



R410A

Commercial Air Conditioners

Engineering Data

Mini Series VRF



Model:

MDV-V230WN1(AU)

MIH200T1HN18(S)

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Part 1

General Information

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1 External Appearance

1.1 Indoor Units

Table 1-2.1: Indoor unit appearance

MIH200T1HN18(S)


1.2 Outdoor Units

Table 1-2.2: Outdoor unit appearance

MDV-V230WN1(AU)


2 Nomenclature

2.1 Indoor Units

2.1.1 Standard indoor units

Indoor units

M IH 22 T1 H N18 (S)
 ① ② ③ ④ ⑤ ⑥ ⑦

Legend		
No.	Code	Remarks
1	M	Midea
2	IH	VRF indoor unit
3	20	Capacity index (the capacity in kW multiplied by 10)
4	T1	Indoor unit type T1: High Static Pressure Duct
5	H	Power supply H: 1 phase, 220-240V, 50/60Hz
6	N18	Refrigerant type (N18: R410A&R32) MIH200T1HN18(S)
7	(S)	Function code

2.2 Outdoor Units

MDV - V 230 W N1 (AU)
 ① ② ③ ④ ⑤ ⑥

Legend		
No.	Code	Remarks
1	MDV	Midea outdoor unit
2	V	All DC inverter
3	230	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

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MDV-V230WN1(AU) VRF 50Hz



1 Specifications

Table 2-1.1: Model specifications

Sale Model			MDV-V230WN1(AU)
Power supply			220-240V~ 50Hz
Heating ¹	Capacity	kW	23.0
	Input	kW	5.28
	EER		4.36
Cooling ²	Capacity	kW	19.5
	Input	kW	5.6
	COP		3.48
Connected indoor unit	Maximum quantity		12
Compressor	Type		DC inverter
	Quantity		1
	Oil type		VG74
	Start-up method		Soft start
Fan	Type		Propeller
	Motor type		DC
	Quantity		2
	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) ³		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:

- Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- 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)

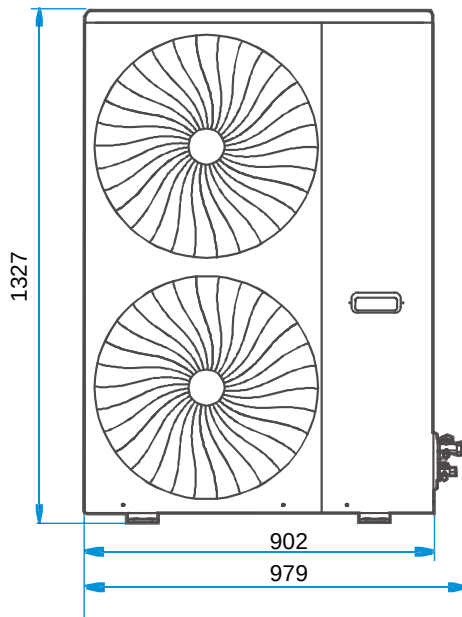
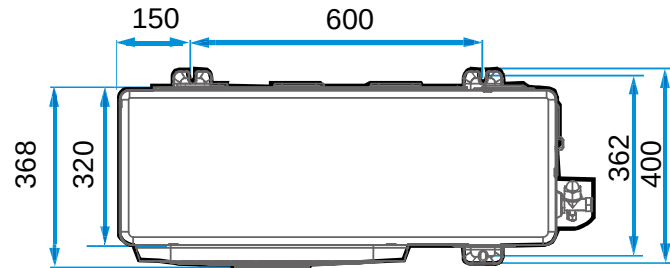


Figure 2-2.:Top view dimensions (unit: mm)



3 Installation Space Requirements

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

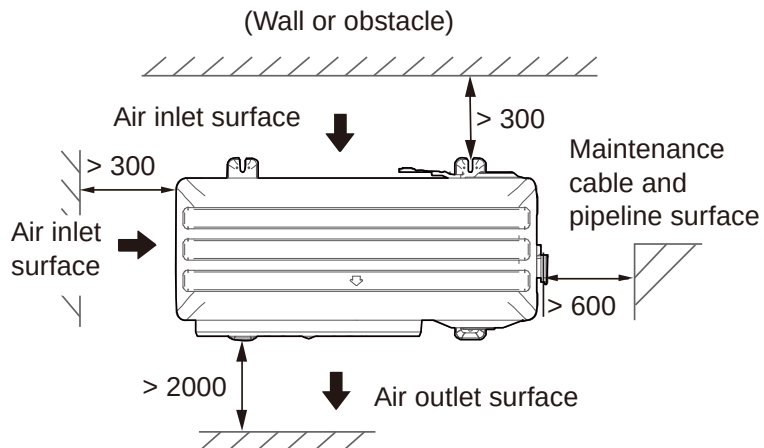
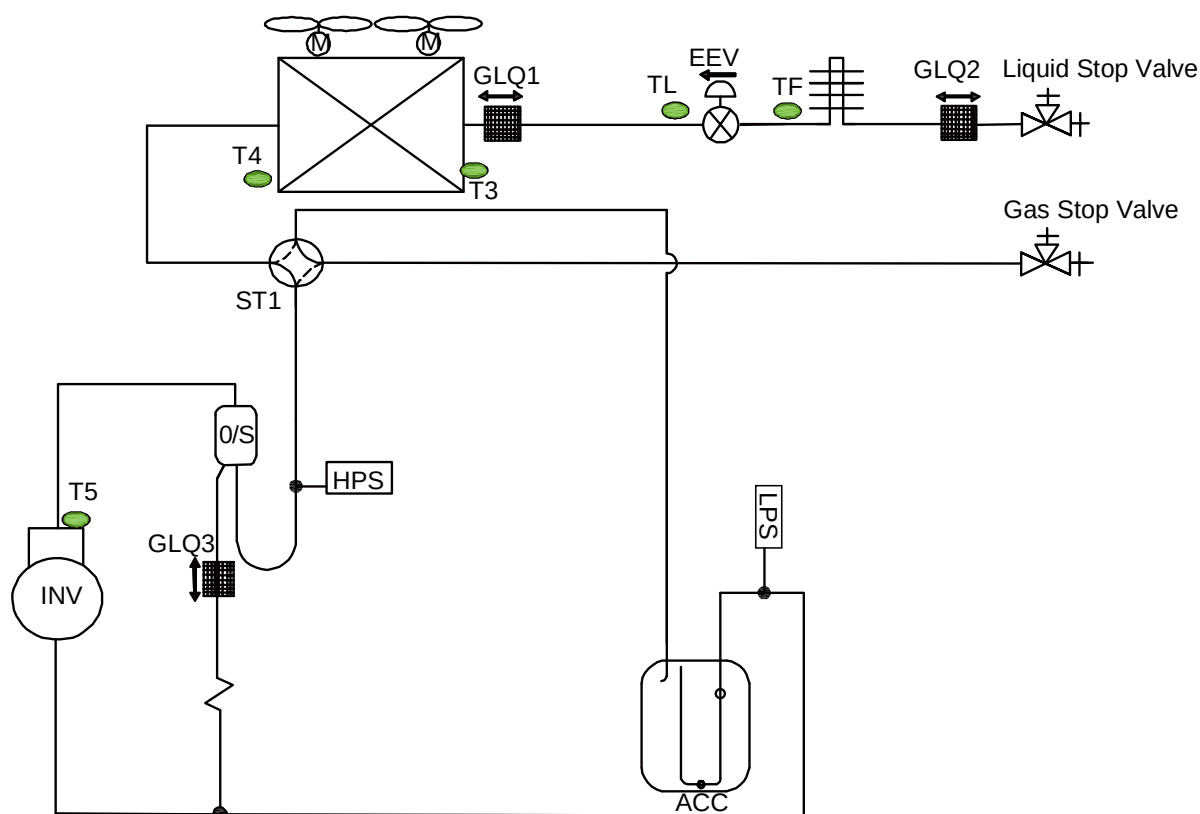


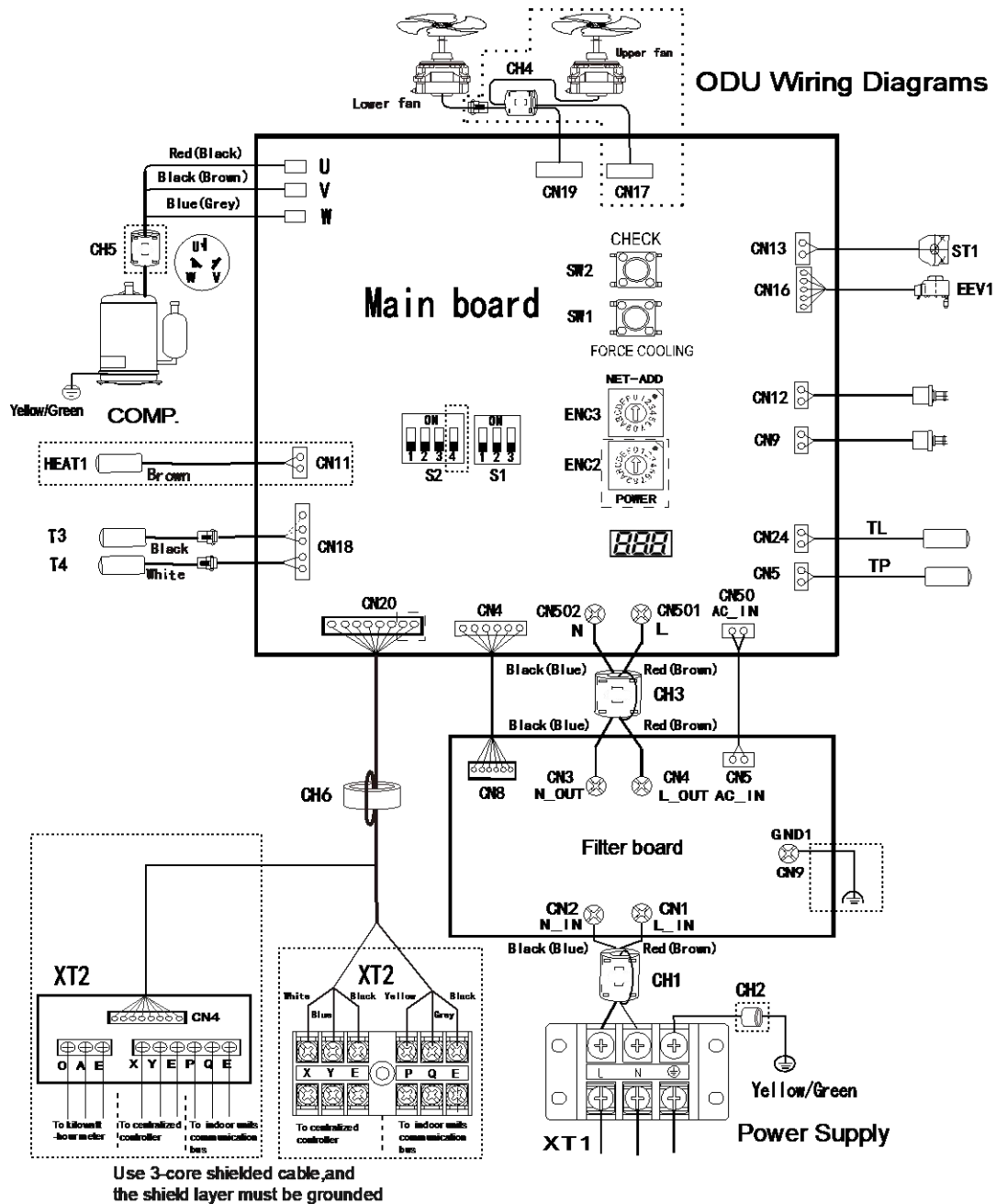
Figure 2-4.1: Piping diagram



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		

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6 Electrical Characteristics

Table 2-6.1: Outdoor unit electrical characteristics

Model	Power Supply ¹							Compressor		OFM	
	Hz	Volts	Min.	Max.	MCA ²	TOCA ³	MFA ⁴	MSC ⁵	RLA ⁶	kW	FLA
			volts	volts							
MDV-V230WN1(AU)	50Hz	220-240	198	264	33	33	40	-	30.5	0.1+0.1	0.71+0.71

Abbreviations:

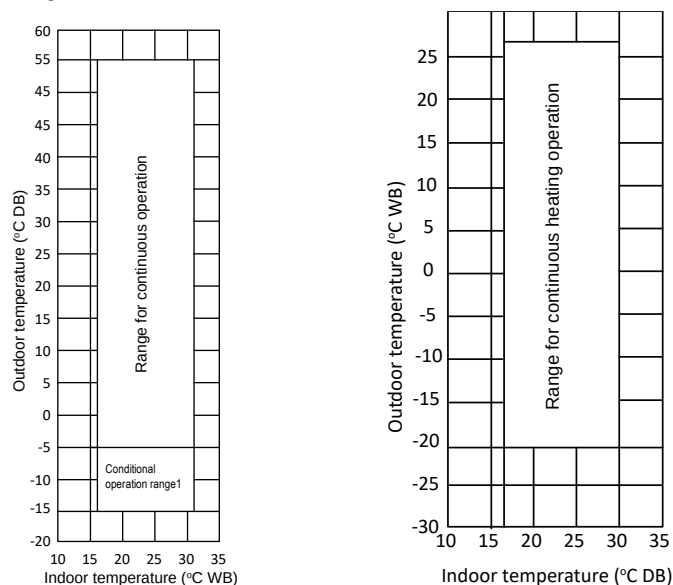
MCA: Minimum Circuit Amps; TOCA: Total Over-current Amps; MFA: Maximum Fuse Amps; MSC: Maximum Starting Current (A); RLA: Rated Load Amps; FLA: Full Load Amps

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

- Outdoor operating temperature under -5°C 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	$-15^{\circ}\text{C} \sim 55^{\circ}\text{C}$	$17^{\circ}\text{C} \sim 32^{\circ}\text{C}$
Heating operating	$-20^{\circ}\text{C} \sim 27^{\circ}\text{C}$	$16^{\circ}\text{C} \sim 30^{\circ}\text{C}$
Indoor humidity	$\leq 80\%$	
	Condensate might form on the unit's surface if the humidity is above 80%	

Notes:

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

Precaution:

- 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.

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8 Sound Levels

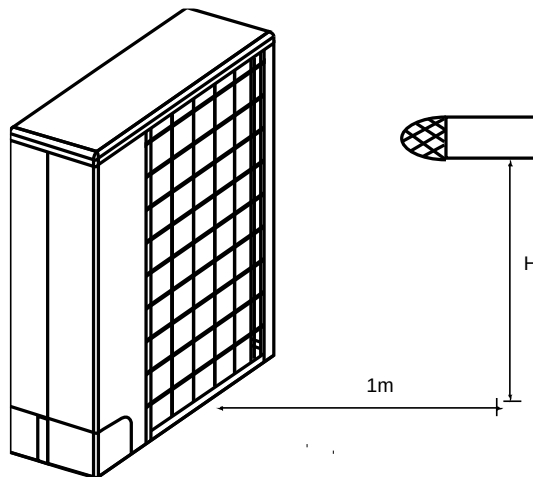
Table 2-9.1: Sound pressure level

Model	dB(A)	Height (m)
MDV-V230WN1(AU)	59	1

Notes:

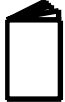
1. Sound pressure level is measured at a position 1m in front of the unit and Hm above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

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

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MDV-V230WN1(AU) VRF 50Hz



1 Specifications

MIH200T1HN18(S)

Model			MIH200T1HN18(S)
Power supply			1 phase, 220-240V, 50/60Hz
Cooling ¹	Capacity	kW	20
	Power input	W	560
Heating ²	Capacity	kW	23.5
	Power input	W	560
Fan motor	Model		ZKSN-920-8-12-2L
	Type		DC
Indoor coil	Number of rows		2
	Fin spacing	mm	1.5
	Fin type		Hydrophilic aluminum
	Tube OD and type	mm	Φ 7 Inner groove
	Number of circuits		11
Air flow rate ³		m ³ /h	4250/4014/3778/3542/3306/3070/2833
External static pressure ⁴		Pa	150(50~280)
Unit	Net dimensions ⁵ (WxHxD)	mm	1300×915×477
	Packed dimensions (WxHxD)	mm	1500×1070×640
	Net weight	kg	79.5
Refrigerant type			R410A/R32
Design pressure (H/L)		MPa	4.4/2.6
Pipe connections	Liquid/Gas pipe	mm	Φ 9.52/ Φ 19
	Drain pipe	mm	OD Φ 32

Notes:

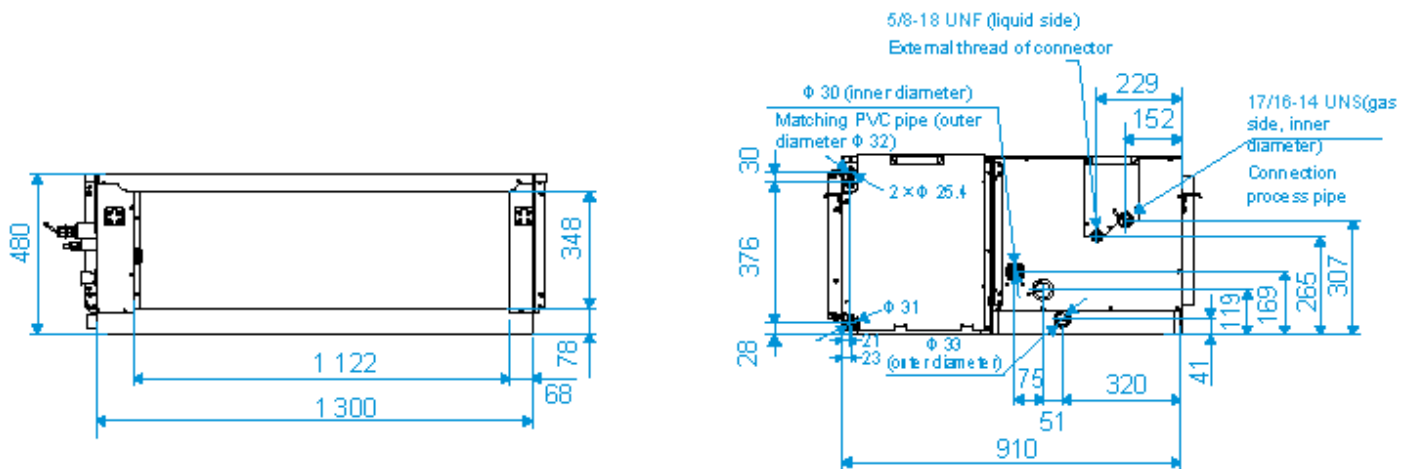
- Indoor temperature 27°C DB, 19°C WB; outdoor temperature 35°C DB; equivalent refrigerant piping length 7.5m with zero level difference.
- Indoor temperature 20°C DB; outdoor temperature 7°C DB, 6°C WB; equivalent refrigerant piping length 7.5m with zero level difference.
- Fan motor speed and air flow rate are from the highest speed to the lowest speed, total 7 rates for each model.
- Stable operation external static pressure range. (Note: setting external static pressure outside the unit's optimal static pressure range may lead to higher noise levels and lower airflow rate. For the optimal external static pressure range refer to the unit's installation manual.)
- 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

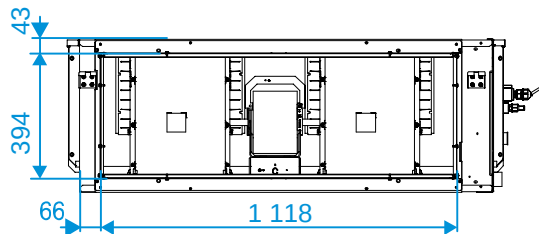
2.1 Unit Dimensions

Figure 2.1: High Static Pressure Duct dimensions (unit: mm)

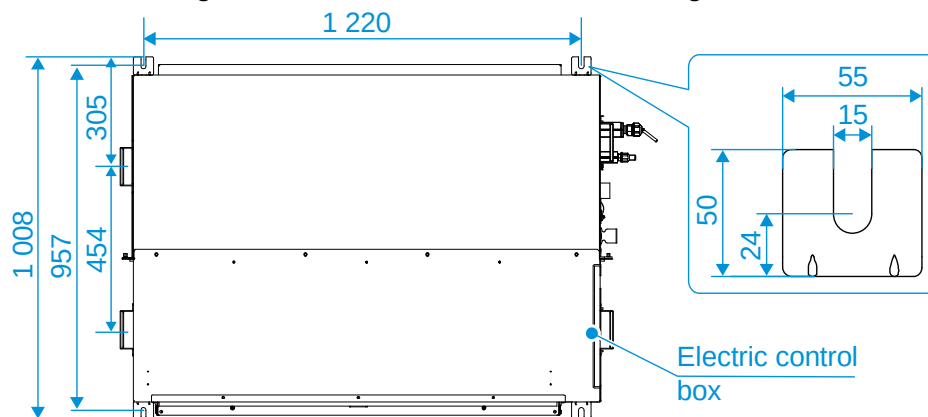
Appearance and dimensions of the air inlets, piping, drain pipes, power cable hole and communication wire hole:



Dimensions of the air outlets:



Dimensions of lugs and the screw hole of air outlet/inlet flange:



3 Unit Placement

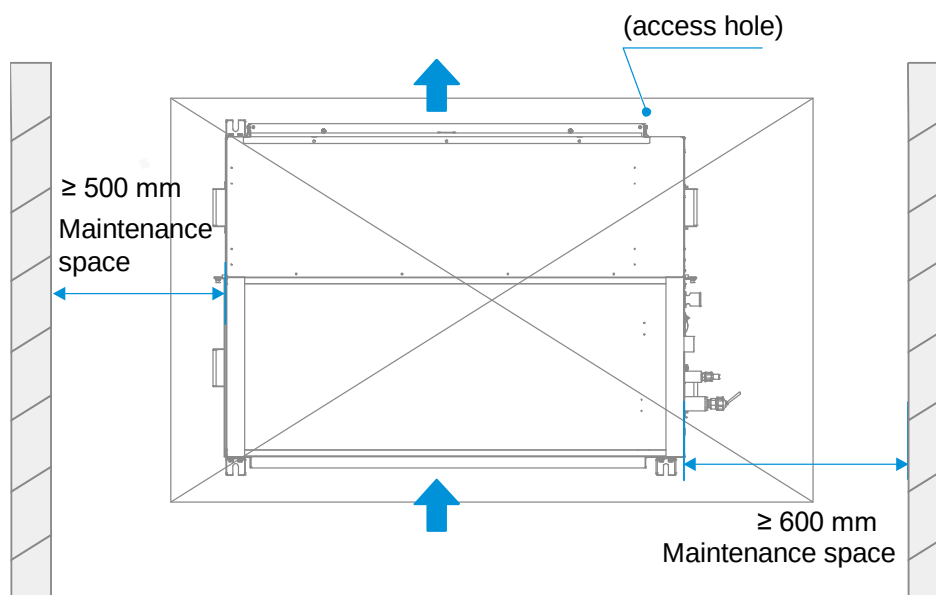
3.1 Placement Considerations

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.

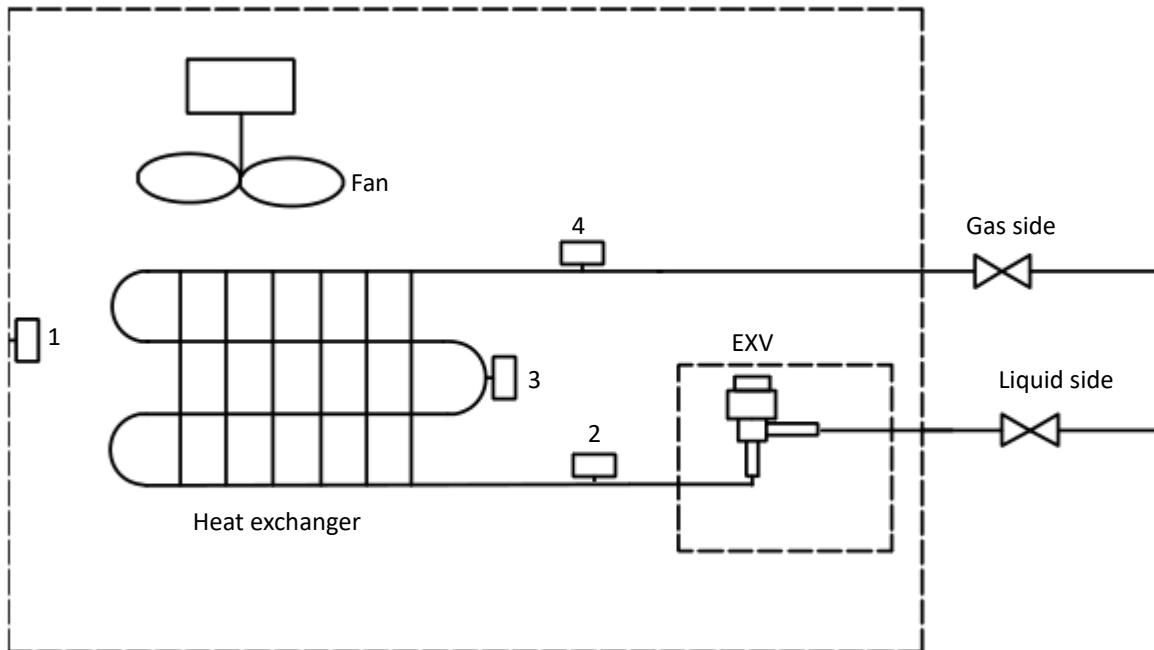
3.2 Space Requirements

Figure 3.1: High Static Pressure Duct space requirements (unit: mm)



4 Piping Diagram

Figure 4.1: High Static Pressure Duct piping diagram



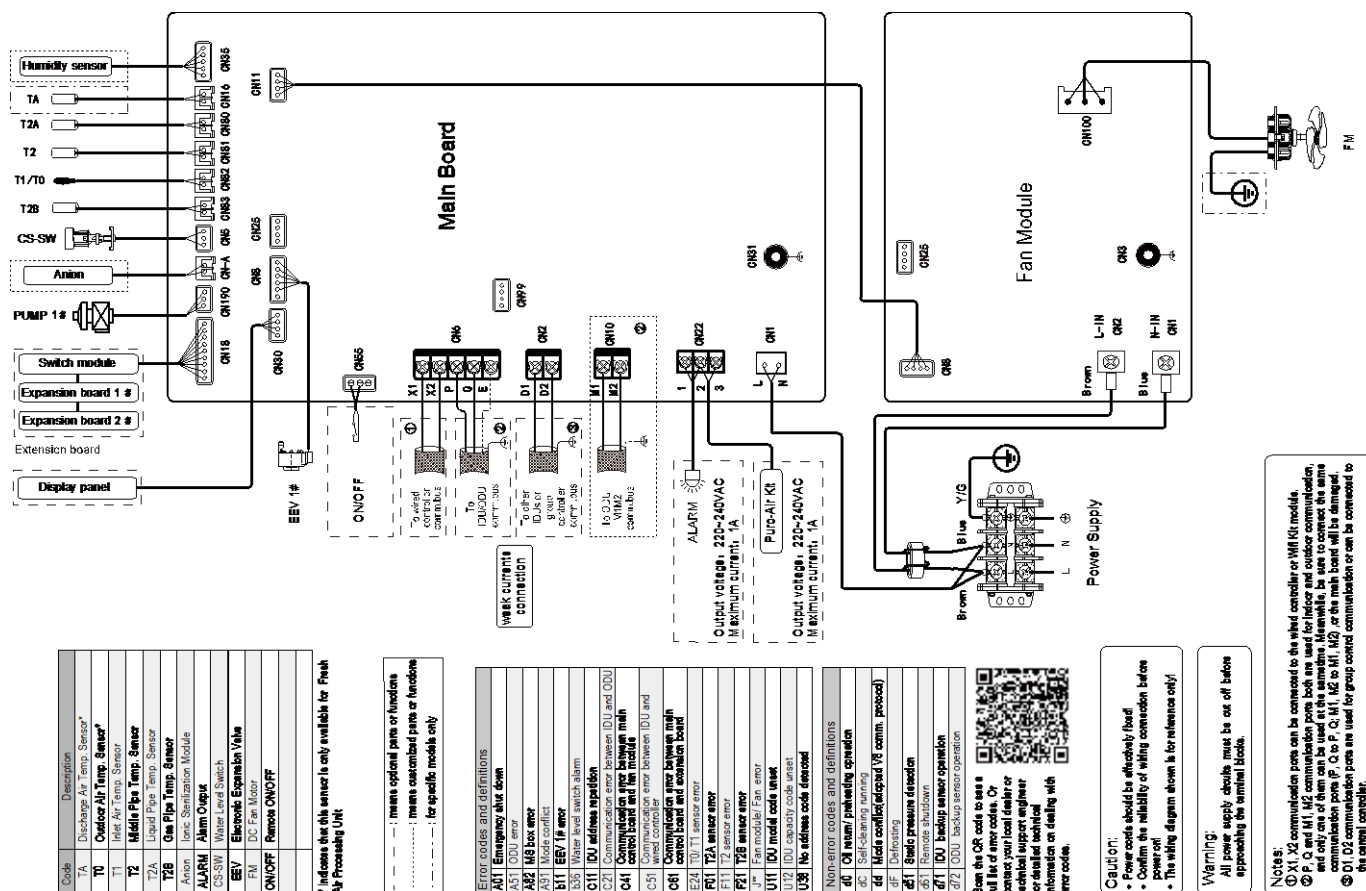
Legend		
1	T1	Indoor ambient temperature sensor
2	T2A	Indoor heat exchanger liquid side temperature sensor
3	T2	Indoor heat exchanger mid-point temperature sensor
4	T2B	Indoor heat exchanger gas side temperature sensor

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5 Wiring Diagram

Figure 5.1: High Static Pressure Duct 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

Model	Power supply						Indoor Fan Motor
	Hz	Volts	Min. volts	Max. volts	MCA	MFA	Rated motor output (W)
MIH200T1HN18(S)	50/60	220-240	198	264	5.25	30	920

Abbreviations:

MCA: Minimum Circuit Amps

MFA: Maximum Fuse Amps

Part 4

System Design and Installation

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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

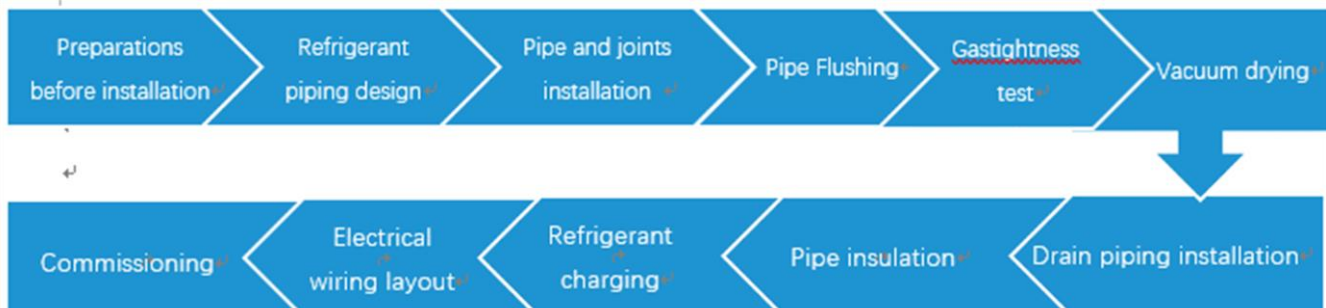
All system installation including installation of piping and electrical works must only be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.

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.

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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.

