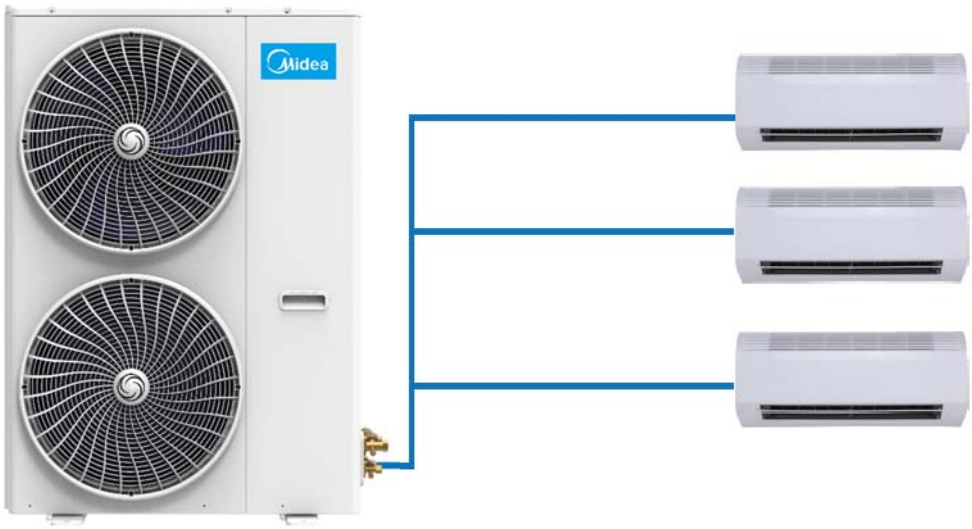
R410A

Commercial Air Conditioners

Engineering Data

Mini Series VRF



Model:

MDV-V200WN1(AU)

MIH22GHN18

MIH28GHN18

MIH36GHN18

MIH45GHN18

MIH56GHN18

MIH71GHN18

MIH80GHN18

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2.2-8KW


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MDV-V200WN1(AU)


2 Nomenclature

2.1 Indoor Units

2.1.1 Standard indoor units

Indoor units

M IH 22 G H N18
① ② ③ ④ ⑤ ⑥

Legend		
No.	**Code**	**Remarks**
1	M	Midea
2	IH	VRF indoor unit
3	22	Capacity index (the capacity in kW multiplied by 10)
4	G	Indoor unit type G: Wall-mounted
5	H	Power supply H: 1 phase, 220-240V, 50/60Hz
6	N18	Refrigerant type (N18: R410A&R32)

2.2 Outdoor Units

MDV - V 200 W N1 (AU)
① ② ③ ④ ⑤ ⑥

Legend		
No.	**Code**	**Remarks**
1	MDV	Midea outdoor unit
2	V	All DC inverter
3	200	Capacity index (the capacity in kW multiplied by 10)
4	W	Unit category (W: VRF outdoor unit)
5	N1	Refrigerant type (N1: R410A)
6	AU	Series code

Part 2

Outdoor Unit

Engineering Data

1 Specifications

Table 2-1.1: Model specifications

Sale Model			MDV-V200WN1(AU)
Power supply			220-240V~ 50Hz
Cooling[1]	Capacity	kW	15.5 (8-20)
	Input	kW	4.0
	EER		3.88
Heating[2]	Capacity	kW	21.0 (12-23)
	Input	kW	5.0
	COP		4.20
Connected indoor unit	Maximum quantity		12
Compressor	Type		DC inverter
	Quantity		1
	Oil type		FVC68D
	Start-up method		Soft start
Fan	Type		Propeller
	Motor type		DC
	Quantity		1
	Drive type		Direct
Refrigerant	Type		R410A
	Factory charge	kg	4.4
Pipe connections	Gas pipe	mm	19.1
	Liquid pipe	mm	9.52
Sound pressure level(cooling/heating)[4]		dB(A)	59/59
Outdoor Unit	Dimension(W x H x D)	mm	902×1327×320
	Packing (W x H x D)	mm	1082X1406X434
	Net/Gross weight	kg	103/111
Ambient temp. operation range	Cooling (DB)	°C	-15~55
	Heating (WB)	°C	-20~27

Notes:

1. Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
2. Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
3. 60-130% is system combination ratio, combination ratio=Sum of capacity indexes of the indoor units/Capacity index of the outdoor units
4. Sound level: Anechoic chamber conversion value, measured at a point 1 m in front of the unit at a height of 1m.

During actual operation, these values are normally somewhat higher as a result of ambient conditions.

2 Dimensions

Figure 2-2.1: Front view dimensions (unit: mm)

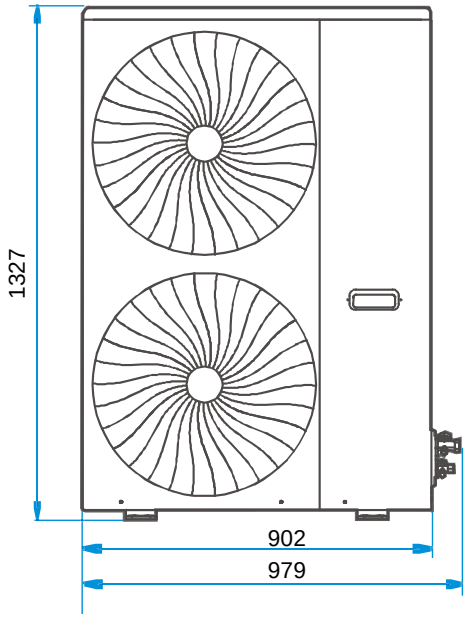
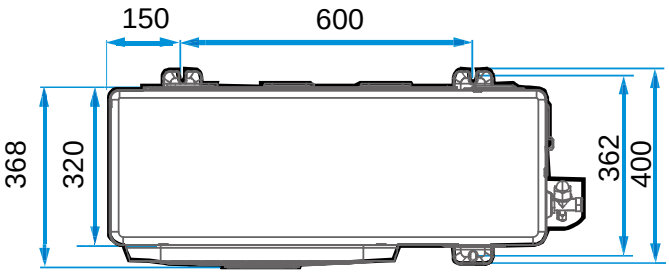
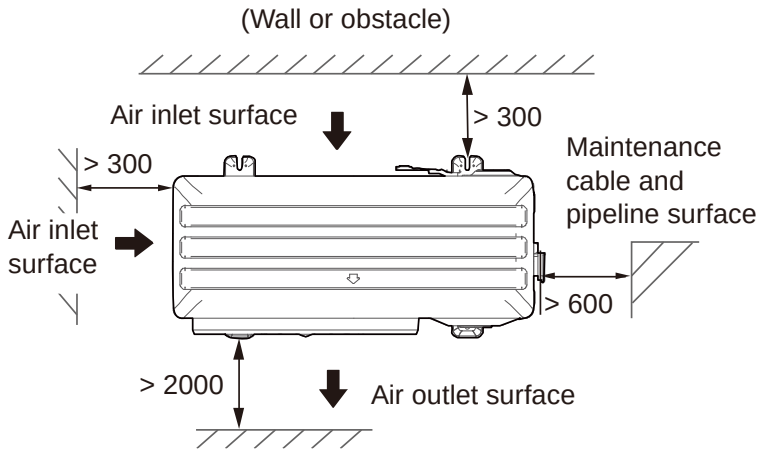


Figure 2-2.:Top view dimensions (unit: mm)



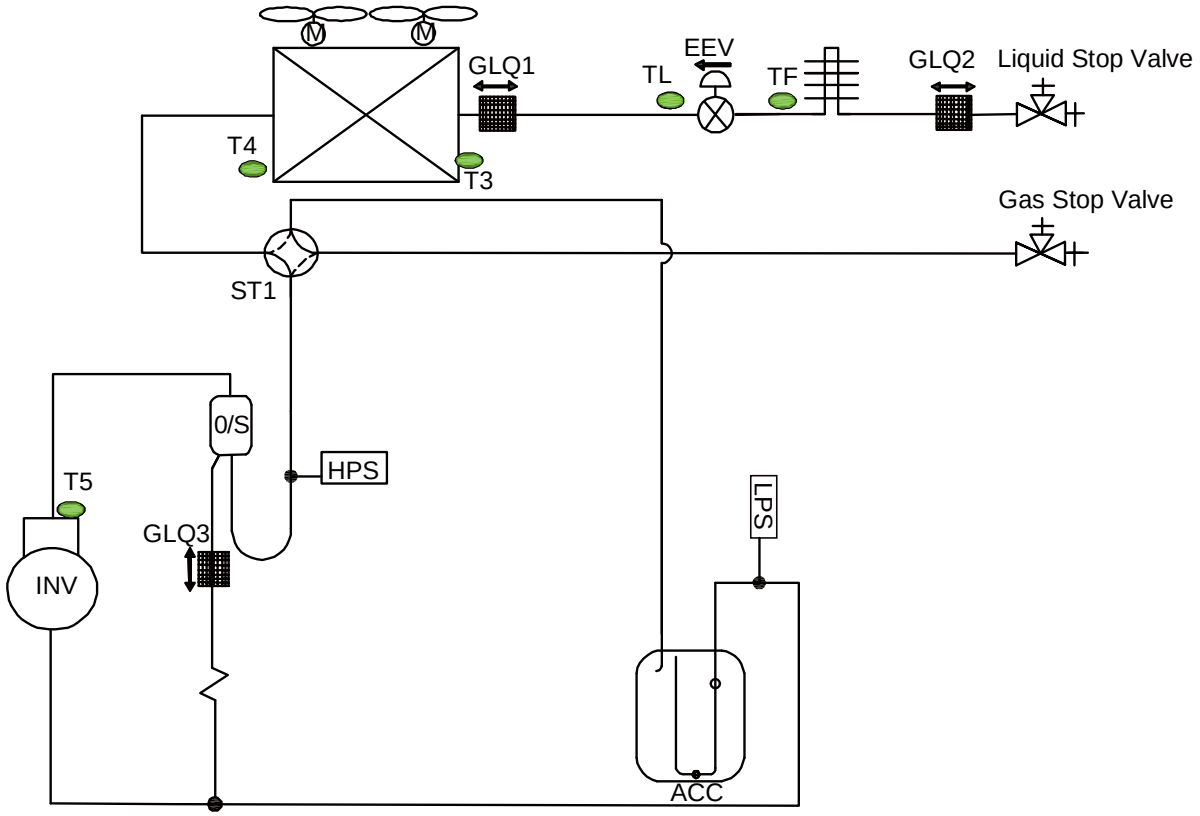
3 Installation Space Requirements

Figure 2-3.1: Single unit installation (unit: mm)



4 Piping Diagrams

Figure 2-4.1: Piping diagram

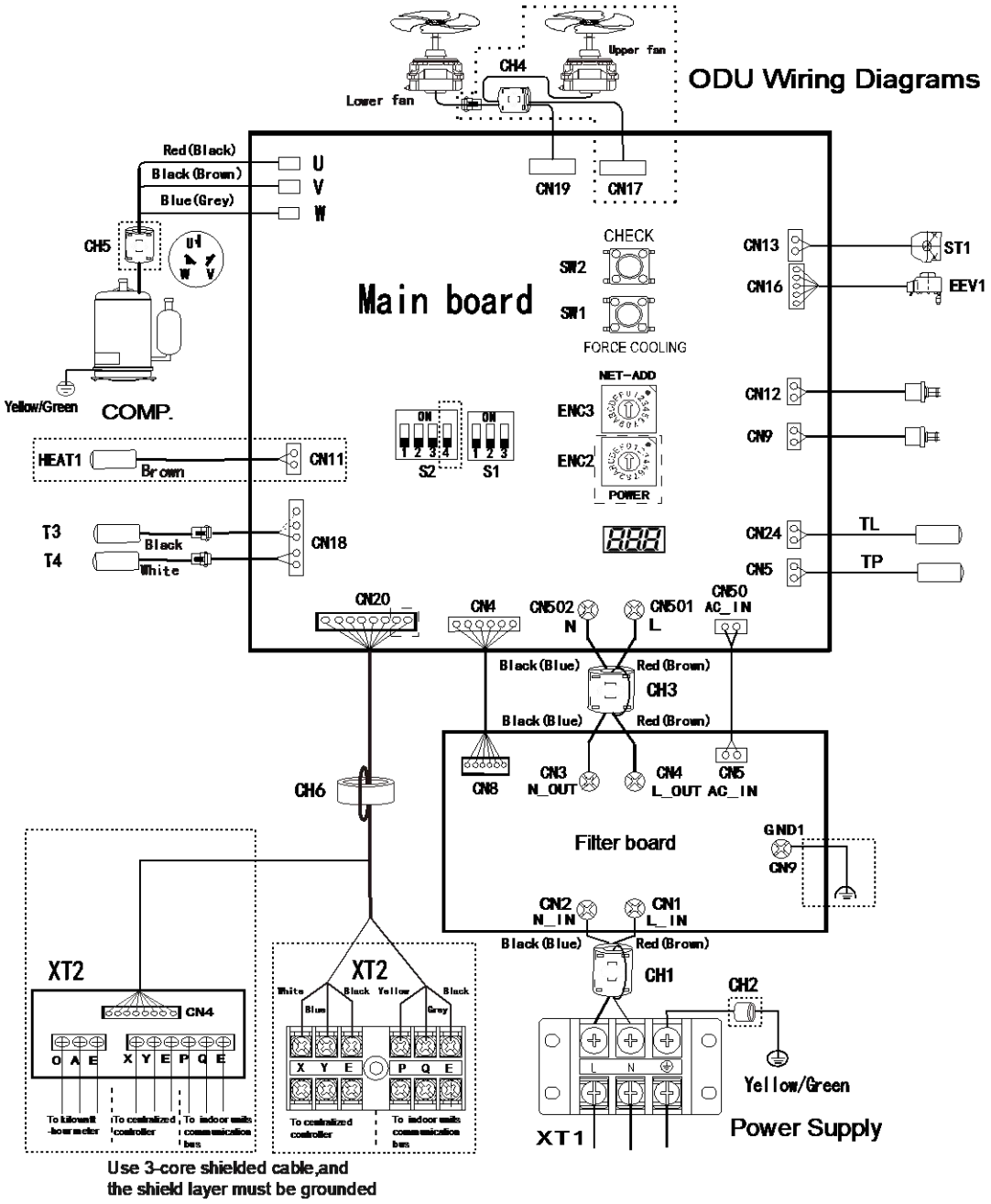


Key components:

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:**
   Stores liquid refrigerant and oil to protect compressor from liquid hammering.
3. **Electronic expansion valve (EEV):**
   Controls refrigerant flow and reduces refrigerant pressure.
4. **Four-way valve:**
   Controls refrigerant flow direction. Closed in cooling mode and open in heating mode. When closed, the heat exchanger functions as a condenser; when open, the heat exchanger functions as an evaporator.
5. **High and low pressure switches:**
   Regulate system pressure. When system pressure rises above the upper limit or falls below the lower limit, the high or low pressure switches turn off, stopping the compressor. After 5 minutes, the compressor restarts.

5 Wiring Diagrams

Figure 2-5.1: Wiring diagram



Component code	Description	Component code	Description
COMP.	Compressor	HEAT1	Crankcase heater
EEV1	Electronic expansion valve	T3	Outdoor heat exchanger temperature sensor
FAN1	Upper DC Fan	T4	Outdoor ambient temperature sensor
FAN2	Lower DC Fan	TP	Discharge temperature sensor
H-PRO	High pressure on/off switch	TF	Radiator temperature sensor
L-PRO	Low pressure on/off switch	TL	Condenser outlet temperature sensor
ST1	Four-way valve	CH1-CH6	Magnetic ring
XT1	Terminal block		

6 Electrical Characteristics

Table 2-6.1: Outdoor unit electrical characteristics

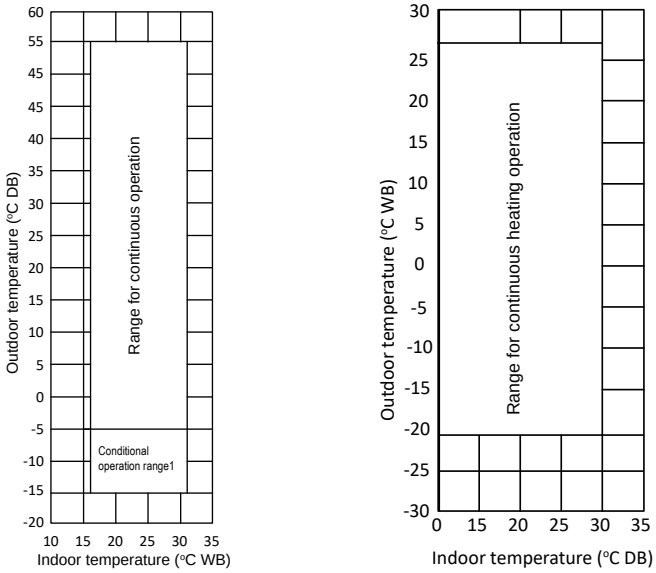
Model	Power Supply[1]							Compressor		OFM	
	Hz	Volts	Min. volts	Max. volts	MCA[2]	TOCA[3]	MFA[4]	MSC[5]	RLA[6]	kW	FLA
MDV-V200WN1(AU)	50Hz	220-240	198	264	33	33	40	-	30.5	0.1+0.1	0.71+0.71

Abbreviations:
MCA: Minimum Circuit Amps; TOCA: Total Over-current Amps; MFA: Maximum Fuse Amps; MSC: Maximum Starting Current (A); RLA: Rated Load Amps; FLA: Full Load Amps

Notes:
1. Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed range limits. Maximum allowable voltage variation between phases is 2%.
2. Select wire size based on the value of MCA.
3. TOCA indicates the total overcurrent amps value of each OC set.
4. MFA is used to select overcurrent circuit breakers and residual-current circuit breakers.
5. MSC indicates the maximum current on compressor start-up in amps.
6. RLA is based on the following conditions: indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB.

7 Operating Limits

Figure 2-8.1: Operating limits



Note

1. Outdoor operating temperature under -5℃ in "cooling" mode, the startup capacity of IDUs must meet at least 30% of ODU capacity.

Table 2-8.1: Operating limits

Mode	Outdoor temperature	Room temperature
Cooling operation	-15℃～55℃	17℃～32℃
Heating operating	-20℃～27℃	16℃～30℃
Indoor humidity	⩽80%	
	Condensate might form on the unit's surface if the humidity is above 80%	

Notes:

1. If the unit is running outside the above condition, protective device will start, and even then the units take place abnormality running.
2. These figures base on the operation conditions between indoor units and outdoor units: Equivalent pipe length is 5m, and height difference is 0m.

Precaution:

1. The indoor relative humidity should be lower than 80%. If the air conditioner works in an environment with a relative humidity higher than mentioned above, the surface of the air conditioner may condensate. In this case, it is recommended to set the air speed of the indoor unit to high.

8 Sound Levels

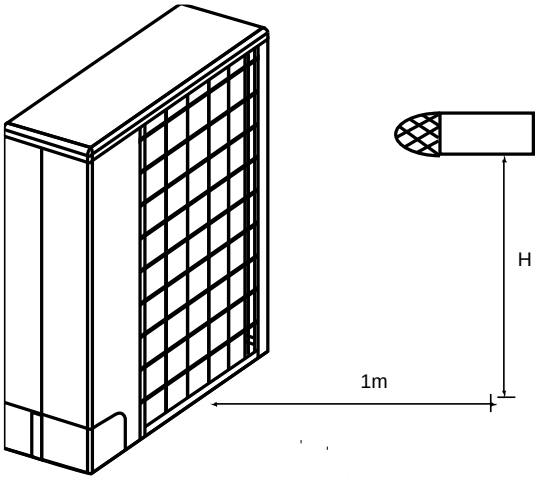
Table 2-9.1: Sound pressure level

Model	dB(A)	Height (m)
MDV-V200WN1(AU)	59	1

Notes:

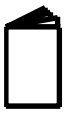
1. Sound pressure level is measured at a position 1m in front of the unit and Hm above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

Figure 2-9.1: Sound pressure level measurement (unit: m)



9 Accessories

Table 2-10.1: Standard accessories

Name	Shape	Quantity
Outdoor unit operation and installation manual		1
Water outlet connection pipe		1
Build-out resistor		1
Magnetic ring		1
Cable Tie		1

Part 3

Indoor Unit

Engineering Data

1 Specifications

MIH22GHN18 / MIH28GHN18

Model			MIH22GHN18	MIH28GHN18
Power supply			1 phase, 220-240V, 50/60Hz	
Cooling[1]	Capacity	kW	2.2	2.8
	Power input	W	21	24
Heating[2]	Capacity	kW	2.4	3.2
	Power input	W	21	24
Fan motor	Model		ZKSN-20-8-5L	ZKSN-20-8-5L
	Type		DC	
Indoor coil	Number of rows		1	2&3
	Fin spacing	mm	1.3	1.33
	Fin type		Hydrophilic aluminum	
	Tube OD and type	mm	Φ7 Inner-groove	Φ5 Inner-groove
	Dimensions (L×H×W)	mm	530×170×95	530×170×95
	Number of circuits		2	6
Air flow rate[3]		m^3/h	500/470/440/410/390/370/340	540/510/470/430/400/370/340
Sound pressure level[4]		dB(A)	33/32/31/30/29/28/27	35/34/33/32/31/30/28
Unit	Net dimensions[5] (WxHxD)	mm	750×295×265	
	Packed dimensions (WxHxD)	mm	875×385×360	
	Net/Gross weight	kg	10/12.5	10/12.5
Refrigerant type			R410A/R32	
Throttle		Type	Electronic expansion valve	
Design pressure (H/L)		MPa	4.4/2.6	
Pipe connections	Liquid/Gas pipe	mm	Φ6.35/Φ12.7	
	Drain pipe	mm	OD Φ16	

Notes:

1. Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
2. Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
3. Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured in an anechoic chamber.
5. The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.

MIH36GHN18 / MIH45GHN18 / MIH56GHN18

Model			MIH36GHN18	MIH45GHN18	MIH56GHN18
Power supply			1 phase, 220-240V, 50/60Hz		
Cooling[1]	Capacity	kW	3.6	4.5	5.6
	Power input	W	27	30	40
Heating[2]	Capacity	kW	4.0	5.0	6.3
	Power input	W	27	30	40
Fan motor	Model		ZKSN-20-8-5L	ZKSN-20-8-5L	ZKSN-20-8-5L
	Type		DC		
Indoor coil	Number of rows		2&3		
	Fin spacing	mm	1.33		
	Fin type		Hydrophilic aluminum		
	Tube OD and type	mm	Φ5 Inner-groove		
	Dimensions (L×H×W)	mm	530×170×95	730×170×95	730×170×95
	Number of circuits		6	6	6
Air flow rate[3]		m^3/h	580/540/500/460/420/380/340	720/670/620/560/510/460/410	860/780/700/620/550/480/410
Sound pressure level[4]		dB(A)	37/36/34/33/31/30/28	37/35/33/32/31/30/29	41/39/37/35/33/31/29
Sound power level		dB(A)	54/53/51/50/48/46/44	54/52/50/49/48/46/44	56/54/52/50/48/46/44
Unit	Net dimensions[5] (WxHxD)	mm	750×295×265	950×295×265	
	Packed dimensions (WxHxD)	mm	875×385×360	1075×385×360	
	Net/Gross weight	kg	10/12.5	11.5/14	
Refrigerant type			R410A/R32		
Throttle		Type	Electronic expansion valve		
Design pressure (H/L)		MPa	4.4/2.6		
Pipe connections	Liquid/Gas pipe	mm	Φ6.35/Φ12.7		
	Drain pipe	mm	OD Φ16		

Notes:

1. Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
2. Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
3. Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured in an anechoic chamber.
5. The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.

MIH71GHN18 / MIH80GHN18

Model			MIH71GHN18	MIH80GHN18
Power supply			1 phase, 220-240V, 50/60Hz	
Cooling[1]	Capacity	kW	7.1	8.0
	Power input	W	50	65
Heating[2]	Capacity	kW	8.0	9.0
	Power input	W	50	65
Fan motor	Model		ZKSN-50-8-17L	ZKSN-50-8-17L
	Type		DC	
Indoor coil	Number of rows		2&3	
	Fin spacing	mm	1.33	
	Fin type		Hydrophilic aluminum	
	Tube OD and type	mm	Φ5 Inner-groove	
	Dimensions (L×H×W)	mm	980×170×95	980×170×95
	Number of circuits		8	8
Air flow rate[3]		m^3/h	1220/1120/1030/940/850/750/660	1380/1260/1140/1020/900/780/660
Sound pressure level[4]		dB(A)	44/42/40/38/36/34/32	45/43/41/39/37/35/32
Sound power level		dB(A)	58/56/54/52/50/48/46	60/57/55/53/50/48/46
Unit	Net dimensions[5] (WxHxD)	mm	1200×295×265	
	Packed dimensions (WxHxD)	mm	1315×385×360	
	Net/Gross weight	kg	15/18	
Refrigerant type			R410A/R32	
Throttle		Type	Electronic expansion valve	
Design pressure (H/L)		MPa	4.4/2.6	
Pipe connections	Liquid/Gas pipe	mm	Φ9.52/Φ15.9	
	Drain pipe	mm	OD Φ16	

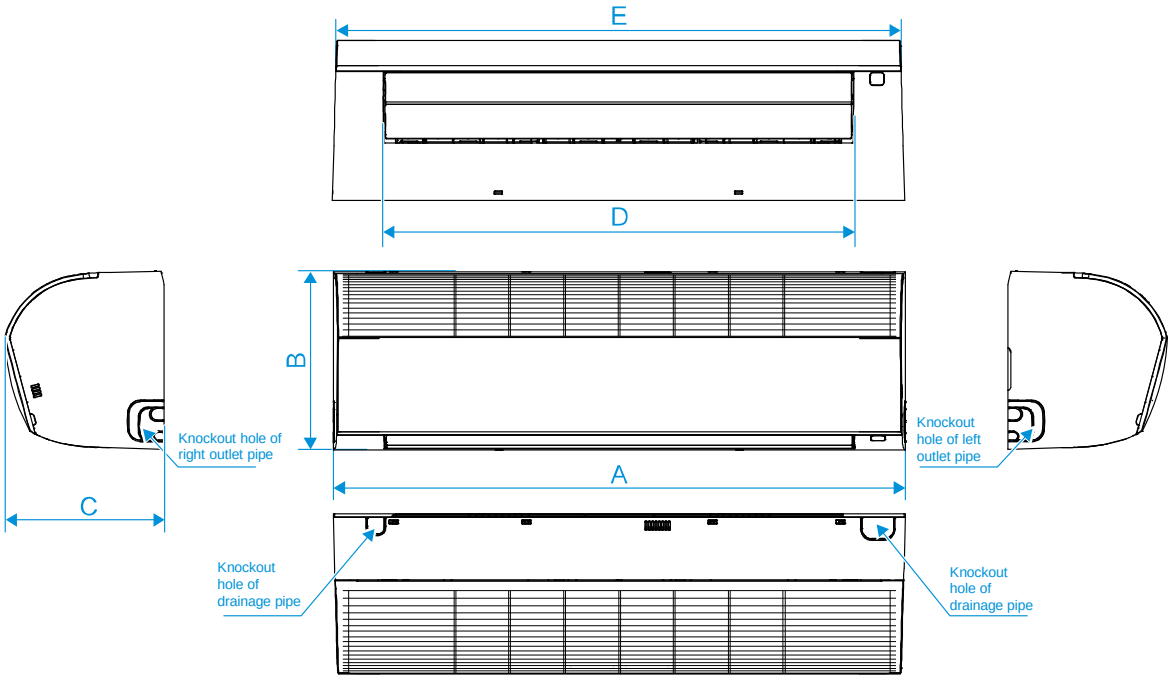
Notes:

1. Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
2. Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
3. Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
4. Sound pressure level is from highest level to lowest level, total 7 levels for each model. Sound pressure level is measured in an anechoic chamber.
5. The dimension is only the body size, excluding the size of the installation lug, connecting copper pipe, etc. For detailed dimensions, please refer to the installation manual.

2 Dimensions

2.1 Unit Dimensions

Figure 2.1: Wall mounted dimensions (unit: mm)



Capacity(kW)	A	B	C	D	E
kW≤3.6	750	295	265	581	736
3.6<kW≤5.6	950	295	265	781	936
5.6<kW≤8.0	1200	295	265	1025	1186

3 Unit Placement

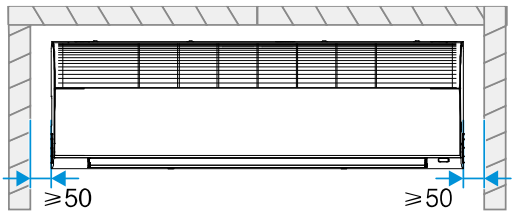
3.1 Placement Considerations

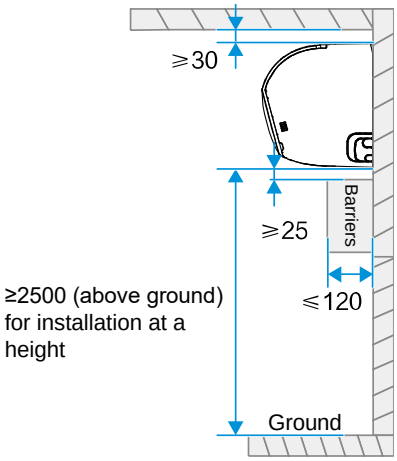
Unit placement should take account of the following considerations:

- Units should not be installed in the following locations:
  - A place filled with mineral oil, fumes or mist, like a kitchen.
  - A place where there are corrosive gases, such as acid or alkaline gases..
  - A place exposed to combustible gases and using volatile combustible gases such as diluent or gasoline.
  - A place where there is equipment emitting electromagnetic radiation.
  - A place where there is a high salt content in the air like a coast.
  - Do not use the air conditioner in an environment where an explosion may occur.
  - Places like in vehicles or cabin rooms.
  - Factories with major voltage fluctuations in the power supplies.
  - Other special environmental conditions.
- Units should be installed in positions where:
  - Ensure that the airflow in and out of the IDU is reasonably organized to form an air circulation in the room.
  - Ensure IDU maintenance space.
  - The nearer the drainage pipe and copper pipe are to the ODU, the lower the pipe cost is.
  - Prevent the air conditioner from blowing directly to the human body.
  - The closer the wiring to the power cabinet, the lower the wiring cost is.
  - Keep the air-conditioning return air away from the setting sun of the room.
  - Be careful not to interfere with the light tank, fire pipe, gas pipe and other facilities.
  - The IDU should not be lifted in the places like load-bearing beam and columns that affect the structural safety of the house.
  - The wired controller and the IDU should be in the same installation space; otherwise, the sampling point setting of the wired controller need to be changed.

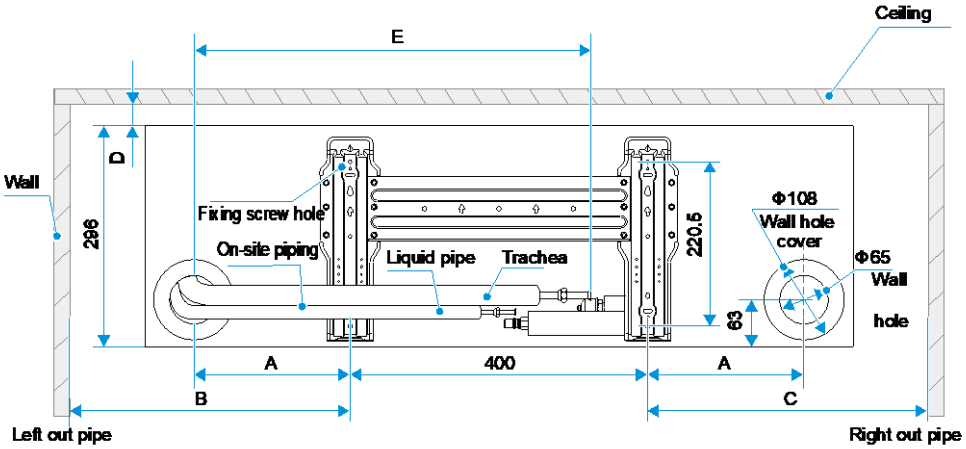
3.2 Space Requirements

Figure 3.1: Wall mounted space requirements (unit: mm)





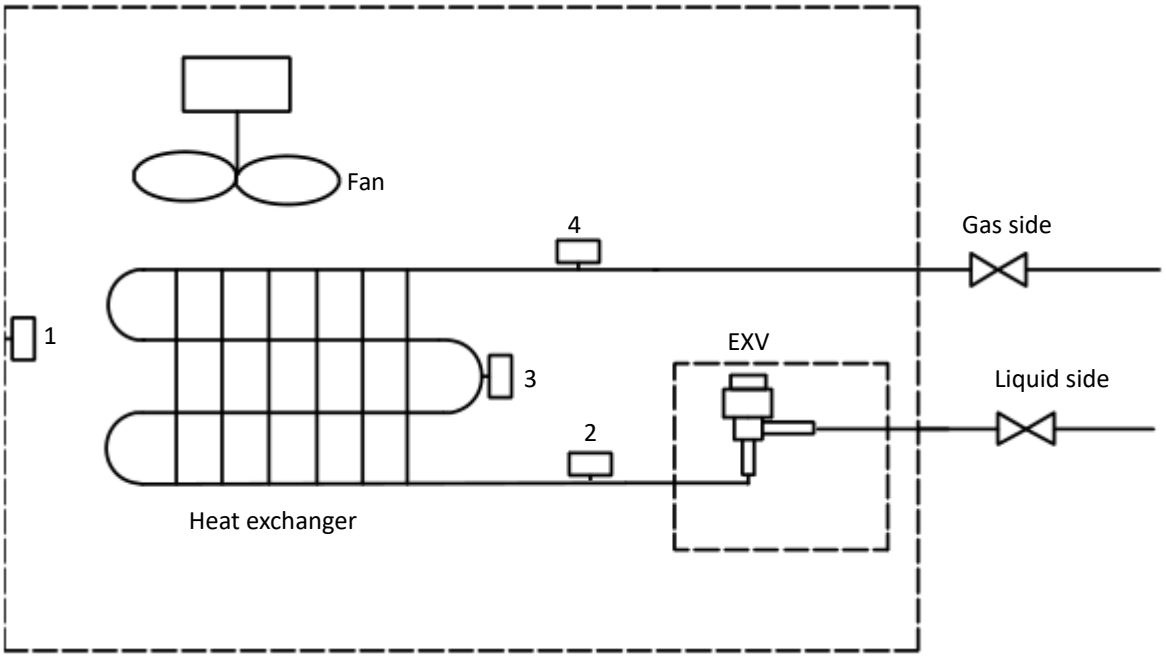
Positioning of mounting plate:



Distance(mm) / Model(kW)	A	B	C	D	E	Reserved lengths for power and signal cables	
						Left out pipe	Right out pipe
1.5~3.6	110	≥361	≥361	≥45	278	≥1115	≥415
4.5~5.6	210	≥561	≥561	≥45	367	≥1315	≥415

4 Piping Diagram

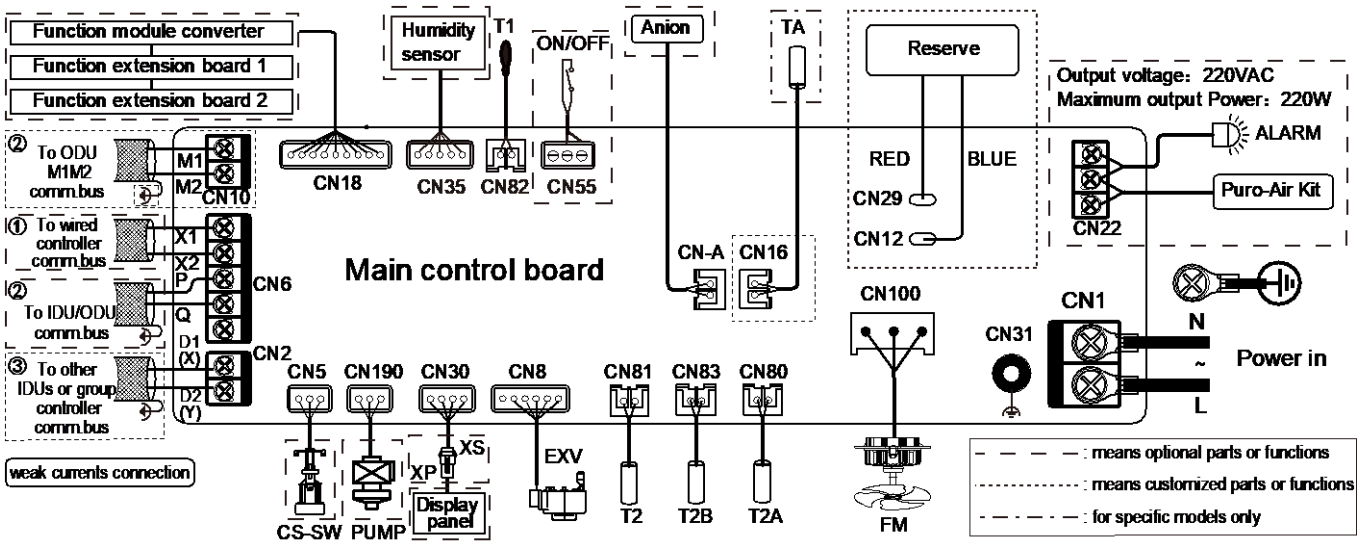
Figure 4.1: Wall mounted piping diagram



Legend		
1	T1	Indoor ambient temperature sensor
2	T2A	Indoor heat exchanger liquid side temperature sensor
3	T2	Indoor heat exchanger mid-point temperature sensor
4	T2B	Indoor heat exchanger gas side temperature sensor

5 Wiring Diagram

Figure 5.1: Wall mounted wiring diagram



Notes for installers and service engineers

Caution

- All installation, servicing and maintenance must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Units should be grounded in accordance with all applicable legislation. Metal and other conductive components should be insulated in accordance with all applicable legislation.
- Power supply wiring should be securely fastened at the power supply terminals – loose power supply wiring would represent a fire risk.
- After installation, servicing or maintenance, the electric control box cover should be closed. Failing to close the electric control box cover risks fire or electric shock.
- Switch ENC1 (indoor unit capacity setting) is factory-set and its setting should normally not be changed. The only circumstances in which a switch ENC1 might need to be set in the field is when replacing a main PCB. When replacing a main PCB, ensure that the capacity setting on switch ENC1 on the new PCB is consistent with the unit capacity given on the unit's nameplate.

6 Electrical Characteristics

Table 7.1: Wall mounted electrical characteristics

Model	Power supply						Indoor Fan Motor	
	Hz	Volts	Min. volts	Max. volts	MCA	MFA	Rated motor output (W)	FLA
MIH22GHN18	50/60	220-240	198	264	0.36	15	20	0.29
MIH28GHN18	50/60	220-240	198	264	0.36	15	20	0.29
MIH36GHN18	50/60	220-240	198	264	0.39	15	20	0.31
MIH45GHN18	50/60	220-240	198	264	0.41	15	20	0.33
MIH56GHN18	50/60	220-240	198	264	0.51	15	20	0.33
MIH71GHN18	50/60	220-240	198	264	0.65	15	50	0.55
MIH80GHN18	50/60	220-240	198	264	0.98	15	50	0.78

Abbreviations:
MCA: Minimum Circuit Amps
MFA: Maximum Fuse Amps
FLA: Full Load Amps

Part 4

System Design and Installation

1 Preface to Part 3

1.1 Notes for Installers Boxes

The information contained in this Engineering Data Book may primarily be of use during the system design stage of a Midea VRF project. Additional important information which may primarily be of use during field installation has been placed in boxes, such as the example below, titled “Notes for installers”.

Notes for installers

- Notes for installers boxes contain important information which may primarily be of use during field installation, rather than during desk-based system design.

1.2 Definitions

In this Engineering Data Book, the term “applicable legislation” refers to all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation.

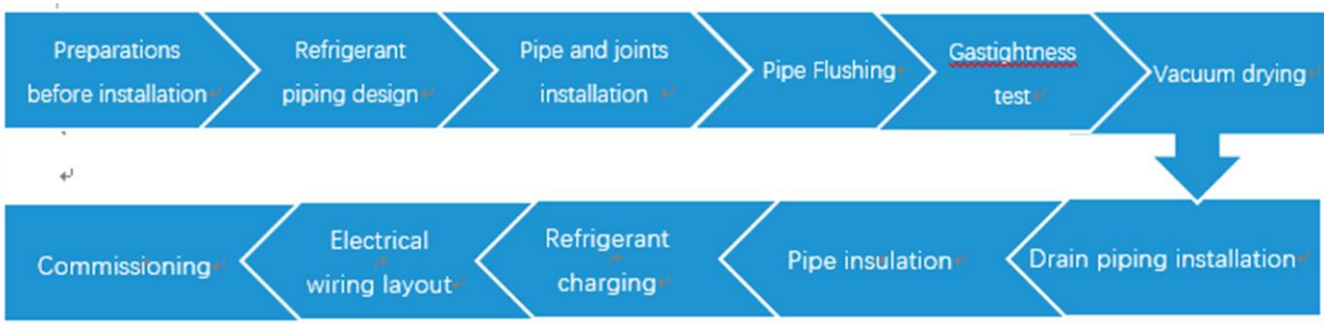
1.3 Precautions

All system installation including installation of piping and electrical works must only be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.

1.4 Installation procedure

Notes for installers

Installation of the system should proceed in the following order



Note: Pipe flushing should be performed once the brazed connections have been completed with the exception of the final connections to the indoor units. That is, flushing should be performed once the outdoor units have been connected but before the indoor units are connected.

2 Unit Placement and Installation

2.1 Outdoor Units

2.1.1 Placement considerations

Placement of outdoor units should take account of the following considerations:

- Air conditioners should not be exposed to direct radiation from a high-temperature heat source.
- Air conditioners should not be installed in positions where dust or dirt may affect heat exchangers.
- Air conditioners should not be installed in locations where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
- Air conditioners should not be installed in locations where exposure to salinity may occur unless the anti-corrosion treatment for high-salinity areas customization option has been added and the precautions described in “Installation in Areas of High Salinity” are taken.
- Outdoor units should be installed in well-drained, well-ventilated positions that are as close as possible to the indoor units.

2.1.2 Installation Space Requirements

Outdoor units must be spaced such that sufficient air may flow through each unit. See Part 2-3 “Installation Space Requirements” for details about the spacing requirements in different scenarios.

In all installation examples in this chapter, the direction of connecting pipe for outdoor unit installation is forward or downward. When the rear pipe is connected and installed, the installation space on the right side of the outdoor unit shall be at least 250mm;

If the particular circumstances of an installation require a unit to be placed closer to a wall than specified in Figures 2-3.1 to 2-3.20, a discharge duct should be installed. Refer to “Outdoor Unit Ducting and Shielding”. Depending on the height of adjacent walls relative to the height of the units, ducting may be required.

2.1.3 Base structures

Outdoor unit base structure design should take account of the following considerations:

- The base of the outdoor unit must use the solid concrete surface as the cement base or the steel beam frame base.
- The base must be completely level to ensure that every point of contact is even.
- During installation, make sure the base supports the vertical folds of the front and back under plates of the chassis directly as the vertical folds of the front and back under plates are unit where the actual support for the unit load is.
- No gravel layer is required when the base is built on the roof surface, but the sand and cement on the concrete surface must be level, and the base should be chamfered along the edge.
- A water drainage ditch should be set around the base to drain the water around the equipment. Potential risk: slip.
- Check the load-bearing capacity of the roof to make sure it can support the load.
- When you choose to install the piping from the bottom, the base height should be above 200mm.
- Make sure the base where the unit is installed is strong enough to prevent vibrations and noise.
- Use six ground bolts (M8) to secure the unit in place. Best is to screw in the ground bolt until it is embedded in the base surface by at least 3 threads.
- Please refer to the Figure 3-2.3 below for the installation position of expansion bolts.

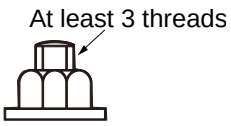


Figure 3-2.2: Outdoor unit typical concrete base structure design (unit: mm)

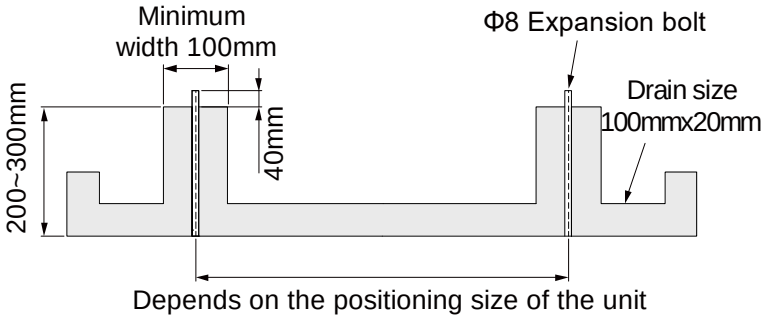


Figure 3-2.3: Expansion bolt positioning

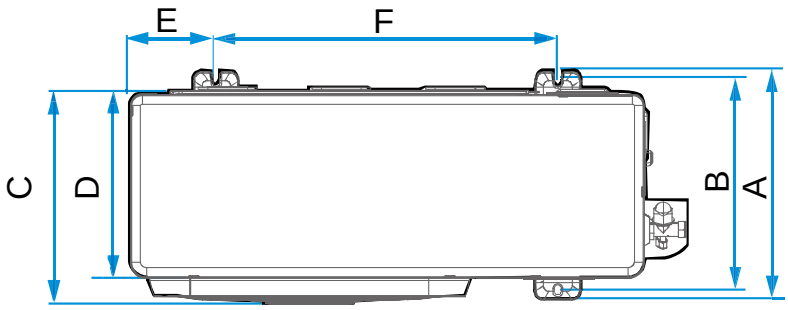


Table 3-2.1: Expansion bolt spacings (unit: mm)

Size \ kW	20
A	400
B	362
C	368
D	320
E	150
F	600

2.1.4 Acceptance and unpacking

Notes for installers

- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories ordered have been included. Retain the Installation and Owner's Manual for future reference.

2.1.5 Hoisting

Notes for installers

- Do not remove any packaging before hoisting. If units are not packaged or if the packaging is damaged, use suitable boards or packing material to protect the units.
- Hoist one unit at a time, using two ropes to ensure stability.
- Keep units upright during hoisting, ensuring that the angle to the vertical does not exceed 30°.
- It is better to use a crane and two long belts to lift the unit as per Figure 3-2.4.
- Handle the unit carefully to protect it, and note the position of the center of gravity of the unit.

Figure 3-2.4: Hoisting

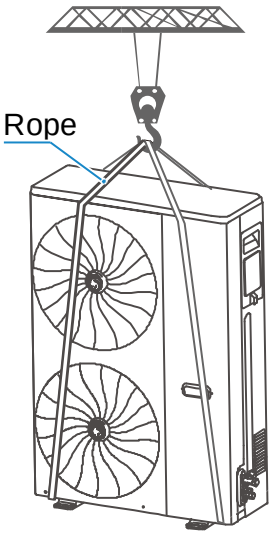


Figure 3-2.5: 8-24HP Center of gravity

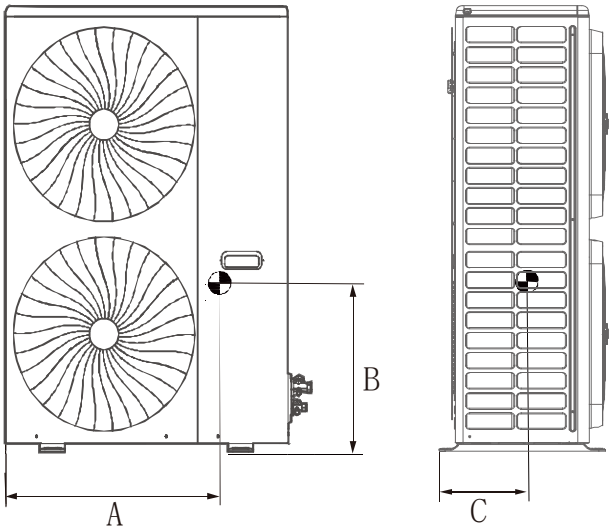


Table 3-2.2: Center of gravity (unit: mm)

Model	A	B	C
20kW	650	500	150

2.2 Indoor Units

2.2.1 Placement considerations

Placement of indoor units should take account of the following considerations:

- Sufficient space for drain piping and for access during servicing and maintenance should be allowed.
- To ensure a good cooling/heating effect, short-circuit ventilation (where outlet air returns quickly to a unit's air inlet) should be avoided.
- To prevent excessive noise or vibration during operation, suspension rods or other weight-bearing fixings should typically be able to bear twice the unit's weight.

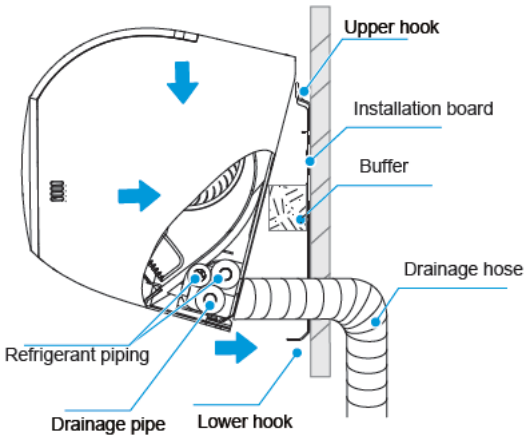
Notes for installers

- Before installing an indoor unit, check that the model to be installed is as specified in the construction drawings and confirm the correct orientation of the unit.
- Ensure that units are installed at the correct height.
- To allow smooth condensate drainage and to ensure unit stability (to prevent excessive noise or vibration), ensure that units are level to within 1° of the horizontal. If a unit is not level to within 1° of the horizontal, water leakage or abnormal vibration/noise may occur.

2.2.2 Hang the indoor unit

- Pass the properly bundled pipeline and connection lines through the wall hole, making sure that the pipe socket is not damaged, and that the connecting pipes of the unit are free of sand and dust.
- Hang the buckle at the back of the indoor unit on the upper hooker of the installation board. Shift the indoor unit left and right to check that the unit is securely and firmly mounted.
- Push the lower part of the indoor unit against the wall, and shift the unit body up and down and left and right to check that the connection is secure.
- Until the indoor unit can be connected properly, make sure that the indoor unit is buckled into the slots. Use your hands to shake the unit to check that it does not move up, down, left or right. Use a spirit level to verify that the indoor unit is level.

Figure 3-2.7: Indoor unit installation



3 Refrigerant Piping Design

3.1 Design Considerations

Refrigerant piping design should take account of the following considerations:

- The amount of brazing required should be kept to a minimum.
- On the two inside sides of the first indoor branch joint ("A" in Figures 3-4.1 and 3-4.4) the system should, as far as possible, be equal in terms of number of units, total capacities and total piping lengths.

3.2 Material Specification

Only seamless phosphorus-deoxidized copper piping that complies with all applicable legislation should be used. Temper grades and minimum thicknesses for different diameters of piping are specified in Table 3-4.1.

