INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

AIR TO WATER HEAT PUMP WATER HEATER

CAHP-MC-38

CONTENTS

1 - Important Safety Information

Thank you for using A.O.Smith heat pump water heater. Please read all of the instructions thoroughly before the installation and operation of the water heater. Please keep this manual for future reference.

- Heat pump water heater is different from the common water heaters. Only qualified persons authorized by the manufacturer can perform the installation, service and maintenance of the water heater.
- Keep the necessary space for water heater installation. Failure to comply with the requirements of installation can affect the performance of the water heater.
- The piping and wiring connections should comply with the requirements of the instruction manual.
- Every heat pump unit is installed with one air breaker, which could be used to cut off the power supply during the maintenance. One leakage protector is requested to be installed between the junction box and the heat pump.
- Please perform through inspection on the whole system before power on the system.
- Please consider lightning stroke when select the location for the heat pump units and the tank. Necessary protection solution is requested to protect the system from suffering lightning stroke.
- Please operate the heat pump units based on the instructions illustrated in this manual.
- Do not insert fingers or other stuff into the fan guard to avoid hurt or damage. Do not touch the fan motor surface to avoid high temperature hurt.
- Please perform inspection and necessary maintenance regularly after the installation and operation of the water heater. If you find the water heater operate abnormally, stop the operation of the entire system immediately, and call service phone to service the units immediately to ensure the normal, safe and reliable operation of the water heaters. Please do not try to fix the issues by yourselves.
- If the heat pump water heaters are not be operated in the winter time, please supply power to all the units all the time to let the unit operate the anti-freezing function automatically. If the heat pumps water heaters will not be operated for a long time, please drain the water from the system by opening the drain valve to avoid freezing.
- Please insulate all the external piping properly if the system is installed in circumstance which has the minimum ambient temperature lower than 0 Celsius.
- In order to reduce the operation cost, the hot water outlet and return lines should be properly insulated.
- Disconnect the power supply before performing any maintenance or service. Only qualified persons authorized by the manufacturer can perform the maintenance and service.

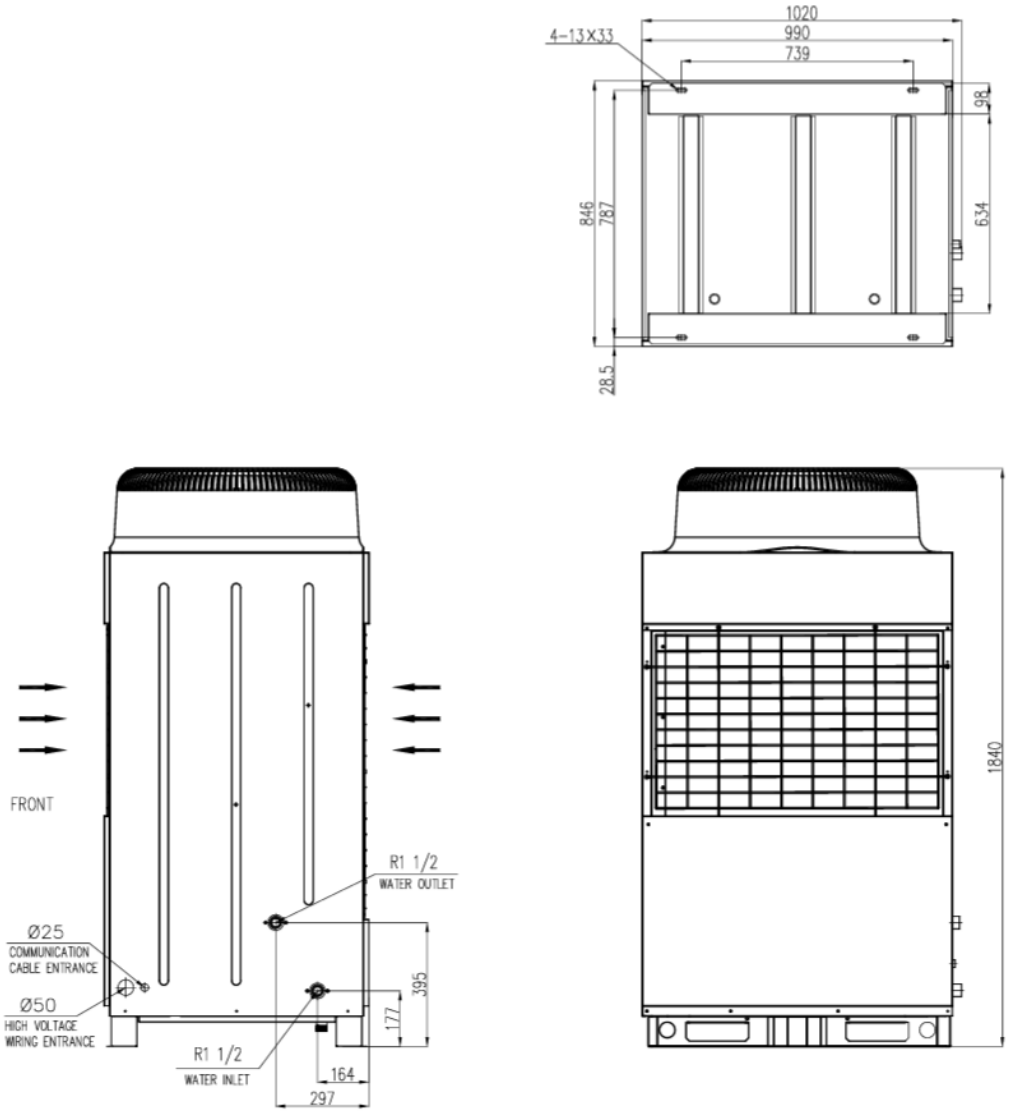
- The manufacturer or seller of the water heater will not be liable for any damage caused by unauthorized installation. These damages include but not limited to leakage of coils, dropping of the unit, the abnormal operation and poor performance caused by improper installation, adverse effect and damage of water heater, and all relevant losses.
- Under no circumstance will A.O. Company be held liable for any damage that caused by failure to comply with the installation and operation instructions outlined in this manual.

A.O.SMITH WATER HEATER COMPANY LTD. reserves the final power of interpretation of the above terms.

CAUTION: Failure to comply with the requirements of this manual can result in fire, property loss, injury or death.

WARNING: The power supply should be grounded reliably before energizing the unit, and it is forbidden to operate the water heater without reliable grounding! The water heater must be provided with floor drain with good drainage nearby, and located in an area where leakage of the water heater or a connection will not result in damage to the area adjacent to the water heater or to lower floors of the structure.

2 - Physical Dimensions



Picture 2.1 Unit Dimensions

3 - Technical Specifications

POWER SUPPLY		380V 3N ~ 50Hz
VOLTAGE RANGE		380V +/- 10%
RATED HEATING CAPACITY(1)		38 kW
RATED WATER FLOW(1)		6.5 CMH
RATED POWER INPUT (1)		10.3 kW
RATED OPERATION CURRENT(1)		18.6 A
MAX. POWER INPUT		13.2 kW
MAX. OPERATION CURRENT		23.3 A
OPERATION NOISE (2)		65 dB(A)
REFRIGERANT / QUANTITY		R410a / 6.2kg
REFRIGERANT SIDE DESIGN PRESSURE	HIGH SIDE	4.2 Mpa
	LOW SIDE	3.1 Mpa
WATER SIDE DESIGN PRESSURE		1.0 Mpa
WATER SIDE PRESSURE DROP (3)		45 kPa
WATER CONNECTION SIZE		DN40 (R1 1⁄2")
WATERPROOF CLASS		IPX4
NET WEIGHT		287 kg
DIMENSIONS (L x W x H)		1020 x 846 x 1840 mm

Table 3.1 Heat Pump Technical Specifications

Note:

(1) Rated condition: Ambient temperature 20/15 ℃ (dry/wet bulb), water temperature 47/52℃ (inlet/outlet).

(2) Sound pressure value at one meter.

(3) Measured at the rated water flow rate.

4 - Features and Functions

1.1. Heating Capacity

Heat pump water heaters remove heat from surrounding air and use that heat to heat water. So the heating capacity is closely linked with the ambient, inlet water, outlet water temperatures. The heating capacity will decrease if the ambient temperature becoming lower. The variation of the inlet water temperature and the water temperature setting will also have influence on the heat pump heating capacity.

1.2. Power off memory

The central controller stores the status of the units automatically when the heat pump units or the central controller is powered off. The central controller will send the command to the system to operate as the status before the power off when the power supply recovers. This will allow the system operate as per the previous setting during abnormal power off.

1.3. Auxiliary heaters

The heat pump heating capacity will decrease when the ambient temperature decreases. Auxiliary heaters should be equipped to improve the heating capacity and ensure the hot water supply if the minimum ambient temperature is lower than 10 Celsius. Either electric heater or gas heater could be used as auxiliary heater.

The central controller supplied by A.O. Smith provides control signal to the auxiliary heater to optimize the system operation efficiency. For example, if a gas heater is selected as auxiliary heater, the central controller will control the heat pump units and the gas storage heater based on the actual ambient temperature, water temperature and the database stored in the CCB to achieve the most economic operation cost, as well as the most reliable operation.

Please read the installation and operation manual of the gas storage heaters if an A.O. Smith gas storage gas heater is selected as auxiliary heater.

5 - Installation Instructions

CAUTION:

- Once upon the equipment are received, please check the unit model information and the accessory parts based on the packing list and inspect whether there is any obvious damage. If you find anything wrong during the inspection, please notify the seller or manufacturer immediately.
- Please verify the power supply capacity, power cable size of the installation site and make sure they could support on the system operation before the installation.
- Please make sure the system is grounded reliably before the operation. Connecting the grounding line to the neutral line or the water piping is not allowed.

1.4. Installation Locations

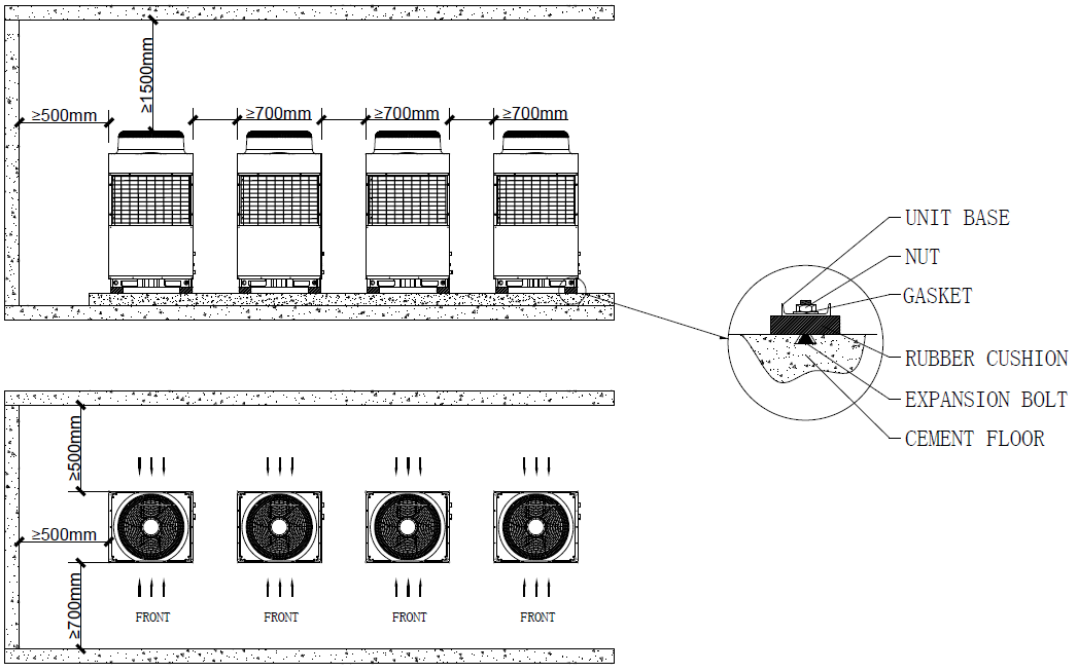
In order to ensure the hot water system could operate normally, please pay attention to following items during the installation location selection:

- The heat pump units should be installed on the ground or the rooftop, which must be able to withstand the total weight of the system as well as to provide sufficient space for installation and maintenance.
- There should be no obstacles around the heat pump units and please make sure the heat pump units have sufficient air flow for the ambient coils. Please also consider the cold air generated by the heat pump units will have no influence on the neighborhoods.
- Please make sure the vibration and sound created by the units operation will have no influence on you and your neighborhoods.
- Please install the vibration isolators to mitigate the vibration passing to the building.
- Please do not install the system in the areas where have influence from high voltage power, severe electromagnetic waves, etc.
- Please install the heat pump units close to the drainage system, to make sure there will be no water accumulated during the operation of the heat pump units.
- Please install the isolation device if the system is installed in locations where is easily to be accessed by personnel.
- Please install the system in areas where is free from: oil, salt (ocean area), sulfide gas, and any other circumstance which contains corrosive gases.

1.5. Space Requirements

1) Please reserve the space as specified in picture 5.2 during the installation for future maintenance.
2) There are two layout options if there are multiple units to be installed, please select the appropriate layout based on the actual conditions.

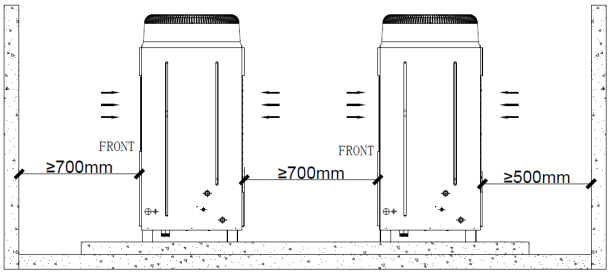
1) Please see picture 5.2 if the heat pump units are installed vertically.



Note: "FRONT" side is the side with the service panel.Please see picture 2.1 for details.

Picture 5.2

2) Please see picture 5.3 if the heat pump units are installed horizontally.



Picture 5.3

3) If the heat pump units are installed in the basement, or other closed spaces, please pay attention to the air circulation of the space to make sure each unit has an air flow rate of 13,000 cubic meters per hour freely.
4) The distance between the floor and the unit base needs to be kept higher than the maximum snow or rain depth of the area, to avoid the units to be immersed by snow or rain.

1.6. Unit Movement

1) The heat pump units have been equipped with multiple protection packages. Please use forklift, crane, to move them in the field. Please do not remove the package before the units are located correctly.
2) Please keep the heat pump units in horizontal status during the movement. The maximum angle of inclination should be kept less than 30 degrees under extreme conditions to avoid compressor damage. Please check the strength and the balance of the slings if the crane is used. Please use four pieces of slings with diameters larger than 6mm and each sling should be able to stand for six times of the heat pump unit weight.

3) Please avoid touching and damage the coils of the heat pump unit during the movement.
4) Please remove all the packages, including the wooden pallet at the bottom of the units after the units are located correctly.
5) If the packages are removed prior to the units are located correctly, please use other protections to protect the units from being damaged during the movement.

1.7. Installation Foundation

Please build the foundation and make sure the foundation is in horizontal status before the installation. The foundation could be made up with reinforced concrete or steel frame. Please fix the M10X60 expansion bolts on the foundation and install the rubber isolators (the accessory parts of the heat pump unit) on the bolts to mitigate the operation vibration and sound passing to the foundation. Please use the expansion bolt nuts to lock the units, isolators, and the foundation after the units are located correctly.

Dual vibration isolation is recommended when the units are installed on the rooftop, where normally can't allow for big vibration or sound. A second stage steel frame could be added to the first foundation made up of reinforced concrete or steel frame. An extra set of isolators to be added between the second and first foundation to create the dual vibration isolation between the rooftop and the units.

1.8. Piping Connection

CAUTION:

- Please install the piping system based on the equivalent length principle to balance the water pressure distribution if multiple heat pump units are installed in one system.
- Please perform the inlet/outlet water piping connection after the heat pump units are well fixed.
- Please install the water filter (accessory part) at the inlet of the circulation pump and reserve the space for filter cleaning/replacement. Please pay attention to the installation direction.
- Please install the water flow switch (accessory part) at the outlet pipeline of the heat pump unit and reverse the space for service.
- Please insulate the inlet/outlet water piping to improve the system efficiency and ensure reliable system operation.
- Please do not allow any dirt or debris entering into the piping system during the installation and clean the water filters after the 1st trial run.

Each A.O. Smith hot water system could be equipped with maximum eight heat pump units, and the system could be controlled by one central controller.

An auxiliary heater is requested as backup if the minimum ambient temperature is lower than 10 Celsius. A.O. Smith central controller is deigned to be able to support on three types of auxiliary heaters:

1) Storage heater.

   This type of auxiliary heater shall be installed in the line which is parallel with the heat pump system as illustrated in picture 5.4a (for vertical tank) and 5.4b (for horizontal tank). An auxiliary heater temperature sensor is requested to be installed at the outlet piping of the

storage heater (maximum 150mm far from the hot water outlet from the heater) and the sensor should be well insulated.