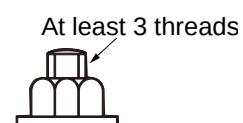


Figure 3-2.2: Outdoor unit typical concrete base structure design (unit: mm)

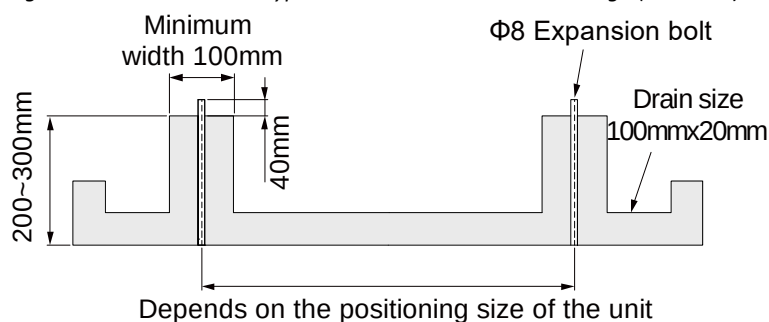


Figure 3-2.3: Expansion bolt positioning

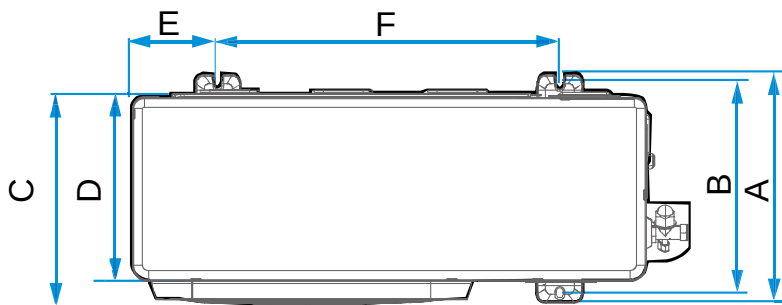


Table 3-2.1: Expansion bolt spacings

(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

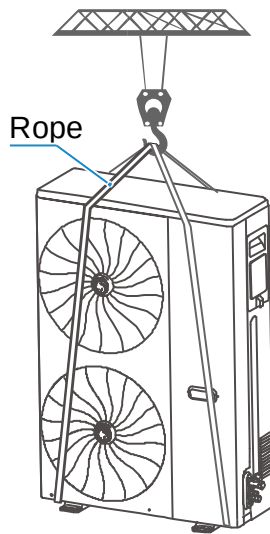


Figure 3-2.5: 8-24HP Center of gravity

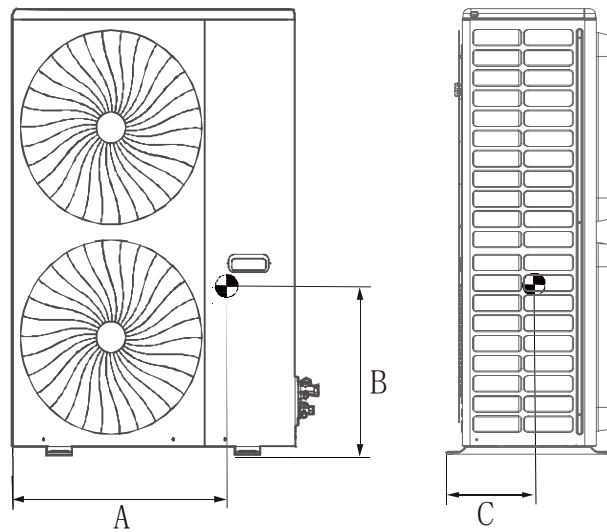


Table 3-2.2: Center of gravity (unit: mm)

Model	A	B	C
23kW	650	500	150

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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.

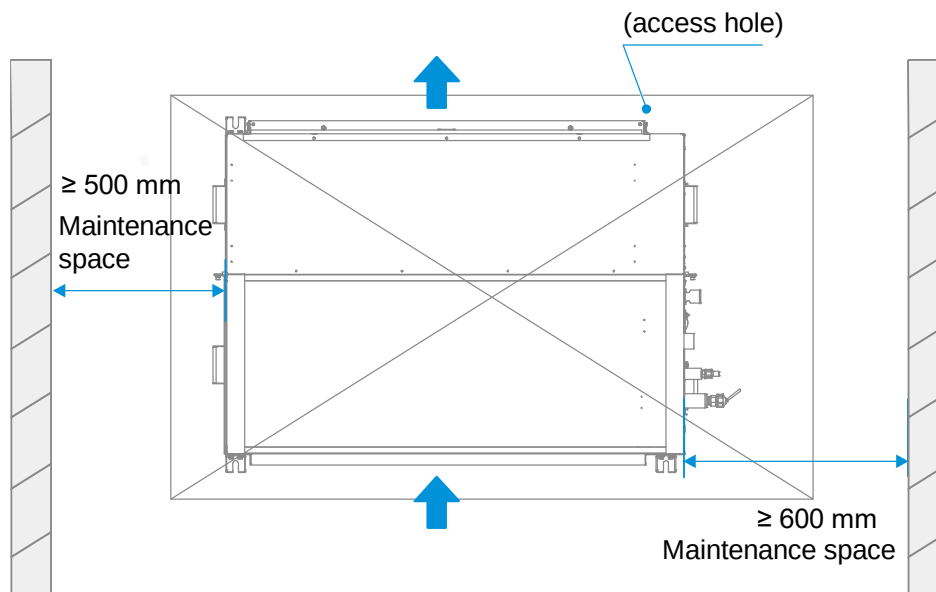
Notes for installers



- 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 Space Requirements

Figure 3.1: High Static Pressure Duct space requirements (unit: mm)



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.

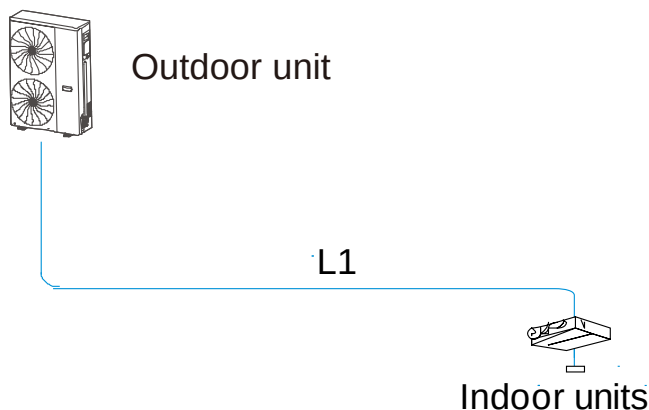
Table 3-4.1: Piping temper and thickness

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
Main pipe	L1

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

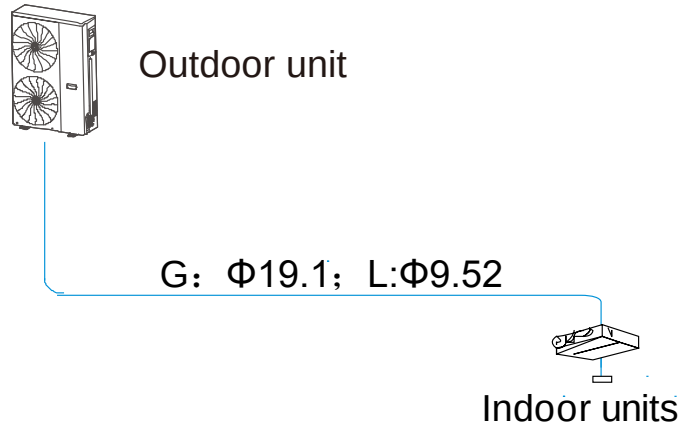
Category			Permitted values	Piping in Figure 3-4.1
Piping lengths	Total piping length		≤ 200m	L1
Level differences	Largest level difference between indoor unit and outdoor unit	Outdoor unit is above	≤ 30m	-
		Outdoor unit is below	≤ 20m	

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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)

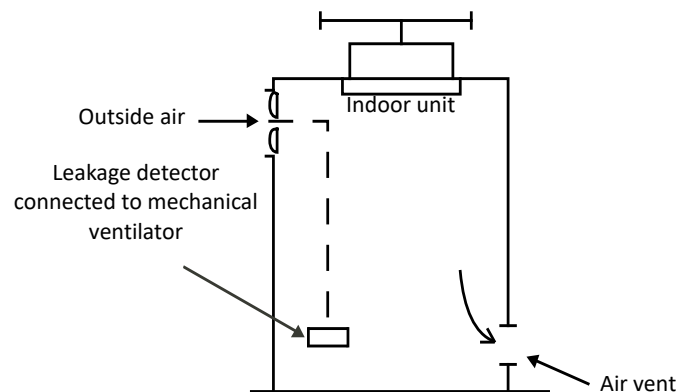
Outdoor units	Gas pipe (mm)	Liquid pipe (mm)
23kW	$\Phi 19.1$	$\Phi 9.52$

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/m³ 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, 8.1 "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/m³, 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 3-4.6: Mechanical ventilator controlled by refrigerant leak detector



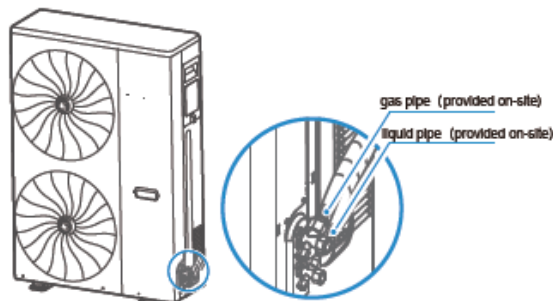
4 Refrigerant Piping Installation

4.1 Refrigerant pipe connection

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

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

Figure 3-5.17: The outdoor refrigerant connecting pipe position



4.1.1 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/scrapper 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.

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4.1.2 Bending piping

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

Notes for installers



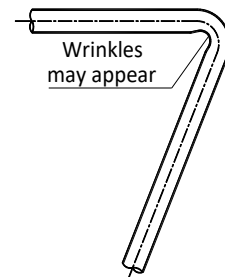
Piping bending methods

- Hand bending is suitable for thin copper piping ($\Phi 6.35\text{mm}$ - $\Phi 12.7\text{mm}$).
- Mechanical bending (using a bending spring, manual bending machine or powered bending machine) is suitable for a wide range of diameters ($\Phi 6.35\text{mm}$ - $\Phi 54.0\text{mm}$).

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°



4.1.3 Flared joints

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

Notes for installers

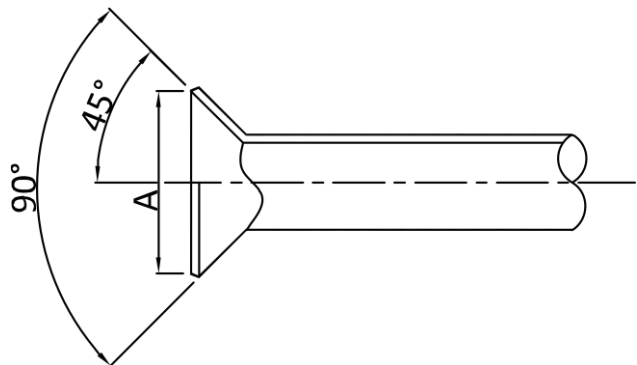


- Before flaring 1/2H (half hard) piping, anneal the end of the pipe to be flared.
- Remember to place the flare nut on the piping before flaring.
- Ensure the flared opening is not cracked, deformed or scratched, otherwise it will not form a good seal and refrigerant leakage may occur.
- The diameter 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)
$\Phi 6.35$	8.7 - 9.1
$\Phi 9.52$	12.8 - 13.2
$\Phi 12.7$	16.2 - 16.6
$\Phi 15.9$	19.3 - 19.7
$\Phi 19.1$	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.

4.1.4 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

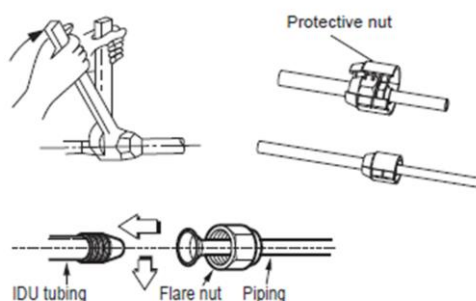


- When connecting the flare nuts, apply a thin coat of refrigeration oil to the flared ends of the pipes.
- Align the center of the two pipes that you will connect. Remember to place the flare nut on the piping before flaring.
- The protective nut is a one-time part, it can not be reused. In case it 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
Φ9.52	32.7~39.9 N.m (333~407 kgf.cm)
Φ19.1	97.2~118.6 N.m (990~1210 kgf.cm)

Figure 3-5.3: Nut fastening



4.1.5 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.

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4.2 Pipe Flushing

4.2.1 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.

4.2.2 Procedure

Notes for installers



Warning

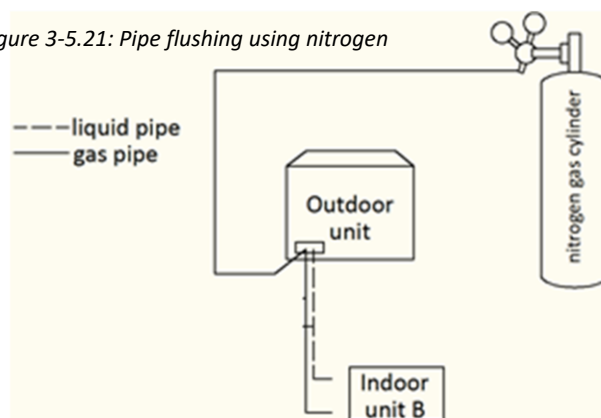
Only use nitrogen for flushing. Using carbon dioxide risks leaving condensation in the piping. Oxygen, air, refrigerant, flammable gases and toxic gases must not be used for flushing. Use of such gases may result in fire or explosion.

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



4.3 Gastightness Test

4.3.1 Purpose

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

4.3.2 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.

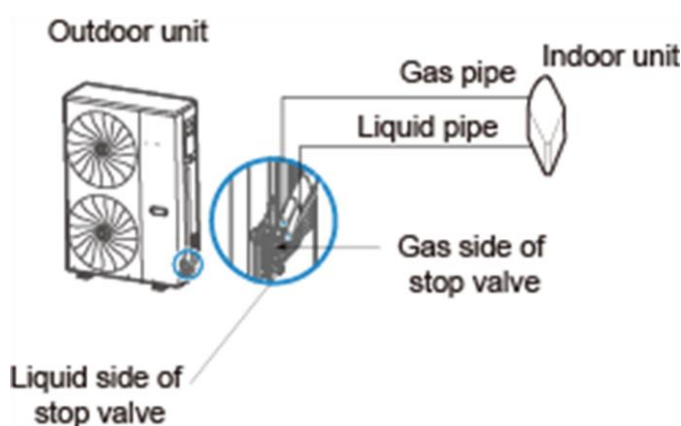
Step 2

- 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, 4.3.3 “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, 4.4 “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



4.3.3 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).

4.4 Vacuum Drying**4.4.1 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).

4.4.2 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.

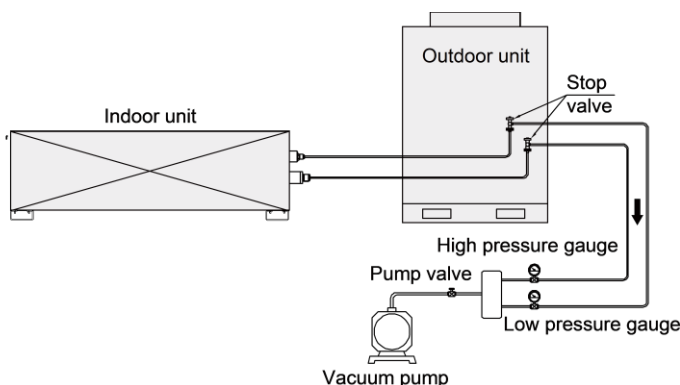
Step 3

- 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, 8 "Charging Refrigerant").

Figure 3-5.15: Vacuum drying



Pressure gauge

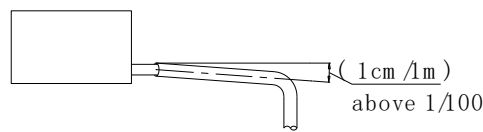
5 Drain Piping

5.1 Design Considerations

Drain piping design should take account of the following considerations:

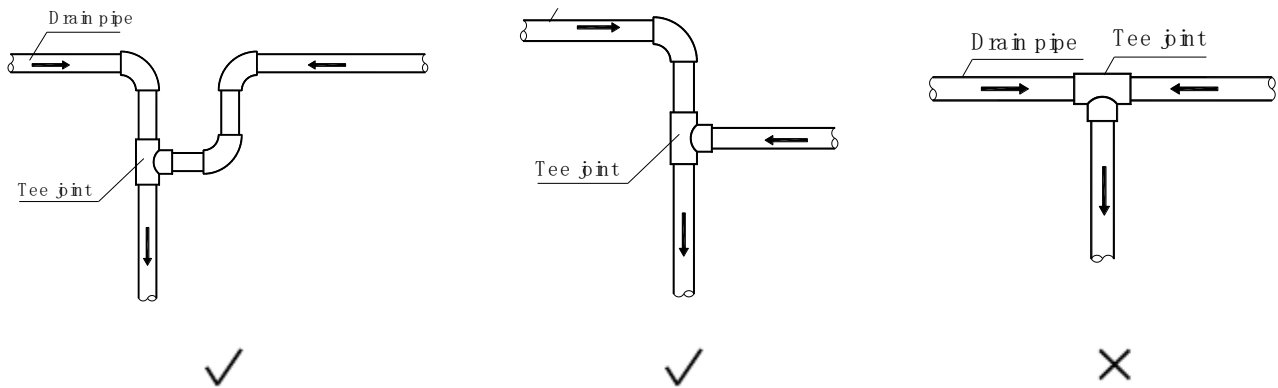
- Indoor unit condensate drain piping needs to be of sufficient diameter to carry the volume of condensate produced at the indoor units and installed at a slope sufficient to allow drainage. Discharge as close as possible to the indoor units is usually preferable.
- To prevent the drain piping becoming 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 outlet should not be installed too close to indoor unit lift pumps.

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

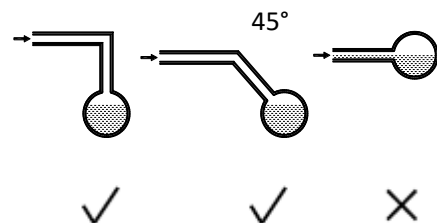


Figure 3-6.4: Effect of insufficient drain piping support

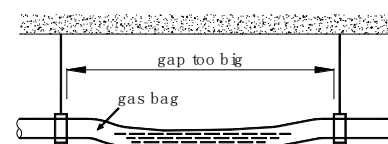
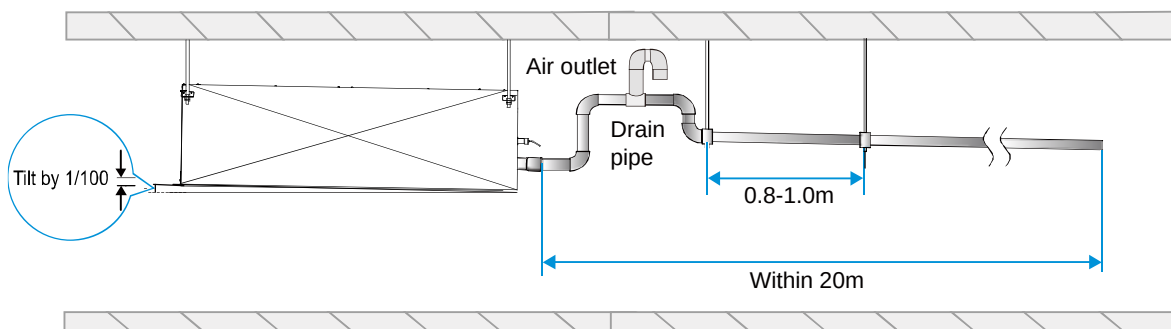


Figure 3-6.5: Drain piping air outlet

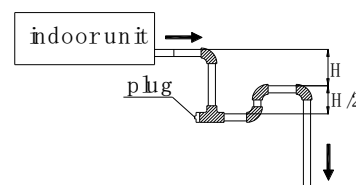


- Air conditioner drain piping should be installed separately from waste, rainwater and other drain piping and should not come into direct contact with the ground.
- Drain piping diameter should be not less than the indoor units' drain piping connection.
- To allow inspection and maintenance, the piping 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:

$$\begin{aligned} \text{Combined flow volume} &= 3 \times 2 \text{ L/HP/h} \times 2\text{HP} + 2 \times 2 \text{ L/HP/h} \times 1.5\text{HP} = 18 \text{ L/h} \end{aligned}$$

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	

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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	
PVC50	50	1440	Branch or main piping
PVC63	63	2760	
PVC75	75	5710	
PVC90	90	8280	

5.4 Drain Piping Installation

Notes for installers



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

**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.

5.5 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

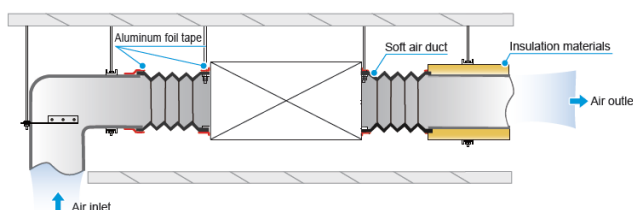
- The drain plug in the drainage pan is for removing accumulated water prior to performing indoor unit maintenance. During normal operation, the drain should be plugged to prevent leakage.

6 Air Duct

6.1 Design Considerations

- Please use locally purchased air ducts and soft air ducts (Use environmentally friendly, odorless materials, otherwise the air conditioner may generate odor when it runs).
- Install the flange at the air return side, and use aluminum foil tape to seal the connection part between the flange and the air duct to avoid air leakage.
- Use aluminum foil tape to seal the connection part between the flange at the air supply side and the air duct to avoid air leakage.
- The air ducts on the air supply side shall be insulated to prevent condensation.
- When installing the air duct and its components, need to fix and adjust the supports and suspension brackets to ensure they are in the right position and subject to uniform force.
- Make sure that the air duct and its components are clean before installation.
- After installation, carry out the air tightness test on the air duct to ensure its air leakage.

Figure 3-6.7: Air ducts design



6.2 Procedure

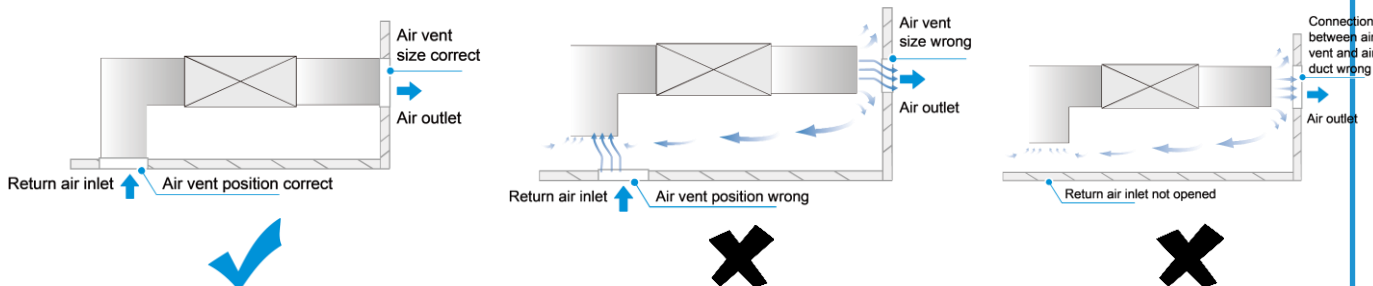
Notes for installers



Warning

- Connect the air outlet and air inlet to the ceiling opening properly to avoid short circuit as in Figure 3-6.8
- Use canvas or soft air duct to connect the indoor unit and air duct at a distance (width) of 150-300mm.
- Do not lay wires, cables or other pipes containing toxic, flammable, and explosive gases or liquids inside the air ducts.
- The air duct regulating device shall be installed in a position that is easily accessible, flexible, and reliable.
- The air duct should be securely connected to the vent.
- The frame shall fit snugly into the building decoration, and should appear neat and flexible. It shall not be twisted or warped.
- If the air vent is installed horizontally, its deviation shall not exceed 3/1000; if installed vertically, its deviation shall not exceed 2/1000.
- All the air vents in one room shall be neatly installed at the same height.
- All metal accessories (including supports, suspension brackets, and brackets) for the piping system shall undergo anti-corrosion treatment.

Figure 3-6.8: Connection between air vent and air duct



7 Insulation

7.1 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.

7.1.1 Selecting insulation materials

Use 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).

7.1.2 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		

7.1.3 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.

7.2 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.

7.3 Ducting Insulation

Suitable insulation should be added to ducting in according with all applicable legislation.

8 Charging Refrigerant

8.1 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.

$$\begin{aligned} \text{Additional refrigerant charge R (kg)} &= L_1 (\Phi 6.35) \times 0.022 \\ &+ L_2 (\Phi 9.52) \times 0.057 \\ &+ L_3 (\Phi 12.7) \times 0.110 \\ &+ L_4 (\Phi 15.9) \times 0.170 \\ &+ L_5 (\Phi 19.1) \times 0.260 \end{aligned}$$

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
23kW	9.6

8.2 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, 8.1 "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.

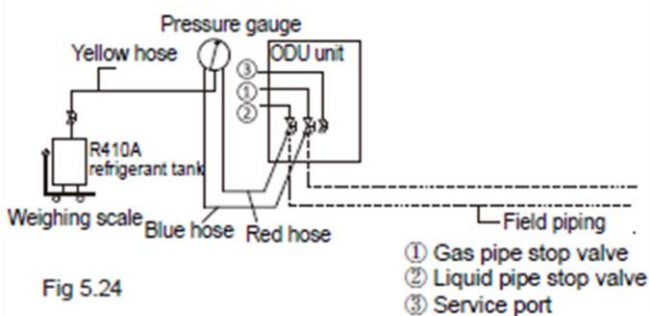
Step 3

- 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



Pressure gauge

Part 5

Electrical Components and Wiring Diagrams

1 Outdoor Unit Electric Control Box Layout	46
2 Outdoor Unit Main PCB	47

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1 Outdoor Unit Electric Control Box Layout

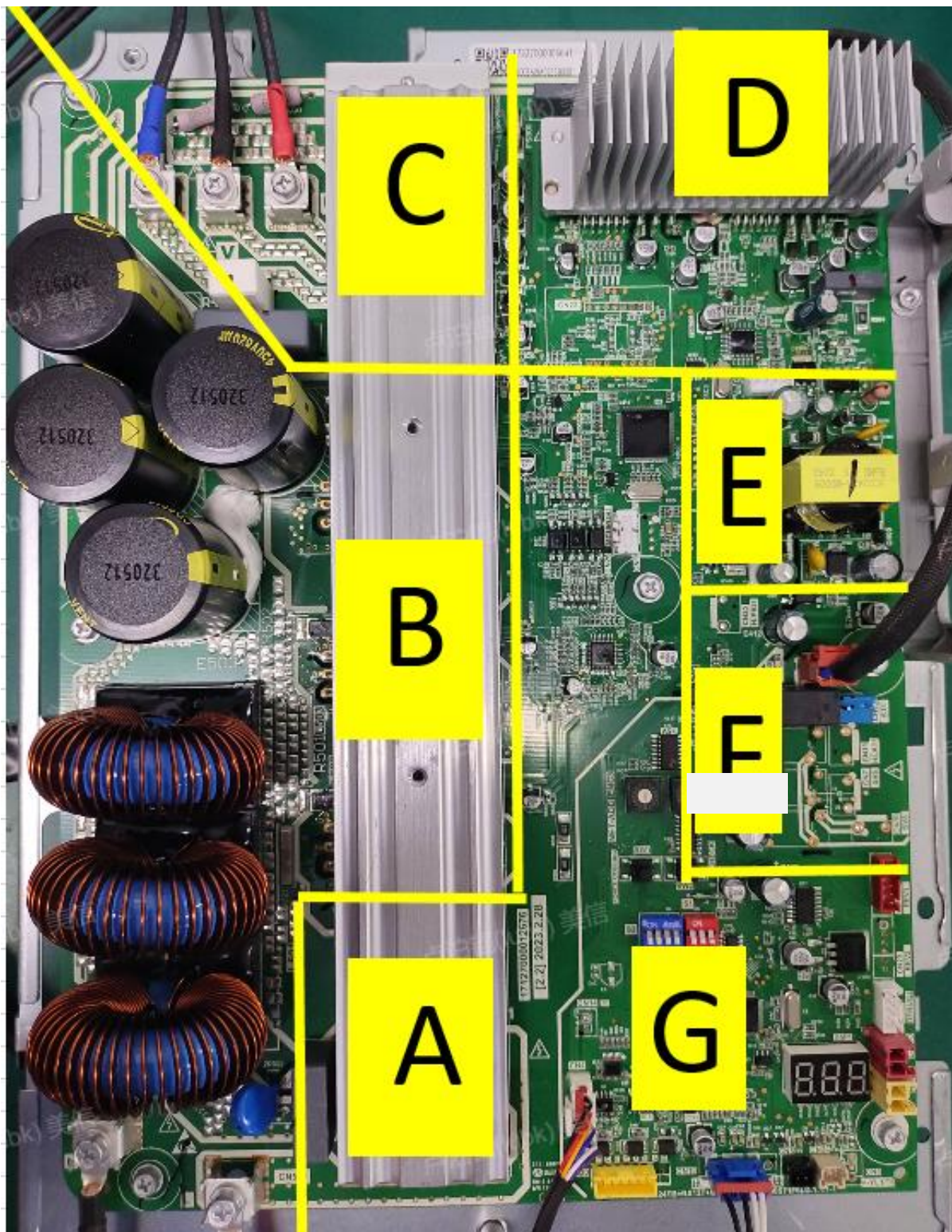
Figure 4-1.1: Electric control box (compressor & fan drive board)



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.

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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	ON 	S1-1 is ON, Forced implementation of old indoor unit protocol S1-1 is OFF, Automatically adapting to indoor unit protocol(default)
	S1-2	ON 	S1-2 is ON, Forced clearing of indoor unit address S1-2 is OFF, Automatic addressing (default)
	S1-3	ON 	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	ON 	First enabled priority mode(default)
	S2=100	ON 	Cooling priority mode
	S2=010	ON 	Automatic selection of priority mode
	S2=001	ON 	In response to cooling mode only
	S2=110	ON 	In response to heating mode only
	S2=011	ON 	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:

- Operating mode:
 - 0: standby; 2: cooling; 3: heating; 4: forced cooling.
- 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

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4 Error for Other Common Faults	75
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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



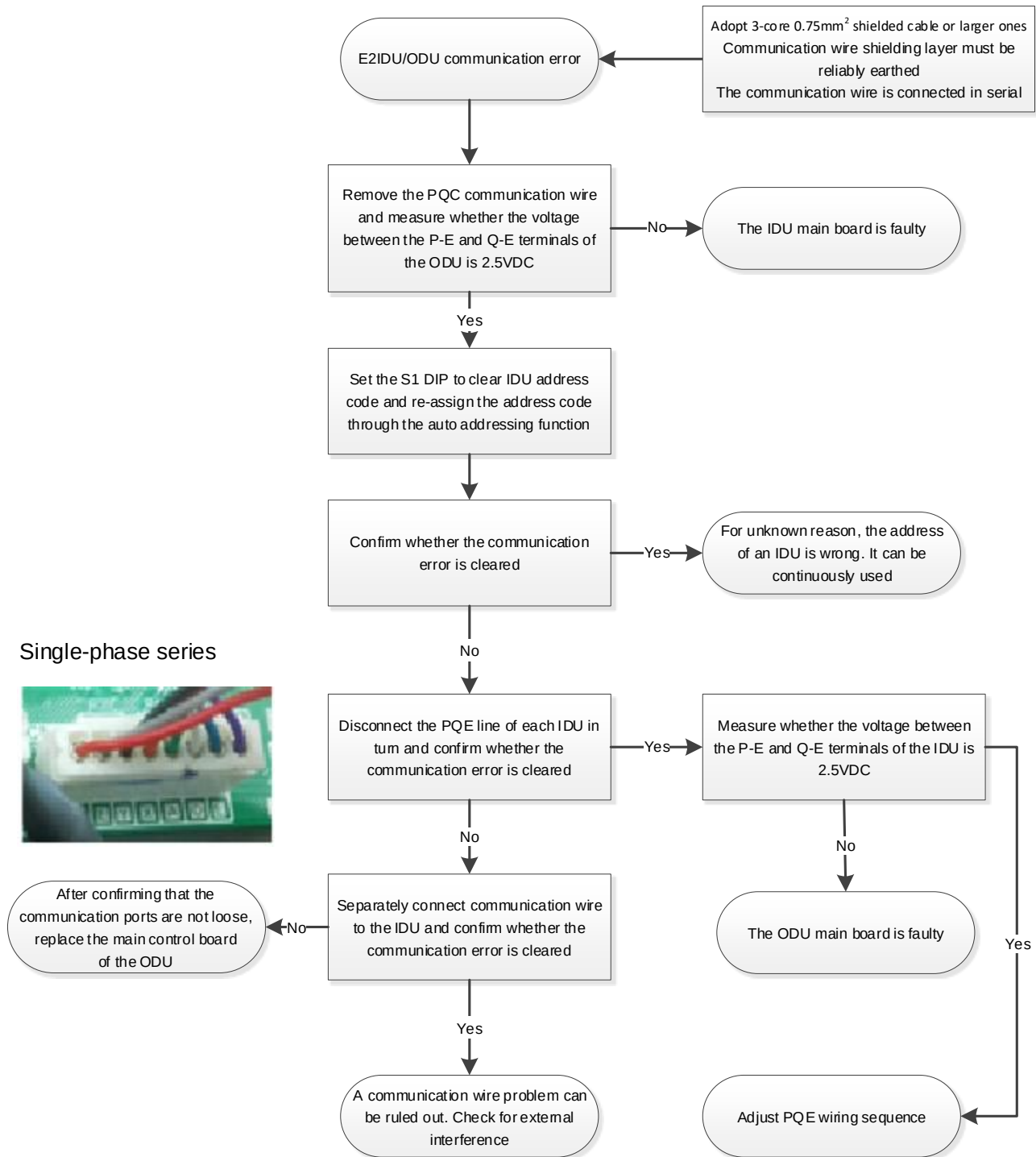
2.1.2 Description

- 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.

