



Heat Pump Water Heater

CAHP-80
CAHP-120



 **aosbath** User Guide

About AOS Bath

Congratulations on your purchase of an A. O. Smith water heater.

AOS Bath is a water heater specialist that focuses on making leading water heater technologies available in Singapore. We represent A. O. Smith, the largest and most technologically advanced water heater manufacturer in the world.

Water heaters are one of the highest energy consumers in a household. Using green technologies, you can save up to 80% of energy. At AOS Bath, we believe in empowering home owners with knowledge so you can make choices suitable for your household. No longer should you have to settle with obsolete technology.

A. O. Smith has delivered innovative residential and commercial solutions for over 140 years.

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User guide

Please read the instructions carefully before the installation or operation of this heat pump Water Heater. This manual is meant for your future reference.

- Only professional installers recommended by AOS Bath will install the AOS heat pump for you. For improper installation of the heater by unauthorized personnel, AOS Bath will not be responsible.
- If the user installs the heat pump system manufactured by themselves or does it by using the self-prepared installation materials, AOS Bath will not be liable for any adverse effects on the normal operation and service performance of the heater, including but not limited to pipeline leakage, fall or improper installation thereof, and harmful effects on or damage to the body of the heat pump system as well as all losses incurred thereby.
- After installation and operation of the heat pump system, users should inspect the heat pump system regularly and make necessary maintenance checks according to the service conditions. If any abnormality occurs, stop the operation of the heater immediately, and contact the local authorized dealer for repair to ensure the normal, safe, and reliable operation of the system.
- The anode rod is a consumable part and should be examined and replaced at fixed periods. Consumers should register and replace the anode rod by contacting the local authorized dealer. In this way, the service life of the heat pump system will be extended effectively.
- Prior to any maintenance or repair of the heat pump system, please cut off the power supply. Installers who are not recommended by AOS Bath should not adjust and repair the heater.
- In case the heat pump water heater is subject to dry heating, the generated steam or burning water may lead to serious scalds. Therefore, it is necessary to fill the heat pump system with water. If dry heating occurs, cut off the power and water supply at once, stop the operation, contact the local authorized dealer and carry out inspection or repair by AOS Bath's acknowledged professional installers.
- Any component soaked into water in the tank can only be used after being inspected or repaired by AOS Bath's acknowledged professional installers.
- Any damaged cords must be replaced by the repair department and professional staff acknowledged by AOS Bath. Primary components of the heat pump system are protected by an insulation layer and thermal protective coating.
- The heat pump system is equipped with a relief valve. To ensure safe operation of the system, the mounting position of the valve shall not be changed without permission, and the blockage of valve outlet is strictly prohibited. A discharge pipe shall be provided for the relief valve, mounted downwards continuously. The discharge pipe shall be directly connected to the floor drain.

Water discharged from the heat pump (including high temperature heating water) shall not be used for drinking.

The heat pump system shall be installed in a dry place. Never insert or disconnect from the power source with a wet hand.

The heater shall be permanently connected to the electricity supply using a double pole linked switch that has a contact separation of at least 3mm between poles incorporated in the circuit and out of reach from the person using the shower. All wiring must conform to local requirements.

Do not use the damaged electric wire, aged, loose and incorrectly fixed power sources. This will prevent the risk of electric shocks, short circuits, fires, etc. Ensure the power source is connected well.

If the supply cord is damaged, it must be replaced by AOS Bath in order to avoid a hazard.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge. They should be given supervision or instructions concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

A. O. SMITH Water Heating Company Ltd and AOS Bath Pte Ltd reserve all rights to interpret the abovementioned provisions.

Caution

Failure to follow these instructions may lead to risk of fire and could cause property damage and or personal injury or death. In order to avoid a hazard due to inadvertent resetting of the thermal cutout, this appliance must not be supplied through an external switching device such as a timer, or connected to a circuit that is regularly switched on and off by the utility.