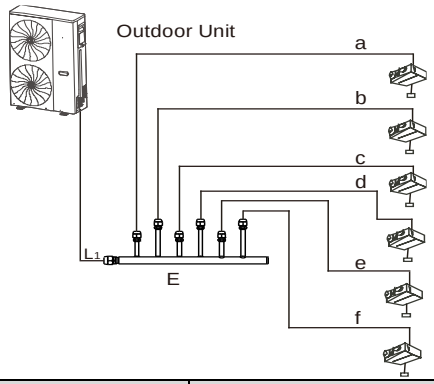
Table 3-4.1: Piping temper and thickness

Piping outer diameter(mm)	Temper	Minimum thickness (mm)
Φ6.35	M-type	0.80
Φ9.52		0.80
Φ12.7		1.00
Φ15.9		1.00
Φ19.1		1.00

3.3 Permitted Piping Lengths and Level Differences

The piping length and level difference requirements that apply are summarized in *Table 3-4.2* and are fully described as follows (refer to *Figure 3-4.1*):

Figure 3-4.1: Permitted refrigerant piping lengths and level differences



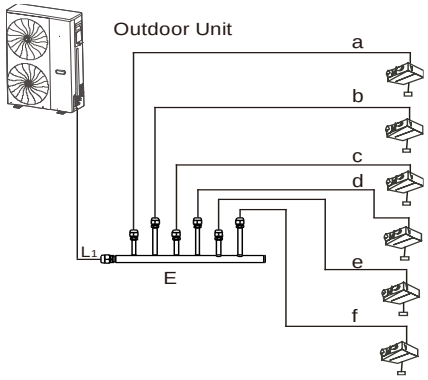
Name	Designation
Indoor unit branch joint	a to f
Main pipe	L1
Branch header	E

Table 3-4.3: Summary of permitted refrigerant piping lengths and level differences

Category			Permitted values	Piping in Figure 3-4.1
Piping lengths	Total piping length		≤ 200m	L1+a+b+c+d+e+f
	Piping between farthest indoor unit and first outdoor branch joint	Actual length	≤ 80m	L1+max(a,b,c,d,e,f)
		Equivalent length	≤ 90m	
Level differences	Largest level difference between indoor unit and outdoor unit	Outdoor unit is above	≤ 30m	-
		Outdoor unit is below	≤ 20m	
	Largest level difference between indoor units		≤ 8m	-

3.4 Selecting Piping Diameters

Tables 3-4.6 to 3-4.10, below, specify the required pipe diameters for the indoor and outdoor piping.



3.4.1 Diameters of Main pipe and first indoor branch joint (L1)

Outdoor units	Gas pipe (mm)	Liquid pipe (mm)
20kW	Φ19.1	Φ9.52

3.4.2 Diameters of Indoor units auxiliary connection pipes

Table 3-4.10: Piping sizes at the branch pipe (a to f)

Capacity of indoor unit (kW)	Gas pipe (mm)	Liquid pipe (mm)
Capacity ≤ 5.6	Φ12.7	Φ6.35
5.6 < Capacity ≤ 8	Φ15.9	Φ9.52

3.5 Refrigerant Leakage Precautions

R410A refrigerant is not flammable in air at temperatures up to 100°C at atmospheric pressure and is generally considered a safe substance to use in air conditioning systems. Nevertheless, precautions should be taken to avoid danger to life in the unlikely event of a major refrigerant leakage. Precautions should be taken in accordance with all applicable legislation. Where no applicable legislation exists, the following may be used as a guide:

- Air conditioned rooms should be large enough that if leakage of all the refrigerant in the system occurs, the concentration of the refrigerant in the room does not reach a level dangerous to health.
- A critical concentration (at which point R410A becomes dangerous to human health) of 0.44 kg/m^3 can be used.
- The potential concentration of refrigerant in a room following a leak can be calculated as follows:
  - Calculate the total amount of refrigerant in the system ("A") as the nameplate charge (the charge in the system when delivered from the factory) plus the additional charge added as Part 3, 7.1 "Calculating Additional Refrigerant Charge".
  - Calculate the total volume ("B") of the smallest room into which refrigerant could potentially leak.
  - Calculate the potential refrigerant concentration as "A" divided by "B".
  - If A/B is equal or more than 0.44 kg/m^3, countermeasures such installing mechanical ventilators (either ventilating regularly or controlled by refrigerant leakage detectors) should be taken.
- Since R410A is heavier than air, particular consideration should be given to leak scenarios in basement rooms.

Figure 3-4.5: Potential refrigerant leak scenario

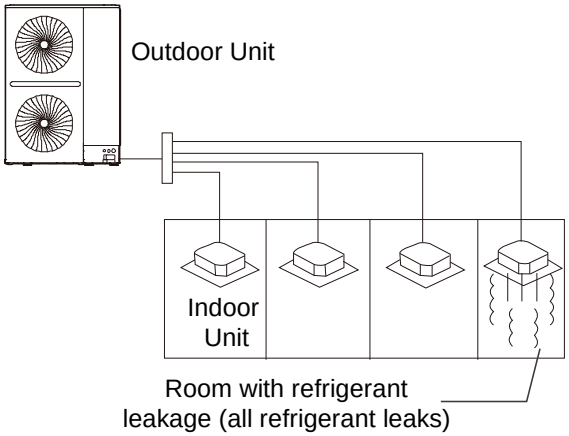
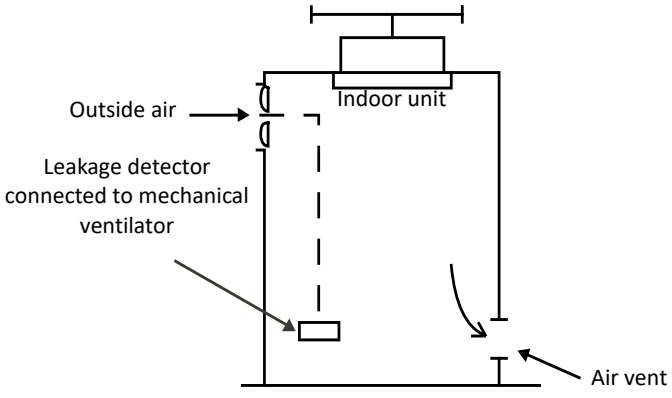


Figure 3-4.6: Mechanical ventilator controlled by refrigerant leak detector



4 Refrigerant Piping Installation

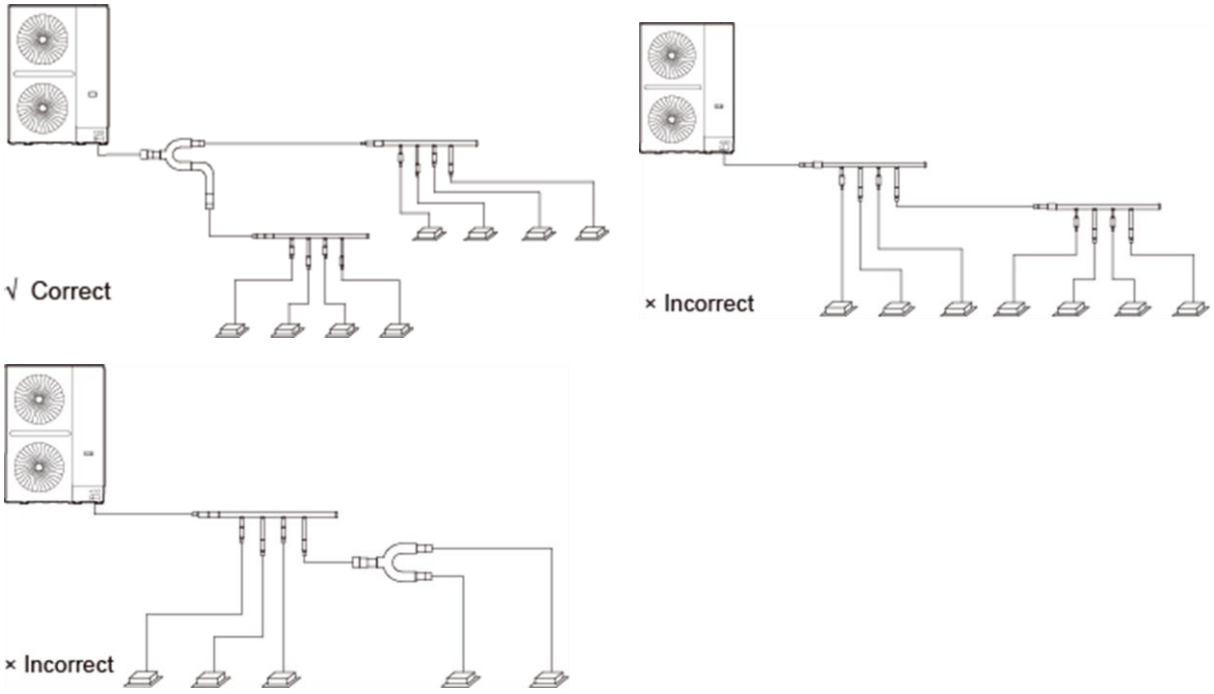
4.1 Branch Joints

4.1.1 Branch header

Notes for installers

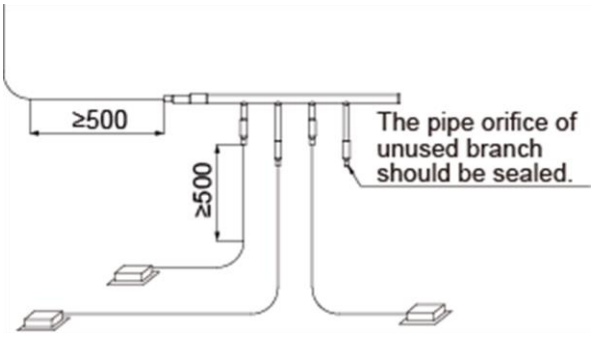
- The content in this section is only for attention during the installation of branch header.
- Please refer to the installation manual of branch header for detailed selection and installation requirements.
- Only parallel installation is allowed, but not serial installation for two branch headers, as shown in Figure 3-5.11
- Each branch can only be connected to indoor units, not to another branch joint, as shown in Figure 3-5.11

Figure 3-5.11: Installation of outdoor branch joints



- The straight horizontal piping distance between two adjacent branch pipes should⩾500mm. The straight horizontal piping distance which indoor unit connecting behind the branch pipe should⩾500mm.

Figure 3-5.12: Branch header spacing and separation from bends (unit: mm)



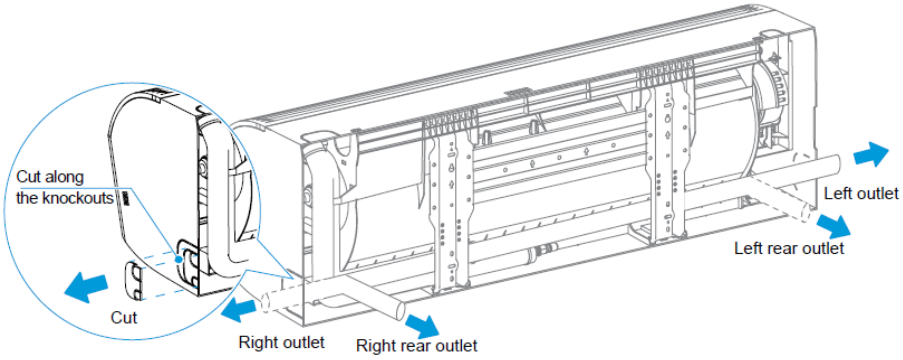
4.2 Refrigerant pipe connection

Connect the Indoor units first, then connect the Outdoor unit.

4.2.1 Indoor unit pipe direction

The refrigerant pipe can be connected in 4 directions. Before connecting, knock off the plate in left, right directions.

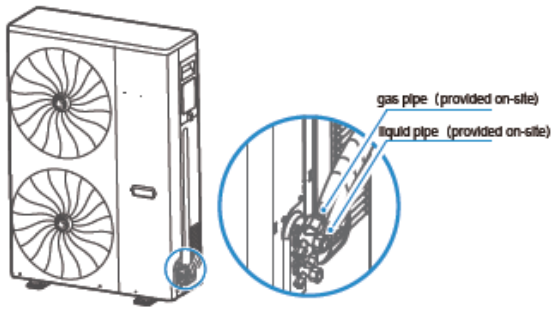
Figure 3-5.17: The indoor unit refrigerant connecting pipe direction



4.2.2 Outdoor unit refrigerant pipe connection position

Before connecting, knock off the plate in the corresponding direction.

Figure 3-5.17: The outdoor refrigerant connecting pipe position



4.2.3 Cutting copper piping and removing burrs

Notes for installers

- Use a pipe cutter rather than a saw or cutting machine to cut piping. Rotate the piping evenly and slowly, applying even force to ensure that the piping does not become deformed during cutting. Using a saw or cutting machine to cut piping runs the risk of copper shavings entering the piping. Copper shavings are difficult to remove and pose a serious risk to the system if they enter the compressor or block the throttling unit.
- After cutting using a pipe cutter, use a reamer/scraper to remove any burrs that have formed at the opening, keeping the opening of the piping downwards to avoid copper shavings from entering the piping.
- Remove burrs carefully to avoid scratches, which may prevent a proper seal being formed and lead to refrigerant leakage.

4.2.4 Bending piping

Bending copper piping reduces the number of brazed joints required and can improve quality and save material.

Notes for installers

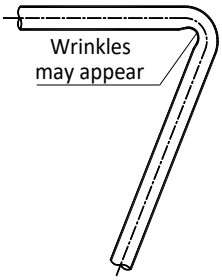
Piping bending methods

- Hand bending is suitable for thin copper piping (Φ6. 35mm - Φ12. 7mm).
- Mechanical bending (using a bending spring, manual bending machine or powered bending machine) is suitable for a wide range of diameters (Φ6. 35mm - Φ54.0mm).

Caution

- When using a spring bender, ensure that the bender is clean before inserting it in the piping.
- After bending a copper pipe, ensure that there are no wrinkles or deformation on either side of the pipe.
- Ensure that bend angles do not exceed 90°, otherwise wrinkles may appear on the inner side of the pipe, and the pipe may buckle or crack. Refer to Figure 3-5.3.
- Do not use a pipe that has buckled during the bending process; ensure that the cross section at the bend is greater than 2/3 of the original area.

Figure 3-5.3: Pipe bending in excess of 90°



4.2.5 Flared joints

Flared joints should be used where a screw thread connection is required.

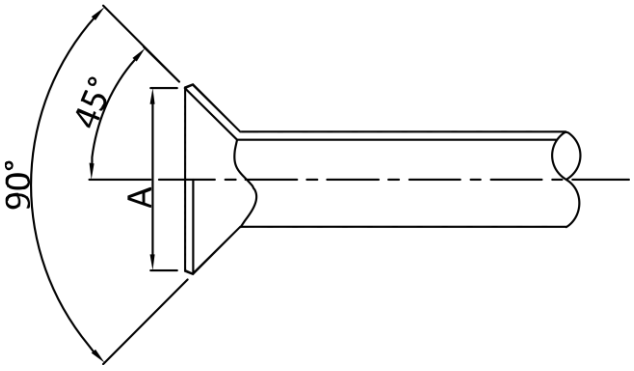
Notes for installers

- Before flaring 1/2H (half hard) piping, anneal the end of the pipe to be flared.
- Remember to place the flare nut on the piping before flaring.
- Ensure the flared opening is not cracked, deformed or scratched, otherwise it will not form a good seal and refrigerant leakage may occur.
- The diameter of the flared opening should be within the ranges specified in Table 3-5.1. Refer to Figure 3-5.2.

Table 3-5.1: Flared opening size ranges

Pipe (mm)	Flared opening diameter (A) (mm)
Φ6.35	8.7 - 9.1
Φ9.52	12.8 - 13.2
Φ12.7	16.2 - 16.6
Φ15.9	19.3 - 19.7
Φ19.1	23.6 - 24.0

Figure 3-5.2: Flared opening



- When connecting a flared joint, apply some compressor oil to the inner and outer surfaces of the flared opening to facilitate the connection and rotation of the flare nut, ensure firm connection between the sealing surface and the bearing surface, and avoid the pipe becoming deformed.

4.2.6 Method of piping flaring connection

Connect the copper pipes to the indoor unit first, then connect it to the outdoor unit. You should first connect the low-pressure pipe, then the high-pressure pipe.

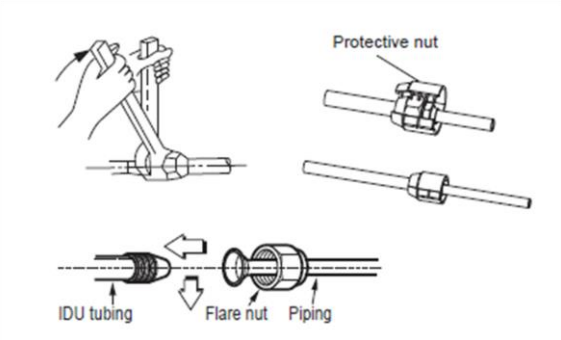
Notes for installers

- When connecting the flare nuts, apply a thin coat of refrigeration oil to the flared ends of the pipes.
- Align the center of the two pipes that you will connect. Remember to place the flare nut on the piping before flaring.
- The protective nut is a one-time part, it can not be reused. In case it is removed, it should be replaced with a new one.
- According to the installation conditions, excessive torque can damage the horn mouth, while insufficient torque can cause air leakage. Please refer to the table below to determine the tightening torque in Table 3-5.2. Refer to Figure 3-5.3.

Table 3-5.2: Flared opening size ranges

Pipe (mm)	Tightening torque
Φ6.35	14.2～17.2 N.m (144～176 kgf.cm)
Φ9.52	32.7～39.9 N.m (333～407 kgf.cm)
Φ12.7	49.5～60.3 N.m (504～616 kgf.cm)
Φ15.9	61.8～75.4 N.m (630～770 kgf.cm)
Φ19.1	97.2～118.6 N.m (990～1210 kgf.cm)

Figure 3-5.3: Nut fastening



4.2.7 Refrigerant Piping Supports

When the air conditioning is running, the refrigerant piping will deform (shrink, expand, droop). To avoid damage to piping, hangers or supports should be spaced as per the criteria in the Table 3-5.2. In general, the gas and liquid pipes should be suspended in parallel and the interval between support points should be selected according to the diameter of the gas pipe.

Table 3-5.2: Refrigerant piping support spacings

Pipe (mm)	Interval between support points (m)	
	Horizontal Piping	Vertical Piping
< Φ20	1	1.5
Φ20 – Φ40	1.5	2
> Φ40	2	2.5

Suitable insulation should be provided between the piping and the supports. If wooden dowels or blocks are to be used, use wood that has undergone preservative treatment.

Changes in refrigerant flow direction and refrigerant temperature result in movement, expansion and shrinkage of the refrigerant piping. Piping should therefore not be fixed too tightly, otherwise stress concentrations may occur in the piping, with the potential for rupturing.

4.3 Pipe Flushing

4.3.1 Purpose

To remove dust, other particles and moisture, which could cause compressor malfunction if not flushed out before the system is run, the refrigerant piping should be flushed using nitrogen. As described in Part 3, “Installation procedure”, pipe flushing should be performed once the piping connections have been completed with the exception of the final connections to the indoor units. That is, flushing should be performed once the outdoor units have been connected but before the indoor units are connected.

4.3.2 Procedure

Notes for installers

Warning

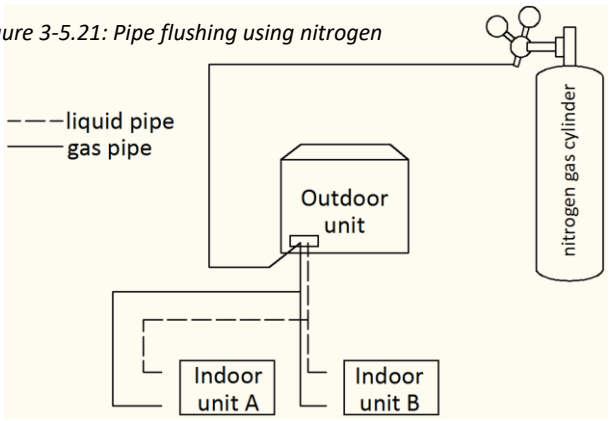
Only use nitrogen for flushing. Using carbon dioxide risks leaving condensation in the piping. Oxygen, air, refrigerant, flammable gases and toxic gases must not be used for flushing. Use of such gases may result in fire or explosion.

Procedure

The liquid and gas sides can be flushed simultaneously; alternatively, one side can be flushed first and then Steps 1 to 8 repeated, for the other side. The flushing procedure is as follows:

1. Cover the inlets and outlets of the indoor units to prevent dirt getting blown in during pipe flushing. (Pipe flushing should be carried out before connecting the indoor units to the piping system.)
2. Attach a pressure reducing valve to a nitrogen cylinder.
3. Connect the pressure reducing valve outlet to the inlet on the liquid (or gas) side of the outdoor unit.
4. Use blind plugs to block all liquid (gas) side openings, except for the opening at the indoor unit which is furthest from the outdoor units (“Indoor unit A” in *Figure 3-5.21*).
5. Start to open the nitrogen cylinder valve and gradually increase the pressure to 0.5MPa.
6. Allow time for nitrogen to flow as far as the opening at indoor unit A.
7. Flush the first opening:
   a) Using suitable material, such as a bag or cloth, press firmly against the opening at indoor unit A.
   b) When the pressure becomes too high to block with your hand, suddenly remove your hand allowing gas to rush out.
   c) Repeatedly flush in this manner until no further dirt or moisture is emitted from the piping. Use a clean cloth to check for dirt or moisture being emitted. Seal the opening once it has been flushed.
8. Flush the other openings in the same manner, working in sequence from indoor unit A towards the outdoor units. Refer to Figure 3-5.22.
9. Once flushing is complete, seal all openings to prevent dust and moisture from entering.

Figure 3-5.21: Pipe flushing using nitrogen



4.4 Gastightness Test

4.4.1 Purpose

To prevent faults caused by refrigerant leakage, a gastightness test should be performed before system commissioning.

4.4.2 Procedure

Notes for installers

Warning

Only dry nitrogen should be used for gastightness testing. Oxygen, air, flammable gases and toxic gases must not be used for gastightness testing. Use of such gases may result in fire or explosion.

Procedure

The gastightness test procedure is as follows:

Step 1

- Once the piping system is complete and the indoor and outdoor units have been connected, vacuum the piping to -0.1MPa.

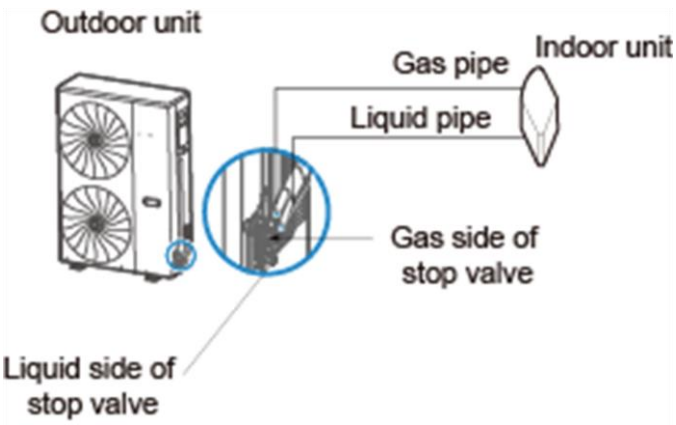
Step 2

- Charge the indoor piping with nitrogen at 0.3MPa through the needle valves on the liquid and gas stop valves and leave for at least 3 minutes (do not open the liquid or gas stop valves). Observe the pressure gauge to check for large leakages. If there is a large leakage, the pressure gauge will drop quickly.
- If there are no large leakages, charge the piping with nitrogen at 1.5MPa and leave for at least 3 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
- If there are no small leakages, charge the piping with nitrogen at 4.2MPa and leave for at least 24 hours to check for micro leakages. Micro leakages are difficult to detect. To check for micro leakages, allow for any change in ambient temperature over the test period by adjusting the reference pressure by 0.01MPa per 1°C of temperature difference. Adjusted reference pressure = Pressure at pressurization + (temperature at observation – temperature at pressurization) x 0.01MPa. Compare the observed pressure with the adjusted reference pressure. If they are the same, the piping has passed the gastightness test. If the observed pressure is lower than the adjusted reference pressure, the piping has a micro leakage.
- If the leakage is detected, refer to Part 3, 4.4.3 “Leak detection”. Once the leak has been found and fixed, the gastightness test should be repeated.

Step 3

- If not continuing straight to vacuum drying (see Part 3, 4.5 “Vacuum Drying”) once the gastightness test is complete, reduce the system pressure to 0.5-0.8MPa and leave the system pressurized until ready to carry out the vacuum drying procedure.

Figure 3-5.19: Gastightness test



4.4.3 Leak detection

Notes for installers

To check for leaks: Vacuum leak test

1. Evacuate the system from the liquid and gas piping to –100.7 kPa (–1.007 bar)(5 Torr absolute) for more than 2 hours.
2. Once reached, turn off the vacuum pump and check that the pressure does not rise for at least 1 minute.
3. Should the pressure rise, the system may either contain moisture (see vacuum drying below) or have leaks.

To check for leaks: Pressure leak test

1. Test for leaks by applying a bubble test solution to all piping connections.
2. Discharge all nitrogen gas.
3. Break the vacuum by pressurizing with nitrogen gas to a minimum gauge pressure of 0.2 MPa (2 bar). Never set the gauge pressure higher than the maximum operation pressure of the unit, i.e. 4.0 MPa (40 bar)

ALWAYS use a recommended bubble test solution from your wholesaler.

NEVER use soap water:

Soap water may cause cracking of components, such as flare nuts or stop valve caps.

Soap water may contain salt, which absorbs moisture that will freeze when the piping gets cold.

Soap water contains ammonia which may lead to corrosion of flared joints (between the brass flare nut and the copper flare).

4.5 Vacuum Drying

4.5.1 Purpose

Vacuum drying should be performed in order to remove moisture and non-condensable gases from the system. Removing moisture prevents ice formation and oxidization of copper piping or other internal components. The presence of ice particles in the system would cause abnormal operation, whilst particles of oxidized copper can cause compressor damage. The presence of non-condensable gases in the system would lead to pressure fluctuations and poor heat exchange performance.

Vacuum drying also provides additional leak detection (in addition to the gastightness test).

4.5.2 Procedure

Notes for installers

During vacuum drying, a vacuum pump is used to lower the pressure in the piping to the extent that any moisture present evaporates. At 5mmHg (755mmHg below typical atmospheric pressure) the boiling point of water is 0°C. Therefore a vacuum pump capable of maintaining a pressure of -756mmHg or lower should be used. Using a vacuum pump with a discharge in excess of 4L/s and a precision level of 0.02mmHg is recommended.

Caution

- Before performing vacuum drying, make sure that all the outdoor unit stop valves are firmly closed.
- Once the vacuum drying is complete and the vacuum pump is stopped, the low pressure in the piping could suck vacuum pump lubricant into the air conditioning system. The same could happen if the vacuum pump stops unexpectedly during the vacuum drying procedure. Mixing of pump lubricant with compressor oil could cause compressor malfunction and a one-way valve should therefore be used to prevent vacuum pump lubricant seeping into the piping system.

Procedure

The vacuum drying procedure is as follows:

Step 1

- Connect the blue (low pressure side) hose of a pressure gauge to the master unit gas pipe stop valve, the red (high pressure side) hose to the master unit liquid pipe stop valve and the yellow hose to the vacuum pump.

Step 2

- Start the vacuum pump and then open the pressure gauge valves to start vacuum the system.
- After 30 minutes, close the pressure gauge valves.
- After a further 5 to 10 minutes check the pressure gauge. If the gauge has returned to zero, check for leakages in the refrigerant piping.

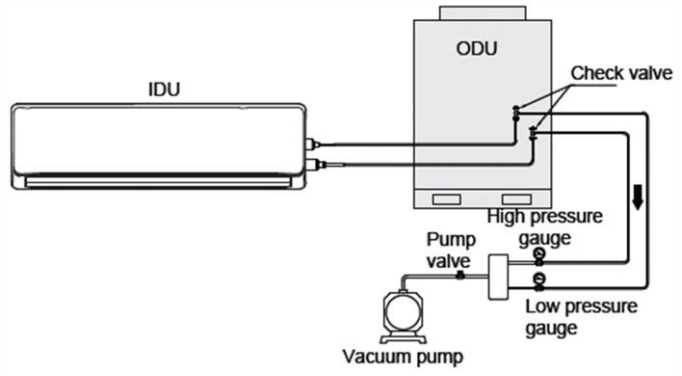
Step 3

- Re-open the pressure gauge valves and continue vacuum drying for at least 2 hours and until a pressure difference(below typical atmospheric pressure) of 756mmHg or more has been achieved. Once the pressure difference of at least 756mmHg has been achieved, continue vacuum drying for 2 hours.

Step 4

- Close the pressure gauge valves and then stop the vacuum pump.
- After 1 hour, check the pressure gauge. If the pressure in the piping has not increased, the procedure is finished. If the pressure has increased, check for leakages.
- After vacuum drying, **keep the blue and red hoses connected to the pressure gauge and to the master unit stop valves**, in preparation for refrigerant charging (see Part 3, 7 “Charging Refrigerant”).

Figure 3-5.15: Vacuum drying



Pressure gauge

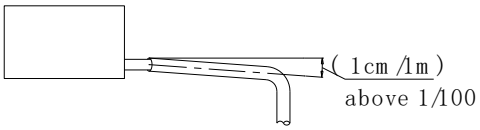
5 Drain Piping

5.1 Design Considerations

Drain piping design should take account of the following considerations:

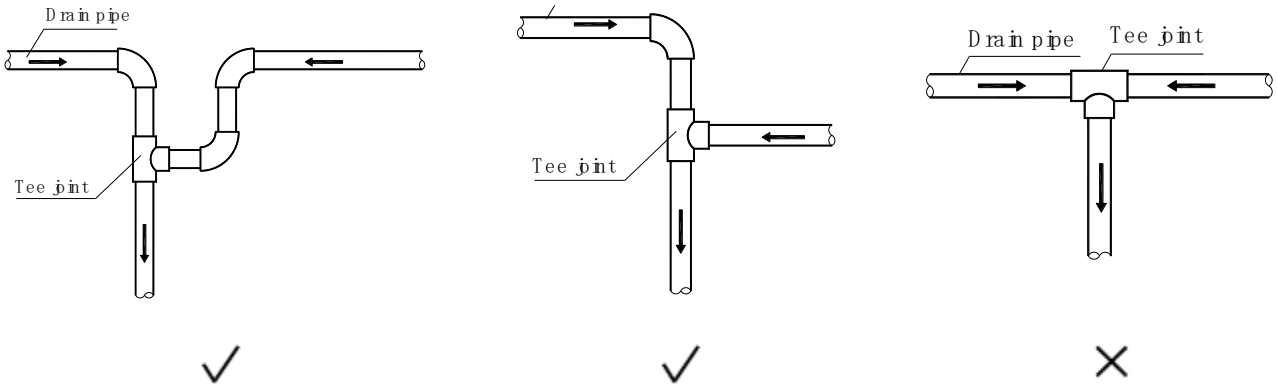
- Indoor unit condensate drain piping needs to be of sufficient diameter to carry the volume of condensate produced at the indoor units and installed at a slope sufficient to allow drainage. Discharge as close as possible to the indoor units is usually preferable.
- To prevent the drain piping becoming excessively long, consideration should be given to installing multiple drain piping systems, with each system having its own drainage point and providing drainage for a subset of the overall set of indoor units.
- The routing of drain piping should take into consideration the need to maintain sufficient slope for drainage whilst avoiding obstacles such as beams and ducting. The drain piping slope should be at least 1:100 away from indoor units. Refer to Figure 3-6.1.

Figure 3-6.1: Drain piping minimum slope requirement



- To avoid backflow and other potential complications, two horizontal drain pipes should not meet at the same level. Refer to the Figure 3-6.2 for suitable connection arrangements. Such arrangements also allow the slope of the two horizontal pipes to be selected independently.

Figure 3-6.2: Drain piping joints – correct and incorrect configurations



- Branch drain piping should join main drain piping from the top, as shown in Figure 3-6.3.
- Recommended support/hanger spacing is 0.8 – 1.0m for horizontal piping and 1.5 – 2.0m for vertical piping. Each vertical section should be fitted with at least two supports. For horizontal piping, spacing greater than those recommended leads to sagging and deformation of the pipe profile at the supports which impedes water flow and should therefore be avoided.
- Air vents should be fitted at the highest point of each drain piping system to ensure that condensation is discharged smoothly. U-bends or elbow joints should be used such that the vents face downwards, to prevent dust entering the piping. Refer to Figure 3-6.5. Air vents should not be installed too close to indoor unit lift pumps.

Figure 3-6.3: Branch drain piping joining main drain piping

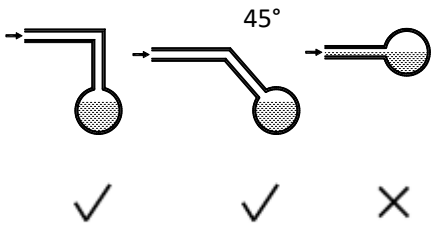


Figure 3-6.4: Effect of insufficient drain piping support

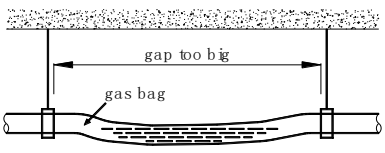
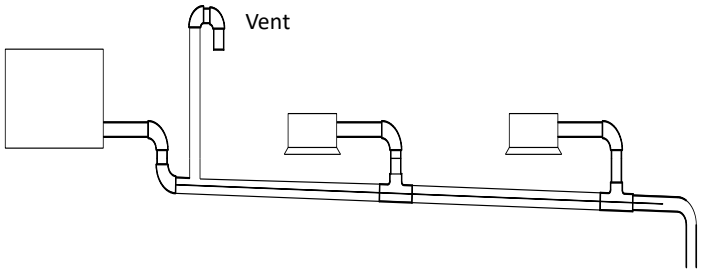


Figure 3-6.5: Drain piping air vents

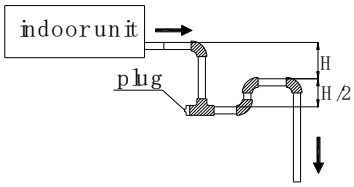


- Air conditioner drain piping should be installed separately from waste, rainwater and other drain piping and should not come into direct contact with the ground.
- Drain piping diameter should be not less than the indoor units' drain piping connection.
- To allow inspection and maintenance, the piping clamps shipped with units should be used to attach drain piping to indoor units – adhesive should not be used.
- Thermal insulation should be added to drain piping to prevent condensation forming. Thermal insulation should extend all the way to the connection with the indoor unit.
- Units with drain pumps should have separate drain piping systems from systems that use natural drainage.

5.2 Water Traps

For indoor units with a high negative pressure differential at the outlet of the drainage pan, a trap should be fitted to the drain piping to prevent poor drainage and/or water being blown back into the drainage pan. Traps should be arranged as in Figure 3-6.6. The vertical separation H should be in excess of 50mm. A plug may be fitted to allow cleaning or inspection.

Figure 3-6.6: Drain piping water traps



5.3 Selecting Piping Diameters

Select branch drainage piping (the drain piping connection to each unit) diameters according to indoor unit flow volume and select main drainage piping diameters according to the combined flow volume of the upstream indoor units. Use a design assumption of 2 liters of condensate per horsepower per hour. For example, the combined flow volume of three 2HP units and two 1.5HP units would be calculated as follows:

Combined flow volume = 3 x 2 L/HP/h × 2HP = 18 L/h
+ 2 x 2 L/HP/h × 1.5HP

Tables 3-6.1 and 3-6.2 specify the required piping diameters for horizontal and vertical branch piping and for main piping. Note that main piping should use PVC40 or larger.

Table 3-6.1: Horizontal drain piping diameters

PVC piping	Nominal diameter (mm)	Capacity (L/h)		Remarks
		Slope 1:50	Slope 1:100	
PVC25	25	39	27	Branch piping only
PVC32	32	70	50	
PVC40	40	125	88	Branch or main piping
PVC50	50	247	175	
PVC63	63	473	334	

Table 3-6.2: Vertical drain piping diameters

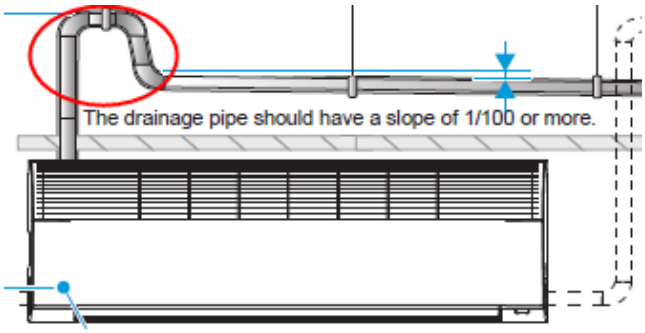
PVC piping	Nominal diameter (mm)	Capacity (L/h)	Remarks
PVC25	25	220	Branch piping only
PVC32	32	410	
PVC40	40	730	Branch or main piping
PVC50	50	1440	
PVC63	63	2760	
PVC75	75	5710	
PVC90	90	8280	

5.4 Drain Piping for Units with Lift Pumps

Drain piping for units with lift pumps should take account of the following additional considerations:

- A downward sloping section should immediately follow the vertically rising section adjacent to the unit, otherwise a water pump error will occur. Refer to Figure 3-6.7.
- Air vents should not be installed on vertically rising sections of drain piping, otherwise water may be discharged through the air vent or water flow may be impeded.

Figure 3-6.7: Downward sloping section of drain piping



5.5 Drain Piping Installation

Notes for installers

Installation of the drain piping should proceed in the following order:

Indoor unit installation → Drain piping installation → Watertightness test → Drain piping insulation

Caution

- Ensure that all joints are firm and once the drain piping is all connected conduct a watertightness test and water flow test.
- Do not connect air conditioner drain piping to waste, rainwater or other drain piping and do not let air conditioner drain piping come into direct contact with the ground.
- For units with drain pumps, test that the drain pump functions properly by adding water to the unit's drainage pan and running the unit. To allow inspection and maintenance, the pipe clamps shipped with units should be used to attach drain piping to indoor units – adhesive should not be used.

5.6 Watertightness Test and Water Flow Test

Once installation of a drainage piping is complete, watertightness and water flow tests should be performed.

Notes for installers

Watertightness test

- Fill the piping with water and test for leakages over a 24-hour period.

Water flow test (natural drainage test)

- Slowly fill the drainage pan of each indoor unit with at least 600ml of water through the inspection port and check that the water is discharged through the outlet of the drain piping.

Caution

- The drain plug in the drainage pan is for removing accumulated water prior to performing indoor unit maintenance. During normal operation, the drain should be plugged to prevent leakage.

6 Insulation

6.1 Refrigerant Piping Insulation

During operation, the temperature of the refrigerant piping varies. Insulation is required to ensure unit performance and compressor lifespan. During cooling, the gas pipe temperature can be very low. Insulation prevents condensation forming on the piping. During heating, the gas pipe temperature can be very high. Insulation serves as necessary protection from burns.

6.1.1 Selecting insulation materials

RUse heat-resistant polyethylene foam for the liquid pipes (able to withstand temperature of 70°C), and polyethylene foam for the gas pipes (able to withstand temperature of 120°C).

6.1.2 Thickness of insulation

Minimum thicknesses for refrigerant piping insulation are specified in Table 3-7.1. In hot, humid environments, the thickness of insulation should be increased over and above the specifications in Table 3-7.1.

Table 3-7.1: Refrigerant piping insulation thickness

Pipe outer diameter (mm)	Minimum insulation thickness (mm) Humidity < 80%RH	Minimum insulation thickness (mm) Humidity ≥ 80%RH
Φ6.35	15	20
Φ9.52		
Φ12.7		
Φ15.9		
Φ19.1		
Φ22.2		
Φ25.4		

6.1.3 Installation of piping insulation

With the exception of joint insulation, insulation should be applied to piping before fixing the piping in place. Insulation at joints in refrigerant piping should be applied after the gastightness test has been completed.

Notes for installers

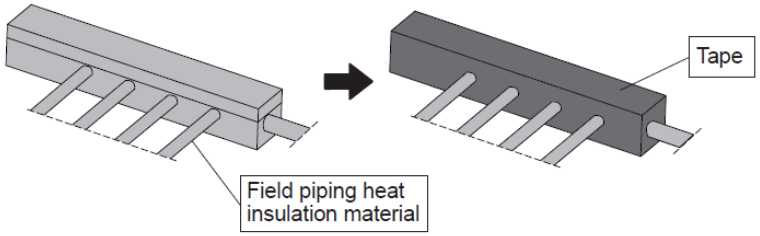
- Installation of insulation should be carried out in a manner suited to the type of insulation material being used.
- Ensure there are no gaps at the joints between sections of insulation.
- Do not apply tape too tightly as doing so may shrink insulation, reducing its insulating properties leading to condensation and loss of efficiency.
- Insulate gas and liquid pipes separately, otherwise heat exchange between the two sides will greatly impact efficiency.
- Do not bind the separately insulated gas and liquid pipes together too tightly as doing so can damage the joints between sections of insulation.

6.1.4 Installation of header insulation

Insulation at joints in the refrigerant piping should be installed after the gastightness test has been successfully completed. The procedure at each joint is as follows:

1. Cut a section of insulation 50 to 100mm longer than the gap to be filled. Ensure that the cross-sectional and longitudinal openings are all cut evenly.
2. Embed the section into the gap ensuring that the ends abut tightly to the sections of insulation either side of the gap.
3. Glue the longitudinal cut and the joints with the sections of insulation either side of the gap.
4. Seal the seams with tape.

Figure 3-7.1: Installation of header insulation (unit: mm)



6.2 Drain Piping Insulation

- Use rubber/plastic insulating tube with a B1 fire resistance rating.
- The insulation should typically be in excess of 10mm thick.
- For drain piping installed inside a wall, insulation is not required.
- Use suitable adhesive to seal seams and joints in the insulation and then bind with cloth reinforced tape of width not less than 50mm. Ensure tape is fixed firmly to avoid condensation.
- Ensure the drain piping insulation adjacent to the indoor unit drainage water outlet is fixed to the unit itself using adhesive, to prevent condensation and dripping.

7 Charging Refrigerant

7.1 Calculating Additional Refrigerant Charge

The additional refrigerant charge required depends on the lengths and diameters of the outdoor and indoor liquid pipes. Table 3-8.1 shows the additional refrigerant charge required per meter of equivalent pipe length for different diameters of pipe. The total additional refrigerant charge is obtained by summing the additional charge requirements for each of the outdoor and indoor liquid pipes, as in the following formula, where L_1 to L_8 represent the equivalent lengths of the pipes of different diameters. Assume 0.5m for the equivalent pipe length of each branch joint.

Additional refrigerant charge R (kg) = L_1 (**Φ6.35**) × 0.022
+ L_2 (**Φ9.52**) × 0.057
+ L_3 (**Φ12.7**) × 0.110
+ L_4 (**Φ15.9**) × 0.170
+ L_5 (**Φ19.1**) × 0.260

Table 3-8.1: Additional refrigerant charge

Liquid side piping (mm)	Additional refrigerant charge per meter of equivalent length of piping (kg)
Φ6.35	0.022
Φ9.52	0.057
Φ12.7	0.110
Φ15.9	0.170
Φ19.1	0.260

Strictly following the additional refrigerant charging amount calculation method, and determine that the additional amount shall not exceed the maximum refrigerant additional amount shown in table 3-8.2. If the additional refrigerant amount exceeds the limits, the total length of the pipeline construction scheme shall be shortened and the refrigerant charging amount shall be recalculated to meet the requirements.

Table 3-8.2: Maximum additional refrigerant charge amount (unit: kg)

Model	Maximum additional refrigerant
20kW	9.6

7.2 Adding Refrigerant

Notes for installers

Caution

- Only charge refrigerant after performing a gastightness test and vacuum drying.
- Never charge more refrigerant than required as doing so can lead to liquid hammering.
- Only use refrigerant R410A - charging with an unsuitable substance may cause explosions or accidents.
- Use tools and equipment designed for use with R410A to ensure required pressure resistance and to prevent foreign materials from entering the system.
- Refrigerant must be treated in accordance with applicable legislation.
- Always use protective gloves and protect your eyes when charging refrigerant.
- Open refrigerant containers slowly, and the power supply for all outdoor units should be turned on.
- The power supply for all outdoor units should be turned on, when add refrigerant

Notes for installers

Procedure

The procedure for adding refrigerant is as follows:

Step 1

- Calculate additional refrigerant charge R (kg) (see Part 3, 7.1 “Calculating Additional Refrigerant Charge”)

Step 2

- Place a tank of R410A refrigerant on a weighing scale. Turn the tank upside down to ensure refrigerant is charged in a liquid state. (R410A is a blend of two different chemicals compounds. Charging gaseous R410A into the system could mean that the refrigerant charged is not of the correct composition).
- After vacuum drying (see Part 3, 4.5 “Vacuum Drying”), the blue and red pressure gauge hoses should still be connected to the pressure gauge and to the outdoor unit stop valves.
- Connect the yellow hose from the pressure gauge to the R410A refrigerant tank.

Step 3

- Open the valve where the yellow hose meets the pressure gauge, and open the refrigerant tank slightly to let the refrigerant eliminate the air. Caution: open the tank slowly to avoid freezing your hand.
- Set the weighing scale to zero.

Step 4

- Open the three valves on the pressure gauge to begin charging refrigerant.
- When the amount charged reaches R (kg), close the three valves. If the amount charged has not reached R (kg) but no additional refrigerant can be charged, close the three valves on the pressure gauge, run the outdoor units in cooling mode, and then open the yellow and blue valves. Continue charging until the full R (kg) of refrigerant has been charged, then close the yellow and blue valves. Note: Before running the system, be sure to complete all the pre-commissioning checks as listed in Part 3, 11.2 “Checklist Before Test Run” and be sure to open all stop valves as running the system with the stop valves closed would damage the compressor.

Figure 3-8.1: Charging refrigerant

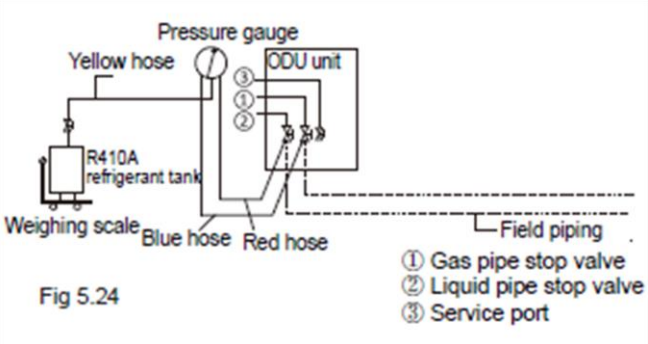
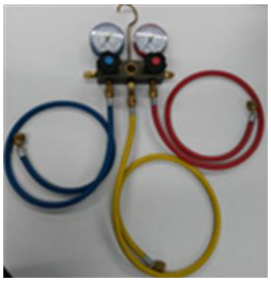


Fig 5.24



Pressure gauge

Part 5

Electrical Components and Wiring Diagrams

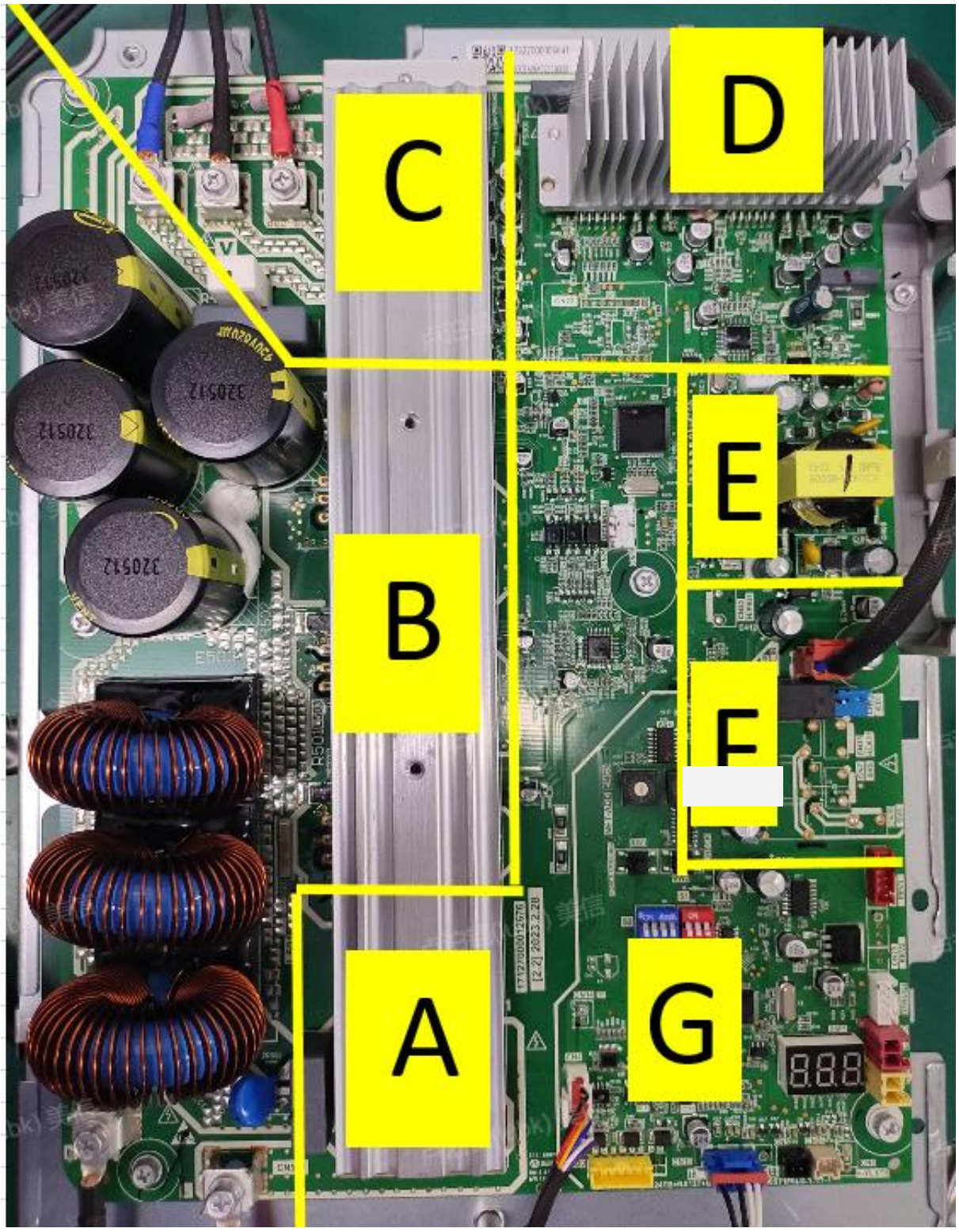
1 Outdoor Unit Electric Control Box Layout

Figure 4-1.1: Electric control box (compressor & fan drive board)

2 Outdoor Unit Main PCB

2.1 Ports

Figure 4-1.1: Outdoor unit main PCB ports



Notes:

1. Label descriptions are given in Table 4-1.1.

Table 4-1.1: Outdoor unit main PCB ports definition table

Region	Name	Port	Content	
A	220V input and rectifier bridge stack	CN501(L) CN502(N)	Converts AC to DC to power the DC bus, the DC fan, and the on-board switching power supply	Input
B	Power correction circuit (PFC)	\	Improve the utilization rate of power grid	None
C	Compressor frequency conversion module (IPM) and frequency conversion drive chip	U,V,W	The frequency conversion module (IPM) converts the DC bus voltage into AC with adjustable frequency and amplitude and outputs it to UVW. The variable frequency drive chip detects P6 and various L-type faults at the same time, and then notifies the main chip through the optocoupler.	Output
D	DC fan	CN 19 (white) CN 17 (white)	The frequency conversion module (IPM) converts the DC bus voltage into AC with adjustable frequency and amplitude and outputs it to the fan interface.	Output
E	Switching power supply	\	Switching power supply output: 15VDC to frequency conversion module (IPM) and DC motor, 5VDC to main chip and safety isolation 5V to 485 communication circuit	\
F	Valve body power supply and control	CN50 (red)	Only as a power supply for the 4-way valve	Output
		CN50 (blue)	Control the action of four-way valve	
G	Main Control Circuit	CN16 (red)	DC pulse voltage is output to drive the electronic expansion valve	Input
		CN27 (gray)	Program burning port	Output
		CN12 (Red, yellow)	Used to detect the status of the high and low voltage switches	Output
		CN24 (TL) CN18 (T3/T4) CN5 (TP)	Detecting the resistance value of each temperature sensor to obtain the temperature	/
		CN20	Internal and external unit communication (PQE), centralized control communication (XYE), electricity meter communication (AOE)	Input
		CN4	12 V (to power the relay of the filter board), GND, RL (to control the large relay)	Input

2.2 Components

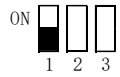
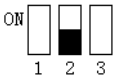
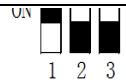
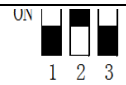
2.2.1 Digital display output

Table 4-2.1: Digital display output in different operating states

Outdoor unit state	Parameters displayed on DSP
Standby	The number of indoor units in communication with the outdoor unit
Normal operation	Compressor frequency
Error or protection	Error or protection code
System check	Refer to Table Table 4-2.3

2.2.2 Field Settings

Table 4-2.2: Outdoor unit main PCB switch settings

Switch	Setting	Switch positions[1]	Description
SW1	Force cooling		Press SW1 to enter the forced cooling function; Press it again to exit the forced cooling function.
SW2	Spot check		Spot check button
S1	S1-1		S1-1 is ON, Forced implementation of old indoor unit protocol S1-1 is OFF, Automatically adapting to indoor unit protocol(default)
	S1-2		S1-2 is ON, Forced clearing of indoor unit address S1-2 is OFF, Automatic addressing (default)
	S1-3		S1-3 is ON, Automatically judging EXV control mode of ODU in cooling mode S1-3 is OFF, ODU EXV of forced discharge temperature control in cooling mode (default)
S2	S2=000		First enabled priority mode(default)
	S2=100		Cooling priority mode
	S2=010		Automatic selection of priority mode
	S2=001		In response to cooling mode only
	S2=110		In response to heating mode only
	S2=011		Heating priority mode

2.2.4 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 4-2.3 system check list:

No.	Parameters displayed on DSP	Remarks
0	Operating frequency	Actual value = value displayed
1	Operating mode	Refer to Note 1
2	Operating fan speed level	
3	Total capacity requirement of indoor units	
4	Total capacity requirement for the modified ODU	
5	T3 Condenser temperature(°C)	Actual value = value displayed
6	T4 Outdoor ambient temperature(°C)	Actual value = value displayed
7	T5 discharge temperature(°C)	Actual value = value displayed
8	TF invert module Temperature(°C)	Actual value = value displayed
9	Upper fan TF module temperature(°C)	Actual value = value displayed
10	Lower fan TF module temperature(°C)	Actual value = value displayed
11	TL refrigerant cooling tube temperature (°C)	Actual value = value displayed
12	EXVA position	Actual value = value displayed× 8
13	Actual current (A)	Actual value = value displayed
14	Inverter compressor current (A)	Actual value = value displayed
15	Actual voltage (V)	Actual value = value displayed
16	DC bus voltage (V)	Actual value = value displayed
17	Indoor heat exchanger pipe (T2/T2B) average temperature (°C)	Actual value = value displayed
18	T2A condenser temperature	Actual value = value displayed
19	Total number of IDUs	Actual value = value displayed
20	Number of Operating IDUs	
21	Model name	
22	System address	ODU address in the centralized control
23	Priority mode	Refer to Note 2
24	Program version number	
25-34	Last 10 times error protection code[4]	Refer to Note 3
35	Display “--”	

Notes:

1. Operating mode:
   - 0: standby; 2: cooling; 3: heating; 4: forced cooling.
2. Priority mode:
   - 0: first ON priority; 1: cooling priority; 2: Automatic selection of priority mode; 3: heating only; 4: cooling only; 5: heating priority
   - “nn” is displayed if no error or protection events have occurred since start-up; it displays all error protection code if the number of error protection codes are less than 10 since start-up.