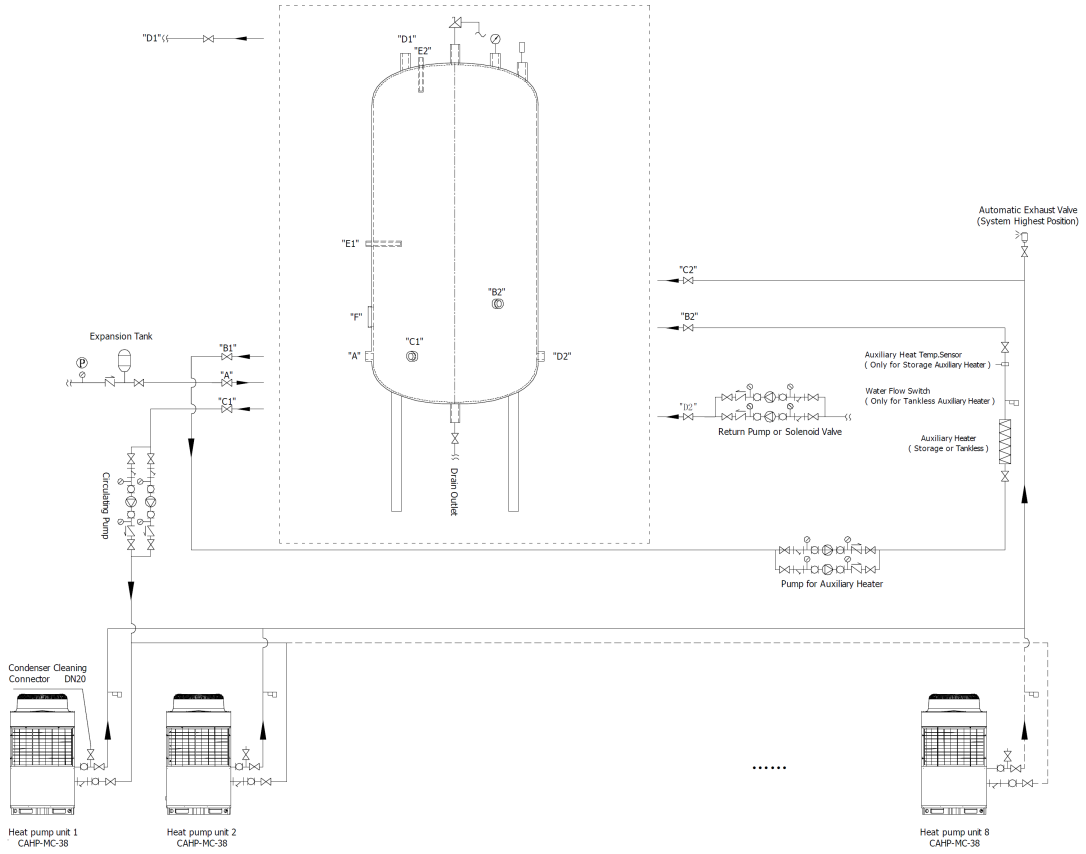
2) Tankless heater.

   This type of auxiliary heater shall be installed in the line which is parallel with the heat pump system as illustrated in picture 5.4a or 5.4b. A flow switch is requested to be installed at the outlet piping.

3) Static heating element.

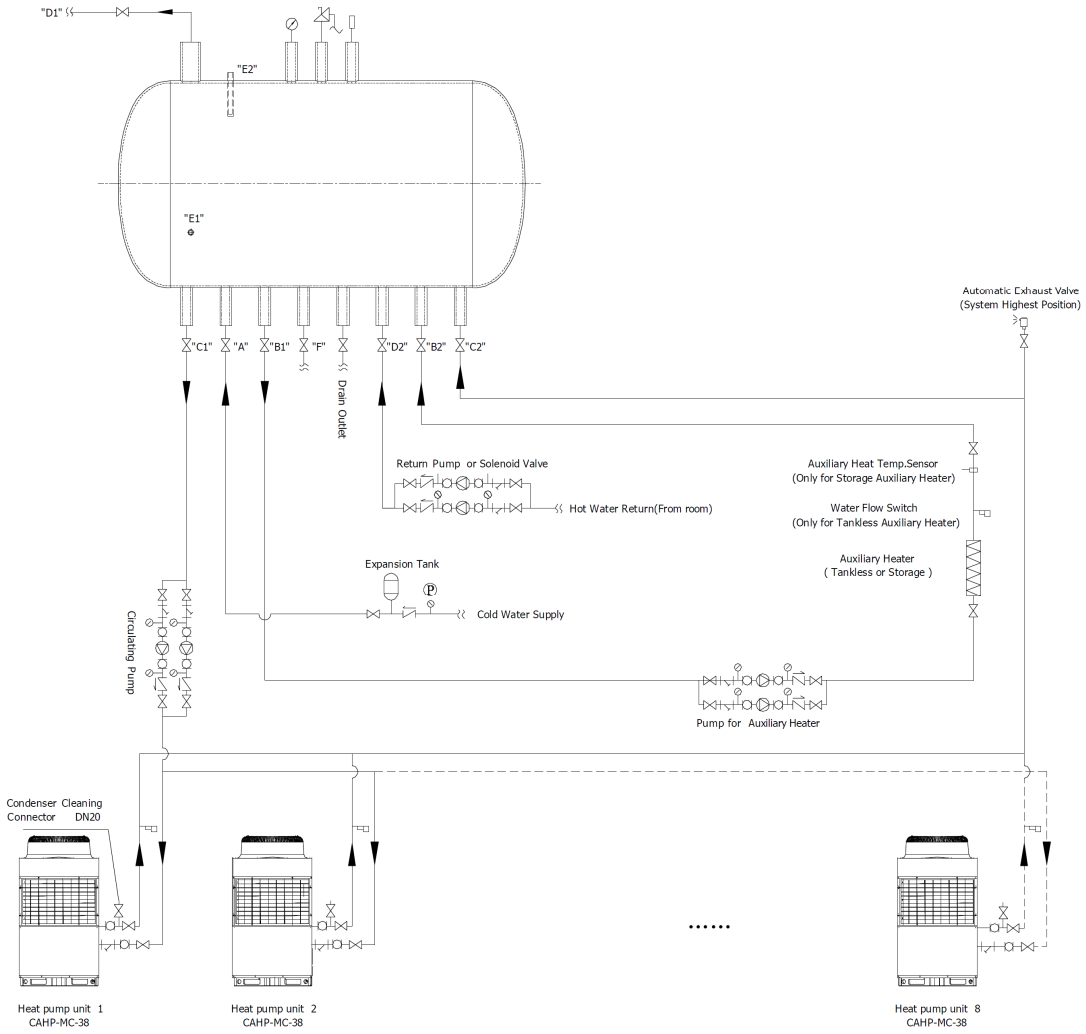
   This type of auxiliary heater could be installed inside of the tank as illustrated in picture 5.4c (for vertical tank) and 5.4d (for horizontal tank). Please determine the installation height based on the actual needs.

Please read information in chapter 5.9 for the tank design requirements.



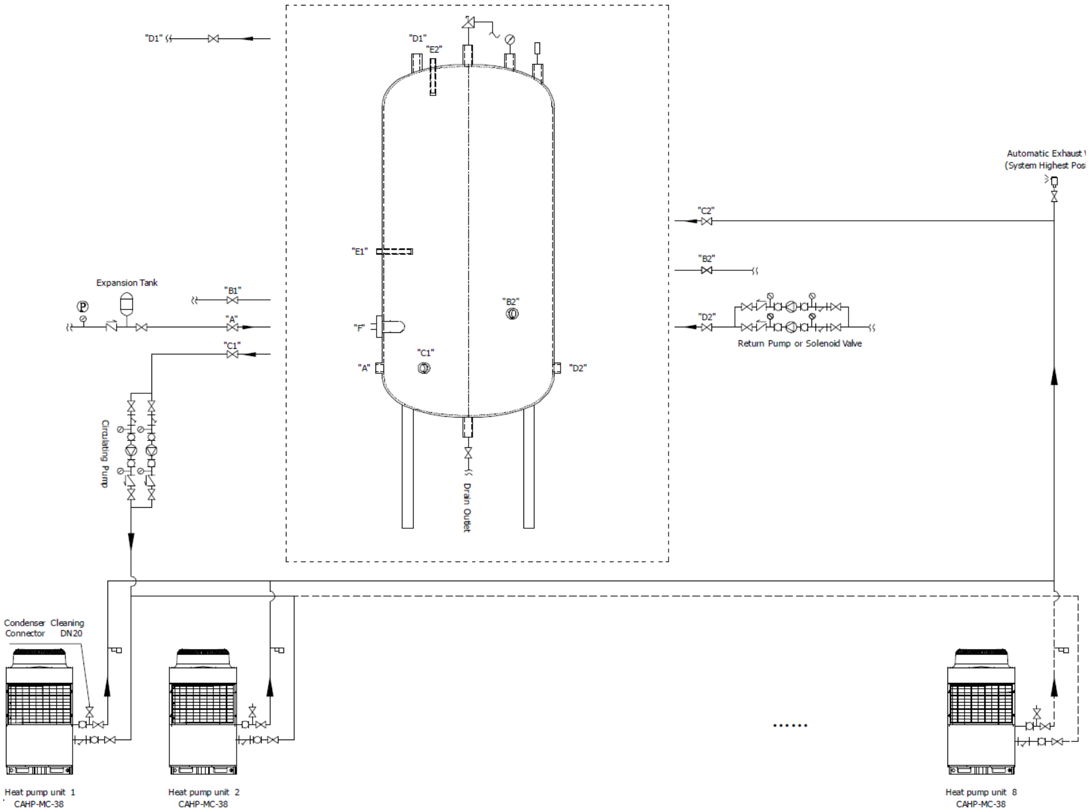
Globe Valve		Check Valve		Auxiliary Heater		Exhaust Valve	
Pump		Soft Joint		Pressure Gauge		P&T Valve	
Sensor		Filter		Water Flow Switch			

Picture 5.4a



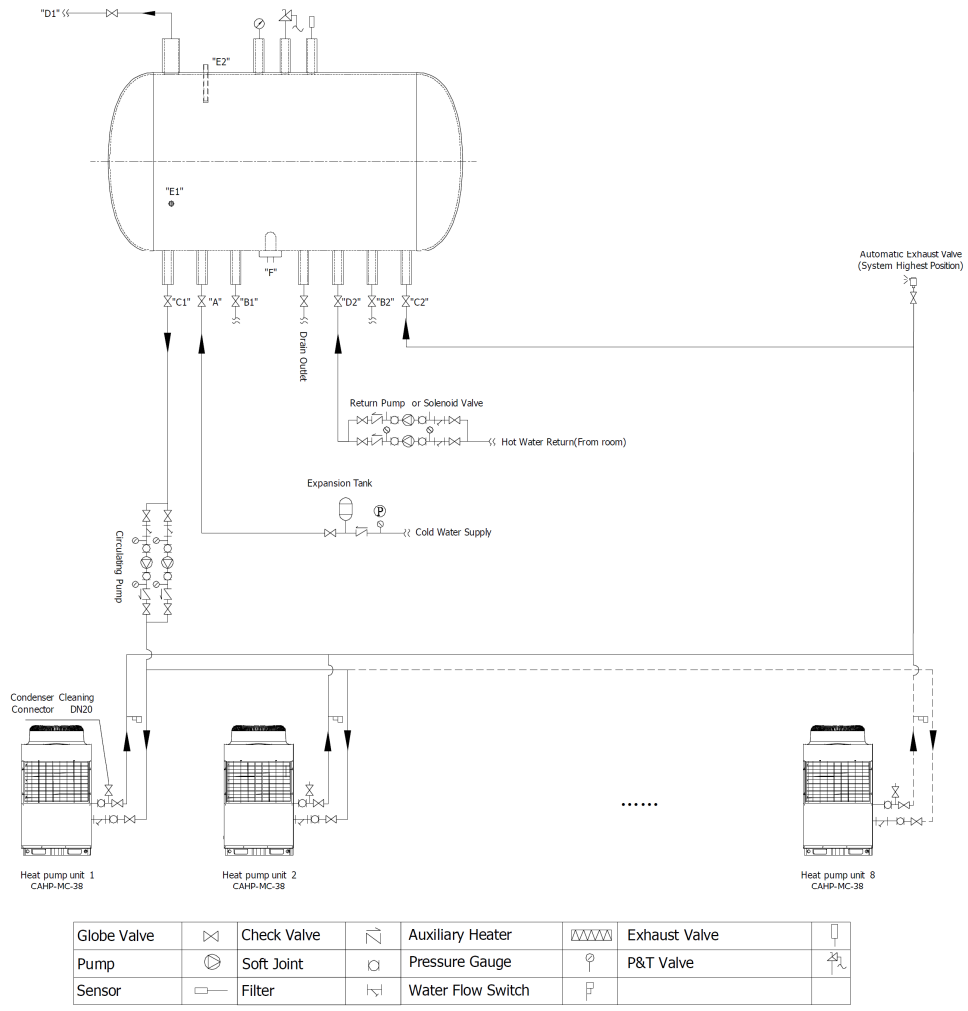
Globe Valve		Check Valve		Auxiliary Heater		Exhaust Valve	
Pump		Soft Joint		Pressure Gauge		P&T Valve	
Sensor		Filter		Water Flow Switch			

Picture 5.4b



Globe Valve		Check Valve		Auxiliary Heater		Exhaust Valve	
Pump		Soft Joint		Pressure Gauge		P&T Valve	
Sensor		Filter		Water Flow Switch			

Picture 5.4c



Picture 5.4d

1.9. Piping Selection

Please select copper pipe, PP-R pipe, galvanized pipe or stainless steel pipe based on the actual requirement and size the system main inlet and outlet piping with reference to table 5.1.

Heat Pump QTY	Main Outlet Piping	Main Inlet Piping
1	DN40	DN40
2	DN65	DN65
3	DN80	DN80
4~5	DN100	DN100
6~8	DN125	DN125

Table 5.1 Main Inlet/Outlet Piping Size of the Hot Water System

Please size the piping for the auxiliary heater based on the auxiliary heater capacity and size the hot water supply piping size based on actual situation. Please refer to table 5.2 as the typical hot water flow velocity.

Piping OD-DN	15-20	25-40	≥50
Flow Velocity m/s	≤0.8	≤1.0	≤1.2

Table 5.2 Typical Flow Velocity of Hot Water

Please size the hot water return piping based on the circulation water volume. Please refer to table 5.3 when do the preliminary selection.

Hot Water Supply Piping Size (mm)	20-25	32	40	50	65	80	100	125	150	200
Hot Water Return Piping Size (mm)	20	20	25	32	40	40	50	65	80	100

Table 5.3 Return Piping Size

1.10. Piping Insulation

Please insulate all the hot water piping with neoprene insulation material with thickness higher than 20mm. (Please ensure the equal insulation performance if other material is used). Please add the extra protection coat (galvanized steel or aluminum plate) if the piping is located outside. If the system is installed in the area with the minimum ambient temperature lower than 0 Celsius, insulation is also required on the cold water piping. Please refer to table 5.4 for the hot water piping insulation requirement.

Hot Water Piping Size (mm)	15~20	25~50	65~100	＞100
Neoprene Insulation Thickness (mm)	20	30	40	50

Table 5.4 Neoprene Insulation Thickness for Hot Water Piping

1.11. Water Pump Selection

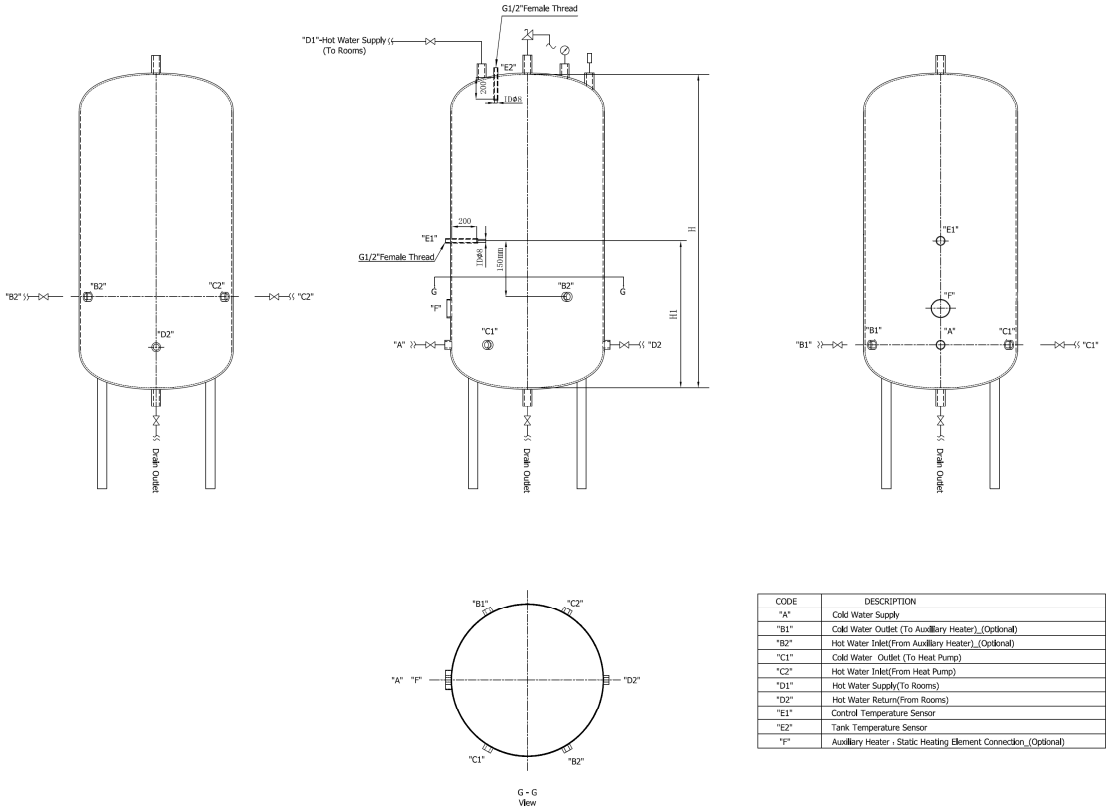
Please refer to table 5.5 for detailed requirement for the circulation pump selection.

