# MIDEA R290 M THERMAL ARCTIC HT SERIES SERVICE MANUAL


## Quick Links

## Table of Contents

Midea Building Technologies Division

# Service Manual

## R290 M thermal Arctic HT Series

# CONTENTS

# Part 1

# General Information

## 1 Product Lineup

| Power Supply | 220-240V/1N/50Hz | | | | | | | 380-415V/3N/50Hz | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model | MHC-V4WD2N7 | MHC-V6WD2N7 | MHC-V8WD2N7 | MHC-V10WD2N7 | MHC-V12WD2N7 | MHC-V14WD2N7 | MHC-V16WD2N7 | MHC-V12WD2RN7 | MHC-V14WD2RN7 | MHC-V16WD2RN7 |
| Appearance |  | | | |  | | | | | |

Note:

Please note that these photos are for reference only, actual products may vary.

## 2 Nomenclature

| M | H | C | - | V | 16 | W | D2 | R | N7 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | | 4 | 5 | 6 | 7 | 8 | 9 |

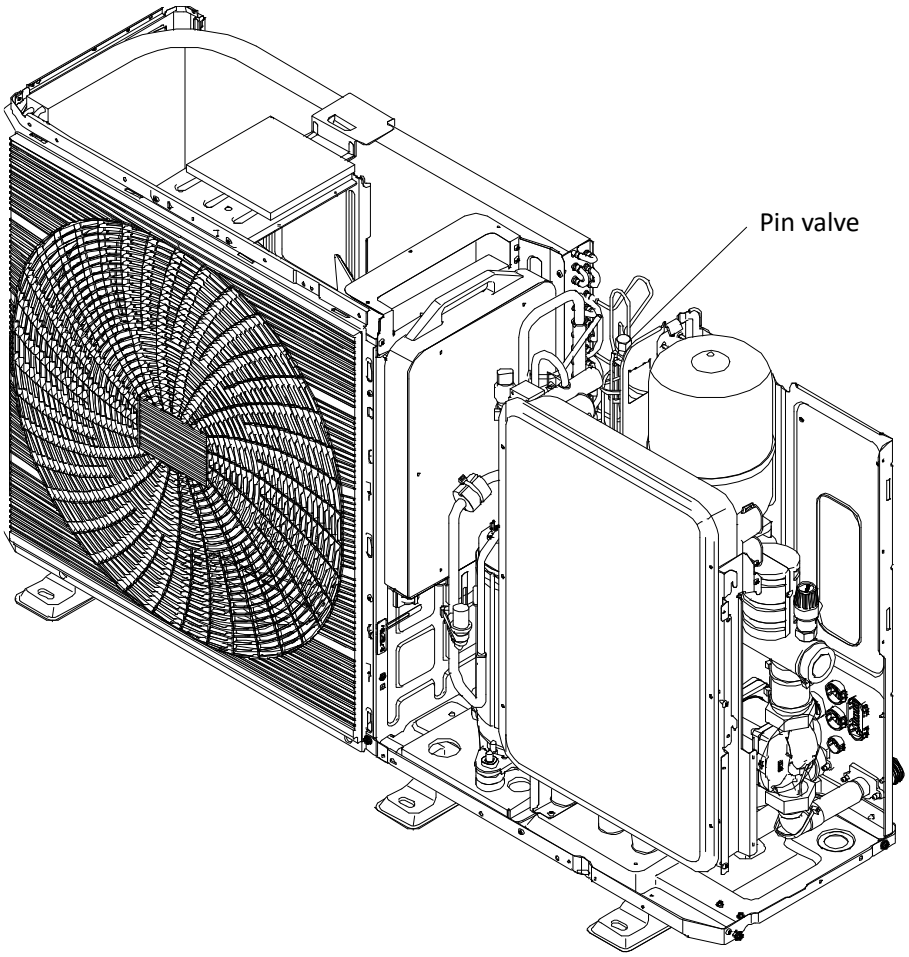
| Legend | | |
|---|---|---|
| **No.** | **Code** | **Remarks** |
| 1 | M | Brand: Midea brand |
| 2 | H | Unit type: heat pump |
| 3 | C | Structure: Mono |
| 4 | V | System type: Inverter |
| 5 | 16 | Capacity code:<br>4: 4kW; 6: 6kW; 8: 8 kW; 10: 10 kW; 12: 12 kW; 14: 14 kW; 16: 16 kW; |
| 6 | W | Cooling type: Air cooling |
| 7 | D2 | Compressor and fan motor types: All DC |
| 8 | R | Power Supply of heat pump<br>R: 3-phase, 380-415V, 50Hz； Omitted: 1-phase, 220-240V, 50Hz |
| 9 | N7 | Refrigerant: R290 |

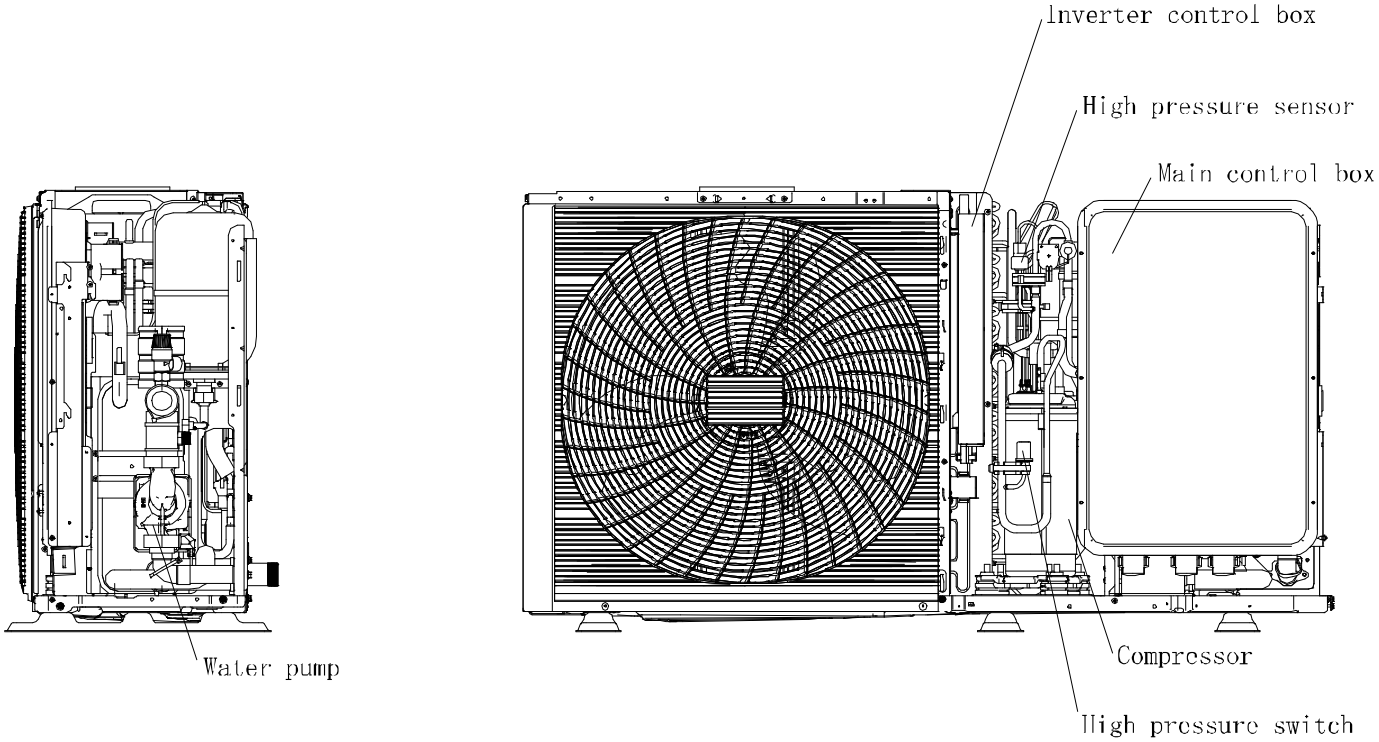
# Part 2

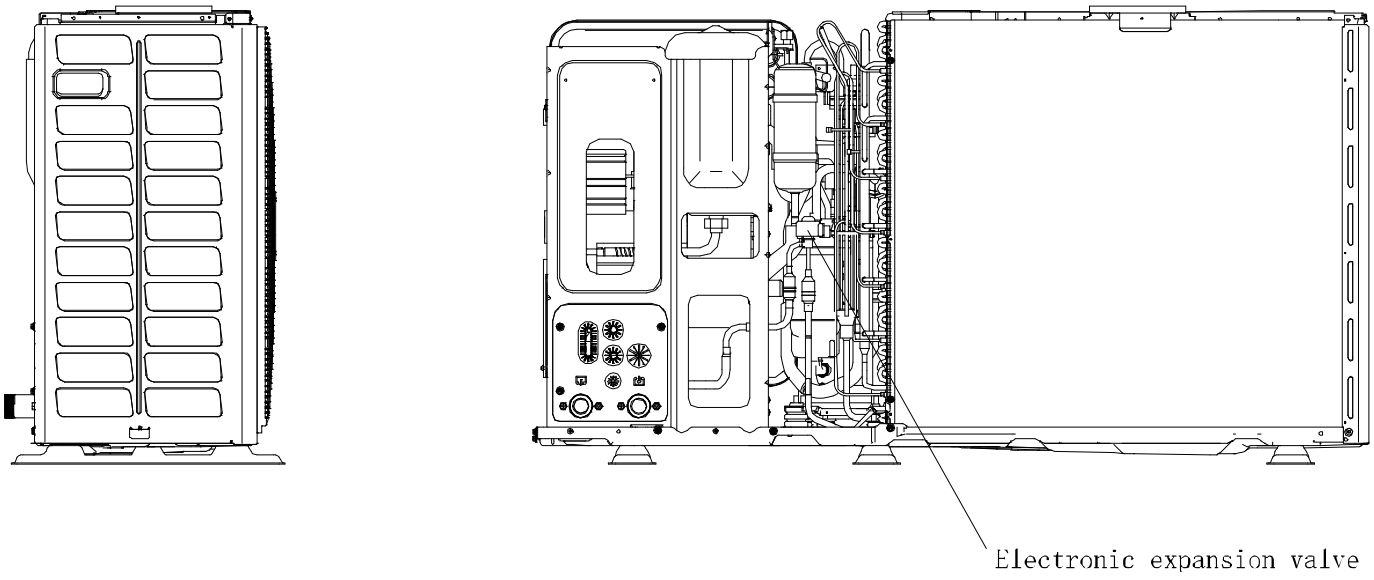
# Component Layout and Refrigerant Circuits

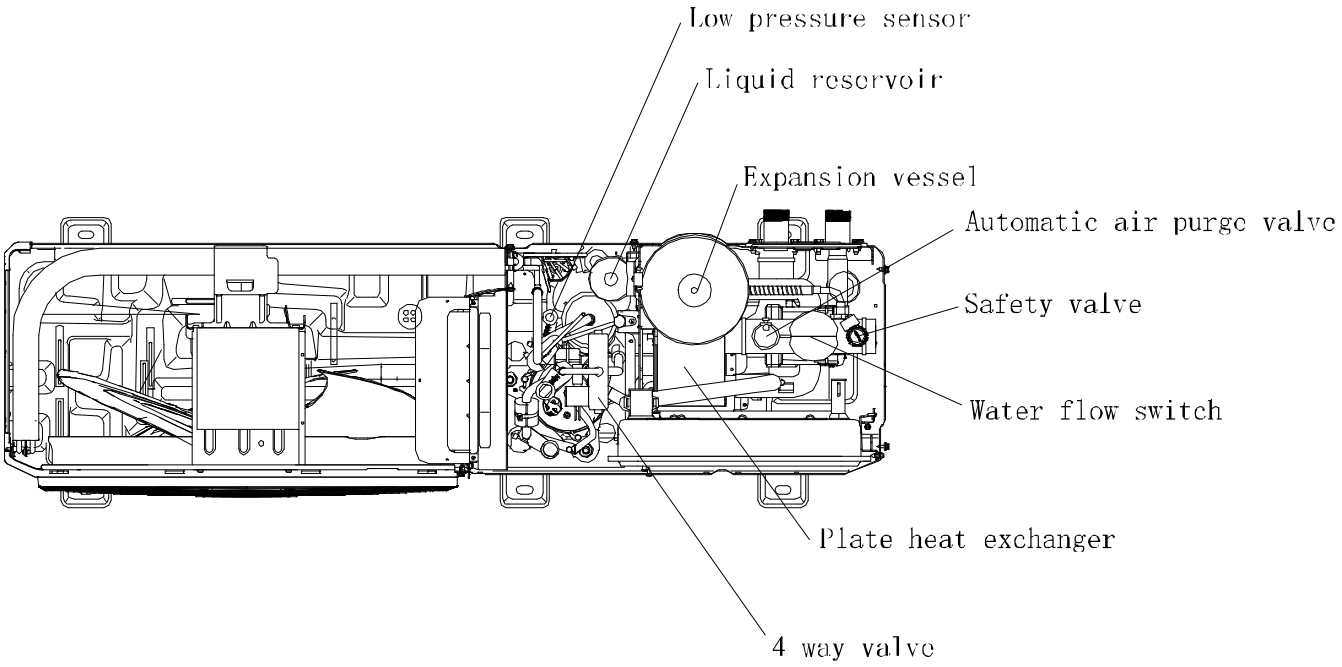
# 1 Layout of Functional Components

## 1.1 4-6kW

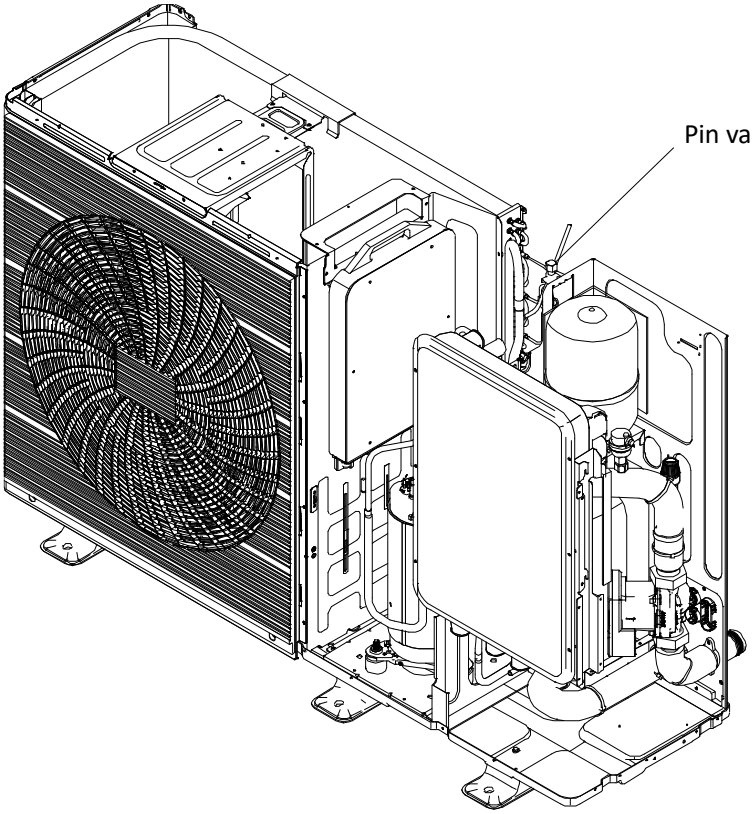


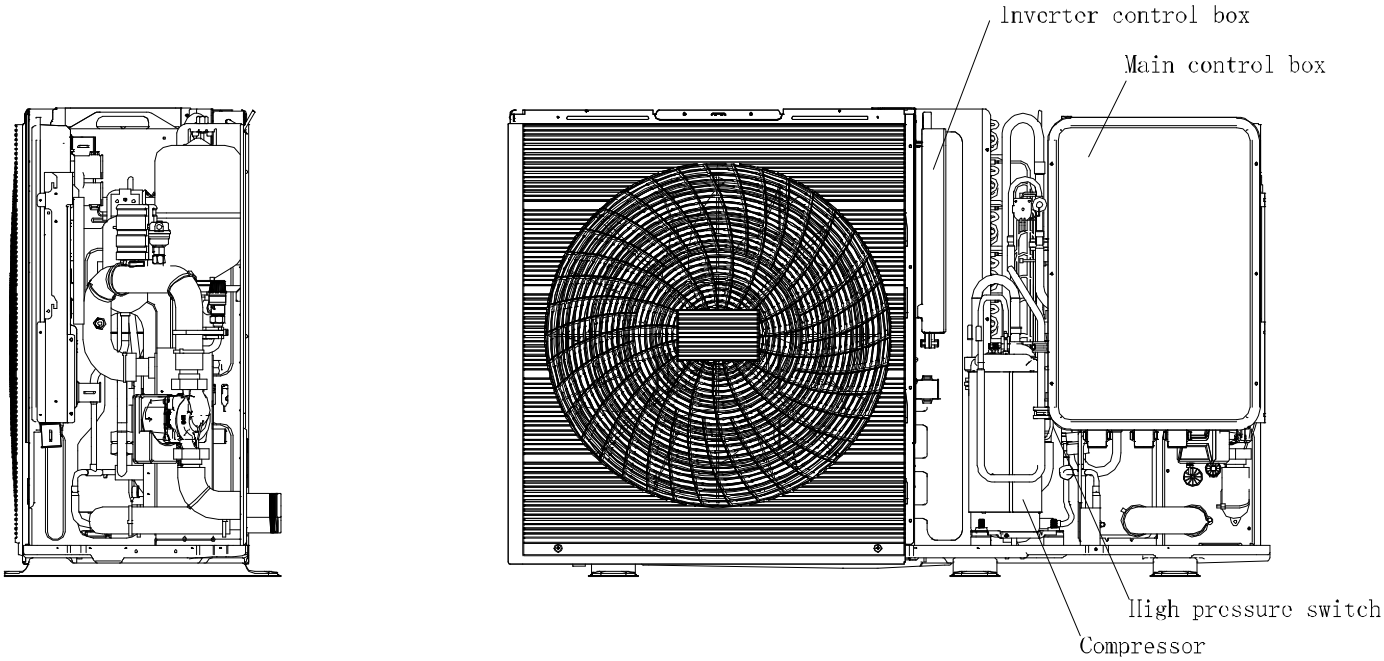



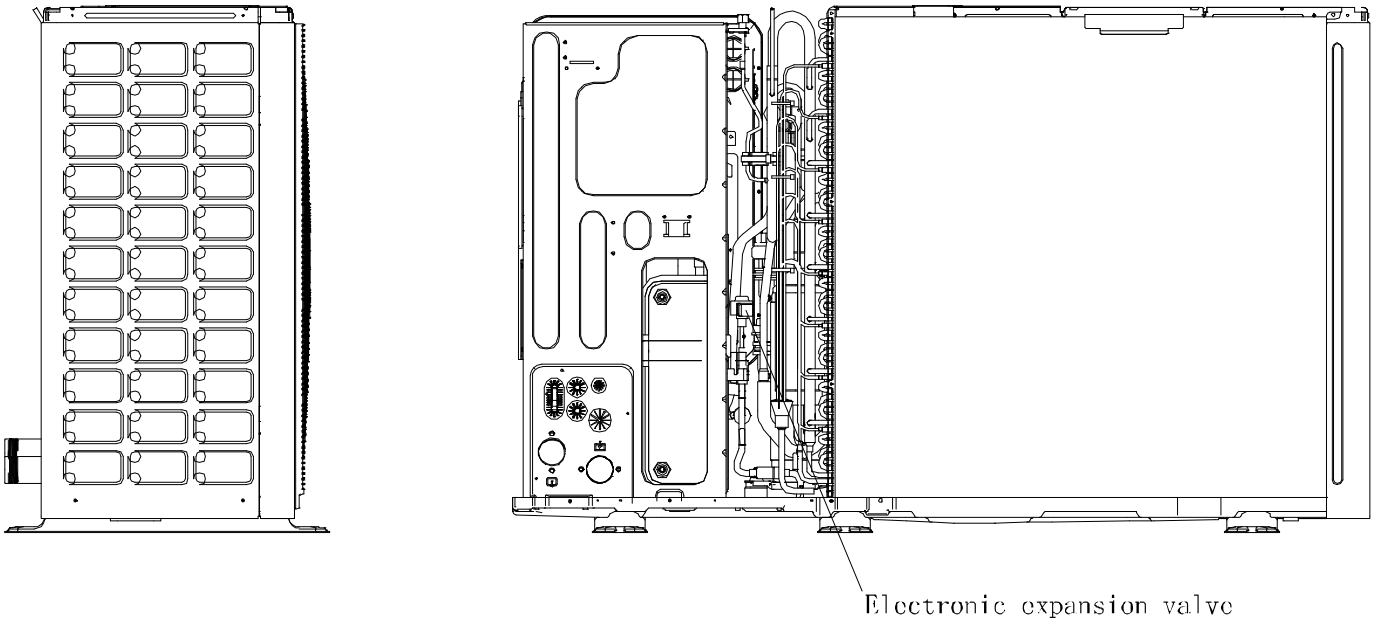

Electronic expansion valve

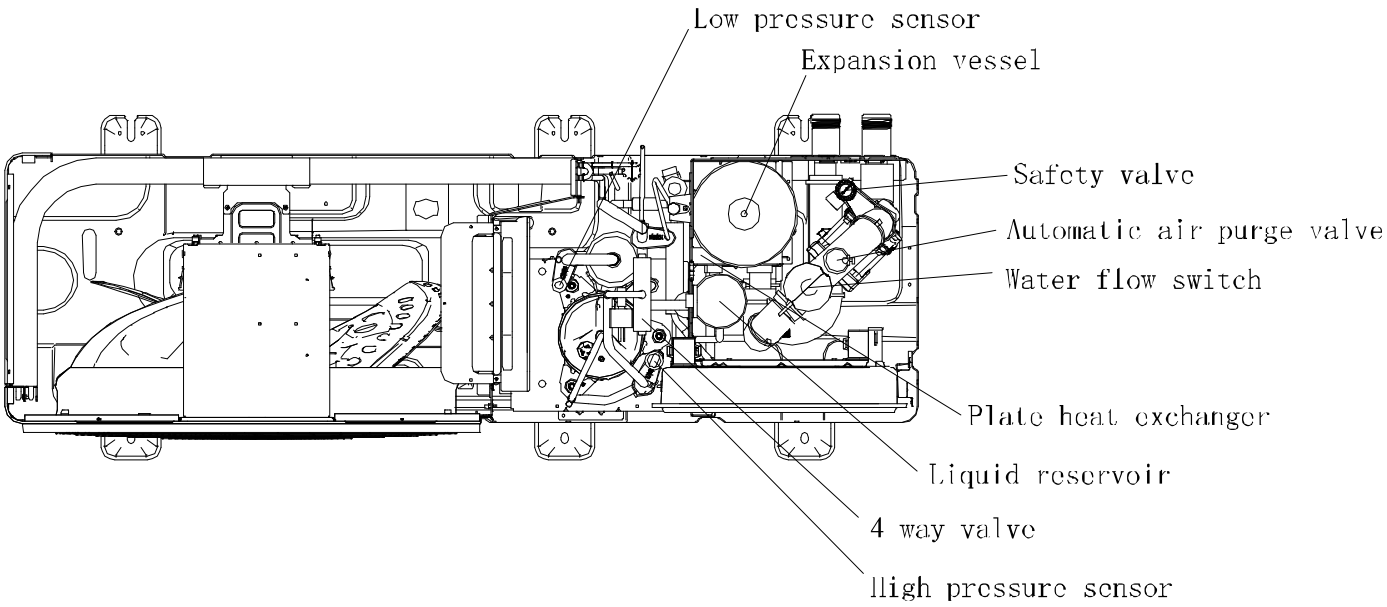

Low pressure sensor
Liquid reservoir
Expansion vessel
Automatic air purge valve
Safety valve
Water flow switch
Plate heat exchanger
4 way valve

## 1.2 8-10kW

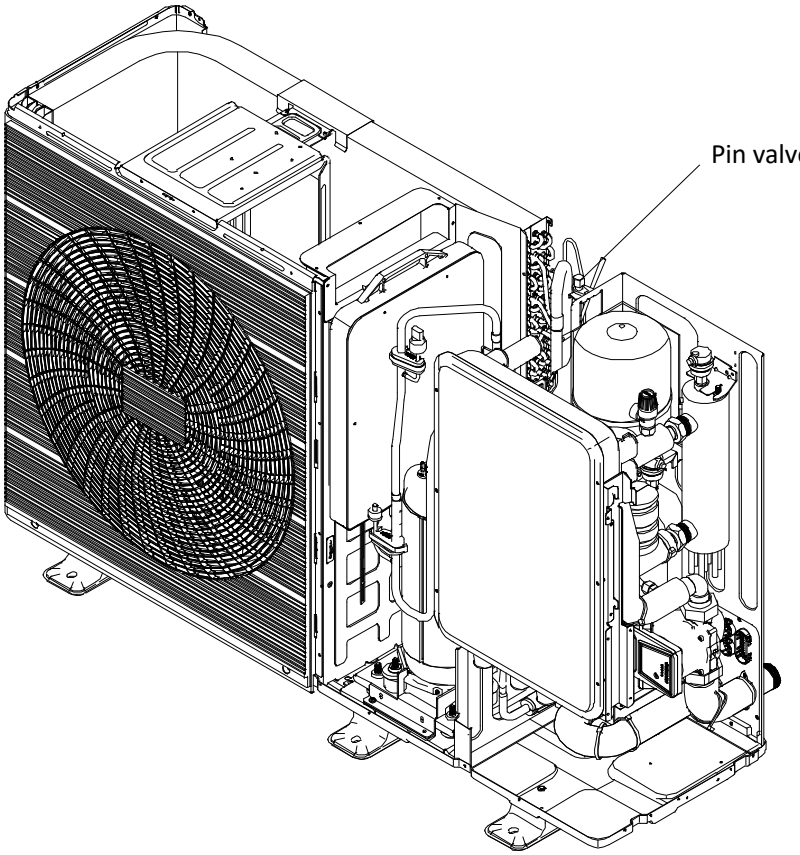

Pin valve

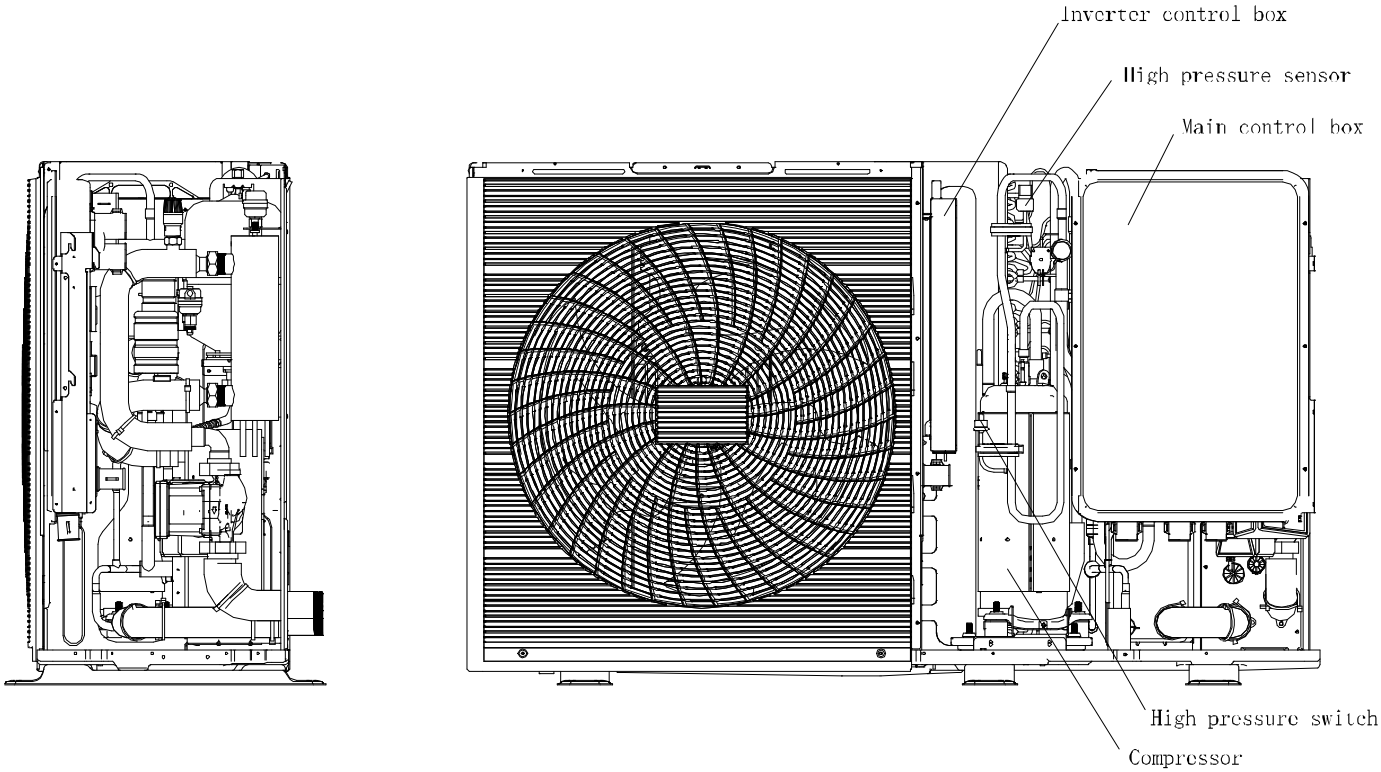

Inverter control box
Main control box
High pressure switch
Compressor

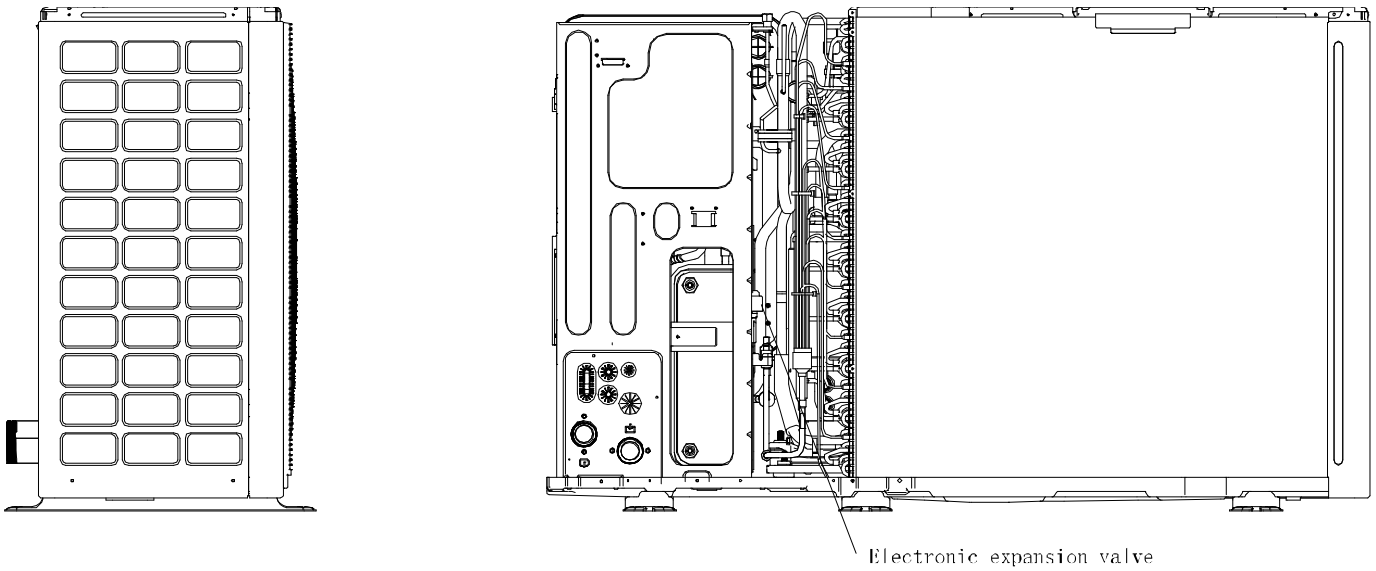

Electronic expansion valve

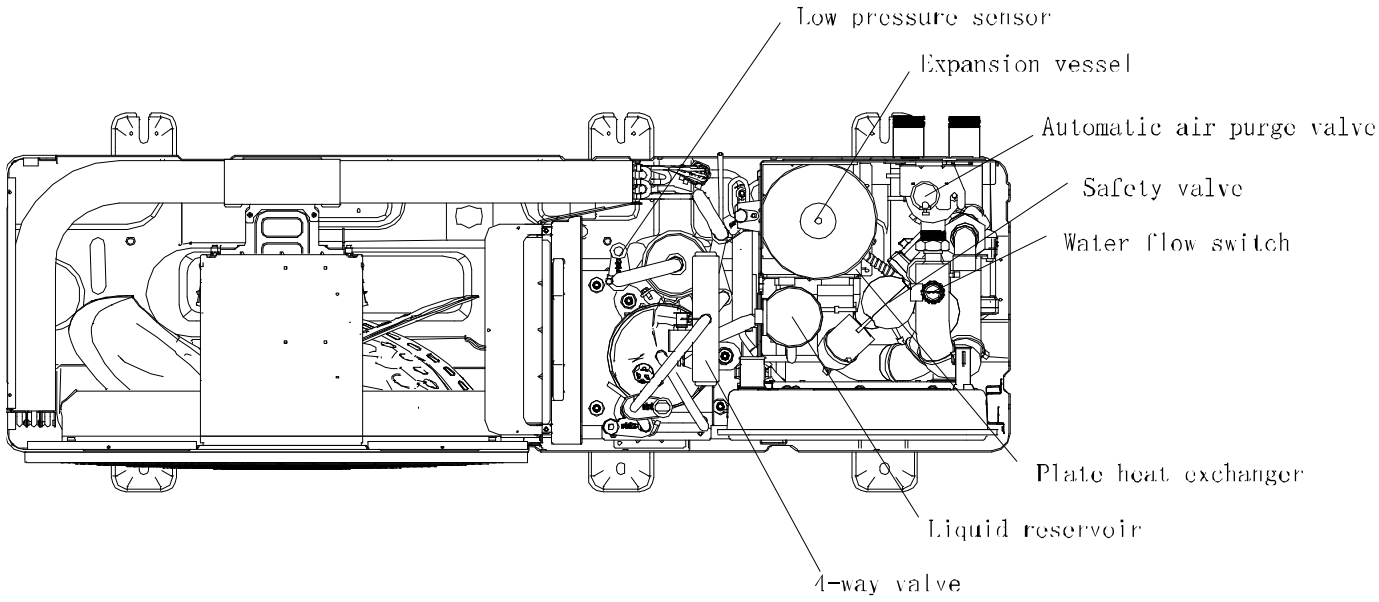

Low pressure sensor
Expansion vessel
Safety valve
Automatic air purge valve
Water flow switch
Plate heat exchanger
Liquid reservoir
4 way valve
High pressure sensor

### 1.3 12-16kW 1Ph

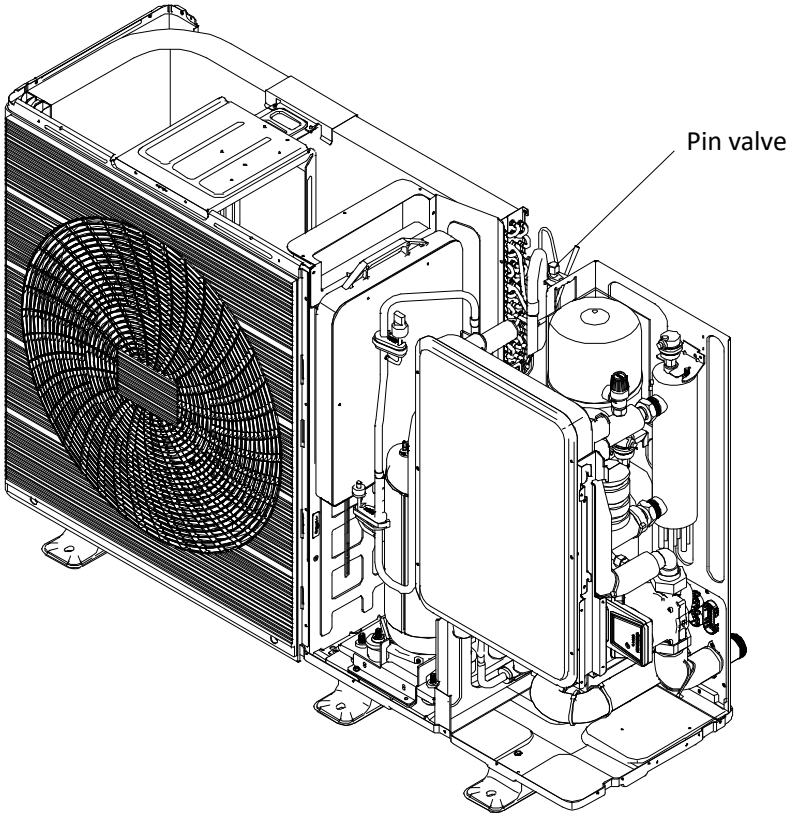


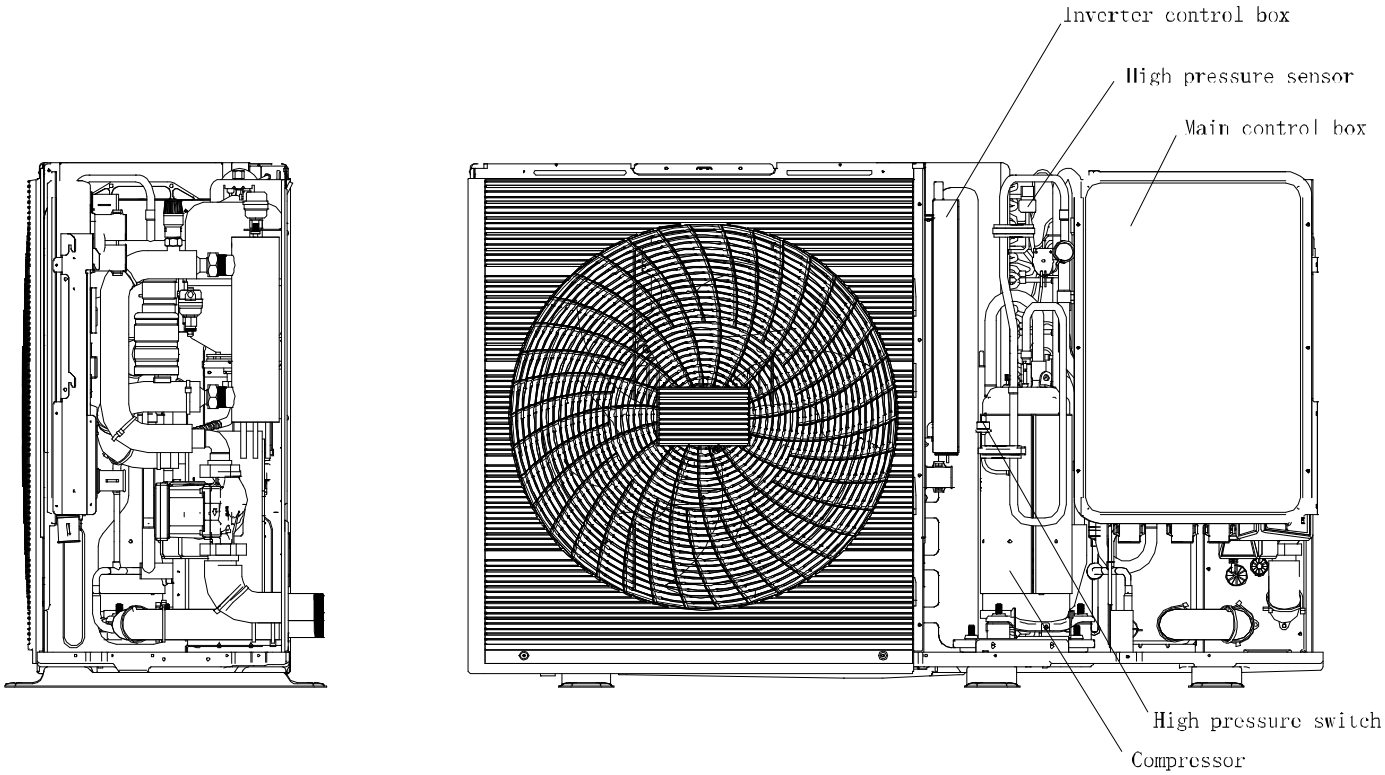



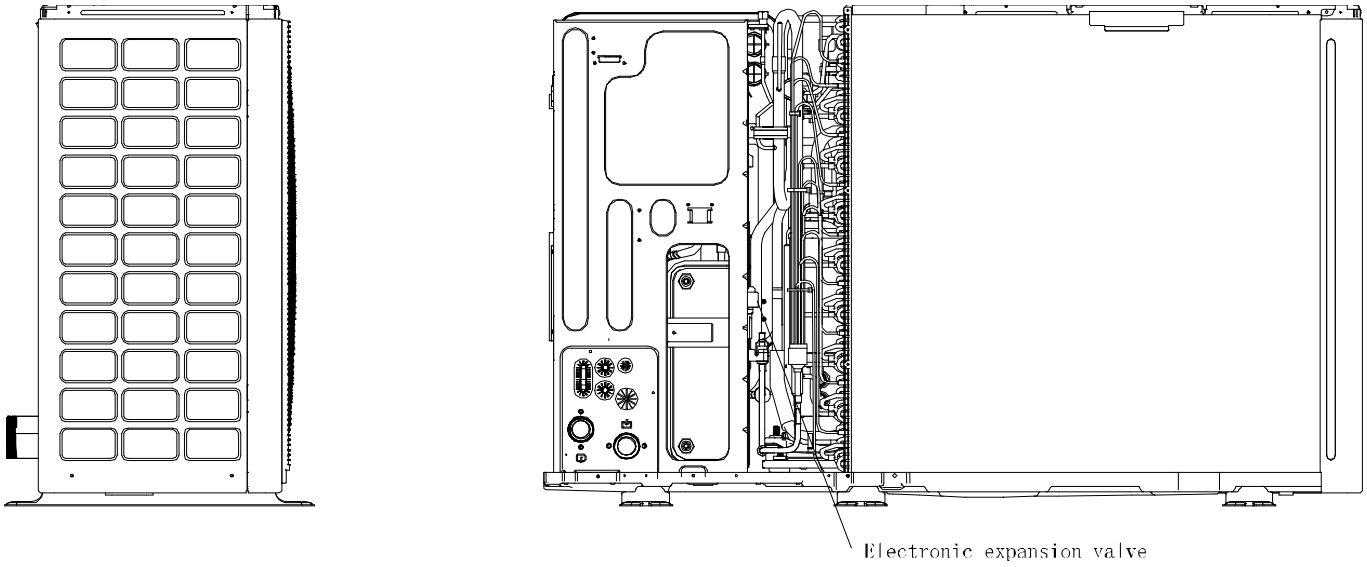

Electronic expansion valve

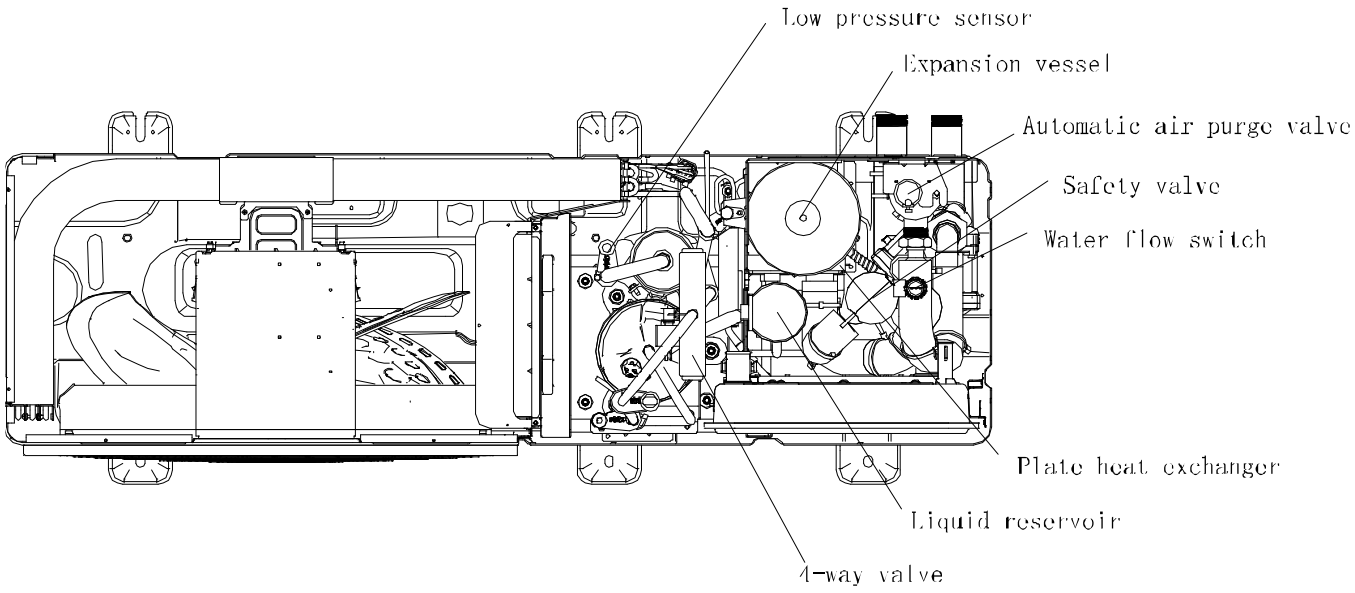

Low pressure sensor
Expansion vessel
Automatic air purge valve
Safety valve
Water flow switch
Plate heat exchanger
Liquid reservoir
4-way valve

## 1.4 12-16kW 3Ph




Electronic expansion valve


Low pressure sensor
Expansion vessel
Automatic air purge valve
Safety valve
Water flow switch
Plate heat exchanger
Liquid reservoir
4-way valve

## 2 Piping Diagrams

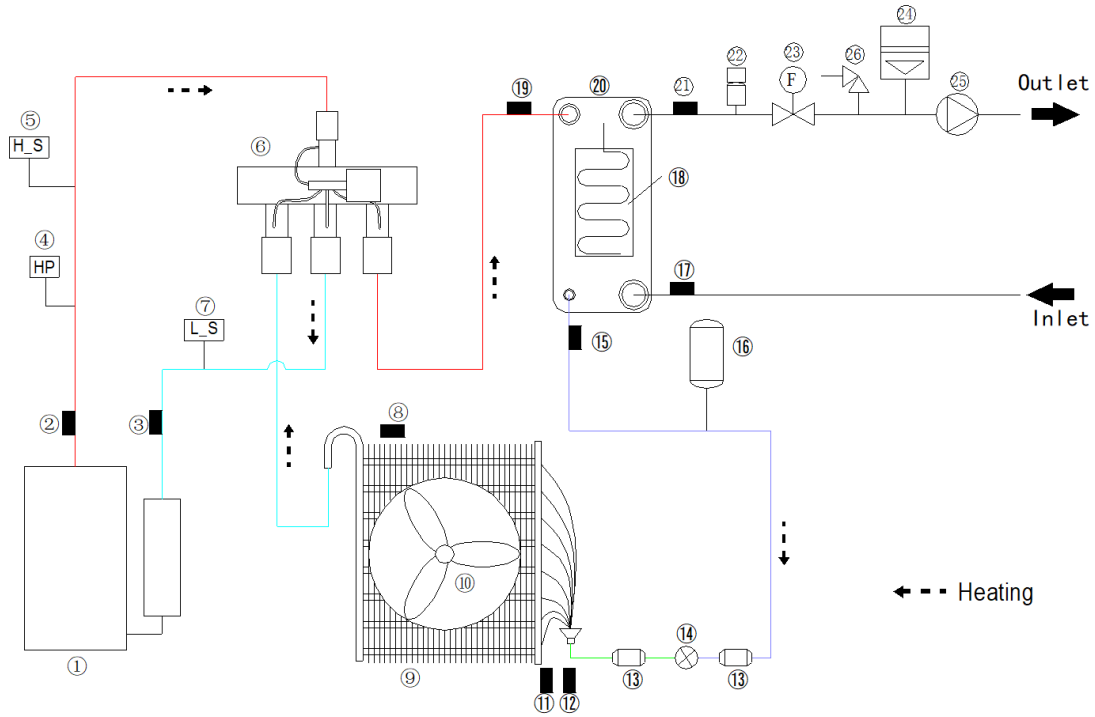
**Refrigerant piping graphic example:**

- High temperature, high pressure gas
- High temperature, high pressure liquid
- Low temperature, low pressure gas liquid mixture
- Low temperature, low pressure gas

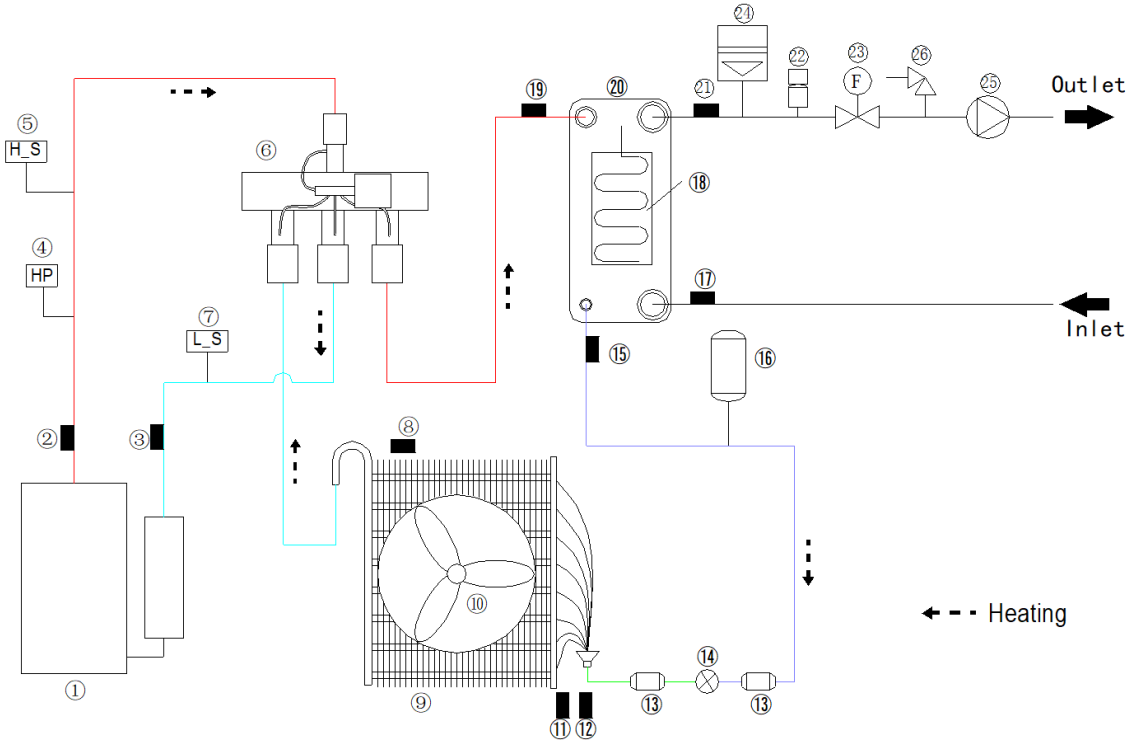
Note: The refrigerant flow direction shown in the figure is the main refrigerant flow direction for reference only.

### 2.1 heating mode

*4-6kW*

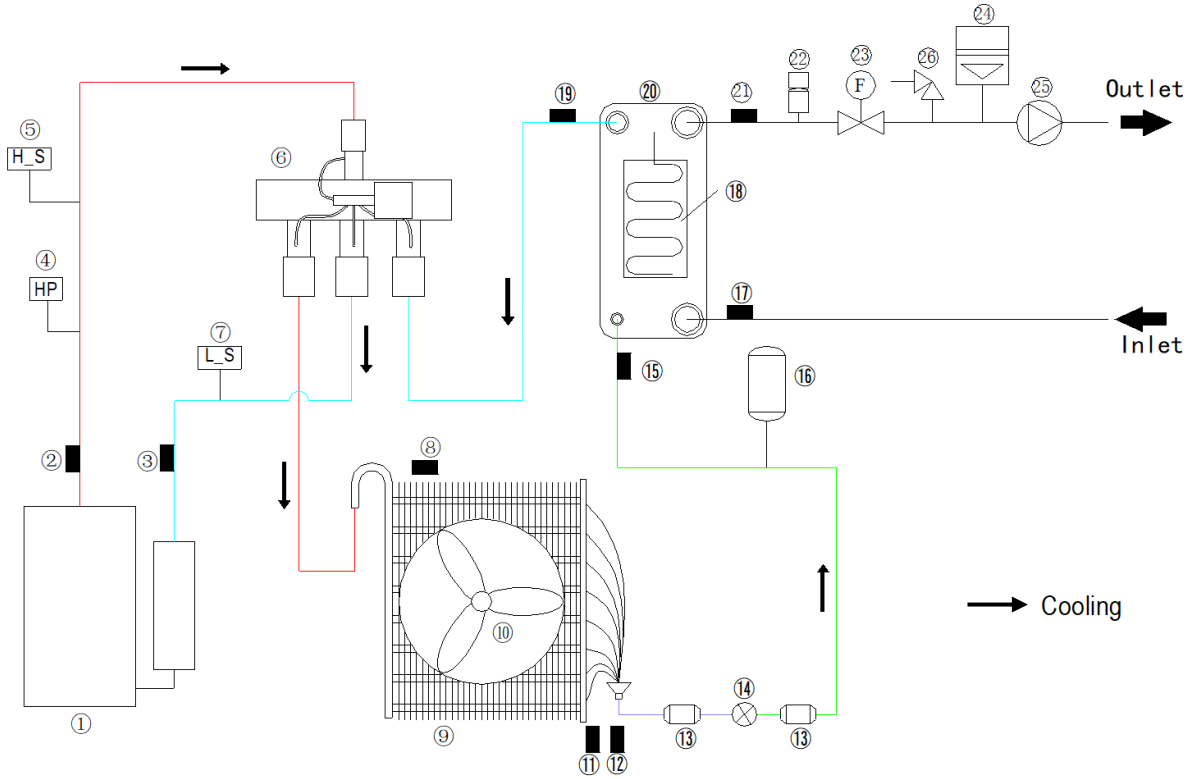



*8-16kW*

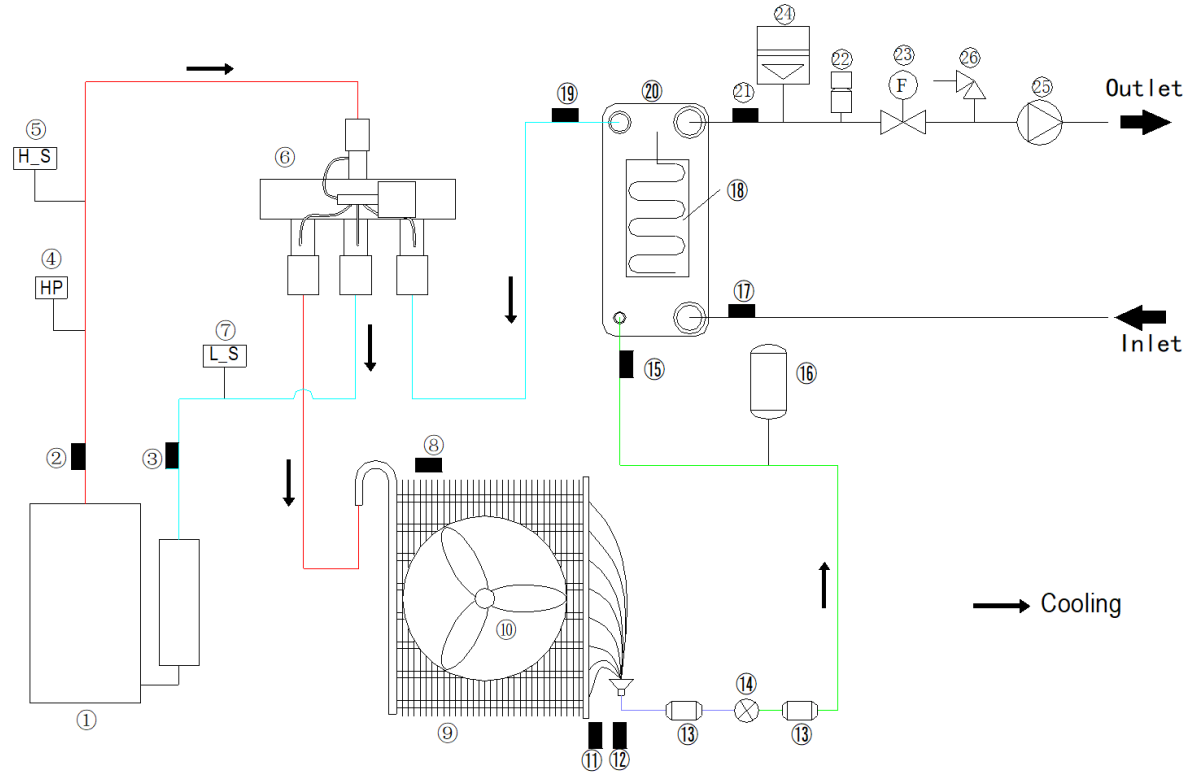


## 2.2 Cooling mode

*4-6kW*




*8-16kW*



## 2.3 Key components

| | |
|---|---|
| 1 | Compressor |
| 2 | Tp Discharge temperature sensor |
| 3 | Th Return-air temperature sensor |
| 4 | High pressure switch |
| 5 | H-SEN High pressure sensor |
| 6 | 4-way valve |
| 7 | L-SEN Low pressure sensor |
| 8 | T4 Ambient temperature sensor error |
| 9 | Finned tube Heat exchanger |
| 10 | Fan |
| 11 | T3 Outdoor unit heat exchanger bottom temperature sensor |
| 12 | TL Outdoor unit heat exchanger outlet temperature sensor |
| 13 | Filter |
| 14 | Electronic expansion valve |
| 15 | T2 Plate heat exchanger outlet refrigerant temperature sensor |
| 16 | Liquid reservoir |
| 17 | Tw_in Plate heat exchanger inlet water temperature sensor |
| 18 | Heating tape of Plate heat exchanger |
| 19 | T2B Plate heat exchanger inlet refrigerant temperature sensor |
| 20 | Plate heat exchanger |
| 21 | Tw_out Plate heat exchanger outlet water temperature sensor |
| 22 | Automatic air purge valve |
| 23 | Water flow switch |
| 24 | Expansion vessel |
| 25 | Water pump |
| 26 | Pressure relief valve |

- **Compressor：**

The refrigerant is compressed to very high pressures in the compressor, while its temperature is also raised. When the refrigerant enters a compressor, it is in a gaseous state at low pressure and low temperature and exits the compressor at high pressure and high temperature in a gaseous state.

- **4-way valve:**

To Control refrigerant flow direction. R290 M thermal Mono has upgraded the default position of 4-way vlave , and made it to keep closed in heating mode and keep open in cooling mode. When closed, the air side heat exchanger functions as an evaporator and water side heat exchanger functions as an condenser; when open, the air side heat exchanger functions as an condenser and water side heat exchanger function as an evaporator.

- **High pressure switch:**

To regulate refrigerant system pressure. When refrigerant system pressure rises above the upper limit, the high pressure switch turns off, stopping the compressor.

- **Air side heat exchanger(Finned tube heat exchanger):**

To transfer heat between refrigerant and air. Refrigerant passes through the tube coils, conducts heat to the fins and dissipates heat to air forced through the heat exchanger.

- **Filter:**

To protect the inside of the heat pump from the dust and other contaminants that are found in the air, including hairs, pet dander and fibers. As the air passes through the filter, this dust and dirt gets caught to stop it from entering different parts of the system.

- **Electronic expansion valve (EXV):**

To Control refrigerant flow and reduces refrigerant pressure.

- **Liquid reservoir:**

To hold excess fluid refrigerant when the system is in operation.

- **Plate heat exchanger:**

To transfer heat between two fluids. This has a major advantage over a conventional heat exchanger in that the fluids are exposed to a much larger surface area because the fluids are spread out over the plates. This facilitates the transfer of heat, and greatly increases the speed of the temperature change.

- **Water pump (Circulating pump):**

To Circulate water in the water circuit.

- **Pressure relief valve:**

To control or limit the pressure in a system; excessive pressure might otherwise build up and create a process upset, instrument or equipment failure, explosion, or fire.

- **Internal backup heater(Optional):**

To Provide additional heating capacity when the heating capacity of the heat pump is insufficient due to very low outdoor temperature. Also protects the external water piping from freezing.

- **Automatic air purge valve:**

To automatically remove air from the water circuit.

- **Water flow switch:**

To detect water flow rate to protect compressor and water pump in the event of insufficient water flow.

- **Expansion vessel:**

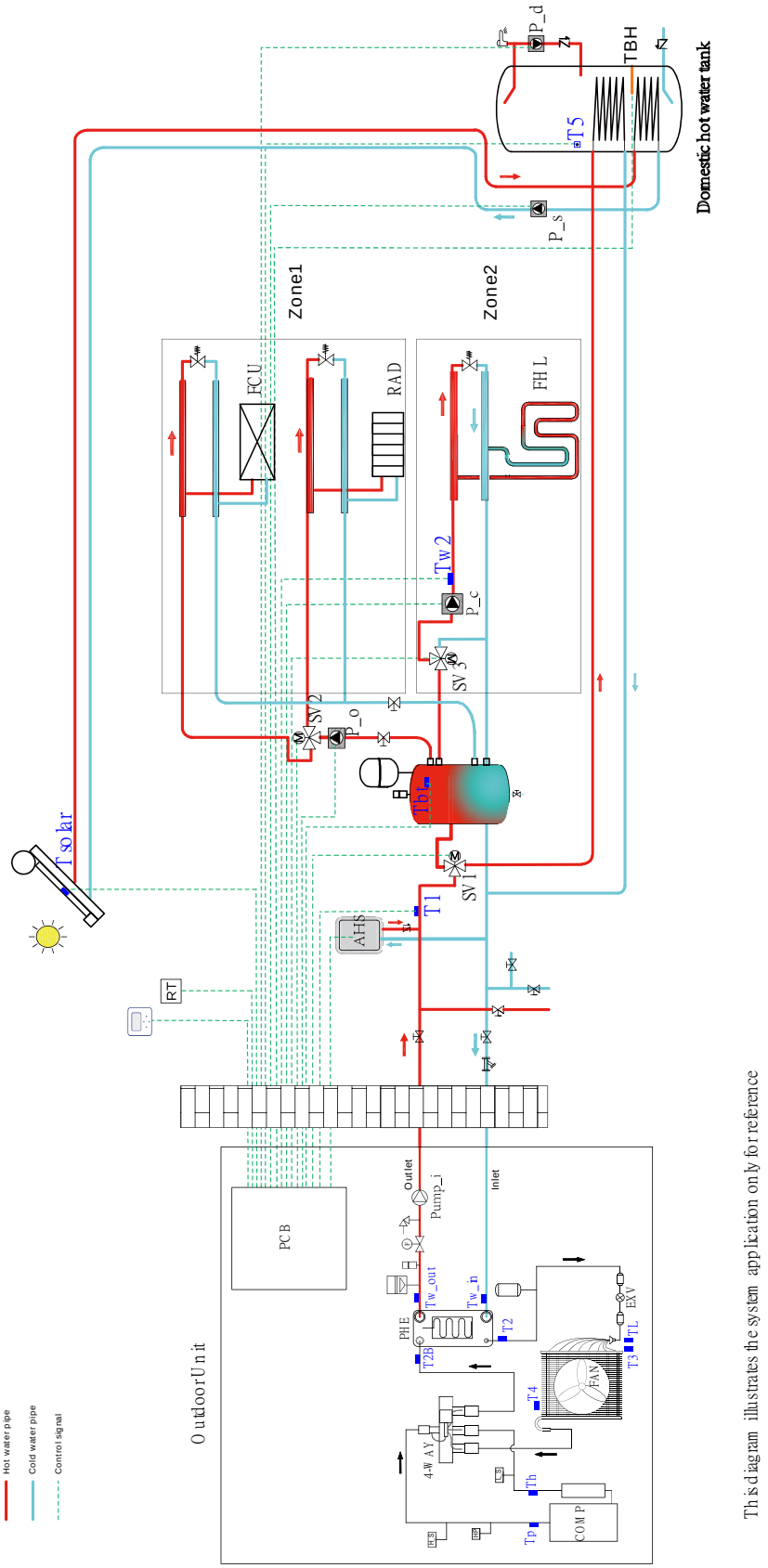
To balance water system pressure. (Expansion vessel Nominal volume 8L, Actual volume 5L)

# Part 3

# Control and Field settings

## Notice

- The whole system diagram is illustrated as below for the understanding of the locations of key components and sensors.
- This is for reference only, it may vary from different scenarios and depend on the actual installation.



