



**IMPORTANT NOTE:**

Read this manual carefully before installing or operating your new heat pump.  
Make sure to save this manual for future reference.

# CONTENTS

|                                                              |            |
|--------------------------------------------------------------|------------|
| <b>Part 1 General Information.....</b>                       | <b>2</b>   |
| <b>Part 2 Component Layout and Refrigerant Circuits.....</b> | <b>4</b>   |
| <b>Part 3 Control.....</b>                                   | <b>9</b>   |
| <b>Part 4 Diagnosis and Troubleshooting.....</b>             | <b>22</b>  |
| <b>Part 5 Component Layout and Refrigerant Circuits.....</b> | <b>90</b>  |
| <b>Part 6 Control.....</b>                                   | <b>105</b> |
| <b>Part 7 Diagnosis and Troubleshooting.....</b>             | <b>124</b> |

# Part 1

# General Information

|                                                       |          |
|-------------------------------------------------------|----------|
| <b>1 Unit Capacities and External Appearance.....</b> | <b>3</b> |
|-------------------------------------------------------|----------|

## 1 Unit Capacities and External Appearance

### 1.1 Unit Capacities

Table 1-1.1: Capacity range

| Capacity | 18kW        | 22kW        | 26kW        | 30kW        |
|----------|-------------|-------------|-------------|-------------|
| Model    | SMHM-180B-3 | SMHM-220B-3 | SMHM-260B-3 | SMHM-300B-3 |

### 1.2 External Appearance

Table 1-1.2: Appearance



# Part 2

# Components Layout and Refrigerant Circuits

|                                                |          |
|------------------------------------------------|----------|
| <b>1 Layout of Functional Components .....</b> | <b>5</b> |
| <b>2 Piping Diagrams .....</b>                 | <b>6</b> |
| <b>3 Refrigerant Flow Diagrams.....</b>        | <b>8</b> |

## 1 Layout of Functional Components

Figure 2-1.1: SMHM-180(220,260,300)B-3 front view

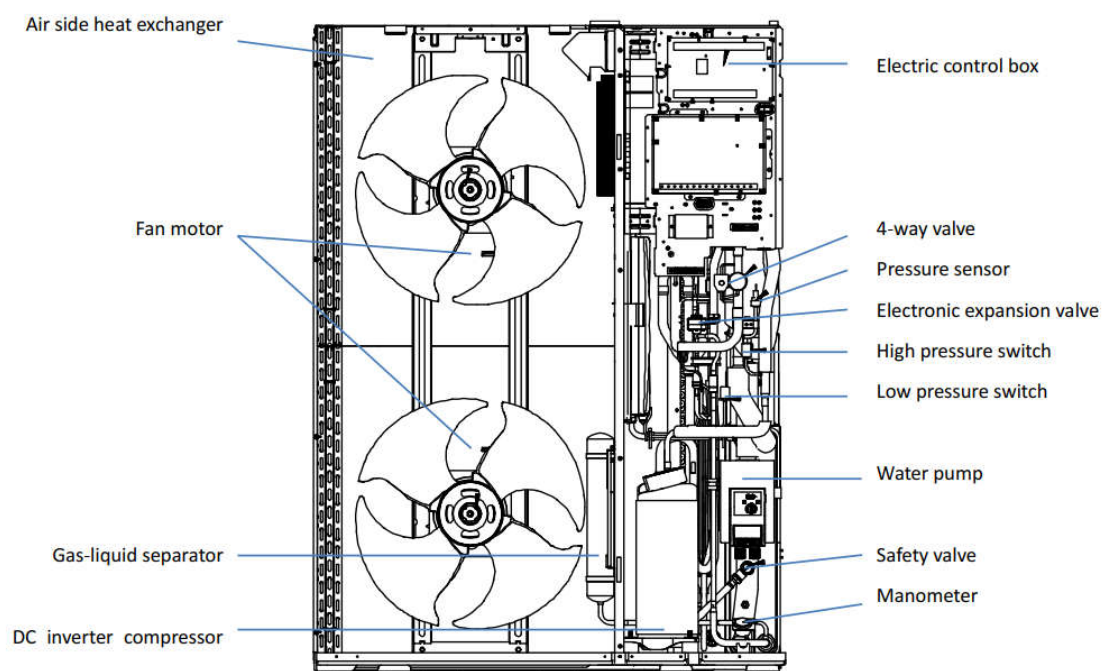
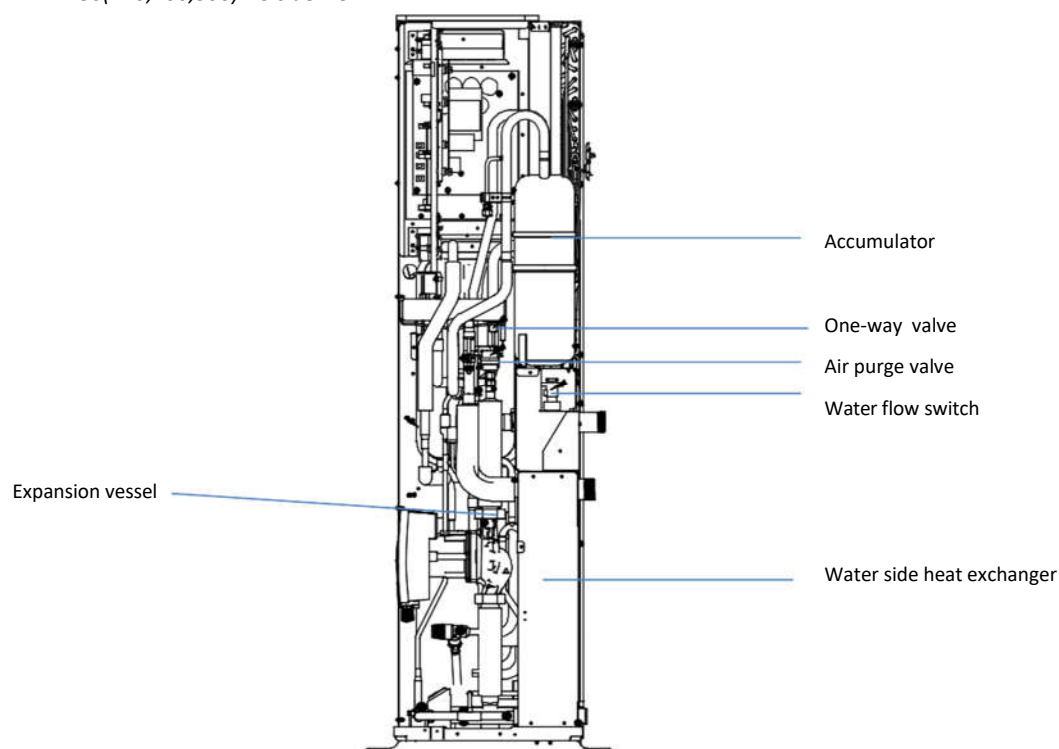
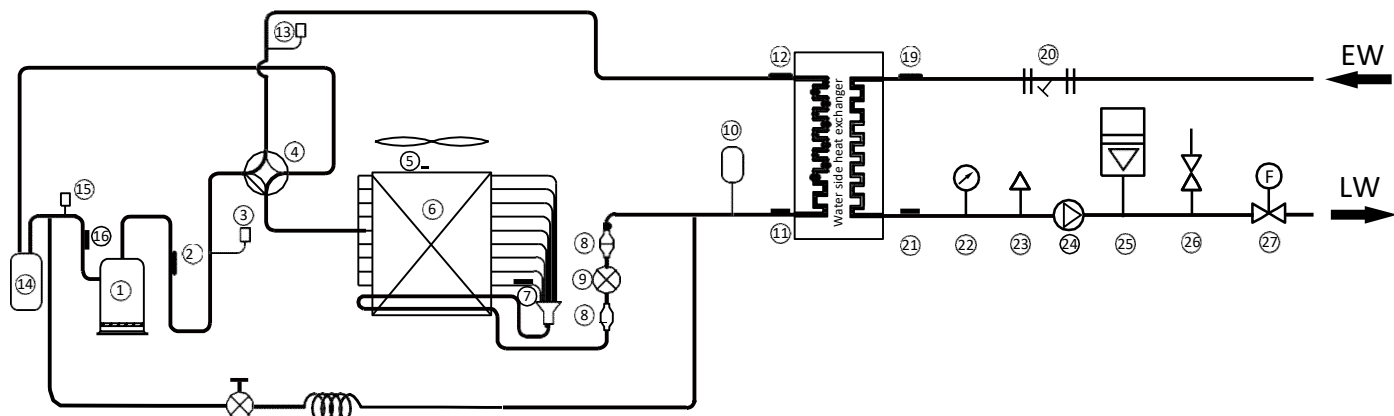


Figure 2-1.2: SMHM-180(220,260,300)B-3 side view



## 2 Piping Diagrams

Figure 2-2.1: SMHM-180(220,260,300)B-3 piping diagram



| Legend |                                                                        |    |                                  |
|--------|------------------------------------------------------------------------|----|----------------------------------|
| 1      | Compressor                                                             | 15 | Low pressure switch              |
| 2      | Discharge temperature sensor                                           | 16 | Suction temperature sensor       |
| 3      | High Pressure Switch                                                   | 17 | Single-way electromagnetic valve |
| 4      | 4-Way Valve                                                            | 18 | Capillary                        |
| 5      | Outdoor temperature sensor                                             | 19 | Water Inlet temp. sensor         |
| 6      | Air side heat exchanger                                                | 20 | Y-shape filter (Accessories)     |
| 7      | Air side heat exchanger refrigerant outlet temperature sensor(cooling) | 21 | Water outlet temp. sensor        |
| 8      | Filter                                                                 | 22 | Manometer                        |
| 9      | Electronic expansion valve                                             | 23 | Safety valve                     |
| 10     | Accumulator                                                            | 24 | Circulating pump                 |
| 11     | Refrigerant temperature sensor (liquid line)                           | 25 | Expansion vessel                 |
| 12     | Refrigerant temperature sensor (gas line)                              | 26 | Air purge valve                  |
| 13     | Pressure sensor                                                        | 27 | Flow switch                      |
| 14     | Gas-liquid separator                                                   |    |                                  |

**Key components:****1. Accumulator:**

Stores liquid refrigerant and oil to protect compressor from liquid hammering.

**2. Electronic expansion valve (EXV):**

Controls refrigerant flow and reduces refrigerant pressure.

**3. Four-way valve:**

Controls refrigerant flow direction. Closed in cooling mode and open in heating mode. When closed, the air side heat exchanger functions as a condenser and water side heat exchanger functions as an evaporator; when open, the air side heat exchanger functions as an evaporator and water side heat exchanger function as a condenser.

**4. High and low pressure switches:**

Regulate refrigerant system pressure. When refrigerant system pressure rises above the upper limit or falls below the lower limit, the high or low pressure switches turn off, stopping the compressor.

**5. Air purge valve:**

Automatically removes air from the water circuit.

**6. Safety valve:**

Prevents excessive water pressure by opening at 43.5 psi (3 bar) and discharging water from the water circuit.

**7. Expansion vessel:**

Balances water system pressure. (Expansion vessel volume: 8L in 18/22/26/30kW units)

**8. Water flow switch:**

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

**9. Manometer:**

Provides water circuit pressure readout.

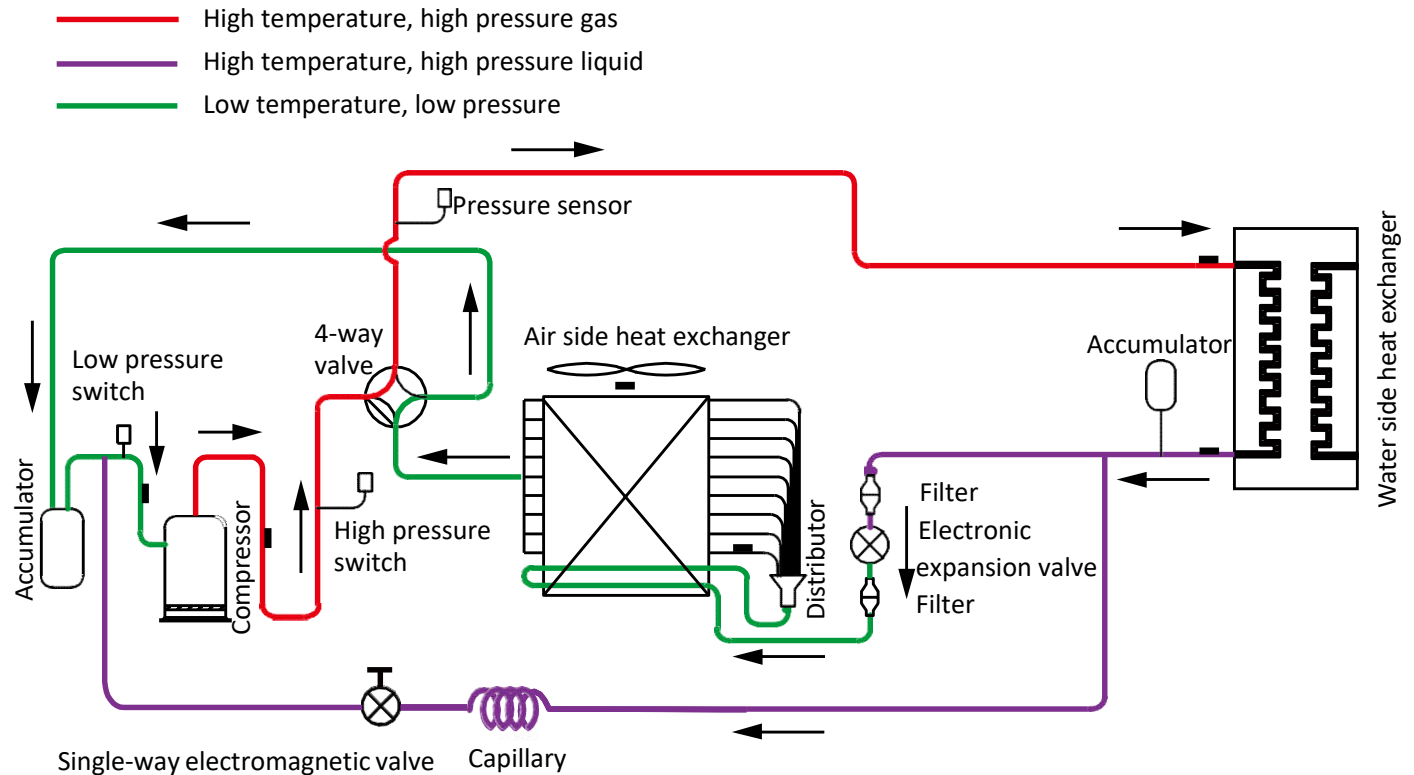
**10. Water pump:**

Circulates water in the water circuit.

### 3 Refrigerant Flow Diagrams

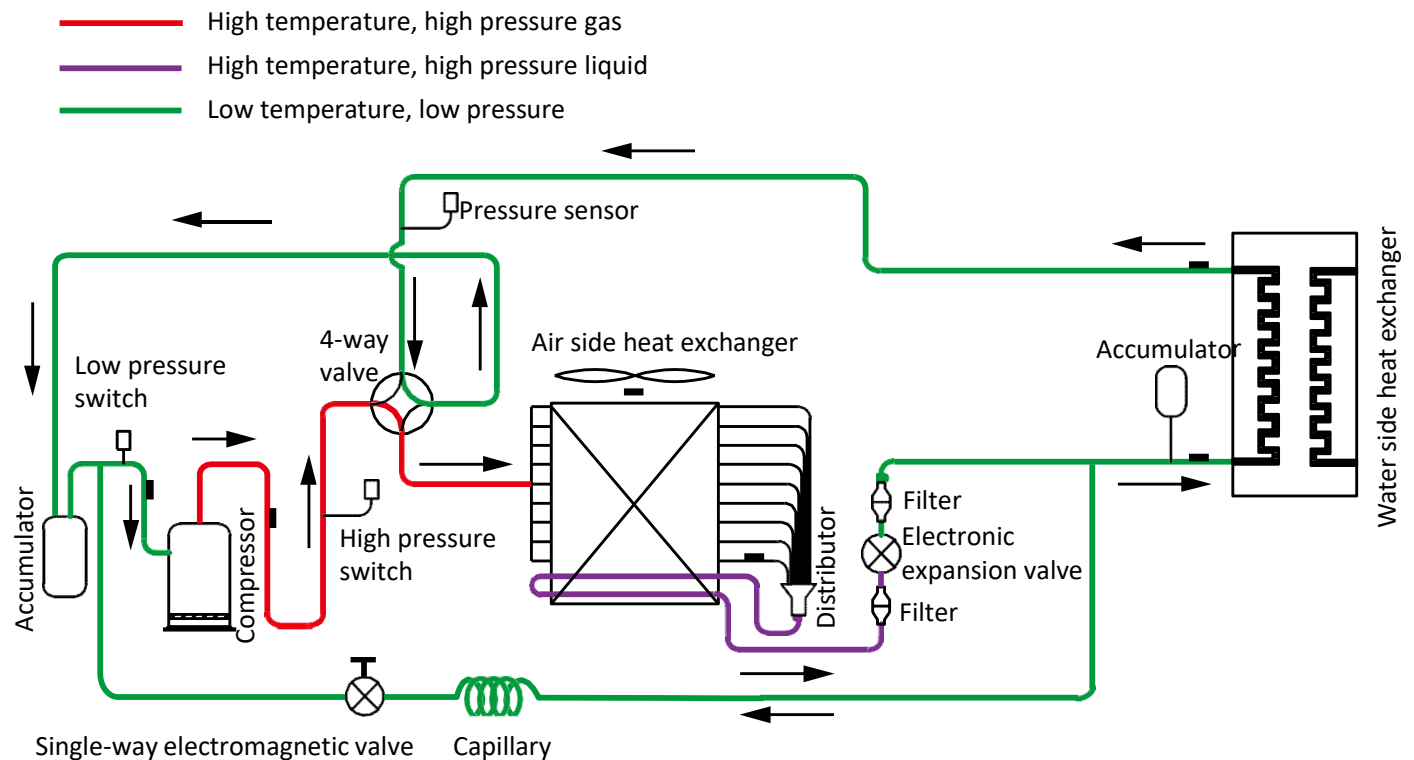
#### Heating and domestic hot water operation

Figure 2-3.1: Refrigerant flow during heating or domestic hot water operation



#### Cooling and defrosting operation

Figure 2-3.2: Refrigerant flow during cooling and defrosting operations



# Part 3

## Control

|                                                                  |           |
|------------------------------------------------------------------|-----------|
| <b>1 Stop Operation.....</b>                                     | <b>10</b> |
| <b>2 Standby Control .....</b>                                   | <b>10</b> |
| <b>3 Startup Control .....</b>                                   | <b>11</b> |
| <b>4 Normal Operation Control .....</b>                          | <b>12</b> |
| <b>5 Protection Control .....</b>                                | <b>14</b> |
| <b>6 Special Control .....</b>                                   | <b>17</b> |
| <b>7 Roles of Temperature Sensors in Control Functions .....</b> | <b>20</b> |

## **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 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 has elapsed since the compressor stopped, in order to prevent frequent compressor on/off and to equalize the pressure within the refrigerant system. The compressor re-start delays for cooling and heating modes are set on the user interface. Refer to the Yukon Mono Engineering Data Book Part 3, 7.5 “COOL MODE SETTING Menu” and Part 3, 7.6 “HEAT MODE SETTING Menu”.

### 3.2 Compressor Startup Program

In initial startup control and in re-start control, compressor startup is controlled according to outdoor ambient temperature. There are two startup programs which both have 60 second stage for compressor to startup. Once the 60 second stage is complete, the program proceeds to the subsequent stages in a step-by-step fashion and exits when the target rotation speed has been reached.

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

Table 3-3.1: Component control during startup in heating and domestic hot water modes

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                   |
|----------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------|
| Inverter compressor        | COMP                 | •             | Compressor startup program selected according to ambient temperature and discharge temperature |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Fan runs at higher speed                                                                       |
| Electronic expansion valve | EEV1                 | •             | 304 steps                                                                                      |
| Four-way valve             | ST                   | •             | On                                                                                             |

### 3.4 Startup Control for Cooling Operation

Table 3-3.2: Component control during startup in cooling mode

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                   |
|----------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------|
| Inverter compressor        | COMP                 | •             | Compressor startup program selected according to ambient temperature and discharge temperature |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Fan runs at higher speed                                                                       |
| Electronic expansion valve | EEV1                 | •             | 304 steps                                                                                      |
| Four-way valve             | ST                   | •             | Off                                                                                            |

## 4 Normal Operation Control

### 4.1 Component Control during Normal Operation

Table 3-4.1: Component control during heating and domestic hot water operations

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                               |
|----------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------|
| Inverter compressor        | COMP                 | •             | Controlled according to load requirement from hydronic system                                              |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Controlled according to outdoor heat exchanger pipe temperature, ambient temperature and compressor speed  |
| Electronic expansion valve | EEV1                 | •             | Controlled according to discharge temperature, discharge superheat, suction superheat and compressor speed |
| Four-way valve             | ST                   | •             | On                                                                                                         |

Table 3-4.2: Component control during cooling operation

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                               |
|----------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------|
| Inverter compressor        | COMP                 | •             | Controlled according to load requirement from hydronic system                                              |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Controlled according to outdoor heat exchanger pipe temperature, ambient temperature and compressor speed  |
| Electronic expansion valve | EEV1                 | •             | Controlled according to discharge temperature, discharge superheat, suction superheat and compressor speed |
| Four-way valve             | ST                   | •             | Off                                                                                                        |

### 4.2 Compressor Output Control

The compressor rotation speed is controlled according to the load requirement. Before compressor startup, the Yukon Mono outdoor unit determines the compressor target speed according to outdoor ambient temperature and discharge temperature and then runs the appropriate compressor startup program. Refer to Part 3, 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 setting and actual water temperature, the refrigerant system pressure, refrigerant temperature and ambient temperature.

### 4.3 Compressor Speed Control

The running speed of six-pole compressors (used on all models) 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. Refer to Figures 2-3.1 and 2-3.2 in Part 2, 3 “Refrigerant Flow Diagrams”.

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

#### 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).

- When the outdoor unit is power on:
  - The EXV first closes fully, then moves to the standby position (304 steps). After compressor runs for 60-second, EXV is controlled according to ambient temperature. After a further 180s, EXV is controlled according to different modes.
- When the outdoor unit is in standby:
  - The EXV is at position 304 (steps).
- When the outdoor unit stops:
  - The EXV is fully closed firstly, then moves to the standby position (304 steps).

#### 4.6 Outdoor Fan Control

The speeds of the outdoor unit fans are adjusted in steps, as shown below.

Table 3-4.3: Fan speed index

| Fan speed index | Fan speed (rpm) |           |
|-----------------|-----------------|-----------|
|                 | Upper fan       | Lower fan |
| W1              | 200             | 180       |
| W2              | 280             | 260       |
| W3              | 340             | 320       |
| W4              | 400             | 380       |
| W5              | 460             | 440       |
| W6              | 520             | 500       |
| W7              | 580             | 560       |
| W8              | 640             | 620       |
| W9              | 700             | 680       |
| W10             | 760             | 740       |
| W11             | 820             | 800       |
| W12             | 880             | 860       |
| W13             | 900             | 900       |

#### 4.7 Spray liquid cooling control

If the discharge temperature exceeds 105°C, the solenoid valve opens. While the spray liquid cooling control is in progress, the discharge temperature is judged every 20s and the frequency of compressor drops 2Hz until the minimum frequency which differs from every model. When the discharge temperature is below 95°C, the compressor runs at the current frequency and solenoid valve closes.

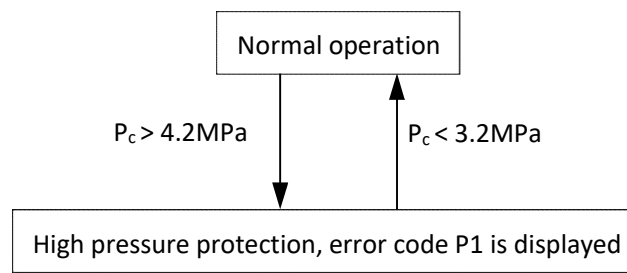
If the discharge temperature exceeds 108°C, the solenoid valve opens. While the spray liquid cooling control is in progress, the discharge temperature is judged every 20s and the frequency of compressor drops 4Hz until the minimum frequency which differs from every model. When the discharge temperature is below 95°C, the compressor runs at the current frequency and solenoid valve closes.

### 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.

Figure 3-5.1: High pressure protection control



Notes:

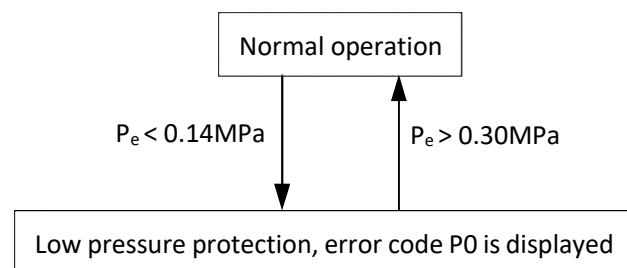
1.  $P_c$ : Discharge pressure

When the discharge pressure rises above 4.2MPa the system displays P1 protection and the unit stops running. When the discharge pressure drops below 3.2MPa, 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.

Figure 3-5.2: Low pressure protection control



Notes:

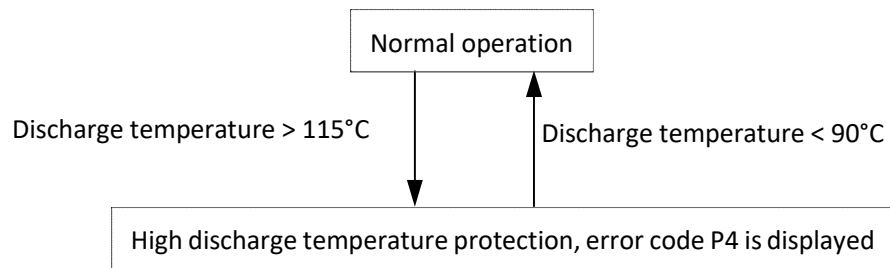
1.  $P_e$ : Suction pressure

When the suction pressure drops below 0.14MPa the system displays P0 protection and the unit stops running. When the suction pressure rises above 0.3MPa, the compressor enters re-start control.

### 5.3 Discharge Temperature Protection Control

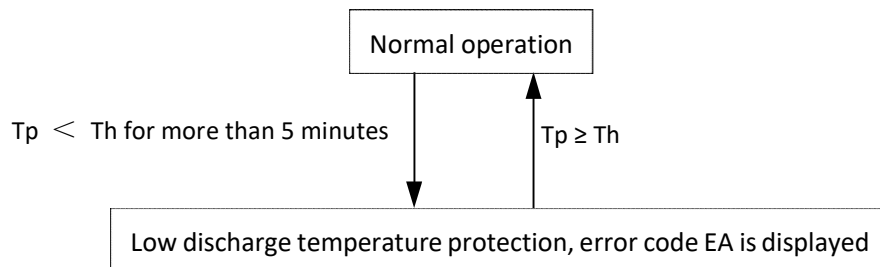
This control protects the compressor from abnormally high temperatures and transient spikes in temperature.

Figure 3-5.3: 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 90°C, the compressor enters re-start control.

Figure 3-5.4: Low discharge temperature protection control

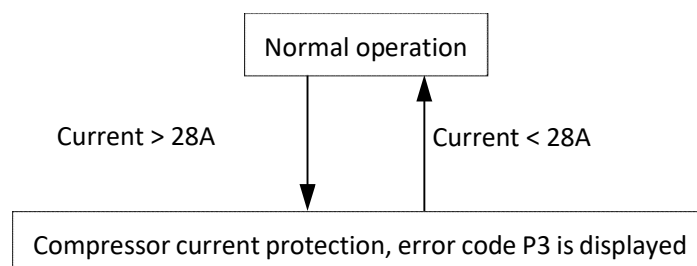


When the discharge temperature is lower than suction temperature for more than 5 minutes, the system displays EA protection and the unit stops running. When the discharge temperature is higher than suction temperature, the compressor enters re-start control.

### 5.4 Compressor Current Protection Control

This control protects the compressor from abnormally high currents.

Figure 3-5.5: Compressor current protection control

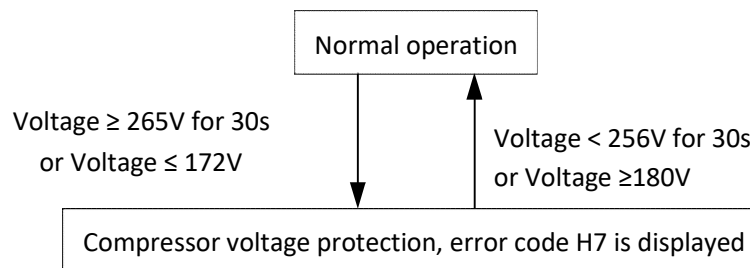


When the compressor current rises above  $\text{Current}_{\text{max}}$  the system displays P3 protection and the unit stops running. When the compressor current drops below  $\text{Current}_{\text{max}}$ , the compressor enters re-start control.

## 5.5 Voltage Protection Control

This control protects the Yukon Mono 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 for more than 30 seconds, 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 at or below 172V, the system displays H7 protection and the unit stops running. When the AC voltage rises to at or 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 three sets of conditions are met:

- Outdoor ambient temperature is at or above 4°C and actual fan speed differs from target fan speed by more than 200rpm for more than 3 minutes.
- Outdoor ambient temperature is below 4°C and actual fan speed differs from target fan speed by more than 300rpm for more than 3 minutes.
- Actual fan speed is less than 150rpm for more than 20seconds.

When DC fan motor protection control occurs the system displays the H6 error code and the unit stops running. After 3 minutes, 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-freeze Protection Control

This control protects the water side heat exchanger from ice formation.

In cooling mode, if inlet water temperature or leaving water temperature or auxiliary heat source leaving water temperature is below 4°C, heat pump stops and water pump keeps running for 30min. If water temperature is still below 4°C, heat pump turns to heating mode.

In heating/DHW standby 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 5°C, heat pump stops and water pump keeps running for 30min. If ambient temperature is still below 3°C and water temperature is still below 5°C, heat pump turns to heating mode.

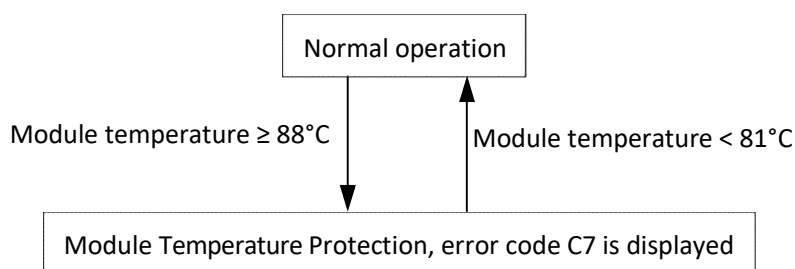
In heating/DHW standby mode, if leaving water temperature is below 2°C, heat pump stops and water pump keeps running for 30min. If water temperature is still below 2°C heat pump turns to heating mode to protect from anti-freezing.

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

## 5.8 Module Temperature Protection Control

This control protects the module from abnormally high temperatures.

Figure 3-5.7: Module Temperature Protection Control



When the module temperature rises at or above 88°C, the system displays C7 protection and the unit stops running. When the module temperature is below 81°C, error disappears and unit runs normally.

## 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.

Timing of oil return operation:

- 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 three conditions occurs:

- Oil return operation duration reaches 5 minutes.
- Compressor stops.
- Mode change command is received.

Table 3-6.1: Outdoor unit component control during oil return operation in cooling mode

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                                                     |
|----------------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------|
| Inverter compressor        | COMP                 | •             | Runs at oil return operation rotation speed                                                                                      |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Controlled according to outdoor heat exchanger pipe temperature, ambient temperature, discharge temperature and compressor speed |
| Electronic expansion valve | EEV1                 | •             | 304 (steps)                                                                                                                      |
| Four-way valve             | ST                   | •             | Off                                                                                                                              |

Table 3-6.2: Outdoor unit component control during oil return operation in heating and DHW modes

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                                                     |
|----------------------------|----------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------|
| Inverter compressor        | COMP                 | •             | Runs at oil return operation rotation speed                                                                                      |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Controlled according to outdoor heat exchanger pipe temperature, ambient temperature, discharge temperature and compressor speed |
| Electronic expansion valve | EEV1                 | •             | 304 (steps)                                                                                                                      |
| Four-way valve             | ST                   | •             | On                                                                                                                               |

## 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.

The defrosting operation ceases when any one of the following three conditions occurs:

- Defrosting operation duration reaches 10 minutes.
- The air side heat exchanger refrigerant outlet temperature is above 8°C for more than 10 seconds.
- The air side heat exchanger refrigerant outlet temperature is above 12°C.
- Water side heat exchanger water outlet temperature sensor is less than 10°C for 5s and air side heat exchanger refrigerant outlet temperature is above 5°C.
- Water side heat exchanger water outlet temperature sensor is less than 7°C for 5s.

Table 3-6.3: Component control during defrosting operation

| Component                  | Wiring diagram label | 18/22/26/30kW | Control functions and states                |
|----------------------------|----------------------|---------------|---------------------------------------------|
| Inverter compressor        | COMP                 | •             | Runs at defrosting operation rotation speed |
| DC fan motor               | FAN_UP / FAN_DOWN    | •             | Off                                         |
| Electronic expansion valve | EEV1                 | •             | Fully open                                  |
| Four-way valve             | ST                   | •             | Off                                         |

## 6.3 Fast DHW Operation

Fast DHW operation is used to quickly meet a requirement for domestic hot water when DHW priority has been set on the user interface. Refer to the Yukon Mono Engineering Data Book Part 3, 7.4 "DHW MODE SETTING Menu".

Domestic hot water demand priority can be ended by changing the switch on controller from "on" to "off".

Table 3-6.4: Component control during fast DHW operation

| Component                      | Wiring diagram label | 18/22/26/30kW | Control functions and states                                                                               |
|--------------------------------|----------------------|---------------|------------------------------------------------------------------------------------------------------------|
| Inverter compressor            | COMP                 | •             | Controlled according to load requirement                                                                   |
| DC fan motor                   | FAN_UP / FAN_DOWN    | •             | Controlled according to outdoor heat exchanger pipe temperature, ambient temperature and compressor speed. |
| Electronic expansion valve     | EEV1                 | •             | Controlled according to pressure, temperature and compressor speed.                                        |
| Four-way valve                 | ST                   | •             | On                                                                                                         |
| Tank electric heater(Optional) | TBH                  | •             | On                                                                                                         |

## 6.4 Two zones control<sup>1</sup>

Two zones control function is used to control temperature of each zone separately, thus different type radiator will operate at its optimal temperature and water pump cycle time will be reduced to save energy.

- Cooling mode

In two zones control for cooling mode, when the setting temperature of a certain zones is reached, the zone and water pump of this zone will turn off.

- Heating mode

In two zones control for heating mode, the on/off control of zone and water pump is same with cooling mode, but in addition, the mixing valve (3-way valve SV3) control function will be activated to adjust the water temperature of the low temperature zone by control the opening time and closing time of the valve. The mixing valve will only turn on when two

zones control for heating is activated. On other conditions, the mixing valve will keep off. When the valve initially turns on, the opening time and closing time is same and then the time is controlled according to the difference between water pipe temperature and setting water temperature of the controlling zone.

- Hydronic adapter PCB (Optional)

With the help of hydronic adapter PCB, totally 8 thermostats can be used at the same time for maximum 8 rooms to control heat pump.

*Note:*

1. *Yukon units just have the controlling function, while the mixing valve, water pump of each zone need to be field supplied and connect to 1 unit.*

## **6.5 Smart grid control**

Unit adjusts the operation according to different electrical signals to realize energy saving.

Free electric energy signal: DHW mode turn on, the setting temperature will be changed to 70°C automatically, and the TBH operate as below:  $T5 < 69^{\circ}\text{C}$ , the TBH is on;  $T5 \geq 70^{\circ}\text{C}$ , the TBH is off. The unit operates in cooling/heating mode as the normal logic.

Common electric energy signal: unit operates according to users' need.

Expensive electric energy signal: only available for cooling or heating mode and user can set the maximum operating time.

## **6.6 Balance tank temperature control**

Balance tank temperature sensor is used to control on/off of heat pump.

Once the heat pump stops, internal pump stops to save energy and then balance tank provides hot water for space heating. In addition, balance tank temperature control can meet both space heating and domestic hot water needs at the same time. Balance tank can store energy to provide hot water whilst heat pump runs heat mode/cooling, which can reduce the host selection and the initial investment.

## **6.7 USB data transfer**

- Convenient program upgrade

No need to carry any other heavy equipments but only USB can realize program upgrade of indoor unit and outdoor unit.

- Parameter setting transmission between wired controllers

Installer can quickly copy the setting from one controller to another via USB, which save the time of on-site installation.

## **6.8 Dry contract M1M2 control**

M1M2 can be set in the wired controller for heat pump on/off control, TBH control, AHS control.

- For heat pump on/off control

When dry contract closes for 1s, heat pump stops. When dry contract opens for 5s, heat pump on/off according to wired controller or room thermostat setting.

- For TBH control

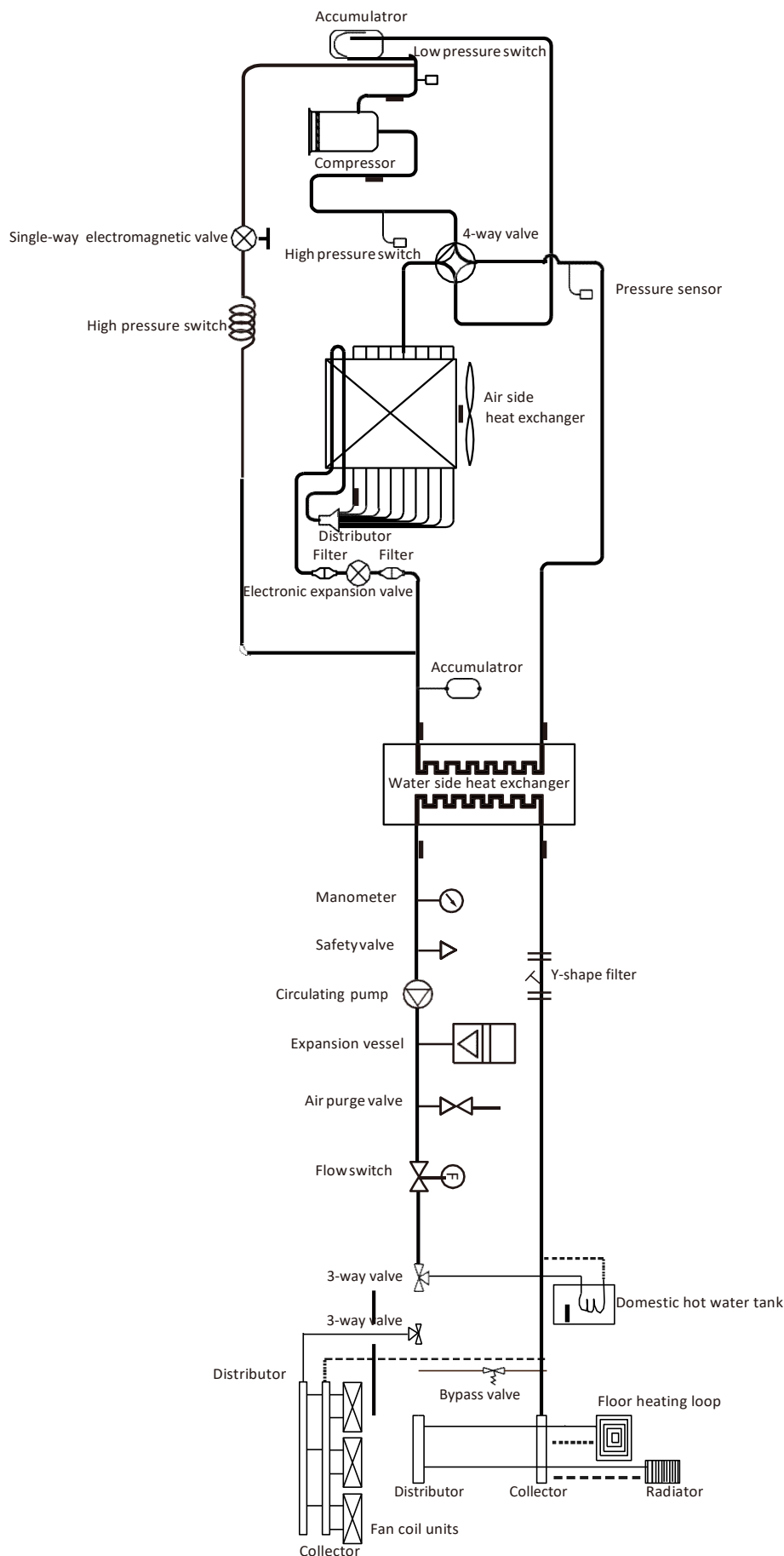
TBH is only controlled by M1M2. If dry contract closes,  $T5 < 65^{\circ}\text{C}$  then TBH opens until water tank temperature reaches 70°C.

- For AHS control

In heating mode, AHS on/off is only controlled by M1M2. In DHW mode, M1M2 control does not affect AHS on/off.

## 7 Role of Temperature Sensors in Control Functions

Figure 3-7.1: Location of the temperature sensors on 18~30kW unit systems



The names and functions of the temperature sensors labelled 1 to 12 in this figure are detailed in Table 3-7.1.

Table 3-7.1: Names and functions of the temperature sensors

| Number | Sensor name <sup>1</sup>                                                     | Sensor code | Mode    | Control functions                                                                                                                                                                                                                                                                                                                                    |
|--------|------------------------------------------------------------------------------|-------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Discharge pipe temperature sensor                                            | Tp          | Heating | <ul style="list-style-type: none"> <li>Electronic expansion valve control<sup>2</sup></li> <li>Discharge superheat control</li> </ul>                                                                                                                                                                                                                |
|        |                                                                              |             | Cooling | <ul style="list-style-type: none"> <li>Electronic expansion valve control<sup>2</sup></li> <li>Outdoor fan control<sup>3</sup></li> <li>Discharge superheat control</li> </ul>                                                                                                                                                                       |
| 2      | Outdoor ambient temperature sensor                                           | T4          | Heating | <ul style="list-style-type: none"> <li>Compressor startup control<sup>4</sup></li> <li>Compressor output control<sup>5</sup></li> <li>Electronic expansion valve control<sup>2</sup></li> <li>Defrosting operation control<sup>7</sup></li> <li>Low pressure protection control<sup>7</sup></li> <li>Crankcase heater control<sup>9</sup></li> </ul> |
|        |                                                                              |             | Cooling | <ul style="list-style-type: none"> <li>Compressor startup control<sup>4</sup></li> <li>Compressor output control<sup>5</sup></li> <li>Electronic expansion valve control<sup>2</sup></li> <li>Outdoor fan control<sup>3</sup></li> <li>Crankcase heater control<sup>9</sup></li> </ul>                                                               |
| 3      | Air side heat exchanger refrigerant outlet temperature sensor                | T3          | Heating | <ul style="list-style-type: none"> <li>Electronic expansion valve control<sup>2</sup></li> <li>Defrosting operation control<sup>7</sup></li> <li>Outdoor fan control<sup>3</sup></li> </ul>                                                                                                                                                          |
|        |                                                                              |             | Cooling | <ul style="list-style-type: none"> <li>Compressor output control<sup>5</sup></li> <li>Outdoor fan control<sup>3</sup></li> </ul>                                                                                                                                                                                                                     |
| 4      | Water side heat exchanger refrigerant inlet (liquid pipe) temperature sensor | T2          | Heating | <ul style="list-style-type: none"> <li>Compressor output control<sup>5</sup></li> </ul>                                                                                                                                                                                                                                                              |
|        |                                                                              |             | DHW     |                                                                                                                                                                                                                                                                                                                                                      |
| 5      | Water side heat exchanger refrigerant outlet (gas pipe) temperature sensor   | T2B         | Heating | <ul style="list-style-type: none"> <li>Freeze prevention control<sup>10</sup></li> </ul>                                                                                                                                                                                                                                                             |
| 6      | Suction pipe temperature sensor                                              | Th          | Heating | <ul style="list-style-type: none"> <li>Electronic expansion valve control<sup>2</sup></li> </ul>                                                                                                                                                                                                                                                     |
|        |                                                                              |             | Cooling |                                                                                                                                                                                                                                                                                                                                                      |
| 7      | Water side heat exchanger water inlet temperature sensor                     | Tw_in       | Heating | <ul style="list-style-type: none"> <li>Freeze prevention control<sup>10</sup></li> </ul>                                                                                                                                                                                                                                                             |
|        |                                                                              |             | Cooling |                                                                                                                                                                                                                                                                                                                                                      |
| 8      | Water side heat exchanger water outlet temperature sensor                    | Tw_out      | Heating | <ul style="list-style-type: none"> <li>Compressor output<sup>5</sup> and on/off control<sup>6</sup></li> <li>Freeze prevention control<sup>10</sup></li> </ul>                                                                                                                                                                                       |
|        |                                                                              |             | Cooling |                                                                                                                                                                                                                                                                                                                                                      |
|        |                                                                              |             | DHW     |                                                                                                                                                                                                                                                                                                                                                      |
| 9      | Final water outlet temperature sensor                                        | T1          | Heating | <ul style="list-style-type: none"> <li>Compressor output control<sup>5</sup></li> <li>Backup electric heater control</li> <li>DHW priority control<sup>11</sup></li> <li>Auto mode control</li> </ul>                                                                                                                                                |
|        |                                                                              |             | Cooling | <ul style="list-style-type: none"> <li>Compressor output<sup>5</sup> and on/off control<sup>6</sup></li> <li>Auto mode control</li> </ul>                                                                                                                                                                                                            |
|        |                                                                              |             | DHW     | <ul style="list-style-type: none"> <li>Compressor output control<sup>5</sup></li> <li>Backup electric heater control</li> <li>DHW priority control<sup>11</sup></li> </ul>                                                                                                                                                                           |
| 10     | Domestic hot water tank temperature sensor                                   | T5          | DHW     | <ul style="list-style-type: none"> <li>Disinfection operation control</li> <li>DHW tank immersion heater control</li> <li>Backup electric heater control</li> <li>Auxiliary heat source control</li> <li>Solar energy kit control</li> <li>Compressor output control<sup>5</sup></li> <li>DHW priority control<sup>11</sup></li> </ul>               |
| 11     | Room temperature sensor (built in wired controller)                          | Ta          | Heating | <ul style="list-style-type: none"> <li>Auto mode control</li> <li>Climate related curve</li> <li>Compressor output control<sup>5</sup></li> </ul>                                                                                                                                                                                                    |
|        |                                                                              |             | Cooling |                                                                                                                                                                                                                                                                                                                                                      |

Notes:

- Sensor names in this service manual referring to refrigerant flow is named according refrigerant flow during cooling operation refer to Part 2, 3 "Refrigerant Flow Diagrams".
- Refer to Part 3, 4.5 "Electronic Expansion Valve Control".
- Refer to Part 3, 4.6 "Outdoor Fan Control".
- Refer to Part 3, 2 "Compressor Startup Program".
- Refer to Part 3, 4.2 "Compressor Output Control".
- Refer to Part 3, 1 "Stop Operation".
- Refer to Part 3, 6.2 "Defrosting Operation".
- Refer to Part 3, 5.2 "Low Pressure Protection Control".
- Refer to Part 3, 2.1 "Crankcase Heater Control".
- Refer to Part 3, 5.7 "Water Side Heat Exchanger Anti-freeze Protection Control".
- Refer to Part 3, 6.3 "Fast DHW Operation".

# Part 4

# Diagnosis and Troubleshooting

|                                                        |           |
|--------------------------------------------------------|-----------|
| <b>1 Outdoor Unit Electric Control Box Layout.....</b> | <b>23</b> |
| <b>2 Outdoor Unit PCBs.....</b>                        | <b>24</b> |
| <b>3 Error Code Table.....</b>                         | <b>31</b> |
| <b>4 Troubleshooting.....</b>                          | <b>33</b> |
| <b>5 Appendix to Part 4.....</b>                       | <b>86</b> |

## 1 Outdoor Unit Electric Control Box Layout

Figure 4-1.1: Electric control box front view

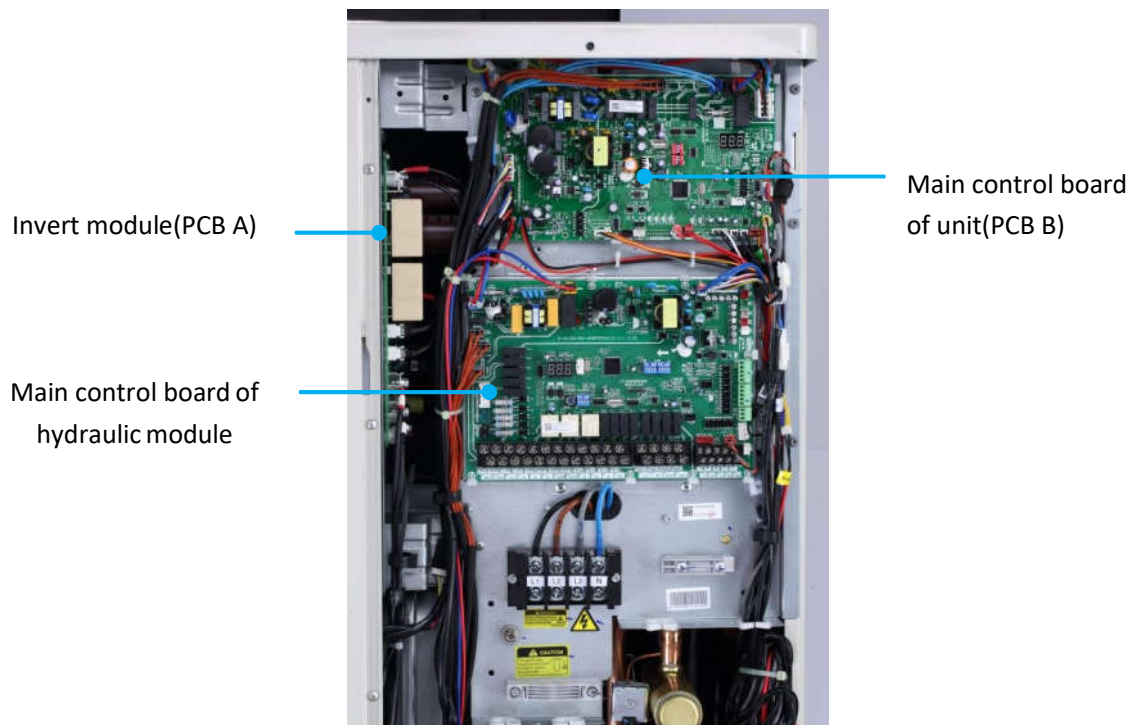
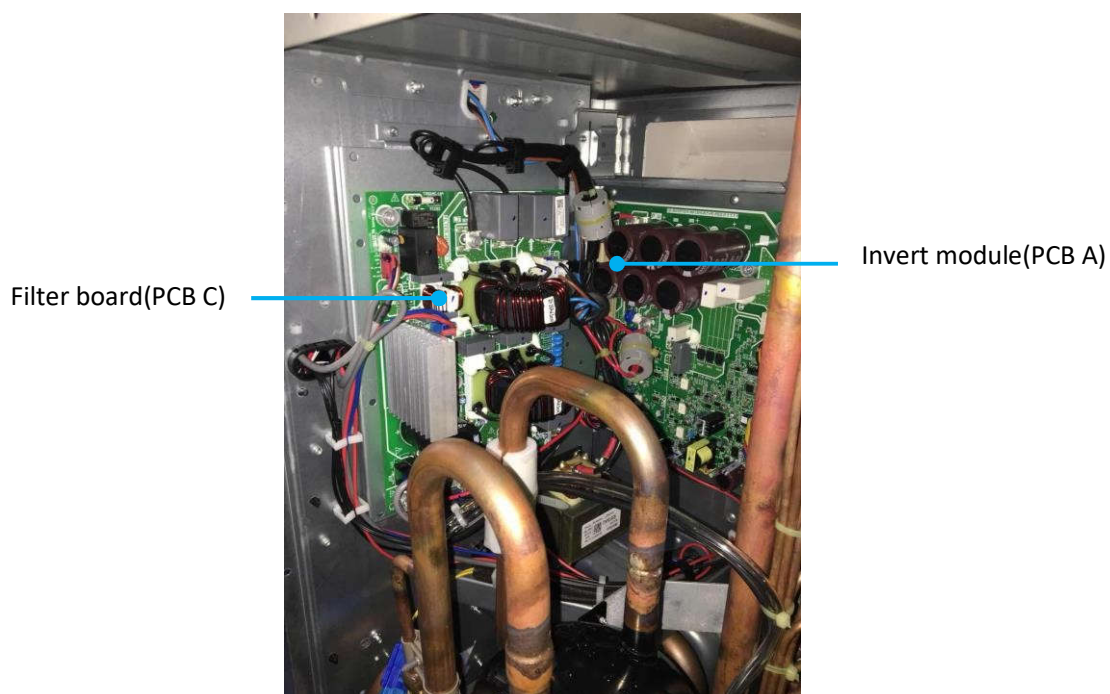


Figure 4-1.2: Electric control box side view



## 2 Outdoor Unit PCBs

## 2.1 Types

Yukon Mono outdoor units have two main PCBs – one for the hydronic system and one for the refrigerant system. In addition to the two main PCBs, all models also have an inverter module and a filter board.

The locations of each PCB in the outdoor unit electric control boxes are shown in Figures 4-1.1 to 4-1.7 in Part 4, 1 “Outdoor Unit Electric Control Box Layout”.

## 2.2 PCB Instruction

Figure 4-2.1: SMHM-180(220,260,300)B-3 hydronic system main PCB

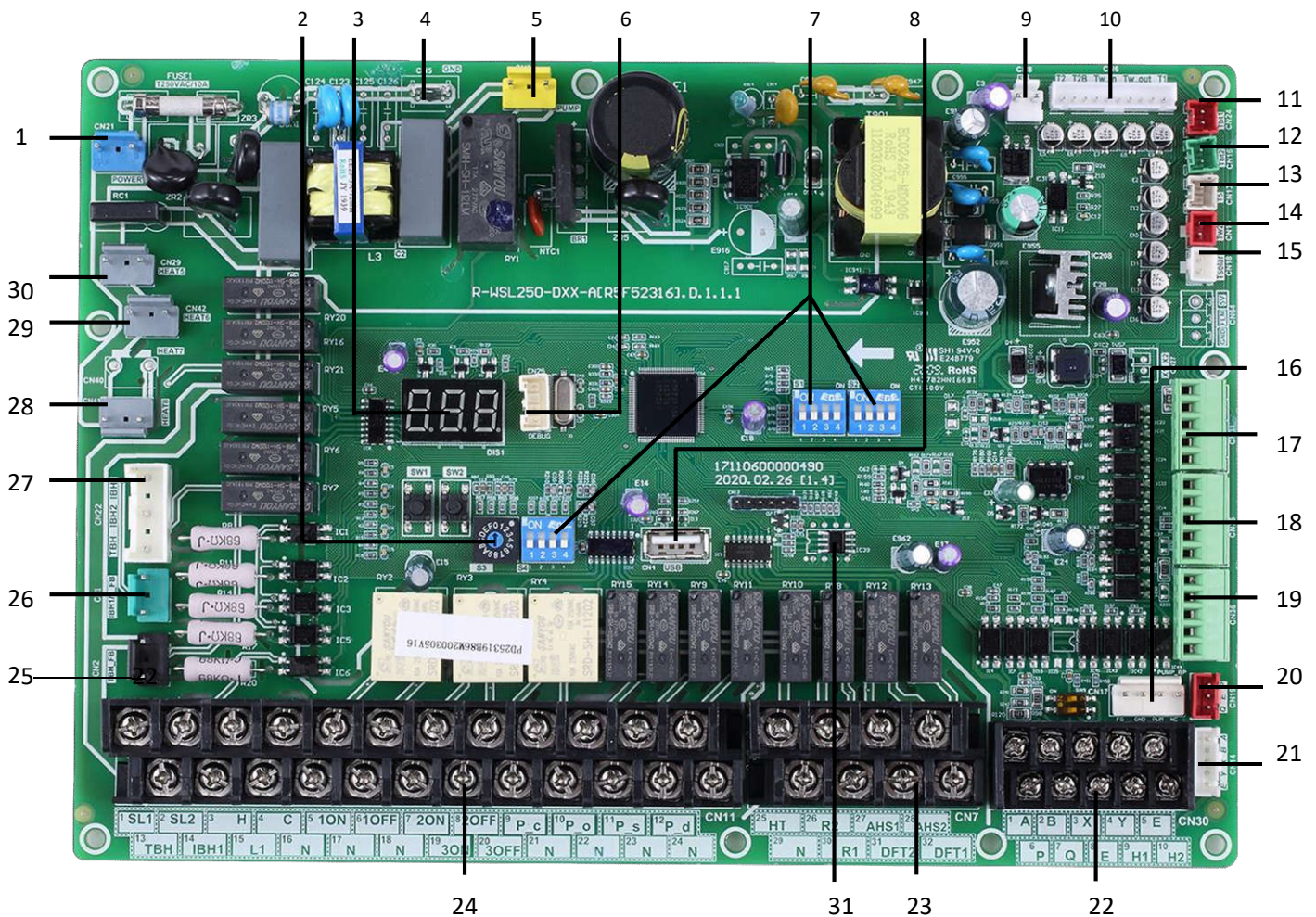


Table 4-2.1: SMHM-180(220,260,300)B-3 hydronic system main PCB

| Label in Figure<br>4-2.1 | Code     | Content                                                                                                                                                                                                                                               |
|--------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                        | CN21     | Port for power supply                                                                                                                                                                                                                                 |
| 2                        | S3       | Rotary dip switch                                                                                                                                                                                                                                     |
| 3                        | DIS1     | Digital display                                                                                                                                                                                                                                       |
| 4                        | CN5      | Port for ground                                                                                                                                                                                                                                       |
| 5                        | CN28     | Port for variable speed pump power input                                                                                                                                                                                                              |
| 6                        | CN25     | Port for IC programming                                                                                                                                                                                                                               |
| 7                        | S1,S2,S4 | Dip switch                                                                                                                                                                                                                                            |
| 8                        | CN4      | Port for USB programming                                                                                                                                                                                                                              |
| 9                        | CN8      | Port for Flow switch                                                                                                                                                                                                                                  |
| 10                       | CN6      | Port for temp. sensors (T2,T2B,TW_out,TW_in, T1,)                                                                                                                                                                                                     |
| 11                       | CN24     | Port for temp. sensor(Tbt1, The balanced water tank of up temp. sensor)                                                                                                                                                                               |
| 12                       | CN16     | Port for temp. sensor(Tbt2, The balanced water tank of up temp. sensor)                                                                                                                                                                               |
| 13                       | CN13     | Port for temp. sensor(T5, domestic hot water tank temp. sensor)                                                                                                                                                                                       |
| 14                       | CN15     | Port for temp. sensor(Tw2, The outlet water for zone 2 temp. sensor)                                                                                                                                                                                  |
| 15                       | CN18     | Port for temp. sensor(Tsolar, Solar panel temp. sensor)                                                                                                                                                                                               |
| 16                       | CN17     | Port for variable speed pump communication                                                                                                                                                                                                            |
| 17                       | CN31     | Control port for room thermostat (heating mode)(HT)/Control port for room thermostat (cooling mode)(CL)/Power port for room thermostat(COM)                                                                                                           |
| 18                       | CN35     | Port for smart grid (grid signal, photovoltaic signal)                                                                                                                                                                                                |
| 19                       | CN36     | Port for remote switch, temperature board                                                                                                                                                                                                             |
| 20                       | CN19     | Communicate port between indoor unit and outdoor unit                                                                                                                                                                                                 |
| 21                       | CN14     | Port for communication with the wired controller                                                                                                                                                                                                      |
| 22                       | CN30     | Communicate port between indoor unit and outdoor unit, port for communication with the wired controller, internal machine parallel                                                                                                                    |
| 23                       | CN7      | Port for antifreeze E-heating tape(external), additional heat source, compressor run/defrost run                                                                                                                                                      |
| 24                       | CN11     | Control port for tank booster heater, internal backup heater 1, input port for solar energy, Port for room thermostat, SV1(3-way valve), SV2(3-way valve), SV3(3-way valve), zone 2 pump, outside circulation pump, solar energy pump, DHW pipe pump, |
| 25                       | CN2      | Feedback port for external temp. switch(shorted in default)                                                                                                                                                                                           |
| 26                       | CN1      | Feedback port for temperature switch(shorted in default)                                                                                                                                                                                              |
| 27                       | CN22     | Control port for backup heater1/booster heater/Reserved                                                                                                                                                                                               |
| 28                       | CN41     | Port for anti-freeze electric heating tape                                                                                                                                                                                                            |
| 29                       | CN42     | Port for anti-freeze electric heating tape                                                                                                                                                                                                            |
| 30                       | CN29     | Port for anti-freeze electric heating tape                                                                                                                                                                                                            |
| 31                       | IC39     | EEPROM                                                                                                                                                                                                                                                |

Figure 4-2.2: SMHM-180(220,260,300)B-3 outdoor unit main PCB for refrigerant system

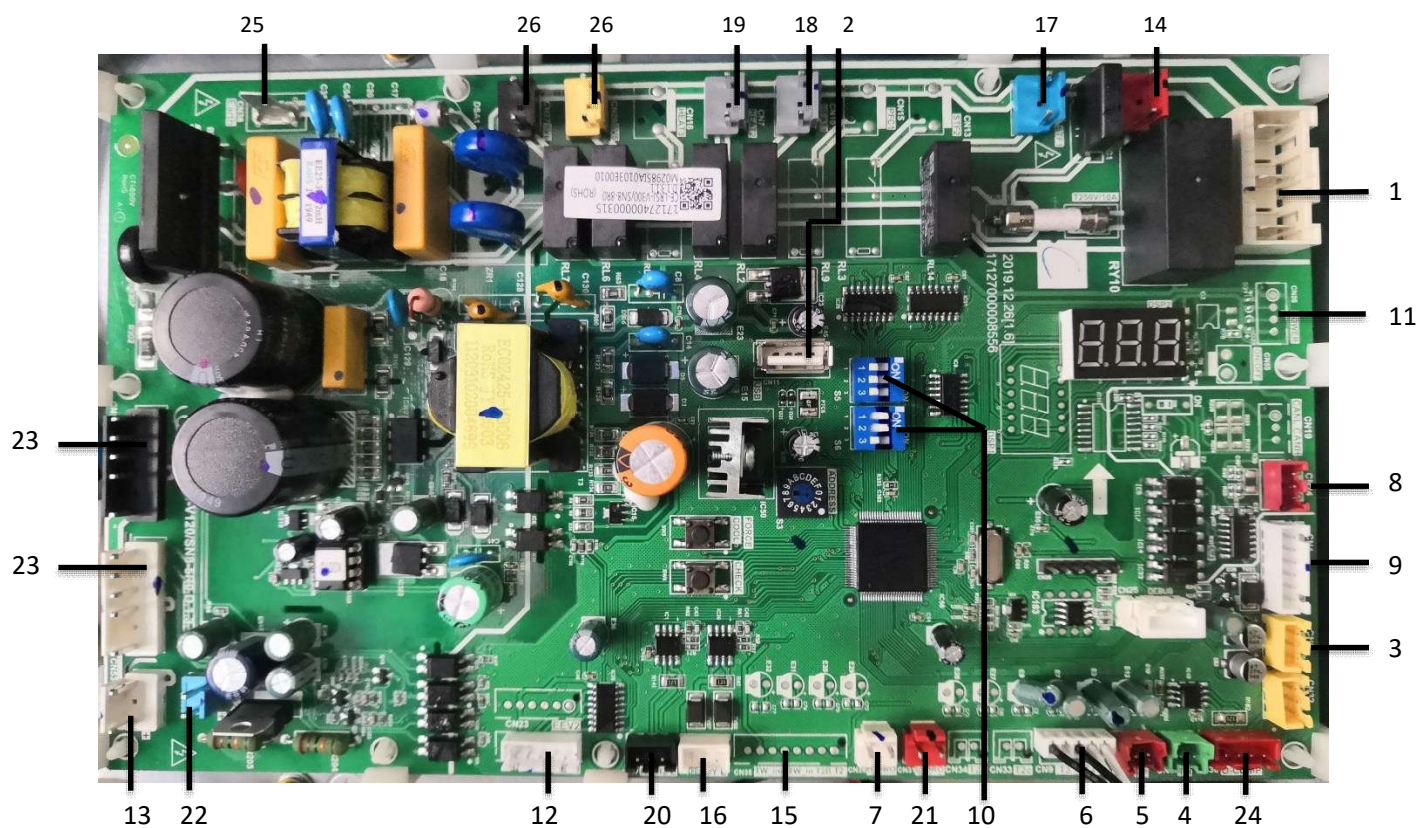


Table 4-2.2: SMHM-180(220,260,300)B-3 outdoor unit main PCB for refrigerant system

| Label in Figure<br>4-2.2 | Code      | Content                                                          |
|--------------------------|-----------|------------------------------------------------------------------|
| 1                        | CN41      | Power supply port for PCB B                                      |
| 2                        | CN11      | Port for IC programming                                          |
| 3                        | CN6       | Port for pressure sensor                                         |
| 4                        | CN5       | Port for suction temp. sensor                                    |
| 5                        | CN8       | Port for discharge temp. sensor                                  |
| 6                        | CN9       | Port for outdoor ambient temp. sensor and condenser temp. sensor |
| 7                        | CN29      | Port for low pressure switch and quick check                     |
| 8                        | CN24      | Port for communication with hydro-box control board              |
| 9                        | CN4       | Port for communication with PCB C                                |
| 10                       | S5, S6    | DIP switch                                                       |
| 11                       | CN26      | Port for communication with Power Meter                          |
| 12                       | CN22      | Port for electrical expansion valve                              |
| 13                       | CN53      | Port for fan 310VDC power supply                                 |
| 14                       | CN21      | Power supply port for hydro-box control board                    |
| 15                       | CN35      | Port for other temp. sensor                                      |
| 16                       | CN28      | Port for communication XYE                                       |
| 17                       | CN18      | Port for 4-way valve                                             |
| 18                       | CN10      | Port for electric heating tape1                                  |
| 19                       | CN7       | Port for electric heating tape2                                  |
| 20                       | CN37      | Port for communication D1D2E                                     |
| 21                       | CN31      | Port for high pressure switch and quick check                    |
| 22                       | CN30      | Port for fan 15VDC power supply                                  |
| 23                       | CN107/109 | Port for fan                                                     |
| 24                       | CN36      | Port for communication with PCB A                                |
| 25                       | CN38      | Port for GND                                                     |
| 26                       | CN20/27   | Port for SV                                                      |

Figure 4-2.3: SMHM-180(220,260,300)B-3 outdoor unit inverter module

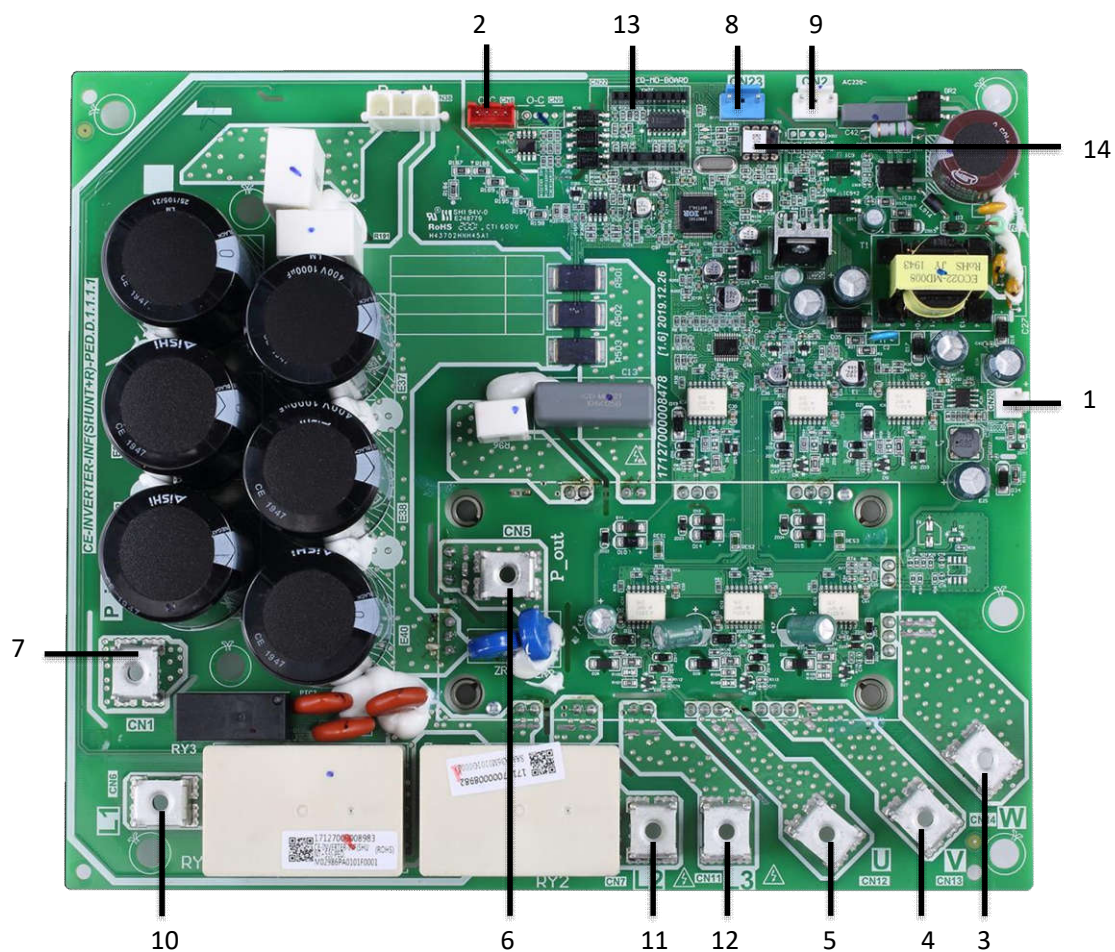


Table 4-2.3: SMHM-180(220,260,300)B-3 outdoor unit inverter module

| Label in Figure 4-2.3 | Code | Content                             |
|-----------------------|------|-------------------------------------|
| 1                     | CN20 | Output port for +15V                |
| 2                     | CN8  | Port for communication with PCB B   |
| 3                     | W    | Compressor connection port W        |
| 4                     | U    | Compressor connection port U        |
| 5                     | V    | Compressor connection port V        |
| 6                     | -    | Input port P_out for IPM module     |
| 7                     | -    | Input port P_in for IPM module      |
| 8                     | CN23 | Input port for high pressure switch |
| 9                     | CN2  | Power for switching power supply    |
| 10                    | L1'  | Power filtering L1                  |
| 11                    | L2'  | Power filtering L2                  |
| 12                    | L3'  | Power filtering L3                  |
| 13                    | -    | PED board                           |
| 14                    | IC25 | EEPROM                              |

Figure 4-2.4: SMHM-180(220,260,300)B-3 outdoor unit filter board

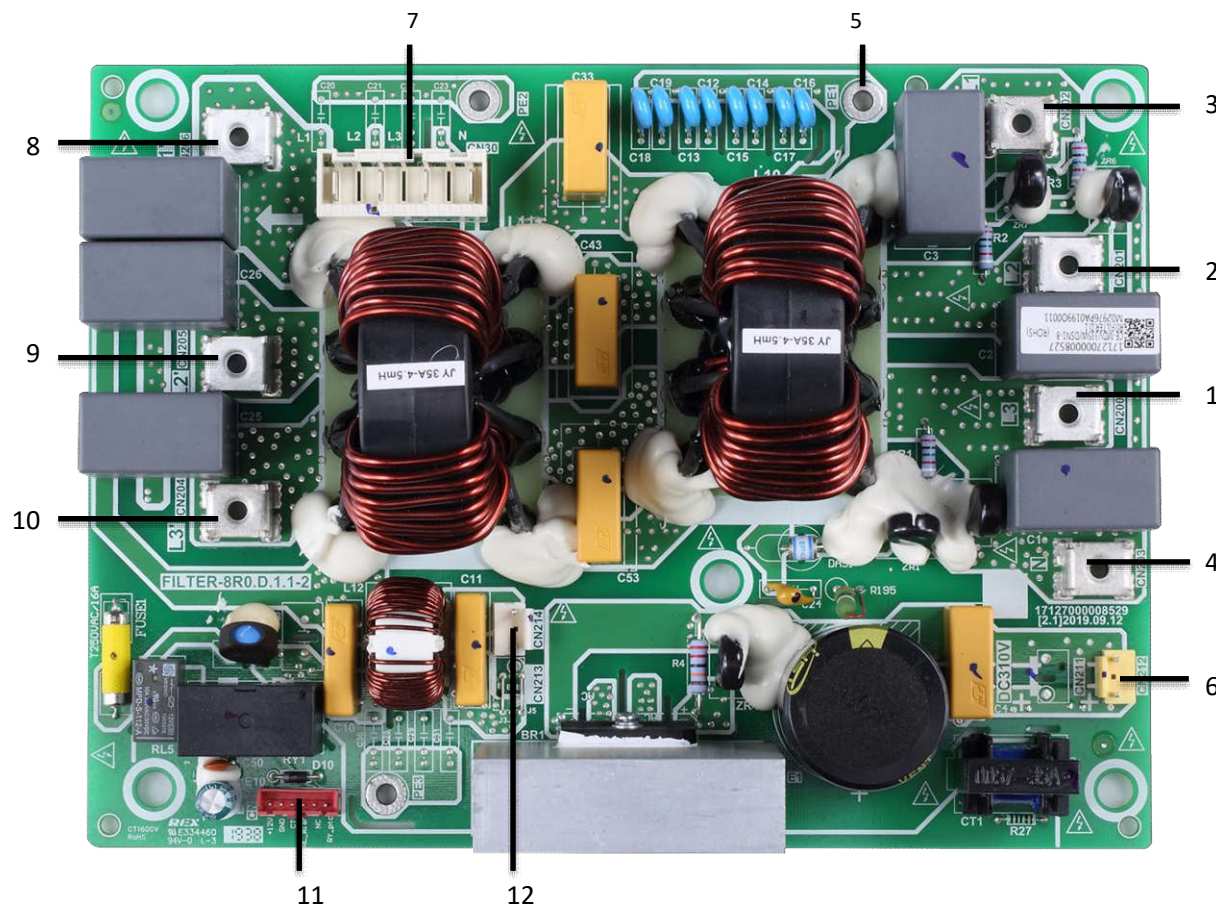


Table 4-2.4: SMHM-180(220,260,300)B-3 outdoor unit filter board

| Label in Figure 4-2.4 | Code  | Content                                       |
|-----------------------|-------|-----------------------------------------------|
| 1                     | L3    | Power supply L3                               |
| 2                     | L2    | Power supply L2                               |
| 3                     | L1    | Power supply L1                               |
| 4                     | N     | Power supply N                                |
| 5                     | PE1   | Ground wire                                   |
| 6                     | CN212 | Power supply port for DC fan                  |
| 7                     | CN30  | Power supply port for main control board      |
| 8                     | L1'   | Power filtering L1                            |
| 9                     | L2'   | Power filtering L2                            |
| 10                    | L3'   | Power filtering L3                            |
| 11                    | CN8   | Port for communication with PCB B             |
| 12                    | CN214 | Power supply for PCB A switching power supply |

## 2.3 Digital Display Output

Table 4-2.5: Digital display output in different operating states

| Outdoor unit state  | Parameters displayed on hydronic system DSP1 | Parameters displayed on refrigerant system DSP1         |  |
|---------------------|----------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------|
| On standby          | 0                                            | 0                                                       |                                                                                     |
| Normal operation    | Leaving water temperature (°C)               | Running speed of the compressor in rotations per second |                                                                                     |
| Error or protection | Error or protection code                     | Error or protection code                                |                                                                                     |

## 2.4 Modbus Function

Figure 4-2.6: Connection

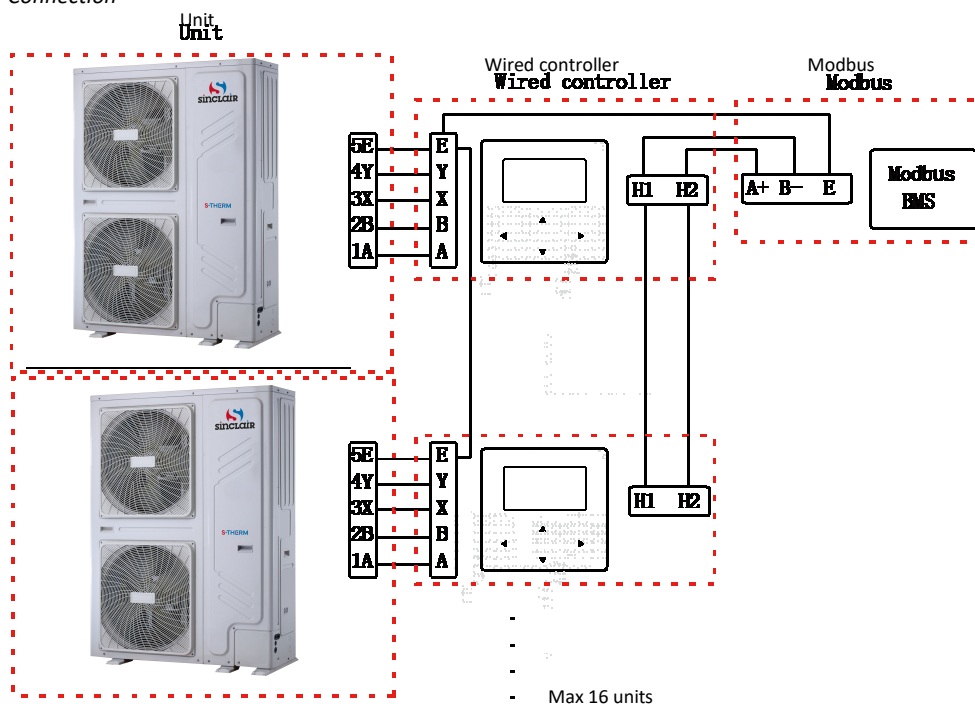
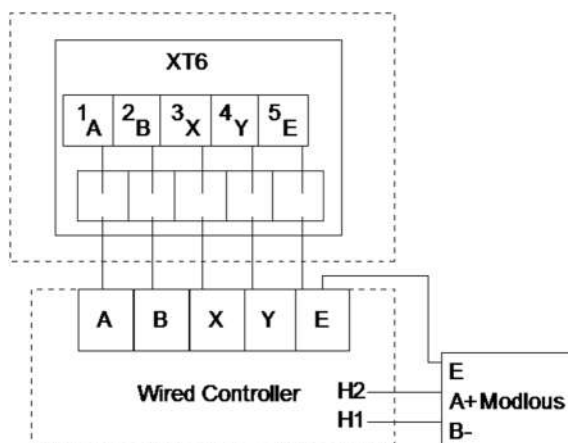


Figure 4-2.7: Wiring



### 3 Error Code Table

| Error code | Content                                                                                                                     |
|------------|-----------------------------------------------------------------------------------------------------------------------------|
| bH         | PED PCB fault                                                                                                               |
| C7         | High temp. protection of inverter module                                                                                    |
| E0         | Water flow fault (E8 displayed 3 times)                                                                                     |
| E1         | Phase loss or neutral wire and live wire are connected reversely (only for three phase unit)                                |
| E2         | Communication fault between controller and main control board of hydraulic module                                           |
| E3         | Final outlet water temp. sensor (T1) fault.                                                                                 |
| E4         | Water tank temp. sensor (T5) fault.                                                                                         |
| E5         | The condenser outlet refrigerant temperature sensor (T3) fault                                                              |
| E6         | The ambient temperature sensor (T4) fault.                                                                                  |
| E7         | The balance tank up temp. sensor (Tbt1 ) fault.                                                                             |
| E8         | Water flow fault.                                                                                                           |
| E9         | Compressor suction temp. sensor (Th) fault.                                                                                 |
| EA         | Compressor discharge temp. sensor (Tp) fault                                                                                |
| Eb         | Solar panel temp.sensor (Tsolar) fault.                                                                                     |
| Ec         | The balance tank low temp.sensor(Tbt2) fault                                                                                |
| Ed         | The plate exchanger water inlet temp. sensor (Tw_in) fault.                                                                 |
| EE.        | The main control board of hydraulic module EEPROM fault.                                                                    |
| F1         | DC bus low voltage protection                                                                                               |
| H0         | Communication fault between main control board of hydraulic module and main control board PCB B(Main control board of unit) |
| H1         | Communication fault between inverter module PCB A(Inverter module) and main control board PCB B(Main control board of unit) |
| H2         | The plate exchanger refrigerant outlet (liquid pipe) temp. sensor (T2) fault.                                               |
| H3         | The plate exchanger refrigerant outlet (gas pipe) temp. sensor (T2B) fault.                                                 |
| H4         | Three times P6 protection                                                                                                   |
| H5         | Room temp.sensor (Ta) fault                                                                                                 |
| H6         | DC fan motor fault.                                                                                                         |
| H7         | Main circuit voltage protection fault                                                                                       |
| H8         | Pressure sensor fault.                                                                                                      |
| H9         | Zone 2 water flow temp. sensor (Tw2) fault.                                                                                 |
| HA         | The plate heat exchanger water outlet temperature sensor (Tw_out) fault.                                                    |
| Hb         | Three times "PP" protection and Tw_out<7℃                                                                                   |
| Hd         | Communication fault between master unit and slave unit (in parallel)                                                        |
| HE         | Communication fault between indoor unit and Ta / room thermostart transfer PCB.                                             |
| HF         | Inverter module board EE PROM fault                                                                                         |
| HH         | H6 displayed 10 times in 120 minutes.                                                                                       |
| HP         | Low pressure protection (Pe<0.6) occurred 3 times in 1 hour in cooling mode                                                 |
| P0         | Low pressure protection                                                                                                     |
| P1         | High pressure protection                                                                                                    |
| P3         | Compressor overcurrent protection                                                                                           |

Table continued on next page ...