Single-phase series



2.2 E4: T3&T4 temperature sensor error

2.2.1 Digital display output



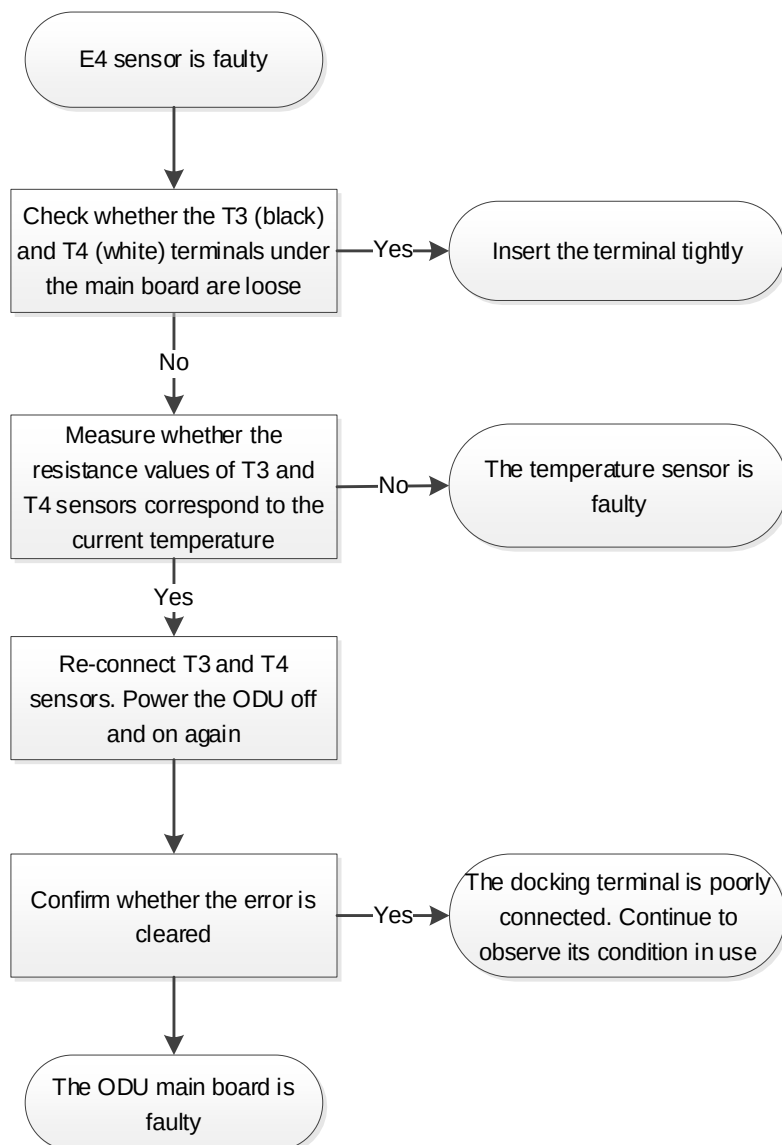
2.2.2 Description

- 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



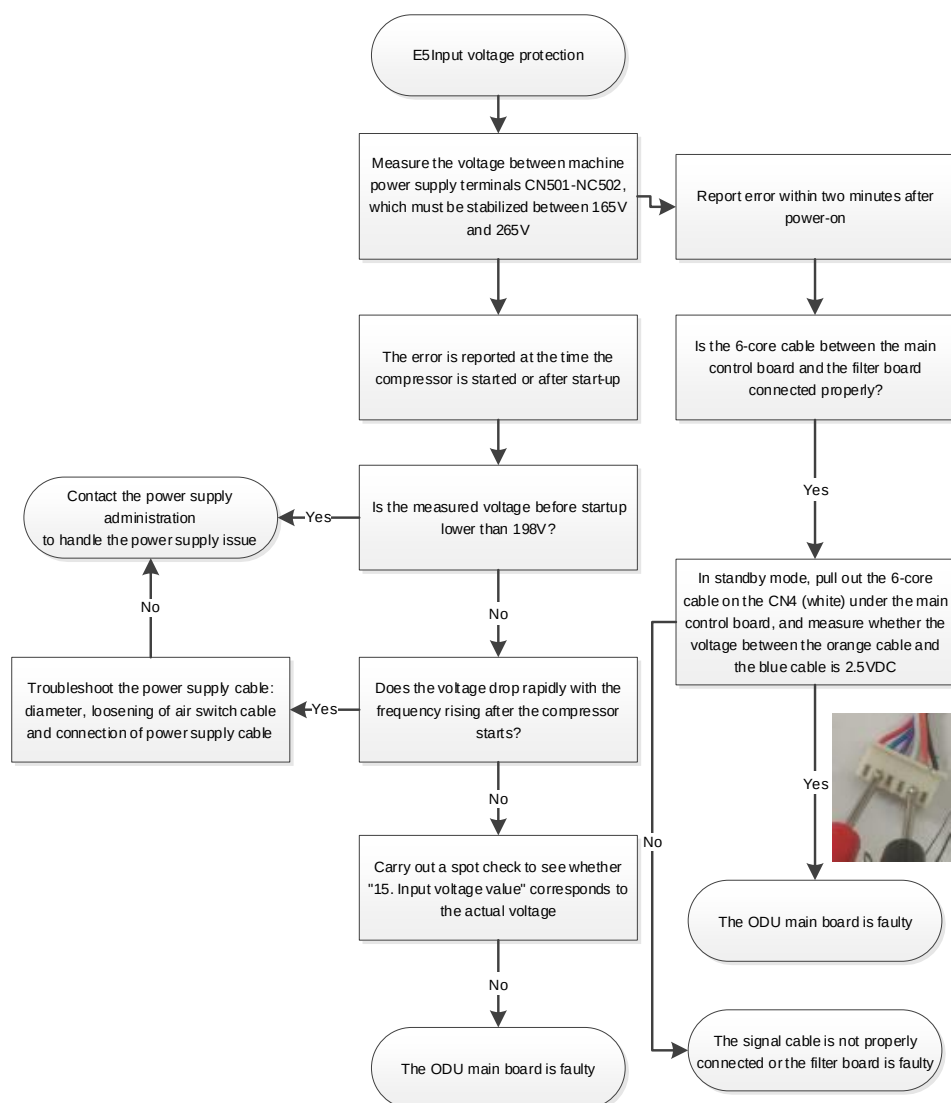
2.3.2 Description

- 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



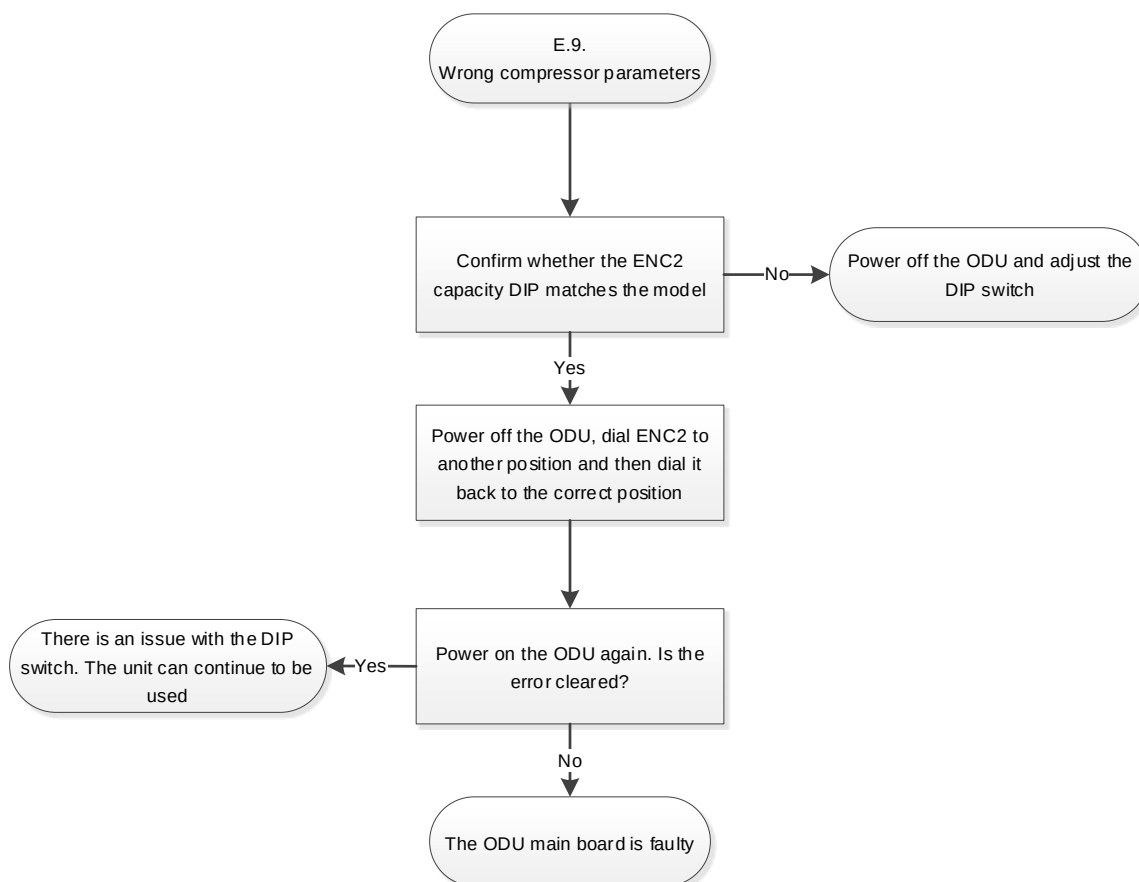
2.4.2 Description

- 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



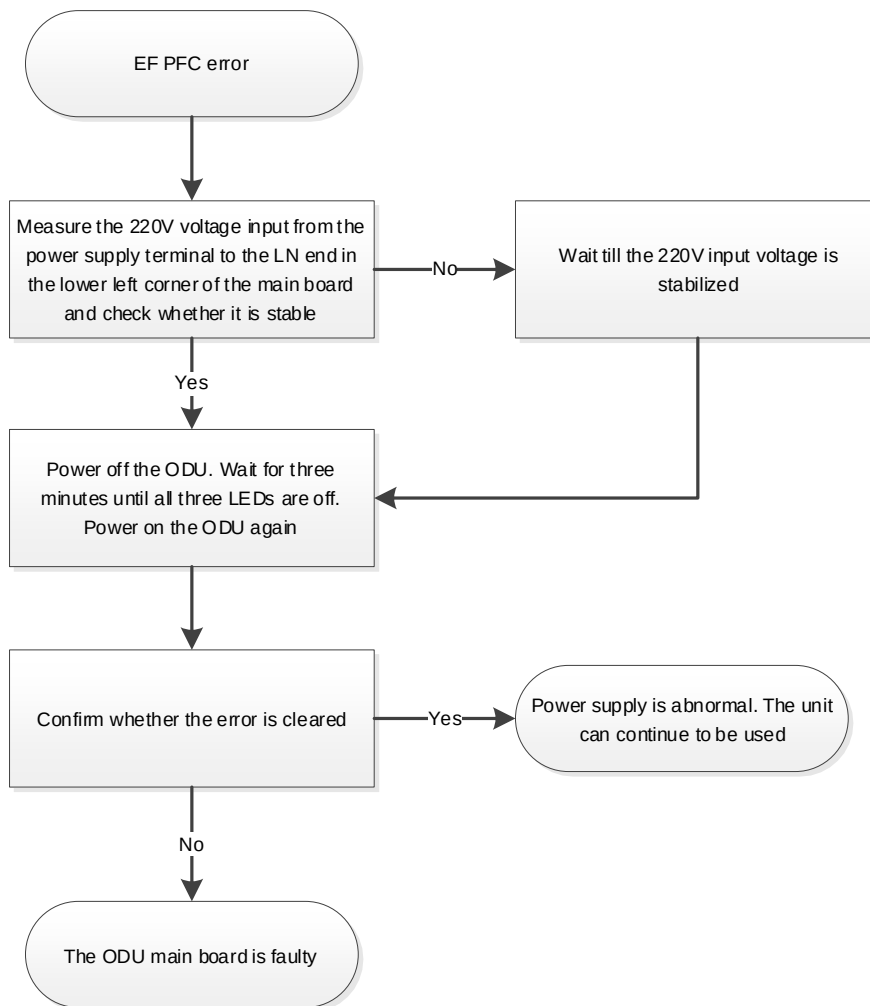
2.5.2 Description

- 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



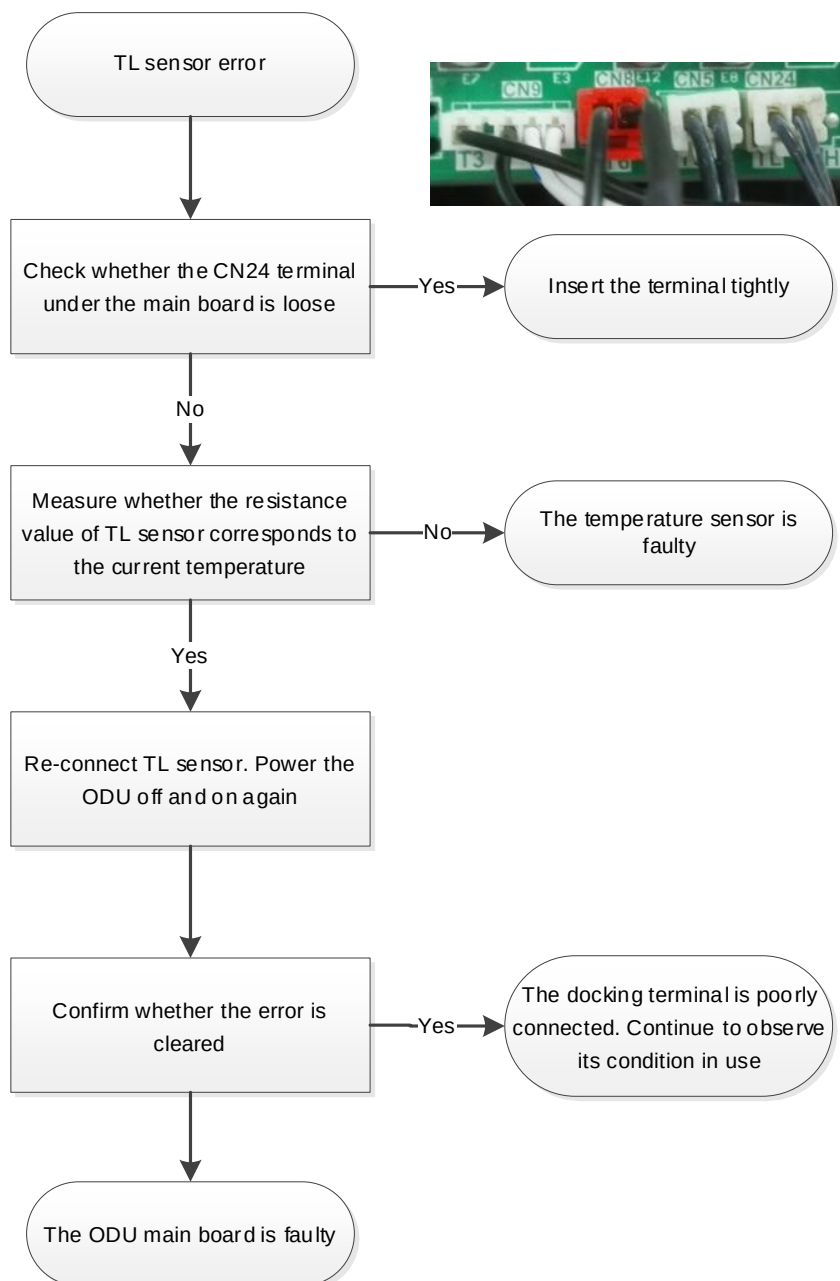
2.6.2 Description

- 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



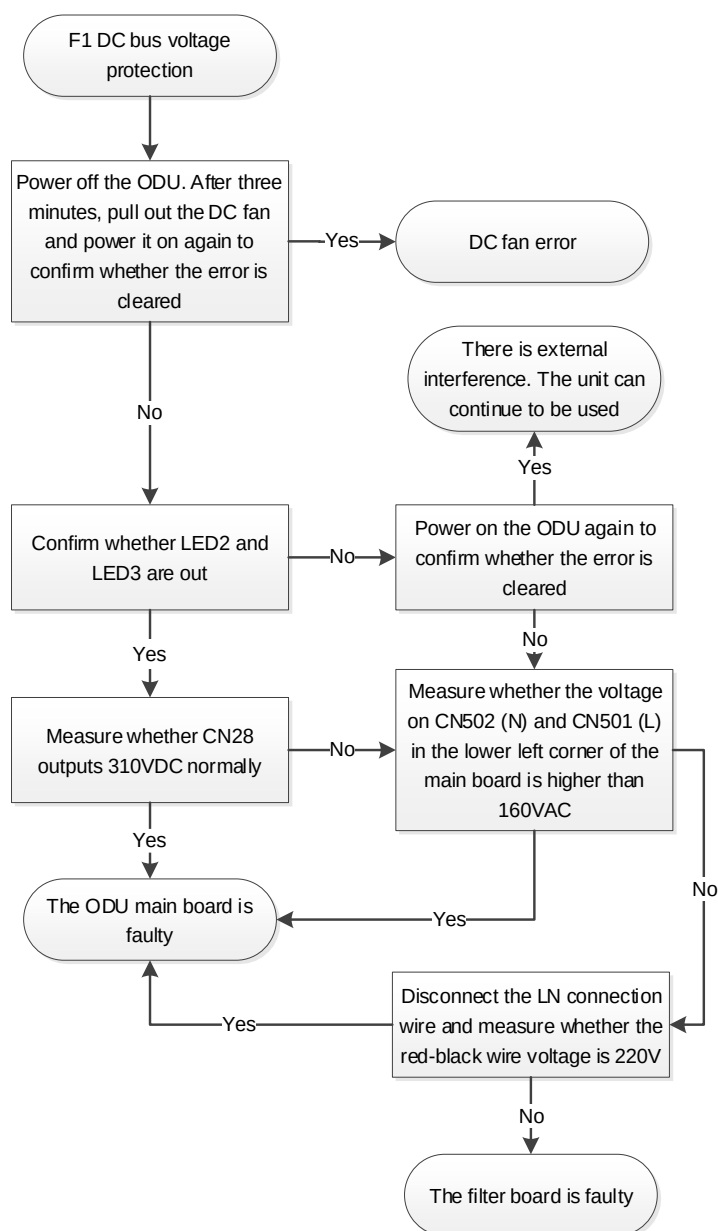
2.7.2 Description

- 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



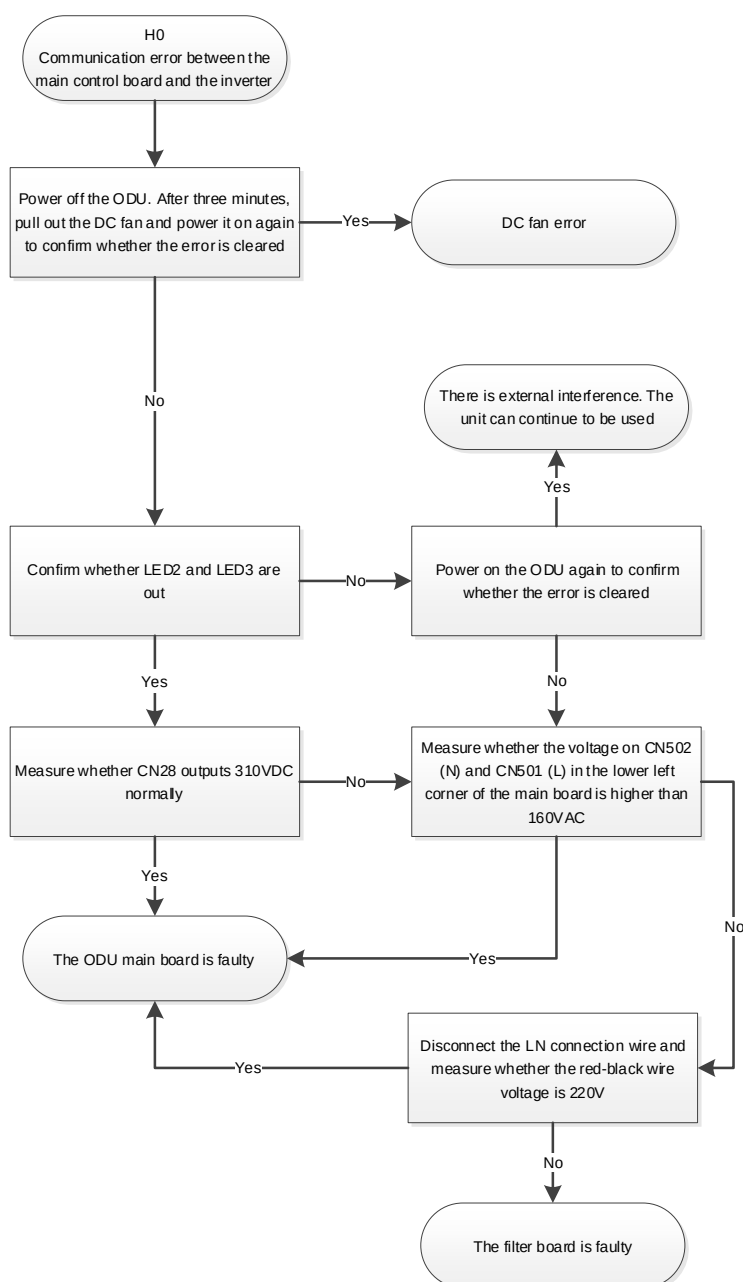
2.8.2 Description

- 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.

2.8.4 Procedure



2.9 HF: M-Home mismatch

2.9.1 Digital display output



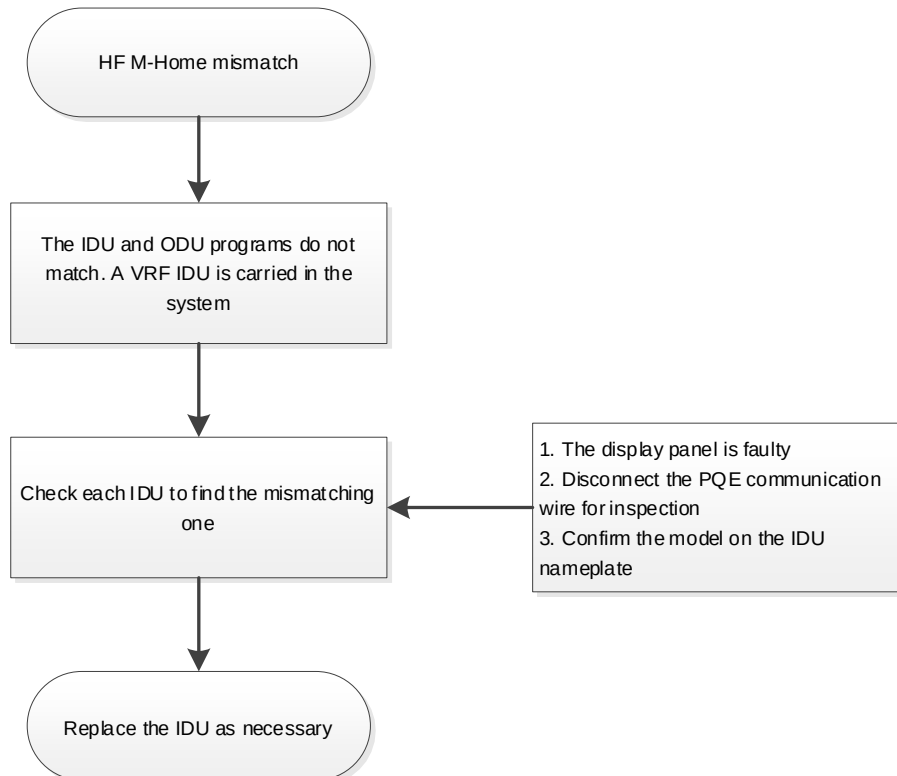
2.9.2 Description

- 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 error

2.10.1 Digital display output



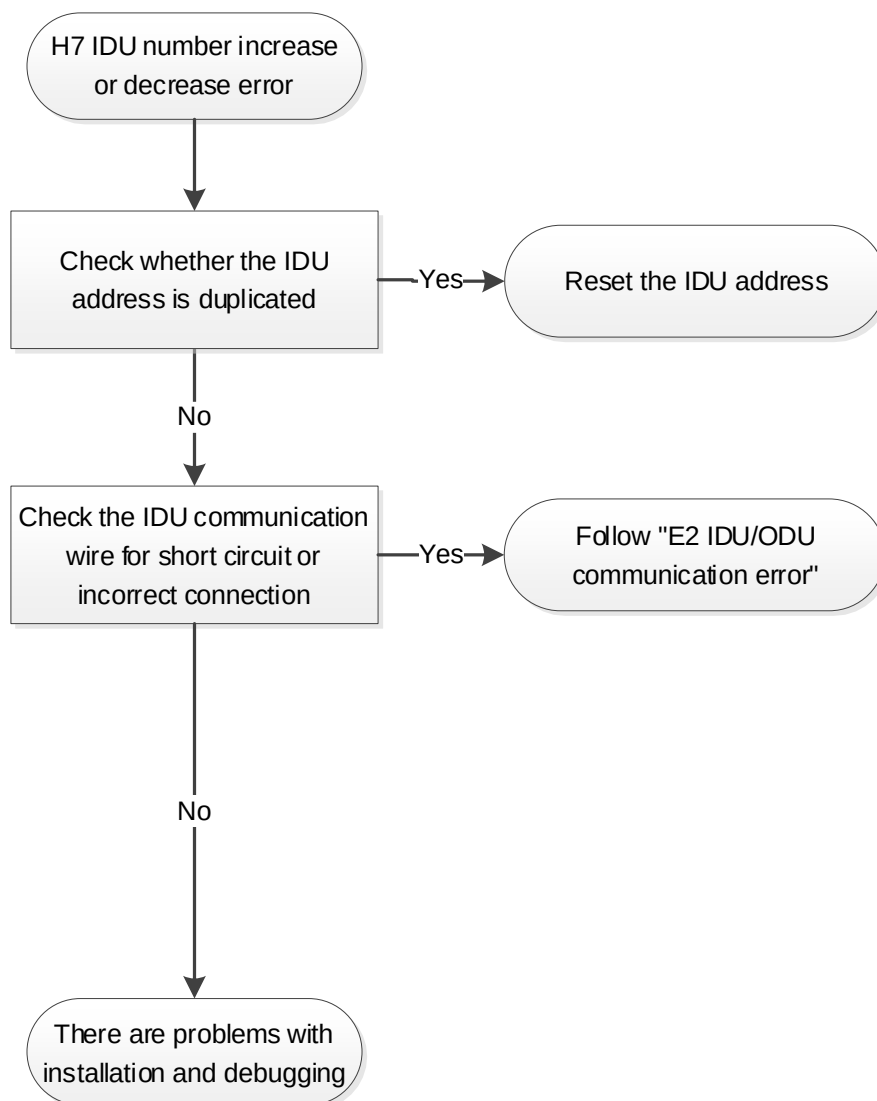
2.10.2 Description

- 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



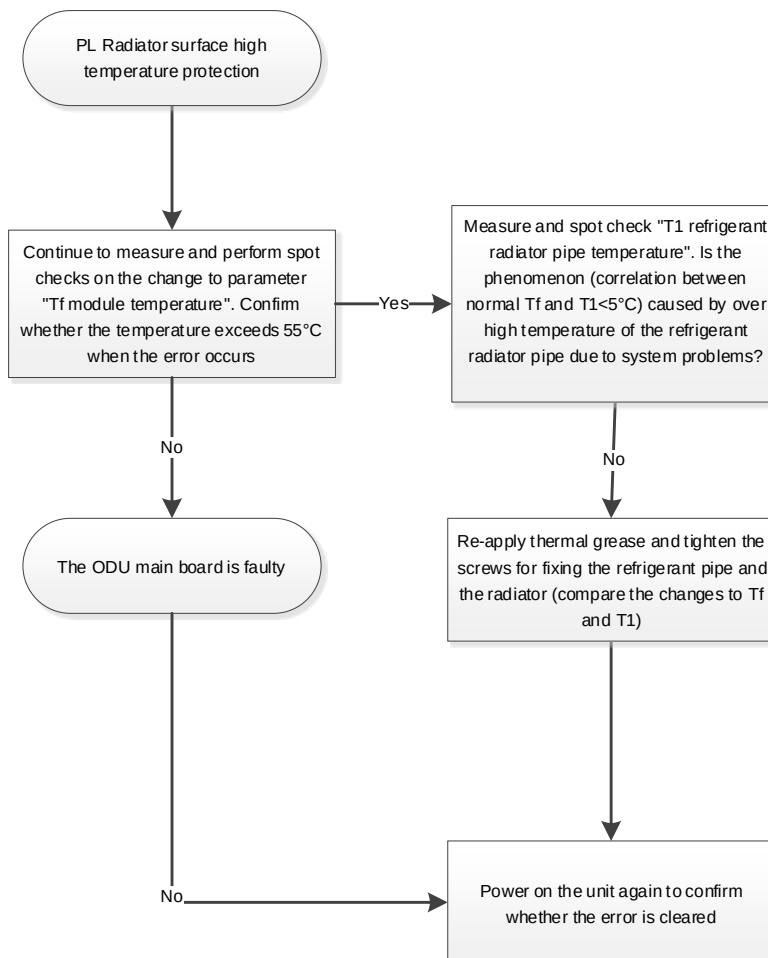
2.11.2 Description

- When compressor TF is $\geq 90^{\circ}\text{C}$ or upper/lower fan TF is $\geq 105^{\circ}\text{C}$, system protection is triggered, PL is displayed, and the compressor stops. When compressor TF is $< 84^{\circ}\text{C}$ and upper/lower fan TF is $< 84^{\circ}\text{C}$, 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



