VMEM Series

Full DC Modular VRF Outdoor Unit

Service Manual

380~415V/3/50-60Hz

CONTENTS

VMEM007N7A-D13V224
VMEM009N7A-D16V280
VMEM010N7A-D20V335
VMEM012N7A-D23V400
VMEM014N7A-D26V450
VMEM016N7A-D29V500
VMEM018N7A-D33V560
VMEM020N7A-D36V615
VMEM022N7A-D39V670
VMEM024N7A-D43V730
VMEM026N7A-D46V785
VMEM028N7A-D50V850

Part 1

General Information

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
VECW	One-way Cassette
VECT	Two-way Cassette
VECM	Compact Four-way Cassette
VECR	Four-way Cassette
VESP	Arc Duct
VEMP	Medium Static Pressure Duct

Abbreviation code	Type
VEFP	High Static Pressure Duct
VEWM	Wall-mounted
VEFC	Ceiling & Floor
VEFB	Floor Standing (Exposed/Concealed)

Table 1-1.2: Standard indoor unit capacity range

Capacity		Capacity index	VECW	VECT	VECM	VECR	VESP	VELP	VEFA	VEWM	VEFC	VEFR
kW	HP											
1.5	0.5	15	—	—	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	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	—
10.0	3.6	100	—	—	—	100	—	—	—	—	100	—
11.2	4	112	—	—	—	112	112	112	112	—	112	—
12.5	4.5	125	—	—	—	—	—	125	125	—	125	—
14.0	5	140	—	—	—	140	—	140	140	—	140	—
16.0	6	160	—	—	—	160	—	160	160	—	—	—
18.0	6.4	180	—	—	—	180	—	—	—	—	—	—
20.0	7	200	—	—	—	—	—	—	200	—	—	—
22.4	8	224	—	—	—	—	—	—	224	—	—	—
25.2	9	252	—	—	—	—	—	—	252	—	—	—
28.0	10	280	—	—	—	—	—	—	280	—	—	—
33.5	12	335	—	—	—	—	—	—	335	—	—	—
40.0	14	400	—	—	—	—	—	—	400	—	—	—
45.0	16	450	—	—	—	—	—	—	450	—	—	—
56.0	20	560	—	—	—	—	—	—	560	—	—	—

1.1.2 Fresh air processing unit

Table 1-1.3: Fresh air processing unit capacity range

Capacity	9kW	14kW	16kW	20kW	22.4kW	25.2kW	28kW	33.5kW	40kW	45kW	56kW
Capacity index	90	140	160	200	224	252	280	335	400	450	560

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	Model Name	Combination Type
8HP	VMEM007N7A-D13V224	/
10HP	VMEM009N7A-D16V280	/
12HP	VMEM010N7A-D20V335	/
14HP	VMEM012N7A-D23V400	/
16HP	VMEM014N7A-D26V450	/
18HP	VMEM016N7A-D29V500	/
20HP	VMEM018N7A-D33V560	/
22HP	VMEM020N7A-D36V615	/
24HP	VMEM022N7A-D39V670	/
26HP	VMEM024N7A-D43V730	/
28HP	VMEM026N7A-D46V785	/
30HP	VMEM028N7A-D50V850	/
32HP	VMEM029N7A-D53V900	16HP+16HP
34HP	VMEM030N7A-D56V950	14HP+20HP
36HP	VMEM032N7A-D59V1010	16HP+20HP
38HP	VMEM034N7A-D63V1065	18HP+20HP
40HP	VMEM036N7A-D64V1120	16HP+24HP
42HP	VMEM038N7A-D64V1180	18HP+24HP
44HP	VMEM040N7A-D64V1235	20HP+24HP
46HP	VMEM042N7A-D64V1300	16HP+30HP
48HP	VMEM044N7A-D64V1345	18HP+30HP
50HP	VMEM046N7A-D64V1400	20HP+30HP
52HP	VMEM048N7A-D64V1465	22HP+30HP
54HP	VMEM050N7A-D64V1515	24HP+30HP
56HP	VMEM052N7A-D64V1570	26HP+30HP
58HP	VMEM054N7A-D64V1635	28HP+30HP
60HP	VMEM056N7A-D64V1700	30HP+30HP
62HP	VMEM058N7A-D64V1750	16HP+16HP+30HP
64HP	VMEM060N7A-D64V1795	14HP+20HP+30HP
66HP	VMEM062N7A-D64V1850	16HP+20HP+30HP
68HP	VMEM064N7A-D64V1915	18HP+20HP+30HP
70HP	VMEM066N7A-D64V1965	16HP+24HP+30HP
72HP	VMEM068N7A-D64V2020	18HP+24HP+30HP
74HP	VMEM070N7A-D64V2085	20HP+24HP+30HP
76HP	VMEM072N7A-D64V2150	16HP+30HP+30HP
78HP	VMEM074N7A-D64V2185	18HP+30HP+30HP
80HP	VMEM076N7A-D64V2250	20HP+30HP+30HP
82HP	VMEM078N7A-D64V2315	22HP+30HP+30HP
84HP	VMEM080N7A-D64V2355	24HP+30HP+30HP
86HP	VMEM082N7A-D64V2420	26HP+30HP+30HP
88HP	VMEM084N7A-D64V2485	28HP+30HP+30HP
90HP	VMEM086N7A-D64V2550	30HP+30HP+30HP

Notes:

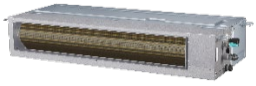
1. The combinations of units shown in the table are factory-recommended. Four units combination are possible for the 8-24 HP models. For other combinations of units please contact your local distributor or technical support engineer.

2 External Appearance

2.1 Indoor Units

2.1.1 Standard indoor units

Table 1-2.1: Standard indoor unit appearance

One-way Cassette VECW 	Two-way Cassette VECT 
Compact Four-way Cassette VECM 	Four-way Cassette VECR 
Arc Duct VESP 	Medium Static Pressure Duct VEMP 
High Static Pressure Duct VEHP 	Ceiling & Floor VEFC 
Wall-mounted VEWM 	

2.1.2 Fresh air processing unit

Table 1-2.2: Fresh air processing unit appearance

Fresh Air Processing Unit VEFA 	

2.2 Heat Recovery Ventilator

Table 1-2.3: Heat recovery ventilator appearance

Heat Recovery Ventilator ERVD-F 

2.3 Outdoor Units

2.3.1 Single units

Table 1-2.4: Single outdoor unit appearance

8/10/12/14/16/18/20HP (with single fan)	22/24/26/28/30HP (with dual fans)
	

2.3.2 Combinations of units

Table 1-2.5: Combination outdoor unit appearance

32/34/36/38HP	40/42/44/46/48/50HP	52/54/56/58/60HP
		
62/64/66/68HP	**70/72/74/76/78/80HP**	**82/84/86/88/90HP**
		

3 Outdoor Unit Combinations

Table 1-3.1: Outdoor unit combinations

System capacity		No. of units	Modules[1]												Outdoor branch joint kit[2]
kW	HP		8	10	12	14	16	18	20	22	24	26	28	30	
22.4	8	1	●												—
28.0	10	1		●											
33.5	12	1			●										
40.0	14	1				●									
45.0	16	1					●								
50.0	18	1						●							
56.0	20	1							●						
61.5	22	1								●					
67.0	24	1									●				
73.0	26	1										●			
78.5	28	1											●		
85.0	30	1												●	
90.0	32	1					●●								VAMC002 -DEF
96.0	34	1				●			●						
101.0	36	1					●		●						
106.0	38	1						●	●						
112.0	40	1					●				●				
117.0	42	2						●			●				
123.0	44	2							●		●				
130.0	46	2					●							●	
135.0	48	2						●						●	
141.0	50	2							●					●	
146.5	52	2								●				●	
152.0	54	2									●			●	
158.0	56	2										●		●	
163.5	58	2											●	●	
170.0	60	2												●●	
175.0	62	2					●●							●	VAMC003 -DEF
181.0	64	2				●			●					●	
186.0	66	2					●		●					●	
191.0	68	2						●	●					●	
197.0	70	2				●					●			●	
202.0	72	2					●				●			●	
208.0	74	2						●			●			●	
215.0	76	2					●							●●	
220.0	78	2						●						●●	
226.0	80	2							●					●●	
231.5	82	3								●				●●	
237.0	84	3									●			●●	
243.0	86	3										●		●●	
248.5	88	3											●	●●	
255.0	90	3												●●●	

Notes:

1. The combinations of units shown in the table are factory-recommended. Four units combination are possible for the 8-24 HP models. For other combinations of units please contact your local distributor or technical support engineer.
2. For systems with two or more outdoor units, outdoor branch joints (sold separately) are required.

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 small airflow rate fresh air processing units	V8 fresh air processing units
VMEM Series outdoor units	50%	200%[1,2,3] (Single ODU) 130% (Combined ODU)	100%	100%[4]	×[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. Piping between farthest indoor unit and first indoor branch joint should less than 40m.
3. Combination ratio greater than 130% is available as a customization option.
4. When V8 small airflow rate 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%. V8 fresh air processing units cannot be installed in the same refrigerant system as standard indoor units.

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
kW	HP	Capacity index			
22.4	8	224	112 to 291.2	112 to 224	13
28	10	280	140 to 364	140 to 280	16
33.5	12	335	167.5 to 435.5	167.5 to 335	19
40	14	400	200 to 520	200 to 400	23
45	16	450	225 to 585	225 to 450	26
50	18	500	250 to 650	250 to 500	29
56	20	560	280 to 728	280 to 560	33
61.5	22	615	307.5 to 799.5	307.5 to 615	36
67	24	670	335 to 871	335 to 670	39
73	26	730	365 to 949	365 to 730	43
78.5	28	785	392.5 to 1020.5	392.5 to 785	46
85	30	850	425 to 1105	425 to 850	50
90.0	32	900	450 to 1170	450 to 900	53
96.0	34	950	480 to 1248	480 to 960	56
101.0	36	1010	505 to 1313	505 to 1010	59
106.0	38	1065	530 to 1378	530 to 1060	62
112.0	40	1120	560 to 1456	560 to 1120	64
117.0	42	1170	585 to 1521	585 to 1170	
123.0	44	1230	615 to 1599	615 to 1230	
130.0	46	1285	650 to 1690	650 to 1300	
135.0	48	1340	675 to 1755	675 to 1350	
141.0	50	1410	705 to 1833	705 to 1410	
146.5	52	1460	732.5 to 1904.5	732.5 to 1465	
152.0	54	1515	760 to 1976	760 to 1520	
158.0	56	1570	790 to 2054	790 to 1580	
163.5	58	1625	817.5 to 2125.5	817.5 to 1635	
170.0	60	1680	850 to 2210	850 to 1700	
175.0	62	1735	875 to 2275	875 to 1750	
181.0	64	1790	905 to 2353	905 to 1810	
186.0	66	1852	930 to 2418	930 to 1860	
191.0	68	1910	955 to 2483	955 to 1910	
197.0	70	1962	985 to 2561	985 to 1970	
202.0	72	2020	1010 to 2626	1010 to 2020	
208.0	74	2070	1040 to 2704	1040 to 2080	
215.0	76	2130	1075 to 2795	1075 to 2150	
220.0	78	2180	1100 to 2860	1100 to 2200	
226.0	80	2240	1130 to 2938	1130 to 2260	
231.5	82	2295	1157.5 to 3009.5	1157.5 to 2315	
237.0	84	2350	1185 to 3081	1185 to 2370	
243.0	86	2405	1215 to 3159	1215 to 2430	
248.5	88	2460	1242.5 to 3230.5	1242.5 to 2485	
255.0	90	2520	1275 to 3315	1275 to 2550	

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 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

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 1-6.1: Room plan

<table>
<tr><td rowspan="2">Room A</td><td>Room H</td><td>Room G</td><td rowspan="2">Room F</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="2">Room B</td><td colspan="2"></td><td rowspan="2">Room E</td></tr>
<tr><td>Room C</td><td>Room D</td></tr>
</table>

Step 1: Establish design conditions

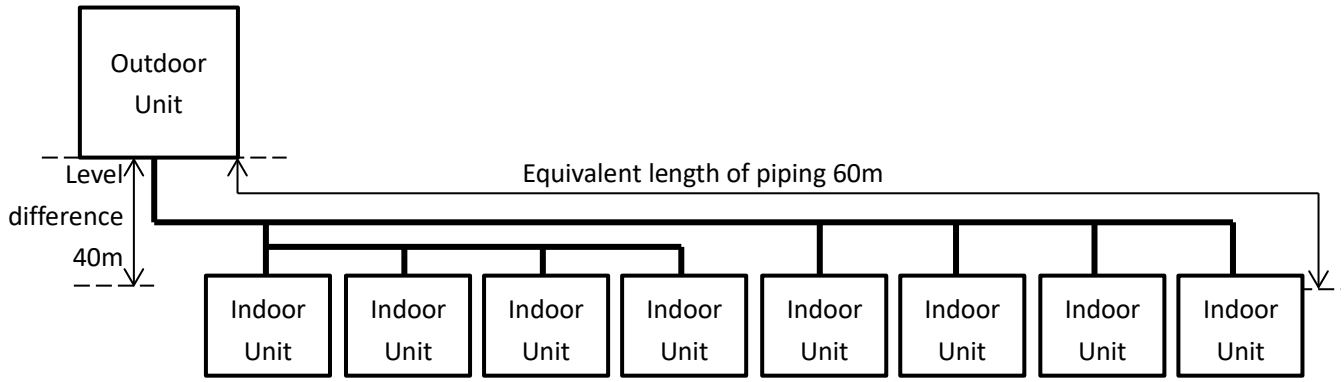
- Indoor air temperature 25.8°C DB, 18°C WB; outdoor air temperature 33°C DB.
- Determine peak load of each room and system peak load. As shown in Table 1-6.1, the system peak load is 50.7kW.

Table 1-6.1: Required heat load of each room (kW)

Time	Room A	Room B	Room C	Room D	Room E	Room F	Room G	Room H	Total
9:00	4.8	4.8	3.0	3.0	9.1	9.0	2.9	2.9	39.5
12:00	6.6	7.1	5.1	5.1	7.4	6.8	4.0	4.0	46.1
14:00	9.0	9.4	4.9	4.9	7.3	6.8	4.2	4.2	**50.7**
16:00	10.6	10.7	3.9	3.9	6.3	6.2	3.8	3.8	49.2

- The maximum piping lengths and level differences in this example are as given in Figure 1-6.2.

Figure 1-6.2: System diagram



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

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 1-6.3.

Table 1-6.2: Extract from medium static pressure duct (VEMP) 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
VEMP	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 1-6.3: Selected indoor units

	Room A	Room B	Room C	Room D
Peak heat load (kW)	10.6	10.7	5.1	5.1
Selected indoor unit	VELP024Q0A	VELP024Q0A	VECT019Q0A	VECT019Q0A
Corrected TC (kW)	13.2	13.2	5.3	5.3
	Room E	**Room F**	**Room G**	**Room H**
Peak heat load (kW)	9.1	9.0	4.2	4.2
Selected indoor unit	VEMP038Q0A	VEMP038Q0A	VELP015Q0A	VELP015Q0A
Corrected TC (kW)	10.5	10.5	4.2	4.2

Step 3: Select outdoor units

- Determine the required total heat load from the indoor units to the outdoor units 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 50.7kW.
- Provisionally select outdoor units using the sum of the capacity indexes (CIs) of the selected indoor units (as shown in Table 1-6.4), ensuring that the combination ratio is between 50% and 130%. Refer to Table 1-6.5. As the sum of CIs of the indoor units is 706, outdoor units from 20HP to 50HP are potentially suitable. Start from the smallest, which is the 20HP unit.

Table 1-6.4: Sum of indoor unit capacity indexes

Model	Capacity Index	No. of units
VELP024Q0A	140	2
VECT019Q0A	112	2
VELP019Q0A	56	2
VELP015Q0A	45	2

Sum of CIs	706

Table 1-6.5: Extract from 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)	Maximum number of connected indoor units
kW	HP	Capacity index		
50.0	18	500	250 to 650	29
56.0	20	560	280 to 728	33
61.5	22	615	307.5 to 799.5	36
67.0	24	670	335 to 871	39
73.0	26	730	365 to 949	43
78.5	28	785	392.5 to 1020.5	46
85.0	30	850	425 to 1105	50
90.0	32	900	450 to 1170	53
95.0	34	950	475 to 1235	56
101.5	36	1010	505 to 1313	59
106.5	38	1065	532.5 to 1384.5	62
112.0	40	1120	560 to 1456	64
117.0	42	1170	585 to 1521	
123.0	44	1230	615 to 1599	
128.5	46	1285	642.5 to 1670.5	
134.0	48	1340	670 to 1742	
141.0	50	1410	705 to 1833	
146.0	52	1460	730 to 1898	

- The number of connected indoor units is 8 and the maximum number of connected indoor units on the 20HP outdoor unit is 33, so the number of connected indoor units is within the limitation.
- Calculate the corrected capacity of the outdoor units:
  a) The sum of the indoor unit CIs is 706 and the CI of the 20HP outdoor unit VMEM018N7A-D33V560 is 560, so the combination ratio is 706 / 560 = 126%.
  b) Using the outdoor units' cooling capacity table, interpolate to obtain the capacity ("B") corrected for outdoor air temperature, indoor air temperature, and combination ratio. Refer to Tables 1-6.6 and 1-6.7.

Table 1-6.6: Extract from Table 2-8.7 VMEM018N7A-D33V560 cooling capacity

CR	Outdoor air temp. (°C DB)	Indoor air temp. (°C DB / °C WB)	
		25.8 / 18.0	
		TC	PI
		kW	kW
130%	31	60.91	17.37
	33	59.88	18.03
	35	59.05	18.63
120%	31	59.94	17.26
	33	58.91	17.93
	35	58.08	18.56

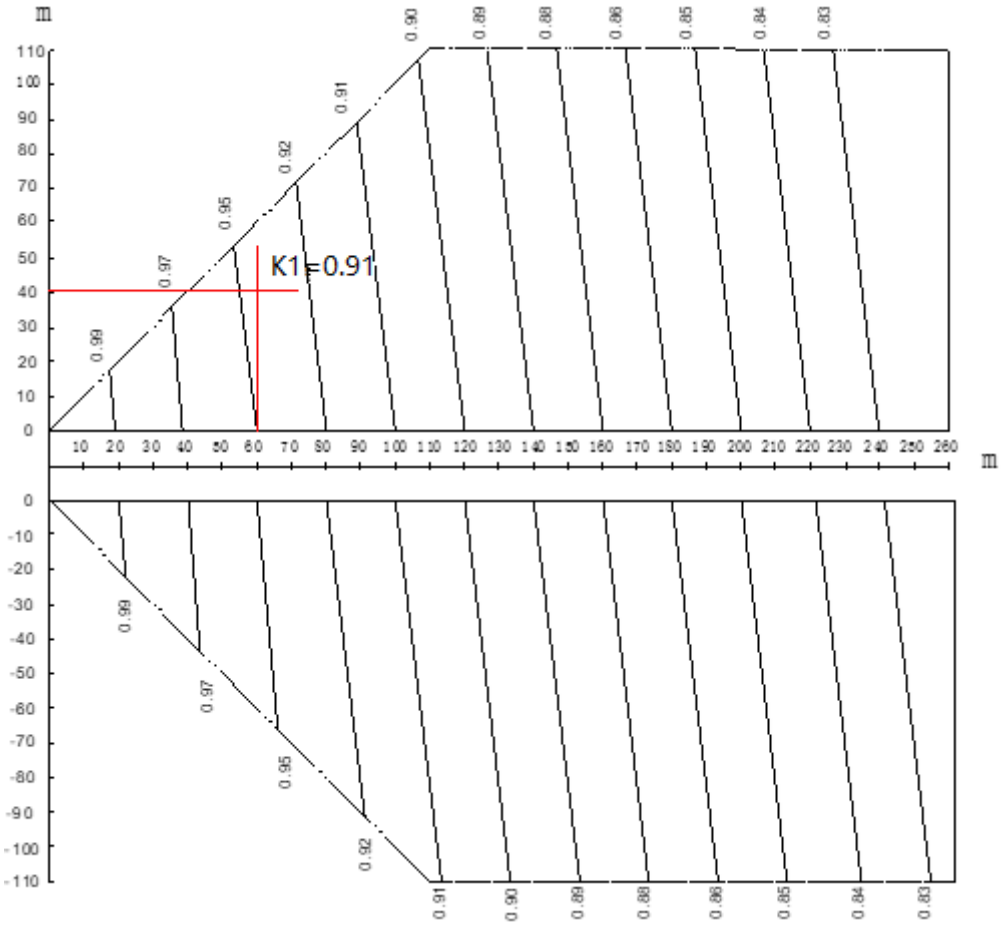
Table 1-6.7: Cooling capacity calculated by interpolation

CR	Outdoor air temp. (°C DB)	Indoor air temp. (°C DB / °C WB)	
		25.8 / 18.0	
		TC	PI
		kW	kW
130%			
	33	61.85	17.64
	B = 61.02[1]		
120%			
	33	60.82	17.51

Notes:
1. 58.91 + (59.88 – 58.91) × (126 – 120) / (130 – 120) =59.49

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

Figure 1-6.3: VMEM 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 VMEM018N7A-D33V560 ("C") by using K1:

$$C = B \times K1 = 59.49 \times 0.91 = 54.14kW$$

- The corrected capacity 54.14kW is larger than required total heat load 50.7kW, 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.)

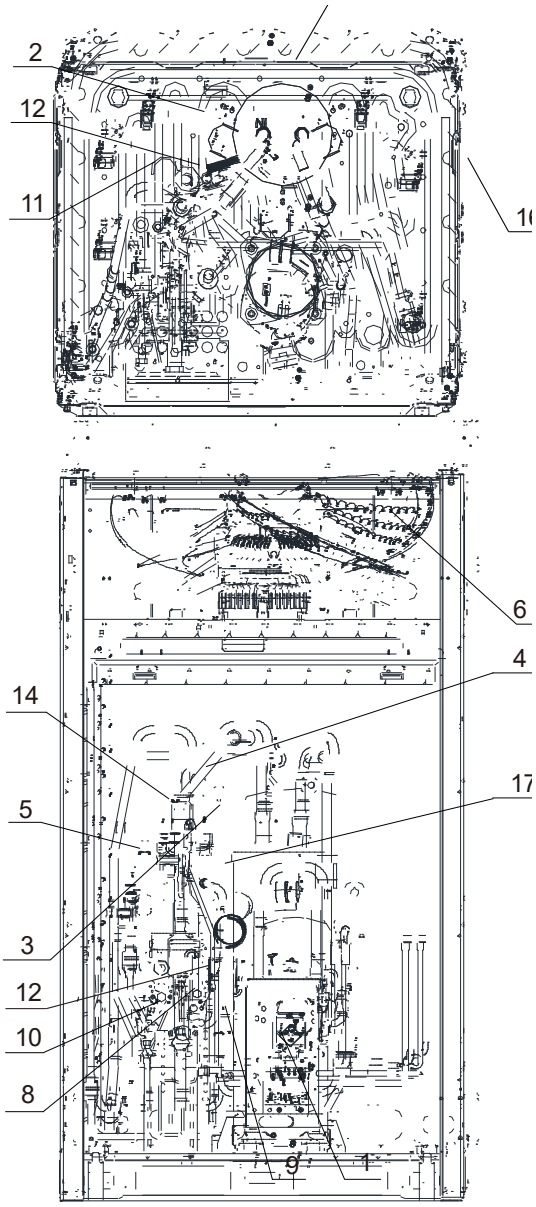
Part 2

Component Layout and Refrigerant Circuits

1 Layout of Functional Components

1.1 VMEM007(009-010)N7A layout of functional components

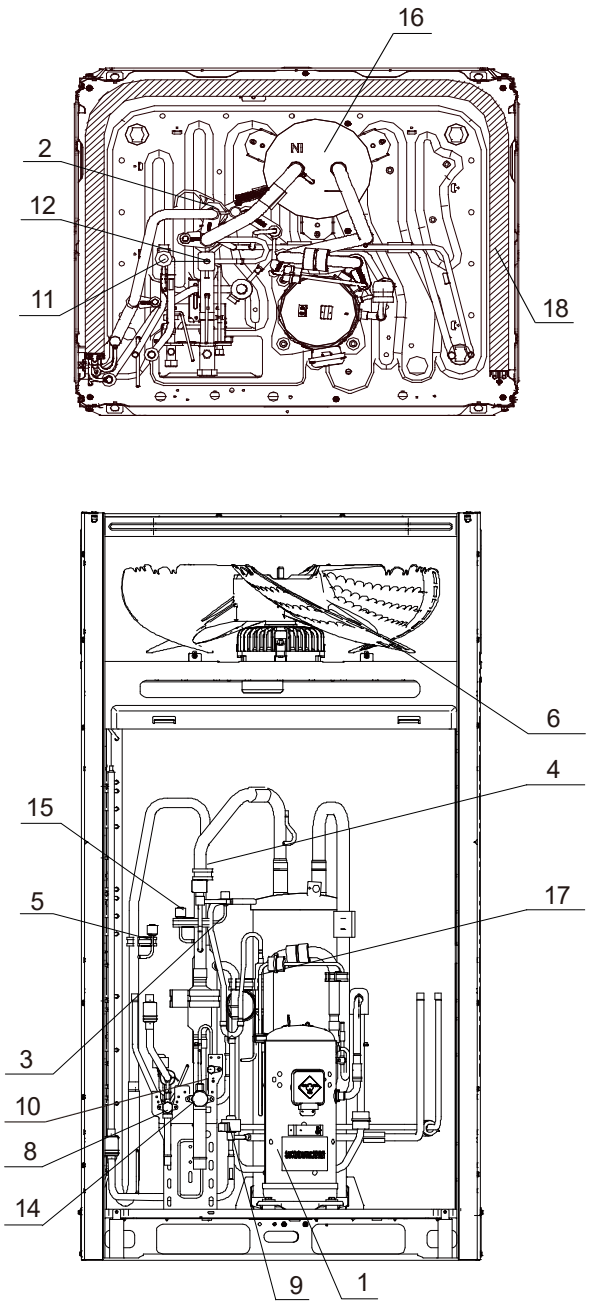
Figure 2-1.1: VMEM007(009-010)N7A layout of functional components



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

1.2 VMEM014(016-018)N7A layout of functional components

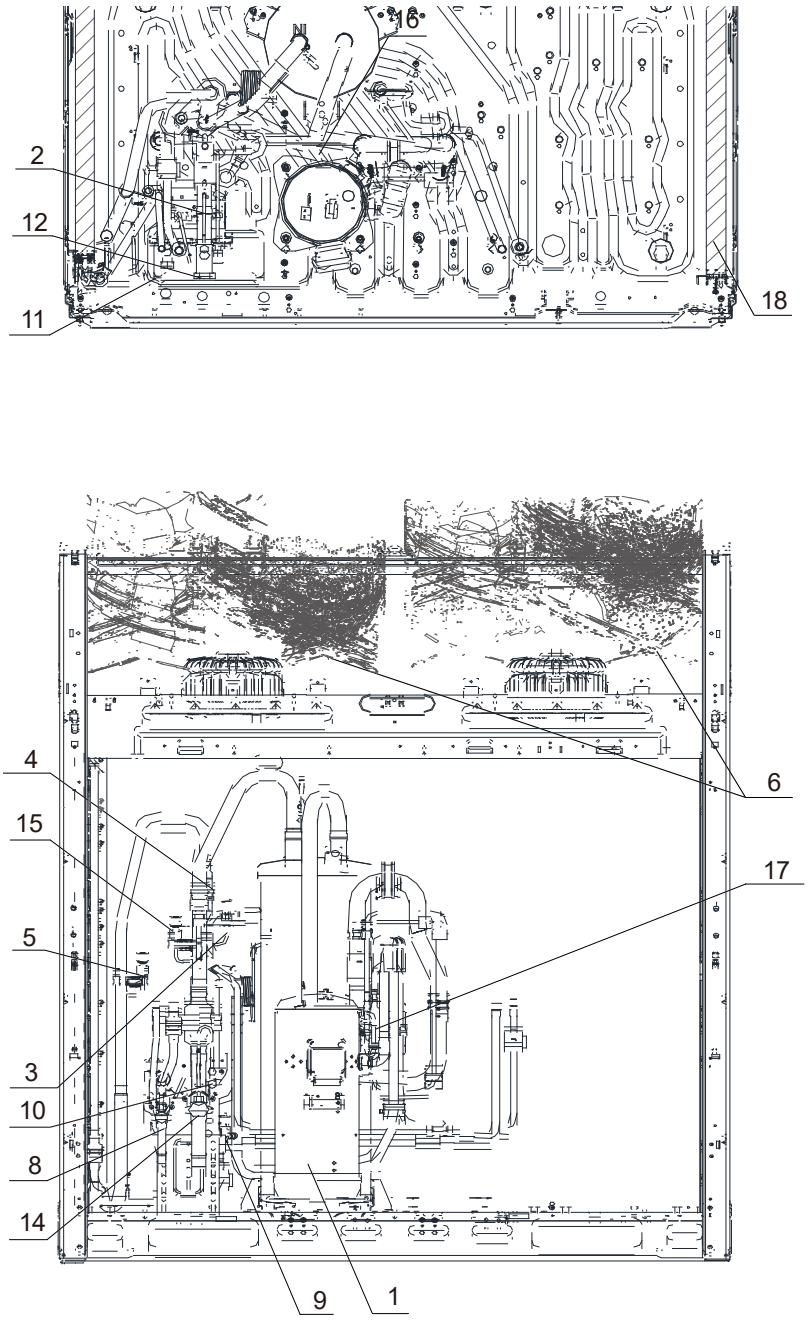
Figure 2-1.2: VMEM014(016-018)N7A layout of functional components



Legend	
No.	**Parts name**
1	Compressor
2	Oil separator
3	High pressure switch
4	Check value
5	High pressure sensor
6	Fan
7	Microchannel heat exchanger
8	Stop valve (liquid side)
9	Electronic expansion valve (EEVA)
10	Charge port
11	Electronic expansion valve (EEVC)
12	Injection bypass solenoid valve(SV5)
13	Electronic expansion valve (Optional EEVE)
14	Stop valve (gas side)
15	Low pressure sensor
16	Gas-liquid separator
17	Muffler
18	Heat exchanger

1.3 VMEM020(022)N7A layout of functional component

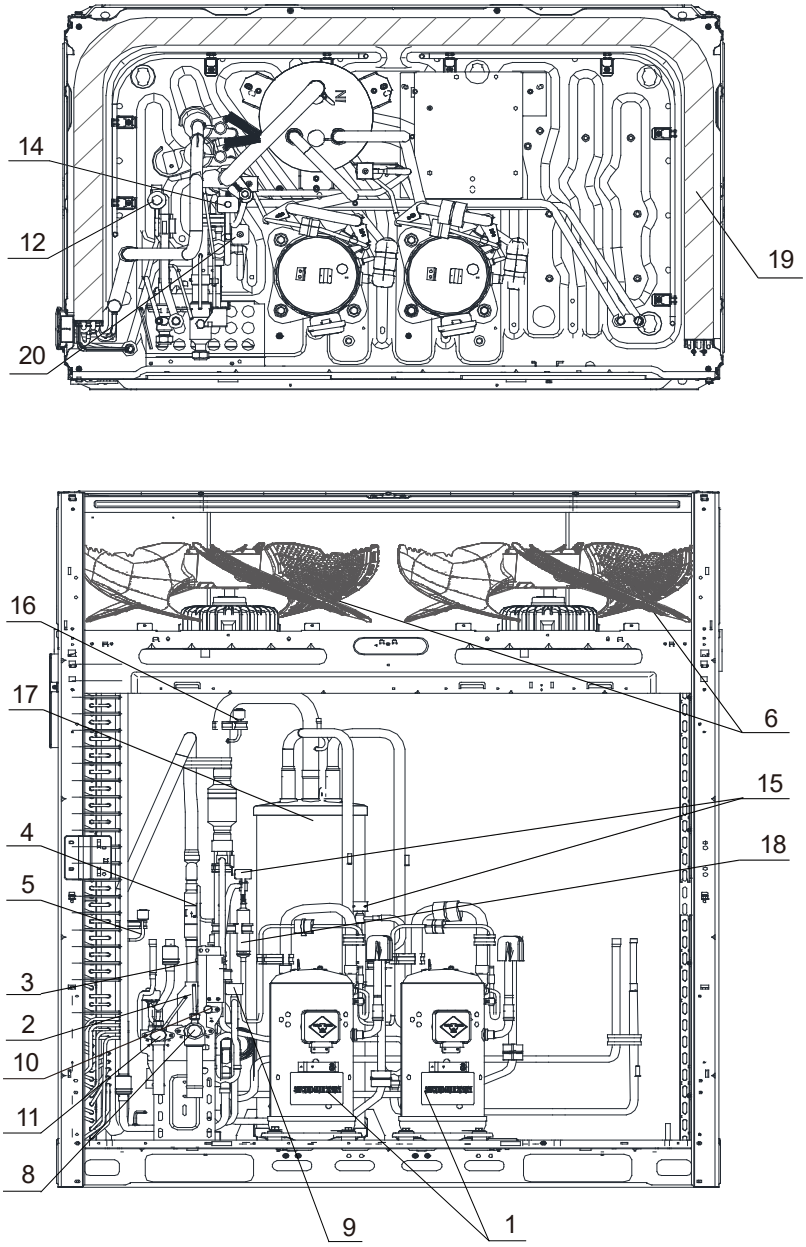
Figure 2-1.3: VMEM020(022)N7A layout of functional components



Legend	
No.	**Parts name**
1	Compressor
2	Oil separator
3	High pressure switch
4	Check value
5	High pressure sensor
6	Fan
7	Microchannel heat exchanger
8	Stop valve (liquid side)
9	Electronic expansion valve (EEVA)
10	Charge port
11	Electronic expansion valve (EEVC)
12	Injection bypass solenoid valve(SV5)
13	Electronic expansion valve (Optional EEVE)
14	Stop valve (gas side)
15	Low pressure sensor
16	Gas-liquid separator
17	Muffler
18	Heat exchanger

1.4 VMEM024(026-028)N7A layout of functional component

Figure 2-1.3: VMEM024(026-028)N7A layout of functional components

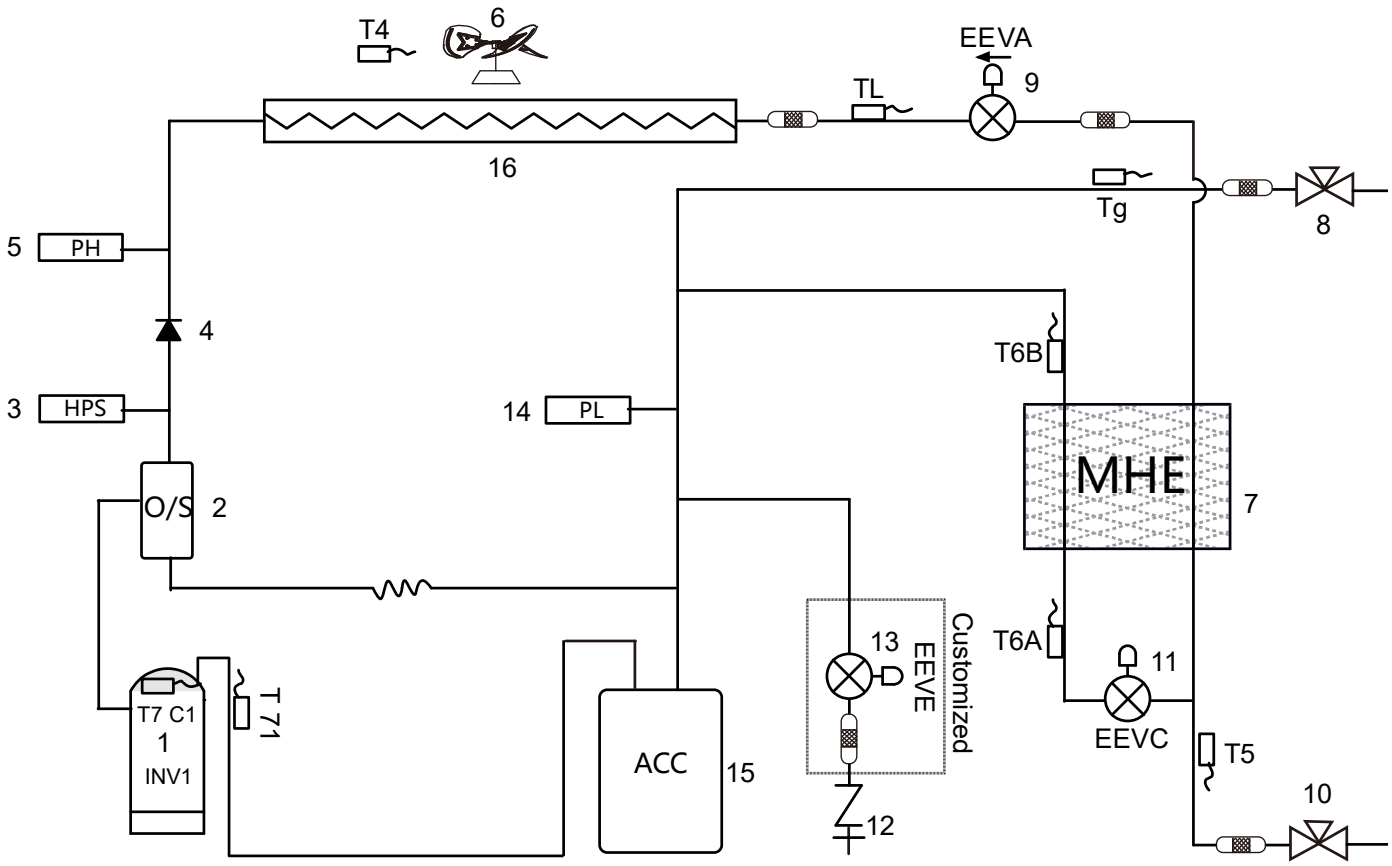


Legend	
No.	**Parts name**
1	Compressor
2	Oil separator
3	High pressure switch
4	Check value
5	High pressure sensor
6	Fan
7	Microchannel heat exchanger
8	Stop valve (gas side)
9	Electronic expansion valve (EEVA)
10	Charge port
11	Stop valve (liquid side)
12	Electronic expansion valve (EEVC)
13	Electronic expansion valve (Optional EEVE)
14	Injection bypass solenoid valve(SV5)
15	Injection valve (SV8A/SV8B)
16	Low pressure sensor
17	Gas-liquid separator
18	Muffler
19	Heat exchanger
20	Liquid bypass valve (SV6)

2 Piping Diagrams

2.1 8-12HP piping diagram

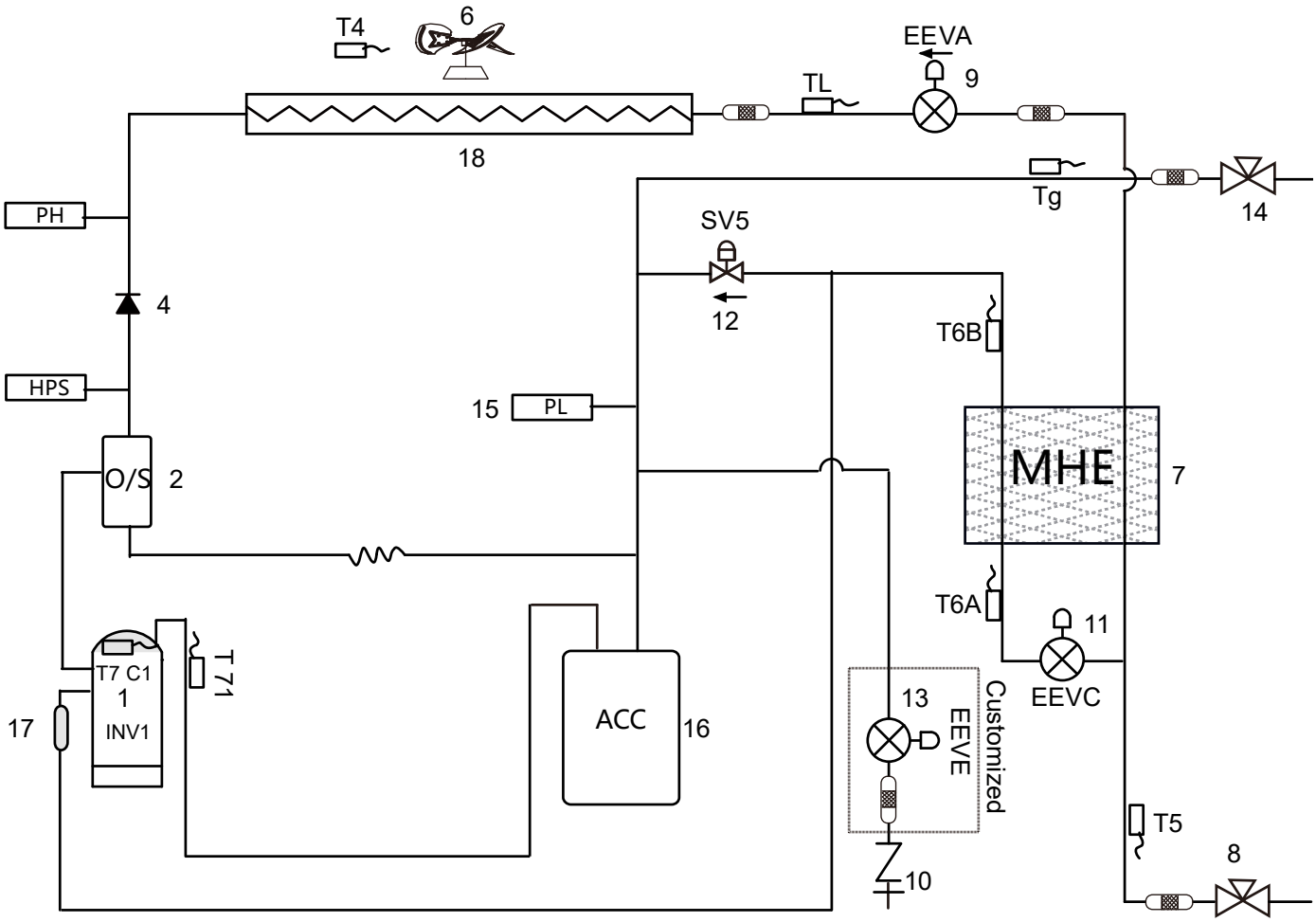
Figure 2-2.1: VMEM007(009-010)N7A piping diagram



Legend			
No.	**Parts name**	**No.**	**Parts name**
1	Compressor	14	Low pressure sensor
2	Oil separator	15	Gas-liquid separator
3	High pressure switch	16	Heat exchanger
4	Check value	**Sensor Code**	**Description**
5	High pressure sensor	T4	Outdoor air temperature sensor
6	Fan	T5	Liquid pipe temperature sensor
7	Microchannel heat exchanger	T6A	Microchannel heat exchanger inlet pipe temperature sensor
8	Stop valve (gas side)	T6B	Microchannel heat exchanger outlet pipe temperature sensor
9	Electronic expansion valve (EEVA)	T71/T72	Suction temperature sensor
10	Stop valve (liquid side)	Tg	Gas pipe temperature sensor
11	Electronic expansion valve (EEVC)	TL	Heat exchanger liquid temperature sensor
12	Charge port	T7C1/T7C2	Compressor discharge temperature sensor
13	Electronic expansion valve (Optional EEVE)	Tb	Electric control box chamber temperature sensor

2.2 VMEM014(016-018)N7A piping diagram

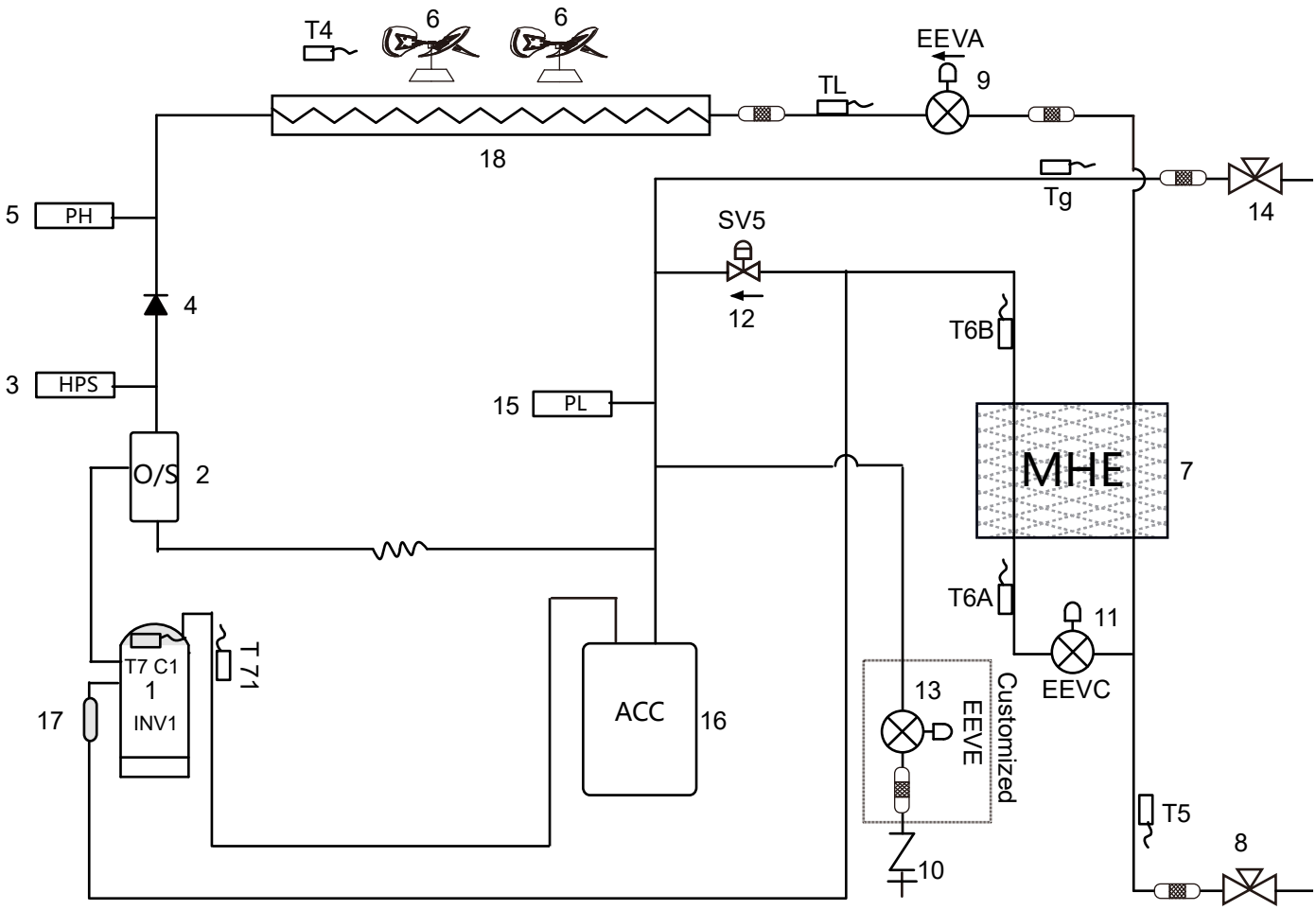
Figure 2-2.2: VMEM014(016-018)N7A piping diagram



Legend				
No.	**Parts name**		**No.**	**Parts name**
1	Compressor		15	Low pressure sensor
2	Oil separator		16	Gas-liquid separator
3	High pressure switch		17	Muffler
4	Check value		18	Heat exchanger
5	High pressure sensor		**Sensor Code**	**Description**
6	Fan		T4	Outdoor air temperature sensor
7	Microchannel heat exchanger		T5	Liquid pipe temperature sensor
8	Stop valve (liquid side)		T6A	Microchannel heat exchanger inlet pipe temperature sensor
9	Electronic expansion valve (EEVA)		T6B	Microchannel heat exchanger outlet pipe temperature sensor
10	Charge port		T71/T72	Suction temperature sensor
11	Electronic expansion valve (EEVC)		Tg	Gas pipe temperature sensor
12	Injection bypass solenoid valve (SV5)		TL	Heat exchanger liquid temperature sensor
13	Electronic expansion valve (Optional EEVE)		T7C1/T7C2	Compressor discharge temperature sensor
14	Stop valve (gas side)		Tb	Electric control box chamber temperature sensor

2.3 VMEM020(022)N7A piping diagram

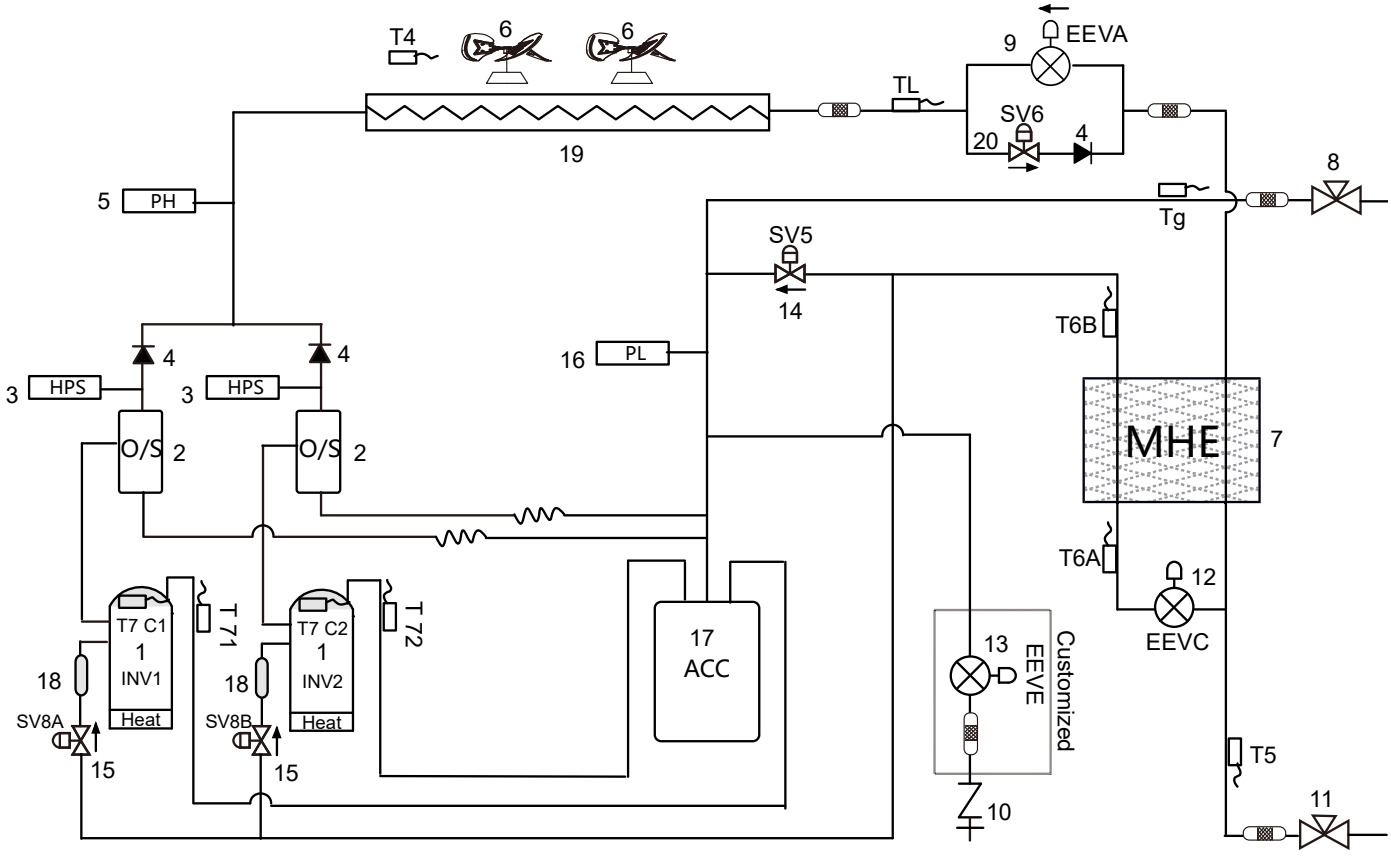
Figure 2-2.3: VMEM020(022)N7A piping diagram



Legend			
No.	**Parts name**	**No.**	**Parts name**
1	Compressor	15	Low pressure sensor
2	Oil separator	16	Gas-liquid separator
3	High pressure switch	17	Muffler
4	Check value	18	Heat exchanger
5	High pressure sensor	**Sensor Code**	**Description**
6	Fan	T4	Outdoor air temperature sensor
7	Microchannel heat exchanger	T5	Liquid pipe temperature sensor
8	Stop valve (liquid side)	T6A	Microchannel heat exchanger inlet pipe temperature sensor
9	Electronic expansion valve (EEVA)	T6B	Microchannel heat exchanger outlet pipe temperature sensor
10	Charge port	T71/T72	Suction temperature sensor
11	Electronic expansion valve (EEVC)	Tg	Gas pipe temperature sensor
12	Injection bypass solenoid valve (SV5)	TL	Heat exchanger liquid temperature sensor
13	Electronic expansion valve (Optional EEVE)	T7C1/T7C2	Compressor discharge temperature sensor
14	Stop valve (gas side)	Tb	Electric control box chamber temperature sensor

2.4 VMEM024(026-028)N7A piping diagram

Figure 2-4.4: VMEM024(026-028)N7A piping diagram



Legend			
No.	**Parts name**	**No.**	**Parts name**
1	Compressor	16	Low pressure sensor
2	Oil separator	17	Gas-liquid separator
3	High pressure switch	18	Muffler
4	Check value	19	Heat exchanger
5	High pressure sensor	20	Liquid bypass valve (SV6)
6	Fan	**Sensor Code**	**Description**
7	Microchannel heat exchanger	T4	Outdoor air temperature sensor
8	Stop valve (gas side)	T5	Liquid pipe temperature sensor
9	Electronic expansion valve (EEVA)	T6A	Microchannel heat exchanger inlet pipe temperature sensor
10	Charge port	T6B	Microchannel heat exchanger outlet pipe temperature sensor
11	Stop valve (liquid side)	T71/T72	Suction temperature sensor
12	Electronic expansion valve (EEVC)	Tg	Gas pipe temperature sensor
13	Electronic expansion valve (Optional EEVE)	TL	Heat exchanger liquid temperature sensor
14	Injection bypass solenoid valve (SV5)	T7C1/T7C2	Compressor discharge temperature sensor
15	Compressor vapor injection valve (SV8A/B)	Tb	Electric control box chamber temperature sensor

2.5 Key components:

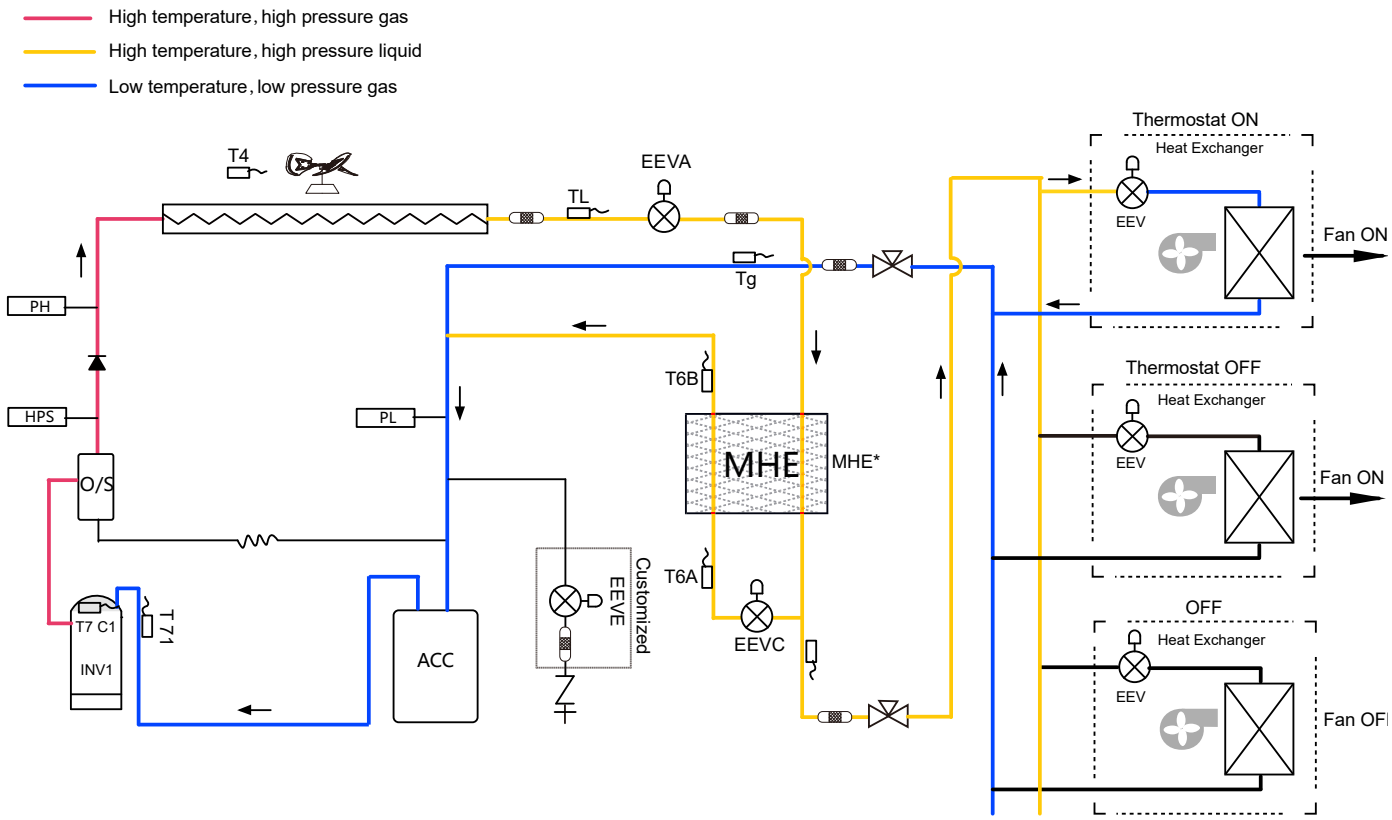
1. **Oil separator:**
   Separates oil from gas refrigerant pumped out of the compressor and quickly returns it to the compressor. Separation efficiency is up to 99%.
2. **Gas-liquid separator:**
   Separates liquid refrigerant from gas refrigerant, stores liquid refrigerant and oil to protect compressor from liquid hammering.
3. **Electronic expansion valve (EEVA):**
   Controls refrigerant flow and reduces refrigerant pressure.
4. **Microchannel heat exchanger:**
   In cooling mode, it can improve super-cooling degree and the super-cooled refrigerant can achieve better heat exchange in indoor side. Refrigerant volume in microchannel heat exchanger is controlled according to temperature different between microchannel heat exchanger inlet and outlet or the temperature different between discharge temperature and target discharge temperature.
5. **Solenoid valve SV5:**
   Controls the refrigerant from microchannel heat exchanger to gas-liquid separator.
6. **Solenoid valve SV8A/B:**
   Allows refrigerant from microchannel heat exchanger inject directly to the compressor. SV8A/B opens when compressor startup and closes when compressor stop.
7. **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.
8. **High/Low pressure sensor**
   Used to detect the system high/low pressure.