# 1 Stop Operation

The stop operation occurs for one of the following reasons:

1. Abnormal shutdown: in order to protect the compressors, if an abnormal state occurs the system makes a stop with thermo off operation and an error code is displayed on the outdoor unit PCB digital displays and on the user interface.
2. The system stops when the set temperature has been reached.

# 2 Standby Control

## 2.1 Crankcase Heater Control

The crankcase heater is used to prevent refrigerant from mixing with compressor oil when the compressors are stopped. The crankcase heater is controlled according to outdoor ambient temperature and the compressor on/off state. When the outdoor ambient temperature is above 8°C or the compressor is running, the crankcase heater is off; when the outdoor ambient temperature is at or below 8°C and either the compressor has been stopped for more than 3 hours or the unit has just been powered-on (either manually or when the power has returned following a power outage), the crankcase heater turns on.

## 2.2 Water Pump Control

When the outdoor unit is in standby, the internal and external circulator pumps run continuously.

# 3 Startup Control

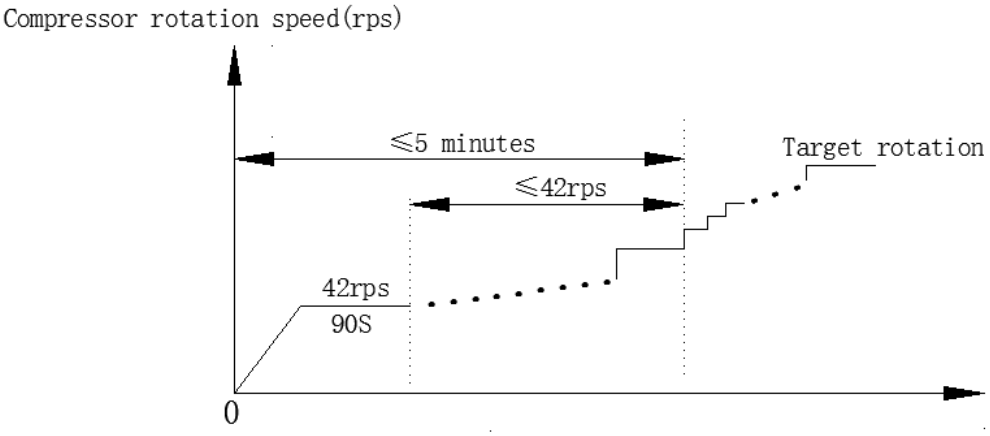
## 3.1 Compressor Startup Delay Control

In initial startup control and in restart control (except in oil return operation and defrosting operation), compressor startup is delayed such that a minimum of the set re-start delay time 3minutes has elapsed since the compressor stopped, in order to prevent frequent compressor on/off and to equalize the pressure within the refrigerant system.

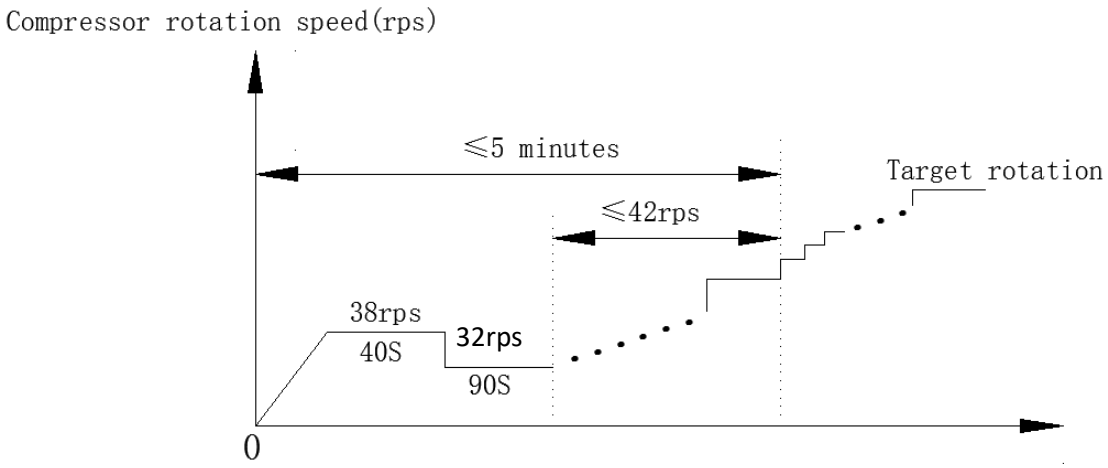
## 3.2 Compressor Startup Program

In initial startup control and in re-start control, compressor startup is controlled according to outdoor ambient temperature. Compressor startup follows one of two startup programs until the target rotation speed is reached.

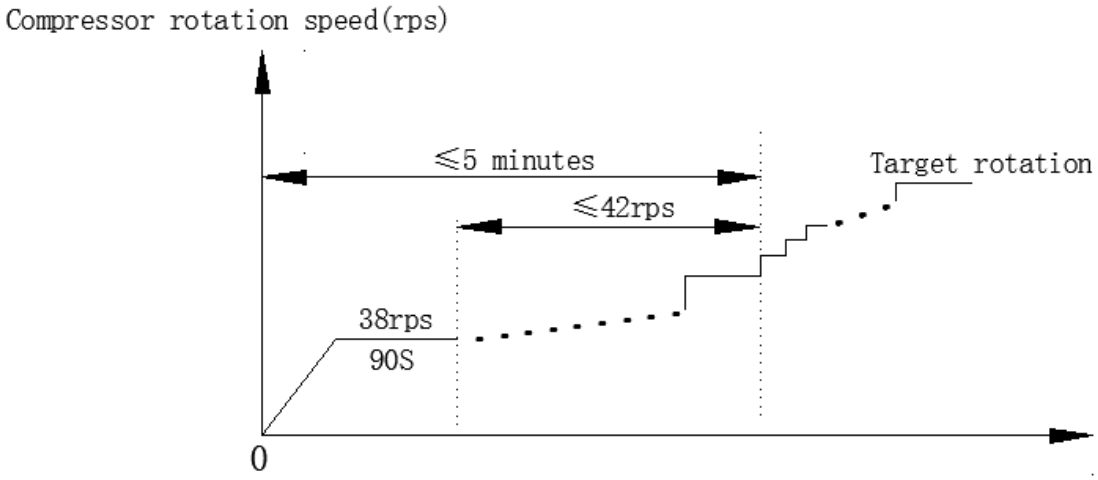
*4-10kw compressor startup program when cooling mode ambient temperature is above 12°C & when heating mode ambient temperature is above 0°C*



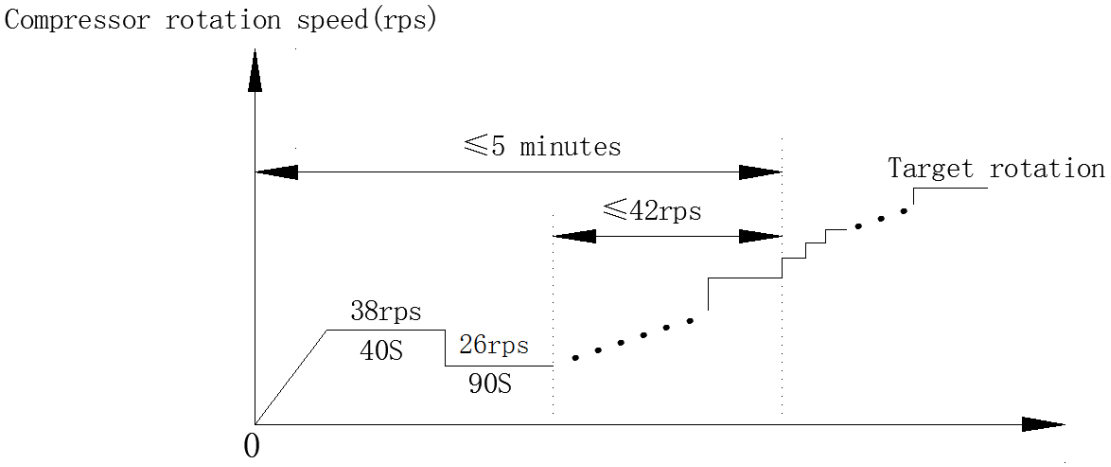

*4-10kw compressor startup program when cooling mode ambient temperature is below 12°C & when heating mode ambient temperature is below 0°C*



*12-16kw compressor startup program when cooling mode ambient temperature is above 12°C & when heating mode ambient temperature is above 0°C*




*12-16kw compressor startup program when cooling mode ambient temperature is below 12°C & when heating mode ambient temperature is below 0°C*



## 3.3 Startup Control for Heating and Domestic Hot Water Operation

*Component control during startup in heating and domestic hot water modes*

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | Compressor startup program selected according to ambient temperature[1] |
| DC fan motor | FAN | ● | Fan run at maximum speed[2] |
| Electronic expansion valve | EXV | ● | Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to outdoor ambient temperature, discharge temperature, suction superheat, compressor speed and refrigerant system pressure |
| Four-way valve | 4-WAY | ● | OFF |

Notes:
1. Refer to "Startup Control - Compressor Startup Program".
2. Refer to "Nomal Operation Control - Outdoor Fan Control"

## 3.4 Startup Control for Cooling Operation

*Component control during startup in cooling mode*

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | Compressor startup program selected according to ambient temperature[1] |
| DC fan motor | FAN | ● | Fan run at maximum speed[2] |
| Electronic expansion valve | EXV | ● | Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to outdoor ambient temperature, discharge temperature, suction superheat, compressor speed and refrigerant system pressure |
| Four-way valve | 4-WAY | ● | ON |

Notes:
1. Refer to "Startup Control - Compressor Startup Program".
2. Refer to "Nomal Operation Control - Outdoor Fan Control"

# 4 Normal Operation Control

## 4.1 Component Control during Normal Operation

*Component control during heating and domestic hot water operations*

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | • | Controlled according to load requirement from temperature set and outlet water temperature |
| DC fan motor | FAN | • | Controlled according to outdoor heat exchanger pipe temperature |
| Electronic expansion valve | EXV | • | Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to outdoor ambient temperature, discharge temperature, suction superheat, compressor speed , refrigerant system pressure and temperature |
| Four-way valve | 4-WAY | • | OFF |

*Component control during cooling operation*

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | • | Controlled according to load requirement from set temperature and outlet water temperature |
| DC fan motor | FAN | • | Controlled according to outdoor heat exchanger pipe temperature |
| Electronic expansion valve | EXV | • | Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to outdoor ambient temperature, discharge temperature, suction superheat, compressor speed and refrigerant system pressure |
| Four-way valve | 4-WAY | • | ON |

## 4.2 Compressor Output Control

The compressor rotation speed is controlled according to the load requirement. Before compressor startup, the outdoor unit determines the compressor target speed according to outdoor ambient temperature, leaving water set temperature and actual leaving water temperature and then runs the appropriate compressor startup program. Refer to Part 3.2 “Compressor Startup Program”. Once the startup program is complete, the compressor runs at the target rotation speed. During operation the compressor speed is controlled according to the rate of change in water temperature, the refrigerant system pressure and the refrigerant temperature.

## 4.3 Compressor Frequency Control

The running speed of six-pole compressors in rotations per second (rps) is one third of the frequency (in Hz) of the electrical input to the compressor motor. The frequency of the electrical input to the compressor motors can be altered at a rate of 1Hz per second.

## 4.4 Four-way Valve Control

The four-way valve is used to change the direction of refrigerant flow through the water side heat exchanger in order to switch between cooling and heating/DHW operations.

During heating and DHW operations, the four-way valve is off; during cooling and defrosting operations, the four-way valve is on.

### 4.5 Electronic Expansion Valve Control

The position of the electronic expansion valve (EXV) is controlled in steps from 0 (fully closed) to 480 (fully open).

- At power-on:
  - The EXV first closes fully, then moves to the standby position (480 (steps)). After compressor runs the EXV is controlled according to suction superheat discharge temperature, pressure, discharge temperature and compressor speed.
- When the outdoor unit is in standby:
  - The EXV is at position 480 (steps).
- When the outdoor unit stops:
  - The EXV first moves to 480 (steps) and remains for 30 seconds, then closes fully, then moves to the standby position (480 (steps)).

### 4.6 Outdoor Fan Control

The speed of the outdoor unit fan is adjusted in steps, as shown below.

Fan speed control during operation

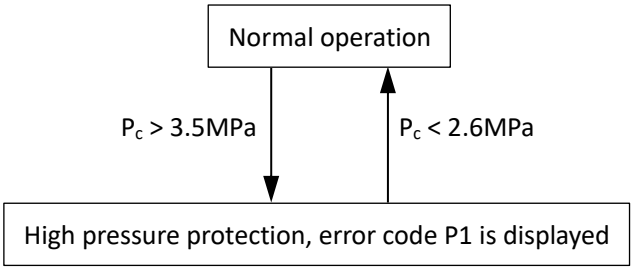
| Fan speed index | Fan speed (rpm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 4kW | 6kW | 8kW | 10kw | 12kW | 14kW | 16kW |
| W1 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| W2 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| W3 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| W4 | 350 | 350 | 350 | 350 | 350 | 350 | 350 |
| W5 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| W6 | 450 | 450 | 450 | 450 | 450 | 450 | 450 |
| W7 | 500 | 500 | 520 | 520 | 500 | 500 | 500 |
| W8 | 530 | 530 | 530 | 530 | 550 | 550 | 550 |
| W9 | 550 | 550 | 550 | 550 | 580 | 580 | 600 |
| W10 | 580 | 580 | 580 | 580 | 610 | 610 | 650 |
| W11 | 600 | 600 | 600 | 600 | 650 | 650 | 700 |
| W12 | 600 | 600 | 600 | 600 | 680 | 680 | 750 |
| W13 | 600 | 600 | 600 | 600 | 700 | 700 | 780 |

# 5 Protection Control

## 5.1 High Pressure Protection Control

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

*High pressure protection control*




Notes:

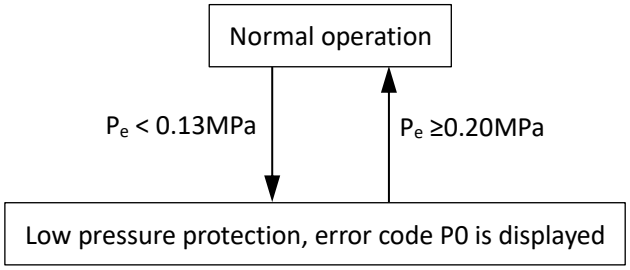
1. $P_c$: Discharge pressure

When the discharge pressure rises above 3.5MPa the system displays P1 protection and the unit stops running. When the discharge pressure drops below 2.6MPa, the compressor enters re-start control.

## 5.2 Low Pressure Protection Control

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

*Low pressure protection control*




Notes:

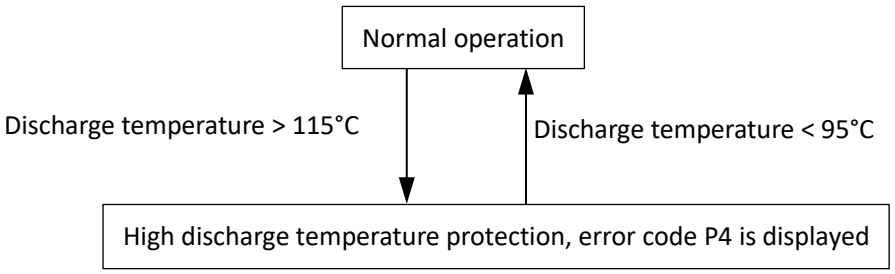
1. $P_e$: Suction pressure

When the suction pressure drops below 0.13MPa the system displays P0 protection and the unit stops running. When the suction pressure rises above 0.2MPa, the compressor enters re-start control.

## 5.3 Discharge Temperature Protection Control

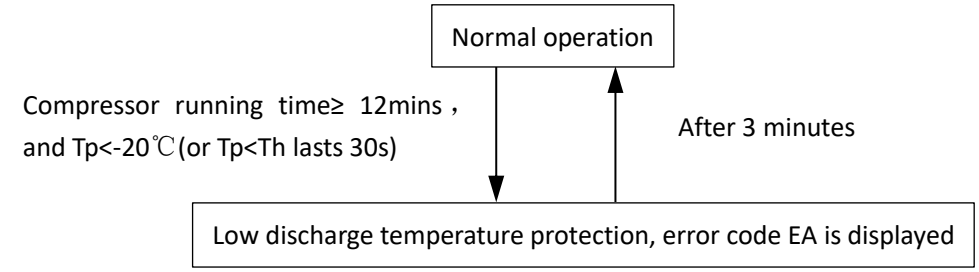
This control protects the compressor from abnormally high temperatures and transient spikes in temperature.

*High discharge temperature protection control*




When the discharge temperature rises above 115°C the system displays P4 protection and the unit stops running. When the discharge temperature drops below 95°C, the compressor enters re-start control.

*Low discharge temperature protection control*



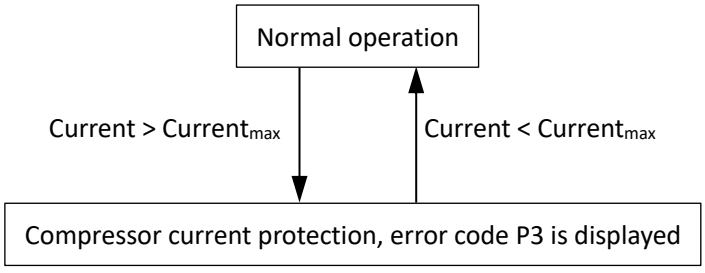

When the discharge temperature(Tp) is below suction temperature(Th) for more than 12 minutes after compressor operates, the system displays EA protection and the unit stops running. After 3 mins the compressor enters re-start control.

Note: EA protection occurs 3 times within 2 hours, the outdoor unit cannot be restarted unless it is powered on again.

## 5.4 Compressor Current Protection Control

This control protects the compressor from abnormally high currents.

*Figure 3-5.5: Compressor current protection control*




Current limitation for ODU

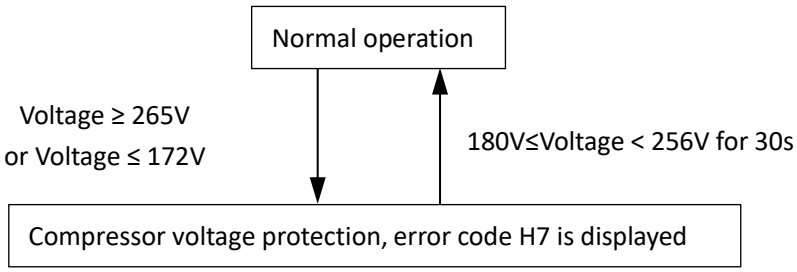
| Model | 1-ph 4-6kw | 1-ph 8-10kw | 1-ph 12-16kw | 3-ph 12-16kw |
|---|---|---|---|---|
| Current$_{max}$ | 15A | 19A | 31A | 11A |

When the compressor current rises above Current$_{max}$ the system displays P3 protection and the unit stops running. When the compressor current drops below Current$_{max}$, the compressor enters re-start control.

## 5.5 Voltage Protection Control

This control protects the M-Thermal Split from abnormally high or abnormally low voltages.

*Figure 3-5.6: Compressor voltage protection control*




When the phase voltage of AC power supply is at or above 265V, the system displays H7 protection and the unit stops running. When the phase voltage drops below 265V for more than 30 seconds, the refrigerant system restarts once the compressor re-start delay has elapsed. When the phase voltage is below 172V, the system displays H7 protection and the unit stops running. When the AC voltage rises to more than 180V, the refrigerant system restarts once the compressor re-start delay has elapsed.

## 5.6 DC Fan Motor Protection Control

This control protects the DC fan motors from strong winds and abnormal power supply. DC fan motor protection occurs when any one of the following conditions are met:

- Fan speed continues to be less than 50rpm more than 40S from the set fan step＞0
- Fan speed is lower than 50rpm for 3S,during normal operation

When DC fan motor protection control occurs the system displays the H6 error code and the unit stops running. After 30S, the unit restarts automatically. When H6 protection occurs 10 times in 120 minutes, the HH error is displayed. When an HH error occurs, a manual system restart is required before the system can resume operation.

## 5.7 Anti-freezing Protection Control

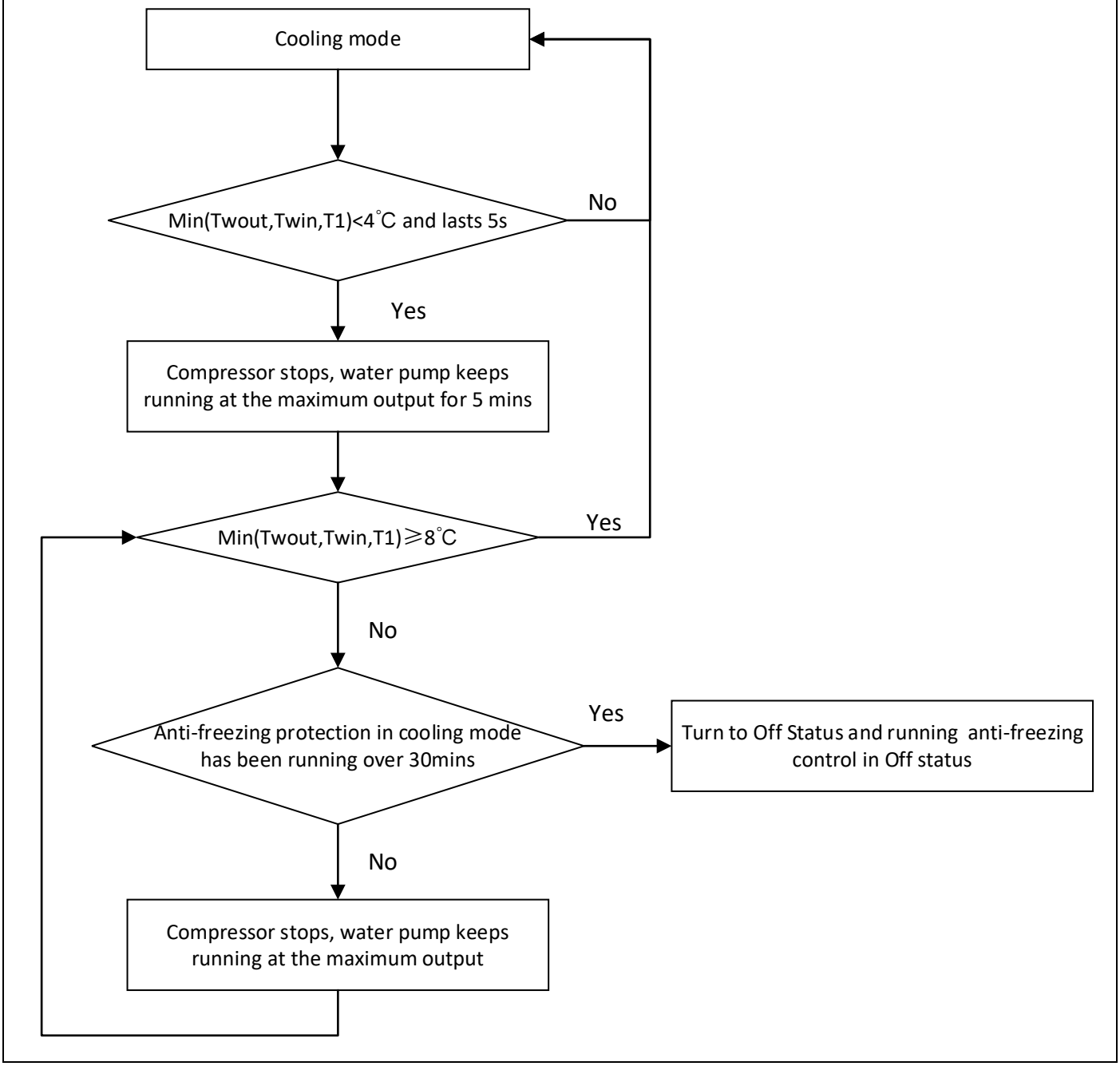
This control protects the water side heat exchanger from ice formation. The water side heat exchanger electric heater is controlled according to outdoor ambient temperature, water side heat exchanger water inlet temperature and water side heat exchanger water outlet temperature.

In cooling mode, if inlet water temperature or leaving water temperature or auxiliary heat source leaving water temperature is below 4°C, the anti-freeze protection actions. In heating/DHW mode, if ambient temperature is below 3°C and inlet water temperature or leaving water temperature or auxiliary heat source leaving water temperature is below 4°C, the anti-freeze protection actions. In heating/DHW mode, leaving water temperature is below 2°C, the anti-freeze protection actions.

When water side heat exchanger anti-freeze protection occurs the system displays error code Pb and the unit stops running.

Note: For the clear and concise understanding of anti-freeze protection control, the diagram is illustrated as below.

## Anti-freezing control in Cooling mode

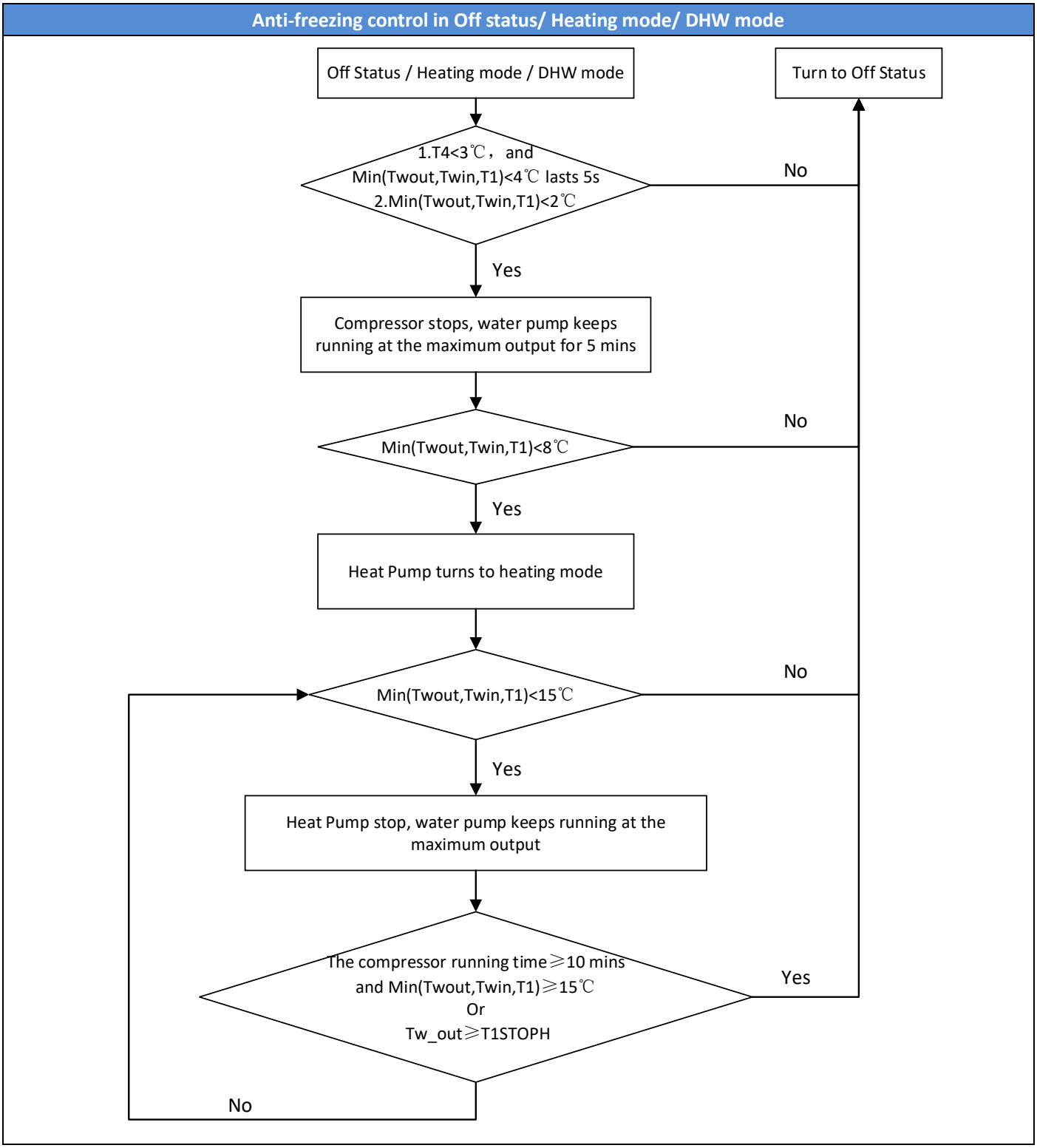



Tw_out: Plate heat exchanger outlet water temperature

Tw_in: Plate heat exchanger inlet water temperature

T1: Electric Heater/AHS water outlet temperature

## Anti-freezing control in Off status/ Heating mode/ DHW mode




T4: Ambient temperature

Tw_out: Plate heat exchanger outlet water temperature

Tw_in: Plate heat exchanger inlet water temperature

T1: Electric Heater/AHS water outlet temperature

T1STOPH: The maximum temperature to stop compressor in heating mode

# 6 Special Control

## 6.1 Oil Return Operation

In order to prevent the compressor from running out of oil, the oil return operation is conducted to recover oil that has flowed out of the compressor and into the refrigerant piping. When the oil return operation is being conducted, the outdoor unit refrigerant system main PCB displays code d0.

The oil return operation starts when the following condition occurs:

- When the compressor cumulative operating time with running rotation speed less than 42rps reaches 6 hours.

The oil return operation ceases when any one of the following two conditions occurs:

- Oil return operation duration reaches 5 minutes.
- Compressor stops.

Component control during oil return operation in **cooling mode**.

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | Runs at oil return operation rotation speed |
| DC fan motor | FAN | ● | Controlled according to cooling mode |
| Electronic expansion valve | EXV | ● | 304 (steps) |
| Four-way valve | 4-WAY | ● | ON |

Component control during oil return operation in **heating and DHW** modes.

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | Runs at oil return operation rotation speed |
| DC fan motor | FAN | ● | Controlled according to heating mode |
| Electronic expansion valve | EXV | ● | 304 (steps) |
| Four-way valve | 4-WAY | ● | OFF |

## 6.2 Defrosting Operation

In order to recover heating capacity, the defrosting operation is conducted when the outdoor unit air side heat exchanger is performing as a condenser. The defrosting operation is controlled according to outdoor ambient temperature, air side heat exchanger refrigerant outlet temperature and the compressor running time.

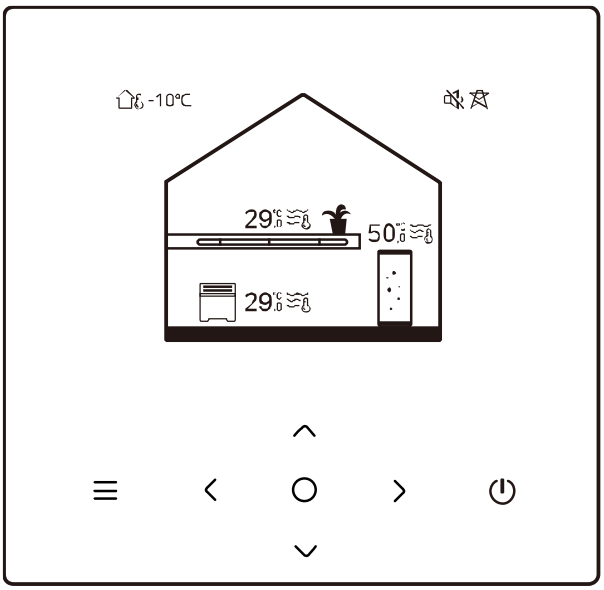
*Component control during defrosting operation*

| Component | Wiring diagram label | 4-16kW | Control functions and states |
|---|---|---|---|
| Inverter compressor | COMP | ● | Runs at defrosting operation rotation speed |
| DC fan motor | FAN | ● | Off |
| Electronic expansion valve | EXV | ● | Fully open |
| Four-way valve | 4-WAY | ● | ON |

# 7 User Interface Field Settings

## 7.1 Introduction

During installation, the parameters setting should be configured by the installer to suit the installation configuration, climate conditions and end-user preferences. The relevant settings are accessible and programmable through the FOR **SERVICEMAN** menu on the user interface. The user interface menus and settings can be navigated using the touch-sensitive keys.



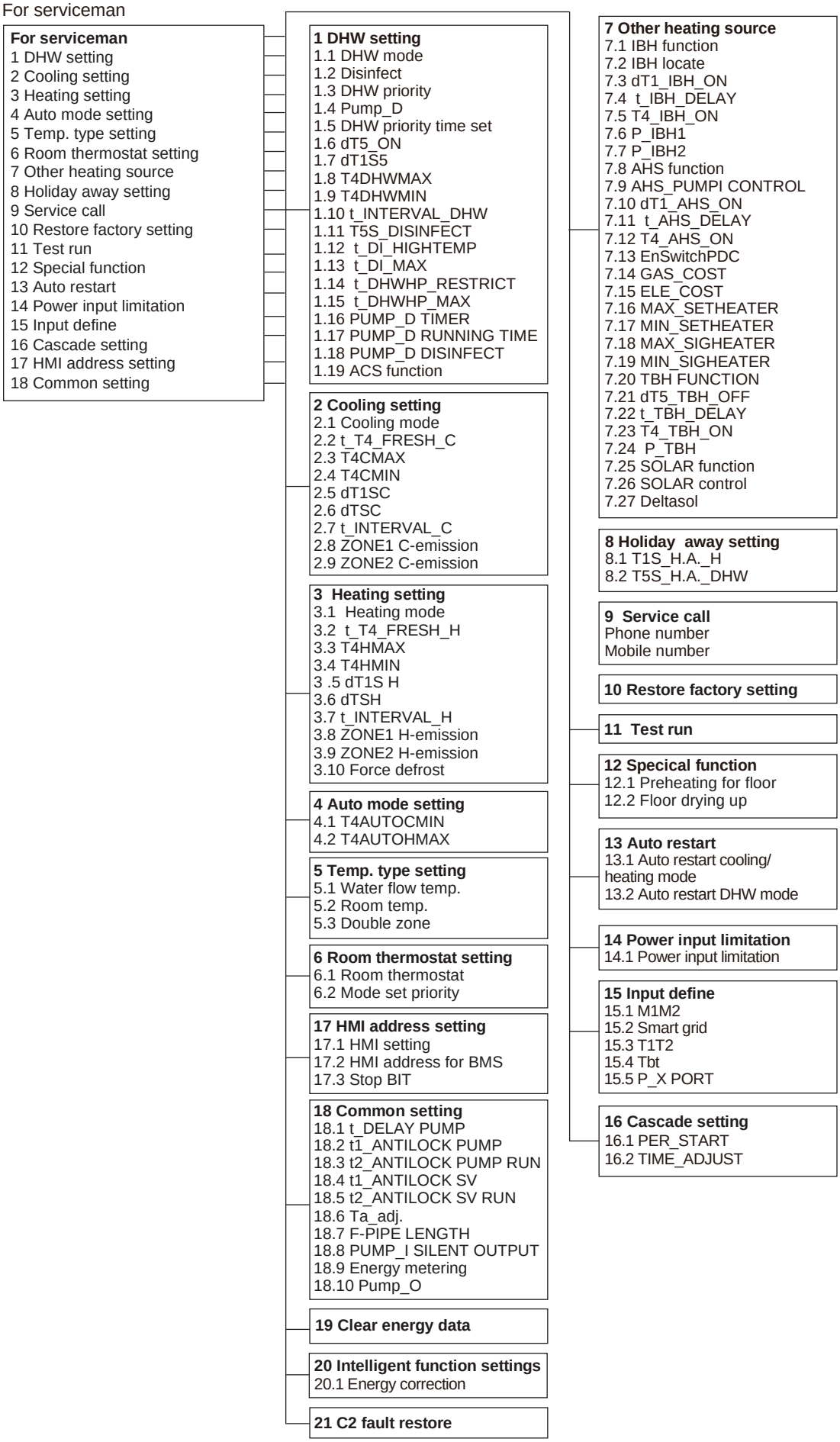

| Icon | Name | Function |
|---|---|---|
| ≡ | Menu | Press to access the menu page (from the home page)<br>Return to the previous page(from a page other then the home page) |
| | Return | Hold for 2 seconds to return to the main page. |
| ○ | Confirm | Confirm a selection<br>Save settings<br>Access the next page |
| ⏻ | ON/OFF | Turn on/off zone 1/zone 2/DHW<br>Press and hold for 3 seconds to turn on/off zone 1 / zone 2 / DHW |
| ‹ ^ › v | Navigation | Press to navigate the cursor to adjust settings (holding it for 1 second can start quick adjustment) |

Combinations of buttons：

Press ≡ and › simultaneously for 3 seconds to enter the **For serviceman** menu.

## 7.2 Menu Structure

For serviceman




There are some items that are invisible if the function is disabled or unavailable.

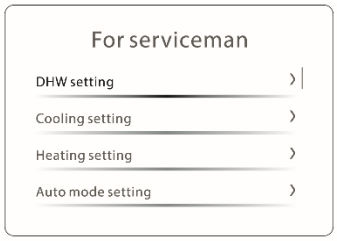
## 7.3 FOR SERVICEMAN Menu

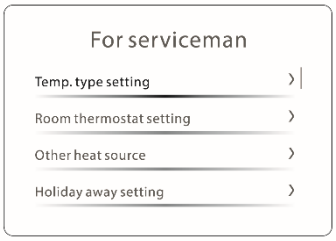
**For serviceman** allows installers to input the system configuration and set the system parameters.

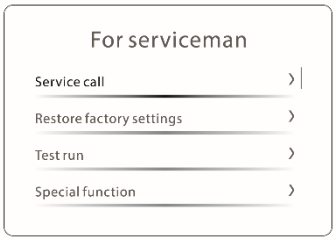
Press ≡ and › simultaneously for 3 seconds to enter the authorization page.

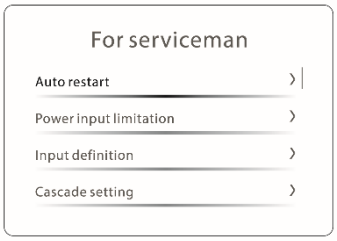

Press ‹ › to navigate cursor and press ◇ to adjust the numerical values. The password is 234. Press ○ to enter **For serviceman** menu.

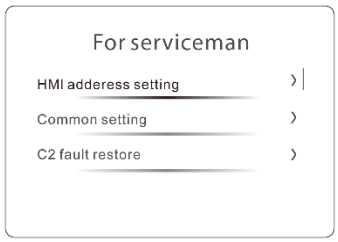

Then the following pages will be displayed:



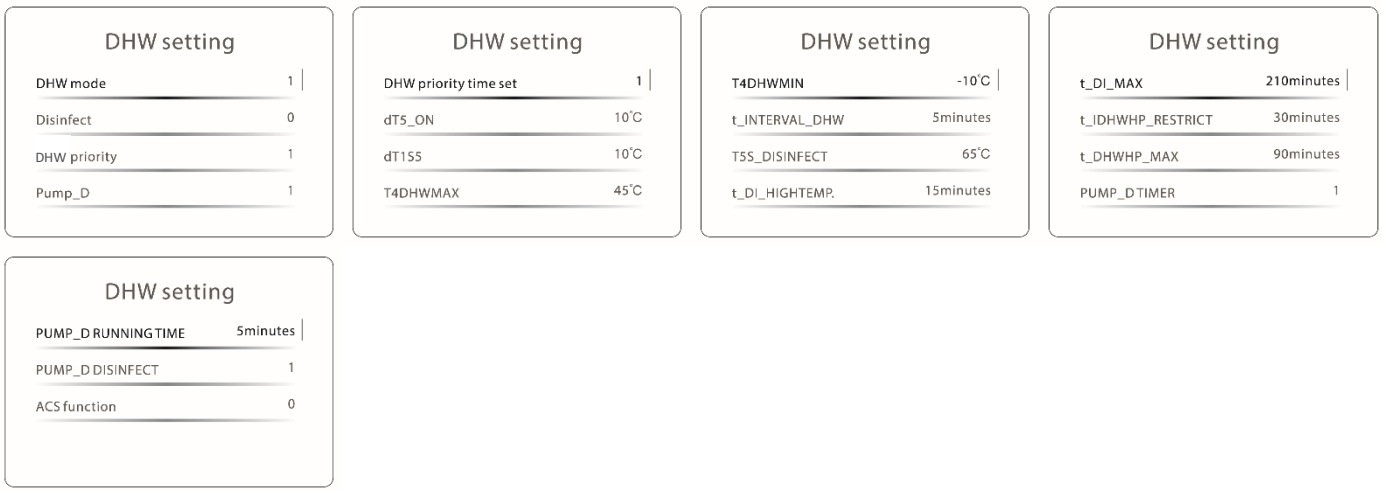



### 7.3.1 DHW heating setting




#### 7.3.1.1 DHW mode

**DHW mode defines whether hot water demand is needed.**

| Setting | Description |
|---|---|
| 1 | Enable DHW mode if DHW tank is installed. |
| 0 | Disable DHW mode if DHW tank is not installed. In this case, no need to define other settings in **DHW setting**. |

#### 7.3.1.2 Disinfect, T5S_DISINFECT, t_DI_HIGHTEMP, t_DI_MAX

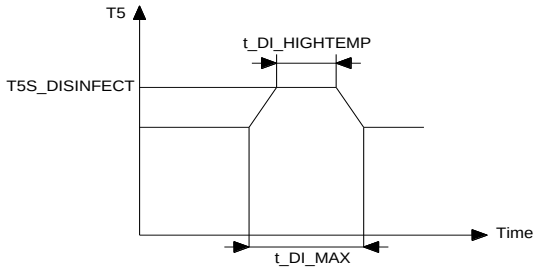
**Disinfect** defines whether disinfection function is activated.

| Setting | Description |
|---|---|
| 1 | Enable DHW tank disinfection function. |
| 0 | Disable DHW tank disinfection function. |

**T5S_DISINFECT** defines the target water temperature of water tank for disinfection function.

**t_DI_HIGHTEMP** defines Period that disinfection water target temperature maintains.

**t_DI_MAX** defines duration of disinfection mode.




Abbreviations:
T5: DHW tank water temperature

#### 7.3.1.3 DHW priority, DHW priority time set, t_DHWHP_RESTRICT, t_DHWHP_MAX

**DHW priority** defines whether domestic hot water or space heating/cooling takes priority.

| Setting | Description |
|---|---|
| 1 | When DHW demand and space heating/cooling demand both exist, heat pump will heat the water according to the setting of **DHW priority time set, t_DHWHP_RESTRICT, t_DHWHP_MAX** |
| 0 | When DHW demand and space heating/cooling demand both exist, heat pump will heat the water after space heating/cooling demand is satisfied. |

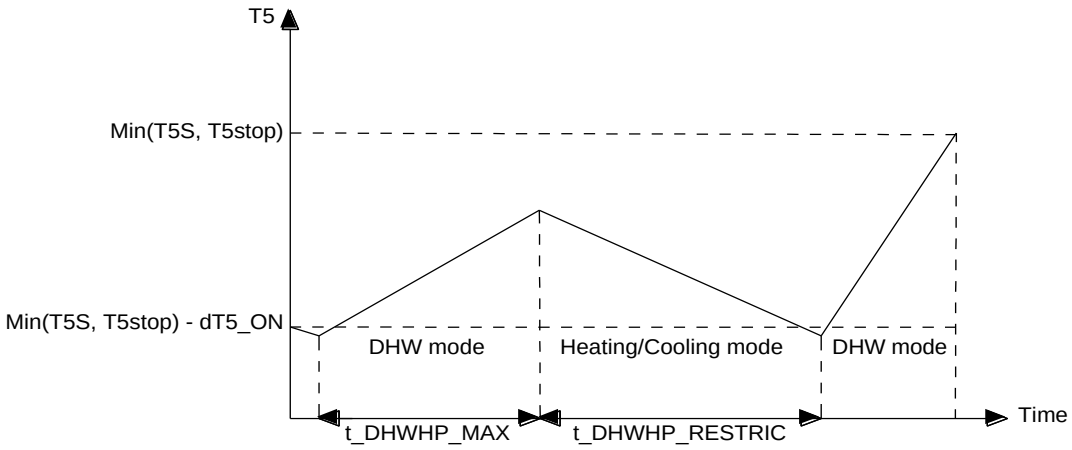
**DHW priority time set** defines whether **t_DHWHP_RESTRICT**(the_operation time of heating/cooling mode) is to be considered before switching to DHW mode and whether **t_DHWHP_MAX**(the operation time of DHW mode) is to be considered before switching to heating/cooling mode.

| Setting | Description |
|---|---|
| 1 | Enable the setting of **t_DHWHP_RESTRICT, t_DHWHP_MAX** |
| 0 | Disable the setting of **t_DHWHP_RESTRICT, t_DHWHP_MAX** |

**t_DHWHP_RESTRICT** defines the period that heat pump runs in space heating/cooling mode before switching to DHW mode if DHW requirement exists.

**t_DHWHP_MAX** defines the period that heat pump runs in DWH mode before switching to space heating/cooling mode if space heating/cooling requirement exists.

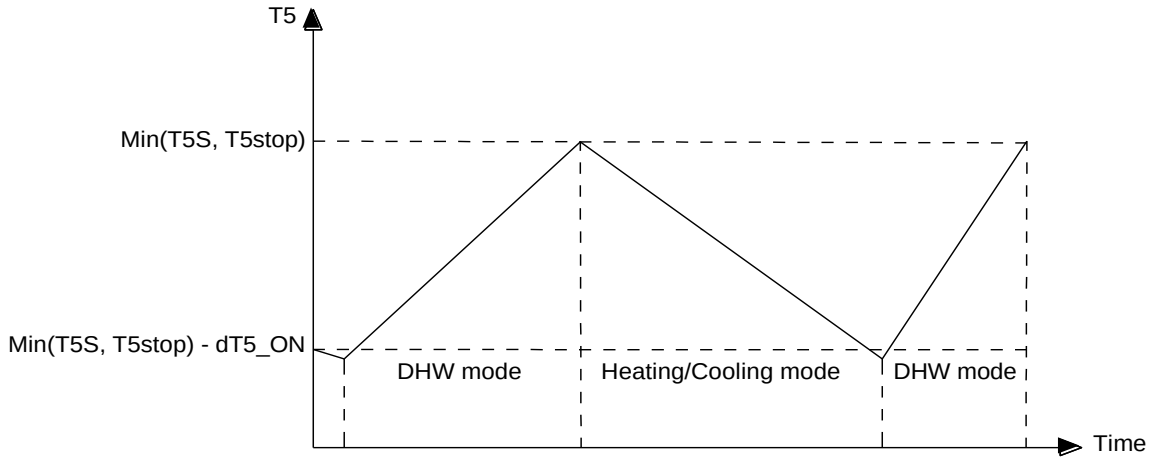
Diagram below illustrates the effects of **t_DHWHP_MAX** and **t_DHWHP_RESTRICT** when **DHW PRIORITY** and **DHW priority time set** are enabled.




Abbreviations:
T5: DHW tank water temperature
T5S: DHW tank set temperature
T5stop: Leaving water temperature operating limit of DHW mode

| DHW PRIORITY | DHW PRIORITY TIME SET | t_DHWHP_RESTRICT | t_DHWHP_MAX | Heating/Cooling turns to DHW | DHW turns to Heating/Cooling |
|---|---|---|---|---|---|
| 1 | 1 | A min | B min | && DHW mode ON<br>&& T5<MIN(T5S, T5STOP)-dT5_ON<br>&& Heating/Cooling mode operates for A mins | \|\| DHW mode OFF<br>\|\| T5≥MIN(T5S, T5STOP)<br>\|\| DHW mode operates for B mins<br>&& Heating/Cooling mode ON |
| 1 | 0 | - | - | && DHW mode ON<br>&& T5<MIN(T5S, T5STOP)-dT5_ON | \|\| DHW mode OFF<br>\|\| T5≥MIN(T5S, T5STOP)<br>&& Heating/Cooling mode ON |
| 0 | - | - | - | && DHW mode ON<br>&& T5<MIN(T5S, T5STOP)-1<br>&& Heating/Cooling mode OFF | Heating/Cooling mode ON |

Diagram below illustrates the effects when **DHW priority time set** is disabled.




Abbreviations:
T5: DHW tank water temperature
T5S: DHW tank set temperature
T5stop: Leaving water temperature operating limit of DHW mode

#### 7.3.1.4 Pump_D, PUMP_D TIMER, PUMP_D RUNNING TIME, PUMP_D DISINFECT

DHW pump**(Pump_D)** is installed to circulate the water in the DHW pipe network.

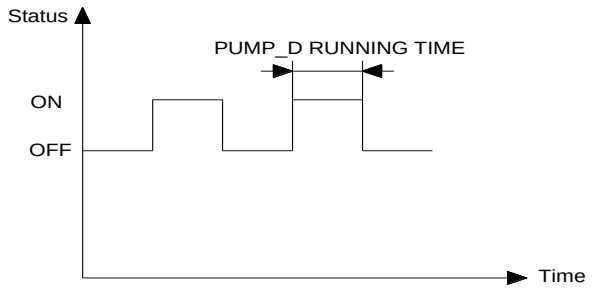
| Setting | Description |
|---|---|
| 1 | Installation with DHW pump. |
| 0 | Installation without DHW pump. |

**PUMP_D TIMER** defines whether DHW pump operation schedule which is defined in the user menu is activated.

| Setting | Description |
|---|---|
| 1 | Enable DHW pump run in timer. |
| 0 | Disable DHW pump run in timer. |

**PUMP_D RUNNING TIME** defines the period that DHW pump operates for each timer

Diagram below illustrates the effects of **PUMP_D RUNNING TIME** when **Pump_D** is installed and **PUMP_D TIMER** is enable.



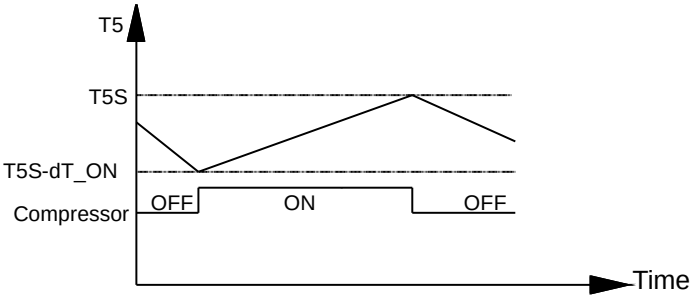

**PUMP_D DISINFECT** defines whether DHW pump operation is activated in disinfection mode.

| Setting | Description |
|---|---|
| 1 | When heat pump is in disinfection mode and T5S_DISINFECT - T5≤2, DHW pump operates **PUMP_D RUNNING TIME**+5 minutes<br>T5S_DISINFECT: DHW tank disinfection set temperature<br>T5S: DHW tank set temperature |
| 0 | Disable the DHW pump operates when heat pump is in disinfection mode |

#### 7.3.1.5 dT5_ON

**dT5_ON** defines water temperature hysteresis of activating heat pump.

When T5S - T5 ≥ dT5_ON and heat pump is within operating ambient temperature range, heat pump provides hot water to the DHW tank.




Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature

#### 7.3.1.6 dT1S5

Leaving water set temperature(T1S) for DHW mode is calculated by formula: T1S = T5 + △dT1S5 + dT1S5

T1S: Leaving water set temperature

T5: DHW tank water temperature

△dT1S5: Temperature modification value related to DHW tank water temperature(T5)

| T5 | T5<30℃ | 30℃≤T5<43℃ | 43℃≤T5 |
|---|---|---|---|
| △dT1S5 | 6 | 4 | 0 |

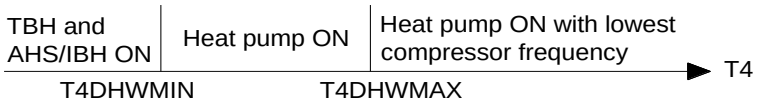
dT1S5: Temperature difference between leaving water set temperature and tank water temperature modification value.

#### 7.3.1.7 T4DHWMAX, T4DHWMIN

**T4DHWMAX** defines the ambient temperature above which the heat pump will operate in DHW mode with lowest compressor frequency.

**T4DHWMIN** defines the ambient temperature below which the heat pump will not operate in DHW mode.

Diagram below illustrates the effects of **T4DHWMAX** and **T4DHWMIN.**




Abbreviations:
TBH: DWH tank immersion heater
AHS: Auxiliary heating source
IBH: Electric heater

#### 7.3.1.8 t_INTERVAL_DHW

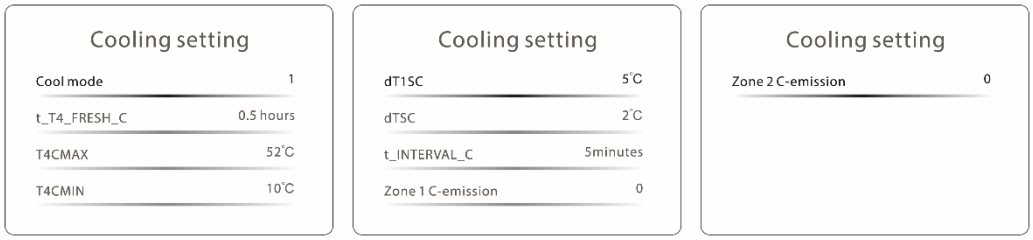
**t_INTERVAL_DHW** defines the delayed start-up time of compressor in DHW mode. Compressor will turn on **t_INTERVAL_DHW** minutes later after it stops last time base on system pressure equalization consideration.

#### 7.3.1.9 ACS FUNCTION

DHW pump(Pump_D) can be installed between two tanks to equalize the tank temperature by water circulation when tank water temperature are different and DHW ON/TBH ON/Solar pump ON. In this case, two tank temperature sensors(T5_1, T5_2) are needed.

| Setting | Description |
|---|---|
| 1 | Installation with double DHW tank. |
| 0 | Installation without double DHW tank. |

### 7.3.2 Cooling setting




#### 7.3.2.1 Cooling mode

**Cooling mode** defines whether space cooling demand is needed.

| Setting | Description |
|---|---|
| 1 | Enable cooling mode if space cooling terminals are installed. |
| 0 | Disable cooling mode if space cooling terminals are not installed. In this case, no need to define other settings in **Cooling mode**. |

#### 7.3.2.2 t_T4_FRESH_C

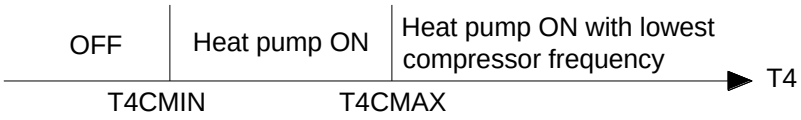
**t_T4_FRESH_C** defines the refresh cycle of detecting ambient temperature for climate curve.

#### 7.3.2.3 T4CMAX, T4CMIN

**T4CMAX** defines ambient temperature above which heat pump operates with lowest compressor frequency.

**T4CMIN** defines ambient temperature below which heat pump not operates.

Diagram below illustrates the effects of **T4CMAX** and **T4CMIN.**



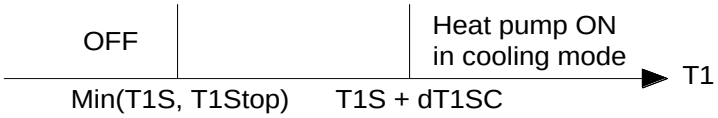

Abreviations:

T4: Outdoor ambient temperature

#### 7.3.2.4 dT1SC

**dT1SC** defines water temperature hysteresis of activating heat pump.

When T1 – T1S ≥ dT1SC and heat pump is within operating ambient temperature range, heat pump provides chilled water to space cooling terminals.




Abreviations:

T1: Leaving water temperature

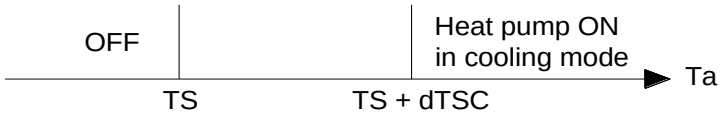
T1S: Leaving water set temperature

T1Stop: Leaving water temperature operating limit of cooling mode

#### 7.3.2.5 dTSC

**dTSC** define room temperature hysteresis of activating heat pump. **dTSC** is only applicable if **1** is selected for **Room temp.** in the **1.5.3 Temp. type setting**.

When Ta – TS ≥ dTSC and heat pump is within operating ambient temperature range, heat pump provides chilled water to space cooling terminals.




Abreviations:

Ta: Actual room temperature

TS: Room setting temperature

#### 7.3.2.6 t_INTERVAL_C

**t_INTERVAL_C** defines the delayed start-up time of compressor in cooling mode. Compressor will turn on **t_INTERVAL_C** minutes after it stops last time base on system pressure equalization consideration.

#### 7.3.2.7 Zone 1 C-emission, Zone 2 C-emission

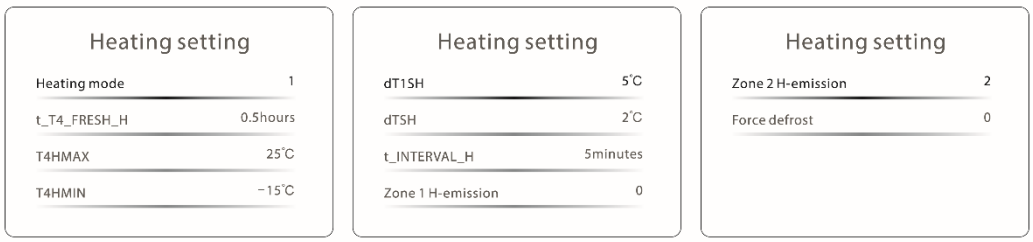
**Zone 1 C-emission** defines the terminal type of zone 1.

| Setting | Description |
|---|---|
| 0 | Fan coil unit |
| 1 | Floor heating loop |
| 2 | Radiator |

**Zone 2 C-emission** defines the terminal type of zone 2.

| Setting | Description |
|---|---|
| 0 | Fan coil unit |
| 1 | Floor heating loop |
| 2 | Radiator |

### 7.3.3 Heating setting




#### 7.3.3.1 Heating mode

**Heating mode** defines whether space heating demand is needed.

| Setting | Description |
|---|---|
| 1 | Enable heating mode if space heating terminals are installed. |
| 0 | Disable heating mode if space heating terminals are not installed. In this case, no need to define other settings in **Heating mode**. |

#### 7.3.3.2 t_T4_FRESH_H

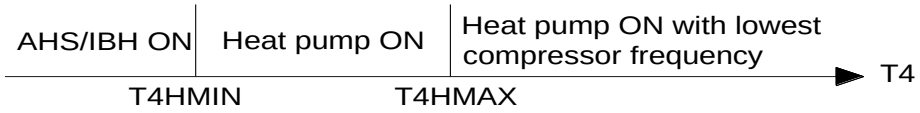
**t_T4_FRESH_H** defines the refresh time of heating mode climate temperature curve.

#### 7.3.3.3 T4HMAX, T4HMIN

**T4HMAX** sets the ambient temperature above which the heat pump will operate heating mode with lowest compressor frequency.

**T4HMIN** sets the ambient temperature below which the heat pump will not operate in heating mode.

Diagram below illustrates the effects of **T4HMAX** and **T4HMIN.**



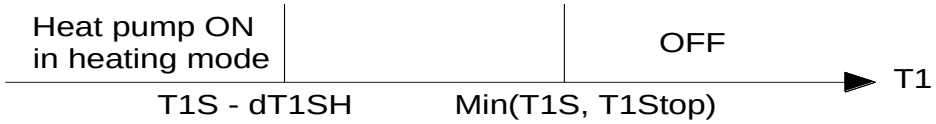

Abreviations:

T4: Outdoor ambient temperature

#### 7.3.3.4 dT1SH

**dT1SH** defines water temperature hysteresis of activating heat pump.

When T1≤T1S - dT1SH and heat pump is within operating ambient temperature range, heat pump provides hot water to the space heating terminals.




Abreviations:

T1: Leaving water temperature

T1S: Leaving water set temperature

T1Stop: Leaving water temperature operating limit of cooling mode

#### 7.3.3.5 dTSH

**dTSH** defines room temperature hysteresis of activating heat pump. **dTSH** is only applicable if **1** is selected for **Room temp.** in the **Temp. type setting**.

When TS – Ta ≥ dTSH and heat pump is within operating ambient temperature range, heat pump provides hot water to the space heating terminals


Abreviations:
Ta: Actual room temperature
TS: Room setting temperature

#### 7.3.3.6 t_INTERVAL_H

**t_INTERVAL_H** defines the delayed start-up time of compressor in heating mode. Compressor will turn on **t_INTERVAL_H** minutes after it stops last time base on system pressure equalization consideration.

#### 7.3.3.7 Zone 1 H-emission, Zone 2 H-emission

**Zone 1 H-emission** defines the terminal type of zone 1.

| Setting | Description |
|---|---|
| 0 | Fan coil unit |
| 1 | Floor heating loop |
| 2 | Radiator |

**Zone 2 H-emission** defines the terminal type of zone 2.

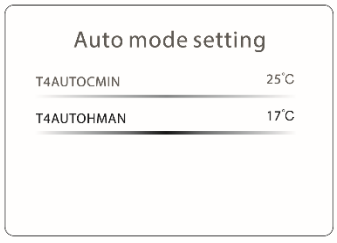
| Setting | Description |
|---|---|
| 0 | Fan coil unit |
| 1 | Floor heating loop |
| 2 | Radiator |

#### 7.3.3.8 Force defrost

**Force defrost** enable heat pump enters defrost mode by manual operation when heat pump runs for 10min and air side heat exchanger outlet temperature T3<0℃ lasts for more than 6min.

| Setting | Description |
|---|---|
| 0 | Disable **Force defrost** function |
| 1 | Enable **Force defrost** function |

### 7.3.4 Auto mode setting

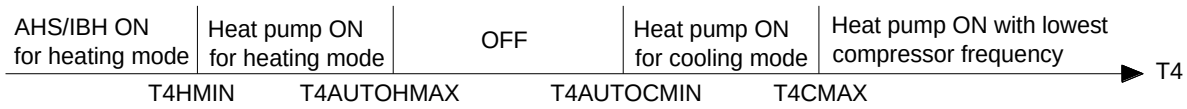



#### 7.3.4.1 T4AUTOCMIN, T4AUTOHMAX

**T4AUTOCMIN** defines the ambient temperature below which the heat pump will not provide chilled water for space cooling in auto mode.

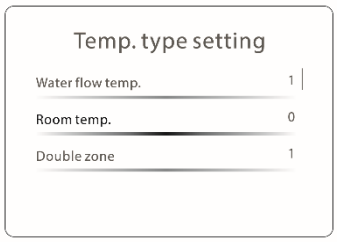
**T4AUTOHMAX** defines the ambient temperature above which the heat pump will not provide hot water for space heating in auto mode.

