

TCL AHU

Function Setting & Troubleshooting

向过去致敬
为未来向前



1 Function Setting

2 Troubleshooting



Function Setting

DSP1-1 DSP1-2 DSP1-3

LED Display



The main board of condensing unit has LED display. When the unit is in normal operation, it can check the running system parameters. When the unit fails, the LED display shows the corresponding fault code for easier maintenance.

DSP1-1、 DSP1-2: Normally blank, but it displays codes accordingly if there is damaged sensor and command response. See fault code Table 1 for details.

DSP1-3: It displays outdoor unit's operation mode.



DSP1-1 DSP1-2 DSP1-3

LED Display



DSP1-3 code	description
0	Standby
1	Reday
2	Cooling
3	Heating
4	Oil return operation
5	Defrosting operation
6	Forced defrosting
7	Forced cooling operation
8	Forced heating operation
A	Fault
H	Dehumidification mode operation

Set DIP switch of ODU

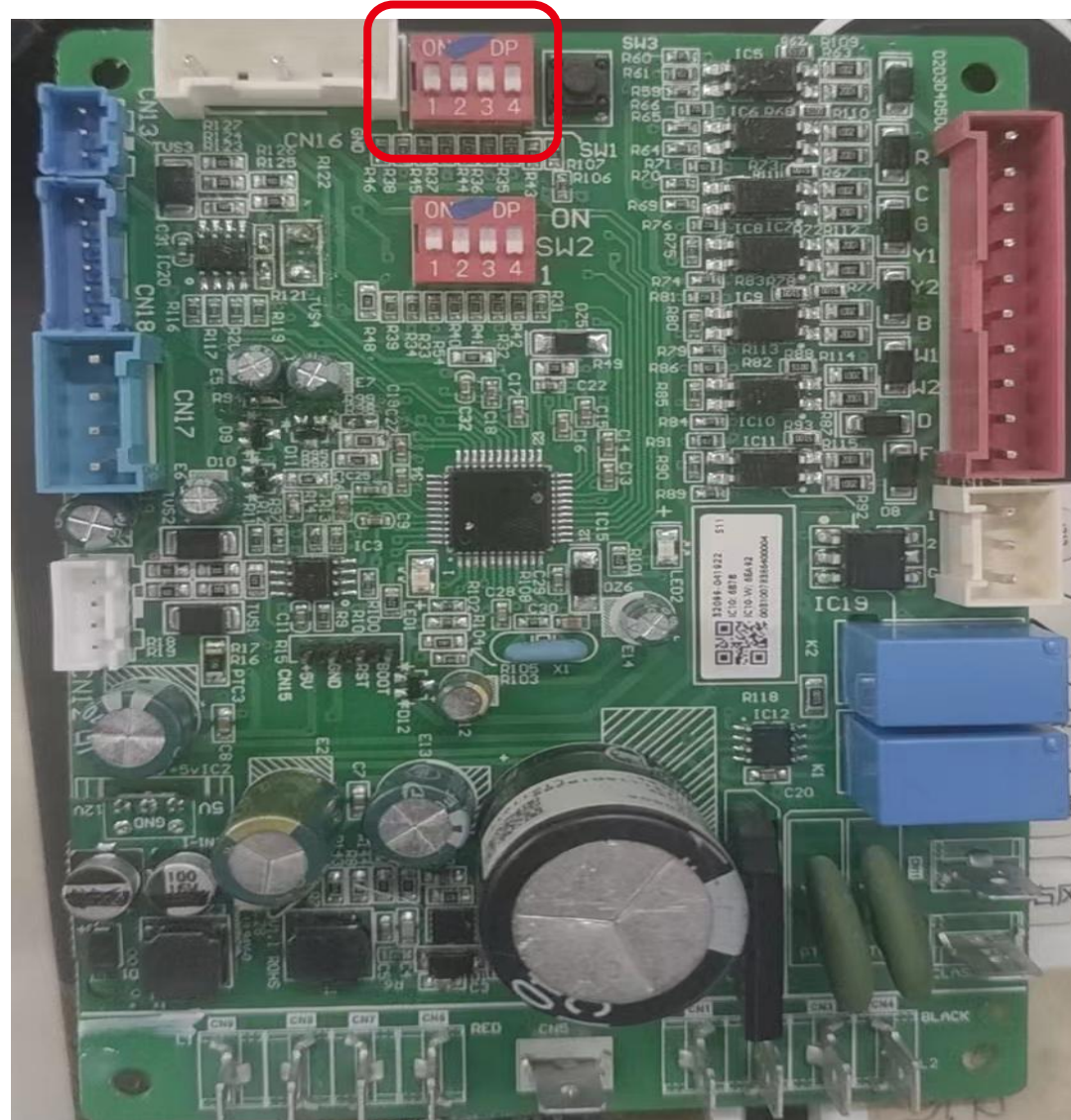
DIP switch

SW1 Dip Switch		Description	
NO.	Setting item	Status	Content
SW1-1	Single cooling/heat pump	ON	AC outdoor unit
		digit	HP outdoor unit
SW1-2	Operating capacity	ON	Lower capacity
		digit	Normal capacity
SW1-3	Control mode	ON	485 communication
		digit	24V ON/OFF control
SW1-4	Keep the factory defaults		

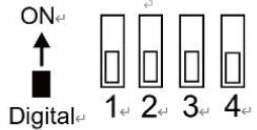
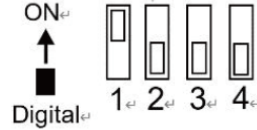
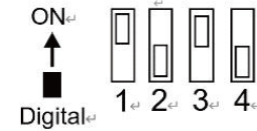
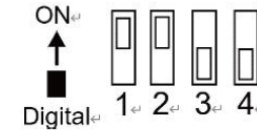
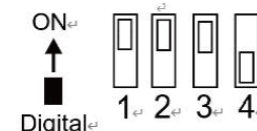


Function Setting

IDU Dip-switch Setting for Fan Speed



IDU Dip-switch Setting for Fan Speed

Combination	SW1 setting	Low speed	High speed
1(Default)		Mid and high grade	Super grade
2		Mid-range	Super grade
3		Mid and low grade	Top grade
4		Low grade	Mid-range
5		Mute tone	Mid-range

Note: The DIP switch of SW1 takes effect only when SW2-1 is on the digital end. When the SW2-1 dip switch is ON, the wind gear is directly controlled and adjusted by the wire controller.

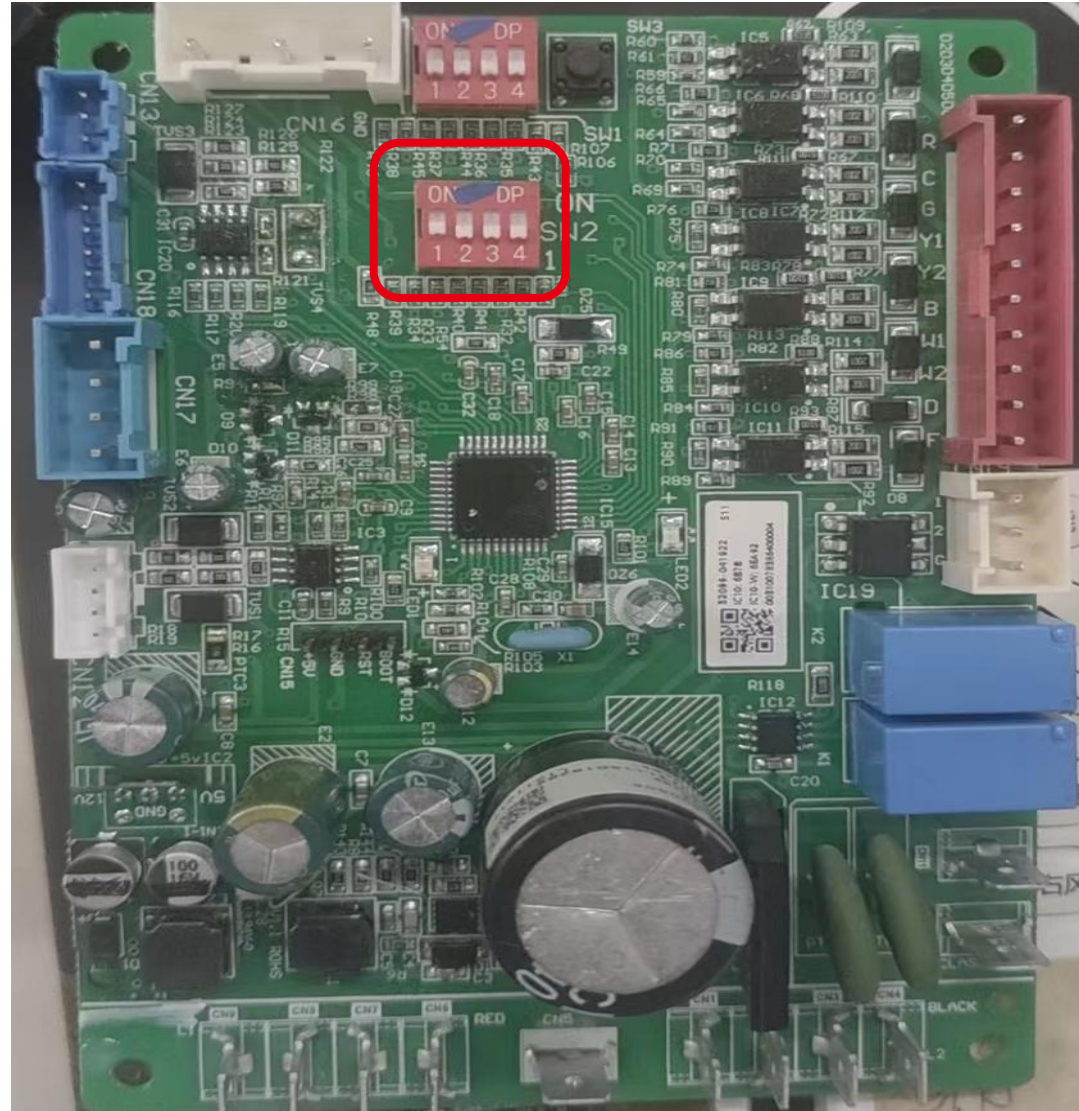
IDU Dip-switch Setting for Anti-cold air

Dip bit	Dip code	Function description
SW1-4	 	The cold air protection function takes effect
	 	The cold air protection function fails

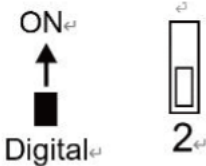
Note: The DIP switch of SW1 takes effect only when SW2-1 is on the digital end. When the SW2-1 dip switch is located at the ON end, the unit is intelligently controlled and the cold air protection function is always effective.