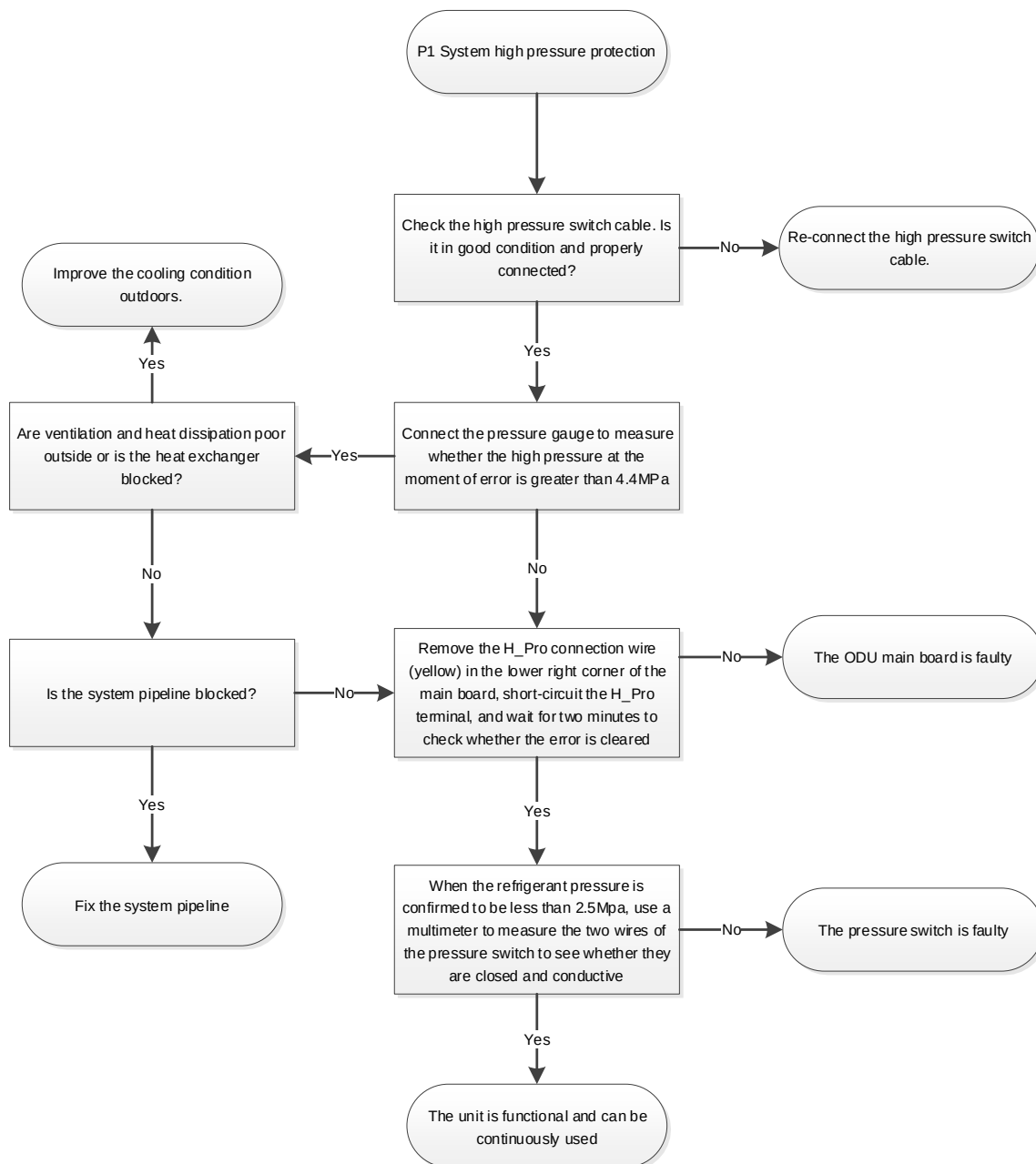
2.12.2 Description

- 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



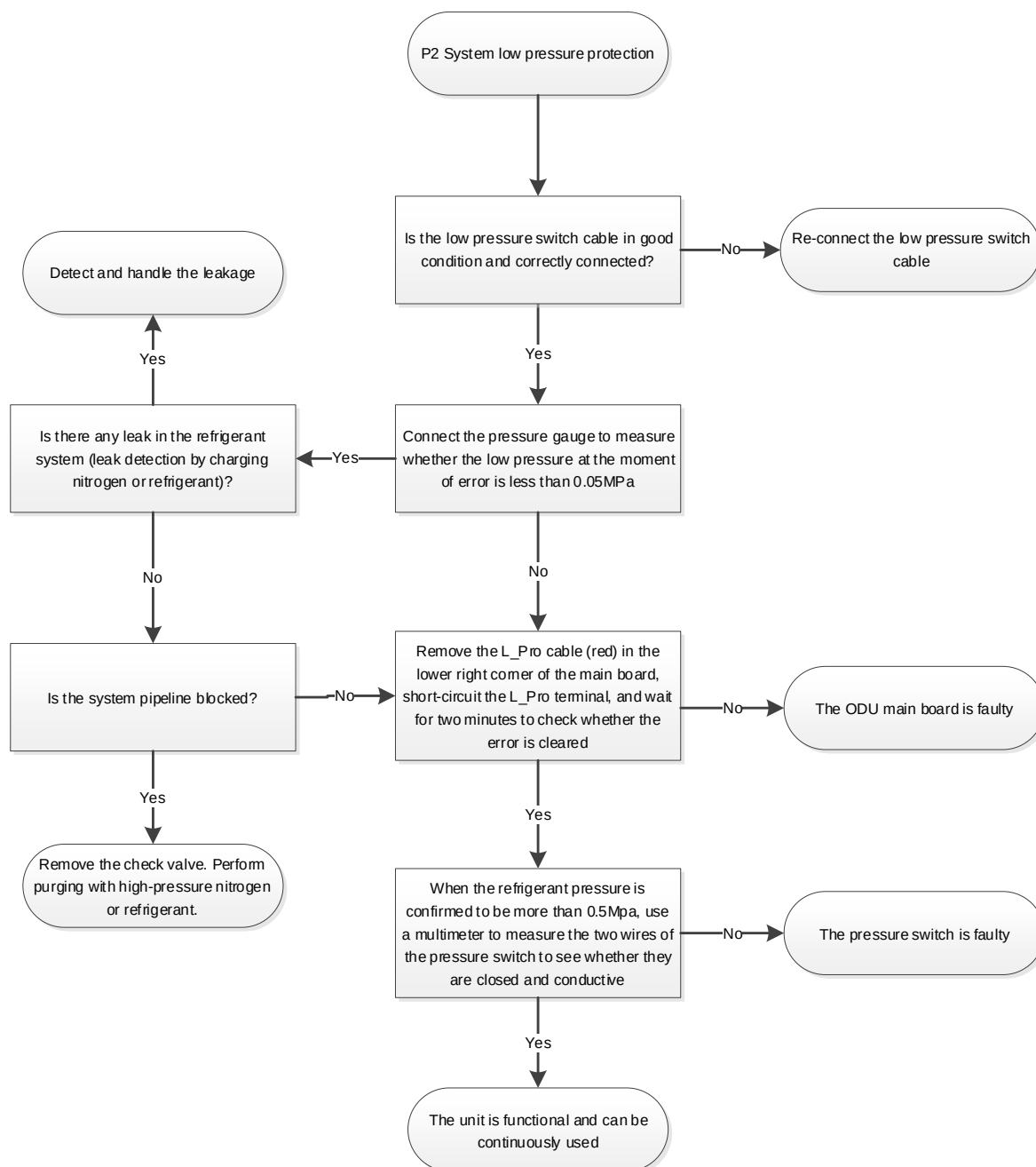
2.13.2 Description

- 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



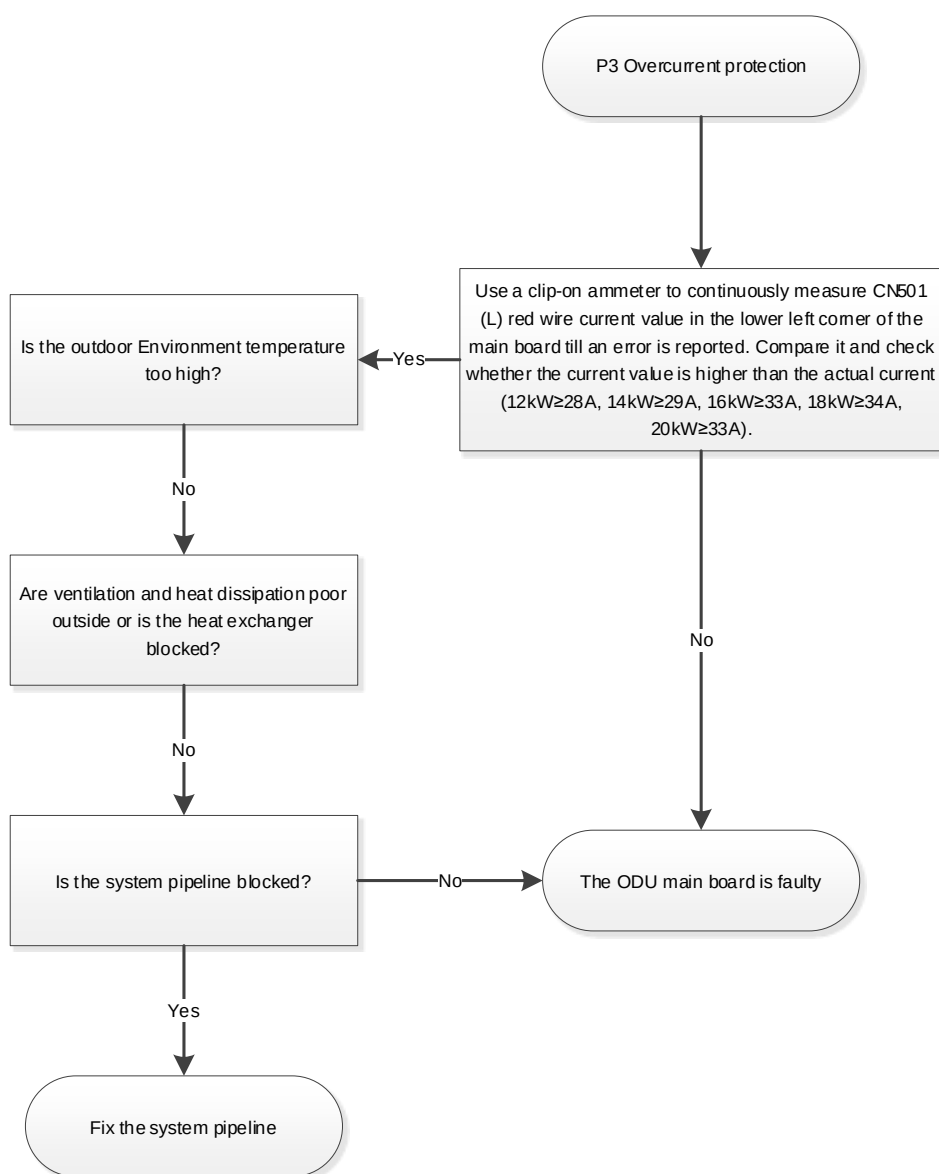
2.14.2 Description

- 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



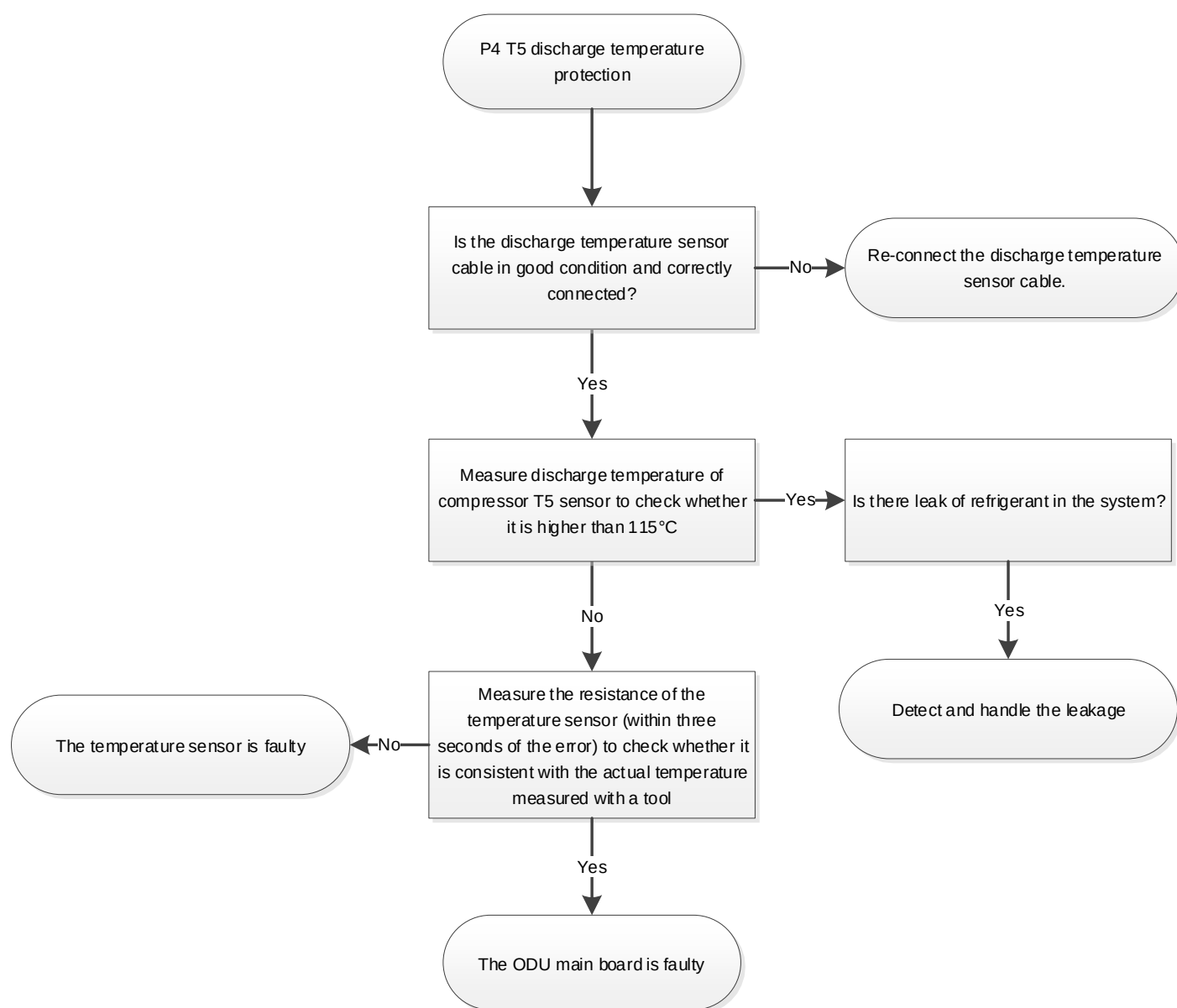
2.15.2 Description

- 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



MDV-V230WN1(AU) VRF 50Hz



2.16 P5: T3 outdoor condenser temperature protection

2.16.1 Digital display output



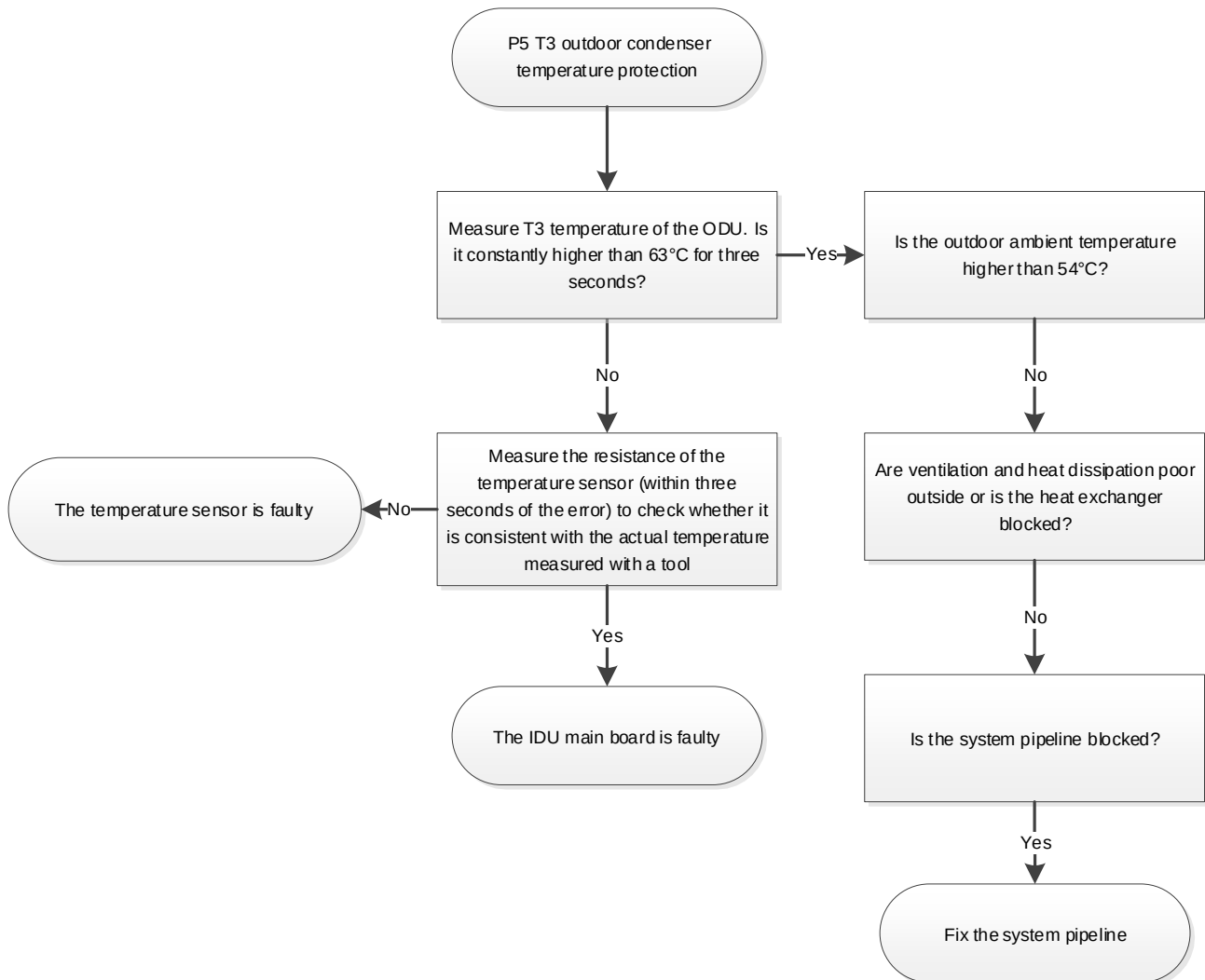
2.16.2 Description

- T3 outdoor condenser temperature protection In the instance of error report, the main board detects $T3 \geq 63^{\circ}\text{C}$ 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 $T3 < 56^{\circ}\text{C}$, 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



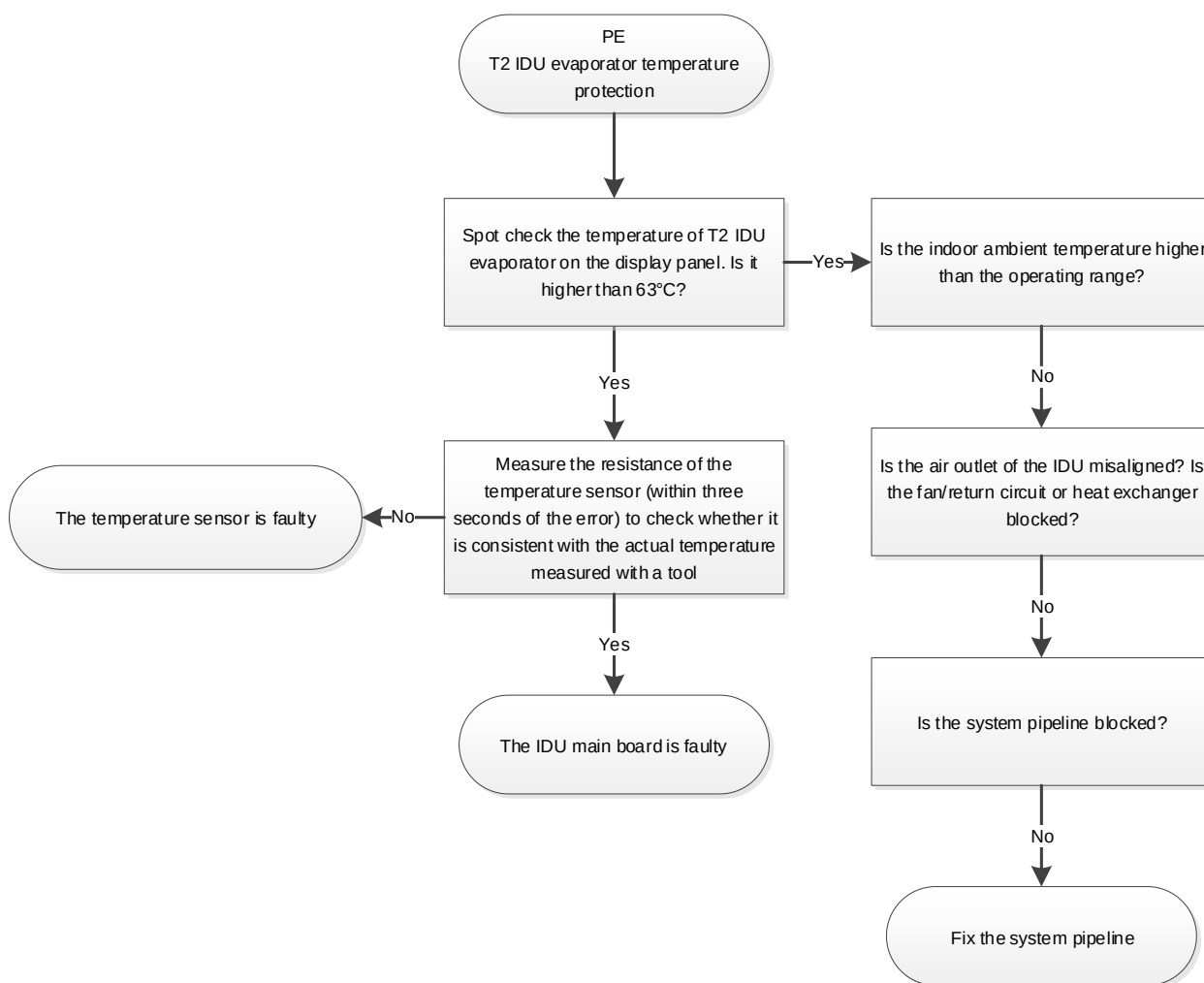
2.17.2 Description

- 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

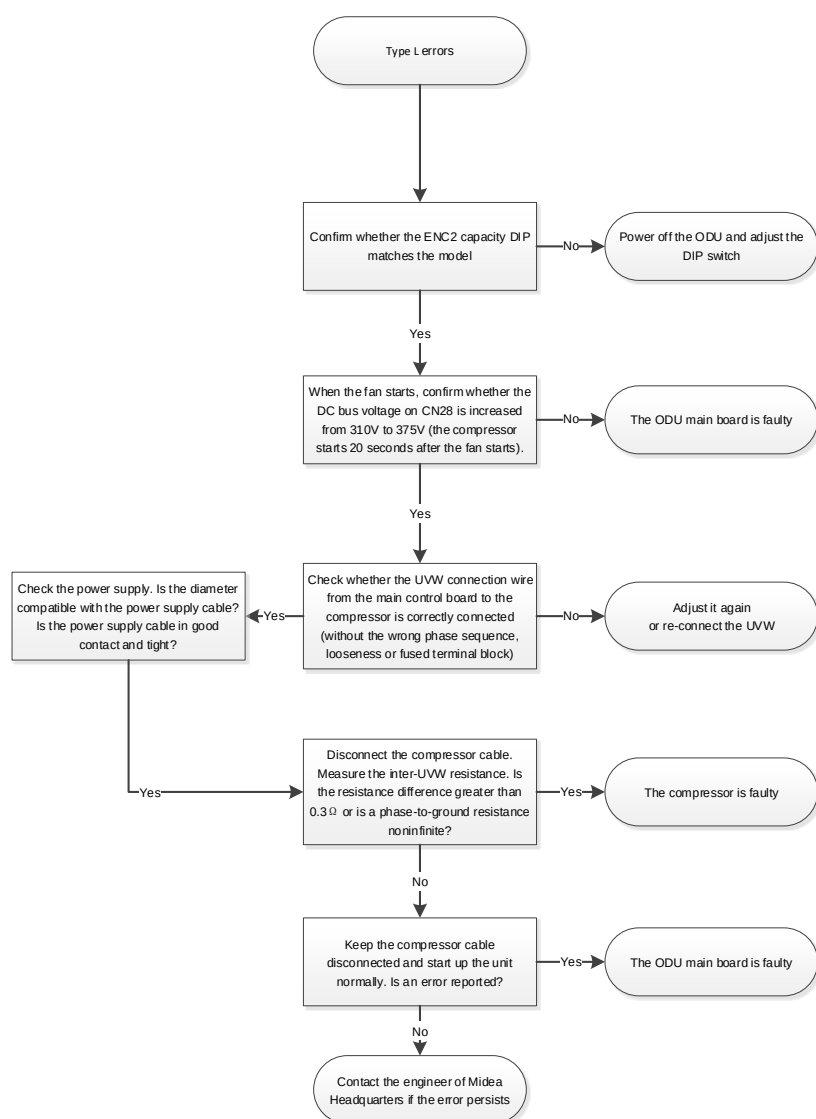
3.1.1 Description

- 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



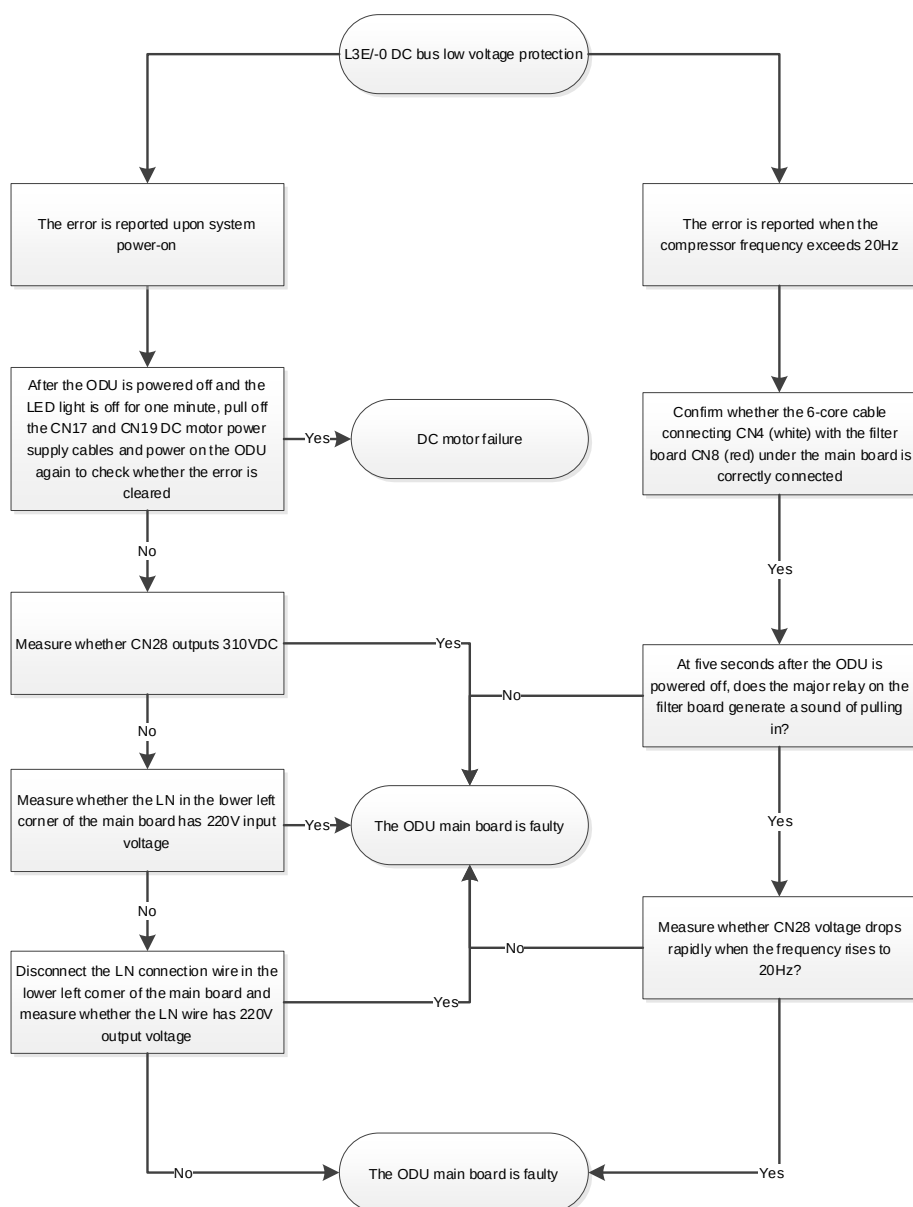
3.2.2 Description

- 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



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3.3 L31: The bus voltage is too high