Diagram below illustrates the effects of **T4AUTOCMIN**, **T4AUTOHMAX, T4CMAX and T4HMIN.**

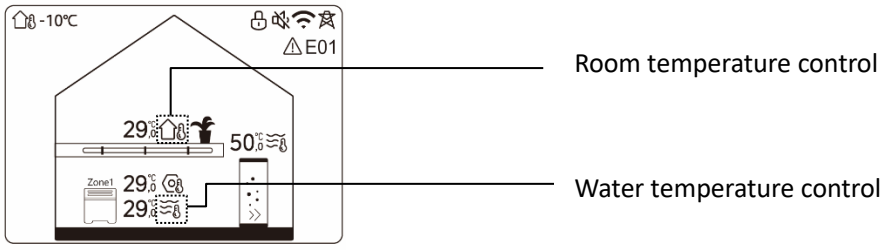



Abreviations:
AHS: Additional heating source
IBH: Backup electric heater
T4CMAX: The ambient temperature above which heat pump operates with lowest compressor frequency.
T4HMIN: The ambient temperature below which the heat pump will not operate in heating mode.

### 7.3.5 Temp. type setting




The TEMP. TYPE SETTING is used for selecting whether the water flow temperature or room temperature is used to control the ON/OFF of the heat pump. In this case, **7.3.6 Room thermostat setting** should be defined as 0.




#### 7.3.5.1 Water flow temp.

**Water flow temp.** defines whether heat pump is controlled by leaving water temperature.

| Setting | Description |
|---|---|
| 1 | Heat pump is controlled by leaving water temperature. |
| 0 | Heat pump is not controlled by leaving water temperature. |

#### 7.3.5.2 Room temp.

**Room temp.** defines whether heat pump is controlled by room temperature detected by the temperature sensor inside the wired controller.

| Setting | Description |
|---|---|
| 1 | Heat pump is controlled by room temperature no matter what is the setting of **7.3.5.1 Water flow temp.** In this case, the target water flow temperature will be calculated from climate curves. |
| 0 | Heat pump is not controlled by room temperature. |

#### 7.3.5.3 Double zone

**Double zone** defines the number of zones.

| Setting | Description |
|---|---|
| 1 | Double zones control |
| 0 | Single zone control |

Figure below illustrates the effects of different combinations in **Temp. type setting.**

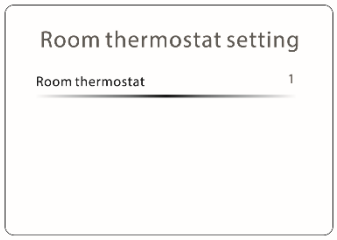
For single zone control

| WATER FLOW TEMP. | ROOM TEMP. | DOUBLE ZONE | Zones control |
|---|---|---|---|
| 1 | 0 | 0 | Zone 1: Water temperature control |
| 0 | 1 | 0 | Zone 1: Room temperature control |

For double zone control

| WATER FLOW TEMP. | | ROOM TEMP. | DOUBLE ZONE | | Zones control |
|---|---|---|---|---|---|
| YES | | YES | YES | NO | Zone 1: Water temperature control |
| | | | | | Zone 2: Room temperature control |
| YES | NO | NO | YES | | Zone 1: Water temperature control |
| | | | | | Zone 2: Water temperature control |
| YES | NO | YES | YES | | Zone 1: Water temperature control |
| | | | | | Zone 2: Room temperature control |

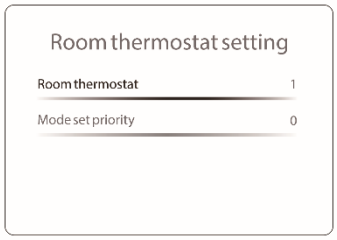
### 7.3.6 Room thermostat setting




Room thermostat can be as an alternative solution to control heat pump.

| Setting | Description | Wired controller is used to |
|---|---|---|
| 0 | • NON<br>• Without room thermostats(means **1.3.5 Temp. type setting** is valid) | • Control heat pump ON/OFF<br>• Define water temperature<br>• Define mode(heating/cooling/auto mode) |
| 1 | • MODE SET<br>• Room thermostat provides separate heating/cooling switch signal to control heat pump ON/OFF<br>• One zone control<br>• All timers are invalid except DHW timers. | • Define water temperature |
| 2 | • ONE ZONE<br>• Room thermostat provides switch signal to control heat pump ON/OFF<br>• One zone control<br>• All timers are invalid except DHW timers. | • Define water temperature<br>• Define mode(heating/cooling mode) |
| 3 | • DOUBLE ZONE<br>• Room thermostat provides switch signal to control heat pump ON/OFF<br>• Double zones control<br>• All timers are invalid except DHW timers. | • Define water temperature<br>• Define mode(Only for heating mode) |

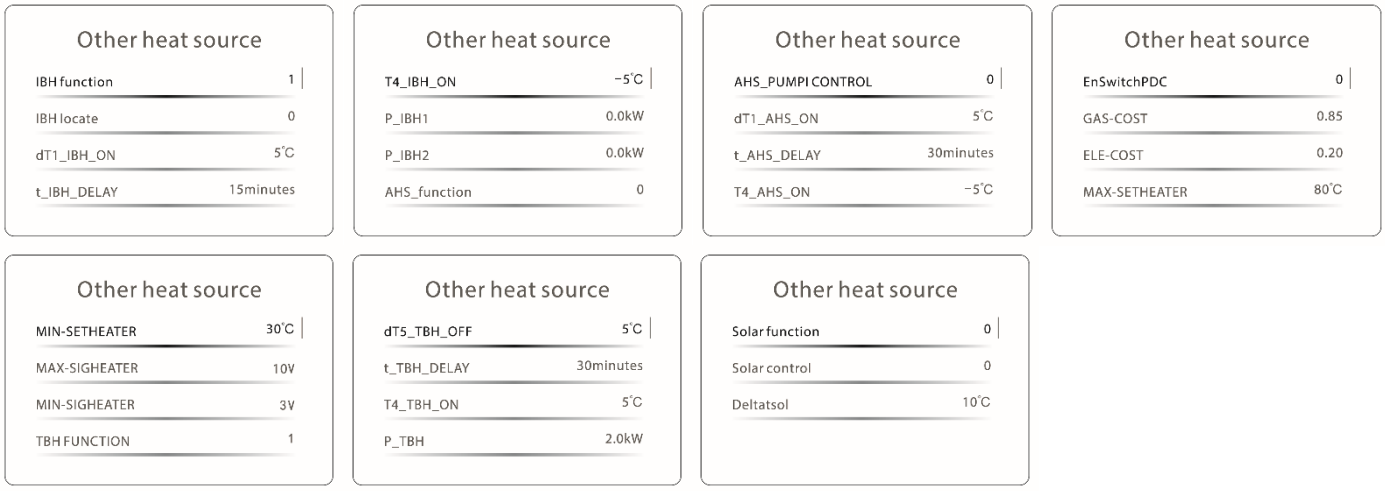
If **Room thermostat setting** is defined as MODE SET, the interface appears:




**Mode set priority** defines whether cooling mode or heating mode takes priority.

| Setting | Description |
|---|---|
| 0 | When heating and cooling switch signal are closed simultaneously, heat pump runs in heating mode. |
| 1 | When heating and cooling switch signal are closed simultaneously, heat pump runs in cooling mode. |

### 7.3.7 Other Heat Source Menu




#### 7.3.7.1 IBH FUNCTION, IBH LOCATE, dT1_IBH_ON, t_IBH_DELAY, T4_IBH_ON, P_IBH1, P_IBH2

**IBH FUNCTION** defines backup heater function.

| Setting | Description |
|---|---|
| 0 | IBH is used for heating mode and DHW mode |
| 1 | IBH is used for heating mode |

**IBH LOCATE** defines backup heater/auxiliary heating source installation location

| Setting | Description |
|---|---|
| 0 | Pipe loop |

**dT1_IBH_ON** defines water temperature hysteresis of activating electric heater. When T1S - T1 ≥ dT1_IBH_ON the backup electric heater is on.

T1S: Heat pump leaving water set temperature

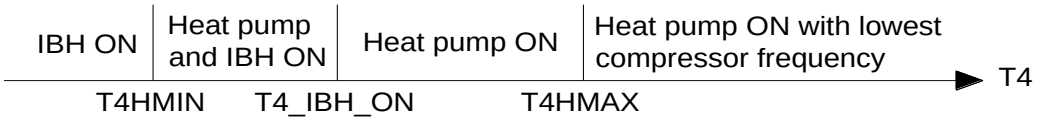
T1: Heat pump leaving water temperature

**t_IBH_DELAY** defines the delayed start-up time of electric heater. Electric heater will turn on **t_IBH_DELAY** minutes later after compressor starts.

**T4_IBH_ON** defines the ambient temperature below which the backup electric heater is on.

**Note: Only when dT1_IBH_ON, t_IBH_DELAY and T4_IBH_ON are met at the same time then electric heater turns on.**

Diagram below illustrates the effects of **T4_IBH_ON, T4HMIN** and **T4HMAX.**




Abreviations:
T4: Outdoor ambient temperature
IBH: Electric heater
T4HMIN: The ambient temperature below which the heat pump will not operate in heating mode.
T4HMAX: The ambient temperature above which the heat pump will operate heating mode with lowest compressor frequency.

**P_IBH1** defines heating capacity of IBH1, which is used for energy consumption statistics.

**P_IBH2** defines heating capacity of IBH2, which is used for energy consumption statistics.

#### 7.3.7.2 AHS FUNCTION, AHS_PUMP_I CONTROL, dT1_AHS_ON, t_AHS_DELAY, T4_AHS_ON

**AHS FUNCTION** defines auxiliary heating source function.

| Setting | Description |
|---|---|
| 0 | Without Auxiliary heating source |
| 1 | Auxiliary heating source is used for heating mode |
| 2 | Auxiliary heating source is used for heating mode and DHW mode |

**AHS_PUMP_I CONTROL** select the Pump_I operating status when only auxiliary heating source runs.

| Setting | Description |
|---|---|
| 0 | Pump_I runs when auxiliary heating source runs only. |
| 1 | Pump_I does not run when auxiliary heating source runs only. In this case, please confirm there is an additional pump running for auxiliary heating source. |

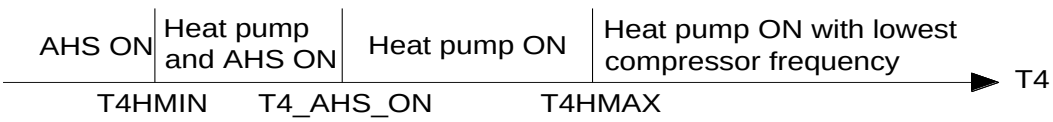
**dT1_AHS_ON** defines water temperature hysteresis of activating auxiliary heating source. When T1S - T1 ≥ dT1_AHS_ON the additional heating source is on.
T1S: Heat pump leaving water set temperature
T1: Heat pump leaving water temperature

**t_AHS_DELAY** defines the delayed start-up time of auxiliary heating source. Auxiliary heating source will turn on **t_AHS_DELAY** minutes later after compressor starts.

**T4_AHS_ON** defines the ambient temperature below which the auxiliary heating source is on.

**Note: Only when dT1_AHS_ON, t_AHS_DELAY and T4_AHS_ON are met at the same time then auxiliary heating source turns on.**

Diagram below illustrates the effects of **T4_AHS_ON, T4HMIN** and **T4HMAX.**




Abreviations:
T4: Outdoor ambient temperature
AHS: Auxiliary heating source
T4HMIN: The ambient temperature below which the heat pump will not operate in heating mode.
T4HMAX: The ambient temperature above which the heat pump will operate heating mode with lowest compressor frequency.

#### 7.3.7.3 EnSWITCHPDC, GAS_COST, ELE_COST

**EnSWITCHPDC** defines whether heat pump and additional heating source switch automatically based on economic performance and system high efficiency.

| Setting | Description |
|---|---|
| 0 | Disable EnSWITCHPDC function, **T4_AHS_ON** need to be defined manually. Additional heating source may work with heat pump depends on the water temperature and heat pump status. |
| 1 | Enable EnSWITCHPDC function, **T4_AHS_ON** is calculated according to price of gas and electricity and the efficiency of boiler and heat pump. Only Additional heating source works at ambient temperature of T4_AHS_ON because of the economic performance and system high efficiency. |

**GAS_COST** defines gas price

**ELE_COST** defines electricity price

#### 7.3.7.4 MAX_SETHEATER, MIN_SETHEATER, MAX_SIGHEATER, MIN_SIGHEATER

When "AHS1" port and "AHS2" port of main control PCB are connected with auxiliary heating source "ON/OFF" signal, auxiliary heating source leaving water temperature automatically change as voltage changes.

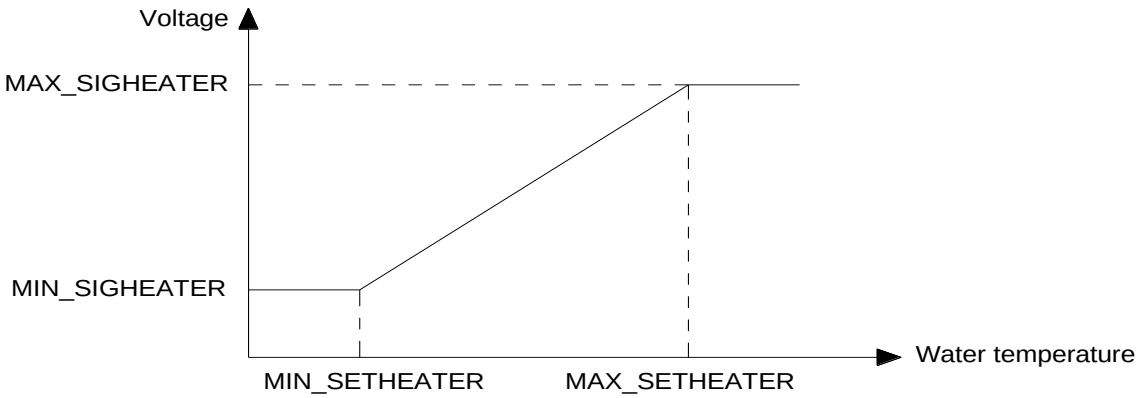
**MAX_SETHEATER** sets the maximum water temperature of auxiliary heating source.

**MIN_SETHEATER** sets the minimum water temperature of auxiliary heating source.

**MAX_SIGHEATER** sets the voltage corresponding to the maximum water set temperature of auxiliary heating source.

**MIN_SIGHEATER** sets the voltage corresponding to the minimum water set temperature of auxiliary heating source.

Diagram below illustrates the effects of **MAX_SETHEATER, MIN_SETHEATER, MAX_SIGHEATER** and **MIN_SIGHEATER.**




#### 7.3.7.5 TBH FUNCTION, dT5_TBH_OFF, t_TBH_DELAY, T4_TBH_ON, P_TBH

**TBH FUNCTION** defines whether tank booster heater function is activated.

| Setting | Description |
|---|---|
| 0 | Disable tank booster heater function |
| 1 | Enable tank booster heater function |

**dT5_TBH_OFF** defines water temperature hysteresis of inactivating tank booster heater when heat pump malfunctions.
When T5 > Min(T5S+dT5_TBH_OFF, 70°C), the tank booster heater is off.
T5S: Domestic hot water tank set temperature

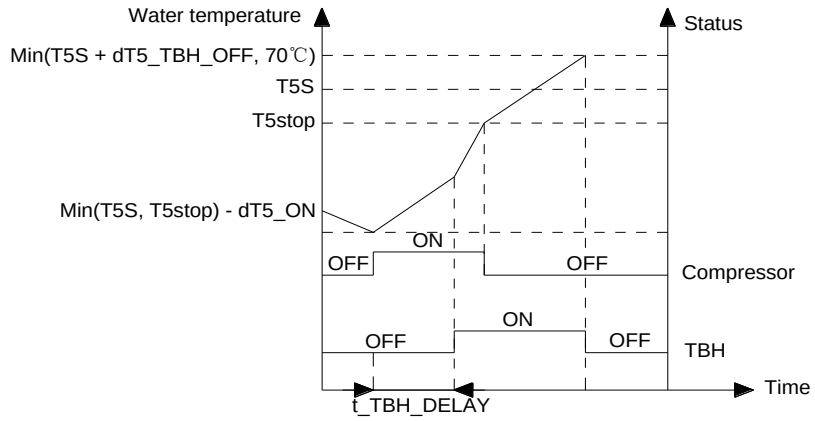
**t_TBH_DELAY** defines the delayed start-up time of tank booster heater. Tank booster heater will turn on **t_TBH_DELAY** minutes later after compressor starts.

**T4_TBH_ON** defines the ambient temperature below which the tank booster heater is on.

**Note: Only when t_TBH_DELAY, T4_TBH_ON are met at the same time then tank booster heater turns on.**

**P_TBH** defines the power input of tank booster heater.

Diagram below illustrates the operation of heat pump and tank booster heater of DHW mode.




Abbreviations:
T5S: DHW set temperature
T5stop: DHW mode leaving water temperature operating limit
TBH: Immersion heater

### 7.3.7.6 Solar function, Solar control, Deltasol

**Solar function** defines whether the heating system is equipped with solar function.

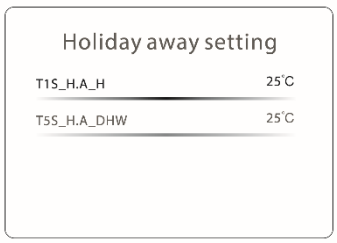
| Setting | Description |
|---|---|
| 0 | Without solar function. |
| 1 | With only solar function. |
| 2 | With solar function and heat pump. |

**Solar control** defines the control type of solar pump

| Setting | Description |
|---|---|
| 0 | Solar pump(Pump_S) is controlled by solar temperature sensor |
| 1 | Solar pump(Pump_S) is controlled by SL1SL2 signal |

**Deltasol** defines temperature hysteresis of activating solar pump(Pump_s).
When Tsolar > T5 + **Deltasol**, T5 < 79℃ and DHW mode is ON, then solar pump activates.

### 7.3.8 Holiday away setting



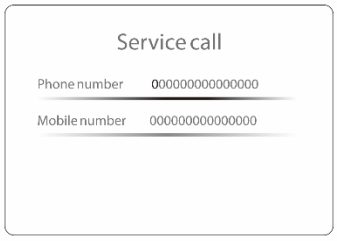
#### 7.3.8.1 T1S_H.A._H, T5S_H.M_DHW

Holiday away setting is used to set the outlet water temperature to prevent water pipes freezing when away from home in cold weather seasons.

**T1S_H.A._H** defines heat pump leaving water temperature for space heating mode during holiday away mode.

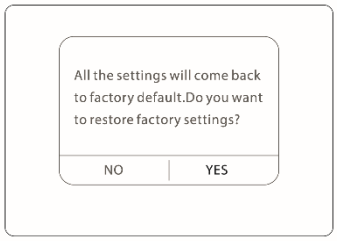
**T5S_H.M_DHW** defines domestic hot water tank temperature for DHW mode during holiday away mode.

### 7.3.9 Service call

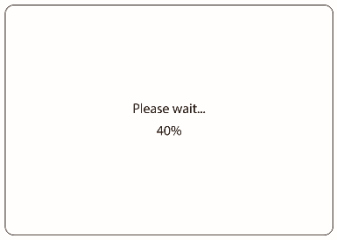



**Phone number** and **Mobile number** define after-sales service contact numbers. Press ‹ › to navigate cursor and press ^ ˇ to adjust the numerical values. The maximum length of the phone numbers is 13 digits.

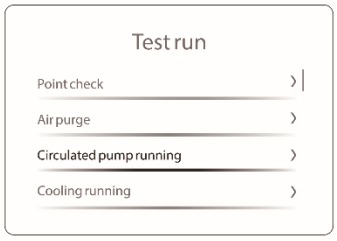
### 7.3.10 Restore factory settings

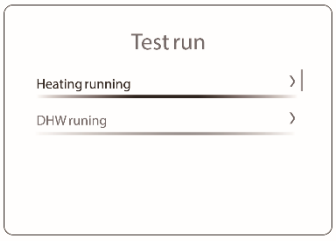



**Restore factory settings** is used to restore all the parameters set in the user interface to factory defaults.
On selecting YES, the process of restoring all settings to factory defaults begins and progress is displayed as a percentage.



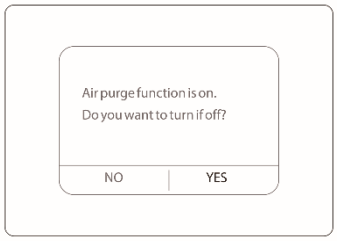

### 7.3.11 Test run



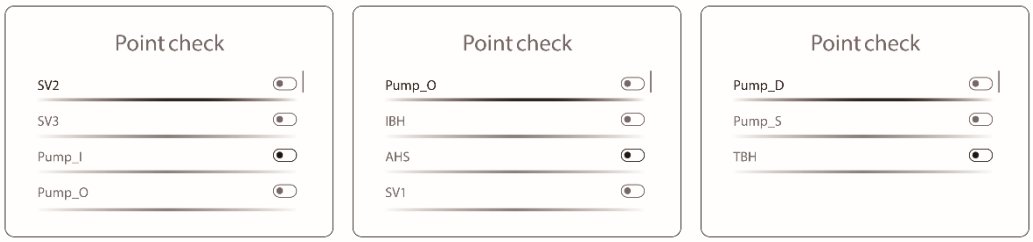




**Test run** is used to do the point check and check that air purge function, circulation pump, cooling mode, heating mode and DHW mode are all operating correctly. If any error code is displayed during the test run operation, the cause should be investigated.

During test run, all buttons except ○ are invalid. If you want to turn off the test run, please press ○. For example, when the unit is in air purge mode, after you press ○, the following page will be displayed:

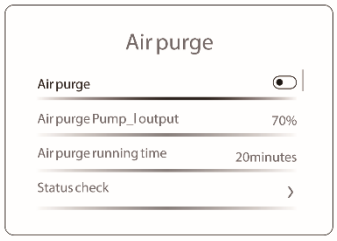



#### 7.3.11.1Point check




The **POINT CHECK** menu is used to check the operation of individual components. Use ^ v to scroll to the components you want to check and press ○ to toggle the on/off state of the component. If a valve does not turn on/off or a pump/heater does not operate when their on/off state is toggled, please check the connection between component and main PCB and make sure components' status is normal.

#### 7.3.11.2Air purge

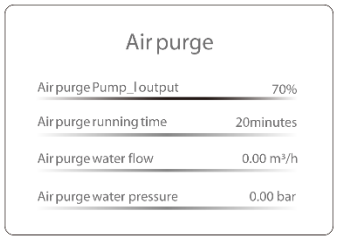



Once installation is complete, it is important to run the air purge function to remove any air which may be present in the water piping and which could cause malfunctions during operation. Before running **Air purge** mode, make sure that the air purge valve is open. Pump_I will run according to the output and running time that has been set.

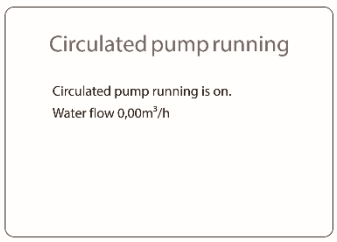
**Air purge** defines whether the function is activated.

**Air purge Pump_I output** defines the Pump_I output capacity.

**Air purge running time** defines the period that Pump_I operates during the air purge process.
**Status check** allows installers to check the real-time operation parameters of air purge operation.

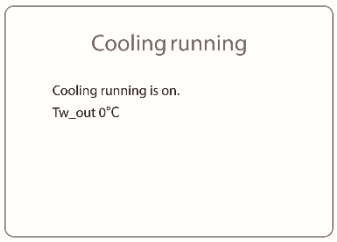


#### 7.3.11.3 Circulated pump running



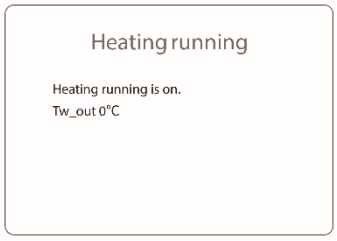

**Circulated pump running** operation is used to check the operation of the circulation pump.
When circulation pump running is turned on, all running components will stop.
60 seconds later, the SV1 will be off, the SV2 will be on.
60 seconds later Pump_I will operate.
30s later, if the flow switch checked normal flow, PUMP_I will operate for 3min.
After the pump stops 60 seconds, the SV1 will close and the SV2 will be off.
60s later the both PUMP_I and PUMP_O will operate.
2 mins later, the flow switch will check the water flow.
If the flow switch closes for 15s, PUMP_I and PUMP_O will operate until the next command is received.

#### 7.3.11.4 Cooling running




The **Cooing running** operation is used to check the operation of the system in space cooling mode.
During the **Cooing running** operation, the leaving water set temperature is 7°C. The current actual leaving water temperature is displayed on the user interface. The unit operates until the leaving water temperature drops to the set temperature or the next command is received.

#### 7.3.11.5 Heating running



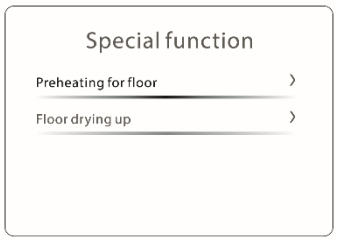

The **Heating running** operation is used to check the operation of the system in space heating mode.
During **Heating running** test running, the default target outlet water temperature is 35°C. The IBH (backup heater) will turn on after the compressor runs for 10 min. After the IBH runs for 3 minutes, the IBH will turn off. Heat pump will operate until the water temperature increase to a certain value or the next command is received.

#### 7.3.11.6 DHW running

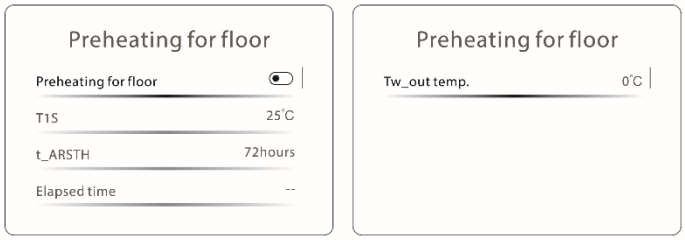
The **DHW running** operation is used to check the operation of the system in DHW mode.

During **DHW running** test running, the default target temperature of the domestic water is 55°C. The TBH(tank boost heater) will turn on after the compressor runs for 10min. The TBH will turn off 3 minutes later. Heat pump will operate until the water temperature increase to a certain value or the next command is received.

### 7.3.12 Special Function




### 7.3.12.1 Preheating for floor




**Preheating for floor** function provides mild heat to the underfloor water piping for the first time during seasonal heating, diminish the risk of damage to the floor and piping system.

| Setting | Description |
|---|---|
| 0 | Disable preheating for floor function |
| 1 | Enable preheating for floor function |

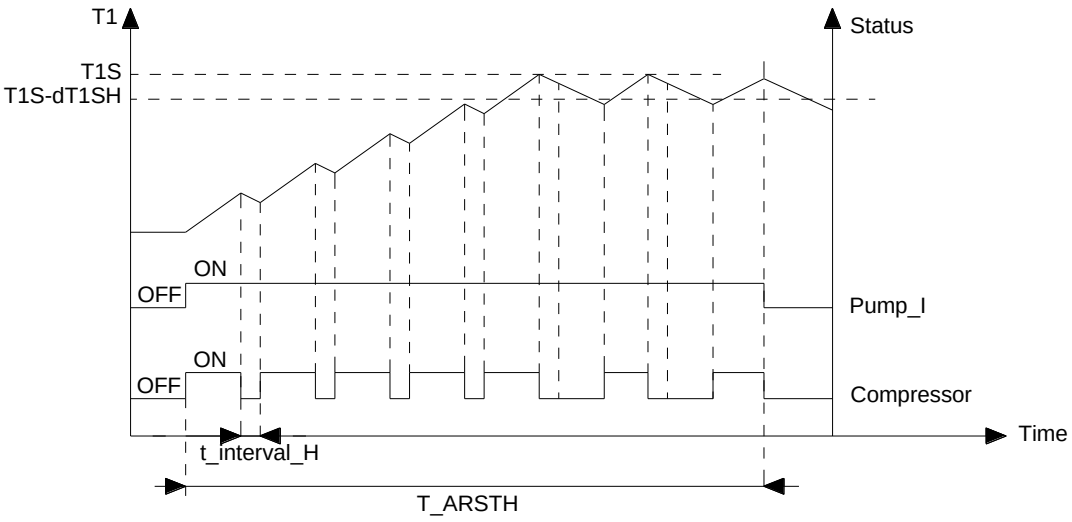
**T1S** defines heat pump leaving water temperature in preheating.

**T_ARSTH** defines running time for first preheating of the floor

**Elapsed time** is the period that **Preheating for floor function** had run.

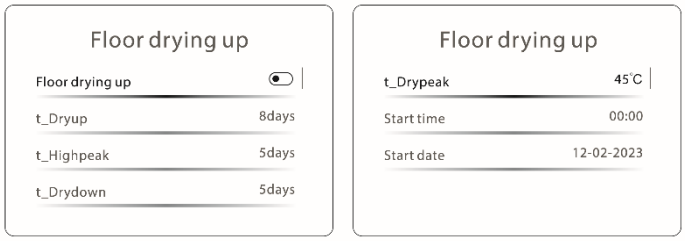
**Tw_out temp.** is the current leaving water temperature

Diagram below illustrates the operation of **Preheating for floor** function.



Abbreviations:
T1: Leaving water temperature
dT1SH: Water temperature hysteresis of activating heat pump.
t_interval_H: The delayed start-up time of compressor in heating mode.

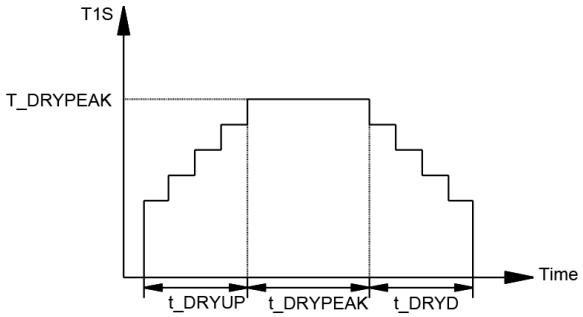
### 7.3.12.2Floor drying up




For newly-installed under-floor heating systems, floor drying up is necessary to remove moisture from the floor slab and subfloor to prevent warping or rupture of the floor. Heat pump provides mild heat to the concrete or other structural material around the underfloor water piping in a certain period of time, accelerate the process of getting rid of moisture. During floor drying up operation, the temperature of the floor would be increased gradually. In the event of a heat pump malfunction, floor drying up mode will continue if a backup electric heater and/or auxiliary heating source is available and configured to support space heating mode.

There are three phases to the floor drying up operation:

- Phase 1: gradual temperature increase to the peak temperature
- Phase 2: maintain peak temperature
- Phase 3: gradual temperature decrease from the peak temperature




**Floor drying up**

| Setting | Description |
|---|---|
| 0 | Disable floor draying up function |
| 1 | Enable floor draying up function |

**t_Dryup** defines the duration of Phase 1.

**t_Highpeak** defines the duration of Phase 2.

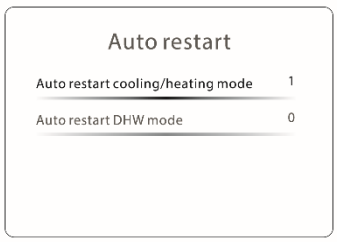
**t_Drydown** defines the duration of Phase 3.

**t_Drypeak** defines the heat pump leaving water temperature of Phase 2.

**Start time** defines the floor drying up operation start time.

**Start date** defines the floor drying up operation start date.

### 7.3.13 Auto restart




**Auto restart** sets whether or not the unit re-applies the mode and unit status settings when the power returns following a power failure.

If **7.3.6 Room thermostat setting** is defined as not 0, **Auto restart function** will not be applicable.

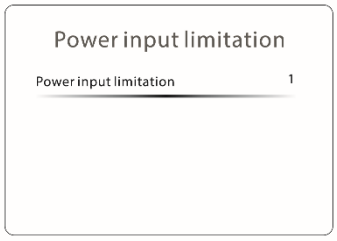
**Auto restart cooling/heating mode**

| Setting | Description |
|---|---|
| 0 | Disable auto restart cooling/heating mode |
| 1 | Enable auto restart cooling/heating mode |

**Auto restart DHW mode**

| Setting | Description |
|---|---|
| 0 | Disable auto restart DHW mode |
| 1 | Enable auto restart DHW mode |

### 7.3.14 Power input limitation




**Power input limitation** makes the machine suitable for a variety of current supplies. There are 8 configurations for user to choose according to the maximum allowable access current. If the unit will operate at larger current input, 1 should be selected. If the unit will operate at a lower current input, 2-8 should be selected and the power input and capacity will decrease.

Power limitation function

| Setting | Model | | | |
|---|---|---|---|---|
| | 4kW<br>6kW | 8kW<br>10kW | Single phase 12~16kW | Three phase 12~16kW |
| 1 | 13.5A | 17.5A | 28A | 9.5A |
| 2 | 12A | 16A | 26A | 8.5A |
| 3 | 11A | 15A | 24A | 7.5A |
| 4 | 10A | 14A | 22A | 7A |
| 5 | 9A | 13A | 20A | 6.5A |
| 6 | 8A | 12A | 18A | 6A |
| 7 | 8A | 12A | 18A | 6A |
| 8 | 8A | 12A | 18A | 6A |

### 7.3.15 Input definition


**INPUT DEFINE** defines sensors and functions to fulfill with installation.

**M1 M2** defines the function of M1M2 port

| Setting | Description |
|---|---|
| 0 | Remote ON/OFF control of heat pump |
| 1 | Remote ON/OFF control of tank booster heater |
| 2 | Remote ON/OFF control of auxiliary heating source |

**Smart grid** defines whether SMART GRID control signal is connected to hydronic PCB.

| Setting | Description |
|---|---|
| 0 | Disable Smart grid function |
| 1 | Enable Smart grid function |

**T1T2** defines control options of Port T1T2

| Setting | Description |
|---|---|
| 0 | Installation with MH-kit |
| 1 | Installation without MH-kit |

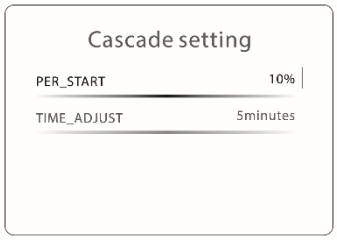
**Tbt** defines whether balance tank temperature sensors are installed in the balance tank.

| Setting | Description |
|---|---|
| 0 | Installation with balance tank temperature sensor(Tbt) |
| 1 | Installation without balance tank temperature sensor(Tbt) |

**P_X PORT** can be defined as defrosting signal or alarm signal according to customers' demand.

| Setting | Description |
|---|---|
| 0 | Defrosting signal |
| 1 | Alarm signal |

### 7.3.16 Cascade setting

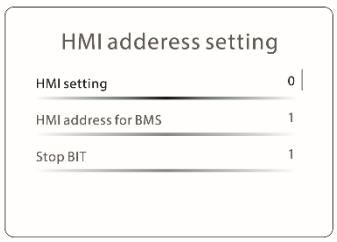



**PER_START** sets the start-up percentage of multiple units for the first time start-up after power on. For example:

| Total units | PER_START | Starting units |
|---|---|---|
| 6 | 50% | 3 |
| 6 | 30% | 2 |

**TIME_ADJUST** sets the judgment period of adding and subtracting units

### 7.3.17 HMI address setting




**HMI setting** sets the wired controller is master or slave. (0=MASTER, 1=SLAVE)

When HMI SET is set to SLAVE, the controller can only switch the operation mode, turn on or off, set the temperature, and cannot set other parameters and functions.

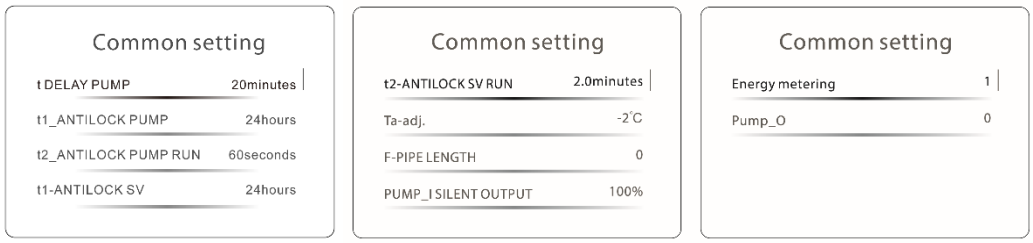
| Setting | Description |
|---|---|
| 0 | Define wired controller as master controller. |

**HMI ADDRESS FOR BMS** sets the HMI address code for BMS.(only valid for master controller)

**STOP BIT** set upper computer stop bit(1: STOP BIT1; 2:STOP BIT2)

| Setting | Description |
|---|---|
| 1 | Stop bit 1 |
| 2 | Stop bit 2 |

### 7.3.18 Common setting




#### 7.3.18.1 t_DELAY PUMP

**t_DELAY PUMP** defines the delayed stop time of Pump_I. Pump_I will stop **t_DELAY PUMP** minutes later after compressor stops base on system temperature equalization consideration.

#### 7.3.18.2 t1_ANTILOCK PUMP, t2_ANTILOCK PUMP RUN, t1_ANTILOCK SV, t2_ANTILOCK SV RUN

Antilock operation prevent components from sticking to result in system fail.

**t1_ANTILOCK PUMP** defines the interval time that Pump_I, Pump_O and Pump_C runs in order to antilock

**t2_ANTILOCK PUMP RUN** defines the running time for Pump_I, Pump_O and Pump_C antilock operation

**t1_ANTILOCK SV** defines the interval time that SV1, SV2 and SV3 valve works in order to antilock

**t2_ANTILOCK SV RUN** defines the running time for SV1, SV2 and SV3 valve antilock operation

#### 7.3.18.3 Ta-adj

**Ta-adj** is an correction value for room temperature sensor(Ta) which is inside the wired controller. The display room temperature value is equal to Ta + **Ta-adj.**

#### 7.3.18.4 F-PIPE LENGTH

**F-PIPE LENGTH** select the total length of the liquid pipe.

| Setting | Description |
|---|---|
| 0 | Total length of the liquid pipe < 10m |
| 1 | Total length of the liquid pipe ≥ 10m |

#### 7.3.18.5 PUMP_I_SLIENT OUTPUT

**PUMP_I_SLIENT OUTPUT** can decrease water pump maximum output in order to decrease the noise of heat pump.

#### 7.3.18.6 Energy metering

**Energy metering** allows user to check energy data of day, week, month and year.

| Setting | Description |
|---|---|
| 0 | Disable energy metering function |
| 1 | Enable energy metering function |

#### 7.3.18.7 Pump_O

**Pump_O** defines Zone 1 pump(**Pump_O**) control type.

| Setting | Description |
|---|---|
| 0 | Pump_O keeps running |
| 1 | Pump_O operation is controlled by heat pump |

#### 7.3.18.8 Glycol, Glycol concentration

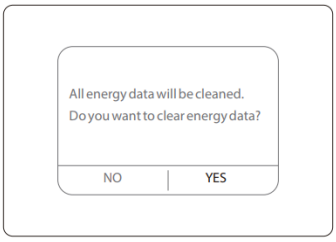
**Glycol** defines whether the unit has added glycol.

| Setting | Description |
|---|---|
| 0 | Without glycol |
| 1 | With glycol |

**Glycol concentration** Define the concentration of glycol added to the unit.

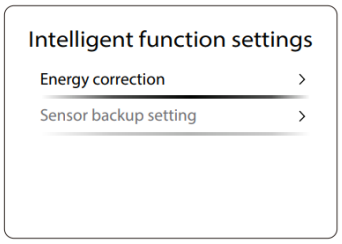
The concentration setting of glycol will affect the correction of the water flow of the unit

### 7.3.19 Clear energy data

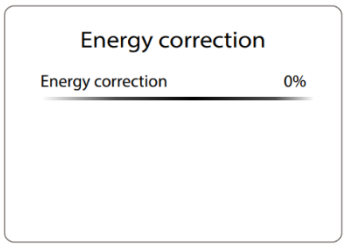



Once selecting YES, All energy metering data is clear.

### 7.3.20 Intelligent function settings




#### 7.3.20.1 Energy correction

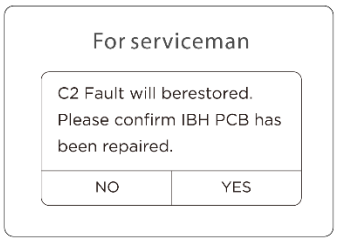



The actual installation scenario would be different from one to another. The energy metering calculation of the unit could deviate slightly due to the actual installation.

**Energy correction** is to offset the deviation of the energy metering calculation of the unit. Value from -50% to 50%, default is 0. It is applied for Heating, Cooling and DHW.

The final energy data = original data * (1+ **Energy correction**)

### 7.3.21 C2 fault restore




For the unit with IBH(internal backup heater), when C2 error occurs, please follow C2 troubleshooting guide of Part4 Diagnosis and Troubleshooting. If necessary, select YES to restore C2 code.

## 7.4 Operation parameter

**Operation parameter** is for reviewing the operation parameters. The interface below is for reference and different units' state correspond to different parameter values.

Operation for entering **Operation parameter**：

Step 1: Home page

Step 2: Press "≡"

Step 3: Select "Unit status"

Step 4: Select "Operation parameter"

Step 5: Press ○

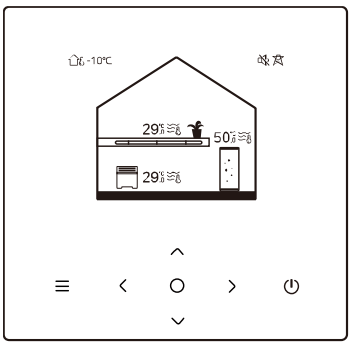

Part of operation parameter may be disabled or unavailable and will not appear on the menu.

### 7.5 OTA (Over-The-Air) guideline

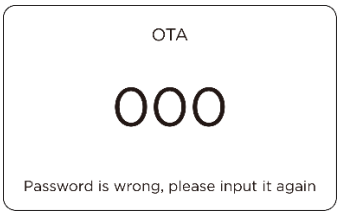
HIM software version is above V1.0.0.95

If your wire controller is not connected to the mobile APP, you need to connect to Internet. (Set personal hotspot with smart phone, hotspot name as: SMARTOTA Password: ota12345. And place the smart phone near the wired controller)
If your wire controller is already connected to the mobile APP, you can follow the following procedure directly.

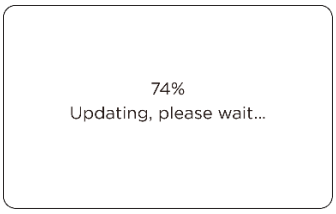
Step 1: Long press "≡"and "ᵛ" for about 4 seconds in wire controller homepage.




Step 2: A password for OTA is needed, use the arrow button to change the password as 999.
Then press "O" to confirm to start the OTA.



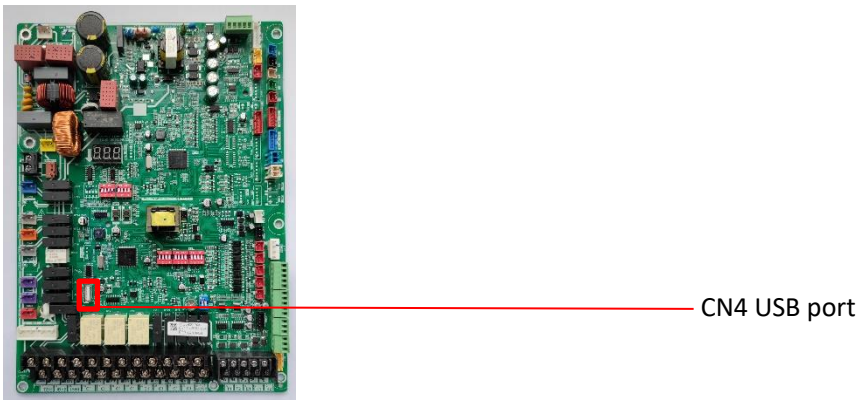

Step 3:HIM will display “Updating, please wait...”, a progress percentage will be shown.
When the OTA progress is finish, the HIM will auto restart. Check whether the OTA is succeeded and software of the HIM had been updated.



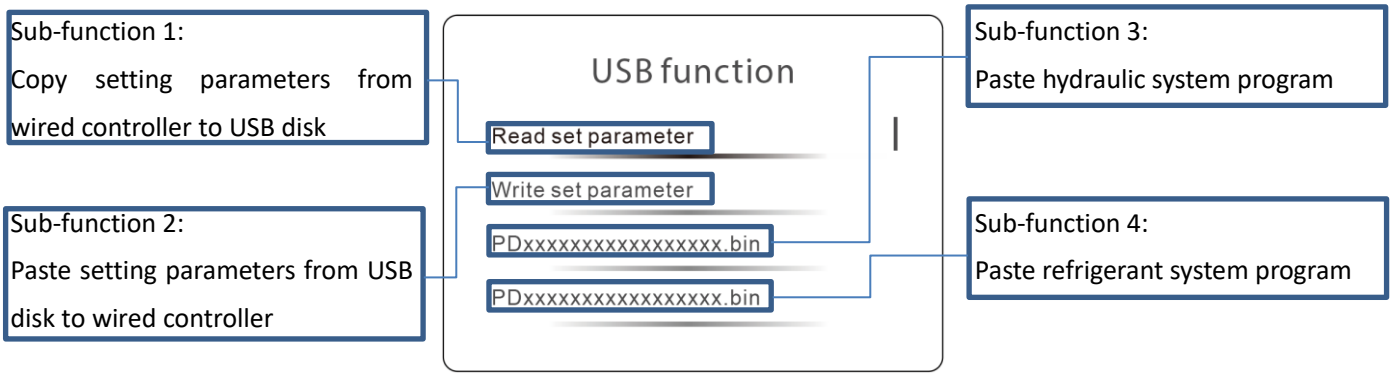
## 8 USB Function Field Settings

USB function helps you to transmit parameters and program easily. When USB disk connect to CN4 port of main control PCB, the USB function interface appears automatically on the wired controller.

Main control PCB

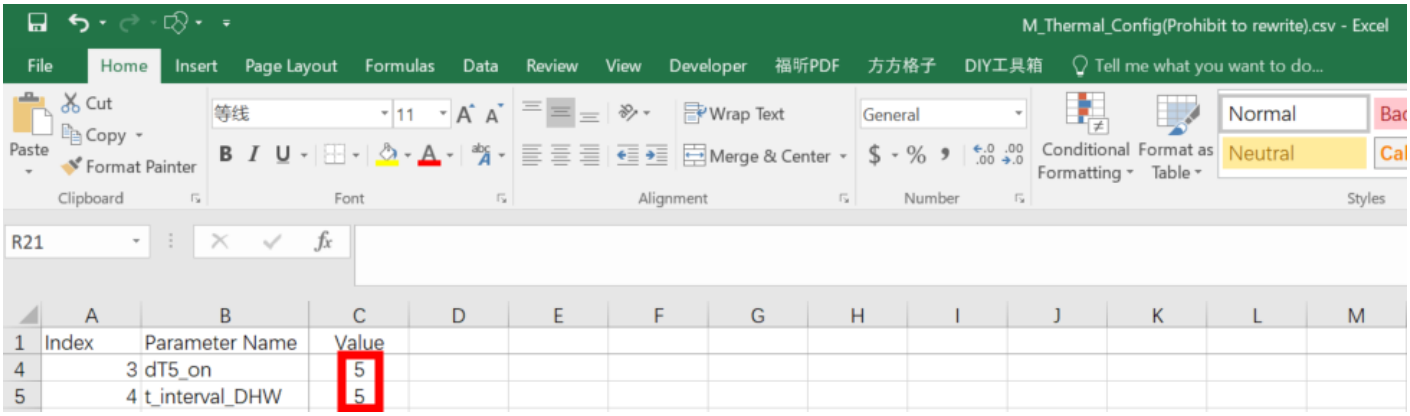



USB function interface




Sub-function 1:

Once the process finishes successfully, the parameter file “M_Thermal_Config(Prohibit to rewrite).csv” will be generated in the USB disk. If you want to change the parameter on computer, please remember only change the value of column C(red frame below) is allowed and do not change any other content or the file name.




Sub-function 2:

Please make sure there is only one parameter file in the USB disk before using this function.

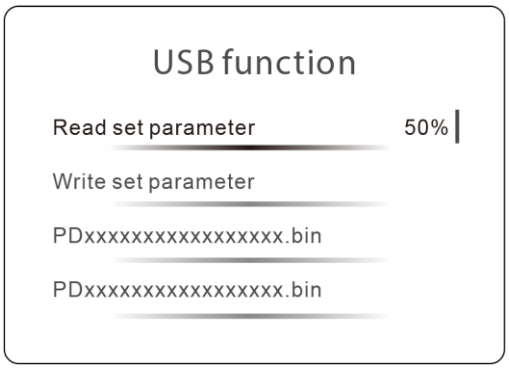
Sub-function 3:

Please make sure there is only one applicable hydraulic system program in the USB disk before using this function.

Sub-function 4:

Please make sure there is only one applicable refrigerant system program in the USB disk before using this function.

Press ^ v to choose the item and press ○ to confirm your choice, then the rate of process appears like below:




During the process, all the buttons are invalid.

When the process finishes, pop-up window with “Success” cue word appears briefly and unit stops. Please remove the USB disk and restart the unit.

When the process fails, pop-up window with “Fail” cue word appears briefly. The system program remains unchanged.

If the stalled process happens, please remove the USB disk and try to insert the USB disk according to operation above.

# Part 4

# Diagnosis and Troubleshooting

# 1 Service Information

**DANGER !**

- These instructions are exclusively intended for qualified contractors and authorized installers
- Work on the refrigerant circuit with flammable refrigerant in safety group A2L may only be carried out by authorized heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40, Section HH. The certificate of competence from an industry accredited body.
- Brazing/soldering work on the refrigerant circuit may only be carried out by contractors certified in accordance with ISO 13585 and AD 2000, Datasheet HP 100R. And only by contractors qualified and certified for the processes to be carried out. The work must fall within the range of applications purchased and be carried out in accordance with the prescribed procedures. Soldering/brazing work on accumulator connections requires certification of personnel and processes by a notified body according to the Pressure Equipment Directive (2014/68/EU).
- Work on electrical equipment may only be carried out by a qualified electrician.
- Before initial commissioning, all safety relevant points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.

## 1.1 Label for Refrigerant Presence

Equipment should be provided with a label stating that it has been de-commissioned and emptied of refrigerant. The label should be dated and signed. Ensure that proper labels are pasted on the equipment stating the equipment contains flammable refrigerant

## 1.2 Leak Detection Methods

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants. An electronic leak detector should be used to detect flammable refrigerants, but its sensitivity may not be adequate, or the detector may need re-calibration. (Detection equipment should be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant. Leak detection equipment should be set at a percentage of the LFL of the refrigerant and should be calibrated to be suitable for the refrigerant employed. The appropriate percentage of gas (25% maximum) is confirmed. Leak detection fluids are suitable for use with most refrigerants but detergents containing chlorine should not be used as the chlorine may react with the refrigerant and corrode the copper pipes. If a leak is suspected, all naked flames should be removed or extinguished. If a leakage of refrigerant is found and brazing is required, all of the refrigerant should be recovered from the system, or isolated (by means of shut off valves) in a part of the system that is remote from the leak. Oxygen free nitrogen (OFN) should then be purged through the system both before and during the brazing process.

## 1.3 Check of Refrigeration Equipment

Where electrical components are to be changed, they should be fit for the intended purpose and comply with the correct specifications. Always follow the manufacturer's maintenance and service guidelines. In case of any doubt, consult the manufacturer's technical department for assistance. Check installations using flammable refrigerants.

- The amount of refrigerant to be charged depends on the size of the room where the refrigerant-containing parts are installed.
- The ventilation machinery and outlets should work adequately and be not obstructed.
- If an indirect refrigerating circuit is used, the secondary circuits should be checked for any refrigerant; Markings on the equipment should be visible and legible.
- Illegible markings and signs should be corrected.
- Refrigeration pipes or components should be installed in positions where they are unlikely to be exposed to any

substance that may corrode refrigerant-containing components, unless the components are constructed of materials that are inherently resistant to corrosion or are suitably protected from corrosion

### 1.4 Check of Electrical Devices

Repair and maintenance of electrical components should include initial safety checks and component inspection procedures. If a fault exists and could compromise safety, no electrical supply should be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution should be adopted. This should be reported to the owner of the equipment so all parties are advised. Repair and maintenance of electrical components should include initial safety checks and component inspection procedures. If a fault exists and could compromise safety, no electrical supply should be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution should be adopted. This should be reported to the owner of the equipment so all parties are advised. Initial safety checks should include the following:

- The capacitors should be discharged in a safe manner to avoid sparking risks
- No live electrical components and wiring can be exposed during the system charging, recovery or purging. Earth bonding should be continuous
- Earth bonding should be continuous

### 1.5 Repair of Sealed Components

1. During repair of sealed components, all electrical supplies should be disconnected from the equipment being worked upon prior to any removal of sealed covers. If it is absolutely necessary to have an electrical supply connected with the equipment during servicing, a permanently operating form of leak detection should be located at the most critical point to warn of a potentially hazardous situation.
2. Particular attention should be paid to the following to ensure that, by working on electrical components, the casing is not altered in such a way that Protection is compromised. This should include damage to cables, an excessive number of connections, terminals not made as per original specifications, damage to seals, and incorrect fitting of glands.
   - Ensure that all apparatuses are mounted securely.
   - Ensure that seals or sealing materials have not degraded such that they can no longer prevent the ingress of flammable atmospheres. Parts for replacement should be in accordance with the manufacturer s specifications.
   - The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

### 1.6 Repair of Intrinsically Safe Components

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that such loads will not exceed the permissible voltage or current permitted for the equipment in use. Intrinsically safe components are the only types that can be worked on when the components live in a flammable atmosphere. The test apparatus should be provided with the correct rating. Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere caused by a leak.

### 1.7 Transportation and Marking

Transport the equipment containing flammable refrigerants in accordance with the transport regulations. Mark the equipment with signs in compliance with local regulations.

### 1.8 Disposal

#### 1.8.1 General

- Components and accessories of the unit are not ordinary domestic wastes.
- The unit, compressors, and motors, etc. can only be disposed of by qualified specialists.
- This unit uses hydrofluorocarbon that can only be disposed of by qualified specialists

### 1.8.2 Packaging

- Dispose of the packaging properly.
- Observe all relevant regulations

### 1.8.3 Refrigerant Removal, Evacuation, Charge, Recovery, and Unit Decommissioning

**WARNING !**

Due to the feature of the R290 refrigerant, only carry out work when you have specific expert refrigeration knowledge and are competent for handling R290 refrigerant.
Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorized heating contractors.

#### 1.8.3.1 Removal and evacuation

When breaking into the refrigerant circuit for repair or any other purpose, follow the conventional procedures. However, it is important to follow the best practice since flammability should be considered. Operate as per the following procedure:

- Remove refrigerant;
- Purge the circuit with inert gas;
- Evacuate;
- Purge the circuit again with inert gas;
- Open the circuit by cutting or brazing

The refrigerant charged should be recovered and put in correct recovery cylinders. The system should be flushed with OFN to guarantee the unit safety. This process may need to be repeated several times. Compressed air or oxygen should not be used.

Flushing should be achieved by filling the system with OFN until the working pressure is achieved before venting to the atmosphere, and recovering the system to a vacuum. This process should be repeated until no refrigerant exists in the system. Upon the final OFN charge, the system should be vented down to reach the atmospheric pressure to start the work.

This operation is absolutely vital if brazing operations on the pipe-work are to take place.

Ensure that the outlet of the vacuum pump is not closed to any ignition sources and adequate ventilation is available.

#### 1.8.3.2 Charging procedures

In addition to conventional charging procedures, the following requirements should be followed:

- Ensure that contamination of different refrigerants does not occur when charging equipment is used. Hoses or lines should be as short as possible to minimize the amount of refrigerant contained in them.
- Earth the refrigeration system prior to charging the system with refrigerant.
- Label the system upon completion of the charging (if the system has not been labeled).
- Extreme care should be taken not to overfill the refrigeration system.
- Prior to recharging the system, test it with OFN. The system should be leak tested upon completion of charging but prior to commissioning. Carry out a follow-up leak test before leaving the site.

#### 1.8.3.3 Recovery

When removing refrigerant from the system, either for service or decommissioning, we recommend you remove all refrigerants safely by following the best practice.

When transferring refrigerant into cylinders, only use appropriate refrigerant recovery cylinders. Ensure that a proper number of cylinders are available for accommodating all the refrigerant. All cylinders to be used are designated and labeled for the recovered refrigerant (i.e., special cylinders for the recovery of refrigerant). The cylinders should be complete with pressure relief valves and associated shut-off valves that work properly.

Empty recovery cylinders should be evacuated and, if possible, cooled before the recovery starts.

The recovery equipment should work properly with a set of instructions concerning the equipment at hand, and should be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighting scales should be available and

work properly. Hoses should be complete with leak-free disconnection couplings and in good conditions. Before using the recovery equipment, check and verify that it works properly and has been properly maintained, and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant leakage. Consult the manufacturer in case of any doubt.

The recovered refrigerant should be returned to the refrigerant supplier in correct recovery cylinders, with the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units, especially in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to ensure that flammable refrigerant does not remain within the lubricant. Carry out the evacuation process before returning the compressor to the suppliers. To accelerate this process, you can only heat the compressor body electrically. Safety drain oil from the system.

#### 1.8.3.4 Decommissioning

Prior to this procedure, the technician should be completely familiar with the equipment and all its details. It is recommended that all refrigerants be recovered safely. Prior to the recovery, an oil and refrigerant sample should be taken for case analysis before re-use of reclaimed refrigerant. Electrical power should be available before the task is commenced.

1. Be familiar with the equipment and its operation.
2. Isolate the system electrically
3. Before attempting the procedure ensure that:
   - Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
   - All personal protective equipment should be available and used correctly.
   - The recovery process should be supervised at all time by a competent person.
   - Recovery equipment and cylinders should conform to the appropriate standards.
4. Pump down the refrigerant system, if possible.
5. If a vacuum is not possible, provide a manifold to remove the refrigerant from various parts of the system.
6. Make sure that the cylinders are situated on the scales before the recovery starts.
7. Start the recovery machine and operate it in accordance with the manufacturer's instructions.
8. Do not overfill the cylinders (for no more than 80% of the volume).
9. Do not exceed the maximum working pressure of the cylinders, even temporarily.
10. When the cylinders have been filled correctly and the process is completed, immediately remove the cylinders and the equipment from the site and close all isolation valves on the equipment.
11. The recovered refrigerant should not be re-used in any other refrigeration system unless it has been cleaned and checked.

## 1.9 R290 System Service

When repairing systems that use R290 refrigerant, the following warnings and operating requirements should be noted.

### 1.9.1 Warning about the R290 refrigerant

**⚠ WARNING**

**The following information indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.**

**The following applies to R290 refrigerant systems.**

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized.

For repair to the refrigerating system, the following precautions shall be complied with prior to conducting work on the system.

Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed.

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially flammable atmospheres.

Ensure that the leak detection equipment being used is suitable for use with flammable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

No person carrying out work in relation to a refrigeration system which involves exposing any pipe work that contains or has contained flammable refrigerant shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.

All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which flammable refrigerant can possibly be released to the surrounding space.

Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt consult the manufacturer’s technical department for assistance.

**The following checks shall be applied to installations using flammable refrigerants:**

– the charge size is in accordance with the room size within which the refrigerant containing parts are installed;
– the ventilation machinery and outlets are operating adequately and are not obstructed;
– if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
– marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
– refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

**Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.**

If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:
-that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
-that no live electrical components and wiring are exposed while charging, recovering or purging the system;
-that there is continuity of earth bonding.

During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon

prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Ensure that seals or sealing materials have not degraded such that they no longer serve the purpose of preventing the ingress of flammable atmospheres.

Replacement parts shall be in accordance with the manufacturer's specifications.

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of ageing or continual vibration from sources such as compressors or fans.

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, it is important that best practice is followed.

**Since flammability is a consideration. The following procedure shall be adhered to:**

- remove refrigerant;
- purge the circuit with inert gas;
- evacuate;
- purge again with inert gas;
- open the circuit by cutting or brazing.

The refrigerant charge shall be recovered into the correct recovery cylinders. The system shall be "flushed" with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for this task.

Flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum.

This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

This operation is absolutely vital if brazing operations on the pipe-work are to take place.

Ensure that the outlet for the vacuum pump is not close to any ignition sources and there is ventilation available. Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them. Prior to recharging the system it shall be pressure tested with OFN.

**DD.12 Decommissioning:**

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its

detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

a) Become familiar with the equipment and its operation.
b) Isolate system electrically.
c) Before attempting the procedure ensure that:

- mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- all personal protective equipment is available and being used correctly;
- the recovery process is supervised at all times by a competent person;
- recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.
e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
f) Make sure that cylinder is situated on the scales before recovery takes place.
g) Start the recovery machine and operate in accordance with manufacturer's instructions.
h) Do not overfill cylinders. (No more than 80 % volume liquid charge).
i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
k) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

**Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.**

**When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.**

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant Waste Transfer Note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Warning: disconnect the appliance from its power source during service and when replacing parts.

These units are partial unit air conditioners, complying with partial unit requirements of this International Standard, and must only be connected to other units that have been confirmed as complying to corresponding partial unit requirements of this International Standard.

### 1.9.2 Qualification requirements for maintenance personnel

**DANGER**

**The following information indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.**

**These instructions are exclusively intended for qualified contractors and authorized installers**

Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorized heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40, Section HH. The certificate of competence from an industry accredited body.