3 Refrigerant Flow Diagrams

3.1 VMEM007(009-010)N7A

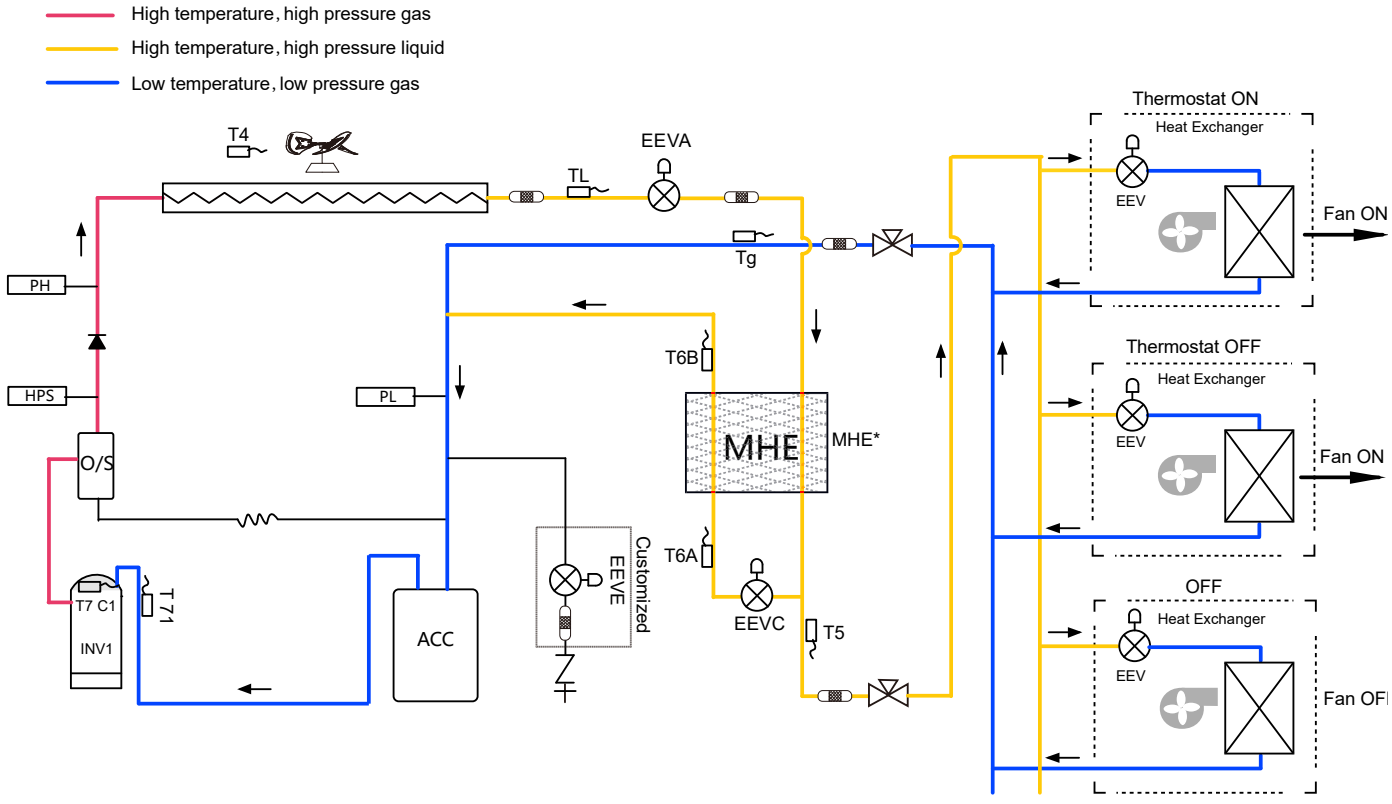
3.1.1 Cooling operation

Figure 2-3.1: VMEM007(009-010)N7A refrigerant flow during cooling operation



3.1.2 Oil return operation in cooling mode

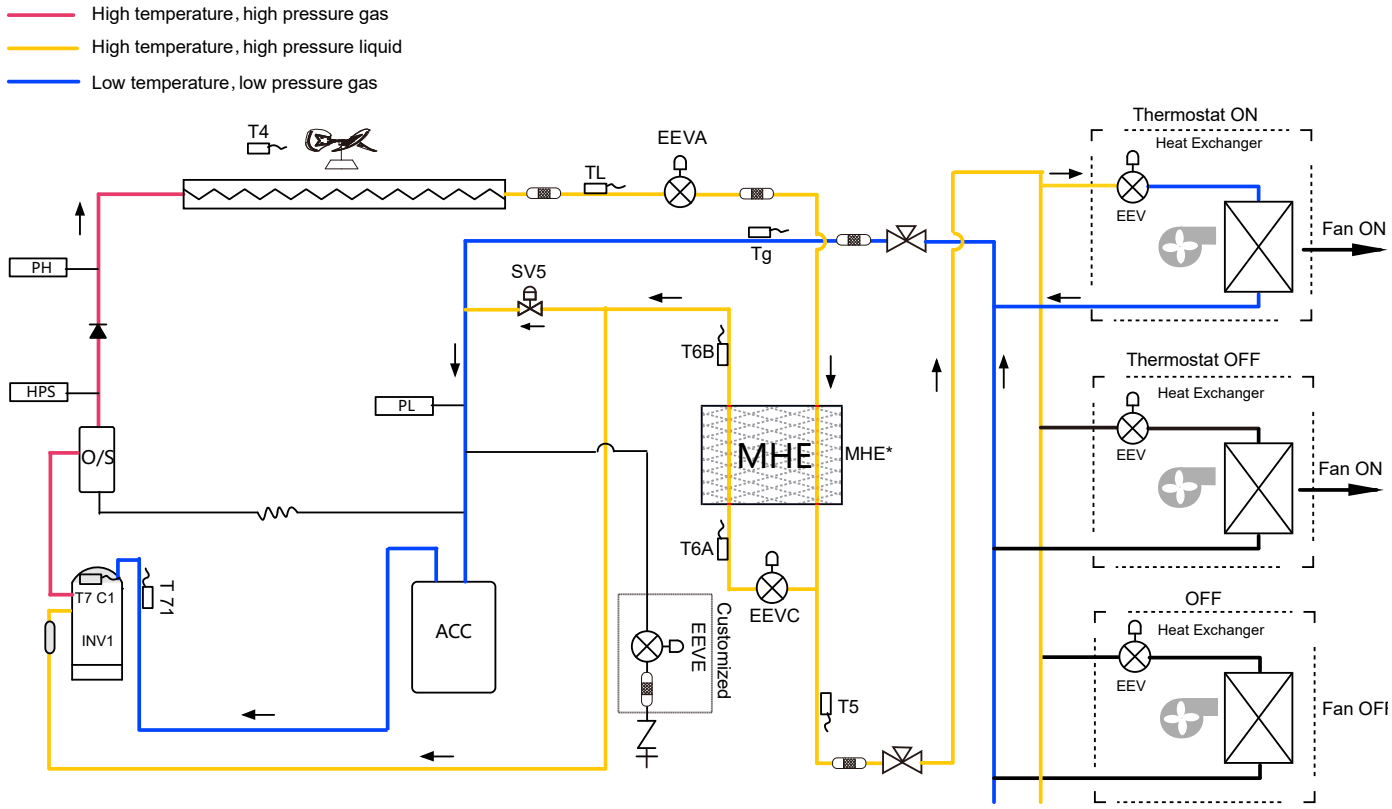
Figure 2-3.3: VMEM007(009-010)N7A refrigerant flow during oil return operation in cooling mode



3.2 VMEM014(016-018)N7A

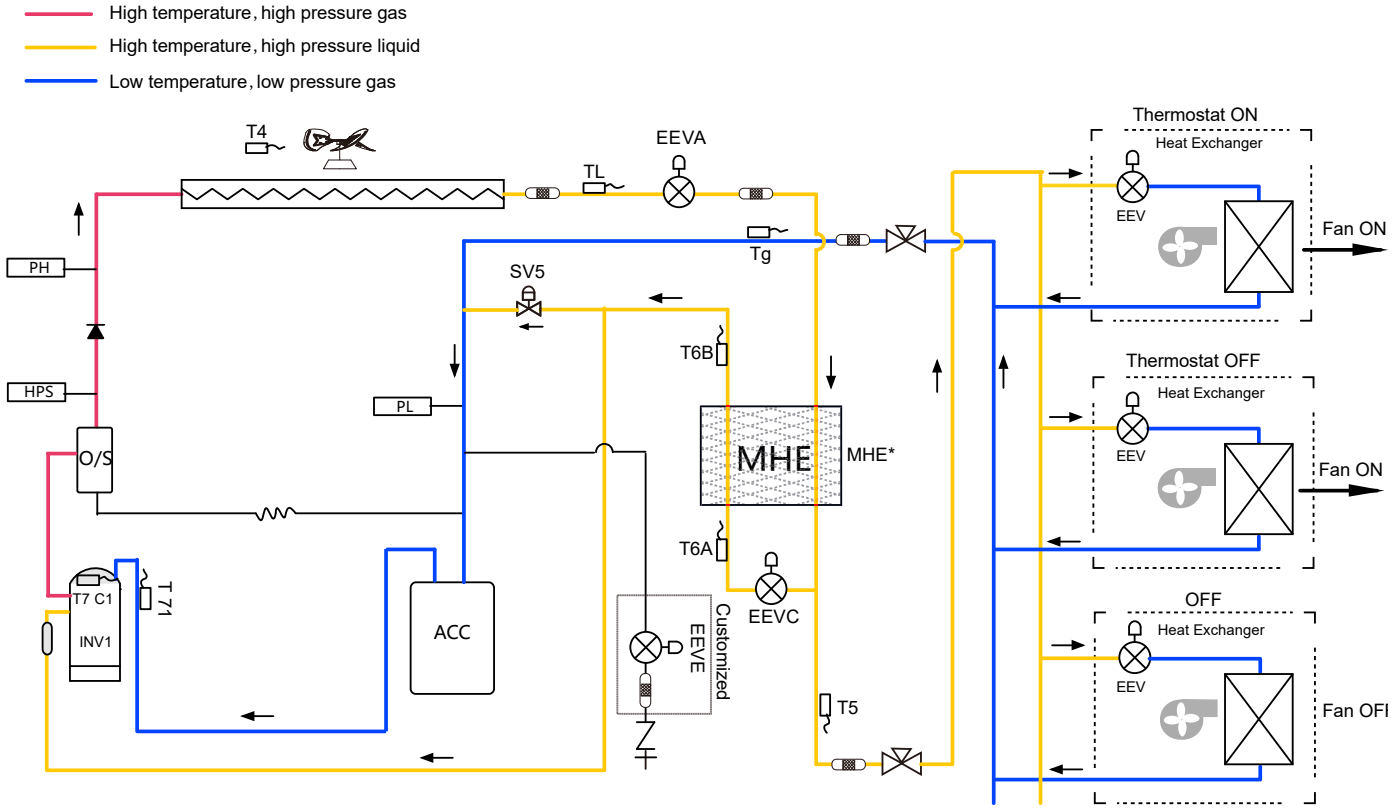
3.2.1 Cooling operation

Figure 2-3.6: VMEM014(016-018)N7A refrigerant flow during cooling operation



3.2.2 Oil return operation in cooling mode

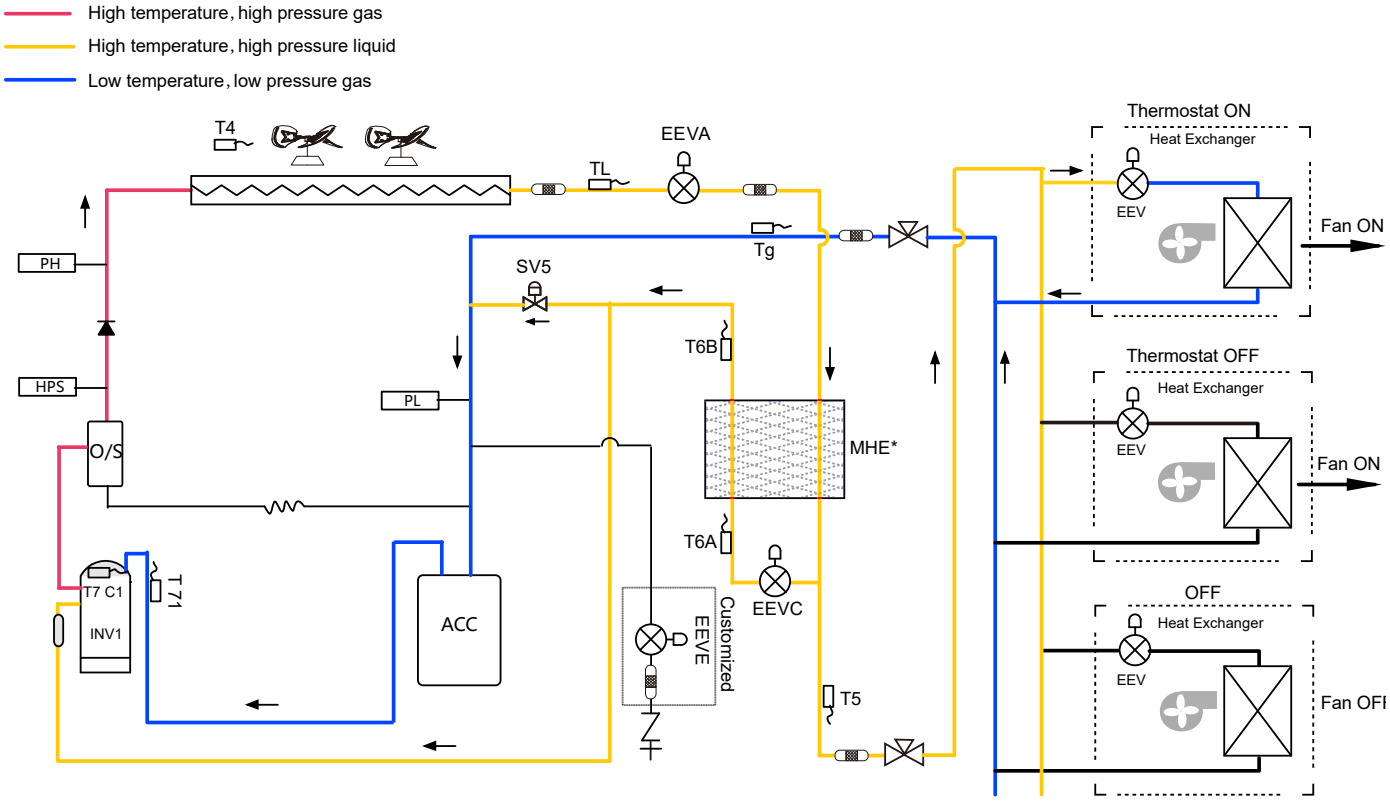
Figure 2-3.8: VMEM014(016-018)N7A refrigerant flow during oil return operation in cooling mode



3.3 VMEM020(022)N7A

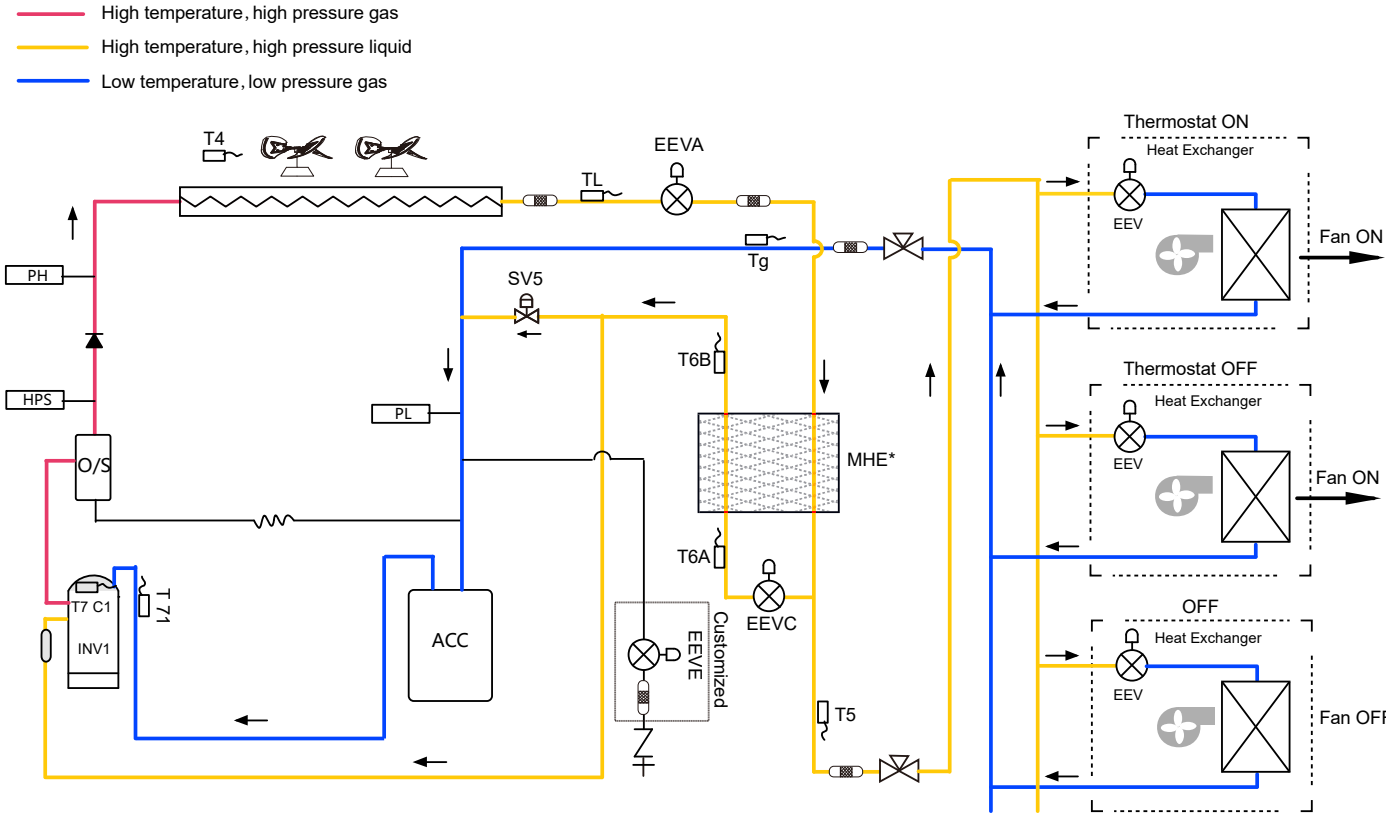
3.3.1 Cooling operation

Figure 2-3.11: VMEM020(022)N7A refrigerant flow during cooling operation



3.3.2 Oil return operation in cooling mode

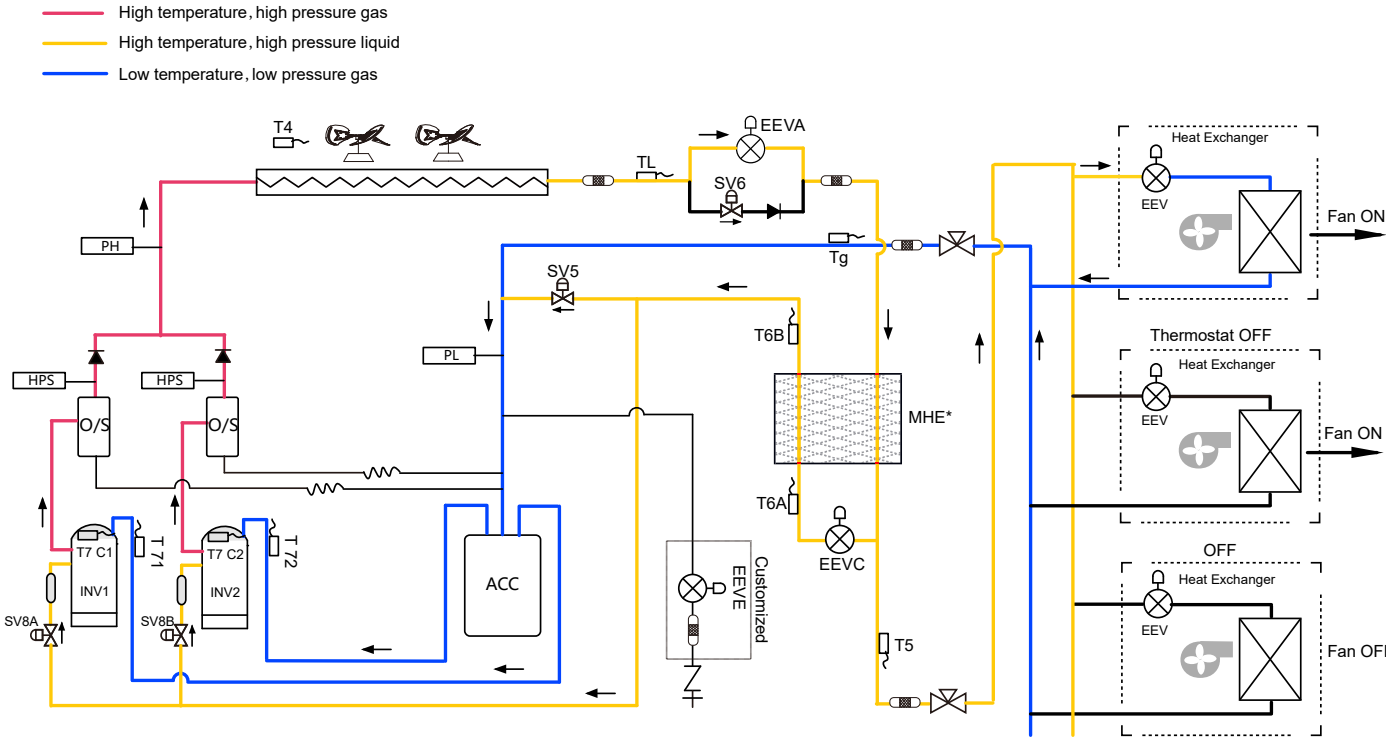
Figure 2-3.13: VMEM020(022)N7A refrigerant flow during oil return operation in cooling mode



3.4 VMEM024(026-028)N7A

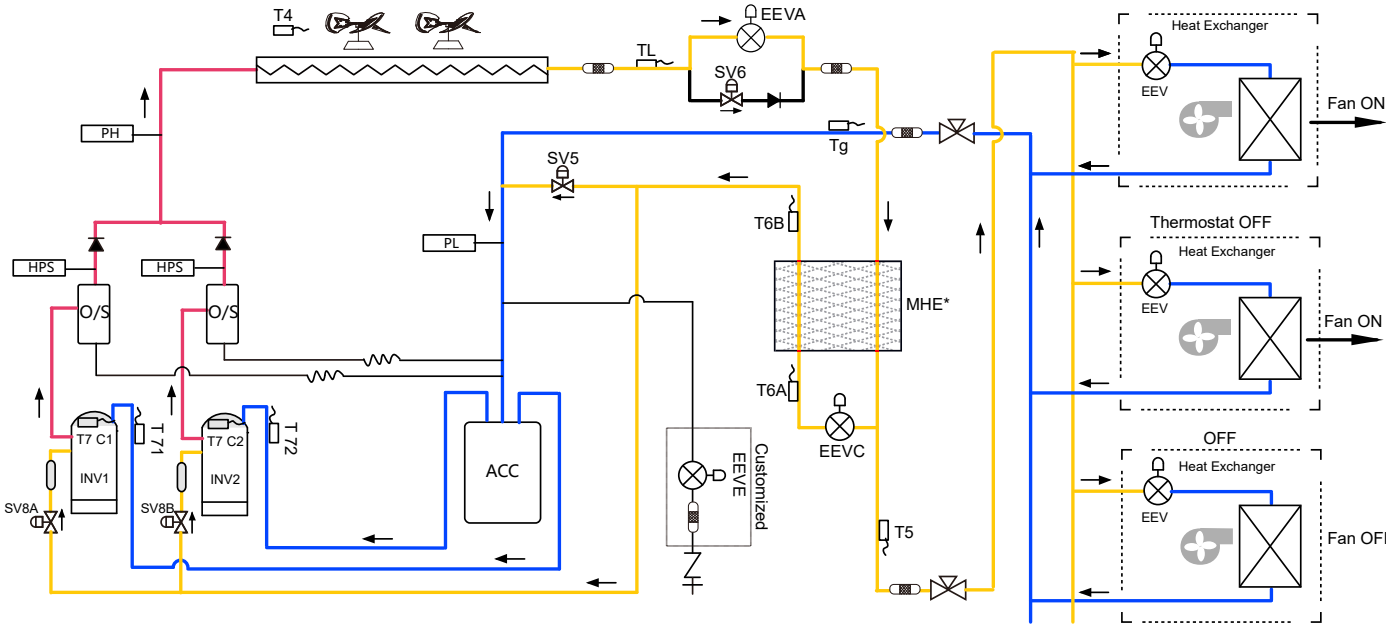
3.4.1 Cooling operation

Figure 2-3.11: VMEM024(026-028)N7A refrigerant flow during cooling operation



3.4.2 Oil return operation in cooling mode

Figure 2-3.13: VMEM024(026-028)N7A refrigerant flow during oil return operation in cooling mode

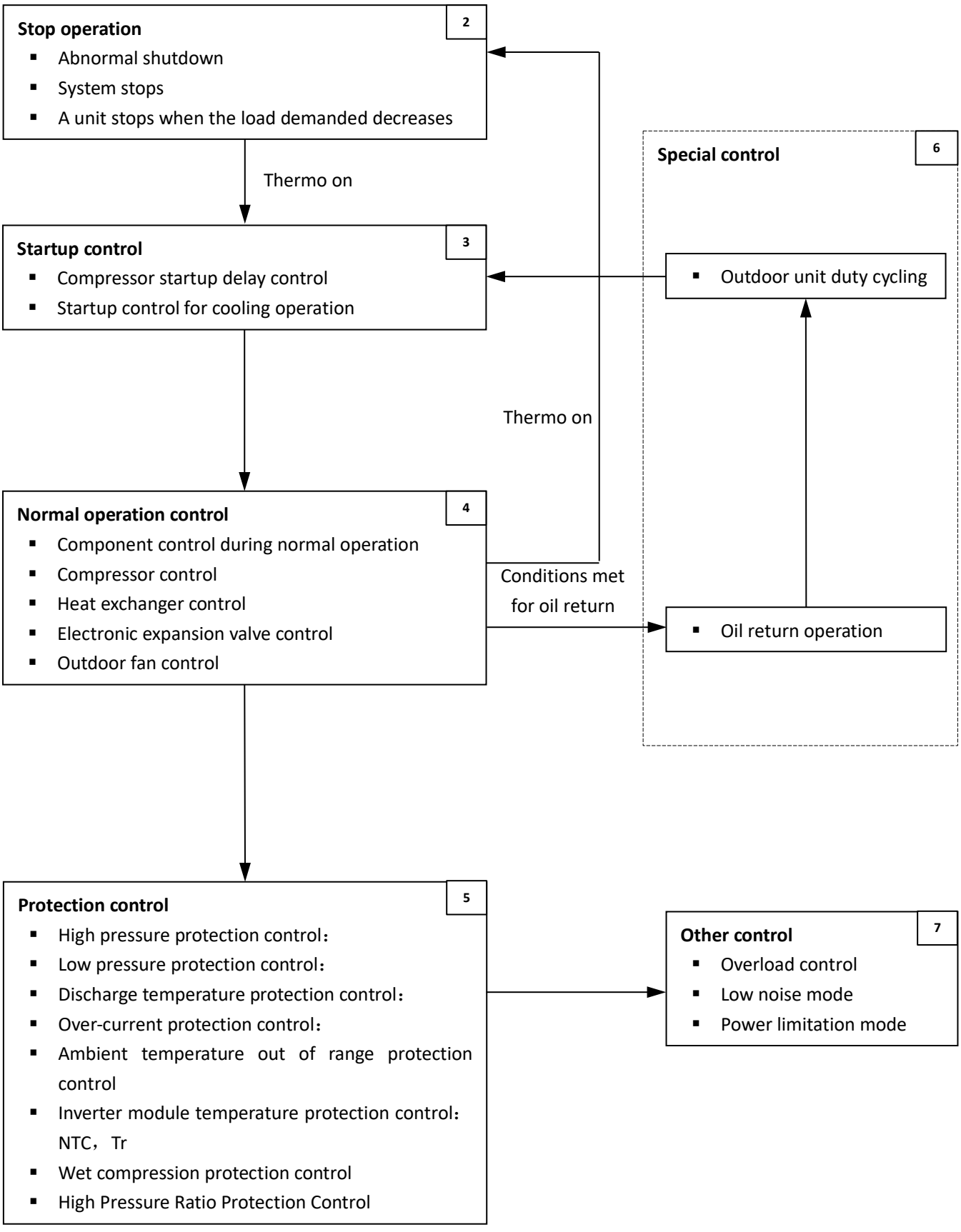


Part 3

Control

1 General Control Scheme Flowchart

Sections 2 to 7 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 cooling 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 compressor B[1]	INV2	OFF
	Inverter fan 1	FANA	Keeps for 2 min, then OFF
	Inverter fan 2[1]	FANB	
	Electronic expansion valve	EEVA	cooling mode: 480pls-valve: 52pls; 2880pls-valve: 120pls,
		EEVC	0pls
	Solenoid valve	SV5	ON for 140sec → OFF
		SV6[2]	OFF
		SV8A/ SV8B[1]	OFF

Notes:
1. Inverter fan 2 is only available for 22-028.
2. The Inverter compressor B, SV8B and SV6 are only available for 26-028.

3 Startup Control

3.1 Startup Sequence and Frequency Control in Combination Modules

During the start-up process, the control of the compressor and the heat exchange mode is uniformly judged by the master 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. After the main outdoor unit is weighted and evenly distributed to each slave unit according to the maximum frequency, each slave unit performs the displacement frequency and convert it to actual frequency.

When combinational modules are started in parallel, the master outdoor unit is started first, and each slave outdoor unit is started with a delay of 5s.

3.2 Compressor Startup Delay Control

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

In restart control (except in oil return 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.

3.3 Startup Control for Cooling Operation

Table 3-3.1: Component control during startup in cooling mode

<table>
<tr><th colspan="2" rowspan="2">Component</th><th rowspan="2">Wiring diagram label</th><th rowspan="2">Before startup[3]</th><th colspan="5">Startup control</th></tr>
<tr><th>STEP1</th><th>STEP2</th><th>STEP3</th><th>STEP4</th><th>STEP5</th></tr>
<tr><td rowspan="7">ODU</td><td>Inverter compressor A</td><td>INV1</td><td>0Hz</td><td>0Hz</td><td>0Hz</td><td>0Hz</td><td rowspan="2">Initial step for 30S, then+8Hz×Nodu / 10S. (Until it reaches (Pc-Pe)_min ≥ 0.4MPa)</td><td rowspan="2">Adjust according to the high pressure and low pressure etc.</td></tr>
<tr><td>Inverter compressor B[1]</td><td>INV2</td><td>0Hz</td><td>0Hz</td><td>0Hz</td><td>0Hz</td></tr>
<tr><td>Inverter fan 1</td><td>FANA</td><td rowspan="2">0 Step</td><td rowspan="2">If T4 temperature exceeds the operating range. The fan runs at 12 levels for 2min and stops for 2min , Then stops after 3 cycles at most</td><td rowspan="2">0 step</td><td rowspan="2">0 step</td><td rowspan="2">Start: 0 step,
Then: high pressure >3.0MPa: 16level</td><td rowspan="2">Keep Initial levels
According to T4 temperature</td></tr>
<tr><td>Inverter fan 2[1]</td><td>FANB</td></tr>
<tr><td rowspan="2">Electronic expansion valve</td><td>EEVA</td><td colspan="3">480pls-valve: 52pls;
3000pls-valve: 120pls,</td><td colspan="3">Compressor operation:
T4<5℃ 480pls-valve: 160pls; 3000pls-valve: 1000pls,
T4≥5℃ 480pls-valve: 320pls; 3000pls-valve: 2000pls
Compressor not operation, 0pls</td></tr>
<tr><td>EEVC</td><td>0pls</td><td colspan="3">0pls</td><td colspan="2">Compressor operation, 17pls→ +8pls per 20S based on high pressure or discharge temperature.
Compressor not operation, 0pls.</td></tr>
<tr><td rowspan="3">Solenoid valve</td><td>SV5</td><td>OFF</td><td colspan="5">ON</td></tr>
<tr><td>SV6[2]</td><td>OFF</td><td colspan="2">OFF</td><td colspan="2">ON</td></tr>
<tr><td>SV8A/SV8B[1]</td><td>OFF</td><td colspan="3">OFF</td><td colspan="2">Compressor operation, ON
Compressor not operation, OFF</td></tr>
<tr><td rowspan="2">IDU</td><td>Fan</td><td>Fan</td><td>0 step</td><td colspan="5">Setting speed by owners</td></tr>
<tr><td>Electronic expansion valve</td><td>EEV</td><td>0pls</td><td colspan="3">0pls</td><td colspan="2">Maintain 120pls for 2min</td></tr>
<tr><td colspan="3">Ending conditions</td><td>60S</td><td>T4≥-16 and T4≤65;</td><td>30s</td><td>30s</td><td>(Pc-Pe)_min≥0.4MPa or 60s</td><td>End if startup time arrives 5 min or the minimum superheat of discharge temperature ≥10°C or Tc_max > 50°C.</td></tr>
</table>

Notes:

1. Inverter fan 2 is only available for 22-028.
2. The Inverter compressor B, SV8B and SV6 are only available for 26-028.
3. The period for restarting after stopping is ≥3min when is necessary to equalize the pressure in the whole system.

4 Normal Operation Control

4.1 Component Control during Normal Operation

Table 3-4.1: Outdoor unit component control during normal operation

Component	Wiring diagram label	Cooling
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 compressor B[1]	COMP(B)	
Inverter fan 1	FANA	PI control
Inverter fan 2[1]	FANB	
Electronic expansion valve	EEVA	Sub-cooling control
	EEVC	Superheat control
Solenoid valve (unloading (in cooling))	SV5	Adjust to high pressure, Discharge temperature, Liquid Holdup Coefficient
Solenoid valve (Microchannel heat exchanger flow control)	SV6[2]	Sub-cooling control
Solenoid valve (inverter compressor A/B vapor injection)	SV8A/SV8B[1]	Compressor operation, ON Compressor not operation, OFF

Notes:

4. Inverter fan 2 is only available for 22-028.
5. The Inverter compressor B, SV8B and SV6 are only available for 26-028.

Table 3-4.2: Indoor unit component control during normal operation

Component		Cooling
Fan	Thermo ON unit	Remote controller setting
	Stopping unit	OFF
	Thermo OFF unit	Remote controller setting
Electronic expansion valve (EEV)	Thermo ON unit	Superheat control
	Stopping unit	0pls
	Thermo OFF unit	0pls

4.2 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 3-4.3: 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

Simultaneous cooling operation

It controls compressor capacity to adjust Te to target value (Tes).

4.3 Rotation of Compressors

In order to make operating time equal for each compressor of combination outdoor units, outdoor units are used in rotation. Figures 3-5.1 to 3-5.2 show the compressor rotation in systems with two and three units. The master unit and slave units 1 and 2 are shown from left to right in that order, and the circled numbers (①, ②, ③, ④, ⑤, ⑥) indicate the rotation sequence(The following rotation sequence is only for example, the actual rotation is based on the cumulative time of operation of the unit.)

Figure 3-4.1: Compressor priority and rotation – two outdoor units

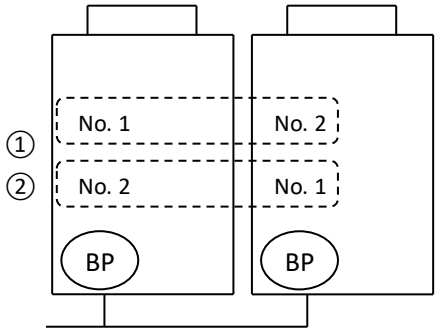
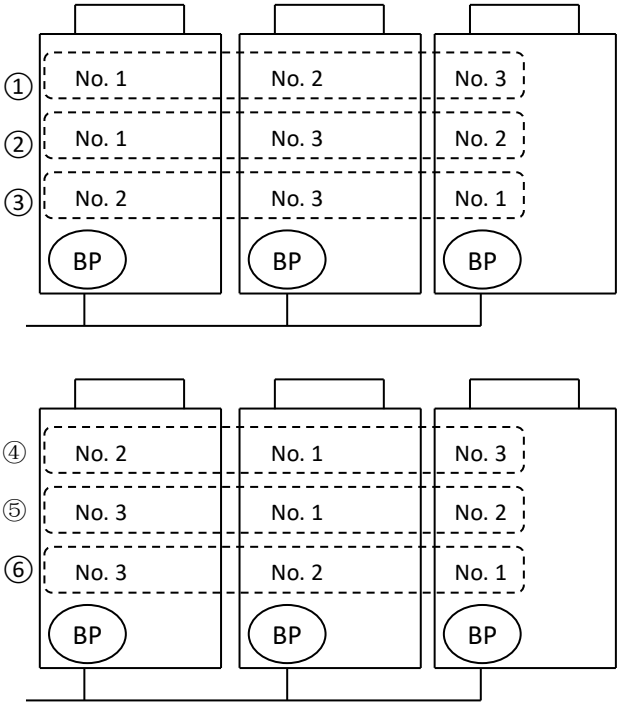


Figure 3-4.2: Compressor priority and rotation – three outdoor units



4.4 Heat Exchanger Control

The mode of the outdoor units is uniformly controlled by the master outdoor unit: the master outdoor unit check status of the outdoor unit heat exchanger and sends the calculation result to each slave unit, and each slave unit control their own fan and EEVA.

4.5 Electronic Expansion Valve Control

4.5.1EEVA control

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

4.5.1.1 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

4.5.2 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 – T6A

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

T6A: Microchannel heat exchanger inlet temperature.

T6B: Microchannel heat exchanger outlet temperature.

4.6 Outdoor Fan Control

The speed of the outdoor unit fans is adjusted in steps, as shown in Table 3-4.4

Table 3-4.4 Outdoor unit fan step

Fan speed index	Fan speed (rpm)		Note
	VMEM007-018N7A	VMEM020-028N7A	Maximum operation Fan speed
		FANA / FANB	Cooling
0	0	150/150	Stop operation or Startup control
1	120	150/150	
2	130	150/150	
3	140	150/150	
4	150	150/150	
5	170	150/150	
6	190	180/180	
7	250	250/250	
8	250	250/250	
9	250	270/270	
10	280	300/300	
11	310	330/330	
12	340	360/360	
13	370	390/390	
14	400	420/420	
15	430	460/460	
16	460	500/500	
17	500	540/540	
18	530	580/580	
19	560	620/620	
20	600	660/660	
21	630	710/710	
22	660	760/760	
23	700	810/810	**VMEM007-009N7A**
24	750	860/860	**VMEM010N7A**
25	800	910/910	
26	850	960/960	**VMEM012-022N7A**
27	890	1000/1000	
28	920	1040/1040	
29	960	1080/1080	
30	1020	1120/1120	**VMEM020N7A**
31	1050	1190/1090	**VMEM022N7A**
32	1090	1230/1130	
33	1130	1250/1150	**VMEM024-028N7A**
34	1170	1230/1230	
35	1210	1270/1270	
36	1210	1330/1330	
37	1210	1390/1390	
38	1210	1440/1440	
39	1210	1490/1490	
40	1210	1540/1540	
41	1210	1540/1540	
42	1210	1540/1540	
43	1210	1540/1540	
44	1210	1540/1540	
45	1210	1540/1540	
46	1210	1540/1540	
47	1210	1540/1540	
48	1210	1540/1540	
49	1210	1540/1540	

Table 3-4.5 Upper limit fan step in static pressure mode

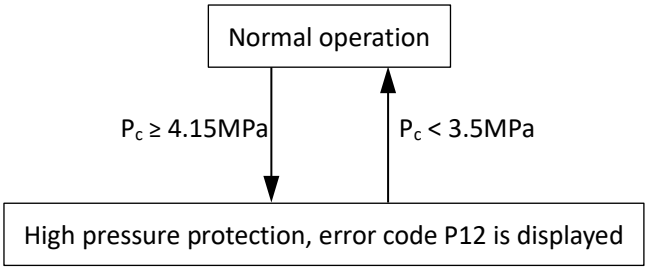
Static Pressure mode \ Model	007	009	010	012	014	016	018	020	022	024	026	028
0Pa(default)	23	23	24	26	26	26	26	30	31	33	33	33
20Pa	24	24	25	29	29	29	29	34	34	35	35	35
40Pa	25	25	26	31	31	31	31	35	35	36	36	36
60Pa	27	27	28	32	32	32	32	36	36	37	37	37
80Pa	28	28	29	33	33	33	33	37	37	38	38	38
100Pa	28	28	29	33	33	33	33	37	37	38	38	38
120Pa	30	30	31	34	34	34	34	39	39	40	40	40

5 Protection Control

5.1 High Pressure Protection Control

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

Figure 3-5.1: High pressure protection control



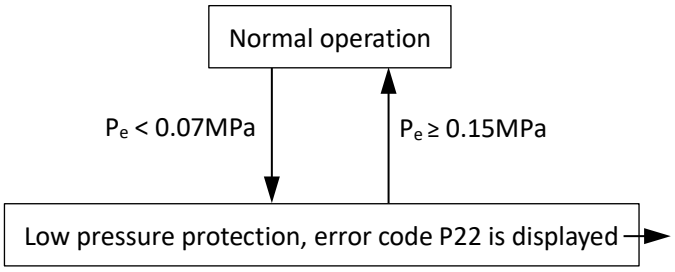
Notes:

1. P_c: Discharge pressure

5.2 Low Pressure Protection Control

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

Figure 3-5.2: Low pressure protection control in cooling operation



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

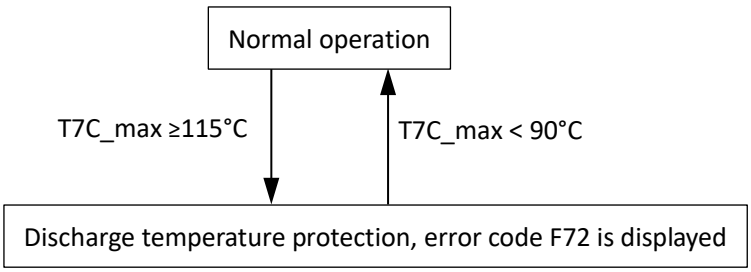
Notes:

1. P_e : Suction pressure

5.3 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 3-5.3: Discharge temperature protection control



Notes:

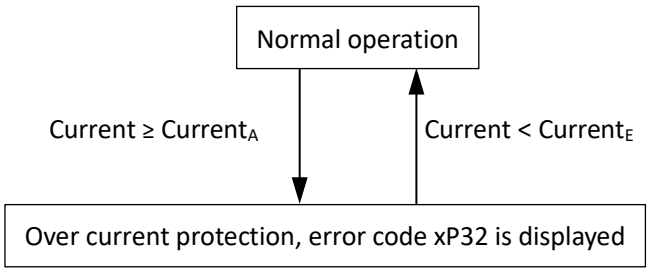
1. T7C_max: Max temperature of compressor discharge temperatures

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.

5.4 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 3-5.4: Over-current protection control

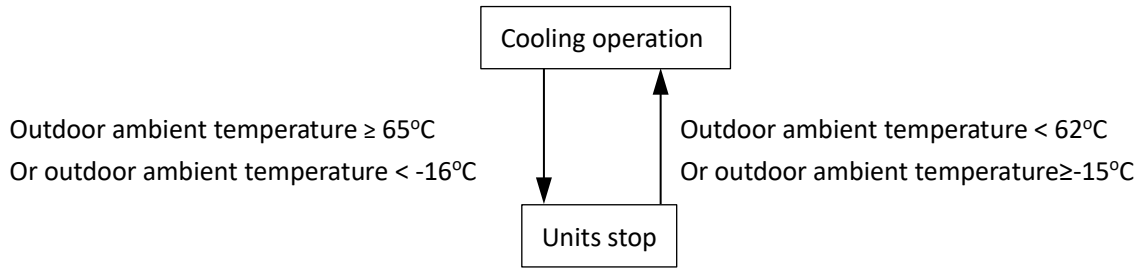


Model	007	009	010	012	014	016	018	020	022	024		028		028	
	INVA	INVA	INVA	INVA	INVA	INVA	INVA	INVA	INVA	INVA	INVB	INVA	INVB	INVA	INVB
Current$_A$	34	34	34	34	35	41.5	51.5	51.5	51.5	34	34	34	34	35	35
Current$_E$	26.5	26.5	26.5	26.5	26.5	34.5	43	43	43	26.5	26.5	26.5	26.5	26.5	26.5

5.5 Ambient temperature out of range protection control

When the outdoor ambient temperature rises above 65°C or outdoor ambient temperature drops below -16°C, cooling mode is disabled to protect the compressor.

Figure 3-5.5: Disable cooling control



Notes:

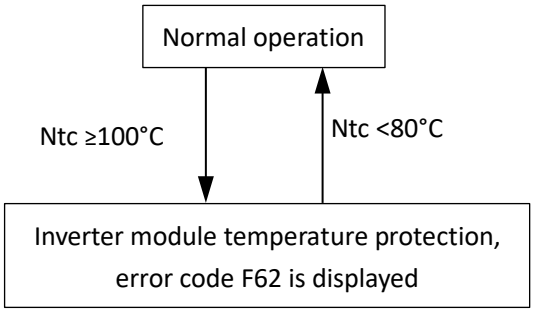
1. If the indoor unit operates in cooling mode below -5 ° C, the temperature of the indoor unit's air outlet may be lower than 0 degrees.

5.6 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.

5.6.1 Error code F62

Figure 3-5.6: Inverter module temperature protection control



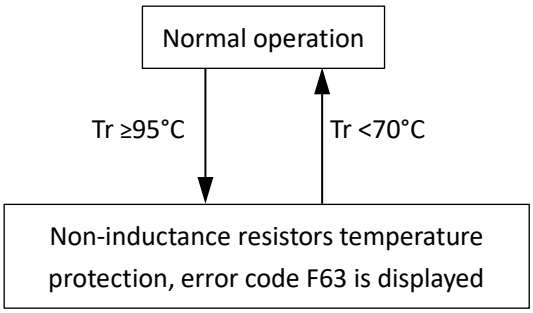
Notes:

1. Ntc: Inverter module temperature

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.