Function Setting

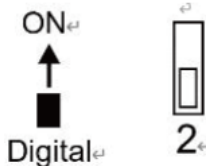
IDU DIP switch setting for other functions



Communication function DIP switch

Dip bit	Dip code	Function description
SW2-1		Factory default, 24V ON/OFF control, using 24V thermostat control unit operation
		RS485 communication control, the need to purchase wire controllers and communication lines from the manufacturer to meet the use of accessories

Dip switch of the lower outlet air gear control function

Dip bit	Dip code	Function description
SW2-2		The installation form of the unit is dialed to this position when the upper air is discharged or the left and right horizontal air is discharged
		The installation form of the unit is dialed to this position when the air is discharged

High outlet air temperature control

Dip bit	Dip code	Function description
SW2-3	ON↕ ↑ ■ Digital↕ 3↕	The exhaust air temperature control function takes effect
	ON↕ ↑ ■ Digital↕ 3↕	The exhaust air temperature control function fails

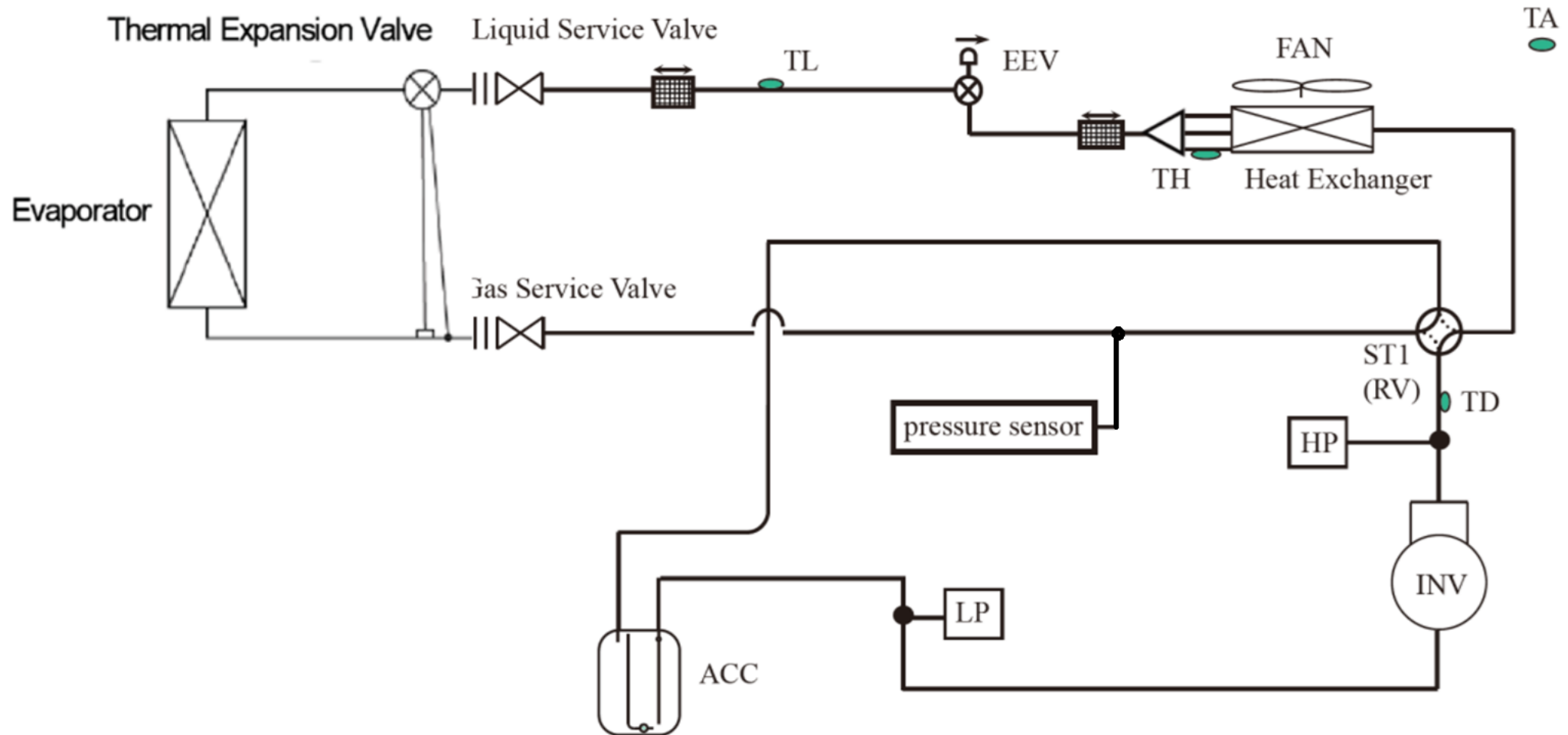
Wired Controller Setting

Device Function Code	Device Function	Device Function Parameter	Remarks
P6	Degree Fahrenheit/ Celsius display	F-C	C: Degree Celsius display F: Degree Fahrenheit display
PA	Ambient/Set temperature display	00-01	00: Set temperature 01: Ambient temperature
PD	Wired controller button Buzzer switch	ON-OFF	ON: Buzzer on OFF: Buzzer off
Pn	Auxiliary heating activation conditions setting	-30~30°C (-22~86°F)	Set the temperature value to enable the auxiliary heating, which value is the outdoor ambient temperature
A8	Maximum backlight luminance	30~100	Percentage of maximum backlight luminance
B3	Dust full reminding	ON-OFF	ON: Dust full reminding function on OFF: Dust full reminding function off
B4	Clock display setting	12-24	12: 12-hour system display 24: 24-hour system display
B6	Set whether the auxiliary heating can be automatically turned on in heating and automatic mode	ON-OFF	ON: Enable by default OFF: Off by default



Troubleshooting

System Diagram (Heat Pump)



Error Code Table

Number	Error Code	Description	Number	Error Code	Description
1	E0	IDU & ODU Communication failure	19	P0	IPM module protection.
2	E1	IDU Room temperature sensor failure. (Wired Controller sensor failure)	20	P1	Over / under voltage protection.
3	E2	IDU Tube temperature sensor failure. (IDU IPT failure)	21	P2	Over current protection.
4	E3	ODU Pipe temperature sensor failure. (OPT)	22	P4	ODU Discharge pipe over temperature protection.
5	E6	IDU PG Fan motor / DC fan motor works abnormal (IDU failure)	23	P5	Sub-cooling protection on cooling mode.
6	E7	ODU Environment temperature sensor failure	24	P6	Overheating protection on cooling mode.
7	E8	ODU Exhaust temperature sensor failure.	25	P7	Overheating protection on heating mode.
8	E9	IPM / Compressor driving control abnormal.	26	P8	Outdoor Over temperature/Under temperature protection.
9	EA	ODU Current test circuit failure	27	P9	Compressor driving protection (Load abnormal).
10	Eb	The main PCB and display board communication abnormal	28	F4	Cooling system gas flow abnormal PROTECTION.
11	EC	The ODU PCB MCU and Fan motor / Compressor driving IC communication abnormal	29	F5	PFC PROTECTION
12	EE	ODU EEPROM failure.	30	F6	The Compressor lack of phase / Anti-phase PROTECTION.
13	EF	ODU DC fan motor failure.	31	F7	IPM Module temperature PROTECTION
14	EU	ODU Voltage test circuit abnormal.	32	F8	4-Way Valve reversing abnormal.
15	H1	High pressure switch failure (HP)	33	F9	The module temperature test circuit failure.
16	H2	Low pressure switch failure (LP)	34	FA	The compressor phase-current test circuit failure.
17	H3	Pressure sensor failure (SHP)	35	Fd	Abnormal communication of refrigerant detection sensor
18	Hd	Excessive refrigerant concentration / refrigerant leakage	36	Fy	Gas leakage protection

DSP1-1 DSP1-2 DSP1-3

Error code display

If malfunction occurs during operation, LED will show the failure information. If several malfunctions occur at the same time, their corresponding error codes will be shown in turn. When malfunction occurs, please shut down the unit and send for professional personnel to repair.