Part 6

Outdoor Diagnosis and Troubleshooting

1 Error Code Table

1.1 Outdoor Error code table

Table 6-1.1 Outdoor Error code table

Error Code	Error or Protection Type	Remarks
E2	IDU/ODU communication error	Recoverable
E4	T3/T4 temperature sensor error	Recoverable
E5	Input voltage protection	Recoverable
E.9.	Wrong compressor parameters (or ENC2 DIP error)	Unrecoverable
Eb	E6 error occurs more than six times in an hour	Unrecoverable
EF	PFC error (no such type of error for the three-phase series)	Unrecoverable
EH	Refrigerant radiator temperature sensor error	Recoverable
F1	Detected DC bus voltage (PN voltage) after power-on<180VDC for five continuous seconds	Recoverable
H0	Communication error between the main control board and the inverter	Recoverable
HF	M-Home mismatch (the IDU/ODU series does not match)	Recoverable
H7	IDU quantity increase or decrease error	Recoverable
PL	Radiator surface high temperature protection	Recoverable
P1	System high pressure protection	Recoverable
P2	System low pressure protection	Recoverable
P3	Current protection	Recoverable
P4	T5 discharge temperature protection	Recoverable
P5	Outdoor condenser temperature T3 protection	Recoverable
PE	IDU evaporator temperature T2 protection	Recoverable
PF	ODU lock	Recoverable

Table continued on next page …

1.2 Compressor drive error code table

Table 6-1.3 Compressor drive error code table

Error Code	Error or Protection Type	Remarks
L11/-0	Instantaneous overcurrent protection for compressor phase current	Recoverable
L12/-0	Continuous 30-second overcurrent protection for compressor phase current	Recoverable
L13/-0	Compressor weak magnetic overload protection	Recoverable
L2E/-0	Compressor module overtemperature protection	Recoverable
L3E/-0	Compressor low bus voltage error	Recoverable
L31/-0	Compressor high bus voltage error	Recoverable
L43/-0	Compressor current sample bias error	Recoverable
L44/-0	Compressor PFC current sample bias error	Recoverable
L46/-0	Compressor IPM protection (FO)	Recoverable
L5E/-0	Compressor start failure	Recoverable
L51/-0	Compressor out-of-synchronization	Recoverable
L52/-0	Compressor blockage protection	Recoverable
L6E/-0	Compressor motor phase loss protection	Recoverable
LC1/-0	Compressor PFC software instantaneous overcurrent	Recoverable

Table continued on next page …

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

Error Code	Error or Protection Type	Remarks
LC5/-0	Compressor PFC effective value overcurrent	Recoverable
LC6/-0	Compressor PFC1 channel hardware overcurrent	Recoverable
LC7/-0	Compressor PFC2 channel hardware overcurrent	Recoverable
LC8/-0	Compressor PFC3 channel hardware overcurrent	Recoverable

Note: The compressor drive error code consists of error type "Lxx" and compressor serial No. "-0". When a compressor drive error occurs and is displayed on the main board LED digital display, "Lxx" and "-0" will flash alternatively.

1.3 Fan motor error code table

Table 6-1.4 Fan motor error code table

Error Code	Error or Protection Type	Remarks
J11/-X	Instantaneous overcurrent protection for fan phase current	Recoverable
J12/-X	Continuous 30-second overcurrent protection for fan phase current	Recoverable
J13/-X	Fan weak magnetic overload protection	Recoverable
J2E/-X	Fan module overtemperature protection	Recoverable
J3E/-X	Fan low bus voltage error	Recoverable
J31/-X	Fan high bus voltage error	Recoverable
J43/-X	Fan current sample bias error	Recoverable
J44/-X	Fan PFC current sample bias error	Recoverable
J46/-X	Fan IPM protection (FO)	Recoverable
J5E/-X	Fan start failure	Recoverable
J51/-X	Fan out-of-synchronization	Recoverable
J52/-X	Fan blockage protection	Recoverable
J6E/-X	Fan motor phase loss protection	Recoverable
J0F/-X	DC fan protection	Recoverable

Note: The fan drive error code consists of error type "Jxx" and fan serial No. "-X". When a fan drive error occurs and is shown on the main board LED digital display, "Jxx" and "-X" will flash alternatively. Where, the lower fan serial No. is "-0" and the upper fan serial No. is "-1".

2 Error in Main Control

2.1 E2: IDU/ODU communication error

2.1.1 Digital display output

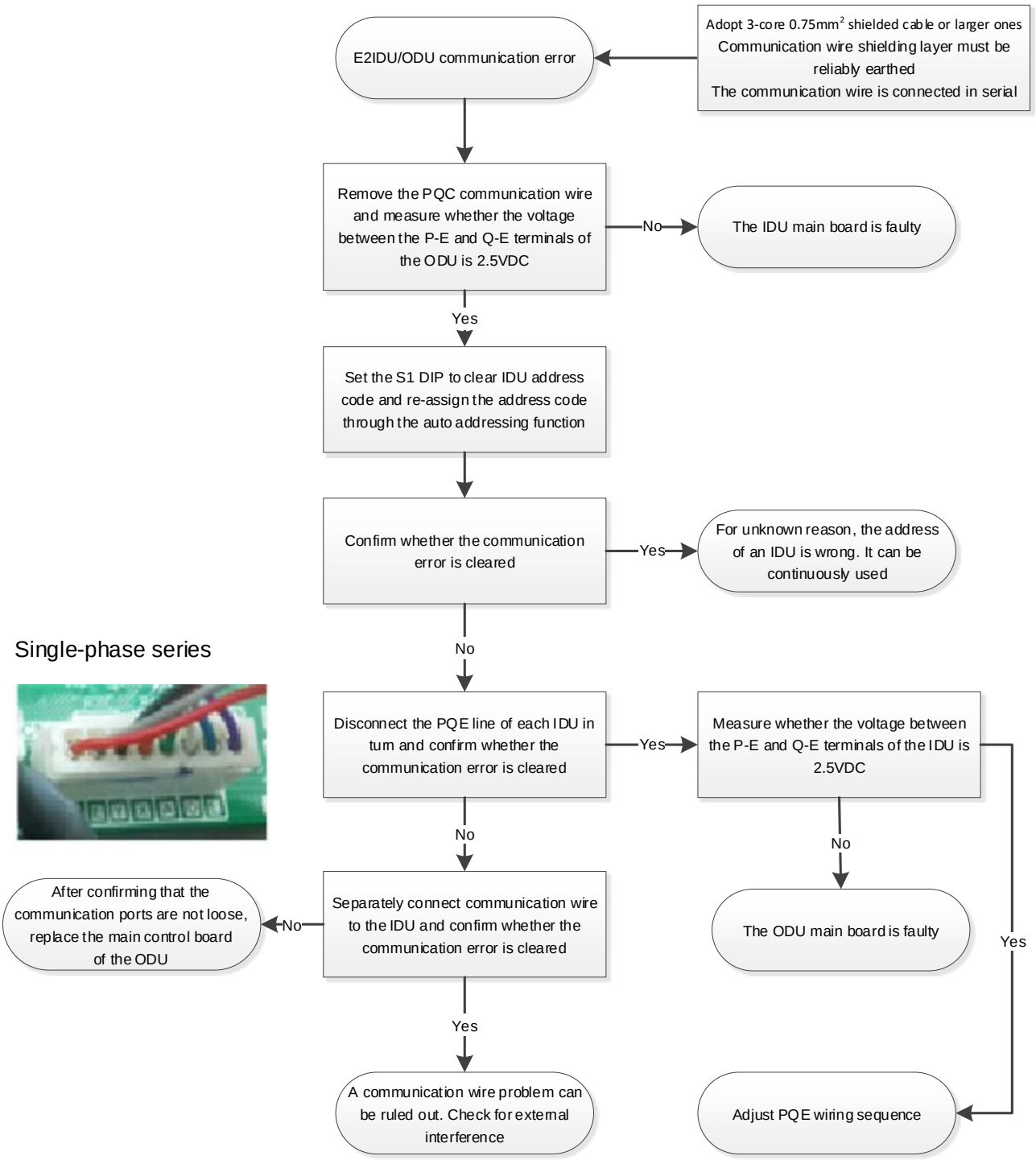
2.1.2 Description

- Failure of communication between ODU and IDU

2.1.3 Possible causes

- The communication wire is not a 3-core shielded cable, or the shielding layer of the shielded cable is not earthed.
- The communication wire is interfered by strong electromagnetic wave.
- The IDU communication wire is not connected hand-in-hand, or the PQE line sequence of a unit is incorrect, or the main control board of an IDU is damaged.
- The communication wire is not securely installed onto the power supply terminal, or there is corrosion or water drop on the surface of the power supply terminal, resulting in poor contact.
- The communication wire is disconnected or improperly connected due to various reasons such as being gnawed by mice or being reconnected after the cable is broken.
- Error in the address of an IDU due to unknown interference.
- The ODU main control board is faulty.

2.1.4 Procedure



2.2 E4: T3&T4 temperature sensor error

2.2.1 Digital display output

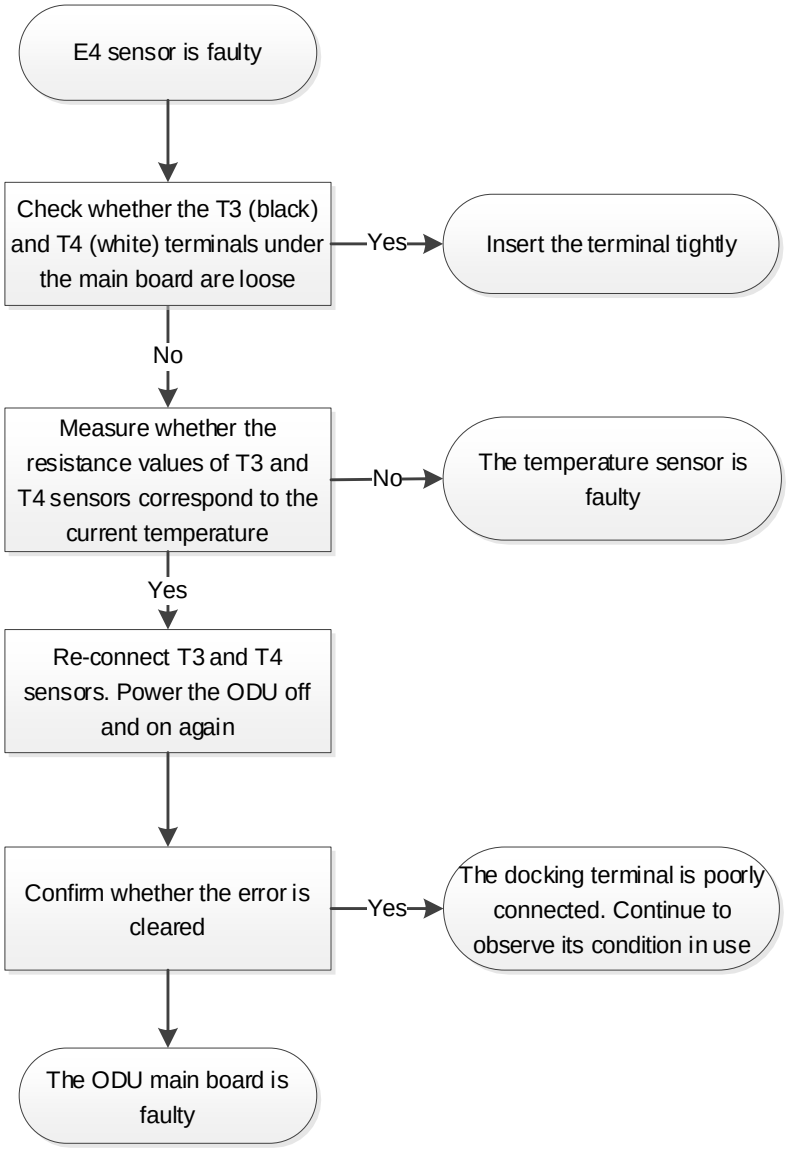
2.2.2 Description

- The T3&T4 temperature sensor is faulty. This error is reported when the sensor is opened (or the plug connecting to the main control board is loose) or short-circuited. The nominal resistance of the compressor discharge temperature sensor (with a square sensing probe) is 50K at 25°C, while the nominal resistance of other temperature sensors is 10K at 25°C. All temperature sensors are subject to negative temperature coefficient, that is, the higher the temperature is, the lower the resistance will be.

2.2.3 Possible causes

- T3&T4 temperature sensors are faulty.
- The sensor plug connecting to the main control board is loose.
- The sensor cable is not properly connected to the wire-to-wire plug on the main board.
- The main control board is faulty.

2.2.4 Procedure



2.3 E5: Input voltage protection

2.3.1 Digital display output

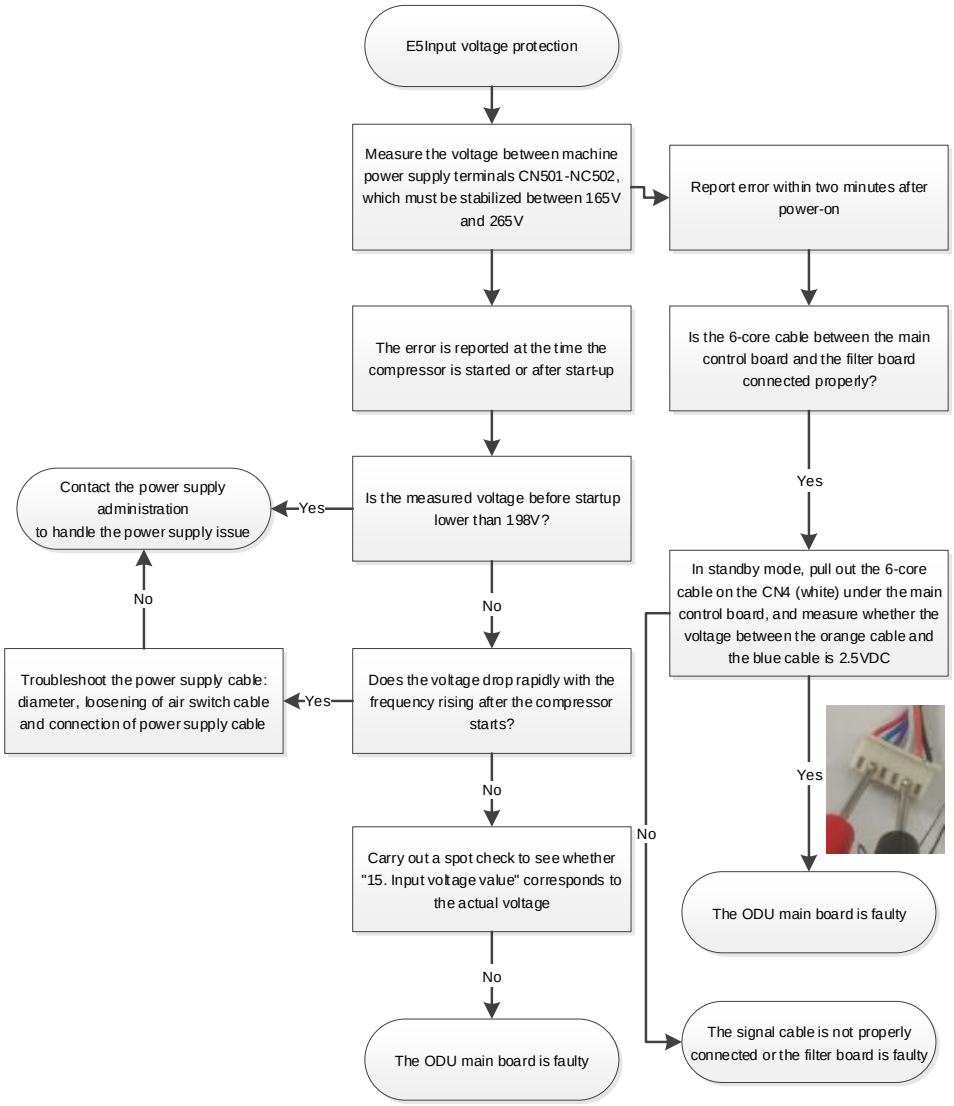
2.3.2 Description

- An E5 error is reported by the main control board when it receives the message that the voltage detected by the "AC voltage detection circuit" on the filter board is lower than 165VAC or higher than 265VAC.

2.3.3 Possible causes

- The relatively low AC voltage (for example, <200V) when the unit is in standby mode is reduced to a lower value at the moment the compressor starts. As a result, E5 occurs. This type of voltage drop is not always detectable by using a multimeter.
- The power supply cable used for the ODU does not meet the minimum requirements, or the circuit breaker cable is not securely connected, or the power supply cable is reconnected after it is broken.
- The 6-core cable (single-phase)/3-core cable (three-phase) between the main control board and the filter board is not inserted stably/the pin is loose.
- The ODU main control board is faulty.
- The filter board is faulty.
- The power supply terminal cable is poorly connected.

2.3.4 Procedure



2.4 E.9.: Wrong compressor parameters

2.4.1 Digital display output

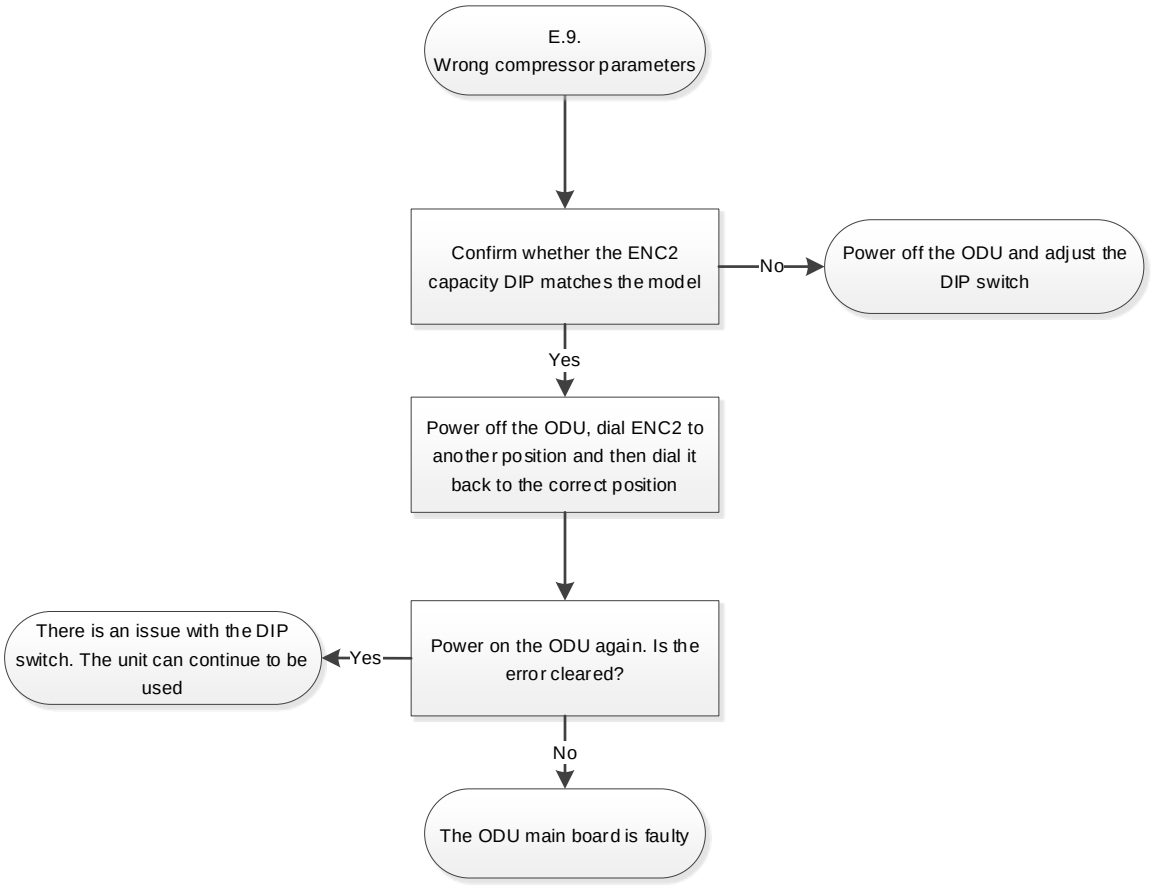
2.4.2 Description

- As detected by the main control chip, the ENC2 capacity DIP switch does not match the model. Refer to the identification on the sheet metal for matching.

2.4.3 Possible causes

- The ENC2 capacity DIP switch does not match the model.
- The main control board is faulty.

2.4.4 Procedure



2.5 EF: PFC error

2.5.1 Digital display output

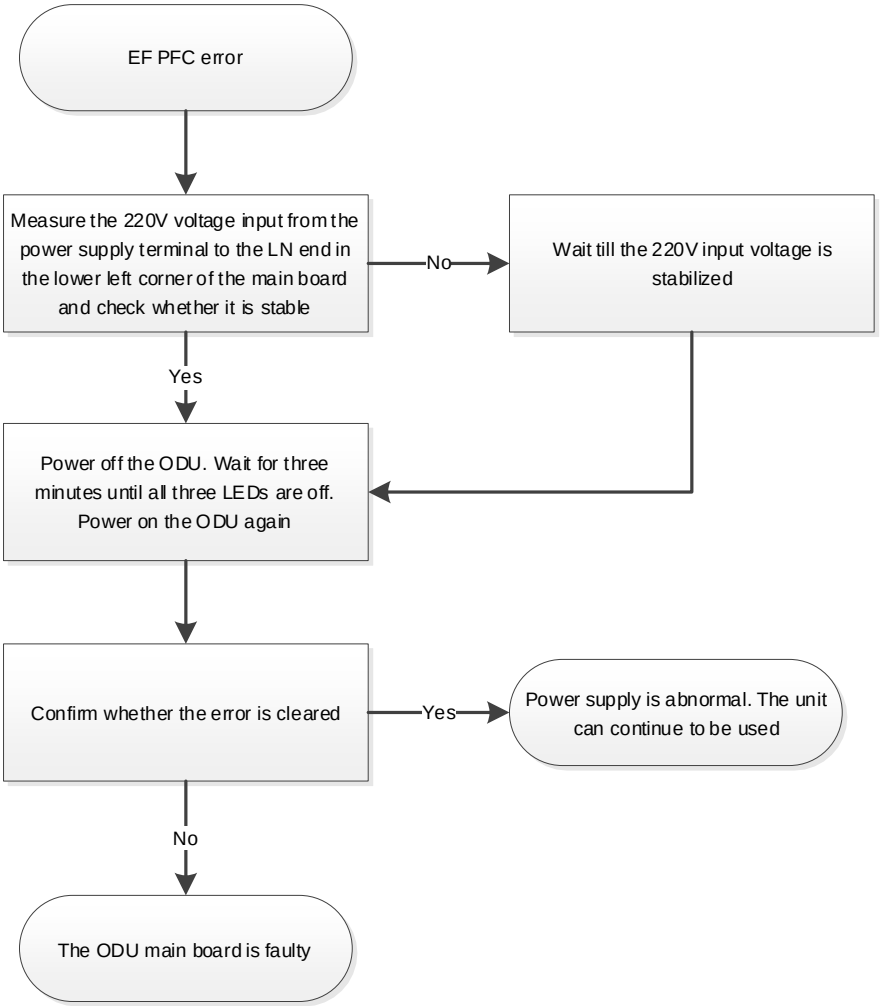
2.5.2 Description

- Within five seconds after the power factor correction (PFC) starts up (initiated from fan startup), if the voltage of DC bus is more than 450V for three seconds or more than 500V, then EF is reported.

2.5.3 Possible causes

- The DC motor is faulty.
- The main control board is faulty.

2.5.4 Procedure



2.6 EH: Refrigerant radiator pipe temperature sensor (TL) error

2.6.1 Digital display output

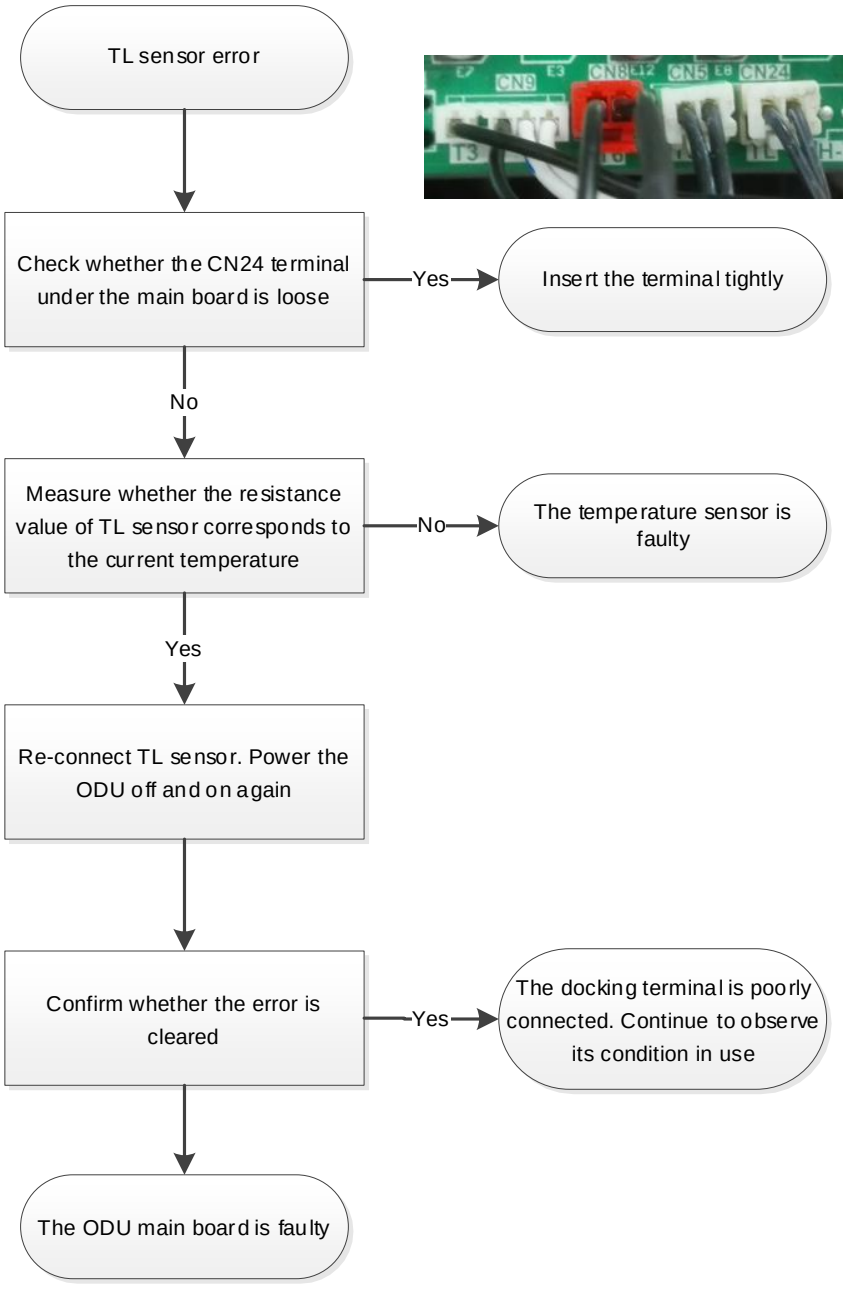
2.6.2 Description

- The TL temperature sensor is faulty. This error is reported when the sensor is opened (or the plug connecting to the main control board is loose) or short-circuited. The nominal resistance of the TL temperature sensor is 10K at 25°C. All temperature sensors are subject to negative temperature coefficient, that is, the higher the temperature is, the lower the resistance will be.

2.6.3 Possible causes

- TL temperature sensor is faulty.
- The sensor plug connecting to the main control board is loose.
- The main control board is faulty.

2.6.4 Procedure



2.7 F1: DC bus voltage protection

2.7.1 Digital display output

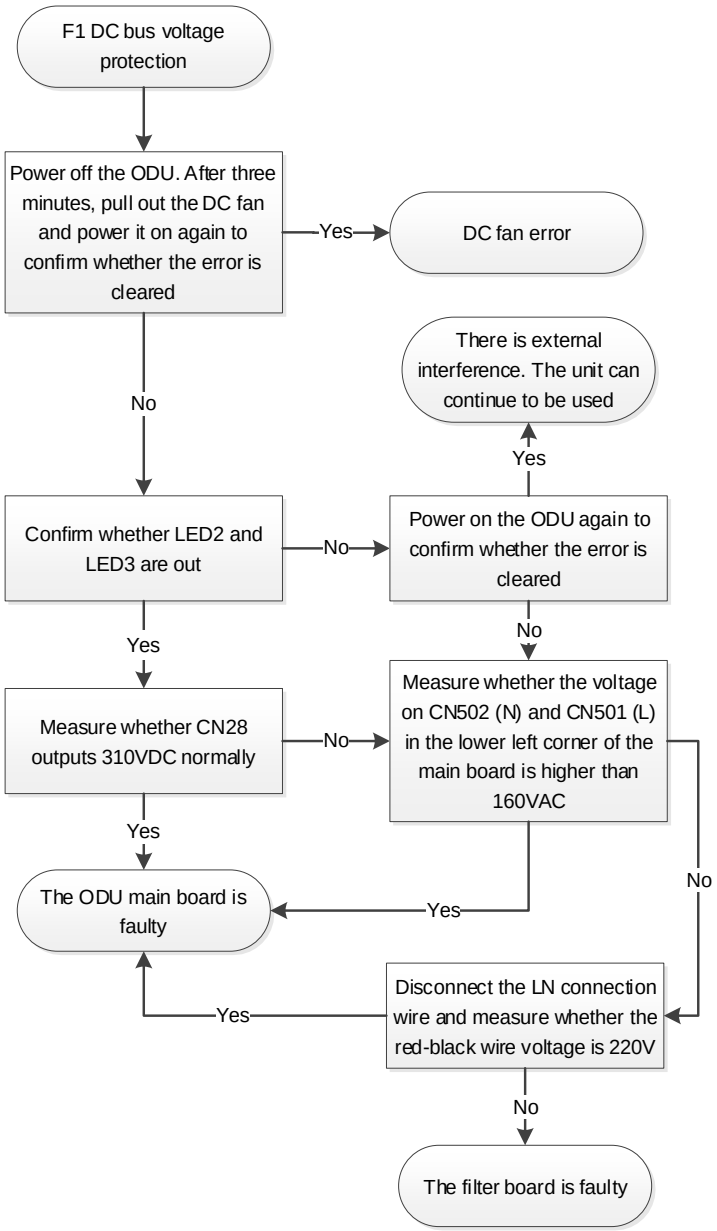
2.7.2 Description

- For the first five seconds after the ODU is powered on, the current flows through the PTC to charge the large capacitor. After five seconds, the inverter drive chip (24T) detects the PN voltage value of DC bus and sends it to the main chip. If the main chip IC55 cannot receive the voltage value or the received voltage value is smaller than 200VDC (single-phase)/180VDC (three-phase), it reports F1 and does not allow the relay to pull in.

2.7.3 Possible causes

- The CN30 terminal cable and the reactor cable are loose (three-phase).
- The DC motor is faulty.
- The main control board is faulty.
- The filter board is faulty.

2.7.4 Procedure



2.8 H0: Communication error between the main control board and motor drive modul

2.8.1 Digital display output

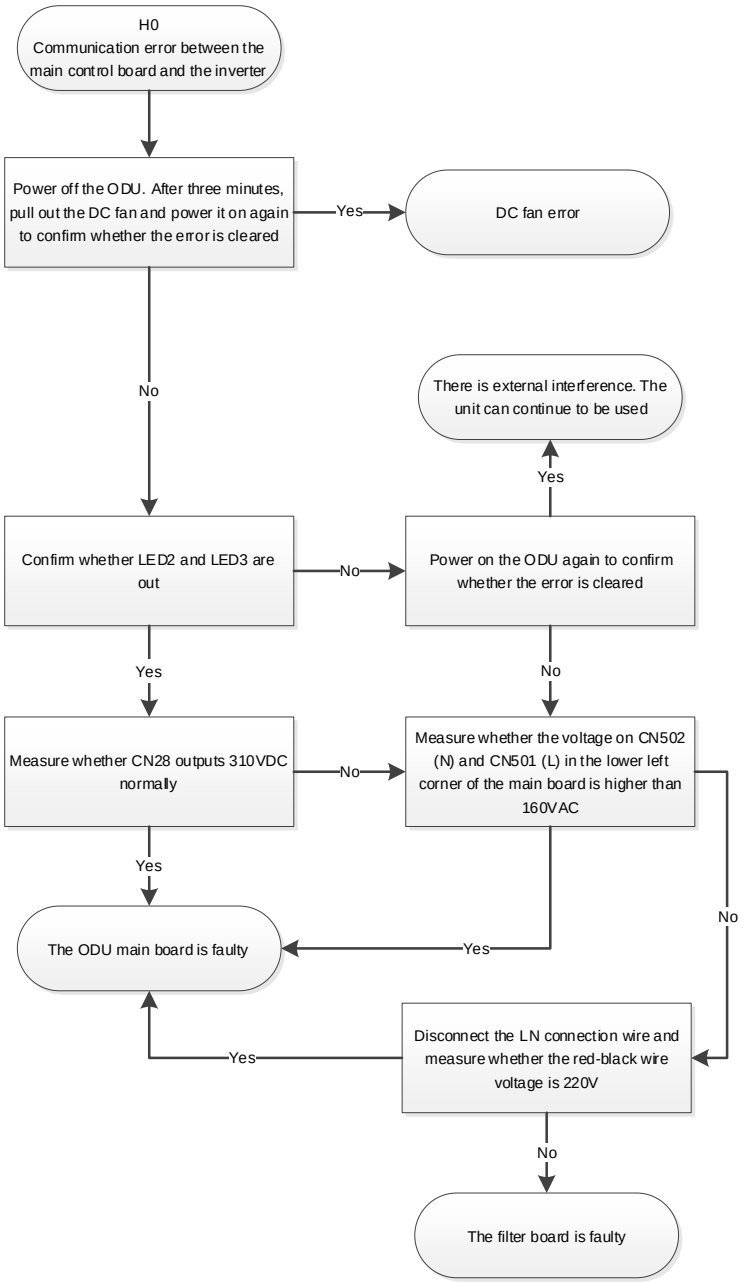
2.8.2 Description

- The main chip IC55 and drive chip are powered by the switching power supply (the input of the switching power supply is 310VDC or 375VDC, and the output is 5V, 15V, etc.). If the switching power supply fails and the inverter drive chip is not powered, the main chip cannot communicate with it.

2.8.3 Possible causes

- The DC motor is faulty.
- The main control board is faulty.
- The filter board is faulty.Procedure

2.8.4 Procedure



2.9 HF: M-Home mismatch

2.9.1 Digital display output

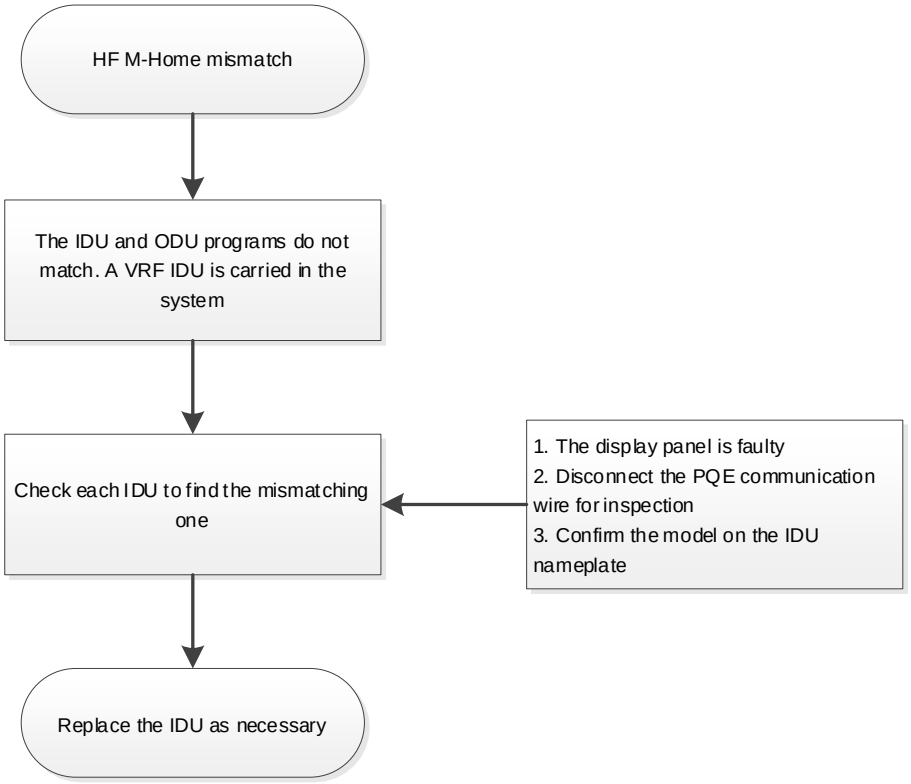
2.9.2 Description

- More specifically, the IDU and ODU programs do not match. A VRF IDU is carried in the system.

2.9.3 Possible causes

- There is VRF IDU in the system.

2.9.4 Procedure



2.10 H7: IDU number increase or decrease erro

2.10.1 Digital display output

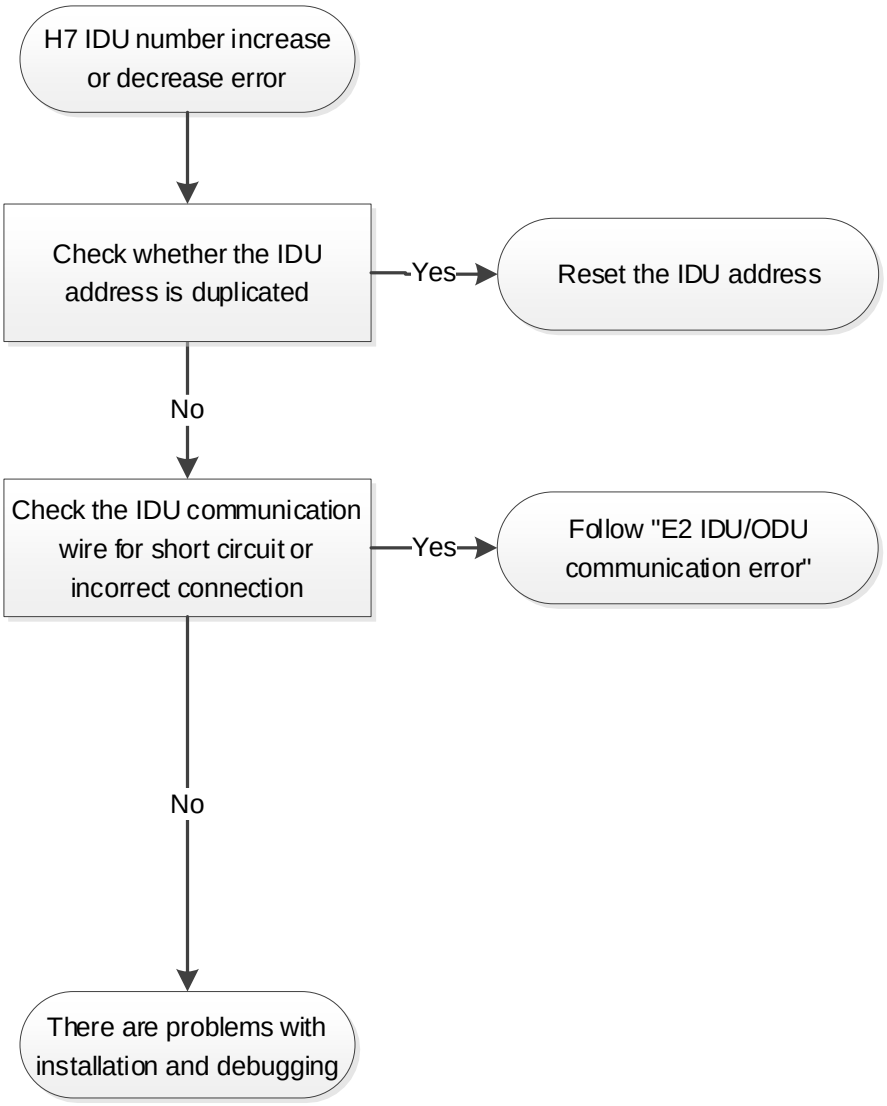
2.10.2 Description

- IDU quantity increase or decrease error.

2.10.3 Possible causes

- The possible cause is the same as that for E2.
- The main control board is faulty.

2.10.4 Procedure



2.11 PL: Radiator surface high temperature protection

2.11.1 Digital display output

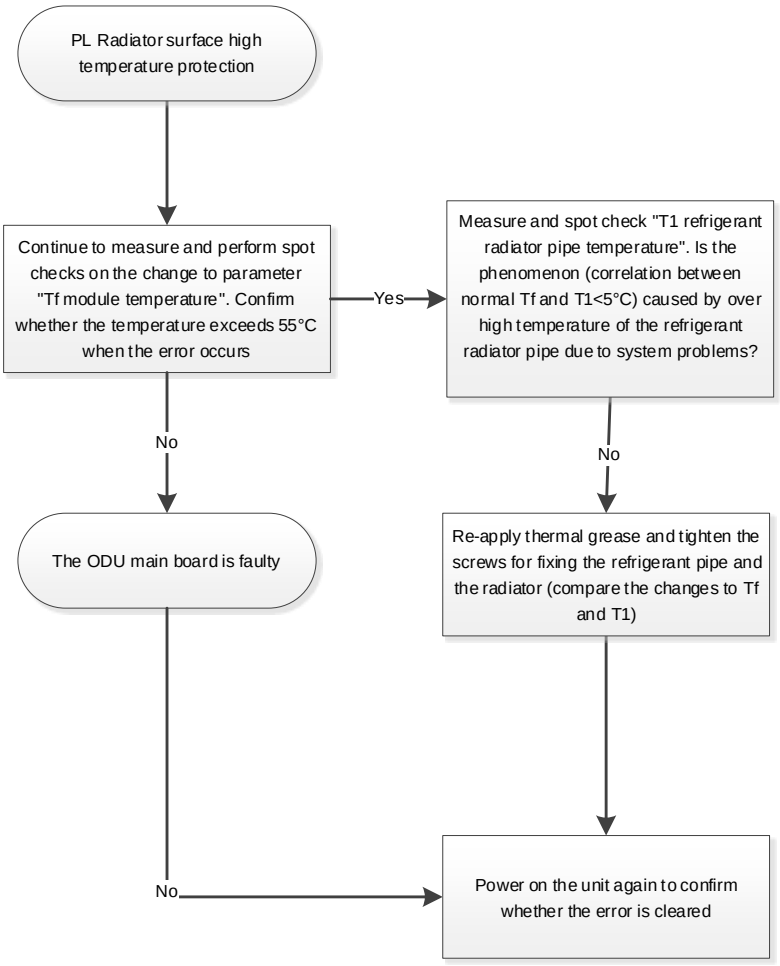
2.11.2 Description

- When compressor TF is ≥90°C or upper/lower fan TF is ≥105°C, system protection is triggered, PL is displayed, and the compressor stops. When compressor TF is <84°C and upper/lower fan TF is <84°C, heatsink high-temperature protection is disabled.

2.11.3 Possible causes

- The performance is poor (leak of refrigerant, extremely poor heat exchange condition of ODU, system blocking).
- The refrigerant is incorrectly applied. The refrigerant pipe and radiator screws are not tightened.
- The main control board is faulty.

2.11.4 Procedure



2.12 P1: System high pressure protection

2.12.1 Digital display output

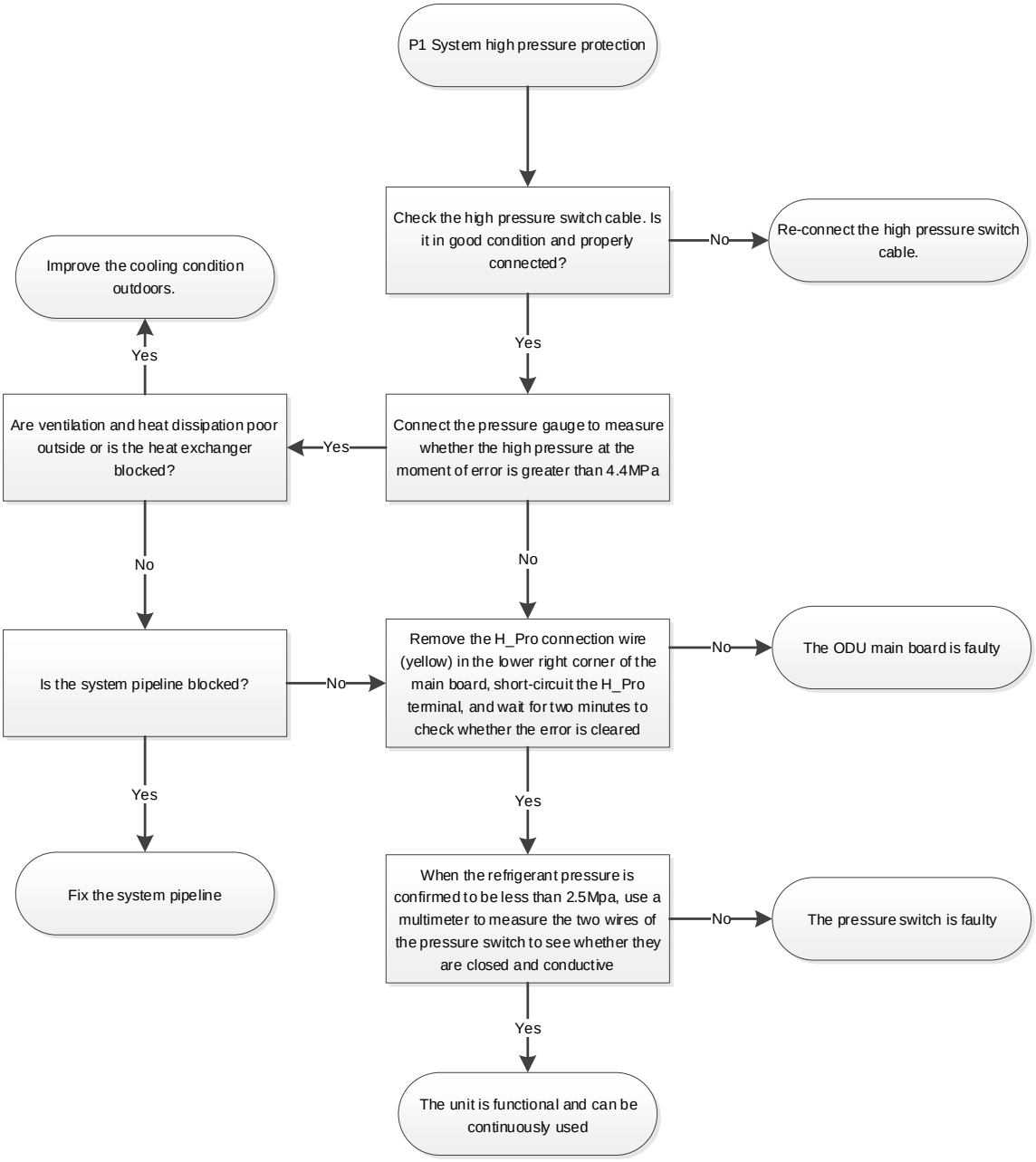
2.12.2 Description

- The high pressure switch is installed on the air discharge pipe in the system. It is on when the pressure is normal, and is off when the pressure is higher than the protection value. The high voltage switch opens when the pressure is higher than about 4.4MPa, and then closes back at about 3.2MPa; the main board reports an error when it detects that the high voltage switch is open.