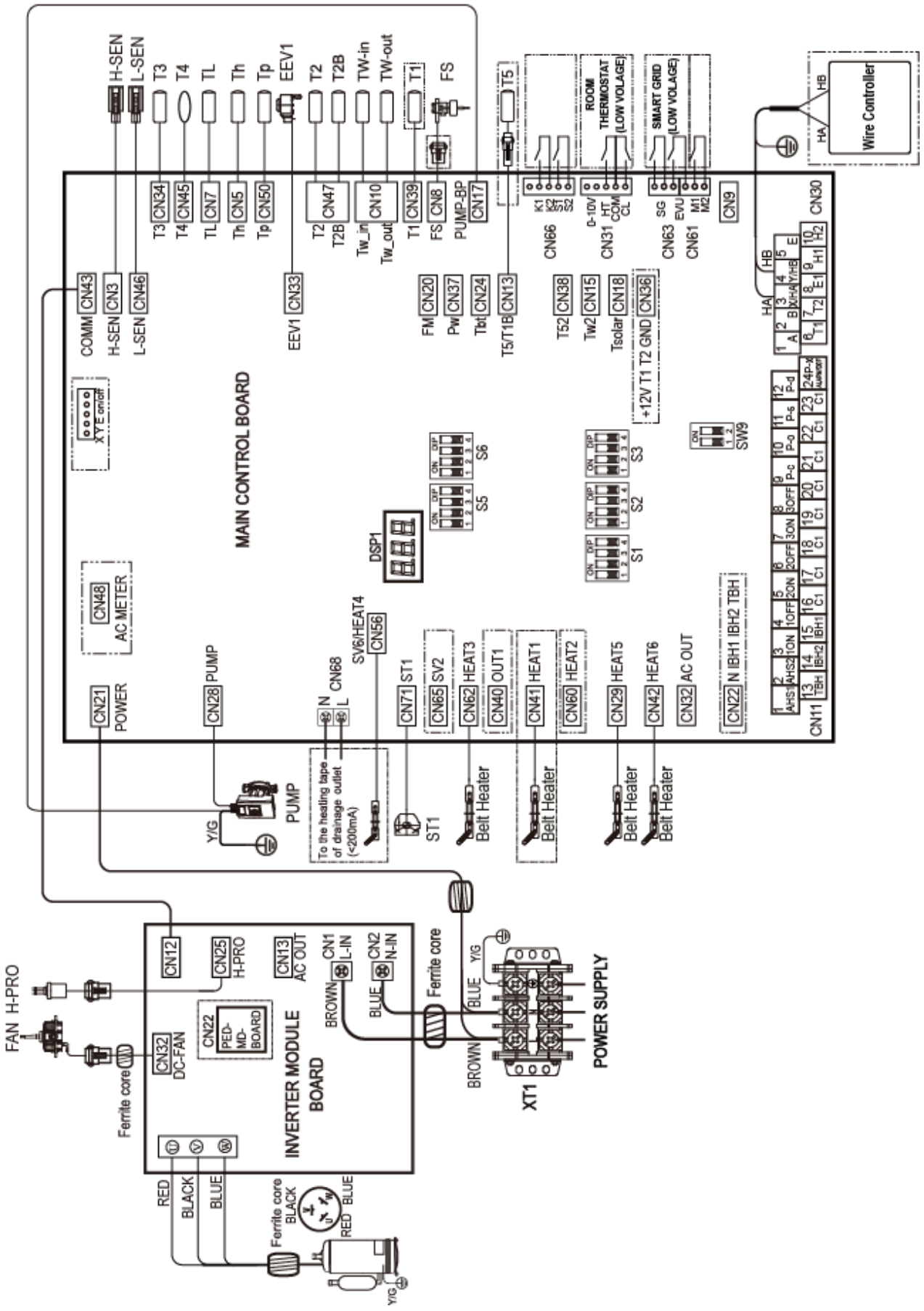
Brazing/soldering work on the refrigerant circuit may only be carried out by contractors certified in accordance with ISO 13585 and AD 2000, Datasheet HP 100R. And only by contractors qualified and certified for the processes to be carried out. The work must fall within the range of applications purchased and be carried out in accordance with the prescribed procedures. Soldering/brazing work on accumulator connections requires certification of personnel and processes by a notified body according to the Pressure Equipment Directive (2014/68/EU).

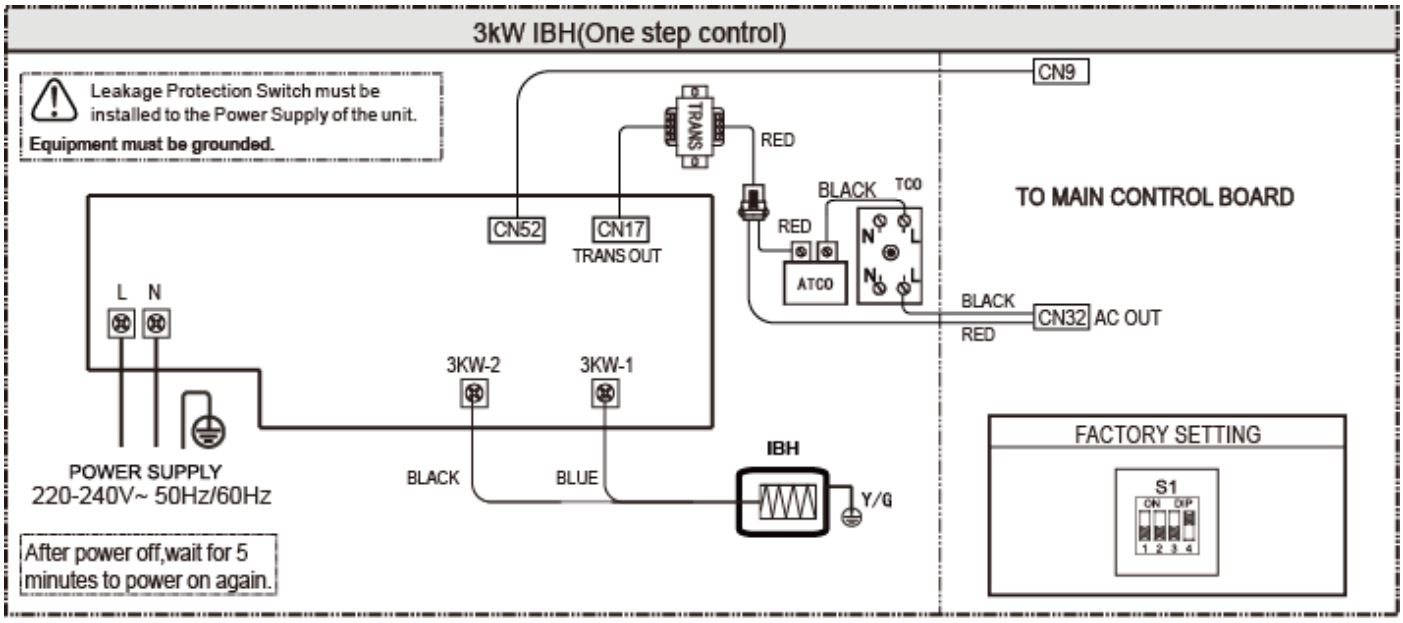
Work on electrical equipment may only be carried out by a qualified electrician.

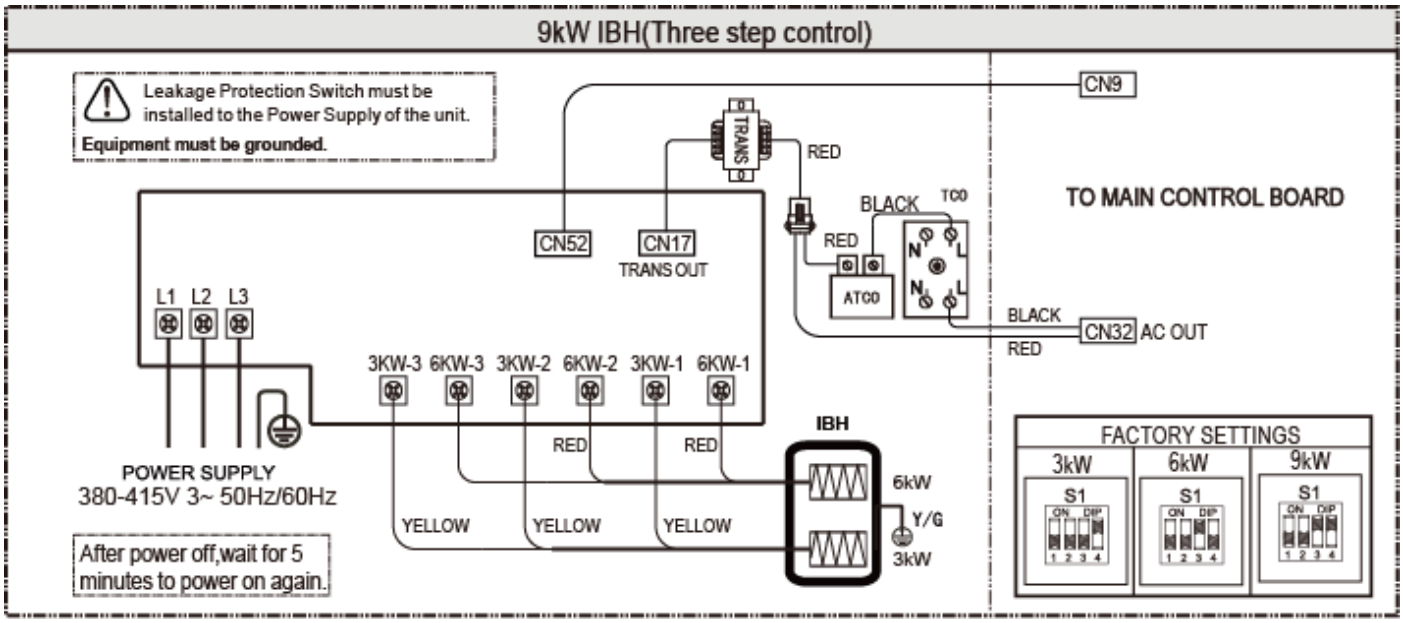
Before initial commissioning, all safety relevant points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.

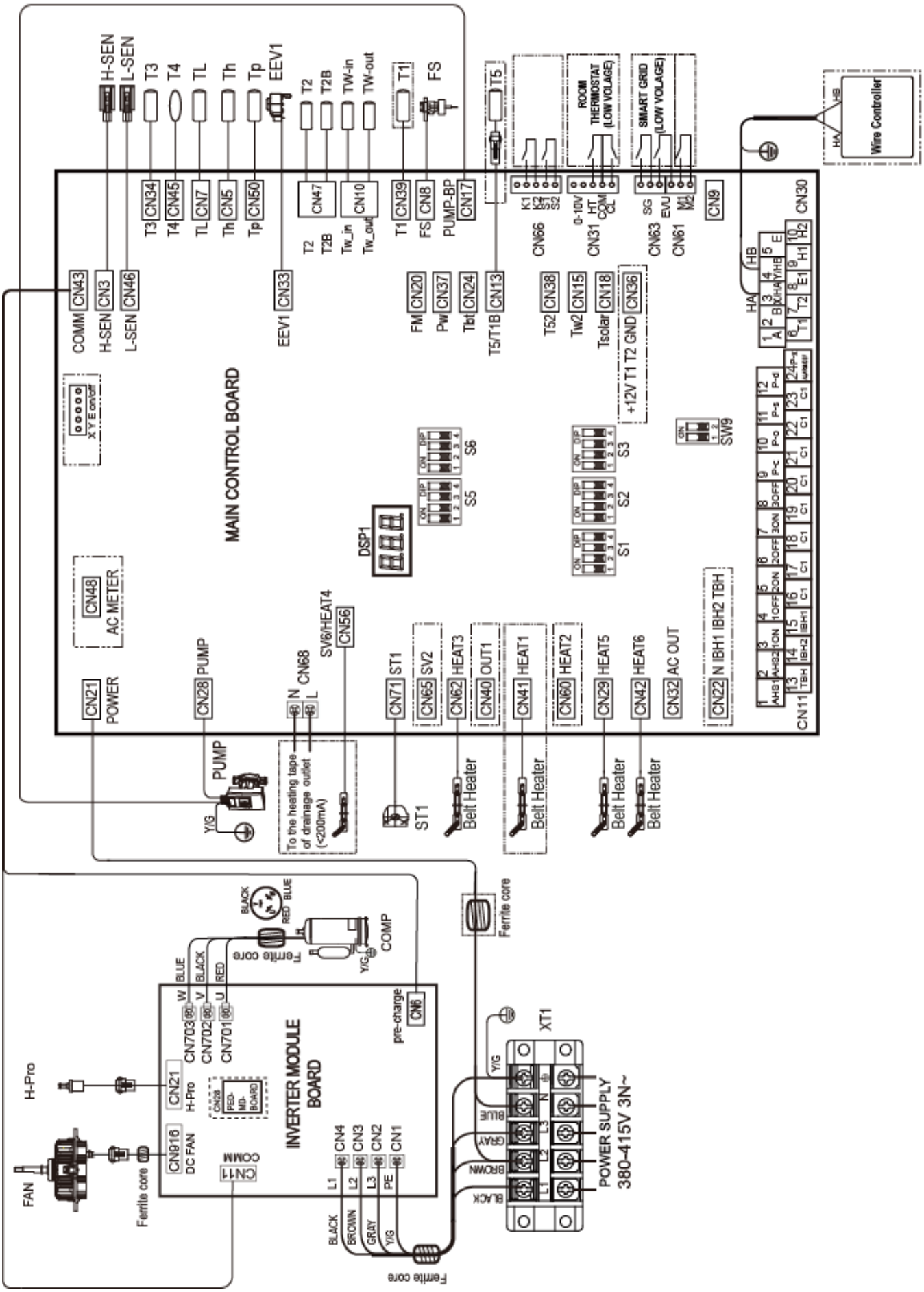
## 2 Electric wiring diagram

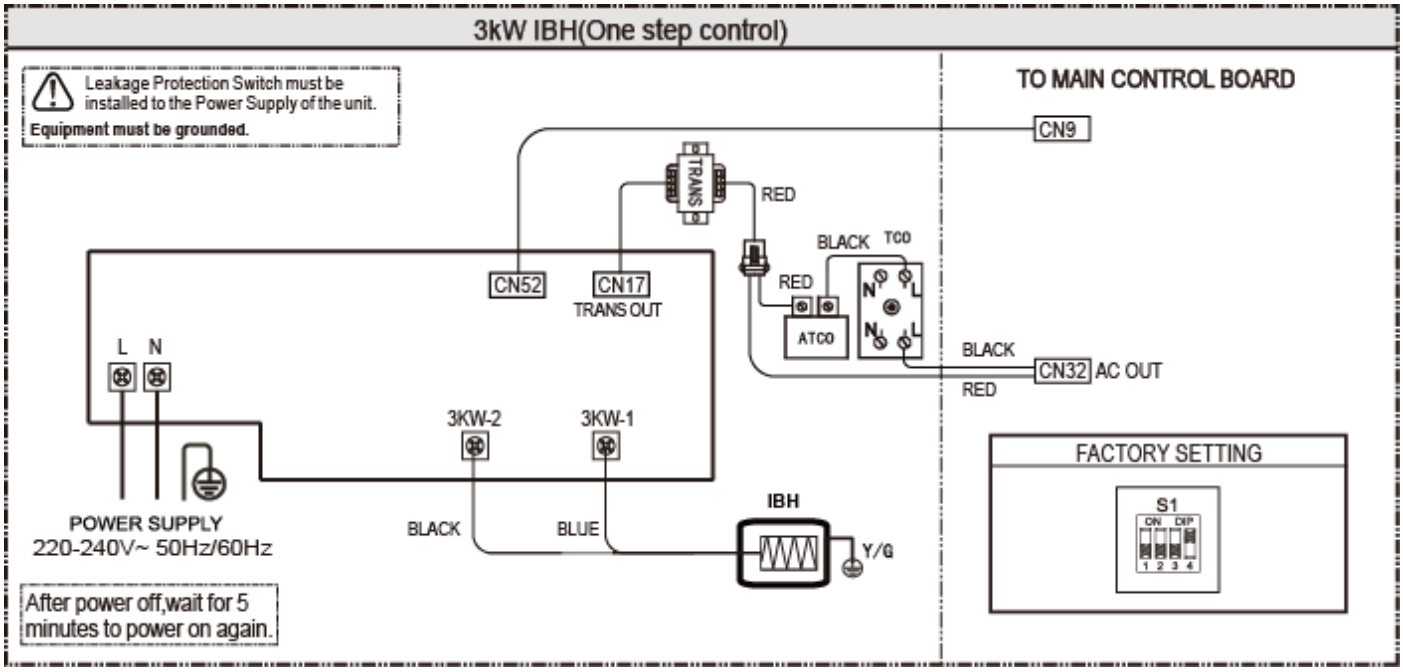
**1Ph 4-16kW**

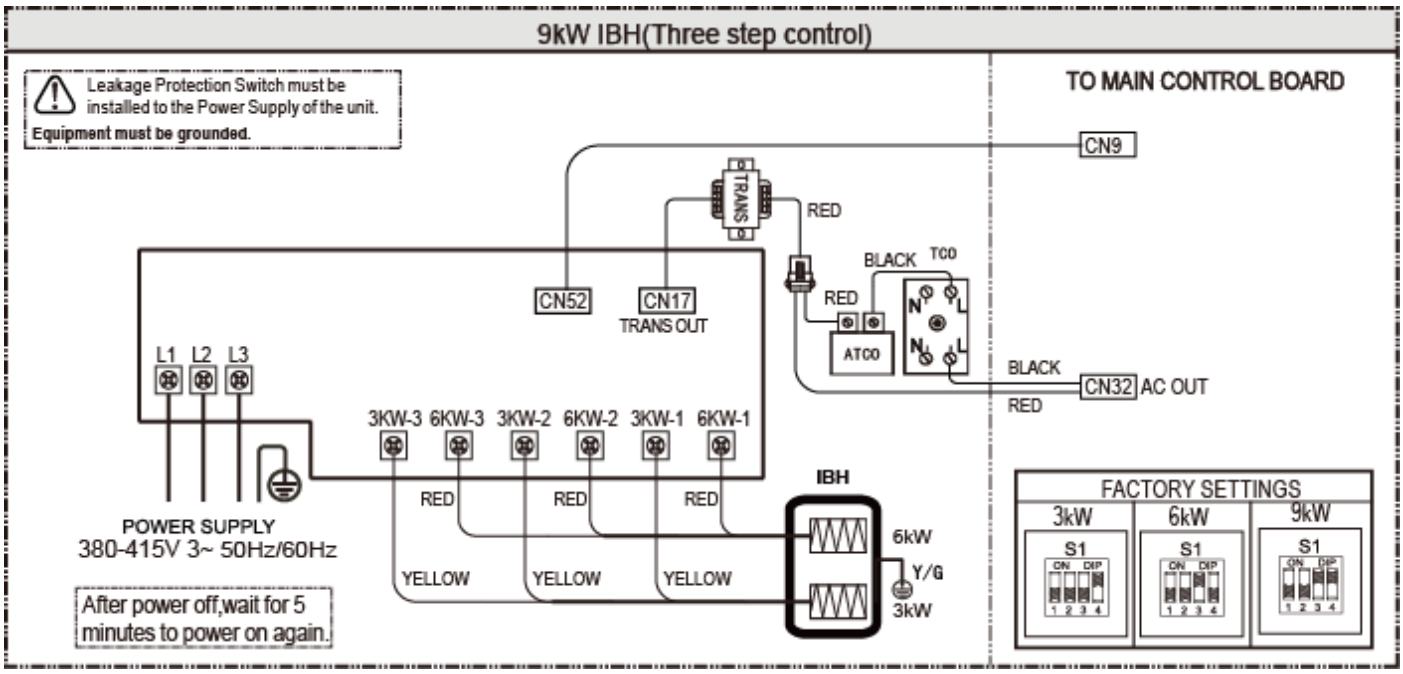



3kW IBH(One step control)
Leakage Protection Switch must be installed to the Power Supply of the unit.
Equipment must be grounded.
CN9
TRANS
RED
BLACK
TCO
TO MAIN CONTROL BOARD
CN52
CN17
TRANS OUT
RED
ATCO
L N
BLACK
CN32 AC OUT
RED
3KW-2
3KW-1
FACTORY SETTING
S1
IBH
POWER SUPPLY
220-240V~ 50Hz/60Hz
BLACK
BLUE
Y/G
After power off,wait for 5 minutes to power on again.


9kW IBH(Three step control)
Leakage Protection Switch must be installed to the Power Supply of the unit.
Equipment must be grounded.
CN9
TRANS
RED
BLACK
TCO
TO MAIN CONTROL BOARD
CN52
CN17
TRANS OUT
RED
ATCO
L1 L2 L3
BLACK
CN32 AC OUT
RED
3KW-3 6KW-3 3KW-2 6KW-2 3KW-1 6KW-1
FACTORY SETTINGS
3kW
6kW
9kW
S1
RED
RED
IBH
6kW
Y/G
3kW
POWER SUPPLY
380-415V 3~ 50Hz/60Hz
YELLOW
YELLOW
YELLOW
After power off,wait for 5 minutes to power on again.

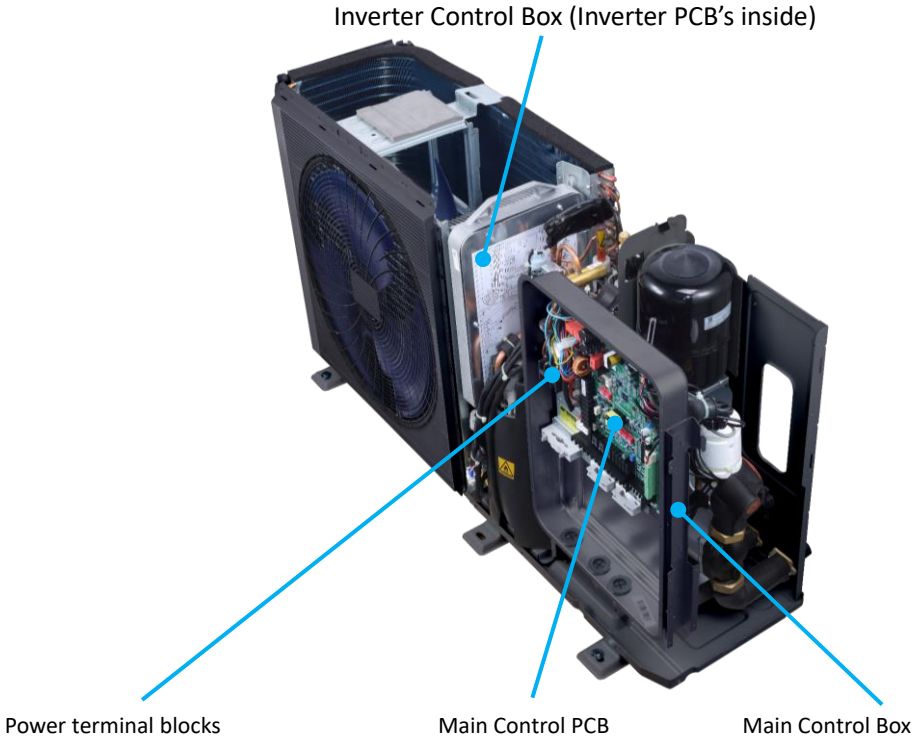

MAIN CONTROL BOARD
INVERTER MODULE BOARD
H-SEN
L-SEN
T3
T4
TL
Th
Tp
EEV1
T2
T2B
TW-in
TW-out
T1
FS
T5
ROOM THERMOSTAT (LOW VOLAGE)
SMART GRID (LOW VOLAGE)
Wire Controller
COMM
AC METER
POWER
PUMP
ST1
SV2
HEAT3
OUT1
HEAT1
HEAT2
HEAT5
HEAT6
AC OUT
IBH1 IBH2 TBH
DSP1
S1
S2
S3
S5
S6
SW9
+12V T1 T2 GND
Belt Heater
To the heating tape of drainage outlet (<200mA)
Ferrite core
COMP
FAN
DC FAN
H-Pro
pre-charge
XT1
POWER SUPPLY
380-415V 3N~


3kW IBH(One step control)
Leakage Protection Switch must be installed to the Power Supply of the unit.
Equipment must be grounded.
TO MAIN CONTROL BOARD
CN9
TRANS
RED
BLACK
TCO
CN52
CN17
TRANS OUT
RED
ATCO
L N
BLACK
CN32 AC OUT
RED
3KW-2
3KW-1
FACTORY SETTING
S1
IBH
POWER SUPPLY
220-240V~ 50Hz/60Hz
BLACK
BLUE
Y/G
After power off,wait for 5 minutes to power on again.

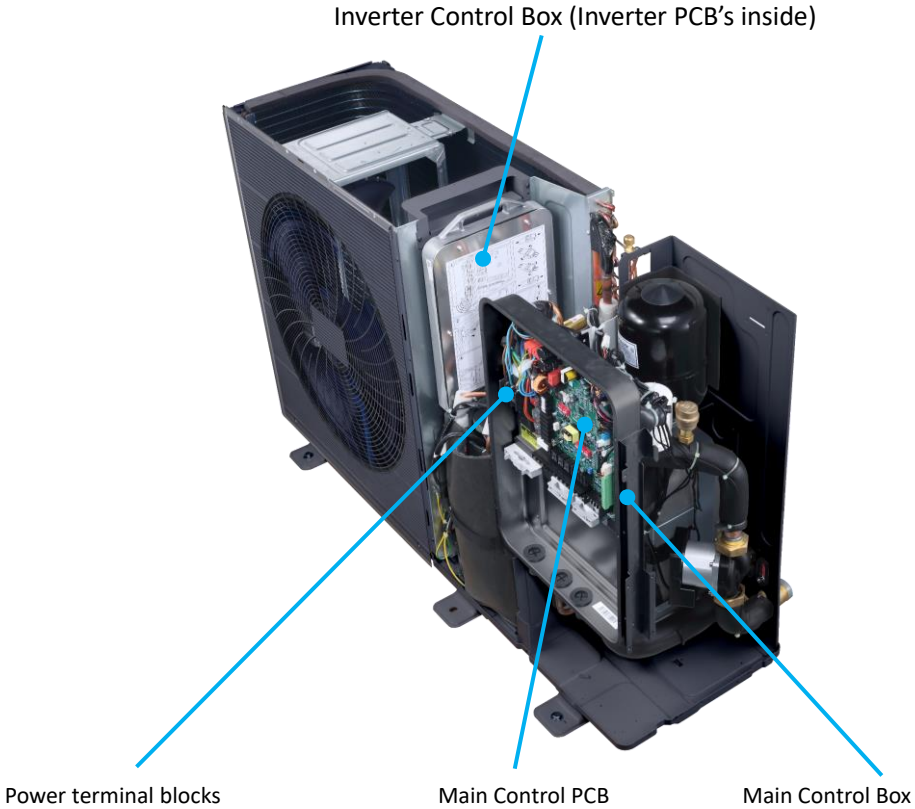

9kW IBH(Three step control)
Leakage Protection Switch must be installed to the Power Supply of the unit.
Equipment must be grounded.
TO MAIN CONTROL BOARD
CN9
TRANS
RED
BLACK
TCO
CN52
CN17
TRANS OUT
RED
ATCO
L1 L2 L3
BLACK
CN32 AC OUT
RED
3KW-3 6KW-3 3KW-2 6KW-2 3KW-1 6KW-1
FACTORY SETTINGS
3kW
6kW
9kW
S1
IBH
RED
RED
RED
6kW
Y/G
3kW
YELLOW
YELLOW
YELLOW
POWER SUPPLY
380-415V 3~ 50Hz/60Hz
After power off,wait for 5 minutes to power on again.

## 3 Electric Control Box Layout

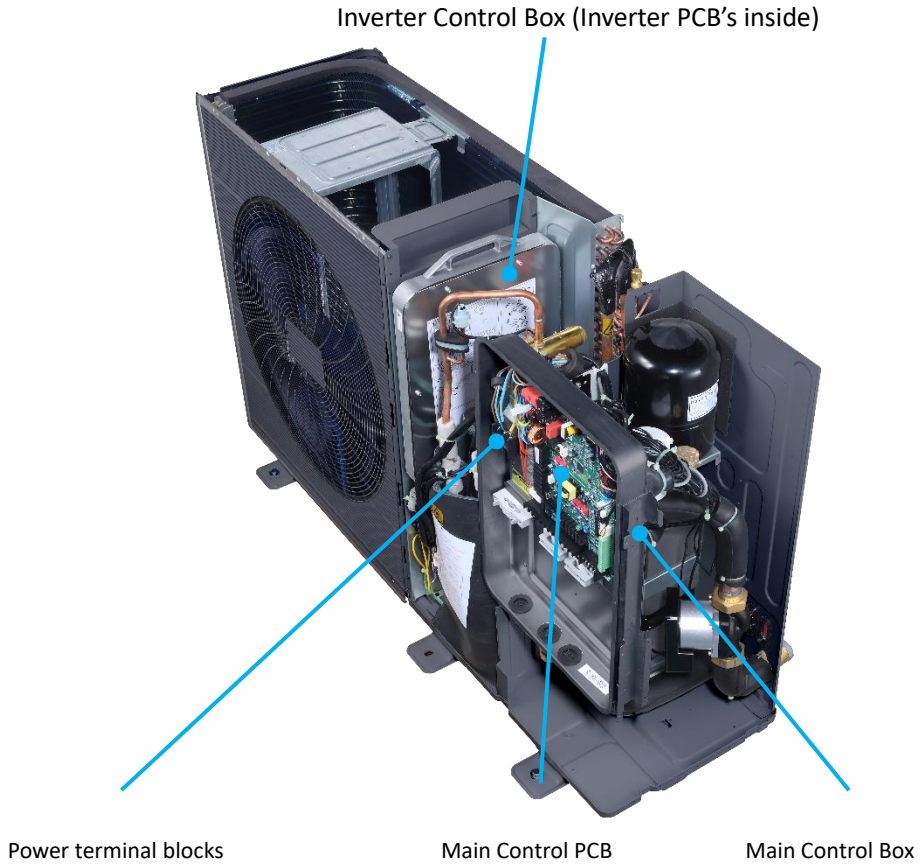
**MHC-V4WD2N7 / MHC-V6WD2N7**



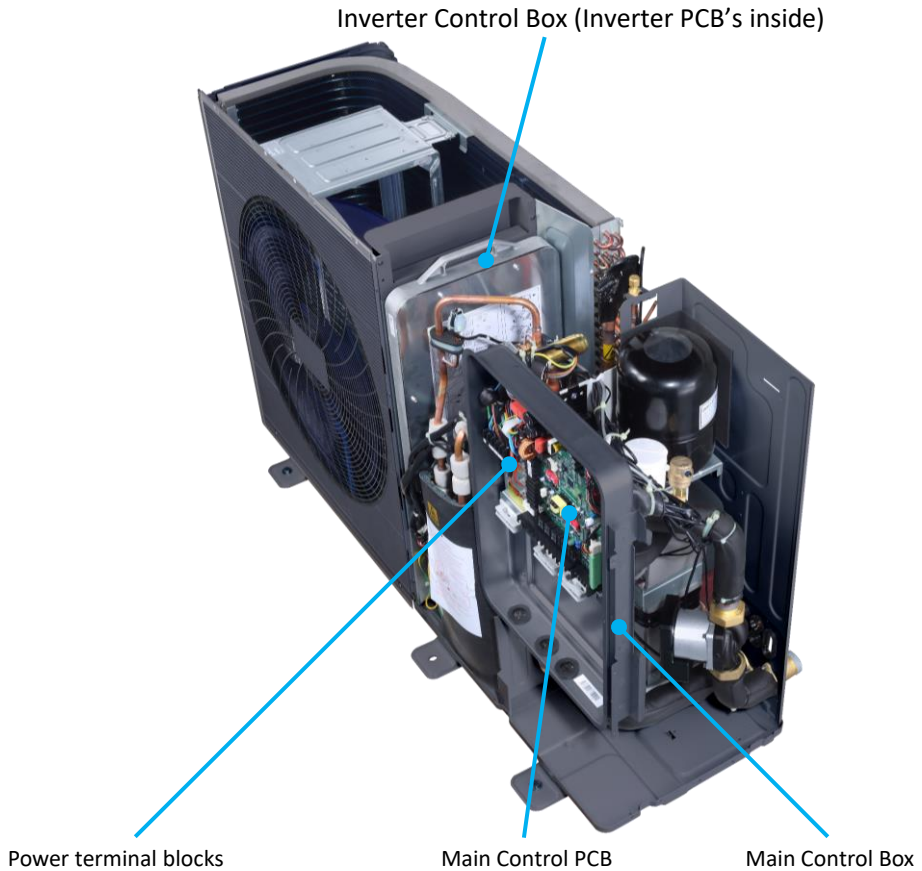

**MHC-V8WD2N7 / MHC-V10WD2N7**



**MHC-V12WD2N7 / MHC-V14WD2N7 / MHC-V16WD2N7**



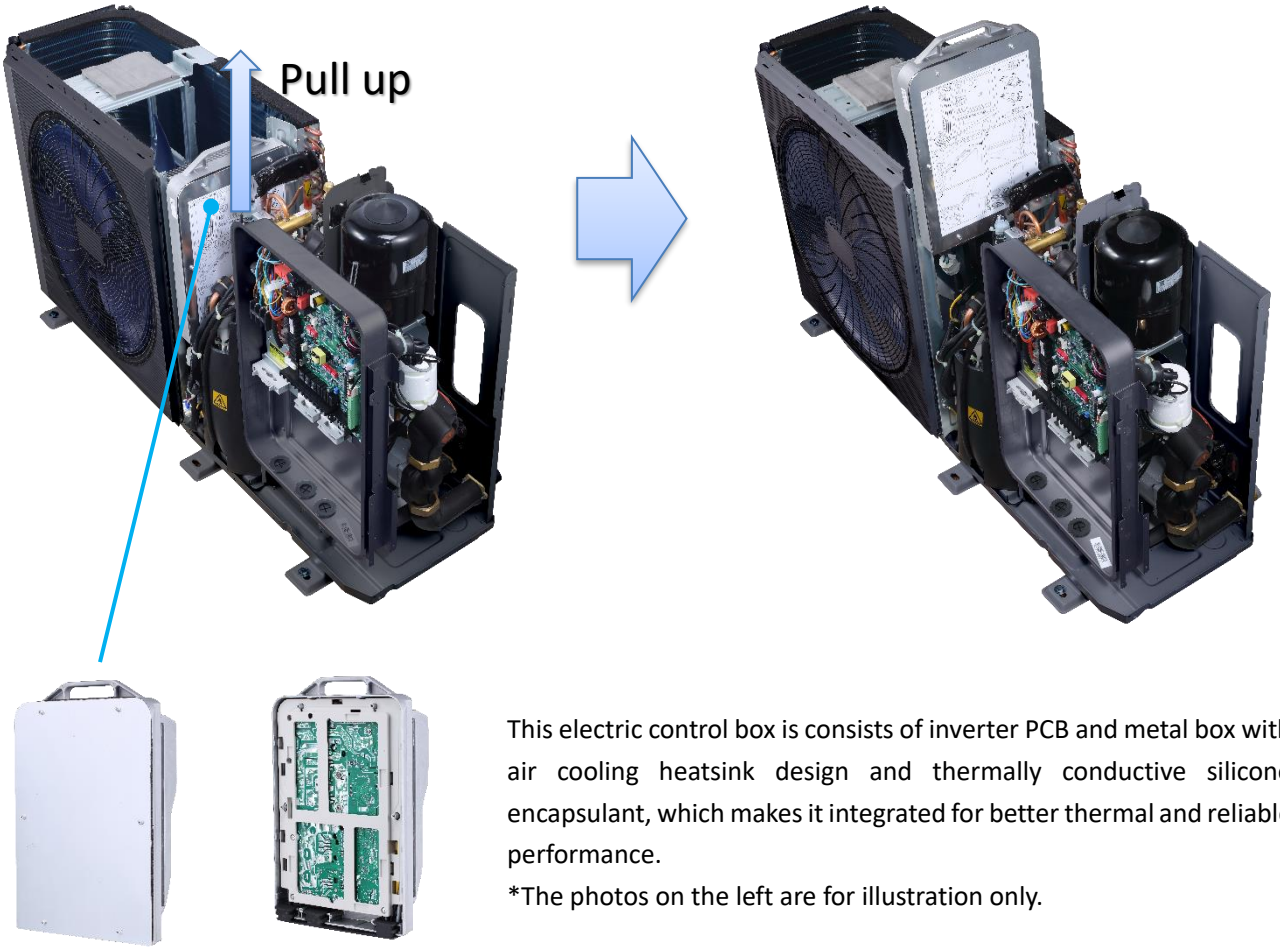

**MHC-V12W/WD2RN7 / MHC-V14W/WD2RN7 / MHC-V16W/WD2RN7**



**Note:**

1. Main Control PCB consists of Refrigerant system and hydronic system, which is sealed in the hermetic electric control box and placed vertically for safety consideration.

2. The hermetic electric control box of inverter PCB is available to be took out entirely. If there's something wrong with inverter PCB, it's suggested to unscrew the cover to identify whether inverter PCB failed (Refer to part 4 Appendix: Guide for identifying inverter PCB failure) and replace the whole inverter control box entirely.



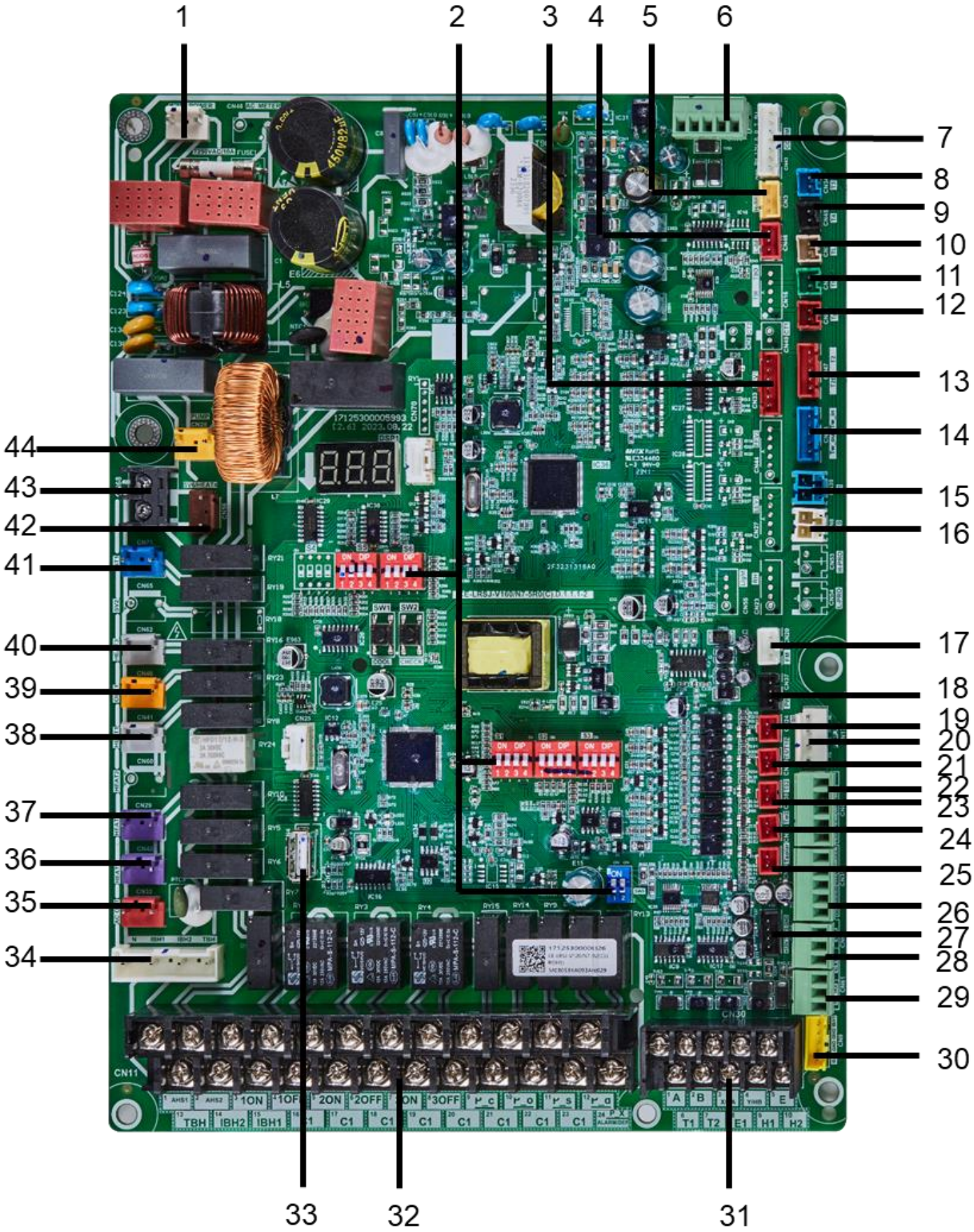

This electric control box is consists of inverter PCB and metal box with air cooling heatsink design and thermally conductive silicone encapsulant, which makes it integrated for better thermal and reliable performance.

*The photos on the left are for illustration only.

# 4 Outdoor Unit PCBs

## 4.1 Main Control PCB

*Main Control PCB of 4-16kW*

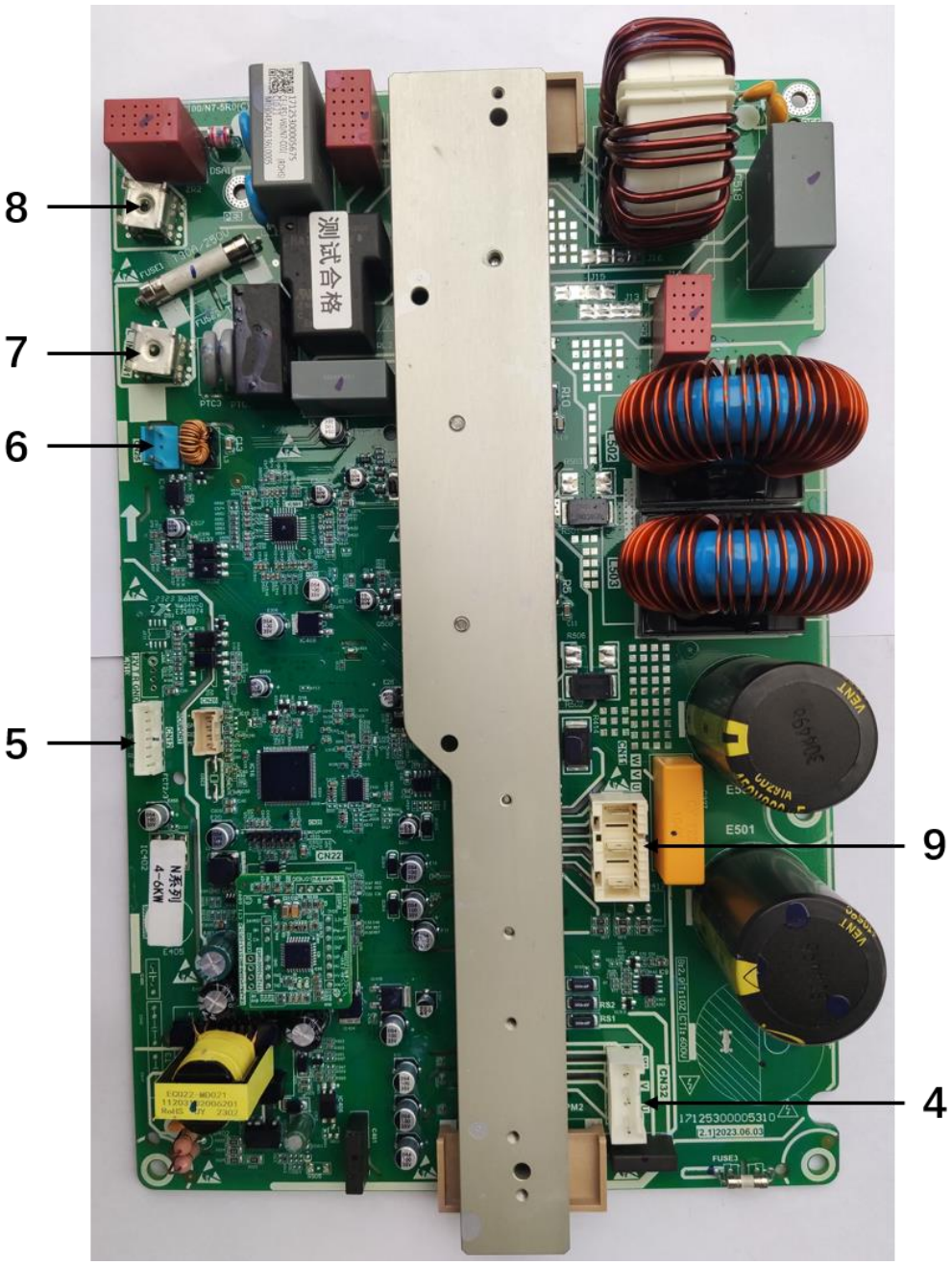


| Label | Port | Code | Content | Rated Voltage |
|---|---|---|---|---|
| 1 | CN21 | POWER | Port for power supply | 230VAC |
| 2 | S1,S2,S3,S5 ,S6,SW9 | / | Dip switch | / |
| 3 | CN33 | EEV1 | Port for electrical expansion valve1 | 0-12V DC |
| 4 | CN3 | H-SEN | Port for high pressure sensor | 0-5V DC |
| 5 | CN46 | L-SEN | Port for low pressure sensor | 0-5V DC |
| 6 | CN35 | RS485 ; on/off | Reserved | 0-5V DC |
| 7 | CN43 | COMM | Port for communication with Inverter PCB | 0-5V DC |
| 8 | CN34 | T3 | Port for T3 temp. sensor | 0-3.3V DC |
| 9 | CN45 | T4 | Port for T4 temp. sensor | 0-3.3V DC |
| 10 | CN7 | TL | Port for TL temp. sensor | 0-3.3V DC |
| 11 | CN5 | Th | Port for Th temp. sensor | 0-3.3V DC |
| 12 | CN50 | Tp | Port for Tp temp. sensor | 0-3.3V DC |
| 13 | CN47 | T2 T2B | Port for T2,T2B temp. sensor | 0-5V DC |
| 14 | CN10 | Tw_in ; Tw_out | Port for Tw_in, Tw_out temp. sensor | 0-5V DC |
| 15 | CN39 | T1 | Port for T1 temp. sensor | 0-5V DC |
| 16 | CN8 | FS | Port for flow switch | 0-12V DC |
| 17 | CN20 | FM | Reserved | 0-5V DC |
| 18 | CN37 | PW | Port for temperature sensor of water pressure | 0-5V DC |
| 19 | CN24 | Tbt | Port for Tbt temp. sensor | 0-5V DC |
| 20 | CN17 | PUMP_BP | Port for internal pump | 0-5V DC |
| 21 | CN13 | T5/T1B | Port for T5/T1B temp. sensor | 0-5V DC |
| 22 | CN66 | K1 K2 S1 S2 | Reserved | 0-5V DC |
| 23 | CN38 | T52 | Port for T52 temp. sensor | 0-5V DC |
| 24 | CN15 | Tw2 | Port for Tw2 temp. sensor | 0-5V DC |
| 25 | CN18 | Tsolar | Port for Tsolar temp. sensor | 0-5V DC |
| 26 | CN31 | 0-10V ; HT ; COM ; CL | (0-10V) - Output port for 0-10V<br>(HT) - Control port for room thermostat (heating mode)<br>(COM) - Power port for room thermostat<br>(CL) - Control port for room thermostat (cooling mode) | 0-12V DC<br>To dry contact signal |
| 27 | CN36 | +12V T1 T2 GND | Port for thermostat transfer board | 0-12V DC |
| 28 | CN63 | SG EVU | (SG) - Port for smart grid (photovoltaic signal)<br>(EVU) - Port for smart grid (grid signal) | 0-12V DC<br>To dry contact signal |
| 29 | CN61 | M1 M2 | Port for remote switch | 0-12V DC<br>To dry contact signal |
| 30 | CN9 | NOP GND IBH2 IBH1 | Control port for internal backup heater1/2 | 0-5V DC |
| 31 | CN30 | A B<br>X/HA Y/HB E<br>T1 T2 E1 H1 H2 | (Port,3,4) - Port for communication with the User Interface<br>(Port 6.7) - Port for thermostat transfer board<br>(Port 8,9,10) - Port for Internal machine Parallel | AB:12VDC<br>X/HA Y/HB:18VDC<br>T1 T2 E1 H1 H2: 0-5VDC |
| 32 | CN11 | / | (Port1,2) - Additional heat source<br>( Port3,4) - Port for SV1(3-way valve)<br>( Port5,6) - Port for SV2(3-way valve)<br>( Port7,8) - Port for SV3(3-way valve) | 230V AC |

| | | | | |
|---|---|---|---|---|
| | | | (Port9,10,11,12) - Port for zone 2 pump(P_c)/ zone 1 pump(P_o)/ solar energy pump(P_s)/ pipe pump(P_d)<br>(Port13) - Control port for tank booster heater<br>(Port14) - Control port for internal backup heater 1<br>(Port15) - Control port for internal backup heater<br>(Port24) - Reserved | |
| 33 | CN4 | USB | Port for USB | / |
| 34 | CN22 | N IBH1 BH2 TBH | Control port for backup heater/booster heater | 230V AC |
| 35 | CN32 | AC OUT | Port for transformer power input | 230V AC |
| 36 | CN42 | HEAT6 | Port for anti-freeze electric heating tape of plate heat exchanger | 230V AC |
| 37 | CN29 | HEAT5 | Port for anti-freeze electric heating tape of plate heat exchanger | 230V AC |
| 38 | CN41 | HEAT1 | Reserved port for electric heating tape | 230V AC |
| 39 | CN40 | OUT1 | Reserved | 230V AC |
| 40 | CN62 | HEAT3 | Port for electrical heating tape of crankshaft | 230V AC |
| 41 | CN71 | ST1 | Port for 4-way valve | 230V AC |
| 42 | CN56 | HEAT4 | Port for the electrical heating tape of chassis | 230V AC |
| 43 | CN68 | / | Port for electrical heating tape of drainage pipeline | 230V AC |
| 44 | CN28 | PUMP | Port for inverter pump power input | / |

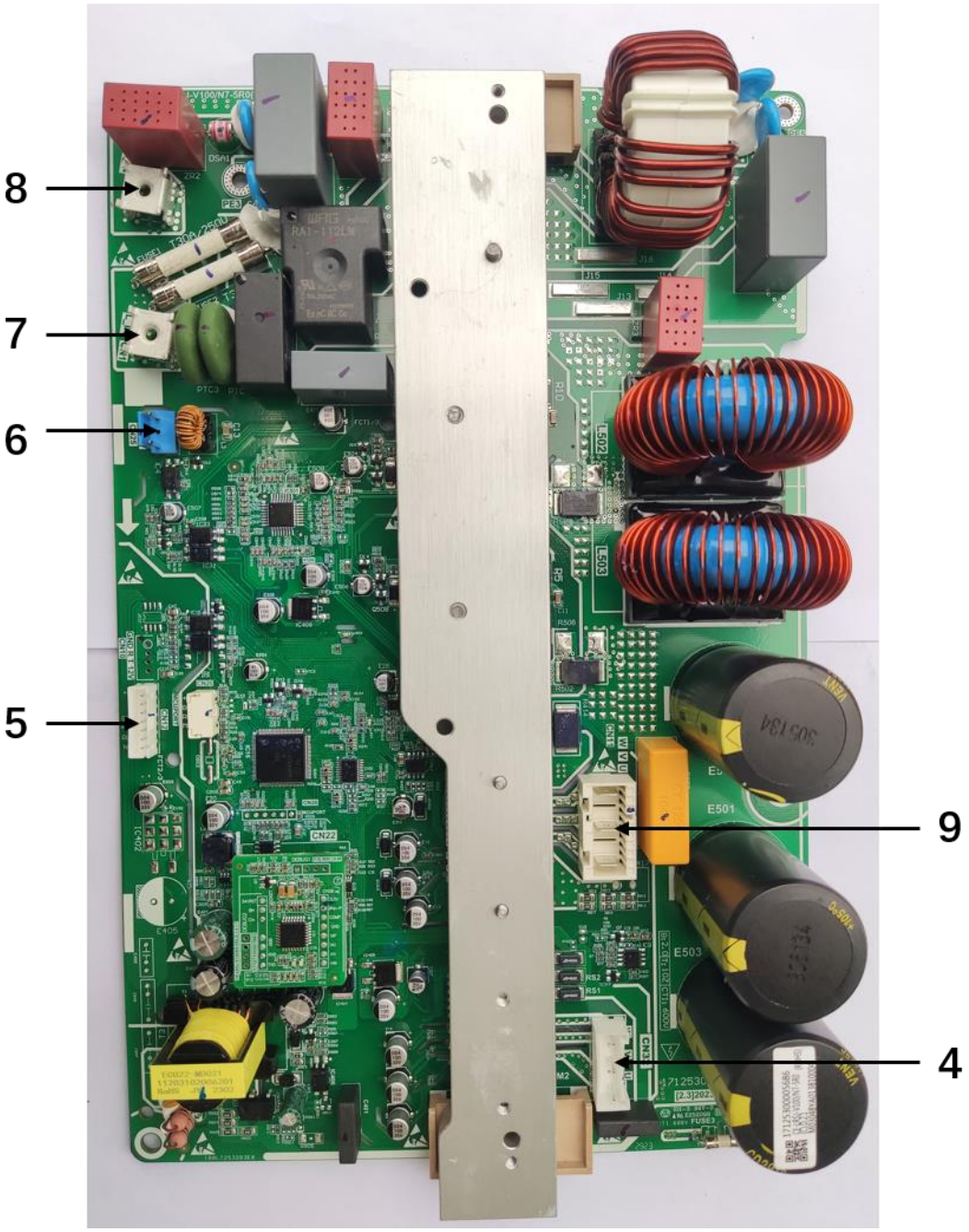
## 4.2 Inverter PCB

*4-6kW Inverter PCB*



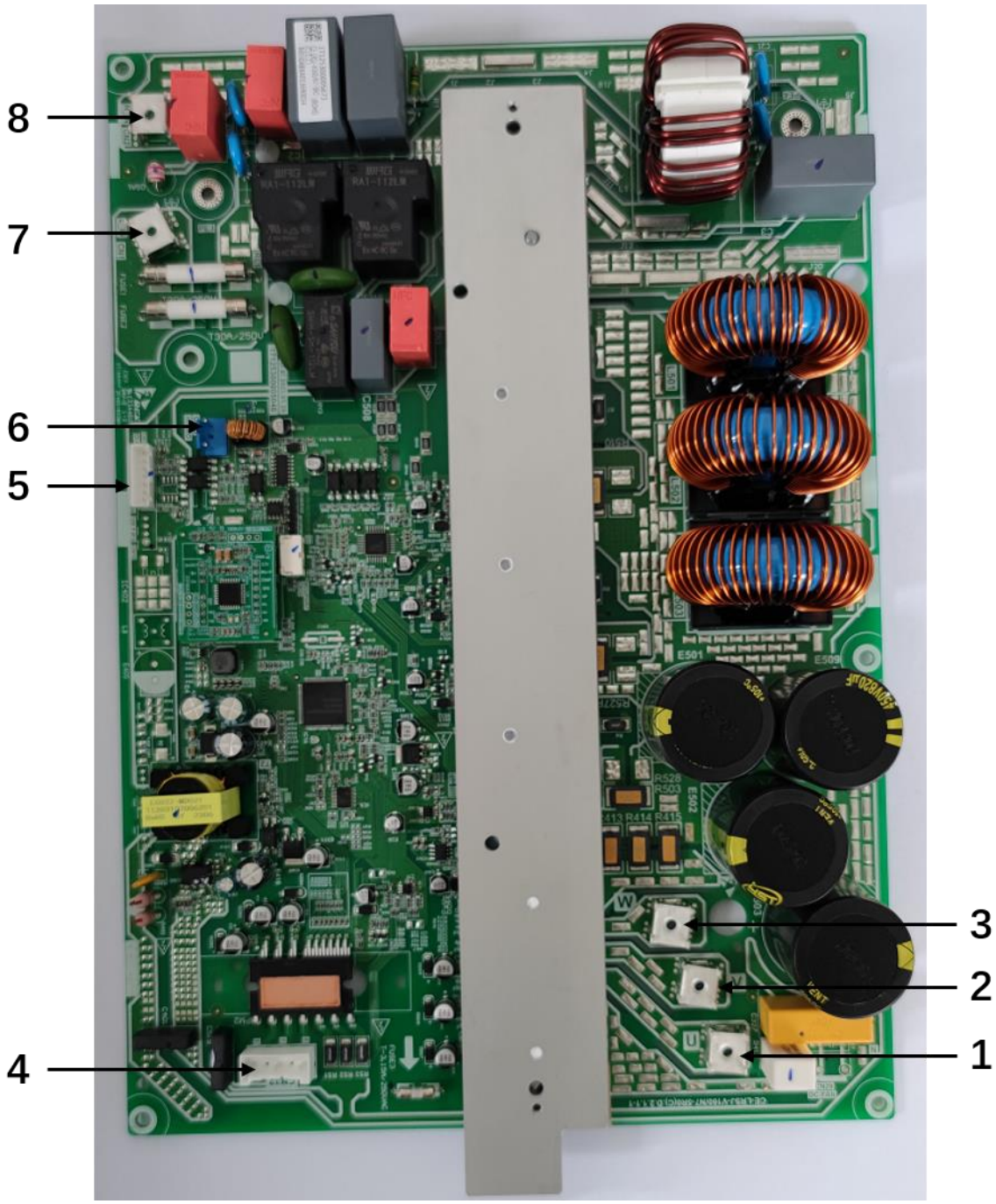

| Label | Port | Code | Content | Voltage |
|---|---|---|---|---|
| 4 | CN32 | / | DC fan power ports | Above 156V DC (varying according to frequency) |
| 5 | CN12 | / | Port for communication with Main Control PCB | 0-5V DC |
| 6 | CN25 | H-pro | Connect to high pressure switch | 0-5V DC |
| 7 | CN1 | L_IN | Power input L of inverter PCB | 230V AC |
| 8 | CN2 | N_IN | Power input N of inverter PCB | 230V AC |
| 9 | CN11 | / | Power output of inverter PCB to compressor | Above 156V DC (varying according to frequency) |

*8-10kW Inverter PCB*



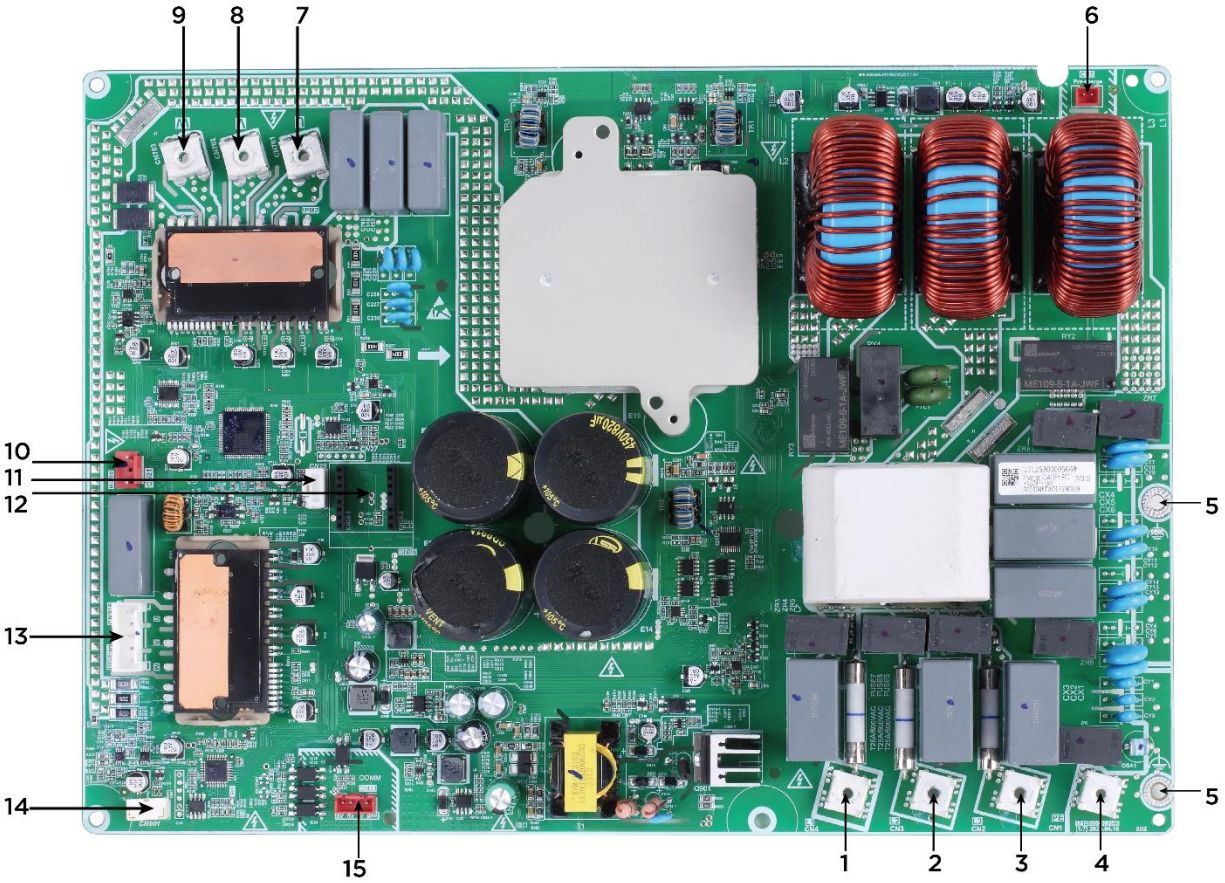

| Label | Port | Code | Content | Voltage |
|---|---|---|---|---|
| 4 | CN32 | / | DC fan power ports | Above 156V DC (varying according to frequency) |
| 5 | CN12 | / | Port for communication with Main Control PCB | 0-5V DC |
| 6 | CN25 | H-pro | Connect to high pressure switch | 0-5V DC |
| 7 | CN1 | L_IN | Power input L of inverter PCB | 230V AC |
| 8 | CN2 | N_IN | Power input N of inverter PCB | 230V AC |
| 9 | CN11 | / | Power output of inverter PCB to compressor | Above 156V DC (varying according to frequency) |

*12-16kW 1Ph Inverter PCB*




| Label | Port | Code | Content | Voltage |
|---|---|---|---|---|
| 1 | U | U | Power output U of inverter PCB to compressor | Above 156V DC (varying according to frequency) |
| 2 | V | V | Power output V of inverter PCB to compressor | Above 156V DC (varying according to frequency) |
| 3 | W | W | Power output W of inverter PCB to compressor | Above 156V DC (varying according to frequency) |
| 4 | CN32 | / | DC fan power ports | Above 156V DC (varying according to frequency) |
| 5 | CN12 | / | Port for communication with Main Control PCB | 0-5V DC |
| 6 | CN25 | H-pro | Connect to high pressure switch | 0-5V DC |
| 7 | CN1 | L_IN | Power input L of inverter PCB | 230V AC |
| 8 | CN2 | N_IN | Power input N of inverter PCB | 230V AC |
| 9 | CN11 | / | Power output of inverter PCB to compressor | Above 156V DC (varying according to frequency) |