Pump	**Flow Rate (m3/h)**	**Heat Pump Pressure Drop (m^3/h)**	**Remarks**
Circulation Pump	6.5 m3/h × Heat pump quantity	80 kPa	Hot water pump

Table 5.5 Water Pump Selection Requirement

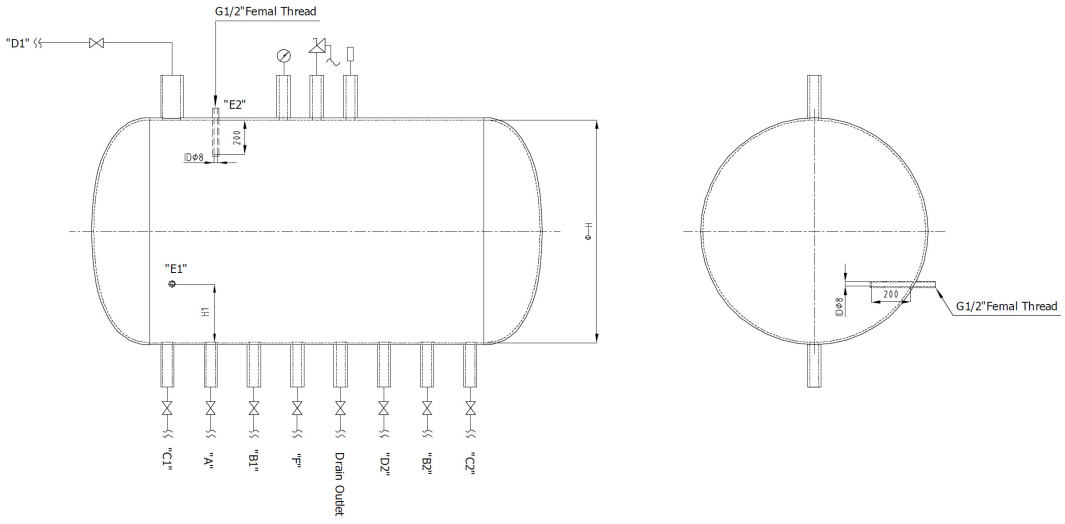
1.12. Tank Design

Please see picture 5.5a (vertical tank) and 5.5b(horizontal tank) for the requirements of hot water tank design and consider following items during the tank design:



CODE	DESCRIPTION
"A"	Cold Water Supply
"B1"	Cold Water Outlet (To Auxiliary Heater)_(Optional)
"B2"	Hot Water Inlet(From Auxiliary Heater)_(Optional)
"C1"	Cold Water Outlet (To Heat Pump)
"C2"	Hot Water Inlet(From Heat Pump)
"D1"	Hot Water Supply(To Rooms)
"D2"	Hot Water Return(From Rooms)
"E1"	Control Temperature Sensor
"E2"	Tank Temperature Sensor
"F"	Auxiliary Heater ، Static Heating Element Connection_(Optional)

Picture 5.5a



CODE	DESCRIPTION
"A"	Cold Water Supply
"B1"	Cold Water Outlet (To Auxiliary Heater)_(Optional)
"B2"	Hot Water Inlet(From Auxiliary Heater)_(Optional)
"C1"	Cold Water Outlet (To Heat Pump)
"C2"	Hot Water Inlet(From Heat Pump)
"D1"	Hot Water Supply(To Rooms)
"D2"	Hot Water Return(From Rooms)
"E1"	Control Temperature Sensor
"E2"	Tank Temperature Sensor
"F"	Auxiliary Heater ، Static Heating Element Connection_(Optional)

Picture 5.5b

1) Please design and manufacture the tank complying with all the local regulations.
2) Please design the tank with 1.0MPa design pressure.

3) Please design the tank with the following minimum volume:
   Minimum tank volume = Quantity of heat pump unit X 4000L
4) Recommend to have PU foaming on the tank to insulate the tank well (standby temperature decrease should be lower than 8 Celsius in 24 hours).
5) Please refer to picture 5.5a and 5.5b for the tank connection nozzles and accessories requirement (assume the total tank internal height is "H"):
   a) Install the temperature & pressure valve on top of the tank.
   b) Install the pressure gauge, temperature meter on top of the tank.
   c) Design the "D_1" connection (hot water to rooms) at the top of the tank.
   d) Design the "F" connection (optional, static heaing element) at the height based on the actual conditions.(the higher installation, the faster heating speed, the lower heating volume).
   e) Design the "A" connection (cold water supply) and "D_2" connection (cold water returned from rooms) as close to the bottom of the tank as possible.
   f) Design the drain outlet connection at the lowest point of the tank.
   g) Design the "B_1" connection (optional, cold water to auxillary heater) and "B_2" connection (optional, hot water from auxillary heater), "C_1" connction (cold water to heat pumps) and "C_2" connection (hot water from heat pumps) as close to the bottom of the tank as possible. Design the hot water connections as far as possible from cold water connections to avoid the cold water mixing with hot water. For vertical tank, the hot water connections could be designed slightly higher than the cold water connections to avoild water mixing as shown in picture 5.5a.
   h) Design the "E_2" connection (tank temperature sensor installation) at the top of the tank. Design the "E_1" connection (control temperature senor installation) at a location which meet both " at least 150mm higher than the 'B_2' and 'C_2' connections" and "at least 'H_1' higher from the bottom of the tank". "H_1" should be determined to create a minimum tank volume (from the bottom of the tank) = Quantity of heat pump unit X 2000L. Two sensor tubes are requested for the temperature senors installation. The sensor tube should have one end closed (inside of the tank), the internal diameter should be 8mm and it should have a 200mm insertion length inside of the tank. The outside connection of the sensor tube should be designed to have good water proof capability, a G-1/2" female threaded connection is recommended as the outside connection. Please paste the thermal paste on the tank temperature sensor head during the installation.
   i) Appropriate anode should be installed to protect the tank from corrosion.

1.13. Tank Installation

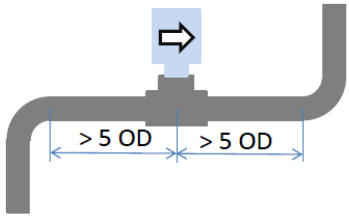
CAUTION:
* Please install the hot water tank as closely as possible to the heat pump units to reduce the standby heat loss.

1.14. Water Requirement

Please check the installation location water hardness data before formal installation. The heat pump units could only be operated with water which has hardness less than 200ppm. A water treatment device is requested if the water hardness is higher than 200ppm. Please do not use the untreated water from river, lake, or underground directly.

1.15. Water Flow Switch Installation

Please install the water flow switch (accessory part) on the outlet pipeline from each heat pump unit to the tank. The water flow switch should be installed at a location which has straight pipe at both inlet and outlet side. The minimum straight pipe length needs to be longer than 5 times of the pipe diameter.



Picture 5.6

Please wire the water flow switch with reference to the heat pump wiring diagram and the yellow line should be connected to the “D16” terminal and the red line should be connected to one of the “GND” terminal.

The water flow switch could be adjusted based on the actual conditions. Correct flow switch setting should create a flow rate at 6.5CMH (turn off if the water flow rate is lower than 4CMH and turn on if the water flow rate is higher than 5.5CMH). Please contact the qualified service personnel for detailed ajustement methodology.

1.16. Electrical Connection

CAUTION:

- The heat pump units must be connected with dedicated power supply and the power supply needs to be controlled within 380V +/-10%.
- The heat pump power supply circuit must be grounded reliably. The power supply cable selection, wiring and related protection devices must comply with the requirement from local domain.
- The wiring job could only be performed by qualified electric technician with reference to the system wiring diagram.
- Please install the leakage protection device as per the requirement from the local domain.
- Please run the power supply cable and the communication cable in a neat, clean way and make sure the cables will not touch the piping, valves, etc.
- This unit is not configured with power supply cables when it leaves the factory, please select the power supply cable based on the requirement in this manual. Connecting cables are not allowed as the power supply cables to the unit.
- If the power supply cable is ran closely to the communication cable, please put each cable into individual conduit and keep the appropriate distance between two conduits.
- Please perform through inspection on all the wirings before power on the system.

(1) Power cable

WARNING:

*An air breaker and an appropriate current leakage protector must be installed outside the water heater as the specification of power supply table for your security.

*The water heater must be grounded permanently. Otherwise, it can result in electric shock, injury or death.

Please refer to table 5.6 for the cable requirements for the heat pump unit and the central controller.

Equipment	Power Supply	Cable Size (mm^2) (Plastic Insulation and Conduit)			Air Breaker Capacity(A)	Current Leakage Protection
		Phase Wire	Neutral Wire	Ground Wire		
CAHP-MC-38	380V 3N~50Hz	6	4	6	80	30mA less than 0.1S
Central Controller	220V 50Hz	1.5	1.5	1.5	＞5	

Table 5.6 Hot Water System Power Supply Requirement

Note:

1. Please install four-pole leakage protection switch (with neutral line) and do not use the three pole leakage protection switch.
2. The cable size should be increased if the distance between the user's junction box to the heat pump unit/central controller is too far.

(2) Low voltage cables requirement

There are many communication and signal cables in the hot water system. Please refer to table 5.7 for the detailed requirements on these cables.

Cable Description	Size	Standard Length	Max. Length	Remarks
The communication cable between the central controller and the furthest heat pump unit	2*1 mm^2	/	200m	Shielded cable
The communication cable between the central controller and the heat pump unit	2*1 mm^2	/	100m	Shielded cable
Tank temperature sensor cable	2*1 mm^2	20m	100m	
Auxiliary heater temperature sensor cable	2*1 mm^2	20m	100m	
Auxiliary heater control cable	2*1.5mm^2	/	100m	
Auxiliary heater flow switch cable	2*1.5 mm^2	/	100m	Shorted if the auxiliary heater is storage gas heater
Circulation pump control cable	1*1.5 mm^2	/	100m	
Auxiliary heater pump control cable	1*1.5 mm^2	/	100m	
Return water solenoid valve or pump control cable	1*1.5 mm^2	/	100m	

Table 5.7 Hot Water System Low Voltage Cables Requirement

CAUTION:
Please connect the shielded wire of the communication cable to the ground, this will help to improve the system anti-interference capability.

(3) Heat pump unit control box layout

Please refer to picture 5.7 for the control box layout of the heat pump unit.

Picture 5.7

(4) Central controller installation

The A.O. Smith central controller provides intelligent control on the entire hot water system. The dimension of the central controller is 400X500X141mm (WXLXD). Please refer to picture 5.8 for the layout of the central controller.

Picture 5.8 (to be updated with the new label)

The central controller should be installed in the area with ambient temperature from -10~50 Celsius and it might not operate abnormally if the ambient temperature is out of this range. It could be installed indoor or outdoor. If it is installed outdoor, please select the location where there is no direct sunshine and rain. Please also consider the anti-freezing protection under low ambient temperature. It's recommended to install the central controller in the control room of the building.

(5) Power control cabinet requirement

To ensure the entire hot water system reliable operation, a power control cabinet is required to provide power to all the heat pump units, central controller, circulation pump, auxiliary heater, auxiliary heater pump, hot water return pump, etc. Please refer to table 5.8 for the power supply requirement of these equipment.

Equipment	Power Supply Requirement	Remarks
Heat pump unit	380V/3N~/50Hz	
Central controller	220V/~/50Hz	
Circulation pump	220V/~/50Hz or 380V/3N~/50Hz	Refer to the actual pump specifications
Auxiliary heater (gas storage heater)	220V/~/50Hz	Refer to the actual heater specifications
Auxiliary heater (Electric)	380V/3N~/50Hz	
Auxiliary heater pump	220V/~/50Hz or 380V/3N~/50Hz	Refer to the actual pump specifications
Hot water return pump	220V/~/50Hz or 380V/3N~/50Hz	

Table 5.8 Power Supply Requirement of the Equipment in the Hot Water System

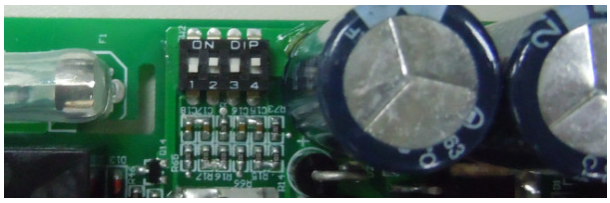
1.17. Series Number Setting

If there are multiple heat pump units are installed in one system and to be controlled by one central controller. Please set the series number for each heat pump unit before the trial operation.

To set the series number, please open the heat pump unit control box to find the 4-digit dial switch (please see picture 5.9) and do the setting as per table 5.9.

It's recommended to paste a label of the series number on the control box door for easy distinguishes.

4-digit dial switch



Picture 5.9

DIP				Unit
1	2	3	4	
ON	OFF	OFF	OFF	No.1
OFF	ON	OFF	OFF	No.2
ON	ON	OFF	OFF	No.3
OFF	OFF	ON	OFF	No.4
ON	OFF	ON	OFF	No.5
OFF	ON	ON	OFF	No.6
ON	ON	ON	OFF	No.7
OFF	OFF	OFF	ON	No.8

Table 5.9 Series No. Setting

1.18. Trial Operation

1.19. Inspection prior to trial operation

- Heat pump unit inspection. Please inspect the following items on the heat pump unit,
    1. Whether all the installation job has been finished correctly.
    2. Whether the space is sufficient for normal operation and maintenance.
    3. Whether all the fasteners are in tight status.
    4. Whether the unit series number has been set correctly.
- Piping system inspection. Please inspect the following items on the piping system,
    1. Whether all the piping has been completed correctly.
    2. Whether all the manual valves have been put in correct status.
    3. Whether the insulation has been done on the piping correctly.
- Power system inspection. Please inspect the following items on the power system,
    1. Whether the power supply voltage is within the specified range.
    2. Whether all the wirings have been tightened reliably.
    3. Inspect all the wiring with reference to the wiring diagram.
    4. Whether the system has been grounded reliably.
    5. Whether the leakage protection device could act effectively.
- Tank status inspection. Please inspect the following items on the piping system,
    1. Whether the tank installation job has been finished correctly.
    2. Whether the tank temperature sensor has been installed correctly.
    3. Whether the tank is full of water.

Please power on the hot water system and check the central controller display to see whether there is any error information. Please do the trouble shooting with the information listed in chapter 8. If there is no error information, please start the hot water system after 12 hours. Please

do the clock setting as well as other user settings as per information listed in chapter 6.