3.3.1 Digital display output



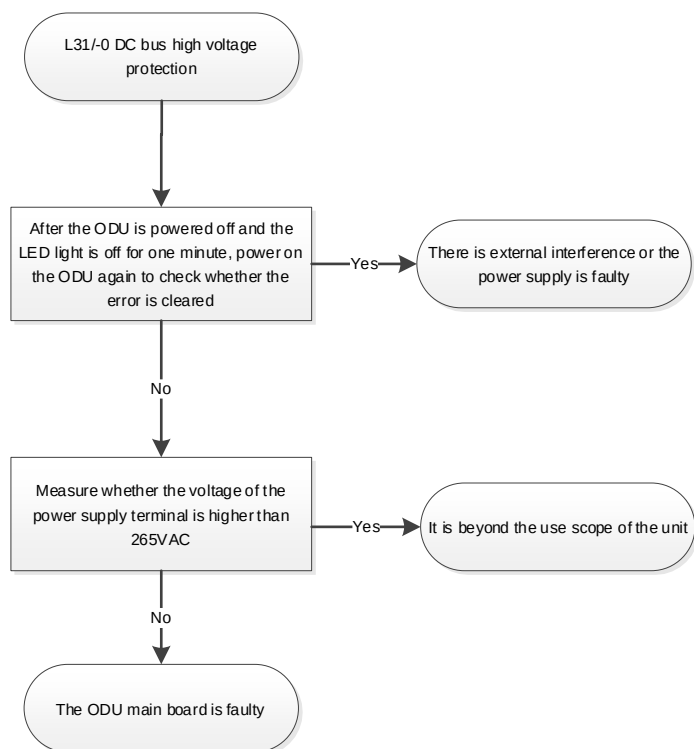
3.3.2 Description

- 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

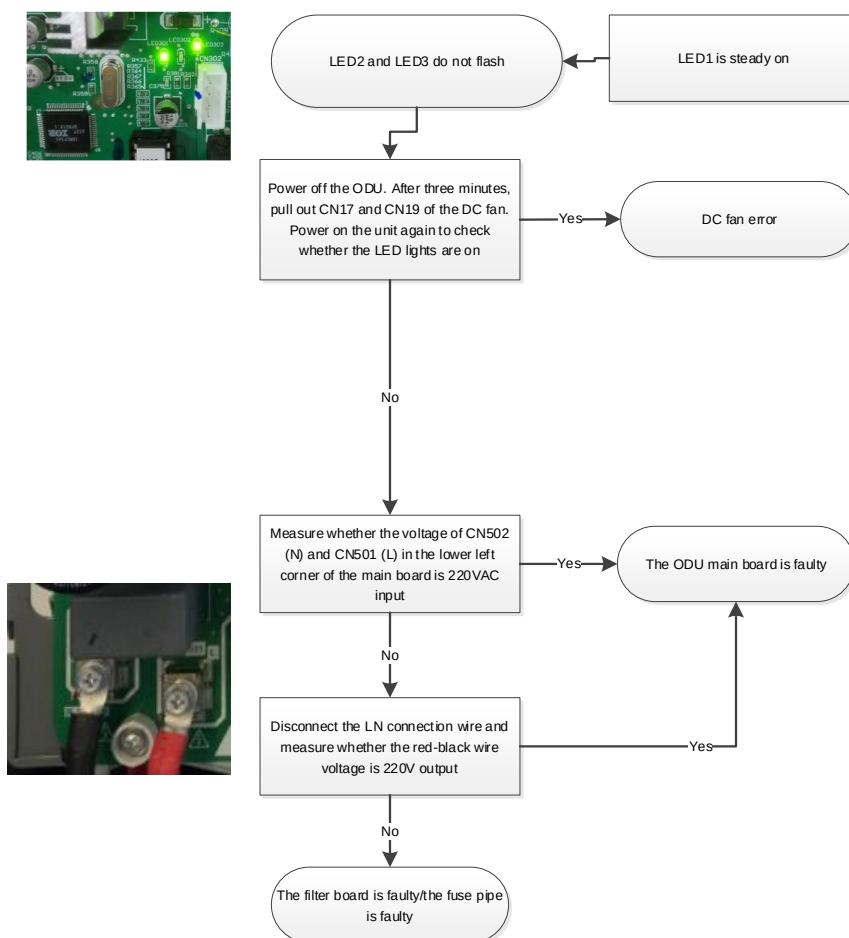
4.1.1 Description

- 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



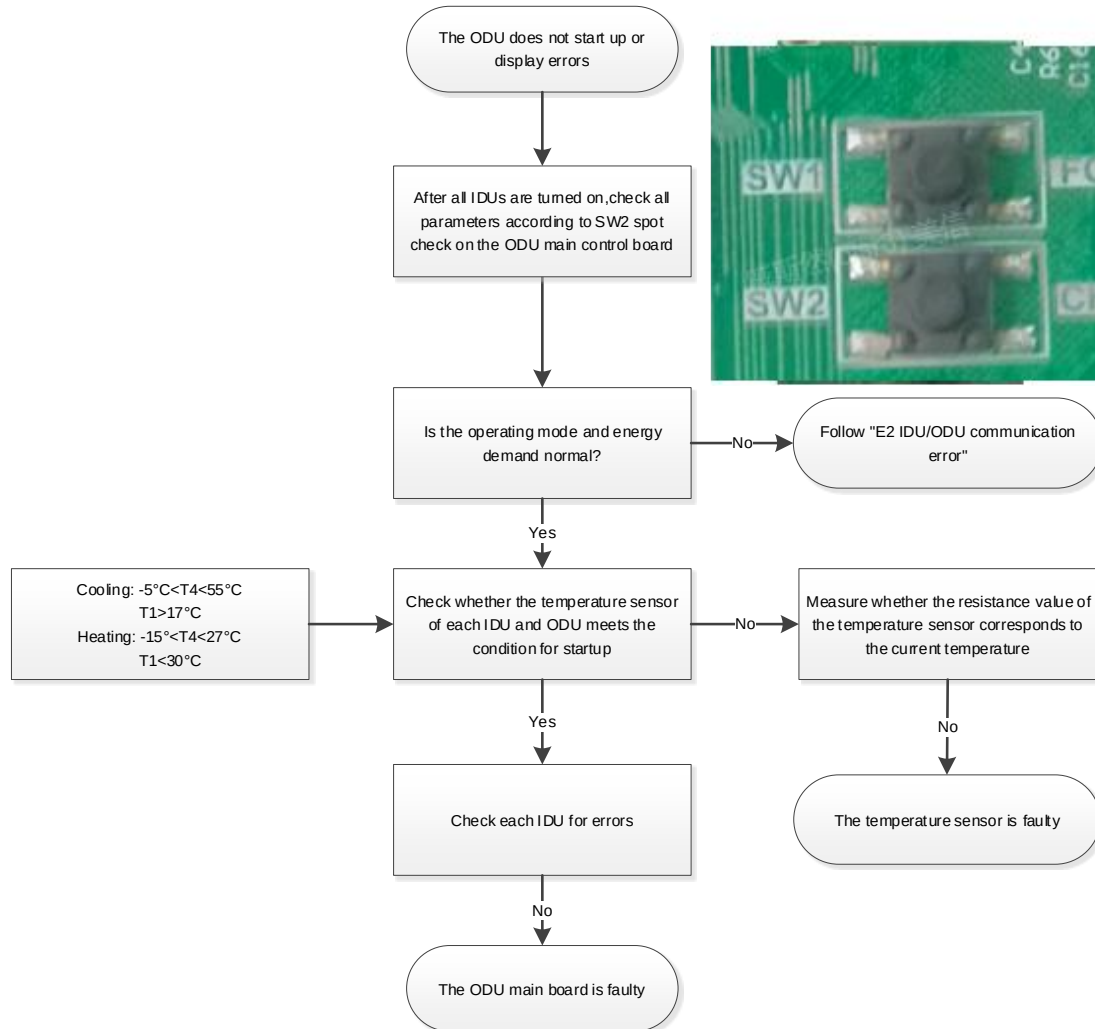
MDV-V230WN1(AU) VRF 50Hz

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

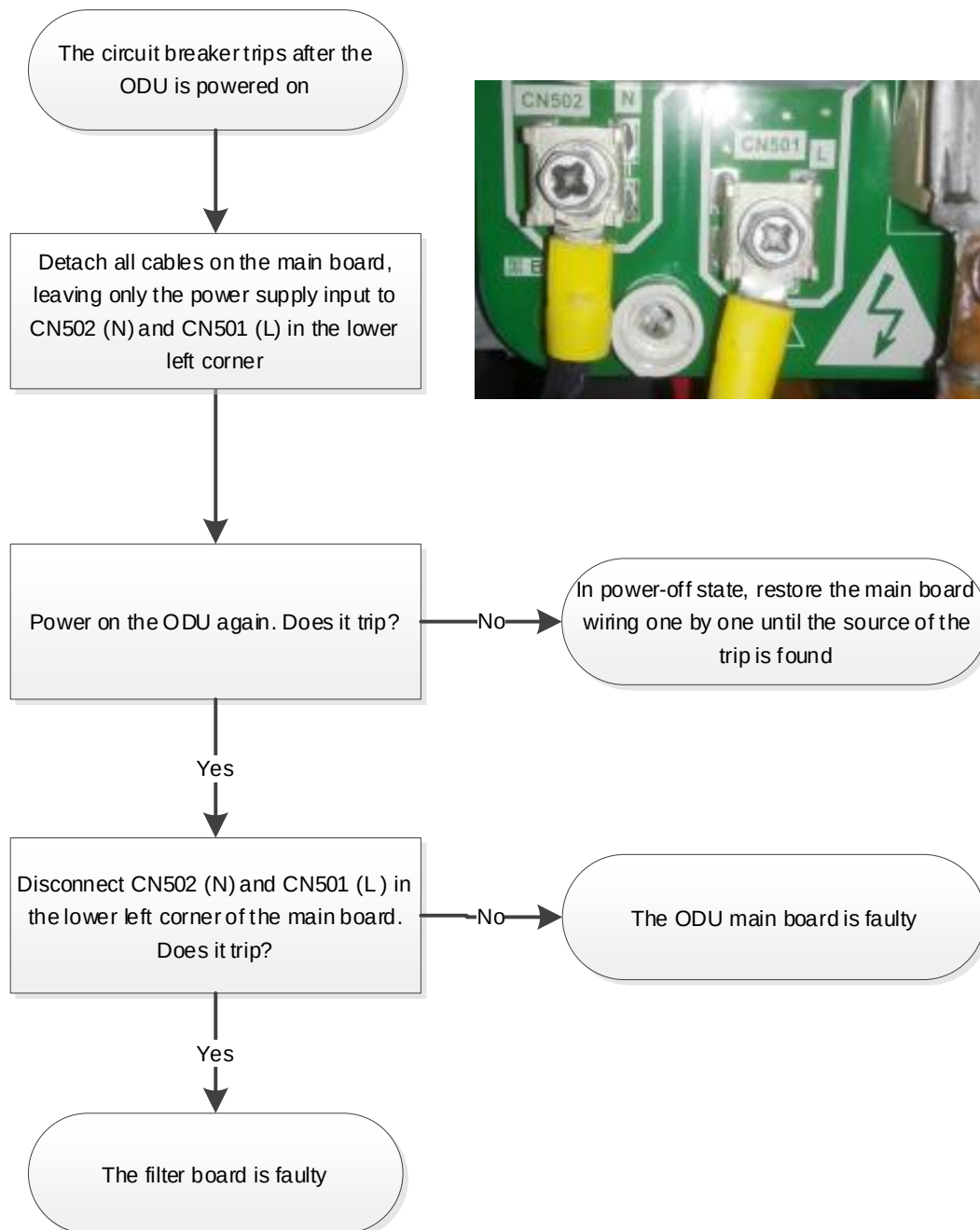
4.3.1 Description

- 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% R(90°C)=5KΩ±-3%	
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045		
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

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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

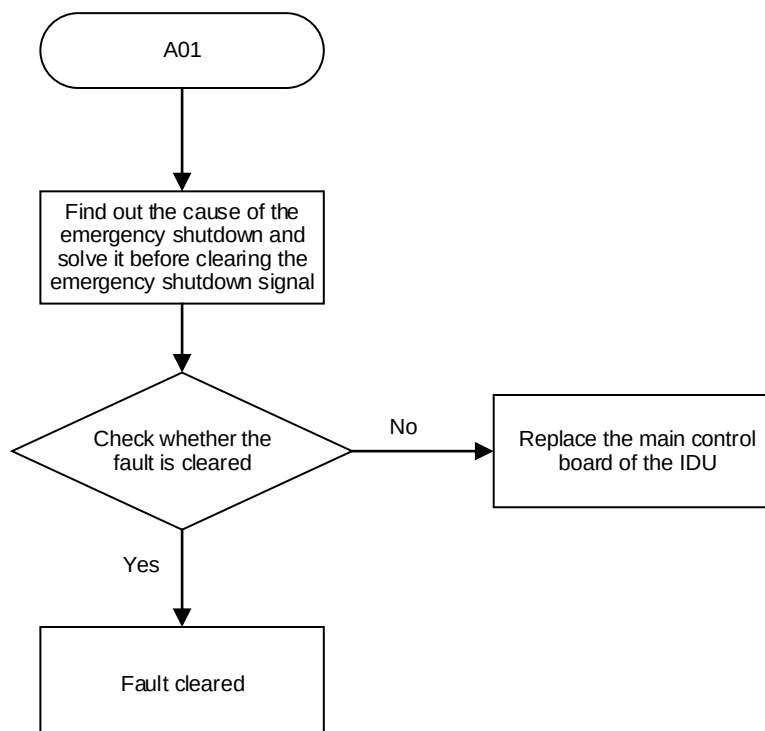
Warning



- 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

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

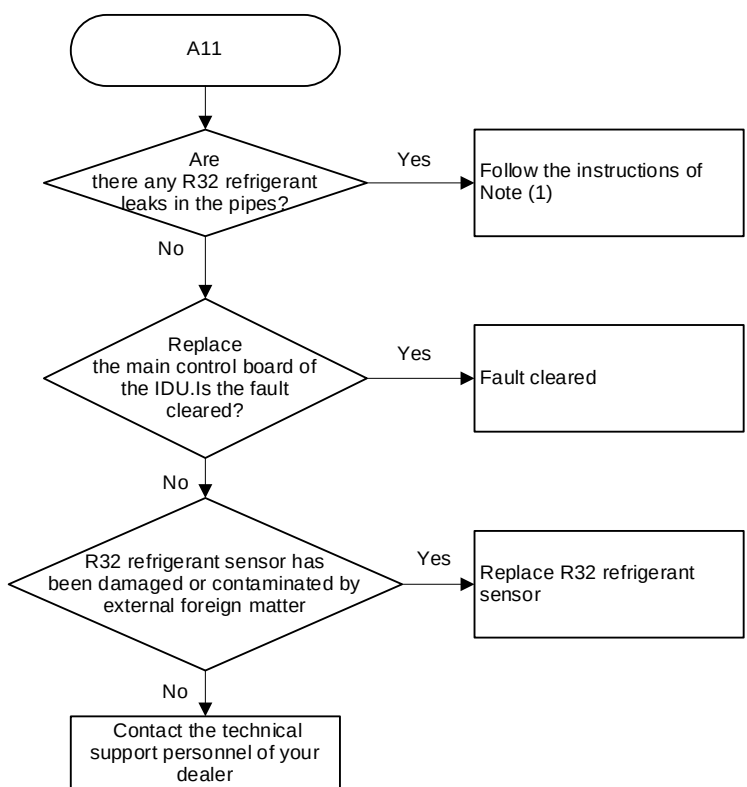
Troubleshooting


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.

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1.1.2 A11 - R32 refrigerant leaks, requiring shutdown immediately

Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	- 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	
	ODU of the same system: It stops running after recycling is completed, displaying code "A11" - IDU refrigerant leaks.	
Error trigger	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.	
Error recovery	Has not detected the refrigerant leak signal and has received the signal of refrigerant fault rectification	
Possible cause	- 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	
Troubleshooting	 <pre> graph TD Start([A11]) --> D1{Are there any R32 refrigerant leaks in the pipes?} D1 -- Yes --> N1[Follow the instructions of Note (1)] D1 -- No --> D2{Replace the main control board of the IDU. Is the fault cleared?} D2 -- Yes --> E1[Fault cleared] D2 -- No --> D3{R32 refrigerant sensor has been damaged or contaminated by external foreign matter?} D3 -- Yes --> E2[Replace R32 refrigerant sensor] D3 -- No --> E3[Contact the technical support personnel of your dealer] </pre> Note 1: Adapter board ENC1 dip switch setting When the function of determining refrigerant	

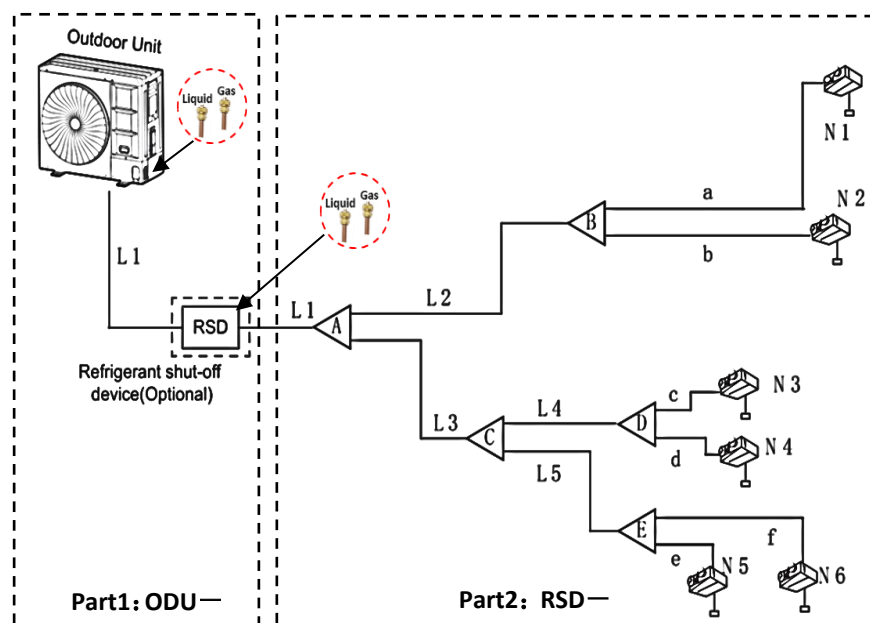
leakage fault is effective, if the communication abnormality between indoor unit main control board, adapter board and R32 refrigerant detection device control board lasts for more than 2 minutes (see "C79" fault handling in this manual for the communication abnormality handling method between indoor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

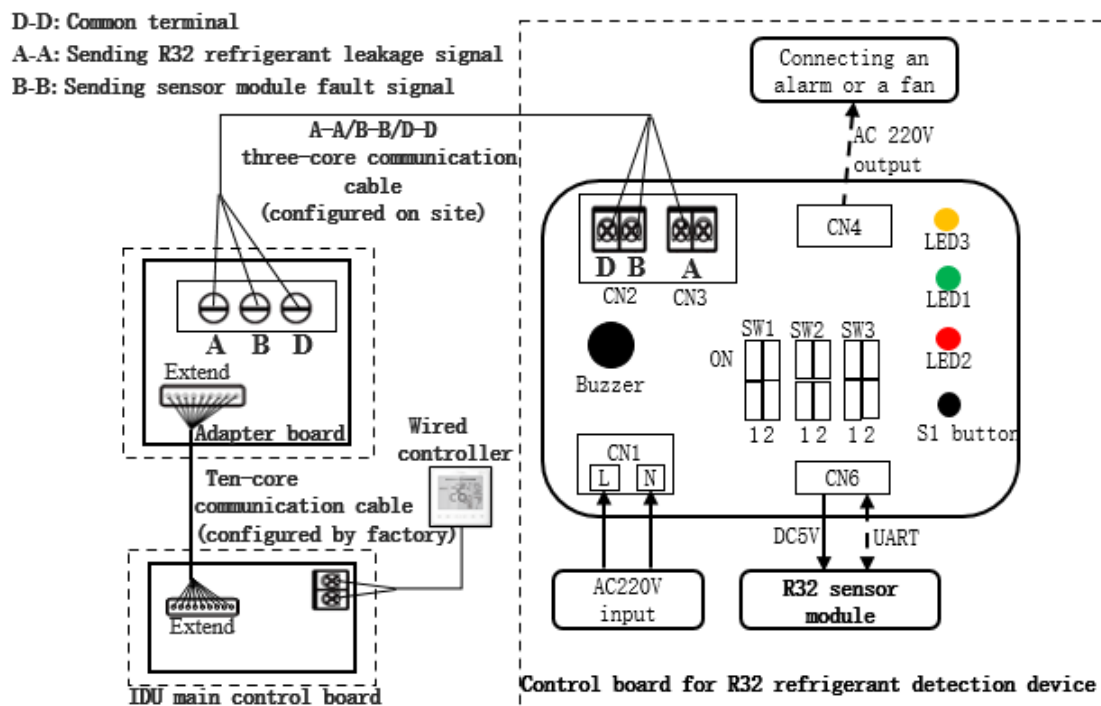
Step 2: Reset the R32 refrigerant detection device.

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.

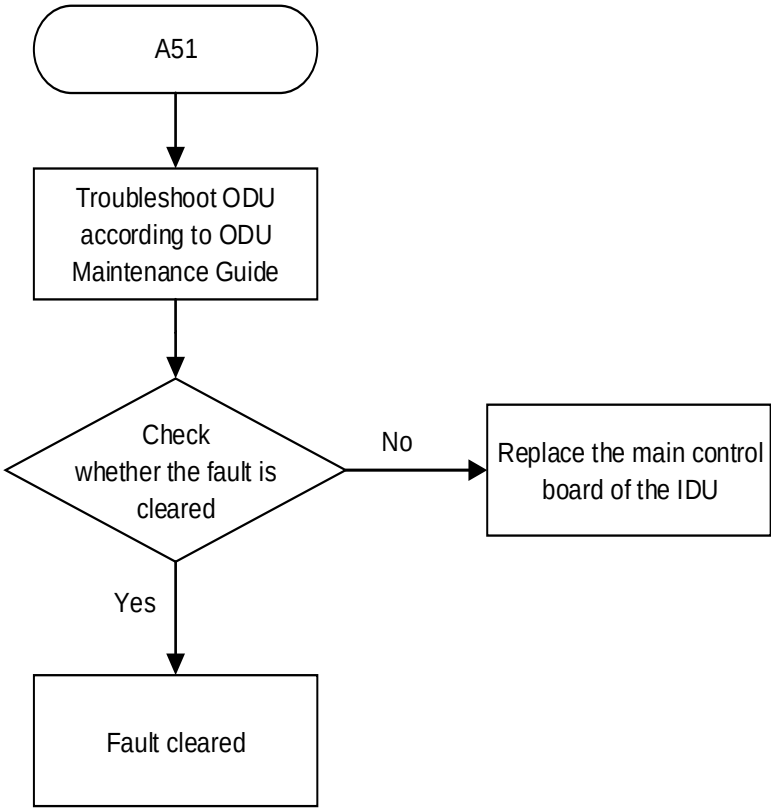
When the wired controller receives the refrigerant leakage fault command transmitted by the indoor unit, the interface will display the "A11" code, and the buzzer will sound once every 1s. After the above step 1/2 is completed and the R32 refrigerant leakage alarm signal is OFF, enter the wired controller 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	 <pre> graph TD A51([A51]) --> B[Troubleshoot ODU according to ODU Maintenance Guide] B --> C{Check whether the fault is cleared} C -- No --> D[Replace the main control board of the IDU] C -- Yes --> E[Fault cleared] </pre>	

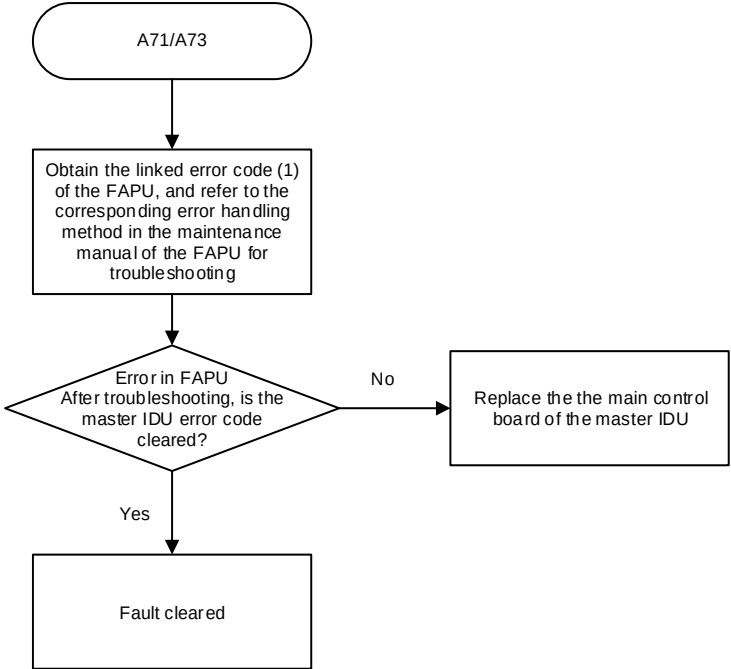
MDV-V230WN1(AU) VRF 50Hz



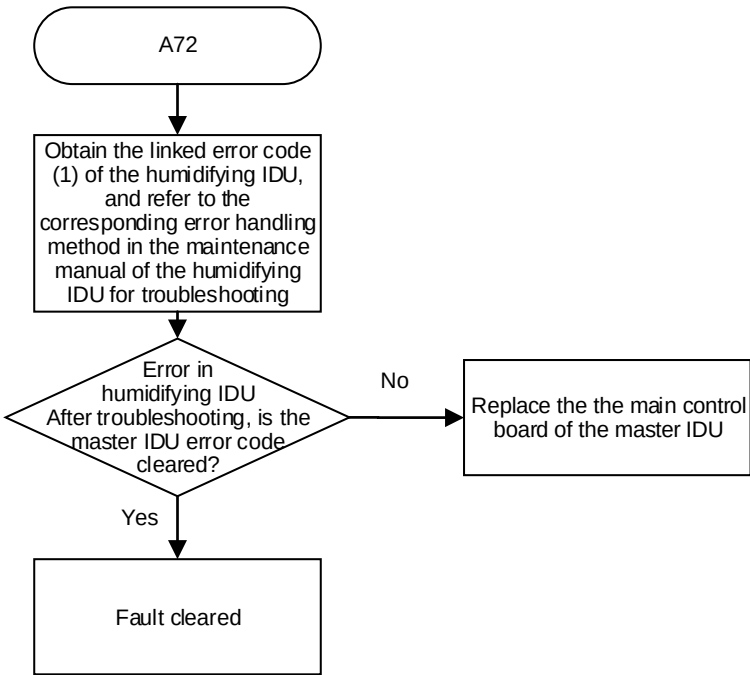
1.1.4 A71 - The error of the linked FAPU is transmitted to the master IDU (series setting)

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.

Error display	Digital display	Display position (master IDU)
		Panel, display box, and wired controller
Error impact	The master IDU and the linked FAPU: stop. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	The error of the linked FAPU is transmitted to the master IDU	
Error recovery	Automatic recovery	
Possible cause	■ The FAPU is faulty. ■ The master IDU's main control board is damaged.	
Troubleshooting	 <pre> graph TD Start([A71/A73]) --> Step1[Obtain the linked error code (1) of the FAPU, and refer to the corresponding error handling method in the maintenance manual of the FAPU for troubleshooting] Step1 --> Decision{Error in FAPU
After troubleshooting, is the master IDU error code cleared?} Decision -- Yes --> End1[Fault cleared] Decision -- No --> End2[Replace the the main control board of the master IDU] </pre> Note: 1. The error code can be queried after the FAPU is connected to the wired controller or the display box.	

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

Error display	Digital display	Display position (master IDU)	
		Panel or display box	Wired controller
		Spot check interface query	Error code is not displayed
Error impact	Master IDU: operates normally. Humidifying IDUs: stop. Other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	The error of the linked humidifying IDU is transmitted to the master IDU		
Error recovery	Automatic recovery		
Possible cause	■ The humidifying IDU is faulty. ■ The master IDU's main control board is damaged.		
	Troubleshooting  <pre> graph TD A72([A72]) --> B[Obtain the linked error code (1) of the humidifying IDU, and refer to the corresponding error handling method in the maintenance manual of the humidifying IDU for troubleshooting] B --> C{Error in humidifying IDU
After troubleshooting, is the master IDU error code cleared?} C -- Yes --> D[Fault cleared] C -- No --> E[Replace the the main control board of the master IDU] </pre> Note: 1. The error code can be queried after the humidifying IDU is connected to the wired controller or the display box.		

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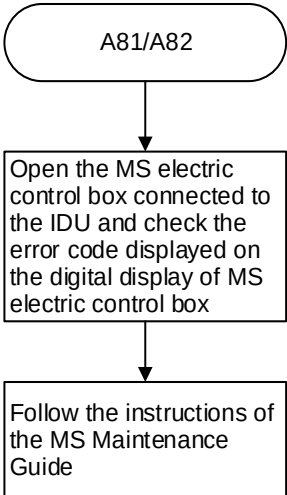
1.1.6 A73 - The error of the linked FAPU is transmitted to the master IDU (non-series connection)

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.

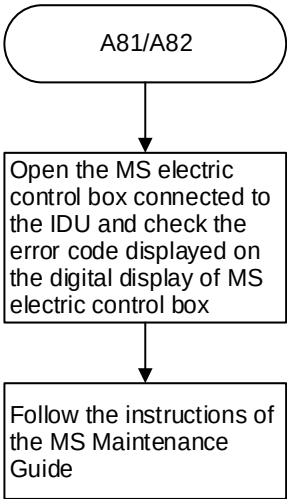
Error display	Digital display	Display position (master IDU)	
		Panel or display box	Wired controller
		Spot check interface query	Error code is not displayed
Error impact	Master IDU: operates normally. FAPU: stops. Other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	The error of the linked FAPU is transmitted to the master IDU		
Error recovery	Automatic recovery		
Possible cause	■ The FAPU is faulty. ■ The master IDU's main control board is damaged.		
Troubleshooting	<pre> graph TD Start([A71/A73]) --> Step1[Obtain the linked error code (1) of the FAPU, and refer to the corresponding error handling method in the maintenance manual of the FAPU for troubleshooting] Step1 --> Decision{Error in FAPU After troubleshooting, is the master IDU error code cleared?} Decision -- No --> Step2[Replace the the main control board of the master IDU] Decision -- Yes --> End[Fault cleared] </pre> Note: 1. The error code can be queried after the FAPU is connected to the wired controller or the display box.		

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	 <pre> graph TD A81A82([A81/A82]) --> B[Open the MS electric control box connected to the IDU and check the error code displayed on the digital display of MS electric control box] B --> C[Follow the instructions of the MS Maintenance Guide] </pre>	

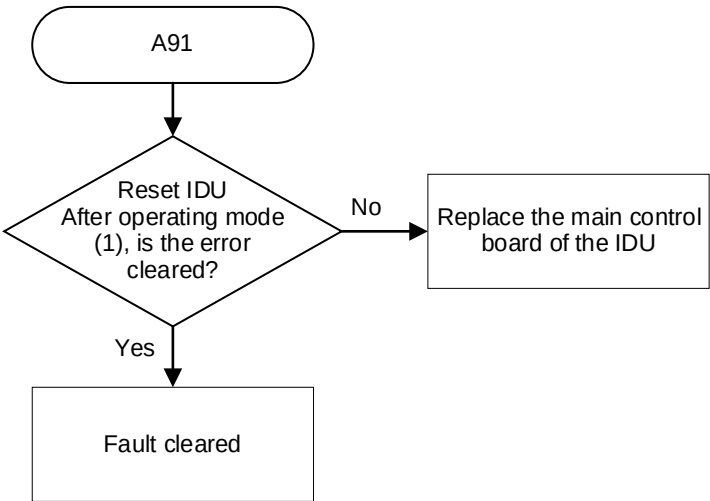
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1.1.8 A82 - MS (refrigerant flow direction switching device) fault

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	 <pre> graph TD A([A81/A82]) --> B[Open the MS electric control box connected to the IDU and check the error code displayed on the digital display of MS electric control box] B --> C[Follow the instructions of the MS Maintenance Guide] </pre>	

1.1.9 A91 - Mode conflict (V6 communication protocol adopted)

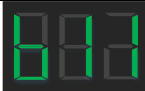
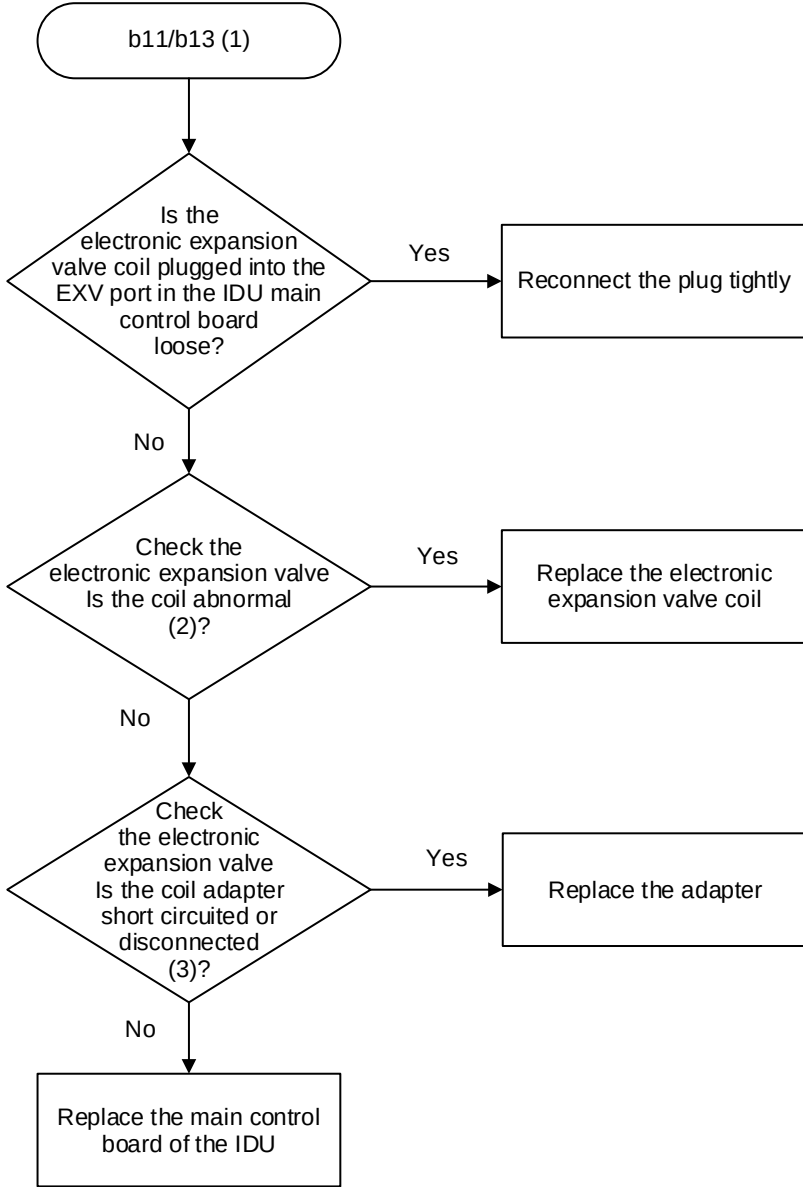
Available when using V6 platform wired controller.

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	 <pre> graph TD A91([A91]) --> D{Reset IDU After operating mode (1), is the error cleared?} D -- Yes --> B[Fault cleared] D -- No --> C[Replace the main control board of the IDU] </pre> Note: 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.	

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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	 <pre> graph TD Start([b11/b13 (1)]) --> D1{Is the electronic expansion valve coil plugged into the EXV port in the IDU main control board loose?} D1 -- Yes --> A1[Reconnect the plug tightly] D1 -- No --> D2{Check the electronic expansion valve Is the coil abnormal (2)?} D2 -- Yes --> A2[Replace the electronic expansion valve coil] D2 -- No --> D3{Check the electronic expansion valve Is the coil adapter short circuited or disconnected (3)?} D3 -- Yes --> A3[Replace the adapter] D3 -- No --> A4[Replace the main control board of the IDU] </pre> 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

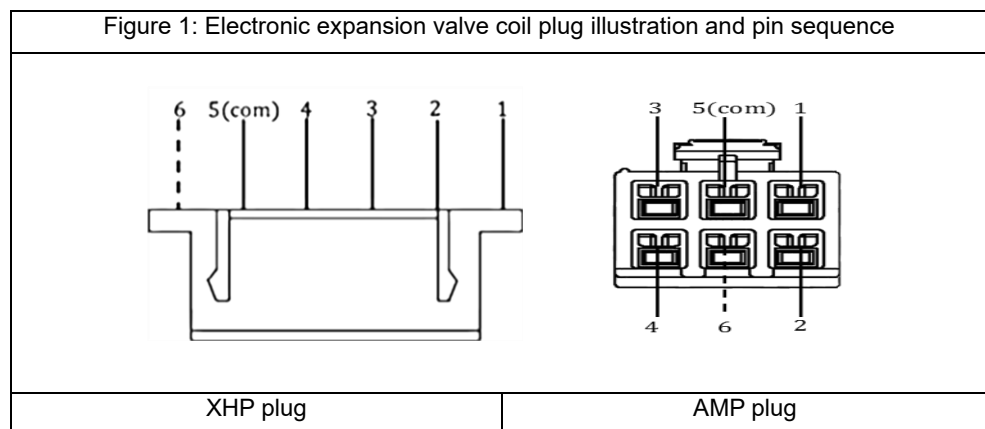
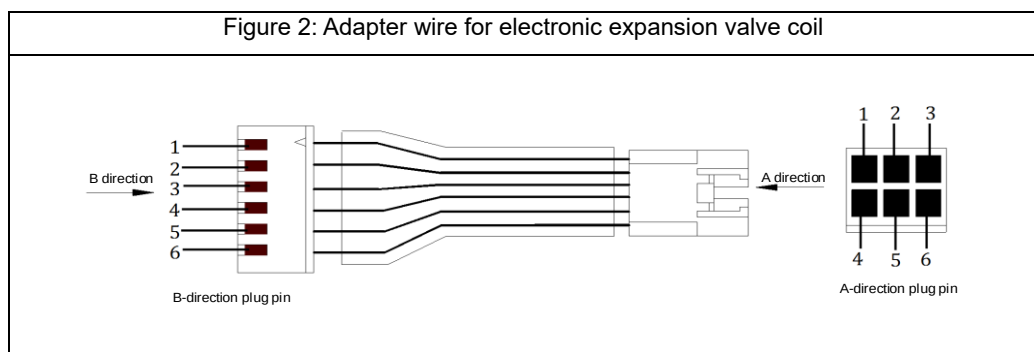


Table 1: Resistance between pins with an electronic expansion valve coil in normal condition

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



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

	Digital display		Display position	
Error display			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	Return air temperature(T1) - Heat exchanger liquid pipe temperature (T2A) > Set value IDU EEV=0, ODU running in cooling mode and compressor speed ≠0			
Error recovery	Automatic recovery			
Possible cause	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.			
Troubleshooting	b12/b14 (1) Remove the coil and fix it to the valve body again. Is the fault cleared? Yes Operate normally (loose coil) No Replace the coil and re-energize. Is the error cleared? Yes Operate normally (the coil cannot drive the valve body) No Replace the main control board. Is the fault cleared? Yes Operate normally (the IDU main control board is damaged and the electronic expansion valve body cannot be driven) No Replace the electronic expansion valve body (the interior of the body is clogged or the valve needle is stuck)			
	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.			