5.6.2 Error code F63

Figure 3-5.7: Non-inductance resistors temperature protection control

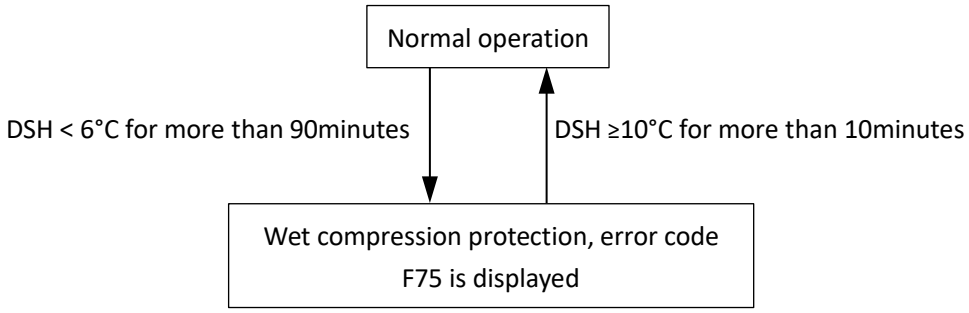


Notes:
1. Tr: Non-inductance resistors temperature

5.7 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 3-5.8: Wet compression protection control

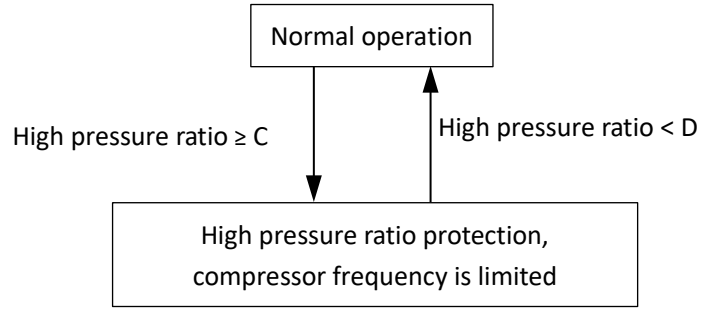


Notes:
1. DSH: Superheat of discharge temperature

5.8 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 3-5.9: High pressure ratio protection control



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

C/D value		C	D
Menu setting【31】=1,3,4		9.0	8.5
Else	T4≥-13℃	8.0	7.5
	T4＜-15℃	8.5	8.0

6 Special Control

6.1 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”.

6.1.1 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 3-6.1 and Tables 3-6.2 show component control during oil return operation in cooling mode.

Table 3-6.1: Outdoor unit control during oil return operation in cooling mode

Component		Wiring diagram label	Cooling oil return control			
			STEP1	STEP2	STEP3	STEP5
ODU	Inverter compressor A	INV1	PI control	PI control, the minimum step is as follows: 007 27Hz 009 39Hz 12-012 52Hz 16-022 69Hz 024 108Hz 28-34HP 108Hz 36-54HP 133Hz 56-66HP 158Hz 68-82HP 226Hz 84-90HP 262Hz	PI control, initial ODU number is decided	PI control
	Inverter compressor B[1]	INV2				
	Inverter fan 1	FANA	PI control			
	Inverter fan 2[1]	FANB				
	Electronic expansion valve	EEVA	PI control	2880pls	PI control	
		EEVC	PI control	OFF, then 17 pls	17 pls	EEVC0_oilreturn
	Solenoid valve	SV5	ON			
		SV6[2]	ON			
		SV8A/SV8B[1]	compressor ON:ON otherwise: OFF			
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.

Notes:

1. Inverter fan 2 is only available for 22-028.
2. The Inverter compressor B, SV8B and SV6 are only available for 26-028.

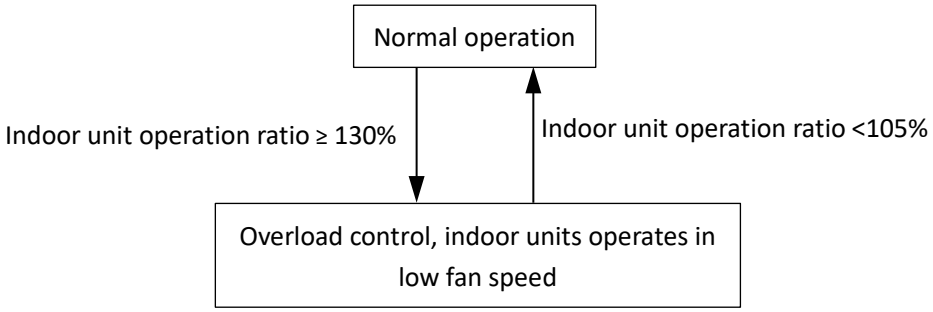
Cooling indoor unit		500P EEV
FAN	Thermo ON unit	Keep the previous fan speed
	Thermo OFF unit	
	Stop or Fan	
Electronic expansion valve (EEV)	Thermo ON unit	Superheat control
	Thermo OFF unit	80pls
	Stop or Fan	80pls

7 Other Control

7.1 Overload control

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

Figure 3-7.1: Overload control



Notes:

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

7.2 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).

7.3 Low Noise Mode

Low noise mode is used to decrease the noise produced by outdoor units. There are 14 kinds of low noise mode: Silent mode1~ Silent mode14. When low noise mode activating, both the fan step and compressor are limited.

Table 3-7.1: Low noise mode

ODU		Silent mode 1		Silent mode 2		Silent mode 3		Silent mode 4		Silent mode 5		Silent mode 6		Silent mode 7	
		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	Max. Fan step	Max. frequency step	Max. Fan step	Max. frequency step
007	Cooling	23	88	22	86	20	86	19	80	17	70	15	60	12	52
009	Cooling	23	98	22	94	20	86	19	80	17	70	15	60	12	52
010	Cooling	23	104	22	94	20	86	19	80	17	70	15	60	12	52
012	Cooling	25	112	24	104	23	100	22	94	20	90	19	82	17	76
014	Cooling	25	112	24	104	23	100	22	94	20	90	19	82	17	76
1007	Cooling	25	112	24	104	23	100	22	92	20	88	19	81	17	76
018	Cooling	25	110	24	102	23	90	22	84	20	78	19	74	17	62
020	Cooling	29	110	28	102	26	90	25	84	23	78	22	74	21	62
022	Cooling	29	110	28	102	26	90	25	84	23	78	22	74	21	62
024	Cooling	29	104/104	28	100/100	26	94/94	25	90/90	23	82/82	22	76/76	21	72/72
2007	Cooling	29	104/104	28	100/100	26	94/94	25	90/90	23	82/82	22	76/76	21	72/72
028	Cooling	29	104/104	28	100/100	26	94/94	25	90/90	23	82/82	22	76/76	21	72/72

Table 3-7.1: Low noise mode (continued)

ODU		Silent mode 8		Silent mode 9		Silent mode 10		Silent mode 11		Silent mode 12		Silent mode 13		Silent mode 14	
		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	Max. Fan step	Max. frequency step	Max. Fan step	Max. frequency step
007	Cooling	11	46	10	42	10	36	10	32	10	26	10	20	10	16
009	Cooling	11	46	10	42	10	36	10	32	10	26	10	20	10	16
010	Cooling	11	46	10	42	10	36	10	32	10	26	10	20	10	16
012	Cooling	16	70	16	62	13	50	11	44	9	40	6	32	3	26
014	Cooling	16	70	16	62	13	50	11	44	9	40	6	32	3	26
1007	Cooling	16	70	16	62	14	50	13	44	13	40	11	32	11	26
018	Cooling	16	56	16	52	14	46	13	38	13	34	11	26	11	20
020	Cooling	20	56	18	52	16	46	12	38	10	34	8	26	6	20
022	Cooling	20	56	18	52	16	46	12	38	10	34	8	26	6	20
024	Cooling	20	62/62	18	52/52	16	48/48	12	44/44	10	36/36	8	32/0	6	20/0
2007	Cooling	20	62/62	18	52/52	16	48/48	12	44/44	10	36/36	8	32/0	6	20/0
028	Cooling	20	62/62	18	52/52	16	48/48	12	44/44	10	36/36	8	32/0	6	20/0

7.4 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 3-7.2: 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

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

Note: The installation personnel should read this chapter.

2. Digital display and button settings

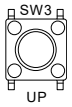
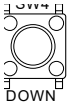
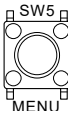
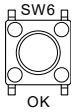
2.1 Digital display output

Table 4-2.1: Digital display output

Outdoor unit state		Parameters displayed on DSP1	Parameters displayed on DSP2
Digital display			
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

Name	Function	Button
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.	

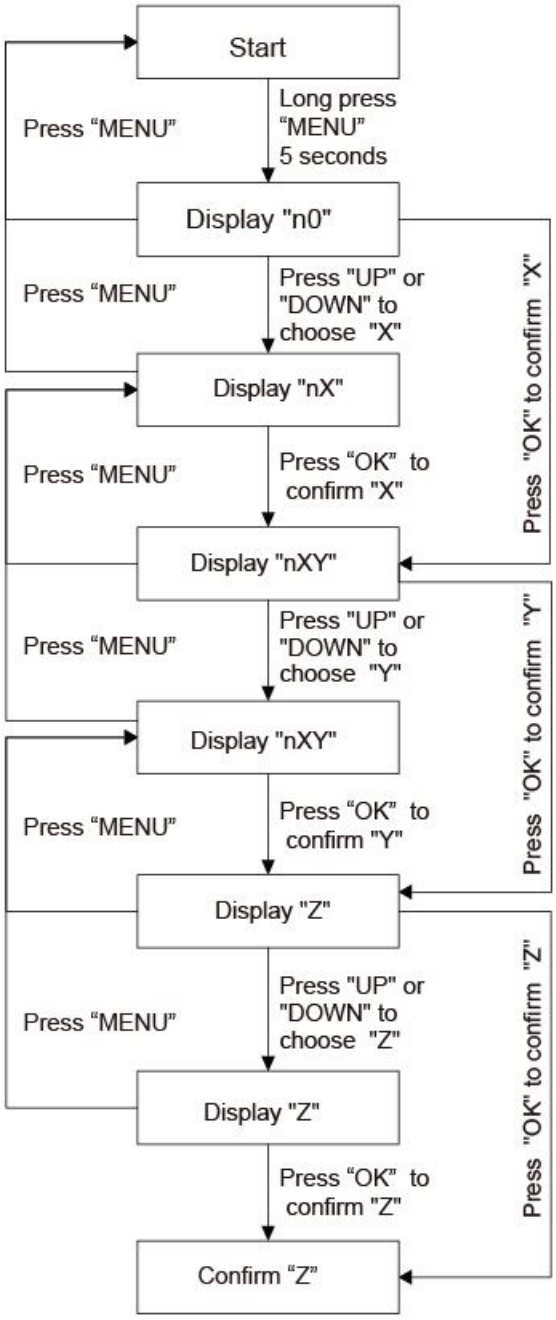
2.3 Menu mode

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 "n1".
2. Press SW3 / SW4 "UP / DOWN" button to select the first level menu "n1", "n2", "n3", "n4"or "nb".
3. Press SW6 "OK" button to enter specified first level menu, for example, enter "n4" mode.
4. Press SW3 / SW4 "UP / DOWN" button to select the second level menu from "n41" to "n47".
5. Press SW6 "OK" button to enter specified second level menu, for example, enter "n43" 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.

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)	0	-	Shield C26 and C28 error in 3 hours	-
	1[1] (System test)	0	Cooling Test	
		1	Reserved	
		2	Test running	
		4	System refrigerant quantity detection	
	2[1] (Refrigerant recovery)	0	Recycle Refrigerant to outdoor unit	
		1	Recycle Refrigerant to indoor unit	
		2	Balance system refrigerant	
	3[1] (Refrigerant charge)	0	Manual refrigerant charge	
		1	Auto refrigerant charge(Customized)	
	4	-	Exit special mode (System test; Refrigerant recovery; Refrigerant charge; Vacuum mode)	
	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	Reserved	
		4	In response to cooling mode only	
		5	Reserved	
		6	Reserved	
		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	
		6	Silent mode 6	
		7	Silent mode 7	

Notes:

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

Table continued on next page …

Table 4-2.3 Menu mode function(continue)

First level menu	Second level menu	Specified menu mode	Description	Default
n2 (Mode setting)	1 (Silent mode)	8	Silent mode 8	-
		9	Silent mode 9	
		A	Silent mode 10	
		b	Silent mode 11	
		C	Silent mode 12	
		d	Silent mode 13	
		E	Silent mode 14	
	2 (static pressure)	0	0Pa static pressure	√
		1	20Pa static pressure	-
		2	40Pa static pressure(Customized)	
		3	60Pa static pressure(Customized)	
		4	80Pa static pressure(Customized)	
		5	100Pa static pressure(Customized)	
		6	120Pa static pressure(Customized)	
	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	-
	6[1] (Auto snow-blowing)	0	Auto snow-blowing function unavailable	√
		1	Auto snow-blowing function available, mode 1	-
		2	Auto snow-blowing function available, mode 2	
	7[2] (Auto dust-clean)	0	Auto dust-clean function unavailable	√
		1	Auto dust-clean function available	-
	8 (Dry contact)	0	Dry contact closing effective	√
		1	Dry contact opening effective	-
	9[3] (Automatic priority mode)	0	Mode Switching temperature:10℃	√
		1	Mode Switching temperature:16℃	-
		2	Mode Switching temperature:21℃	

Notes:

1. When the outdoor unit is in standby, the fan will turn on to clear the snow on the fan blade, and the effect of mode 2 is better than that of mode 1.
2. When the outdoor unit is in standby, the fan will start to remove the dust of heat exchanger.
3. For details of mode, refer to *2.4 Special mode introduction*
4. 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 continued on next page …

Table 4-2.3 Menu mode function(continue)

First level menu	Second level menu	Specified menu mode	Description	Default
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	60m level difference between indoor unit and outdoor unit	
		4	80m level difference between indoor unit and outdoor unit	
		5	100m level difference between indoor unit and outdoor unit	
		6	110m level difference between indoor unit and outdoor unit	
	7 (Ambient temperature)	0	Enable Internal ambient temperature sensor(T4)	√
		1	Enable External ambient temperature sensor(T10-Optional)	-
	8 (Chassis electric heating)	0	Chassis electric heating function unavailable	-
		1	Chassis electric heating function available(Customized)	√
	E	0	Reserved	-
		1	Reserved	√
n4 (address)	0	-	Set address of Outdoor unit	-
	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	
n5[2] (Backup)	0 (Fan, compressor and outdoor unit)	0	Fan, compressor and outdoor unit backup unavailable	-
		1	Fan, compressor and outdoor unit backup available[3]	√
	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)	√

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.
2. Only one compressor backup, one fan backup or one sensor backup can be started at the same time
3. For the combined system, if the compressor is damaged, start the outdoor unit backup function directly.

Table continued on next page …

Table 4-2.3 Menu mode function(continue)

First level menu	Second level menu	Specified menu mode	Description	Default
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	0	Reserved	√
		1	Reserved	-
n9	1 (Rotation)	0	Rotation function unavailable	-
		1	Compressor Rotation function available	-
		2	Outdoor unit Rotation function available	√
		3	Compressor + Outdoor unit Rotation function available	-
	5	-	Release central controller emergency stop statue	-
	7	0	Digital electricity meter	√
		1	Pulse electricity meter	-
nc[1] (Dry contact function)	0	0	Dry contact 1 function selection (Force cooling only)	-
		1	Dry contact 1 function selection (Reserved)	
		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 (Reserved)	
		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 (Reserved)	
		4	Dry contact 3 function selection (Refrigerant leakage signal)	

Notes:

1. 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.

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

2.4.2.1. Cooling Test

After the outdoor unit enter this mode, all indoor units in the system are forced to run cooling 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.

2.4.2.2. Test running

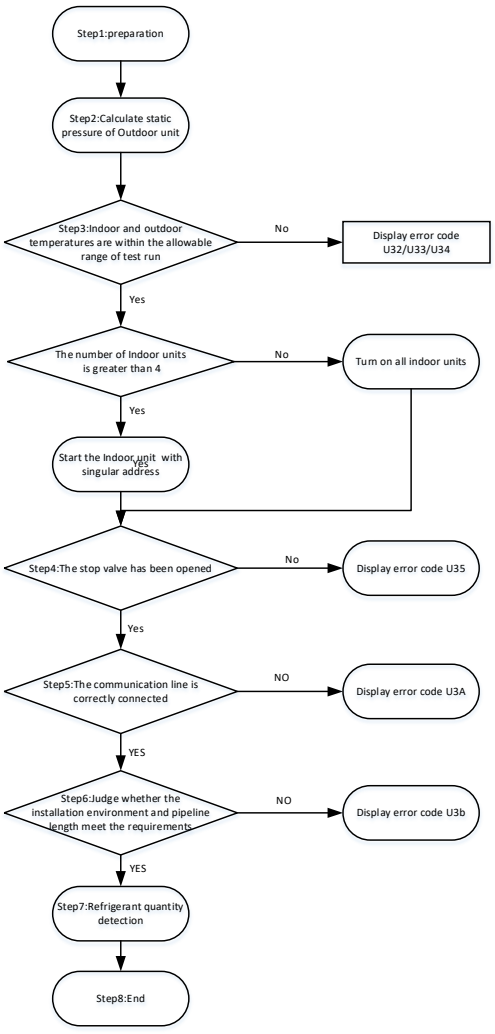
This operation checks and determines the following items:

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

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.

2.4.2.3. System refrigerant quantity detection

After entering this mode, the system will automatically run and finally output the diagnostic results of the system refrigerant quantity.

Diagnostic results:

a) Normal: Digital display “d34”

b) Significantly excessive: Digital display “d32”

c) Excessive: Digital display “d33”

d) Insufficient: Digital display “d35”

e) Significantly insufficient: Digital display “d36”

f) No result- The system operation conditions do not meet the functional requirements: Digital display “d31”

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.

2.4.4 Refrigerant charge

a) Manual refrigerant charge:

(1) Without customized refrigerant charging valve (EEVE)

Charge the refrigerant through the stop valve

(2) With customized refrigerant charging valve (EEVE)

Menu setting [n1-3-0], refrigerant charging valve (EEVE) will open, you can charge the refrigerant through EEVE.

b) Auto refrigerant charge :

The refrigerant charging valve (EEVE) must be customized to use this function.

Menu setting [n1-3-1], refrigerant charging valve (EEVE) will open, the system will automatically charge refrigerant through EEVE. When refrigerant charging is completed, the digital displays “End” and EEVE will close.

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	Master unit: 0; slave units: 1, 2 255 represents invalid address
1.--	Outdoor unit capacity	Actual value = value displayed (HP)
2.--	Number of outdoor units	$1\sim4^{(1)}$
3.--	Number of indoor units (set by master unit)	$1\sim64^{(1)}$
4.--	Total capacity of outdoor unit	Only available for master unit $^{(2)}$
5.--	Target frequency of this ODU	Displacement frequency$^{(3)}$
6.--	Target frequency of ODU system	Target frequency= value displayed ×10
7.--	Inverter compressor A actual frequency(Hz)	Actual value = value displayed
8.--	Inverter compressor B actual frequency(Hz)	Actual value = value displayed
9.--	Operating mode	0: OFF
		2: Cooling
		3: Reserved
		5: Reserved
		6: Reserved
10.--	Fan A speed index (rpm)	Actual value = value displayed
11.--	Fan B speed index (rpm)	Actual value = value displayed
12.--	Indoor heat exchanger pipe (**T2**) average temperature (°C)	Actual value = value displayed$^{(1)}$
13.--	Indoor heat exchanger pipe (**T2B**) average temperature (°C)	Actual value = value displayed$^{(1)}$
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.--	Microchannel heat exchanger inlet pipe (**T6A**) temperature (°C)	Actual value = value displayed
18.--	Microchannel heat exchanger outlet pipe (**T6B**) temperature (°C)	Actual value = value displayed
19.--	Inverter compressor A discharge (**T7C1**)temperature (°C)	Actual value = value displayed
20.--	Inverter compressor B discharge (**T7C2**) temperature (°C)	Actual value = value displayed
21.--	Inverter compressor A suction (**T71**) temperature (°C)	Actual value = value displayed
22.--	Inverter compressor B suction (**T72**) temperature (°C)	Actual value = value displayed
23.--	(**T8**) temperature (°C)	Actual value = value displayed
24.--	Inverter module heatsink (**Ntc**)temperature (°C)	Actual value = value displayed
25.--	Reserved for heat recovery unit's **T9** temperature (°C)	Actual value = value displayed
26.--	Outdoor Heat exchanger liquid (**TL**)temperature (°C)	Actual value = value displayed

Table continued on next page …

Table 4-3.1 system check list(continue):

DSP1 content	Parameters displayed on DSP2	Remarks
27.--	Discharge superheat degree (°C)	Actual value = value displayed
28.--	Primary current(A)	Actual value = value displayed /10
29.--	Inverter compressor A current (A)	Actual value = value displayed /10
30.--	Inverter compressor A current (A)	Actual value = value displayed /10
31.--	EEVA position	Actual value = value displayed × 24
32.--	EEVB position	Actual value = value displayed × 24
33.--	EEVC position	Actual value = value displayed × 4
34.--	EEVE position	Actual value = value displayed × 4
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(1)
38.--	Number of indoor units operating	Actual value = value displayed(1)
39.--	Heat exchanger status(Outdoor unit)	【0】OFF
		【1】C1:Cooling mode
		【2】D1: Disabled(Cooling mode)(4)
		【3】D2:Compressor OFF(Cooling mode)
		【4】E1:Heating mode
		【5】F1: Disabled(Heating mode)(4)
		【6】F2:Compressor OFF(Heating mode)
40.--	Special state	【0】No special mode
		【1】Oil return
		【2】Reserved
		【3】Start-up
		【4】Stop
		【5】Quick check
		【6】Self-cleaning
41.--	Silent mode	0~14 ,14 represents the most silent
42.--	Static pressure mode	【0】0Pa
		【1】20Pa
		【2】40Pa
		【3】60Pa
		【4】80Pa
		【5】100Pa
		【6】120Pa
43.--	Tes(°C)	Actual value = value displayed(5)
44.--	Tcs(°C)	Actual value = value displayed(5)
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.--	Reserved	
49.--	Capacity of cooling mode IDUs (HP)	Actual value = value displayed(1)

Table 4-3.1 system check list(continue):

DSP1 content	Parameters displayed on DSP2	Remarks
50.--	Reserved	Actual value = value displayed(1)
51.--	Refrigerant volume judgment(1)	【0】:No result
		【1】:Significantly insufficient
		【2】:insufficient
		【3】:Normal
		【4】:excessive
		【5】:Significantly excessive
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	
-- --	--	End

Notes:

(1) Only available for master unit (Combined system).

(2) Only available for master unit (Combined system), 0 displayed on slave units has no sense.

(3) Need to convert to current compressor output volume, example: compressor output volume is 70, Target frequency =Actual frequency * 70 / 60.

(4) Only available for Heat recovery unit

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

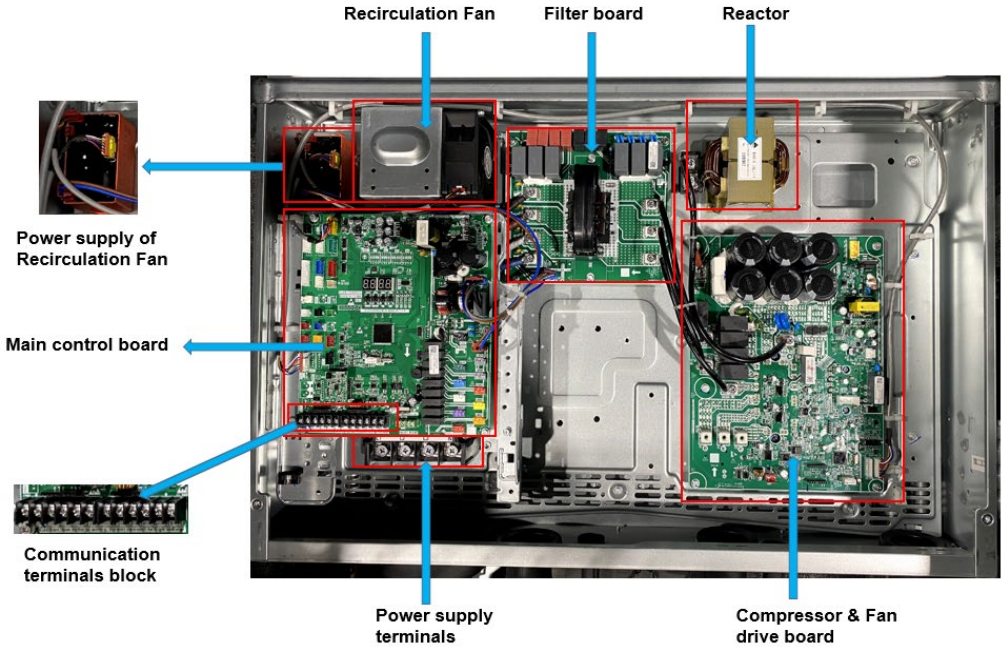
Part 5

Electrical Components and Wiring Diagrams

1. Outdoor Unit Electric Control Box Layout

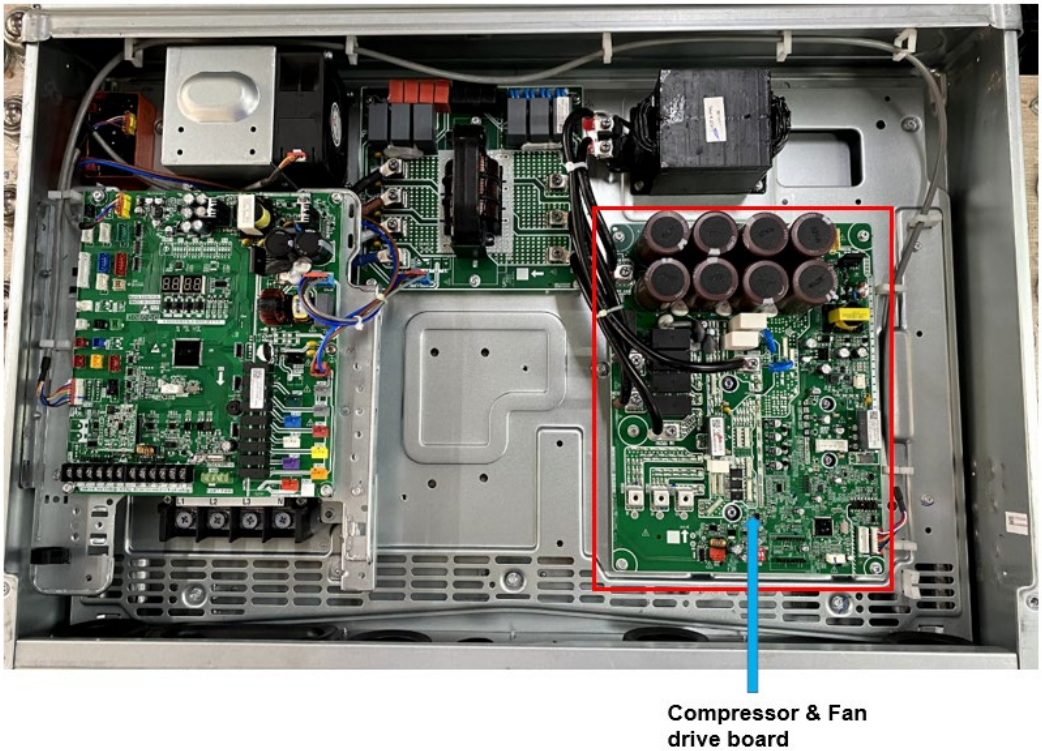
1.1 VMEM007(009-010)N7A electric control box

Figure 5-1.1: VMEM007(009-010)N7A electric control box



1.2 VMEM018N7A electric control box

Figure 5-1.2: VMEM018N7A electric control box

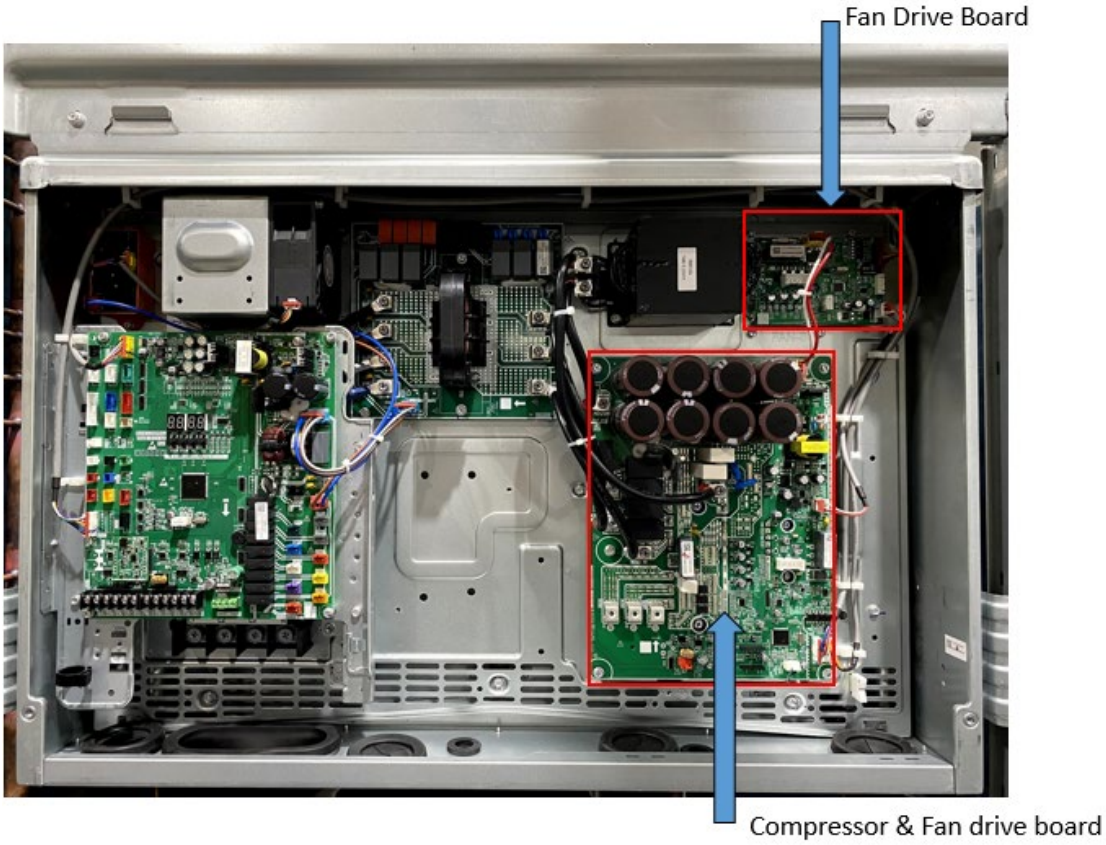


Notes:

The differences between electric control box of VMEM018N7A and VMEM007(009-010)N7A are shown in the *Figure 5-1.2*. Others are the same as VMEM007(009-010)N7A electric control box.

1.3 VMEM020(022)N7A electric control box

Figure 5-1.3: VMEM020(022)N7A electric control box

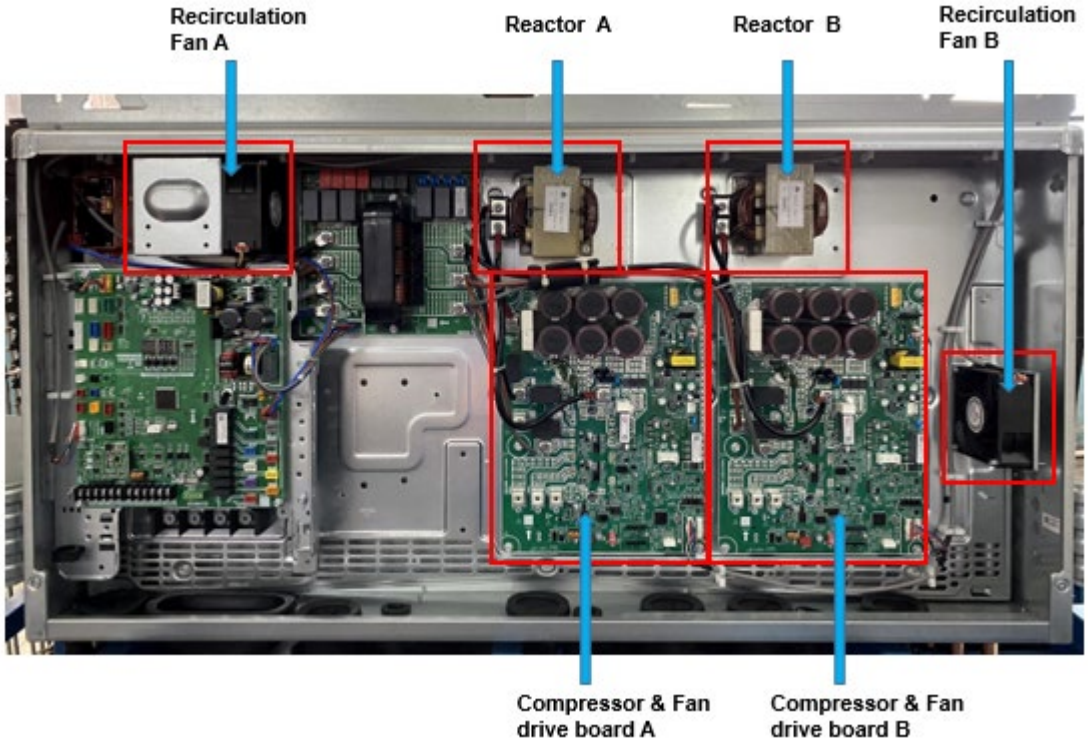


Notes:

The differences between electric control box of VMEM020(022)N7A and VMEM007(009-010)N7A are shown in the *Figure 5-1.3*. Others are the same as VMEM007(009-010)N7A electric control box.

1.4 VMEM024-028N7A electric control box

Figure 5-1.4: VMEM024-028N7A electric control box



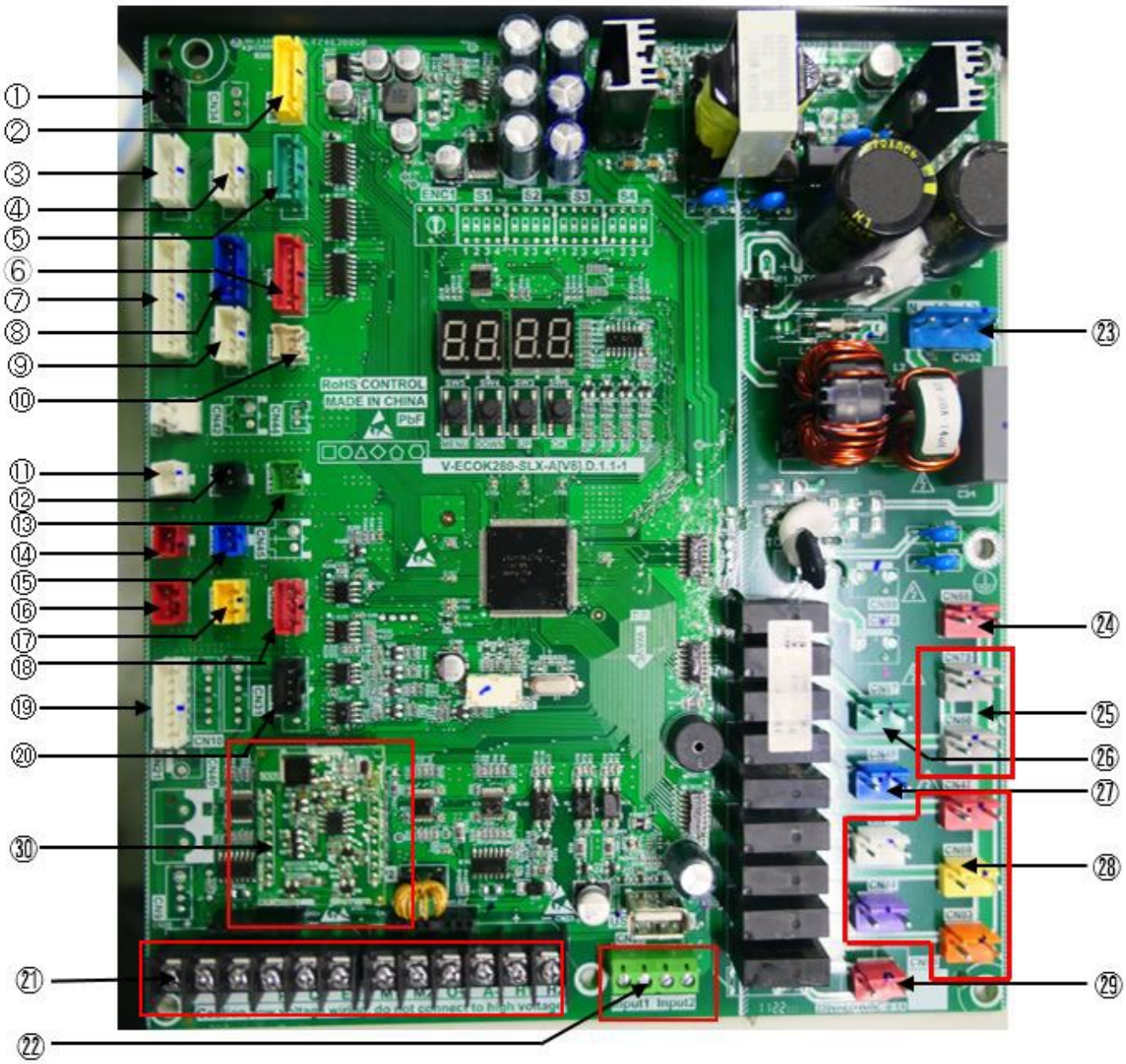
Notes:

The differences between electric control box of VMEM024-028N7A and VMEM007(009-010)N7A are shown in the *Figure 5-1.4*. Others are the same as VMEM007(009-010)N7A electric control box.

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

.

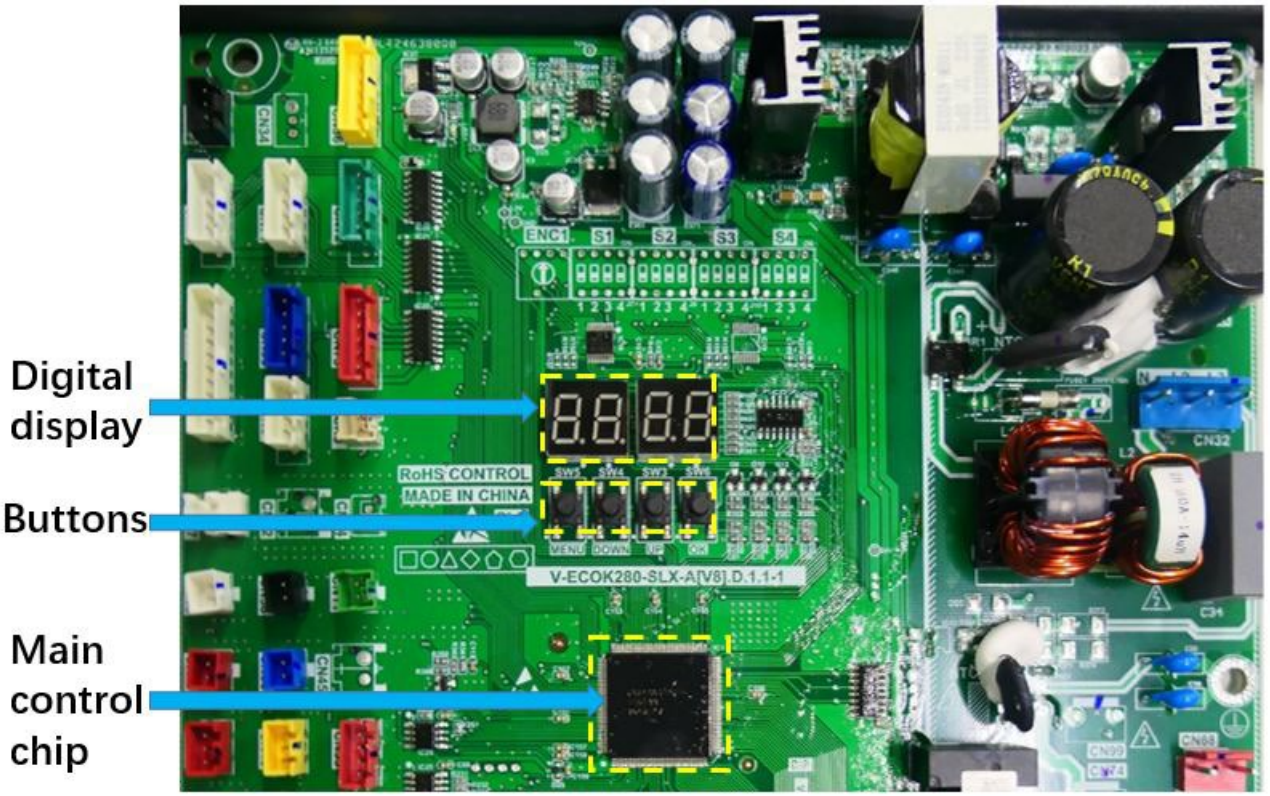
Table 5-2.1: Main Control Board port

Label in Figure 5-2.1	Port code	Content	Port voltage
1	CN82	Reserved	5Vdc
2	CN36	Recirculation fan control port	3.3Vdc
3	CN70	EEVA drive port	12Vdc
4	CN71	EEVB drive port(Reserved)	12Vdc
5	CN72	EEVC drive port	12Vdc
6	CN73	EEVE drive port	12Vdc
7	CN4	Microchannel heat exchanger inlet temperature sensor(**T6A**) /Liquid pipe inlet temperature sensor(**T5**) /Microchannel heat exchanger outlet temperature sensor(**T6B**) /Suction temperature sensor 1 (**T71**) /Discharge temperature sensor 1 (**T7C1**) (**From top to bottom**)	3.3Vdc
8	CN35	Reserved	3.3Vdc
9	CN8	Reserved	3.3Vdc
10	CN3	Condenser outlet temperature sensor(TL)	3.3Vdc
11	CN16	Gas pipe temperature sensor(**Tg**)	3.3Vdc
12	CN38	Discharge temperature sensor 2 (**T7C2**)	3.3Vdc
13	CN11	Electric control box chamber temperature sensor(**Tb**)	3.3Vdc
14	CN37	Suction temperature sensor 2 (**T72**)	3.3Vdc
15	CN30	Outdoor ambient temperature sensor(**T4**)	3.3Vdc
16	CN41	Low pressure sensor	5Vdc
17	CN40	High pressure sensor	5Vdc
18	CN33	Expanded communication port	12Vdc
19	CN26	Communication port to Compressor & Fan Drive Board	5Vdc+12Vdc
20	CN14	Communication port to data transfer module	12Vdc
21	CN22/CN23	Communication port	0-5V DC (varying)
22	CN28	Emergency stop port	0V or Open
23	CN32	Power input of main board	176Vac~264Vac
24	CN68	Recirculation fan power	176Vac~264Vac
25	CN75/CN66	Power supply to compressor crankcase heater	176Vac~264Vac
26	CN67	Solenoid valve drive ports CN67-SV4(Reserved)	176Vac~264Vac
27	CN48	Reserved	176Vac~264Vac
28	CN47 /CN49/CN69 /CN84/CN83	Solenoid valve drive ports CN47-SV6 ; CN49-SV5 ; CN69-Reserved ; CN84-SV8A; CN83-SV8B	176Vac~264Vac
29	CN93	Dry contact output	0V or Open
30	-	HyperLink board	-

2.2 Outdoor unit main Control Board components

2.2.1 Layout

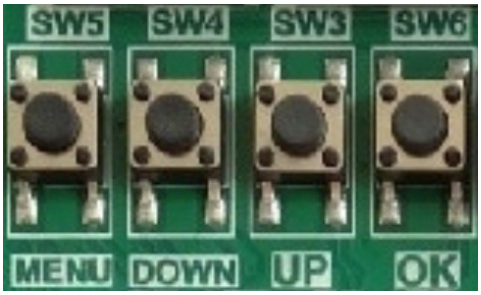
Figure 5-2.2: Outdoor unit main Control Board components



2.2.2 Function of buttons SW3 to SW6

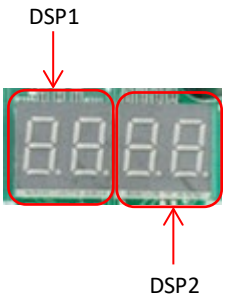
Table 5-2.2: Function of buttons SW3 to SW6

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 5-2.4: 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

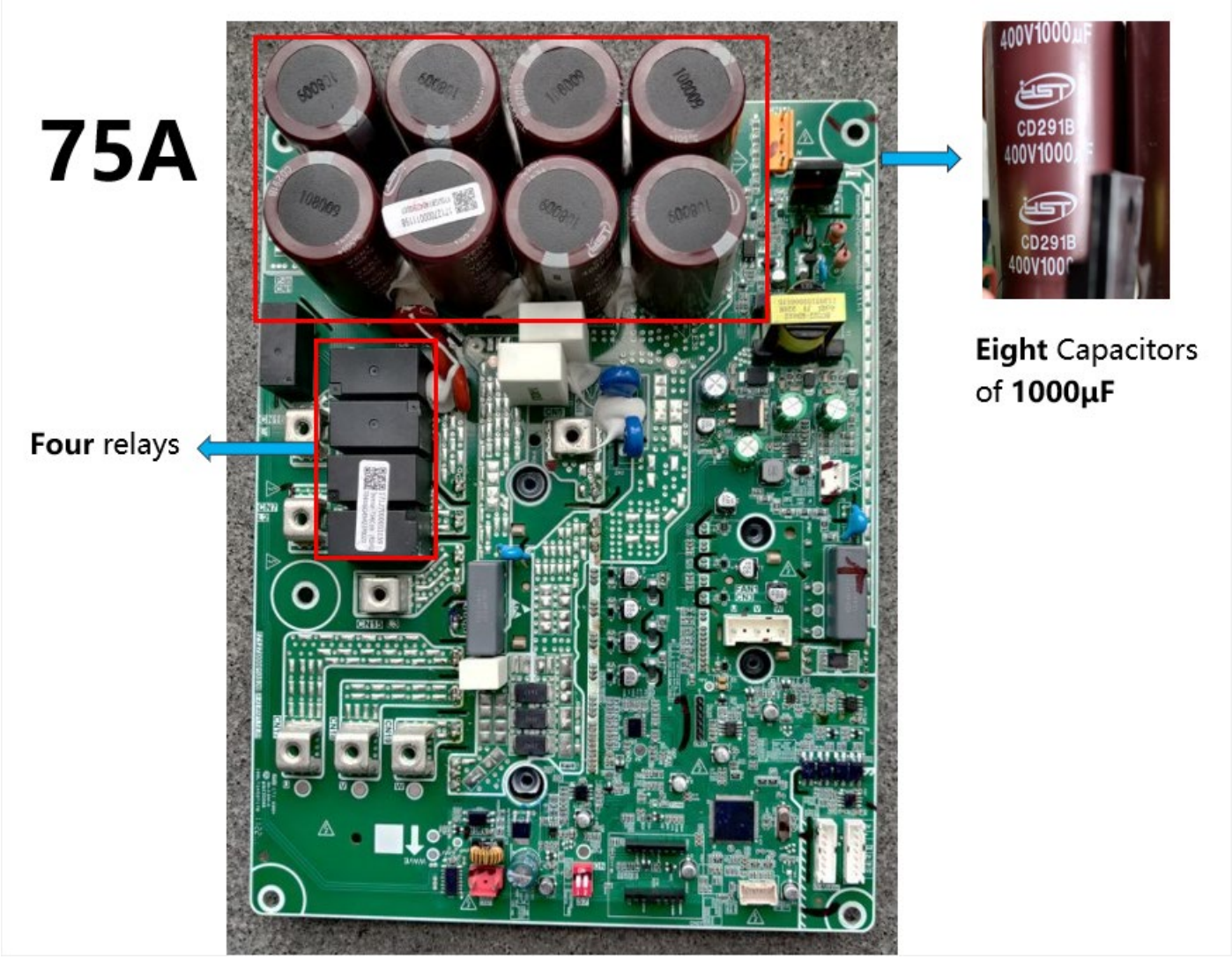
3.1 Corresponding table of Compressor & Fan drive board and outdoor units

Table 5-3.1: Corresponding table of Compressor & Fan drive board and outdoor units

Compressor & Fan drive board model	Outdoor unit series	Model
35A	VMEM	8-16HP;VMEM024-028N7A
50A	VMEM	18HP
75A	VMEM	20-24HP

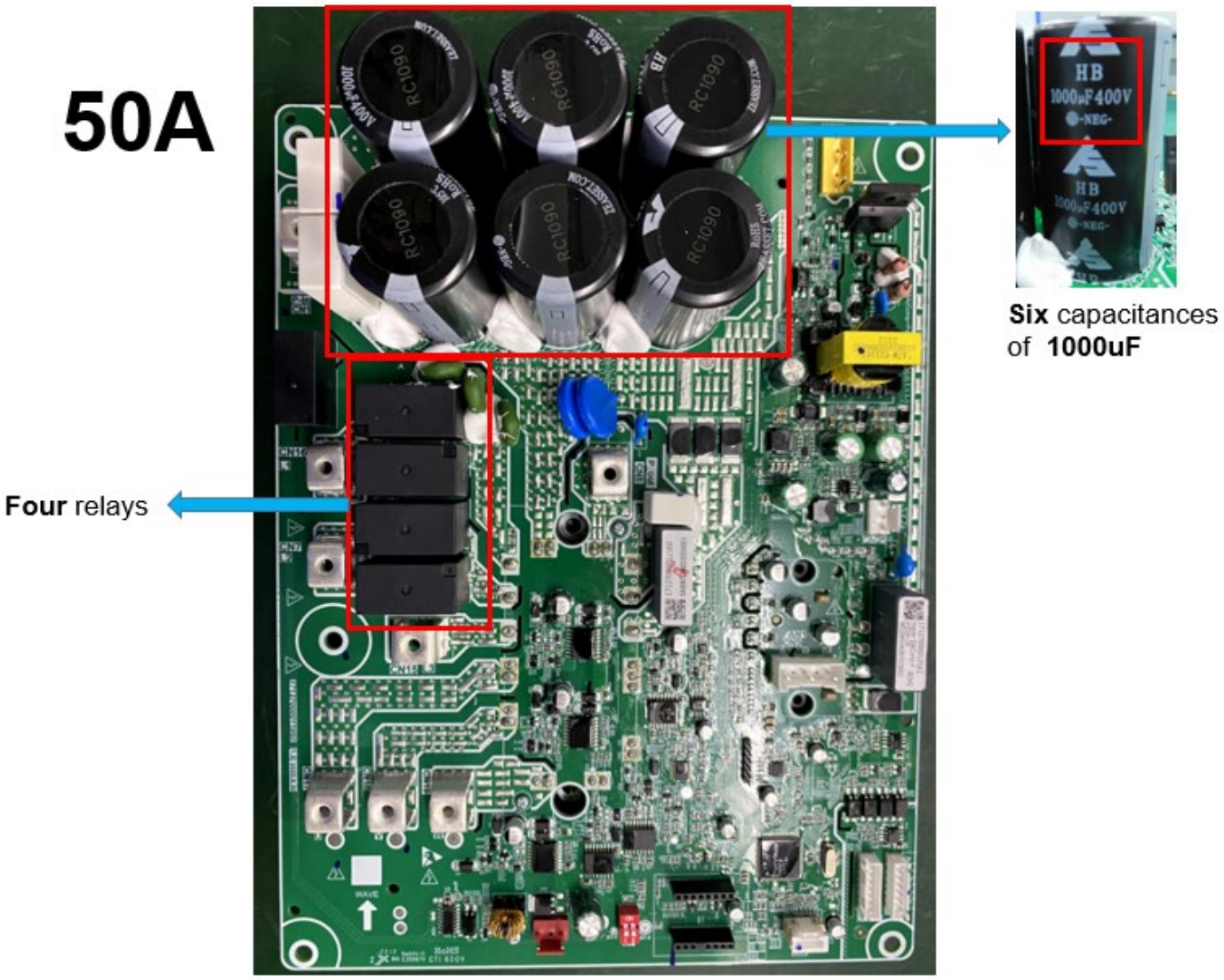
3.2 Compressor & Fan drive board of 75A

Figure 5-3.1: Compressor & Fan drive board of 75A



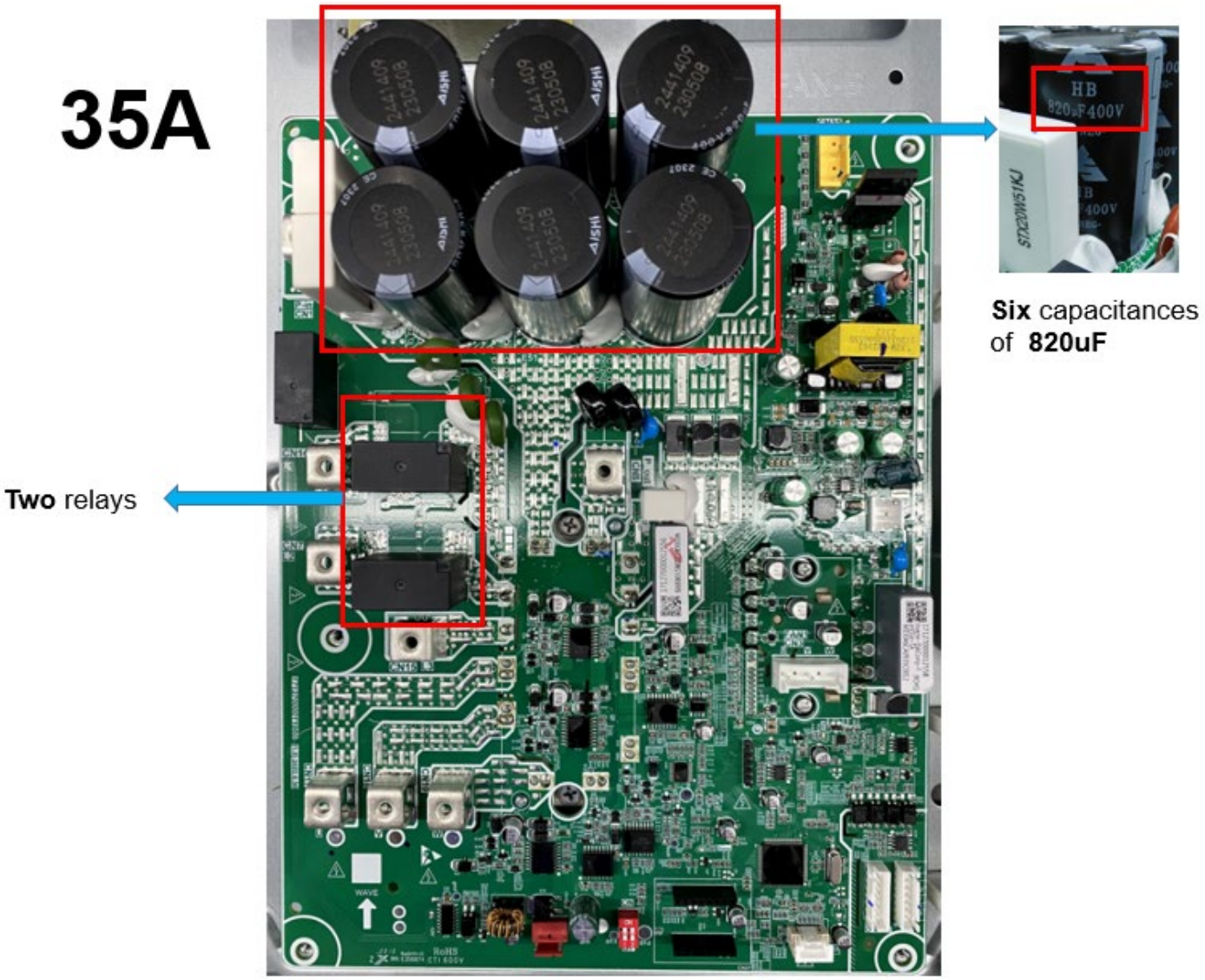
3.3 Compressor & Fan drive board of 50A

Figure 5-3.2: Compressor & Fan drive board of 50A



3.4 Compressor & Fan drive board of 35A

Figure 5-3.3: Compressor & Fan drive board of 35A



3.5 Compressor & Fan drive board ports

Figure 5-3.4: Compressor & Fan drive board ports

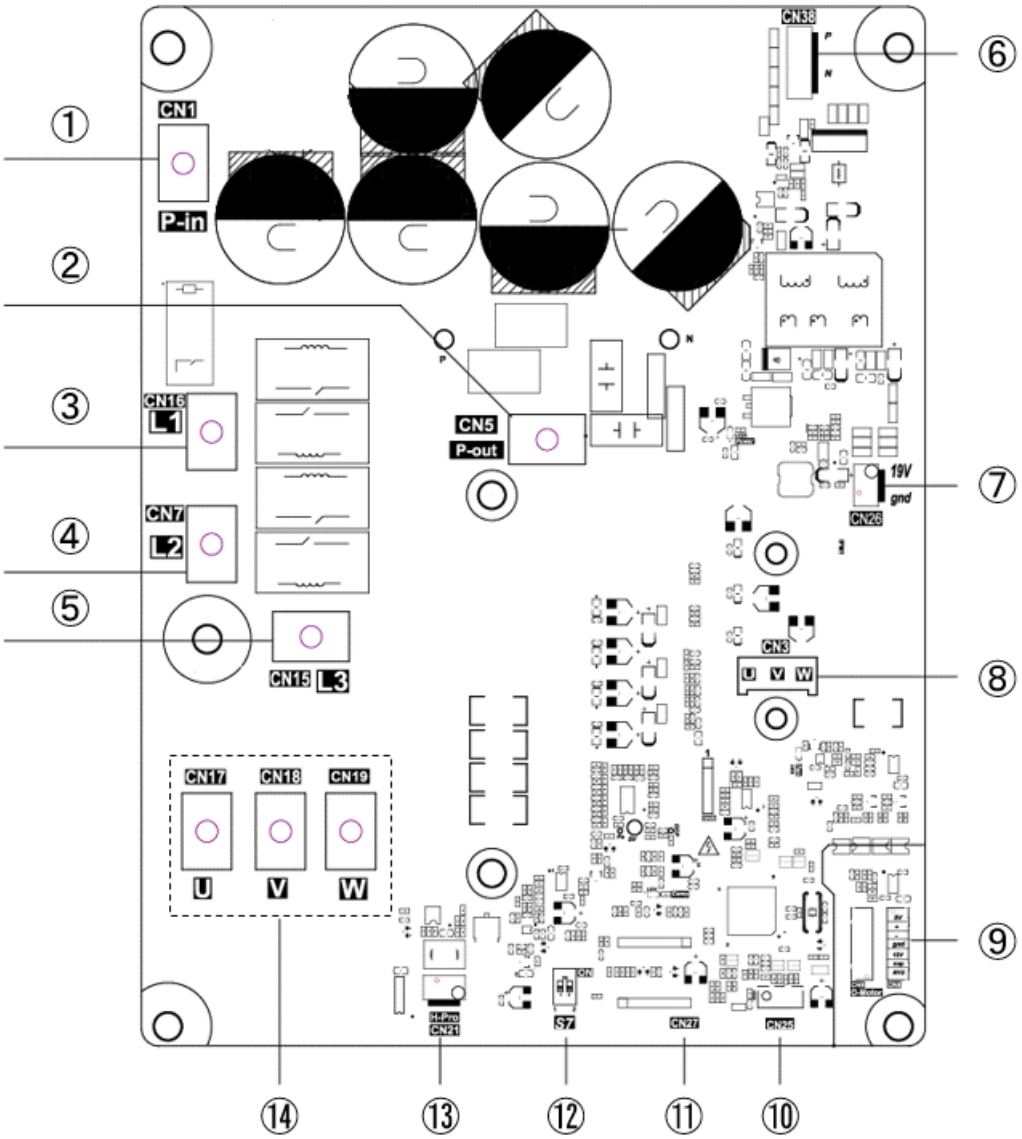


Table 5-3.2: Compressor & Fan drive board port

Label in Figure 5-2.5	Port code	Feature identifier	Content	Port voltage
1	CN1	P-in	Positive pole Input terminal of the high voltage capacitors (connected to reactor)	438Vdc-650Vdc(Rated at 540Vdc)
2	CN5	P-out	Positive pole output terminal of the three-phase rectifier (connected to reactor)	438Vdc-650Vdc(Rated at 540Vdc)
3	CN16	L1	Three phase power input of L1 phase	310Vac-460Vac(Rated 380Vac between phases)
4	CN7	L2	Three phase power input of L2 phase	310Vac-460Vac(Rated 380Vac between phases)
5	CN15	L3	Three phase power input of L3 phase	310Vac-460Vac(Rated 380Vac between phases)
6	CN38	-	Power supply terminal for DC fan drive board (P,N) (Reserved)	438Vdc~650Vdc(Rated 540Vdc; P is positive, N is negative)
7	CN26	-	Fan module controls power supply(Reserved)	19V

Table continued on next page ...