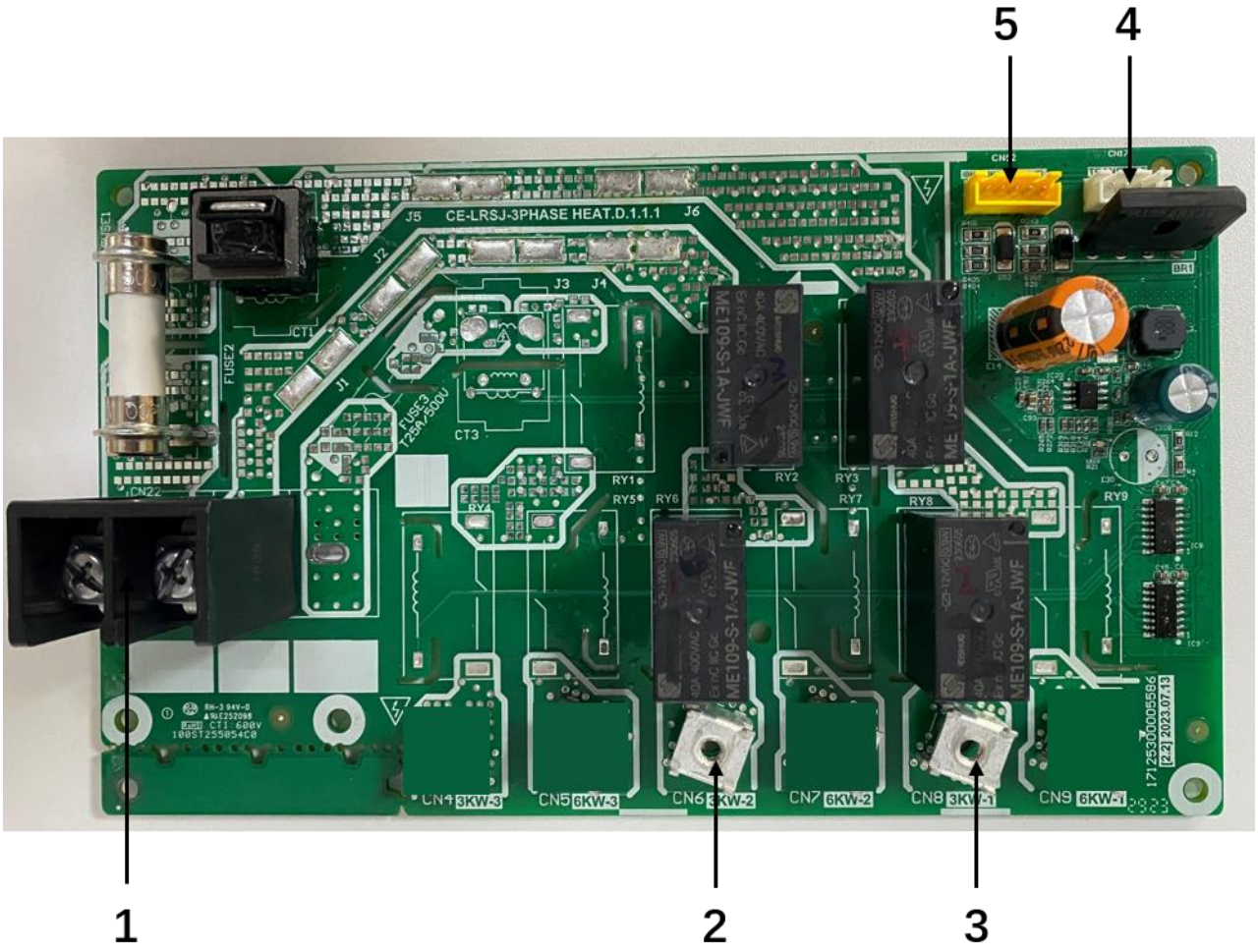
*12-16kW 3Ph Inverter PCB*



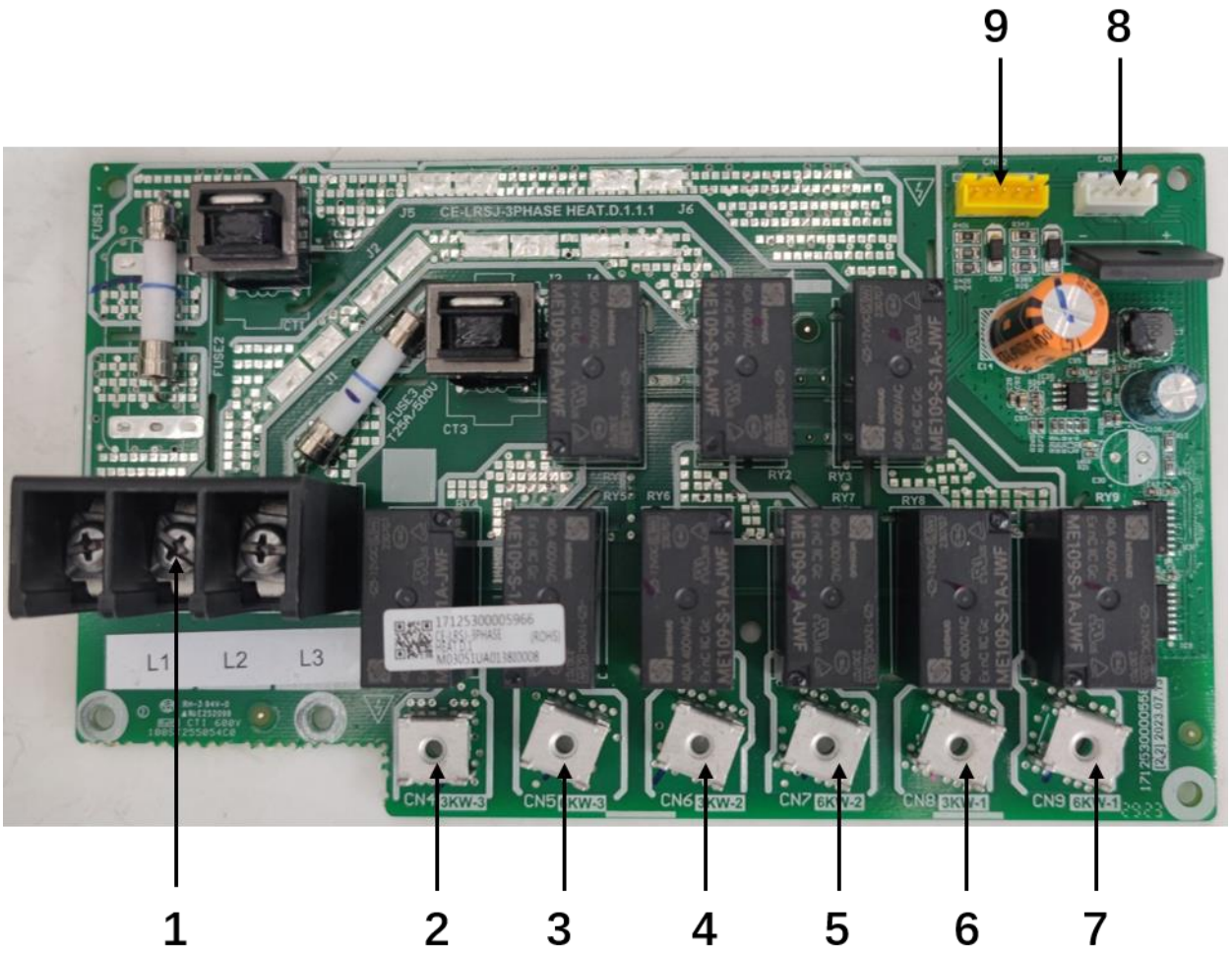

| Label | Port | Code | Content | Voltage |
|---|---|---|---|---|
| 1 | CN4 | L1 | Power input L1 of inverter PCB | Phase to phase voltage 380VAC |
| 2 | CN3 | L2 | Power input L2 of inverter PCB | Phase to phase voltage 380VAC |
| 3 | CN2 | L3 | Power input L3 of inverter PCB | Phase to phase voltage 380VAC |
| 4 | CN1 | PE | Ground | / |
| 5 | / | / | Ground | / |
| 6 | CN6 | Pre-charge | Pre-charge for relay ( low power ) control port | 12VDC; |
| 7 | CN701 | U | Power output U of inverter PCB to compressor | Phase to phase voltage 46-460VAC |
| 8 | CN702 | V | Power output V of inverter PCB to compressor | Phase to phase voltage 46-460VAC |
| 9 | CN703 | W | Power output W of inverter PCB to compressor | Phase to phase voltage 46-460VAC |
| 10 | CN21 | H-Pro | Connect to high pressure switch | On: 0V; Off: 6V; |
| 11 | CN25 | Debug | / | / |
| 12 | CN28 | PED | PED board | / |
| 13 | CN916 | DCFAN | DC fan power ports | Phase to phase voltage 46-460VAC |
| 14 | CN901 | Debug | / | / |
| 15 | CN11 | COMM | Port for communication with Main Control PCB | 0-5V DC |

## 4.3 IBH PCB

*1Ph 3kW IBH PCB*



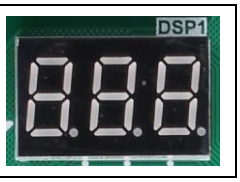

| Label | Port | Code | Content | Voltage |
|---|---|---|---|---|
| 1 | CN22 | L | Power input L of IBH PCB | Phase to phase voltage 230VAC |
| 2 | CN6 | 3KW-2 | Power input N of 3KW IBH | Phase to phase voltage 230VAC |
| 3 | CN8 | 3KW-1 | Power input L of 3KW IBH | Phase to phase voltage 230VAC |
| 4 | CN17 | TRANS OUT | Transformer outputs to IBH | 13.5VAC |
| 5 | CN52 | IBH1 IBH2 GND IA IB | Main board and IBH control port | 5VDC(variating); |




| Label | Port | Code | Content | Voltage |
|---|---|---|---|---|
| 1 | CN22 | L1 L2 L3 | Power input L1/L2/L3 of IBH PCB | Phase to phase voltage 380VAC |
| 2 | CN4 | 3KW-3 | Power input L3 of 3KW IBH | Phase to phase voltage 380VAC |
| 3 | CN5 | 6KW-3 | Power input L3 of 6KW IBH | Phase to phase voltage 380VAC |
| 4 | CN6 | 3KW-2 | Power input L2 of 3KW IBH | Phase to phase voltage 380VAC |
| 5 | CN7 | 6KW-2 | Power input L2 of 6KW IBH | Phase to phase voltage 380VAC |
| 6 | CN8 | 3KW-1 | Power input L1 of 3KW IBH | Phase to phase voltage 380VAC |
| 7 | CN9 | 6KW-1 | Power input L1 of 6KW IBH | Phase to phase voltage 380VAC |
| 8 | CN17 | TRANS OUT | Transformer outputs to IBH | 13.5VAC |
| 9 | CN52 | IBH1 IBH2 GND IA IB | Main board to IBH board control port | 5VDC(variating); |

## 4.4 Digital Display Output

*Digital display output in different operating states*

| Outdoor unit state | Parameters displayed on Main Control PCB DSP1 |  |
|---|---|---|
| On standby | 0 | |
| Normal operation | The current frequency of compressor | |
| Error or protection | Error or protection code | |



## 4.5 DIP Switch Settings

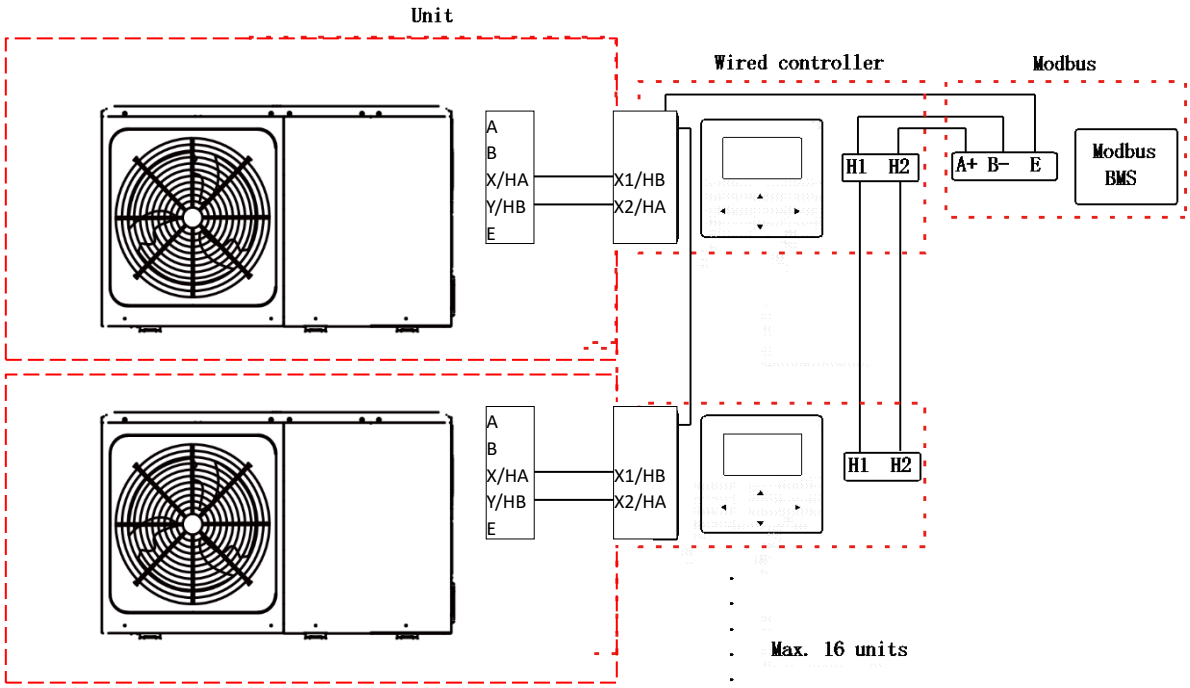
The DIP switch S3 on the Main Control PCB is used for setting the Modbus address. By defaulting the units have this DIP switch positioned=0/0/0

*Dip switch*

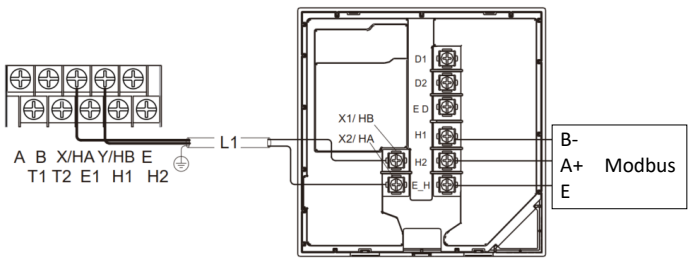

| | | | |
|---|---|---|---|
| S3 | 1/2/3 | 0/0/0=address 0#(master units)<br>1/0/0=address 1#(slave units)<br>0/1/0=address 2#(slave units)<br>0/0/1=address 3#(slave units)<br>1/1/0=address 4#(slave units)<br>1/0/1=address 5#(slave units)<br>0/1/1=address 6#(slave units)<br>(Reserved)<br>1/1/1=address 7#(slave units)<br>(Reserved) | 1:OFF<br>2:OFF<br>3:OFF |
| | 4 | Reserved | 4:OFF |

(ON=1, OFF=0)

*Modbus Connection*




*Modbus Wiring*

# 5 Error Code Table

| Water circuit error | | | |
|---|---|---|---|
| Error code | Description | Displayed on | |
| E0 | water flow failure (10 times of E8) | User Interface and Main Control PCB | |
| E8 | water flow protection | User Interface and Main Control PCB | |
| **Communication error** | | | |
| Error code | Description | Displayed on | |
| E2 | Communication fault between User Interface and Main Control PCB | User Interface and Main Control PCB | |
| H0 | Communication error of Main Control PCB | User Interface and Main Control PCB | |
| H1 | Communication error between Main Control PCB and inverter PCB | User Interface and Main Control PCB | |
| Hd | Communication fault between master unit and slave unit. | User Interface and Main Control PCB | |
| **Sensor error** | | | |
| Error code | Description | Displayed on | |
| E3 | T1 Electric Heater/AHS water outlet temperature sensor error | User Interface and Main Control PCB | |
| E4 | T5 Water tank temperature sensor error | User Interface and Main Control PCB | |
| E5 | T3 Outdoor unit heat exchanger bottom temperature sensor error | User Interface and Main Control PCB | |
| E6 | T4 Ambient temperature sensor error | User Interface and Main Control PCB | |
| E7 | Tbt Balance tank temperature sensor/ Final outlet water temperature of cascade system sensor error | User Interface and Main Control PCB | |
| E9 | Th Return-air temperature sensor error | User Interface and Main Control PCB | |
| EA | Tp Discharge temperature sensor error | User Interface and Main Control PCB | |
| Eb | Tsolar Solar panel temperature sensor error | User Interface and Main Control PCB | |
| EC | T5_2 Water tank temperature sensor error (Reserved) | User Interface and Main Control PCB | |
| Ed | Tw_in Plate heat exchanger inlet water temperature sensor error | User Interface and Main Control PCB | |
| FC1 | TL Outdoor unit heat exchanger outlet temperature sensor error | User Interface and Main Control PCB | |
| H2 | T2 Plate heat exchanger outlet refrigerant temperature sensor error | User Interface and Main Control PCB | |
| H3 | T2B Plate heat exchanger inlet refrigerant temperature sensor error | User Interface and Main Control PCB | |
| H5 | Ta room temperature sensor error | User Interface and Main Control PCB | |
| H8 | H-SEN High pressure sensor error | User Interface and Main Control PCB | |
| H9 | Tw2 Zone 2 water flow temperature sensor error | User Interface and Main Control PCB | |
| HA | Tw_out Plate heat exchanger outlet water temperature sensor error | User Interface and Main Control PCB | |
| P21 | L-SEN Low pressure sensor error | User Interface and Main Control PCB | |
| P27 | H-SEN and L-SEN connected reversely (Detect when compressor is off) | User Interface and Main Control PCB | |

| Voltage error | | | |
|---|---|---|---|
| **Error code** | **Description** | **Displayed on** | |
| E1 | Phase loss or phase reversal | User Interface and Main Control PCB | For 3Ph units |
| H7 | Power overvoltage and Power under-voltage protection | User Interface and Main Control PCB | |
| **Protection code** | | | |
| **Error code** | **Description** | **Displayed on** | |
| P0 | Low pressure protection | User Interface and Main Control PCB | |
| P1 | High pressure switch protection | User Interface and Main Control PCB | |
| P3 | Overcurrent protection | User Interface and Main Control PCB | |
| P4 | Compressor protection against excessively-high discharge temperature | User Interface and Main Control PCB | |
| Pd | Protection for over-high condensing temperature in cooling mode | User Interface and Main Control PCB | |
| HP | Low pressure protection in cooling mode | User Interface and Main Control PCB | |
| bA | T4 sensor out of operation range protection | User Interface and Main Control PCB | |
| PP | Protection for abnormal temperature difference between outlet water and inlet water | User Interface and Main Control PCB | |
| Hb | PP occurs 3 times in heating/DHW mode | User Interface and Main Control PCB | |
| P5 | The big temperature difference between outlet water temp. and inlet water temp. | User Interface and Main Control PCB | |
| F75 | Protection for insufficient discharge overheating degree. | User Interface and Main Control PCB | |
| **Inverter module error/ protection** | | | |
| **Error code** | **Description** | **Displayed on** | |
| F1 | Protection for DC bus undervoltage | User Interface and Main Control PCB | For 1Ph units |
| C7 | Over-high temperature protection for IPM module | User Interface and Main Control PCB | |
| H4 | 3 times of “L1*” in 60 mins | User Interface and Main Control PCB | |
| L1E | Hardware overcurrent protection | Main Control PCB | |
| L11 | Phase current instantaneous overcurrent protection | Main Control PCB | |
| L12 | Phase current continuous 30s overcurrent protection | Main Control PCB | |
| L2E | Over-temperature protection | Main Control PCB | |
| L3E | Bus voltage too low error | Main Control PCB | |
| L31 | Bus voltage too high error | Main Control PCB | |
| L32 | Bus voltage excessively high error | Main Control PCB | |
| L34 | Phase loss error of three-phase power supply | Main Control PCB | For 3Ph units |
| L43 | Abnormal phase current sampling bias | Main Control PCB | |
| L45 | Fan motor code mismatch error | Main Control PCB | |
| L46 | IPM protection (FO) | Main Control PCB | |
| L47 | Module type mismatch | Main Control PCB | |
| L5E | Motor failed to start | Main Control PCB | |
| L52 | Motor stalling protection | Main Control PCB | |
| L6E | Phase loss protection | Main Control PCB | |
| L61 | compressor terminals short circuit protection | Main Control PCB | |
| L65 | IPM short circuit protection | Main Control PCB | |
| LBE | Action of high pressure switch | Main Control PCB | |
| LB7 | PED bH error | Main Control PCB | |
| LCE | PFC hardware overcurrent protection | Main Control PCB | For 3Ph units |

| | | | |
|---|---|---|---|
| LC1 | Instantaneous overcurrent of PFC software protection | Main Control PCB | For 3Ph units |
| LC2 | PFC software continuous 30 s overcurrent protection | Main Control PCB | For 3Ph units |
| LC3 | PFC low voltage protection | Main Control PCB | For 3Ph units |
| LC4 | PFC power factor is less than 0.8 | Main Control PCB | For 3Ph units |
| LC5 | PFC valid value overcurrent protection | Main Control PCB | For 3Ph units |
| LC6 | PFC1 channel hardware overcurrent protection | Main Control PCB | For 3Ph units |
| LC7 | PFC2 channel hardware overcurrent protection | Main Control PCB | For 3Ph units |
| LC8 | PFC3 channel hardware overcurrent protection | Main Control PCB | For 3Ph units |
| LC9 | Over-temperature protection of PFC module | Main Control PCB | For 3Ph units |
| LCA | PFC module CBC overcurrent error protection | Main Control PCB | For 3Ph units |
| LCB | Overvoltage of PFC bus or PFC half bus | Main Control PCB | For 3Ph units |
| LCC | Short circuit of PFC IGBT | Main Control PCB | For 3Ph units |
| LCD | Abnormal PFC Ad sampling bias | Main Control PCB | For 3Ph units |
| H6 | Fan failure | User Interface and Main Control PCB | |
| HH | 10 times of H6 in 120mins | User Interface and Main Control PCB | |
| J1E | Hardware overcurrent protection | Main Control PCB | |
| J11 | Phase current instantaneous overcurrent protection | Main Control PCB | |
| J12 | Phase current continuous 30s overcurrent protection | Main Control PCB | |
| J2E | Over-temperature protection | Main Control PCB | |
| J3E | Bus voltage too low error | Main Control PCB | |
| J31 | Bus voltage too high error | Main Control PCB | |
| J32 | Bus voltage excessively high error | Main Control PCB | |
| J43 | Abnormal phase current sampling bias | Main Control PCB | |
| J45 | Fan motor code mismatch error | Main Control PCB | |
| J46 | IPM PROTECTION (FO) | Main Control PCB | |
| J47 | Module type mismatch (after module resistance tested) | Main Control PCB | |
| J5E | Motor failed to start | Main Control PCB | |
| J52 | Motor stalling protection | Main Control PCB | |
| J6E | Phase loss protection | Main Control PCB | |
| J61 | Fan terminals short circuit protection | Main Control PCB | |
| J65 | IPM short circuit protection | Main Control PCB | |
| HF | Outdoor unit EEPROM error | User Interface and Main Control PCB | |

| Others | | | |
|---|---|---|---|
| **Error code** | **Description** | **Displayed on** | |
| Pb | Pb is the indicator that shows the system is running in anti-freezing control | Main Control PCB | |

| IBH-related error | | | |
|---|---|---|---|
| **Error code** | **Description** | **Displayed on** | |
| C2 | Relay adhesion on IBH PCB | User Interface and Main Control PCB | For Units with IBH |
| C3 | Current transformer failure or circuit failure of IBH PCB | User Interface and Main Control PCB | For Units with IBH |
| C4 | C3≥3 times | User Interface and Main Control PCB | For Units with IBH |

# 6 Troubleshooting

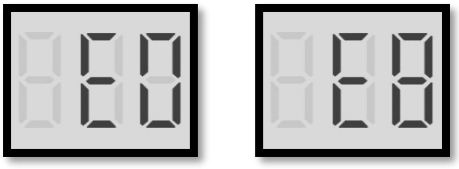
## 6.1 Warning

**WARNING!**

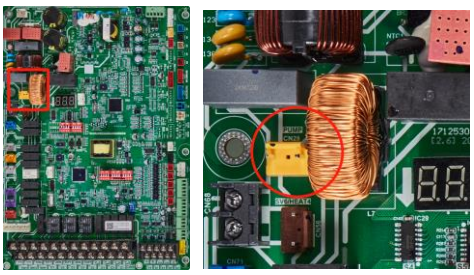
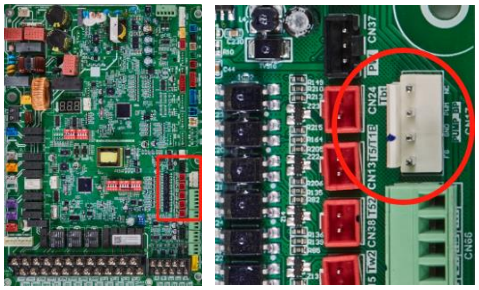
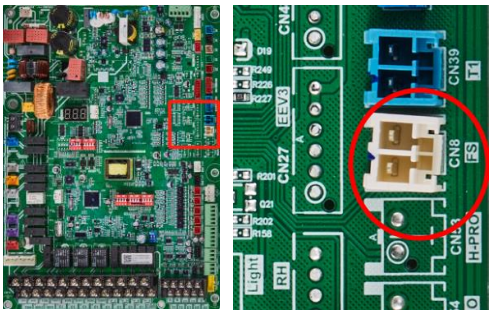
- All electrical work must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation (all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation).
- Power-off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

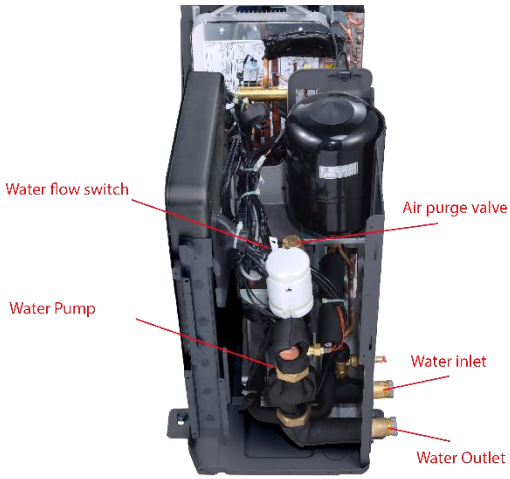
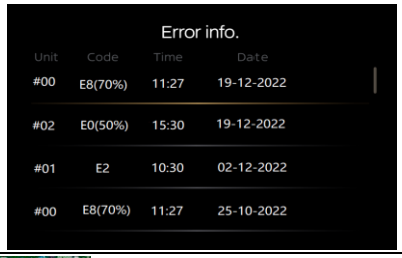
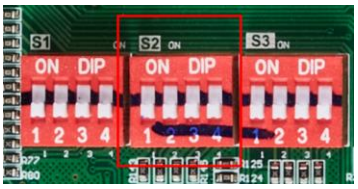
## 6.2 E0, E8 Troubleshooting

### 6.2.1 Digital display output



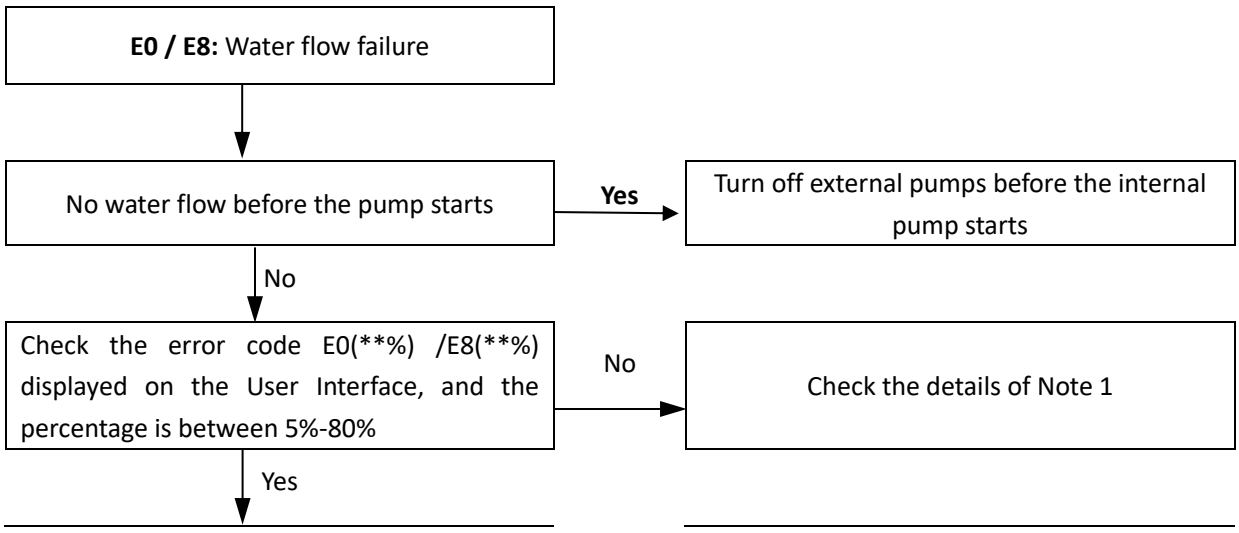

### 6.2.2 Description

| Error code | | E0 | E8 |
|---|---|---|---|
| Description | | water flow failure | water flow protection |
| Triggering | | 5 times of No-water detection failures in a row before pump on<br>Or<br>10 times of E8 in a row when do running-water detection after pump on | No-water detection failures before pump on or water flow switch breaks after pump on within 10 times |
| Relative ports and locations | CN28 PUMP<br>(To supply power for water pump) |  | |
| | CN17 PUMP BP<br>(feedback signal of water pump) |  | |
| | CN8 FS<br>(signal of water flow switch) |  | |

| | | |
|---|---|---|
| | Layout of main component |  |
| User Interface | | E0(**%) /E8(**%) is displayed on the User Interface. The percentage indicates possible cause of water flow failure, which is illustrated as note 1.<br>  |
| Correct Dip switch | |   |

| | | | |
|---|---|---|---|
| S2 | 1/2 | Reserved | 1:OFF<br>2:OFF |
| | 3/4 | 0/0=Variable speed pump (9m head)<br>0/1=Variable speed pump (8.5m head)<br>1/0=Fixed speed pump<br>1/1=Reserved | 3:OFF<br>4:OFF |

### 6.2.3 Procedure



Check the water pump indicator lights, and it shows water pump is normal
(Willo water pump green light indicates normal ; Xinjie water pump 5 lights all on indicates normal)

No → Check the details of Note 2

Yes ↓

Check the water circuit, and it is abnormal:
1. The ball valve which is connected to the unit is not opened
2.Water inlet and outlet pipe connected reversely.
3.Y-type filter is dirty block
4.The power cable(CN28) or feedback signal cable(CN17) is not connected properly
5. The water circuit was not filled first and not released air completely.

Yes → 1. Open the waterway ball valve which is connected to the unit
2.Make sure water inlet and outlet pipe connected correctly.
3.Clean the filter.
4.Connect the power cable or feedback signal cable correctly.
5.Fill the water circuit first and then release the air. If necessary, we can quickly release the air from the air purge valve by unscrewing black nut.

No ↓

Check the Water flow switch,and it is damaged
1.Flow switch FS plug (CN8) is not connected properly.
2. The water flow in the pipe is not consistent with arrow on the flow switch.
3.Remove the water flow switch from the pipeline, manually dial the water flow switch rake to closed status, and use a digital multimeter with buzzer to measure. if it does not beep, the water flow switch damaged.

Yes → 1.Insert the plug of the water flow switch correctly
2. Adjust the direction of water flow in the pipe to be the same as the arrow on the flow switch
3. When you manually dial the water flow switch to the closed status, use a digital multimeter with buzzer to measure. If buzzer sounds, the water flow switch is normal. Otherwise, it’s damaged and replace with a new water flow switch.

No ↓

For more error information of water pump and flow switch, check the note 3/4 to solve the problem.
If the error still occurs, request aftersales service

Note 1 :

| The meaning of percentage of water pump output(displayed on the user interface) | | | |
|---|---|---|---|
| **Percentage** | **Water pump model** | **Brand** | **Description** |
| 0% | Para 25/9 IPWM-130-1 | WILO | IPWM connection port short circuited |
| | APM25-9-130/180 | SHIMGE | PWM feedback signal loss |
| 2% | Para 25/9 IPWM-130-1 | WILO | Pump Standby |
| | APM25-9-130/180 | SHIMGE | Pump Standby |
| | APM25-9-130/180 | SHIMGE | Pump Standby |
| 80% | Para 25/9 IPWM-130-1 | WILO | Under-voltage＜160/170-194V, and Pump keeps running |
| | APM25-9-130/180 | SHIMGE | Alarm, and Pump keeps running<br>(Low voltage: 170-194V; High voltage: 250-270V) |
| 85% | Para 25/9 IPWM-130-1 | WILO | Under-voltage＜160/170V; Overvoltage＞253V-264V; Motor overload; module overheat; external pump flow rate larger than internal pump flow rate, Pump stops running |
| | APM25-9-130/180 | SHIMGE | Alarm, and pump stops running<br>(Low voltage: <170V/ High voltage: >270V) |
| 90% | Para 25/9 IPWM-130-1 | WILO | Over-speed Motor; over current; Under-speed; pump stalling, and pump stops running |
| | APM25-9-130/180 | SHIMGE | Alarm (Pump idling , pump stalling) and pump stops running |
| 95% | Para 25/9 IPWM-130-1 | WILO | Pump damaged; circuit damaged; terminal damaged, and pump stops running |
| | APM25-9-130/180 | SHIMGE | Alarm; Phase loss; Overcurrent error, and pump stops running |
| 100% | Para 25/9 IPWM-130-1 | WILO | IPWM connection port open circuited |
| | APM25-9-130/180 | SHIMGE | No PWM signal input |

Note 2 – Indicator lights on Xinjie water pump :

| Indicator lights on Xinjie water pump | | |
|---|---|---|
| **Name** | **Indicator lights** | **Description** |
| motor stalling protection |  | When motor stalling happens, the pump tries to reboot every 5s, and indicator lights shows the error. After 5 times reboot, pump stops running |
| Overcurrent/ Undercurrent protection |  | When low voltage: <165V/ high voltage: >275V, pump stops running and indicator lights shows the error. When the voltage is back to 160V-270V, pump resume running |
| Phase loss protection |  | When phase loss happens, the pump tries to reboot every 1s, and indicator lights shows the error. After 5 times reboot, pump stops running |
| Overcurrent (Short circuit) protection |  | When overcurrent / overheat happens, the pump tries to reboot every 1s, and indicator lights shows the error. After 5 times reboot, pump stops running |
| Overheat protection |  | When power module overheat, pump stops running and indicator lights shows the error. |

Note 3: The possible error and solutions of water pump

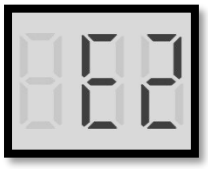
| The possible causes of water pump failure and solutions | | |
|---|---|---|
| **Description** | **Possible cause** | **Solution** |
| Error occurs at the first time running | Water pump leak | Replace the sealing ring |
| | Water inlet and outlet pipe connected reversely. | Connect the pipe correctly. |
| | The power cable (CN28) is not connected properly | Connect the power cable correctly. |
| | The feedback signal cable (CN17) is not connected properly | Connect the feedback signal cable correctly. |
| | The dip switch is not correct. | Correct the dip switch as the illustration above |
| Error occurs at the first time running or after running for a while | Pump idling | Fill the water circuit first and then release the air |
| | Pump stalling | Remove the water pump, Rotate the impeller manually until it can move freely. And then install it back. (If it's too hard to rotate the impeller manually, replace the water pump) |
| | Power supply is abnormal | Check the power supply |
| Error occurs after running for a while | E8 occurs after water pump running for a while | Fill the water circuit first and then release the air. |
| Error occurs at the first time running or after running for a while | Motor stall, and it can not be rotated manually | Replace water pump |
| Error occurs at the first time running | Water pump connection is correct, the water pump icon on the User Interface is lit, while no indicator lights on water pump is lit. | Replace water pump |

Note 4: The possible error and solutions of water flow switch failure

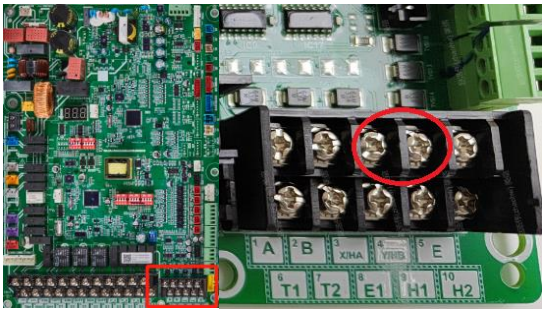
| The possible causes of water flow switch failure and solutions | | |
|---|---|---|
| **Description** | **Possible cause** | **Solution** |
| Error occurs at the first time running | The water flow in the pipe is not consistent with arrow on the flow switch. | Adjust the direction of water flow in the pipe to be the same as the arrow on the flow switch |
| | Flow switch FS plug (CN8) is not connected properly. | Insert the plug of the water flow switch correctly |
| | External pump starts before internal pump (PUMPI) starts | Start internal pump first, make sure water flow is sufficient for external pump |
| Error occurs at the first time running or after running for a while | Flow switch not installed properly | Reinstall the flow switch correctly |
| | Flow switch leak | Replace the sealing ring |
| | flow switch rake blocked | Clean the obstacles |
| | flow switch rake damaged | Replace the flow switch |
| | The flow switch contact can not be completely closed | Replace the flow switch |
| | The flow switch contact can not be completely open | Replace the flow switch |
| | The flow switch model did not match | Replace the flow switch |

## 6.3 E2 Troubleshooting

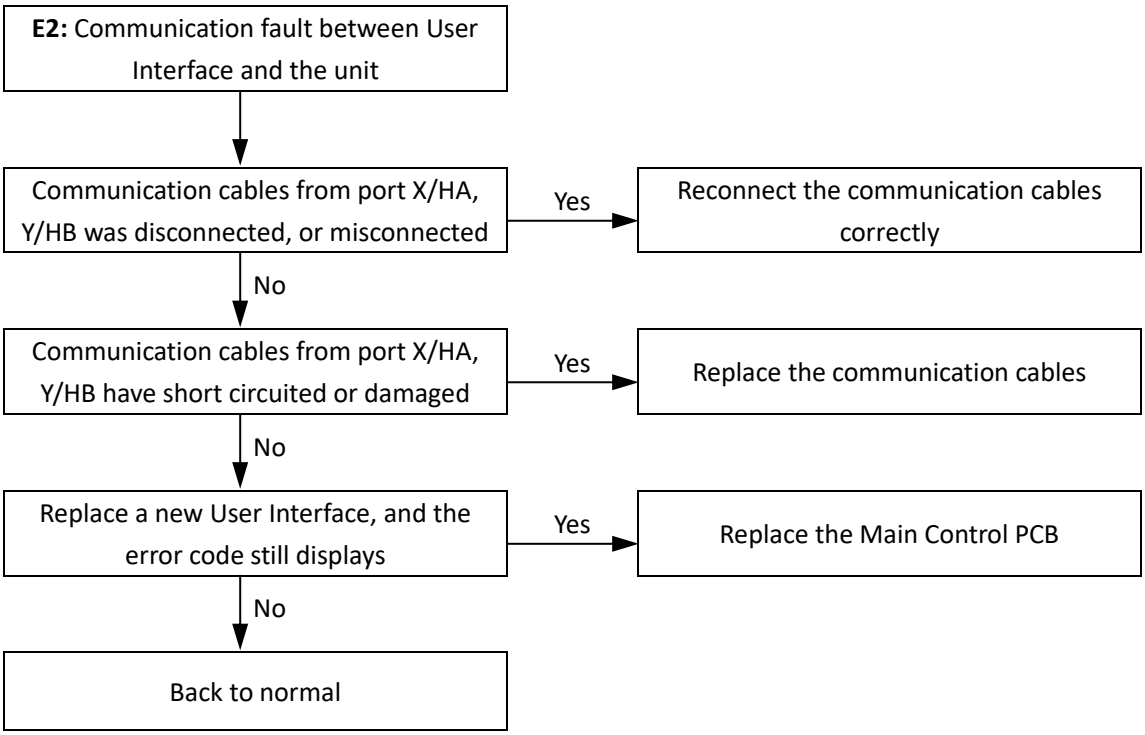
### 6.3.1 Digital display output




### 6.3.2 Description

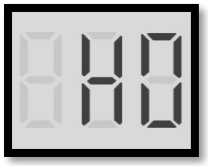
| Error code | | E2 |
|---|---|---|
| Description | | Communication fault between User Interface and Main Control PCB |
| Triggering | | Main Control PCB side: Communication failure with User Interface lasts 2 mins<br>Or<br>User Interface side: No communication reply from Main Control PCB for 1 min |
| Relative ports and locations | X/HA、Y/HB |  |

### 6.3.3 Procedure



## 6.4 H0 Troubleshooting

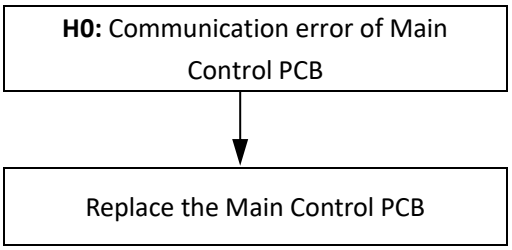
### 6.4.1 Digital display output




### 6.4.2 Description

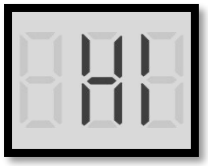
| Error code | H0 |
|---|---|
| Description | Communication error of Main Control PCB |
| Triggering | Communication failure lasts 1 min |

### 6.4.3 Procedure

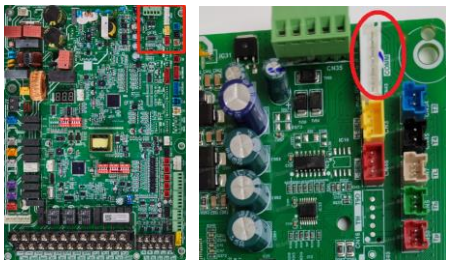
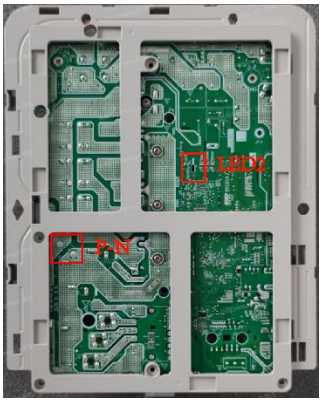
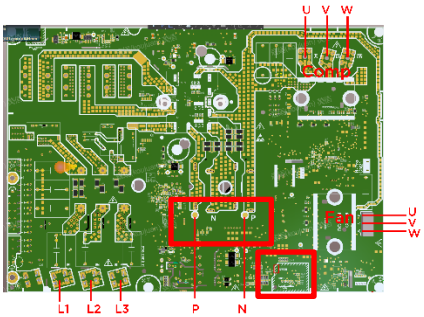
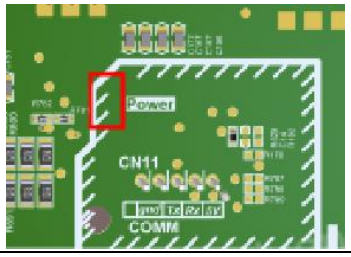


## 6.5 H1 Troubleshooting

### 6.5.1 Digital display output

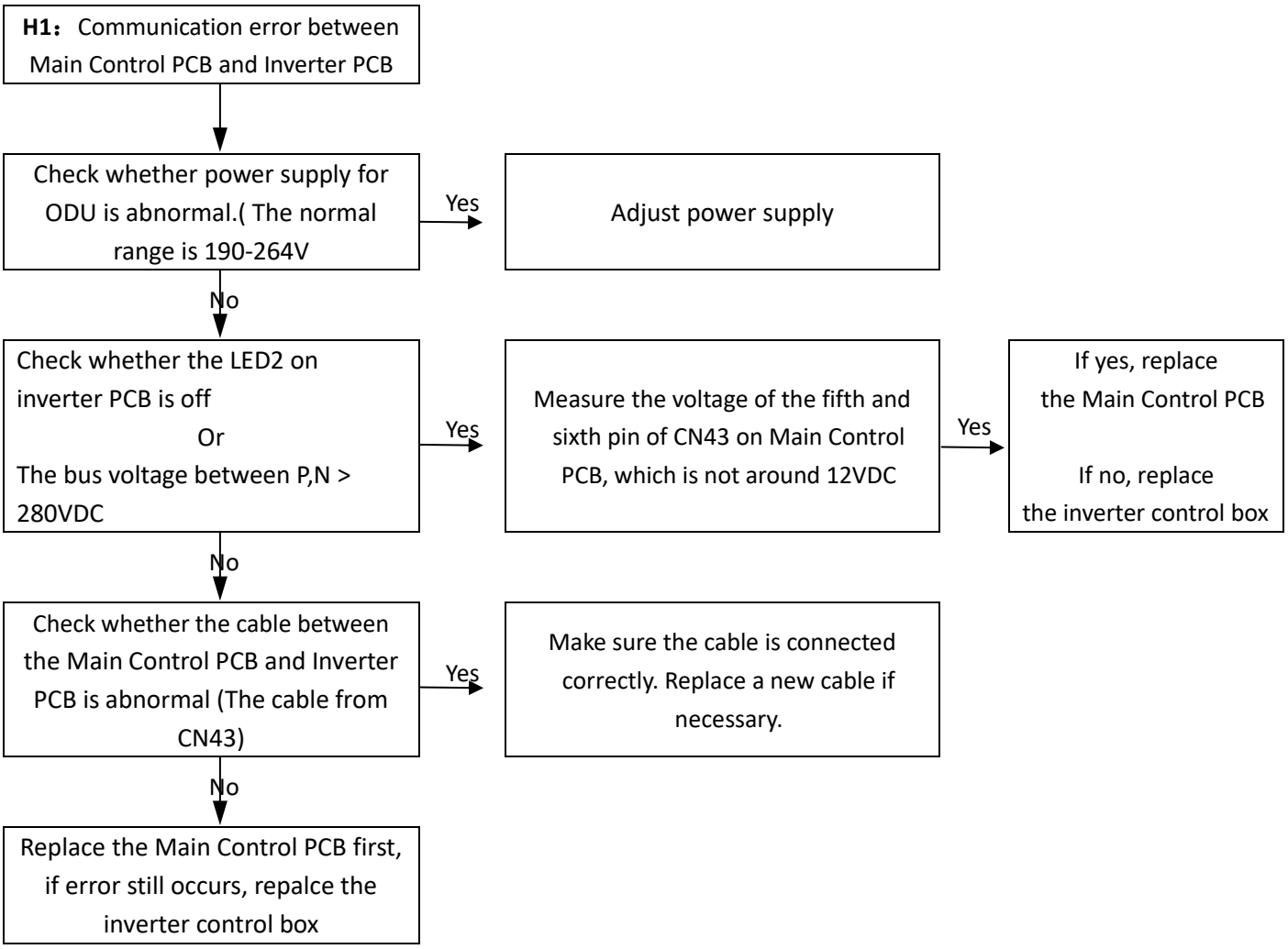



### 6.5.2 Description

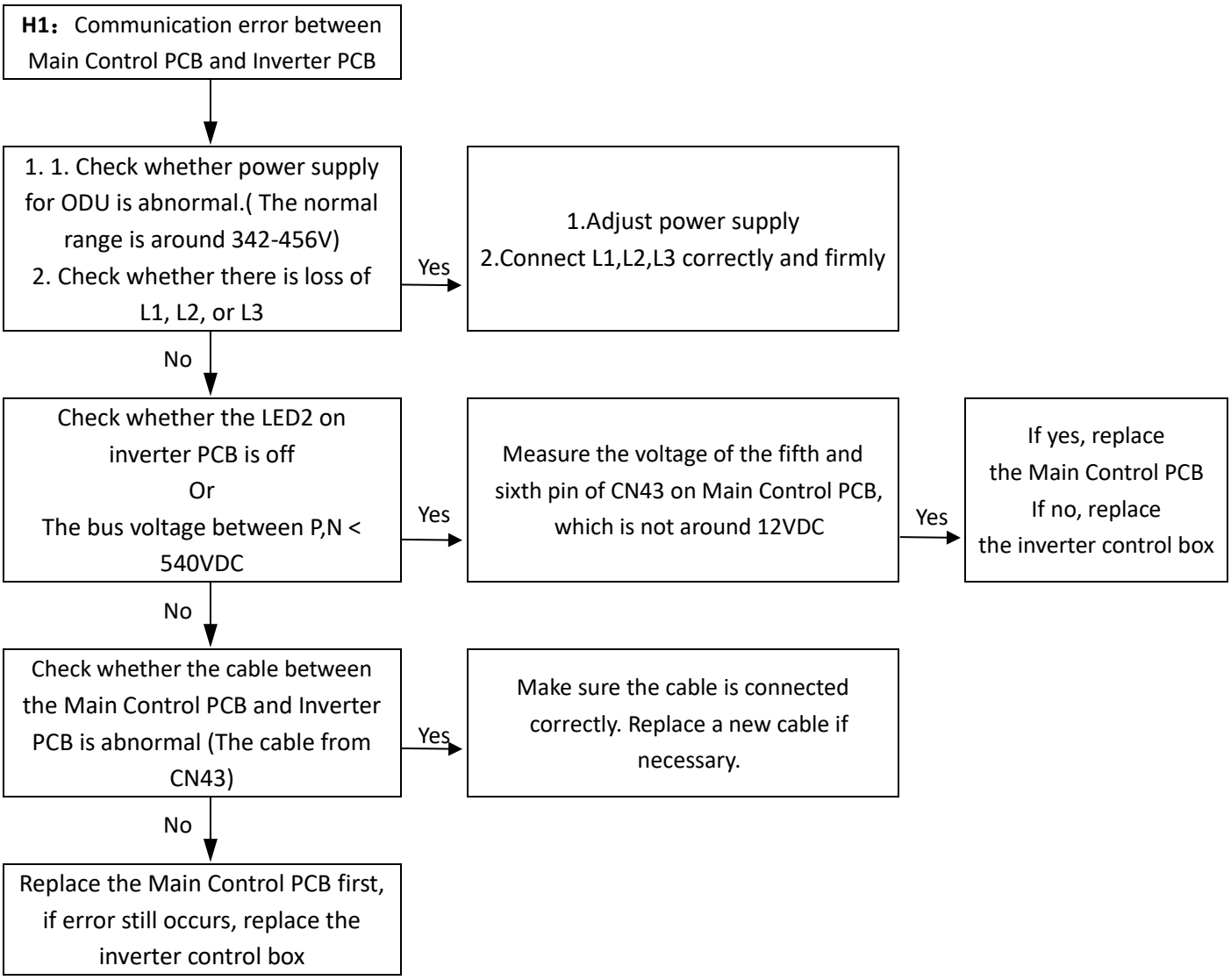
<table>
<tr><th colspan="2">Error code</th><th>H1</th></tr>
<tr><td colspan="2">Description</td><td>Communication error between Main Control PCB and inverter PCB</td></tr>
<tr><td colspan="2">Triggering</td><td>Communication failure occurs after powering on the unit for 2 mins</td></tr>
<tr><td rowspan="3">Relative ports and locations</td><td>CN43 COMM<br>(Main Control PCB)</td><td>  </td></tr>
<tr><td>LED2<br>&<br>BUS voltage(P-N)<br>(1 Ph Inverter PCB)</td><td> 
</td></tr>
<tr><td>LED2<br>&<br>BUS voltage(P-N)<br>(3 Ph inverter PCB)</td><td> 
<br>You can see the slim light of LED2 through the gap at the back of inverter PCB<br> 
</td></tr>
</table>

### 6.5.3 Procedure

**For 1Ph models**

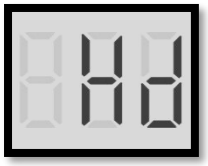


**For 3Ph units**

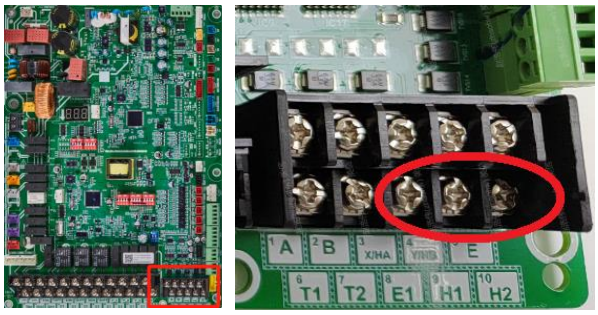
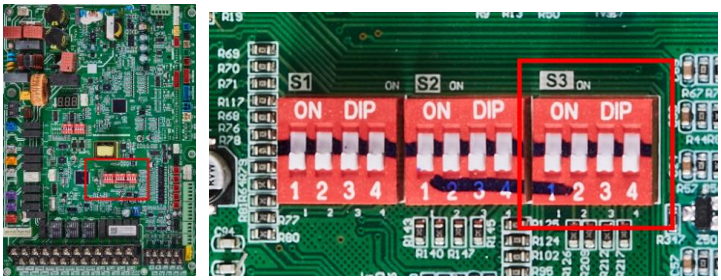
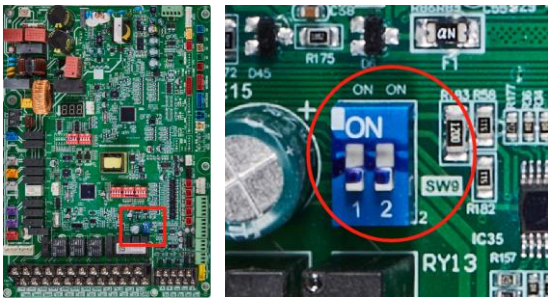


## 6.6 Hd Troubleshooting

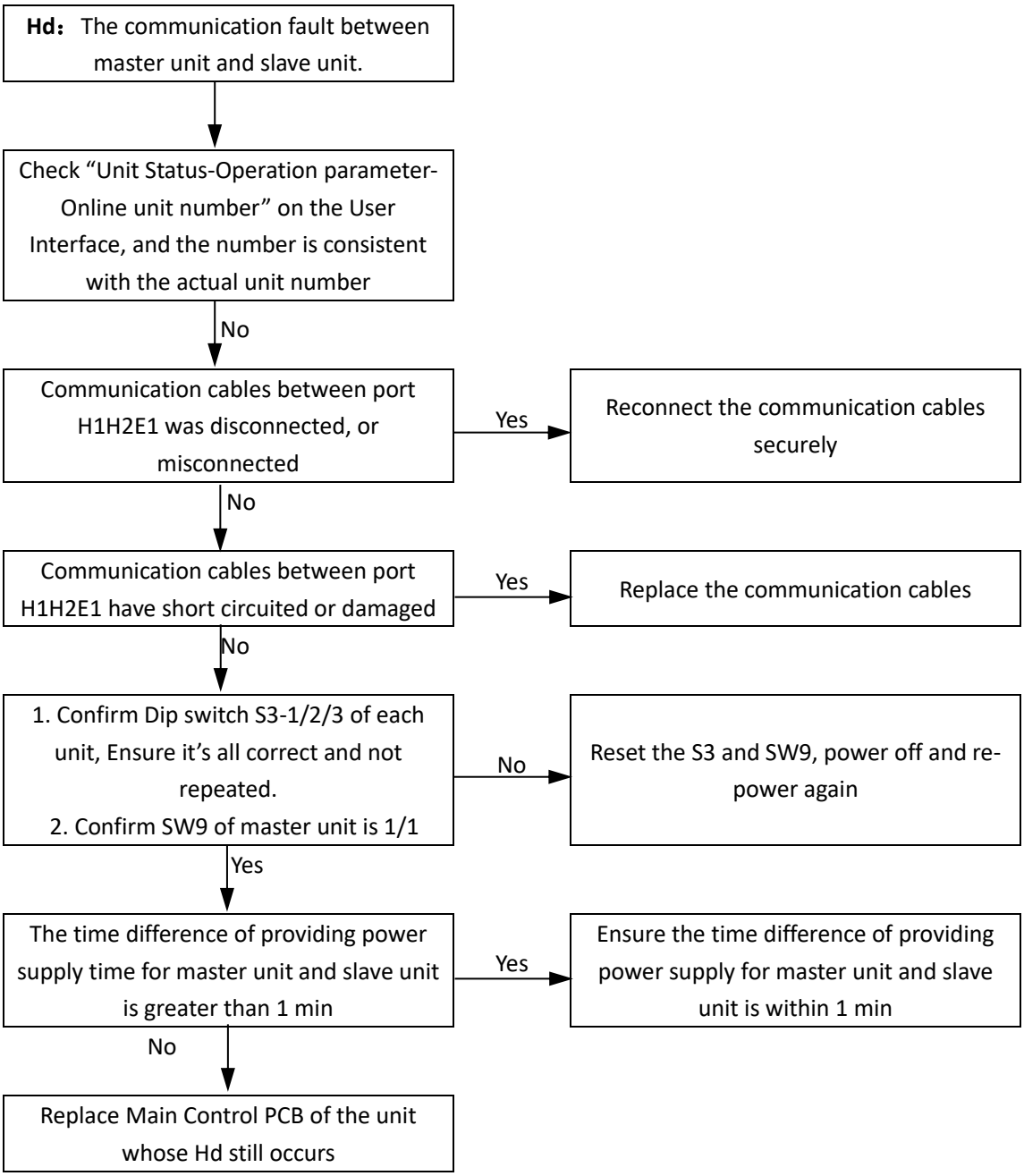
### 6.6.1 Digital display output




### 6.6.2 Description

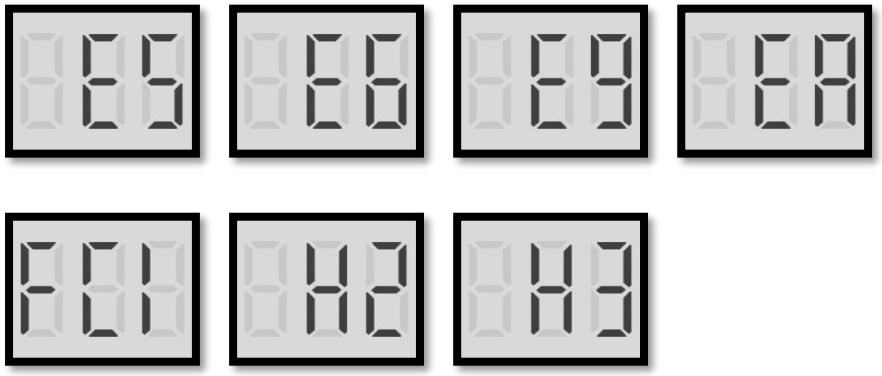
| Error code | | Hd |
|---|---|---|
| Description | | Communication fault between master unit and slave unit. |
| Triggering | | For cascade system, the communication failure between master unit and slave unit lasts 2mins and above |
| Relative ports and locations | Communication port<br>E1/H1/H2 |  |
| | Dip switch S3-1/2/3<br>0/0/0=address 0#（Master）<br>1/0/0=address 1#（Slave）<br>0/1/0=address 2#（Slave）<br>0/0/1=address 3#（Slave）<br>1/1/0=address 4#（Slave）<br>1/0/1=address 5#（Slave）<br>0/1/1=address 6#（Slave）<br>1/1/1=address 7#（Slave） |  |
| | SW9<br>1/1=master unit<br>0/0=slave unit |  |

### 6.6.3 Procedure

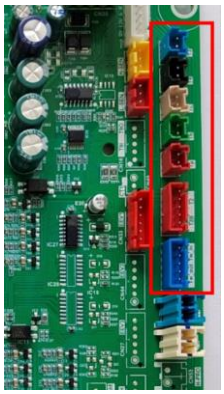


## 6.7 E5, E6, E9, EA, FC1, H2, H3 Troubleshooting

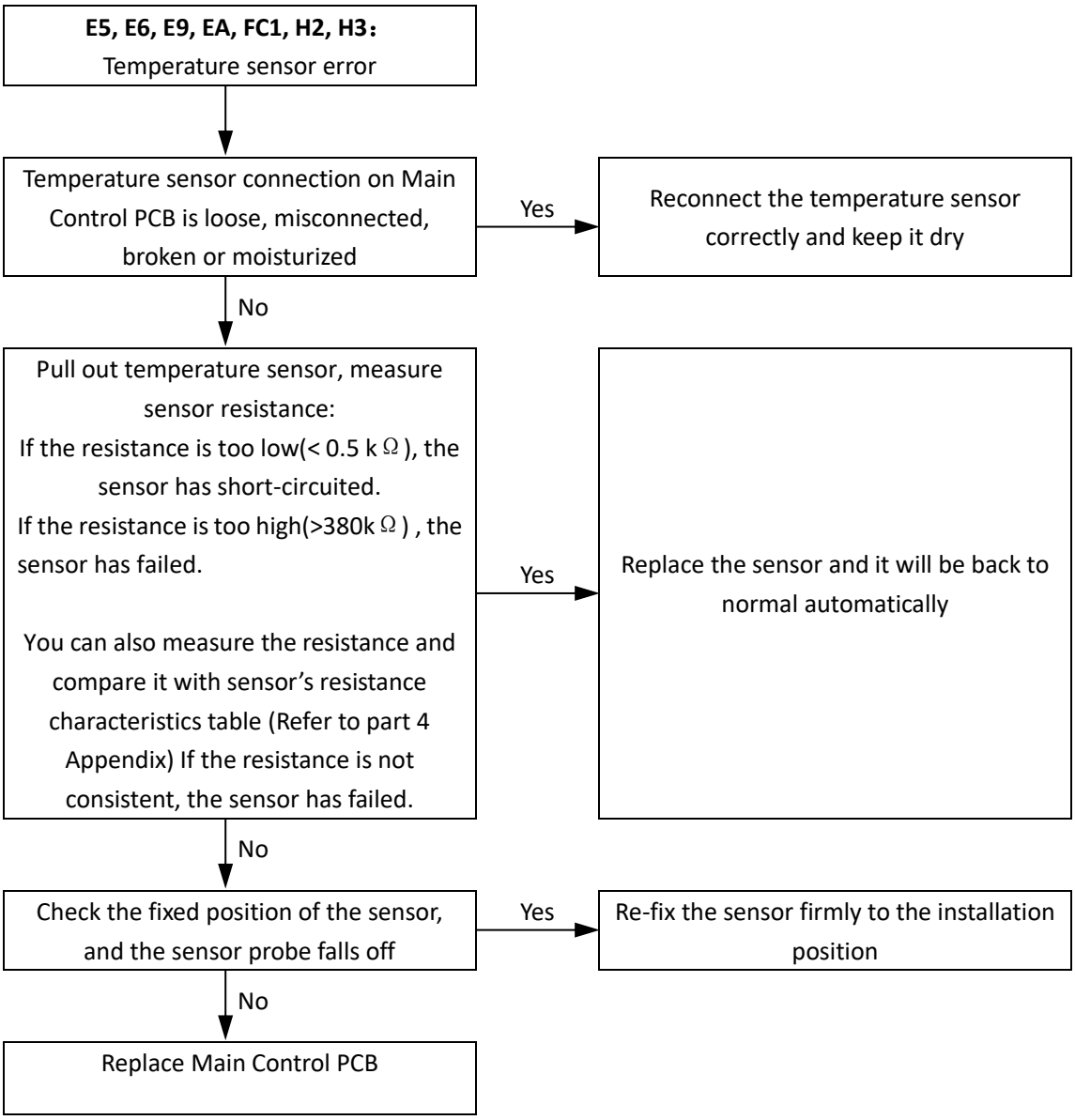
### 6.7.1 Digital display output




### 6.7.2 Description

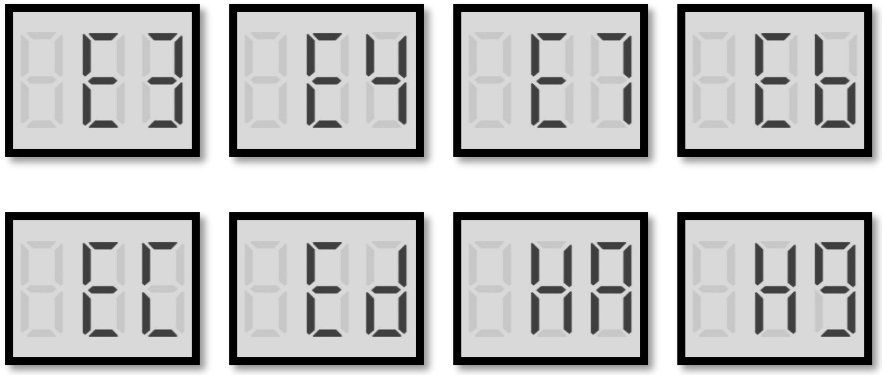
| Code | Description | Port | Location |
|---|---|---|---|
| E5 | T3 Outdoor unit heat exchanger bottom temperature sensor error | CN34 |   |
| E6 | T4 Ambient temperature sensor error | CN45 | |
| E9 | Th Return-air temperature sensor error | CN5 | |
| EA | Tp Discharge temperature sensor error | CN50 | |
| FC1 | TL Outdoor unit heat exchanger outlet temperature sensor error | CN7 | |
| H2 | T2 Plate heat exchanger outlet refrigerant temperature sensor error | CN47 | |
| H3 | T2B Plate heat exchanger inlet refrigerant temperature sensor error | | |