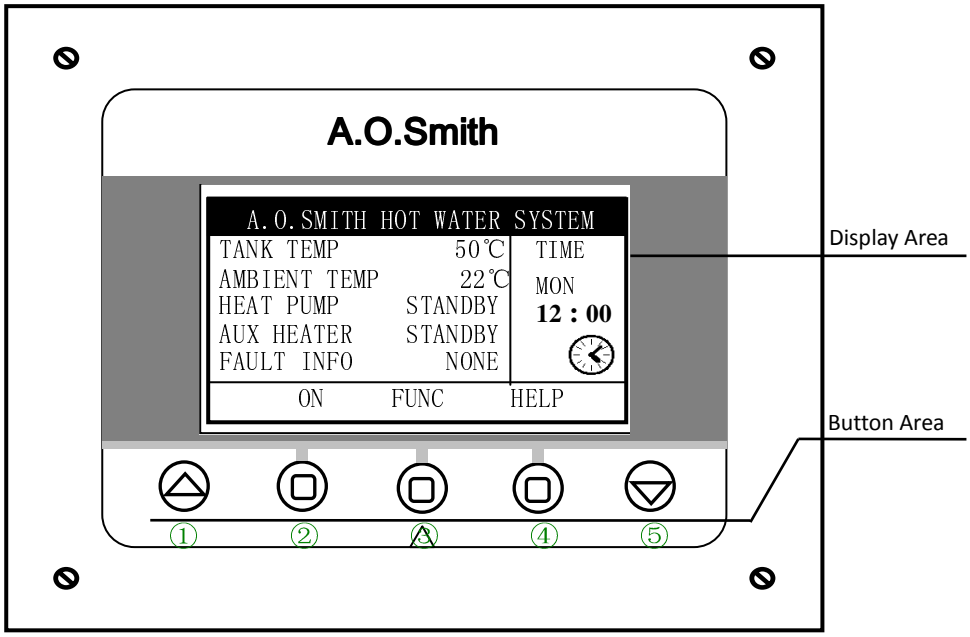
1.20. Trial Operation

- Power on the system and wait for 12 hours. Press the start button on the display of the central controller to start the hot water system.
- Wait for the compressor to start and listen to the sound of the compressor noise. Stop the system immediately if there is obvious abnormal sound. Perform the inspection on the system after cut off the power to the system. If there is no abnormal sound, continue the operation and monitor the outlet temperature.
- Check whether the fan is rotating without any abnormal noise.
- If the system is operating normally, please record the unit operation status, ambient temperature, heat pump inlet/outlet temperature, tank temperature.
- Do the system setting, check the system operation parameters through the display of the central controller with reference to chapter 6. A service password will be requested to enter the service parameter setting and heat pump setting interfaces.
- If a gas storage heater is selected as the auxiliary heater, only qualified technician could perform the installation.
- Please clean the water piping system and the water filter after the trial operation.

6 - Operation Instructions

6.1. UIM and Button Description

The UIM (User Interface Module) of this central controller include two areas, display area and button area. The display area displays all the information of the system setting and operation. The button area includes five buttons which could be pressed for system setting and operation.



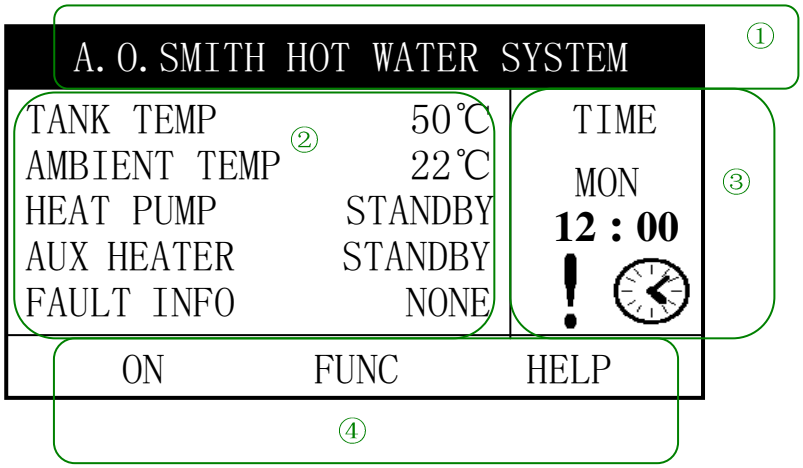
Picture 6.1 UIM Interface

Button Description：

Button	Function Description
Direction Button:Up(①)/Down(⑤)	Roll the scroll bar to select the menu items, adjust the setting parameters.
Function Button:② ③ ④	Turn on/off the hot water system. Select the menu items. Modify the parameters. Each specific button function is corresponding to the related content on the LCD display area.

6.2. UIM Interface Introduction

The UIM interface includes two pages of display, the main page and the secondary page. The two pages could be switched by pressing the UP/DOWN buttons. The UIM will display the main page as default. Press the UP or DOWN button to go to the secondary page. If there is no operation for 10S when the secondary page is displayed, the UIM will return to the main page automatically. Please refer to figure 3-1 for the details of the main page interface layout and contents.

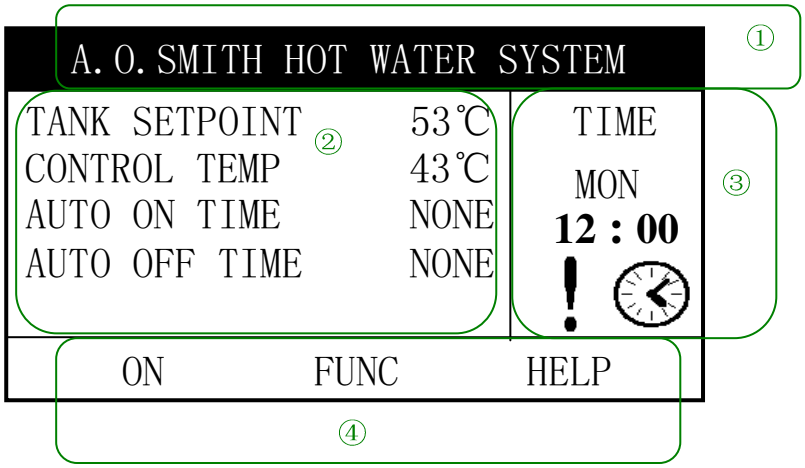


Picture 6.2 Main Page Layout & Display Content

Interface Description – Main Page

Area	Content		Function Description
Area□	Controller Title		Display the controller title.
Area□	Hot water System Parameters	TANK TEMP	Display the current tank temperature. Display the upper tank temperature. It will display the control temperature, which is the lower tank temperature if there is a control temperature fault.
		AMBIENT TEMP	Display the ambient temperature, which is the average value of the ambient temperatures from all the heat pumps. It will display " -10℃" if all the heat pump units have the ambient sensor fault.
		HEAT PUMP	Display the current status of the heat pump units. There are totally six status, which are: "OFF", "HEATING", "DEFROST", "ANTI-FRZ" (Anti-Freezing), "STANDBY" & SWITCH".
		AUX HEATER	Display the status of the auxillary heating equipment. If the hot water system is installed with a auxillary heating equipemtn, it will display the current status of the auxillary heating equipment. There are totally three status, which are: "ON", "STANDBY", "OFF". If the hot water system is not installed with a auxillary heating equipment, it will display "NONE". Auxiliary Heating Anti-Freezing Display:"ANTI-FRZ".
		FAULT INFO	Display the error Informations of the centrall controller and all the heat pump units. The error codes will be displayed alternatively with 2 seconds shift if there are more than one error codes. Please refer to the "error code table" for detailed description of the errors.

Area	Time Information	TIME	Display the current day of the week and the clock time (hour & minute).
			The icon indication of the timer status. The timer is ON if the icon is displayed and is off otherwise.
			Communication error alarm. If the central controller could not get the timing information from the heat pump units, this icon will be displayed diamatically (size change), and the timer function will be disabled.
Area	Function Buttons Display	ON	Display “ON” when the system is off. To turn on the system, press the button below this icon. Display “OFF” when the system is on. To turn off the system, press the button below this icon.
		FUNC	Press the button below this icon to enter the related function ineterfaces.
		HELP	Press the button below this icon to enter the “HELP” interface.



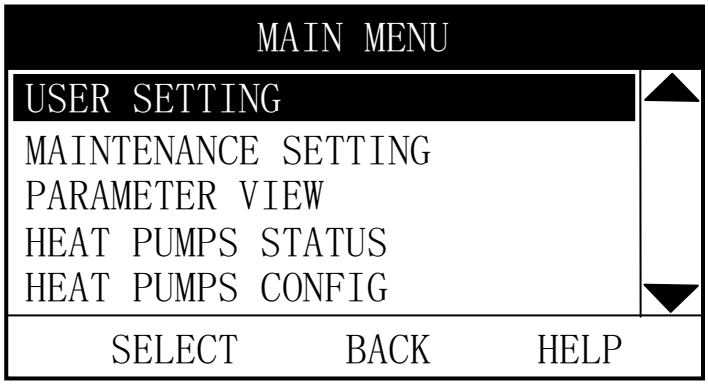
Picture 6.3 The Secondary Page Layout & Display

Interface Description – Secondary Page

Area	Content		Description
Area①	Controller Title		The same as “Main Page Description”
Area②	Hotwater System Parameter	TANK SETPOINT	Display the current tank setpoint. The system will use the “SUMMER SETPOINT” if the ambient temperature is higher than “AUX HEATER ON TEMP” and use “WINTER SETPOINT” otherwise.
		CONTROL TEMP	Display the lower tank temperature, which is used to control the start of stop of the heating syste. It will display “—“ if there is an error on the temperature sensor.
		AUTO ON TIME	When the timer function is enabled, it will display the time set by the user to turn on the system. Otherwise, it will display “NONE”.
		AUTO OFF TIME	When the timer function is enabled, it will display the time set by the user to turn off the system. Otherwise, it will display “NONE”.
Area③	Time information	TIME	The same as “Main Page Description”
			
		!	
Area④	Function button display	ON	The same as “Main Page Description”
		FUNC	
		HELP	

6.3. Main Menu Introduction & Operation

Press the “FUNC” button to enter the “Main Menu”.



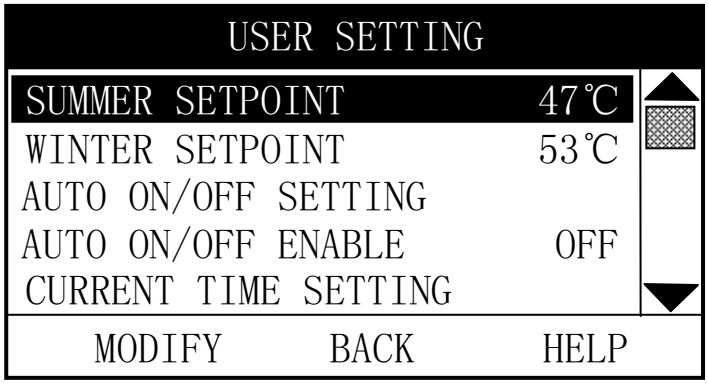
Picture 6.4 Main Menu

Menu Description：

Main Menu Table	
Menu	**Description**
USER SETTING	Settings could be done by user.
MAINTENANCE SETTING	Settings could be done by the service people. Need a password to enter the menu.
PARAMETER VIEW	The status parameters and the historical errors of the central controller and the hot water system.
HEAT PUMPS STATUS	The status parameters of the heat pump units.
HEAT PUMPS CONFIG	Settings related to the heat pump units operation. Need a password to enter the menu.

Note: Select the menu item by pressing the Up/Down buttons. When the menu is selected, it will be highlighted with the white background, then press the “SELECT” button to enter the menu or press “BACK” to return to the main page of the interface.

6.4. User Setting Menu



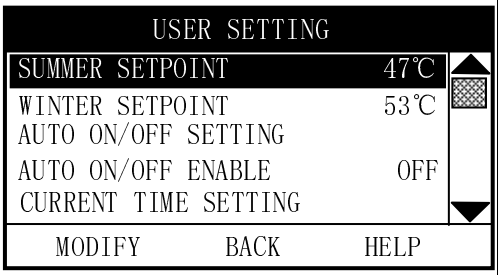
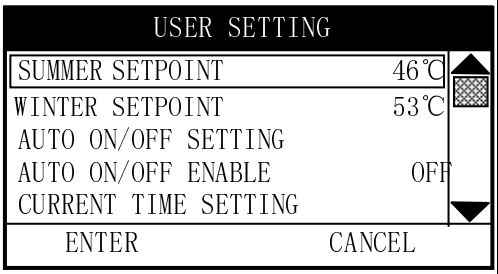
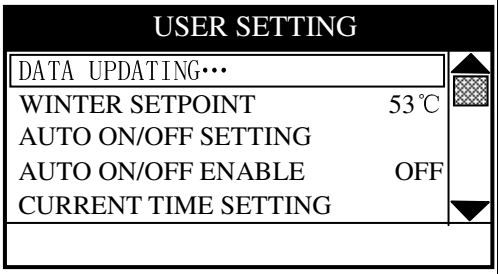
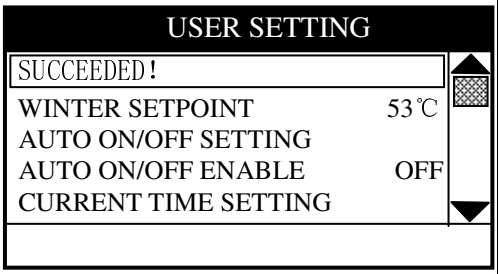
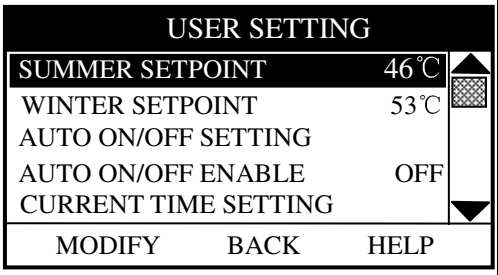
Picture 6.5 User Setting Menu

Menu Description：

User Setting Menu	
Menu Item	**Description**
SUMMER SETPOINT	**SUMMER SETPOINT** is used as tank temperature setpoint when the ambient temperature is higher than the setpoint for enabling the auxillary heater. **Setting Range:** 35-60°C **Default Value:** 47°C Please refer to "Summer Tank Temperature Setting" section for detailed setting method.
WINTER SETPOINT	**WINTER SETPOINT** is used as tank temperature setpoint when the ambient temperature is lower than the setpoint for disabling the auxillary heater. **Setting Range:** 35-60°C **Default Value:** 53°C The setting process is similar as "Summer Tank Temperature Setting".
AUTO ON/OFF SETTING	**AUTO ON/OFF SETTING** is used to set the automatic operation time of the hot water system if the automatic operation function is enabled. Please refer to "Timer Setting" section for detailed setting method.
AUTO ON/OFF ENABLE	**AUTO ON/OFF ENABLE** is used to enable or disable the hot water system automatic operation. **Setting Options:** ON/OFF **Default Option:** OFF The setting process is similar as "Summer Tank Temperature Setting".
CURRENT TIME SETTING	**AUTO ON/OFF ENABLE** is used to set the clock time of the central controller. Please refer to "Time Setting" section for detailed setting method.
USER PUMP ON INTVL	**USER PUMP ON INTVL** is the parameter used to control the operaion interval of the user pump. **Setting Range:** 0~90 Minutes **Default Value:** 30 Minutes The setting process is similar as "Summer Tank Temperature Setting".
USER PUMP ON TIME	**USER PUMP ON TIME** is the parameter used to control the operaion time of the user pump. **Setting Range:** 0~90 Minutes **Default Value:** 20 Minutes

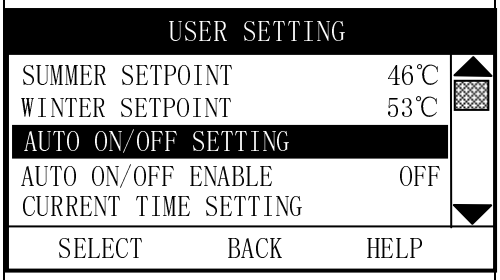
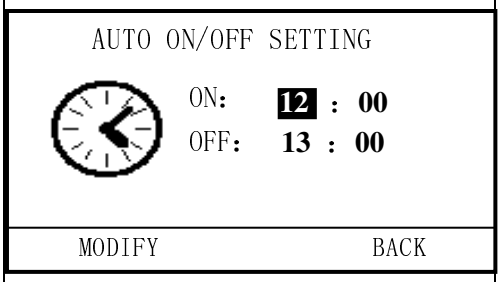
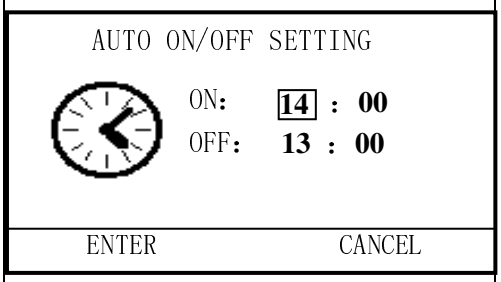
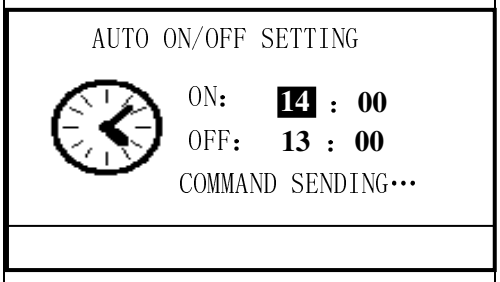
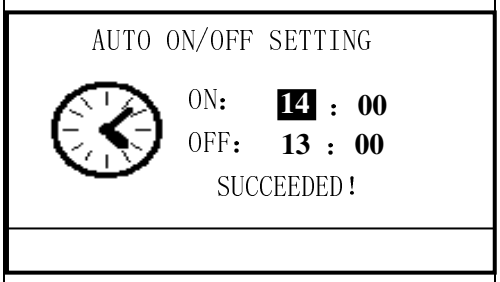
	The setting process is similar as “Summer Tank Temperature Setting”.
AUX HEATER AT H-AMB	**AUX HEATER AT H-AMB** is the parameter used to enable/disable the auxillary heater’s operation under high ambient conditions. **Setting Options:** ON/OFF **Default Option:** OFF The setting process is similar as “Summer Tank Temperature Setting”.
HX CLEAN RESET	**HX CLEAN RESET** is used to reset the condenser cleaning factor when the user complete the condenser cleaning as per controller indication. Please refer to “Condenser Cleaning Reset” section for detailed setting method.
CLEAR HEAT PUMP FAULTS	**CLEAR HEAT PUMP FAULTS** is used clear the fault information of the heat pump units. Please refer to “CLEAR HEAT PUMP FAULTS OPERATION” section for detailed setting method.
CLEAR FAULTS HISTORY	**CLEAR FAULTS HISTORY** is used to clear the historical fault information. Setting method: Please refer to “CLEAR FAULTS HISTORY OPERATION” section for detailed setting method.