Table 5-3.2: Compressor & Fan drive board port (continued)

Label in Figure 5-2.5	Port code	Feature identifier	Content	Port voltage
8	CN3	DCFAN	Three phase output of the inverter ,connected to the DC fan	0~100%*input voltage(varying)
9	CN8/CN9	O-Motor	Communication port between main control board and Inverter drive board	Ports from top to bottom are defined as follows: 5V, +, -, GND, 12V, empty, and Ry2.
10	CN25	-	Debug port	--
11	CN27	-	PED Diagnostic Module	--
12	S7	-	Dial switches of address setting (Compressor & Fan drive module)	--
13	CN21	H-Pro	High pressure switch connection	Close: 0 Vdc ; Open: 6 Vdc
14	CN17/18/19	U/V/W	Three phase output of the inverter ,connected to the compressor	0~100%*input voltage(varying)

Notes:

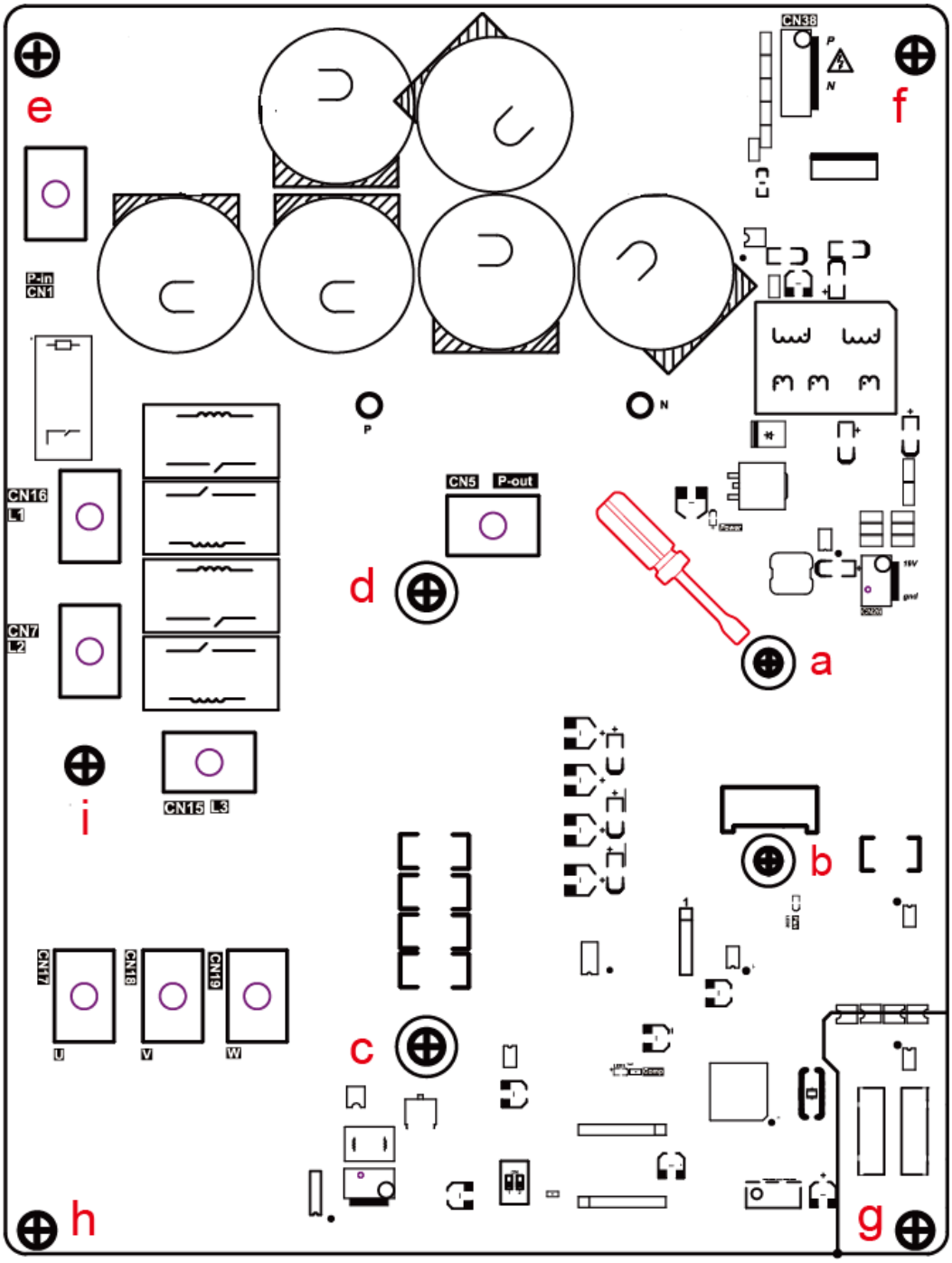
The Compressor & Fan drive board ports of 35A and 50A is same as 75A.

Table 5-3.3: Compressor & Fan drive board switch settings

Switch	Setting	Switch positions1	Description
S7 	Serial number		Compressor & Fan A
			Compressor & Fan B

3.6 The installation guide of Compressor & Fan drive board

Figure 5-3.5: The installation guide of Compressor & Fan drive board



1. Before maintaining or repairing the outdoor unit, cut off the power supply of the outdoor unit for 5 minutes and use a mustimeter to ensure that the voltage is zero to avoid electric shock. Notice The unit has the low-power standby function. After entering this mode, only the power indicator of the main board is on.

2. Perform the following steps to install the module board:

①. Evenly apply thermal silicone grease on the IPM (The cooling panel on the back of Compressor & Fan drive board)

②. Pre-fix screws a, b, c and d respectively, and then tighten them successively after pre-fix;

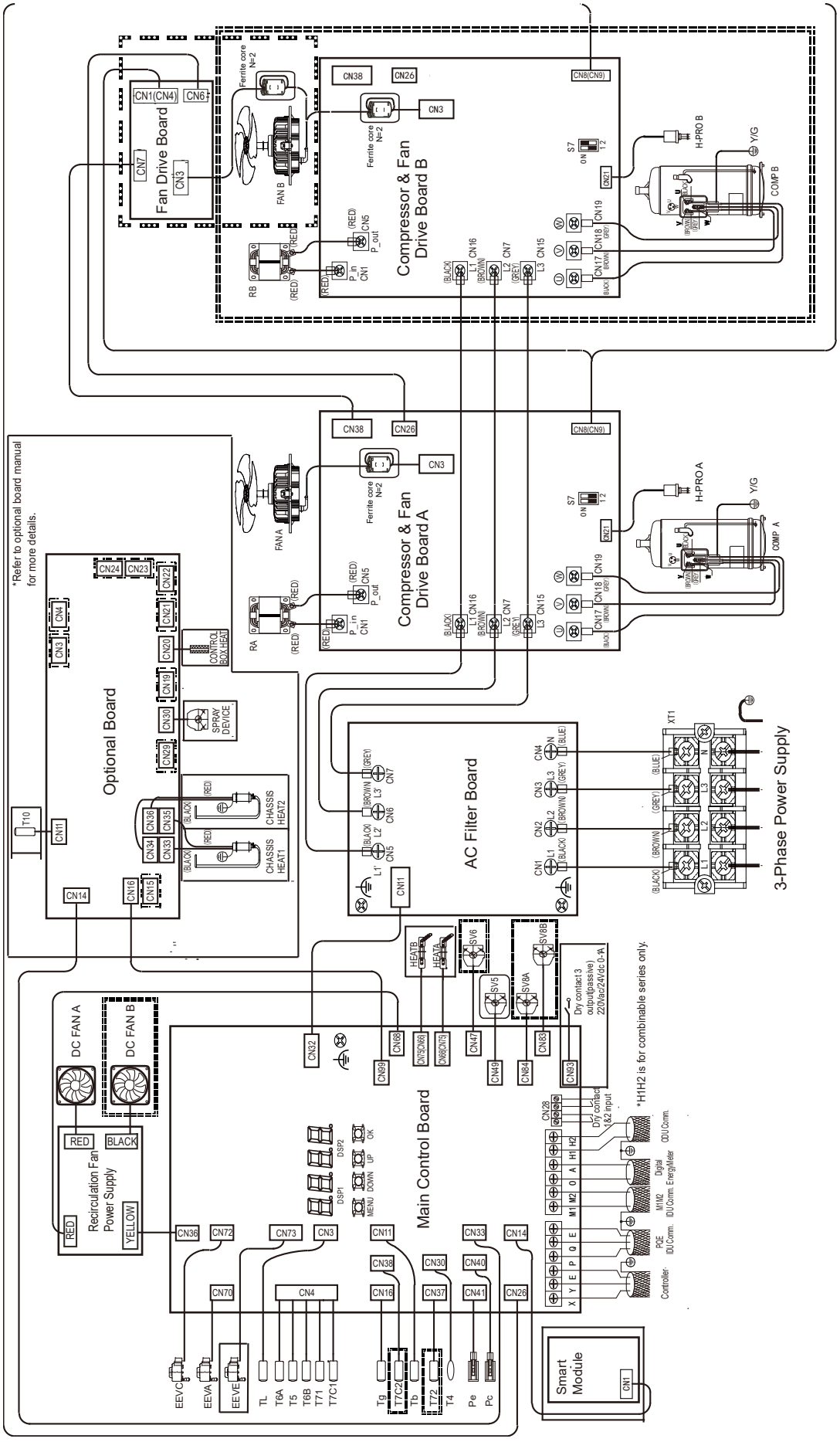
③. Fix e, f, g, h and i screws.

④. The order of steps ②③ cannot be reversed; Do not tighten the module directly without pre-fixing, otherwise the module will be damaged by force when other screws are fixed.

⑤. Do not directly fix e and f screws, hang the module board and then fix other screws;

4. Wiring Diagrams

Figure 5-3.1: Outdoor unit wiring diagram



Legend				
Code	**Name**		**Code**	**Name**
COMP A/ COMP B	Compressor		XT1	Terminal block
EEVA / EEVC / EEVE	Electronic expansion valve		T4	Outdoor ambient temperature sensor
FAN A/ FAN B	DC Fan		T5	Liquid pipe temperature sensor
DC FAN A/DC FAN B	Recirculation Fan		T6A	Microchannel heat exchanger inlet pipe temperature sensor
HEAT A/ HEAT B	Compressor heater		T6B	Microchannel heat exchanger outlet pipe temperature sensor
RA/ RB	Reactance		T71/ T72	Suction temperature sensor
SV5-SV8B	Solenoid valve		Tg	Gas pipe temperature sensor
H-PRO A/ H-PRO B	High pressure switch		TL	Heat exchanger liquid temperature sensor
Pc	High pressure sensor		T7C1/ T7C2	Compressor discharge temperature sensor
Pe	Low pressure sensor		Tb	Electric control box chamber temperature sensor

Part 6

Diagnosis and Troubleshooting

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
AAx	No.x Inverter driver board does not match the main control board	Outdoor unit's fault	NO
xA61	No.x slave unit error	Salve unit's fault	NO
xb53	No.x Heat dissipation fan error	system failure	YES
C13	The address of outdoor Unit is repeated	communication failure	NO
C21	Communication error between indoor and master outdoor unit	communication failure	NO
C26	Number of indoor units detected by master unit has decreased or less than the setting amount	communication failure	NO
C28	Number of indoor units detected by master unit has increased or more than the setting amount	communication failure	NO
xC31	Communication error between No.x slave outdoor unit and master outduoor unit	communication failure	NO
C32	Number of slave units detected by master unit has decreased	communication failure	NO
C33	Number of slave units detected by master unit has increased	communication failure	NO
xC41	Communication Error between main control board and No.x inverter driver board	communication failure	NO
E41	Outdoor ambient temperature sensor (T4) error(open/short)	sensor error	NO
F31	Microchannel 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
F51	Microchannel heat exchanger inlet temperature sensor(T6A) 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
xF71	No.(x) compressor discharge temperature sensor(T7C1/T7C2) error (open/short)	sensor error	YES
xF72	No.(x) compressor discharge temperature(T7C1/T7C2) 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

Table continued on next page ...

Table 6-1.1 Outdoor Error code table (continued)

Error code	Error description	Remarks	Manual re-start required[2]
F81	Gas pipe temperature sensor (Tg) error (open/short)	sensor error	NO
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
xFd1	Compressor suction temperature sensor (T71/T72) error (open/short)	sensor error	NO
FL1	T10 outdoor ambient temperature sensor fault (open circuit/short circuit)	sensor error	NO
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
xP32	No.(x) compressor high DC bus current protection	Current protection	NO
xP33	xP32 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
xP56	No.(x) Inverter driver board DC bus low voltage error	Power protection	YES
xP57	No.(x) Inverter driver board DC bus high voltage error	Power protection	YES
xP58	No.(x) Inverter driver board DC bus excessively high voltage error	Power protection	YES
xP59	No. (x) inverter module bus voltage drop fault	Power protection	No
P71	EEPROM error	E party error	YES
Pb1	HyperLink overcurrent error	Overcurrent protection	YES
Pd1	Anti-condensation protection	condensation	NO
Pd2	Pd1 protection occurs 2 times in 60 minutes	condensation	YES
1b01	Electronic expansion valve (EEVA) error	missing Connection	YES
2b01	Electronic expansion valve (EEVB) error	missing Connection	YES
3b01	Electronic expansion valve (EEVC) error	missing Connection	YES
4b01	Electronic expansion valve (EEVE) error	missing Connection	YES
bA1	HyperLink cannot open or close indoor unit's Electronic expansion valve	System error	YES

Note:

'x' is a placeholder for the fan or compressor address, with 1 representing fan A or compressor A and 2 representing fan B or compressor B.

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
U25	Non-common Indoor Unit in the system	System configuration	YES
U26	Outdoor unit and Indoor Unit mismatch	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-U48	System configuration	YES
U51	Outdoor unit of Individual Series is installed in combined system.	System configuration	YES
U53	Different series of outdoor units are detected in the same VRF system.	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]
xL01	xL1* or xL2* error occurs 3 times in 60 minutes	Current overload error	Yes
xL1E	Hardware overcurrent		NO
xL11	Software overcurrent		NO
xL12	Software overcurrent protection last 30s		NO
xL2E	Module overtemperature protection	Over-temperature error	NO
xL3E	Low bus voltage error	Power supply error	NO
xL31	High bus voltage error		NO
xL32	The bus voltage is excessively high		NO
xL33	Bus voltage drop fault		NO
XL43	The current sampling bias is abnormal	Hardware error	NO
xL45	Motor code mismatch	Motor error	NO
xL46	IPM protection (FO)	IPM error	NO

Table continued on next page ...

Table 6-1.3 Compressor drive error code table (continued)

Error code	Error description	Remarks	Manual re-start required[2]
xL47	Module type mismatch	Module error	NO
xL4E	EEPROM error	E party error	NO
xL5E	Startup failed	Control error	NO
xL51	Out-of-step error	Control error	NO
xL52	Locked-rotor protection	Motor error	NO
xL6E	Compressor motor lack of phase protection	Diagnosis error	NO

Note:'x' is a placeholder for the fan or compressor address, with 1 representing fan A or compressor A and 2 representing fan B or compressor B.

1.4 Fan motor error code table

Table 6-1.4 Fan motor error code table

Code	Error description	Remarks	Manual re-start required2
xJ01	xJ1* or xJ2* error occurs 10 times in 60 minutes	current overload error	YES
xJ1E	Hardware overcurrent		NO
xJ11	Software overcurrent		NO
xJ12	Software overcurrent protection last 30s		NO
xJ2E	Module overtemperature protection	Over-temperature error	NO
xJ3E	Low bus voltage error	Power supply error	NO
xJ31	High bus voltage error		NO
xJ32	The bus voltage is excessively high		NO
xJ43	The current sampling bias is abnormal	Hardware error	NO
xJ5E	Startup failed	Control error	NO
xJ51	Out-of-step error		NO
xJ52	Locked-rotor protection		NO
xJ6E	Motor lack of phase protection	Diagnosis error	NO

Note: 'x' is a placeholder for the fan address, with 1 representing fan A and 2 representing fan B

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

Table continued on next page ...

Table 6-1.5 Status prompt code table (continued)

Status code	Code description	Remarks	Manual re-start required2
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
- Error codes are displayed only on master uint.

2.1.3 Trigger / recover condition

Scenario 1: ODU menu item n28 is set to 0:

- Trigger condition: The dry contact is closed (as shown in Figure B below, the two terminal blocks of Input1 of port CN28 ① and ② or the two terminal blocks of Input 2 ③ and ④ are connected).
- Restoration condition: The dry contact is open (terminal blocks ① and ② and terminal blocks ③ and ④ are simultaneously disconnected).
- Reset method: Resume automatically upon dry contact opening

Scenario 2: ODU menu item n28 is set to 1:

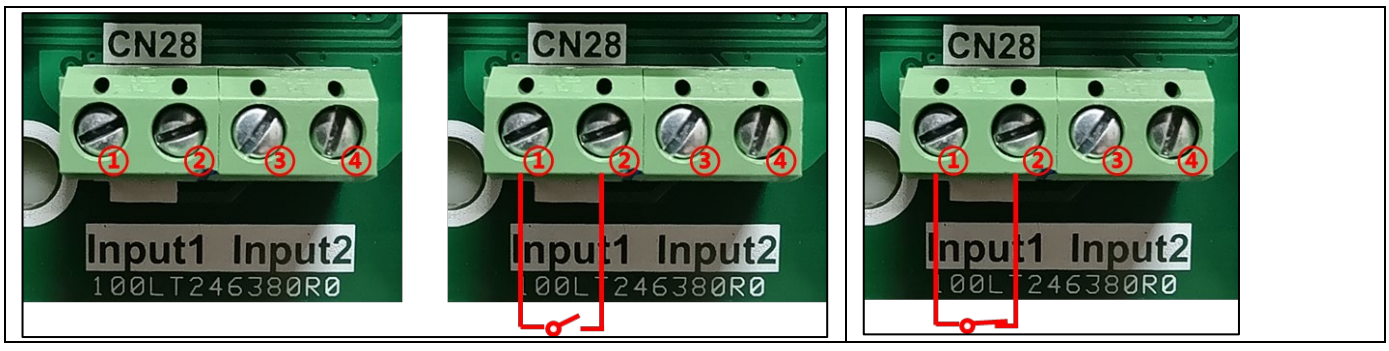
- Trigger condition: The dry contact is open (as shown in Figure A below, the two terminal blocks of Input1 of port CN28 ① and ② or the two terminal blocks of Input 2 ③ and ④ are disconnected).
- Restoration condition: The dry contact is closed (terminal blocks ① and ② and terminal blocks ③ and ④ are simultaneously connected).
- Reset method: Resume automatically upon dry contact closure

Scenario 3: An emergency shutdown command is sent from the centralized controller

- Trigger condition: Centralized controller sends an emergency shutdown command.
- Restoration condition: Centralized controller cancels the emergency shutdown command.
- Reset method: Resume automatically

Figure A The dry contact is open (taking Input1 as an example)

Figure B The dry contact is closed (taking Input1 as an example)



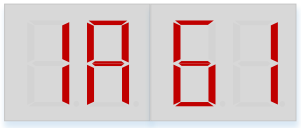
2.1.4 Possible causes

- External causes triggers emergency shutdown.
- Centralized controller sends an emergency shutdown command.
- The ODU main board is damaged.

2.1.5 Procedure

2.2 xA61: No.x slave unit error

2.2.1 Digital display output



2.2.2 Description

- xA61 shows a slave unit error with the ODU address of x (x = 1,2,3).
- All Outdoor Units stop running
- Error code are displayed only on master unit.

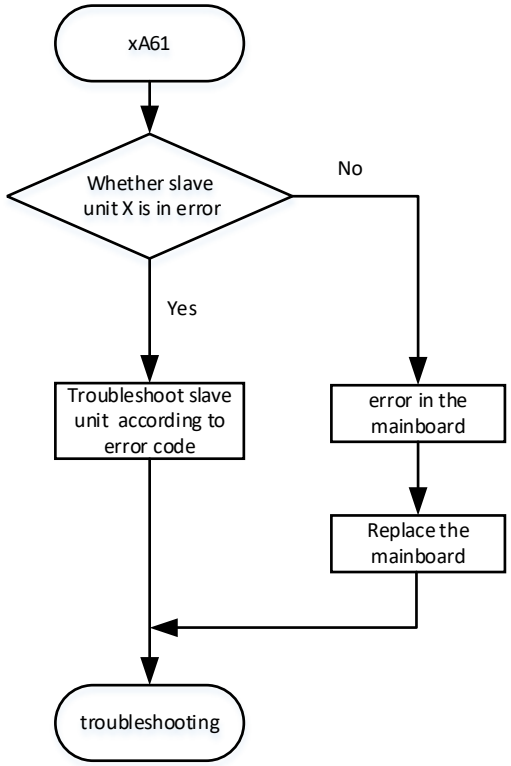
2.2.3 Trigger / recover condition

- Trigger condition: Slave unit is in error.
- Recover condition: Error of slave unit recover
- Reset method: Resume automatically

2.2.4 Possible causes

- Slave unit is in error

2.2.5 Procedure



2.3 AAx: Inverter driver board X does not match the main control board

2.3.1 Digital display output

2.3.2 Description

- No.x Inverter driver board does not match the main control board
- All units stop running.
- Error code is displayed on the unit with the error

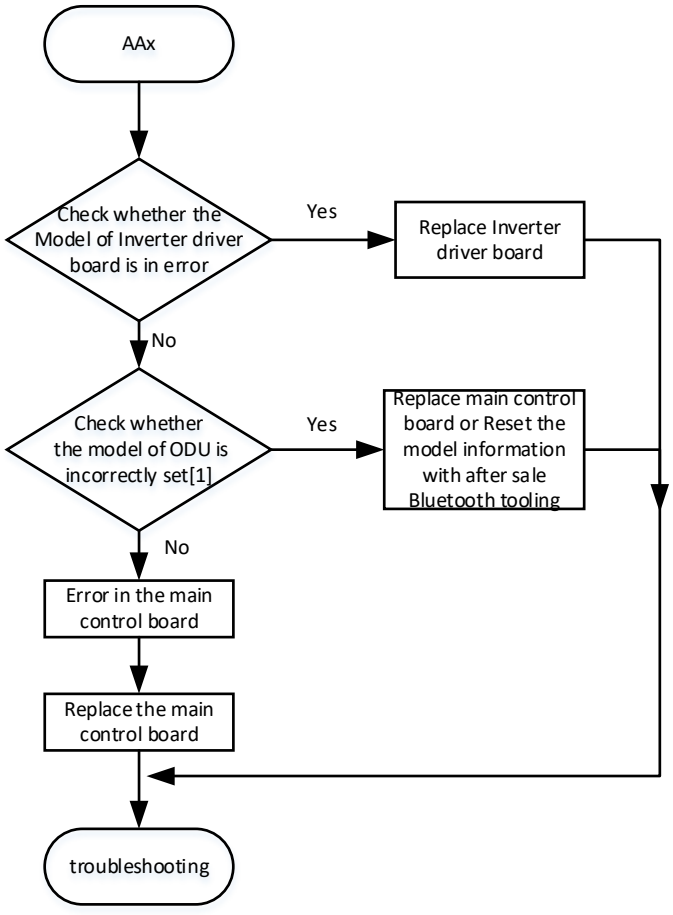
2.3.3 Trigger / recover condition

- Trigger condition: Parameters of the built-in drive in the module board do not match Outdoor Units
- Recover condition: Parameters of the built-in drive in the module board match Outdoor Units
- Reset method: Resume manually

2.3.4 Possible causes

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

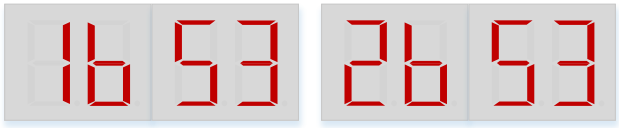
2.3.5 Procedure



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

2.4 xb53: No.x Recirculation fan error

2.4.1 Digital display output



2.4.2 Description

- No.x Recirculation Fan[1] is in error
- Unit with the error stop running.
- Error code is displayed on the unit with the error

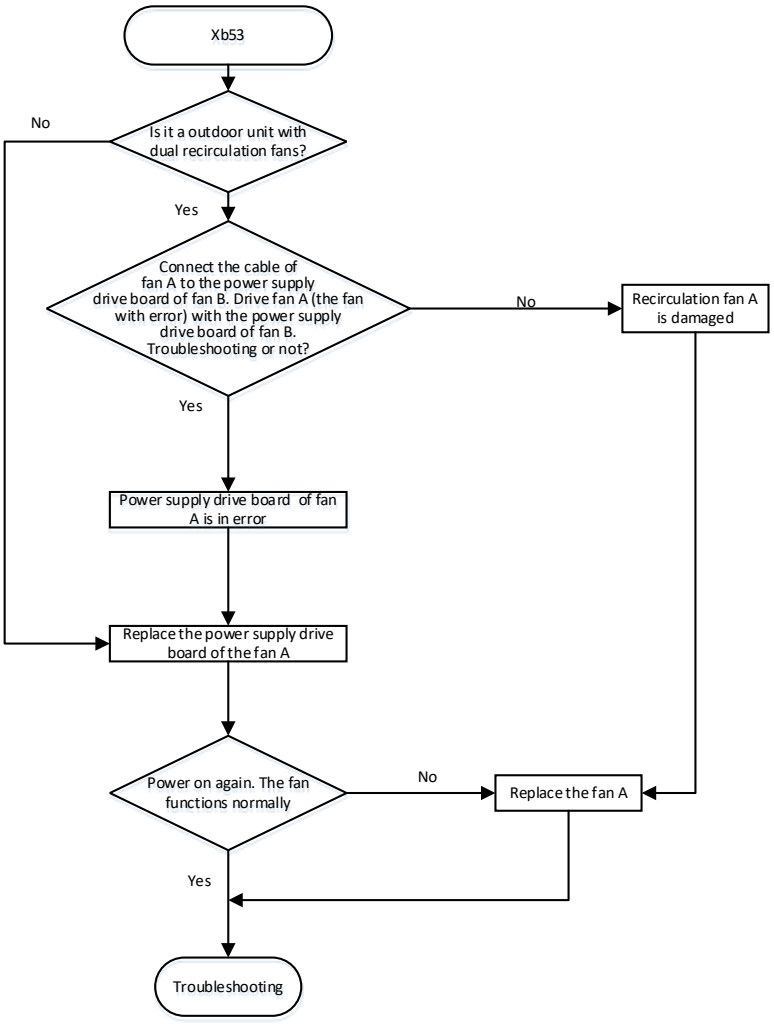
2.4.3 Trigger / recover condition

- Trigger condition: the difference between the actual fan speed and the set fan speed is 300rpm, lasting for 50s.
- Recover condition: the difference between the actual fan speed and the set fan speed is within 300rpm
- Reset method: Rectify the error and power-on again

2.4.4 Possible causes

- The cable connect Recirculation Fan and Recirculation Fan power supply disconnected.
- The Recirculation Fan is damaged
- The Recirculation Fan power supply is damaged
- ODU main control board is damaged

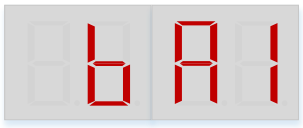
2.4.5 Procedure



Notes:
[1]. The fan runs only when the fan or compressor is running, but does not run in standby mode

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

2.5.1 Digital display output



2.5.2 Description

- When some IDUs are powered off, HyperLink fail to close their EEV.
- All units stop running.
- Error code is only displayed on the master unit
- Error is generated only under the M1M2 communication protocol.

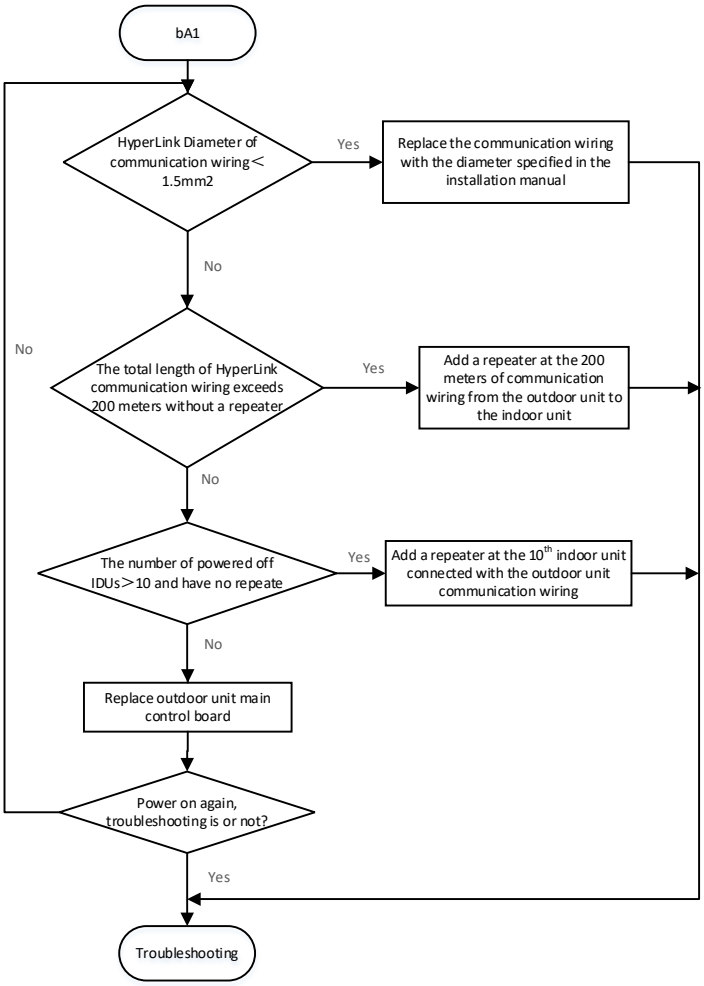
2.5.3 Trigger / recover condition

- 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

2.5.4 Possible causes

- HyperLink diameter of communication wiring＜1.5mm^2;
- The total length of HyperLink communication wiring 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.

2.5.5 Procedure



2.6 1b01/3b01 Disconnection of EEVA/EEVC

2.6.1 Digital display output

2.6.2 Description

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

2.6.3 Trigger / recover condition

Trigger condition: The main control board has not detected signals from the EEV for 2 minutes.

Recover condition: The main control board detects a signal from the EEV.

Reset condition: Resume automatically

2.6.4 Possible causes

- EEV is disconnected or loose.
- EEV wiring harness is damaged.
- Outdoor unit main control board is damaged.

2.6.5 Procedure

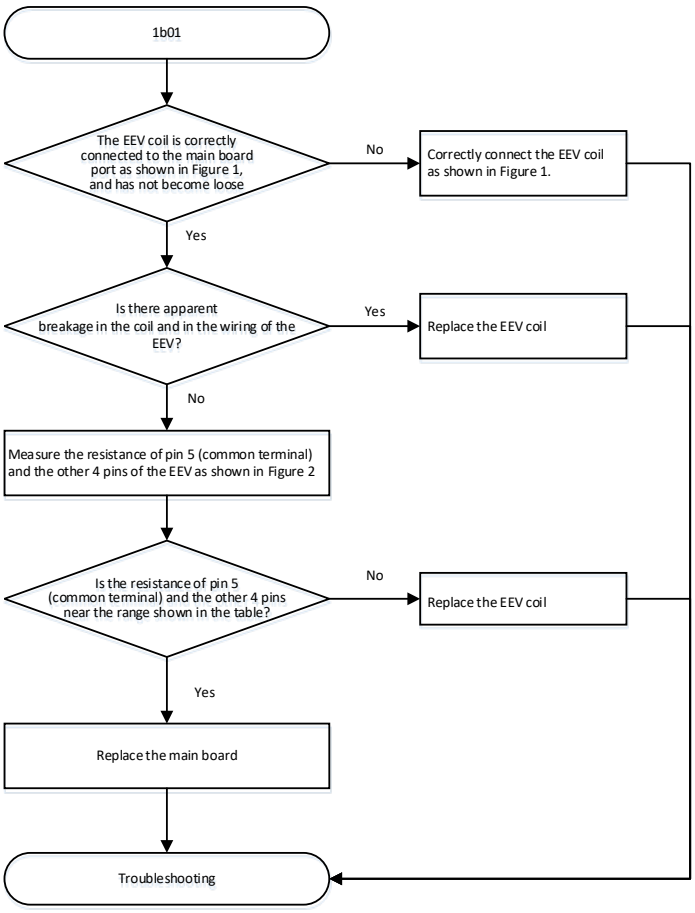
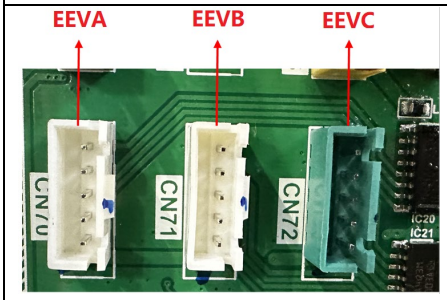
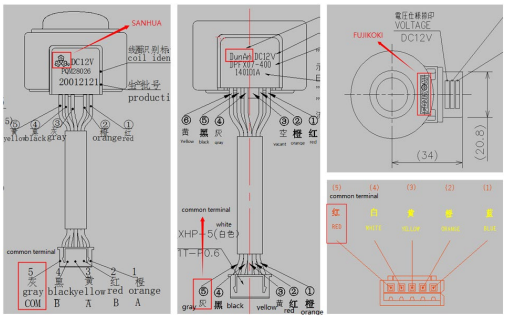


Figure 1 Main boar port



Note: CN71 is reserved port.

Figure 2 Five pin of EEV



Note: If the EEV coil is SANHUA, pin 5 is gray. If it is Fujikoki, pin 5 is red. Measure the resistance sequentially from pin 5 to the other 4 pins (for SANHUA coils, the sequence is gray-black, gray-yellow, gray-red, and gray-orange.)

Type	Outdoor unit model	Coil Brand	Coil resistance (between the common terminal and the other four pins; ambient temperature: 20°C)
EEVA	8-20HP	SANHUA	46±3.7 Ω
	22-30HP	SANHUA	150±15 Ω
		FUJIKOKI	100±10 Ω
EEVC	8-30HP	FUJIKOKI	46±4 Ω

2.7 C13: The address of Outdoor Unit is repeated

2.7.1 Digital display output

2.7.2 Description

- The address of Outdoor Unit is repeated.
- Error code is displayed on the master outdoor unit.

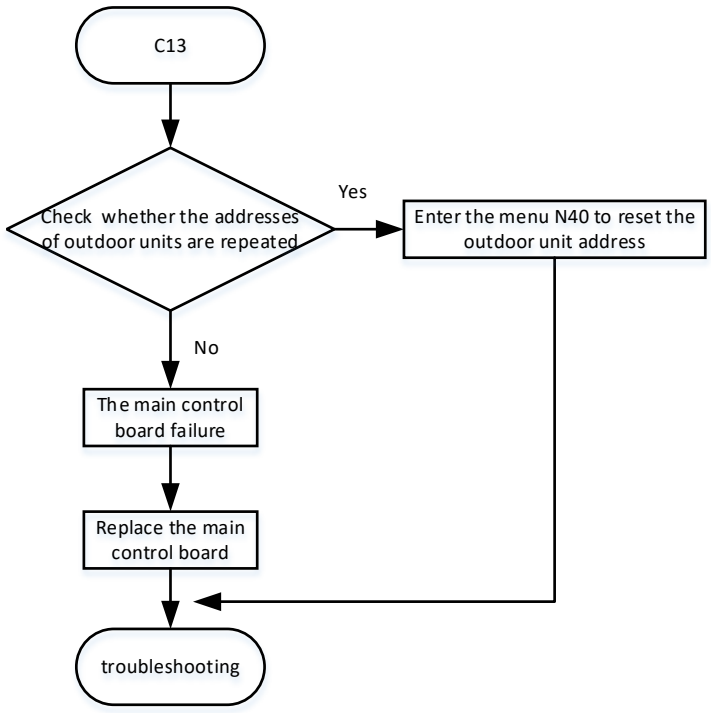
2.7.3 Trigger /recover condition

- Trigger:Two or more outdoor units in the combined system have the same address
- Recover condition: The address of master and slave unit are set to be 0~3 successively
- Reset method: Manually restart

2.7.4 Possible causes

- Two or more outdoor units in the Combined system have the same address
- Damaged outdoor main control board

2.7.5 Procedurem



Notes:

After setting the outdoor unit address, waiting for 30 seconds then, powering off the device, next waiting another 30 seconds, and then powering on the device again. The master address must be set to 0

2.8 C21: Communication error between IDU and ODU.

2.8.1 Digital display output

2.8.2 Description

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

2.8.3 Trigger / recover condition

- Trigger condition: 1. 20 minutes after the outdoor unit is power on,the communication signal from the IDU cannot be received by ODU for two minutes
  2. The IDU is not detected after automatic addressing.
- Recover condition: ODU receives the communication signal from the IDU.
- Reset method: Resume automatically

2.8.4 Possible causes

1. Error caused by communication interfaces and protocols

Table 6.2.1 Communication troubleshooting list:

ODU interface	IDU interface	IDU type	Communication protocol	Digital display output	Solution
PQE	PQE	V8	n45-0, V8 protocol P Q communication	/	/
			n45-1, V6 protocol PQE communication	/	/
			n45-2, V8 HyperLink protocol IDU uniform power supplied	/	It is recommended to be changed to V8 protocol PQ communication (n45-0).
			n45-3, V8 HyperLink protocol IDU separate power supply	/	It is recommended to be changed to V8 protocol PQ communication (n45-0).
M1M2	M1M2	V8	n45-0, V8 protocol P Q communication	C21	Modify the communication protocol. n45-3 is recommended.
			n45-1, V6 protocol PQE communication	C21	Modify the communication protocol. n45-3 is recommended.
			n45-2, V8 HyperLink protocol IDU uniform power supplied	/	/
			n45-3, V8 HyperLink protocol IDU separate power supply	/	/
PQE	PQE	V6	n45-0, V8 protocol P Q communication	C21	Modify the communication protocol. n45-1 is recommended.
			n45-1, V6 protocol PQE communication	/	/
			n45-2, V8 HyperLink protocol IDU uniform power supplied	C21	Modify the communication protocol. n45-1 is recommended.
			n45-3, V8 HyperLink protocol IDU separate power supply	C21	Modify the communication protocol. n45-1 is recommended.
PQE	M1M2	V8	All protocols	C21	It is recommended to connect M1M2 to the ODU port and adopt the n45-3 communication protocol.
M1M2	PQE	V8	All protocols	C21 (the IDU board may be damaged)	It is recommended to connect PQE to the ODU port and adopt the n45-0 communication protocol.
M1M2	PQE	V8 + V6	All protocols	C21 (the IDU board may be damaged)	Connect PQE to the ODU port and adopt the n45-1 communication protocol.
M1M2	PQE + M1M2	V8 + V6	All protocols	C21 (the PQE communication IDU board may be damaged)	Connect PQE to the ODU/IDU port and adopt the n45-1 communication protocol.
PQE	PQE + M1M2	V8 + V6	All protocols	C21	Connect PQE to the ODU/IDU port and adopt the n45-1 communication protocol.

2. Faults caused by other factors

(1) All indoor units are not set address;

(2) All indoor units are not powered on;

(3) The communication wiring between the master unit and the first IDU is not reliably connected:

- The communication wiring between the ODU and the first IDU is not tightened, or the surface contact of the power supply terminal is poor.
- The communication wiring between the ODU and the first IDU is disconnected or short-circuited for some reason.
- In PQ communication, the sequence of PQ and E is incorrect (for example, PEQ or QEP connection).

(4) The main communication wiring is connected to the slave ODU;

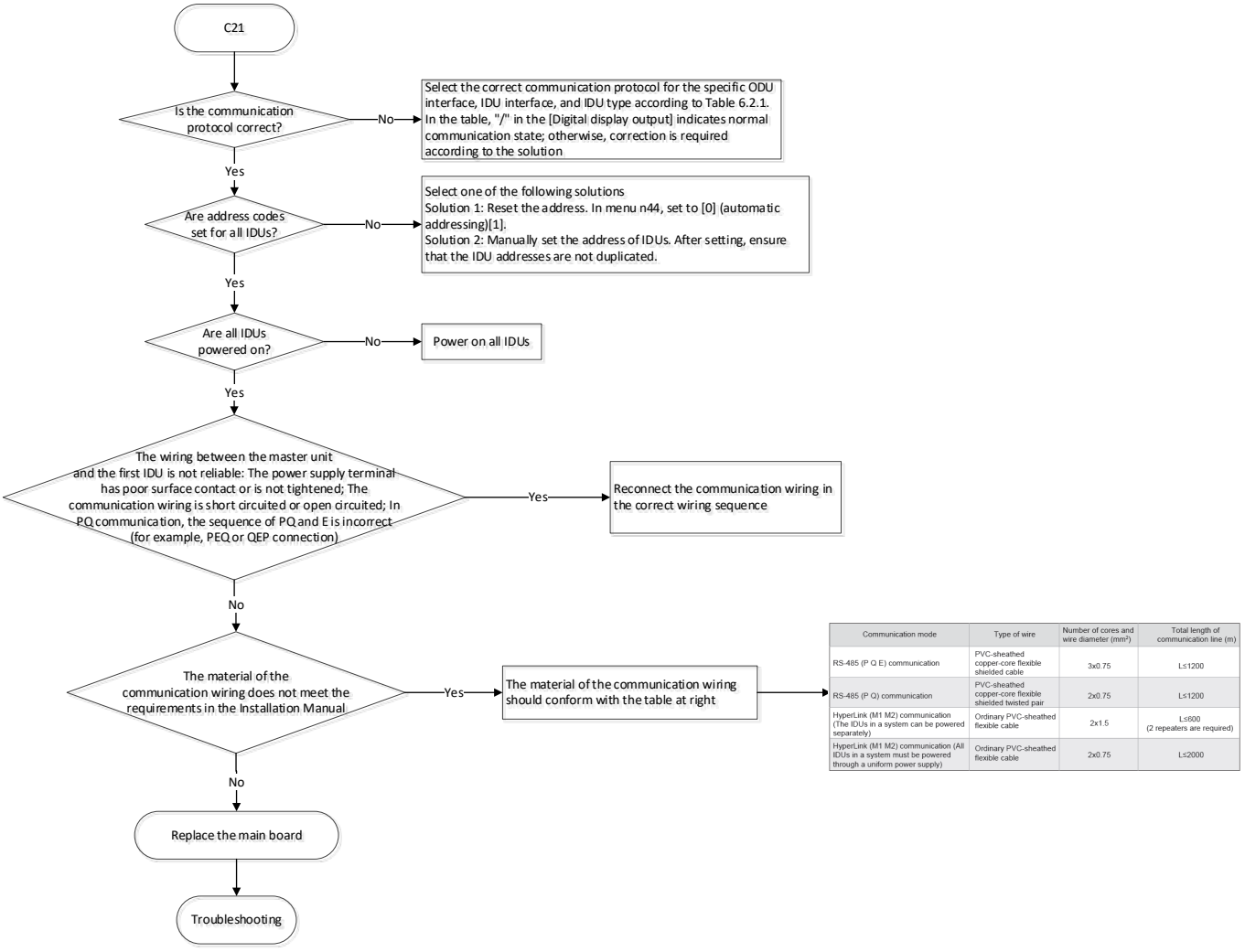
(5) Three-core shielded cable is used or the shielded layer is not grounded in PQ communication;

(6) When the function of IDU separate power supply in M1M2 communication is enabled, the diameter of the communication wiring is less than 1.5mm^2;

(7) The total length of the communication wiring exceeds range requirements: In PQE communication, the total length of the communication wiring (L) is less than or equal to 1200m; in M1M2 communication, the total length of the communication wiring (L) is less than or equal to 2000m. In M1M2 communication when the function of IDU separate power supply is enabled, the total length of the communication wiring (L) is less than or equal to 600m.

(8) The communication wiring is interfered with by a strong electromagnetic wave.

2.8.5 Procedure



Communication mode	Type of wire	Number of cores and wire diameter (mm²)	Total length of communication line (m)
RS-485 (P Q E) communication	PVC-sheathed copper-core flexible shielded cable	3x0.75	L≤1200
RS-485 (P Q) communication	PVC-sheathed copper-core flexible shielded twisted pair	2x0.75	L≤1200
HyperLink (M1 M2) communication (The IDUs in a system can be powered separately)	Ordinary PVC-sheathed flexible cable	2x1.5	L≤600 (2 repeaters are required)
HyperLink (M1 M2) communication (All IDUs in a system must be powered through a uniform power supply)	Ordinary PVC-sheathed flexible cable	2x0.75	L≤2000

Note:

[1] Addressing will last for 10min, during which no operation is allowed.

