Chapter 4 Maintenance

1 Failure Code Table

Indoor:

Error Code	Content	Error Code	Content
L0	Malfunction of IDU	d2	Malfunction of lower water temperature sensor of water tank
L1	Protection of indoor fan	d3	Malfunction of ambient temperature sensor
L2	Auxiliary heating protection	d4	Malfunction of entry-tube temperature sensor
L3	Water-full protection	d6	Malfunction of exit-tube temperature sensor
L4	Abnormal power supply for wired controller	d7	Malfunction of humidity sensor
L5	Freeze prevention protection	d8	Malfunction of water temperature sensor
L7	No main IDU	d9	Malfunction of jumper cap
L8	Power supply is insufficient	dA	Web address of IDU is abnormal
L9	For single control over multiple units, number of IDU is inconsistent	dH	PCB of wired controller is abnormal
LA	For single control over multiple units, IDU series is inconsistent	dC	Setting capacity of DIP switch code is abnormal
LH	Alarm due to bad air quality	dL	Malfunction of air outlet temperature sensor
LC	IDU is not matching with outdoor unit	dE	Malfunction of indoor CO_2 sensor
LL	Malfunction of water flow switch	dF	Malfunction of upper water temperature sensor of water tank
LE	Rotation speed of EC DC water pump is abnormal	dJ	Malfunction of backwater temperature sensor
LF	Malfunction of shunt valve setting	dP	Malfunction of inlet tube temperature sensor of generator
LJ	Setting of functional DIP switch code is wrong	dU	Malfunction of drainage pipe temperature sensor of generator
LP	Zero-crossing malfunction of PG motor	db	Debugging status
LU	Indoor unit's branch is not inconsistent for one-to-more unit of heat recovery system	dd	Malfunction of solar power temperature sensor
d1	Indoor PCB is poor	dn	Malfunction of swing parts

Outdoor:

Error Code	Content	Error Code	Content
E0	Malfunction of ODU	FH	Current sensor of compressor 1 is abnormal
E1	High-pressure protection	FC	Current sensor of compressor 2 is abnormal
E2	Discharge low-temperature protection	FL	Current sensor of compressor 3 is abnormal
E3	Low-pressure protection	FE	Current sensor of compressor 4 is abnormal

E4	High discharge temperature protection of compressor	FF	Current sensor of compressor 5 is abnormal
J0	Protection for other modules	FJ	Current sensor of compressor 6 is abnormal
J1	Over-current protection of compressor 1	FP	Malfunction of DC motor
J2	Over-current protection of compressor 2	FU	Malfunction of casing top temperature sensor of compressor 1
J3	Over-current protection of compressor 3	Fb	Malfunction of casing top temperature sensor of compressor 2
J4	Over-current protection of compressor 4	Fd	Malfunction of exit tube temperature sensor of mode exchanger
J5	Over-current protection of compressor 5	Fn	Malfunction of inlet tube temperature sensor of mode exchanger
J6	Over-current protection for compressor 6	b1	Malfunction of outdoor ambient temperature sensor
J7	Gas-mixing protection of 4-way valve	b2	Malfunction of defrosting temperature sensor 1
J8	High pressure ratio protection of system	b3	Malfunction of defrosting temperature sensor 2
J9	Low pressure ratio protection of system	b4	Malfunction of liquid temperature sensor of sub-cooler
JA	Protection because of abnormal pressure	b5	Malfunction of gas temperature sensor of sub-cooler
JC	Water flow switch protection	b6	Malfunction of inlet tube temperature sensor of vapor liquid separator
JL	Protection because high pressure is too low	b7	Malfunction of exit tube temperature sensor of vapor liquid separator
JE	Oil-return pipe is blocked	b8	Malfunction of outdoor humidity sensor
JF	Oil-return pipe is leaking	b9	Malfunction of gas temperature sensor of heat exchanger
P0	malfunction of driving board of compressor	bA	Malfunction of oil-return temperature sensor 1
P1	Driving board of compressor operates abnormally	bH	Clock of system is abnormal
P2	Voltage protection of driving board power of compressor	bE	Malfunction of inlet tube temperature sensor of condenser
P3	Reset protection of driving module of compressor	bF	Malfunction of outlet tube temperature sensor of condenser
P4	Drive PFC protection of compressor	bJ	High-pressure sensor and low-pressure sensor are connected reversely
P5	Over-current protection of inverter compressor	bP	Malfunction of temperature sensor of oil-return 2
P6	Drive IPM module protection of compressor	bU	Malfunction of temperature sensor of oil return 3
P7	Malfunction of drive temperature sensor of compressor	bb	Malfunction of temperature sensor of oil return 4

P8	Drive IPM high temperature protection of compressor	H0	Malfunction of driving board of fan
P9	Desynchronizing protection of inverter compressor	H1	Driving board of fan operates abnormally
PA	Malfunction of drive storage chip of compressor	H2	Voltage protection of driving board power of fan
PH	High-voltage protection of compressor's drive DC bus bar	H3	Reset protection of driving module of fan
PC	Malfunction of current detection circuit drive of compressor	H4	Drive PFC protection of fan
PL	Low voltage protection for DC bus bar of drive of compressor	H5	Over-current protection of inverter fan
PE	Phase-lacking of inverter compressor	H6	Drive IPM module protection of fan
PF	Malfunction of charging loop of driven of compressor	H7	Malfunction of drive temperature sensor of fan
PJ	Failure startup of inverter compressor	H8	Drive IPM high temperature protection of fan
PP	AC current protection of inverter compressor	H9	Desynchronizing protection of inverter fan
PU	AC input voltage of drive of inverter compressor	HA	Malfunction of drive storage chip of inverter outdoor fan
F0	Main board of ODU is poor	HH	High-voltage protection of fan's drive DC bus bar
F1	Malfunction of high-pressure sensor	HC	Malfunction of current detection circuit of fan drive
F3	Malfunction of low-pressure sensor	HL	Low voltage protection of bus bar of fan drive
F5	Malfunction of discharge temperature sensor of compressor 1	HE	Phase-lacking of inverter fan
F6	Malfunction of discharge temperature sensor of compressor 2	HF	Malfunction of charging loop of fan drive
F7	Malfunction of discharge temperature sensor of compressor 3	HJ	Failure startup of inverter fan
F8	Malfunction of discharge temperature sensor of compressor 4	HP	AC current protection of inverter fan
F9	Malfunction of discharge temperature sensor of compressor 5	HU	AC input voltage of drive of inverter fan
FA	Malfunction of discharge temperature sensor of compressor 6		

Debugging:

Error Code	Content	Error Code	Content
U0	Preheat time of compressor is insufficient	C6	Alarm because ODU quantity is inconsistent
U2	Wrong setting of ODU's capacity code/jumper cap	C7	Abnormal communication of converter
U3	Power supply phase sequence protection	C8	Emergency status of compressor
U4	Refrigerant-lacking protection	C9	Emergency status of fan
U5	Wrong address for driving board of compressor	CA	Emergency status of module
U6	Alarm because valve is abnormal	CH	Rated capacity is too high
U8	Malfunction of pipeline for IDU	CC	No main unit

U9	Malfunction of pipeline for ODU	CL	The matching ratio of rated capacity for IDU and ODU is too low
UC	Setting of main IDU is succeeded	CE	Communication malfunction between mode exchanger and IDU
UL	Emergency operation DIP switch code of compressor is wrong	CF	Malfunction of multiple main control units
UE	Charging of refrigerant is invalid	CJ	Address DIP switch code of system is shocking
UF	Identification malfunction of IDU of mode exchanger	CP	Malfunction of multiple wired controller
C0	Communication malfunction between IDU, ODU and IDU's wired controller	CU	Communication malfunction between IDU and the receiving lamp
C2	Communication malfunction between main control and inverter compressor driver	Cb	Overflow distribution of IP address
C3	Communication malfunction between main control and inverter fan driver	Cd	Communication malfunction between mode exchanger and ODU
C4	Malfunction of lack of IDU	Cn	Malfunction of network for IDU and ODU of mode exchanger
C5	Alarm because project code of IDU is inconsistent	Cy	Communication malfunction of mode exchanger

Status:

Error Code	Content	Error Code	Content
A0	Unit waiting for debugging	Ay	Shielding status
A2	Refrigerant recovery operation of after-sales	n0	SE operation setting of system
A3	Defrosting	n3	Compulsory defrosting
A4	Oil-return	n4	Limit setting for max. capacity/output capacity
A6	Heat pump function setting	n5	Compulsory excursion of engineering code of IDU
A7	Quiet mode setting	n6	Inquiry of malfunction
A8	Vacuum pump mode	n7	Inquiry of parameters
AH	Heating	n8	Inquiry of project code of IDU
AC	Cooling	n9	Check quantity of IDU on line
AL	Charge refrigerant automatically	nA	Heat pump unit
AE	Charge refrigerant manually	nH	Heating only unit
AF	Fan	nC	Cooling only unit
AJ	Cleaning reminding of filter	nE	Negative code
AP	Debugging confirmation when starting up the unit	nF	Fan model
AU	Long-distance emergency stop	nJ	High temperature prevention when heating
Ab	Emergency stop of operation	nU	Eliminate the long-distance shielding command of IDU
Ad	Limit operation	nb	Bar code inquiry
An	Child lock status	nn	Length modification of connection pipe of ODU

Note: Previous faults in the system can be queried on the main board of the ODU and commissioning software. See n6 Fault Enquiry of the ODU or enquiry function of the commissioning software for the method.

2 Exception Analyzing and Troubleshooting

2.1 Form analyzing

2.1.1 Control

Fault code	Fault	Possible reasons	Solution
F0	Faults in the ODU's main board (such as memory and address chip exceptions)	1. The clock chip on the main board is damaged. 2. The memory chip on the main board is damaged. 3. The address chip on the main board is damaged.	1. Replace the small CPU board. 2. Replace the control board. 3. Replace the control board.
FC	Faults in the constant frequency compressor's current sensor	1. The constant-frequency compressor is not started. 2. The current detection board is faulty. 3. The main board's detection circuit is faulty.	1. If the compressor is not started, check if the AC contact is closed. If not, replace the AC contact. If the connection is loose, reconnect it; 2. Replace the current detection board. 3. Replace the main board.
U2	Wrong outdoor capacity code setting	1. The capacity code is wrong. 2. The dial component is faulty.	1. Modify the capacity code setting. 2. Replace the main board.
U3	Power phase sequence protection	1. The three-phase power cable is not connected correctly. 2. The main board's detection circuit is faulty.	1. Check connection of the power cable. 2. Replace the control board.
UL	Wrong emergency operation dial code	1. The dial setting is wrong. 2. The dial component is faulty.	1. Modify the dial setting. 2. Replace the main board.
C0	Communication failure between indoor and ODUs and IDU's communicator	1. The communication cable is not connected. 2. The communicator is disconnected. 3. The communication cable is poorly connected. 4. The communicator controller is faulty.	If C0 is not displayed on the control board of the ODU, check the network between the IDU and communicator. If C0 is displayed, check the network between the IDUs and ODUs and between the IDU and communicator as follows: 1) Check if the cables connecting the control board of the ODU and the IDU and connecting the IDU and communicator are loose. If yes, reconnect them; 2) Check if the cables connecting the control board and IDU and connecting the IDU and communicator are broken. If yes, replace the cables; 3) Check the contact of the communication cables; 4) Replace the control board. If the fault is solved, the control board is faulty. Replace the IDU. If the fault is solved, the IDU is faulty.
C2	Communication failure between main control board and inverter compressor drive	1. The communication cable is not connected. 2. The communicator is disconnected. 3. The communication cable is poorly connected. 4. The communicator is faulty.	1) Check if the cable connecting the control board and the compressor's drive board is loose. If yes, reconnect it; 2) Check if the cable connecting the control board and compressor's drive board is broken. If yes, replace the cable; 3) Check the contact of the communication cable connecting the control board and compressor's drive board; 4) Replace the control board. If the fault is solved, the control board is faulty. Replace the compressor's drive board. If the fault is solved, the compressor's drive board is faulty.

C3	Communication failure between main control board and variable frequency fan drive	1. The communication cable is not connected. 2. The communicator is disconnected. 3. The communication cable is poorly connected. 4. The communicator is faulty.	1) Check if the cable connecting the fan's drive board and the compressor's drive board is loose. If yes, reconnect it; 2) Check if the cable connecting the fan's drive board and compressor's drive board is broken. If yes, replace the cable; 3) Check the contact of the communication cable connecting the fan's drive board and compressor's drive board; 4) Replace the control board. If the fault is solved, the control board is faulty. Replace the fan's drive board. If the fault is solved, the fan's drive board is faulty.
C4	Malfunction of lack of indoor unit	1. Some indoor units in the system are not power-connected. 2. Communication wires of some indoor units in the system are disconnected or have loose contact. 3. Controllers of some indoor units in the system are abnormal.	1. Check the number of online indoor units through outdoor unit and compare it with the number of indoor units that are actually installed. Confirm the number of missing indoor units. 2. Check whether all the indoor units are power-connected. If some are not, connect them to power. If power connection is fine, check further whether there is any indoor unit that fails to display on wired controller or receiver board. If such indoor unit exists, it means its main board is abnormal and needs to be replaced. If everything said above is confirmed OK, continue to check according to step 3. 3. The missing indoor units will display error “C0” on wired controller or receiver board. Check the communication wire of the missing indoor unit whether it is disconnected or has loose contact. If yes, connect the communication wire tightly. If communication wire is OK, check whether it is connected reversely. Power on the indoor unit again and see if error “C0” occurs. If “C0” is displayed, it means main board is abnormal and needs to be replaced.
C5	Indoor unit project number conflict warning	1. Project numbers conflict with each other.	1. Change conflicting project numbers and ensure that no IDU's project number is repeated.
C6	Outdoor unit number inconsistency warning	1. Communication cables between ODUs are loose. 2. Communication cables between ODUs are broken. 3. Communication cables between ODUs are poorly connected. 4. The control board is faulty.	1. If the communication cable is loose, reconnect it; 2. If the communication cable is broken, replace it; 3. Check contact of the communication cable; 4. Replace the control board.
CC	No controlling unit	1. The SA8 dial switch of the ODU is not switched to 00. 2. The SA8 dial switch of the ODU is faulty.	1. Switch the SA8 dial switch of an ODU to 00; 2. Replace the control board or switch an ODU's SA8 dial switch to 00.
CF	Multiple controlling units	1. SA8 dial switches of multiple ODUs are switched to 00. 2. Dial switches of multiple ODUs are faulty.	1. Leave one SA8 dial switch unchanged, while switch all the other dial switches to 11; 2. Replace the control board.
L7	No master IDU	1. The master IDU is powered off. 2. The communication of the master IDU fails. 3. The main board of the master IDU is faulty. 4. No master IDU is set in the system.	1. Check if the master IDU is powered on. If yes, replace the main board; 2. Check the contact of the communication cable of the master IDU. If no communication failure (C0) is reported, replace the main board. 3. Replace the IDU's main board and reset the master IDU. 4. Set the master IDU.

Note: Solution of C5 fault when multiple cooling systems are controlled in a centralized way

When multiple cooling systems are controlled in a centralized way, the C5 fault, i.e. project

number conflict, may occur on different cooling systems. In such case, set project numbers of each system and solve the fault as follows:

1) Project number conflict:

When multiple systems are controlled in a centralized way, if two or more IDUs share the same project number, the engineer number conflict occurs. In that case, IDUs cannot be switched to varied modes or be turned on or off. The whole device cannot be started before the conflict is solved. The commissioning software will show the following Figure1:

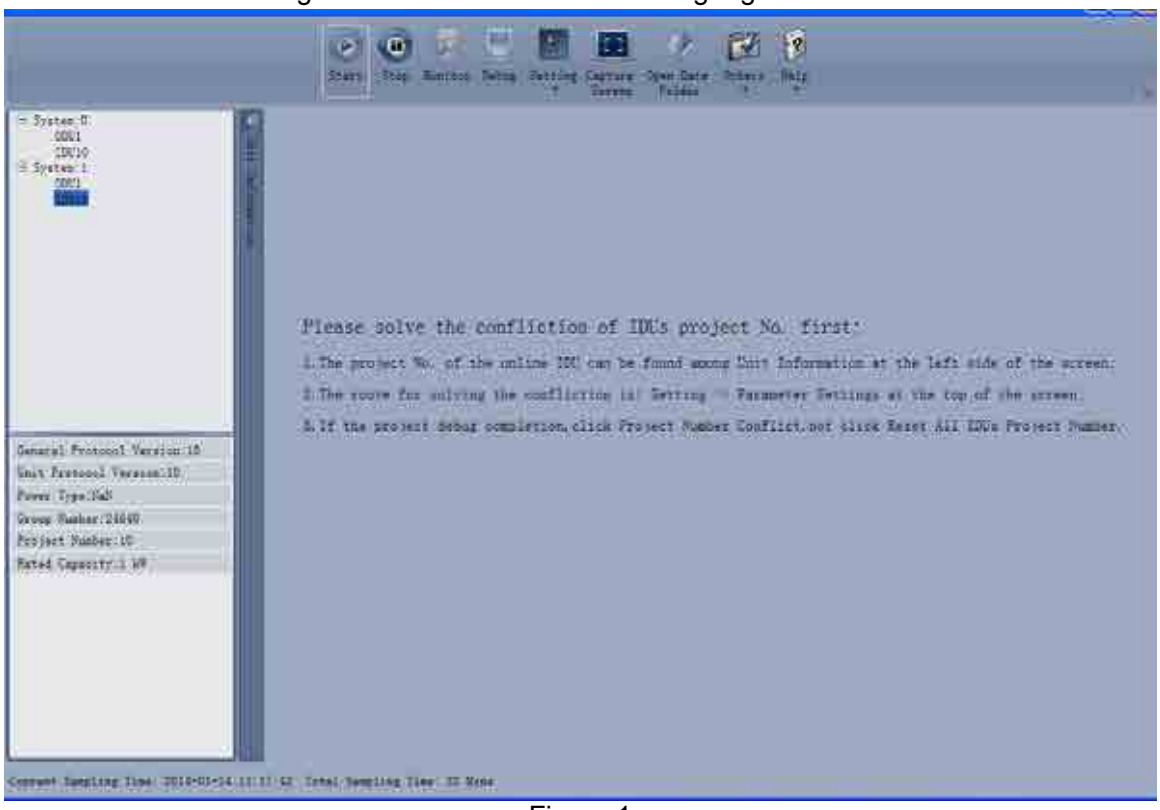


Figure 1

2) Solution of project number conflict:

① Manual setting on the commissioning software:

Use the commissioning software to set IDUs' project numbers separately in every system or reset projects numbers in multiple systems.

Choose Setting -> Parameter Settings, as shown in Figure 2:

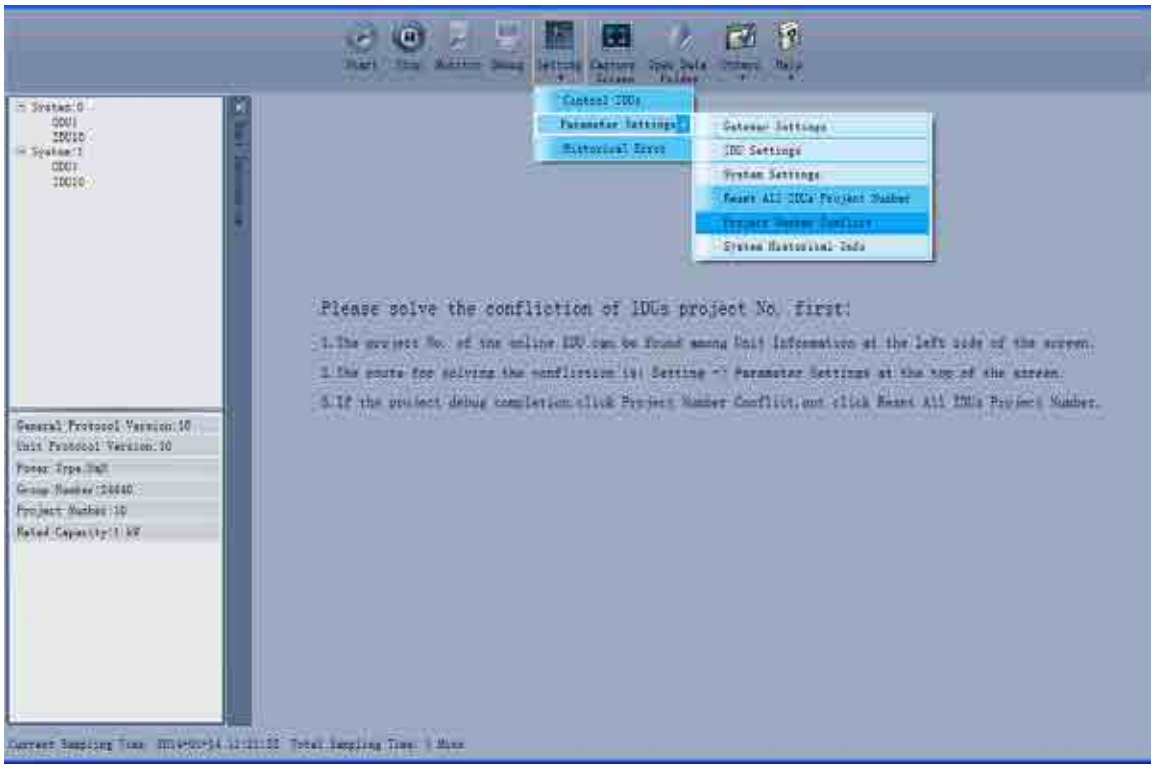


Figure 2

If project commissioning is finished and the IDU where the conflict occurs needs to be set separately. Click Project Number Conflict, as shown in Figure 3. The pop-up box comprises two parts: conflicting IDU box, showing the IDU's project number, system number and time; setting box, showing the IDU project number setting and setting button.

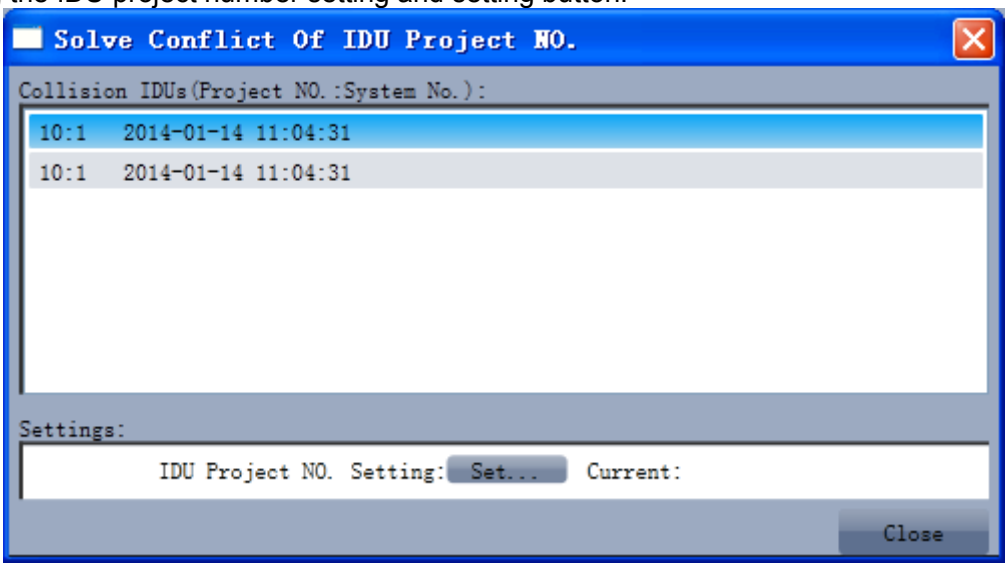


Figure 3

Choose one IDU in the conflicting IDU box shown in Figure 3 and click Set in the setting box. Choose a value in the pop-up box shown in Figure 4 and click Set.

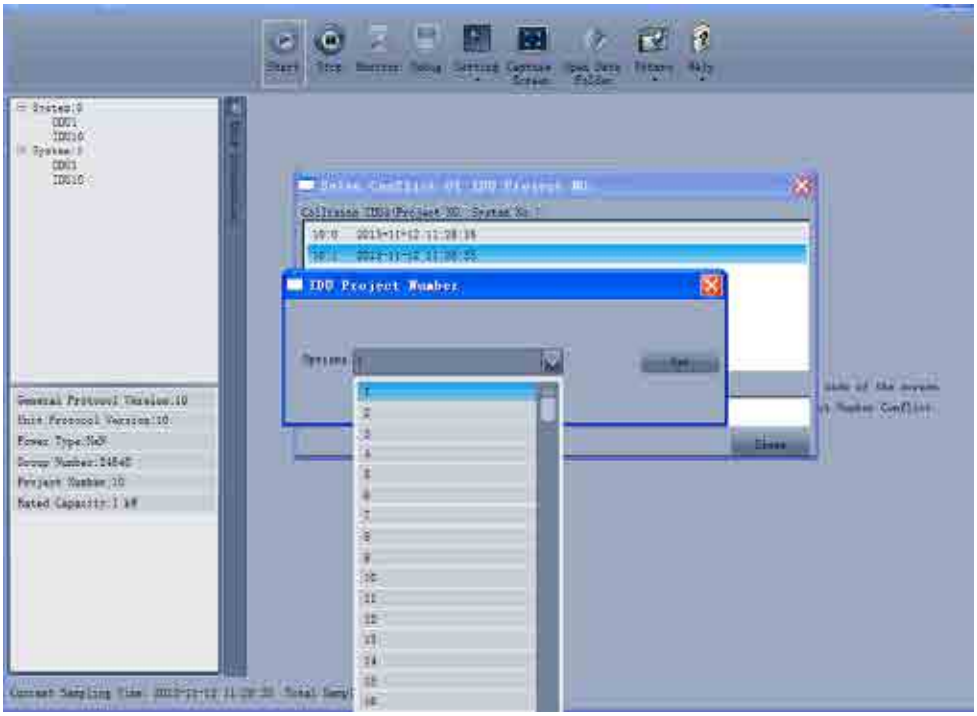


Figure 4

If the conflict is solved, the system will return to the normal status and IDUs can be operated, as shown in Figure 5:

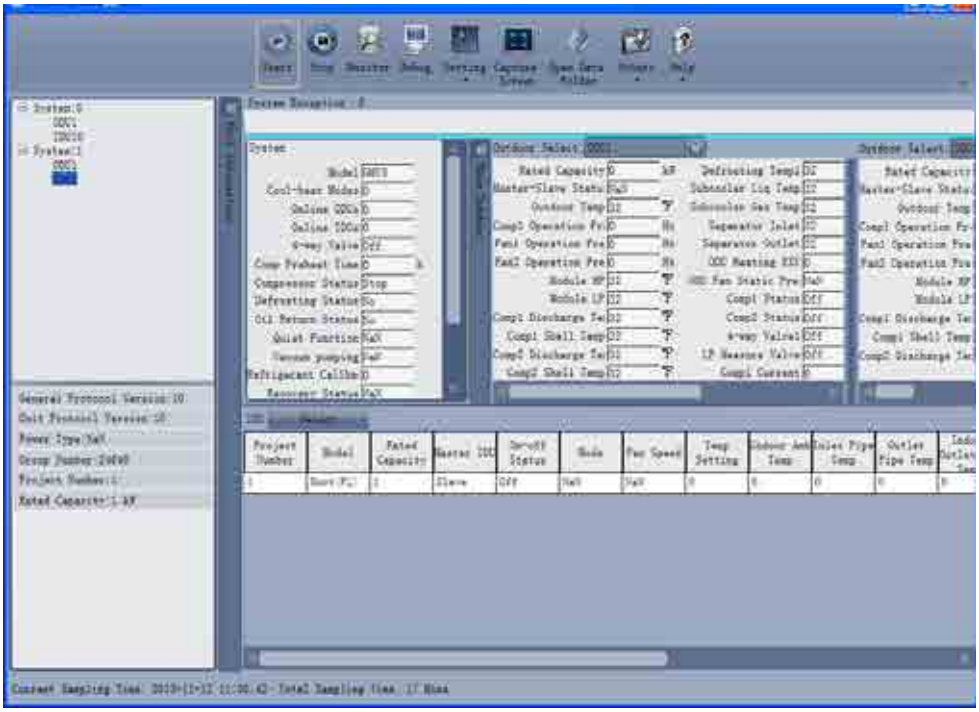


Figure 5

If project commissioning is not finished and all the IDUs' project numbers need to be reset, click Set All IDUs Project Number shown in Figure 2. As shown in Figure 6, the pop-up box comprises two parts: Systems Selection, where you can choose the system to be reset; Settings box, where you can give the resetting instruction.

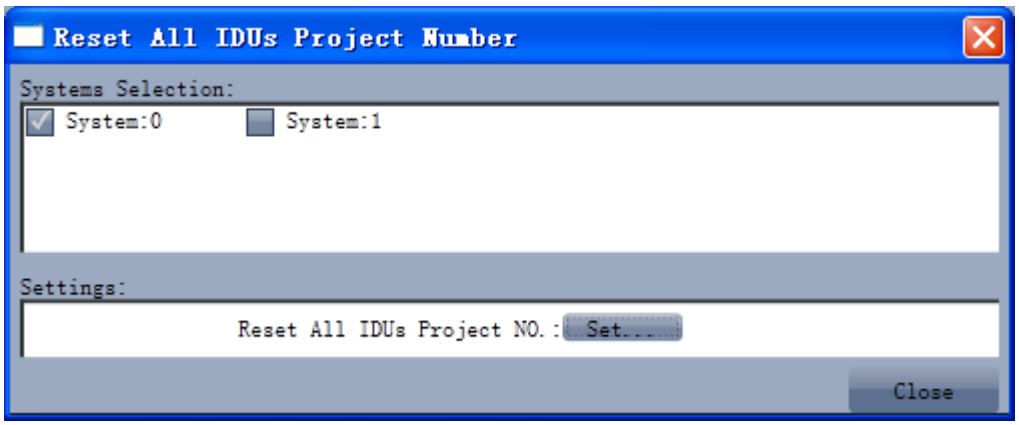


Figure 6

Choose one or multiple systems in the Systems Selection box and click Set in the Settings box, as shown in Figure 6. Click Set, as shown in Figure 7.

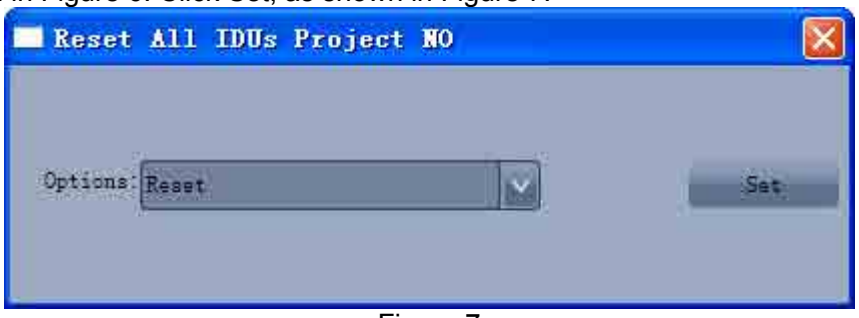


Figure 7

If the conflict is solved, the system will return to the normal status and IDUs can be operated as shown in Figure 5.