Troubleshooting



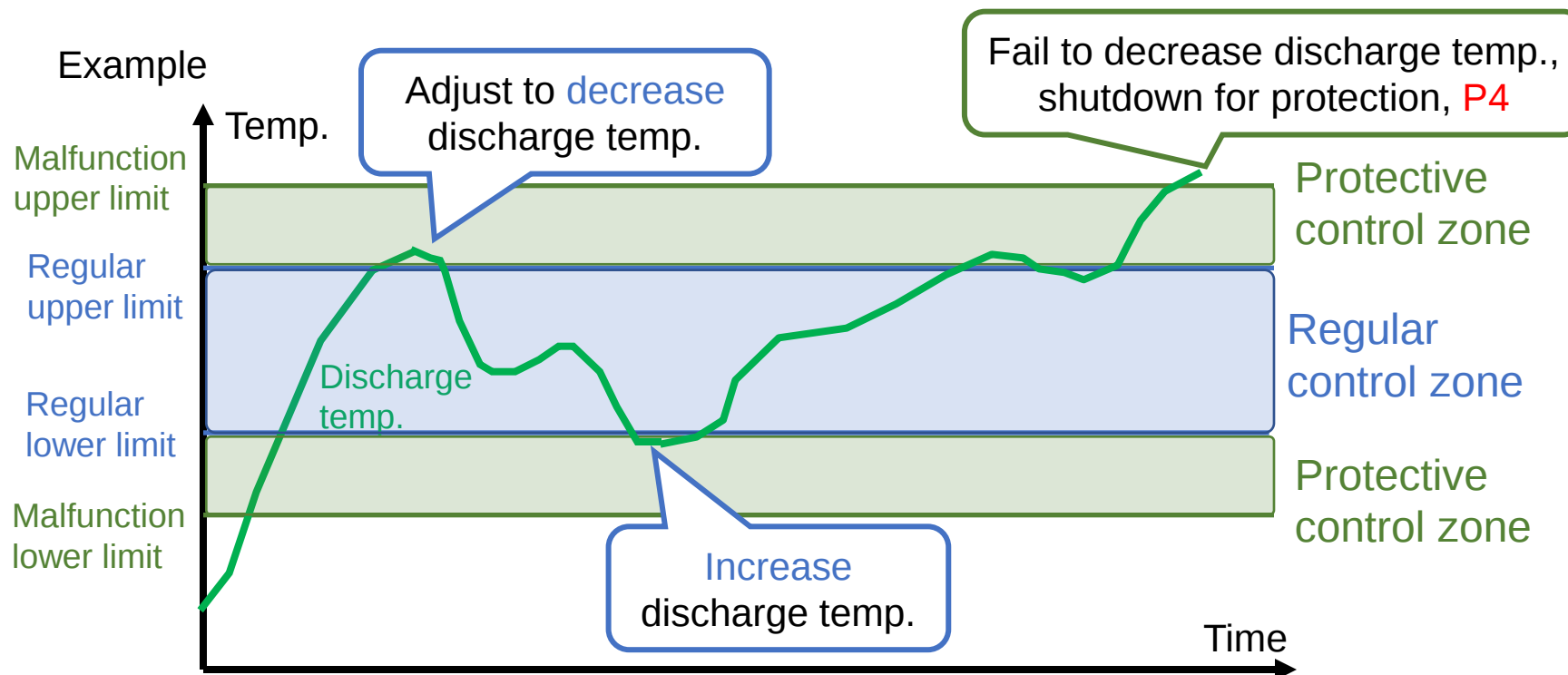
IDU

LED light color	LED light status	Failure
Green light	Turn off	Standby mode
Green light	stay lit	In operation
Green light	beat 1	Anti-cold air running (blink once, off for 1s)
Green light	beat 2	Electric auxiliary hot running (blink twice, off for 1s)
Green light	beat 3	Commodity inspection status (blink 3 times, off for 1s)
Green light	beat 4	Self-check status (blink 4 times, off for 1s)

This only works with 24V communication; 485 Communication is not displayed, the online controller displays the fault code.

LED light color	LED light status	Failure
Red light	Turn off	trouble-free
Red light	stay lit	Refrigerant leak protection
Red light	beat 1	The communication of the refrigerant sensor is abnormal (blink once, and then off for 1s).
Red light	beat 2	Internal fan fault (Blinking twice, off for 1s)
Red light	beat 3	Internal coil temperature sensing packet fault (blink 3 times, off for 1s)
Red light	beat 4	The supply air temperature sensing packet is faulty (blinks four times, and then disappears for 1s).
Red light	beat 5	EEPROM fault (blink 5 times, off for 1s)
Red light	beat 6	Indoor/Outdoor 485 Communication failure (blinking six times, off for 1s)
Red light	beat 7	Controller 485 Communication failure (blinking 7 times, off for 1s)

- The system keep monitor every important parameter(e.g. discharge temp. OD temp.) during operation
- Adjust components setting(e.g. compressor & fan rpm, EXV opening) to keep above parameter within design range
- Malfunction: Something wrong with the system or parameter exceeds design range , e.g. system shutdown, parts damage, abnormal vibration or noise



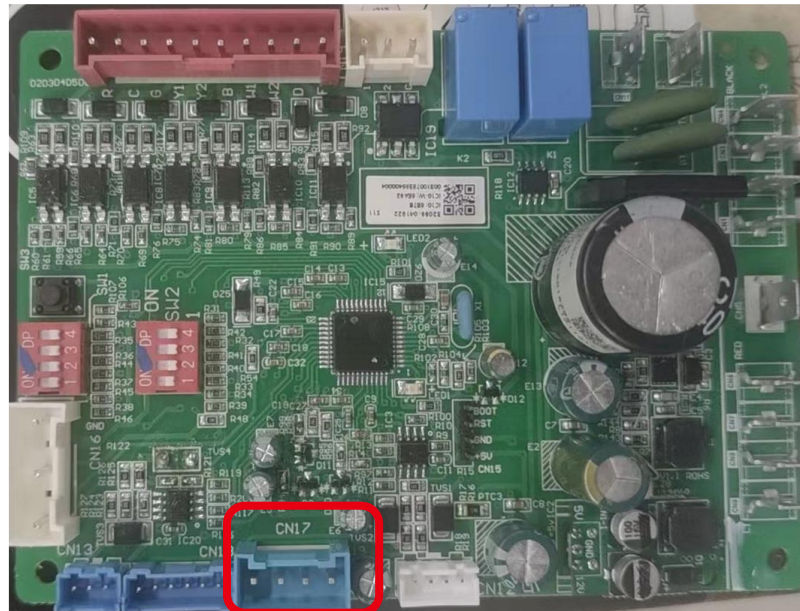
Temperature Sensor(Thermistor)

1- Display E1 or E2

Reason: Room temp sensor(RT) , Indoor coil temp sensor(IPT) fault.

Analysis:

- Connection of sensor?
- Sensor resistance OPEN? SHORT? Of DRIFT (changed)?
- PCB broken?



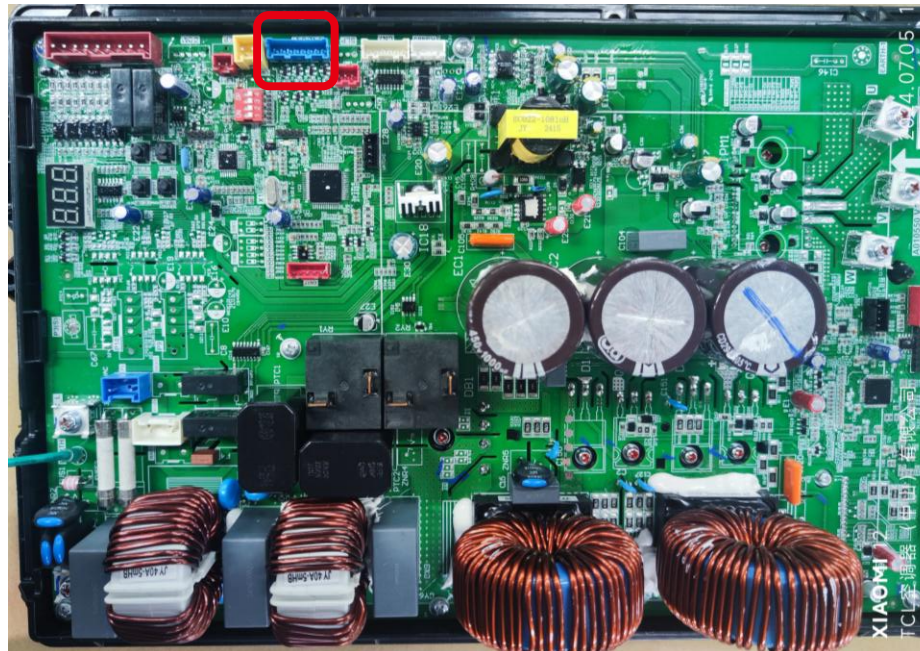
The Pictures for reference.

2- Display E3 E7 E8 or Ey

Reason: Outdoor pipe temp sensor, outdoor temp sensor , exhaust temp sensor or ODU Condenser outlet temperature sensor failure .

Analysis:

- a. Connection of CN1, CN2.
- b. Sensor resistance OPEN? SHORT? or DRIFT?
- c. PCB itself?



Troubleshooting

Reconnect the sensor
with the main board



Test the resistance of
the sensor



Recommend to compare the
value with a good one

Replace the
main board



The Pictures for reference.

4 Display EF

Reason: ODU DC fan motor or it concerned circuit.

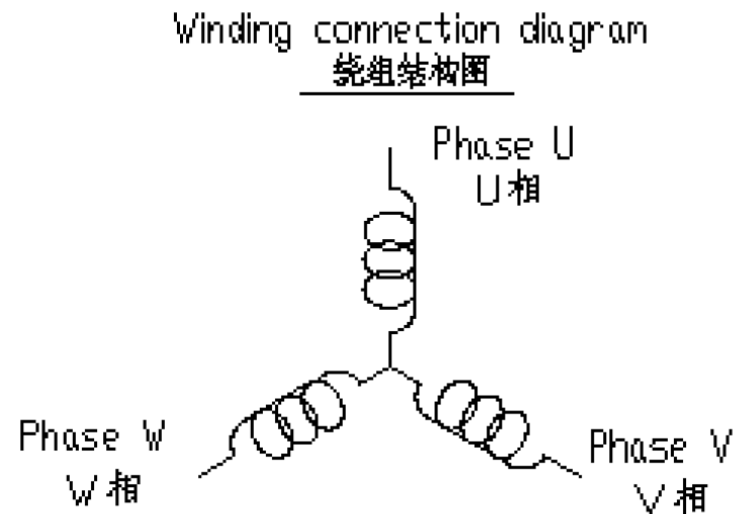
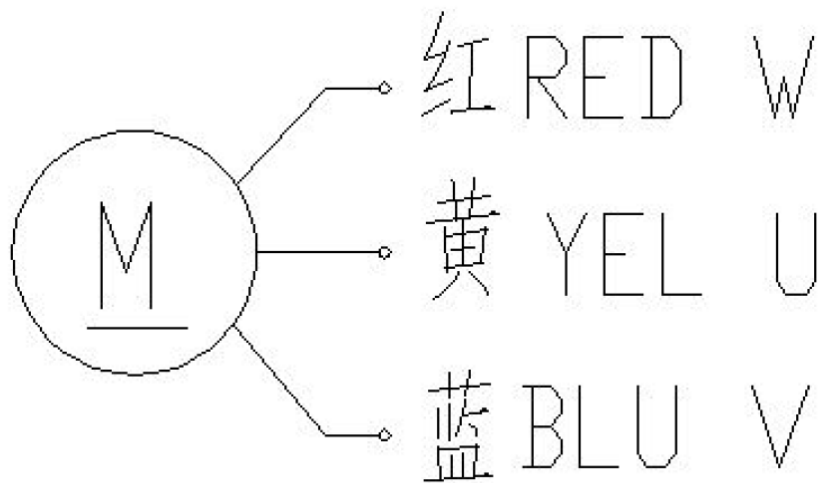
---If The ODU fan motor protection stops working for six consecutive times, it will show EF.