Warning

Power-on and operation will be permitted only after reliable grounding is provided for the power socket. The heat pump system is strictly forbidden for use in circumstances where no safe grounding or well-drained floor drain is provided. In the installation area, it should be ensured that the water leakage of the heat pump system or joints may not cause damage to the articles in adjacent regions or lower portions of the building.

Safety Features

Compressor protection

System will stop operation of compressor in the event of an overheated compressor

Relay operation protection

System will shut down to prevent overvoltage, fire and other relay-related issues

Electronic expansion valve protection

System will stop operation of compressor if the electronic expansion valve is found to have issues

High-low voltage protection

System will shut down to protect system components due to variation of external voltage beyond safety levels

Refrigerant leakage protection

System will stop operation of compressor if there is a refrigerant leak

High water temperature protection

System will shut down when any of the sensors inside the water heater reaches 90°C.

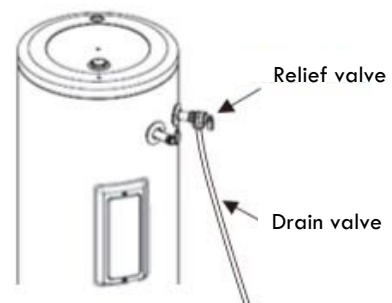
Thermal cutout switch

A high temperature limit thermal cutout disconnects the live and neutral wire simultaneously in the event of abnormally high water temperature.

Temperature and pressure relief valve

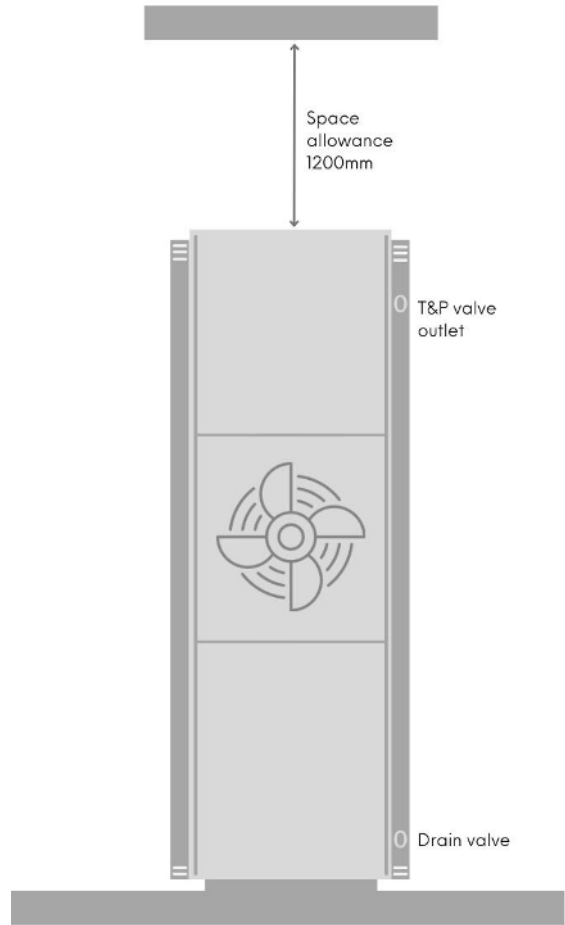
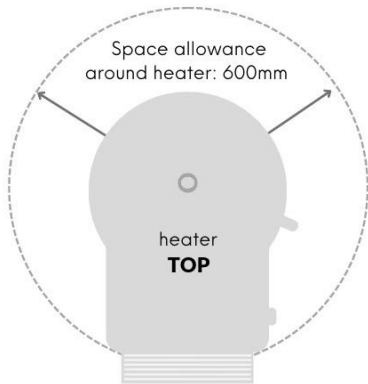
The water heater comes with a temperature and pressure relief valve set at 1.03MPa. The valve must be installed according to the position shown in the figure. The valve will release pressure automatically when the pressure in the water heater exceeds 1.03MPa or the temperature exceeds 99°C.