② Manual setting on the communicator and remote controller:

When the project number conflict occurs, you can use the communicator or remote controller to revise project numbers and solve the conflict. See the manual of the communicator or remote controller for the method.

③ Setting of auto project number deviation on ODU's main board (recommended)

You can set auto IDU project number deviation via the ODU's main board as follows:

(1) After the whole system is commissioned, short press SW3 on the controlling unit and the system will enter the standby status as follows:

LED1		LED2		LED3	
Function Code	LED Status	Progress	LED Status	Status	LED Status
A7	Flicker	00	Flicker	00	Flicker
A6	Flicker	00	Flicker	00	Flicker
A2	Flicker	00	Flicker	00	Flicker
A8	Flicker	00	Flicker	00	Flicker
n0	Flicker	01	Flicker	00	Flicker
n1	Flicker	00	Flicker	00	Flicker
n2	Flicker	00	Flicker	00	Flicker
n3	Flicker	00	Flicker	00	Flicker
n4	Flicker	00	Flicker	00	Flicker
n5	Flicker	00	Flicker	00	Flicker

(2) Press SW2 (▼) on the controlling unit and select n5. Short press SW7 to show the following information:

LED1		LED2		LED3	
Function Code	LED Status	Progress	LED Status	Status	LED Status
n5	Solid On	00	Flicker	OC	Flicker

(3) When project number deviation is to be confirmed, short press SW7 confirmation button to enter the project number deviation status as shown in the following:

LED1		LED2		LED3	
Function Code	LED Status	Current Progress/Mode	LED Status	Status	LED Status
n5	Solid On	00	Solid On	OC	Solid On

· IDU project numbers in all systems will automatically deviate. The conflict will be solved in about 1 minute and the system will work properly.

The automatic deviation function only works when it is enabled on the controlling unit in the system, of which the centralized control address is 00000.

Note: When there are only a few conflicting IDUs, manual setting is recommended. This method only applies to conflicting IDUs and does only affect other IDUs' project numbers.
In case of many conflicting IDUs, auto deviation is recommended. This method is faster, but may change project numbers of normal IDUs. This method applies for the first commissioning after installation.

Fault code	Fault	Possible reasons	Solution
C2	Communication failure between main control board and inverter compressor drive	1. The control board is powered off; 2. The compressor drive board is powered off; 3. The communication cable between the control board and compressor drive board is not connected; 4. The compressor drive board's dial switch SA201 is wrong.	1. Check the power supply of the control board. Replace the control board if it works properly; 2. Check the power supply of the drive board. Replace the drive board if it works properly; 3. Connect the main board and drive board using the communication cable; 4. Adjust the dial switch of the compressor drive board.
P3	Compressor drive module reset protection	1. The compressor drive board is faulty.	1. Replace the compressor drive board.
P5	Inverter compressor over-current protection	1. The drive board's IPM module is damaged; 2. The compressor's UVW cable is not connected properly; 3. The compressor is damaged.	1. Replace the compressor drive board; 2. Reconnect the compressor's UVW cable; 3. Replace the compressor.
P6	Compressor drive IPM module protection	1. The drive board's IPM module is damaged; 2. The compressor's UVW cable is not connected properly; 3. The compressor is damaged.	1. Replace the compressor drive board; 2. Reconnect the compressor's UVW cable; 3. Replace the compressor.
P7	Compressor drive temperature sensor fault	1. The compressor drive board is faulty.	1. Replace the compressor drive board.
P8	Compressor drive IPM over-temperature protection	1. The compressor drive board is faulty; 2. Thermal gel is not applied evenly on the IPM module; 3. The IPM module is not screwed properly.	1. Replace the compressor drive board; 2. Apply thermal gel evenly on the IPM module; 3. Screw the IPM module properly.
P9	Inverter compressor out-of-step protection	1. The compressor drive board is faulty. 2. The compressor is damaged.	1. Replace the compressor drive board. 2. Replace the compressor.
PH	Compressor drive DC bus high voltage protection	1. Does the voltage of the input power cable of the whole system exceed 460 V; 2. The compressor drive board is faulty.	1. Lower the voltage of the input power cable to the required range; 2. Replace the compressor drive board.
PL	Compressor drive DC bus low voltage protection	1. Is the voltage of the input power cable of the whole system lower than 320 V; 2. The compressor drive board is	1. Elevate the voltage of the input power cable to the required range; 2. Replace the compressor drive board.

		faulty.	
PC	Compressor drive current check circuit fault	1. The compressor drive board is faulty.	1. Replace the compressor drive board.
PF	Compressor drive recharging circuit fault	1. Is the voltage of the input power cable of the whole system lower than 280 V; 2. The compressor drive board is faulty.	1. Elevate the voltage of the input power cable to the required range; 2. Replace the compressor drive board.
PJ	Inverter compressor starting failure	1. The drive board is damaged; 2. The compressor's UVW cable is not connected properly; 3. The compressor is damaged.	1. Replace the compressor drive board; 2. Reconnect the compressor's UVW cable; 3. Replace the compressor.
C3	Communication failure between main control board and variable frequency fan drive	1. The control board is powered off; 2. The fan drive board is powered off; 3. The communication cable between the control board and fan drive board is not connected; 4. The fan drive board's dial switch is wrong.	1. Check the power supply of the control board. Replace the control board if it works properly; 2. Check the power supply of the drive board. Replace the drive board if it works properly; 3. Connect the main board and drive board using the communication cable; 4. Adjust the dial switch of the fan drive board.
H3	Fan drive module reset protection	1. The fan drive board is faulty.	1. Replace the fan drive board.
H5	Variable frequency fan over-current protection	1. The fan drive board's IPM module is damaged; 2. The fan's UVW cable is not connected properly; 3. The fan is damaged.	1. Replace the fan drive board; 2. Reconnect the fan's UVW cable; 3. Replace the fan.
H6	Fan drive IPM module protection	1. The fan drive board's IPM module is damaged; 2. The fan's UVW cable is not connected properly; 3. The fan is damaged.	1. Replace the fan drive board; 2. Reconnect the fan's UVW cable; 3. Replace the fan.
H7	Fan drive temperature sensor fault	1. The fan drive board is faulty.	1. Replace the fan drive board.
H8	Fan drive IPM over-temperature protection	1. The fan drive board is faulty; 2. Thermal gel is not applied evenly on the IPM module; 3. The IPM module is not screwed properly.	1. Replace the fan drive board; 2. Apply thermal gel evenly on the IPM module; 3. Screw the IPM module properly.
H9	Variable frequency fan out-of-step protection	1. The fan drive board is faulty. 2. The fan is damaged.	1. Replace the fan drive board. 2. Replace the fan.
HH	Fan drive DC bus high voltage protection	1. Does the voltage of the input power cable of the whole system exceed 460 V; 2. The fan drive board is faulty.	1. Lower the voltage of the input power cable to the required range; 2. Replace the fan drive board.
HL	Fan drive DC bus low voltage protection	1. Is the voltage of the input power cable of the whole system lower than 320 V; 2. Is the fan drive board well connected with the compressor drive board; 3. The fan drive board is faulty.	1. Elevate the voltage of the input power cable to the required range; 2. Connect the fan drive board with the compressor drive board according to the wiring diagram; 3. Replace the fan drive board.
HC	Fan drive current detection circuit fault	1. The fan drive board is faulty.	1. Replace the fan drive board.
HJ	Variable frequency fan starting failure	1. The drive board is damaged; 2. The fan's UVW cable is not connected properly; 3. The fan is damaged.	1. Replace the fan drive board; 2. Reconnect the fan's UVW cable; 3. Replace the fan.

2.1.2 System faults

2.1.2.1 System exhaust temperature exception

<table>
<tr><th rowspan="3">Fault code</th><th rowspan="3">Fault</th><th colspan="6">Possible reasons</th><th rowspan="3">Solution</th></tr>
<tr><th colspan="2">Primary reason</th><th colspan="2">Secondary reason</th><th colspan="2">Tertiary reason</th></tr>
<tr><th>Description</th><th>Confirmation method</th><th>Description</th><th>Confirmation method</th><th>Description</th><th>Confirmation method</th></tr>
<tr><td rowspan="6">E4</td><td rowspan="6">High exhaust temperature protection</td><td>1. The stop valve of the ODU is not fully opened as required.</td><td>——</td><td>——</td><td>——</td><td>——</td><td>Manual check</td><td>Fully open the stop valve.</td></tr>
<tr><td rowspan="3">2. The IDU's electronic expansion valve is not working properly.</td><td rowspan="5">When the IDU is working in the cooling mode and the electronic expansion valve is opened to 2000PLS, the exhaust temperature of the IDU's coil is more than 15°C higher than the intake temperature; when the IDU is working in the heating mode and the electronic expansion valve is opened to 2000PLS, the intake temperature of the IDU's coil is more than 10°C higher than the intake temperature;</td><td rowspan="2">2.1 The controlling of electronic expansion valve by main board of indoor unit is abnormal.</td><td rowspan="2">Reset the IDU. Listen to the sound and touch the tube to see if the electronic expansion valve is reset. If it is set, it is normal. Otherwise, it is faulty.</td><td>2.1.1 The control wire of the electronic expansion valve is not connected to the main board.</td><td>Manual check</td><td>Connect the electronic expansion valve's control wire to the main board.</td></tr>
<tr><td>2.1.2 The control wire that connects the electronic expansion valve to the main board is broken.</td><td>Manual check</td><td>Repair or replace the control wire of the electronic expansion valve.</td></tr>
<tr><td rowspan="2">2.2 The electronic expansion valve in the mode switcher is faulty.</td><td rowspan="2">Other reasons</td><td>2.2.1 Affected by impurities in the system</td><td>——</td><td>Clean the system and clear the impurities. Replace the body of the electronic expansion valve.</td></tr>
<tr><td>2.2.2 The valve body is faulty.</td><td>——</td><td>Replace the body of the electronic expansion valve.</td></tr>
<tr><td rowspan="2">3. The system pipeline is blocked.</td><td rowspan="2">The system's exhaust temperature rises and the low pressure is too low (compared with the reference value).</td><td>3.1 The fluid pipe is blocked.</td><td rowspan="2">Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.</td><td>——</td><td>——</td><td>Replace and solder the pipe.</td></tr>
<tr><td>3.2 The air pipe is blocked.</td><td>——</td><td>——</td><td>Replace and solder the pipe.</td></tr>
</table>

				3.3 The pipe that connects the IDU is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	3.3.1 The block is caused by solder.	Cut off the pipe to see if it is blocked.	Replace and solder the pipe.
						3.3.2 The pipeline is blocked by impurities.		Replace and solder the pipe.
		4. Lacking refrigerant	The system's exhaust temperature rises and the low pressure is too low (compared with the reference value).	4.1 Not enough refrigerant	——	——	——	Inject refrigerant as required.
				4.2 Refrigerant pipe leakage	Use the refrigerant leak detector to detect the leak along the pipe.	——	——	Stop the leak. Pump out air and inject refrigerant again.
		5. Wrong refrigerant is injected.	Stop the whole system. Test the system's balance pressure 20 minutes later and convert the pressure into the corresponding saturation temperature. Compare it with the outdoor ambient temperature. If the difference is larger than 5°C, it is exceptional.	——	——	——	——	Discharge existing refrigerant and inject the correct refrigerant as required.
		6. Exhaust temperature sensor failure	——	——		——		Replace the temperature sensor or main board.
		7. The ambient temperature exceeds the scope of temperature required for safe operation.	——	The outdoor ambient temperature exceeds 50°C.	Measure the ambient temperature.	——	——	It is a normal phenomenon caused by the protection function.
E2	Low exhaust temperature protection	1. The ODU's electronic expansion valve is not working properly.	When the system is working in the heating mode and the ODU's	1.2 The controlling heating electronic expansion of the main board or	Reset the ODU. Listen to the sound and touch the tube to see if the electronic expansion	1.2.1 The control wire of the electronic expansion valve is not connected	Manual check	Connect the electronic expansion valve's control wire to the main board.

			electronic expansion valve is opened to 100PLS, the intake temperature of the corresponding liquid-air separator is more than 1°C lower than the low-pressure saturation temperature and the difference between the compressor's exhaust temperature or cover temperature and the high-pressure temperature is smaller than 10°C.	the electronic expansion valve of the subcooler is faulty.	valve is reset. If it is set, it is normal. Otherwise, it is faulty.			
						1.2.2 The control wire that connects the electronic expansion valve to the main board is broken.	Manual check	Repair or replace the control wire of the electronic expansion valve.
				1.3 The body of the electronic expansion valve is not working properly.	Other reasons	1.3.1 Affected by impurities in the system	——	Clean the system and clear the impurities. Replace the body of the electronic expansion valve.
						1.3.2 The body of the valve is faulty.	——	Replace the body of the electronic expansion valve.
		2. The IDU's electronic expansion valve is not working properly	When the system is working in the cooling mode and the ODU's electronic expansion valve is opened to 200PLS, the exhaust temperature of the IDU's coil is more than 1°C lower than the intake pipe's temperature and the difference between the compressor's exhaust temperature or cover temperature and the high-pressure temperature is smaller than 10°C.	2.1 The controlling of electronic expansion valve by main board of indoor unit is abnormal.	Reset the IDU. Listen to the sound and touch the tube to see if the electronic expansion valve is reset. If it is set, it is normal. Otherwise, it is faulty.	2.1.1 The control wire of the electronic expansion valve is not connected to the main board.	Manual check	Connect the electronic expansion valve's control wire to the main board.
						2.1.2 The control wire that connecting the electronic expansion valve to the main board is broken.	Manual check	Repair or replace the control wire of the electronic expansion valve.
				2.2 The body of the electronic expansion valve is not working properly.	Other reasons	2.2.1 Affected by impurities in the system	——	Clean the system and clear the impurities. Replace the body of the electronic expansion valve.
						2.2.2 The valve body is faulty.	——	Replace the body of the electronic expansion valve.

		3. Exhaust temperature sensor failure	——	——	——	——	——	Replace the temperature sensor or main board.
		4. Too much refrigerant	Other reasons	Incorrect quantity of refrigerant is injected.	——	——	——	Check the necessary amount of refrigerant and discharge the unneeded refrigerant slowly via the stop valve of the fluid pipe.

2.1.2.2 Pressure exception

Fault code	Fault	Possible reasons						Solution
		Primary reason		Secondary reason		Tertiary reason		
		Description	Confirmation method	Description	Confirmation method	Description	Confirmation method	
E1	High pressure protection	1. The stop valve of the ODU is not fully opened as required.	——	——	——	——	Manual check	Fully open the stop valve.
		2. The system pipeline is blocked.	The system's exhaust pressure rises and the low pressure is too low (compared with the reference value).	2.1. The system air pipeline is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large.	2.1.1 The block is caused by solder.	Cut off the pipe and check it.	Replace and solder the pipe.
						2.1.2 The pipeline is blocked by impurities.		Replace and solder the pipe.
				2.2 The fluid pipe is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	——	——	Replace and solder the pipe.
				2.4 The pipe that connects the IDU is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	2.4.1 The block is caused by solder.	Cut off the pipe and check it.	Replace and solder the pipe.
						2.4.2 The pipeline is blocked by impurities.		Replace and solder the pipe.

		3. The ambient temperature is too high.	——	3.1 In the cooling mode, the outdoor temperature is over 50°C.	Measure the outdoor ambient temperature.	——	——	It is a normal phenomenon caused by the protection function.
				3.2 In the heating mode, the actual ambient temperature of the IDU's return air is over 30°C.	Measure the temperature of the unit's return air.	——	——	It is a normal phenomenon caused by the protection function.
		4. The pressure sensor is faulty.	——	4.1 The high pressure sensor is faulty.	Stop the whole system. Test the system's balance pressure 20 minutes later and convert the pressure into the corresponding saturation temperature. Compare it with the outdoor ambient temperature. If the difference is larger than 5°C, it is exceptional.	——	——	Replace the high pressure sensor.
				4.2 The high pressure and low pressure sensors are connected reversely.	Connect the stop valve of the module fluid pipe and air pipe to the high and low pressure gauges and transform the readings into corresponding temperatures. Compare them to the high- and low-temperatures tested by the system. If the difference is larger than 5°C, it is exceptional.	——	——	Reconnect the high- and low-pressure sensors.
		5. The high pressure switch is faulty.	E1 protection is displayed on the unit when it is	5.1 The high pressure switch is not	——	5.1.1 The pressure switch is not connected	——	Reconnect it.

			powered on.	connected to the main board.		to the main board.		
					——	5.1.2 The connect wire between the pressure switch and main board is faulty.	——	Reconnect them with the wire.
				5.2 The high pressure switch is damaged.	——	——	——	Replace the pressure switch.
		6. The fan is not working properly.	A. The ODU's fan does not work in the cooling mode. B. The IDU's motor does not work in the heating mode.	6.1 The IDU's fan is faulty.	Manual check	6.1.1 The power cable connecting the motor and main board is loose.	Manual check	Reconnect the motor with the power cable.
						6.1.2 The electric capacity is not connected or is damaged.	Manual check	Connect or replace the electric capacity.
						6.1.3 The motor is damaged.	Other reasons	Replace the motor.
				6.2 The ODU's fan is faulty.	Manual check	6.2.1 The fan motor is not properly connected with the control board of the motor with the power cable.	Manual check	Reconnect it properly.
						6.2.2 The fan motor is not properly connected with the control board of the motor with the signal feedback cable.	Manual check	Reconnect it properly.

						6.2.3 The control board of the fan's motor is damaged.	Manual check	Replace the control board of the motor.
						6.2.4 The main board of the fan's motor is damaged.	Other reasons	Replace the motor.
		7. Too much refrigerant	Other reasons	Incorrect quantity of refrigerant is injected.	——	——	——	Check the necessary amount of refrigerant and discharge unneeded refrigerant slowly via the stop valve of the fluid pipe.
JL	Low high pressure protection	1. The ambient temperature exceeds the range.	——	1.1 The outdoor ambient temperature in the cooling mode is lower than -10°C.	Measure the outdoor ambient temperature.	——	——	It is a normal phenomenon caused by the protection function.
				1.2 The indoor ambient temperature in the heating mode is lower than 5°C.	Measure the temperature of the unit's return air.	——	——	It is a normal phenomenon caused by the protection function.
		2. Not enough refrigerant	——					Locate the leak and inject refrigerant.

Fault code	Fault	Possible reasons						Solution
		Primary reason		Secondary reason		Tertiary reason		
		Description	Confirmation method	Description	Confirmation method	Description	Confirmation method	
E3	Low-pressure Protection	1. The stop valve of the ODU is not fully opened as required.	——	——	——	——	Manual check	Fully open the stop valve.

		2. The system pipeline is blocked.	The system's exhaust pressure rises and the low pressure is too low (compared with the reference value).	2.1. The system air pipeline is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large.	2.1.1 The block is caused by solder.	Cut off the pipe and check it.	Replace and solder the pipe.
						2.1.2 The pipeline is blocked by impurities.		Replace and solder the pipe.
				2.2 The fluid pipe is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	——	——	Replace and solder the pipe.
				2.4 The pipe that connects the IDU is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	2.4.1 The block is caused by solder.	Cut off the pipe and check it.	Replace and solder the pipe.
						2.4.2 The pipeline is blocked by impurities.		Replace and solder the pipe.
		3. The ambient temperature is too low.	——	3.1 The outdoor ambient temperature is lower than -25°C in the heating mode.	Measure the outdoor ambient temperature.	——	——	It is a normal phenomenon caused by the protection function.
		4. The pressure sensor is faulty.	——	4.1 The low pressure sensor is faulty.	Stop the whole system. Test the system's balance pressure 20 minutes later and convert the pressure into the corresponding saturation temperature. Compare it with the outdoor ambient temperature. If the difference is larger than 5°C, it is exceptional.	——	——	Replace the high pressure sensor.

				4.2 The high pressure and low pressure sensors are connected reversely.	Connect the stop valves of the module high- and low-pressure air pipes to the high and low pressure gauges and transform the readings into corresponding temperatures. Compare them to the high- and low-temperatures tested by the system. If the difference is larger than 5°C, it is exceptional.	——	——	Reconnect the high- and low-pressure sensors.
		6. The fan is not working properly.	A. The IDU's fan does not work in the cooling mode. B. The ODU's fan does not work in the heating mode.	6.1 The IDU's fan is faulty.	Manual check	6.1.1 The power cable connecting the motor and main board is loose.	Manual check	Reconnect the motor with the power cable.
						6.1.2 The electric capacity is not connected or is damaged.	Manual check	Connect or replace the electric capacity.
						6.1.3 The motor is damaged.	Other reasons	Replace the motor.
				6.2 The ODU's fan is faulty.	Manual check	6.2.1 The fan motor is not properly connected with the control board of the motor.	Manual check	Reconnect it properly.
						6.2.2 The fan motor is not properly connected with the control board of the motor with the communication feedback cable.	Manual check	Reconnect it properly.
						6.2.3 The control board of the fan's motor is damaged.	Manual check	Replace the control board of the motor.
						6.2.4 The main board of the fan's motor is	Other reasons	Replace the motor.

						damaged.		
		7. Not enough refrigerant	Other reasons	Incorrect quantity of refrigerant is injected.	——	——	——	Check the necessary amount of refrigerant and inject refrigerant slowly via the stop valve of the low-pressure air pipe.

2.1.2.3 Poor cooling/heating performance

Feedback from user	Exception	Possible reasons						Solution
		Primary reason		Secondary reason		Tertiary reason		
		Description	Confirmation method	Description	Confirmation method	Description	Confirmation method	
Poor heating/cooling performance	A. When the IDU is working in the cooling mode and the electronic expansion valve is opened to the max., the exhaust temperature of the IDU's coil is more than 5°C higher than the intake temperature; B. when the IDU is working in the heating mode and the electronic expansion valve is opened to 2PLS, the intake temperature of the IDU's coil is more than 12°C lower than the saturation temperature corresponding to the high pressure;	1. The stop valve of the ODU is not fully opened as required.	——	——	——	——	Manual check	Fully open the stop valve.
		2. The system pipeline is blocked.	——	2.1. The system air pipeline is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large.	2.1.1 The block is caused by solder.	Cut off the pipe and check it.	Replace and solder the pipe.
						2.1.2 The pipeline is blocked by impurities.		Replace and solder the pipe.
				2.2 The fluid pipe is blocked.	Touch the pipe along the flowing direction of refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	——	——	Replace and solder the pipe.
				2.4 The pipe that connects the IDU is blocked.	Touch the pipe along the flowing direction of	2.4.1 The block is caused by solder.	Cut off the pipe and check it.	Replace and solder the pipe.

					refrigerant to feel the temperature difference. The difference is large or part of the pipe is frosting.	2.4.2 The pipeline is blocked by impurities.		Replace and solder the pipe.
		3. The ambient temperature exceeds the required range.	——	3.1 The ambient temperature of the IDU that works in the cooling mode is higher than 32°C.	Measure the outdoor ambient temperature.	3.1.1 The system has worked for less than 1 hour.	——	It is a normal phenomenon.
						3.1.2 An improper system is selected.	——	Choose another system with larger power.
				3.2 The outdoor ambient temperature in the cooling mode is higher than 40°C.	Measure the outdoor ambient temperature.	——	——	It is a normal phenomenon.
				3.3 The ambient temperature of the IDU that works in the heating mode is lower than 12°C.	Measure the outdoor ambient temperature.	3.3.1 The system has worked for less than 2 hours.	——	It is a normal phenomenon.
						3.3.2 An improper system is selected.	——	Choose another system with larger power.
				3.4 The outdoor ambient temperature in the heating mode is lower than -7°C.	Measure the outdoor ambient temperature.	——	——	It is a normal phenomenon.
		4. Poor airflow distribution design	——	4.1 The air intake and return inlet of the ODU are too close to each other, affecting the heat exchange	Check the distance.	——	——	Re-design the airflow distribution.

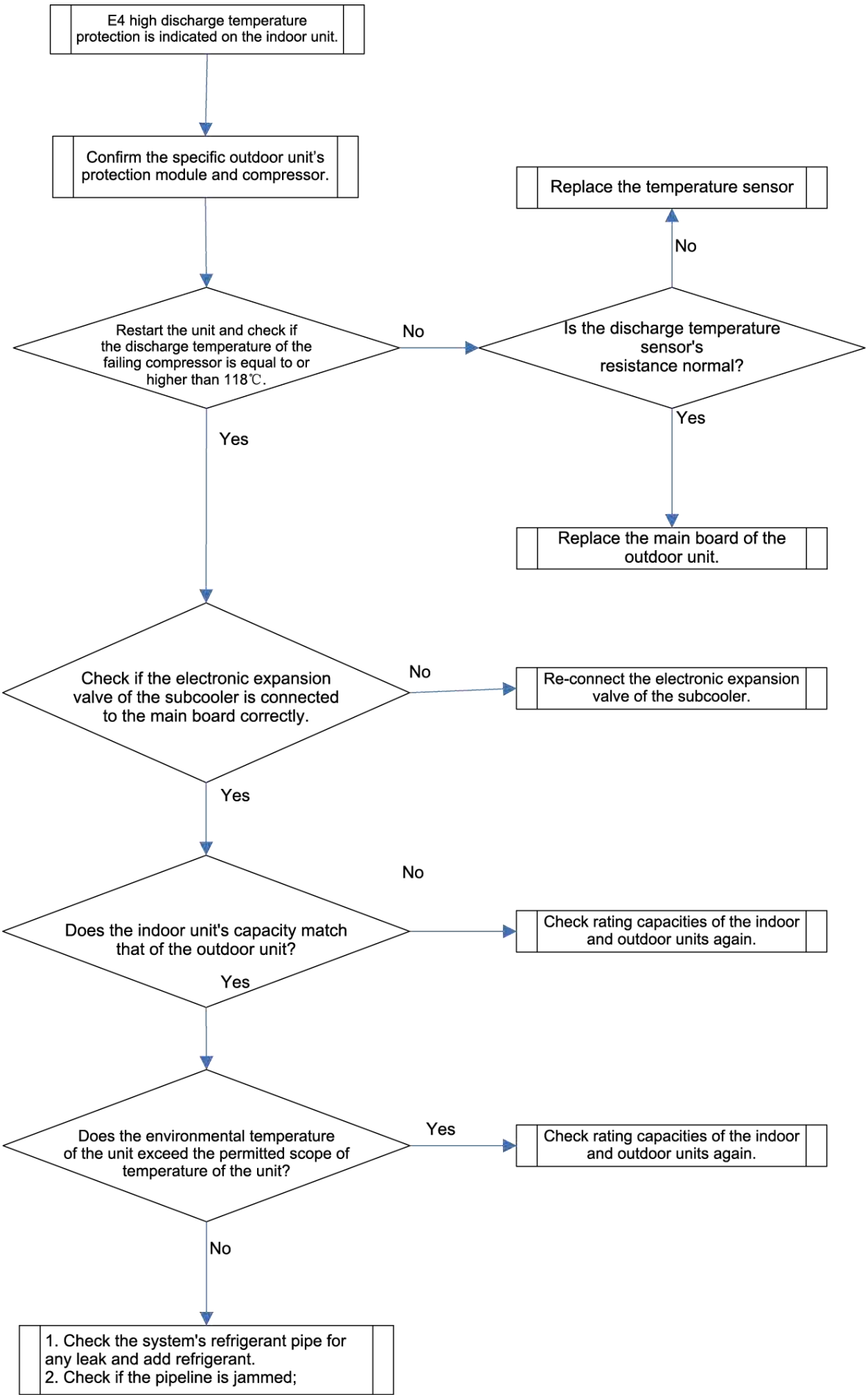
				4.2 The air intake and return inlet of the IDU are too close to each other, causing poor heat exchange of the unit.	Check the distance.	——	——	Re-design the airflow distribution .
		7. Not enough refrigerant	Other reasons	Incorrect quantity of refrigerant is injected.	——	——	——	Check the necessary amount of refrigerant and inject refrigerant slowly via the stop valve of the low-pressure air pipe.

2.2 Flowchart analyzing

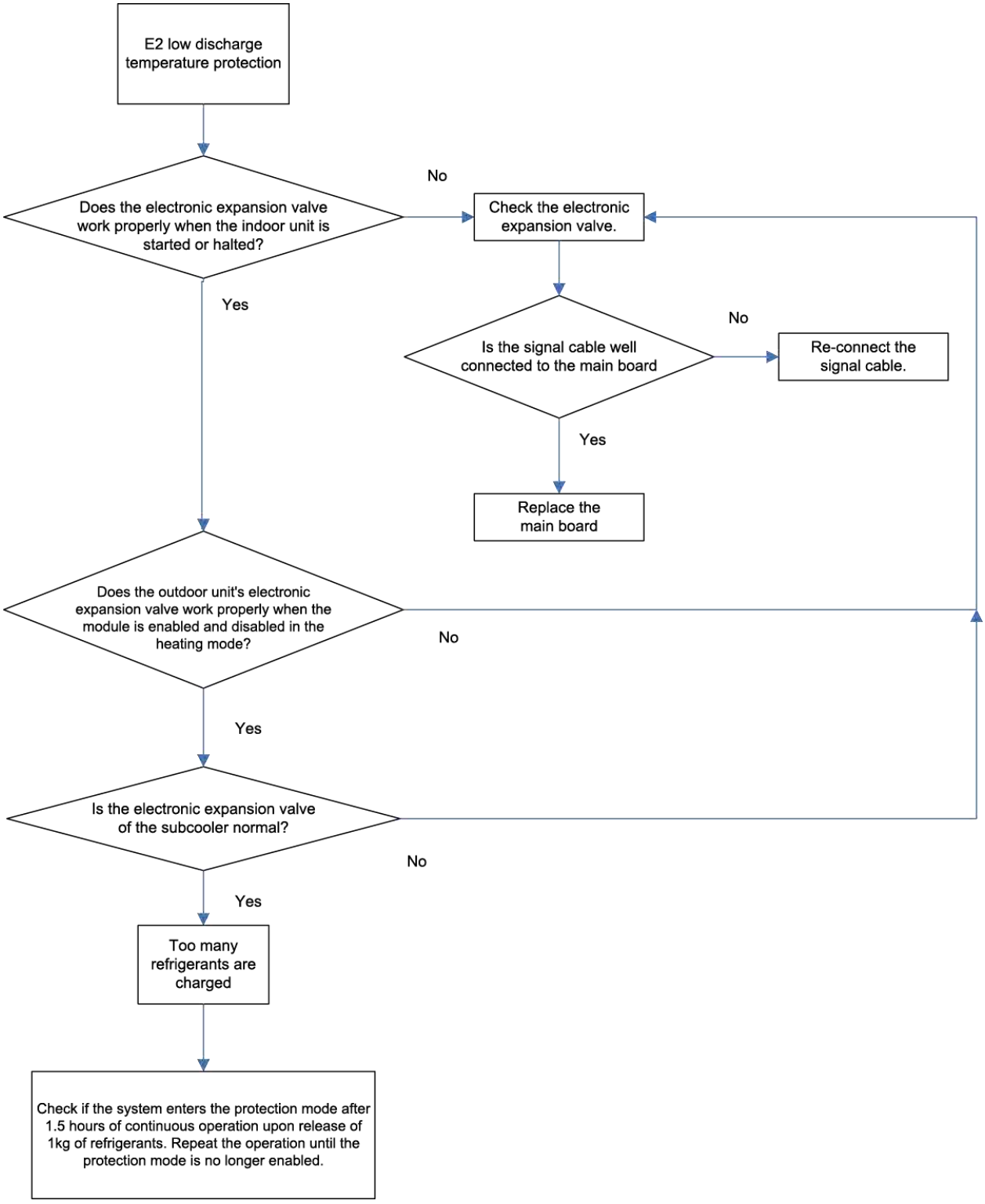
2.2.1High exhaust temperature protection (E4)

When the system shows high exhaust temperature protection for compressor, the IDU will show high exhaust temperature fault E4, while the IDU will show the specific faulty compressor.