Analysis:

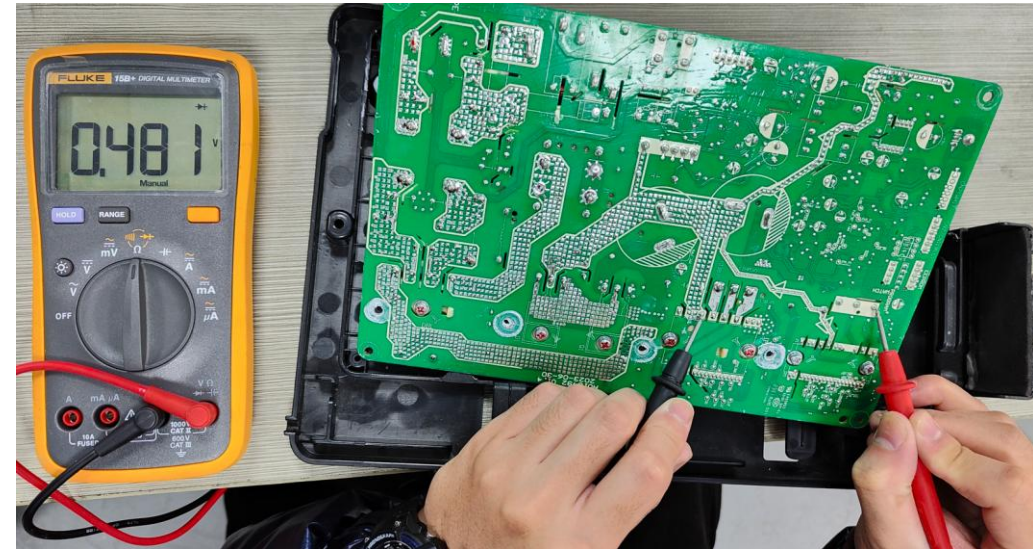
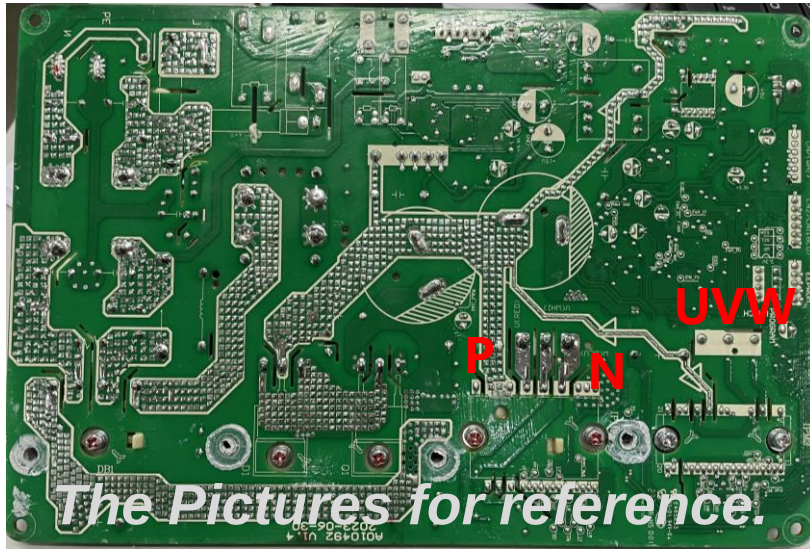
- a. Fan motor coil broken or short circuit?
- b. ODU PCB motor driving module IPM defective? (over heating? Over current? Phase protection? etc.)
- c. The connector of fan motor to PCB abnormal?
- d. Fan motor blocked to running?

□ 3-wiring DC motor

Wiring diagram



❑ 3-wiring DC motor---IPM



Step	DC fan motor IPM
1	Power off the system for 5 minutes, remove the wires of DC fan motor
2	Switch the multimeter to diode mode
3	Put the black probe to P, the red probe to U, V, W
4	Put the red probe to N, the black probe to U, V, W
5	Above value should be 0.3~0.7 V and equal. "0" or infinitely great indicates IPM module is malfunction

Code	Reason	Remark
EA	ODU Current Test circuit failure	1. Try to re-power the AC unit. 2. ODU PCB broken?
EE	ODU EEPROM failure.	
EU	ODU Voltage test circuit abnormal.	
F9	The module temperature test circuit failure.	
FA	The compressor Phase-current test circuit failure.	

1- Display E0

Reason : Indoor/outdoor communication fault.

---If the IDU PCB detects that there is abnormal communication between IDU and ODU exceeds 120s, or ODU PCB detects abnormal communication btw IDU and ODU exceeds 120s.

Analysis:

1. Poor or wrong wiring connection of indoor and/or outdoor unit.
2. Indoor PCB or outdoor PCB malfunction.
3. Communication wiring between IDU and ODU broken or defective.

2- Display E9 or P0

When overheat or overcurrent for IPM, AC unit will display P0 protection. If unit have 6 times stopping works for IPM protection (P0) continuously, it will display E9 error, and unit can't be recovered to operation, except press ON/OFF button.

Judgement

1. Overcurrent;
2. Low voltage;
3. IPM overheat

POSSIBLE REASON

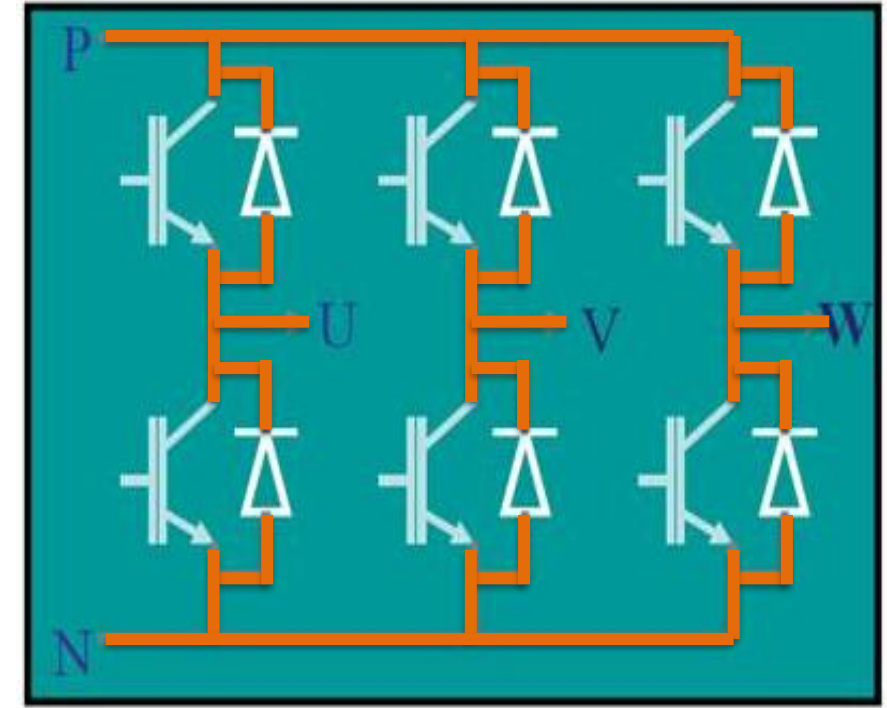
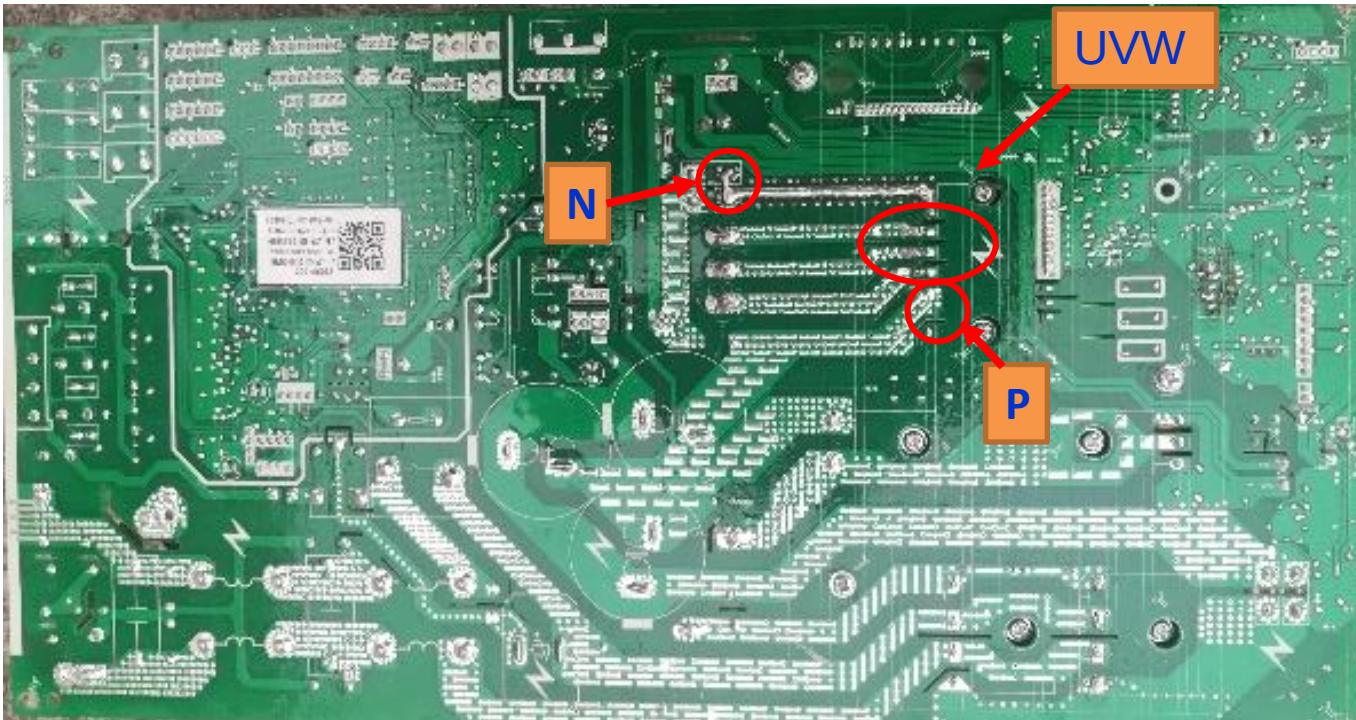
- For a **new** system