2.9 C26 Abnormal reduction in the number of indoor units

2.9.1 Digital display output

2.9.2 Description

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

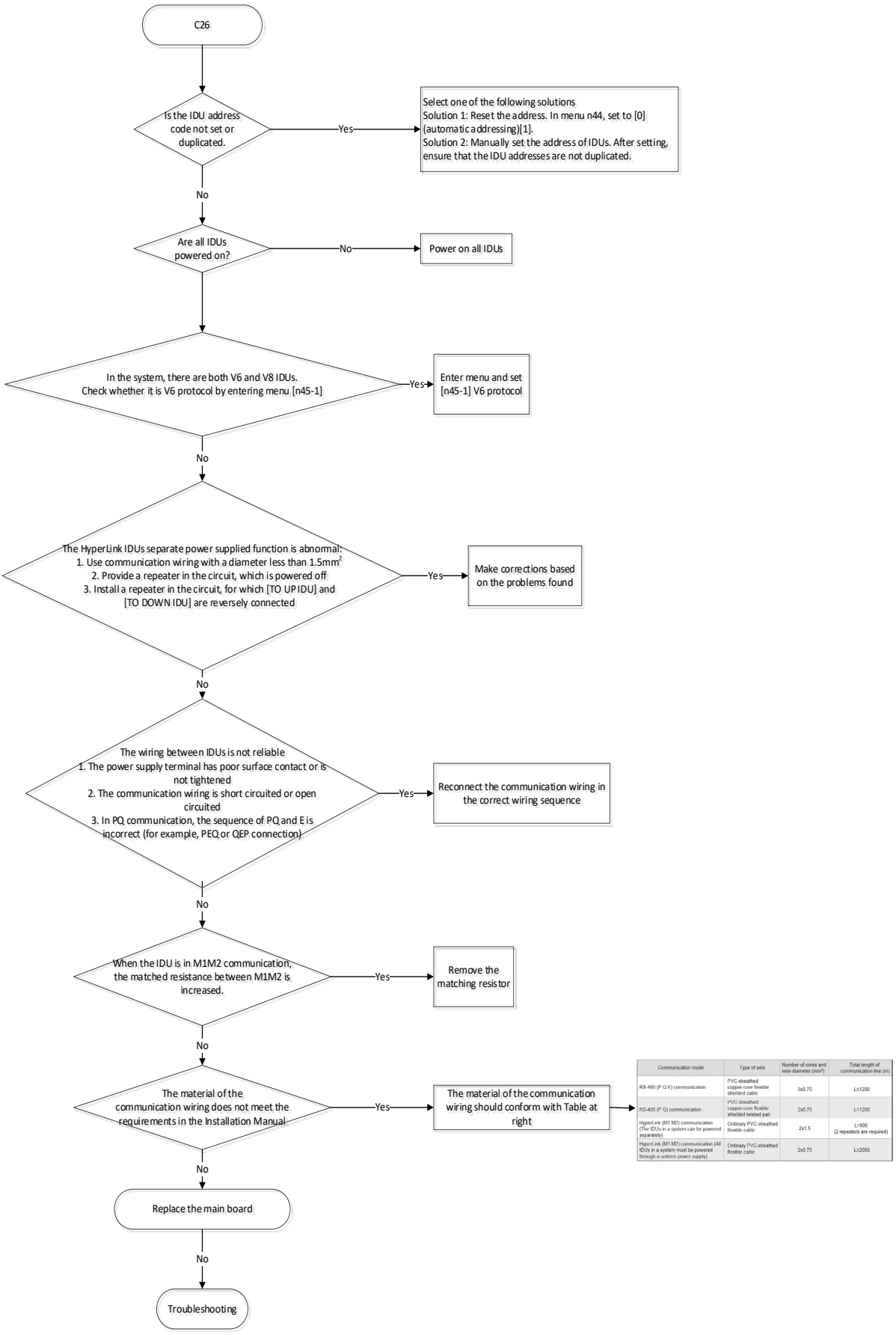
2.9.3 Trigger / recover condition

- Trigger condition: N0: The number of IDU set by ODU; N1: The number of online IDUs.
  1) When the unit is installed and commissioned, enter the number of IDUs (N0). The number of IDUs detected by the system is N1. If N1 < N0 lasts for 2min at any time, C26 is reported.
  2) If the number of IDUs (N1) detected within 20 min of initial power-on is less than the set number (N0), the outdoor unit does not start up (except for the quick check or service mode), but no error is reported. After 20 min, C26 is reported.
- Recover condition:
  N1 = N0 for 60 seconds
- Reset method: Resume automatically

2.9.4 Possible causes

- The IDU address code is not set or is duplicated.
- The IDU is not powered on or the power supply cable is incorrectly connected.
- In the system, there are V6 IDUs but the V6 protocol has not been set.
- When adopting the function of IDU separate power supply enabled in HyperLink communication, the communication wiring is improperly installed:
  When adopting the function of IDU separate power supply enabled in HyperLink communication with a repeater, the repeater is powered off;
  When adopting the function of IDU separate power supply enabled in HyperLink communication with a repeater, the repeater is incorrectly wired;
  The diameter of the communication wiring is less than 1.5mm^2.
- The IDU communication wiring is incorrectly connected:
  The communication wiring is not tightened or there is poor surface contact with the power supply terminal.
  The communication wiring is open-circuited or short-circuited for a certain reason.
  In PQ communication, the communication wiring is not connected in chain or the sequence of PQ and E is incorrect (for example, PEQ or QEP connection).
- When the IDU is in M1M2 communication, the matched resistance between M1M2 is increased.
- The material of the communication wiring does not meet requirements:
  Three-core shielded cable is used or the shielded layer is not grounded in PQ communication;
  The total length of the communication wiring exceeds range requirements: In PQE communication, the total length of the communication wiring (L) is less than or equal to 1200m; in M1M2 communication, the total length of the communication wiring (L) is less than or equal to 2000m. In M1M2 communication when the function of IDU separate power supply is enabled, the total length of the communication wiring (L) is less than or equal to 600m.
- The set number of IDUs does not match the actual number of IDUs.
- The communication wiring is interfered with by a strong electromagnetic wave.
- The IDU's main control board is damaged.

2.9.5 Procedure



Note:

[1] Addressing will last for 10min, during which no operation is allowed.

2.10 C28: Abnormal increase in the number of indoor units

2.10.1 Digital display output

2.10.2 Description

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

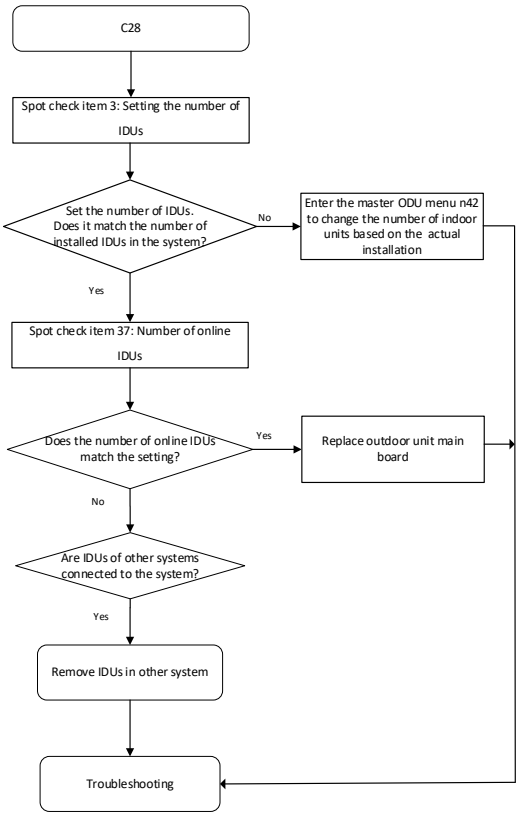
2.10.3 Trigger / recover condition

- Trigger condition: N0: The number of IDU set by ODU; N1: The number of online machines.
  1) When the unit is installed and commissioned, enter the number of IDUs (N0). The number of IDUs detected by the system is N1. If N1>N0 lasts for 2min at any time, C28 is reported.
  2) If the number of IDUs (N1) detected within 20 min of initial power-on is greater than the set number (N0), the outdoor unit does not start up (except for the quick check or service mode), but no error is reported. After 20 min, C26 is reported.
- Recover condition:
  N1 = N0 for 60 seconds
- Reset method: Resume automatically.

2.10.4 Possible causes

- The set number of IDUs is inconsistent with the number of IDUs installed in the system.
- The IDUs of other systems are connected to the system.
- The IDU communication wiring of the system (A) and system B are reversely connected, and the total number of IDUs of system B is greater than that of system A.

2.10.5 Procedure



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

2.11 xC31: Communication error between No.x slave outdoor unit and master outduoor unit.

2.11.1 Digital display output

2.11.2 Description

- The No.x outdoor slave unit cannot communicate with the outdoor master unit.
- Outdoor units that display the error code stop running.
- Error code is only displayed on the slave unit with the error.

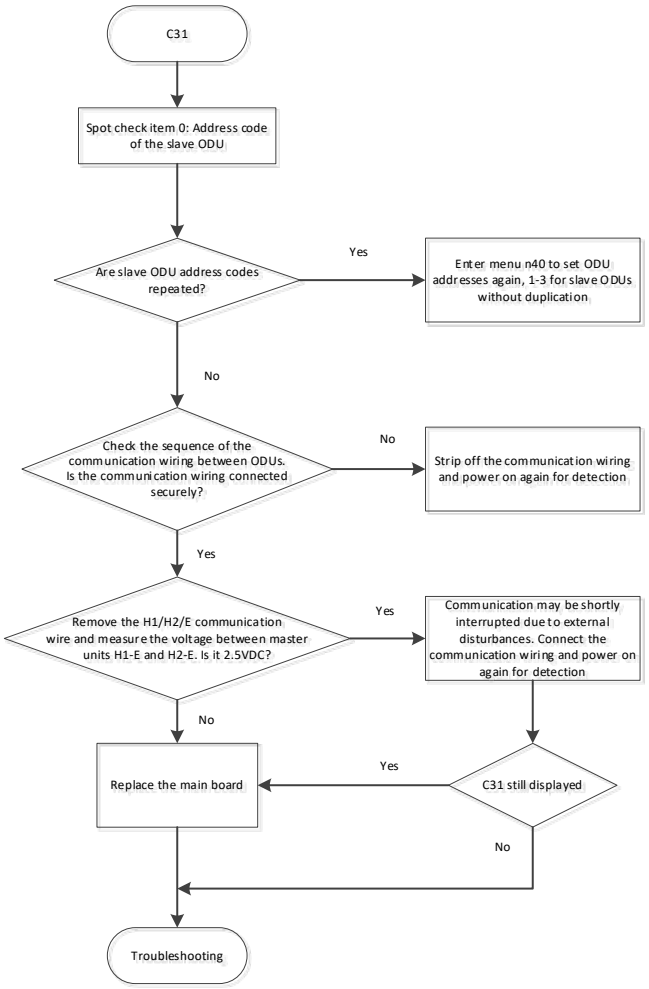
2.11.3 Trigger / recover condition

- Trigger condition:The communication between the slave unit and the master unit of the combined system is interrupted for more than 2 minute
- Recover condition:The communication between the slave unit and the master unit of the combined system is recovered
- Reset method:Power off the unit for 30s and then power it on again

2.11.4 Possible causes

- The address of slave outdoor unit is repeated.
- The communication wiring is not tightened or there is poor surface contact with the power supply terminal.
- The communication wiring between the master unit and the slave unit is disconnected.
- The main board of the slave outdoor unit is damaged.

2.11.5 Procedure



2.12 C32: Abnormal reduction in the number of outdoor units

2.12.1 Digital display output

2.12.2 Description

- The number of online slave outdoor units detected by the master outdoor unit decreases
- All units stop running.
- Error code is only displayed on the master unit

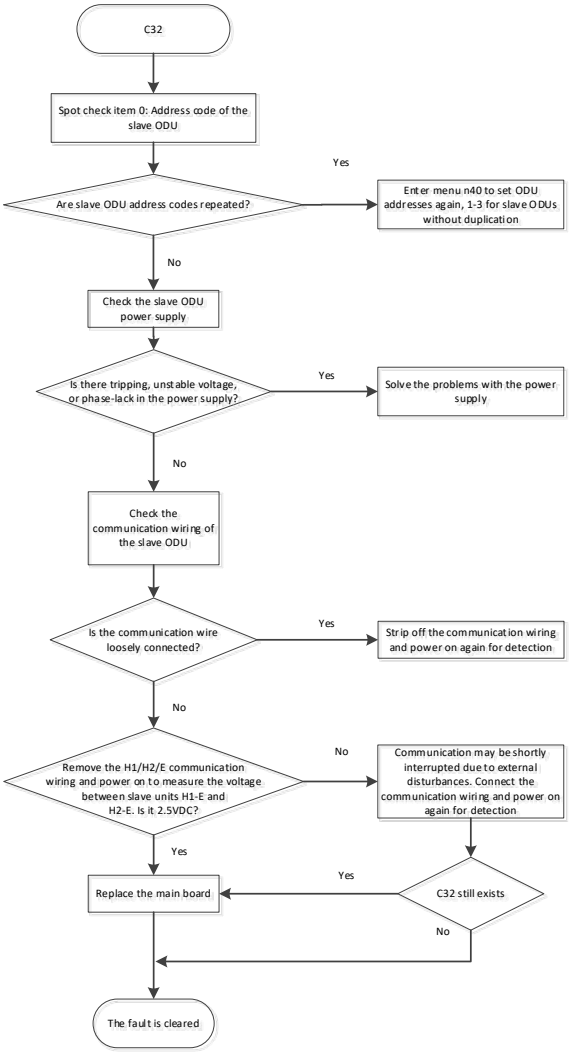
2.12.3 Trigger / recover condition

- Trigger condition:The number of online outdoor slave units detected by the outdoor master unit decreases
- Recover condition: The number of outdoor units online restored to actual connections
- Reset method: Resume automatically

2.12.4 Possible causes

- Some outdoor slave units are powered off
- The slave outdoor units' address are repeated
- The communication wiring between the master and slave units is disconnected, the communication wiring of the ODU has poor contact
- Outdoor main control board is damaged

2.12.5 Procedure



2.13 C33: Abnormal increase in the number of outdoor units

2.13.1 Digital display output

2.13.2 Description

- The number of online outdoor slave units detected by the outdoor master unit increases
- All units stop running.
- Error code is only displayed on the master unit

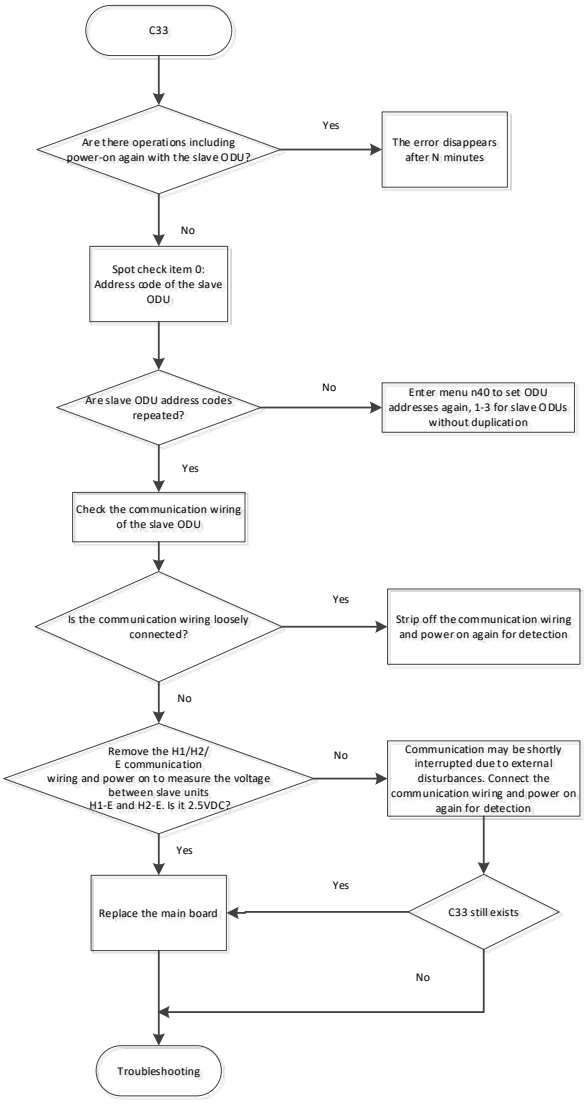
2.13.3 Trigger / recover condition

- Trigger condition:One or more slave Outdoor unit is newly connected during system operation
- Recover condition: Number of outdoor units online restored to actual connections
- Reset method: Resume manually

2.13.4 Possible causes

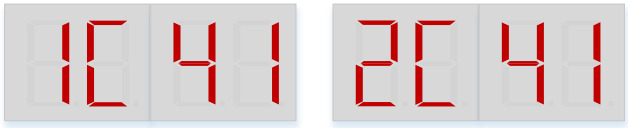
- An additional new ODU is connected to a combined system.
- The address of the slave ODU is corrected after a fault of ODU address setting occurs.
- The address of the slave ODU is repeated.
- Communication is interrupted due to poor contact of the slave ODU communication wiring.

2.13.5 Procedure



2.14 xC41: Communication Error between main control board and No.x inverter driver board

2.14.1 Digital display output



2.14.2 Description

- The communication between the main control board and No.x inverter driver board is error
- All units stop running.
- Error code is displayed on the unit with the error

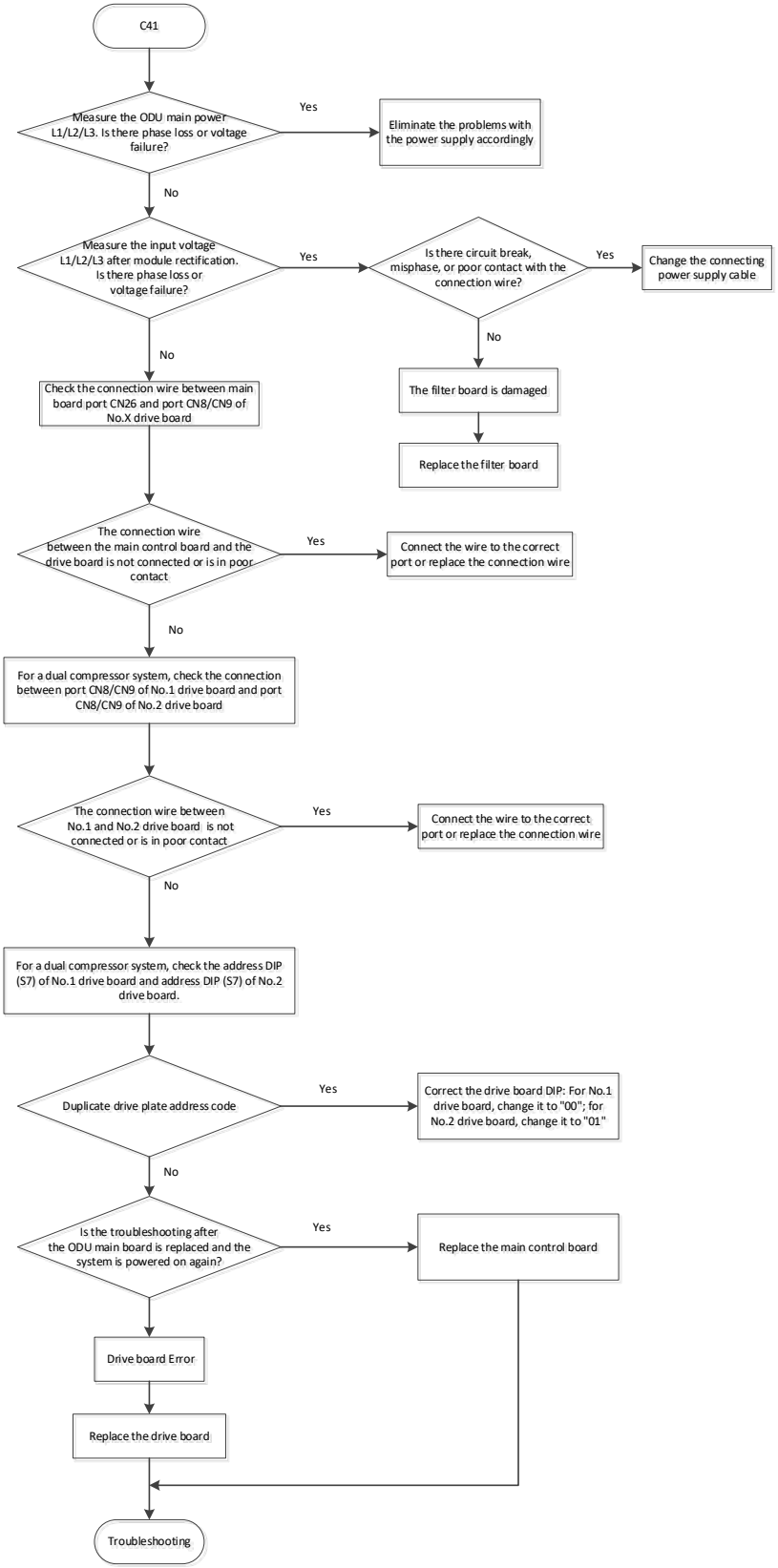
2.14.3 Trigger / recover condition

- Trigger condition: Communication between main control board and No.x 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.

2.14.4 Possible causes

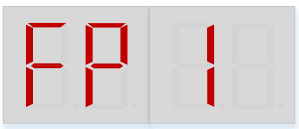
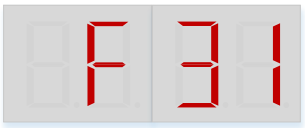
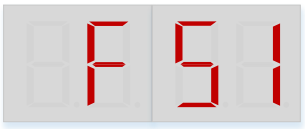
- The connection wire between port CN8/CN9 of No. x drive board and port CN26 of the ODU main control board is poorly connected or disconnected.
- In a dual-compressor system, the connection wire between port CN8 of No. 1 drive board and port CN9 of No. 2 drive board is poorly connected or disconnected.
- In a dual-compressor system, the address of DIP switch S7 of No. 1 drive board and that of DIP switch S7 of No. 2 drive board are duplicate (the correct addresses are: "00" for No. 1 drive board and "01" for No. 2 drive board).
- The main power has L1/L2/L3 misphase or abnormal voltage.
- The filter board is damaged.
- No. x inverter drive board is damaged.
- The ODU main control board is damaged

2.14.5 Procedure



2.15 E41,F31,F51,xF71,F81,F91,FC1,xFd1,Fp1: Temperature sensor error

2.15.1 Digital display output

Error code	Error description	Remarks	Digital display output
E41	Outdoor ambient temperature sensor (**T4**) error(open/short)	sensor error	
F81	Gas pipe temperature sensor (**Tg**) error (open/short)	sensor error	
FC1	Outdoor heat exchanger liquid temperature sensor (**TL**) error (open/short)	sensor error	
Fp1	Electric control box chamber temperature sensor (**Tb**) error (open/short)	sensor error	
F31	Microchannel heat exchanger outlet temperature sensor(**T6B**) error(open/short)	sensor error	
F51	Microchannel heat exchanger inlet temperature sensor(**T6A**) error(open/short)	sensor error	
F91	Liquid pipe temperature sensor (**T5**) error (open/short)	sensor error	
xFd1	Compressor suction temperature sensor (**T71/T72**) error (open/short)	sensor error	
xF71	Discharge temperature sensor(**T7C1/T7C2**) error (open/short)	sensor error	

2.15.2 Description

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

2.15.3 Trigger / recover condition

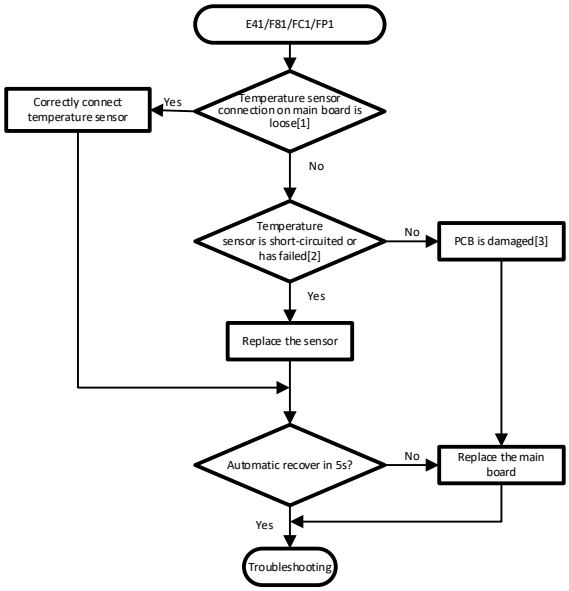
- Trigger condition:The main control board cannot obtain the normal AD value of the temperature sensor
- Recover condition:The main control board obtain the normal AD value of the temperature sensor
- Reset method: Resume automatically.

2.15.4 Possible causes

- The temperature sensor is not properly connected to the main control board.
- The sensor is short-circuited or fails.
- The main control board is damaged

2.15.5 Procedure

1. E41/F81/FC1/FP1



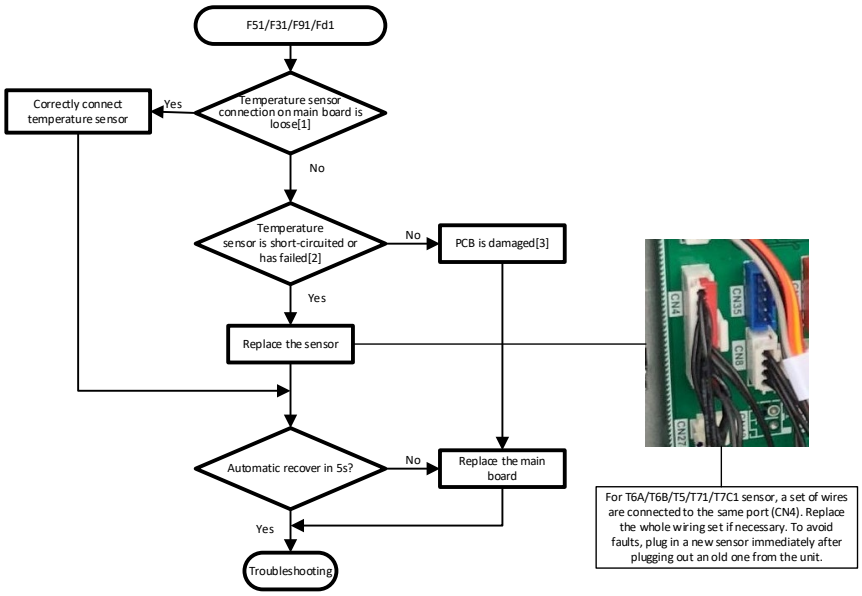
Notes:

[1].The port CN30 (T4), CN16 (Tg), CN3 (TL) and CN11 (Tb) on the main control board corresponding to the Temperature sensor refer to *Table5.2.1: Main Control Board port*.

[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, the sensor is short-circuited, whereas, if the impedance is very higher than 380 kΩ, the sensor is open-circuited (Refer to *Table 6.5.2: Temperature sensor temperature resistance characteristic table*)

[3]. Measure the voltage of the port CN30 (T4), CN16 (Tg), CN3 (TL) and CN11 (Tb) 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. F51/F31/F91/Fd1



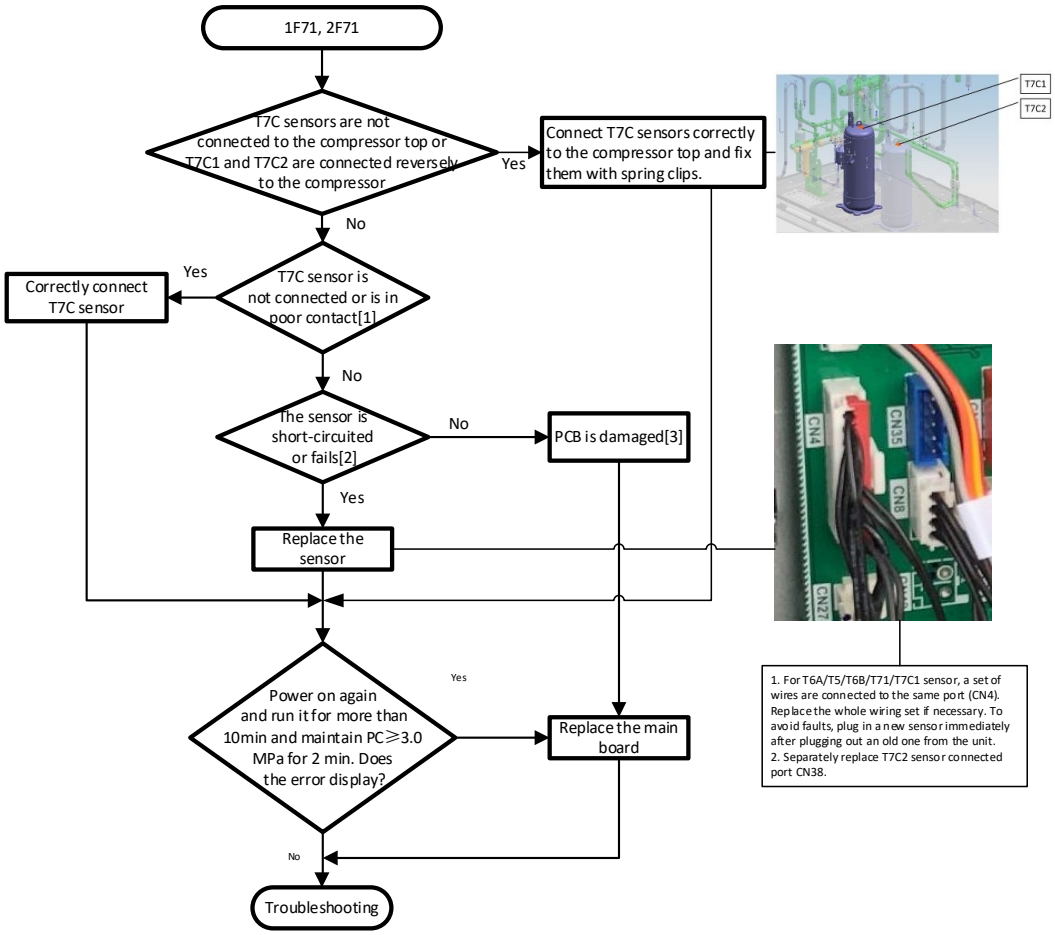
Notes:

[1].The port CN4 (T6A, T6B, T5, T71) on the main control board corresponding to the Temperature sensor refer to *Table5.2.1: Main Control Board port*.

[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, the sensor is short-circuited, whereas, if the impedance is very higher than 380 kΩ, the sensor is open-circuited (Refer to *Table 6.5.2: Temperature sensor temperature resistance characteristic table*)

[3]. Measure the voltage of the port CN4 (T6A, T6B, T5, T71) 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

3. xF71



Notes:

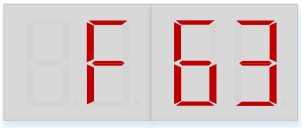
[1].The port CN4 pin (T7C1) on the main control board and port CN38 (T7C2) on the main control board corresponding to the Temperature sensor refer to *Table5.2.1: Main Control Board port*.

[2].Measure sensor resistance. Removing the sensor and Use a multimeter to measure the sensor access resistance: If the resistance value is smaller than 0.97 kΩ, the sensor is short-circuited, whereas, if the impedance is very higher than 743 kΩ, the sensor is open-circuited (Refer to *Table 6.5.2: Temperature sensor temperature resistance characteristic table*)

[3]. Measure the voltage of the port CN4 (T6A, T6B, T5, T71) 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

2.16 F63: Non-inductive resistance Tr overtemperature protection

2.16.1 Digital display output



2.16.2 Description

- The temperature of the Tr non-inductive resistance NTC is too high.
- All units stop running
- Error code is displayed on the outdoor unit with the Error

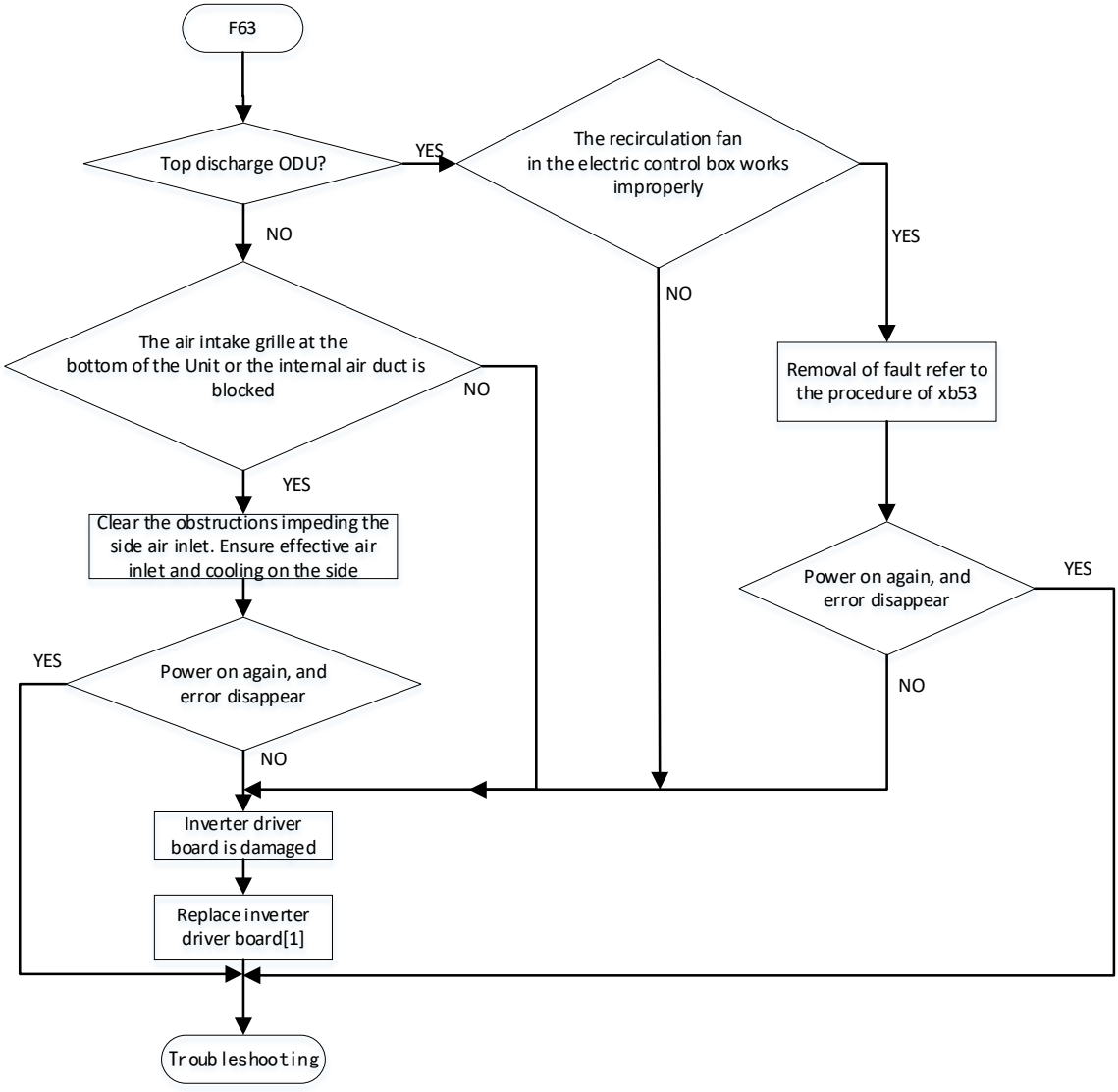
2.16.3 Trigger/ Recover condition

- 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

2.16.4 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

2.16.5 Procedure



Notes:

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

2.17 F72, F7A: Discharge Temperature protection

2.17.1 Digital display output

2.17.2 Description

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

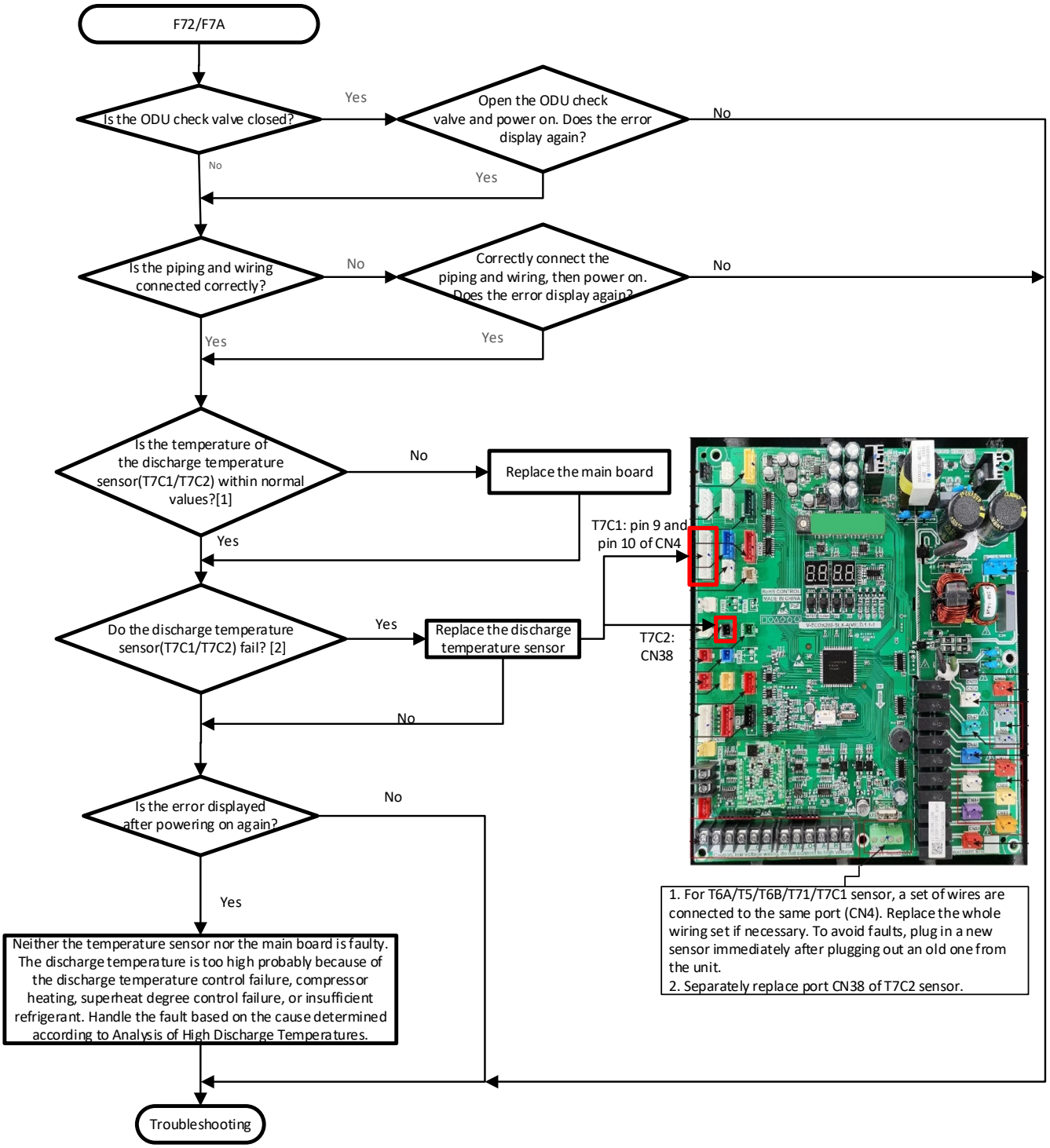
2.17.3 Trigger / Recover condition

- 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

2.17.4 Possible causes

- The ODU check valve is not opened.
- Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.
- The discharge temperature sensor (T7C1/T7C2) has failed.
- The main board PCB is damaged.
- The system has insufficient refrigerant, SV7 has seized and cannot be opened, the ODU or IDU EEV cannot be opened normally, or the ODU check valve is not opened.

2.17.5 Procdure



Notes:

[1]. Connect 10K resistor to pin 9 and pin 10 of CN4, Spot check item 19: If the discharge temperature of T7C1 is not within 69±5°C, the main board failure, should replace the main board; Connect 10K resistor to CN38, Spot check item 20: If the temperature of T7C2 is not within 69±5°C. (Not required for a single compressor system)

[2]. Pull T7C1 and T7C2 sensors out of the compressor and let them rest in the air for 5min. Spot-check the difference between item 19 (T7C1 temperature) and item 20 (T7C2) temperature (not required for a single compressor system) and item 15 (ambient temperature T4). If the difference is greater than 5°C, the sensor has failed.

2.18 F75: Compressor discharge insufficient superheat protection

2.18.1 Digital display output

2.18.2 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.

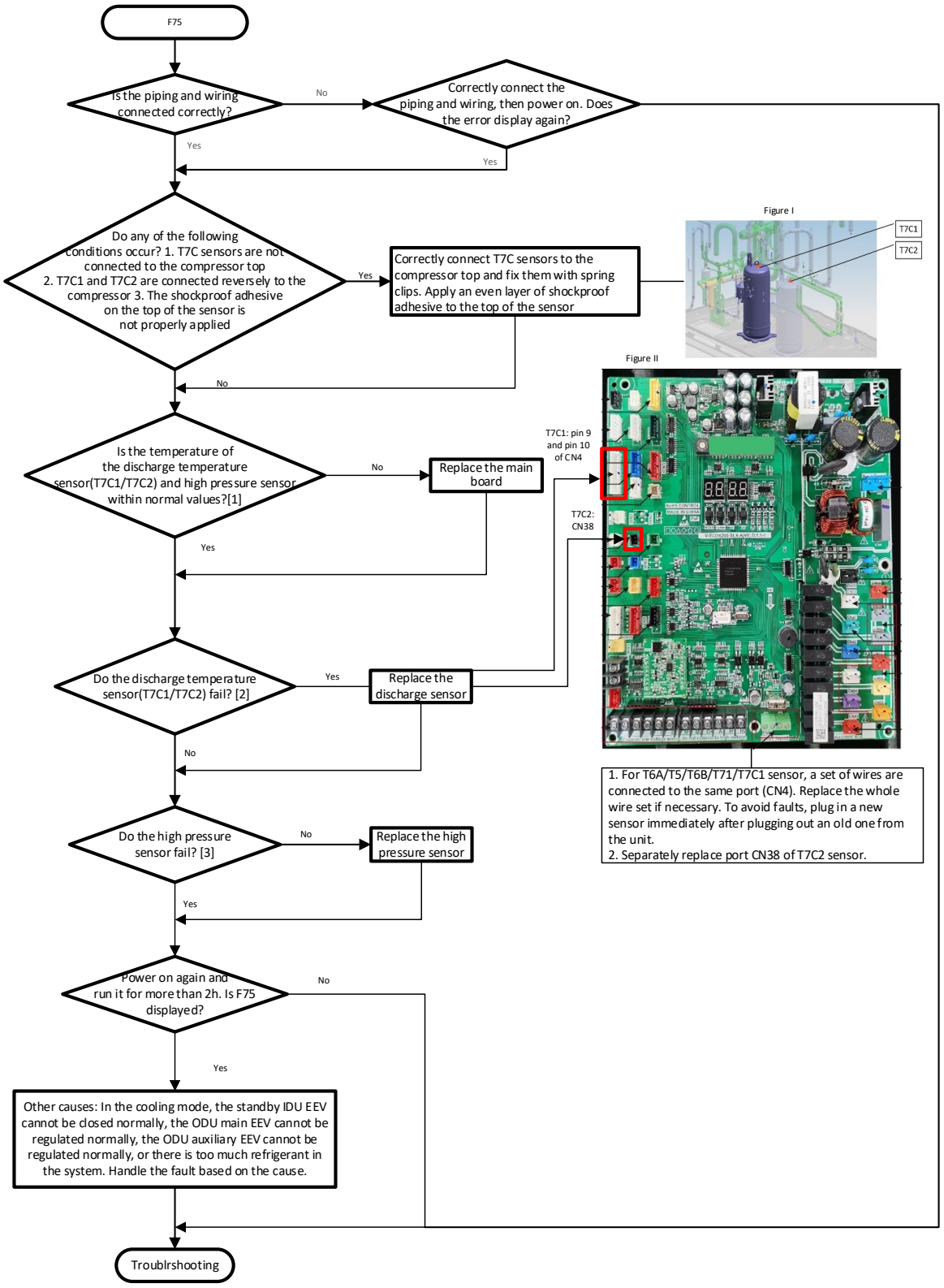
2.18.3 Trigger / recover condition

- 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

2.18.4 Possible causes

- Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.
- The discharge temperature sensor is not correctly connected or has failed.
- The high pressure sensor is not correctly connected or has failed.
- The ODU main board is damaged.
- Certain IDU EEVs that are not opened in the cooling mode are not closed properly.
- The ODU main EEV cannot be adjusted normally.
- The ODU auxiliary EEV cannot be adjusted normally.
- There is too much refrigerant in the system.

2.18.5 Procedure



Notes:

[1]. Connect 10K resistor to pin 9 and pin 10 of CN4, Spot check item 19: If the discharge temperature of T7C1 is not within 69±5°C, the main board failure, should replace the main board; Connect 10K resistor to CN38, Spot check item 20: If the temperature of T7C2 is not within 69±5°C, the main board failure, should replace the main board. (Not required for a single compressor system); Connect 10K resistor to pin 2 and pin 3 of CN40. Spot check item 35: If the high pressure is not within 3.73±0.2 MPa, the main board failure, should replace the main board

[2]. Pull T7C1 and T7C2 sensors out of the compressor and let them rest in the air for 5min. Spot-check the difference between item 19 (T7C1 temperature) and item 20 (T7C2) temperature (not required for a single compressor system) and item 15 (ambient temperature T4). If the difference is greater than 5°C, the sensor has failed.

[3]. Enter the MENU vacuum mode (n15) after power off. After 5min, spot-check item 35 (HP pressure) and item 36 (LP pressure); If the P_{HP}-P_{LP} ＞ 0.2MPa, the high pressure sensor failure, should replace the high pressure sensor.

2.19 P11: High pressure sensor error

2.19.1 Digital display output

2.19.2 Description

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

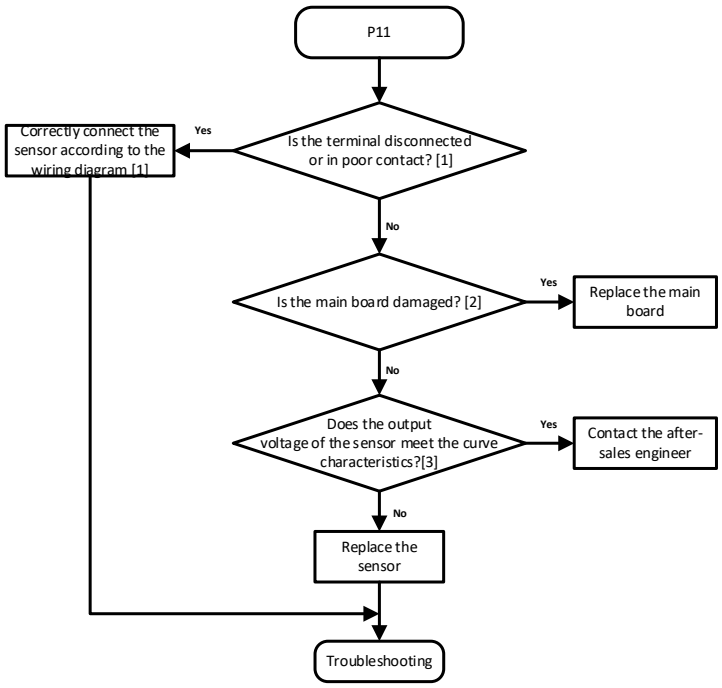
2.19.3 Trigger / recover condition

- Trigger condition: The high pressure sensor is open-circuited (the output voltage is 0V) or short-circuited.
- Recover condition: The voltage detected by the pressure sensor is within 0-5.0V.
- Reset method: Resume automatically.

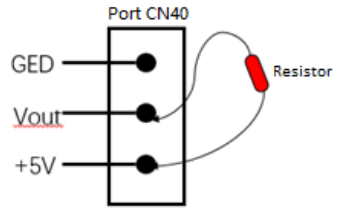
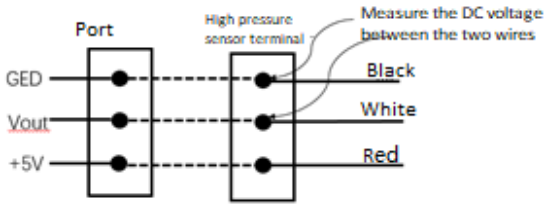
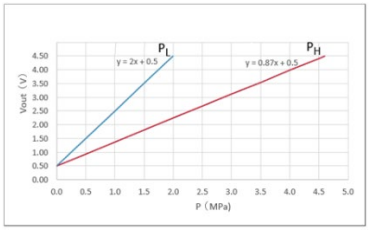
2.19.4 Possible causes

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

2.19.5 Procedure

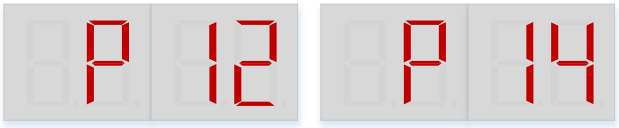


Notes:
[1]. The ports on the main control board corresponding to the high pressure sensor are CN40; ensure that the sensor port is free of contaminants such as water.
[2] How to determine main board failure: The unit is powered on and in standby, the sensor is unplugged. Connect 10K resistor to the two pin holes under port CN40 of the main board, as shown in Figure 1. Observe whether P11 disappears. The main board is normal if the error disappears; otherwise, the main board is damaged.
[3] Measure the output voltage of a sensor as shown in Figure 2. The relationship between HP pressure and output voltage characteristics as shown in Figure 3.

Figure 1: Resistor connection method	Figure 2: Measure the output voltage of a sensor	Figure 3: High pressure and output voltage characteristics
		

2.20 P12/P14: High pressure protection

2.20.1 Digital display output



2.20.2 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

2.20.3 Trigger / recover condition

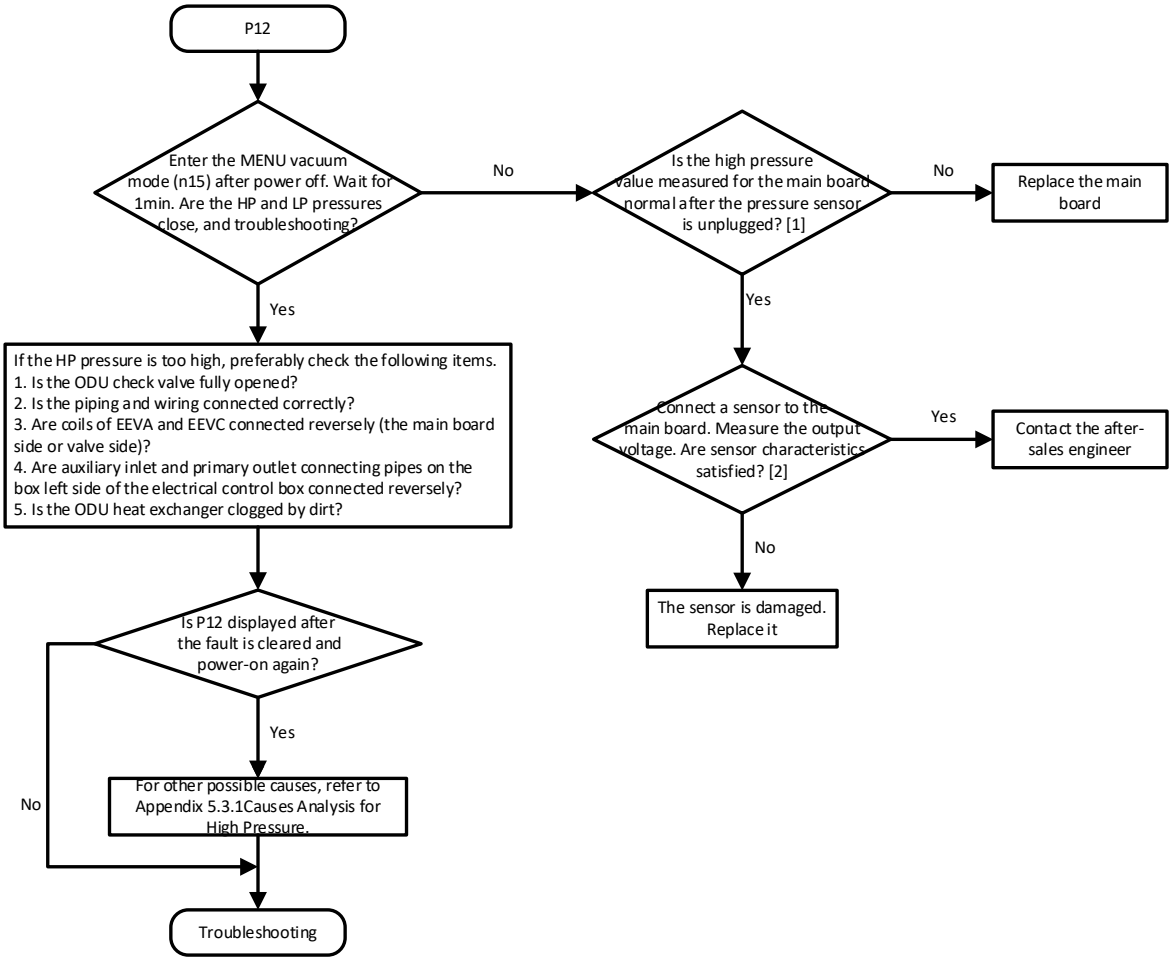
- Trigger condition:
  - P12: $P_{high\ pressure} \geqslant$ 4.15 MPa.
  - P14: P12 occurs 3 times within 100 minutes
- Recover condition:
  - P12: $P_{high\ pressure}$ < 3.5MPa
  - P14: Remove high pressure protection from Outdoor Unit
- Reset method:
  - P12: Resume automatically.
  - P14: Resume manually

2.20.4 Possible causes

- Pressure sensor damaged
- Outdoor main control board damaged.
- Refer to Appendix 5.3.1 - Cause Analysis of too high Pressure.

  Common causes of high pressure in operation:
  - The ODU check valve is not opened.
  - Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.
  - Coils of EEVA and EEVC are connected reversely (the main board side or valve side).
  - The auxiliary inlet and primary outlet connecting pipes on the left side of the electrical control box are connected reversely.
  - The ODU heat exchanger is clogged by dirt.

2.20.5 Procedure



Notes:

[1] The ports on the main control board corresponding to the high pressure sensor are CN40, ensure that the sensor port is free of contaminants such as water. There are two ways to determine whether the detected high pressure value of the main board is correct:

1.1 Connect the T4 ambient temperature sensor terminal (CN30) to the two pins of the port of the high pressure sensor, as shown in Figure 1, the temperature-pressure relationship as shown in Figure 2.

1.2 Connect 10K resistor to the two pins of the port of the high pressure sensor, as shown in Figure 1. Spot-check the HP pressure = 3.73 (±0.2) MPa. If so, the main board is normal; otherwise, the main board is damaged.

[2] Measure the output voltage of a sensor as shown in Figure 3. The relationship between HP pressure and output voltage characteristics as shown in Figure 4.