Table 4-3.1: Error code table (continued)

|    |                                                |
|----|------------------------------------------------|
| P4 | Compressor discharge temp. too high protection |
|----|------------------------------------------------|

|    |                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------|
| P5 | High Temperature difference protection between water inlet and water outlet of the plate heat exchanger. |
| P6 | Inverter module protection                                                                               |
| Pb | Anti-freeze mode protection                                                                              |
| Pd | High temperature protection of refrigerant outlet temp. of condenser                                     |
| PP | Water inlet temperature is higher than water outlet in heating mode                                      |
| L0 | DC compressor inverter module fault                                                                      |
| L1 | DC bus low voltage protection (from inverter module mostly when compressor running)                      |
| L2 | DC bus high voltage protection from DC driver                                                            |
| L4 | MCE fault                                                                                                |
| L5 | Zero speed protection                                                                                    |
| L7 | Phase sequence fault                                                                                     |
| L8 | Compressor frequency variation greater than 15Hz within 1 second protection                              |
| L9 | Actual compressor frequency differs from target frequency by more than 15Hz protection                   |

## 4 Troubleshooting

### 4.1 Warning

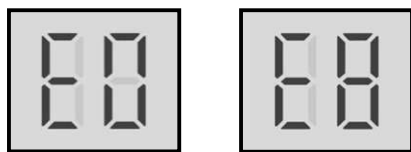
#### Warning



- 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.

## 4.2 E0, E8 Troubleshooting

### 4.2.1 Digital display output



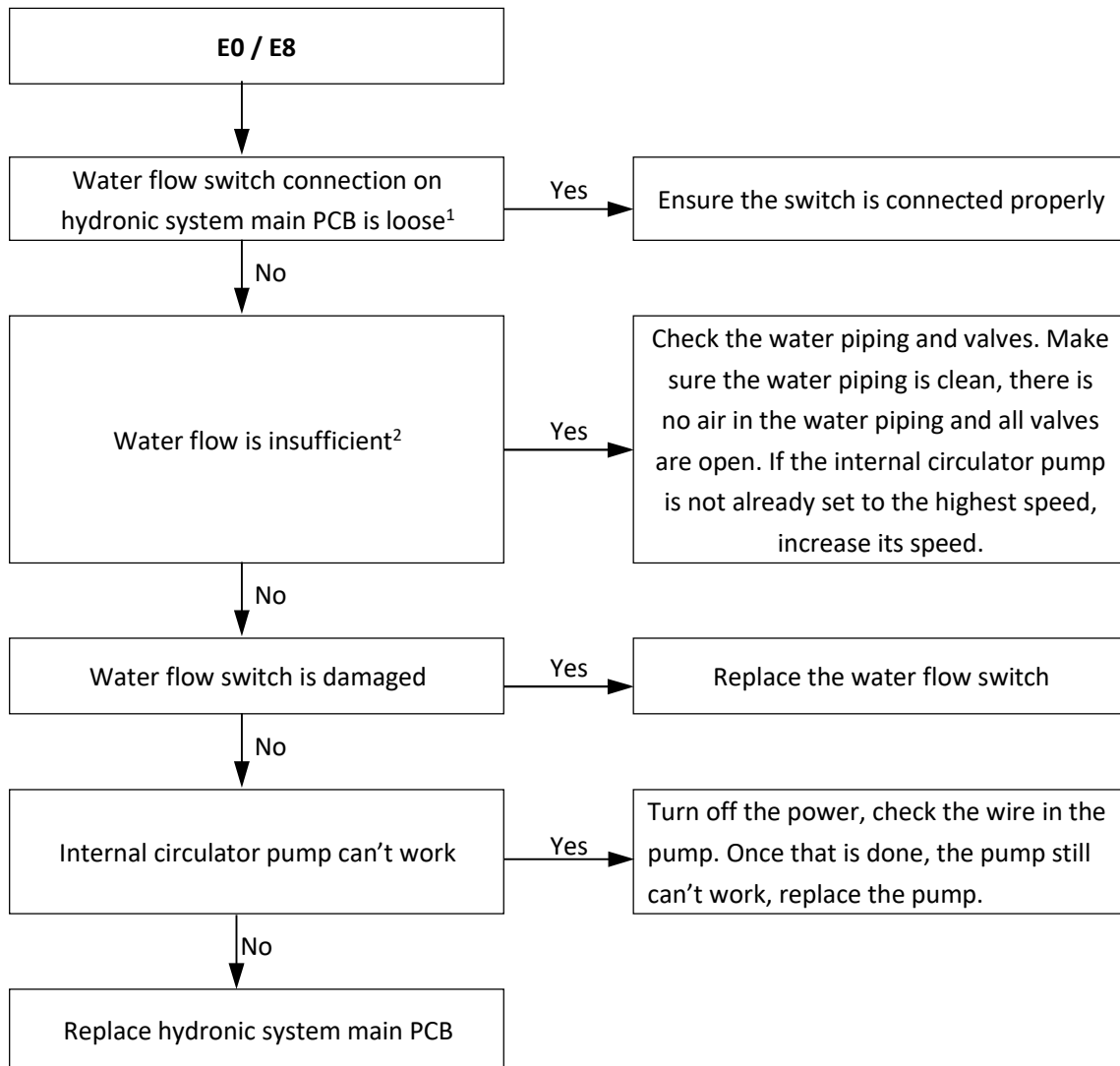
### 4.2.2 Description

- Water flow failure.
- E0 indicates E8 has displayed 3 times. When an E0 error occurs, a manual system restart is required before the system can resume operation.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### 4.2.3 Possible causes

- The wire circuit is short connected or open.
- Water flow rate is too low.
- Water flow switch damaged.

#### 4.2.4 Procedure



**Notes:**

1. Water flow switch connection is port CN8 on the main PCB for hydronic system (labeled 9 in Figure 4-2.1).
2. Check water pressure on the manometer. If the water pressure is not > 1 bar, water flow is insufficient. Refer to Figure 2-1.1.

## **4.3 E1 Troubleshooting**

### **4.3.1 Digital display output**



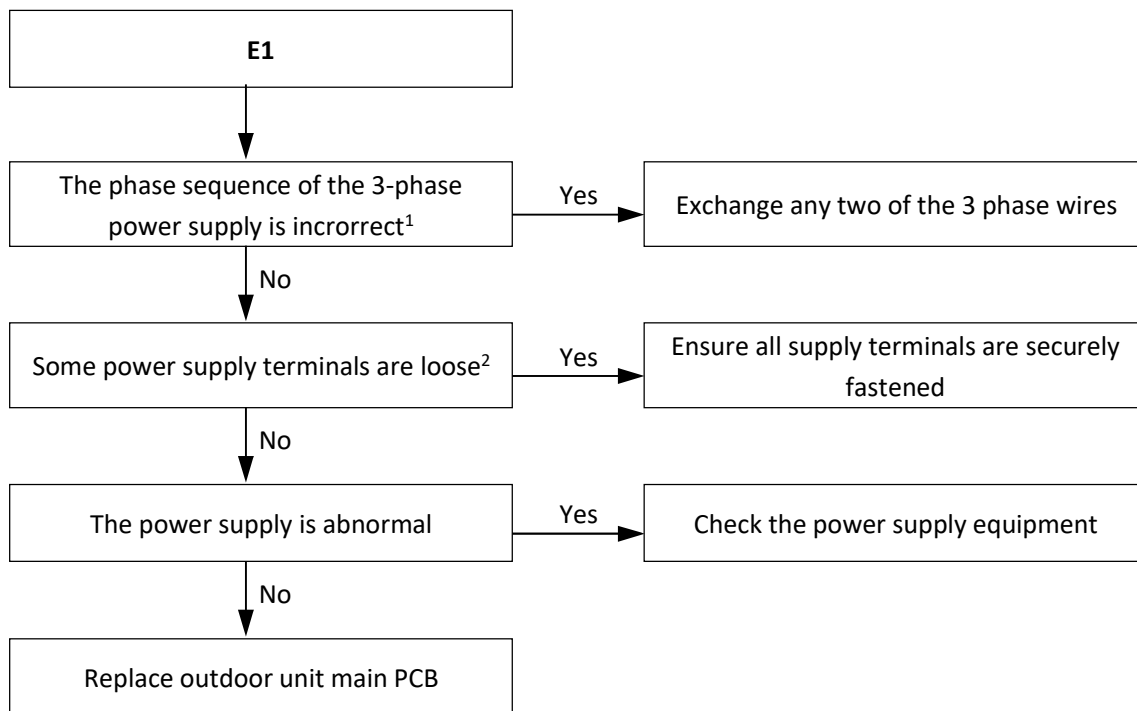
### **4.3.2 Description**

- Phase sequence error.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### **4.3.3 Possible causes**

- Power supply phases not connected in correct sequence.
- Power supply terminals loose.
- Power supply abnormal.
- Main PCB damaged.

#### 4.3.4 Procedure



##### Notes:

1. The A, B, C terminals of 3-phase power supply should match compressor phase sequence requirements. If the phase sequence is inverted, the compressor will operate inversely. If the wiring connection of each outdoor unit is in A, B, C phase sequence, and multiple units are connected, the current difference between C phase and A, B phases will be very large as the power supply load of each outdoor unit will be on C phase. This can easily lead to tripped circuits and terminal wiring burnout. Therefore if multiple units are to be used, the phase sequence should be staggered, so that the current is distributed among the three phases equally.
2. Loose power supply terminals can cause the compressors to operate abnormally and compressor current to be very large.

## **4.4 E2 Troubleshooting**

### **4.4.1 Digital display output**



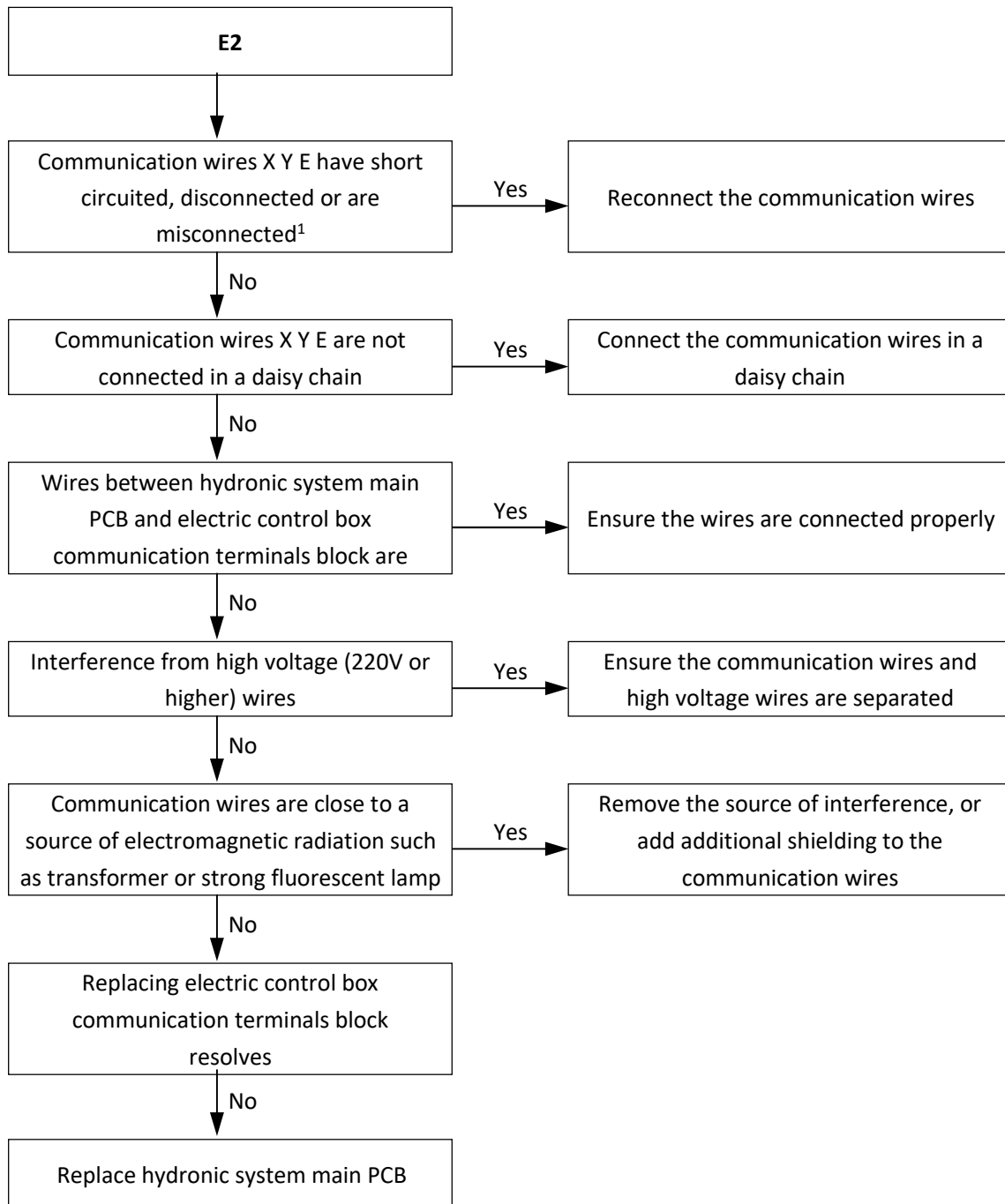
#### **4.4.2 Description**

- Communication error between hydronic system and user interface.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

#### **4.4.3 Possible causes**

- Communication wires between hydronic system and user interface not connected properly.
- Communication wiring X Y E terminals misconnected.
- Loosened wiring within electric control box.
- Interference from high voltage wires or other sources of electromagnetic radiation.
- Damaged main PCB or electric control box communication terminals block.

#### 4.4.4 Procedure

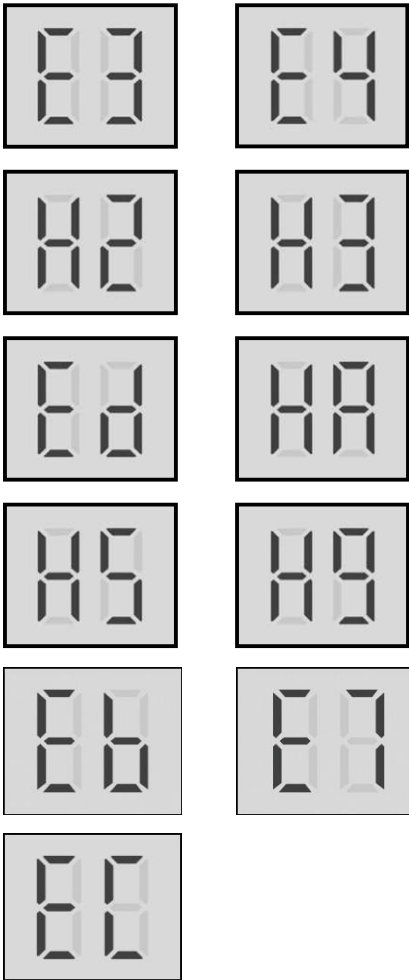


#### Notes:

1. Measure the resistance among X, Y and E. The normal resistance between P and Q is 120Ω, between P and E is infinite, between Y and E is infinite. Communication wiring has polarity. Ensure that the X wire is connected to X terminals and the Y wire is connected to Y terminals.

## 4.5 E3, E4, H2, H3, Ed, HA, H5, H9, Eb, E7, Ec Troubleshooting

### 4.5.1 Digital display output



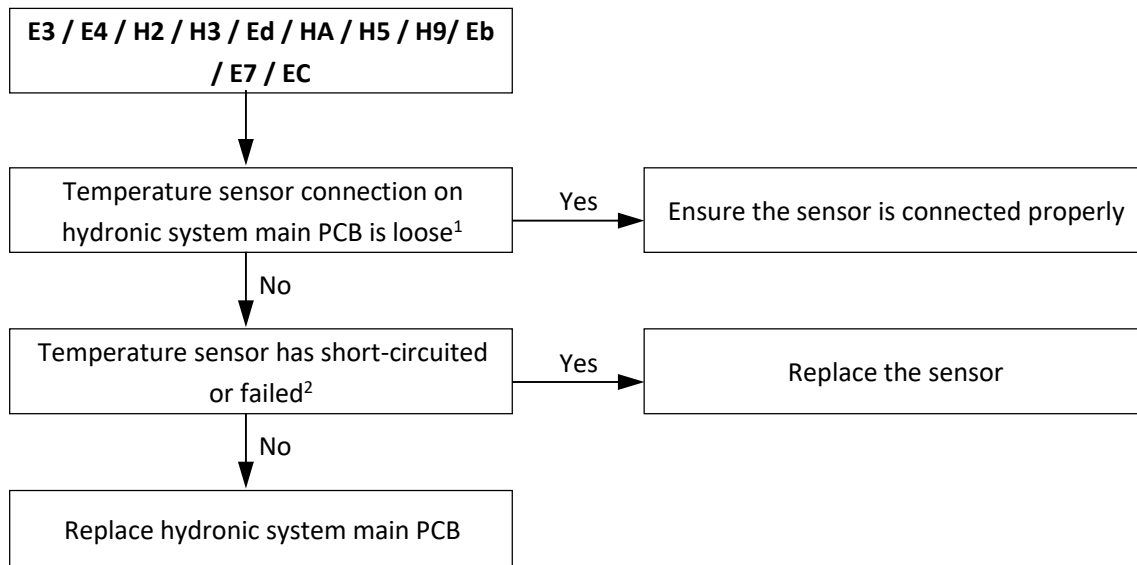
### 4.5.2 Description

- E3 indicates final outlet water temperature sensor error
- E4 indicates a domestic hot water tank temperature sensor error.
- H2 indicates a water side heat exchanger refrigerant outlet (liquid pipe) temperature sensor error.
- H3 indicates a water side heat exchanger refrigerant inlet (gas pipe) temperature sensor error.
- Ed indicates a water side heat exchanger water inlet temperature sensor error.
- HA indicates a water side heat exchanger water outlet temperature sensor error.
- H5 indicates a room temperature sensor error.
- H9 indicates a circuit 2 water outlet temperature sensor error.
- Eb indicates solar panel temperature sensor error
- E7 indicates balance tank upper temperature sensor error
- EC indicates balance tank nether temperature sensor error
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### 4.5.3 Possible causes

- Temperature sensor not connected properly or has malfunctioned.
- Damaged hydronic system main PCB.

#### 4.5.4 Procedure

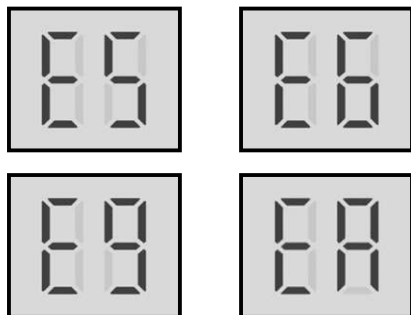


##### Notes:

1. Final water outlet temperature sensor, water side heat exchanger refrigerant inlet (liquid pipe) temperature sensor, water side heat exchanger refrigerant outlet (gas pipe) temperature sensor, water side heat exchanger water inlet temperature sensor and water side heat exchanger water outlet temperature sensor connections are port CN6 on the hydronic system main PCB (labeled 10 in Figure 4-2.1). Domestic hot water tank temperature sensor connection is port CN13 on the hydronic system main PCB (labeled 13 in Figure 4-2.1). Circuit 2 water outlet temperature sensor connection is port CN15 on the hydronic system main PCB (labeled 14 in Figure 4-2.1). Room temperature sensor connection is port CN11 on the hydronic system main PCB (labeled 24 in Figure 4-2.1). Solar panel temperature sensor connection is port CN18 on the hydronic system main PCB (labeled 15 in Figure 4-2.1). Balance tank upper temperature sensor connection is port CN24 on the hydronic system main PCB (labeled 11 in Figure 4-2.1) Balance tank nether temperature sensor connection is port CN16 on the hydronic system main PCB (labeled 12 in Figure 4-2.1)
2. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 4-5.1 or 4-5.3.

## 4.6 E5, E6, E9, EA Troubleshooting

### 4.6.1 Digital display output



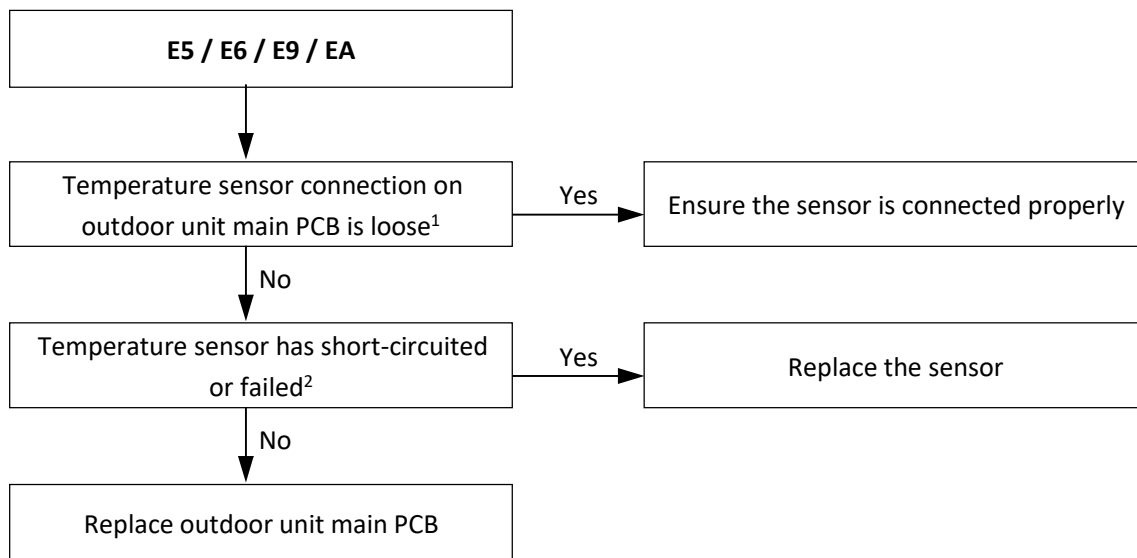
### 4.6.2 Description

- E5 indicates an air side heat exchanger refrigerant outlet temperature sensor error.
- E6 indicates an outdoor ambient temperature sensor error.
- E9 indicates a suction pipe temperature sensor error.
- EA indicates a discharge temperature sensor error.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### 4.6.3 Possible causes

- Temperature sensor not connected properly or has malfunctioned.
- Damaged outdoor unit main PCB.

#### 4.6.4 Procedure



**Notes:**

1. Air side heat exchanger refrigerant outlet temperature sensor and outdoor ambient temperature sensor connections are port CN9 on the outdoor unit refrigerant system main PCB (labeled 6 in Figure 4-2.2). Discharge pipe temperature sensor connection are port CN8 on the outdoor unit refrigerant system main PCB (labeled 5 in Figure 4-2.2). Suction pipe temperature sensor connection are port CN5 on the outdoor unit refrigerant system main PCB (labeled 4 in Figure 4-2.2).
2. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 4-5.1, and Table 4-5.2.

## 4.7 EE Troubleshooting

### 4.7.1 Digital display output



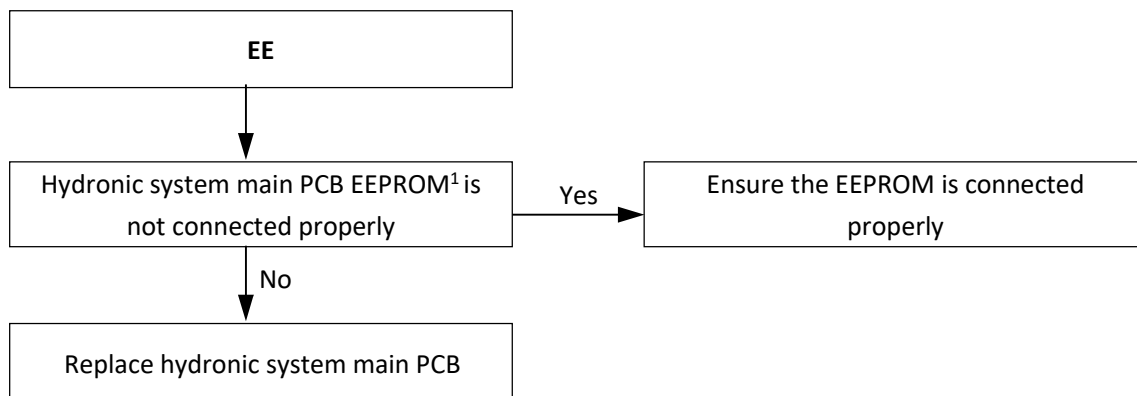
### 4.7.2 Description

- Hydronic system main PCB EEPROM error.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### 4.7.3 Possible causes

- Hydronic system main PCB EEPROM is not connected properly.
- Hydronic system main PCB damaged.

### 4.7.4 Procedure



Notes:

1. Hydronic system main PCB EEPROM is designated IC39 on the main PCB for hydronic system (labeled 31 in Figure 4-2.1).

## 4.8 F1 Troubleshooting

### 4.8.1 Digital display output



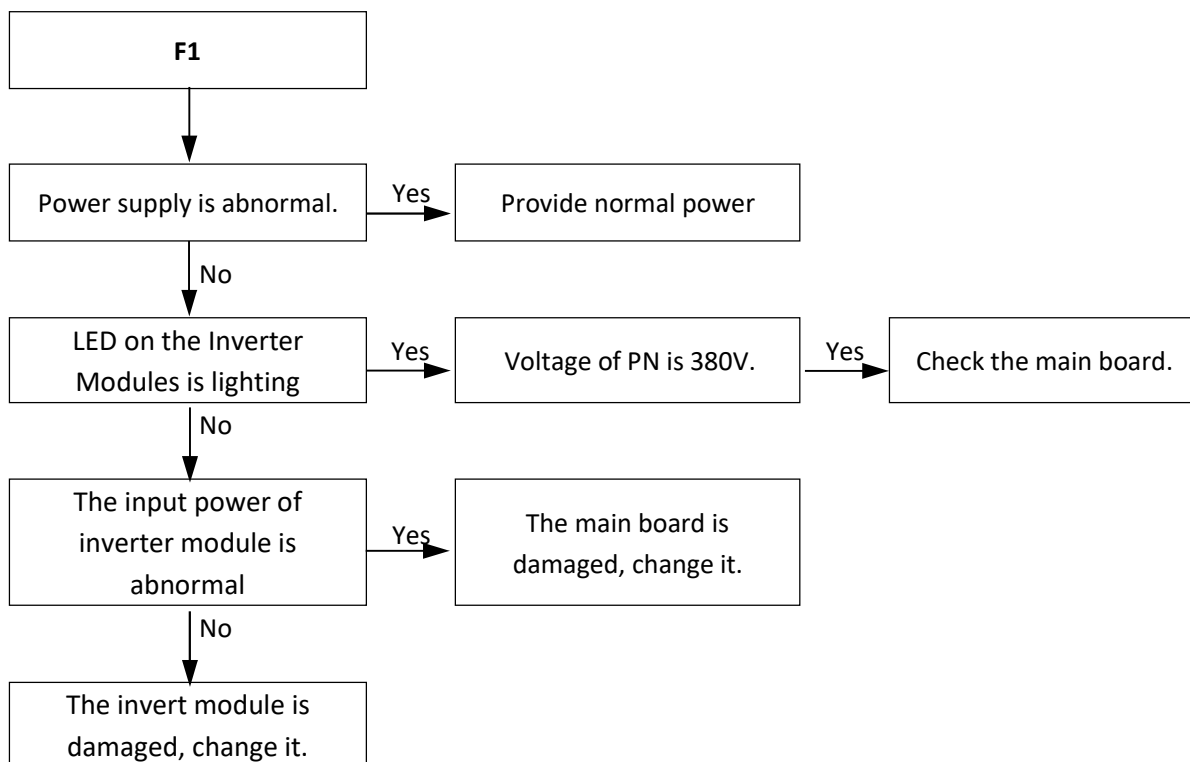
### 4.8.2 Description

- Low DC generatrix voltage.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### 4.8.3 Possible causes

- The DC generatrix voltage is too low.

### 4.8.4 Procedure



## 4.9 HF Troubleshooting

### 4.9.1 Digital display output



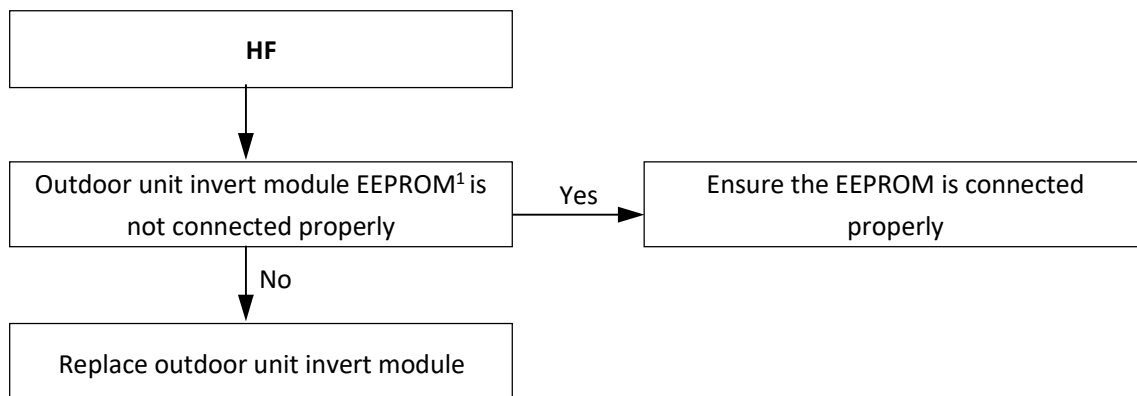
### 4.9.2 Description

- Outdoor unit inverter module EEPROM error.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### 4.9.3 Possible causes

- Outdoor unit invert module EEPROM is not connected properly.
- Outdoor unit invert module EEPROM damaged.

### 4.9.4 Procedure



**Notes:**

1. Outdoor unit invert module EEPROM is designated IC25 on the outdoor unit invert module (labeled 14 in Figure 4-2.3)..

## **4.10 H0 Troubleshooting**

### **4.10.1 Digital display output**



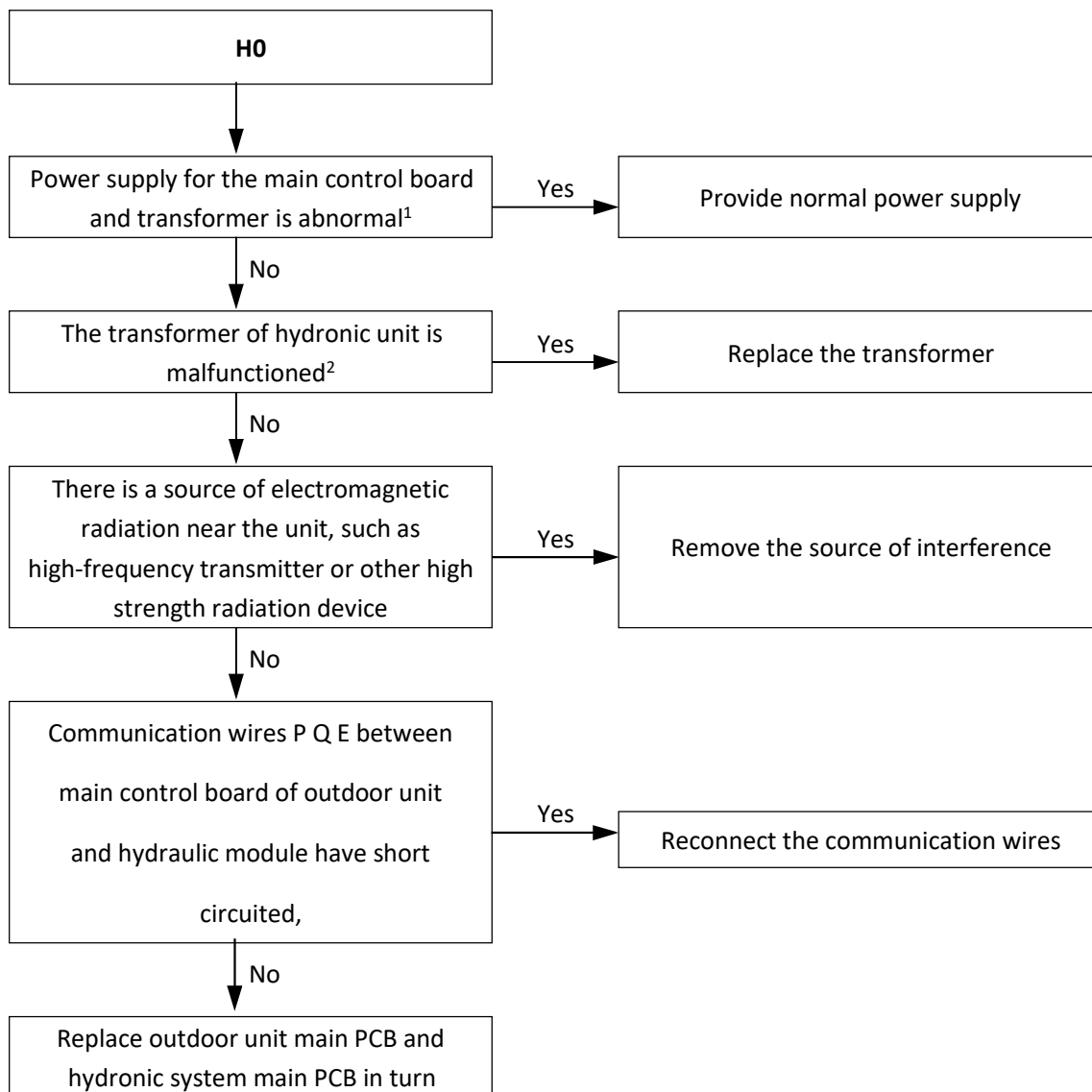
### **4.10.2 Description**

- Communication error between outdoor unit and hydronic system.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB, outdoor unit main PCB and user interface.

### **4.10.3 Possible causes**

- Power supply abnormal.
- Transformer malfunction.
- Interference from a source of electromagnetic radiation.
- Outdoor unit main PCB or hydronic system main PCB damaged.

#### 4.10.4 Procedure



**Notes:**

1. Measure the voltages of transformer input port and out port. The input voltage of transformer is 220V AC, output voltage of transformer is 13.5V AC. If any voltages is abnormal, the power supply for the main control board of hydraulic module and transformer will be abnormal.
2. Measure the voltages of transformer output port ports. If the voltages are not normal, the transformer has malfunctioned.

## 4.11 H1 Troubleshooting

### 4.11.1 Digital display output



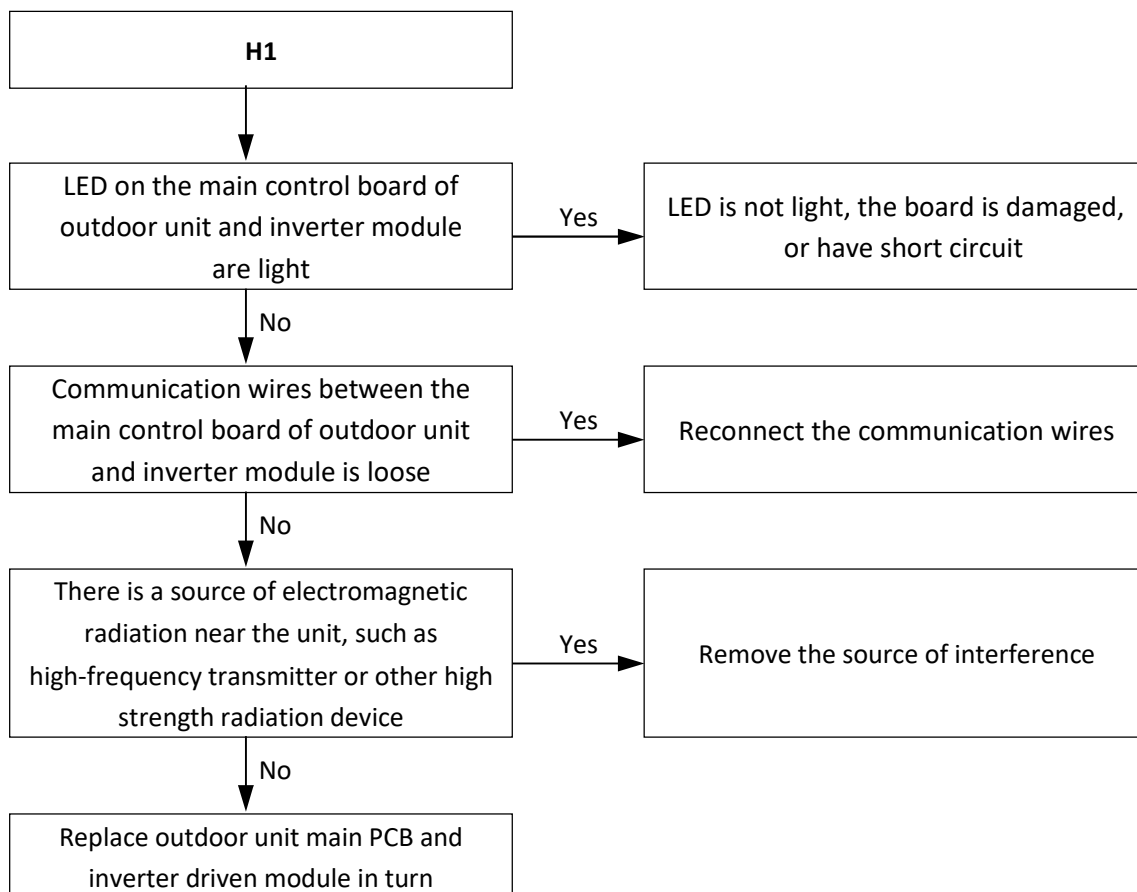
### 4.11.2 Description

- Communication error between outdoor unit main control board and inverter module.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### 4.11.3 Possible causes

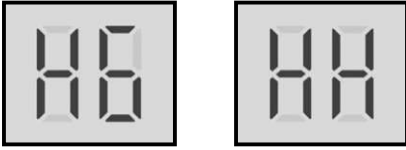
- Power supply abnormal.
- Interference from a source of electromagnetic radiation.
- Outdoor unit main PCB or inverter driven module damaged.

### 4.11.4 Procedure



## **4.12 H6, HH Troubleshooting**

### **4.12.1 Digital display output**



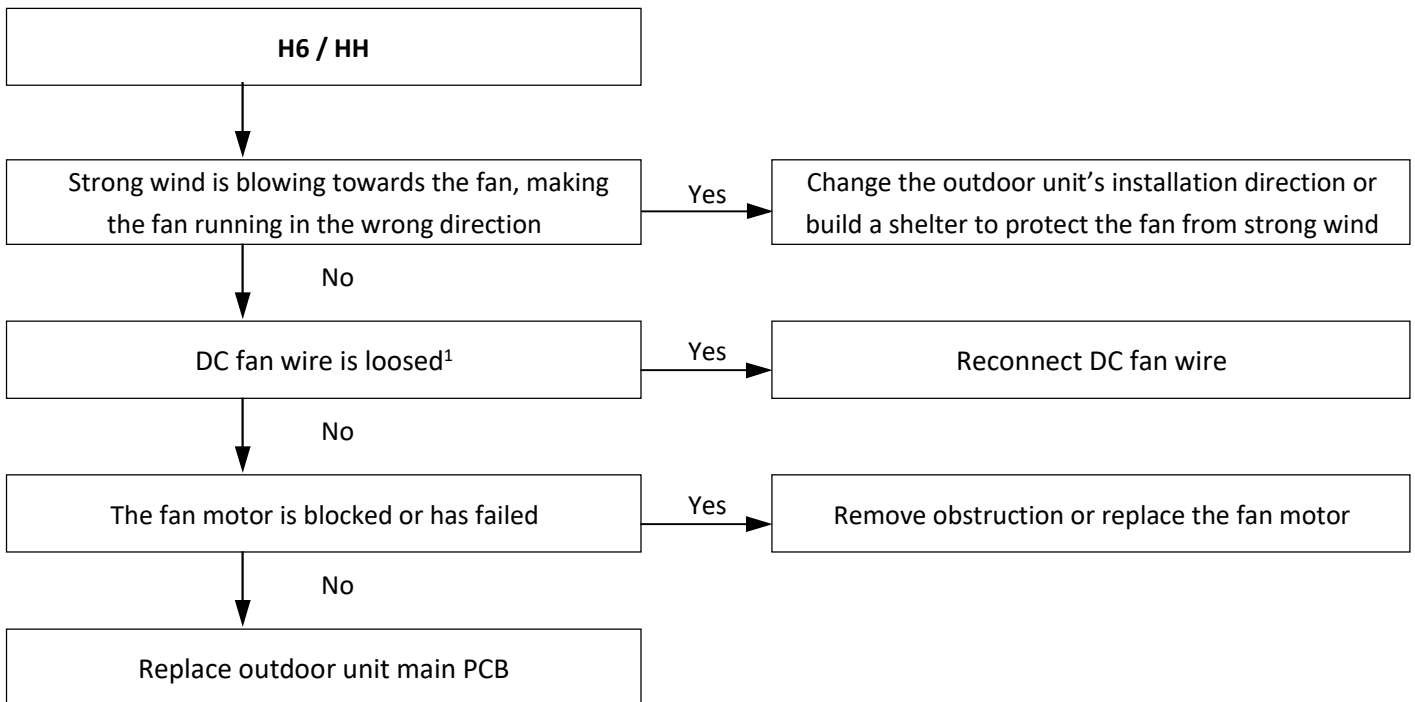
### **4.12.2 Description**

- H6 indicates a DC fan error.
- HH indicates that H6 protection has occurred 10 times in 2 hours. When HH error occurs, a manual system restart is required before the system can resume operation. The cause of HH error should be addressed promptly in order to avoid system damage.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### **4.12.3 Possible causes**

- DC fan wire is loosed.
- High wind speed.
- Fan motor blocked or has failed.
- Invert module damaged.
- Main PCB is damaged.

#### 4.12.4 Procedure



**Notes:**

1. Refer to Figures 4-1.1 to 4-1.2 in "Yukon Mono Service Manual" and to Part 2 "Wiring Diagrams". in Yukon Mono Engineering Data Book,
2. Measure the voltage between the DC fan motor power supply's white and black wires. The normal voltage is 15V when the unit is in standby. If the voltage is significantly different from 15V, the IPM module on the inverter module is damaged. DC fan connection is CN107/109 on the outdoor unit refrigerant system main PCB (labeled 23 in Figure 4-2.2).

## 4.13 H7 Troubleshooting

### 4.13.1 Digital display output



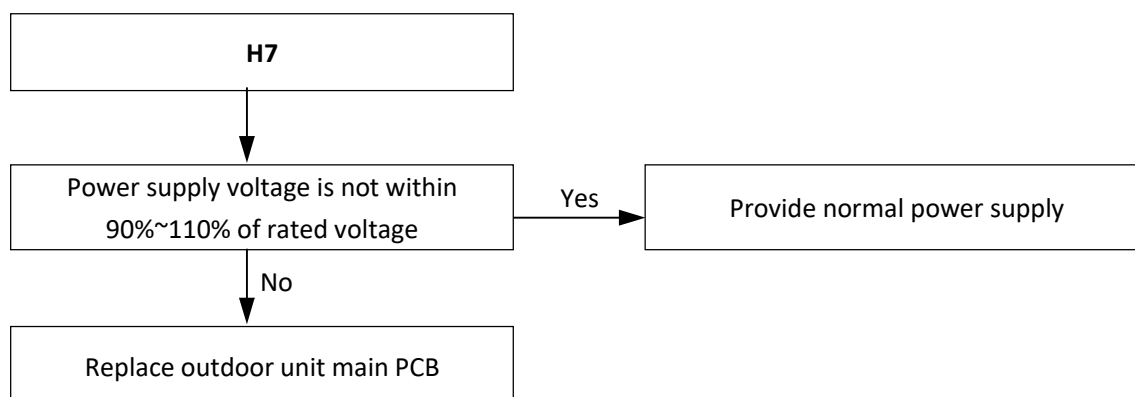
### 4.13.2 Description

- Abnormal main circuit voltage.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### 4.13.3 Possible causes

- Power supply voltage not within 90%~110% of rated voltage.
- Outdoor unit main PCB is damaged.

### 4.13.4 Procedure



## 4.14 H8 Troubleshooting

### 4.14.1 Digital display output



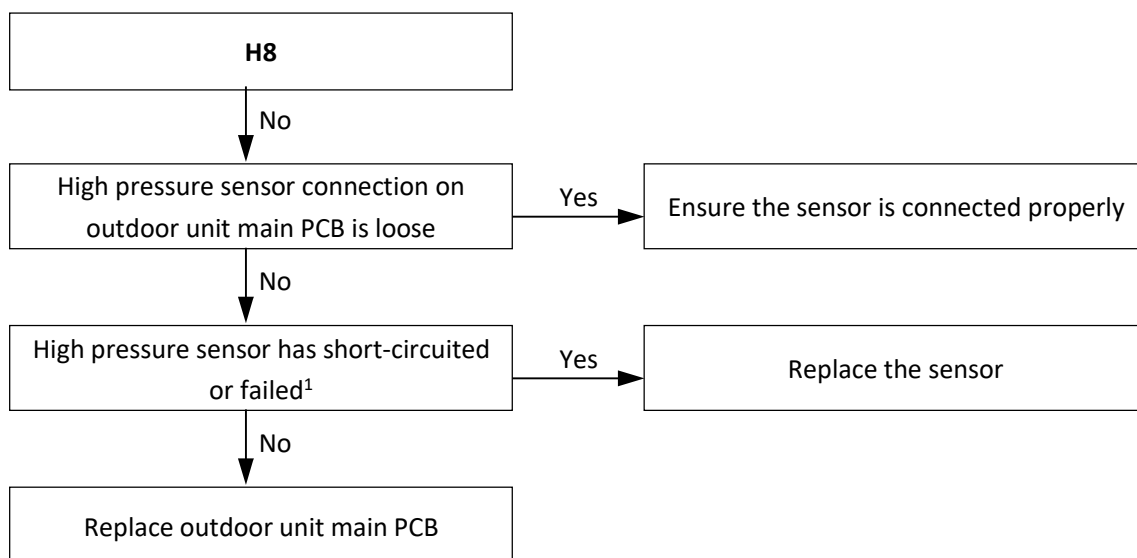
### 4.14.2 Description

- Pressure sensor error.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### 4.14.3 Possible causes

- Pressure sensor not connected properly or has malfunctioned.
- Outdoor unit main PCB is damaged.

### 4.14.4 Procedure

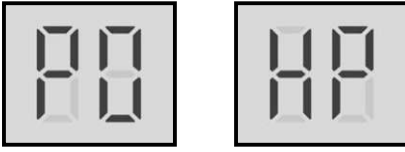


#### Notes:

1. Measure the resistance among the three terminals of the pressure sensor. If the resistance is of the order of mega Ohms or infinite, the pressure sensor has failed. The pressure sensor connection is port CN6 on the outdoor unit refrigerant system main PCB (labeled 3 in Figure 4-2.2).

## 4.15 P0, HP Troubleshooting

### 4.15.1 Digital display output



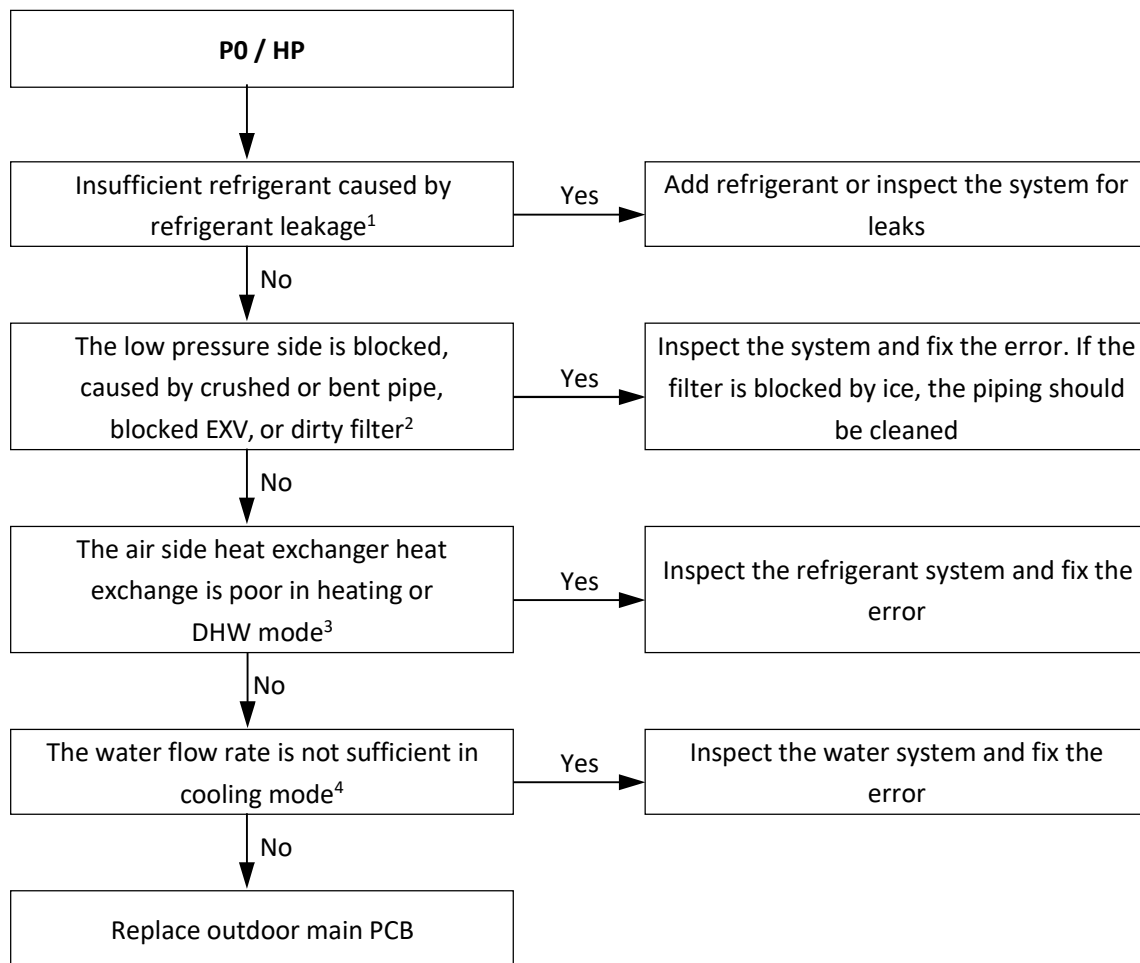
### 4.15.2 Description

- P0 indicates suction pipe low pressure protection. When the suction pressure falls below 0.14MPa, the system displays P0 protection and Yukon Mono stops running. When the pressure rises above 0.3MPa, P0 is removed and normal operation resumes.
- HP indicates  $P_e < 0.6\text{MPa}$  occurred 3 times in an hour.
- Error code is displayed on outdoor unit main PCB and user interface.

### 4.15.3 Possible causes

- Low pressure switch not connected properly or has malfunctioned.
- Insufficient refrigerant.
- Low pressure side blockage.
- Poor evaporator heat exchange in heating mode or DHW mode.
- Insufficient water flow in cooling mode.
- Outdoor unit main PCB damaged.

#### 4.15.4 Procedure



#### Notes:

1. To check for insufficient refrigerant: An insufficiency of refrigerant causes compressor discharge temperature to be higher than normal, discharge and suction pressures to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. These issues disappear once sufficient refrigerant has been charged into the system.
2. A low pressure side blockage causes compressor discharge temperature to be higher than normal, suction pressure to be lower than normal and compressor current to be lower than normal, and may cause frosting to occur on the suction pipe. For normal system parameters.
3. Check air side heat exchanger, fan and air outlets for dirt/blockages.
4. Check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages.

## **4.16 P1 Troubleshooting**

### **4.16.1 Digital display output**



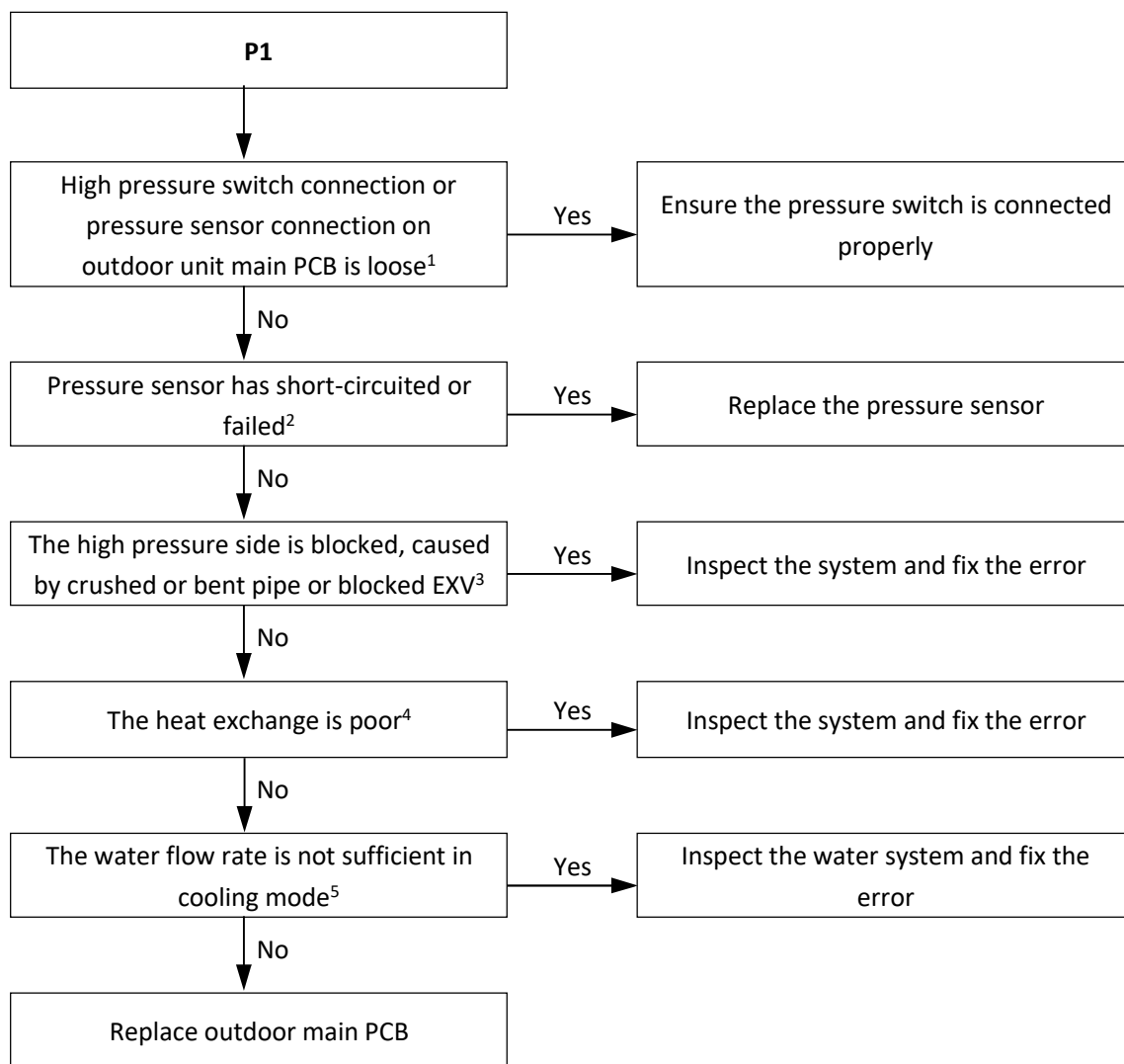
### **4.16.2 Description**

- Discharge pipe high pressure protection. When the discharge pressure rises above 4.2MPa, the system displays P1 protection and Yukon Mono stops running. When the discharge pressure falls below 3.2MPa, P1 is removed and normal operation resumes.
- Error code is displayed on outdoor unit main PCB and user interface.

### **4.16.3 Possible causes**

- Pressure sensor/switch not connected properly or has malfunctioned.
- Excess refrigerant.
- System contains air or nitrogen.
- High pressure side blockage.
- Poor condenser heat exchange.
- Outdoor unit main PCB damaged.

#### 4.16.4 Procedure



#### Notes:

1. High pressure switch connection is port CN31 on the outdoor unit refrigerant system main PCB (labeled 21 in Figure 4-2.2).
2. Measure the resistance among the three terminals of the pressure sensor. If the resistance is of the order of mega Ohms or infinite, the pressure sensor has failed.
3. High pressure side blockage causes discharge temperature to be higher than normal, discharge pressure to be higher than normal and suction pressure to be lower than normal.
4. In heating mode check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages. In cooling mode check air side heat exchanger, fan(s) and air outlets for dirt/blockages.
5. Check water pressure on the manometer. If the water pressure is not > 1 bar, water flow is insufficient. Refer to Figure 2-1.1.

## **4.17 P3 Troubleshooting**

### **4.17.1 Digital display output**



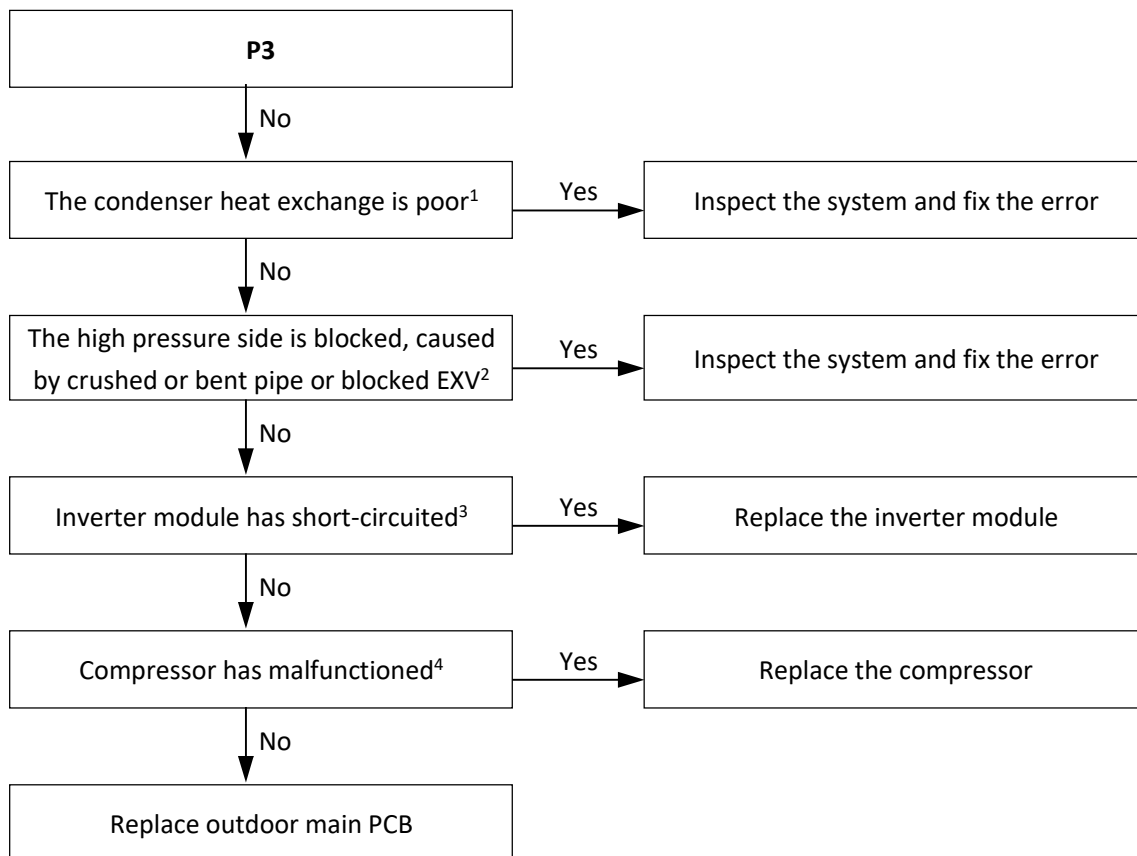
### **4.17.2 Description**

- Compressor current protection.
- When the compressor current rises above the protection value (28A), the system displays P3 protection and Yukon Mono stops running. When the current returns to the normal range, P3 is removed and normal operation resumes.
- Error code is displayed on refrigerant system main PCB and user interface.

### **4.17.3 Possible causes**

- Poor condenser heat exchange.
- High pressure side blockage.
- Inverter module damaged.
- Compressor damaged.
- Outdoor unit main PCB damaged.

#### 4.17.4 Procedure



#### Notes:

1. In heating mode check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages. In cooling mode check air side heat exchanger, fan and air outlets for dirt/blockages.
2. High pressure side blockage causes discharge temperature to be higher than normal, discharge pressure to be higher than normal and suction pressure to be lower than normal.
3. Set a multi-meter to buzzer mode and test any two terminals of P N and U V W of the inverter module. If the buzzer sounds, the inverter module has short-circuited.
4. The normal resistances of the inverter compressor are 0.7-1.5Ω among U V W and infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.