- ☐ Power supply is too high or too low
- ☐ Poor ventilation
- ☐ Ambient temp. out of operating range
- ☐ System is abnormal, e.g. blockage



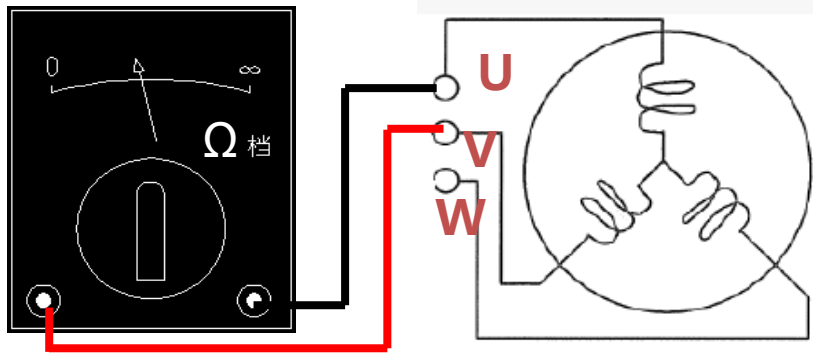
- For an **repaired** system

- ☐ Poor contact of compressor UVW wire
→ Higher current → Higher heat release
- ☐ Connection sequence of compressor UVW wire is incorrect
- ☐ IPM poor contact with heat sink
- ☐ Compressor malfunction
- ☐ Compressor drive board IPM malfunction

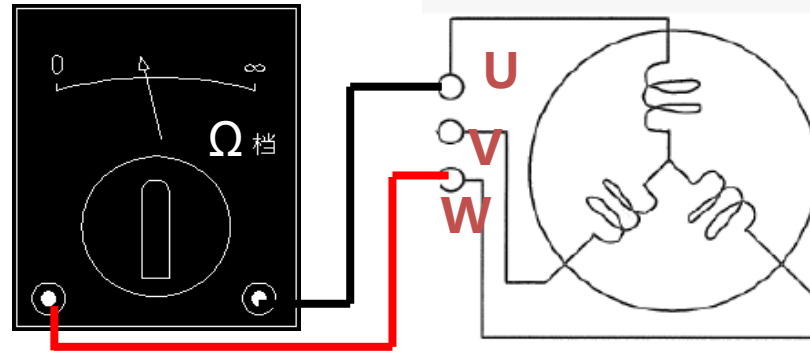


- Disconnect the power supply **5 minutes later**, remove the wires of the compressor
- Switch the multimeter to **diode mode**
 - ❑ Put the **black test probe** to pad **P** (on the left of U) and the **red test probe** to pad **U, V, W**
 - ❑ Put the **red test probe** to pad **N** (on the left of U) and the **black test probe** to pad **U, V, W**
 - ❑ Above 6 value should be **0.3~0.7 V**. If the value is "0" or infinitely great, indicates the IPM module is malfunction

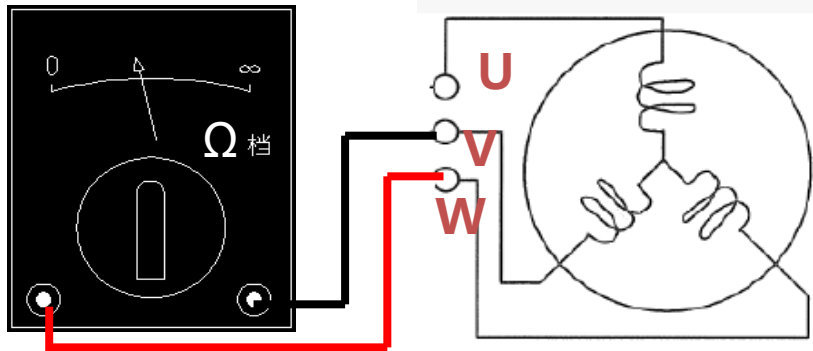
Inverter Compressor inspection



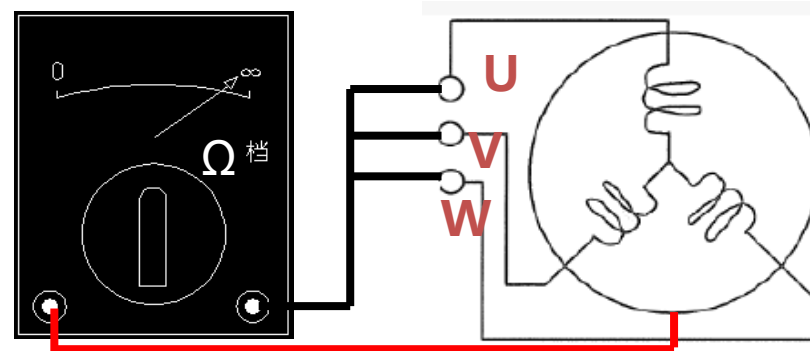
Resistance of U-V



Resistance of U-W



Resistance of V-W



Insulation to cover

- ❑ Measure the **resistance between two terminals** (U, V, W). The resistance value $\leq 2.0 \Omega$ and equal
- ❑ Measure the **insulation resistance of each terminal**. The value $\geq 10 \text{ M}\Omega$ or more
- ❑ Abnormal noise during operating
- ❑ Abnormal temperature rise (120°C)

Audio 1



Audio 2



3- Display P1

Troubleshooting:

- (1). It is normal protection if voltage fluctuation too much.
- (2). Check whether the voltage: **$145V \leq V \leq 260V$** .
 - if **$V < 145V$** , or **$V > 260V$** , P1 is the normal protection.
- (3). Test the ODU PCB DC bus voltage (*it can be tested between the large electrolytic capacitor*), normally it should be: **$150V \leq V \leq 420V$** , otherwise unit will be protected and show P1 code.
- (4). If both the power supply and DC bus voltage normal, please check the voltage sampling circuit. or replace the ODU PCB.

Display P4

Error judgment condition and method:

Test the compressor discharge temperature through compressor discharge pipe or shell top temperature sensor. If the tested temperature value is higher than **120°C**, the unit will stop for protection.

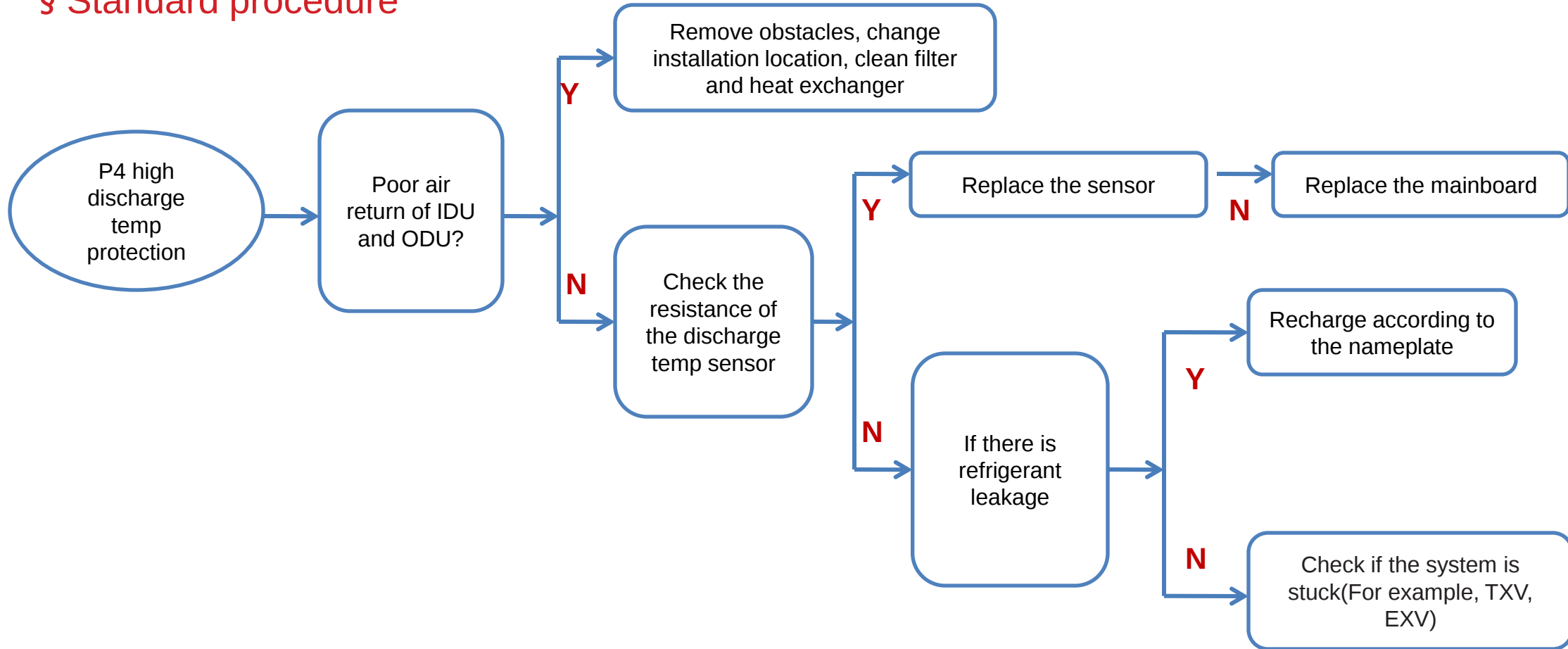
Possible cause:

- Cut-off valve of ODU or IDU is not fully opened;
- Electronic expansion valve is abnormal;
- Outdoor or indoor fan is not working properly;
- IDU filter or air duct is blocked (cooling mode);
- Ambient temperature exceeds allowable operation range;
- Refrigerant charging amount is insufficient;
- System pipeline is blocked;

Tips:

- ① If the cooling performance is not good after energize the unit, it means the refrigerant is not enough.
- ② If the supply air temperature is normal, then check the air return of IDU and ODU, and also the fan motor rpm.
- ③ Check the discharge temperature sensor resistance.
- ④ Check if the system is stuck (For example, TXV, EXV).