### 6.7.3 Procedure

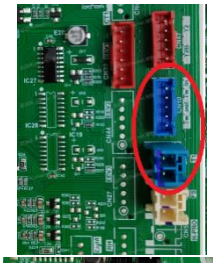
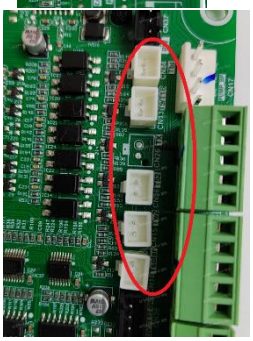
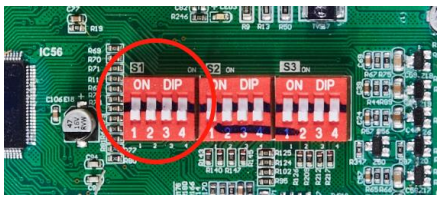
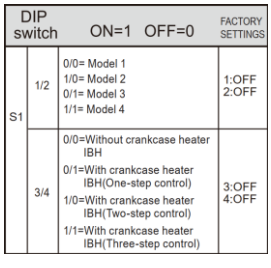


## 6.8 E3, E4, E7, Eb, EC, Ed, HA, H9 Troubleshooting

### 6.8.1 Digital display output




### 6.8.2 Description

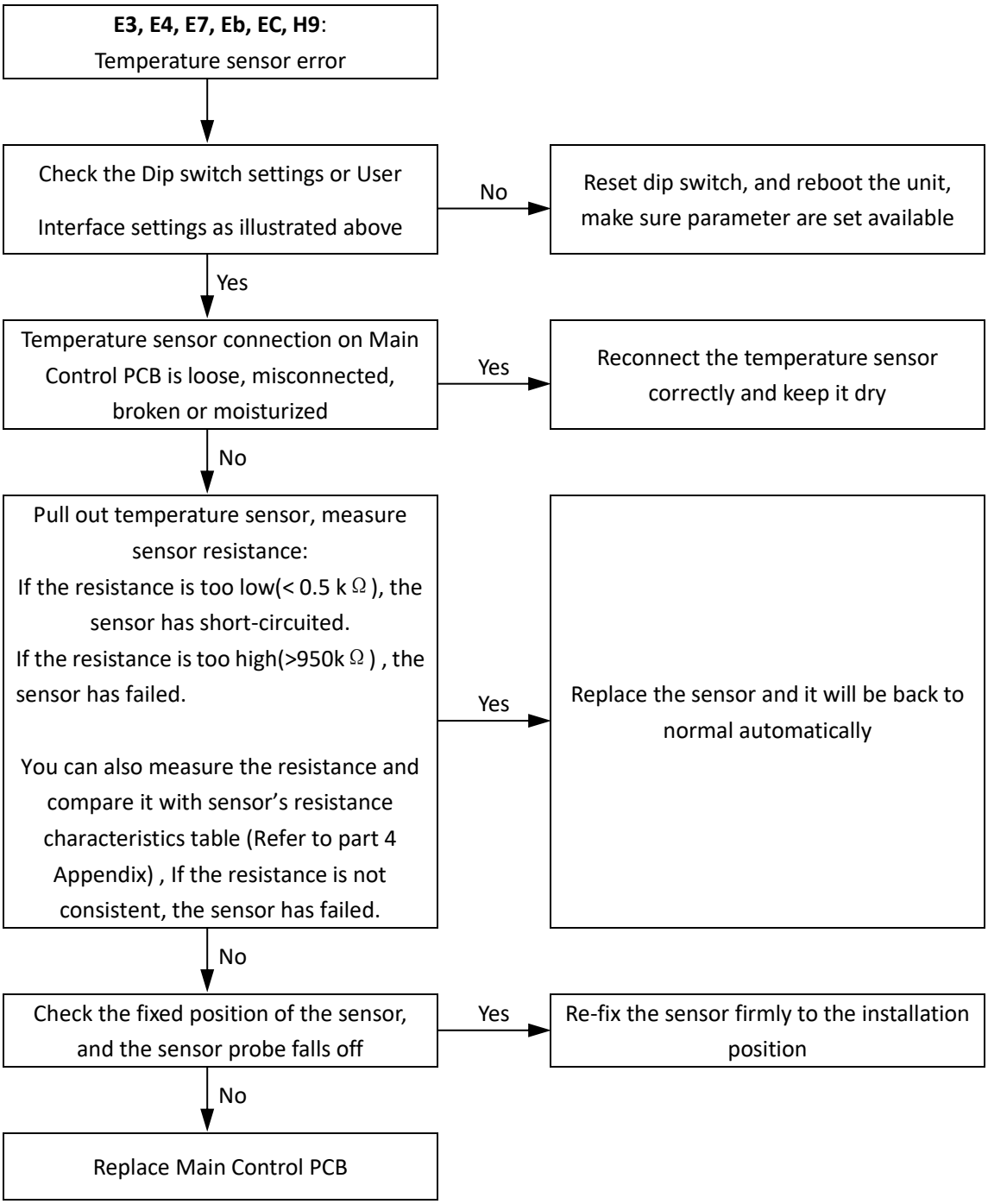
| Code | Description | Port | Location (Main Control PCB) |
|---|---|---|---|
| E3 | T1 Electric Heater/AHS water outlet temperature sensor error | CN39 |    |
| E4 | T5 Water tank temperature sensor error | CN13 | |
| E7 | Tbt Balance tank temperature sensor/ Final outlet water temperature of cascade system sensor error | CN24 | |
| Eb | Tsolar Solar panel temperature sensor error | CN18 | |
| EC | T5_2 Water tank temperature sensor error (Reserved) | CN38 | |
| Ed | Tw_in Plate heat exchanger inlet water temperature sensor error | CN10 | |
| HA | Tw_out Plate heat exchanger outlet water temperature sensor error | | |
| H9 | Tw2 Zone 2 water flow temperature sensor error | CN15 | |
| Dip Switch S1 | IBH Dip switch | |    |

| DIP switch | | ON=1 OFF=0 | FACTORY SETTINGS |
|---|---|---|---|
| S1 | 1/2 | 0/0= Model 1<br>1/0= Model 2<br>0/1= Model 3<br>1/1= Model 4 | 1:OFF<br>2:OFF |
| | 3/4 | 0/0=Without crankcase heater IBH<br>0/1=With crankcase heater IBH(One-step control)<br>1/0=With crankcase heater IBH(Two-step control)<br>1/1=With crankcase heater IBH(Three-step control) | 3:OFF<br>4:OFF |

Note 1: Dip switch settings or User Interface settings

| Code | Description |
|---|---|
| Ed | Main Control PCB can not detect the right sensor value. |
| HA | |
| E3 | IBH function is on(Dip switch S1-3/4 is set IBH available, and User Interface- For Serviceman - Other heat source – IBH function=1) ,while Main Control PCB can not detect the right **T1** sensor value.<br><br>AHS function is on (User Interface- For Serviceman - Other heat source - AHS function=1), while Main Control PCB can not detect the right **T1** sensor value. |
| E4 | DHW mode is on (User Interface- For Serviceman – DHW setting- DHW mode=1), while Main Control PCB can not detect the right **T5** sensor value. |
| E7 | Tbt is on (User Interface- For Serviceman- Input definition- Tbt=1 ), while Main Control PCB can not detect the right **Tbt** sensor value. |
| Eb | Solar function is on and Solar control is on (User Interface- For Serviceman - Other heat source - Solar function=1 & Solar control=1 ),while Main Control PCB can not detect the right **Tsolar** sensor value. |
| EC | T5_2 is on (User Interface- For Serviceman- Input definition- Tbt=1 ), while Main Control PCB can not detect the right **T5_2** sensor value. (Reserved) |
| H9 | Double zone is on(User Interface- For Serviceman –Temp. type setting – Double zone=1),while Main Control PCB can not detect the right **Tw2** sensor value. |

### 6.8.3 Procedure



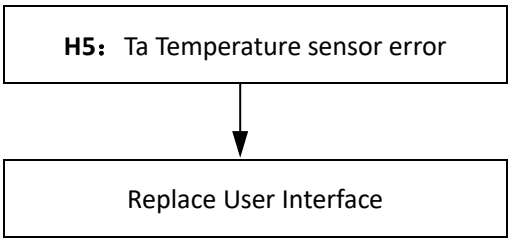
## 6.9 H5 Troubleshooting

### 6.9.1 Digital display output


### 6.9.2 Description

| Code | Description | Location |
|---|---|---|
| H5 | Ta room temperature sensor error | Inserted on PCB of User Interface |

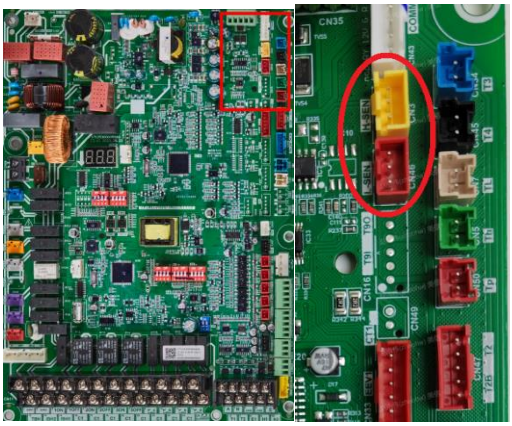
### 6.9.3 Procedure



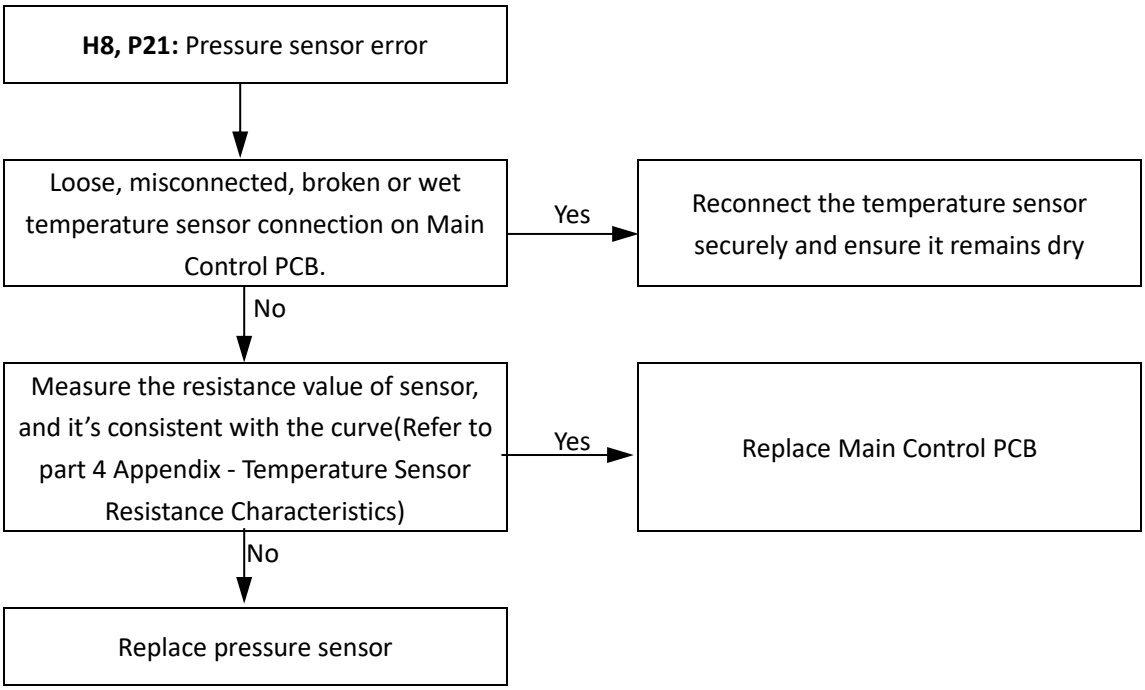
## 6.10 H8, P21, P27 Troubleshooting

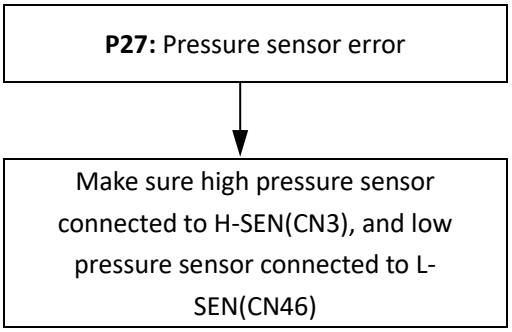
### 6.10.1 Digital display output


### 6.10.2 Description

| Code | Description | Port | Location(Main Control PCB) |
|---|---|---|---|
| H8 | H-SEN High pressure sensor error | CN3 |  |
| P21 | L-SEN Low pressure sensor error | CN46 | |
| P27 | H-SEN and L-SEN connected reversely (Detect when compressor is off) | CN3/ CN46 | |

### 6.10.3 Procedure



## 6.11 E1 Troubleshooting

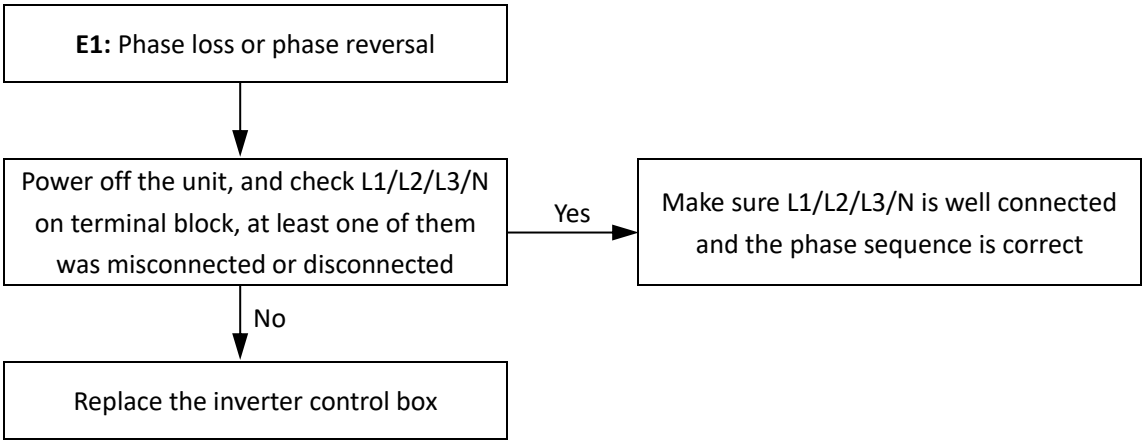
### 6.11.1 Digital display output


### 6.11.2 Description

| Error code | | E1 (For 3Ph units) |
|---|---|---|
| Description | | Phase loss or phase reversal |
| Triggering | | At least one of L1/L2/L3/N misconnected or disconnected |
| Relative ports and locations | Terminal blocks |  |

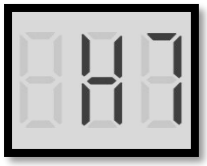


### 6.11.3 Procedure



## 6.12 H7 Troubleshooting

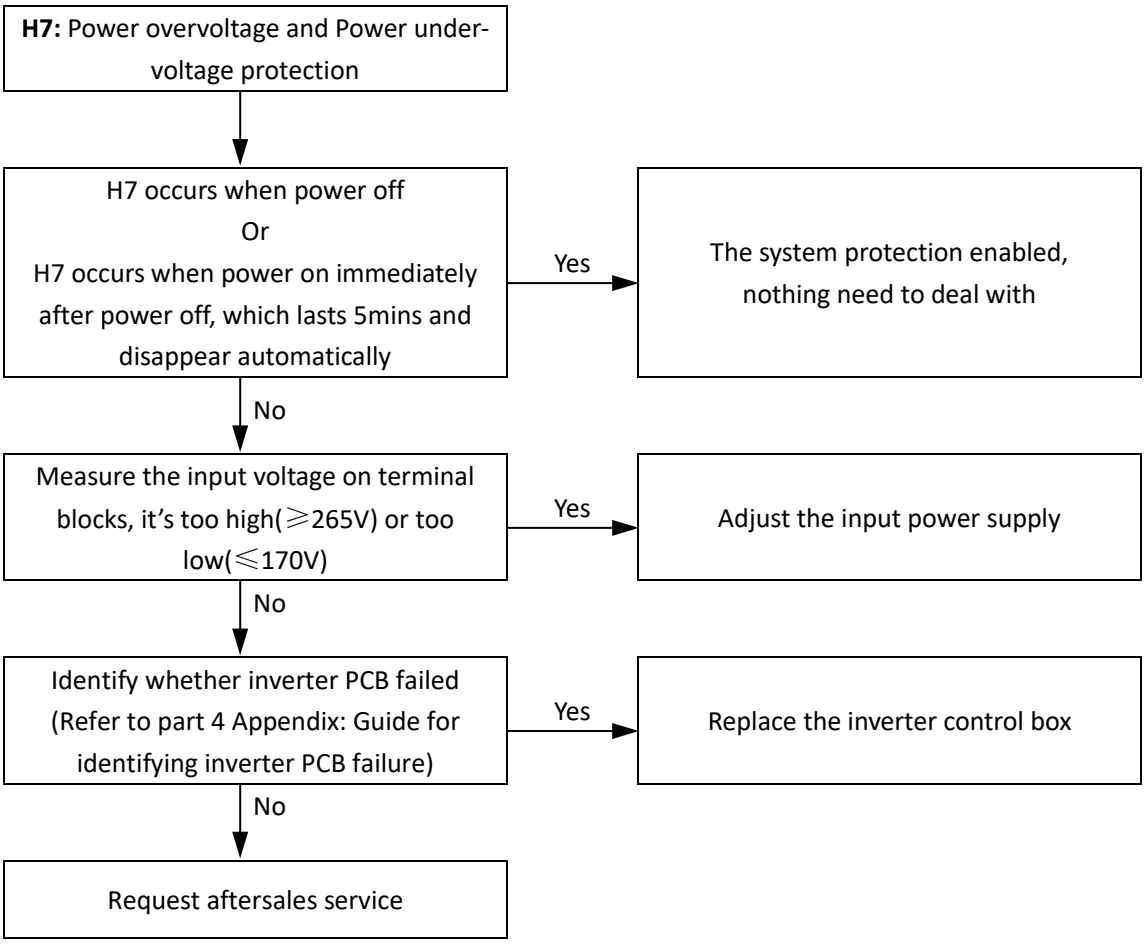
### 6.12.1 Digital display output




### 6.12.2 Description

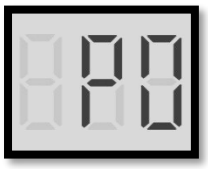
| Error code | H7 |
|---|---|
| Description | Power overvoltage and Power under-voltage protection |
| Triggering | Input voltage<170V or Input voltage≥265V<br>(The unit operating normally if 250V≥input voltage≥180V) |

### 6.12.3 Procedure

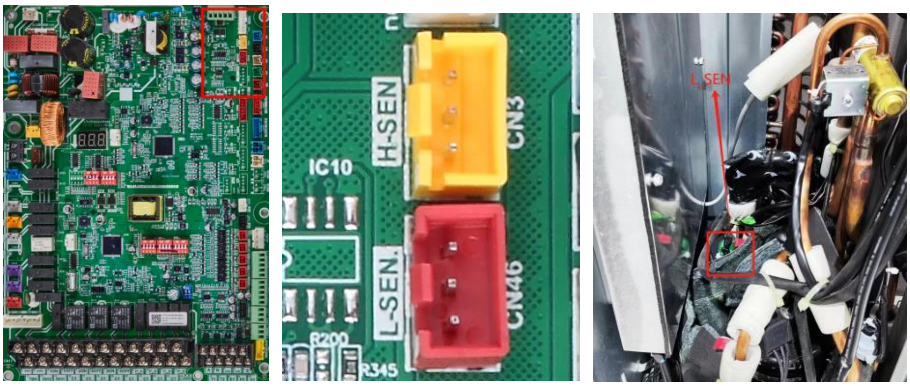
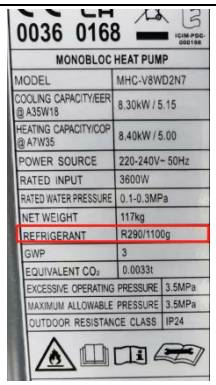


## 6.13 P0 Troubleshooting

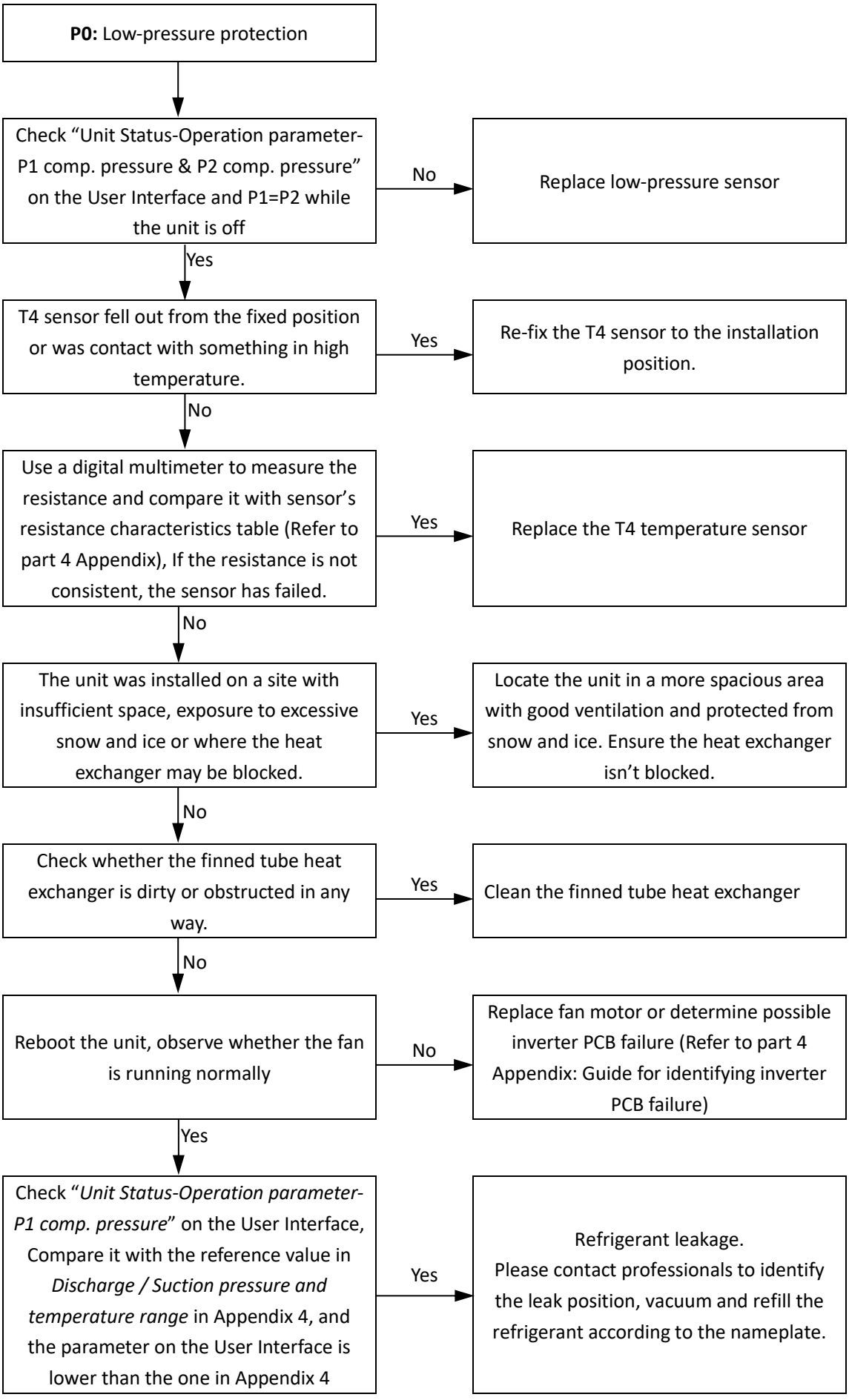
### 6.13.1 Digital display output

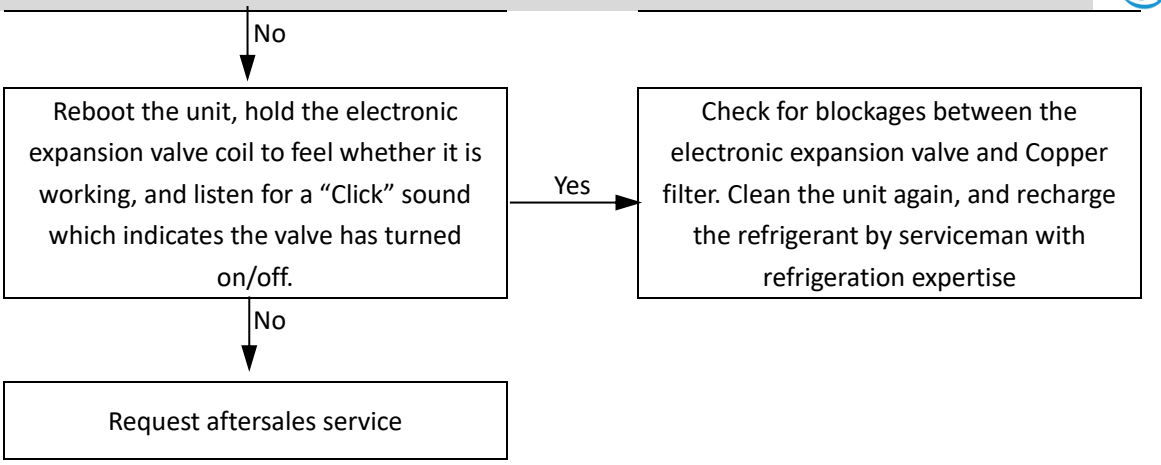



### 6.13.2 Description

| Error code | P0 |
|---|---|
| Description | Low pressure protection |
| Triggering | 1. Main Control PCB detected that the low pressure <0.12MPa lasting more than 30 mins<br>2. Main Control PCB detected that low pressure <0.13MPa & compressor shutting off more than 2 mins at the same time.<br>3. Main Control PCB detected that low pressure <0.13MPa & compressor is running (T4≥-10℃ ambient condition) except defrost and forced cooling operation status |
| Low pressure sensor |  |
| Nameplate |  <br>Refer to Nameplate for rated refrigerant charge volume.<br>The picture is for reference only. The actual product may vary. |

### 6.13.3 Procedure

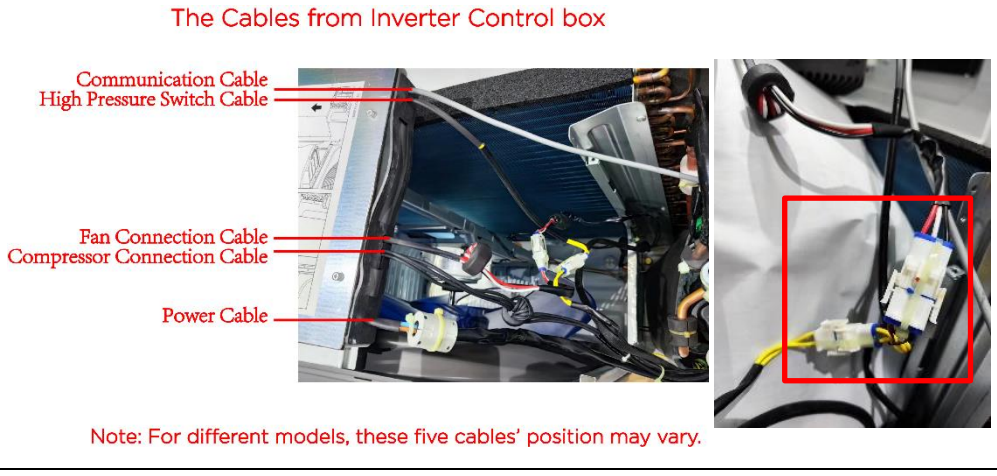
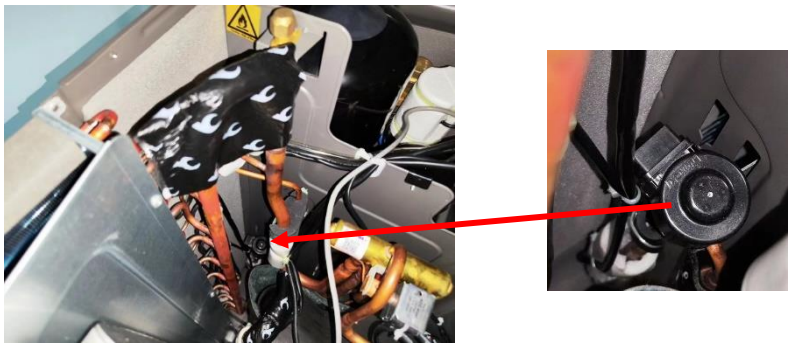
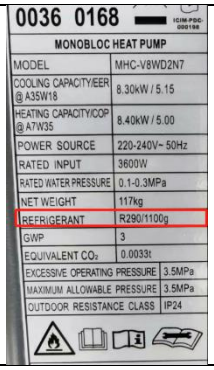



No
Reboot the unit, hold the electronic expansion valve coil to feel whether it is working, and listen for a “Click” sound which indicates the valve has turned on/off.
Yes
Check for blockages between the electronic expansion valve and Copper filter. Clean the unit again, and recharge the refrigerant by serviceman with refrigeration expertise
No
Request aftersales service

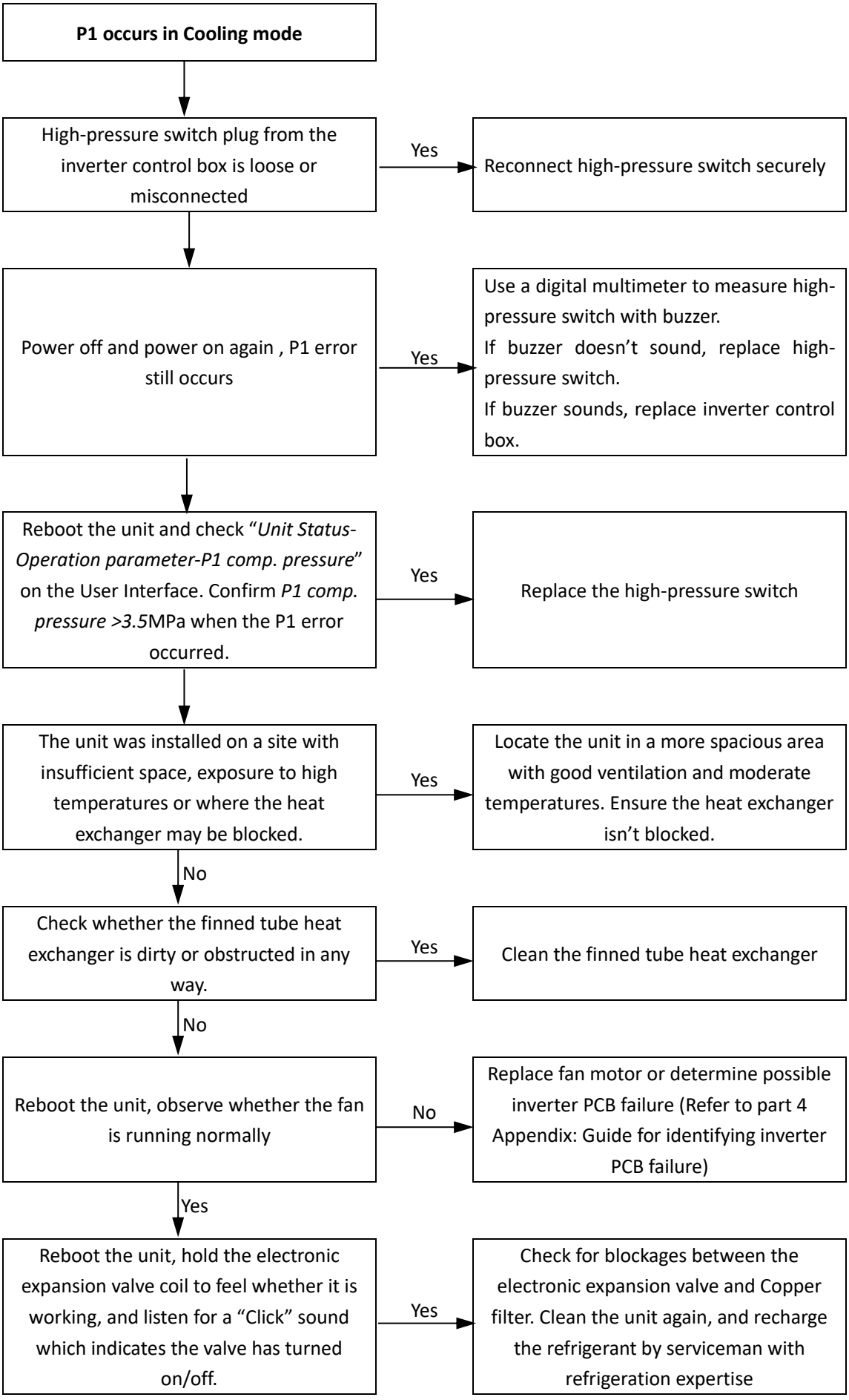
## 6.14 P1 Troubleshooting

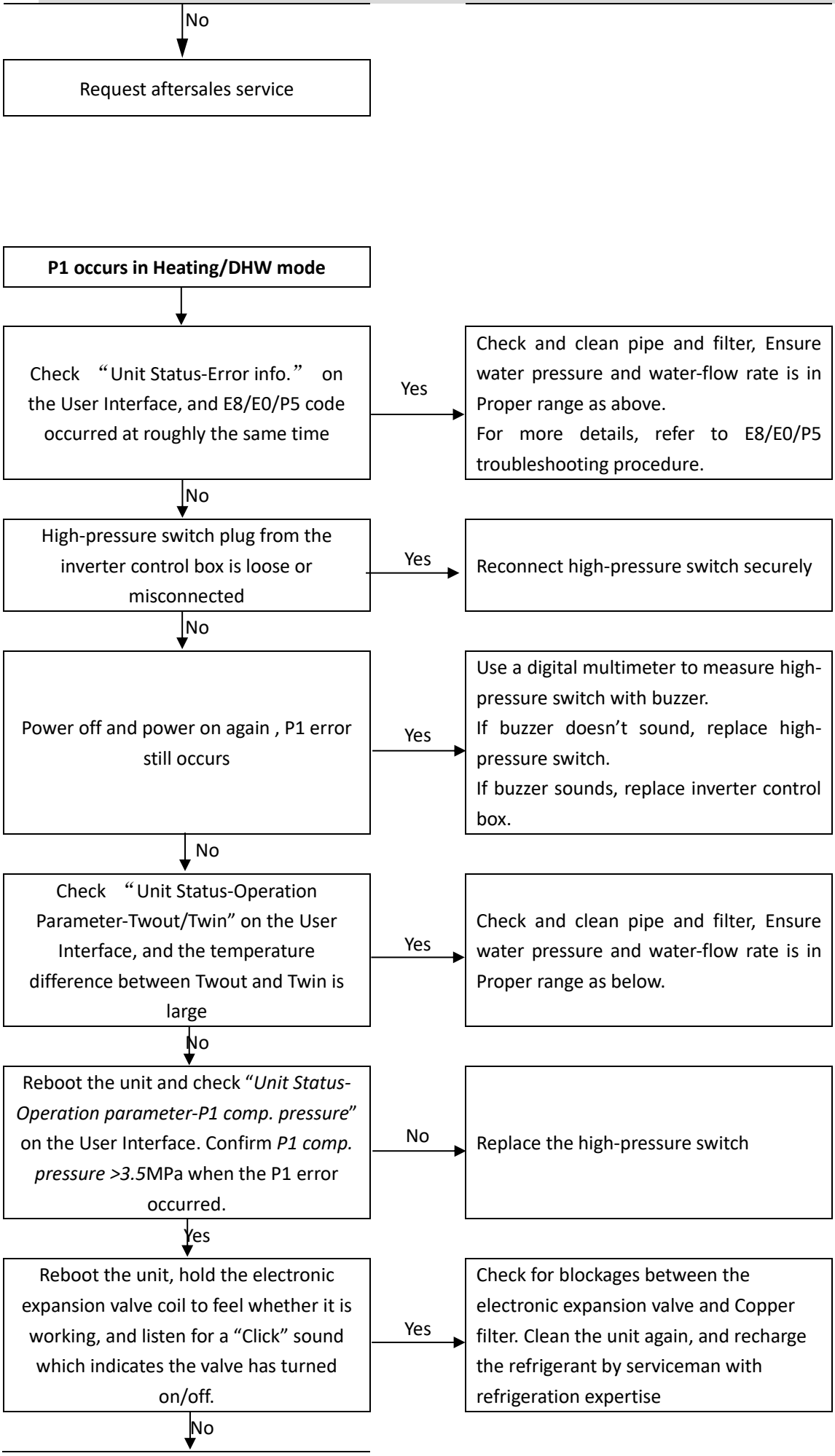
### 6.14.1 Digital display output


### 6.14.2 Description

| Error code | P1 |
|---|---|
| Description | High pressure switch protection |
| Triggering | The Main Control PCB detected that the high pressure was ⩾ 3.5 Mpa |
| High pressure switch location | The location of high pressure switch refer to Part 2 Component Layout and Refrigerant Circuits |
| High pressure switch plug |  |
| Electric expansion valve |  |
| Nameplate |  <br>Refer to Nameplate for rated refrigerant charge volume.<br>The picture is for reference only. The actual product may vary. |

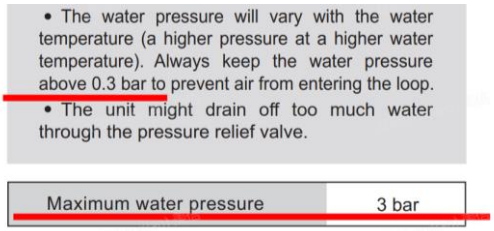
### 6.14.3 Procedure




No
Request aftersales service
P1 occurs in Heating/DHW mode
Check “Unit Status-Error info.” on the User Interface, and E8/E0/P5 code occurred at roughly the same time
Yes
Check and clean pipe and filter, Ensure water pressure and water-flow rate is in Proper range as above.
For more details, refer to E8/E0/P5 troubleshooting procedure.
No
High-pressure switch plug from the inverter control box is loose or misconnected
Yes
Reconnect high-pressure switch securely
No
Power off and power on again , P1 error still occurs
Yes
Use a digital multimeter to measure high-pressure switch with buzzer.
If buzzer doesn’t sound, replace high-pressure switch.
If buzzer sounds, replace inverter control box.
No
Check “Unit Status-Operation Parameter-Twout/Twin” on the User Interface, and the temperature difference between Twout and Twin is large
Yes
Check and clean pipe and filter, Ensure water pressure and water-flow rate is in Proper range as below.
No
Reboot the unit and check “*Unit Status-Operation parameter-P1 comp. pressure*” on the User Interface. Confirm *P1 comp. pressure >3.5*MPa when the P1 error occurred.
No
Replace the high-pressure switch
Yes
Reboot the unit, hold the electronic expansion valve coil to feel whether it is working, and listen for a “Click” sound which indicates the valve has turned on/off.
Yes
Check for blockages between the electronic expansion valve and Copper filter. Clean the unit again, and recharge the refrigerant by serviceman with refrigeration expertise
No

Replace the inverter control box

| The proper water pressure range:(0.3bar-3bar) | The proper water flow rate range |
|---|---|



- The water pressure will vary with the water temperature (a higher pressure at a higher water temperature). Always keep the water pressure above 0.3 bar to prevent air from entering the loop.
- The unit might drain off too much water through the pressure relief valve.

| | |
|---|---|
| Maximum water pressure | 3 bar |

| Unit | Flow rate range |
|---|---|
| 4kW | 0.40 - 0.90 $m^3/h$ |
| 6kW | 0.40 - 1.25 $m^3/h$ |
| 8kW | 0.40 - 1.65 $m^3/h$ |
| 10kW | 0.40 - 2.10 $m^3/h$ |
| 12kW | 0.70 - 2.50 $m^3/h$ |
| 14kW | 0.70 - 2.75 $m^3/h$ |
| 16kW | 0.70 - 3.00 $m^3/h$ |

**P1 occurs in Off status**

↓

Check “Unit Status-Operation parameter-P1 comp. pressure & P2 comp. pressure” on the User Interface, and P1&P2<3.5MPa

→ No → Request aftersales service

↓ Yes

Check whether high-pressure switch plug was disconnected, or misconnected

→ Yes → Re-connect the high-pressure witch plug

↓ No

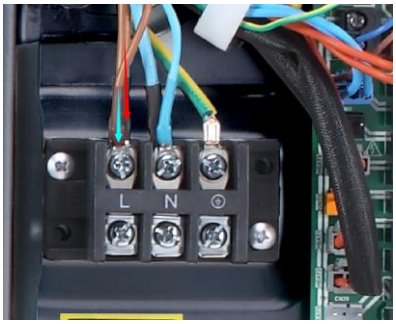
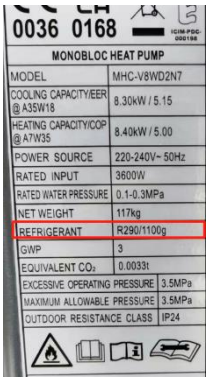
Measure the high-pressure switch to check whether it keeps closed

→ Yes → Replace high-pressure switch

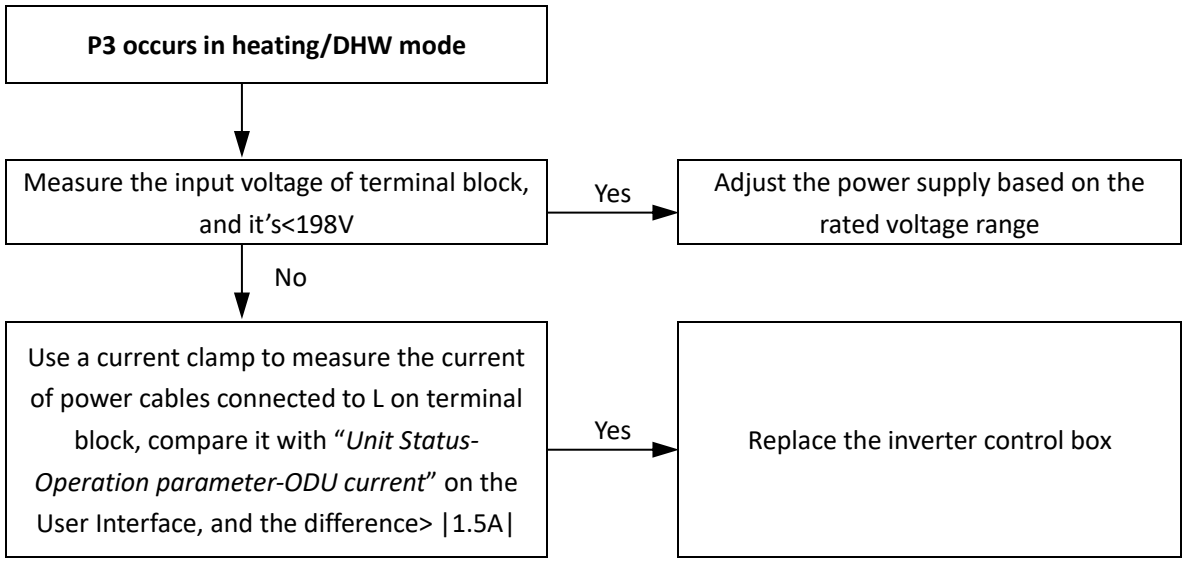
## 6.15 P3 Troubleshooting

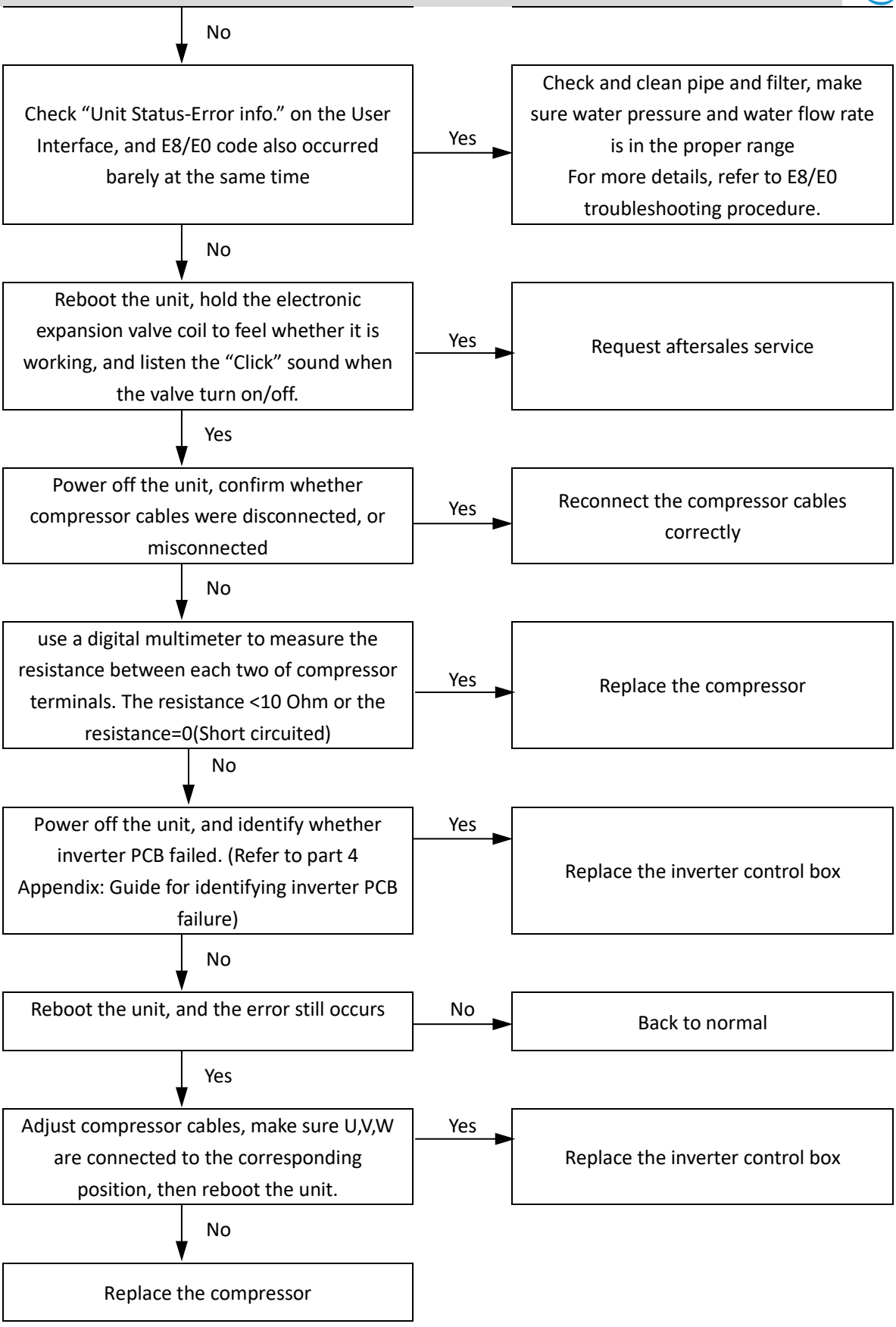
### 6.15.1 Digital display output


### 6.15.2 Description

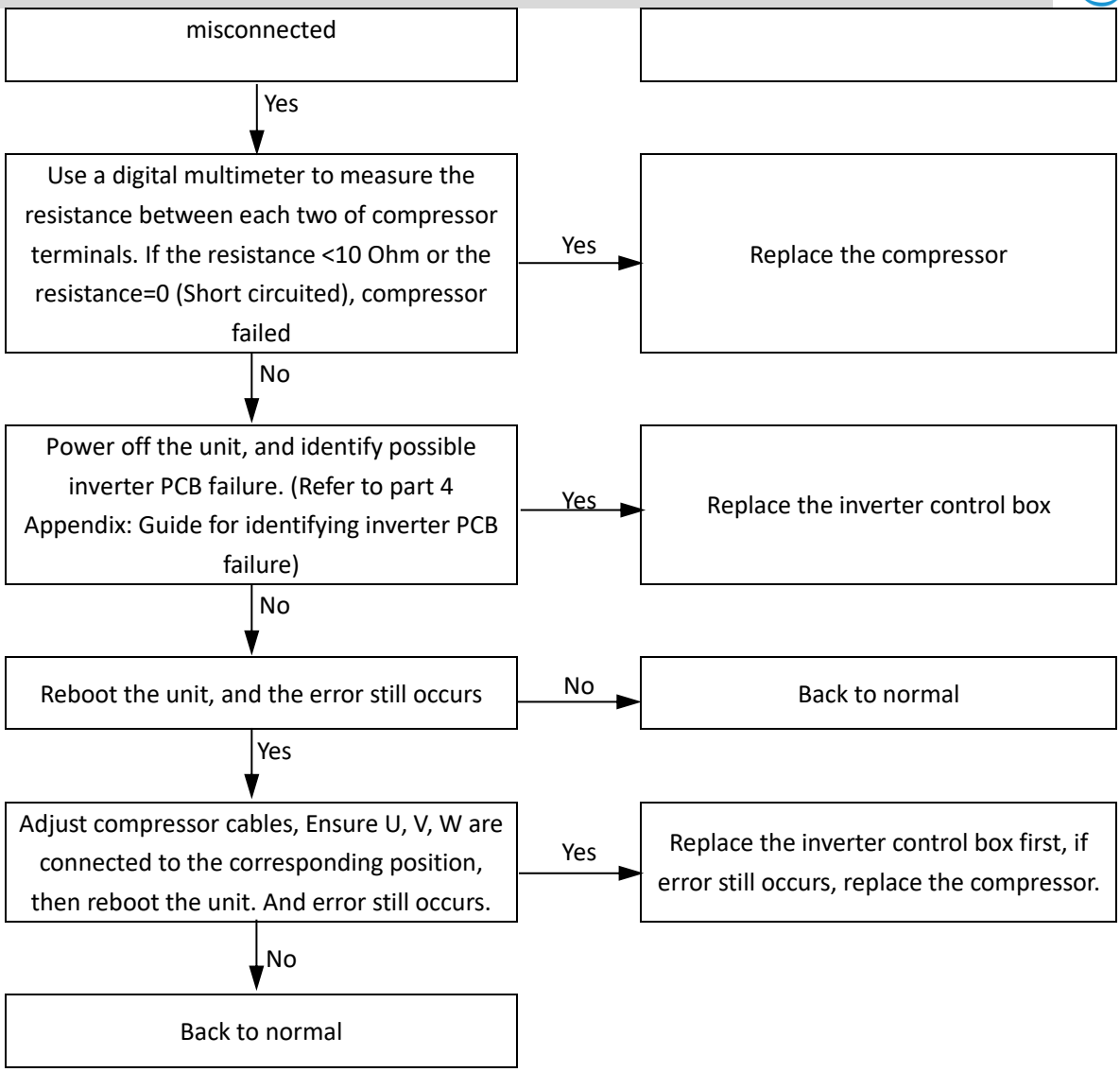
| Error code | P3 |
|---|---|
| Description | Overcurrent protection |
| Triggering | The Main Control PCB detected that the input current is higher than protection value |
| Terminal block |    |
| Nameplate |   Refer to Nameplate for rated refrigerant charge volume. The picture is for reference only. The actual product may vary. |

### 6.15.3 Procedure



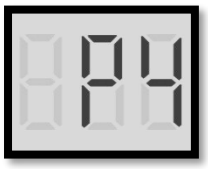

No
Check “Unit Status-Error info.” on the User Interface, and E8/E0 code also occurred barely at the same time
Yes
Check and clean pipe and filter, make sure water pressure and water flow rate is in the proper range
For more details, refer to E8/E0 troubleshooting procedure.
No
Reboot the unit, hold the electronic expansion valve coil to feel whether it is working, and listen the “Click” sound when the valve turn on/off.
Yes
Request aftersales service
Yes
Power off the unit, confirm whether compressor cables were disconnected, or misconnected
Yes
Reconnect the compressor cables correctly
No
use a digital multimeter to measure the resistance between each two of compressor terminals. The resistance <10 Ohm or the resistance=0(Short circuited)
Yes
Replace the compressor
No
Power off the unit, and identify whether inverter PCB failed. (Refer to part 4 Appendix: Guide for identifying inverter PCB failure)
Yes
Replace the inverter control box
No
Reboot the unit, and the error still occurs
No
Back to normal
Yes
Adjust compressor cables, make sure U,V,W are connected to the corresponding position, then reboot the unit.
Yes
Replace the inverter control box
No
Replace the compressor


P3 occurs in cooling mode
Measure the input voltage of terminal block, and it's<198V
Yes
Adjust the power supply based on the rated voltage range
No
Use a current clamp to measure the current between two power cables connected to "L" on terminal block, compare it with "Unit Status-Operation parameter-ODU current" on the User Interface, and the difference> |1.5A|
Yes
Replace the inverter control box
No
The unit was installed on a site with insufficient space, exposure to high temperatures or where the heat exchanger may be blocked.
Yes
Locate the unit in a more spacious area with good ventilation and moderate temperatures. Ensure the heat exchanger isn't blocked.
No
Check whether the finned tube heat exchanger is dirty or obstructed in any way.
Yes
Clean the finned tube heat exchanger
No
Reboot the unit, observe whether the fan is running normally
No
Replace fan motor or determine possible inverter PCB failure (Refer to part 4 Appendix: Guide for identifying inverter PCB failure)
Yes
Reboot the unit, hold the electronic expansion valve coil to feel whether it is working, and listen for a "Click" sound which indicates the valve has turned on/off.
No
Request aftersales service
Yes
Check for blockages between the electronic expansion valve and Copper filter. Clean the unit again, and recharge the refrigerant by serviceman with refrigeration expertise. Then Reboot the unit, and the error still occurs
No
Back to normal
Yes
Power off the unit, confirm whether compressor cables were disconnected, or
No
Reconnect the compressor cables securely

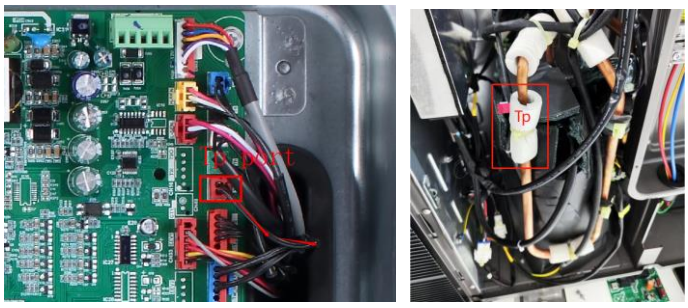
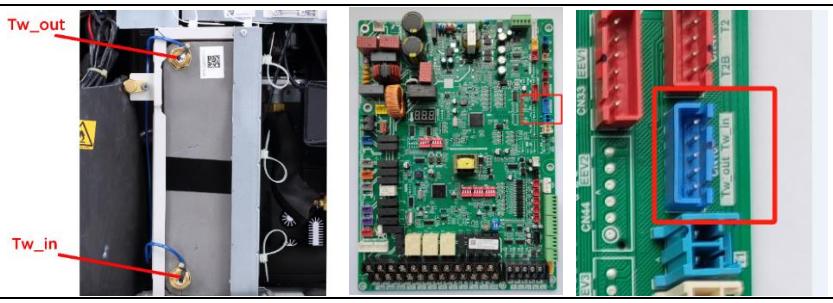

misconnected
Yes
Use a digital multimeter to measure the resistance between each two of compressor terminals. If the resistance <10 Ohm or the resistance=0 (Short circuited), compressor failed
Yes
Replace the compressor
No
Power off the unit, and identify possible inverter PCB failure. (Refer to part 4 Appendix: Guide for identifying inverter PCB failure)
Yes
Replace the inverter control box
No
Reboot the unit, and the error still occurs
No
Back to normal
Yes
Adjust compressor cables, Ensure U, V, W are connected to the corresponding position, then reboot the unit. And error still occurs.
Yes
Replace the inverter control box first, if error still occurs, replace the compressor.
No
Back to normal

## 6.16 P4 Troubleshooting

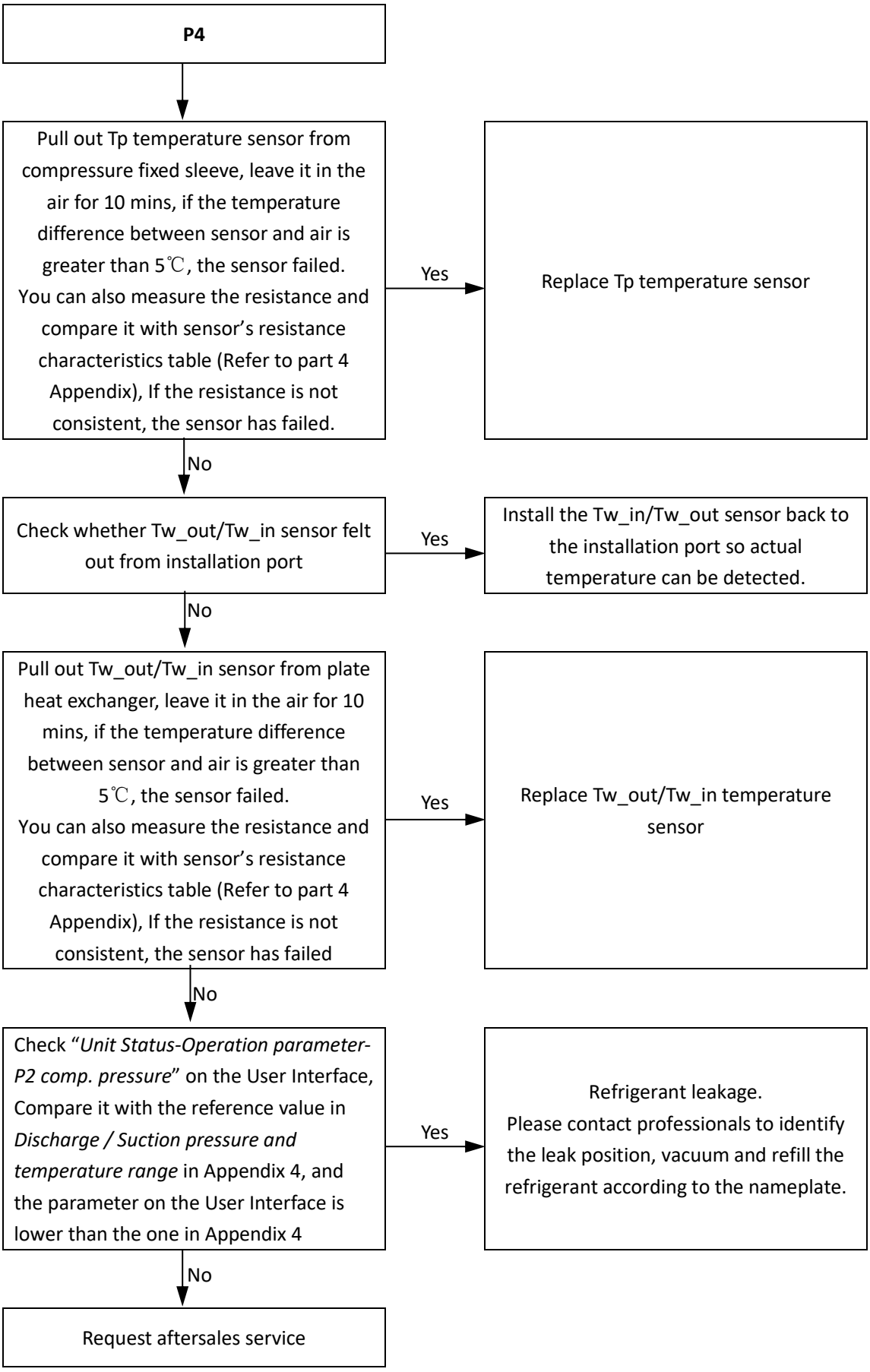
### 6.16.1 Digital display output




### 6.16.2 Description

| Error code | | P4 |
|---|---|---|
| Description | | Compressor protection against excessively-high discharge temperature |
| Triggering | | The Main Control PCB detected that the compressor discharge temperature was ⩾ 115℃ |
| Relative ports and locations | Tp discharge temp. sensor |   |
| | Tw_in<br>Tw_out |   |

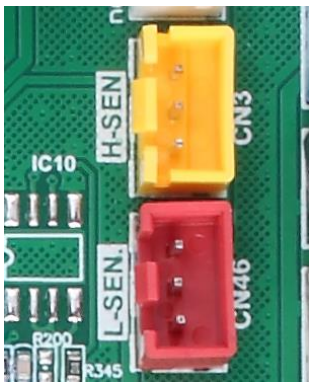
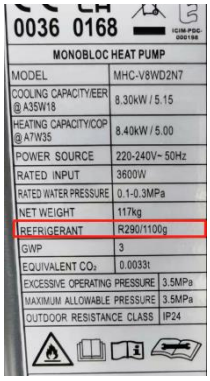
### 6.16.3 Procedure



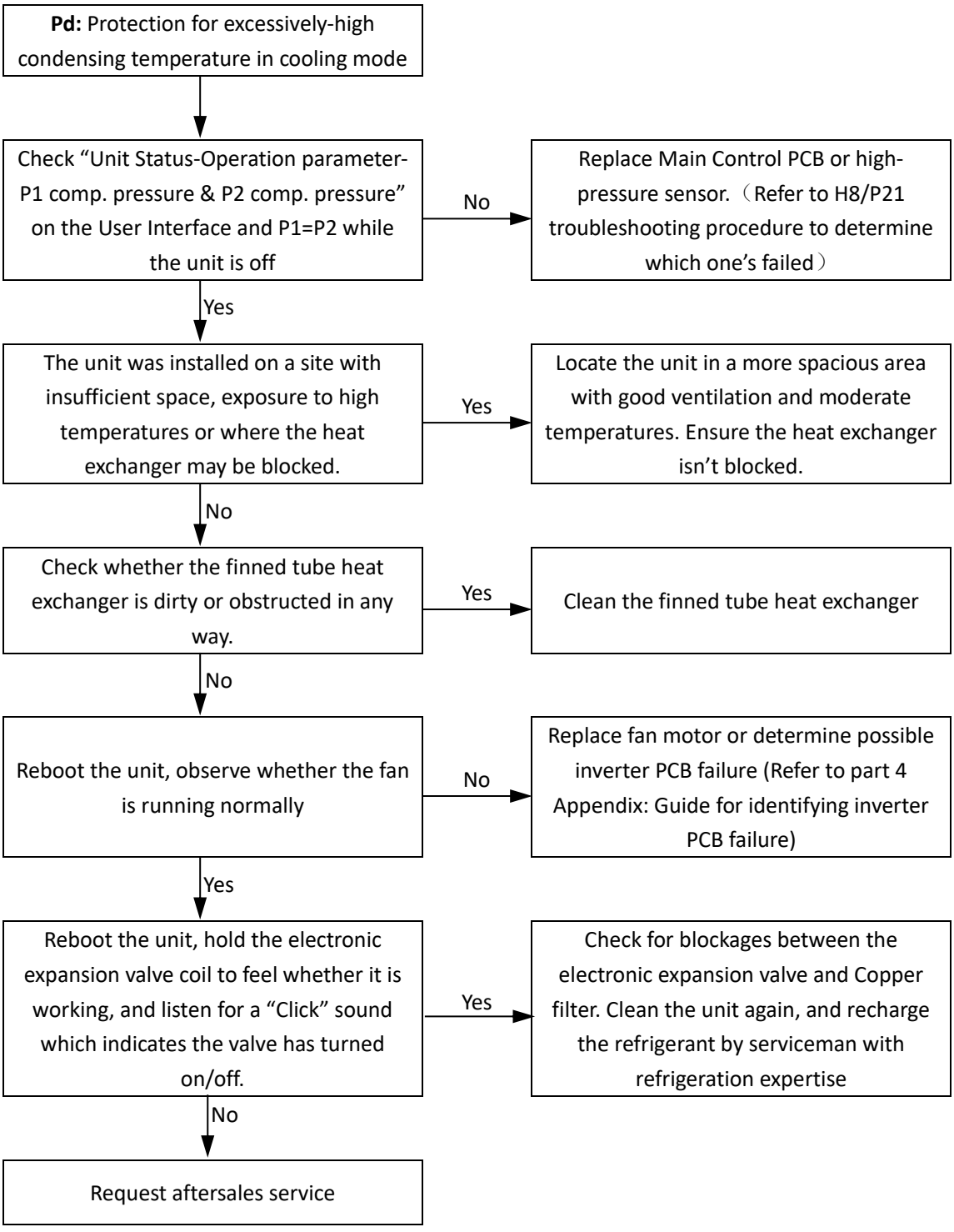
## 6.17 Pd Troubleshooting

### 6.17.1 Digital display output


### 6.17.2 Description

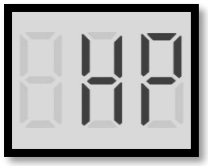
| Error code | Pd |
|---|---|
| Description | Protection for excessively-high condensing temperature in cooling mode |
| Triggering | Main Control PCB detected that the condensing temperature was ≥65℃ in cooling mode |
| Relative ports and locations |    |
| Nameplate |   Refer to Nameplate for rated refrigerant charge volume. The picture is for reference only. The actual product may vary. |