## **4.18 P4 Troubleshooting**

### **4.18.1 Digital display output**



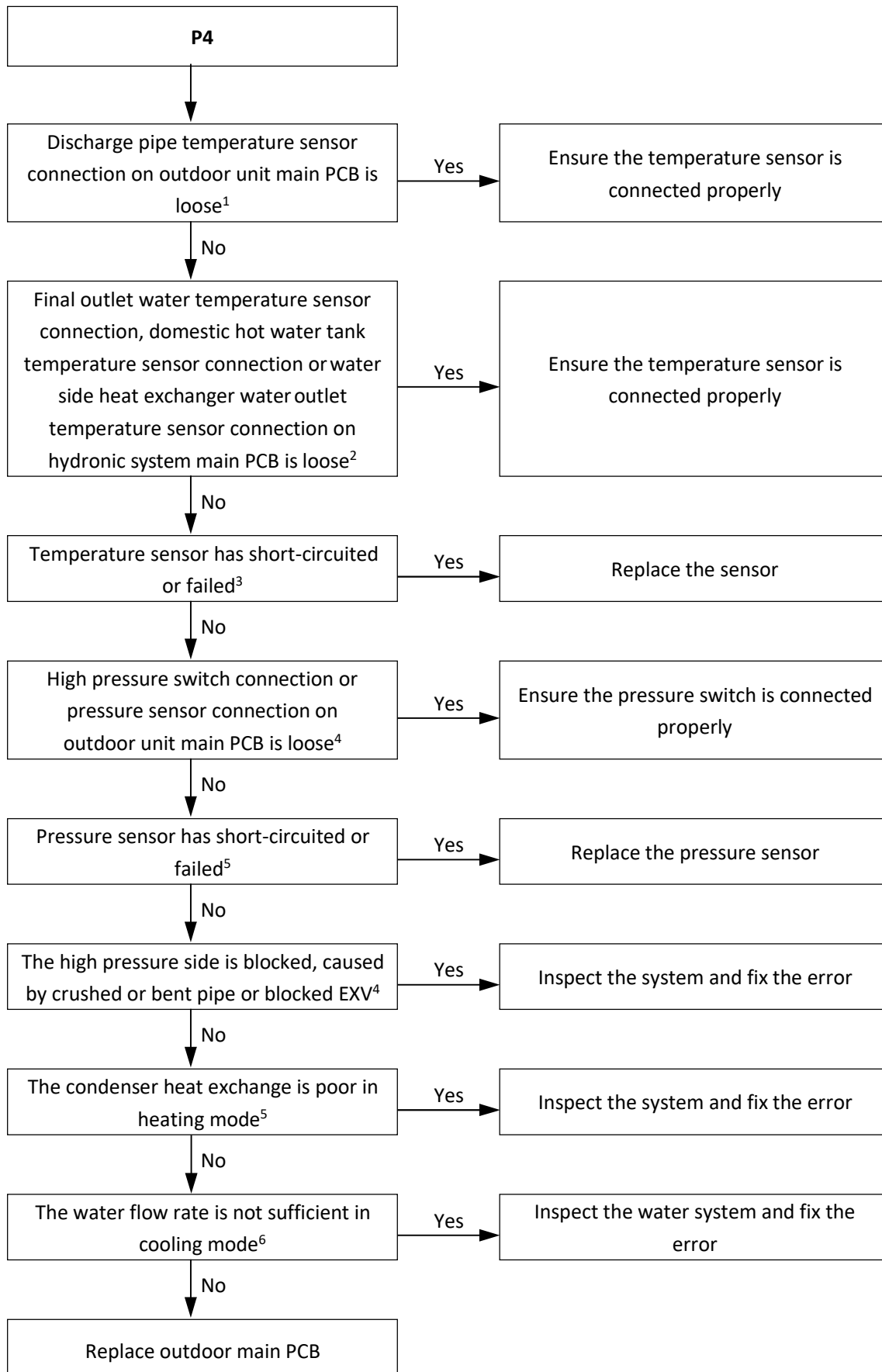
### **4.18.2 Description**

- Discharge temperature protection.
- When the compressor the discharge temperature rises above 115°C, the system displays P4 protection and Yukon Mono stops running. When the discharge temperature falls below 90°C, P4 is removed and normal operation resumes.
- Error code is displayed on refrigerant system main PCB and user interface.

### **4.18.3 Possible causes**

- Temperature sensor error.
- High pressure side blockage.
- Poor condenser heat exchange.
- Outdoor unit main PCB damaged.

#### 4.18.4 Procedure



#### Notes:

1. Discharge pipe temperature sensor connection is port CN8 on the outdoor unit refrigerant system main PCB (labeled 5 in Figure 4-2.2).
2. Final outlet water temperature sensor and water side heat exchanger water outlet temperature sensor connections are port CN6 on the hydronic system

main PCB (labeled 10 in Figure 4-2.1). Domestic hot water tank temperature sensor connection is port CN13 on hydronic system main PCB (labeled 13 in Figure 4-2.1).

3. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Part 2, 1 "Layout of Functional Components" and to Table 5-5.1 or 5-5.2 in Part 5, 5.1 "Temperature Sensor Resistance Characteristics".

4. High pressure switch connection is port CN31 on the outdoor unit refrigerant system main PCB (labeled 21 in Figure 4-2.2).

Measure the resistance among the three terminals of the pressure sensor. If the resistance is of the order of mega Ohms or infinite, the pressure sensor has failed.

High pressure side blockage causes discharge temperature to be higher than normal, discharge pressure to be higher than normal and suction pressure to be lower than normal.

5. Check air side heat exchanger, fan and air outlets for dirt/blockages.
6. Check the water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages.

## **4.19 P5 Troubleshooting**

### **4.19.1 Digital display output**

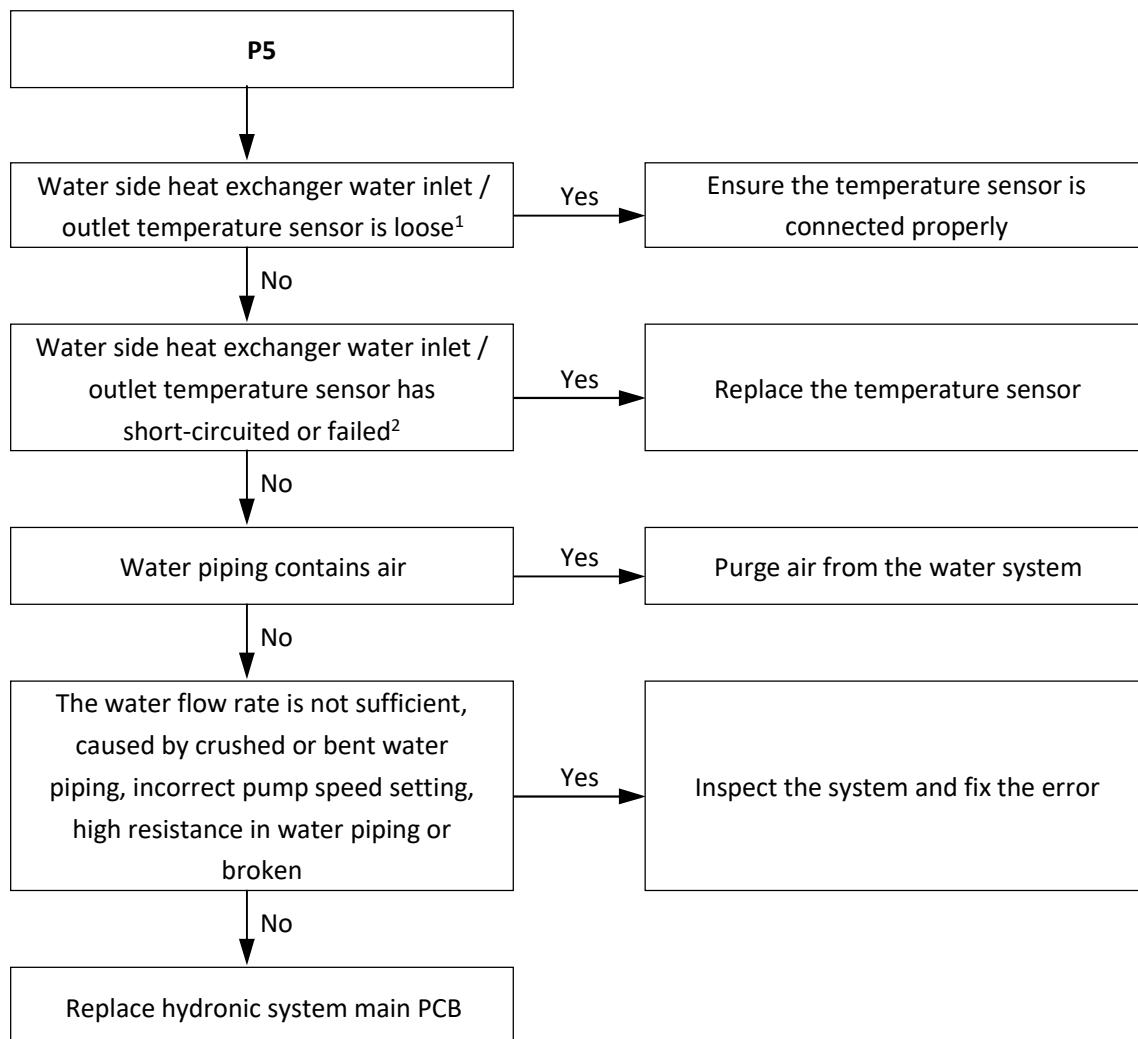


### **4.19.2 Description**

- High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### **4.19.3 Possible causes**

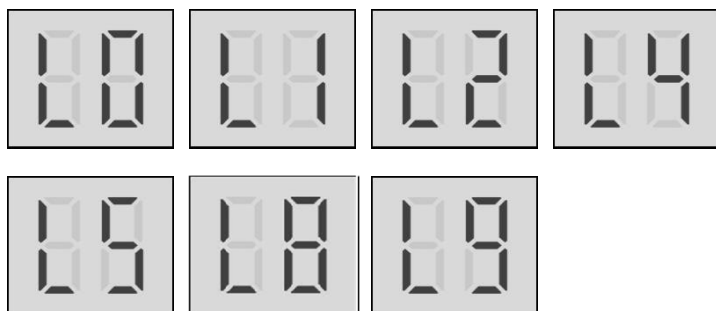
- Temperature sensor not connected properly or has malfunctioned.
- Water piping contains air.
- Insufficient water flow.
- Hydronic system main PCB damaged.

**Procedure**

**Notes:**

1. Water side heat exchanger water inlet temperature sensor and water side heat exchanger water outlet temperature sensor connections are port CN6 on the hydronic system main PCB (labeled10 in Figure 4-2.1).
2. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 5-5.3.
3. Check water pressure on the manometer. If the water pressure is not > 1 bar, water flow is insufficient. Refer to Figures 2-1.1

## 4.20 Inverter module Troubleshooting

### 4.20.1 Digital display output



### 4.20.2 Description

- Inverter module protection or high pressure protection.
- Yukon Mono stops running.
- Specific error code L0, L1, L2, L4, L5, L8 , L9 is displayed on the user interface and the refrigerant system main PCB.

### 4.20.3 Possible causes

- Inverter module protection.
- DC bus low or high voltage protection.
- MCE error(DC bus low or high voltage protection or software over current protection)
- Zero speed protection.
- Excessive compressor frequency variation.
- Actual compressor frequency differs from target frequency.
- High pressure protection.
- Contactor stuck or 908 self checking fail.

### 4.20.4 Specific error codes for inverter module protection

Table 4-4.1: Specific error codes

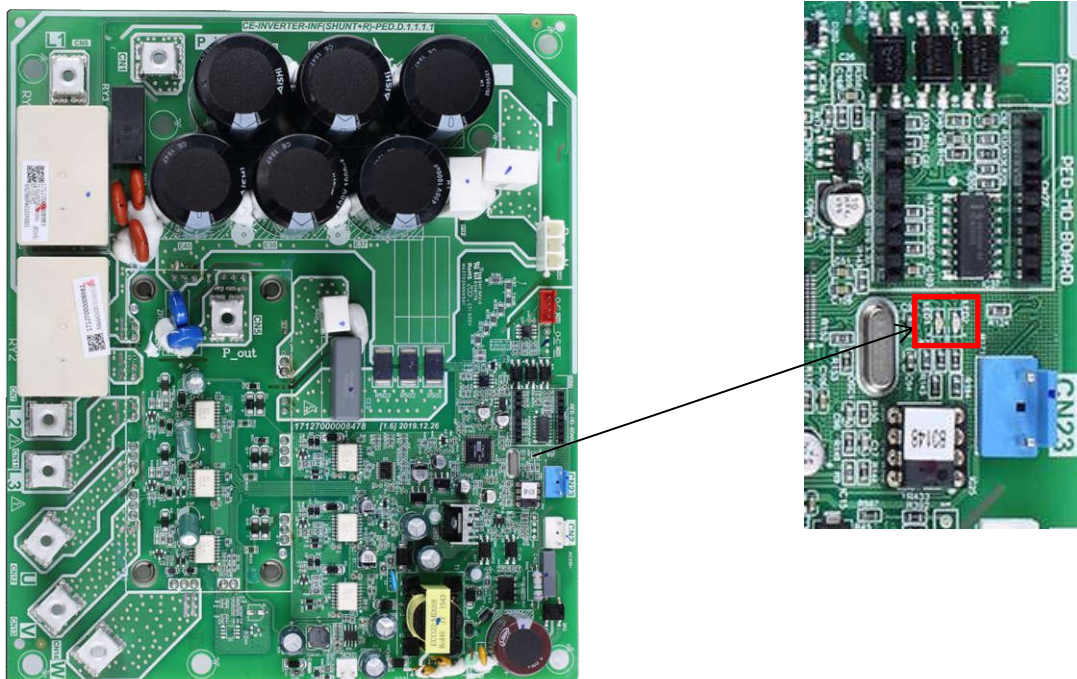
| Specific error code | Content                                                                                |
|---------------------|----------------------------------------------------------------------------------------|
| L0                  | Inverter module protection                                                             |
| L1                  | DC bus low voltage protection                                                          |
| L2                  | DC bus high voltage protection                                                         |
| L4                  | MCE error(DC bus low or high voltage protection or software over current protection)   |
| L5                  | Zero speed protection                                                                  |
| L8                  | Compressor frequency variation greater than 15Hz within one second protection          |
| L9                  | Actual compressor frequency differs from target frequency by more than 15Hz protection |

The specific error codes can also be obtained from the LED indicators LED1/LED2 on the inverter module.

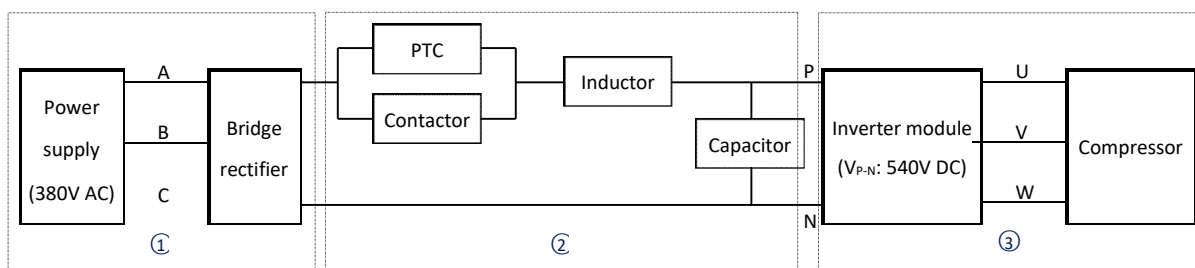
Table 4-4.2: Errors indicated on LED for 18/22/26/30kW unit

| LED1/2 flashing pattern                               | Corresponding error                                                                                                                                                               |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flashes 8 times and stops for 1 second, then repeats  | L0 - Inverter module protection                                                                                                                                                   |
| Flashes 9 times and stops for 1 second, then repeats  | L1 - DC bus low voltage protection                                                                                                                                                |
| Flashes 10 times and stops for 1 second, then repeats | L2 - DC bus high voltage protection                                                                                                                                               |
| Flashes 12 times and stops for 1 second, then repeats | L4 - MCE error(DC bus low or high voltage protection or software over current protection)                                                                                         |
| Flashes 13 times and stops for 1 second, then repeats | L5 - Zero speed protection                                                                                                                                                        |
| Flashes 17 times and stops for 1 second, then repeats | L8 - Compressor frequency variation greater than 15Hz within one second protection<br>L9 - Actual compressor frequency differs from target frequency by more than 15Hz protection |
| Flashes 3 times and stops for 1 second, then repeats  | bH - Contactor stuck or 908 self checking fail                                                                                                                                    |
| Flashes 5 times and stops for 1 second, then repeats  | P1 - High pressure protection                                                                                                                                                     |

Figure 4-4.1: LED location of inveter module for three-phase 18/22/26/30kW unit



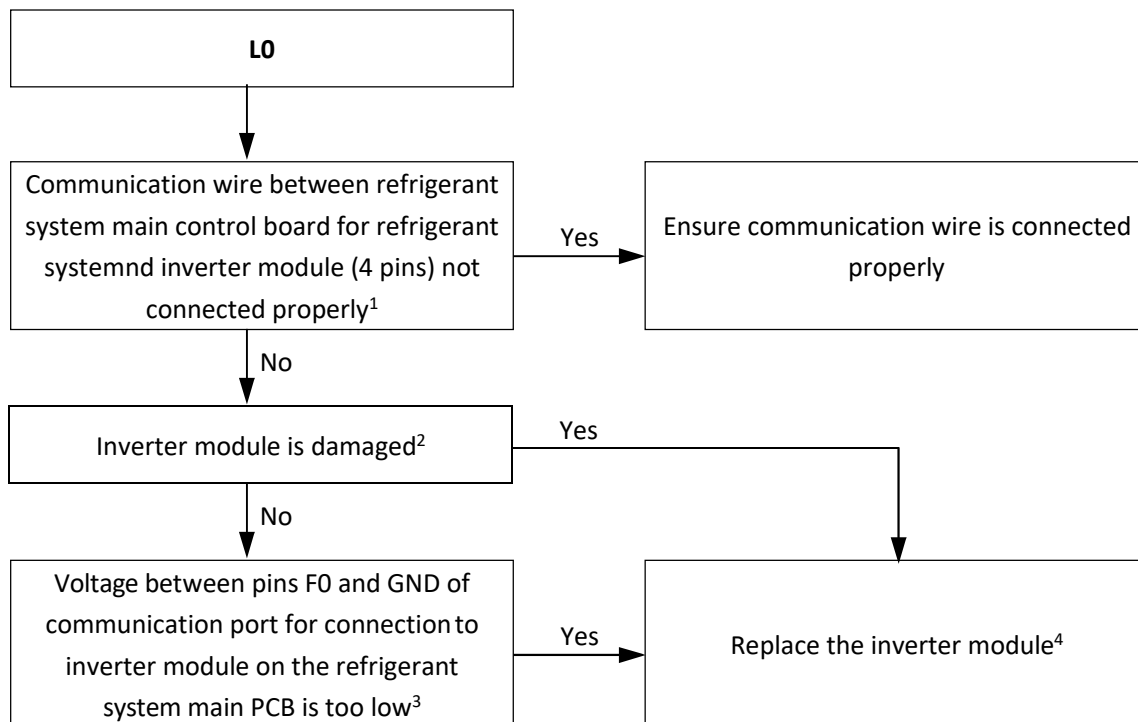
## 4.20.5 Principle of DC inverter



- ① 380-415V AC power supply change to DC power supply after bridge rectifier.
- ② Contactor is open the current across the PTC to charge capacitor, after 5 seconds the contactor closed.
- ③ The capacitor output steady 540V DC power supply for inverter module P N terminals.

#### 4.20.6 L0 troubleshooting

**Situation 1: L0 error appears immediately after the outdoor unit is powered-on**



Notes:

1. The communication port between refrigerant system main control board for refrigerant system inverter module is port CN36 on refrigerant system main control board for refrigerant system port CN8 on inverter module.
2. Measure the resistance between each of U, V and W and each of P and N on the inverter module. All the resistances should be infinite. If any of them are not infinite, the inverter module is damaged and should be replaced.
3. The normal voltage between F0 and GND is 5V. Refer to Figure 4-4.2.
4. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the IPM module (on the reverse side of the inverter module PCB). Refer to Figure 4-4.3.

Figure 4-4.2: F0 and GND voltage on IC28-1 (F0), IC28-4 (GND)

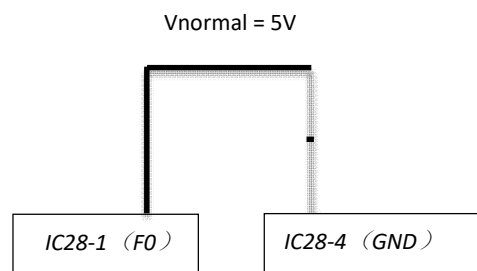
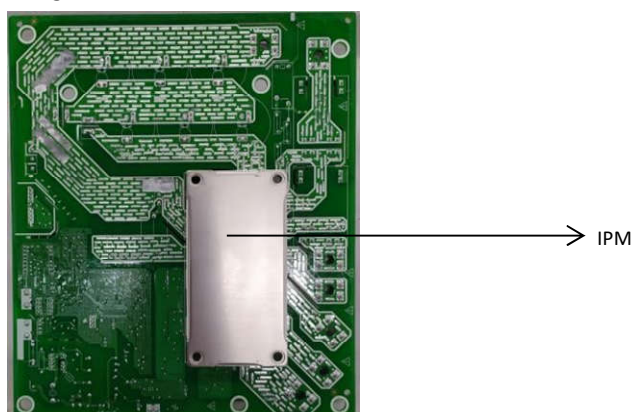
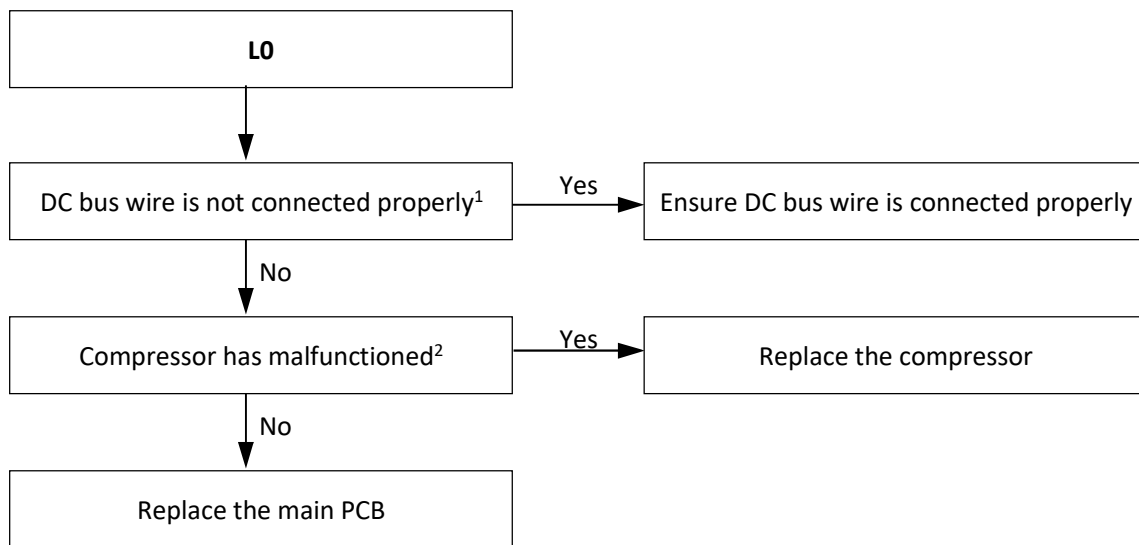


Figure 4-4.3: Replacing an inverter module



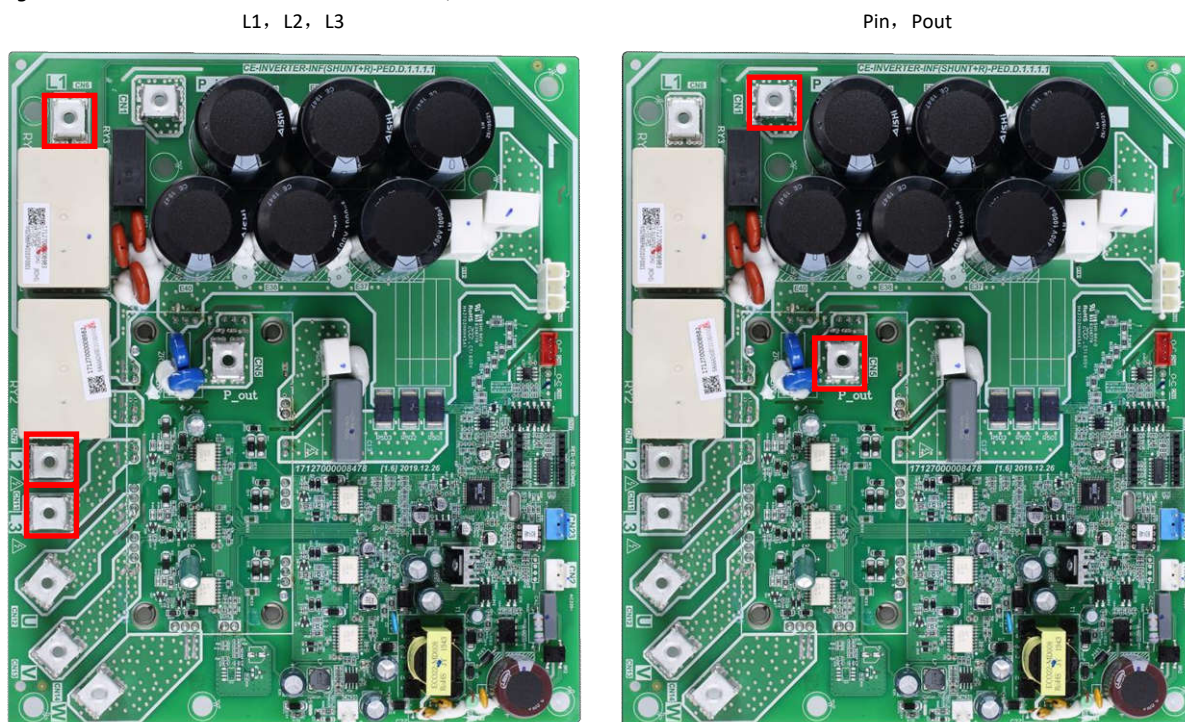
## Situation 2: L0 error appears immediately after the compressor starts up



### Notes:

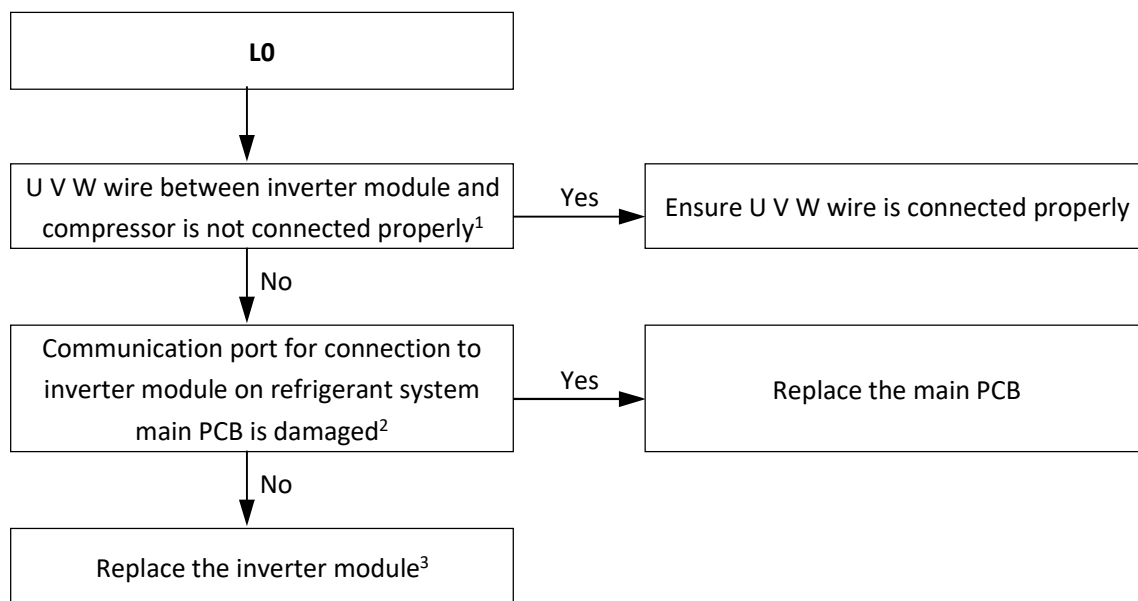
1. The DC bus wire should run from the N terminal on the inverter module, through the current sensor (in the direction indicated by the arrow on the current sensor), and end at the N terminal of capacitor. Refer to Figure 4-4.4.

Figure 4-4.4: DC bus wire connection (L1L2L3,PIN- POUT)



2. The normal resistances of the inverter compressor are 0.7-1.5Ω among U V W and infinite between each of U V W and ground. If any of the resistances differ from these specifications, the compressor has malfunctioned.

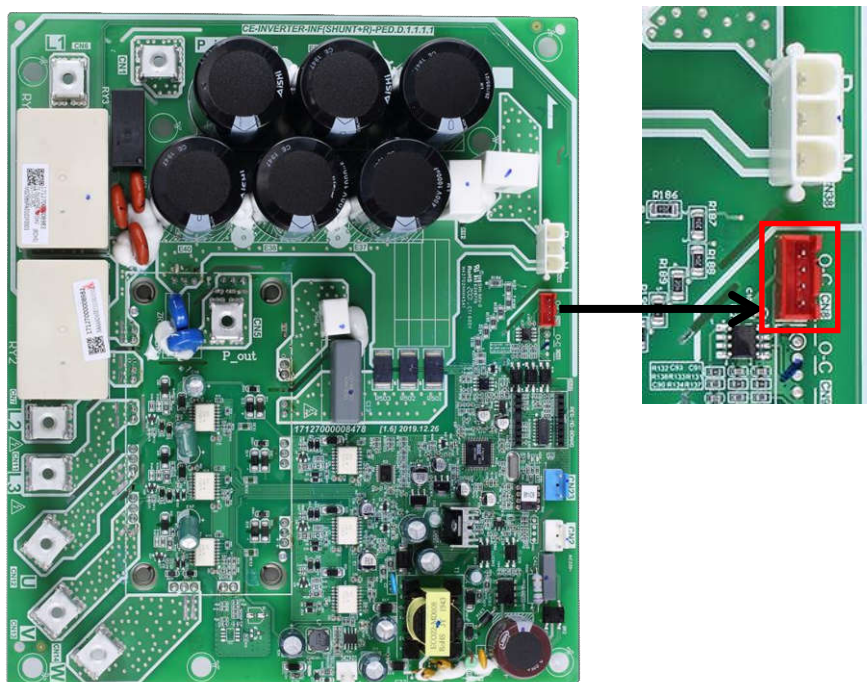
## Situation 3: L0 error appears within 2 seconds of compressor start-up



### Notes:

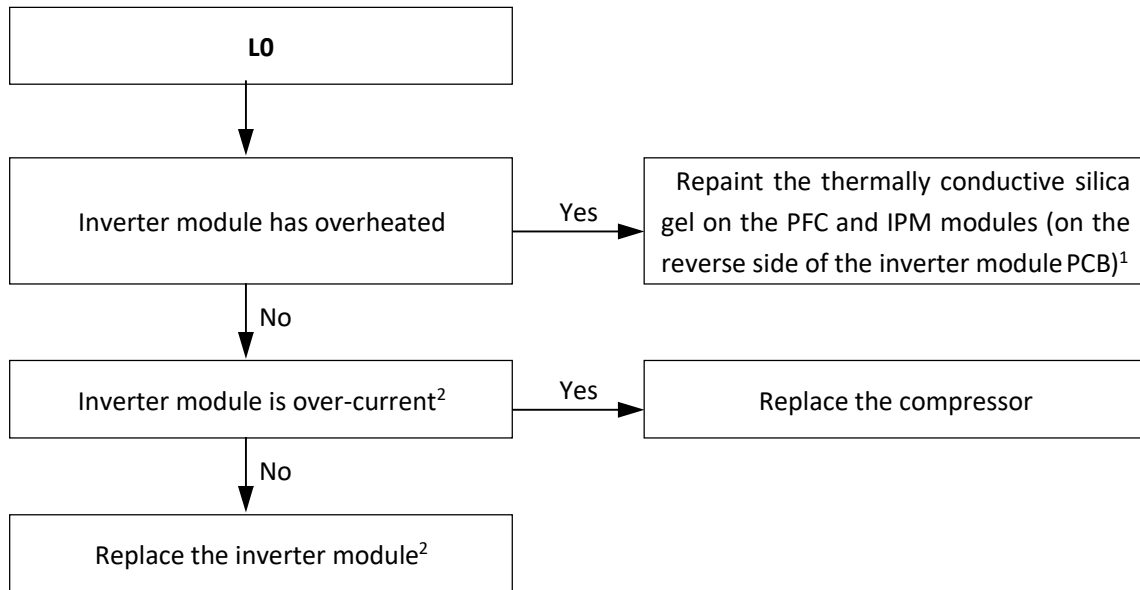
1. Connect the U V W wire from the inverter module to the correct compressor terminals, as indicated by the labels on the compressor.
2. Measure the voltage between each of W-, W+, V-, V+, U-, U+ and GND when the unit is in standby. The normal voltage should be 2.5V-4V and the six voltages should be same, otherwise the communication terminal has failed. Refer to Figure4-4.5.

Figure 4-4.5: Connection port for inverter module



3. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the IPM module (on the reverse side of the inverter module PCB). Refer to Figure 4-4.3.

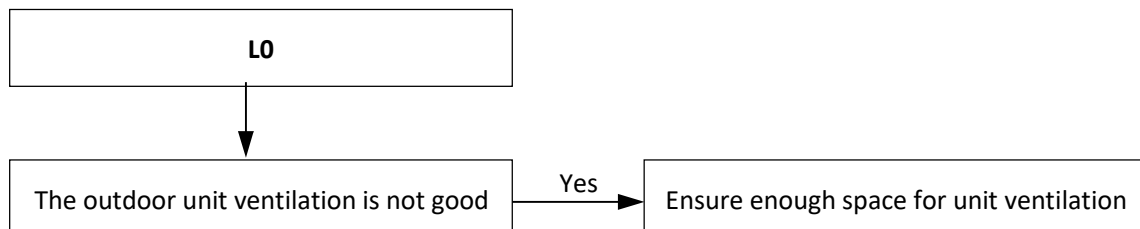
**Condition 4: L0 error appears after the compressor has been running for a period of time and the compressor speed is over 60rps**



Notes:

1. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the IPM module (on the reverse side of the inverter module PCB). Refer to Figure 4-4.3.
2. Use clip-on ammeter to measure the compressor current, if the current is normal indicates the inverter module is failed, if the current is abnormal indicates the compressor has failed.

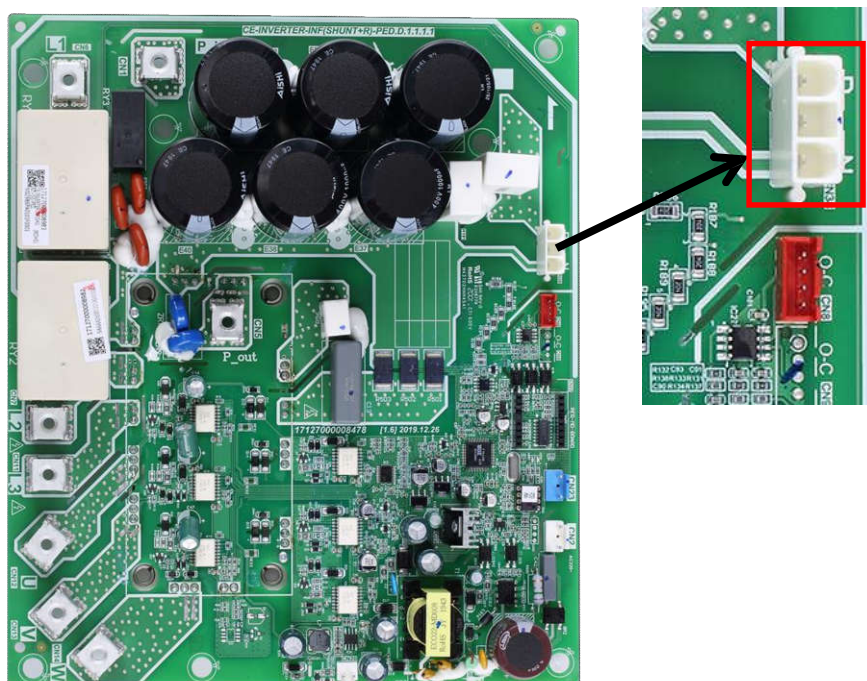
**Situation 5: L0 error appears occasionally/irregularly**



#### 4.20.7 L1/L2 troubleshooting

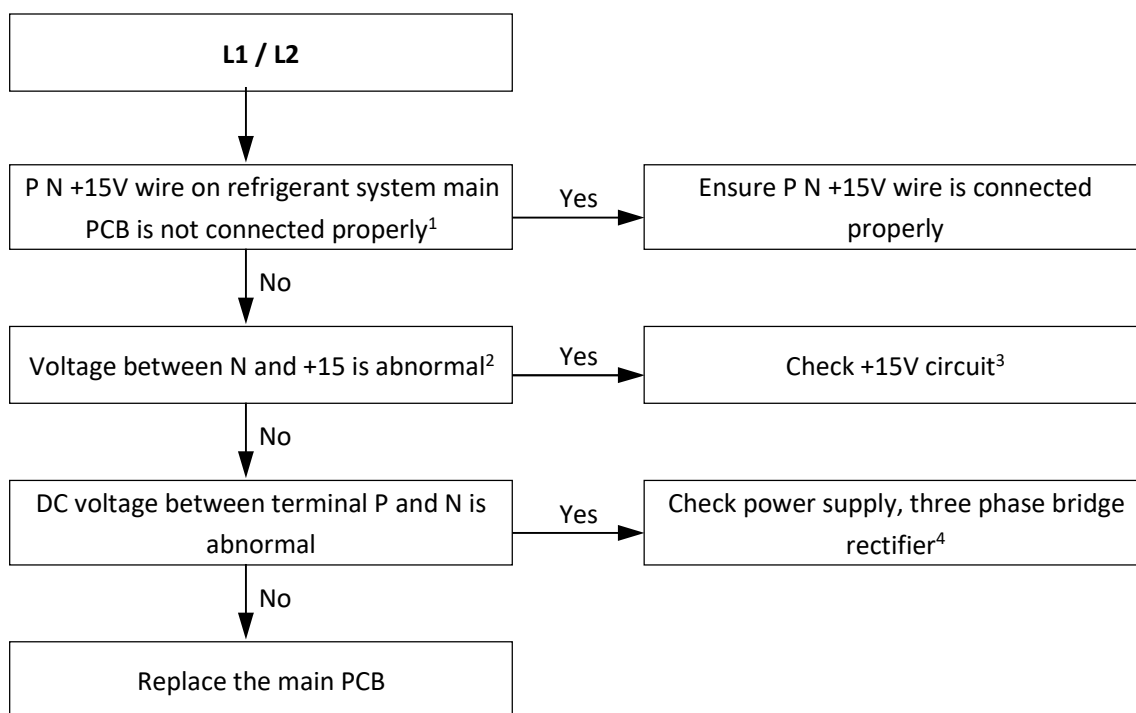
The normal DC voltage between terminals P and N on inverter module is 540V. If the voltage is lower than 300V, the unit displays an L1 error; if the voltage is higher than 830V, the unit displays an L2 error. Refer to Figure4-4.6.

Figure 4-4.6: P, N terminals voltage



$V_{\text{normal}} = 540\text{V DC}$

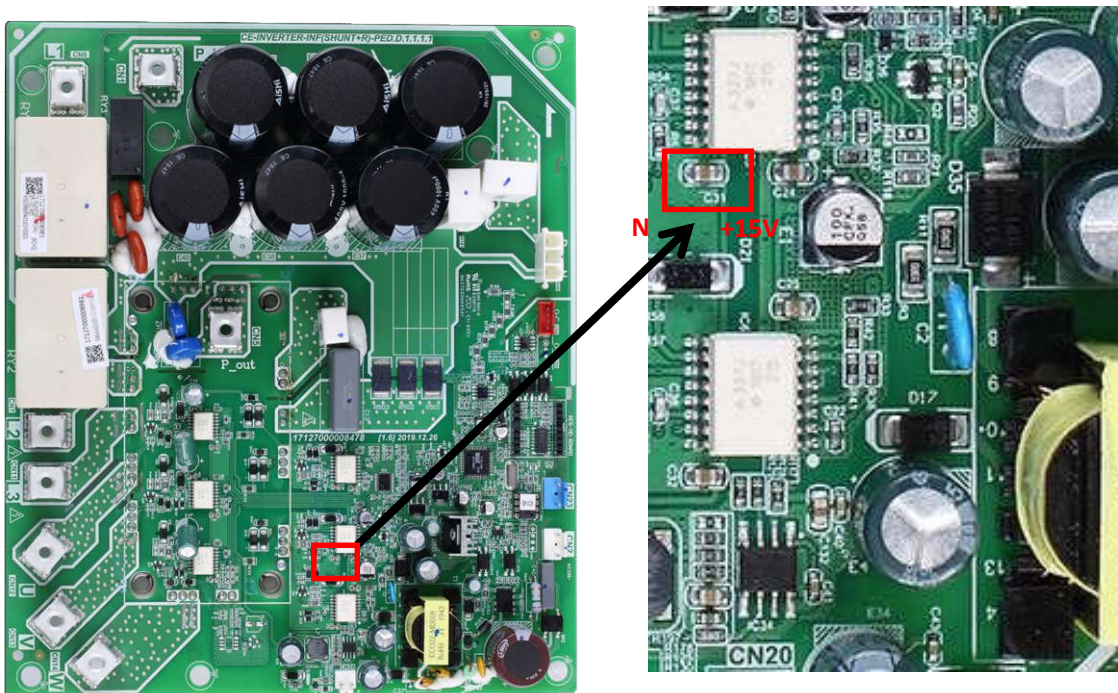
**Situation 1: L1 or L2 error appears immediately after the outdoor unit is powered-on**



Notes:

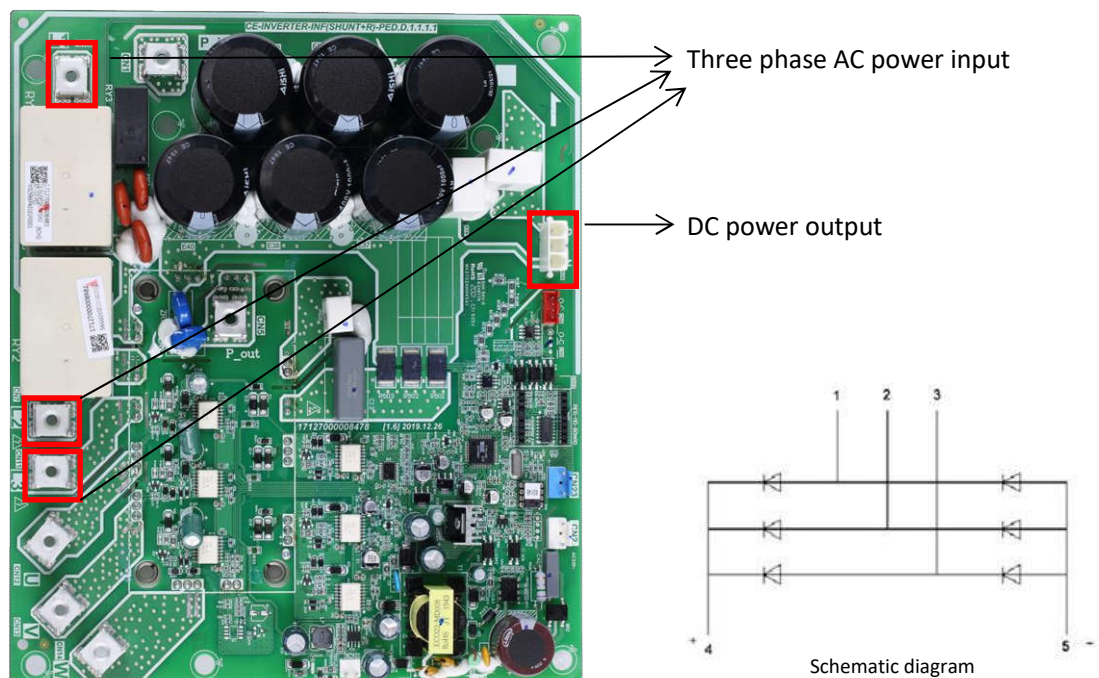
1. P N +15V terminal on refrigerant system main PCB. Refer to Figure4-4.9.
2. Voltage between N and +15. Refer to Figure4-4.7

Figure 4-4.7: P N +15V terminal +15V (IC4/5/6PIN12); N- (IC4/5、6) PIN13



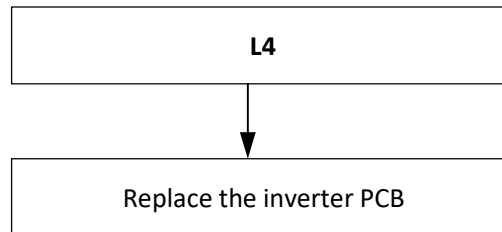
3. Check the +15V circuit according to corresponding wiring diagram. If IC4/5/6PIN12 on inverter module output voltage is not +15V means the inverter module is failed. If voltage output of inverter module is +15V means main PCB is failed.
4. Check the bridge rectifier using one of the following two methods (refer to Figure 4-4.8):
  - Method 1: measure the resistance between any two of the 5 bridge rectifier terminals. If any of the resistances is close to zero, the bridge rectifier has failed.
  - Method 2: dial a multimeter to the diodesetting:
    - Put the red probe on the DC power output negative terminal (terminal 5) and put the black probe onto each of the AC power input terminals (terminals 1, 2 and 3) in turn. The voltage between terminal 5 and each of terminals 1, 2 and 3 should be around 0.378V. If the voltage is 0, the bridge rectifier has failed.
    - Put the red probe on the DC power output positive terminal (terminal 4), then put black probe onto each of the AC power input terminals (terminals 1, 2 and 3) in turn. The voltage between terminal 4 and each of terminals 1, 2 and 3 should be infinite. If the voltage is 0, the bridge rectifier has failed.

Figure 4-4.8: Bridge rectifier

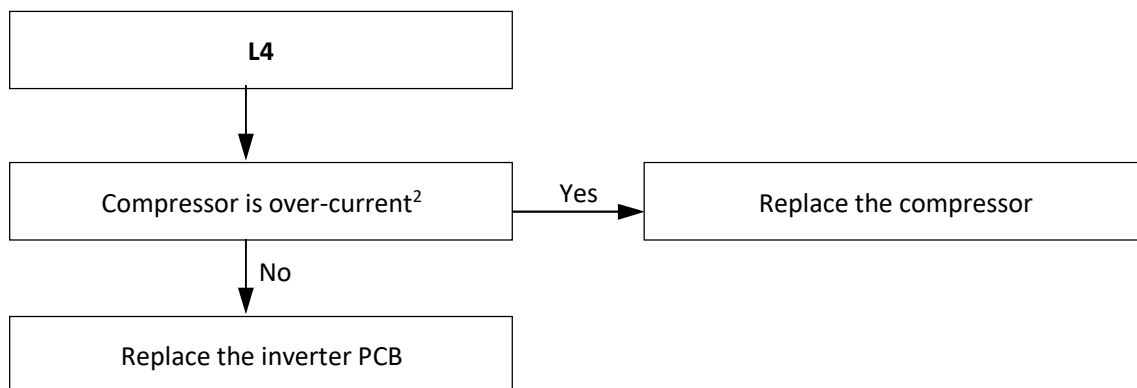


#### 4.20.8 L4 troubleshooting(the same as L1/L2)

**Situation 1: L4 error appears immediately after the outdoor unit is powered-on**



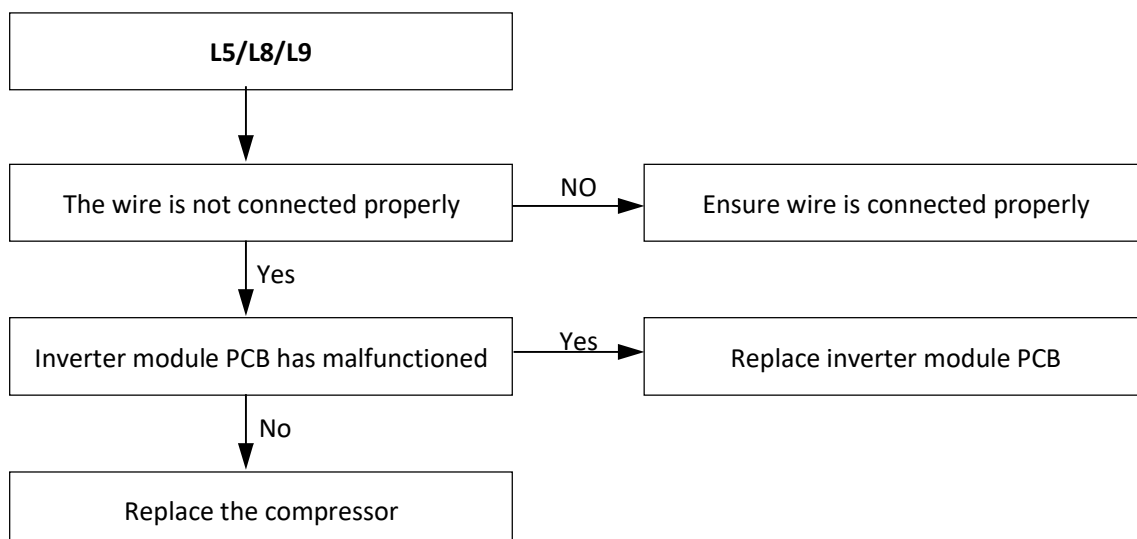
**Condition 2: L4 error appears after the compressor has been running for a period of time and the compressor speed is over 60rps**



Notes:

1. Re-start the unit, use clip-on ammeter to measure the compressor current, if the current is normal indicates the compressor is failed, if the current is abnormal indicates the inverter PCB is failed..

#### 4.20.9 L5/L8/L9 troubleshooting



## **4.21 Pd Troubleshooting**

### **4.21.1 Digital display output**



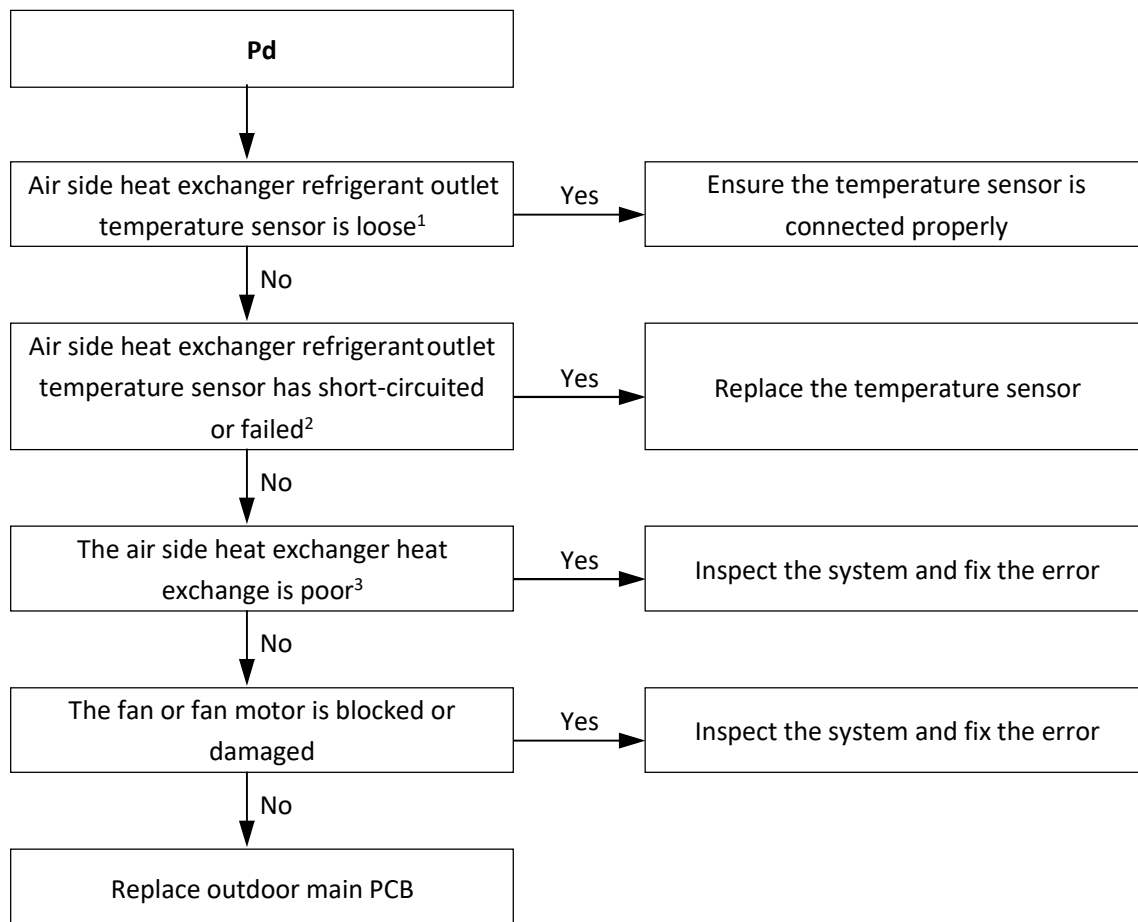
### **4.21.2 Description**

- High temperature protection of air side heat exchanger refrigerant outlet in cooling mode. When the air side heat exchanger refrigerant outlet temperature is higher than 61°C for more than 3 seconds, the system displays Pd protection and Yukon Mono stops running. When the air side heat exchanger refrigerant outlet temperature returns drops below 55°C, Pd is removed and normal operation resumes.
- Yukon Mono stops running.
- Error code is displayed on outdoor unit main PCB and user interface.

### **4.21.3 Possible causes**

- Temperature sensor not connected properly or has malfunctioned.
- Poor condenser heat exchange.
- Fan motor damaged.
- Hydronic system main PCB damaged.

#### 4.21.4 Procedure

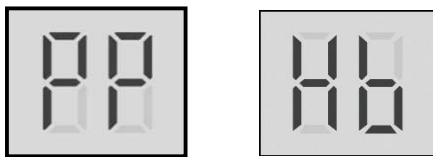


**Notes:**

1. Air side heat exchanger refrigerant outlet temperature sensor and outdoor ambient temperature sensor connection port are CN9 on the outdoor unit refrigerant system main PCB (labeled 6 in Figure 4-2.2)
2. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 4-5.1.
3. Check air side heat exchanger, fan and air outlets for dirt/blockages.
4. High pressure switch connection is port CN31 on the outdoor unit refrigerant system main PCB (labeled 21 in Figure 4-2.2)

## 4.22 PP Troubleshooting

### 4.22.1 Digital display output



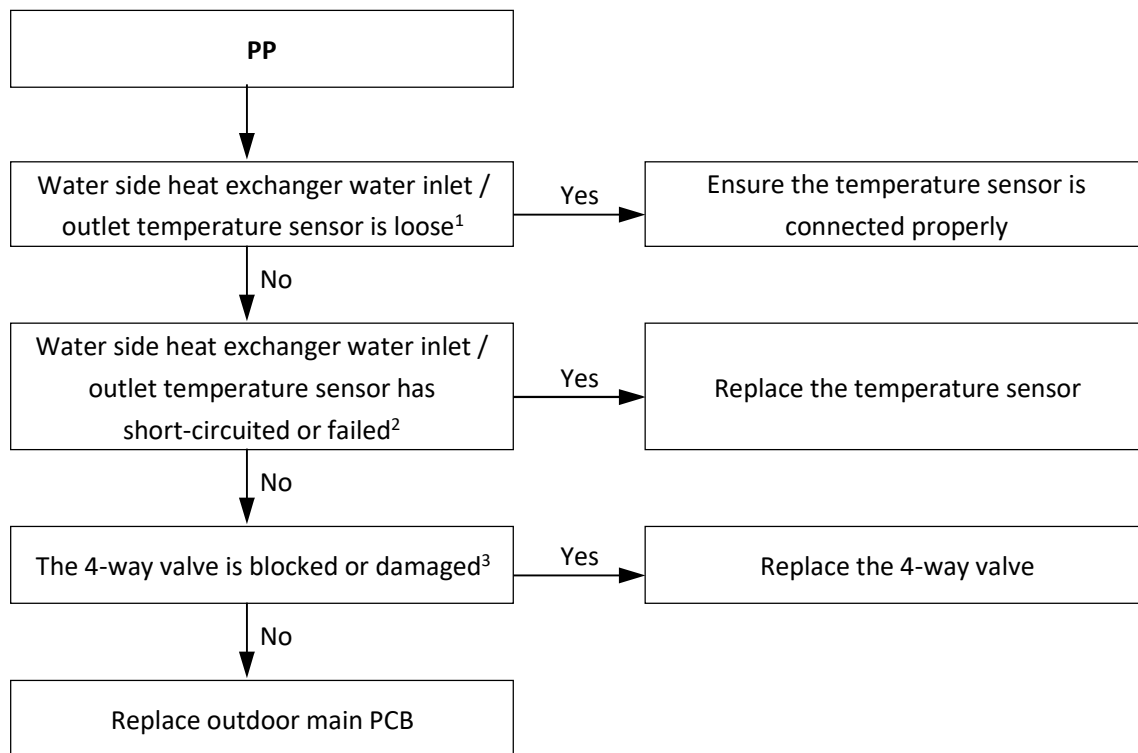
### 4.22.2 Description

- Water side heat exchanger inlet temperature is higher than outlet temperature in heating mode.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.
- Hb indicates PP has displayed 3 times.

### 4.22.3 Possible causes

- Temperature sensor not connected properly or has malfunctioned.
- 4-way valve is blocked or damaged.
- Hydronic system main PCB damaged.

#### 4.22.4 Procedure

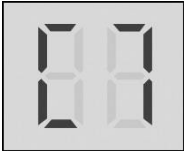


#### Notes:

1. Water side heat exchanger water inlet temperature sensor and water side heat exchanger water outlet temperature sensor connections are port CN6 on the hydronic system main PCB (labeled 10 in Figure 4-2.1).
2. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 4-5.3
3. Restart the unit in cooling mode to change the refrigerant flow direction. If the unit does not operate normally, the 4-way valve is blocked or damaged.

## **4.23 C7 Troubleshooting**

### **4.23.1 Digital display output**



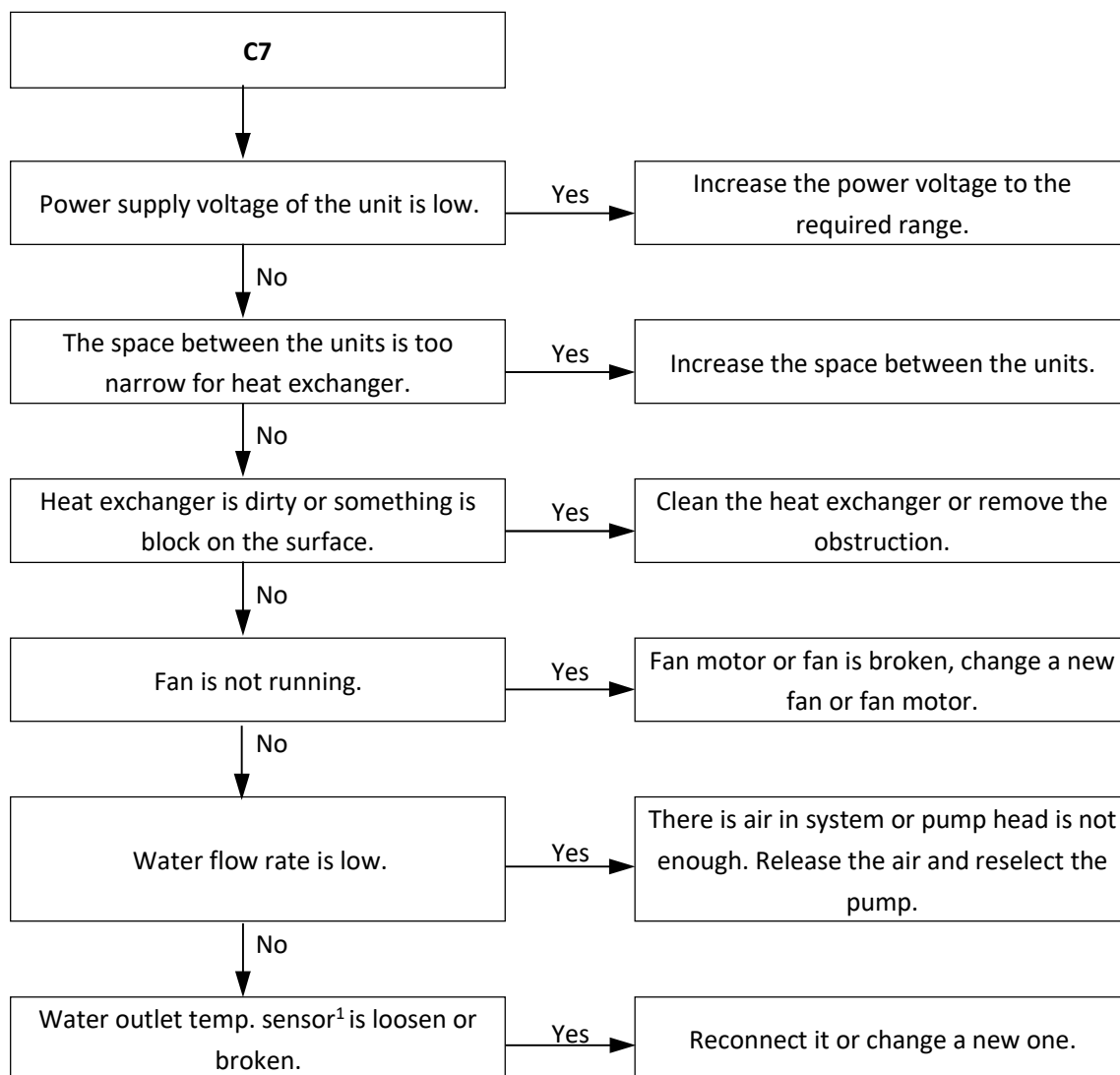
### **4.23.2 Description**

- Transducer module temperature too high protection
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### **4.23.3 Possible causes**

- Power supply voltage of the unit is low.
- The space between the units is too narrow for heat exchanger.
- Heat exchanger is dirty or something is block on the surface.
- Fan is not running.
- Water flow rate is low.
- Water outlet temp. sensor is loosen or broken.

#### 4.23.4 Procedure



#### Notes:

1. Water side heat exchanger water inlet temperature sensor and water side heat exchanger water outlet temperature sensor connections are port CN6 on the hydronic system main PCB (labeled 10 in Figure 4-2.1).
2. Set a multi-meter to buzzer mode and test any two terminals of sensor. If the resistance is too low, the buzzer sounds, which means the sensor has short-circuited. If the resistance is not consistent with the sensor's resistance characteristics table, the sensor has failed. Refer to Table 4-5.3.

## **4.24 bH Troubleshooting**

### **4.24.1 Digital display output**



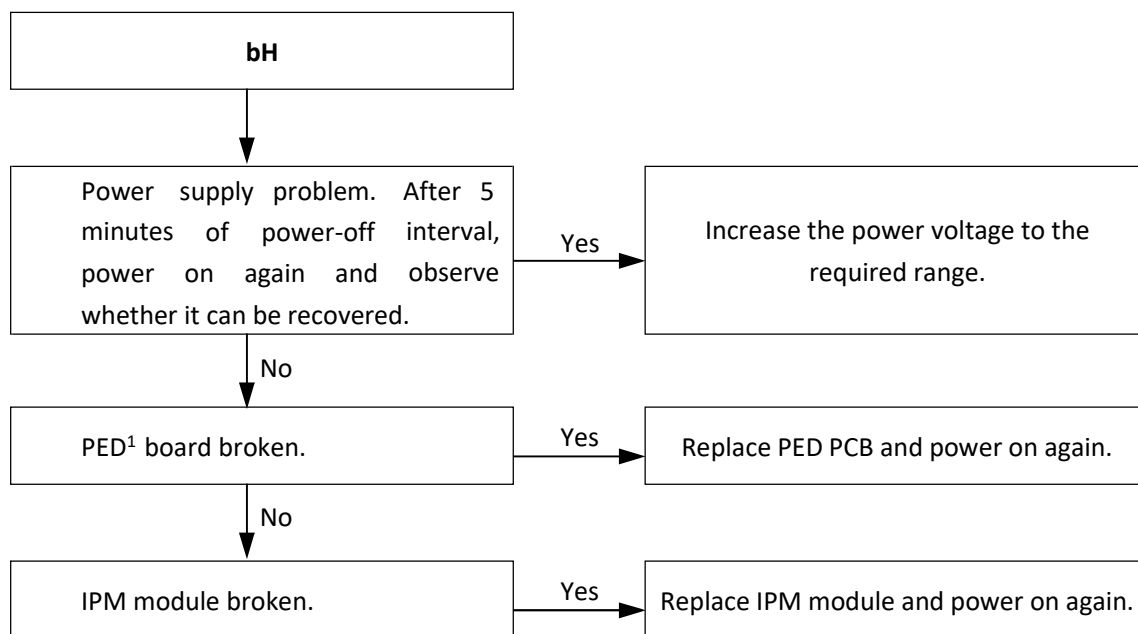
### **4.24.2 Description**

- PED PCB failure
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB and user interface.

### **4.24.3 Possible causes**

- Power supply problem.
- PED board broken.
- IPM module broken.

#### 4.24.4 Procedure



Notes:

1. PED is labeled 13 in Figure 4-2.3.

## 4.25 Pb Troubleshooting

### 4.25.1 Digital display output



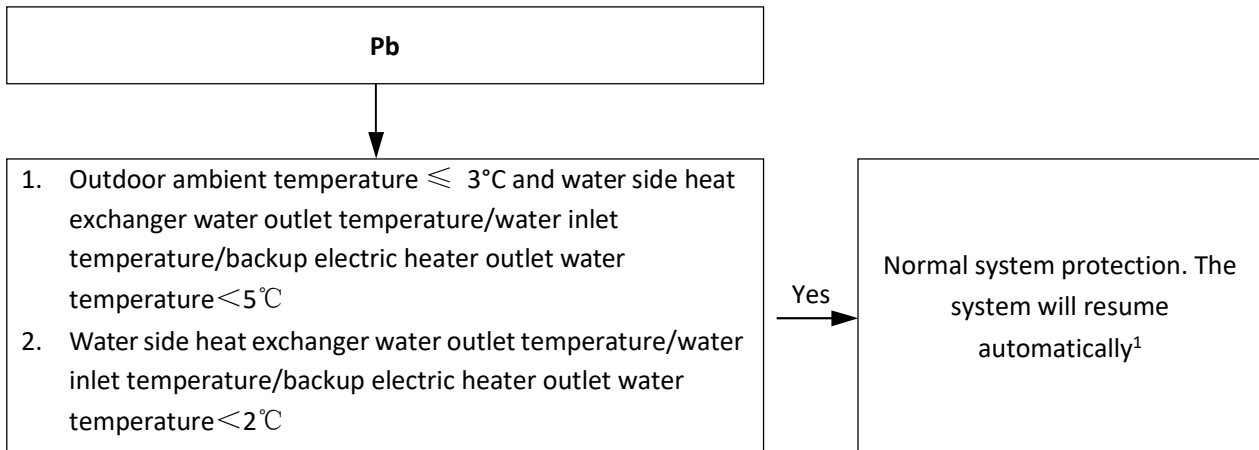
### 4.25.2 Description

- Water side heat exchanger anti-freeze protection.
- Yukon Mono stops running.
- Pb is displayed on hydronic system main PCB and **ANTI.FREEZE** icon is displayed on user interface.

### 4.25.3 Possible causes

- Normal system protection.

### 4.25.4 Procedure



#### Notes:

1. Refer to Part 3, 5.7 "Water Side Heat Exchanger Anti-freeze Protection Control".

## 4.26 HE Troubleshooting

### 4.26.1 Digital display output



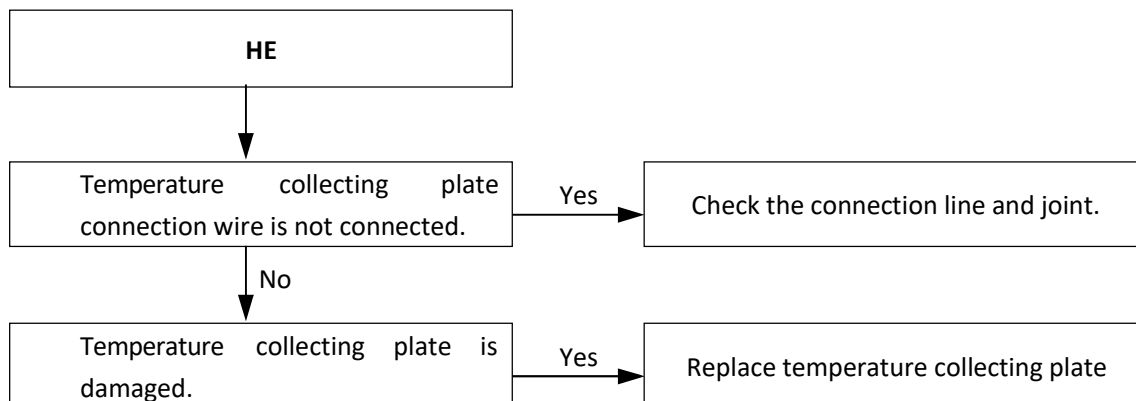
### 4.26.2 Description

- Communication error between main control board of hydronic module and Ta/room thermostat transfer PCB
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB, outdoor unit main PCB and user interface.

### 4.26.3 Possible causes

- Temperature collecting plate(Optional) connection wire is not connected.
- Temperature collecting plate(Optional) is damaged.

### 4.26.4 Procedure



## 4.27 Hd Troubleshooting

### 4.27.1 Digital display output



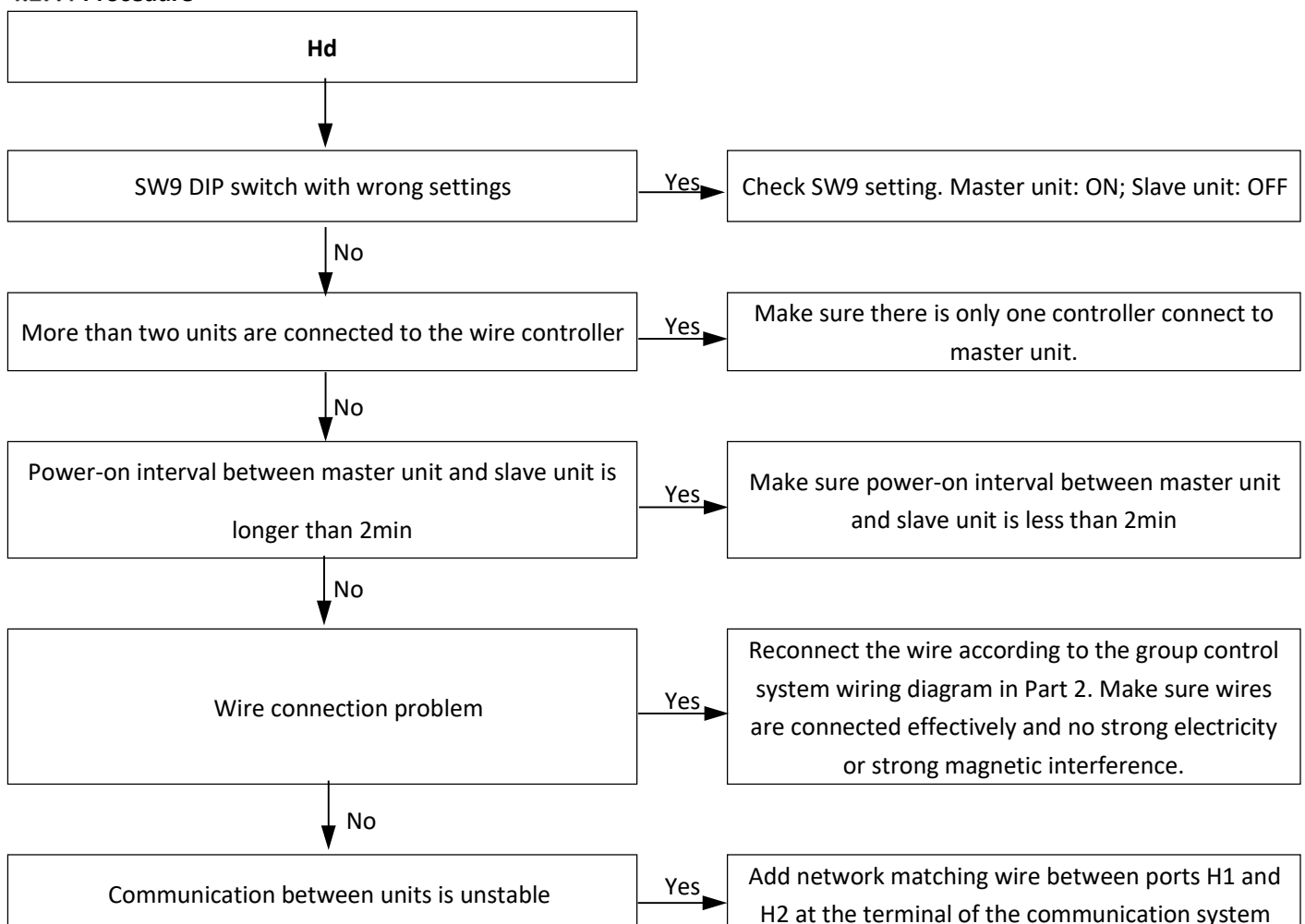
### 4.27.2 Description

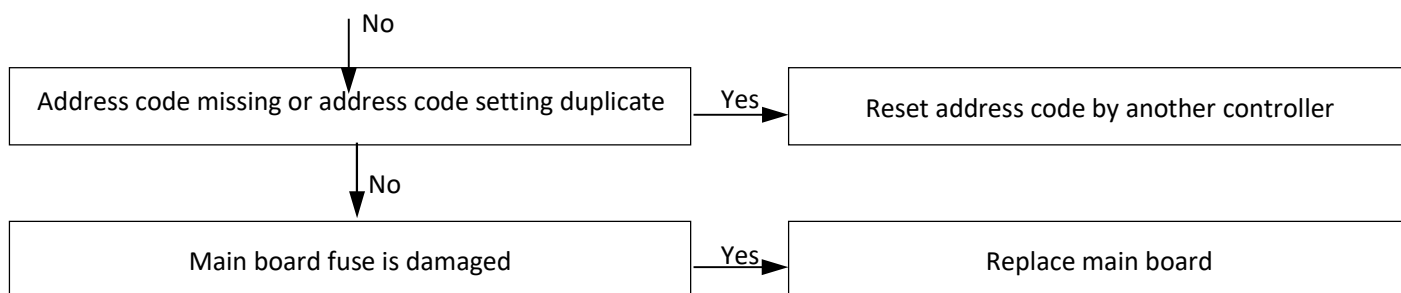
- Communication fault between master unit and slave unit (in parallel)
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB, outdoor unit main PCB and user interface.

