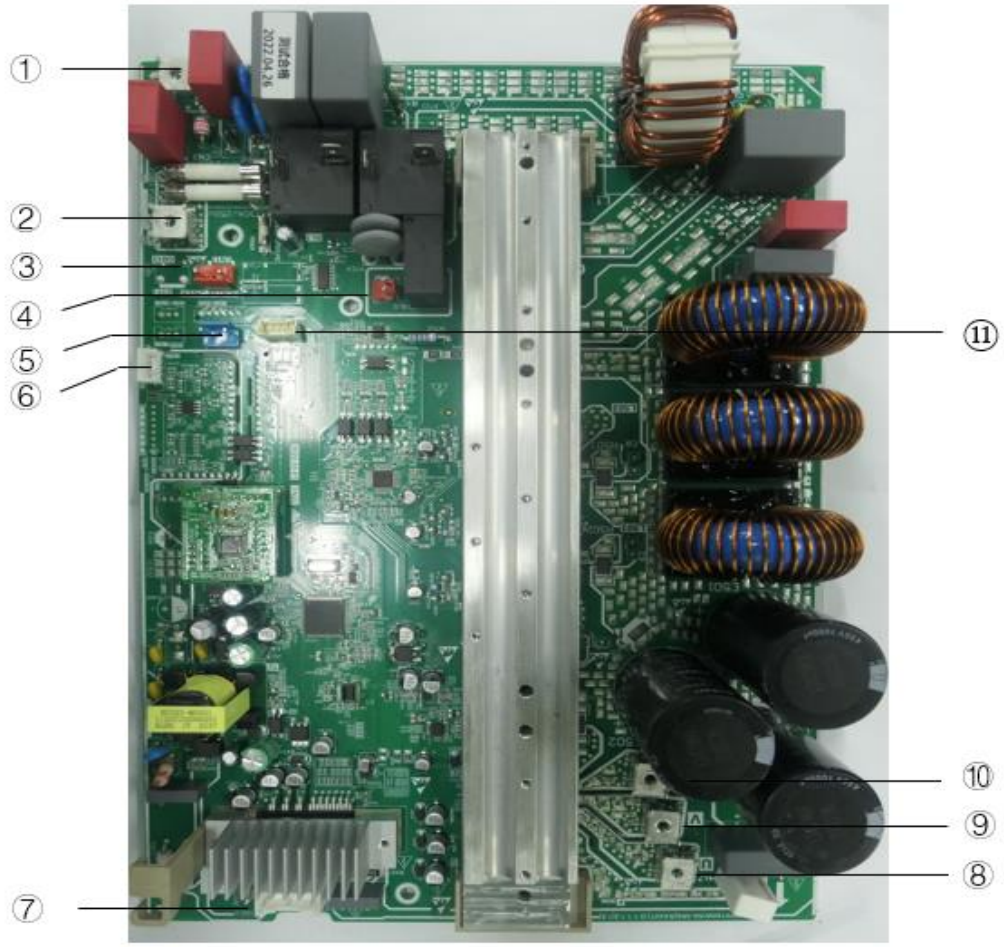
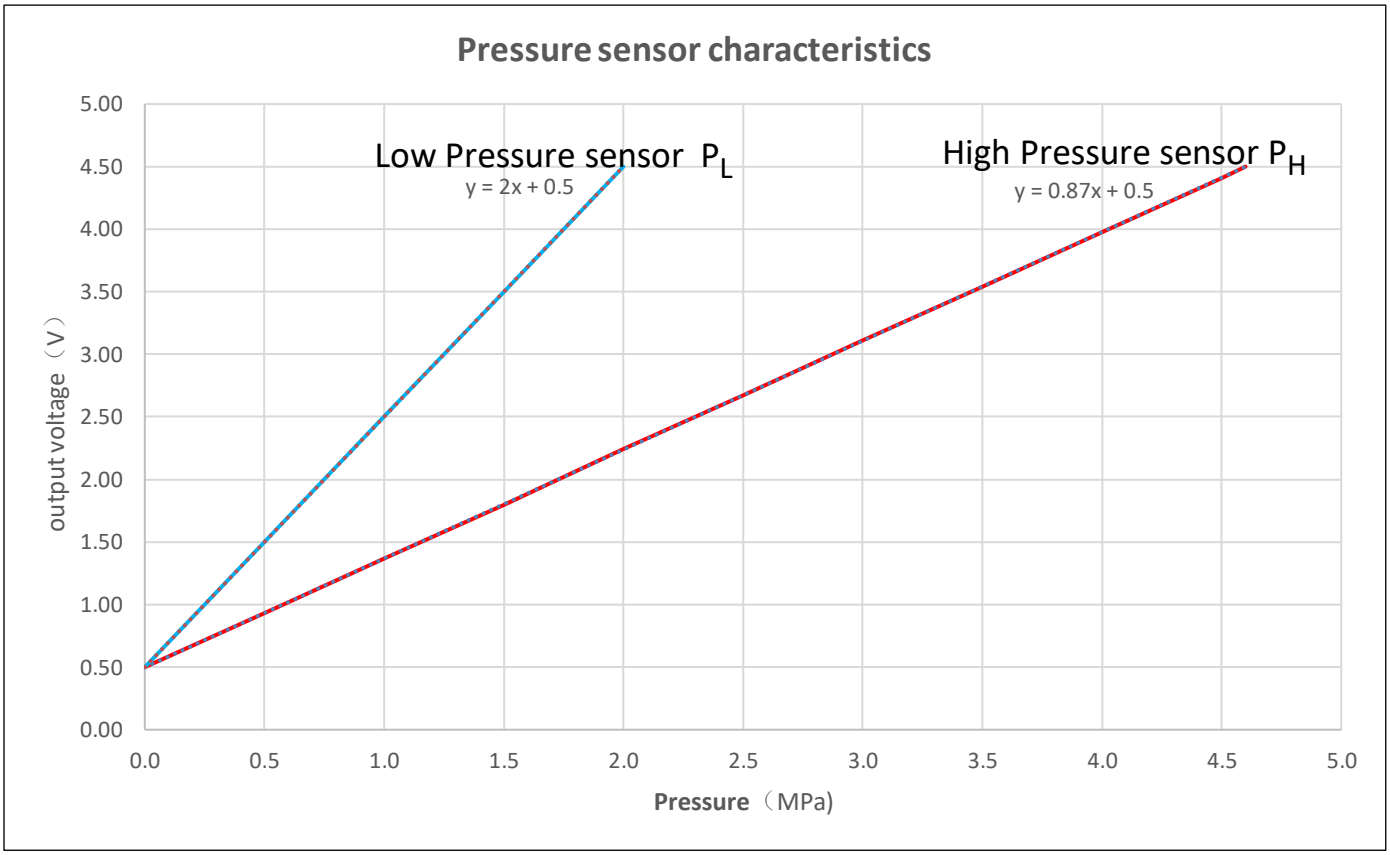