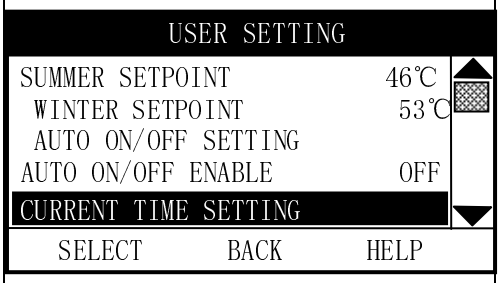
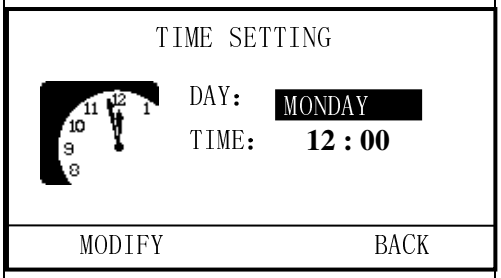
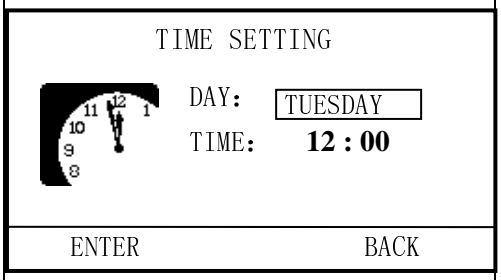
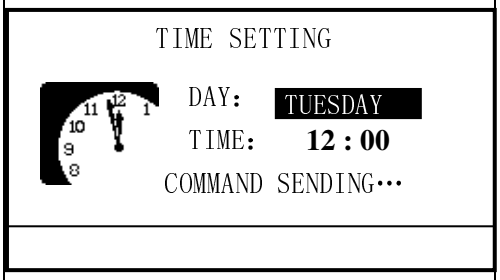
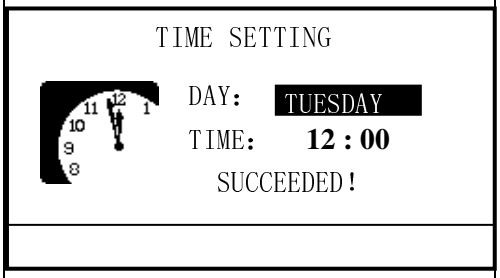
Note: Select the menu item by pressing the Up/Down buttons. When the menu is selected, it will be highlighted with the white background, then press the “MODIFY” button to set the related parameters. Press the “BACK” button to return to the main page of the interface and press the “HELP” button to enter the menu for help.

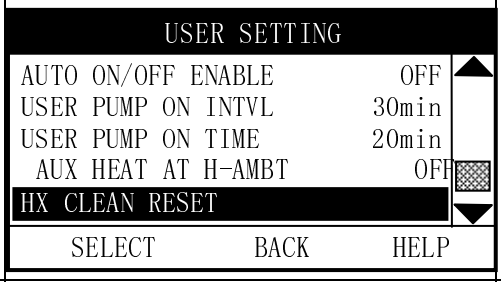
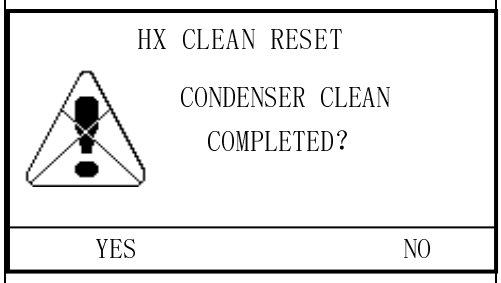
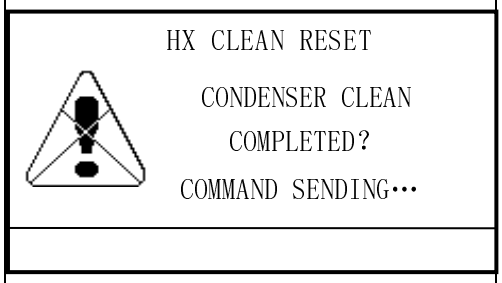
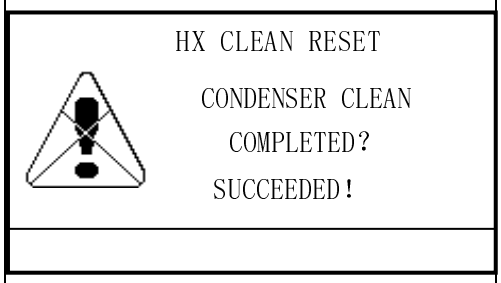
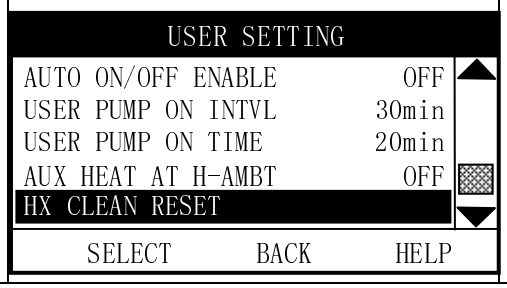
Summer Tank Temperature Setting		
Operation	**Display**	**Description**
Move to “SUMMER SETPOINT” menu by pressing UP/DOWN button, then press MODIFY button to start the parameter modification process.		
Modify the paramater by pressing UP/DOWN button when the menu contents are highlighted in a black frame. then press the ENTER button to save the new setting or press the CANCEL button to cancel the modification.		
The new setting will be sent to the MCB (main control board) if the ENTER button is pressed in the previous step and the UIM will display “DATA UPDATING…”		
		The modification is successful if the UIM display “SUCCEEDED!”. If the UIM display “FAILED!”, it indicates the modification is unsuccessful, please check the communication between the control board and the display board of the central controller.
		The SUMMER SETPOINT will be updated after the successful modification.

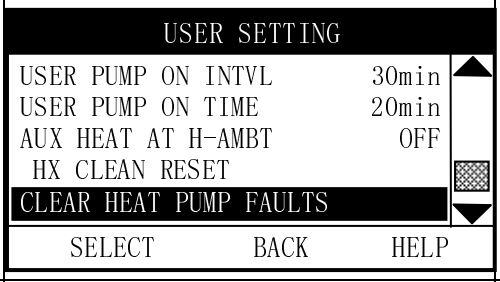
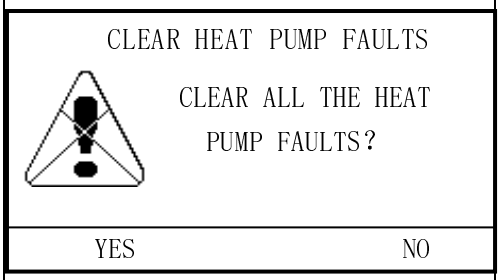
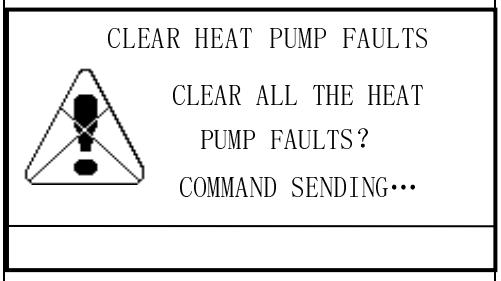
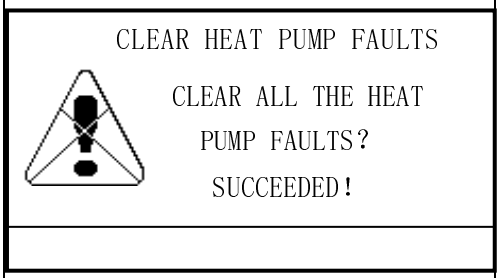
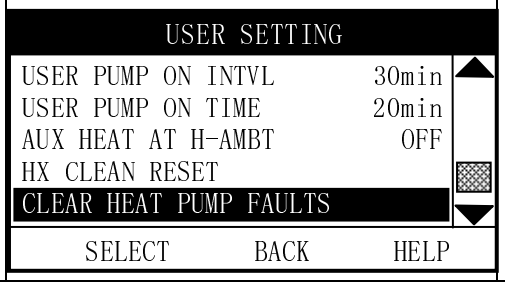
Note：

“WINTER SETPOINT”, “AUTO ON/OFF ENABLE”、“USER PUMP ON INTVL”、“USER PUMP ON TIME”、“AUX HEATER AT H-AMB” have the similar operation procedures.

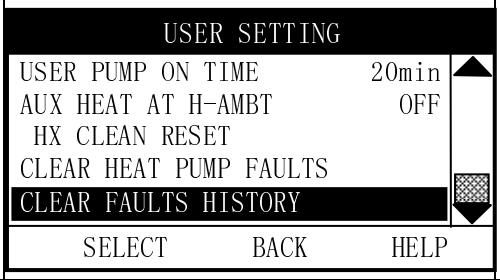
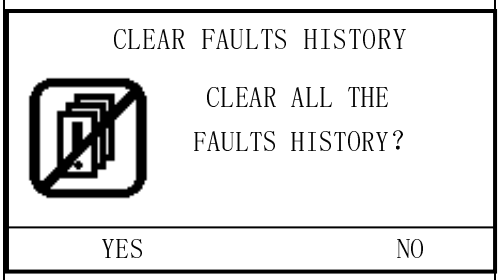
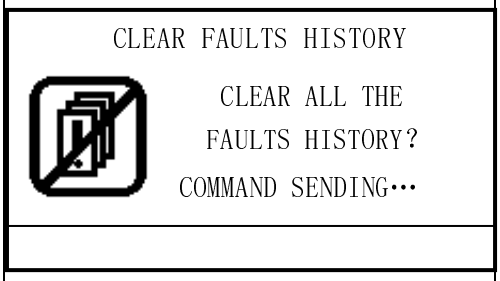
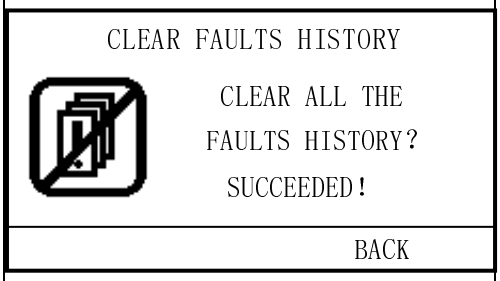
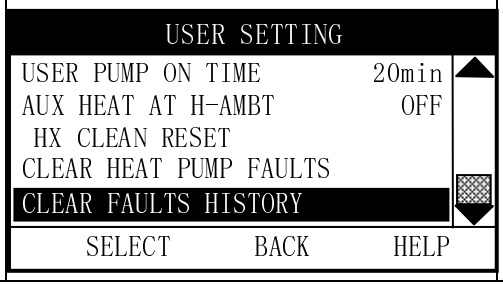
Auto ON/OFF Setting		
Operation	**Display**	**Description**
Move to “AUTO ON/OFF SETTING” menu by pressing UP/DOWN button, then press SELECT button to start this setting process.		
The “AUTO ON/OFF SETTING” interface will be displayed subsequently. Move to the correlative parameter by pressing the Up/Donw button and the selected parameter would be highlighted by white background. Press the MODIFY button to start the modification process or press the BACK button to cancel the modification.		
Modify the paramater by pressing UP/DOWN button when the parameter is highlighted in a black frame. Then press the ENTER button to save the new setting or press the CANCEL button to cancel the modification.		
The new setting will be sent to the MCB (main control board) of the controller if the ENTER button is pressed in the previous step and the UIM will display “COMMAND SENDING…”		
		The modification is successful if the UIM display “SUCCEEDED!”. If the UIM display “FAILED!”, it indicates the modification is unsuccessful, please check the communication between the control board and the display board of the central controller.

Current Time Setting		
Operation	**Display**	**Description**
Move to “CURRENT TIME SETTING” by pressing the Up/Down button, then press SELECT button to start this setting process.		
The “TIME SETTING” interface will be displayed subsequently. Move to the correlative parameter by pressing the Up/Donw button and the selected parameter would be highlighted by white background. Press the MODIFY button to start the modification process or press the BACK button to cancel the modification.		
Modify the paramater by pressing UP/DOWN button when the parameter is highlighted in a black frame. Then press the ENTER button to save the new setting or press the CANCEL button to cancel the modification.		
The new setting will be sent to the MCB of heat pump unit 1 if the ENTER button is pressed in the previous step and the UIM will display “COMMAND SENDING…”		
		The modification is successful if the UIM display “SUCCEEDED!”. If the UIM display “FAILED!”, it indicates the modification is unsuccessful, please check the communication between the central controller and the heat pump units.

Hx Clean Reset		
Operation	**Display**	**Description**
Move to "**HX CLEAN RESET**" by pressing the Up/Down button, then press SELECT button to start this setting process.		
The "HX CLEAN RESET" interface will be displayed subsequently. Press YES button to excute the resetting or press the NO button to cancel the resetting.		
The resetting command will be sent to all the heat pump units if the YES button is pressed in the previous step and the UIM will display "COMMAND SENDING…"		
		The resetting is successful if the UIM display "SUCCEEDED!". If the UIM display "FAILED!", it indicates the resetting is unsuccessful, please check the communication between the central controller and the heat pump units.
Press BACK button to return to the previouse UIM interface.		

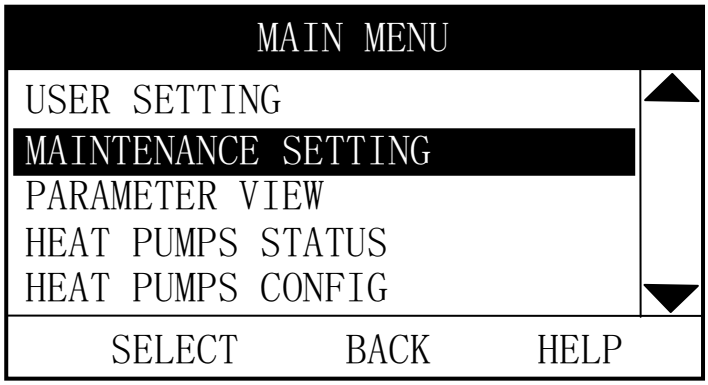
Clear Heat Pump Faults		
Operation	**Display**	**Description**
Move to "**CLEAR HEAT PUMP FAULTS**" by pressing the Up/Down button, then press SELECT button to start this clearing process.		
The "CLEAR HEAT PUMP FAULTS" interface will be displayed subsequently. Press YES button to excute the clearing or press the NO button to cancel the clearing.		
The clearing command will be sent to all the heat pump units if the YES button is pressed in previous step and the UIM will display "COMMAND SENDING…"		
		The clearing is successful if the UIM display "SUCCEEDED!". If the UIM display "FAILED!", it indicates the clearing is unsuccessful, please check the communication between the central controller and the heat pump units.
Press BACK button to return to the previouse UIM interface.		

Note: The fault information of ALL the heat pump units will be cleared after this operation.

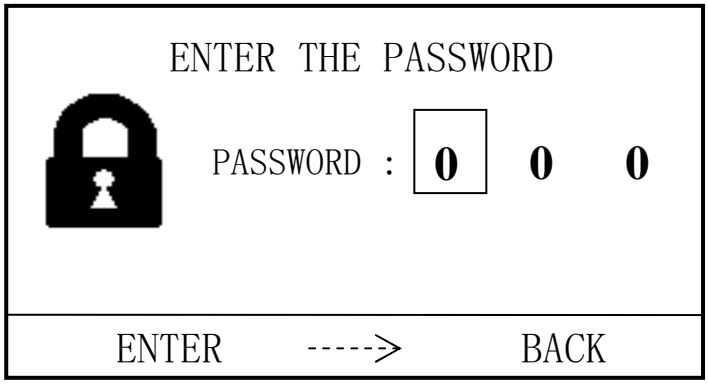
Clear Faults History		
Operation	**Display**	**Description**
Move to "**CLEAR FAULTS HISTORY**" by pressing the Up/Down button, then press SELECT button to start this clearing process.		
The "CLEAR FAULTS HISTORY" interface will be displayed subsequently. Press YES button to excute the clearing or press the NO button to cancel the clearing.		
The clearing command will be sent to the MCB of the central controller if the YES button is pressed in the previous step and the UIM will display "COMMAND SENDING…"		
		The clearing is successful if the UIM display "SUCCEEDED!". If the UIM display "FAILED!", it indicates the clearing is unsuccessful, please check the communication between the control board and the display board of the central controller.
Press BACK button to return to the previouse UIM interface.		

