EN

SERVICE MANUAL

04 | 12-12-2022

YUKON SERIES

MONOBLOCK HEAT PUMPS

SMHM-XXXB/3

SMHM-XXXB-3/9

S-THERM

sinclair HEAT PUMPS

IMPORTANT NOTE:

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

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1 Unit Capacities and External Appearance

1.1 Unit Capacities

Table 1-1.1: Capacity range

Capacity	4kW	6kW	8kW	10kW	12kW	14kW	16kW
Model (1-phase)	SMHM-40B/3	SMHM-60B/3	SMHM-80B/3	SMHM-100B/3	SMHM-120B/3	SMHM-140B/3	SMHM-160B/3

Capacity	12kW	14kW	16kW
Model(3-phase)	SMHM-120B-3/9	SMHM-140B-3/9	SMHM-160B-3/9

3-phase, 380-415V, 50Hz; 1-phase, 220-240V, 50Hz.

1.2 External Appearance

Table 1-1.2: Unit appearance

4/6kW	8/10/12/14/16kW
	

2 Layout of Functional Components

SMHM-40B/3; SMHM-60B/3

Figure 2-1.1: top view

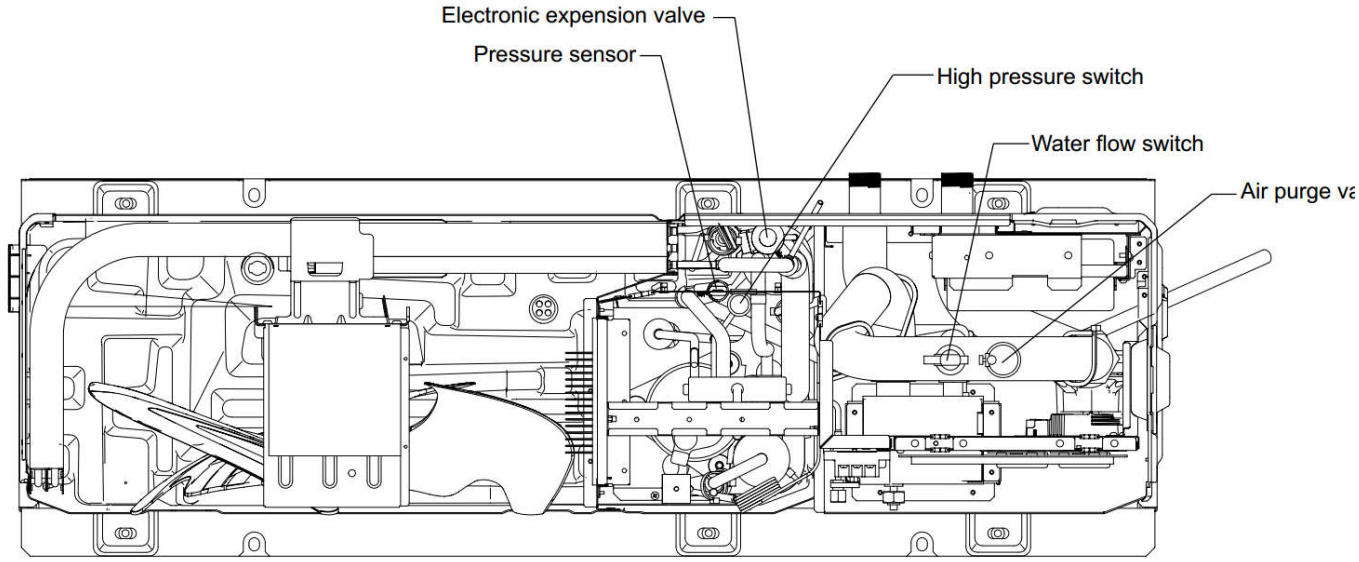
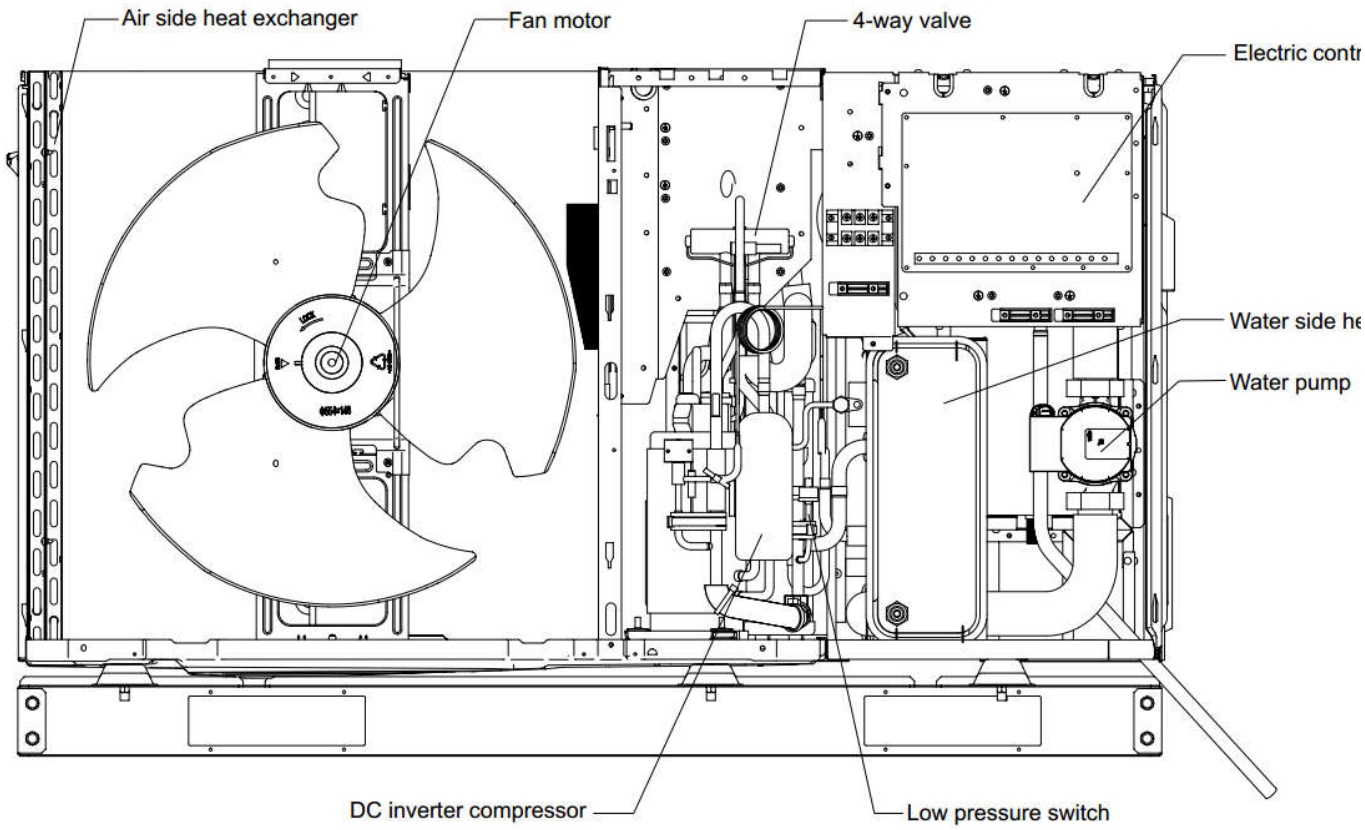
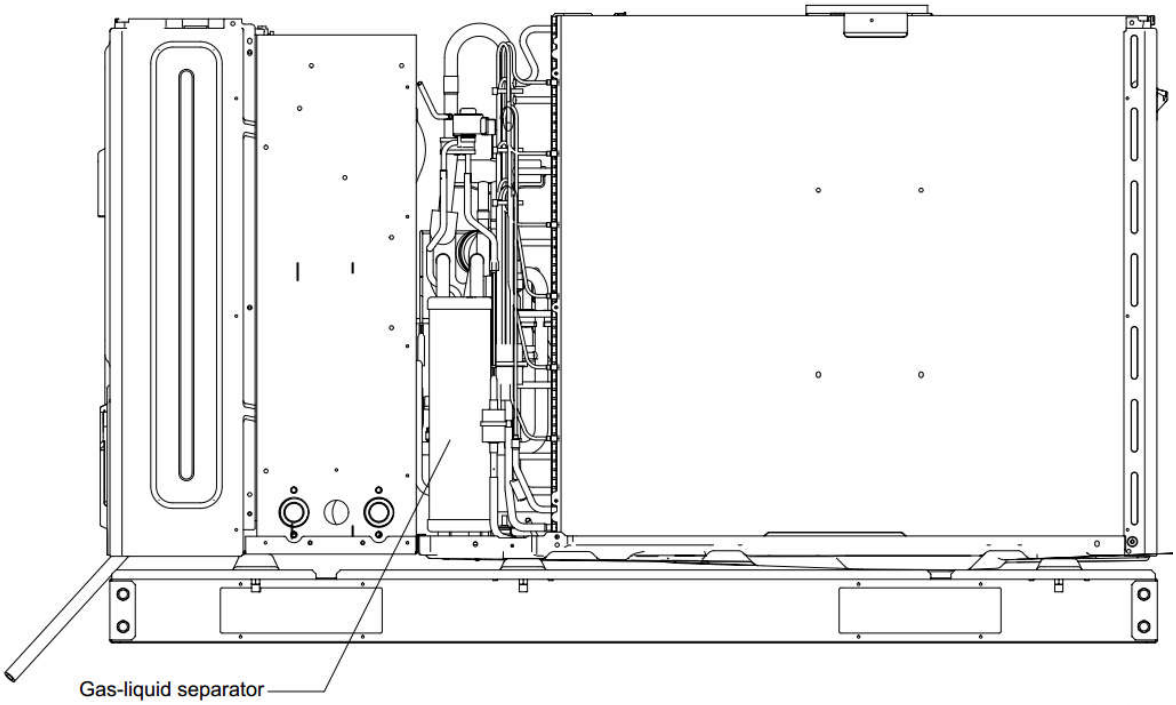
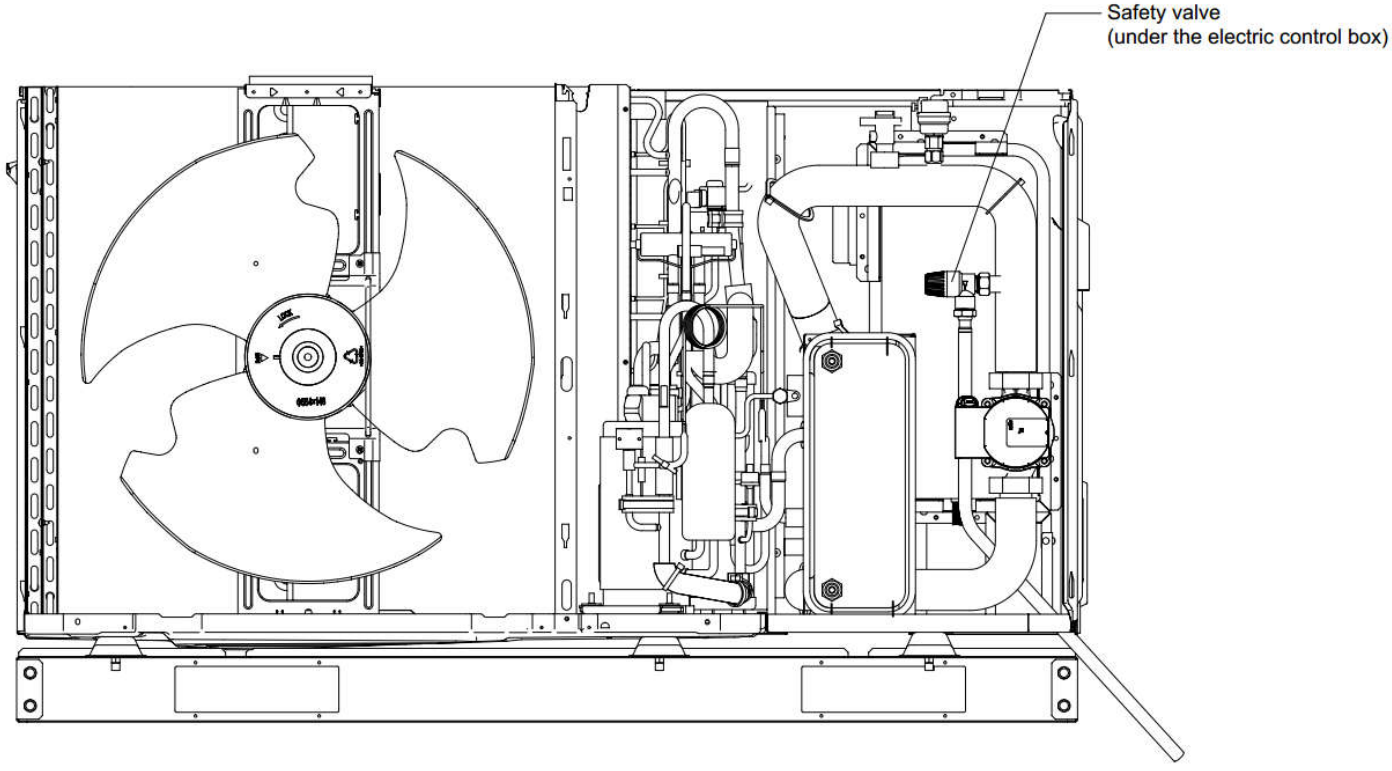


Figure 2-1.2: front view




Gas-liquid separator


Safety valve
(under the electric control box)

SMHM-80B/3 / SMHM-100B/3

Figure 2-1.1: top view

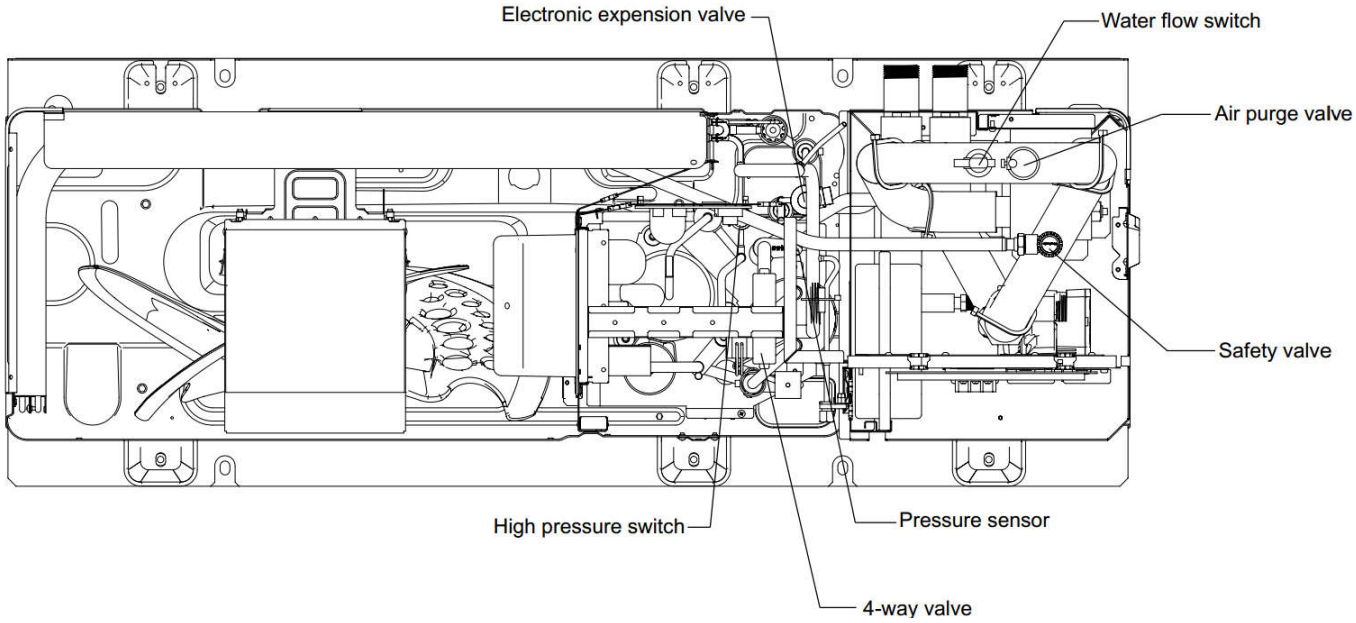
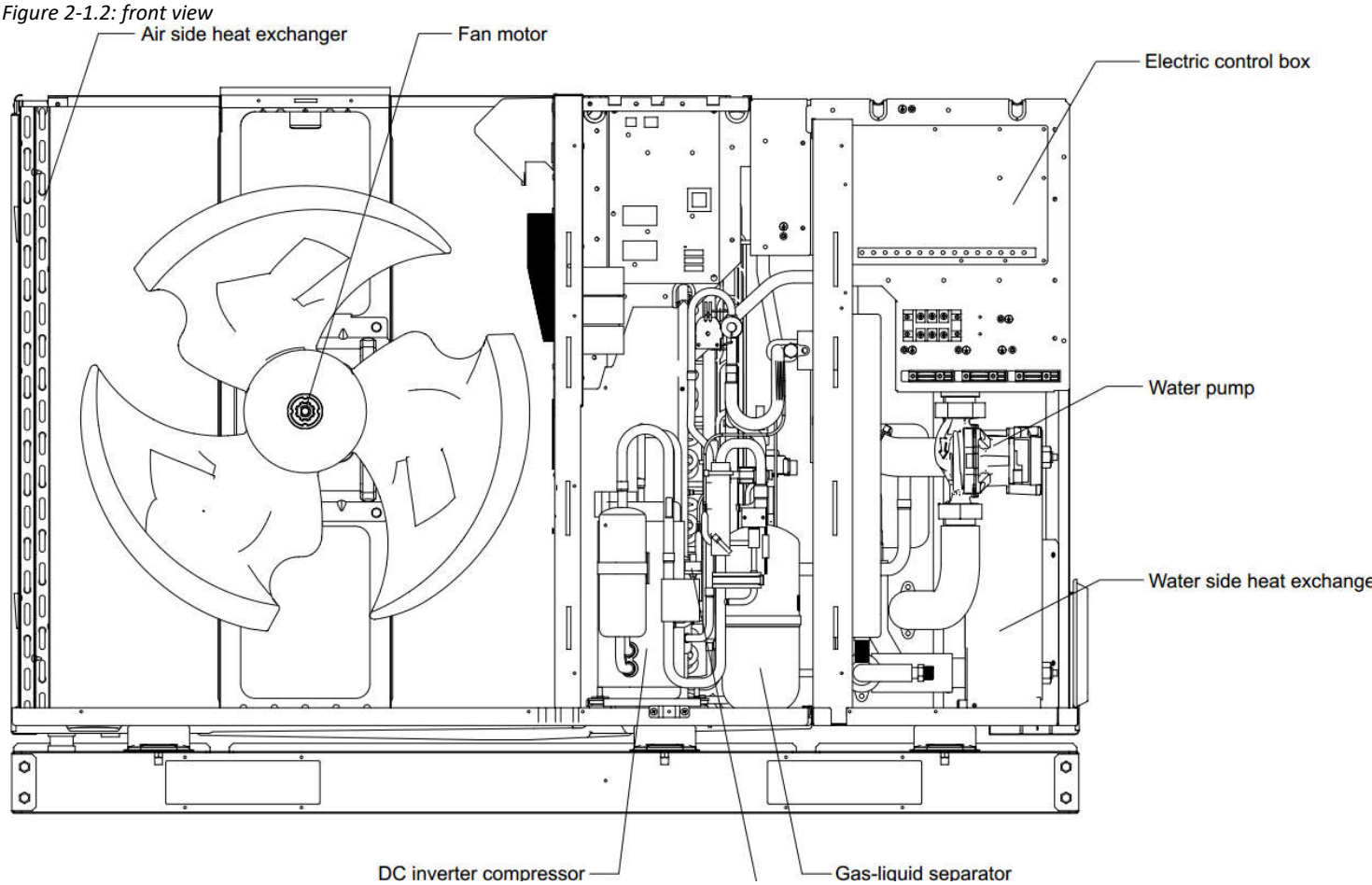


Figure 2-1.2: front view



SMHM-120B/3 / SMHM-140B/3 / SMHM-160B/3

Figure 2-1.4: top view

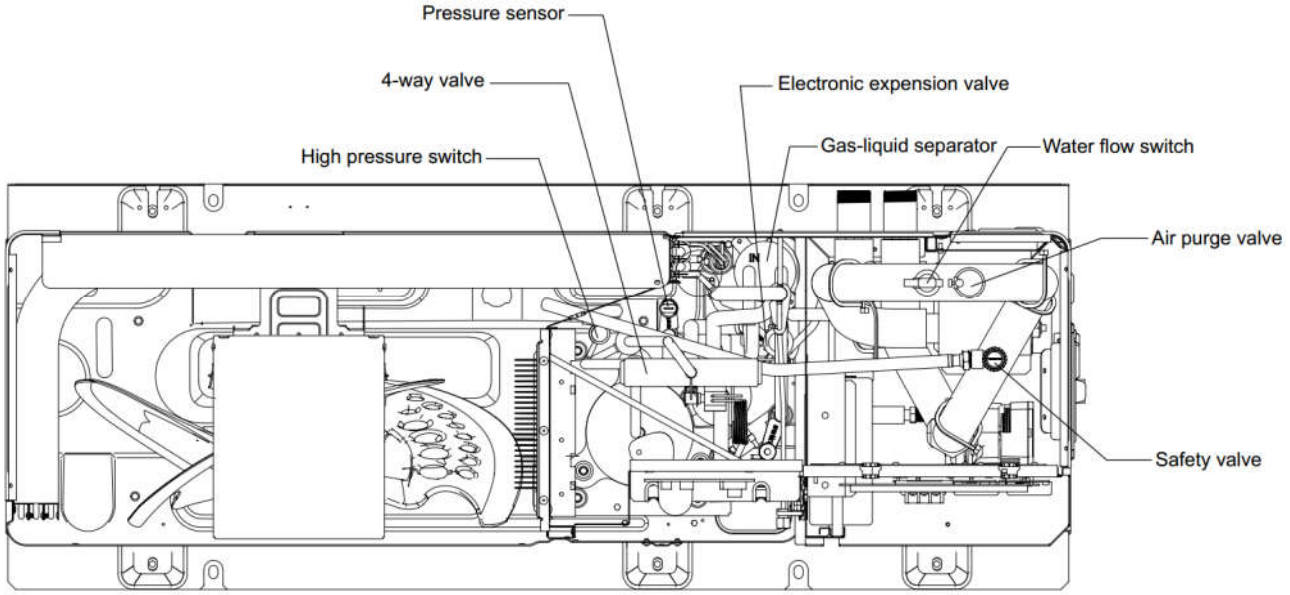
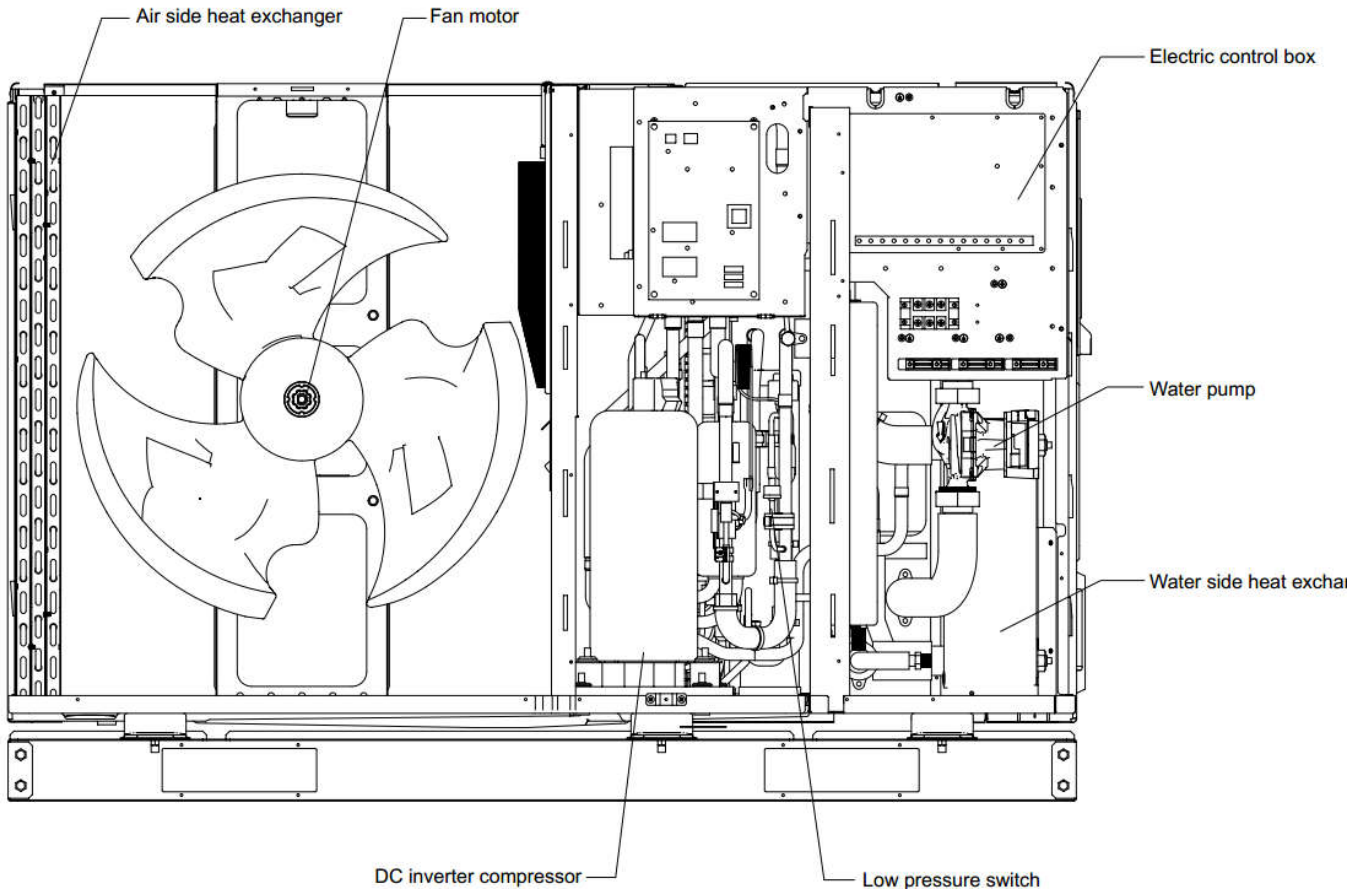


Figure 2-1.5: front view



SMHM-120-3/9 / SMHM-140-3/9 / SMHM-160-3/9

Figure 2-1.4: top view

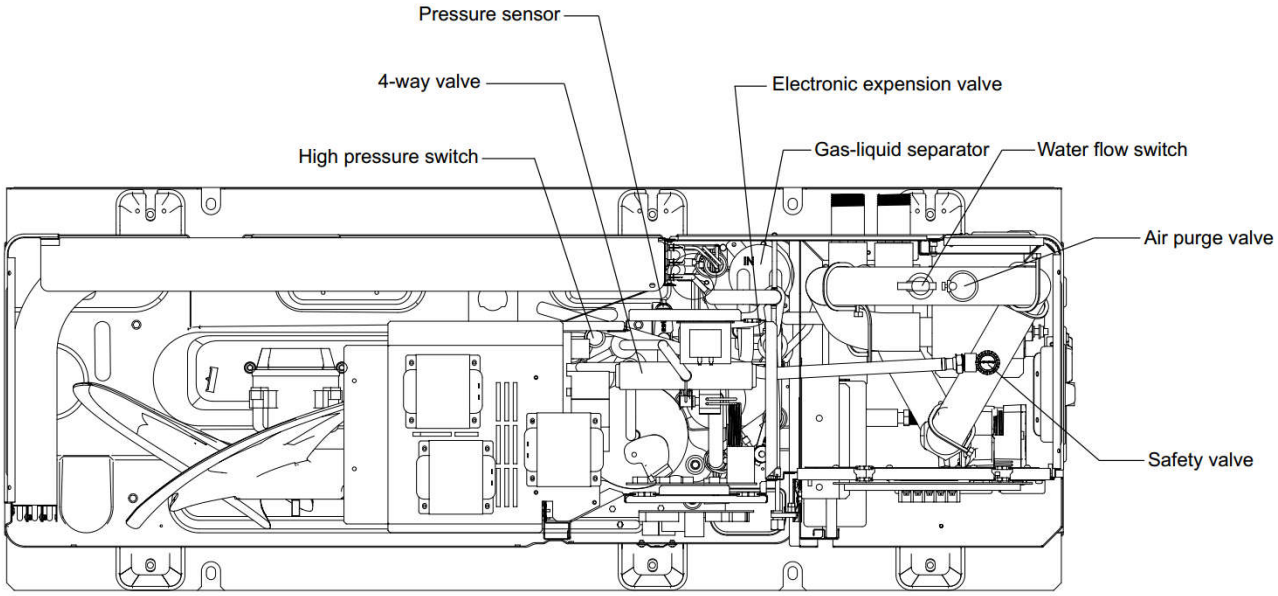
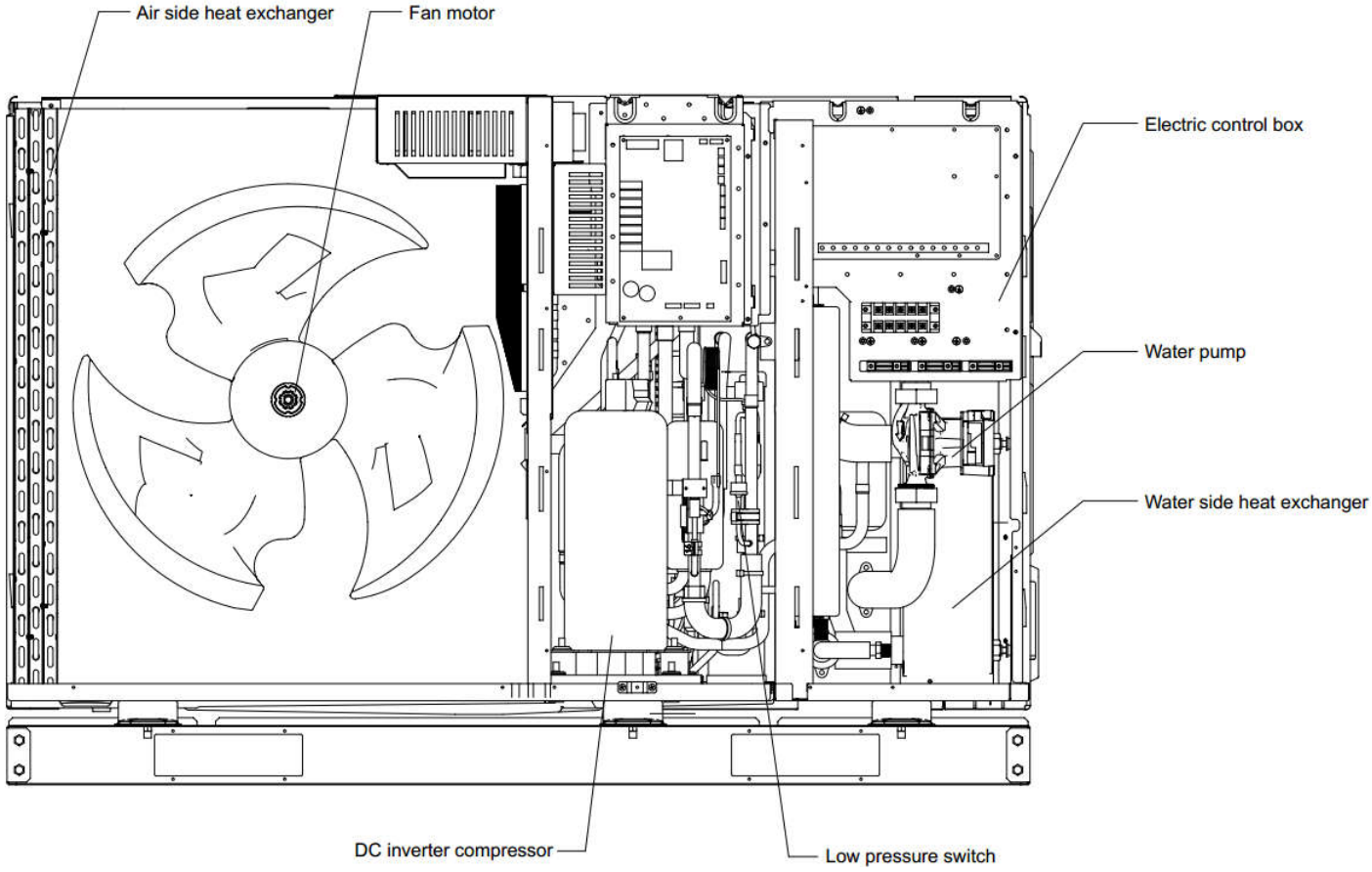
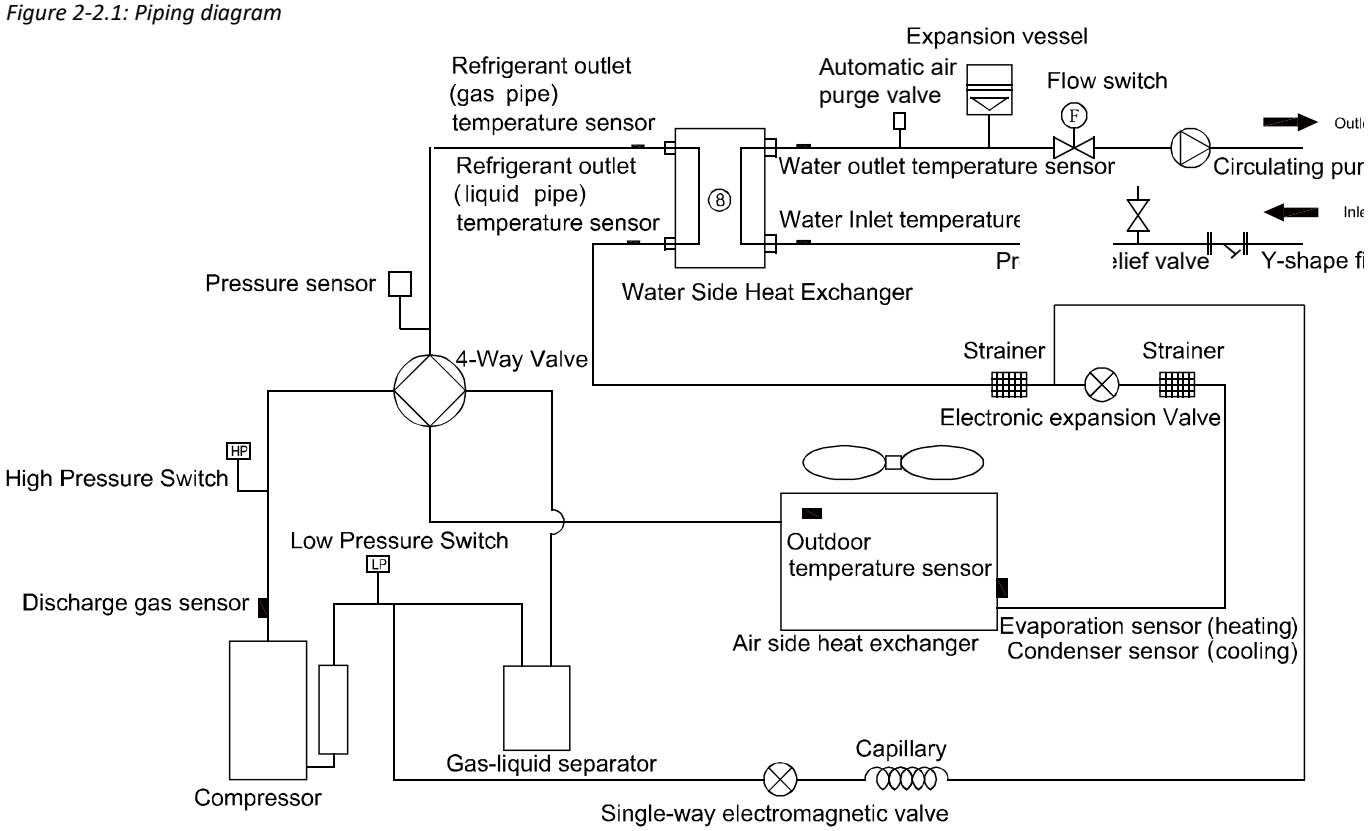


Figure 2-1.5: front view



3 Piping Diagrams

Figure 2-2.1: Piping diagram



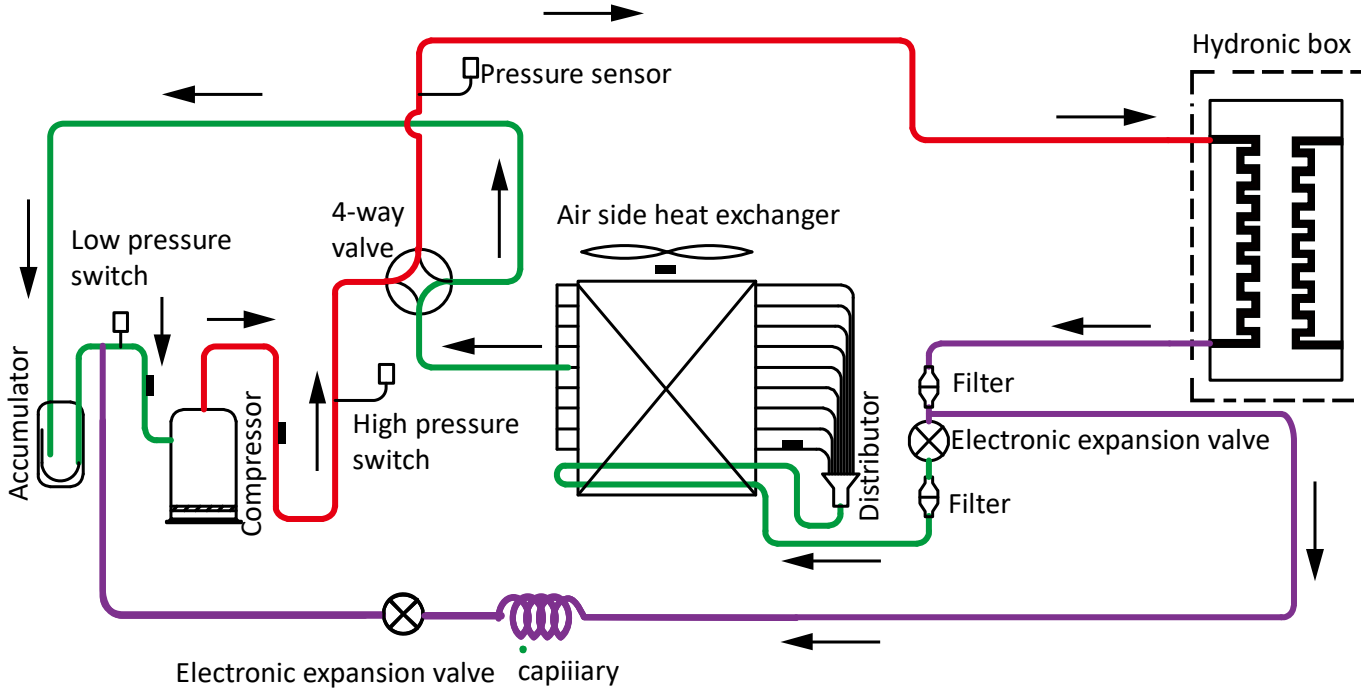
Key components:

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)
8. **Water flow switch:**
   Detects water flow rate to protect compressor and water pump in the event of insufficient water flow.
9. **Backup heater:**
   Provides additional heating capacity when the heating capacity of the heat pump is insufficient due to very low outdoor temperature. Also protects the external water piping from freezing.
10. **Water pump:**
    Circulates water in the water circuit.

4 Refrigerant Flow Diagrams

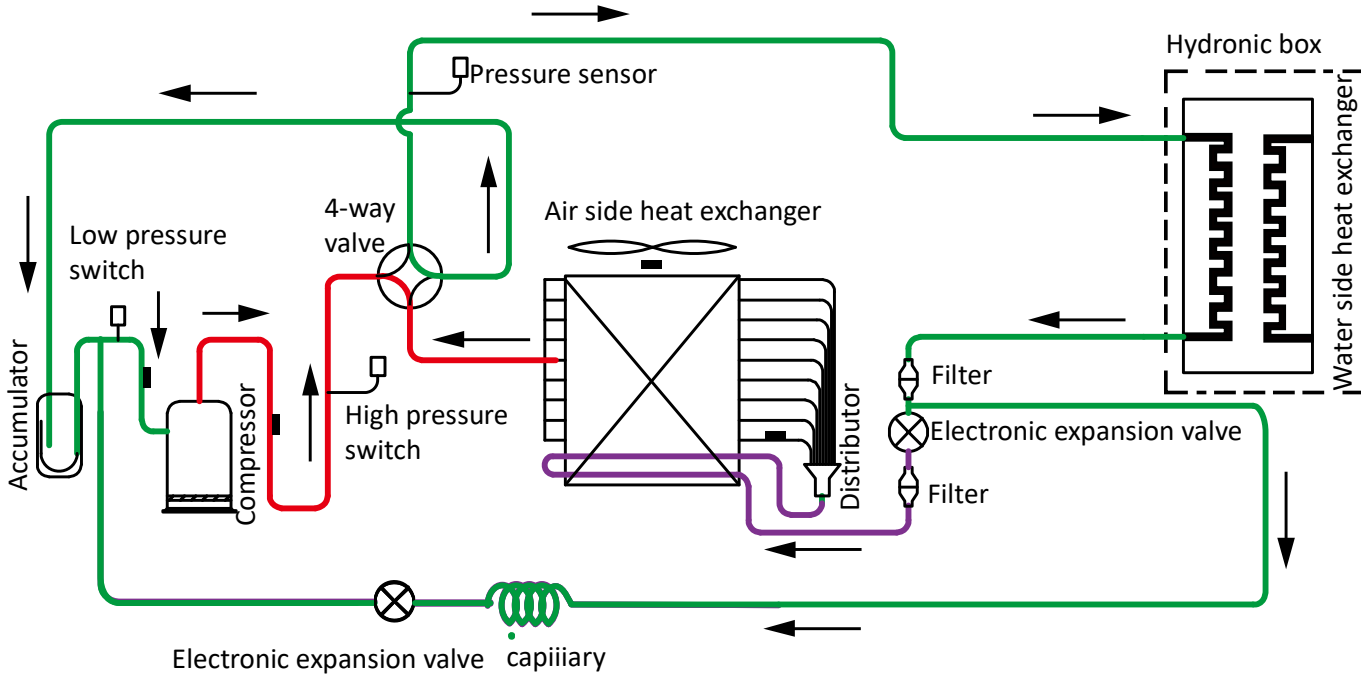
Heating and domestic hot water operation

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



5 Stop Operation

The stop operation occurs for one of the following reasons:

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

6 Standby Control

6.1 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.

6.2 Water Pump Control

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

7 Startup Control

7.1 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”.

7.2 Compressor Startup Program

In initial startup control and in re-start control, compressor startup is controlled according to outdoor ambient temperature. Compressor startup follows one of two startup programs until the target rotation speed is reached. Refer to Figures 3-3.1, 3-3.2, 3-3.3 and 3-3.4.

Figure 3-3.1: 4-6kW to 12-16kW Compressor startup program[1,2] when ambient temperature is above 3°C

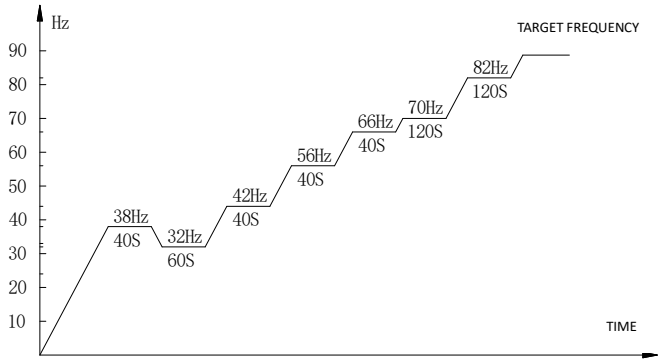


Figure 3-3.2: 8-10kW Compressor startup program[1,2] when ambient temperature is above 11°C

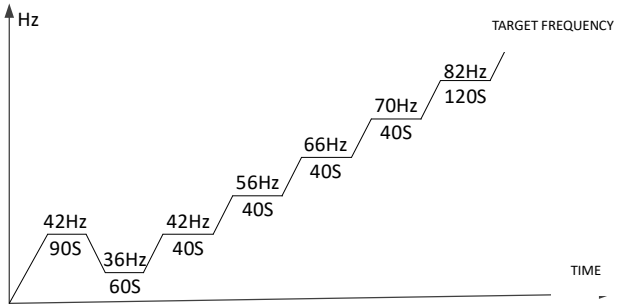


Figure 3-3.3: 4-10KW compressor startup program[1] when ambient temperature is at or below 3°C(4-6KW)/11°C(8-10KW)

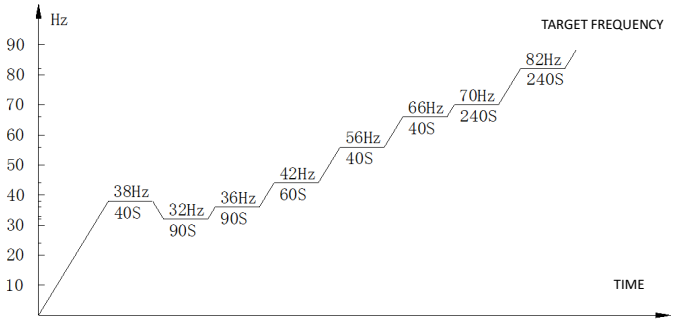
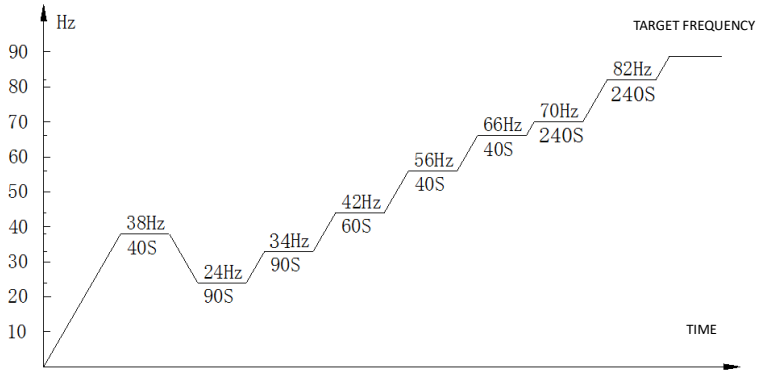


Figure 3-3.4: 12-16KW compressor startup program[1] when ambient temperature is at or below 3°C



Notes:

1. Once the first, 40-second stage of the program 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.

7.3 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	4/6kW	8/10/12/ 14/16kW	Control functions and states
Inverter compressor	COMP	●	●	Compressor startup program selected according to ambient temperature[1]
DC fan motor	FAN	●	●	Fan runs at maximum speed[2]
Electronic expansion valve	EXV	●	●	Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to outdoor ambient temperature, discharge temperature and suction superheat
Four-way valve	ST	●	●	On

7.4 Startup Control for Cooling Operation

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

Component	Wiring diagram label	4/6kW	8/10/12/ 14/16kW	Control functions and states
Inverter compressor	COMP	●	●	Compressor startup program selected according to ambient temperature[1]
DC fan motor	FAN	●	●	Fan run at maximum speed[2]
Electronic expansion valve	EXV	●	●	Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to outdoor ambient temperature, discharge temperature and suction superheat
Four-way valve	ST	●	●	Off

Notes:

1. Refer to Figure 3-3.1, Figure 3-3.2, Figure 3-3.3 and Figure 3-3.4 in Part 3, 4.2 “Compressor Startup Program”.
2. Refer to Table 3-4.3 in Part 3, 5.6 “Outdoor Fan Control”.

8 Normal Operation Control

8.1 Component Control during Normal Operation

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

Component	Wiring diagram label	4/6kW	8/10/12/14/16kW	Control functions and states
Inverter compressor	COMP	•	•	Controlled according to load requirement from hydronic system
DC fan motor	FAN	•	•	Controlled according to outdoor heat exchanger pipe temperature
Electronic expansion valve	EXV	•	•	Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to discharge temperature, suction superheat and compressor speed
Four-way valve	ST	•	•	On

Table 3-4.2: Component control during cooling operation

Component	Wiring diagram label	4/6kW	8/10/12/14/16kW	Control functions and states
Inverter compressor	COMP	•	•	Controlled according to load requirement from hydronic system
DC fan motor	FAN	•	•	Controlled according to outdoor heat exchanger pipe temperature
Electronic expansion valve	EXV	•	•	Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to discharge temperature, suction superheat and compressor speed
Four-way valve	ST	•	•	Off

8.2 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, leaving water set temperature and actual leaving water temperature and then runs the appropriate compressor startup program. Refer to Part 3, 4.2 “Compressor Startup Program”. Once the startup program is complete, the compressor runs at the target rotation speed.

During operation the compressor speed is controlled according to the rate of change in water temperature, the refrigerant system pressure and the refrigerant temperature.

8.3 Compressor Step 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.

8.4 Four-way Valve Control

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

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

8.5 Electronic Expansion Valve Control

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

- At power-on:
  - The EXV first closes fully, then moves to the standby position. After a few seconds the EXV moves to an initial running position, which is determined according to operating mode and outdoor ambient temperature. After a further a few minutes, the EXV is controlled according to suction superheat and discharge temperature. Once a further a few minutes have elapsed, the EXV is then controlled according to suction superheat, discharge temperature and compressor speed.
- When the outdoor unit is in standby:
  - The EXV is at standby position.
- When the outdoor unit stops:
  - The EXV first closes fully, then moves to the standby position.

8.6 Outdoor Fan Control

The speed of the outdoor unit fan(s) is adjusted in steps, as shown in Table 3-4.3.

Table 3-4.3: Outdoor fan speed steps

Fan speed index	Fan speed (rpm)			
	4-6kW	8-10kW	12-14kW	16kW
0	0	0	0	0
1	200	200	200	200
2	250	250	250	250
3	300	300	300	300
4	350	350	350	350
5	400	400	400	400
6	450	450	450	450
7	500	500	500	500
8	530	530	550	550
9	550	550	580	600
10	580	580	610	650
11	600	600	630	700
12	600	600	650	730

8.7 Spray liquid cooling control

When the discharge temperature of compressor exceeds 105℃, the solenoid valve opens and the frequency of compressor drops in order to reduce the discharge temperature. When the discharge temperature is below 100℃, the solenoid valve closes.

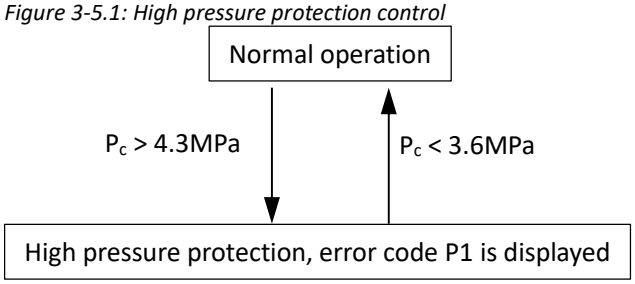
If the discharge temperature exceeds 108℃ while the spray liquid cooling control is in progress, which is judged every 20s, the frequency of compressor drops 4Hz until the minimum frequency which differs from every model. When the discharge temperature is below 101℃, the compressor runs at the current frequency.

9 Protection Control

9.1 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:

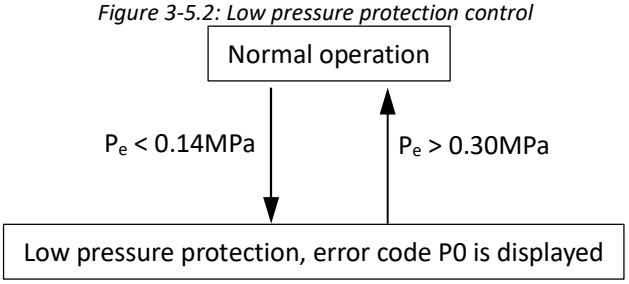
1. P_c: Discharge pressure

When the discharge pressure rises above 4.3MPa the system displays P1 protection and the unit stops running. When the discharge pressure drops below 3.6MPa, the compressor enters re-start control.

9.2 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:

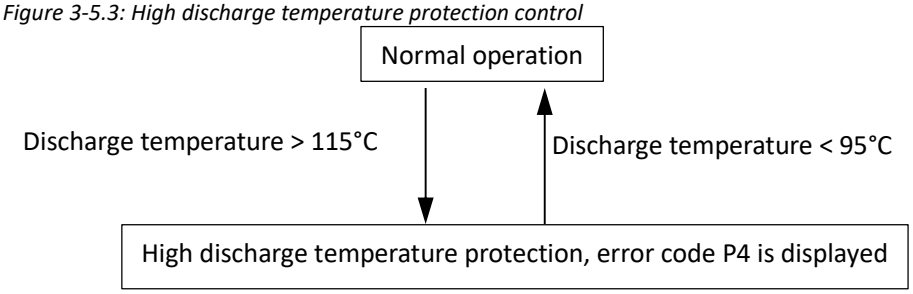
1. P_e: Suction pressure

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.

9.3 Discharge Temperature Protection Control

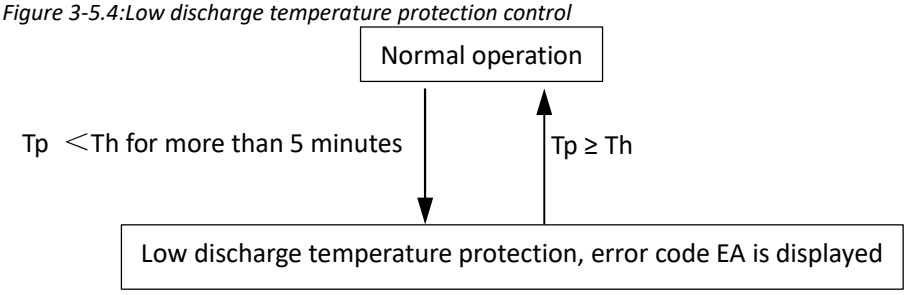
This control protects the compressor from abnormally high temperatures and transient spikes in temperature.

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 95°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.

9.4 Compressor Current Protection Control

This control protects the compressor from abnormally high currents.

Figure 3-5.5: Compressor current protection control

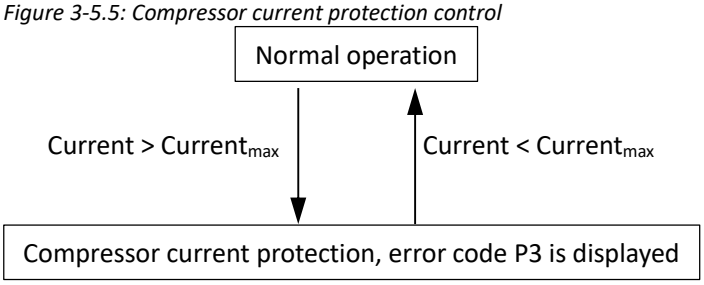


Table 3-5.1: Current limitation for compressors

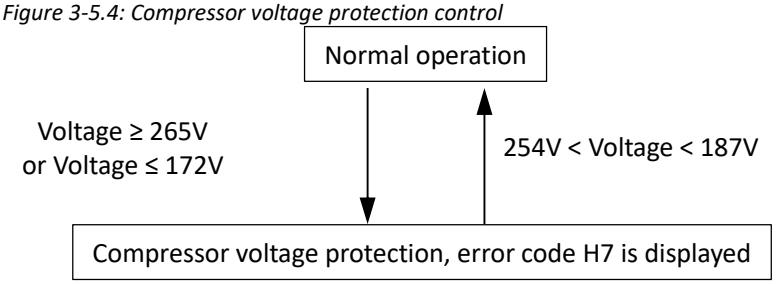
Model name	4-6kw	8-10kw	12-16kw 1ph	12-16kw 3ph
Current$_{max}$	18A	19A	30A	14A

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

9.5 Voltage Protection Control

This control protects the Yukon Mono from abnormally high or abnormally low voltages.

Figure 3-5.4: 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 187V, the refrigerant system restarts once the compressor re-start delay has elapsed.

9.6 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 90 seconds.

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.

9.7 Water Side Heat Exchanger 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.

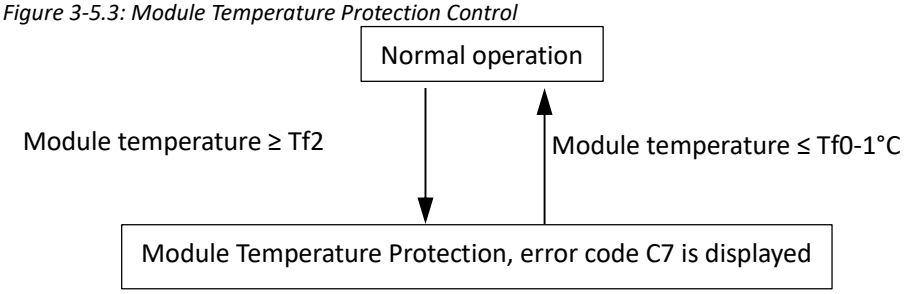
In heating/DHW standby mode, if leaving water temperature is below 2°C, heat pump stops and water pump keeps running for 30min. If water temperature is still below 2°C heat pump turns to heating mode to protect from anti-freezing.

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

9.8 Module Temperature Protection Control

This control protects the module from abnormally high temperatures.

Figure 3-5.3: Module Temperature Protection Control



When the module temperature rises at or above Tf2 the system displays C7 protection and the unit stops running.
When the module temperature drops at or below Tf0-1, the compressor enters re-start control.

	4-6kW	8-10kW	12-16kW 1ph	12-16kW 3ph
Tf2	75	81	100	84
Tf0	69	75	94	78

10 Special Control

10.1 Oil Return Operation

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

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.

Tables 3-6.1 show component control during oil return operation in cooling mode.

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

Component	Wiring diagram label	4/6kW	8/10/12/ 14/16kW	Control functions and states
Inverter compressor	COMP	●	●	Runs at oil return operation rotation speed
DC fan motor	FAN	●	●	Controlled according to outdoor heat exchanger pipe temperature
Electronic expansion valve	EXV	●	●	304 (steps)
Four-way valve	ST	●	●	Off

Tables 3-6.2 show component control during oil return operation in heating and DHW modes.

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

Component	Wiring diagram label	4/6kW	8/10/12/ 14/16kW	Control functions and states
Inverter compressor	COMP	●	●	Runs at oil return operation rotation speed
DC fan motor	FAN	●	●	Controlled according to outdoor heat exchanger pipe temperature
Electronic expansion valve	EXV	●	●	304 (steps)
Four-way valve	ST	●	●	On

10.2 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.

Table 3-6.3: Component control during defrosting operation

Component	Wiring diagram label	4/6kW	8/10/12/ 14/16kW	Control functions and states
Inverter compressor	COMP	●	●	Runs at defrosting operation rotation speed
DC fan motor	FAN	●	●	Off
Electronic expansion valve	EXV	●	●	Fully open
Four-way valve	ST	●	●	Off

10.3 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 3-6.5: Component control during fast DHW operation

Component	Wiring diagram label	4/6kW	8/10/12/14/16kW	Control functions and states
Inverter compressor	COMP	•	•	Controlled according to load requirement
DC fan motor	FAN	•	•	Controlled according to outdoor heat exchanger pipe temperature
Electronic expansion valve	EXV	•	•	Position (steps) from 0 (fully closed) to 480 (fully open), controlled according to discharge superheat
Four-way valve	ST	•	•	On
Tank electric heater	TBH	•	•	On

10.4 Two zones control[1]

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.

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.

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.

Hydraulic adapter PCB (Optional)
With the help of hydraulic 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 Yukon unit.*

10.5 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℃ automatically, and the TBH operate as below:T5<69. the TBH is on, T5 ≥ 70, the TBH is off. The unit operate 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.

1.1 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.

1.2 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.

1.3 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

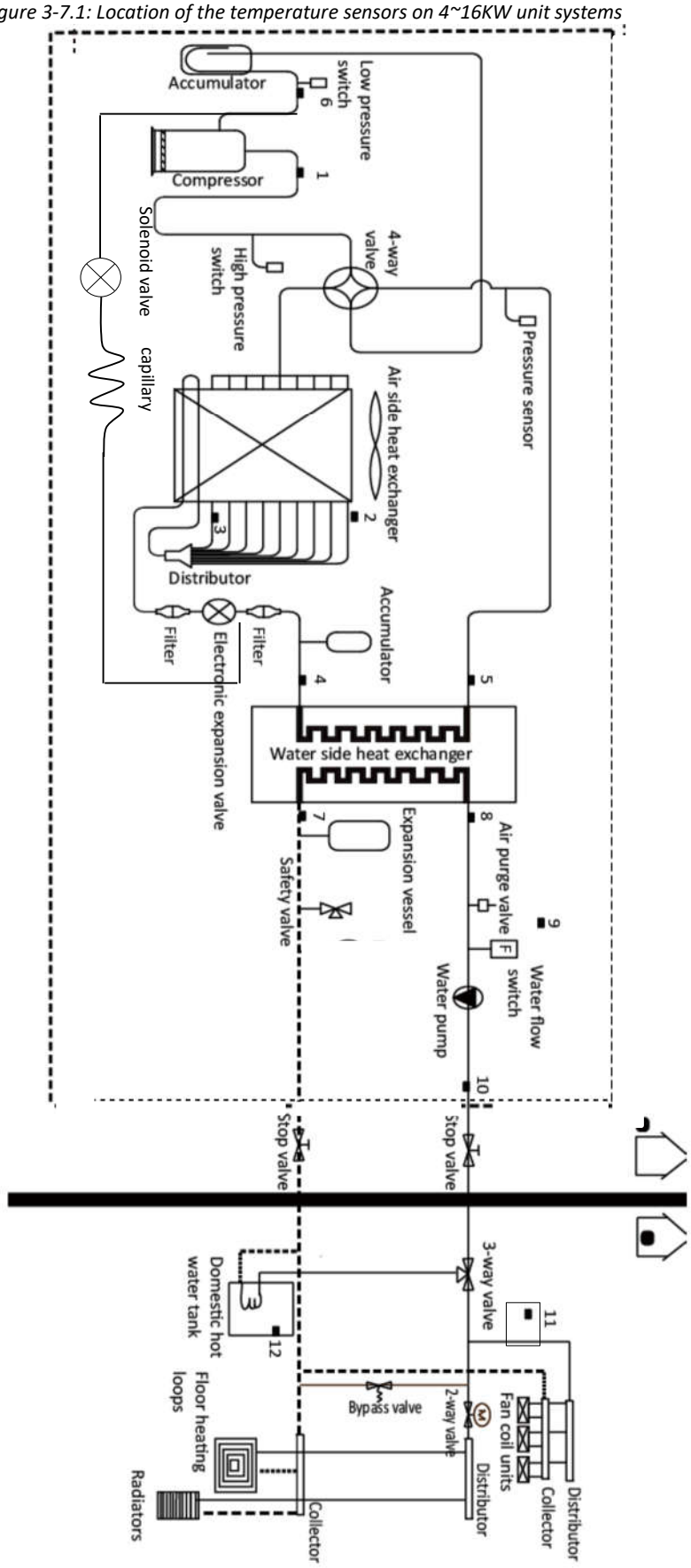
TBH is only controlled by M1M2. If dry contract closes, T5<65℃ then TBH opens until water tank temperature reaches 70℃.

- 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.

11 Role of Temperature Sensors in Control Functions

Figure 3-7.1: Location of the temperature sensors on 4~16KW unit systems



Notes:

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

Table 3-6.1.

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

Number	Sensor name[1]	Sensor code	Mode	Control functions
1	Discharge pipe temperature sensor	Tp	Heating	▪ Electronic expansion valve control2 ▪ Discharge superheat control
			Cooling	▪ Electronic expansion valve control2 ▪ Outdoor fan control3 ▪ Discharge superheat control
2	Outdoor ambient temperature sensor	T4	Heating	▪ Compressor startup control4 ▪ Compressor output control5 ▪ Electronic expansion valve control2 ▪ Defrosting operation control7 ▪ Low pressure protection control7 ▪ Crankcase heater control9
			Cooling	▪ Compressor startup control4 ▪ Compressor output control5 ▪ Electronic expansion valve control2 ▪ Outdoor fan control3 ▪ Crankcase heater control9
3	Air side heat exchanger refrigerant outlet temperature sensor	T3	Heating	▪ Electronic expansion valve control2 ▪ Defrosting operation control7 ▪ Outdoor fan control3
			Cooling	▪ Compressor output control5 ▪ Outdoor fan control3
4	Water side heat exchanger refrigerant inlet (liquid pipe) temperature sensor	T2	Heating DHW	▪ Compressor output control5
5	Water side heat exchanger refrigerant outlet (gas pipe) temperature sensor	T2B	Heating	▪ Freeze prevention control10
6	Suction pipe temperature sensor	Th	Heating Cooling	▪ Electronic expansion valve control2
7	Water side heat exchanger water inlet temperature sensor	Tw_in	Heating Cooling	▪ Freeze prevention control10
8	Water side heat exchanger water outlet temperature sensor	Tw_out	Heating Cooling DHW	▪ Compressor output5 and on/off control6 ▪ Freeze prevention control10
9	Backup electric heater water outlet temperature sensor	T1	Heating	▪ Compressor output control5 ▪ Backup electric heater control ▪ DHW priority control11 ▪ Auto mode control
			Cooling	▪ Compressor output5 and on/off control6 ▪ Auto mode control
			DHW	▪ Compressor output control5 ▪ Backup electric heater control ▪ DHW priority control11
10	Circuit 2 water outlet temperature sensor	T1B	Heating	▪ Mixing valve control
11	Room temperature sensor Built in wire controller	Ta	Heating Cooling	▪ Auto mode control ▪ Climate related curve ▪ Compressor output control5
12	Domestic hot water tank temperature sensor	T5	DHW	▪ Disinfection operation control ▪ DHW tank immersion heater control ▪ Backup electric heater control ▪ Auxiliary heat source control ▪ Solar energy kit control ▪ Compressor output control5 ▪ DHW priority control11

Notes:

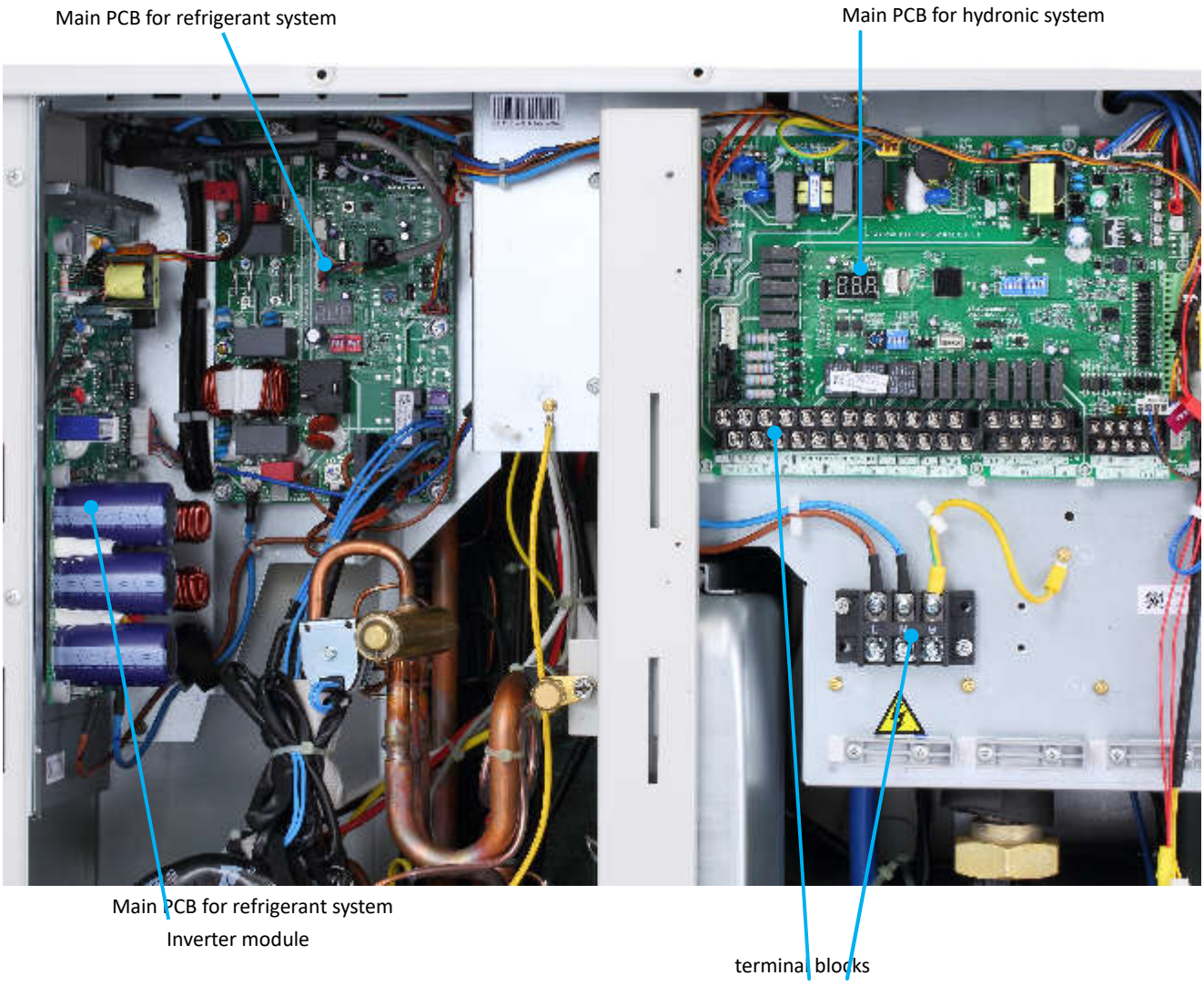
1. Sensor names in this service manual referring to refrigerant flow is named according refrigerant flow during cooling operation refer to Part 2, 3 “Refrigerant Flow Diagrams”.
2. Refer to Part 3, 4.5 “Electronic Expansion Valve Control”.
6. Refer to Part 3, 1 “Stop Operation”.
7. Refer to Part 3, 6.2 “Defrosting Operation”.
8. Refer to Part 3, 5.2 “Low Pressure Protection Control”.
9. Refer to Part 3, 2.1 “Crankcase Heater Control”.

3. Refer to Part 3, 4.6 “Outdoor Fan Control”.
4. Refer to Part 3, 3 “Startup Control”.
5. Refer to Part 3, 4.2 “Compressor Output Control”.
10. Refer to Part 3, 2.2 “Freeze Prevention Control”.
11. Refer to Part 3, 6.4 “Fast DHW Operation”.

12 Outdoor Unit Electric Control Box Layout

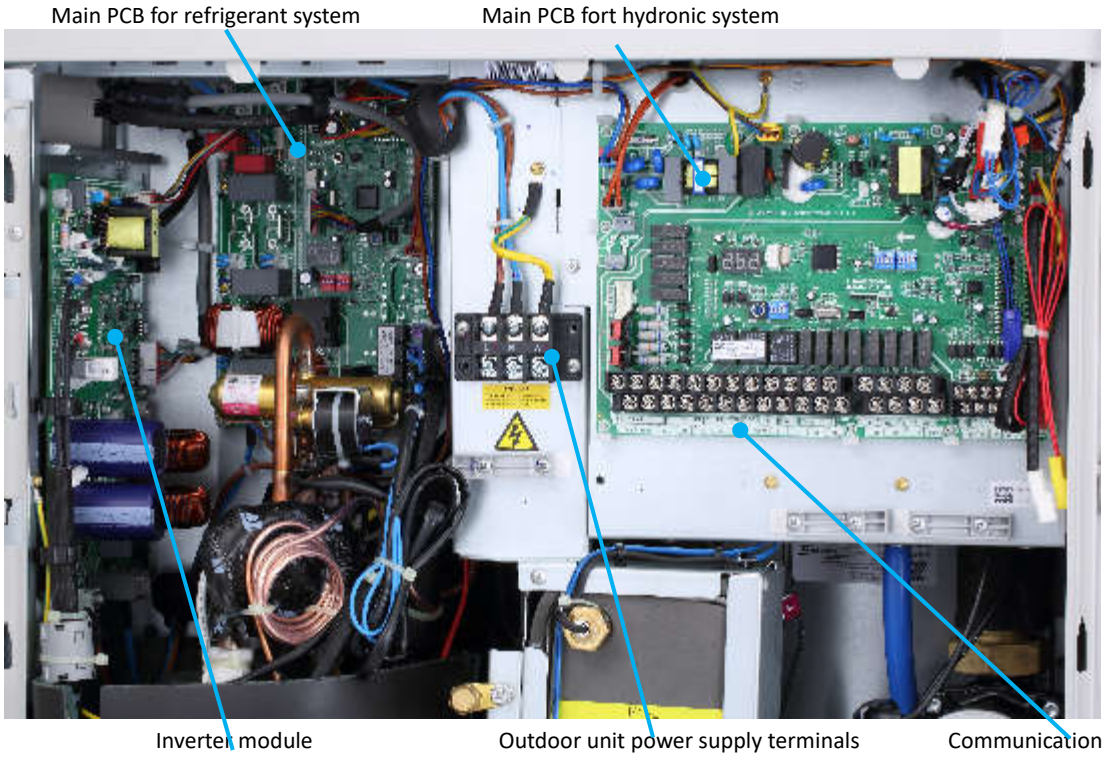
SMHM-40B/3 / SMHM-60B/3

Figure 4-1.1: Electric control box front view



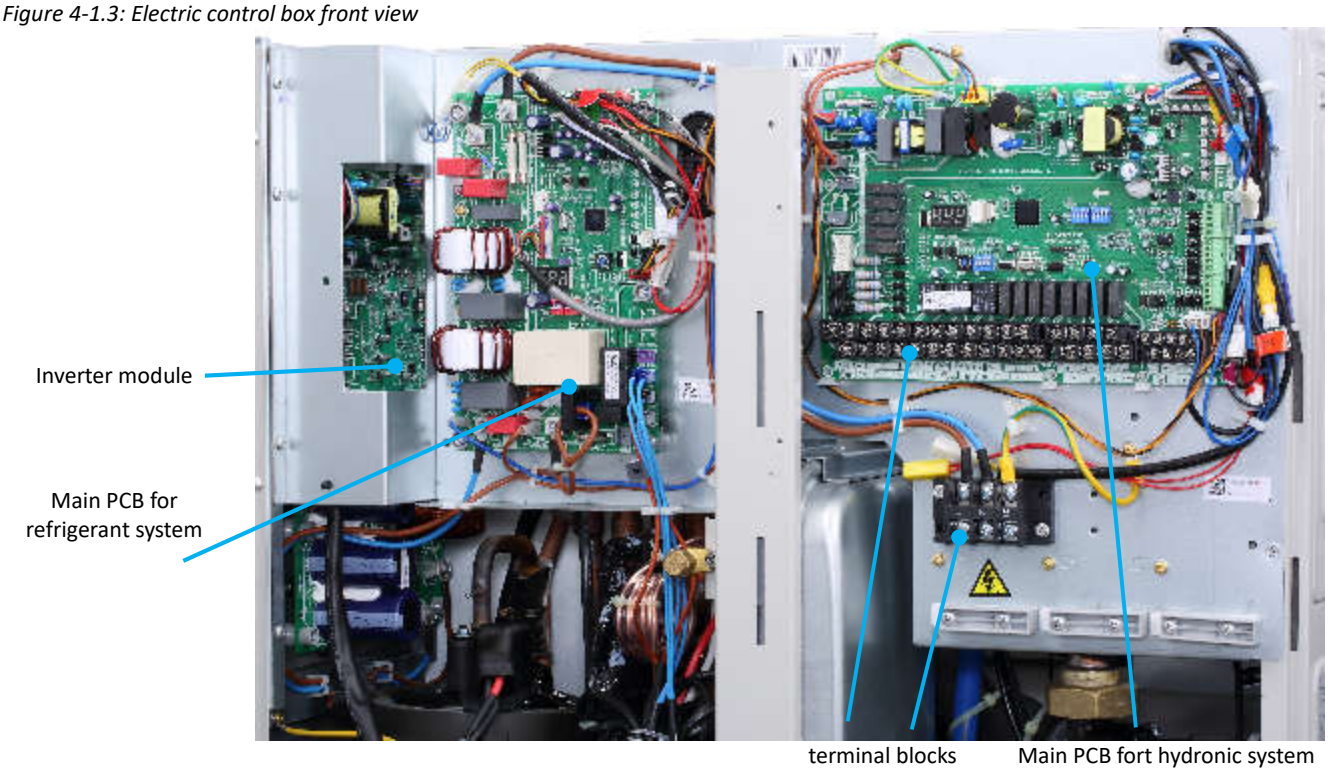
SMHM-80B/3 / SMHM-100B/3

Figure 4-1.2: Electric control box front view



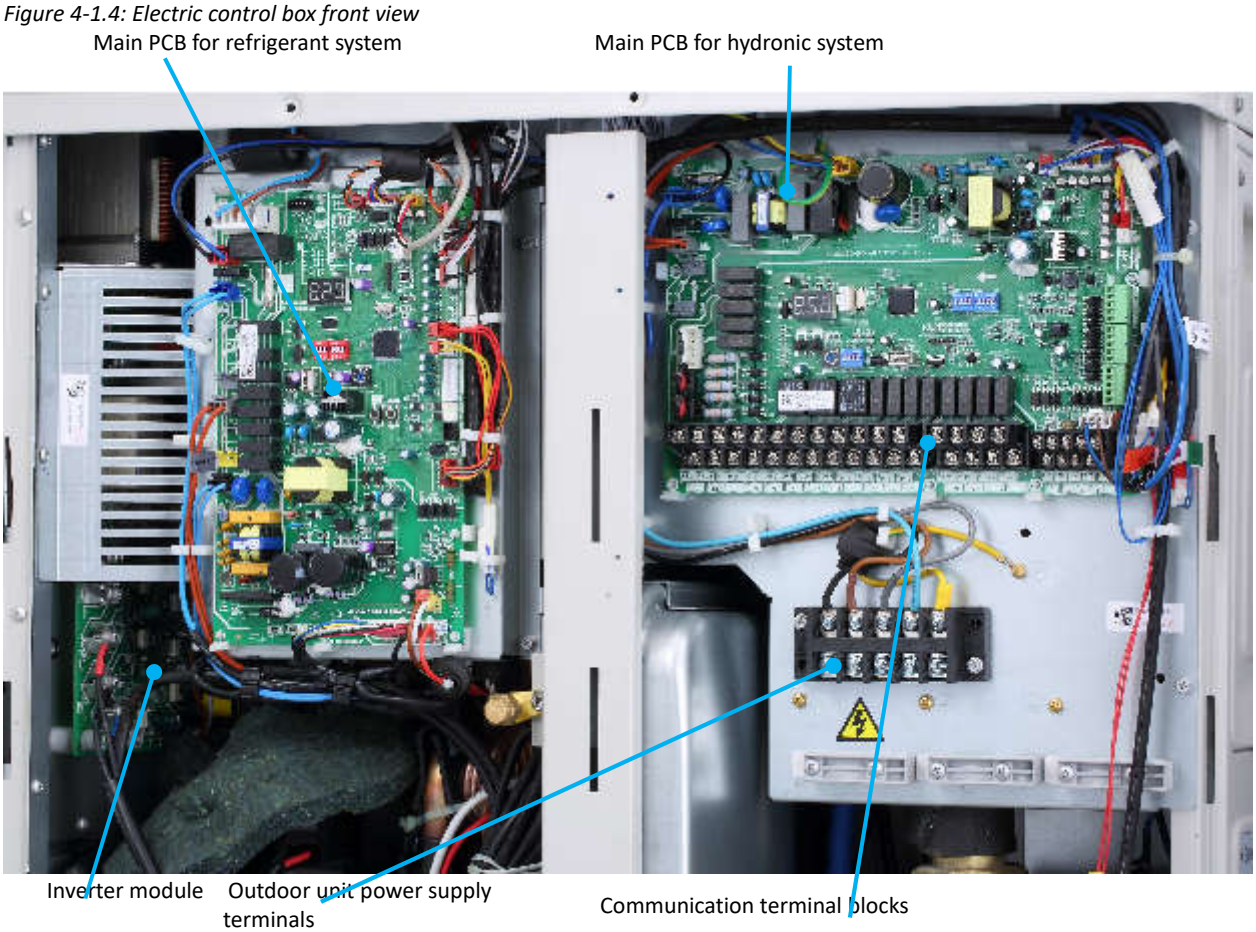
SMHM-120B/3 SMHM-140B/3 / SMHM-160B/3

Figure 4-1.3: Electric control box front view



SMHM-120B-3/9 / SMHM-140B-3/9 / SMHM-160B-3/9

Figure 4-1.4: Electric control box front view



13 Outdoor Unit PCBs

13.1 Types

Yukon Mono outdoor units have two main PCBs – one for the hydronic system and one for the refrigerant system. The hydronic system main PCB is the same on all Yukon Mono models.

The locations of each PCB in the outdoor unit electric control boxes are shown in Figures 4-1.1 to 4-1.4 in Part 4, 1 “Outdoor Unit Electric Control Box Layout”.