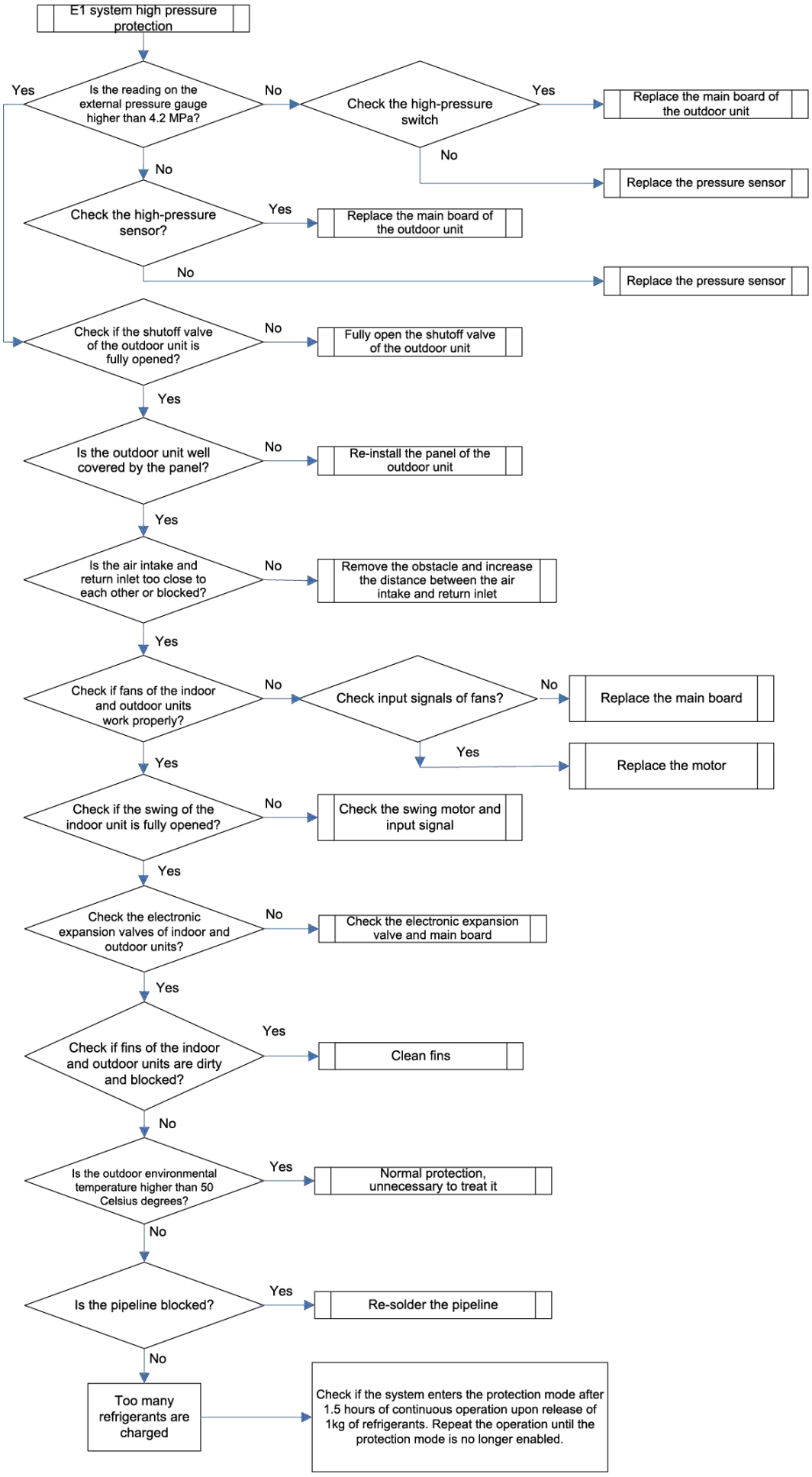
For example, when high exhaust temperature protection is enabled on compressor 2# of module 3# of the ODU, IDUs will show E4 and the module will show E6, indicating that high exhaust temperature protection is enabled on compressor 2#.


E4 high discharge temperature protection is indicated on the indoor unit.
Confirm the specific outdoor unit's protection module and compressor.
Restart the unit and check if the discharge temperature of the failing compressor is equal to or higher than 118℃.
No
Is the discharge temperature sensor's resistance normal?
No
Replace the temperature sensor
Yes
Replace the main board of the outdoor unit.
Yes
Check if the electronic expansion valve of the subcooler is connected to the main board correctly.
No
Re-connect the electronic expansion valve of the subcooler.
Yes
No
Does the indoor unit's capacity match that of the outdoor unit?
Check rating capacities of the indoor and outdoor units again.
Yes
Does the environmental temperature of the unit exceed the permitted scope of temperature of the unit?
Yes
Check rating capacities of the indoor and outdoor units again.
No
1. Check the system's refrigerant pipe for any leak and add refrigerant.
2. Check if the pipeline is jammed;

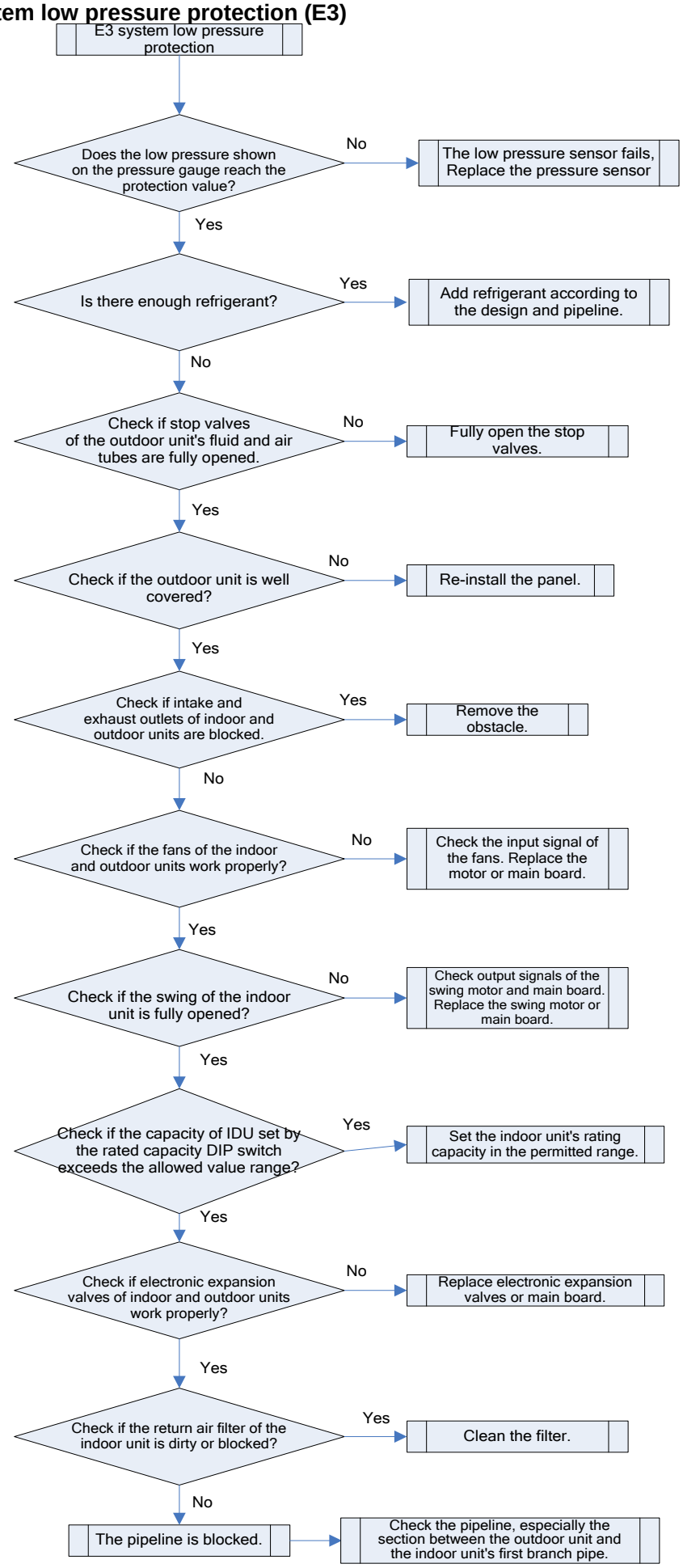
2.2.2 Low exhaust temperature protection (E2)



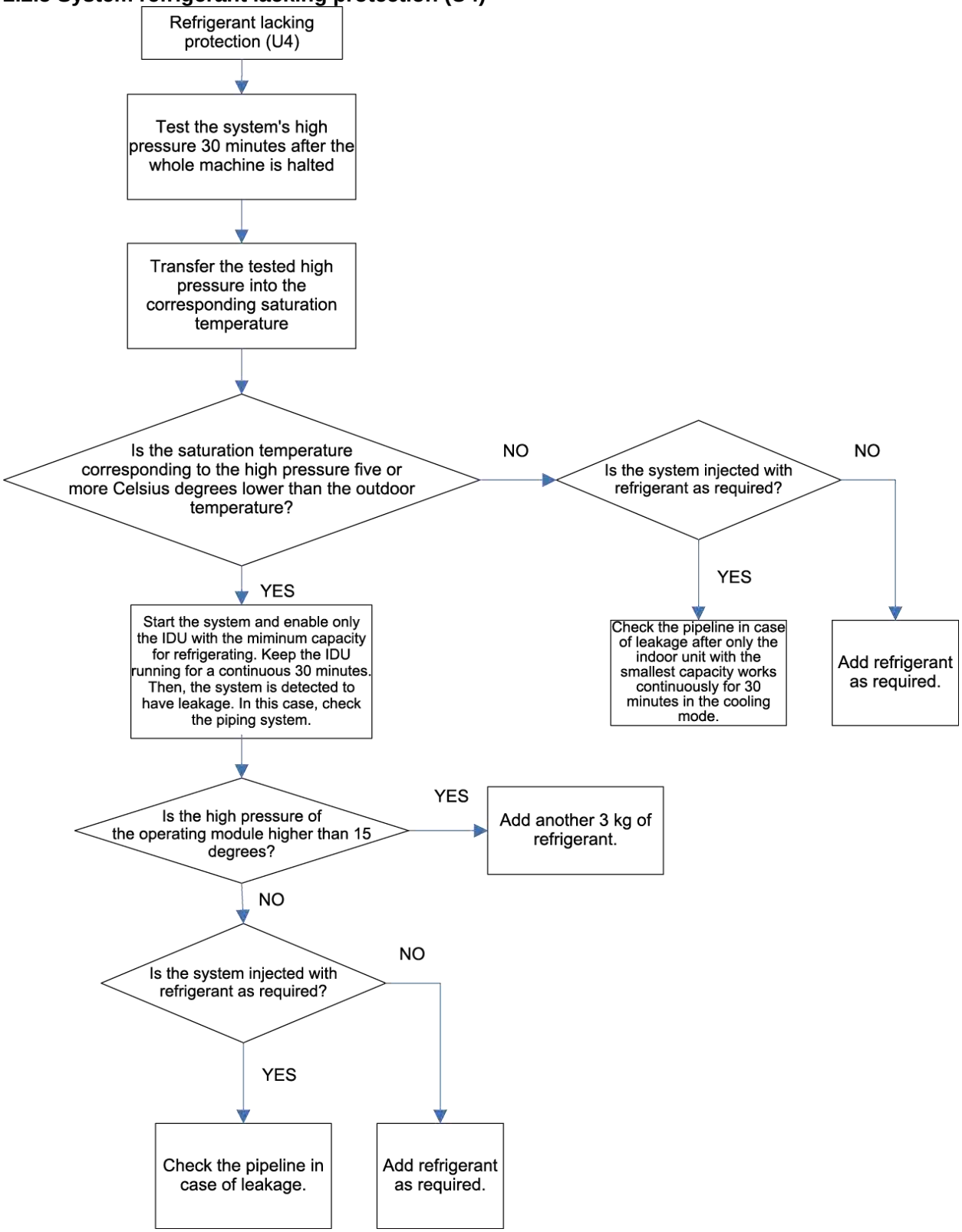
2.2.3 System high pressure protection (E1)


E1 system high pressure protection
Is the reading on the external pressure gauge higher than 4.2 MPa?
Yes
No
Check the high-pressure switch
Yes
Replace the main board of the outdoor unit
No
Replace the pressure sensor
Check the high-pressure sensor?
Yes
Replace the main board of the outdoor unit
No
Replace the pressure sensor
Check if the shutoff valve of the outdoor unit is fully opened?
No
Fully open the shutoff valve of the outdoor unit
Yes
Is the outdoor unit well covered by the panel?
No
Re-install the panel of the outdoor unit
Yes
Is the air intake and return inlet too close to each other or blocked?
No
Remove the obstacle and increase the distance between the air intake and return inlet
Yes
Check if fans of the indoor and outdoor units work properly?
No
Check input signals of fans?
No
Replace the main board
Yes
Replace the motor
Yes
Check if the swing of the indoor unit is fully opened?
No
Check the swing motor and input signal
Yes
Check the electronic expansion valves of indoor and outdoor units?
No
Check the electronic expansion valve and main board
Yes
Check if fins of the indoor and outdoor units are dirty and blocked?
Yes
Clean fins
No
Is the outdoor environmental temperature higher than 50 Celsius degrees?
Yes
Normal protection, unnecessary to treat it
No
Is the pipeline blocked?
Yes
Re-solder the pipeline
No
Too many refrigerants are charged
Check if the system enters the protection mode after 1.5 hours of continuous operation upon release of 1kg of refrigerants. Repeat the operation until the protection mode is no longer enabled.

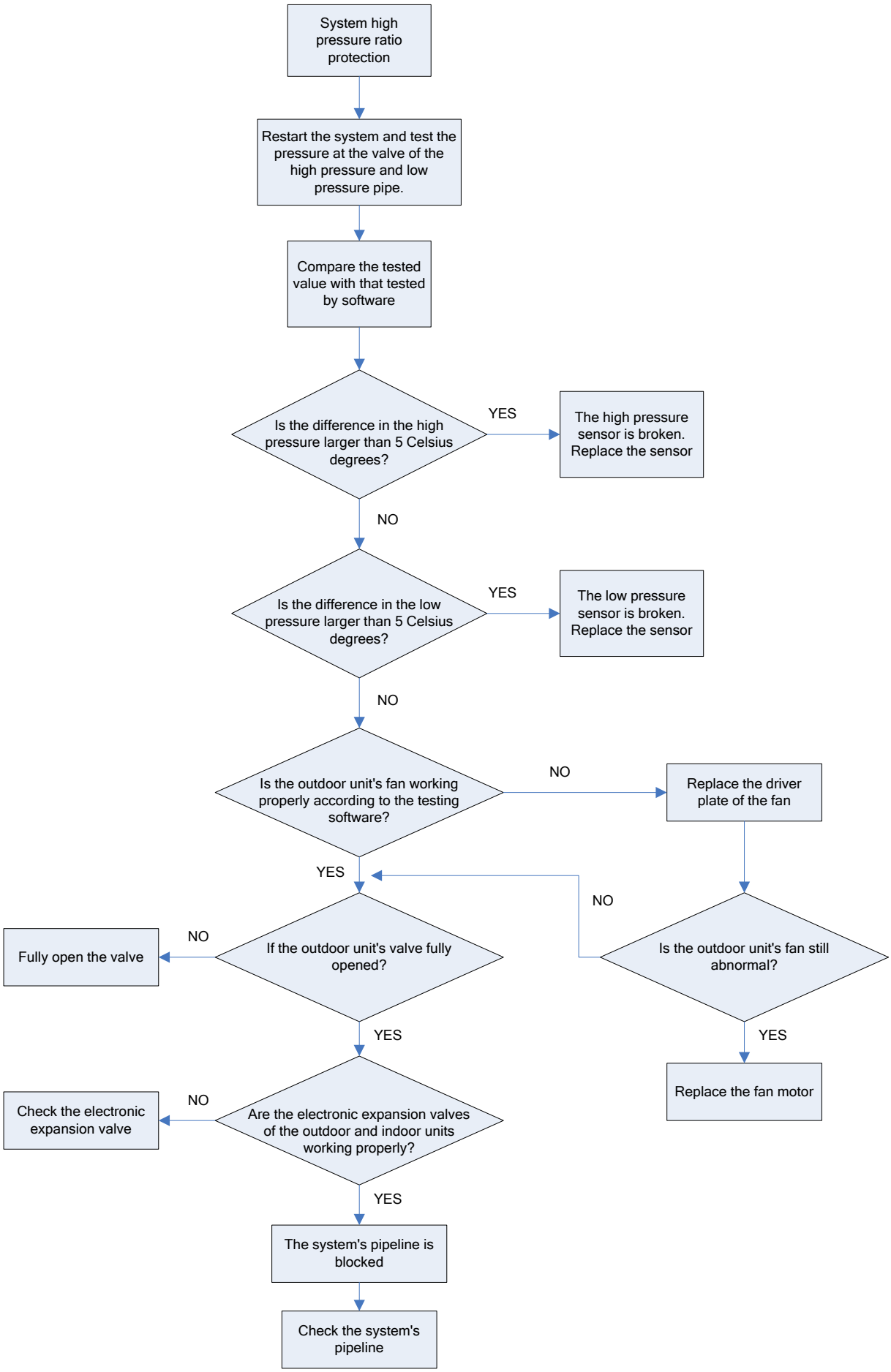
2.2.4 System low pressure protection (E3)



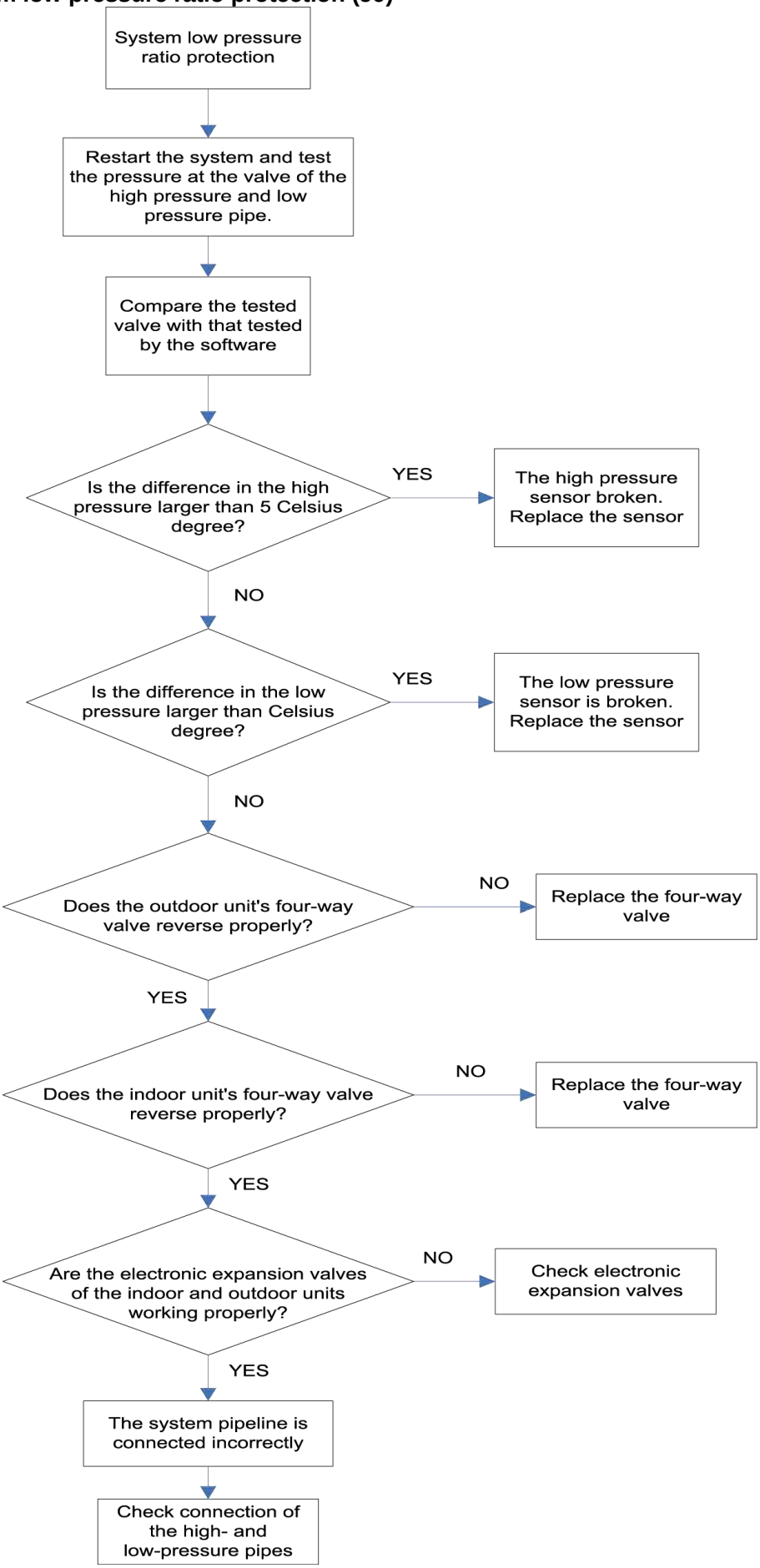
2.2.5 System refrigerant lacking protection (U4)



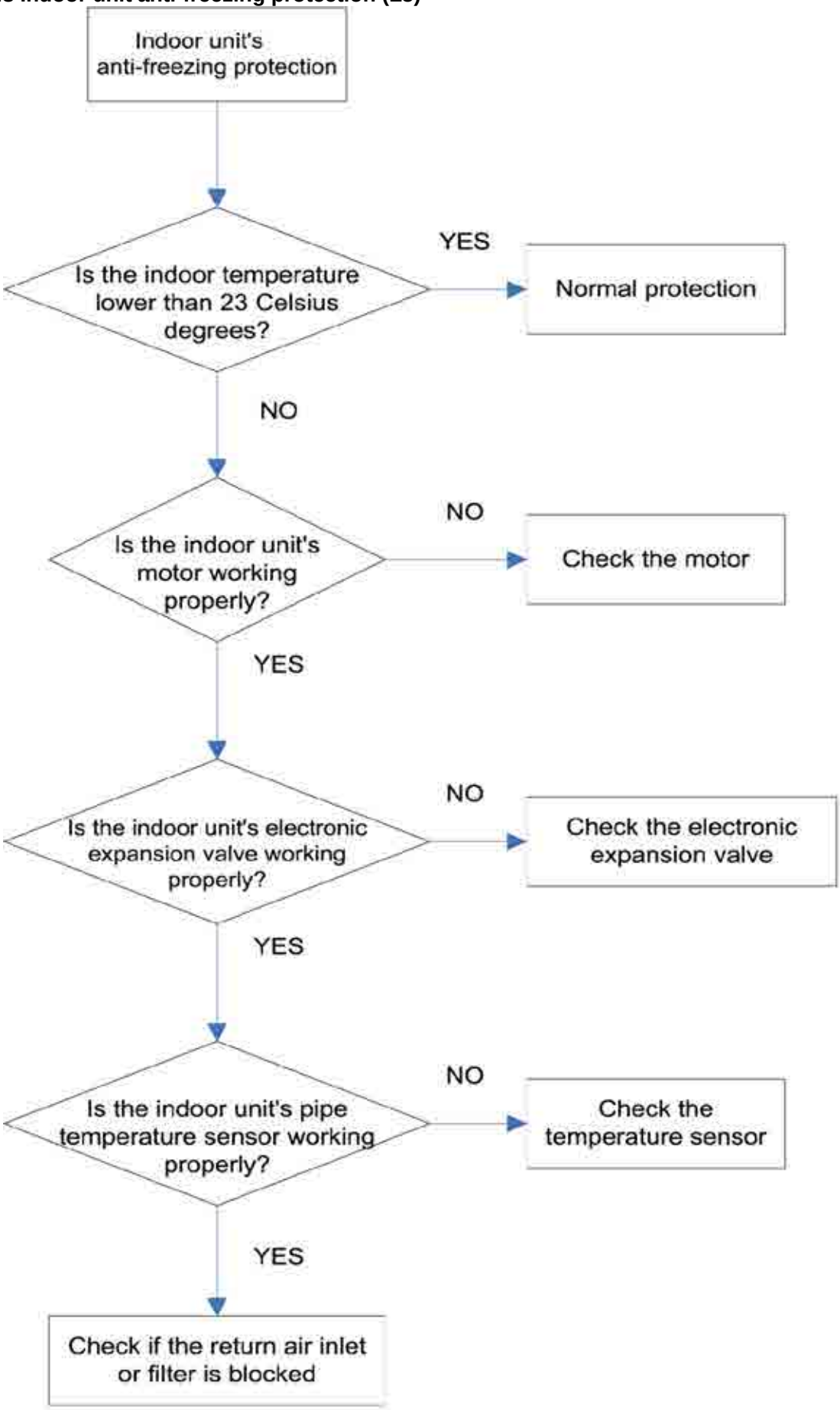
2.2.6 System high pressure ratio protection (J8)



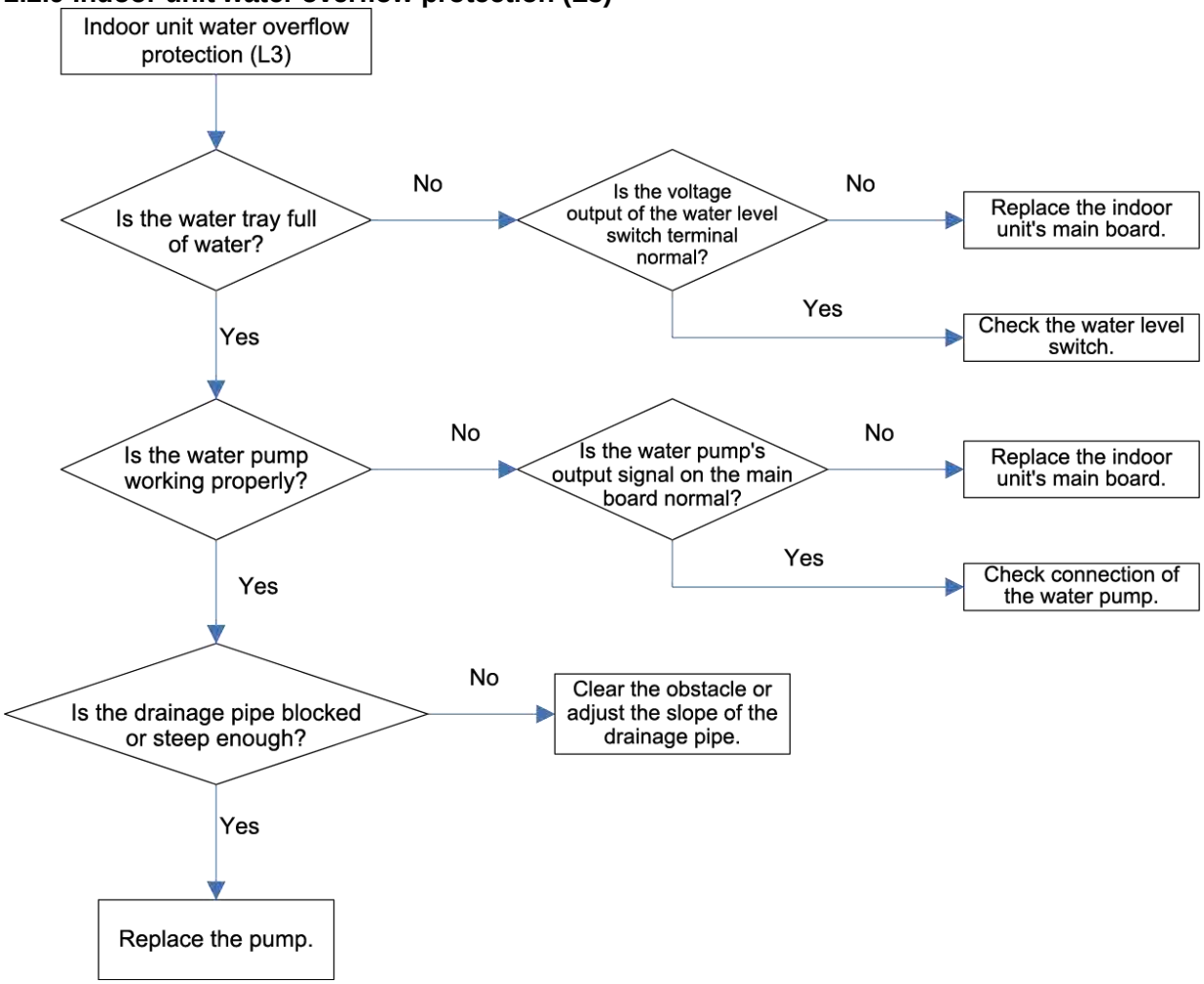
2.2.7 System low pressure ratio protection (J9)