### 4.27.3 Possible causes

- SW9 DIP switch with wrong settings
- More than two units are connected to the wire controller
- Power-on interval between master unit and slave unit is longer than 2min
- Wire connection error
- Communication between units is unstable
- Address code missing or addresscode setting duplicate
- Main board fuse is damaged

### 4.27.4 Procedure





## 5 Appendix to Part 4

### 5.1 Temperature Sensor Resistance Characteristics

Table 4-5.1: Outdoor ambient temperature sensor, water side heat exchanger refrigerant inlet / outlet (liquid / gas pipe) temperature sensor, air side heat exchanger refrigerant out temperature sensor and suction pipe temperature sensor resistance characteristics

| Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) |
|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| -25              | 144.266         | 15               | 16.079          | 55               | 2.841           | 95               | 0.708           |
| -24              | 135.601         | 16               | 15.313          | 56               | 2.734           | 96               | 0.686           |
| -23              | 127.507         | 17               | 14.588          | 57               | 2.632           | 97               | 0.666           |
| -22              | 119.941         | 18               | 13.902          | 58               | 2.534           | 98               | 0.646           |
| -21              | 112.867         | 19               | 13.251          | 59               | 2.44            | 99               | 0.627           |
| -20              | 106.732         | 20               | 12.635          | 60               | 2.35            | 100              | 0.609           |
| -19              | 100.552         | 21               | 12.05           | 61               | 2.264           | 101              | 0.591           |
| -18              | 94.769          | 22               | 11.496          | 62               | 2.181           | 102              | 0.574           |
| -17              | 89.353          | 23               | 10.971          | 63               | 2.102           | 103              | 0.558           |
| -16              | 84.278          | 24               | 10.473          | 64               | 2.026           | 104              | 0.542           |
| -15              | 79.521          | 25               | 10              | 65               | 1.953           | 105              | 0.527           |
| -14              | 75.059          | 26               | 9.551           | 66               | 1.883           |                  |                 |
| -13              | 70.873          | 27               | 9.125           | 67               | 1.816           |                  |                 |
| -12              | 66.943          | 28               | 8.721           | 68               | 1.752           |                  |                 |
| -11              | 63.252          | 29               | 8.337           | 69               | 1.69            |                  |                 |
| -10              | 59.784          | 30               | 7.972           | 70               | 1.631           |                  |                 |
| -9               | 56.524          | 31               | 7.625           | 71               | 1.574           |                  |                 |
| -8               | 53.458          | 32               | 7.296           | 72               | 1.519           |                  |                 |
| -7               | 50.575          | 33               | 6.982           | 73               | 1.466           |                  |                 |
| -6               | 47.862          | 34               | 6.684           | 74               | 1.416           |                  |                 |
| -5               | 45.308          | 35               | 6.401           | 75               | 1.367           |                  |                 |
| -4               | 42.903          | 36               | 6.131           | 76               | 1.321           |                  |                 |
| -3               | 40.638          | 37               | 5.874           | 77               | 1.276           |                  |                 |
| -2               | 38.504          | 38               | 5.63            | 78               | 1.233           |                  |                 |
| -1               | 36.492          | 39               | 5.397           | 79               | 1.191           |                  |                 |
| 0                | 34.596          | 40               | 5.175           | 80               | 1.151           |                  |                 |
| 1                | 32.807          | 41               | 4.964           | 81               | 1.113           |                  |                 |
| 2                | 31.12           | 42               | 4.763           | 82               | 1.076           |                  |                 |
| 3                | 29.528          | 43               | 4.571           | 83               | 1.041           |                  |                 |
| 4                | 28.026          | 44               | 4.387           | 84               | 1.007           |                  |                 |
| 5                | 26.608          | 45               | 4.213           | 85               | 0.974           |                  |                 |
| 6                | 25.268          | 46               | 4.046           | 86               | 0.942           |                  |                 |
| 7                | 24.003          | 47               | 3.887           | 87               | 0.912           |                  |                 |
| 8                | 22.808          | 48               | 3.735           | 88               | 0.883           |                  |                 |
| 9                | 21.678          | 49               | 3.59            | 89               | 0.855           |                  |                 |
| 10               | 20.61           | 50               | 3.451           | 90               | 0.828           |                  |                 |
| 11               | 19.601          | 51               | 3.318           | 91               | 0.802           |                  |                 |
| 12               | 18.646          | 52               | 3.191           | 92               | 0.777           |                  |                 |
| 13               | 17.743          | 53               | 3.069           | 93               | 0.753           |                  |                 |
| 14               | 16.888          | 54               | 2.952           | 94               | 0.73            |                  |                 |

Table 4-5.2: Compressor discharge pipe temperature sensor resistance characteristics

| Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) |
|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| -20              | 542.7           | 20               | 68.66           | 60               | 13.59           | 100              | 3.702           |
| -19              | 511.9           | 21               | 65.62           | 61               | 13.11           | 101              | 3.595           |
| -18              | 483.0           | 22               | 62.73           | 62               | 12.65           | 102              | 3.492           |
| -17              | 455.9           | 23               | 59.98           | 63               | 12.21           | 103              | 3.392           |
| -16              | 430.5           | 24               | 57.37           | 64               | 11.79           | 104              | 3.296           |
| -15              | 406.7           | 25               | 54.89           | 65               | 11.38           | 105              | 3.203           |
| -14              | 384.3           | 26               | 52.53           | 66               | 10.99           | 106              | 3.113           |
| -13              | 363.3           | 27               | 50.28           | 67               | 10.61           | 107              | 3.025           |
| -12              | 343.6           | 28               | 48.14           | 68               | 10.25           | 108              | 2.941           |
| -11              | 325.1           | 29               | 46.11           | 69               | 9.902           | 109              | 2.860           |
| -10              | 307.7           | 30               | 44.17           | 70               | 9.569           | 110              | 2.781           |
| -9               | 291.3           | 31               | 42.33           | 71               | 9.248           | 111              | 2.704           |
| -8               | 275.9           | 32               | 40.57           | 72               | 8.940           | 112              | 2.630           |
| -7               | 261.4           | 33               | 38.89           | 73               | 8.643           | 113              | 2.559           |
| -6               | 247.8           | 34               | 37.30           | 74               | 8.358           | 114              | 2.489           |
| -5               | 234.9           | 35               | 35.78           | 75               | 8.084           | 115              | 2.422           |
| -4               | 222.8           | 36               | 34.32           | 76               | 7.820           | 116              | 2.357           |
| -3               | 211.4           | 37               | 32.94           | 77               | 7.566           | 117              | 2.294           |
| -2               | 200.7           | 38               | 31.62           | 78               | 7.321           | 118              | 2.233           |
| -1               | 190.5           | 39               | 30.36           | 79               | 7.086           | 119              | 2.174           |
| 0                | 180.9           | 40               | 29.15           | 80               | 6.859           | 120              | 2.117           |
| 1                | 171.9           | 41               | 28.00           | 81               | 6.641           | 121              | 2.061           |
| 2                | 163.3           | 42               | 26.90           | 82               | 6.430           | 122              | 2.007           |
| 3                | 155.2           | 43               | 25.86           | 83               | 6.228           | 123              | 1.955           |
| 4                | 147.6           | 44               | 24.85           | 84               | 6.033           | 124              | 1.905           |
| 5                | 140.4           | 45               | 23.89           | 85               | 5.844           | 125              | 1.856           |
| 6                | 133.5           | 46               | 22.89           | 86               | 5.663           | 126              | 1.808           |
| 7                | 127.1           | 47               | 22.10           | 87               | 5.488           | 127              | 1.762           |
| 8                | 121.0           | 48               | 21.26           | 88               | 5.320           | 128              | 1.717           |
| 9                | 115.2           | 49               | 20.46           | 89               | 5.157           | 129              | 1.674           |
| 10               | 109.8           | 50               | 19.69           | 90               | 5.000           | 130              | 1.632           |
| 11               | 104.6           | 51               | 18.96           | 91               | 4.849           |                  |                 |
| 12               | 99.69           | 52               | 18.26           | 92               | 4.703           |                  |                 |
| 13               | 95.05           | 53               | 17.58           | 93               | 4.562           |                  |                 |
| 14               | 90.66           | 54               | 16.94           | 94               | 4.426           |                  |                 |
| 15               | 86.49           | 55               | 16.32           | 95               | 4.294           |                  |                 |
| 16               | 82.54           | 56               | 15.73           | 96               | 4.167           |                  |                 |
| 17               | 78.79           | 57               | 15.16           | 97               | 4.045           |                  |                 |
| 18               | 75.24           | 58               | 14.62           | 98               | 3.927           |                  |                 |
| 19               | 71.86           | 59               | 14.09           | 99               | 3.812           |                  |                 |

**Yukon Arctic Mono**

Table 4-5.3: Water side heat exchanger water inlet / outlet temperature sensor, backup heater exchanger outlet water temperature sensor and DHW temperature sensor resistance characteristics

| Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) | Temperature (°C) | Resistance (kΩ) |
|------------------|-----------------|------------------|-----------------|------------------|-----------------|------------------|-----------------|
| -30              | 853.724         | 10               | 98.227          | 50               | 17.600          | 90               | 4.4381          |
| -29              | 802.986         | 11               | 93.634          | 51               | 16.943          | 91               | 4.3022          |
| -28              | 755.557         | 12               | 89.278          | 52               | 16.315          | 92               | 4.1711          |
| -27              | 711.21          | 13               | 85.146          | 53               | 15.713          | 93               | 4.0446          |
| -26              | 669.728         | 14               | 81.225          | 54               | 15.136          | 94               | 3.9225          |
| -25              | 630.913         | 15               | 77.504          | 55               | 14.583          | 95               | 3.8046          |
| -24              | 594.58          | 16               | 73.972          | 56               | 14.054          | 96               | 3.6908          |
| -23              | 560.556         | 17               | 70.619          | 57               | 13.546          | 97               | 3.5810          |
| -22              | 528.68          | 18               | 67.434          | 58               | 13.059          | 98               | 3.4748          |
| -21              | 498.814         | 19               | 64.409          | 59               | 12.592          | 99               | 3.3724          |
| -20              | 470.812         | 20               | 61.535          | 60               | 12.144          | 100              | 3.2734          |
| -19              | 444.548         | 21               | 58.804          | 61               | 11.715          | 101              | 3.1777          |
| -18              | 419.907         | 22               | 56.209          | 62               | 11.302          | 102              | 3.0853          |
| -17              | 396.779         | 23               | 53.742          | 63               | 10.906          | 103              | 2.9960          |
| -16              | 375.063         | 24               | 51.396          | 64               | 10.526          | 104              | 2.9096          |
| -15              | 354.662         | 25               | 49.165          | 65               | 10.161          | 105              | 2.8262          |
| -14              | 335.492         | 26               | 47.043          | 66               | 9.8105          |                  |                 |
| -13              | 317.470         | 27               | 45.025          | 67               | 9.4736          |                  |                 |
| -12              | 300.521         | 28               | 43.104          | 68               | 9.1498          |                  |                 |
| -11              | 284.576         | 29               | 41.276          | 69               | 8.8387          |                  |                 |
| -10              | 269.569         | 30               | 39.535          | 70               | 8.5396          |                  |                 |
| -9               | 255.439         | 31               | 37.878          | 71               | 8.2520          |                  |                 |
| -8               | 242.131         | 32               | 36.299          | 72               | 7.9755          |                  |                 |
| -7               | 229.593         | 33               | 34.796          | 73               | 7.7094          |                  |                 |
| -6               | 217.774         | 34               | 33.363          | 74               | 7.4536          |                  |                 |
| -5               | 206.630         | 35               | 31.977          | 75               | 7.2073          |                  |                 |
| -4               | 196.119         | 36               | 30.695          | 76               | 6.9704          |                  |                 |
| -3               | 186.201         | 37               | 29.453          | 77               | 6.7423          |                  |                 |
| -2               | 176.840         | 38               | 28.269          | 78               | 6.5228          |                  |                 |
| -1               | 168.001         | 39               | 27.139          | 79               | 6.3114          |                  |                 |
| 0                | 159.653         | 40               | 26.061          | 80               | 6.1078          |                  |                 |
| 1                | 151.766         | 41               | 25.031          | 81               | 5.9117          |                  |                 |
| 2                | 144.311         | 42               | 24.048          | 82               | 5.7228          |                  |                 |
| 3                | 137.264         | 43               | 23.109          | 83               | 5.5409          |                  |                 |
| 4                | 130.599         | 44               | 22.212          | 84               | 5.3655          |                  |                 |
| 5                | 124.293         | 45               | 21.355          | 85               | 5.1965          |                  |                 |
| 6                | 118.326         | 46               | 20.536          | 86               | 5.0336          |                  |                 |
| 7                | 112.679         | 47               | 19.752          | 87               | 4.8765          |                  |                 |
| 8                | 107.330         | 48               | 19.003          | 88               | 4.7251          |                  |                 |
| 9                | 102.265         | 49               | 18.286          | 89               | 4.5790          |                  |                 |

# CONTENTS – TECHNICAL PART

|                                             |     |
|---------------------------------------------|-----|
| Part 5 General Information.....             | 90  |
| Part 6 Engineering Data.....                | 105 |
| Part 7 Installation and Field Settings..... | 124 |

# Part 5

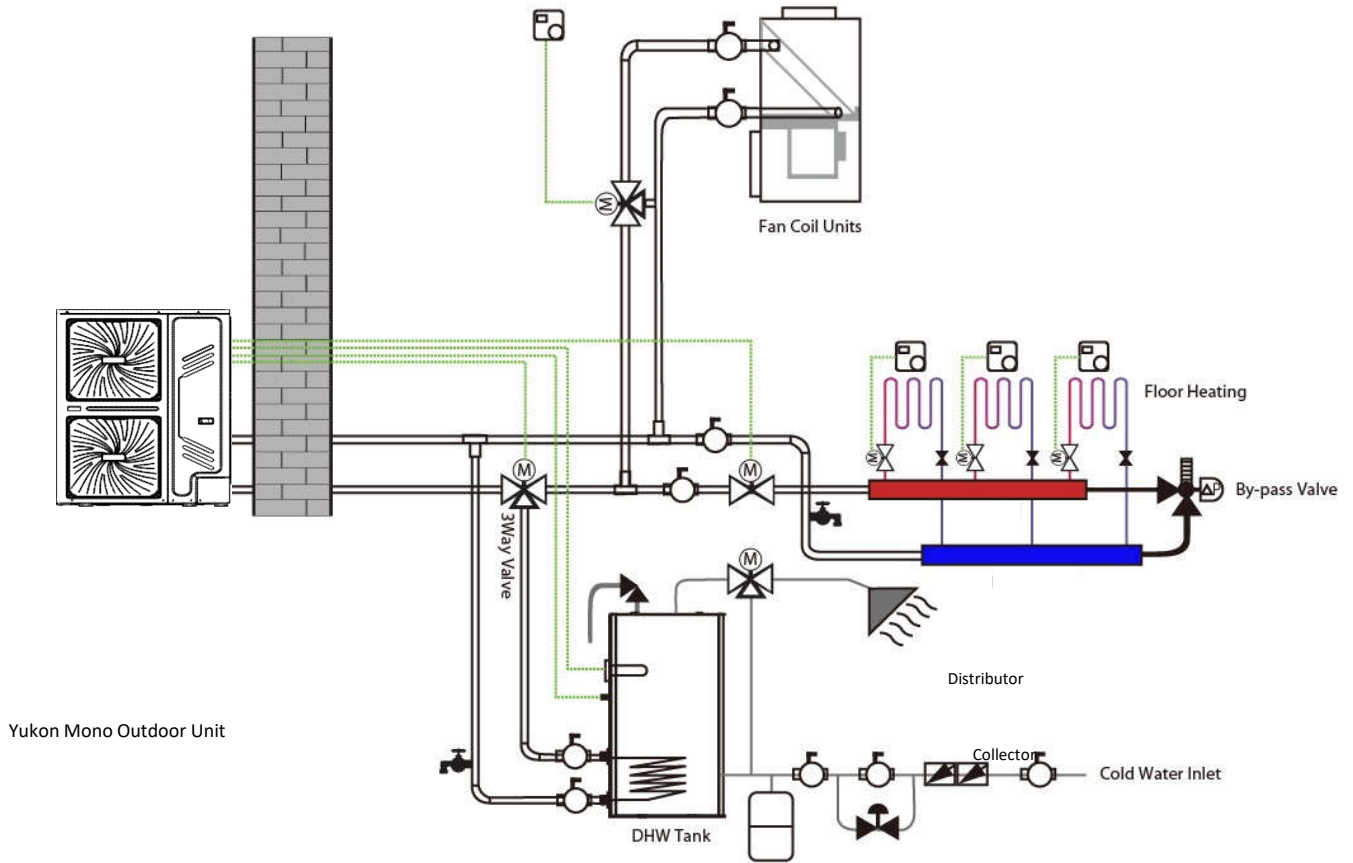
# General Information

- 1** Yukon Mono System ..... 91
  - 2** Unit Capacities ..... 93
  - 3** Nomenclature..... 93
  - 4** System Design and Unit Selection ..... 94
  - 5** Typical Applications ..... 96

## 1 Yukon Mono System

### 1.1 System Schematic

Figure 1-1.1: System schematic



Yukon Mono is an integrated air to water heat pump system which is one-stop solution for space heating, space cooling and domestic hot water. The outdoor heat pump system extracts heat from the outdoor air and transfers this heat through refrigerant piping to the plate heat exchanger in the hydronic system. The heated water in the hydronic system circulates to low temperature heat emitters (floor heating loops or low temperature radiators) to provide space heating, and to the domestic hot water tank to provide domestic hot water. The 4-way valve in the outdoor unit can reverse the refrigerant cycle so that the hydronic system can provide chilled water for cooling using fan coil units.

The heating capacity of heat pumps decreases with ambient temperature dropping. Yukon Mono can be equipped with a backup electric heater to provide additional heating capacity for use during extremely cold weather when the heat pump capacity is insufficient. The backup electric heater also serves as a backup in case of heat pump malfunction and for anti-freeze protection of the outside water piping in winter.

## Yukon Arctic Mono

### 1.2 System Configurations

Yukon Mono can be configured to run with the electric heater either enabled or disabled and can also be used in conjunction with an auxiliary heat source such as a boiler.

The chosen configuration affects the size of heat pump that is required. Three typical configurations are described below. Refer to Figure 1-1.2.

#### Configuration 1: Heat pump only

- The heat pump covers the required capacity and no extra heating capacity is necessary.
- Requires selection of larger capacity heat pump and implies higher initial investment.
- Ideal for new construction in projects where energy efficiency is paramount.

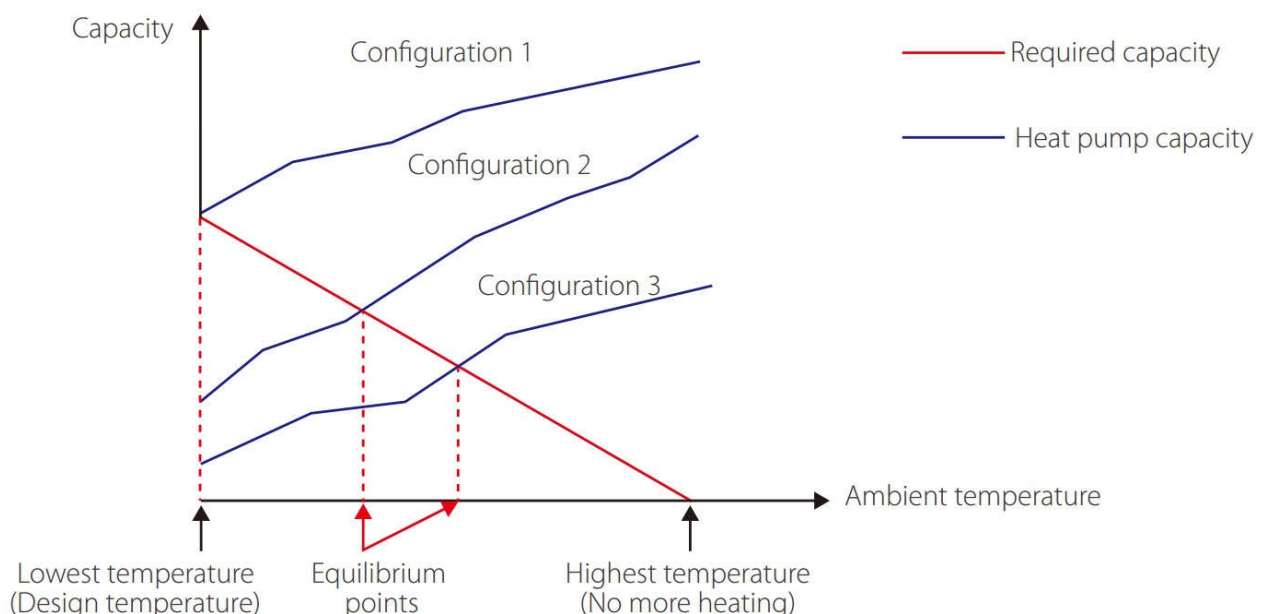
#### Configuration 2: Heat pump and backup electric heater

- Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point (as shown in Figure 1-1.2), the backup electric heater supplies the required additional heating capacity.
- Best balance between initial investment and running costs, results in lowest lifecycle cost.
- Ideal for new construction.

#### Configuration 3: Heat pump with auxiliary heat source

- Heat pump covers the required capacity until the ambient temperature drops below the point at which the heat pump is able to provide sufficient capacity. When the ambient temperature is below this equilibrium point (as shown in Figure 1-1.2), depending on the system settings, either the auxiliary heat source supplies the required additional heating capacity or the heat pump does not run and the auxiliary heat source covers the required capacity.
- Enables selection of lower capacity heat pump.
- Ideal for refurbishments and upgrades.

Figure 1-1.2: System configurations

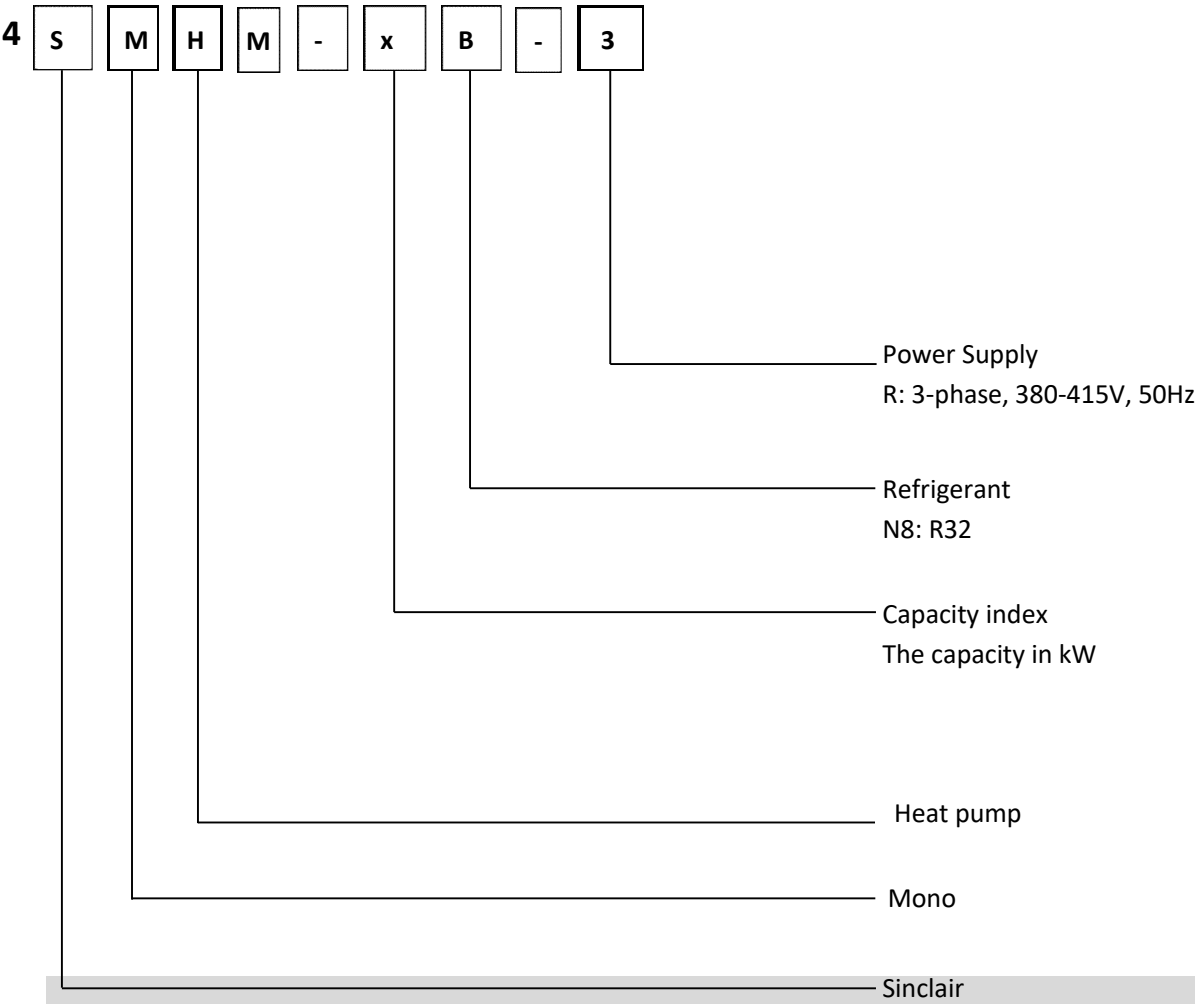


**2** Unit Capacities

Table 1-2.1: Unit capacities range and appearances

| Capacity   | 18kW                                                                                | 22kW        | 26kW        | 30kW        |
|------------|-------------------------------------------------------------------------------------|-------------|-------------|-------------|
| Model      | SMHM-180B-3                                                                         | SMHM-220B-3 | SMHM-260B-3 | SMHM-300B-3 |
| Appearance |  |             |             |             |

**3** Nomenclature



## 5 System Design and Unit Selection

### 5.1 Selection Procedure

#### Step 1: Total heat load calculation

|  |                                                                                                                  |  |
|--|------------------------------------------------------------------------------------------------------------------|--|
|  | Calculate conditioned surface area<br>Select the heat emitters (type, quantity, water temperature and heat load) |  |
|--|------------------------------------------------------------------------------------------------------------------|--|

#### Step 2: System configuration

|  |                                                                                                                                   |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------|--|
|  | Decide whether to include AHS and set AHS's switching temperature<br>Decide whether backup electric heater is enabled or disabled |  |
|--|-----------------------------------------------------------------------------------------------------------------------------------|--|

#### Step 3: Selection of outdoor units

|  |                                                                                                                                                                                        |                                                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|  | Determine required total heat load on outdoor units<br>Set capacity safety factor<br>Select power supply                                                                               |                                                                  |
|  | Provisionally select Yukon Mono unit capacity based on nominal capacity                                                                                                                |                                                                  |
|  | Correct capacity of the outdoor units for the following items:<br>Outdoor air temperature / Outdoor humidity / Water outlet temperature <sup>1</sup> /<br>Altitude / Anti-freeze fluid |                                                                  |
|  | Is corrected Yukon Mono unit capacity $\geq$ Required total heat load on outdoor units <sup>2</sup>                                                                                    |                                                                  |
|  | Yes                                                                                                                                                                                    | No                                                               |
|  | Yukon Mono system selection is complete                                                                                                                                                | Select a larger model or enable backup electric heater operation |

#### Notes:

1. If the required water temperatures of the heat emitters are not all the same, the Yukon Mono's outlet water temperature setting should be set at the highest of the heat emitter required water temperatures. If the water outlet design temperature falls between two temperatures listed in the outdoor unit's capacity table, calculate the corrected capacity by interpolation.
2. Select Mono units which should satisfy both total heating and cooling load requirements.

### 5.2 Yukon Leaving Water Temperature (LWT) Selection

The recommended design LTW ranges for different types of heat emitter are:

- For floor heating: 30 to 35°C
- For fan coil units: 30 to 45°C
- For low temperature radiators: 40 to 50°C

### 5.3 Optimizing System Design

To get the most comfort with the lowest energy consumption with Yukon, it is important to take account of the following considerations:

- Choose heat emitters that allow the heat pump system to operate at as low a hot water temperature as possible whilst still providing sufficient heating.
- Make sure the correct weather dependency curve is selected to match the installation environment (building structure, climate) as well as ender user's demands.
- Connecting room thermostats (field supplied) to the hydronic system helps prevent excessive space heating by stopping the outdoor unit and circulator pump when the room temperature is above the thermostat set point.

### 5.4 Tank back up heater notice

Heat pump will stop when T5(tank temperature) has reached the minimum of both T5S(tank setting temperature) and T5stop (highest tank temperature which can be reached under certain ambient temperature with heat pump only) and lasted for 5s. The value of T5stop is shown as below.

If T5S is higher than T5stop, then T5S can not be reached with heat pump only. In this case, tank back up heater is needed in order to reach T5S.

*T5stop value:*

| Ambient temperature(°C) | -25~21 | -20~14 | -15~-11 | -10~-4 | -5~-1 | 0~4 | 5~9 |
|-------------------------|--------|--------|---------|--------|-------|-----|-----|
| T5stop(°C)              | 35     | 40     | 45      | 48     | 50    | 53  | 55  |

| Ambient temperature(°C) | 10~14 | 15~19 | 20~24 | 25~29 | 30~34 | 35~39 | 40~43 |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| T5stop(°C)              | 55    | 53    | 50    | 50    | 48    | 48    | 45    |

## 6 Typical Applications

### 6.1 Space Heating

The room thermostat is used as a switch. When there is a heating request from the room thermostat, the Mono unit operates to achieve the target water temperature set on the user interface. When the room temperature reaches the thermostat's set temperature, the unit stops.

Figure 1-5.1: Space heating

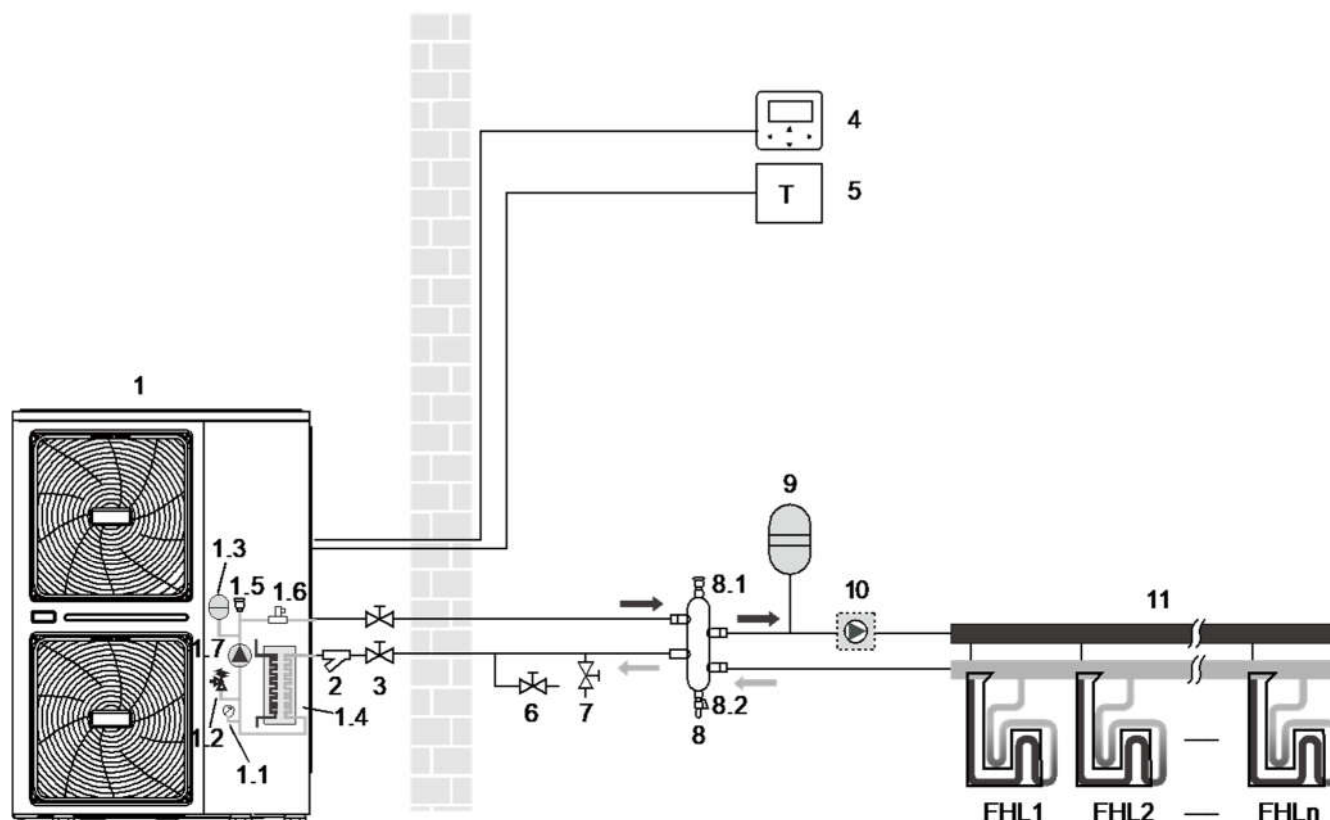


Table 1-5.1: Space heating

| Legend |                                                   |           |                                                            |
|--------|---------------------------------------------------|-----------|------------------------------------------------------------|
| 1      | Outdoor unit                                      | 5         | Room thermostat (field supplied)                           |
| 1.1    | Manometer                                         | 6         | Drain valve (field supplied)                               |
| 1.2    | Pressure relief valve                             | 7         | Fill valve (field supplied)                                |
| 1.3    | Expansion vessel                                  | 8         | Balance tank (field supplied)                              |
| 1.4    | Plate heat exchanger                              | 8.1       | Air purge valve                                            |
| 1.5    | Air purge valve                                   | 8.2       | Drain valve                                                |
| 1.6    | Flow switch                                       | 9         | Expansion vessel (field supplied)                          |
| 1.7    | P <sub>i</sub> : Circulation pump inside the unit | 10        | P <sub>o</sub> : Outside circulation pump (field supplied) |
| 2      | Y-shape filter                                    | 11        | Collector / Distributor (field supplied)                   |
| 3      | Stop valve (field supplied)                       | FHL 1...n | Floor heating loop (field supplied)                        |
| 4      | Wired controller                                  |           |                                                            |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

## 6.2 Space Heating and DHW with solar system

Space heating without room thermostat connected to the unit. Domestic hot water tank is connected to the unit, and the tank is with solar heating system. Solar water pump is controlled by T<sub>solar</sub> temperature sensor. Balance tank temperature sensor is used to control on/off of heat pump. Once the heat pump stops, internal pump stops to save energy and then balance tank provides hot water for space heating. In addition, balance tank temperature control can meet both space heating and domestic hot water needs at the same time.

Figure 1-5.2: Space heating and DHW with solar system

Space heating without room thermostat connected to the unit. Domestic hot water tank is connected to the unit, and the tank is with solar heating system. (The example is just for application illustration; please confirm the exact installation method according to the installation manual)

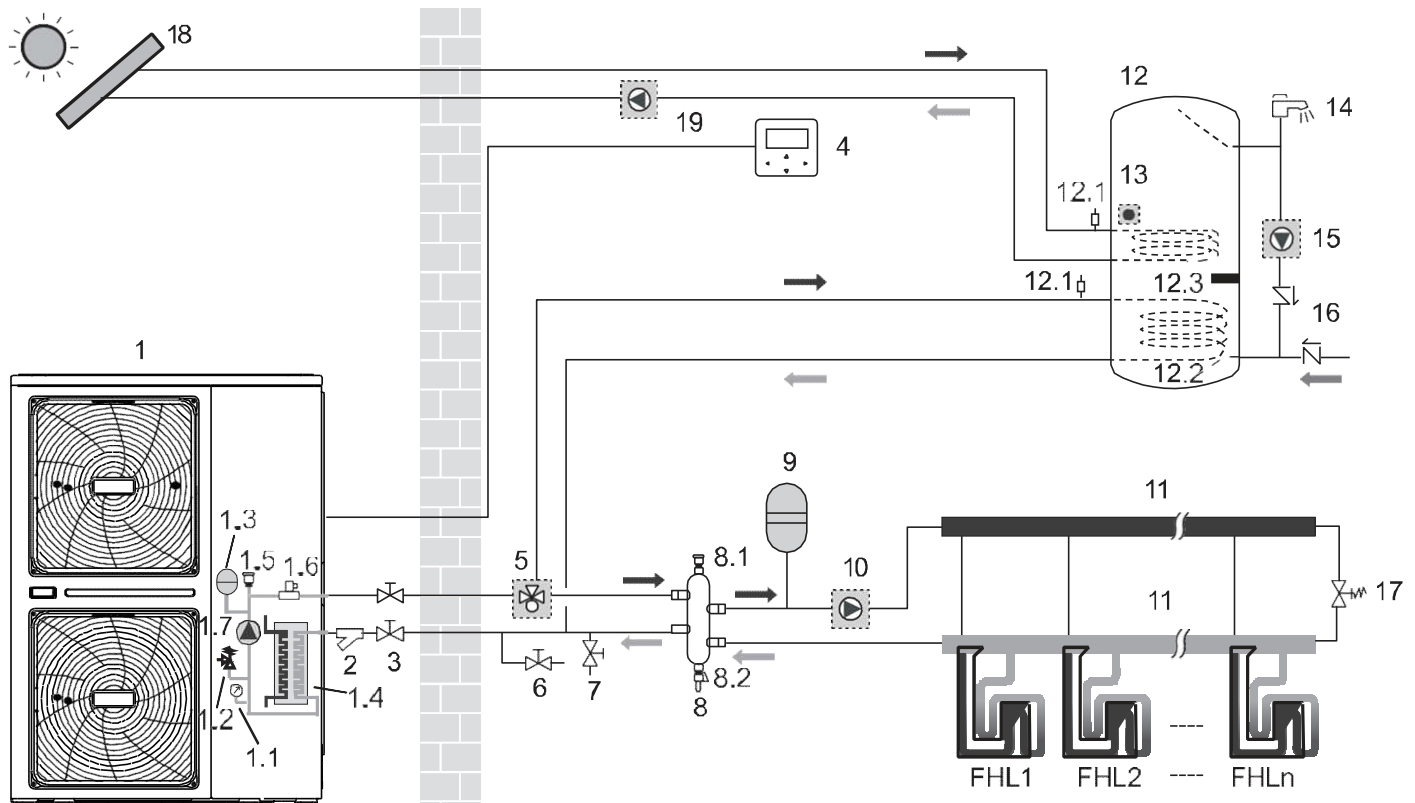


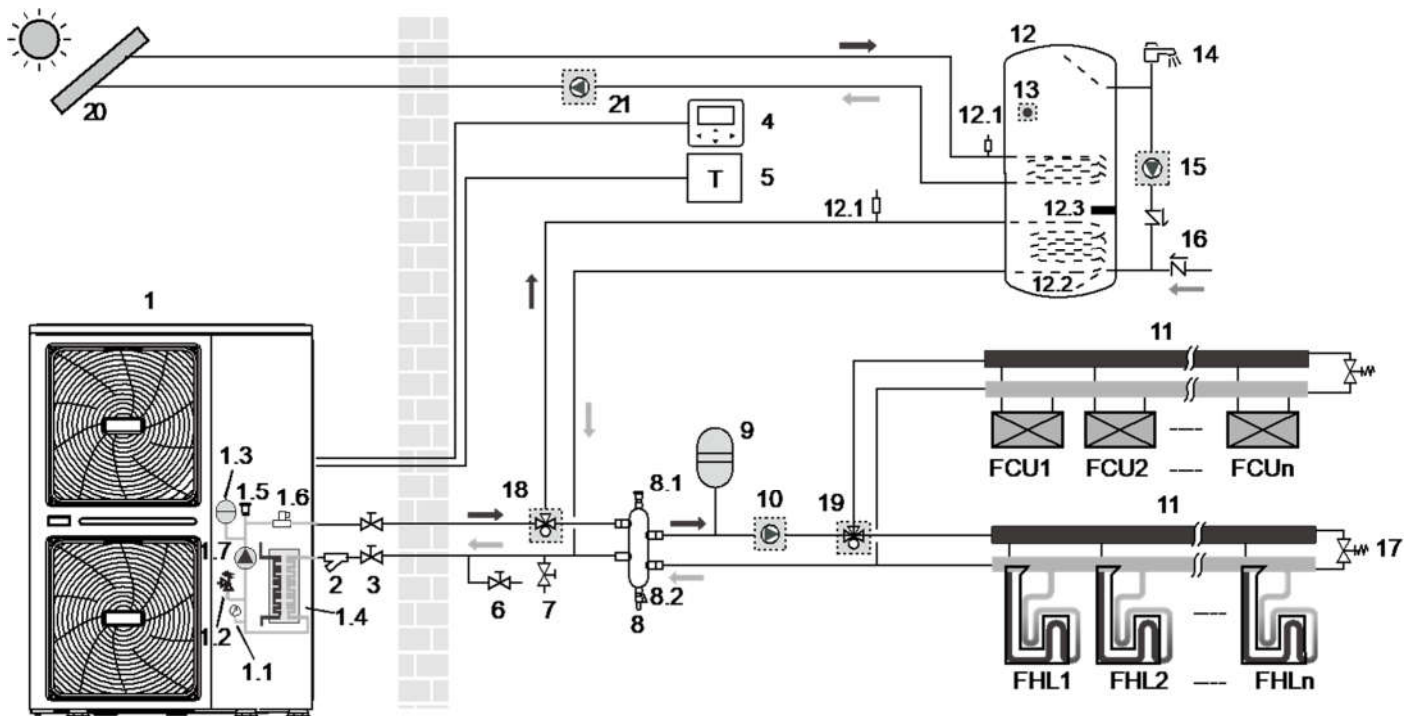
Table 1-5.2: Space heating and DHW with solar system

| Legend |                                                   |           |                                                            |
|--------|---------------------------------------------------|-----------|------------------------------------------------------------|
| 1      | Outdoor unit                                      | 8.2       | Drain valve                                                |
| 1.1    | Manometer                                         | 9         | Expansion vessel (field supplied)                          |
| 1.2    | Pressure relief valve                             | 10        | P <sub>o</sub> : Outside circulation pump (field supplied) |
| 1.3    | Expansion vessel                                  | 11        | Collector / Distributor (field supplied)                   |
| 1.4    | Plate heat exchanger                              | 12        | Domestic hot water tank (field supplied)                   |
| 1.5    | Air purge valve                                   | 12.1      | Air purge valve                                            |
| 1.6    | Flow switch                                       | 12.2      | Heat exchanger coil                                        |
| 1.7    | P <sub>i</sub> : Circulation pump inside the unit | 12.3      | Booster heater                                             |
| 2      | Y-shape filter                                    | 13        | T <sub>S</sub> : Temperature sensor                        |
| 3      | Stop valve (field supplied)                       | 14        | Hot water tap(field supplied)                              |
| 4      | Wired controller                                  | 15        | P <sub>d</sub> : Cycle hot water pump (field supplied)     |
| 5      | SV1: 3-way valve (field supplied)                 | 16        | One way valve(field supplied)                              |
| 6      | Drain valve (field supplied)                      | 17        | Bypass valve(field supplied)                               |
| 7      | Fill valve (field supplied)                       | 18        | Solar heater(field supplied)                               |
| 8      | Balance tank (field supplied)                     | 19        | P <sub>s</sub> : Solar pump(field supplied)                |
| 8.1    | Air purge valve                                   | FHL 1...n | Floor heating loop (field supplied)                        |

### 6.3 Space Heating, Cooling and DHW with solar system

Space cooling and heating application with a room thermostat suitable for heating/cooling changeover when connected to the unit. Heating is provided through floor heating loops and fan coil units. Cooling is provided through the fan coil units only. Domestic hot water is provided through the domestic hot water tank which is connected to the unit.

Figure 1-5.3: Space heating, cooling and DHW with solar system



*Table 1-5.3: Space heating, cooling and DHW with solar system*

| Legend |                                       |           |                                                |
|--------|---------------------------------------|-----------|------------------------------------------------|
| 1      | Outdoor unit                          | 10        | P_o: Outside circulation pump (field supplied) |
| 1.1    | Manometer                             | 11        | Collector / Distributor (field supplied)       |
| 1.2    | Pressure relief valve                 | 12        | Domestic hot water tank (field supplied)       |
| 1.3    | Expansion vessel                      | 12.1      | Air purge valve                                |
| 1.4    | Plate heat exchanger                  | 12.2      | Heat exchanger coil                            |
| 1.5    | Air purge valve                       | 12.3      | Booster heater                                 |
| 1.6    | Flow switch                           | 13        | T5: Temperature sensor                         |
| 1.7    | P_i: Circulation pump inside the unit | 14        | Hot water tap(field supplied)                  |
| 2      | Y-shape filter                        | 15        | P_d: Cycle hot water pump(field supplied)      |
| 3      | Stop valve (field supplied)           | 16        | One way valve(field supplied)                  |
| 4      | Wired controller                      | 17        | Bypass valve(field supplied)                   |
| 5      | Room thermostat (field supplied)      | 18        | SV1: 3-way valve(field supplied)               |
| 6      | Drain valve (field supplied)          | 19        | SV2: 3-way valve (field supplied)              |
| 7      | Fill valve (field supplied)           | 20        | Solar heater(field supplied)                   |
| 8      | Balance tank (field supplied)         | 21        | P_s: Solar pump(field supplied)                |
| 8.1    | Air purge valve                       | FHL 1...n | Floor heating loop (field supplied)            |
| 8.2    | Drain valve                           | FCU 1...n | Fan coil units(field supplied)                 |
| 9      | Expansion vessel (field supplied)     |           |                                                |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

#### 6.4 AHS provides heat for space heating

Space heating application by either the unit or by AHS connected in the system.

If AHS only provides heat for space heating, AHS must be integrated in the piping work.

Figure 1-5.4: AHS provides heat for space heating

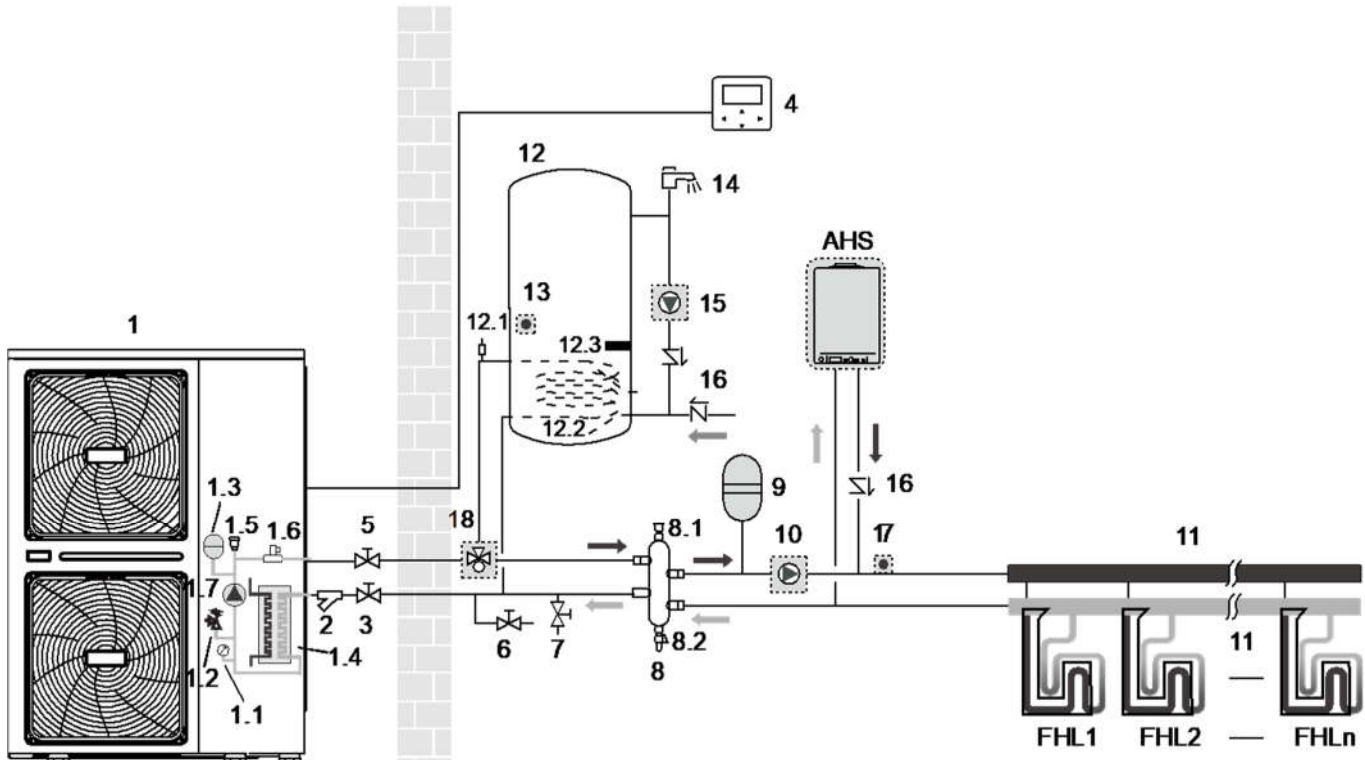


Table 1-5.4: AHS provides heat for space heating

| Legend |                                       |           |                                                     |
|--------|---------------------------------------|-----------|-----------------------------------------------------|
| 1      | Outdoor unit                          | 8.2       | Drain valve                                         |
| 1.1    | Manometer                             | 9         | Expansion vessel (field supplied)                   |
| 1.2    | Pressure relief valve                 | 10        | P_o: Outside circulation pump (field supplied)      |
| 1.3    | Expansion vessel                      | 11        | Collector / Distributor (field supplied)            |
| 1.4    | Plate heat exchanger                  | 12        | Domestic hot water tank (field supplied)            |
| 1.5    | Air purge valve                       | 12.1      | Air purge valve                                     |
| 1.6    | Flow switch                           | 12.2      | Heat exchanger coil                                 |
| 1.7    | P_i: Circulation pump inside the unit | 12.3      | Booster heater                                      |
| 2      | Y-shape filter                        | 13        | T5: Temperature sensor                              |
| 3      | Stop valve (field supplied)           | 14        | Hot water tap(field supplied)                       |
| 4      | Wired controller                      | 15        | P_d: Cycle hot water pump(field supplied)           |
| 5      | Stop valve (field supplied)           | 16        | One way valve(field supplied)                       |
| 6      | Drain valve (field supplied)          | 17        | T1: Outlet water temperature sensor(field supplied) |
| 7      | Fill valve (field supplied)           | 18        | SV1: 3-way valve (field supplied)                   |
| 8      | Balance tank (field supplied)         | FHL 1...n | Floor heating loop (field supplied)                 |
| 8.1    | Air purge valve                       |           |                                                     |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

### 6.5 AHS provides heat for space heating and DHW

Space heating application by either the unit or by AHS connected in the system. Bivalent operation is possible for both space heating operation and domestic water heating operation. If AHS is also providing heat for domestic hot water, AHS can be integrated in the piping work. In this condition, the unit can sent ON/OFF signal to AHS in heating mode, but AHS control itself in DHW mode.

Figure 1-5.5: AHS provides heat for space heating and DHW

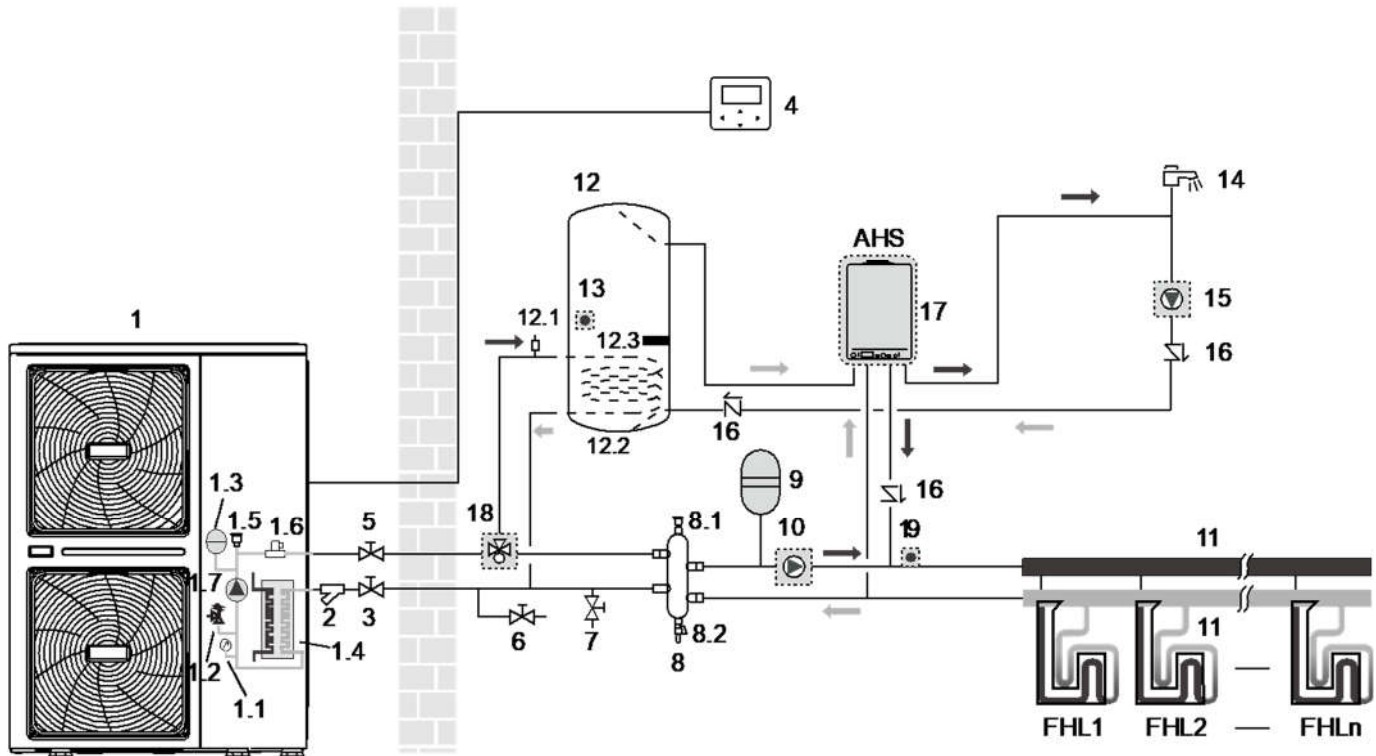


Table 1-5.5: AHS provides heat for space heating and DHW

| Legend |                                       |           |                                                     |
|--------|---------------------------------------|-----------|-----------------------------------------------------|
| 1      | Outdoor unit                          | 8.2       | Drain valve                                         |
| 1.1    | Manometer                             | 9         | Expansion vessel (field supplied)                   |
| 1.2    | Pressure relief valve                 | 10        | P_o: Outside circulation pump (field supplied)      |
| 1.3    | Expansion vessel                      | 11        | Collector / Distributor (field supplied)            |
| 1.4    | Plate heat exchanger                  | 12        | Domestic hot water tank (field supplied)            |
| 1.5    | Air purge valve                       | 12.1      | Air purge valve                                     |
| 1.6    | Flow switch                           | 12.2      | Heat exchanger coil                                 |
| 1.7    | P_i: Circulation pump inside the unit | 12.3      | Booster heater                                      |
| 2      | Y-shape filter                        | 13        | T5: Temperature sensor                              |
| 3      | Stop valve (field supplied)           | 14        | Hot water tap(field supplied)                       |
| 4      | Wired controller                      | 15        | P_d: Cycle hot water pump(field supplied)           |
| 5      | Stop valve (field supplied)           | 16        | One way valve(field supplied)                       |
| 6      | Drain valve (field supplied)          | 17        | Additional heat source(field supplied)              |
| 7      | Fill valve (field supplied)           | 18        | SV1: 3-way valve (field supplied)                   |
| 8      | Balance tank (field supplied)         | 19        | T1: Outlet water temperature sensor(field supplied) |
| 8.1    | Air purge valve                       | FHL 1...n | Floor heating loop (field supplied)                 |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

## 6.6 HS provides heat for DHW

Figure 1-5.6: AHS provides heat for DHW

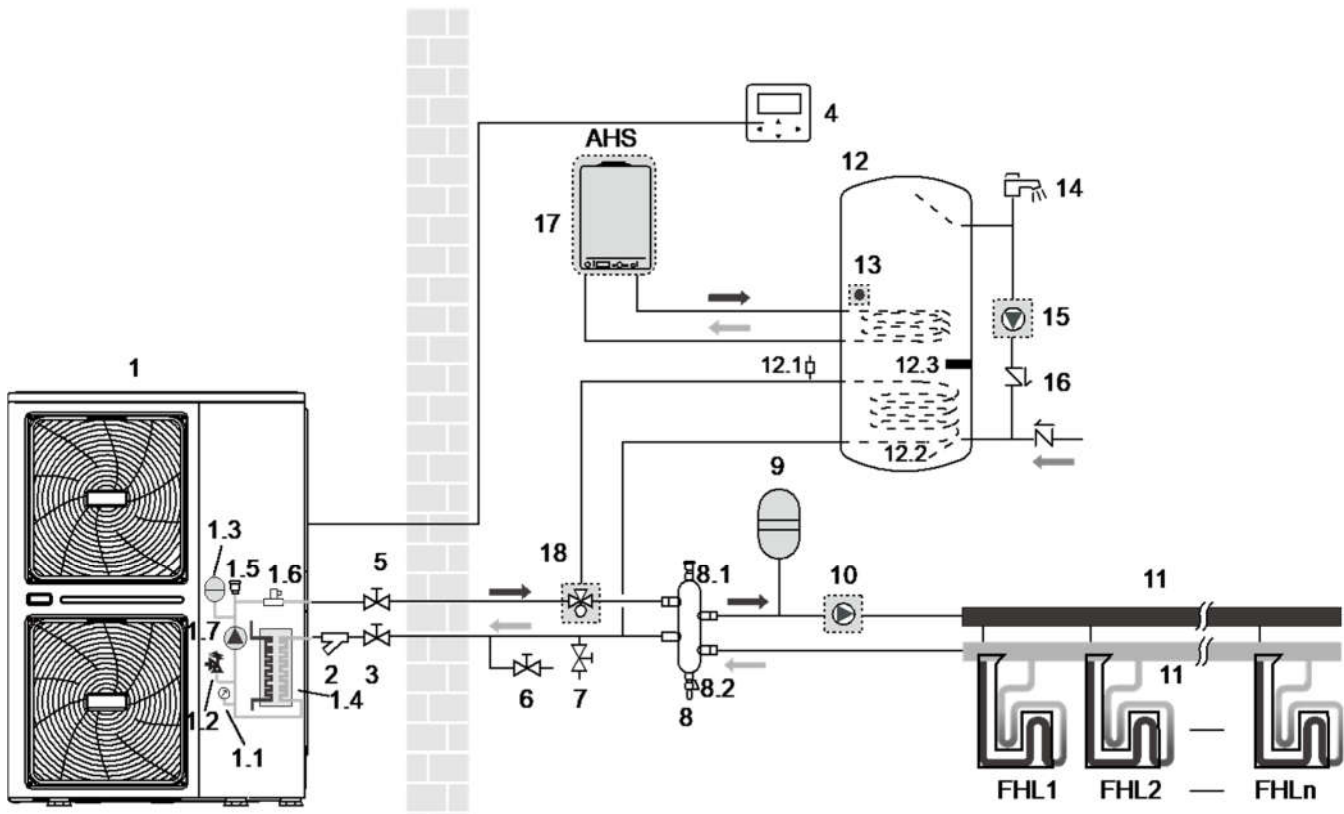


Table 1-5.6: AHS provides heat for DHW

| Legend |                                       |           |                                                |
|--------|---------------------------------------|-----------|------------------------------------------------|
| 1      | Outdoor unit                          | 8.2       | Drain valve                                    |
| 1.1    | Manometer                             | 9         | Expansion vessel (field supplied)              |
| 1.2    | Pressure relief valve                 | 10        | P_o: Outside circulation pump (field supplied) |
| 1.3    | Expansion vessel                      | 11        | Collector / Distributor (field supplied)       |
| 1.4    | Plate heat exchanger                  | 12        | Domestic hot water tank (field supplied)       |
| 1.5    | Air purge valve                       | 12.1      | Air purge valve                                |
| 1.6    | Flow switch                           | 12.2      | Heat exchanger coil                            |
| 1.7    | P_i: Circulation pump inside the unit | 12.3      | Booster heater                                 |
| 2      | Y-shape filter                        | 13        | T5: Temperature sensor                         |
| 3      | Stop valve (field supplied)           | 14        | Hot water tap(field supplied)                  |
| 4      | Wired controller                      | 15        | P_d: Cycle hot water pump(field supplied)      |
| 5      | Stop valve (field supplied)           | 16        | One way valve(field supplied)                  |
| 6      | Drain valve (field supplied)          | 17        | Additional heat source(field supplied)         |
| 7      | Fill valve (field supplied)           | 18        | SV1: 3-way valve (field supplied)              |
| 8      | Balance tank (field supplied)         | FHL 1...n | Floor heating loop (field supplied)            |
| 8.1    | Air purge valve                       |           |                                                |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

### 6.7 Dual setpoint function application with two room thermostats

Space heating with two room thermostats application is through floor heating loops and fan coil units. The floor heating loops and fan coil units require different operating water temperature. The floor heating loops require a lower water temperature in heating mode compared to fan coil units. To achieve these two set points, a mixing station is used to adapt the water temperature according to requirements of the floor heating loops. The fan coil units are directly connected to the unit water circuit and the floor heating loops are after the mixing station. The mixing station is controlled by the unit (or field supply, controls by itself). With the help of hydronic adapter board(optional) which is connected between hydronic box and thermostats, maximum 8 thermostats for 8 rooms are available to control heat pump, which greatly improves the operation convenience.

Figure 1-5.7: Dual setpoint function application with two room thermostats

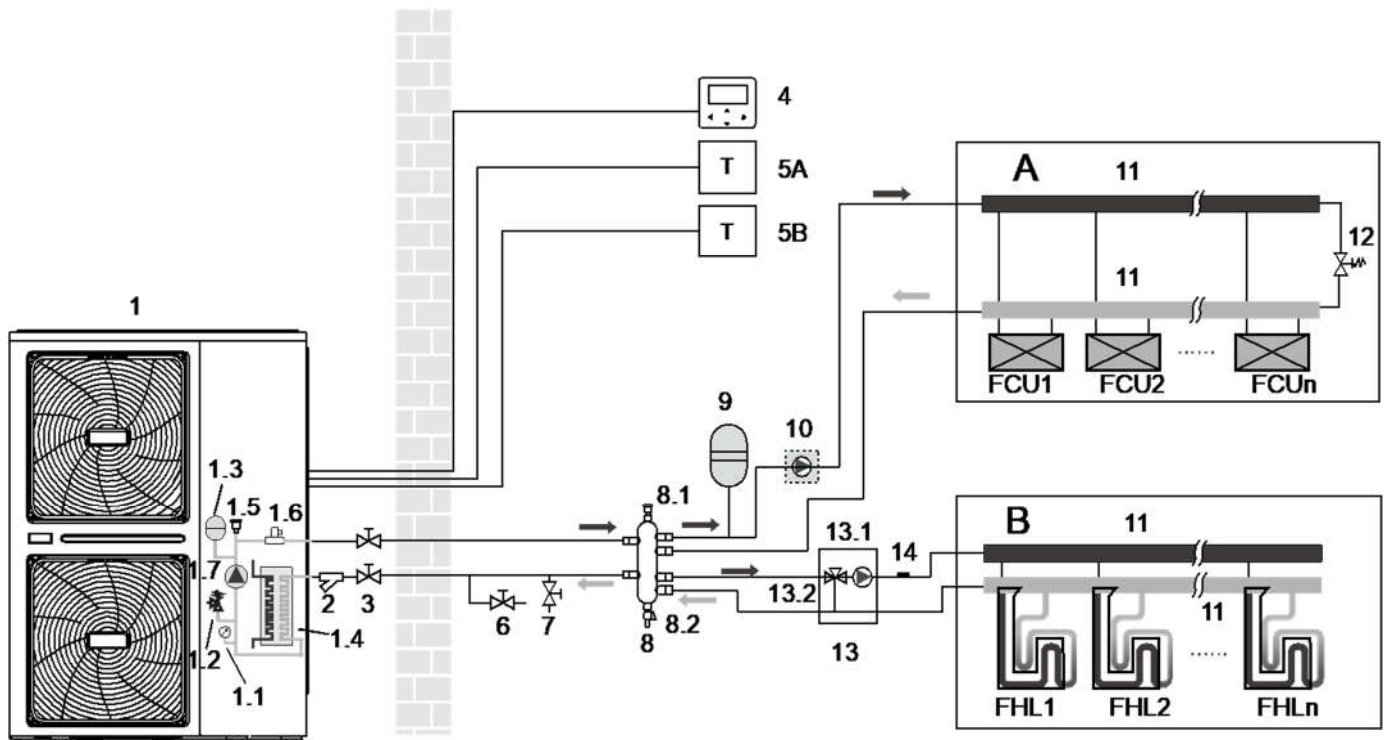


Table 1-5.7: Dual setpoint function application with two room thermostats

| Legend |                                           |           |                                                |
|--------|-------------------------------------------|-----------|------------------------------------------------|
| 1      | Outdoor unit                              | 7         | Fill valve (field supplied)                    |
| 1.1    | Manometer                                 | 8         | Balance tank (field supplied)                  |
| 1.2    | Pressure relief valve                     | 8.1       | Air purge valve                                |
| 1.3    | Expansion vessel                          | 8.2       | Drain valve                                    |
| 1.4    | Plate heat exchanger                      | 9         | Expansion vessel (field supplied)              |
| 1.5    | Air purge valve                           | 10        | P_o: Outside circulation pump (field supplied) |
| 1.6    | Flow switch                               | 11        | Collector / Distributor (field supplied)       |
| 1.7    | P_i: Circulation pump inside the unit     | 12        | Bypass valve (field supplied)                  |
| 2      | Y-shape filter                            | 13        | Mixing station(field supplied)                 |
| 3      | Stop valve (field supplied)               | 13.1      | P_c: zone 2 pump (field supplied)              |
| 4      | Wired controller                          | 13.2      | SV3: 3-way valve (field supplied)              |
| 5A     | Room thermostat for zone 1 (field supply) | 14        | Tw2: Zone 2 water flow temp.(field supplied)   |
| 5B     | Room thermostat for zone 2 (field supply) | FHL 1...n | Floor heating loop (field supplied)            |
| 6      | Drain valve(field supplied)               | FCU 1...n | Fan coil units (field supplied)                |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

### 6.8 Dual setpoint function application without thermostats

Heating is provided through floor heating loops and fan coil units. The floor heating loops and fan coil units require different operating water temperatures. The floor heating loops require a lower water temperature in heating mode compared to fan coil units. To achieve these two set points, a mixing station is used to adapt the water temperature according to requirements of the floor heating loops. The fan coil units are directly connected to the unit water circuit and the floor heating loops are after the mixing station. The mixing station is controlled by the unit (or field supply, controls by itself).