13.2 Main PCB for Hydronic System

Figure 4-2.1: Outdoor unit main PCB for hydronic system

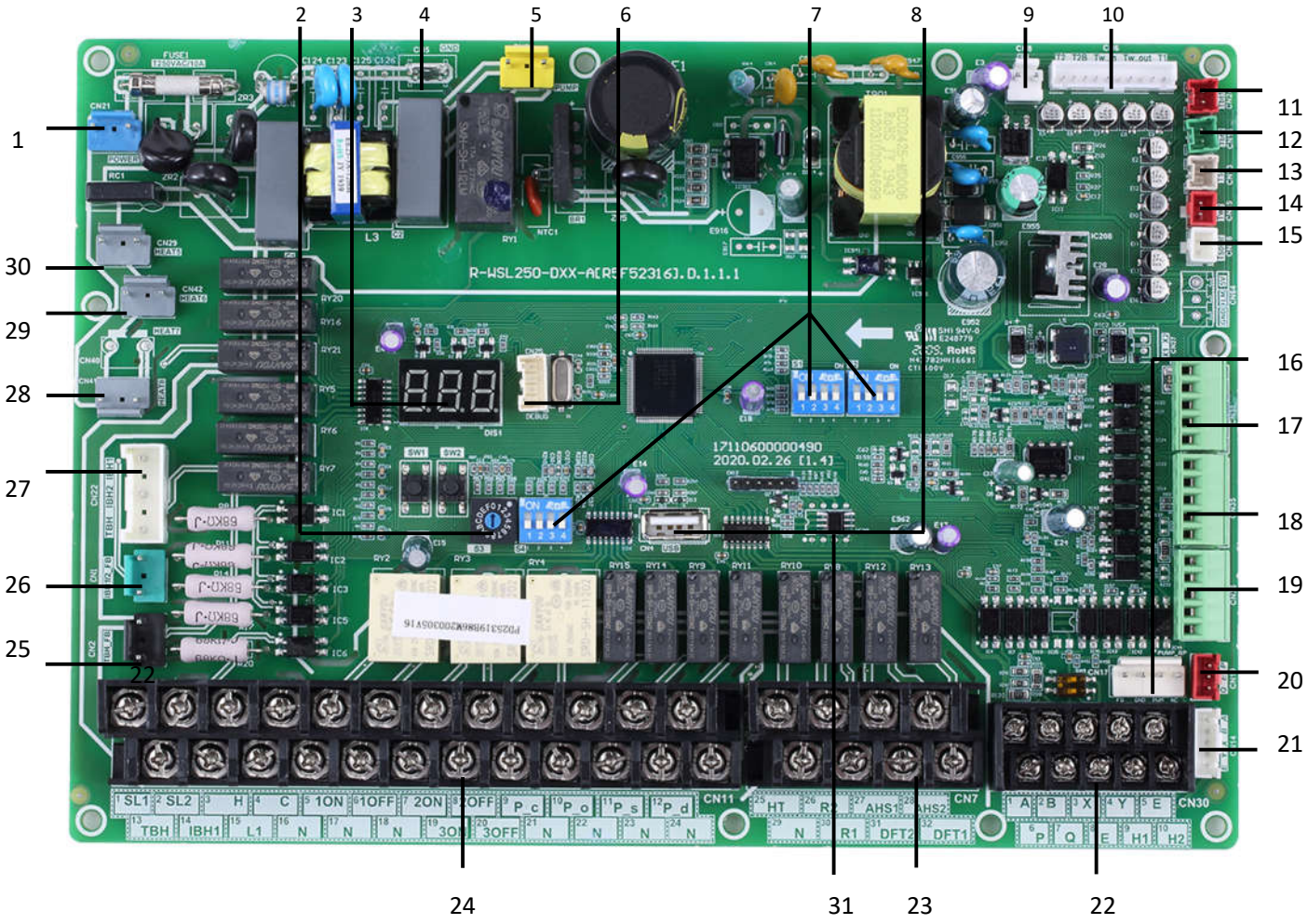


Table 4-2.1: Main PCB for hydronic system

Label in Figure 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 internal pump
6	CN25	Port for IC programming
7	S1,S2,S4	Dip switch
8	CN4	Port for USB
9	CN8	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 internal pump
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
27	CN22	Control port for backup heater/booster heater
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

13.3 Main PCBs for Refrigerant System, Inverter Modules and filter board

SMHM-40B/3 / SMHM-60B/3 / SMHM-80B/3 / SMHM-100B/3

Figure 4-2.2: outdoor unit main PCB for refrigerant system

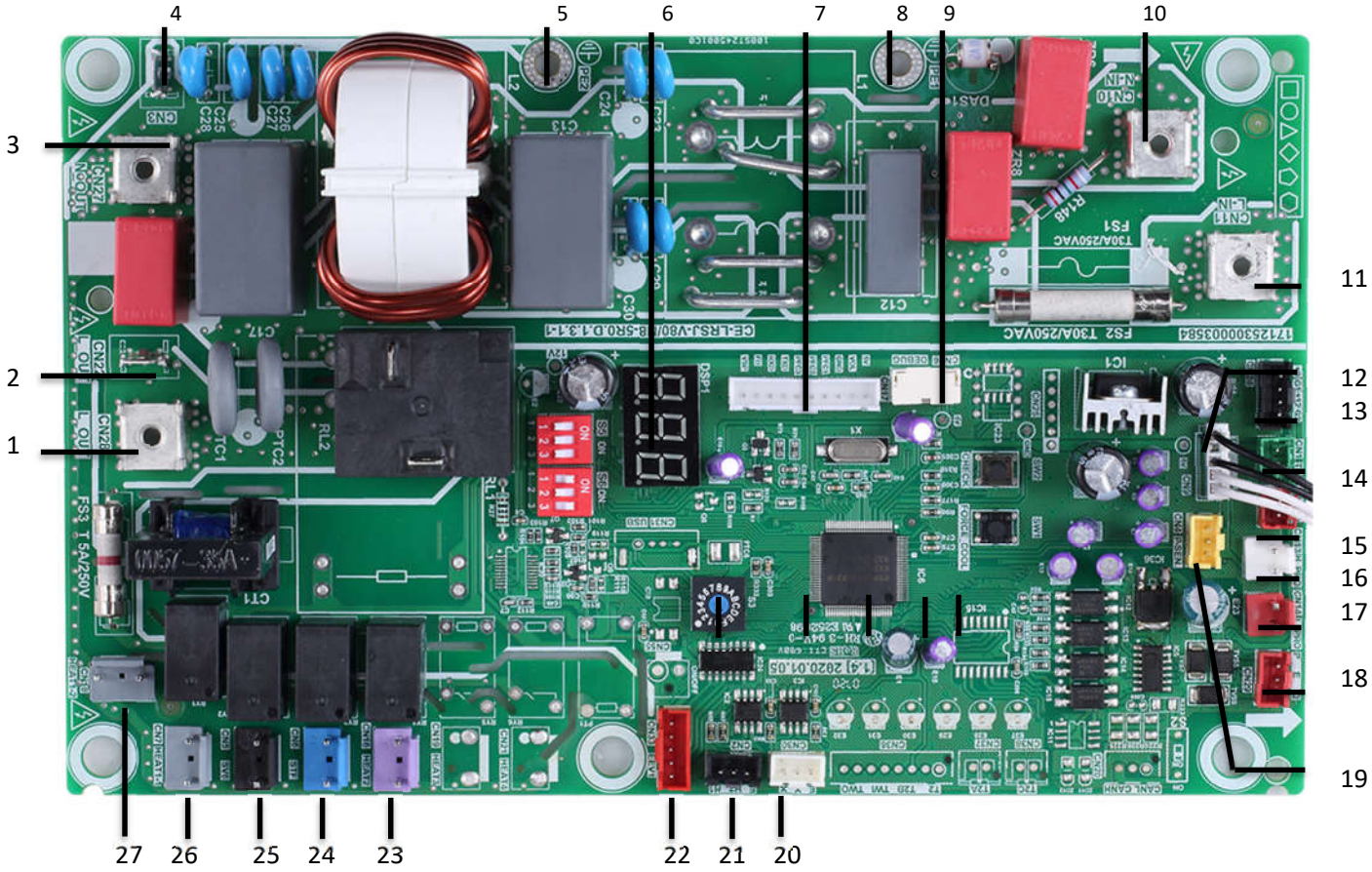


Table 4-2.2: outdoor unit main PCB for refrigerant system

Label in Figure 4-2.2	Code	Content
1	CN28	Output port L to MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM
2	CN22	Reserved
3	CN27	Output port N to MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM
4	CN3	Reserved
5	PE2	Port for ground wire
6	DSP1	Digital display
7	CN17	Port for communication with MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM
8	PE1	Port for ground wire
9	CN26	Port for IC programming
10	CN10	Input port for neutral wire
11	CN11	Input port for live wire
12	CN9	Port for outdoor ambient temp. sensor and condenser temp. sensor
13	CN24	Input port for +12V/9V
14	CN1	Port for suction temp. sensor
15	CN8	Port for discharge temp. sensor
16	CN13	Port for high pressure switch
17	CN14	Port for low pressure switch
18	CN29	Port for communication with hydro-box control board
19	CN4	Port for pressure sensor
20	CN30	Port for communication(reserved)
21	CN2	Port for communication(reserved)
22	CN33	Port for electrical expansion value
23	CN16	Reserved
24	CN6	Port for 4-way value
25	CN5	Port for SV6 value
26	CN7	Port for compressor electric heating tape 1
27	CN18	Port for compressor electric heating tape 2

Figure 4-2.3: outdoor unit inverter module

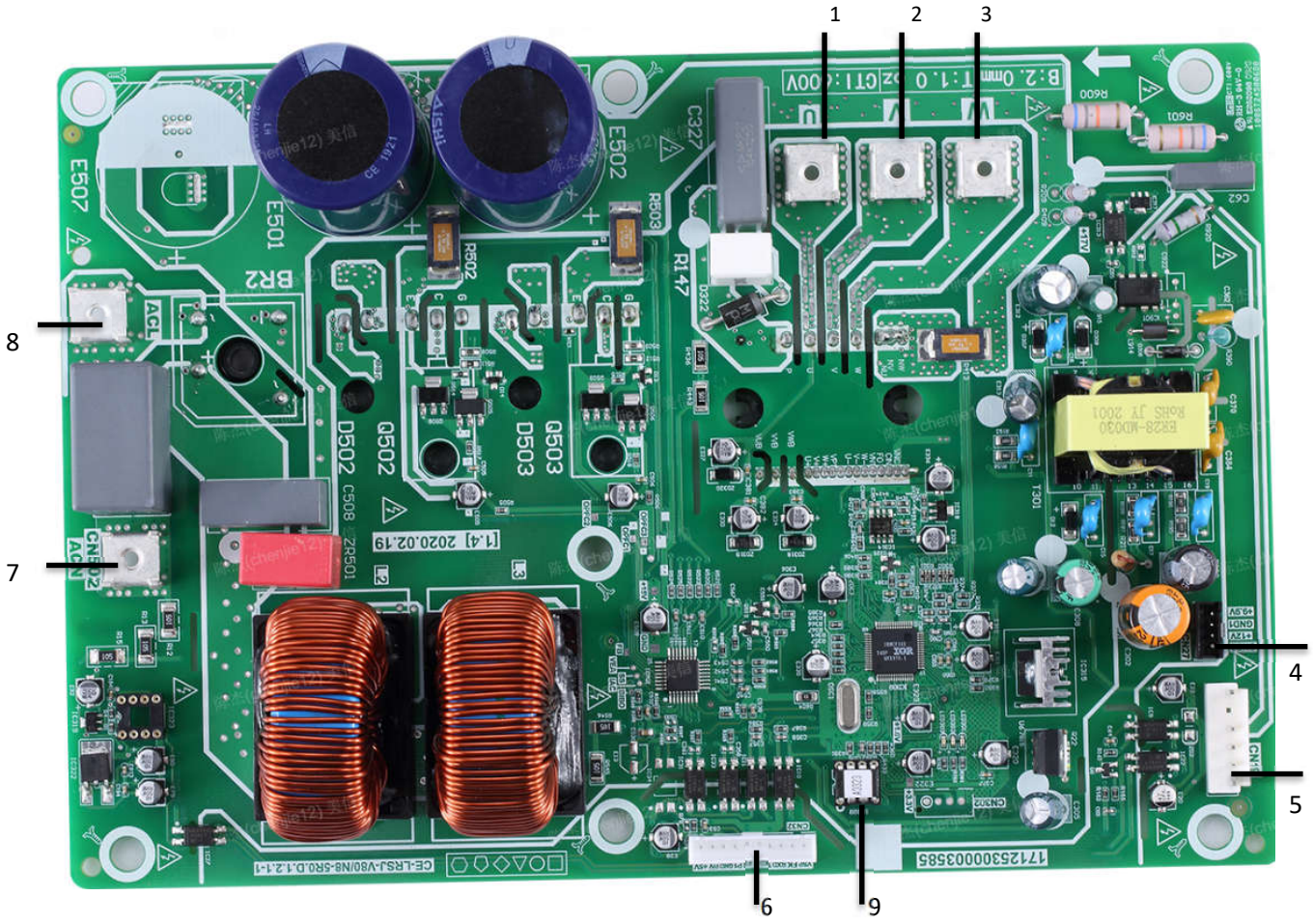


Figure 4-2.3: outdoor unit inverter module

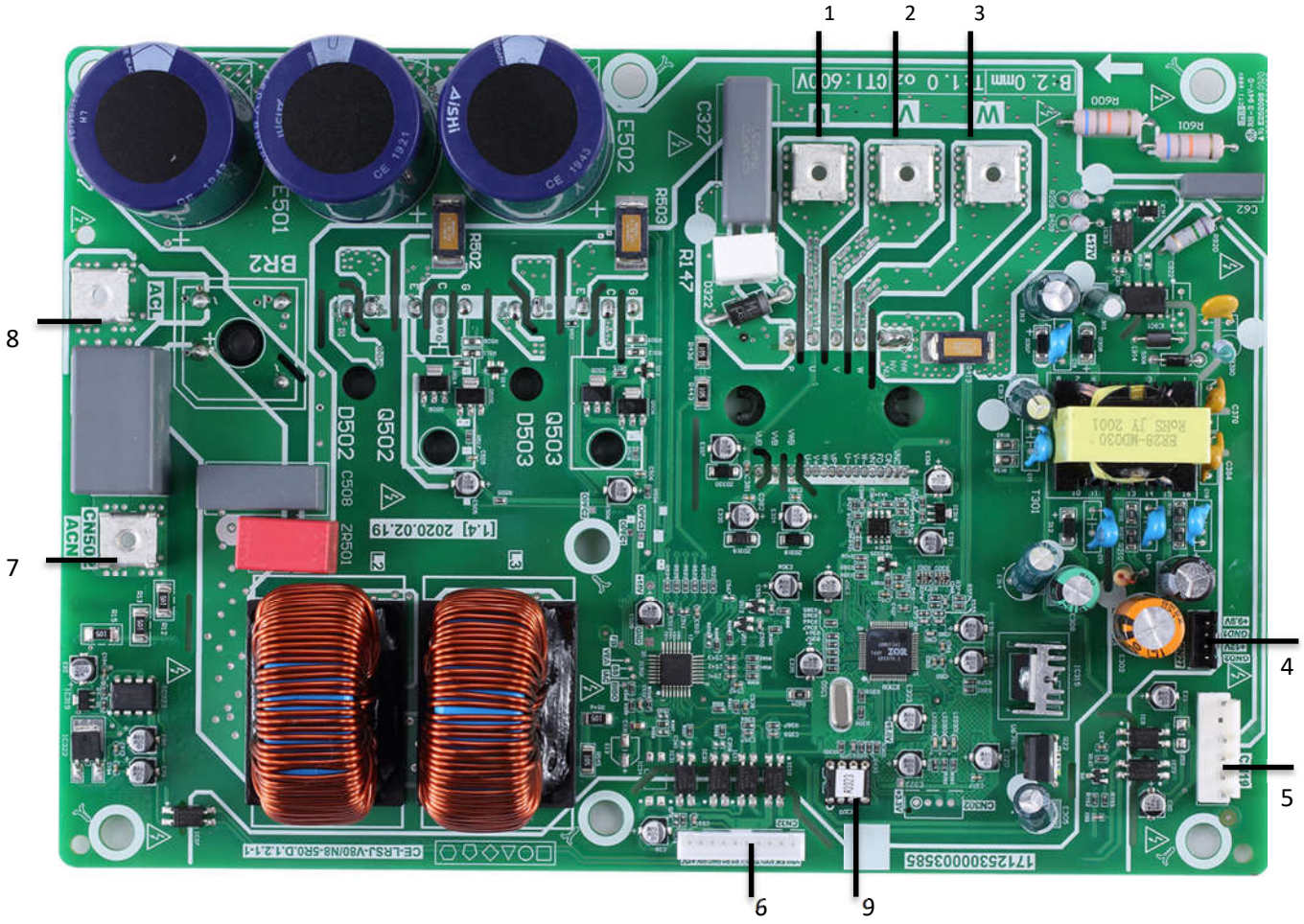


Table 4-2.3: outdoor unit inverter module

Label in Figure 4-2.5	Code	Content
1	U	Compressor connection port U
2	V	Compressor connection port V
3	W	Compressor connection port W
4	CN20	Output port for +12V/5V
5	CN19	Port for fan
6	CN32	Port for communication with FILTER BOARD
7	CN502	Input port L for rectifier bridge
8	CN501	Input port N for rectifier bridge
9	IC320	EEPROM

SMHM-120B/3 / SMHM-140B/3 / SMHM-160B/3

Figure 4-2.4: outdoor unit main PCB for refrigerant system[1]

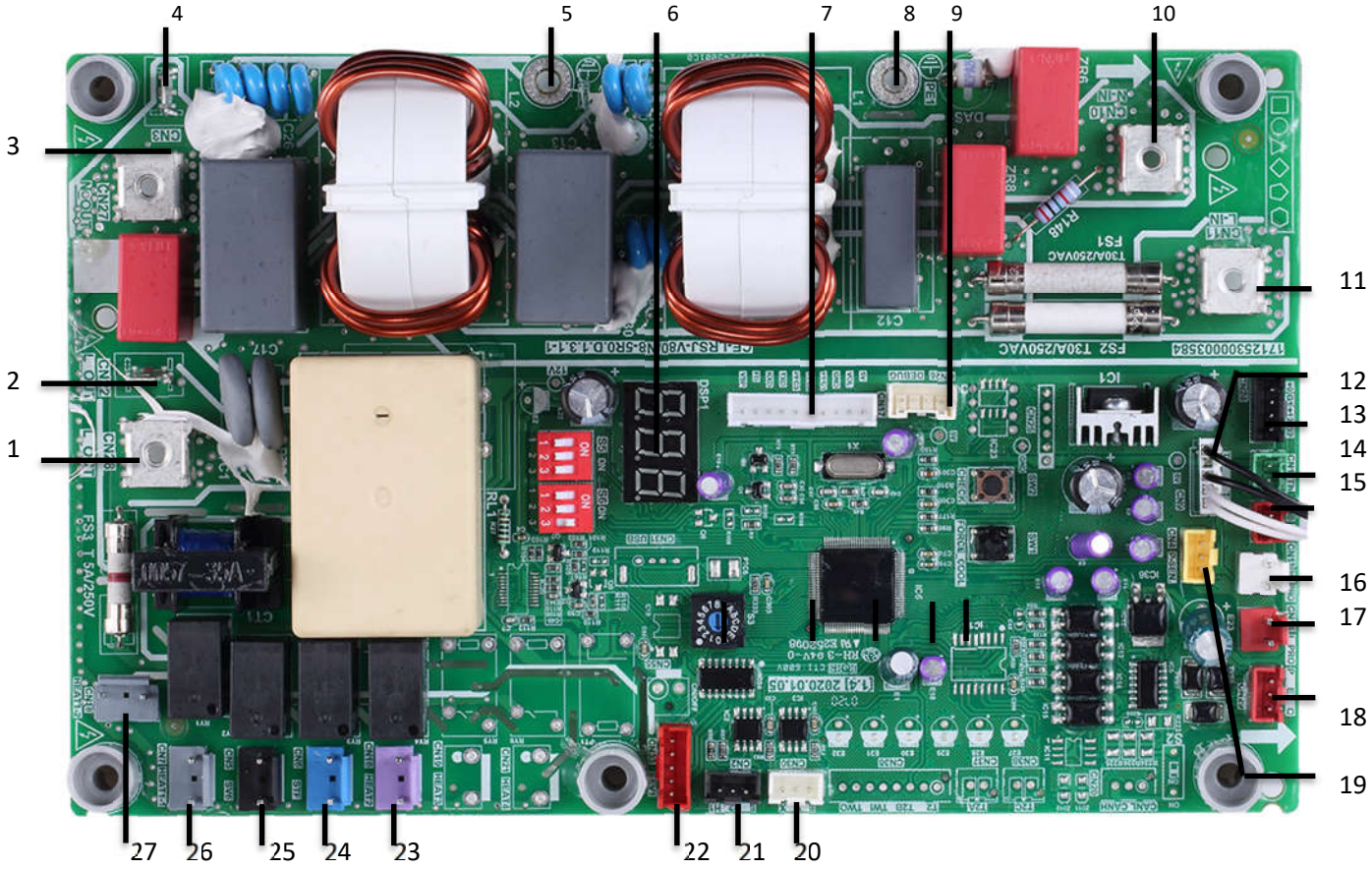


Table 4-2.4: outdoor unit main PCB for refrigerant system

Label in Figure 4-2.3	Code	Content
1	CN28	Output port L to MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM
2	CN22	Reserved
3	CN27	Output port N to MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM
4	CN3	Reserved
5	PE2	Port for ground wire
6	DSP1	Digital display
7	CN17	Port for communication with MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM
8	PE1	Port for ground wire
9	CN26	Port for IC programming
10	CN10	Input port for neutral wire
11	CN11	Input port for live wire
12	CN9	Port for outdoor ambient temp. sensor and condenser temp. sensor
13	CN24	Input port for +12V/9V
14	CN1	Port for suction temp. sensor
15	CN8	Port for discharge temp. sensor
16	CN13	Port for high pressure switch
17	CN14	Port for low pressure switch
18	CN29	Port for communication with hydro-box control board
19	CN4	Port for pressure sensor
20	CN30	Port for communication(reserved)
21	CN2	Port for communication(reserved)
22	CN33	Port for electrical expansion value
23	CN16	Reserved
24	CN6	Port for 4-way value
25	CN5	Port for SV6 value
26	CN7	Port for compressor electric heating tape 1
27	CN18	Port for compressor electric heating tape 2

Figure 4-2.5: outdoor unit inverter module

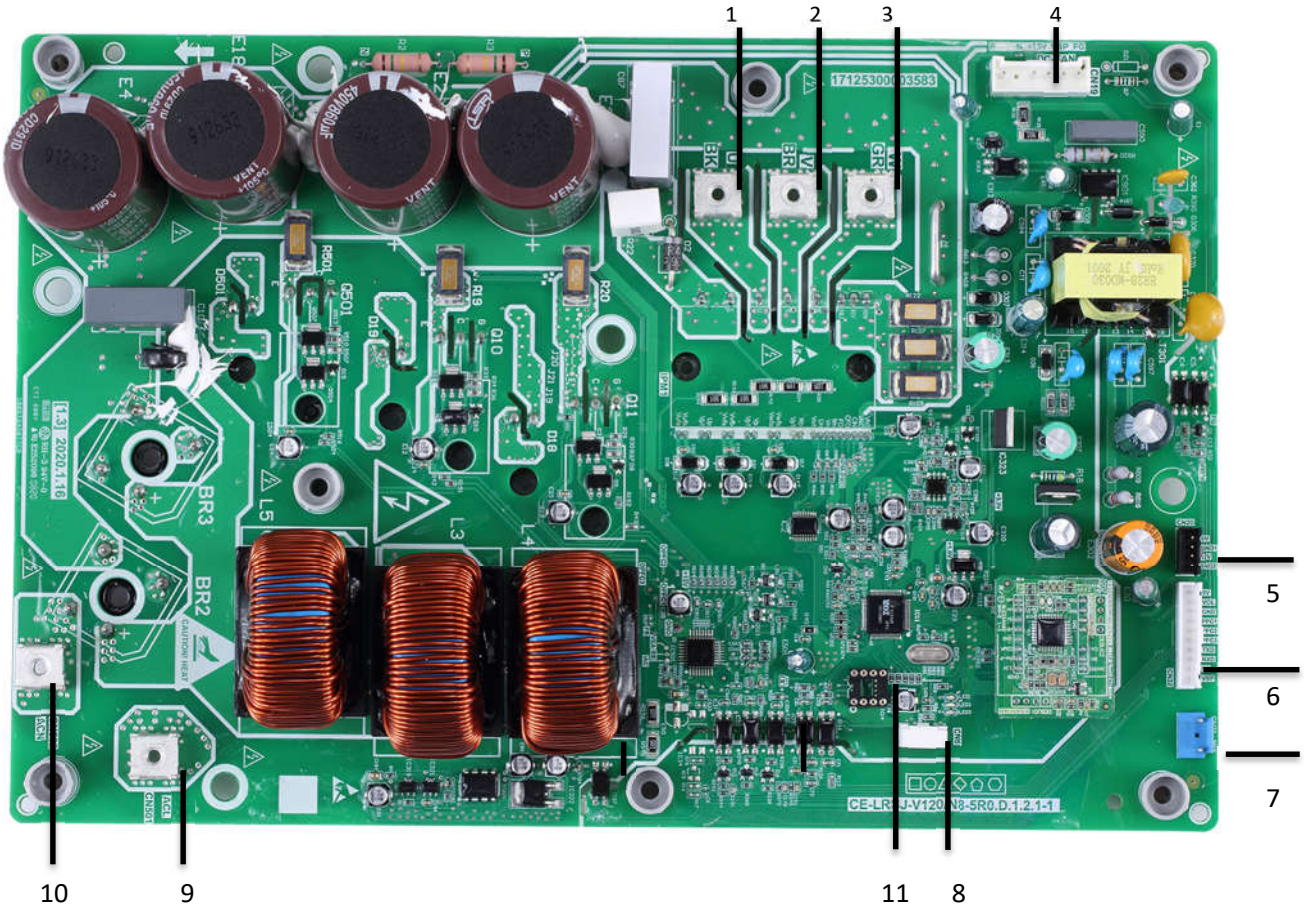


Table 4-2.5: outdoor unit inverter module

Label in Figure 4-2.6	Code	Content
1	U	Compressor connection port U
2	V	Compressor connection port V
3	W	Compressor connection port W
4	CN19	Port for fan
5	CN20	Output port for +12V/9V
6	CN32	Port for communication with FILTER BOARD
7	CN23	Port for high pressure switch
8	CN6	Reserved
9	CN501	Input port L for rectifier bridge
10	CN502	Input port N for rectifier bridge
11	IC14	EEPROM

SMHM-120B-3/9 / SMHM-140B-3/9 / SMHM-160B-3/9

Figure 4-2.6: B outdoor unit main PCB for refrigerant system [1]

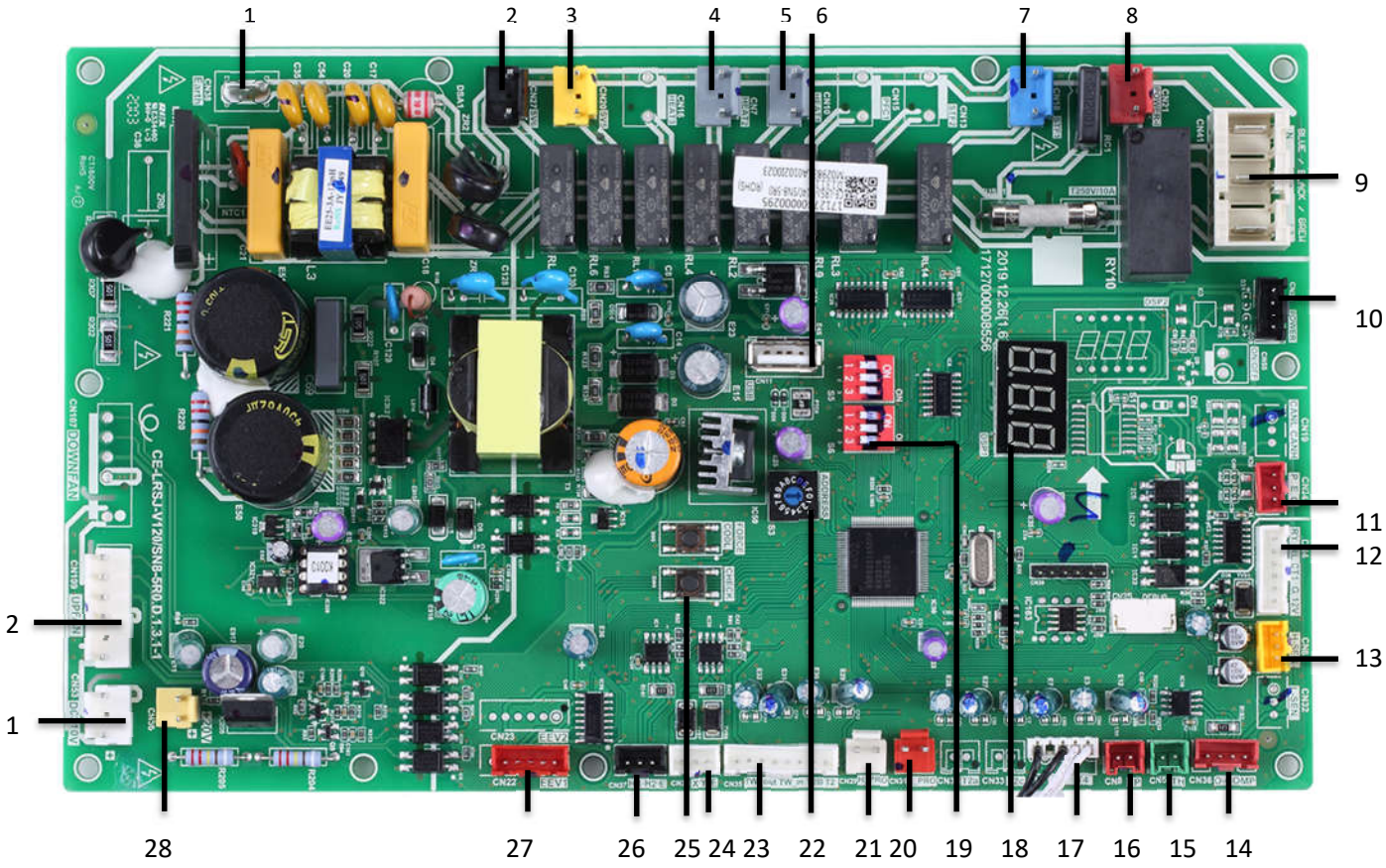


Table 4-2.6: outdoor unit main PCB for refrigerant system

Label in Figure 4-2.4	Code	Content
1	CN38	Port for GND
2	CN27	Port for 2-way valve 5
3	CN20	Port for 2-way valve 6
4	CN10	Port for electric heating tape1
5	CN7	Port for electric heating tape2
6	CN11	Port for IC programming
7	CN18	Port for 4-way value
8	CN21	Power supply port for hydro-box control board
9	CN41	Power supply port for FILTER BOARD
10	CN26	Port for communication with Power Meter
11	CN24	Port for communication with hydro-box control board
12	CN4	Port for communication with INVERT MODULE BOARD
13	CN6	Port for pressure sensor
14	CN36	Port for communication with MAIN CONTROL BOARD FOR REFRIGERANT SYSTEM(CN36)
15	CN4	Port for temp.sensor Tp(CN4)
16	CN8	Port for temp.sensor Th(CN8)
17	CN9	Port for outdoor ambient temp. sensor and condenser temp.sensor(CN9)
18	DSP1	Digital display(DSP1)
19	S5,S6	DIP switch(S5,S6)
20	CN31	Port for high pressure switch(CN31)
21	CN29	Port for low pressure switch and quick check(CN29)
22	S3	Rotary dip switch(S3)
23	CN35	Port for temp.sensors(TW_out, TW_in, T1, T2,T2B)
24	CN28	Port for communication XYE
25	S5, S6	DIP switch
26	CN37	Port for communication D1D2E
27	CN22	Port for electrical expansion value
28	CN30	Port for fan 15VDC power supply
29	CN53	Port for fan 310VDC power supply
30	CN107	Port for fan

Figure 4-2.7: outdoor unit inverter module

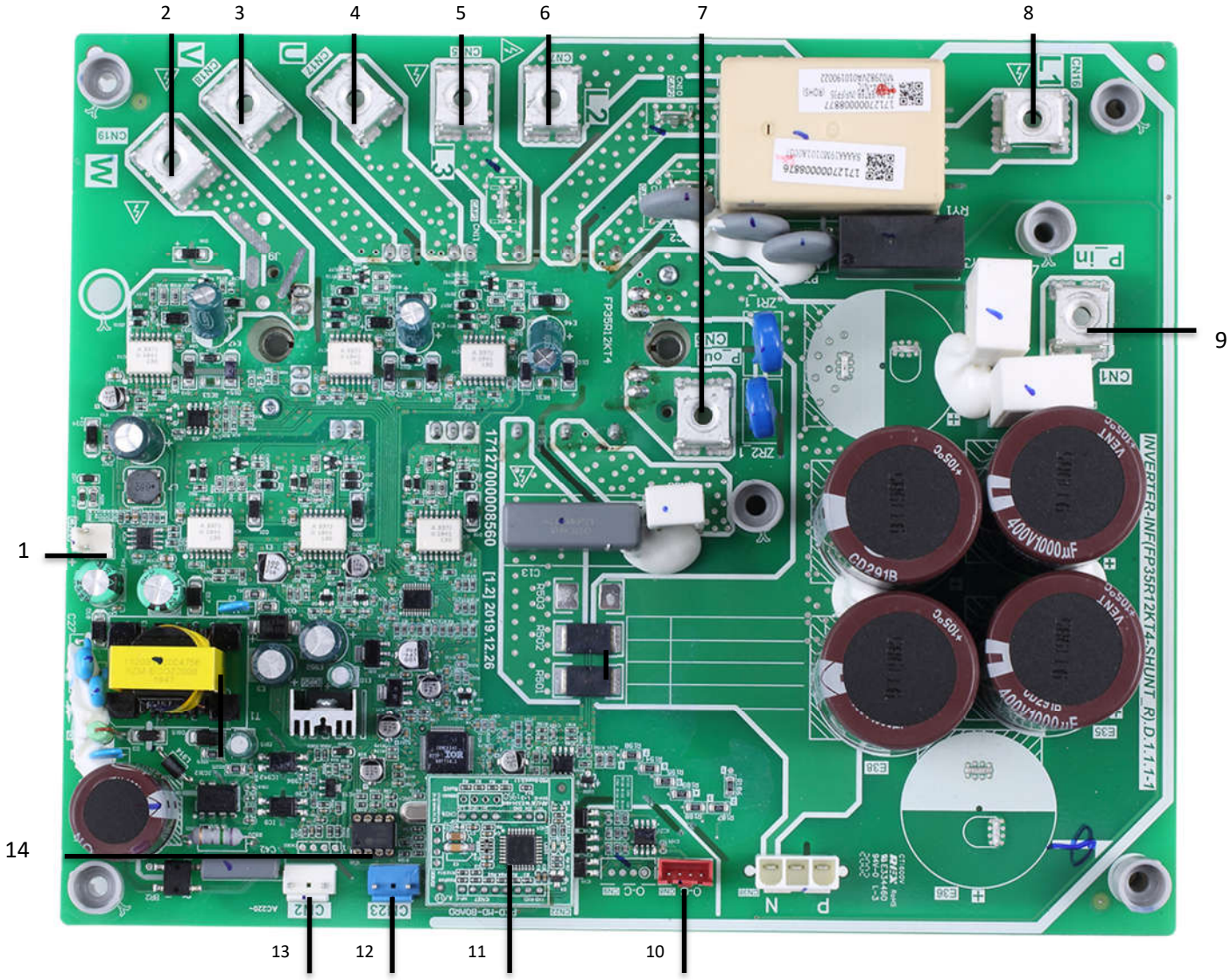


Table 4-2.7: outdoor unit inverter module

Label in Figure 4-2.7	Code	Content
1	CN4	Output port for +15V
2	W	Compressor connection port W
3	V	Compressor connection port V
4	U	Compressor connection port U
5	L1	Power Input port L1
6	L2	Power Input port L2
7	P_out	Input port P_out for IPM module
8	L3	Power Input port L3
9	P_in	Input port P_in for IPM module
10	CN1	Port for communication with FILTER BOARD
11	CN22	Power for PED board
12	CN2	Power for switching power supply
13	CN23	Input port for high pressure switch
14	IC25	EEPROM

Figure 4-2.8: outdoor unit filter board

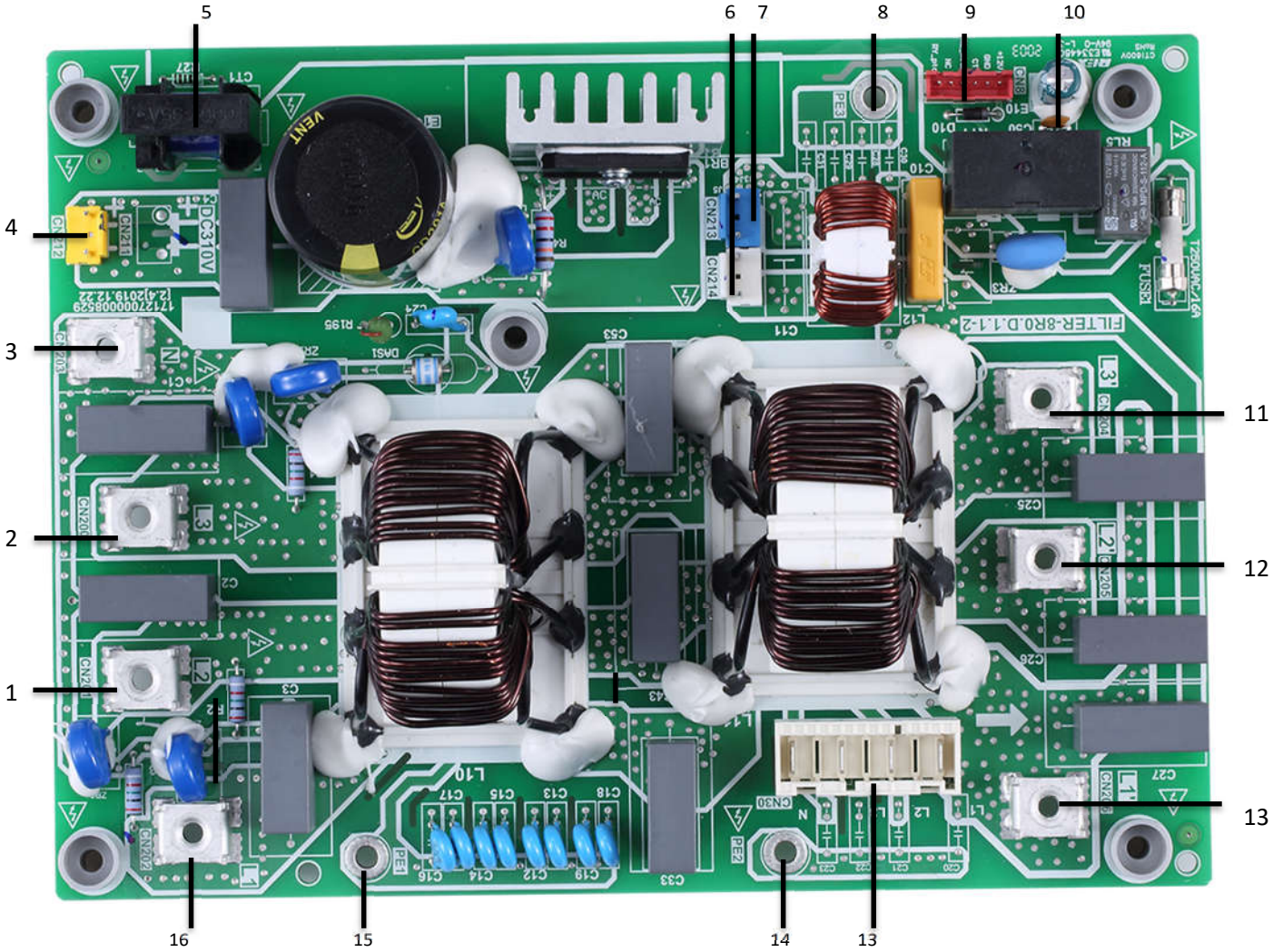


Table 4-2.8: outdoor unit filter board

Label in Figure 4-2.8	Code	Content
1	CN201	Power supply L2
2	CN200	Power supply L3
3	CN203	Power supply N
4	CN212	Power supply port of 310VDC
5	CN211	Power supply port for load
6	CN213	Port for FAN Reactor
7	CN214	Power supply port for Inverter module
8	PE3	Ground wire
9	CN8	Port for communication with FILTER BOARD
10	L3’	Power filtering L3
11	L2’	Power filtering L2
12	L1’	Power filtering L1
13	CN30	Power supply port for main control board
14	PE2	Ground wire
15	PE1	Ground wire
16	L1	Power supply L1

13.4 Digital Display Output

Table 4-2.9: 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	

13.5 DIP Switch Settings (Modbus function will be available in 2020-5-30)

The rotating coded switch S3(0-F) on the main control board of hydraulic module is used for setting the Modbus address. By defaulting the units have this coded switch positioned=0, but this corresponds to the Modbus address 16, while the others positions correspond the number, e.g. pos=2 is address 2, pos=5 is address 5.

Figure 4-2.9 Rotating switch



Figure 4-2.10: Connection

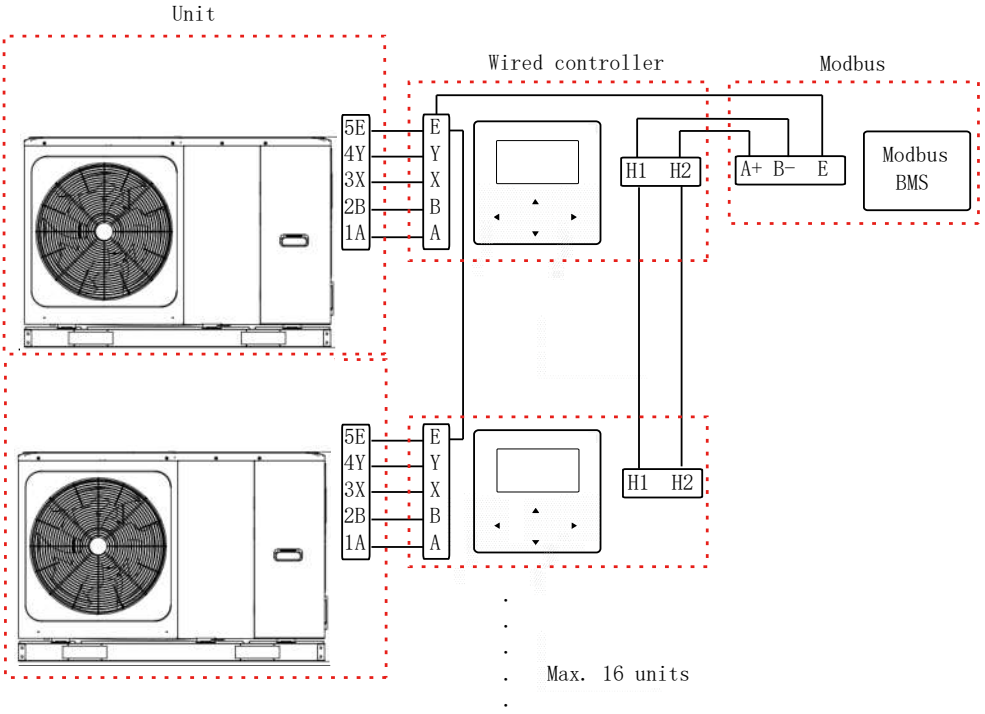
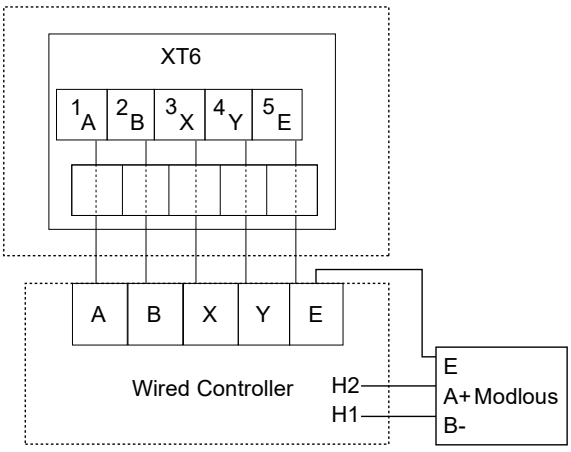


Figure 4-2.11: Wiring



14 Error Code Table

Table 4-3.1: Error code table

Error code	Serial number	Content[1]	Displayed on	Remarks
C7	65	Transducer module temperature too high protect	User interface and refrigerant system main PCB	Contact your local dealer
E0 E8	1 9	Water flow failure	User interface and hydronic system main PCB	
E1	2	Phase sequence error	User interface and refrigerant system main PCB	Only applies to 3-phase models
E2	3	Communication error between outdoor unit and user interface	User interface and hydronic system main PCB	
E3	4	Backup electric heater exchanger water outlet temperature sensor error	User interface and hydronic system main PCB	Sensor T1
E4	5	Domestic hot water tank temperature sensor error	User interface and hydronic system main PCB	Sensor T5
E5	6	Air side heat exchanger refrigerant outlet temperature sensor error	User interface and refrigerant system main PCB	Sensor T3
E6	7	Outdoor ambient temperature sensor error	User interface and refrigerant system main PCB	Sensor T4
E9	10	Suction pipe temperature sensor error	User interface and refrigerant system main PCB	Sensor Th
EA	11	Discharge pipe temperature sensor error	User interface and refrigerant system main PCB	Sensor Tp
Ed	14	Water side heat exchanger water inlet temperature sensor error	User interface and hydronic system main PCB	Sensor Tw_in
EE	15	Hydronic system EEPROM error	User interface and hydronic system main PCB	
F1	116	DC bus voltage is too low	User interface and refrigerant system main PCB	
H0	39	Communication error between refrigerant system main control chip and hydronic system main control chip	User interface, refrigerant system main control board for refrigerant system and hydronic system main PCB	
H1	40	Communication error between refrigerant system main control chip and inverter driver chip	User interface and refrigerant system main PCB	
H2	41	Water side heat exchanger refrigerant inlet (liquid pipe) temperature sensor error	User interface and hydronic system main PCB	Sensor T2
H3	42	Water side heat exchanger refrigerant outlet (gas pipe) temperature sensor error	User interface and hydronic system main PCB	Sensor T2B
H5	44	Room temperature sensor error	User interface and hydronic system main PCB	Sensor Ta
H6 HH	45 55	DC fan error	User interface and refrigerant system main PCB	
H7	46	Abnormal main circuit voltage	User interface and refrigerant system main PCB	

Table continued on next page …

Table 4-3.1: Error code table *(continued)*

H8	47	Pressure sensor error	User interface and refrigerant system main PCB	
H9	48	Zone 2 water outlet temperature sensor error	User interface and hydronic system main PCB	Sensor T1B
HA	49	Water side heat exchanger water outlet temperature sensor error	User interface and hydronic system main PCB	Sensor Tw_out
HF	54	Refrigerant system EEPROM error	User interface and refrigerant system main PCB	
P0 HP	20 57	Low pressure protection	User interface and refrigerant system main PCB	
P1	21	High pressure protection	User interface and refrigerant system main PCB	

P3	23	Compressor current protection	User interface and refrigerant system main PCB	
P4	24	Discharge temperature protection	User interface and refrigerant system main PCB	
P5	25	High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection	User interface and hydronic system main PCB	
P6 H4	26 43	Inverter module protection	User interface	Displayed on user interface when any of L0, L1, L2, L4, L5, L7, L8 or L9 occur
L0	-	Inverter module protection	Refrigerant system main PCB	
L1	-	DC bus low voltage protection	Refrigerant system main PCB	
L2	-	DC bus high voltage protection	Refrigerant system main PCB	
L4	-	MCE error	Refrigerant system main PCB	
L5	-	Zero speed protection	Refrigerant system main PCB	
L7	-	Phase sequence error	Refrigerant system main PCB	
L8	-	Compressor frequency variation greater than 15Hz within one second protection	Refrigerant system main PCB	
L9	-	Actual compressor frequency differs from target frequency by more than 15Hz protection	Refrigerant system main PCB	
Pb	31	Water side heat exchanger anti-freeze protection	User interface and hydronic system main PCB	
Pd	33	High temperature protection of refrigerant outlet temperature of condenser in cooling mode	User interface and refrigerant system main PCB	
PP	38	Water side heat exchanger inlet temperature is higher than outlet temperature in heating mode	user interface and hydronic system main PCB	
bH	112	PED board error		

Notes:

1. 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”.
2. When the error code appears, the error code corresponding to the error code can be obtained through the H1H2 port by using the host computer to query the wired controller register.

15 Troubleshooting

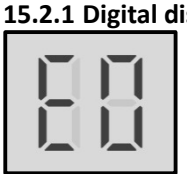
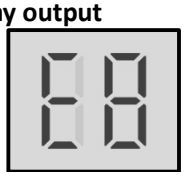
15.1 Warning

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.

15.2 E0, E8 Troubleshooting

15.2.1 Digital display output

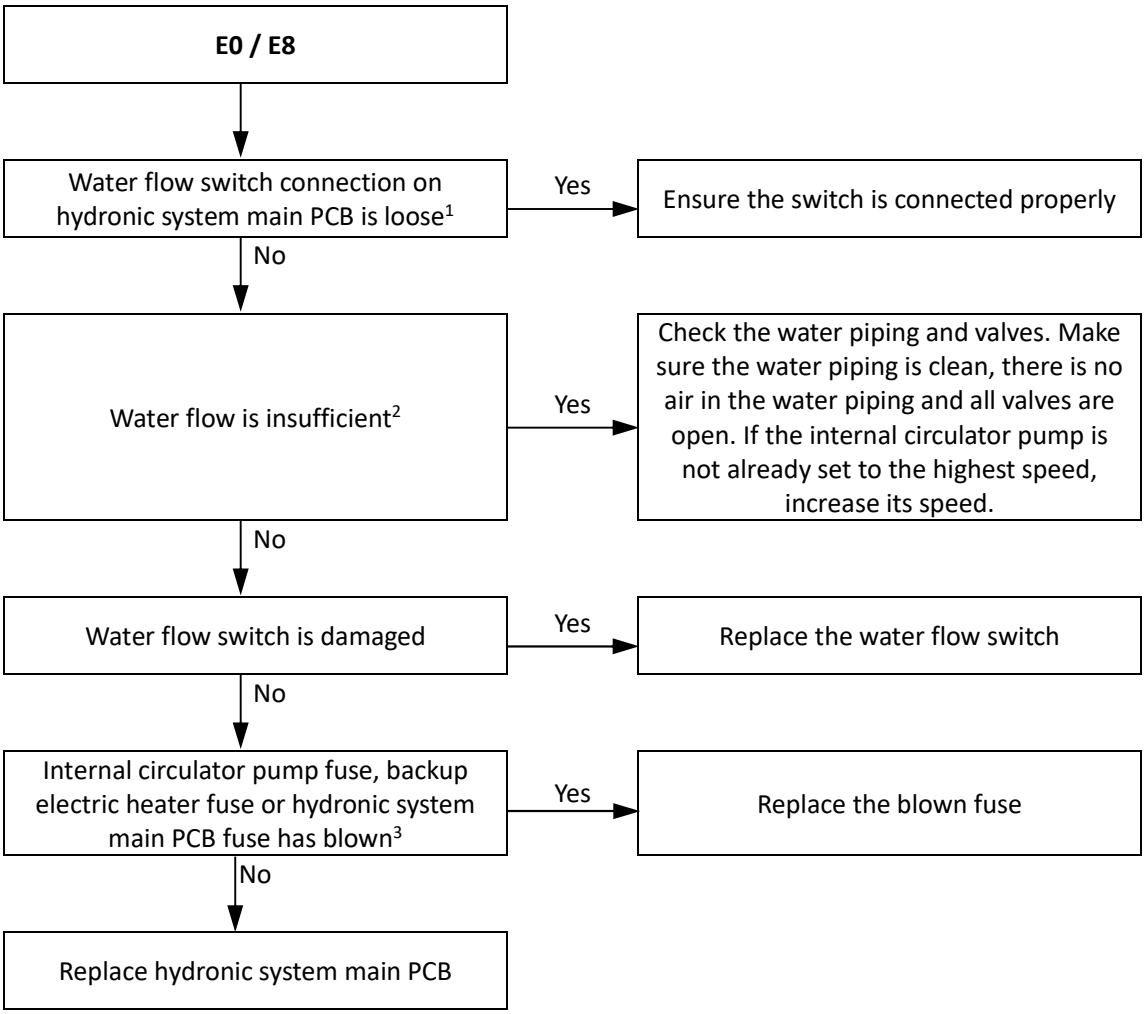
15.2.2 Description

- 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 control board for refrigerant system and user interface.

15.2.3 Possible causes

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

15.2.4 Procedure

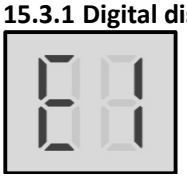


Notes:

1. Water flow switch connection is port CN8 on the main PCB for hydronic system (labeled 5 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”).
2. Check water pressure on the manometer. If the water pressure is not > 1 bar, water flow is insufficient. Refer to Figure 2-1.2 and 2-1.6 in Part 2, 1 “Layout of Functional Components”.
3. The fuse is labeled 25 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”.

15.3 E1 Troubleshooting

15.3.1 Digital display output



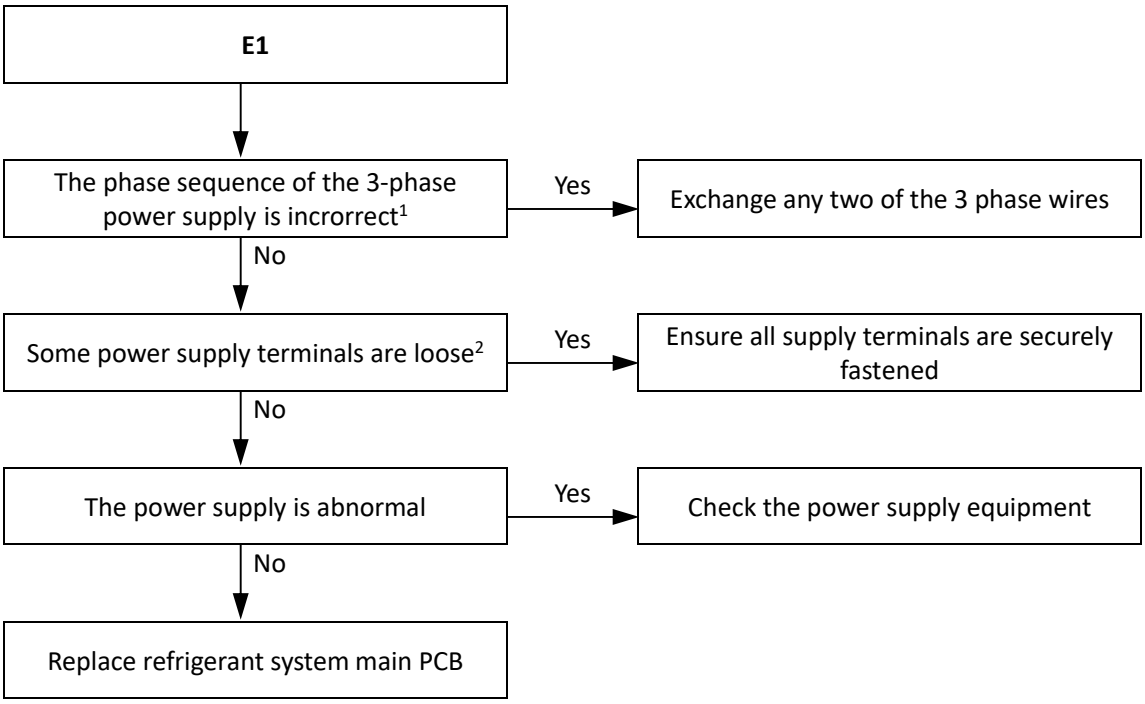
15.3.2 Description

- Phase sequence error.
- Only applies to 3-phase models.
- Yukon Mono stops running.
- Error code is displayed on refrigerant system main control board for refrigerant system and user interface.

15.3.3 Possible causes

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

15.3.4 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.

15.4 E2 Troubleshooting

15.4.1 Digital display output



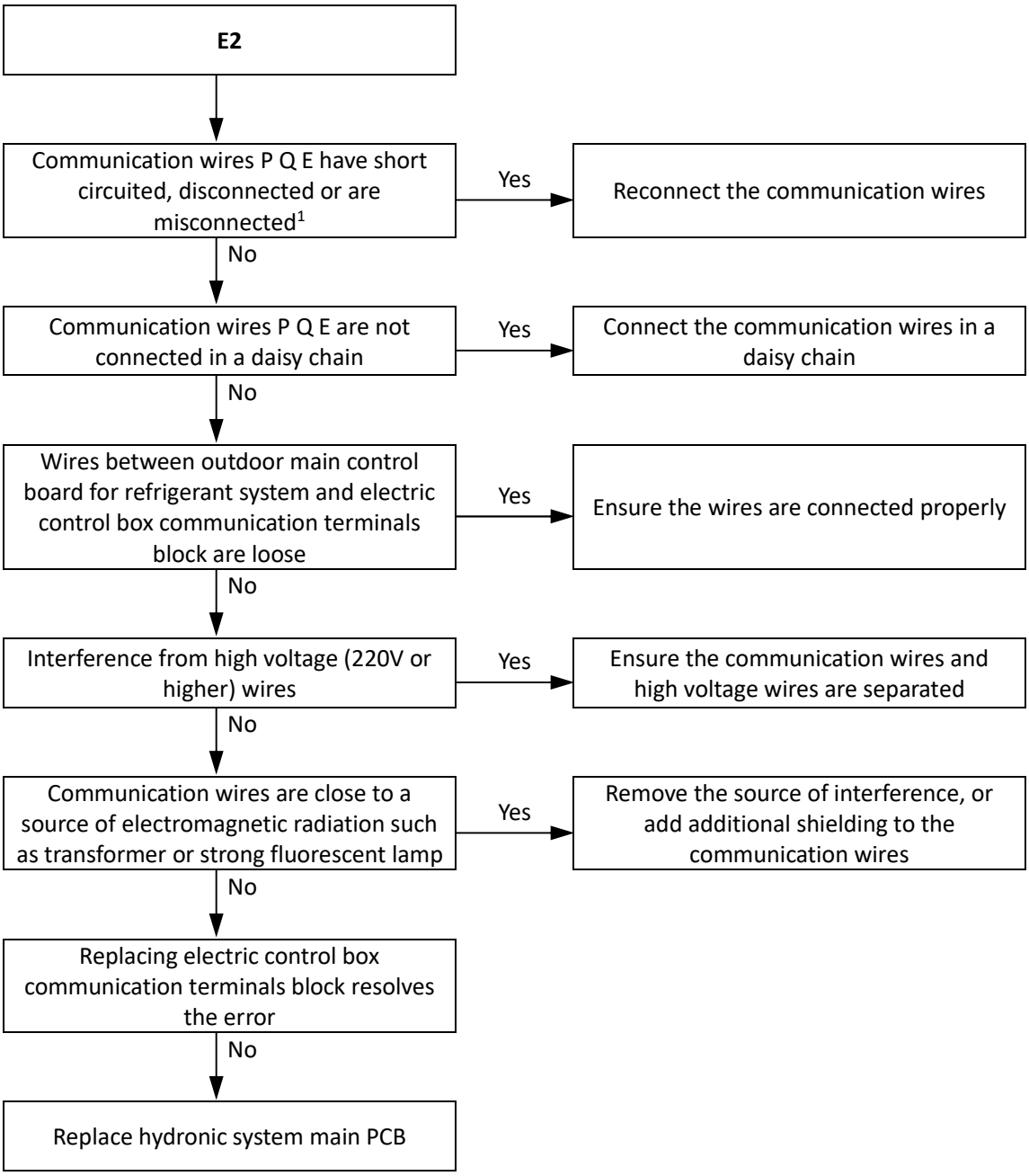
15.4.2 Description

- Communication error between outdoor unit and user interface.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main control board for refrigerant system and user interface.

15.4.3 Possible causes

- Communication wires between outdoor unit 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.

15.4.4 Procedure

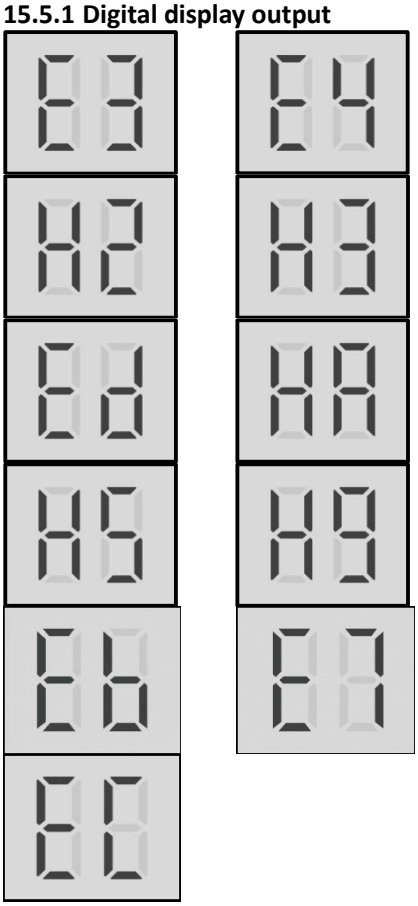


Notes:

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

15.5 E3, E4, H2, H3, Ed, HA, H5, H9 Troubleshooting

15.5.1 Digital display output



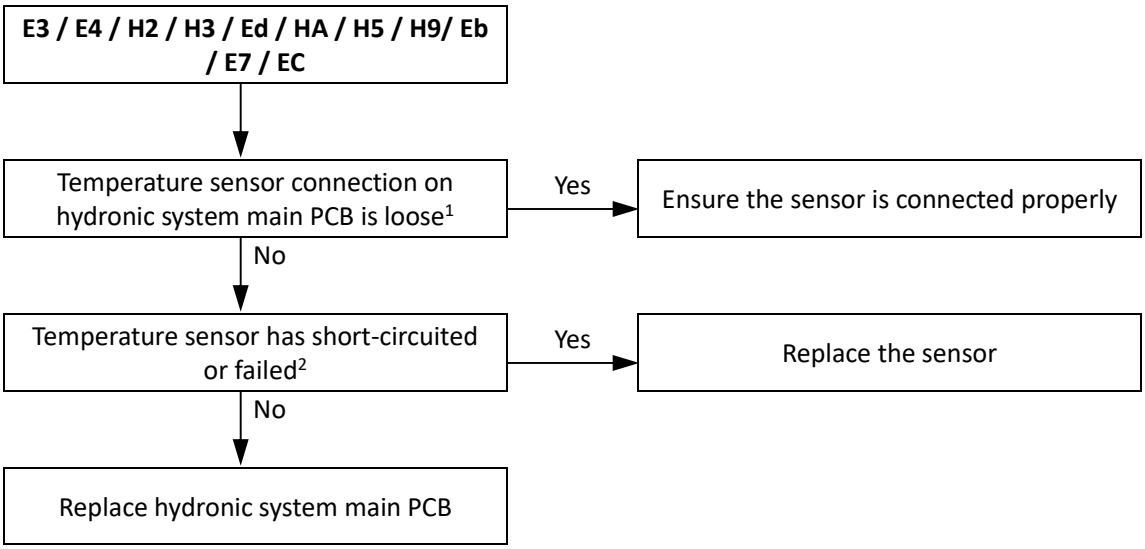
15.5.2 Description

- E3 indicates a backup electric heater water outlet 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 zone 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 control board for refrigerant system and user interface.

15.5.3 Possible causes

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

15.5.4 Procedure

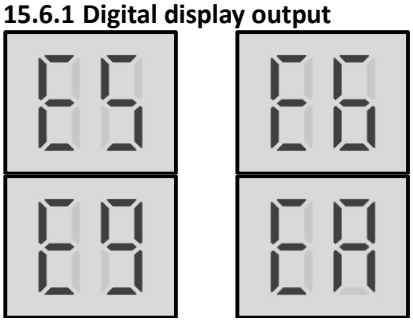


Notes:

1. Backup electric heater 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 8 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”). Domestic hot water tank temperature sensor connection is port CN13 on the hydronic system main PCB (labeled 9 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”). Circuit 2 water outlet temperature sensor connection is port CN15 on the hydronic system main PCB (labeled 10 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”). Room thermostat connection is port CN3 on the hydronic system main PCB (labeled 28 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”).
2. Measure sensor resistance. If the resistance is too low, 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 in Part 4, 5.1 “Temperature Sensor Resistance Characteristics”.

15.6 E5, E6, E9, EA Troubleshooting

15.6.1 Digital display output



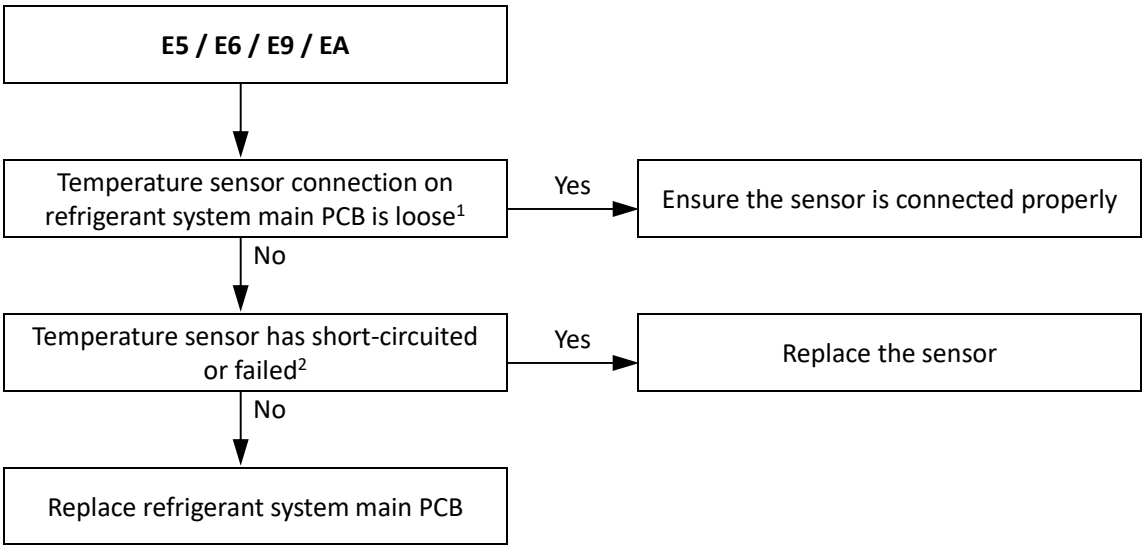
15.6.2 Description

- 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 refrigerant system main control board for refrigerant system and user interface.

15.6.3 Possible causes

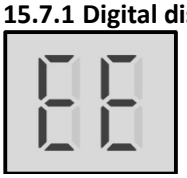
- Temperature sensor not connected properly or has malfunctioned.
- Damaged refrigerant system main PCB.

15.6.4 Procedure



15.7 EE Troubleshooting

15.7.1 Digital display output



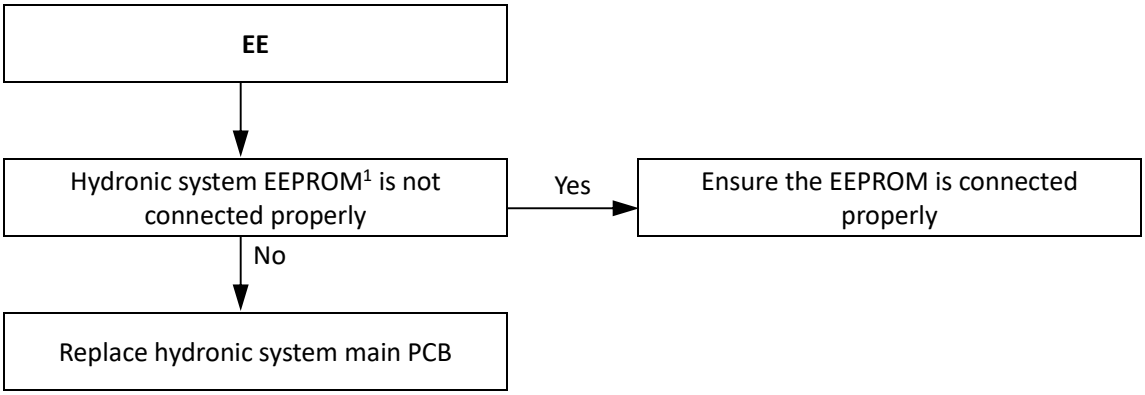
15.7.2 Description

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

15.7.3 Possible causes

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

15.7.4 Procedure



Notes:

1. Hydronic system main PCB EEPROM is designated IC18 on the hydronic system main PCB (labeled 29 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”).

15.8 F1 Troubleshooting

15.8.1 Digital display output



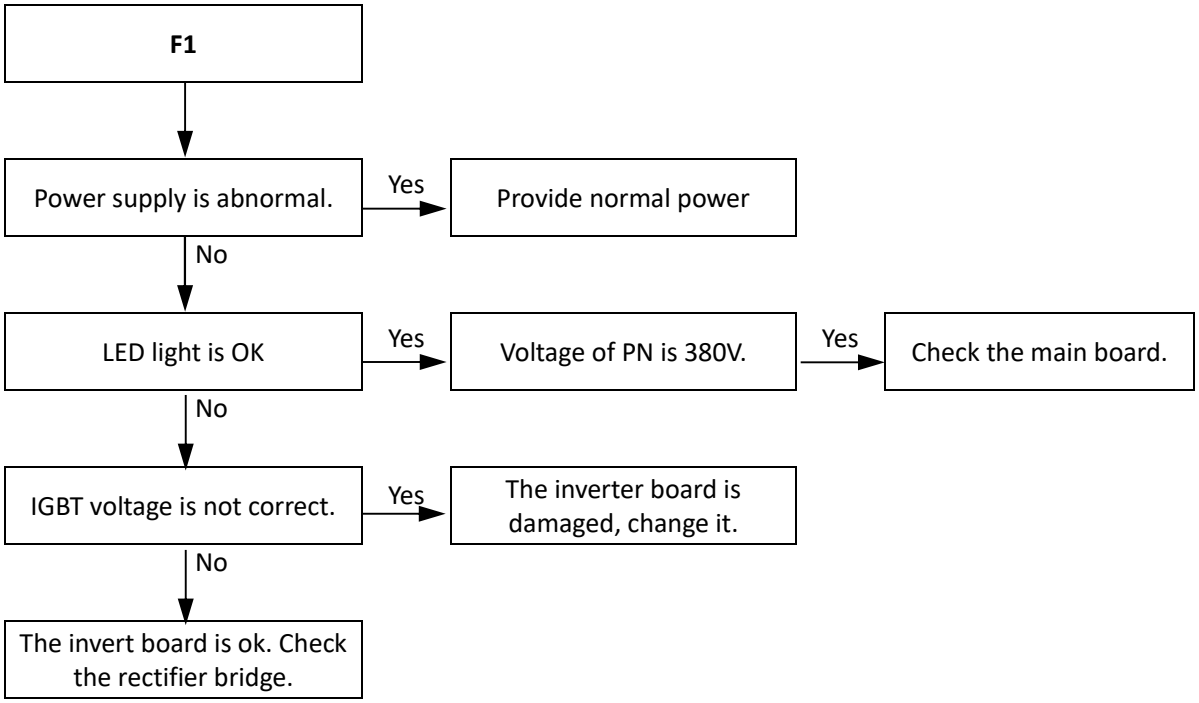
15.8.2 Description

- Low DC bus voltage.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main control board for refrigerant system and user interface.

15.8.3 Possible causes

- The DC bus voltage is too low.

15.8.4 Procedure



15.9 HF Troubleshooting

15.9.1 Digital display output



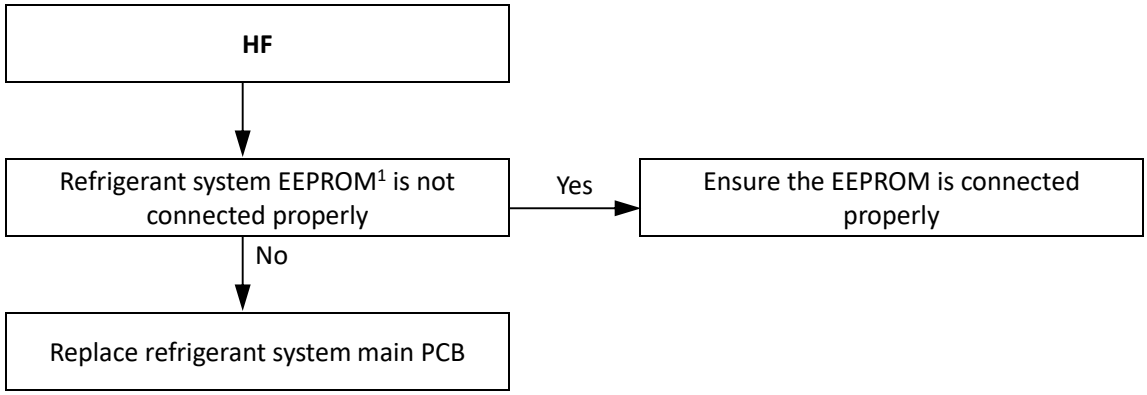
15.9.2 Description

- Refrigerant system EEPROM error.
- Yukon Mono stops running.
- Error code is displayed on refrigerant system main control board for refrigerant system and user interface.

15.9.3 Possible causes

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

15.9.4 Procedure

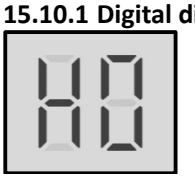


Notes:

1. Refrigerant system main PCB EEPROM is designated IC23 on the refrigerant system main PCBs (labeled 29 in Figure 4-2.2 in Part 4, 2.3 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards”), designed IC13 on the refrigerant system main PCBs (labeled 19 in Figure 4-2.4 in Part 4, 2.2 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards”), designed IC23 on the refrigerant system main PCBs (labeled 26 in Figure 4-2.6 in Part 4, 2.2 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards”).

15.10 H0 Troubleshooting

15.10.1 Digital display output



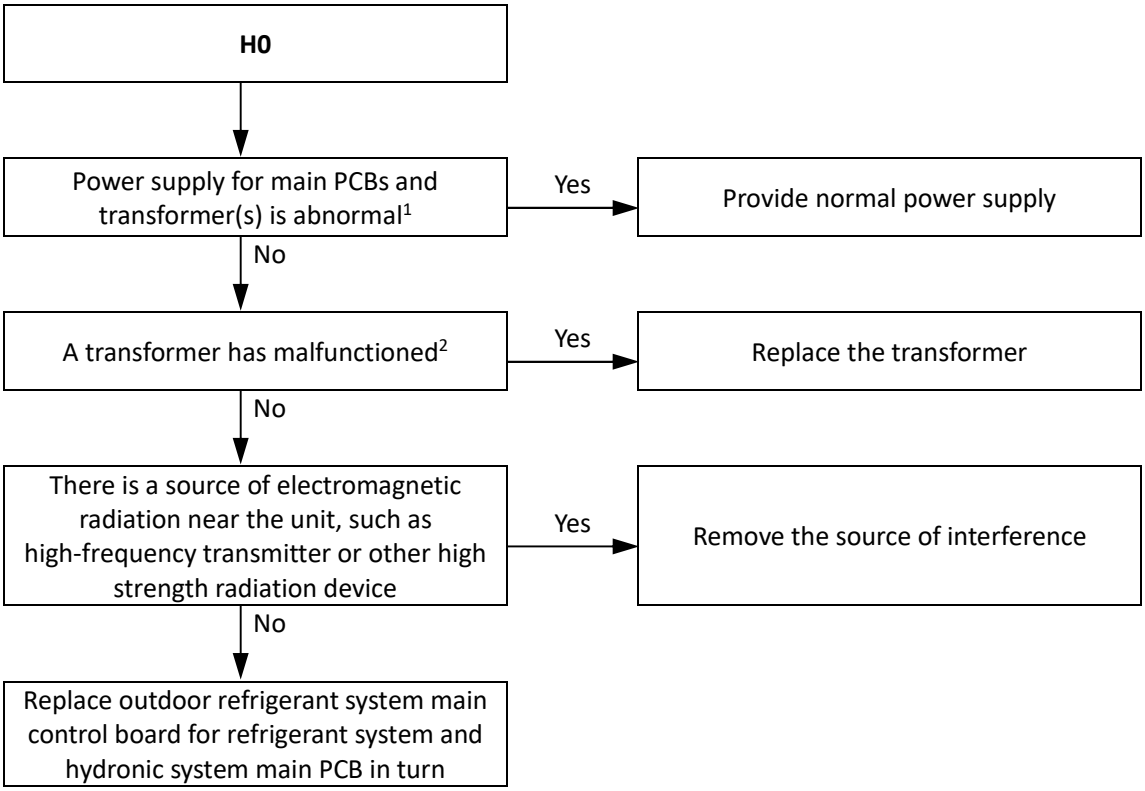
15.10.2 Description

- Communication error between refrigerant system main control chip and hydronic system main control chip.
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB, refrigerant system main control board for refrigerant system and user interface.

15.10.3 Possible causes

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

15.10.4 Procedure

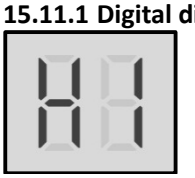


Notes:

1. Measure the voltages of transformer(s) input port and on the main PCB. The normal voltage between transformer input port terminals is 220V, between GND and 18V is 18V. If one or more of the voltages are not normal, the power supply for main control board for refrigerant system and transformer is abnormal.
2. Measure the voltages of transformer(s) output ports. If the voltages are not normal, the transformer has malfunctioned.

15.11 H1 Troubleshooting

15.11.1 Digital display output



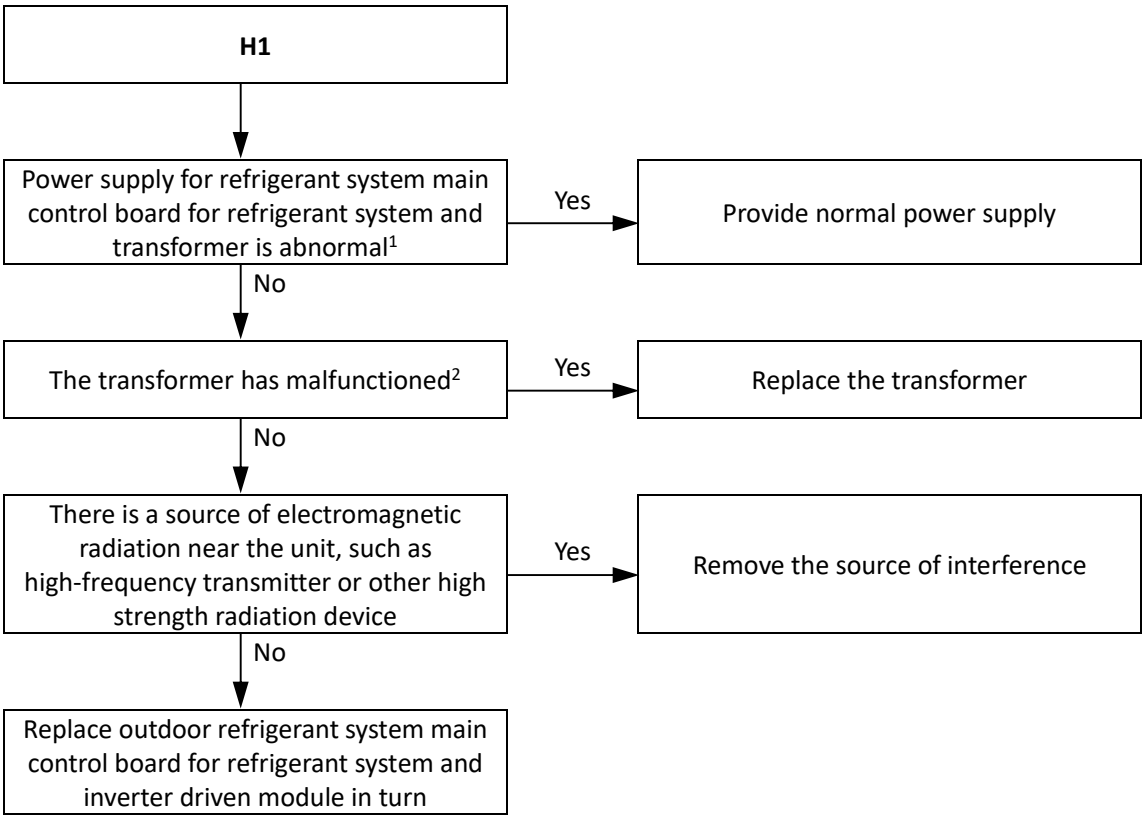
15.11.2 Description

- Communication error between refrigerant system main control chip and the inverter driver chip.
- Yukon Mono stops running.
- Error code H1 is displayed on refrigerant system main control board and user interface.

15.11.3 Possible causes

- Power supply abnormal.
- Transformer malfunction.
- Interference from a source of electromagnetic radiation.
- Refrigerant system main PCB or inverter driven module damaged.

15.11.4 Procedure

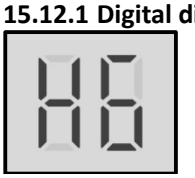


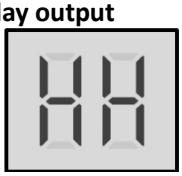
Notes:

1. Measure the voltages of transformer input port and on the main PCB. The normal voltage between transformer input port terminals is 220V, output two sets of voltages 11V and 17V. If one or more of the voltages are not normal, the power supply for main control board for refrigerant system and transformer is abnormal.
2. Measure the voltages of transformer output ports. If the voltages are not normal, the transformer has malfunctioned.

15.12 H6, HH Troubleshooting

15.12.1 Digital display output





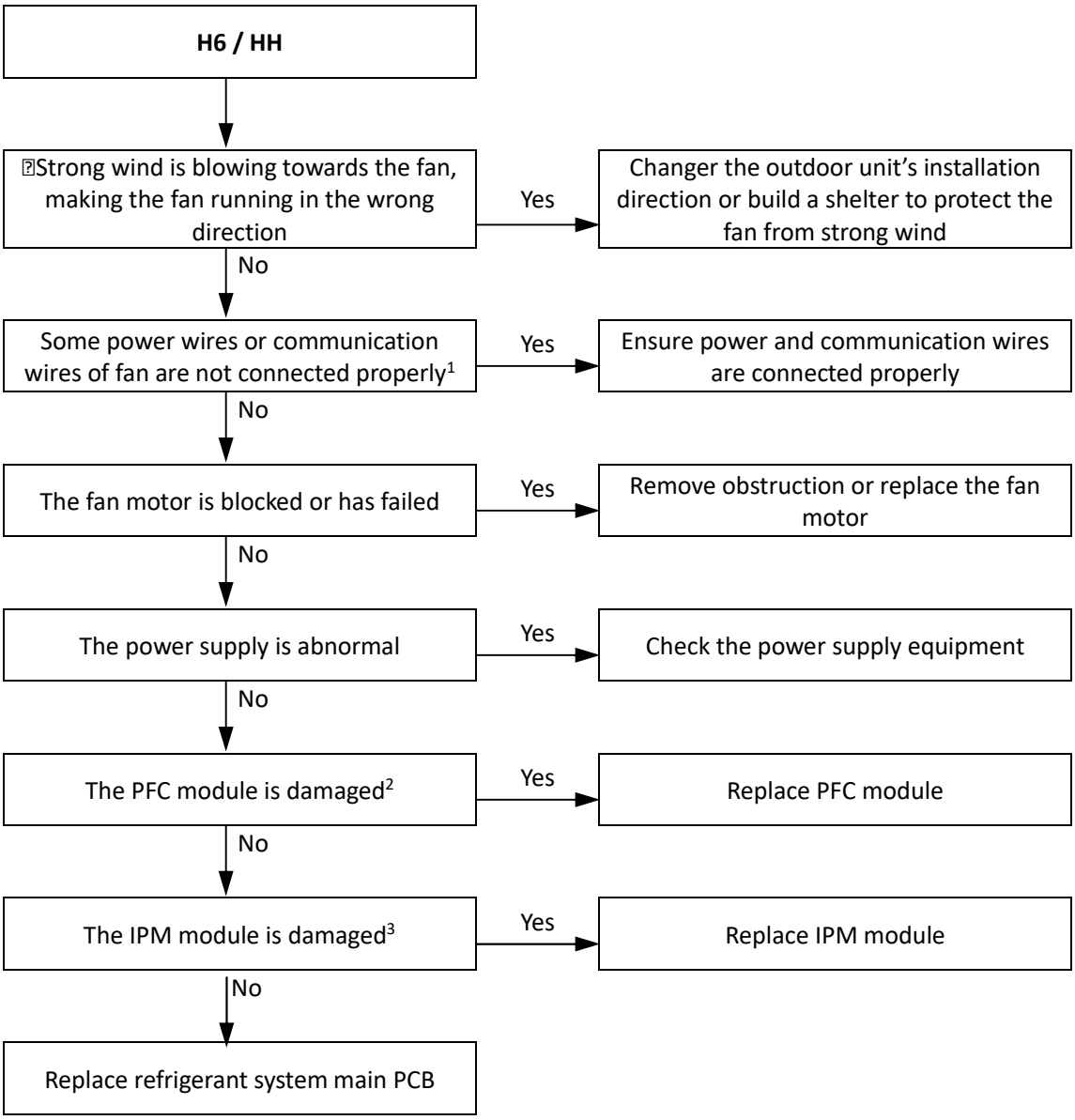
15.12.2 Description

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

15.12.3 Possible causes

- Power or communication wires not connected properly.
- High wind speed.
- Fan motor blocked or has failed.
- Power supply abnormal.
- PFC module damaged.
- IPM module damaged.
- Main PCB damaged.

15.12.4 Procedure

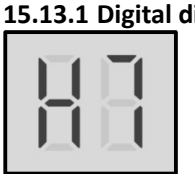


Notes:

1. Refer to Figures 4-1.1 to 4-1.7 in Part 4, 1 "Outdoor Unit Electric Control Box Layout" and to the Yukon Mono Engineering Data Book, Part 2, 5 "Wiring Diagrams".
2. Only applies to single-phase power supply models. Check the voltage between "+" and "-" terminals on the PFC module on the inverter module. The normal range is 277V to 354V. If the voltage is outside this range, the PFC module is damaged.
3. 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. The fan connections on each type of refrigerant system main control board for refrigerant system are labelled in Figures 4-2.2, 4-2.4 and 4-2.6 in Part 4, 2.3 "Main PCBs for Refrigerant System, Inverter Modules and Filter Boards".

15.13 H7 Troubleshooting

15.13.1 Digital display output



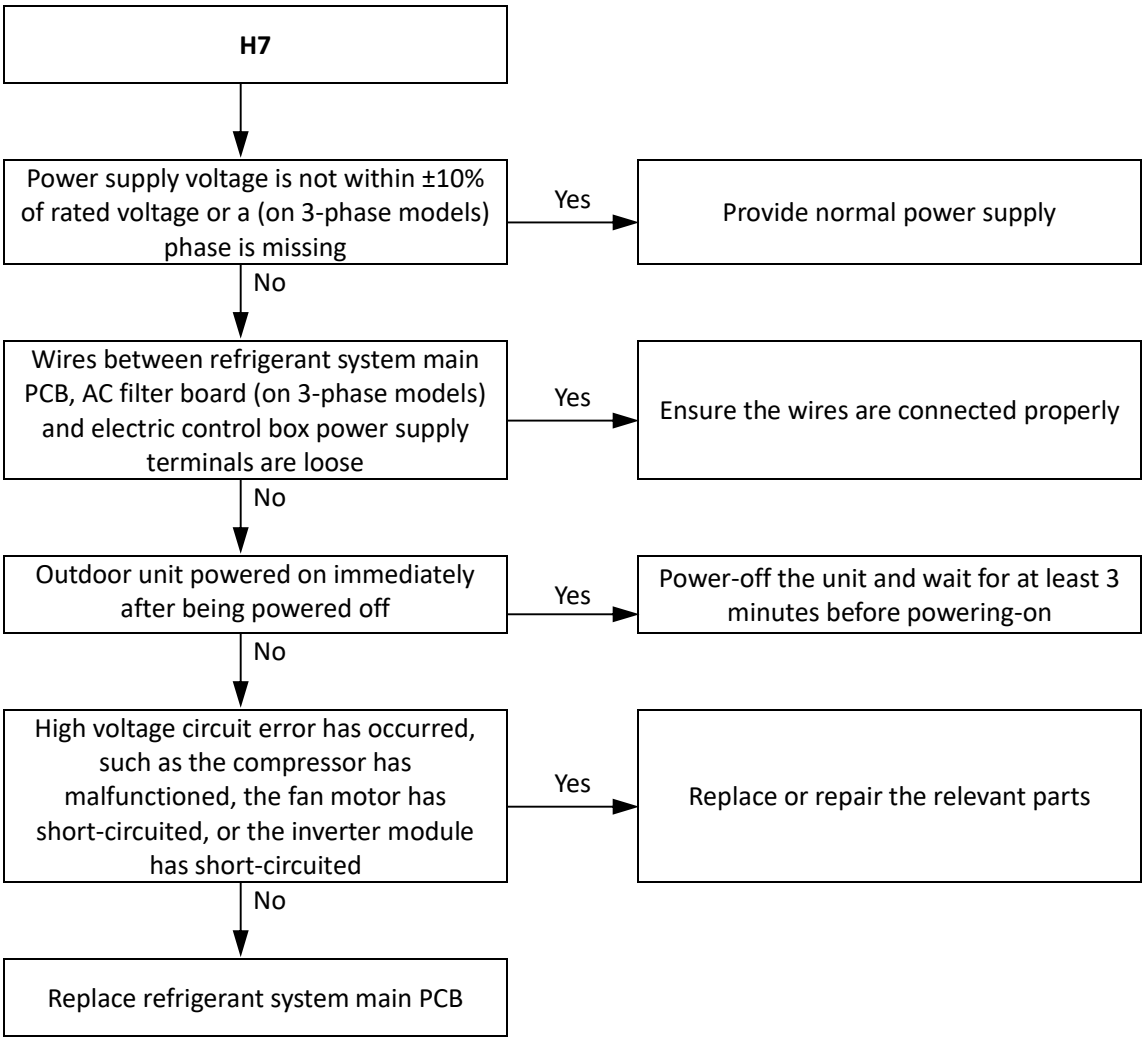
15.13.2 Description

- Abnormal main circuit voltage.
- Yukon Mono stops running.
- Error code is displayed on refrigerant system main control board for refrigerant system and user interface.

15.13.3 Possible causes

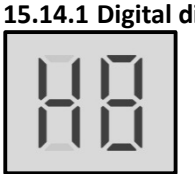
- Power supply voltage not within ±10% of rated voltage or a phase is missing.
- Outdoor unit powered on immediately after being powered off.
- Loosened wiring within electric control box.
- High voltage circuit error.
- Main PCB damaged.

15.13.4 Procedure



15.14 H8 Troubleshooting

15.14.1 Digital display output



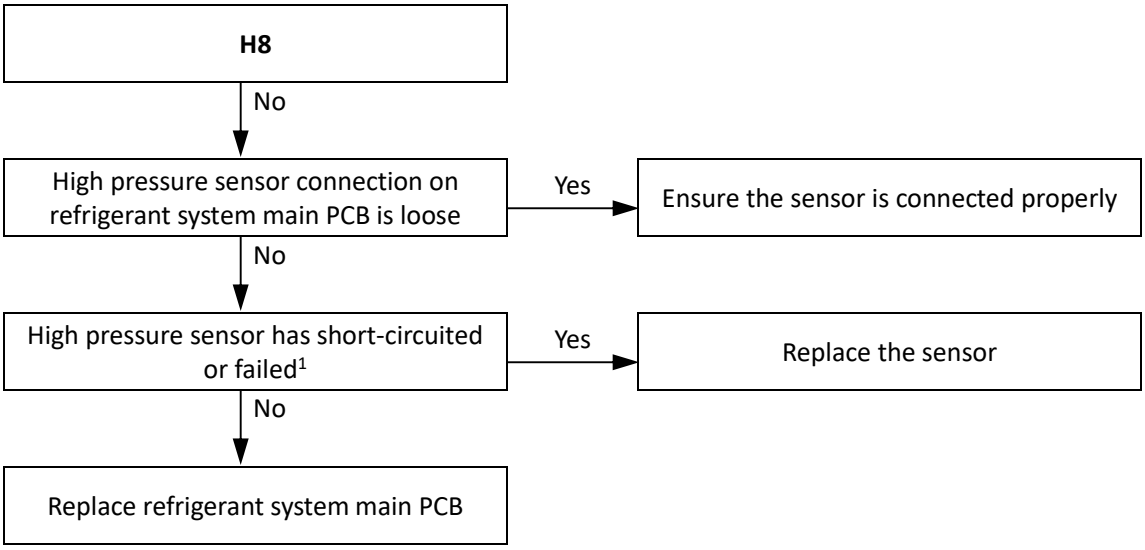
15.14.2 Description

- Pressure sensor error.
- Yukon Mono stops running.
- Error code is displayed on refrigerant system main control board for refrigerant system and user interface.

15.14.3 Possible causes

- Pressure sensor not connected properly or has malfunctioned.
- Refrigerant system main PCB damaged.

15.14.4 Procedure

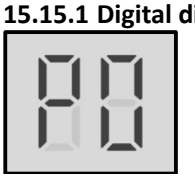


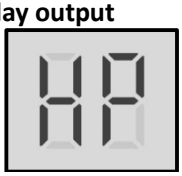
Notes:

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 on each type of refrigerant system main PCB is labelled in Figures 4-2.2, 4-2.4 and 4-2.6 in Part 4, 2.3 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards”. Refer also to Part 2, 1 “Layout of Functional Components”.

15.15 P0, HP Troubleshooting

15.15.1 Digital display output





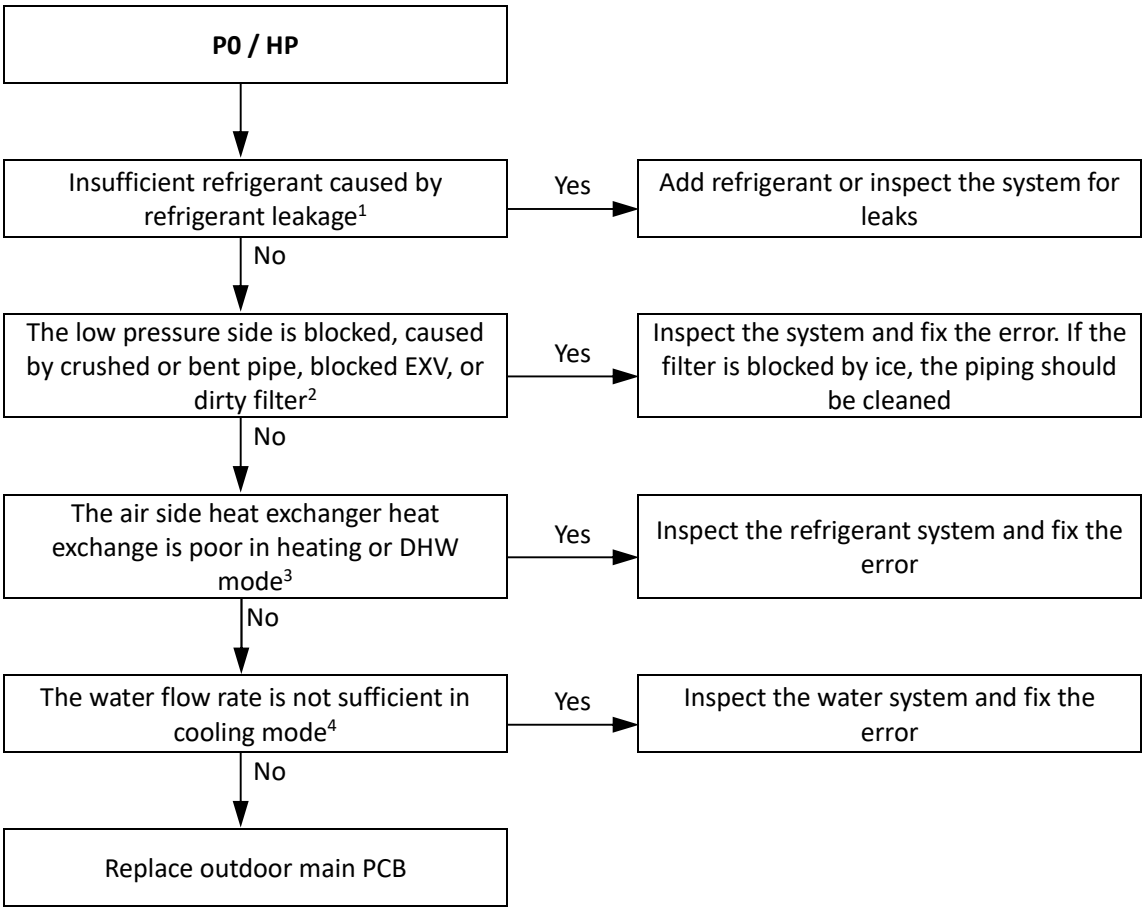
15.15.2 Description

- 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 0.30MPa, P0 is removed and normal operation resumes.
- HP indicates P0 protection has occurred 3 times in 60 minutes. When an HP error occurs, a manual system restart is required before the system can resume operation.
- Error code is displayed on refrigerant system main control board for refrigerant system and user interface.

15.15.3 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.
- Main PCB damaged.

15.15.4 Procedure

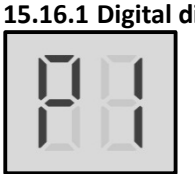


Notes:

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(s) and air outlets for dirt/blockages.
4. Check water side heat exchanger, water piping, circulator pumps and water flow switch for dirt/blockages.