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	DC-PUMP CN190 <pre> graph LR A[b34/b35 (1)] --> B[Cause 1: Water pump suction impeller is clogged] A --> C[Cause 2: The water pump plug to the PUMP port in the IDU main control board is loose] A --> D[Cause 3: DC voltage output between Pin 2 and Pin 3 of the PUMP port in the main control board is less than 11V (2)] A --> E[Cause 4: If the error cannot be cleared after causes 1/2/3 have been eliminated, it can be determined that the pump body is damaged] B --> B1[Remove the debris at the suction, and clean the drainage pan and drain pipe] C --> C1[Reconnect the loose plug] D --> D1[Replace the main control board of the IDU] E --> E1[Replace the water pump] </pre> Note: - The error code corresponds to the following two situations: - 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. - 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. - 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.		

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1.1.13 b36 - Water level switch alarm error

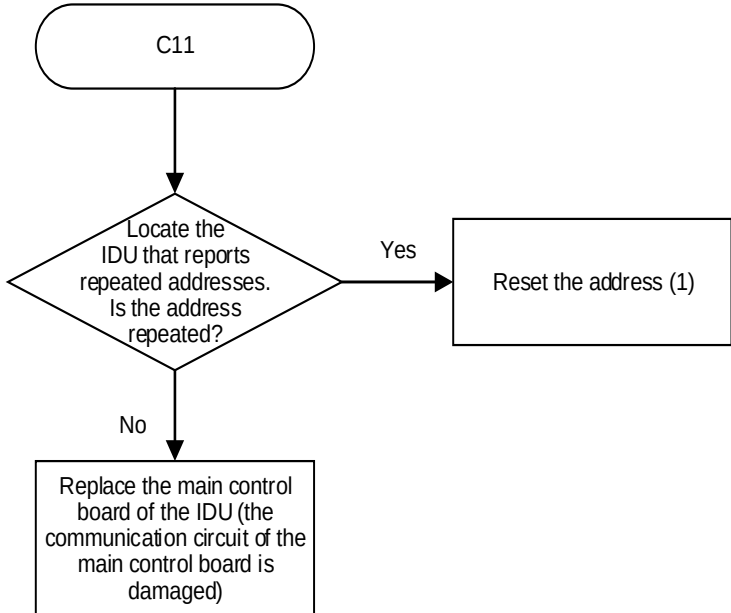
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	The water level switch alarm is triggered when the floater of the water 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	b36 Cause 1: The water pump suction or discharge is blocked by dirt Remove dirt and clean the drainage pan and drain pipe Cause 2: The water level switch plug or short-circuit plug to the WATER port of the IDU main control board is loose (1) Reconnect the loose plug Cause 3: The water level switch is damaged (2) Replace the water level switch Cause 4: The water level switch floater is clogged Move the floater to remove impurities and reset the floater switch Cause 5: The pump outlet does not discharge water or discharge flow is very small (3) Take measures according to Note (3) Cause 6: Non-standard installation results in abnormal drainage (4) Take measures according to Note (4) Cause 7: Connect the short-circuit plug to the WATER port of the main control board. If the error persists, it can be determined that the main control board is damaged Replace the main control board of the IDU	
	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 $\geq 1\%$). 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.

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1.1.14 C11 - Duplicate IDU address code

Error display	Digital display	Display position	
		Panel or display box	Wired controller
		Error code and address code are displayed alternately (2)	Error code and address code flash simultaneously
Error impact	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		
Error trigger	Repeated address codes for IDU		
Error recovery	Automatic recovery		
Possible cause	■ Duplicate IDU address code (▲) ■ The IDU main control board is damaged.		
Troubleshooting	 <pre> graph TD C11([C11]) --> Decision{Locate the IDU that reports repeated addresses. Is the address repeated?} Decision -- Yes --> Reset[Reset the address (1)] Decision -- No --> Replace[Replace the main control board of the IDU (the communication circuit of the main control board is damaged)] </pre> (▲): 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:		

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.

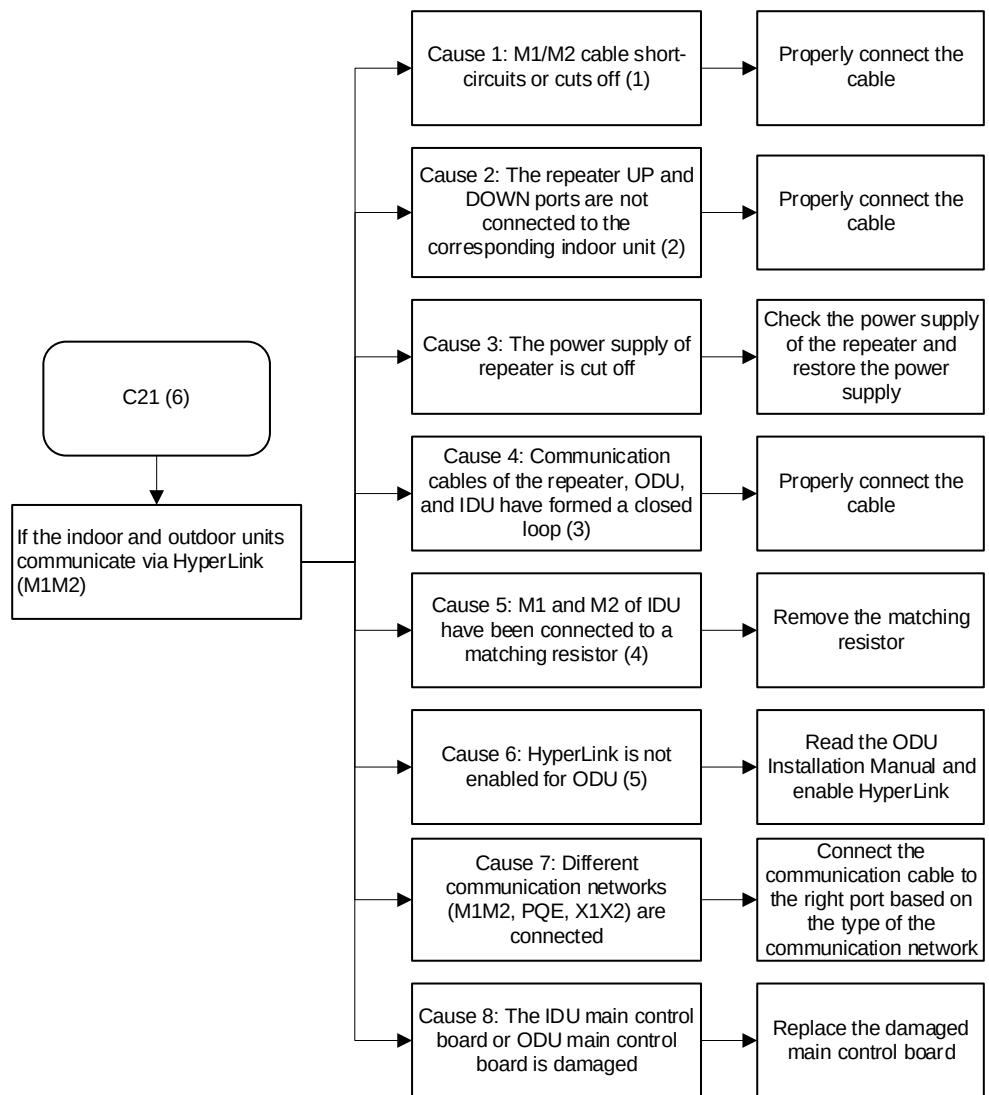
★Example 2: If IDU 1 is 20 HP and the address code is set to 1 (the addresses actually occupied are 1, 2, 3, and 4), IDU 2 is 5 HP and the address code is set to 2, IDU 3 is 5 HP and the address code is set to 3, then the display box or panel of IDU 1 will alternately display the code C11 and the address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

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: 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: ■ stops. ■ Error code "C26" is displayed (V6 platform ODU displays the code "H7"). Meaning of the code: IDU qty decrease fault	
Error trigger	If the IDU has not received any communication signal from ODU for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	■ If the indoor and outdoor units communicate via RS-485(PQE/PQ): <pre> graph TD C21[C21 (6)] --> Start[If the indoor and outdoor units communicate via RS-485 (PQE/PQ)] Start --> C1[Cause 1: P/Q/E communication cable short-circuits or cuts off (1)] Start --> C2[Cause 2: Communication cables are not connected in a series] Start --> C3[Cause 3: Cable P or Q is connected to port E] Start --> C4[Cause 4: The communication cable does not have a shield layer] Start --> C5[Cause 5: Interfered by strong-current power cables (over 220 V)] Start --> C6[Cause 6: Interfered by electromagnetic radiation source (transformer/high-power fluorescent lamp, etc.)] Start --> C7[Cause 7: Different communication networks (M1M2, PQE, X1X2) are connected] Start --> C8[Cause 8: The IDU main control board or ODU main control board is damaged] C1 --> S1[Properly connect the cable] C2 --> S2[Connect the cables in a series] C3 --> S3[Connect P/Q/E to the right port] C4 --> S4[Use shielded cables] C5 --> S5[Separate the communication cable from the strong-current power cable] C6 --> S6[Eliminate sources of interference or add one more shield to the cable] C7 --> S7[Connect the communication cable to the right port based on the type of the communication network] C8 --> S8[Replace the damaged main control board] </pre>	
	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.	

Troubleshooting

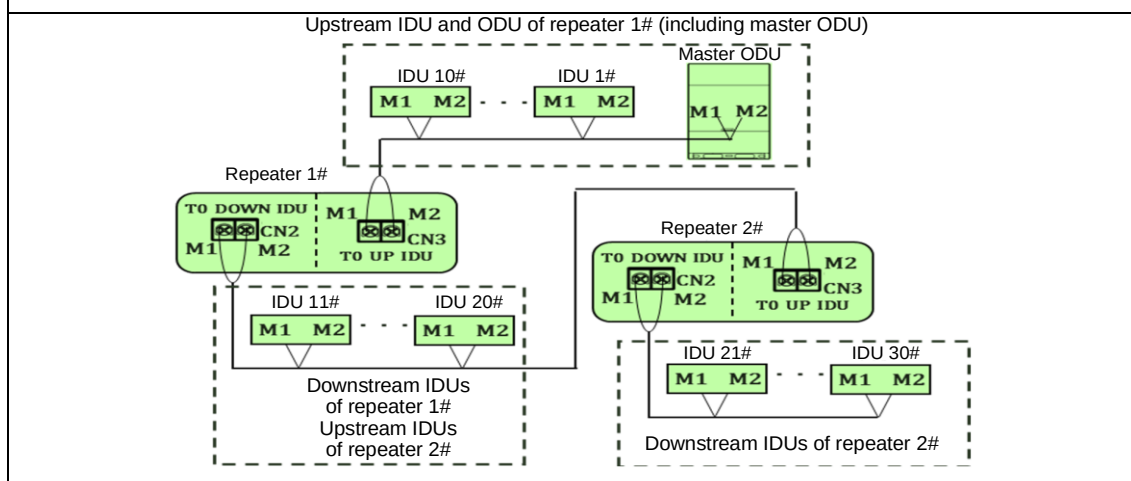
- If the indoor and outdoor units communicate via HyperLink (M1M2):



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).

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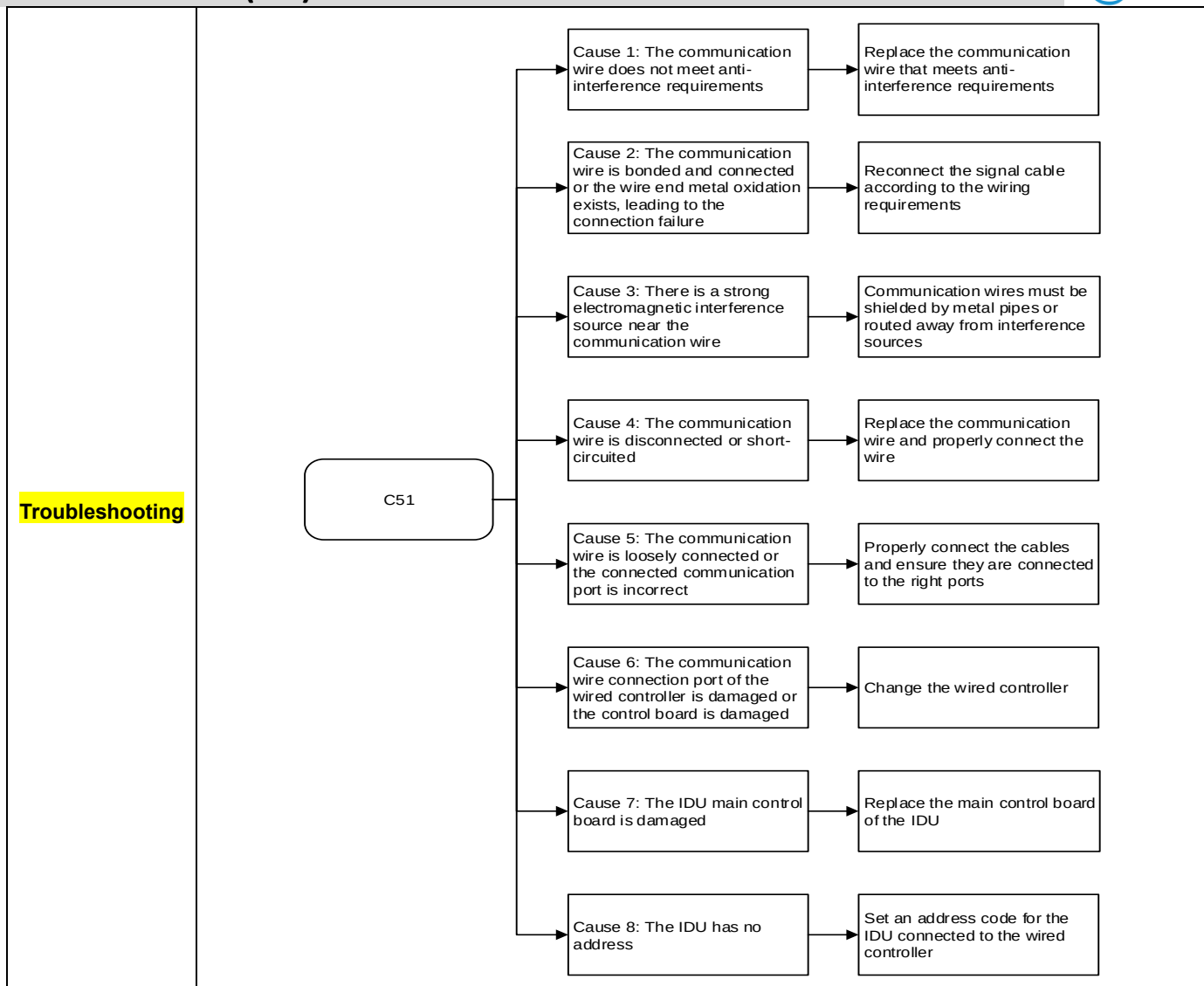
1.1.16 C41 - Abnormal communication between IDU main control board and fan drive board

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	<pre> graph LR C41([C41]) --> C1[Cause 1: The communication cable between the fan drive board and the IDU main control board has become loose (1)] C41 --> C2[Cause 2: The IDU main control board is damaged] C41 --> C3[Cause 3: The fan drive board is damaged (2)] C1 --> R1[Reconnect the loose plug] C2 --> R2[Replace the main control board of the IDU] C3 --> R3[Replace the fan drive board] </pre> 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.

Fault Display	LED display	Display position
		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. 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.
Fault Impact	- 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.	
	ODU of the same system operates normally.	
Fault Trigger	- 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.	
Fault Recovery	Automatic recovery	
Possible Cause	- 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.	

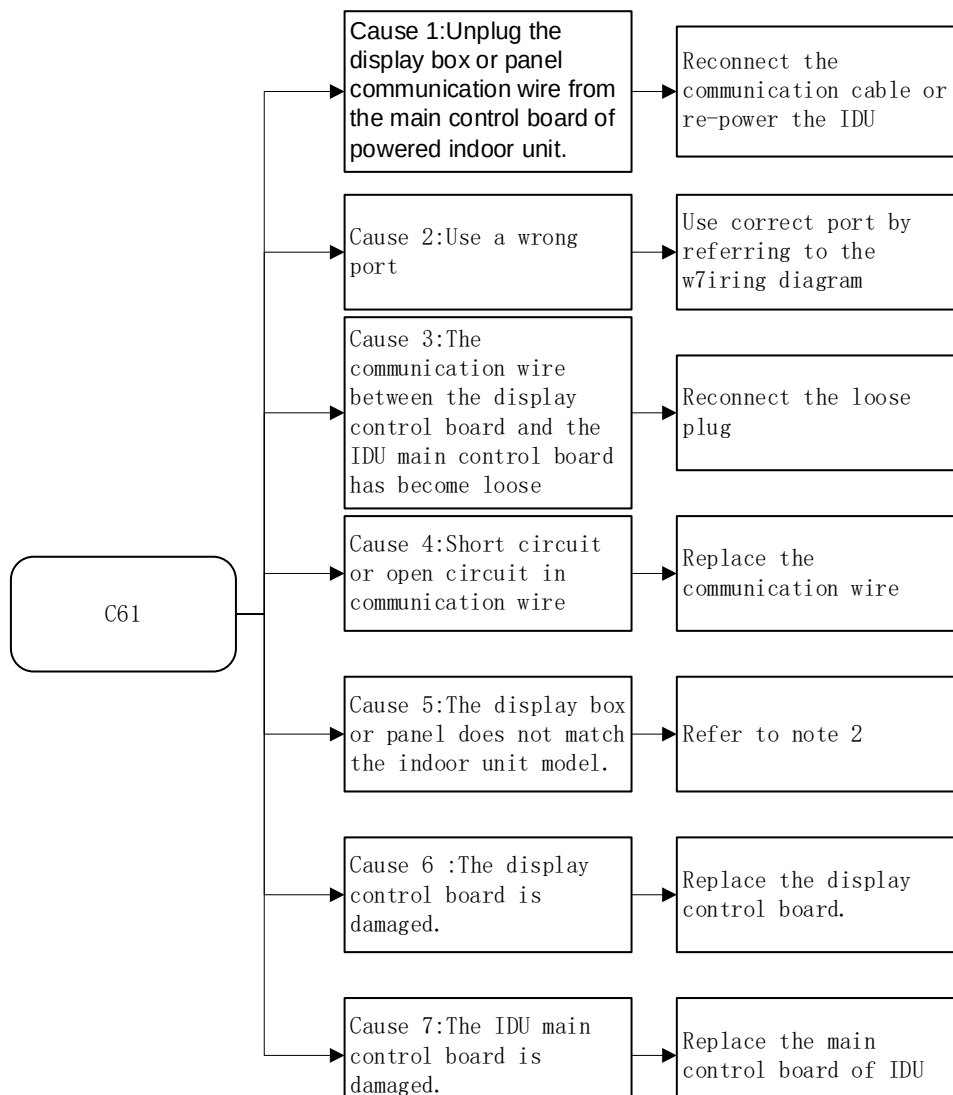


1.1.18 C61 - Abnormal communication between the IDU main control board and display control board

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

	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".
Error display		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

Error display	Digital display	Display position (master IDU)	
		Panel or display box	Wired controller
		Spot check interface query	Error code is not displayed
Error impact	Master IDU: operates normally. Humidifying IDUs: stop. Other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	If the main control board of the master IDU has lost communication with the main control board of the humidifying IDU for 2 min		
Error recovery	Automatic recovery		
Possible cause	■ 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.		
Troubleshooting	C73 Cause 1: The communication cable between the main control board of the humidifying IDU and the main control board of master IDU is disconnected or short circuited Replace the communication cable and properly connect the cable Cause 2: The communication cable between the main control board of the humidifying IDU and the main control board of the master IDU has become loose or is connected to a wrong port Properly connect the cables and ensure they are connected to the right ports Cause 3: The main control board of the master IDU is damaged Replace the main control board of the master IDU Cause 4: The main control board of the humidifying IDU is damaged Replace the main control board of the humidifying IDU		
	Note: 1. The error code can be queried after the humidifying IDU is connected to the wired controller or the display box.		

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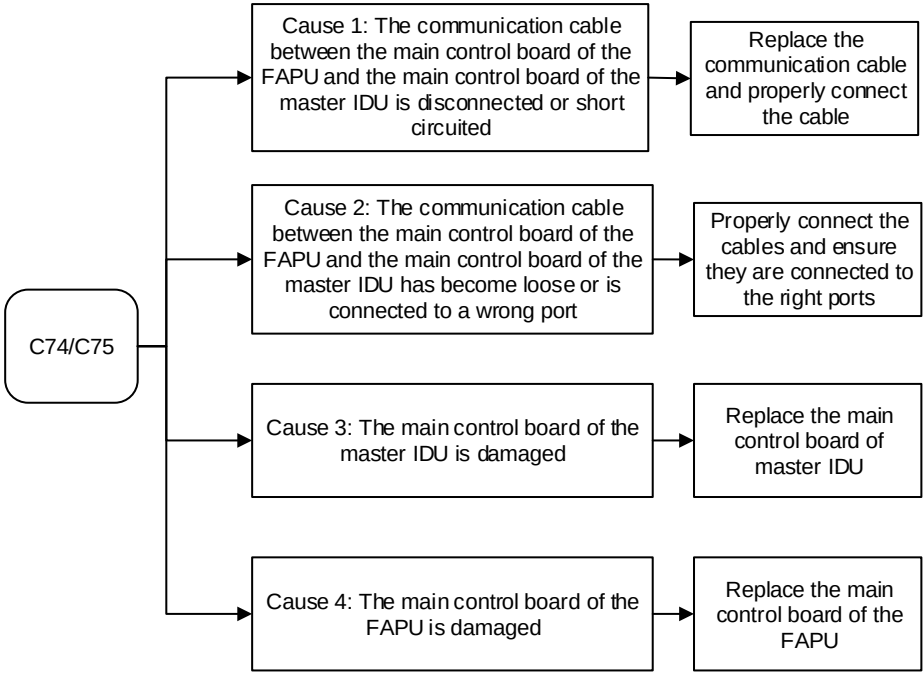


1.1.20 C74 - Abnormal communication between the linked FAPU and master IDU (series setting)

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.

Error display	Digital display	Display position (master IDU)
		Panel, display box, and wired controller
Error impact	The master IDU and the linked FAPU: stop. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of the master IDU has lost communication with the main control board of the FAPU for 2 min	
Error recovery	Automatic recovery	
Possible cause	■ 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.	
Troubleshooting	 Note: 1. The error code can be queried after the FAPU is connected to the wired controller or the display box.	

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.

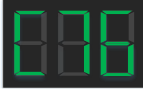
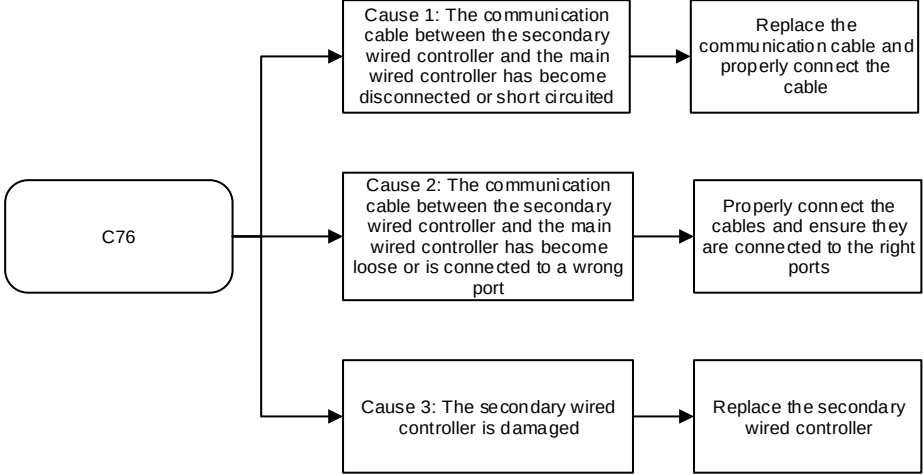
Error display	Digital display	Display position (master IDU)	
		Panel or display box	Wired controller
		Spot check interface query	Error code is not displayed
Error impact	Master IDU: operates normally. FAPU: stops. Other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	If the main control board of the master IDU has lost communication with the main control board of the FAPU for 2 min		
Error recovery	Automatic recovery		
Possible cause	■ 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.		
Troubleshooting	C74/C75 Cause 1: The communication cable between the main control board of the FAPU and the main control board of the master IDU is disconnected or short circuited Replace the communication cable and properly connect the cable Cause 2: The communication cable between the main control board of the FAPU and the main control board of the master IDU has become loose or is connected to a wrong port Properly connect the cables and ensure they are connected to the right ports Cause 3: The main control board of the master IDU is damaged Replace the main control board of the master IDU Cause 4: The main control board of the FAPU is damaged Replace the main control board of the FAPU		
	Note: 1. The error code can be queried after the FAPU is connected to the wired controller or the display box.		

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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	 <pre> graph LR C76([C76]) --> C1[Cause 1: The communication cable between the secondary wired controller and the main wired controller has become disconnected or short circuited] C76 --> C2[Cause 2: The communication cable between the secondary wired controller and the main wired controller has become loose or is connected to a wrong port] C76 --> C3[Cause 3: The secondary wired controller is damaged] C1 --> R1[Replace the communication cable and properly connect the cable] C2 --> R2[Properly connect the cables and ensure they are connected to the right ports] C3 --> R3[Replace the secondary wired controller] </pre>	

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

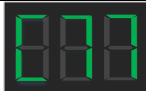
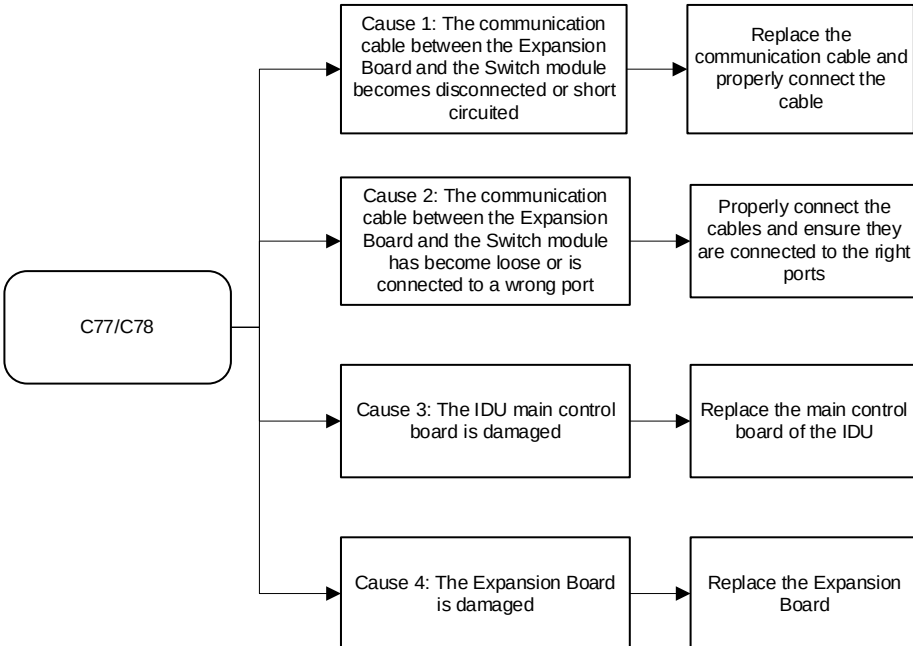
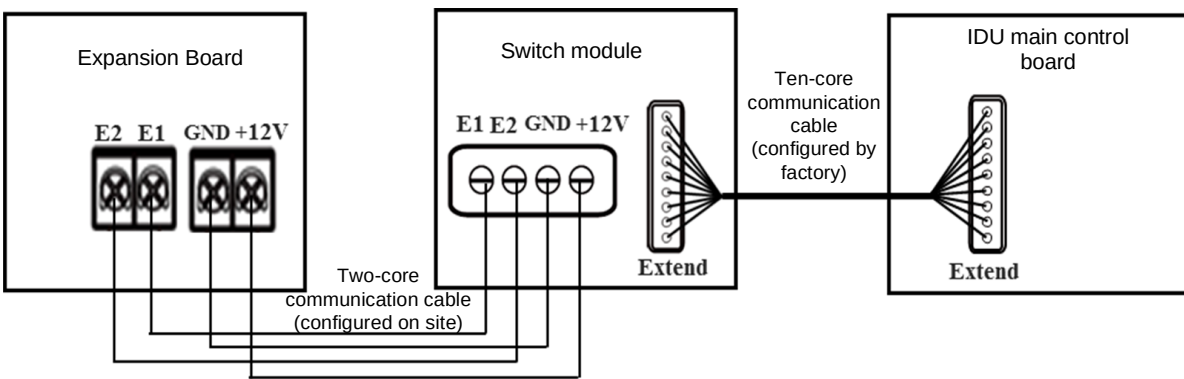
	Digital display		Display position
Error display			Panel, display box, and wired controller
Error impact	Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: operate normally.		
	ODU of the same system: operate normally.		
Error trigger	If the main control board 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:		

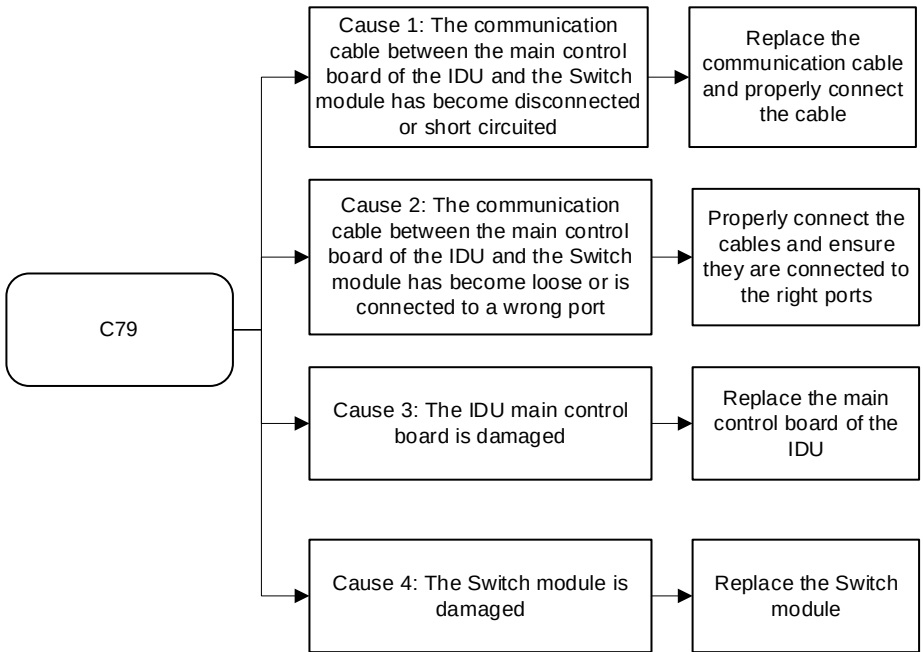
Figure 1 Wiring diagram of Expansion Board, Switch module, and IDU main control board