2.12.3 Possible causes

- The performance is poor.
- The main control board is faulty.
- The pressure switch is faulty.

2.12.4 Procedure



2.13 P2: System low pressure protection

2.13.1 Digital display output

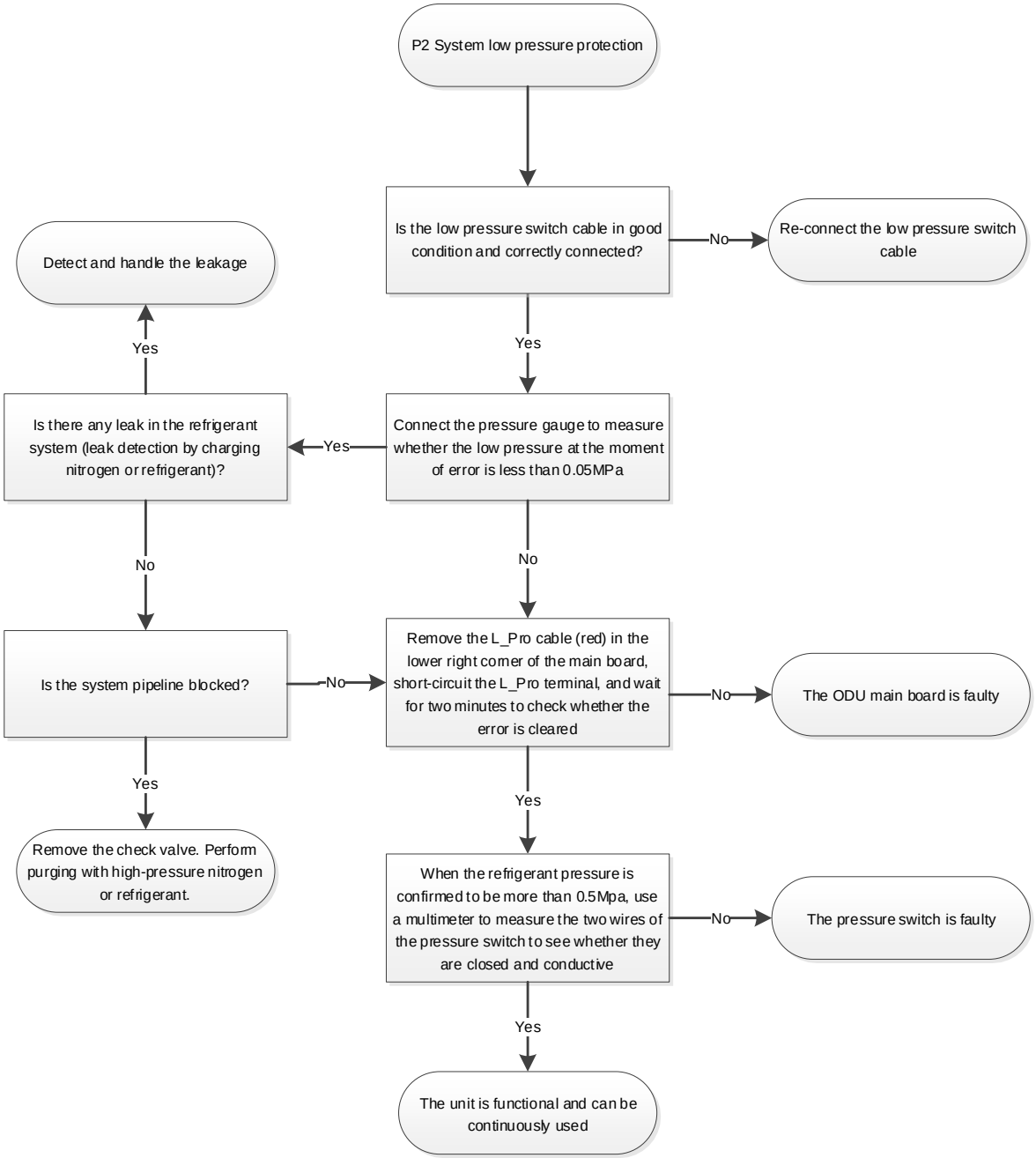
2.13.2 Description

- The low pressure switch is installed on the suction pipe in the system. It is on when the pressure is normal, and is off when the pressure is lower than the protection value. The low pressure switch is off when the pressure is lower than 0.05MPa and on again at 0.15MPa. The main board reports an error when it detects an open circuit.

2.13.3 Possible causes

- The performance is poor.
- The main control board is faulty.
- The pressure switch is faulty.

2.13.4 Procedure



2.14 P3: Current protection

2.14.1 Digital display output

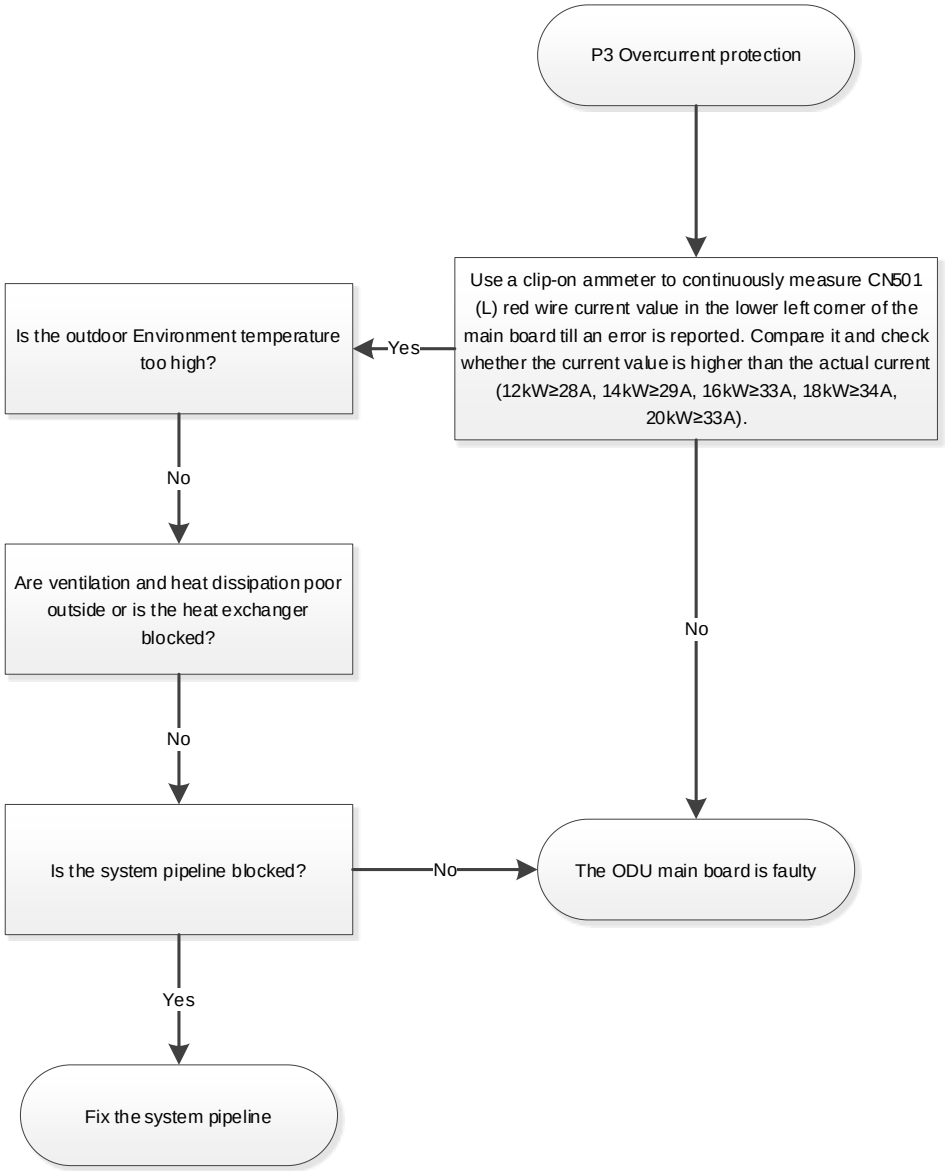
2.14.2 Description

- The ODU main control board detects that the current exceeds the specified value of the specific model (the value varies with the model and HP). As a result, the error is reported.

2.14.3 Possible causes

- The current is exceptionally large.
- The ODU main control board is faulty.

2.14.4 Procedure



2.15 P4: T5 Discharge overtemperature protection

2.15.1 Digital display output

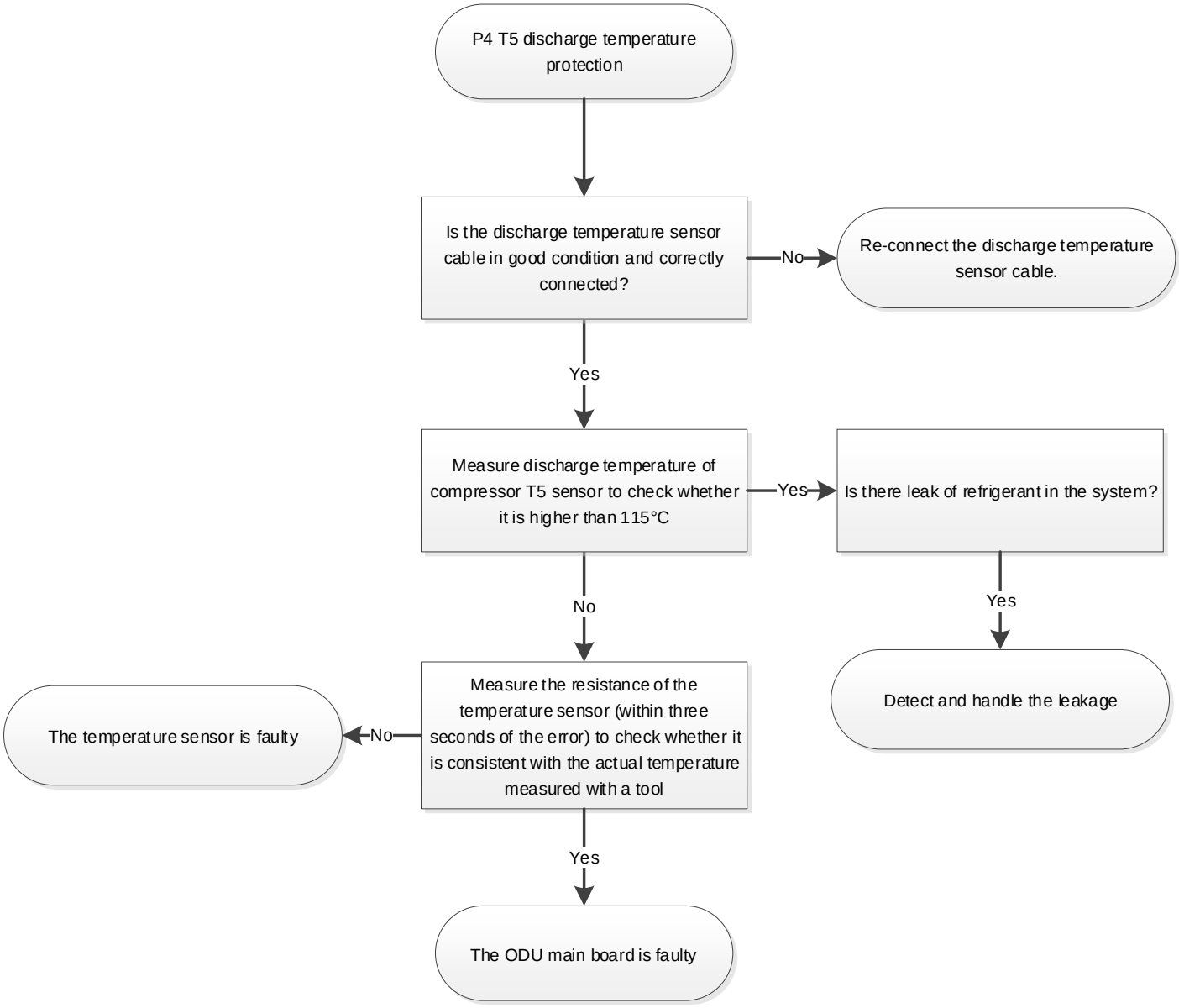
2.15.2 Description

- The main board detects that the discharge temperature exceeds the rated value of this model (usually about 115°C), and the error is reported.

2.15.3 Possible causes

- An error occurs (system leakage).
- The resistance of T5 sensor drifts.
- The ODU main control board is faulty.

2.15.4 Procedure



2.16 P5: T3 outdoor condenser temperature protection

2.16.1 Digital display output

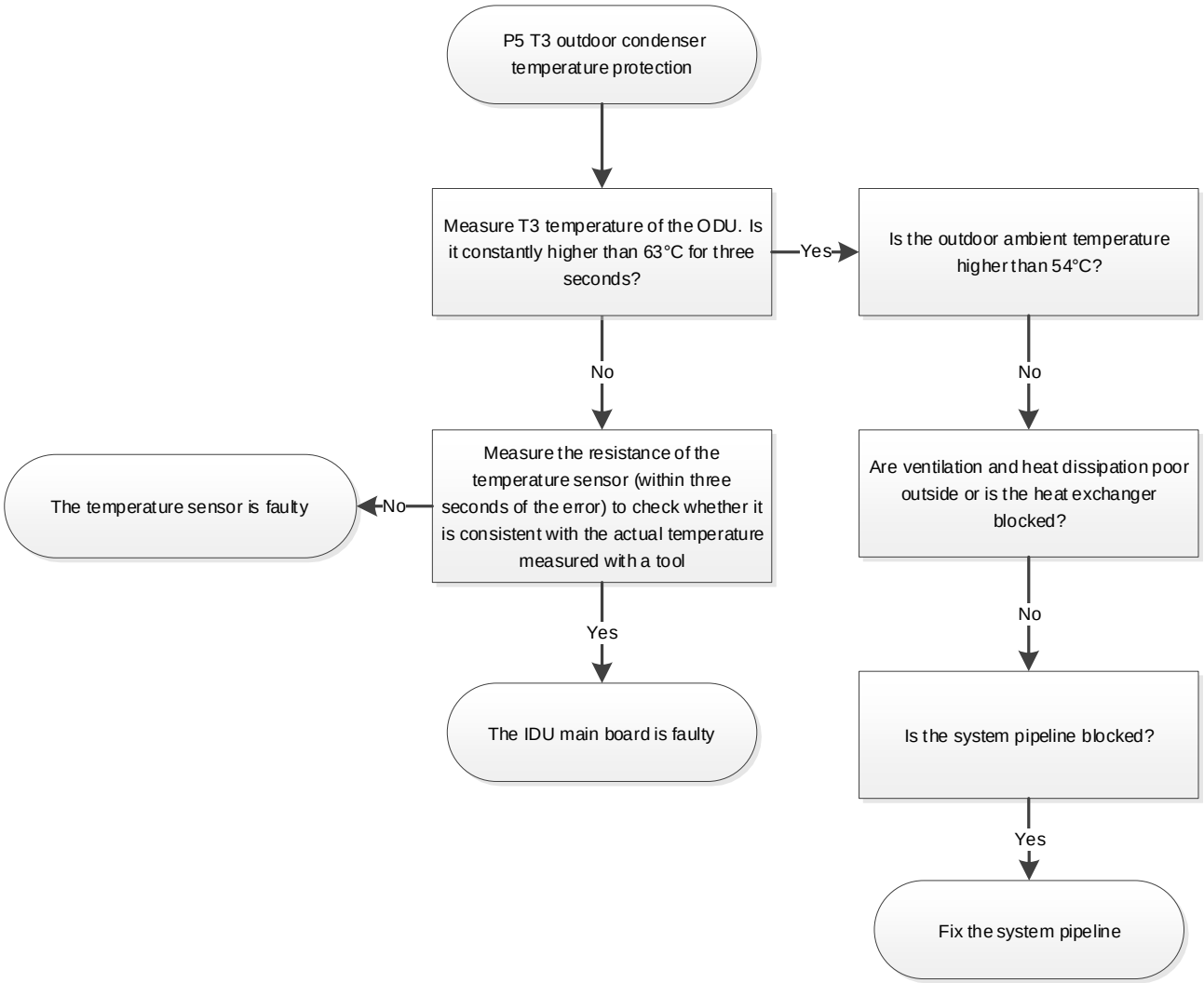
2.16.2 Description

- T3 outdoor condenser temperature protection In the instance of error report, the main board detects T3≥63° C for three seconds and stops the compressor. The outdoor fan runs with the fan speed before shutdown until the protection is released, and the indoor fan is not closed. When T3<56°C, the protection is released. (The temperature value varies with the model.)

2.16.3 Possible causes

- The performance is poor.
- The sensor is damaged.
- The main control board is faulty.

2.16.4 Procedure



2.17 PE: IDU evaporator temperature T2 protection

2.17.1 Digital display output

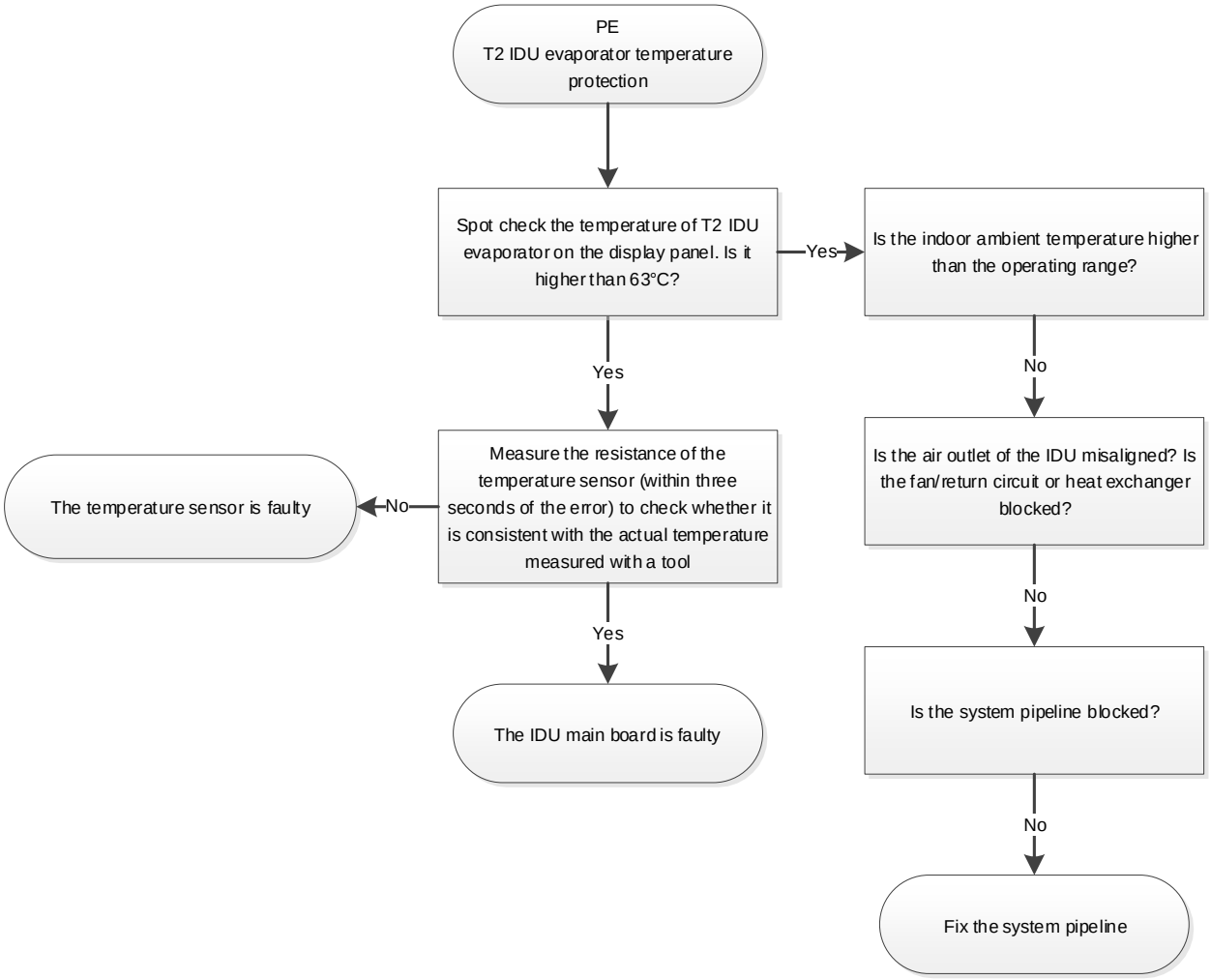
2.17.2 Description

- T2 IDU evaporator temperature protection At the moment of error reporting, the T2 central temperature sensor of the evaporator of an IDU exceeds the specified value. The temperature is fed back to the ODU and the error is reported.

2.17.3 Possible causes

- The system is faulty.
- The T2 sensor resistor of the IDU is short-circuited or disconnected.
- The IDU main control board is faulty.

2.17.4 Procedure



3 Error in Compressor Driver

3.1 Type L module protection: L11,L12,L13,L2E,L43,L5E,L51,L1E,L11,L2E,L3E,L32,L34,L35,L4E,L43,L5E,L52,L52

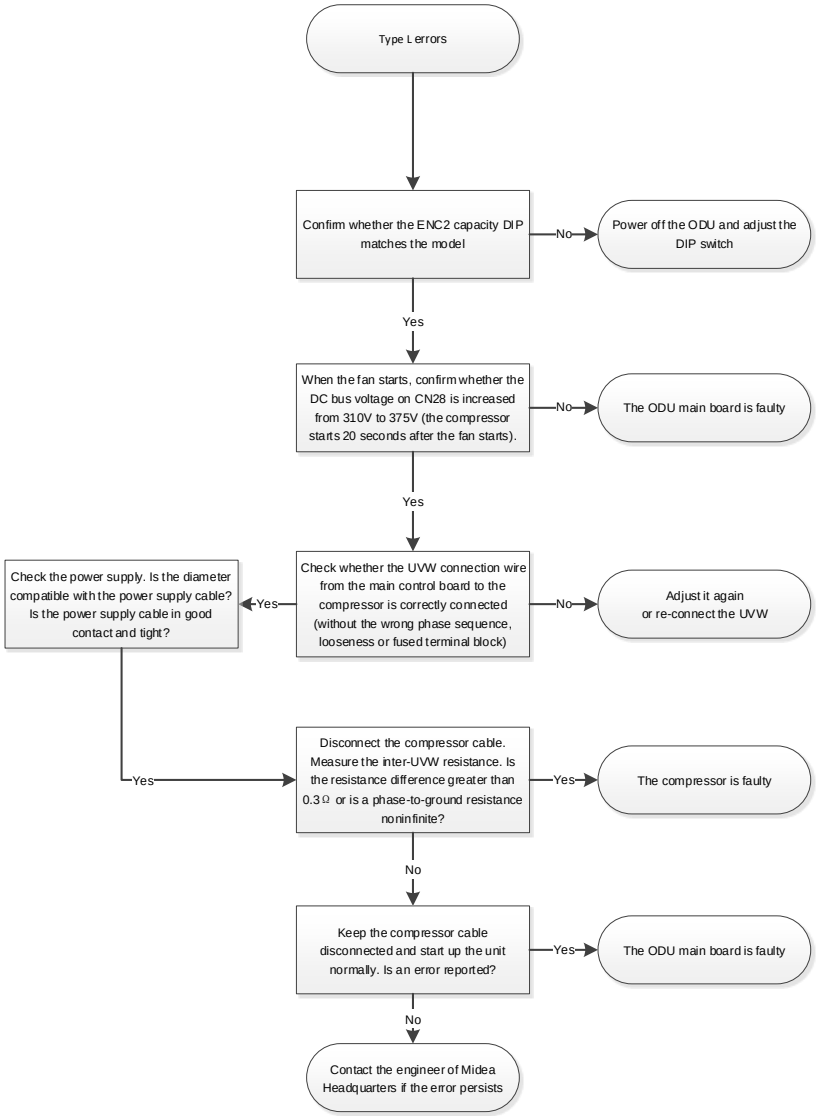
3.1.1 Description

- The compressor inverter circuit or the compressor is faulty.

3.1.2 Possible causes

- The user power supply cable is faulty.
- The compressor is faulty.
- The refrigerant radiator pipe is faulty.
- The main control board is faulty.

3.1.3 Procedure



3.2 L3E: DC bus low voltage protection

3.2.1 Digital display output

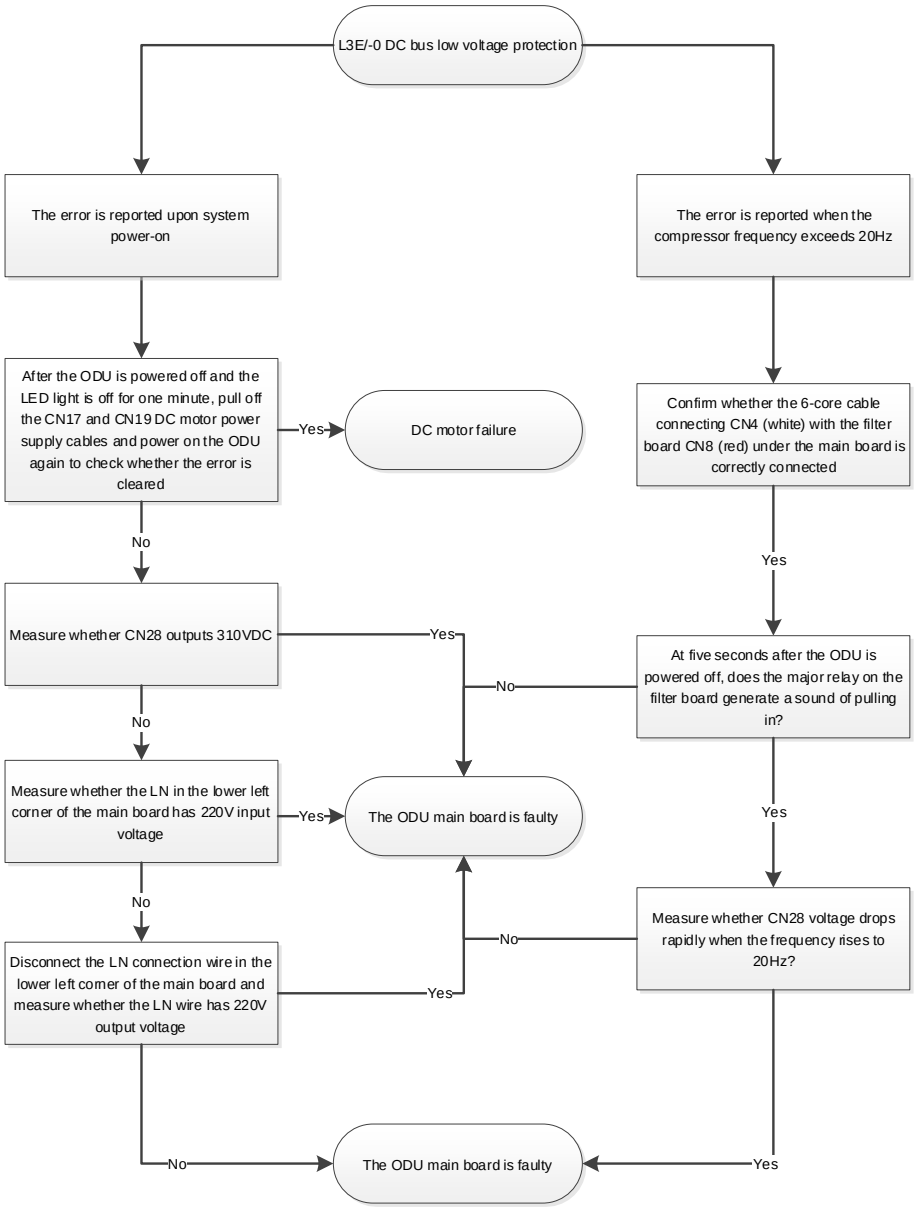
3.2.2 Description

- DC bus low voltage < 180VDC protection (LED3 flashes three times). The voltage on the two pins of main control board CN28 is measured to obtain the DC bus voltage.

3.2.3 Possible causes

- The user power supply cable is faulty.
- The main control board is faulty.
- The filter board is faulty.

3.2.4 Procedure



3.3 L31: The bus voltage is too high

3.3.1 Digital display output

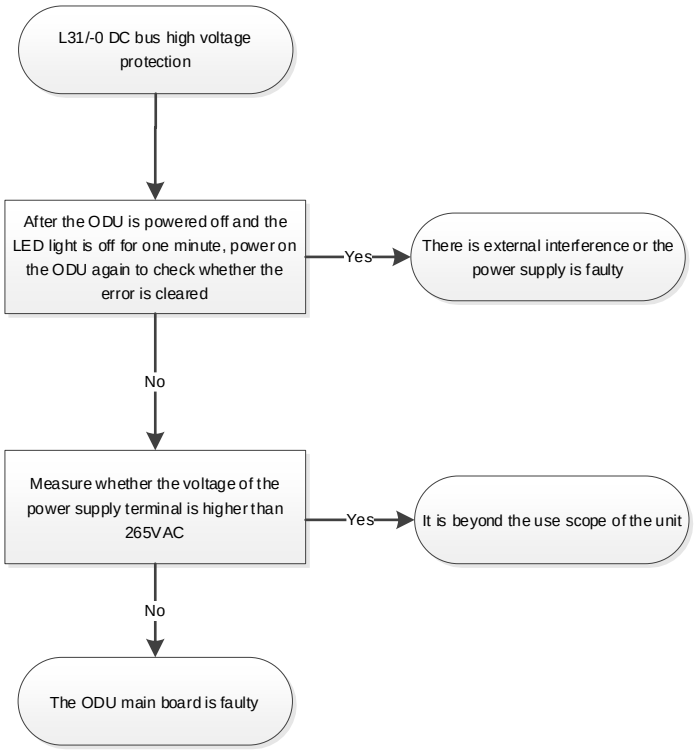
3.3.2 Description

- DC bus low voltage < 180VDC protection (LED3 flashes three times). The voltage on the two pins of main control board CN28 is measured to obtain the DC bus voltage.

3.3.3 Possible causes

- The household power supply cable is faulty.
- The main control board is faulty.
- The filter board is faulty.

3.3.4 Procedure



4 Error for Other Common Faults

4.1 The drive LED light does not light up

4.1.1 Description

- There are two LEDs on side of the inverter drive chip which must always be flashing. LED power supply is changed from 220V -> power correction and rectifier filter to 310VDC -> 5V input from switching power supply.

4.1.2 Possible causes

- The household power supply cable is faulty.
- The filter board is damaged, causing the loss of 220V input.
- The DC motor (if any) is damaged, causing abnormal 310VDC.
- The main control board is faulty.

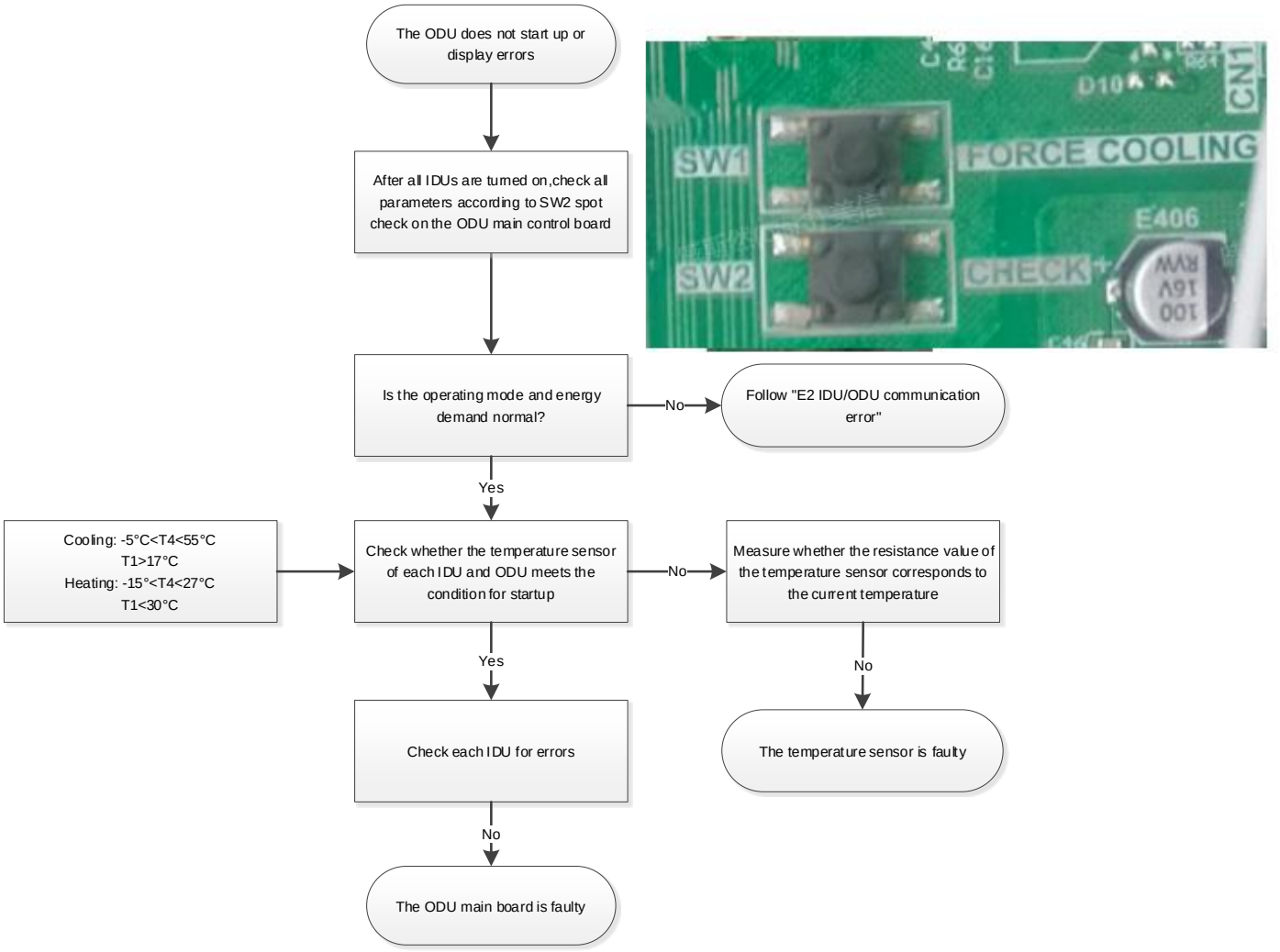
4.1.3 Procedure

4.2 The ODU does not start or display errors

4.2.1 Possible causes

- The main control board does not receive the energy demand from the IDU.
- The conditions for ODU startup are not met.
- The main control board is faulty.

4.2.2 Procedure



4.3 The ODU trips after power-on

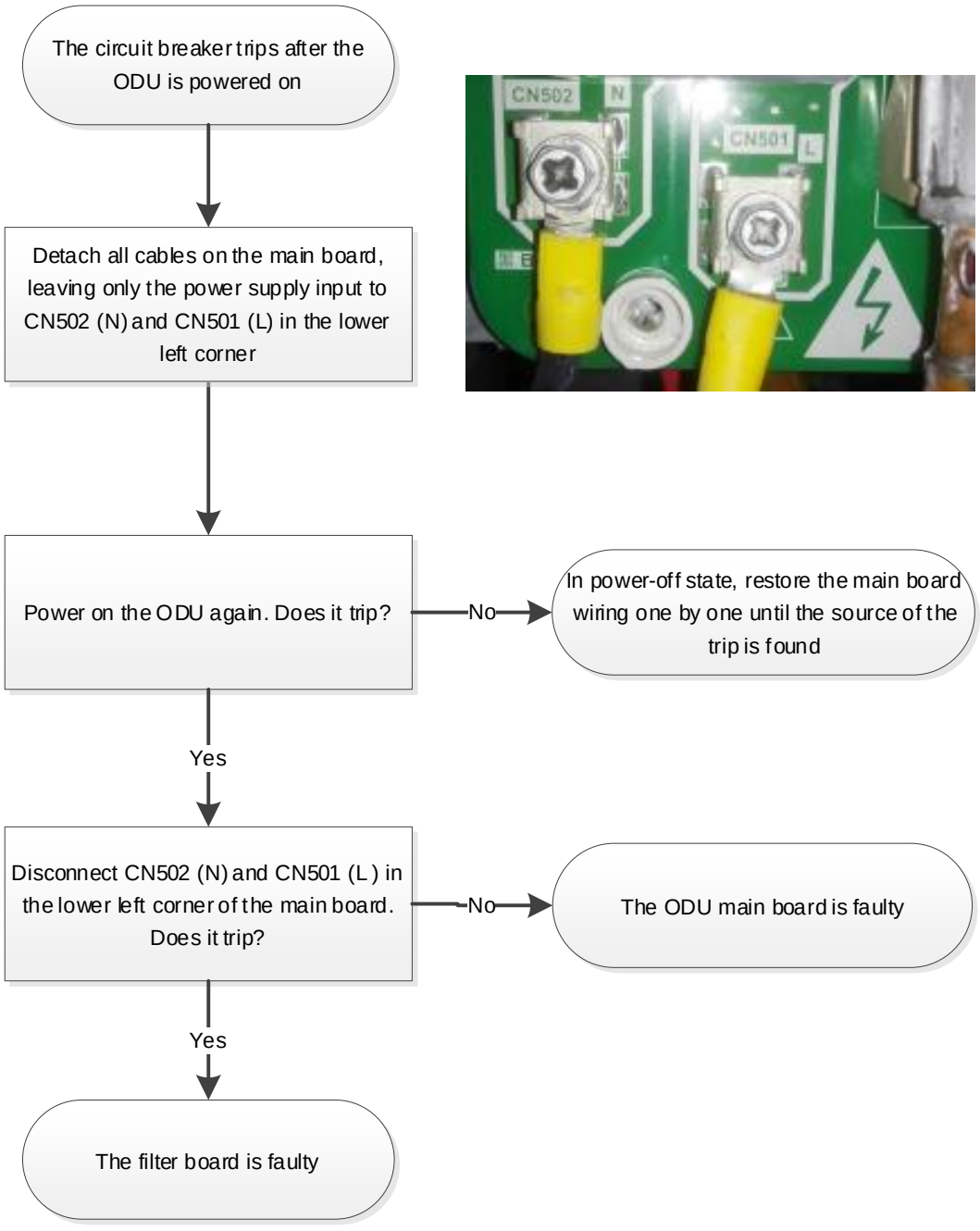
4.3.1 Description

- Short circuit of electric leakage on the electric control parts.

4.3.2 Possible causes

- The filter board is faulty, causing short circuit.
- The DC motor (if any) is faulty. There is a PN short circuit.
- The main control board is faulty.
- The shield of the wire is broken and the wire core has contact with the metal plate.

4.3.3 Procedure



5 Appendix

5.1 Resistance characteristics of temperature sensor

Table 6-5.1: List of Ambient Temperature and Pipeline Temperature Sensors (B value = 4100K, 25°C/10KΩ; unit: °C-K)

Temperature (°C)	Resistance (K)	Temperature (°C)	Resistance (K)	Temperature (°C)	Resistance (K)	Temperature (°C)	Resistance (K)
-20	115.266	20	12.6431	60	2.35774	100	0.62973
-19	108.146	21	12.0561	61	2.27249	101	0.61148
-18	101.517	22	11.5	62	2.19073	102	0.59386
-17	96.3423	23	10.9731	63	2.11241	103	0.57683
-16	89.5865	24	10.4736	64	2.03732	104	0.56038
-15	84.219	25	10	65	1.96532	105	0.54448
-14	79.311	26	9.55074	66	1.89627	106	0.52912
-13	74.536	27	9.12445	67	1.83003	107	0.51426
-12	70.1698	28	8.71983	68	1.76647	108	0.49989
-11	66.0898	29	8.33566	69	1.70547	109	0.486
-10	62.2756	30	7.97078	70	1.64691	110	0.47256
-9	58.7079	31	7.62411	71	1.59068	111	0.45957
-8	56.3694	32	7.29464	72	1.53668	112	0.44699
-7	52.2438	33	6.98142	73	1.48481	113	0.43482
-6	49.3161	34	6.68355	74	1.43498	114	0.42304
-5	46.5725	35	6.40021	75	1.38703	115	0.41164
-4	44	36	6.13059	76	1.34105	116	0.4006
-3	41.5878	37	5.87359	77	1.29078	117	0.38991
-2	39.8239	38	5.62961	78	1.25423	118	0.37956
-1	37.1988	39	5.39689	79	1.2133	119	0.36954
0	35.2024	40	5.17519	80	1.17393	120	0.35982
1	33.3269	41	4.96392	81	1.13604	121	0.35042
2	31.5635	42	4.76253	82	1.09958	122	0.3413
3	29.9058	43	4.5705	83	1.06448	123	0.33246
4	28.3459	44	4.38736	84	1.03069	124	0.3239
5	26.8778	45	4.21263	85	0.99815	125	0.31559
6	25.4954	46	4.04589	86	0.96681	126	0.30754
7	24.1932	47	3.88673	87	0.93662	127	0.29974
8	22.5662	48	3.73476	88	0.90753	128	0.29216
9	21.8094	49	3.58962	89	0.8795	129	0.28482
10	20.7184	50	3.45097	90	0.85248	130	0.2777
11	19.6891	51	3.31847	91	0.82643	131	0.27078
12	18.7177	52	3.19183	92	0.80132	132	0.26408
13	17.8005	53	3.07075	93	0.77709	133	0.25757
14	16.9341	54	2.95896	94	0.75373	134	0.25125
15	16.1156	55	2.84421	95	0.73119	135	0.24512
16	15.3418	56	2.73823	96	0.70944	136	0.23916
17	14.6181	57	2.63682	97	0.68844	137	0.23338
18	13.918	58	2.53973	98	0.66818	138	0.22776
19	13.2631	59	2.44677	99	0.64862	139	0.22231

Table 6-5.2: List of Discharge Temperature Sensors (B value = 3950K, 90°C/5KΩ; unit: °C-K)

Temperature (°C)	Resistance (K)	Temperature (°C)	Resistance (K)	Temperature (°C)	Resistance (K)	Temperature (°C)	Resistance (K)
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.86
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.94	112	2.63
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.3	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.82	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28	81	6.641	121	2.061
2	163.3	42	26.9	82	6.43	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.1	87	5.488	127	1.762
8	121	48	21.26	88	5.32	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294	B(25/50)=3950K+-3%	
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045	R(90℃)=5KΩ+-3%	
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		

Part 7

Indoor Unit Diagnosis and Troubleshooting

1 Errors and operation code

1.1 Error Code Table

Table 7.1: Error code

Error code	Content	Error code	Content
A01	Emergency stop	C52	Abnormal communication between the IDU and Wi-Fi Kit
A11	R32 refrigerant leaks, requiring shutdown immediately	C61	Abnormal communication between the IDU main control board and display board
A51	Outdoor unit fault	C71	Abnormal communication between the AHU Kit slave unit and master unit
A71	Interlocking control Heat Recovery Ventilation Unit fault(in-series application)	C72	Number of AHU Kits is not the same as the set number
A72	The Humidity Unit fault	C73	Abnormal communication between the linked humidifying IDU and master IDU
A73	Interlocking control Heat Recovery Ventilation Unit fault（non-serial application)	C74	Abnormal communication between the linked FAPU and master IDU (series setting)
A74	The AHU Kit slave unit fault	C75	Abnormal communication between the linked FAPU and master IDU (non-series setting)
A81	Self-check fault	C76	Abnormal communication between the main wired controller and secondary wired controller
A82	MS (refrigerant flow direction switching device) fault	C77	Abnormal communication between the IDU main control board and 1# Expansion board
A91	Mode conflict	C78	Abnormal communication between the IDU main control board and 2# Expansion board
b11	1# EEV coil fault	C79	Abnormal communication between the IDU main control board and Switch module
b12	1# EEV body fault	C81	The indoor unit is in a power-off state
b13	2# EEV coil fault	d16	Air inlet temperature of the IDU is too low in heating mode
b14	2# EEV body fault	d17	Air inlet temperature of the IDU is too high in cooling mode
b34	Protection on 1# water pump	d81	Alarm for exceeding temperature and humidity range
b35	Protection on 2# water pump	dE1	Sensor control board fault
b36	Water level switch alarm	dE2	PM2.5 sensor fault
b71	Reheating electric heater fault	dE3	CO2 sensor fault
b72	Preprocessing electric heater fault	dE4	Formaldehyde sensor fault
b81	Humidifier fault	dE5	Human Detect sensor fault
C11	Duplicate IDU address code	E21	T0 (fresh inlet air temperature sensor) short-circuits or cuts off
C21	Abnormal communication between the IDU and ODU	E22	The upper dry bulb temperature sensor short-circuits or cuts off
C41	Abnormal communication between the IDU main control board and fan drive board	E23	The lower dry bulb temperature sensor short-circuits or cuts off
C51	Abnormal communication between the IDU and wired controller	E24	T1 (IDU return air temperature sensor) short-circuits or cuts off

Table 7.1: Error code(continues)

Error code	Content	Error code	Content
E31	wired controller temperature sensor failure	U01	Locked (electronic lock)
E32	The wireless temperature sensor short-circuits or cuts off	U11	Unit model code not set
E33	The external room temperature sensor short-circuits or cuts off	U12	Capacity(HP) code not set
E61	Tcp (pre-cooled fresh air temperature sensor) short-circuits or cuts off	U14	The capacity value of the AHU Kit DIP switch does not match the model
E62	Tph (pre-heated fresh air temperature sensor) short-circuits or cuts off	U15	The DIP value of AHU Kit's fan speed output voltage is incorrect
E81	TA (outlet air temperature sensor) short-circuits or cuts off	U26	Mismatch between indoor unit model and outdoor unit model
EA1	Outlet air humidity sensor fault	U38	Address code not detected
EA2	Return air humidity sensor fault	J01	Motor failed more than once
EA3	Upper wet bulb sensor fault	J1E	IPM (fan module) overcurrent protection
EA4	Lower wet bulb sensor fault	J11	Instantaneous overcurrent protection for phase current
EC1	R32 refrigerant leakage sensor fault	J3E	Low bus voltage fault
F01	T2A (heat exchanger liquid pipe temperature sensor) short-circuits or cuts off	J31	High bus voltage fault
F11	T2 (heat exchanger middle temperature sensor) short-circuits or cuts off	J43	Phase current sample bias error
F12	T2 (heat exchanger middle temperature sensor) over temperature protection	J45	Motor and IDU are unmatched
F21	T2B (heat exchanger gas pipe temperature sensor) short-circuits or cuts off	J47	IPM and IDU are unmatched
P71	Main control board EEPROM fault	J5E	Motor startup failure
P72	IDU display control board EEPROM fault	J52	Motor blocking protection
P31/P34	Fan drive board AC side overcurrent protection	J55	Speed control mode setting error
P52	The voltage of the power supply is too low	J6E	Phase lack protection of motor

1.2 Operating Status Codes

Table 7.2:Operating Status Codes

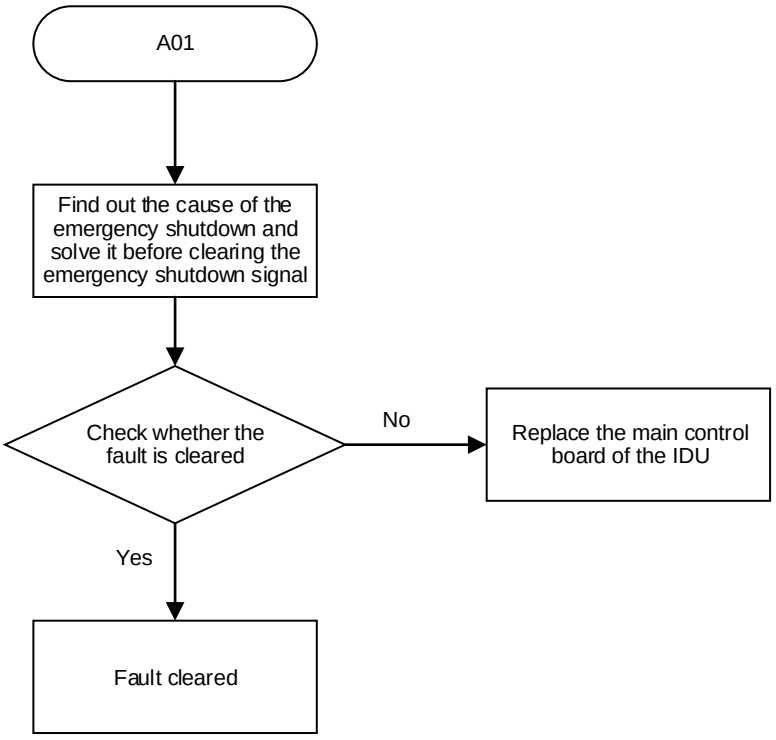
Code	Content	Code	Content
d0	Oil return or preheating operation	d61	Remote shutdown
dC	Self-cleaning	d71	IDU backup operation
dd	Mode conflict	d72	ODU backup operation
dF	Defrosting	OTA	Main control program upgrading
d51	Initial static pressure detection	dH	Hot water mode(Specific series)

2 Troubleshooting

Warning

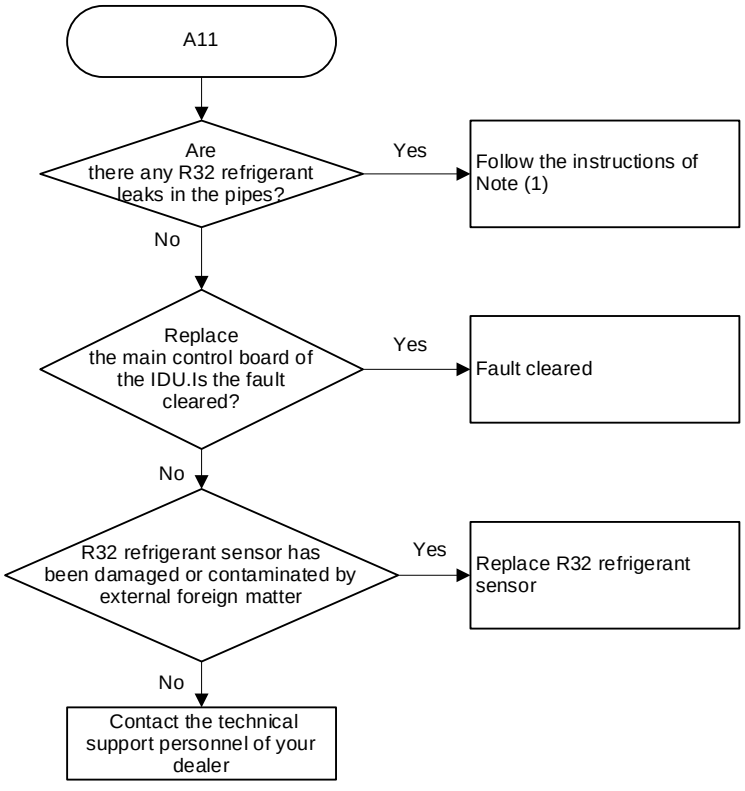
- All electrical work must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation (all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation).
- Power-off the unit before connecting or disconnecting any connections or wiring, otherwise electric shock (which can cause physical injury or death) may occur or damage to components may occur.