### 6.17.3 Procedure

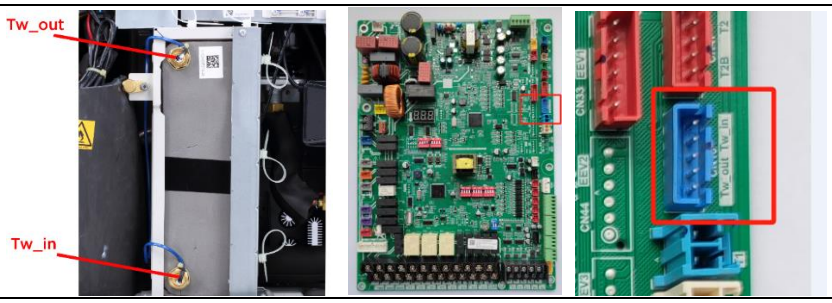


## 6.18 HP Troubleshooting

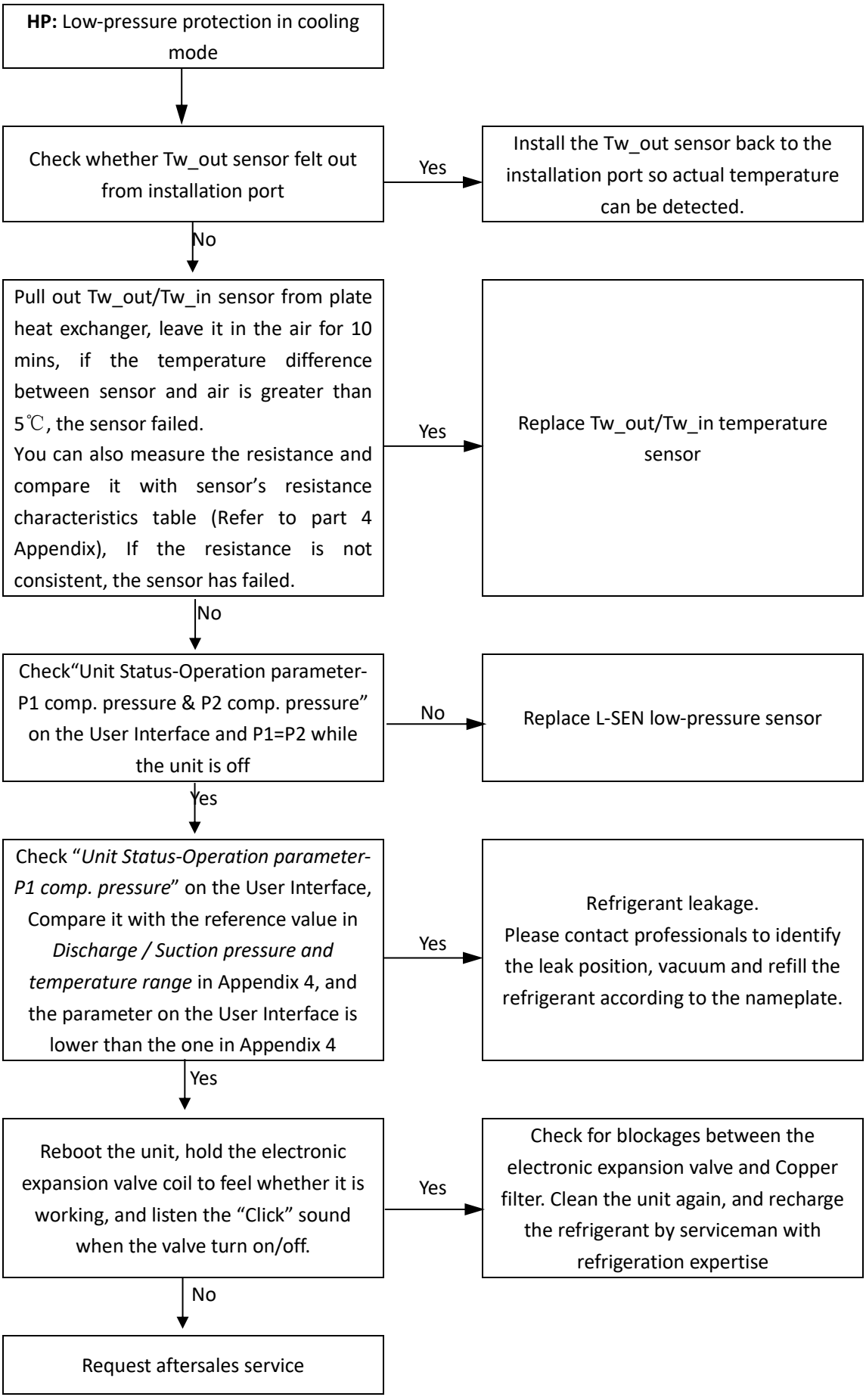
### 6.18.1 Digital display output




### 6.18.2 Description

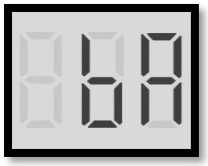
| Error code | HP |
|---|---|
| Description | Low pressure protection in cooling mode |
| Triggering | Main Control PCB detected that the suction pressure P2<0.35Mpa for 5 seconds in cooling mode and compressor running over 300 seconds. |
| Tw_in<br>Tw_out |  |

### 6.18.3 Procedure



## 6.19 bA Troubleshooting

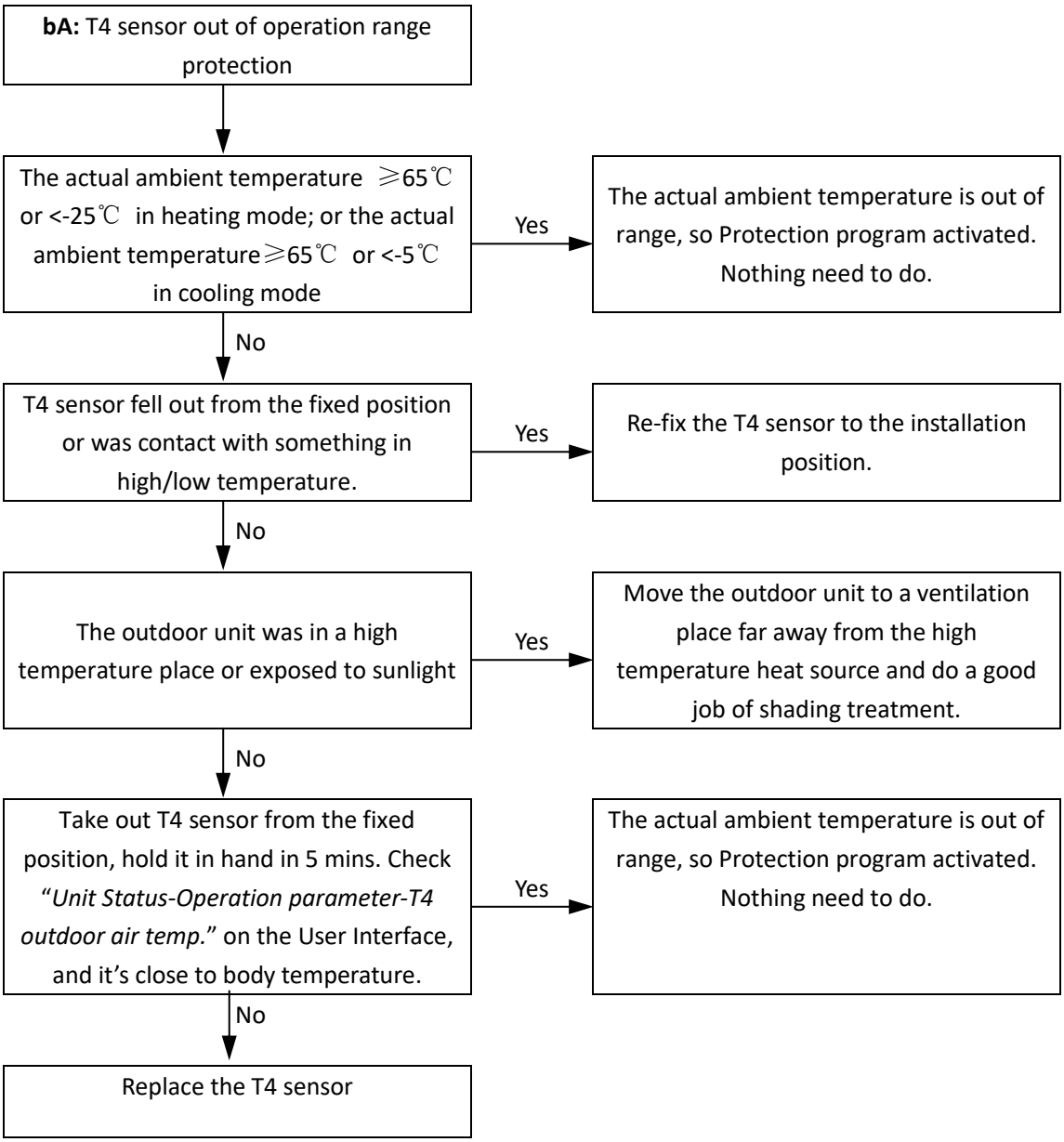
### 6.19.1 Digital display output




### 6.19.2 Description

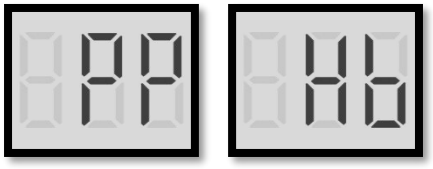
| Error code | bA |
|---|---|
| Description | T4 sensor out of operation range protection |
| Triggering | In heating/ DHW mode, the error occurs when T4≥65℃ or T4<-25℃<br>In cooling mode, the error occurs when T4≥65℃ or T4<-5℃ |
| T4 |   |

### 6.19.3 Procedure

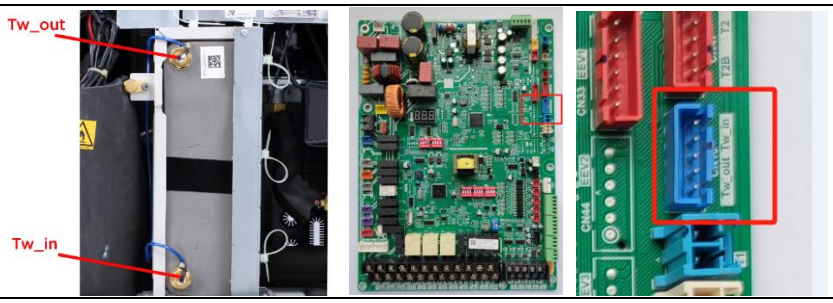
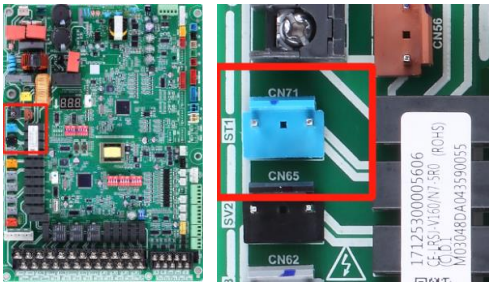


## 6.20 PP, Hb Troubleshooting

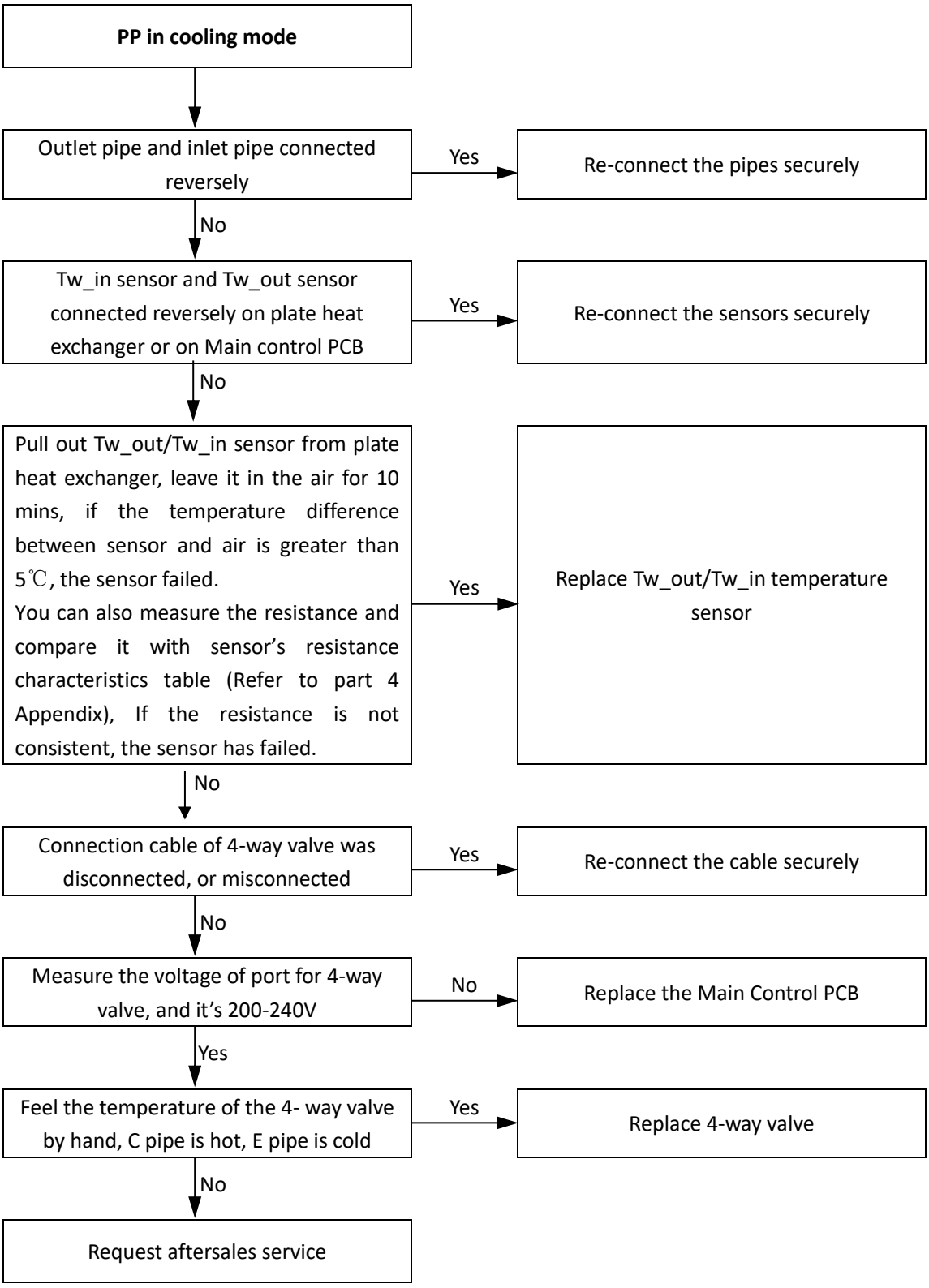
### 6.20.1 Digital display output

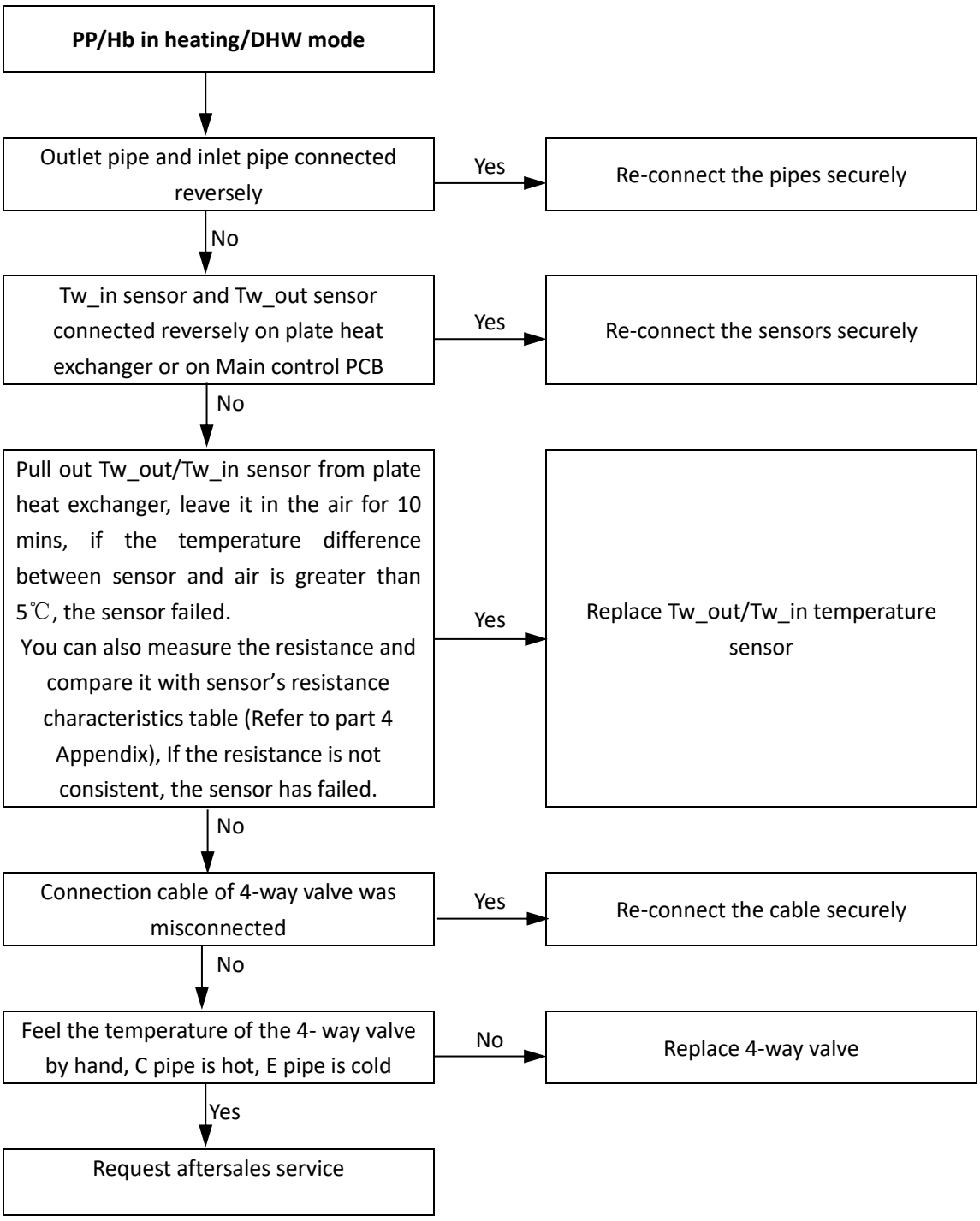



### 6.20.2 Description

| Error code | PP | Hb |
|---|---|---|
| Description | Protection for abnormal temperature difference between outlet water and inlet water | PP occurs 3 times in heating/DHW mode |
| Triggering | Twout-Twin≥3℃ and lasts 15 mins in cooling mode<br>Twin-Twout≥3℃ and lasts 15 mins in heating/DHW mode | PP occurs 3 times in heating/DHW mode;<br>When Twout<7℃ occurs, the number of PP failures increases by one |
| Outlet pipe and inlet pipe |  | |
| Tw_in<br>Tw_out |  | |
| CN71 ST1<br>Port for 4-way valve |  | |
| For-way valve E S C |  | |

### 6.20.3 Procedure

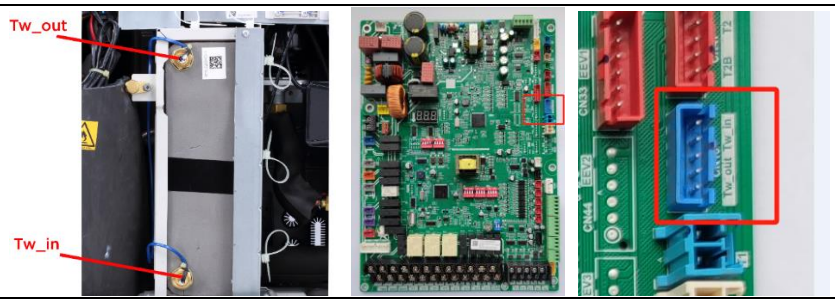



PP/Hb in heating/DHW mode
Outlet pipe and inlet pipe connected reversely
Yes
Re-connect the pipes securely
No
Tw_in sensor and Tw_out sensor connected reversely on plate heat exchanger or on Main control PCB
Yes
Re-connect the sensors securely
No
Pull out Tw_out/Tw_in sensor from plate heat exchanger, leave it in the air for 10 mins, if the temperature difference between sensor and air is greater than 5℃, the sensor failed.
You can also measure the resistance and compare it with sensor's resistance characteristics table (Refer to part 4 Appendix), If the resistance is not consistent, the sensor has failed.
Yes
Replace Tw_out/Tw_in temperature sensor
No
Connection cable of 4-way valve was misconnected
Yes
Re-connect the cable securely
No
Feel the temperature of the 4- way valve by hand, C pipe is hot, E pipe is cold
No
Replace 4-way valve
Yes
Request aftersales service

## 6.21 P5 Troubleshooting

### 6.21.1 Digital display output


### 6.21.2 Description

| Error code | P5 |
|---|---|
| Description | The big temperature difference between outlet water temp. and inlet water temp. |
| Triggering | Twout-Twin≥30℃ in heating/DHW mode<br>Twout-Twin≥17℃ in cooling mode |
| Tw_in<br>Tw_out |  |

### 6.21.3 Procedure

**P5：** The big temperature difference between outlet water temp. and inlet water temp.

↓

Check “Unit Status-Error info.” on the User Interface, and E8/E0 code occurred at roughly the same time

→ Yes → Check and clean pipe and filter, Ensure water pressure and water-flow rate is in Proper range
For more details, refer to E8/E0 troubleshooting procedure.

↓ No

Check ”Unit Status-Operation Parameter-water flow” is smaller than normal

→ Yes → Check and clean pipe and filter, Ensure water pressure and water-flow rate is in Proper range

↓ No

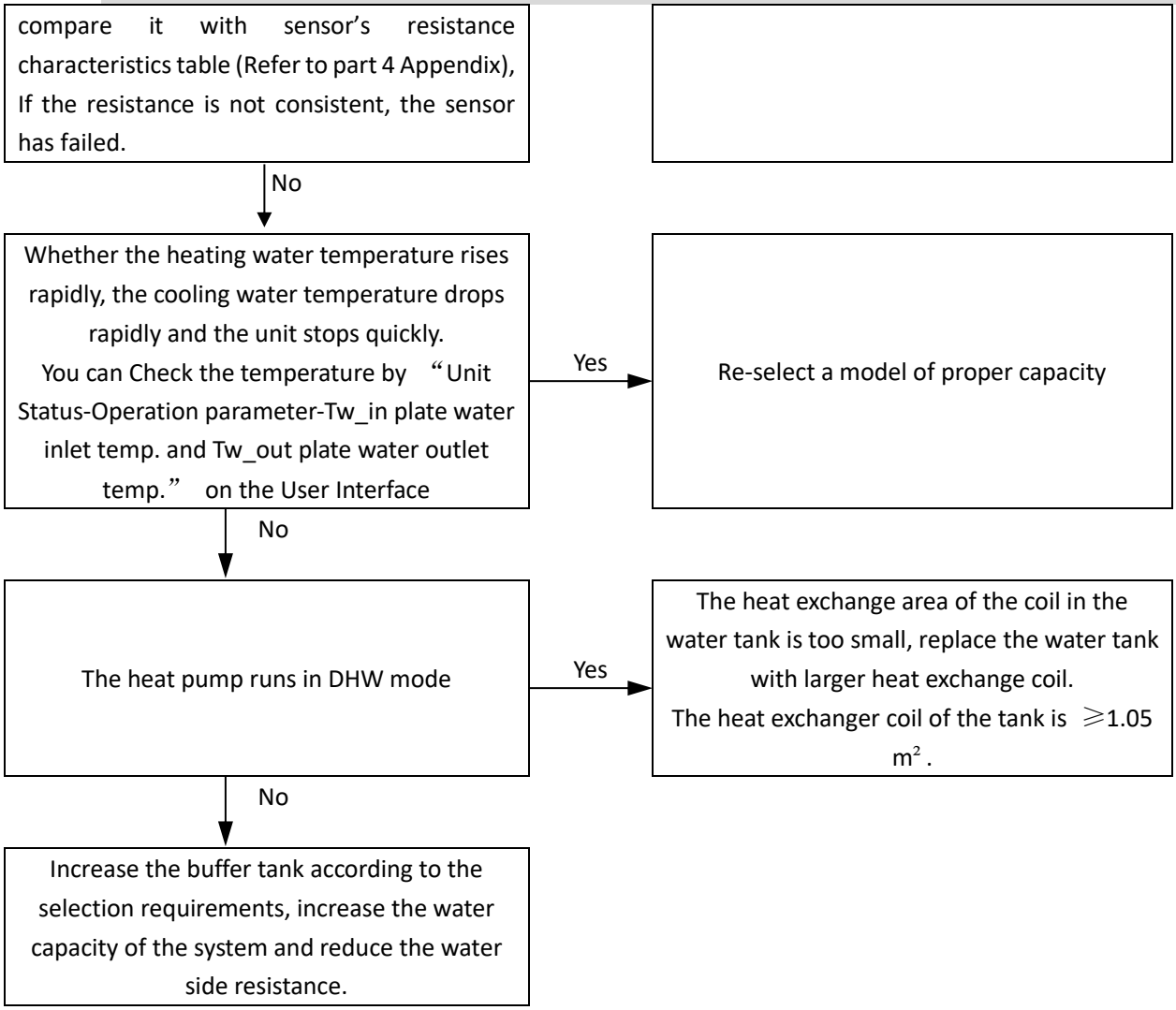
Check whether Twout/Twin sensor fell out from the fixed position

→ Yes → Re-fix the Twout/Twin sensor to the installation position.

↓ No

Pull out Tw_out/Tw_in sensor from plate heat exchanger, leave it in the air for 10 mins, if the temperature difference between sensor and air is greater than 5℃, the sensor failed.
You can also measure the resistance and

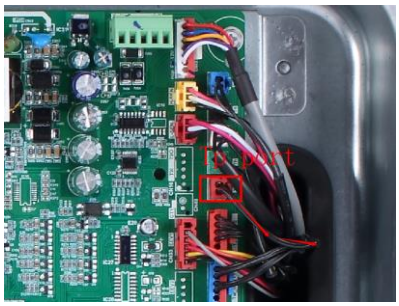
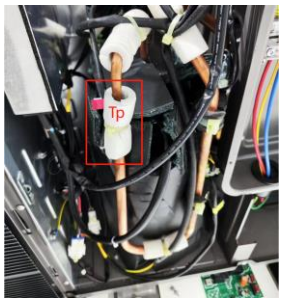
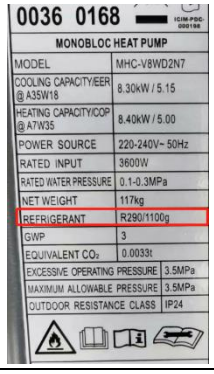
→ Yes → Replace Tw_out/Tw_in temperature sensor


compare it with sensor's resistance characteristics table (Refer to part 4 Appendix), If the resistance is not consistent, the sensor has failed.
No
Whether the heating water temperature rises rapidly, the cooling water temperature drops rapidly and the unit stops quickly.
You can Check the temperature by "Unit Status-Operation parameter-Tw_in plate water inlet temp. and Tw_out plate water outlet temp." on the User Interface
Yes
Re-select a model of proper capacity
No
The heat pump runs in DHW mode
Yes
The heat exchange area of the coil in the water tank is too small, replace the water tank with larger heat exchange coil.
The heat exchanger coil of the tank is ⩾1.05 m².
No
Increase the buffer tank according to the selection requirements, increase the water capacity of the system and reduce the water side resistance.

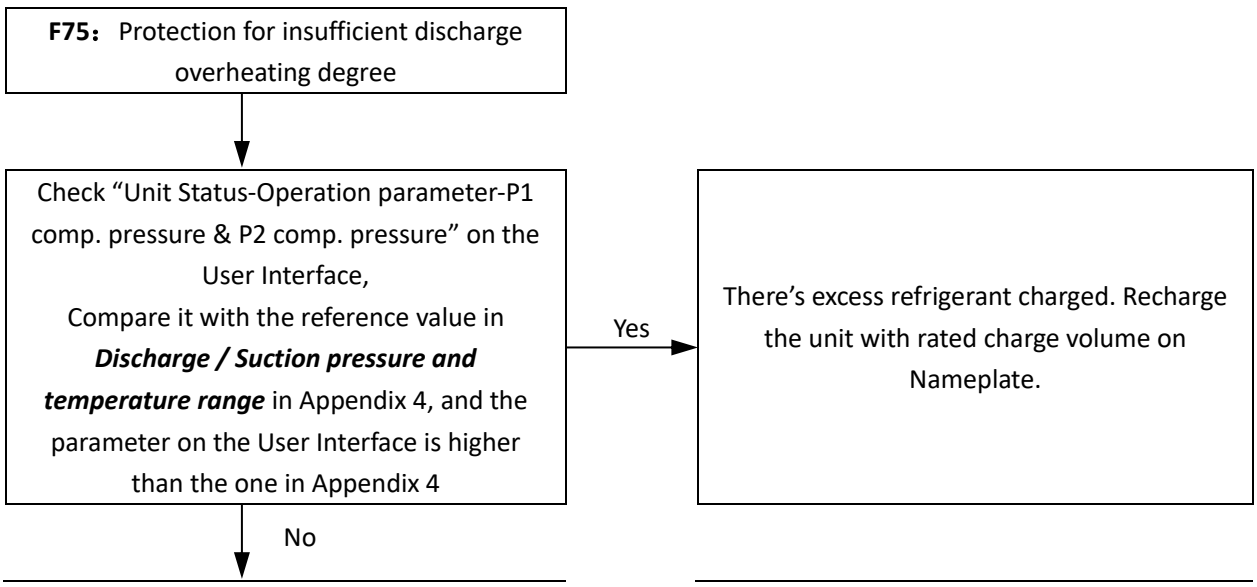
## 6.22 F75 Troubleshooting

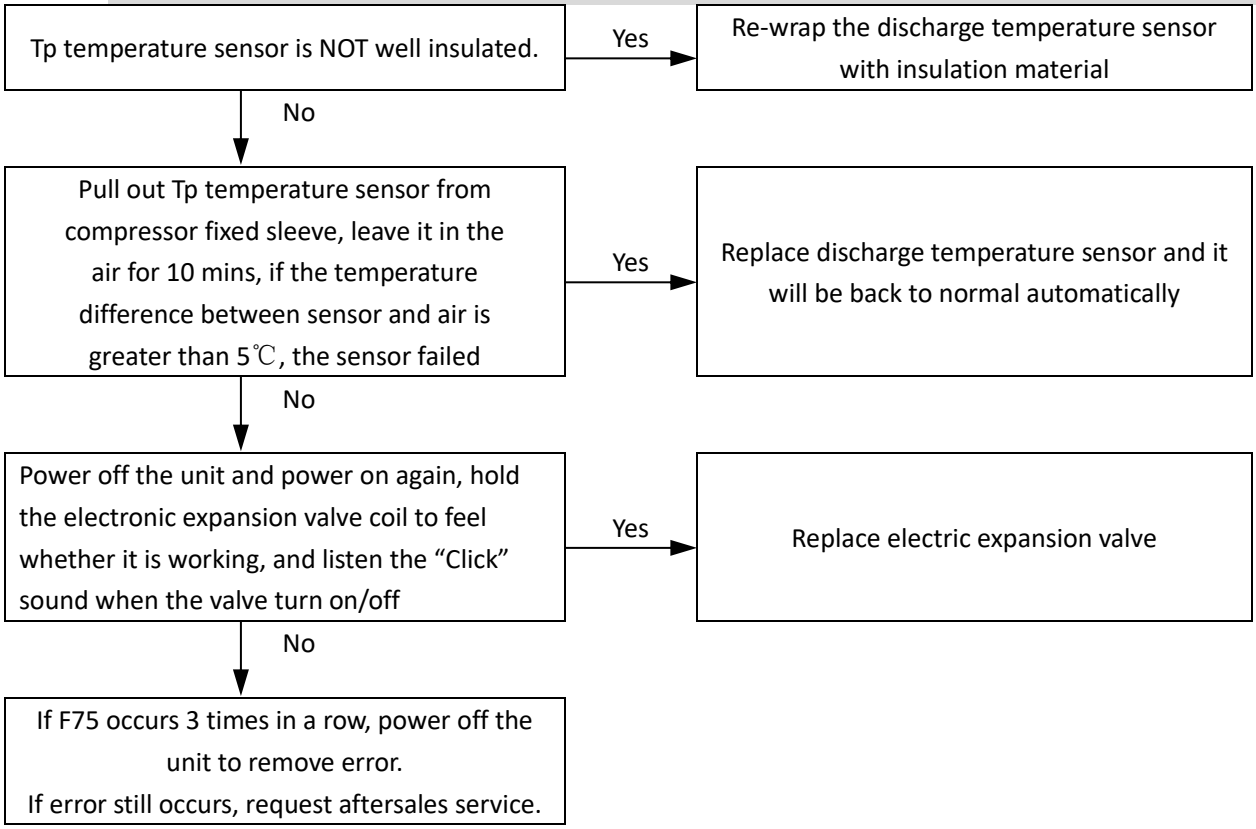
### 6.22.1 Digital display output


### 6.22.2 Description

| Error code | F75 |
|---|---|
| Description | Protection for insufficient discharge overheating degree. |
| Triggering | Tp-Tc < 0℃ and last 10 mins |
| Tp discharge temp. sensor |     |
| Nameplate |   Refer to Nameplate for rated refrigerant charge volume. The picture is for reference only. The actual product may vary. |

### 6.22.3 Procedure




Tp temperature sensor is NOT well insulated.
Yes
Re-wrap the discharge temperature sensor with insulation material
No
Pull out Tp temperature sensor from compressor fixed sleeve, leave it in the air for 10 mins, if the temperature difference between sensor and air is greater than 5℃, the sensor failed
Yes
Replace discharge temperature sensor and it will be back to normal automatically
No
Power off the unit and power on again, hold the electronic expansion valve coil to feel whether it is working, and listen the “Click” sound when the valve turn on/off
Yes
Replace electric expansion valve
No
If F75 occurs 3 times in a row, power off the unit to remove error.
If error still occurs, request aftersales service.

## 6.23 F1 Troubleshooting

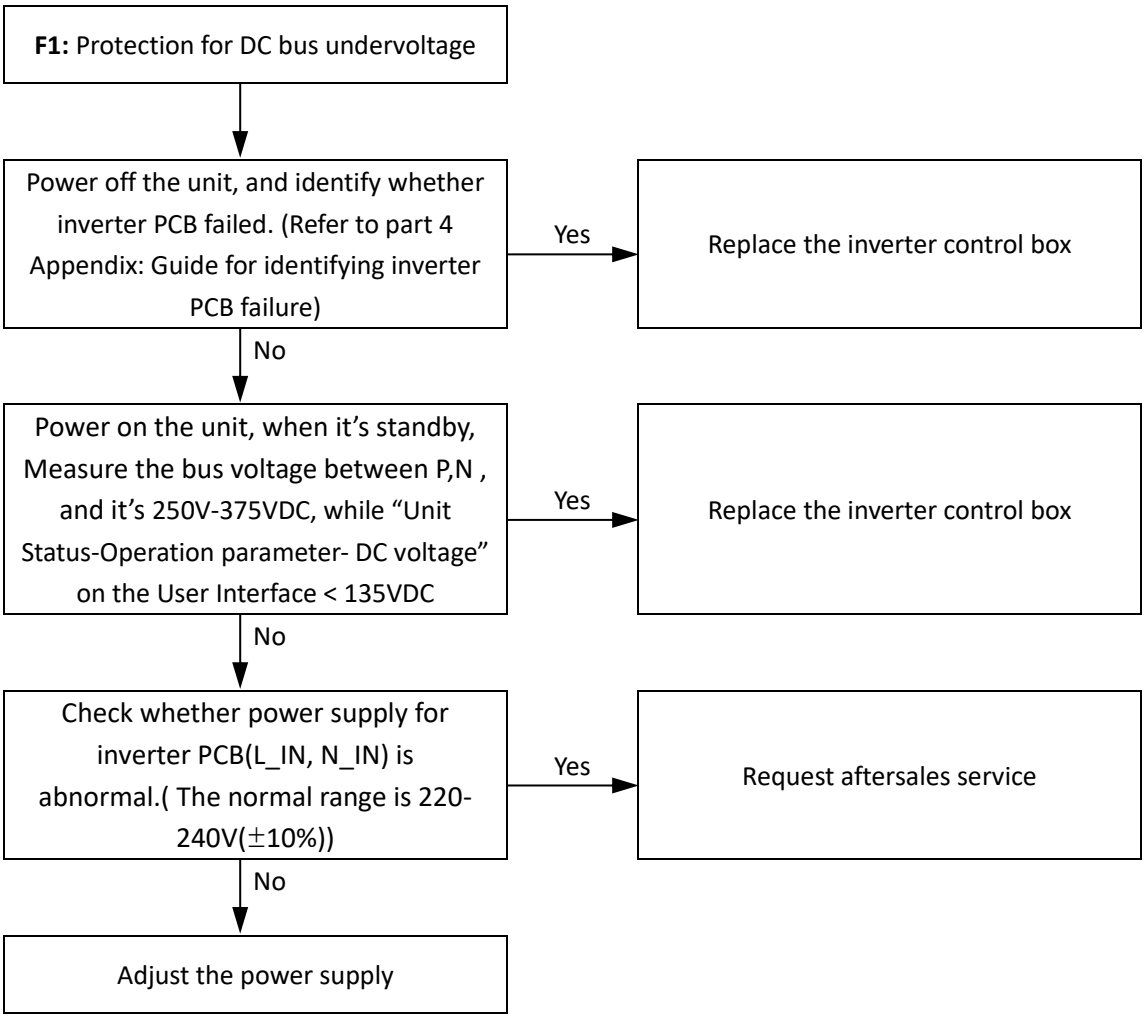
### 6.23.1 Digital display output


### 6.23.2 Description

| Error code | F1 |
|---|---|
| Description | Protection for DC bus undervoltage |
| Triggering | For single phase inverter PCB, the DC bus voltage≤200VDC |
| BUS voltage(P-N)<br>(Inverter PCB) |  |

### 6.23.3 Procedure

**For single phase:**

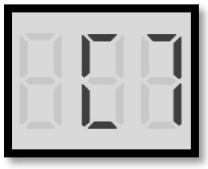


## 6.24 C7 Troubleshooting

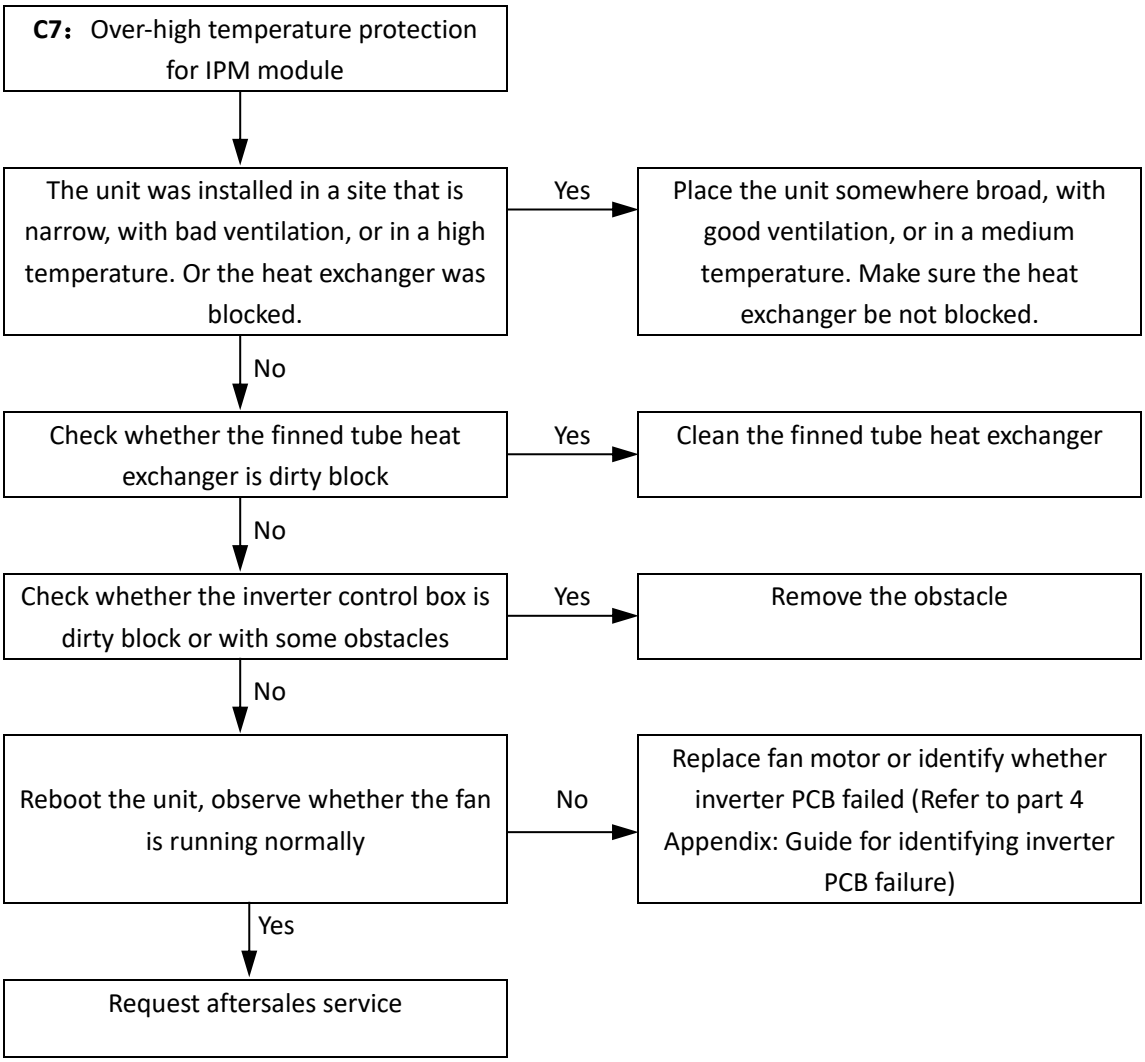
### 6.24.1 Description

| Error code | C7 |
|---|---|
| Description | Over-high temperature protection for IPM module |
| Triggering | IPM module temperature ≥ 95℃ |

### 6.24.2 Digital display output

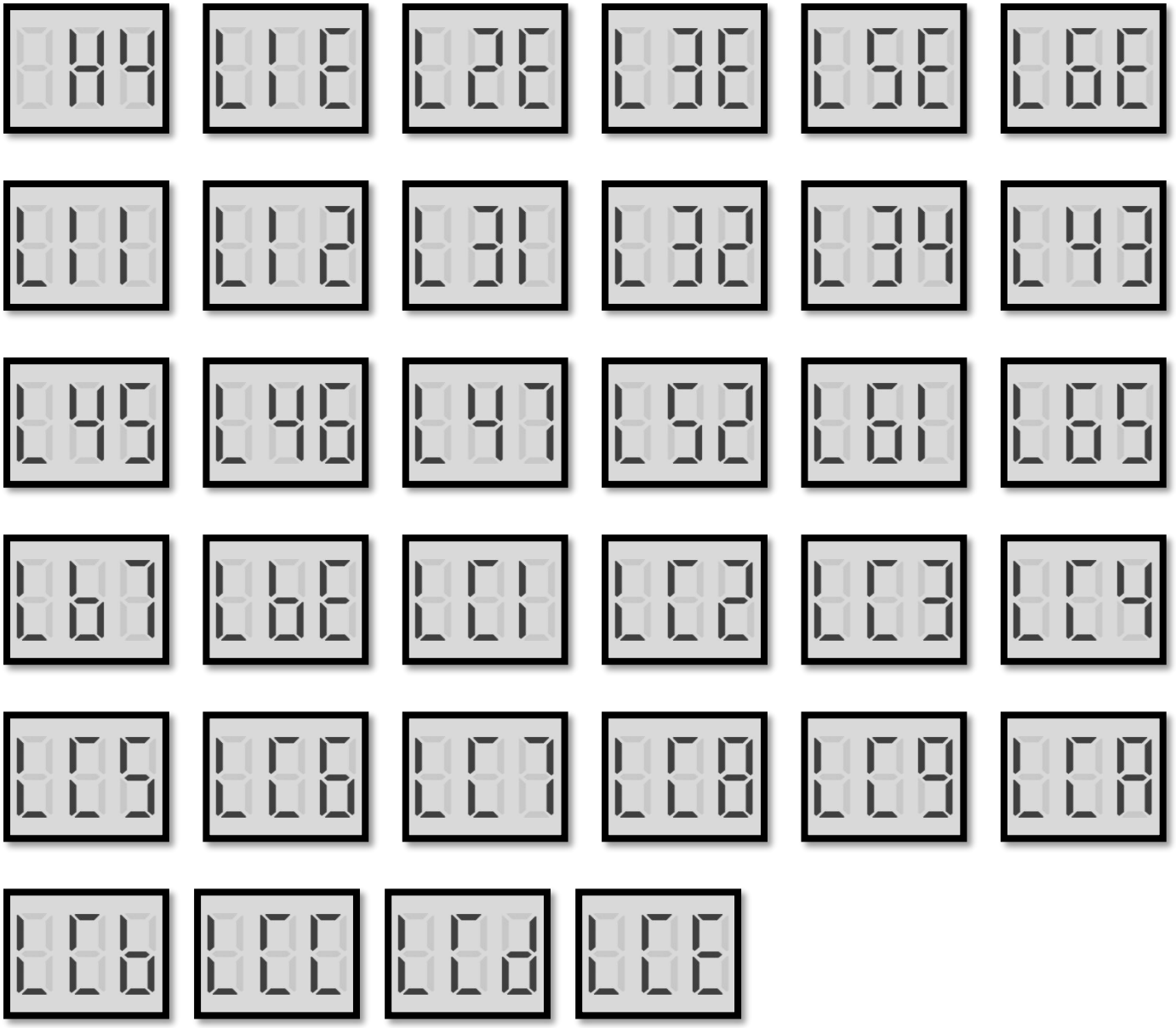



### 6.24.3 Procedure



## 6.25 H4, L** Troubleshooting

### 6.25.1 Digital display output




### 6.25.2 Description

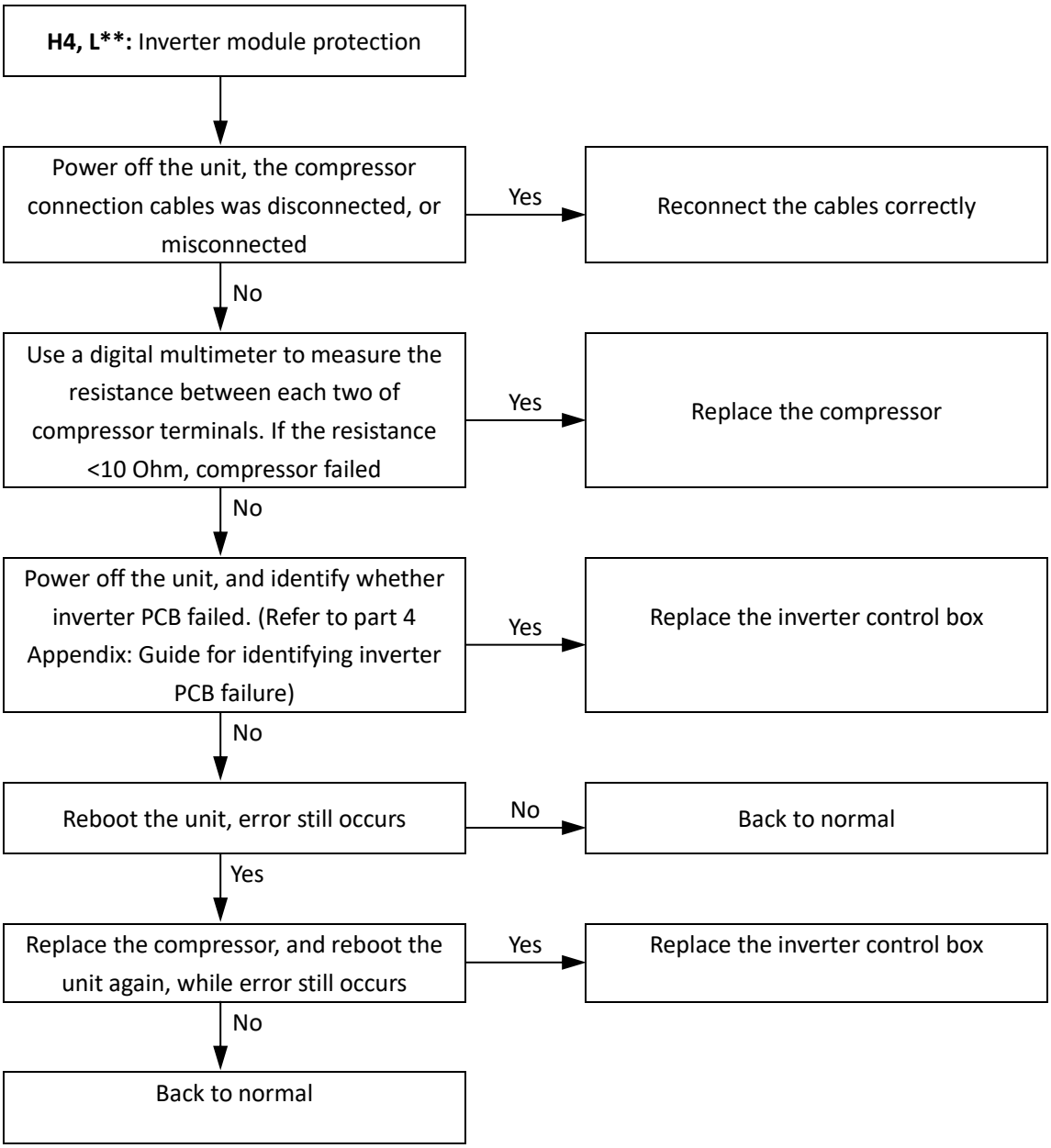
| Error code | Description | Note |
|---|---|---|
| H4 | 3 times of “L1*” in 60 mins | |
| L** | Inverter module protection | Check the specific code on digital display panel on the Main Control PCB |

The specific L** code table:

| Error code | Description | Note |
|---|---|---|
| L1E | Hardware overcurrent protection | |
| L11 | Phase current instantaneous overcurrent protection | |
| L12 | Phase current continuous 30s overcurrent protection | |
| L2E | Over-temperature protection | |
| L3E | Bus voltage too low error | |
| L31 | Bus voltage too high error | |

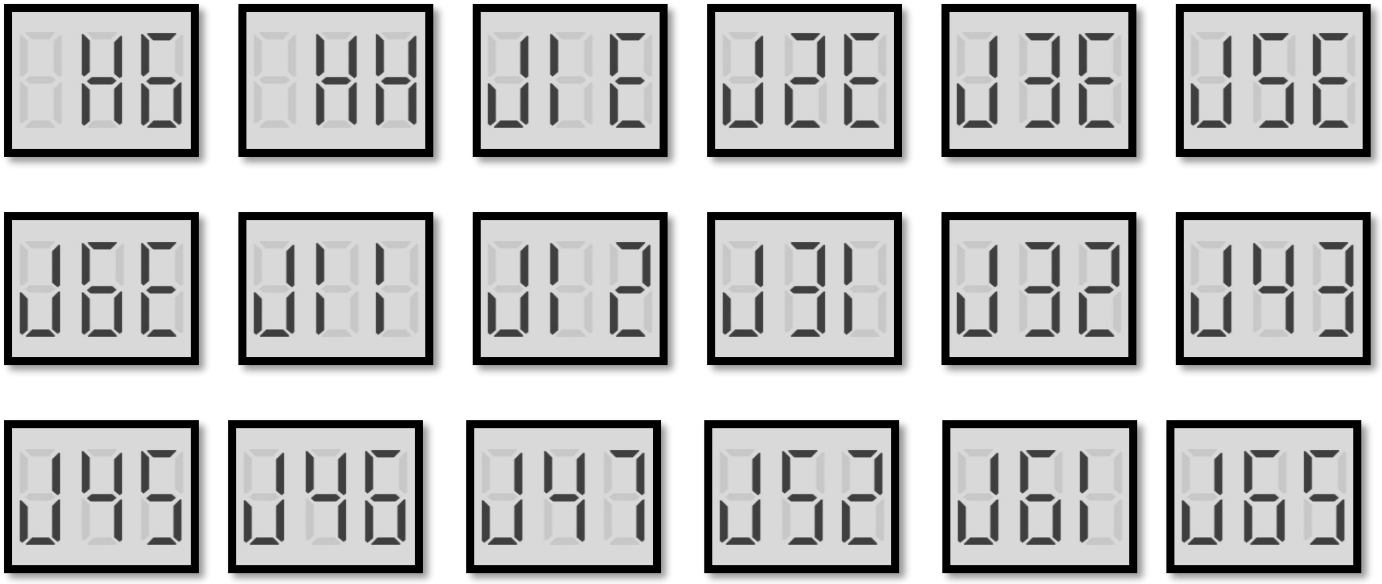
| | | |
|---|---|---|
| L32 | Bus voltage excessively high error | |
| L34 | Phase loss error of three-phase power supply | For 3Ph units |
| L43 | Abnormal phase current sampling bias | |
| L45 | Fan motor code mismatch error | |
| L46 | IPM protection (FO) | |
| L47 | Module type mismatch | |
| L5E | Motor failed to start | |
| L52 | Motor stalling protection | |
| L6E | Phase loss protection | |
| L61 | Compressor terminals short circuit protection | |
| L65 | IPM short circuit protection | |
| LBE | Action of high pressure switch | |
| LB7 | PED bH error | |
| LCE | PFC HARDWARE OVERCURRENT PROTECTION | For 3Ph units |
| LC1 | Instantaneous overcurrent of PFC software protection | For 3Ph units |
| LC2 | PFC software continuous 30 s overcurrent protection | For 3Ph units |
| LC3 | PFC low voltage protection | For 3Ph units |
| LC4 | PFC power factor is less than 0.8 | For 3Ph units |
| LC5 | PFC valid value overcurrent protection | For 3Ph units |
| LC6 | PFC1 channel hardware overcurrent protection | For 3Ph units |
| LC7 | PFC2 channel hardware overcurrent protection | For 3Ph units |
| LC8 | PFC3 channel hardware overcurrent protection | For 3Ph units |
| LC9 | Over-temperature protection of PFC module | For 3Ph units |
| LCA | PFC module CBC overcurrent error protection | For 3Ph units |
| LCB | Overvoltage of PFC bus or PFC half bus | For 3Ph units |
| LCC | Short circuit of PFC IGBT | For 3Ph units |
| LCD | Abnormal PFC Ad sampling bias | For 3Ph units |

### 6.25.3 Procedure



## 6.26 H6, HH, J** Troubleshooting

### 6.26.1 Digital display output



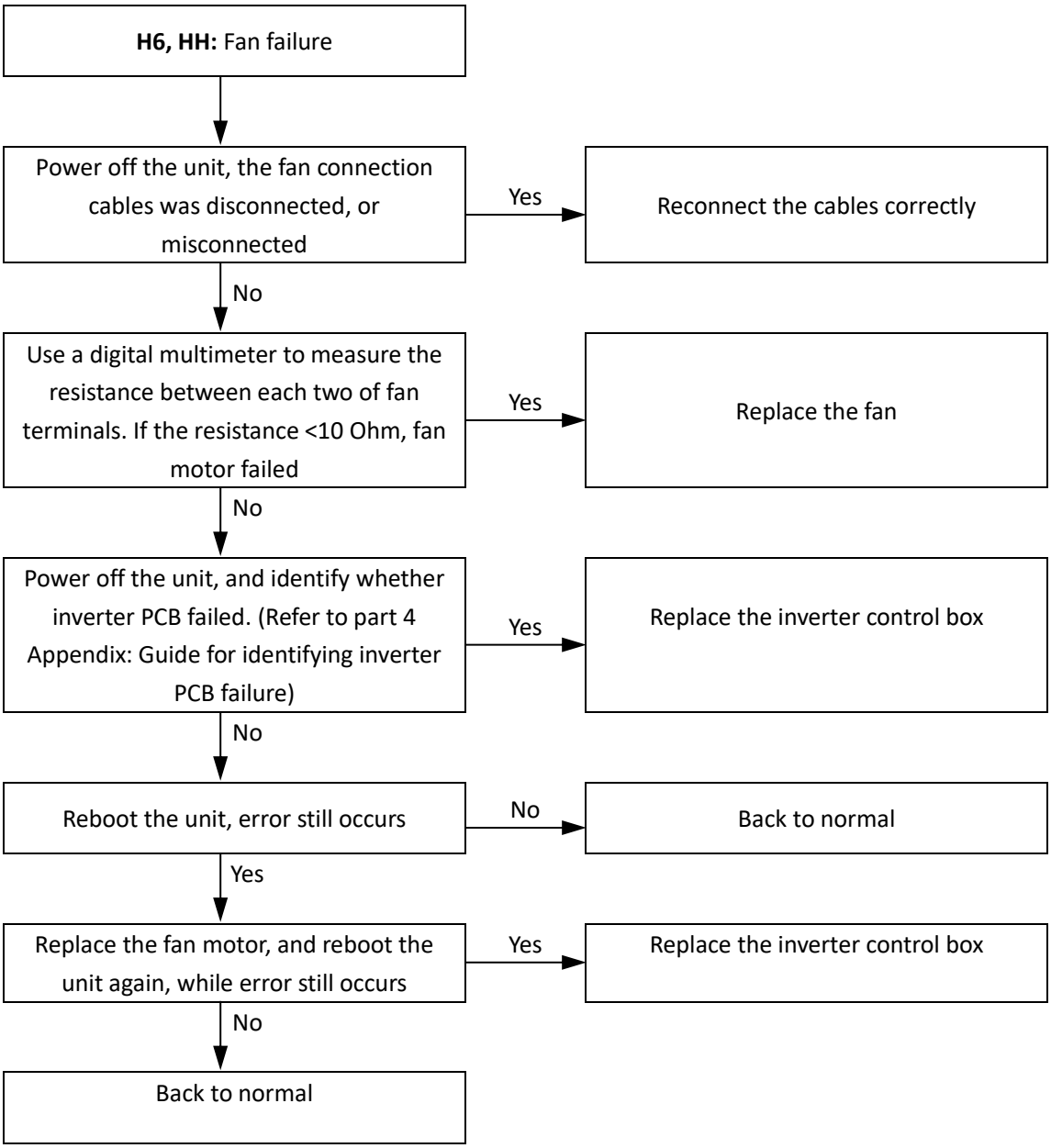

### 6.26.2 Description

| Error code | Description | Note |
|---|---|---|
| H6 | Fan failure | |
| HH | 10 times of H6 in 120mins | |
| J** | Fan module failure | Check the specific code on digital display panel on the Main Control PCB |

The specific J** code table:

| Error code | Description |
|---|---|
| J1E | Hardware overcurrent protection |
| J11 | Phase current instantaneous overcurrent protection |
| J12 | Phase current continuous 30s overcurrent protection |
| J2E | Over-temperature protection |
| J3E | Bus voltage too low error |
| J31 | Bus voltage too high error |
| J32 | Bus voltage excessively high error |
| J43 | Abnormal phase current sampling bias |
| J45 | Fan motor code mismatch error |
| J46 | IPM protection (FO) |
| J47 | Module type mismatch (after module resistance tested) |
| J5E | Motor failed to start |
| J52 | Motor stalling protection |
| J6E | Phase loss protection |
| J61 | Fan terminals short circuit protection |
| J65 | IPM short circuit protection |

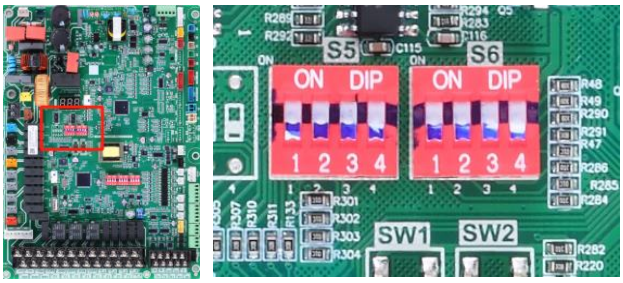
### 6.26.3 Procedure



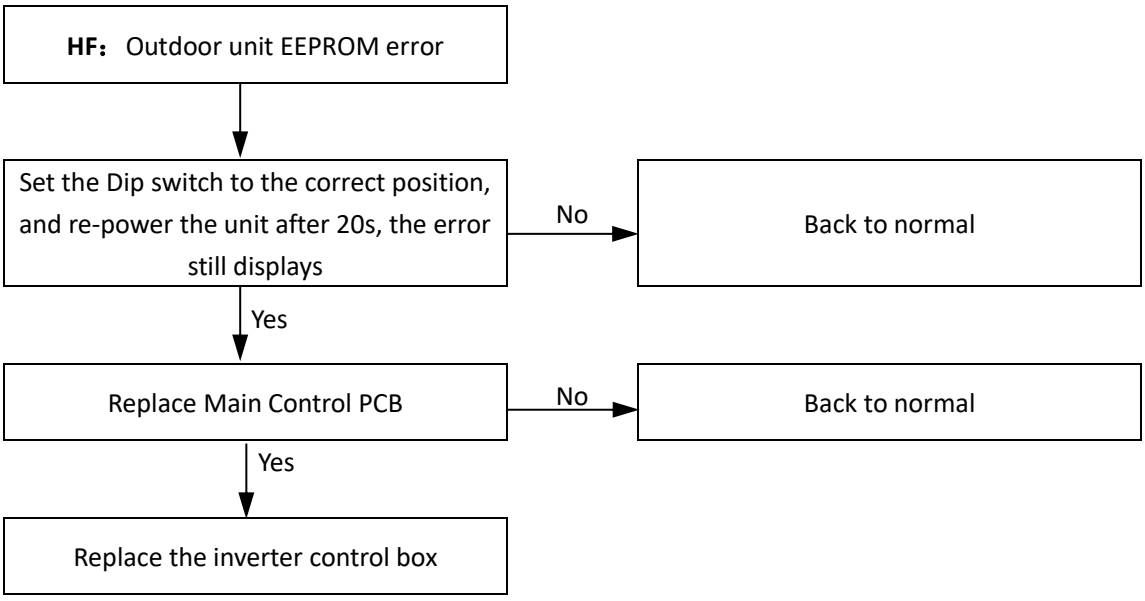
## 6.27 HF Troubleshooting

### 6.27.1 Digital display output


### 6.27.2 Description

| Error code | | HF |
|---|---|---|
| Description | | Outdoor unit EEPROM error |
| Triggering | | The driving program of inverter PCB is detected as being mismatched with Dip switch |
| Relative ports and locations | Dip switch S5 S6 |   |
| Correct Dip switch | S5 | 0/0/0/0 |
| | S6 (4-16kW 1Ph) | 0/0/0/1-4kW、0/0/1/0-6kW、0/0/1/1-8kW、0/1/0/0-10kW、0/1/0/1-12kW、0/1/1/0-14kW、0/1/1/1-16kW |
| | S6 (12-16kW 3Ph) | 1/1/0/1-12kW、1/1/1/0-14kW、1/1/1/1-10kW、 |