Table 6-5.5: Port definition and functions table:

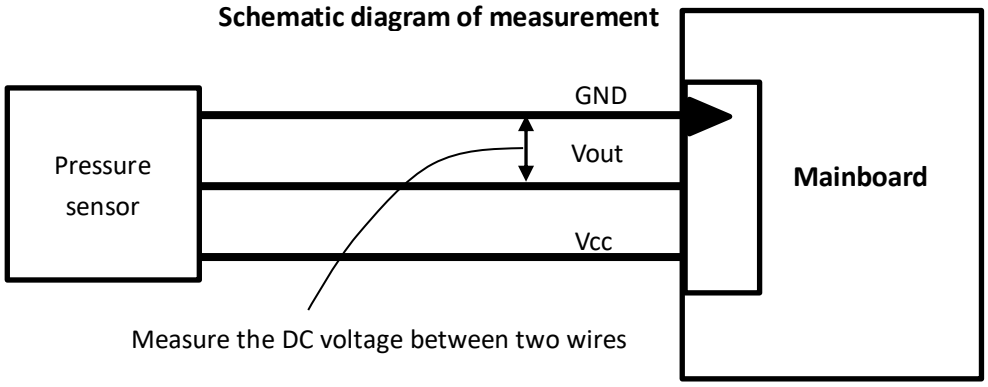
Label in Figure 5-2.1	Port code	Content	Port voltage
1	CN2	Power input port N	AC 220-240V
2	CN1	Power input port L	AC 220-240V
3	CN11	Main Control Board Power input port	AC 220-240V
4	CN16	Relay control input port	12V DC
5	CN25	Connect to high pressure switch	0-5V DC
6	CN27	Communication port to main control board	0-5V DC
7	CN32	Power supply to DC Fan	0-380V DC (varying according to frequency)
8	U	Power output U of inverter module to compressor	0-380V DC (varying according to frequency)
9	V	Power output V of inverter module to compressor	0-380V DC (varying according to frequency)
10	W	Power output W of inverter module to compressor	0-380V DC (varying according to frequency)
11	CN26	DEBUG	0-5V DC

5.6 Appendix of Pressure Sensor Detection



P_H :Vout(H)=0.87×P_H+0.5

P_L:Vout(L)=2×P_L+0.5



5.7 Oil volume table

Table 6-5.6: Oil volume table:

Model	Oil model	Compressor A (Y1)	additional adding oil Volume	TOTAL OIL	TOTAL OIL
80	FV68H	0.67L	0.6L	0.67L+0.6L	1.27L
100	FV68H	0.67L	0.6L	0.67L+0.6L	1.27L
120	FV68H	1.0L	1.2L	1.0L+1.2L	2.2L
140	FV68H	1.0L	1.2L	1.0L+1.2L	2.2L
160	FV68H	1.0L	1.2L	1.0L+1.2L	2.2L

1. If we only need to replace the compressor, do not need to replace the Gas-liquid separator and the pipe, then how much oil you pulled out (for example we pulled out X), then we need to add X-Y1 (for 120 model, Y1 is 1.1L)

2. If we need to replace all the compressors and we need to replace the Gas-liquid separator, then we need to add the additional adding oil Volume as above show.

3 Pls add the additional oil to the innlet of Gas-liquid separator, not directly to the compressor.

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