6.5. Maintenance Setting

Select the “MAINTENANCE SETTING” on the main menu interface and then an 3 digits nonpublic password is requested for entering the setting interface.

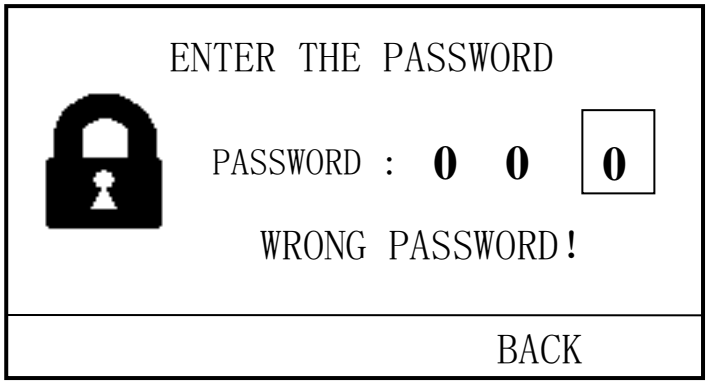


Picture 6.6 Main Menu

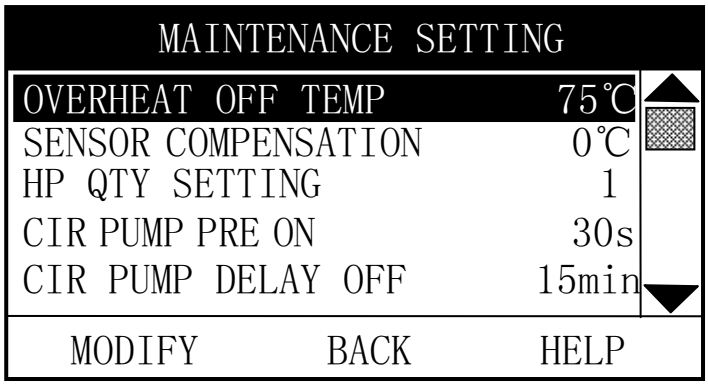


Picture 6.8 “ENTER THE PASSWORD”Interface

The selected digit will be highlighted by black frame and press the UP/DOWN button to modify the number. Move to the next digit by pressing the —> button. Press the ENTER button when all the three digits are confirmed. The UIM will enter the MAINTENANCE SETTING interface if the password is correc and display the following alarm information otherwise. Press the BACK button to return to the main menu interface if the password is incorrect. Reselect the “MAINTENANCE SETTING” menu to reinput the password.



Picture 6.9 Wrong Password



Picture 6.10 Maintenance Setting Interface

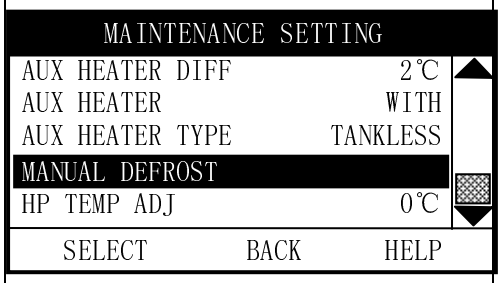
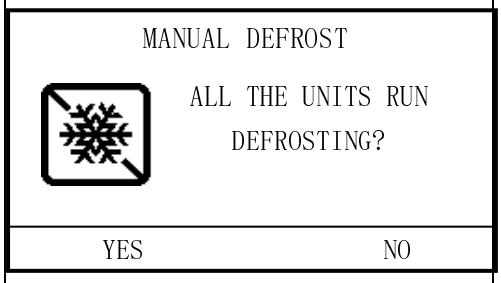
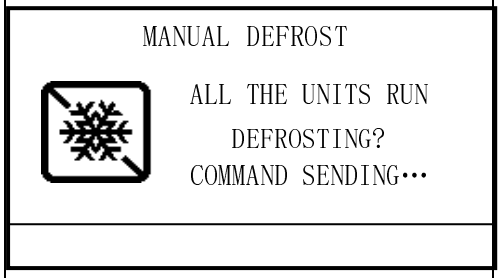
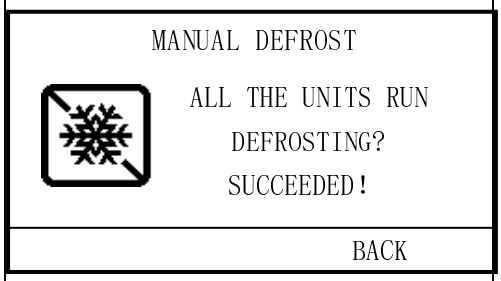
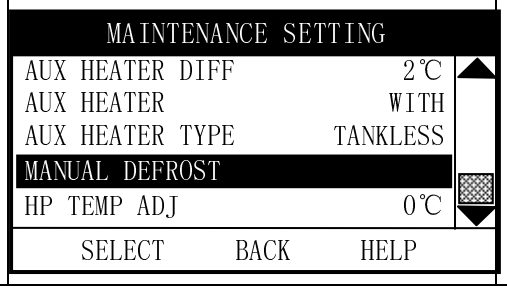
Menu Description：

Maintenance Setting Menu	
Menu Item	**Description**
OVERHEAT OFF TEMP-*	**OVERHEAT OFF TEMP** is the parameter which is set to stop the heating process if the tank temperature exceeded the setpoint. Setting Range: 60~80℃ Default Value: 75
SENSOR COMPENSATION-*	**SENSOR COMPENSATION** is the parameter which is set to adjust the tank temperature sensor reading if an obviouse deviation is found on the measurement. Setting Range: -3~3 ℃ Default Value: 0
HP QTY SETTING-*	**HP QTY SETTING** should be set based on the actual quantity of the heat pump units, which are controlled by the same central cotroller in one system. Setting Range: 1~8 Default Value: 2
CIR PUMP PRE ON-*	**CIR PUMP PRE ON** is the parameter which is set to determine how long the circulation pump should operate prior to the heat pump starts, to make sure evey heat pump unit have sufficient water flow during the operation period. Setting Range: 4~500 Seconds Default Value: 70
CIR PUMP DELAY OFF-*	**CIR PUMP DELAY OFF** is reserved for unpressurized tank system and it could not be set for pressurized tank system.
MEMORY FUNCTION-*	**MEMORY FUNCTION** could be set as ON or OFF, which indicate whether the controller would remember the settings during the power off period. If it is set as ON, the controller will use the previouse setting after the power on. Otherwise, the controller will use the default settings. Setting Options: ON, OFF Default Option: ON
TANK TEMP DIFF-*	**TANK TEMP DIFF** is the parameter for heating process control. If the control temperature is lower than the set temperature minus the TANK TEMP DIFF, the controller will active the heating system and start the heating process. Setting Range: 2~5℃ Default Value: 2

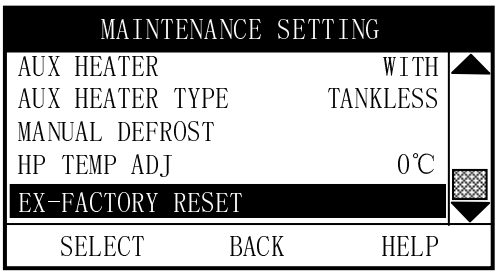
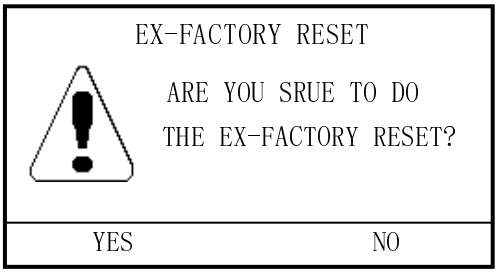
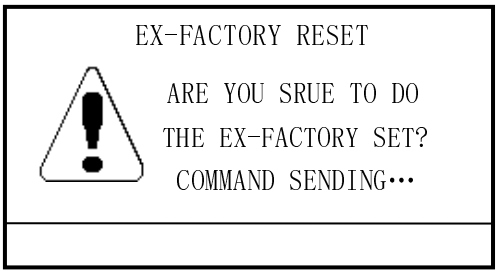
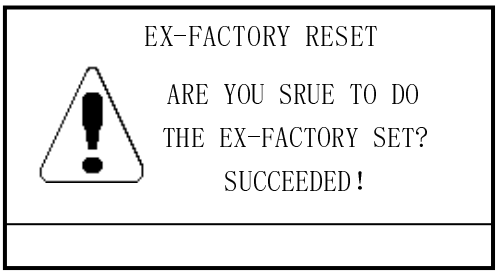
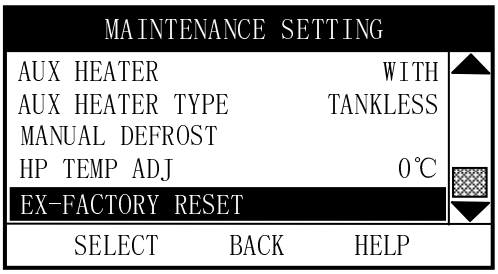
AUX HEATER ON TEMP-*	**AUX HEATER ON TEMP** is the parameter which is used to determine whether the auxillary heater should be enabled. Setting Range: -5~30℃ Default Value: 15
AUX HEATER TEMP ADJ-*	**AUX HEATER TEMP ADJ** is the parameter which is used to determine whether the auxillary heater should be enabled. Setting Range: 3~8℃ Default Value: 6
AUX HEATER DIFF-*	**AUX HEATER DIFF** is the parameter which is used to determine whether the auxillary heater should be enabled. Setting Range: 1~4℃ Default Value: 2
AUX HEATER-*	**AUX HEATER** should be set as WITH or W/O based on the actual system installation. Setting Options: WITH, W/O (Without) Default Options: WITH
AUX HEATER TYPE-*	**AUX HEATER TYPE** should be set to determine the auxillary heater control logic. Setting Options: STORAGE, TANKLESS, STATIC Default Options: TANKLESS
MANUAL DEFROST	**MANUAL DEFROST** is the menu item which could enforce a defrosting cycle even the heat pump unit does not have defrosting request. *Please refer to "MANUAL DEFROST OPERATION PROCESS" section for detailed setting method.*
HP TEMP ADJ-*	**HP TEMP ADJ** is the parameter to adjust the maximum water temperature for the heat pump based on the total operation time. It would be reset to 0 after the HX CLEAN RESET. Setting Range: 0~2℃ Default Value: 0
EX-FACTORY RESET	**EX-FACTORY RESET** is the menu item to reset all the parameters to be the ex-factory settings. *Please refer to "CENTREL CONTROLLOR EX-FACTORY RESET OPERATION PROCESS" section for detailed setting method.*

Note: Select the menu item by pressing the Up/Down buttons. When the menu is selected, it will be highlighted with the white background, then press the "MODIFY" button to set the related parameters. Press the "BACK" button to return to the main page of the interface and press the "HELP" button to enter the menu for help.

*Please refer to "Summer Tank Temperature Setting" section for detailed setting method of menu items marked with *.*

Manual Defrost Operation Process		
Operation	**Display**	**Description**
Move to "**MANUAL DEFROST**" by pressing the Up/Down button, then press SELECT button to start this process.		
The "Manula Defrost" interface will be displayed subsequently. Press YES button to excute the defrosting process or press the NO button to cancel the process.		
The defrosting command will be sent to all the heat pump if YES button is pressed in the previous step and the UIM will display "COMMAND SENDING…"		
		The manual defrosting is successful if the UIM display "SUCCEEDED!" and all the heat pump should enter the defrosting cycle. If the UIM display "FAILED!", it indicates the manual defrosting is unsuccessful, please check the communication between the central controller and the heat pump units.
Press BACK button to return to the previouse UIM interface.		

Note: This operation can't be selected when heat pump unit is ON.

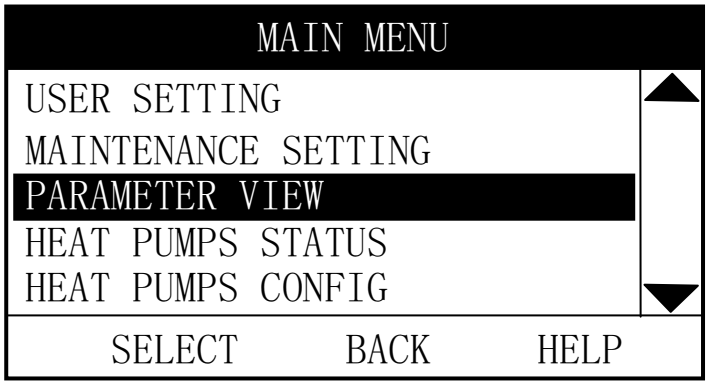
Ex-Factory Rest		
Operation	**Display**	**Description**
Move to "**EX-FACTORY**" by pressing the Up/Down button, then press SELECT button to start this process.		
The "Manula Defrost" interface will be displayed subsequently. Press YES button to excute the reset process or press the NO button to cancel the process.		
The reset command will be sent to the MCB if YES button is pressed in the previous step and the UIM will display "COMMAND SENDING…"		
		The reseting is successful if the UIM display "SUCCEEDED!". If the UIM display "FAILED!", it indicates the reseting is unsuccessful, please check the communication Between the control board and display board of the central controller.
Press BACK button to return to the previouse UIM interface.		

Note：

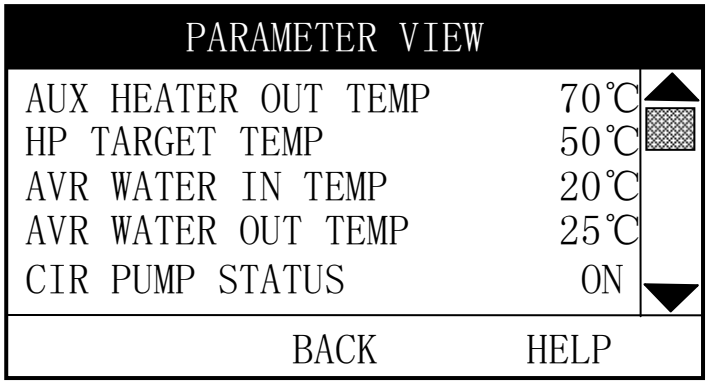
After this operation,all the parameters of central controller (except for the heat pump quantity) will be reset to the ex-factory settings.

6.6. Parameter View

Select the PARAMETER REVIEW on the main menu to enter the parameter review interface.



Picture 6.11 Main Menu



Picture 6.12 Parameter View Interface

Move to specific menu items by pressing the UP/DOWN button.

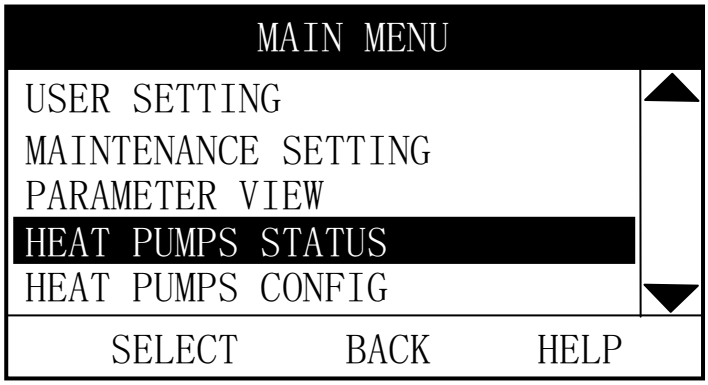
Menu Description

Parameter View	
Menu Item	**Description**
AUX HEATER OUT TEMP	**AUX HEATER TEMP ADJ** displays the actual outlet water temperature from the auxillary heater.
HP TARGET TEMP	**HP TARGET TEMP** displays the target temperature for the heat pump operation. It will display “NO” if the heat pump is in other status than “Heating”.
AVR WATER IN TEMP	**AVR WATER IN TEMP** displays the average inlet water temperature for all the heat pump units.
AVR WATER OUT TEMP	**AVR WATER OUT TEMP** displays the average outlet water temperature for all the heat pump units.
CIR PUMP STATUS	**CIR PUMP STATUS** displays the status of the circulation pump.
USER PUMP STATUS	**USER PUMP STATUS** displays the status of the user pump.
AUX PUMP STATUS	**AUX PUMP STATUS** displays the status of the auxillary heater pump.
HISTORY FAULT(1)	**HISTORY FAULT(1)** displays the most recent fault information.
HISTORY FAULT(2)	**HISTORY FAULT(2)** displays the 2nd newest fault information.
HISTORY FAULT(3)	**HISTORY FAULT(2)** displays the 3rd newest fault information.
HISTORY FAULT(4)	**HISTORY FAULT(2)** displays the eldest fault information.