15.16 P1 Troubleshooting

15.16.1 Digital display output



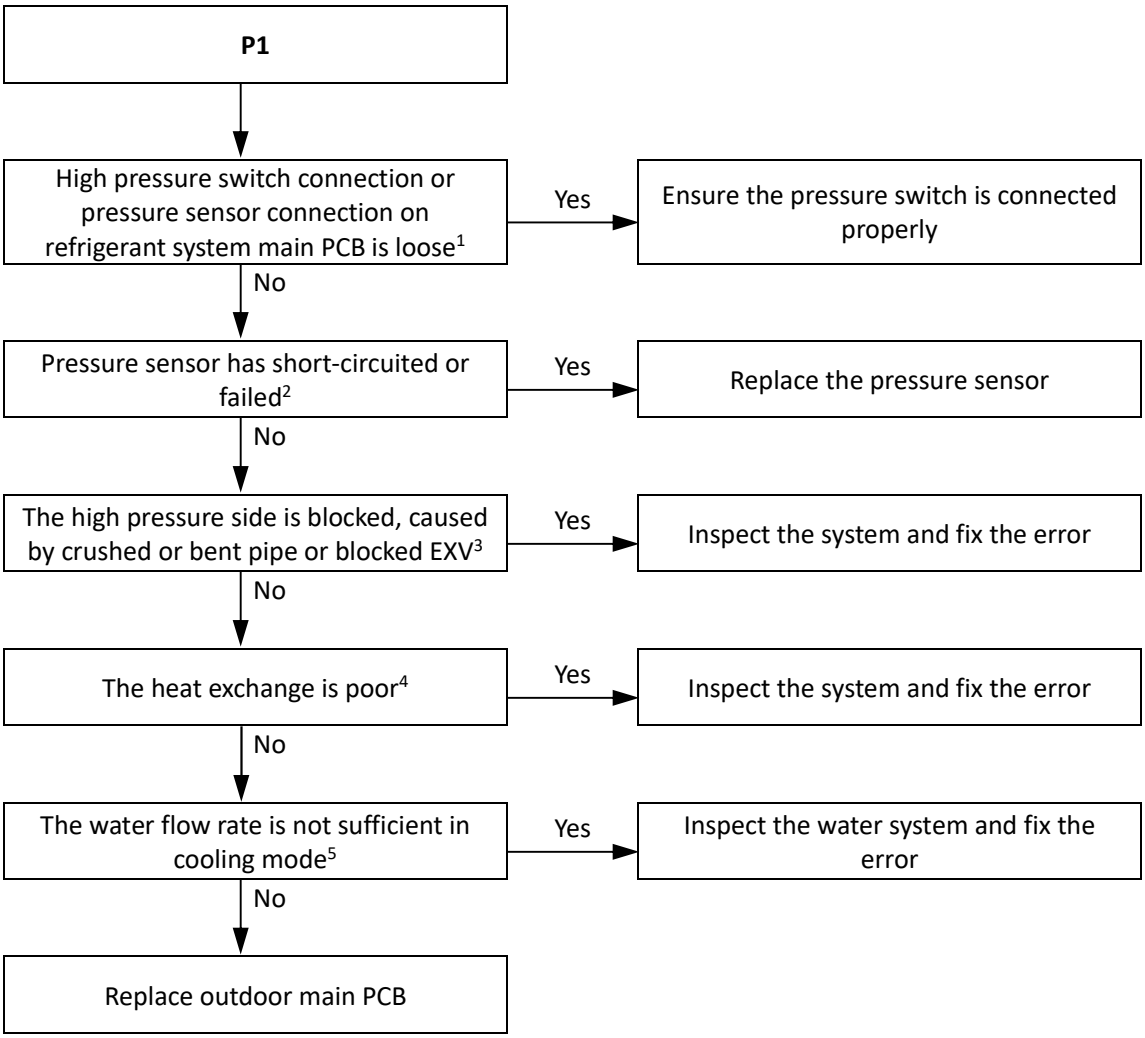
15.16.2 Description

- 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 refrigerant system main control board for refrigerant system and user interface.

15.16.3 Possible causes

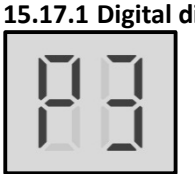
- Pressure sensor/switch not connected properly or has malfunctioned.
- Excess refrigerant.
- System contains air or nitrogen.
- High pressure side blockage.
- Poor condenser heat exchange.
- Main PCB damaged.

15.16.4 Procedure



15.17 P3 Troubleshooting

15.17.1 Digital display output



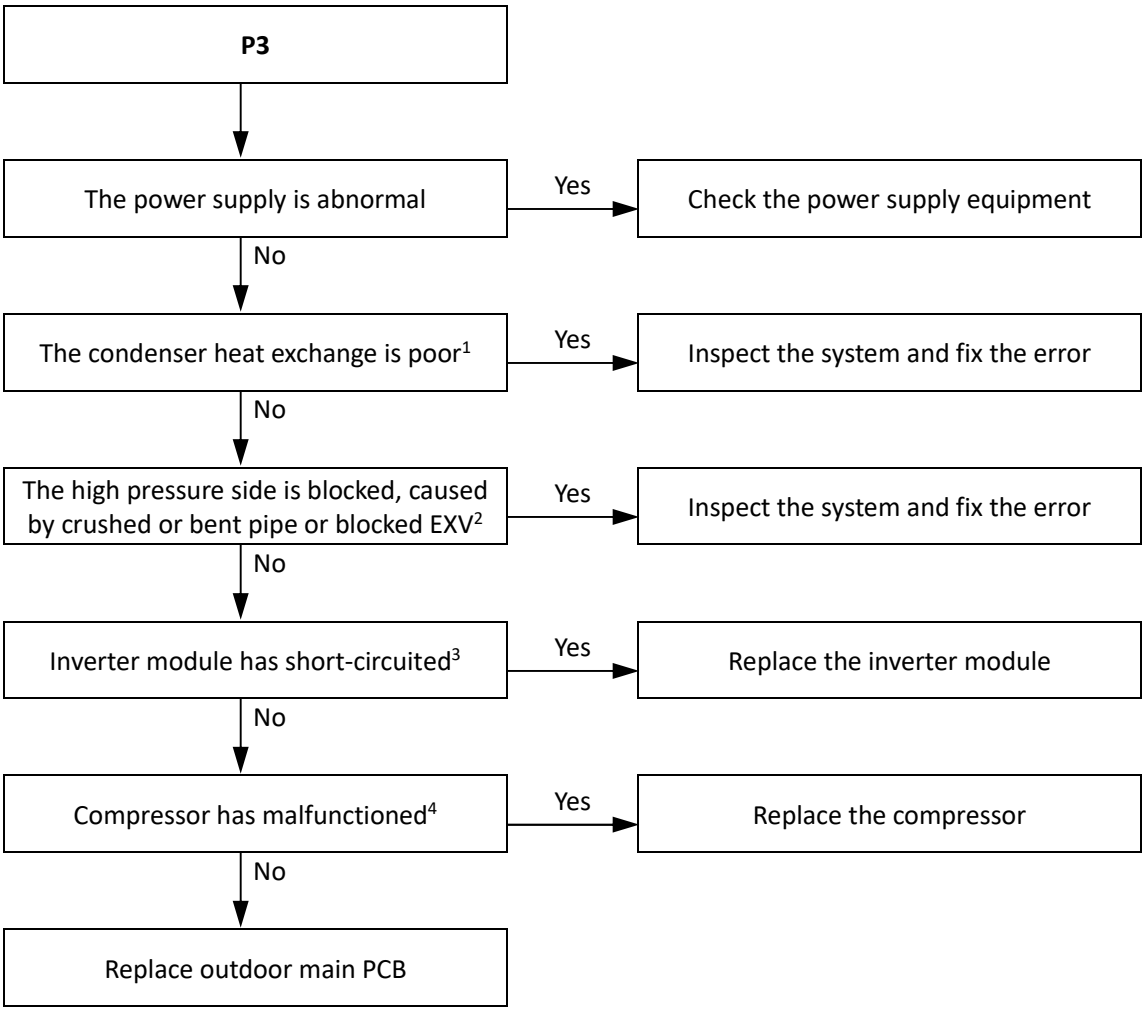
15.17.2 Description

- Compressor current protection.
- When the compressor current rises above the protection value (4/6kW models 18A, 8/10kW model 19A, 12/14/16kW single phase model 30A, 12/14/16kW three phase model 14A), 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 control board for refrigerant system and user interface.

15.17.3 Possible causes

- Power supply abnormal.
- Poor condenser heat exchange.
- High pressure side blockage.
- Inverter module damaged.
- Compressor damaged.
- Main PCB damaged.

15.17.4 Procedure

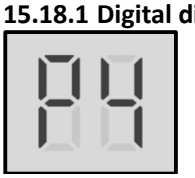


Notes:

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(s) 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.

15.18 P4 Troubleshooting

15.18.1 Digital display output



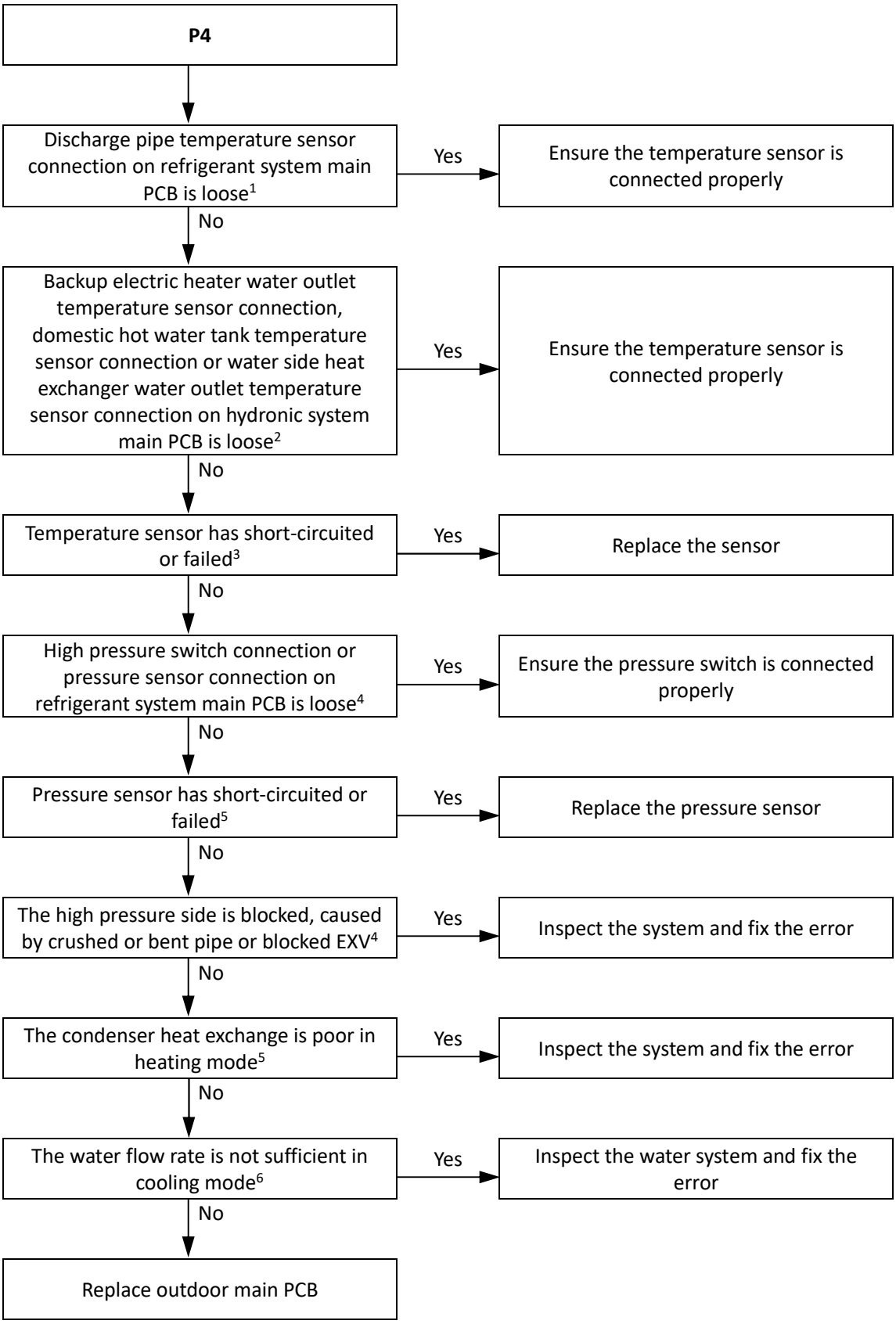
15.18.2 Description

- 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 95°C, P4 is removed and normal operation resumes.
- Error code is displayed on refrigerant system main control board for refrigerant system and user interface.

15.18.3 Possible causes

- Temperature sensor error
- High pressure side blockage.
- Poor condenser heat exchange.
- Main PCB damaged.

15.18.4 Procedure



15.19 P5 Troubleshooting

15.19.1 Digital display output



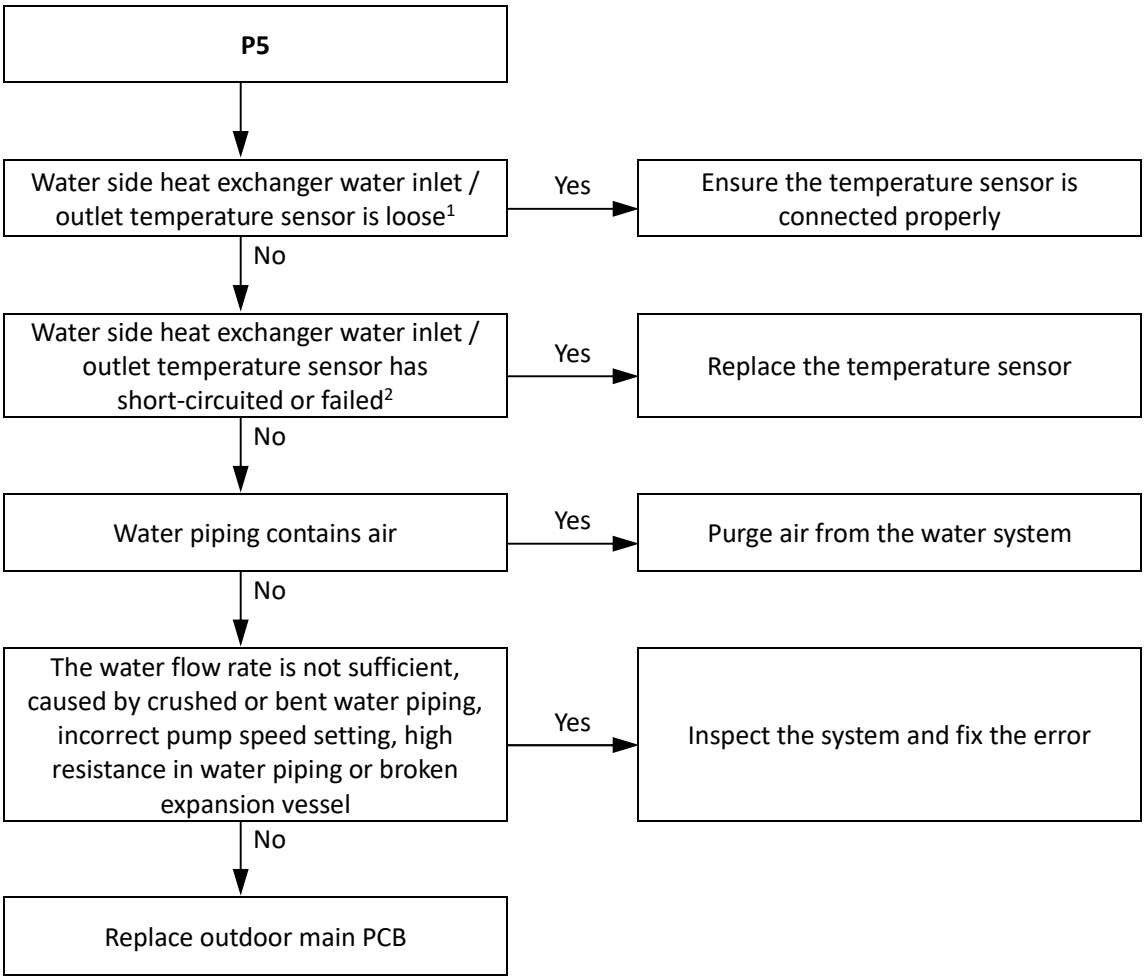
15.19.2 Description

- 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 control board for refrigerant system and user interface.

15.19.3 Possible causes

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

15.19.4 Procedure

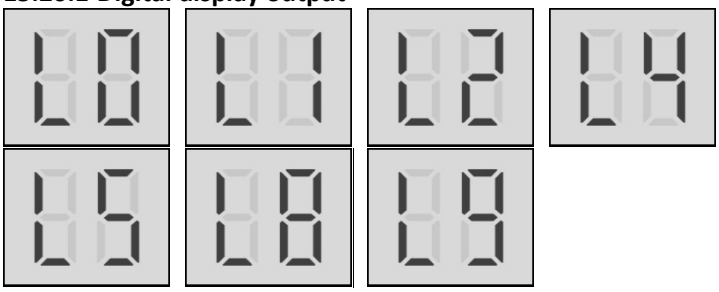


Notes:

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 8 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”).
2. Measure sensor resistance. If the resistance is too low, 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 5-5.3 in Part 5, 5.1 “Temperature Sensor Resistance Characteristics”.

15.20 Inverter module Troubleshooting for single-phase models

15.20.1 Digital display output



15.20.2 Description

- Inverter module protection.
- Yukon Split stops running.
- Specific error code L0, L1, L2, L4, L5, L8, L9 is displayed on the user interface and the main control board of refrigerant system.

15.20.3 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.
- PED board self checking fail.

15.20.4 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 1 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 on the inverter module.

Table 4-4.2: Errors indicated on LED, single-phase 4~10kW

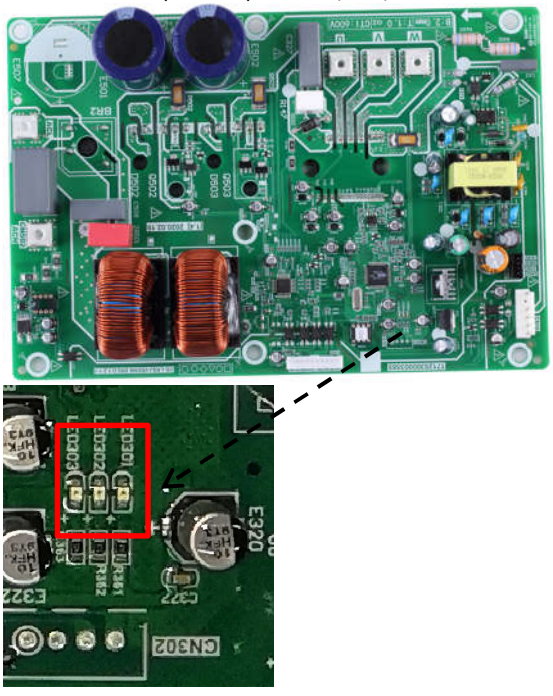
LED301 flashing pattern (GREEN) LED302 is always on (RED)	Corresponding error
Flashes 8 times and stops for 1 second, then repeats	L0 - Inverter module protection
Flashes 9 times and stops for 1 second, then repeats	L1 - DC bus low voltage protection
Flashes 10 times and stops for 1 second, then repeats	L2 - DC bus high voltage protection
Flashes 12 times and stops for 1 second, then repeats	L4 - MCE error
Flashes 13 times and stops for 1 second, then repeats	L5 - Zero speed protection
Flashes 16 times and stops for 1 second, then repeats	L8 - Compressor frequency variation greater than 15Hz within one second protection
Flashes 17 times and stops for 1 second, then repeats	L9 - Actual compressor frequency differs from target frequency by more than 15Hz protection

Table 4-4.3: Errors indicated on LED, single-phase 4~10kW

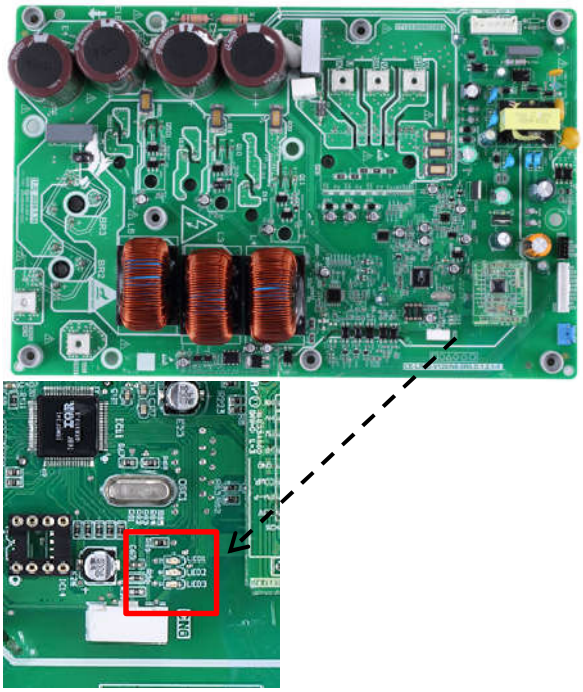
LED1 flashing pattern (GREEN) LED2 is always on (RED)	Corresponding error
Flashes 3 times and stops for 1 second, then repeats	P1 - High pressure protection
Flashes 5 times and stops for 1 second, then repeats	bH – PED board checking fail
Flashes 8 times and stops for 1 second, then repeats	L0 - Inverter 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
Flashes 13 times and stops for 1 second, then repeats	L5 - Zero speed protection
Flashes 16 times and stops for 1 second, then repeats	L8 - Compressor frequency variation greater than 15Hz within one second protection
Flashes 17 times and stops for 1 second, then repeats	L9 - Actual compressor frequency differs from target frequency by more than 15Hz protection

Figure 4-4.1: LED location of inverter module

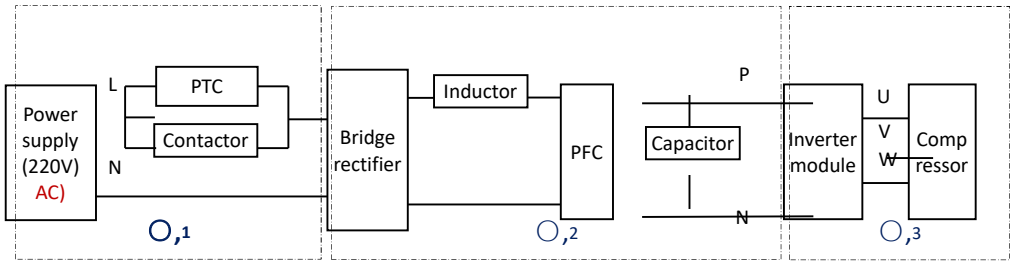
Inverter Module(4-10KW): LED301/302/303



Inverter Module(12-16KW): LED1/LED2/LED3



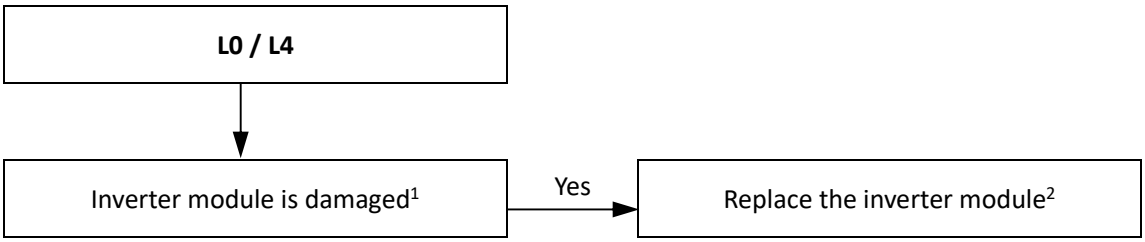
15.20.5 Principle of DC inverter



①Contactor is open, the current across the PTC to charge capacitor. After 5 seconds, the contactor closed.
②220-240V AC power supply change to DC power supply after bridge rectifier.
③The capacitor output steady power supply for inverter module P N terminals. In standby the voltage between P and N terminal on inverter module is 1.4 time of AC power supply. When the fan motor is running, the voltage is 377V DC.

15.20.6 L0/L4 troubleshooting

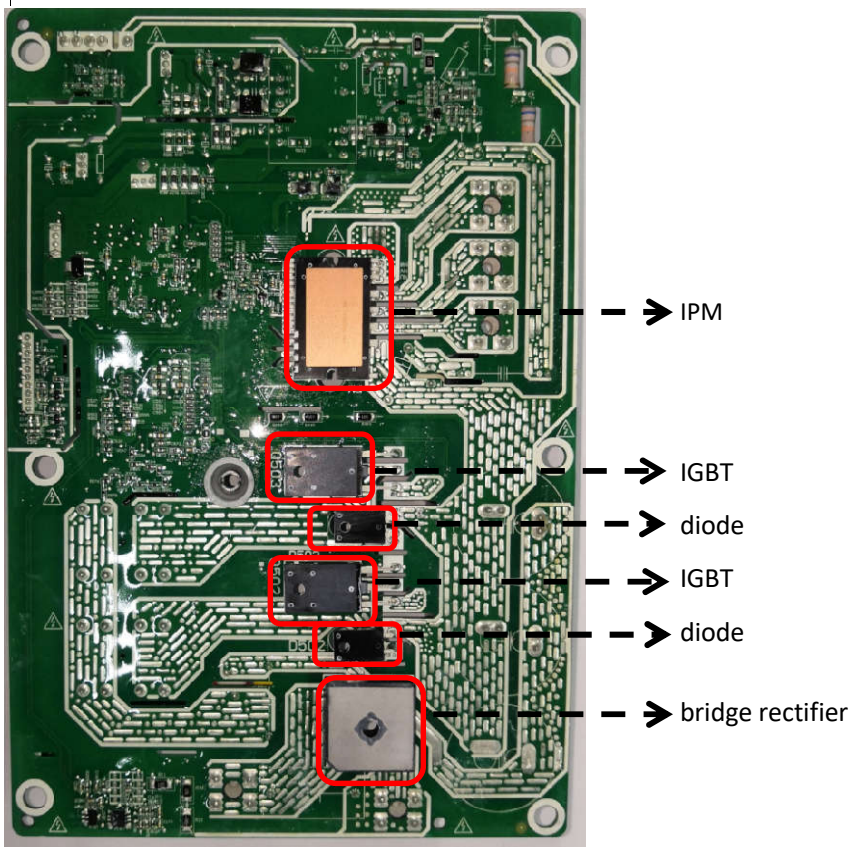
Situation 1: L0 or L4 error appears immediately after the outdoor unit is powered-on



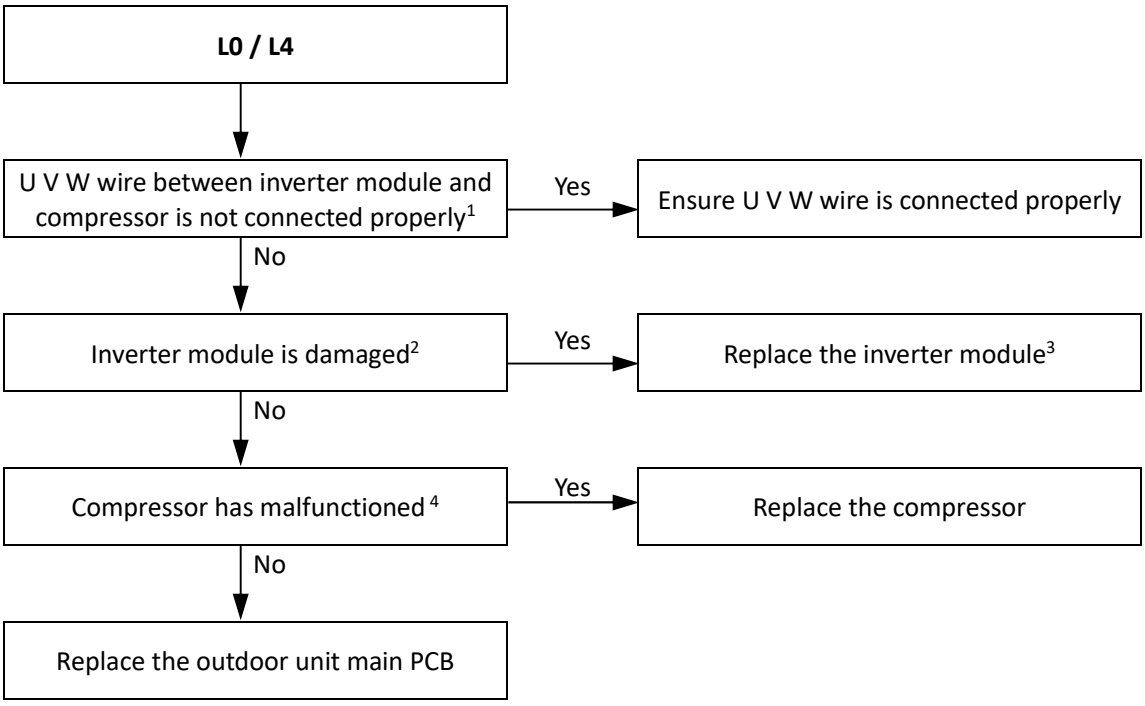
Notes:

1. 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. Refer to Figure 4-2.5 to 4-2.7 in Part 4, 2.1 “Main PCBs for Refrigerant System, Inverter Module”.
2. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the IPM module, IGBT, diode, bridge rectifier (on the reverse side of the inverter module). Refer to Figure 4-4.2.

Figure 4-4.2: Replacing an inverter module



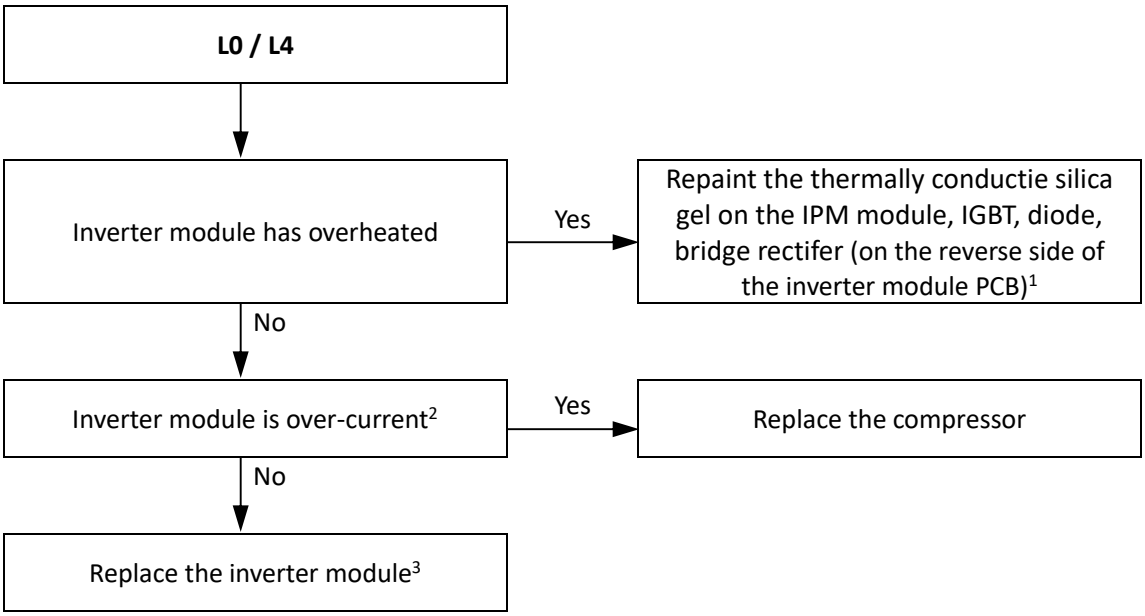
Situation 2: L0 or L4 error appears immediately after the compressor starts up



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 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. Refer to Figure 4-2.5 to 4-2.7 in Part 4, 2.1 “Main PCBs for Refrigerant System, Inverter Module”.
3. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the IPM module, IGBT, diode bridge rectifer (on the reverse side of the inverter module PCB). Refer to Figure 4-4.2.
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.

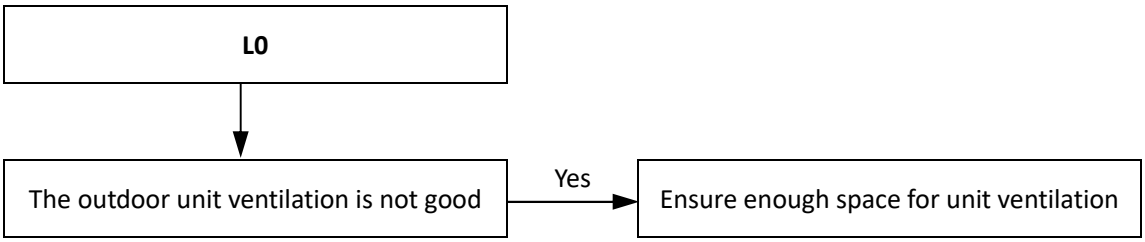
Situation 3: L0 or L4 error appears after the compressor has been running for a period of time and the compressor speed is over 60rps



Notes:

1. Refer to Figure 4-4.2.
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 is failed.
3. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the PFC and IPM modules (on the reverse side of the inverter module PCB). Refer to Figure 4-4.2.

Situation 4: L0 error appears occasionally/irregularly

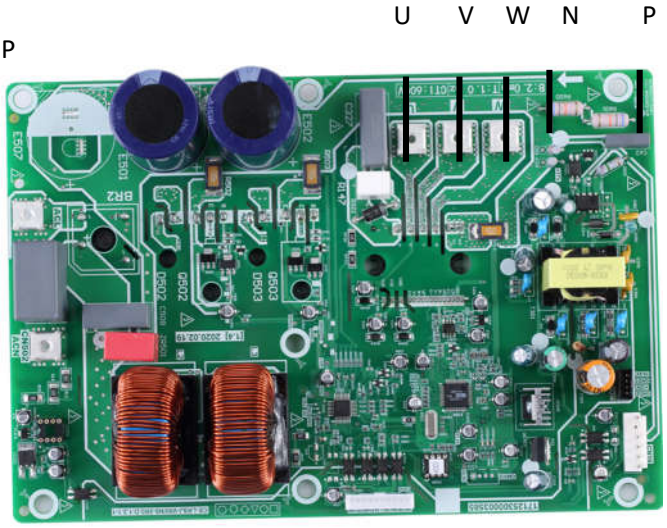


15.20.7 L1/L2 troubleshooting

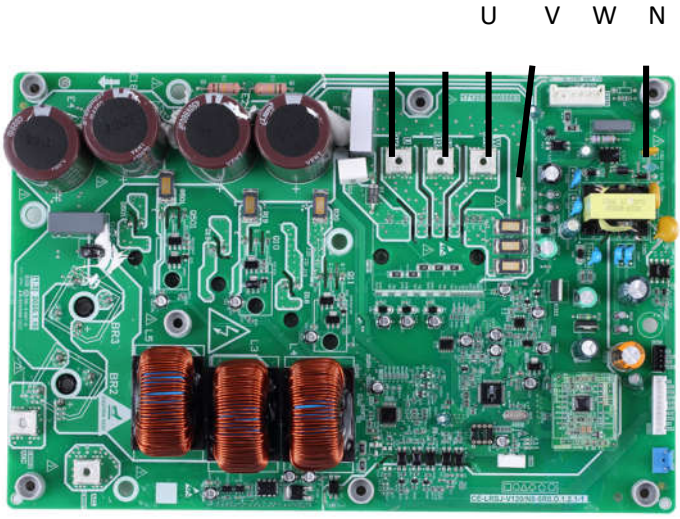
The normal DC voltage between terminals P and N on inverter module is 1.4 time of AC power supply in standby , the DC voltage is 377V when the fan motor is running. If the voltage is lower than 160V, the unit displays L1. If the voltage is higher than 500V, the unit display L2.

Figure 4-4.3: Inverter module terminals

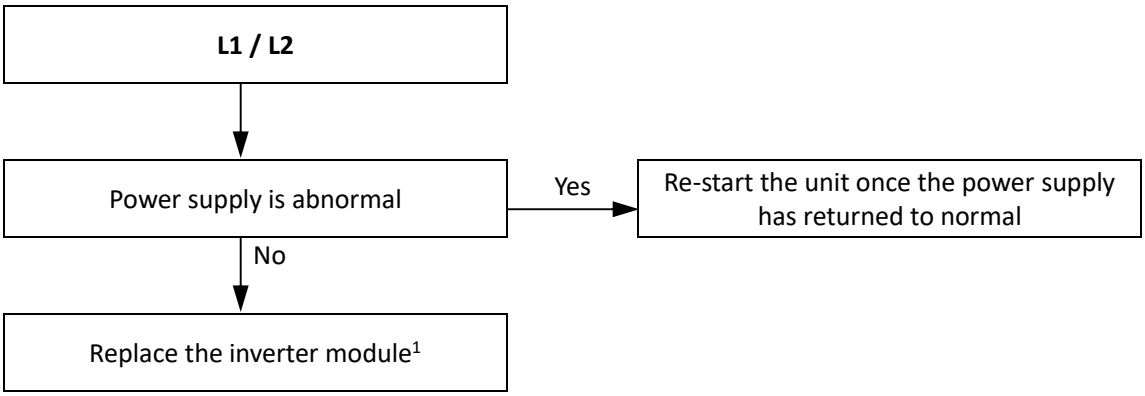
Inverter module terminals (4-10KW)



Inverter module terminals (12-16KW)



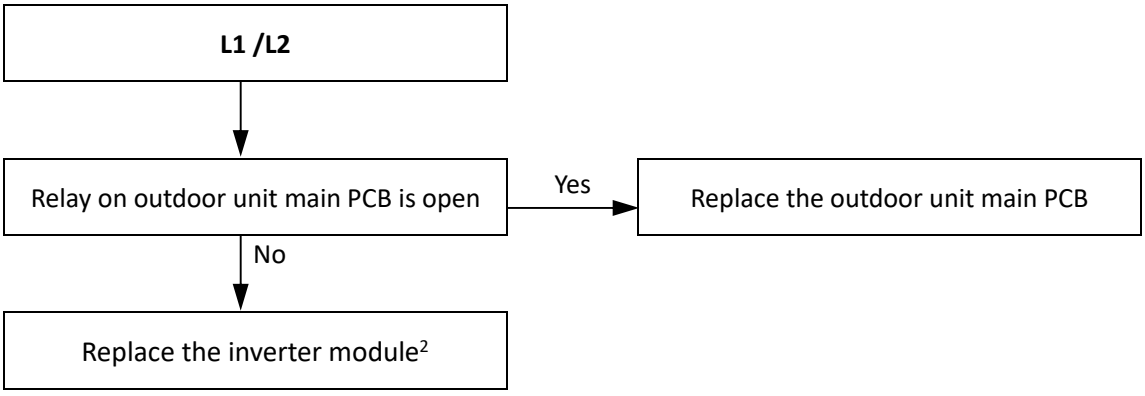
Situation 1: L1 or L2 error appears immediately after the outdoor unit is powered-on



Notes:

1. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on the IPM module, IGBT, diode, bridge rectifer (on the reverse side of the inverter module PCB). Refer to Figure 4-4.2.

Situation 2: L1 or L2 error appears after the compressor has been running for a period of time and the compressor speed is over 20rps



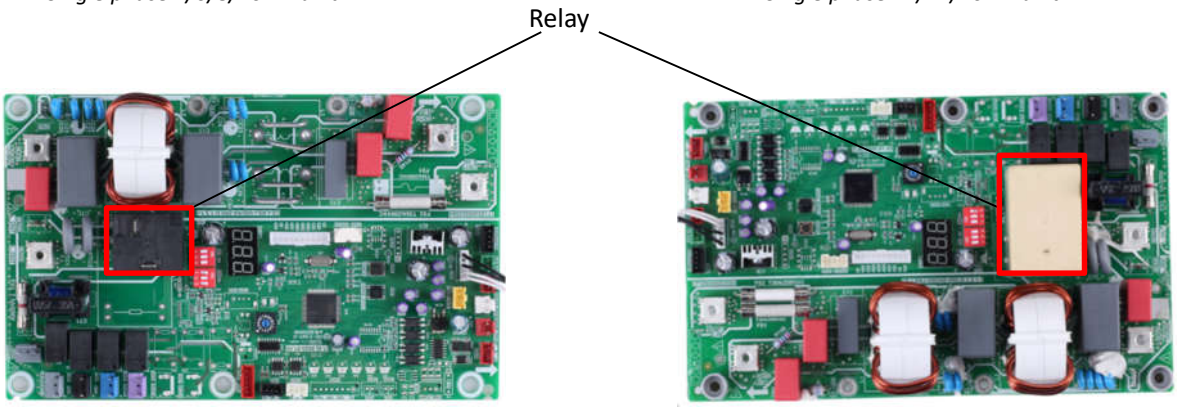
Notes:

1. If the fan motor is running and the DC voltage between terminals P and N on inverter module declined, Relay on the main control board of outdoor unit is open.
2. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on IPM module (on the reverse side of the inverter module PCB). Refer to Figure 4-4.2.

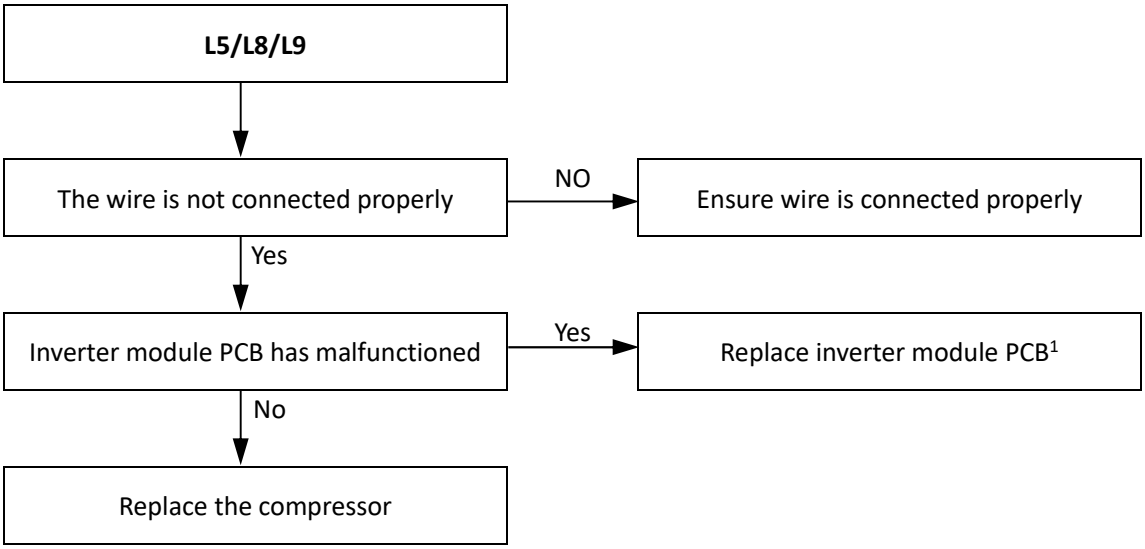
Figure 4-4.4: Relay location of main PCB for refrigerant system

Single phase 4/6/8/10kW unit

Single phase 12/14/16kW unit



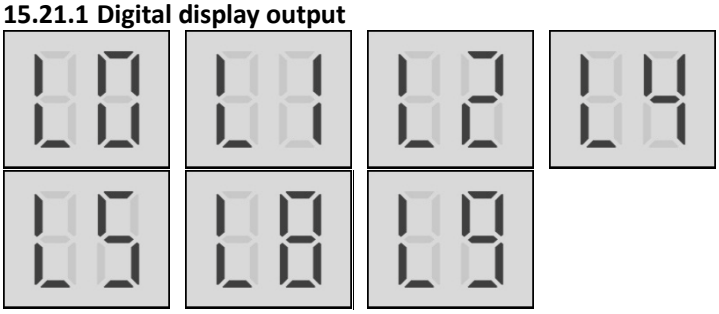
15.20.8 L5/L8/L9 troubleshooting



1. When replacing an inverter module, a layer of thermally conductive silica gel should be painted on IPM module (on the reverse side of the inverter module PCB). Refer to Figure 4-4.2.

15.21 Inverter module Troubleshooting for three-phase models

15.21.1 Digital display output



15.21.2 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.

15.21.3 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.

15.21.4 Specific error codes for inverter module protection

Table 4-4.4: Specific error codes

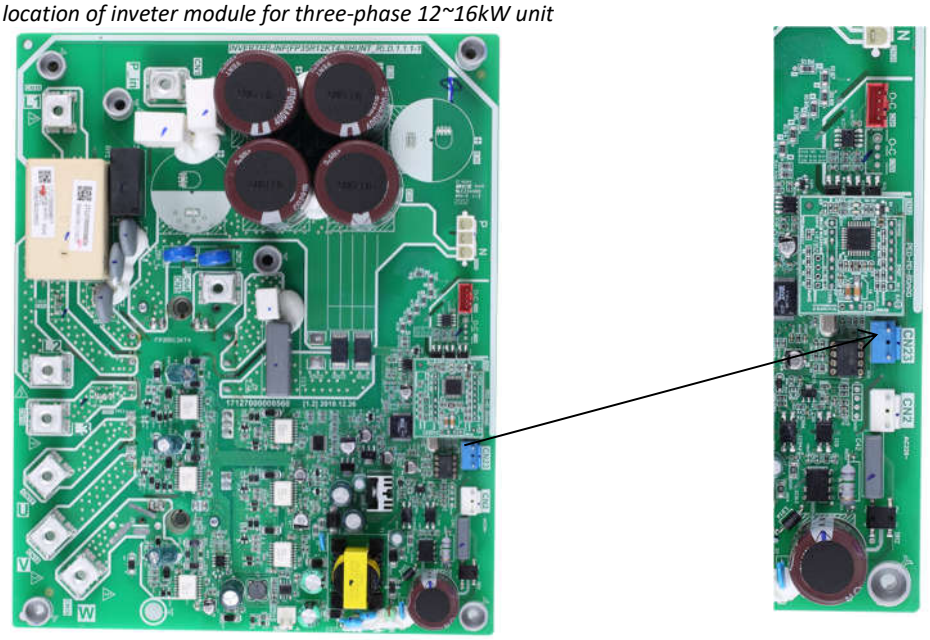
Specific error code	Content
L0	Inverter module protection
L1	DC bus low voltage protection
L2	DC bus high voltage protection
L4	MCE error(DC bus low or high voltage protection or software over current protection)
L5	Zero speed protection
L8	Compressor frequency variation greater than 15Hz within one 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.

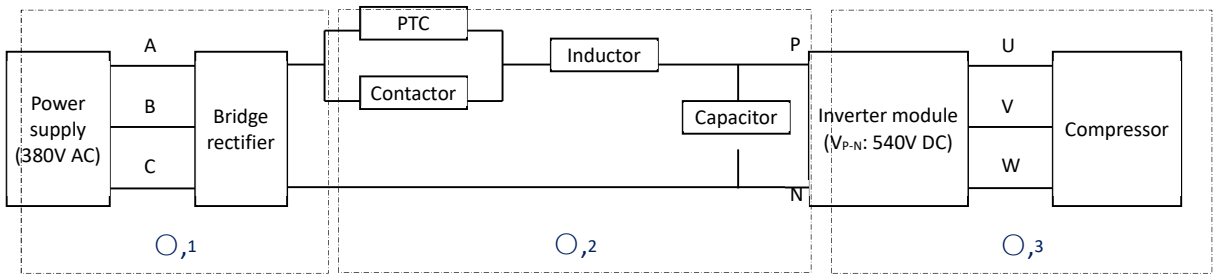
Table 4-4.5: Errors indicated on LED for three-phase 12~16kW unit

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 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 4-4.5: LED location of inveter module for three-phase 12~16kW unit



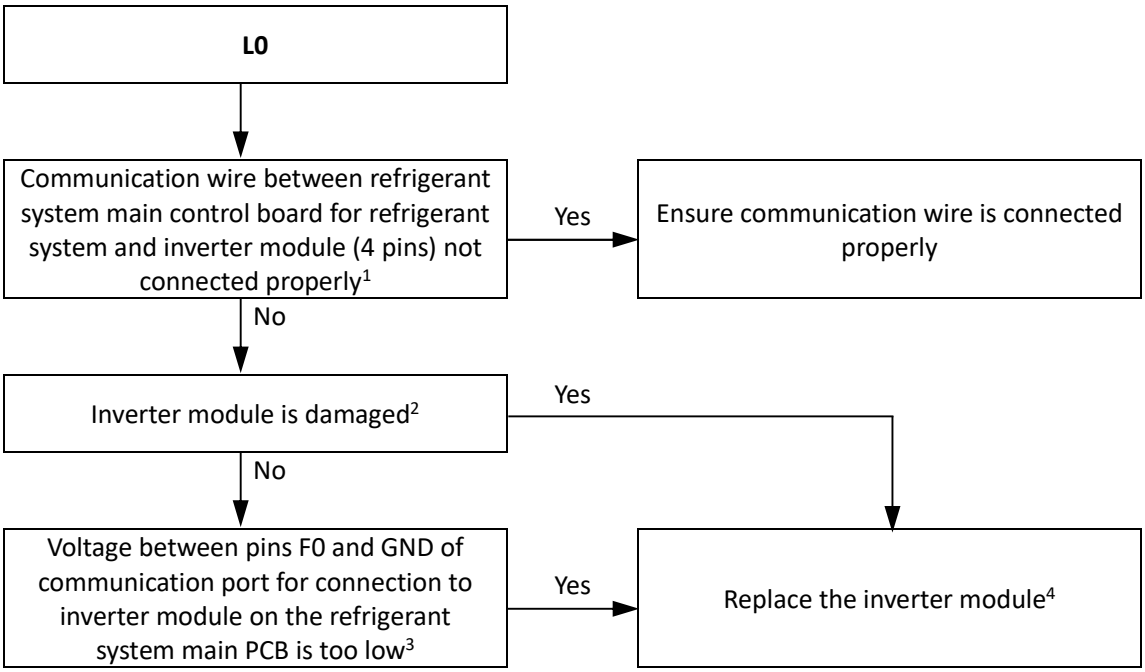
15.21.5 Principle of DC inverter



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.

15.21.6 L0 troubleshooting

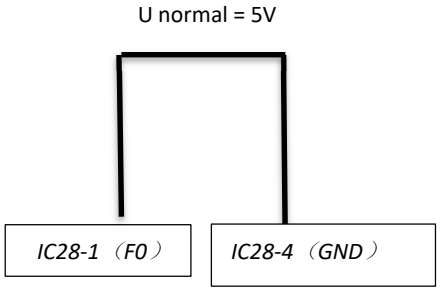
Situation 1: L0 error appears immediately after the outdoor unit is powered-on



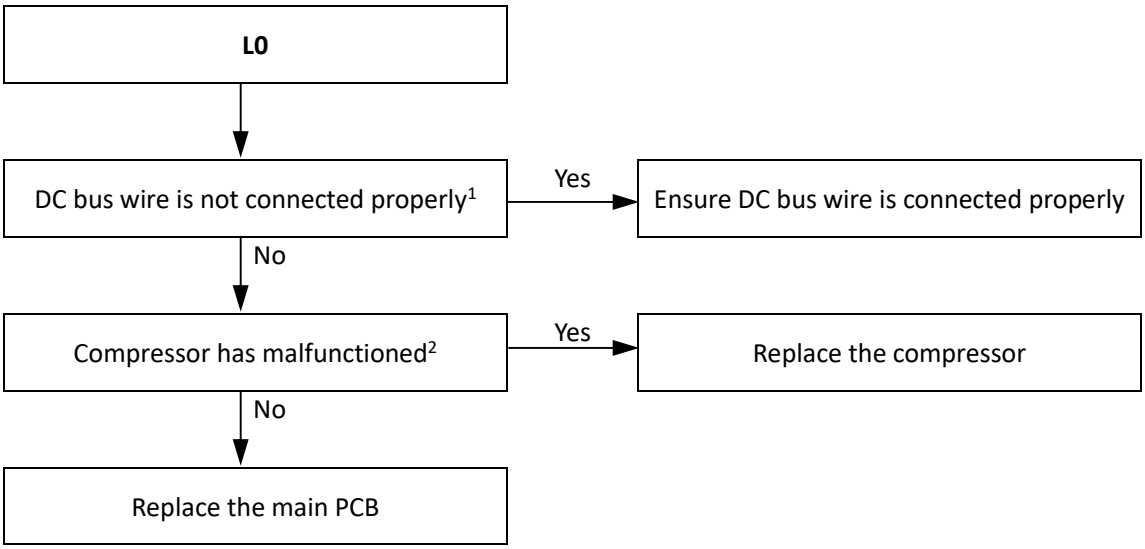
Notes:

1. For SMHM-120/140/160B-3/9, 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 4-4.6.
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 4-4.2.

Figure 4-4.6: F0 and GND voltage on IC28-1（F0），IC28-4（GND）



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

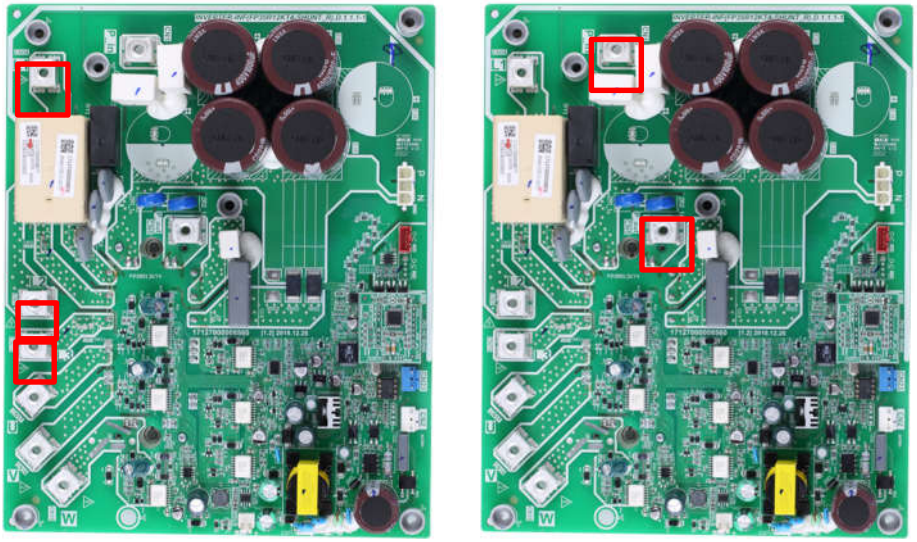


Notes:

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 4-4.7.

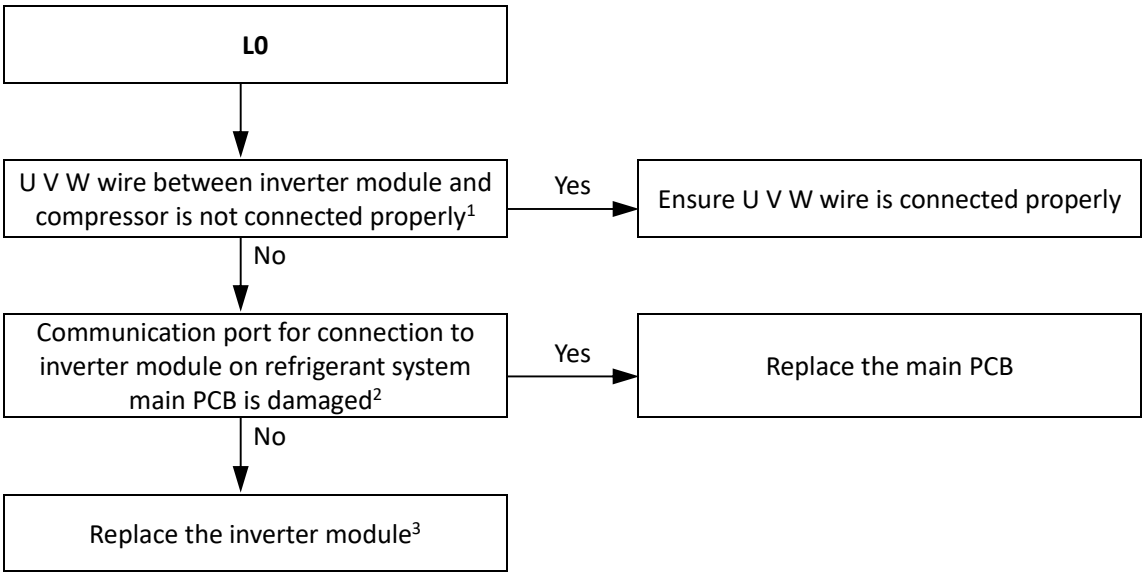
Figure 4-4.7: DC bus wire connection（L1L2L3,PIN- POUT）

L1，L2，L3 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.

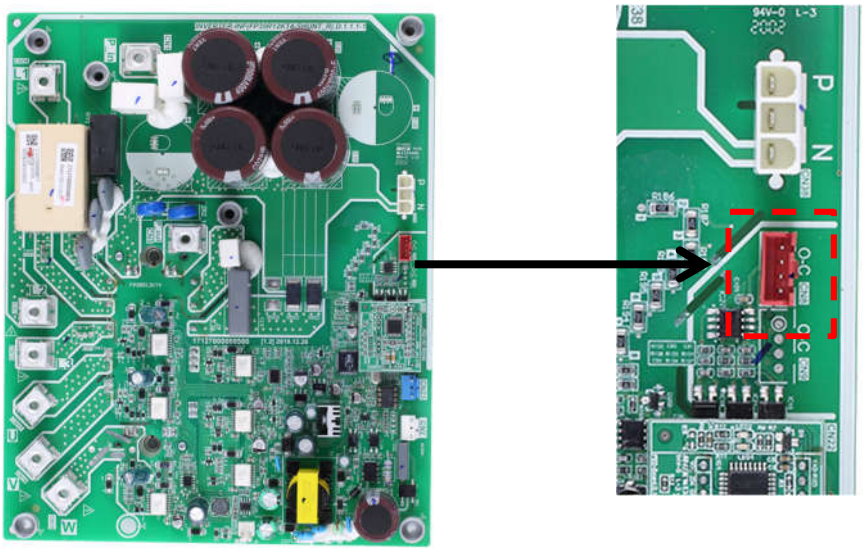
Situation 3: L0 error appears within 2 seconds of compressor start-up



Notes:

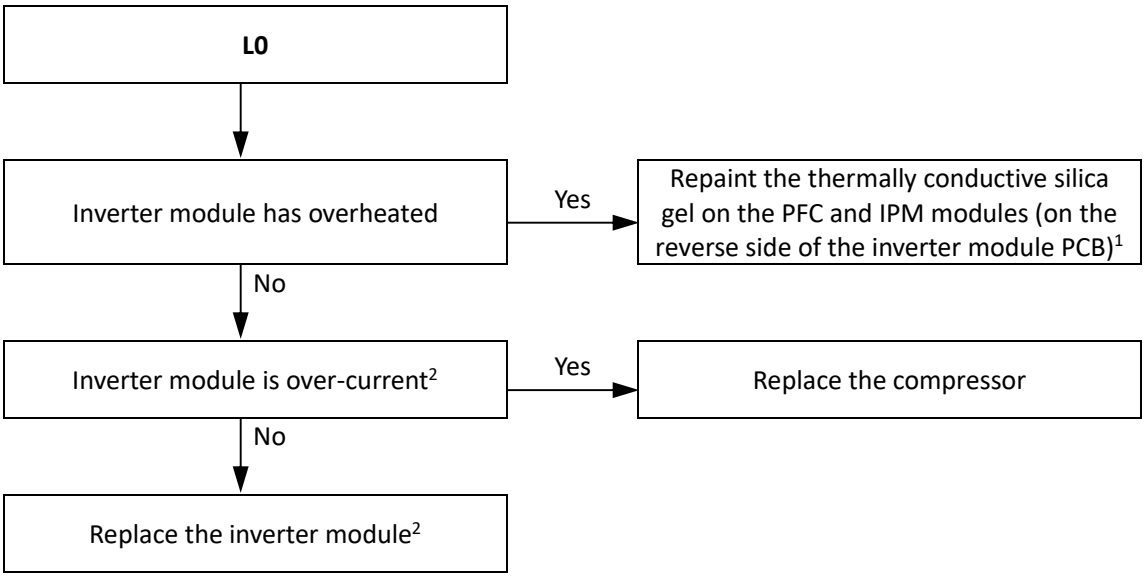
1. Connect the U V W wire from the inverter module to the correct compressor terminals, as indicated by the labels on the compressor.
2. Measure the voltage between each of W-, W+, V-, V+, U-, U+ and GND when the unit is in standby. The normal voltage should be 2.5V-4V and the six voltages should be same, otherwise the communication terminal has failed. Refer to Figure4-4.8.

Figure 4-4.8: 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 4-4.2.

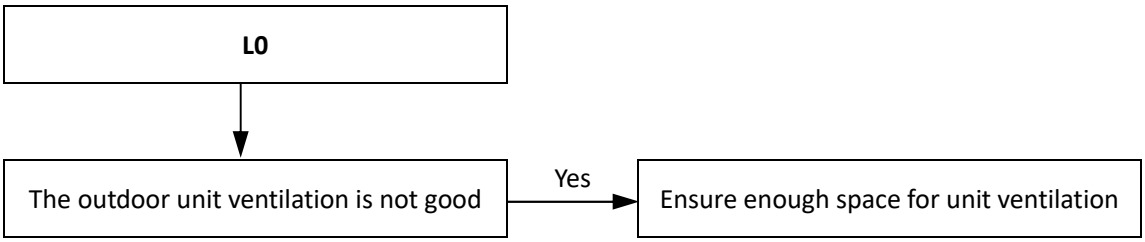
Condition 4: L0 error appears after the compressor has been running for a period of time and the compressor speed is over 60rps



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).
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.

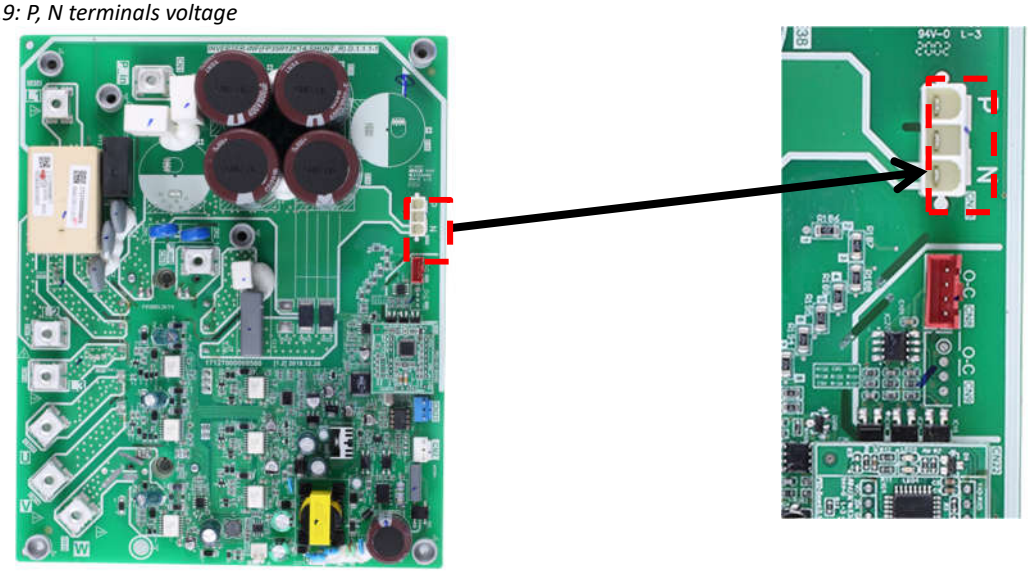
Situation 5: L0 error appears occasionally/irregularly



15.21.7 L1/L2 troubleshooting

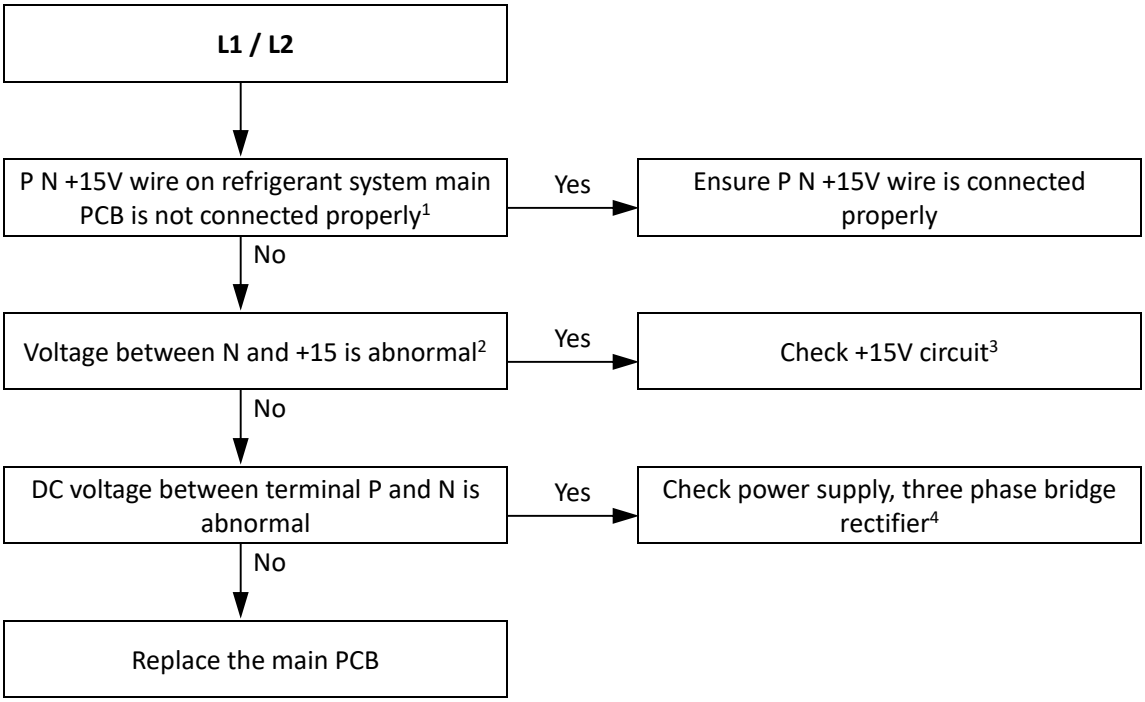
The normal DC voltage between terminals P and N on inverter module is 540V. If the voltage is lower than 300V, the unit displays an L1 error; if the voltage is higher than 830V, the unit displays an L2 error. Refer to Figure4-4.9.

Figure 4-4.9: P, N terminals voltage



V_{normal} = 540V DC

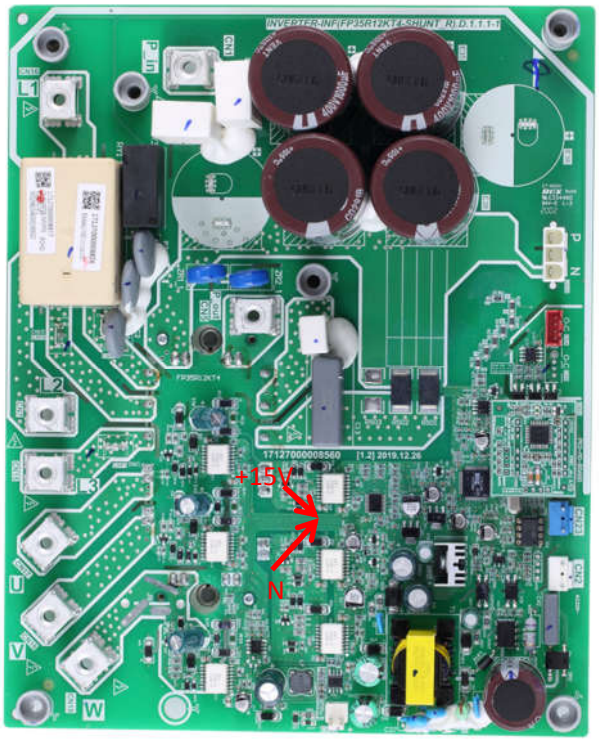
Situation 1: L1 or L2 error appears immediately after the outdoor unit is powered-on



Notes:

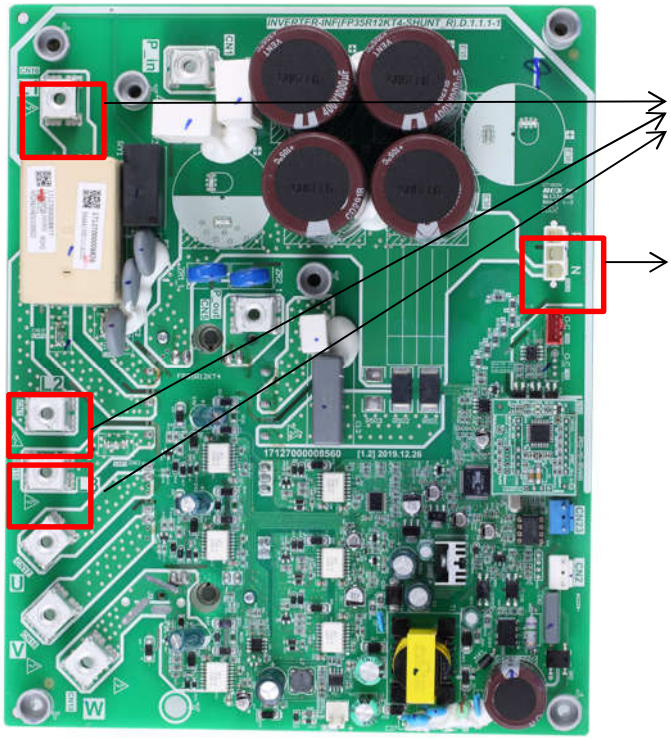
1. P N +15V terminal on refrigerant system main PCB. Refer to Figure4-4.9.
2. Voltage between N and +15. Refer to Figure4-4.10

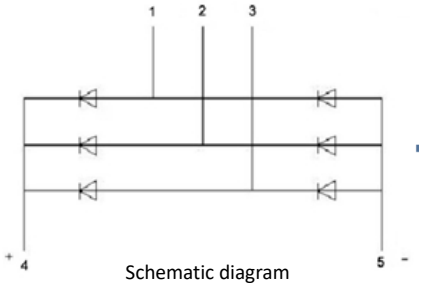
Figure 4-4.10: P N +15V terminal-+15V（IC4/5/6PIN12）；N-（IC/4/5、6）PIN13



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 4-4.11):
   - 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 diode setting:
     - 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 4-4.11: Bridge rectifier

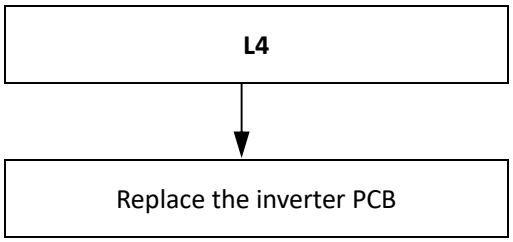




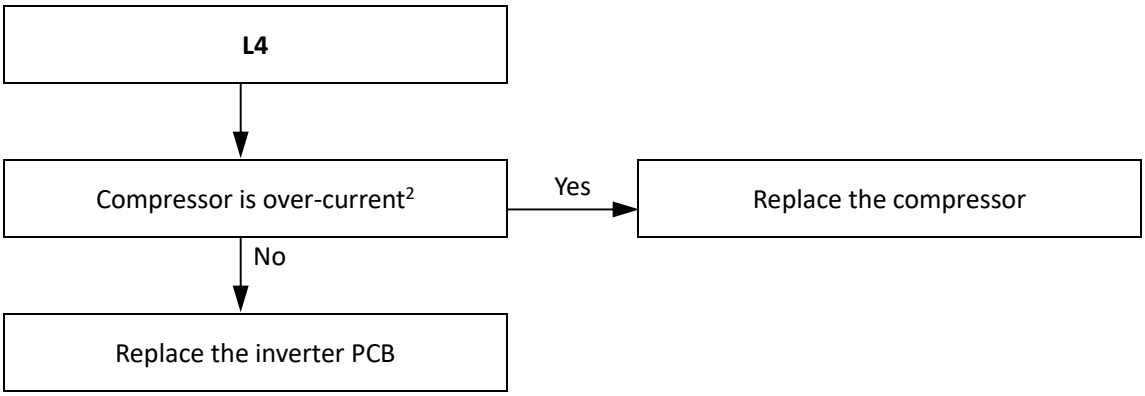
Schematic diagram

15.21.8 L4 troubleshooting(the same as L1/L2)

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



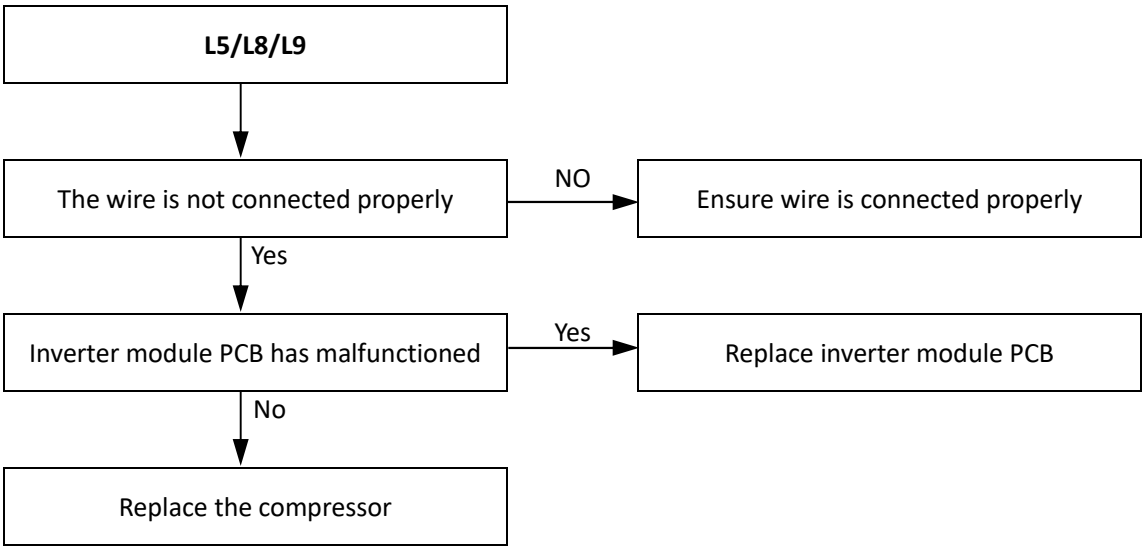
Condition 2: L4 error appears after the compressor has been running for a period of time and the compressor speed is over 60rps



Notes:

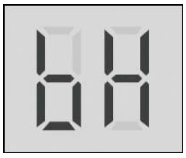
1. Re-start the unit, use clip-on ammeter to measure the compressor current, if the current is normal indicates the compressor is failed, if the current is abnormal indicates the inverter PCB is failed..

15.21.9 L5/L8/L9 troubleshooting



15.22 bH Troubleshooting

15.22.1 Digital display output



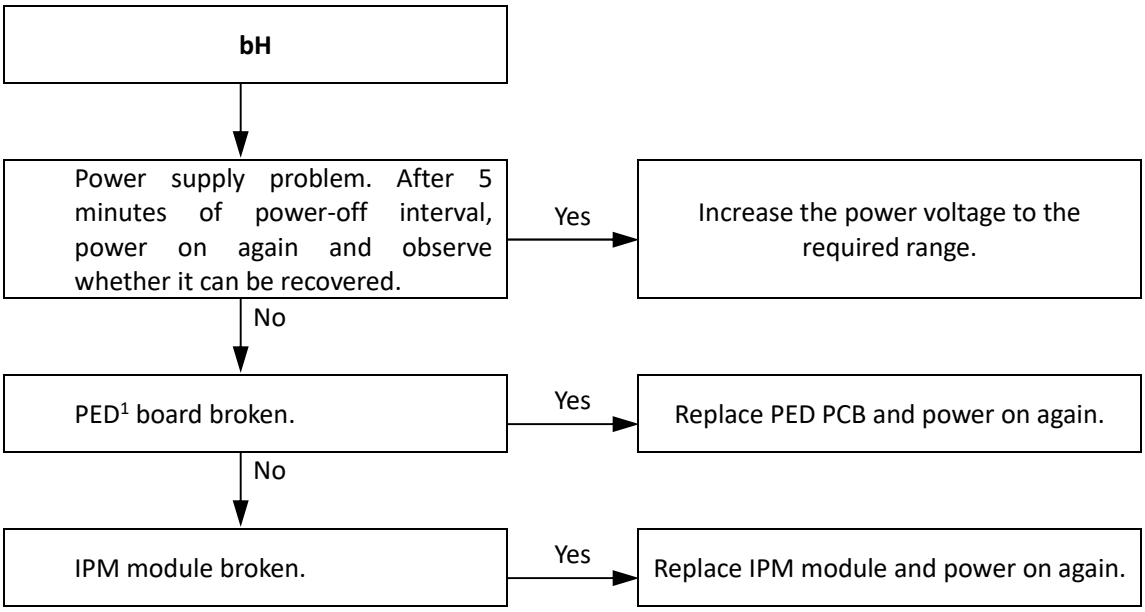
15.22.2 Description

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

15.22.3 Possible causes

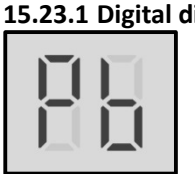
- Power supply problem.
- PED board broken.
- IPM module broken.

15.22.4 Procedure



15.23 Pb Troubleshooting

15.23.1 Digital display output



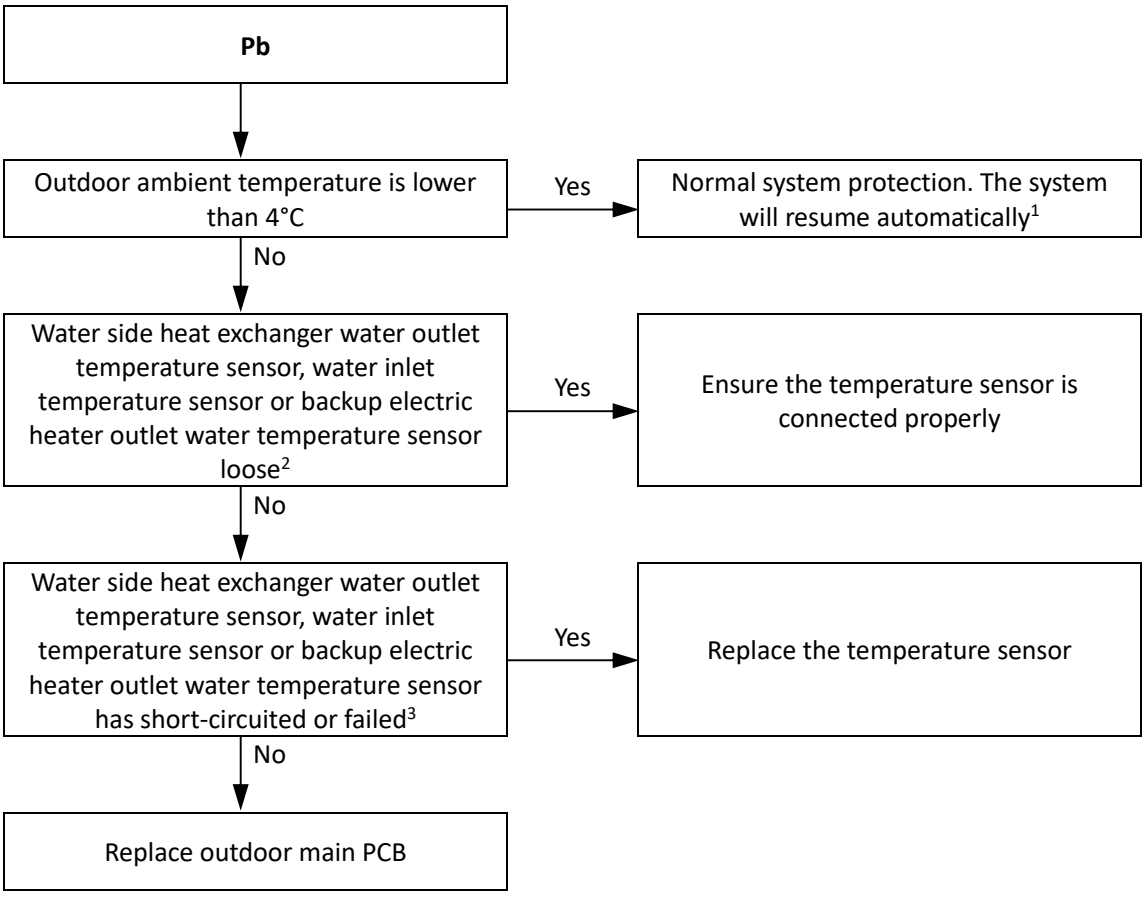
15.23.2 Description

- Water side heat exchanger anti-freeze protection.
- Yukon Mono stops running.
- Error code is displayed on refrigerant system main control board for refrigerant system and **ANTI.FREEZE** icon is displayed on user interface.

15.23.3 Possible causes

- Normal system protection.
- Temperature sensor not connected properly or has malfunctioned.
- Hydronic system main PCB damaged.

15.23.4 Procedure

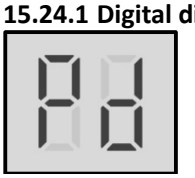


Notes:

1. Refer to Part 3, 5.7 “Water Side Heat Exchanger Anti-freeze Protection Control”.
2. Backup electric heater water outlet 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 8 in Figure 4-2.1 in Part 4, 2.2 “Main PCB for Hydronic System”).
3. Measure sensor resistance. If the resistance is too low, 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 4-5.3 in Part 4, 5.1 “Temperature
4. Sensor Resistance Characteristics”.

15.24 Pd Troubleshooting

15.24.1 Digital display output



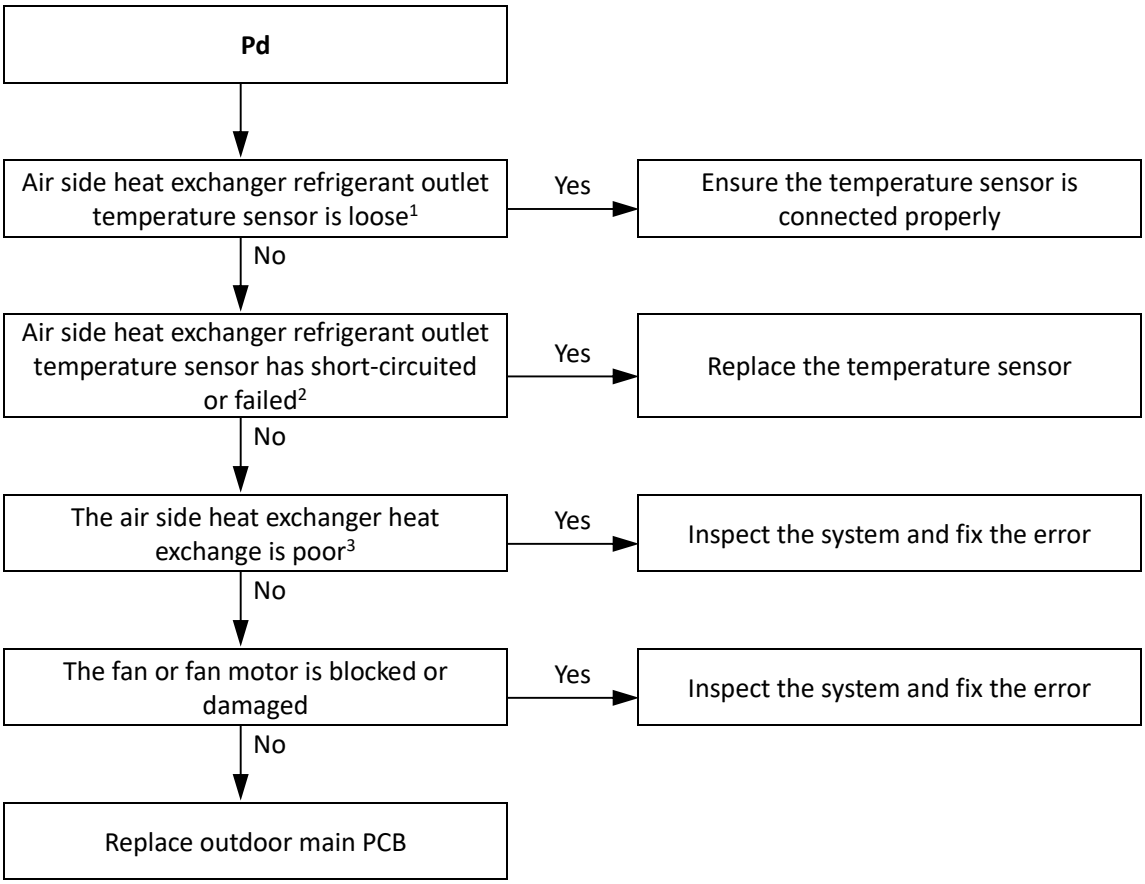
15.24.2 Description

- 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 refrigerant system main control board for refrigerant system and user interface.

15.24.3 Possible causes

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

15.24.4 Procedure

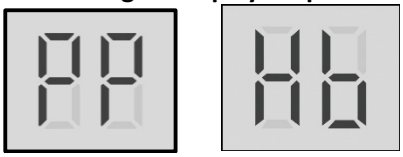


Notes:

1. Air side heat exchanger refrigerant outlet temperature sensor and outdoor ambient temperature sensor connections are port CN9 on the refrigerant system main PCB (labeled 12 in Figure 4-2.2 in Part 4, 2.3 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards”, (labeled 5 in Figure 4-2.4 in Part 4, 2.3 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards” and labeled 6 in Figure 4-2.6 in Part 4, 2.3 “Main PCBs for Refrigerant System, Inverter Modules and Filter Boards”).
2. Measure sensor resistance. If the resistance is too low, 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 4-5.1 in Part 4, 5.1 “Temperature Sensor Resistance Characteristics”.
3. Check air side heat exchanger, fan(s) and air outlets for dirt/blockages.

15.25 PP Troubleshooting

15.25.1 Digital display output



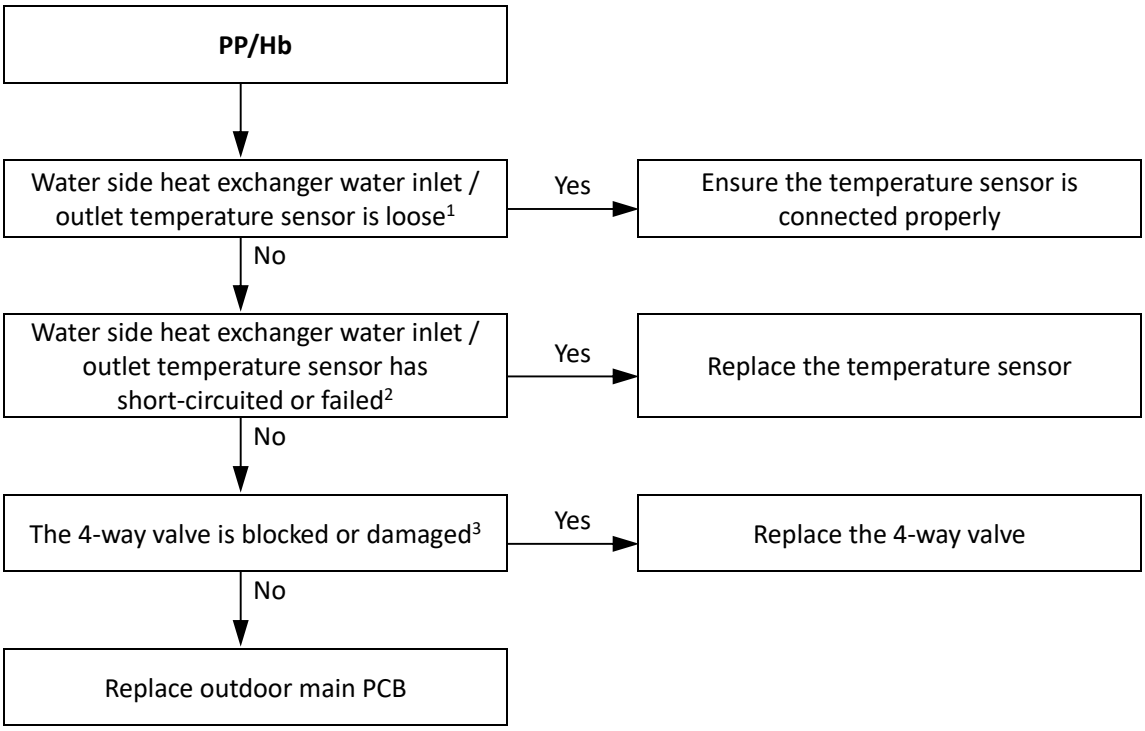
15.25.2 Description

- 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 control board for refrigerant system and user interface.
- If PP error occurs 3 times then Hb will appear.

15.25.3 Possible causes

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

15.25.4 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 8 in Figure 4-2.1 in Part 4, 2.2 “Min PCB for Hydronic System”).
2. Measure sensor resistance. If the resistance is too low, 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 4-5.1 to 4-5.2 in Part 4, 5.1 “Temperature Sensor Resistance Characteristics”.
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.

15.26 HE Troubleshooting

15.26.1 Digital display output



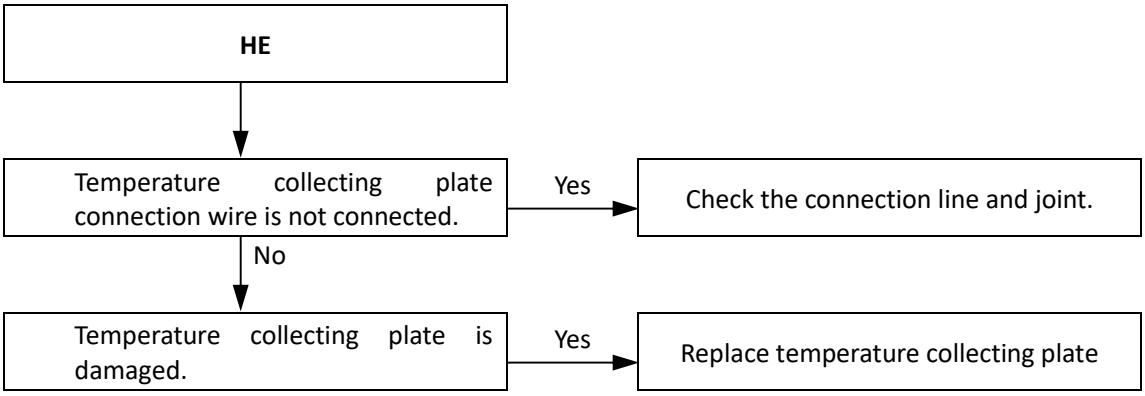
15.26.2 Description

- 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.