Figure 1: Resistor connection method

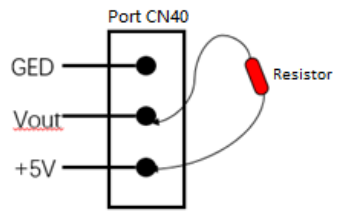


Figure 2: Temperature-pressure relationship

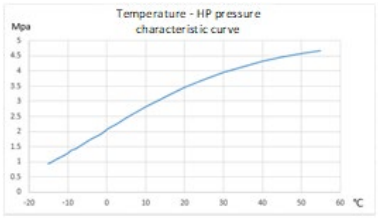


Figure 3: Measure the output voltage of a sensor

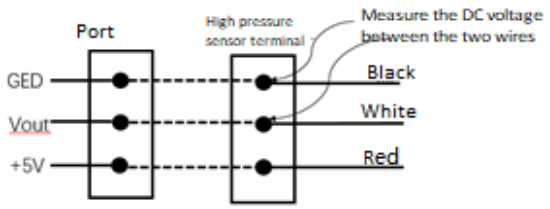
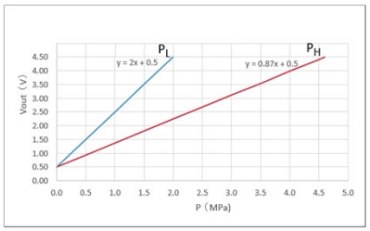


Figure 4: High pressure and output voltage characteristics



2.21 P13: High pressure switch protection

2.21.1 Digital display output

2.21.2 Description

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

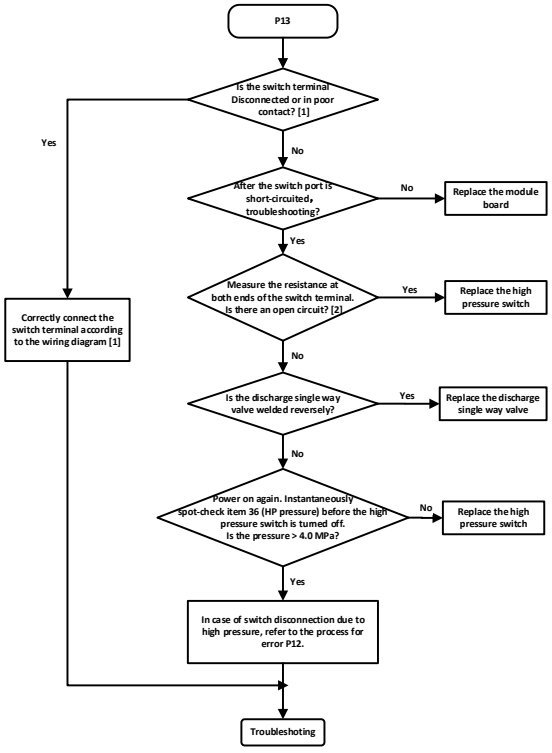
2.21.3 Trigger / recover condition

- Trigger condition: discharge pressure≥ 4.1MPa or the switch is open-circuited.
- Recover condition: pressure switch is closed.
- Reset method: Resume automatically.

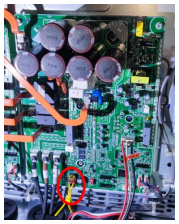
2.21.4 Possible causes

- Discharge single way valve is welded reversely.
- Pressure switch is not correctly connected or is damaged.
- Outdoor main control board damaged.
- For other causes, refer to Appendix 5.3.1 - Cause Analysis of too high Pressure.

2.21.5 Procedure



Note:
[1]. The High pressure switch port is connected to the Outdoor Unit Inverter driver board port CN21, the port is red and the switch wiring is yellow, as shown in figure below. Ensure that the sensor port is free of contaminants such as water.
[2]. Unplug the pressure switch and measure the resistance at both ends. If the resistance is 0-2 Ω, the switch is normal; if the resistance is infinite, there is an open circuit, and the switch is faulty.
[3]. Caution: There is high voltage at the port. Power off before operation



2.22 P21: Low pressure sensor error

2.22.1 Digital display output

2.22.2 Description

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

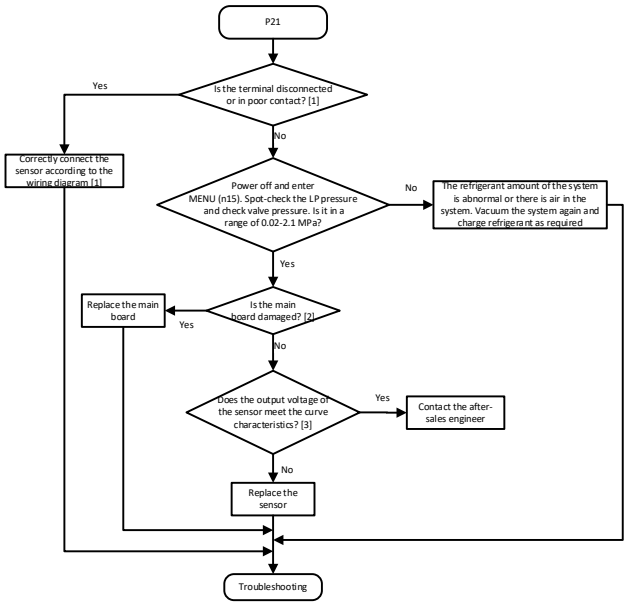
2.22.3 Trigger / recover condition

- Trigger condition: $P_{Low\ Pressure} < 0.02MPa$ or $P_{Low\ Pressure} > 2.1MPa$ (including sensor open circuit).
- Recover condition: $0.02Mpa \leqslant P_{Low\ Pressure} \leqslant 2.1Mpa$
- Reset method: Resume automatically.

2.22.4 Possible causes

- There is air in the system.
- Low pressure sensor is not correctly connected to the main board.
- There is no refrigerant in the system.
- Pressure exceeds the operating range.
- Outdoor unit main board is damaged.
- Pressure sensor has failed.

2.22.5 Procedure

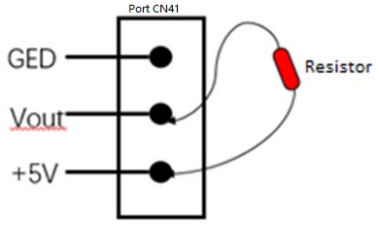
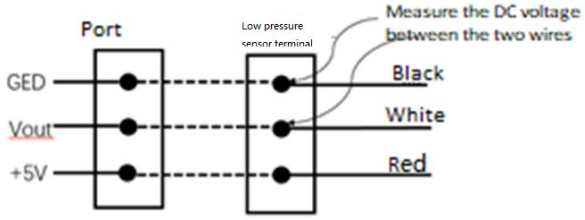
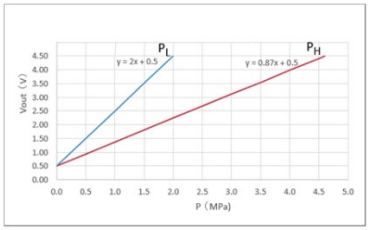


Notes:

[1]. The ports on the main control board corresponding to the low pressure sensor are CN41; ensure that the sensor port is free of contaminants such as water.

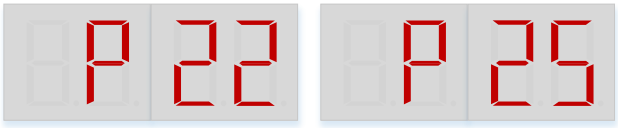
[2] How to determine main board failure: The unit is powered on and in standby, the sensor is unplugged. Connect 10K resistor to the two pin holes under port CN41 of the main board, as shown in Figure 1. Observe whether P21 disappears. The main board is normal if the error disappears; otherwise, the main board is damaged.

[3] Measure the output voltage of a sensor as shown in Figure 2. The relationship between LP pressure and output voltage characteristics as shown in Figure 3.

Figure 1: Resistor connection method	Figure 2: Measure the output voltage of a sensor	Figure 3: Low pressure and output voltage characteristics
		

2.23 P22/P25: Low pressure protection

2.23.1 Digital display output



2.23.2 Description

- P22: Low pressure protection;
- P25: Low pressure protection occurs 3 times in 60 min.
- All units stop running.
- Error code is displayed on the unit with the error.

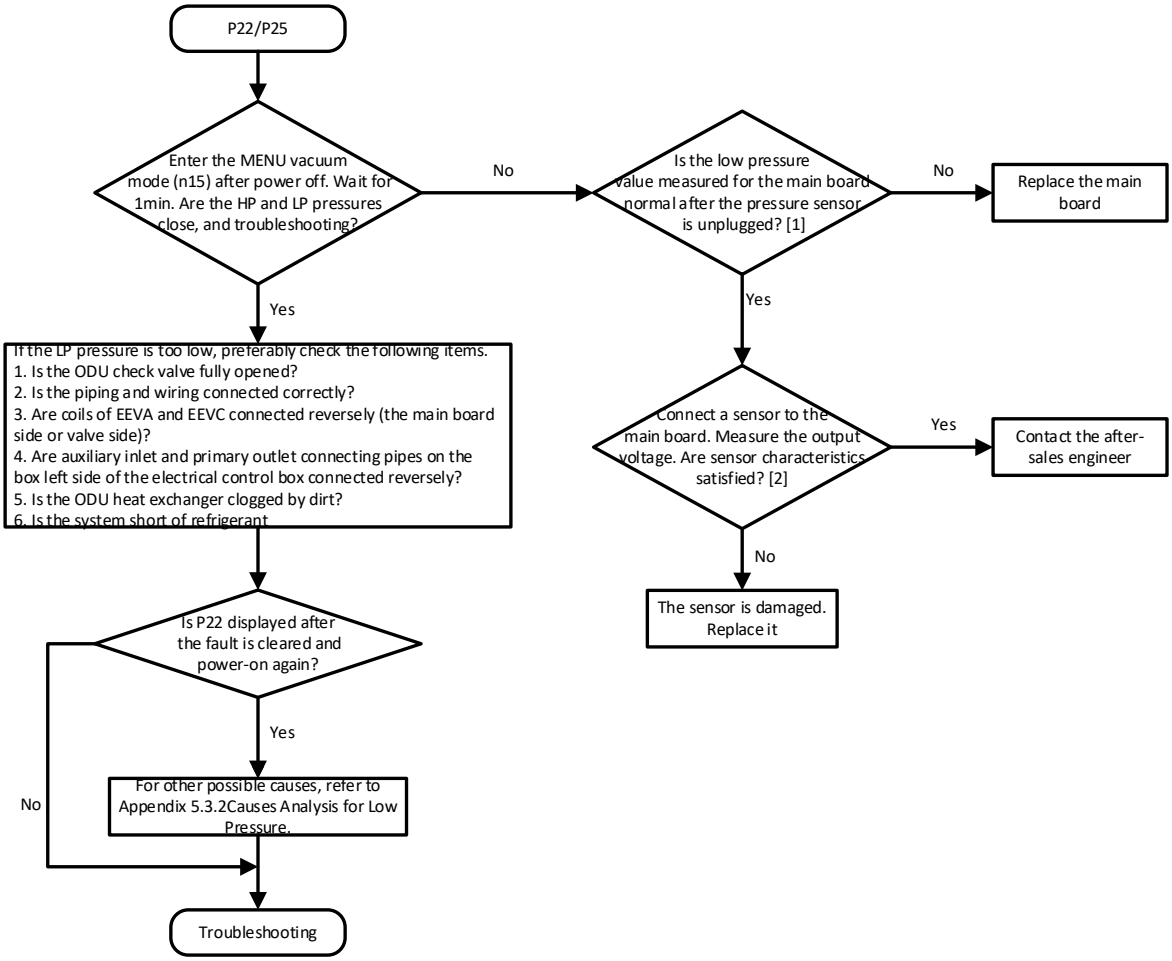
2.23.3 Trigger/ Recover condition

- 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

2.23.4 Possible causes

- ODU check valve is not opened.
- Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.
- Sensor detection is abnormal.
- Outdoor unit main board is damaged.
- Refer to Appendix - Cause Analysis of too Low Pressure.
  Common causes of low pressure in operation:
  - Coils of EEVA and EEVC are connected reversely (the main board side or valve side).
  - The auxiliary inlet and primary outlet connecting pipes on the left side of the electrical control box are connected reversely.
  - EEVA is seized and cannot be opened in heating mode.
  - Insufficient refrigerant in the system.
  - Low-pressure side piping is clogged by ice.
  - Ourdoor unit heat exchanger is clogged by dirt.

2.23.5 Procedure



Notes:

[1] The ports on the main control board corresponding to the high pressure sensor are CN41, ensure that the sensor port is free of contaminants such as water. There are two ways to determine whether the detected high pressure value of the main board is correct:

1.1 Connect the T4 ambient temperature sensor terminal (CN31) to the two pins of the port of the low pressure sensor, as shown in Figure 1, the temperature-pressure relationship as shown in Figure 2.

1.2 Connect 10K resistor to the two pins of the port of the low pressure sensor, as shown in Figure 1. Spot-check the LP pressure = 1.61 (±0.05) MPa. If so, the main board is normal; otherwise, the main board is damaged.

[2] Measure the output voltage of a sensor as shown in Figure 3. The relationship between LP pressure and output voltage characteristics as shown in Figure 4.

Figure 1: Resistor connection method	Figure 2: Temperature-pressure relationship

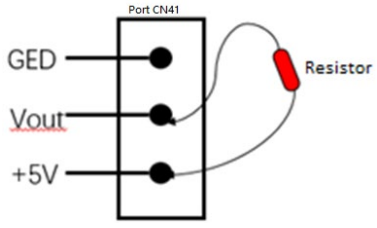
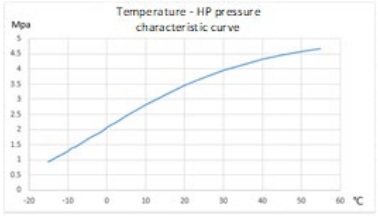
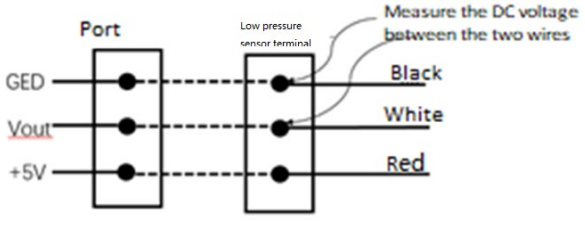
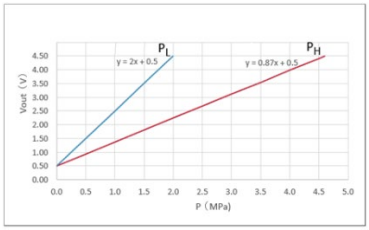
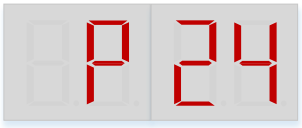

	

Figure 3: Measure the output voltage of a sensor	Figure 4: Low pressure and output voltage characteristics
	

2.24 P24: Low Pressure too High Protection

2.24.1 Digital display output



2.24.2 Description

- All units stop running.
- ODU fault is determined based on the sensor.
- Error code is displayed on the unit with the error

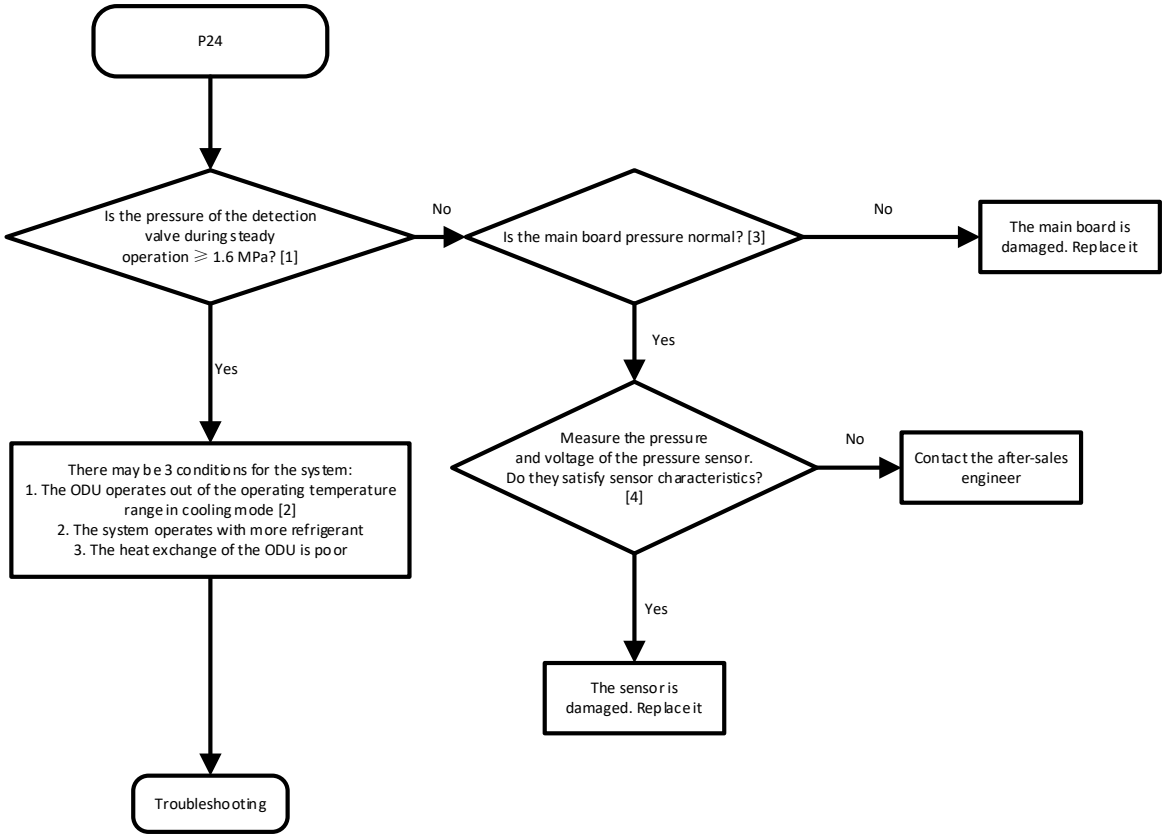
2.24.3 Trigger/ Recover condition

- Trigger condition: Suction pressure >1.6MPa and lasts 60 minutes
- Recover condition: Outdoor unit power off and resume automatically after 1 minute.
- Reset method: Resume automatically

2.24.4 Possible causes

- Low pressure of the system is too high:
  1. There is too much refrigerant.
  2. The ambient temperature of the Outdoor unit exceeds the operating range.
  3. Heat exchange of the ODU is severely poor.
- Outdoor unit main board is damaged.
- Sensor fault

2.24.5 Procedure



Notes:

[1] As shown in Figure 1, the position of the check port is the same as the position of the low pressure sensor. As a result, this pressure is an accurate reading.

[2] When the ambient temperature of an ODU is higher than 55°C, the LP pressure may be higher than expected.

[3] There are two ways to determine whether the detected Low pressure value of the main board is correct.

3.1 Connect the T4 ambient temperature sensor terminal to the lower two pins of the port of the low pressure sensor, as shown in Figure 2. The temperature-pressure relationship, as shown in Figure 3.

3.2 Connect 10K resistor to the lower two pins of the port of the low pressure sensor, as shown in Figure 3. Spot-check whether the LP pressure is equal to 1.61 (±0.2) MPa. If so, the main board is normal; otherwise, the main board is damaged.

[4] Measure the output voltage of a sensor as shown in Figure 4. The relationship between LP pressure and output voltage characteristics as shown in Figure 5

Figure 1: Position of the check port

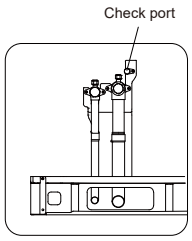


Figure 2: Resistor connection method

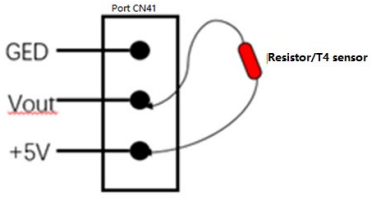


Figure 3: Temperature-pressure relationship

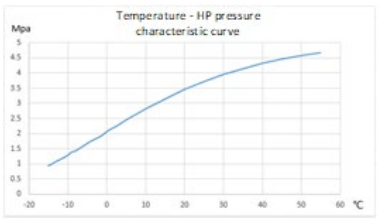


Figure 4: Measure the output voltage of a sensor

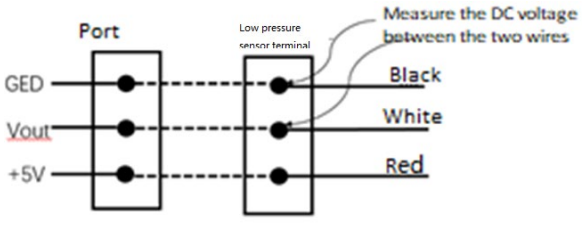
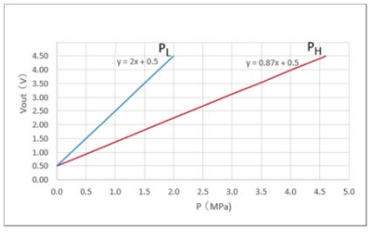
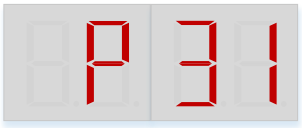


Figure 5: Low pressure and output voltage characteristics



2.25 P31: Primary Side Overcurrent Protection

2.25.1 Digital display output



2.25.2 Description

- The AC current at the device primary side is too high, which triggers protective shutdown. The current is transmitted by the module to the main control board.
- All units stop running
- Error code is displayed on the unit with the error

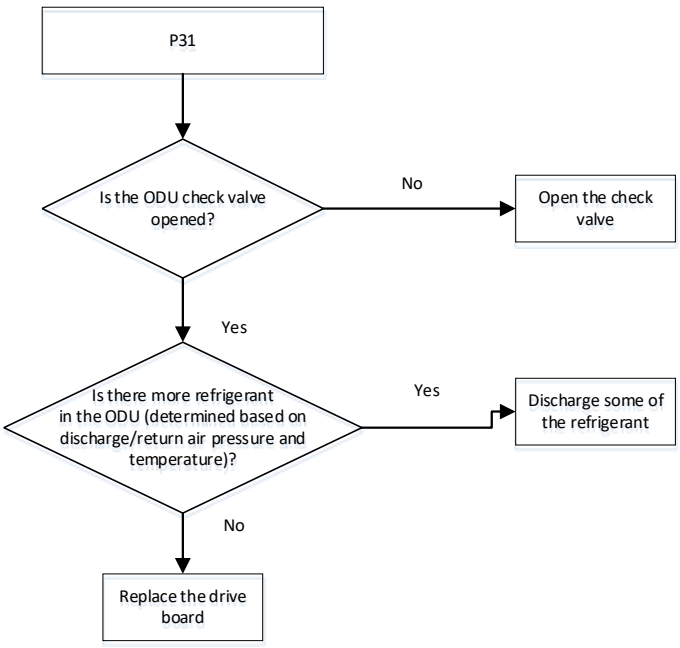
2.25.3 Trigger/ Recover condition

- Trigger condition: The primary-side AC current of the device exceeds the threshold.
- Recover condition: The primary-side AC current of the device is within the threshold.
- Reset method: Resume automatically

2.25.4 Possible causes

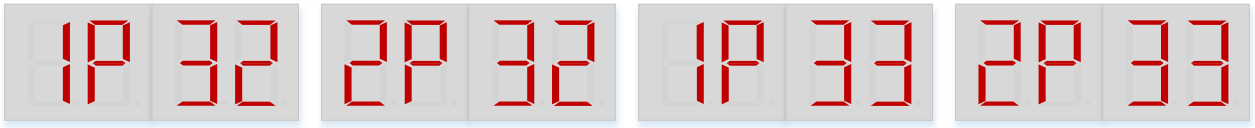
- The check valve is closed.
- The compressor experiences slugging due to excessive refrigerant in the system.
- The drive board fault.

2.25.5 Procedure



2.26 xP32, xP33: No.(x) compressor high DC bus current protection

2.26.1 Digital display output



2.26.2 Description

- The DC bus current of No.x compressor is too high, triggering protection shutdown
- All units stop running.
- Error code is displayed on the unit with the error.

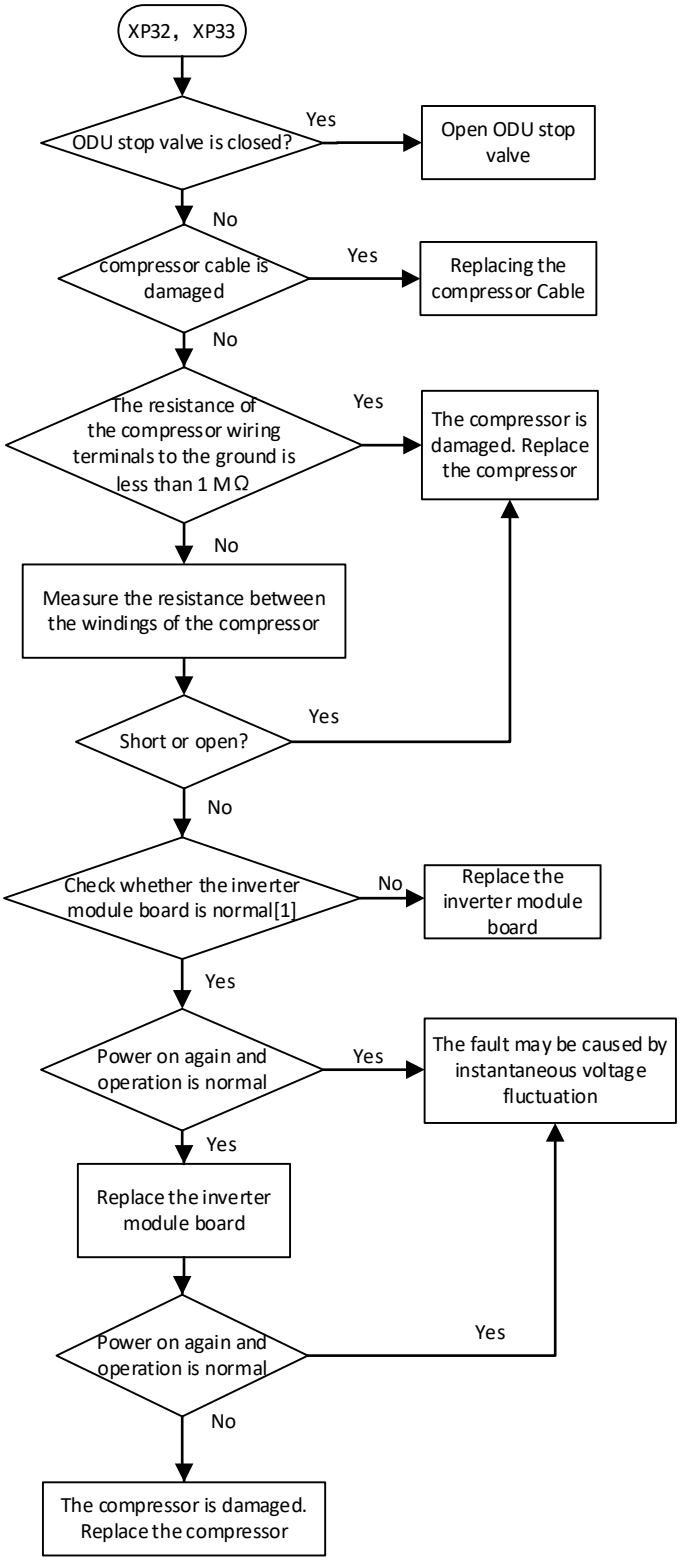
2.26.3 Trigger / recover condition

- Trigger condition:
  P32: During operation, the DC bus current of any compressor exceeds the upper limit
  P33: Within 100min, No.x 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

2.26.4 Possible causes

- The compressor is overloaded.
- The module board is damaged.
- The compressor cable is not connected.
- The compressor is damaged.

2.26.5 Procedure

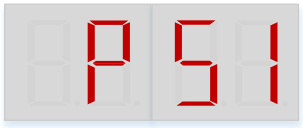


Note:

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

2.27 P51: High AC voltage protection

2.27.1 Digital display output



2.27.2 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.

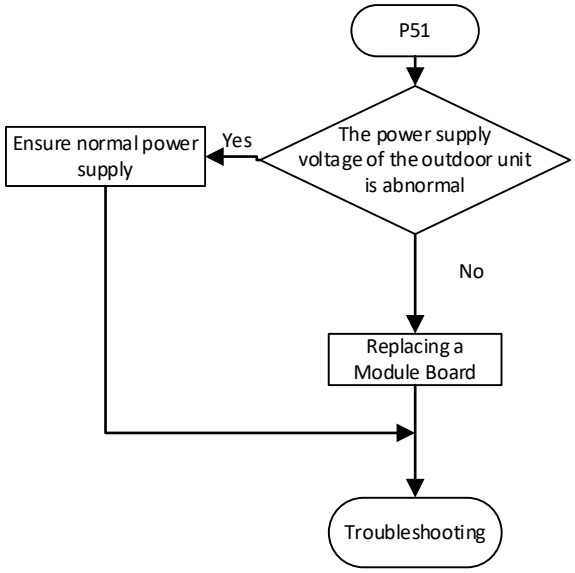
2.27.3 Trigger / recover condition

- 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.

2.27.4 Possible causes

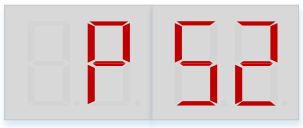
- The power supply voltage is too high
- The module is damaged.

2.27.5 Procedure



2.28 P52: Low voltage protection

2.28.1 Digital display output



2.28.2 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

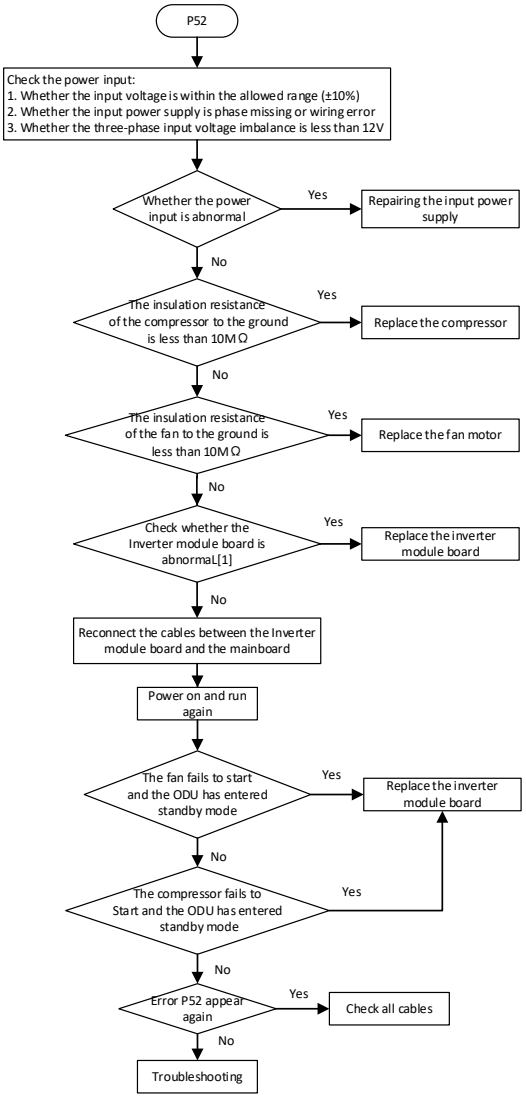
2.28.3 Trigger / recover condition

- 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.

2.28.4 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

2.28.5 Procedure

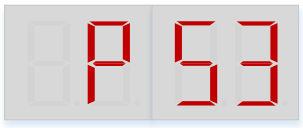


Note:

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

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

2.29.1 Digital display output



2.29.2 Description

- System phase and neutral wires are connected reversely and fail the inspection
- All units stop running
- Error code is displayed on the unit with the error

2.29.3 Trigger / recover condition

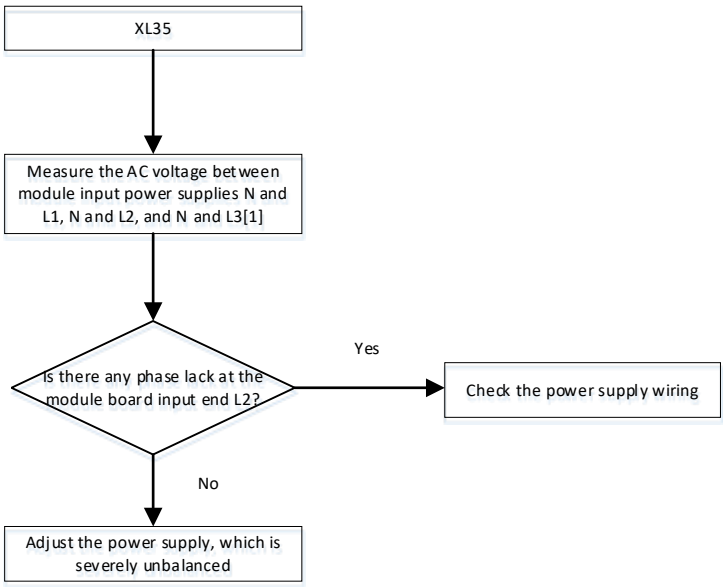
- Trigger condition: The drive board uploads L35 fault
- Recover condition: The drive board does not upload L35 fault
- Reset method: Resume automatically

2.29.4 Possible causes

- Outdoor Uint power supply B N is inversely connected
- Cables in the electric control box are loose
- The module board PCB is damaged

2.29.5 Procedure

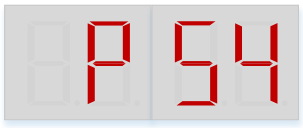
Perform troubleshooting based on the xL35



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.

2.30 P54: DC bus low voltage protection

2.30.1 Digital display output



2.30.2 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

2.30.3 Trigger / recover condition

- Trigger condition: The drive board uploads XL3E fault
- Recover condition: The drive board does not upload XL3E fault.
- Reset method: Resume automatically

2.30.4 Possible causes

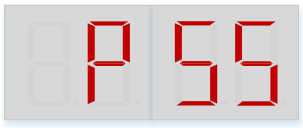
- The input voltage is too low
- The power supply loose phase
- The model power supply information is incorrectly configured
- Compressor inverter driver board is damaged

2.30.5 Procedure

Troubleshoot according to xL3E

2.31 P55: DC bus ripple over protection

2.31.1 Digital display output



2.31.2 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

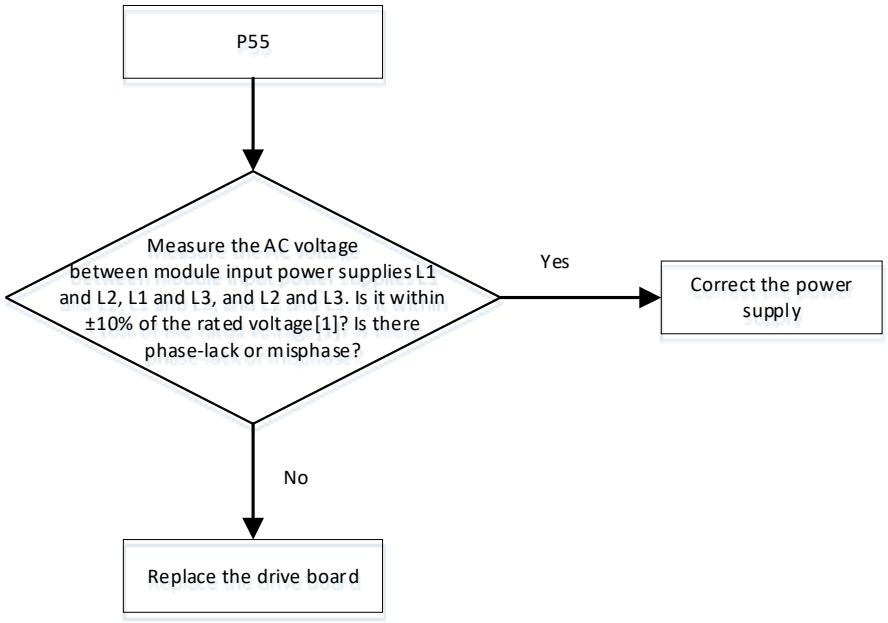
2.31.3 Trigger / recover condition

- Trigger condition: The DC bus ripple voltage uploaded by the drive board exceeds the threshold set by the main control board.
- Recover condition: The DC bus ripple voltage is lower than the threshold set by the main control board.
- Reset method: Resume automatically

2.31.4 Possible causes

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

2.31.5 Procedure



Note:
[1] When the system is powered on, use a multimeter to measure the voltages of the power input terminals L1, L2 and L3 of the inverter dirve board.

2.32 xP56: No.x inverter driver board DC bus voltage is too low

2.32.1 Digital display output

2.32.2 Description

- No.x inverter driver board DC bus voltage is too low
- All units stop running.
- Error code is displayed on the unit with the error

2.32.3 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.

2.32.4 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

2.32.5 Procedure

Troubleshoot according to xJ3E/xL3E

2.33 xP57: No.x inverter driver board DC bus voltage is too high

2.33.1 Digital display output

2.33.2 Description

- No.x inverter driver board DC bus voltage is too high
- All units stop running.
- Error code is displayed on the unit with the error

2.33.3 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.

2.33.4 Possible causes

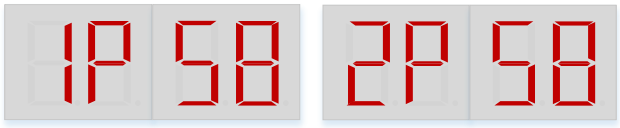
- The Outdoor Unit power supply is too high
- Inverter driver board is damaged

2.33.5 Procedure

Troubleshoot according to xJ31/xL31

2.34 xP58: No.x inverter driver board DC bus voltage is seriously too high

2.34.1 Digital display output



2.34.2 Description

- No.x inverter driver board DC bus voltage is seriously too high
- All units stop running
- Error code is displayed on the unit with the error

2.34.3 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.

2.34.4 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

2.34.5 Procedure

Troubleshoot according to xJ32/xL32

2.35 xP5A: Phase B Misphase of Inverter Module P5A Input Power Supply

2.35.1 Digital display output

2.35.2 Description

- The phase and neutral wires are connected reversely and fail the inspection.
- All units stop running
- Error code is displayed on the unit with the error

2.35.3 Trigger / recover condition

- Trigger condition: phase and neutral wires are connected reversely
- Recover condition: phase and neutral wires are connected correctly
- Reset method: Resume automatically.

2.35.4 Possible causes

- The B and N phases of the ODU power supply are connected reversely.
- The internal wiring of the electrical control box is loose.
- The module board PCB is damaged.

2.35.5 Procedure

Troubleshoot according to xL35

2.36 P71: Error in EEPROM

2.36.1 Digital display output

2.36.2 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

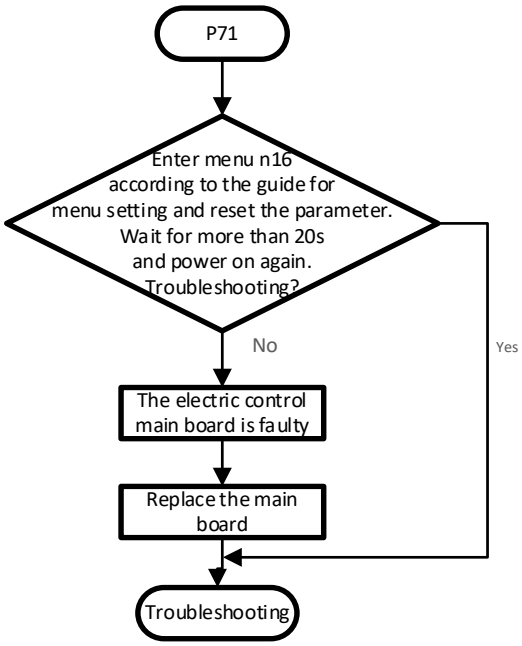
2.36.3 Trigger / recover condition

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

2.36.4 Possible causes

- EEPROM units damaged:
- Main control board is damaged
- Menu settings are incorrect

2.36.5 Procedure



2.37 Pb1: HyperLink overcurrent error

2.37.1 Digital display output

2.37.2 Description

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

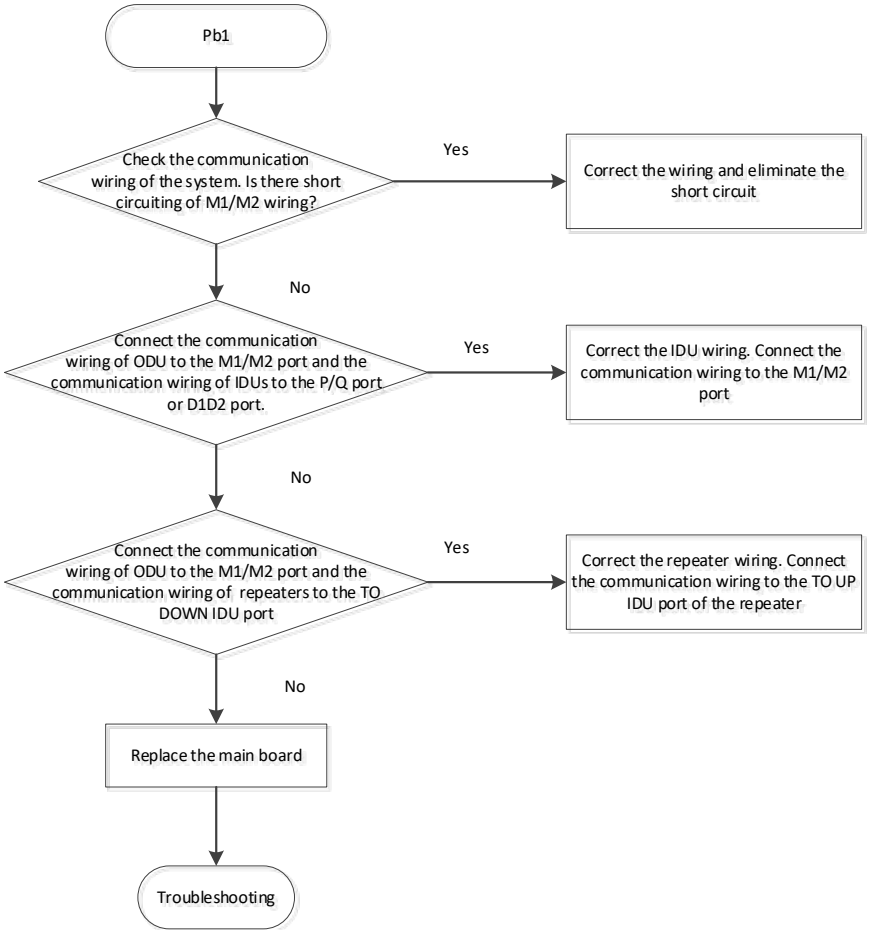
2.37.3 Trigger / recover condition

- Trigger condition: The M1M2 communication wiring is short-circuited, or M1M2 is connected to the 485 communication port by mistake
- Recover condition: Eliminate the short circuit/wrong connection
- Reset method: Automatic restoration if the error display time is less than 2h; power on again if the error display time is greater than 2h.

2.37.4 Possible causes

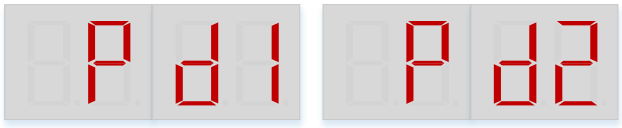
- The M1M2 communication wiring of the master ODU is short-circuited.
- The M1M2 communication wiring of the master ODU is connected to other communication wiring (not M1M2) of the IDU.
- The M1M2 communication wiring of the master ODU is connected to port “TO DOWN IDU” of the repeater.
- Main control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

2.37.5 Procedure



2.38 Pd1, Pd2: Anti-condensation protection

2.38.1 Digital display output



2.38.2 Description

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

2.38.3 Trigger / recover condition

- Trigger condition:
  Pd1: Liquid pipe inlet temperature (T5) remains lower than the anti-condensation setting temperature for more than 10 min
  Pd2: Pd1 protection occurs 2 times in 60 minutes
- Recover condition: Liquid pipe inlet temperature (T5) is higher than the anti-condensation setting temperature
- Reset method:
  Pd1: Resume automatically
  Pd2: Resume manually

2.38.4 Possible causes

- The ODU check valve is not opened.
- Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.
- EEVC fails and cannot be closed normally.
- Excessive refrigerant
- Temperature sensors T6A, T6B, and T5 are not installed in designated positions.
- Temperature sensors T6A, T6B, and T5 are damaged.
- The main board is damaged.

2.38.5 Procedure

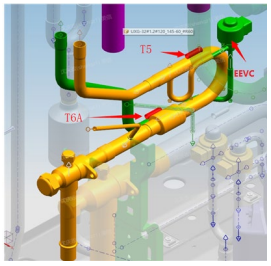
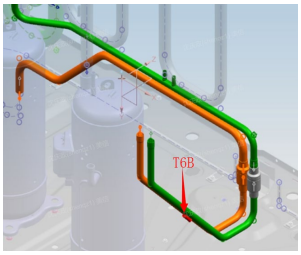
Notes:

[1] EEVC port of the main board is CN72. Both the port and terminal are green. The location of the EEVC as shown in Figure 1.

[2] The location of temperature sensor T6A/T5 as shown in Figure 1. The location of temperature sensor T6B (auxiliary out) as shown in Figure 2.

[3] In the shutdown state of the Bluetooth tool shows that the EEVC open degree of 0 after unplugging the EEVC coil (that is, the EEVC has been in a closed state). Power on the unit again, after the compressor starts to touch the T6A, observe whether there is a refrigerant flow through, if there is a refrigerant flow through the judgment of EEVC failure; otherwise, EEVC normal.

Note: After checking, the EEVC coil should be restored and then re-powered.

Figure 1: Location of the EEVC, T6A, T5	Figure 2: Location of the T6B
	

2.39 U11: Outdoor unit model is not set

2.39.1 Digital display output

2.39.2 Description

- The outdoor unit model is not set into the main board.
- All units stop running
- Error code is displayed on the unit with the error

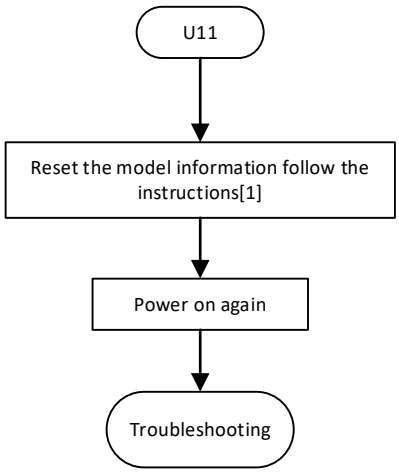
2.39.3 Trigger / recover condition

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

2.39.4 Possible causes

- Outdoor unit model is not set or setting fails after replacing the main board.

2.39.5 Procedure



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

2.40 U12: Outdoor unit Capacity setting error

2.40.1 Digital display output

2.40.2 Description

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

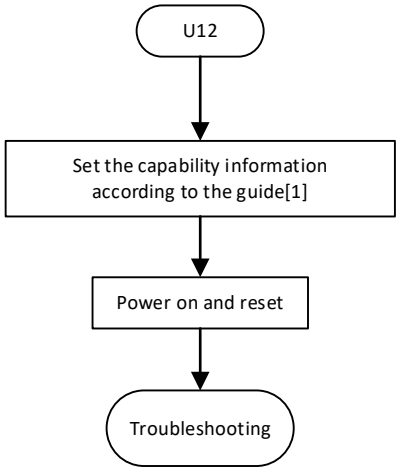
2.40.3 Trigger / recover condition

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

2.40.4 Possible causes

- The capability information of outdoor unit is not set

2.40.5 Procedure



Note:
[1] Use the Bluetooth module or Bluetooth after-sales kit set the capability information according to the nameplate

2.41 U21: The indoor unit connection is incorrect

2.41.1 Digital display output

2.41.2 Description

- Connected to the 1st generation indoor unit or indoor unit address repeated in system
- All Outdoor units stop running
- Error code is displayed on the master unit

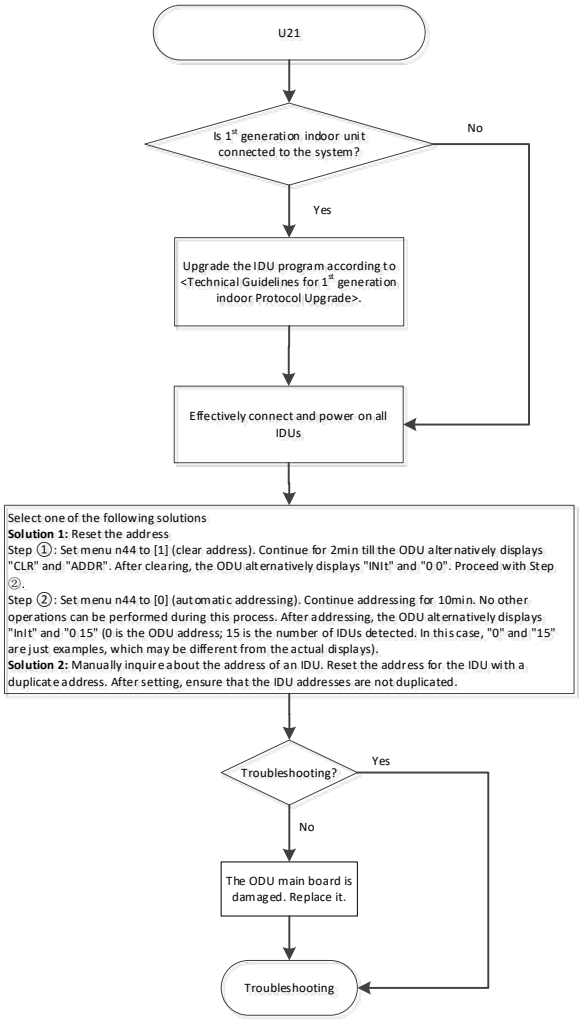
2.41.3 Trigger / recover condition

- Trigger condition:
  - 1st generation indoor units are connected to the system.
  - The indoor units address is repeated.
- Recover condition: No 1st generation indoor units are connected to the system and the indoor units address is not repeated.
- Reset method: Resume manually

2.41.4 Possible causes

- 1st generation indoor unit are connected in system
- The indoor unit address is repeated.

2.41.5 Procedure



2.42 U31: The test run was never successful

2.42.1 Digital display output

2.42.2 Description

- The system is not in the test run or the test run is unsuccessful
- All units stop running
- Error code is only displayed on the master unit.

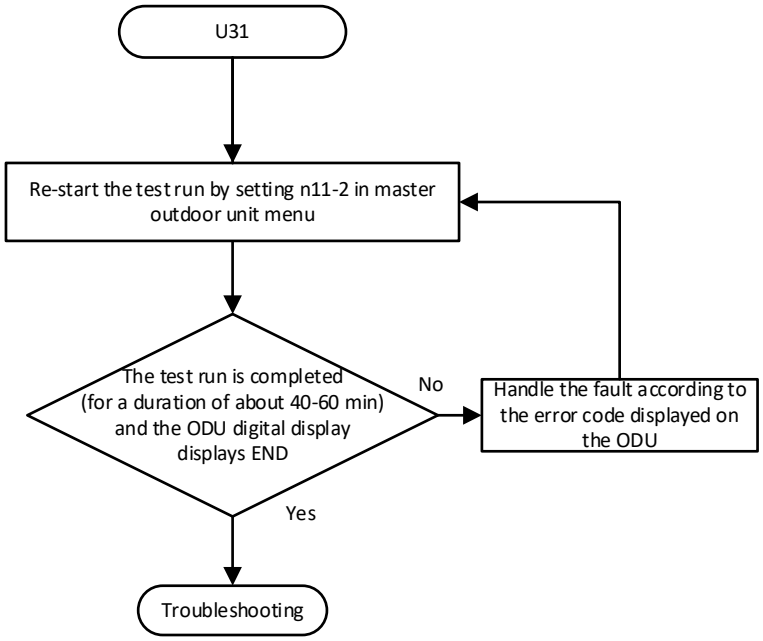
2.42.3 Trigger / Recover condition

- Trigger condition:
  - The system is not in the test run mode within 30 min of power-on
  - The test run is unsuccessful
- Recover condition: The test run complete successfully.
- Reset method: Resume manually

2.42.4 Possible causes

- The system is not in the test run or the test run is unsuccessful

2.42.5 Procedure



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

2.43.1 Digital display output

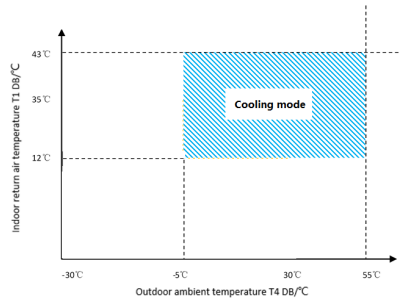
2.43.2 Description

- During the test run, the indoor or outdoor temperature exceeds the operating range
- All units stop running
- Error code is only displayed on outdoor unit

2.43.3 Trigger /Recover condition

- Trigger condition:

  After entering into test run, the master 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”

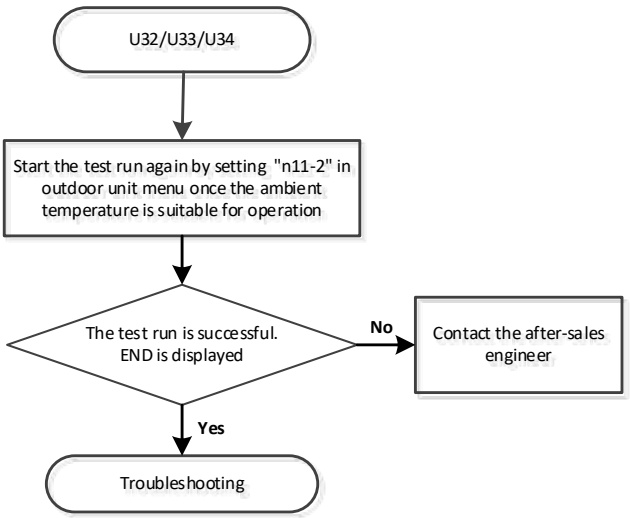
Temperature range	Error code	Description	
	**U32**	The outdoor temperature is not suitable	T4min≤-5 ºC or T4min>55 ºC
	U33	The indoor temperature is not suitable	Cooling mode: Average T1≥43 ºC
	U34	The indoor and outdoor temperature is not suitable	Average T1≥12 ºC : T4min>55 ºC or T4min<-5 ºC

- Recover condition: Maintain indoor and outdoor temperature within a suitable range. Set "n11-2" in the MENU for test run, and the test run succeeds.
- Reset method: Resume manually

2.43.4 Possible causes

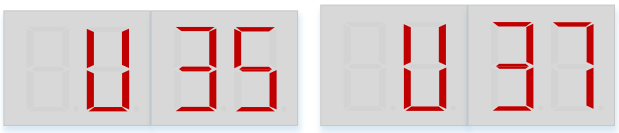
- The Temperature out of test run range

2.43.5 Procedure



2.44 U35, U37: Stop valve is not open

2.44.1 Digital display output



2.44.2 Description

- The outdoor unit stop valve is not opened during the test run.
- All units stop running
- Error code is only displayed on the master unit.