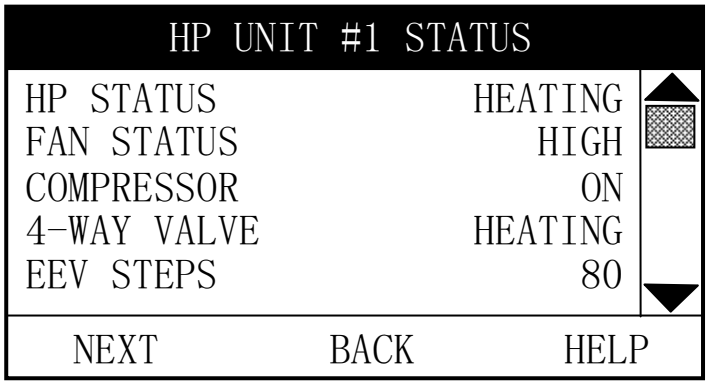
Note: Press the “BACK” button to return to the main page of the interface and press the “HELP” button to enter the menu for help.

6.7. Heat Pump Unit Status

Select the HEAT PUMPS STATUS on the main menu to enter the heat pump status interface.

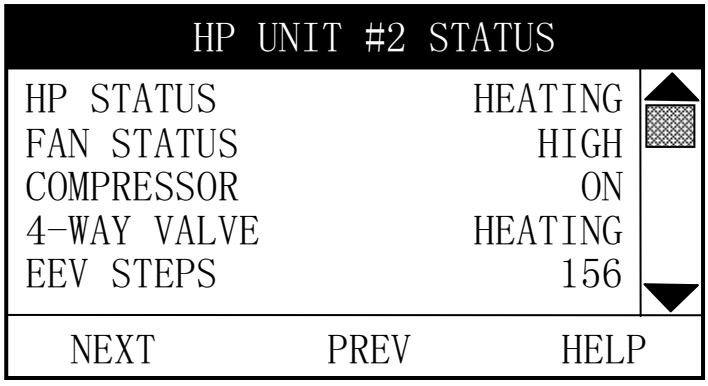


Picture 6.13 Main Menu



Picture 6.14 Heat Pump #1 Unit Status

Move to specific menu items by pressing the UP/DOWN button. Press the NEXT button to the next heat pump unit status interface and press PREV button to the previous heat pump unit status interface.



Picture 6.15 Heat Pump 2# Unit

Menu description：

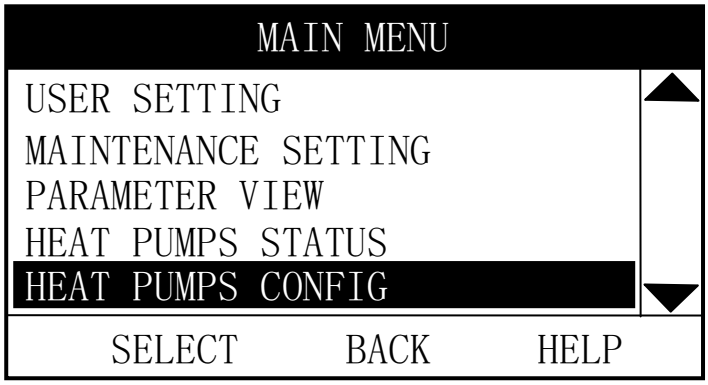
Heat Pumps Status

Menu Item	Description
HP STATUS	**HP STATUS** displays the actual status of the heat pump. OFF: The hot water system is in off status. HEATING: The heat pump is in operation status to heat water. DEFROST: The heat pump is in defrosting cycle. STANDBY: The heat pump is in standby status due to there is no hot water demand or there are other conditions which do not meet the heat pump operation conditions.
FAN STATUS	**FAN STATUS** displays the actual status of the fan. HIGH: High speed operation LOW: Low speed operation OFF: Stop
COMPRESSOR	**COMPRESSOR** displays the satus of the compressor.
4-WAY VALVE	**4-WAY VALVE** displays the position of the 4-way reversing valve.
EEV STEPS	**EEV STEPS** displays the actual openning of the electronic expansion valve.
WATER IN TEMP	**WATER IN TEMP** displays the actual inlet water temperature of this unit.
WATER OUT TEMP	**WATER OUT TEMP** displays the actual outlet water temperature of this unit.
AMBIENT TEMP	**AMBIENT TEMP** displays the actual ambient temperature read by the ambient temperature sensor of this unit.
SUCTION TEMP	**SUCTION TEMP** displays the actual suction temperature of this unit.
DISCHARGE TEMP	**DISCHARGE TEMP** displays the actual discharge temperature of this unit.
COIL TEMP	**COIL TEMP** displays the actual coil temperature of this unit.
SOFTWARE VERSION	**SOFTWARE VERSION** displays the actual software verison of this unit.

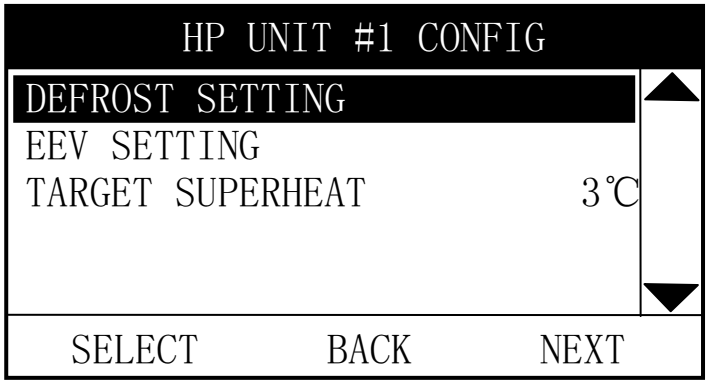
Note: Press the "BACK" button to return to the main page of the interface and press the "HELP" button to enter the menu for help.

6.8. Heat Pump Unit Configuration

Move to the HEAT PUMPS CONFIG from the main menu and press SELECT button to enter the heat pump configuration interface. An 3 digits nonpublic password is requested for entering the configuration interface.

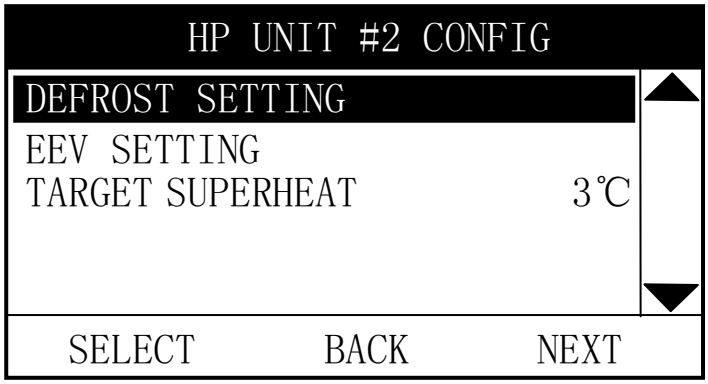


Picture 6.16 Main Menu



Picture 6.17 1# Unit Parameter Setting

Move to specific menu items by pressing the UP/DOWN button. Press the NEXT button to the next heat pump configuration interface.



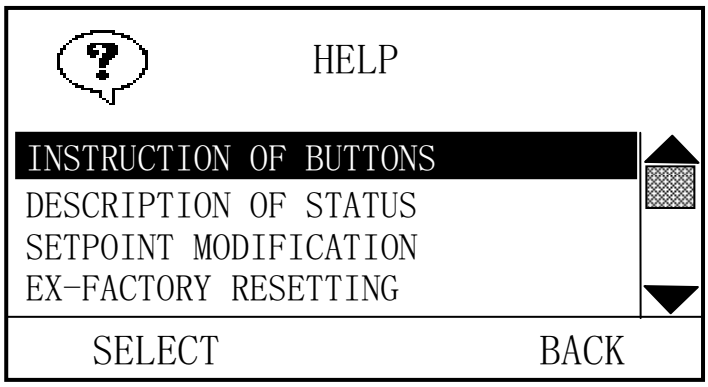
Picture 6.18 2# Unit Parameter Setting Interface

Menu Description：

Heat Pumps Configuration		
Menu Item		**Description**
Defrost Setting	**DEFROST ON TEMP**	**DEFROST ON TEMP** is one of the parameters to judge whether the heat pump should enter the defrosting cycle. Setting Range: -30~-2 ℃ Default Value: -7
	DEFROST OFF TEMP	**DEFROST OFF TEMP** is one of the parameters to judge whether the heat pump should exit the defrosting cycle. Setting Range: 0~30℃ Default Value: 15
	DEFROST INTERVAL	**DEFROST INTERVAL** is the time frame for the controller to judge whether the heat pump should enter the defrosting cycle. SettingRange: 15~90 Minute Default Value:30
	DEFROST TIME	**DEFROST TIME** is one of the parameters to judge whether the heat pump should exit the defrosting cycle. Setting Range: 1~20 Minute Default Value: 8
	Please refer to "Defrost Setting Operation" section for detailed setting method.	
EEV Setting	**EEV CONTROL**	**EEV CONTROL** is used to set the control method of the electronic expansion valve, it could be set as MANUAL for trouble shooting during service. Setting Options: AUTO, MANUAL Default Option: AUTO
	EEV INIT STEPS	**EEV INIT STEPS** is the parameter which determines the initial openning of the electronic expansion valve during the unit start up period. Setting Range: 0~500 Steps Default Value: 350
	EEV MIN STEPS	**EEV MIN STEPS** is the parameter which determines the minimum openning of the electronic expansion valve during control. Setting Range: 0~500 Steps Default Value: 50
	EEV MAX STEPS	**EEV MAX STEPS** is the parameter which determines the maximum openning of the electronic expansion valve during control. Setting Range: 0~500 Steps Default Value: 480
	Please refer to "EEV Setting Operation" section for detailed setting method.	
TARGET SUPERHEAT		**TARGET SUPERHEAT** is the parameter which set the suction superheating target for the electronic expansion valve control. Setting Range:-20~20℃ The Default:3

6.9. HELP MENU

Press the HELP button from any UIM interface, the UIM will enter the HELP interface. Press the SELECT button to enter the menu item or press the BACK button to return to the previous interface.



Picture 6.19 Controller Help Menu Interface

HELP INFORMATION	
Menu Item	**Description**
INSTRUCTION OF BUTTONS	USERS CAN OPERATE THE CONTROLLER BY PRESSING THE 'UP', 'DOWN' AND THREE FUNCTION BUTTONS. THE 'UP' AND 'DOWN' BUTTONS LOCATE AT THE LEFT SIDE AND RIGHT SIDE UNDER THE LCD RESPECTIVELY, AND THREE FUNCTION BUTTONS LOCATE RIGHT UNDER THE LCD. PRESS 'UP' OR 'DOWN' BUTTON TO CHECK OR CHANGE THE PARAMETERS OF THE WATER SYSTEM OR HEAT PUMP UNITS. THE FUNCTION BUTTONS ARE DEFINED AS THE DISPLAY SHOWN ON THE LCD.
DESCRIPTION OF STATUS	FOLLOWING ARE THE WORKING STATUS OF THE HOT WATER SYSTEM: HEATING: HEAT PUMP OR AUXILIARY HEATER HAS BEEN PROPERLY STARTED TO HEAT THE TANK WATER. DEFROST: FOUR-WAY VALVE HAS BEEN SWITCHED TO DEFROSTING SIDE TO DEFROST THE EVAPORATOR. ANTI-FRZ: CIRCULATION PUMP OR HEAT PUMP HAS BEEN STARTED TO PROTECT THE WATER SYSTEM FROM BEING FROZEN. STANDBY: THE HOT WATER SYSTEM IS NOT IN AN ACTIVE HEATING CYCLE. USUALLY THIS MEANS THE TEMPERATURE IN THE TANK HAS REACHED A SUFFICIENT TEMPERATURE AND HAS NOT DROPPED LOW ENOUGH TO INITIATE A CALL FOR HEAT.
SETPOINT MODIFICATION	THE TANK SETPOINT DETERMINES THE REGULATED TEMPERATURE FOR THE WATER IN TANK. THIS PARAMETER IS ADJUSTED IN THE 'USER SETTING' MENU. TO ADJUST, FOLLOW THESE STEPS: FROM THE HOME PAGE SCREEN, PRESS 'FUNC' FROM THE MAIN MENU, PRESS 'SELECT' TO ENTER THE 'USER SETTING' SCREEN,THEN USE 'UP' AND 'DOWN' BUTTON TO SELECT 'SUMMER SETPOINT' OR 'WINTER SETPOINT', PRESS 'MODIFY' TO ENTER THE MODIFICATION SCREEN, USE 'UP' AND 'DOWN' BUTTON TO CHANGE THE SETPOINT, THEN PRESS 'ENTER' TO ACCEPT THE CHANGE OR PRESS 'CANCEL' TO ABORT. THIS PROCEDURE CAN ALSO BE USED TO CHANGE OTHER TEMPERATURE SETTING.
EX-FACTORY RESETTING	FACTORY DEFAULT SETTING FOR THE CONTROLLER CAN BE RESTORED IN THE 'EX-FACTORY RESETTING' MENU. SELECT 'EX-FACTORY RESETTING' FROM THE MAIN MENU AND FOLLOW THE ON SCREEN INSTRUCTIONS.
CONTACT INFOS	A.O.SMITH CORPORATION www.aosmith.com

7 – Maintenance Instructions

WARNING:
This heat pump water heater system maintenance and service sould be peformed by qualified technician. The improper maintenance and service might cause serious personal injury or property lose.
Please disconnect the power to both heat pump unit and centralcontroller before any maintenance or service is performed.

- Please inspect on the water piping system and gas exhausting valve regularly to avoid air entering the system or there is no water in the system, which will bring negative influence on the system performance and reliability.
- Please clean the water system, including the water filter regularly (every 2 to 3 months) to avoid the system stop due to insufficient water flow.
- Please keep the system installation environment dry, clean and with good ventilation. To ensure the good heat exchange performance of the air side coil, please use the dedicated detergent to clean the air side coil regularly (every 12 to 24 months, depends on the environment of the system installation).Proposed cleaning process: Dilute the detergent by the water with the proposed proportion by the detergent supplier, spray the liquid to the coil surface and wait for 3-5 minutes, then clean the coil with pressurized water. Please avoild spraying detergent or water on the electrical components or wiring harnesses.
- Please clean the condenser regularly (every 2 to 6 months, depends on the local water qualtity) to ensure the efficient and safe operation of the heat pump unit.
- Please inspect the major components of the system regularly and do the service or maintenance if there is any abnormal observation.
- Please inspect the power supply, electrical components and system wiring regularly and do the service or maintenance if there is any abnormal observation.
- Please drain out the water from the piping system, seal all the openings, disconnect the power to the system if the system will be stopped for a long time.
- If the system had been stopped for a long time and need to be restarted. Please do the full inspection on the system, check on every valve status, connect power to the heat pump unit for at least 12 hours before switch on the system.
- If the system had been stopped for a long time under low ambient temperature, i.e. the tank temperature had dropped to lower than 15C. Please use the auxillary heater to heat the tank temperature to be higher than 15C before start the heat pump system.
- This hot water system is designed with anti-freezing protection function. Please do not disconnect the power to the hot water system if the system is not under operation continuously.

8 - Troubleshooting Instructions

12.1. Error Code Trouble Shooting

Please try to do the trouble shooting based on the error code information before call the service call if the central controller reported a error code.