Figure 1-5.8: Dual setpoint function application without thermostats

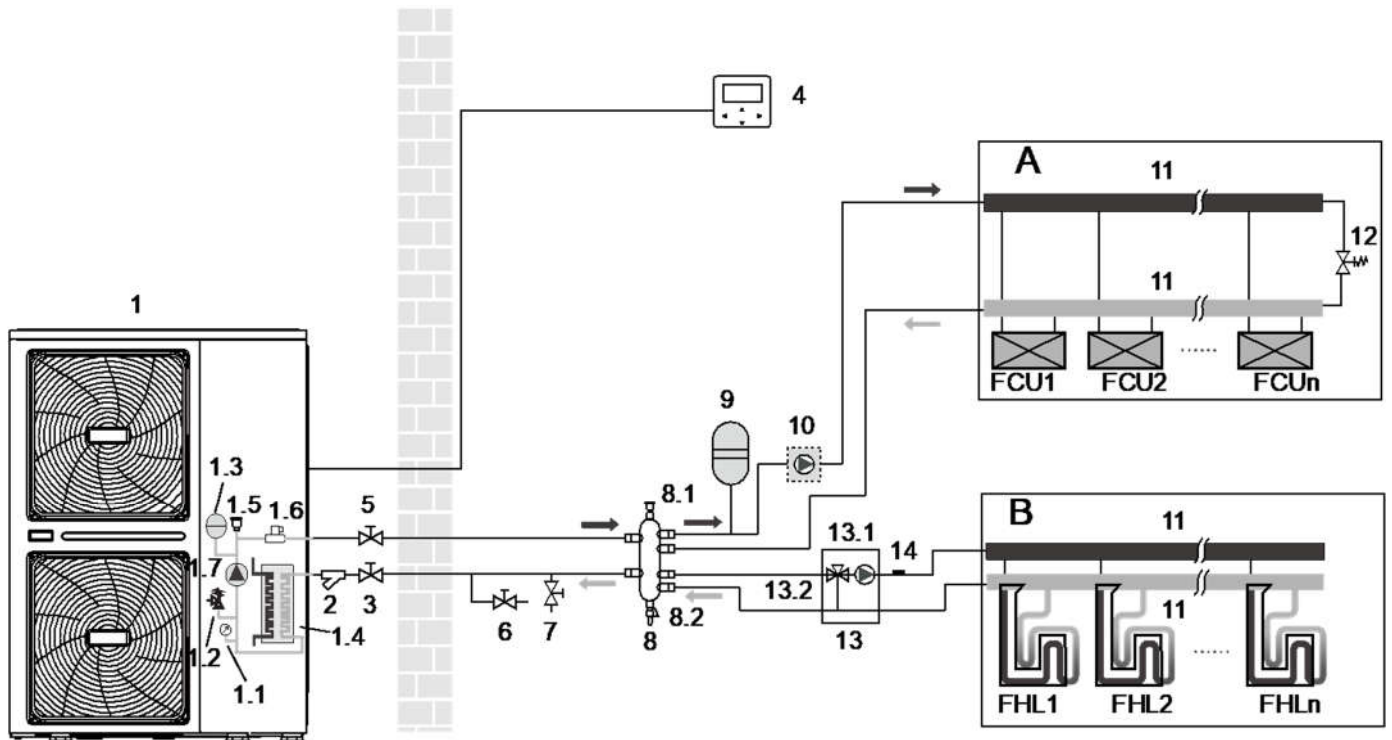


Table 1-5.8: Dual setpoint function application without thermostats

| Legend |                                       |           |                                                |
|--------|---------------------------------------|-----------|------------------------------------------------|
| 1      | Outdoor unit                          | 8         | Balance tank (field supplied)                  |
| 1.1    | Manometer                             | 8.1       | Air purge valve                                |
| 1.2    | Pressure relief valve                 | 8.2       | Drain valve                                    |
| 1.3    | Expansion vessel                      | 9         | Expansion vessel (field supplied)              |
| 1.4    | Plate heat exchanger                  | 10        | P_o: Outside circulation pump (field supplied) |
| 1.5    | Air purge valve                       | 11        | Collector / Distributor (field supplied)       |
| 1.6    | Flow switch                           | 12        | Bypass valve (field supplied)                  |
| 1.7    | P_i: Circulation pump inside the unit | 13        | Mixing station(field supplied)                 |
| 2      | Y-shape filter                        | 13.1      | P_c: zone 2 pump (field supplied)              |
| 3      | Stop valve (field supplied)           | 13.2      | SV3: 3-way valve (field supplied)              |
| 4      | Wired controller                      | 14        | Tw2: Zone 2 water flow temp.(field supplied)   |
| 5      | Stop valve (field supplied)           | FHL 1...n | Floor heating loop (field supplied)            |
| 6      | Drain valve(field supplied)           | FCU 1...n | Fan coil units (field supplied)                |
| 7      | Fill valve (field supplied)           |           |                                                |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

### 6.9 Group control function for cooling, heating and DHW

Modularity is perfect when an extension of capacity becomes required as the building cooling/heating demand evolves. 6 units can be controlled in group. The group control system can control and view the operation of the entire system only by connecting the master to the wire controller. If the DHW function is required, the water tank can only be connected to the master unit water circuit through a three-way valve, and controlled by the master unit. If AHS is needed, it can only be connected to the master waterway and controlled by the master unit. The Tbt1 temperature sensor must be installed in the parallel system (otherwise unit cannot be started). If the balance tank is too large, Tbt2 needs to be added in order to improve the control accuracy. Tbt2 is set in the lower part of the balance tank. The water inlet and outlet pipe joints of each unit of the parallel system should be connected with soft connections and one-way valves must be installed at the water outlet pipe

Figure 1-5.9: Group control function for cooling, heating and DHW

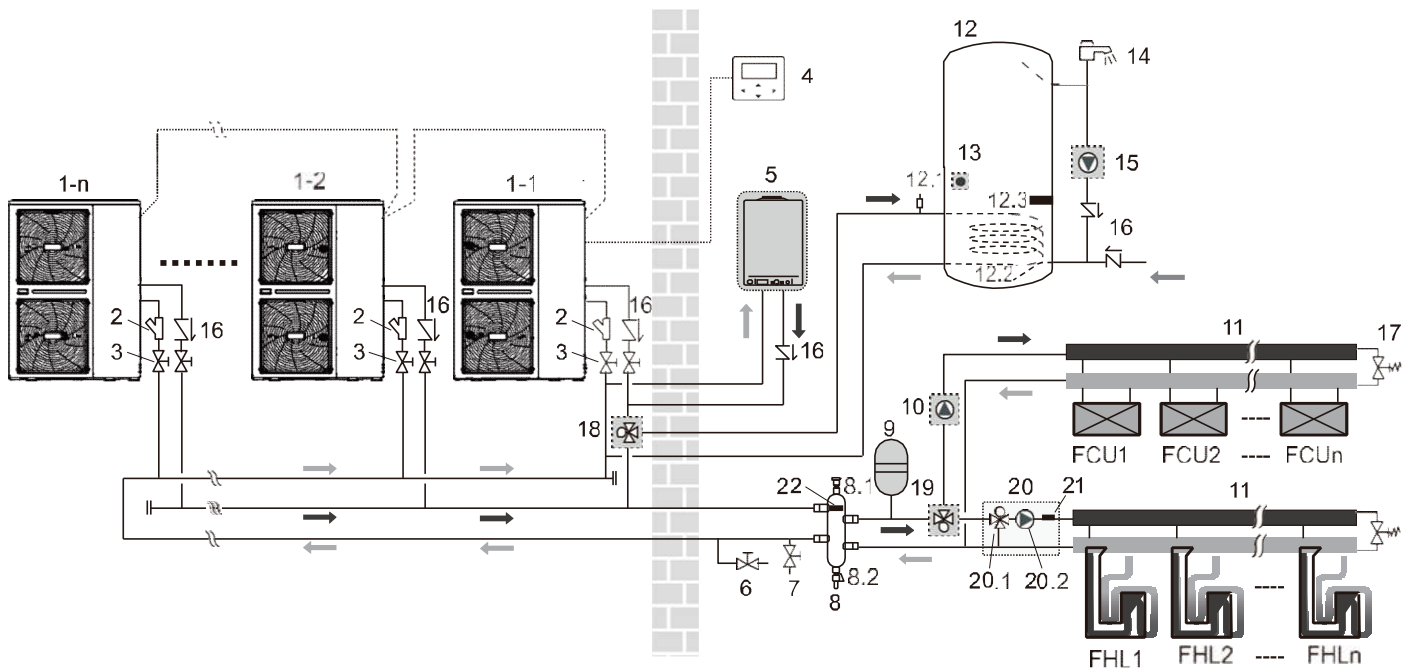


Table 1-5.9: Group control function for cooling, heating and DHW

| Legend    |                                                  |           |                                                       |
|-----------|--------------------------------------------------|-----------|-------------------------------------------------------|
| 1-1       | Outdoor unit: master                             | 12.2      | Heat exchanger coil                                   |
| 1-2...1-n | Outdoor unit: slave                              | 12.3      | Booster heater                                        |
| 2         | Y-shape filter                                   | 13        | T5: DHW tank temp. sensor                             |
| 3         | Stop valve (field supply)                        | 14        | Hot water tap (field supply)                          |
| 4         | Wired controller                                 | 15        | P_d: DHW pump (field supply)                          |
| 5         | Additional heating source(boiler) (field supply) | 16        | One way valve (field supply)                          |
| 6         | Drain valve (field supply)                       | 17        | Bypass valve(field supply)                            |
| 7         | Fill valve (field supply)                        | 18        | SV1: 3-way valve (field supply)                       |
| 8         | Balance tank (field supply)                      | 19        | SV1: 3-way valve (field supply)                       |
| 8.1       | Air purge valve                                  | 20        | Mixing station (field supply)                         |
| 8.2       | Drain valve                                      | 20.1      | P_c: zone 2 pump (field supply)                       |
| 9         | Expansion vessel (field supply)                  | 20.2      | SV3: 3-way valve (field supply)                       |
| 10        | P_o: Outside circulation pump (field supply)     | 21        | Tw2: Zone 2 water flow temp. (individual purchase)    |
| 11        | Collector / distributor (field supply)           | 22        | Tbt1: Balance tank temp. sensor (individual purchase) |
| 12        | Domestic hot water tank (field supply)           | FHL 1...n | Floor heating loop (field supply)                     |
| 12.1      | Air purge valve                                  | FCU 1...n | Fan coil units (field supply)                         |

Notes:

1. The example is just for application illustration; please confirm the exact installation method according to the installation manual.

# Part 6

## Engineering Data

|           |                                       |     |
|-----------|---------------------------------------|-----|
| <b>1</b>  | Specifications.....                   | 106 |
| <b>2</b>  | Electrical characteristics .....      | 107 |
| <b>3</b>  | Dimensions and Center of Gravity..... | 107 |
| <b>4</b>  | Piping Diagrams.. ..                  | 108 |
| <b>5</b>  | Wiring Diagrams.....                  | 109 |
| <b>6</b>  | Capacity Tables.....                  | 112 |
| <b>7</b>  | Operating Limits.....                 | 118 |
| <b>8</b>  | Hydronic Performance.....             | 119 |
| <b>9</b>  | Sound Levels.....                     | 120 |
| <b>10</b> | Accessories.....                      | 123 |

## 1 Specifications

|                                                |                             |                   |                               |             |             |             |
|------------------------------------------------|-----------------------------|-------------------|-------------------------------|-------------|-------------|-------------|
| Model name                                     |                             |                   | SMHM-180B-3                   | SMHM-220B-3 | SMHM-260B-3 | SMHM-300B-3 |
| Power supply                                   |                             | V/Ph/             | 380-415/3/50                  |             |             |             |
| Heating(A7W35)                                 | Capacity                    | W                 | 18000                         | 22000       | 26000       | 30100       |
|                                                | Rated input                 | W                 | 3830                          | 5000        | 6373        | 7698        |
|                                                | COP                         |                   | 4.70                          | 4.40        | 4.08        | 3.91        |
| Heating(A7W45)                                 | Capacity                    | W                 | 18000                         | 22000       | 26000       | 30000       |
|                                                | Rated input                 | W                 | 5143                          | 6471        | 8387        | 10345       |
|                                                | COP                         |                   | 3.50                          | 3.40        | 3.10        | 2.90        |
| Heating(A7W55)                                 | Capacity                    | W                 | 18000                         | 22000       | 26000       | 30000       |
|                                                | Rated input                 | W                 | 6545                          | 8302        | 10612       | 13043       |
|                                                | COP                         |                   | 2.75                          | 2.65        | 2.45        | 2.30        |
| Heating(A-7W35)                                | Capacity                    | W                 | 18000                         | 21000       | 22000       | 23000       |
|                                                | Rated input                 | W                 | 6667                          | 8077        | 8800        | 9388        |
|                                                | COP                         |                   | 2.70                          | 2.60        | 2.50        | 2.45        |
| Cooling(A35W18)                                | Capacity                    | W                 | 18500                         | 23000       | 27000       | 31000       |
|                                                | Rated input                 | W                 | 3895                          | 5000        | 6279        | 7750        |
|                                                | EER                         |                   | 4.75                          | 4.60        | 4.30        | 4.00        |
| Cooling(A35W7)                                 | Capacity                    | W                 | 17000                         | 21000       | 26000       | 29500       |
|                                                | Rated input                 | W                 | 5574                          | 7119        | 9630        | 11569       |
|                                                | EER                         |                   | 3.05                          | 2.95        | 2.70        | 2.55        |
| Seasonal space heating energy efficiency class | Water outlet at 35°C / 55°C | class             | A+++ / A++                    | A+++ / A++  | A+++ / A+   | A++ / A+    |
| SCOP                                           | Warmer climate              | 35°C              | 5.73                          | 5.93        | 5.85        | 5.40        |
|                                                |                             | 55°C              | 4.00                          | 4.10        | 4.28        | 4.15        |
|                                                | Average climate             | 35°C              | 4.60                          | 4.53        | 4.50        | 4.20        |
|                                                |                             | 55°C              | 3.20                          | 3.23        | 3.15        | 3.15        |
|                                                | Colder climate              | 35°C              | 3.73                          | 3.73        | 3.65        | 3.53        |
|                                                |                             | 55°C              | 2.50                          | 2.63        | 2.60        | 2.58        |
| SEER                                           | Water outlet at 7°C / 18°C  |                   | 4.70 / 5.48                   | 4.70 / 5.67 | 4.66 / 5.88 | 4.49 / 5.71 |
| Compressor                                     |                             | Type              | Twin rotary DC inverter       |             |             |             |
| Outdoor fan motor                              |                             | Type              | Brushless DC motor            |             |             |             |
| Water side heat exchanger                      |                             |                   | Plate type                    |             |             |             |
| Water pump                                     | Max. pump head              | m                 | 12                            | 12          | 12          | 12          |
| Refrigerant (R32)                              | Charged volume              | kg                | 5.0                           |             |             |             |
| Throttle type                                  |                             |                   | Electronic expansion valve    |             |             |             |
| Sound power level <sup>2</sup>                 |                             | dB                | 71                            | 73          | 75          | 77          |
| Rated water flow                               |                             | m <sup>3</sup> /h | 3.10                          | 3.78        | 4.47        | 5.18        |
| Internal water volume                          |                             | L                 | 3.5                           | 3.5         | 3.5         | 3.5         |
| Unit dimension / Packing dimension (W×H×D)     |                             | mm                | 1129×1558×528 / 1220×1735×565 |             |             |             |
| Net / Gross weight                             |                             | kg                | 177 / 206                     |             |             |             |
| Water piping connections Dia.                  |                             | inch              | 1-1/4" BSP                    | 1-1/4" BSP  | 1-1/4" BSP  | 1-1/4" BSP  |
| Ambient temperature range                      | Cooling                     | °C                | -5-46                         |             |             |             |
|                                                | Heating                     | °C                | -25-35                        |             |             |             |
|                                                | DHW                         | °C                | -25-43                        |             |             |             |

|                                 |                  |    |       |
|---------------------------------|------------------|----|-------|
| Water setting temperature range | Cooling          | °C | 5-25  |
|                                 | Heating          | °C | 25-60 |
|                                 | DHW <sup>3</sup> | °C | 30-60 |

Notes:

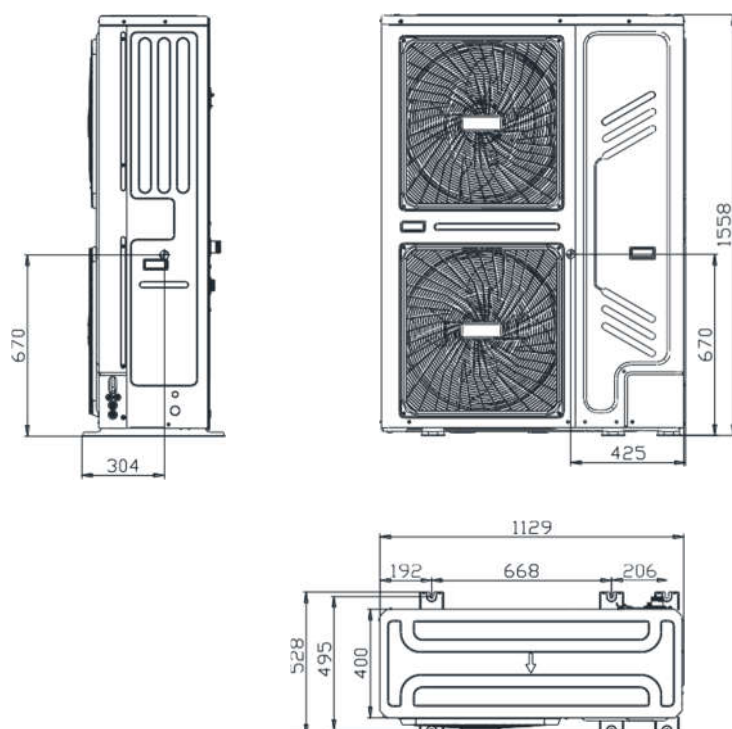
1. Relevant EU standards and legislation: EN14511; EN14825; EN50564; EN12102; (EU) No 811/2013; (EU) No 813/2013; OJ 2014/C 207/02.
2. Test standard: EN12102-1
3. Maximum domestic hot water temperature 60°C is only available with TBH support.

## 2 Electrical characteristics

| Model       | power supply        | Circuit breaker | Cable           | Inrush current | Nominal current | Max. fan and compres | e-heater current | max. current (rated) |
|-------------|---------------------|-----------------|-----------------|----------------|-----------------|----------------------|------------------|----------------------|
|             | V, phase, Hz        | A               | mm <sup>2</sup> | A              | A               | A                    | A                | A                    |
| SMHM-180B-3 | 400V~; 3 fáze; 50Hz | 20              | CYKY -J 5x6     | 1              | 5,7             | 16,8                 | 0                | 16,8                 |
| SMHM-220B-3 |                     | 20              | CYKY -J 5x6     | 1              | 5,4             | 19,6                 | 0                | 19,6                 |
| SMHM-260B-3 |                     | 25              | CYKY -J 5x10    | 1              | 9,4             | 21,6                 | 0                | 21,6                 |
| SMHM-300B-3 |                     | 25              | CYKY -J 5x10    | 1              | 11              | 22,8                 | 0                | 22,8                 |

## 3 Dimensions and Center of Gravity

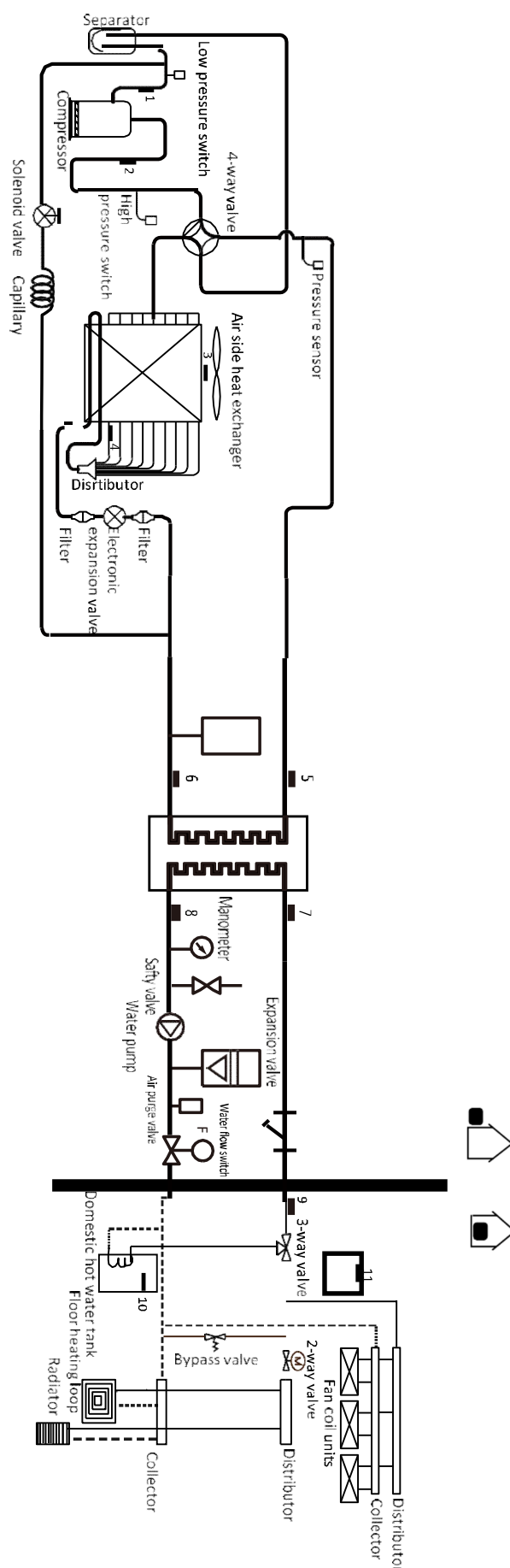
Figure 2-2.1: SMHM-180(220, 260,300)B-3 dimensions and center of gravity (unit: mm)



## 4 Piping Diagrams

Figure 2-3.1: SMHM-180(220, 260, 300)B-3 piping diagram

| Number | Sensor name                                                                   | Sensor code |
|--------|-------------------------------------------------------------------------------|-------------|
| 1      | Suction pipe temperature sensor                                               | Th          |
| 2      | Discharge pipe temperature sensor                                             | Tp          |
| 3      | Outdoor ambient temperature sensor                                            | T4          |
| 4      | Air side heat exchanger refrigerant outlet temperature sensor                 | T3          |
| 5      | Water side heat exchanger refrigerant outlet (gas pipe) temperature sensor    | T2B         |
| 6      | Water side heat exchanger refrigerant outlet (liquid pipe) temperature sensor | T2          |
| 7      | Water side heat exchanger water outlet temperature sensor                     | Tw_out      |
| 8      | Water side heat exchanger water inlet temperature sensor                      | Tw_in       |
| 9      | Final water outlet temperature sensor                                         | T1          |
| 10     | Domestic hot water tank temperature sensor                                    | T5          |
| 11     | Room temperature sensor (Built-in controller)                                 | Ta          |



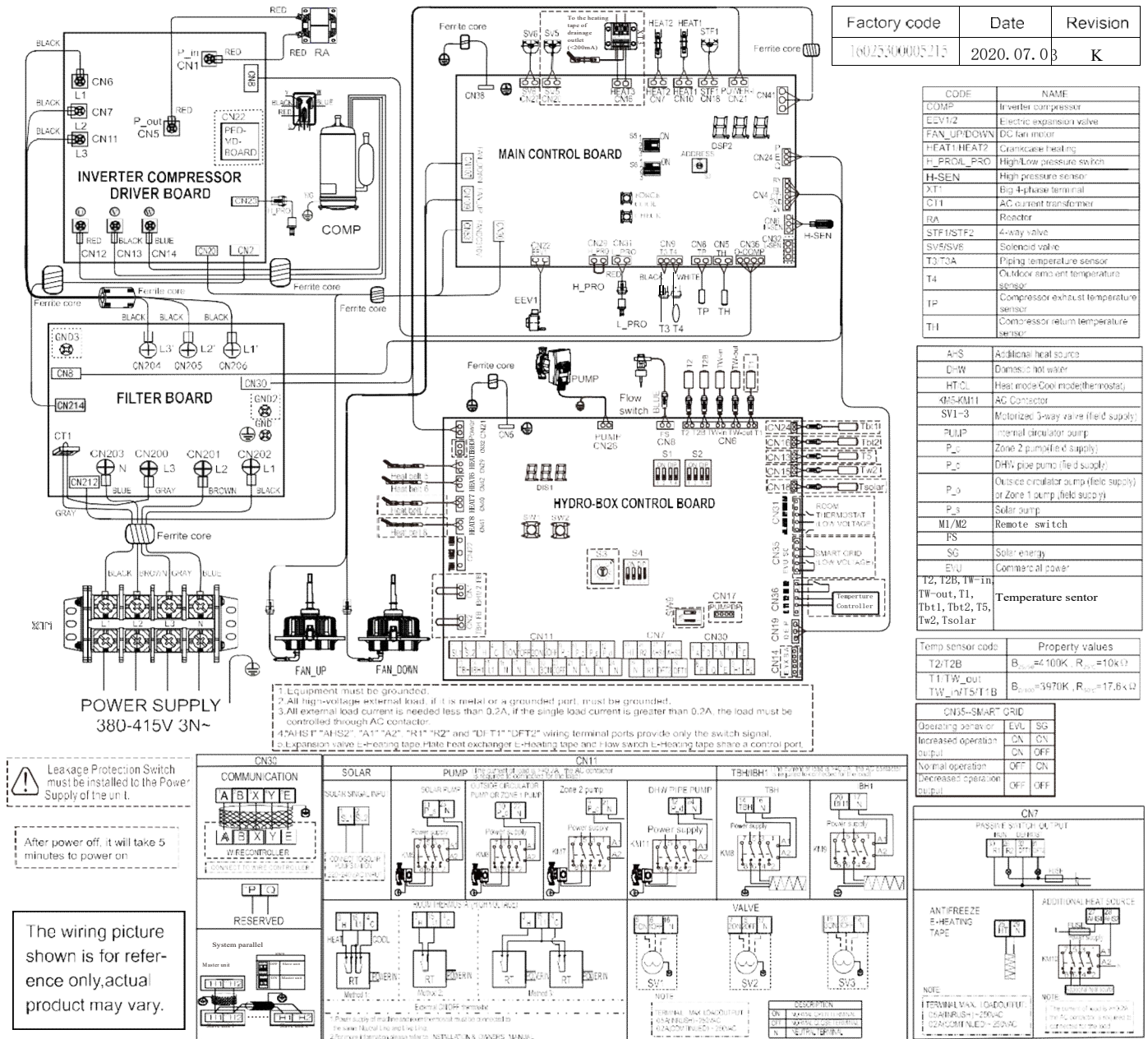
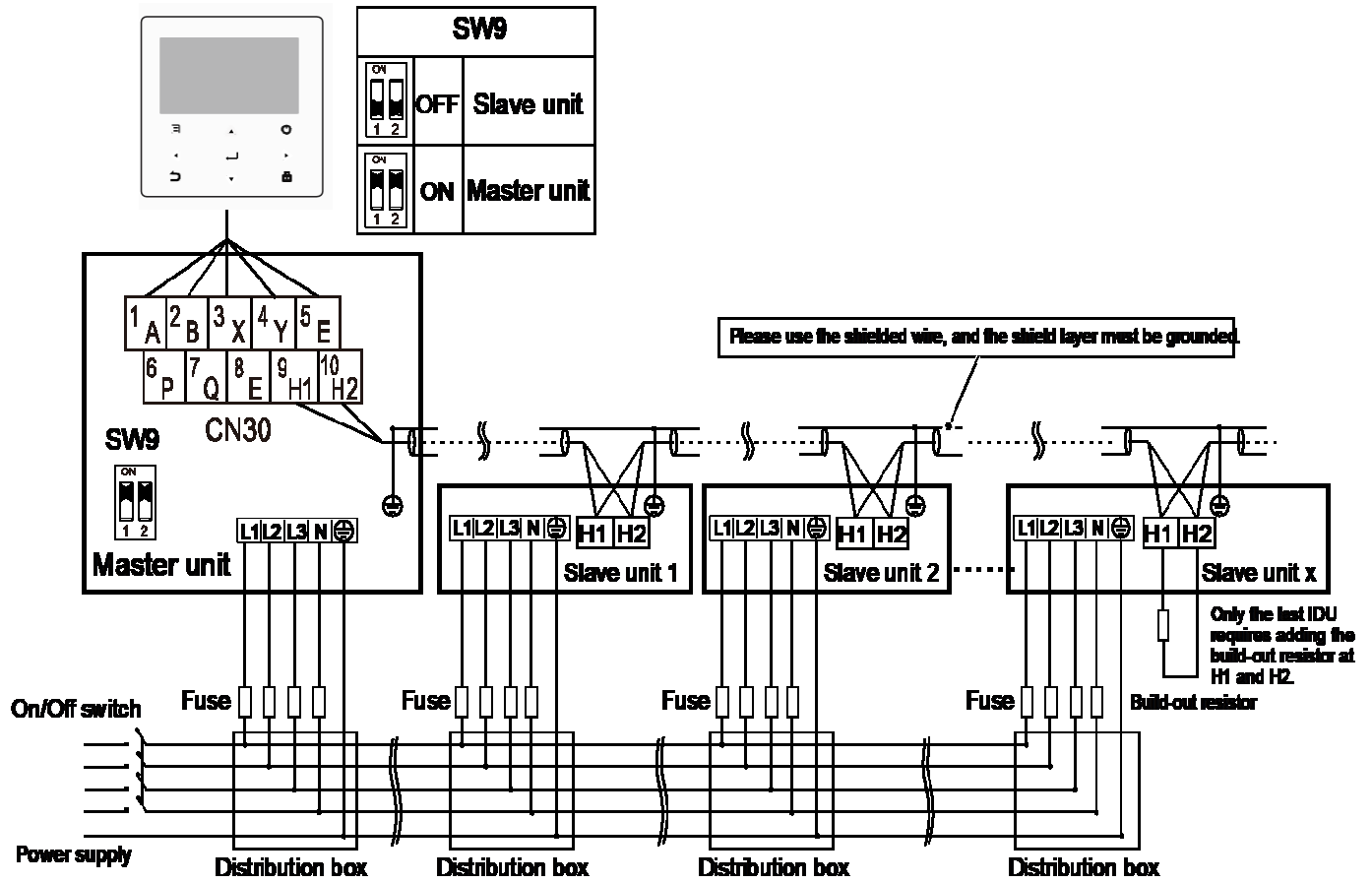


Figure 2-4.2: SMHM-180(220, 260,300)B-3 group control system wiring diagram



## Notes:

1. Sinclair recommends 6 units to be controlled by one controller and installed by reversed return water system for better hydraulic equilibrium.
2. In order to ensure the success of automatic addressing, all machines must be connected to the same power supply and powered on uniformly.
3. Only the master unit can connect the controller, and SW9 on hydronic PCB should be switched to “on” for the master unit. The slave units can not connect the controller.
4. Please use the shielded wire and the shield layer must be grounded.
5. When the communication between the unit is unstable, please add a network matching wire between the ports H1 and H2 at the terminal of the communication system
6. When connecting to the power supply terminal, use the circular wiring terminal with the insulation casing (see Figure 2-4.3).
7. Use power cord that conforms to the specifications and connect the power cord firmly. To prevent the cord from being pulled out by external force, make sure it is fixed securely.
8. If circular wiring terminal with the insulation casing cannot be used, please make sure that: Do not connect two power cords with different diameters to the same power supply terminal (may cause overheating of wires due to loose wiring) (See Figure 2-4.4).

Figure 2-4.3

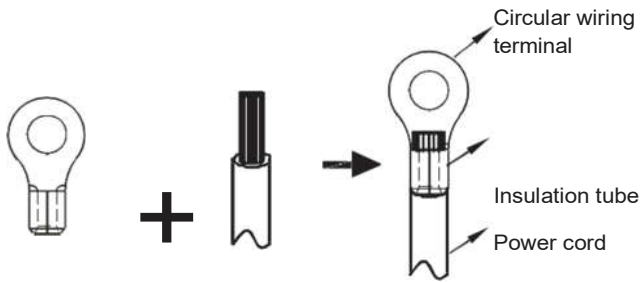
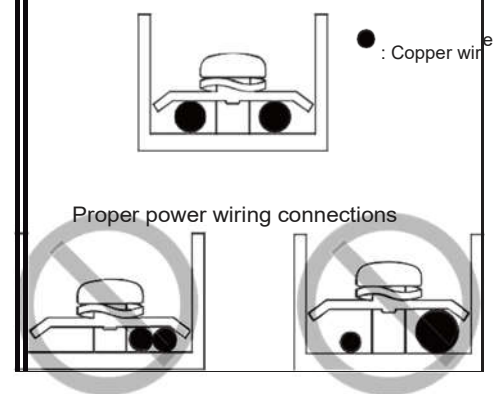
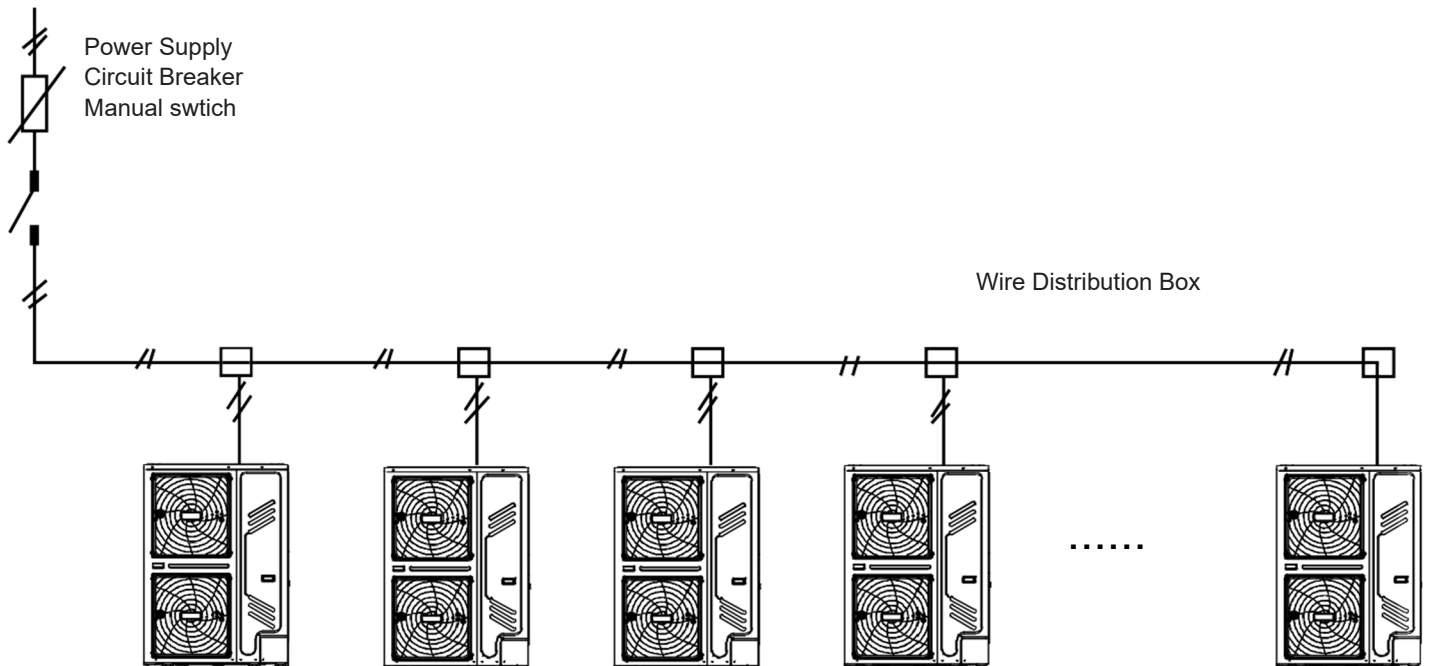


Figure 2-4.4



#### 9. Power Cord Connection of group control system

Use a dedicated power supply for the indoor unit that is different from the power supply for the outdoor unit. Use the same power supply, circuit breaker and leakage protective device for the indoor units connected to the same outdoor unit.



## 6 Capacity Tables

### 6.1 Heating Capacity Tables (Test standard: EN14511)

Table 2-5.1: SMHM-180B-3 heating capacity - peak values<sup>1</sup>

| Outdoor<br>air temp. | LWT (°C) |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |
|----------------------|----------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|
|                      | 30       |      |      | 35    |      |      | 40    |      |      | 45    |      |      | 50    |      |      | 55    |      |      | 60    |      |      |
| °C DB                | HC       | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  |
| -25.0                | 10191    | 6401 | 1.59 | 9069  | 6788 | 1.34 |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |
| -20.0                | 12939    | 6013 | 2.15 | 11515 | 6376 | 1.81 | 10091 | 6739 | 1.50 |       |      |      |       |      |      |       |      |      |       |      |      |
| -15.0                | 20078    | 7699 | 2.61 | 19027 | 8151 | 2.33 | 17841 | 9048 | 1.97 | 15171 | 9112 | 1.66 | 12715 | 9070 | 1.40 |       |      |      |       |      |      |
| -10                  | 22882    | 8635 | 2.65 | 21871 | 8832 | 2.48 | 21232 | 9533 | 2.23 | 18785 | 9369 | 2.01 | 16482 | 9128 | 1.81 | 9437  | 8390 | 1.12 | 6282  | 5554 | 1.13 |
| -7.0                 | 24296    | 8831 | 2.75 | 23577 | 9241 | 2.55 | 23266 | 9824 | 2.37 | 20360 | 9253 | 2.20 | 18743 | 9163 | 2.05 | 10735 | 8784 | 1.22 | 8565  | 7170 | 1.19 |
| -5.0                 | 25871    | 8671 | 2.98 | 25235 | 9210 | 2.74 | 25038 | 9924 | 2.52 | 22679 | 9738 | 2.33 | 20410 | 9475 | 2.15 | 11858 | 8869 | 1.34 | 10173 | 8050 | 1.26 |
| -2.0                 | 26720    | 7980 | 3.35 | 25246 | 8346 | 3.02 | 24294 | 8836 | 2.75 | 23360 | 9301 | 2.51 | 21178 | 9626 | 2.20 | 13926 | 9310 | 1.50 | 11838 | 8353 | 1.42 |
| 0                    | 24577    | 6937 | 3.54 | 24132 | 7502 | 3.22 | 23688 | 8068 | 2.94 | 23244 | 8633 | 2.69 | 21313 | 9386 | 2.27 | 17275 | 9037 | 1.91 | 14415 | 8998 | 1.60 |
| 2                    | 25962    | 6948 | 3.74 | 25494 | 7477 | 3.41 | 25026 | 8006 | 3.13 | 24558 | 8535 | 2.88 | 23848 | 9184 | 2.60 | 20623 | 8764 | 2.35 | 19015 | 9387 | 2.03 |
| 5                    | 20580    | 5005 | 4.11 | 19758 | 5333 | 3.70 | 18937 | 5662 | 3.34 | 18115 | 5990 | 3.02 | 17898 | 6718 | 2.66 | 17680 | 7446 | 2.37 | 17463 | 8373 | 2.09 |
| 7.0                  | 21884    | 5019 | 4.36 | 20738 | 5313 | 3.90 | 19593 | 5608 | 3.49 | 18447 | 5902 | 3.13 | 18424 | 6805 | 2.71 | 18401 | 7707 | 2.39 | 18378 | 8610 | 2.13 |
| 10                   | 21824    | 4923 | 4.43 | 20654 | 5071 | 4.07 | 19484 | 5220 | 3.73 | 18314 | 5368 | 3.41 | 18238 | 6070 | 3.00 | 18162 | 6771 | 2.68 | 18087 | 7473 | 2.42 |
| 15.0                 | 23370    | 5157 | 4.53 | 22078 | 5109 | 4.32 | 20786 | 5061 | 4.11 | 20886 | 5372 | 3.89 | 19338 | 5484 | 3.53 | 19182 | 5954 | 3.22 | 19026 | 6424 | 2.96 |
| 20.0                 | 25031    | 5384 | 4.65 | 23779 | 5329 | 4.46 | 22527 | 5273 | 4.27 | 21275 | 5217 | 4.08 | 20829 | 5569 | 3.74 | 20382 | 5921 | 3.44 | 19935 | 6273 | 3.18 |
| 25.0                 | 24785    | 5211 | 4.76 | 23660 | 5152 | 4.59 | 22535 | 5093 | 4.43 | 21410 | 5033 | 4.25 | 20725 | 5250 | 3.95 | 20040 | 5468 | 3.67 | 19355 | 5685 | 3.40 |
| 30.0                 | 26328    | 5423 | 4.85 | 25240 | 5356 | 4.71 | 24153 | 5289 | 4.57 | 23065 | 5222 | 4.42 | 22110 | 5330 | 4.15 | 21154 | 5437 | 3.89 | 20199 | 5545 | 3.64 |
| 35.0                 | 12774    | 1712 | 7.46 | 12484 | 1898 | 6.58 | 12195 | 2085 | 5.85 | 11905 | 2271 | 5.24 | 11516 | 2596 | 4.44 | 11127 | 2920 | 3.81 |       |      |      |

Abbreviations:

LWT: Leaving water temperature (°C)

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.2: SMHM-180B-3 heating capacity - integrated values<sup>1</sup>

| Outdoor<br>air temp. | LWT (°C) |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |
|----------------------|----------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|
|                      | 30       |      |      | 35    |      |      | 40    |      |      | 45    |      |      | 50    |      |      | 55    |      |      | 60    |      |      |
| °C DB                | HC       | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  |
| -25.0                | 8684     | 6028 | 1.44 | 7841  | 6518 | 1.20 |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |
| -20.0                | 11025    | 5663 | 1.95 | 9955  | 6123 | 1.63 | 8885  | 6583 | 1.35 |       |      |      |       |      |      |       |      |      |       |      |      |
| -15.0                | 15468    | 6961 | 2.22 | 14693 | 6973 | 2.11 | 14167 | 8250 | 1.72 | 12439 | 8742 | 1.42 | 10822 | 9073 | 1.19 |       |      |      |       |      |      |
| -10                  | 18972    | 7639 | 2.48 | 17951 | 7874 | 2.28 | 17232 | 8595 | 2.00 | 15056 | 8533 | 1.76 | 13026 | 8388 | 1.55 | 9165  | 8350 | 1.10 | 6100  | 5826 | 1.05 |
| -7.0                 | 21075    | 8180 | 2.58 | 19906 | 8414 | 2.37 | 19071 | 8803 | 2.17 | 16156 | 8169 | 1.98 | 14349 | 7978 | 1.80 | 10075 | 8515 | 1.18 | 8038  | 7435 | 1.08 |
| -5.0                 | 22146    | 7943 | 2.79 | 20955 | 8275 | 2.53 | 20117 | 8760 | 2.30 | 17578 | 8459 | 2.08 | 15209 | 8110 | 1.88 | 10946 | 8535 | 1.28 | 9390  | 8035 | 1.17 |
| -2.0                 | 22479    | 7183 | 3.13 | 20516 | 7346 | 2.79 | 19021 | 7627 | 2.49 | 17570 | 7892 | 2.23 | 16322 | 8364 | 1.95 | 12613 | 8870 | 1.42 | 10722 | 8815 | 1.22 |
| 0                    | 19933    | 6025 | 3.31 | 19367 | 6511 | 2.97 | 18800 | 6998 | 2.69 | 18234 | 7484 | 2.44 | 17629 | 8545 | 2.06 | 15174 | 8562 | 1.77 | 13564 | 8812 | 1.54 |
| 2                    | 20355    | 5816 | 3.50 | 20228 | 6397 | 3.16 | 20101 | 6979 | 2.88 | 19974 | 7560 | 2.64 | 19936 | 8410 | 2.37 | 17735 | 8254 | 2.15 | 16838 | 8572 | 1.96 |
| 5                    | 20220    | 4928 | 4.10 | 19080 | 5189 | 3.68 | 17940 | 5450 | 3.29 | 16800 | 5711 | 2.94 | 16775 | 6496 | 2.58 | 16750 | 7282 | 2.30 | 16726 | 8067 | 2.07 |
| 7.0                  | 21884    | 5019 | 4.36 | 20738 | 5313 | 3.90 | 19593 | 5608 | 3.49 | 18447 | 5902 | 3.13 | 18424 | 6805 | 2.71 | 18401 | 7707 | 2.39 | 18378 | 8610 | 2.13 |
| 10                   | 21824    | 4923 | 4.43 | 20654 | 5071 | 4.07 | 19484 | 5220 | 3.73 | 18314 | 5368 | 3.41 | 18238 | 6070 | 3.00 | 18162 | 6771 | 2.68 | 18087 | 7473 | 2.42 |
| 15.0                 | 23370    | 5157 | 4.53 | 22078 | 5109 | 4.32 | 20786 | 5061 | 4.11 | 20886 | 5372 | 3.89 | 19338 | 5484 | 3.53 | 19182 | 5954 | 3.22 | 19026 | 6424 | 2.96 |
| 20.0                 | 25031    | 5384 | 4.65 | 23779 | 5329 | 4.46 | 22527 | 5273 | 4.27 | 21275 | 5217 | 4.08 | 20829 | 5569 | 3.74 | 20382 | 5921 | 3.44 | 19935 | 6273 | 3.18 |
| 25.0                 | 24785    | 5211 | 4.76 | 23660 | 5152 | 4.59 | 22535 | 5093 | 4.43 | 21410 | 5033 | 4.25 | 20725 | 5250 | 3.95 | 20040 | 5468 | 3.67 | 19355 | 5685 | 3.40 |
| 30.0                 | 26328    | 5423 | 4.85 | 25240 | 5356 | 4.71 | 24153 | 5289 | 4.57 | 23065 | 5222 | 4.42 | 22110 | 5330 | 4.15 | 21154 | 5437 | 3.89 | 20199 | 5545 | 3.64 |
| 35.0                 | 12774    | 1712 | 7.46 | 12484 | 1898 | 6.58 | 12195 | 2085 | 5.85 | 11905 | 2271 | 5.24 | 11516 | 2596 | 4.44 | 11127 | 2920 | 3.81 |       |      |      |

Abbreviations:

LWT: Leaving water temperature (°C)

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1. Integrated

heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.3: SMHM-220B-3 heating capacity - peak values <sup>1</sup>

| Outdoor air temp. | LWT (°C) |      |      |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
|-------------------|----------|------|------|-------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                   | 30       |      |      | 35    |      |      | 40    |       |      | 45    |       |      | 50    |       |      | 55    |       |      | 60    |       |      |
| °C DB             | HC       | PI   | COP  | HC    | PI   | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  |
| -25.0             | 10174    | 6756 | 1.51 | 9123  | 7154 | 1.28 |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
| -20.0             | 12899    | 6067 | 2.13 | 11566 | 6424 | 1.80 | 10234 | 6782  | 1.51 |       |       |      |       |       |      |       |       |      |       |       |      |
| -15.0             | 20342    | 7021 | 2.90 | 19112 | 8206 | 2.33 | 17973 | 9705  | 1.85 | 16782 | 11251 | 1.49 | 14704 | 11423 | 1.29 |       |       |      |       |       |      |
| -10               | 22770    | 7972 | 2.86 | 22000 | 8861 | 2.48 | 21609 | 9866  | 2.19 | 21191 | 10901 | 1.94 | 18987 | 10952 | 1.73 | 12202 | 10922 | 1.12 | 8529  | 7893  | 1.08 |
| -7.0              | 24093    | 8271 | 2.91 | 23733 | 9254 | 2.56 | 23791 | 9963  | 2.39 | 23836 | 10691 | 2.23 | 21846 | 10470 | 2.09 | 13558 | 10441 | 1.30 | 9946  | 8124  | 1.22 |
| -5.0              | 25944    | 8376 | 3.10 | 25423 | 9289 | 2.74 | 25347 | 10043 | 2.52 | 25252 | 10817 | 2.33 | 23008 | 10627 | 2.16 | 15564 | 10743 | 1.45 | 12091 | 9304  | 1.30 |
| -2.0              | 28722    | 8702 | 3.30 | 27958 | 9343 | 2.99 | 27680 | 10163 | 2.72 | 27375 | 11005 | 2.49 | 23397 | 10626 | 2.20 | 18573 | 11196 | 1.66 | 14958 | 11305 | 1.32 |
| 0                 | 28274    | 8037 | 3.52 | 27530 | 8709 | 3.16 | 26787 | 9382  | 2.86 | 26043 | 10054 | 2.59 | 24722 | 10978 | 2.25 | 21601 | 10987 | 1.97 | 19108 | 11100 | 1.72 |
| 2                 | 29878    | 7993 | 3.74 | 29100 | 8743 | 3.33 | 28321 | 9492  | 2.98 | 27542 | 10242 | 2.69 | 27112 | 10959 | 2.47 | 24629 | 10778 | 2.29 | 22717 | 11224 | 2.02 |
| 5                 | 24792    | 6189 | 4.01 | 23920 | 6684 | 3.58 | 23049 | 7178  | 3.21 | 22177 | 7673  | 2.89 | 21966 | 8497  | 2.59 | 21754 | 9321  | 2.33 | 21543 | 10344 | 2.08 |
| 7.0               | 25997    | 6215 | 4.18 | 24925 | 6468 | 3.85 | 23891 | 7096  | 3.37 | 22657 | 7511  | 3.02 | 22706 | 8542  | 2.66 | 22775 | 9089  | 2.51 | 22443 | 10552 | 2.13 |
| 10                | 25467    | 5928 | 4.30 | 24549 | 6290 | 3.90 | 23631 | 6652  | 3.55 | 22713 | 7015  | 3.24 | 22316 | 7676  | 2.91 | 21919 | 8337  | 2.63 | 21521 | 8999  | 2.39 |
| 15.0              | 28916    | 6484 | 4.46 | 28048 | 6789 | 4.13 | 27180 | 7095  | 3.83 | 26312 | 7401  | 3.56 | 25450 | 7657  | 3.32 | 24588 | 7913  | 3.11 | 23726 | 8169  | 2.90 |
| 20.0              | 28642    | 6171 | 4.64 | 27752 | 6407 | 4.33 | 26862 | 6644  | 4.04 | 25972 | 6881  | 3.77 | 24963 | 7064  | 3.53 | 23953 | 7248  | 3.30 | 22944 | 7431  | 3.09 |
| 25.0              | 28913    | 6010 | 4.81 | 27988 | 6192 | 4.52 | 27063 | 6373  | 4.25 | 26138 | 6555  | 3.99 | 24984 | 6679  | 3.74 | 23830 | 6803  | 3.50 | 22676 | 6928  | 3.27 |
| 30.0              | 30920    | 6224 | 4.97 | 29906 | 6364 | 4.70 | 28892 | 6505  | 4.44 | 27878 | 6645  | 4.20 | 26518 | 6722  | 3.95 | 25158 | 6798  | 3.70 | 23799 | 6875  | 3.46 |
| 35.0              | 12748    | 1735 | 7.35 | 12458 | 1923 | 6.48 | 12167 | 2110  | 5.77 | 11877 | 2298  | 5.17 | 11536 | 2619  | 4.41 | 11196 | 2940  | 3.81 |       |       |      |

Abbreviations:

LWT: Leaving water temperature (°C)

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1.Integrated

heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.4: SMHM-220B-3 heating capacity - integrated values <sup>1</sup>

| Outdoor air temp. | LWT (°C) |      |      |       |      |      |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |
|-------------------|----------|------|------|-------|------|------|-------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                   | 30       |      |      | 35    |      |      | 40    |      |      | 45    |       |      | 50    |       |      | 55    |       |      | 60    |       |      |
| °C DB             | HC       | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  |
| -25.0             | 8726     | 6366 | 1.37 | 8064  | 6892 | 1.17 |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |
| -20.0             | 11062    | 5716 | 1.94 | 10223 | 6188 | 1.65 | 9383  | 6660 | 1.41 |       |       |      |       |       |      |       |       |      |       |       |      |
| -15.0             | 16554    | 6653 | 2.49 | 15913 | 7348 | 2.17 | 14860 | 9099 | 1.63 | 13761 | 10907 | 1.26 | 12571 | 11272 | 1.12 |       |       |      |       |       |      |
| -10               | 20427    | 8048 | 2.54 | 19266 | 8196 | 2.35 | 18429 | 9176 | 2.01 | 17550 | 10186 | 1.72 | 15221 | 10274 | 1.48 | 10648 | 10010 | 1.06 | 7442  | 7234  | 1.03 |
| -7.0              | 22348    | 8404 | 2.66 | 21279 | 8704 | 2.44 | 20570 | 9223 | 2.23 | 19824 | 9754  | 2.03 | 17426 | 9425  | 1.85 | 12547 | 10034 | 1.25 | 9204  | 7904  | 1.16 |
| -5.0              | 23094    | 8219 | 2.81 | 22113 | 8611 | 2.57 | 21508 | 9221 | 2.33 | 20869 | 9847  | 2.12 | 18483 | 9601  | 1.93 | 13813 | 10050 | 1.37 | 10731 | 8985  | 1.19 |
| -2.0              | 24215    | 8052 | 3.01 | 23364 | 8471 | 2.76 | 22915 | 9219 | 2.49 | 22435 | 9988  | 2.25 | 18925 | 9595  | 1.97 | 15713 | 10074 | 1.56 | 13392 | 10067 | 1.33 |
| 0                 | 22920    | 7140 | 3.21 | 22469 | 7779 | 2.89 | 22018 | 8417 | 2.62 | 21568 | 9056  | 2.38 | 20738 | 9947  | 2.08 | 18377 | 10003 | 1.84 | 16511 | 10149 | 1.63 |
| 2                 | 23355    | 6959 | 3.36 | 23244 | 7692 | 3.02 | 23132 | 8425 | 2.75 | 23021 | 9157  | 2.51 | 22908 | 9959  | 2.30 | 21042 | 9933  | 2.12 | 19629 | 10005 | 1.96 |
| 5                 | 23541    | 6021 | 3.91 | 22623 | 6460 | 3.50 | 21704 | 6900 | 3.15 | 20786 | 7340  | 2.83 | 20672 | 8189  | 2.52 | 20559 | 9039  | 2.27 | 20445 | 9889  | 2.07 |
| 7.0               | 25997    | 6215 | 4.18 | 24925 | 6468 | 3.85 | 23891 | 7096 | 3.37 | 22657 | 7511  | 3.02 | 22706 | 8542  | 2.66 | 22775 | 9089  | 2.51 | 22443 | 10552 | 2.13 |
| 10                | 25467    | 5928 | 4.30 | 24549 | 6290 | 3.90 | 23631 | 6652 | 3.55 | 22713 | 7015  | 3.24 | 22316 | 7676  | 2.91 | 21919 | 8337  | 2.63 | 21521 | 8999  | 2.39 |
| 15.0              | 28916    | 6484 | 4.46 | 28048 | 6789 | 4.13 | 27180 | 7095 | 3.83 | 26312 | 7401  | 3.56 | 25450 | 7657  | 3.32 | 24588 | 7913  | 3.11 | 23726 | 8169  | 2.90 |
| 20.0              | 28642    | 6171 | 4.64 | 27752 | 6407 | 4.33 | 26862 | 6644 | 4.04 | 25972 | 6881  | 3.77 | 24963 | 7064  | 3.53 | 23953 | 7248  | 3.30 | 22944 | 7431  | 3.09 |
| 25.0              | 28913    | 6010 | 4.81 | 27988 | 6192 | 4.52 | 27063 | 6373 | 4.25 | 26138 | 6555  | 3.99 | 24984 | 6679  | 3.74 | 23830 | 6803  | 3.50 | 22676 | 6928  | 3.27 |
| 30.0              | 30920    | 6224 | 4.97 | 29906 | 6364 | 4.70 | 28892 | 6505 | 4.44 | 27878 | 6645  | 4.20 | 26518 | 6722  | 3.95 | 25158 | 6798  | 3.70 | 23799 | 6875  | 3.46 |
| 35.0              | 12748    | 1735 | 7.35 | 12458 | 1923 | 6.48 | 12167 | 2110 | 5.77 | 11877 | 2298  | 5.17 | 11536 | 2619  | 4.41 | 11196 | 2940  | 3.81 |       |       |      |

Abbreviations:

LWT: Leaving water temperature (°C)

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1.Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.5: SMHM-260B-3 heating capacity - peak values <sup>1</sup>

| Outdoor<br>air temp. | LWT (°C) |      |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
|----------------------|----------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                      | 30       |      |      | 35    |       |      | 40    |       |      | 45    |       |      | 50    |       |      | 55    |       |      | 60    |       |      |
| °C DB                | HC       | PI   | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  |
| -25.0                | 10157    | 7112 | 1.43 | 9177  | 7521  | 1.22 |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
| -20.0                | 12858    | 6120 | 2.10 | 11617 | 6472  | 1.79 | 10376 | 6824  | 1.52 |       |       |      |       |       |      |       |       |      |       |       |      |
| -15.0                | 20606    | 6342 | 3.25 | 19196 | 8261  | 2.32 | 18104 | 10362 | 1.75 | 16961 | 12531 | 1.35 | 16535 | 13802 | 1.20 |       |       |      |       |       |      |
| -10                  | 22658    | 7758 | 2.92 | 22130 | 8889  | 2.49 | 21987 | 10200 | 2.16 | 21825 | 11550 | 1.89 | 21277 | 12722 | 1.67 | 12658 | 11004 | 1.15 | 9889  | 8909  | 1.11 |
| -7.0                 | 23890    | 8607 | 2.78 | 24743 | 9597  | 2.58 | 24316 | 10102 | 2.41 | 24743 | 10962 | 2.26 | 24743 | 11645 | 2.12 | 16704 | 12198 | 1.37 | 12590 | 10175 | 1.24 |
| -5.0                 | 26018    | 8754 | 2.97 | 25612 | 9369  | 2.73 | 25656 | 10162 | 2.52 | 25685 | 10977 | 2.34 | 25265 | 11614 | 2.18 | 19042 | 12259 | 1.55 | 14431 | 10380 | 1.39 |
| -2.0                 | 29211    | 8974 | 3.26 | 28195 | 9523  | 2.96 | 27665 | 10252 | 2.70 | 27099 | 11000 | 2.46 | 26142 | 11863 | 2.20 | 23013 | 12689 | 1.81 | 21303 | 14295 | 1.49 |
| 0                    | 30979    | 8866 | 3.49 | 29918 | 9625  | 3.11 | 29372 | 10571 | 2.78 | 28788 | 11543 | 2.49 | 28276 | 12655 | 2.23 | 25372 | 12580 | 2.02 | 23965 | 13083 | 1.83 |
| 2                    | 32747    | 8757 | 3.74 | 31640 | 10400 | 3.04 | 31078 | 10890 | 2.85 | 30476 | 12086 | 2.52 | 30411 | 12867 | 2.36 | 27207 | 12236 | 2.22 | 25583 | 12690 | 2.02 |
| 5                    | 28950    | 7415 | 3.90 | 28072 | 8110  | 3.46 | 27194 | 8805  | 3.09 | 26316 | 9501  | 2.77 | 26129 | 10400 | 2.51 | 28150 | 12261 | 2.30 | 25755 | 12399 | 2.08 |
| 7.0                  | 29927    | 7459 | 4.01 | 29083 | 8074  | 3.60 | 28240 | 8690  | 3.25 | 27396 | 9305  | 2.94 | 27120 | 10382 | 2.61 | 26843 | 11459 | 2.34 | 24306 | 11469 | 2.12 |
| 10                   | 28870    | 6938 | 4.16 | 28366 | 7576  | 3.74 | 27863 | 8214  | 3.39 | 27359 | 8852  | 3.09 | 26538 | 9413  | 2.82 | 25717 | 9974  | 2.58 | 24895 | 10536 | 2.36 |
| 15.0                 | 32415    | 7394 | 4.38 | 30789 | 7789  | 3.95 | 30707 | 8536  | 3.60 | 30624 | 9283  | 3.30 | 28930 | 9180  | 3.15 | 26556 | 8851  | 3.00 | 24905 | 8751  | 2.85 |
| 20.0                 | 32835    | 7086 | 4.63 | 32475 | 7723  | 4.21 | 30468 | 7931  | 3.84 | 30126 | 8535  | 3.53 | 28453 | 8482  | 3.35 | 26780 | 8428  | 3.18 | 25107 | 8375  | 3.00 |
| 25.0                 | 33747    | 6931 | 4.87 | 33140 | 7449  | 4.45 | 32533 | 7966  | 4.08 | 31926 | 8484  | 3.76 | 30146 | 8472  | 3.56 | 28366 | 8460  | 3.35 | 26586 | 8448  | 3.15 |
| 30.0                 | 35360    | 6947 | 5.09 | 34511 | 7366  | 4.69 | 33662 | 7785  | 4.32 | 33725 | 8432  | 4.00 | 31839 | 8462  | 3.76 | 29952 | 8491  | 3.53 | 28066 | 8521  | 3.29 |
| 35.0                 | 12722    | 1759 | 7.23 | 12431 | 1947  | 6.38 | 12140 | 2136  | 5.68 | 11849 | 2324  | 5.10 | 11557 | 2642  | 4.37 | 11264 | 2959  | 3.81 |       |       |      |

Abbreviations:

LWT: Leaving water temperature (°C )

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1. Peak heating capacity values do not take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.6: SMHM-260B-3 heating capacity - integrated values<sup>1</sup>

| Outdoor<br>air temp. | LWT (°C) |      |      |       |      |      |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |
|----------------------|----------|------|------|-------|------|------|-------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                      | 30       |      |      | 35    |      |      | 40    |      |      | 45    |       |      | 50    |       |      | 55    |       |      | 60    |       |      |
| °C DB                | HC       | PI   | COP  | HC    | PI   | COP  | HC    | PI   | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  |
| -25.0                | 8768     | 6704 | 1.31 | 8286  | 7266 | 1.14 |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |
| -20.0                | 11099    | 5769 | 1.92 | 10490 | 6253 | 1.68 | 9881  | 6737 | 1.47 |       |       |      |       |       |      |       |       |      |       |       |      |
| -15.0                | 17641    | 6344 | 2.78 | 17133 | 7723 | 2.22 | 15554 | 9948 | 1.56 | 13909 | 12247 | 1.14 | 13613 | 12772 | 1.07 |       |       |      |       |       |      |
| -10                  | 21882    | 8010 | 2.73 | 20582 | 8518 | 2.42 | 19626 | 9757 | 2.01 | 18624 | 11035 | 1.69 | 17278 | 12141 | 1.42 | 13199 | 12016 | 1.10 | 10311 | 9728  | 1.06 |
| -7.0                 | 23620    | 8628 | 2.74 | 23460 | 9316 | 2.52 | 22069 | 9642 | 2.29 | 21453 | 10307 | 2.08 | 20450 | 10803 | 1.89 | 15277 | 11629 | 1.31 | 11515 | 9701  | 1.19 |
| -5.0                 | 24043    | 8494 | 2.83 | 23270 | 8947 | 2.60 | 22900 | 9682 | 2.37 | 22501 | 10438 | 2.16 | 21701 | 11024 | 1.97 | 16354 | 11161 | 1.47 | 12392 | 9986  | 1.24 |
| -2.0                 | 24677    | 8515 | 2.90 | 24199 | 8875 | 2.73 | 24145 | 9742 | 2.48 | 24074 | 10634 | 2.26 | 22101 | 11100 | 1.99 | 18394 | 10781 | 1.71 | 15966 | 10988 | 1.45 |
| 0                    | 25100    | 8045 | 3.12 | 24819 | 8828 | 2.81 | 24975 | 9782 | 2.55 | 25122 | 10765 | 2.33 | 24034 | 11414 | 2.11 | 20968 | 11023 | 1.90 | 19220 | 11177 | 1.72 |
| 2                    | 25523    | 7910 | 3.23 | 25438 | 8780 | 2.90 | 25806 | 9822 | 2.63 | 26170 | 10896 | 2.40 | 25967 | 11612 | 2.24 | 23098 | 11052 | 2.09 | 21594 | 11019 | 1.96 |
| 5                    | 26524    | 7131 | 3.72 | 25990 | 7792 | 3.34 | 25455 | 8453 | 3.01 | 24920 | 9115  | 2.73 | 24688 | 9993  | 2.47 | 24457 | 10871 | 2.25 | 24225 | 11749 | 2.06 |
| 7.0                  | 29927    | 7459 | 4.01 | 29083 | 8074 | 3.60 | 28240 | 8690 | 3.25 | 27396 | 9305  | 2.94 | 27120 | 10382 | 2.61 | 26843 | 11459 | 2.34 | 24306 | 11469 | 2.12 |
| 10                   | 28870    | 6938 | 4.16 | 28366 | 7576 | 3.74 | 27863 | 8214 | 3.39 | 27359 | 8852  | 3.09 | 26538 | 9413  | 2.82 | 25717 | 9974  | 2.58 | 24895 | 10536 | 2.36 |
| 15.0                 | 32415    | 7394 | 4.38 | 30789 | 7789 | 3.95 | 30707 | 8536 | 3.60 | 30624 | 9283  | 3.30 | 28930 | 9180  | 3.15 | 26556 | 8851  | 3.00 | 24905 | 8751  | 2.85 |
| 20.0                 | 32835    | 7086 | 4.63 | 32475 | 7723 | 4.21 | 30468 | 7931 | 3.84 | 30126 | 8535  | 3.53 | 28453 | 8482  | 3.35 | 26780 | 8428  | 3.18 | 25107 | 8375  | 3.00 |
| 25.0                 | 33747    | 6931 | 4.87 | 33140 | 7449 | 4.45 | 32533 | 7966 | 4.08 | 31926 | 8484  | 3.76 | 30146 | 8472  | 3.56 | 28366 | 8460  | 3.35 | 26586 | 8448  | 3.15 |
| 30.0                 | 35360    | 6947 | 5.09 | 34511 | 7366 | 4.69 | 33662 | 7785 | 4.32 | 33725 | 8432  | 4.00 | 31839 | 8462  | 3.76 | 29952 | 8491  | 3.53 | 28066 | 8521  | 3.29 |
| 35.0                 | 12722    | 1759 | 7.23 | 12431 | 1947 | 6.38 | 12140 | 2136 | 5.68 | 11849 | 2324  | 5.10 | 11557 | 2642  | 4.37 | 11264 | 2959  | 3.81 |       |       |      |

Abbreviations:

LWT: Leaving water temperature (°C )

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1. Integrated

heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.7: SMHM-300B-3 heating capacity - peak values <sup>1</sup>

| Outdoor air temp. | LWT (°C) |      |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
|-------------------|----------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                   | 30       |      |      | 35    |       |      | 40    |       |      | 45    |       |      | 50    |       |      | 55    |       |      | 60    |       |      |
| °C DB             | HC       | PI   | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  |
| -25.0             | 10495    | 7989 | 1.31 | 9553  | 8439  | 1.13 |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
| -20.0             | 13266    | 6606 | 2.01 | 12076 | 6976  | 1.73 | 10887 | 7347  | 1.48 |       |       |      |       |       |      |       |       |      |       |       |      |
| -15.0             | 21600    | 6060 | 3.56 | 19955 | 8898  | 2.24 | 18873 | 11790 | 1.60 | 17740 | 14777 | 1.20 | 17283 | 16036 | 1.08 |       |       |      |       |       |      |
| -10               | 23336    | 7831 | 2.98 | 23038 | 9542  | 2.41 | 23147 | 11270 | 2.05 | 23245 | 13053 | 1.78 | 22937 | 14639 | 1.57 | 14692 | 13080 | 1.12 | 11046 | 9807  | 1.13 |
| -7.0              | 24516    | 9090 | 2.70 | 24888 | 9928  | 2.51 | 25711 | 10959 | 2.35 | 26547 | 12019 | 2.21 | 26933 | 12887 | 2.09 | 22278 | 14100 | 1.58 | 16470 | 12795 | 1.29 |
| -5.0              | 27005    | 9411 | 2.87 | 26704 | 10109 | 2.64 | 26874 | 11001 | 2.44 | 27033 | 11917 | 2.27 | 26721 | 12641 | 2.11 | 23263 | 14564 | 1.60 | 19236 | 12538 | 1.53 |
| -2.0              | 30739    | 9892 | 3.11 | 29428 | 10381 | 2.83 | 28618 | 11064 | 2.59 | 27762 | 11765 | 2.36 | 27612 | 12944 | 2.13 | 27907 | 14716 | 1.90 | 27664 | 17438 | 1.59 |
| 0                 | 32612    | 9711 | 3.36 | 31244 | 10562 | 2.96 | 30409 | 11617 | 2.62 | 29526 | 12703 | 2.32 | 29993 | 13980 | 2.15 | 29409 | 14730 | 2.00 | 28335 | 14653 | 1.93 |
| 2                 | 33318    | 8907 | 3.74 | 31942 | 9481  | 3.37 | 31111 | 11374 | 2.74 | 30700 | 12748 | 2.41 | 30582 | 13511 | 2.26 | 29866 | 13781 | 2.17 | 28047 | 13980 | 2.01 |
| 5                 | 31830    | 8363 | 3.81 | 31020 | 9257  | 3.35 | 30791 | 10348 | 2.98 | 30532 | 11310 | 2.70 | 30387 | 12427 | 2.45 | 29919 | 13651 | 2.19 | 28984 | 14005 | 2.07 |
| 7.0               | 31177    | 8100 | 3.85 | 31754 | 9509  | 3.34 | 30825 | 9810  | 3.14 | 30992 | 11268 | 2.75 | 31077 | 12097 | 2.57 | 30563 | 13819 | 2.21 | 27332 | 12943 | 2.11 |
| 10                | 30030    | 7459 | 4.03 | 30099 | 8373  | 3.59 | 30837 | 9493  | 3.25 | 31579 | 10654 | 2.96 | 30903 | 11281 | 2.74 | 30172 | 11925 | 2.53 | 27033 | 11579 | 2.33 |
| 15.0              | 31835    | 7396 | 4.30 | 32695 | 8637  | 3.79 | 34334 | 10108 | 3.40 | 36014 | 11636 | 3.09 | 34020 | 11332 | 3.00 | 32585 | 11237 | 2.90 | 27197 | 9762  | 2.79 |
| 20.0              | 32636    | 7055 | 4.63 | 32977 | 8075  | 4.08 | 34150 | 9322  | 3.66 | 35340 | 10620 | 3.33 | 33608 | 10510 | 3.20 | 32477 | 10618 | 3.06 | 27137 | 9328  | 2.91 |
| 25.0              | 33876    | 6869 | 4.93 | 33763 | 7710  | 4.38 | 34535 | 8776  | 3.94 | 35302 | 9885  | 3.57 | 33766 | 9942  | 3.40 | 32877 | 10226 | 3.22 | 27519 | 9093  | 3.03 |
| 30.0              | 36747    | 7036 | 5.22 | 36198 | 7749  | 4.67 | 36587 | 8684  | 4.21 | 36947 | 9657  | 3.83 | 35488 | 9862  | 3.60 | 34721 | 10306 | 3.37 | 29225 | 9313  | 3.14 |
| 35.0              | 12696    | 1782 | 7.12 | 12405 | 1972  | 6.29 | 12113 | 2161  | 5.61 | 11821 | 2351  | 5.03 | 11577 | 2665  | 4.34 | 11333 | 2979  | 3.80 |       |       |      |

Abbreviations:

LWT: Leaving water temperature (°C)

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1.Integrated heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

Table 2-5.8: SMHM-300B-3 heating capacity - integrated values<sup>1</sup>

| Outdoor air temp. | LWT (°C) |      |      |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
|-------------------|----------|------|------|-------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                   | 30       |      |      | 35    |      |      | 40    |       |      | 45    |       |      | 50    |       |      | 55    |       |      | 60    |       |      |
| °C DB             | HC       | PI   | COP  | HC    | PI   | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  | HC    | PI    | COP  |
| -25.0             | 8886     | 7322 | 1.21 | 8680  | 8019 | 1.08 |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
| -20.0             | 11249    | 6302 | 1.79 | 10773 | 6901 | 1.56 | 10288 | 7500  | 1.37 |       |       |      |       |       |      |       |       |      |       |       |      |
| -15.0             | 17880    | 6930 | 2.58 | 17595 | 8523 | 2.06 | 16194 | 11075 | 1.46 | 14691 | 13737 | 1.07 | 14318 | 13687 | 1.05 |       |       |      |       |       |      |
| -10               | 22178    | 8749 | 2.53 | 21136 | 9400 | 2.25 | 20434 | 10862 | 1.88 | 19671 | 12377 | 1.59 | 18172 | 13423 | 1.35 | 14290 | 13635 | 1.05 | 10381 | 10223 | 1.02 |
| -7.0              | 23940    | 9425 | 2.54 | 23261 | 9927 | 2.34 | 22977 | 10735 | 2.14 | 22659 | 11561 | 1.96 | 21508 | 11943 | 1.80 | 16540 | 13786 | 1.20 | 12228 | 11043 | 1.11 |
| -5.0              | 24368    | 9278 | 2.63 | 23897 | 9874 | 2.42 | 23842 | 10779 | 2.21 | 23766 | 11708 | 2.03 | 22825 | 12188 | 1.87 | 18040 | 13480 | 1.34 | 13933 | 11348 | 1.23 |
| -2.0              | 25011    | 9301 | 2.69 | 24851 | 9795 | 2.54 | 25138 | 10846 | 2.32 | 25427 | 11928 | 2.13 | 23246 | 12272 | 1.89 | 19934 | 12793 | 1.56 | 17952 | 12818 | 1.40 |
| 0                 | 25440    | 8787 | 2.90 | 25487 | 9742 | 2.62 | 26003 | 10891 | 2.39 | 26534 | 12075 | 2.20 | 25278 | 12619 | 2.00 | 22724 | 13080 | 1.74 | 21611 | 13039 | 1.66 |
| 2                 | 24994    | 8075 | 3.10 | 26021 | 9085 | 2.86 | 25959 | 10220 | 2.54 | 28191 | 12317 | 2.29 | 26388 | 11998 | 2.20 | 24651 | 12493 | 1.97 | 23085 | 11821 | 1.95 |
| 5                 | 28738    | 8054 | 3.57 | 28531 | 8892 | 3.21 | 28875 | 9918  | 2.91 | 29219 | 10978 | 2.66 | 28825 | 11863 | 2.43 | 27846 | 13110 | 2.12 | 27000 | 13141 | 2.05 |
| 7.0               | 31177    | 8100 | 3.85 | 31754 | 9509 | 3.34 | 30825 | 9810  | 3.14 | 30992 | 11268 | 2.75 | 31077 | 12097 | 2.57 | 30563 | 13819 | 2.21 | 27332 | 12943 | 2.11 |
| 10                | 30030    | 7459 | 4.03 | 30099 | 8373 | 3.59 | 30837 | 9493  | 3.25 | 31579 | 10654 | 2.96 | 30903 | 11281 | 2.74 | 30172 | 11925 | 2.53 | 27033 | 11579 | 2.33 |
| 15.0              | 31835    | 7396 | 4.30 | 32695 | 8637 | 3.79 | 34334 | 10108 | 3.40 | 36014 | 11636 | 3.09 | 34020 | 11332 | 3.00 | 32585 | 11237 | 2.90 | 27197 | 9762  | 2.79 |
| 20.0              | 32636    | 7055 | 4.63 | 32977 | 8075 | 4.08 | 34150 | 9322  | 3.66 | 35340 | 10620 | 3.33 | 33608 | 10510 | 3.20 | 32477 | 10618 | 3.06 | 27137 | 9328  | 2.91 |
| 25.0              | 33876    | 6869 | 4.93 | 33763 | 7710 | 4.38 | 34535 | 8776  | 3.94 | 35302 | 9885  | 3.57 | 33766 | 9942  | 3.40 | 32877 | 10226 | 3.22 | 27519 | 9093  | 3.03 |
| 30.0              | 36747    | 7036 | 5.22 | 36198 | 7749 | 4.67 | 36587 | 8684  | 4.21 | 36947 | 9657  | 3.83 | 35488 | 9862  | 3.60 | 34721 | 10306 | 3.37 | 29225 | 9313  | 3.14 |
| 35.0              | 12696    | 1782 | 7.12 | 12405 | 1972 | 6.29 | 12113 | 2161  | 5.61 | 11821 | 2351  | 5.03 | 11577 | 2665  | 4.34 | 11333 | 2979  | 3.80 |       |       |      |

Abbreviations:

LWT: Leaving water temperature (°C)

HC: Total heating capacity (W)

PI: Power input (W)

Notes:

1.Integrated

heating capacity values take account of capacity drops caused by frost accumulation and during defrosting.