2.44.3 Trigger/ Recover condition

- Trigger condition:

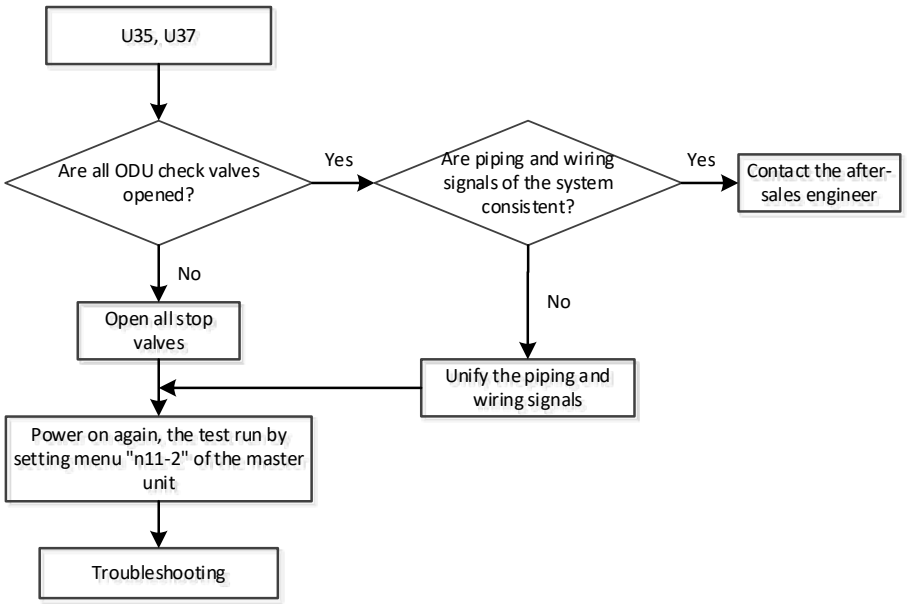
Error code	Description	
U35	The liquid side stop valve of the system is not opened	Discharge pressure of cooling mode≥ 3.9MPa
U37	The gas side stop valve of the system is not opened	Suction pressure of cooling mode<0.3MPa

- Recover condition: Set "n11-2" in the MENU for test run, and the test run succeeds.
- Reset method: Resume automatically after the test run succeeds

2.44.4 Possible causes

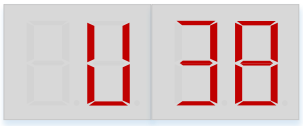
- Stop valve is not open
- Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.

2.44.5 Procedure



2.45 U38: Outdoor Unit has no address.

2.45.1 Digital display output



2.45.2 Description

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

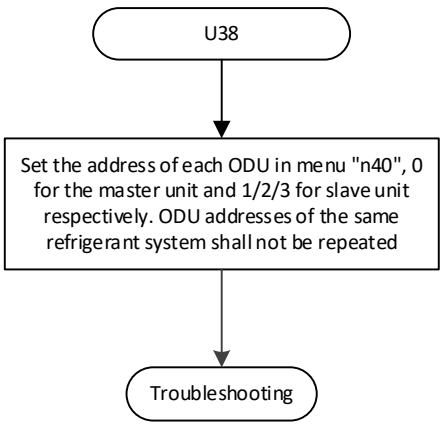
2.45.3 Trigger / recover condition

- Trigger condition: Outdoor unit address is not set
- Recover condition: Outdoor unit address detection is normal
- Reset method: Resume automatically

2.45.4 Possible causes

- The ODU's address is not set

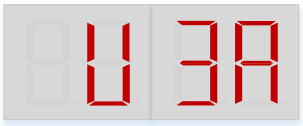
2.45.5 Procedure



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.

2.46 U3A: The communication wiring is connected incorrectly

2.46.1 Digital display output



2.46.2 Description

- Indoor unit piping and communication wiring are not connected in the same system.
- All units stop running
- Error code only displayed on the master unit.

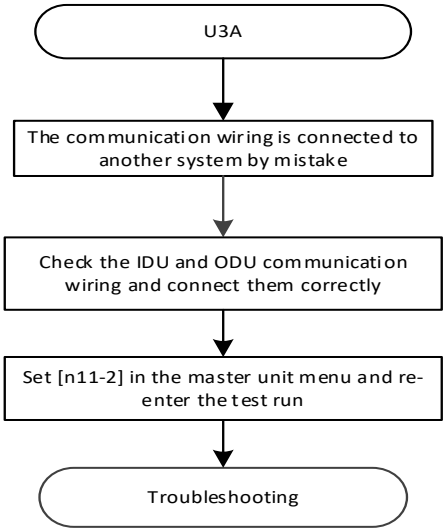
2.46.3 Trigger / Recover condition

- Trigger condition: Indoor unit piping and communication wiring are not connected in the same system. The communication wiring of the indoor unit is connected to another system.
- Recover condition: Set "n11-2" in the MENU for test run, and the test run succeeds.
- Reset method: Resume automatically after the test run succeeds

2.46.4 Possible causes

- Indoor unit piping and communication wiring are not connected in the same system. The communication wiring of the indoor unit is connected to another system.

2.46.5 Procedure



2.47 U3b: The installation environment is abnormal

2.47.1 Digital display output

2.47.2 Description

- Ambient temperature of the test environment exceeds the allowed range during the test run
- All units stop running
- Error code only displayed on the master unit.

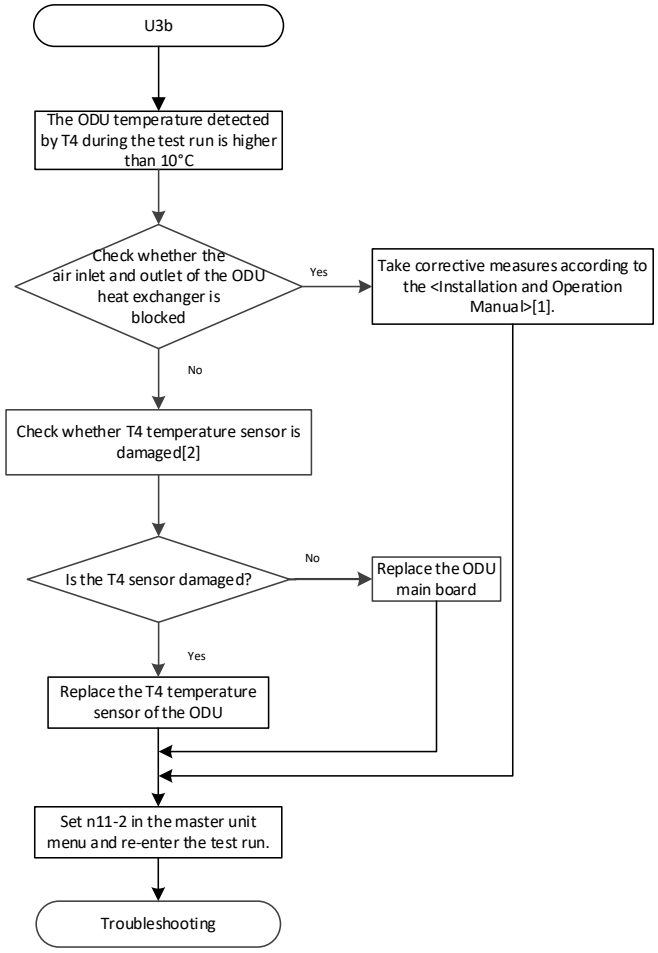
2.47.3 Trigger / Recover condition

- Trigger condition: Return air temperature is detected to increase more than 10℃ during test run.
- Recover condition: Set "n11-2" in the MENU for test run, and the test run succeeds.
- Reset method: Resume automatically after the test run succeeds

2.47.4 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

2.47.5 Procedure



Note:
[1]. Clear the obstructions beside the ODU. Ensure smooth air inlet and outlet of the ODU without a short circuit. In spaces that have limited area for heat dissipation, install a louver for air discharge or relocate the ODU
[2]. Refer to "E41: T4 Temperature Sensor Fault". Check whether T4 temperature sensor is damaged

2.48 U3C: Changeover mode error

2.48.1 Digital display output

2.48.2 Description

- ODU in changeover mode doesn't set the VIP IDU address.
- ODUs stop running
- Error code only displayed on the master unit.

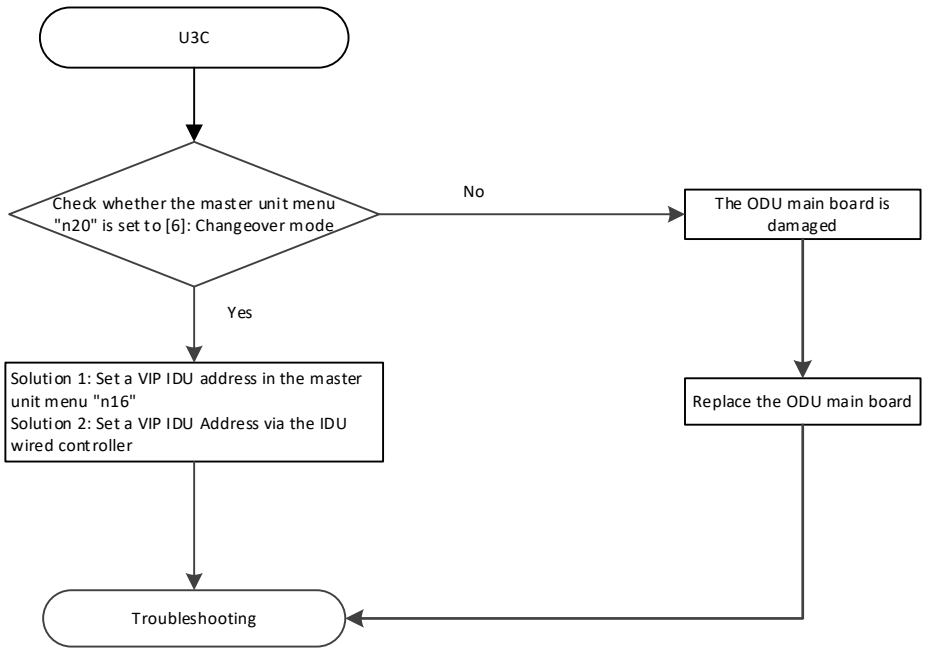
2.48.3 Trigger / Recover condition

- Trigger condition: Outdoor unit in changeover mode, but the VIP address has not been set.
- Recover condition: Outdoor unit in changeover mode detect the VIP IDU address.
- Reset method: Resume automatically

2.48.4 Possible causes

- VIP address has not been set
- Mainboard of ODU is damaged.

2.48.5 Procedure



2.49 U4x: Overconnection ratio

2.49.1 Digital display output





2.49.2 Description

- Combination ratio of indoor unit and outdoor unit is out of range
- All units stop running
- Error code only displayed on the master unit

2.49.3 Trigger / Recover condition

- Trigger condition:

Error code	Description
U41	The combination ratio of Standard VRF Indoor Unit is out of range.
U42	The combination ratio of Fresh Air Processing Uint is out of range.
U43	The combination ratio of AHU Kit (air outlet temperature control) is out of range
U44	The combination ratio of AHU Kit (return air temperature control) is out of range
U48	The combination ratios of all Indoor Units are out of range.

1) Code and type of Indoor Unit

Indoor unit code	A	B	C	D
Indoor unit type	Standard VRF Indoor Unit	Fresh Air Processing Uint	AHU Kit (Air outlet temperature control)	AHU Kit (Return air temperature control)

2) Connection type and combination ratio limit

	Connection type				Combination ratio (%)				
Indoor unit code	A	B	C	D	A	B	C	D	Total capacity combination ratio of all indoor units
Only one type of IDU is connected to the system	●				50-130				50-130
		●				50-105			50-105
			●				50-105		50-105
				●				50-115	50-115
Combination 1	●	●			50-115	⩽35			50-130
Combination 2	●		●		50-130		⩽35		50-130
Combination 3	●			●	50-130			⩽65	50-115
Combination 4	●	●	●	●	50-130	⩽35		50-130	50-130

3) Calculation of combination ratio: Combination ratio = Total capacity of online IDUs/Total capacity of ODUs

- Recover condition:

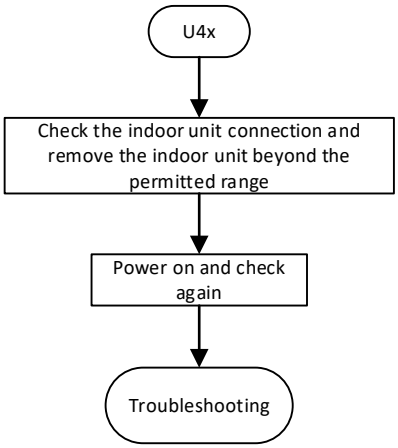
  Indoor/Outdoor Unit connection rate within allowable range

- Reset method: Resume manually

2.49.4 Possible causes

- Indoor units and outdoor units combination ratio is out of range.
- Outdoor unit address is repeated or the slave outdoor unit does not have an address.
- Individual series indoor unit is installed in combination with a combinable series.

2.49.5 Procedure



2.50 U51: More than One Outdoor Unit Models in the Individual Series System

2.50.1 Digital display output

2.50.2 Description

- Outdoor unit of Individual Series is installed in combine system, and the number of ODUs detected is greater than 1.
- All units stop running
- Error code is only displayed on master unit.

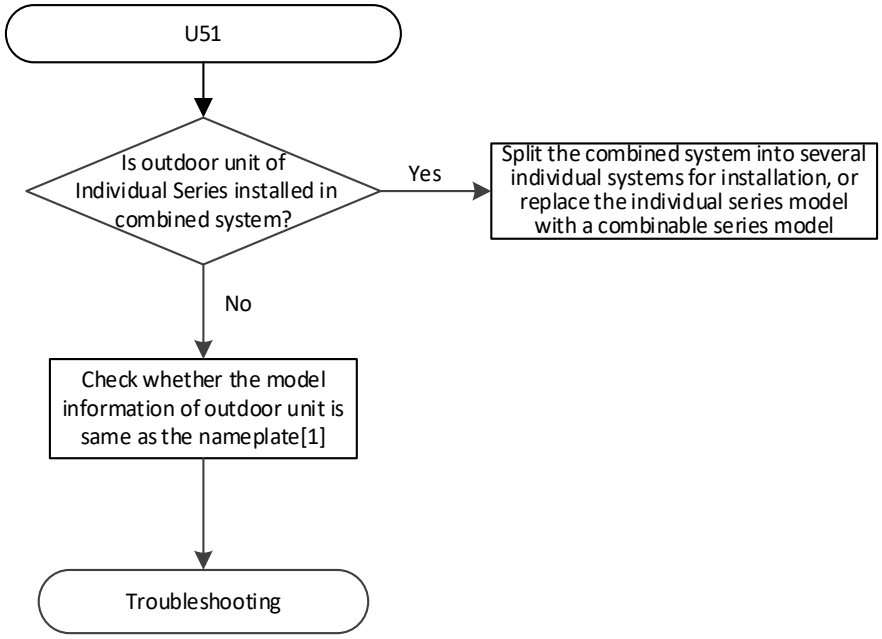
2.50.3 Trigger / Recover condition

- Trigger condition: The number of ODUs connected to the system detected by individual series is greater than 1
- Recover condition: The number of ODUs connected to the system detected by individual series is equal to 1
- Reset method: Resume manually (Power on again)

2.50.4 Possible causes

- Outdoor unit of Individual Series is installed in combine system, and the number of ODUs detected is greater than 1
- Outdoor unit model is incorrectly set

2.50.5 Procedure



Note:
[1]Use Bluetooth module or bluetooth after-sales kit to check and reset the model parameter.

2.51 U53: Two or More Outdoor Unit Models in the Combined System

2.51.1 Digital display output

2.51.2 Description

- Detected different series outdoor units in the combined system
- All units stop running
- Error code is only displayed master unit

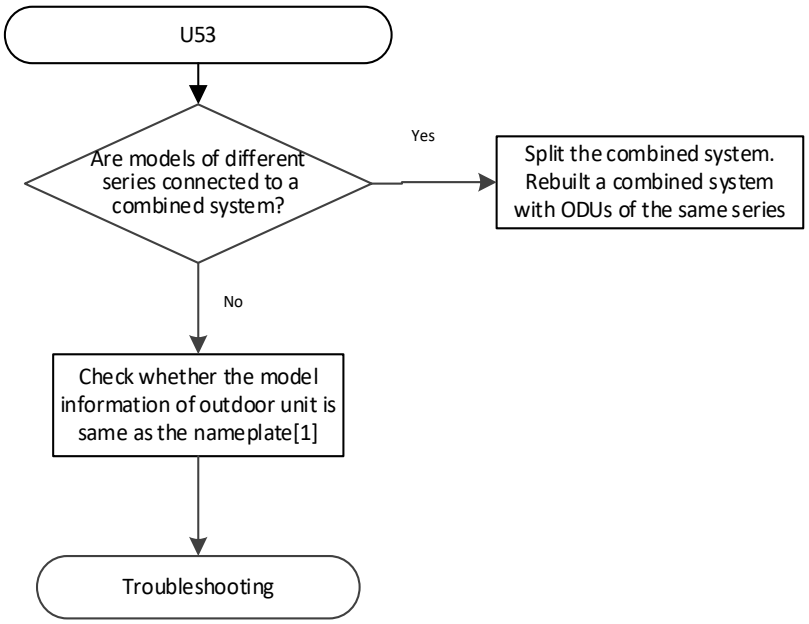
2.51.3 Trigger / Recover condition

- Trigger condition: Detected different series outdoor units in the combined system
- Recover condition: There is only one series of Outdoor Unit in the combined system
- Reset method: Resume manually (Power on again)

2.51.4 Possible causes

- Detected different series outdoor units in the combined system
- Outdoor unit model is incorrectly set

2.51.5 Procedure



Note:
[1]Use Bluetooth module or bluetooth after-sales kit to check and reset the model parameter.

3 Error in Compressor Driver

3.1 xL1E: Hardware overcurrent

3.1.1 Digital display output

3.1.2 Description

- The compressor current exceeds the protection value set for the hardware.
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again

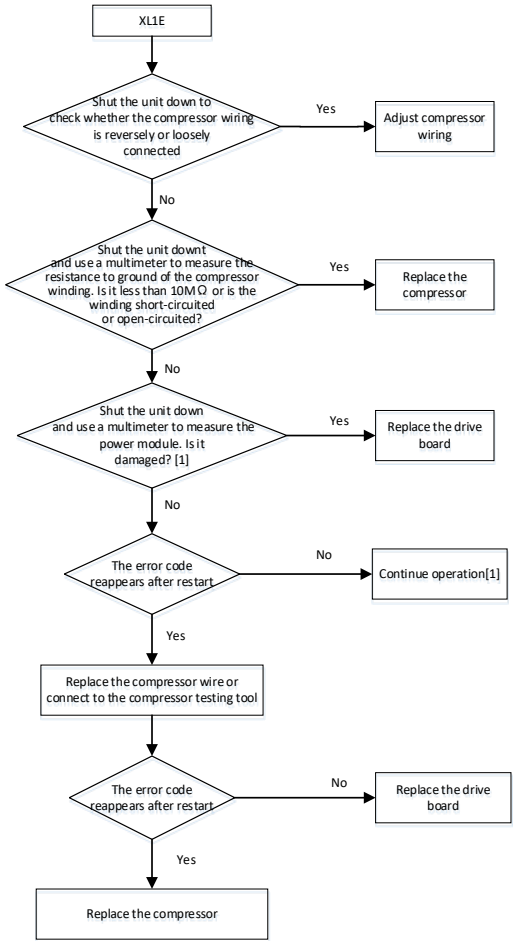
3.1.3 Trigger / recover condition

- Trigger condition: The current exceeds the protection value set for the hardware
- Recover condition: The compressor will stop after failure, and recover after one minute, if the condition for fault elimination is satisfied in 1 min, compressor operation resumes
- Reset method:The system automatically recovers one minute after the error exit condition is reached

3.1.4 Possible causes

- Compressor wiring is wrong. Compressor winding is open-circuited or short-circuited.
- System power supply is faulty.
- The system is faulty, due to reasons such as liquid return and impurities.
- The compressor is worn or locked upon startup.
- The compressor drive board is faulty.

3.1.5 Procedure

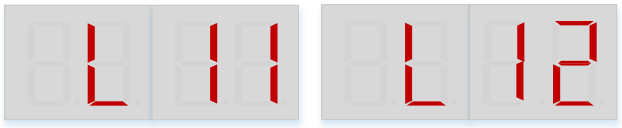


Notes:

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

3.2 xL11, xL12 : Software overcurrent

3.2.1 Digital display output



3.2.2 Description

- The compressor current exceeds the 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.

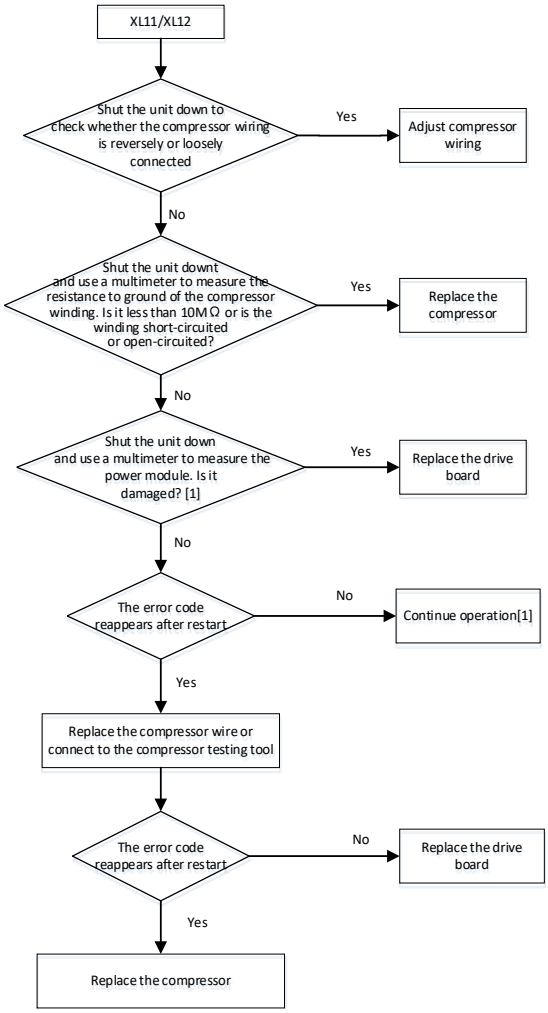
3.2.3 Trigger / recover condition

- Trigger condition:
  xL11: The compressor current is detected to have exceeded the protection value set for the software 3 times in a row.
  xL12: 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 is instantaneously locked.
- The compressor drive board is faulty.
- The system is faulty, due to reasons such as liquid return and impurities.

3.2.5 Procedure



Notes:
[1]Voltage fluctuation occurs when high-power equipment is started

3.3 xL2E: Module overtemperature protection

3.3.1 Digital display output

3.3.2 Description

- The temperature of the compressor or fan drive board (IPM) exceeds the set value (100°C).
- The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again

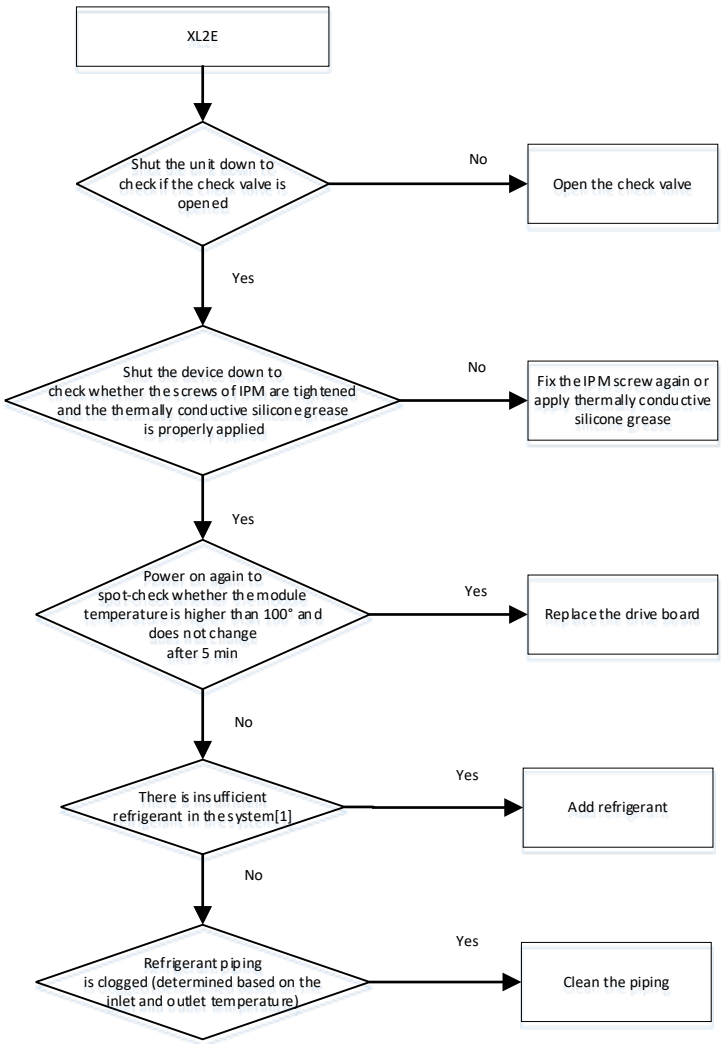
3.3.3 Trigger / recover condition

- Trigger condition:The temperature of the IPM exceeds the set value
- Recover condition: The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again (when module temperature is lower than the set value).
- Reset method:Resume automatically

3.3.4 Possible causes

- The set screws of the compressor or fan drive board (IPM) 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:
- There is insufficient refrigerant in the system or the piping is clogged, resulting in poor cooling effect.
- The drive board is faulty.

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.

3.4 xL3E: The bus voltage is too low

3.4.1 Digital display output

3.4.2 Description

- The DC bus voltage of the drive board is lower than 350VDC.
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

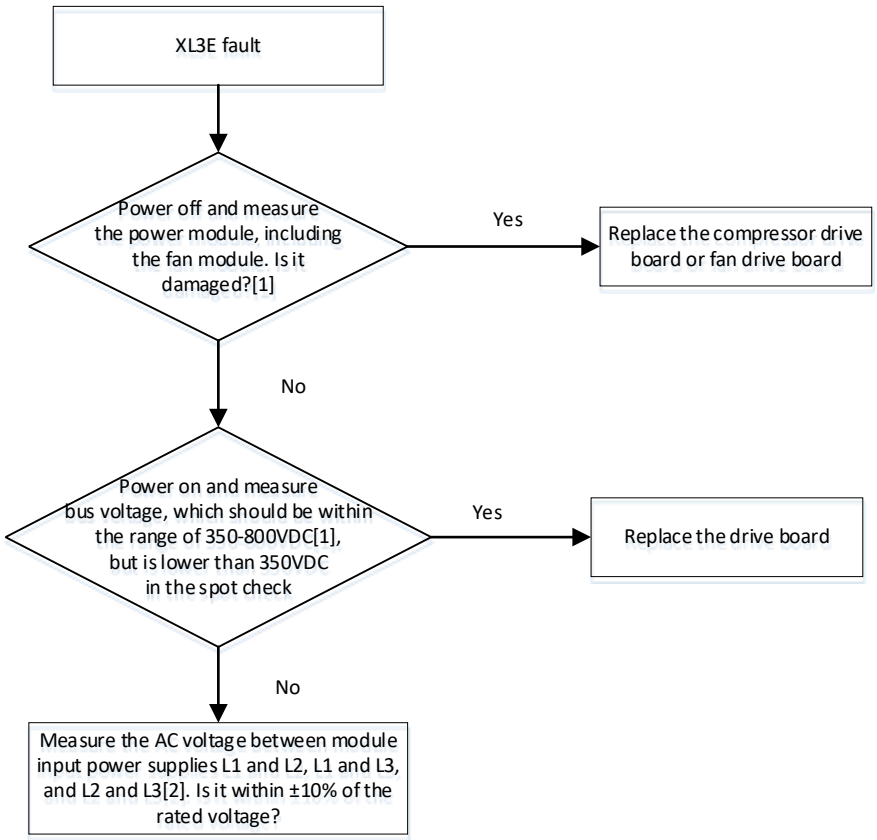
3.4.3 Trigger / recover condition

- Trigger condition: The bus voltage is lower than the bus voltage protection threshold set by the software.
- Recover condition: The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again (bus voltage is higher than 350VDC).
- 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:
- The power grid suffers short-time power outage or the voltage is too low within a short time.
- The compressor drive board is faulty.

3.4.5 Procedure



Note:

[1] Refer to *5.5 Compressor & Fan drive board ports detection*

[2] When the system is powered on, use a multimeter to measure the voltages of the power input terminals L1, L2 and L3 of the inverter dirve board.

3.5 xL31: 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.

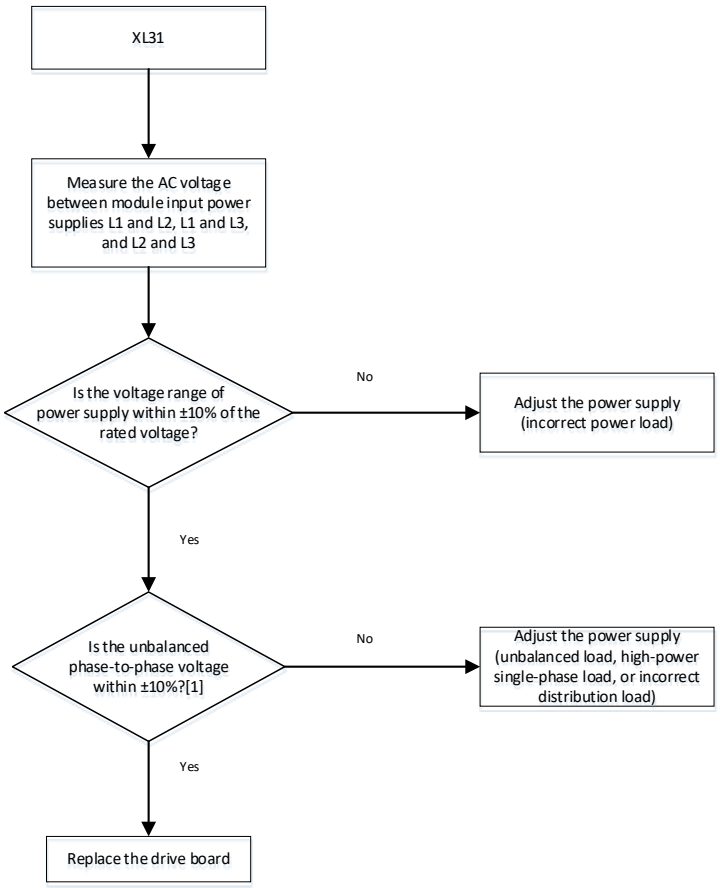
3.5.3 Trigger / recover condition

- Trigger condition: The bus voltage is higher than the software overvoltage protection threshold.
- Recover condition: The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again (bus voltage is lower than 800VDC).
- 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 drive board is faulty.

3.5.5 Procedure



Notes:

[1] When the system is powered on, use the AC voltage function of a multimeter to measure the voltage of input terminals CN16 (L1), CN7 (L2) and CN15 (L3) of the power supply of the drive board. Compare the L1-L2, L2-L3, and L1-L3 voltages and check whether they are equal. If the voltages are almost equal, there is no problem with the power supply voltage. If the difference is greater than 10V, there may be phase unbalance of the power supply. If the difference is as great as dozens of or more than a hundred volts, the power supply or filter board may be faulty.

3.6 xL32: 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.

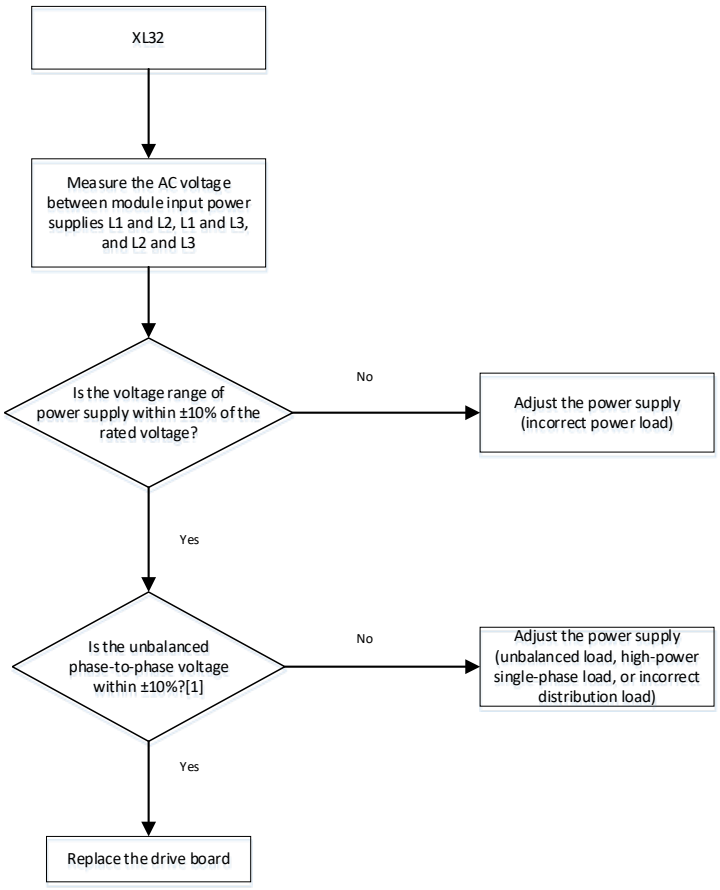
3.6.3 Trigger / recover condition

- Trigger condition: The bus voltage is too high, higher than the high bus voltage protection threshold set by the software (820VDC)
- Recover condition: The compressor will stop when the error occurs. If the error disappears one minute later, the compressor will start again
- 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 drive board is faulty.

3.6.5 Procedure



Notes:

[1] When the system is powered on, use the AC voltage function of a multimeter to measure the voltage of input terminals CN16 (L1), CN7 (L2) and CN15 (L3) of the power supply of the drive board. Compare the L1-L2, L2-L3, and L1-L3 voltages and check whether they are equal. If the voltages are almost equal, there is no problem with the power supply voltage. If the difference is greater than 10V, there may be phase unbalance of the power supply. If the difference is as great as dozens of or more than a hundred volts, the power supply or filter board may be faulty.

3.7 xL43: The current sampling bias is abnormal.

3.7.1 Digital display output

3.7.2 Description

- The drive board is faulty upon the power-on self test.
- Once this fault occurs, the compressor cannot be started up, and the drive board must be checked.

3.7.3 Trigger / recover condition

- Trigger condition: The drive board fails the power-on self test.

3.7.4 Possible causes

- The compressor and fan drive board is faulty.

3.7.5 Procedure

- Replace the compressor and fan drive board.

3.8 XL45: Motor Code Mismatch

3.8.1 Digital display output

3.8.2 Description

- The compressor parameters set by the main control board do not match the compressor parameters of the drive board.
- Once this fault occurs, the compressor cannot be started up, and the drive board must be checked.

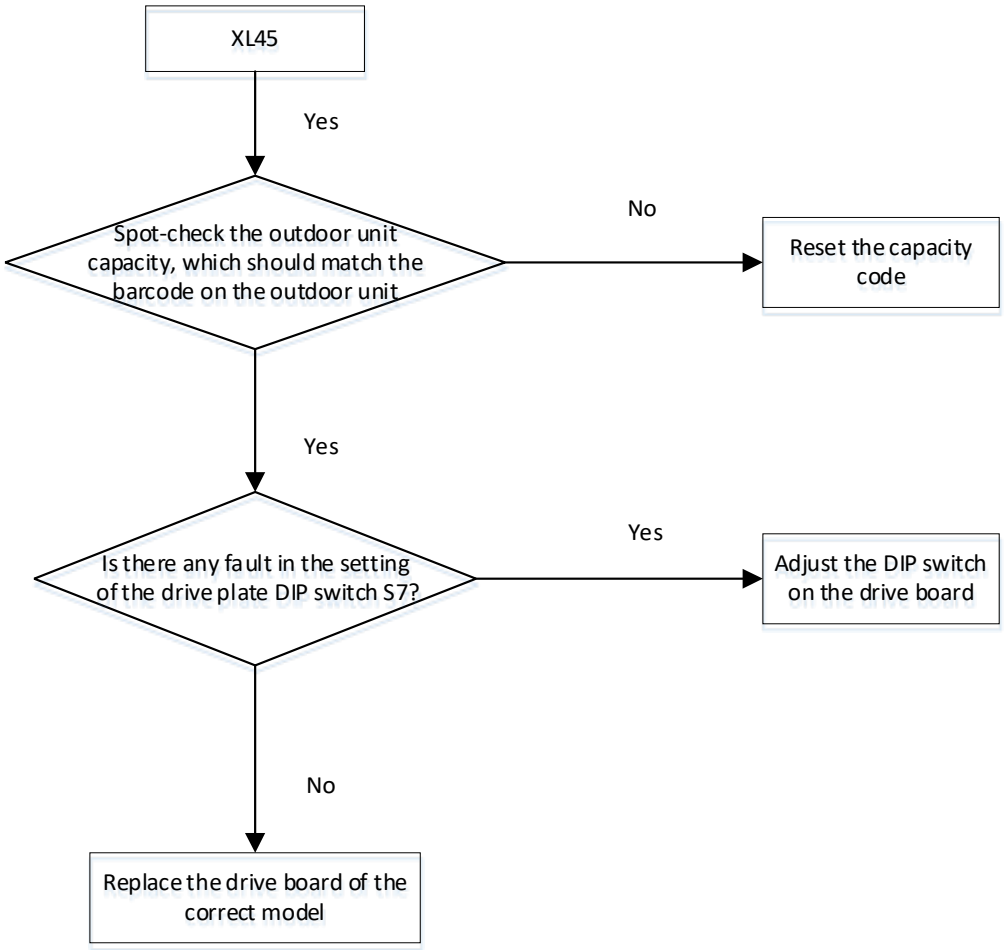
3.8.3 Trigger / recover condition

- Trigger condition: The compressor model selected through communication for the main control board does not match the compressor model in the drive.
- Restoration condition: Check whether the DIP switch of the model is wrong. Select a correct DIP switch for the model.
- Reset method: Resume manually (Select the correct DIP switch for the model, power the unit off, and power on again)

3.8.4 Possible causes

- The capacity DIP switch or model DIP switch of the main control board is incorrectly set.
- The model selected does not match the drive board.
- The main board or compressor drive board is faulty.

3.8.5 Procedure



3.9 XL46: Motor Code Mismatch

3.9.1 Digital display output

3.9.2 Description

- IPM has overcurrent or IPM has drive undervoltage.
- The compressor stops running after the error occurs. If the error disappears one minute later, the compressor starts again.

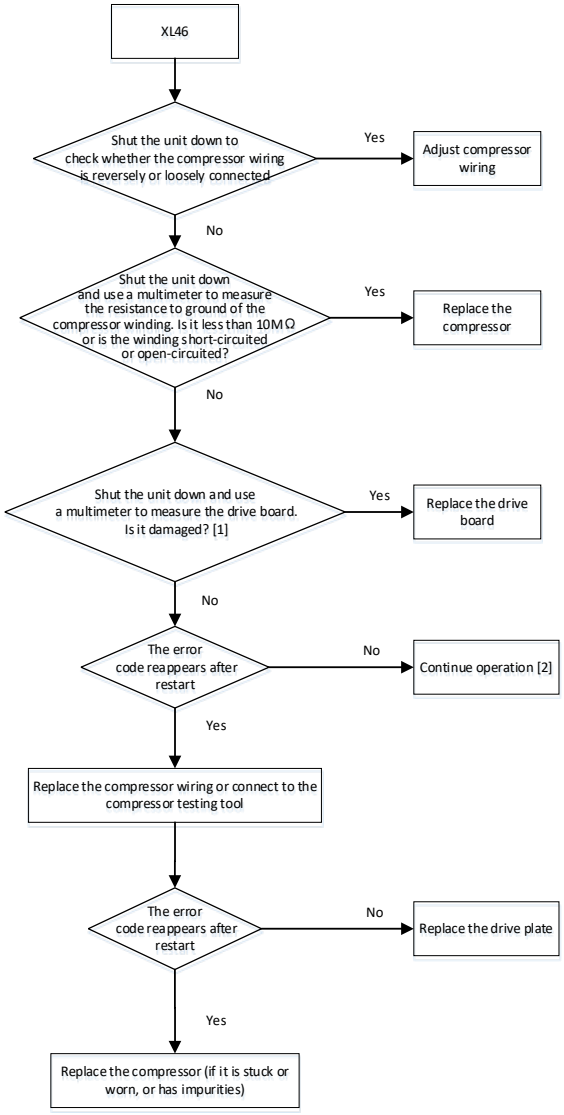
3.9.3 Trigger / recover condition

- Trigger condition: IPM has overcurrent or IPM has drive undervoltage.
- Restoration condition:
- Reset method: Resume manually

3.9.4 Possible causes

- The compressor wiring is reversely connected, in poor contact, or short-circuited.
- There is impurity in the refrigerant system or the compressor is instantaneously locked.
- The compressor drive board is faulty.

3.9.5 Procedure



Notes:
[1] Refer to *5.5 Compressor & Fan drive board ports detection*
[2] Voltage fluctuation occurs when high-power equipment is started

3.10 XL47: Motor Code Mismatch

3.10.1 Digital display output

3.10.2 Description

- The compressor parameters set by the main control board do not match the compressor parameters, the driver board specifications set by the main control board do not match the compressor specifications of the drive board.

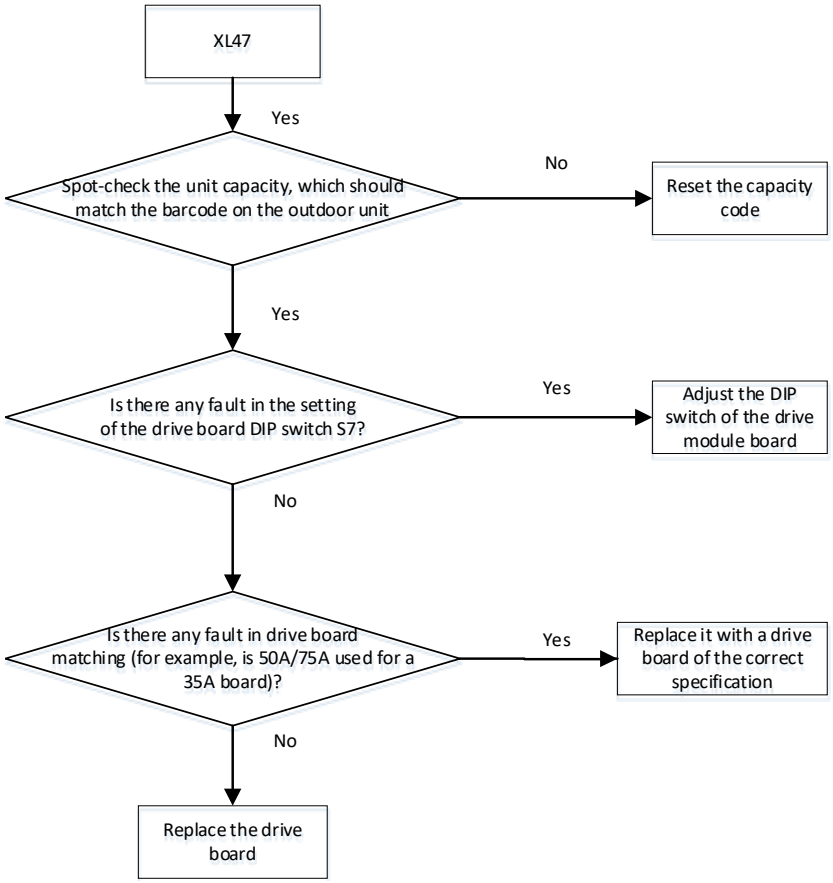
3.10.3 Trigger / recover condition

- Trigger condition: The compressor parameters set by the main control board do not match the compressor parameters, the driver board specifications set by the main control board do not match the compressor specifications of the drive board.
- Restoration condition: Select the correct drive board for the model, power the unit off, and start it up again.
- Reset method: Resume manually

3.10.4 Possible causes

- Model configuration parameters are incorrect.
- The drive board used does not match the model.
- The compressor drive board is faulty.

3.10.5 Procedure



3.11 xL5E: Startup failed

3.11.1 Digital display output

3.11.2 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.

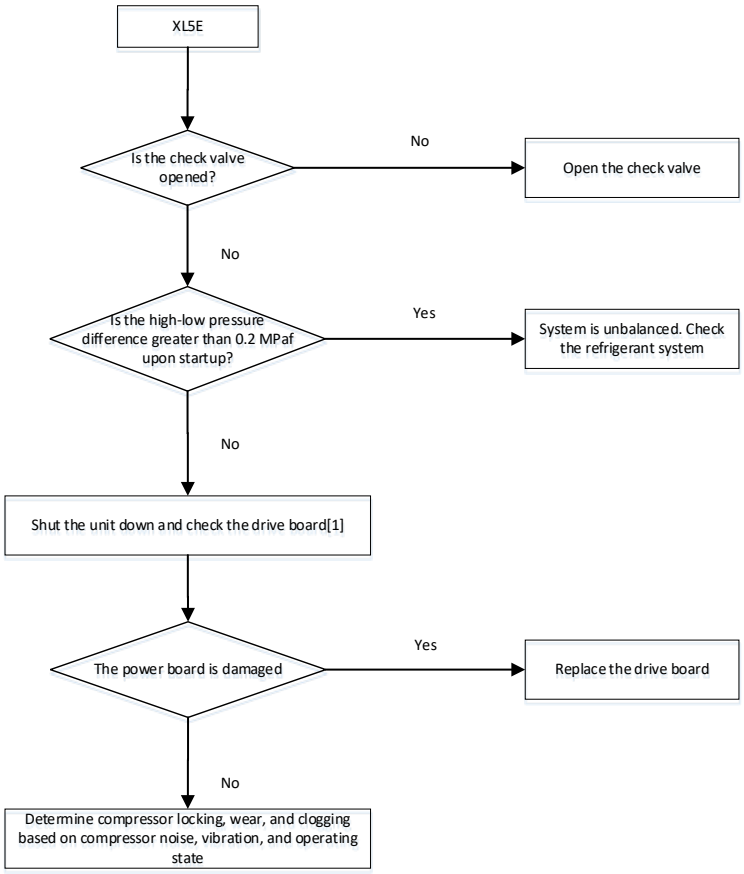
3.11.3 Trigger / recover condition

- 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.

3.11.4 Possible causes

- The check valve is not opened.
- Differential pressure occurs upon system startup.
- The compressor is locked, worn, or blocked.
- The compressor drive board is faulty.

3.11.5 Procedure



Notes:
[1] Refer to *5.5 Compressor & Fan drive board ports detection*

3.12 xL52: Locked-rotor protection

3.12.1 Digital display output

3.12.2 Description

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

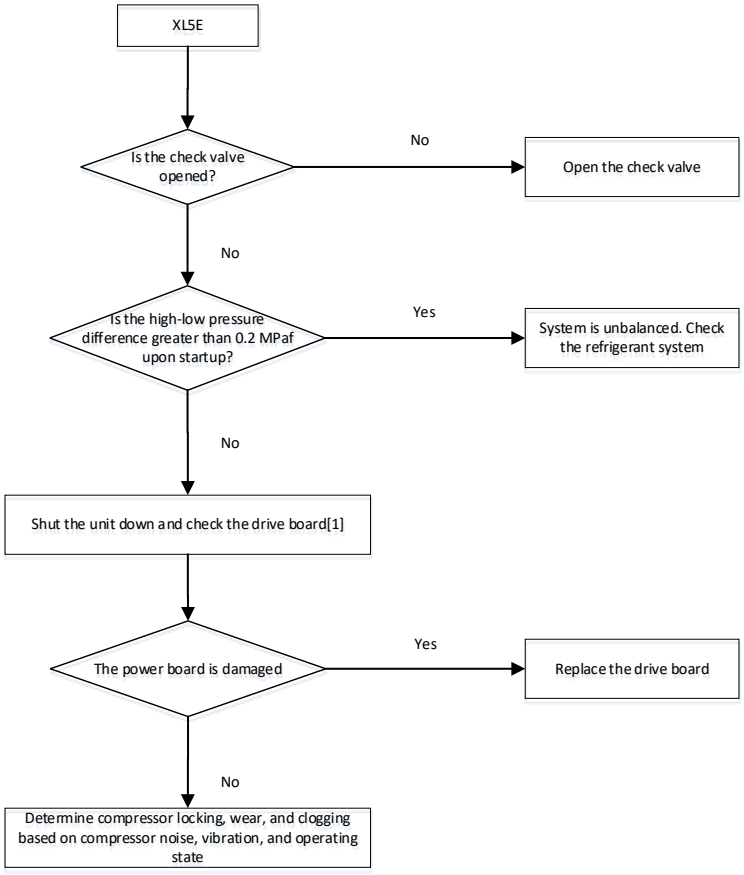
3.12.3 Trigger / recover condition

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

3.12.4 Possible causes

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

3.12.5 Procedure



Notes:

[1] Refer to *5.5 Compressor & Fan drive board ports detection*

3.13 xL6E: Compressor motor lack of phase protection

3.13.1 Digital display output

3.13.2 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.

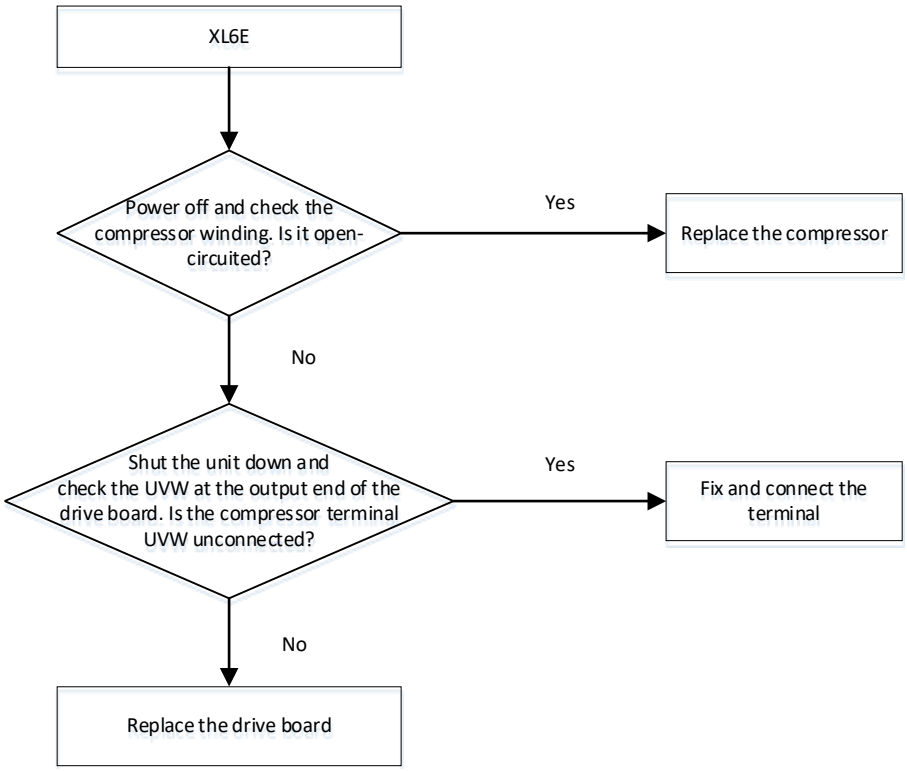
3.13.3 Trigger / recover condition

- 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.