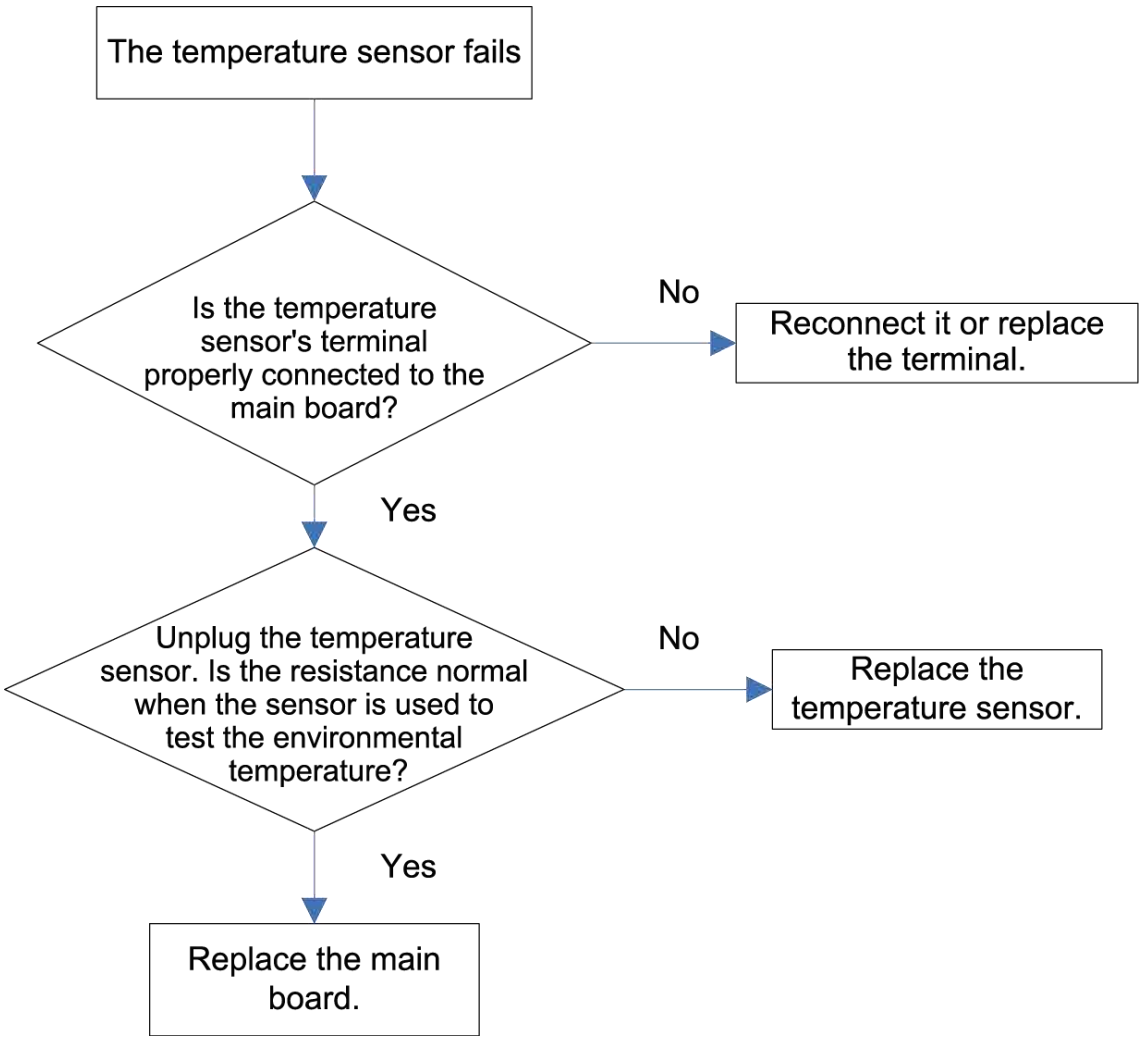
2.2.8 Indoor unit anti-freezing protection (L5)



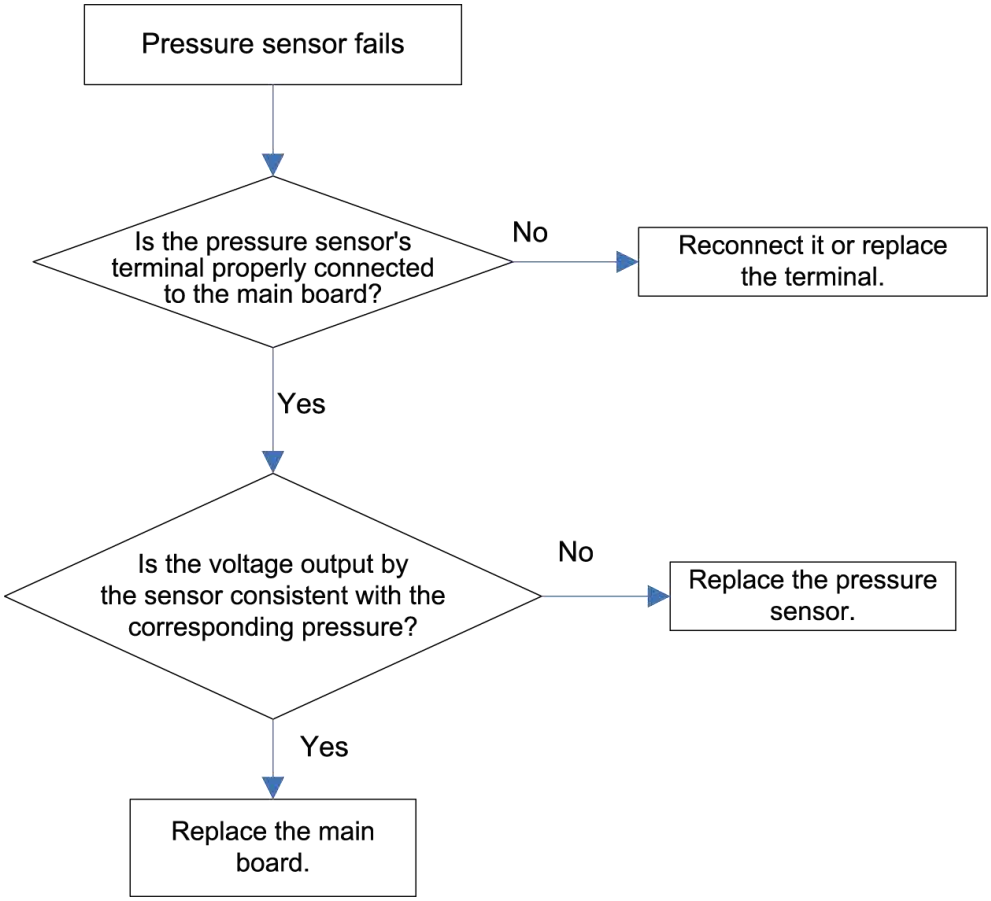
2.2.9 Indoor unit water overflow protection (L3)



2.2.10 Temperature sensor fault


The temperature sensor fails
Is the temperature sensor's terminal properly connected to the main board?
No
Reconnect it or replace the terminal.
Yes
Unplug the temperature sensor. Is the resistance normal when the sensor is used to test the environmental temperature?
No
Replace the temperature sensor.
Yes
Replace the main board.

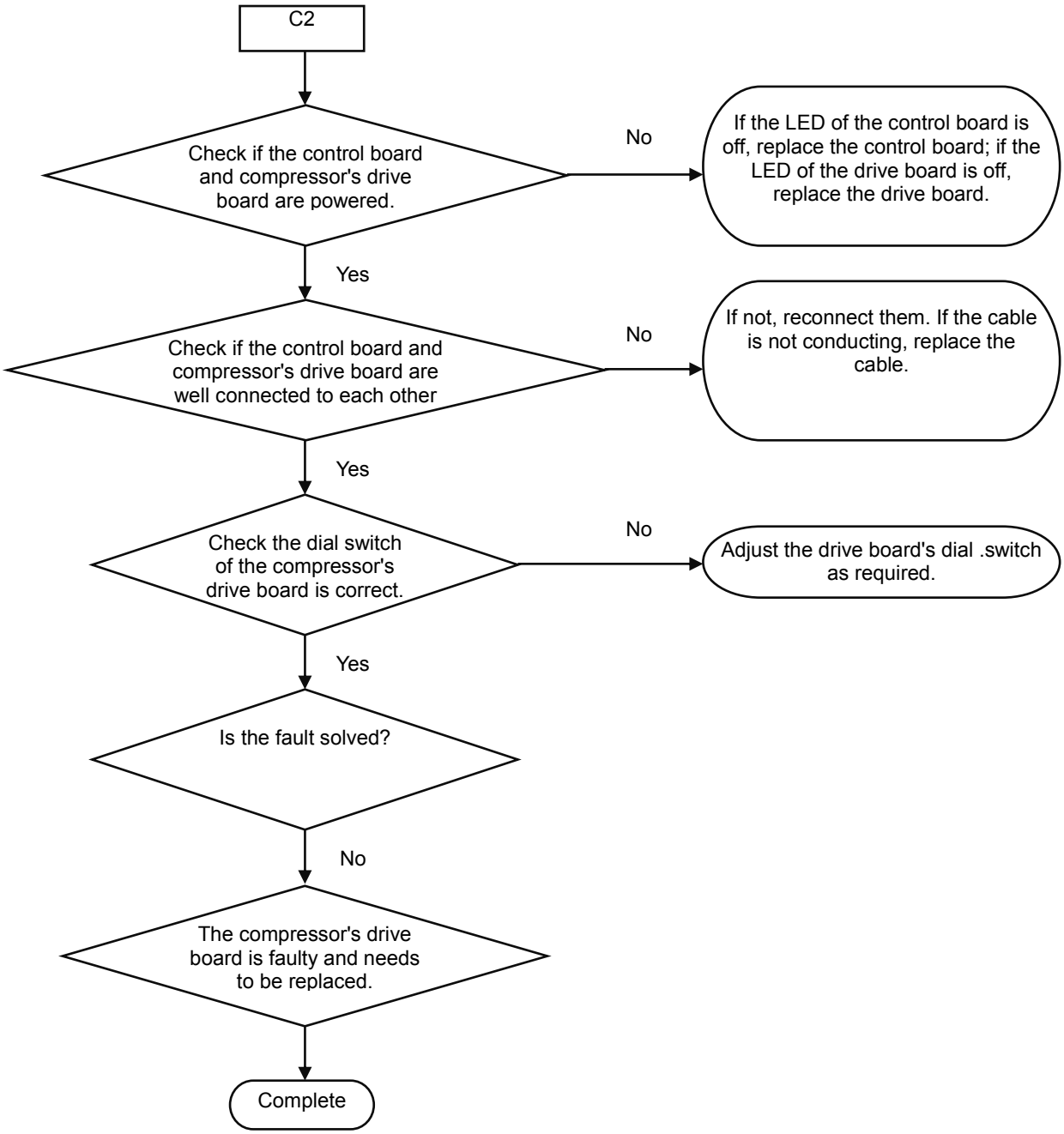
2.2.11 Pressure sensor fault



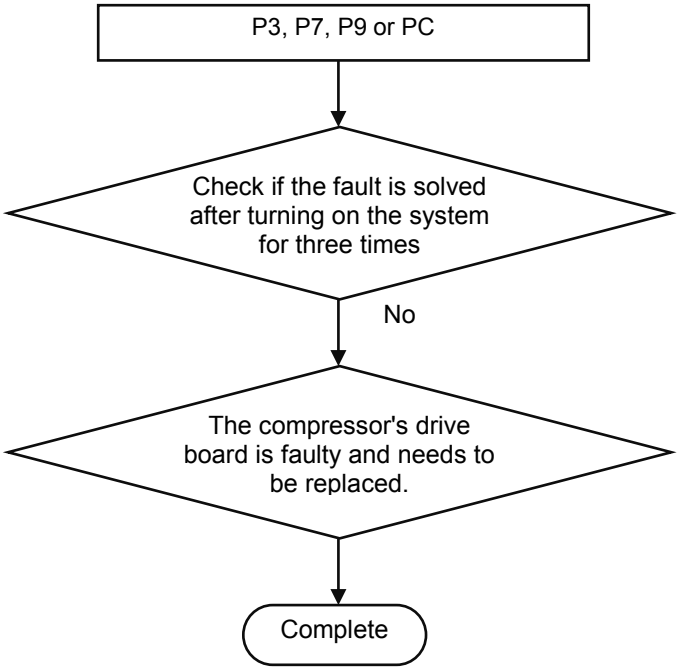
2.2.12 Analyzing of drive control system faults

When the unit fails and halts, first check the two-digit nixie tube of the control board and fault table to find out the specific fault. Then check and solve the fault according to the following methods.

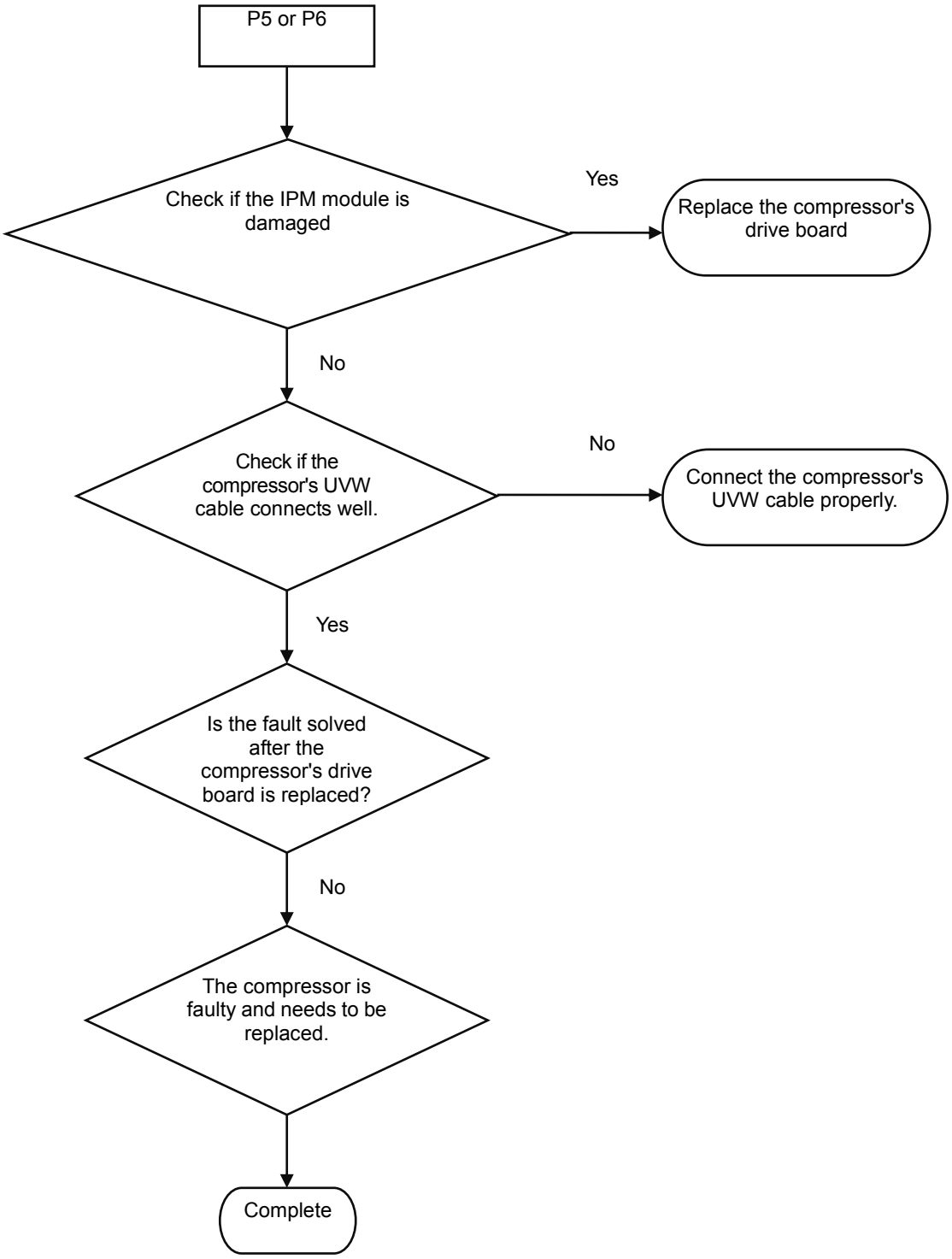
(1) Communication failure between the compressor's drive board and control board (outdoor fault C2)



(2) Faults in the IPM temperature sensor of the variable-frequency compressor's drive board (IDU fault P7), current detection circuit (ODU fault PC), drive module reset protection (ODU fault P3) and out-of-step protection (ODU fault P9)



(3) Variable-frequency compressor over-current protection (ODU fault P5) and IPM module protection faults (ODU fault P6)

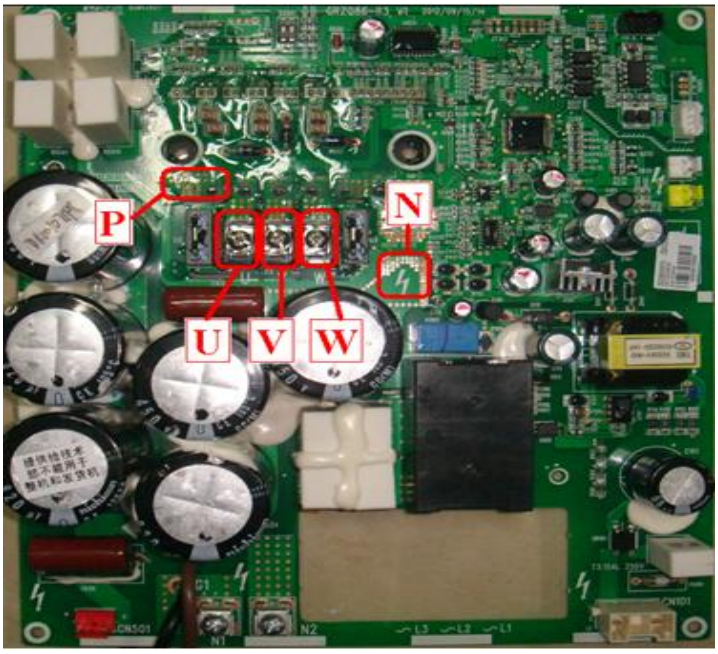


Attachment: How to check whether the IPM module is damaged

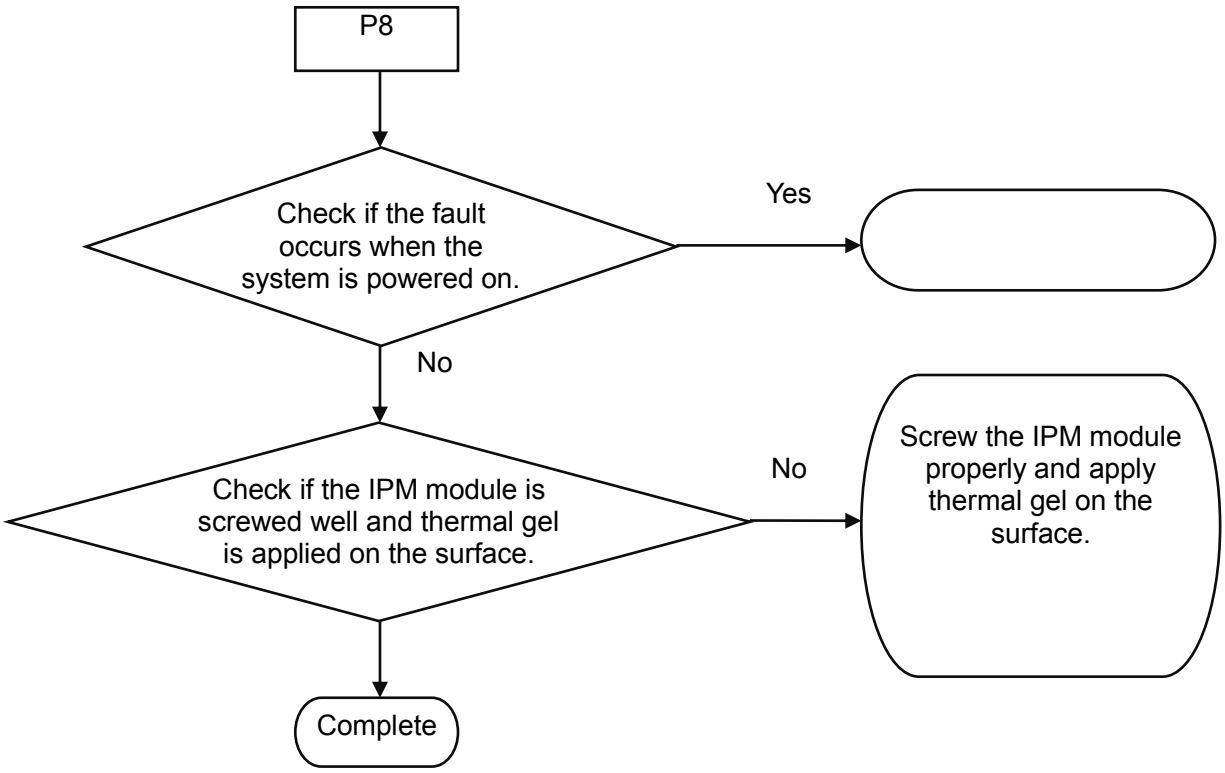
1. Preparation: Find a digital multi-meter and switch it to the diode. Remove U, V and W cables of the compressor from the drive board two minutes after the system is powered off. Make sure that it is tested at least two minutes after the system is powered off.

2. Method: Use the black probe of the multi-meter to touch the place marked by P in the follow picture and the red probe to touch places marked by U, V and W respectively and record readings of the multi-meter. Use the red probe to touch the place marked by N and black probe to touch places marked by U, V and W respectively and record readings of the multi-meter.

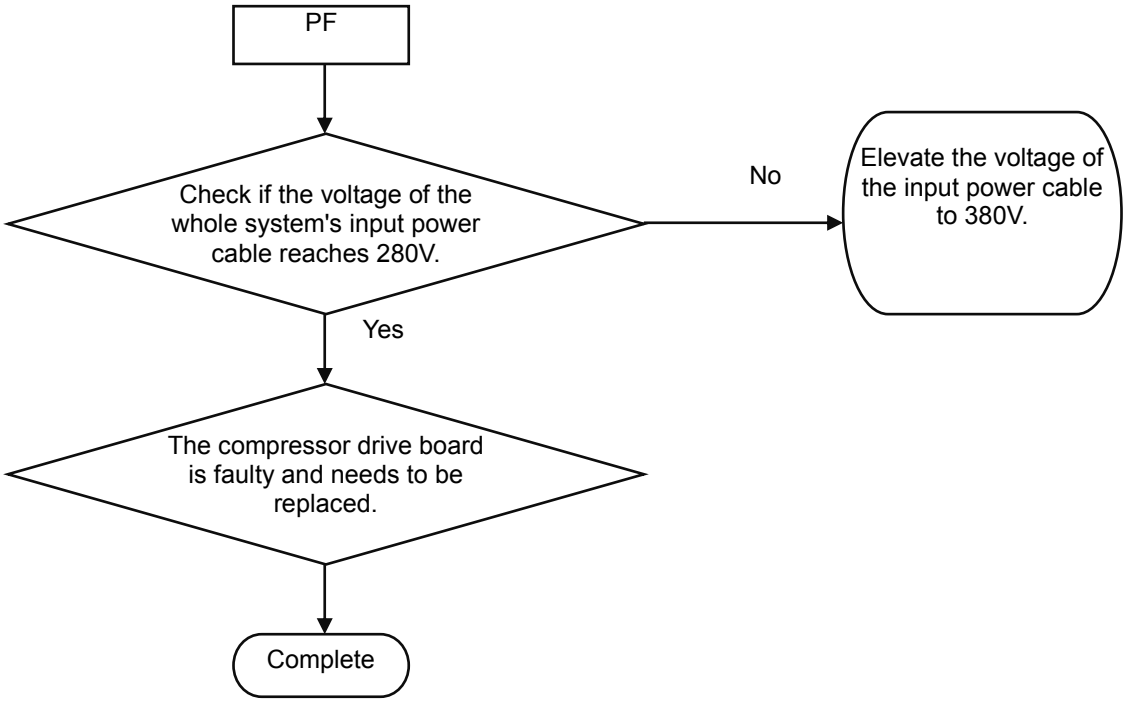
3. Analyzing: If the reading ranges between 0.3 V and 0.7 V in the above-mentioned six scenarios, the IPM module is normal. If the reading is 0 in one or multiple scenarios, the IPM module is damaged.



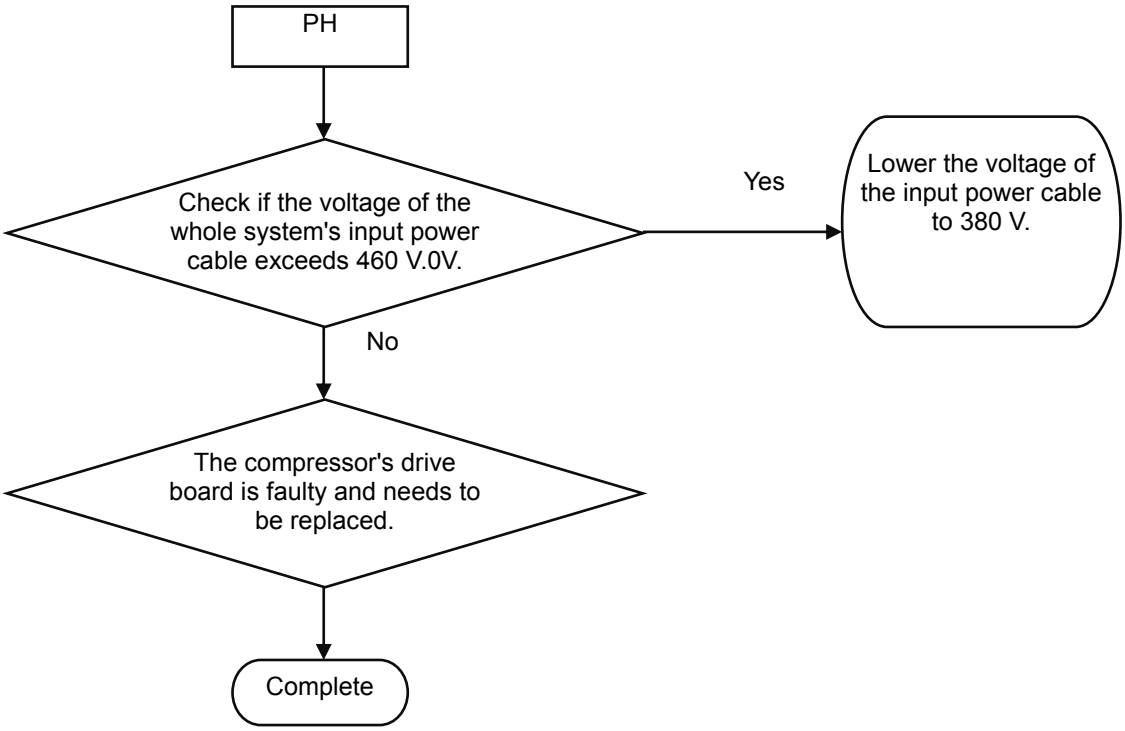
(4) Variable-frequency compressor drive board IPM over-temperature fault (ODU fault P8)



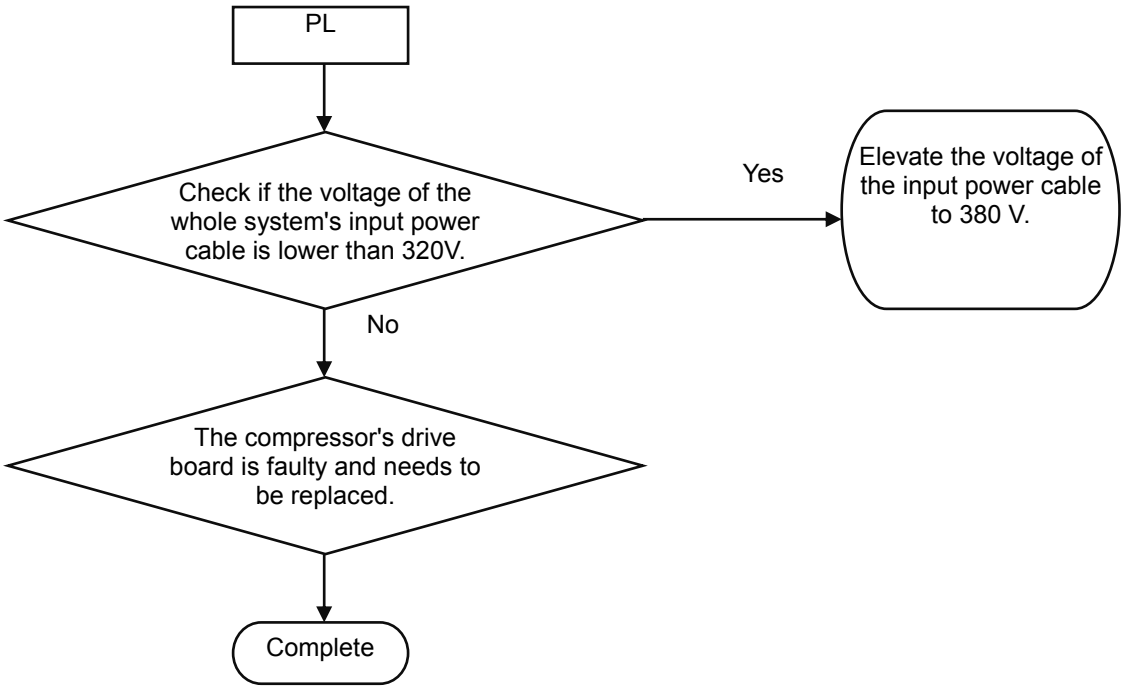
(5) Recharging circuit faulty of the variable-frequency compressor drive board (ODU fault PF)



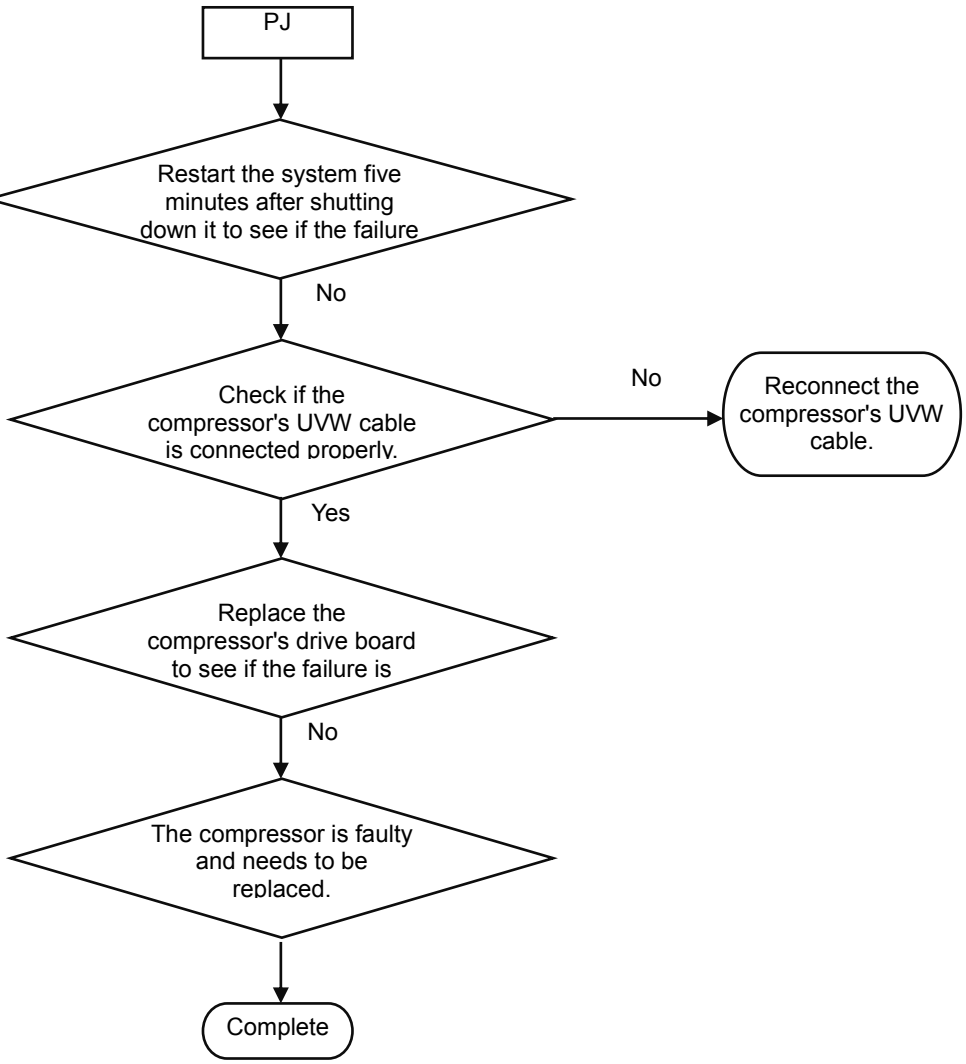
(6) High voltage protection for the DC bus of the variable-frequency compressor's drive board (ODU fault PH)