This valve must be installed with a drain pipe at its outlet and the pipe should be installed downward in a frost-free environment. The pipe should be discharged to a floor drain.



Temperature and pressure relief valve

Specifications



Physical Dimensions							
	Height (mm)	Tank Diameter (mm)	Maximum Depth (mm)	Maximum width (mm)	TP valve From floor (mm)	Inlet from floor (mm)	Relief Valve Angle (°)
CAHP-80	1700	610	910	686	1440	145	22
CAHP-120	1700	713	1012	770	1467	144	22

Location and allowances

- The unit should not be installed in a confined area.
- A height allowance of 1200mm above the unit is required for maintenance access
- A space allowance of 600mm is required around the unit
- Installation location to be away from oil smoke, severe electromagnetic waves, acid or alkaline steam.
- The airflow surrounding the unit must be unrestricted

Model			CAHP-80	CAHP-120
HP Rated Power		W	875	
HP rated heating capacity		W	3680	
COP		W	4.20	
Unit maximum power		W	10000	
Unit maximum heating capacity		W	15000	
Maximum operation current	1N	A	38.7	
Refrigerant			R134a	
Electrical heating capacity		W	6000	
Tank capacity		L	300	455
Hot water delivery rate	Efficiency	L/h	79.7	
	High demand	L/h	201	
Net weight		kg	161	194
Operation weight		kg	461	649
Max water temp in efficiency mode		°C	65	
Temperature regulation range		°C	35 ~ 75	
Ambient temperature for HP		°C	-7 ~ 43	
Ambient temperature for unit		°C	-15 ~ 50	
Unit operation noise		dB (A)	54	
Power supply specification			230V~50Hz	
Connection size	Water inlet		NPT ¾ (female thread)	
	Water outlet		NPT ¾ (female thread)	
	T&P relief valve		NPT ¾ (female thread)	
	Drain valve		NPT ¾ (female thread)	

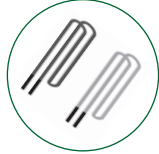
Note: Heat pump performance is the mean performance under condition “20 (dry bulb) / 15 (wet bulb) °C ambient temperature and 15°C to 55°C water temperature”.

Key features



Blue Diamond tank Patent US6303183

Blue Diamond tanks provide higher superior corrosion resistance and durability than steel or stainless steel tanks.



Blue Diamond elements Patent ZL200510037670.1

Blue Diamond elements are more scale-resistant and have higher heating efficiencies than conventional steel elements.



Touch screen control panel

Full control of your water heater. Get real time hot water visuals, adjust your temperature to save 40% of energy or \$200/year.



Instant heating Patent ZL200820185859.4

Instead of waiting 20 minutes for hot water as with conventional heaters, get hot water in 2 minutes at the touch of a button.



MAX heating Patent ZL200820185859.4

MAX Heating gives you about twice as much hot water as a conventional electric heater without consuming more energy.



Built-in timer

Heater runs only when programmed and goes into energy saving mode when not in use.



Heat pump Patent ZL201020224011.5

Saves over 80% of energy or \$900/year by absorbing free ambient heat.



Patented Automatic Energy Saver (AES) ZL00112584.2

Memory chip records up to 21 days of your family's usage habits and send data to the heater for more efficient heating at the lowest cost



AOS Bath 3 year full warranty

AOS Bath provides the longest on-site water heater warranty in Singapore for A. O. Smith. Other brands provide full warranties for only 1 year.



Intelligent Dormancy

During periods when water is not used, the heater goes into power-saving mode

Installation

Caution

- Please wait for 30 minutes before using the heater for the first time.
- The heater should only be connected to a power source after a full installation which ensures secure mounting, piping, wiring and filling of the tank with water.
- To prevent injuries from lifting heavy equipment, the water heater should be installed by at least 3 persons and where necessary, aid of a forklift.
- The water heater must be installed by a qualified person

Tank installation

- Make sure the floor where the tank is placed can bear approximately 1.5 times weight of the tank when it is fully filled with water.
- During the installation, the tank cannot be tilted over 30°
- Unit should rest on a flameproof, fixed base below of at least 20mm height with adequate drainage.
- The tank of the water heater shall be installed near to the power socket, sewer mouth and the area where water is needed (Figure 4).
- Because high temperature water may drain from the temperature and pressure relief valve on the tank during the usage of the water heater, the drainage pipes of the pressure relief port must be connected to floor drain to prevent scald.
- The water heater should be located in an area where leakage of the water heater or the pipe joint will not damage to the subjects around or the lower floors of the building.