3.13.4 Possible causes

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

3.13.5 Procedure



4 Error in Fan Drive

4.1 xJ1E: Hardware overcurrent

4.1.1 Digital display output

4.1.2 Description

- The fan current exceeds the protection value set for the hardware.
- The fan stops running after the error occurs. If the error disappears five seconds, the fan starts again

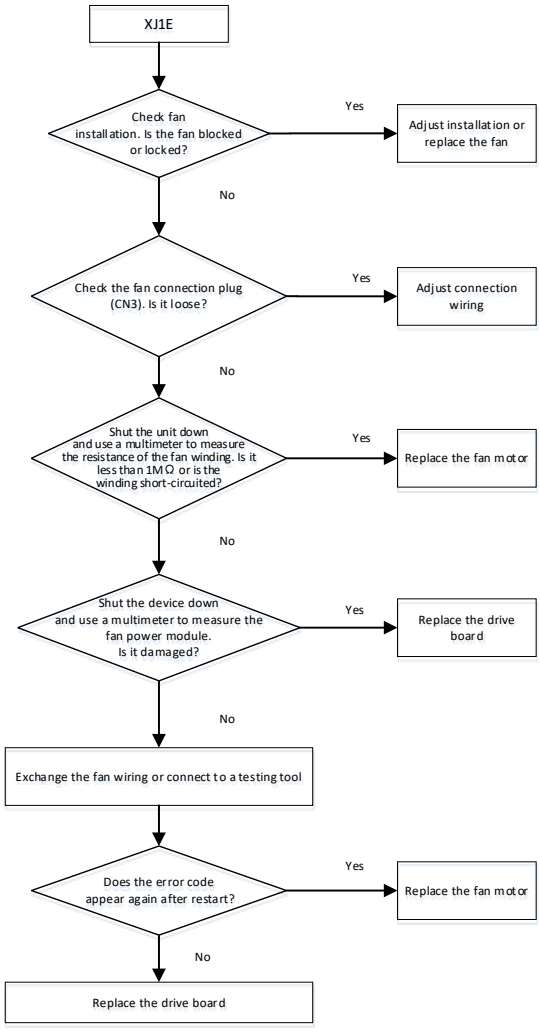
4.1.3 Trigger / recover condition

- Trigger condition: The instantaneous current of the fan exceeds the 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

4.1.4 Possible causes

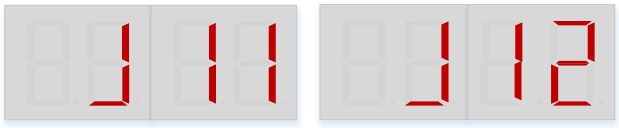
- The fan is blocked or the internal coil is short-circuited or damaged
- The fan drive board is damaged
- The circuits of Inverter drive board(fan section) are abnormal

4.1.5 Procedure



4.2 xJ11, xJ12: Software overcurrent

4.2.1 Digital display output



4.2.2 Description

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

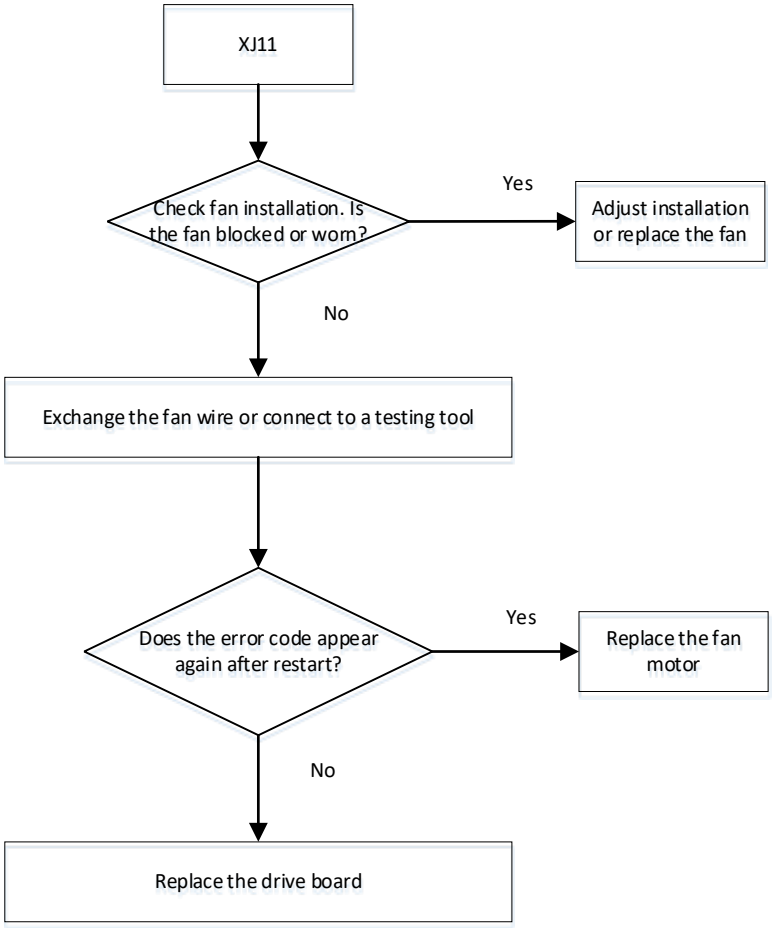
4.2.3 Trigger / recover condition

- Trigger condition:
  xJ11: The compressor current is detected to have exceeded the protection value set for the software 3 times
  xJ12: 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 fan drive board is faulty.

4.2.5 Procedure



4.3 xJ2E: Module overtemperature protection

4.3.1 Digital display output

4.3.2 Description

- The internal temperature of the fan drive module (IPM) is higher than 100℃.

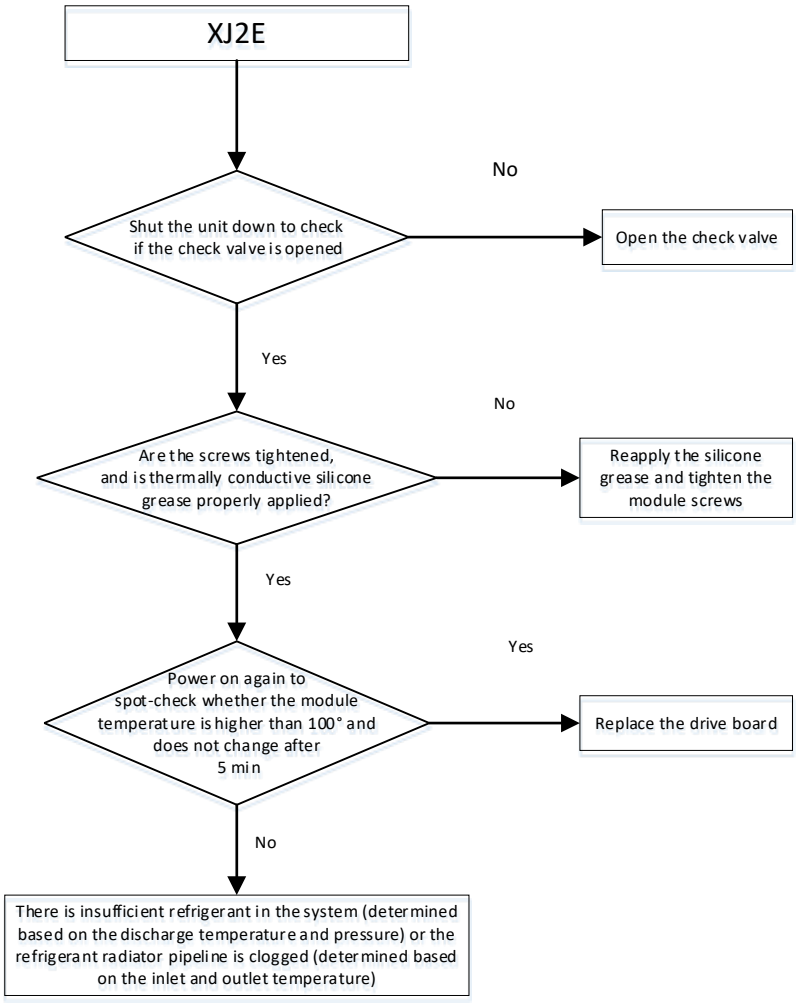
4.3.3 Trigger / recover condition

- Trigger condition:The temperature of the IPM exceeds 100℃
- Recover condition: After an 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 100℃).
- 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 fan drive board is faulty.

4.3.5 Procedure



4.4 XJ01: J1*/J2* Fault Occurs 10 Times in 1 h

4.4.1 Digital display output

4.4.2 Description

- xJ1*/xJ2* fault occurs 10 times in 1 h.

4.4.3 Possible Cause

- Spot check to inquire about the code. Find out the cause by the error code.

4.4.4 Procedure

- Spot check to inquire about the error code. Refer to the process for the error code.

4.5 xJ3E: The bus voltage is too low

4.5.1 Digital display output

4.5.2 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.

4.5.3 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.

4.5.4 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:

4.5.5 Procedure

Troubleshoot according to xL3E

4.6 xJ31: The bus voltage is too 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 (750VDC).
- 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 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.

4.6.4 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 xL31

4.7 xJ32: The bus voltage is excessively high

4.7.1 Digital display output

4.7.2 Description

- Bus voltage is higher than the high bus voltage protection threshold set by the software (770VDC).
- The fan stops running after the error occurs. If the error disappears five seconds later, the fan starts again.

4.7.3 Trigger / recover condition

- Trigger condition: The bus voltage is too high, higher than the high bus voltage protection threshold set by the software (770VDC)
- 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.

4.7.4 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:

4.7.5 Procedure

Troubleshooting according to xL32

4.8 xJ43: The current sampling bias is abnormal

4.8.1 Digital display output

4.8.2 Description

- The detection circuit of the drive board fails the power-on self test.
- After this error occurs, the fan cannot start. Check whether the inverter driver board is in error.

4.8.3 Trigger / recover condition

- Trigger condition: The drive board fails the power-on self test.
- Reset method: Restoration after passing the self test.

4.8.4 Possible causes

- The fan drive board is abnormal

4.8.5 Procedure

- Replace the inverter drive board

4.9 J45: Motor Code Mismatch

4.9.1 Digital display output

4.9.2 Description

- The compressor parameters set by the main control board do not match the compressor parameters of the drive board.
- Once this fault occurs, the fan cannot be started up, and the drive board must be checked.

4.9.3 Trigger / recover condition

- Trigger condition: The fan model selected through communication for the main control board does not match the fan model in the drive.
- Restoration condition: Check whether the DIP switch of the model is wrong. Select a correct DIP switch for the model.
- Reset method: Resume manually (Select the correct DIP switch for the model, power the unit off, and power on again)

4.9.4 Possible causes

- The capacity DIP switch or model DIP switch of the main control board is incorrectly set.
- The model selected does not match the drive board.
- The fan drive board is faulty.

4.9.5 Procedure

Troubleshooting according to xL45

4.10 XJ47: Motor Code Mismatch

4.10.1 Digital display output

4.10.2 Description

- The fan parameters set by the main control board do not match the fan parameters, the driver board specifications set by the main control board do not match the fan specifications of the drive board.

4.10.3 Trigger / recover condition

- Trigger condition: The fan parameters set by the main control board do not match the fan parameters, the driver board specifications set by the main control board do not match the fan specifications of the drive board.
- Restoration condition: Select the correct drive board for the model, power the unit off, and start it up again.
- Reset method: Resume manually

4.10.4 Possible causes

- Model configuration parameters are incorrect.
- The drive board used does not match the model.
- The drive board is faulty.

4.10.5 Procedure

Troubleshooting according to xL47

4.11 xJ5E: Startup failed

4.11.1 Digital display output

4.11.2 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.

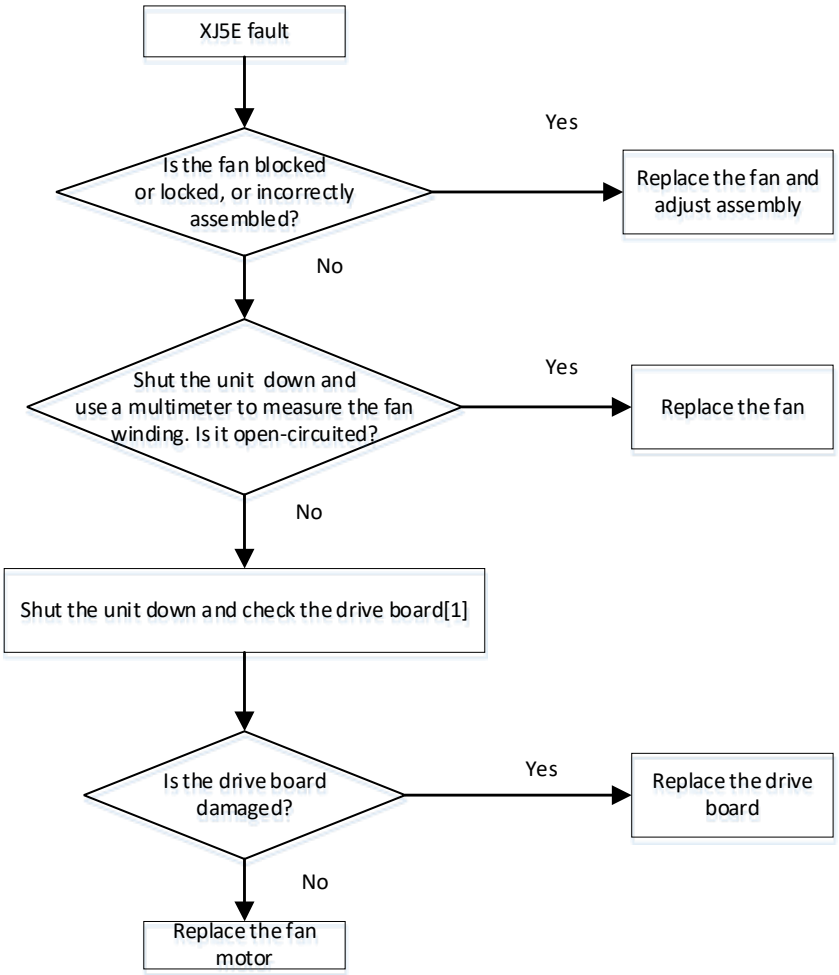
4.11.3 Trigger / recover condition

- 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.

4.11.4 Possible causes

- Fan motor stuck:
- Fan is started against the wind:
- Fan drive board is abnormal:

4.11.5 Procedure



4.12 xJ52: Locked-rotor protection

4.12.1 Digital display output

4.12.2 Description

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

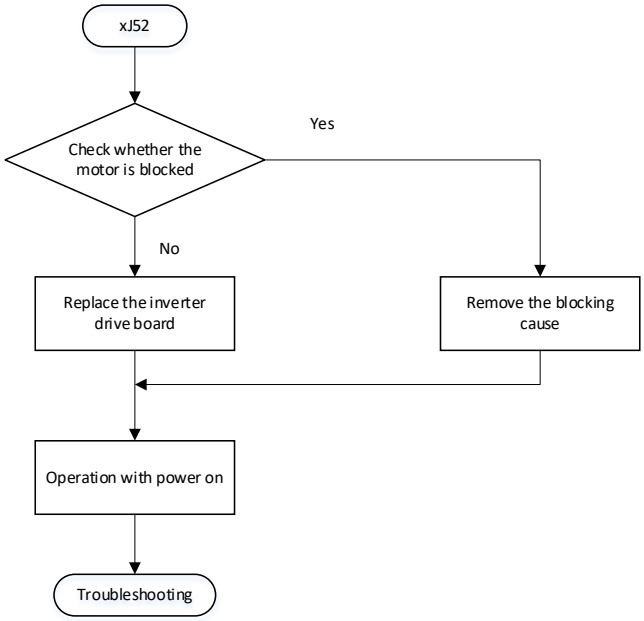
4.12.3 Trigger / recover condition

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

4.12.4 Possible causes

- The fan shaft is stuck.

4.12.5 Procedure



4.13 xJ6E: Motor lack of phase protection

4.13.1 Digital display output

4.13.2 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

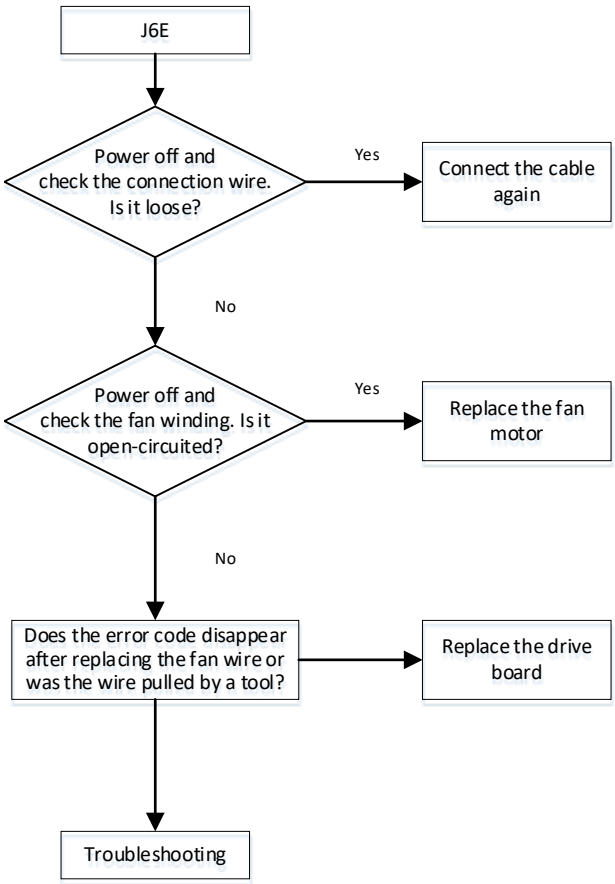
4.13.3 Trigger / recover condition

- Trigger condition: The fan has phase loss protection.
- 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

4.13.4 Possible causes

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

4.13.5 Procedure



4.14 xJ65: Fan IPM Short Circuit Protection

4.14.1 Digital display output

4.14.2 Description

- The fan is in IPM short circuit protection.
- The fan stops running after the error. If the error disappears after five seconds, the fan starts again

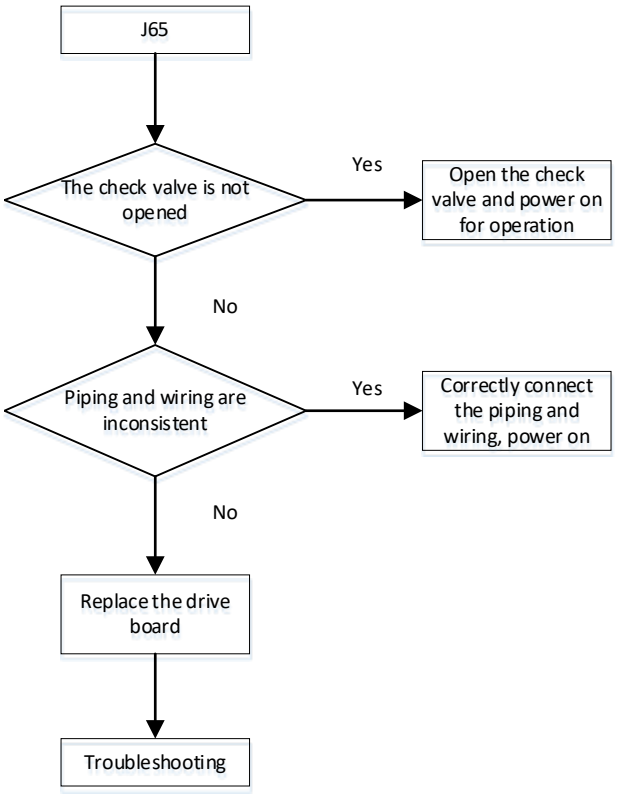
4.14.3 Trigger / recover condition

- Trigger condition: The fan is in IPM short circuit protection.
- Recover condition: IPM short circuit protection is disabled.
- Reset method:Resume Automatically after the error exit condition is reached

4.14.4 Possible causes

- The check valve is not opened.
- Piping and wiring are inconsistent. For example, the piping for system A is connected to system A and the communication wiring is connected to system B.
- Coils of EEVA and EEVC are reversely connected.
- The fan drive board is short-circuited or damaged.

4.14.5 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
T4	Outdoor ambient temperature	Type A
T5	Liquid pipe stop valve	Type A
T6A	Microchannel heat exchanger inlet pipe	Type A
T6B	Microchannel heat exchanger outlet pipe	Type A
T71/T72	Inverter compressor A/B suction	Type A
T7C1/T7C2	Inverter compressor A/B discharge	Type B
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
1	33.33	171.9	169.9
2	31.56	163.3	161.5

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

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
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
44	4.387	24.85	24.85
45	4.213	23.89	23.9

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

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
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
87	0.9366	5.488	5.492
88	0.9075	5.32	5.322

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

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
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	
130	0.2777	1.632	
131	0.2708		

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

temperature	resistance (kΩ)		
(°C)	Type A	Type B	Type C
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 6.5.3 need to be noted when the following conditions are met::

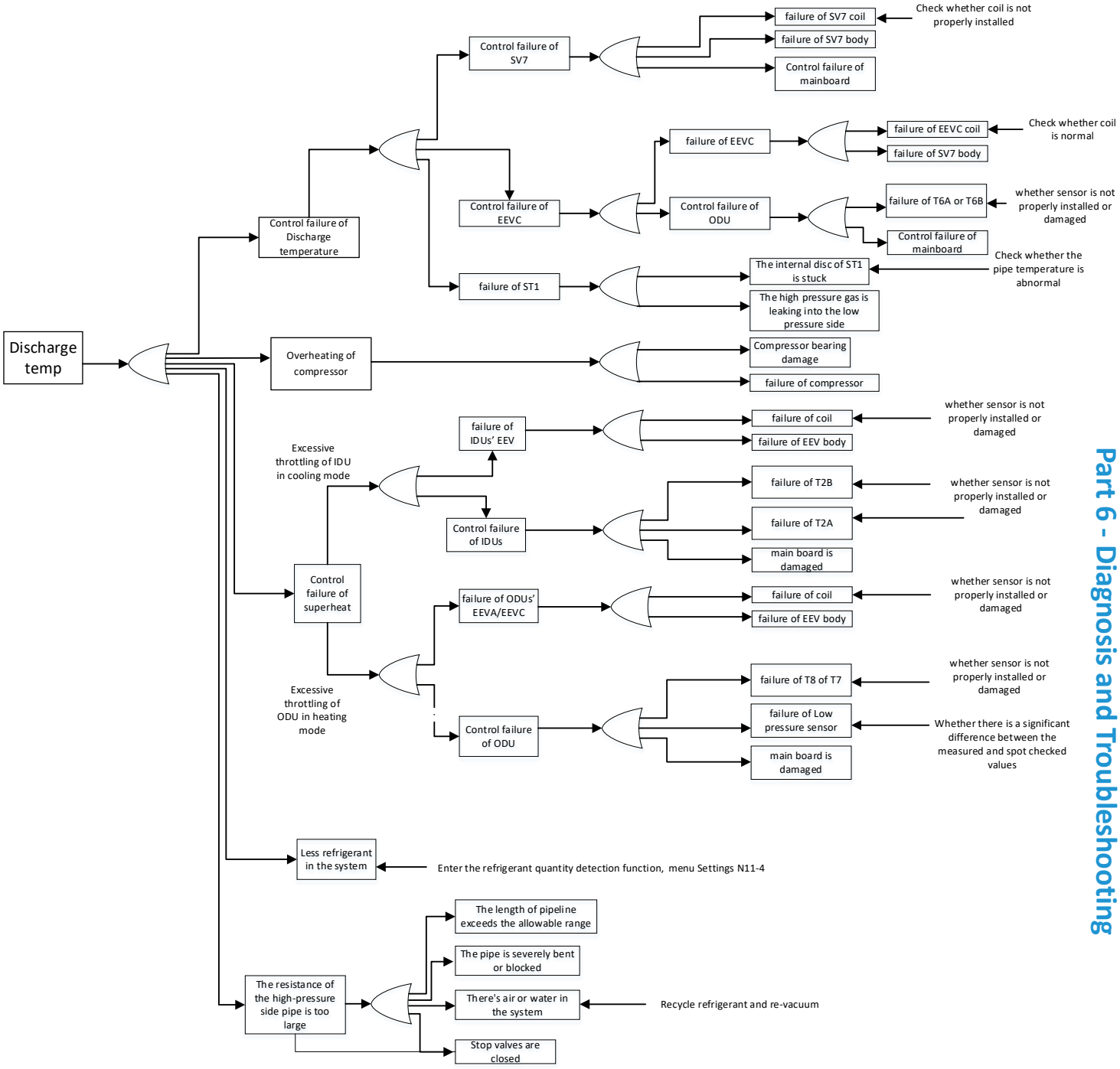
- The master outdoor unit can detect all indoor machines:
- The number of indoor units displayed for outdoor units is consistent with the actual installation.
- All stop valves have been opened and all indoor units' electronic expansion valve have been connected to their main control board:
- If the 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;
- The system runs properly for more than 30 minutes

Table 6-5.3: outdoor unit cooling mode parameters

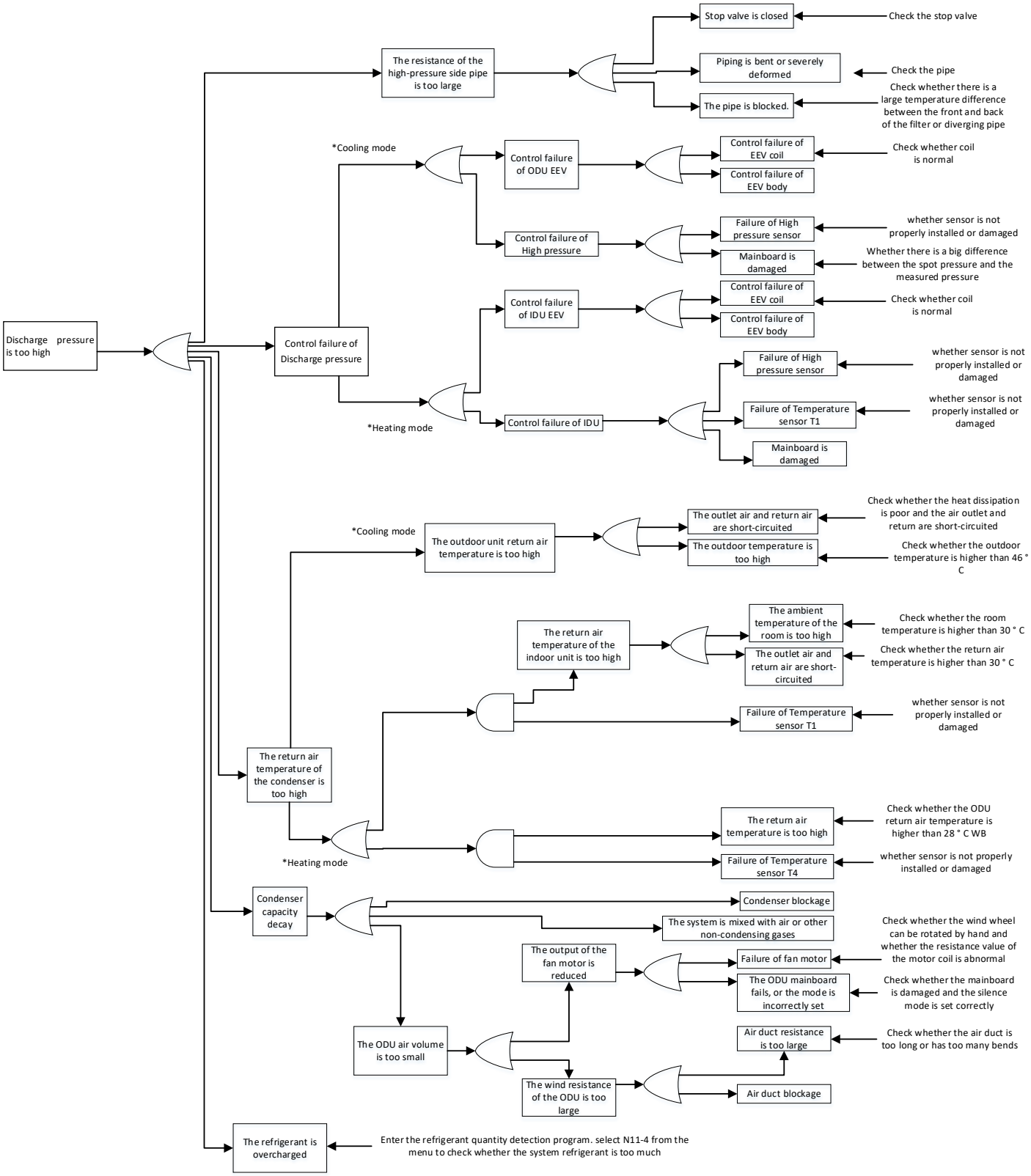
Outdoor ambient temperature	**°C**	< 10	10 to 26	26 to 31	31 to 41	> 41
Discharge temperature	**°C**	60-76	62-78	65-82	67-92	69-92
Discharge superheat	**°C**	17-30	17-33	17-34	17-36	10-32
Discharge pressure	**MPa**	2.3-2.8	2.3-2.8	2.4-3.6	2.6-3.8	3.1-4.1
Suction pressure	**MPa**	0.6-0.7	0.7-0.9	0.8-1.0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

5.3 Analysis of the cause of system anomalies

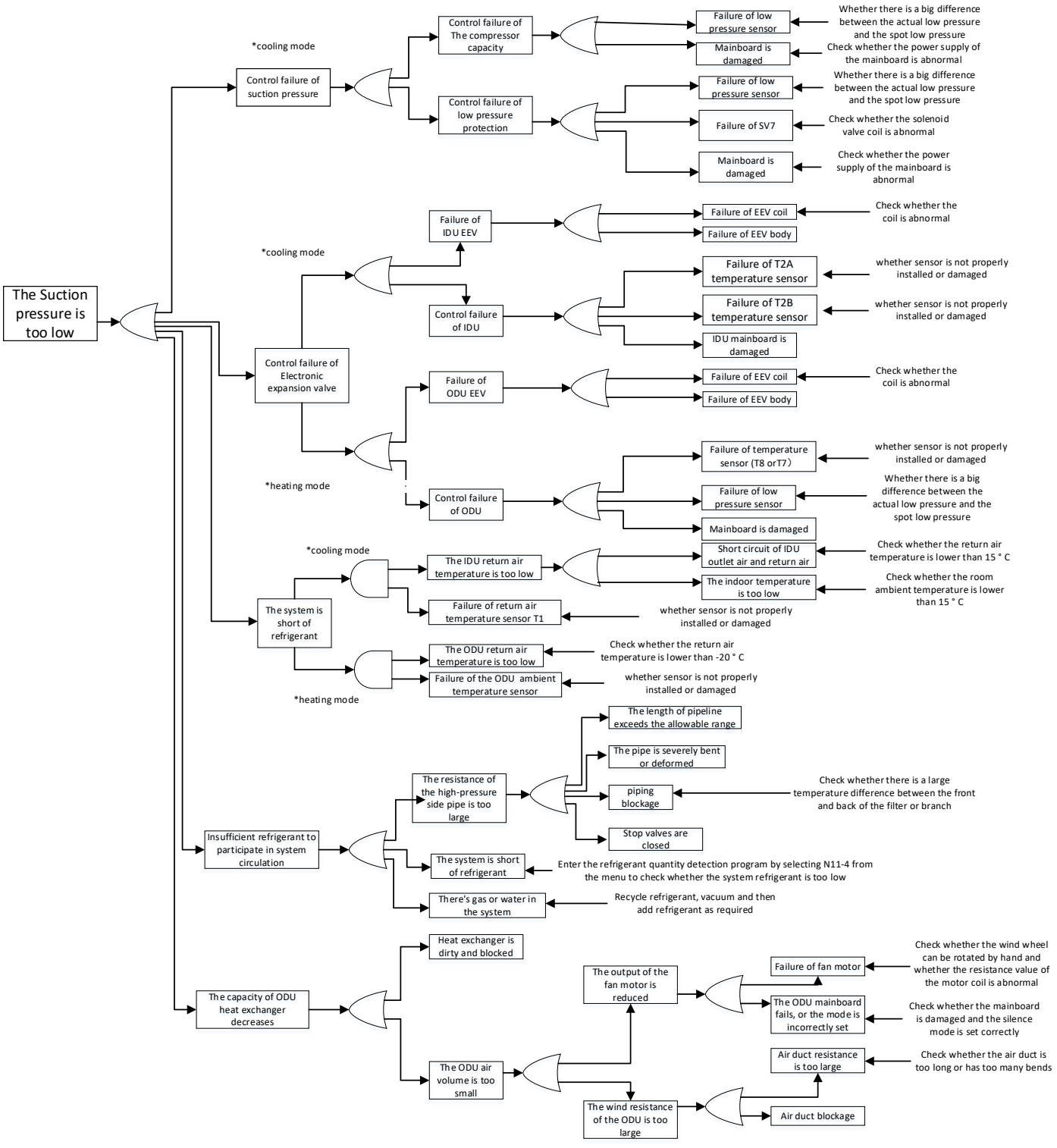
5.3.1 Cause Analysis of Excessive discharge Temperature



5.3.2 Cause Analysis of too high Pressure



5.3.3 Cause Analysis of too Low Pressure

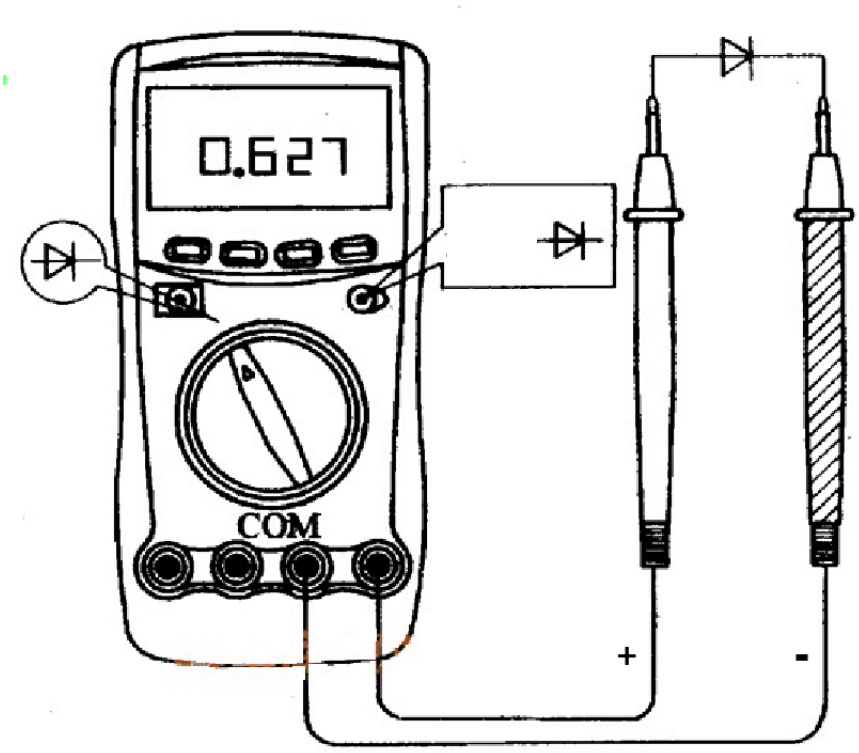


5.4 Inverter drive board measurement guidelines

Please give priority to the following things before testing Inverter drive board:

1) Cut off the power supply:
2) To avoid electric shock from capacitor discharge, power off for 10 minutes and wait for capacitor discharge before operation:
3) Remove all wiring on the Inverter drive board.

Tools: multimeter (measurable secondary pipe)



The following measurements are for reference:

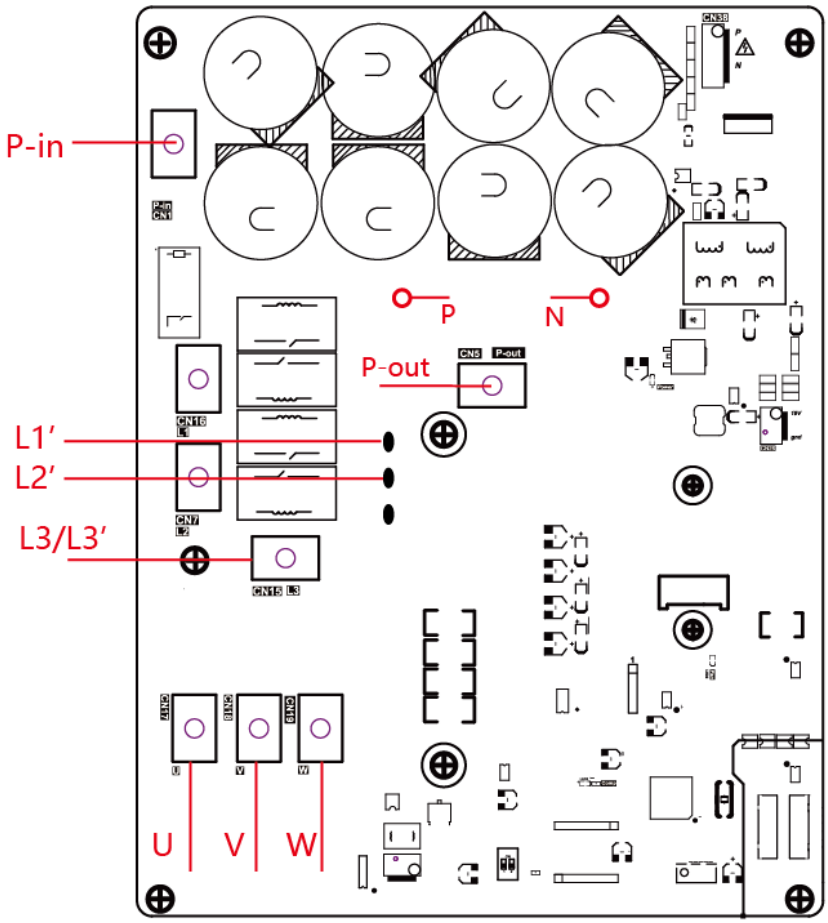
Table 6-5.4: Inverter circuit measurement (including compressor/fan)

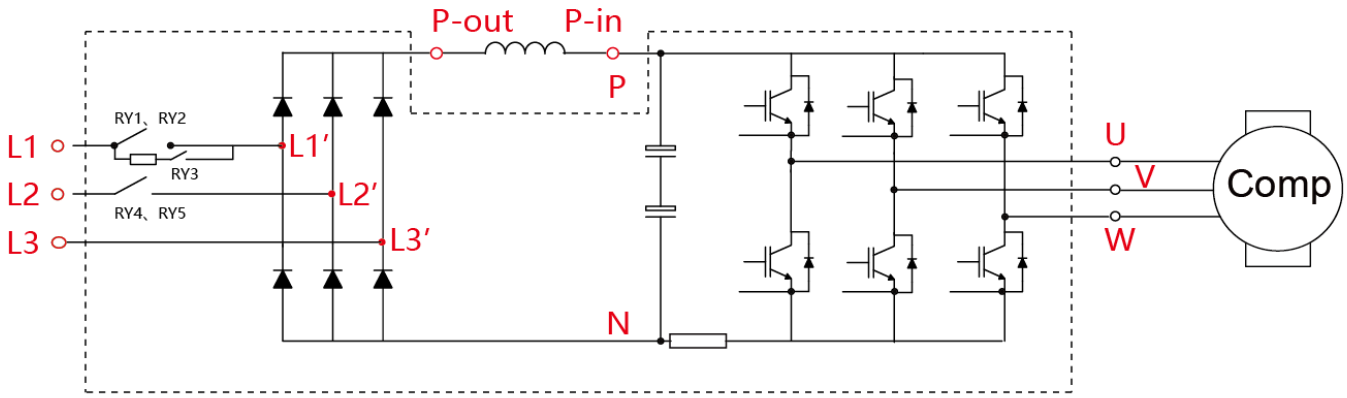
Number	Test point		Normal decision value	Notes
	+(Red)	-(Black)		
1	U	P-in	0.3-0.7V	0 or→+ ∞ is abnormal
2	V	P-in		
3	W	P-in		
4	N	U		
5	N	V		
6	N	W		

Table 6-5.5: Rectifier bridge stack measurement

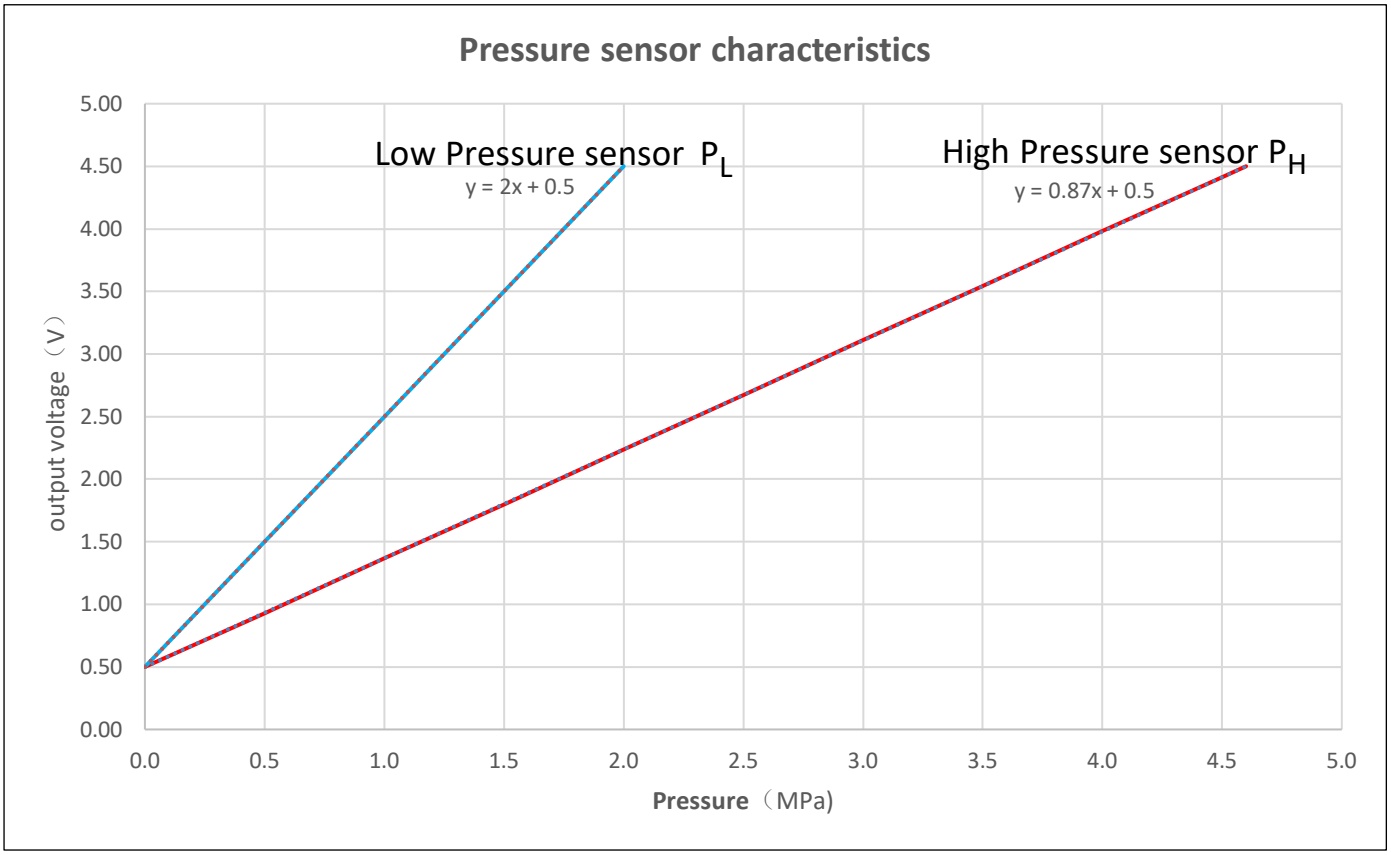
Number	Test point		Normal decision value	Notes
	+(Red)	-(Black)		
1	L1’	P-out	0.3-0.7V	0 or→+ ∞ is abnormal
2	L2’	P-out		
3	L3’	P-out		
4	N	L1’		
5	N	L2’		
6	N	L3’		

Schematic diagram of measuring points of Inverter drive board:



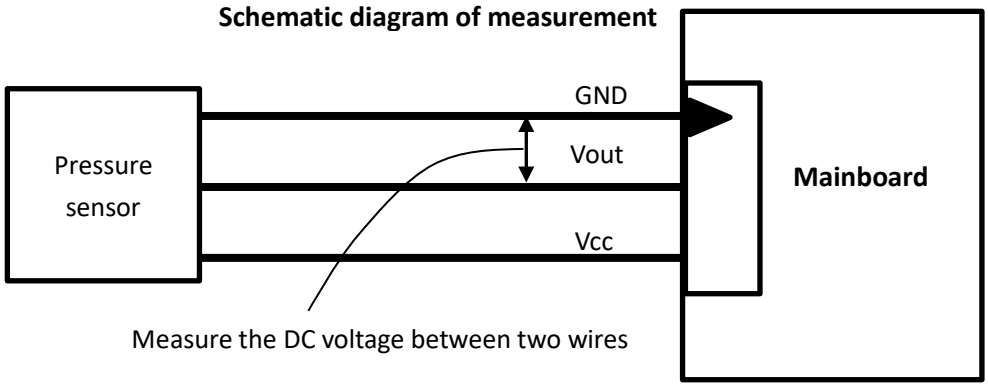


5.5 Appendix of Pressure Sensor Detection



P_H :Vout(H)=0.87×P_H+0.5

P_L:Vout(L)=2×P_L+0.5



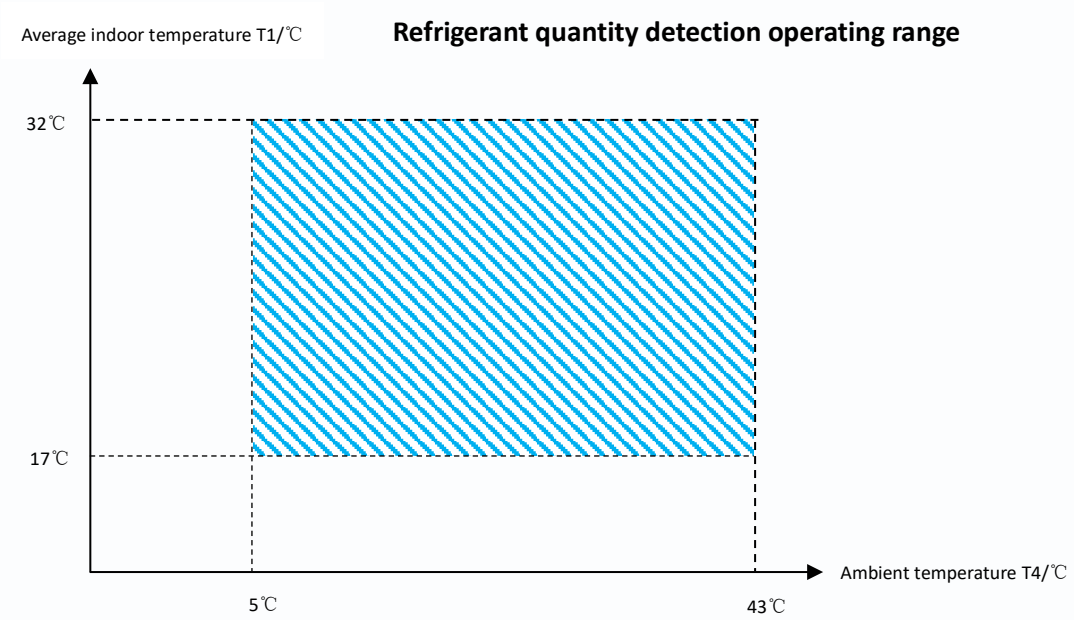
5.6 Refrigerant volume diagnosis

When running the refrigerant quantity detection program, the machine calculates the system refrigerant quantity according to the ambient temperature, condensing temperature and evaporation temperature, heat exchanger inlet and outlet temperature and other parameters, and give hints according to the results

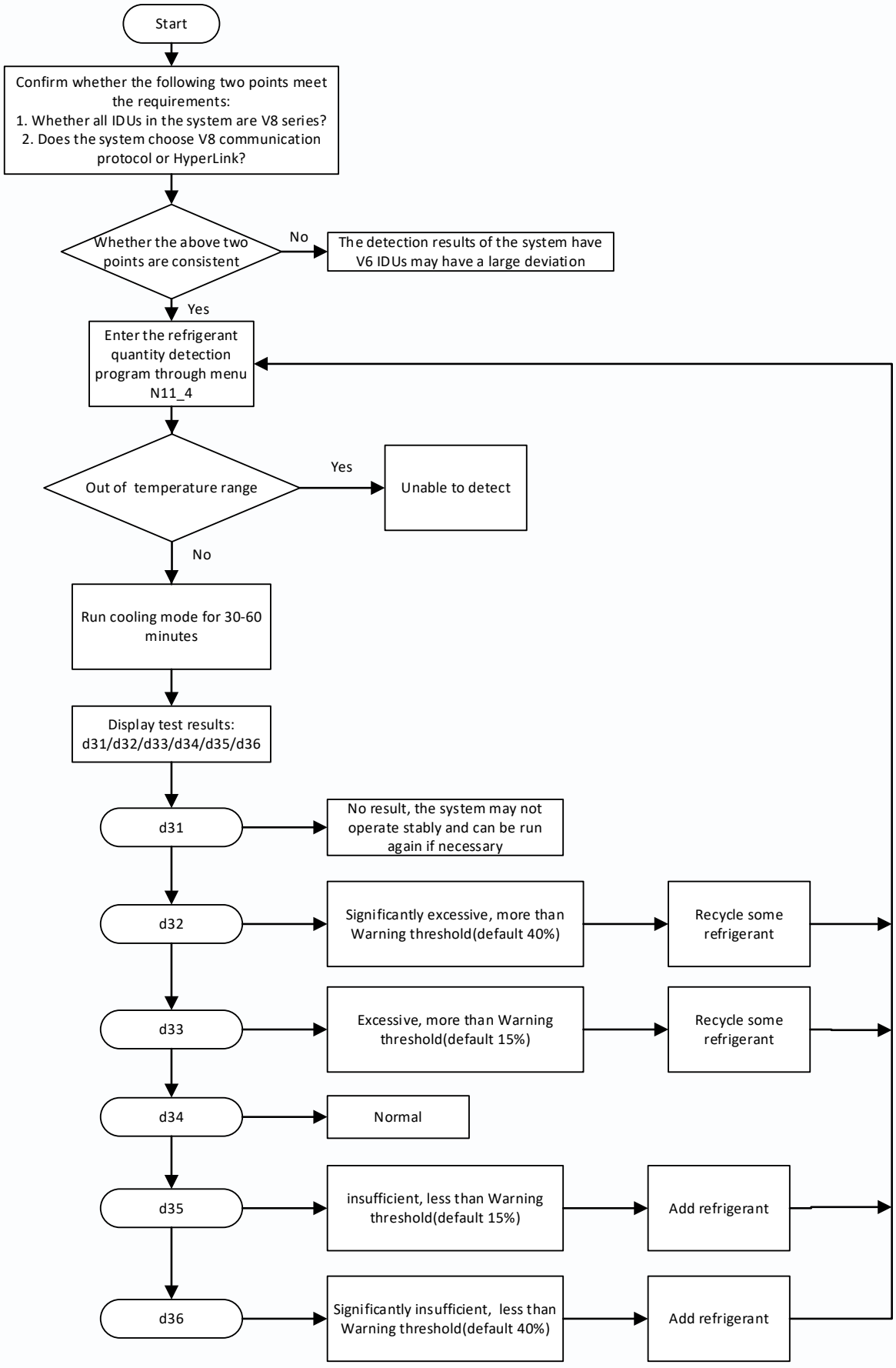
The detection results of the system have V6 IDUs may have a large deviation. It is recommended to perform the refrigerant quantity diagnostic test when the system is all V8 IDUs and the communication protocol is V8 communication.

The following operating ranges must be met

Refrigerant quantity detection operating range



5.6.1 Procedure



5.7 Oil volume table

Table 6-5.6: Oil volume table:

HP	Oil model	Compressor A (Y1)	Compressor B (Y2)	Total compressors oil	additional adding oil Volume	TOTAL OIL	TOTAL OIL
8HP	FV68H	1.1L		1.1L	5L	5L+1.1L	6.1L
10HP	FV68H	1.1L		1.1L	5L	5L+1.1L	6.1L
12HP	FV68H	1.1L		1.1L	5L	5L+1.1L	6.1L
14HP	FV68H	1.1L		1.1L	5L	5L+1.1L	6.1L
16HP	FV68H	1.1L		1.1L	5L	5L+1.1L	6.1L
18HP	FV68H	1.1L		1.1L	6L	6L+1.1L	7.1L
20HP	FV68H	1.1L		1.1L	7L	7L+1.1L	8.1L
22HP	FV68H	1.1L		1.1L	7L	7L+1.1L	8.1L
24HP	FV68H	1.1L		1.1L	7L	7L+1.1L	8.1L
26HP	FV68H	1.1L	1.1L	1.1L+1.1L	7L	7L+1.1L+1.1L	9.2L
28HP	FV68H	1.1L	1.1L	1.1L+1.1L	7L	7L+1.1L+1.1L	9.2L
30HP	FV68H	1.1L	1.1L	1.1L+1.1L	7L	7L+1.1L+1.1L	9.2L

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 you pulled out X), then you need to add X-Y1-Y2(for 30HP, Y1 is 1.1L, Y2 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 Please add the additional oil to the innlet of Gas-liquid separator, not directly to the compressor.

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