(7) Low voltage protection for the DC bus of the variable-frequency compressor's drive board (ODU fault PL)

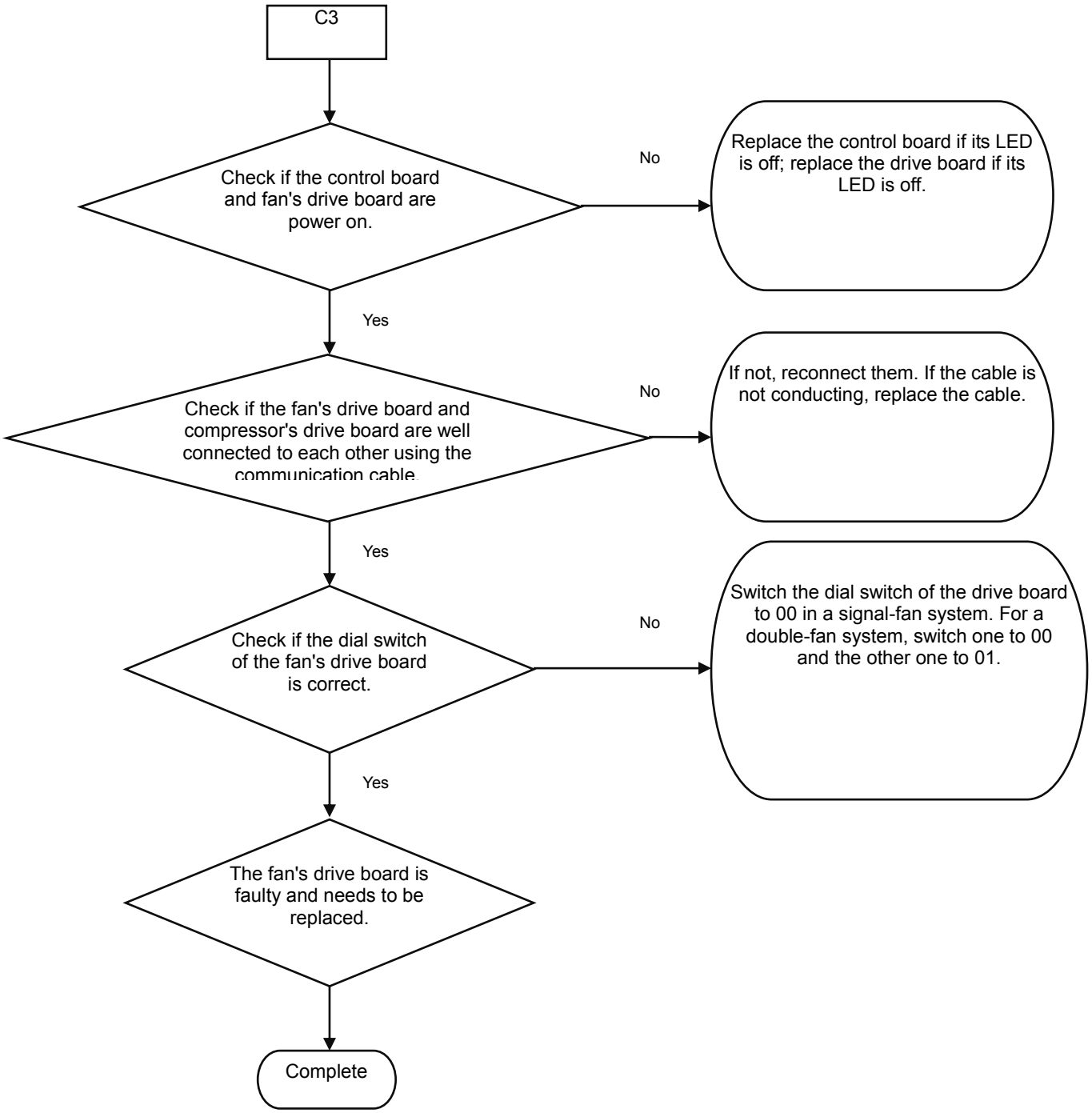


(8) Variable-frequency compressor starting failure (ODU fault PJ)

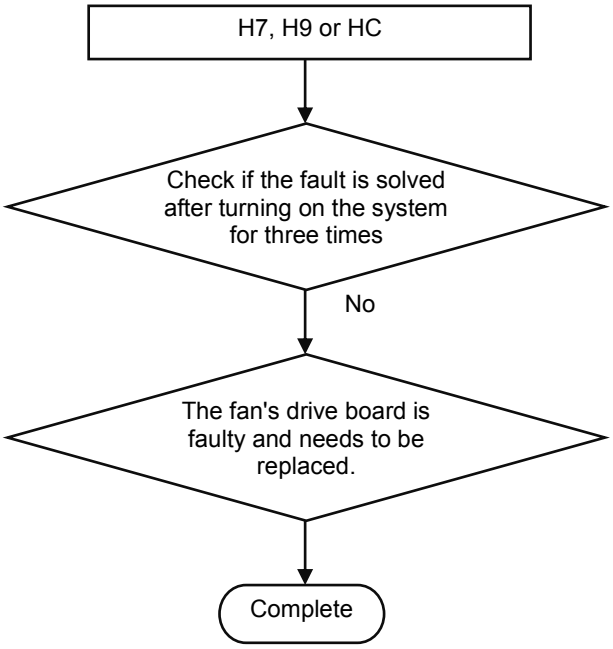


2.2.13 Analyzing of faults in the variable-frequency fan drive's control system

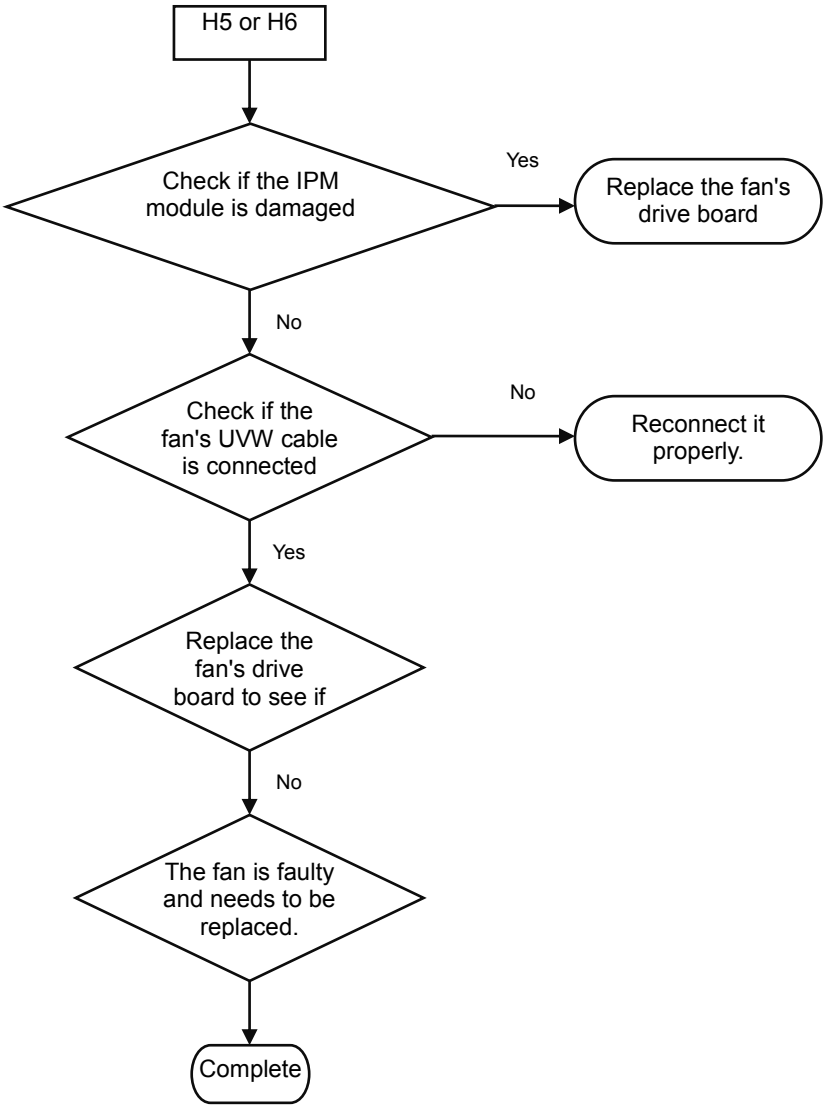
(1) Communication failure between the fan's drive board and control board (outdoor fault C3)



(2) Faults in the IPM temperature sensor of the fan's drive board (ODU fault H7), current detection circuit (ODU fault HC) and out-of-step protection (ODU fault H9)



(3) Variable-frequency fan over-current protection and IPM module protection faults (ODU fault H5 and H6)



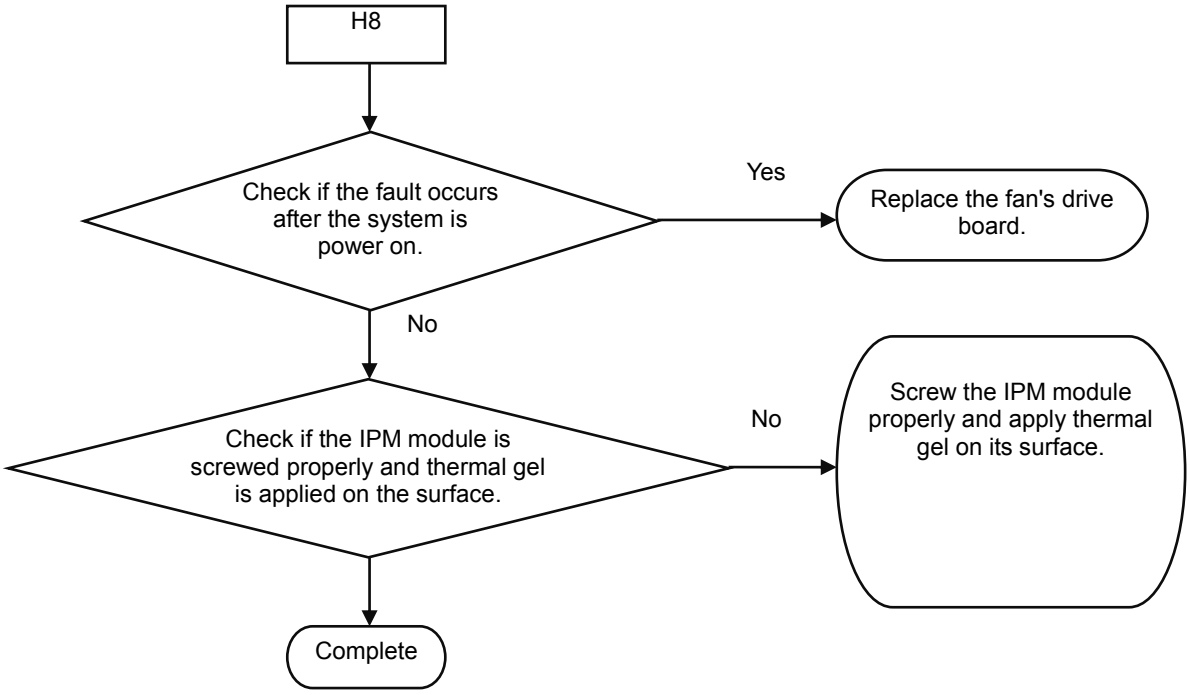
Attachment: How to check whether the IPM module is damaged

① Preparation: Find a digital multi-meter and switch it to the diode. Remove U, V and W cables of the fan from the drive board two minutes after the system is powered off. Make sure that it is tested two minutes after the system is powered off.

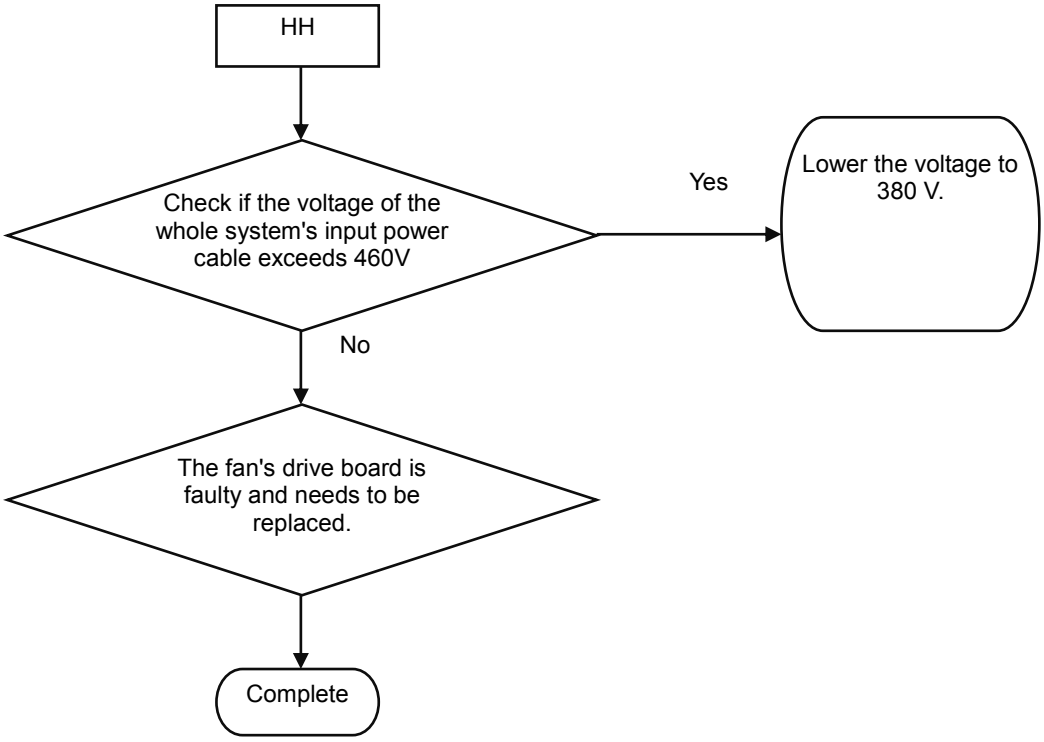
② Method: Use the black probe of the multi-meter to touch the place marked by P in the follow picture and the red probe to touch places marked by U, V and W respectively and record readings of the multi-meter. Use the red probe to touch the place marked by N and black probe to touch places marked by U, V and W respectively and record readings of the multi-meter.

③ Analyzing: If the reading ranges between 0.3 V and 0.7 V in the above-mentioned six scenarios, the IPM module is normal. If the reading is 0 in one or multiple scenarios, the IPM module is damaged.

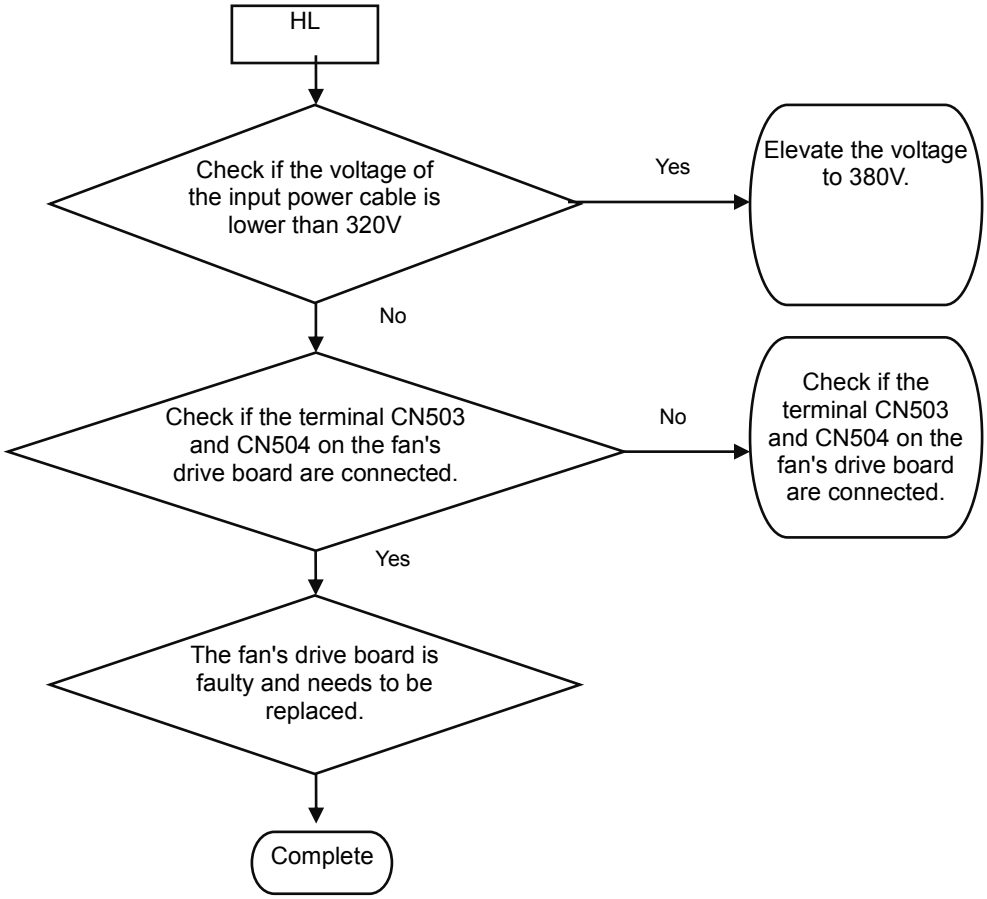
(4) Variable-frequency fan drive board IPM over-temperature fault (outdoor fault H8)



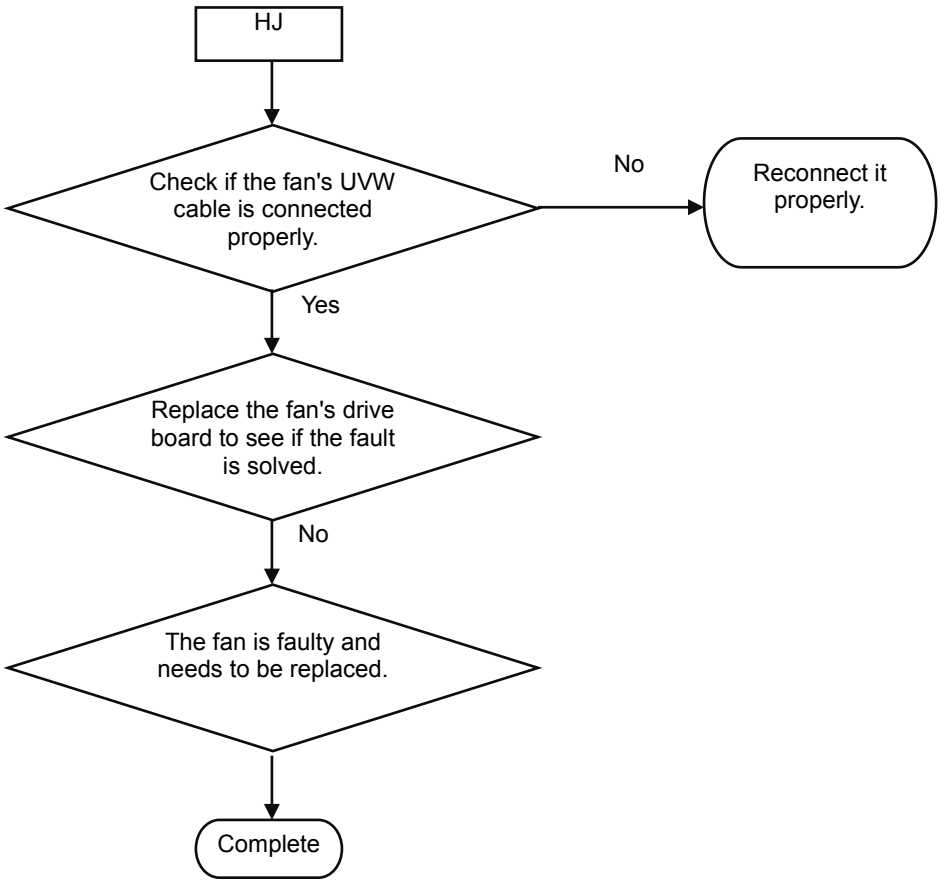
(5) High voltage protection for the DC bus of the variable-frequency fan's drive board (ODU fault HH)



(6) Low voltage protection for the DC bus of the variable-frequency fan's drive board (ODU fault HL)



(7) Variable-frequency fan starting failure (ODU fault HJ)



3 Key Parts Maintenance
3.1 Cautions on Controller AP1 Replacement

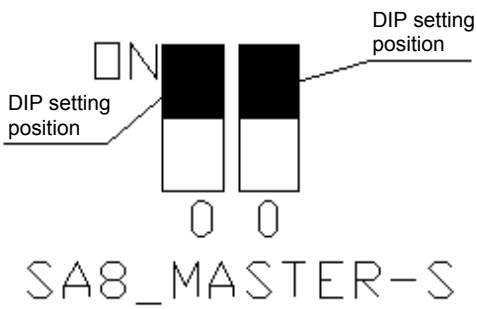
3.1.1 Cautions on ODU AP1 Replacement

3.1.1.1 Distinguishing Master Module from Slave Module

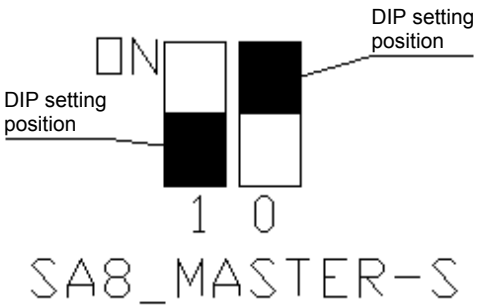
Before replacing ODU AP1, determine the module is a master ODU or a slave ODU. They can be distinguished based on:

①"Master module DIP state (SA8_MASTER-S)"

Every cooling system has only one master module (set in power-off state). When a DIP is "ON", the corresponding position is "0"; when the DIP is "OFF", the corresponding position is "1". If SA8_MASTER-S is set to "00", it indicates a master module; if it is set to "10", it indicates a slave module (as shown in the figure below).



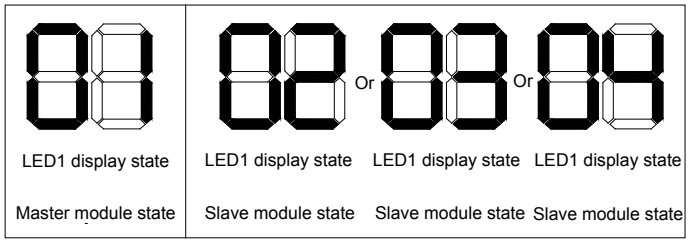
Master module state



Slave module state

②AP1 LED

When a master module is powered on, LED1 is displayed as "01". For a slave module, LED1 is displayed as "02", "03" or "04" (as shown in the figure below).



3.1.1.2 Cautions on Replacement of Master ODU AP1

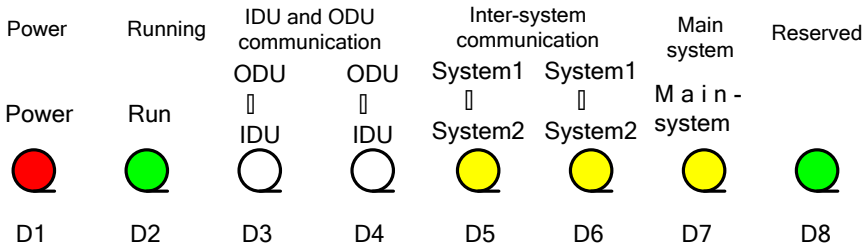
Before replacing master module AP1, make the following preparations:

①Master module DIP setting

Set the new AP1 identical to the faulty AP1. Note that settings must be performed when the master ODU is powered off and they will take effect after the ODU is powered on. Settings that are performed in power-on state are invalid.

②Communication state check

After AP1 DIP setting and all wiring, power on the master ODU AP1 and check whether D3 and D4 LEDs are flashing. See the figure below:



If the LEDs flash, the ODU and IDUs normally communicate; if the LEDs are steadily on, communication is faulty. Check communication lines connecting the ODU and IDUs.

Note: After AP1 is replaced, you should power on the ODU and IDUs at the same time or power on the ODU first; otherwise, “CC does not have module” will be prompted and a “C0 fault” alarm will be reported by the IDUs.

③Master ODU engineering debug setting

Debug the entire system after master module AP1 replacement.

④System parameter setting

After system debug, reset system parameters. For details, refer to section 1 “ODU Function Setting”, in part II, chapter III.

3.1.1.3 Cautions on Replacement of Slave ODU AP1

Before replacing slave module AP1, set DIP identical to that of the faulty AP1, check wiring, and then power on the AP1.

3.1.2 Cautions on IDU AP1 Replacement

Before replacing IDU AP1, determine the module is a master IDU or a slave IDU.

3.1.2.1 AP1 DIP Setting and Jumper Cap Confirmation

Whatever the AP1 you replace is a master IDU AP1 or a slave IDU AP1, after it is replaced, check original DIP setting and model.

Configure capacity DIP for the new AP1 and confirm its jumper cap, fan overload detect terminal, and overflow detect terminal. They should be kept identical to those of the faulty AP1.

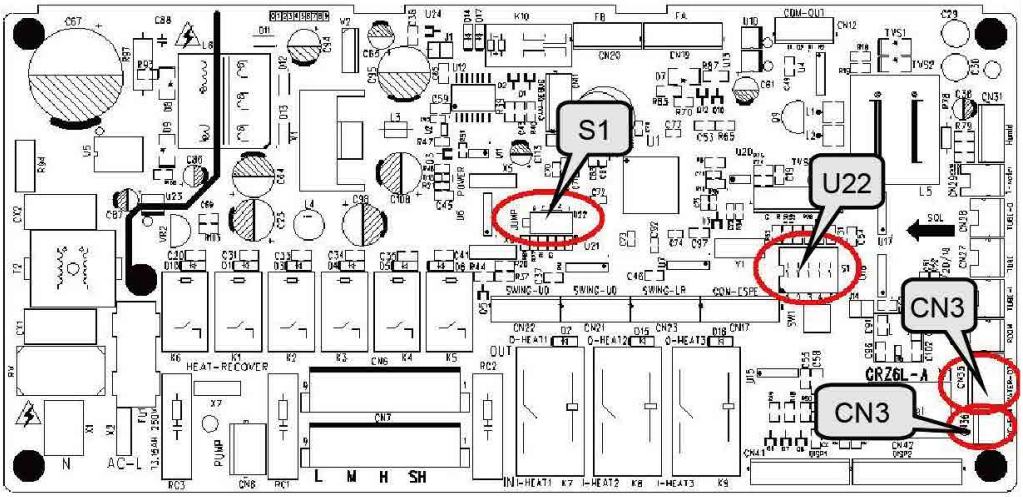
Their positions and corresponding silkscreen are as follows:

Capacity DIP: S1 (Capacity)

Jumper cap: U22 (Jump)

Overflow detect terminal: CN35(WATER-DTCT)

Fan overload detect terminal: CN36(OVC-FAN)



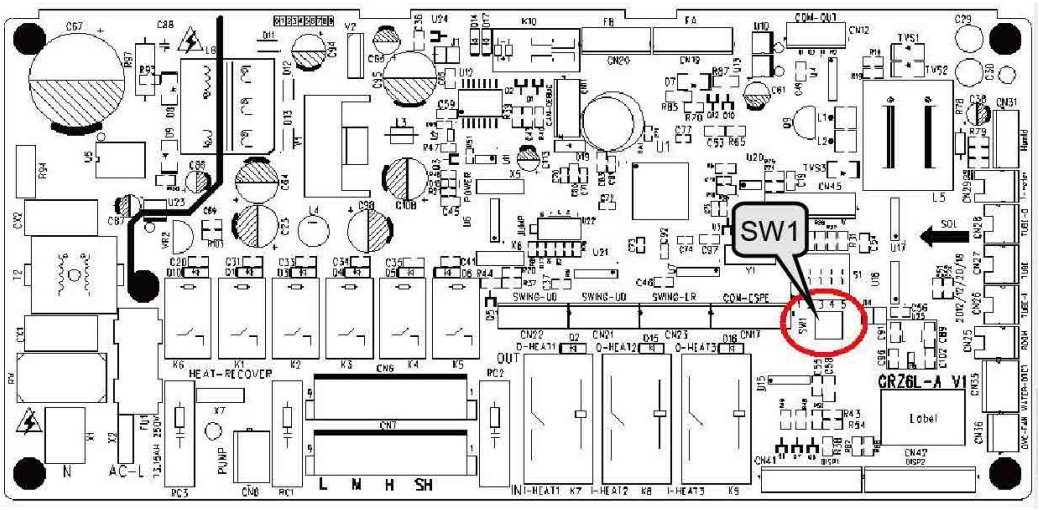
3.1.2.2. Restoring AP1 Engineering Parameters to Factory Settings (This Step Is Not Required for Original Packaged Parts)

After wiring, whatever the AP1 is a master IDU AP1 or a slave IDU AP1, the new AP1 must be restored to factory settings. There are three methods to restore engineering parameter settings:

① If the IDU is configured with wired control, set P35 and P36 to default values.

② If the IDU is configured with wireless control, use the special control YV1L1 to set P35 and P36 to default values.

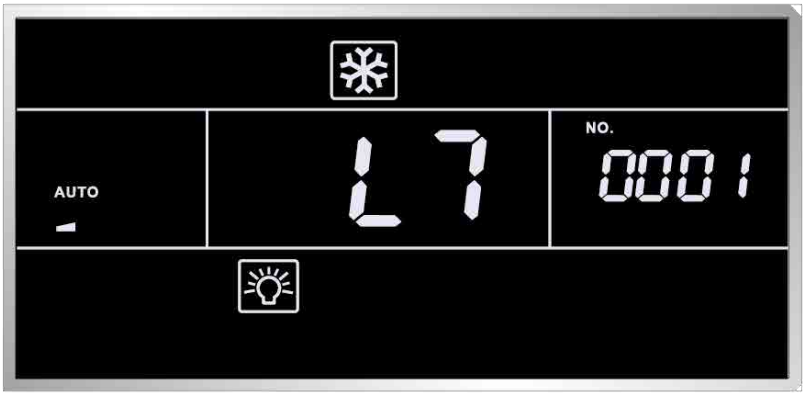
③ If the IDU is configured with wireless control and special control, you can restore engineering settings through the AP1 SW1 button. After AP1 is powered on, press and hold SW1 for 5 seconds. If a tick sound is heard, release the button.



3.1.2.3 Cautions on Replacement of Master IDU AP1

If the AP1 of the master IDU needs to be replaced, after the IDU is powered on, “No master IDU (L7)” or “Project number conflict (C5)” alarm may be reported.