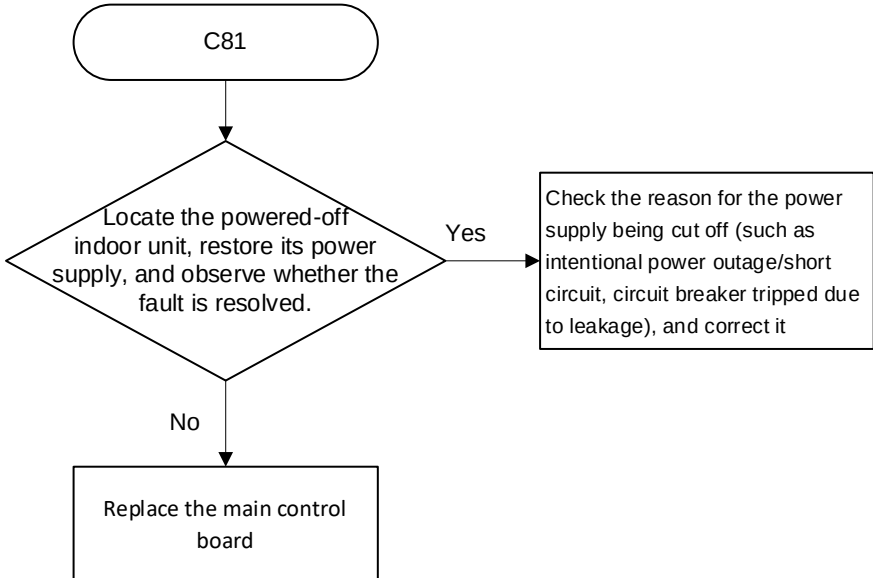
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1.1.24 C79 - Abnormal communication between the IDU main control board and Switch module

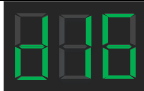
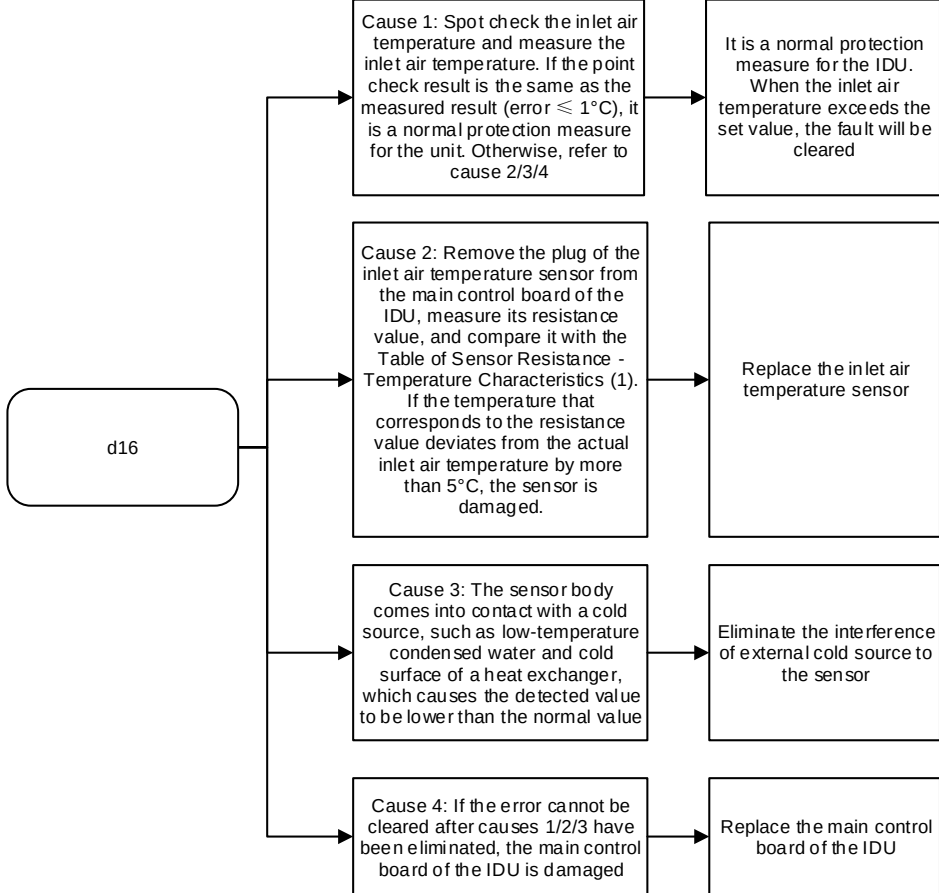
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	Faulty IDU: The fan continues running, and the EEV is closed. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with the Switch module for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 <pre> graph LR C79([C79]) --> C1[Cause 1: The communication cable between the main control board of the IDU and the Switch module has become disconnected or short circuited] C79 --> C2[Cause 2: The communication cable between the main control board of the IDU and the Switch module has become loose or is connected to a wrong port] C79 --> C3[Cause 3: The IDU main control board is damaged] C79 --> C4[Cause 4: The Switch module is damaged] C1 --> A1[Replace the communication cable and properly connect the cable] C2 --> A2[Properly connect the cables and ensure they are connected to the right ports] C3 --> A3[Replace the main control board of the IDU] C4 --> A4[Replace the Switch module] </pre>	

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

Error display	Digital display	Display position
		Central controller or various types of control terminal software
Error impact	■ 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.	
	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.	
Error trigger	The power supply to the indoor unit has been detected as being cut off.	
Error recovery	The faulty indoor unit will automatically resume operation once power supply is restored.	
Possible cause	■ The power supply to the indoor unit has been cut off. ■ The main control board of the indoor unit is damaged	
Troubleshooting	 <pre> graph TD Start([C81]) --> Decision{Locate the powered-off indoor unit, restore its power supply, and observe whether the fault is resolved.} Decision -- Yes --> YesBox[Check the reason for the power supply being cut off (such as intentional power outage/short circuit, circuit breaker tripped due to leakage), and correct it] Decision -- No --> NoBox[Replace the main control board] </pre> 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.	

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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	 <pre> graph LR d16([d16]) --> C1[Cause 1: Spot check the inlet air temperature and measure the inlet air temperature. If the point check result is the same as the measured result (error ≤ 1°C), it is a normal protection measure for the unit. Otherwise, refer to cause 2/3/4] d16 --> C2[Cause 2: Remove the plug of the inlet air temperature sensor from the main control board of the IDU, measure its resistance value, and compare it with the Table of Sensor Resistance - Temperature Characteristics (1). If the temperature that corresponds to the resistance value deviates from the actual inlet air temperature by more than 5°C, the sensor is damaged.] d16 --> C3[Cause 3: The sensor body comes into contact with a cold source, such as low-temperature condensed water and cold surface of a heat exchanger, which causes the detected value to be lower than the normal value] d16 --> C4[Cause 4: If the error cannot be cleared after causes 1/2/3 have been eliminated, the main control board of the IDU is damaged] C1 --> R1[It is a normal protection measure for the IDU. When the inlet air temperature exceeds the set value, the fault will be cleared] C2 --> R2[Replace the inlet air temperature sensor] C3 --> R3[Eliminate the interference of external cold source to the sensor] C4 --> R4[Replace the main control board of the IDU] </pre>	
	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

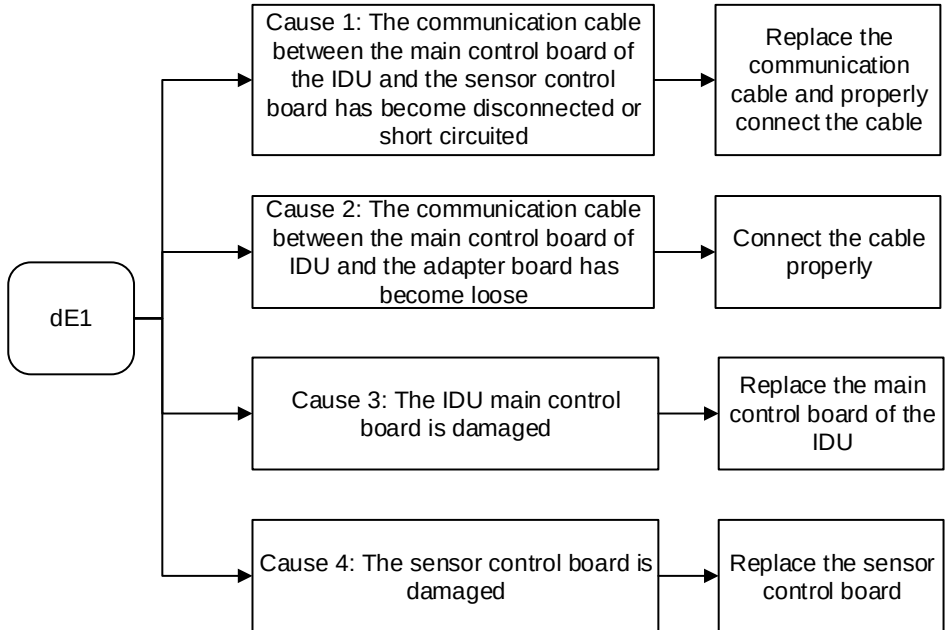
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the air inlet temperature of the IDU is higher than the set value (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.	

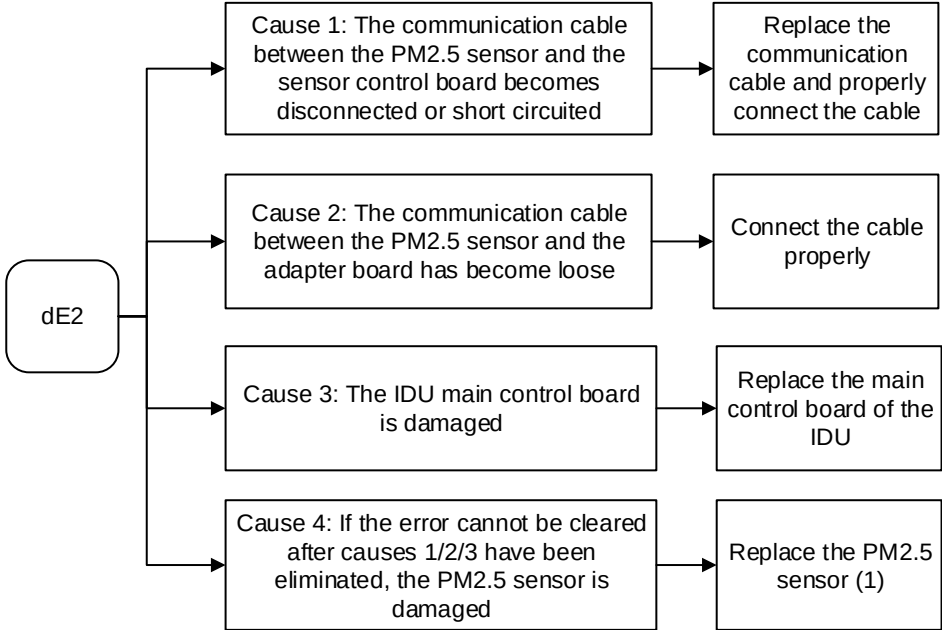
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1.1.28 dE1 - Sensor control board fault

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	 <pre> graph LR dE1(dE1) --> C1[Cause 1: The communication cable between the main control board of the IDU and the sensor control board has become disconnected or short circuited] dE1 --> C2[Cause 2: The communication cable between the main control board of IDU and the adapter board has become loose] dE1 --> C3[Cause 3: The IDU main control board is damaged] dE1 --> C4[Cause 4: The sensor control board is damaged] C1 --> R1[Replace the communication cable and properly connect the cable] C2 --> R2[Connect the cable properly] C3 --> R3[Replace the main control board of the IDU] C4 --> R4[Replace the sensor control board] </pre>	

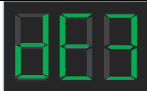
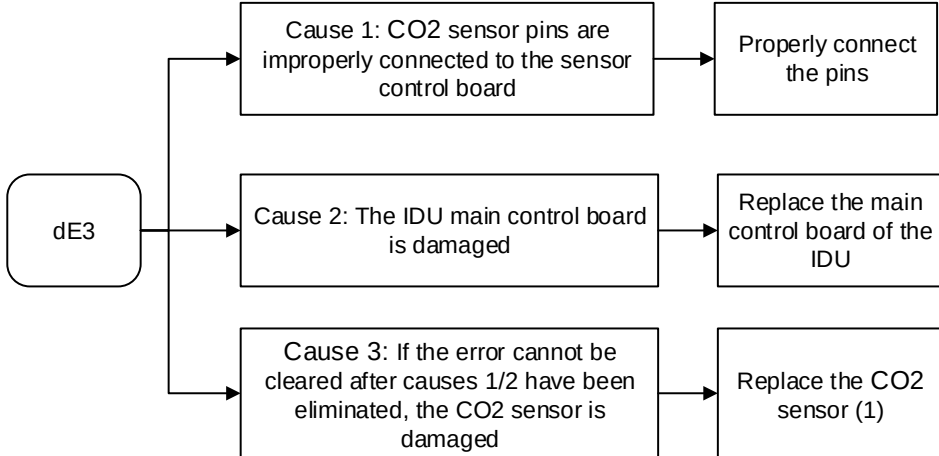
1.1.29 dE2 - PM2.5 sensor fault

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	 <pre> graph LR dE2([dE2]) --> C1[Cause 1: The communication cable between the PM2.5 sensor and the sensor control board becomes disconnected or short circuited] dE2 --> C2[Cause 2: The communication cable between the PM2.5 sensor and the adapter board has become loose] dE2 --> C3[Cause 3: The IDU main control board is damaged] dE2 --> C4[Cause 4: If the error cannot be cleared after causes 1/2/3 have been eliminated, the PM2.5 sensor is damaged] C1 --> R1[Replace the communication cable and properly connect the cable] C2 --> R2[Connect the cable properly] C3 --> R3[Replace the main control board of the IDU] C4 --> R4[Replace the PM2.5 sensor (1)] </pre>	
	Note: 1. If the PM2.5 sensor is integrated with the sensor control board, making disassembly difficult, then replace the sensor control board directly.	

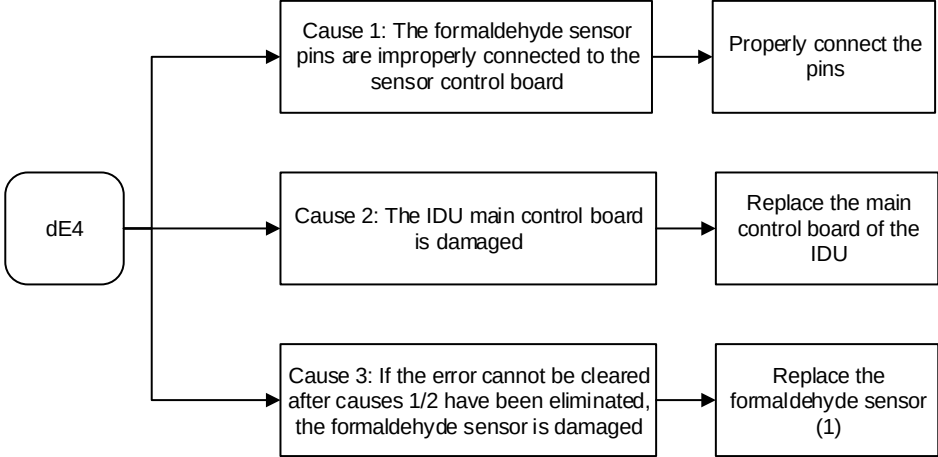
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1.1.30 dE3 - CO2 sensor fault

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	 <pre> graph LR dE3([dE3]) --> C1[Cause 1: CO2 sensor pins are improperly connected to the sensor control board] dE3 --> C2[Cause 2: The IDU main control board is damaged] dE3 --> C3[Cause 3: If the error cannot be cleared after causes 1/2 have been eliminated, the CO2 sensor is damaged] C1 --> S1[Properly connect the pins] C2 --> S2[Replace the main control board of the IDU] C3 --> S3[Replace the CO2 sensor (1)] </pre>	
	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

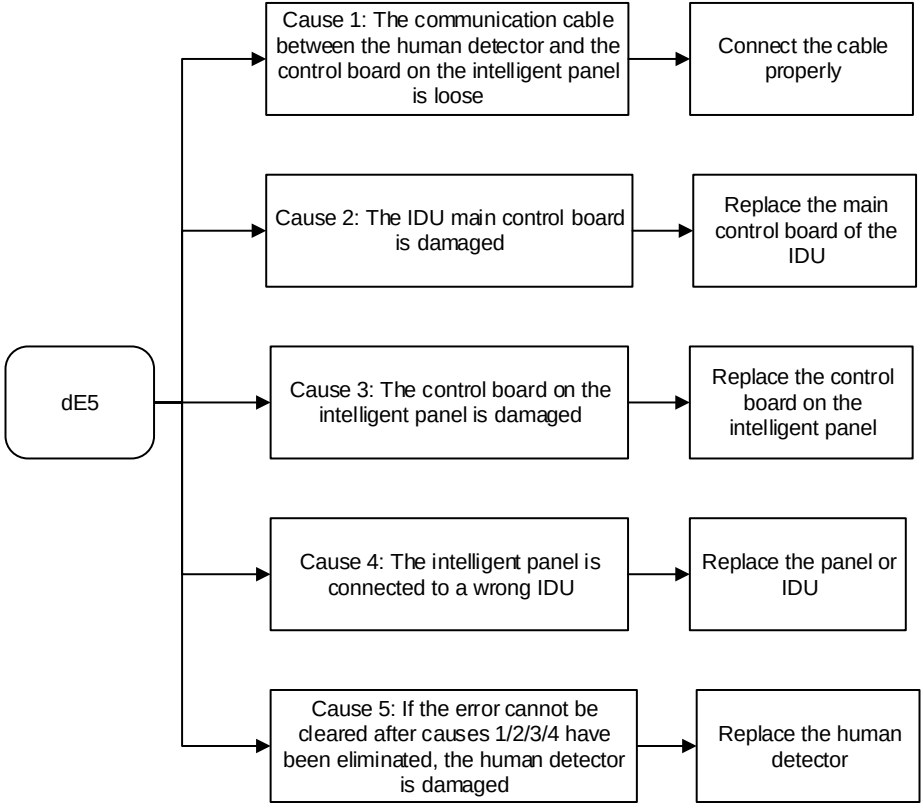
Error display	Digital display	Display position
		Panel, display box, and wired controller
Error impact	The faulty IDU and other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	If the main control board of an IDU has lost communication with formaldehyde sensor for 2 min	
Error recovery	Automatic recovery	
Possible cause	See the Troubleshooting section.	
Troubleshooting	 <pre> graph LR dE4([dE4]) --> C1[Cause 1: The formaldehyde sensor pins are improperly connected to the sensor control board] dE4 --> C2[Cause 2: The IDU main control board is damaged] dE4 --> C3[Cause 3: If the error cannot be cleared after causes 1/2 have been eliminated, the formaldehyde sensor is damaged] C1 --> S1[Properly connect the pins] C2 --> S2[Replace the main control board of the IDU] C3 --> S3[Replace the formaldehyde sensor (1)] </pre>	
	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.	

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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	 <pre> graph LR dE5(dE5) --> C1[Cause 1: The communication cable between the human detector and the control board on the intelligent panel is loose] dE5 --> C2[Cause 2: The IDU main control board is damaged] dE5 --> C3[Cause 3: The control board on the intelligent panel is damaged] dE5 --> C4[Cause 4: The intelligent panel is connected to a wrong IDU] dE5 --> C5[Cause 5: If the error cannot be cleared after causes 1/2/3/4 have been eliminated, the human detector is damaged] C1 --> R1[Connect the cable properly] C2 --> R2[Replace the main control board of the IDU] C3 --> R3[Replace the control board on the intelligent panel] C4 --> R4[Replace the panel or IDU] C5 --> R5[Replace the human detector] </pre>	

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

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 temperature sensor short-circuits or cuts off			
Error recovery	Automatic recovery			
Possible cause	■ 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.			
Troubleshooting	<pre> graph TD Start([E21/E24/E81 (1)]) --> D1{Is the temperature sensor plug connecting to the IDU main control board loose?} D1 -- Yes --> A1[Reconnect the plug tightly] D1 -- No --> D2{Is the temperature sensor resistance abnormal (2)?} D2 -- Yes --> A2[Replace the temperature sensor] D2 -- No --> A3[Replace the main control board of the IDU] </pre> 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			

	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.
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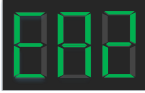
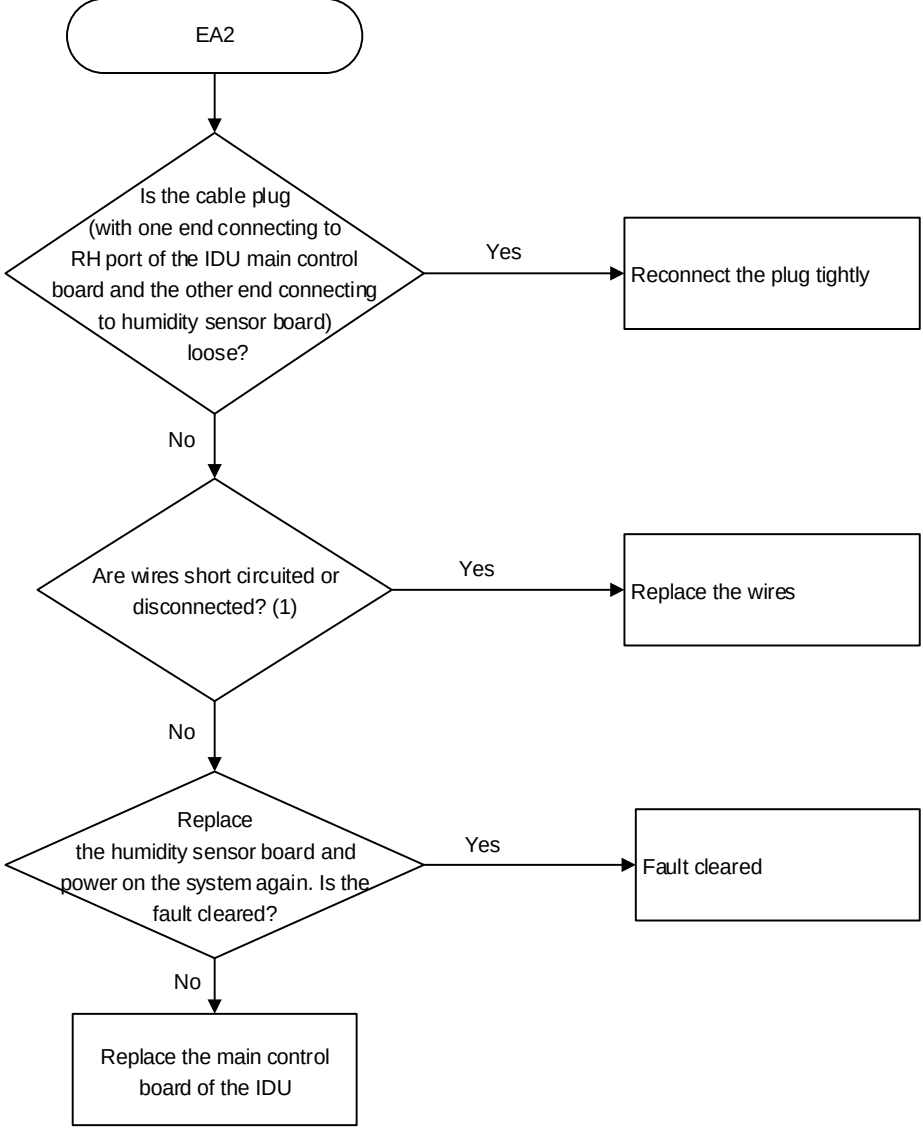
1.1.34 E31: wired controller temperature sensor failure

Fault Display	LED display	Display position	
		Panel or display box	Wired controller
		Panel, display box, and wired controller	
Fault Impact	The faulty IDU and other IDUs of the same system operate normally.		
	ODU of the same system operates normally.		
Fault Trigger	When the V8 series FAPU uses room temperature control, the "Follow Me" temperature value received from the wired controller is abnormal.		
Fault Recovery	Automatic recovery		
Possible Cause	■ 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.		
Troubleshooting	E31 Is the fault cleared after replacing the wired controller of the same model? (1) Yes The "Follow Me" temperature sensor embedded in the wired controller is damaged No Replace the main control board of the IDU		
	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.		

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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	 <pre> graph TD Start([EA2]) --> D1{Is the cable plug (with one end connecting to RH port of the IDU main control board and the other end connecting to humidity sensor board) loose?} D1 -- Yes --> A1[Reconnect the plug tightly] D1 -- No --> D2{Are wires short circuited or disconnected? (1)} D2 -- Yes --> A2[Replace the wires] D2 -- No --> D3{Replace the humidity sensor board and power on the system again. Is the fault cleared?} D3 -- Yes --> A3[Fault cleared] D3 -- No --> A4[Replace the main control board of the IDU] </pre> 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

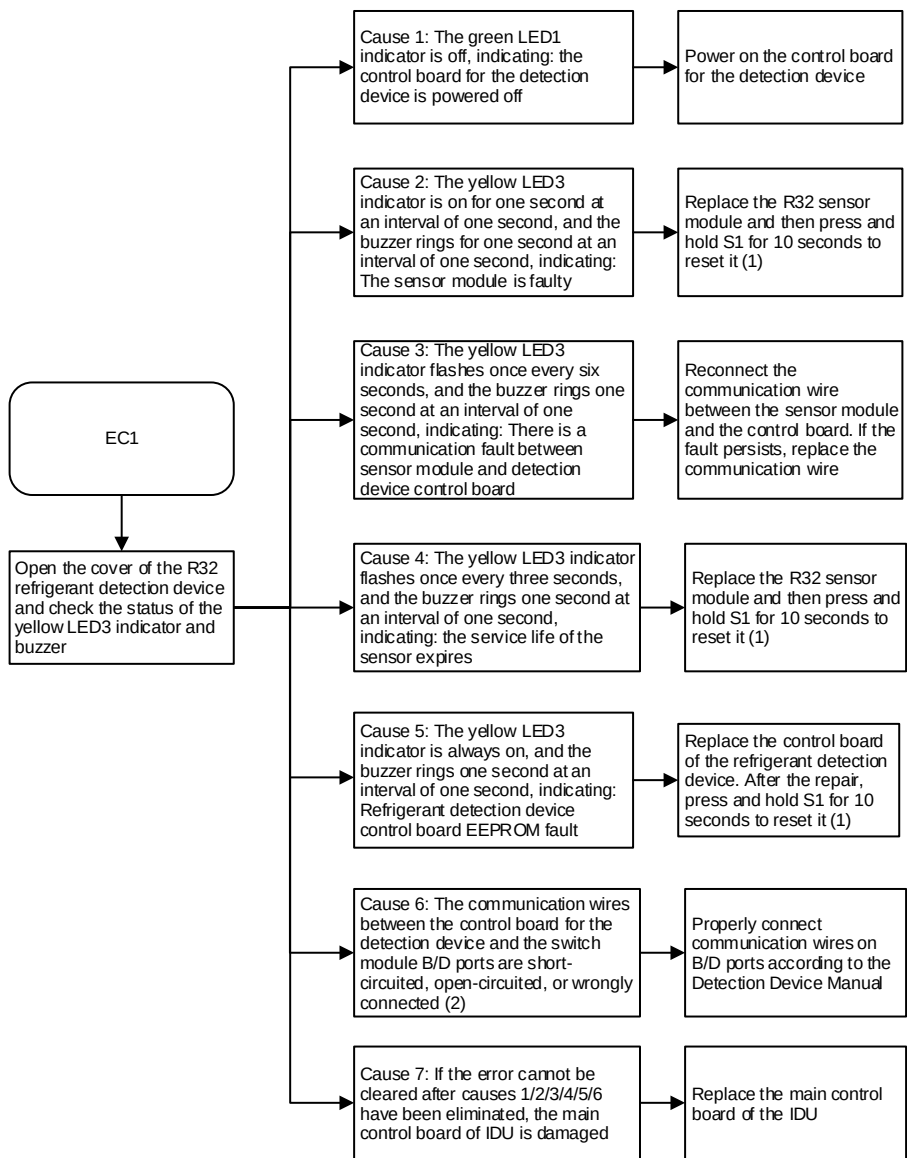
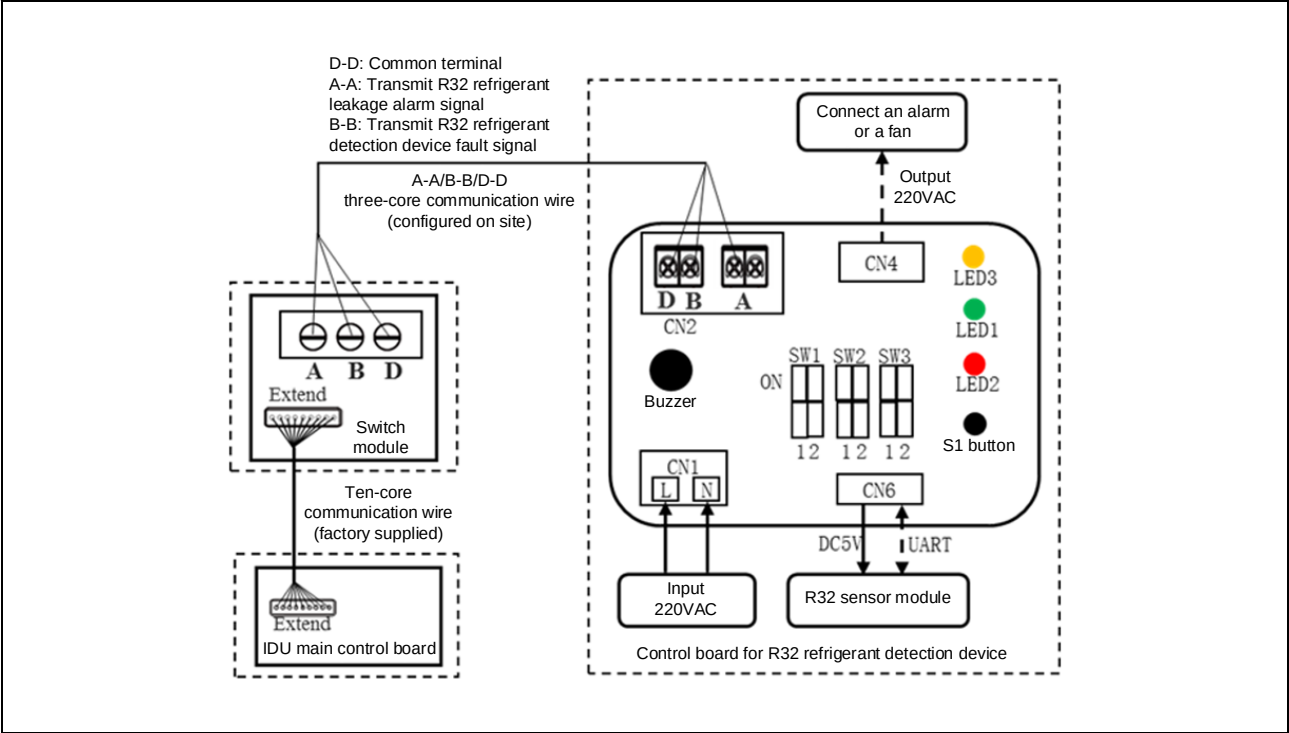
Fault Display	LED display	Display position
		Panel, display box, and wired controller
Fault Impact	Faulty IDU: stops. Other IDUs of the same system: operate normally.	
	ODU of the same system operates normally.	
Fault Trigger	The IDU main control board receives sensor module fault signal from the R32 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.	