CODE	ERROR DESCRIPTION	POSSIBLE REASONS	TROUBLE SHOOTING STEPS
Central Controller			
E00-01	RESERVED		
E00-02	RESERVED		
E00-03	RESERVED		
E00-04	RESERVED		
E00-05	TANK TEMPERATURE SENSOR ERROR	1. Loose wiring. 2. Bad temperature sensor.	1. Inspect the wiring and fix them. 2. Replace the temperature sensor.
E00-06	AUXILIARY HEATER TANK TEMPERATURE SENSOR ERROR		
E00-07	AUXILIARY HEATER FLOW SWITCH ALARM	1. Loose wiring. 2. No water, the valve had been opened fully. 3. Too small water flow rate, blocked water filter. 4. Bad switch.	1. Inspect the wiring and fix them. 2. Inspect the piping system and make sure all the valves are fully open. 3. Clean the water filter. 4. Replace the switch.
E00-08	TANK TEMPERATURE OVERHEAT EEROR	Too hot water from auxillary heater.	Inspect the control circuit of the auxillary heater.
E00-09	AUXILIARY HEATER FLOW SWITCH LOCK	There are three times of E00-07 happpened within one hour.	Power off and power on the central controller. If there is still E00-07 reported, please refer to the trouble shooting method of E00-07.
E00-10	ABNORMAL TANK TEMPERATURE	1. Abnormal installation of the tank temperature sensor or control temperature sensor. 2. Bad tank temperature sensor or control temperature sensor.	1. Inspect the two temperature sensors installation on the tank. 2. Replace the tank temperature sensor or control temperature sensor.
E00-11	SYSTEM WATER FLOW ERROR	All the heat pump units has water flow switch error three times within one hour.	Inspect the heat pump water piping line as per E0X-11 trouble shooting.
E00-12	HIGH VOLTAGE ALARM	The power supply voltage is higher than 264V.	Inspect the power supply system.
E00-13	LOW VOLTAGE ALARM	The power supply voltage is lower than 187V.	
E00-14	CONDENSER CLEAN ALARM	Scalling condenser.	Clean the condenser.
HEAT PUMP 0X（01~08）			
E0X-00	COMMUNICATION ERROR	1. No power supply to the heat	1. Inspect the power supply to

		pump units. 2. Loose communication cable wiring. 3. Bad controller.	each heat pump units and the status of each air switch. 2. Inspec the communication cable wiring and fix. 3. Replace the control board.
E0X-01	RESERVED		
E0X-02	OUTLET WATER TEMPERATURE SENSOR ERROR	1. Loose wiring. 2. Bad sensor.	1. Inspect the wiring of the realted sensor. 2. Replace the related sensor.
E0X-03	DISCHARGE TEMPERATURE SENSOR ERROR		
E0X-04	SUCTION TEMPERATURE SENSOR ERROR		
E0X-05	RESERVED		
E0X-06	MEMORY CHIP ERROR		
E0X-07	COIL TEMPERATURE SENSOR ERROR	1. Loose wiring. 2. Bad sensor.	1. Inspect the wiring of the realted sensor. 2. Replace the related sensor.
E0X-08	RESERVED		
E0X-09	AMBIENT TEMPERATURE SENSOR ERROR	1. Loose wiring. 2. Bad sensor.	1. Inspect the wiring of the realted sensor. 2. Replace the related sensor.
E0X-10	INLET WATER TEMPERATURE SENSOR ERROR		
E0X-11	FLOW SWITCH ERROR	1. Loose wiring. 2. No water, the valve had been opened fully. 3. Too small water flow rate, blocked water filter. 4. Bad switch.	1. Inspect the wiring and fix them. 2. Inspect the piping system and make sure all the valves are fully open. 3. Clean the water filter. 4. Replace the switch.
E0X-12	HIGH PRESSURE ERROR	1. Loose wiring of the higher pressure switch. 2. Too small water flow rate. 3. Water filter block. 4. Scalling condenser. 5. Refrigerant filter or expansion valve block. 6. Bad higher pressure switch.	1. Inspect the wirng and fix. 2. Inspec the water piping system including the pump selection. 3. Clean the water filter. 4. Clean the condenser. 5. Replace the refrigerant filter or expansion valve. 6. Replace the high pressure switch.
E0X-13	LOW PRESSURE ERROR	7. Loose wiring of the lower pressure switch. 8. Refrigerant leakage. 9. Refrigerant filter or expansion valve block. 10. Bad evaporator performance. 11. Bad low pressure switch.	1. Inspect the wirng and fix. 2. Perform the leakage detection and recharge the refrigerant. 3. Replace the refrigerant filter or expansion valve. 4. Clean the evaporator and check the air circuit.

			5. Replace the low pressure switch.
E0X-14	RESERVED		
E0X-15	POWER SUPPLY PROTECTOR ERROR	The wrong phase sequence or incorrect phase of the power supply.	Inspect the power supply system.
E0X-16	COMPRESSOR OVERLOAD PROTECTION	1. Loose wiring of the overload protection relay. 2. Higher compressor current. 3. Bad overload protection relay.	1. Inspect the wiring and fix. 2. Inspect the compressor wiring. 3. Replace the relay.
E0X-17	DISCHARGE TEMPERATURE OVERHEAT	1. Refrigerant leakage. 2. Non-condensing gas in the refrigerant system. 3. Inproper installation of the temperature sensor.	1. Perform the leakage detection and recharge the refrigerant. 2. Vacuum the system and recharge the refrigerant. 3. Inspec the sensor installation.
E0X-18	RESERVED		
E0X-19	OUTLET WATER TEMPERATURE OVERHEAT	1. Low water flow rate. 2. Dirty water filter. 3. Scalling condenser.	1. Inspect the water piping and the pump selection. 2. Clean the water filter. 3. Clean the condenser.
E0X-20	ABNORMAL HEATING ALARM	1. Improper installation of the water temperature sensors.Improper installation of the water temperature sensors. 2. The four way reversing valve is not in heating status.	1. Inspect all the water temperature sensor installation (on each heat pump unit and on the tank). 2. Power on and power off the four way reversing valve for a few times.
E0X-21	AMBIENT TEMPERATURE OUT OF RANGE	1. The actual ambient temperature is out of -10-48^{o}C. 2. Bad ambient temperature sensor.	1. Measure the actual ambient temperature by other temperature meters. 2. Replace the ambient temperature sensor.
E0X-22	EVAPORATOR DIRTY ALARM	The evaporator coil is dirty.	Clean the evaporator coil.
E0X-23	EVAPORATOR BLOCK ALARM	The evaporator coil is very dirty.	

12.2. Other Phenomena – Normal

	Phenomena	Possible Reason	Solutions
NOT ERROR	The tank temperature is lower than the setting point when heat pump units stop.	This is normal since the heat pump will stop for protection if the condensing pressure is too high.	Install the auxillary heaters to heat the water to desired temperature if a higher water temperature is requested.
	Heat pump units stop under low ambient temperature.	This is normal phenomeno. The heat pump units will stop and enter the defrosting cycle to	No actions needed.

		remove the frost from the evaporator to ensure efficient system operation after a certain time operation.	
	Heat pump units does not start as soon as the system is switched on.	This is normal phenomeno. To protect the compressor from frequent cycle, the heat pump unit will not start within 3 minutes from last stop.	
	The heat pump fan stops under high ambient temperature.	This is normal phenomeno. The fan will possibly stop to reduce the evaporative pressur for compressor protection under high ambient temperature operation.	

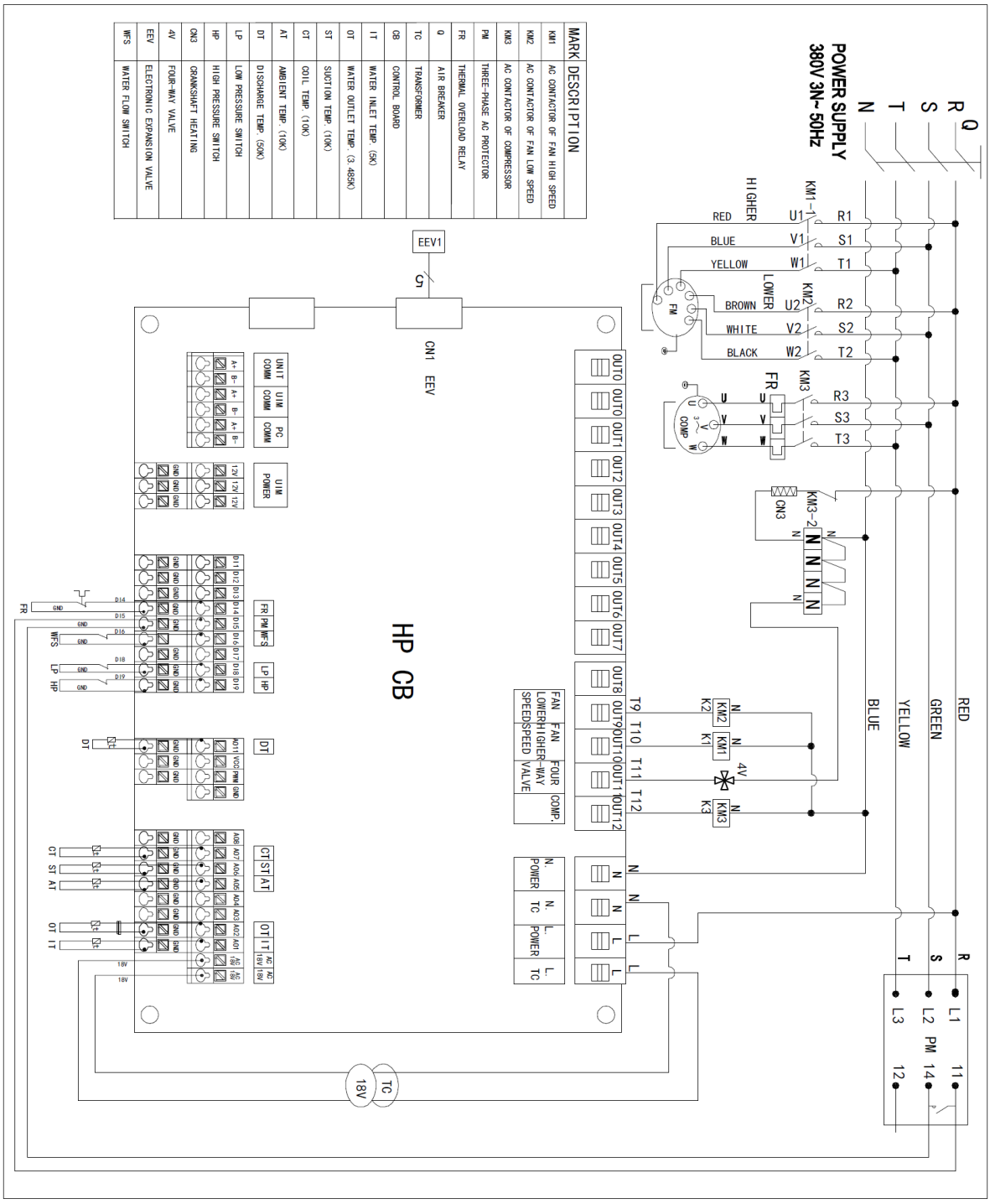
12.3. Other Phenomena-Abnormal

	Phenomena	Possible Reason	Solutions
ERRORS, PLEASE DOUBEL CHECK BEFORE CALL SERVICE NUMBER	The central controller displays “N/A” for some paramters.	Communication is not established successfully.	Please check the communication cables between the central controller controller and display, among the heat pump units.
	Heat pump units does not start after the system is switched on for a long time.	1. Power supply error. 2. Loose wiring. 3. Bad fuse. 4. Operation timer expired.	1. Inspect the power supply. 2. Inspect the wiring and fix. 3. Replace the fuse. 4. Check on the timer setting.
	The circulation pump is operating but with abnormal noise.	1. No water in piping system. 2. Air in pipin system. 3. The valves are not fully open. 4. Blocked water filter.	1. Inspect the water piping system. 2. Exhaust the air from the piping system. 3. Open all the valves fully. 4. Clean the water filter.
	Lower heating capacity and the heat pump units are always operating without stop	1. Bad insulation on water side and high standby loss. 2. Bad performance of ambient coil. 3. Insufficient water. 4. Small tank and the hot water system is undersized.	1. Improve the water system insulation. 2. Inspect the air circulation around the unit. 3. Clean the water filter or exhaust the gas in the system. 4. Improve the system design by inquiring system manufacturer.
	Compressor does not start	1. Bad compressor contactor. 2. Loose wiring. 3. Compressor overload protection.	1. Replace the contactor. 2. Inspect the wiring and fix. 3. Check the UIM for error code. 4. Reset the tank temperature. 5. Clean the water filter or

		4. Inproper setting point. 5. Insufficient water.	exhaust the gas in the system.
	Fan does not start	1. Bad fan contactor. 2. Bad fan motor.	1. Replace the fan contactor. 2. Replace the fan motor.

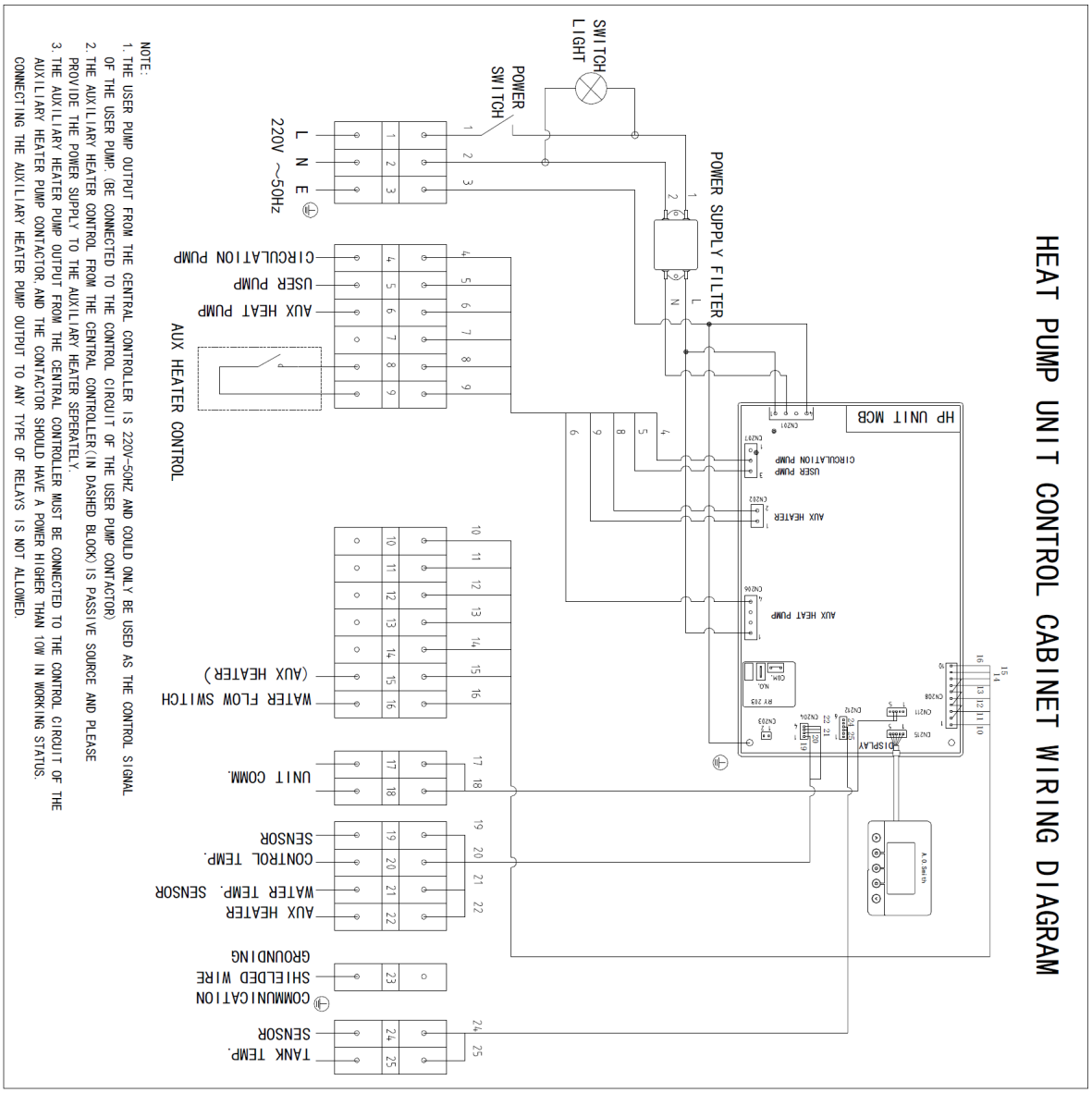
9- Appendix

12.4. Heat Pump Unit Wiring Diagram



Picture 9.1 Heat Pump Unit Wiring Diagram

12.5. Central Controler Wiring Diagram



Picture 9.2 Central Controller Wiring Diagram

12.6. Communication Wiring Diagram Among Mutilple Units

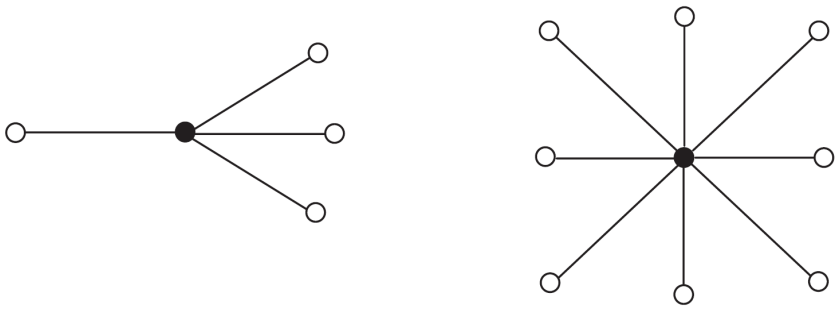
Picture 9.3 Communication Cable Wiring Diagram

Note:

1. Please use shielded cable for all the communication cables among heat pump units and central controllers and grounded the cable well. The maixmum length of the communication cable should be shorter than 200 meters.

2. One central controller could be connected to maximum eight heat pump units.

3. Please do not connect the communication cable as following picture.



Picture 9.3 Incorrect Communication Cable Wiring

10 - Packing List

22.1. Packing List of the Heat Pump Unit

#	Description	Quantity	Instructions
1	Heat Pump Unit	1	
2	Neoprene Isolator	4	To be installed between the heat pump unit and the foundation to isolate the vibration of the unit
3	Water Filter	1	To be installed between the tank and the inlet water connection of the heat pump unit.
4	Flow Switch	1	To be installed on the pipe between the ouotlet water connection of the heat pump unit and the tank.
5	Installation and Operation Manual	1	

22.2. Central Controller Kit

#	Description	Quantity	Instructions
1	Central Controller	1	
2	Temperature Sensor Kit	3	Tank temperature sensor Control temperature sensor Auxilliary heater temperature sensor
3	Key Central Controller	2	

Note: One hot water system needs one central controller kit, which could control up to eight heat pump units and the auxillary heater, related pumps.