## 6.2 Cooling Capacity Tables (Test standard: EN14511)

Table 2-5.9: SMHM-180B-3 cooling capacity

| Outdoor<br>air<br>temp. | LWT (°C) |      |       |       |      |       |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |
|-------------------------|----------|------|-------|-------|------|-------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|
|                         | 25       |      |       | 22    |      |       | 18    |      |      | 15    |      |      | 13    |      |      | 10    |      |      | 7     |      |      | 5     |      |      |
| °C DB                   | CC       | PI   | EER   | CC    | PI   | EER   | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  |
| 45                      | 23005    | 5857 | 3.93  | 20981 | 5876 | 3.57  | 18282 | 5902 | 3.10 | 18000 | 6556 | 2.75 | 17038 | 6782 | 2.51 | 15520 | 6811 | 2.28 | 12938 | 6417 | 2.02 | 11216 | 6154 | 1.82 |
| 40                      | 24236    | 5049 | 4.80  | 22408 | 5197 | 4.31  | 19972 | 5396 | 3.70 | 20088 | 6139 | 3.27 | 19344 | 6451 | 3.00 | 17784 | 6527 | 2.72 | 15016 | 6200 | 2.42 | 13170 | 5981 | 2.20 |
| 35                      | 25466    | 4240 | 6.01  | 23836 | 4519 | 5.27  | 21661 | 4890 | 4.43 | 22176 | 5722 | 3.88 | 21649 | 6119 | 3.54 | 20048 | 6242 | 3.21 | 17093 | 5982 | 2.86 | 15123 | 5809 | 2.60 |
| 30                      | 27199    | 3660 | 7.43  | 25360 | 3892 | 6.52  | 22907 | 4201 | 5.45 | 23324 | 4908 | 4.75 | 22675 | 5244 | 4.32 | 21450 | 5463 | 3.93 | 18808 | 5355 | 3.51 | 17047 | 5283 | 3.23 |
| 25                      | 24799    | 2640 | 9.39  | 23043 | 2799 | 8.23  | 20702 | 3011 | 6.88 | 20525 | 3434 | 5.98 | 20738 | 3822 | 5.43 | 20836 | 4271 | 4.88 | 18712 | 4311 | 4.34 | 17296 | 4338 | 3.99 |
| 20                      | 21499    | 2298 | 9.36  | 20033 | 2380 | 8.42  | 18080 | 2489 | 7.26 | 18196 | 2815 | 6.46 | 19360 | 3250 | 5.96 | 18221 | 3480 | 5.24 | 16337 | 3585 | 4.56 | 15081 | 3655 | 4.13 |
| 15                      | 18256    | 1960 | 9.32  | 17061 | 1980 | 8.61  | 15467 | 2008 | 7.70 | 15858 | 2255 | 7.03 | 16470 | 2497 | 6.60 | 16373 | 2752 | 5.95 | 14780 | 2780 | 5.32 | 13717 | 2798 | 4.90 |
| 10                      | 16075    | 1733 | 9.28  | 15066 | 1708 | 8.82  | 13722 | 1674 | 8.20 | 14303 | 1855 | 7.71 | 15052 | 2040 | 7.38 | 15171 | 2209 | 6.87 |       |      |      |       |      |      |
| 5                       | 14841    | 1446 | 10.26 | 13820 | 1436 | 9.62  | 12458 | 1423 | 8.76 | 11436 | 1413 | 8.10 | 13060 | 1707 | 7.65 | 13211 | 1894 | 6.97 |       |      |      |       |      |      |
| 0                       | 21194    | 1868 | 11.34 | 19619 | 1871 | 10.49 | 17519 | 1874 | 9.35 | 15944 | 1876 | 8.50 | 14894 | 1878 | 7.93 | 13319 | 1880 | 7.08 |       |      |      |       |      |      |
| -5                      | 18573    | 3347 | 5.55  | 17370 | 3155 | 5.51  | 15767 | 2899 | 5.44 | 14565 | 2707 | 5.38 | 13763 | 2579 | 5.34 | 12561 | 2387 | 5.26 |       |      |      |       |      |      |

Abbreviations:

LWT: Leaving water temperature (°C)

CC: Total cooling capacity (W)

PI: Power input (W)

Table 2-5.10: SMHM-220B-3 cooling capacity

| Outdoor<br>air<br>temp. | LWT (°C) |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |       |      |      |
|-------------------------|----------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|-------|------|------|
|                         | 25       |      |      | 22    |      |      | 18    |      |      | 15    |      |      | 13    |      |      | 10    |      |      | 7     |      |      | 5     |      |      |
| °C DB                   | CC       | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  |
| 45                      | 24059    | 5909 | 4.07 | 21857 | 5984 | 3.65 | 18920 | 6083 | 3.11 | 20753 | 7644 | 2.72 | 19982 | 8133 | 2.46 | 18394 | 8281 | 2.22 | 15755 | 8000 | 1.97 | 13996 | 7813 | 1.79 |
| 40                      | 25547    | 5289 | 4.83 | 23508 | 5498 | 4.28 | 20790 | 5775 | 3.60 | 23278 | 7428 | 3.13 | 22791 | 8022 | 2.84 | 21085 | 8083 | 2.61 | 18179 | 7722 | 2.35 | 16242 | 7481 | 2.17 |
| 35                      | 31695    | 5475 | 5.79 | 29498 | 5876 | 5.02 | 26568 | 6410 | 4.14 | 25804 | 7212 | 3.58 | 25600 | 7911 | 3.24 | 23775 | 7886 | 3.01 | 20873 | 7120 | 2.93 | 18938 | 6609 | 2.87 |
| 30                      | 32805    | 4833 | 6.79 | 30457 | 5113 | 5.96 | 27325 | 5487 | 4.98 | 26491 | 6117 | 4.33 | 26249 | 6675 | 3.93 | 24797 | 6818 | 3.64 | 21925 | 6599 | 3.32 | 20011 | 6453 | 3.10 |
| 25                      | 29567    | 3694 | 8.01 | 27392 | 3839 | 7.14 | 24491 | 4032 | 6.07 | 24706 | 4625 | 5.34 | 23846 | 4885 | 4.88 | 23026 | 5184 | 4.44 | 20716 | 5179 | 4.00 | 19176 | 5175 | 3.71 |
| 20                      | 26423    | 3223 | 8.20 | 25189 | 3389 | 7.43 | 23542 | 3609 | 6.52 | 21581 | 3677 | 5.87 | 21775 | 3998 | 5.45 | 21025 | 4352 | 4.83 | 18773 | 4429 | 4.24 | 17272 | 4481 | 3.85 |
| 15                      | 21288    | 2537 | 8.39 | 21105 | 2718 | 7.76 | 20861 | 2960 | 7.05 | 19239 | 2957 | 6.51 | 19671 | 3200 | 6.15 | 19292 | 3442 | 5.60 | 17399 | 3437 | 5.06 | 16138 | 3434 | 4.70 |
| 10                      | 18223    | 2153 | 8.46 | 17097 | 2102 | 8.13 | 15597 | 2034 | 7.67 | 16079 | 2204 | 7.30 | 16770 | 2383 | 7.04 | 16794 | 2531 | 6.63 |       |      |      |       |      |      |
| 5                       | 14462    | 1734 | 8.34 | 13538 | 1686 | 8.03 | 12306 | 1622 | 7.59 | 13820 | 1911 | 7.23 | 14610 | 2093 | 6.98 | 14762 | 2241 | 6.59 |       |      |      |       |      |      |
| 0                       | 22126    | 2691 | 8.22 | 20667 | 2606 | 7.93 | 18721 | 2493 | 7.51 | 17261 | 2408 | 7.17 | 16288 | 2352 | 6.93 | 14829 | 2267 | 6.54 |       |      |      |       |      |      |
| -5                      | 18833    | 3765 | 5.00 | 17543 | 3550 | 4.94 | 15824 | 3264 | 4.85 | 14535 | 3049 | 4.77 | 13675 | 2906 | 4.71 | 12386 | 2691 | 4.60 |       |      |      |       |      |      |

Abbreviations:

LWT: Leaving water temperature (°C)

CC: Total cooling capacity (W)

PI: Power input (W)

Table 2-5.11: SMHM-260B-3 cooling capacity

| Outdoor<br>air<br>temp.<br>°C DB | LWT (°C) |      |       |       |      |      |       |      |      |       |      |      |       |       |      |       |       |      |       |      |      |       |      |      |
|----------------------------------|----------|------|-------|-------|------|------|-------|------|------|-------|------|------|-------|-------|------|-------|-------|------|-------|------|------|-------|------|------|
|                                  | 25       |      |       | 22    |      |      | 18    |      |      | 15    |      |      | 13    |       |      | 10    |       |      | 7     |      |      | 5     |      |      |
|                                  | CC       | PI   | EER   | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI    | EER  | CC    | PI    | EER  | CC    | PI   | EER  | CC    | PI   | EER  |
| 45                               | 24292    | 5752 | 4.22  | 21983 | 5881 | 3.74 | 18905 | 6053 | 3.12 | 20603 | 7674 | 2.68 | 18692 | 7781  | 2.40 | 18066 | 8335  | 2.17 | 15882 | 8240 | 1.93 | 14426 | 8177 | 1.76 |
| 40                               | 25992    | 5350 | 4.86  | 23808 | 5612 | 4.24 | 20896 | 5962 | 3.51 | 27746 | 9229 | 3.01 | 25587 | 9488  | 2.70 | 24434 | 9762  | 2.50 | 21497 | 9373 | 2.29 | 19538 | 9114 | 2.14 |
| 35                               | 35332    | 6312 | 5.60  | 32705 | 6817 | 4.80 | 29201 | 7490 | 3.90 | 32319 | 9723 | 3.32 | 31530 | 10583 | 2.98 | 29357 | 10325 | 2.84 | 25843 | 9616 | 2.69 | 23500 | 9144 | 2.57 |
| 30                               | 40671    | 6489 | 6.27  | 37606 | 6836 | 5.50 | 33520 | 7300 | 4.59 | 33500 | 8412 | 3.98 | 32673 | 9061  | 3.61 | 30755 | 9069  | 3.39 | 27417 | 8684 | 3.16 | 25192 | 8426 | 2.99 |
| 25                               | 40988    | 5845 | 7.01  | 37863 | 5988 | 6.32 | 33697 | 6177 | 5.46 | 32181 | 6652 | 4.84 | 31488 | 7089  | 4.44 | 30023 | 7356  | 4.08 | 27059 | 7285 | 3.71 | 25083 | 7238 | 3.47 |
| 20                               | 32833    | 4532 | 7.24  | 30492 | 4567 | 6.68 | 27372 | 4614 | 5.93 | 26646 | 4949 | 5.38 | 26499 | 5275  | 5.02 | 25220 | 5619  | 4.49 | 22426 | 5661 | 3.96 | 20564 | 5688 | 3.62 |
| 15                               | 27030    | 3603 | 7.50  | 25242 | 3565 | 7.08 | 22858 | 3513 | 6.51 | 22690 | 3742 | 6.06 | 23700 | 4113  | 5.76 | 22264 | 4198  | 5.30 | 20063 | 4151 | 4.83 | 18596 | 4119 | 4.51 |
| 10                               | 24482    | 3143 | 7.79  | 22993 | 3045 | 7.55 | 21008 | 2914 | 7.21 | 21146 | 3051 | 6.93 | 21614 | 3209  | 6.74 | 22006 | 3426  | 6.42 |       |      |      |       |      |      |
| 5                                | 18107    | 2600 | 6.96  | 17044 | 2489 | 6.85 | 15626 | 2342 | 6.67 | 16181 | 2479 | 6.53 | 16932 | 2637  | 6.42 | 17054 | 2729  | 6.25 |       |      |      |       |      |      |
| 0                                | 23803    | 3790 | 6.28  | 22456 | 3593 | 6.25 | 20661 | 3331 | 6.20 | 19315 | 3134 | 6.16 | 18417 | 3003  | 6.13 | 17071 | 2806  | 6.08 |       |      |      |       |      |      |
| -5                               | 27668    | 2661 | 10.40 | 25774 | 2590 | 9.95 | 23248 | 2496 | 9.31 | 21354 | 2425 | 8.80 | 20091 | 2378  | 8.45 | 18197 | 2307  | 7.89 |       |      |      |       |      |      |

Abbreviations:

LWT: Leaving water temperature (°C)

CC: Total cooling capacity (W)

PI: Power input (W)

Table 2-5.11: SMHM-300B-3 cooling capacity

| Outdoor<br>air<br>temp.<br>°C DB | LWT (°C) |      |      |       |      |      |       |      |      |       |       |      |       |       |      |       |       |      |       |       |      |       |       |      |
|----------------------------------|----------|------|------|-------|------|------|-------|------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
|                                  | 25       |      |      | 22    |      |      | 18    |      |      | 15    |       |      | 13    |       |      | 10    |       |      | 7     |       |      | 5     |       |      |
|                                  | CC       | PI   | EER  | CC    | PI   | EER  | CC    | PI   | EER  | CC    | PI    | EER  | CC    | PI    | EER  | CC    | PI    | EER  | CC    | PI    | EER  | CC    | PI    | EER  |
| 45                               | 24524    | 5595 | 4.38 | 22109 | 5778 | 3.83 | 18890 | 6023 | 3.14 | 20452 | 7705  | 2.65 | 18454 | 7857  | 2.35 | 18197 | 8596  | 2.12 | 16403 | 8680  | 1.89 | 15206 | 8736  | 1.74 |
| 40                               | 26438    | 5410 | 4.89 | 24108 | 5726 | 4.21 | 21002 | 6148 | 3.42 | 27686 | 9586  | 2.89 | 25383 | 9898  | 2.56 | 24621 | 10227 | 2.41 | 22087 | 9866  | 2.24 | 20399 | 9625  | 2.12 |
| 35                               | 34379    | 6180 | 5.56 | 33308 | 7240 | 4.60 | 31881 | 8653 | 3.68 | 35981 | 11591 | 3.10 | 33401 | 12107 | 2.76 | 30194 | 11214 | 2.69 | 29736 | 12705 | 2.34 | 29431 | 13699 | 2.15 |
| 30                               | 41579    | 7118 | 5.84 | 38295 | 7474 | 5.12 | 33917 | 7949 | 4.27 | 38293 | 10380 | 3.69 | 35557 | 10677 | 3.33 | 35512 | 11169 | 3.18 | 31911 | 10593 | 3.01 | 29511 | 10210 | 2.89 |
| 25                               | 44052    | 7030 | 6.27 | 40581 | 7121 | 5.70 | 35954 | 7244 | 4.96 | 36544 | 8253  | 4.43 | 35450 | 8692  | 4.08 | 33685 | 8912  | 3.78 | 30412 | 8762  | 3.47 | 28230 | 8662  | 3.26 |
| 20                               | 38765    | 5925 | 6.54 | 35944 | 5916 | 6.08 | 32183 | 5904 | 5.45 | 30993 | 6223  | 4.98 | 30535 | 6544  | 4.67 | 30825 | 7350  | 4.19 | 25479 | 6850  | 3.72 | 21915 | 6516  | 3.36 |
| 15                               | 32622    | 4756 | 6.86 | 30453 | 4670 | 6.52 | 27561 | 4554 | 6.05 | 26212 | 4612  | 5.68 | 26264 | 4837  | 5.43 | 25291 | 5020  | 5.04 | 22772 | 4920  | 4.63 | 21093 | 4853  | 4.35 |
| 10                               | 28779    | 3984 | 7.22 | 27055 | 3834 | 7.06 | 24757 | 3635 | 6.81 | 25502 | 3859  | 6.61 | 25011 | 3869  | 6.46 | 24481 | 3929  | 6.23 |       |       |      |       |       |      |
| 5                                | 19577    | 3160 | 6.20 | 18535 | 3123 | 5.94 | 17145 | 2887 | 5.94 | 17712 | 2981  | 5.94 | 18488 | 3110  | 5.94 | 18674 | 3139  | 5.95 |       |       |      |       |       |      |
| 0                                | 24178    | 4426 | 5.46 | 23068 | 4559 | 5.06 | 21587 | 4131 | 5.23 | 20477 | 3809  | 5.38 | 19737 | 3595  | 5.49 | 18627 | 3273  | 5.69 |       |       |      |       |       |      |
| -5                               | 28578    | 4067 | 7.03 | 26544 | 3815 | 6.96 | 23832 | 3478 | 6.85 | 21798 | 3225  | 6.76 | 20442 | 3057  | 6.69 | 18408 | 2804  | 6.56 |       |       |      |       |       |      |

Abbreviations:

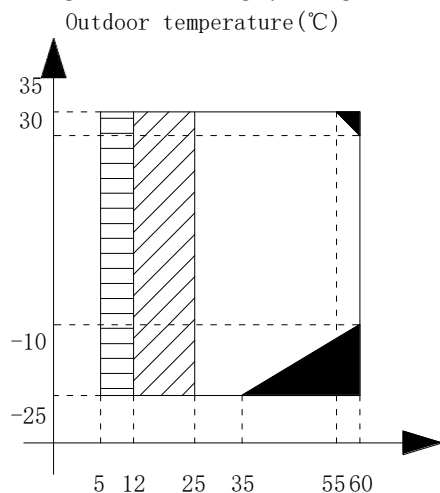
LWT: Leaving water temperature (°C)

CC: Total cooling capacity (W)

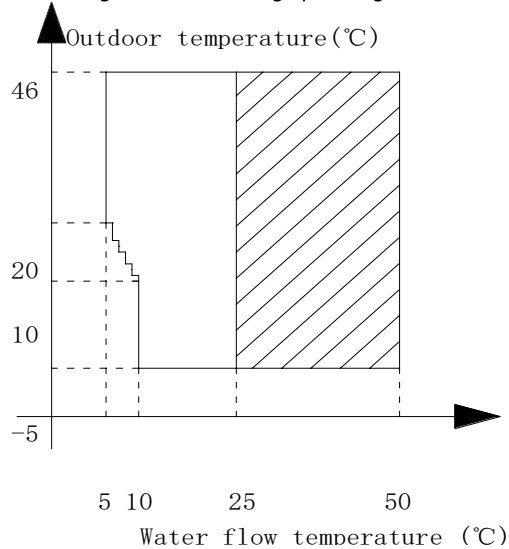
PI: Power input (W)

## 7 Operating Limits

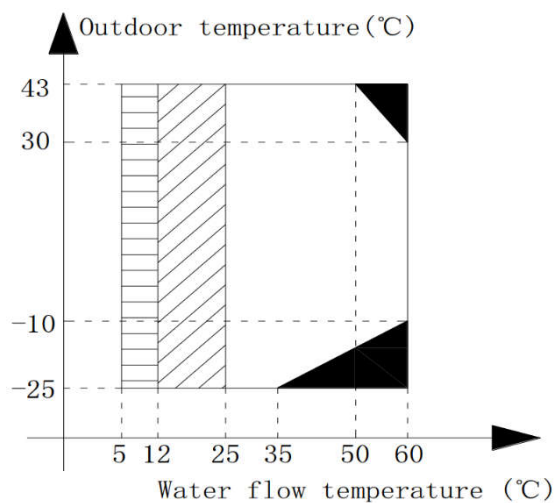
*Figure 2-6.1: Heating operating limits*



*Figure 2-6.2: Cooling operating limits*



*Figure 2-6.3: Domestic hot water operating limits*



**Notes:**

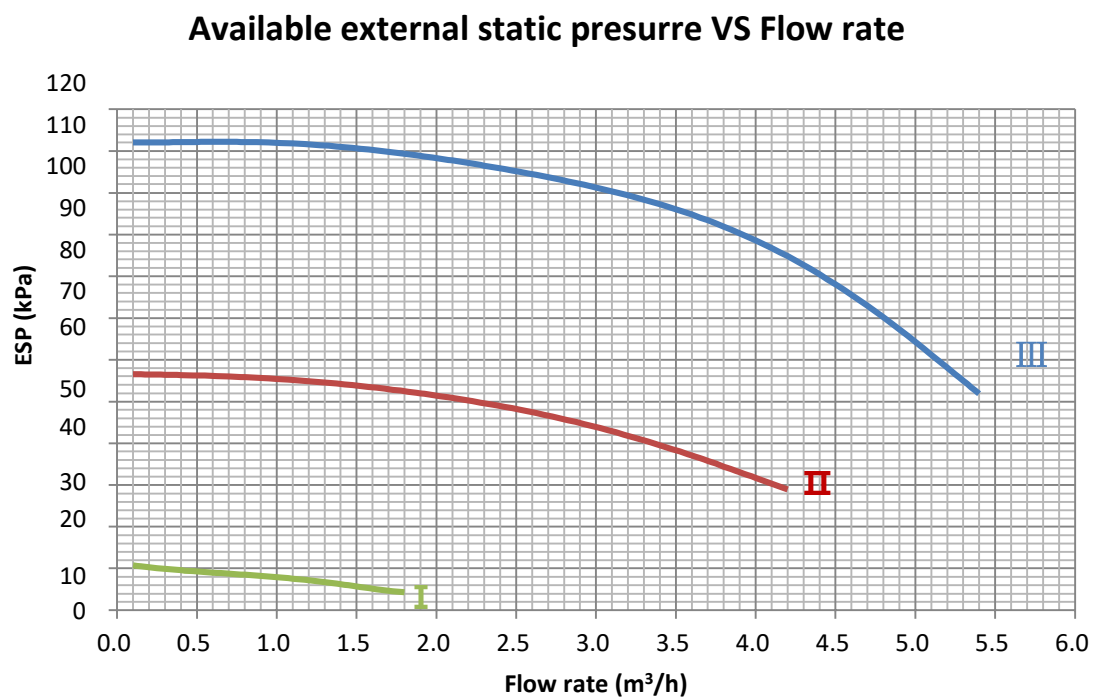
Shaded areas indicate no heat pump operation, IBH or AHS only.

Shaded areas indicate water flow temperature drop or rise interval

Shaded areas indicates If IBH/AHS setting is valid. only IBH/AHS turns on. If IBH/AHS setting is invalid. only heat pump turns on.

## 8 Hydronic Performance

Figure 2-7.1: SMHM-180(220, 260,300)B-3 hydronic performance<sup>1</sup>



Abbreviations:

ESP: External static pressure

Notes:

1. I, II and III indicate water pump speed:

I: Low

II: Medium

III: High

## 9 Sound Levels

### 9.1 Overall

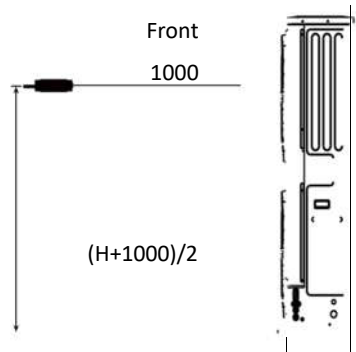
Table 2-8.1: Sound pressure levels<sup>1</sup>

| Model name  | dB(A) <sup>2</sup> |
|-------------|--------------------|
| SMHM-180B-3 | 57.6               |
| SMHM-220B-3 | 59.8               |
| SMHM-260B-3 | 61.5               |
| SMHM-300B-3 | 63.5               |

Notes:

1. Sound pressure level is measured at a position 1m in front of the unit and  $(1+H)/2$  m (where H is the height of the unit) above the floor in a semi-anechoic chamber. During in-situ operation, sound pressure levels may be higher as a result of ambient noise.

Figure 2-8.1: Sound pressure level measurement (unit: mm)



2. dB(A) is the maximum value tested under the conditions below:  
 Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C.  
 Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C.

## 9.2 Octave Band Levels

Figure 2-8.2: SMHM-180B-3 octave band levels

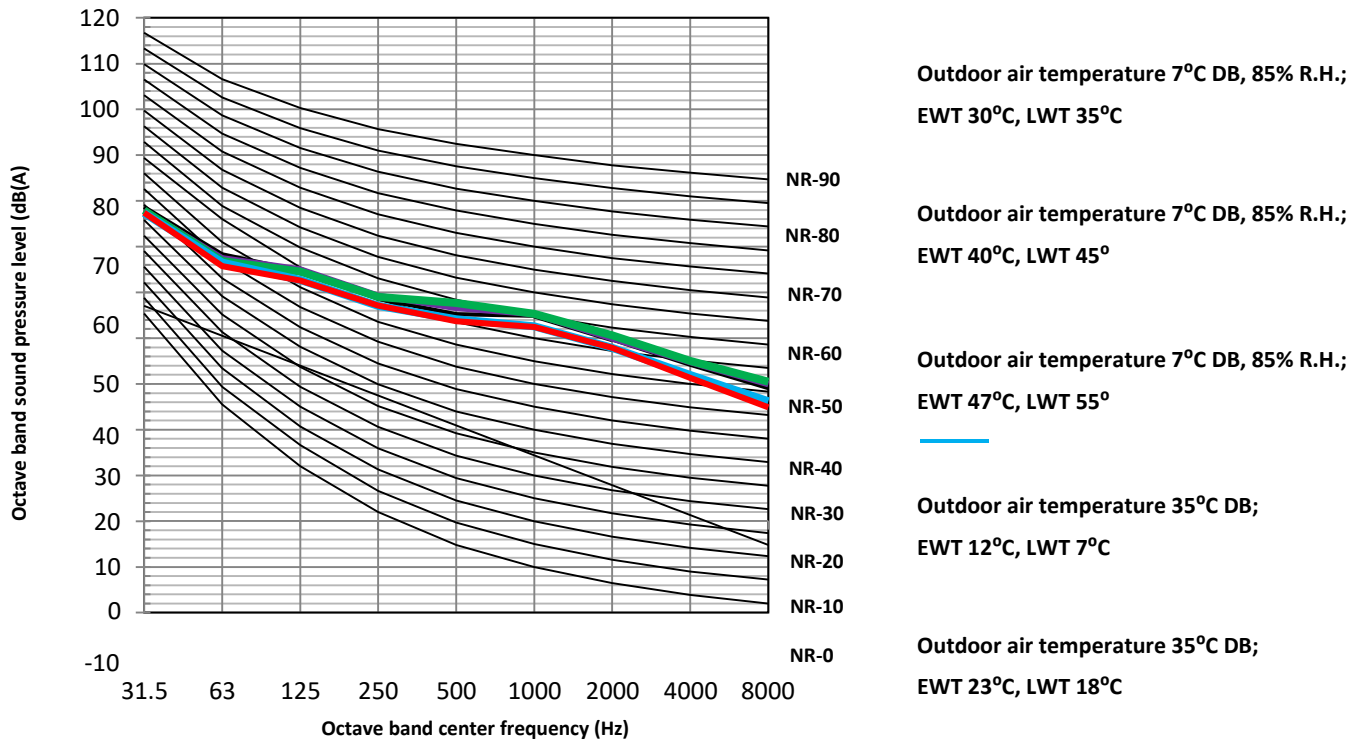


Figure 2-8.3: SMHM-220B-3 octave band levels

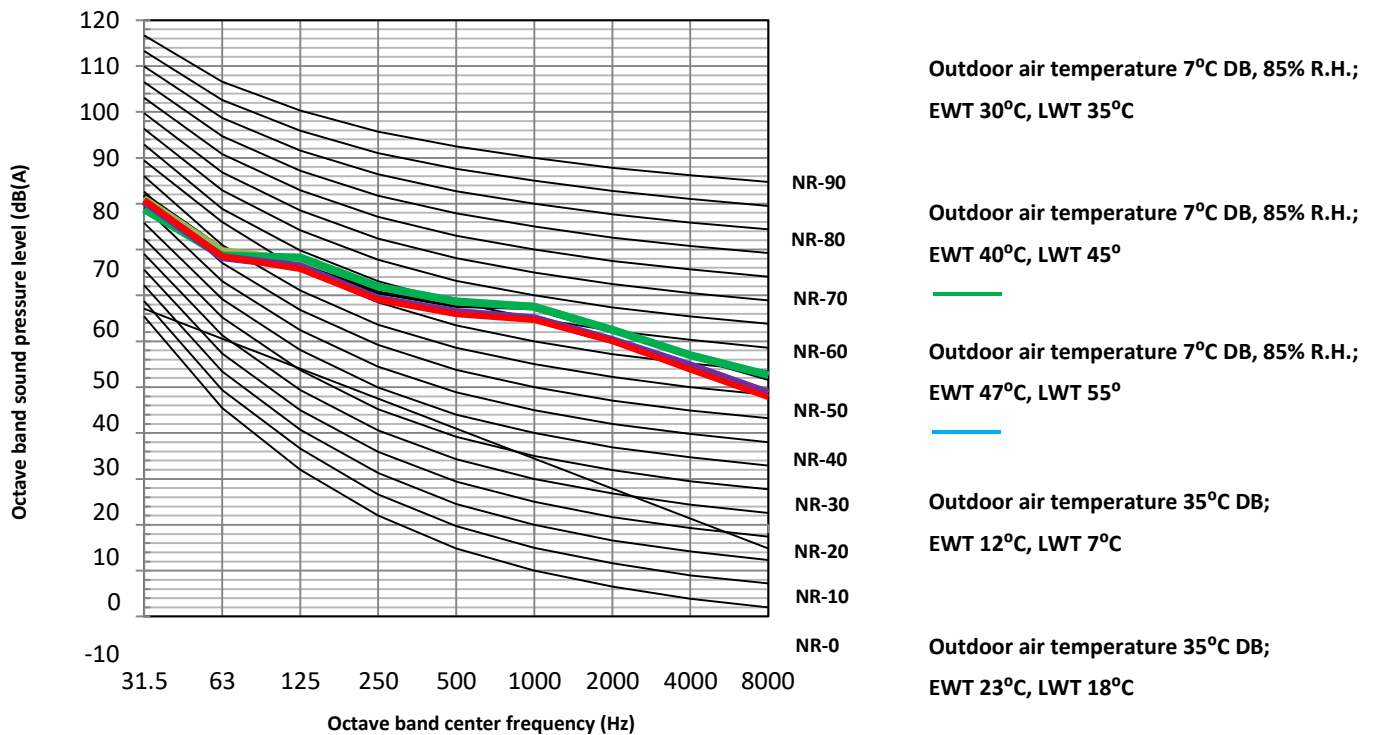
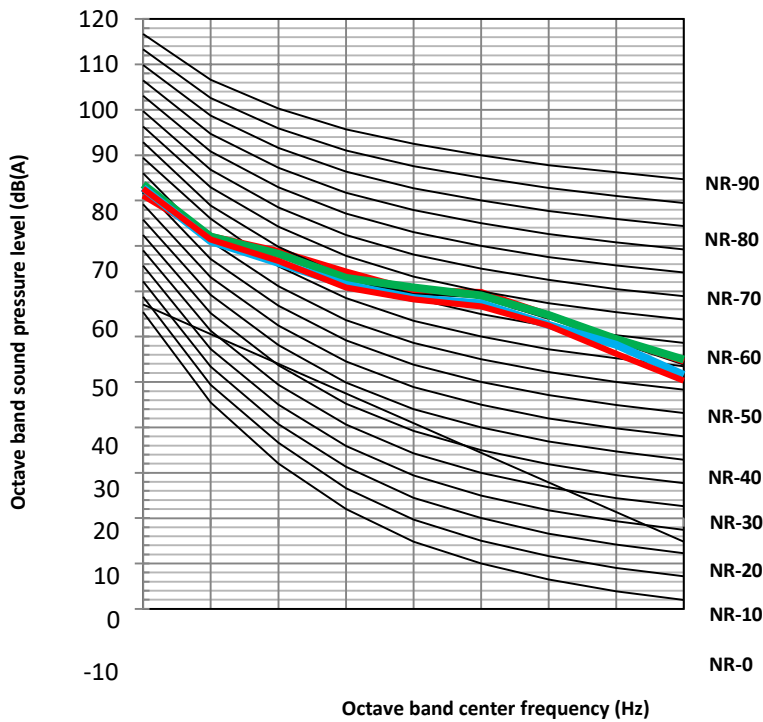


Figure 2-8.4: SMHM-260B-3 octave band levels



Outdoor air temperature 7°C DB, 85%  
R.H.; EWT 30°C, LWT 35°C

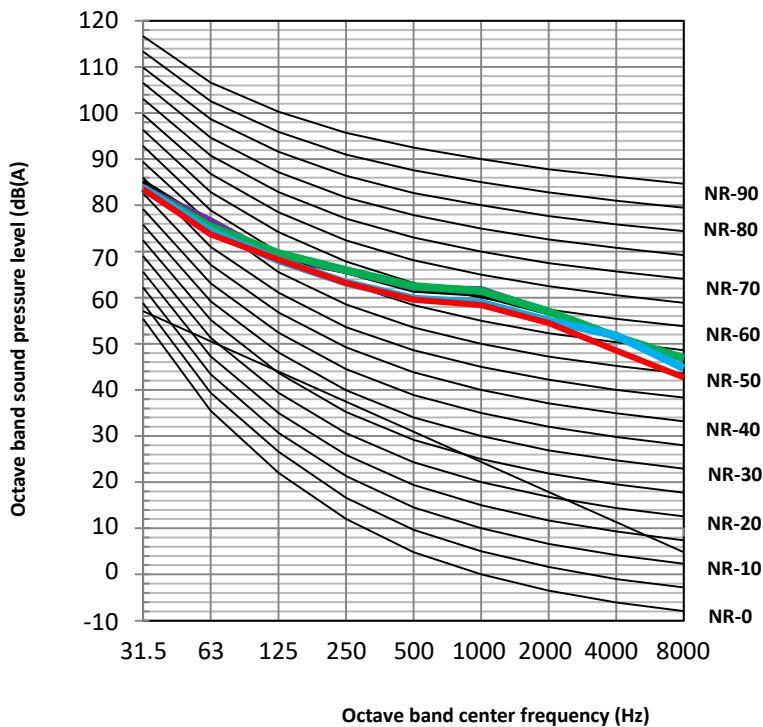
Outdoor air temperature 7°C DB, 85%  
R.H.; EWT 40°C, LWT 45°

Outdoor air temperature 7°C DB, 85%  
R.H.; EWT 47°C, LWT 55°

Outdoor air temperature 35°C DB;  
EWT 12°C, LWT 7°C

Outdoor air temperature 35°C DB;  
EWT 23°C, LWT 18°C

Figure 2-8.5: SMHM-300B-3 octave band levels



Outdoor air temperature 7°C DB, 85%  
R.H.; EWT 30°C, LWT 35°C

Outdoor air temperature 7°C DB, 85%  
R.H.; EWT 40°C, LWT 45°

Outdoor air temperature 7°C DB, 85%  
R.H.; EWT 47°C, LWT 55°

Outdoor air temperature 35°C DB;  
EWT 12°C, LWT 7°C

Outdoor air temperature 35°C DB;  
EWT 23°C, LWT 18°C

## 10 Accessories

### 10.1 Standard accessories

Table 2-9.1: Standard accessories

| Name                                  | Shape                                                                             | Quantity | Name                                         | Shape                                                                               | Quantity |
|---------------------------------------|-----------------------------------------------------------------------------------|----------|----------------------------------------------|-------------------------------------------------------------------------------------|----------|
| Installation and owner's manual       |  | 1        | Tighten belt for customer wiring use         |  | 2        |
| Operation manual                      |  | 1        | Thermistor for domestic hot water tank(T5) * |  | 1        |
| Technical data manual                 |  | 1        | Extension wire for T5                        |  | 1        |
| Y-shaped filter                       |  | 1        | Network matching wire*                       |  | 1        |
| Water outlet connection pipe assembly |  | 2        | Adapter for inlet water pipe                 |  | 1        |
| Wired controller                      |  | 1        |                                              |                                                                                     |          |

\*Note:

When the units are connected in parallel, such as when the communication between the unit is unstable(such as Hd fault code), add a network matching wire between the ports H1 and H2 at the terminal of the communication system.

### 10.2 Optional Accessories

Table 2-9.2: Standard accessories

| Name                                   | Shape                                                                               | Quantity |                           |                                                                                       |   |
|----------------------------------------|-------------------------------------------------------------------------------------|----------|---------------------------|---------------------------------------------------------------------------------------|---|
| Thermistor for balance tank(Tbt1)      |  | 1        | Extension wire for Tbt1   |  | 1 |
| Thermistor for Zone 2 flow temp. (Tw2) |  | 1        | Extension wire for Tw2    |  | 1 |
| Thermistor for solar temp. (Tsolar)    |  | 1        | Extension wire for Tsolar |  | 1 |

Note:

1. If the system is installed in parallel, Tbt1 must be connected and installed in the balancetank.
2. Sensor Tbt1, T5 and extension wire can be shared, sensors Tw2, Tsolar and extension wire can be shared. If these functions are needed at the same time, please customize these sensors and extension wire additionally.

# Part

# 7 Installation

# and Field

# Settings

|           |                                                      |            |
|-----------|------------------------------------------------------|------------|
| <b>1</b>  | <b>Preface to Part 3.....</b>                        | <b>125</b> |
| <b>2</b>  | <b>Installation.....</b>                             | <b>126</b> |
| <b>3</b>  | <b>Water Pipework.....</b>                           | <b>131</b> |
| <b>4</b>  | <b>Electrical Wiring.....</b>                        | <b>135</b> |
| <b>5</b>  | <b>DIP Switch Settings.....</b>                      | <b>137</b> |
| <b>6</b>  | <b>Internal Circulation PumpSpeed Settings .....</b> | <b>138</b> |
| <b>7</b>  | <b>User Interface Field Settings.....</b>            | <b>140</b> |
| <b>8</b>  | <b>Operation parameter .....</b>                     | <b>159</b> |
| <b>9</b>  | <b>Network Configuration Guidelines .....</b>        | <b>160</b> |
| <b>10</b> | <b>USB function guidelines .....</b>                 | <b>165</b> |
| <b>11</b> | <b>Appendix.....</b>                                 | <b>167</b> |
| <b>12</b> | <b>Error Code Table.....</b>                         | <b>170</b> |
| <b>13</b> | <b>Spare parts.....</b>                              | <b>172</b> |

## **1 Preface to Part 3**

### **1.1 Notes for Installers Boxes**

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

#### **Notes for installers**



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

### **1.2 Definitions**

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

### **1.3 Precautions**

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

## 2 Installation

### 2.1 Acceptance and Unpacking

#### Notes for installers

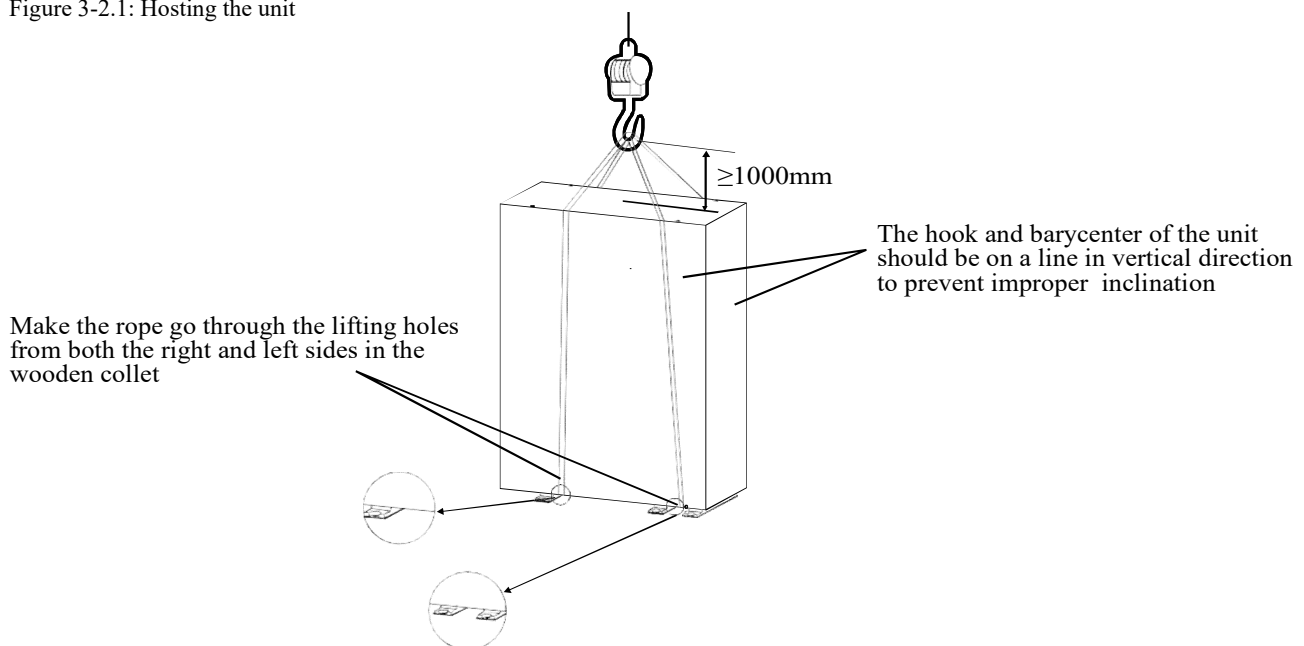
- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories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

### 2.2 Hoisting

#### Notes for installers

- Do not remove any packaging before hoisting. If units are not packaged or if the packaging is damaged, use suitable boards or packing material to protect the units.
- Hoist one unit at a time, using two ropes to ensure stability.

Figure 3-2.1: Hoisting the unit



### 2.3 Placement Considerations

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

- Outdoor units should not be exposed to direct radiation from a high-temperature heat source or a potentially explosive atmosphere. Outdoor units should be installed in positions that are as far as possible to the heat emitters.
- Outdoor units should not be installed in positions often used as a work space. In case of construction work (e.g. grinding etc.) where dust or dirt is created and it may affect heat exchangers.
- Outdoor units should not be installed in locations where exposure to oil or to corrosive or harmful gases, such as acidic or alkaline gases, may occur.
- Outdoor units should be installed in well-drained, well-ventilated positions.
- Outdoor units should be installed in positions that are sufficiently close to the desired position of the wired controller

that the controller's wiring length limitation will not be exceeded.

- In systems that are configured to heat domestic hot water and/or include an external backup electric heater, outdoor units should be installed in positions that are sufficiently close to the domestic hot water tank and/or backup electric heater that the piping and temperature sensor wiring length come within the allowable ranges.
- Outdoor units should be installed in locations where the noise from the unit will not disturb neighbors.
- Outdoor units should be installed in safe places which can bear the unit's weight and vibration and where the unit can be installed at an even level.
- Outdoor units should be installed in positions that there is no possibility of flammable gas or product leak.
- Outdoor units should be installed in positions where servicing space can be well ensured.
- Outdoor units should be installed in positions where rain can be avoided as much as possible.

Outdoor units should be installed in clean area in case of small animals making contact with electrical parts, which can cause malfunction, smoke or fire.

There is flammable refrigerant in the unit and it should be installed in a well-ventilated site. If the unit is installed inside, an additional refrigerant detection device and ventilation equipment must be added in accordance with the standard EN378.

Adequate measures should be adopted to prevent the unit from being used as a shelter by small animals.

## 2.4 Strong Wind Installation

Wind of 5m/s or more blowing against an outdoor unit's air outlet blocks the flow of air through the unit, leading to deterioration in unit capacity, accelerated frost accumulation when in heating mode or domestic hot water mode, and potential disruption to operation due to increased pressure in the refrigerant circuit. Exposure to very strong wind can also cause the fan to rotate excessively fast, potentially leading to damage to the fan. In locations where exposure to high winds may occur should take account of the following considerations:

- Set the outlet side at a right angle to the direction of the wind, refer to Figure 3-2.2. For installation of the outdoor unit in a place where the wind direction can be foreseen, refer to Figure 3-2.3 for installation of the unit.
- If turn the air outlet side toward the building's wall, fence or screen. Make sure there is enough room to do the installation

Figure 3-2.2: Strong wind installation direction

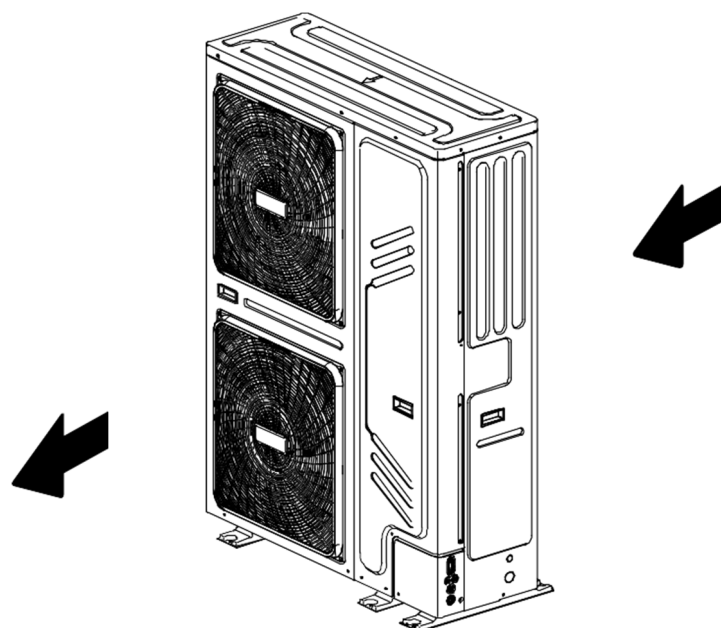
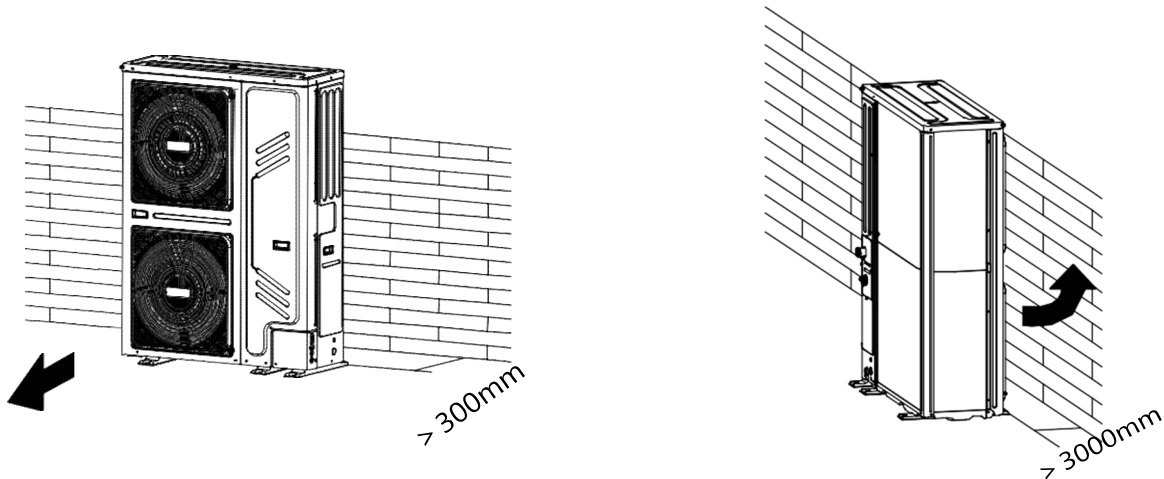


Figure 3-2.3: Installation room illustration



## 2.5 Cold Climate Installation

In cold climate locations installation should take account of the following considerations:

- Never install the unit at a site where the suction side may be exposed directly to wind.
- To prevent exposure to wind, install a baffle plate on the air discharge side of the unit.
- To prevent exposure to wind, install the unit with its suction side facing the wall.
- In areas of heavy snowfall, a canopy should be installed to prevent snow entering the unit. Additionally, the height of the base structure should be increased so as to raise the unit further off the ground and make sure that the heat exchanger coil is not affected by the snow. Refer to Figure 3-2.4.

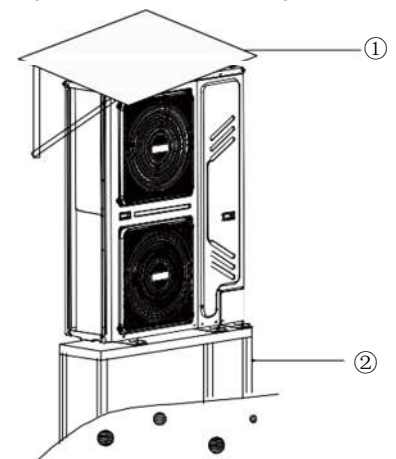
Notes:

① Construct a large canopy.

② Construct a pedestal

Install the unit high enough off the ground to prevent it from being buried in snow

Figure 3-2.4: Snow shielding



## 2.6 Hot Climate Installation

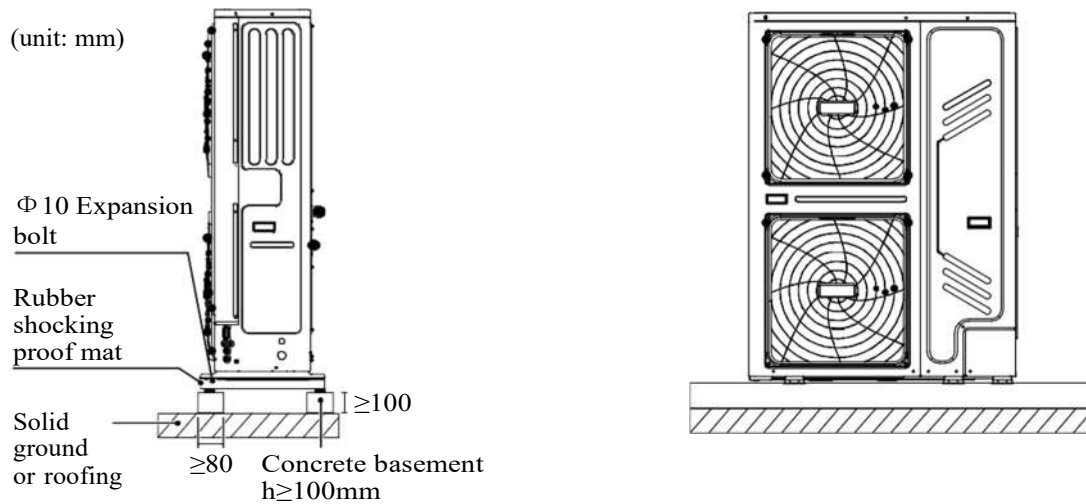
As the outdoor temperature is measured via the outdoor ambient temperature sensor, make sure to install the outdoor unit in the shade, or a canopy should be constructed to avoid direct sunlight. So that it is not influenced by the sun's heat, otherwise system protection may occur.

## 2.7 Base Structure

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

- A solid base prevents excess vibration and noise. Outdoor unit bases should be constructed on solid ground or on structures of sufficient strength to support the unit's weight.
- Bases should be at least 100mm high to provide sufficient drainage and to prevent water ingress into the base of the unit.
- Either steel or concrete bases may be suitable.
- Outdoor units should not be installed on supporting structures that could be damaged by water build-in in the event of a blocked drain.
- Fix the unit securely to foundation by means of the  $\Phi 10$  expansion bolt. It is best to screw in the foundation bolts until their length is 20 mm from the foundation surface.

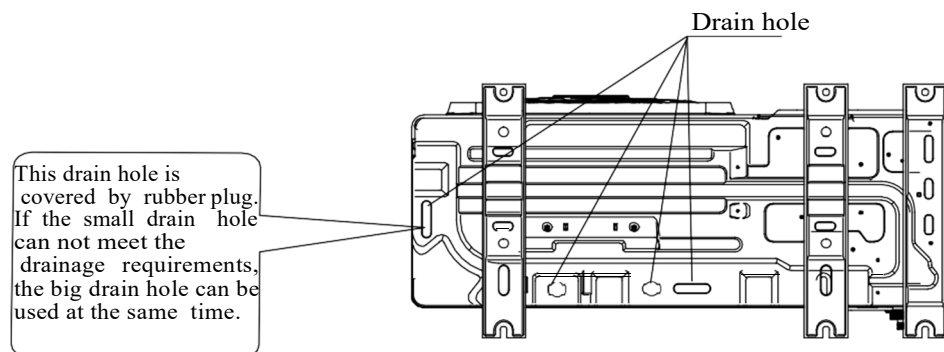
Figure 3-2.5: Outdoor unit typical concrete base structure design (unit: mm)



## 2.8 Drainage

Drainage ditch should be provided to allow drainage of condensate that may form on the air side heat exchanger when the unit is running in heating mode or domestic hot water mode. The drainage should ensure that condensate is directed away from roadways and footpaths, especially in locations where the climate is such that condensate may freeze.

Figure 3-2.6: Drainage hole



## 2.9 Spacing

Outdoor units must be spaced such that sufficient air may flow through each unit. Sufficient airflow across heat exchangers is essential for outdoor units to function properly. For more details please refer to the figures below.

Figure 3-2.7: Single unit installation

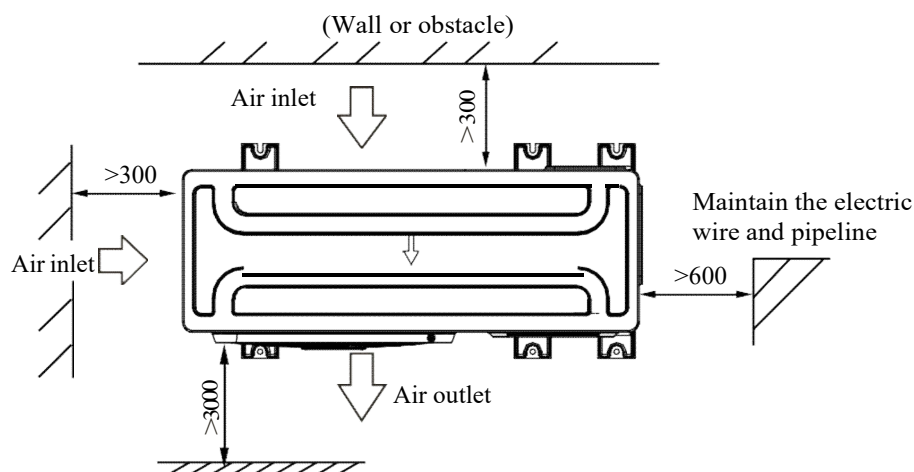


Figure 3-2.8: Parallel connect the two units or above

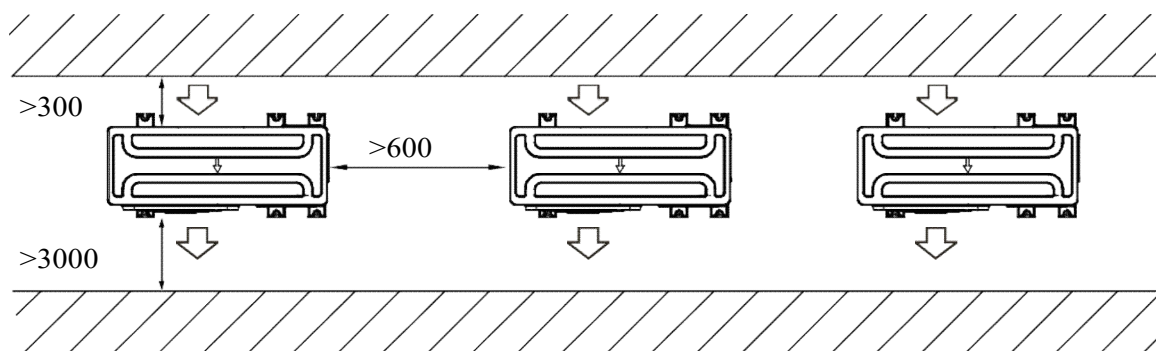
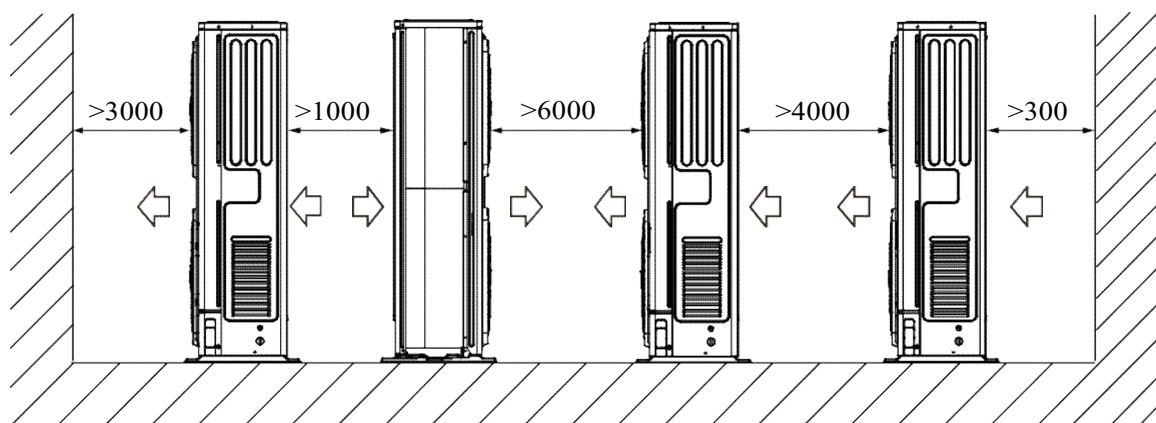


Figure 3-2.9: Parallel connect the front with rear sides



### 3 WaterPipework

#### 3.1 Water Circuit Checks

Yukon Mono units are equipped with a water inlet and outlet for connection to a water circuit. Yukon Mono units should only be connected to closed water circuits. Connection to an open water circuit would lead to excessive corrosion of the water piping. Only materials complying with all applicable legislation should be used.

Before continuing installation of the unit, check the following:

- The maximum water pressure  $\leq 3$  bar.
- The maximum water temperature  $\leq 70^{\circ}\text{C}$  according to safety device setting.
- Always use materials that are compatible with the water used in the system and with the materials used in the unit.
- Ensure that components installed in the field piping can withstand the water pressure and temperature.
- Drain taps must be provided at all low points of the system to permit complete drainage of the circuit during maintenance.
- Air vents must be provided at all high points of the system. The vents should be located at points that are easily accessible for service. An automatic air purge is provided inside the unit. Check that this air purge valve is not tightened so that automatic release of air in the water circuit is possible.

#### 3.2 Water Volume and Expansion Vessel Pre-pressure Checks

Outdoor units are equipped with an expansion vessel (8L) that has a default pre-pressure of 1.0 bar. To assure proper operation of the unit, the pre-pressure of the expansion vessel might need to be adjusted.

Table 3-3.1: Expansion vessel pre-pressure adjustment

| Installation height difference <sup>1</sup> | Water volume $\leq 230$ L                                                                                                                                                                                                                                                                                      | Water volume $> 230$ L                                                                                                                                                                                                                                                                                         |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\leq 7$ m                                  | No pre-pressure adjustment required                                                                                                                                                                                                                                                                            | <p>Actions required:</p> <ul style="list-style-type: none"> <li>• Pre-pressure must be decreased, calculate according to "Calculating the pre-pressure of the expansion vessel"<sup>2</sup></li> <li>• Check if the water volume is lower than maximum allowed water volume (refer to Figure 3-3.1)</li> </ul> |
| $> 7$ m                                     | <p>Actions required:</p> <ul style="list-style-type: none"> <li>• Pre-pressure must be increased, calculate according to "Calculating the pre-pressure of the expansion vessel"<sup>2</sup></li> <li>• Check if the water volume is lower than maximum allowed water volume (refer to Figure 3-3.1)</li> </ul> | Expansion vessel in the outdoor unit too small for the system. An external expansion vessel (field supplied) is required.                                                                                                                                                                                      |

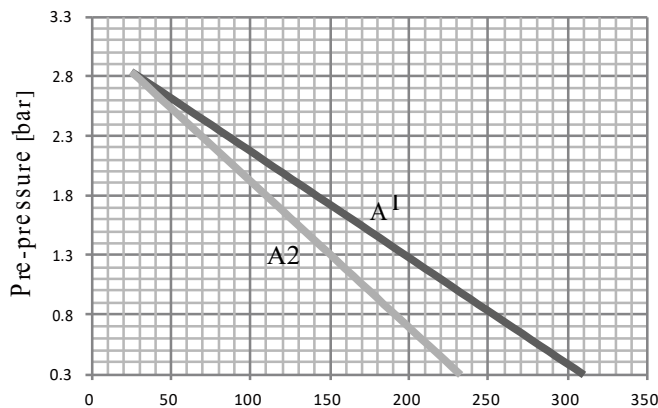
Notes:

1. Height difference is between the highest point of the water circuit and the outdoor unit's expansion tank. Unless the unit is located at the highest point of the system, in which case the installation height difference is considered to be zero.
2. Calculating the pre-pressure of the expansion vessel:  
The pre-pressure ( $P_g$ ) to be set depends on the maximum installation height difference ( $H$ ) and is calculated as  $P_g(\text{bar}) = (H(\text{m})/10 + 0.3)$  bar

To determine the maximum allowed water volume in the entire circuit, proceed as follows:

- Determine the calculated pre-pressure ( $P_g$ ) for the corresponding maximum water volume using the Figure 3-3.1.

Figure 3-3.1: Maximum water volume



A1: System without glycol

A2: System with 25% propylene glycol

Pre-pressure = pre-pressure of the expansion vessel

Maximum water volume = maximum water volume in the system

- Check that the total water volume in the entire water circuit is lower than this value. If this is not the case, the expansion vessel inside the unit is too small for the installation.

#### Example 1

The unit is installed 5m below the highest point in the water circuit. The total water volume in the water circuit is 100 L. In this example, no action or adjustment is required.

#### Example 2

The unit is installed at the highest point in the water circuit. The total water volume in the water circuit is 250L.

Result:

- Since 250 L is more than 230 L, the pre-pressure must be decreased.
- The required pre-pressure is:  $P_g(\text{bar}) = (H(\text{m})/10 + 0.3) \text{ bar} = (0/10 + 0.3) \text{ bar} = 0.3 \text{ bar}$
- The corresponding maximum water volume can be read from the graph: approximately 310L.
- Since the total water volume (250L) is below the maximum water volume (310L), the expansion vessel suffices for the installation.

When it is required to change the default pre-pressure of the expansion vessel (1.0 bars), following guidelines:

- Use only dry nitrogen to set the expansion vessel pre-pressure.
- Inappropriate setting of the expansion vessel pre-pressure will lead to malfunctioning of the system. Pre-pressure should only be adjusted by a licensed installer.

If the expansion vessel of unit is too small for the installation, an additional expansion vessel is needed.

- Calculate the pre-pressure of the expansion vessel:  $P_g(\text{bar}) = (H(\text{m})/10 + 0.3) \text{ bar}$   
The expansion vessel equipped in the unit should adjust the pre-pressure also.
- Calculate the volume needed of the additional expansion vessel:  $V1 = 0.0693 * V_{\text{water}} / (2.5 - P_g) - V0$   
 $V_{\text{water}}$ : the volume of water in the system  
 $V0$ : the volume of expansion vessel which the unit is equipped (8L)

### 3.3 Water Circuit Connection

Water connections must be made correctly in accordance with the labels on the outdoor unit, with respect to the water inlet and water outlet. If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:

- Use clean pipes only.
- Hold the pipe end downwards when removing burrs

- Cover the pipe end when inserting it through a wall to prevent dust and dirt entering.
- Use a good thread sealant for sealing the connections. The sealing must be able to withstand the pressures and temperatures of the system.
- When using non-copper metallic piping, be sure to insulate the two kind of materials from each other to prevent galvanic corrosion.
- For copper is a soft material, use appropriate tools for connecting the water circuit. Inappropriate tools will cause damage to the pipes

### 3.4 Water Circuit Anti-freeze Protection

Ice formation can cause damage to the hydronic system. All internal hydronic parts are insulated to reduce heat loss. Insulation must also be added to the field piping.

- The software contains special functions using the heat pump to protect the entire system against freezing. When the temperature of the water flow in the system drops to a certain value, the unit will heat the water, either using the heat pump, or the backup heater. The freeze protection function will turn off only when the temperature increases to a certain value.
- In event of a power failure, the above features would not protect the unit from freezing. Since a power failure could happen when the unit is unattended, the supplier recommends use anti-freeze fluid to the water system.

Depending on the expected lowest outdoor temperature, make sure the water system is filled with a concentration of glycol as mentioned in the table below. When glycol is added to the system, the freezing point of water will be lower and the performance of the unit will be affected. The correction factor of the unit capacity, flow rate and pressure drop of the system is listed in the table 3-3.2 and 3-3.3.

Table 3-3.2: Ethylene Glycol

| Concentration of ethylene glycol (%) | Modification coefficient      |                    |                  |                         | Minimum outdoor temperature(°C) |
|--------------------------------------|-------------------------------|--------------------|------------------|-------------------------|---------------------------------|
|                                      | Cooling capacity modification | Power modification | Water resistance | Water flow modification |                                 |
| 0                                    | 1.000                         | 1.000              | 1.000            | 1.000                   | 0                               |
| 10                                   | 0.984                         | 0.998              | 1.118            | 1.019                   | -5                              |
| 20                                   | 0.973                         | 0.995              | 1.268            | 1.051                   | -15                             |
| 30                                   | 0.965                         | 0.992              | 1.482            | 1.092                   | -25                             |

Table 3-3.3: Propylene Glycol (including the necessary inhibitors, classified as Category III according to EN1717)

| Concentration of propylene glycol (%) | Modification coefficient      |                    |                  |                         | Minimum outdoor temperature (°C) |
|---------------------------------------|-------------------------------|--------------------|------------------|-------------------------|----------------------------------|
|                                       | Cooling capacity modification | Power modification | Water resistance | Water flow modification |                                  |
| 0                                     | 1.000                         | 1.000              | 1.000            | 1.000                   | 0                                |
| 10                                    | 0.976                         | 0.996              | 1.071            | 1.000                   | -4                               |
| 20                                    | 0.961                         | 0.992              | 1.189            | 1.016                   | -12                              |
| 30                                    | 0.948                         | 0.988              | 1.380            | 1.034                   | -20                              |

Glycol absorbs water from its environment. Therefore do NOT add glycol that has been exposed to air. Leaving the cap off the glycol container causes the concentration of water to increase. The glycol concentration is then lower than assumed. As a result, the hydraulic components might freeze up after all. Take preventive actions to ensure a minimal exposure of the glycol to air.

Due to the presence of glycol, corrosion of the system is possible. Uninhibited glycol will turn acidic under the influence of oxygen. This process is accelerated by presence of copper and at higher temperatures. The acidic uninhibited glycol attacks metal surfaces and forms galvanic corrosion cells that cause severe damage to the system. It is of extreme importance:

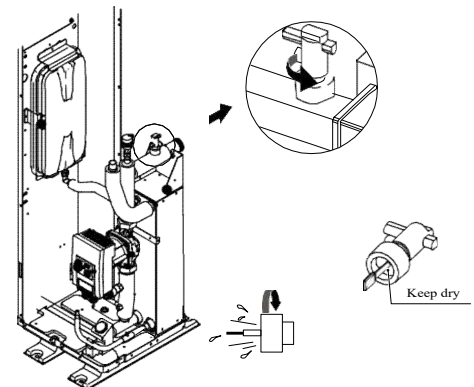
That the water treatment is correctly executed by a qualified water specialist.

- That a glycol with corrosion inhibitors is selected to counteract acids formed by the oxidation of glycols.
- That in case of an installation with a domestic hot water tank, only the use of propylene glycol is allowed. If the system does NOT contain a domestic hot water tank, then you can use either propylene glycol or ethyleneglycol;
- That no automotive glycol is used because their corrosion inhibitors have a limited lifetime and contain silicates that can foul or plug the system;
- That galvanized piping is not used in glycol systems since it may lead to the precipitation of certain elements in the glycol's corrosion inhibitor;
- To ensure that the glycol is compatible with the materials used in the system.
- Protection against bursting: the glycol will prevent the piping from bursting, but NOT the liquid inside the piping from freezing.
- Protection against freezing: the glycol will prevent the liquid inside the piping from freezing.
- The required concentration might differ depending on the type of glycol. ALWAYS compare the requirements from the table above with the specifications provided by the glycol manufacturer. If necessary, meet the requirements set by the glycol manufacturer.
- If the liquid in the system is frozen, the pump will NOT be able to start. Mind that if you only prevent the system from bursting, the liquid inside might still freeze.
- When water is at standstill inside the system, the system is very likely to freeze and get damaged.

### 3.5 Water Flow Switch

Water may enter into the flow switch and cannot be drained out and may freeze when the temperature is low enough. The flow switch should be removed and dried, then can be reinstalled in the unit.

Figure 3-3.2: Water flow switch

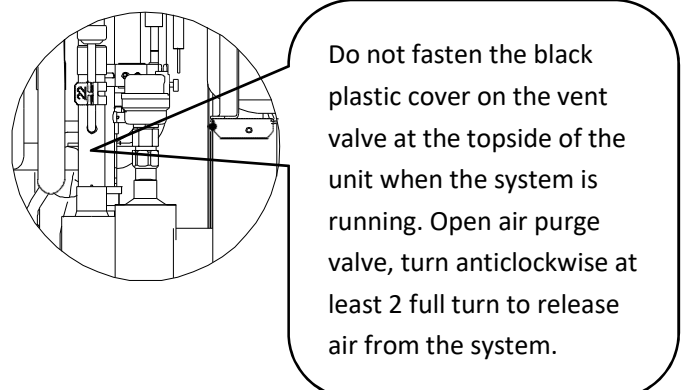


- Counterclockwise rotation, remove the water flow switch.
- Drying the water flow switch completely.

### 3.6 Adding Water

- Connect the water supply to the fill valve and open the valve.
- Make sure the automatic air purge valve is open (at least 2 turns). Refer to Figure 3-3.3.
- Fill with water until the manometer indicates a pressure of approximately 2.0 bars. Remove air in the circuit as much as possible using the air purge valve. Air in the water circuit could lead to malfunction of the backup electric heater.

Figure 3-3.3: Air purge valve



### 3.7 Water Piping Insulation

The complete water circuit including all piping, water piping must be insulated to prevent condensation during cooling operation and reduction of the heating and cooling capacity as well as prevention of freezing of the outside water piping during winter. The insulation material should at least of B1 fire resistance rating and complies with all applicable legislation. The thickness of the sealing materials must be at least 13mm with thermal conductivity 0.039W/mK in order to prevent freezing on the outside water piping. If the outdoor ambient temperature is higher than 30°C and the humidity is higher than RH 80%, the thickness of the sealing materials should be at least 20mm in order to avoid condensation on the surface of the seal.

## 4 Electrical Wiring

### 4.1 General

#### Notes for installers

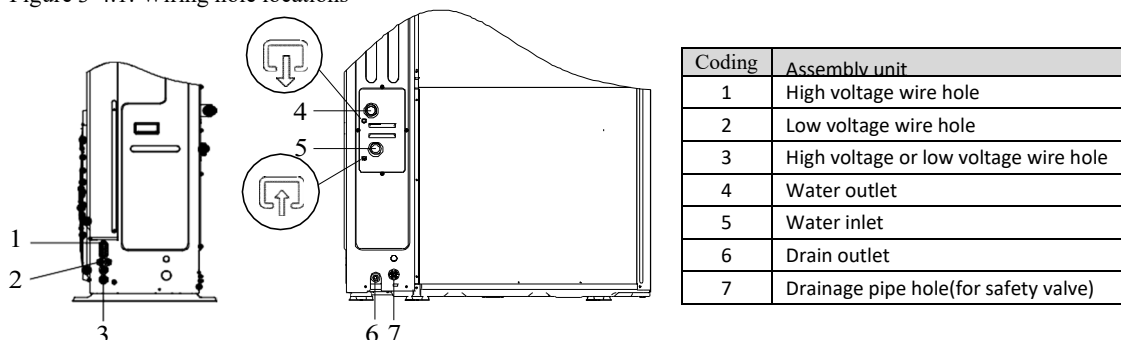
##### Caution

- All installation and wiring must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation.
- Electrical systems should be grounded in accordance with all applicable legislation.
- Overcurrent circuit breakers and residual-current circuit breakers (ground fault circuit interrupters) should be used in accordance with all applicable legislation.
- Wiring patterns shown in this data book are general connection guides only and are not intended for, or to include all details for, any specific installation.
- The water piping, power wiring and communication wiring are typically run in parallel. However the communication wiring should not be bound together with power wiring. To prevent signal interference, the power wiring and communication wiring should not be run in the same conduit. If the power supply is less than 10A, a separation of at least 300mm between power wiring and communication wiring conduits should be maintained; if the power supply is in the range 10A to 50A then a separation of at least 500mm should be maintained.

### 4.2 Precautions

- Fix cables so that cables do not make contact with the pipes (especially on the high pressure side).
- Secure the electrical wiring with cable ties as shown in Figure 3-1.14 and Figure 3-1.15. So that it does not come in contact with the piping, particularly on the high-pressure side.

Figure 3-4.1: Wiring hole locations



- Make sure no external pressure is applied to the terminal connectors.
- When installing the ground fault circuit interrupter make sure that it is compatible with the inverter (resistant to high frequency electrical noise) to avoid unnecessary opening of the ground fault circuit interrupter.
- This unit is equipped with an inverter. Installing a phase advancing capacitor not only reduce the power factor improvement effect, but also may cause abnormal heating of the capacitor due to high frequency waves. Never install a phase advancing capacitor as it could lead to an accident.