1.1.1 A01 – Emergency shutdown

<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">The faulty IDU and other IDUs of the same system: stop running, displaying code "A01" (V6 platform indoor unit displays "A0" code)</td></tr>
<tr><td colspan="2">ODU of the same system: stop running, displaying code "A01" (V6 platform outdoor unit displays "A0" code)</td></tr>
<tr><td>Error trigger</td><td colspan="2">When the IDU receives an emergency shutdown signal from the ODU</td></tr>
<tr><td>Error recovery</td><td colspan="2">After troubleshooting, power on again</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ An emergency shutdown signal is received.
■ The IDU main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note:
1.Emergency shutdown is usually caused by the outdoor unit receiving an emergency shutdown command sent by the central controller or external reasons. For detailed handling instructions, please refer to the corresponding outdoor unit troubleshooting manual.</td></tr>
</table>

1.1.2 A11 - R32 refrigerant leaks, requiring shutdown immediately

<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">■ Faulty IDU: The fan operates at the highest speed, the EEV is closed (Note: Fault persists after power on again), and buzzer of the display control board of the faulty IDU and buzzer of wired controller connected to the faulty IDU keep beeping.
■ Other IDUs of the same system: Refrigerant is recycled to ODU. After recycling is completed, other IDUs stop running, displaying code "A51" - ODU fault</td></tr>
<tr><td colspan="2">ODU of the same system: It stops running after recycling is completed, displaying code "A11" - IDU refrigerant leaks.</td></tr>
<tr><td>Error trigger</td><td colspan="2">When the IDU main control board receives a refrigerant leakage signal from R32 refrigerant detection device (See Figure 1 below) or the abnormal communication among the IDU main control board, the adapter board and the control board of the R32 refrigerant detection device causes the fault to trigger by mistake.</td></tr>
<tr><td>Error recovery</td><td colspan="2">Has not detected the refrigerant leak signal and has received the signal of refrigerant fault rectification</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ R32 refrigerant of IDUs leaks.
■ R32 refrigerant sensor is damaged or contaminated with external foreign matter (e.g. steam, oil)
■ Abnormal communication among IDU main control board, adapter board and R32 refrigerant detection device control board
■ IDU main control board or adapter board or R32 refrigerant detection device control board damaged</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note 1: Adapter board ENC1 dip switch setting When the function of determining refrigerant</td></tr>
</table>

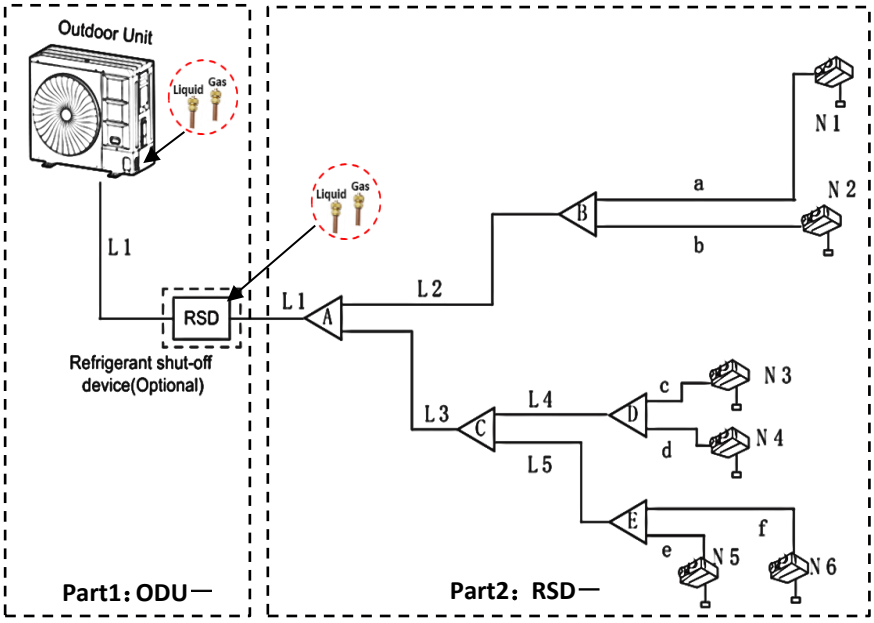
leakage fault is effective, if the communication abnormality between indoor unit main control board, adapter board and R32 refrigerant detection device control board lasts for more than 2 minutes (see "C79" fault handling in this manual for the communication abnormality handling method between indoor unit main control board and adapter board, and see R32 refrigerant detection device control board operation and installation manual for the communication abnormality handling method between adapter board and R32 refrigerant detection device control board), "A11" fault will be triggered by mistake.

Note 2:

Step 1: Refrigerant leakage inspection method and refrigerant leakage treatment

(1) Check whether there is refrigerant leakage in the field pipeline. Inspection method: if the system is connected with the refrigerant block device, use the refrigerant pressure gauge to connect the liquid test or gas test maintenance needle valve of the refrigerant block device; if the system is not connected with the refrigerant block device, use the refrigerant pressure gauge to connect the liquid test or gas test maintenance needle valve of the outdoor unit. Measure the refrigerant saturation gauge pressure in the field pipeline. If the measured liquid side or gas side refrigerant saturation pressure is less than the standard saturation pressure (see the table of R32 refrigerant ambient temperature and standard saturation gauge pressure in the attached table of this manual), it is determined that there is refrigerant leakage. Follow these steps to handle refrigerant leaks:

- As shown in the figure below, use the refrigerant recovery device to recover the refrigerant in Part 1 and Part 2 respectively. Note: 1) The recovery device must be connected to the liquid/gas side needle valve at the same time to ensure that the residual refrigerant in the liquid pipe and the air pipe is recovered completely; 2) For the recovery of Part 1, it is necessary to enter the outdoor unit engineering menu and select the vacuumizing mode to ensure that all valve bodies of the outdoor unit are in the open state.



- Locate and repair pipeline leaks.
- After the repair is completed, the system is tested for gas tightness, refer to the Owner's and installation manual for details. If the gas tightness test is passed, go to the next step, otherwise repeat the step above until the gas tightness test is passed
- Replace the R32 sensor model of the faulty IDU.
- Recharge refrigerant according to the ODU Installation Manual.

(2) If the measured refrigerant saturation pressure on the liquid side or gas side is equal to the

standard saturation pressure (see Table of Ambient Temperature and Standard Saturation Pressure of R32 attached to this manual), confirm whether there is a refrigerant leak by using refrigerant testing instruments. If it is determined that there is a refrigerant leak, please operate the refrigerant leak handling procedure above.

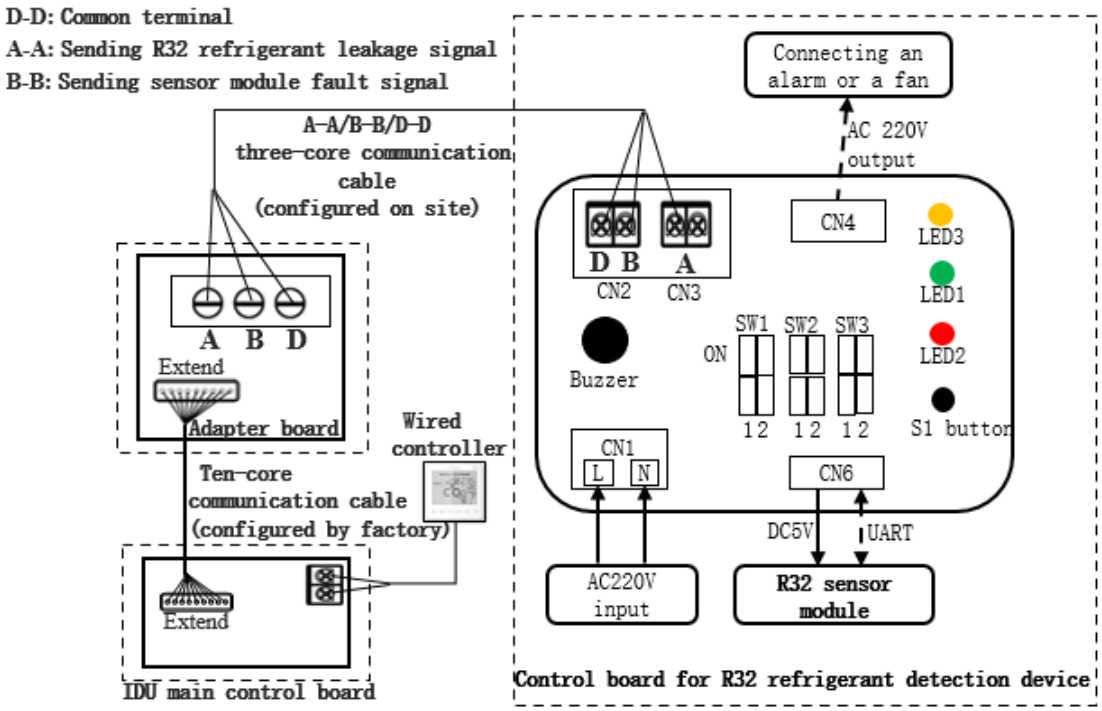
Step 2: Reset the R32 refrigerant detection device.

Refer to Figure 1 below. After the refrigerant leakage alarm, the red LED (LED 2) in the R32 refrigerant detection device lights up once every 1s, and the buzzer sounds once every 1s. After maintenance, press and hold the S1 key on the control panel for 10s to reset. After resetting, all LEDs are on for 2S and then go out, and the buzzer stops ringing. The R32 sensor life timing recorded by EERPOM on the control panel is cleared.

Step 3: Wired controller reset operation.

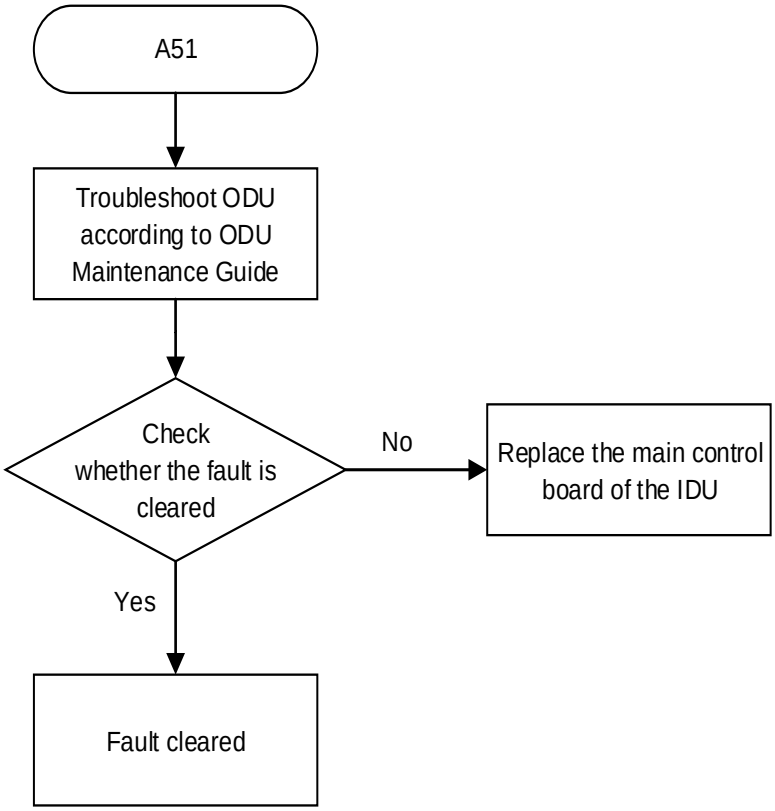
When the wired controller receives the refrigerant leakage fault command transmitted by the indoor unit, the interface will display the "A11" code, and the buzzer will sound once every 1s. After the above step 1/2 is completed and the R32 refrigerant leakage alarm signal is OFF, enter the wired controller engineering parameter setting menu to select the parameter: refrigerant leakage fault reset. After the reset is completed, the interface will no longer display the "A11" code, and the buzzer stops ringing. Note: If the R32 refrigerant leakage alarm signal = ON, the reset operation is invalid!

Figure 1 Schematic diagram of the R32 refrigerant leakage detection system



Note: The A/B/D wet printed numbers on the adapter board and the R32 refrigerant detection device control board are only used for the connection of the communication line. Please refer to the corresponding requirements in the installation instructions of the adapter board and the R32 refrigerant detection device control board when connecting the communication line on site.

1.1.3 A51 - ODU fault

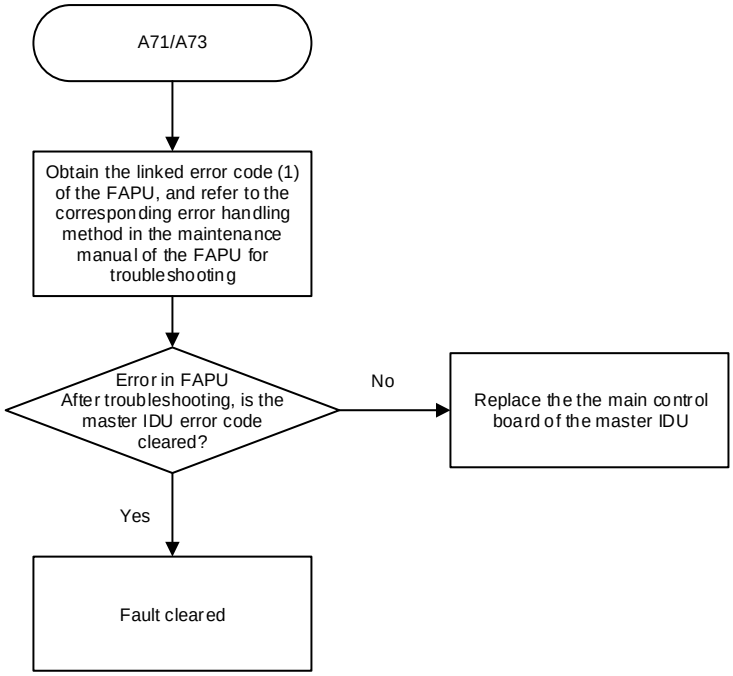
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU and other IDUs of the same system: The fan continues running, the EEV is closed, and code "A51" is displayed (V6 platform IDU displays the code "Ed")	
	ODU of the same system: ■ stops. ■ The displayed code depends on the error type of the ODU. For the meaning of the code, please refer to the error table specific to the model of the ODU.	
Error trigger	Duration of ODU error ≥ 10 minutes	
Error recovery	Automatic recovery	
Possible cause	■ The ODU error is transmitted to the IDU. ■ The IDU main control board is damaged.	
Troubleshooting		

1.1.4 A71 - The error of the linked FAPU is transmitted to the master IDU (series setting)

Note:

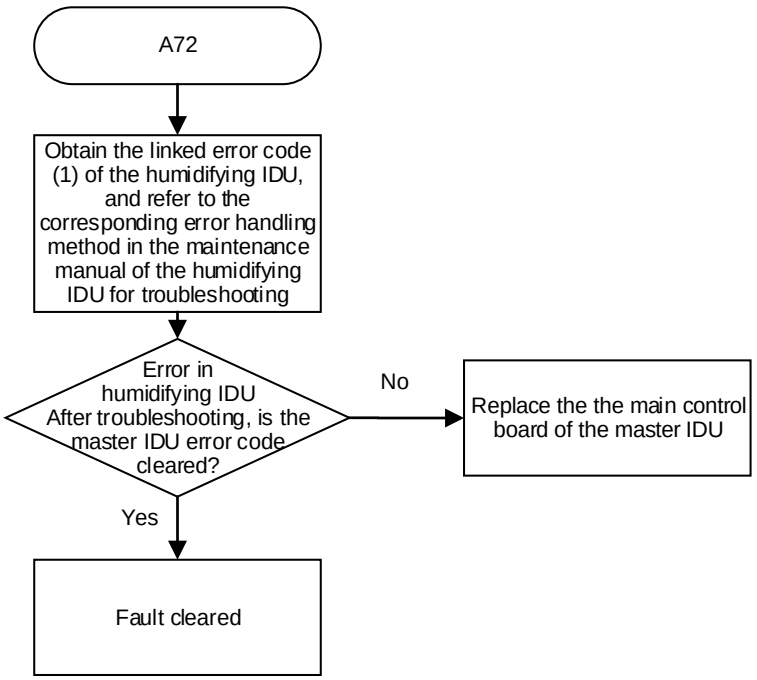
1) The type of FAPU may be HRV, VRF fresh air IDU and so on.

2) Series setting: The air supply side of the linked FAPU is directly connected to the air return side of the master IDU through an air duct. A wired controller is used to set this installation method as a series connection.

<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position (master IDU)</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">The master IDU and the linked FAPU: stop. Other IDUs of the same system: operate normally.</td></tr>
<tr><td colspan="2">ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="2">The error of the linked FAPU is transmitted to the master IDU</td></tr>
<tr><td>Error recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ The FAPU is faulty.
■ The master IDU's main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note:
1. The error code can be queried after the FAPU is connected to the wired controller or the display box.</td></tr>
</table>

1.1.5 A72 - The error of the linked humidifying IDU is transmitted to the master IDU

<table>
<tr><td rowspan="3">Error display</td><td>Digital display</td><td colspan="2">Display position (master IDU)</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Spot check interface query</td><td>Error code is not displayed</td></tr>
<tr><td>Error impact</td><td colspan="3">Master IDU: operates normally. Humidifying IDUs: stop. Other IDUs of the same system: operate normally.
ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="3">The error of the linked humidifying IDU is transmitted to the master IDU</td></tr>
<tr><td>Error recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="3">■ The humidifying IDU is faulty.
■ The master IDU's main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3"> 

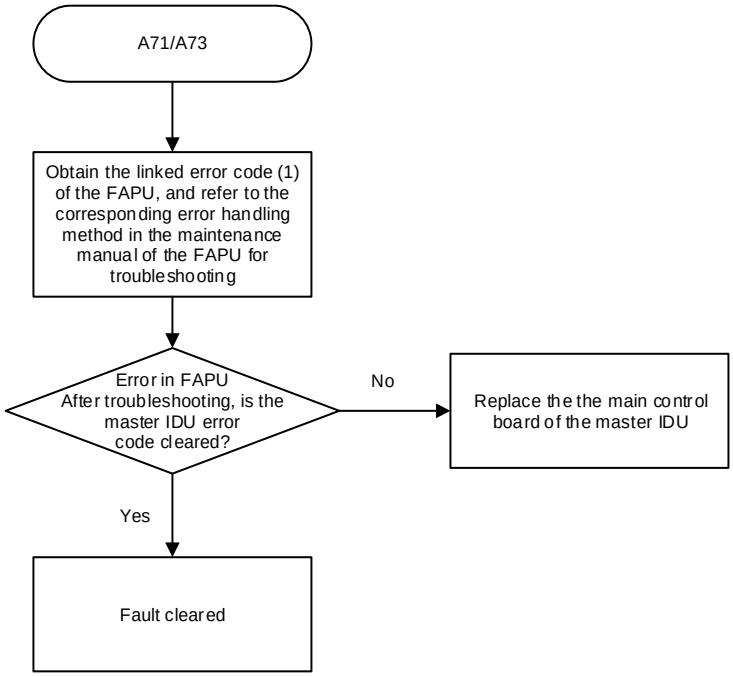
Note:
1. The error code can be queried after the humidifying IDU is connected to the wired controller or the display box.</td></tr>
</table>

1.1.6 A73 - The error of the linked FAPU is transmitted to the master IDU (non-series connection)

Note:

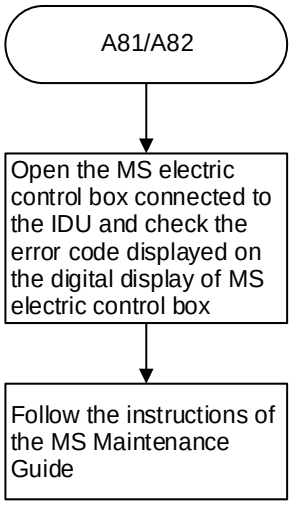
1) The type of FAPU may be HRV, VRF fresh air IDU and so on.

2) Series setting: The linked FAPU and the master IDU are connected to the air supply duct and air return duct respectively and separately. A wired controller is used to set this installation method as a non-series connection.

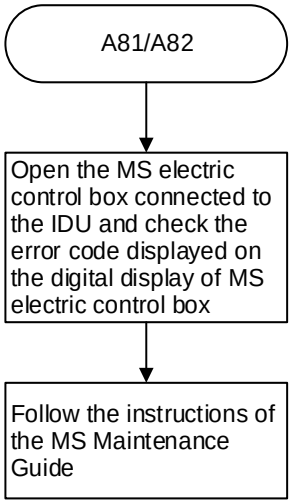
<table>
<tr><td rowspan="3">Error display</td><td>Digital display</td><td colspan="2">Display position (master IDU)</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Spot check interface query</td><td>Error code is not displayed</td></tr>
<tr><td>Error impact</td><td colspan="3">Master IDU: operates normally. FAPU: stops. Other IDUs of the same system: operate normally.
ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="3">The error of the linked FAPU is transmitted to the master IDU</td></tr>
<tr><td>Error recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="3">■ The FAPU is faulty.
■ The master IDU's main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3"> 

Note:
1. The error code can be queried after the FAPU is connected to the wired controller or the display box.</td></tr>
</table>

1.1.7 A81 - Self-check fault

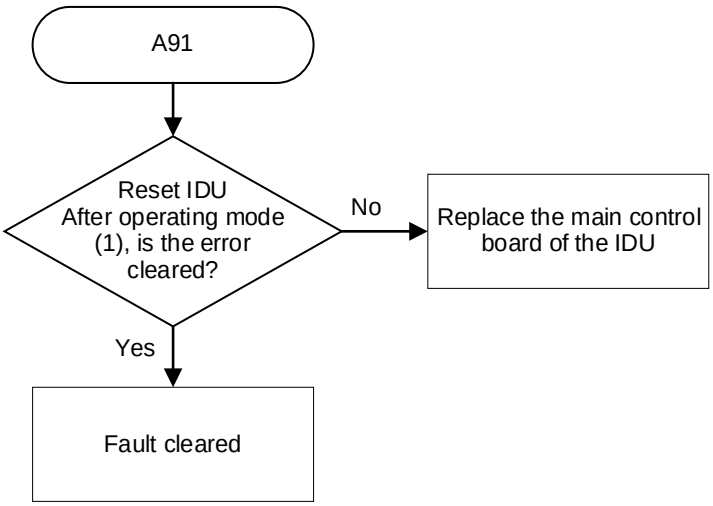
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	Faulty IDU: stops. Other IDUs of the same system: ■ IDUs that share the same MS with the faulty IDU will stop operating, while other IDUs remain in operation. ■ IDUs that share the same MS with the faulty IDU display the code "A81" (V6 platform IDU displays the code "U4"). Meaning of the code: MS self-check fault); IDUs that are connected to other MSs work properly.	
	ODU of the same system: ■ stops. ■ V8 platform ODU displays the code "A81", and V6 platform ODU displays the code "U4". Meaning of the code: MS self-check fault)	
Error trigger	The MS self-check fault lasts for at least 10 min	
Error recovery	The fault is cleared if one of the following conditions is met: ■ Automatic recovery 30 min after the MS fault is cleared ■ Power on again	
Possible cause	■ A fault may occur during the MS self-check process.	
Troubleshooting		

1.1.8 A82 - MS (refrigerant flow direction switching device) fault

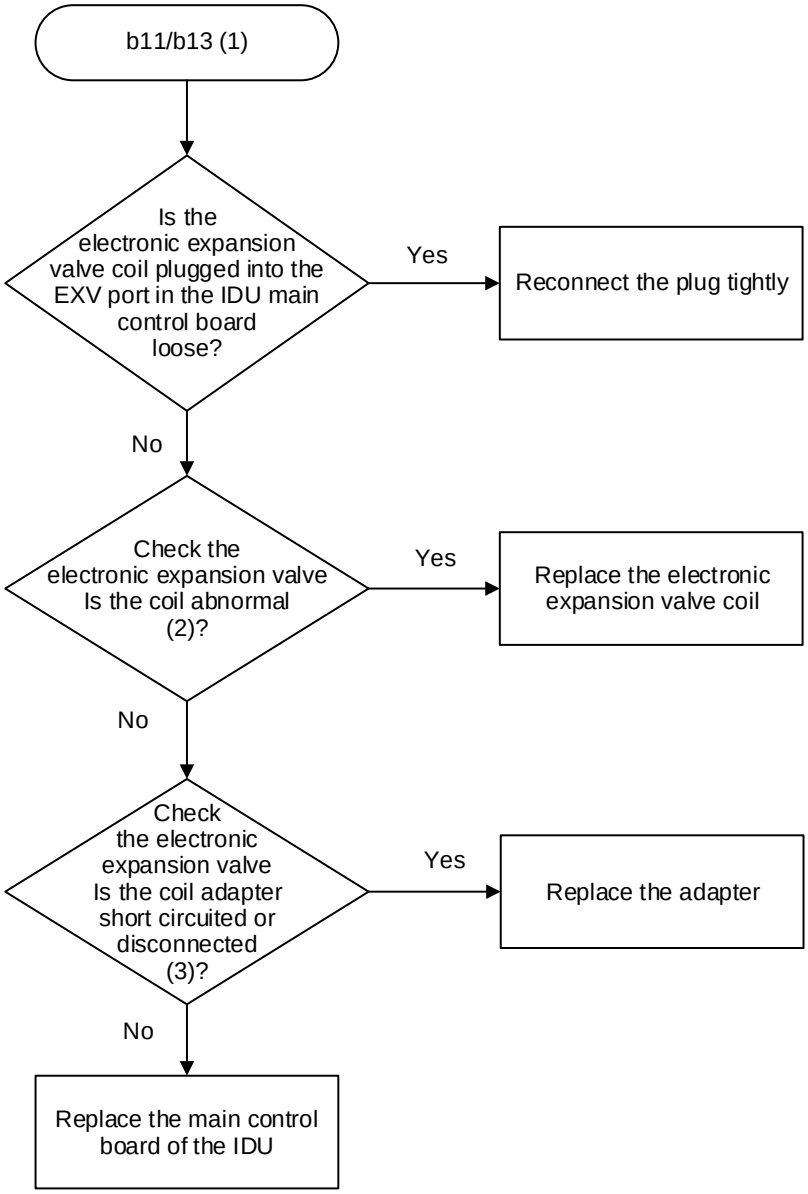
Faulty IDU	Digital display	Display position
		Panel, display box, and wired controller
Error impact	Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: ■ IDUs that share the same MS with the faulty IDU: The fan continues running, and the EEV is closed. Other IDUs remain in operation. ■ IDUs that share the same MS with the faulty IDU: V8 platform IDU displays the code "A82", and V6 platform IDU displays the code "F8". Meaning of the code: MS fault. IDUs that are connected to other MSs work properly.	
	ODU of the same system: ■ Shutdown ■ V8 platform ODU displays the code "A82" (V6 platform ODU displays the code "F8". Meaning of the code: MS fault)	
Error trigger	When the IDU receives a fault signal from MS	
Error recovery	Automatic recovery (Note: Duration from fault triggering to automatic recovery is at least 30 min)	
Possible cause	The MS is faulty.	
Troubleshooting		

1.1.9 A91 - Mode conflict (V6 communication protocol adopted)

Available when using V6 platform wired controller.

Error display	Digital display	Display position
		Panel, display box, and wired controller (Note: Error codes are displayed 2 minutes after faults are triggered)
Error impact	Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	■ The ODU is running in heating mode, and the IDU is running in cooling mode or dehumidification mode. ■ The ODU is running in heating mode, and the IDU is running in fan mode (note: the wired controller can be used to set whether the heating mode conflicts with the fan mode). ■ The ODU is running in cooling mode, and the IDU is running in heating mode.	
Error recovery	Automatic recovery	
Possible cause	■ The operation mode of IDU conflicts with that of the ODU. ■ The IDU main control board is damaged.	
Troubleshooting	 Note: 1. For all IDUs in the heat pump system (Except for DC Fresh Air Processing Unit): 1) When the ODU is running in heating mode, the IDU can only operate in heating mode. If you would like to use the fan mode for the IDU, the wired controller needs to be used to change the settings (for more instructions on how to change settings, refer to "Instruction for Use of the wired controller"). 2) When the ODU is running in cooling mode, the IDU can operate in cooling mode or fan mode.	

1.1.10 b11, b13 - Error in 1# electronic expansion valve coil, error in 2# electronic expansion valve coil

Error display	Digital display		Display position
			Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	The IDU main control board cannot detect the feedback signal from the electronic expansion valve coil for no less than 4 seconds.		
Error recovery	After the unit is powered on again, the main control program detects a feedback signal from the electronic expansion valve.		
Possible cause	■ The electronic expansion valve coil plugged into the EEV port in the IDU main control board is loose. ■ The IDU main control board is damaged. ■ The electronic expansion valve coil is faulty. ■ The electronic expansion valve coil is short circuited or disconnected.		
Troubleshooting	 Note:		

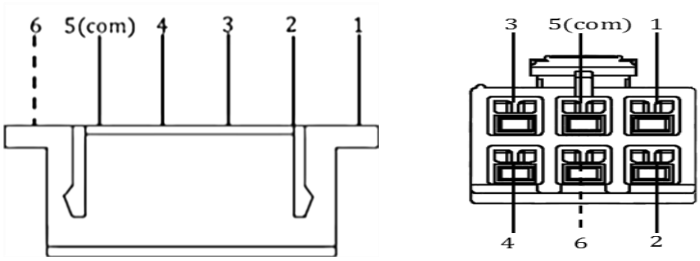
1. The error code corresponds to the following two situations:

a. If there is only one electronic expansion valve port on the main control board of the IDU, when an error occurs in the electronic expansion valve coil connected to the EEV port, the error code is b05.

b. If there are two electronic expansion valve ports on the main control board of the IDU named EEV1 and EEV2, when an error occurs in the electronic expansion valve coil connected to port EEV1, the error code is b05; when an error occurs in the electronic expansion valve coil connected to port EEV2, the error code is b07.

2. In Figure 1 below: The numbers 1 to 5 stand for the pins of different colours paired with individual wires which have the same colour as the pin. 5(com) is a pin of the common terminal, and number 6 is a null pin without any wire connected; an XHP coil plug is used to connect to the EEV port of the main control board, and an APM coil plug is used to connect to the A-direction plug of the adapter wire (see Figure 2 below). Table 1 shows the resistance between pin 1-4 and pin 5 (the common terminal) when the electronic expansion valve coil is in a normal state. If the resistance is near zero or significantly deviates from its normal state, the coil is damaged.

Figure 1: Electronic expansion valve coil plug illustration and pin sequence



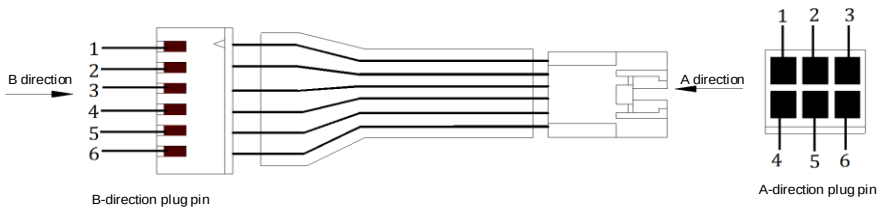
XHP plug	AMP plug

Table 1: Resistance between pins with an electronic expansion valve coil in normal condition

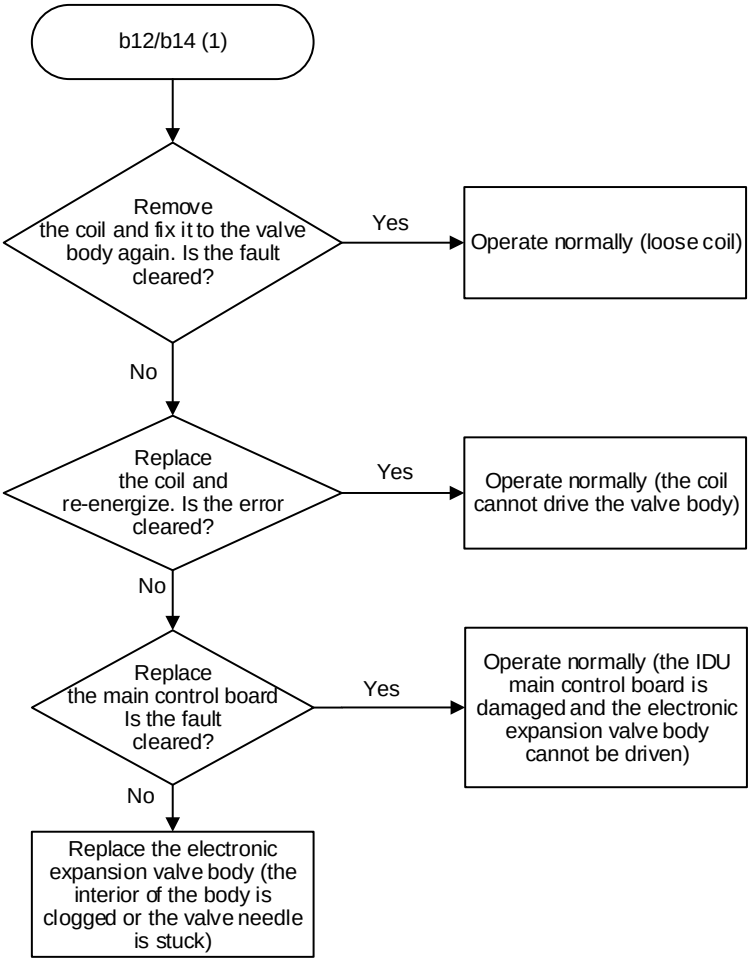
Pin measured	Resistance in normal status
1-5	40-50Ω
2-5	40-50Ω
3-5	40-50Ω
4-5	40-50Ω

3. When the distance between the throttle part and the main control board of the IDU in need of connection is too great, you will need an adapter wire for the electronic expansion valve coil. This is shown in Figure 2 below: Use a multimeter to measure the resistance between the pin in the plug at end A of each wire and at end B. A resistance value close to 0 indicates a short circuit has occurred in the wire, and a resistance value close to infinity indicates an open circuit of the wire.

Figure 2: Adapter wire for electronic expansion valve coil

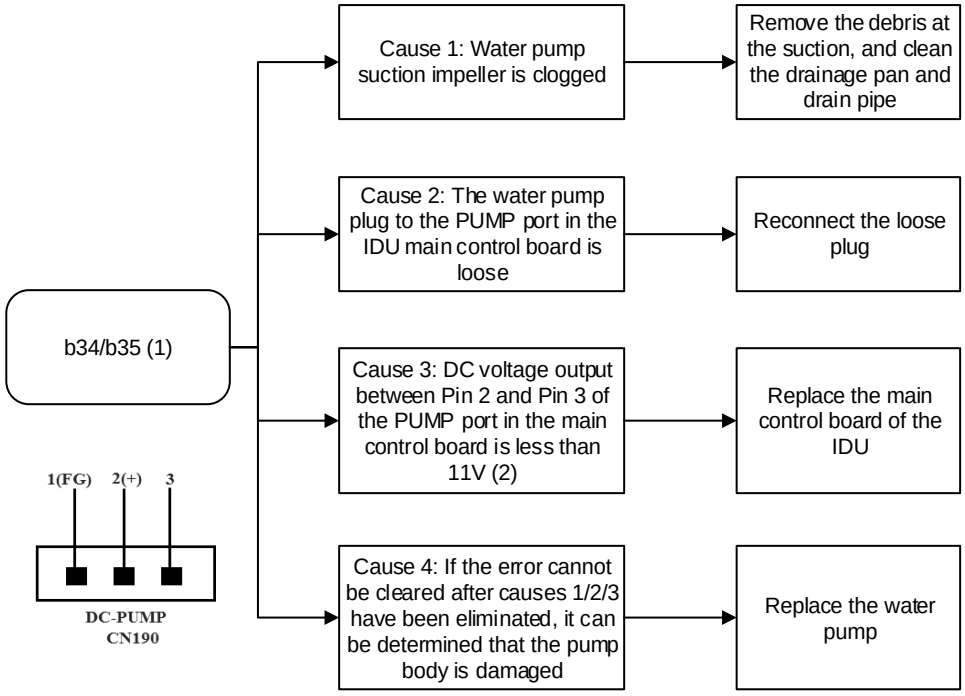


1.1.11 b12, b14 - Error in 1# electronic expansion valve body, error in 2# electronic expansion valve body

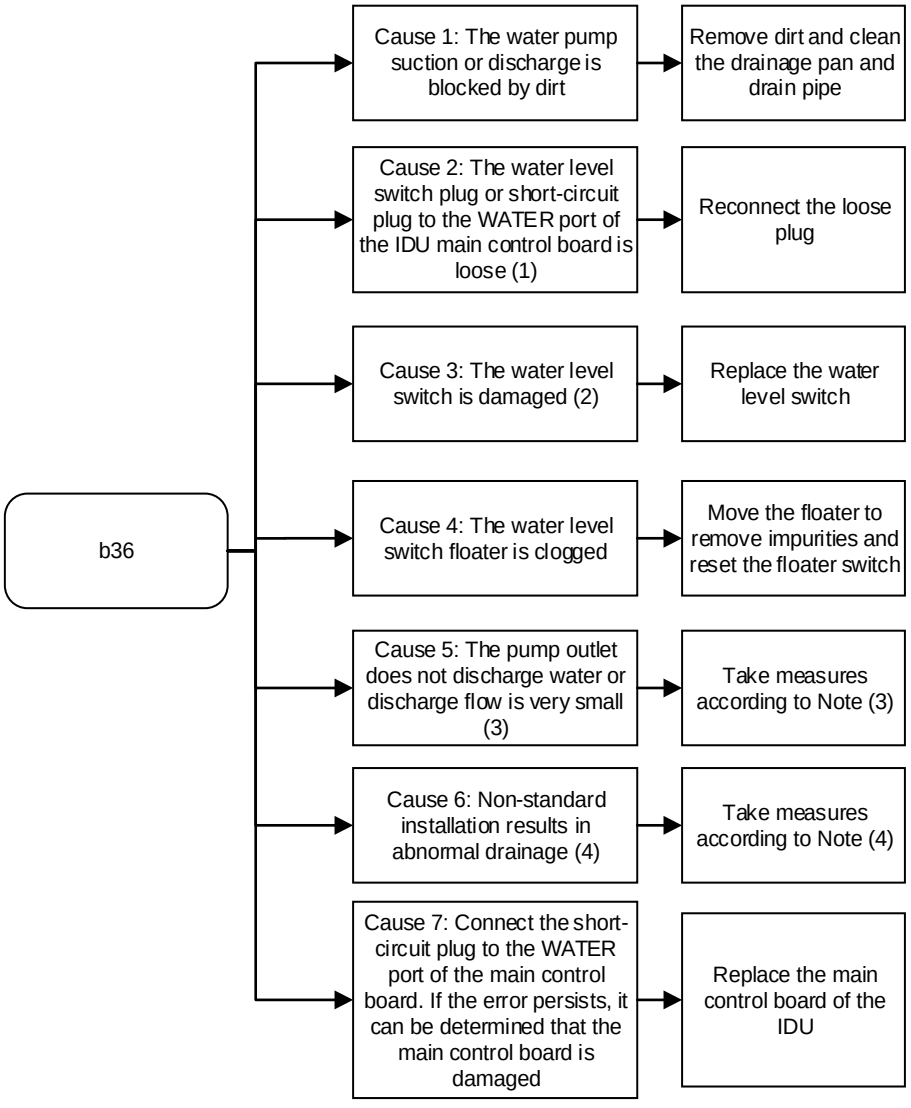
<table>
<tr><td rowspan="3">Error display</td><td colspan="2">Digital display</td><td colspan="2">Display position</td></tr>
<tr><td rowspan="2">  </td><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Spot check interface query</td><td>Error code is not displayed</td></tr>
<tr><td>Error impact</td><td colspan="4">The faulty IDU and other IDUs of the same system: operate normally.
ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="4">■ Return air temperature(T1) - Heat exchanger liquid pipe temperature (T2A) > Set value
■ IDU EEV=0, ODU running in cooling mode and compressor speed ≠0</td></tr>
<tr><td>Error recovery</td><td colspan="4">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="4">■ The electronic expansion valve needle is stuck or clogged.
■ The electronic expansion valve coil is damaged and unable to drive the valve body.
■ The IDU main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="4"> 

Note:
1. The error code corresponds to the following two situations:
1) If there is only one electronic expansion valve port on the main control board of the IDU, when an internal leakage error occurs in the electronic expansion valve body connected to the EEV port, the error code is b12.
2) If there are two electronic expansion valve ports on the main control board of the IDU named EEV1 and EEV2, when there is a leak inside the electronic expansion valve body connected to port EEV1, the error code is b12; when there is a leak inside the electronic expansion valve body connected to port EEV2, the error code is b14.</td></tr>
</table>

1.1.12 b34, b35 - Stall protection for 1# water pump, stall protection on 2# water pump

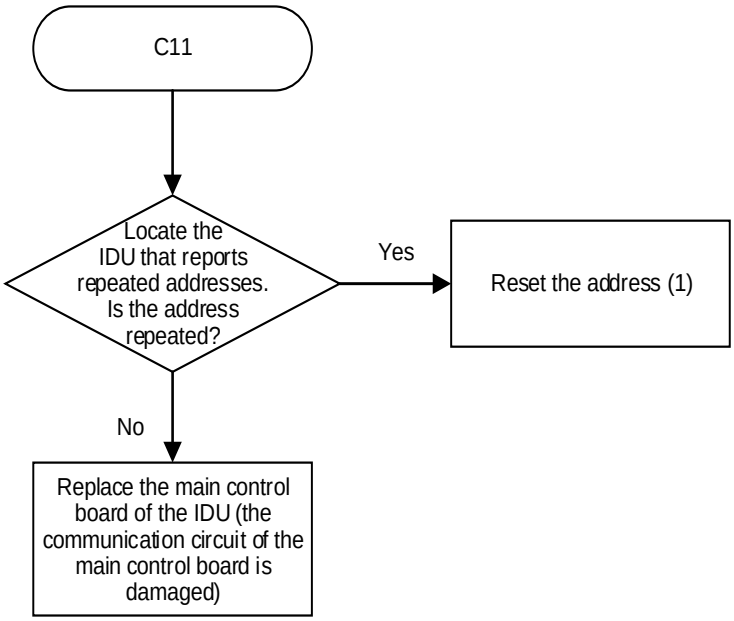
Error display	Digital display	Display position
	 	Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	The main control board of the IDU detects the pump rotation speed ≤ 100 rpm for 10 seconds	
Error recovery	Automatic recovery	
Possible cause	■ The water pump suction impeller is clogged. ■ The water pump plug to the PUMP port in the IDU main control board is loose. ■ The pump body is damaged (due to motor damage, control drive circuit damage, etc.). ■ The IDU main control board is damaged.	
Troubleshooting	 Note: 1. The error code corresponds to the following two situations: 1) If there is only one PUMP port on the main control board of the IDU, when a stall error occurs in the water pump connected to the PUMP port, the error code is b34. 2) If there are two PUMP ports on the main control board of the IDU named PUMP1 and PUMP2, when a stall error occurs in the water pump connected to PUMP1 port, the error code is b34; when a stall error occurs in the water pump connected to PUMP2 port, the error code is b35. 2. Figure 1 above shows the pins of the PUMP port. The output voltage between pin 2 and pin 3 can be measured with a multimeter in DC voltage gear. If the output voltage is less than 11 V, the water pump cannot be driven.	

1.1.13 b36 - Water level switch alarm error

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	The water level switch alarm is triggered when the floater of the water level switch rises to the warning water level and lasts for 5 min.	
Error recovery	Automatic recovery	
Possible cause	■ The drain pump/water level switch is damaged. ■ Water level switch float is stuck by a foreign object ■ The water level switch plug or short-circuit plug to the WATER port of the IDU main control board is loose. ■ Non-standard installation results in abnormal drainage: The drain pipe is blocked; the improperly sloped drain pipe causes the condensate water to flow backwards; and the lift of the drain pipe exceeds the allowable value. ■ The IDU main control board is damaged.	
Troubleshooting	 Note:	

	1. The plug attached to the WATER port of the main control board corresponds to the following two cases: a. The factory default of IDUs without a water level switch uses a short-circuit plug to seal the WATER port. b. IDUs with a water level switch use a water level switch plug to seal the WATER port. 2. Use a multimeter to measure the resistance between the pins corresponding to the two wires of the water level switch plug. 1) After the floater of the water level switch is moved upwards to the highest position, the water level switch is in a short-circuited state, and the resistance value is infinite. 2) After the floater of the water level switch is moved downwards to the lowest position, the water level switch is closed, and the resistance value is less than 1 Ω. If the detected resistance value does not meet the above values, the water level switch is damaged. 3. Possible causes and solutions for the situation where the pump outlet does not discharge water or the discharge flow is very small: 1) The water pump plug to the PUMP port in the IDU main control board is loose. Reconnect it firmly. 2) The drain pump suction impeller is clogged. Remove the debris causing the clog to make the pump continue running. 3) If the error cannot be cleared after implementing solutions for causes 1) and 2), the drain pump body is damaged. Replace the drain pump. 4. Possible causes and solutions for abnormal drainage due to non-standard installation: 1) If the drain pipe is blocked, remove the debris and clean the drainage pan and the drain pipe of the IDU. 2) If the drain pipe is improperly installed, which causes the condensate water to flow backward, tilt the IDU to the drainage side by a certain gradient (inclination ≥ 1%). The centralized drain pipe must be lower than the drainage outlet of the unit. Air outlets must be placed at the highest horizontal pipeline (see Installation and Operation Manual of IDUs). 3) If the lift of the drain pipe exceeds the allowable value, reduce the vertical height of the drain pipe or replace the drain pump with the one which has a higher lift.

1.1.14 C11 - Duplicate IDU address code

<table>
<tr><td rowspan="3">Error display</td><td>Digital display</td><td colspan="2">Display position</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Error code and address code are displayed alternately (2)</td><td>Error code and address code flash simultaneously</td></tr>
<tr><td>Error impact</td><td colspan="3">Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: The fan continues running, the EEV is closed, and error code "A51" is displayed (V6 platform IDU displays the code "Ed"). Meaning of the code: ODU fault
ODU of the same system:
■ Stop.
■ Error code "C26" is displayed (V6 platform ODU displays the code "H7"). Meaning of the code: IDU qty decrease fault</td></tr>
<tr><td>Error trigger</td><td colspan="3">Repeated address codes for IDU</td></tr>
<tr><td>Error recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="3">■ Duplicate IDU address code（▲）
■ The IDU main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3"> 

(▲): The common reasons for address code duplication are as follows:
1. After replacing the main control board, the address was not reset, resulting in address duplication. The address can be manually set using the controller or the indoor unit address can be cleared at the outdoor unit and then automatically addressed again.
2. In systems where the nominal capacity of an indoor unit is greater than or equal to 20KW, the indoor unit usually occupies more than two addresses (one real address + several virtual addresses, see Note 1 below), which may cause the addresses of other indoor units in the system to duplicate with the virtual addresses of the large indoor unit. In this case, the indoor unit address can be cleared at the outdoor unit and then automatically addressed again, or the controller can be used to manually set the address to avoid duplicate codes when the duplicate address code is known.
Note:</td></tr>
</table>

1. The following table shows the number of addresses and address codes for any indoor unit (AHU kit/direct expansion unit not applicable) with different capacities (HP)

Nominal capacity (kW)	capacity (HP)	Number of IDUs (N)	Number of addresses (N)	Address code	Address code to be queried at the centralized controller or wired controller (★)
kW<20	HP<7	1	1	Address code can be any integer from 0 to 63, denoted by X	X
20≤kW<40	7≤HP<14	1	2	The address code can be any integer from 0 to 62, denoted by X, and the virtual address following it is X+1	X
40≤kW<78.5	14≤HP<28	1	4	The address code can be any integer from 0 to 60, denoted by X, and the virtual addresses following it are: X+1, X+2, X+3	X
78.5≤kW<101	28≤HP<36	1	5	The address code can be any integer from 0 to 59, denoted by X, and the virtual addresses following it are: X+1, X+2, X+3, X+4	X
101≤kW<112	36≤HP<40	1	6	The address code can be any integer from 0 to 58, denoted by X, and the virtual addresses following it are: X+1, X+2, X+3, X+4, X+5	X
kW>112	HP>40	1	8	The address code can be any integer from 0 to 56, denoted by X, and the virtual addresses following it are: X+1, X+2, X+3, X+4, X+5, X+6, X+7	X

★Example: If one IDU is 5 HP and the address code is set to 1, then the query address at the centralized

controller side or wired controller side is 1. If one IDU is 20 HP and the address code is set to 5, then this IDU has four address codes, which are 5, 6, 7, and 8, but the query address at the centralized controller side or wired controller side is 5.