15.26.3 Possible causes

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

15.26.4 Procedure



15.27 Hd Troubleshooting

15.27.1 Digital display output



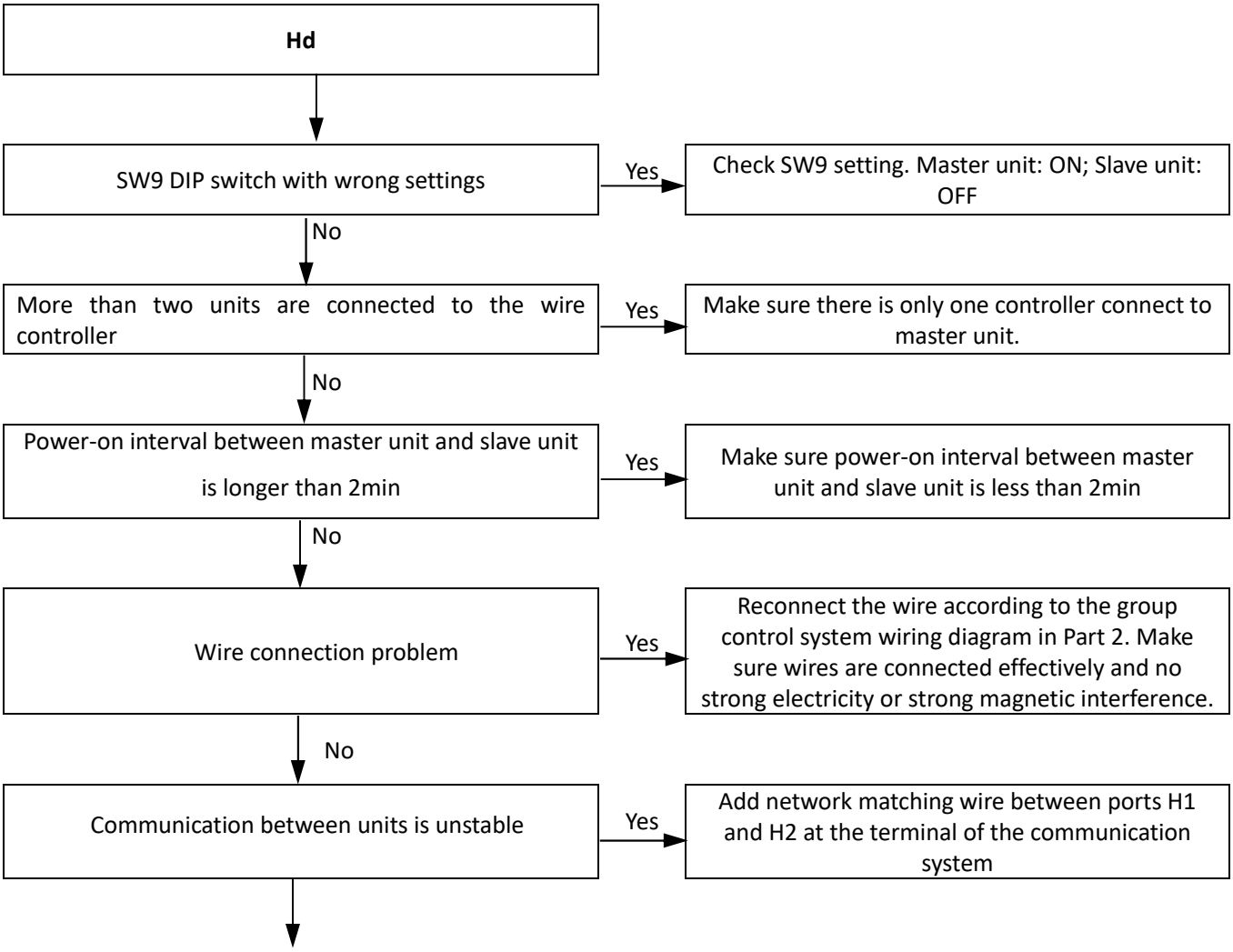
15.27.2 Description

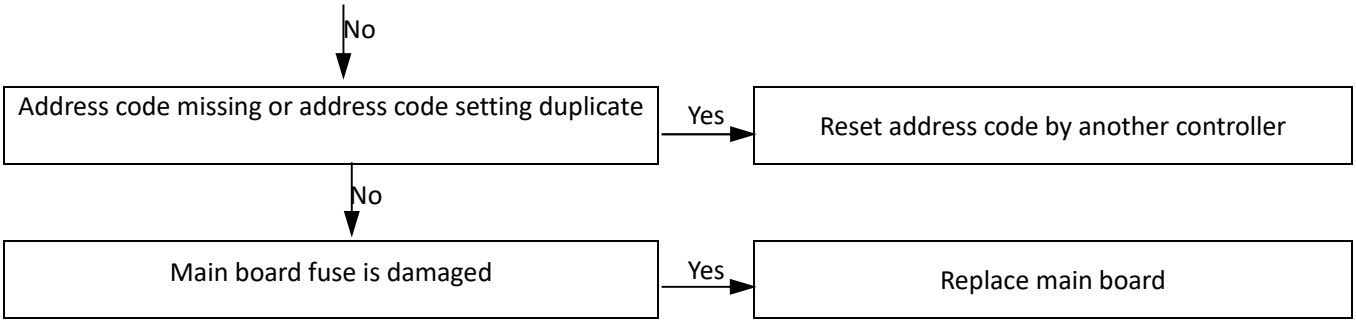
- Communication fault between master unit and slave unit (in parallel)
- Yukon Mono stops running.
- Error code is displayed on hydronic system main PCB, outdoor unit main PCB and user interface.

15.27.3 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 address code setting duplicate
- Main board fuse is damaged

15.27.4 Procedure




No
Address code missing or address code setting duplicate
Yes
Reset address code by another controller
No
Main board fuse is damaged
Yes
Replace main board

16 Appendix to Part 4

16.1 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		

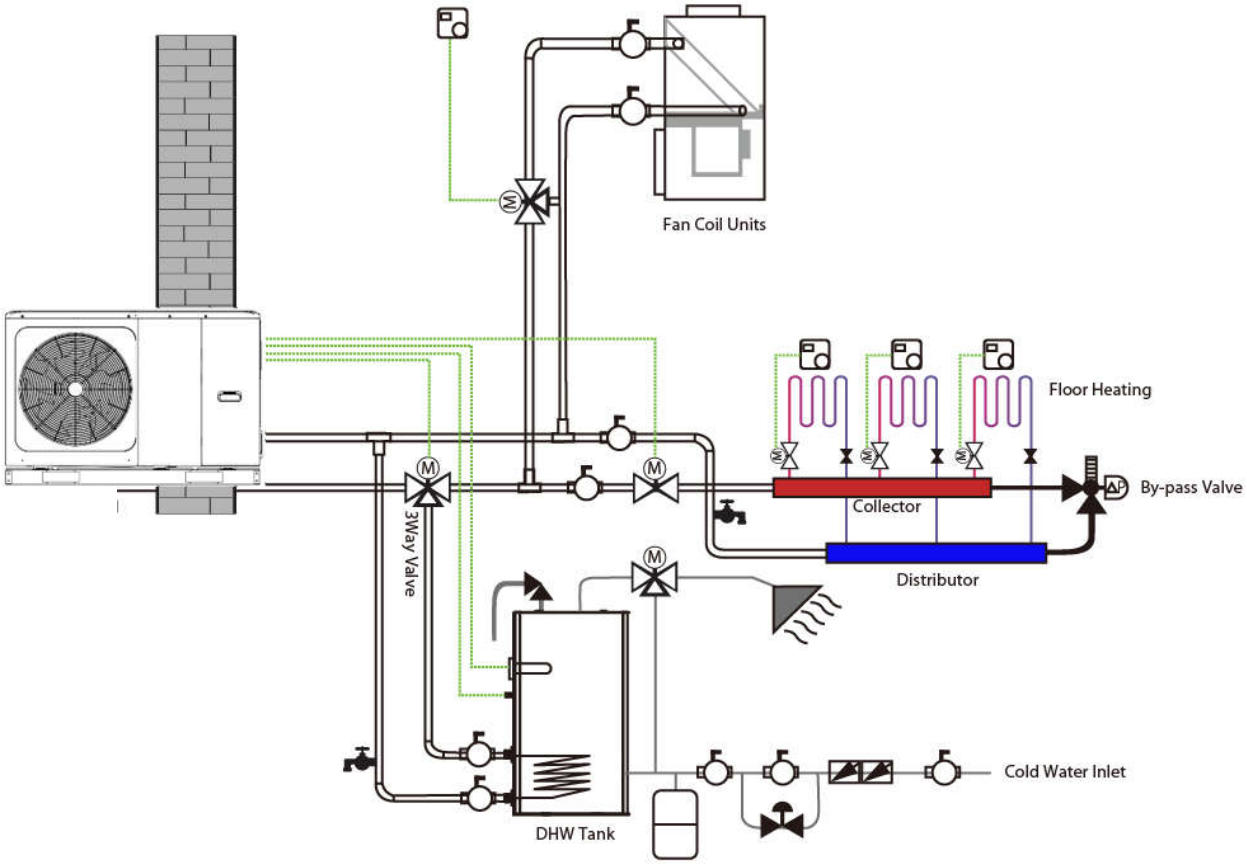
Table 4-5.3: Water side *heat exchanger water inlet / outlet temperature sensor, final outlet water temperature sensor and DHW temperature sensor resistance characteristics*

Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
-30	867.29	**10**	98.227	**50**	17.600	**90**	4.4381
-29	815.80	**11**	93.634	**51**	16.943	**91**	4.3022
-28	767.68	**12**	89.278	**52**	16.315	**92**	4.1711
-27	722.68	**13**	85.146	**53**	15.713	**93**	4.0446
-26	680.54	**14**	81.225	**54**	15.136	**94**	3.9225
-25	641.07	**15**	77.504	**55**	14.583	**95**	3.8046
-24	604.08	**16**	73.972	**56**	14.054	**96**	3.6908
-23	569.39	**17**	70.619	**57**	13.546	**97**	3.5810
-22	536.85	**18**	67.434	**58**	13.059	**98**	3.4748
-21	506.33	**19**	64.409	**59**	12.592	**99**	3.3724
-20	477.69	**20**	61.535	**60**	12.144	**100**	3.2734
-19	450.81	**21**	58.804	**61**	11.715	**101**	3.1777
-18	425.59	**22**	56.209	**62**	11.302	**102**	3.0853
-17	401.91	**23**	53.742	**63**	10.906	**103**	2.9960
-16	379.69	**24**	51.396	**64**	10.526	**104**	2.9096
-15	358.83	**25**	49.165	**65**	10.161	**105**	2.8262
-14	339.24	**26**	47.043	**66**	9.8105		
-13	320.85	**27**	45.025	**67**	9.4736		
-12	303.56	**28**	43.104	**68**	9.1498		
-11	287.33	**29**	41.276	**69**	8.8387		
-10	272.06	**30**	39.535	**70**	8.5396		
-9	257.71	**31**	37.878	**71**	8.2520		
-8	244.21	**32**	36.299	**72**	7.9755		
-7	231.51	**33**	34.796	**73**	7.7094		
-6	219.55	**34**	33.363	**74**	7.4536		
-5	208.28	**35**	31.977	**75**	7.2073		
-4	197.67	**36**	30.695	**76**	6.9704		
-3	187.66	**37**	29.453	**77**	6.7423		
-2	178.22	**38**	28.269	**78**	6.5228		
-1	168.31	**39**	27.139	**79**	6.3114		
0	160.90	**40**	26.061	**80**	6.1078		
1	152.96	**41**	25.031	**81**	5.9117		
2	145.45	**42**	24.048	**82**	5.7228		
3	138.35	**43**	23.109	**83**	5.5409		
4	131.64	**44**	22.212	**84**	5.3655		
5	125.28	**45**	21.355	**85**	5.1965		
6	119.27	**46**	20.536	**86**	5.0336		
7	113.58	**47**	19.752	**87**	4.8765		
8	108.18	**48**	19.003	**88**	4.7251		
9	103.07	**49**	18.286	**89**	4.5790		

17 Yukon Mono System

17.1 System Schematic

Figure 1-1.1: System schematic



Yukon 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.

17.2 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.

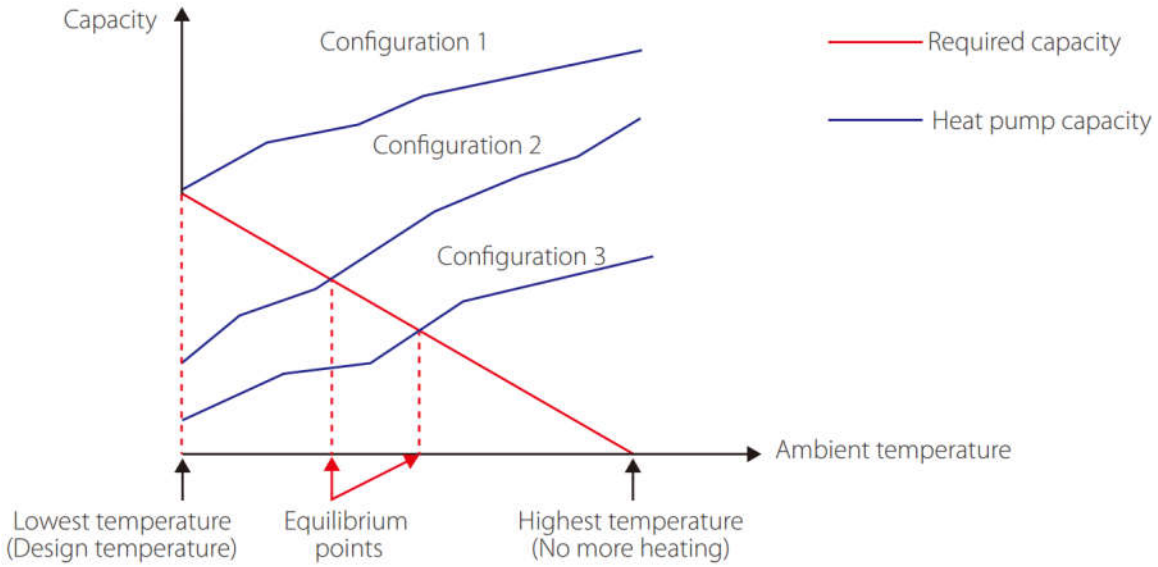
Configuration 2: Heat pump and backup electric heater

- 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



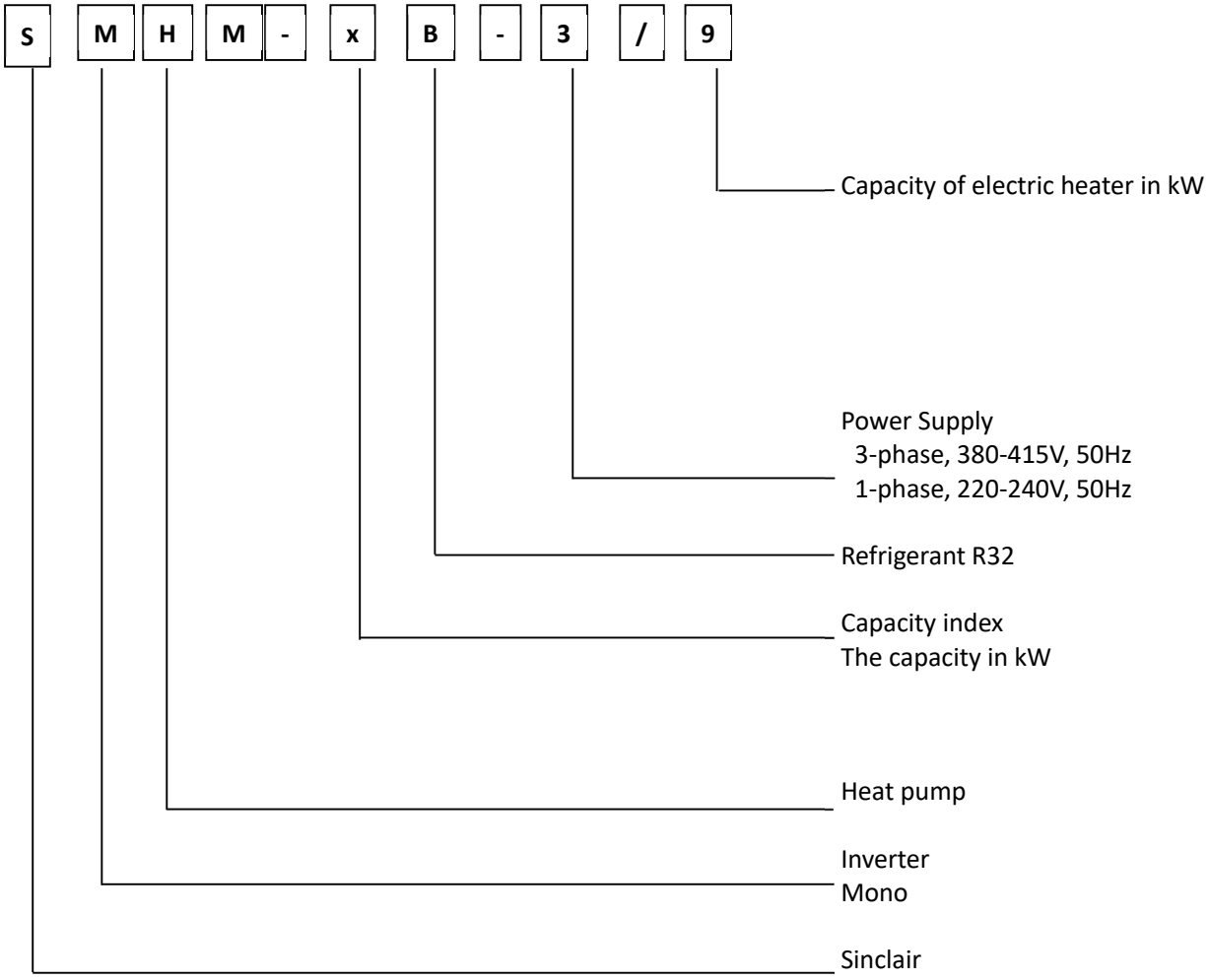
18 Unit Capacities

Table 1-2.1:Yukon Mono unit capacity range and unit appearances

Capacity	4kW	6kW	8kW	10kW	12kW	14kW	16kW
Model[1] (SMHM-)	SMHM-40B/3	SMHM-60B/3	SMHM-80B/3	SMHM-100B/3	SMHM-120B/3 SMHM-120B-3/9	SMHM-140B/3 SMHM-140B-3/9	SMHM-160B/3 SMHM-160B-3/9
Appearance							

3-phase, 380-415V, 50Hz; 1-phase, 220-240V, 50Hz.

19 Nomenclature



20 System Design and Unit Selection

20.1 Selection Procedure

Step 1: Total heat load calculation

Calculate conditioned surface area
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
Decide whether backup electric heater is enabled or disabled

Step 3: Selection of outdoor units

Determine required total heat load on outdoor units
Set capacity safety factor
Select power supply

Provisionally select Yukon Mono unit capacity based on nominal capacity

Correct capacity of the outdoor units for the following items:
Outdoor air temperature / Outdoor humidity / Water outlet temperature[1] / Altitude / Anti-freeze fluid

Is corrected Yukon Mono unit capacity ≥ Required total heat load on outdoor units[2]

Yes

Yukon Mono system selection is complete

No

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. If the outdoor unit selection is to be based on total heating load and total cooling load, select Mono units which satisfy not only the total heating load requirements but also the total cooling load requirements.

20.2 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

20.3 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.

20.4 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(℃)	< -20	-20~15	-15~-10	-10~-5	-5~0	0~5	5~10
T5stop(℃)	35	40	45	48	52	55	56

Ambient temperature(℃)	10~15	15~20	20~25	25~30	35~40	40~65	40~65
T5stop(℃)	57	56	55	52	50	48	45

21 Typical Applications

21.1 Application 1

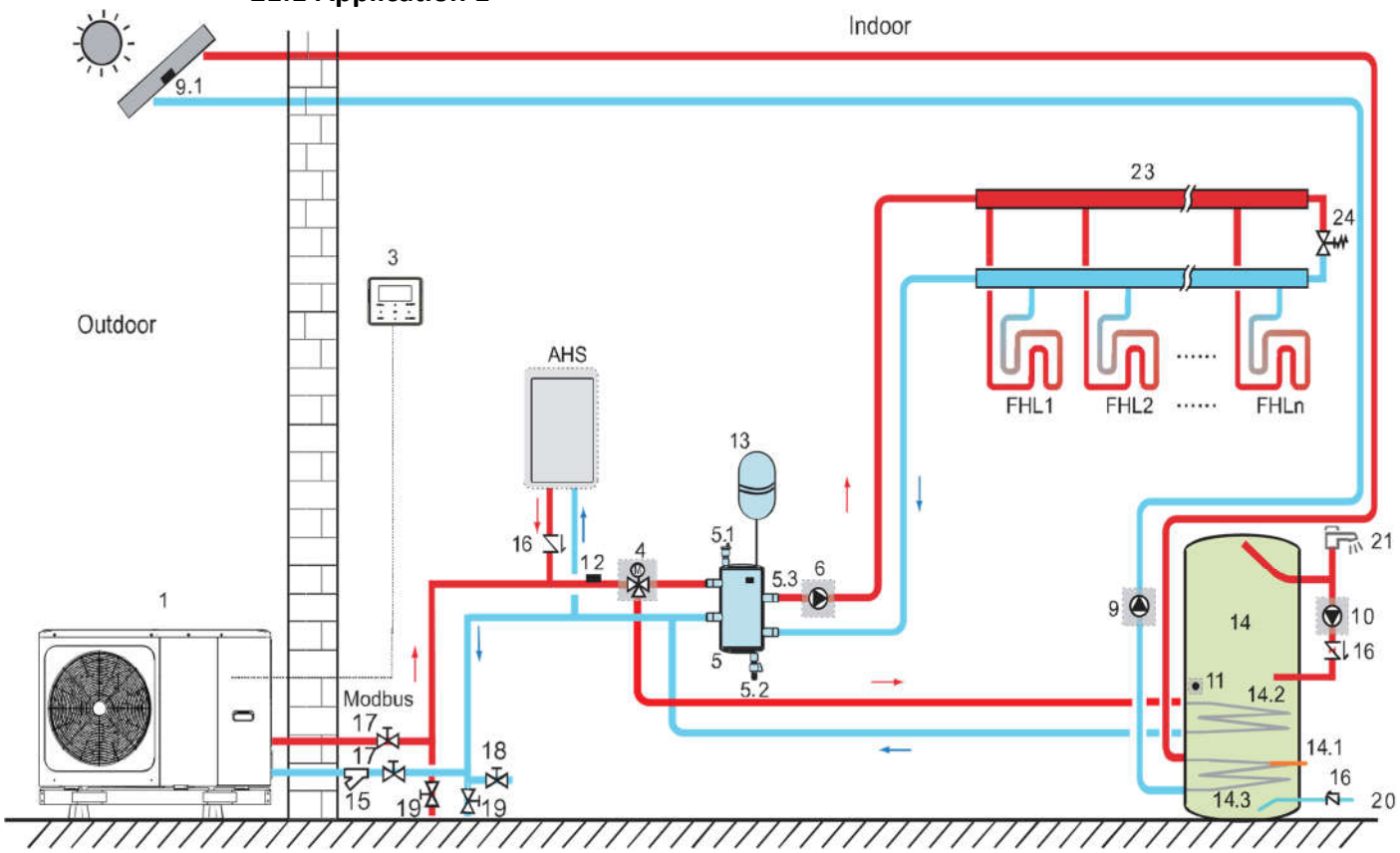


Figure 1-5.1: Application 1

Legend			
1	Outdoor unit	14	Domestic hot water tank (Field supply)
3	User interface	14.1	TBH: Domestic hot water tank booster heater (Field supply)
4	SV1:3-way valve (Field supply)	14.2	Coil 1, heat exchanger for heat pump
5	Balance tank (Field supply)	14.3	Coil 2, heat exchanger for Solar energy
5.1	Automatic bleed valve	15	Filter (Accessory)
5.2	Drainage valve	16	Check valve (Field supply)
5.3	Tbt1: Balance tank upper temperature sensor (Optional)	17	Shut-off valve (Field supply)
6	P_o: Zone A circulation pump (Field supply)	18	Filling valve (Field supply)
9	P_s: Solar pump (Field supply)	19	Drainage valve (Field supply)
9.1	Tsolar: Solar temperature sensor (Optional)	20	Tap water inlet pipe (Field supply)
9.2	Solar panel (Field supply)	21	Hot water tap (Field supply)
10	P_d: DHW pipe pump (Field supply)	23	Collector/distributor (Field supply)
11	T5: Domestic water tank temperature sensor (Accessory)	24	Bypass valve (Field supply)
12	T1: Water flow temperature sensor (Optional)	FHL1…n	Floor heating loop (Field supply)
13	Expansion vessel (Field supply)	AHS	Auxiliary heat source (Field supply)

Notes:

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

21.1.1 Space heating

The ON/OFF signal and operation mode and temperature setting are set on the user interface. P_o (6) keeps running as long as the unit is ON for space heating, SV1(4) keeps OFF.

21.1.2 Domestic water heating

The ON/OFF signal and target tank water temperature (T5S) are set on the user interface. P_o (6) stops running as long as the unit is ON for domestic water heating, SV1(4) keeps ON.

21.1.3 AHS (auxiliary heat source) control

The AHS function is set on the indoor unit

1) When the AHS is set to be valid only for heating mode, AHS can be turned on in the following ways:

a. Turn on the AHS via BACKHEATER function on the user interface;

b. AHS will be turned on automatically if initial water temperature is too low or target water temperature is too high at low ambient temperature.

P_o (6) keeps running as long as the AHS is ON, SV1(4) keeps OFF.

2) When the AHS is set to be valid for heating mode and DHW mode. In heating mode, AHS control is same as part 1); In DHW mode, AHS will be turned on automatically when the initial domestic water temperature T5 is too low or the target domestic water temperature is too high at low ambient temperature. P_o (6) stops running, SV1(4) keeps ON.

3) When the AHS is set to be valid, M1M2 can be set to be valid on the user interface. In heating mode, AHS will be turned on if MIM2 dry contact closes. This function is invalid in DHW mode.

21.1.4 TBH (tank booster heater) control

The TBH function is set on the user interface.

1） When the TBH is set to be valid, TBH can be turned on via TANKHEATER function on the user interface; In DHW mode, TBH will be turned on automatically when the initial domestic water temperature T5 is too low or the target domestic water temperature is too high at low ambient temperature.

2） When the TBH is set to be valid, M1M2 can be set to be valid on the user interface. TBH will be turned on if MIM2 dry contact closes.

21.1.5 Solar energy control

Hydraulic module recognizes solar energy signal by judging Tsolar or receiving SL1SL2 signal from user interface. The recognition method can be set via SOLAR INPUT on the user interface. Please refer to 8.8.5 "For solar energy input signal" for wiring.

1） When Tsolar is set to be valid, Solar energy turns ON when Tsolar is high enough, P_s(9) starts running; Solar energy turns OFF when Tsolar is low, P_s (9) stops running.

2） When SL1SL2 control is set to be valid, Solar energy turns ON after receiving Solar kit signal from user interface, P_s (9) starts running; Without solar kit signal. Solar energy turns OFF, P_s (9) stops running. The room thermostats are not connected to the Mono unit but to a motorized valve. Each room’s temperature is regulated by the motorized valve on its water circuit. Domestic hot water is supplied from the domestic hot water tank connected to the Mono unit. A bypass valve is required.

21.2 Application 2

ROOM THERMOSTAT Control for Space heating or cooling need to be set on the user interface. It can be set in three ways: MODE SET/ONE ZONE/DOUBLE ZONE. The indoor unit can be connected to a high voltage room thermostat and a low voltage room thermostat. A hydraulic adapter box can also be connected. Another six thermostats can be connected to the hydraulic adapter box. Please refer to "ROOM THERMOSTAT in installation manual" for wiring.

21.2.1 One zone control

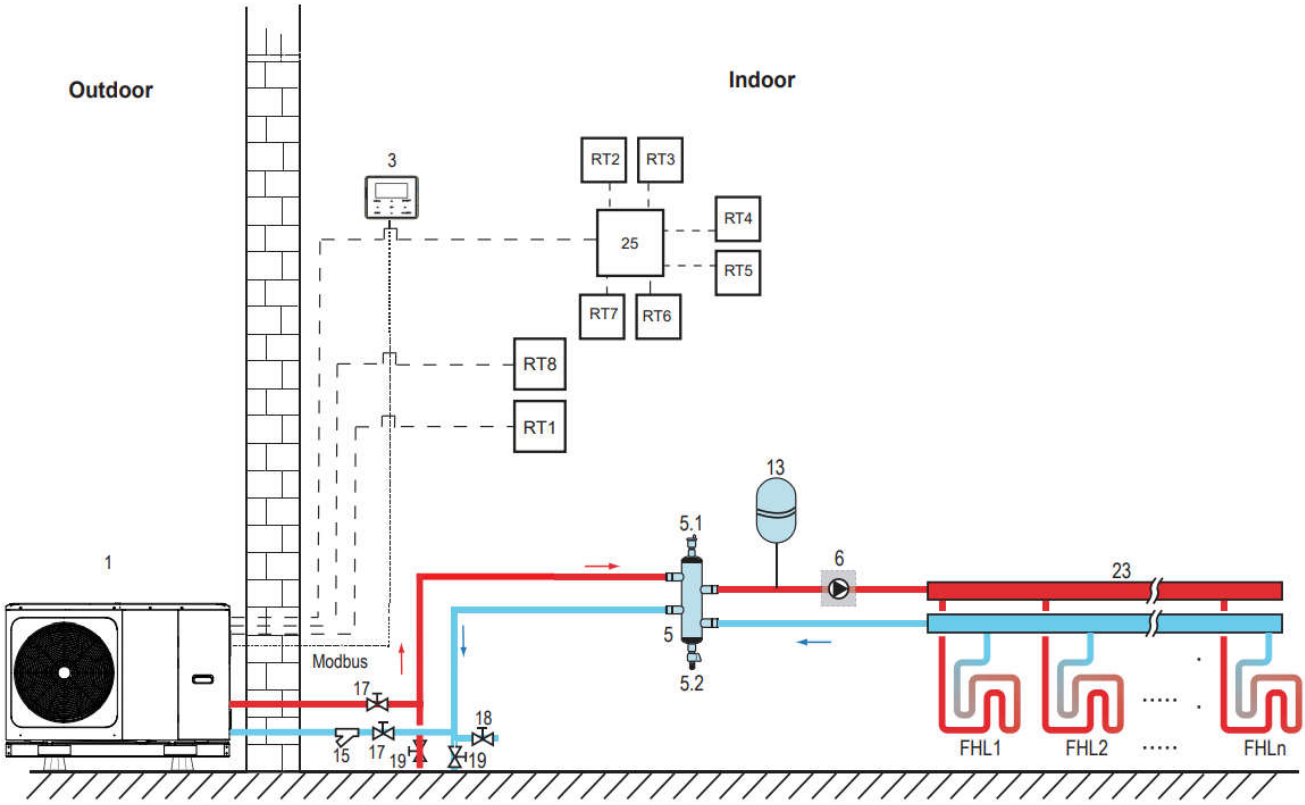


Figure 1-5.2: Application 2-One zone control

Legend			
1	Outdoor unit	17	Shut-off valve (Field supply)
3	User interface	18	Filling valve (Field supply)
5	Balance tank (Field supply)	19	Drainage valve (Field supply)
5.1	Automatic bleed valve	23	Collector/distributor (Field supply)
5.2	Drainage valve	25	Hydraulic adapter box (Optional)
6	P_o: Zone A circulation pump (Field supply)	RT 1…7	Low voltage room thermostat (Field supply)
13	Expansion vessel (Field supply)	RT8	High voltage room thermostat (Field supply)
15	Filter (Accessory)	FHL1…n	Floor heating loop (Field supply)

Notes:

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

Space heating

One zone control: the unit ON/OFF is controlled by the room thermostat, cooling or heating mode and outlet water temperature is set on the user interface. System is ON when any "HL" of all the thermostats closes. When all "HL" open, system turns OFF.

The circulation pumps operation

When the system is ON, which means any "HL" of all the thermostats closes, P_o(6) starts running; When the system is OFF, which means all "HL" close, P_o (6) stops running.

21.2.2 Mode set control

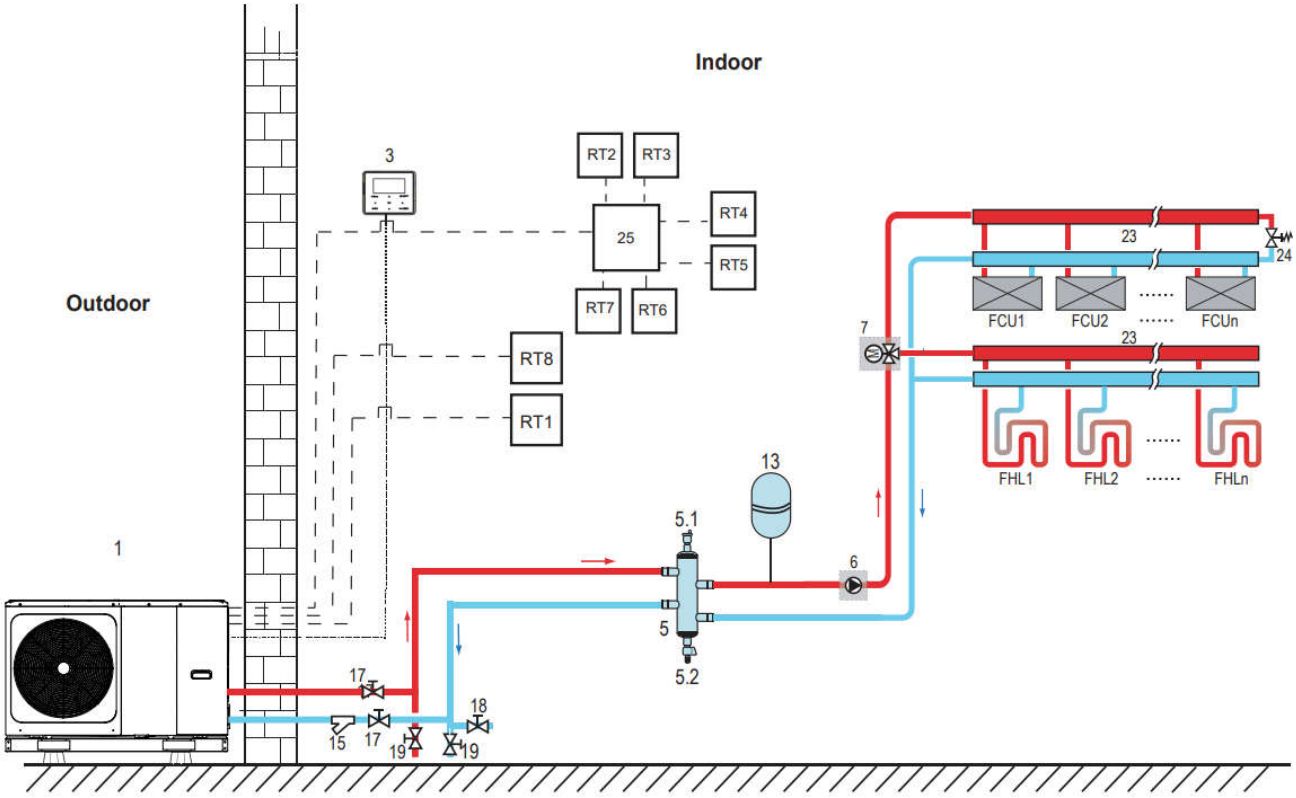


Figure 1-5.3: Application 2- Mode set control

Legend			
1	Outdoor unit	17	Shut-off valve (Field supply)
3	User interface	18	Filling valve (Field supply)
5	Balance tank (Field supply)	19	Drainage valve (Field supply)
5.1	Automatic bleed valve	23	Collector/distributor (Field supply)
5.2	Drainage valve	24	Bypass valve (Field supply)
6	P_o: Zone A circulation pump (Field supply)	25	Hydraulic adapter box (Optional)
7	SV2: 3-way valve (Field supply)	RT 1…7	Low voltage room thermostat (Field supply)
13	Expansion vessel (Field supply)	RT8	High voltage room thermostat (Field supply)
15	Filter (Accessory)	FHL1…n	Floor heating loop (Field supply)
		FCU1…n	Fan coil unit (Field supply)

Notes:

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

Space heating

Cooling or heating mode is set via the room thermostat, water temperature is set on the user interface. 1) When any “CL” of all the thermostats close, system will be set at cooling mode. 2) When any “HL” of all the thermostats close and all “CL” open, system will be set at heating mode.

The circulation pumps operation

1) When the system is in cooling mode, which means any “CL” of all the thermostats closes, SV2(7) keeps OFF, P_o(6) starts running;

2) When the system is in heating mode, which means one or more “HL” close and all “CL” open, SV2(7) keeps ON, P_o(6) starts running.

21.2.3 Double zone control

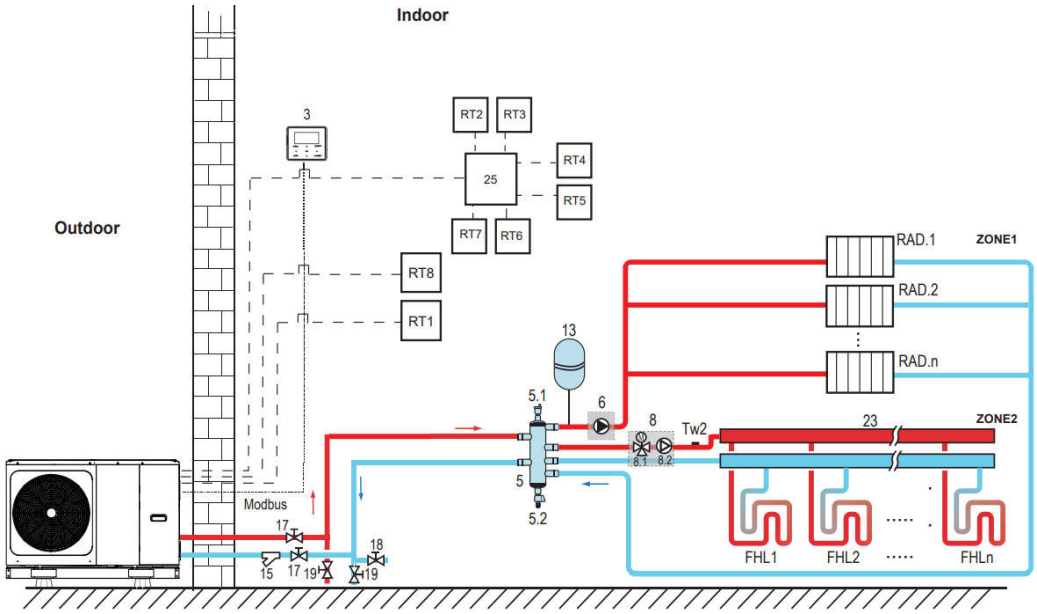


Figure 1-5.4: Application 2-Double zone control

Legend			
1	Outdoor unit	17	Shut-off valve (Field supply)
3	User interface	17	Shut-off valve (Field supply)
5	Balance tank (Field supply)	18	Filling valve (Field supply)
5.1	Automatic bleed valve	19	Drainage valve (Field supply)
5.2	Drainage valve	23	Collector/distributor (Field supply)
6	P_o: Zone A circulation pump (Field supply)	25	Hydraulic adapter box (Optional)
8	Mixing station (Field supply)	RT 1...7	Low voltage room thermostat (Field supply)
8.1	SV3: Mixing valve (Field supply)	RT8	High voltage room thermostat (Field supply)
8.2	P_c: zone 2 circulation	FHL1...n	Floor heating loop (Field supply)
13	Expansion vessel (Field supply)	Tw2	Zone 2 water flow temperature sensor (Optional)
15	Filter (Accessory)	RAD.1...n	Radiator (Field supply)

Notes:

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

Space heating

Zone1 can operate in cooling mode or heating mode, while zone2 can only operate in heating mode; While installation, for all thermostats in zone1, only “H、L” terminals need to be connected. For all thermostats in zone2, only “C、L” terminals need to be connected.

1) The ON/OFF of zone1 is controlled by the room thermostats in zone1. When any “HL” of all thermostats in zone1 closes, zone1 turns ON. When all “HL” turn OFF, zone1 turns OFF; Target temperature and operation mode are set on the user interface;

2) In heating mode, the ON/OFF of zone2 is controlled by the room thermostats in zone2. When any ”CL” of all thermostats in zone2 closes, zone2 turns ON. When all “CL” open, zone2 turns OFF. Target
temperature is set on the user interface; Zone 2 can only operate in heating mode. When cooling mode is set on the user interface, zone2 keeps in OFF status.

The circulation pump operation

When zone 1 is ON, P_o(6) starts running; When zone 1 is OFF, P_o(6) stops running;

When zone 2 is ON, SV3(8.1) is ON, P_c(8.2) starts running; When zone 2 is OFF, SV3(8.1) is OFF, P_c(8.2) stops running .

The floor heating loops require a lower water temperature in heating mode compared to radiators. 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 radiators 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.

21.3 Application 3

21.3.1 Group control

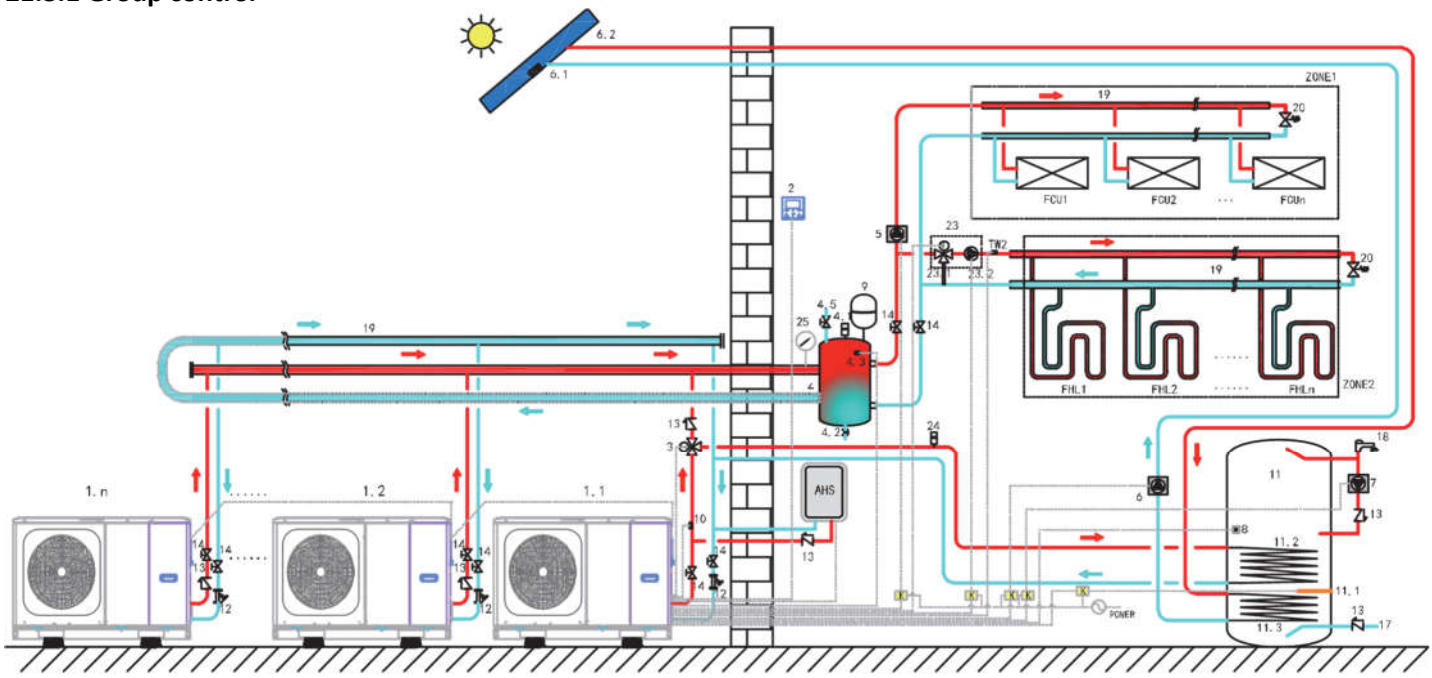


Figure 1-5.5: Application 3- Parallel system control

Legend			
1.1	Master unit	11.3	Coil 2: heat exchanger for heat pump
1.2…n	Slave unit	12	Filter(Accessory)
2	User interface	13	Check valve (Field supply)
3	SV1: 3-way valve(Field supply)	14	Shut-off valve(Field supply)
4	Balance tank(Field supply)	17	Tap water inlet pipe(Field supply)
4.1	Automatic bleed valve	18	Hot water tap(Field supply)
4.2	Drainage valve	19	Collector/Distributor(Field supply)
4.3	Tbt1: Balance tank upper temperature sensor(optional)	20	Bypass valve(Field supply)
4.5	Filling valve	23	Mixing station(Field supply)
5	P_O: Outside circulation pump (Field supply)	23.1	SV3: Mixing valve(Field supply)
6	P_S: Solar pump(Field supply)	23.2	P_C: Zone B circulation pump(Field supply)
6.1	Tsolar: Solar temperature sensor(Optional)	24	Automatic bleed valve(Field supply)
6.2	Solar panel (Field supply)	25	Water manometer(Field supply)
7	P_D: DHW pipe pump(Field supply)	Tw2	Zone B water flow temperature sensor(Optional)
8	T5: Domestic water tank temperature sensor(Accessory)	RAD 1…n	Radiator(Field supply)
9	Expansion vessel(Field supply)	FHL 1…n	Floor heating loop(Field supply)
10	T1: Total water flow temperature sensor(Optional)	K	Contactor(Field supply)
11	Domestic water tank(Field supply)	ZONE 1	The space operate cooling or heating mode
11.1	TBH: Domestic water tank heater	ZONE 2	The space operate heating mode
11.2	Coil 1: heat exchanger for heat pump	AHS	Auxiliary heat source(Field supply)

Notes:

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

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.

Space heating

All salve units can operate in space heating mode. The operation mode and setting temperature are set on the user interface(2). Due to changes of the outdoor temperature and the required load indoors, multiple outdoor units may operate at different times.

In cooling mode, SV3(23.1) and P_C(23.2) keep OFF, P_O(5) keeps ON;

In heating mode, when both ZONE 1 and ZONE 2 work, P_C(23.2) and P_O(5) keeps ON, SV3(23.1) switches between ON and OFF according to the set Tw2.

In heating mode, when only ZONE 1 works, P_O(5) keep ON, SV3(23.1) and P_C(23.2) keep OFF.

In heating mode, when only ZONE 2 works, P_O(5) keep OFF, P_C(23.2) keep ON, SV3(23.1) switches between ON and OFF according to the set Tw2.

Domestic water heating

Only master unit(1.1) can operate in DHW mode. T5S is set on the user interface(2). In DHW mode, SV1(3) keeps ON. When master unit operated in DHW mode, slave units can operate in space cooling/heating mode.

AHS control

AHS should be set via the dip switches on main board; AHS is only controlled by master unit. When master unit operates in DHW mode, AHS can only be used for producing domestic hot water; when master unit operates in heating mode, AHS can only be used for heating mode.

1) When AHS is set valid only for heating mode, it will be turned on in following conditions:

a. Turn on BACKUPHEATER function on user interface;

b. Master unit operates in heating mode. When inlet water temperature is too low or ambient temperature is too low, the target leaving water temperature is too high, AHS will be turned on automatically.

2) When the AHS is set valid for heating mode and DHW mode. It will be turned on in following conditions:

When master unit operates in heating mode, conditions of turning on AHS is same as 1);

When master unit operates in heating mode, if T5 or ambient temperature is too low, target T5 temperature is too high, AHS will be turned on automatically.

3)When AHS is valid, and the operation of AHS is controlled by M1M2.

When M1M2 closes, AHS is turned on. When master unit operates in DHW mode, AHS can not be turned on by closing M1M2.

TBH control

TBH should be set via the dip switches on main board. TBH is only controlled by master unit.

1) When the TBH is set to be valid, TBH can be turned on via TANKHEATER function on the user interface; In DHW mode, TBH will be turned on automatically when the initial domestic water temperature T5 is too low or the target domestic water temperature is too high at low ambient temperature.

2) When the TBH is set to be valid, M1M2 can be set to be valid on the user interface. TBH will be turned on if MIM2 dry contact closes.

Solar energy control

Solar energy is only controlled by master.

Hydraulic module recognizes solar energy signal by judging Tsolar or receiving SL1SL2 signal from user interface. The recognition method can be set via SOLAR INPUT on the user interface.

1)When Tsolar is set to be valid, Solar energy turns ON when Tsolar is high enough, P_s starts running; Solar energy turns OFF when Tsolar is low, P_s stops running.

2)When SL1SL2 control is set to be valid, Solar energy turns ON after receiving Solar kit signal from user interface, P_s starts running; Without solar kit signal. Solar energy turns OFF, P_s stops running.

22 Specifications

Outdoor unit model name			SMHM-40B	SMHM-60B	SMHM-80B	SMHM-100B
Power supply	V/Ph/Hz		220 240/1/50			
Heating A7W35	Capacity	kW	4.20	6.35	8.40	10.0
	Rated input	kW	0.82	1.28	1.63	2.02
	COP		5.10	4.95	5.15	4.95
Heating A7W45	Capacity	kW	4.30	6.30	8.10	10.0
	Rated input	kW	1.13	1.70	2.10	2.67
	COP		3.80	3.70	3.85	3.75
Heating A7W55	Capacity	kW	4.40	6.00	7.50	9.50
	Rated input	kW	1.49	2.03	2.36	3.06
	COP		2.95	2.95	3.18	3.10
Heating A 7W35	Capacity	kW	4.70	6.00	7.00	8.00
	Rated input	kW	1.52	2.00	2.19	2.62
	COP		3.10	3.00	3.20	3.05
Heating A-7W55	Capacity	kW	4.00	5.15	6.15	6.85
	Rated input	kW	2.05	2.58	3.00	3.43
	COP		1.95	2.00	2.05	2.00
Cooling A35W18	Capacity	kW	4.50	6.50	8.30	9.90
	Rated input	kW	0.82	1.35	1.64	2.18
	EER		5.50	4.80	5.05	4.55
Cooling A35W7	Capacity	kW	4.70	7.00	7.45	8.20
	Rated input	kW	1.36	2.33	2.22	2.52
	EER		3.45	3.00	3.35	3.25
Seasonal space heating energy efficiency class	Water outlet at 35°C		A+++			
	Water outlet at 55°C		A++			
SCOP	Warmer climate	35°C	6.46	6.57	6.99	7.09
		55°C	4.15	4.21	4.51	4.62
	Average climate	35°C	4.85	4.95	5.22	5.20
		55°C	3.31	3.52	3.37	3.47
	Colder climate	35°C	4.06	4.21	4.33	4.32
		55°C	2.63	2.85	2.88	2.99
SEER	Water outlet	7°C	4.98	5.31	5.82	5.95
		18°C	7.76	8.22	8.94	8.73
Sound power Level[2]		dB	55	58	59	60
Rated water flow		m^3/h	0.72	1.09	1.44	1.72
Water flow range		m^3/h	0.4~0.9	0.4~1.25	0.4~1.65	0.4~2.1
Internal water volume		L	2.16~6.96	2.16~6.96	2.44-7.24	2.44-7.24
Compressor	Type		Twin rotary			
Outdoor fan	Motor type / Number of fans		DC fan / 1		DC fan / 1	
Air side heat exchanger			Finned tube			
Refrigerant			R32 1.4kg			
Unit dimension (W×H×D)		mm	1295×718×429		1385×865×523	
Packing dimension (W×H×D)		mm	1375×885×475		1465×1035×560	
Net/Gross weight		kg	86/107		105/132	

Outdoor air temperature range	Cooling	°C	5 ~ 43			
	Heating	°C	-25 ~ 35			
	DHW	°C	25 ~ 43			
Water side heat exchanger			Plate type			
Water side connection			R1 "	R1 "	R5/4"	R5/4"
Water setting temperature range	Cooling	°C	5 ~ 25			
	Heating	°C	25 ~ 65			
	DHW[3]	°C	20 ~ 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. Sound power test condition： EN12102-1
3. Maximum domestic hot water temperature 60℃ is only available with TBH support.

Outdoor unit model name				SMHM-120B	SMHM-140B	SMHM-160B
Power supply			V/Ph/Hz	220-240/1/50		
Heating A7W35	Capacity		kW	12.1	14.5	15.9
	Rated input		kW	2.44	3.15	3.53
	COP			4.95	4.60	4.50
Heating A7W45	Capacity		kW	12.3	14.1	16.0
	Rated input		kW	3.32	3.92	4.57
	COP			3.70	3.60	3.50
Heating A7W55	Capacity		kW	11.9	13.8	16.0
	Rated input		kW	3.90	4.68	5.61
	COP			3.05	2.95	2.85
Heating A 7W35	Capacity		kW	10.00	12.00	13.10
	Rated input		kW	3.33	4.21	4.85
	COP			3.00	2.85	2.70
Heating A 7W55	Capacity		kW	9.80	11.00	12.50
	Rated input		kW	4.78	5.37	6.25
	COP			2.05	2.05	2.00
Cooling A35W18	Capacity		kW	12.00	13.50	14.2
	Rated input		kW	3.04	3.74	3.94
	EER			3.95	3.61	3.61
Cooling A35W7	Capacity		kW	11.5	12.4	14.0
	Rated input		kW	4.18	4.96	5.60
	EER			2.75	2.50	2.50
Seasonal space heating energy efficiency class	Water outlet at 35°C			A+++		
	Water outlet at 55°C			A++		
SCOP	Warmer climate		35 °C	6.48	6.58	6.29
			55 °C	4.43	4.49	4.48
	Average climate		35 °C	4.81	4.72	4.62
			55 °C	3.45	3.47	3.41
	Colder climate		35 °C	4.08	4.07	4.02
			55 °C	3.02	3.05	3.12
SEER	Water outlet		7 °C	4.93	4.87	4.69
			18°C	7.13	6.94	6.75
Sound power Level[2]			dB	65	65	68
Rated water flow			m^3/h	2.08	2.49	2.73
Water flow range			m^3/h	0.7~2.5	0.7~2.75	0.7~3.0
Internal water volume			L	2.78 7.58	2.78 7.58	2.78 7.58
Compressor	Type			Twin rotary		
Outdoor fan	Motor type			DC fan		
	Number of fans			1		
Air side heat exchanger				Finned tube		
Refrigerant				R32 1.75kg		
Unit dimension (W×H×D)			mm	1385×865×523		
Packing dimension (W×H×D)			mm	1465×1035×560		
Net/Gross weight			kg	129/155		
Outdoor air temperature range	Cooling		℃	-5 ~ 43		

	Heating	℃	-25 ~ 35
	DHW	℃	-25 ~ 43
Water side heat exchanger			Plate type
Water side connection			R5/4"
Water setting temperature range	Cooling	℃	5 ~ 25
	Heating	℃	25 ~ 65
	DHW[3]	℃	20 ~ 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. Sound power test condition：EN12102-1
3. Maximum domestic hot water temperature 60℃ is only available with TBH support.

Outdoor unit model name			SMHM-120B-3	SMHM-140B-3	SMHM-160B-3
Power supply		V/Ph/Hz	380-415/3/50		
Heating A7W35	Capacity	kW	12.1	14.5	15.9
	Rated input	kW	2.44	3.15	3.53
	COP		4.95	4.60	4.50
Heating A7W45	Capacity	kW	12.3	14.1	16.0
	Rated input	kW	3.32	3.92	4.57
	COP		3.70	3.60	3.50
Heating A7W55	Capacity	kW	11.9	13.8	16.0
	Rated input	kW	3.90	4.68	5.61
	COP		3.05	2.95	2.85
Heating A-7W35	Capacity	kW	10.00	12.00	13.10
	Rated input	kW	3.33	4.21	4.85
	COP		3.00	2.85	2.70
Heating A-7W55	Capacity	kW	9.80	11.00	12.50
	Rated input	kW	4.78	5.37	6.25
	COP		2.05	2.05	2.00
Cooling A35W18	Capacity	kW	12.00	13.50	14.20
	Rated input	kW	3.04	3.74	3.94
	EER		3.95	3.61	3.61
Cooling A35W7	Capacity	kW	11.5	12.4	14.0
	Rated input	kW	4.18	4.96	5.60
	EER		2.75	2.50	2.50
Seasonal space heating energy efficiency class	Water outlet at 35°C		A+++		
	Water outlet at 55°C		A++		
SCOP	Warmer climate	35°C	6.47	6.57	6.28
		55°C	4.42	4.49	4.47
	Average climate	35°C	4.81	4.72	4.62
		55°C	3.45	3.47	3.41
	Colder climate	35°C	4.08	4.07	4.02
		55°C	3.02	3.05	3.12
SEER	Water outlet	7°C	4.90	4.85	4.67
		18°C	7.07	6.89	6.70
Sound power Level[2]		dB	65	65	68
Rated water flow		m^3/h	2.08	2.49	2.73
Water flow range		m^3/h	0.7~2.5	0.7~2.75	0.7~3.0
Internal water volume		L	2.78-7.58	2.78-7.58	2.78-7.58
Compressor	Type		Twin rotary		
Outdoor fan	Motor type		DC fan		
	Number of fans		1		
Air side heat exchanger			Finned tube		
Refrigerant			R32 1.75kg		
Unit dimension (W×H×D)		mm	1385×865×523		
Packing dimension (W×H×D)		mm	1465×1035×560		
Net/Gross weight		kg	144/172		
Outdoor air temperature range	Cooling	°C	-5 ~ 43		

	Heating	°C	-25~ 35
	DHW	°C	-25~ 43
Water side heat exchanger			Plate type
Water side connection			R5/4"
Water setting temperature range	Cooling	°C	5~ 25
	Heating	°C	25~ 65
	DHW[3]	°C	20~ 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. Sound power test condition： EN12102-1
3. Maximum domestic hot water temperature 60℃ is only available with TBH support.

Outdoor unit model name			SMHM-40B/3	SMHM-60B/3	SMHM-80B/3	SMHM-80B/9	SMHM-100B/3	SMHM-100B/9
Power supply	V/Ph/Hz		220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50
Heating A7W35	Capacity	kW	4.20	6.35	8.40	8.40	10.0	10.0
	Rated input	kW	0.82	1.28	1.63	1.63	2.02	2.02
	COP		5.10	4.95	5.15	5.15	4.95	4.95
Heating A7W45	Capacity	kW	4.30	6.30	8.10	8.10	10.0	10.0
	Rated input	kW	1.13	1.70	2.10	2.10	2.67	2.67
	COP		3.80	3.70	3.85	3.85	3.75	3.75
Heating A7W55	Capacity	kW	4.40	6.00	7.50	7.50	9.50	9.50
	Rated input	kW	1.49	2.03	2.36	2.36	3.06	3.06
	COP		2.95	2.95	3.18	3.18	3.10	3.10
Heating A-7W35	Capacity	kW	4.70	6.00	7.00	7.00	8.00	8.00
	Rated input	kW	1.52	2.00	2.19	2.19	2.62	2.62
	COP		3.10	3.00	3.20	3.20	3.05	3.05
Heating A-7W55	Capacity	kW	4.00	5.15	6.15	6.15	6.85	6.85
	Rated input	kW	2.05	2.58	3.00	3.00	3.43	3.43
	COP		1.95	2.00	2.05	2.05	2.00	2.00
Cooling A35W18	Capacity	kW	4.50	6.50	8.30	8.30	9.90	9.90
	Rated input	kW	0.82	1.35	1.64	1.64	2.18	2.18
	EER		5.50	4.80	5.05	5.05	4.55	4.55
Cooling A35W7	Capacity	kW	4.70	7.00	7.45	7.45	8.20	8.20
	Rated input	kW	1.36	2.33	2.22	2.22	2.52	2.52
	EER		3.45	3.00	3.35	3.35	3.25	3.25
Seasonal space heating energy efficiency class	Water outlet at 35°C		A+++					
	Water outlet at 55°C		A++					
SCOP	Warmer climate	35°C	6.46	6.57	6.99	6.99	7.09	7.09
		55°C	4.15	4.21	4.51	4.51	4.62	4.62
	Average climate	35°C	4.85	4.95	5.22	5.22	5.20	5.20
		55°C	3.31	3.52	3.37	3.37	3.47	3.47
	Colder climate	35°C	4.06	4.21	4.33	4.33	4.32	4.32
		55°C	2.63	2.85	2.88	2.88	2.99	2.99
SEER	Water outlet	7°C	4.98	5.31	5.82	5.82	5.95	5.95
		18°C	7.76	8.22	8.94	8.94	8.73	8.73
Sound power Level[2]		dB	55	58	59	59	59	59
Rated water flow		m^3/h	0.72	1.09	1.44	1.44	1.44	1.44
Water flow range		m^3/h	0.4~0.9	0.4~1.25	0.4~1.65	0.4~1.65	0.4~1.65	0.4~1.65
Internal water volume		L	3.31-8.11	3.31-8.11	3.59-8.39	3.49-8.29	3.59-8.39	3.49-8.29
Backup electric heater	Capacity	kW	3	3	3	9	3	9
	Power supply	V/Ph/Hz	220-240/1/50	220-240/1/50	220-240/1/50	380-415/3/50	220-240/1/50	380-415/3/50
Compressor	Type		Twin rotary					
Outdoor fan	Motor type / Number of fans		DC fan / 1					

YUKON SERIES MONOBLOCK 4-16 kW

Air side heat exchanger			Finned tube								
Refrigerant			R32 1.4kg								
Unit dimension (W×H×D)		mm	1295×718×429				1385×865×523				
Packing dimension (W×H×D)		mm	1375×885×475				1465×1035×560				
Net/Gross weight		kg	91/112				110/137				
Outdoor air temperature range	Cooling	°C	5 ~ 43								
	Heating	°C	25 ~ 35								
	DHW	°C	25 ~ 43								
Water side heat exchanger			Plate type								
Water side connection			R1 "		R1 "		R5/4"		R5/4"		R5/4"		R5/4"
Water setting temperature range	Cooling	°C	5 ~ 25								
	Heating	°C	25 ~ 65								
	DHW[3]	°C	20 ~ 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. Sound power test condition： EN12102 1
3. Maximum domestic hot water temperature 60℃ is only available with TBH support.

Outdoor unit model name				SMHM-120B/3	SMHM-120B/9	SMHM-140B/3	SMHM-140B/9	SMHM-160B/3	SMHM-160B/9
Power supply			V/Ph/Hz	220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50	220-240/1/50
Heating A7W35	Capacity		kW	12.1	12.1	14.5	14.5	15.9	15.9
	Rated input		kW	2.44	2.44	3.15	3.15	3.53	3.53
	COP			4.95	4.95	4.60	4.60	4.50	4.50
Heating A7W45	Capacity		kW	12.3	12.3	14.1	14.1	16.0	16.0
	Rated input		kW	3.32	3.32	3.92	3.92	4.57	4.57
	COP			3.70	3.70	3.60	3.60	3.50	3.50
Heating A7W55	Capacity		kW	11.9	11.9	13.8	13.8	16.0	16.0
	Rated input		kW	3.90	3.90	4.68	4.68	5.61	5.61
	COP			3.05	3.05	2.95	2.95	2.85	2.85
Heating A-7W35	Capacity		kW	10.00	10.00	12.00	12.00	13.10	13.10
	Rated input		kW	3.33	3.33	4.21	4.21	4.85	4.85
	COP			3.00	3.00	2.85	2.85	2.70	2.70
Heating A-7W55	Capacity		kW	9.80	9.80	11.00	11.00	12.50	12.50
	Rated input		kW	4.78	4.78	5.37	5.37	6.25	6.25
	COP			2.05	2.05	2.05	2.05	2.00	2.00
Cooling A35W18	Capacity		kW	12.00	12.00	13.50	13.50	14.2	14.2
	Rated input		kW	3.04	3.04	3.74	3.74	3.94	3.94
	EER			3.95	3.95	3.61	3.61	3.61	3.61
Cooling A35W7	Capacity		kW	11.5	11.5	12.4	12.4	14.0	14.0
	Rated input		kW	4.18	4.18	4.96	4.96	5.60	5.60
	EER			2.75	2.75	2.50	2.50	2.50	2.50
Seasonal space heating energy efficiency class	Water outlet at 35°C			A+++					
	Water outlet at 55°C			A++					
SCOP	Warmer climate		35°C	6.48	6.48	6.58	6.58	6.29	6.29
			55°C	4.43	4.43	4.49	4.49	4.48	4.48
	Average climate		35°C	4.81	4.81	4.72	4.72	4.62	4.62
			55°C	3.45	3.45	3.47	3.47	3.41	3.41
	Colder climate		35°C	4.08	4.08	4.07	4.07	4.02	4.02
			55°C	3.02	3.02	3.05	3.05	3.12	3.12
SEER	Water outlet		7°C	4.93	4.93	4.87	4.87	4.69	4.69
			18°C	7.13	7.13	6.94	6.94	6.75	6.75
Sound power Level[2]			dB	65	65	65	65	68	68
Rated water flow			m^3/h	2.08	2.08	2.49	2.49	2.73	2.73
Water flow range			m^3/h	0.7~2.5	0.7~2.5	0.7~2.75	0.7~2.75	0.7~3.0	0.7~3.0
Internal water volume			L	3.93-8.73	3.83-8.63	3.93-8.73	3.83-8.63	3.93-8.73	3.83-8.63
Backup electric heater	Capacity		kW	3	9	3	9	3	9
	Power supply		V/Ph/Hz	220-240/1/50	380-415/3/50	220-240/1/50	380-415/3/50	220-240/1/50	380-415/3/50
Compressor	Type			Twin rotary					
Outdoor fan	Motor type			DC fan					
	Number of fans			1					
Air side heat exchanger				Finned tube					
Refrigerant				R32 1.75kg					
Unit dimension (W×H×D)			mm	1385×865×523					

Packing dimension (W×H×D)		mm	1465×1035×560
Net/Gross weight		kg	134/160
Outdoor air temperature range	Cooling	°C	5 ~ 43
	Heating	°C	-25 ~ 35
	DHW	°C	25 ~ 43
Water side heat exchanger			Plate type
Water side connection			R5/4"
Water setting temperature range	Cooling	°C	5 ~ 25
	Heating	°C	25 ~ 65
	DHW[3]	°C	20 ~ 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. Sound power test condition： EN12102-1
3. Maximum domestic hot water temperature 60℃ is only available with TBH support.

Outdoor unit model name			SMHM-120B-3/3	SMHM-120B-3/9	SMHM-140B-3/3	SMHM-140B-3/9	SMHM-160B-3/3	SMHM-160B-3/9
Power supply		V/Ph/Hz	380-415/3/50					
Heating A7W35	Capacity	kW	12.1	12.1	14.5	14.5	15.9	15.9
	Rated input	kW	2.44	2.44	3.15	3.15	3.53	3.53
	COP		4.95	4.95	4.60	4.60	4.50	4.50
Heating A7W45	Capacity	kW	12.3	12.3	14.1	14.1	16.0	16.0
	Rated input	kW	3.32	3.32	3.92	3.92	4.57	4.57
	COP		3.70	3.70	3.60	3.60	3.50	3.50
Heating A7W55	Capacity	kW	11.9	11.9	13.8	13.8	16.0	16.0
	Rated input	kW	3.90	3.90	4.68	4.68	5.61	5.61
	COP		3.05	3.05	2.95	2.95	2.85	2.85
Heating A-7W35	Capacity	kW	10.00	10.00	12.00	12.00	13.10	13.10
	Rated input	kW	3.33	3.33	4.21	4.21	4.85	4.85
	COP		3.00	3.00	2.85	2.85	2.70	2.70
Heating A-7W55	Capacity	kW	9.80	9.80	11.00	11.00	12.50	12.50
	Rated input	kW	4.78	4.78	5.37	5.37	6.25	6.25
	COP		2.05	2.05	2.05	2.05	2.00	2.00
Cooling A35W18	Capacity	kW	12.00	12.00	13.50	13.50	14.2	14.2
	Rated input	kW	3.04	3.04	3.74	3.74	3.94	3.94
	EER		3.95	3.95	3.61	3.61	3.61	3.61
Cooling A35W7	Capacity	kW	11.5	11.5	12.4	12.4	14.0	14.0
	Rated input	kW	4.18	4.18	4.96	4.96	5.60	5.60
	EER		2.75	2.75	2.50	2.50	2.50	2.50
Seasonal space heating energy efficiency class	Water outlet at 35°C		A+++					
	Water outlet at 55°C		A++					
SCOP	Warmer climate	35°C	6.47	6.47	6.57	6.57	6.28	6.28
		55°C	4.42	4.42	4.49	4.49	4.47	4.47
	Average climate	35°C	4.81	4.81	4.72	4.72	4.62	4.62
		55°C	3.45	3.45	3.47	3.47	3.41	3.41
	Colder climate	35°C	4.08	4.08	4.07	4.07	4.02	4.02
		55°C	3.02	3.02	3.05	3.05	3.12	3.12
SEER	Water outlet	7°C	4.90	4.90	4.85	4.85	4.67	4.67
		18°C	7.07	7.07	6.89	6.89	6.70	6.70
Sound power Level[2]		dB	65	65	65	65	68	68
Rated water flow		m^3/h	2.08	2.08	2.49	2.49	2.73	2.73
Water flow range		m^3/h	0.7~2.5	0.7~2.5	0.7~2.75	0.7~2.75	0.7~3.0	0.7~3.0
Internal water volume		L	3.93-8.73	3.83-8.63	3.93-8.73	3.83-8.63	3.93-8.73	3.83-8.63
Backup electric heater	Capacity	kW	3	9	3	9	3	9
	Power supply	V/Ph/Hz	220-240/1/50	380-415/3/50	220-240/1/50	380-415/3/50	220-240/1/50	380-415/3/50
Compressor	Type		Twin rotary					
Outdoor fan	Motor type		DC fan					
	Number of fans		1					
Air side heat exchanger			Finned tube					
Refrigerant			R32 1.75kg					

YUKON SERIES MONOBLOCK 4-16 kW

Unit dimension (W×H×D)		mm	1385× 865 ×523
Packing dimension (W×H×D)		mm	1465×1035×560
Net/Gross weight		kg	149/177
Outdoor air temperature range	Cooling	°C	-5 ~ 43
	Heating	°C	25 ~ 35
	DHW	°C	-25 ~ 43
Water side heat exchanger			Plate type
Water side connection			R5/4"
Water setting temperature range	Cooling	°C	5 ~ 25
	Heating	°C	25 ~ 65
	DHW[3]	°C	20 ~ 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. Sound power test condition： EN12102 1
3. Maximum domestic hot water temperature 60℃ is only available with TBH support.

Electrical characteristics

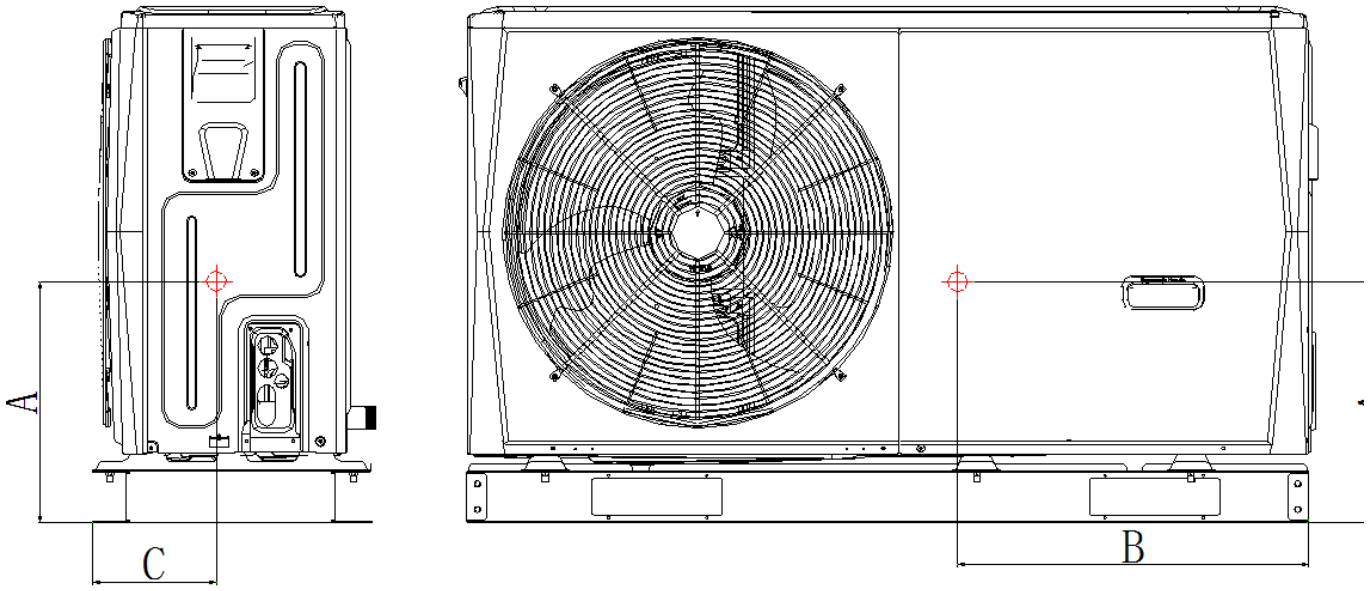
Model	power supply	Circuit breaker	Cable	Inrush current	Nominal current	Max. fan and compressor current	e-heater current	max. current (rated)
	V, phase, Hz	A	mm_2	A	A	A	A	A
SMHM-60B	230V~; 1 phase; 50 Hz	16	3x2,5	1	5,7	12,5	0	12,5
SMHM-80B		16	3x2,5	1	7,2	15	0	15
SMHM-100B		20	3x4	1	8,9	16,5	0	16,5
SMHM-120B		32	3x10	1	10,7	25	0	25
SMHM-140B		32	3x10	1	13,8	25,5	0	25,5
SMHM-160B		32	3x10	1	15,5	26,5	0	26,5
SMHM-60B/3		32(16*)	3x10 (3x2,5*)	1	5,7	12,5	13,5	26
SMHM-80B/3		32(16*)	3x10 (3x2,5*)	1	7,2	15	13,5	28,5
SMHM-100B/3		32(20*)	3x10 (3x4*)	1	8,9	17	13,5	30,5
SMHM-120B-3/9	400V~;3 phase; 50 Hz	25(16*)	5x6 (5x2,5*)	1	3,6	9,5	13,5	23
SMHM-140B-3/9		25(16*)	5x6 (5x2,5*)	1	4,65	10,5	13,5	24
SMHM-160B-3/9		25(16*)	5x6 (5x2,5*)	1	5,2	11	13,5	24,5
SMHM-180B-3		20	5x4	1	5,7	16,8	0	16,8
SMHM-220B-3		20	5x4	1	5,4	19,6	0	19,6
SMHM-260B-3		25	5x6	1	9,4	21,6	0	21,6
SMHM-300B-3		25	5x6	1	11	22,8	0	22,8

POZOR: Values marked with * are valid only after blocking (IBH) - see 10.1 DIP switch settings page 49

23 Dimensions and Center of Gravity

SMHM-40B/3 / SMHM-60B/3

Figure 2-2.1: dimensions and center of gravity (unit: mm)

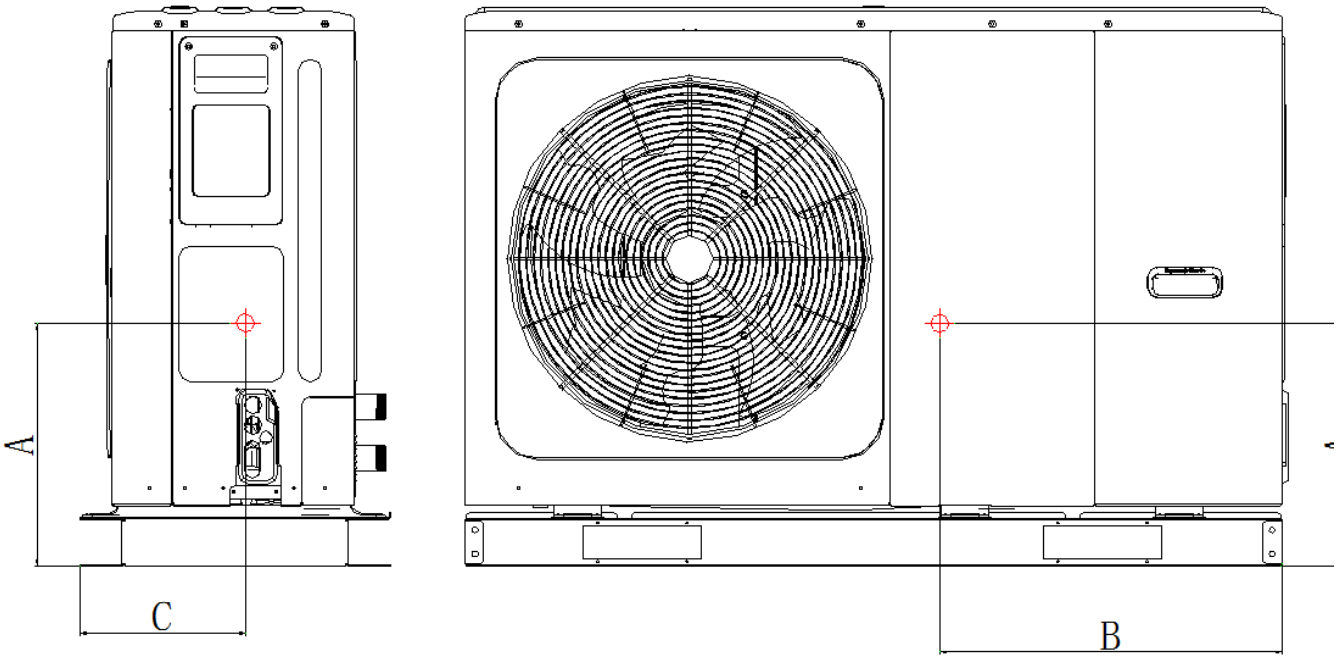


unit：mm

Model	A	B	C
4/6kW	370	540	190

SMHM-80B/3 / SMHM-100B/3
SMHM-120B/3 / SMHM-140B/3 / SMHM-160B/3
SMHM-120B-3/9 / SMHM-140B-3/9 / SMHM-160B-3/9

Figure 2-2.2: dimensions and center of gravity (unit: mm)



unit：mm

Model	A	B	C
8/10kW	410	580	280
12-16kW 1Ph	370	605	605
12-16kW 3Ph	285	245	245

24 Piping Diagrams

SMHM-40/60/80/100/120/140/160B/3 / SMHM-120/140/160B-3/9

Figure 2-3.1: piping diagram

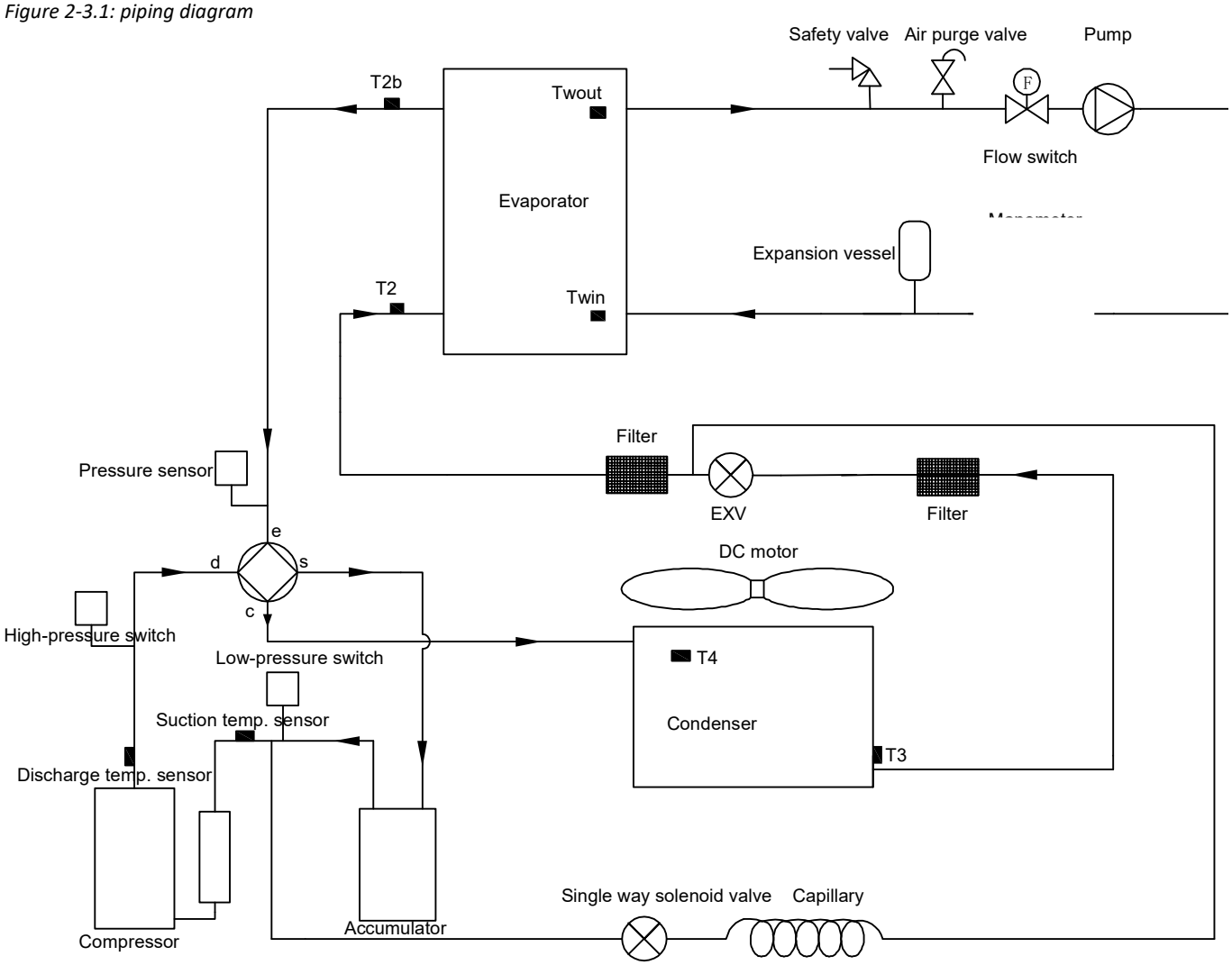
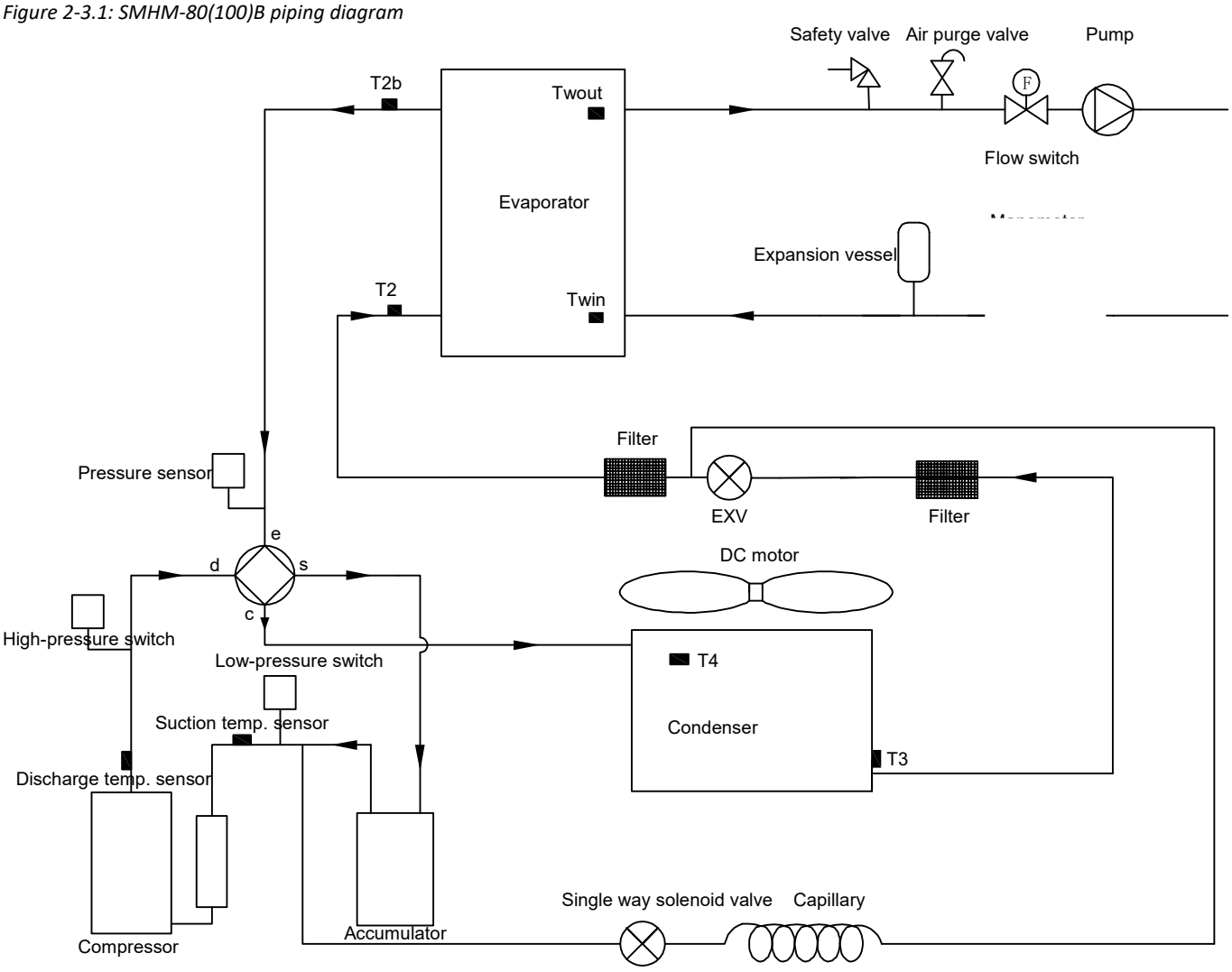


Figure 2-3.1: SMHM-80(100)B piping diagram



25 Wiring Diagrams

SMHM-40B/3 / SMHM-60B/3 / SMHM-80B/3 / SMHM-100B/3

Figure 2-4.1: wiring diagram

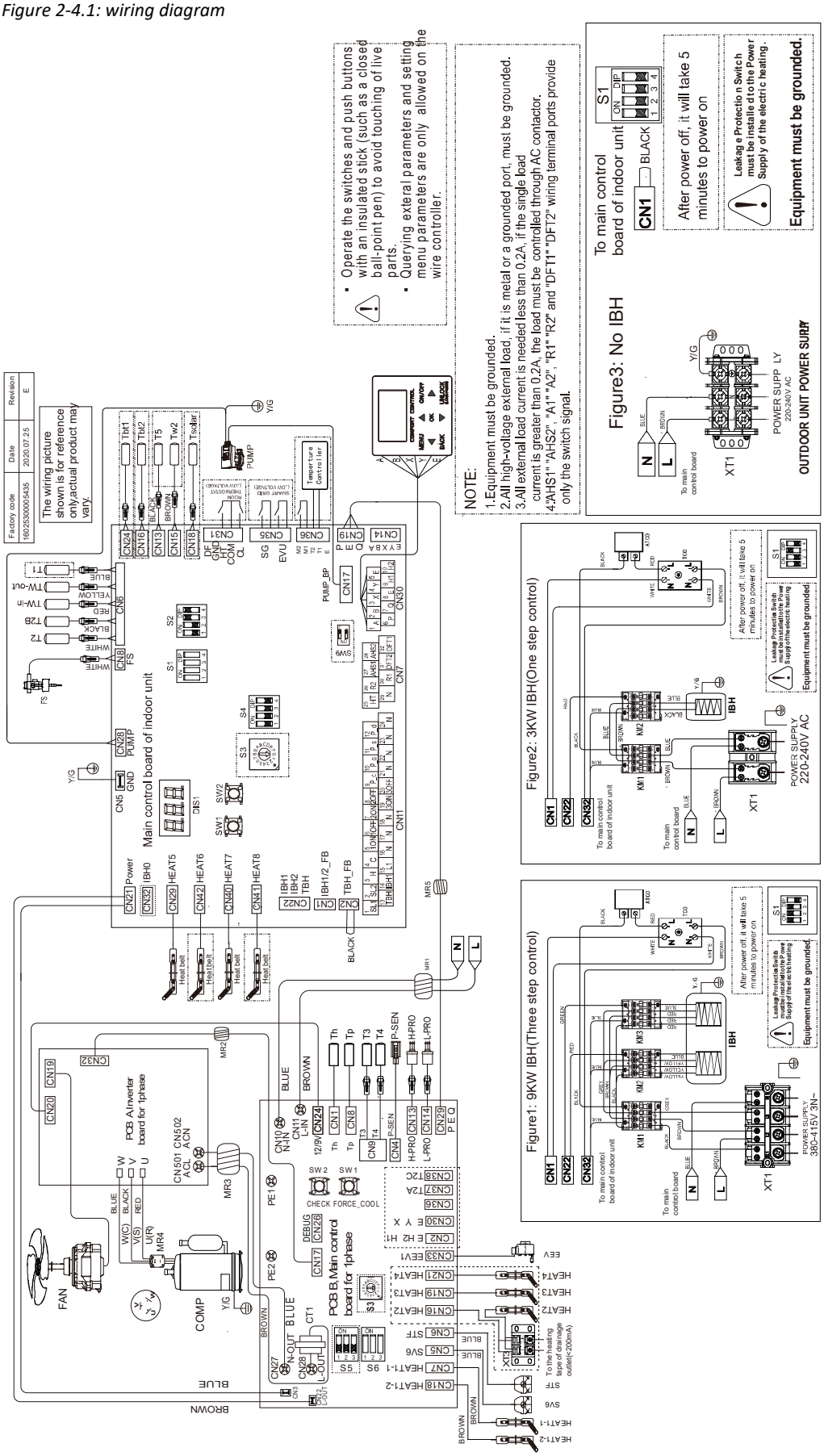
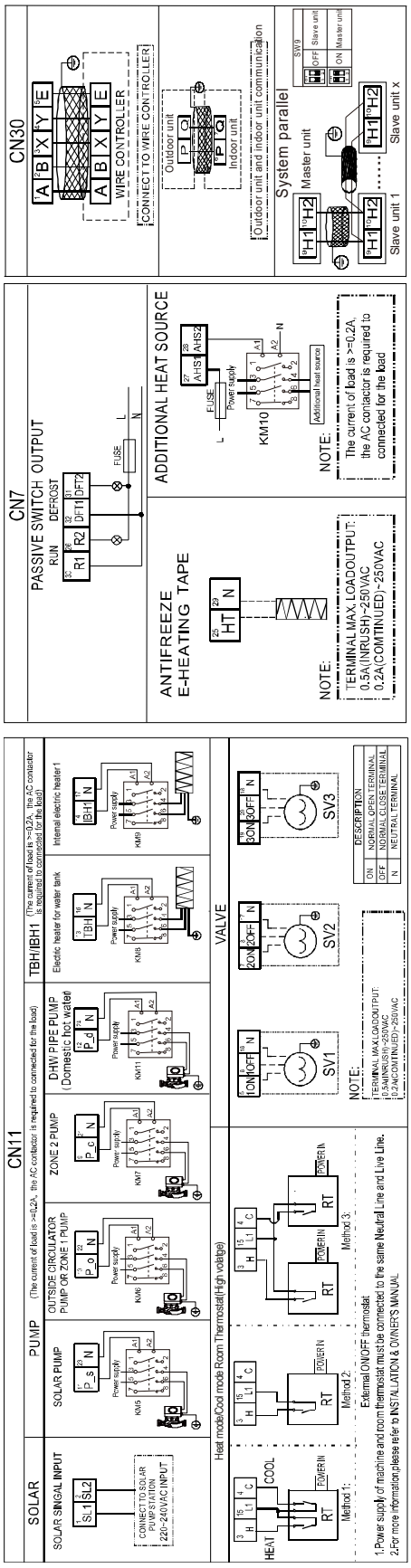


Figure continued on next page …

Figure 2-4.1: wiring diagram (continued)