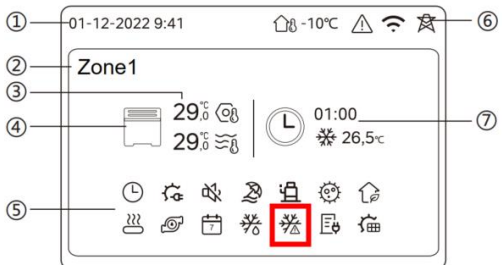
### 6.27.3 Procedure



## 6.28 Pb Troubleshooting

### 6.28.1 Digital display output

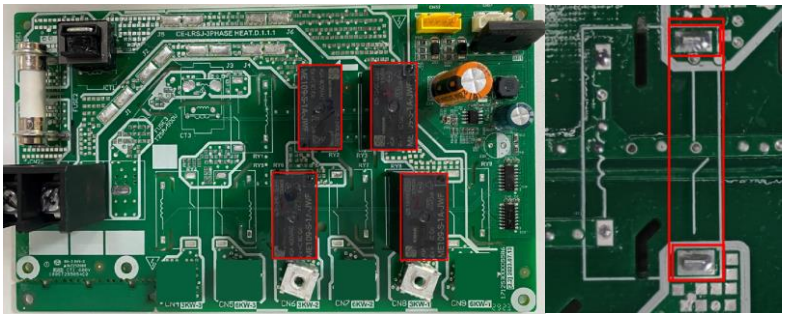
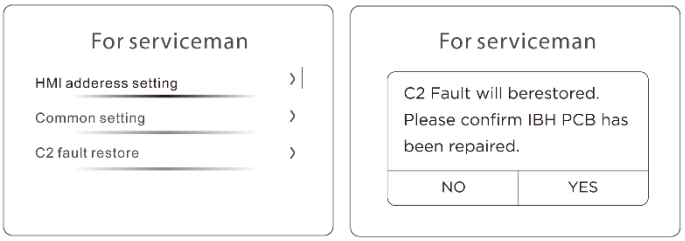

### 6.28.2 Description

| Error code | Pb |
|---|---|
| Description | Pb is the indicator that shows the system is running in anti-freezing control |
| Triggering | Refer to Part 3 - Protection control – Anti-freezing protection control |
| User Interface |  It shows anti-freezing icon on the User Interface |

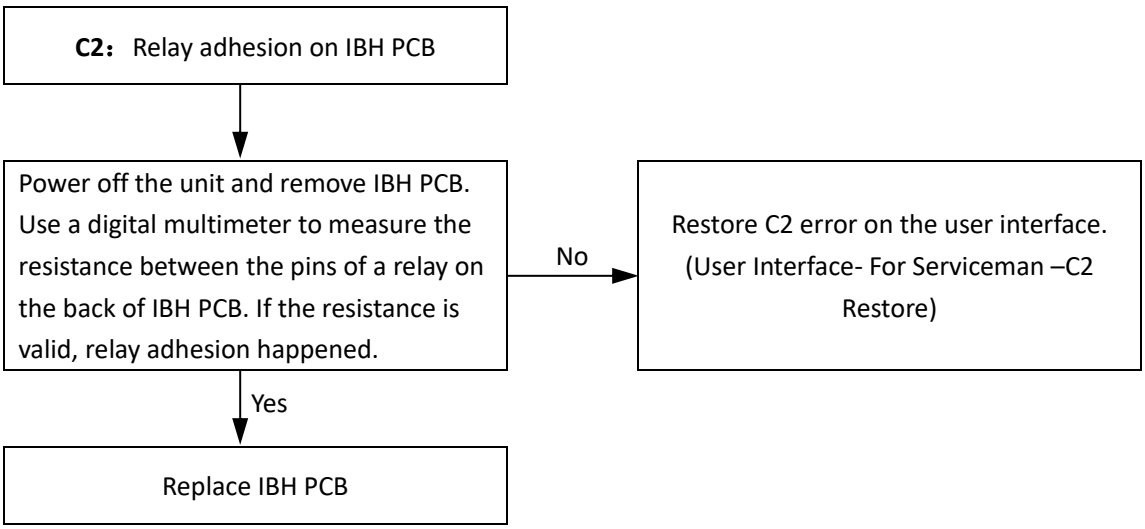
## 6.29 C2 Troubleshooting

### 6.29.1 Digital display output


### 6.29.2 Description

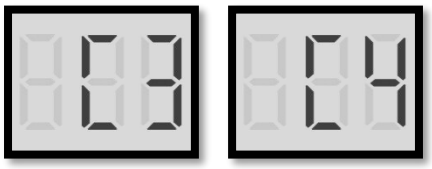
| Error code | | C2 |
|---|---|---|
| Description | | Relay adhesion on IBH PCB |
| Triggering | | Relay: Poor contact, relay deformation, relay aging, etc.<br>External factors : overcurrent, over high ambient temperature, etc. |
| Relative ports and locations | Relays and pins of a relay |  |
| | User interface -For Serviceman- C2 restore |  |

### 6.29.3 Procedure

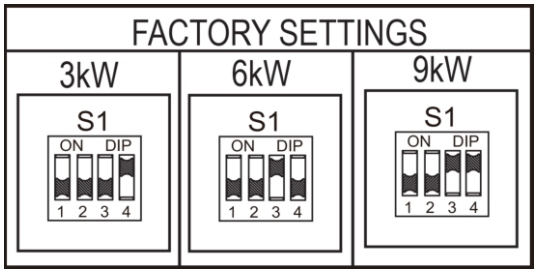
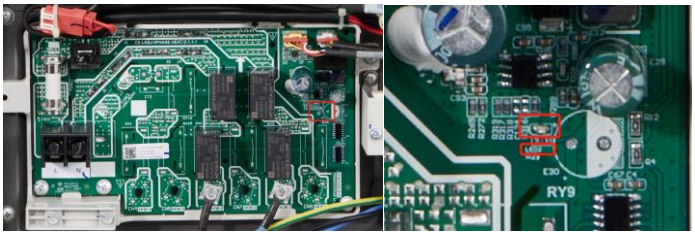
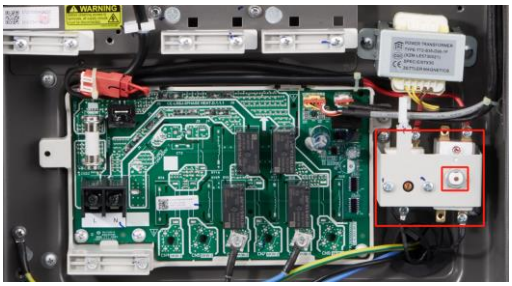
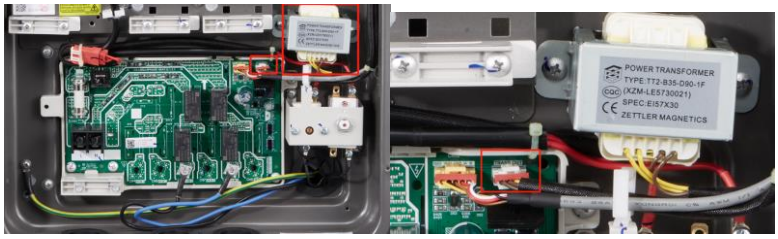


## 6.30 C3, C4 Troubleshooting

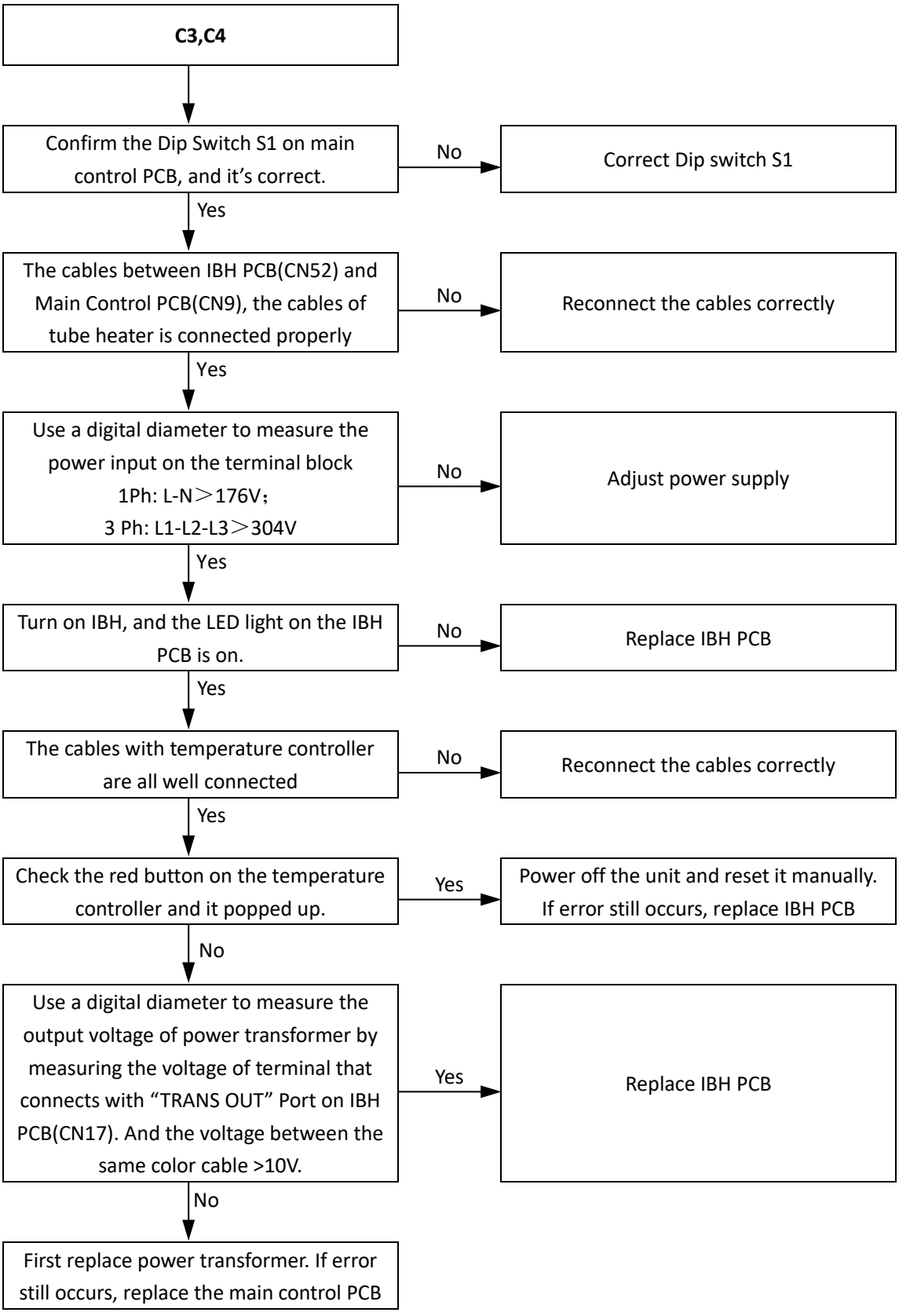
### 6.30.1 Digital display output




### 6.30.2 Description

| Error code | C3 | C4 |
|---|---|---|
| Description | Current transformer failure or circuit failure of IBH PCB | C3⩾3 times |
| Triggering | Incorrect Dip switch S1, cables with IBH connected improperly; Overvoltage, IBH failure etc. | |
| Correct Dip switch S1 |  | |
| IBH PCB LED light |  | |
| Temperature controller |  | |
| Power transformer And “TRANS OUT” port |  | |

### 6.30.3 Procedure



## 7 Discharge / Suction pressure and temperature range

The following parameter ranges are used to roughly determine whether the system is running properly:

| Discharge temperature(Tp) on heating/DHW mode | |
|---|---|
| T4＜-10℃ | Twout+10＜Tp＜Twout+30 |
| -10℃≤T4＜10℃ | Twout+10＜Tp＜Twout+30 |
| 10℃≤T4＜25℃ | Twout+10＜Tp＜Twout+25 |
| T4≥25℃ | Twout+10＜Tp＜Twout+25 |
| Note:<br>T4: ambient temperature<br>Tw_out: leaving water temperature. | |

| Discharge temperature(Tp) on cooling mode | | | | |
|---|---|---|---|---|
| Tp 值(℃) | Fx＜44Hz | 44Hz≤Fx＜62Hz | 62Hz≤Fx＜72Hz | Fx≥72Hz |
| T4＜25℃ | 50±10 | 55±10 | 60±10 | 65±10 |
| 25℃≤T4＜30℃ | 55±10 | 60±10 | 65±10 | 70±10 |
| 30℃≤T4＜35℃ | 60±10 | 65±10 | 70±10 | 75±10 |
| 35℃≤T4＜40℃ | 65±10 | 70±10 | 75±10 | 80±10 |
| 40℃≤T4＜46℃ | 70±10 | 75±10 | 80±10 | 85±10 |
| T4≥46℃ | 70±10 | 75±10 | 80±10 | 85±10 |
| Note:<br>T4: ambient temperature<br>Fx: compressor frequency | | | | |

| Discharge pressure(P1) for heating/DHW mode | | | | | | |
|---|---|---|---|---|---|---|
| Tw_out(℃) | 25 | 30 | 35 | 40 | 45 | 50 |
| P1（kPa） | 1000±100 | 1150±100 | 1300±100 | 1450±100 | 1600±100 | 1800±100 |
| Tw_out(℃) | 55 | 60 | 65 | 70 | 75 | |
| P1（kPa） | 2000±150 | 2200±150 | 2450±150 | 2700±150 | 3000±150 | |
| Note: P1 is absolute pressure. | | | | | | |

| Suction pressure(P2) for cooling mode | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tw_out(℃) | 5～7 | 8～10 | 11～13 | 14～16 | 17～19 | 20～22 | 23～25 |
| P2（kPa） | 520±50 | 570±50 | 610±50 | 670±50 | 740±50 | 780±50 | 830±50 |
| Note: P2 is absolute pressure. | | | | | | | |

# 8 Appendix to Part 4

## 8.1 Temperature Sensor Resistance Characteristics

| Applied to |
|---|
| T3 Outdoor unit heat exchanger bottom temperature sensor<br>T4 Ambient temperature sensor<br>Th Return-air temperature sensor<br>T2 Plate heat exchanger outlet refrigerant temperature sensor<br>T2B Plate heat exchanger inlet refrigerant temperature sensor<br>TL Outdoor unit heat exchanger outlet temperature sensor |
| *R25=10KΩ±3%，B25/50=4100K±3%* |

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| -40 | 433.108 | 383.315 | 336.854 | -8 | 57.649 | 53.458 | 49.492 |
| -39 | 404.038 | 358.094 | 315.212 | -7 | 54.456 | 50.575 | 46.899 |
| -38 | 377.08 | 334.677 | 295.088 | -6 | 51.456 | 47.862 | 44.455 |
| -37 | 352.071 | 312.924 | 276.365 | -5 | 48.636 | 45.308 | 42.15 |
| -36 | 328.859 | 292.709 | 258.939 | -4 | 45.984 | 42.903 | 39.977 |
| -35 | 307.306 | 273.916 | 242.714 | -3 | 43.49 | 40.638 | 37.927 |
| -34 | 287.285 | 256.435 | 227.599 | -2 | 41.144 | 38.504 | 35.992 |
| -33 | 268.678 | 240.17 | 213.514 | -1 | 38.935 | 36.492 | 34.165 |
| -32 | 251.38 | 225.029 | 200.382 | 0 | 36.857 | 34.596 | 32.44 |
| -31 | 235.291 | 210.929 | 188.133 | 1 | 34.898 | 32.807 | 30.81 |
| -30 | 220.32 | 197.792 | 176.705 | 2 | 33.055 | 31.12 | 29.271 |
| -29 | 206.384 | 185.547 | 166.037 | 3 | 31.317 | 29.528 | 27.815 |
| -28 | 193.407 | 174.131 | 156.075 | 4 | 29.681 | 28.026 | 26.44 |
| -27 | 181.317 | 163.481 | 146.768 | 5 | 28.138 | 26.608 | 25.14 |
| -26 | 170.049 | 153.543 | 138.071 | 6 | 26.682 | 25.268 | 23.909 |
| -25 | 159.543 | 144.266 | 129.939 | 7 | 25.31 | 24.003 | 22.745 |
| -24 | 149.745 | 135.601 | 122.333 | 8 | 24.016 | 22.808 | 21.644 |
| -23 | 140.602 | 127.507 | 115.216 | 9 | 22.794 | 21.678 | 20.601 |
| -22 | 132.067 | 119.941 | 108.555 | 10 | 21.641 | 20.61 | 19.614 |
| -21 | 124.098 | 112.867 | 102.318 | 11 | 20.553 | 19.601 | 18.68 |
| -20 | 116.539 | 106.732 | 96.92 | 12 | 19.525 | 18.646 | 17.794 |
| -19 | 110.231 | 100.552 | 91.451 | 13 | 18.554 | 17.743 | 16.955 |
| -18 | 103.743 | 94.769 | 86.328 | 14 | 17.636 | 16.888 | 16.16 |
| -17 | 97.673 | 89.353 | 81.525 | 15 | 16.769 | 16.079 | 15.406 |
| -16 | 91.99 | 84.278 | 77.017 | 16 | 15.949 | 15.313 | 14.691 |
| -15 | 86.669 | 79.521 | 72.788 | 17 | 15.174 | 14.588 | 14.014 |
| -14 | 81.684 | 75.059 | 68.815 | 18 | 14.442 | 13.902 | 13.372 |
| -13 | 77.013 | 70.873 | 65.083 | 19 | 13.748 | 13.251 | 12.762 |
| -12 | 72.632 | 66.943 | 61.574 | 20 | 13.093 | 12.635 | 12.183 |
| -11 | 68.523 | 63.252 | 58.274 | 21 | 12.471 | 12.05 | 11.634 |
| -10 | 64.668 | 59.784 | 55.169 | 22 | 11.883 | 11.496 | 11.112 |
| -9 | 61.048 | 56.524 | 52.246 | 23 | 11.327 | 10.971 | 10.617 |

Continue on next page...

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| 24 | 10.8 | 10.473 | 10.147 | 66 | 2.004 | 1.883 | 1.766 |
| 25 | 10.3 | 10 | 9.7 | 67 | 1.934 | 1.816 | 1.702 |
| 26 | 9.848 | 9.551 | 9.255 | 68 | 1.867 | 1.752 | 1.641 |
| 27 | 9.418 | 9.125 | 8.834 | 69 | 1.802 | 1.69 | 1.582 |
| 28 | 9.01 | 8.721 | 8.434 | 70 | 1.74 | 1.631 | 1.525 |
| 29 | 8.621 | 8.337 | 8.055 | 71 | 1.68 | 1.574 | 1.471 |
| 30 | 8.252 | 7.972 | 7.695 | 72 | 1.622 | 1.519 | 1.419 |
| 31 | 7.9 | 7.625 | 7.353 | 73 | 1.567 | 1.466 | 1.369 |
| 32 | 7.566 | 7.296 | 7.029 | 74 | 1.514 | 1.416 | 1.321 |
| 33 | 7.247 | 6.982 | 6.721 | 75 | 1.463 | 1.367 | 1.275 |
| 34 | 6.944 | 6.684 | 6.428 | 76 | 1.414 | 1.321 | 1.23 |
| 35 | 6.656 | 6.401 | 6.15 | 77 | 1.367 | 1.276 | 1.188 |
| 36 | 6.381 | 6.131 | 5.886 | 78 | 1.321 | 1.233 | 1.147 |
| 37 | 6.119 | 5.874 | 5.634 | 79 | 1.277 | 1.191 | 1.108 |
| 38 | 5.87 | 5.63 | 5.395 | 80 | 1.235 | 1.151 | 1.07 |
| 39 | 5.631 | 5.397 | 5.167 | 81 | 1.195 | 1.113 | 1.034 |
| 40 | 5.404 | 5.175 | 4.951 | 82 | 1.156 | 1.076 | 0.999 |
| 41 | 5.188 | 4.964 | 4.745 | 83 | 1.118 | 1.041 | 0.966 |
| 42 | 4.982 | 4.763 | 4.549 | 84 | 1.082 | 1.007 | 0.934 |
| 43 | 4.785 | 4.571 | 4.362 | 85 | 1.047 | 0.974 | 0.903 |
| 44 | 4.596 | 4.387 | 4.183 | 86 | 1.014 | 0.942 | 0.874 |
| 45 | 4.417 | 4.213 | 4.014 | 87 | 0.982 | 0.912 | 0.845 |
| 46 | 4.246 | 4.046 | 3.851 | 88 | 0.951 | 0.883 | 0.818 |
| 47 | 4.082 | 3.887 | 3.697 | 89 | 0.921 | 0.855 | 0.791 |
| 48 | 3.925 | 3.735 | 3.55 | 90 | 0.892 | 0.828 | 0.766 |
| 49 | 3.776 | 3.59 | 3.409 | 91 | 0.864 | 0.802 | 0.742 |
| 50 | 3.632 | 3.451 | 3.274 | 92 | 0.838 | 0.777 | 0.719 |
| 51 | 3.495 | 3.318 | 3.146 | 93 | 0.812 | 0.753 | 0.696 |
| 52 | 3.363 | 3.191 | 3.023 | 94 | 0.787 | 0.73 | 0.675 |
| 53 | 3.237 | 3.069 | 2.905 | 95 | 0.763 | 0.708 | 0.654 |
| 54 | 3.116 | 2.952 | 2.793 | 96 | 0.74 | 0.686 | 0.634 |
| 55 | 3.001 | 2.841 | 2.685 | 97 | 0.718 | 0.666 | 0.615 |
| 56 | 2.89 | 2.734 | 2.582 | 98 | 0.697 | 0.646 | 0.597 |
| 57 | 2.784 | 2.632 | 2.484 | 99 | 0.677 | 0.627 | 0.579 |
| 58 | 2.682 | 2.534 | 2.39 | 100 | 0.657 | 0.609 | 0.562 |
| 59 | 2.585 | 2.44 | 2.299 | 101 | 0.638 | 0.591 | 0.546 |
| 60 | 2.491 | 2.35 | 2.213 | 102 | 0.62 | 0.574 | 0.53 |
| 61 | 2.401 | 2.264 | 2.13 | 103 | 0.602 | 0.558 | 0.515 |
| 62 | 2.315 | 2.181 | 2.051 | 104 | 0.585 | 0.542 | 0.501 |
| 63 | 2.233 | 2.102 | 1.975 | 105 | 0.569 | 0.527 | 0.485 |
| 64 | 2.154 | 2.026 | 1.903 | | | | |
| 65 | 2.077 | 1.953 | 1.833 | | | | |

End

Applied to

Tp Discharge temperature sensor

R90℃=5KΩ±3%， B25/50=3950K±3%

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| -40 | 2002.628 | 1642.059 | 1281.49 | -8 | 318.604 | 271.634 | 224.664 |
| -39 | 1881.964 | 1544.968 | 1207.972 | -7 | 302.08 | 257.867 | 213.653 |
| -38 | 1769.292 | 1454.213 | 1139.134 | -6 | 286.483 | 244.857 | 203.232 |
| -37 | 1664.009 | 1369.32 | 1074.631 | -5 | 271.757 | 232.561 | 193.365 |
| -36 | 1565.57 | 1289.862 | 1014.154 | -4 | 257.852 | 220.937 | 184.022 |
| -35 | 1473.481 | 1215.451 | 957.421 | -3 | 244.717 | 209.945 | 175.173 |
| -34 | 1387.282 | 1145.725 | 904.168 | -2 | 232.309 | 199.55 | 166.79 |
| -33 | 1306.554 | 1080.355 | 854.156 | -1 | 220.585 | 189.716 | 158.848 |
| -32 | 1230.918 | 1019.042 | 807.166 | 0 | 209.504 | 180.412 | 151.321 |
| -31 | 1160.015 | 961.505 | 762.994 | 1 | 199.029 | 171.607 | 144.186 |
| -30 | 1093.521 | 907.487 | 721.452 | 2 | 189.125 | 163.273 | 137.422 |
| -29 | 1031.137 | 856.752 | 682.368 | 3 | 179.759 | 155.383 | 131.007 |
| -28 | 972.588 | 809.086 | 645.583 | 4 | 170.899 | 147.911 | 124.923 |
| -27 | 917.615 | 764.281 | 610.947 | 5 | 162.517 | 140.835 | 119.152 |
| -26 | 865.981 | 722.152 | 578.323 | 6 | 154.585 | 134.13 | 113.675 |
| -25 | 817.469 | 682.528 | 547.586 | 7 | 147.077 | 127.778 | 108.478 |
| -24 | 771.875 | 645.245 | 518.616 | 8 | 139.97 | 121.757 | 103.544 |
| -23 | 729.009 | 610.156 | 491.303 | 9 | 133.239 | 116.049 | 98.859 |
| -22 | 688.698 | 577.121 | 465.544 | 10 | 126.864 | 110.638 | 94.411 |
| -21 | 650.778 | 546.012 | 441.246 | 11 | 120.825 | 105.505 | 90.185 |
| -20 | 615.097 | 516.708 | 418.318 | 12 | 115.103 | 100.636 | 86.17 |
| -19 | 581.515 | 489.096 | 396.678 | 13 | 109.679 | 96.017 | 82.354 |
| -18 | 549.899 | 463.073 | 376.247 | 14 | 104.537 | 91.633 | 78.728 |
| -17 | 520.129 | 438.542 | 356.955 | 15 | 99.662 | 87.471 | 75.28 |
| -16 | 492.089 | 415.411 | 338.733 | 16 | 95.038 | 83.52 | 72.001 |
| -15 | 465.672 | 393.595 | 321.518 | 17 | 90.652 | 79.767 | 68.882 |
| -14 | 440.779 | 373.014 | 305.25 | 18 | 86.489 | 76.202 | 65.915 |
| -13 | 417.316 | 353.595 | 289.874 | 19 | 82.539 | 72.815 | 63.091 |
| -12 | 395.197 | 335.268 | 275.339 | 20 | 78.789 | 69.596 | 60.404 |
| -11 | 374.34 | 317.967 | 261.594 | 21 | 75.228 | 66.537 | 57.845 |
| -10 | 354.669 | 301.632 | 248.595 | 22 | 71.846 | 63.627 | 55.409 |
| -9 | 336.113 | 286.206 | 236.298 | 23 | 68.633 | 60.86 | 53.088 |

Continue on next page...

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| 24 | 65.58 | 58.228 | 50.877 | 66 | 11.858 | 11.134 | 10.411 |
| 25 | 62.678 | 55.724 | 48.77 | 67 | 11.432 | 10.749 | 10.066 |
| 26 | 59.919 | 53.34 | 46.762 | 68 | 11.024 | 10.38 | 9.735 |
| 27 | 57.295 | 51.071 | 44.847 | 69 | 10.632 | 10.024 | 9.416 |
| 28 | 54.8 | 48.91 | 43.021 | 70 | 10.255 | 9.682 | 9.109 |
| 29 | 52.426 | 46.853 | 41.279 | 71 | 9.894 | 9.354 | 8.814 |
| 30 | 50.167 | 44.892 | 39.617 | 72 | 9.546 | 9.038 | 8.53 |
| 31 | 48.016 | 43.024 | 38.031 | 73 | 9.213 | 8.734 | 8.255 |
| 32 | 45.969 | 41.243 | 36.517 | 74 | 8.892 | 8.442 | 7.992 |
| 33 | 44.019 | 39.546 | 35.072 | 75 | 8.584 | 8.161 | 7.737 |
| 34 | 42.162 | 37.927 | 33.692 | 76 | 8.288 | 7.89 | 7.492 |
| 35 | 40.392 | 36.383 | 32.373 | 77 | 8.003 | 7.629 | 7.256 |
| 36 | 38.706 | 34.91 | 31.113 | 78 | 7.729 | 7.379 | 7.028 |
| 37 | 37.098 | 33.504 | 29.909 | 79 | 7.466 | 7.137 | 6.809 |
| 38 | 35.566 | 32.162 | 28.758 | 80 | 7.213 | 6.905 | 6.597 |
| 39 | 34.104 | 30.881 | 27.657 | 81 | 6.969 | 6.681 | 6.393 |
| 40 | 32.709 | 29.657 | 26.605 | 82 | 6.735 | 6.466 | 6.196 |
| 41 | 31.379 | 28.488 | 25.598 | 83 | 6.509 | 6.258 | 6.006 |
| 42 | 30.109 | 27.372 | 24.634 | 84 | 6.292 | 6.058 | 5.823 |
| 43 | 28.896 | 26.304 | 23.712 | 85 | 6.084 | 5.865 | 5.646 |
| 44 | 27.739 | 25.284 | 22.829 | 86 | 5.883 | 5.679 | 5.476 |
| 45 | 26.633 | 24.309 | 21.984 | 87 | 5.689 | 5.5 | 5.311 |
| 46 | 25.577 | 23.376 | 21.174 | 88 | 5.502 | 5.327 | 5.152 |
| 47 | 24.568 | 22.483 | 20.399 | 89 | 5.323 | 5.161 | 4.998 |
| 48 | 23.603 | 21.629 | 19.656 | 90 | 5.15 | 5 | 4.85 |
| 49 | 22.681 | 20.812 | 18.943 | 91 | 4.996 | 4.845 | 4.694 |
| 50 | 21.799 | 20.03 | 18.261 | 92 | 4.847 | 4.696 | 4.545 |
| 51 | 20.956 | 19.281 | 17.606 | 93 | 4.703 | 4.552 | 4.4 |
| 52 | 20.149 | 18.563 | 16.978 | 94 | 4.564 | 4.412 | 4.261 |
| 53 | 19.377 | 17.876 | 16.375 | 95 | 4.43 | 4.278 | 4.127 |
| 54 | 18.638 | 17.218 | 15.797 | 96 | 4.3 | 4.149 | 3.997 |
| 55 | 17.931 | 16.587 | 15.243 | 97 | 4.175 | 4.024 | 3.872 |
| 56 | 17.254 | 15.982 | 14.71 | 98 | 4.054 | 3.903 | 3.752 |
| 57 | 16.606 | 15.402 | 14.199 | 99 | 3.937 | 3.787 | 3.636 |
| 58 | 15.984 | 14.846 | 13.708 | 100 | 3.824 | 3.674 | 3.524 |
| 59 | 15.389 | 14.313 | 13.236 | 101 | 3.715 | 3.565 | 3.416 |
| 60 | 14.819 | 13.801 | 12.783 | 102 | 3.609 | 3.46 | 3.312 |
| 61 | 14.272 | 13.31 | 12.348 | 103 | 3.507 | 3.359 | 3.211 |
| 62 | 13.748 | 12.839 | 11.929 | 104 | 3.409 | 3.261 | 3.114 |
| 63 | 13.246 | 12.387 | 11.527 | 105 | 3.313 | 3.167 | 3.02 |
| 64 | 12.764 | 11.952 | 11.14 | 106 | 3.221 | 3.075 | 2.929 |
| 65 | 12.302 | 11.535 | 10.768 | 107 | 3.131 | 2.987 | 2.842 |

Continue on next page...

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| 108 | 3.045 | 2.901 | 2.758 | 132 | 1.625 | 1.511 | 1.397 |
| 109 | 2.962 | 2.819 | 2.676 | 133 | 1.586 | 1.473 | 1.36 |
| 110 | 2.881 | 2.739 | 2.597 | 134 | 1.548 | 1.436 | 1.324 |
| 111 | 2.802 | 2.662 | 2.521 | 135 | 1.511 | 1.401 | 1.29 |
| 112 | 2.727 | 2.587 | 2.448 | 136 | 1.475 | 1.366 | 1.257 |
| 113 | 2.653 | 2.515 | 2.377 | 137 | 1.44 | 1.332 | 1.225 |
| 114 | 2.582 | 2.445 | 2.308 | 138 | 1.407 | 1.3 | 1.193 |
| 115 | 2.514 | 2.378 | 2.242 | 139 | 1.374 | 1.268 | 1.163 |
| 116 | 2.447 | 2.313 | 2.178 | 140 | 1.342 | 1.238 | 1.133 |
| 117 | 2.383 | 2.249 | 2.116 | 141 | 1.311 | 1.208 | 1.105 |
| 118 | 2.32 | 2.188 | 2.056 | 142 | 1.281 | 1.179 | 1.077 |
| 119 | 2.26 | 2.129 | 1.998 | 143 | 1.252 | 1.151 | 1.051 |
| 120 | 2.201 | 2.072 | 1.942 | 144 | 1.224 | 1.124 | 1.024 |
| 121 | 2.145 | 2.016 | 1.888 | 145 | 1.196 | 1.098 | 0.999 |
| 122 | 2.09 | 1.963 | 1.836 | 146 | 1.169 | 1.072 | 0.975 |
| 123 | 2.037 | 1.911 | 1.785 | 147 | 1.143 | 1.047 | 0.951 |
| 124 | 1.985 | 1.86 | 1.736 | 148 | 1.118 | 1.023 | 0.928 |
| 125 | 1.935 | 1.812 | 1.689 | 149 | 1.093 | 0.999 | 0.905 |
| 126 | 1.887 | 1.765 | 1.643 | 150 | 1.069 | 0.977 | 0.884 |
| 127 | 1.84 | 1.719 | 1.598 | | | | |
| 128 | 1.794 | 1.675 | 1.555 | | | | |
| 129 | 1.75 | 1.632 | 1.514 | | | | |
| 130 | 1.707 | 1.59 | 1.473 | | | | |
| 131 | 1.665 | 1.55 | 1.434 | | | | |

End

Applied to
TW_in Plate heat exchanger inlet water temperature sensor
TW_out Plate heat exchanger outlet water temperature sensor
T5 Water tank temperature sensor
TW2 Zone 2 water flow temperature sensor

R50=17.6KΩ±3%，B0/100=3970K±2%

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| -40 | 1822.916 | 1608.351 | 1393.786 | -8 | 263.273 | 242.131 | 220.989 |
| -39 | 1705.939 | 1507.271 | 1308.602 | -7 | 249.357 | 229.593 | 209.828 |
| -38 | 1596.976 | 1412.994 | 1229.013 | -6 | 236.255 | 217.774 | 199.293 |
| -37 | 1495.47 | 1325.058 | 1154.647 | -5 | 223.915 | 206.63 | 189.345 |
| -36 | 1400.897 | 1243.025 | 1085.152 | -4 | 212.289 | 196.119 | 179.949 |
| -35 | 1312.771 | 1166.486 | 1020.2 | -3 | 201.332 | 186.201 | 171.07 |
| -34 | 1230.637 | 1095.061 | 959.485 | -2 | 191.001 | 176.84 | 162.678 |
| -33 | 1154.07 | 1028.393 | 902.717 | -1 | 181.258 | 168.001 | 154.744 |
| -32 | 1082.675 | 966.151 | 849.626 | 0 | 172.066 | 159.653 | 147.24 |
| -31 | 1016.084 | 908.023 | 799.962 | 1 | 163.391 | 151.766 | 140.141 |
| -30 | 953.957 | 853.724 | 753.491 | 2 | 155.2 | 144.311 | 133.422 |
| -29 | 896.053 | 802.986 | 709.918 | 3 | 147.466 | 137.264 | 127.062 |
| -28 | 842.002 | 755.557 | 669.113 | 4 | 140.159 | 130.599 | 121.038 |
| -27 | 791.53 | 711.21 | 630.889 | 5 | 133.253 | 124.293 | 115.332 |
| -26 | 744.384 | 669.728 | 595.072 | 6 | 126.725 | 118.326 | 109.926 |
| -25 | 700.328 | 630.913 | 561.498 | 7 | 120.554 | 112.679 | 104.803 |
| -24 | 659.144 | 594.58 | 530.015 | 8 | 114.715 | 107.33 | 99.945 |
| -23 | 620.629 | 560.556 | 500.483 | 9 | 109.191 | 102.265 | 95.338 |
| -22 | 584.595 | 528.683 | 472.771 | 10 | 103.963 | 97.466 | 90.969 |
| -21 | 550.871 | 498.814 | 446.757 | 11 | 99.013 | 92.918 | 86.822 |
| -20 | 519.295 | 470.812 | 422.328 | 12 | 94.327 | 88.607 | 82.888 |
| -19 | 489.718 | 444.548 | 399.379 | 13 | 89.887 | 84.519 | 79.152 |
| -18 | 462.003 | 419.907 | 377.812 | 14 | 85.679 | 80.642 | 75.604 |
| -17 | 436.022 | 396.779 | 357.537 | 15 | 81.692 | 76.963 | 72.234 |
| -16 | 411.657 | 375.063 | 338.468 | 16 | 77.911 | 73.471 | 69.032 |
| -15 | 388.797 | 354.662 | 320.527 | 17 | 74.326 | 70.157 | 65.989 |
| -14 | 367.343 | 335.492 | 303.641 | 18 | 70.925 | 67.011 | 63.097 |
| -13 | 347.198 | 317.47 | 287.743 | 19 | 67.699 | 64.023 | 60.347 |
| -12 | 328.275 | 300.521 | 272.767 | 20 | 64.636 | 61.184 | 57.731 |
| -11 | 310.495 | 284.576 | 258.658 | 21 | 61.729 | 58.486 | 55.243 |
| -10 | 293.78 | 269.569 | 245.359 | 22 | 58.967 | 55.921 | 52.875 |
| -9 | 278.06 | 255.439 | 232.818 | 23 | 56.345 | 53.483 | 50.621 |

Continue on next page...

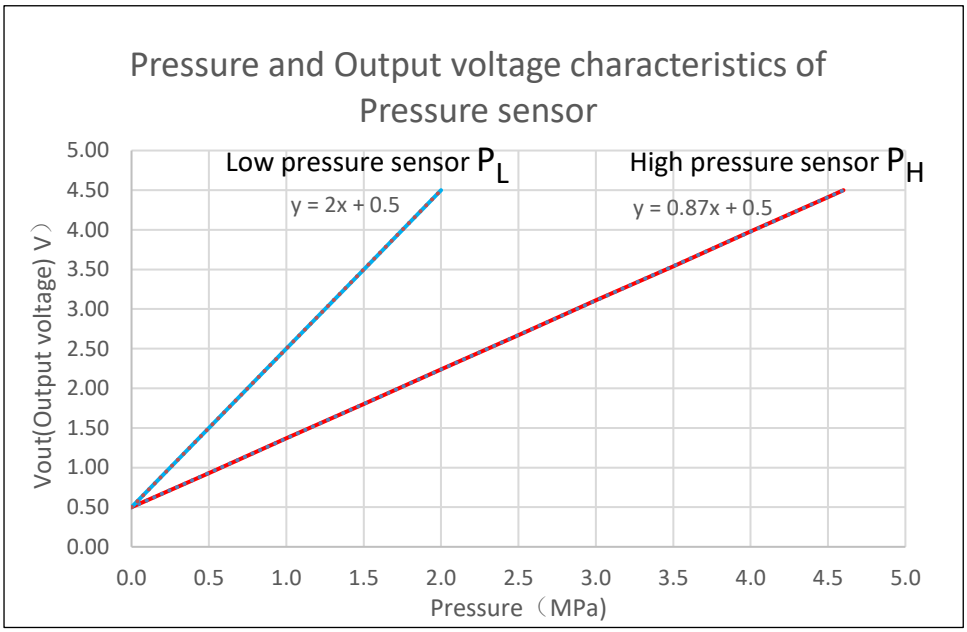
| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| 24 | 53.854 | 51.165 | 48.476 | 66 | 10.231 | 9.818 | 9.405 |
| 25 | 51.485 | 48.959 | 46.432 | 67 | 9.887 | 9.481 | 9.075 |
| 26 | 49.234 | 46.86 | 44.486 | 68 | 9.556 | 9.157 | 8.758 |
| 27 | 47.094 | 44.863 | 42.632 | 69 | 9.237 | 8.846 | 8.454 |
| 28 | 45.058 | 42.961 | 40.865 | 70 | 8.932 | 8.547 | 8.163 |
| 29 | 43.121 | 41.151 | 39.181 | 71 | 8.637 | 8.259 | 7.882 |
| 30 | 41.278 | 39.427 | 37.575 | 72 | 8.354 | 7.983 | 7.613 |
| 31 | 39.524 | 37.784 | 36.044 | 73 | 8.08 | 7.717 | 7.354 |
| 32 | 37.854 | 36.219 | 34.583 | 74 | 7.818 | 7.461 | 7.105 |
| 33 | 36.263 | 34.726 | 33.189 | 75 | 7.565 | 7.215 | 6.866 |
| 34 | 34.748 | 33.304 | 31.86 | 76 | 7.322 | 6.978 | 6.635 |
| 35 | 33.305 | 31.947 | 30.59 | 77 | 7.087 | 6.75 | 6.414 |
| 36 | 31.929 | 30.653 | 29.378 | 78 | 6.861 | 6.531 | 6.201 |
| 37 | 30.617 | 29.419 | 28.22 | 79 | 6.643 | 6.319 | 5.995 |
| 38 | 29.367 | 28.241 | 27.114 | 80 | 6.433 | 6.115 | 5.798 |
| 39 | 28.174 | 27.115 | 26.057 | 81 | 6.23 | 5.919 | 5.608 |
| 40 | 27.036 | 26.042 | 25.048 | 82 | 6.035 | 5.73 | 5.425 |
| 41 | 25.949 | 25.015 | 24.082 | 83 | 5.847 | 5.548 | 5.249 |
| 42 | 24.913 | 24.036 | 23.159 | 84 | 5.666 | 5.372 | 5.079 |
| 43 | 23.924 | 23.1 | 22.276 | 85 | 5.491 | 5.204 | 4.916 |
| 44 | 22.979 | 22.206 | 21.432 | 86 | 5.323 | 5.041 | 4.759 |
| 45 | 22.076 | 21.35 | 20.624 | 87 | 5.16 | 4.884 | 4.608 |
| 46 | 21.213 | 20.532 | 19.85 | 88 | 5.003 | 4.732 | 4.462 |
| 47 | 20.389 | 19.749 | 19.11 | 89 | 4.852 | 4.587 | 4.322 |
| 48 | 19.602 | 19.001 | 18.401 | 90 | 4.706 | 4.446 | 4.186 |
| 49 | 18.848 | 18.285 | 17.722 | 91 | 4.565 | 4.31 | 4.056 |
| 50 | 18.128 | 17.6 | 17.072 | 92 | 4.429 | 4.179 | 3.929 |
| 51 | 17.466 | 16.944 | 16.422 | 93 | 4.298 | 4.053 | 3.809 |
| 52 | 16.831 | 16.316 | 15.801 | 94 | 4.172 | 3.932 | 3.692 |
| 53 | 16.223 | 15.714 | 15.206 | 95 | 4.049 | 3.814 | 3.579 |
| 54 | 15.641 | 15.139 | 14.638 | 96 | 3.932 | 3.701 | 3.471 |
| 55 | 15.081 | 14.586 | 14.092 | 97 | 3.817 | 3.591 | 3.365 |
| 56 | 14.545 | 14.058 | 13.571 | 98 | 3.708 | 3.486 | 3.265 |
| 57 | 14.03 | 13.55 | 13.07 | 99 | 3.601 | 3.384 | 3.167 |
| 58 | 13.537 | 13.064 | 12.591 | 100 | 3.499 | 3.286 | 3.073 |
| 59 | 13.063 | 12.597 | 12.132 | 101 | 3.4 | 3.191 | 2.983 |
| 60 | 12.608 | 12.15 | 11.692 | 102 | 3.303 | 3.098 | 2.894 |
| 61 | 12.171 | 11.721 | 11.27 | 103 | 3.21 | 3.009 | 2.809 |
| 62 | 11.752 | 11.309 | 10.866 | 104 | 3.12 | 2.923 | 2.727 |
| 63 | 11.349 | 10.913 | 10.478 | 105 | 3.032 | 2.84 | 2.647 |
| 64 | 10.962 | 10.533 | 10.105 | 106 | 2.948 | 2.759 | 2.571 |
| 65 | 10.589 | 10.168 | 9.748 | 107 | 2.866 | 2.681 | 2.497 |

Continue on next page...

| Temp. (°C) | Resistance (kΩ) | | | Temp. (°C) | Resistance (kΩ) | | |
|---|---|---|---|---|---|---|---|
| | Rmax | R（t）Normal | Rmin | | Rmax | R（t）Normal | Rmin |
| 108 | 2.787 | 2.606 | 2.425 | 132 | 1.477 | 1.364 | 1.251 |
| 109 | 2.711 | 2.533 | 2.356 | 133 | 1.44 | 1.329 | 1.219 |
| 110 | 2.637 | 2.463 | 2.288 | 134 | 1.405 | 1.296 | 1.187 |
| 111 | 2.565 | 2.394 | 2.224 | 135 | 1.37 | 1.264 | 1.157 |
| 112 | 2.496 | 2.328 | 2.161 | 136 | 1.337 | 1.232 | 1.127 |
| 113 | 2.428 | 2.264 | 2.1 | 137 | 1.304 | 1.202 | 1.099 |
| 114 | 2.363 | 2.202 | 2.041 | 138 | 1.273 | 1.172 | 1.071 |
| 115 | 2.3 | 2.142 | 1.985 | 139 | 1.242 | 1.143 | 1.044 |
| 116 | 2.239 | 2.084 | 1.93 | 140 | 1.212 | 1.115 | 1.018 |
| 117 | 2.179 | 2.028 | 1.876 | 141 | 1.183 | 1.088 | 0.993 |
| 118 | 2.122 | 1.973 | 1.825 | 142 | 1.155 | 1.061 | 0.968 |
| 119 | 2.066 | 1.92 | 1.775 | 143 | 1.127 | 1.036 | 0.944 |
| 120 | 2.012 | 1.869 | 1.726 | 144 | 1.101 | 1.011 | 0.921 |
| 121 | 1.96 | 1.82 | 1.68 | 145 | 1.075 | 0.986 | 0.898 |
| 122 | 1.909 | 1.772 | 1.634 | 146 | 1.05 | 0.963 | 0.876 |
| 123 | 1.86 | 1.725 | 1.59 | 147 | 1.025 | 0.94 | 0.855 |
| 124 | 1.812 | 1.68 | 1.548 | 148 | 1.001 | 0.918 | 0.834 |
| 125 | 1.765 | 1.636 | 1.506 | 149 | 0.978 | 0.896 | 0.814 |
| 126 | 1.72 | 1.593 | 1.466 | 150 | 0.955 | 0.875 | 0.794 |
| 127 | 1.677 | 1.552 | 1.428 | | | | |
| 128 | 1.634 | 1.512 | 1.39 | | | | |
| 129 | 1.593 | 1.473 | 1.354 | | | | |
| 130 | 1.553 | 1.436 | 1.318 | | | | |
| 131 | 1.515 | 1.399 | 1.284 | | | | |

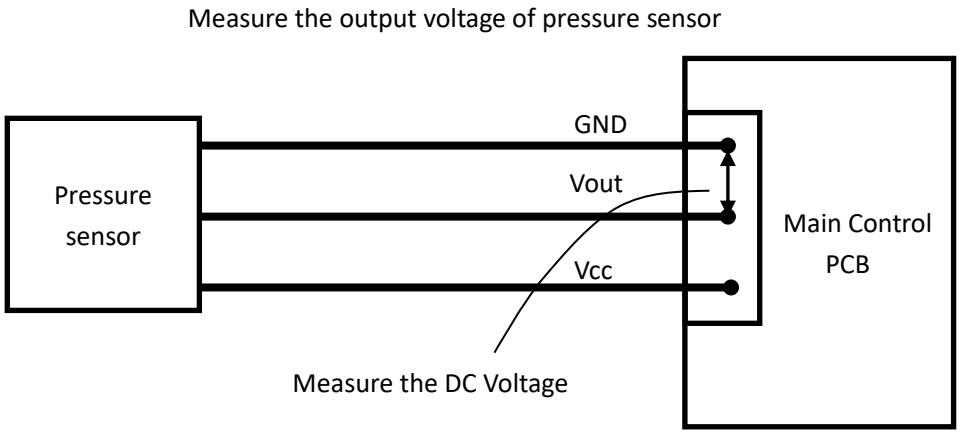
End

## 8.2 Pressure and Output voltage characteristics of Pressure sensor




Output voltage formula of high pressure sensor： Vout(H)=0.87×$P_H$+0.5

Output voltage formula of low pressure sensor： Vout(L)=2×$P_L$+0.5



## 8.3 Guide for identifying inverter PCB failure

Before measuring the inverter PCB, please confirm steps below in advance :

1) Cut off the power supply ;

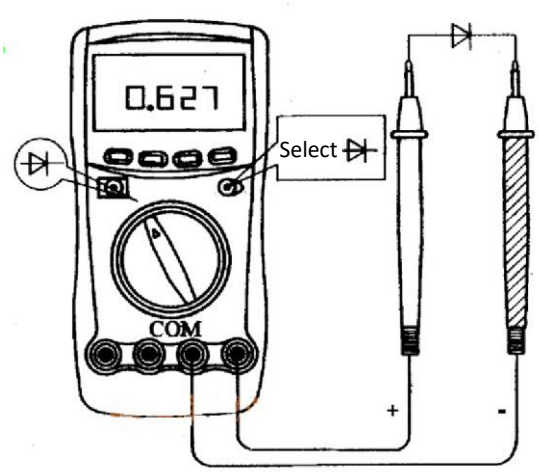
2) Wait for 10 mins for capacitor discharging in order to avoid the electric shock

3) Remove all connections wires

4) To identify whether inverter PCB of 1Ph models failed, follow the guide to test inverter circuit. If any one of test value abnormal, the 1 Ph inverter PCB failed.

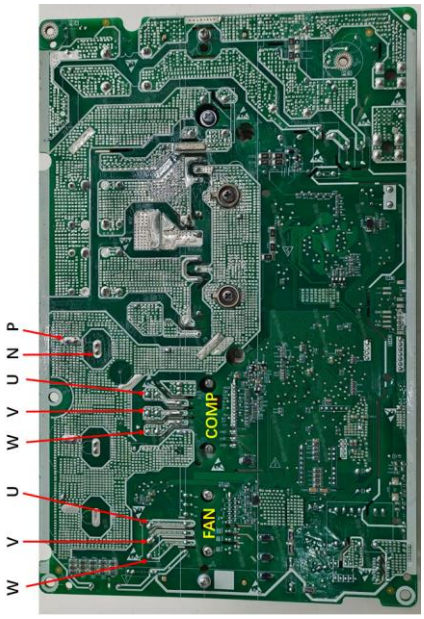
To identify whether inverter PCB of 3Ph models failed, follow the guide to test inverter circuit and three phase bridge rectifiler. If any one of test value abnormal, the 3 Ph inverter PCB failed.

Preparing tools : multimeter (secondary tube is available)

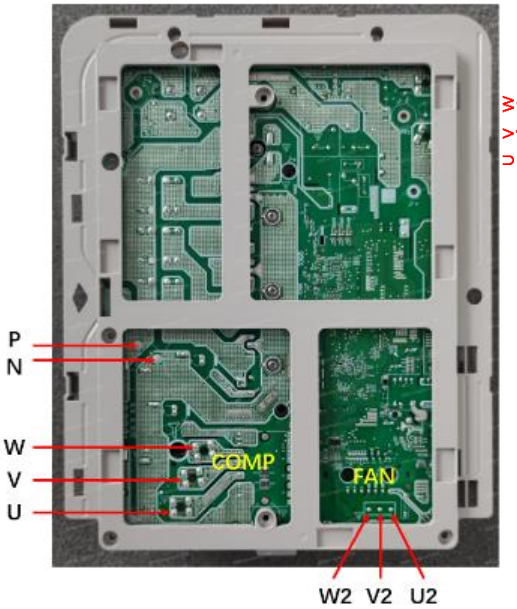


Inverter circuit (Fan module/ Compressor module):

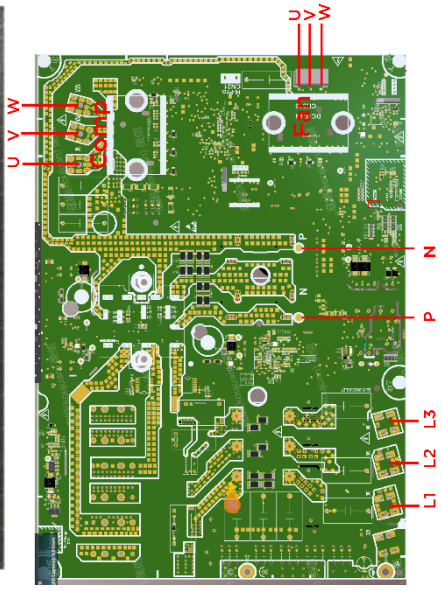
| Order | Test point | | Normal | Abnormal |
|---|---|---|---|---|
| | +(Red) | -（Black） | | |
| 1 | U | P | 0.3-0.7V | 0 /infinite |
| 2 | V | P | | |
| 3 | W | P | | |
| 4 | N | U | | |
| 5 | N | V | | |
| 6 | N | W | | |
| Note:<br>1. If any one of test value abnormal, the inverter PCB failed. Request aftersales service and replace the inverter control box. | | | | |




4-10KW




1Ph 12-16kW




3Ph 12-16kW

Three phase bridge rectifiler:

| Order | Test point | | Normal | Abnormal |
|---|---|---|---|---|
| | +(Red) | -（Black） | | |
| 1 | L1 | P | 0.3-0.7V | 0 /infinite |
| 2 | L2 | P | | |
| 3 | L3 | P | | |
| 4 | N | L1 | | |
| 5 | N | L2 | | |
| 6 | N | L3 | | |
| Note:<br>If any one of test value is abnormal, the inverter PCB failed. Request aftersales service and replace the inverter control box. | | | | |

# Service Notice


**—August 2023 | SN 001**

Midea will introduce a new generation of heat pumps that operate using R290 refrigerant. Theoretically, R290 is a highly flammable A3 refrigerant, but its risk can be effectively eliminated through product design and various aspects of control. This refrigerant has also been widely used in air conditioners, refrigerators, heat pumps, and other products in recent years. A3 refrigerant handling is therefore neither novel nor unusual. However, some basic precautions must be taken during storage, transportation, installation, maintenance, etc., which will be explained on the following pages.

## General information

### Characteristics of R290 refrigerant

**Environmental protection:** R290 is an environmentally friendly refrigerant with a global warming potential (GWP) of 3 and no ozone depletion potential (ODP).

**High efficiency:** R290 has good heat transfer properties and provides efficient refrigeration and air conditioning. It features a wide range of applications (up to -40°C).

**Safety:** R290 refrigerant (propane) is a colorless, odorless gas used in refrigeration and air conditioning equipment. It is non-toxic and highly flammable when mixed with air at a concentration of 0.021 to 0.095. R290 is heavier than air at the same temperature and pressure and often reaches higher concentrations near the ground. The gas has no odor, but it can be easily detected by commercially available gas detectors and leak detection devices, and its risk can be eliminated through effective preventative measures.

### Basic information on R290 heat pumps

The new generation of R290 heat pumps now adopts a monolithic structure design. This means that the refrigeration circuit of the unit is hermetically sealed, the refrigeration circuit is completely inside the heating system, and it is fully charged with R290 refrigerant when delivered. The maximum refrigerant charging amount for a single heat pump is 1250 g. More details can be found on Midea's official website.

### Explanation of common symbols on the heat pump

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|   | WARNING | This symbol shows that this appliance used a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire. |
|  | CAUTION | No open flame; Fire, open ignition sources, and smoking are prohibited. |
|  | CAUTION | This symbol shows that service personnel should be handling this equipment with reference to the installation manual. |
|  | CAUTION | This symbol shows that information is available, such as the operating manual or installation manual. |

## Transportation precautions

### Transportation regulations: ADR, IMDG, IATA

ADR regulations: Equipment containing less than 12 kg of flammable refrigerant is not subject to transportation regulations if it is designed with protection (i.e., it meets the appropriate safety standards). If the refrigerant amount exceeds 12 kg, the equipment is subject to the regulations for any containers for flammable gases.

IMDG regulations: R290 is classified as a flammable gas and defined as 2.1 class: it does not produce obvious flames or explosions during combustion, but produces heat and gas within its flammable range. The explosion limit of this gas is relatively high, and once exceeded, it can cause dangerous explosions. It is required that the shipper provides the corresponding MSDS for the product, which stands for Material Safety Data Sheet. The maximum filling quantity for flammable refrigerants is limited to 12 kg.

IATA regulations: These regulations prohibit the transportation of equipment charged with more than 0.1 kg of combustible refrigerant by a passenger plane or cargo aircraft. If air transportation is required, up to 150 kg of flammable refrigerant can be carried in cylinders, so that the system can be charged on site.

### Basic requirements for transportation

1. For finished machines, the carrier vehicle cannot be fully enclosed during transportation.
2. Red-and-white reflective strips should be pasted at the sides and rear of the carrier vehicle to alert other vehicles to keep a safe distance. The vehicle should not get close to the high-temperature area during transportation. Take heat dissipation measures when the temperature inside the compartment is too high.
3. Refrigerants and products to be repaired are not allowed to be transported in the open air, and the compartment should be equipped with an anti-static device.
4. A combustible agent leakage alarm device, an anti-static device, and a fire extinguishing device should be equipped.

## Storage precautions

### Basic requirements for warehouse

1. The warehouse should be equipped with ventilation equipment. Before entering the warehouse, the personnel should first turn on the ventilation equipment. Explosion-proof ventilation equipment and electrical appliances should be used in the warehouse. When conditions do not permit, at least explosion-proof exhaust fans should be used. All electrical appliances should be installed at a height of over 1.5 meters.
2. The warehouse should be illuminated, spacious, open, well-ventilated, equipped with ventilation equipment, and located in a place without heat sources.
3. When a refrigerant leak is detected, the ventilation equipment must be turned on immediately.

### Warehouse management requirements

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|  | Only desk telephones will be set up for communication within the warehouse. No mobile phones are allowed. |
|  | A combustible gas leakage detection device should be installed in the warehouse. |
|  | Product placement requirements: One side of the box surface must have a visible fireproof label and cannot be obstructed by other products. |
|  | The warehouse should be equipped with dry powder or carbon dioxide fire extinguishers and other fire-fighting equipment suitable for extinguishing electrical fires. |

### Refrigerant leakage handling plan

Rapidly evacuate people from the contaminated leakage area to a windward location and isolate them until the gas is fully dissipated. Cut off the fire source. Emergency responders should wear a self-contained breathing apparatus and an anti-static fire protection suit. Cut off the gas source, spray water mist for dilution and dissolution, or take extraction (indoor) or strong ventilation (outdoor) measures. If possible, use explosion-proof exhaust fans to transfer the leaked gas to an open place or install an appropriate nozzle to burn it off. Optionally, move the container with air leakage to an open place. Note that containers that gush air or which have air leakage cannot be used again, and technical measures should be taken to eliminate the remaining gas.

## Installation and commissioning precautions

1. Installation environment check: The heat pump is not allowed to be installed in an enclosed building space.
2. Unpacking check: The product should be unpacked and inspected in a well-ventilated area. A concentration detector should be prepared before heat pump unpacking to check for damage and abnormal appearance.
3. Installation height check: Not less than 1.0 m for window units, not less than 1.8 m for split wall-mounted units, and not less than 2.2 m for ceiling-mounted units.
4. Grounding check: The user's power supply should be grounded with a grounding resistance of no more than 4Ω. The air conditioner grounding wires must be firmly connected to the metal shells of the heat pump and ODU and thoroughly checked using a multimeter. Arrange a dedicated power supply line and connect it directly to the air conditioner's power supply.
5. Support installation: The support must be subjected to a test and a corrosion resistance test at more than 4 times the weight of the unit before use.
6. heat pump fixing: When installing the heat pump, place the refrigerant piping connectors outdoors if possible. When fixing a wall-mounted heat pump, the distance between the two

sides of the unit and the wall should be more than 65 cm, the bottom of the unit must be more than 1.8 m above the ground, and an installation height of more than 15 cm should be maintained on the top of the heat pump.

7. ODU installation: The clearance between the ODU and the inner wall should not be less than 75 cm. Connect the heat pump power cable, signal cable, and ODU's electrical part and take proper insulation measures. Be sure to make a ground connection.
8. ODU refrigerant pressure check: Check whether the compressor's discharge pressure and air return pressure are within a reasonable range (air return: 0.4–0.6 MPa; discharge: 1.5–2.0 MPa).
9. IDU and ODU connection pipes: It is prohibited to use removable connections for heat pump pipes. Avoid laying the connection pipes in an area with any sources of flame.
10. System vacuumizing: Use a dedicated vacuum pump for combustible refrigerants to vacuumize the system pipelines. It is prohibited to use refrigerants for vacuumizing.
11. Test run: Test runs must be performed after the installation is complete. During test runs, perform leakage inspections for pipe connections. Tightly seal the room where the heat pump is located and check for refrigerant leaks.
12. Electrical inspection: Perform a grounding check on the heat pump sheet metal. Power off and perform an insulation resistance test on the entire unit. The live line + null line insulation resistance to ground should be greater than 10 MΩ.

## Precautions for maintenance requirements

### Installation safety principles

1. The premises for installation should be kept ventilated.
2. Open flame or a high-temperature heat source with a temperature higher than 370°C, such as welding or smoking, are prohibited.
3. Take anti-static measures.
4. Choose a place that is convenient for installation and maintenance, which should not be an environment that is close to heat sources or exposed to flammable or explosive materials.
5. During the installation of the heat pump, in the event of refrigerant leakage, immediately close the ODU valve. All personnel should leave the room and handle the leakage 15 minutes later. Damaged products must be transported back to the maintenance point for processing. Welding is prohibited on the user's premises.
6. Choose a place where a uniform air inlet and outlet of the heat pump can be guaranteed.
7. Keep both sides of the area underneath the unit away from electric appliances, power switches, sockets, and other items.

### Tools required

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|  Vacuum pump | When performing pipeline welding or replacing refrigerant during charging, it is necessary to use an explosion-proof vacuum pump. |
|  Charging equipment | The refrigerant must be charged using dedicated explosion-proof charging equipment. Accuracy requirement: The deviation of the charging amount is less than 5 g. |
|  Concentration detector | 1. Repair facilities should be equipped with fixed R290 flammable refrigerant concentration detectors, which should be connected to safety protection/alarm systems. The error rate should not exceed 5%.<br>2. The installation site should be equipped with portable R290 flammable refrigerant concentration detectors (catalytic combustion/electronic/infrared), which can achieve two-stage audio and visual alarms. The error rate should not exceed 10%.<br>3. Detectors need to be calibrated every 30 days.<br>4. Before using the detector, functional checks and confirmations should be carried out. |
|  Fire extinguisher | During installation and repair, a fire extinguisher should be carried. There should be two or more dry powder, carbon dioxide, or foam fire extinguishers available at the repair site, placed in designated locations, with prominent identification, and easily accessible. |

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