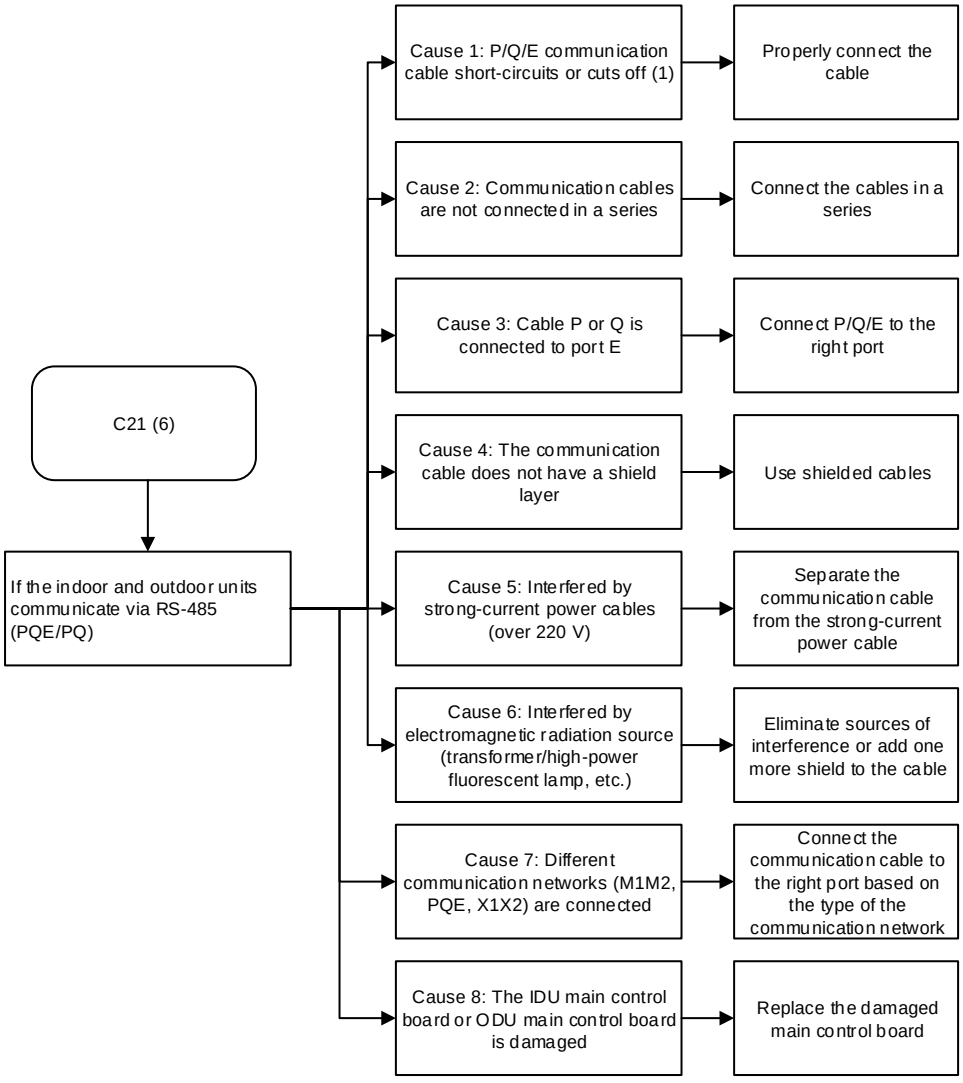
2. Repeated display of address codes and confirmation of repeated address codes

	Error code	Display box/panel	Wired controller
IDU with repeated address codes (number of addresses N = 1)	C11	Error code "C11" and address code are displayed alternately every 1s (★1)	Error code "C11" is displayed
IDU with repeated address codes (number of addresses N>1)	C11	If the number of repeated address codes is 1, then the error code "C11" is displayed alternately with the minimum address code every 1s. If the number of repeated address codes is >1, then the error code "C11" is displayed alternately with the minimum address code every 1s; (★2)	Error code "C11" is displayed

★ Example 1: If IDU 1 is 5 HP and the address code is set to 1, and IDU 2 is 5 HP and the address code is set to 1 too, then the display box or panel of IDU 1 and IDU 2 will alternately display the code C11 and the address code 1.

★Example 2: If IDU 1 is 20 HP and the address code is set to 1 (the addresses actually occupied are 1, 2, 3, and 4), IDU 2 is 5 HP and the address code is set to 2, IDU 3 is 5 HP and the address code is set to 3, then the display box or panel of IDU 1 will alternately display the code C11 and the address code 2 (If there are multiple repeated addresses, then the minimum address code is displayed); the display box or panel of IDU 2 will alternately display the code C11 and the address code 2; and the display box or panel of IDU 3 will alternately display the code C11 and the address code 3.

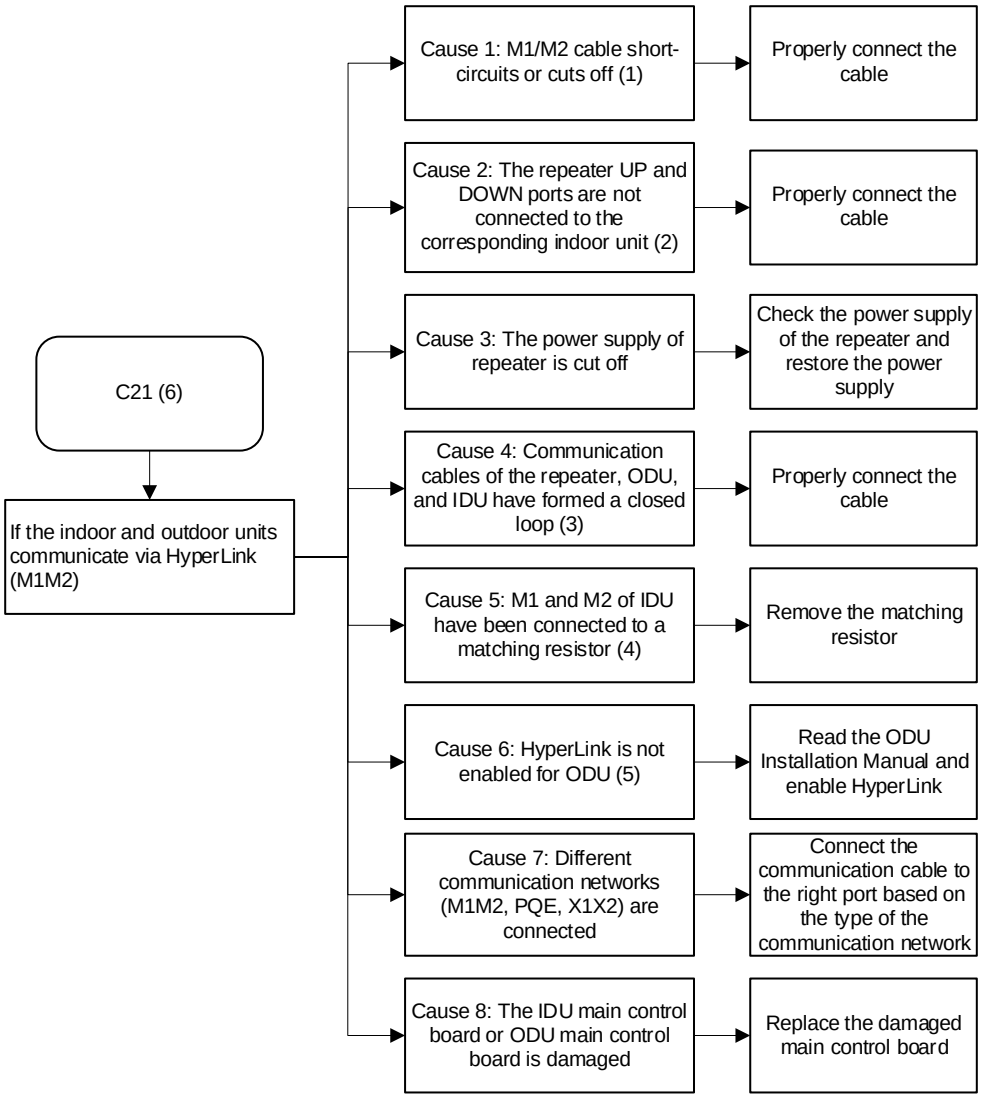
1.1.15 C21 - Abnormal communication between IDU and ODU

<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: The fan continues running, the EEV is closed, and error code "A51" is displayed (V6 platform IDU displays the code "Ed"). Meaning of the code: ODU fault</td></tr>
<tr><td colspan="2">ODU of the same system:
■ stops.
■ Error code "C26" is displayed (V6 platform ODU displays the code "H7"). Meaning of the code: IDU qty decrease fault</td></tr>
<tr><td>Error trigger</td><td colspan="2">If the IDU has not received any communication signal from ODU for 2 min</td></tr>
<tr><td>Error recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">See the Troubleshooting section.</td></tr>
<tr><td>Troubleshooting</td><td colspan="2">■ If the indoor and outdoor units communicate via RS-485(PQE/PQ):
 

Note 1: If you measure the resistance between ports P, Q, and E of the IDU main control board, normally the resistance between P and Q is 120 Ω, the resistance between P and E is infinite, and the resistance between Q and E is infinite.</td></tr>
</table>

Troubleshooting

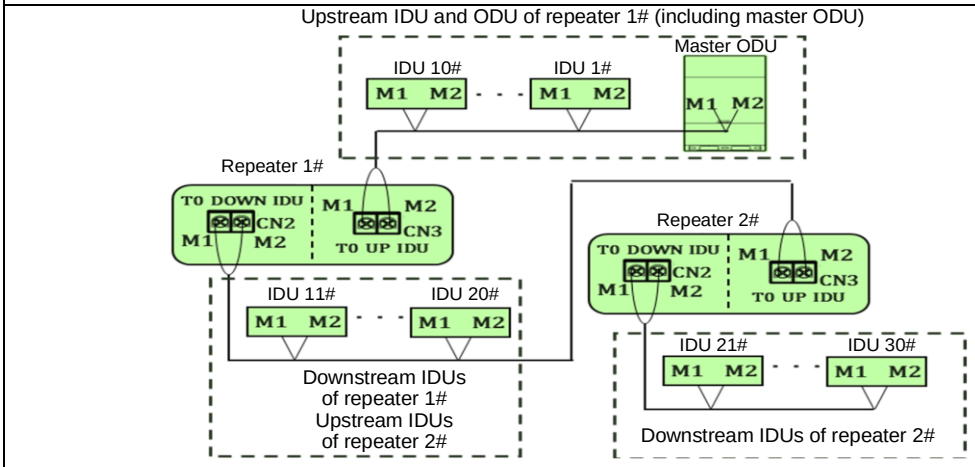
■ If the indoor and outdoor units communicate via HyperLink (M1M2):



Note:

1. If you measure the resistance between terminal blocks M1 and M2 of the IDU main control board, normally this resistance is greater than 1 MΩ.
2. Figure 1 shows the schematic diagram of HyperLink communication line connection. The connection of repeater wires must comply with the following requirements. Otherwise, an IDU communication fault may occur.

Figure 1 Schematic diagram of HyperLink communication cable connection



1) The UP communication port of 1# repeater is connected to the communication port of 10# IDU, and the DOWN communication port of 1# repeater is connected to the communication port of 11# IDU.

2) The UP communication port of 2# repeater is connected to the communication port of 20# IDU, and the DOWN communication port of 2# repeater is connected to the communication port of 21# IDU.

3) For each repeater added, 10 IDUs and 200 m communication distance can be added. A refrigerant system allows the addition of a maximum of 2 repeaters and can connect to up to 30 IDUs. If more than 30 IDUs are connected, please allocate separate refrigerant systems.

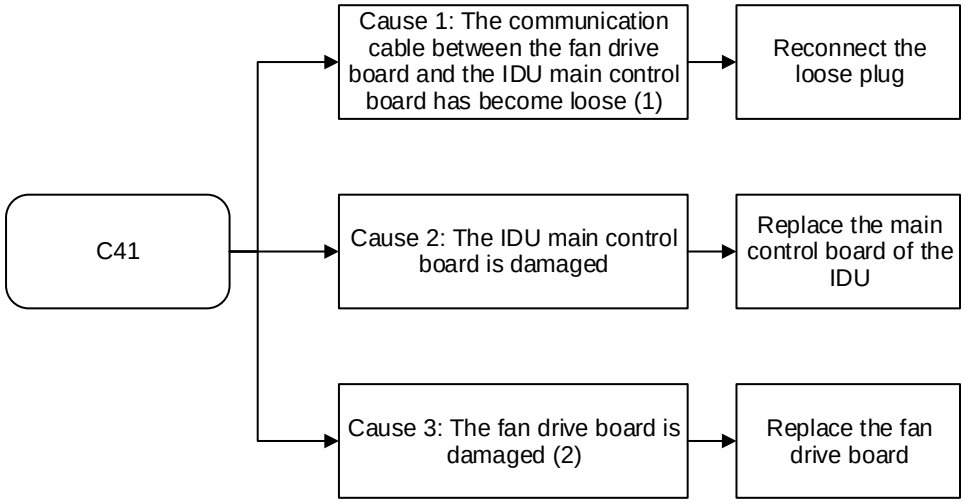
3. If communication cables connecting the communication ports of the repeater, IDU and ODU form a closed loop, it will cause a communication fault.

4. RS-485 communication cables must be connected hand in hand. If communication is unstable, a matching resistor needs to be added to the last IDU on the PQ (in the accessory bag of the ODU). However, a matching resistor should not be added between M1 and M2. Otherwise, a communication fault may occur.

5. To select the communication mode HyperLink (M1M2), users must go to the ODU menu item to change the mode (For the setting method, refer to the ODU Installation Manual). Otherwise, communication faults may occur.

6. The V8 platform ODU typically uses the V8 communication protocol. If there are any IDUs that use a non-V8 platform, users must go to the ODU menu item to change the communication protocol (Please refer to the ODU Installation Manual for setup instructions). Otherwise, these IDUs will display communication fault codes (For the code number, please refer to the IDU wiring nameplate).

1.1.16 C41 - Abnormal communication between IDU main control board and fan drive board

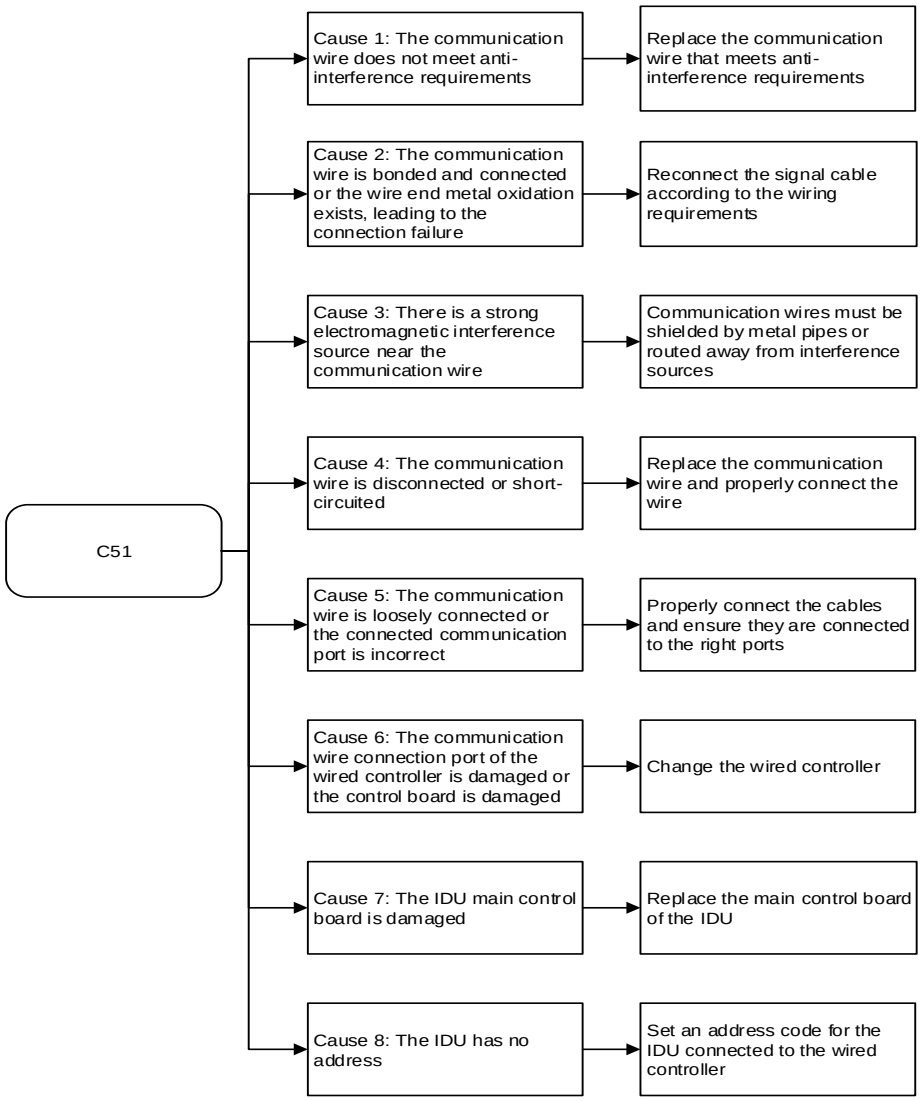
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with the fan drive board for 2 min (3)	
Error recovery	Automatic recovery	
Possible cause	■ The fan drive board is damaged. ■ The IDU main control board is damaged. ■ The communication cable between the fan drive board and the IDU main control board has become loose.	
Troubleshooting	 Note: 1. Communication cables are only provided for units whose fan drive board is independent of the IDU main control board. 2. For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

1.1.17 C51: communication exception between the IDU and wired controller

Note: The error code C51 can be triggered either at the IDU side or the wired controller side.

<table>
<tr><td rowspan="3">Fault Display</td><td>LED display</td><td>Display position</td></tr>
<tr><td rowspan="2">  </td><td>If a powered-on IDU does not receive any message from the wired controller: 1) Wired controller: "C51" is displayed; 2) Panel or display box: The LED display and the error code bit on the inspection interface are displayed normally.</td></tr>
<tr><td>If a powered-on IDU receives any message from the wired controller: 1) Wired controller: "C51" is displayed; 2) Panel or display box: The LED display is normal, and "C51" is displayed in the error code bit on the inspection interface.</td></tr>
<tr><td rowspan="2">Fault Impact</td><td colspan="2">■ Triggered at the IDU side: The faulty IDU and other IDUs of the same system operate normally.
■ Triggered at the wired controller side: The wired controller is unavailable.</td></tr>
<tr><td colspan="2">ODU of the same system operates normally.</td></tr>
<tr><td>Fault Trigger</td><td colspan="2">■ Triggered at the IDU side: The IDU main control board experiences a two-minute communication interruption with the wired controller.
■ Triggered at the wired controller side: The wired controller has not received any reply from the IDU main control board for one continuous minute.</td></tr>
<tr><td>Fault Recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible Cause</td><td colspan="2">■ The wired controller is damaged.
■ The IDU main control board is damaged.
■ Communication wires are loose or the communication port is faulty.
■ Communication wires have short-circuited or been cut off.
■ The communication wire does not meet anti-interference requirements or is affected by strong-current interference.
■ IDU has no address.</td></tr>
</table>

Troubleshooting

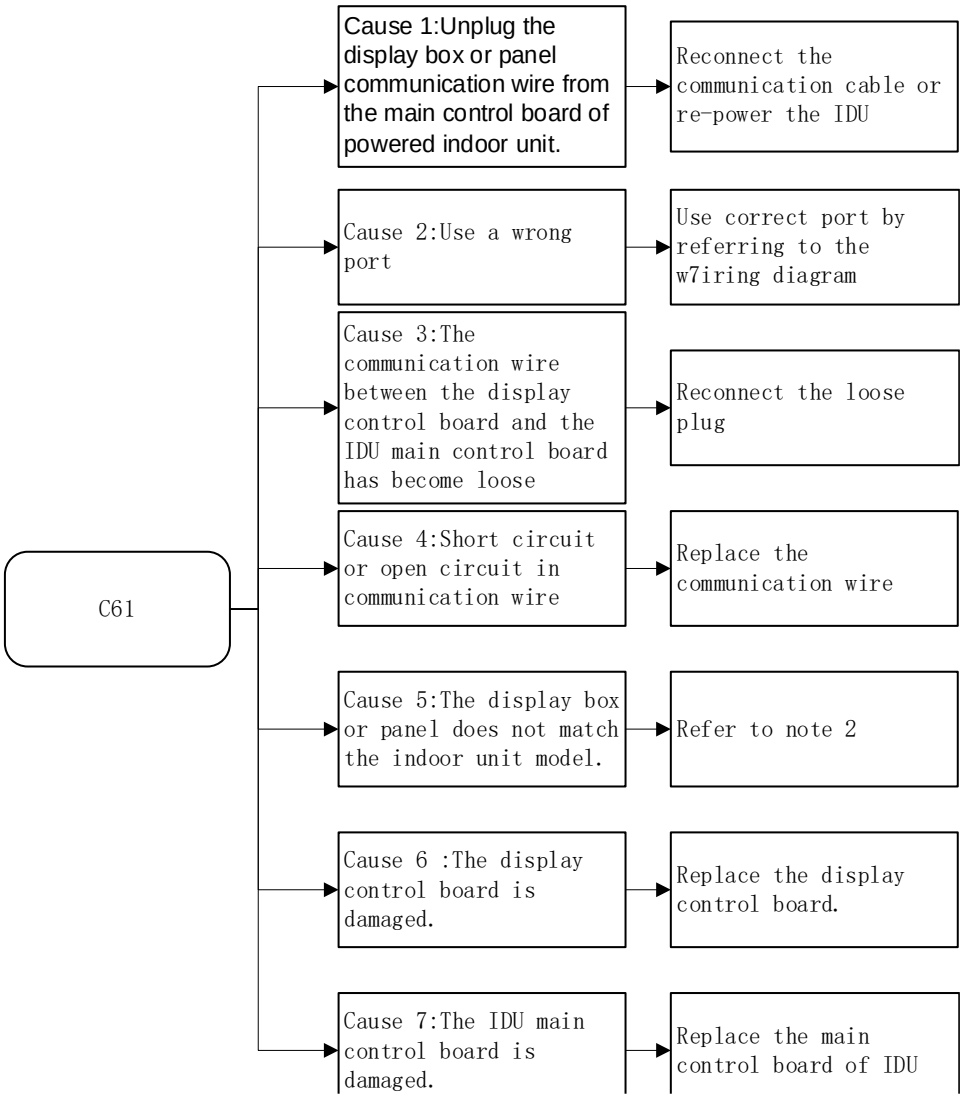


1.1.18 C61 - Abnormal communication between the IDU main control board and display control board

Note: The error code C61 can be triggered either at the IDU side or at the panel or display box side.

Error display	Digital display	Display position
		After power on, normal communication was not established between the indoor unit and the wired controller: 1) The wired controller does not display fault code; 2) The panel or display box displays "C61".
		After power on, normal communication was established between the indoor unit and the wired controller: 1) The wired controller displays "C61"; 2) The panel or display box displays "C61".
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	■ Triggered at the IDU side: If the main control board of the IDU has been connected to the display board but has not communicated with the display board for 2 min; ■ Triggered at panel or display box side: If the display board has not received any reply from the main control board of an IDU for 1 min	
Error recovery	Automatic recovery	
Possible cause	■ Unplug the display box or panel communication wire from the main control board of powered indoor unit. ■ Use a wrong port to connect display control board and IDU main control board. ■ The communication wire between the display control board and the IDU main control board has become loose. ■ Short circuit or open circuit in communication wire ■ The display box or panel does not match the indoor unit model. ■ The display control board is damaged. ■ The IDU main control board is damaged.	

Troubleshooting

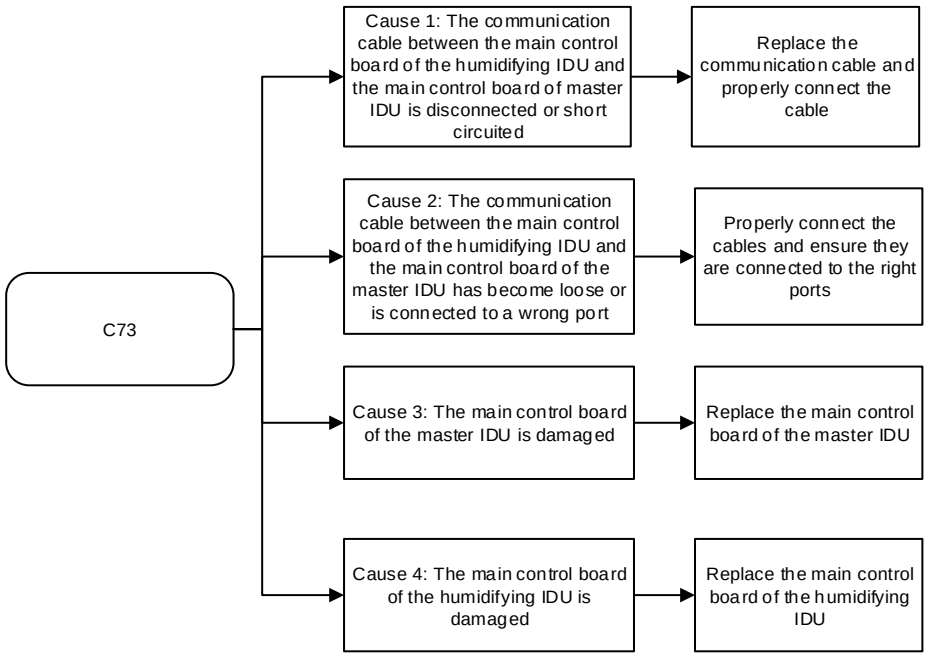


Note:

1. The control boards of display box and panel are uniformly named as display control board.

2. Check whether the model of display box and panel is correct and the type of the indoor unit main control board is set correctly

1.1.19 C73 - Abnormal communication between the linked humidifying IDU and master IDU

<table>
<tr><td rowspan="3">Error display</td><td>Digital display</td><td colspan="2">Display position (master IDU)</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Spot check interface query</td><td>Error code is not displayed</td></tr>
<tr><td>Error impact</td><td colspan="3">Master IDU: operates normally. Humidifying IDUs: stop. Other IDUs of the same system: operate normally.
ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="3">If the main control board of the master IDU has lost communication with the main control board of the humidifying IDU for 2 min</td></tr>
<tr><td>Error recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="3">■ The main control board of the humidifying IDU is damaged.
■ The master IDU's main control board is damaged.
■ Communication cables are loose or the communication port is faulty.
■ Communication cables have short-circuited or been cut off.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3"> 

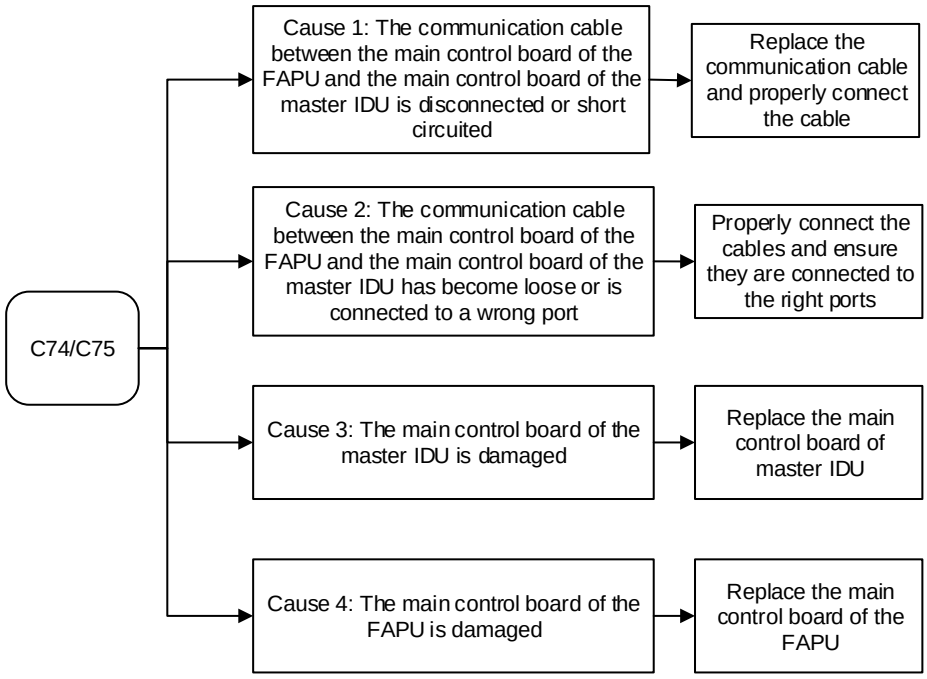
Note:
1. The error code can be queried after the humidifying IDU is connected to the wired controller or the display box.</td></tr>
</table>

1.1.20 C74 - Abnormal communication between the linked FAPU and master IDU (series setting)

Note:

1) The type of FAPU may be HRV, VRF fresh air IDU and so on.

2) Series setting: The air supply side of the linked FAPU is directly connected to the air return side of the master IDU through an air duct. A wired controller is used to set this installation method as a series connection.

<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position (master IDU)</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">The master IDU and the linked FAPU: stop. Other IDUs of the same system: operate normally.</td></tr>
<tr><td colspan="2">ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="2">If the main control board of the master IDU has lost communication with the main control board of the FAPU for 2 min</td></tr>
<tr><td>Error recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ The main control board of the FAPU is damaged.
■ The master IDU's main control board is damaged.
■ Communication cables are loose or the communication port is faulty.
■ Communication cables have short-circuited or been cut off.</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

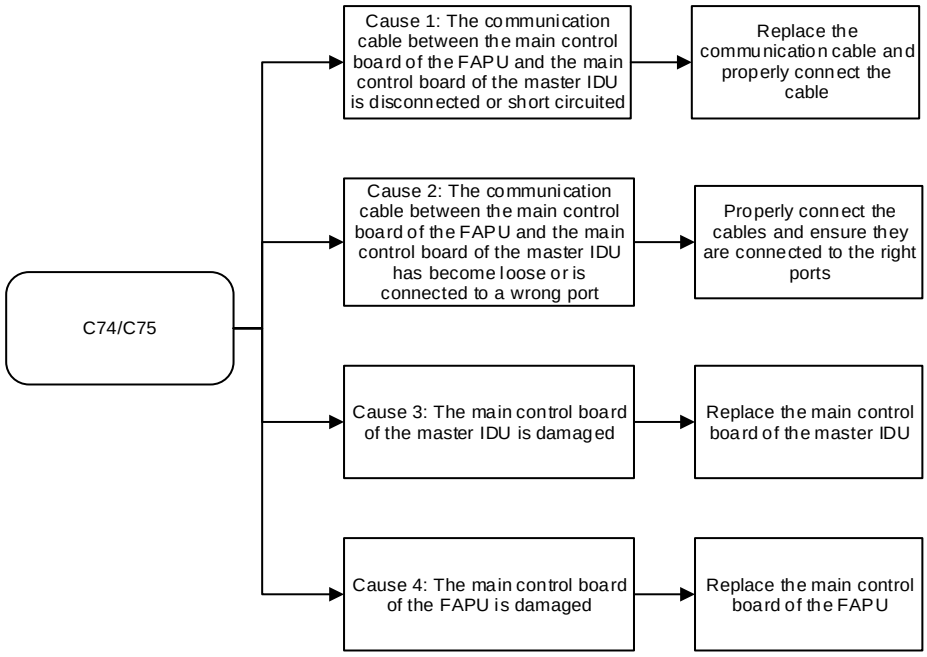
Note:
1. The error code can be queried after the FAPU is connected to the wired controller or the display box.</td></tr>
</table>

1.1.21 C75 - Communication fault between linked FAPU and master IDU (non-series setting)

Note:

1) The type of FAPU may be HRV, VRF fresh air IDU and so on.

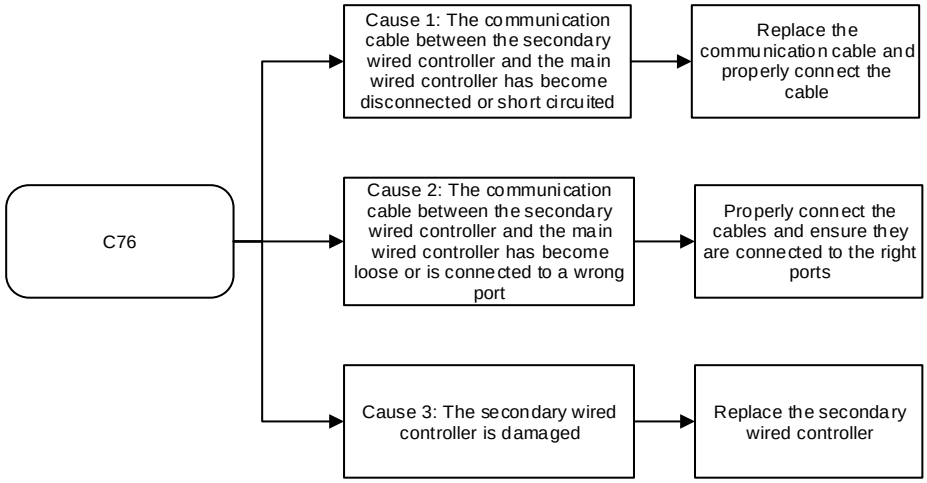
2) Series setting: The linked FAPU and the master IDU are connected to the air supply duct and air return duct respectively and separately. A wired controller is used to set this installation method as a non-series connection.

<table>
<tr><td rowspan="3">Error display</td><td>Digital display</td><td colspan="2">Display position (master IDU)</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Spot check interface query</td><td>Error code is not displayed</td></tr>
<tr><td>Error impact</td><td colspan="3">Master IDU: operates normally. FAPU: stops. Other IDUs of the same system: operate normally.
ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="3">If the main control board of the master IDU has lost communication with the main control board of the FAPU for 2 min</td></tr>
<tr><td>Error recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="3">■ The main control board of the FAPU is damaged.
■ The master IDU's main control board is damaged.
■ Communication cables are loose or the communication port is faulty.
■ Communication cables have short-circuited or been cut off.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3"> 

Note:
1. The error code can be queried after the FAPU is connected to the wired controller or the display box.</td></tr>
</table>

1.1.22 C76 - Abnormal communication between the main wired controller and secondary wired controller

Note: The error code C51 can be triggered either at the IDU side or at the wired controller side.

Error display	Digital display	Display position
		The error code "C76" is displayed only on the secondary wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally. The wired controller does not work.	
	ODU of the same system: operate normally.	
Error trigger	If the secondary wired controller has not received any reply from the main wired controller for 1 min	
Error recovery	Automatic recovery	
Possible cause	■ The secondary wired controller is damaged. ■ Communication cables are loose or the communication port is faulty. ■ Communication cables have short-circuited or been cut off.	
Troubleshooting		

1.1.23 C77, C78 - Abnormal communication between IDU main control board and 1# Expansion Board, abnormal communication between IDU main control board and 2# Expansion Board

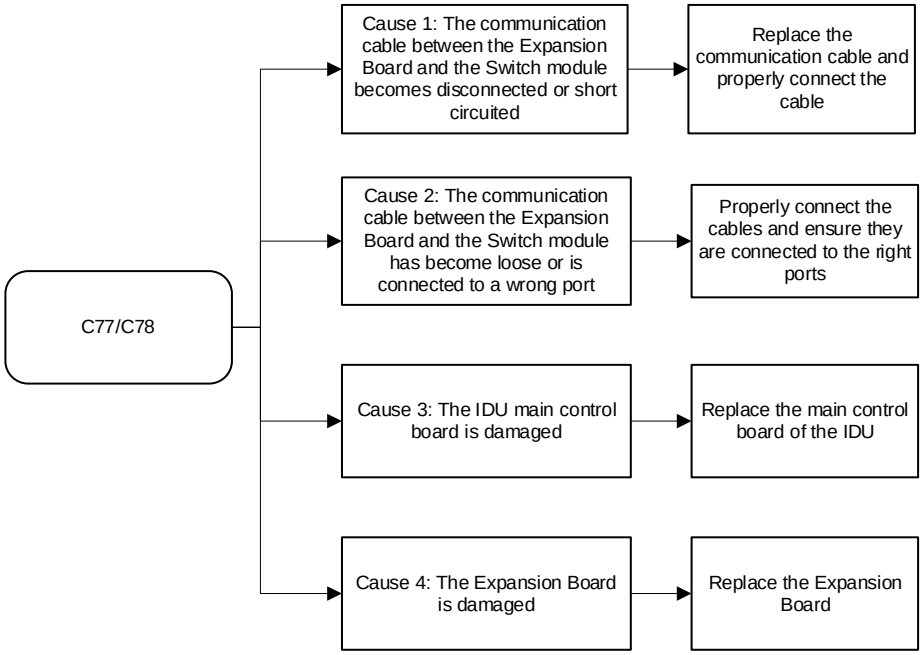
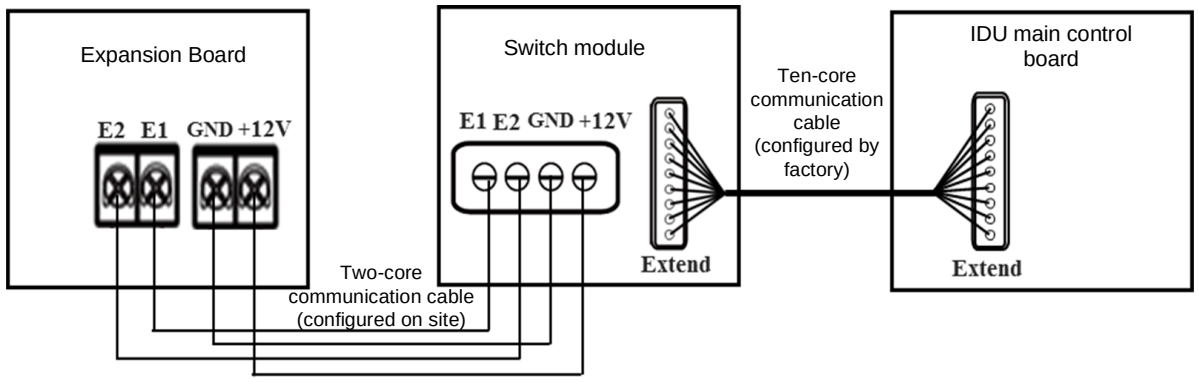
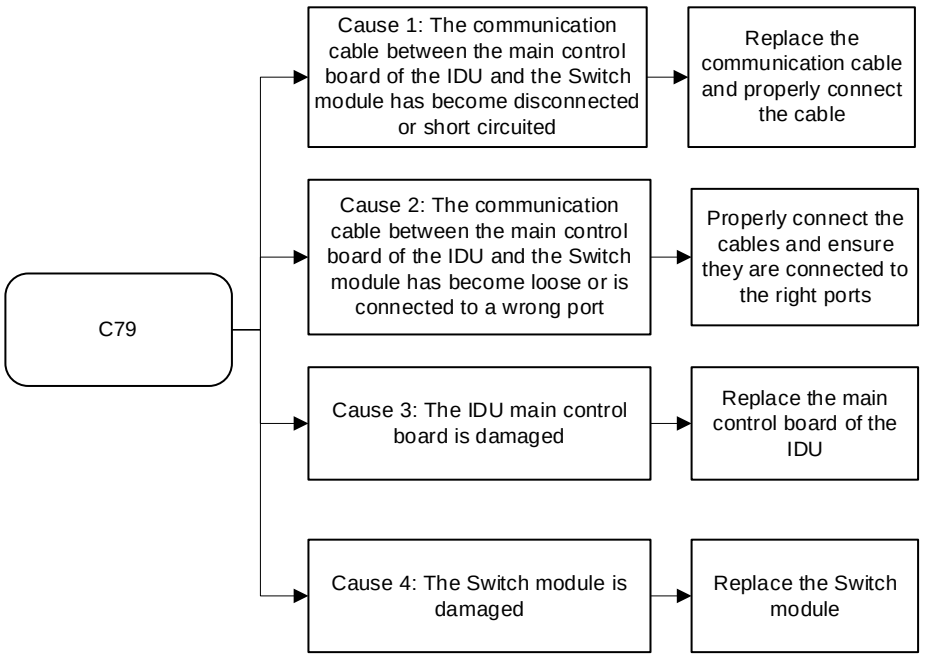
Error display	Digital display	Display position
	 	Panel, display box, and wired controller
Error impact	Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with 1# Expansion Board or 2# Expansion Board for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 Note: The main control board of the IDU cannot be directly connected to the Expansion Board. Instead, a Switch module has to be used. See Figure 1 below:	

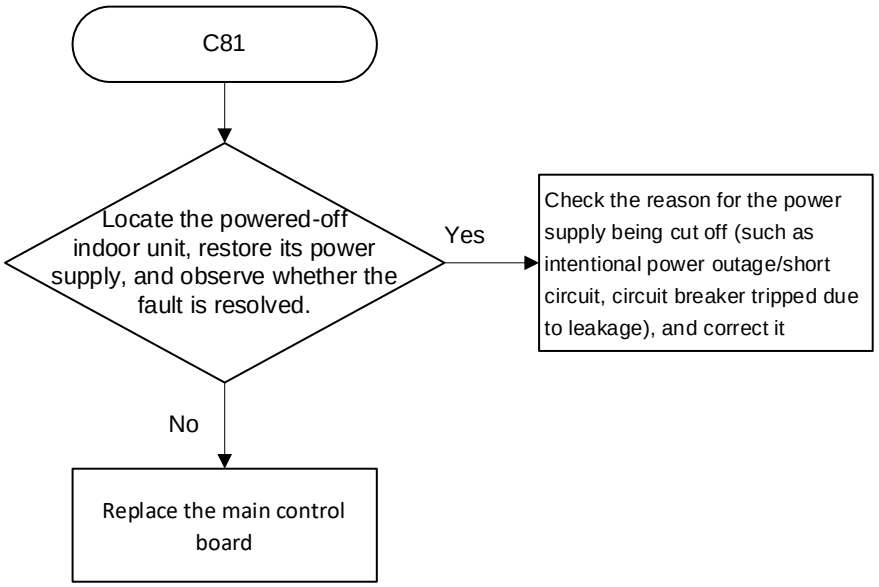
Figure 1 Wiring diagram of Expansion Board, Switch module, and IDU main control board



1.1.24 C79 - Abnormal communication between the IDU main control board and Switch module

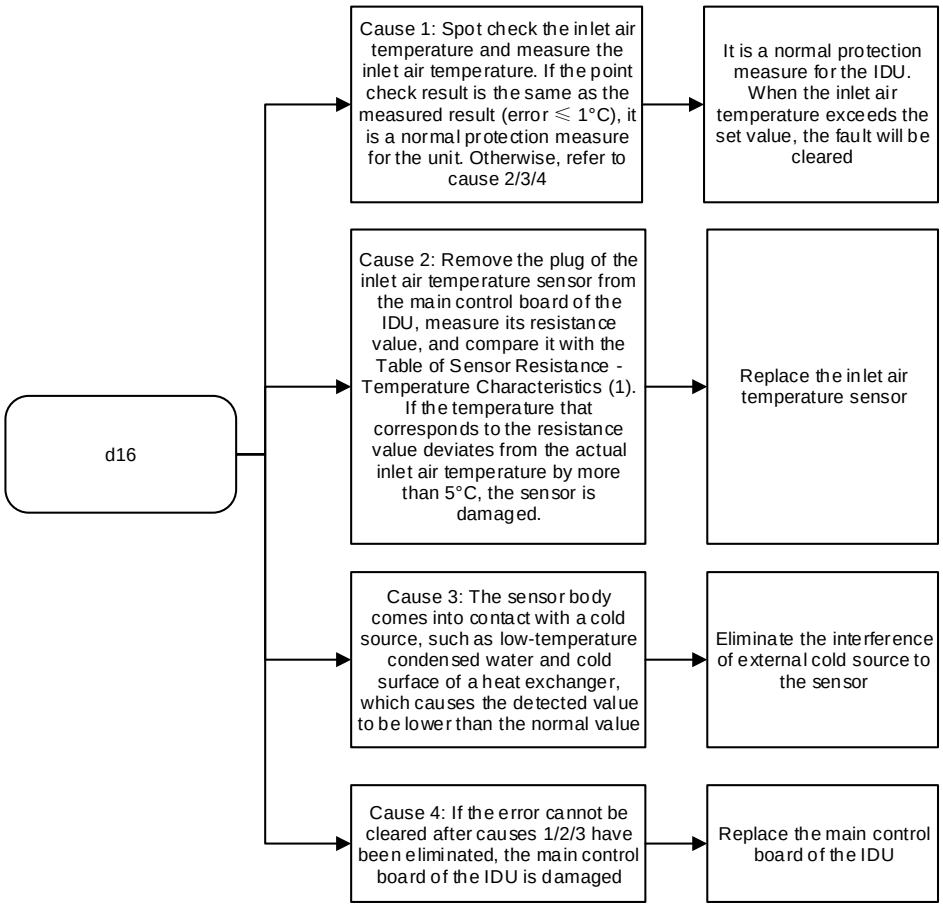
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with the Switch module for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting		

1.1.25 C81—The indoor unit is in a power-off state

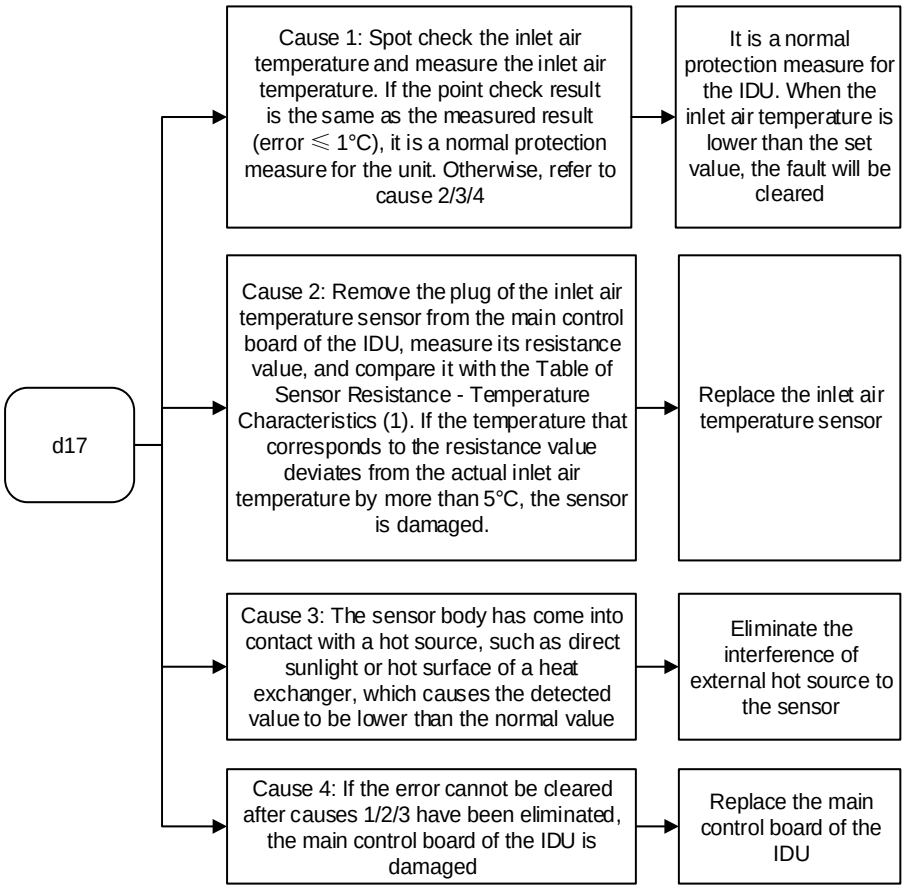
<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Central controller or various types of control terminal software</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">■ The faulty indoor unit and the panels, display boxes, and wired controllers connected to it will stop running, and the central controller or various types of control terminal software will display "C81".
■ Other indoor units in the same system are operating normally.</td></tr>
<tr><td colspan="2">The outdoor unit in the same system is operating normally, displaying ’d41’(There are indoor units in the system that are in a powered-off state).
HyperLink will closes the electronic expansion valve of the powered-off indoor unit.</td></tr>
<tr><td>Error trigger</td><td colspan="2">The power supply to the indoor unit has been detected as being cut off.</td></tr>
<tr><td>Error recovery</td><td colspan="2">The faulty indoor unit will automatically resume operation once power supply is restored.</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ The power supply to the indoor unit has been cut off.
■ The main control board of the indoor unit is damaged</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note: The C81 fault trigger is only supported when both the indoor and outdoor units belong to the V8 series and the communication line between the indoor and outdoor units is connected to the M1/M2 ports.</td></tr>
</table>

1.1.26 d16 - Air inlet temperature of IDU is too low in heating mode

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the air inlet temperature of the IDU is lower than the set value (See the operating temperature range set out in the IDU Manual) for 5 min in heating mode	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 Note: 1. The inlet air temperature sensor is commonly found in the fresh air IDUs (The sensor code is defined as T0), and its resistance and temperature characteristics are similar to T1 - return air temperature sensor. Please refer to the Table of Temperature Sensor Resistance Characteristics listed in the Maintenance Manual to learn more about the sensor's features.	

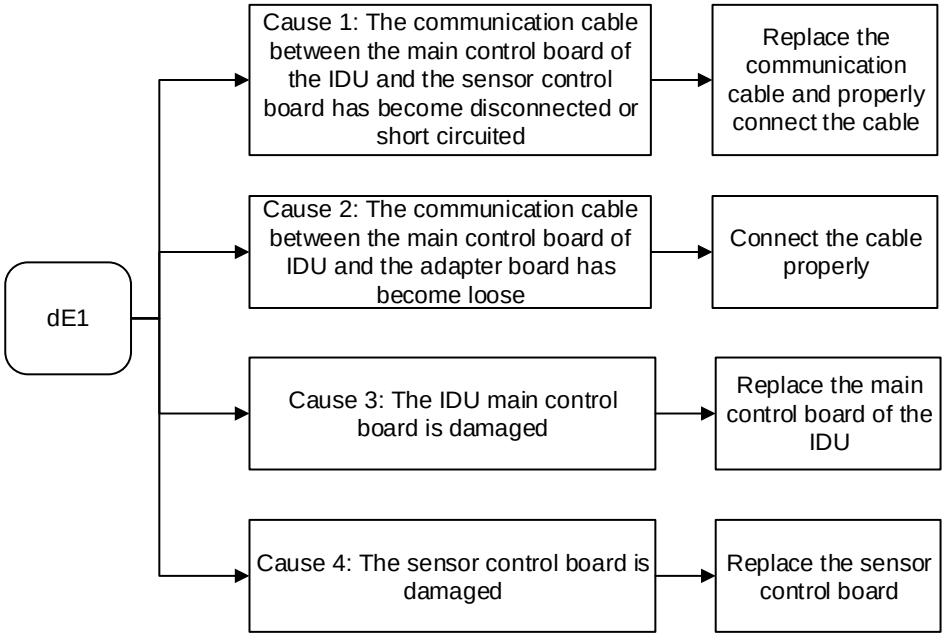
1.1.27 d17 - Air inlet temperature of IDU is too high in cooling mode

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the air inlet temperature of the IDU is higher than the set value (See the operating temperature range set out in the IDU Manual) for 5 min in cooling mode	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting		

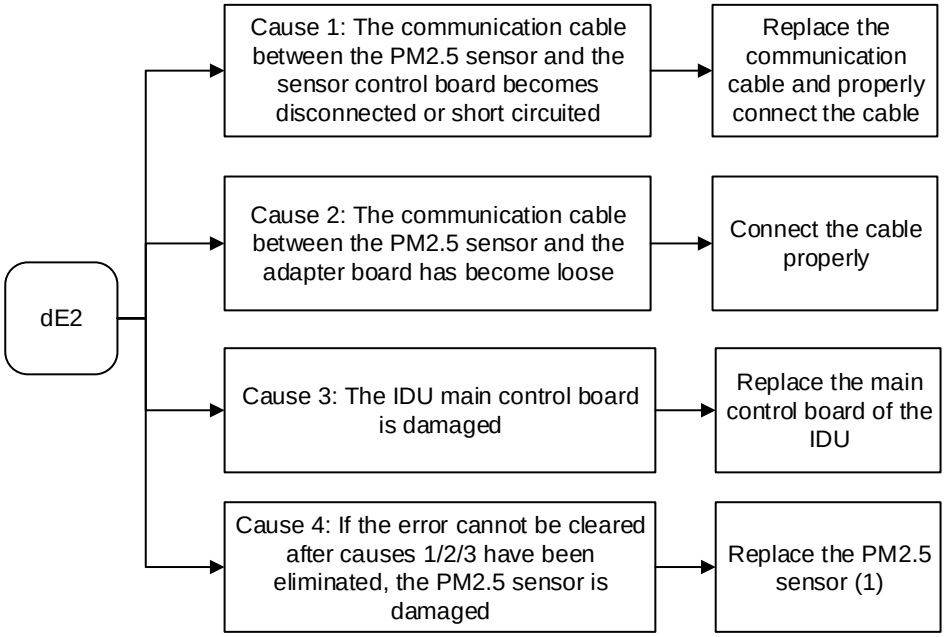
Note:

1. The inlet air temperature sensor is commonly found in the fresh air IDUs (The sensor code is defined as T0), and its resistance and temperature characteristics are similar to T1 - return air temperature sensor. Please refer to the Table of Temperature Sensor Resistance Characteristics listed in the Maintenance Manual to learn more about the sensor's features.