CODE	Part name
4-WAY	4-WAY valve
COMP.	Compressor
CT1	AC current detector
EEV	Electric expensive valve
FAN	Outdoor fan motor
HEAT1-1	Comp. electrical heating tape1
HEAT1-2	Comp. electrical heating tape2
HEAT2	Chassis electrical heating tape
H-PRO	High pressure switch
L-PRO	Low pressure switch
MR1-MR5	Magnetic ring
P-SEN.	Pressure sensor
T3	Condenser temp.sensor
T4	Outdoor ambient temp.sensor
TF	Radiator temp.sensor
Th	Suction temp.sensor
Tp	COMP. discharge temp.sensor
XT1,3	Terminal blocks

CODE	Part name
AHS	Additional heat source
DHW	Domestic hot water
EVU	Commercial power
FS	Flow switch
HT/CL	Heat mode/Cool mode(thermostat)
KM5-KM11	AC Contactor
M1/M2	Remote switch
PUMP	Variable speed pump
P_c	Zone 2 pump(field supply)
P_d	DHW pipe pump (field supply)
P_o	Outside circulator pump (field supply) or Zone 1 pump (field supply)
P_s	Solar pump
SG	Solar energy
SV1-3	Motorized 3-way valve (field supply)
T2、T2B、TW-in、TW-out、T1、Tbt1、Tbt2、T5、Tw2、Tsolar	Temperature sensor

CN35--SMART GRID		
Operating behavior	EVU	SG
Increased operation output	ON	ON
	ON	OFF
Normal operation	OFF	ON
Decreased operation output	OFF	OFF

Temp.sensor code	Property values
T2/T2B	$B_{25/50}$=4100K , $R_{25°C}$=10kΩ
T1/TW_out TW_in/T5/Tw2	$B_{0/100}$=3970K , $R_{50°C}$=17.6kΩ

Temp. Sensor code	Property values
T3/T4/Th	$B_{25/50}$=4100K, $R_{25°C}$=10kΩ
Tp	$B_{25/50}$=3950K, $R_{90°C}$=5kΩ

SMHM-120B/3 / SMHM-140B/3 / SMHM-160B/3

Figure 2-4.2: wiring diagram

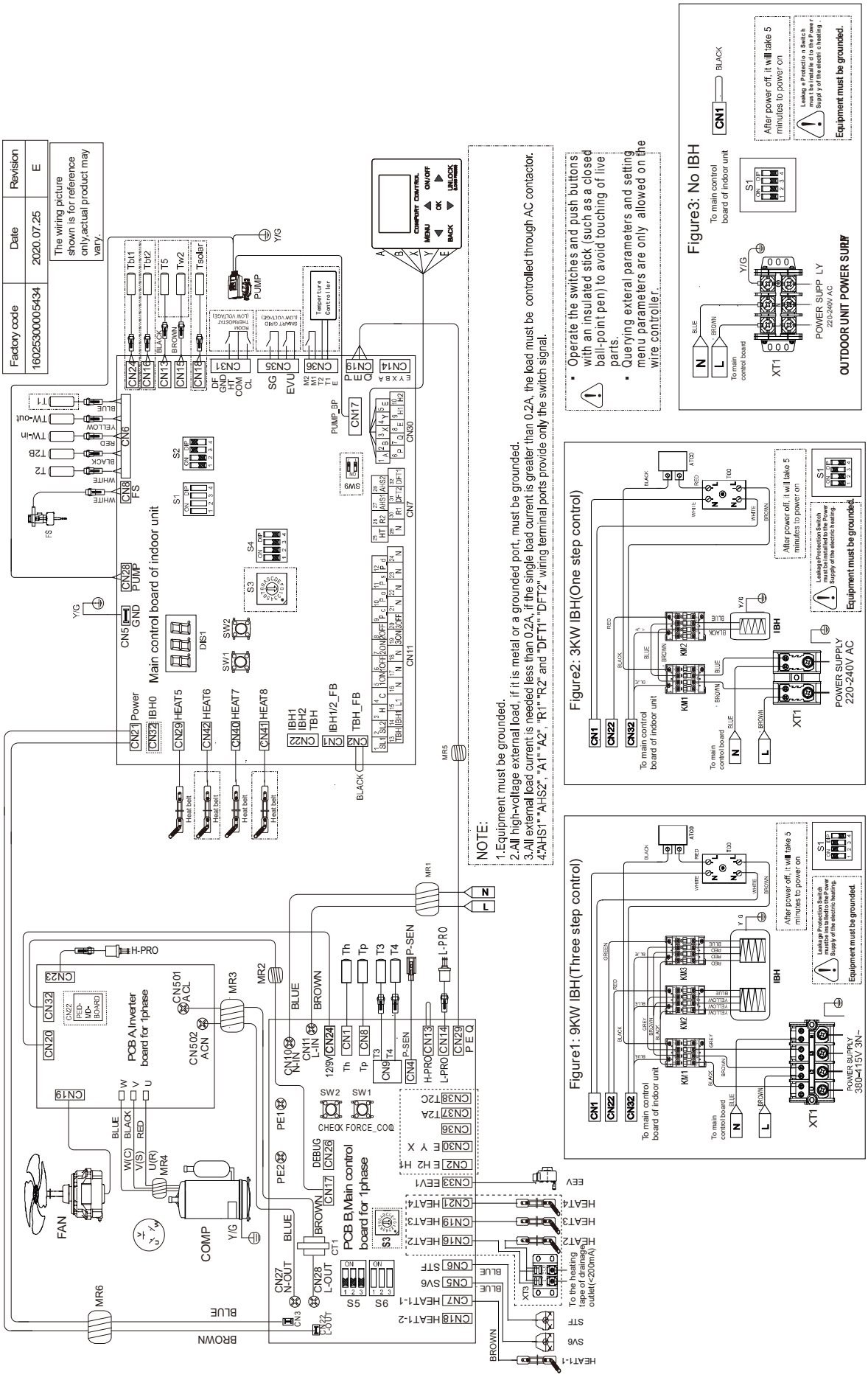
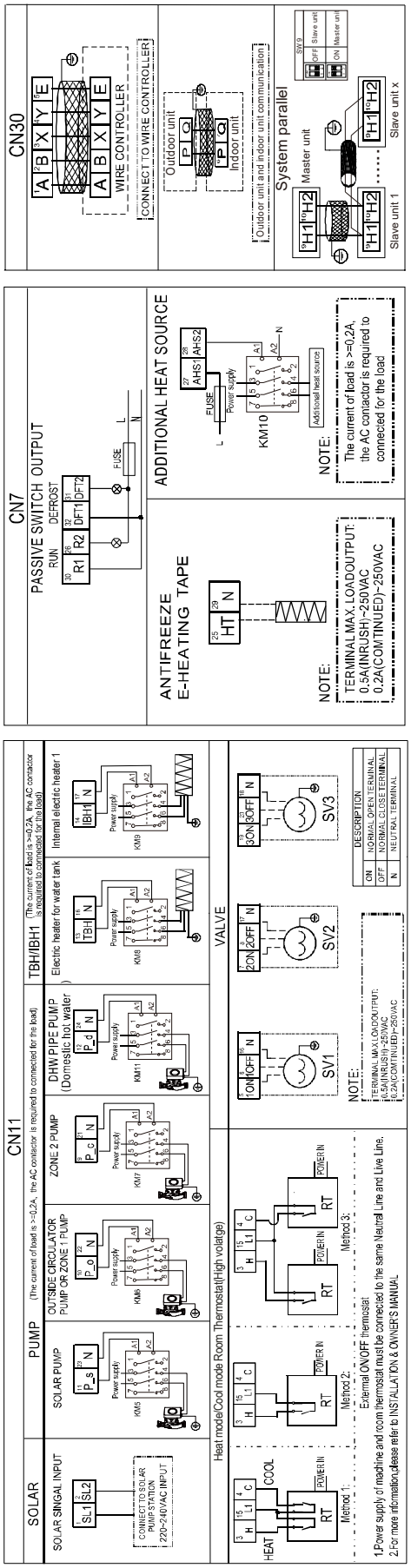


Figure 2-4.2: wiring diagram (continued)



CODE	Part name
4-WAY	4-WAY valve
COMP.	Compresso
CT1	AC current detector
EEV	Electric expensive valve
FAN	Outdoor fan motor
HEAT1-1	Comp. electrical heating tape1
HEAT1-2	Comp. electrical heating tape2
HEAT2	Chassis electrical heating tape
H-PRO	High pressure switch
L-PRO	Low pressure switch
MR1-MR6	Magnetic ring
P-SEN.	Pressure sensor
T3	Condenser temp.sensor
T4	Outdoor ambient temp.sensor
TF	Radiator temp.sensor
Th	Suction temp.sensor
Tp	COMP. discharge temp.sensor
XT1,3	Terminal blocks

CODE	Part name
AHS	Additional heat source
DHW	Domestic hot water
EVU	Commercial power
FS	Flow switch
HT/CL	Heat mode/Cool mode(thermostat)
KM5~KM11	AC Contactor
M1/M2	Remote switch
PUMP	Variable speed pump
P_c	Zone 2 pump(field supply)
P_d	DHW pipe pump (field supply)
P_o	Outside circulator pump (field supply) or Zone 1 pump (field supply)
P_s	Solar pump
SG	Solar energy
SV1~3	Motorized 3-way valve (field supply)
T2、T2B、TW-in、TW-out、T1、Tb1、Tb2、T5、Tw2、Tsolar	Temperature sensor

CN35--SMART GRID			
Operating behavior		EVU	SG
Increased operation output		ON	ON
		ON	OFF
Normal operation		OFF	ON
Decreased operation output		OFF	OFF

Temp.sensor code	Property values
T2/T2B	$B_{25/50}$=4100K , $R_{25℃}$=10kΩ
T1/TW_out TW_in/T5/Tw2	$B_{0/100}$=3970K , $R_{50℃}$=17.6kΩ

Temp. Sensor code	Property values
T3/T4/Th	$B_{25/50}$=4100K, $R_{25℃}$=10kΩ
Tp	$B_{25/80}$=3950K, $R_{90℃}$=5kΩ

SMHM-120B-3/9 / SMHM-140B-3/9 / SMHM-160B-3/9

Figure 2-4.3 wiring diagram

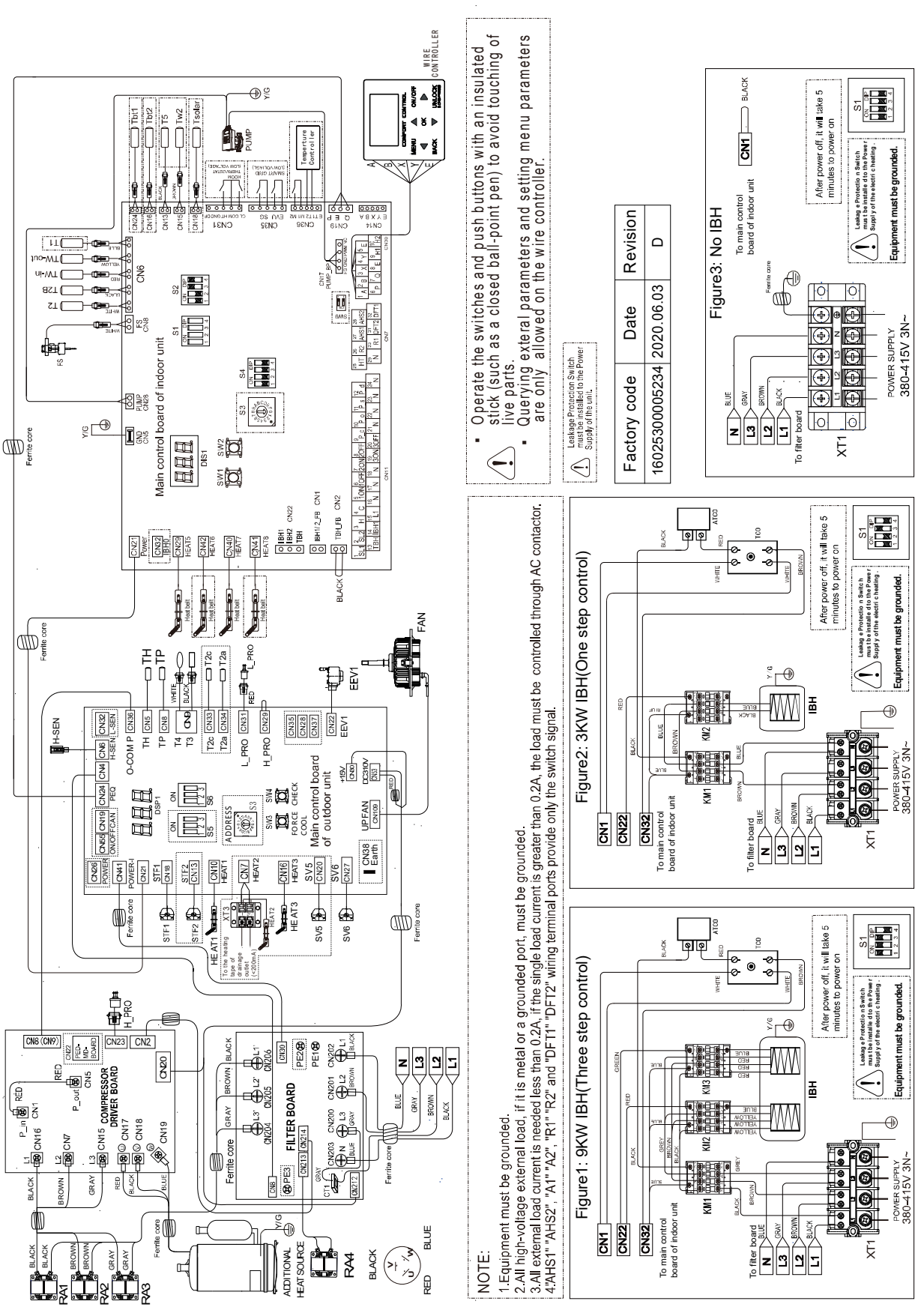
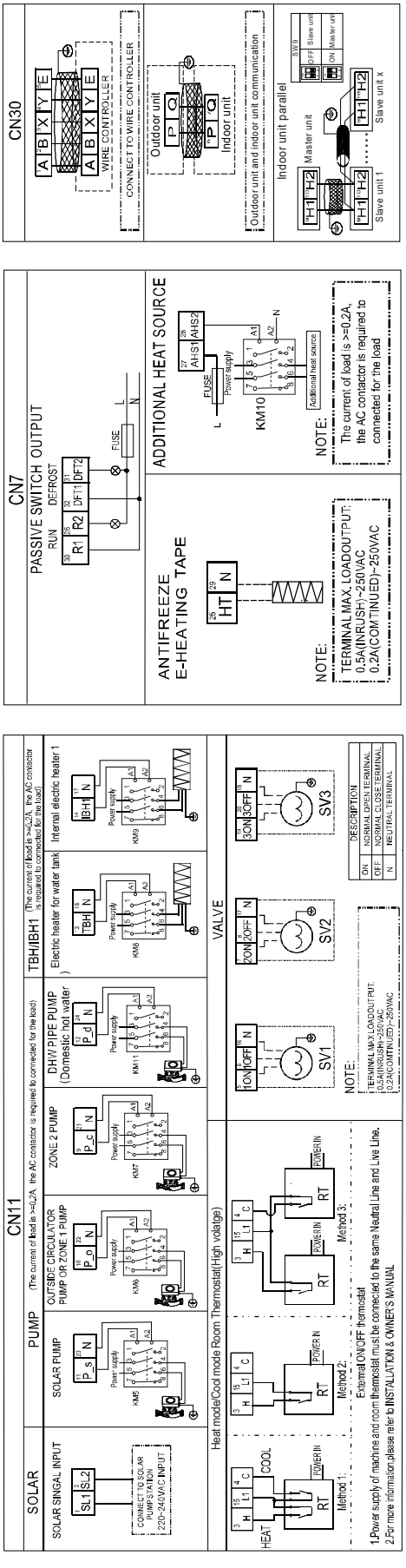


Figure 2-4.3 wiring diagram (continued)



CODE	NAME
COMP	Inverter compressor
EEV1/2	Electric expansion valve
FAN_UP/DOWN	DC fan motor
HEAT1/HEAT2	Crankcase heating
H_PRO/L_PRO	High/Low pressure switch
H-SEN	High pressure sensor
XT1	Big 4-phase terminal
CT1	AC current transformer
RA	Reactor
STF1/STF2	4-way valve
SV5/SV6	Solenoid valve
T3/T3A	Piping temperature sensor
T4	Outdoor ambient temperature sensor
T5	Inverter compressor discharge temperature sensor
TP	Compressor exhaust temperature sensor
TH	Compressor return temperature sensor

CODE	NAME
AHS	Additional heat source
DHW	Domestic hot water
EVU	Commercial power
FS	Flow switch
HT/CL	Heat mode/Cool mode(thermostat)
KM5~KM11	AC Contactor
M1/M2	Remote switch
PUMP	Variable speed pump
P_c	Zone 2 pump (field supply)
P_d	DHW pipe pump (field supply)
P_o	Outside circulator pump (field supply) or Zone 1 pump (field supply)
P_s	Solar pump
SG	Solar energy
SV1~3	Motorized 3-way valve (field supply)
T2、T2B、TW-in、TW-out T1、Tbf1、Tb2、T5、Tw2、Tsolar	Temperature sensor

CN35--SMART GRID		
Operating behavior	EVU	SG
Increased operation output	ON	ON
	ON	OFF
Normal operation	OFF	ON
Decreased operation output	OFF	OFF

Temp sensor code	Property values
T2/T2B	$B_{25/5}$=4100K, $R_{25℃}$=10kΩ
T1/TW_out TW_in/T5/Tw2	$B_{0/100}$=3970K, $R_{90℃}$=17.6kΩ

Temp. Sensor code	Property values
T3/T4/Th	$B_{25/50}$=4100K, $R_{25℃}$=10kΩ
Tp	$B_{25/0}$=3950K, $R_{90℃}$=5kΩ

Combination system diagram

Figure 2-4.4 Combination system diagram for single phase 4~16kW models

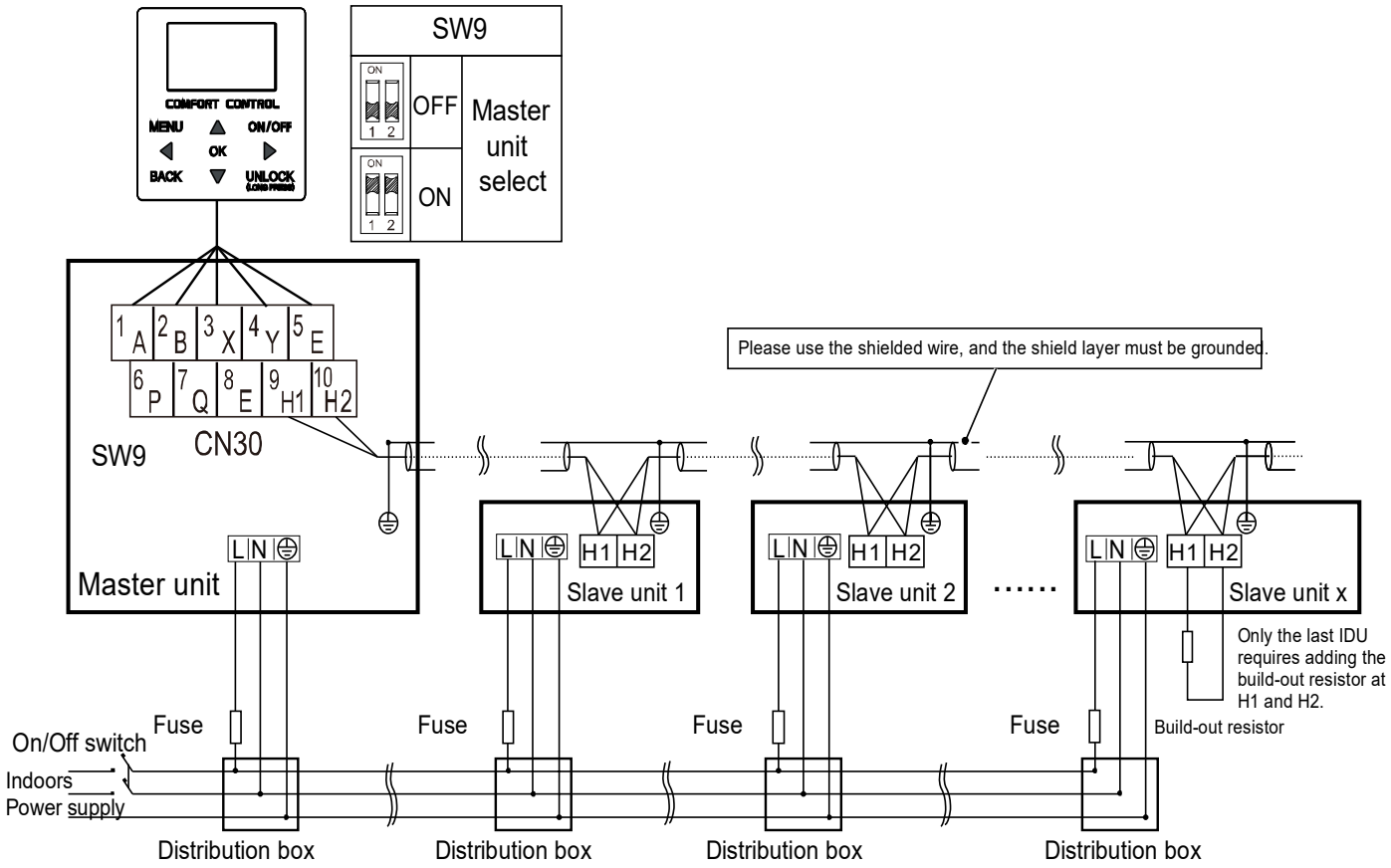
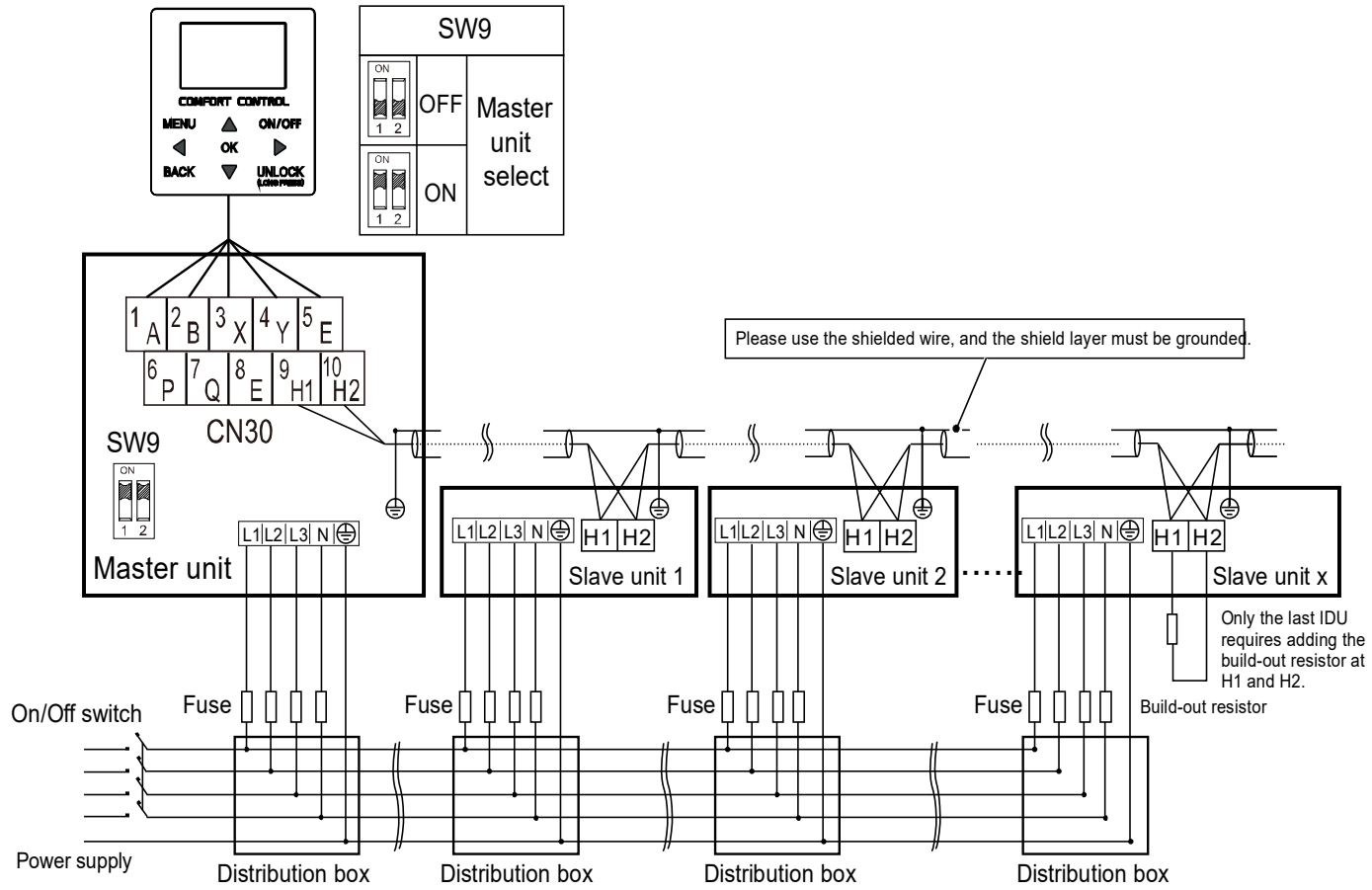


Figure 2-4.5 Combination system diagram for three phase 12~16kW models



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 units 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 2-4.6).
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 2-4.7).

Figure 2-4.6

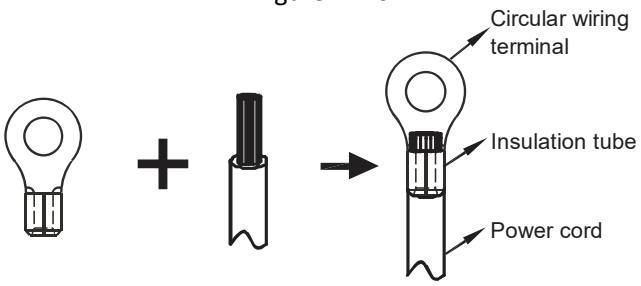
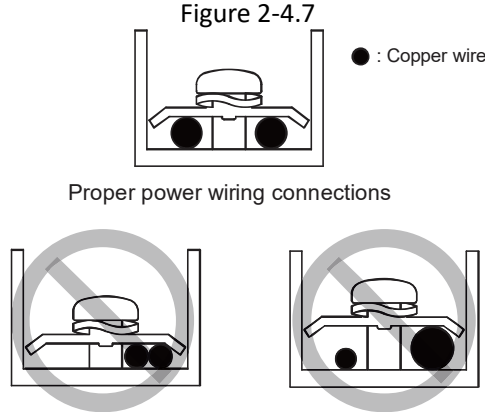


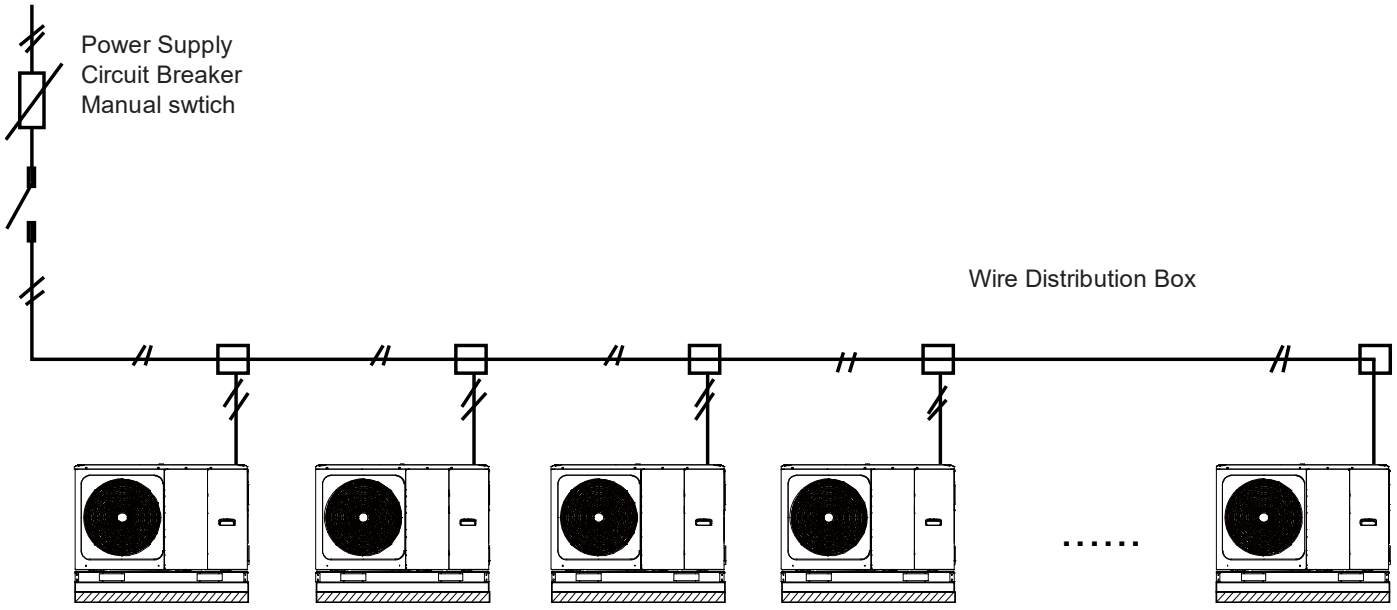
Figure 2-4.7



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.



26 Capacity Tables

26.1 Heating Capacity Tables (Test standard：EN14511)

Table 2-5.1: Heating capacity for SMHM-40B/3

Maximum

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	2.05	1.18	1.74	1.80	1.22	1.48	1.71	1.32	1.29	1.53	1.30	1.18	1.37	1.25	1.10	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	3.09	1.31	2.36	2.83	1.56	1.82	2.44	1.70	1.43	2.17	1.74	1.24	1.98	1.75	1.13	1.85	1.75	1.06	1.56	1.59	0.98	/	/	/	/	/	/	/
-15	3.60	1.19	3.03	3.41	1.22	2.78	3.25	1.36	2.39	2.93	1.49	1.97	2.50	1.60	1.56	2.20	1.68	1.31	1.84	1.56	1.18	1.73	1.68	1.03	/	/	/	/
-10	4.17	1.22	3.40	4.49	1.38	3.25	4.34	1.52	2.85	4.02	1.65	2.43	3.59	1.77	2.02	3.28	1.81	1.81	2.63	1.68	1.56	2.81	1.80	1.56	/	/	/	/
-7	4.92	1.33	3.69	5.14	1.46	3.52	4.99	1.60	3.11	4.67	1.73	2.70	4.54	1.98	2.29	4.41	2.12	2.08	4.28	2.34	1.83	3.56	1.94	1.84	/	/	/	/
-5	4.99	1.24	4.03	5.18	1.39	3.72	5.02	1.53	3.27	4.74	1.68	2.82	4.63	1.89	2.45	4.56	2.02	2.26	4.41	2.26	1.95	3.83	2.00	1.92	/	/	/	/
0	5.41	1.07	5.06	5.27	1.21	4.34	5.10	1.36	3.74	4.92	1.55	3.18	5.04	1.74	2.89	5.02	2.03	2.48	5.13	2.16	2.37	4.40	2.10	2.09	/	/	/	/
5	5.99	1.03	5.83	5.75	1.18	4.85	5.68	1.31	4.33	5.59	1.48	3.77	5.60	1.71	3.27	5.50	1.98	2.78	5.54	2.07	2.68	4.90	2.09	2.35	4.04	2.16	1.87	
7	6.58	0.99	6.67	6.22	1.15	5.40	6.26	1.26	4.96	6.26	1.42	4.41	5.96	1.63	3.67	5.69	1.76	3.23	5.74	1.90	3.03	5.41	2.08	2.61	4.27	2.09	2.04	
10	6.37	0.95	6.68	6.03	1.17	5.16	6.07	1.26	4.82	6.31	1.36	4.63	6.05	1.57	3.86	5.80	1.80	3.23	5.70	1.80	3.16	5.27	1.96	2.69	4.49	2.02	2.22	
15	6.03	0.90	6.71	5.72	1.20	4.78	5.75	1.25	4.59	6.40	1.27	5.04	6.20	1.47	4.21	5.47	1.50	3.65	5.63	1.65	3.41	5.04	1.76	2.87	4.87	1.90	2.56	
20	5.86	0.81	7.24	5.74	1.00	5.75	5.67	1.11	5.13	6.16	1.12	5.48	6.12	1.31	4.66	5.61	1.40	3.99	5.52	1.50	3.68	4.77	1.56	3.06	/	/	/	
25	5.70	0.72	7.91	5.77	0.80	7.21	5.60	0.96	5.85	5.91	0.98	6.06	6.05	1.15	5.25	5.75	1.31	4.39	5.42	1.35	4.02	4.50	1.36	3.30	/	/	/	
30	5.78	0.69	8.41	5.84	0.78	7.48	5.78	0.89	6.51	5.89	0.92	6.39	6.02	1.07	5.62	5.67	1.22	4.63	5.51	1.28	4.31	4.61	1.32	3.51	/	/	/	
35	5.85	0.65	8.96	5.90	0.76	7.77	5.97	0.82	7.27	5.86	0.87	6.77	5.99	0.99	6.05	5.59	1.14	4.90	5.61	1.22	4.62	/	/	/	/	/	/	
40	6.30	0.58	10.8	6.38	0.67	9.51	6.36	0.74	8.57	6.33	0.80	7.88	6.38	0.93	6.86	6.00	1.15	5.20	/	/	/	/	/	/	/	/	/	
43	6.57	0.54	12.2	6.67	0.62	10.8	6.59	0.69	9.50	6.62	0.77	8.63	6.61	0.89	7.39	6.25	1.16	5.38	/	/	/	/	/	/	/	/	/	

Normal

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	1.90	1.07	1.78	1.65	1.08	1.52	1.56	1.19	1.31	1.42	1.20	1.19	1.28	1.18	1.09	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	2.82	1.15	2.45	2.57	1.38	1.86	2.20	1.49	1.48	1.98	1.57	1.26	1.83	1.61	1.14	1.73	1.61	1.07	1.50	1.52	0.99	/	/	/	/	/	/	/
-15	3.26	1.03	3.17	3.07	1.06	2.88	2.90	1.17	2.48	2.66	1.31	2.02	2.22	1.40	1.59	1.96	1.46	1.34	1.69	1.41	1.20	1.61	1.56	1.03	/	/	/	/
-10	3.73	1.04	3.60	4.00	1.18	3.40	3.82	1.30	2.95	3.60	1.45	2.49	3.25	1.59	2.05	2.99	1.62	1.84	2.40	1.52	1.58	2.59	1.67	1.55	/	/	/	/
-7	4.59	1.19	3.85	4.63	1.27	3.65	4.70	1.52	3.10	4.26	1.52	2.81	4.30	1.83	2.35	4.12	1.93	2.14	4.00	2.05	1.95	3.15	1.68	1.87	/	/	/	/
-5	4.49	1.05	4.26	4.62	1.19	3.86	4.37	1.28	3.41	4.21	1.42	2.96	4.10	1.61	2.55	4.04	1.73	2.33	3.94	1.96	2.01	3.42	1.75	1.95	/	/	/	/
0	4.99	0.96	5.19	4.80	1.08	4.46	4.60	1.20	3.85	4.53	1.40	3.23	4.46	1.49	3.00	4.41	1.75	2.52	4.43	1.78	2.49	3.87	1.86	2.09	/	/	/	/
5	5.48	0.91	6.04	5.19	1.03	5.03	5.08	1.13	4.49	5.11	1.32	3.86	4.82	1.41	3.42	4.53	1.59	2.86	4.56	1.66	2.75	4.28	1.81	2.37	3.30	1.68	1.96	
7	4.60	0.66	6.98	4.36	0.77	5.65	4.20	0.82	5.10	4.38	0.95	4.64	4.30	1.13	3.80	4.54	1.45	3.12	4.40	1.49	2.95	4.27	1.61	2.65	3.54	1.64	2.16	
10	5.73	0.80	7.13	5.28	0.98	5.41	5.36	1.08	4.97	5.64	1.17	4.83	5.48	1.40	3.91	5.20	1.57	3.31	4.96	1.54	3.23	4.84	1.76	2.74	3.67	1.56	2.35	
15	5.48	0.75	7.32	5.06	0.99	5.13	5.14	1.06	4.84	5.78	1.08	5.38	5.67	1.30	4.37	5.11	1.33	3.83	4.96	1.40	3.53	4.68	1.58	2.97	4.03	1.45	2.77	
20	5.36	0.67	7.96	5.11	0.82	6.22	5.09	0.93	5.46	5.59	0.95	5.89	5.63	1.16	4.88	5.27	1.25	4.23	4.89	1.27	3.84	4.45	1.45	3.07	/	/	/	
25	5.08	0.58	8.75	5.24	0.67	7.85	5.12	0.82	6.27	5.47	0.83	6.55	5.67	1.02	5.53	5.50	1.17	4.68	4.89	1.16	4.23	4.28	1.28	3.34	/	/	/	
30	5.18	0.55	9.37	5.33	0.65	8.20	5.32	0.76	7.01	5.48	0.79	6.97	5.67	0.95	5.97	5.45	1.10	4.97	5.01	1.10	4.56	4.41	1.23	3.57	/	/	/	
35	5.29	0.53	10.1	5.44	0.63	8.57	5.54	0.70	7.89	5.50	0.74	7.43	5.70	0.88	6.47	5.42	1.02	5.30	5.14	1.04	4.92	/	/	/	/	/	/	
40	5.78	0.47	12.2	5.77	0.55	10.6	5.73	0.61	9.37	5.78	0.66	8.70	5.89	0.80	7.38	5.66	1.00	5.67	/	/	/	/	/	/	/	/	/	
43	6.08	0.44	13.9	6.09	0.50	12.1	6.00	0.57	10.5	6.09	0.63	9.60	6.15	0.77	8.01	5.94	1.01	5.90	/	/	/	/	/	/	/	/	/	

Minimum

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	1.23	0.68	1.80	1.12	0.72	1.55	1.18	0.89	1.33	1.09	0.90	1.20	0.86	0.79	1.10	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	1.73	0.69	2.50	1.53	0.80	1.90	1.42	0.94	1.51	1.39	1.08	1.29	1.23	1.07	1.15	1.28	1.18	1.08	1.14	1.14	1.00	/	/	/	/	/	/	/
-15	1.68	0.52	3.25	1.65	0.56	2.95	1.55	0.61	2.54	1.64	0.79	2.07	1.60	1.00	1.61	1.52	1.12	1.36	1.25	1.00	1.25	1.23	1.17	1.05	/	/	/	/
-10	1.65	0.45	3.70	1.75	0.50	3.50	1.71	0.56	3.04	2.09	0.82	2.56	2.17	1.04	2.09	2.23	1.19	1.88	1.82	1.14	1.60	2.02	1.27	1.58	/	/	/	/
-7	1.16	0.29	4.01	1.18	0.31	3.76	1.25	0.37	3.34	2.06	0.70	2.93	2.08	0.86	2.42	2.05	0.94	2.18	1.88	0.98	1.91	2.22	1.16	1.91	/	/	/	/
-5	1.36	0.31	4.38	1.36	0.34	3.98	1.42	0.40	3.51	2.06	0.67	3.07	2.16	0.83	2.60	2.09	0.92	2.27	1.99	0.98	2.04	2.29	1.15	1.99	/	/	/	/
0	1.45	0.27	5.37	1.51	0.33	4.61	1.42	0.36	3.98	2.12	0.63	3.34	2.22	0.72	3.07	2.24	0.90	2.48	2.21	1.00	2.21	2.61	1.22	2.14	/	/	/	/
5	1.97	0.31	6.28	1.99	0.38	5.23	1.92	0.41	4.66	2.58	0.64	4.01	2.59	0.74	3.52	2.58	0.91	2.84	2.79	1.05	2.66	3.05	1.25	2.44	2.33	1.14	2.04	

7	2.35	0.32	7.28	2.34	0.40	5.89	2.31	0.43	5.39	2.95	0.62	4.78	3.22	0.82	3.91	3.22	1.00	3.23	3.65	1.16	3.15	3.56	1.30	2.75	2.71	1.19	2.26
10	1.95	0.26	7.46	1.77	0.31	5.67	1.92	0.37	5.21	2.84	0.56	5.06	3.27	0.81	4.06	3.19	0.93	3.44	3.60	1.07	3.35	3.53	1.24	2.85	2.87	1.17	2.44
15	2.36	0.31	7.72	2.25	0.41	5.42	2.25	0.44	5.12	2.96	0.52	5.68	3.43	0.75	4.58	3.37	0.84	4.01	4.05	1.10	3.70	3.68	1.23	3.00	3.07	1.06	2.90
20	2.64	0.31	8.41	2.81	0.43	6.58	3.01	0.52	5.78	3.88	0.62	6.23	3.80	0.74	5.12	3.65	0.82	4.44	3.70	0.92	4.04	3.19	0.99	3.23	/	/	/
25	3.14	0.34	9.25	3.40	0.41	8.30	3.52	0.53	6.63	4.31	0.62	6.94	4.35	0.75	5.81	4.31	0.88	4.92	3.89	0.87	4.44	3.28	0.93	3.52	/	/	/
30	3.32	0.34	9.90	3.59	0.41	8.68	3.79	0.51	7.43	4.03	0.55	7.37	4.42	0.71	6.27	4.39	0.84	5.22	4.10	0.85	4.79	3.48	0.93	3.76	/	/	/
35	3.92	0.37	10.6	4.01	0.44	9.08	3.91	0.47	8.36	4.04	0.51	7.87	4.44	0.65	6.80	4.47	0.80	5.57	4.38	0.85	5.18	/	/	/	/	/	/
40	4.28	0.33	12.9	4.27	0.38	11.2	4.51	0.45	9.93	4.56	0.49	9.22	4.85	0.62	7.76	4.86	0.82	5.96	/	/	/	/	/	/	/	/	/
43	4.53	0.31	14.7	4.53	0.35	12.8	4.75	0.43	11.1	4.83	0.48	10.2	5.15	0.61	8.42	5.19	0.84	6.20	/	/	/	/	/	/	/	/	/

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Table 2-5.2: Heating capacity for SMHM-60B/3

Maximum

DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	2.57	1.49	1.72	2.25	1.53	1.46	2.14	1.67	1.28	1.91	1.64	1.17	1.71	1.57	1.09	/	/	/	/	/	/	/	/	/	/	/	/
-20	3.64	1.56	2.34	3.34	1.86	1.80	2.88	2.03	1.42	2.56	2.08	1.23	2.33	2.08	1.12	2.19	2.04	1.07	1.84	1.86	0.99	/	/	/	/	/	/
-15	4.43	1.49	2.97	4.19	1.53	2.73	4.00	1.71	2.34	3.61	1.87	1.93	3.08	2.01	1.53	2.70	2.02	1.34	2.26	1.88	1.20	2.13	2.02	1.05	/	/	/
-10	5.75	1.69	3.41	5.50	1.84	2.99	5.11	1.99	2.57	4.83	2.18	2.22	4.64	2.24	2.07	4.13	2.41	1.72	3.80	2.24	1.69	3.32	2.30	1.44	/	/	/
-7	6.55	1.77	3.71	6.30	1.92	3.28	6.21	2.17	2.86	5.79	2.32	2.50	5.57	2.38	2.35	5.29	2.63	2.01	5.22	2.66	1.96	4.57	2.61	1.75	/	/	/
-5	6.54	1.64	3.98	6.32	1.79	3.52	6.14	1.99	3.09	5.97	2.18	2.74	5.84	2.30	2.54	5.44	2.44	2.23	5.31	2.64	2.01	4.73	2.59	1.83	/	/	/
0	6.49	1.34	4.85	6.37	1.48	4.31	6.35	1.68	3.79	6.80	1.99	3.42	6.85	2.25	3.04	5.88	2.37	2.48	5.42	2.59	2.09	5.06	2.54	1.99	/	/	/
5	7.04	1.31	5.37	6.71	1.50	4.48	6.88	1.62	4.25	6.96	1.89	3.69	6.99	2.12	3.29	6.37	2.27	2.81	6.11	2.46	2.48	5.74	2.53	2.27	4.92	2.68	1.84
7	7.58	1.28	5.90	7.06	1.47	4.81	7.41	1.56	4.76	7.13	1.79	3.99	7.13	2.00	3.58	6.87	2.16	3.17	6.90	2.37	2.91	6.42	2.52	2.55	5.25	2.60	2.02
10	7.43	1.21	6.12	7.11	1.36	5.24	7.35	1.46	5.02	7.37	1.75	4.21	7.32	1.93	3.78	7.01	2.09	3.35	6.93	2.28	3.04	6.27	2.41	2.60	5.57	2.52	2.21
15	7.17	1.13	6.35	7.20	1.24	5.82	7.26	1.38	5.28	7.78	1.69	4.61	7.63	1.83	4.16	7.24	1.97	3.67	6.98	2.12	3.30	6.01	2.23	2.70	6.10	2.39	2.56
20	6.93	0.97	7.15	6.97	1.11	6.28	6.98	1.18	5.91	7.21	1.54	4.70	7.42	1.68	4.42	7.28	1.81	4.02	6.81	1.89	3.60	5.98	1.95	3.06	/	/	/
25	6.69	0.80	8.32	6.74	0.94	7.16	6.70	1.06	6.31	6.65	1.30	5.11	7.21	1.52	4.74	7.33	1.66	4.43	6.63	1.66	4.00	5.94	1.67	3.55	/	/	/
30	6.74	0.71	9.53	6.83	0.85	8.02	6.83	0.94	7.27	6.56	1.09	6.01	7.05	1.40	5.05	6.91	1.40	4.92	6.60	1.57	4.21	6.01	1.57	3.83	/	/	/
35	6.79	0.66	10.3	6.93	0.73	9.43	6.96	0.85	8.17	6.47	0.94	6.87	6.89	1.27	5.42	6.49	1.24	5.21	6.57	1.48	4.45	/	/	/	/	/	/
40	7.26	0.64	11.4	7.37	0.73	10.2	7.28	0.81	9.02	7.12	0.97	7.34	7.34	1.20	6.12	6.93	1.22	5.68	/	/	/	/	/	/	/	/	/
43	7.54	0.63	12.0	7.64	0.70	10.9	7.48	0.76	9.87	7.51	0.91	8.27	7.61	1.08	7.02	7.19	1.21	5.96	/	/	/	/	/	/	/	/	/

Normal

DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	2.37	1.35	1.76	2.07	1.37	1.51	1.95	1.50	1.30	1.77	1.51	1.17	1.61	1.49	1.08	/	/	/	/	/	/	/	/	/	/	/	/
-20	3.33	1.37	2.43	3.04	1.65	1.85	2.60	1.78	1.46	2.34	1.87	1.25	2.16	1.92	1.13	2.04	1.88	1.08	1.77	1.78	1.00	/	/	/	/	/	/
-15	4.01	1.29	3.11	3.77	1.33	2.83	3.57	1.47	2.43	3.27	1.65	1.98	2.73	1.76	1.56	2.41	1.76	1.37	2.08	1.70	1.22	1.98	1.88	1.05	/	/	/
-10	5.15	1.43	3.61	4.89	1.57	3.12	4.51	1.69	2.66	4.33	1.91	2.27	4.21	2.01	2.10	3.76	2.15	1.75	3.46	2.03	1.71	3.06	2.13	1.44	/	/	/
-7	6.24	1.62	3.86	6.05	1.80	3.36	6.00	2.00	3.00	5.61	2.21	2.54	5.40	2.25	2.40	5.07	2.45	2.07	5.15	2.58	2.00	4.28	2.39	1.79	/	/	/
-5	5.89	1.40	4.20	5.64	1.54	3.66	5.26	1.64	3.21	5.26	1.81	2.90	5.10	1.93	2.64	4.31	1.87	2.30	4.28	2.06	2.07	3.94	2.12	1.86	/	/	/
0	5.99	1.20	4.98	5.80	1.31	4.43	5.74	1.47	3.89	6.26	1.81	3.47	6.06	1.92	3.15	5.36	2.12	2.53	4.75	2.24	2.12	4.46	2.24	1.99	/	/	/
5	6.43	1.16	5.56	6.06	1.31	4.64	6.16	1.39	4.42	6.36	1.68	3.78	6.13	1.78	3.45	5.76	1.99	2.89	5.40	2.13	2.54	5.01	2.19	2.29	4.03	2.09	1.93
7	6.75	1.09	6.18	6.30	1.21	5.21	6.35	1.28	4.95	6.44	1.55	4.14	6.30	1.70	3.70	6.13	1.86	3.29	6.00	2.03	2.95	5.64	2.17	2.60	4.40	2.06	2.14
10	6.68	1.02	6.52	6.22	1.13	5.49	6.49	1.26	5.17	6.59	1.50	4.39	6.62	1.73	3.83	6.47	1.88	3.44	6.04	1.94	3.11	5.76	2.17	2.65	4.54	1.94	2.34
15	6.52	0.94	6.93	6.37	1.02	6.24	6.48	1.16	5.57	7.03	1.43	4.92	6.98	1.61	4.32	6.76	1.75	3.86	6.15	1.80	3.42	5.59	2.00	2.79	5.04	1.82	2.77
20	6.34	0.81	7.85	6.20	0.91	6.79	6.27	1.00	6.28	6.55	1.30	5.05	6.82	1.48	4.62	6.84	1.61	4.25	6.03	1.60	3.76	5.58	1.82	3.07	/	/	/
25	5.97	0.65	9.21	6.12	0.78	7.79	6.13	0.91	6.75	6.15	1.11	5.53	6.76	1.35	4.99	7.01	1.49	4.72	5.99	1.43	4.20	5.65	1.57	3.59	/	/	/
30	6.04	0.57	10.6	6.24	0.71	8.79	6.29	0.80	7.84	6.10	0.93	6.55	6.64	1.24	5.35	6.64	1.26	5.28	6.00	1.35	4.46	5.75	1.47	3.91	/	/	/

35	6.14	0.53	11.6	6.38	0.61	10.4	6.46	0.73	8.87	6.07	0.81	7.54	6.55	1.13	5.79	6.29	1.12	5.63	6.02	1.27	4.75	/	/	/	/	/	/
40	6.66	0.52	12.9	6.67	0.59	11.3	6.57	0.67	9.86	6.49	0.80	8.11	6.78	1.03	6.59	6.53	1.06	6.19	/	/	/	/	/	/	/	/	/	/
43	6.97	0.51	13.7	6.98	0.57	12.2	6.80	0.63	10.9	6.91	0.75	9.20	7.09	0.93	7.61	6.84	1.05	6.54	/	/	/	/	/	/	/	/	/	/

Minimum

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	1.54	0.86	1.78	1.39	0.91	1.53	1.48	1.12	1.32	1.36	1.14	1.19	1.08	0.99	1.09	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	2.04	0.82	2.47	1.80	0.96	1.88	1.67	1.12	1.49	1.64	1.28	1.28	1.45	1.27	1.14	1.51	1.38	1.09	1.34	1.34	1.01	/	/	/	/	/	/
-15	2.07	0.65	3.18	2.03	0.70	2.90	1.90	0.76	2.49	2.02	0.99	2.03	1.97	1.25	1.58	1.86	1.35	1.39	1.53	1.24	1.24	1.51	1.41	1.07	/	/	/
-10	2.28	0.62	3.71	2.14	0.67	3.21	2.02	0.74	2.74	2.51	1.07	2.34	2.81	1.32	2.14	2.80	1.57	1.78	2.63	1.51	1.74	2.38	1.63	1.47	/	/	/
-7	1.57	0.39	4.03	1.45	0.41	3.50	1.48	0.48	3.06	2.49	0.92	2.72	2.67	1.08	2.48	2.57	1.22	2.11	2.64	1.31	2.01	2.68	1.47	1.82	/	/	/
-5	1.78	0.41	4.32	1.66	0.44	3.76	1.70	0.52	3.30	2.59	0.87	2.98	2.82	1.05	2.69	2.59	1.10	2.35	2.81	1.33	2.11	2.72	1.43	1.90	/	/	/
0	1.74	0.34	5.15	1.82	0.40	4.58	1.77	0.44	4.02	2.93	0.82	3.59	3.02	0.93	3.23	2.99	1.15	2.59	2.85	1.31	2.17	3.00	1.47	2.04	/	/	/
5	2.31	0.40	5.78	2.32	0.48	4.82	2.33	0.51	4.59	3.21	0.82	3.93	3.29	0.93	3.54	3.43	1.15	2.98	3.46	1.32	2.62	3.58	1.52	2.36	2.85	1.42	2.01
7	2.71	0.42	6.44	2.65	0.49	5.37	2.73	0.53	5.32	3.36	0.78	4.32	3.85	0.99	3.88	4.26	1.25	3.41	4.38	1.41	3.10	4.23	1.57	2.69	3.33	1.49	2.24
10	2.27	0.33	6.83	2.08	0.36	5.75	2.32	0.43	5.42	3.32	0.72	4.60	3.96	0.99	3.99	4.22	1.18	3.57	4.37	1.35	3.23	4.20	1.53	2.75	3.55	1.46	2.43
15	2.81	0.38	7.31	2.83	0.43	6.59	2.84	0.48	5.89	3.60	0.69	5.20	4.22	0.93	4.53	4.46	1.10	4.05	5.03	1.40	3.58	4.39	1.56	2.82	3.84	1.33	2.90
20	3.12	0.38	8.30	3.41	0.48	7.18	3.70	0.56	6.65	4.54	0.85	5.34	4.60	0.95	4.86	4.73	1.06	4.46	4.56	1.15	3.95	4.00	1.24	3.23	/	/	/
25	3.68	0.38	9.73	3.97	0.48	8.24	4.22	0.59	7.15	4.85	0.83	5.85	5.19	0.99	5.24	5.50	1.11	4.96	4.76	1.08	4.41	4.34	1.15	3.78	/	/	/
30	3.88	0.35	11.2	4.20	0.45	9.30	4.47	0.54	8.30	4.49	0.65	6.94	5.18	0.92	5.63	5.35	0.96	5.55	4.91	1.05	4.69	4.54	1.10	4.11	/	/	/
35	4.55	0.37	12.3	4.71	0.43	11.0	4.57	0.49	9.40	4.46	0.56	7.99	5.10	0.84	6.09	5.19	0.88	5.92	5.13	1.03	4.99	/	/	/	/	/	/
40	4.93	0.36	13.6	4.94	0.41	11.9	5.17	0.49	10.4	5.12	0.60	8.59	5.58	0.81	6.92	5.61	0.86	6.50	/	/	/	/	/	/	/	/	/	/
43	5.20	0.36	14.4	5.20	0.40	13.0	5.39	0.47	11.5	5.48	0.56	9.75	5.93	0.74	8.00	5.97	0.87	6.87	/	/	/	/	/	/	/	/	/	/

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Table 2-5.3: Heating capacity for SMHM-80B/3

Maximum

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	4.45	1.98	2.25	4.00	2.04	1.96	3.59	2.19	1.64	3.34	2.15	1.55	2.81	2.17	1.30	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	5.68	2.03	2.80	5.09	2.15	2.37	4.74	2.24	2.11	4.32	2.44	1.77	3.70	2.29	1.61	3.17	2.26	1.41	2.62	2.10	1.25	/	/	/	/	/	/	/
-15	6.90	2.07	3.34	6.44	2.24	2.87	6.11	2.51	2.43	5.57	2.47	2.26	5.29	2.65	2.00	4.67	2.70	1.73	4.94	2.92	1.69	3.99	2.84	1.41	/	/	/	/
-10	7.45	2.02	3.68	7.28	2.18	3.33	7.08	2.25	3.15	6.87	2.63	2.62	6.77	2.74	2.47	6.32	2.88	2.20	6.07	3.05	1.99	5.19	2.86	1.81	/	/	/	/
-7	7.64	2.03	3.76	7.47	2.20	3.40	7.27	2.26	3.21	7.05	2.64	2.67	6.94	2.76	2.52	6.48	2.89	2.24	6.22	3.07	2.03	5.32	2.88	1.85	/	/	/	/
-5	8.05	2.00	4.02	7.97	2.16	3.69	7.69	2.39	3.22	7.45	2.57	2.90	7.44	2.77	2.69	7.35	2.99	2.46	6.45	2.94	2.19	6.04	3.00	2.02	/	/	/	/
0	8.24	1.73	4.77	8.55	2.02	4.23	8.49	2.25	3.77	8.40	2.53	3.32	8.09	2.75	2.94	8.11	2.95	2.75	7.10	2.99	2.38	6.85	3.16	2.17	/	/	/	/
5	8.86	1.49	5.95	8.95	1.81	4.94	9.03	1.98	4.56	8.78	2.29	3.84	8.61	2.57	3.38	8.30	2.76	3.00	7.56	2.74	2.76	7.11	2.89	2.46	3.89	3.27	1.19	
7	9.51	1.45	6.54	9.20	1.73	5.32	9.11	1.80	5.07	8.85	2.12	4.18	8.98	2.35	3.82	8.43	2.66	3.17	7.80	2.50	3.12	7.24	2.66	2.72	4.08	3.00	1.36	
10	10.1	1.35	7.44	9.28	1.59	5.84	8.94	1.65	5.42	8.70	2.02	4.30	8.74	2.24	3.90	8.28	2.42	3.42	8.20	2.48	3.31	7.50	2.72	2.76	5.59	2.65	2.11	
15	9.86	1.12	8.79	9.39	1.33	7.09	9.09	1.51	6.04	9.07	1.77	5.12	8.91	2.03	4.38	8.41	2.23	3.77	8.32	2.34	3.55	7.68	2.49	3.09	5.71	2.39	2.39	
20	9.65	0.95	10.1	9.51	1.14	8.33	9.33	1.32	7.09	9.45	1.59	5.93	9.08	1.81	5.02	8.53	2.02	4.22	8.43	2.12	3.97	7.86	2.27	3.46	/	/	/	/
25	9.42	0.90	10.4	9.00	1.03	8.75	8.75	1.15	7.64	9.15	1.44	6.34	9.01	1.55	5.80	8.61	1.87	4.61	8.09	1.90	4.25	7.46	2.01	3.72	/	/	/	/
30	9.18	0.83	11.0	8.49	0.93	9.16	8.17	1.05	7.78	8.85	1.29	6.84	8.93	1.43	6.23	8.68	1.74	4.99	7.84	1.73	4.53	7.07	1.78	3.98	/	/	/	/
35	9.55	0.84	11.3	8.83	0.93	9.45	8.50	1.06	8.05	9.20	1.31	7.05	9.29	1.46	6.34	9.03	1.73	5.21	8.16	1.80	4.72	/	/	/	/	/	/	/
40	10.0	0.87	11.6	9.27	0.93	10.0	8.92	1.05	8.49	9.66	1.32	7.31	9.75	1.51	6.46	9.48	1.74	5.46	/	/	/	/	/	/	/	/	/	/
43	10.	0.8	12.	9.5	0.8	11.	9.1	1.0	9.1	9.9	1.2	7.8	10.	1.4	6.8	9.7	1.6	6.0	/	/	/	/	/	/	/	/	/	/

	3	4	3	5	5	3	9	1	1	5	7	6	0	7	3	7	1	8									

Normal

DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	4.11	1.79	2.29	3.68	1.82	2.03	3.27	1.96	1.67	3.10	1.99	1.56	2.64	2.05	1.29	/	/	/	/	/	/	/	/	/	/	/	/
-20	5.20	1.79	2.90	4.63	1.90	2.43	4.27	1.97	2.17	3.96	2.20	1.80	3.43	2.11	1.62	2.96	2.08	1.42	2.52	2.00	1.25	/	/	/	/	/	/
-15	6.24	1.79	3.49	5.80	1.95	2.98	5.45	2.15	2.53	5.04	2.18	2.32	4.69	2.31	2.03	4.16	2.36	1.76	4.55	2.65	1.72	3.72	2.64	1.41	/	/	/
-10	6.66	1.71	3.89	6.48	1.86	3.49	6.25	1.92	3.26	6.16	2.30	2.68	6.14	2.46	2.50	5.75	2.58	2.23	5.53	2.75	2.01	4.78	2.65	1.81	/	/	/
-7	7.27	1.83	3.97	7.11	2.01	3.53	7.00	2.19	3.20	6.71	2.40	2.79	6.60	2.59	2.55	6.17	2.67	2.31	6.15	3.00	2.05	5.07	2.69	1.89	/	/	/
-5	7.25	1.71	4.25	7.11	1.86	3.83	6.69	2.00	3.35	6.56	2.14	3.06	6.49	2.33	2.79	6.29	2.48	2.54	5.56	2.46	2.26	5.38	2.62	2.05	/	/	/
0	7.60	1.55	4.89	7.78	1.79	4.34	7.67	1.98	3.88	7.74	2.30	3.37	7.16	2.35	3.05	7.39	2.64	2.79	6.33	2.63	2.41	6.03	2.78	2.17	/	/	/
5	8.09	1.31	6.17	8.08	1.58	5.13	8.08	1.71	4.73	8.03	2.04	3.93	7.62	2.15	3.54	7.50	2.43	3.09	6.68	2.37	2.82	6.21	2.50	2.49	3.32	2.72	1.22
7	8.60	1.26	6.84	8.21	1.47	5.57	8.40	1.63	5.15	8.00	1.84	4.34	8.10	2.10	3.85	7.53	2.29	3.29	7.50	2.36	3.18	6.25	2.25	2.77	3.44	2.46	1.40
10	9.05	1.14	7.93	8.12	1.33	6.12	7.89	1.41	5.58	7.77	1.74	4.48	7.91	2.00	3.95	7.65	2.18	3.51	7.14	2.11	3.38	6.89	2.45	2.81	4.92	2.27	2.16
15	8.96	0.93	9.59	8.32	1.09	7.60	8.11	1.27	6.37	8.20	1.50	5.46	8.15	1.79	4.55	7.85	1.98	3.96	7.33	1.99	3.68	7.13	2.24	3.19	5.19	2.11	2.46
20	8.82	0.79	11.1	8.46	0.94	9.00	8.37	1.11	7.53	8.58	1.35	6.37	8.36	1.59	5.25	8.01	1.79	4.47	7.47	1.80	4.14	7.34	2.11	3.47	/	/	/
25	8.39	0.73	11.6	8.17	0.86	9.52	8.01	0.98	8.18	8.47	1.23	6.86	8.44	1.38	6.11	8.23	1.68	4.91	7.31	1.64	4.47	7.10	1.89	3.76	/	/	/
30	8.23	0.67	12.3	7.75	0.77	10.0	7.52	0.90	8.39	8.24	1.11	7.46	8.42	1.27	6.61	8.35	1.56	5.36	7.13	1.49	4.80	6.77	1.67	4.06	/	/	/
35	8.63	0.68	12.7	8.13	0.78	10.4	7.89	0.90	8.74	8.64	1.12	7.74	8.83	1.30	6.77	8.75	1.55	5.63	7.48	1.49	5.03	/	/	/	/	/	/
40	9.20	0.70	13.1	8.39	0.75	11.1	8.04	0.87	9.28	8.81	1.09	8.08	9.01	1.30	6.95	8.94	1.50	5.95	/	/	/	/	/	/	/	/	/
43	9.56	0.69	13.9	8.72	0.69	12.6	8.36	0.83	10.0	9.16	1.05	8.74	9.36	1.26	7.40	9.28	1.39	6.67	/	/	/	/	/	/	/	/	/

Minimum

DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	2.67	1.15	2.33	2.48	1.21	2.06	2.48	1.46	1.69	2.37	1.50	1.58	1.77	1.37	1.29	/	/	/	/	/	/	/	/	/	/	/	/
-20	3.18	1.08	2.96	2.75	1.11	2.48	2.75	1.24	2.22	2.76	1.51	1.83	2.29	1.40	1.64	2.19	1.52	1.44	1.91	1.51	1.27	/	/	/	/	/	/
-15	3.22	0.90	3.58	3.12	1.03	3.05	2.91	1.12	2.59	3.12	1.31	2.37	3.38	1.64	2.06	3.22	1.80	1.79	3.36	1.92	1.75	2.84	1.99	1.43	/	/	/
-10	2.96	0.74	4.01	2.84	0.79	3.59	2.80	0.84	3.35	3.57	1.30	2.76	4.10	1.61	2.55	4.29	1.88	2.28	4.20	2.05	2.05	3.72	2.02	1.84	/	/	/
-7	1.83	0.45	4.09	1.72	0.47	3.63	1.82	0.53	3.44	3.12	1.07	2.90	3.41	1.28	2.67	3.38	1.44	2.35	3.57	1.67	2.13	3.42	1.78	1.92	/	/	/
-5	2.19	0.50	4.37	2.09	0.53	3.94	2.17	0.63	3.44	3.23	1.03	3.15	3.60	1.27	2.84	3.78	1.46	2.59	3.65	1.59	2.30	3.71	1.77	2.09	/	/	/
0	2.21	0.44	5.06	2.44	0.54	4.49	2.37	0.59	4.01	3.62	1.04	3.48	3.57	1.14	3.12	4.12	1.44	2.86	3.80	1.54	2.47	4.06	1.83	2.22	/	/	/
5	2.90	0.45	6.41	3.10	0.58	5.32	3.06	0.62	4.91	4.05	0.99	4.08	4.09	1.12	3.64	4.47	1.41	3.18	4.28	1.47	2.91	4.43	1.73	2.56	2.47	1.99	1.24
7	3.40	0.48	7.14	3.46	0.60	5.81	3.36	0.61	5.54	4.17	0.92	4.53	4.85	1.17	4.15	5.23	1.54	3.40	4.95	1.49	3.33	4.76	1.66	2.87	2.69	1.89	1.42
10	3.08	0.37	8.30	2.72	0.42	6.41	2.83	0.48	5.85	3.92	0.83	4.70	4.73	1.15	4.11	4.99	1.37	3.65	5.17	1.47	3.51	5.02	1.72	2.92	3.80	1.72	2.22
15	3.86	0.38	10.1	3.69	0.46	8.03	3.55	0.53	6.73	4.20	0.73	5.76	4.94	1.04	4.77	5.19	1.25	4.15	5.99	1.55	3.86	5.60	1.74	3.23	3.82	1.52	2.52
20	4.34	0.37	11.8	4.66	0.49	9.52	4.94	0.62	7.98	5.95	0.88	6.74	5.63	1.02	5.51	5.55	1.18	4.69	5.65	1.30	4.35	5.26	1.44	3.65	/	/	/
25	5.18	0.42	12.2	5.31	0.53	10.1	5.51	0.64	8.66	6.68	0.92	7.26	6.48	1.01	6.42	6.46	1.25	5.16	5.81	1.24	4.69	5.45	1.38	3.96	/	/	/
30	5.28	0.41	13.0	5.22	0.49	10.6	5.35	0.60	8.88	6.06	0.77	7.89	6.56	0.94	6.95	6.73	1.20	5.63	5.83	1.16	5.04	5.34	1.25	4.27	/	/	/
35	6.40	0.48	13.4	6.00	0.54	11.0	5.58	0.60	9.26	6.35	0.77	8.20	6.87	0.96	7.12	7.22	1.22	5.92	6.36	1.20	5.29	/	/	/	/	/	/
40	6.82	0.49	13.8	6.21	0.53	11.8	6.34	0.64	9.84	6.96	0.81	8.56	7.41	1.01	7.31	7.68	1.23	6.25	/	/	/	/	/	/	/	/	/
43	7.13	0.48	14.7	6.49	0.49	13.4	6.62	0.62	10.6	7.27	0.78	9.26	7.83	1.01	7.78	8.11	1.16	7.01	/	/	/	/	/	/	/	/	/

Abbreviations:

LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for Outdoor air temperature (°C)

HC: Total heating capacity (kW)

PI: Power input (kW)

Table 2-5.4: Heating capacity for SMHM-100B/3

Maximum

DB	LWT																								
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	4.68	2.06	2.27	4.21	2.12	1.98	3.78	2.28	1.66	3.52	2.24	1.57	2.96	2.26	1.31	/	/	/	/	/	/	/	/	/	/	/	/
-20	5.98	2.12	2.82	5.35	2.24	2.39	4.98	2.34	2.13	4.55	2.55	1.79	3.89	2.39	1.63	3.34	2.35	1.42	2.75	2.18	1.26	/	/	/	/	/	/
-15	7.26	2.15	3.37	6.78	2.34	2.90	6.43	2.62	2.46	5.86	2.57	2.28	5.57	2.76	2.02	4.91	2.82	1.74	5.20	3.04	1.71	4.20	2.96	1.42	/	/	/
-10	8.37	2.33	3.60	8.14	2.53	3.22	7.89	2.65	2.98	7.64	2.86	2.67	7.38	3.10	2.38	7.03	3.31	2.13	6.67	3.58	1.86	5.38	3.15	1.71	/	/	/
-7	8.72	2.29	3.81	8.48	2.49	3.41	8.31	2.61	3.11	7.96	2.81	2.83	7.68	3.05	2.52	7.33	3.26	2.25	7.05	3.53	1.97	5.61	3.10	1.81	/	/	/
-5	8.80	2.14	4.12	8.86	2.47	3.60	8.80	2.64	3.33	8.46	2.94	2.88	8.18	3.09	2.65	8.04	3.27	2.46	7.53	3.32	2.27	6.13	3.10	1.98	/	/	/
0	9.03	1.83	4.94	9.36	2.31	4.05	9.56	2.55	3.76	9.25	2.93	3.16	8.89	3.10	2.87	8.82	3.27	2.70	8.18	3.31	2.47	6.99	3.30	2.12	/	/	/
5	9.94	1.73	5.75	9.97	2.07	4.81	10.11	2.25	4.51	10.11	2.64	3.83	9.79	2.88	3.40	9.45	3.14	3.01	9.08	3.27	2.78	7.85	3.20	2.45	4.52	3.30	1.37
7	10.55	1.77	5.94	10.33	1.97	5.21	10.33	2.09	4.93	10.55	2.50	4.18	10.33	2.73	3.77	9.83	3.05	3.22	9.72	3.20	3.04	8.23	2.96	2.78	4.85	3.11	1.56
10	11.22	1.59	7.04	10.44	1.85	5.64	10.00	1.96	5.13	9.94	2.38	4.17	9.87	2.69	3.67	9.59	2.91	3.30	9.57	3.11	3.08	8.27	3.04	2.72	6.44	3.05	2.11
15	11.44	1.41	8.10	10.66	1.64	6.49	10.22	1.73	5.90	10.11	2.11	4.80	10.11	2.39	4.22	9.78	2.58	3.80	9.76	2.76	3.54	8.43	2.70	3.13	6.56	2.71	2.43
20	10.88	1.19	9.05	10.88	1.35	7.96	10.77	1.59	6.72	10.77	1.89	5.66	10.33	2.12	4.86	10.00	2.38	4.21	9.85	2.54	3.88	8.90	2.56	3.48	/	/	/
25	9.94	1.04	9.59	9.90	1.17	8.44	9.82	1.38	7.12	9.82	1.64	6.00	9.46	1.84	5.15	9.22	2.07	4.46	9.06	2.20	4.11	8.18	2.22	3.69	/	/	/
30	9.77	0.96	10.2	9.07	1.10	8.79	8.90	1.12	7.95	8.85	1.32	6.72	9.92	1.61	6.15	9.31	1.88	4.96	9.04	1.88	4.80	7.49	1.96	3.83	/	/	/
35	10.2	0.95	10.7	9.44	1.03	9.15	9.25	1.11	8.30	9.21	1.32	6.97	10.3	1.61	6.40	9.69	1.87	5.17	9.42	1.90	4.96	/	/	/	/	/	/
40	10.7	0.93	11.5	9.91	1.01	9.81	9.71	1.15	8.47	9.67	1.32	7.34	10.8	1.60	6.79	10.2	1.84	5.53	/	/	/	/	/	/	/	/	/
43	11.0	0.91	12.0	10.2	0.96	10.6	10.0	1.08	9.25	9.96	1.23	8.07	11.2	1.47	7.58	10.5	1.68	6.25	/	/	/	/	/	/	/	/	/

Normal

DB	LWT																								
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	4.33	1.87	2.32	3.87	1.89	2.05	3.45	2.05	1.68	3.26	2.07	1.57	2.78	2.14	1.30	/	/	/	/	/	/	/	/	/	/	/	/
-20	5.47	1.87	2.93	4.87	1.98	2.46	4.50	2.05	2.20	4.17	2.29	1.82	3.61	2.20	1.64	3.11	2.17	1.44	2.65	2.09	1.27	/	/	/	/	/	/
-15	6.57	1.86	3.53	6.10	2.03	3.01	5.73	2.24	2.56	5.31	2.27	2.34	4.94	2.41	2.05	4.38	2.46	1.78	4.79	2.76	1.74	3.91	2.75	1.42	/	/	/
-10	7.49	1.97	3.81	7.25	2.15	3.37	6.95	2.26	3.08	6.84	2.50	2.74	6.69	2.78	2.41	6.41	2.96	2.16	6.08	3.23	1.88	4.96	2.91	1.70	/	/	/
-7	8.28	2.11	3.92	8.18	2.33	3.51	8.00	2.62	3.05	7.43	2.54	2.93	7.35	2.88	2.55	7.00	3.04	2.30	6.85	3.43	2.00	5.14	0.00	1.84	/	/	/
-5	7.93	1.82	4.35	7.90	2.12	3.73	7.66	2.21	3.47	7.45	2.45	3.04	7.13	2.60	2.75	6.88	2.72	2.53	6.49	2.78	2.34	5.46	2.71	2.02	/	/	/
0	8.33	1.64	5.06	8.52	2.05	4.15	8.63	2.24	3.86	8.53	2.66	3.20	7.87	2.65	2.97	8.03	2.92	2.75	7.30	2.87	2.54	6.16	2.91	2.11	/	/	/
5	9.09	1.53	5.95	9.00	1.81	4.99	9.07	1.94	4.68	9.23	2.35	3.92	8.58	2.41	3.55	8.53	2.76	3.09	8.02	2.82	2.84	6.86	2.77	2.48	3.86	2.75	1.40
7	10.2	1.69	6.05	9.98	1.85	5.40	10.00	2.02	4.95	10.1	2.37	4.29	10.0	2.67	3.75	9.58	2.92	3.28	9.50	3.06	3.10	7.70	2.72	2.83	4.29	2.66	1.61
10	10.1	1.34	7.50	9.12	1.54	5.91	8.85	1.68	5.28	8.88	2.04	4.35	8.94	2.40	3.72	8.86	2.62	3.39	8.34	2.65	3.14	7.60	2.74	2.77	5.66	2.62	2.16
15	10.3	1.18	8.83	9.40	1.35	6.96	9.13	1.47	6.22	9.16	1.79	5.12	9.22	2.10	4.38	9.14	2.29	3.99	8.60	2.34	3.67	7.84	2.42	3.23	5.97	2.39	2.50
20	9.88	0.99	9.94	9.58	1.11	8.60	9.58	1.34	7.14	9.70	1.60	6.08	9.46	1.86	5.08	9.41	2.11	4.46	8.73	2.16	4.05	8.31	2.38	3.49	/	/	/
25	8.86	0.83	10.6	8.98	0.98	9.18	8.99	1.18	7.63	9.10	1.40	6.49	8.87	1.63	5.43	8.82	1.85	4.76	8.19	1.89	4.32	7.79	2.09	3.73	/	/	/
30	8.76	0.77	11.3	8.28	0.86	9.63	8.19	0.96	8.57	8.24	1.13	7.32	9.35	1.43	6.53	8.96	1.68	5.33	8.21	1.61	5.08	7.17	1.84	3.90	/	/	/
35	9.19	0.76	12.0	8.69	0.86	10.1	8.59	0.95	9.01	8.65	1.13	7.65	9.81	1.43	6.84	9.39	1.68	5.59	8.63	1.63	5.29	/	/	/	/	/	/
40	9.79	0.75	13.0	8.97	0.82	10.9	8.75	0.95	9.26	8.82	1.09	8.11	10.0	1.37	7.31	9.59	1.59	6.02	/	/	/	/	/	/	/	/	/
43	10.2	0.74	13.7	9.32	0.79	11.9	9.10	0.89	10.2	9.16	1.02	8.98	10.4	1.27	8.21	9.96	1.45	6.85	/	/	/	/	/	/	/	/	/

Minimum

DB	LWT																								
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	2.81	1.19	2.35	2.61	1.26	2.08	2.61	1.53	1.71	2.50	1.56	1.60	1.87	1.43	1.31	/	/	/	/	/	/	/	/	/	/	/	/
-20	3.35	1.12	2.99	2.89	1.15	2.50	2.89	1.29	2.24	2.91	1.57	1.85	2.41	1.46	1.66	2.31	1.59	1.45	2.01	1.57	1.28	/	/	/	/	/	/
-15	3.39	0.94	3.61	3.29	1.07	3.08	3.06	1.17	2.62	3.28	1.37	2.40	3.56	1.71	2.08	3.39	1.88	1.81	3.53	2.00	1.76	2.98	2.07	1.44	/	/	/
-10	3.32	0.85	3.91	3.18	0.92	3.47	3.11	0.98	3.17	3.97	1.41	2.82	4.47	1.82	2.46	4.78	2.17	2.20	4.62	2.40	1.92	3.87	2.22	1.74	/	/	/
-7	2.09	0.51	4.14	1.95	0.54	3.64	2.05	0.61	3.37	3.52	1.14	3.08	3.77	1.41	2.67	3.82	1.62	2.36	3.99	1.93	2.07	3.60	1.91	1.88	/	/	/
-5	2.39	0.53	4.48	2.32	0.60	3.84	2.48	0.70	3.57	3.67	1.17	3.13	3.95	1.41	2.80	4.13	1.60	2.58	4.26	1.79	2.38	3.76	1.83	2.06	/	/	/
0	2.42	0.46	5.24	2.68	0.62	4.30	2.67	0.67	3.99	3.99	1.20	3.31	3.92	1.29	3.04	4.48	1.59	2.82	4.38	1.68	2.61	4.14	1.91	2.17	/	/	/
5	3.26	0.53	6.18	3.45	0.67	5.18	3.43	0.71	4.86	4.65	1.14	4.07	4.61	1.26	3.66	5.08	1.60	3.18	5.14	1.76	2.92	4.89	1.92	2.55	2.87	2.02	1.42
7	3.76	0.58	6.48	3.86	0.68	5.69	3.81	0.71	5.39	4.92	1.09	4.53	5.55	1.36	4.09	6.10	1.76	3.46	6.17	1.90	3.25	5.41	1.85	2.93	3.19	1.96	1.63
10	3.43	0.44	7.86	3.05	0.49	6.19	3.17	0.57	5.54	4.47	0.98	4.55	5.34	1.38	3.86	5.78	1.64	3.52	6.04	1.85	3.27	5.54	1.92	2.88	4.38	1.98	2.22
15	4.48	0.4	9.3	4.1	0.5	7.3	4.0	0.6	6.5	4.6	0.8	5.4	5.5	1.2	4.5	6.0	1.4	4.1	7.0	1.8	3.8	6.1	1.8	3.2	4.4	1.7	2.5

		8	2	7	7	5	0	1	8	9	7	0	8	1	9	3	4	8	3	3	5	6	8	7	0	1	6
20	4.86	0.46	10.5	5.27	0.58	9.10	5.66	0.75	7.56	6.73	1.05	6.44	6.38	1.19	5.34	6.51	1.39	4.68	6.60	1.55	4.25	5.96	1.62	3.67	/	/	/
25	5.47	0.49	11.2	5.84	0.60	9.72	6.19	0.77	8.07	7.17	1.04	6.87	6.81	1.19	5.70	6.92	1.38	5.00	6.51	1.43	4.54	5.97	1.52	3.93	/	/	/
30	5.62	0.47	12.0	5.58	0.55	10.2	5.83	0.64	9.08	6.06	0.78	7.75	7.29	1.06	6.86	7.22	1.29	5.59	6.71	1.26	5.34	5.65	1.38	4.11	/	/	/
35	6.81	0.53	12.7	6.42	0.60	10.7	6.07	0.64	9.55	6.35	0.78	8.10	7.64	1.06	7.19	7.75	1.32	5.88	7.34	1.32	5.56	/	/	/	/	/	/
40	7.26	0.53	13.8	6.64	0.58	11.5	6.90	0.70	9.81	6.96	0.81	8.59	8.24	1.07	7.68	8.24	1.30	6.33	/	/	/	/	/	/	/	/	/
43	7.59	0.52	14.5	6.94	0.55	12.6	7.20	0.67	10.8	7.27	0.76	9.51	8.71	1.01	8.64	8.70	1.21	7.20	/	/	/	/	/	/	/	/	/

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Table 2-5.5: Heating capacity for SMHM-120B/3, SMHM-120B-3/9

Maximum																													
DB	LWT																												
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	6.03	2.78	2.17	6.26	2.91	2.15	5.03	2.96	1.70	4.53	3.12	1.45	4.23	3.29	1.28	/	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	7.65	3.00	2.55	7.69	3.08	2.50	7.21	3.34	2.16	6.38	3.41	1.87	6.05	3.52	1.72	5.36	3.55	1.51	5.08	3.63	1.40	/	/	/	/	/	/	/	/
-15	8.90	3.12	2.85	8.86	3.34	2.65	8.86	3.62	2.45	7.93	3.62	2.19	7.39	3.95	1.87	6.71	3.97	1.69	6.33	4.31	1.47	5.87	4.69	1.25	/	/	/	/	/
-10	11.0	3.47	3.17	10.1	3.68	2.74	10.0	3.95	2.54	9.69	4.34	2.23	9.32	4.54	2.05	8.96	4.62	1.94	8.60	4.79	1.79	6.70	5.13	1.30	/	/	/	/	/
-7	12.3	3.52	3.49	10.9	3.62	3.02	11.0	3.89	2.83	10.4	4.27	2.44	10.4	4.50	2.31	10.6	4.74	2.24	10.6	5.25	2.02	8.05	5.06	1.59	/	/	/	/	/
-5	12.4	3.33	3.71	11.2	3.55	3.15	11.3	3.87	2.92	10.9	4.26	2.57	10.9	4.61	2.37	10.8	4.75	2.27	10.6	5.14	2.05	8.21	5.14	1.60	/	/	/	/	/
0	12.4	2.87	4.35	11.9	3.13	3.80	12.0	3.44	3.48	12.3	4.04	3.04	12.3	4.37	2.81	11.1	4.61	2.41	10.8	4.74	2.27	8.52	5.03	1.69	/	/	/	/	/
5	14.6	2.66	5.49	13.5	2.97	4.55	13.6	3.28	4.15	13.8	3.70	3.73	13.6	4.18	3.26	12.8	4.46	2.88	12.8	4.70	2.73	11.6	5.06	2.29	9.92	5.16	1.92		
7	15.5	2.57	6.00	14.2	2.83	5.04	14.6	3.11	4.69	14.8	3.57	4.14	14.5	4.00	3.63	13.9	4.43	3.14	13.9	4.66	2.97	13.0	5.07	2.56	11.5	5.17	2.23		
10	15.0	2.40	6.22	14.4	2.62	5.49	14.3	2.83	5.06	14.6	3.34	4.37	14.3	3.89	3.69	13.5	4.11	3.30	13.1	4.38	2.99	12.7	4.79	2.65	11.7	4.89	2.39		
15	15.1	1.97	7.67	14.7	2.21	6.65	14.4	2.65	5.43	15.0	3.17	4.72	14.6	3.53	4.14	13.4	3.73	3.60	12.1	3.97	3.03	12.3	4.32	2.85	11.7	4.42	2.65		
20	14.6	1.66	8.76	14.3	1.88	7.60	14.2	2.20	6.47	14.8	2.75	5.39	14.8	3.15	4.69	13.7	3.37	4.06	12.0	3.55	3.39	10.8	3.71	2.90	/	/	/		
25	14.4	1.55	9.31	14.3	1.73	8.23	14.2	1.93	7.35	14.7	2.35	6.26	14.7	2.73	5.39	13.9	3.00	4.63	12.0	3.12	3.84	10.0	3.36	2.99	/	/	/		
30	14.6	1.45	10.1	14.2	1.62	8.75	14.4	1.85	7.76	14.7	2.22	6.63	14.7	2.63	5.59	14.0	2.82	4.95	12.6	2.94	4.30	10.3	3.40	3.04	/	/	/		
35	15.2	1.39	10.9	14.9	1.60	9.29	14.7	1.80	8.16	15.1	2.17	6.95	14.6	2.50	5.83	14.2	2.72	5.24	12.9	2.79	4.62	/	/	/	/	/	/		
40	15.7	1.41	11.1	15.6	1.59	9.82	15.4	1.79	8.65	16.0	2.17	7.36	15.3	2.44	6.29	14.5	2.69	5.40	/	/	/	/	/	/	/	/	/		
43	16.2	1.35	12.0	16.0	1.50	10.6	15.9	1.73	9.18	16.5	2.11	7.82	16.0	2.35	6.81	14.8	2.57	5.75	/	/	/	/	/	/	/	/	/		
Normal																													
DB	LWT																												
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	5.16	2.24	2.30	5.32	2.32	2.29	4.24	2.37	1.79	3.88	2.57	1.51	3.66	2.82	1.30	/	/	/	/	/	/	/	/	/	/	/	/	/	/
-20	6.73	2.45	2.75	6.73	2.49	2.70	6.25	2.72	2.30	5.62	2.85	1.97	5.31	3.01	1.77	4.72	3.03	1.56	4.63	3.30	1.40	/	/	/	/	/	/	/	/
-15	7.43	2.41	3.09	7.35	2.55	2.88	7.28	2.78	2.62	6.63	2.86	2.32	6.04	3.13	1.93	5.51	3.14	1.75	5.30	3.58	1.48	4.96	4.01	1.24	/	/	/	/	/
-10	9.06	2.69	3.37	8.26	2.83	2.92	8.14	3.06	2.66	8.00	3.45	2.32	7.80	3.70	2.11	7.54	3.77	2.00	7.24	3.91	1.85	5.70	4.30	1.33	/	/	/	/	/
-7	11.1	3.11	3.57	10.3	3.26	3.15	10.0	3.33	3.00	10.1	4.06	2.50	10.2	4.25	2.40	10.3	4.48	2.29	9.80	4.78	2.05	7.23	4.42	1.64	/	/	/	/	/
-5	10.3	2.55	4.03	9.22	2.72	3.38	9.05	2.89	3.13	8.87	3.19	2.78	8.78	3.48	2.52	8.47	3.59	2.36	8.36	3.91	2.14	6.74	4.10	1.64	/	/	/	/	/
0	9.93	2.09	4.75	9.35	2.29	4.09	9.19	2.46	3.74	9.51	2.88	3.30	9.43	3.14	3.00	8.13	3.22	2.52	7.93	3.38	2.34	6.70	3.83	1.75	/	/	/	/	/
5	11.8	1.95	6.05	10.8	2.18	4.94	10.6	2.35	4.50	10.8	2.65	4.08	10.6	3.01	3.51	9.75	3.22	3.03	9.83	3.42	2.88	9.21	3.86	2.38	8.19	4.05	2.02		
7	12.9	1.96	6.57	11.9	2.19	5.44	12.1	2.44	4.95	12.4	2.75	4.50	12.3	3.32	3.70	12.2	3.75	3.25	11.9	3.90	3.05	10.8	4.06	2.66	9.64	4.10	2.35		
10	11.8	1.72	6.88	11.2	1.87	5.99	10.9	1.97	5.51	11.3	2.34	4.81	10.9	2.74	3.99	10.1	2.93	3.44	9.86	3.16	3.13	9.92	3.62	2.74	9.48	3.80	2.49		
15	12.0	1.41	8.56	11.6	1.58	7.32	11.0	1.84	5.97	11.6	2.21	5.24	11.2	2.48	4.52	10.1	2.66	3.79	9.12	2.85	3.20	9.66	3.26	2.97	9.57	3.39	2.82		
20	11.5	1.16	9.86	11.1	1.32	8.45	10.8	1.50	7.18	11.4	1.89	6.04	11.2	2.17	5.16	10.1	2.35	4.32	9.00	2.50	3.61	8.37	2.74	3.06	/	/	/		
25	11.4	1.09	10.5	11.2	1.22	9.15	10.8	1.33	8.15	11.4	1.46	7.79	11.2	1.89	5.93	10.4	2.11	4.93	9.04	2.21	4.09	7.85	2.50	3.14	/	/	/		

30	11.7	1.04	11.3	11.2	1.16	9.66	11.0	1.29	8.55	11.5	1.41	8.15	11.4	1.93	5.88	10.5	2.01	5.24	9.62	2.14	4.49	8.17	2.58	3.17	/	/	/
35	12.4	1.02	12.1	12.0	1.17	10.2	11.5	1.32	8.78	12.0	1.60	7.49	11.5	1.86	6.17	11.0	1.96	5.58	10.0	2.06	4.86	/	/	/	/	/	/
40	13.1	1.06	12.4	12.9	1.19	10.9	12.5	1.33	9.37	13.0	1.63	7.99	12.4	1.84	6.71	11.5	1.98	5.80	/	/	/	/	/	/	/	/	/
43	13.7	1.02	13.5	13.4	1.14	11.8	13.0	1.30	10.0	13.7	1.60	8.54	13.1	1.80	7.31	11.9	1.91	6.22	/	/	/	/	/	/	/	/	/