①Troubleshoot for “no master IDU (L7)” fault

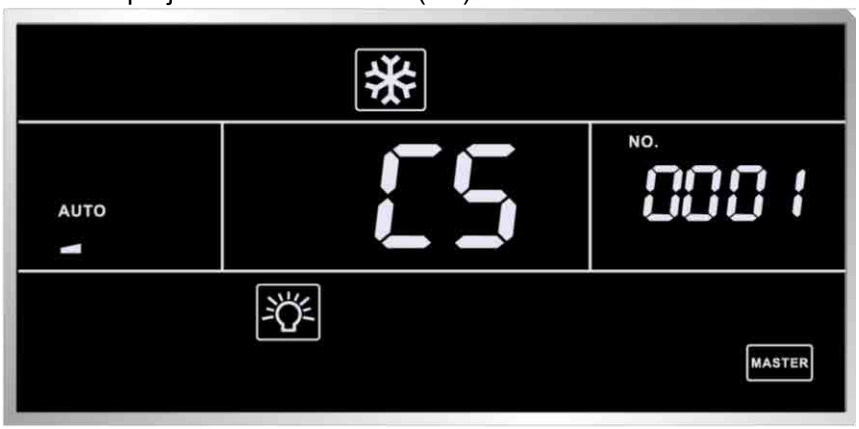


Method 1: If the IDU is configured with wired control, stop the IDU (except for lock mode) and press and hold the “MODE” button for 5 seconds to enter setting mode. After setting, the “Master” icon will be highlighted and the wired control buzzer will beep once.

Method 2: If the IDU is configured with lamp board or wired control, set to fan mode, 30°C/86°F, and press and hold “-” and “+” consecutively three times within 5 seconds. The IDU and wired control will identify it as a master IDU setting command, and show “set master IDU success (UC)” (5 seconds) and highlight the “Master” icon respectively.

Method 3: If the IDU is configured with the Debugger, set the IDU to master IDU through this software.

②Troubleshoot for “project number conflict (C5)”



If this fault occurs, the number of the new AP1 is identical to that of a unit within the network. Manually change it to the original number of the faulty AP1 or a unique number. There are three methods to change project number:

Method 1: If the IDU is configured with wired control, set P42 to a new project number.

Method 2: If the IDU is configured with lamp board, use the special control YV1L1 to set P42 to a new project number.

Method 3: If the IDU is configured with the Debugger, configure a new project number through this software.

Tip:

If there are N units within the network, the units should be numbered from N+1.

Special situation:

In some cases, the created project number is identical to that of a unit within the network. In this case, you can use the “one-key IDU project number reset” function. However, this function will cause the project number of the entire system to be re-distributed; thus, original number will be changed. If you do not expect this result, forbid the use of this function and replace the AP1 again.

Methods to use the “one-key IDU project number reset” function:

Method 1: If the IDU is configured with wired control, set P45 to reset IDU project number through one key function.

Method 2: If the IDU is configured with lamp board, use the special control YV1L1 to set P45 and reset IDU project number through one key function.

Method 3: On the AP1 of the master ODU, press and hold SW5 for 10 seconds at least to clear all project numbers of the IDUs and then redistribute project numbers. Other parameters are kept unchanged.

3.1.2.4 Cautions on Replacement of Slave IDU AP1

If the AP1 of a slave IDU needs to be replaced, after it is powered on, “Project number conflict (C5)” alarm may be reported. Refer to section 3.1.2.3 “Cautions on Replacement of Master IDU AP1” to address the issue.

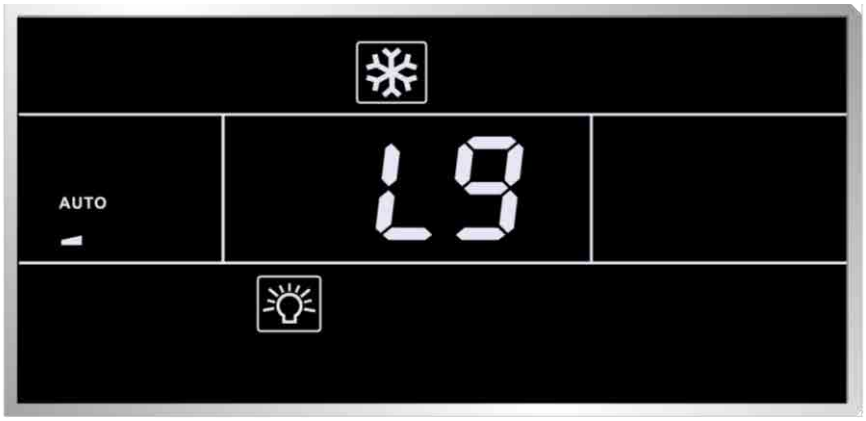
3.1.3 Cautions on Wired Control Replacement

3.1.3.1. Cautions on Wired Control XK46 Replacement

(1) If the wired control to be replaced controls only one IDU, directly replace the control.

(2) If the wired control to be replaced controls multiple IDUs, perform the steps below first:

Set the wired control parameter “P14” to change the number of managed IDUs to the actual quantity the control manages. For example, if the wired control manages 3 IDUs, set this parameter to 3. If you keep the default value 1, the LCD displays L9 (as shown in the figure below).



(3) If there are two wired controls controlling one or multiple IDUs, perform the steps below first:

Set the wired control parameter “P13” to change the address of one control to 01 (master) and that of the other control to 02 (slave); otherwise, a CP (multiple master wired controls) fault alarm will be reported (as shown in the figure below).

After setting, the LCD displays the  icon, as shown in the figure below.

Note: All wired controls are set to master wired controls by default.

(4) If the AP1 of the master IDU is replaced,

Reset the master IDU through the wired control; otherwise, the LCD displays L7 (no master IDU). There are two methods to set the IDU:

①In shut mode, press and hold the “MASTER” button for 5 seconds and set the IDU corresponding to this wired control to a master IDU. After setting, the “Main” icon is highlighted.

②Set the wired control parameter “P10” to 1.

3.1.3.2. Cautions on Wired Control XK49 Replacement

To replace the wired control XK49, in addition to the preceding handling steps specific for XK46, you should also configure access control.

(1) If the wired control does not need an access control system, set switch “1” for DIP S1 at the bottom of the wired control to digital end (neglect switch “2”).

(2) If the wired control needs an access control system, set switch “1” for DIP S1 at the bottom of the wired control to ON (neglect switch “2”) and connect the access control card interface to ports N and L or ports VCC and GND of the wiring terminal. The following should be noted:

①Ports N and L are power interfaces of 100-240V~50/60Hz access control.

②Ports VCC and GND are power interfaces of DC 5-24V access control.

③Either of them can be selected at one time.

3.2 Compressor Replacement and Cautions

3.2.1 Determining Compressor Fault

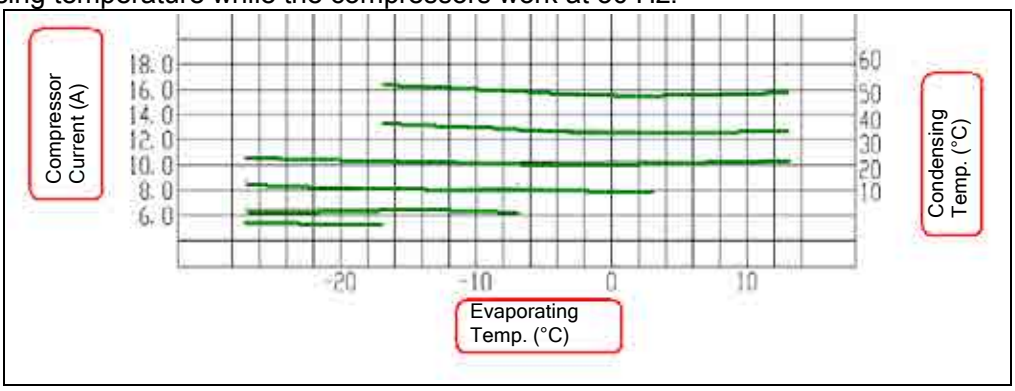
3.2.1.1 Precondition: Units can be normally started.

Step 1:

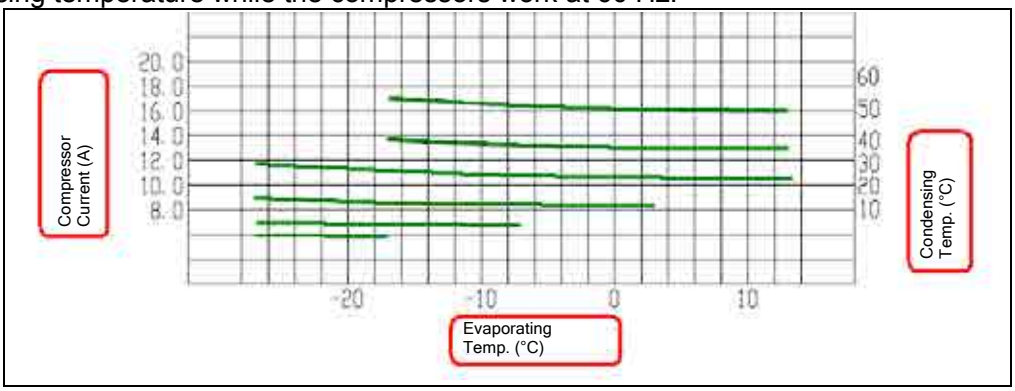
If units can be normally started, start the units so as to measure line current of the faulty compressor. Use a pressure gauge to measure pressure of various valves and connect the gauge to a PC for viewing test data. Verify the current data in the figures below against the current recommended. For inverter compressors, current will be deviated 10% while rate of turn and operating condition vary.

①For inverter compressors E655DHD-65D2YG and E705DHD-72D2YG:

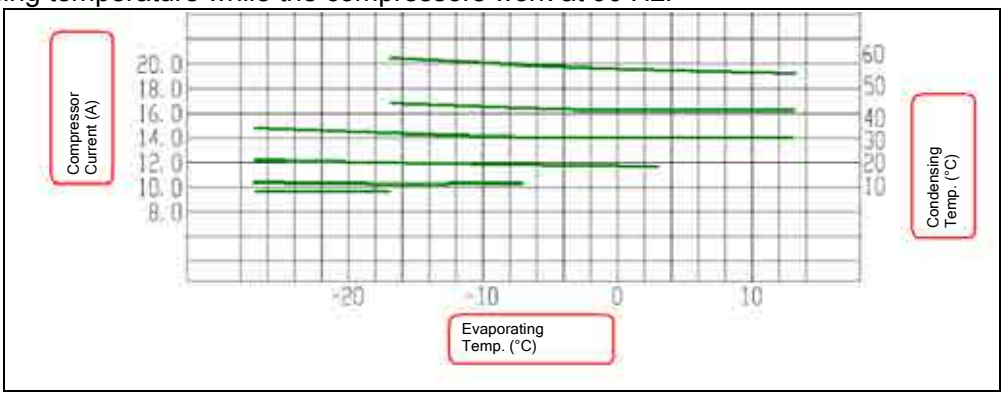
The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressors work at 30 Hz.



The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressors work at 60 Hz.



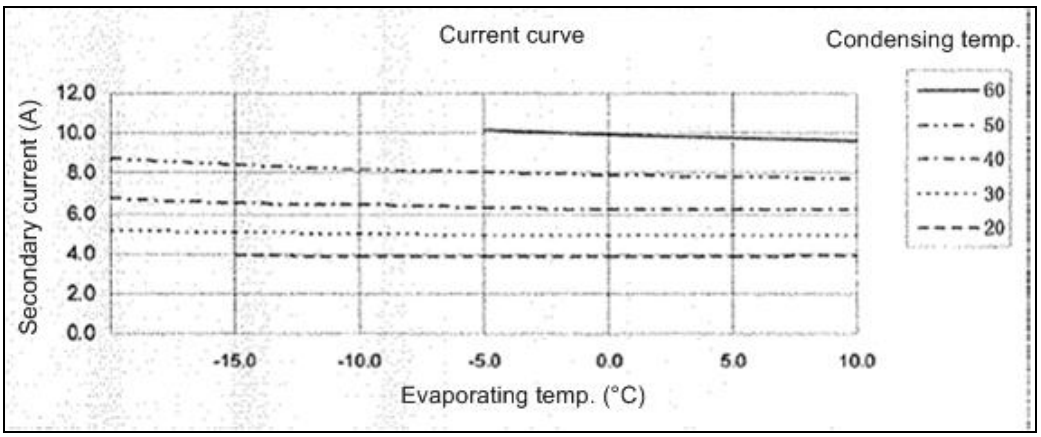
The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressors work at 90 Hz.



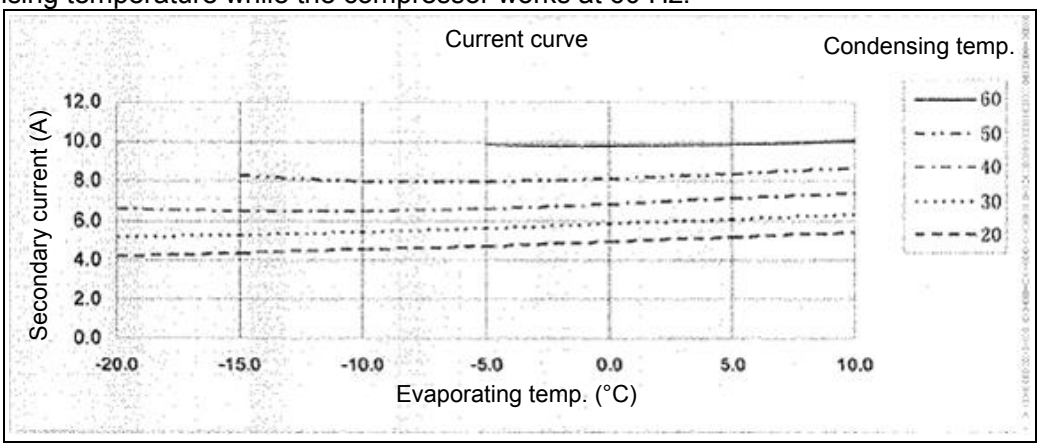
Note: You can infer from the preceding figures the current of the compressors operating at other frequency bands.

②For inverter compressor E405DHD-38D2YG:

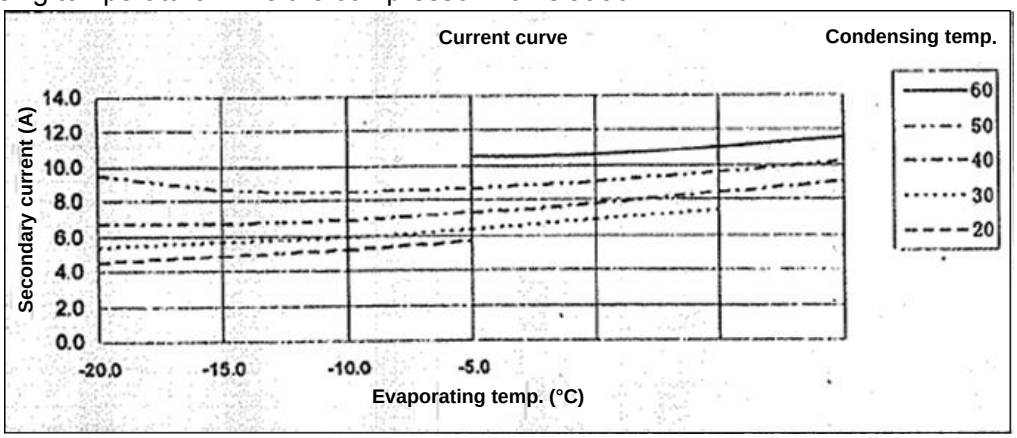
The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressor works at 30 Hz.



The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressor works at 60 Hz.

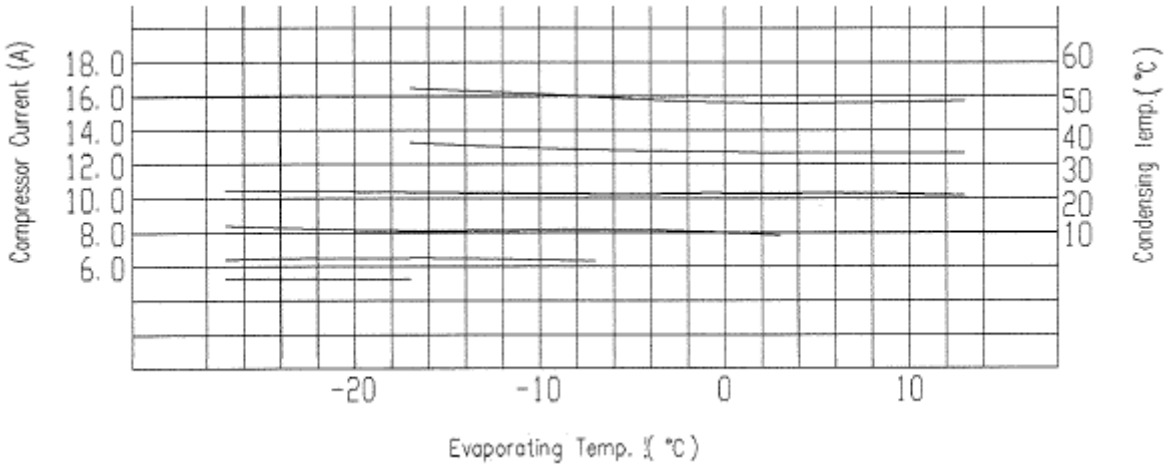


The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressor works at 90 Hz.

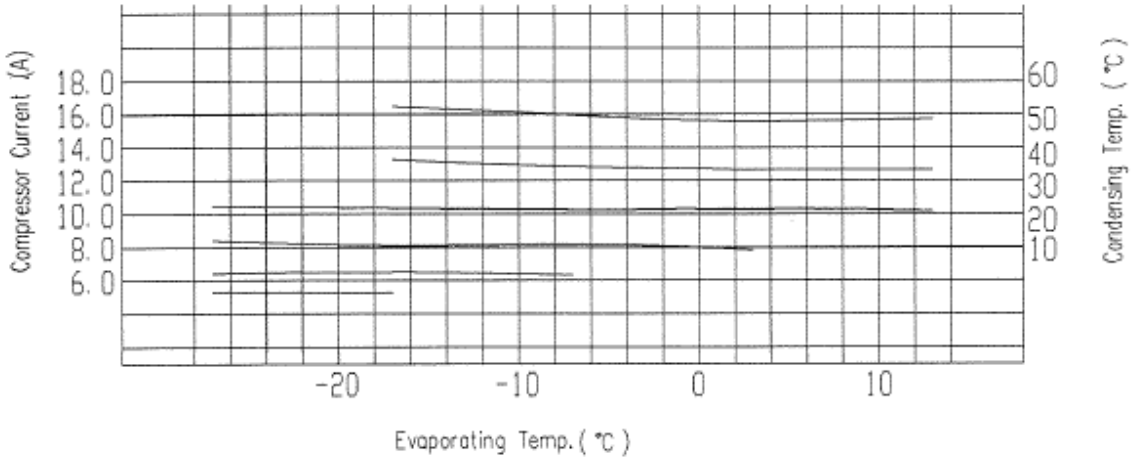


③For inverter compressor E656DHD-65D2YG:

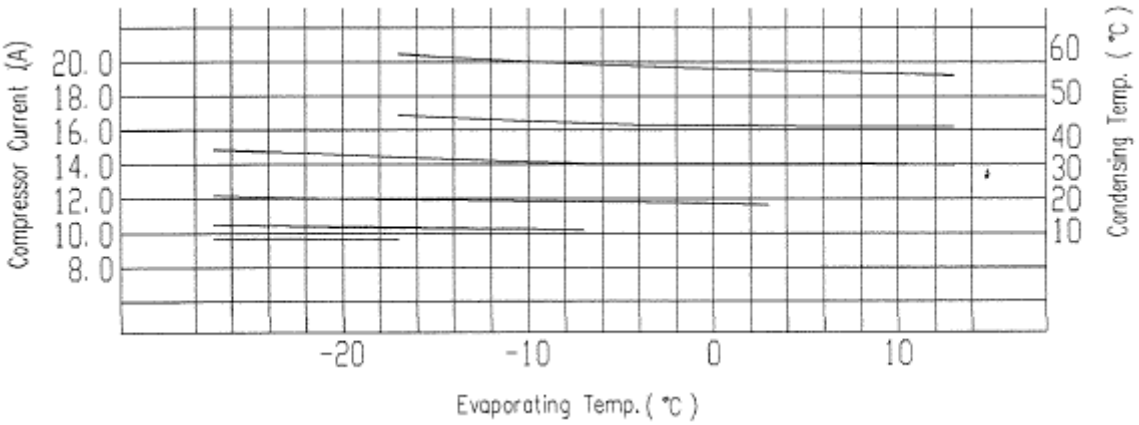
The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressors work at 30 Hz.



The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressor works at 60 Hz.



The figure below shows current curves that change with evaporating temperature and condensing temperature while the compressor works at 90 Hz.



Note: You can infer from the preceding figures the current of the compressor operating at other frequency bands.

Step 2:

Check whether the compressor sounds sharp or rubs. Compare the sound of the faulty compressor with that of normal ones.

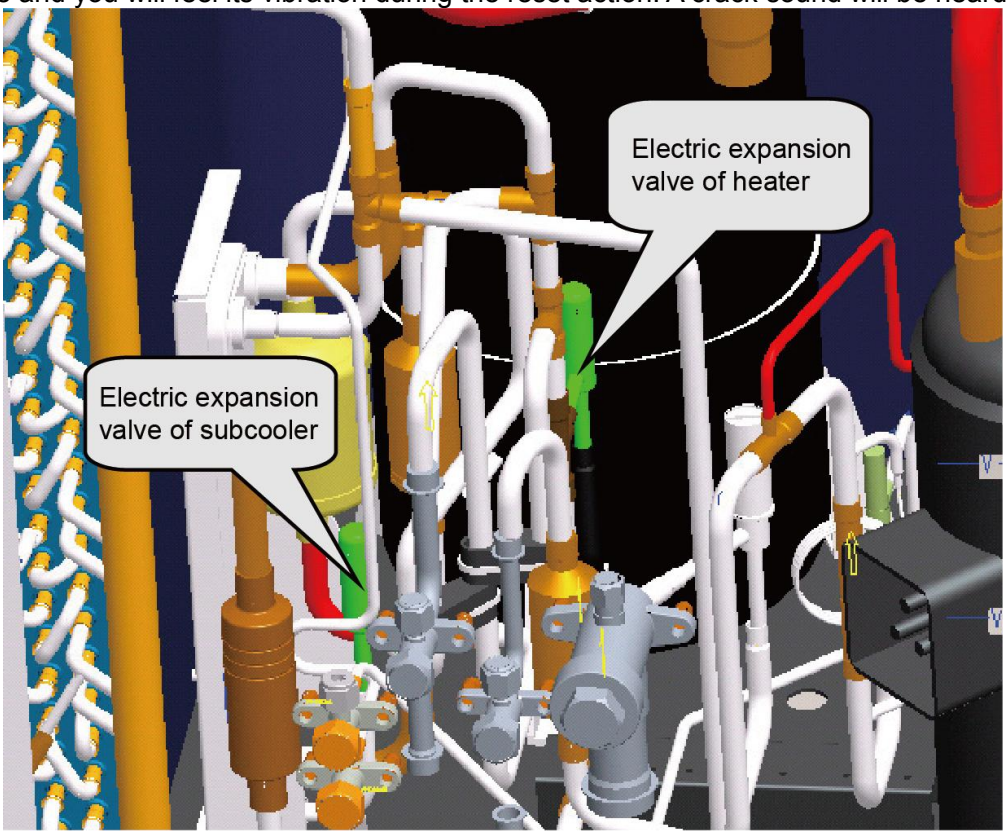
Step 3:

Check whether the electric expansion valves of ODUs and the 4-way valves act, and whether the oil return pipes and oil balance valves 1 and 2 are normal. Touch the pipelines next to the return capillary tubes to check whether there is oil flowing.

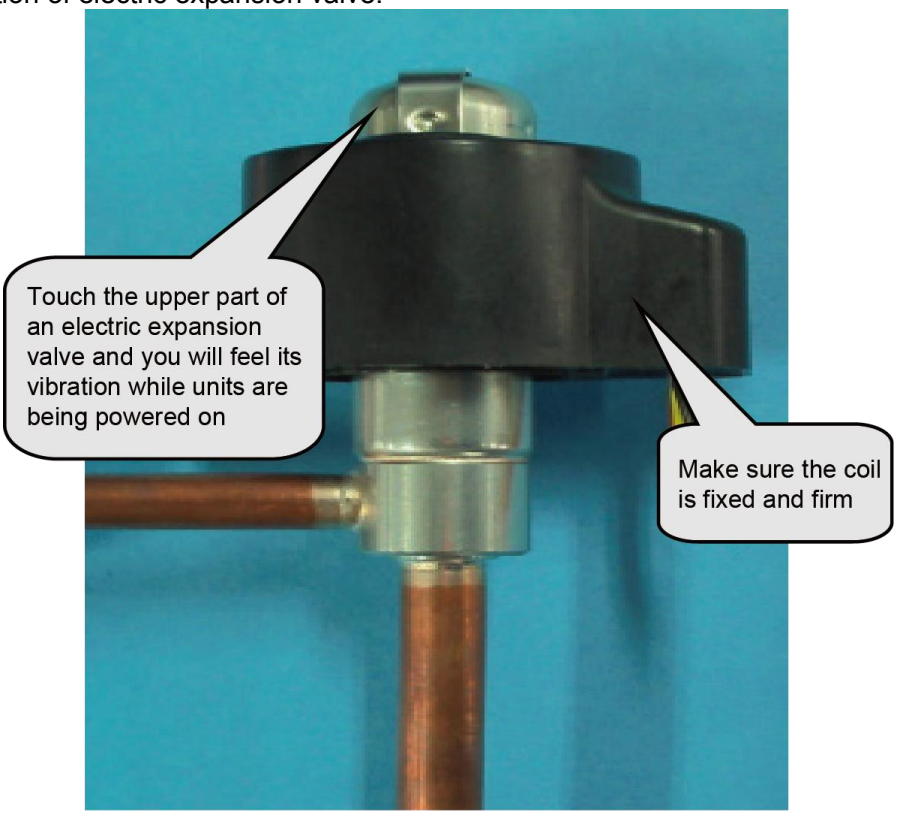
Check method for each part:

①Electric expansion valve: This valve will reset for each power-on or power-off action. Touch

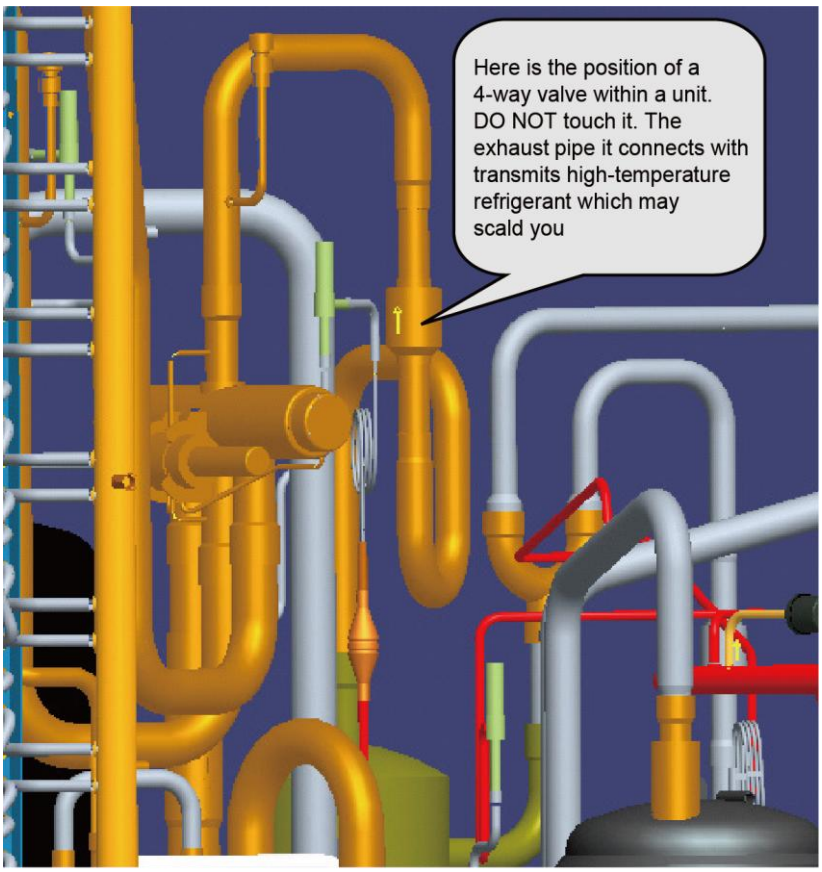
the valve and you will feel its vibration during the reset action. A crack sound will be heard as well.

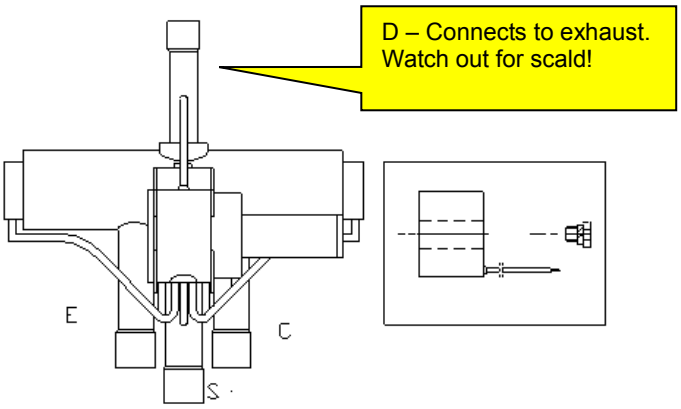


Description of electric expansion valve:



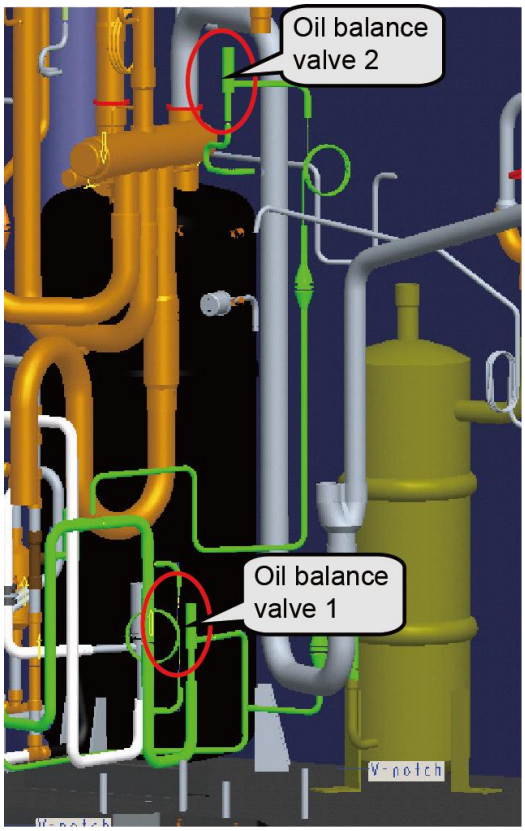
②Four-way valve: While this valve is normally running, the four copper pipes connected to it will suffer different temperature. When a unit switches to act the valve, you will feel obvious vibration and hear sound.