### 4.3 Guidance

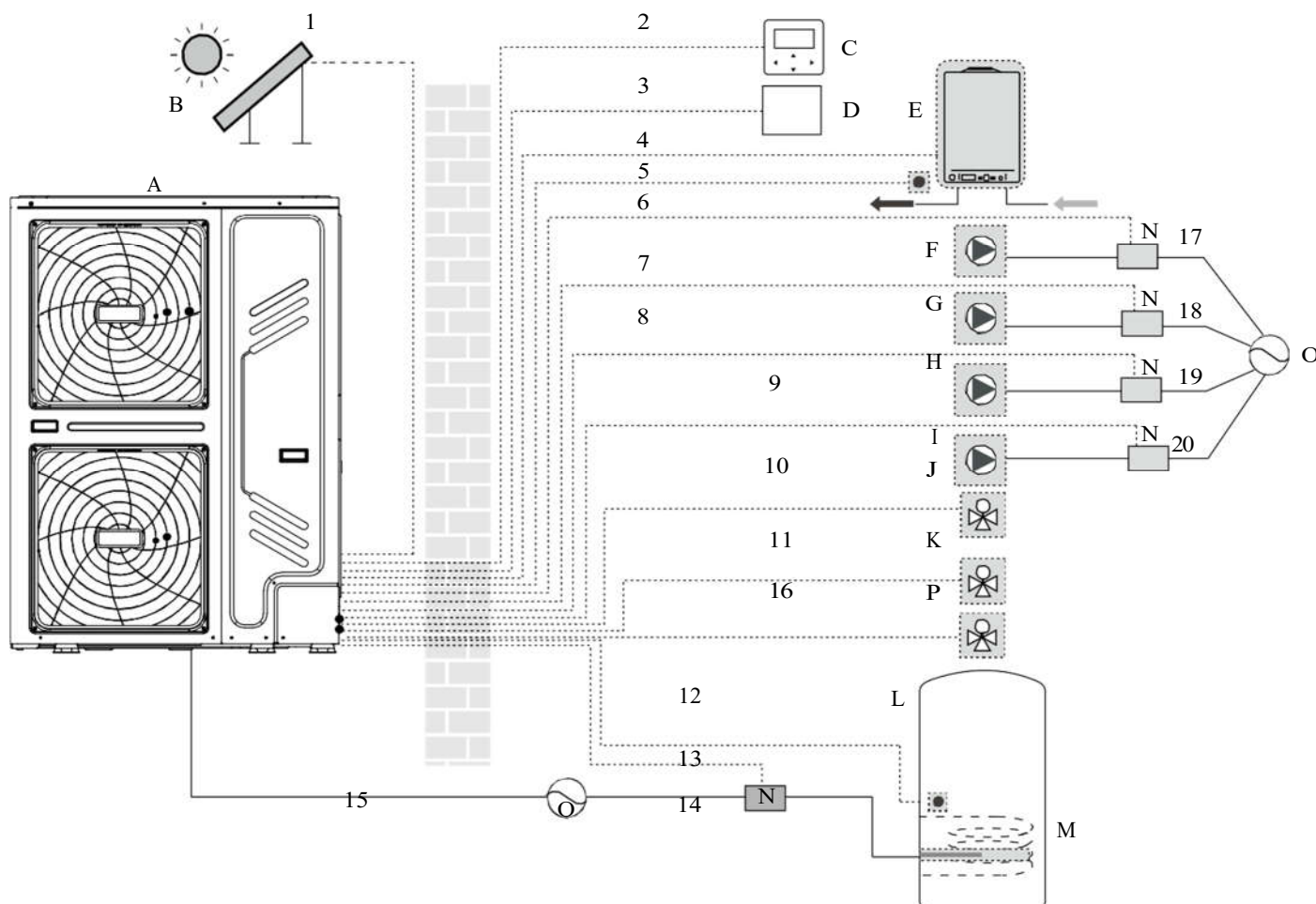
- Most field wiring on the unit is to be made on the terminal block inside the switch box. To gain access to the terminal block, remove the switch box service panel.
- Fix all cables using cable ties.

A dedicated power circuit is required for the backup electric heater.

- Installation equipped with a domestic hot water tank (field supplied) requires a dedicated power circuit for the immersion heater.
- Lay out the electrical wiring so that the front cover does not rise up when doing wiring work and attach the front cover securely.
- Follow the electric wiring diagrams for electrical wiring works. Refer to Figure 2-4.1 in part 2, 4 “Wiring Diagram”.
- Install the wires and fix the cover firmly so that the cover may be fit in properly.

#### 4.4 Wiring Overview

Figure 3-4.2: Wiring overview



| Legend |                                                            |   |                                                              |
|--------|------------------------------------------------------------|---|--------------------------------------------------------------|
| A      | Outdoor unit                                               | I | P_d: DHW pump (field supplied)                               |
| B      | Solar panel (field supplied)                               | J | SV2: 3-way valve (field supplied)                            |
| C      | Wired controller                                           | K | SV1: 3-way valve for domestic hot water tank(field supplied) |
| D      | Room thermostat (field supplied)                           | L | Domestic water tank (field supplied)                         |
| E      | AHS (field supplied)                                       | M | Booster heater (field supplied)                              |
| F      | P_s: Solar pump (field supplied)                           | N | Contactor (field supplied)                                   |
| G      | P_c: Circulation pump / zone 2 pump (field supply)         | O | Power supply                                                 |
| H      | P_o: Outside circulation pump / zone 1 pump (field supply) | P | SV3: 3-way valve for Zone 2 (field supplied)                 |

Table 3-4.1: Wiring requirements

| Item | Description                        | Current | Required number of conductors | Maximum running current |
|------|------------------------------------|---------|-------------------------------|-------------------------|
| 1    | Solar energy kit signal wire       | AC      | 2                             | 200mA                   |
| 2    | User interface wire                | AC      | 5                             | 200mA                   |
| 3    | Room thermostat wire               | AC      | 2 or 3                        | 200mA <sup>a</sup>      |
| 4    | Boiler control wire                | /       | 2                             | 200mA                   |
| 5    | Temperature sensor wire for Tw2    | DC      | 2                             | b                       |
| 9    | Control wire for DHW PUMP          | AC      | 2                             | 200mA <sup>a</sup>      |
| 10   | Control wire for 3-way valve       | AC      | 2 or 3                        | 200mA <sup>a</sup>      |
| 11   | Control wire for 3-way valve       | AC      | 2 or 3                        | 200mA <sup>a</sup>      |
| 12   | Temperature sensor wire for T5     | DC      | 2                             | b                       |
| 13   | Control wire for booster heater    | AC      | 2                             | 200mA <sup>a</sup>      |
| 15   | Power supply wire for outdoor unit | AC      | 3+GND                         | c                       |
| 16   | Control wire for 3-way valve       | AC      | 2 or 3                        | 200mA <sup>a</sup>      |

Notes:

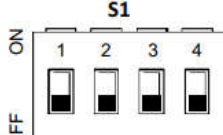
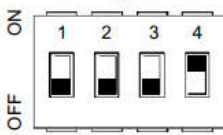
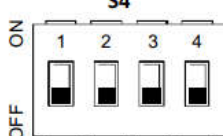
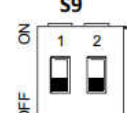
- Minimum cable section AWG 18 (0.75mm<sup>2</sup>)
- The temperature sensor wire (10m) are delivered with zone 2 outlet tem. Tw2 and domestic hot water tank T5.
- See Table 3-4.2 for details.

Table 3-4.2: Outdoor unit power supply

| Unit                               | 18kW | 22kW | 26kW | 30kW |
|------------------------------------|------|------|------|------|
| Maximum overcurrent protector(MOP) | 18   | 21   | 24   | 28   |
| Wiring size(mm <sup>2</sup> )      | 6    | 6    | 6    | 6    |

## 5 DIP Switch Settings

DIP switch is located on the hydraulic module main control board and allows configuration of additional heating source thermistor installation, the second inner backup heater installation, etc.

| Switch                                                                                           |       | ON=1                                                                                                                                              | OFF=0                                    |
|--------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>S1</b><br> | 1     | Reserved                                                                                                                                          | Reserved                                 |
|                                                                                                  | 2     | Reserved                                                                                                                                          | Reserved                                 |
|                                                                                                  | 3/4   | 00=Without IBH and AHS<br>10=With IBH<br>01=With AHS for heat mode<br>11=With AHS for heat mode and DHW mode                                      |                                          |
| <b>S2</b><br> | 1     | Start pumpo after 24 hours will be invalid                                                                                                        | Start pumpo after 24 hours will be valid |
|                                                                                                  | 2     | without TBH                                                                                                                                       | with TBH                                 |
|                                                                                                  | 3/4   | 00=variable speed pump (Max head:8.5m)<br>01=constant speed pump<br>10=variable speed pump(Max head:10.5m)<br>11=variable speed pump(Max head:9m) |                                          |
| <b>S4</b><br> | 1     | Master unit: clear address of all slave units<br>Slave unit: clear its own address                                                                | Keep the current address                 |
|                                                                                                  | 2/3/4 | Reserved                                                                                                                                          |                                          |
| <b>S9</b><br> | 1/2   | 00=Slave unit<br>11=Master unit                                                                                                                   |                                          |

## 6 Internal Circulation Pump Speed Settings

The internal circulation pump speed can be selected by adjusting the red knob on the pump. The default factory setting is the highest speed (III). If the system water flow is too high, the pump speed can be set to medium (II) or low (I). The relationship between external static pressure and water flow rate is described in Part 2, 7 “Hydronic Performance”.

Figure 3-6.1: Internal circulation pump

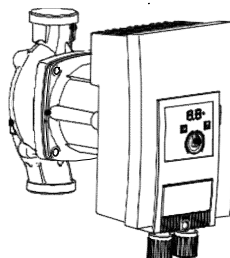


Figure 3-6.2: Faults with external interference sources

| Faults                                                        | Causes                                           | Remedy                                                              |
|---------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------|
| Pump is not running although the power supply is switched on. | Electrical fuse defective.                       | Check fuses.                                                        |
| Black display.                                                | Pump has no voltage                              | Restore power after interruption.                                   |
| Pump is making noises.                                        | Cavitation due to insufficient suction pressure. | Increase the system suction pressure within the permissible range.  |
|                                                               |                                                  | Check the delivery head setting and set to lower head if necessary. |

### ▪ Fault signals

- The fault signal is indicated by the LED display.
- The fault signal LED is continuously illuminated in red.
- The pump switches off (depending on the error code), and attempts a cyclical restart.( Specially, for Error code E10 (blocking): After approx. 10 minutes, the pump switches off permanently and displays the error code.)

Figure 3-6.3: Fault signals

| Code No. | Fault                    | Cause                                                                                                  | Remedy                                                                                       |
|----------|--------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| E04      | Mains undervoltage       | Power supply too low on mains side                                                                     | Check mains voltage                                                                          |
| E05      | Mains overvoltage        | Power supply too high on mains side                                                                    | Check mains voltage                                                                          |
| E09      | Turbine operation        | The pump is driven in reverse (the fluid flows through the pump from the pressure to the suction side) | Check flow, install non-return valves if necessary                                           |
| E10      | Blocking                 | The rotor is blocked                                                                                   | Request customer service                                                                     |
| E21*     | Overload                 | Sluggish motor                                                                                         | Request customer service                                                                     |
| E23      | Short-circuit            | Motor current too high                                                                                 | Request customer service                                                                     |
| E25      | Contacting/winding       | Motor winding defective                                                                                | Request customer service                                                                     |
| E30      | Module overheated        | Module interior too warm                                                                               | Improve room ventilation, check operating conditions, request customer service, if necessary |
| E31      | Overheated power section | Ambient temperature too high                                                                           | Improve room ventilation, check operating conditions, request customer service, if necessary |
| E36      | Electronic faults        | Electronics defective                                                                                  | Request customer service                                                                     |

\* In addition to the LED display, the fault signal LED is continuously illuminated in red.

- Warning signals
  - The warning signal is indicated by the LED display.
  - The fault signal LED and the SSM relay do not respond.
  - The pump continues to run with limited output.
  - The indicated faulty operating status must not occur for a prolonged period. The cause must be eliminated.

Figure 3-6.4: Warning signals

| Code No. | Fault               | Cause                                                                                                                                           | Remedy                           |
|----------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| E07      | Generator operation | Pump hydraulics have fluid running through them.                                                                                                | Check the system                 |
| E11      | Dry running         | Air in the pump                                                                                                                                 | Check the water volume/ pressure |
| E21*     | Overload            | Sluggish motor, pump is operated outside of its specifications (e.g. high module temperature). The speed is lower than during normal operation. | Check the ambient conditions     |

\* In addition to the LED display, the fault signal LED is continuously illuminated in red.

- In order to ensure the service life of the pump, it is recommended that the unit run at least once every 2 weeks (ensure that the pump is running) or keep it powered on for a long time (in the power-on standby state, the unit will run the pump for 3 minutes every 6 hours)

## 7 Field Settings

### 7.1 Introduction

During installation, the Yukon Mono's settings and parameters 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 Yukon Mono's user interface. The user interface menus and settings can be navigated using the user interface's touch-sensitive keys, as detailed in Table 3-7.1.

Figure 3-7.1: User interface

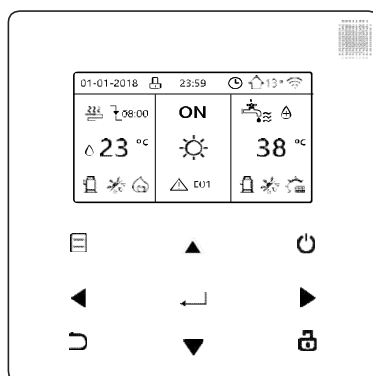
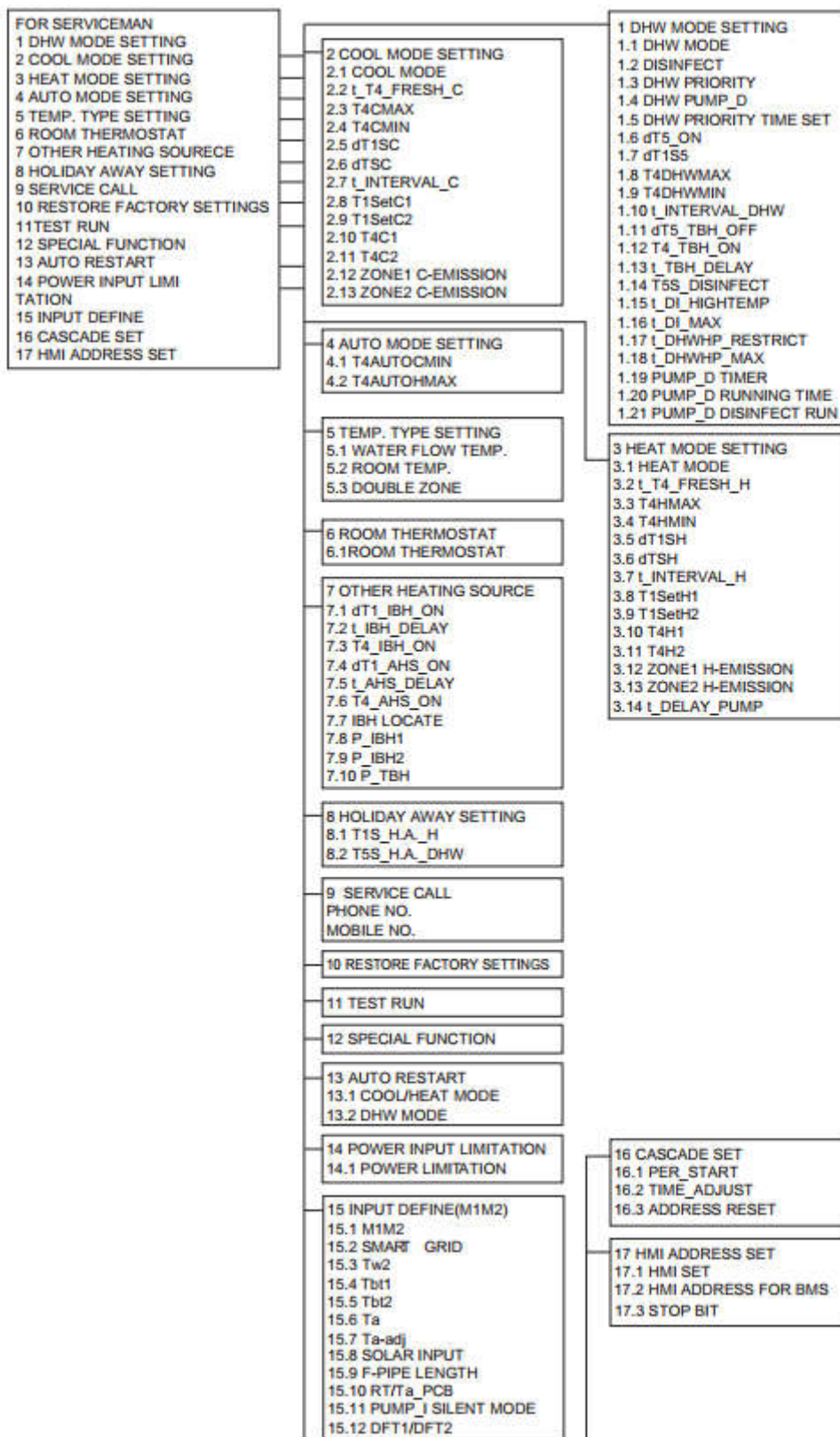


Table 3-7.1: User interface keys

| Keys                                                                                                                                                                                                                                                                                                                                               | Function                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                 | Go to the menu structure(on the home page)                                                                                                   |
|   <br> | Navigate the cursor on the display<br>Navigate in the menu structure<br>Adjust settings                                                      |
|                                                                                                                                                                                                                                                                 | Turn on/off the space heating/cooling operation or DHW mode<br>Turn on/off functions in the menu structure                                   |
|                                                                                                                                                                                                                                                                 | Come back to the up level                                                                                                                    |
|                                                                                                                                                                                                                                                                 | Long press for unlock/lock the controller<br>Unlock /lock some functions such as "DHW temperature adjusting"                                 |
|                                                                                                                                                                                                                                                                 | Go to the next step when programming a schedule in the menu structure and confirm a selection to enter in the submenu of the menu structure. |

## 7.2 Menu Structure



## 7.3 FOR SERVICEMAN Menu

FOR SERVICEMAN allows installers to input the system configuration and set the system parameters. To enter FOR SERVICEMAN, go to MENU > FOR SERVICEMAN.

Enter the password, using ◀ ▶ to navigate between digits and using ▼ ▲ to adjust the numerical values, and then press OK. The password is 234. Refer to Figure 3-7.2

Then the following pages will be displayed after putting the password. Refer to Figure 3-7.3

Figure 3-7.2: FOR SERVICEMAN password screen

FOR SE RVICEMAN

Please input password:

2 3 4

ENTER ADJUST

Figure 3-7.3: FOR SERVICEMAN menu

| FOR SERVICEMAN 1/3    | FOR SERVICEMAN 2/3           | FOR SERVICEMAN 3/3         |
|-----------------------|------------------------------|----------------------------|
| 1. DHW MODE SETTING   | 7. OTHER HEATING SOURCE      | 13. AUTO RESTART           |
| 2. COOL MODE SETTING  | 8. HOLIDAY AWAY SETTING      | 14. POWER INPUT LIMITATION |
| 3. HEAT MODE SETTING  | 9. SERVICE CALL SETTING      | 15. INPUT DEFINE           |
| 4. AUTO MODE SETTING  | 10. RESTORE FACTORY SETTINGS | 16. CASCADE SET            |
| 5. TEMP. TYPE SETTING | 11. TEST RUN                 | 17. HMI ADDRESS SET        |
| 6. ROOM THERMOSTAT    | 12. SPECIAL FUNCTION         |                            |
| ENTER                 | ENTER                        | ENTER                      |

## 7.4 DHW MODE SETTING Menu

### 7.4.1 DHW MODE SETTING menu overview

MENU > FOR SERVICEMAN > DHW MODE SETTING

Figure 3-7.4: DHW MODE SETTING menu

| 1 DHW MODE SETTING 1/5         | 1 DHW MODE SETTING 2/5        | 1 DHW MODE SETTING 3/5     |
|--------------------------------|-------------------------------|----------------------------|
| 1.1 DHW MODE YES               | 1.6 dT5_ON 5°C                | 1.11 dT5_TBH_OFF 5°C       |
| 1.2 DISINFECT YES              | 1.7 dT1S5 10°C                | 1.12 T4_TBH_ON 5°C         |
| 1.3 DHW PRIORITY YES           | 1.8 T4DHWMAX 43°C             | 1.13 t_TBH_DELAY 30 MIN    |
| 1.4 DHW PUMP_D YES             | 1.9 T4DHWMIN -10°C            | 1.14 T5S_DISINFECT 65°C    |
| 1.5 DHW PRIORITY TIME SET NON  | 1.10 t_INTERVAL_DHW 5 MIN     | 1.15 t_DI_HIGHTEMP. 15 MIN |
| ADJUST                         | ADJUST                        | ADJUST                     |
| 1 DHW MODE SETTING 4/5         | 1 DHW MODE SETTING 5/5        |                            |
| 1.16 t_DI_MAX 210 MIN          | 1.21 PUMP_D DISINFECT RUN NON |                            |
| 1.17 t_DHWHP_RESTRICT 30 MIN   |                               |                            |
| 1.18 t_DHWHP_MAX 120 MIN       |                               |                            |
| 1.19 PUMP_D TIMER YES          |                               |                            |
| 1.20 PUMP_D RUNNING TIME 5 MIN |                               |                            |
| ADJUST                         | ADJUST                        |                            |

In DHW MODE SETTING the following parameters should be set.

DHW MODE enables or disables DHW mode. For installations with DHW tanks, select YES to enable DHW mode. For installations without DHW tanks, select NON to disable DHW mode.

DISINFECT sets whether or not the disinfection operation is performed.

DHW PRIORITY sets whether domestic hot water heating or space heating/cooling takes priority. If NON is selected in the DHW PRIORITY mode, when it is available and the space heating/cooling is OFF, the heat pump will heat the water as required. If space heating/cooling is ON, the water will be heated as required when the immersion heater is unavailable.

Only when the space heating/cooling is OFF will the heat pump operate to heat domestic water.

DHW PUMP\_D sets whether or not the DHW pump is controlled by the Yukon Mono unit. If the DHW pump is to be controlled by the Yukon Mono, select YES. If the DHW pump is not to be controlled by the Yukon Mono unit, select NON.

DHW PUMP PRIORITY TIME SET set the operation time of DHW during DHW PRIORITY mode.

dT5\_ON sets the temperature difference between the DHW set temperature (T5S) and the DHW tank water temperature (T5) above which the heat pump providing heated water to the DHW tank. When  $T5S - T5 \geq dT5\_ON$  the heat pump providing heated water to the DHW tank.

Note: When the heat pump's leaving water temperature is above the DHW mode leaving water temperature operating limit (T5stop), the heat pump does not provide heated water to the DHW tank. The DHW mode leaving water temperature operating limit is related to ambient temperature as shown in Figure 2-6.3 in Part 2, 6 "Operating Limits".

dT1S5 sets the heat pump's leaving water set temperature (T1S) relative to DHW tank water temperature (T5). For DHW mode, the user sets the DHW set temperature (T5S) on the main screen and cannot manually set T1S. T1S is set as  $T1S = T5 + dT1S5$ .

Figure 3-7.6 illustrates the operation of the heat pump and immersion heater(optional) in DHW mode. If the DHW tank water temperature (T5) is less than the minimum of the DHW set temperature (T5S) and the heat pump leaving water temperature operating limit (T5stop) (refer to Figure 2-6.3 in Part 2, 6 "Operating Limits") less dT5\_ON, the heat pump starts providing heated water to the DHW tank. After t\_TBH\_delay minutes have elapsed, the immersion heater is turned on. If T5 reaches T5stop, the heat pump stops but the immersion heater continues running until T5 has reached  $T5S + dT5\_TBH\_OFF$ .

T4DHWMAX sets the ambient temperature above which the heat pump will not operate in DHW mode. The highest value that T4DHWMAX can take is 43°C, which is the DHW mode upper ambient temperature operating limit of the heat pump.

T4DHWMIN sets the ambient temperature below which the heat pump will not operate in DHW mode. The lowest value that T4DHWMIN can take is -25°C, which is the DHW mode lower ambient temperature operating limit of the heat pump.

Figure 3-7.5: dT5\_ON

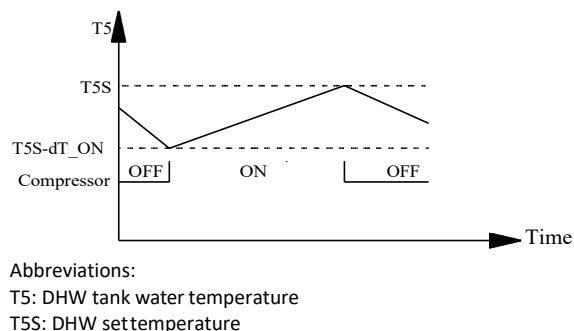


Figure 3-7.6: DHW mode operation

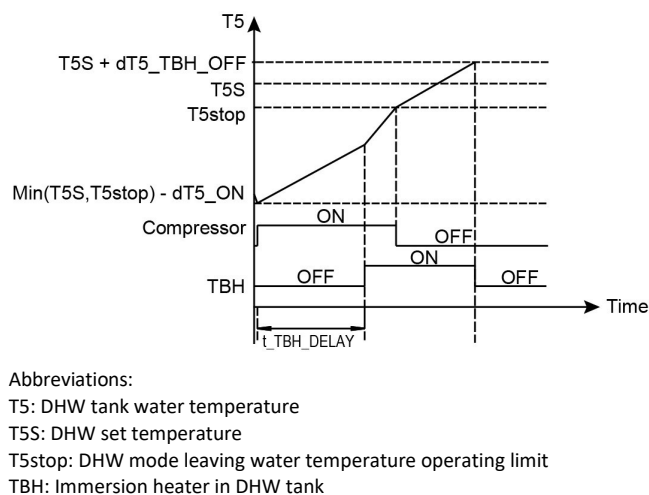
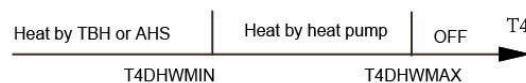


Figure 3-7.7: T4DHWMAX and T4DHWMIN



Abbreviations:  
HP: Heat pump  
TBH: DWH tank immersion heater  
AHS: Additional heating source

$t\_INTERVAL\_DHW$  sets the DHW mode compressor re-start delay. When the compressor stops running, it will not re-start until at least  $t\_INTERVAL\_DHW$  minutes have elapsed.

$dT5\_TBH\_OFF$  sets the temperature difference between the DHW set temperature ( $T5S$ ) and the DHW tank water temperature ( $T5$ ) below which the immersion is not used. When  $T5 > \text{Min}(T5S + dT5\_TBH\_OFF, 65^\circ\text{C})$ , the immersion heater is off.

$T4\_TBH\_ON$  sets the ambient temperature above which the immersion heater will not be used.

$t\_TBH\_DELAY$  sets the delay between the compressor starting and the immersion heater being turned on.

$T5S\_DISINFECT$  sets the DHW tank disinfection operation target temperature. Caution: during the disinfection operation (duration:  $t\_DI\_MAX$ ) the domestic hot water temperature at the hot water taps will at times be equal to the value set for  $T5S\_DI$ .

$t\_DI\_HIGHTEMP$  sets that length of time that the DHW tank disinfection operation target temperature is maintained.

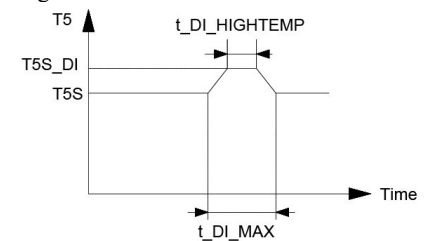
$t\_DI\_MAX$  sets the total duration of the DHW tank disinfect operation.

$t\_DHWHP\_RESTRICT$  sets the maximum length of time that the heat pump will run in space heating or space cooling modes before switching to DHW mode, if a requirement for DHW mode exists. When running in space heating mode or space cooling mode, the heat pump becomes available for DHW mode either as soon as the space heating/cooling set temperatures have been reached (refer to Part 3, 7.5 "COOL MODE SETTING Menu" and Part 3, 7.6 "HEAT MODE SETTING Menu") or after  $t\_DHWHP\_MAX$  minutes have elapsed.

$t\_DHWHP\_MAX$  sets the maximum length of time that the heat pump will run in DWH mode before switching to space heating mode or space cooling mode if a requirement for space heating/cooling modes exists. When running in DHW mode, the heat pump becomes available for space heating/cooling either as soon as the DHW tank water temperature ( $T5$ ) reaches the DHW set temperature ( $T5S$ ) or after  $t\_DHWHP\_MAX$  minutes have elapsed.

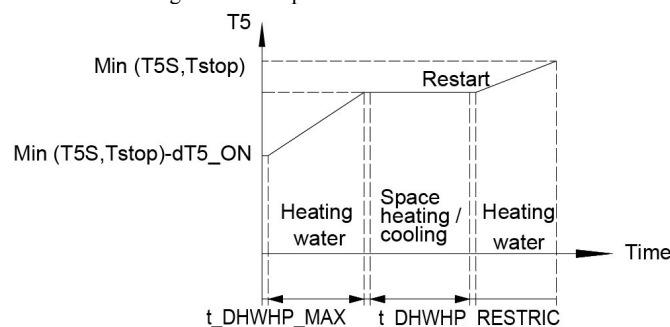
Figure 3-7.9 illustrates the effects of  $t\_DHWHP\_MAX$  and  $t\_DHWHP\_RESTRICT$  when DHW PRIORITY is enabled. The heat pump initially runs in DWH mode. After  $t\_DHWHP\_MAX$  minutes,  $T5$  has not reached

Figure 3-7.8: DHW tank disinfection



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

Figure 3-7.9: Operation in DHW PRIORITY



Abbreviations:  
 $T5$ : DHW tank water temperature  
 $T5S$ : DHW set temperature  
 $T5stop$ : DHW mode leaving water temperature operating limit

PUMP\_D TIMER sets whether or not the user is able to set the DHW pump (field supply) in DHW mode. For installations with a DHW pump, select ON so that the user is able to set pump start times.

PUMP\_D RUNNING TIME sets the length of time the pump runs for at each of the user-specified start times on the DHW PUMP tab on the DOMESTIC HOT WATER (DHW) menu, if TIMER RUNNING is enabled.

PUMP\_D DISINFECT RUN sets whether or not the DHW pump (field supply) operates during the disinfection mode.

## 7.5 COOL MODE SETTING Menu

MENU > FOR SERVICEMAN > COOL MODE SETTING

Figure 3-7.10: COOL MODE SETTING menu

| 2 COOL MODE SETTING 1/3  | 2 COOL MODE SETTING 2/3 | 2 COOL MODE SETTING 3/3   |
|--------------------------|-------------------------|---------------------------|
| 2.1 COOL MODE <b>YES</b> | 2.6 dTSC <b>2°C</b>     | 2.11 T4C2 <b>25°C</b>     |
| 2.2 t T4_FRESH_C 2.0HRS  | 2.7 t_INTERVAL_C 5MIN   | 2.12 ZONE1 C-EMISSION FCU |
| 2.3 T4CMAX 43°C          | 2.8 T1SetC1 10°C        | 2.13 ZONE2 C-EMISSION FLH |
| 2.4 T4CMIN 20°C          | 2.9 T1SetC2 16°C        |                           |
| 2.5 dT1SC 5°C            | 2.10 T4C1 35°C          |                           |
| ⬆️ ADJUST ⬆️             | ⬆️ ADJUST ⬆️            | ⬆️ ADJUST ⬆️              |

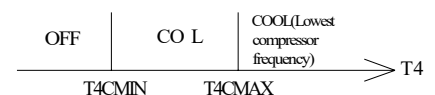
In COOL MODE SETTING the following parameters should be set.

COOL MODE enables or disables cooling mode. For installations with space cooling terminals, select YES to enable cooling mode. For installations without space cooling terminals, select NON to disable cooling mode.

t\_T4\_FRESH\_C sets the refresh time of cooling model climate temperature curve.

T4CMAX sets the ambient temperature above which the heat pump will operate in cooling mode with lowest compressor frequency. The highest value that T4CMAX can take is 46°C, which is the cooling mode upper ambient temperature operating limit of the heat pump. Refer to Figure 3-7.11.

Figure 3-7.11: T4CMAX, T4CMIN

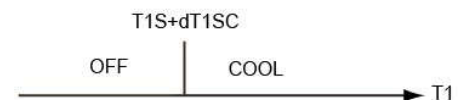


T4CMIN sets the ambient temperature below which the heat pump will not operate in cooling mode. The lowest value that T4CMIN can take is -5°C, which is the cooling mode lower ambient temperature operating limit of the heat pump. Refer to Figure 3-7.11.

Abbreviations:  
T4: Outdoor ambient temperature

dT1SC sets the minimum temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) at which the heat pump provides chilled water to the space cooling terminals. When  $T1 - T1S \geq dT1SC$  the heat pump provides chilled water to the space cooling terminals and when  $T1 \leq T1S$  the heat pump does not provide chilled water to the space cooling terminals.

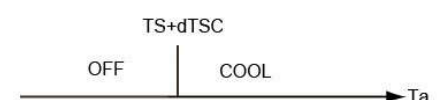
Figure 3-7.12: dT1SC



Abbreviations:  
T1: Heat pump leaving water temperature  
T1S: Heat pump leaving water set temperature

dTSC sets the temperature difference between the actual room temperature (Ta) and set room temperature (TS) above which the heat pump provides chilled water to the space cooling terminals. When  $Ta - TS \geq dTSC$  the heat pump provides chilled water to the space cooling terminals and when  $Ta \leq TS$  the heat pump does not provide chilled water to the space cooling terminals. Refer to Figure 3-7.13. dTSC is only applicable if YES is selected for ROOM TEMP in the TEMP. TYPE SETTING menu. Refer to Part 3,

Figure 3-7.13: dTSC



## 7.8 "TEMP. TYPE SETTING Menu".

t\_INTERVAL\_C sets the cooling mode compressor re-start delay. When the compressor stops running, it will not re-start until at least t\_INTERVAL\_C minutes have elapsed.

T1SetC1 sets the temperature 1 of automatic setting curve for cooling mode.

T1SetC2 sets the temperature 2 of automatic setting curve for cooling mode.

T4C1 sets the ambient temperature 1 of automatic setting curve for cooling mode.

T4C2 sets the ambient temperature 2 of automatic setting curve for cooling mode.

ZONE1 C-EMISSION sets the emission type of zone1 for cooling mode.

ZONE2 C-EMISSION sets the emission type of zone2 for cooling mode.

## 7.6 HEAT MODE SETTING Menu

MENU > FOR SERVICEMAN > HEAT MODE SETTING

Figure 3-7.14: HEAT MODE SETTING menu

|                     |        |                     |      |                       |      |
|---------------------|--------|---------------------|------|-----------------------|------|
| 3 HEAT MODE SETTING | 1/3    | 3 HEAT MODE SETTING | 2/3  | 3 HEAT MODE SETTING   | 3/3  |
| 3.1 HEAT MODE       | YES    | 3.6 dTSH            | 2°C  | 3.11 T4H2             | 7°C  |
| 3.2 t T4_FRESH_H    | 2.0HRS | 3.7 t_INTERVAL_H    | 5MIN | 3.12 ZONE1 H-EMISSION | RAD. |
| 3.3 T4HMAX          | 16°C   | 3.8 T1SetH1         | 35°C | 3.13 ZONE2 H-EMISSION | FLH  |
| 3.4 T4HMIN          | -15°C  | 3.9 T1SetH2         | 28°C | 3.14 t DELAY PUMP     | 2MIN |
| 3.5 dT1SH           | 5°C    | 3.10 T4H1           | -5°C |                       |      |
| ⬅️ ADJUST           | ➡️     | ⬅️ ADJUST           | ➡️   | ⬅️ ADJUST             | ➡️   |

In HEAT MODE SETTING the following parameters should be set.

HEAT MODE enables or disables heating mode.

t\_T4\_FRESH\_H sets the refresh time of heating model climate temperature curve.

T4HMAX sets the ambient temperature above which the heat pump will operate heating mode with lowest compressor frequency. The highest value that T4HMAX can take is 35°C, which is the heating mode upper ambient temperature operating limit of the heat pump. Refer to Figure 3-7.15.

T4HMIN sets the ambient temperature below which the heat pump will not operate in heating mode. The lowest value that T4HMIN can take is -25°C, which is the heating mode lower ambient temperature operating limit of the heat pump. Refer to Figure 3-7.15.

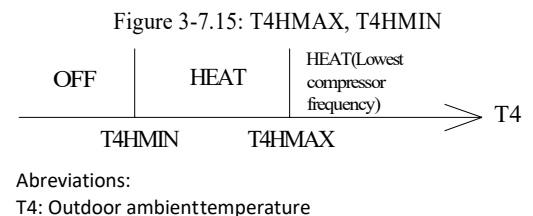


Figure 3-7.16: dTSH

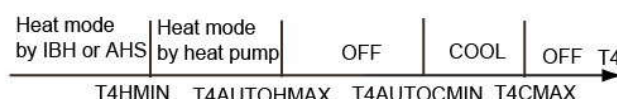


**ZONE2 H-EMISSION** sets the emission type for heating mode.

Figure 3-7.17: AUTO MODE SETTING menu

|                      |      |
|----------------------|------|
| 4 AUTO. MODE SETTING |      |
| 4.1 T4AUTOCMIN       | 25°C |
| 4.2 T4AUTOHMAX       | 17°C |
|                      |      |
|                      |      |
|                      |      |
|                      |      |
| ADJUST               |      |

Figure 3-7.18: T4AUTOCMAX, T4AUTOCMIN



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

## 7.8 TEMP. TYPE SETTING Menu

MENU > FOR SERVICEMAN > 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.

When ROOM TEMP. is enabled, the target water flow temperature will be calculated from climate-related curves (refer to “9 Climate related curves”).

For installations without room thermostats, space heating and cooling modes can be controlled in one of two different ways:

- according to the Yukon Mono’s leaving water temperature alone
- according to the room temperature detected by the Yukon Split user interface’s built-in temperature sensor alone

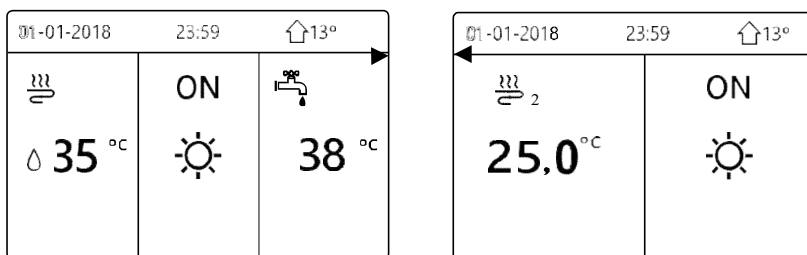
WATER FLOW TEMP. sets whether space heating/cooling modes are controlled according to the Yukon Mono’s leaving water temperature. If YES is selected, the user is able to set the Yukon Mono unit’s leaving water temperature set temperature on the user interface’s main screen.

ROOM TEMP. sets whether space heating/cooling modes are controlled according to the room temperature detected by the temperature sensor in the Yukon Mono user interface. If YES is selected, the user is able to set the room temperature set temperature on the user interface’s main screen, no matter what is the setting of WATER FLOW TEMP.

DOUBLE ZONE sets whether there are two zones.

If set WATER FLOW TEMP. and ROOM TEMP. to YES, meanwhile set DOUBLE ZONE to NON or YES, the following pages will be displayed. In this case, the setting value of zone 1 is T1S, the setting value of zone 2 is TS(The corresponding TIS2 is calculated according to the climate related curves.)

Figure 3-7.22: DOUBLE ZONE to NON or YES



Homepage (zone 1)

Addition page (zone 2)  
(Double zone is effective)

If set DOUBLE ZONE to YES and set ROOM TEMP. to NON, meanwhile set WATER FLOW TEMP. to YES or NON, the following pages will be displayed. In this case, the setting value of zone 1 is T1S, the setting value of zone 2 is T1S2.

Figure 3-7.19: TEMP. TYPE SETTING menu

|                      |     |
|----------------------|-----|
| 5 TEMP. TYPE SETTING |     |
| 5.1 WATER FLOW TEMP. | YES |
| 5.2 ROOM TEMP.       | NON |
| 5.3 DOUBLE ZONE      | NON |
|                      |     |
|                      |     |
|                      |     |
| ⏮ ADJUST             | ⏭   |

Figure 3-7.20: Only set WATER FLOW TEMP to YES

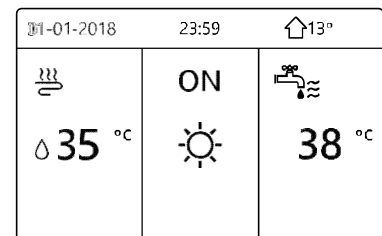


Figure 3-7.21: Only set ROOM TEMP to YES

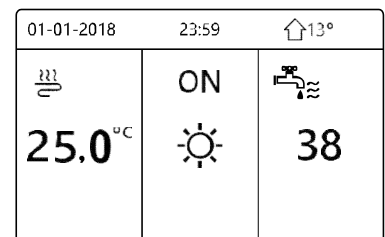
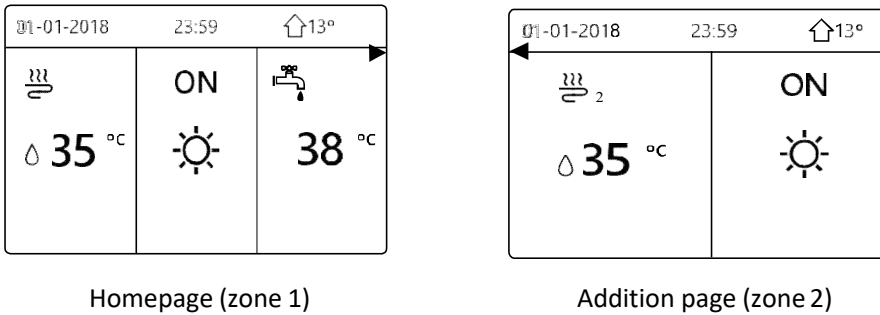
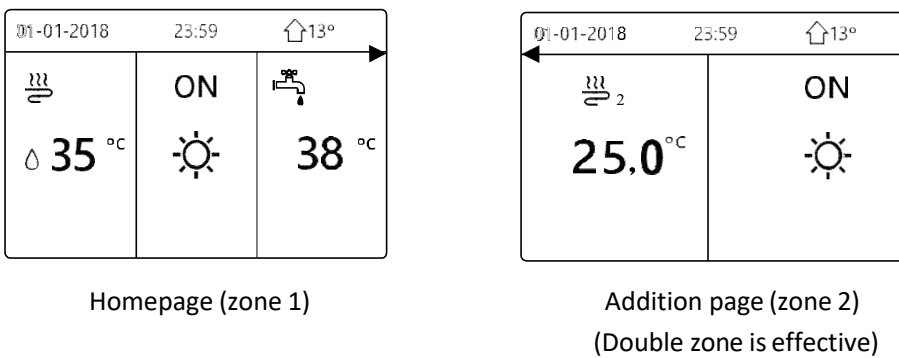


Figure 3-7.23: DOUBLE ZONE to YES and set ROOM TEMP. to NON meanwhile set WATER FLOW TEMP. to YES or NON



If set DOUBLE ZONE and ROOM TEMP. to YES, meanwhile set WATER FLOW TEMP. to YES or NON, the following page will be displayed. In this case, the setting value of zone 1 is T1S, the setting value of zone 2 is TS (The corresponding TIS2 is calculated according to the climate related curves.)

Figure 3-7.24: DOUBLE ZONE and set ROOM TEMP. to YES meanwhile set WATER FLOW TEMP. to YES or NON



## 7.9 ROOM THERMOSTAT Menu

MENU > FOR SERVICEMAN > ROOM THERMOSTAT

As an alternative to controlling space heating/cooling modes according to the Yukon Mono unit's leaving water temperature and/or the room temperature detected by the temperature sensor in the Yukon Mono user interface, separate room thermostat can be installed and used to control space heating/cooling modes.

Figure 3-7.25: ROOM THERMOSTAT menu

|                                |
|--------------------------------|
| 6 ROOM THERMOSTAT              |
| 6.1 ROOM THERMOSTAT <b>NON</b> |
|                                |
|                                |
|                                |
|                                |
| ➔ ADJUST                       |

In ROOM THERMOSTAT the following parameters should be set.

ROOM THERMOSTAT sets whether or not room thermostats are installed. For installations with room thermostats, select YES. For installations without room thermostats, select NON.

ROOM THERMOSTAT = NON: No room thermostat.

ROOM THERMOSTAT = MODE SET: Room thermostat can control heating and cooling individually.

ROOM THERMOSTAT=ONE ZONE: Room thermostat provides the switch signal to unit.

ROOM THERMOSTAT=DOUBLE ZONE: Indoor unit is connected with two room thermostat.

## 7.10 OTHER HEATING SOURCE Menu

### 7.10.1 OTHER HEATING SOURCE menu overview

MENU>FOR SERVICEMAN>OTHER HEATING SOURCE

Figure 3-7.26: OTHER HEATING SOURCE menu

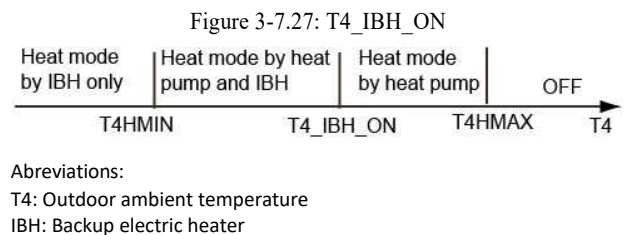
| 7 OTHER HEATING SOURCE 1/2 | 7 OTHER HEATING SOURCE 2/2 |
|----------------------------|----------------------------|
| 7.1 dT1_IBH_ON <b>5°C</b>  | 7.6 T4_AHS_ON <b>-5°C</b>  |
| 7.2 t_IBH_DELAY 30MIN      | 7.7 IBH LOCATE PIPE LOOP   |
| 7.3 T4_IBH_ON -5°C         | 7.8 P_IBH1 0.0kW           |
| 7.4 dT1_AHS_ON 5°C         | 7.9 P_IBH2 0.0kW           |
| 7.5 t_AHS_DELAY 30MIN      | 7.10 P_TBH 2.0kW           |
| ⬇️ ADJUST ⬅️               | ⬇️ ADJUST ⬅️               |

In OTHER HEATING SOURCE the following parameters should be set. Backup electric heater is optional.

dT1\_IBH\_ON sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the backup electric heater heating element(s) are on. When  $T1S - T1 \geq dT1\_IBH\_ON$  the backup electric heater is on (on models where the backup electric heater has a simple on/off control function).

t\_IBH\_DELAY sets the delay between the compressor starting and the backup electric heater being turned on.

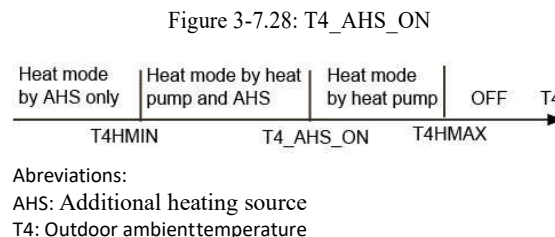
T4\_IBH\_ON sets the ambient temperature below which the backup electric heater is used. If the ambient temperature is above T4\_IBH\_ON, the backup electric heater is not used. The relationship between operation of the backup heater and the ambient is shown in Figure 3-7.22.



dT1\_ASH\_ON sets the temperature difference between the heat pump's leaving water set temperature (T1S) and the heat pump's leaving water temperature (T1) above which the additional heating source is on. When  $T1S - T1 \geq dT1\_AHS\_ON$  the additional heating source is on.

t\_ASH\_DELAY sets the delay between the compressor starting and the additional heating source being turned on.

T4\_AHS\_ON sets the ambient temperature below which the additional heating source is used. If the ambient temperature is above T4\_AHS\_ON, the additional heating source is not used. The relationship between operation of the additional heating source and the ambient is shown in the picture below.



IBH LOCATE means IBH is installed for pipe heating.

P\_IBH1, P\_IBH2 set heating capacity of IBH and P\_TBH sets heating capacity of TBH, which are used for energy consumption statistics.

### 7.11 HOLIDAY AWAY SETTING Menu

MENU > FOR SERVICEMAN > HOLIDAY AWAY SETTING

The HOLIDAY AWAY SETTING menu settings are used to set the outlet water temperature to prevent water pipes freezing when away from home in cold weather seasons. In HOLIDAY AWAY SETTING the following parameters should be set.

T1S\_H.A.\_H sets the heat pump's leaving water set temperature for space heating mode when in holiday away mode.

T5S\_H.M\_DHW sets the heat pump's leaving water set temperature for DHW mode when in holiday away mode.

Figure 3-7.29: HOLIDAY AWAY SETTING menu

|                        |      |
|------------------------|------|
| 8 HOLIDAY AWAY SETTING |      |
| 8.1 T1S_H.A._H         | 20°C |
| 8.2 T5S_H.A._DHW       | 20°C |
|                        |      |
|                        |      |
|                        |      |
| ⬅️ ADJUST              | ⏪    |

### 7.12 SERVICE CALL Menu

MENU > FOR SERVICEMAN > SERVICE CALL

In SERVICE CALL the following parameters can be set.

PHONE NO. and MOBILE NO. can be used to set after-sales service contact numbers. If set, these numbers are displayed to users in MENU > FOR SERVICEMAN > SERVICE CALL

Use ▼ ▲ to adjust the numerical values. The maximum length of the phone numbers is 14 digits.

Figure 3-7.30: SERVICE CALL menu

|                        |       |
|------------------------|-------|
| 9 SERVICE CALL SETTING |       |
| PHONE NO.              | ***** |
| MOBILE NO.             | ***** |
|                        |       |
|                        |       |
|                        |       |
| ⬅️ CONFIRM             | ⏪     |

The black rectangle found between 0 and 9 when scrolling up and down using ▼ ▲ is converted to a blank space when the phone numbers are displayed to users in MENU > FOR SERVICEMAN > SERVICE CALL and can be used for phone numbers less than 14 digits in length.

### 7.13 RESTORE FACTORY SETTINGS

MENU > FOR SERVICEMAN > RESTORE FACTORY SETTINGS

RESTORE FACTORY SETTINGS is used to restore all the parameters set in the user interface to their factory defaults.

On selecting YES, the process of restoring all settings to their factory defaults begins and progress is displayed as a percentage.

Figure 3-7.31: RESTORE FACTORY SETTINGS screens

|                                                                                                                                                                                        |                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>10 RESTORE FACTORY SETTINGS</b><br>All the settings will come back to factory default.<br>Do you want to restore factory settings?<br><br><div>NO YES</div> <div>⬅️ CONFIRM ⏪</div> | <b>10 RESTORE FACTORY SETTINGS</b><br>Please wait...<br><br>5% |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|

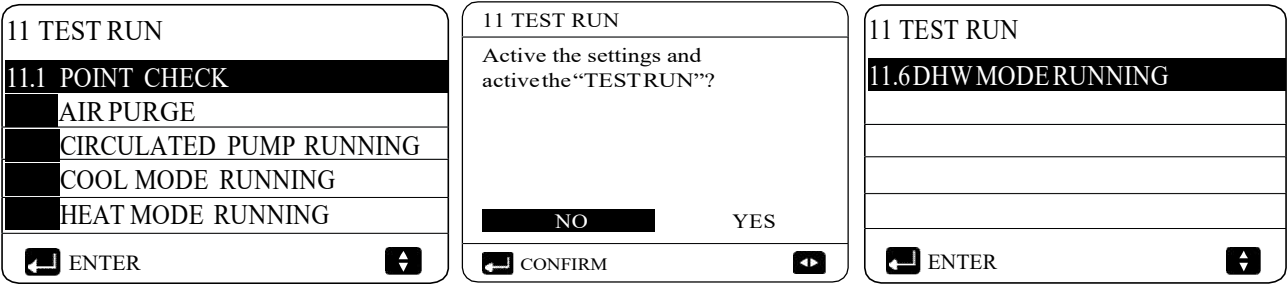
### 7.14 TEST RUN

#### 7.14.1 TEST RUN Menu overview

MENU>FOR SERVICEMAN>TEST RUN

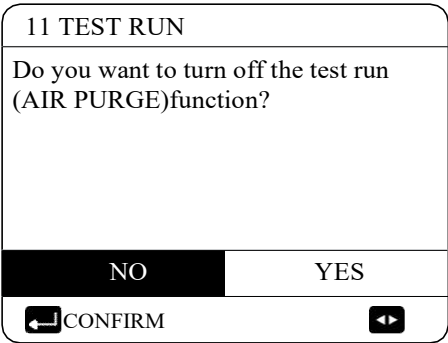
TEST RUN is used to check that the valves, air purge function, circulation pump, space cooling mode, space heating mode and DHW mode are all operating correctly.

Figure 3-7.32: TEST RUN start screen and TEST RUN menu



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

Figure 3-7.33: Exit air purge screen



#### 7.14.2 POINT CHECK menu

MENU > FOR SERVICEMAN > TEST RUN > POINT CHECK

The POINT CHECK menu is used to check the operation of individual components. Use ▼▲ to scroll to the components you want to check and press ON/OFF to toggle the on/off state of the component. If a valve does not turn on/off when its on/off state is toggled or if a pump/heater does not operate when turned on, check the component’s connection to the hydronic system main PCB.

Figure 3-7.34: POINT CHECK menu

|              |     |                     |     |
|--------------|-----|---------------------|-----|
| 11 TEST RUN  | 1/2 | 11 TEST RUN         | 2/2 |
| 3WAY-VALVE 1 | OFF | PUMPSOLAR           | OFF |
| 3WAY-VALVE 2 | OFF | PUMPDHW             | OFF |
| PUMP I       | OFF | INNER BACKUP HEATER | OFF |
| PUMP O       | OFF | TANK HEATER         | OFF |
| PUMP C       | OFF | 3-WAY VALVE 3       | OFF |
| ON/OFF       |     | ON/OFF              |     |

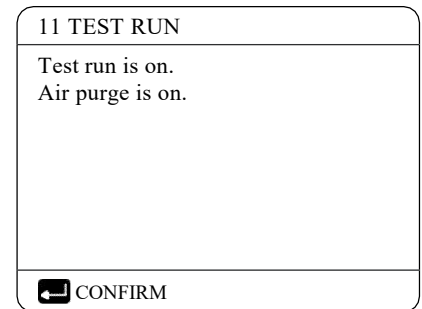
## 7.14.3 AIR PURGE operation

MENU > FOR SERVICEMAN > TEST RUN > AIR 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.

The AIR PURGE operation is used to remove air from the water piping. Before running AIR PURGE mode, make sure that the air purge valve is open. When the air purge operation starts, SV1 valve opens and SV2 valve closes. 60 secs later the pump in the unit (PUMPI) operates for 10min during which the flow switch does not work. After the pump stops, SV1 valve closes and SV2 valve opens. 60 secs later both PUMPI and PUMPO operate until the next command is received. If any error code is displayed during the air purge operation, the cause should be investigated. Refer to Part 3, 10 "Error Code table".

Figure 3-7.35: AIR PURGE operation

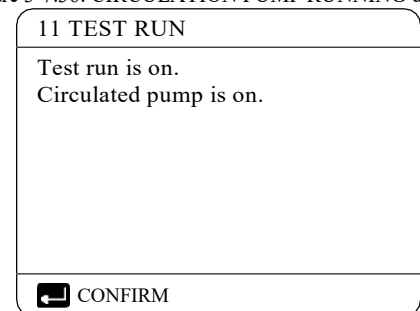


## 7.14.4 CIRCULATION PUMP RUNNING operation

MENU > FOR SERVICEMAN > TEST RUN > CIRCULATION PUMP RUNNING

The CIRCULATION PUMP RUNNING operation is used to check the operation of the circulation pump. When the circulation pump running operation starts, all running components stop. 60 secs later, the 3-way valve opens and the 3-way valve closes. After a further 60 secs PUMPI starts. 30 seconds later, if the flow switch detects that the water flow is normal, PUMPI operates for 3 mins. After the pump stops 60s, the 3-way valve closes and the 3-way valve opens. 60s later both PUMI and PUMPO will operate. After a further 2 mins the flow switch start to check the water flow. If the water flow rate is sufficient, both PUMPI and PUMPO operate until the next command is received. If the water flow rate is insufficient over any 15-second period, PUMPI and PUMPO stop and error code E8 is displayed. Refer to Part 3, 10 "Error Code table".

Figure 3-7.36: CIRCULATION PUMP RUNNING display



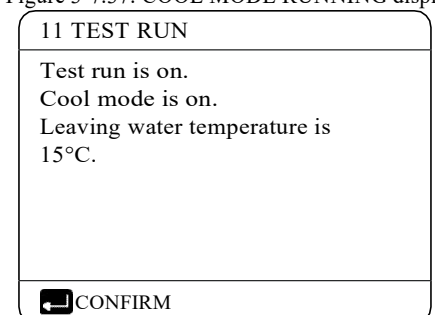
## 7.14.5 COOL MODE RUNNING operation

MENU > FOR SERVICEMAN > TEST RUN > COOL MODE RUNNING

The COOL MODE RUNNING operation is used to check the operation of the system in space cooling mode.

During the COOL MODE RUNNING operation, the Yukon Mono unit 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.

Figure 3-7.37: COOL MODE RUNNING display



If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 10 "Error Code table".

## 7.14.6 HEAT MODE RUNNING operation

The HEAT MODE RUNNING operation is used to check the operation of the system in space heating mode.

During the HEAT MODE RUNNING operation the Yukon Split unit leaving water set temperature is 35°C. The current actual leaving water temperature is displayed on the user interface. When the HEAT MODE RUNNING operation starts, the heat pump first runs for 10 mins.

After 10 mins:

- On systems where an auxiliary heat source (AHS) is installed, the AHS starts and runs for 10 mins (whilst the heat pump continues running), after which the AHS stops and the heat pump continues to operate until the water temperature rises to the set temperature or the heat mode running operation is exited by pressing OK.
- On systems where a backup electric heater is being used, the backup heater turn on (on models where the backup heater has a simple on/off control function). 3 mins later the backup electric heater will turn off. The heat pump will then operate until the water temperature rises to the set temperature or the next command is received.
- On systems with no auxiliary heat source (AHS), the heat pump will then operate until the water temperature rises to the set temperature or the next command is received.

If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 8.2 "Error Code table".

## 7.14.7 DHW MODE RUNNING operation

The DHW MODE RUNNING operation is used to check the operation of the system in DHW mode.

During the DHW MODE RUNNING operation, the DHW set temperature is 55°C. On systems where a tank boost heater is installed, the tank boost heater will turn on once the heat pump has run for 10 mins. The tank boost heater will turn off 3 mins later and the heat pump will operate until the water temperature rises to the set temperature or the next command is received.

Figure 3-7.38: HEAT MODE RUNNING display

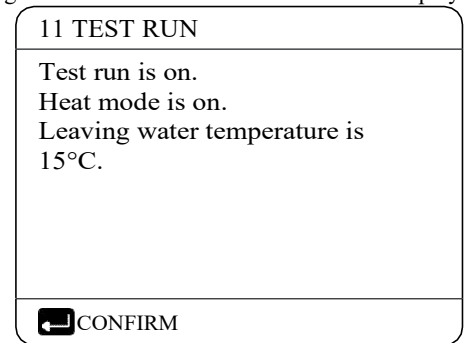
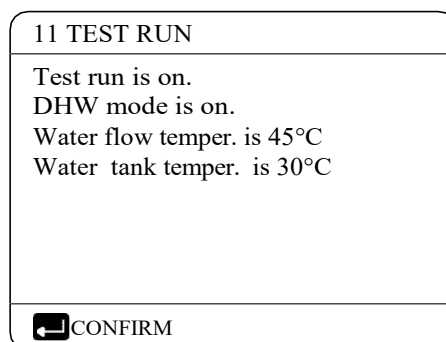


Figure 3-7.39: DHW MODE RUNNING display



7.15 SPECIAL FUNCTION

7.15.1 SPECIAL FUNCTION menu overview

MENU > FOR SERVICEMAN > SPECIAL FUNCTION

SPECIAL FUNCTION is used to pre-heating floor and drying up floor once installation is complete or the first time start up the unit or restart the unit after a long time stop.

7.15.2 PREHEATING FOR FLOOR

MENU>FOR SERVICEMAN>SPECIAL FUNCTION>PREHEATING FOR FLOOR

Before floor heating, if a large amount of water remains on the floor, the floor may be warped or even rupture during floor heating operation, in order to protect the floor, floor drying is necessary, during which the temperature of the floor should be increased gradually.

During first operation of the unit, air may remain in the water system which can cause malfunctions during operation. It is necessary to run the air purge function to release the air (make sure the air purge valve is open).

T1S sets the heat pump’s leaving water set temperature in preheating for floor mode.

t\_fristFH sets the duration of preheating for floor mode.

The operation of the unit during preheating for floor mode is illustrated in Figure 3-7.37.

Figure 3-7.40: Special functions menu

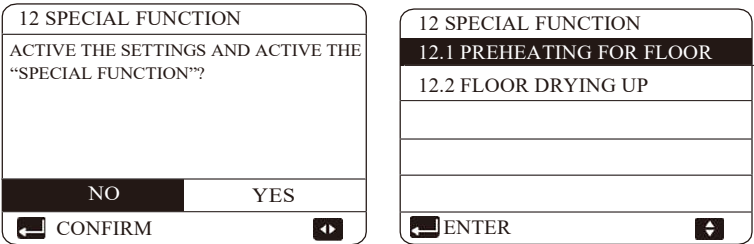


Figure 3-7.41: Preheating for floor menu

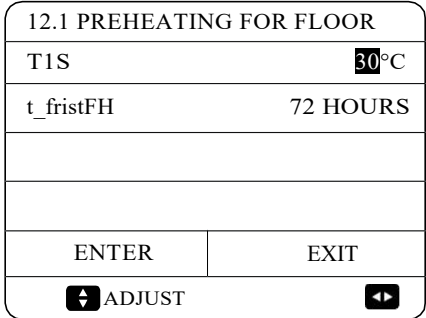
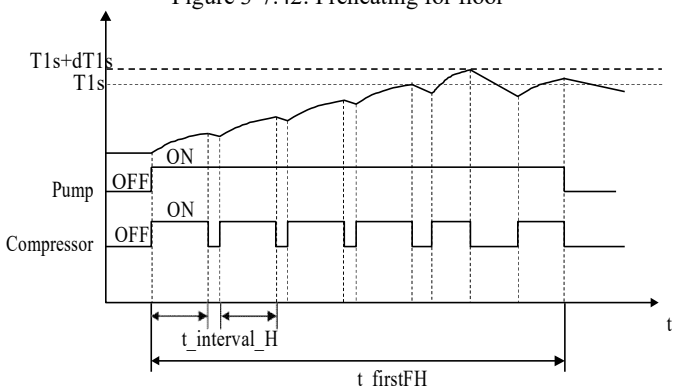


Figure 3-7.42: Preheating for floor



Abbreviations:  
t\_interval\_H: Compressor re-start delay in space heating mode. (Refer to Part 3, 8.6 “HEAT MODE SETTING Menu”).

Whilst the preheating for floor operation is running, the number of minutes that it has been running for and the heat pump’s leaving water temperature are displayed on the user interface. During the preheating for floor operation all buttons except OK are inactivated. To exit the preheating for floor operation, press OK and then select YES when prompted. Refer to Figure 3-7.38.

Figure 3-7.43: Preheating for floor screens

12.1 PREHEATING FOR FLOOR

Preheat for floor is running for 25 minutes.  
Water flow temperature is 20°C.

CONFIRM

12.1 PREHEATING FOR FLOOR

Do you want to turn off the preheating for floor function?

NO

YES

CONFIRM

7.15.3 FLOOR DRYING UP

MENU > FOR SERVICEMAN > SPECIAL FUNCTION > FLOOR DRYING UP

For newly-installed under-floor heating systems, floor drying up mode can be used to remove moisture from the floor slab and subfloor to prevent warping or rupture of the floor during floor heating operation. There are three phases to the floor drying up operation:

- Phase 1: gradual temperature increase from a starting point of 25°C to the peak temperature
- Phase 2: maintain peak temperature
- Phase 3: gradual temperature decrease from the peak temperature to 45°C

WARMUPTIME(t\_DRYUP) sets the duration of Phase 1.

KEEP TIME(t\_HIGHPEAK) sets the duration of Phase 2.

TEMP. DOWN TIME(t\_DRYDOWN) is the duration of Phase 3.

PEAK TEMP.(T\_DRYPEAK) sets the heat pump’s leaving water set temperature for Phase 2.

STARTTIME sets the floor drying up operation start time.

STARTDATE sets the floor drying up operation start date.

The heat pump’s leaving water set temperature during the floor drying up operation is illustrated in Figure 3-7.40.

During the floor drying up operation all buttons except OK are inactivated. To exit the floor drying up operation, press OK and then select YES when prompted.

Note: In the event of a heat pump malfunction, floor drying up mode will continue if a backup electric heater and/or additional heating source is available and configured to support space heating mode.

Figure 3-7.44: FLOOR DRYING UP menu

12.2 FLOORDRYING UP 1/2

WARM UP TIME(t\_DRYUP) 5 days

KEEP TIME(t\_HIGHPEAK) 5 days

TEMP.DOWN TIME(t\_DRYDOWN) 5 days

PEAK TEMP.(T\_DRYPEAK) 45°C

STARTTIME 15:00

ADJUST

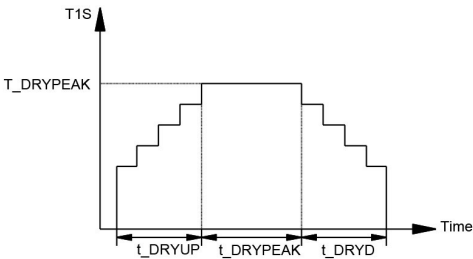
12.2 FLOOR DRYING UP 2/2

STARTDATE 01-01-2019

ENTER EXIT

ADJUST

Figure 3-7.45: FLOOR DRYING UP settings



## 7.16 AUTO RESTART

MENU > FOR SERVICEMAN > AUTO RESTART

AUTO RESTART sets whether or not the unit re-applies the user interface settings when the power returns following a power failure. Select YES to enable auto restart or NON to disable auto restart.

If the auto restart function is enabled, when the power returns following a power failure, the unit re-applies the user interface settings from before the power failure. If the auto restart function is disabled, when the power returns after a power failure, the unit won't auto restart.

Figure 3-7.47: AUTO RESTART menu

|                     |     |
|---------------------|-----|
| 13 AUTO RESTART     |     |
| 13.1 COOL/HEAT MODE | YES |
| 13.2 DHW MODE       | NON |
|                     |     |
|                     |     |
|                     |     |
|                     |     |
| ADJUST              |     |

## 7.17 POWER INPUT LIMITATION

MENU > FOR SERVICEMAN > POWER INPUT LIMITATION

POWER INPUT LIMITATION sets the type of power input limitation and the setting range is 0-8. If the unit will operate at larger power input, 0 should be selected. If the unit will operate at a lower power input, 1-8 should be selected and the power input and capacity will decrease.

Figure 3-7.48: POWER INPUT LIMITATION menu

|                             |   |
|-----------------------------|---|
| 14 POWER INPUT LIMITATION   |   |
| 14.1 POWER INPUT LIMITATION | 0 |
|                             |   |
|                             |   |
|                             |   |
|                             |   |
| ADJUST                      |   |

Figure 3-7.49: Limitation value (unit:A)

| Model \ No. | 0  | 1  | 2  | 3  | 4  | 5  | 6  | 7    | 8  |
|-------------|----|----|----|----|----|----|----|------|----|
| 18kW        | 18 | 18 | 17 | 16 | 15 | 14 | 13 | 12.5 | 12 |
| 22kW        | 21 | 21 | 20 | 19 | 18 | 17 | 16 | 15   | 14 |
| 26kW        | 24 | 24 | 23 | 22 | 21 | 20 | 19 | 18   | 17 |
| 30kW        | 28 | 28 | 27 | 26 | 25 | 24 | 23 | 22   | 21 |

## 7.18 INPUT DEFINE

MENU > FOR SERVICEMAN > INPUT DEFINE

Figure 3-7.50: INPUT DEFINE

|                 |        |
|-----------------|--------|
| 15 INPUT DEFINE |        |
| 15.1 M1M2       | REMOTE |
| 15.2 SMART GRID | NON    |
| 15.3 Tw2        | NON    |
| 15.4 Tbt1       | NON    |
| 15.5 Tbt2       | NON    |
| ADJUST          |        |

|                   |      |
|-------------------|------|
| 15 INPUT DEFINE   |      |
| 15.6 Ta           | HMI  |
| 15.7 Ta-adj       | -2°C |
| 15.8 SOLAR INPUT  | NON  |
| 15.9 F-PIPELENGTH | <10m |
| 15.10 RT/Ta_PCB   | NON  |
| ADJUST            |      |

|                          |         |
|--------------------------|---------|
| 15 INPUT DEFINE          |         |
| 15.11 PUMP_I SILENT MODE | NON     |
| 15.12 DFT1/DFT2          | DEFROST |
|                          |         |
|                          |         |
|                          |         |
| ADJUST                   |         |

INPUT DEFINE sets sensors and functions to fulfill with installation.

M1M2 sets the control function of M1M2 for remote ON/OFF of unit or AHS or TBH

SMART GRID sets whether SMART GRID control signal is connected to hydronic PCB.

Tw2 sets whether T1b sensor exist in the installation.

Tbt1 set whether balance tank temperature sensors are installed in the balance tank. (Tbt1 sensor, individually purchase;Tbt2, reserved)

Ta sets the Ta sensor connection type (HMI: Ta on wired controller; IDU: Ta connected on hydronic PCB)

Ta-adj is an correction value for Ta.

SOLAR INPUT sets whether solar control signal is connected to hydronic PCB. (0=NON; 1=CN18; Tsolar 2=CN11SL1SL2)

F-PIPE LENGTH sets the length of refrigerant pipes between outdoor unit and indoor unit.

RT/Ta\_PCB sets whether M-kit is valid.

Pump silent mode can decrease water pump maximum output by 5% in order to decrease the noise of heat pump.

DFT1/DFT2 sets DFT1 and DFT2 port of the hydro module as DEFROST or Alarm(ALARM function can be valid only with IDU software version higher than V99)

## 7.19 CASCADE SET

MENU > FOR SERVICEMAN > CASCADE SET

Figure 3-7.51: CASCADE SET

|                                                                                          |       |
|------------------------------------------------------------------------------------------|-------|
| 16 CASCADE SET                                                                           |       |
| 16.1 PER_START                                                                           | 20%   |
| 16.2 TIME_ADJUST                                                                         | 5 MIN |
| 16.3 ADDRESS RESET                                                                       | FF    |
|                                                                                          |       |
|                                                                                          |       |
|  ADJUST |       |

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

ADDRESS RESET resets the address code of unit.( "FF" is an invalid address code.) Normally, program will set the address for each unit automatically, only when unit lost address and Hd error code appears then we need to use this function. After setting the address, you need to press the "UNLOCK" key to confirm.

## 7.20 HMI ADDRESS SET

MENU > FOR SERVICEMAN > HMI ADDRESS SET

Figure 3-7.52: HMI ADDRESS SET

|                                                                                                                                                                         |        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 17 HMIADDRESS SET                                                                                                                                                       |        |
| 17.1 HMISET                                                                                                                                                             | MASTER |
| 17.2 HMIADDRESSFORBMS                                                                                                                                                   | 1      |
| 17.3 STOP BIT                                                                                                                                                           | 1      |
|                                                                                                                                                                         |        |
|                                                                                                                                                                         |        |
|   |        |

HMI SET 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.

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

The STOP BIT of wired controller and upper computer software should be the same to ensure the reliability of data transformation.