Minimum																											
DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	3.44	1.46	2.36	3.72	1.59	2.35	3.27	1.81	1.81	3.08	2.01	1.53	2.83	2.17	1.30	/	/	/	/	/	/	/	/	/	/	/	/
-20	4.24	1.52	2.78	4.42	1.61	2.74	4.08	1.75	2.33	3.72	1.86	2.00	3.93	2.25	1.75	3.75	2.43	1.54	3.60	2.58	1.39	/	/	/	/	/	/
-15	4.85	1.54	3.16	5.00	1.70	2.94	4.92	1.83	2.68	4.55	1.92	2.37	4.73	2.45	1.93	4.63	2.64	1.75	4.43	2.98	1.49	4.22	3.39	1.25	/	/	/
-10	4.67	1.34	3.49	4.48	1.48	3.03	4.36	1.59	2.74	4.39	1.84	2.38	4.85	2.25	2.15	5.11	2.50	2.04	5.33	2.83	1.89	4.49	3.32	1.35	/	/	/
-7	4.61	1.17	3.94	3.85	1.15	3.36	3.97	1.26	3.14	4.20	1.53	2.74	5.41	2.14	2.52	5.73	2.41	2.37	6.03	2.79	2.16	5.23	3.11	1.68	/	/	/
-5	4.75	1.13	4.19	4.06	1.15	3.53	4.18	1.28	3.26	4.52	1.56	2.90	5.80	2.23	2.61	5.93	2.44	2.43	6.12	2.79	2.20	5.42	3.20	1.69	/	/	/
0	4.99	1.01	4.96	4.64	1.08	4.28	4.62	1.18	3.92	5.24	1.52	3.45	6.70	2.15	3.11	6.12	2.49	2.45	6.23	2.69	2.32	5.75	3.18	1.81	/	/	/
5	5.91	0.93	6.35	5.34	1.03	5.19	5.31	1.12	4.73	5.97	1.39	4.29	7.49	2.05	3.66	7.30	2.32	3.15	8.08	2.71	2.98	7.87	3.18	2.48	6.99	3.33	2.10
7	6.15	0.88	6.98	5.53	0.96	5.79	5.58	1.04	5.38	6.30	1.31	4.80	7.88	1.92	4.10	7.83	2.26	3.46	8.63	2.64	3.27	8.71	3.13	2.79	8.06	3.28	2.46
10	6.10	0.84	7.24	5.72	0.91	6.31	5.62	0.97	5.81	6.37	1.26	5.07	7.92	1.90	4.16	7.76	2.13	3.63	8.30	2.54	3.27	8.68	3.03	2.87	8.28	3.17	2.61
15	5.93	0.66	8.96	5.78	0.75	7.68	5.62	0.90	6.26	6.92	1.26	5.49	8.09	1.72	4.69	8.28	2.08	3.98	7.83	2.35	3.33	8.73	2.83	3.09	8.62	2.95	2.92
20	5.81	0.56	10.3	5.73	0.65	8.85	5.66	0.75	7.52	6.97	1.10	6.32	8.27	1.54	5.36	8.52	1.88	4.53	7.90	2.11	3.75	7.72	2.43	3.18	/	/	/
25	5.89	0.54	11.0	5.85	0.61	9.58	5.79	0.68	8.54	7.06	0.96	7.36	8.39	1.36	6.16	8.81	1.70	5.18	8.00	1.88	4.25	7.29	2.23	3.27	/	/	/
30	6.83	0.58	11.8	6.96	0.69	10.1	7.82	0.89	8.78	8.23	1.09	7.52	8.52	1.38	6.18	8.91	1.62	5.51	8.60	1.82	4.73	7.34	2.20	3.33	/	/	/
35	7.23	0.56	12.8	7.43	0.69	10.8	8.17	0.88	9.31	8.60	1.08	7.94	8.58	1.32	6.49	9.27	1.58	5.87	8.90	1.74	5.11	/	/	/	/	/	/
40	7.63	0.58	13.1	7.95	0.69	11.5	8.75	0.88	9.93	9.09	1.07	8.47	9.05	1.28	7.05	9.60	1.57	6.10	/	/	/	/	/	/	/	/	/
43	8.10	0.57	14.3	8.37	0.67	12.5	9.22	0.87	10.6	9.64	1.06	9.06	9.75	1.27	7.69	10.0	1.53	6.54	/	/	/	/	/	/	/	/	/

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Table 2-5.6: Heating capacity for SMHM-140B/3, SMHM-140B-3/9

Maximum																											
DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	6.60	3.09	2.14	6.76	3.20	2.11	5.43	3.18	1.71	4.89	3.35	1.46	4.47	3.47	1.29	/	/	/	/	/	/	/	/	/	/	/	/
-20	8.26	3.22	2.57	8.30	3.30	2.52	7.79	3.58	2.18	6.89	3.65	1.89	6.25	3.61	1.73	5.42	3.61	1.50	5.14	3.87	1.33	/	/	/	/	/	/
-15	9.61	3.40	2.82	9.57	3.65	2.62	9.57	3.94	2.43	8.57	3.95	2.17	7.63	4.12	1.85	7.01	4.32	1.62	6.46	4.58	1.41	6.01	5.05	1.19	/	/	/
-10	11.9	3.81	3.12	11.4	4.18	2.73	11.0	4.44	2.47	10.6	4.70	2.26	9.64	4.73	2.04	9.07	5.01	1.81	8.72	5.21	1.67	6.73	5.30	1.27	/	/	/
-7	13.7	4.02	3.41	12.9	4.28	3.02	12.7	4.55	2.79	12.3	4.94	2.49	11.9	5.17	2.31	11.0	5.33	2.07	11.3	5.46	2.01	8.02	5.31	1.51	/	/	/
-5	13.9	3.78	3.68	13.2	3.87	3.41	12.5	4.16	2.99	12.6	4.61	2.73	12.1	4.99	2.42	11.2	5.24	2.13	11.1	5.32	2.09	8.25	5.06	1.63	/	/	/
0	14.3	3.40	4.21	13.7	3.54	3.87	12.4	3.82	3.26	13.0	4.32	3.01	12.7	4.85	2.62	11.9	4.99	2.38	11.8	5.19	2.27	9.34	5.48	1.70	/	/	/
5	15.4	2.93	5.25	14.9	3.30	4.51	14.3	3.63	3.94	14.3	3.95	3.61	14.3	4.59	3.11	13.8	4.98	2.77	13.8	5.18	2.66	11.7	5.38	2.17	9.76	5.33	1.83
7	16.3	2.81	5.80	15.6	3.15	4.94	15.5	3.37	4.59	15.6	3.86	4.04	15.7	4.35	3.60	15.0	4.81	3.11	14.5	4.92	2.95	13.2	5.20	2.54	10.4	4.95	2.10
10	15.5	2.28	6.81	15.5	2.89	5.36	14.9	3.10	4.79	15.3	3.60	4.24	15.0	4.08	3.67	15.3	4.62	3.31	14.2	4.60	3.08	13.2	4.91	2.69	11.2	4.98	2.26
15	15.3	2.01	7.62	15.2	2.62	5.79	15.2	2.94	5.16	15.8	3.56	4.45	15.5	3.98	3.89	15.3	4.37	3.51	13.0	4.02	3.24	12.7	4.48	2.84	11.9	4.97	2.41
20	14.9	1.78	8.35	14.8	2.20	6.74	14.6	2.59	5.65	15.2	3.04	5.01	15.1	3.42	4.42	15.0	3.84	3.90	12.7	3.62	3.52	11.0	3.77	2.92	/	/	/
25	14.9	1.64	9.08	14.7	1.92	7.69	14.6	2.38	6.15	14.9	2.68	5.57	14.7	2.98	4.95	14.7	3.43	4.30	12.5	3.28	3.80	10.2	3.40	2.99	/	/	/
30	15.3	1.55	9.82	14.8	1.80	8.21	14.9	2.10	7.09	15.1	2.42	6.22	15.0	2.80	5.36	14.6	3.14	4.65	12.8	2.93	4.37	10.3	3.40	3.04	/	/	/
35	16.0	1.45	11.1	15.4	1.70	9.04	15.0	1.87	8.02	15.5	2.26	6.86	15.3	2.65	5.77	14.8	2.95	5.00	13.0	2.77	4.69	/	/	/	/	/	/
40	16.2	1.40	11.6	16.4	1.59	10.3	16.2	1.89	8.57	16.0	2.20	7.26	15.8	2.59	6.09	15.0	2.78	5.38	/	/	/	/	/	/	/	/	/

43	16.5	1.36	12.2	16.7	1.54	10.8	16.5	1.88	8.81	16.3	2.12	7.69	16.1	2.56	6.27	15.2	2.73	5.54	/	/	/	/	/	/	/	/	/

Normal

DB	LWT																										
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	5.65	2.48	2.27	5.75	2.55	2.25	4.57	2.55	1.79	4.19	2.76	1.51	3.88	2.97	1.30	/	/	/	/	/	/	/	/	/	/	/	/
-20	7.27	2.63	2.77	7.27	2.67	2.72	6.75	2.92	2.32	6.07	3.06	1.99	5.48	3.08	1.78	4.77	3.08	1.55	4.69	3.52	1.33	/	/	/	/	/	/
-15	8.03	2.63	3.06	7.94	2.79	2.85	7.86	3.03	2.60	7.16	3.12	2.29	6.24	3.26	1.91	5.76	3.42	1.68	5.41	3.81	1.42	5.09	4.31	1.18	/	/	/
-10	9.80	2.96	3.31	9.36	3.22	2.91	8.89	3.43	2.59	8.76	3.74	2.34	8.07	3.85	2.09	7.63	4.08	1.87	7.34	4.26	1.72	5.73	4.44	1.29	/	/	/
-7	12.7	3.56	3.56	12.2	3.94	3.09	12.0	4.21	2.85	11.9	4.46	2.66	11.8	5.02	2.35	10.9	5.15	2.11	11.0	5.37	2.05	7.41	4.77	1.55	/	/	/
-5	11.6	2.89	4.00	10.8	2.96	3.66	9.98	3.11	3.21	10.2	3.45	2.95	9.68	3.77	2.57	8.78	3.96	2.22	8.83	4.05	2.18	6.77	4.04	1.68	/	/	/
0	11.4	2.48	4.59	10.8	2.58	4.17	9.52	2.72	3.50	10.1	3.08	3.27	9.74	3.48	2.79	8.78	3.62	2.42	8.78	3.70	2.38	7.18	4.08	1.76	/	/	/
5	12.4	2.15	5.78	11.9	2.42	4.90	11.1	2.60	4.27	11.2	2.83	3.96	11.1	3.31	3.35	10.5	3.60	2.92	10.6	3.77	2.81	9.31	4.11	2.27	8.06	4.19	1.93
7	15.2	2.43	6.26	14.5	2.77	5.24	14.5	3.15	4.60	14.6	3.52	4.15	14.1	3.92	3.60	14.0	4.40	3.18	13.8	4.68	2.95	12.3	4.73	2.61	9.71	4.50	2.16
10	12.3	1.63	7.53	12.1	2.07	5.85	11.3	2.17	5.22	11.8	2.52	4.67	11.4	2.87	3.97	11.4	3.30	3.46	10.6	3.31	3.21	10.3	3.71	2.78	9.11	3.88	2.35
15	12.2	1.43	8.50	11.9	1.87	6.37	11.6	2.05	5.67	12.3	2.49	4.94	11.9	2.80	4.25	11.5	3.11	3.70	9.84	2.88	3.41	10.0	3.38	2.96	9.68	3.78	2.56
20	11.7	1.25	9.40	11.5	1.54	7.49	11.1	1.77	6.27	11.7	2.08	5.62	11.5	2.35	4.87	11.1	2.68	4.16	9.53	2.55	3.74	8.54	2.78	3.07	/	/	/
25	11.8	1.15	10.2	11.6	1.35	8.55	11.1	1.63	6.82	11.5	1.66	6.93	11.3	2.06	5.46	11.0	2.41	4.58	9.40	2.32	4.04	7.95	2.53	3.14	/	/	/
30	12.2	1.11	11.0	11.7	1.29	9.07	11.4	1.46	7.81	11.7	1.54	7.64	11.6	2.05	5.63	11.0	2.24	4.92	9.74	2.13	4.56	8.17	2.58	3.17	/	/	/
35	13.0	1.06	12.3	12.4	1.25	9.93	11.8	1.36	8.63	12.3	1.67	7.39	12.0	1.96	6.10	11.4	2.13	5.33	10.1	2.05	4.93	/	/	/	/	/	/
40	13.5	1.04	13.0	13.6	1.19	11.4	13.1	1.41	9.28	13.0	1.65	7.88	12.7	1.96	6.48	11.8	2.04	5.78	/	/	/	/	/	/	/	/	/
43	14.1	1.02	13.8	14.1	1.17	12.1	13.6	1.41	9.61	13.5	1.61	8.40	13.2	1.96	6.73	12.2	2.04	5.99	/	/	/	/	/	/	/	/	/

Minimum

DB	LWT																										
	25			25			25			25			25			25			25			25			25		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	3.76	1.62	2.33	4.02	1.74	2.30	3.54	1.94	1.82	3.33	2.17	1.54	3.00	2.29	1.31	/	/	/	/	/	/	/	/	/	/	/	/
-20	4.58	1.63	2.80	4.77	1.73	2.76	4.40	1.87	2.35	4.02	1.99	2.02	4.06	2.31	1.76	3.79	2.47	1.54	3.65	2.76	1.32	/	/	/	/	/	/
-15	5.24	1.68	3.13	5.40	1.85	2.91	5.31	2.00	2.66	4.91	2.09	2.35	4.88	2.56	1.91	4.84	2.87	1.68	4.52	3.17	1.43	4.33	3.65	1.19	/	/	/
-10	5.05	1.47	3.44	5.08	1.68	3.02	4.76	1.79	2.66	4.80	1.99	2.41	5.01	2.35	2.13	5.17	2.71	1.90	5.40	3.08	1.76	4.51	3.43	1.32	/	/	/
-7	5.14	1.34	3.84	4.55	1.35	3.36	4.57	1.48	3.10	4.96	1.77	2.80	6.21	2.46	2.52	5.96	2.71	2.20	6.25	2.90	2.15	5.22	3.26	1.60	/	/	/
-5	5.35	1.28	4.17	4.78	1.25	3.81	4.61	1.38	3.34	5.19	1.69	3.07	6.40	2.41	2.65	6.15	2.69	2.28	6.46	2.88	2.24	5.44	3.15	1.73	/	/	/
0	5.73	1.19	4.80	5.34	1.22	4.36	4.79	1.31	3.66	5.57	1.63	3.42	6.92	2.39	2.90	6.61	2.67	2.48	6.90	2.81	2.46	6.17	3.39	1.82	/	/	/
5	6.23	1.03	6.07	5.89	1.14	5.15	5.58	1.24	4.49	6.18	1.49	4.16	7.86	2.25	3.49	7.86	2.59	3.03	8.68	2.98	2.91	7.95	3.38	2.35	6.88	3.44	2.00
7	6.48	0.96	6.75	6.03	1.06	5.68	5.92	1.12	5.27	6.64	1.42	4.68	8.50	2.09	4.07	8.43	2.46	3.43	9.05	2.78	3.25	8.88	3.21	2.77	7.25	3.14	2.31
10	6.34	0.80	7.93	6.18	1.00	6.16	5.84	1.06	5.50	6.66	1.35	4.92	8.28	2.00	4.15	8.77	2.40	3.65	8.96	2.67	3.36	9.02	3.10	2.91	7.95	3.23	2.46
15	6.01	0.67	8.90	5.97	0.89	6.68	5.93	1.00	5.94	7.33	1.42	5.18	8.59	1.94	4.42	9.47	2.43	3.89	8.45	2.38	3.55	9.04	2.93	3.09	8.72	3.29	2.65
20	5.95	0.60	9.84	5.93	0.76	7.85	5.83	0.89	6.57	7.16	1.22	5.88	8.48	1.68	5.06	9.35	2.14	4.36	8.36	2.15	3.89	7.88	2.47	3.19	/	/	/
25	6.09	0.57	10.7	6.05	0.68	8.95	5.96	0.83	7.15	7.17	1.10	6.54	8.42	1.48	5.67	9.33	1.94	4.80	8.32	1.98	4.21	7.38	2.26	3.27	/	/	/
30	7.11	0.62	11.5	7.26	0.76	9.49	8.10	1.01	8.02	8.43	1.20	7.05	8.68	1.46	5.92	9.37	1.81	5.17	8.70	1.81	4.80	7.34	2.20	3.33	/	/	/
35	7.63	0.59	13.0	7.69	0.73	10.5	8.32	0.91	9.15	8.83	1.13	7.84	8.98	1.40	6.42	9.63	1.72	5.61	8.97	1.73	5.19	/	/	/	/	/	/
40	7.89	0.57	13.8	8.37	0.69	12.1	9.16	0.93	9.84	9.10	1.09	8.35	9.29	1.36	6.82	9.89	1.63	6.08	/	/	/	/	/	/	/	/	/
43	8.30	0.57	14.6	8.79	0.69	12.8	9.59	0.94	10.2	9.53	1.07	8.90	9.24	1.31	7.08	10.3	1.63	6.30	/	/	/	/	/	/	/	/	/

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

Table 2-5.7: Heating capacity for SMHM-160B/3, SMHM-160B-3/9

Maximum

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	7.69	4.03	1.91	7.99	4.22	1.93	6.61	4.01	1.65	5.89	4.43	1.33	4.96	4.21	1.18	/	/	/	/	/	/	/	/	/	/	/	/
-20	9.57	3.94	2.38	9.71	4.43	2.19	8.16	4.77	1.71	7.48	4.76	1.57	6.55	4.85	1.35	5.85	4.54	1.29	5.37	4.75	1.13	/	/	/	/	/	/
-15	11.8	4.37	2.71	11.3	4.60	2.45	10.7	4.93	2.17	10.1	5.24	1.92	9.03	5.38	1.68	7.53	5.32	1.42	6.82	5.29	1.29	6.42	5.59	1.15	/	/	/
-10	13.4	4.51	2.97	13.0	4.78	2.72	12.7	5.09	2.49	12.4	5.43	2.28	11.1	5.61	1.96	9.49	5.56	1.70	8.92	5.88	1.51	7.04	5.59	1.26	/	/	/
-7	14.3	4.59	3.13	14.1	4.89	2.88	13.9	5.19	2.67	13.8	5.55	2.50	13.1	6.02	2.18	12.9	6.22	2.07	12.6	6.29	2.00	8.25	6.18	1.33	/	/	/
-5	14.6	4.27	3.47	14.3	4.61	3.13	14.0	4.93	2.86	13.8	5.33	2.61	13.4	5.88	2.28	13.0	5.82	2.22	12.6	5.92	2.13	8.62	5.97	1.45	/	/	/
0	15.1	3.49	4.33	14.7	3.91	3.75	14.3	4.27	3.34	13.9	4.80	2.88	14.1	5.33	2.64	13.4	5.14	2.61	12.8	5.42	2.37	9.56	5.54	1.72	/	/	/
5	16.8	3.25	5.19	14.6	3.61	4.06	16.1	4.00	4.04	15.6	4.57	3.43	15.9	4.96	3.20	15.3	5.05	3.02	14.5	5.21	2.77	12.7	5.36	2.37	10.7	5.24	2.04
7	17.5	3.16	5.53	15.7	3.12	4.68	16.8	3.79	4.43	16.4	4.25	3.85	16.6	4.71	3.53	16.2	5.05	3.17	16.2	5.53	2.89	14.1	5.34	2.63	11.3	5.13	2.20
10	18.0	3.01	6.02	16.4	3.34	4.96	17.6	3.73	4.74	17.1	4.33	3.96	17.3	4.72	3.67	16.7	5.12	3.26	16.1	5.16	3.11	14.3	5.15	2.79	12.2	4.97	2.46
15	18.9	2.76	6.84	19.3	3.08	6.26	18.9	3.48	5.43	18.3	4.08	4.48	18.5	4.53	4.09	17.8	4.79	3.72	17.5	5.11	3.42	14.7	4.83	3.06	12.5	4.80	2.60
20	16.7	2.08	8.03	16.9	2.38	7.10	16.7	2.69	6.21	17.4	3.40	5.12	16.1	3.77	4.28	14.6	4.06	3.60	15.0	4.32	3.46	13.1	4.39	3.00	/	/	/
25	16.2	1.83	8.86	16.2	2.23	7.26	16.0	2.31	6.94	16.6	2.87	5.81	15.7	3.23	4.87	14.5	3.46	4.20	14.1	3.68	3.82	12.4	4.05	3.07	/	/	/
30	15.6	1.55	10.1	15.5	1.88	8.21	15.4	2.00	7.68	15.9	2.45	6.49	15.3	2.81	5.46	14.4	3.01	4.79	13.2	3.15	4.18	12.7	4.11	3.10	/	/	/
35	16.3	1.50	10.8	16.6	1.84	9.01	16.3	1.94	8.42	16.6	2.42	6.87	15.9	2.79	5.68	15.0	3.00	5.01	13.4	3.07	4.35	/	/	/	/	/	/
40	16.9	1.47	11.5	17.6	1.75	10.1	17.2	1.88	9.15	17.4	2.40	7.24	16.4	2.78	5.91	15.6	2.98	5.22	/	/	/	/	/	/	/	/	/
43	17.2	1.46	11.8	18.0	1.71	10.5	17.6	1.88	9.37	17.7	2.39	7.41	16.7	2.70	6.20	15.9	2.94	5.41	/	/	/	/	/	/	/	/	/

Normal

DB	LWT																											
	25			30			35			40			45			50			55			60			65		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	6.57	3.24	2.03	6.79	3.29	2.06	5.57	3.21	1.73	5.04	3.65	1.38	4.30	3.60	1.19	/	/	/	/	/	/	/	/	/	/	/	/
-20	8.42	3.29	2.56	8.50	3.59	2.37	7.07	3.88	1.82	6.59	3.99	1.65	5.74	4.14	1.39	5.15	3.88	1.33	4.89	4.33	1.13	/	/	/	/	/	/
-15	9.89	3.37	2.93	9.35	3.52	2.66	8.80	3.79	2.32	8.41	4.14	2.03	7.38	4.26	1.73	6.18	4.21	1.47	5.71	4.40	1.30	5.43	4.77	1.14	/	/	/
-10	11.1	3.51	3.15	10.7	3.68	2.90	10.3	3.95	2.61	10.3	4.34	2.37	9.25	4.59	2.01	7.98	4.55	1.75	7.51	4.83	1.55	5.99	4.69	1.28	/	/	/
-7	13.9	4.27	3.25	13.5	4.44	3.05	13.1	4.85	2.70	13.1	4.98	2.63	12.8	5.69	2.25	12.4	5.83	2.12	12.5	6.25	2.00	7.69	5.60	1.37	/	/	/
-5	12.1	3.21	3.77	11.7	3.49	3.36	11.2	3.65	3.07	11.2	3.98	2.82	10.7	4.44	2.42	10.2	4.83	2.11	9.98	4.50	2.22	7.08	4.76	1.49	/	/	/
0	12.0	2.54	4.72	11.5	2.86	4.04	10.9	3.05	3.59	10.7	3.43	3.13	10.8	3.83	2.81	10.1	4.00	2.52	9.77	3.91	2.50	7.66	4.30	1.78	/	/	/
5	13.5	2.37	5.71	11.7	2.64	4.41	12.5	2.85	4.38	12.3	3.27	3.76	12.3	3.58	3.44	11.6	3.90	2.97	11.1	3.79	2.93	10.1	4.09	2.47	8.84	4.24	2.08
7	17.0	2.87	5.91	15.2	2.98	5.11	15.9	3.53	4.50	15.7	3.99	3.94	16.0	4.57	3.50	16.0	4.92	3.24	16.0	5.61	2.85	13.2	4.86	2.72	10.2	4.60	2.23
10	14.2	2.14	6.66	12.8	2.36	5.42	13.4	2.59	5.16	13.2	3.01	4.36	13.2	3.33	3.97	12.5	3.66	3.41	12.1	3.71	3.25	11.2	3.88	2.88	9.92	3.93	2.52
15	15.0	1.97	7.63	15.2	2.20	6.89	14.5	2.43	5.97	14.2	2.84	4.98	14.2	3.19	4.46	13.4	3.41	3.92	13.2	3.67	3.61	11.6	3.64	3.19	10.2	3.81	2.67
20	13.2	1.46	9.04	13.2	1.67	7.89	12.7	1.84	6.88	13.3	2.32	5.75	12.2	2.59	4.71	10.9	2.83	3.84	11.2	3.04	3.68	10.2	3.24	3.15	/	/	/
25	12.8	1.29	9.97	12.7	1.57	8.06	12.2	1.59	7.71	12.9	1.78	7.22	12.0	2.24	5.36	10.8	2.43	4.47	10.6	2.60	4.07	9.73	3.01	3.23	/	/	/
30	12.5	1.11	11.3	12.2	1.35	9.06	11.8	1.40	8.47	12.4	1.55	7.98	11.8	2.06	5.74	10.9	2.15	5.07	10.0	2.29	4.37	10.1	3.12	3.23	/	/	/
35	13.3	1.10	12.0	13.3	1.35	9.90	12.8	1.41	9.06	13.2	1.79	7.40	12.5	2.07	6.02	11.5	2.16	5.34	10.4	2.27	4.57	/	/	/	/	/	/
40	14.1	1.10	12.8	14.6	1.31	11.1	13.9	1.40	9.91	14.1	1.80	7.86	13.2	2.10	6.30	12.3	2.19	5.61	/	/	/	/	/	/	/	/	/
43	14.7	1.10	13.3	15.1	1.29	11.7	14.4	1.41	10.2	14.7	1.81	8.10	13.7	2.06	6.66	12.8	2.19	5.85	/	/	/	/	/	/	/	/	/

Minimum

DB	LWT																											
	25			25			25			25			25			25			25			25			25		
	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP	HC	PI	COP
-25	4.38	2.11	2.08	4.74	2.25	2.11	4.30	2.44	1.76	4.01	2.86	1.40	3.33	2.77	1.20	/	/	/	/	/	/	/	/	/	/	/	/
-20	5.31	2.04	2.60	5.58	2.33	2.40	4.61	2.50	1.85	4.36	2.60	1.68	4.25	3.10	1.37	4.10	3.11	1.32	3.81	3.38	1.13	/	/	/	/	/	/
-15	6.45	2.15	3.00	6.37	2.34	2.72	5.94	2.50	2.38	5.77	2.77	2.08	5.78	3.33	1.73	5.20	3.54	1.47	4.78	3.66	1.30	4.62	4.04	1.15	/	/	/
-10	5.70	1.74	3.27	5.80	1.93	3.01	5.52	2.06	2.68	5.63	2.31	2.43	5.75	2.80	2.05	5.41	3.03	1.79	5.53	3.49	1.58	4.71	3.62	1.30	/	/	/
-7	5.38	1.53	3.52	4.96	1.55	3.21	4.99	1.68	2.97	5.58	1.99	2.80	6.83	2.86	2.38	6.94	3.17	2.19	7.11	3.27	2.17	5.36	3.80	1.41	/	/	/
-5	5.60	1.43	3.93	5.16	1.47	3.50	5.17	1.62	3.20	5.72	1.94	2.94	7.09	2.84	2.50	7.12	3.29	2.17	7.31	3.20	2.28	5.69	3.72	1.53	/	/	/
0	6.04	1.22	4.94	5.72	1.35	4.23	5.49	1.46	3.76	5.93	1.81	3.28	7.66	2.62	2.92	7.58	2.91	2.60	7.52	2.91	2.59	6.32	3.43	1.84	/	/	/
5	6.80	1.13	5.99	5.78	1.25	4.64	6.27	1.36	4.60	6.77	1.71	3.95	8.74	2.43	3.59	8.70	2.82	3.09	9.11	3.00	3.04	8.65	3.36	2.57	7.55	3.51	2.15
7	6.96	1.08	6.43	5.67	1.05	5.38	6.43	1.27	5.08	6.97	1.56	4.46	9.02	2.26	3.99	9.01	2.58	3.49	9.96	3.13	3.19	9.46	3.29	2.87	7.87	3.41	2.31
10	7.35	1.05	7.01	6.51	1.14	5.70	6.91	1.27	5.44	7.44	1.62	4.59	9.58	2.31	4.15	9.56	2.66	3.59	10.2	2.99	3.40	9.78	3.24	3.02	8.66	3.38	2.56

15	7.40	0.93	7.99	7.57	1.05	7.22	7.39	1.18	6.26	8.45	1.62	5.22	10.3	2.21	4.64	11.0	2.67	4.12	11.4	3.02	3.75	10.5	3.16	3.32	9.17	3.37	2.72
20	6.67	0.70	9.46	6.76	0.82	8.27	6.65	0.92	7.21	8.17	1.36	6.02	9.04	1.85	4.89	9.12	2.26	4.03	9.82	2.57	3.83	9.42	2.87	3.28	/	/	/
25	6.62	0.63	10.4	6.64	0.79	8.45	6.54	0.81	8.07	7.99	1.17	6.82	8.98	1.61	5.57	9.20	1.96	4.69	9.38	2.22	4.23	9.04	2.69	3.36	/	/	/
30	7.29	0.62	11.8	7.58	0.80	9.48	8.38	0.96	8.70	8.91	1.21	7.36	8.88	1.47	6.03	9.25	1.74	5.33	8.95	1.95	4.59	9.05	2.66	3.40	/	/	/
35	7.75	0.61	12.7	8.28	0.79	10.5	9.05	0.94	9.60	9.48	1.21	7.85	9.34	1.48	6.33	9.77	1.74	5.61	9.23	1.92	4.81	/	/	/	/	/	/
40	8.22	0.61	13.6	9.00	0.76	11.8	9.75	0.93	10.5	9.89	1.19	8.34	9.68	1.46	6.62	10.3	1.75	5.90	/	/	/	/	/	/	/	/	/
43	8.64	0.61	14.1	9.45	0.76	12.4	10.2	0.94	10.8	10.4	1.21	8.59	10.2	1.46	7.00	10.7	1.75	6.15	/	/	/	/	/	/	/	/	/

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
HC: Total heating capacity (kW)
PI: Power input (kW)

26.2 Cooling Capacity Tables (Test standard： EN14511)

Table 2-5.8: SMHM-40B/3 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	4.76	0.46	10.30	5.47	0.55	10.01	6.09	0.48	12.66
0	/	/	/	/	/	/	4.54	0.57	8.03	5.25	0.65	8.08	5.87	0.55	10.70
5	/	/	/	/	/	/	4.04	0.67	6.07	4.75	0.75	6.34	5.37	0.65	8.28
10	/	/	/	/	/	/	6.06	1.06	5.71	6.44	1.01	6.40	7.11	0.85	8.37
15	/	/	/	5.05	0.86	5.91	8.09	1.46	5.55	8.14	1.26	6.44	8.85	1.05	8.43
20	4.72	1.04	4.53	6.01	1.35	4.47	8.16	1.49	5.47	8.33	1.30	6.42	8.98	1.10	8.15
25	5.87	1.30	4.51	6.97	1.84	3.80	8.23	1.53	5.39	8.52	1.33	6.40	9.12	1.15	7.90
30	5.84	1.55	3.78	6.80	1.85	3.67	7.77	1.65	4.72	8.19	1.46	5.63	8.77	1.30	6.75
35	5.80	1.79	3.24	6.64	1.87	3.55	7.31	1.76	4.15	7.87	1.58	4.98	8.43	1.44	5.84
40	3.80	1.51	2.52	5.08	1.81	2.81	5.91	1.73	3.41	6.63	1.68	3.95	7.88	1.64	4.80
43	2.58	1.15	2.24	3.80	1.52	2.51	5.08	1.56	3.26	5.88	1.57	3.74	7.55	1.59	4.73
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	3.83	0.33	11.74	4.45	0.37	11.92	4.95	0.35	14.10
0	/	/	/	/	/	/	3.66	0.39	9.35	4.28	0.44	9.81	4.78	0.36	13.31
5	/	/	/	/	/	/	3.23	0.48	6.68	3.81	0.52	7.29	4.36	0.45	9.77
10	/	/	/	/	/	/	4.87	0.77	6.29	5.19	0.70	7.37	5.79	0.59	9.89
15	/	/	/	3.79	0.61	6.25	6.79	1.15	5.89	7.00	0.99	7.06	7.44	0.80	9.29
20	3.68	0.77	4.76	4.86	1.01	4.80	6.80	1.16	5.88	7.17	1.03	6.94	7.82	0.87	8.98
25	4.65	0.97	4.78	5.72	1.40	4.09	6.96	1.21	5.74	7.44	1.07	6.98	8.05	0.91	8.85
30	4.69	1.17	4.02	5.67	1.45	3.92	6.67	1.32	5.06	7.25	1.20	6.05	7.85	1.06	7.44
35	4.51	1.32	3.40	5.45	1.43	3.82	6.02	1.35	4.47	6.87	1.28	5.36	7.69	1.20	6.39
40	3.10	1.15	2.70	4.30	1.42	3.03	5.15	1.40	3.68	5.95	1.37	4.34	7.15	1.32	5.41
43	2.12	0.91	2.33	2.99	1.15	2.59	4.04	1.18	3.43	5.04	1.25	4.04	5.97	1.15	5.18
Minimum															
DB	LWT (°C)														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	2.48	0.20	12.60	2.87	0.23	12.38	3.21	0.20	15.83
0	/	/	/	/	/	/	2.37	0.24	9.92	2.77	0.27	10.09	3.11	0.23	13.40
5	/	/	/	/	/	/	1.74	0.24	7.35	2.06	0.27	7.76	2.35	0.23	10.17
10	/	/	/	/	/	/	2.70	0.39	6.99	2.90	0.37	7.91	3.21	0.31	10.39
15	/	/	/	2.32	0.35	6.64	3.64	0.58	6.29	3.50	0.45	7.80	4.25	0.41	10.32
20	1.86	0.38	4.95	2.13	0.43	5.00	3.38	0.54	6.23	3.95	0.54	7.32	4.44	0.47	9.50
25	2.23	0.46	4.89	2.37	0.55	4.29	3.29	0.54	6.04	3.92	0.53	7.33	4.38	0.47	9.28
30	2.23	0.54	4.10	2.33	0.57	4.11	3.12	0.59	5.30	3.79	0.59	6.38	4.23	0.55	7.72
35	2.05	0.59	3.50	2.53	0.63	4.00	3.01	0.63	4.79	3.66	0.63	5.81	4.23	0.62	6.84
40	1.40	0.52	2.69	2.01	0.64	3.12	2.52	0.66	3.82	3.18	0.71	4.50	4.07	0.74	5.51
43	0.73	0.31	2.38	1.43	0.53	2.68	2.11	0.59	3.57	2.57	0.62	4.17	3.80	0.71	5.38

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.9: SMHM-60B/3 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	5.27	0.59	8.93	6.38	0.55	11.53	6.77	0.64	10.62
0	/	/	/	/	/	/	5.05	0.69	7.28	6.16	0.66	9.39	6.55	0.74	8.85
5	/	/	/	/	/	/	4.55	0.79	5.74	5.66	0.76	7.48	6.05	0.84	7.20
10	/	/	/	/	/	/	6.32	1.13	5.61	6.90	1.01	6.83	7.45	0.95	7.88
15	/	/	/	5.89	1.10	5.33	8.09	1.46	5.55	8.14	1.26	6.44	8.85	1.05	8.43
20	5.41	1.38	3.93	6.63	1.43	4.62	8.16	1.49	5.47	8.33	1.30	6.42	8.98	1.10	8.15
25	7.16	1.80	3.98	7.37	1.77	4.17	8.23	1.53	5.39	8.52	1.33	6.40	9.12	1.15	7.90
30	6.50	1.85	3.51	7.29	1.90	3.84	7.77	1.65	4.72	8.19	1.46	5.63	8.77	1.30	6.75
35	5.84	1.90	3.07	7.22	2.03	3.55	7.31	1.76	4.15	7.87	1.58	4.98	8.43	1.44	5.84
40	3.80	1.51	2.52	5.08	1.81	2.81	5.91	1.73	3.41	6.63	1.68	3.95	7.88	1.64	4.80
43	2.58	1.15	2.24	3.80	1.52	2.51	5.08	1.56	3.26	5.88	1.57	3.74	7.55	1.59	4.73
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	4.24	0.42	10.18	5.19	0.38	13.72	5.50	0.42	12.96
0	/	/	/	/	/	/	4.07	0.48	8.48	5.02	0.44	11.39	5.33	0.48	11.01
5	/	/	/	/	/	/	3.64	0.58	6.31	4.54	0.53	8.61	4.91	0.58	8.49
10	/	/	/	/	/	/	5.08	0.82	6.18	5.55	0.71	7.86	6.06	0.65	9.31
15	/	/	/	4.42	0.78	5.65	6.79	1.15	5.89	7.00	0.99	7.06	7.44	0.80	9.29
20	4.22	1.02	4.14	5.36	1.08	4.96	6.80	1.16	5.88	7.17	1.03	6.94	7.82	0.87	8.98
25	5.67	1.35	4.21	6.05	1.35	4.49	6.96	1.21	5.74	7.44	1.07	6.98	8.05	0.91	8.85
30	5.23	1.40	3.74	6.08	1.48	4.10	6.67	1.32	5.06	7.25	1.20	6.05	7.85	1.06	7.44
35	4.54	1.41	3.22	5.93	1.55	3.83	6.02	1.35	4.47	6.87	1.28	5.36	7.69	1.20	6.39
40	3.10	1.15	2.70	4.30	1.42	3.03	5.15	1.40	3.68	5.95	1.37	4.34	7.15	1.32	5.41
43	2.12	0.91	2.33	2.99	1.15	2.59	4.04	1.18	3.43	5.04	1.25	4.04	5.97	1.15	5.18
Minimum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	2.75	0.25	10.92	3.35	0.23	14.26	3.57	0.27	13.17
0	/	/	/	/	/	/	2.64	0.29	9.00	3.25	0.28	11.72	3.47	0.31	11.08
5	/	/	/	/	/	/	1.96	0.28	6.95	2.46	0.27	9.16	2.64	0.30	8.84
10	/	/	/	/	/	/	2.81	0.41	6.87	3.10	0.37	8.44	3.36	0.34	9.78
15	/	/	/	2.71	0.45	5.99	3.64	0.58	6.29	3.50	0.45	7.80	4.25	0.41	10.32
20	2.13	0.50	4.30	2.35	0.45	5.17	3.38	0.54	6.23	3.95	0.54	7.32	4.44	0.47	9.50
25	2.72	0.63	4.31	2.50	0.53	4.72	3.29	0.54	6.04	3.92	0.53	7.33	4.38	0.47	9.28
30	2.48	0.65	3.81	2.49	0.58	4.30	3.12	0.59	5.30	3.79	0.59	6.38	4.23	0.55	7.72
35	2.07	0.62	3.31	2.75	0.69	4.00	3.01	0.63	4.79	3.66	0.63	5.81	4.23	0.62	6.84
40	1.40	0.52	2.69	2.01	0.64	3.12	2.52	0.66	3.82	3.18	0.71	4.50	4.07	0.74	5.51
43	0.73	0.31	2.38	1.43	0.53	2.68	2.11	0.59	3.57	2.57	0.62	4.17	3.80	0.71	5.38

Abbreviations:
LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.10: SMHM-80B/3 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	6.39	0.63	10.07	8.21	0.76	10.82	8.74	0.71	12.31
0	/	/	/	/	/	/	6.17	0.71	8.69	7.26	0.74	9.76	7.76	0.70	11.05
5	/	/	/	/	/	/	5.96	0.82	7.30	6.30	0.72	8.69	6.78	0.69	9.78
10	/	/	/	/	/	/	6.29	0.74	8.54	7.91	0.84	9.45	8.30	0.79	10.53
15	/	/	/	5.97	0.87	6.84	7.33	0.99	7.38	9.11	1.15	7.94	9.73	1.12	8.67
20	5.68	1.15	4.96	7.06	1.29	5.46	8.38	1.35	6.22	10.31	1.60	6.43	11.15	1.64	6.81
25	6.47	1.48	4.36	7.82	1.63	4.81	9.26	1.68	5.52	11.25	1.90	5.92	12.76	2.02	6.33
30	7.27	1.89	3.85	8.57	2.01	4.25	10.15	2.06	4.93	12.20	2.20	5.54	14.36	2.40	6.00
35	7.39	2.25	3.28	8.77	2.31	3.80	10.21	2.31	4.43	11.74	2.40	4.89	13.59	2.50	5.42
40	6.61	2.52	2.62	7.42	2.37	3.14	8.88	2.53	3.51	10.23	2.51	4.07	12.27	2.83	4.34
43	5.09	2.28	2.23	5.64	2.19	2.58	6.73	2.13	3.16	8.15	2.17	3.75	10.04	2.49	4.03
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	5.14	0.45	11.38	6.68	0.53	12.50	7.10	0.51	14.03
0	/	/	/	/	/	/	4.98	0.50	9.94	5.91	0.52	11.31	6.31	0.49	12.86
5	/	/	/	/	/	/	4.77	0.60	7.96	5.05	0.52	9.69	5.50	0.51	10.76
10	/	/	/	/	/	/	5.05	0.54	9.32	6.37	0.60	10.55	6.75	0.58	11.60
15	/	/	/	4.48	0.62	7.24	6.16	0.79	7.83	7.83	0.90	8.70	8.17	0.86	9.55
20	4.43	0.85	5.21	5.71	0.97	5.86	6.99	1.04	6.69	8.87	1.28	6.95	9.71	1.29	7.50
25	5.13	1.11	4.61	6.42	1.24	5.17	7.84	1.33	5.87	9.82	1.52	6.46	11.26	1.59	7.09
30	5.84	1.42	4.10	7.14	1.57	4.54	8.71	1.65	5.28	10.80	1.82	5.94	12.86	1.95	6.61
35	5.75	1.67	3.45	7.20	1.76	4.09	8.42	1.76	4.77	10.25	1.95	5.26	12.39	2.09	5.94
40	5.40	1.92	2.81	6.27	1.86	3.38	7.73	2.04	3.79	9.18	2.06	4.47	11.14	2.28	4.89
43	4.18	1.80	2.32	4.44	1.66	2.67	5.36	1.61	3.32	6.98	1.72	4.06	7.94	1.80	4.41
Minimum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	3.33	0.28	11.86	4.31	0.33	12.89	4.60	0.31	14.71
0	/	/	/	/	/	/	3.23	0.31	10.38	3.83	0.32	11.79	4.11	0.31	13.34
5	/	/	/	/	/	/	2.57	0.30	8.55	2.74	0.27	10.29	2.96	0.26	11.57
10	/	/	/	/	/	/	2.80	0.28	10.11	3.56	0.31	11.31	3.75	0.30	12.59
15	/	/	/	2.75	0.36	7.69	3.30	0.39	8.37	3.92	0.41	9.62	4.67	0.44	10.61
20	2.24	0.41	5.42	2.50	0.41	6.12	3.47	0.49	7.09	4.88	0.67	7.33	5.51	0.69	7.93
25	2.46	0.52	4.73	2.66	0.49	5.43	3.71	0.60	6.18	5.18	0.76	6.78	6.12	0.82	7.44
30	2.78	0.66	4.19	2.93	0.62	4.76	4.08	0.74	5.53	5.64	0.90	6.28	6.92	1.01	6.86
35	2.62	0.74	3.54	3.34	0.78	4.28	4.21	0.82	5.12	5.46	0.96	5.70	6.82	1.07	6.36
40	2.44	0.87	2.80	2.94	0.84	3.48	3.79	0.97	3.93	4.91	1.06	4.64	6.34	1.28	4.97
43	1.43	0.60	2.37	2.12	0.77	2.76	2.80	0.81	3.46	3.55	0.85	4.18	5.06	1.11	4.58

Abbreviations:
LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.11: SMHM-100B/3 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	6.83	0.69	9.92	8.79	0.82	10.66	9.35	0.77	12.13
0	/	/	/	/	/	/	6.61	0.77	8.56	7.76	0.81	9.61	8.30	0.76	10.88
5	/	/	/	/	/	/	6.38	0.89	7.19	6.74	0.79	8.56	7.25	0.75	9.63
10	/	/	/	/	/	/	6.55	0.75	8.73	8.17	0.80	10.18	8.80	0.86	10.22
15	/	/	/	6.30	1.07	5.89	7.61	1.03	7.35	9.48	1.13	8.38	10.64	1.20	8.84
20	6.20	1.28	4.86	7.19	1.39	5.17	8.67	1.45	5.97	10.79	1.64	6.57	12.49	1.68	7.45
25	7.13	1.68	4.24	8.26	1.81	4.56	9.87	1.88	5.24	12.00	2.07	5.79	13.93	2.17	6.42
30	8.06	2.17	3.71	9.34	2.31	4.05	11.08	2.40	4.62	13.21	2.57	5.14	15.37	2.79	5.51
35	8.13	2.48	3.12	9.48	2.43	3.72	11.03	2.62	4.21	12.70	2.68	4.73	14.51	2.87	5.06
40	6.61	2.52	2.62	7.42	2.37	3.14	8.88	2.53	3.51	10.23	2.51	4.07	12.27	2.83	4.34
43	5.09	2.28	2.23	5.64	2.19	2.58	6.73	2.13	3.16	8.15	2.17	3.75	10.04	2.49	4.03
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	5.50	0.49	11.21	7.15	0.58	12.31	7.59	0.55	13.82
0	/	/	/	/	/	/	5.33	0.54	9.79	6.33	0.57	11.14	6.75	0.53	12.66
5	/	/	/	/	/	/	5.11	0.65	7.84	5.41	0.57	9.54	5.88	0.56	10.60
10	/	/	/	/	/	/	5.26	0.55	9.53	6.58	0.58	11.37	7.16	0.64	11.26
15	/	/	/	4.73	0.76	6.24	6.39	0.82	7.80	8.15	0.89	9.18	8.94	0.92	9.74
20	4.83	0.95	5.11	5.82	1.05	5.55	7.23	1.13	6.42	9.29	1.31	7.10	10.87	1.32	8.21
25	5.65	1.26	4.49	6.78	1.38	4.91	8.35	1.50	5.58	10.47	1.66	6.32	12.30	1.71	7.18
30	6.48	1.64	3.95	7.78	1.80	4.32	9.51	1.92	4.95	11.69	2.12	5.51	13.76	2.26	6.08
35	6.31	1.93	3.28	7.78	1.94	4.01	9.09	2.01	4.53	11.08	2.18	5.09	13.23	2.39	5.54
40	5.40	1.92	2.81	6.27	1.86	3.38	7.73	2.04	3.79	9.18	2.06	4.47	11.14	2.28	4.89
43	4.18	1.80	2.32	4.44	1.66	2.67	5.36	1.61	3.32	6.98	1.72	4.06	7.94	1.80	4.41
Minimum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	3.56	0.30	11.68	4.61	0.36	12.69	4.93	0.34	14.49
0	/	/	/	/	/	/	3.46	0.34	10.23	4.09	0.35	11.61	4.39	0.33	13.14
5	/	/	/	/	/	/	2.75	0.33	8.42	2.93	0.29	10.13	3.17	0.28	11.40
10	/	/	/	/	/	/	2.92	0.28	10.33	3.67	0.30	12.18	3.97	0.33	12.22
15	/	/	/	2.90	0.44	6.62	3.42	0.41	8.33	4.08	0.40	10.14	5.11	0.47	10.81
20	2.44	0.46	5.31	2.55	0.44	5.79	3.59	0.53	6.81	5.11	0.68	7.49	6.17	0.71	8.68
25	2.71	0.59	4.60	2.81	0.55	5.15	3.95	0.67	5.88	5.52	0.83	6.64	6.69	0.89	7.54
30	3.08	0.76	4.03	3.19	0.70	4.53	4.45	0.86	5.19	6.10	1.05	5.82	7.41	1.18	6.30
35	2.88	0.85	3.37	3.61	0.86	4.19	4.55	0.94	4.86	5.90	1.07	5.52	7.28	1.23	5.93
40	2.44	0.87	2.80	2.94	0.84	3.48	3.79	0.97	3.93	4.91	1.06	4.64	6.34	1.28	4.97
43	1.43	0.60	2.37	2.12	0.77	2.76	2.80	0.81	3.46	3.55	0.85	4.18	5.06	1.11	4.58

Abbreviations:
LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.12: SMHM-120B/3, SMHM-120B-3/9 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	9.55	1.27	7.50	10.39	1.41	7.37	11.39	1.36	8.35
0	/	/	/	/	/	/	9.33	1.57	5.93	10.90	1.49	7.32	11.89	1.50	7.92
5	/	/	/	/	/	/	9.12	1.71	5.32	11.41	1.57	7.27	12.38	1.64	7.57
10	/	/	/	/	/	/	10.81	2.05	5.27	13.14	1.92	6.85	14.18	1.94	7.32
15	/	/	/	10.51	2.32	4.53	12.50	2.33	5.36	14.87	2.27	6.56	15.98	2.24	7.14
20	7.78	2.03	3.83	12.15	2.96	4.10	14.16	3.12	4.54	15.93	3.14	5.08	16.53	2.84	5.82
25	10.10	3.00	3.37	13.80	3.61	3.82	15.82	3.91	4.04	17.00	4.01	4.24	17.07	3.44	4.96
30	9.99	3.58	2.79	13.43	4.13	3.25	15.18	4.17	3.64	16.17	4.15	3.90	16.11	3.74	4.31
35	9.89	4.52	2.19	13.07	4.90	2.67	14.53	4.56	3.19	15.34	4.38	3.51	15.26	4.00	3.81
40	8.11	4.53	1.79	9.87	4.33	2.28	10.67	3.92	2.72	12.19	4.05	3.01	13.23	3.77	3.51
43	5.20	3.72	1.40	6.11	3.26	1.87	7.33	3.02	2.43	8.53	3.19	2.67	10.68	3.26	3.27
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	7.69	0.91	8.47	8.46	0.99	8.51	9.25	0.97	9.52
0	/	/	/	/	/	/	7.53	1.11	6.78	8.89	1.05	8.48	9.67	1.05	9.22
5	/	/	/	/	/	/	7.30	1.26	5.80	9.16	1.13	8.10	10.05	1.21	8.32
10	/	/	/	/	/	/	8.68	1.51	5.75	10.57	1.38	7.65	11.54	1.43	8.07
15	/	/	/	7.88	1.62	4.86	10.50	1.80	5.82	12.78	1.74	7.36	13.43	1.67	8.05
20	6.07	1.51	4.02	9.83	2.20	4.46	11.81	2.36	4.99	13.71	2.44	5.61	14.39	2.19	6.56
25	8.00	2.24	3.56	11.33	2.71	4.17	13.39	3.04	4.41	14.84	3.14	4.73	15.07	2.65	5.68
30	8.04	2.71	2.97	11.19	3.18	3.52	13.03	3.27	3.99	14.31	3.34	4.28	14.43	2.97	4.86
35	7.68	3.34	2.30	10.73	3.69	2.91	11.97	3.41	3.51	13.39	3.47	3.86	13.91	3.26	4.27
40	6.62	3.45	1.92	8.35	3.35	2.49	9.28	3.09	3.00	10.94	3.24	3.38	12.00	2.97	4.05
43	4.27	2.93	1.45	4.80	2.44	1.97	5.83	2.23	2.61	7.30	2.47	2.96	8.44	2.30	3.66
Minimum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	4.98	0.56	8.83	5.46	0.62	8.78	6.00	0.60	9.98
0	/	/	/	/	/	/	4.88	0.69	7.09	5.75	0.65	8.84	6.29	0.66	9.56
5	/	/	/	/	/	/	3.93	0.63	6.23	4.96	0.58	8.61	5.41	0.60	8.95
10	/	/	/	/	/	/	4.81	0.77	6.24	5.91	0.72	8.20	6.40	0.73	8.75
15	/	/	/	4.83	0.94	5.16	5.63	0.91	6.22	6.39	0.79	8.11	7.67	0.86	8.92
20	3.07	0.73	4.18	4.30	0.92	4.65	5.86	1.11	5.29	7.55	1.28	5.92	8.16	1.18	6.93
25	3.84	1.05	3.65	4.69	1.07	4.38	6.33	1.36	4.64	7.82	1.58	4.96	8.19	1.38	5.95
30	3.82	1.26	3.03	4.59	1.25	3.68	6.10	1.46	4.17	7.47	1.65	4.51	7.77	1.54	5.04
35	3.50	1.48	2.36	4.98	1.64	3.04	5.99	1.59	3.76	7.13	1.71	4.18	7.66	1.68	4.56
40	2.99	1.56	1.91	3.91	1.53	2.56	4.55	1.46	3.11	5.85	1.67	3.50	6.83	1.66	4.12
43	1.46	0.98	1.48	2.30	1.13	2.03	3.05	1.12	2.72	3.72	1.22	3.04	5.38	1.42	3.80

Abbreviations:
LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.13: SMHM-140B/3, SMHM-140B-3/9 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	10.0	1.32	7.57	10.9	1.47	7.44	12.0	1.42	8.43
0	/	/	/	/	/	/	9.80	1.67	5.87	11.4	1.58	7.24	12.5	1.59	7.84
5	/	/	/	/	/	/	9.57	1.76	5.44	12.0	1.61	7.43	13.0	1.68	7.73
10	/	/	/	/	/	/	11.3	2.18	5.21	13.1	1.92	6.85	14.2	1.94	7.32
15	/	/	/	11.0	2.32	4.60	13.1	2.32	5.45	15.5	2.32	6.67	16.4	2.32	7.26
20	8.17	2.17	3.77	12.8	3.16	4.04	14.9	3.33	4.47	15.9	3.14	5.08	16.5	2.84	5.82
25	10.6	3.19	3.32	14.5	3.84	3.77	16.6	4.16	3.99	17.0	4.01	4.24	17.1	3.44	4.96
30	10.5	3.96	2.65	14.1	4.53	3.11	15.9	4.56	3.49	16.2	4.18	3.87	16.1	3.74	4.31
35	10.4	4.81	2.16	13.7	5.32	2.58	15.3	4.88	3.13	15.3	4.44	3.45	15.3	4.12	3.71
40	8.11	4.53	1.79	9.87	4.33	2.28	10.7	3.92	2.72	12.2	4.05	3.01	13.2	3.77	3.51
43	5.20	3.72	1.40	6.11	3.26	1.87	7.33	3.02	2.43	8.53	3.19	2.67	10.7	3.26	3.27
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	8.07	0.94	8.56	8.88	1.03	8.60	9.72	1.01	9.61
0	/	/	/	/	/	/	7.90	1.18	6.71	9.33	1.11	8.39	10.2	1.11	9.13
5	/	/	/	/	/	/	7.67	1.29	5.93	9.61	1.16	8.28	10.6	1.24	8.50
10	/	/	/	/	/	/	9.12	1.60	5.69	10.6	1.38	7.65	11.5	1.43	8.07
15	/	/	/	8.24	1.67	4.94	11.0	1.85	5.92	13.4	1.79	7.48	13.8	1.68	8.19
20	6.37	1.61	3.96	10.3	2.35	4.40	12.4	2.52	4.92	13.7	2.44	5.61	14.4	2.19	6.56
25	8.40	2.39	3.52	11.9	2.89	4.12	14.1	3.23	4.35	14.8	3.14	4.73	15.1	2.65	5.68
30	8.44	2.99	2.82	11.8	3.49	3.37	13.7	3.57	3.83	14.3	3.37	4.25	14.4	2.97	4.86
35	8.07	3.56	2.27	11.3	4.00	2.81	12.6	3.65	3.45	13.4	3.52	3.80	13.9	3.35	4.15
40	6.62	3.45	1.92	8.35	3.35	2.49	9.28	3.09	3.00	10.9	3.24	3.38	12.0	2.97	4.05
43	4.27	2.93	1.45	4.80	2.44	1.97	5.83	2.23	2.61	7.30	2.47	2.96	8.44	2.30	3.66
Minimum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	5.22	0.59	8.92	5.73	0.65	8.86	6.30	0.63	10.08
0	/	/	/	/	/	/	5.13	0.73	7.01	6.04	0.69	8.75	6.61	0.70	9.47
5	/	/	/	/	/	/	4.12	0.65	6.37	5.21	0.59	8.80	5.68	0.62	9.15
10	/	/	/	/	/	/	5.06	0.82	6.16	5.91	0.72	8.20	6.40	0.73	8.75
15	/	/	/	5.05	0.96	5.24	5.88	0.93	6.32	6.68	0.81	8.25	7.86	0.87	9.07
20	3.22	0.78	4.12	4.52	0.99	4.58	6.16	1.18	5.21	7.55	1.28	5.92	8.16	1.18	6.93
25	4.03	1.12	3.60	4.93	1.14	4.32	6.65	1.45	4.58	7.82	1.58	4.96	8.19	1.38	5.95
30	4.01	1.39	2.88	4.82	1.37	3.53	6.41	1.60	4.01	7.47	1.67	4.48	7.77	1.54	5.04
35	3.67	1.58	2.33	5.23	1.78	2.94	6.29	1.70	3.69	7.13	1.73	4.11	7.66	1.73	4.44
40	2.99	1.56	1.91	3.91	1.53	2.56	4.55	1.46	3.11	5.85	1.67	3.50	6.83	1.66	4.12
43	1.46	0.98	1.48	2.30	1.13	2.03	3.05	1.12	2.72	3.72	1.22	3.04	5.38	1.42	3.80

Abbreviations:
LWT: Leaving water temperature (°C)

DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

Table 2-5.14: SMHM-160B/3, SMHM-160B-3/9 cooling capacity

Maximum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	10.0	1.32	7.57	10.9	1.47	7.44	12.0	1.42	8.43
0	/	/	/	/	/	/	9.80	1.67	5.87	11.4	1.58	7.24	12.5	1.59	7.84
5	/	/	/	/	/	/	9.57	1.76	5.44	12.0	1.61	7.43	13.0	1.68	7.73
10	/	/	/	/	/	/	11.3	2.18	5.21	13.1	1.92	6.85	14.2	1.94	7.32
15	/	/	/	11.4	2.43	4.67	13.5	2.44	5.53	16.1	2.37	6.77	17.0	2.30	7.37
20	8.99	2.43	3.70	14.0	3.55	3.96	15.8	3.56	4.42	16.9	3.36	5.03	17.5	3.04	5.76
25	11.7	3.59	3.25	15.9	4.32	3.69	17.4	4.47	3.90	17.9	4.31	4.14	17.9	3.70	4.84
30	11.5	4.46	2.59	15.5	5.11	3.04	17.2	5.05	3.41	17.1	4.66	3.68	16.9	4.02	4.21
35	11.4	5.42	2.11	15.1	6.00	2.52	16.5	5.60	2.94	16.3	4.96	3.27	16.2	4.47	3.62
40	8.92	5.11	1.75	10.9	4.89	2.22	11.7	4.42	2.65	13.4	4.69	2.86	14.6	4.36	3.34
43	5.98	4.50	1.33	7.33	4.12	1.78	9.01	3.91	2.31	10.5	4.13	2.54	12.0	3.85	3.11
Normal															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	8.07	0.94	8.56	8.88	1.03	8.60	9.72	1.01	9.61
0	/	/	/	/	/	/	7.90	1.18	6.71	9.33	1.11	8.39	10.2	1.11	9.13
5	/	/	/	/	/	/	7.67	1.29	5.93	9.61	1.16	8.28	10.6	1.24	8.50
10	/	/	/	/	/	/	9.12	1.60	5.69	10.6	1.38	7.65	11.5	1.43	8.07
15	/	/	/	8.52	1.70	5.02	11.4	1.89	6.01	13.8	1.82	7.59	14.2	1.71	8.31
20	7.01	1.80	3.88	11.4	2.63	4.31	13.1	2.70	4.87	14.5	2.62	5.56	15.3	2.35	6.49
25	9.24	2.69	3.43	13.1	3.25	4.02	14.8	3.47	4.25	15.6	3.37	4.62	15.8	2.85	5.55
30	9.28	3.37	2.75	12.9	3.93	3.29	14.8	3.95	3.74	15.2	3.75	4.04	15.1	3.19	4.75
35	8.87	4.01	2.21	12.4	4.51	2.75	13.6	4.19	3.24	14.2	3.94	3.60	14.7	3.64	4.05
40	7.28	3.89	1.87	9.18	3.78	2.43	10.2	3.49	2.93	12.0	3.75	3.21	13.2	3.43	3.84
43	4.91	3.55	1.38	5.76	3.08	1.87	7.17	2.89	2.48	8.98	3.20	2.81	9.46	2.72	3.48
Minimum															
DB	LWT														
	5			10			15			20			25		
	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER	CC	PI	EER
-5	/	/	/	/	/	/	5.22	0.59	8.92	5.73	0.65	8.86	6.30	0.63	10.08
0	/	/	/	/	/	/	5.13	0.73	7.01	6.04	0.69	8.75	6.61	0.70	9.47
5	/	/	/	/	/	/	4.12	0.65	6.37	5.21	0.59	8.80	5.68	0.62	9.15
10	/	/	/	/	/	/	5.06	0.82	6.16	5.91	0.72	8.20	6.40	0.73	8.75
15	/	/	/	5.23	0.98	5.32	6.08	0.95	6.41	6.91	0.83	8.37	8.14	0.88	9.21
20	3.54	0.88	4.04	4.97	1.11	4.49	6.53	1.27	5.15	8.01	1.37	5.86	8.65	1.26	6.86
25	4.43	1.26	3.52	5.42	1.28	4.22	6.98	1.56	4.47	8.21	1.69	4.85	8.60	1.48	5.81
30	4.41	1.57	2.81	5.31	1.54	3.44	6.92	1.77	3.91	7.92	1.86	4.26	8.15	1.66	4.92
35	4.04	1.78	2.27	5.75	2.00	2.87	6.79	1.96	3.47	7.56	1.94	3.90	8.12	1.87	4.33
40	3.29	1.76	1.86	4.30	1.72	2.50	5.01	1.65	3.03	6.43	1.93	3.33	7.52	1.92	3.91
43	1.68	1.19	1.41	2.76	1.43	1.93	3.75	1.45	2.58	4.57	1.58	2.89	6.03	1.67	3.61

Abbreviations:
LWT: Leaving water temperature (°C)
DB: Dry-bulb temperature for Outdoor air temperature (°C)
CC: Total cooling capacity (kW)
PI: Power input (kW)

27 Operating Limits

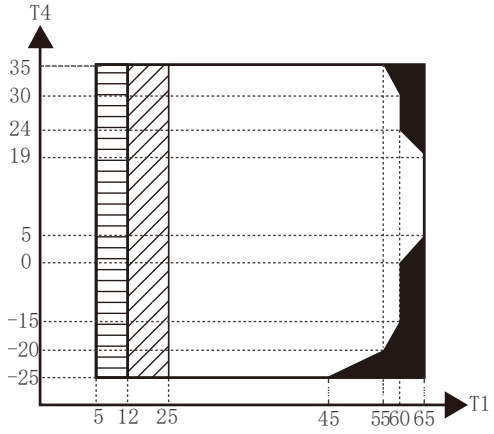


Figure 2-6.1: Heating operating limits[1]

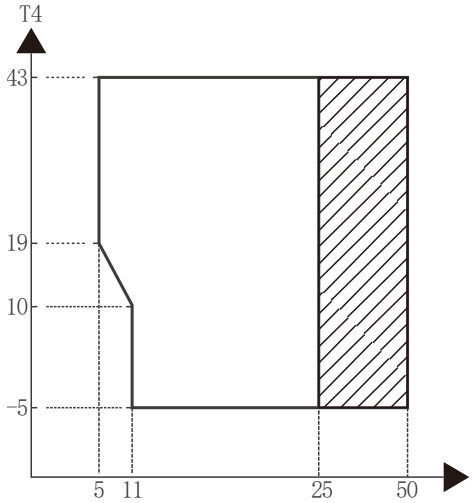


Figure 2-6.2: Cooling operating limits

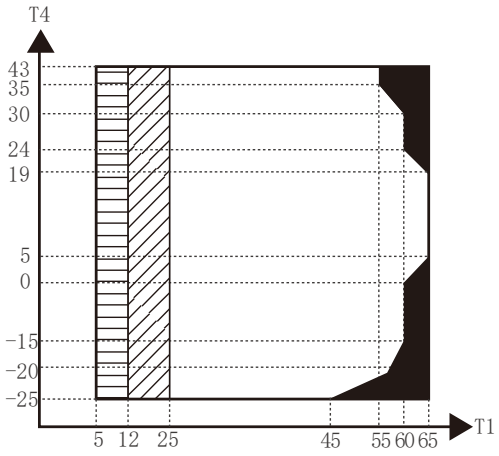


Figure 2-6.3: Domestic hot water operating limits[1]

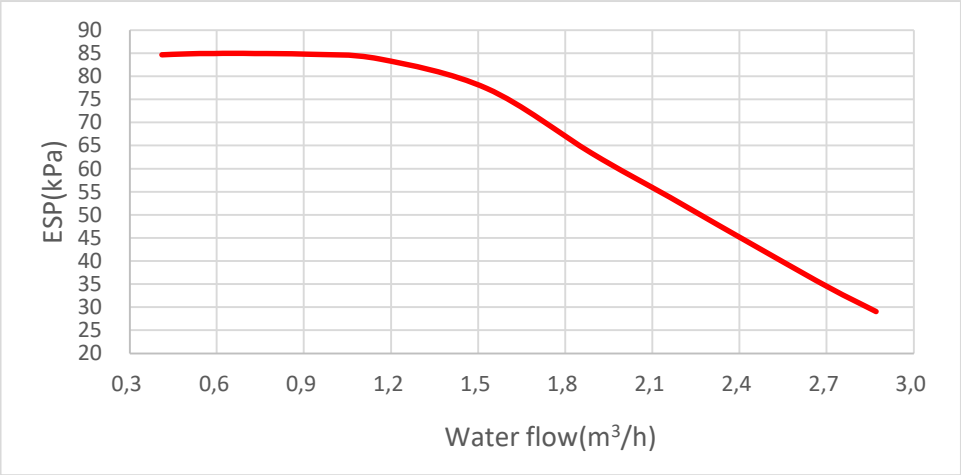
Abbreviations:
T4: Outdoor temperature(°C)
T1: Leaving water temperature (°C)
IBH: Backup electric heater
AHS: Additional heat source

Notes:
1. ■ IBH/AHS only
2. ▨ Water flow temperature drops or rises interval
3. ▤ If IBH/AHS setting is valid, only IBH/AHS turns on; If IBH/AHS setting is invalid, only heat pump turns on

28 Hydronic Performance

SMHM-40B/3 / SMHM-60B/3 / SMHM-80B/3 / SMHM-100B/3

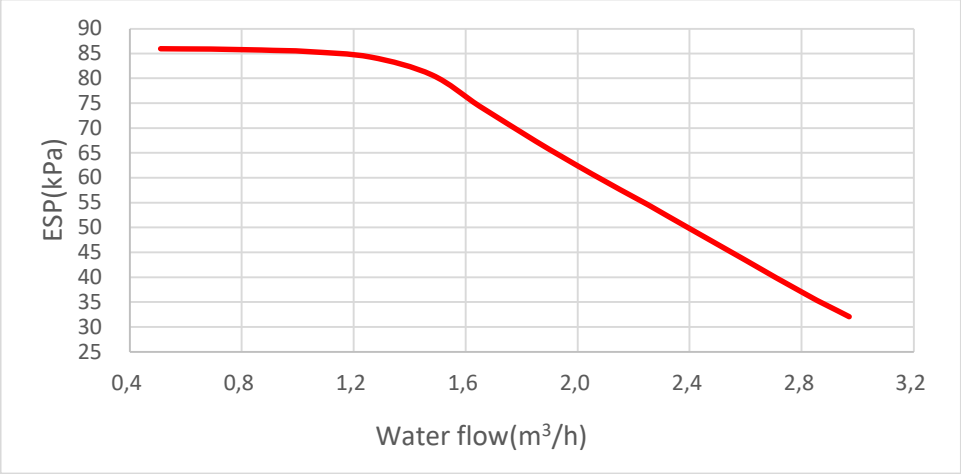
Figure 2-7.1: hydronic performance[1]



Abbreviations:
ESP: External static pressure

SMHM-120B/3 / SMHM-140B/3 / SMHM-160B/3
SMHM-120B-3/9 / SMHM-140B-3/9 / SMHM-160B-3/9

Figure 2-7.2: hydronic performance [1]



Abbreviations:
ESP: External static pressure

29 Sound Levels

29.1 Overall

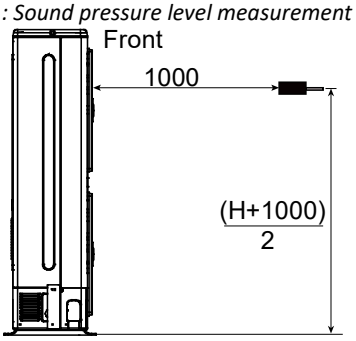
Table 2-8.1: Sound pressure levels[1]

Model name	dB [2]
SMHM-40B/3	45.0
SMHM-60B/3	47.5
SMHM-80B/3	48.5
SMHM-100B/3	50.5
SMHM-120B/3	53.0
SMHM-140B/3	53.5
SMHM-160B/3	57.5
SMHM-120B-3/9	53.5
SMHM-140B-3/9	54.0
SMHM-160B-3/9	58.0

Notes:

1. Sound pressure level is measured at a position 1m in front of the unit and (1+H)/2m (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 is the maximum value tested under the conditions below:
   Outdoor air temperature 7°C DB, 85% R.H.; EWT 30°C, LWT 35°C. Free compressor frequency.
   Outdoor air temperature 7°C DB, 85% R.H.; EWT 47°C, LWT 55°C. Free compressor frequency.

29.2 Octave Band Levels

Figure 2-8.2: SMHM-40B/3 octave band levels

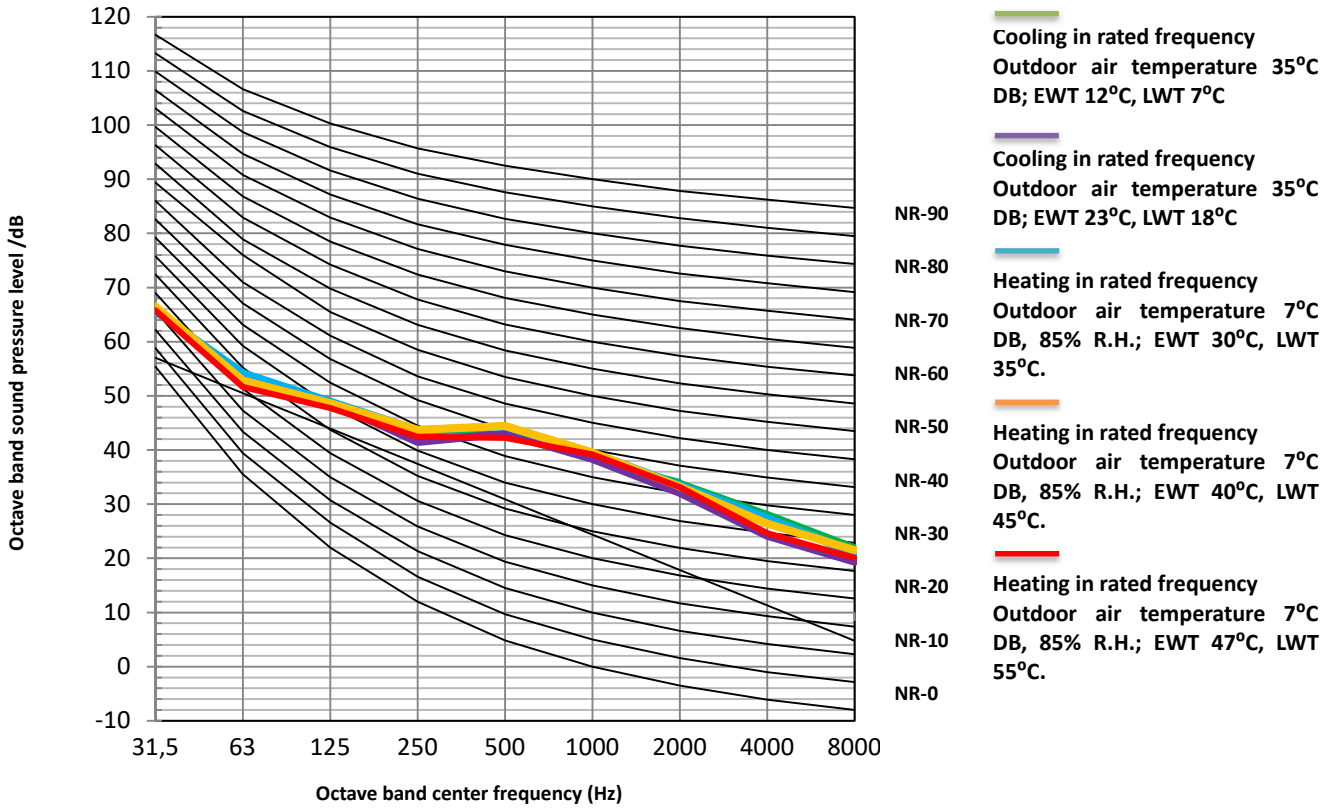


Figure 2-8.3: SMHM-60B/3 octave band levels

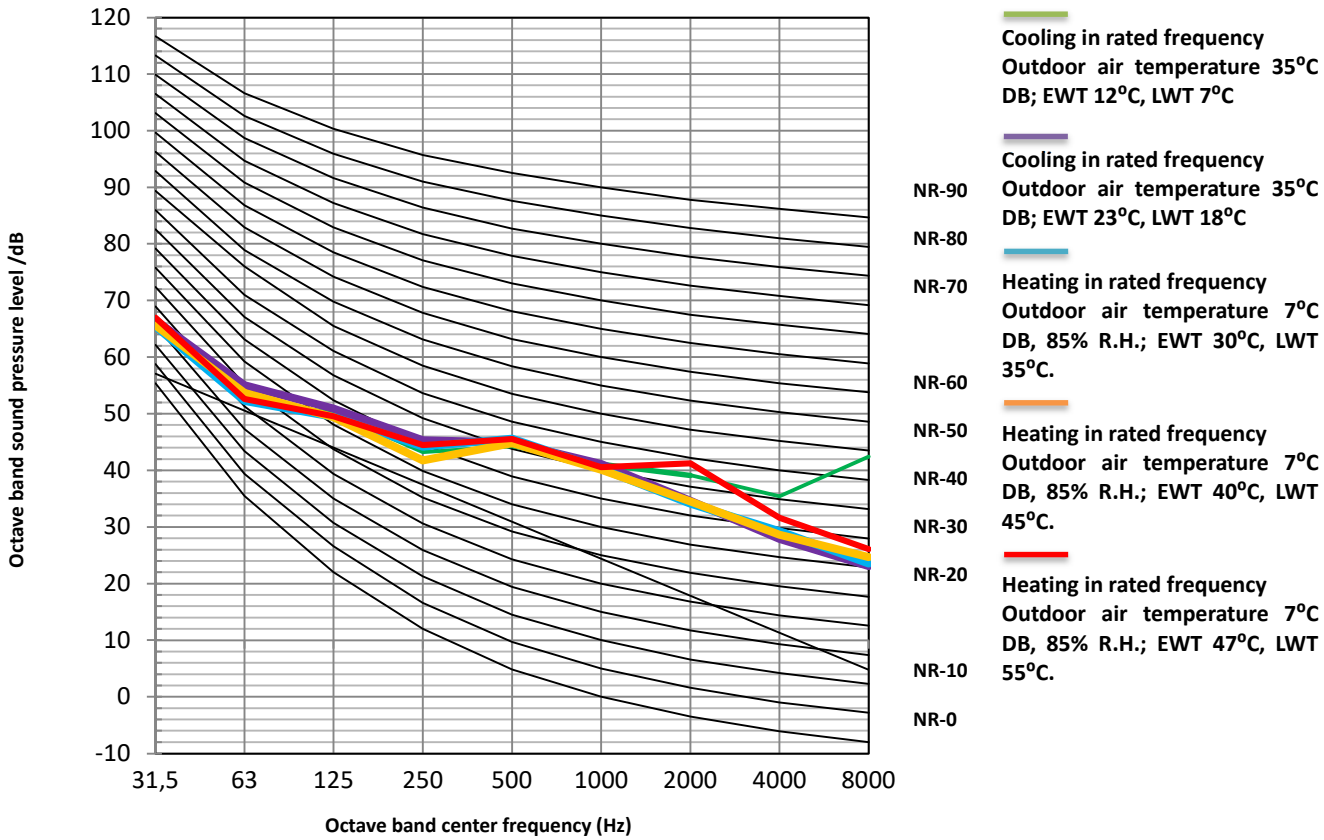


Figure 2-8.4: SMHM-80B/3 octave band levels

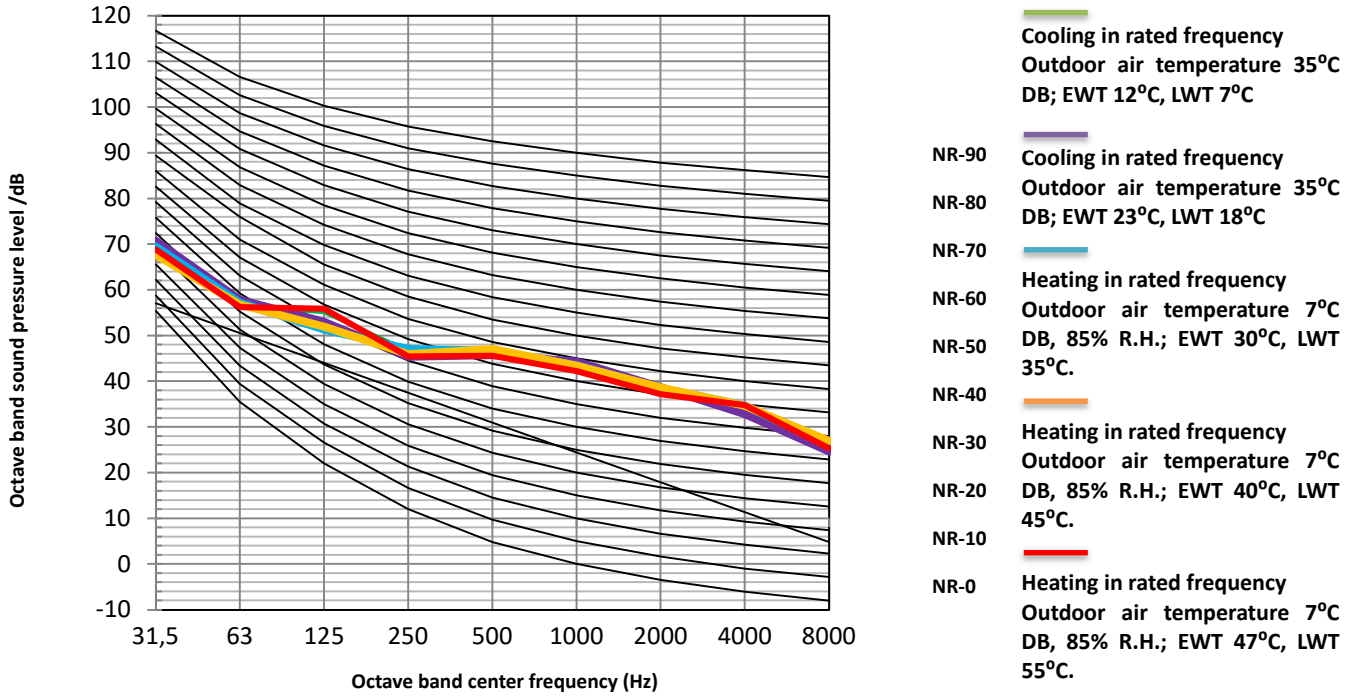


Figure 2-8.5: SMHM-100B/3 octave band levels

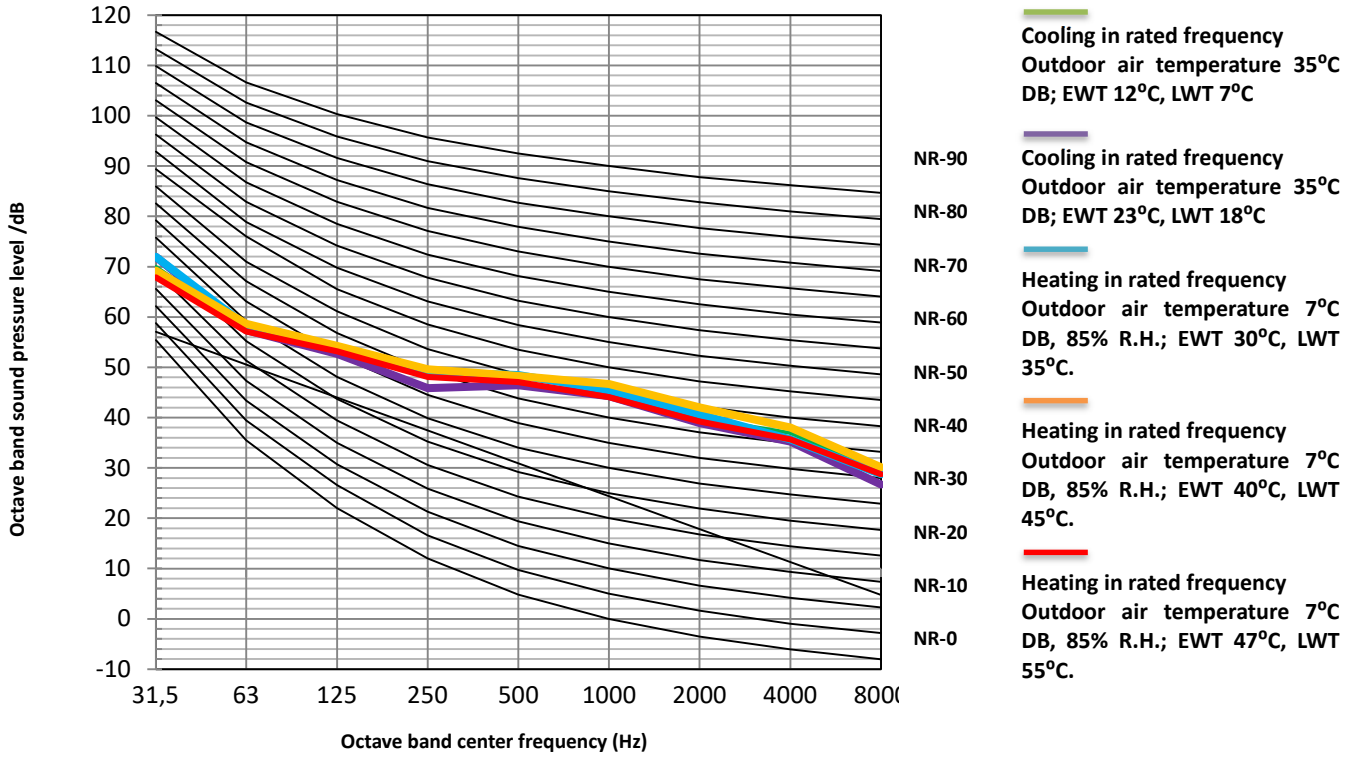


Figure 2-8.6: SMHM-120B/3 octave band levels

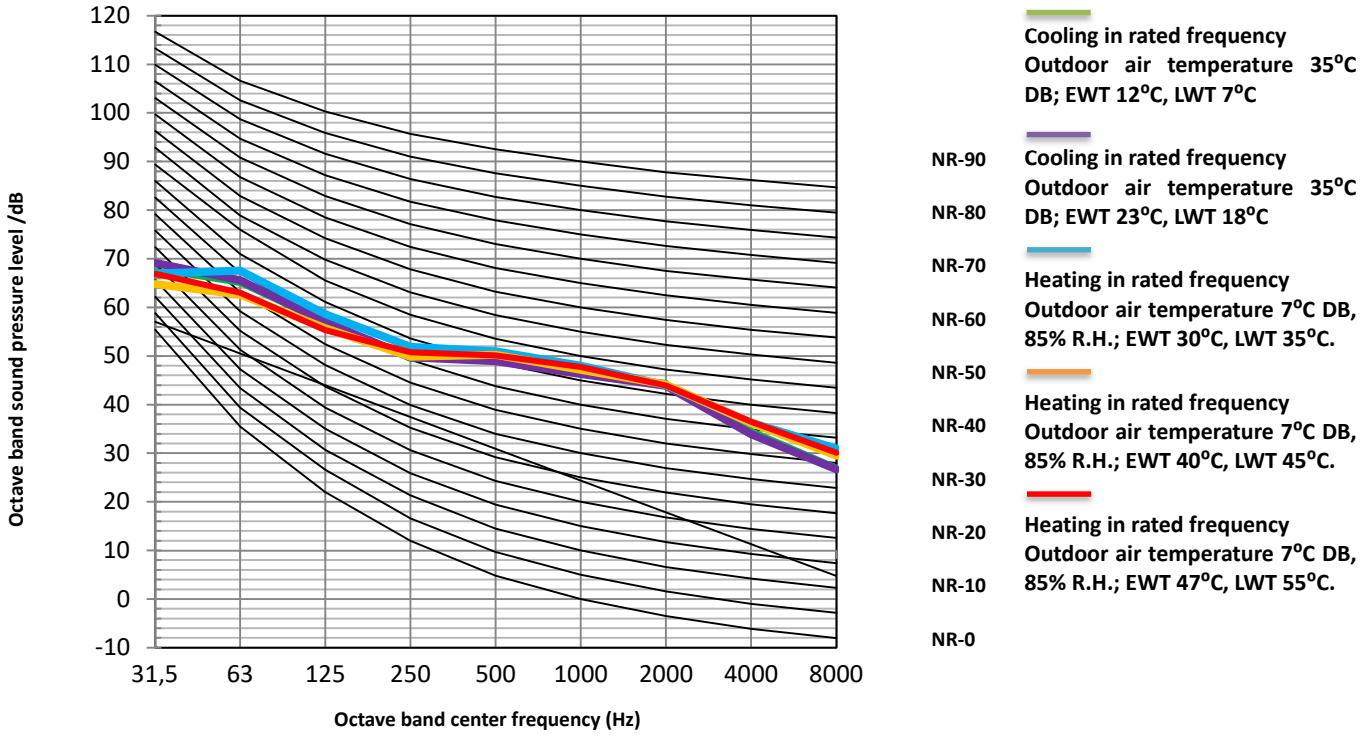


Figure 2-8.7: SMHM-140B/3 octave band levels

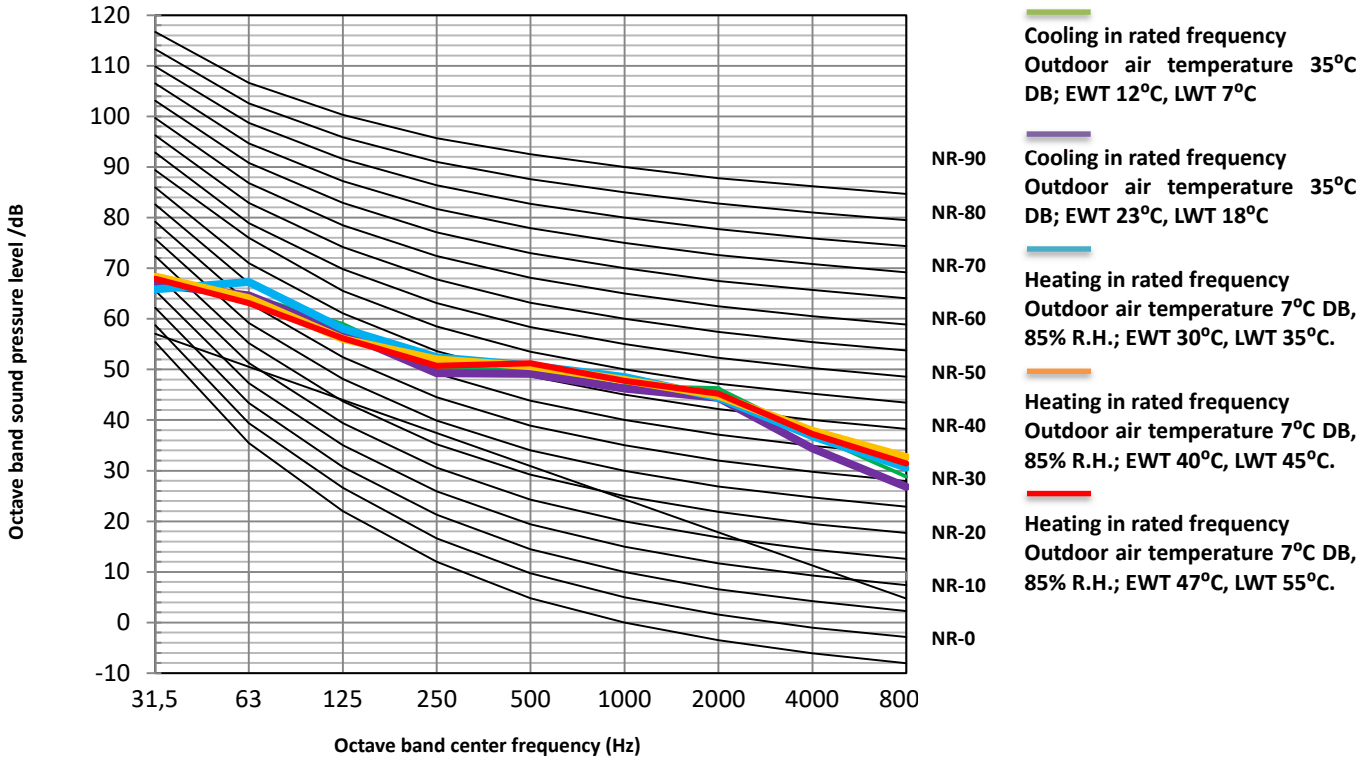


Figure 2-8.8: SMHM-160B/3 octave band levels

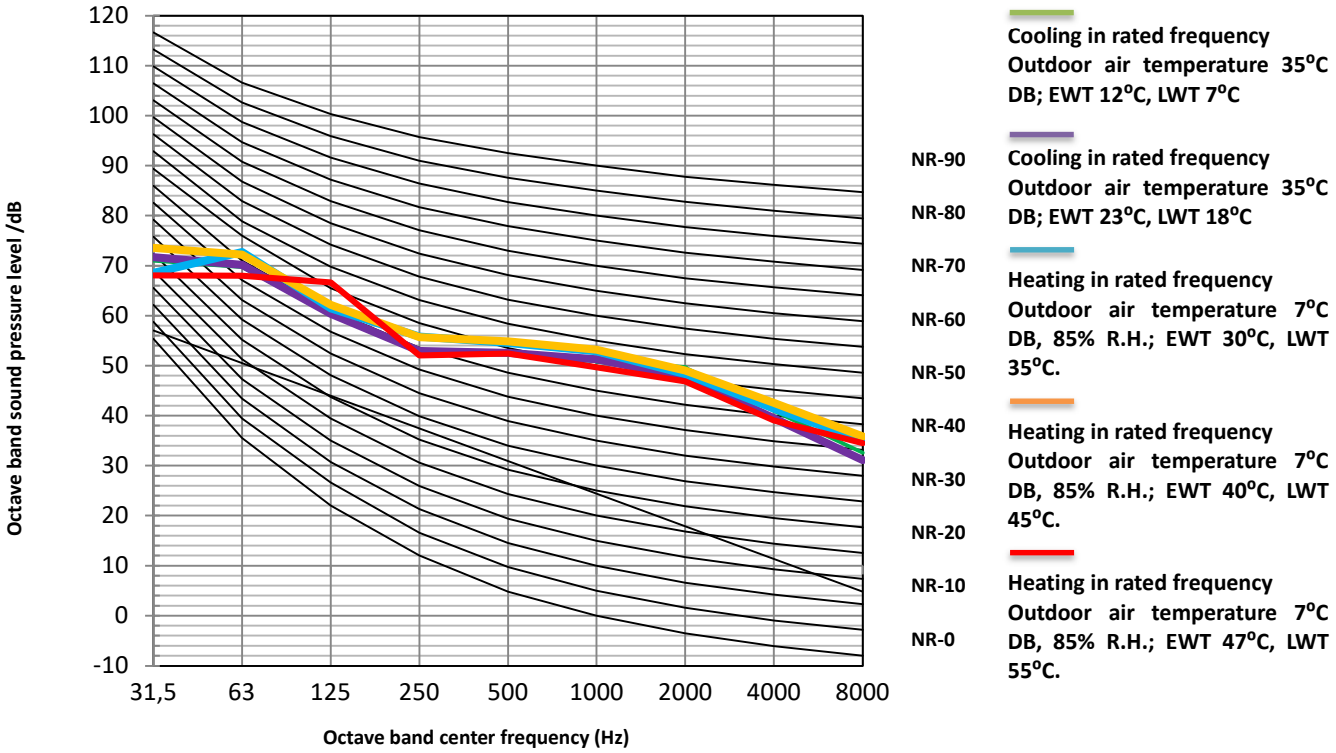


Figure 2-8.9: SMHM-120B-3/9 octave band levels

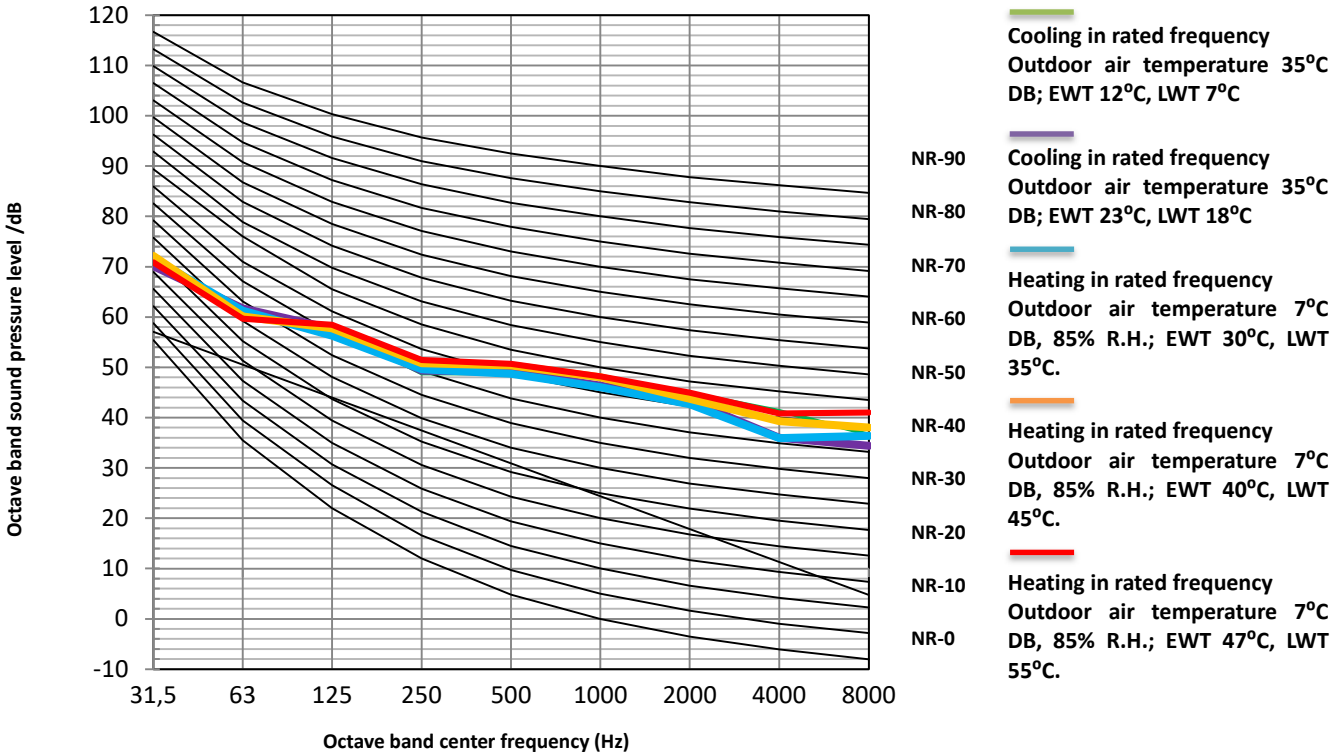


Figure 2-8.10: SMHM-140B-3/9 octave band levels

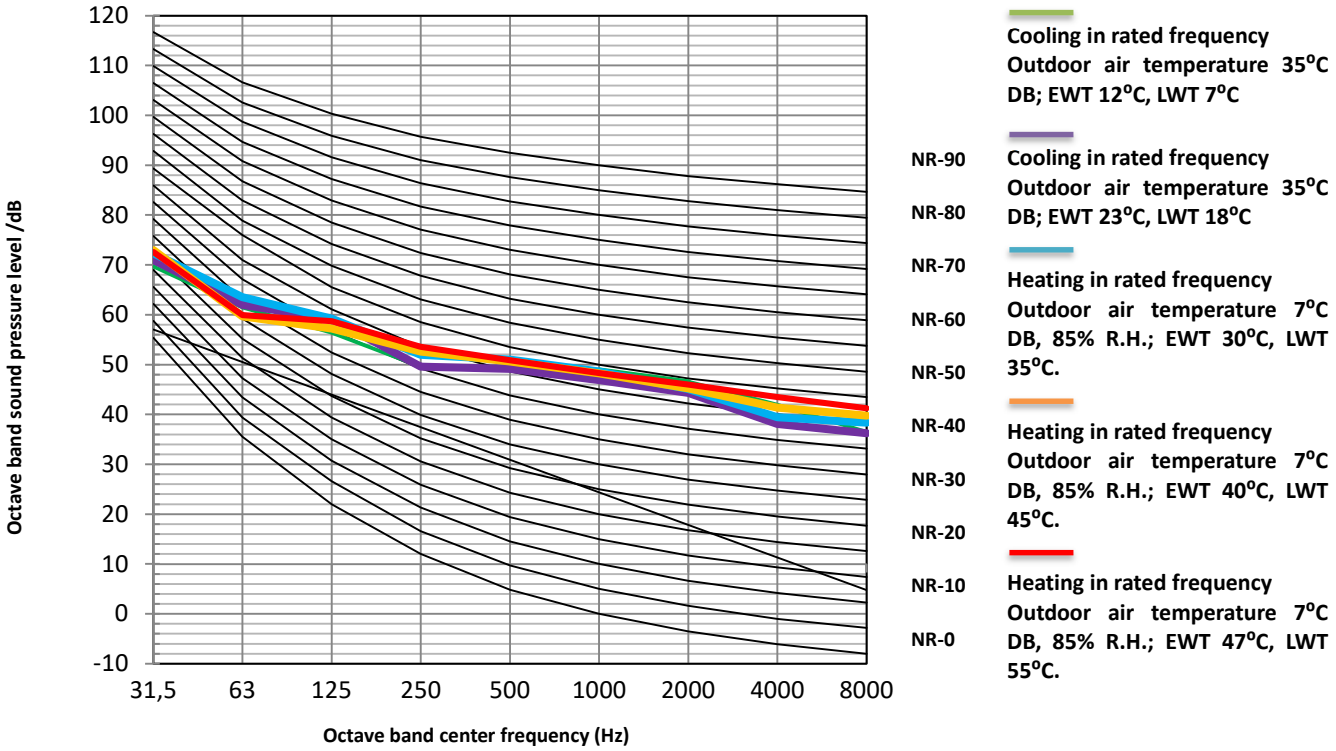
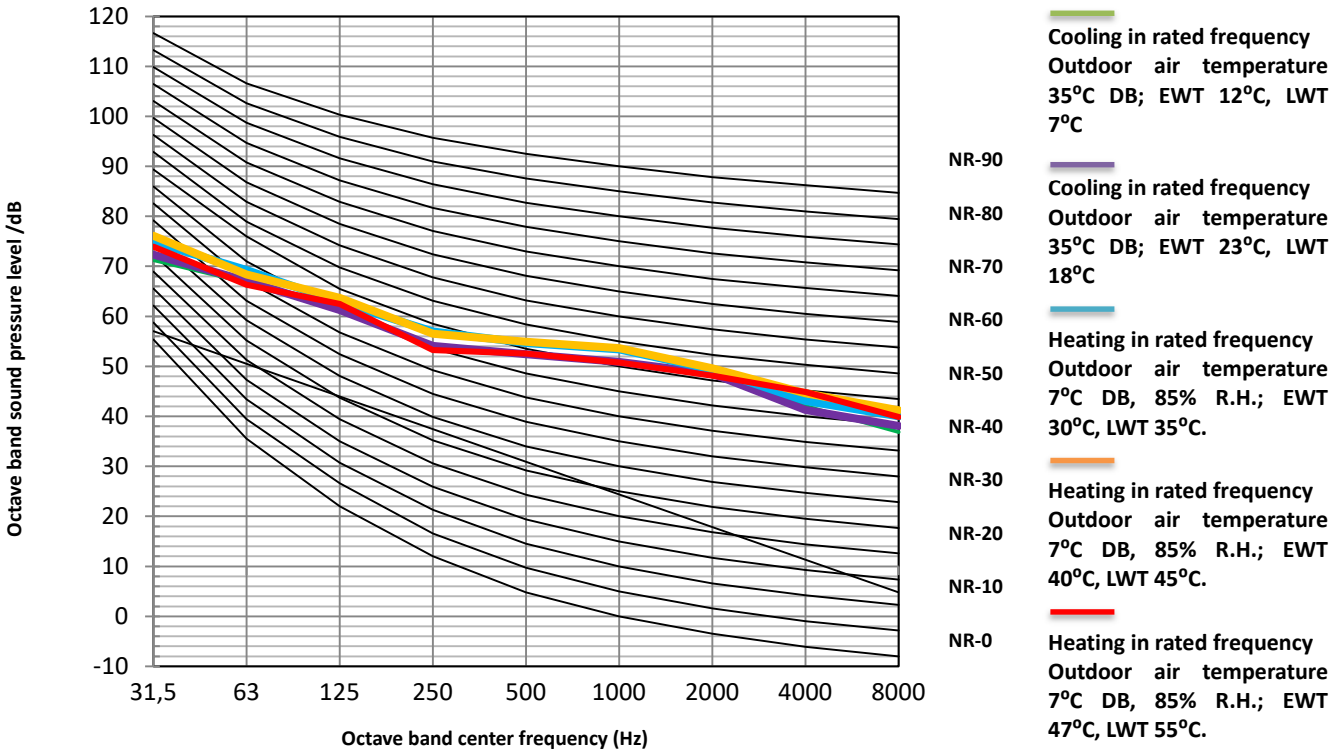


Figure 2-8.9: SMHM-160B/3 octave band levels



30 Accessories

30.1 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	Tighten belt for customer wiring use		3
Technical data manual		1	Thermistor for domestic hot water tank or zone 2 water flow or balance tank		1
Y-shaped filter		1	Network matching wires		1
Drain hose		1	Energy label		1
Wired controller		1			

30.2 Optional accessories

Table 2-9.2: Standard accessories

Name	Shape	Quantity			
Thermistor for balance tank(Tbt1)		1	Extension wire for Tbt1		**1**
Thermistor for balance tank(Tbt2)		1	Extension wire for Tbt2		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

31 Preface to Part 3

31.1 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.