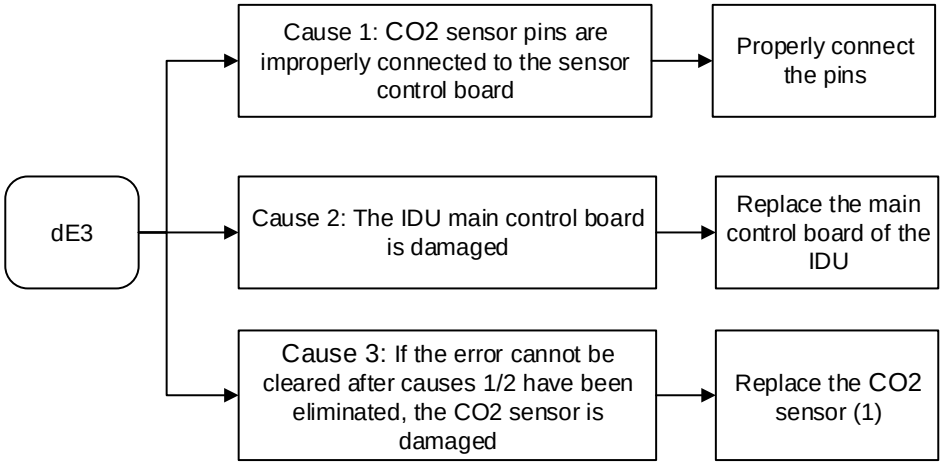
1.1.28 dE1 - Sensor control board fault

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with sensor control board for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting		

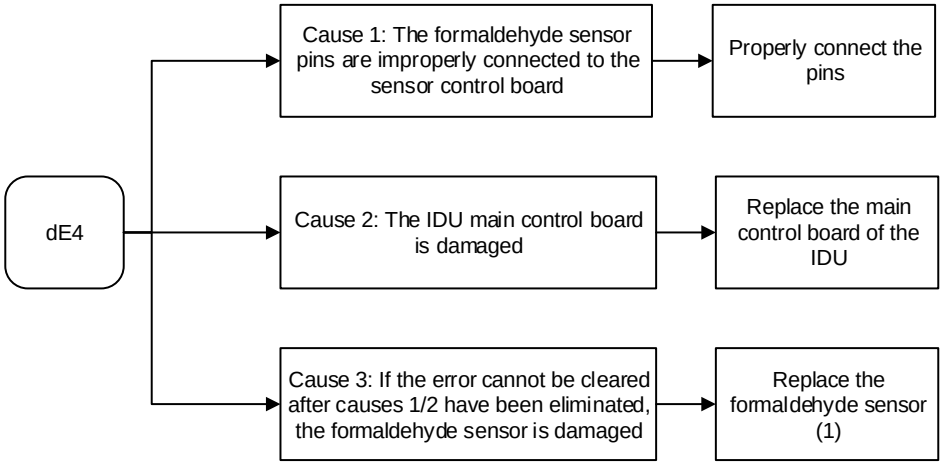
1.1.29 dE2 - PM2.5 sensor fault

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with PM2.5 sensor for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 Note: 1. If the PM2.5 sensor is integrated with the sensor control board, making disassembly difficult, then replace the sensor control board directly.	

1.1.30 dE3 - CO2 sensor fault

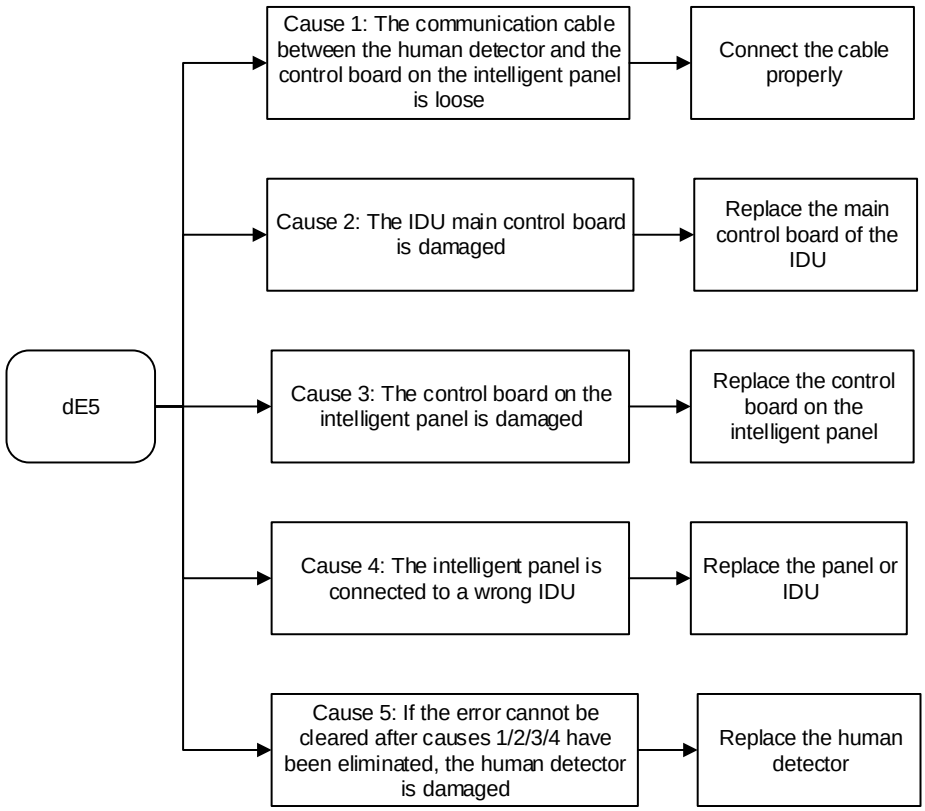
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with CO2 sensor for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 Note 1: 1) The CO2 sensor pins should be inserted on the sensor control board according to the wiring nameplate. 2) When inserting and removing the sensor, do not press and deform the sensor surface, as it may change its internal optical path and cause zero drift to the sensor, making the measuring results of sensor too large or even out of range. 3) When inserting and removing the sensor: Operators must keep their hands clean and dry; the antistatic wrist strap should be worn on the wrist; the metal piece inside the antistatic wrist strap should be in close contact with the skin; and the metal clamp of the antistatic wrist strap should be placed at the exposed copper grounding wire.	

1.1.31 dE4 - Formaldehyde sensor fault

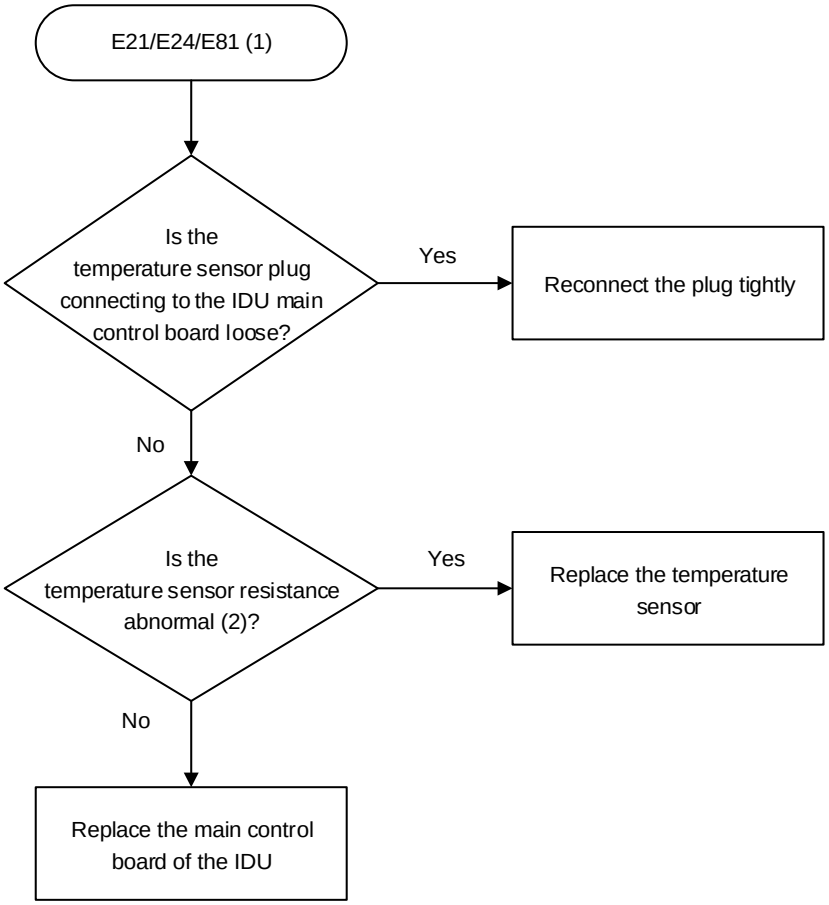
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with formaldehyde sensor for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 Note 1: 1) The formaldehyde sensor pins should be inserted on the sensor control board according to the wiring nameplate. 2) When inserting and removing the sensor, do not touch or squeeze the white sensor film with your hand. 3) When inserting and removing the sensor: Operators must keep their hands clean and dry; the antistatic wrist strap should be worn on the wrist; the metal piece inside the antistatic wrist strap should be in close contact with the skin; and the metal clamp of the antistatic wrist strap should be placed at the exposed copper grounding wire.	

1.1.32 dE5 - Human Detect sensor fault

Note: The human detector sensor on the smart panel is used to detect the location of the human body.

Error display	Digital display	Display position
		Panel, wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the control board of intelligent panel has lost communication with the human detector sensor for 10s and a fault signal has been sent to the IDU main control board	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting		

1.1.33 E21, E24, E81 - T0 (fresh inlet air temperature sensor) short-circuits or cuts off, T1 (IDU return air temperature sensor) short-circuits or cuts off, and TA (outlet air temperature sensor) short-circuits or cuts off

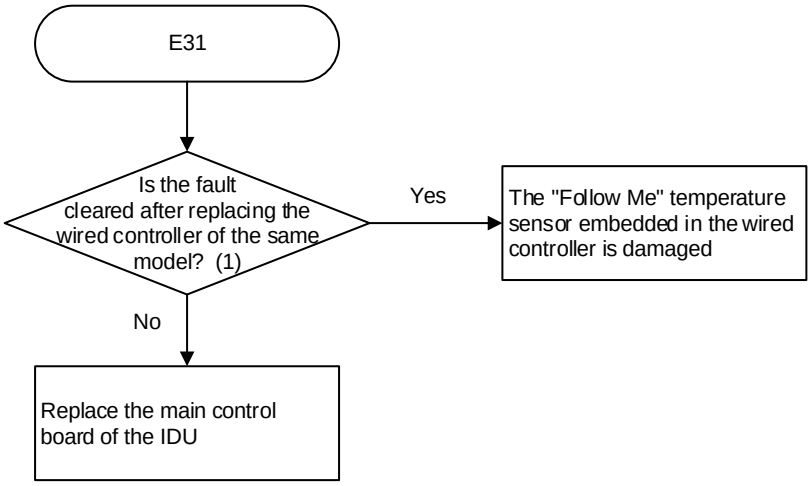
<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">The faulty IDU stops. Other IDUs of the same system: operate normally.</td></tr>
<tr><td colspan="2">ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="2">When detecting that the temperature sensor short-circuits or cuts off</td></tr>
<tr><td>Error recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ The temperature sensor is damaged.
■ The sensor plug to the T0/T1/TA port in the IDU main control board is loose.
■ The IDU main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note:
1) The E21/E24/E81 code respectively corresponds to the T0/T1/TA temperature sensor. Check the wiring nameplate to find the sensor port on the main control board.
2) Measure the resistance between two pins of the sensor plug with a multimeter. A resistance value close to 0 indicates a short circuit has occurred in the temperature sensor, and a resistance value close to infinity indicates an open circuit in the temperature sensor.
3) When the AHU kit is set to return air temperature control, it is able to determine if the T1 sensor is short-circuited or open-circuited, but it is not able to determine if the T0 or TA sensors are short-circuited or open-circuited.

When the AHU kit is set to supply air temperature control, it is able to determine if the T0 or TA</td></tr>
</table>

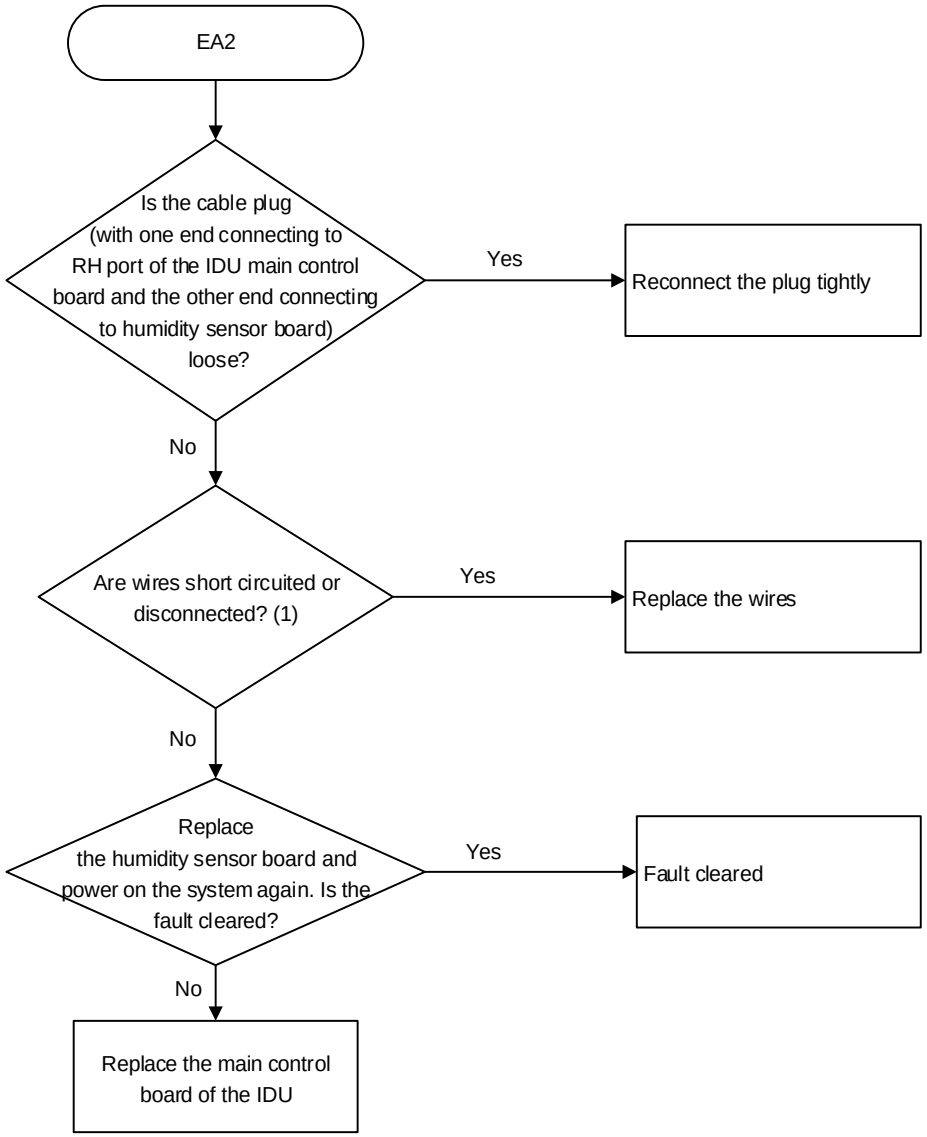
	sensors are short-circuited or open-circuited, but it is not able to determine if the T1 sensor is short-circuited or open-circuited. 4) Only the master unit needs to be connected to the T1/T0/TA sensors when the AHU kit is installed in parallel.

1.1.34 E31: wired controller temperature sensor failure

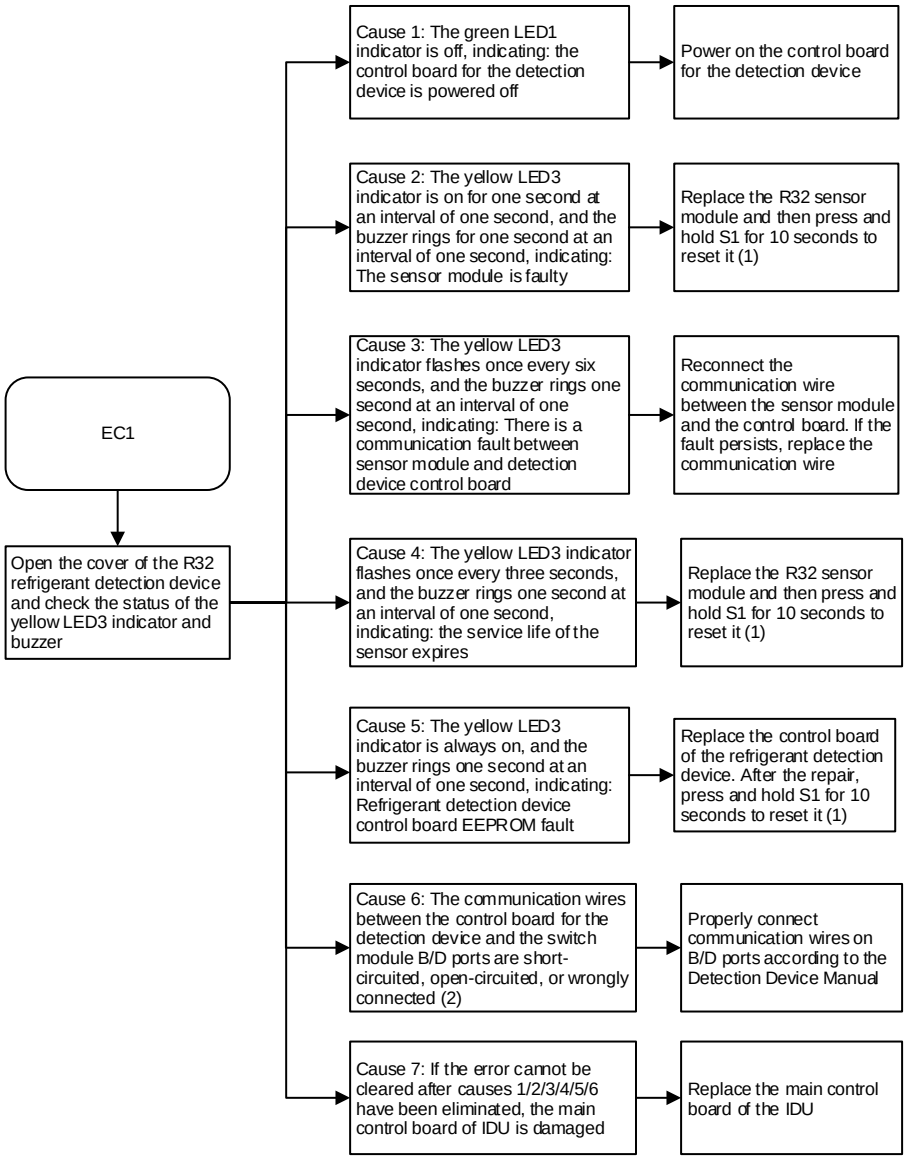
<table>
<tr><td rowspan="3">Fault Display</td><td>LED display</td><td colspan="2">Display position</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td colspan="2">Panel, display box, and wired controller</td></tr>
<tr><td>Fault Impact</td><td colspan="3">The faulty IDU and other IDUs of the same system operate normally.
ODU of the same system operates normally.</td></tr>
<tr><td>Fault Trigger</td><td colspan="3">When the V8 series FAPU uses room temperature control, the "Follow Me" temperature value received from the wired controller is abnormal.</td></tr>
<tr><td>Fault Recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible Cause</td><td colspan="3">■ The built-in room temperature sensor of the wired controller is short-circuited or open-circuited.
■ The wired controller is damaged.
■ The main control board of the FAPU is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3"> 

Note:
1. After replacing the wired controller of the same model, set the FAPU to room temperature control and activate the "Follow Me" function according to the engineering parameter settings in the Installation Manual for V8 Series Fresh Air Processing Unit.</td></tr>
</table>

1.1.35 EA2 - Return air humidity sensor fault

Error display	Digital display	Display position	
		Panel or display box	Wired controller
		Spot check interface query	Error code is not displayed
Error impact	The faulty IDU and other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	If the main control board of an IDU has lost communication with the return air humidity sensor for 2 min		
Error recovery	Automatic recovery		
Possible cause	■ The humidity sensor board is damaged. ■ The cable plug connecting to the RH port in the IDU main control board is loose. ■ The cable plug connecting to the humidity sensor board is loose. ■ The IDU main control board is damaged.		
Troubleshooting	 Note: 1. Use a multimeter to measure the resistance between the pin in the plug at two ends of each wire. A resistance value close to 0 indicates a short circuit has occurred in the wire, and a resistance value close to infinity indicates an open circuit in the wire.		

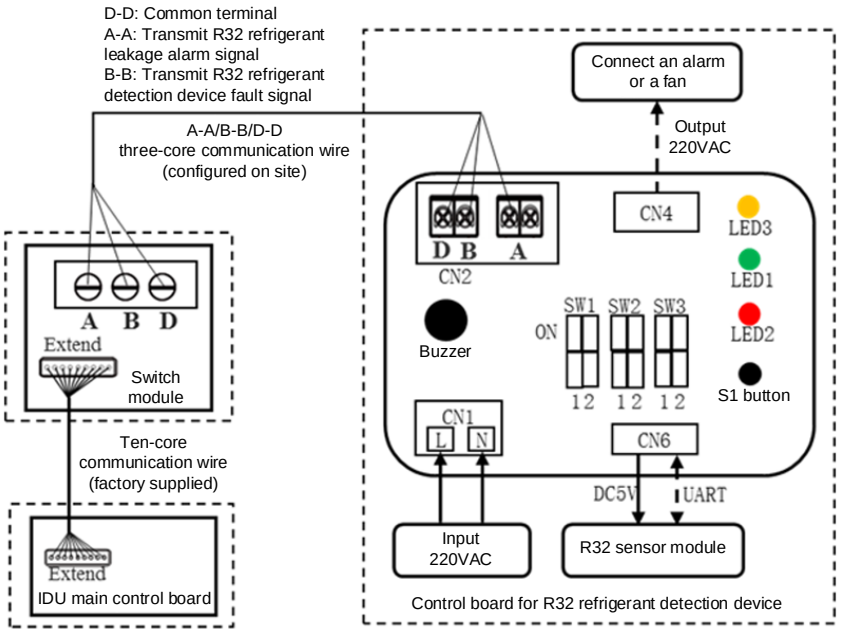
1.1.36 EC1: R32 refrigerant leakage sensor fault

Fault Display	LED display	Display position
		Panel, display box, and wired controller
Fault Impact	Faulty IDU: stops. Other IDUs of the same system: operate normally.	
	ODU of the same system operates normally.	
Fault Trigger	The IDU main control board receives sensor module fault signal from the R32 refrigerant detection device.	
Fault Recovery	No sensor module fault signal is detected by the IDU main control board.	
Possible Cause	See the Troubleshooting section.	
Troubleshooting		

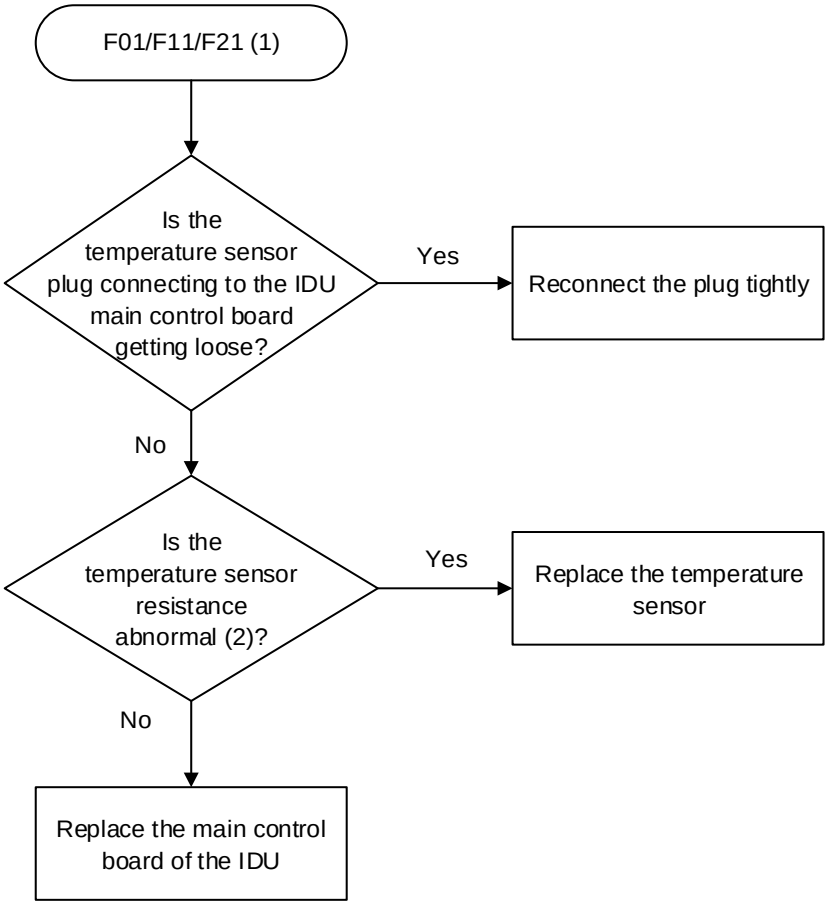
Note:

1. Three fault resetting methods: sensor module fault, sensor module life expiration, and refrigerant detection device control board EEPROM fault: After faults have been cleared, press and hold the S1 button on the control board for 10 seconds to reset the unit. After resetting, all the LED indicators are lit for two seconds before they become dimmed. The R32 sensor life recorded by the control board EEPROM is cleared. Communication between the sensor and the control board for the detection device is automatically restored.
2. The communication connection between the control board for the detection device and the switch module A/B/D is shown in Figure 1 below.

Figure 1 Schematic diagram of the R32 refrigerant leakage detection system

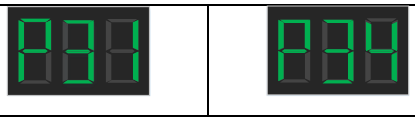
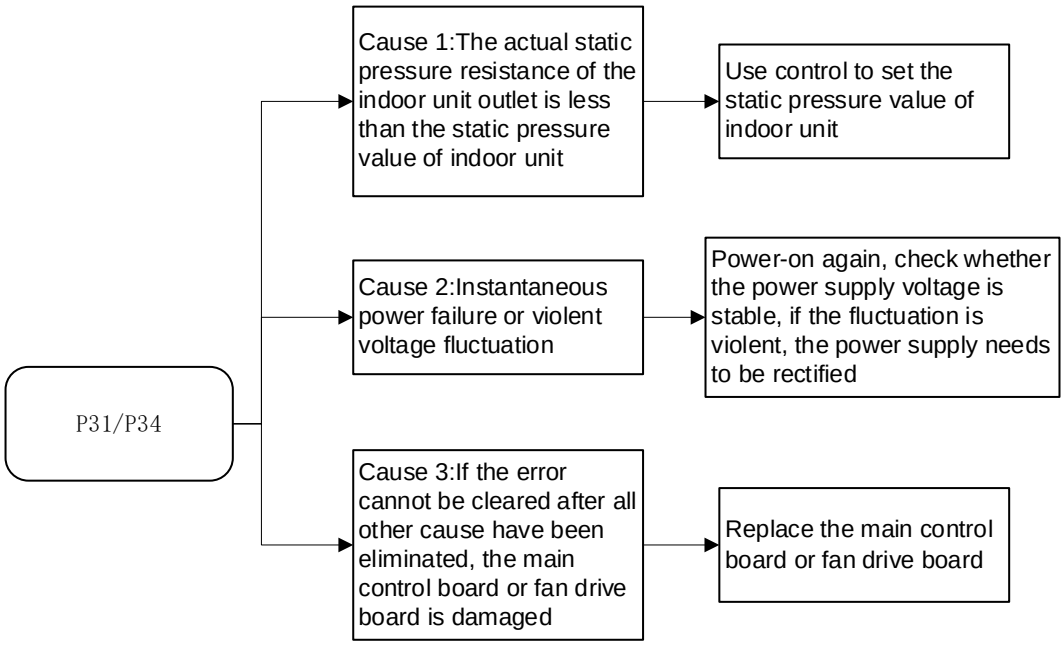

D-D: Common terminal
A-A: Transmit R32 refrigerant leakage alarm signal
B-B: Transmit R32 refrigerant detection device fault signal
A-A/B-B/D-D three-core communication wire (configured on site)
Connect an alarm or a fan
Output 220VAC
A B D
Extend
Switch module
D B A
CN2
CN4
LED3
LED1
LED2
S1 button
Buzzer
SW1 SW2 SW3
ON
1 2 1 2 1 2
CN1
L N
CN6
DC5V
UART
Ten-core communication wire (factory supplied)
Extend
IDU main control board
Input 220VAC
R32 sensor module
Control board for R32 refrigerant detection device

1.1.37 F01, F11, F21 - T2A (heat exchanger liquid pipe temperature sensor) short-circuits or cuts off, T2 (heat exchanger middle temperature sensor) short-circuits or cuts off, and T2B (heat exchanger gas pipe temperature sensor) short-circuits or cuts off

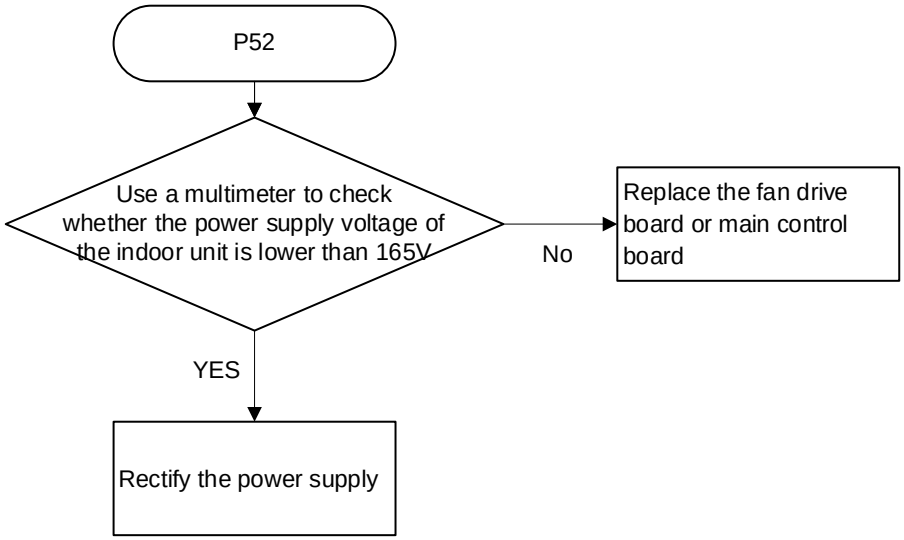
<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">The faulty IDU stops. Other IDUs of the same system: operate normally.</td></tr>
<tr><td colspan="2">ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="2">When detecting that the temperature sensor short-circuits or cuts off</td></tr>
<tr><td>Error recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ The temperature sensor is damaged.
■ The sensor plug connecting to the T2A/T2/T2B port in the IDU main control board is loose.
■ The IDU main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note:
1) The F01/F11/F21 codes respectively correspond to T2A/T2/T2B temperature sensors. Check the wiring nameplate to find the sensor port on the main control board.
2) Measure the resistance between two pins of the sensor plug with a multimeter. A resistance value close to 0 indicates a short circuit has occurred in the temperature sensor, and a resistance value close to infinity indicates an open circuit in the temperature sensor.
3) If only the master unit is connected to the T2A/T2/T2B temperature sensors in the parallel control of the AHU kit, then only the master unit can detect the F01/F11/F21 faults, and the slave units cannot detect them.</td></tr>
</table>

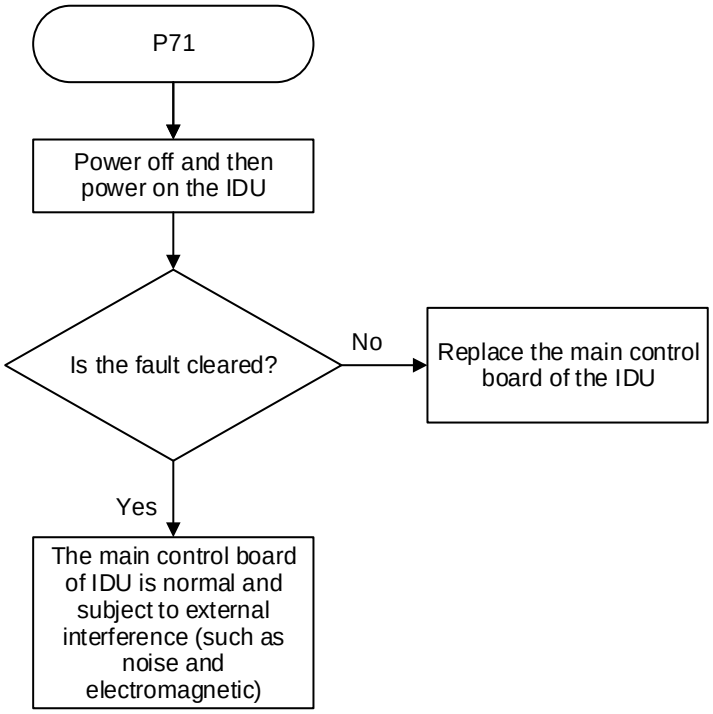
1.1.38 P31/P34 - Fan drive board AC side overcurrent protection

Error display	Digital display 	Display position Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally. ODU of the same system: operate normally.	
Error trigger	■ P31: The current value detected on the AC side of the fan drive board exceeds the programmed overcurrent protection value ■ P34: Six P31 failures within an hour.	
Error recovery	■ P31: Automatic recovery ■ P34: Power-on again	
Possible cause	■ The actual static pressure resistance of the indoor unit outlet is less than the static pressure value of indoor unit ■ Instantaneous power failure or violent voltage fluctuation ■ Indoor unit fan driver board is damaged ■ Indoor unit main control board is damaged	
Troubleshooting	 Note 1: When replacing the fan drive board, the following should be noted: For models where the fan drive board is integrated and soldered onto the main control board, if either the fan drive board or the indoor unit main control board is damaged, the entire control board needs to be replaced."	

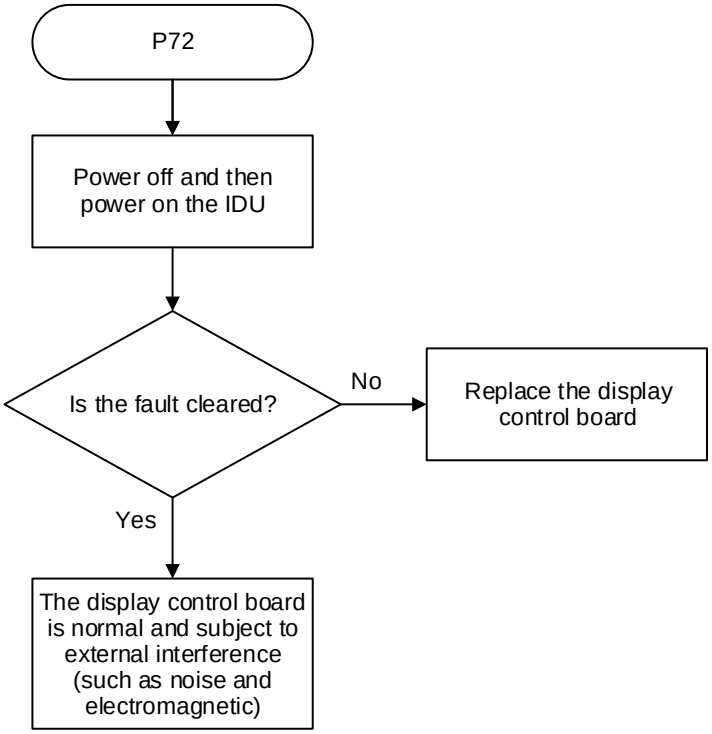
1.1.39 P52 - The voltage of the power supply is too low

<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">The faulty IDU stops. Other IDUs of the same system: operate normally.</td></tr>
<tr><td colspan="2">ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="2">■ Power supply voltage is below the programmed protection threshold (165V)</td></tr>
<tr><td>Error recovery</td><td colspan="2">■ Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ Power supply voltage is lower than 165V
■ Indoor unit fan driver board is damaged</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 
</td></tr>
</table>

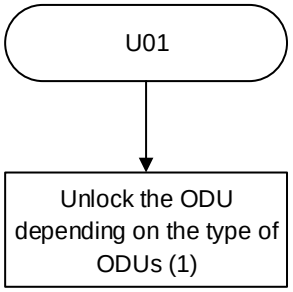
1.1.40 P71 - Main control board EEPROM fault

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	When the master chip cannot receive data from EEPROM (EEPROM: a non-volatile memory whose data are kept even when powered off)	
Error recovery	Automatic recovery	
Possible cause	■ The IDU main control board is damaged. ■ External interference (such as noise and electromagnetic)	
Troubleshooting		

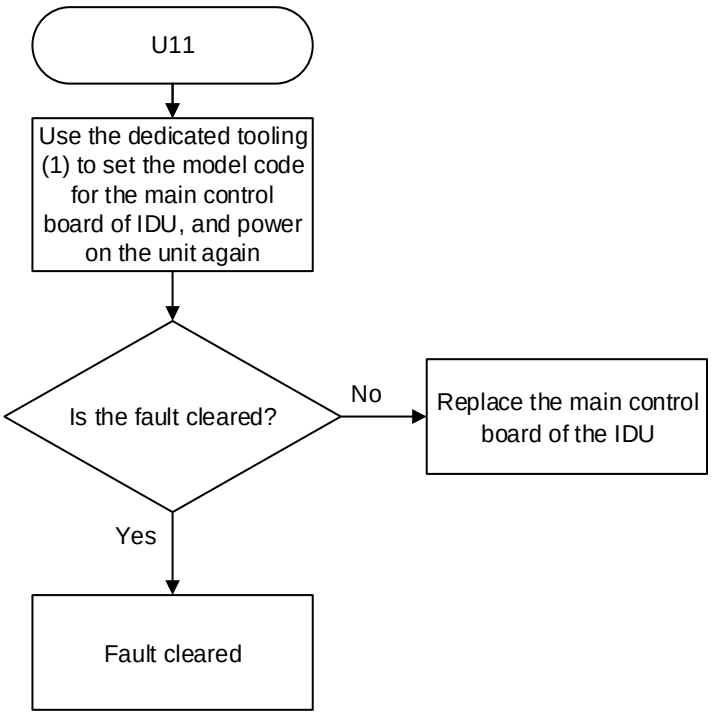
1.1.41 P72 - IDU display control board EEPROM fault

Error display	Digital display	Display position
		Panel or display box
Error impact	The faulty IDU operates normally, and the error code is displayed on the panel or display box only. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	Unable to read data from display control board EEPROM (EEPROM: a non-volatile memory whose data are kept even when powered off)	
Error recovery	Automatic recovery	
Possible cause	■ The display control board is damaged. ■ External interference (such as noise and electromagnetic)	
Troubleshooting		

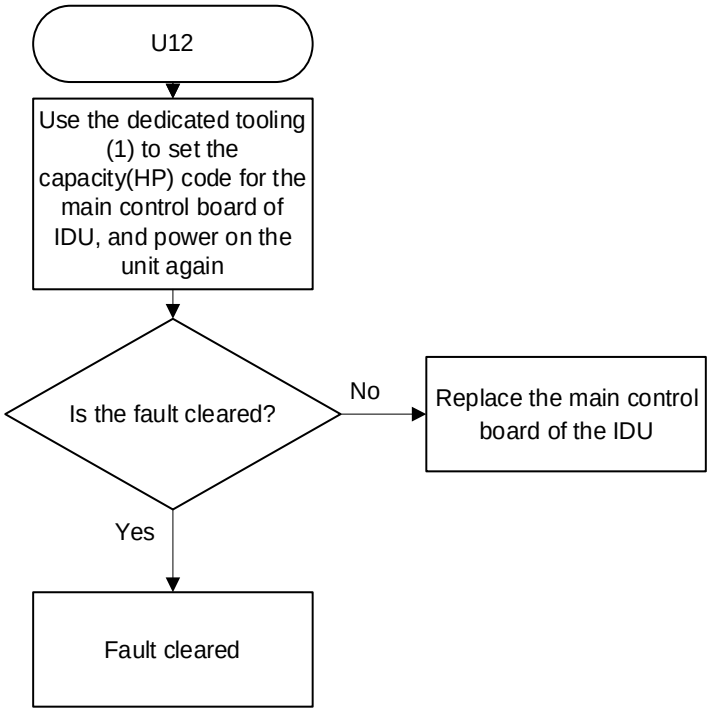
1.1.42 U01 - Locked (electronic lock)

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	All IDUs of the same system: stop running, displaying code "U01"	
	ODU of the same system: stops running, displaying code "U01"	
Error trigger	When detecting that the ODU is locked	
Error recovery	Automatic recovery	
Possible cause	The ODU is still locked.	
Troubleshooting	 Note 1: To get unlocking methods and tools, please contact your local dealer or technical support personnel.	

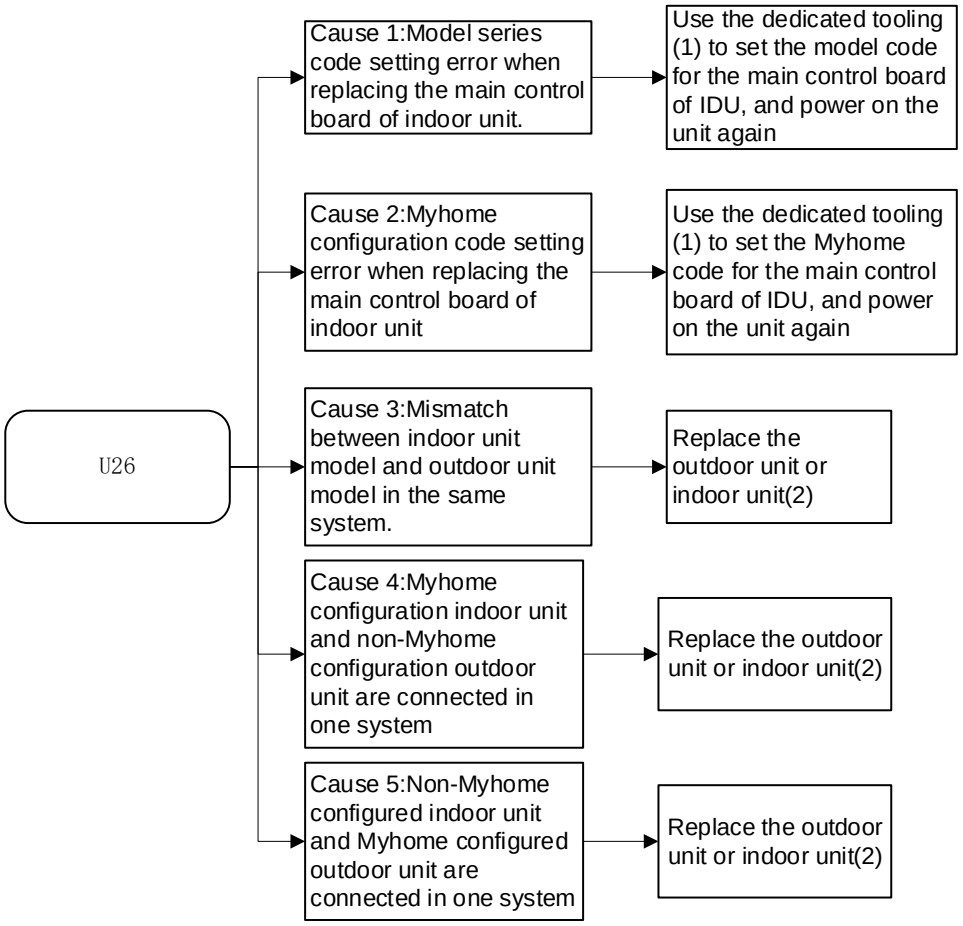
1.1.43 U11 - Unit model code not set

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	1) The faulty IDU stops running. 2) Other IDUs of the same system: ■ If the address for the faulty IDU has been set, other IDUs will operate normally. ■ If the address of the faulty IDU was not set, other IDUs will display error code "A51"-ODU fault. (The indoor unit of V6 platform displays "Ed" code)	
	ODU of the same system: ■ If the address for the faulty IDU has been set, the ODU will operate normally. ■ If the address of the faulty IDU was not set, the ODU will display the error code "C26" -number of IDUs reduced. (The outdoor unit of V6 platform displays "H7" code.)	
Error trigger	When detecting that the unit model code for IDU main control board is not set	
Error recovery	Automatic recovery	
Possible cause	■ The unit model code has not been set after replacing the IDU main control board. ■ The IDU main control board is damaged.	
Troubleshooting	 Note 1: For specialized tooling and instructions, please contact your local dealer or technical support personnel.	

1.1.44 U12 - Capacity(HP) code not set

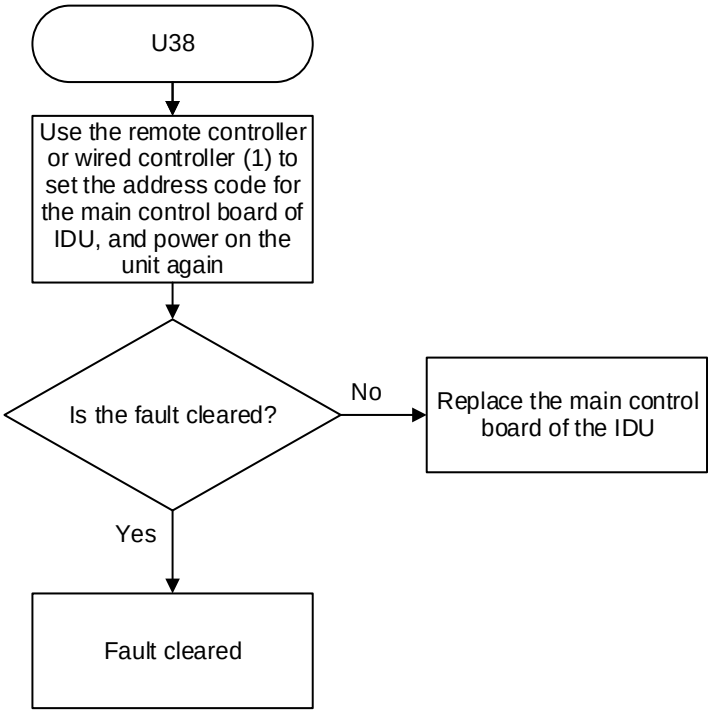
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	1) The faulty IDU stops running. 2) Other IDUs of the same system: ■ If the address for the faulty IDU has been set, other IDUs will operate normally. ■ If the address of the faulty IDU was not set, other IDUs will display error code "A51"-ODU fault.	
	ODU of the same system: ■ If the address for the faulty IDU has been set, the ODU will operate normally. ■ If the address of the faulty IDU was not set, the ODU will display the error code "C26" -number of IDUs reduced.	
Error trigger	When detecting that the capacity(HP) code for IDU main control board has not been set	
Error recovery	Automatic recovery	
Possible cause	■ The capacity(HP) code has not been set after replacing the IDU main control board. ■ The new IDU main control board is damaged.	
Troubleshooting	 Note 1: For specialized tooling and instructions, please contact your local dealer or technical support personnel.	

1.1.45 U26 - Mismatch between indoor unit model and outdoor unit model

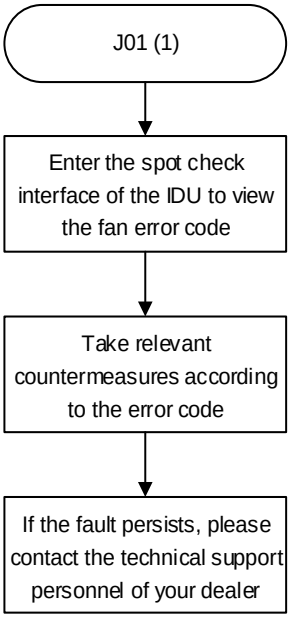
<table>
<tr><td rowspan="2">Error display</td><td>Digital display</td><td>Display position</td></tr>
<tr><td>  </td><td>Panel, display box, and wired controller</td></tr>
<tr><td rowspan="2">Error impact</td><td colspan="2">1) The faulty IDU stops running.
2) Other IDUs of the same system will operate normally</td></tr>
<tr><td colspan="2">ODU of the same system:
■ If there is one IDU in the system is operating normally, the ODU will operate normally.
■ If all the IDUs in the system are display error code "U26", the ODU will operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="2">■ There is a conflict between the model series code of indoor unit and the model series code of outdoor unit
■ The communication flag bit (Myhome identification flag bit) between indoor unit and outdoor unit has a matching conflict</td></tr>
<tr><td>Error recovery</td><td colspan="2">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="2">■ Model series code setting error when replacing the main control board of indoor unit.
■ Mismatch between indoor unit model and outdoor unit model in the same system.
■ Myhome configuration code setting error when replacing the main control board of indoor unit
■ Myhome configuration indoor unit and non-Myhome configuration outdoor unit are connected in one system
■ Non-Myhome configured indoor unit and Myhome configured outdoor unit are connected in one system</td></tr>
<tr><td>Troubleshooting</td><td colspan="2"> 

Note:
1.For specialized tooling and instructions, please contact your local dealer or technical support personnel.
2.Please contact your local dealer or technical support staff to confirm the detail.</td></tr>
</table>

1.1.46 U38 - Address code not detected

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	1) The faulty IDU stops running. 2) Other IDUs of the same system: The fan continues running, the EEV is closed, and ODU error code "A51" is displayed (V6 platform IDU displays the code "Ed").	
	ODU of the same system: Otherwise, the ODU will display the error code "C26" (number of IDUs reduced) (V6 platform ODU displays the code "H7")	
Error trigger	When detecting that the address code for IDU main control board has not been set	
Error recovery	Automatic recovery	
Possible cause	■ The address code has not been set after replacing the IDU main control board. ■ The new IDU main control board is damaged.	
Troubleshooting	 Note 1: For instructions on how to set up addresses for a remote controller or a wired controller, please refer to relevant manuals.	