§ Standard procedure



High Discharge Temp. Protection

HOW TO CHECK ?

P4

Discharge Temperature Protection

➤ Checking the status of the discharge temperature sensor. And test the low pressure to see the data.

➤ Measure if compressor's discharge temperature has reached 120°C



Leakage, add refrigerant



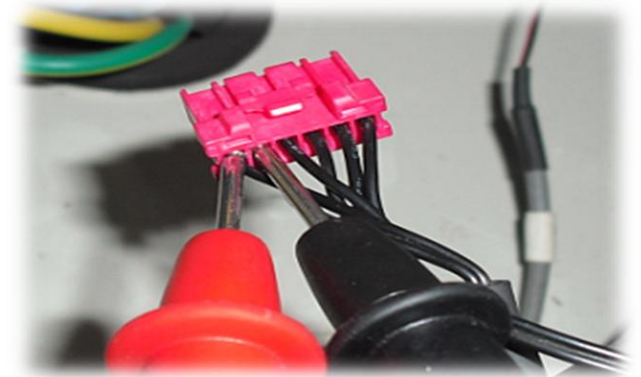
➤ Measure if temperature sensor's resistance value is correct



Replace relevant sensor



➤ Replace the outdoor unit mainboard



5- Display P5

Error judgment condition and method:

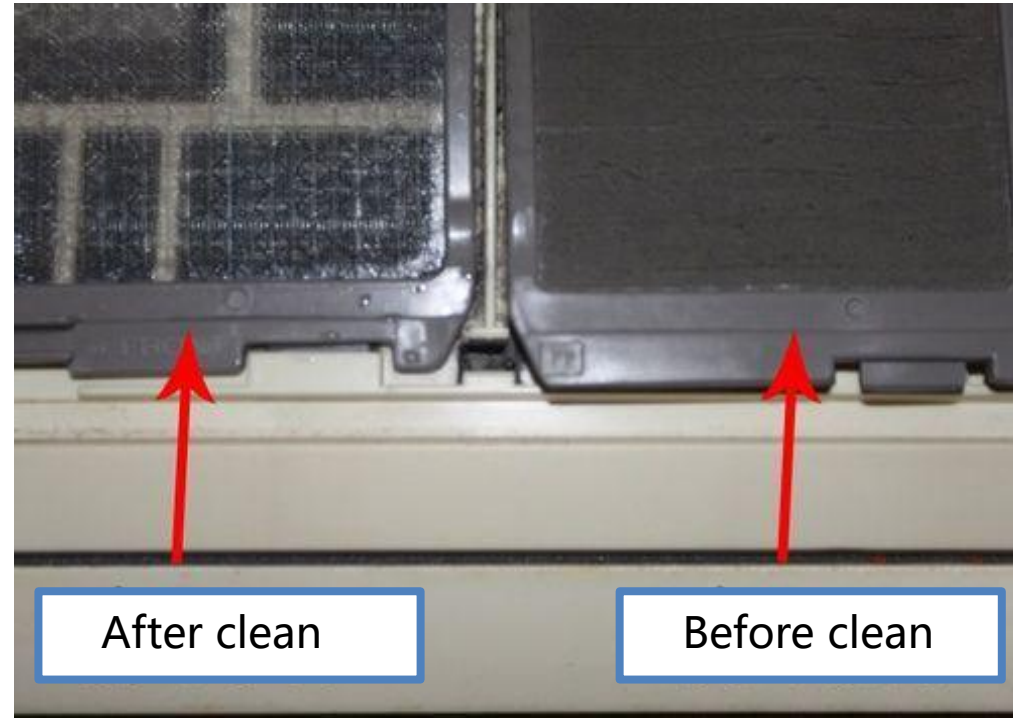
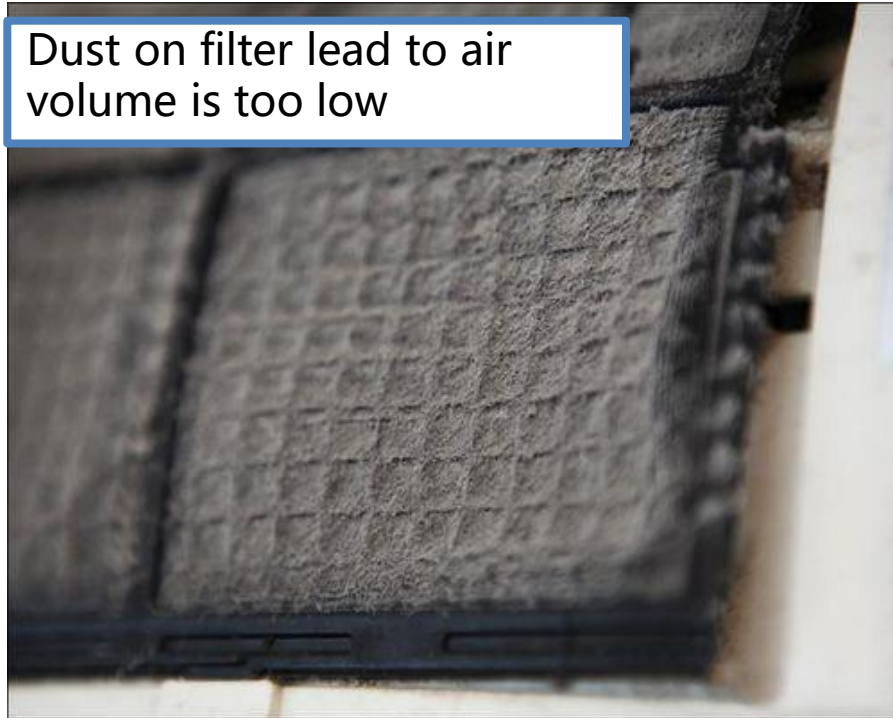
When **IDU pipe temperature** is too low, freeze protection is activated to prevent freezing damage of evaporator.

Possible reason:

- IDU filter and evaporator are dirty
- IDU motor is blocked
- Refrigerant amount is insufficient
- Ambient temperature of IDU and ODU is too low

5- Display P5

1. Too much dust on the filter and evaporator?



2. Check IDU fan & fan motor is normal
3. Check indoor and outdoor ambient temperature

6- Display P6/P7

Error judgment condition and method:

On Cooling and Dry mode, when ODU condenser coil temperature $OPT \geq 62^{\circ}\text{C}$, MCU will switch off outdoor unit and show P6 failure code.

On heating mode, when IDU evaporator coil temperature $IPT \geq 62^{\circ}\text{C}$, ODU PCB will switch off outdoor unit and show P7 failure code.

Possible reason:

- ODU condenser is dirty; IDU filter and evaporator are dirty
- ODU or IDU motor is blocked or low speed
- OPT or IPT sensor is malfunction or poor connection

7- Display P8

Error judgment condition and method:

When environment temperature as below condition, the compressor will stop working, after 200s delay, the IDU will show P8 failure code.

- (1). On Cooling or Dry mode: ODU ambient temperature: $OAT < -20^{\circ}\text{C}$ or $OAT > 63^{\circ}\text{C}$;
- (2). On Heating mode:
 - a. $OAT \geq 40^{\circ}\text{C}$
 - b. $30^{\circ}\text{C} < OAT \leq 40^{\circ}\text{C}$ and $RT > 35^{\circ}\text{C}$

Possible reason:

- Ambient temperature exceeds operating range
- ODU ventilation is not good
- OAT sensor is malfunction or poor connection

Display P9

Error judgment condition and method:

- 1、compressor runs out of step
- 2、The compressor startup abnormal

Possible reason:

- Compressor 3-phase wire connection is lack of phase or phased-reversed.
- Compressor phase wire connection is bad.
- System is blocked, too much refrigerant or short of compressor oil.
- Drive board IPM module is damaged.
- Drive board compressor current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.
- Compressor is damaged. (Coil is short circuit or open circuit, cylinder stuck, etc.)

Display F5

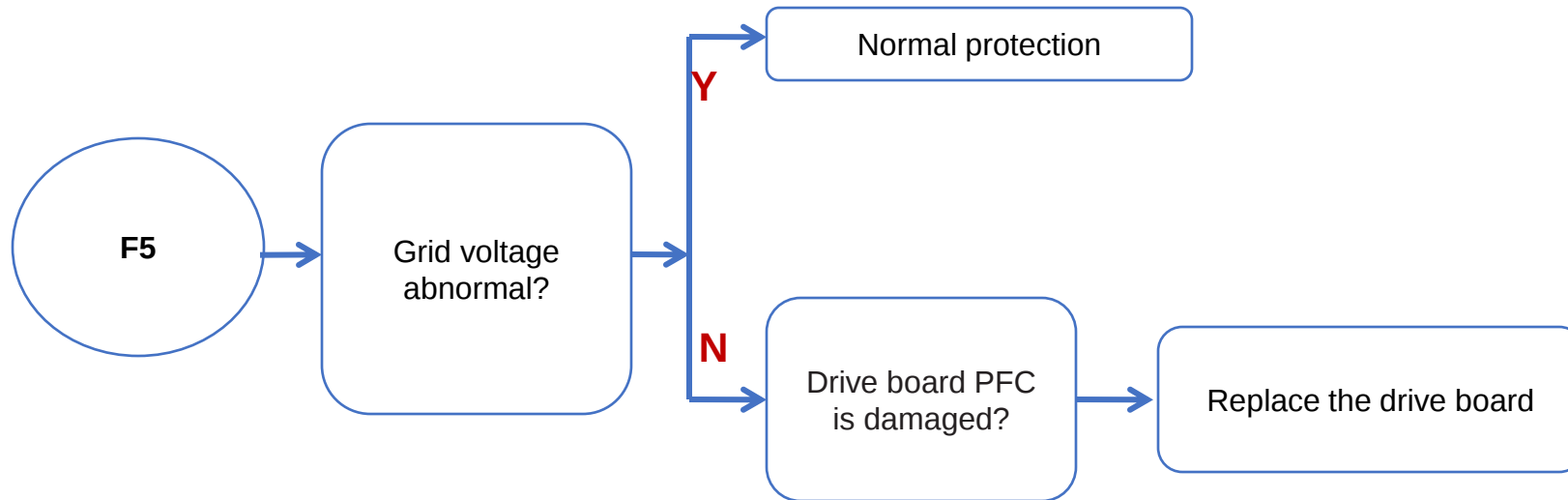
1. Malfunction description

If the current of PFC circuit is larger than the protection value when the compressor is starting up. System will shut down for protection.