31.2 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.

31.3 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.

32 Installation

32.1 Acceptance and Unpacking

Notes for installers

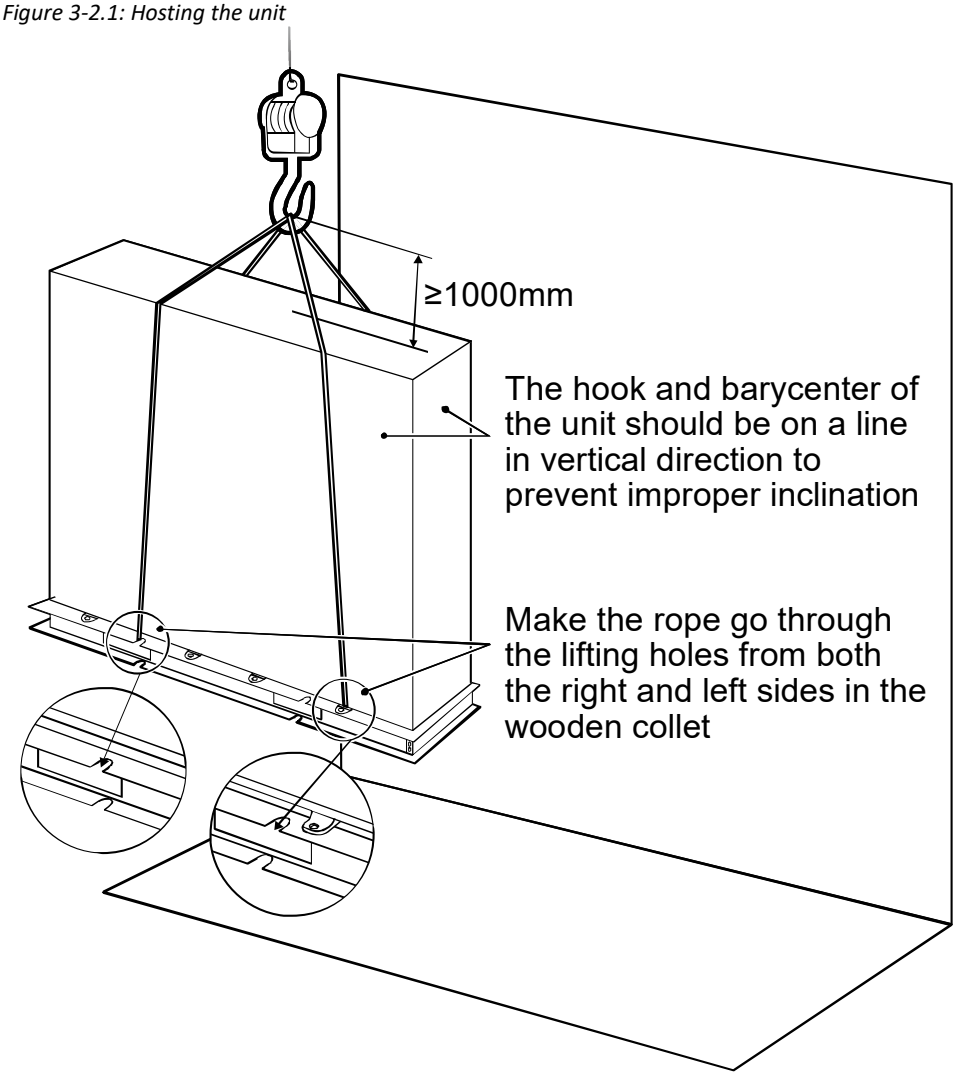
- When units are delivered check whether any damage occurred during shipment. If there is damage to the surface or outside of a unit, submit a written report to the shipping company.
- Check that the model, specifications and quantity of the units delivered are as ordered.
- Check that all accessories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

32.2 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.
- Keep units upright during hoisting, ensuring that the angle to the vertical does not exceed 30°.

Figure 3-2.1: Hosting the unit



32.3 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.
- Outdoor units should not be installed in positions where dust or dirt 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 not be installed in locations where exposure to salinity may occur.
- Outdoor units should be installed in well-drained, well-ventilated positions.
- Outdoor units should be installed in positions that are as close as possible to the heat emitters.
- 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 temperature sensor wiring length limitations will not be exceeded.
- Outdoor units should be installed in locations where the noise from the unit will not disturb neighbors.

32.4 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:

- For installation of the outdoor unit in a place where the wind direction can be foreseen, refer to Figure 3-2.3 and Table 3-2.1 for installation of the unit. Set the outlet side at a right angle to the direction of the wind, refer to Figure 3-2.2.
- 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

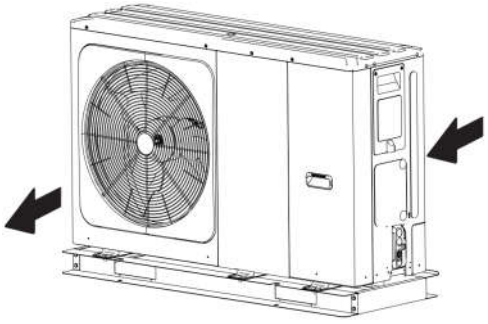


Figure 3-2.3: Installation room illustration

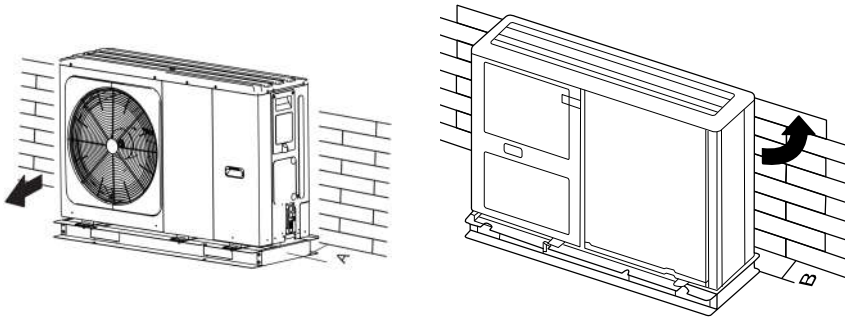


Table 3-2.1: Installation room requirement (Unit: mm)

Model	A(mm)
4-6KW	⩾300
8-16KW	⩾300

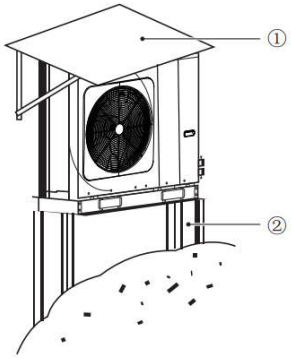
Model	B(mm)
4-6KW	⩾1000
8-16KW	⩾1500

32.5 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. Refer to Figure 3-2.4.

Figure 3-2.4: Snow shielding



32.6 Hot Climate Installation

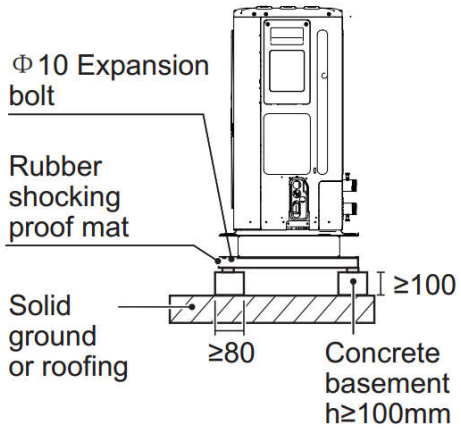
As the outdoor temperature is measured via the outdoor ambient temperature sensor, make sure to install the outdoor unit in the shade, or a canopy should be constructed to avoid direct sunlight. So that it is not influenced by the sun's heat, otherwise system protection may occur.

32.7 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 Φ10 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)



(unit: mm)

32.8 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: 4/6kW models drainage hole

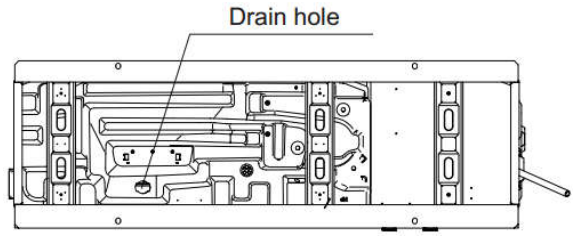
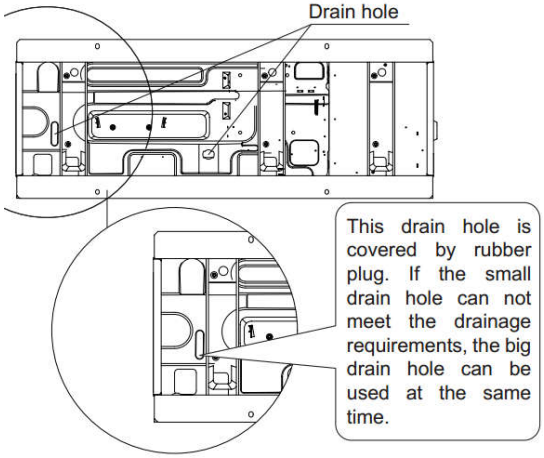


Figure 3-2.7: 8/10/12/14/16kW models drainage hole



32.9 Spacing

32.9.1 Stacked installation

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. Figures 3-2.8 and 3-2.9 show the minimum spaces that must be allowed between units and the minimum distances from obstacles in front of and behind units.

Figure 3-2.8: Installation with obstacles in front of the unit

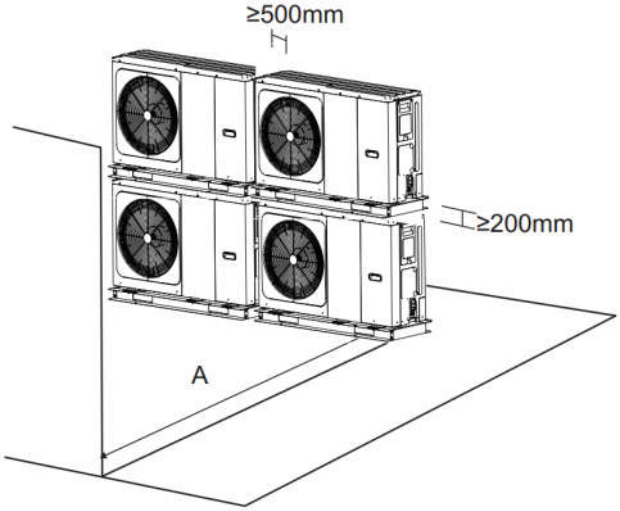
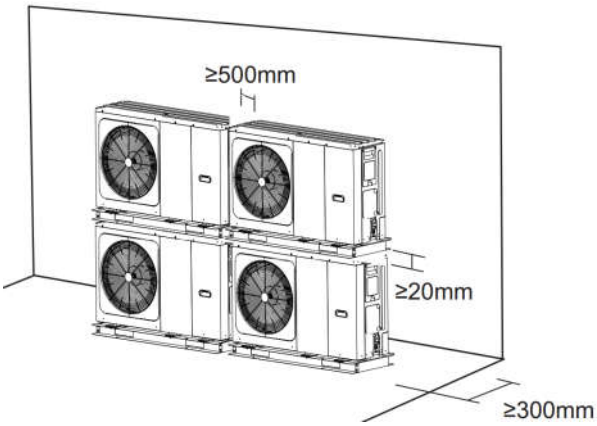


Table 3-2.2: Minimum spacing from obstacles in front of the unit

Model	A(mm)
4-6KW	⩾1000
8-16KW	⩾1500

Figure 3-2.9: Installation with obstacles behind the unit



32.9.2 Installation in Rows

Figure 3-2.10: Single row installation

Table 3-2.3: Single row installation spacing requirements

Model	A(mm)	B1(mm)	B2(mm)	C(mm)
4-6KW	⩾1500	⩾500	⩾150	⩾300
8-16KW	⩾2000	⩾1000	⩾150	⩾300

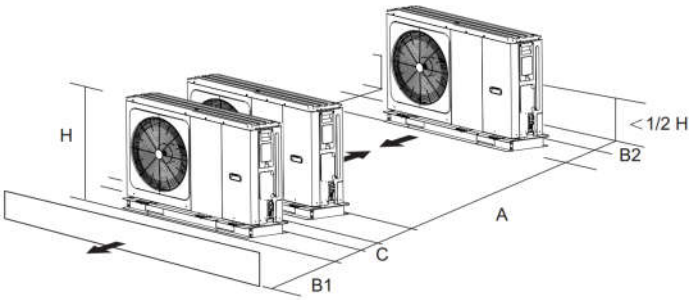


Figure 3-2.11: Multi-row installation

Table 3-2.4: Multiple row installation spacing requirements

Model	A(mm)	B1(mm)	B2(mm)	C(mm)
4-6KW	⩾2500	⩾1000	⩾300	⩾600
8-16KW	⩾3000	⩾1500	⩾300	⩾600

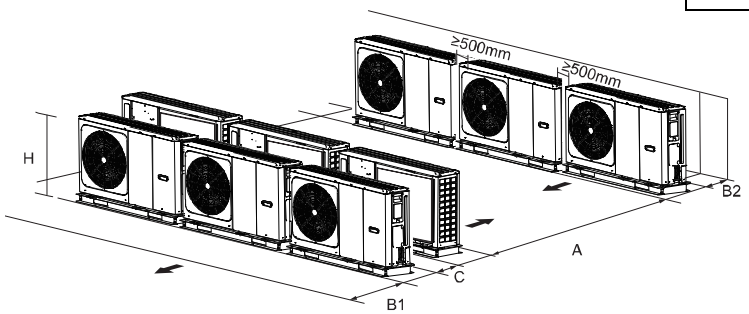
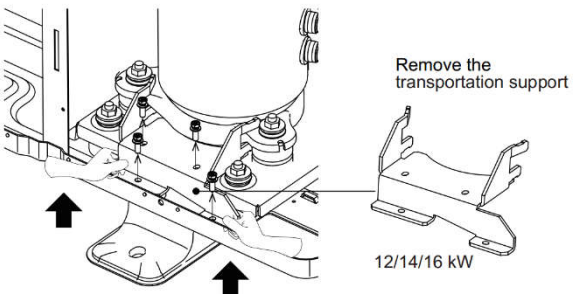


Figure 3-2.12: Remove the transportation support

32.10 Transportation support

For 12/14/16kW model, there is a transportation support which is used to protect tubes from breaking during transportation and this support should be taken off before turning on the heat pump.



33 Water Pipework

33.1 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 ≤ 3 bar.
- The maximum water temperature ≤ 70°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.

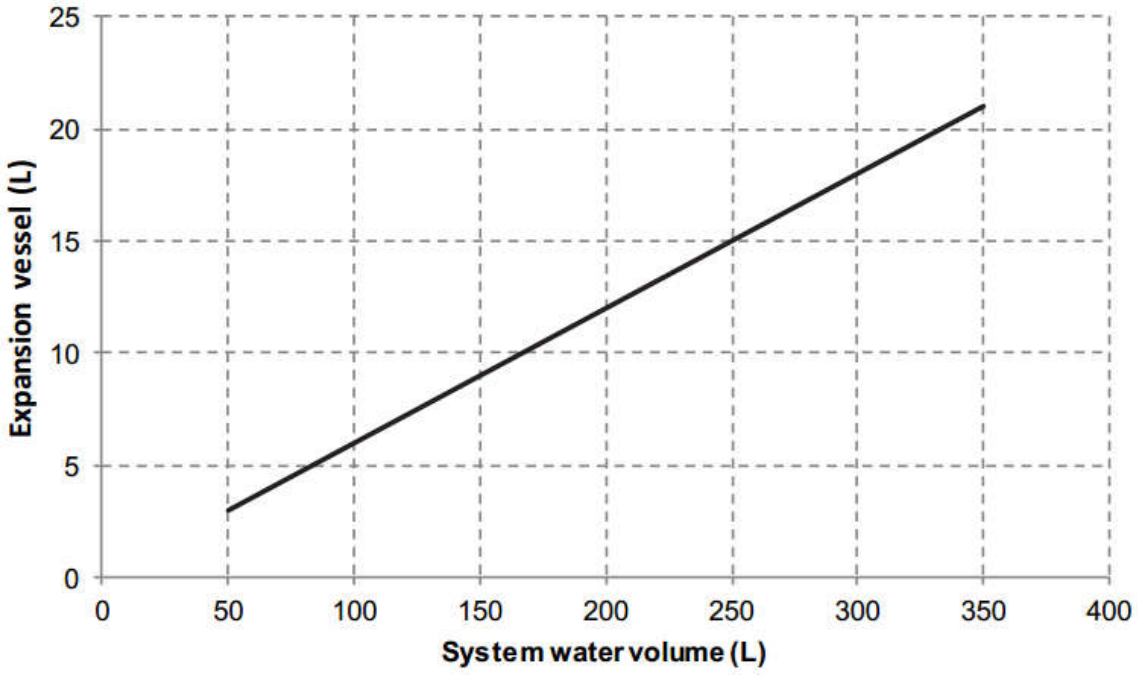
33.2 Water Volume and Expansion Vessel Pre-pressure Checks

The units are equipped with an expansion vessel of 8L that has a default pre-pressure of 1.5 bar. To assure proper operation of the unit, the pre-pressure of the expansion vessel might need to be adjusted.

- Check that the total water volume in the installation, excluding the internal water volume of the unit, is at least 40L.
- Expansion vessel volume must fit the total water system volume.
- To size the expansion for the heating and cooling circuit.

The expansion vessel volume can follow the figure below:

Figure 3-3.1: Expansion vessel volume



Notes:

- In most applications this minimum water volume will be satisfactory.
- In critical processes or in rooms with a high heat load though, extra water might be required.
- When circulation in each space heating loop is controlled by remotely controlled valves, it is important that this minimum water volume is kept even if all the valves are closed.

33.3 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

33.4 Water Circuit Anti-freeze Protection

Ice formation can cause damage to the hydronic system. As the outdoor unit may be exposed to sub-zero temperatures, care must be taken to prevent freezing of the 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, the electric heating tap, 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 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 3-3.1 and 3-3.2.

Table 3-3.1: Ethylene Glycol

Concentration of ethylene glycol (%)	Modification coefficient				Minimum outdoor temperature(°C)
	Cooling capacity modification	Power input 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 3-3.2: Propylene Glycol

Concentration of propylene glycol (%)	Modification coefficient				Minimum outdoor temperature(°C)
	Cooling capacity modification	Power input 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

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:

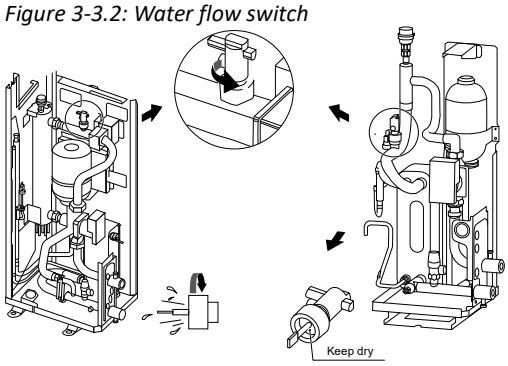
- That the water treatment is correctly executed by a qualified water specialist.
- That a glycol with corrosion inhibitors is selected to counteract acids formed by the oxidation of glycols.
- That in case of an installation with a domestic hot water tank, only the use of propylene glycol is allowed. In other installations the use of ethylene glycol is fine.
- 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.

33.5 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.

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

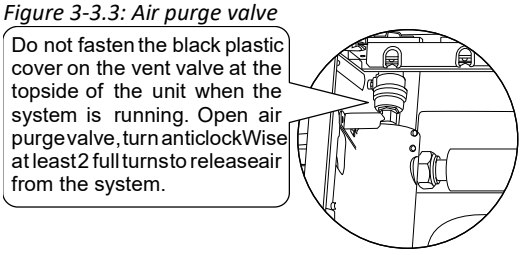
Figure 3-3.2: Water flow switch



33.6 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



33.7 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.

34 Electrical Wiring

34.1 General

Notes for installers

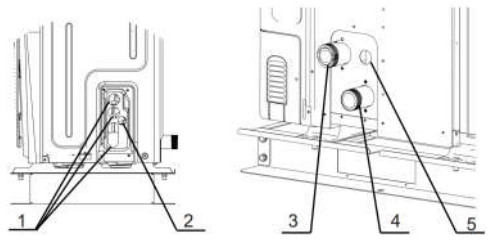
Caution

- 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.

34.2 Precautions

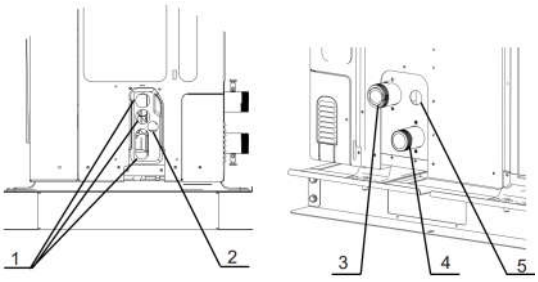
- Fix cables so that cables do not make contact with the pipes (especially on the high pressure side).
- Secure the electrical wiring with cable ties as shown in Figure 3-1.14 and Figure 3-1.15. So that it does not come in contact with the piping, particularly on the high-pressure side.

Figure 3-4.1: Wiring hole for 4/6kW models



Legend	
1	High voltage wire hole
2	Low voltage wire hole
3	Drainage pipe hole
4	Water inlet
5	Water outlet

Figure 3-4.2: Wiring hole for 8~16kW models



Legend	
1	High voltage wire hole
2	Low voltage wire hole
3	Drainage pipe hole
4	Water outlet
5	Water inlet

- 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.

34.3 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.

Secure the wiring in the order shown below:

- 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, Figure 2-4.2 and Figure 2-4.3 in part 2, 4 “Wiring Diagram”.
- Install the wires and fix the cover firmly so that the cover may be fit in properly.

34.4 Wiring Overview

Figure 3-4.3: Wiring overview for 4/6kW models

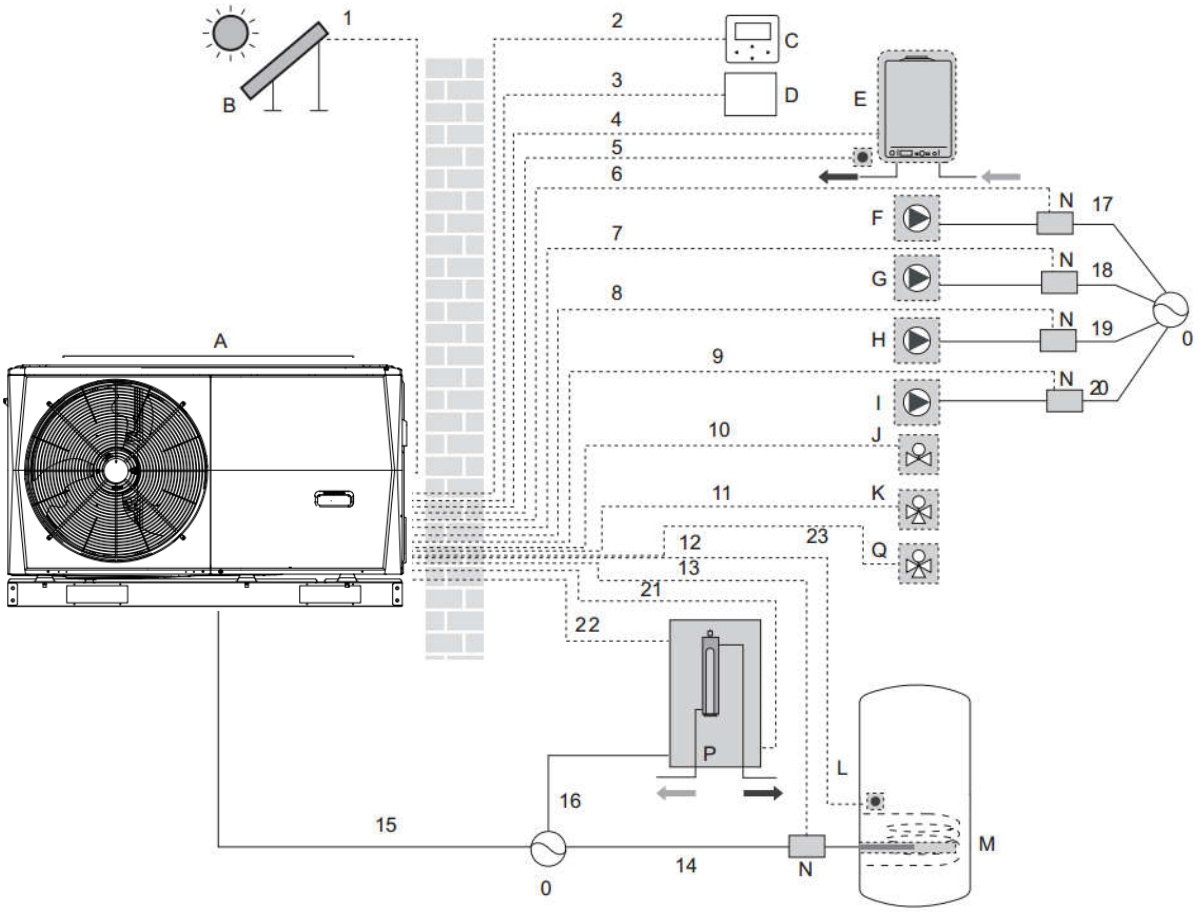
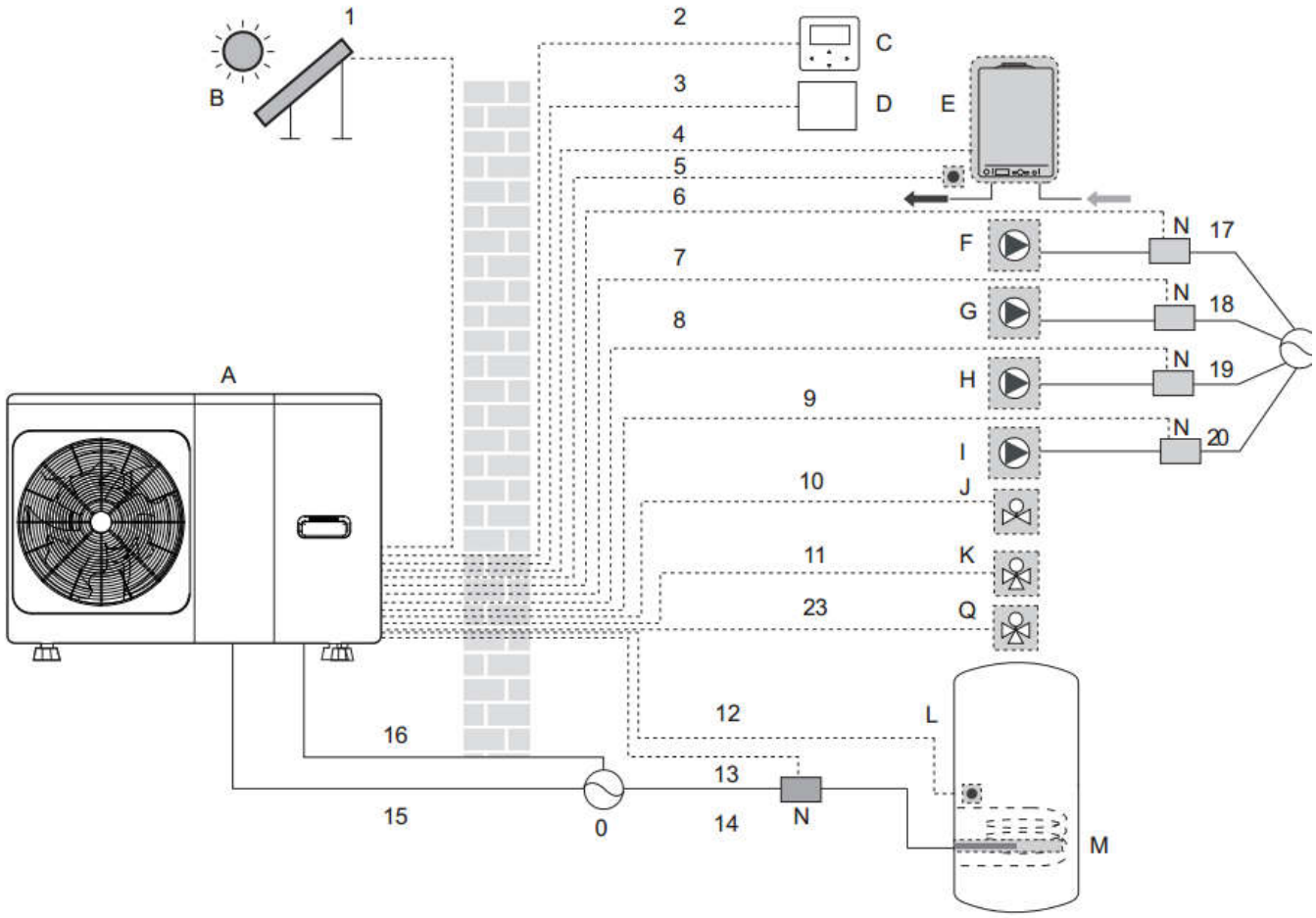


Figure 3-4.4: Wiring overview for 8/10/12/14/16kW models



Item	Description	Item	Description
A	Outdoor unit	J	SV2: 3-way valve (field supply)
B	Solar energy kit (field supply)	K	SV1: 3-way valve for domestic hot water tank (field supply)
C	User interface	L	Domestic hot water tank
D	Room thermostat (field supply)	M	Booster heater
E	Boiler (field supply)	N	Contactor
F	P_s: Solar pump (field supply)	O	Power supply
G	P_c: Mixing pump (field supply)	P	Backup heater
H	P_o: Outside circulation pump (field supply)	Q	Zone2 SV3(3-way valve)
I	P_d: DHW pump (field supply)		

Table 3-4.1: Wiring requirements

Item	Description	AC/DC	Required number of conductors	Maximum running current
1	Solar energy kit signal cable	AC	2	200mA
2	User interface cable	AC	5	200mA
3	Room thermostat cable	AC	2 or 3	200mA(a)
4	Boiler control cable	/	2	200mA
5	Thermistor cable for T1B	DC	2	(b)
9	DHW pump control cable	AC	2	200mA(a)
10	3-way valve control cable	AC	2	200mA(a)
11	3-way valve control cable	AC	2 or 3	200mAC
12	Thermistor cable	DC	2	(b)
13	Booster heater control cable	AC	2	200mA(a)
15	Power supply cable for unit	AC	2+GND(1-Phase) 3+GND(3-Phase)	31A (1-Phase) 15A (3-Phase)
16	Power supply cable for backup heater	AC	2+GND(1-Phase) 3+GND(3-Phase)	14A (1-Phase) 6A (3-Phase)

35 DIP Switch Settings

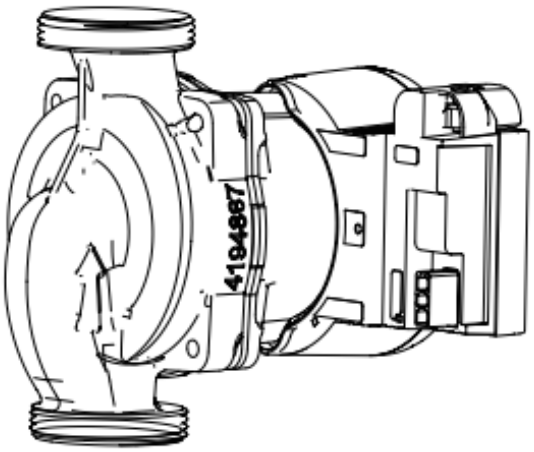
DIP switch is located on the hydraulic module main control board and allows configuration of additional heating source thermistor installation, the second inner backup heater installation, etc.

Switch		ON=1	OFF=0
S1 ON OFF 1 2 3 4	1/2	00=IBH(One-step control) 01=IBH(Two-step control) 11=IBH(Three-step control)	
	3/4	00=Without IBH and AHS 10=With IBH 01=With AHS for heating mode 11=With AHS for heating mode and DHW	
S2 ON OFF 1 2 3 4	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=pump 1 01=pump 2 10=pump 3 11=pump 4	
S4 ON OFF 1 2 3 4	1	Master unit: clear address of all slave units Slave unit: clear its own address	Keep the current address
	2	IBH for DHW=valid	IBH for DHW=invalid
	3/4	Reserved	
S9 ON 1 2 OFF	1/2	00=Slave unit 11=Msater unit	

36 Internal Circulation Pump

The pump is controlled via a digital low-voltage pulse-width modulation signal which means that the speed of rotation depends on the input signal. The speed changes as a function of the input profile. 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



37 User Interface Field Settings

37.1 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

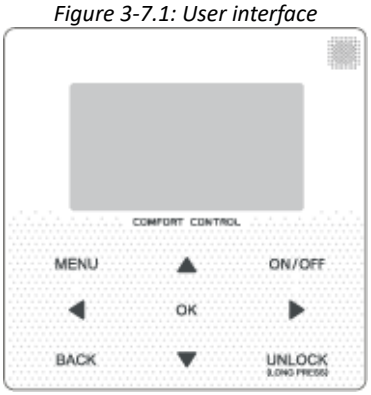
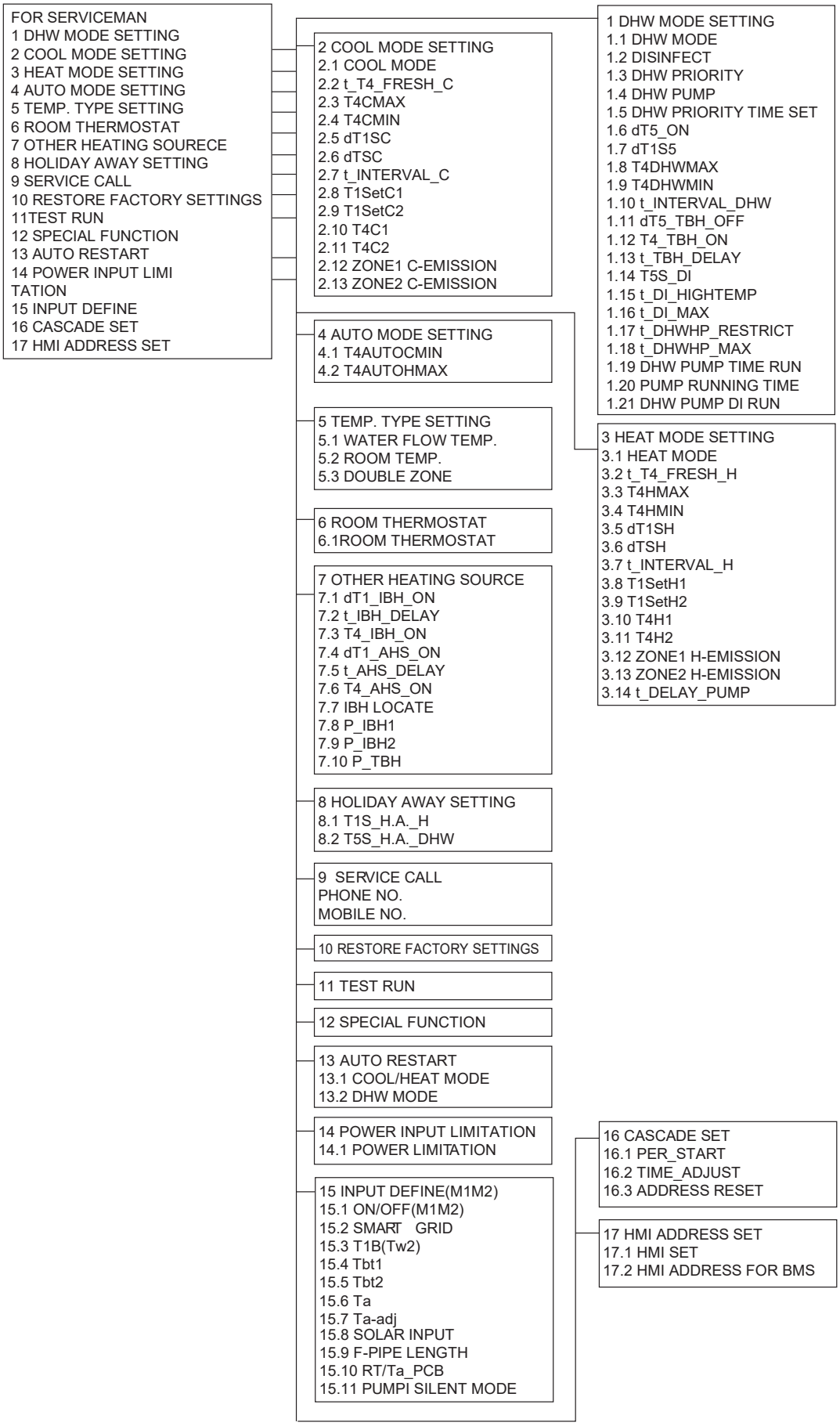


Table 3-7.1: User interface keys

Keys	Function
MENU	Go to the menu structure(on the home page)
◄► ▼ ▲	▪ Navigate the cursor on the display ▪ Navigate in the menu structure ▪ Adjust settings
ON/OFF	▪ Turn on/off the space heating/cooling operation or DHW mode ▪ Turn on/off functions in the menu structure
BACK	Come back to the up level
UNLOCK	▪ Long press for unlock/lock the controller ▪ Unlock /lock some functions such as "DHW temperature adjusting"
OK	▪ 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.

37.2 Menu Structure



37.3 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 SERVICEMAN
Please input the password:
0 0 0
OK ENTER ▲▼ ADJUST ◄►

Figure 3-7.3: FOR SERVICEMAN menu

FOR SERVICEMAN 1/3
1. DHW MODE SETTING
2. COOL MODE SETTING
3. HEAT MODE SETTING
4. AUTO MODE SETTING
5. TEMP.TYPE SETTING
6. ROOM THERMOSTAT
OK ENTER ▲▼

FOR SERVICEMAN 2/3
7. OTHER HEATING SOURCE
8. HOLIDAY AWAY MODE SET
9. SERVICE CALL SETTING
10. RESTORE FACTORY SETTINGS
11. TEST RUN
12. SPECIAL FUNCTION
OK ENTER ▲▼

FOR SERVICEMAN 3/3
13. AUTO RESTART
14. POWER INPUT LIMITATION
15. INPUT DEFINE
16. CASCADE SET
17. HMI ADDRESS SET
OK ENTER ▲▼

37.4 DHW MODE SETTING Menu

37.4.1 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	
1.1 DHW MODE	YES
1.2 DISINFECT	YES
1.3 DHW PRIORITY	YES
1.4 DHW PUMP	YES
1.5 DHW PRIORITY TIME SET	NON
▲▼ ADJUST	◄►

1 DHW MODE SETTING 2/5	
1.6 dT5_ON	5 °C
1.7 dT1S5	10°C
1.8 T4DHWMAX	43°C
1.9 T4DHWMIN	-10°C
1.10 t_INTERVAL_DHW	5 MIN
▲▼ ADJUST	◄►

1 DHW MODE SETTING	3/5
1.11 dT5_TBH_OFF	5 °C
1.12 T4_TBH_ON	5 °C
1.13 t_TBH_DELAY	30 MIN
1.14 T5S_DI	65°C
1.15 t_DI HIGHTEMP.	15MIN
ADJUST	

1 DHW MODE SETTING	4/5
1.16 t_DI_MAX	210 MIN
1.17 t_DHWHP_RESTRICT	30 MIN
1.18 t_DHWHP_MAX	120 MIN
1.19 DHWPUMP TIME RUN	YES
1.20 PUMP RUNNING TIME	5 MIN
ADJUST	

1 DHW MODE SETTING	5/5
1.21 DHW PUMP DI RUN	NON
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.

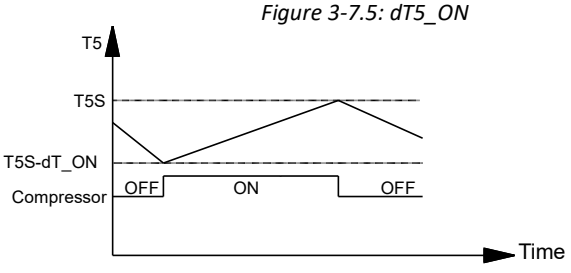
DHW PRIORITY sets whether domestic hot water heating or space heating/cooling takes priority. If **NON** is selected in the **DHW PRIORITY** mode, when it is available and the space heating/cooling is **OFF**, the heat pump will heat the water as required. If space heating/cooling is **ON**, the water 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 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 ≥ dT5_ON the heat pump providing heated water to the DHW tank.

Figure 3-7.5: dT5_ON



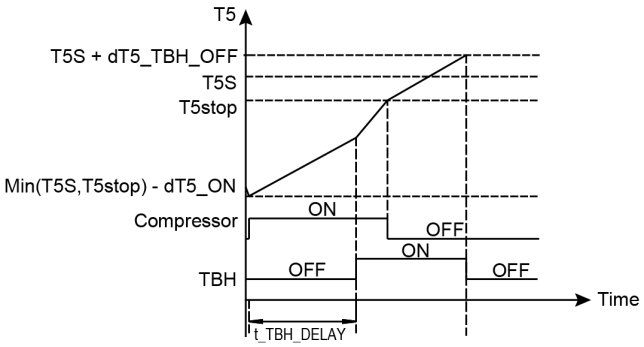
Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature

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: DHW mode operation

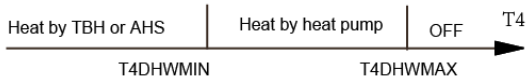
Figure 3-7.6 illustrates the operation of the heat pump and immersion heater(optional) in DHW mode. If the DHW tank water temperature (T5) is less than the minimum of the DHW set temperature (T5S) and the heat pump leaving water temperature operating limit (T5stop) (refer to Figure 2-6.3 in Part 2, 6 "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**



Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature
T5stop: DHW mode leaving water temperature operating limit
TBH: Immersion heater in DHW tank

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.

Figure 3-7.7: T4DHWMAX and T4DHWMIN



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

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.

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 > Min(T5S+dT5_TBH_OFF, 65°C), the immersion heater is off.

T4_TBH_ON sets the ambient temperature above which the immersion heater will not be used.

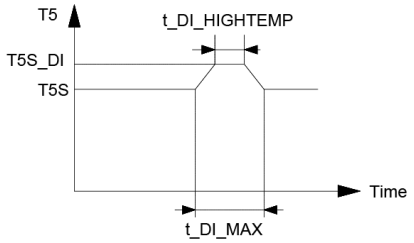
t_TBH_DELAY sets the delay between the compressor starting and the immersion heater being turned on.

T5S_DI 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.

Figure 3-7.8: DHW tank disinfection



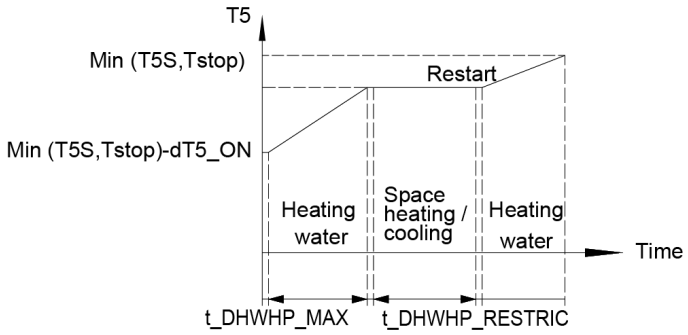
Abbreviations:
T5: DHW tank water temperature
T5S: DHW set temperature

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 3-7.9: Operation in DHW PRIORITY



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

DHWPUMP TIME RUN 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 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.

DHW PUMP DI RUN sets weather or not the DHW pump (field supply) operates during the disinfection mode.

37.5 COOL MODE SETTING Menu

MENU > **FOR SERVICEMAN** > **COOL MODE SETTING**

Figure 3-7.10: COOL MODE SETTING menu

2 COOL MODE SETTING	1/3
2.1 COOL MODE	YES
2.2 t_T4_FRESH_C	2.0HRS
2.3 T4CMAX	43°C
2.4 T4CMIN	20°C
2.5 dT1SC	5°C
ADJUST	

2 COOL MODE SETTING	2/3
2.6 dTSC	2°C
2.7 t_INTERVAL_C	5MIN
2.8 T1SetC1	10°C
2.9 T1SetC2	16°C
2.10 T4C1	35°C
ADJUST	

2 COOL MODE SETTING	3/3
2.11 T4C2	25°C
2.12 ZONE1 C-EMISSION	FCU
2.13 ZONE2 C-EMISSION	FLH
ADJUST	

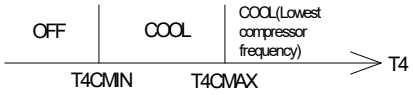
In **COOL MODE SETTING** the following parameters should be set.

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

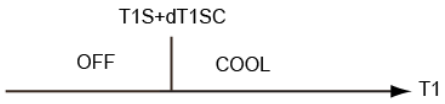


Abreviations:
T4: Outdoor ambient temperature

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.

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 ≥ dT1SC the heat pump provides chilled water to the space cooling terminals and when T1 ≤ T1S the heat pump does not provide chilled water to the space cooling terminals.

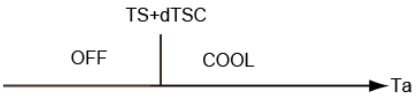
Figure 3-7.12: dT1SC



Abreviations:
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 ≥ dTSC the heat pump provides chilled water to the space cooling terminals and when Ta ≤ 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, 7.8 "TEMP. TYPE SETTING Menu".

Figure 3-7.13: dTSC



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.

37.6 HEAT MODE SETTING Menu

MENU > **FOR SERVICEMAN** > **HEAT MODE SETTING**

Figure 3-7.14: HEAT MODE SETTING menu

3 HEAT MODE SETTING	1/3
3.1 HEAT MODE	YES
3.2 t_T4_FRESH_H	2.0HRS
3.3 T4HMAX	16°C
3.4 T4HMIN	-15°C
3.5 dT1SH	5°C
ADJUST	

3 HEAT MODE SETTING	2/3
3.6 dTSH	2°C
3.7 t_INTERVAL_H	5MIN
3.8 T1SetH1	35°C
3.9 T1SetH2	28°C
3.10 T4H1	-5°C
ADJUST	

3 HEAT MODE SETTING	3/3
3.11 T4H2	7°C
3.12 ZONE1 H-EMISSION	RAD.
3.13 ZONE2 H-EMISSION	FLH
3.14 t_DELAY_PUMP	2MIN
ADJUST	

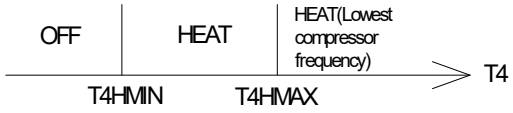
In **HEAT MODE SETTING** the following parameters should be set.

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.

Figure 3-7.15: T4HMAX, T4HMIN



Abreviations:
T4: Outdoor ambient temperature

T4HMIN sets the ambient temperature below which the heat pump will not operate in heating mode. The lowest value that **T4CMIN** 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.

dT1SH sets the temperature difference between the heat pump leaving water temperature (T1) and the heat pump leaving water set temperature (T1S) above which the heat pump provides heated water to the space heating terminals.

Figure 3-7.16: dTSH



Note:
Only when ROOM TEMP is enabled will this function be available

dTSH sets the temperature difference between the actual room temperature (Ta) and set room temperature (TS) above which the heat pump provides heated water to the space heating terminals. When TS – Ta ≥ dTSH the heat pump provides heated water to the space heating terminals and when Ta ≥ TS the heat pump does not provide heated water to the space heating terminals. Refer to Figure 3-7.16. **dTSH** is only relevant if **YES** is selected for **ROOM TEMP** in the **TEMP. TYPE SETTING** menu. Refer to Part 3, 7.8 "TEMP. TYPE SETTING Menu".

t_INTERVAL_H sets the heating mode compressor re-start delay. When the compressor stops running, it will not re-start until at least **t_INTERVAL_H** minutes have elapsed.

T1SetH1 sets the temperature 1 of automatic setting curve for heating mode.

T1SetH2 sets the temperature 2 of automatic setting curve for heating mode.

T4H1 sets the ambient temperature 1 of automatic setting curve for heating mode.

T4H2 sets the ambient temperature 2 of automatic setting curve for heating mode.

ZONE1 H-EMISSION sets the emission type for heating mode.

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

Figure 3-7.17: AUTO MODE SETTING menu

37.7 AUTO MODE SETTING Menu

MENU > **FOR SERVICEMAN** > **AUTO MODE SETTING**

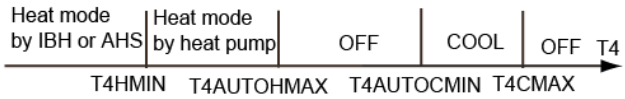
4 AUTO. MODE SETTING	
4.1 T4AUTOCMIN	25°C
4.2 T4AUTOHMAX	17°C
ADJUST	

In **AUTO MODE SETTING** the following parameters should be set.

T4AUTOCMIN sets the ambient temperature below which the heat pump will not provide chilled water for space cooling in auto mode. Refer to Figure 3-7.18.

T4AUTOHMAX sets the ambient temperature above which the heat pump will not provide heated water for space heating in auto mode. Refer to Figure 3-7.18.

Figure 3-7.18: T4AUTOCMAX, T4AUTOCMIN

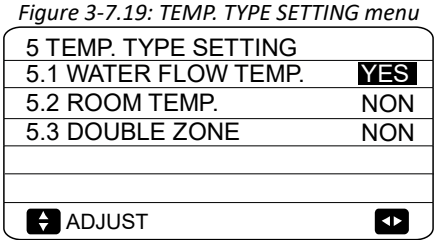


Abreviations:
HP: Heat pump
AHS: Additional heating source
IBH: Backup electric heater
T4CMAX: The ambient temperature above which the heat pump will not operate in cooling mode.
T4HMIN: The ambient temperature below which the heat pump will not operate in heating mode.

37.8 TEMP. TYPE SETTING Menu

MENU > **FOR SERVICEMAN** > **TEMP. TYPE SETTING**

Figure 3-7.19: TEMP. TYPE SETTING menu



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.

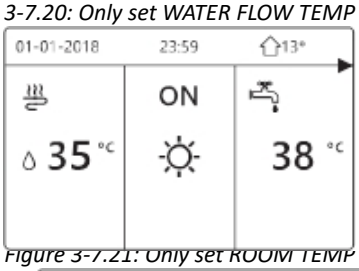
When ROOM TEMP. is enabled, the target water flow temperature will be calculated from climate-related curves (refer to “9 Climate related curves”).

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.

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



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.**

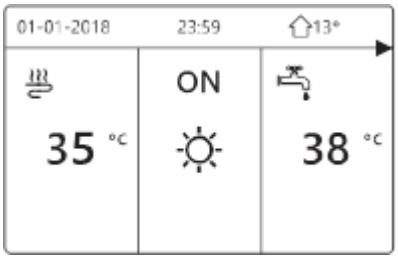
Figure 3-7.21: Only set ROOM TEMP to YES



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



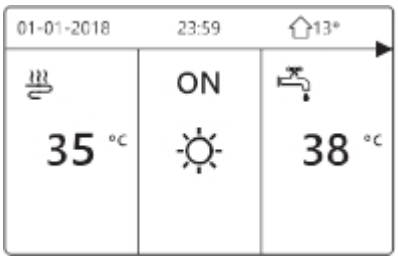
Homepage (zone 1)



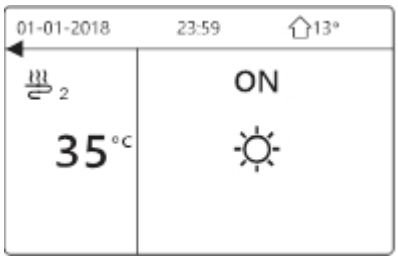
Addition page (zone 2)
(Double zone is effective)

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



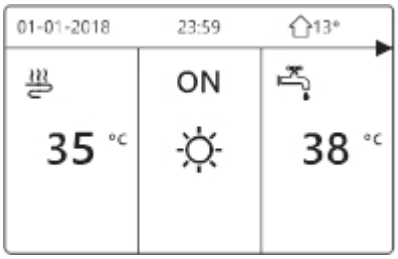
Homepage (zone 1)



Addition page (zone 2)

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



Homepage (zone 1)

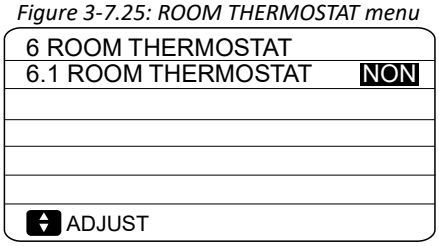


Addition page (zone 2)
(Double zone is effective)

37.9 ROOM THERMOSTAT Menu

MENU > **FOR SERVICEMAN** > **ROOM THERMOSTAT**

Figure 3-7.25: ROOM THERMOSTAT menu



As an alternative to controlling space heating/cooling modes according 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.

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.

37.10 OTHER HEATING SOURCE Menu

37.10.1 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	
7.1 dT1_IBH_ON	5°C
7.2 t_IBH_DELAY	30MIN
7.3 T4_IBH_ON	-5°C
7.4 dT1_AHS_ON	5°C
7.5 t_AHS_DELAY	30MIN
ADJUST	

7 OTHER HEATING SOURCE 2/2	
7.6 T4_AHS_ON	-5°C
7.7 IBH LOCATE	PIPE LOOP
7.8 P_IBH1	0.0kW
7.9 P_IBH2	0.0kW
7.10 P_TBH	2.0kW
ADJUST	

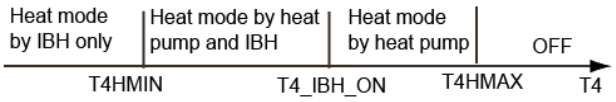
In **OTHER HEATING SOURCE** the following parameters should be set. Backup electric heater is optional.

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 ≥ 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.

Figure 3-7.27: T4_IBH_ON



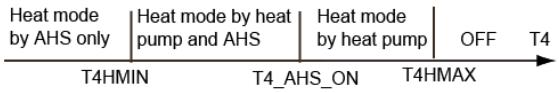
Abreviations:
T4: Outdoor ambient temperature
IBH: Backup electric heater

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 ≥ 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_ASH_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.

Figure 3-7.28: T4_AHS_ON



Abreviations:
AHS: *Additional heating source*
T4: Outdoor ambient temperature

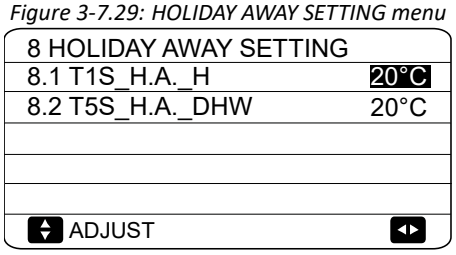
IBH LOCATE means IBH is installed for pipe heating.
P_IBH1, P_IBH2 set heating capacity of IBH and P_TBH sets heating capacity of TBH, which are used for energy consumption statistics.

37.11 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.

Figure 3-7.29: HOLIDAY AWAY SETTING menu



T1S_H.A._H sets the heat pump's leaving water set temperature for space heating mode when in holiday away mode.

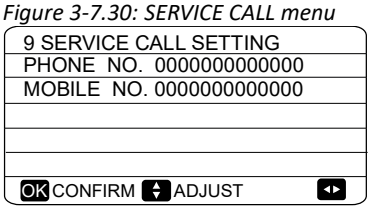
T5S_H.M_DHW sets the heat pump's leaving water set temperature for DHW mode when in holiday away mode.

37.12 SERVICE CALL Menu

MENU > FOR SERVICEMAN > SERVICE CALL

In **SERVICE CALL** the following parameters can be set.

Figure 3-7.30: SERVICE CALL menu



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.

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.

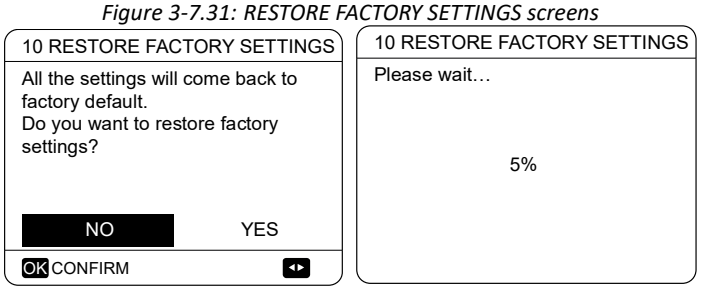
37.13 RESTORE FACTORY SETTINGS

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



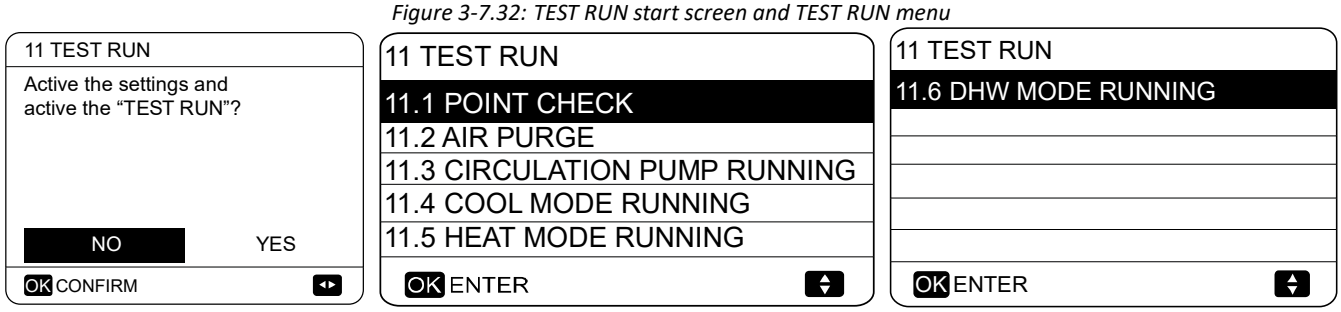
37.14 TEST RUN

37.14.1 TEST RUN Menu overview

MENU > FOR SERVICEMAN > TEST RUN

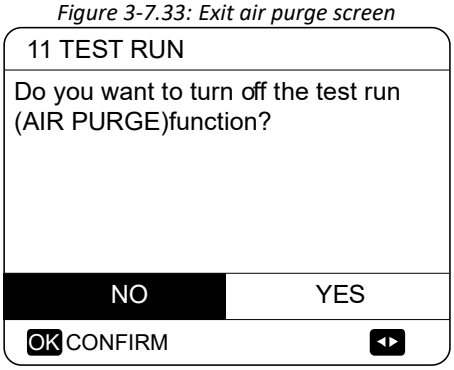
TEST RUN is used to check that the valves, air purge function, circulation pump, space cooling mode, space heating mode and DHW mode are all operating correctly.

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

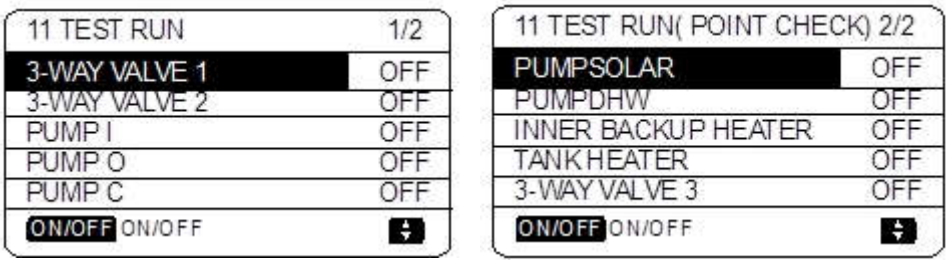


37.14.2 POINT CHECK menu

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

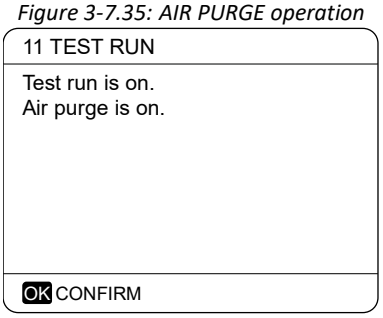


37.14.3 AIR PURGE operation
MENU > FOR SERVICEMAN > TEST RUN > AIR PURGE

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.

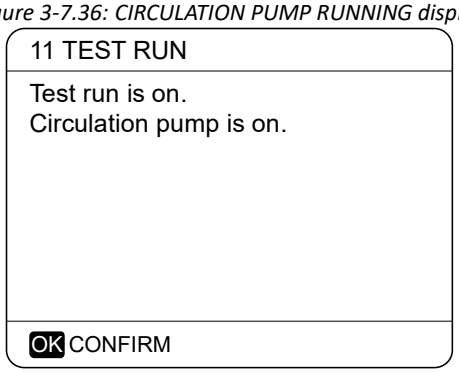
The **AIR PURGE** operation is used to remove air from the water piping. Before running AIR PURGE mode, make sure that the air purge valve is open. When the air purge operation starts, SV1 valve opens and SV2 valve closes. 60 secs later the pump in the unit (PUMPI) operates for 10min during which the 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



37.14.4 CIRCULATION PUMP RUNNING operation
MENU > FOR SERVICEMAN > TEST RUN > CIRCULATION PUMP RUNNING

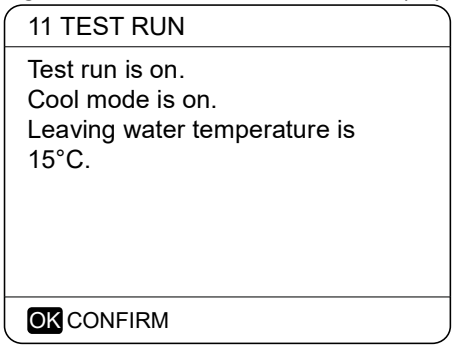
Figure 3-7.36: CIRCULATION PUMP RUNNING display



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”.

37.14.5 COOL MODE RUNNING operation
MENU > FOR SERVICEMAN > TEST RUN > COOL MODE RUNNING

Figure 3-7.37: COOL MODE RUNNING display



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

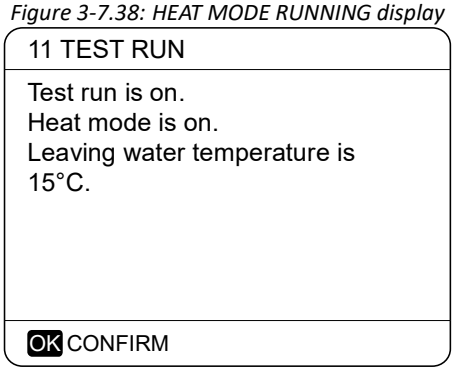
During the **COOL MODE RUNNING** operation, the Yukon Mono unit leaving water set temperature is 7°C. The current actual leaving water temperature is displayed on the user interface. The unit operates until the leaving water temperature drops to the set temperature or the next command is received.

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”.

37.14.6 HEAT MODE RUNNING operation

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

Figure 3-7.38: HEAT MODE RUNNING display



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.**

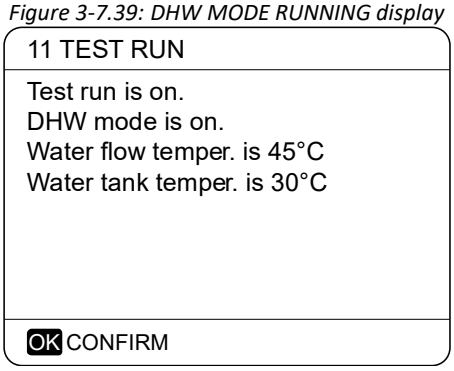
If any error code is displayed during the cool mode running operation, the cause should be investigated. Refer to Part 3, 8.2 “Error Code table”.

37.14.7 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 3-7.39: DHW MODE RUNNING display



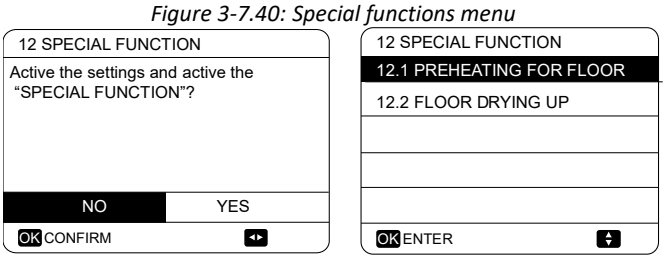
37.15 SPECIAL FUNCTION

37.15.1 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.

Figure 3-7.40: Special functions menu



37.15.2 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 3-7.41: Preheating for floor menu

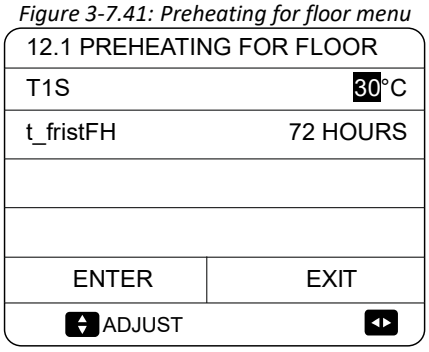
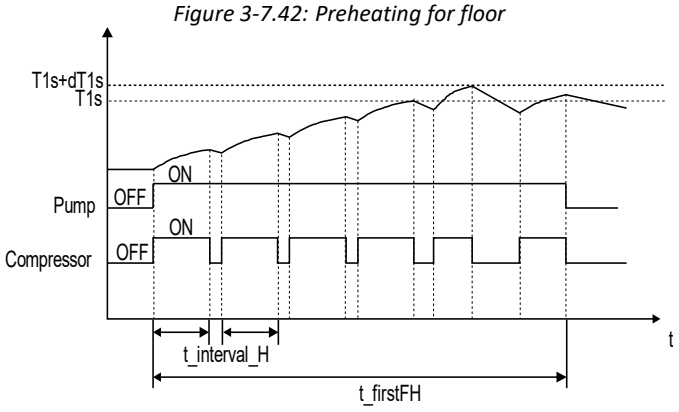


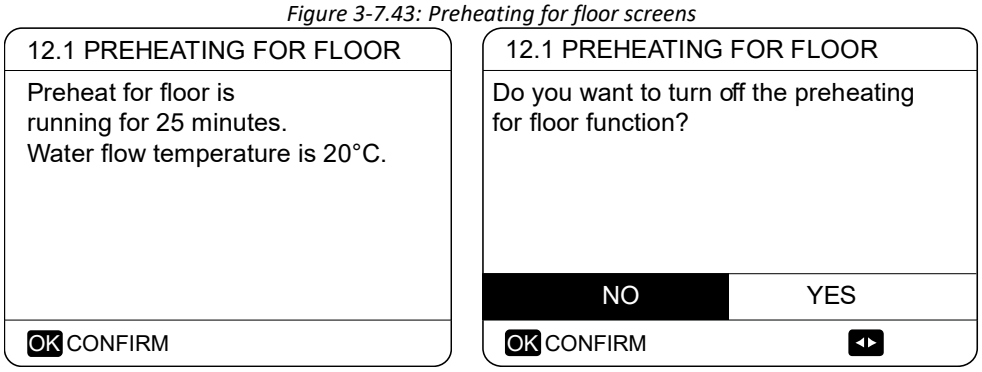
Figure 3-7.42: Preheating for floor



Abreviations:
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.

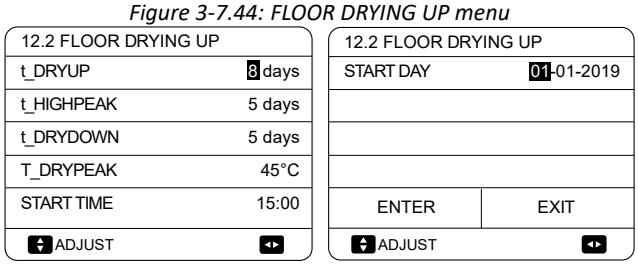
Figure 3-7.43: Preheating for floor screens



37.15.3 FLOOR DRYING UP

MENU > FOR SERVICEMAN > SPECIAL FUNCTION > FLOOR DRYING UP

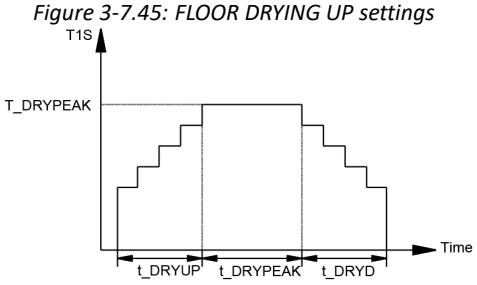
Figure 3-7.44: FLOOR DRYING UP menu



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

Figure 3-7.45: FLOOR DRYING UP settings



t_DRYUP sets the duration of Phase 1.

t_HIGHPEAK sets the duration of Phase 2.

t_DRYDOWN is the duration of Phase 3.

T_DRYPEAK sets the heat pump's leaving water set temperature for Phase 2.

START TIME sets the floor drying up operation start time.

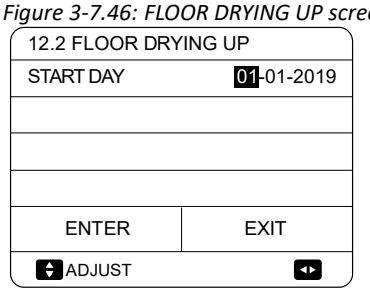
START DATE sets the floor drying up operation start date.

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.

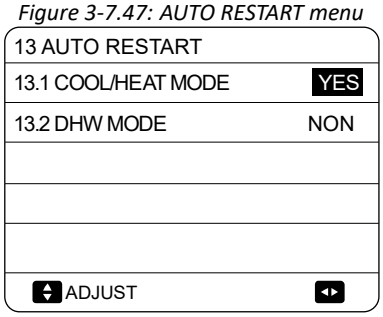
Figure 3-7.46: FLOOR DRYING UP screen



37.16 AUTO RESTART

MENU > FOR SERVICEMAN > AUTO RESTART

Figure 3-7.47: AUTO RESTART menu



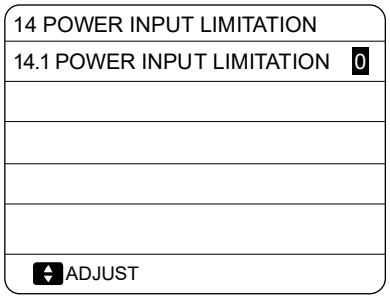
AUTO RESTART sets whether or not the unit re-applies the user interface settings when the power returns following a power failure. Select **YES** to enable auto restart or **NON** to disable auto restart.

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.

37.17 POWER INPUT LIMITATION

MENU > FOR SERVICEMAN > POWER INPUT LIMITATION

Figure 3-7.48: POWER INPUT LIMITATION menu



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.

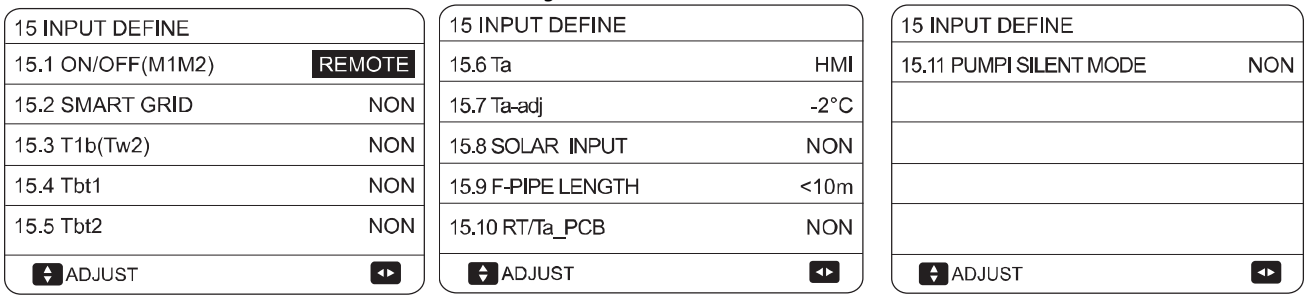
Figure 3-7.49: Limitation value (unit:A)

Model / No.	0	1	2	3	4	5	6	7	8
4/6kW	18	18	16	15	14	13	12	12	12
8/10kW	19	19	18	16	14	12	12	12	12
12/14kW(1N)	30	30	28	26	24	22	20	18	16
16kW(1N)	30	30	29	27	25	23	21	19	17
12/14kW(3N)	14	14	13	12	11	10	9	9	9
16kW(3N)	14	14	13	12	11	10	9	9	9

37.18 INPUT DEFINE

MENU > FOR SERVICEMAN > INPUT DEFINE

Figure 3-7.50: INPUT DEFINE



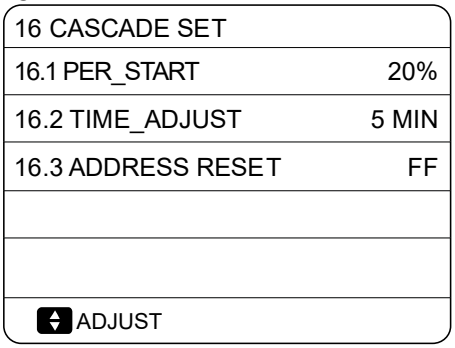
INPUT DEFINE sets sensors and functions to fulfill with installation.

ON/OFF(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.
T1b(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.

37.19 CASCADE SET

MENU > FOR SERVICEMAN > CASCADE SET

Figure 3-7.51:CASCADE SET



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

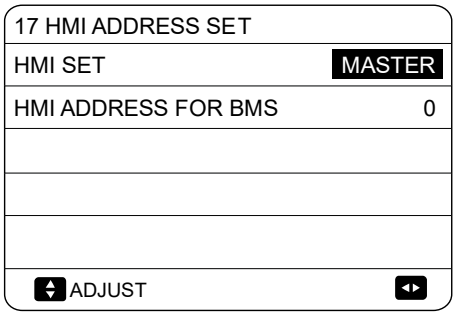
TIME_ADJUST sets the judgment period of adding and subtracting units

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.

37.20 HMI ADDRESS SET

MENU > FOR SERVICEMAN > HMI ADDRESS SET

Figure 3-7.52: HMI ADDRESS SET



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)

38 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
ONLINE UNITS NUMBER	1
OPERATE MODE	COOL
SV1 STATE	ON
SV2 STATE	OFF
SV3 STATE	OFF
PUMP_I	ON
ADDRESS	1/9

OPERATION PARAMETER	#01
PUMP-O	OFF
PUMP-C	OFF
PUMP-S	OFF
PUMP-D	OFF
PIPE BACKUP HEATER	OFF
TANK BACKUP HEATER	ON
ADDRESS	2/9

OPERATION PARAMETER	#01
GAS BOILER	OFF
T1 LEAVING WATER TEMP.	35°C
WATER FLOW	1.72m3/h
HEAT PUMP CAPACTIY	11.52kW
POWER CONSUM.	1000kWh
Ta ROOM TEMP	25°C
ADDRESS	3/9

OPERATION PARAMETER	#01
T5 WATER TANK TEMP.	53°C
Tw2 CIRCUIT2 WATER TEMP.	35°C
TIS' C1 CLIMATE CURVE TEMP.	35°C
TIS2' C2 CLIMATE CURVE TEMP.	35°C
TW_O PLATE W-OUTLET TEMP.	35°C
TW_I PLATE W-OUTLET TEMP.	30°C
ADDRESS	4/9

OPERATION PARAMETER	#01
Tbt1 BUFFERTANK_UP TEMP.	35°C
Tbt2 BUFFERTANK_LOW TEMP.	35°C
Tsolar	25°C
IDU SOFTWARE	01-09-2019V01
ADDRESS	5/9

OPERATION PARAMETER	#01
ODU MODEL	6kW
COMP.CURRENT	12A
COMP.FREQENCY	24Hz
COMP.RUN TIME	54 MIN
COMP.TOTAL RUN TIME	1000Hrs
EXPANSION VALVE	200P
ADDRESS	6/9

OPERATION PARAMETER	#01
FAN SPEED	600R/MIN
IDU TARGET FREQUENCY	46Hz
FREQUENCY LIMITED TYPE	5
SUPPLY VOLTAGE	230V
DC GENERATRIX VOLTAGE	420V
DC GENERATRIX CURRENT	18A
ADDRESS	7/9

OPERATION PARAMETER	#01
TW_O PLATE W-OUTLET TEMP.	35°C
TW_I PLATE W-INLET TEMP.	30°C
T2 PLATE F-OUT TEMP.	35°C
T2B PLATE F-IN TEMP.	35°C
Th COMP. SUCTION TEMP.	5°C
Tp COMP. DISCHARGE TEMP.	75°C
ADDRESS	8/9

OPERATION PARAMETER	#01
T3 OUTDOOR EXCHARGE TEMP.	5°C
T4 OUTDOOR AIR TEMP.	5°C
TF MODULE TEMP.	55°C
P1 COMP. PRESSURE	2300kPa
ODU SOFTWARE	01-09-2018V01
HMI SOFTWARE	01-09-2018V01
ADDRESS	9/9

39 Network Configuration Guidelines

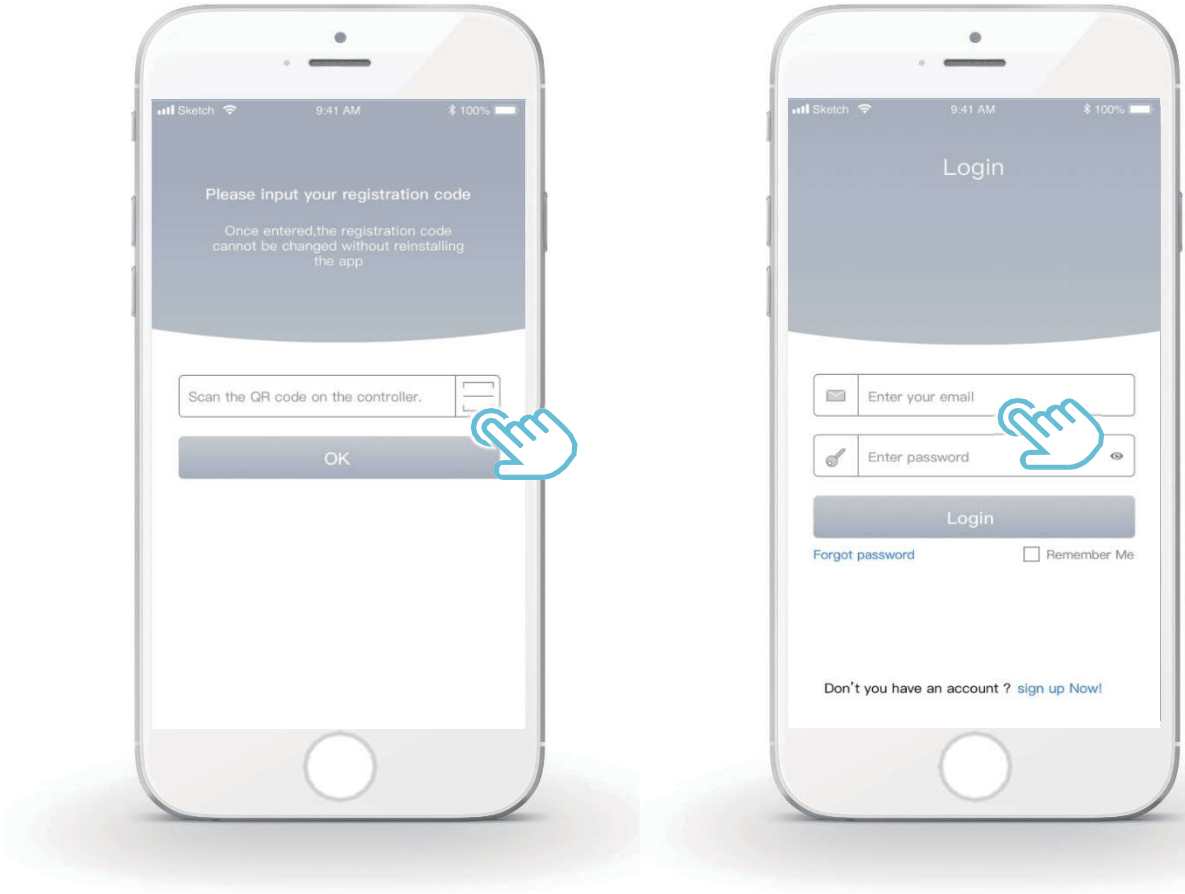
The wired controller realizes intelligent control with a built-in WIFI module, which receives control signal from the APP. Before connecting the WLAN, please check for it if the router in your environment is active and make sure that the wired controller is well-connected to the wireless signal. When 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.