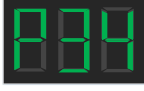
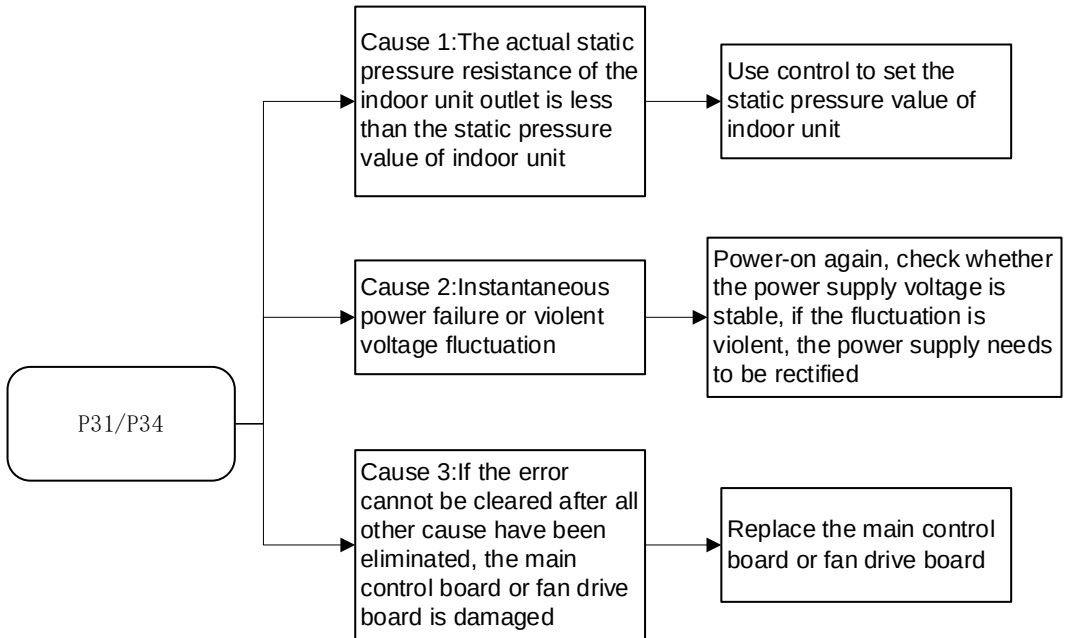
Figure 1 Schematic diagram of the R32 refrigerant leakage detection system



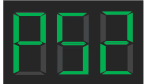
1.1.37 F01, F11, F21 - T2A (heat exchanger liquid pipe temperature sensor) short-circuits or cuts off, T2 (heat exchanger middle temperature sensor) short-circuits or cuts off, and T2B (heat exchanger gas pipe temperature sensor) short-circuits or cuts off

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 temperature sensor short-circuits or cuts off			
Error recovery	Automatic recovery			
Possible cause	■ 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.			
Troubleshooting	<pre> graph TD Start([F01/F11/F21 (1)]) --> D1{Is the temperature sensor plug connecting to the IDU main control board getting loose?} D1 -- Yes --> A1[Reconnect the plug tightly] D1 -- No --> D2{Is the temperature sensor resistance abnormal (2)?} D2 -- Yes --> A2[Replace the temperature sensor] D2 -- No --> A3[Replace the main control board of the IDU] </pre> 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.			

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	 <pre> graph LR A(P31/P34) --> B[Cause 1: The actual static pressure resistance of the indoor unit outlet is less than the static pressure value of indoor unit] A --> C[Cause 2: Instantaneous power failure or violent voltage fluctuation] A --> D[Cause 3: If the error cannot be cleared after all other cause have been eliminated, the main control board or fan drive board is damaged] B --> E[Use control to set the static pressure value of indoor unit] C --> F[Power-on again, check whether the power supply voltage is stable, if the fluctuation is violent, the power supply needs to be rectified] D --> G[Replace the main control board or fan drive board] </pre> 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."		

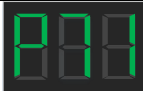
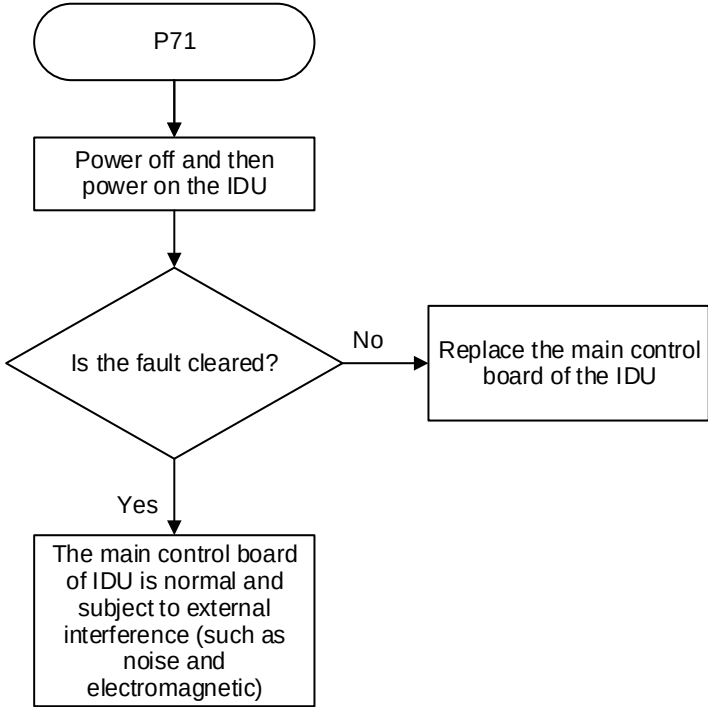
1.1.39 P52 - The voltage of the power supply is too low

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	Power supply voltage is below the programmed protection threshold (165V)	
Error recovery	Automatic recovery	
Possible cause	- Power supply voltage is lower than 165V - Indoor unit fan driver board is damaged	
	<pre> graph TD P52([P52]) --> D{Use a multimeter to check whether the power supply voltage of the indoor unit is lower than 165V} D -- No --> R1[Replace the fan drive board or main control board] D -- YES --> R2[Rectify the power supply] </pre>	

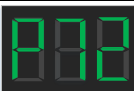
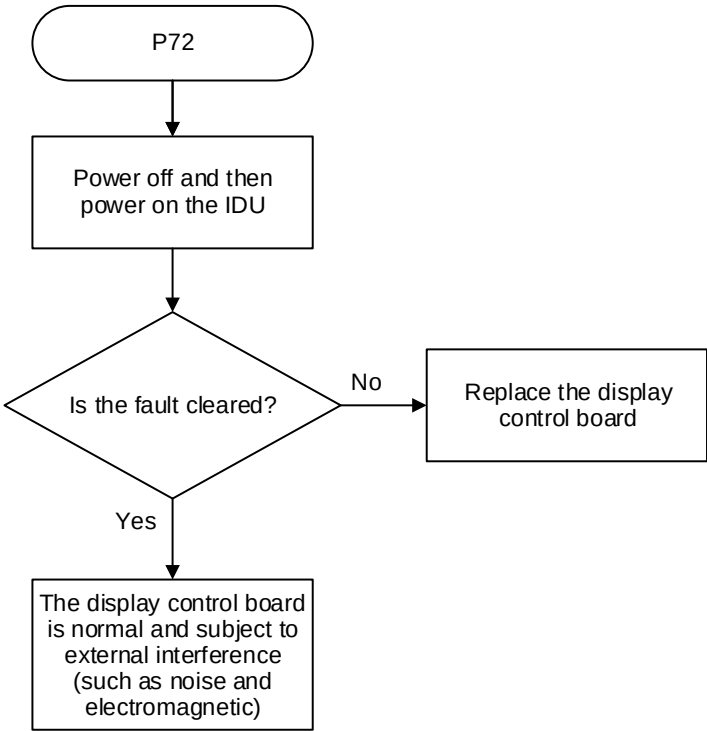
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1.1.40 P71 - Main control board EEPROM fault

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	 <pre> graph TD P71([P71]) --> PowerOff[Power off and then power on the IDU] PowerOff --> IsCleared{Is the fault cleared?} IsCleared -- No --> ReplaceBoard[Replace the main control board of the IDU] IsCleared -- Yes --> NormalBoard[The main control board of IDU is normal and subject to external interference (such as noise and electromagnetic)] </pre>	

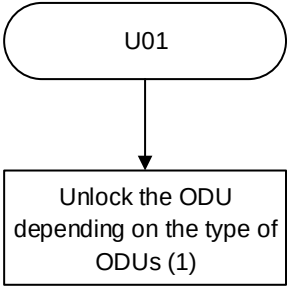
1.1.41 P72 - IDU display control board EEPROM fault

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	 <pre> graph TD P72([P72]) --> PowerOff[Power off and then power on the IDU] PowerOff --> Decision{Is the fault cleared?} Decision -- No --> ReplaceBoard[Replace the display control board] Decision -- Yes --> NormalBoard[The display control board is normal and subject to external interference (such as noise and electromagnetic)] </pre>	

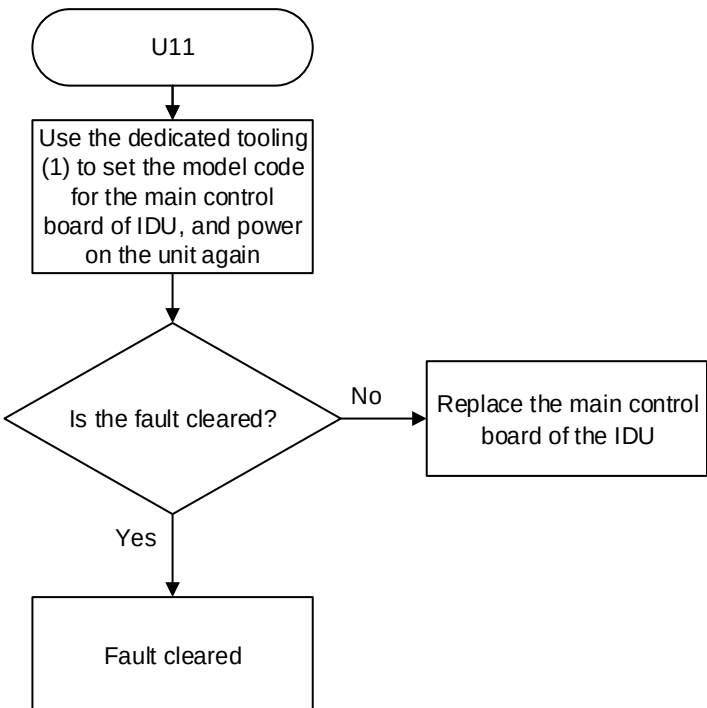
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1.1.42 U01 - Locked (electronic lock)

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	 <pre> graph TD U01([U01]) --> A[Unlock the ODU
depending on the type of
ODUs (1)] </pre> 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	 <pre> graph TD Start([U11]) --> Step[Use the dedicated tooling (1) to set the model code for the main control board of IDU, and power on the unit again] Step --> Decision{Is the fault cleared?} Decision -- Yes --> End([Fault cleared]) Decision -- No --> Replace[Replace the main control board of the IDU] </pre> Note 1: For specialized tooling and instructions, please contact your local dealer or technical support personnel.	

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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	<pre> graph TD U12([U12]) --> Step1[Use the dedicated tooling (1) to set the capacity(HP) code for the main control board of IDU, and power on the unit again] Step1 --> Decision{Is the fault cleared?} Decision -- No --> Step2[Replace the main control board of the IDU] Decision -- Yes --> Step3[Fault cleared] </pre> Note 1: For specialized tooling and instructions, please contact your local dealer or technical support personnel.	

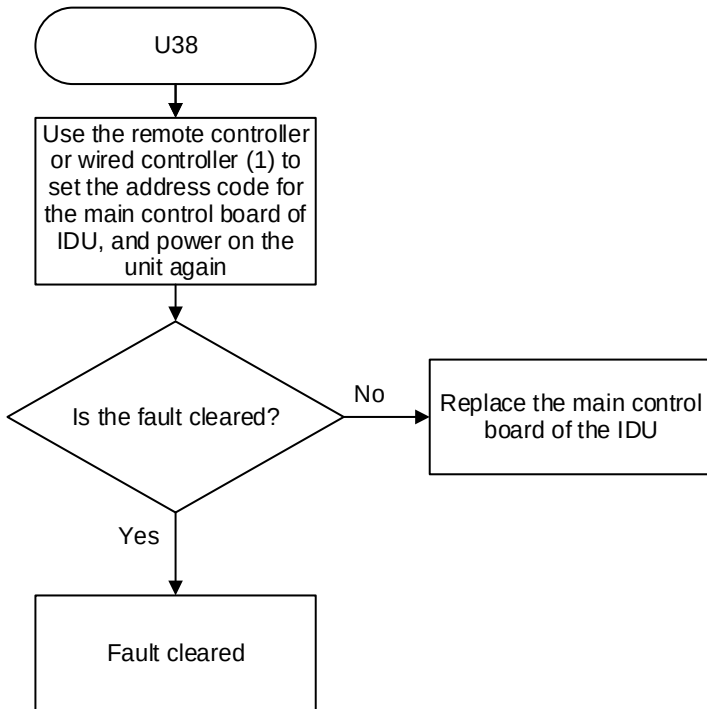
1.1.45 U26 - Mismatch between indoor unit model and outdoor unit model

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 will operate normally	
	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.	
Error trigger	■ 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	
Error recovery	Automatic recovery	
Possible cause	■ 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	
Troubleshooting	U26 Cause 1: Model series code setting error when replacing the main control board of indoor unit. Use the dedicated tooling (1) to set the model code for the main control board of IDU, and power on the unit again Cause 2: Myhome configuration code setting error when replacing the main control board of indoor unit Use the dedicated tooling (1) to set the Myhome code for the main control board of IDU, and power on the unit again Cause 3: Mismatch between indoor unit model and outdoor unit model in the same system. Replace the outdoor unit or indoor unit(2) Cause 4: Myhome configuration indoor unit and non-Myhome configuration outdoor unit are connected in one system Replace the outdoor unit or indoor unit(2) Cause 5: Non-Myhome configured indoor unit and Myhome configured outdoor unit are connected in one system Replace the outdoor unit or indoor unit(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.	

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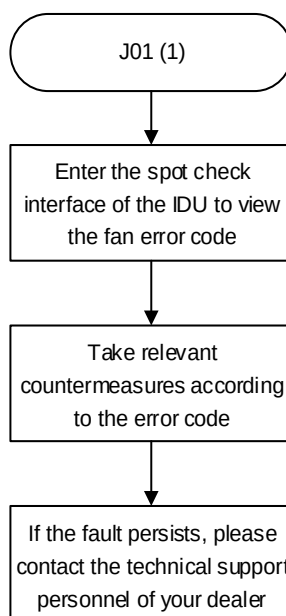


1.1.46 U38 - Address code not detected

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	 <pre> graph TD U38([U38]) --> Step[Use the remote controller or wired controller (1) to set the address code for the main control board of IDU, and power on the unit again] Step --> Decision{Is the fault cleared?} Decision -- Yes --> End([Fault cleared]) Decision -- No --> Replace[Replace the main control board of the IDU] </pre> 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.	

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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	<pre> graph LR J1E[J1E] --> C1[Cause 1: No fan wheel is installed on the motor. As a result, the motor load is too low and the current exceeds the protection value set by the driver] J1E --> C2[Cause 2: Measure the inter-turn winding resistance between the red, white, and black wires of the motor power cable. If there is a short circuit or an open circuit, the motor is damaged] J1E --> C3[Cause 3: Measure the resistance between any wire pin of the power cord plug of the motor and the metal housing of the motor. If the resistance is less than 1 MΩ, the motor is damaged] J1E --> C4[Cause 4: The fan drive board is damaged] J1E --> C5[Cause 5: If the error cannot be cleared after causes 1/2/3/4 have been eliminated, the IDU main control board is damaged] C1 --> A1[Assemble and fix the matched fan wheel and motor, and then start the unit.] C2 --> A2[Replace the motor] C3 --> A3[Replace the motor] C4 --> A4[Replace the fan drive board (1)] C5 --> A5[Replace the main control board of the IDU] </pre> 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

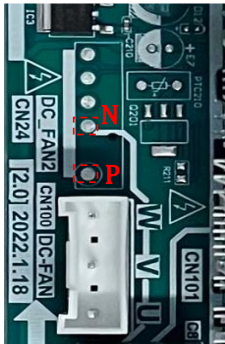
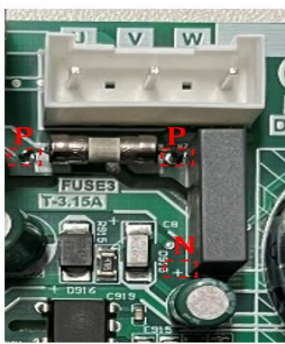
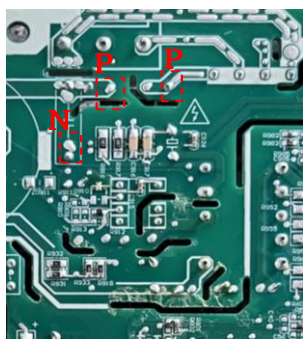
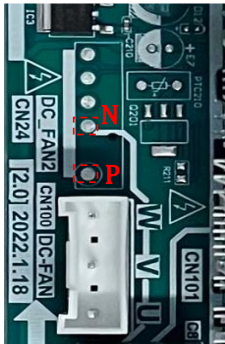
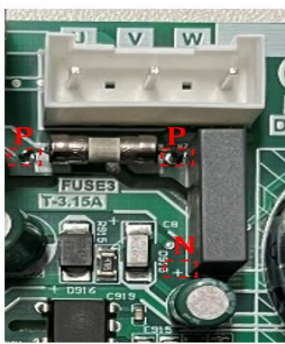
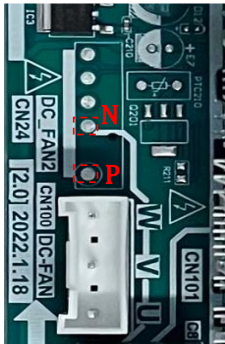
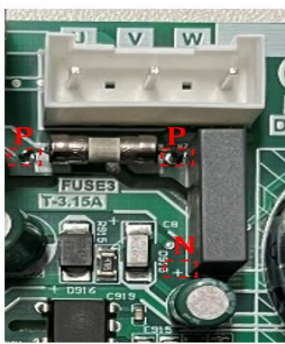
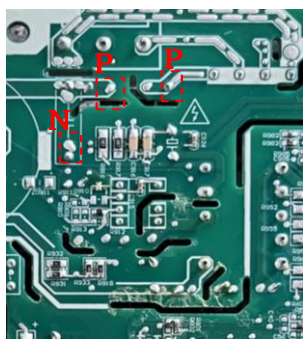
	LED display	Display position
Fault Display		Panel, display box, and wired controller
Fault Impact	The faulty IDU stops. Other IDUs of the same system: operate normally. ODU of the same system operates normally.	
Fault Trigger	The current value (AC) detected for any phase line of U/V/W on the IPM exceeds 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	<pre> graph LR J11([J11]) --> C1[Cause 1: No fan wheel is installed on the motor. As a result, the motor load is too low and the current exceeds the protection value set by the driver] J11 --> C2[Cause 2: Measure the inter-turn winding resistance between the red, white, and black wires of the motor power cable. If there is a short circuit or an open circuit, the motor is damaged] J11 --> C3[Cause 3: The motor bearing is severely worn, resulting in overcurrent. It causes the motor to create noise when rotating and to over heat] J11 --> C4[Cause 4: The fan drive board is damaged] J11 --> C5[Cause 5: If the error cannot be cleared after causes 1/2/3/4 have been eliminated, the IDU main control board is damaged] C1 --> A1[Assemble and fix the matched fan wheel and motor, and then start the unit.] C2 --> A2[Replace the motor] C3 --> A3[Replace the motor] C4 --> A4[Replace the fan drive board (1)] C5 --> A5[Replace the main control board of the IDU] </pre> 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.

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1.1.50 J3E - Low bus voltage 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 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 below the threshold value of the driver (165 V)										
Error recovery	Automatic recovery										
Possible cause	■ 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.										
Troubleshooting	J3E Cause 1: Measure the input voltage of the IDU. If the voltage is significantly lower than the normal value (≤ 140 V) or the voltage interrupts or drops instantaneously, the power supply is abnormal Fix the power supply Cause 2: If the input power supply is normal, and the voltage (DC) between P and N is normal (the normal voltage is about 310 V), it indicates that the voltage detection circuit for fan drive board is abnormal (1) Replace the fan drive board (2) Cause 3: If the error cannot be cleared after causes 1/2 have been eliminated, the main control board of the IDU is damaged Replace the main control board of the IDU										
	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>			PCB type 1	PCB type 2		P/N measuring point	P/N measuring point (front of PCB)	P/N measuring point (back of PCB)		
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.											

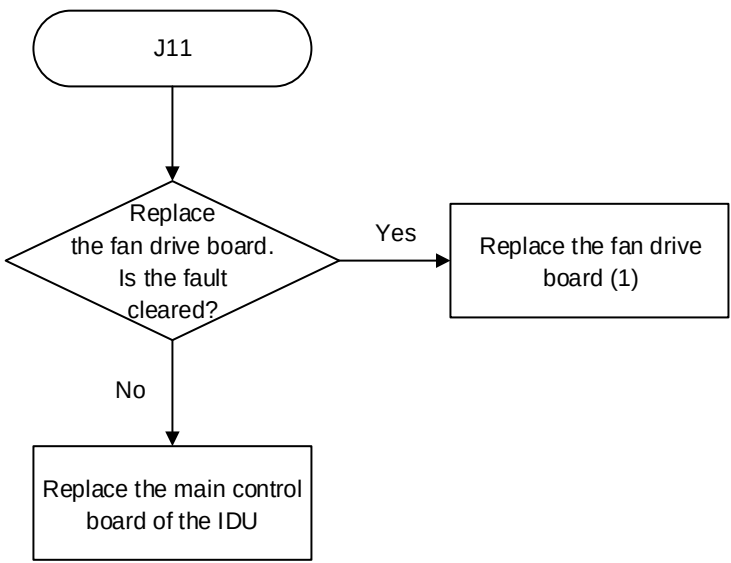
1.1.51 J31 - High bus voltage fault

	Digital display	Display position									
Error display		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	J31 Cause 1: Measure the input voltage of IDU. If the voltage is significantly higher than the normal value (≥ 318 V) or the voltage increases instantaneously, the power supply is abnormal Fix the power supply Cause 2: If the input power supply is normal, and the voltage (DC) between P and N is normal (the normal voltage is about 310 V), it indicates that the voltage detection circuit for fan drive board is abnormal (1) Replace the fan drive board (2) Cause 3: If the error cannot be cleared after causes 1/2 have been eliminated, the main control board of the IDU is damaged Replace the main control board of the IDU 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><th>PCB type 1</th><th colspan="2">PCB type 2</th></tr><tr><th>P/N measuring point</th><th>P/N measuring point (front of PCB)</th><th>P/N measuring point (back of PCB)</th></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.		PCB type 1	PCB type 2		P/N measuring point	P/N measuring point (front of PCB)	P/N measuring point (back of PCB)			
	PCB type 1	PCB type 2									
	P/N measuring point	P/N measuring point (front of PCB)	P/N measuring point (back of PCB)								

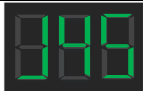
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1.1.52 J43 - Phase current sample bias error

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	 <pre> graph TD J11([J11]) --> D{Replace the fan drive board. Is the fault cleared?} D -- Yes --> A1[Replace the fan drive board (1)] D -- No --> A2[Replace the main control board of the IDU] </pre> 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.	
	J45 Use the dedicated tooling (1) to set the model code and capacity code for the main control board of IDU according to the IDU model or nominal capacity, and power on the unit again Is the fault cleared? Yes Fault cleared No Replace the fan drive board (2) 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.	

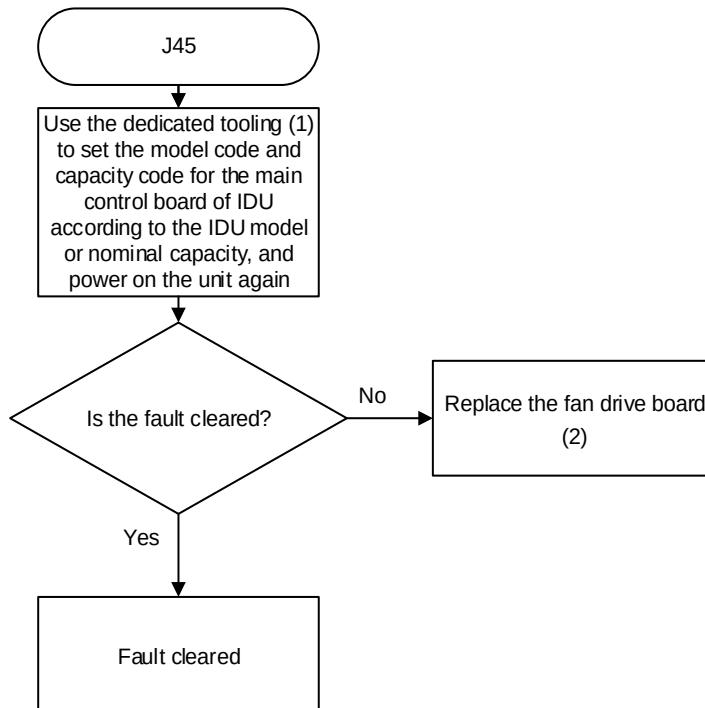
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1.1.54 J47 - IPM (fan module) and IDU unmatched

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

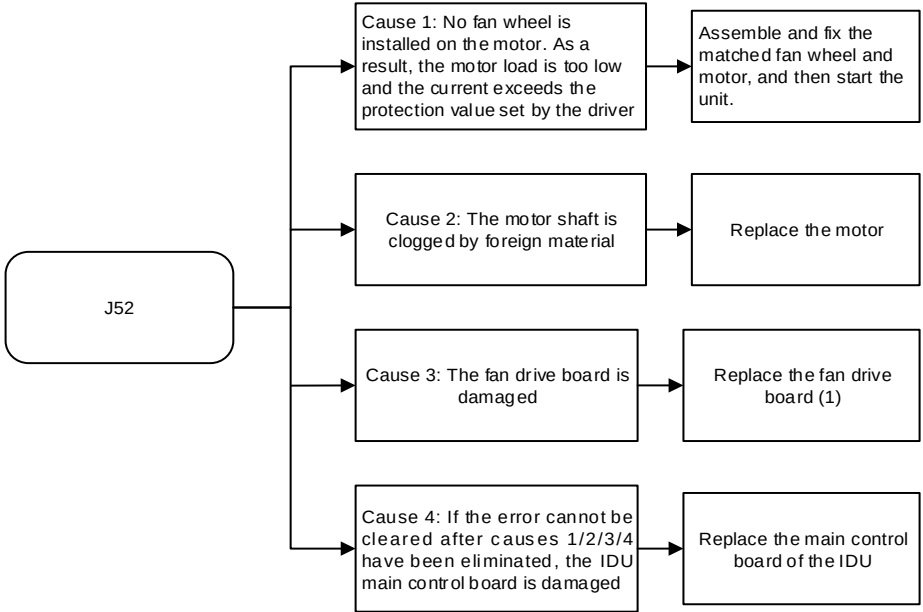
Error display	Digital display	Display position
		Panel, display box Wired controller
Error impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system: operate normally.	
Error trigger	Motor startup failure	
Error recovery	Automatic recovery	
Possible cause	■ 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	J5E <pre> graph LR J5E --> C1[Cause 1: Measure the inter-turn winding resistance between the red, white, and black wires of the motor power cable. If there is a short circuit or an open circuit, the motor is damaged] J5E --> C2[Cause 2: The fan is blocked by foreign matters and cannot rotate] J5E --> C3[Cause 3: The unit's model code or capacity code are set incorrectly] J5E --> C4[Cause 4: The fan blades are not installed] J5E --> C5[Cause 5: The fan drive board is damaged] J5E --> C6[Cause 6: If the error cannot be cleared after all other causes have been eliminated, the main control board of the IDU is damaged] C1 --> R1[Replace the motor] C2 --> R2[Remove foreign matter.] C3 --> R3[Reset the code] C4 --> R4[Install the fan blade] C5 --> R5[Replace the fan drive board (1)] C6 --> R6[Replace the main control board of the IDU] </pre> 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

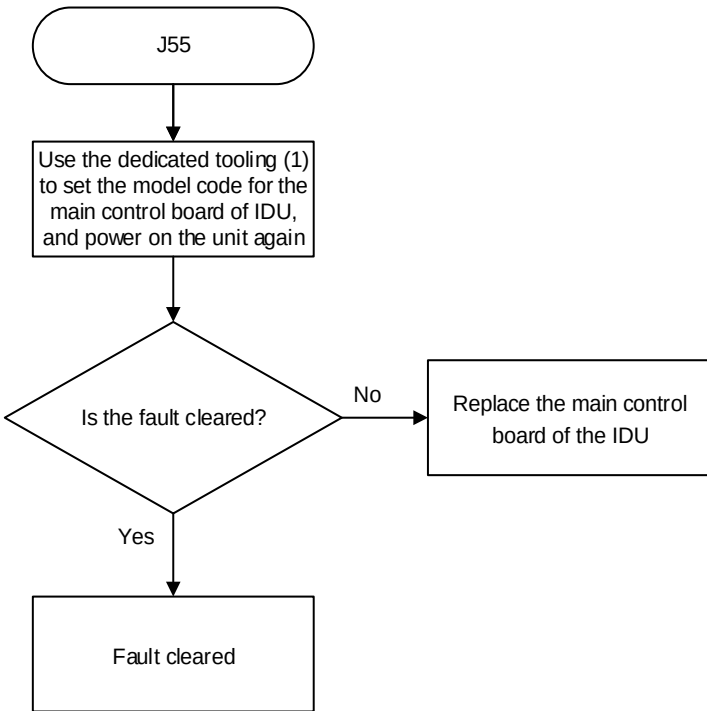
Fault Display	LED display	Display position
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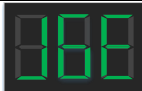
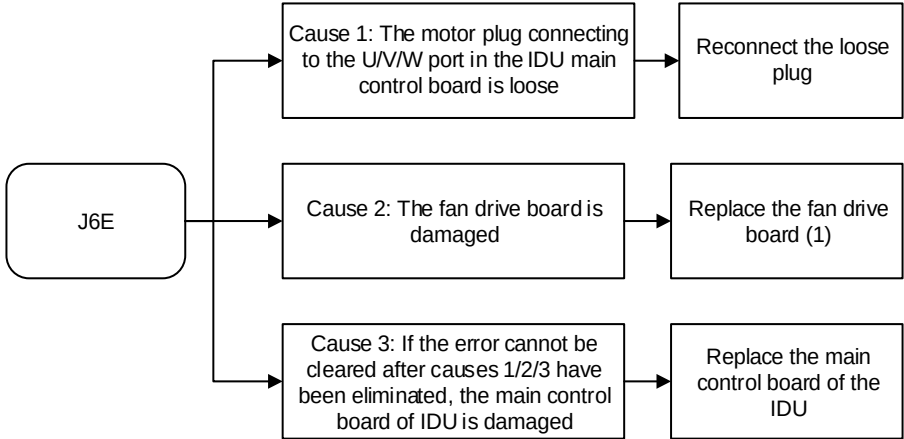
		Panel, display box, and wired controller
Fault Impact	The faulty IDU stops. Other IDUs of the same system: operate normally.	
	ODU of the same system operates normally.	
Fault Trigger	The motor is blocked.	
Fault Recovery	Automatic recovery	
Possible Cause	■ There is no fan wheel installed on the motor. ■ The motor shaft gets stuck. ■ The fan drive board is damaged. ■ The IDU main control board is damaged.	
	Troubleshooting  <pre> graph LR J52(J52) --> C1[Cause 1: No fan wheel is installed on the motor. As a result, the motor load is too low and the current exceeds the protection value set by the driver] J52 --> C2[Cause 2: The motor shaft is clogged by foreign material] J52 --> C3[Cause 3: The fan drive board is damaged] J52 --> C4[Cause 4: If the error cannot be cleared after causes 1/2/3/4 have been eliminated, the IDU main control board is damaged] C1 --> S1[Assemble and fix the matched fan wheel and motor, and then start the unit.] C2 --> S2[Replace the motor] C3 --> S3[Replace the fan drive board (1)] C4 --> S4[Replace the main control board of the IDU] </pre> 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	 <pre> graph TD J55([J55]) --> Step1[Use the dedicated tooling (1) to set the model code for the main control board of IDU, and power on the unit again] Step1 --> Decision{Is the fault cleared?} Decision -- No --> Step2[Replace the main control board of the IDU] Decision -- Yes --> Step3[Fault cleared] </pre> Note 1: For specialized tooling and instructions, please contact your local dealer or technical support personnel.	

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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=10K $\Omega \pm 3\%$ B25/50=4100K $\pm 3\%$

Temperature (°C)	Resistance min(k Ω)	Resistance Normal(k Ω)	Resistance max(k Ω)	Temperature (°C)	Resistance min(k Ω)	Resistance Normal(k Ω)	Resistance max(k Ω)
-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

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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

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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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