2. Possible cause

- Power grid voltage is abnormal.
- Drive board PFC module is damaged.
- Drive board PFC module's 15V power supply is lower than 13.5V.
- Drive board PWM signal for PFC and the corresponding element are abnormal.
- Drive board PFC current sampling circuit element is damaged or drive chip current sampling AD terminal is abnormal.

§ Standard procedure



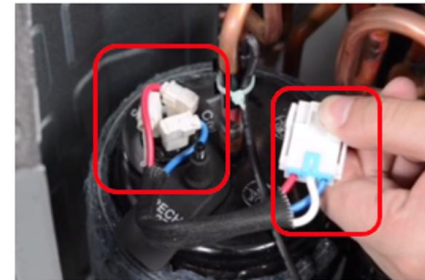
9- Display F6

Error judgment condition and method:

If ODU PCB can't test one, or even three phase of compressor current, it will show F6 protection.

Possible reason:

- Poor contact or incorrect sequence of compressor UVW wire
(Drive board and compressor wirings)
- Compressor abnormal
- Compressor drive abnormal



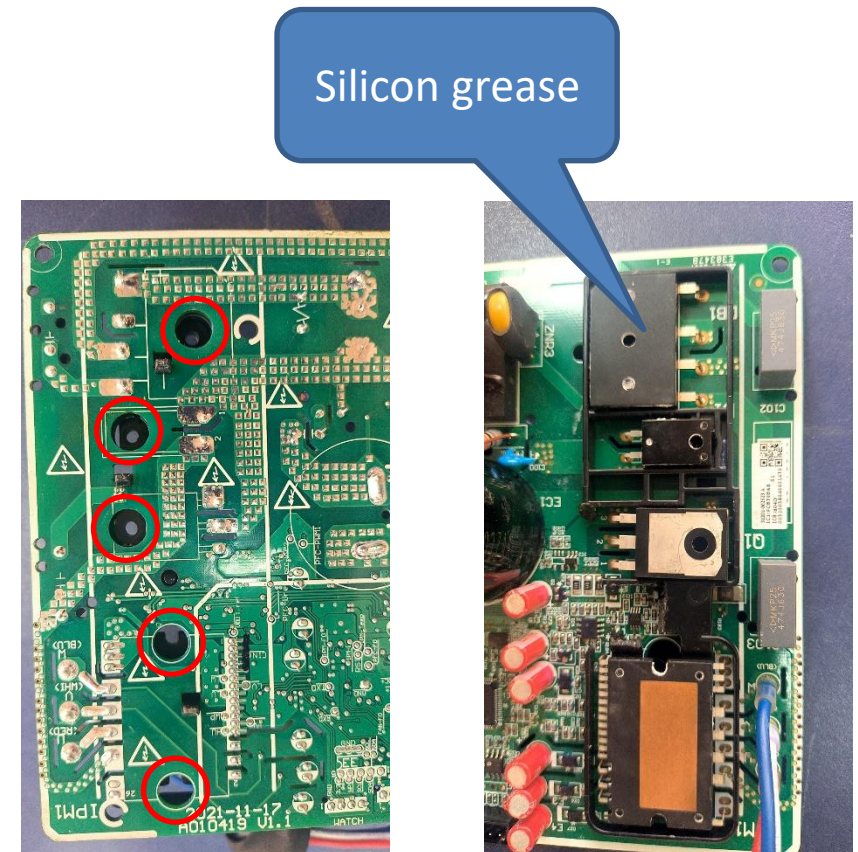
9- Display F7

Error judgment condition and method:

IPM over-temperature protection, when IPM temperature more than 95°C, it will show F7.

Possible reason:

- Ambient temp. out of operating range
- Lower voltage
 - Higher current
 - Higher heat release
- Poor or mismatching of compressor wiring
 - Higher current
 - Higher heat release
- IPM NOT good contact with heat sink
- System abnormal, e.g. blockage
- Compressor abnormal
- Compressor drive abnormal

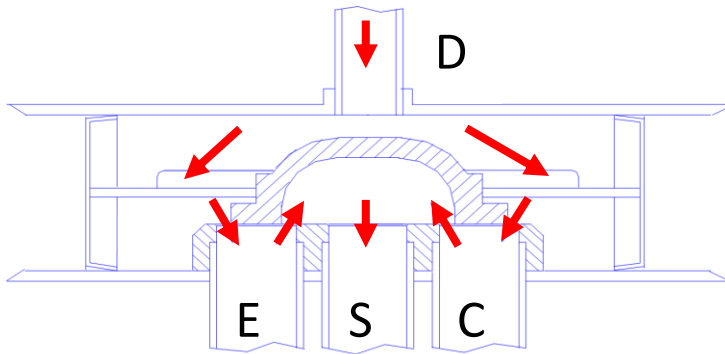


4-Way Value reversing abnormal

10- Display F8 (Heat pump only)

On heating mode, if IDU Coil temperature tested lower than Room temperature 5°C or even more after compressor works for 8min, unit will show F8.

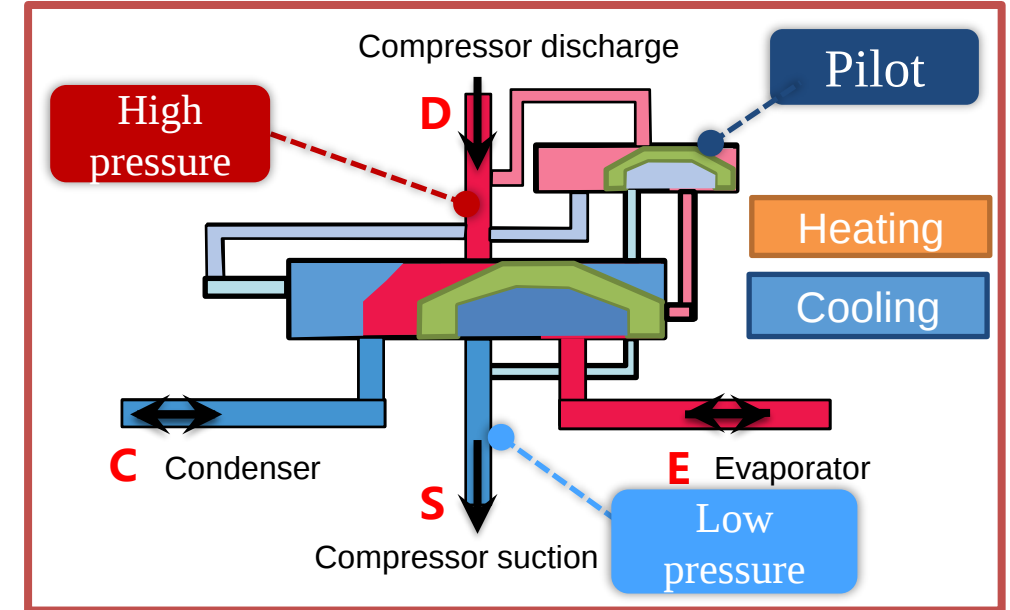
- Gas-missing for a repaired unit: The slider is in the middle position, E/S/C port is connected with each other. Gas from D port can flow to E/S/C port



● Checking method

1. Touch the pipe
2. The compressor suction temp. $\geq$ environment temp. Judgement?

Confirm gas-missing



- Change direction requirement:
 1. Power supply of solenoid valve
 2. Smooth movement of slider
 3. Cleanness of 4 way valve

11- Display E4/Fy/Hd

Description

- After compressor works in high frequency for 9 min, if the temperature on IDU evaporator & ODU condenser has only a little variation comparing previous, but, the compressor discharge temperature on high level, then the unit will show E4 failure code.

Inspection

- (1). Check the pipes connector, any place gas leakage? If yes, fix it.
- (2). Any other place gas leakage? Check and fix it.
- (3). Check refrigerant detection sensor.

Display H1 or H3

1. Malfunction description

ODU displays “H1”. Unit off.

Through high pressure switch to detect system's operation pressure.

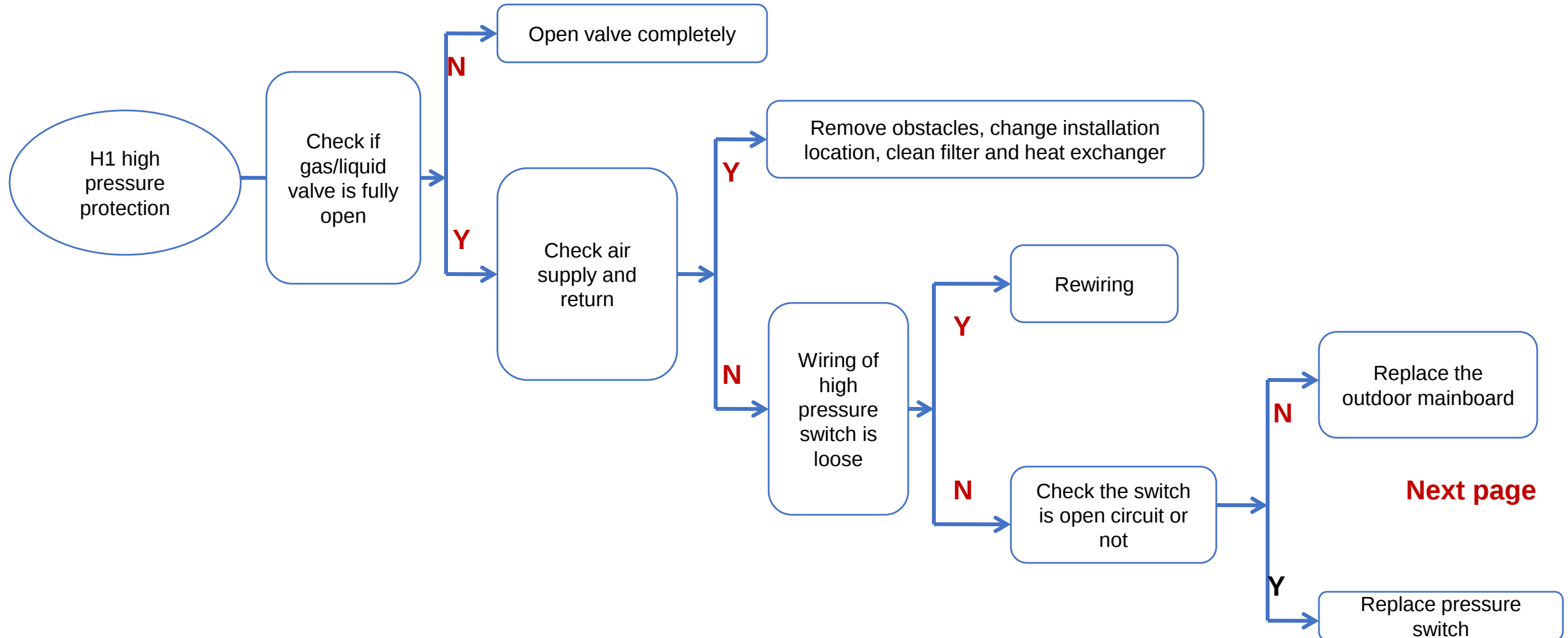
2. Possible cause

- Cut-off valve of ODU or IDU is not fully opened;
- High-pressure switch is abnormal;
- Outdoor or indoor fan is not working properly;
- IDU filter or air duct is blocked (heating mode);
- Ambient temperature is too high;
- Refrigerant charging amount is too much;
- System pipeline is blocked

Note: **H3** only for **HEATING** mode **HIGH** pressure protection.