39.1 Install APP

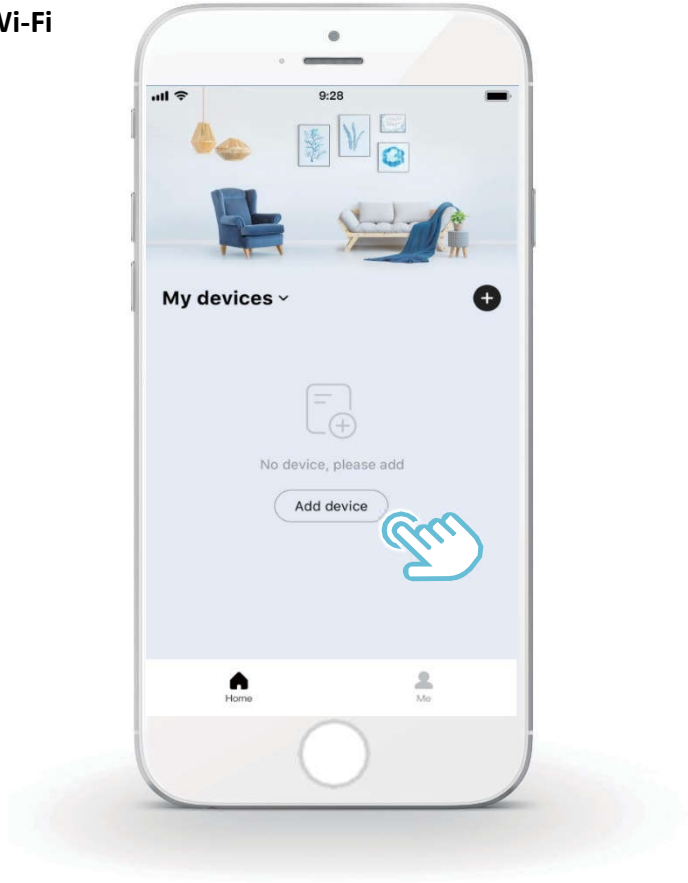
Scan the following QR code or research "Comfort Home" in APP STORE or GOOGLE PLAY to install the APP.

39.2 Sign in

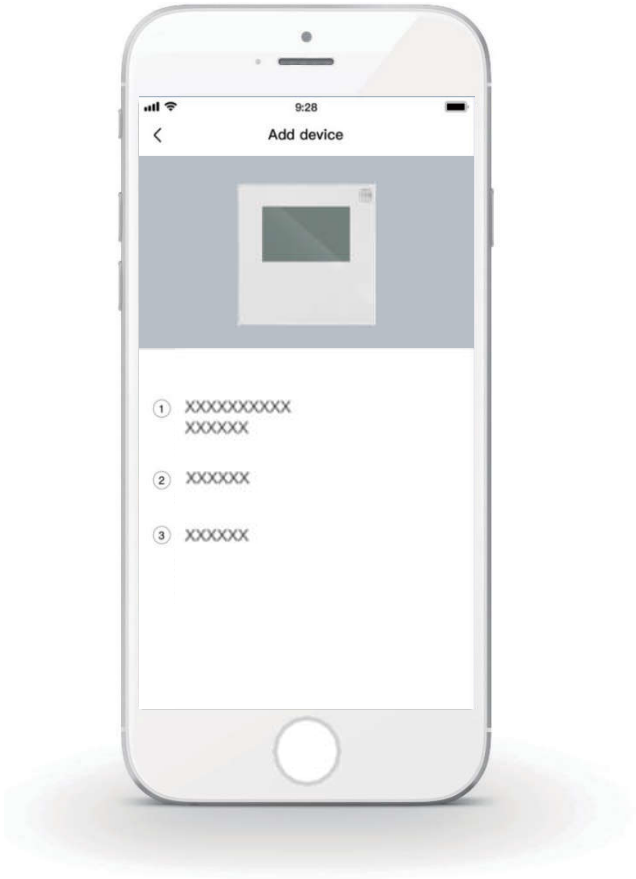
After installation, open the APP and login.



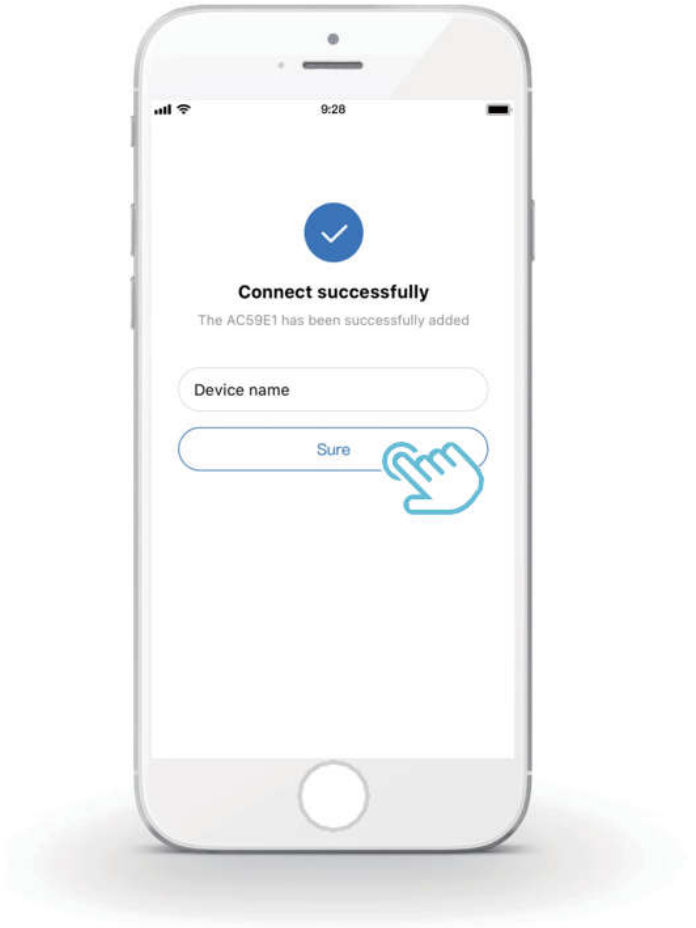
39.3 Add device and login to home Wi-Fi



39.4 Operate the wired controller according to APP promps

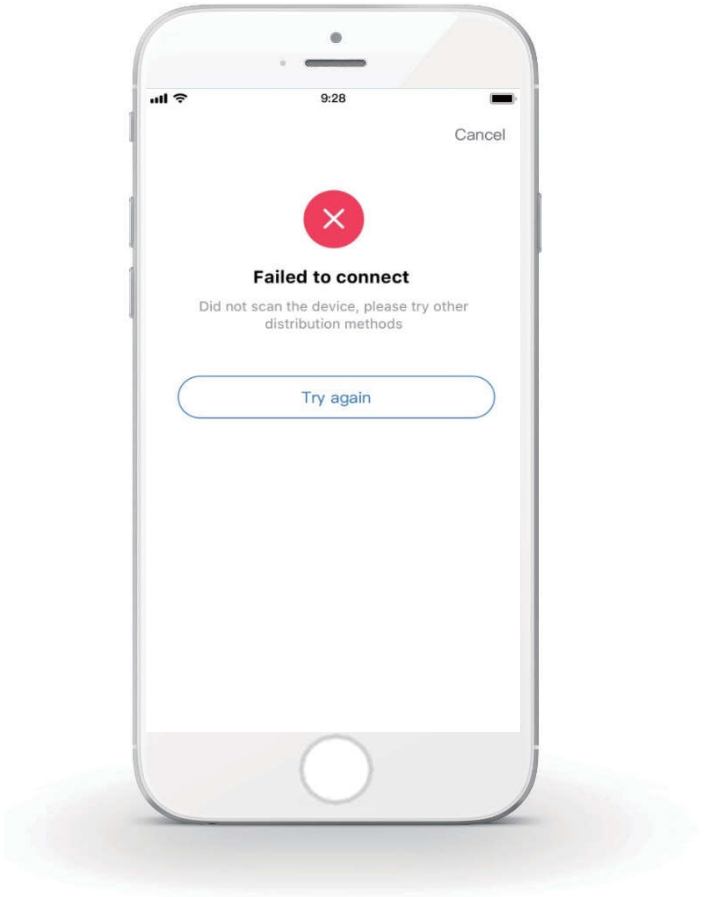


39.5 Wait for the home appliance to connect, and click “Sure”.



39.6 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.

39.7 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.



⚠ 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

40 USB function guidelines

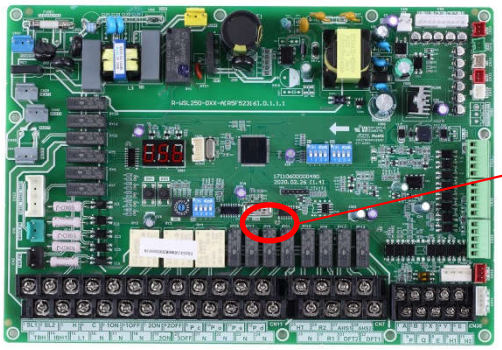
40.1 Parameters setting transfer between wired controllers

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:

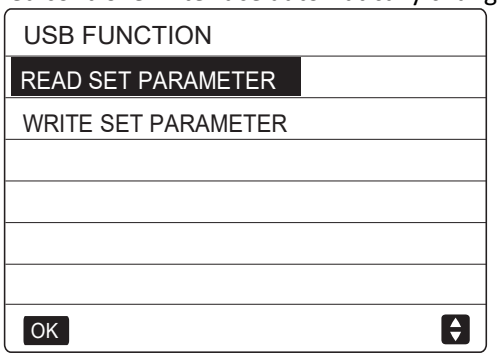
Step 1:

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

"USb" appears on digital display



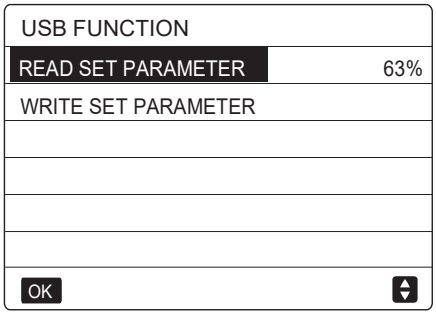
Wired controller interface automatically changes



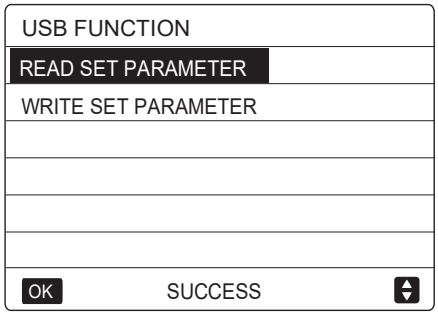
Step 2:

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.

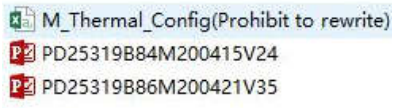
Select "READ SET PARAMETER"



Finished



EXCEL generated

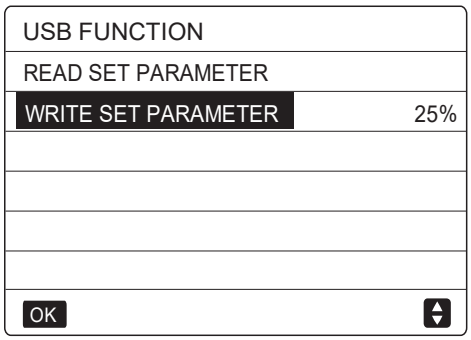


After that, if parameter correction is needed, please connect the USB with computer and open the EXCEL file to change parameters and then save it. Please do not change the file name or format. Parameters are not allowed for non-professionals to change and Sinclair recommends to use the wired controller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

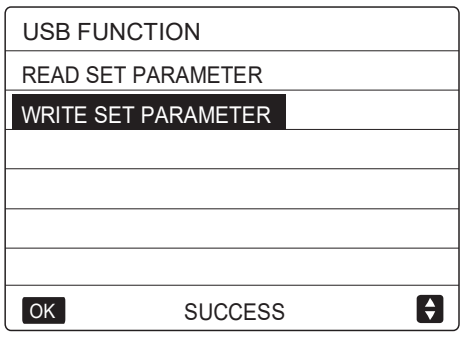
Step 3:

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"



Finished



40.2 Convenient program upgrade for unit

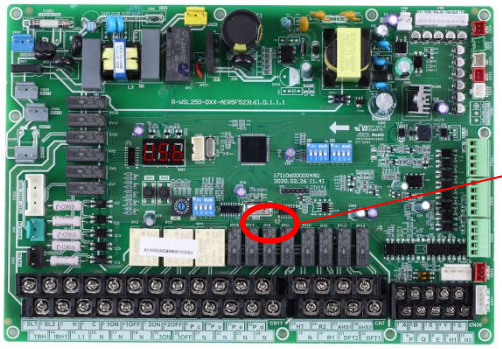
There is no need to carry any heavy equipment but only USB disk can realize program upgrade. Steps are as follows:

Step 1:
Copy new program in U disk root directory where other files in bin format are not allowed in

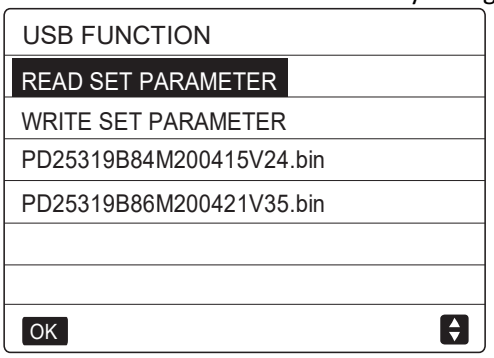
Step 2:
Power on and make sure communication is normal.

Step 3:
Plug U disk into the port of hydronic PCB.

"USb" appears on digital display

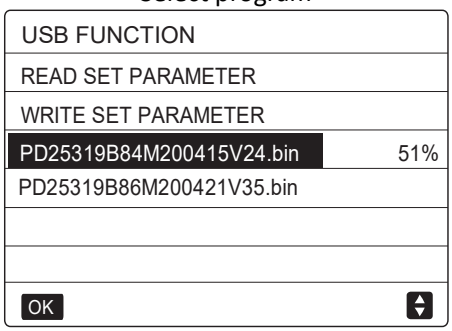


Wired controller interface automatically changes

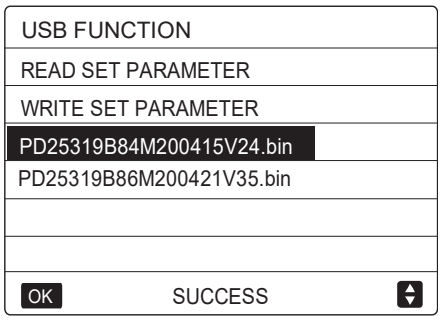


Step 4:
Please distinguish between programs for main control PCB and hydronic PCB. Select one of them and press "OK" button then rate of progress appears. When the process is finished, "SUCCESS" appears below. For upgrading outdoor unit, the process normally lasts for several minutes while only few seconds is needed for indoor unit.

Select program

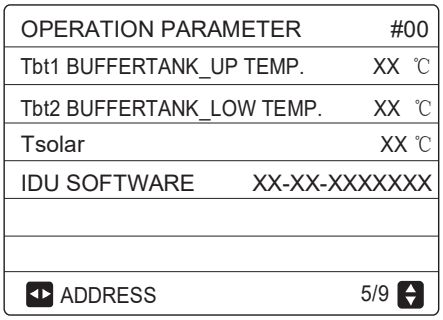


Finished



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



Check ODU software version

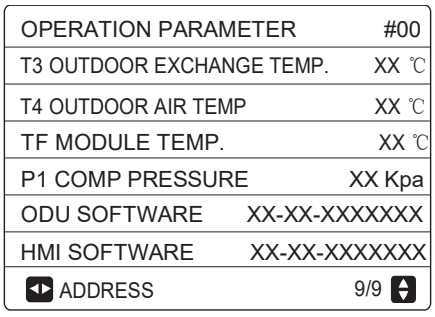
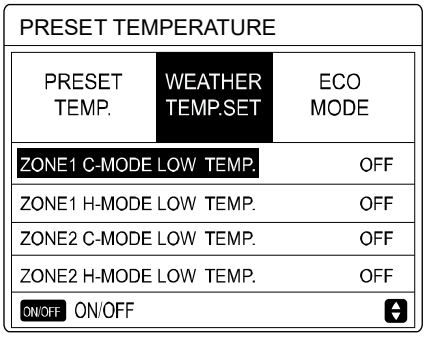


Figure 3-9.1: WEATHER TEMP. SET menu

41 Climate Related Curves

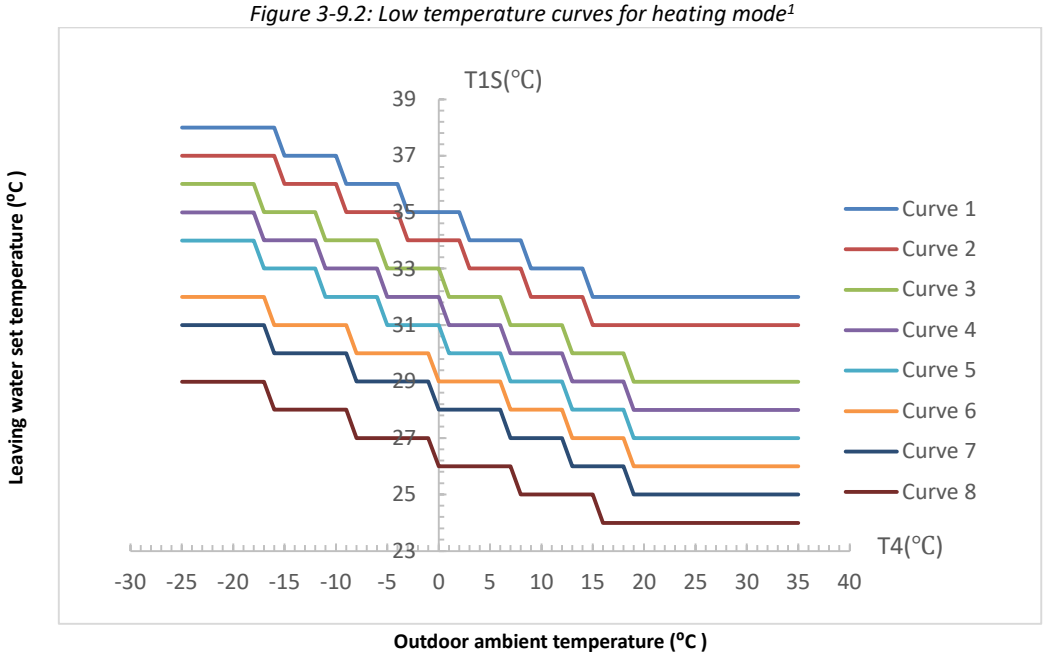


The climate related curves can be selected in the user interface, **MENU > PRESET TEMPERATURE > WEATHER TEMP. SET**.

The curves for heating mode and ECO heating mode are the same but the default curve is curve 4 in heating mode, while in ECO mode, the default curve is curve 6.
The default curves for cooling mode is curve 4. Once the curve is selected, the leaving water set temperature (T1s) is determined by the outdoor temperature. In each mode, each curve from the eight curves in the user interface can be selected. The relationship between outdoor ambient temperature (T4) and leaving water set temperature (T1s) is described as in Figure 3-9.2, Figure 3-9.3, Figure 3-9.4 and Figure 3-9.5.

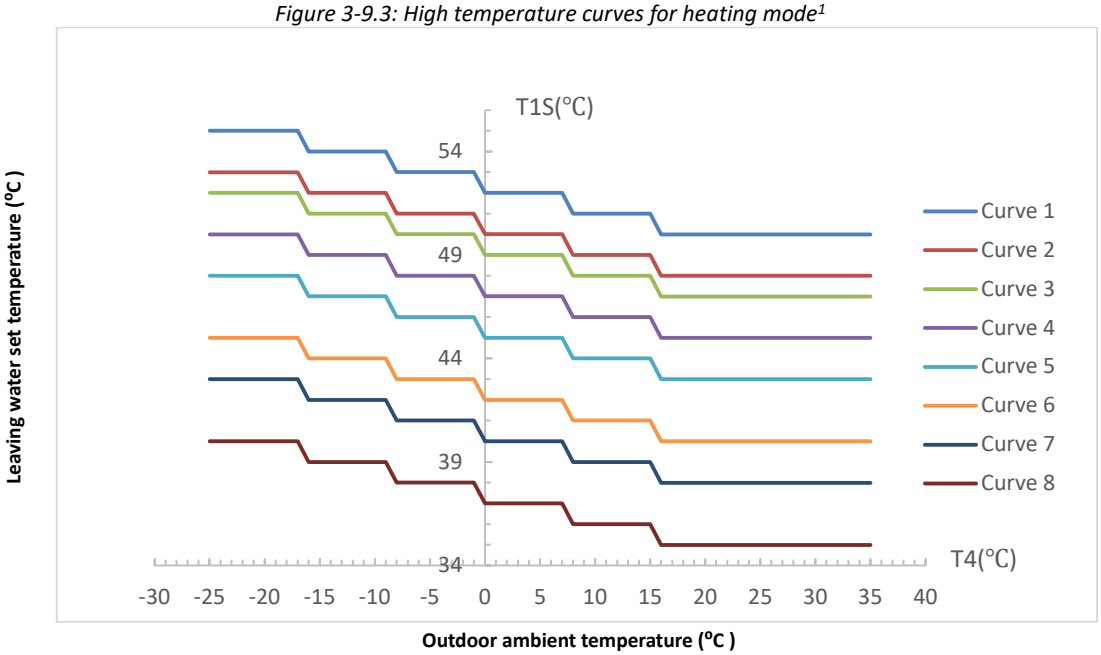
The automatic setting curves are the ninth curve for cooling and heating mode, the ninth curve can be set as in Figure 3-9.6 and Figure 3-9.7.

Figure 3-9.2: Low temperature curves for heating mode[1]



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.

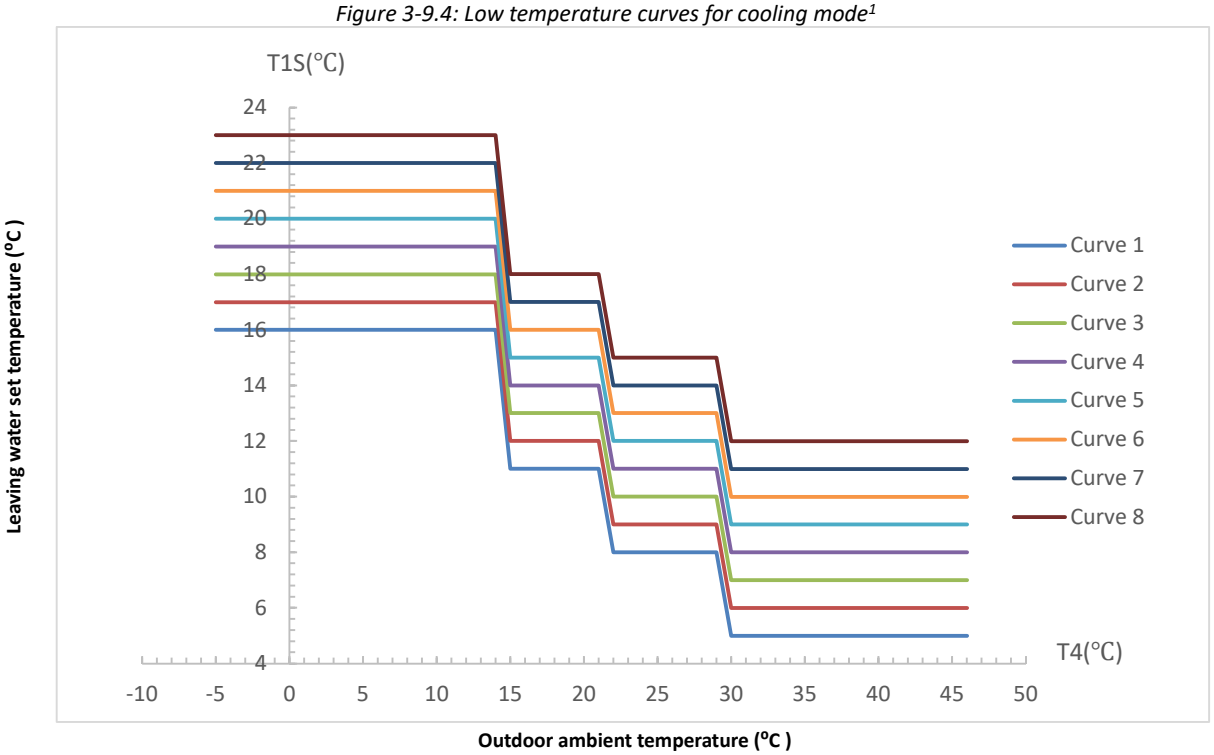
Figure 3-9.3: High temperature curves for heating mode[1]



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.

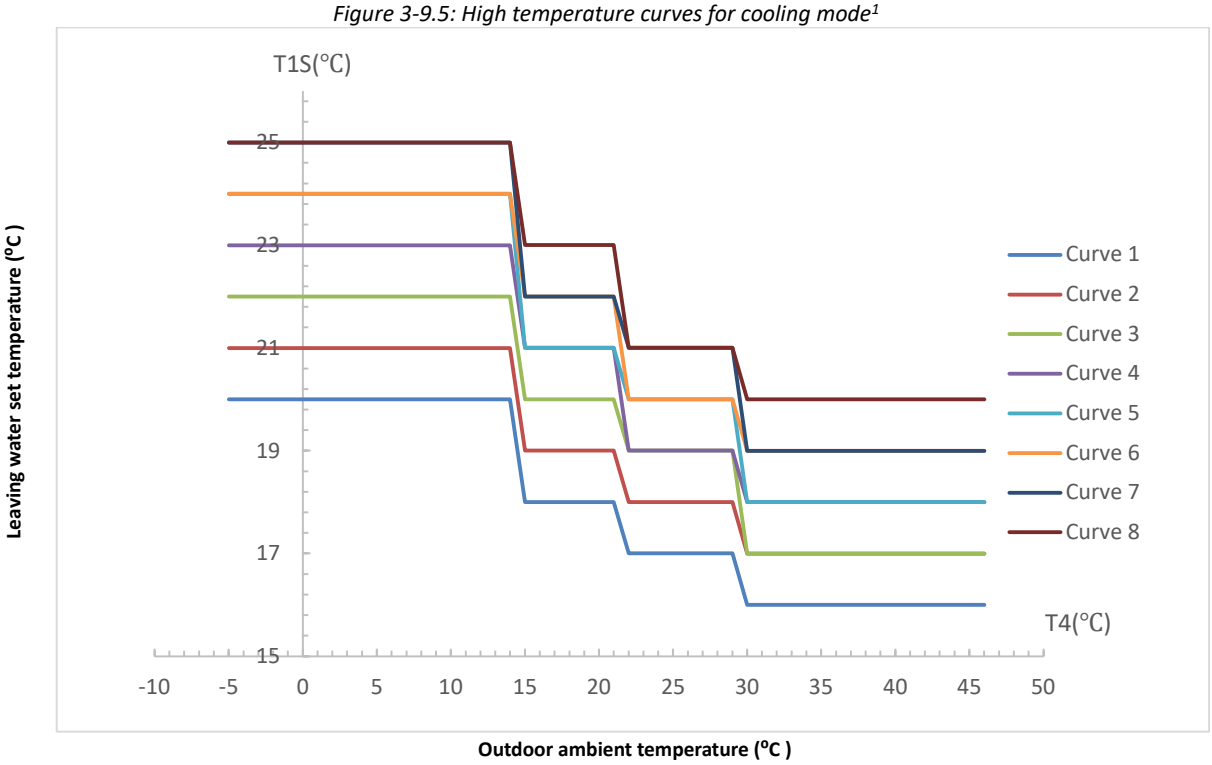
Figure 3-9.4: Low temperature curves for cooling mode[1]



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 and curve 6 is default in ECO mode.

Figure 3-9.5: High temperature curves for cooling mode[1]



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 and curve 6 is default in ECO mode.

Figure 3-9.6: Automatic setting curve for heating mode

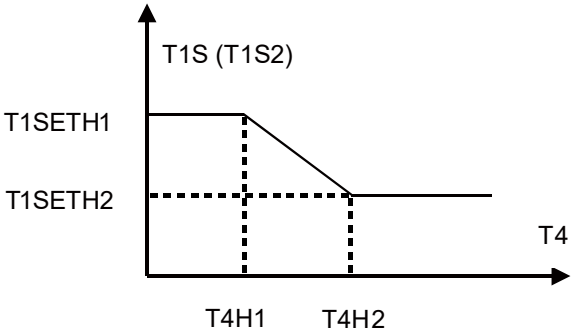
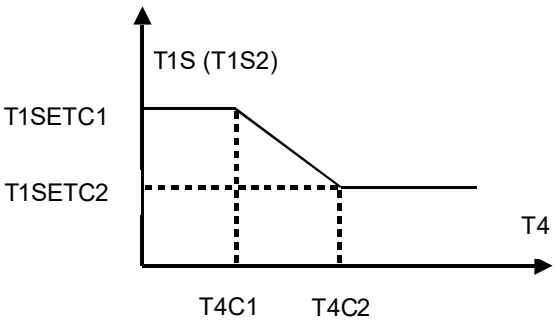


Figure 3-9.7: Automatic setting curve for cooling mode



The setting of T1SETH1, T1SETH2, T4H1, T4H2 refer to Part 3, 7.6" HEATING MODE SETTING Menu" and T1SETC1, T1SETC2, T4C1, T4C2 refer to Part 3, 7.5" COOLING MODE SETTING Menu".

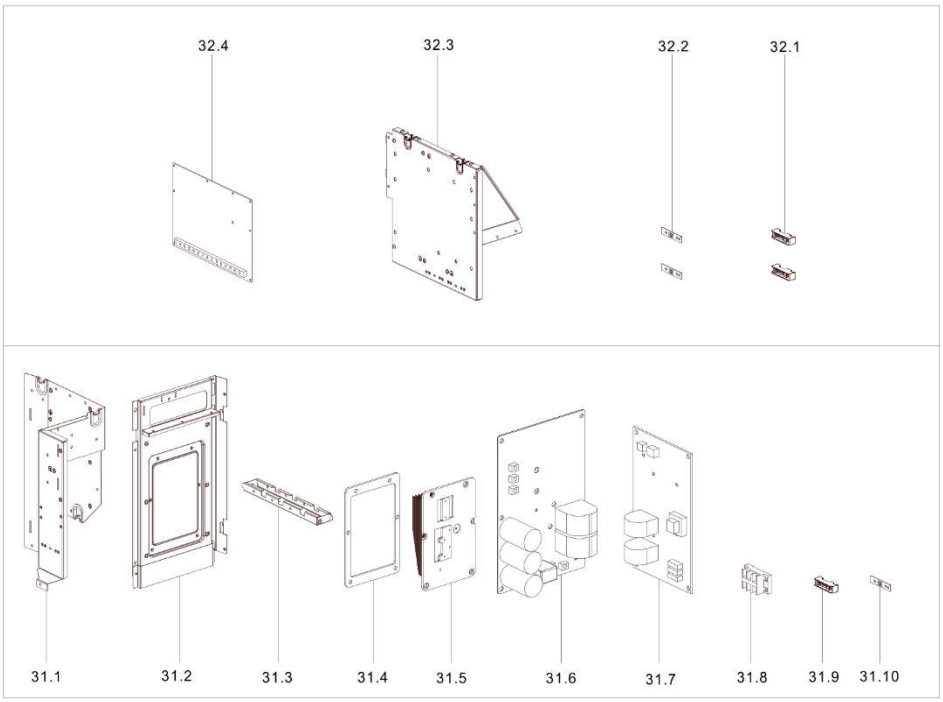
42 Error Code Table

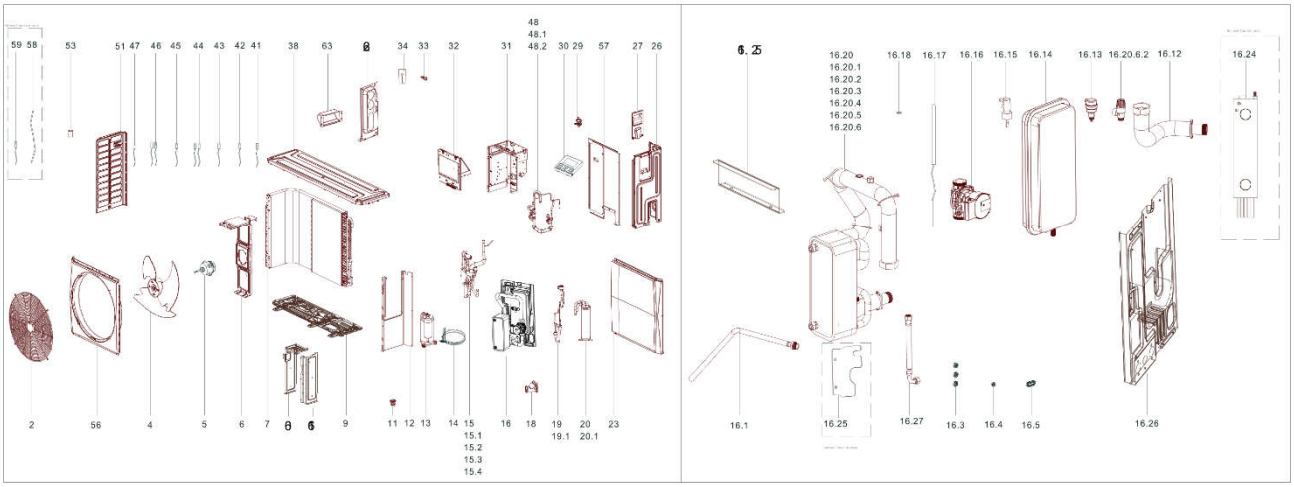
Table 3-10.1: Error code table

Error code	Content[2]
C7	Transducer module temperature too high protect
E0	Water flow failure (E8 appears 3 times)
E1	Phase sequence error (for 3 phase models)
E2	Communication error between the main control board of hydraulic module and user interface
E3	Backup electric heater exchanger water outlet temperature sensor T1 error
E4	Domestic hot water tank temperature sensor T5 error
E5	Air side heat exchanger refrigerant outlet temperature sensor T3 error
E6	Outdoor ambient temperature sensor T4 error
E7	Balance tank sensor Tbt1 error
E8	Water flow failure within 3 times
E9	Suction pipe temperature sensor Th error
EA	Discharge pipe temperature sensor Tp error
Eb	Solar board sensor Tsolar error
Ec	Balance tank sensor Tbt2 error
Ed	Water side heat exchanger water inlet temperature sensor Twin error
EE.	Hydronic box EEPROM error
F1	DC generatrix voltage is too low
H0	Communication error between outdoor unit main control chip and hydronic box main control chip
H1	Communication error between outdoor unit main control chip and inverter driver chip
H2	Water side heat exchanger refrigerant outlet (liquid pipe) temperature sensor error
H3	Water side heat exchanger refrigerant inlet (gas pipe) temperature sensor error
H4	Inverter module protection (L0/L1 appear 3 times in one hour)
H5	Room temperature sensor Ta error
H6	DC fan error
H7	Abnormal main circuit voltage
H8	Pressure sensor error
H9	Zone 2 water outlet temperature sensor Tw2 error
HA	Water side heat exchanger water outlet temperature sensor error
Hb	PP protection three times in a row and Twout<7℃
Hd	Communication fault between master unit and slave unit (in parallel)
HE	Communication error between main board and thermostat transfer board
H.F.	Refrigerant system EEPROM error
HH	H6 appears 10 times in 120min
HP	Low pressure protection (pressure < 0.6MPa for 3 times in one hour)
P0	Low pressure protection
P1	High pressure protection
P3	Compressor current protection
P4	Discharge temperature sensor Tp protection
P5	High temperature difference between water side heat exchanger water inlet and water outlet temperatures protection
P6	Inverter module protection
L0	Inverter module protection
L1	DC bus low voltage protection
L2	DC bus high voltage protection
L4	MCE error
L5	Zero speed protection
L7	Phase sequence error
L8	Compressor frequency variation greater than 15Hz within one second protection
L9	Actual compressor frequency differs from target frequency by more than 15Hz protection
Pb	Water side heat exchanger anti-freeze protection
Pd	High temperature protection of refrigerant outlet temperature of condenser in cooling mode
PP	Water side heat exchanger inlet temperature is higher than outlet temperature in heating/DHW mode
bH	PED board error

43 Spare parts

43.1 SMHM-60B/3

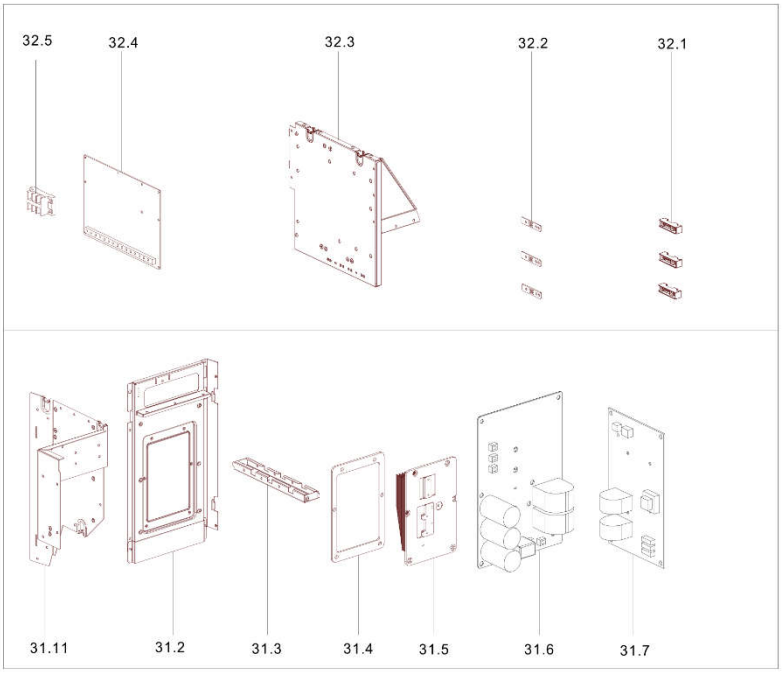


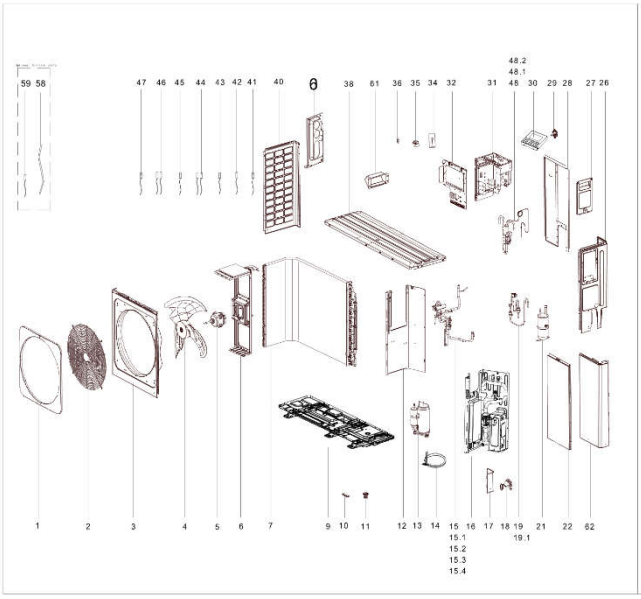


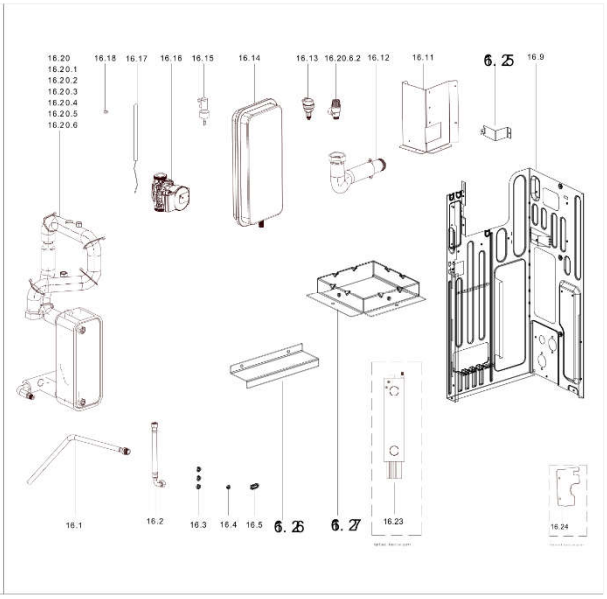
EX_ID	Part name(EN)	Part Code	Qty	Remark
2	Wind nets	12927000001413	1	
4	Axial flow fan	12100105000022	1	
5	Brushless DC Motor	11002015010746	1	
6	Motor holder assembly	12223000012695	1	
7	Condenser part	15827000001668	1	
9	Chassis part	12227000016170	1	
11	Drain hose	12100509000553	1	
12	Partition board assembly	12222500002372	1	
13	DC Inverter Rotary Compressor	11103020005759	1	
14	Compressor electric heater	17402001000339	2	
15	Four-way valve assembly	15427000004724	1	
15.1	4-way valve suite	15500216000103	1	
15.2	Pressure sensor	11201008000033	1	
15.3	Pressure switch	17400516000808	1	
15.4	meter connector	15500301000035	1	
16	Hydraulic module assembly	12210600A00929	1	
16.1	Connecting hose	12100509000392	1	
16.12	Water outlet pipe assembly	15410600A00101	1	
16.12	Water Outlet pipe assembly	15425300A00333	1	
16.13	Exhaust valve	15500211000047	1	
16.14	closed expansion vessels with built in	15500509000107	1	
16.15	Water flow switch	17400510000474	1	
16.16	Shielded pump	17400802003473	1	
16.17	Electrical heater of differential pressure valve	17402001000043	1	
16.18	Seal ring	12600701001469	2	
16.18	Seal ring (RoHS)	12600701000082	2	
16.20	Heat-exchanger assembly	15725300A00181	1	
16.20.1	Temperature sensing tube assembly	15325300000051	2	
16.20.2	seal ring	12600701000064	2	
16.20.3	Water Inlet pipe assembly	15425300003204	1	
16.20.4	Plate heat exchanger	15700101000977	1	
16.20.5	Electrical heater of plate heat exchanger	17402001000083	1	
16.20.6	Water outlet pipe assembly	15410600A00102	1	
16.25	Fixing board	12210600002370	1	
16.26	Support Plate	12225300011538	1	
16.27	Connection hose	12110600000209	1	
18	Y shape filter	15500504000150	1	
19	Expansion valve assembly	15427000004725	1	
19.1	Electronic expansion valve suite	15500213001526	1	
20	Liquid storage tank assembly	15425300003060	1	
20.1	Gas-liquid separator	15500501001808	1	
20.1	Connecting tube	15125300006529	1	
20.1	L-shape pipe	15100101008763	1	
23	Right Front Side Panel Assembly	12223000015411	1	
26	Rear right clapboard assembly	12222000014225	1	

27	Large handle	12227000011039	1	
29	Sensor clamp	12100303001162	1	
30	Wired controller	17317100006815	1	
31	E-part box assembly	17227000A07470	1	
31.1	Electrical appliance mounting plate assembly	12223000015294	1	
31.2	Radiator support plate	12227000015799	1	
31.3	Connecting plate assembly	12227100007239	1	
31.4	Seal gasket	12627000000646	1	
31.5	Optional heat exchanger	12927000001412	1	
31.6	Module board assembly	17125300003909	1	
31.7	Outdoor main control board assembly	17125300004203	1	
31.8	Wire joint	17400401003936	1	
31.8	Terminal	17400401000026	1	
31.9	Tension clip	12100303000123	1	
32	E-part box assembly	17227000A05891	1	
32.1	Wire clip	12100303001082	2	
32.2	Insulation plate	12122000006931	2	
32.3	Electric control box welding assembly	12227000A06939	1	
32.4	Hydraulic module, Main control board assembly	17110600000570	1	
33	rubber base	12600401000158	1	
34	EXV coil protective jacket	12600901000108	1	
38	Top cover assembly	12227000012977	1	
41	Room Temperature Sensor	11201007000039	1	
42	Pipe Temperature Sensor	11201007000164	1	
43	Pipe Temperature Sensor	11201007000382	1	
44	Pipe Temperature Sensor	11201007000165	2	
45	Water Temperature Sensor	11201007000223	1	
46	Water Temperature Sensor	11201007001982	2	
47	Discharge Temperature Sensor	11201007002463	1	
48	Suction pipe assembly	15427000004447	1	
48.1	One-way solenoid valve	15500205000419	1	
48.2	Pressure switch	17400516000008	1	
51	Column	12223000012696	1	
53	Rubber washer	12600401000642	1	
56	Front panel	12223000012698	1	
57	Side panel assembly	12225300011536	1	
58	Chassis electric heating	17402001000259	1	
59	Water Temperature Sensor	11201007001980	1	
60	Plate heat exchanger fixed plate	12227400000421	1	
61	Plate heat exchanger fixed plate	12227400000441	1	
62	Valve plate	12227000012978	1	
63	Rainproof cover	12127000001300	1	

43.2 SMHM-80B/3





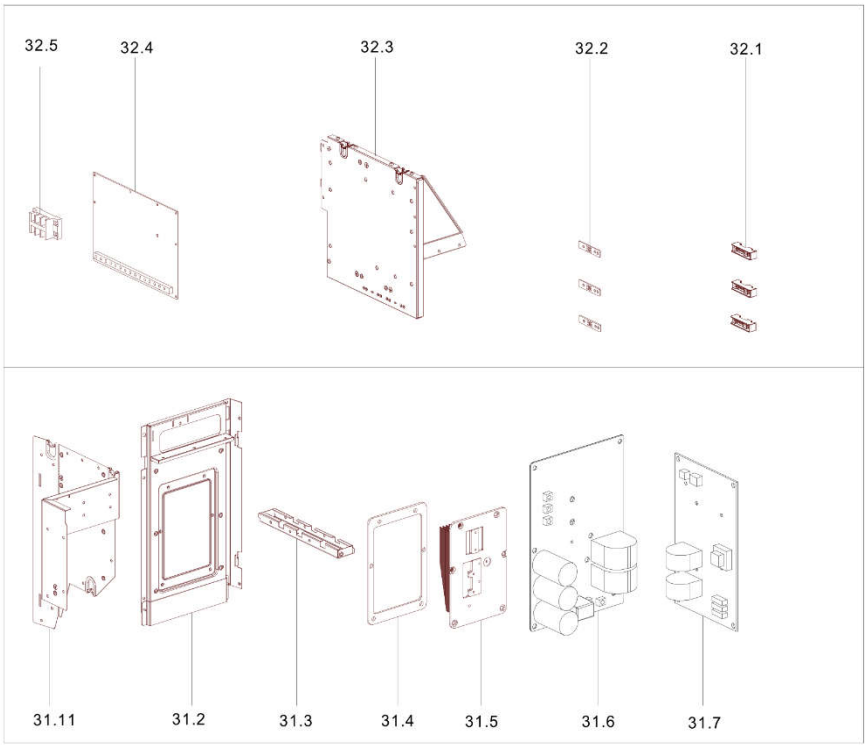


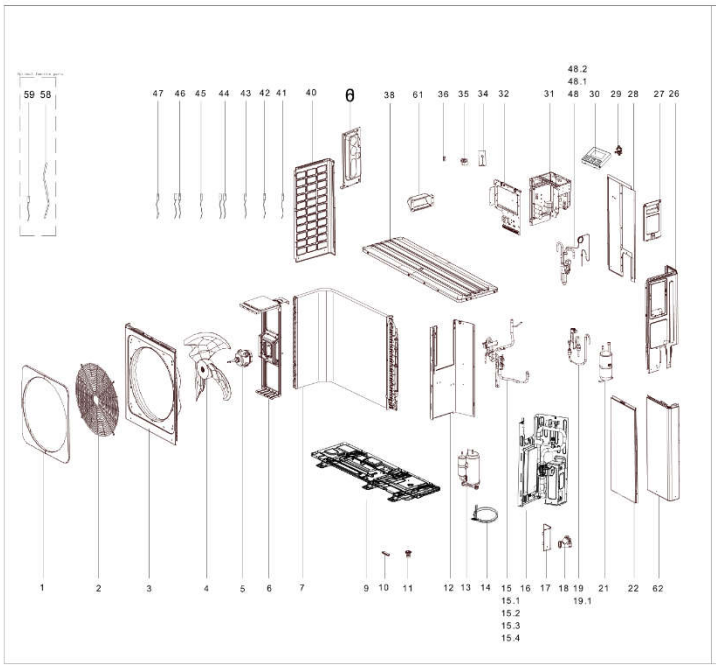
EX_ID	Part name(EN)	Part Code	Qty	Remark
1	Panel	12127000001137	1	
2	Wind nets	12927000001414	1	
3	Right front panel	12227000009453	1	
4	Axial fan	12100105000641	1	
5	Brushless DC Motor	11002015006321	1	
6	Motor bracket I assembly	12227000012340	1	
7	B unit condenser assembly	15827000001670	1	
9	Chassis part	12227000016171	1	

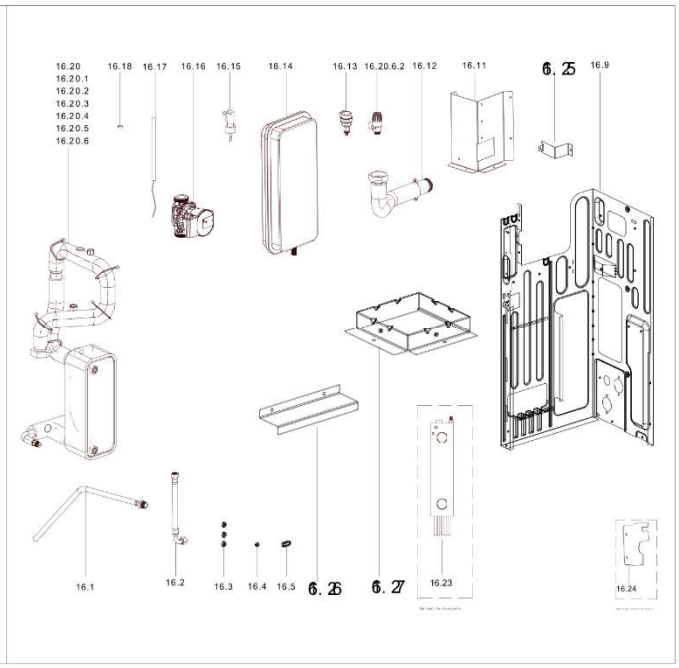
10	Chassis waterproof cover	12627000000002	1	
11	Drain hose	12100509000553	1	
12	Partition board assembly	12227000015810	1	
13	DC Inverter Rotary Compressor	11103020005012	1	
14	Compressor electric heater	17402001000339	2	
15	Four-way valve assembly	15427000004726	1	
15.1	4-way valve suite	15500216000103	1	
15.2	Pressure sensor	11201008000033	1	
15.3	Pressure switch	17400516000808	1	
15.4	meter connector	15500301000035	1	
16	Hydraulic module assembly	12210600A00910	1	
16.1	Connecting hose	12100509000392	1	
16.2	Connection hose	12110600000229	1	
16.9	Partition board assembly	12225300011537	1	
16.11	Plate heat exchanger fixed plate	12227400000442	1	
16.12	Water outlet pipe assembly	15410600A00104	1	
16.12	Water Outlet pipe assembly	15425300003206	1	
16.13	Exhaust valve	15500211000047	1	
16.14	closed expansion vessels with built in	15500509000107	1	
16.15	Water flow switch	17400510000474	1	
16.16	Shielded pump	17400802003473	1	
16.17	Electrical heater of differential pressure valve	17402001000043	1	
16.18	Seal ring (RoHS)	12600701000082	2	
16.18	Seal ring	12600701001469	2	
16.20	Heat-exchanger assembly	15725300A00182	1	
16.20.1	Temperature sensing tube assembly	15325300000051	2	
16.20.2	seal ring	12600701000064	2	
16.20.3	Water Inlet pipe assembly	15425300003208	1	
16.20.4	Plate heat exchanger	15700101000977	1	
16.20.5	Electrical heater of plate heat exchanger	17402001000083	1	
16.20.6	Water outlet pipe assembly	15410600A00103	1	
16.26	Fixing board	12210600002370	1	
16.27	Plate heat exchanger supporting plate	12227400000425	1	
17	Clapboard	12227000007795	1	
18	Y shape filter	15500504000152	1	
19	Expansion valve assembly	15427000004727	1	
19.1	Electronic expansion valve suite	15500213001527	1	
21	Gas-liquid separator	15500501001809	1	
22	Front panel assembly	12227000015808	1	
23	Front Right Side Plate Assembly	12227000016351	1	
26	Rear-Right Side Plate Assembly	12227000012342	1	
27	Big handle assembly	12227000007741	1	
28	Side panel assembly	12225300011541	1	
29	Sensor clamp	12100303001162	1	
30	Wired controller	17317100006815	1	
31	E-part box assembly	17227000005622	1	
31.2	Radiator support plate	12227000015799	1	
31.3	Connecting plate assembly	12227100007239	1	
31.4	Seal gasket	12627000000646	1	
31.5	Optional heat exchanger	12927000001412	1	
31.6	Module board assembly	17125300003905	1	
31.7	Outdoor main control board assembly	17125300004203	1	
31.11	Electrical appliance mounting plate assembly	12223000015291	1	
32	E-part box assembly	17210600A00210	1	

32.1	Wire clip	12100303001082	3	
32.2	Insulation plate	12122000006931	3	
32.3	Electric control box welding assembly	12225300A02421	1	
32.4	Hydraulic module, Main control board	17110600000570	1	
32.5	Wire joint	17400401003936	1	
32.5	Terminal	17400401000026	1	
34	EXV coil protective jacket	12600901000108	1	
35	Rubber Cap	12600901000162	1	
36	rubber base	12600401000240	1	
38	Top cover assembly	12227000012979	1	
40	Clapboard	12227000007803	1	
41	Room Temperature Sensor	11201007000039	1	
42	Pipe Temperature Sensor	11201007000164	1	
43	Pipe Temperature Sensor	11201007000382	1	
44	Pipe Temperature Sensor	11201007000165	2	
45	Water Temperature Sensor	11201007000223	1	
46	Water Temperature Sensor	11201007001982	2	
47	Discharge Temperature Sensor	11201007002463	1	
48	D unit suction pipe assembly	15427000004451	1	
48.1	One-way solenoid valve	15500205000419	1	
48.2	Pressure switch	17400516000008	1	
58	Chassis electric heating	17402001000259	1	
59	Water Temperature Sensor	11201007001980	1	
60	Valve plate	12227000012978	1	
61	Rainproof cover	12127000001300	1	

43.3 SMHM-100B/3



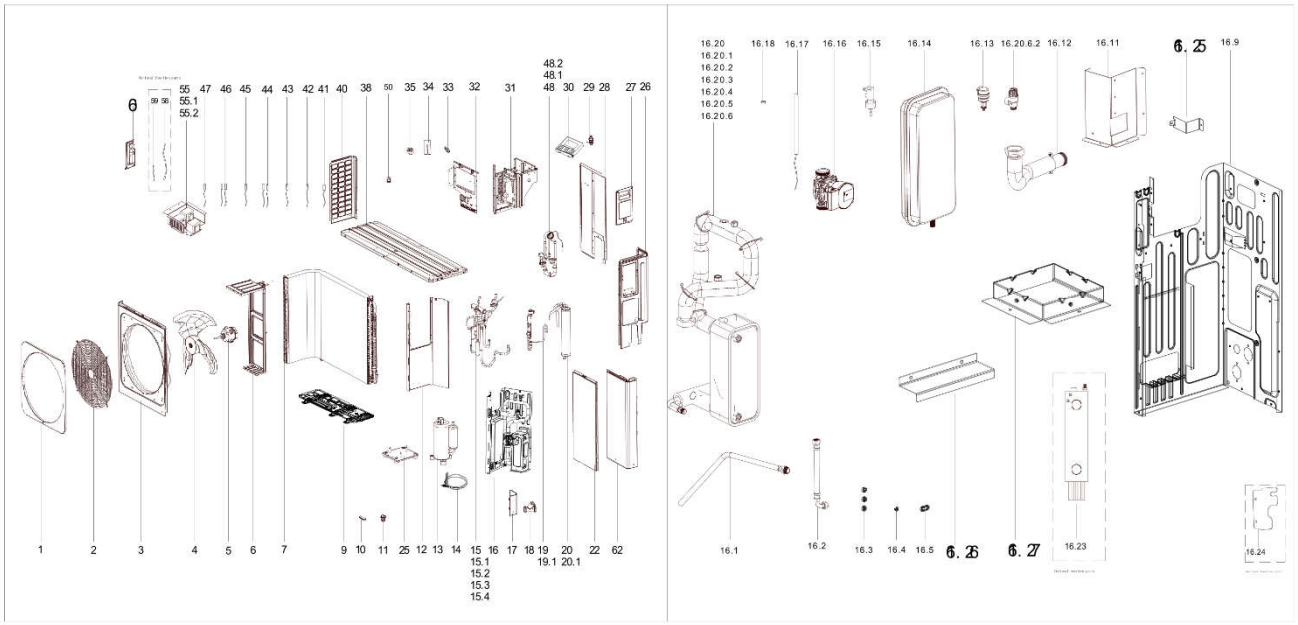


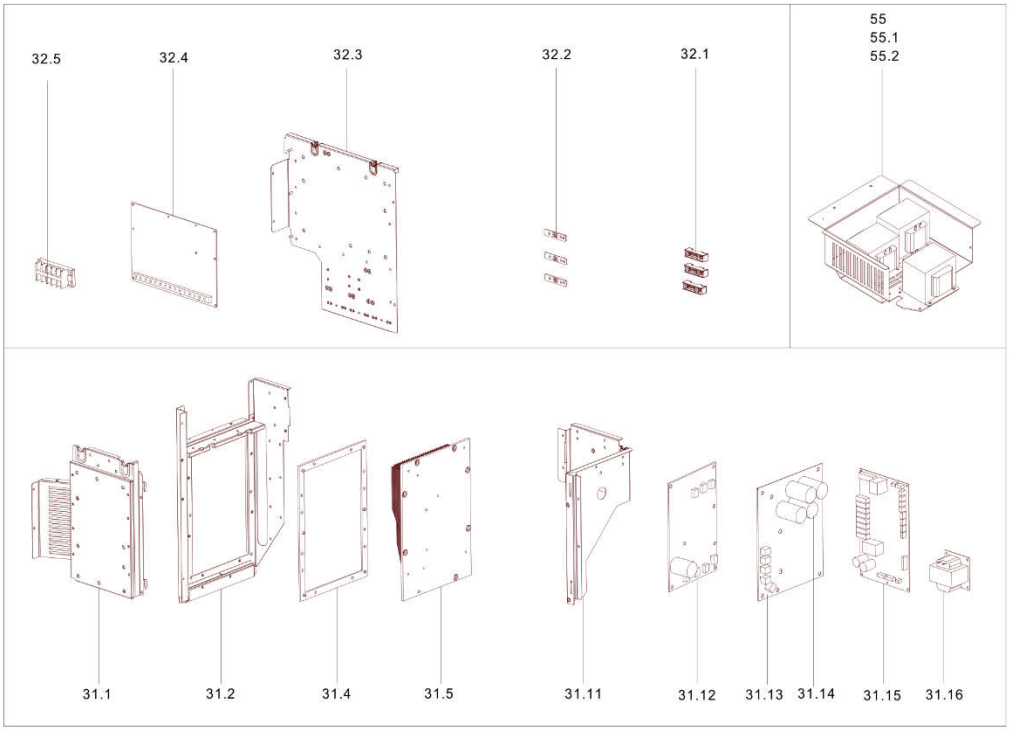


EX_ID	Part name(EN)	Part Code	Qty	Remark
1	Panel	12127000001137	1	
2	Wind nets	12927000001414	1	
3	Right front panel	12227000009453	1	
4	Axial fan	12100105000641	1	
5	Brushless DC Motor	11002015006321	1	
6	Motor bracket I assembly	12227000012340	1	
7	B unit condenser assembly	15827000001670	1	
9	Chassis part	12227000016171	1	
10	Chassis waterproof cover	12627000000002	1	
11	Drain hose	12100509000553	1	
12	Partition board assembly	12227000015810	1	
13	DC Inverter Rotary Compressor	11103020005012	1	
14	Compressor electric heater	17402001000339	2	
15	Four-way valve assembly	15427000004726	1	
15.1	4-way valve suite	15500216000103	1	
15.2	Pressure sensor	11201008000033	1	
15.3	Pressure switch	17400516000808	1	
15.4	meter connector	15500301000035	1	
16	Hydraulic module assembly	12210600A00910	1	
16.1	Connecting hose	12100509000392	1	
16.2	Connection hose	12110600000229	1	
16.9	Partition board assembly	12225300011537	1	
16.11	Plate heat exchanger fixed plate	12227400000442	1	
16.12	Water outlet pipe assembly	15410600A00104	1	
16.12	Water Outlet pipe assembly	15425300003206	1	
16.13	Exhaust valve	15500211000047	1	
16.14	closed expansion vessels with built in	15500509000107	1	
16.15	Water flow switch	17400510000474	1	
16.16	Shielded pump	17400802003473	1	
16.17	Electrical heater of differential pressure valve	17402001000043	1	
16.18	Seal ring (RoHS)	12600701000082	2	
16.18	Seal ring	12600701001469	2	
16.20	Heat-exchanger assembly	15725300A00182	1	
16.20.1	Temperature sensing tube assembly	15325300000051	2	
16.20.2	seal ring	12600701000064	2	
16.20.3	Water Inlet pipe assembly	15425300003208	1	
16.20.4	Plate heat exchanger	15700101000977	1	
16.20.5	Electrical heater of plate heat exchanger	17402001000083	1	
16.20.6	Water outlet pipe assembly	15410600A00103	1	
16.24	Plate heat exchanger supporting plate	12227400000425	1	
16.26	Fixing board	12210600002370	1	
17	Clapboard	12227000007795	1	
18	Y shape filter	15500504000152	1	
19	Expansion valve assembly	15427000004727	1	
19.1	Electronic expansion valve suite	15500213001527	1	
21	Gas-liquid separator	15500501001809	1	
22	Front panel assembly	12227000015808	1	
26	Rear-Right Side Plate Assembly	12227000012342	1	
27	Big handle assembly	12227000007741	1	
28	Side panel assembly	12225300011541	1	
29	Sensor clamp	12100303001162	1	

30	Wired controller	17317100006815	1	
31	E-part box assembly	17227000005622	1	
31.2	Radiator support plate	12227000015799	1	
31.3	Connecting plate assembly	12227100007239	1	
31.4	Seal gasket	12627000000646	1	
31.5	Optional heat exchanger	12927000001412	1	
31.6	Module board assembly	17125300003905	1	
31.7	Outdoor main control board assembly	17125300004203	1	
31.17	Electrical appliance mounting plate assembly	12223000015291	1	
32	E-part box assembly	17210600A00210	1	
32.1	Wire clip	12100303001082	3	
32.2	Insulation plate	12122000006931	3	
32.3	Electric control box welding assembly	12225300A02421	1	
32.4	Hydraulic module, Main control board	17110600000570	1	
32.5	Wire joint	17400401003936	1	
32.5	Terminal	17400401000026	1	
34	EXV coil protective jacket	12600901000108	1	
35	Rubber Cap	12600901000162	1	
36	rubber base	12600401000240	1	
38	Top cover assembly	12227000012979	1	
40	Clapboard	12227000007803	1	
41	Room Temperature Sensor	11201007000039	1	
42	Pipe Temperature Sensor	11201007000164	1	
43	Pipe Temperature Sensor	11201007000382	1	
44	Pipe Temperature Sensor	11201007000165	2	
45	Water Temperature Sensor	11201007000223	1	
46	Water Temperature Sensor	11201007001982	2	
47	Discharge Temperature Sensor	11201007002463	1	
48	D unit suction pipe assembly	15427000004451	1	
48.1	One-way solenoid valve	15500205000419	1	
48.2	Pressure switch	17400516000008	1	
58	Chassis electric heating	17402001000259	1	
59	Water Temperature Sensor	11201007001980	1	
60	Valve plate	12227000012978	1	
61	Rainproof cover	12127000001300	1	

43.4 SMHM-120B-3/9

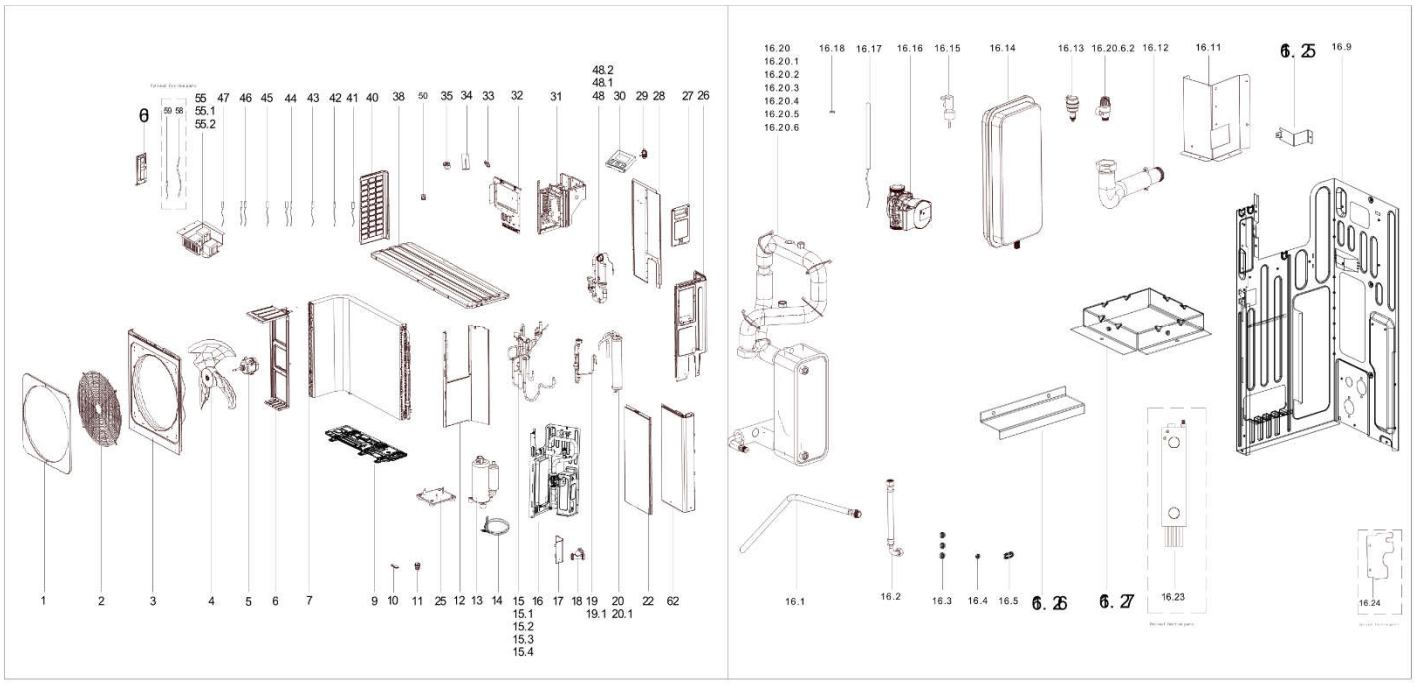


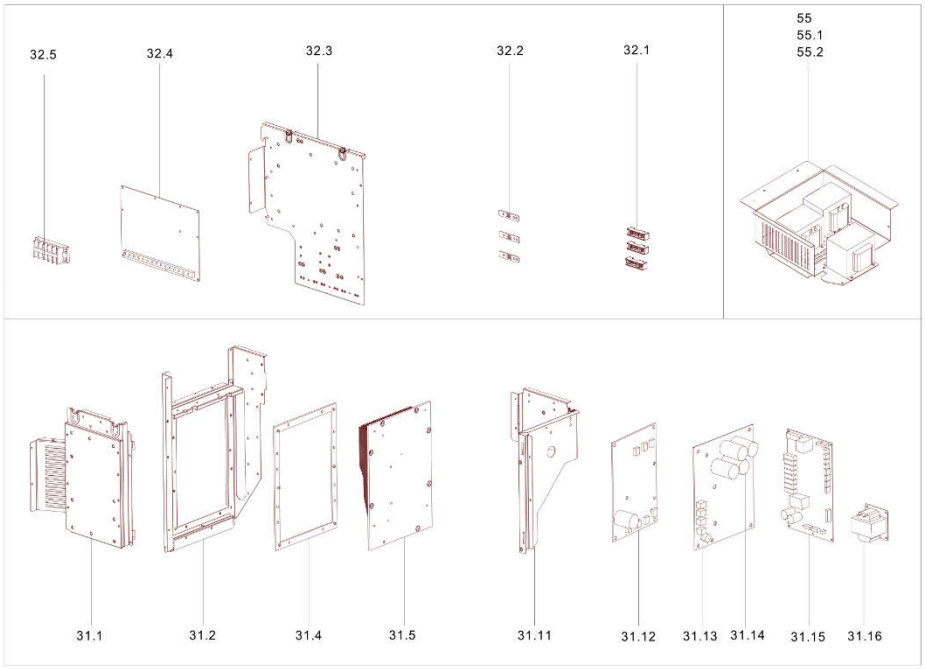


EX_ID	Part name(EN)	Part Code	Qty	Remark
1	Panel	12127000001137	1	
2	Wind nets	12927000001414	1	
3	Right front panel	12227000009453	1	
4	Axial fan	12100105000641	1	
5	Brushless DC Motor	11002015006321	1	
6	Motor bracket I assembly	12227000012449	1	
7	B unit condenser assembly	15827000001708	1	
9	Chassis part	12227000016172	1	
10	Chassis waterproof cover	12627000000002	1	
11	Drain hose	12100509000553	1	
12	Partition board assembly	12227000015803	1	
13	DC Inverter Rotary Compressor	11103020006960	1	
14	Compressor electric heater	17402001000539	1	
15	Four-way valve assembly	15427000004729	1	
15.1	four-way valve assembly	15500216001041	1	
15.2	Pressure sensor	11201008000033	1	
15.3	Pressure controller	17400516000788	1	
15.4	meter connector	15500301000035	1	
16	Hydraulic module assembly	12210600A00931	1	
16.1	Connecting hose	12100509000392	1	
16.2	Connection hose	12110600000229	1	
16.9	Partition board assembly	12225300011537	1	
16.11	Plate heat exchanger fixed plate	12227400000443	1	
16.12	Water outlet pipe assembly	15410600A00104	1	
16.12	Water Outlet pipe assembly	15425300003206	1	
16.13	Exhaust valve	15500211000047	1	
16.14	closed expansion vessels with built in	15500509000107	1	
16.15	Water flow switch	17400510000007	1	
16.16	Shielded pump	17400802003473	1	
16.17	Electrical heater of differential pressure valve	17402001000043	1	
16.18	Seal ring	12600701001469	2	
16.18	Seal ring (RoHS)	12600701000082	2	
16.20	Heat-exchanger assembly	15725300A00183	1	
16.20.1	Temperature sensing tube assembly	15325300000051	2	
16.20.2	seal ring	12600701000064	2	
16.20.3	Water Inlet pipe assembly	15425300003208	1	
16.20.4	Plate heat exchanger	15700101000976	1	
16.20.5	Electrical heater of plate heat exchanger	17402001000083	1	
16.20.6	Water outlet pipe assembly	15410600A00103	1	
16.26	Fixing board	12210600002370	1	
16.27	Plate heat exchanger supporting plate	12227400000425	1	
17	Clapboard	12227000007795	1	
18	Y shape filter	15500504000152	1	
19	Expansion valve assembly	15427000004728	1	
19.1	Electronic expansion valve suite	15500213001565	1	
20	Liquid storage tank assembly	15425300003080	1	
20.1	Seporator	15500501001851	1	
20.1	Connecting tube	15125300006547	1	
20.1	Connecting tube	15125300006546	1	
22	Front panel assembly	12227000015808	1	

23	Front Right Side Plate Assembly	12227000016351	1	
25	Compressor, supporting plate	12227000012450	1	
26	Rear-Right Side Plate Assembly	12227000012342	1	
27	Big handle assembly	12227000007741	1	
28	Side panel assembly	12225300011541	1	
29	Sensor clamp	12100303001162	1	
30	Operation and Installation Manual	16110600A06972	1	
30	Wired controller	17317100A35071	1	
31	E-part box assembly	17223000008766	1	
31.1	Electrical appliance mounting plate assembly	12223000015292	1	
31.2	Radiator support plate	12227000015796	1	
31.4	Seal gasket	12627000000647	1	
31.5	Optional heat exchanger	12927000001415	1	
31.11	Electrical appliance mounting plate assembly	12227000015797	1	
31.12	Filter board assembly	17127000008540	1	
31.13	Compressor module board assembly	17127000010897	1	
31.14	Switch board assembly	17127100001363	1	
31.15	DC inverter aqua mini chiller - Main control	17127400000355	1	
31.16	Reactance	17400306000163	1	
32	E-part box assembly	17210600A00211	1	
32.1	Wire clip	12100303001082	3	
32.2	Insulation plate	12122000006931	3	
32.3	Electric control box welding assembly	12225300A02421	1	
32.4	Hydraulic module, Main control board	17110600000570	1	
32.5	Terminal	17400401000026	1	
32.5	Wire joint	17400401003816	1	
33	rubber base	12600401000158	1	
34	EXV coil protective jacket	12600901000108	1	
35	Rubber Cap	12600901000162	1	
38	Top cover assembly	12227000012979	1	
40	Clapboard	12227000007803	1	
41	Room Temperature Sensor	11201007000039	1	
42	Pipe Temperature Sensor	11201007000164	1	
43	Pipe Temperature Sensor	11201007000382	1	
44	Pipe Temperature Sensor	11201007000165	2	
45	Water Temperature Sensor	11201007000223	1	
46	Water Temperature Sensor	11201007001982	2	
47	Discharge Temperature Sensor	11201007002463	1	
48	D unit suction pipe assembly	15427000004528	1	
48.1	One-way solenoid valve	15500205000419	1	
48.2	Pressure switch	17400516000008	1	
55	Inductance box assembly	17225300003000	1	
55.1	Electrical inductance box	12223000015290	1	
55.2	Reactor	17400306001423	3	
58	Chassis electric heating	17402001000259	1	
59	Water Temperature Sensor	11201007001980	1	
60	Valve plate	12227000012978	1	

43.5 SMHM-140B-3/9

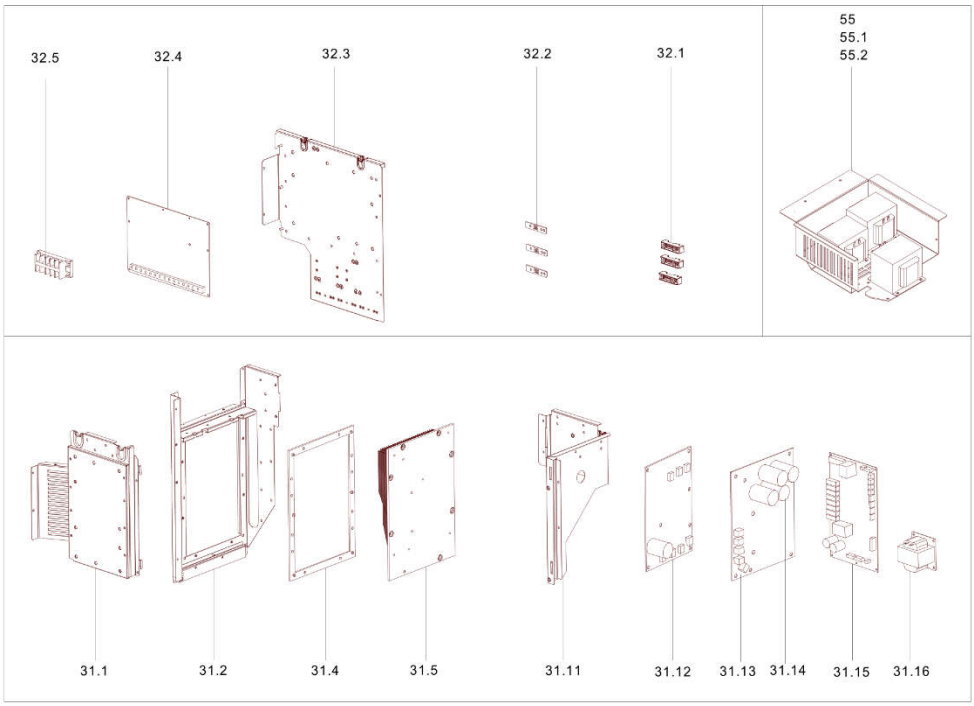


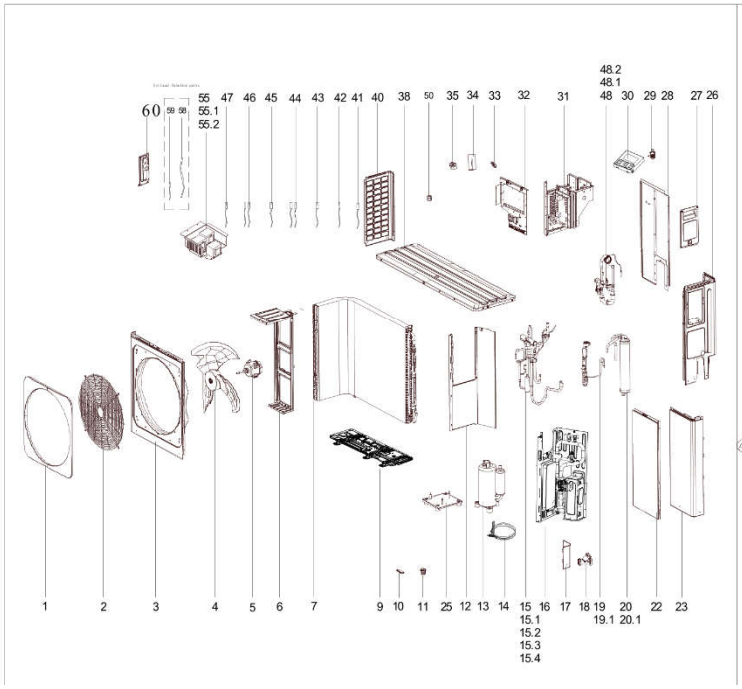


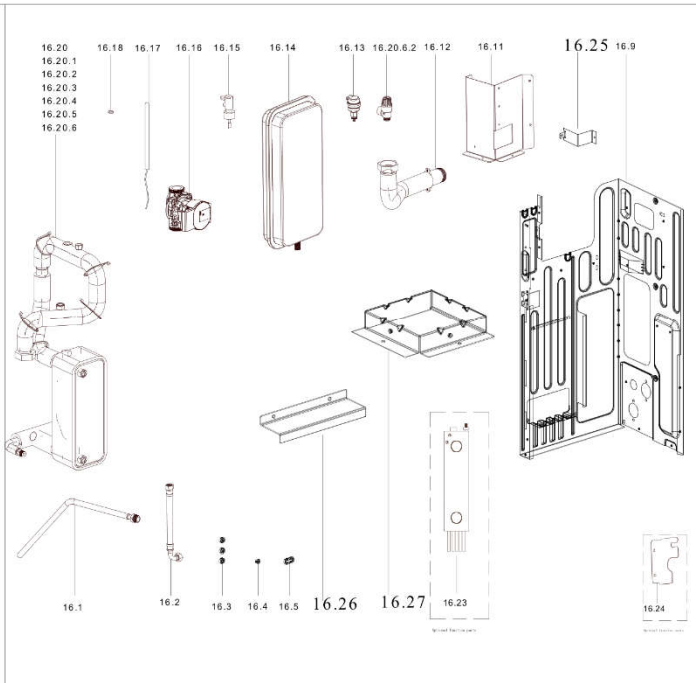
EX_ID	Part name(EN)	Part Code	Qty	Remark
1	Panel	12127000001137	1	
2	Wind nets	12927000001414	1	
3	Right front panel	12227000009453	1	
4	Axial fan	12100105000641	1	
5	Brushless DC Motor	11002015006321	1	
6	Motor bracket I assembly	12227000012449	1	
7	B unit condenser assembly	15827000001708	1	
9	Chassis part	12227000016172	1	
10	Chassis waterproof cover	12627000000002	1	
11	Drain hose	12100509000553	1	
12	Partition board assembly	12227000015803	1	
13	DC Inverter Rotary Compressor	11103020006960	1	
14	Compressor electric heater	17402001000539	1	
15	Four-way valve assembly	15427000004729	1	
15.1	four-way valve assembly	15500216001041	1	
15.2	Pressure sensor	11201008000033	1	
15.3	Pressure controller	17400516000788	1	
15.4	meter connector	15500301000035	1	
16	Hydraulic module assembly	12210600A00931	1	
16.1	Connecting hose	12100509000392	1	
16.2	Connection hose	12110600000229	1	
16.9	Partition board assembly	12225300011537	1	
16.11	Plate heat exchanger fixed plate	12227400000443	1	
16.12	Water outlet pipe assembly	15410600A00104	1	
16.12	Water Outlet pipe assembly	15425300003206	1	
16.13	Exhaust valve	15500211000047	1	
16.14	closed expansion vessels with built in	15500509000107	1	
16.15	Water flow switch	17400510000007	1	
16.16	Shielded pump	17400802003473	1	
16.17	Electrical heater of differential pressure valve	17402001000043	1	
16.18	Seal ring	12600701001469	2	
16.18	Seal ring (RoHS)	12600701000082	2	
16.20	Heat-exchanger assembly	15725300A00183	1	
16.20.1	Temperature sensing tube assembly	15325300000051	2	
16.20.2	seal ring	12600701000064	2	
16.20.3	Water Inlet pipe assembly	15425300003208	1	
16.20.4	Plate heat exchanger	15700101000976	1	
16.20.5	Electrical heater of plate heat exchanger	17402001000083	1	
16.20.6	Water outlet pipe assembly	15410600A00103	1	
16.26	Fixing board	12210600002370	1	
16.27	Plate heat exchanger supporting plate	12227400000425	1	
17	Clapboard	12227000007795	1	
18	Y shape filter	15500504000152	1	
19	Expansion valve assembly	15427000004728	1	
19.1	Electronic expansion valve suite	15500213001565	1	
20	Liquid storage tank assembly	15425300003080	1	
20.1	Seporator	15500501001851	1	
20.1	Connecting tube	15125300006547	1	
20.1	Connecting tube	15125300006546	1	
22	Front panel assembly	12227000015808	1	

23	Front Right Side Plate Assembly	12227000016351	1	
25	Compressor, supporting plate	12227000012450	1	
26	Rear-Right Side Plate Assembly	12227000012342	1	
27	Big handle assembly	12227000007741	1	
28	Side panel assembly	12225300011541	1	
29	Sensor clamp	12100303001162	1	
30	Operation and Installation Manual	16110600A06972	1	
30	Wired controller	17317100A35071	1	
31	E-part box assembly	17223000008766	1	
31.1	Electrical appliance mounting plate assembly	12223000015292	1	
31.2	Radiator support plate	12227000015796	1	
31.4	Seal gasket	12627000000647	1	
31.5	Optional heat exchanger	12927000001415	1	
31.11	Electrical appliance mounting plate assembly	12227000015797	1	
31.12	Filter board assembly	17127000008540	1	
31.13	Compressor module board assembly	17127000010897	1	
31.14	Switch board assembly	17127100001363	1	
31.15	DC inverter aqua mini chiller - Main control	17127400000355	1	
31.16	Reactance	17400306000163	1	
32	E-part box assembly	17210600A00211	1	
32.1	Wire clip	12100303001082	3	
32.2	Insulation plate	12122000006931	3	
32.3	Electric control box welding assembly	12225300A02421	1	
32.4	Hydraulic module, Main control board assembly	17110600000570	1	
32.5	Terminal	17400401000026	1	
32.5	Wire joint	17400401003816	1	
33	rubber base	12600401000158	1	
34	EXV coil protective jacket	12600901000108	1	
35	Rubber Cap	12600901000162	1	
38	Top cover assembly	12227000012979	1	
40	Clapboard	12227000007803	1	
41	Room Temperature Sensor	11201007000039	1	
42	Pipe Temperature Sensor	11201007000164	1	
43	Pipe Temperature Sensor	11201007000382	1	
44	Pipe Temperature Sensor	11201007000165	2	
45	Water Temperature Sensor	11201007000223	1	
46	Water Temperature Sensor	11201007001982	2	
47	Discharge Temperature Sensor	11201007002463	1	
48	D unit suction pipe assembly	15427000004528	1	
48.1	One-way solenoid valve	15500205000419	1	
48.2	Pressure switch	17400516000008	1	
55	Inductance box assembly	17225300003000	1	
55.1	Electrical inductance box	12223000015290	1	
55.2	Reactor	17400306001423	3	
58	Chassis electric heating	17402001000259	1	
59	Water Temperature Sensor	11201007001980	1	
60	Valve plate	12227000012978	1	

43.6 SMHM-160B-3/9



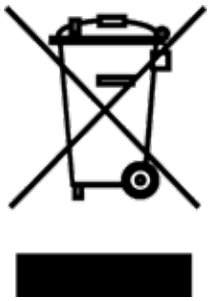




EX_ID	Part name(EN)	Part Code	Qty	Remark
1	Panel	12127000001137	1	
2	Wind nets	12927000001414	1	
3	Right front panel	12227000009453	1	
4	Axial fan	12100105000641	1	
5	Brushless DC Motor	11002015006321	1	
6	Motor bracket I assembly	12227000012449	1	
7	B unit condenser assembly	15827000001708	1	
9	Chassis part	12227000016172	1	
10	Chassis waterproof cover	12627000000002	1	
11	Drain hose	12100509000553	1	
12	Partition board assembly	12227000015803	1	
13	DC Inverter Rotary Compressor	11103020006960	1	
14	Compressor electric heater	17402001000539	1	
15	Four-way valve assembly	15427000004729	1	
15.1	four-way valve assembly	15500216001041	1	
15.2	Pressure sensor	11201008000033	1	
15.3	Pressure controller	17400516000788	1	
15.4	meter connector	15500301000035	1	
16	Hydraulic module assembly	12210600A00931	1	
16.1	Connecting hose	12100509000392	1	
16.2	Connection hose	12110600000229	1	
16.9	Partition board assembly	12225300011537	1	
16.11	Plate heat exchanger fixed plate	12227400000443	1	
16.12	Water outlet pipe assembly	15410600A00104	1	
16.12	Water Outlet pipe assembly	15425300003206	1	
16.13	Exhaust valve	15500211000047	1	
16.14	closed expansion vessels with built in	15500509000107	1	
16.15	Water flow switch	17400510000007	1	
16.16	Shielded pump	17400802003473	1	
16.17	Electrical heater of differential pressure valve	17402001000043	1	
16.18	Seal ring	12600701001469	2	
16.18	Seal ring (RoHS)	12600701000082	2	
16.20	Heat-exchanger assembly	15725300A00183	1	
16.20.1	Temperature sensing tube assembly	15325300000051	2	
16.20.2	seal ring	12600701000064	2	
16.20.3	Water Inlet pipe assembly	15425300003208	1	
16.20.4	Plate heat exchanger	15700101000976	1	
16.20.5	Electrical heater of plate heat exchanger	17402001000083	1	
16.20.6	Water outlet pipe assembly	15410600A00103	1	
16.26	Fixing board	12210600002370	1	
16.27	Plate heat exchanger supporting plate	12227400000425	1	
18	Y shape filter	15500504000152	1	
19	Expansion valve assembly	15427000004728	1	
19.1	Electronic expansion valve suite	15500213001565	1	
20	Liquid storage tank assembly	15425300003080	1	
20.1	Seporator	15500501001851	1	
20.1	Connecting tube	15125300006547	1	
20.1	Connecting tube	15125300006546	1	
22	Front panel assembly	12227000015808	1	
23	Front Right Side Plate Assembly	12227000016351	1	
25	Compressor, supporting plate	12227000012450	1	
26	Rear-Right Side Plate Assembly	12227000012342	1	
27	Big handle assembly	12227000007741	1	
28	Sid panel assembly	12225300011541	1	
29	Sensor clamp	12100303001162	1	

30	Operation and Installation Manual	16110600A06972	1	
30	Wired controller	17317100A35071	1	
31	E-part box assembly	17223000008766	1	
31.1	Electrical appliance mounting plate assembly	12223000015292	1	
31.2	Radiator support plate	12227000015796	1	
31.4	Seal gasket	12627000000647	1	
31.5	Optional heat exchanger	12927000001415	1	
31.11	Electrical appliance mounting plate assembly	12227000015797	1	
31.12	Filter board assembly	17127000008540	1	
31.13	Compressor module board assembly	17127000010897	1	
31.14	Switch board assembly	17127100001363	1	
31.15	DC inverter aqua mini chiller - Main control	17127400000355	1	
31.16	Reactance	17400306000163	1	
32	E-part box assembly	17210600A00211	1	
32.1	Wire clip	12100303001082	3	
32.2	Insulation plate	12122000006931	3	
32.3	Electric control box welding assembly	12225300A02421	1	
32.4	Hydraulic module, Main control board assembly	17110600000570	1	
32.5	Terminal	17400401000026	1	
32.5	Wire joint	17400401003816	1	
33	rubber base	12600401000158	1	
34	EXV coil protective jacket	12600901000108	1	
35	Rubber Cap	12600901000162	1	
38	Top cover assembly	12227000012979	1	
40	Clapboard	12227000007803	1	
41	Room Temperature Sensor	11201007000039	1	
42	Pipe Temperature Sensor	11201007000164	1	
43	Pipe Temperature Sensor	11201007000382	1	
44	Pipe Temperature Sensor	11201007000165	2	
45	Water Temperature Sensor	11201007000223	1	
46	Water Temperature Sensor	11201007001982	2	
47	Discharge Temperature Sensor	11201007002463	1	
48	D unit suction pipe assembly	15427000004528	1	
48.1	One-way solenoid valve	15500205000419	1	
48.2	Pressure switch	17400516000008	1	
55	Inductance box assembly	17225300003000	1	
55.1	Electrical inductance box	12223000015290	1	
55.2	Reactor	17400306001423	3	
58	Chassis electric heating	17402001000259	1	
59	Water Temperature Sensor	11201007001980	1	
60	Valve plate	12227000012978	1	
62	Clapboard	12227000007795	1	

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_2 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

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

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CE


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HEAT PUMPS