## 8 Operation parameter

### MENU > OPERATION PARAMETER

This menu is for installer or service engineer reviewing the operation parameters. There are nine pages for the operating parameter as following

Figure 3-9.1: Operation parameter

| OPERATION PARAMETER          | #01      | OPERATION PARAMETER       | #01           | OPERATION PARAMETER       | #01                   |
|------------------------------|----------|---------------------------|---------------|---------------------------|-----------------------|
| ONLINE UNITS NUMBER          | 1        | PUMP-O                    | OFF           | GAS BOILER                | OFF                   |
| OPERATE MODE                 | COOL     | PUMP-C                    | OFF           | T1 LEAVING WATER TEMP.    | 35°C                  |
| SV1 STATE                    | ON       | PUMP-S                    | OFF           | WATER FLOW                | 1.72m <sup>3</sup> /h |
| SV2 STATE                    | OFF      | PUMP-D                    | OFF           | HEAT PUMP CAPACTIY        | 11.52kW               |
| SV3 STATE                    | OFF      | PIPE BACKUP HEATER        | OFF           | POWER CONSUM.             | 1000kWh               |
| PUMP_I                       | ON       | TANK BACKUP HEATER        | ON            | Ta ROOM TEMP              | 25°C                  |
| ◀ ADDRESS                    | 1/9 ▶    | ◀ ADDRESS                 | 2/9 ▶         | ◀ ADDRESS                 | 3/9 ▶                 |
| OPERATION PARAMETER          | #01      | OPERATION PARAMETER       | #01           | OPERATION PARAMETER       | #01                   |
| T5 WATER TANK TEMP.          | 53°C     | Tbt1 BUFFERTANK_UP TEMP.  | 35°C          | ODU MODEL                 | 6kW                   |
| Tw2 CIRCUIT2 WATER TEMP.     | 35°C     | Tbt2 BUFFERTANK_LOW TEMP. | 35°C          | COMP.CURRENT              | 12A                   |
| TIS' C1 CLIMATE CURVE TEMP.  | 35°C     | Tsolar                    | 25°C          | COMP.FREQUENCY            | 24Hz                  |
| TIS2' C2 CLIMATE CURVE TEMP. | 35°C     | IDU SOFTWARE              | 01-09-2019V01 | COMP.RUN TIME             | 54 MIN                |
| TW_O PLATE W-OUTLET TEMP.    | 35°C     |                           |               | COMP.TOTAL RUN TIME       | 1000Hrs               |
| TW_I PLATE W-OUTLET TEMP.    | 30°C     |                           |               | EXPANSION VALVE           | 200P                  |
| ◀ ADDRESS                    | 4/9 ▶    | ◀ ADDRESS                 | 5/9 ▶         | ◀ ADDRESS                 | 6/9 ▶                 |
| OPERATION PARAMETER          | #01      | OPERATION PARAMETER       | #01           | OPERATION PARAMETER       | #01                   |
| FAN SPEED                    | 600R/MIN | TW_O PLATE W-OUTLET TEMP. | 35°C          | T3 OUTDOOR EXCHARGE TEMP. | 5°C                   |
| IDU TARGET FREQUENCY         | 46Hz     | TW_I PLATE W-INLET TEMP.  | 30°C          | T4 OUTDOOR AIR TEMP.      | 5°C                   |
| FREQUENCY LIMITED TYPE       | 5        | T2 PLATE F-OUT TEMP.      | 35°C          | TF MODULE TEMP.           | 55°C                  |
| SUPPLY VOLTAGE               | 230V     | T2B PLATE F-IN TEMP.      | 35°C          | P1 COMP. PRESSURE         | 2300kPa               |
| DC GENERATRIX VOLTAGE        | 420V     | Th COMP. SUCTION TEMP.    | 5°C           | ODU SOFTWARE              | 01-09-2018V01         |
| DC GENERATRIX CURRENT        | 18A      | Tp COMP. DISCHARGE TEMP.  | 75°C          | HMI SOFTWARE              | 01-09-2018V01         |
| ◀ ADDRESS                    | 7/9 ▶    | ◀ ADDRESS                 | 8/9 ▶         | ◀ ADDRESS                 | 9/9 ▶                 |

## 9 Network Configuration Guidelines

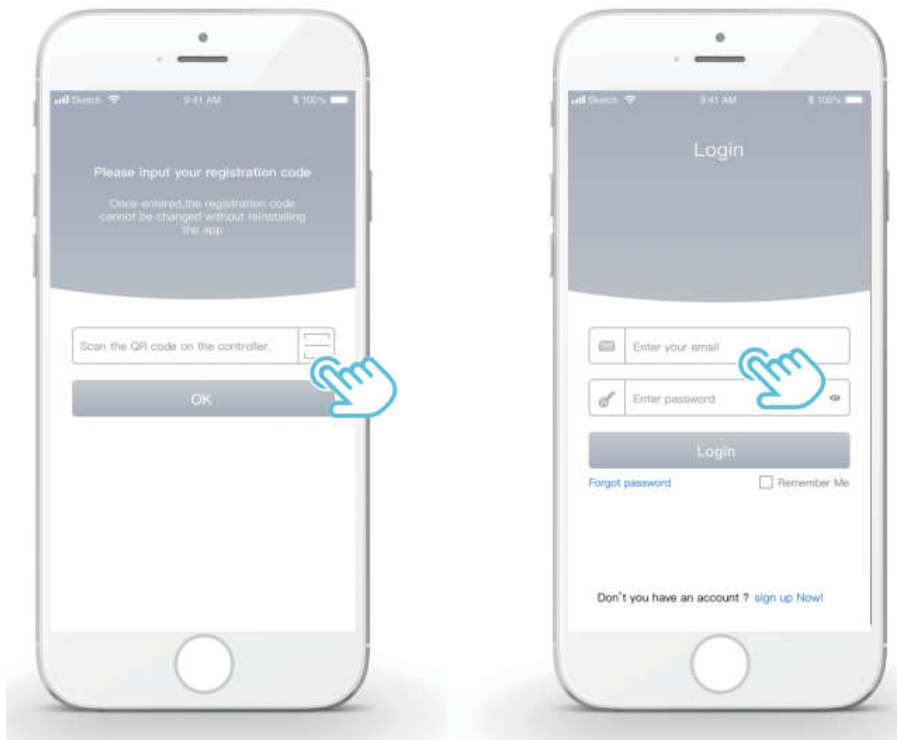
The wired controller realizes intelligent control with a built-in WIFI module, which receives control signal from the APP. Before connecting the WLAN, please check for it if the router in your environment is active and make sure that the wired controller is well-connected to the wireless signal. When the product is connected to the network, please make sure that the phone is as close as possible to the product. Sinclair only supports 2.4GHz band routers at present. Special characters (punctuation, spaces, etc.) are not recommended as part of the WLAN name. It is recommended that you connect no more than 10 devices to a single router lest home appliances are affected by weak or unstable network signal. If the password of the router or WLAN is changed, clear all settings and reset the appliance. APP interface changes from time to time as APP is updated and may change slightly vary from those in this document.

### 9.1 Install APP

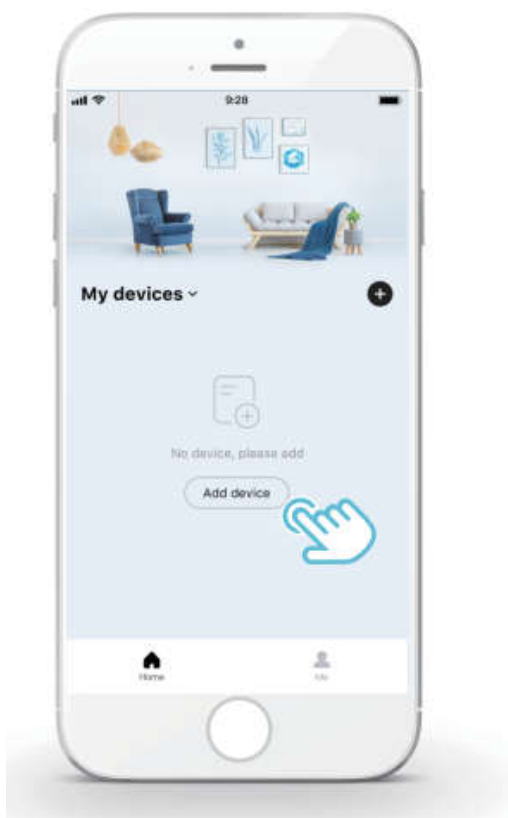
Scan the following QR code or research "Comfort home" in APP STORE or GOOGLE PLAY to install the APP.



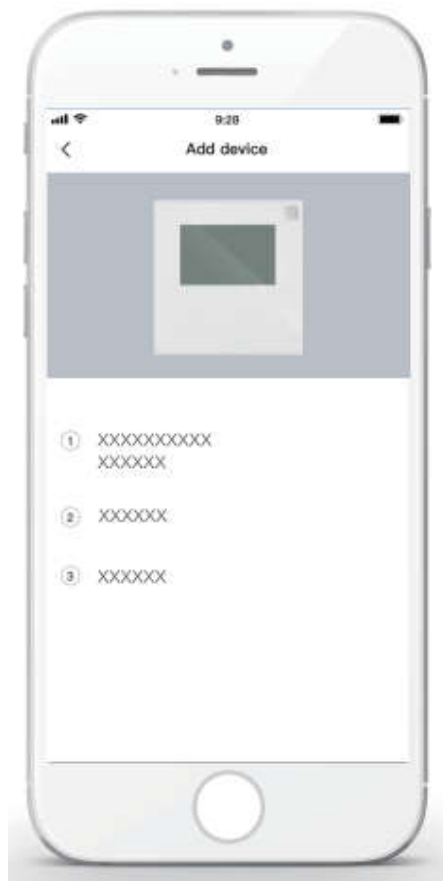
Please input your registration code. Or scan the QR code on the controller packaging box if existed. And register your account according to the guidance.



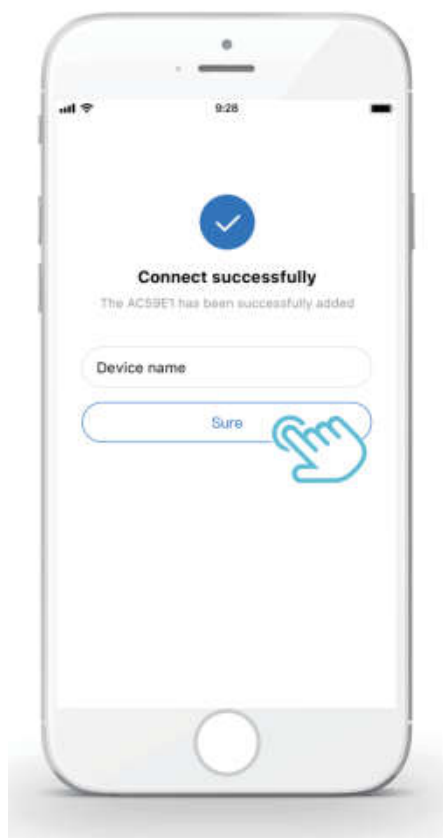
- 1) Add your device following the guidance



- 2) Operate the wired controller according to APP prompts



- 3) Wait for the home appliance to connect, and click “Sure”.



- 4) After the appliance is successfully connected, the LCD icon “” of the wired controller is constantly on, and the heat pump can be controlled through the APP.
- 5) If the network distribution process fails, or the mobile connection demands reconnection and replacement, operate “RESTORE WLAN SETTING” on the wired controller, and then repeat the above process.

## 9.2 Wired Controller Setting

Go to "MENU">"WLAN SETTING">"AP MODE". Press "OK" to activate the WLAN, refer to Figure 3-8.1. Select YES, press OK to select AP mode. Select AP Mode correspondingly on the mobile device and continue the follow-up settings according to the APP prompts. During the Wireless distribution process, the LCD icon  " flashes to indicate that the network is being deployed. After the process is completed, the icon  " will be constantly on.

|                     |     |
|---------------------|-----|
| MENU                | 2/2 |
| SERVICE INFORMATION |     |
| OPERATION PARAMETER |     |
| FOR SERVICEMAN      |     |
| WLAN SETTING        |     |
| SN VIEW             |     |
| ENTER               |     |

|                      |
|----------------------|
| WLAN SETTING         |
| AP MODE              |
| RESTORE WLAN SETTING |
|                      |
|                      |
|                      |
| ENTER                |

|                                                    |
|----------------------------------------------------|
| AP MODE                                            |
| Do you want to activate the WLAN network and exit? |
| NO YES                                             |
| CONFIRM                                            |

|                                                                                         |                                                                                    |                                                                                           |                                                                                     |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 01-01-2018                                                                              | 23:59                                                                              | 13°C                                                                                      |  |
|  08:00 | ON                                                                                 |        |                                                                                     |
|  23 °C |  |  38 °C |                                                                                     |
|       | E01                                                                                |       |                                                                                     |

This icon will flash



Once the connection starts,

Connect to new Wi-Fi



### **Warning and troubleshooting for networking failures**

When the product is connected to the network, please make sure that the phone is as close as possible to the product.

---

We only support 2.4GHz band routers at present.

---

Special characters (punctuation, spaces, etc.) are not recommended as part of the WLAN name.

---

It is recommended that you connect no more than 10 devices to a single router lest home appliances are affected by weak or unstable network signal.

---

If the password of the router or WLAN is changed, clear all settings and reset the appliance.

---

The contents of APP might change in version updates and actual operation shall prevail.

### WIFI information

WIFI transmit frequency range: 2.400 ~ 2.4835 GHz  
EIRP not more than 20dbm

## 10 USB function guidelines

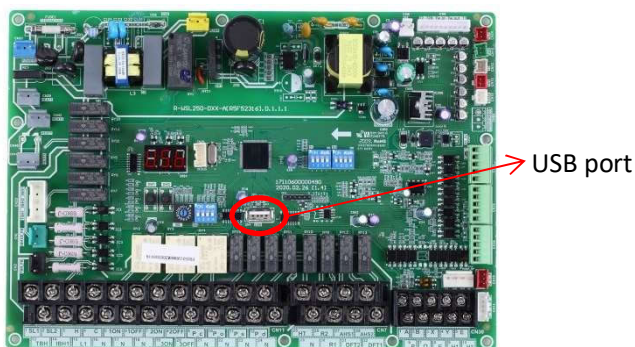
### 10.1 Parameters setting transfer between wired controllers

Installer can quickly copy the wired controller parameter settings from unit A to unit B via USB disk, which save the time of on-site installation. Steps are as follows:

Step 1:

Plug U disk into the port of hydronic PCB of A unit.

"USB" appears on digital display



Wired controller interface automatically changes

|                     |  |
|---------------------|--|
| USB FUNCTION        |  |
| READ SET PARAMETER  |  |
| WRITE SET PARAMETER |  |
|                     |  |
|                     |  |
|                     |  |
|                     |  |
| CONFIRM             |  |

Step 2:

Select "READ SET PARAMETER" and press "OK" button then rate of progress will appear. When the process is finished, "SUCCESS" appears below and an EXCEL file which can not be seen in the wired controller interface but users can find it on computer will be generated inside the USB disk.

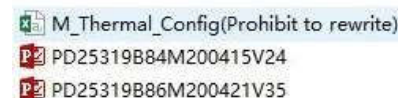
Select "READ SET PARAMETER"

|                     |     |
|---------------------|-----|
| USB FUNCTION        |     |
| READ SET PARAMETER  | 63% |
| WRITE SET PARAMETER |     |
|                     |     |
|                     |     |
|                     |     |
|                     |     |
| CONFIRM             |     |

Finished

|                     |         |
|---------------------|---------|
| USB FUNCTION        |         |
| READ SET PARAMETER  |         |
| WRITE SET PARAMETER |         |
|                     |         |
|                     |         |
|                     |         |
|                     |         |
| CONFIRM             | SUCCESS |

EXCEL generated



After that, if parameter correction is needed, please connect the USB with computer and open the EXCEL file to change parameters and then save it. Please do not change the file name or format. Parameters are not allowed for non-professionals to change and Sinclair recommends to use the wired controller to change the parameters.

Step 3:

Plug USB disk into the port of hydronic PCB of B unit and select "WRITE SET PARAMETER" then rate of progress will appear. When the process is finished, "SUCCESS" appears below.

Select "WRITE SET PARAMETER"

|                     |     |
|---------------------|-----|
| USB FUNCTION        |     |
| READ SET PARAMETER  |     |
| WRITE SET PARAMETER | 25% |
|                     |     |
|                     |     |
|                     |     |
|                     |     |
| CONFIRM             |     |

Finished

|                     |         |
|---------------------|---------|
| USB FUNCTION        |         |
| READ SET PARAMETER  |         |
| WRITE SET PARAMETER |         |
|                     |         |
|                     |         |
|                     |         |
|                     |         |
| CONFIRM             | SUCCESS |

## 10.2 Convenient program upgrade for unit

There is no need to carry any heavy equipment but only USB disk can realize program upgrade. Steps are as follows:

Step 1:

Copy new program in U disk root directory where other files in bin format are not allowed in

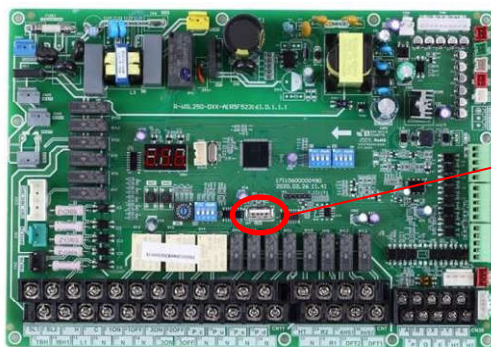
Step 2:

Power on and make sure communication is normal.

Step 3:

Plug U disk into the port of hydronic PCB.

“USB” appears on digital display



USB port

Wired controller interface automatically changes

|                          |
|--------------------------|
| USB FUNCTION             |
| RATED SET PARAMETER      |
| WRITE SET PARAMETER      |
| PD25319B84M200415V24.bin |
| PD25319B86M200415V24.bin |
|                          |
| CONFIRM                  |

Step 4:

Please distinguish between programs for main control PCB and hydronic PCB. Select one of them and press “OK” button then rate of progress appears. When the process is finished, “SUCCESS” appears below. For upgrading outdoor unit, the process normally lasts for several minutes while only few seconds is needed for indoor unit.

Select program

|                              |
|------------------------------|
| USB FUNCTION                 |
| RATED SET PARAMETER          |
| WRITE SET PARAMETER          |
| PD25319B84M200415V24.bin 51% |
| PD25319B86M200415V24.bin     |
|                              |
| CONFIRM                      |

Finished

|                          |
|--------------------------|
| USB FUNCTION             |
| RATED SET PARAMETER      |
| WRITE SET PARAMETER      |
| PD25319B84M200415V24.bin |
| PD25319B86M200415V24.bin |
|                          |
| CONFIRM                  |

Step 5:

Pull out U disk and power on again to finish upgrading program. Check the program version to make sure upgrade is successful.

Check IDU software version

|                           |               |
|---------------------------|---------------|
| OPERATION PARAMETER       | #00           |
| Tbt1 BUFFERTANK_UP TEMP.  | XX°C          |
| Tbt2 BUFFERTANK_LOW TEMP. | XX°C          |
| Tsolar                    | XX°C          |
| IDU SOFTWARE              | XX-XX-XXXXXXX |
|                           |               |
| ADDRESS                   | 5/9           |

Check ODU software version

|                           |               |
|---------------------------|---------------|
| OPERATION PARAMETER       | #00           |
| T3 OUTDOOR EXCHANGE TEMP. | XX°C          |
| T4 OUTDOOR AIR TEMP       | XX°C          |
| TF MODULE TEMP.           | XX°C          |
| P1 COMP PRESSURE          | XX Kpa        |
| ODU SOFTWARE              | XX-XX-XXXXXXX |
| HMI SOFTWARE              | XX-XX-XXXXXXX |
| ADDRESS                   | 9/9           |

## 11 Appendix

### 11.1 Environment Temperature Curves

The climate related curves can be selected in the user interface, MENU > PRESET TEMPERATURE > WEATHER TEMP. SET.

Figure 3-11.1: WEATHER TEMP.SET menu

| PRE SET TEMPERATURE |                       |          |
|---------------------|-----------------------|----------|
| PRESET TEMP         | WEATHER TEMPSET       | ECO MODE |
|                     | ZONE1 C-MODE LOW TEMP | OFF      |
|                     | ZONE1 H-MODE LOW TEMP | OFF      |
|                     | ZONE2 C-MODE LOW TEMP | OFF      |
|                     | ZONE2 H-MODE LOW TEMP | OFF      |
| ON/OFF              |                       |          |

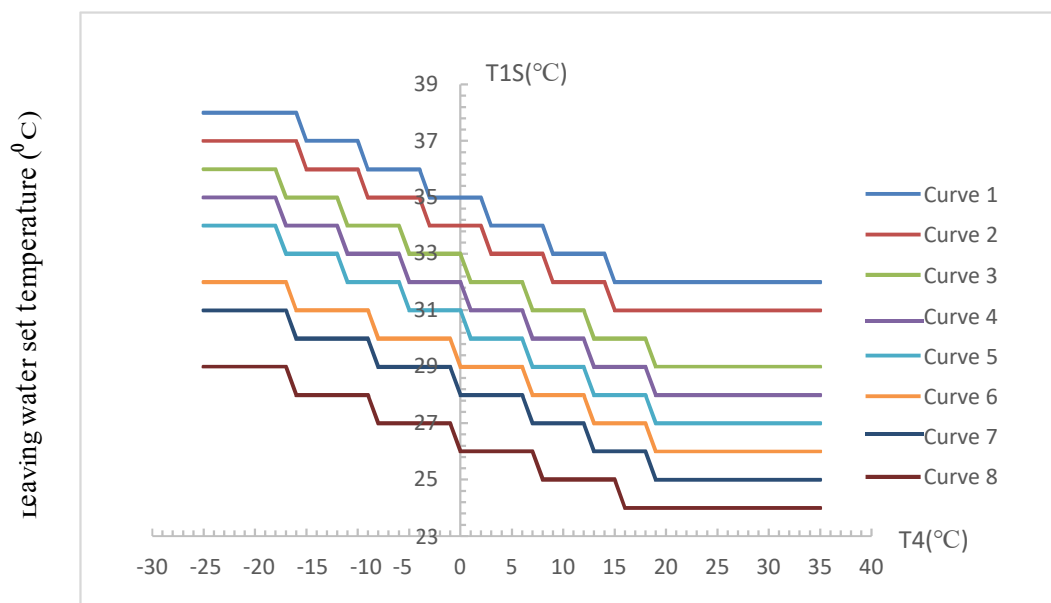
In cooling/mode mode, eight curves which are already set in the user interface can be selected. Once the curve is selected, the leaving water set temperature (T1s) is determined by the outdoor temperature (T4).

ECO mode is only suitable for heating mode. It has lower water temperature setting inside the program, which is more energy saving.

The relationship between outdoor ambient temperature (T4) and leaving water set temperature (T1s) is described as in Figure 3-11.2, Figure 3-11.3, Figure 3-11.4 and Figure 3-11.5.

The automatic setting curves are the ninth curve for cooling and heating mode, the ninth curve can be set as in Figure 3-11.6 and Figure 3-11.7.

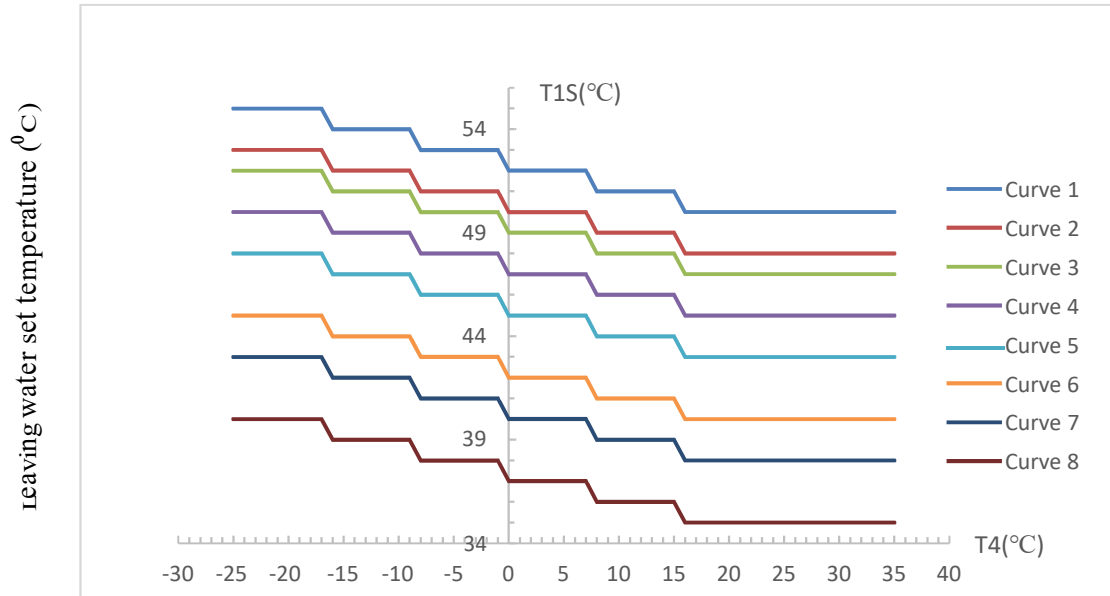
Figure 3-11.2: Low temperature curves for heating mode<sup>1</sup>



Notes:

1. It only has the curves of the low temperature setting for heating, if the low temperature is set for heating.
2. Curve 4 is default in low temperature heating mode and curve 6 is default in ECO mode.

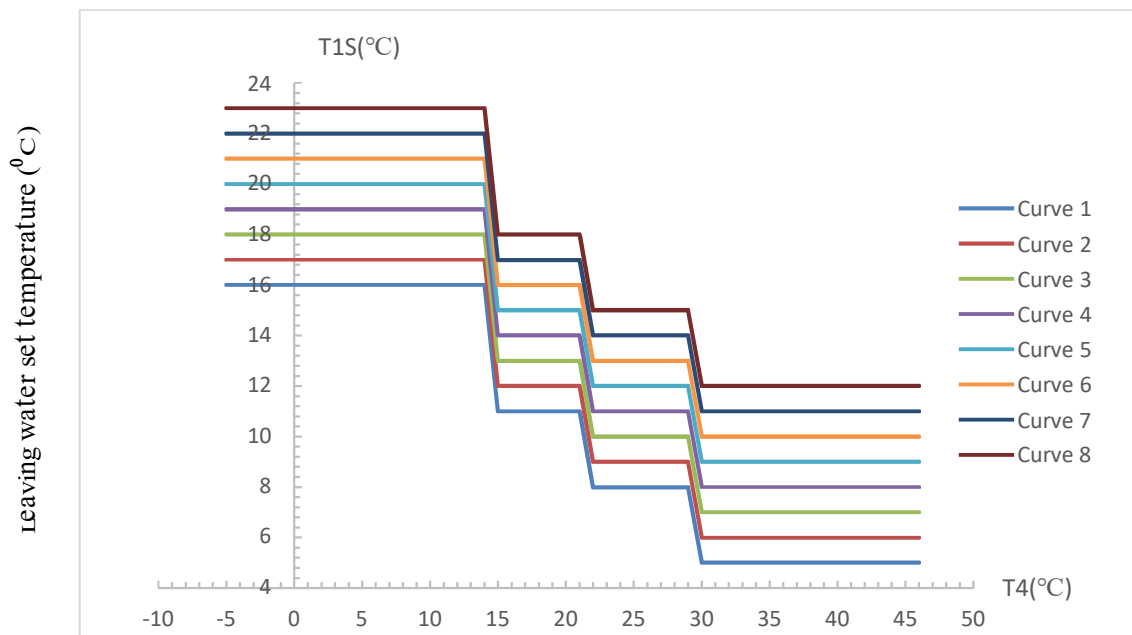
Figure 3-11.3: High temperature curves for heating mode<sup>1</sup>



Notes:

1. It only has the curves of the high temperature setting for heating, if the high temperature is set for heating.
2. Curve 4 is default in high temperature heating mode and curve 6 is default in ECO mode.

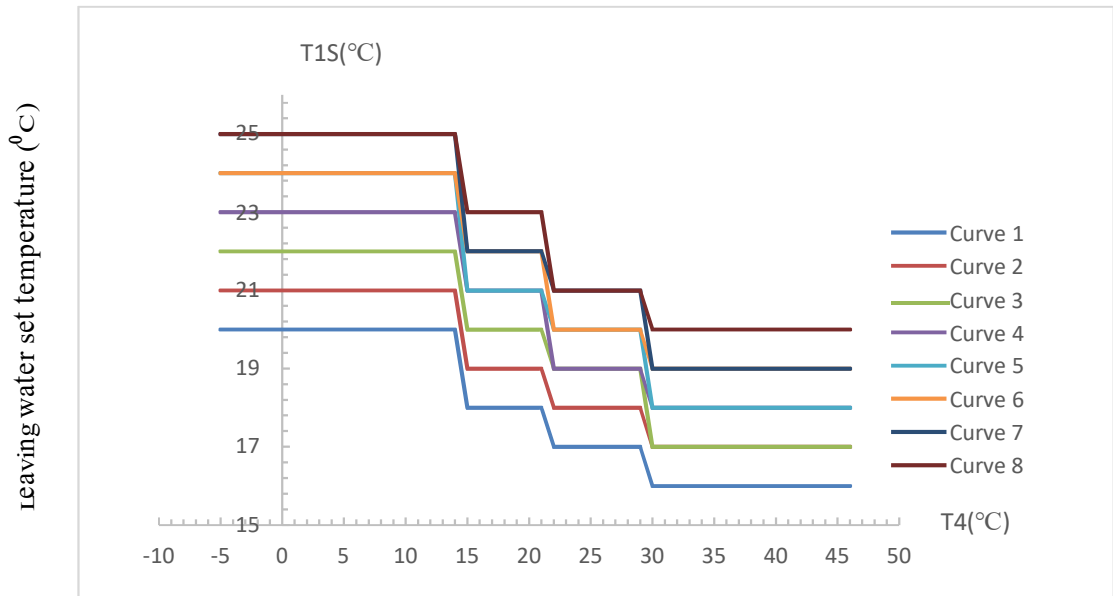
Figure 3-11.4: Low temperature curves for cooling mode<sup>1</sup>



Notes:

1. It only has the curves of the low temperature setting for cooling, if the low temperature is set for cooling.
2. Curve 4 is default in low temperature cooling mode.

Figure 3-11.5: High temperature curves for cooling mode<sup>1</sup>



Notes:

1. It only has the curves of the high temperature setting for cooling, if the high temperature is set for cooling.
2. Curve 4 is default in high temperature cooling mode.

There is one customized curve which can set by user according to using habits. Users just need to input the ambient temperature and desire water temperature for two working condition to build the customized curve. The setting of T1SETH1, T1SETH2, T4H1, T4H2 refer to Part 3, 8.6" HEATING MODE SETTING Menu" and T1SETC1, T1SETC2, T4C1, T4C2 refer to Part 3, 8.5" COOLING MODE SETTING Menu".

Figure 3-11.6: Automatic setting curve for heating mode

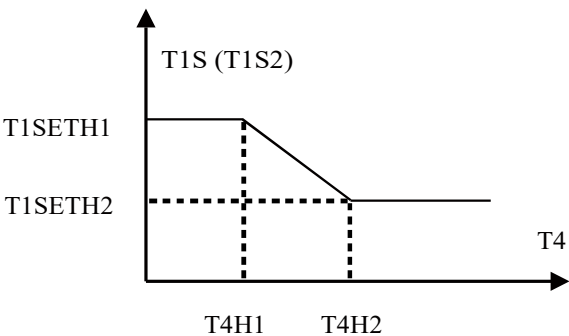
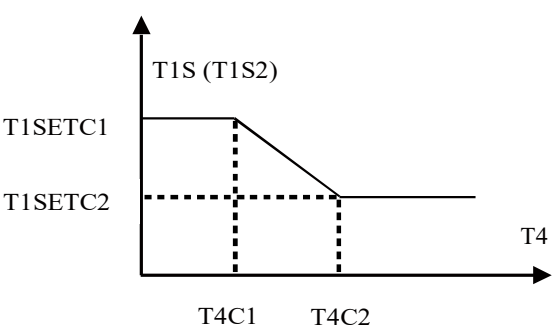


Figure 3-11.7: Automatic setting curve for cooling mode



## 12 Error Code Table

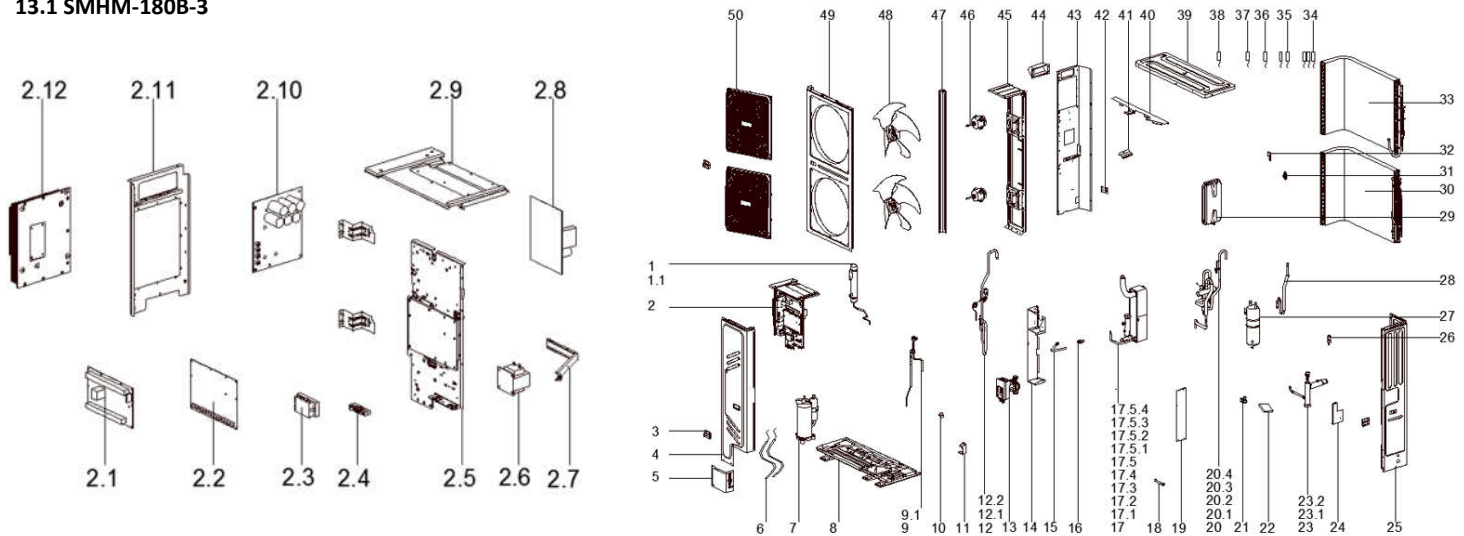
Table 3-12.1: Error code table

| Error code | Content <sup>2</sup>                                                                                                        |
|------------|-----------------------------------------------------------------------------------------------------------------------------|
| bH         | PED PCB fault                                                                                                               |
| C7         | High temp. protection of inverter module                                                                                    |
| E0         | Water flow fault (E8 displayed 3 times)                                                                                     |
| E1         | Phase loss or neutral wire and live wire are connected reversely (only for three phase unit)                                |
| E2         | Communication fault between controller and main control board of hydraulic module                                           |
| E3         | Final outlet water temp. sensor (T1) fault.                                                                                 |
| E4         | Water tank temp. sensor (T5) fault.                                                                                         |
| E5         | The condenser outlet refrigerant temperature sensor (T3) fault                                                              |
| E6         | The ambient temperature sensor (T4) fault.                                                                                  |
| E7         | The balance tank up temp. sensor (Tbt1 ) fault.                                                                             |
| E8         | Water flow fault.                                                                                                           |
| E9         | Compressor suction temp. sensor (Th) fault.                                                                                 |
| EA         | Compressor discharge temp. sensor (Tp) fault                                                                                |
| Eb         | Solar panel temp.sensor (Tsolar) fault.                                                                                     |
| Ec         | The balance tank low temp.sensor(Tbt2) fault                                                                                |
| Ed         | The plate exchanger water inlet temp. sensor (Tw_in) fault.                                                                 |
| EE.        | The main control board of hydraulic module EEPROM fault.                                                                    |
| F1         | DC bus low voltage protection                                                                                               |
| H0         | Communication fault between main control board of hydraulic module and main control board PCB B(Main control board of unit) |
| H1         | Communication fault between inverter module PCB A(Inverter module) and main control board PCB B(Main control board of unit) |
| H2         | The plate exchanger refrigerant outlet (liquid pipe) temp. sensor (T2) fault                                                |
| H3         | The plate exchanger refrigerant outlet (gas pipe) temp. sensor (T2B) fault.                                                 |
| H4         | Three times P6 protection                                                                                                   |
| H5         | Room temp. sensor (Ta) fault                                                                                                |
| H6         | DC fan motor fault.                                                                                                         |
| H7         | Main circuit voltage protection fault                                                                                       |
| H8         | Pressure sensor fault.                                                                                                      |
| H9         | Zone 2 water flow temp. sensor (Tw2) fault.                                                                                 |
| HA         | The plate heat exchanger water outlet temperature sensor (Tw_out) fault.                                                    |
| Hb         | Three times “PP” protection and Tw_out<7℃                                                                                   |
| Hd         | Communication fault between master unit and slave unit (in parallel)                                                        |
| HE         | Communication fault between indoor unit and Ta / room thermostat transfer PCB.                                              |
| HF         | Inverter module board EE PROM fault                                                                                         |
| HH         | H6 displayed 10 times in 120 minutes.                                                                                       |
| HP         | Low pressure protection (Pe<0.6) occurred 3 times in 1 hour in cooling mode                                                 |
| P0         | Low pressure protection                                                                                                     |
| P1         | High pressure protection                                                                                                    |
| P3         | Compressor overcurrent protection                                                                                           |
| P4         | Compressor discharge temp. too high protection                                                                              |
| P5         | High Temperature difference protection between water inlet and water outlet of the plate heat exchanger.                    |

| P6 | Inverter module protection                                                             |
|----|----------------------------------------------------------------------------------------|
| Pb | Anti-freeze mode protection                                                            |
| Pd | High temperature protection of refrigerant outlet temp. of condenser                   |
| PP | Water inlet temperature is higher than water outlet in heating mode                    |
| L0 | DC compressor inverter module fault                                                    |
| L1 | DC bus low voltage protection (from inverter module mostly when compressor running)    |
| L2 | DC bus high voltage protection from DC driver                                          |
| L4 | MCE fault                                                                              |
| L5 | Zero speed protection                                                                  |
| L7 | Phase sequence fault                                                                   |
| L8 | Compressor frequency variation greater than 15Hz within 1 second protection            |
| L9 | Actual compressor frequency differs from target frequency by more than 15Hz protection |

## 13 Spare parts

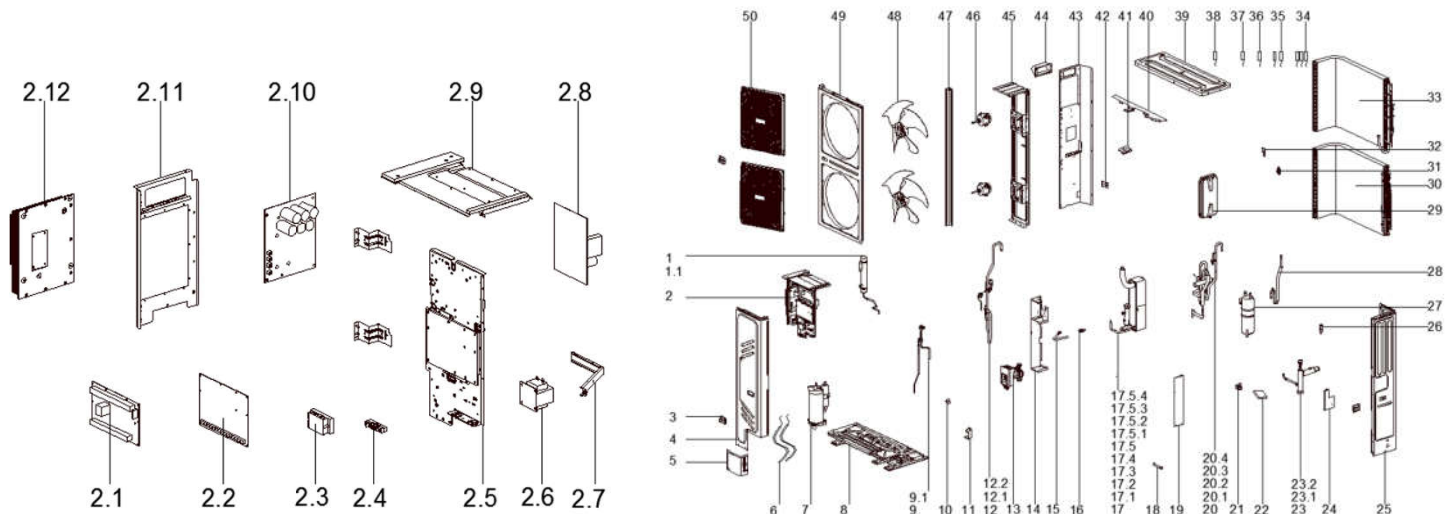
### 13.1 SMHM-180B-3



| No   | Description                                                 | Part Code      | Qty |
|------|-------------------------------------------------------------|----------------|-----|
| 1    | Liquid storage tank assembly                                | 15425300003145 | 1   |
| 1.1  | Accumulator tank                                            | 15500508000475 | 1   |
| 2    | E-box assembly                                              | 17225300A01059 | 1   |
| 2.1  | DC inverter aqua mini chiller - Main control board assembly | 17127400000315 | 1   |
| 2.2  | Hydraulic module, Main control board assembly               | 17110600000570 | 1   |
| 2.3  | Terminal                                                    | 17400401000026 | 1   |
| 2.3  | Wire joint                                                  | 17400401002616 | 1   |
| 2.4  | Wire clamp                                                  | 12127000000070 | 1   |
| 2.5  | Electrical appliance mounting plate assembly                | 12225300008916 | 1   |
| 2.6  | Reactor                                                     | 17400306000320 | 1   |
| 2.7  | Support plate assembly                                      | 12225300009016 | 1   |
| 2.8  | Filter board assembly                                       | 17127000008981 | 1   |
| 2.9  | Cover of electronic control box subassembly                 | 12227000010356 | 1   |
| 2.10 | Compressor module board assembly                            | 17127000008982 | 1   |
| 2.11 | Radiator support plate                                      | 12227000012564 | 1   |
| 2.12 | Optional heat exchanger                                     | 12927000001472 | 1   |
| 3    | Small handle                                                | 12100701000676 | 3   |
| 4    | Clapboard subassembly                                       | 12227000013835 | 1   |
| 5    | Fixed plate of inlet/outlet pipe                            | 12227000015550 | 1   |
| 6    | Compressor electric heater                                  | 17402001000759 | 2   |
| 7    | DC Inverter Rotary Compressor                               | 11103020006899 | 1   |
| 8    | Chassis assembly                                            | 12225300011313 | 1   |
| 9    | Expansion valve assembly                                    | 15425300003147 | 1   |
| 9.1  | Electronic expansion valve suite                            | 15500213001587 | 1   |
| 10   | Pressure gauge                                              | 17500501000121 | 1   |
| 11   | Installation board                                          | 12225300008906 | 1   |
| 12   | Suction pipe assembly                                       | 15425300003146 | 1   |
| 12.1 | Pressure switch                                             | 17400516000008 | 1   |
| 12.2 | One-way solenoid valve                                      | 15500205000440 | 1   |
| 13   | Shielded pump                                               | 17400802001533 | 1   |
| 14   | Support plate assembly                                      | 12225300011297 | 1   |
| 15   | Connecting hose                                             | 12100509000532 | 1   |
| 16   | Safety valve                                                | 15500201000025 | 1   |
| 17   | Plate heat exchanger part                                   | 15725300000663 | 1   |
| 17.1 | Electrical heater of plate heat exchanger                   | 17402001000083 | 1   |

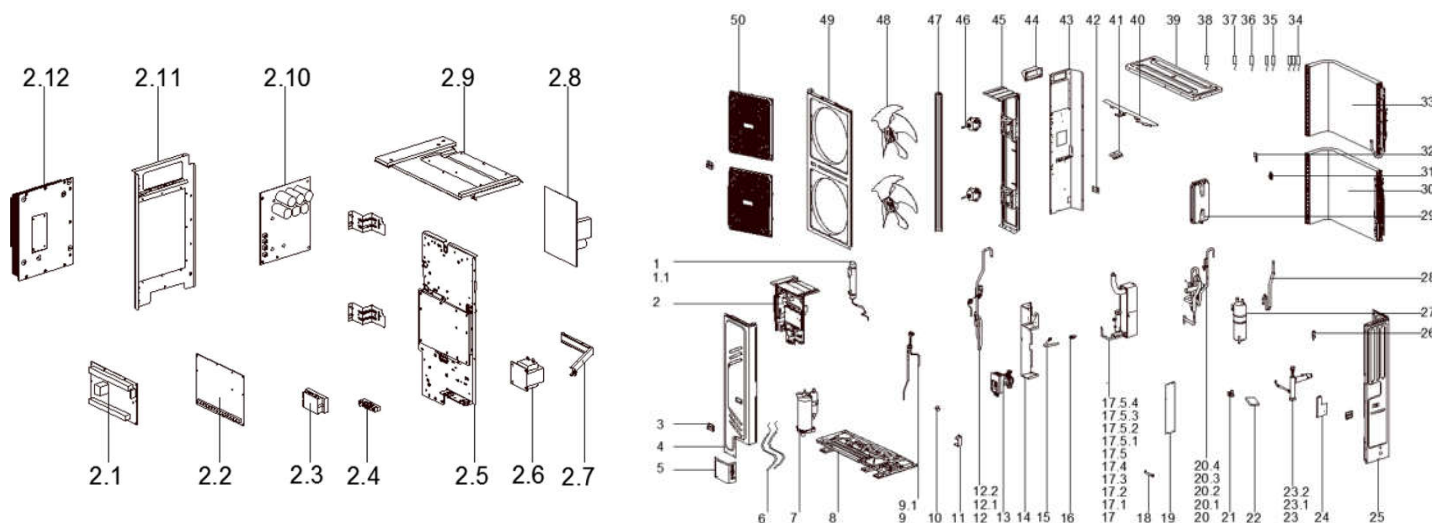
|        |                                                  |                |   |
|--------|--------------------------------------------------|----------------|---|
| 17.2   | seal ring                                        | 12600701000064 | 1 |
| 17.3   | Temperature sensing tube assembly                | 15325300000051 | 1 |
| 17.4   | Copper nut                                       | 15500406000022 | 1 |
| 17.5   | Plate heat exchanger part                        | 15725300000064 | 1 |
| 17.5.1 | Plate heat exchanger                             | 15700101000097 | 1 |
| 18     | Support Plate                                    | 12225300011295 | 2 |
| 19     | Support Plate                                    | 12225300011298 | 1 |
| 20     | Four-way valve assembly                          | 15425300003143 | 1 |
| 20.1   | Pressure controller                              | 17400516000568 | 1 |
| 20.2   | Four-way valve kit                               | 15500216000528 | 1 |
| 20.3   | Pressure sensor                                  | 11201008000033 | 1 |
| 20.4   | Meter connector                                  | 15500301000055 | 1 |
| 21     | Y shape filter                                   | 15500504000152 | 1 |
| 22     | Operation and Installation Manual                | 16110600A06972 | 1 |
| 22     | Wired controller                                 | 17317100A35071 | 1 |
| 23     | Water outlet pipe assembly                       | 15425300003144 | 1 |
| 23.1   | Electrical heater of differential pressure valve | 17402001000043 | 1 |
| 23.2   | Exhaust valve                                    | 15500211000047 | 1 |
| 24     | Fixing board, gas-liquid separator               | 12225300011294 | 1 |
| 25     | Side panel assembly                              | 12225300011293 | 1 |
| 26     | Flow Switch                                      | 17400510000554 | 1 |
| 27     | Gas-liquid separator                             | 15500501001868 | 1 |
| 28     | Condenser output pipe assembly                   | 15125300006591 | 1 |
| 29     | closed expansion vessels with built in diaphragm | 15500509000107 | 1 |
| 30     | Condenser part                                   | 15825300001282 | 1 |
| 31     | Sensor clamp                                     | 12100303001022 | 1 |
| 32     | Fixing board, gas-liquid separator               | 12225300008931 | 1 |
| 33     | Condenser part                                   | 15825300001280 | 1 |
| 34     | Pipe Temperature Sensor                          | 11201007000165 | 3 |
| 35     | Water Temperature Sensor                         | 11201007001982 | 2 |
| 36     | Pipe Temperature Sensor                          | 11201007000098 | 1 |
| 37     | Room Temperature Sensor                          | 11201007000039 | 1 |
| 38     | Discharge Temperature Sensor                     | 11201007000352 | 1 |
| 39     | Top cover                                        | 12223000013752 | 1 |
| 40     | Bracket assembly, net                            | 12227000000132 | 1 |
| 41     | Installation board                               | 12225300008930 | 1 |
| 42     | Installation board                               | 12225300008929 | 1 |
| 43     | Partition board assembly                         | 12225300008922 | 1 |
| 45     | Fan motor support                                | 12227000001289 | 1 |
| 46     | Brushless DC Motor                               | 11002015000104 | 2 |
| 47     | Column                                           | 12223000013750 | 1 |
| 48     | Axial flow fan                                   | 12100105000027 | 2 |
| 49     | Front panel                                      | 12223000013751 | 1 |
| 50     | Air-out mesh enclosure                           | 12126000002648 | 2 |

## 13.2 SMHM-220B-3



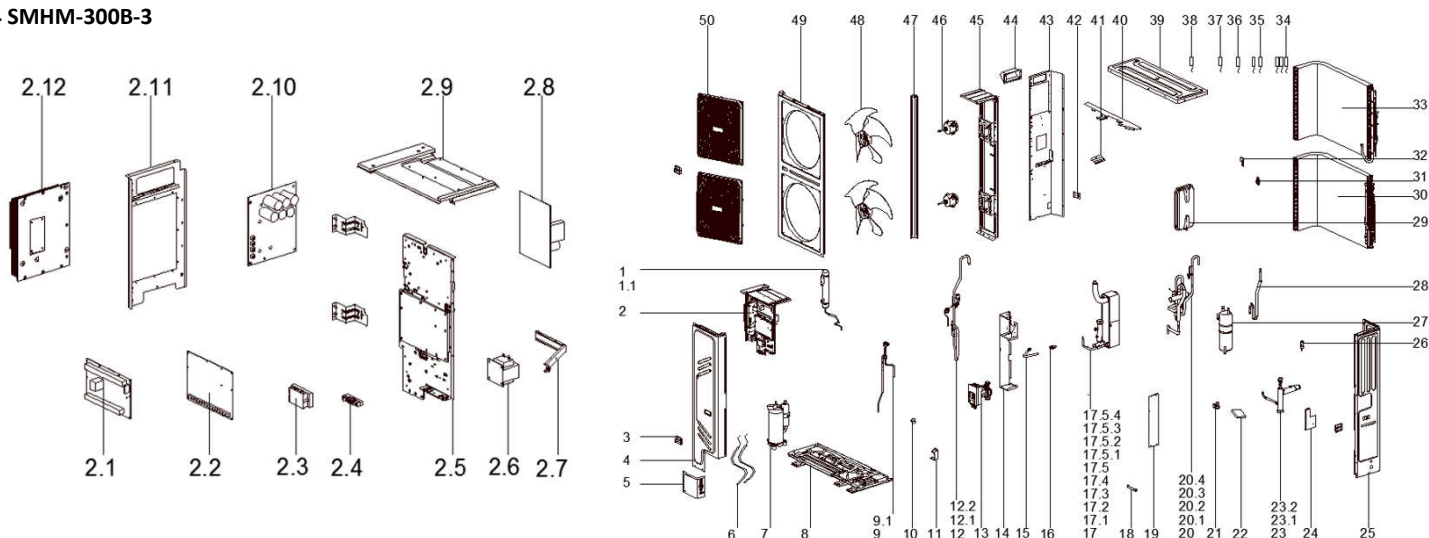
| No   | Description                                                 | Part Code      | Qty |
|------|-------------------------------------------------------------|----------------|-----|
| 1    | Liquid storage tank assembly                                | 15425300003145 | 1   |
| 1.1  | Accumulator tank                                            | 15500508000475 | 1   |
| 2    | E-box assembly                                              | 17225300A01059 | 1   |
| 2.1  | DC inverter aqua mini chiller - Main control board assembly | 17127400000315 | 1   |
| 2.2  | Hydraulic module, Main control board assembly               | 17110600000570 | 1   |
| 2.3  | Terminal                                                    | 17400401000026 | 1   |
| 2.3  | Wire joint                                                  | 17400401002616 | 1   |
| 2.4  | Wire clamp                                                  | 12127000000070 | 1   |
| 2.5  | Electrical appliance mounting plate assembly                | 12225300008916 | 1   |
| 2.6  | Reactor                                                     | 17400306000320 | 1   |
| 2.7  | Support plate assembly                                      | 12225300009016 | 1   |
| 2.8  | Filter board assembly                                       | 17127000008981 | 1   |
| 2.9  | Cover of electronic control box subassembly                 | 12227000010356 | 1   |
| 2.10 | Compressor module board assembly                            | 17127000008982 | 1   |
| 2.11 | Radiator support plate                                      | 12227000012564 | 1   |
| 2.12 | Optional heat exchanger                                     | 12927000001472 | 1   |
| 3    | Small handle                                                | 12100701000676 | 3   |
| 4    | Clapboard subassembly                                       | 12227000013835 | 1   |
| 5    | Fixed plate of inlet/outlet pipe                            | 12227000015550 | 1   |
| 6    | Compressor electric heater                                  | 17402001000759 | 2   |
| 7    | DC Inverter Rotary Compressor                               | 11103020006899 | 1   |
| 8    | Chassis assembly                                            | 12225300011313 | 1   |
| 9    | Expansion valve assembly                                    | 15425300003147 | 1   |
| 9.1  | Electronic expansion valve suite                            | 15500213001587 | 1   |
| 10   | Pressure gauge                                              | 17500501000121 | 1   |
| 11   | Installation board                                          | 12225300008906 | 1   |
| 12   | Suction pipe assembly                                       | 15425300003146 | 1   |
| 12.1 | Pressure switch                                             | 17400516000008 | 1   |
| 12.2 | One-way solenoid valve                                      | 15500205000440 | 1   |
| 13   | Shielded pump                                               | 17400802001533 | 1   |
| 14   | Support plate assembly                                      | 12225300011297 | 1   |
| 15   | Connecting hose                                             | 12100509000532 | 1   |
| 16   | Safety valve                                                | 15500201000025 | 1   |
| 17   | Plate heat exchanger part                                   | 15725300000663 | 1   |
| 17.1 | Electrical heater of plate heat exchanger                   | 17402001000083 | 1   |
| 17.2 | seal ring                                                   | 12600701000064 | 1   |

|        |                                                  |                |   |
|--------|--------------------------------------------------|----------------|---|
| 17.3   | Temperature sensing tube assembly                | 15325300000051 | 1 |
| 17.4   | Copper nut                                       | 15500406000022 | 1 |
| 17.5   | Plate heat exchanger part                        | 15725300000664 | 1 |
| 17.5.1 | Plate heat exchanger                             | 15700101000997 | 1 |
| 17.5.2 | Plate heat exchanger connecting pipe assembly    | 15425300003142 | 1 |
| 17.5.3 | Plate heat exchanger connecting pipe assembly    | 15425300003141 | 1 |
| 17.5.4 | Water outlet pipe assembly                       | 15425300003140 | 1 |
| 18     | Support Plate                                    | 12225300011295 | 2 |
| 19     | Support Plate                                    | 12225300011298 | 1 |
| 20     | Four-way valve assembly                          | 15425300003143 | 1 |
| 20.1   | Pressure controller                              | 17400516000568 | 1 |
| 20.2   | Four-way valve kit                               | 15500216000528 | 1 |
| 20.3   | Pressure sensor                                  | 11201008000033 | 1 |
| 20.4   | Meter connector                                  | 15500301000055 | 1 |
| 21     | Y shape filter                                   | 15500504000152 | 1 |
| 22     | Operation and Installation Manual                | 16110600A06972 | 1 |
| 22     | Wired controller                                 | 17317100A35071 | 1 |
| 23     | Water outlet pipe assembly                       | 15425300003144 | 1 |
| 23.1   | Electrical heater of differential pressure valve | 17402001000043 | 1 |
| 23.2   | Exhaust valve                                    | 15500211000047 | 1 |
| 24     | Fixing board, gas-liquid separator               | 12225300011294 | 1 |
| 25     | Side panel assembly                              | 12225300011293 | 1 |
| 26     | Flow Switch                                      | 17400510000554 | 1 |
| 27     | Gas-liquid separator                             | 15500501001868 | 1 |
| 28     | Condenser output pipe assembly                   | 15125300006591 | 1 |
| 29     | closed expansion vessels with built in diaphragm | 15500509000107 | 1 |
| 30     | Condenser part                                   | 15825300001282 | 1 |
| 31     | Sensor clamp                                     | 12100303001022 | 1 |
| 32     | Fixing board, gas-liquid separator               | 12225300008931 | 1 |
| 33     | Condenser part                                   | 15825300001280 | 1 |
| 34     | Pipe Temperature Sensor                          | 11201007000165 | 3 |
| 35     | Water Temperature Sensor                         | 11201007001982 | 2 |
| 36     | Pipe Temperature Sensor                          | 11201007000098 | 1 |
| 37     | Room Temperature Sensor                          | 11201007000039 | 1 |
| 38     | Discharge Temperature Sensor                     | 11201007000352 | 1 |
| 39     | Top cover                                        | 12223000013752 | 1 |
| 40     | Bracket assembly, net                            | 12227000000132 | 1 |
| 41     | Installation board                               | 12225300008930 | 1 |
| 42     | Installation board                               | 12225300008929 | 1 |
| 43     | Partition board assembly                         | 12225300008922 | 1 |
| 45     | Fan motor support                                | 12227000001289 | 1 |
| 46     | Brushless DC Motor                               | 11002015000104 | 2 |
| 47     | Column                                           | 12223000013750 | 1 |
| 48     | Axial flow fan                                   | 12100105000027 | 2 |
| 49     | Front panel                                      | 12223000013751 | 1 |
| 50     | Air-out mesh enclosure                           | 12126000002648 | 2 |

**13.3 SMHM-260B-3**


| No   | Description                                                 | Part Code      | Qty |
|------|-------------------------------------------------------------|----------------|-----|
| 1    | Liquid storage tank assembly                                | 15425300003145 | 1   |
| 1.1  | Accumulator tank                                            | 15500508000475 | 1   |
| 2    | E-box assembly                                              | 17225300A01059 | 1   |
| 2.1  | DC inverter aqua mini chiller - Main control board assembly | 17127400000315 | 1   |
| 2.2  | Hydraulic module, Main control board assembly               | 17110600000570 | 1   |
| 2.3  | Terminal                                                    | 17400401000026 | 1   |
| 2.3  | Wire joint                                                  | 17400401002616 | 1   |
| 2.4  | Wire clamp                                                  | 12127000000070 | 1   |
| 2.5  | Electrical appliance mounting plate assembly                | 12225300008916 | 1   |
| 2.6  | Reactor                                                     | 17400306000320 | 1   |
| 2.7  | Support plate assembly                                      | 12225300009016 | 1   |
| 2.8  | Filter board assembly                                       | 17127000008981 | 1   |
| 2.9  | Cover of electronic control box subassembly                 | 12227000010356 | 1   |
| 2.10 | Compressor module board assembly                            | 17127000008982 | 1   |
| 2.11 | Radiator support plate                                      | 12227000012564 | 1   |
| 2.12 | Optional heat exchanger                                     | 12927000001472 | 1   |
| 3    | Small handle                                                | 12100701000676 | 3   |
| 4    | Clapboard subassembly                                       | 12227000013835 | 1   |
| 5    | Fixed plate of inlet/outlet pipe                            | 12227000015550 | 1   |
| 6    | Compressor electric heater                                  | 17402001000759 | 2   |
| 7    | DC Inverter Rotary Compressor                               | 11103020006899 | 1   |
| 8    | Chassis assembly                                            | 12225300011313 | 1   |
| 9    | Expansion valve assembly                                    | 15425300003147 | 1   |
| 9.1  | Electronic expansion valve suite                            | 15500213001587 | 1   |
| 10   | Pressure gauge                                              | 17500501000121 | 1   |
| 11   | Installation board                                          | 12225300008906 | 1   |
| 12   | Suction pipe assembly                                       | 15425300003146 | 1   |
| 12.1 | Pressure switch                                             | 17400516000008 | 1   |
| 12.2 | One-way solenoid valve                                      | 15500205000440 | 1   |
| 13   | Shielded pump                                               | 17400802001533 | 1   |
| 14   | Support plate assembly                                      | 12225300011297 | 1   |
| 15   | Connecting hose                                             | 12100509000532 | 1   |

|        |                                                  |                |   |
|--------|--------------------------------------------------|----------------|---|
| 16     | Safety valve                                     | 15500201000025 | 1 |
| 17     | Plate heat exchanger part                        | 15725300000663 | 1 |
| 17.1   | Electrical heater of plate heat exchanger        | 17402001000083 | 1 |
| 17.2   | seal ring                                        | 12600701000064 | 1 |
| 17.3   | Temperature sensing tube assembly                | 15325300000051 | 1 |
| 17.4   | Copper nut                                       | 15500406000022 | 1 |
| 17.5   | Plate heat exchanger part                        | 15725300000664 | 1 |
| 17.5.1 | Plate heat exchanger                             | 15700101000097 | 1 |
| 17.5.2 | Plate heat exchanger connecting pipe assembly    | 15425300003142 | 1 |
| 17.5.3 | Plate heat exchanger connecting pipe assembly    | 15425300003141 | 1 |
| 17.5.4 | Water outlet pipe assembly                       | 15425300003144 | 1 |
| 18     | Support Plate                                    | 12225300011295 | 2 |
| 19     | Support Plate                                    | 12225300011298 | 1 |
| 20     | Four-way valve assembly                          | 15425300003143 | 1 |
| 20.1   | Pressure controller                              | 17400516000568 | 1 |
| 20.2   | Four-way valve kit                               | 15500216000528 | 1 |
| 20.3   | Pressure sensor                                  | 11201008000033 | 1 |
| 20.4   | Meter connector                                  | 15500301000055 | 1 |
| 21     | Y shape filter                                   | 15500504000152 | 1 |
| 22     | Operation and Installation Manual                | 16110600A06972 | 1 |
| 22     | Wired controller                                 | 17317100A35071 | 1 |
| 23.1   | Electrical heater of differential pressure valve | 17402001000043 | 1 |
| 23.2   | Exhaust valve                                    | 15500211000047 | 1 |
| 24     | Fixing board, gas-liquid separator               | 12225300011294 | 1 |
| 25     | Side panel assembly                              | 12225300011293 | 1 |
| 26     | Flow Switch                                      | 17400510000554 | 1 |
| 27     | Gas-liquid separator                             | 15500501001868 | 1 |
| 28     | Condenser output pipe assembly                   | 15125300006591 | 1 |
| 29     | closed expansion vessels with built in diaphragm | 15500509000107 | 1 |
| 30     | Condenser part                                   | 15825300001282 | 1 |
| 31     | Sensor clamp                                     | 12100303001022 | 1 |
| 32     | Fixing board, gas-liquid separator               | 12225300008931 | 1 |
| 33     | Condenser part                                   | 15825300001280 | 1 |
| 34     | Pipe Temperature Sensor                          | 11201007000165 | 3 |
| 35     | Water Temperature Sensor                         | 11201007001982 | 2 |
| 36     | Pipe Temperature Sensor                          | 11201007000098 | 1 |
| 37     | Room Temperature Sensor                          | 11201007000039 | 1 |
| 38     | Discharge Temperature Sensor                     | 11201007000352 | 1 |
| 39     | Top cover                                        | 12223000013752 | 1 |
| 40     | Bracket assembly, net                            | 12227000000132 | 1 |
| 41     | Installation board                               | 12225300008930 | 1 |
| 42     | Installation board                               | 12225300008929 | 1 |
| 43     | Partition board assembly                         | 12225300008922 | 1 |
| 45     | Fan motor support                                | 12227000001289 | 1 |
| 46     | Brushless DC Motor                               | 11002015000104 | 2 |
| 47     | Column                                           | 12223000013750 | 1 |
| 48     | Axial flow fan                                   | 12100105000027 | 2 |
| 49     | Front panel                                      | 12223000013751 | 1 |
| 50     | Air-out mesh enclosure                           | 12126000002648 | 2 |

**13.4 SMHM-300B-3**


| No   | Description                                                 | Part Code       | Qty |
|------|-------------------------------------------------------------|-----------------|-----|
| 1    | Liquid storage tank assembly                                | 15425300003145  | 1   |
| 1.1  | Accumulator tank                                            | 15500508000475  | 1   |
| 2    | E-box assembly                                              | 17225300A01059  | 1   |
| 2.1  | DC inverter aqua mini chiller - Main control board assembly | 17127400000315  | 1   |
| 2.2  | Hydraulic module, Main control board assembly               | 17110600000570  | 1   |
| 2.3  | Terminal                                                    | 17400401000026  | 1   |
| 2.3  | Wire joint                                                  | 17400401002616  | 1   |
| 2.4  | Wire clamp                                                  | 12127000000070  | 1   |
| 2.5  | Electrical appliance mounting plate assembly                | 122253000008916 | 1   |
| 2.6  | Reactor                                                     | 17400306000320  | 1   |
| 2.7  | Support plate assembly                                      | 122253000009016 | 1   |
| 2.8  | Filter board assembly                                       | 171270000008981 | 1   |
| 2.9  | Cover of electronic control box subassembly                 | 12227000010356  | 1   |
| 2.10 | Compressor module board assembly                            | 171270000008982 | 1   |
| 2.11 | Radiator support plate                                      | 12227000012564  | 1   |
| 2.12 | Optional heat exchanger                                     | 129270000001472 | 1   |
| 3    | Small handle                                                | 12100701000676  | 3   |
| 4    | Clapboard subassembly                                       | 12227000013835  | 1   |
| 5    | Fixed plate of inlet/outlet pipe                            | 12227000015550  | 1   |
| 6    | Compressor electric heater                                  | 17402001000759  | 2   |
| 7    | DC Inverter Rotary Compressor                               | 11103020006899  | 1   |
| 8    | Chassis assembly                                            | 12225300011313  | 1   |
| 9    | Expansion valve assembly                                    | 15425300003147  | 1   |
| 9.1  | Electronic expansion valve suite                            | 15500213001587  | 1   |
| 10   | Pressure gauge                                              | 17500501000121  | 1   |
| 11   | Installation board                                          | 122253000008906 | 1   |
| 12   | Suction pipe assembly                                       | 154253000003146 | 1   |
| 12.1 | Pressure switch                                             | 17400516000008  | 1   |
| 12.2 | One-way solenoid valve                                      | 15500205000440  | 1   |
| 13   | Shielded pump                                               | 17400802001533  | 1   |
| 14   | Support plate assembly                                      | 12225300011297  | 1   |
| 15   | Connecting hose                                             | 12100509000532  | 1   |
| 16   | Safety valve                                                | 15500201000025  | 1   |
| 17   | Plate heat exchanger part                                   | 15725300000663  | 1   |
| 17.1 | Electrical heater of plate heat exchanger                   | 17402001000083  | 1   |
| 17.2 | seal ring                                                   | 12600701000064  | 1   |

|        |                                                  |                |   |
|--------|--------------------------------------------------|----------------|---|
| 17.3   | Temperature sensing tube assembly                | 15325300000051 | 1 |
| 17.4   | Copper nut                                       | 15500406000022 | 1 |
| 17.5   | Plate heat exchanger part                        | 15725300000664 | 1 |
| 17.5.1 | Plate heat exchanger                             | 15700101000997 | 1 |
| 17.5.2 | Plate heat exchanger connecting pipe assembly    | 15425300003142 | 1 |
| 17.5.3 | Plate heat exchanger connecting pipe assembly    | 15425300003141 | 1 |
| 17.5.4 | Water outlet pipe assembly                       | 15425300003140 | 1 |
| 18     | Support Plate                                    | 12225300011295 | 2 |
| 19     | Support Plate                                    | 12225300011298 | 1 |
| 20     | Four-way valve assembly                          | 15425300003143 | 1 |
| 20.1   | Pressure controller                              | 17400516000568 | 1 |
| 20.2   | Four-way valve kit                               | 15500216000528 | 1 |
| 20.3   | Pressure sensor                                  | 11201008000033 | 1 |
| 20.4   | Meter connector                                  | 15500301000055 | 1 |
| 21     | Y shape filter                                   | 15500504000152 | 1 |
| 22     | Operation and Installation Manual                | 16110600A06972 | 1 |
| 22     | Wired controller                                 | 17317100A35071 | 1 |
| 23     | Water outlet pipe assembly                       | 15425300003144 | 1 |
| 23.1   | Electrical heater of differential pressure valve | 17402001000043 | 1 |
| 23.2   | Exhaust valve                                    | 15500211000047 | 1 |
| 24     | Fixing board, gas-liquid separator               | 12225300011294 | 1 |
| 25     | Side panel assembly                              | 12225300011293 | 1 |
| 26     | Flow Switch                                      | 17400510000554 | 1 |
| 27     | Gas-liquid separator                             | 15500501001868 | 1 |
| 28     | Condenser output pipe assembly                   | 15125300006591 | 1 |
| 29     | closed expansion vessels with built in diaphragm | 15500509000107 | 1 |
| 30     | Condenser part                                   | 15825300001282 | 1 |
| 31     | Sensor clamp                                     | 12100303001022 | 1 |
| 32     | Fixing board, gas-liquid separator               | 12225300008931 | 1 |
| 33     | Condenser part                                   | 15825300001280 | 1 |
| 34     | Pipe Temperature Sensor                          | 11201007000165 | 3 |
| 35     | Water Temperature Sensor                         | 11201007001982 | 2 |
| 36     | Pipe Temperature Sensor                          | 11201007000098 | 1 |
| 37     | Room Temperature Sensor                          | 11201007000039 | 1 |
| 38     | Discharge Temperature Sensor                     | 11201007000352 | 1 |
| 39     | Top cover                                        | 12223000013752 | 1 |
| 40     | Bracket assembly, net                            | 12227000000132 | 1 |
| 41     | Installation board                               | 12225300008930 | 1 |
| 42     | Installation board                               | 12225300008929 | 1 |
| 43     | Partition board assembly                         | 12225300008922 | 1 |
| 45     | Fan motor support                                | 12227000001289 | 1 |
| 46     | Brushless DC Motor                               | 11002015000104 | 2 |
| 47     | Column                                           | 12223000013750 | 1 |
| 48     | Axial flow fan                                   | 12100105000027 | 2 |
| 49     | Front panel                                      | 12223000013751 | 1 |
| 50     | Air-out mesh enclosure                           | 12126000002648 | 2 |

## NOTE CONCERNING PROTECTION OF ENVIRONMENT



This product must not be disposed of via normal household waste after its service life, but must be taken to a collection station for the recycling of electrical and electronic devices. The symbol on the product, the operating instructions or the packaging indicate such disposal procedures. The materials are recyclable in accordance with their respective symbols. By means of re-use, material recycling or any other form of recycling old appliances you are making an important contribution to the protection of our environment. Please ask your local council where your nearest disposal station is located.

## INFORMATION CONCERNING USED REFRIGERANT MEDIUM

This unit is containing fluorinated gases included in the Kyoto protocol.  
The maintenance and the liquidation must be carried out by qualified personnel.

Type of refrigerant: R32

The quantity of the refrigerant: Please see the unit label.

The value GWP: 675 (1 kg R32 = 0,675 t CO<sub>2</sub> eq)

GWP = Global Warming Potential



Appliance filled with flammable gas R32.

In case of quality problem or other please contact your local supplier or authorized service center.

**Emergency number: 112**

## PRODUCER

SINCLAIR CORPORATION Ltd.  
16 Great Queen Street  
WC2B 5AH London  
United Kingdom  
[www.sinclair-world.com](http://www.sinclair-world.com)

This product was manufactured in China (Made in China).

## REPRESENTATIVE

SINCLAIR Global Group s.r.o.  
Purkynova 45  
612 00 Brno  
Czech Republic

## TECHNICAL SUPPORT

SINCLAIR Global Group s.r.o.  
Purkynova 45  
612 00 Brno  
Czech Republic  
Tel.: +420 800 100 285 | Fax: +420 541 590 124  
[www.sinclair-solutions.com](http://www.sinclair-solutions.com) | [info@sinclair-solutions.com](mailto:info@sinclair-solutions.com)



**IMPORTANT NOTE:**

Read this manual carefully before installing or operating your new heat pump.  
Make sure to save this manual for future reference.