Labels on the 4-way valve and their meanings: D – connects to exhaust; E – connects to IDU evaporator; S – connects to intake of gas separator; C – connects to condenser. When the system is cooling, the pipe at side C works at high pressure high temperature, the pipes at sides E and S work at low pressure low temperature; when the system is heating, the pipe at side E works at high pressure high temperature, the pipes at sides C and S work at low pressure low temperature. The pipe at side D connects to exhaust and it is always working at high pressure high temperature. When units are starting, defrosting, or returning oil, the valve will vibrate obviously. DO NOT touch the pipe; or, you may be scalded.

③Oil balance solenoid valve: This valve can be operated based on its state that is shown through the monitoring software and actual situation. When this valve is opened, the coil will be heated and lubricant at both sides of the valve flows.



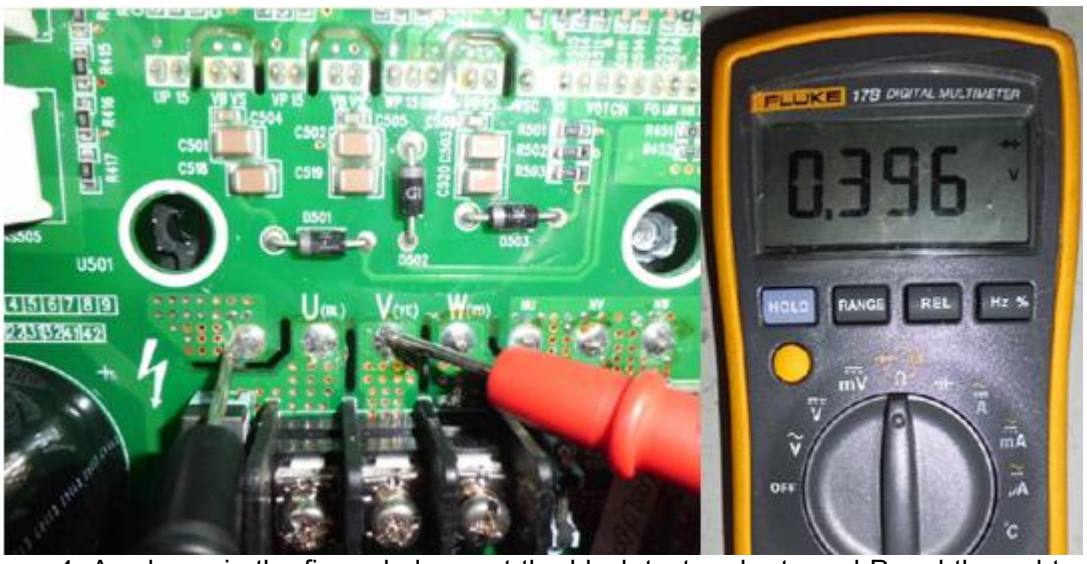
Step 4:

Test the compressor drive, namely the IPM module, to see whether it is normal.

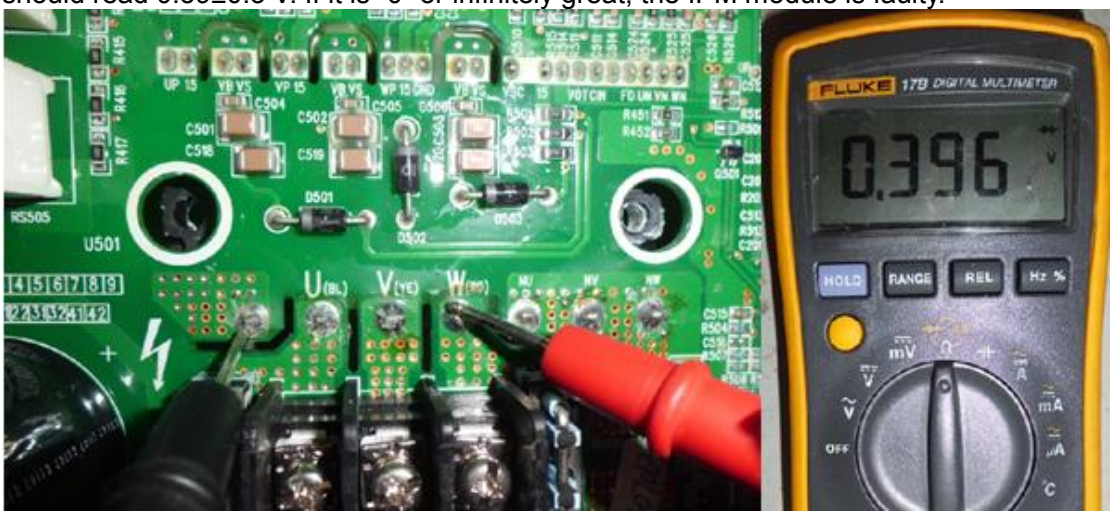
1. Disconnect the power supply. Five minutes later, remove the line of the faulty compressor.

2. Set a multimeter to gear diode. As shown in the figure below, put the black test probe to pad P (on the left of pad U (BL)) and the red test probe to pad U (BL) (make sure the moisture proof tape is removed). In normal cases, the multimeter should read 0.39±0.3 V. If it is “0” or infinitely great, the IPM module is faulty.

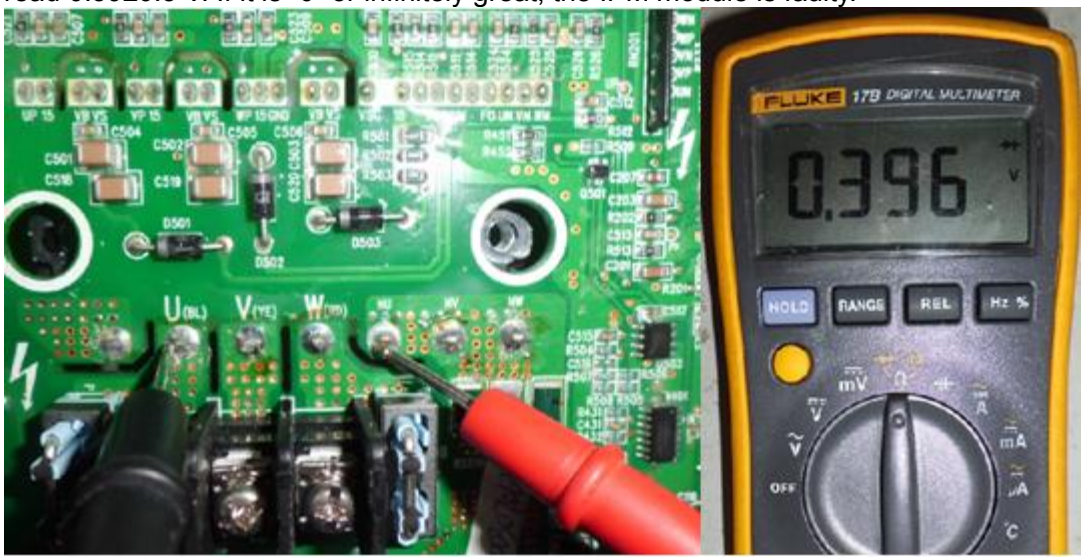
3. As shown in the figure below, put the black test probe to pad P and the red test probe to pad V (YE) (make sure the moisture proof tape is removed). In normal cases, the multimeter should read 0.39±0.3 V. If it is “0” or infinitely great, the IPM module is faulty.



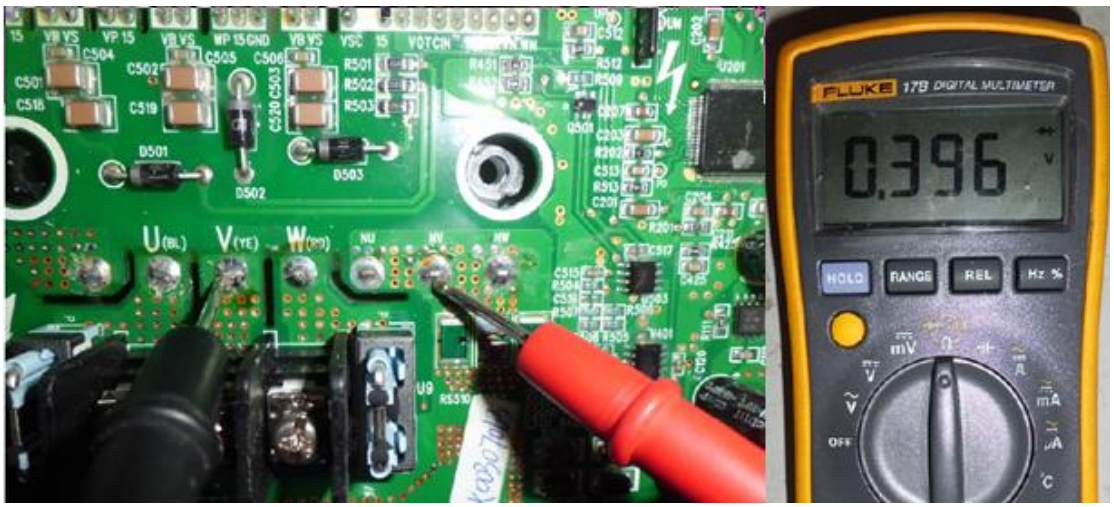
4. As shown in the figure below, put the black test probe to pad P and the red test probe to pad W (RD) (make sure the moisture proof tape is removed). In normal cases, the multimeter should read 0.39±0.3 V. If it is “0” or infinitely great, the IPM module is faulty.



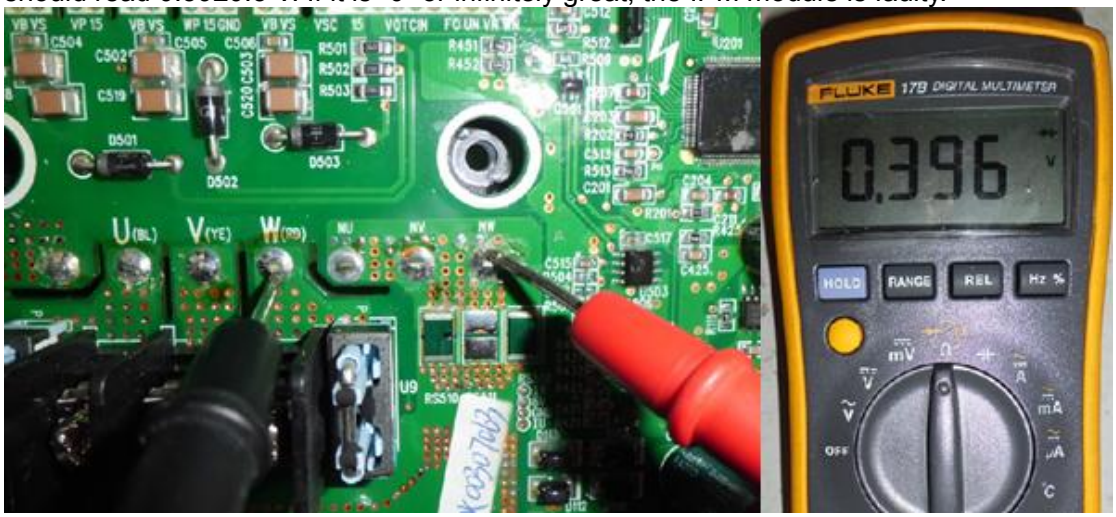
5. As shown in the figure below, put the black test probe to pad U (BL) and the red test probe to pad NU (make sure the moisture proof tape is removed). In normal cases, the multimeter should read 0.39±0.3 V. If it is “0” or infinitely great, the IPM module is faulty.



6. As shown in the figure below, put the black test probe to pad V (YE) and the red test probe to pad NV (make sure the moisture proof tape is removed). In normal cases, the multimeter should read 0.39±0.3 V. If it is “0” or infinitely great, the IPM module is faulty.



7. As shown in the figure below, put the black test probe to pad W (RD) and the red test probe to pad NW (make sure the moisture proof tape is removed). In normal cases, the multimeter should read 0.39±0.3 V. If it is “0” or infinitely great, the IPM module is faulty.



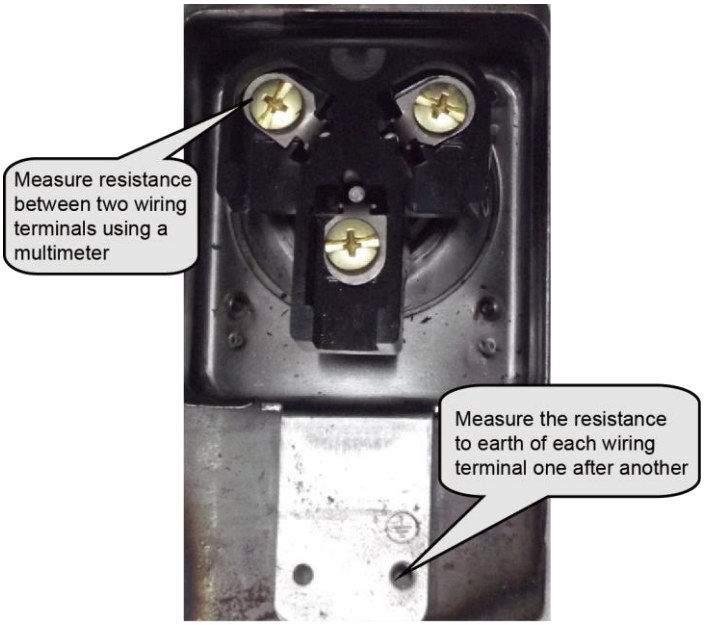
3.2.1.2 Precondition: Units cannot be normally started.

Step 1:

Disconnect the power supply of the units and open the electric junction box of the compressor to see whether wiring of the compressor is intact.

Step 2:

Measure resistance between two wiring terminals (U, V, W). The resistance value range should be 0.5~2.0 Ω.



Measure the resistance to earth of each wiring terminal. The value should be 10 MΩ. If not, the compressor has an internal fault.

Step 3:

Check the solenoid valves of the system, include electric expansion valves, oil return valves, and oil balance valves. Refer to the preceding section for the test method.

Step 4:

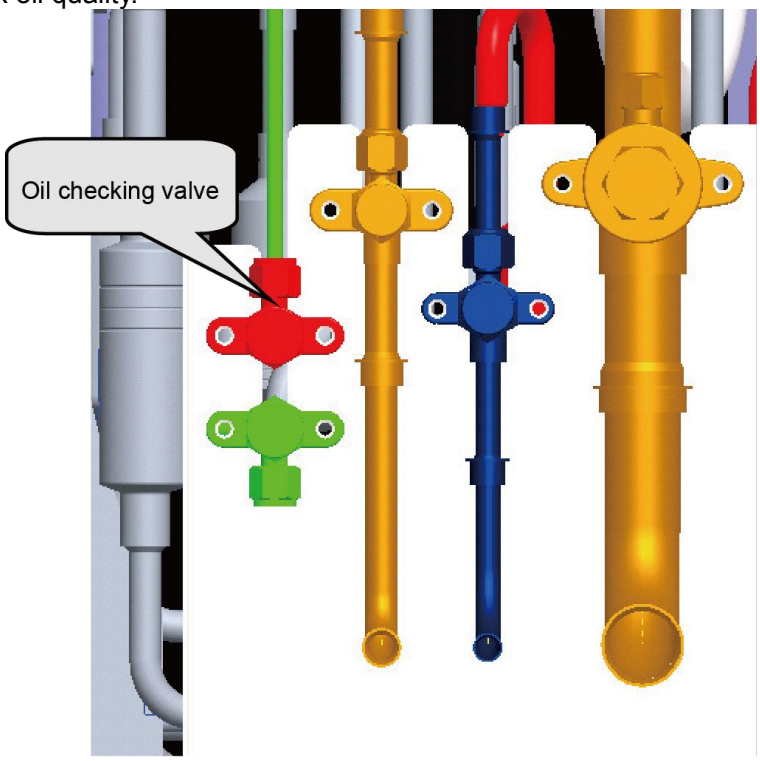
Check the IPM module. Refer to the preceding section for the test method.

3.2.2. Compressor Replacement

Step 1: Disconnect power supply.

Turn off the power switch of the ODUs and disconnect the line of the power supply and the power line of the ODUs. Meanwhile, cover the power line with tape for insulation and put a warning sign beside the power switch to prevent electric shock.

Step 2: Check oil quality.

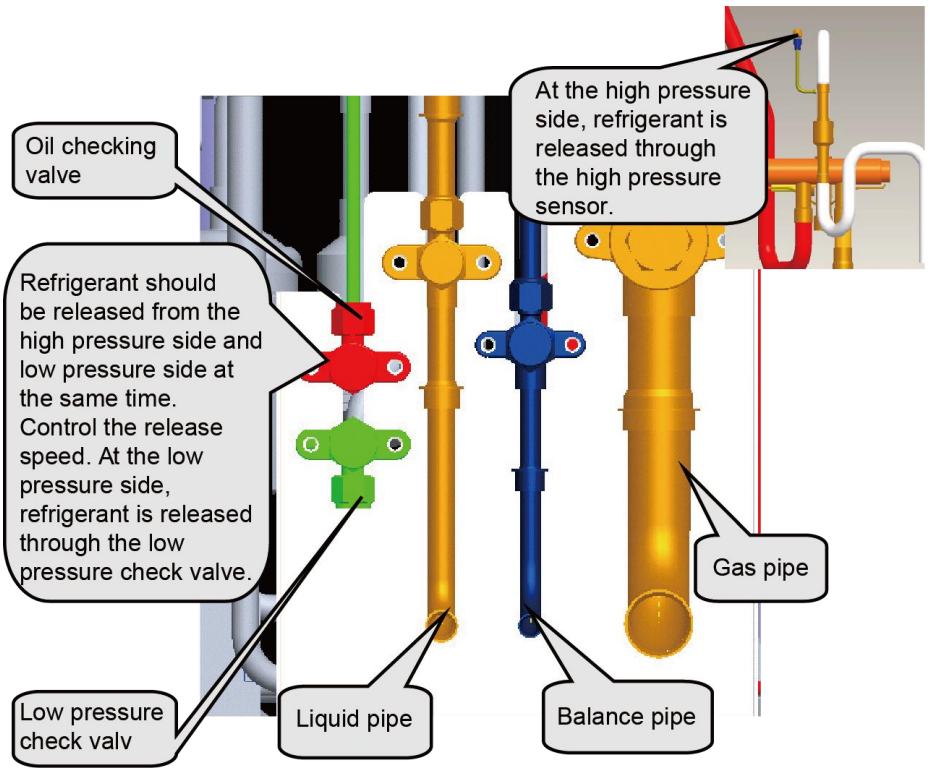


Before releasing the refrigerant, get some freezing oil through the oil checking valve. Connect a rubber hose to the oil checking valve at one end and a glass container at the other end. Open the oil checking valve. Control oil flow speed. Since the oil is a mixture of volatile refrigerant and lubricant, DO NOT cover the container; or it may explode.

After the lubricant is fully gasified, record the volume of oil.

Step 3: Release refrigerant.

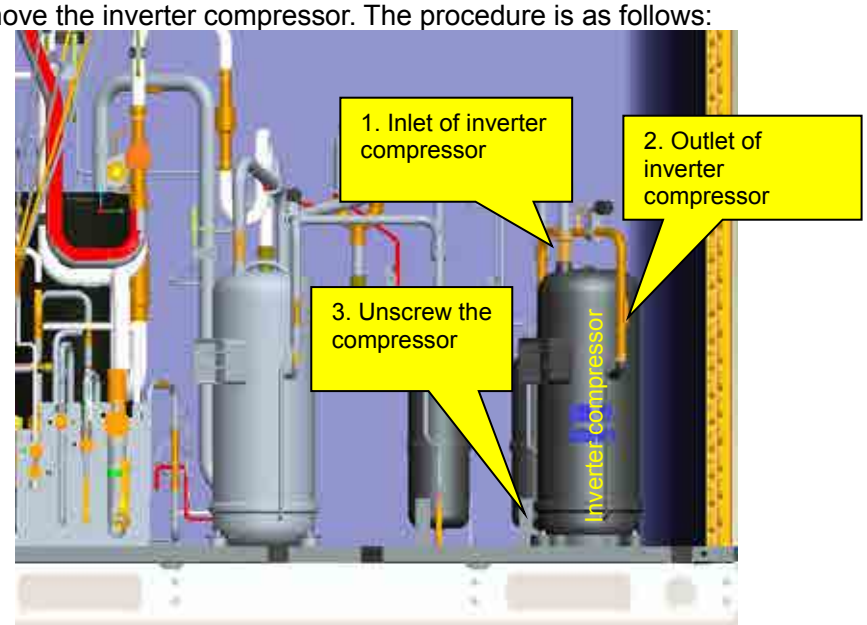
Refrigerant should be released from the high pressure side and low pressure side at the same time. If it is released from one side only, the scroll is sealed, causing the refrigerant to fail to be released completely. Control the release speed (it is expected to release for 12 hours or more). If too fast, massive lubricant will be discharged with the refrigerant. Make sure to mark the valves.



Step 4: Remove faulty compressors.

Confirm faulty compressors, including number of faulty ones, compressor position, and model.

If the inverter compressor is damaged, or the oil of the fixed speed compresor is contaminated, remove the inverter compressor. The procedure is as follows:



After the compressor and oil separator are removed, check oil quality. If oils are contaminated, replace the compressor, oil separator, and gas/liquid separator. If oil changes to black, check oils of other modular units. The check procedure is similar to the preceding.

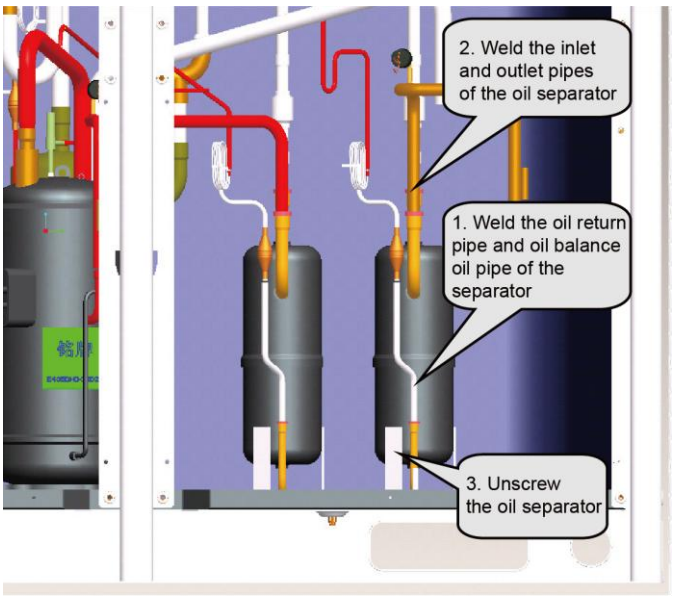
Note: Before replacing the faulty compressors, make sure to block their openings with tapes. They should be kept intact for further analysis.

Step 5: Check system parts.

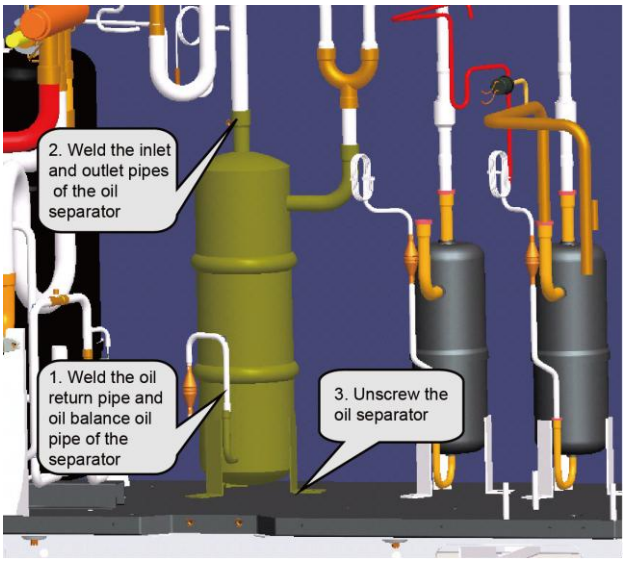
If system oil is contaminated, check unit parts, including oil separator, gas/liquid separator, and storage tank.

① Check oil separator

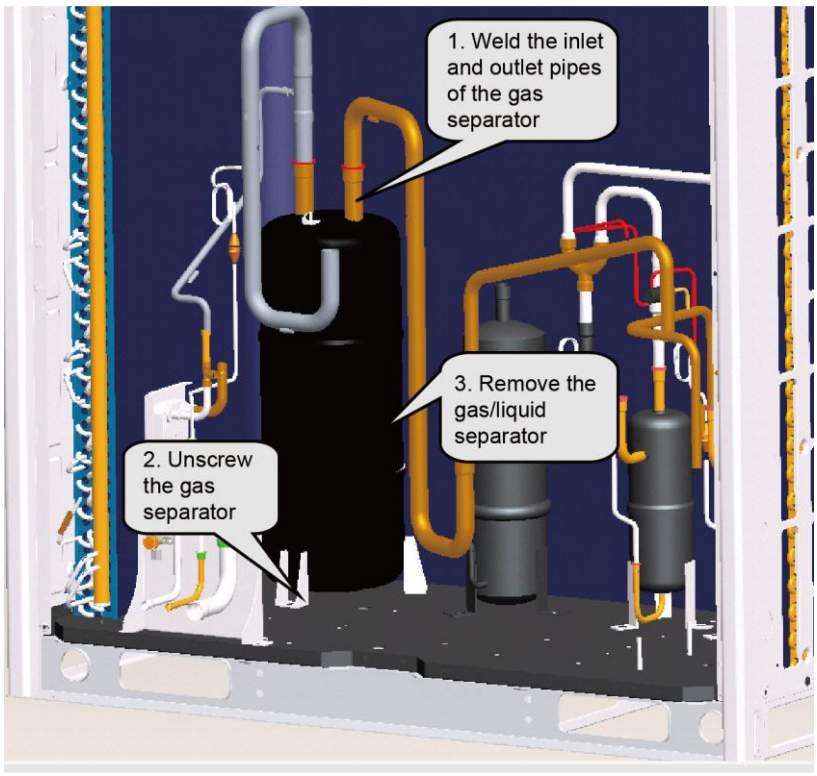
Remove the oil separator. Tilt the separator to draw oil out into a container. Block the container for further factory inspection.



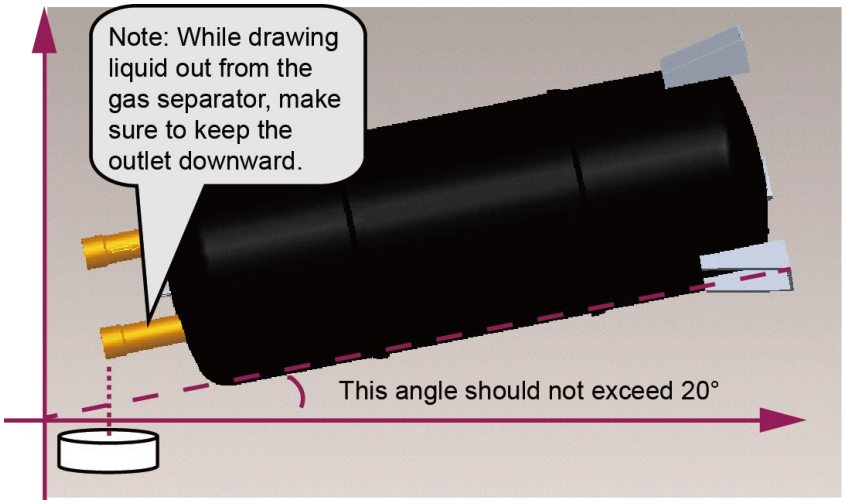
② Check oil balancer



③ Check gas/liquid separator



After the gas separator is taken out, check whether it contains impurities. The check procedure is as follows:

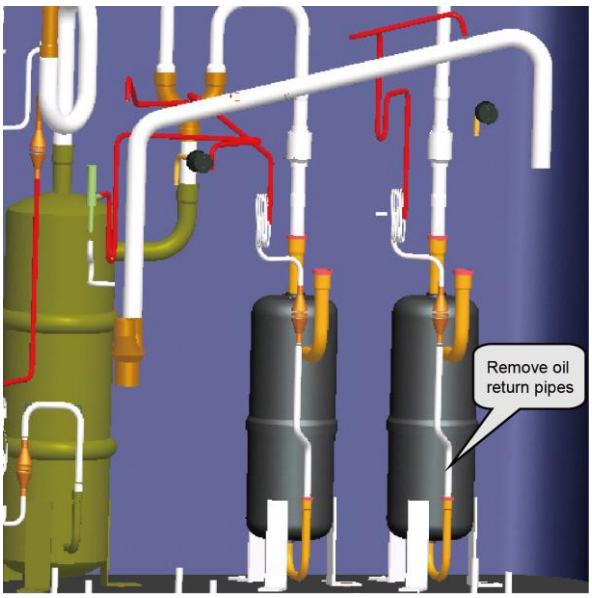


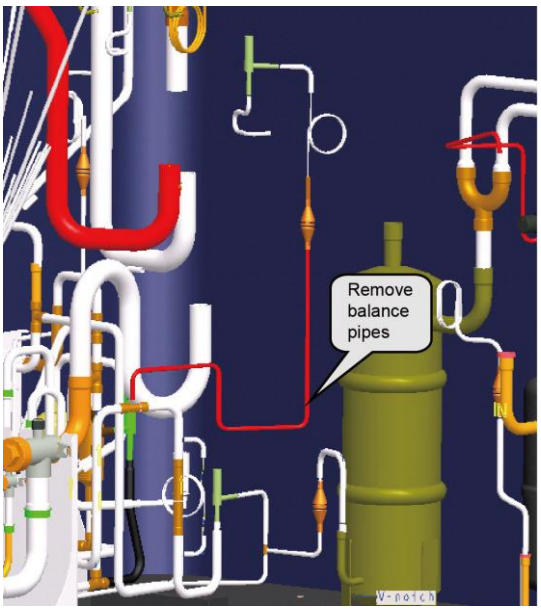
Use a glass container to hold the liquid. Check liquid impurities and colours and block the container for further factory inspection.

Note: If the compressor needs replacement, the gas/liquid separator needs replacement as well, regardless whether the separator contains impurities or has faults or not.

④ Check oil return pipes

Remove oil return pipes and balance pipes, and check oil volume and impurity.





Note: Before replacing the faulty parts, make sure to block their openings with tapes. They should be kept intact for further analysis.

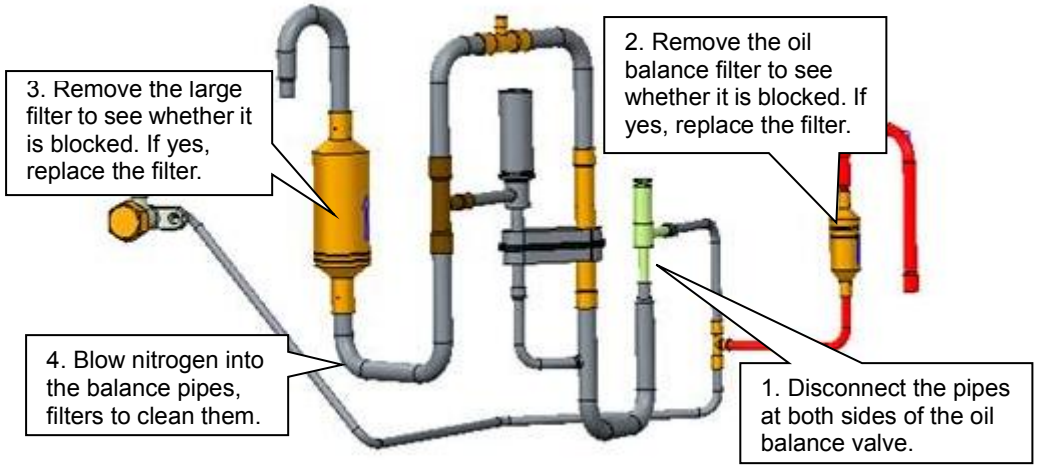
Note: Volumes of oils drawn out from the oil separator, gas separator, and oil balancer should be recorded. After faulty compressors and parts are replaced, you should fill new oils of equivalent amount into the compressors and parts.