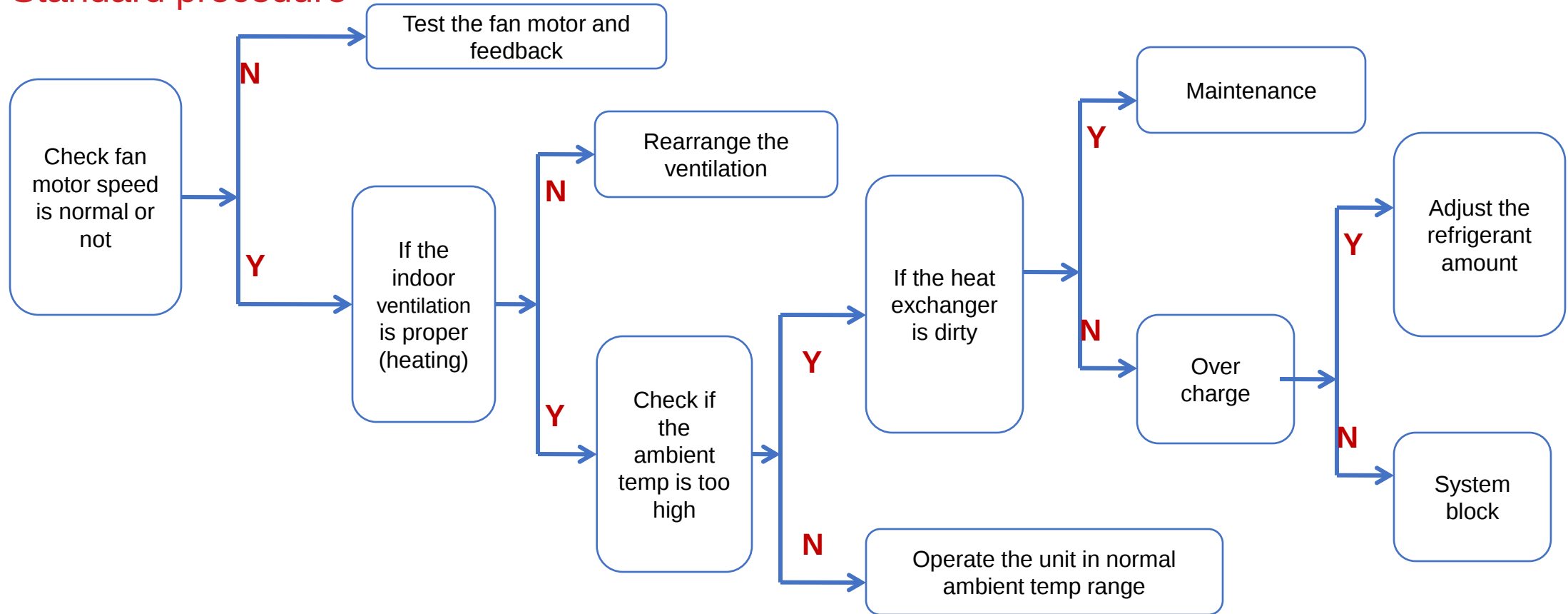


§ Standard procedure



Next page

§ Standard procedure



Tips: ① If H1 protection appears in 5 seconds just after compressor startup, check the high pressure switch and its wiring and the control part. ② If the system operates for a while and then H1 appears, check the system.

High Pressure Protection

TCL

•POINT TO CHECK –

•BASIC FOR SYSTEM

H1

H3



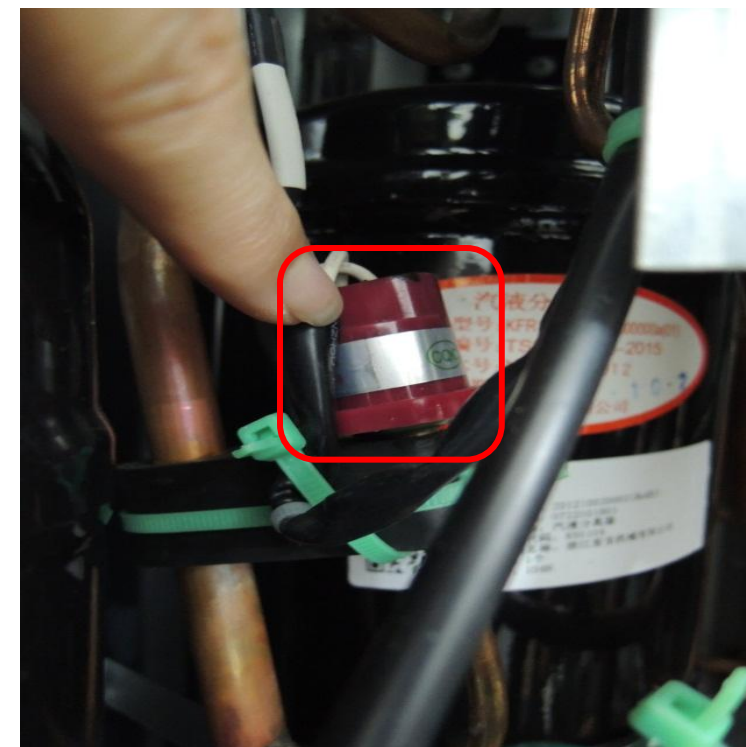
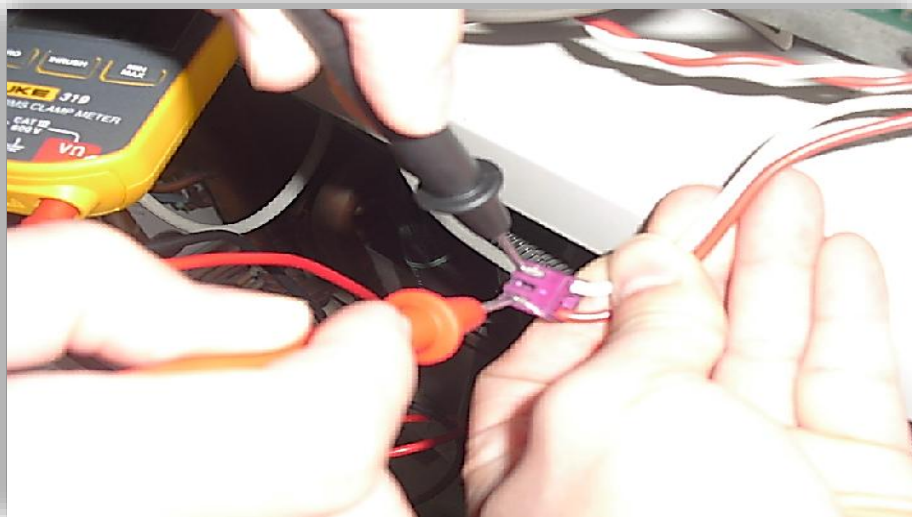
•1. ALL VALVES SHOULD BE OPENED

Note: H3 is LOW pressure protection when COOLING, HIGH pressure protection when HEATING.

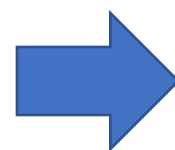
•HOW TO CHECK –

•PRESSURE SWITCH

H1 H3



•No Beep!

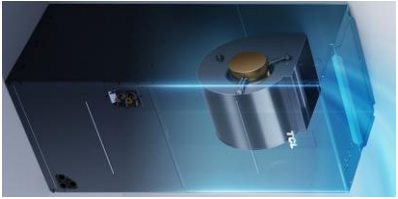


•pressure switch failed

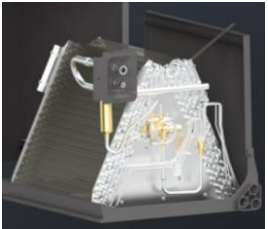
•POINT TO CHECK –

•BASIC FOR SYSTEM

Heat exchange



1. Air inlet and outlet (IDU & ODU) should be good. IDU louver is open.



2. Heat exchanger (IDU & ODU) should be clean. Filter for IDU is clean.



3. Fan (IDU & ODU) should run normally

•POINT TO CHECK –

•BASIC FOR SYSTEM

H1 H3



•4. No block in piping system

•5. Check High pressure from the service valve while cooling



Low Pressure Protection

TCL

Display H2 or H3

H2 H3 stands for three statuses:

- (1) Low pressure protection
- (2) Refrigerant shortage protection
- (3) Refrigerant recovery mode

Check the refrigerant in the system is really less or not.

1. Use the pressure gauge to test the pressure of the system when the system is on operation.
2. If the pressure is lower than 0.2Mpa(29Psi) , you have to add additional refrigerant into the system.

Note: the other checking procedure is as the same as you did with H1

H2

H3

Low pressure Protection



Note: **H3** is **LOW** pressure protection when **COOLING**, **HIGH** pressure protection when **HEATING**.



THANK YOU