1.1.47 J01 - Motor failed more than once

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If fan control faults have occurred 10 times in 120 min (1)	
Error recovery	After troubleshooting, power on again	
Possible cause	The fan drive faults have caused the motor to fail more than once.	
Troubleshooting		

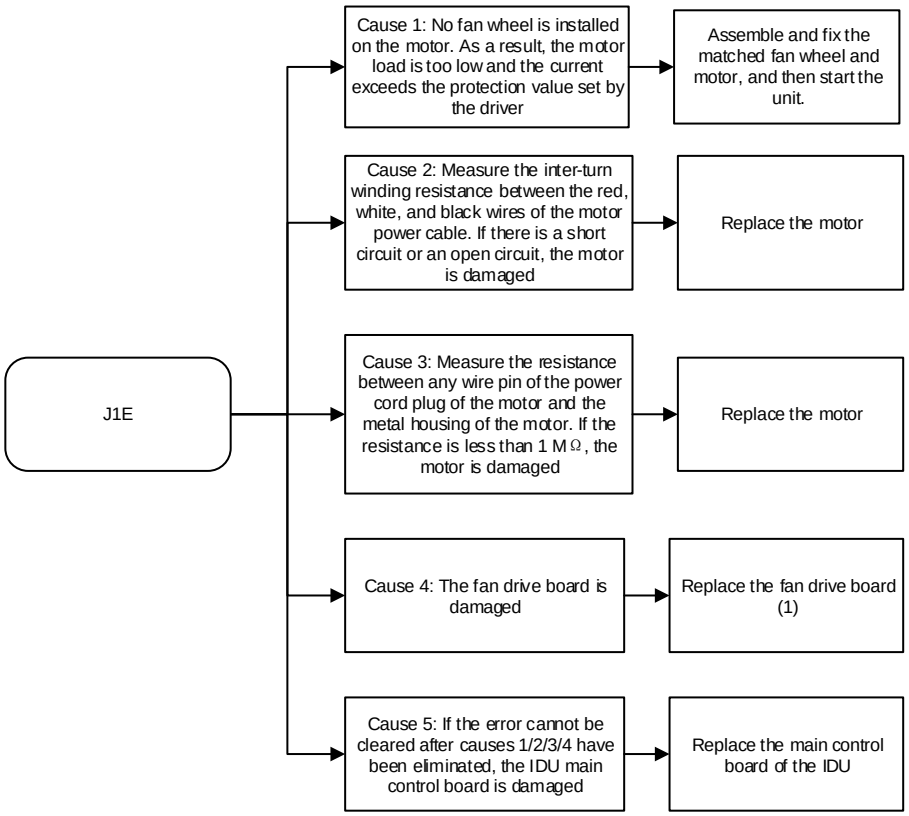
Note:

1. Enter the spot check interface of the IDU to query fan drive fault code (see the table below). For specific troubleshooting methods, please refer to this document.

No.	Error	Fan drive fault name
1	J1E	IPM (fan module) overcurrent protection
2	J11	Instantaneous overcurrent protection for phase
3	J3E	Low bus voltage fault
4	J31	High bus voltage fault
5	J43	Phase current sample bias error
6	J47	IPM (fan module) and IDU unmatched
7	J5E	Motor startup failure
8	J52	Motor blocking protection
9	J55	Speed control mode setting error
10	J6E	Phase lack protection of motor

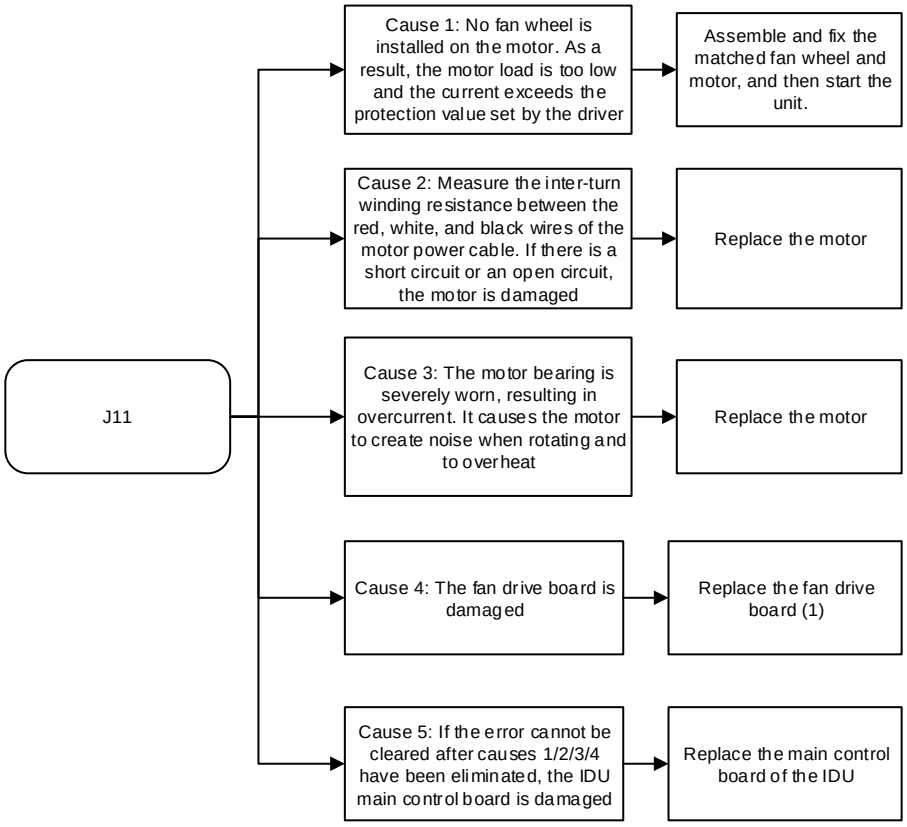
1.1.48 J1E: IPM (fan module) overcurrent protection

Fault Display	LED display	Display position
		Panel, display box, and wired controller
Fault Impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system operates normally.	

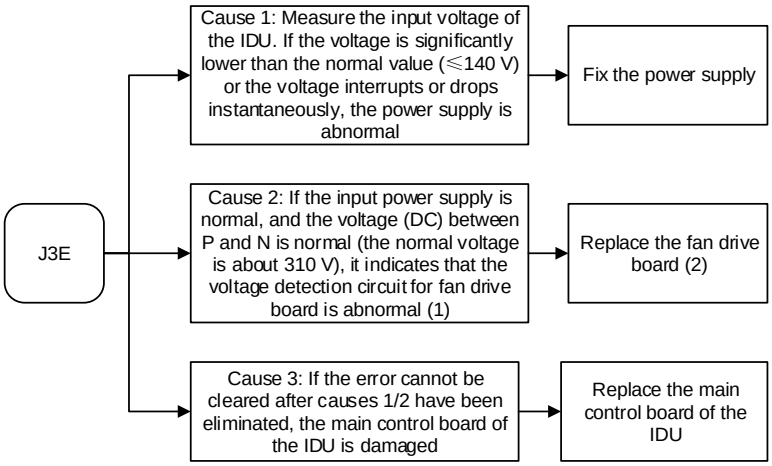
Fault Trigger	The fault is triggered if one of the following conditions is met: 1) The current value (AC) detected for any phase line of U/V/W on the IPM exceeds the set overcurrent protection value of the IPM. 2) A fault signal output by the IPM protection circuit is detected.
Fault Recovery	Automatic recovery
Possible Cause	■ There is no fan wheel installed on the motor. ■ The motor insulation is damaged or motor coils are short-circuited. ■ The fan drive board is damaged. ■ The IDU main control board is damaged.
Troubleshooting	 Note 1: Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.

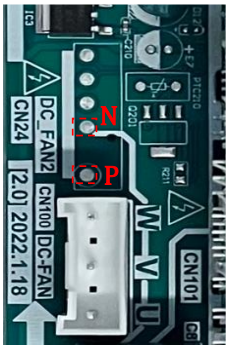
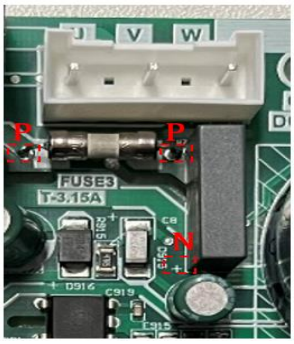
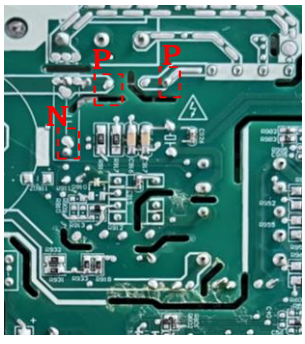
1.1.49 J11: instantaneous overcurrent protection for phase current

Fault Display	LED display	Display position
		Panel, display box, and wired controller
Fault Impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system operates normally.	
Fault Trigger	The current value (AC) detected for any phase line of U/V/W on the IPM exceeds the set overcurrent	

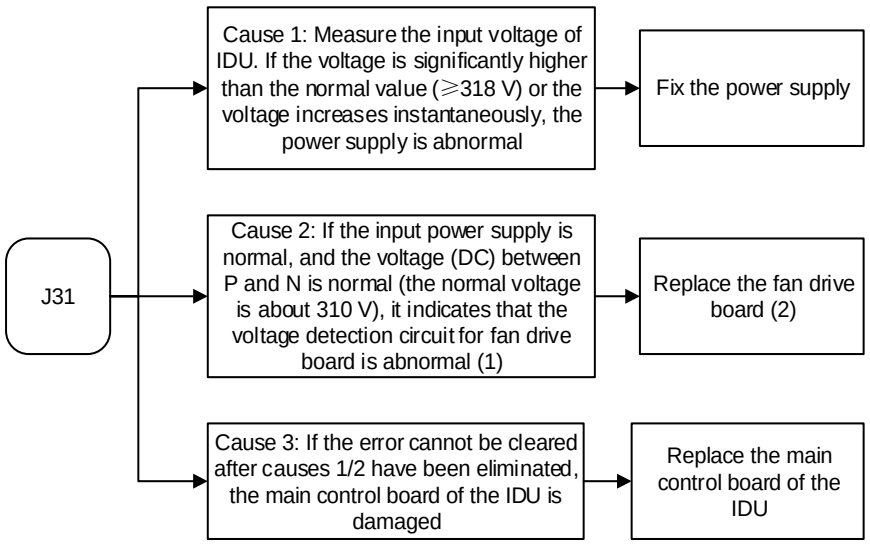
	protection value of the driver.
Fault Recovery	Automatic recovery
Possible Cause	■ There is no fan wheel installed on the motor. ■ Motor coils are short-circuited, or the motor bearing is worn, resulting in an abnormal increase of motor current. ■ The fan drive board is damaged. ■ The IDU main control board is damaged.
Troubleshooting	 Note 1: Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.

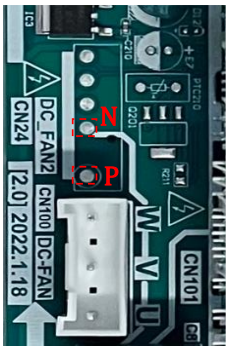
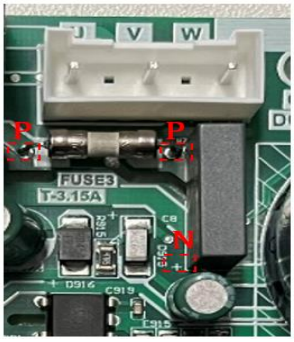
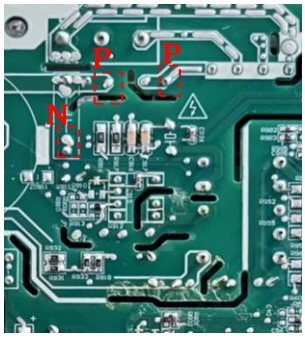
1.1.50 J3E - Low bus voltage fault

<table>
<tr><td rowspan="3">Error display</td><td>Digital display</td><td colspan="2">Display position</td></tr>
<tr><td rowspan="2">  </td><td>Panel or display box</td><td>Wired controller</td></tr>
<tr><td>Spot check interface query</td><td>Error code is not displayed</td></tr>
<tr><td>Error impact</td><td colspan="3">The faulty IDU stops. Other IDUs of the same system: operate normally.
ODU of the same system: operate normally.</td></tr>
<tr><td>Error trigger</td><td colspan="3">When the bus voltage (DC voltage) is below the threshold value of the driver (165 V)</td></tr>
<tr><td>Error recovery</td><td colspan="3">Automatic recovery</td></tr>
<tr><td>Possible cause</td><td colspan="3">■ The input voltage is too low, resulting in low bus voltage.
■ The input voltage encounters transient drop and interruption, resulting in too low transient bus voltage.
■ The fan drive board is damaged, so the bus voltage detection circuit becomes abnormal.
■ The IDU main control board is damaged.</td></tr>
<tr><td>Troubleshooting</td><td colspan="3">


Note:
1. Please refer to the figure below when measuring voltage between P and N. Make sure P/N measuring points are selected according to PCB type.
<table>
<tr><td>PCB type 1</td><td colspan="2">PCB type 2</td></tr>
<tr><td>P/N measuring point</td><td>P/N measuring point
(front of PCB)</td><td>P/N measuring point
(back of PCB)</td></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
</table>
2. Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.</td></tr>
</table>

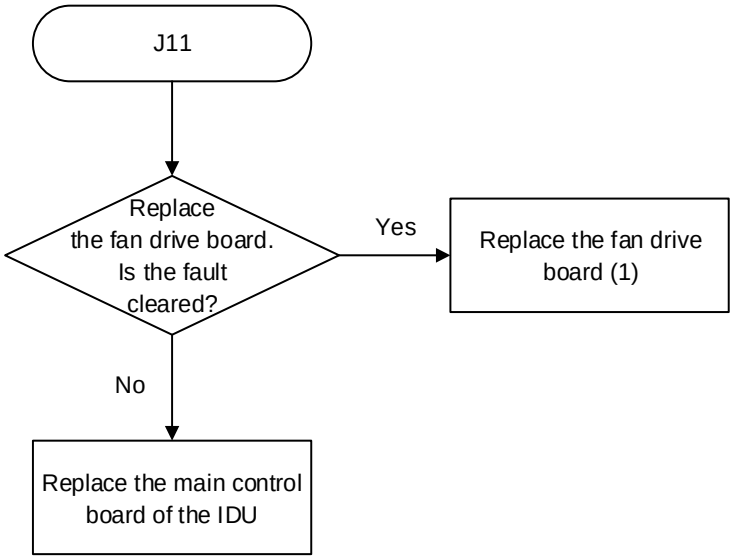
1.1.51 J31 - High bus voltage fault

Error display	Digital display	Display position
		Panel, display box Wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	When the bus voltage (DC voltage) is greater than the threshold value of the driver (450V)	
Error recovery	Automatic recovery	
Possible cause	■ The input voltage is too high, resulting in high bus voltage. ■ Instantaneous high input voltage. ■ The fan drive board is damaged, so the bus voltage detection circuit becomes abnormal. ■ The IDU main control board is damaged.	
Troubleshooting	 Note: 1. Please refer to the figure below when measuring voltage between P and N. Make sure P/N measuring points are selected according to PCB type.	

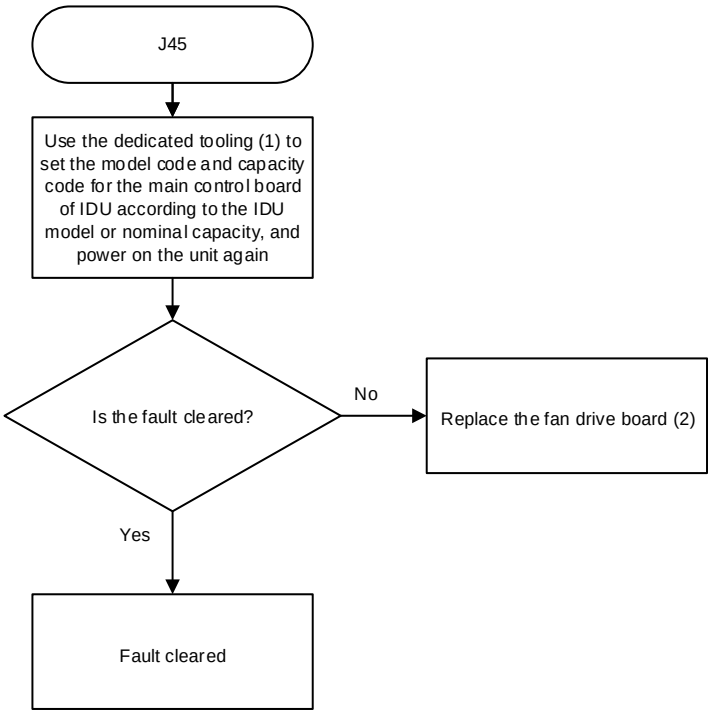
PCB type 1	PCB type 2	
P/N measuring point	P/N measuring point (front of PCB)	P/N measuring point (back of PCB)
		

2. Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.

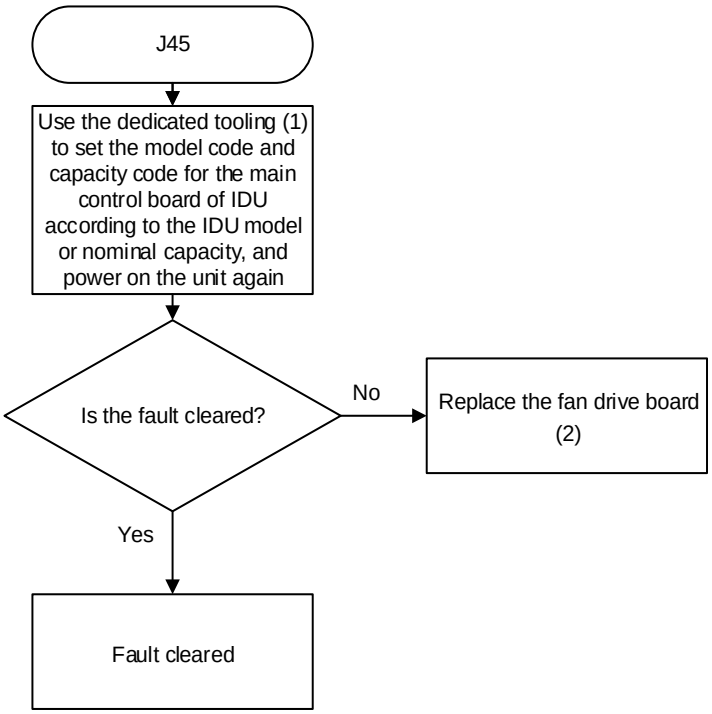
1.1.52 J43 - Phase current sample bias error

Error display	Digital display	Display position
		Panel, display box Wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	When detecting that the current sample is 50% greater than 2.5 V	
Error recovery	Automatic recovery	
Possible cause	■ The current sampling circuit of the fan drive board is damaged. ■ The IDU main control board is damaged.	
Troubleshooting	 Note 1: Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

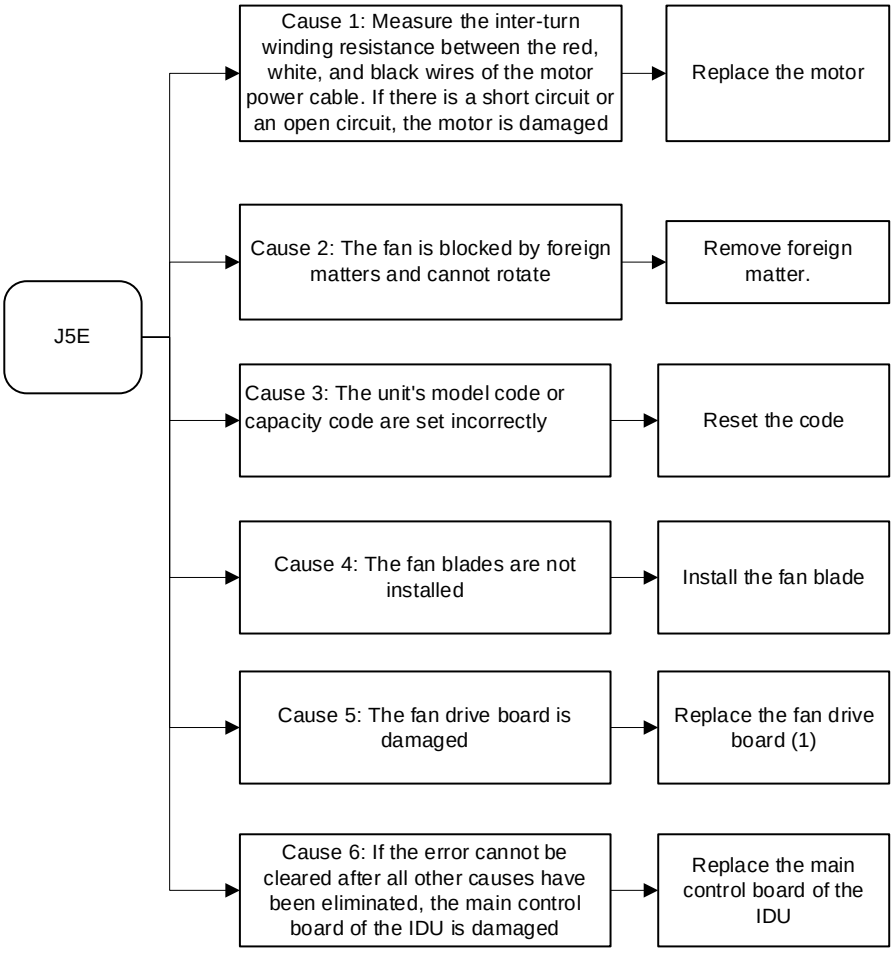
1.1.53 J45 - Motor and IDU unmatched

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the motor code sent by the IDU main control board is not found in the fan driver	
Error recovery	Automatic recovery	
Possible cause	■ Unit model code or capacity code is incorrectly set. ■ The fan drive board is wrong or damaged.	
Troubleshooting	 Note: 1. For specialized tooling and instructions, please contact your local dealer or technical support personnel. 2. Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

1.1.54 J47 - IPM (fan module) and IDU unmatched

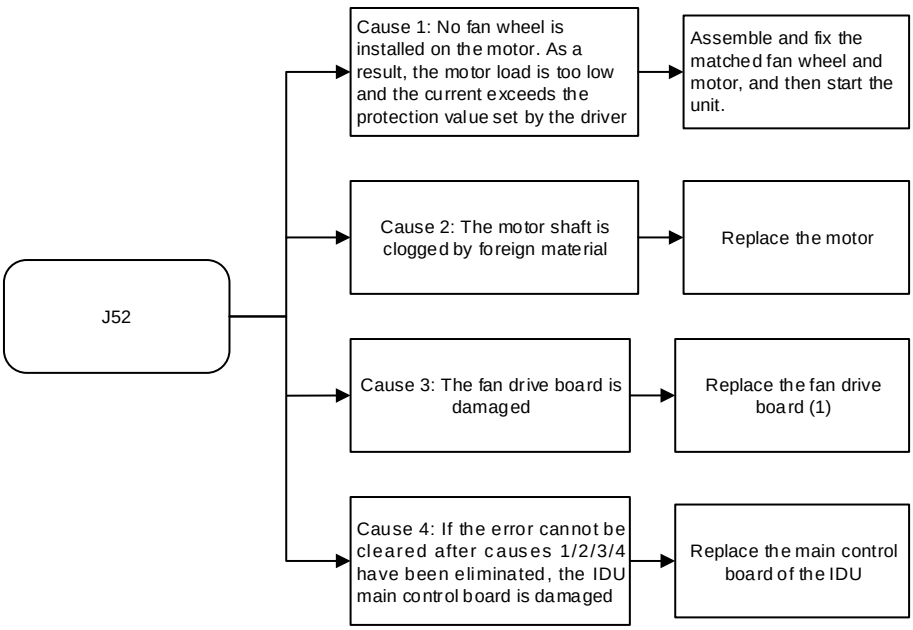
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	When detecting that the fan drive board does not match the set value of the driver	
Error recovery	Automatic recovery	
Possible cause	■ Unit model code or capacity(HP) code is incorrectly set. ■ The fan drive board is wrong or damaged.	
Troubleshooting	 Note: 1. For specialized tooling and instructions, please contact your local dealer or technical support personnel. 2. Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

1.1.55 J5E - Motor startup failure

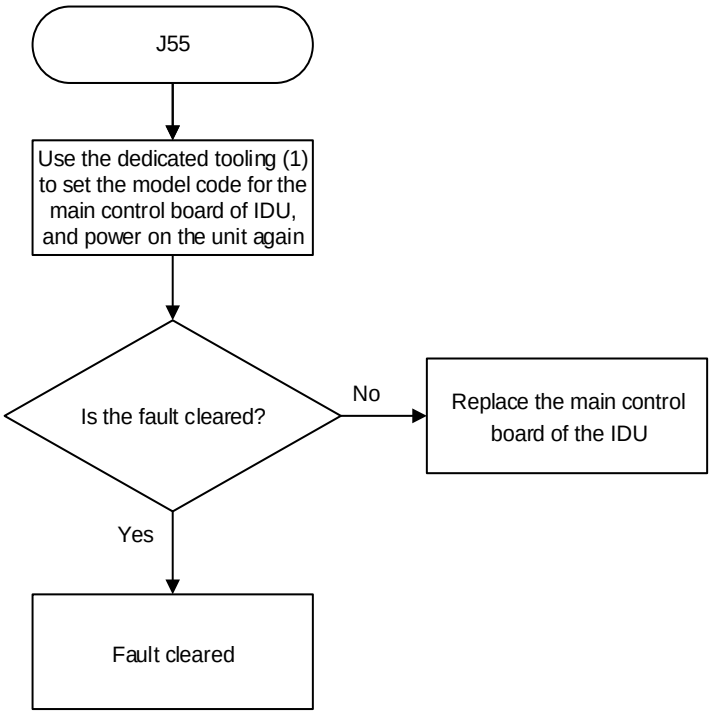
Error display	Digital display	Display position
		Panel, display box Wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	Motor startup failure	
Error recovery	Automatic recovery	
Possible cause	■ Motor winding short-circuits or cuts off ■ The fan is blocked by foreign material or the motor is damaged and cannot rotate. ■ The unit's model code or capacity code are set incorrectly ■ Fan blade is not installed ■ The fan drive module is damaged. ■ The IDU main control board is damaged.	
Troubleshooting	 Note 1: Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

1.1.56 J52: motor blocking protection

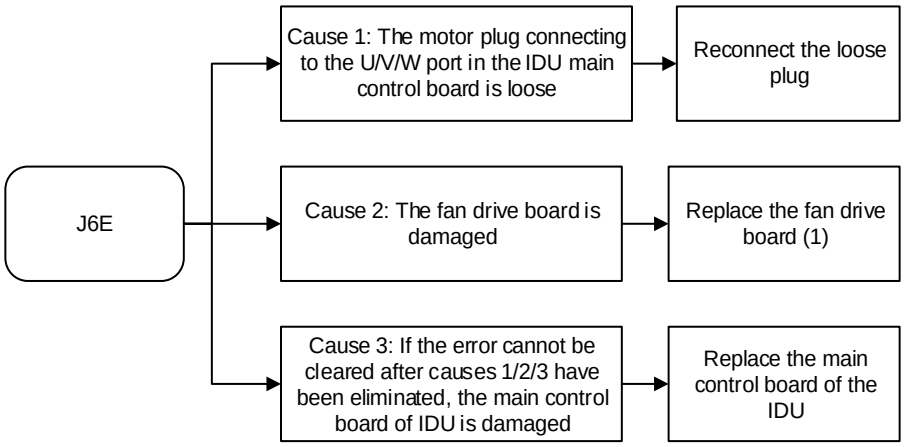
Fault Display	LED display	Display position

		Panel, display box, and wired controller
Fault Impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system operates normally.	
Fault Trigger	The motor is blocked.	
Fault Recovery	Automatic recovery	
Possible Cause	■ There is no fan wheel installed on the motor. ■ The motor shaft gets stuck. ■ The fan drive board is damaged. ■ The IDU main control board is damaged.	
Troubleshooting	 Note 1: Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

1.1.57 J55 - Speed control mode setting error

Error display	Digital display	Display position
		Panel, display box Wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	The IDU is non constant air flow control, but its main control program sets the fan speed according to the constant air flow control mode.	
Error recovery	Automatic recovery	
Possible cause	■ The IDU model is set incorrectly. ■ The IDU main control board is damaged.	
Troubleshooting	 Note 1: For specialized tooling and instructions, please contact your local dealer or technical support personnel.	

1.1.58 J6E - Phase lack protection of motor

Error display	Digital display	Display position
		Panel, display box Wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	When the motor phase lacks protection	
Error recovery	Automatic recovery	
Possible cause	■ The motor plug connecting to the U/V/W port in the IDU main control board is loose. ■ The fan drive board is damaged. ■ The IDU main control board is damaged.	
Troubleshooting	 Note 1: Please observe the following rule when replacing the fan drive board: For units whose fan drive board is welded onto the main control board, if either the fan drive board or main control board becomes faulty, the whole control board has to be replaced.	

3 Appendix

3.1 Temperature Sensor Resistance Characteristics

Table 9.1: Indoor temperature sensors resistance characteristics

R25=10KΩ ±3% B25/50=4100K±3%

Temperature (°C)	Resistance min(kΩ)	Resistance Normal(kΩ)	Resistance max(kΩ)	Temperature (°C)	Resistance min(kΩ)	Resistance Normal(kΩ)	Resistance max(kΩ)
-40	337.762	388.619	446.732	**0**	32.140	34.385	36.753
-39	315.441	362.171	415.450	**1**	30.532	32.613	34.803
-38	294.802	337.767	386.646	**2**	29.013	30.941	32.968
-37	275.699	315.226	360.096	**3**	27.578	29.364	31.238
-36	258.001	294.386	335.600	**4**	26.221	27.876	29.609
-35	241.589	275.100	312.977	**5**	24.938	26.471	28.074
-34	226.358	257.238	292.067	**6**	23.725	25.145	26.626
-33	212.210	240.679	272.721	**7**	22.578	23.892	25.260
-32	199.059	225.317	254.809	**8**	21.492	22.708	23.972
-31	186.823	211.053	238.210	**9**	20.464	21.590	22.757
-30	175.432	197.799	222.817	**10**	19.491	20.532	21.609
-29	164.820	185.475	208.531	**11**	18.569	19.532	20.526
-28	154.925	174.007	195.264	**12**	17.696	18.586	19.502
-27	145.695	163.330	182.934	**13**	16.868	17.690	18.536
-26	137.078	153.381	171.467	**14**	16.084	16.843	17.622
-25	129.030	144.105	160.797	**15**	15.341	16.041	16.758
-24	121.508	135.452	150.861	**16**	14.635	15.281	15.941
-23	114.473	127.375	141.604	**17**	13.966	14.562	15.169
-22	107.892	119.832	132.974	**18**	13.332	13.880	14.438
-21	101.730	112.783	124.925	**19**	12.729	13.234	13.746
-20	95.959	106.193	117.413	**20**	12.157	12.621	13.091
-19	90.551	100.028	110.399	**21**	11.614	12.041	12.471
-18	85.480	94.259	103.846	**22**	11.099	11.490	11.884
-17	80.724	88.857	97.721	**23**	10.608	10.967	11.327
-16	76.260	83.796	91.994	**24**	10.143	10.471	10.800
-15	72.070	79.054	86.636	**25**	9.700	10.000	10.300
-14	68.134	74.607	81.620	**26**	9.254	9.553	9.853
-13	64.436	70.436	76.924	**27**	8.830	9.128	9.428
-12	60.960	66.521	72.525	**28**	8.429	8.725	9.024
-11	57.691	62.847	68.402	**29**	8.048	8.342	8.639
-10	54.615	59.396	64.536	**30**	7.686	7.977	8.273
-9	51.721	56.153	60.911	**31**	7.342	7.631	7.924
-8	48.996	53.106	57.509	**32**	7.016	7.302	7.592
-7	46.430	50.241	54.315	**33**	6.706	6.988	7.276
-6	44.012	47.546	51.317	**34**	6.412	6.690	6.975
-5	41.733	45.010	48.500	**35**	6.132	6.407	6.688
-4	39.585	42.623	45.853	**36**	5.866	6.137	6.414
-3	37.558	40.376	43.365	**37**	5.613	5.880	6.153
-2	35.647	38.259	41.025	**38**	5.373	5.635	5.905
-1	33.843	36.264	38.824	**39**	5.144	5.402	5.667

Table 9.1: Indoor temperature sensors resistance characteristics(continues)

Temperature (°C)	Resistance min(kΩ)	Resistance Normal(kΩ)	Resistance max(kΩ)	Temperature (°C)	Resistance min(kΩ)	Resistance Normal(kΩ)	Resistance max(kΩ)
40	4.926	5.179	5.441	**80**	1.060	1.166	1.281
41	4.718	4.968	5.225	**81**	1.025	1.128	1.240
42	4.521	4.766	5.019	**82**	0.990	1.091	1.201
43	4.333	4.573	4.822	**83**	0.958	1.056	1.164
44	4.154	4.390	4.634	**84**	0.926	1.022	1.127
45	3.983	4.215	4.455	**85**	0.895	0.990	1.092
46	3.821	4.047	4.283	**86**	0.866	0.958	1.059
47	3.666	3.888	4.120	**87**	0.838	0.928	1.026
48	3.518	3.736	3.963	**88**	0.811	0.899	0.995
49	3.377	3.590	3.813	**89**	0.785	0.870	0.965
50	3.243	3.451	3.670	**90**	0.760	0.843	0.935
51	3.114	3.318	3.533	**91**	0.735	0.817	0.907
52	2.991	3.192	3.402	**92**	0.712	0.792	0.880
53	2.874	3.070	3.276	**93**	0.689	0.768	0.854
54	2.762	2.954	3.156	**94**	0.668	0.744	0.829
55	2.656	2.843	3.041	**95**	0.647	0.722	0.804
56	2.553	2.737	2.931	**96**	0.627	0.700	0.781
57	2.456	2.635	2.825	**97**	0.607	0.679	0.758
58	2.362	2.538	2.723	**98**	0.589	0.659	0.736
59	2.273	2.444	2.626	**99**	0.571	0.639	0.715
60	2.187	2.355	2.533	**100**	0.553	0.620	0.694
61	2.105	2.269	2.444	**101**	0.537	0.602	0.674
62	2.027	2.187	2.358	**102**	0.520	0.584	0.655
63	1.952	2.109	2.276	**103**	0.505	0.567	0.637
64	1.880	2.033	2.197	**104**	0.490	0.551	0.619
65	1.811	1.961	2.121	**105**	0.475	0.535	0.602
66	1.745	1.892	2.048	**106**	0.461	0.520	0.585
67	1.682	1.825	1.978	**107**	0.448	0.505	0.569
68	1.622	1.761	1.911	**108**	0.434	0.490	0.553
69	1.564	1.700	1.847	**109**	0.422	0.477	0.538
70	1.508	1.641	1.785	**110**	0.410	0.463	0.523
71	1.455	1.585	1.725	**111**	0.398	0.450	0.509
72	1.403	1.530	1.668	**112**	0.386	0.438	0.495
73	1.354	1.478	1.613	**113**	0.375	0.425	0.482
74	1.307	1.428	1.559	**114**	0.365	0.414	0.469
75	1.261	1.380	1.509	**115**	0.354	0.402	0.456
76	1.218	1.334	1.460	**116**	0.344	0.391	0.444
77	1.176	1.289	1.412	**117**	0.335	0.381	0.433
78	1.136	1.247	1.367	**118**	0.325	0.370	0.421
79	1.098	1.206	1.323	**119**	0.317	0.361	0.410

Table 9.1: Indoor temperature sensors resistance characteristics(continues)

Temperature (°C)	Resistance min(kΩ)	Resistance Normal(kΩ)	Resistance max(kΩ)	Temperature (°C)	Resistance min(kΩ)	Resistance Normal(kΩ)	Resistance max(kΩ)
120	0.308	0.351	0.400				
121	0.299	0.342	0.389				
122	0.291	0.332	0.379				
123	0.283	0.324	0.370				
124	0.276	0.315	0.360				
125	0.268	0.307	0.351				
126	0.261	0.299	0.342				
127	0.254	0.291	0.334				
128	0.247	0.284	0.325				
129	0.241	0.277	0.317				
130	0.234	0.269	0.309				
131	0.228	0.263	0.302				
132	0.222	0.256	0.294				
133	0.217	0.250	0.287				
134	0.211	0.243	0.280				
135	0.206	0.237	0.273				
136	0.200	0.231	0.267				
137	0.195	0.226	0.260				
138	0.190	0.220	0.254				
139	0.186	0.215	0.248				
140	0.181	0.210	0.242				
141	0.177	0.205	0.237				
142	0.172	0.200	0.231				
143	0.168	0.195	0.226				
144	0.164	0.190	0.221				
145	0.160	0.186	0.216				
146	0.156	0.181	0.211				
147	0.152	0.177	0.206				
148	0.148	0.173	0.201				
149	0.145	0.169	0.197				
150	0.142	0.165	0.192				

3.2 Ambient Temperature and Standard Saturation Pressure of R410A

Table 9.2: Ambient Temperature and Standard Saturation Pressure of R410A (saturated vapor state)

Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)	Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)	Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)
-70	-65.879	-9.5549	**-30**	168.02	24.37	**10**	983.49	142.64
-69	-63.608	-9.2256	**-29**	179.3	26.005	**11**	1015.9	147.35
-68	-61.22	-8.8793	**-28**	190.93	27.693	**12**	1049.1	152.15
-67	-58.711	-8.5154	**-27**	202.94	29.434	**13**	1083	157.07
-66	-56.077	-8.1332	**-26**	215.32	31.23	**14**	1117.6	162.09
-65	-53.312	-7.7322	**-25**	228.09	33.081	**15**	1153	167.22
-64	-50.411	-7.3115	**-24**	241.25	34.99	**16**	1189.1	172.47
-63	-47.371	-6.8706	**-23**	254.81	36.957	**17**	1226	177.82
-62	-44.186	-6.4087	**-22**	268.78	38.983	**18**	1263.8	183.29
-61	-40.852	-5.925	**-21**	283.17	41.07	**19**	1302.3	188.88
-60	-37.362	-5.4189	**-20**	297.98	43.218	**20**	1341.6	194.58
-59	-33.713	-4.8896	**-19**	313.23	45.43	**21**	1381.8	200.41
-58	-29.898	-4.3363	**-18**	328.91	47.705	**22**	1422.7	206.35
-57	-25.913	-3.7583	**-17**	345.05	50.046	**23**	1464.6	212.42
-56	-21.752	-3.1548	**-16**	361.65	52.453	**24**	1507.3	218.61
-55	-17.409	-2.525	**-15**	378.71	54.928	**25**	1550.8	224.93
-54	-12.88	-1.868	**-14**	396.26	57.472	**26**	1595.3	231.37
-53	-8.1571	-1.1831	**-13**	414.28	60.086	**27**	1640.6	237.95
-52	-3.2361	-0.46936	**-12**	432.8	62.772	**28**	1686.8	244.65
-51	1.8893	0.27402	**-11**	451.82	65.531	**29**	1734	251.49
-50	7.2252	1.0479	**-10**	471.35	68.364	**30**	1782.1	258.47
-49	12.777	1.8532	**-9**	491.4	71.272	**31**	1831.1	265.58
-48	18.552	2.6908	**-8**	511.98	74.257	**32**	1881.1	272.83
-47	24.556	3.5615	**-7**	533.1	77.32	**33**	1932.1	280.23
-46	30.794	4.4663	**-6**	554.76	80.462	**34**	1984	287.76
-45	37.274	5.4062	**-5**	576.99	83.685	**35**	2037	295.44
-44	44.002	6.382	**-4**	599.77	86.99	**36**	2091	303.27
-43	50.985	7.3947	**-3**	623.13	90.378	**37**	2146	311.25
-42	58.228	8.4453	**-2**	647.08	93.851	**38**	2202	319.37
-41	65.739	9.5347	**-1**	671.62	97.41	**39**	2259.1	327.66
-40	73.525	10.664	**0**	696.76	101.06	**40**	2317.3	336.09
-39	81.592	11.834	**1**	722.51	104.79	**41**	2376.5	344.69
-38	89.947	13.046	**2**	748.89	108.62	**42**	2436.9	353.44
-37	98.598	14.3	**3**	775.9	112.53	**43**	2498.4	362.36
-36	107.55	15.599	**4**	803.55	116.54	**44**	2561	371.45
-35	116.81	16.942	**5**	831.85	120.65	**45**	2624.8	380.7
-34	126.39	18.332	**6**	860.82	124.85	**46**	2689.8	390.12
-33	136.3	19.768	**7**	890.45	129.15	**47**	2755.9	399.71
-32	146.53	21.252	**8**	920.77	133.55	**48**	2823.3	409.48
-31	157.1	22.786	**9**	951.78	138.04	**49**	2891.8	419.43

Table 9.2: Ambient Temperature and Standard Saturation Pressure of R410A (saturated vapor state)-continue

50	2961.7	429.55	**57**	3487.2	505.78	**64**	4083.4	592.25
51	3032.8	439.87	**58**	3567.8	517.47	**65**	4175	605.54
52	3105.2	450.36	**59**	3649.9	529.38	**66**	4268.3	619.07
53	3178.9	461.05	**60**	3733.5	541.5	**67**	4363.5	632.87
54	3253.9	471.94	**61**	3818.6	553.84	**68**	4460.5	646.93
55	3330.3	483.02	**62**	3905.3	566.41	**69**	4559.4	661.28
56	3408	494.3	**63**	3993.5	579.21	**70**	4660.4	675.93

Table 9.3: Ambient Temperature and Standard Saturation Pressure of R410A (Saturated liquid state)

Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)	Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)	Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)
-70	-65.704	-9.5296	**-37**	99.329	14.407	**-4**	602.1	87.327
-69	-63.425	-9.1991	**-36**	108.31	15.709	**-3**	625.53	90.725
-68	-61.029	-8.8515	**-35**	117.6	17.057	**-2**	649.55	94.209
-67	-58.511	-8.4863	**-34**	127.22	18.451	**-1**	674.16	97.779
-66	-55.867	-8.1028	**-33**	137.15	19.892	**0**	699.38	101.44
-65	-53.092	-7.7004	**-32**	147.42	21.381	**1**	725.21	105.18
-64	-50.182	-7.2782	**-31**	158.03	22.92	**2**	751.67	109.02
-63	-47.131	-6.8358	**-30**	168.98	24.509	**3**	778.76	112.95
-62	-43.935	-6.3722	**-29**	180.29	26.15	**4**	806.49	116.97
-61	-40.589	-5.8869	**-28**	191.97	27.843	**5**	834.88	121.09
-60	-37.087	-5.379	**-27**	204.01	29.59	**6**	863.93	125.3
-59	-33.425	-4.8479	**-26**	216.44	31.391	**7**	893.66	129.61
-58	-29.597	-4.2927	**-25**	229.24	33.249	**8**	924.07	134.02
-57	-25.599	-3.7128	**-24**	242.45	35.164	**9**	955.17	138.54
-56	-21.423	-3.1072	**-23**	256.05	37.137	**10**	986.98	143.15
-55	-17.066	-2.4752	**-22**	270.07	39.17	**11**	1019.5	147.87
-54	-12.521	-1.816	**-21**	284.5	41.263	**12**	1052.7	152.69
-53	-7.7823	-1.1287	**-20**	299.36	43.419	**13**	1086.7	157.62
-52	-2.8446	-0.41258	**-19**	314.66	45.637	**14**	1121.5	162.65
-51	2.2981	0.33331	**-18**	330.39	47.92	**15**	1156.9	167.8
-50	7.6519	1.1098	**-17**	346.58	50.268	**16**	1193.2	173.06
-49	13.223	1.9178	**-16**	363.23	52.683	**17**	1230.2	178.43
-48	19.017	2.7582	**-15**	380.35	55.165	**18**	1268.1	183.92
-47	25.041	3.6319	**-14**	397.95	57.717	**19**	1306.7	189.52
-46	31.3	4.5397	**-13**	416.03	60.34	**20**	1346.1	195.24
-45	37.802	5.4827	**-12**	434.61	63.034	**21**	1386.4	201.08
-44	44.553	6.4618	**-11**	453.69	65.802	**22**	1427.5	207.04
-43	51.558	7.4779	**-10**	473.28	68.643	**23**	1469.4	213.12
-42	58.826	8.5319	**-9**	493.39	71.561	**24**	1512.2	219.33
-41	66.362	9.625	**-8**	514.04	74.555	**25**	1555.9	225.67
-40	74.173	10.758	**-7**	535.22	77.627	**26**	1600.5	232.13
-39	82.267	11.932	**-6**	556.95	80.779	**27**	1645.9	238.72
-38	90.65	13.148	**-5**	579.24	84.012	**28**	1692.3	245.45

Table 9.3: Ambient Temperature and Standard Saturation Pressure of R410A (Saturated liquid state) -continue

29	1739.6	252.31	**43**	2505.8	363.44	**57**	3495.4	506.96
30	1787.8	259.3	**44**	2568.5	372.54	**58**	3575.9	518.64
31	1837	266.43	**45**	2632.4	381.8	**59**	3657.9	530.53
32	1887.1	273.7	**46**	2697.5	391.24	**60**	3741.3	542.63
33	1938.2	281.11	**47**	2763.7	400.85	**61**	3826.2	554.95
34	1990.3	288.67	**48**	2831.2	410.63	**62**	3912.7	567.48
35	2043.4	296.37	**49**	2899.8	420.59	**63**	4000.6	580.24
36	2097.5	304.22	**50**	2969.7	430.73	**64**	4090.2	593.23
37	2152.6	312.21	**51**	3040.9	441.05	**65**	4181.3	606.45
38	2208.8	320.36	**52**	3113.3	451.55	**66**	4274.1	619.9
39	2266	328.66	**53**	3187.1	462.25	**67**	4368.6	633.61
40	2324.3	337.11	**54**	3262.1	473.13	**68**	4464.8	647.56
41	2383.7	345.73	**55**	3338.5	484.21	**69**	4562.8	661.77
42	2444.2	354.5	**56**	3416.3	495.49	**70**	4662.6	676.25

3.3 Ambient Temperature and Standard Saturation Pressure of R32

Table 9.4: Ambient Temperature and Standard Saturation Pressure of R32

Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)	Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)	Ambient Temperature (°C)	Saturated gauge pressure (kPa)	Saturated gauge pressure (psi)
-70	-65.258	-9.4649	**-29**	183.58	26.627	**12**	1072.9	155.6
-69	-62.958	-9.1312	**-28**	195.42	28.344	**13**	1107.6	160.65
-68	-60.539	-8.7804	**-27**	207.64	30.115	**14**	1143.2	165.8
-67	-57.997	-8.4118	**-26**	220.24	31.943	**15**	1179.5	171.07
-66	-55.328	-8.0247	**-25**	233.24	33.828	**16**	1216.6	176.45
-65	-52.527	-7.6184	**-24**	246.64	35.772	**17**	1254.5	181.95
-64	-49.589	-7.1923	**-23**	260.45	37.775	**18**	1293.3	187.57
-63	-46.509	-6.7456	**-22**	274.68	39.838	**19**	1332.8	193.31
-62	-43.283	-6.2777	**-21**	289.33	41.964	**20**	1373.2	199.17
-61	-39.905	-5.7877	**-20**	304.43	44.153	**21**	1414.5	205.16
-60	-36.37	-5.275	**-19**	319.97	46.407	**22**	1456.6	211.27
-59	-32.673	-4.7388	**-18**	335.96	48.727	**23**	1499.6	217.5
-58	-28.808	-4.1782	**-17**	352.42	51.114	**24**	1543.5	223.87
-57	-24.77	-3.5926	**-16**	369.34	53.569	**25**	1588.3	230.36
-56	-20.553	-2.981	**-15**	386.75	56.093	**26**	1634	236.99
-55	-16.153	-2.3428	**-14**	404.65	58.689	**27**	1680.6	243.75
-54	-11.562	-1.677	**-13**	423.04	61.357	**28**	1728.2	250.65
-53	-6.7758	-0.98275	**-12**	441.94	64.098	**29**	1776.7	257.69
-52	-1.7877	-0.25928	**-11**	461.36	66.915	**30**	1826.2	264.87
-51	3.4082	0.49432	**-10**	481.31	69.808	**31**	1876.6	272.18
-50	8.8179	1.2789	**-9**	501.79	72.778	**32**	1928.1	279.65
-49	14.448	2.0955	**-8**	522.81	75.828	**33**	1980.5	287.25
-48	20.304	2.9448	**-7**	544.39	78.957	**34**	2034	295.01
-47	26.393	3.8279	**-6**	566.53	82.169	**35**	2088.5	302.91
-46	32.721	4.7457	**-5**	589.25	85.464	**36**	2144.1	310.97
-45	39.295	5.6992	**-4**	612.55	88.843	**37**	2200.7	319.18
-44	46.121	6.6893	**-3**	636.44	92.308	**38**	2258.3	327.55
-43	53.206	7.7169	**-2**	660.94	95.861	**39**	2317.1	336.07
-42	60.558	8.7831	**-1**	686.05	99.503	**40**	2377	344.75
-41	68.182	9.8889	**0**	711.78	103.23	**41**	2438	353.6
-40	76.086	11.035	**1**	738.14	107.06	**42**	2500.1	362.61
-39	84.277	12.223	**2**	765.15	110.97	**43**	2563.4	371.79
-38	92.762	13.454	**3**	792.8	114.99	**44**	2627.8	381.13
-37	101.55	14.728	**4**	821.13	119.09	**45**	2693.5	390.65
-36	110.64	16.048	**5**	850.12	123.3	**46**	2760.3	400.34
-35	120.05	17.413	**6**	879.8	127.6	**47**	2828.3	410.21
-34	129.79	18.824	**7**	910.18	132.01	**48**	2897.6	420.26
-33	139.86	20.284	**8**	941.26	136.52	**49**	2968.1	430.49
-32	150.26	21.793	**9**	973.06	141.13	**50**	3039.9	440.9
-31	161.01	23.353	**10**	1005.6	145.85	**51**	3113	451.5
-30	172.12	24.963	**11**	1038.8	150.67	**52**	3187.4	462.29

Table 9.4: Ambient Temperature and Standard Saturation Pressure of R32 (continue)

53	3263.1	473.27	**59**	3746.3	543.36	**65**	4282.9	621.19
54	3340.1	484.45	**60**	3831.9	555.77	**66**	4378	634.97
55	3418.6	495.82	**61**	3919	568.4	**67**	4474.7	649
56	3498.4	507.39	**62**	4007.6	581.25	**68**	4573.2	663.29
57	3579.6	519.17	**63**	4097.8	594.33	**69**	4673.4	677.82
58	3662.2	531.16	**64**	4189.6	607.64	**70**	4775.5	692.63

3.4 Sensor codes and definitions applicable to the table

Table 9.5: Sensor codes and definitions

Sensor code	definition	Sensor code	definition
T1	Inlet Air Temp. Sensor	**T2A**	Liquid Pipe Temp. Sensor
T0	Outdoor Air Temp. Sensor*	**T2**	Middle Pipe Temp. Sensor
TA	Discharge Air Temp. Sensor*	**T2B**	Gas Pipe Temp. Sensor

* Indicates that this sensor is only available for Fresh Air Processing Unit

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