Step 6: Clear pipeline system.

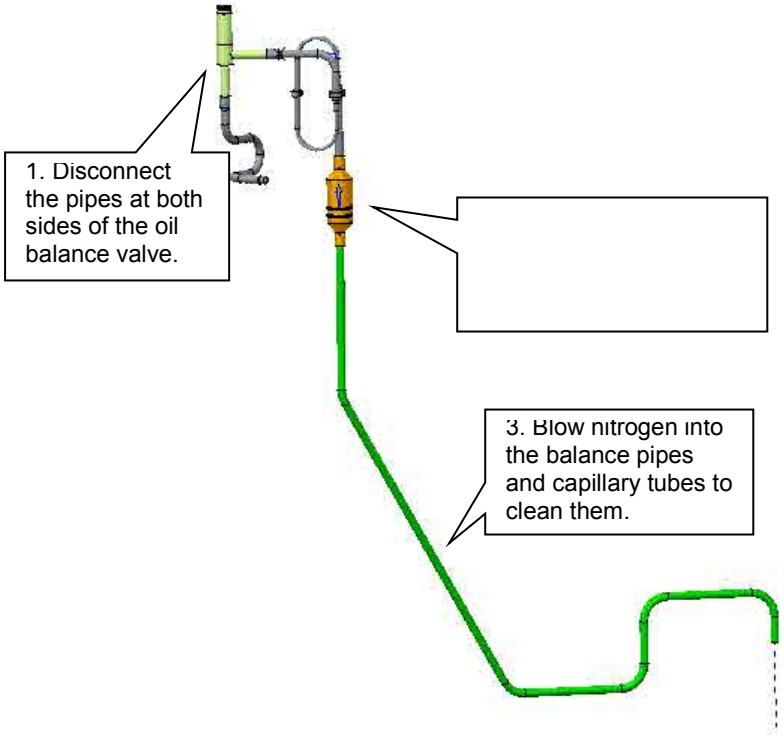
Check pipelines for abnormalities. Charge nitrogen into the main pipeline and clear the pipeline system.

① Clear the balance pipes

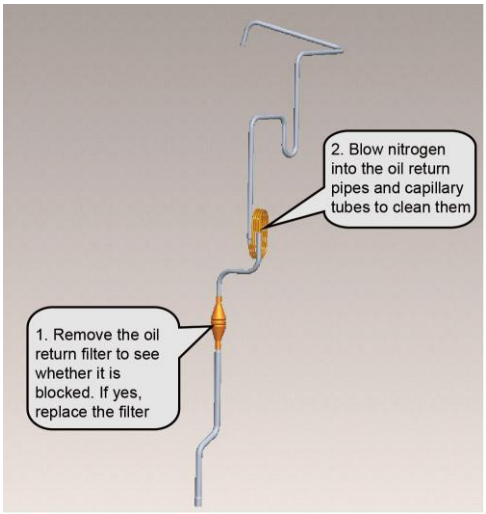
Components of oil balance valve 1:



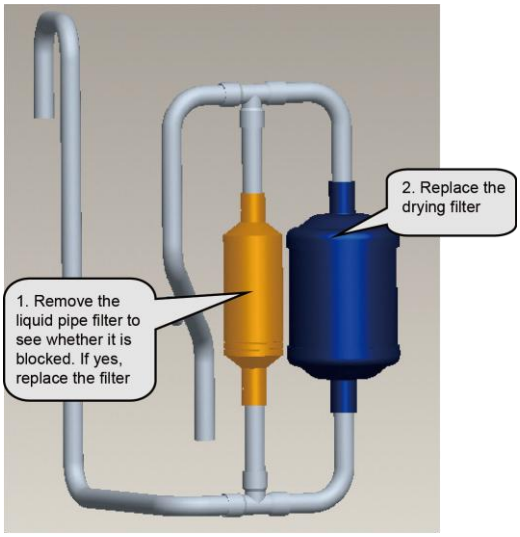
Components of oil balance valve 2:



② Clear oil return pipes



③ Clear liquid pipe filters



For other pipeline parts, clear them based on actual situation. If you do not replace the parts immediately, make sure to block the pipes with tapes, preventing air moistures and impurities from contaminating them.

Step 7: Preparations.

1. Prepare new parts.

In the course of moving compressors, do not lay them down or put them upside down. The tilt angle should be less than 30°. Make sure oil will not overflow from the oil balance opening. The inlet and outlet should be blocked. If the sealing rubber is not available, cover them with tape to prevent direct contact of oil and air.

Note: The new compressor must be consistent with the faulty one in model.

Check the rubbers for oil separator, gas separator, oil balancer, and drying filter. If they are lost during transportation, cover the parts with tape to keep the compressor dry and airtight inside.

Note: Compressor lubricant must be kept completely airtight. Hitachi compressors use special lubricant FVC68D whose moisture absorption capability is high. Requirements on air-tightness of these compressors are higher.

2. Prepare other materials.

(1) Prepare nitrogen. Prepare enough nitrogen. They will be used during welding. Nitrogen pressure should be 2.0 MPa at least.

(2) Prepare welding rods. In addition to ordinary welding rods, you should also prepare special welding rods (containing 5% or more silver). Compressors' inlets and outlets are made of copper plated steels, which require special welding rods and materials.

(3) Prepare gases for welding. Oxygen and acetylene of proper amount should be determined with consideration of actual welding positions. Try to finish the welding task once. Avoid repeated welding.

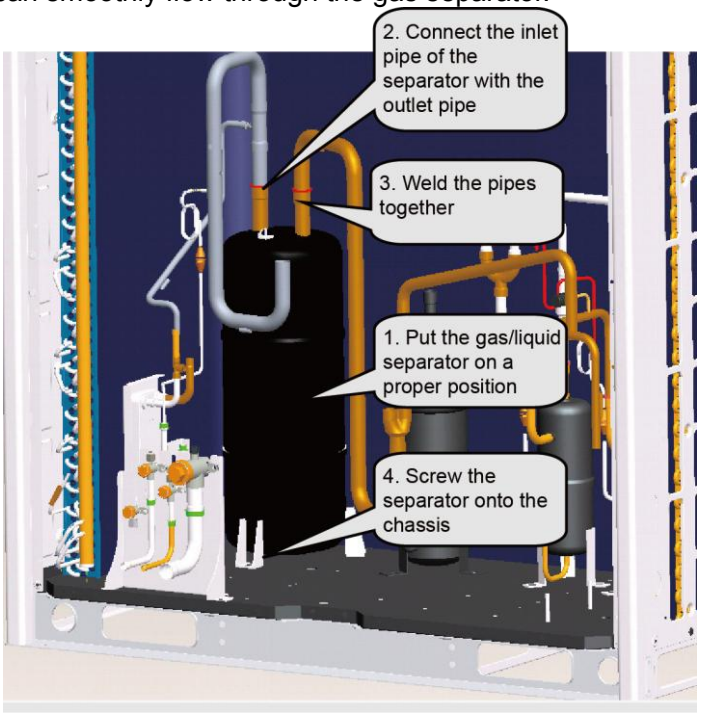
(4) Prepare tools, including hexagon, diagonal pliers, combination pliers, needle nose pliers, multimeter, pressure gauge, Phillips screwdriver, flathead screwdriver, wrenches (at least two), PVC insulation tape, and tielines (multiple).

Step 8: Install a new gas/liquid separator.

Note: If a faulty compressor needs replacement, the gas/liquid separator needs replacement as well. This is to avoid abnormality from happening inside the gas separator, and affecting system safety and reliability.

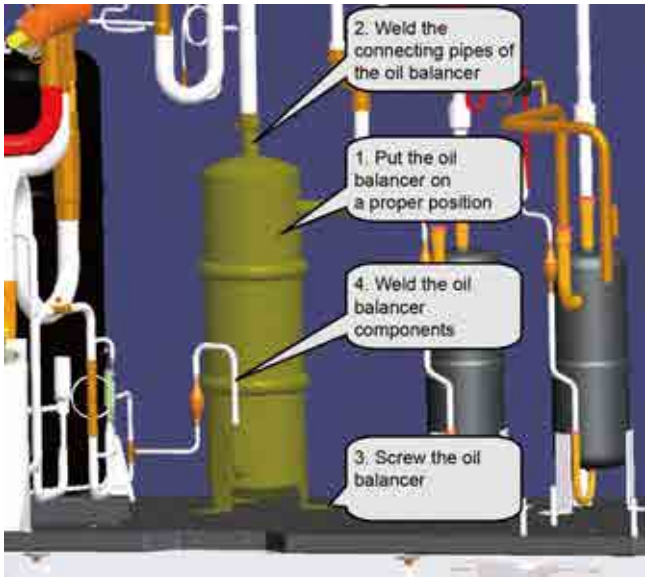
Put the gas/liquid separator on a chassis and connect the inlet pipe of the gas separator with the outlet pipe. Then, connect the pipe to a nitrogen source. The nitrogen source can be

connected based on actual situation, for example, you can add a bypass interface or directly connect the nitrogen source to the inlet/outlet pipe. If the pipe is big, cover it with tape as well. Make sure nitrogen can smoothly flow through the gas separator.



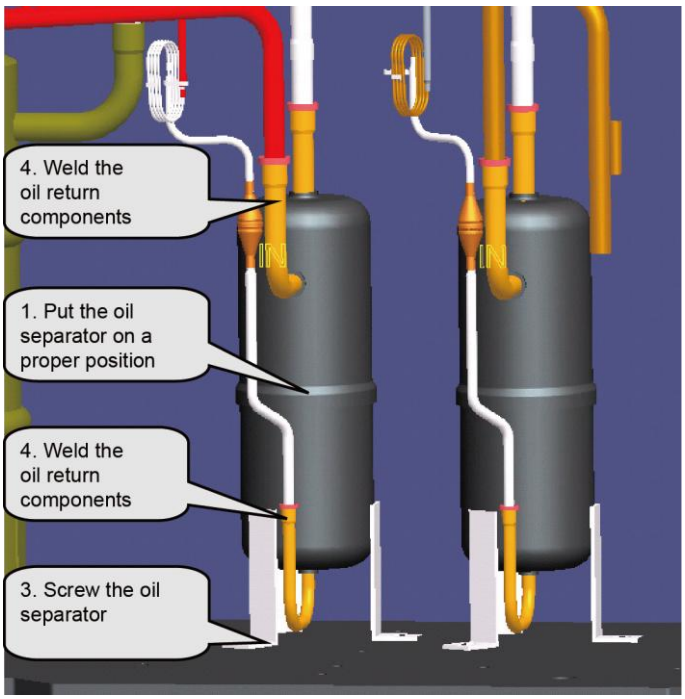
Step 9: Install a new oil balancer.

The original oil balancer, if is found to have no impurities or other objects, can be used further more. This part serves as a container and it does not have complex structure. However, if it contains impurities or other objects, replace it. This is because a dirty oil balancer cannot be thoroughly cleaned.

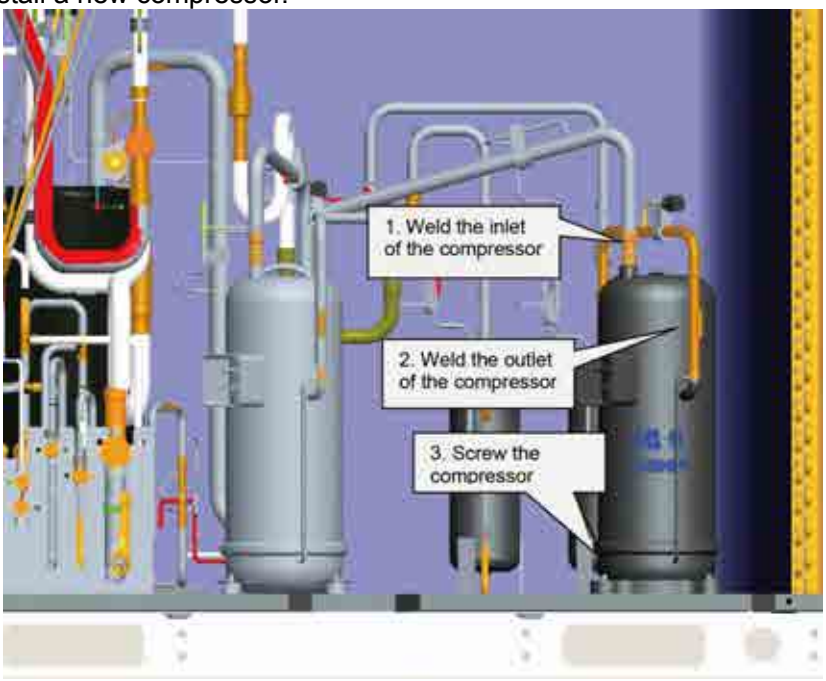


Step 10: Install a new oil separator.

If the original oil separator contains impurities inside, replace it.



Step 11: Install a new compressor.



Note: Keep wiring identical to factory installation. Control varies with compressors. Wrong wiring or inverse connection of the compressors may cause damage to units.

Cautions on replacement of compressors:

① Before installing new compressors, remove the sealing rubbers and weld the compressors with corresponding pipes. During welding, charge nitrogen into the pipes. Since compressors' suction and discharge pipes are made of copper plated steels, you need to prepare special welding rods (containing 5% or more silver). Welding clearance should be controlled within 0.1~0.3mm, avoiding blockage or loose welding. During welding, control pipe openings from being over-heated.

② After the pipeline system is welded, use special supports and bolts to fix the compressors, ensuring stability of the compressors during running.

③ Power lines of the compressors should be wired following the factory installation. You can refer to the wiring diagram. Phase sequence error is not allowed.

Step 12: System check.

1. Check welding joints for abnormalities.

2. Charge nitrogen into the system for leakage detection. If you are maintaining ODUs and the IDU system is normal, you can charge nitrogen into the ODU system only. Note that nitrogen

should be charged from both the high pressure side and low pressure side. You are advised to charge through all valves. Nitrogen pressure should be larger than 20 kgf. Then, charge soapsuds into the system and check specially the weld joints for leakage.

3. Finally, charge nitrogen into the system again for pressure check. Close all valves and keep system pressure up to 25 kgf for more than 12 hours. If the pressure remains unchanged, you can extract all air. Otherwise, you should find the leakage points first.

While determining system pressure change, take temperature into consideration. For 1°C temperature change, pressure will change by 0.01 MPa accordingly. Suppose that nitrogen pressure reaches 2.5 MPa at 30°C, 12 hours later, temperature decreases to 25°C and pressure decreases to 2.43 MPa accordingly. The system is regarded qualified despite the pressure decrease.

Step 13: Fill lubricant.

When a compressor is replaced, we should clear all lubricant of the system and determine fill amount by referring to the basic parameters of units.

For example:

For CHV-5S280NMX unit, one compressor is replaced; we should draw out all lubricant of separator and other accessories in the system; pipes have been charged with nitrogen for cleaning. So there is a little of residual lubricant inside the system. You are advised to add 3.5L new lubricant into the system (determined by referring to the basic parameters of units).

Specific procedure is as follows:

① CHV5 series units use FVC68D or FV-68H lubricant. Make sure to confirm the trademark of the lubricant first. Lubricant of other trademarks is not allowed.

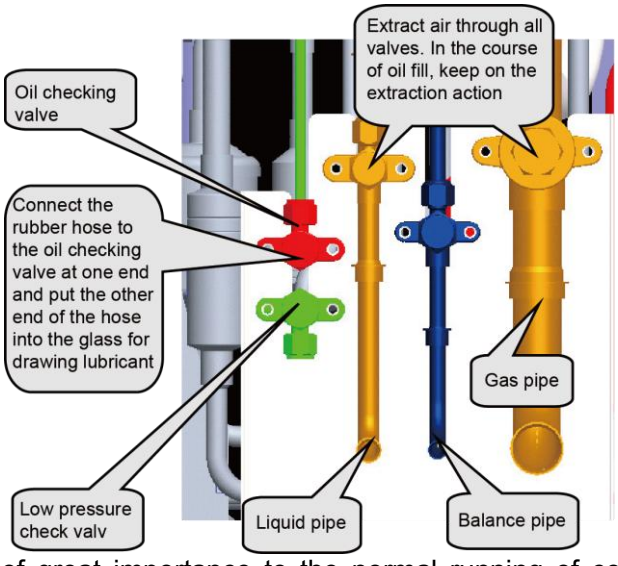
② Open all valves and extract air for 30 minutes or longer.

③ Connect a rubber hose to the oil checking valve at one end. Open the container that holds lubricant and pour lubricant into a measuring glass. If the glass is too small to hold the lubricant of a required amount, measure the lubricant portion by portion. Record volume of each portion and then put the other end of the rubber hose into the glass.

④ Keep on extracting air and open the oil checking valve. The lubricant will be pressed into the low pressure side of units.

⑤ If the lubricant is added portion by portion, close the oil checking valve first and then measure another portion of lubricant. In the course of repeated measuring and adding, keep the extraction action.

⑥ After a required amount of lubricant is added, close the oil checking valve to ensure tightness.



Note: Lubricant is of great importance to the normal running of compressors. You should follow C&H's requirement to add qualified lubricant of the specified trademark and ensure properness of fill amount.

Step 14: Vacuum-pump.

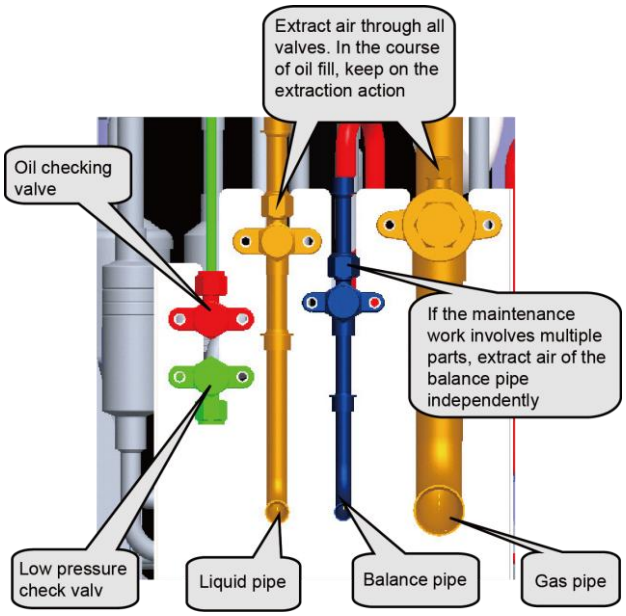
After lubricant is added, keep on extracting air through a vacuum pump till the internal pressure reaches the absolute pressure 0 kgf/cm^2 and the pressure gauge reads -1 kgf/cm^2. This is to ensure that moistures inside the pipeline system are completely vaporized.

Vacuum pumps of the specifications below are recommended:

Type	Max. Discharge Rate	Purpose

		For air discharge	For vacuum drying
Lubricant driven pump	100 L/min	Applicable	Applicable
Lubricant free pump	50 L/min	Applicable	Applicable

Open all valves in order that the vacuum pump extracts air through all the valves, during which, connect the units to a pressure gauge. When the internal pressure reaches 0 kgf/cm2 and the pressure gauge reads -1 kgf/cm2, keep on the extraction action for 0.5~1.0 hour more. Finally, turn off the rotary switch of the gauge and close the pump. One hour later, if the pressure remains the same, fill refrigerant. If the pressure increases to 0.1 kgf/cm2 or higher, conduct leakage check again.



Step 15: Fill refrigerant.

Before filling refrigerant, check its manufacturer, package, and print information. Besides, check refrigerant pressure and quality against the saturation pressure / temperature list.

1. Measure and check the pressure of the entire refrigerant product against the saturation pressure / temperature list. Verify temperature parameter. If the difference between the actual temperature and the parameter value is 3°C or more, the refrigerant quality is unsatisfactory.

2. If the refrigerant is proved satisfactory, fill refrigerant of the combined amount of the rated amount (specified on the nameplate) and the calculated refrigerant loss amount.

For a multi-modular unit system, if only the refrigerant of an ODU is drawn out, add 80% refrigerant of the rated fill amount (specified on the nameplate of the ODU) and start the system for a debugging test.

Step 16: Install electric parts.

Install the electric box and connect various parts to the electric box by referring to the marks made beforehand and the wiring diagram on the back of the box. Wire the compressors and corresponding electric heating belts.

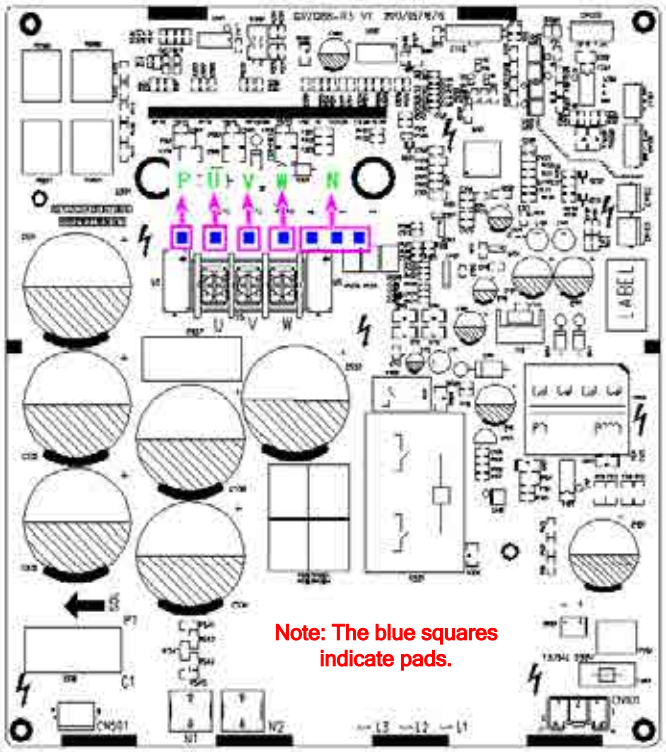
Note: Wires should be checked against the wiring diagram beforehand so that they can be connected correctly.

Step 17: Start for debugging.

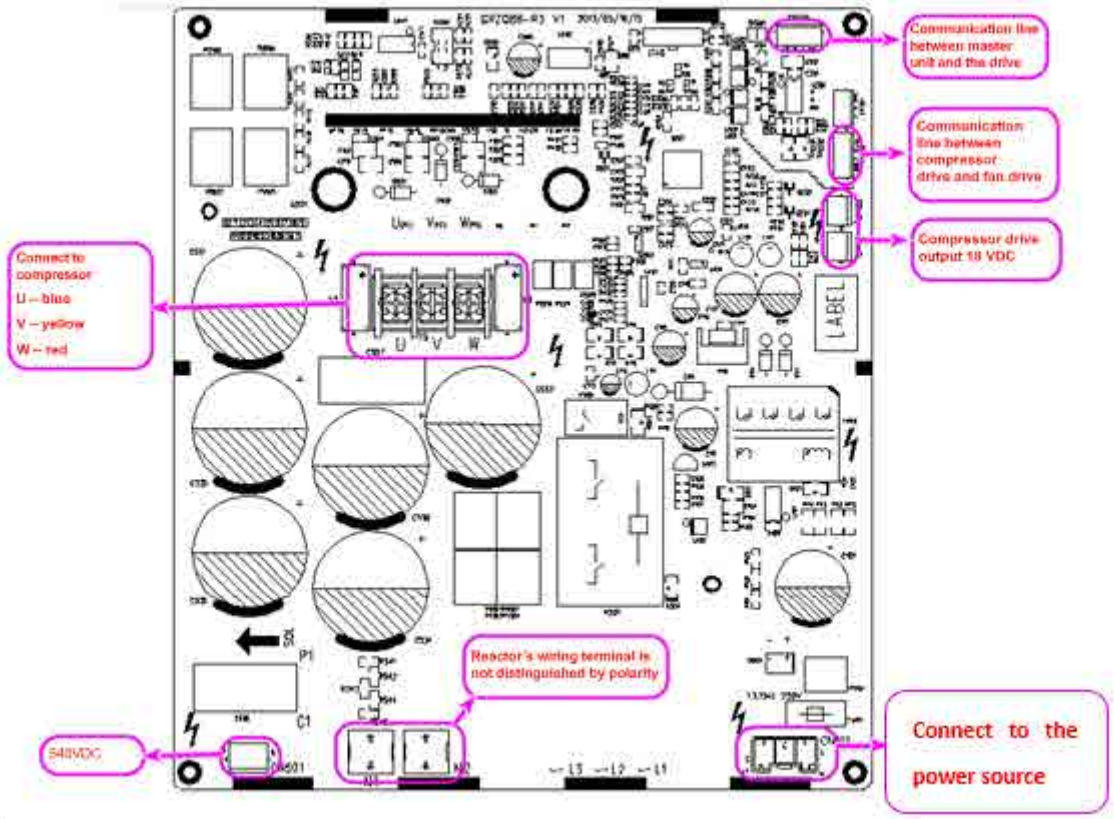
Start the units and set them to run in refrigerating full-start, refrigerating single-start, heating full-start, and heating single-start modes respectively. Duration for each running mode should be 30 minutes at least. After the debug, analyze data and adjust the unit system, to ensure indexes of the entire system. For details about each index, please consult after-sale persons and technicians.

3.3 Cautions on Compressor Drive Replacement

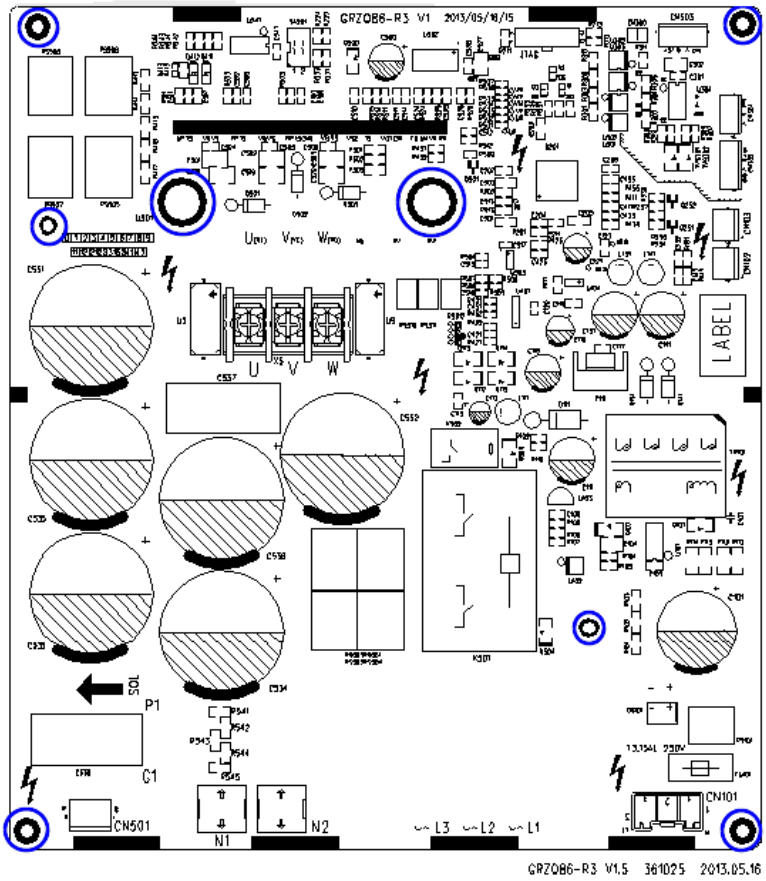
1. Disconnect the power supply of the system. Set a multimeter to the AC voltage gear and measure voltage between two of the lines (L1, L2, L3, and N). The measuring result should be 0 V (sometimes, multimeters may be faulty and read false values). Set a mark beside the power supply for warning.
2. Measure compressor drive DC bus voltage between two wire terminals of P, U, V, W and N. Set the multimeter to the DC voltage gear and measure the voltage between P and N. The voltage should be lower than 36 V. If no multimeter is available, wait for 20 minutes before performing the steps below.



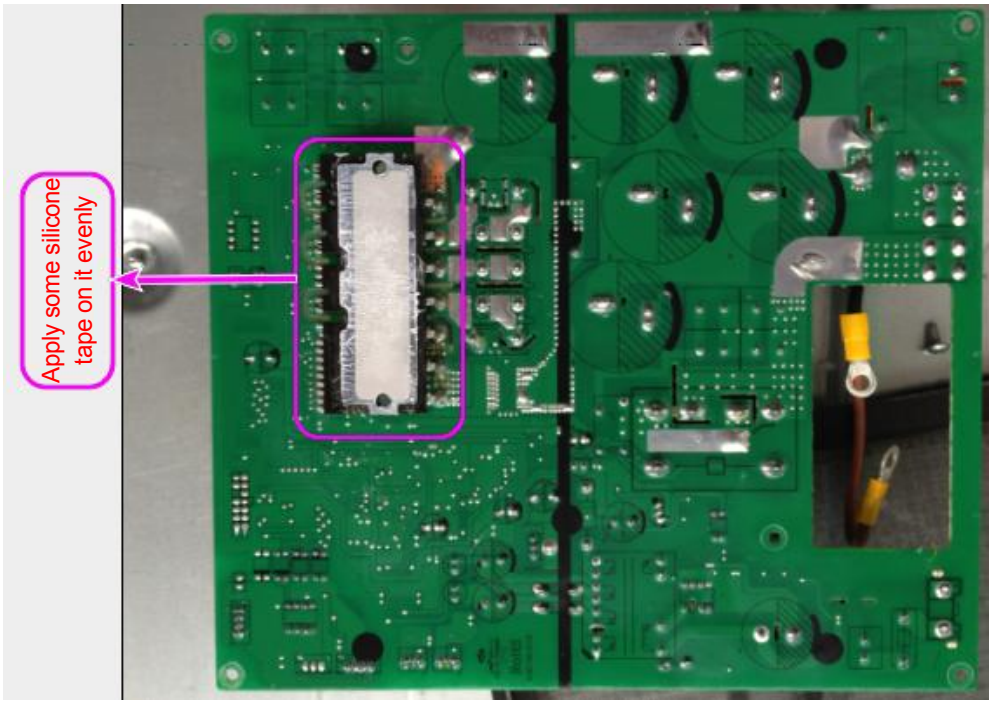
3. Disconnect all lines of the compressor drive, including: compressor line; communication line between the master unit and the drive; communication line between the compressor drive and fan drive; compressor drive output 18 VDC; bridge rectifier output P; bridge rectifier output N; compressor drive output 540 VDC; reactor's wiring terminal; bridge rectifier input AC inlead; compressor drive's mains terminal. See the figure below:



4. Loosen the screws on the compressor drive, as shown in the figure below:



5. Replace the compressor drive. Before the replacement, apply some silicone tape onto the IPM module.



6. Install a new compressor drive, screw and wire it.