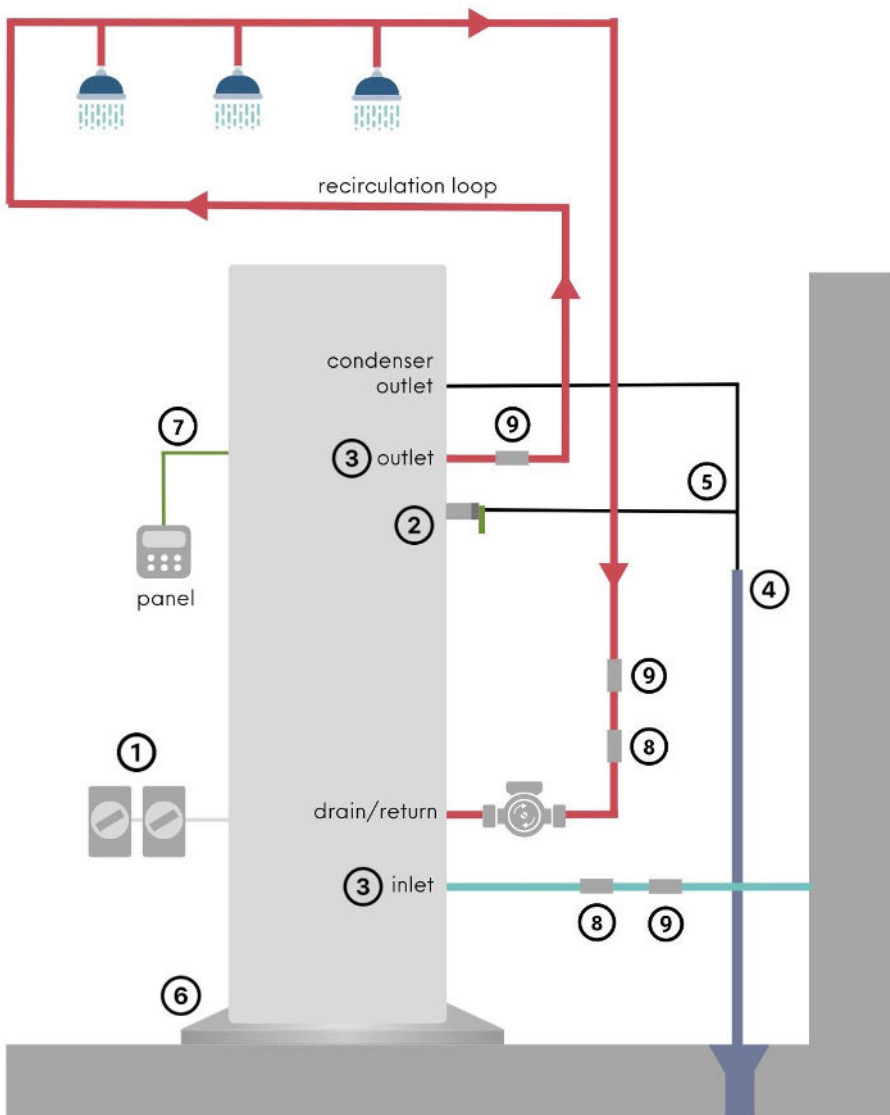
Installation environment

- The unit is suitable for outdoor installation
- If the water heater is installed in the places where it would be easily subject to lightning strike, such as on the roof top of buildings, lightning-protection is necessary.
- Do not power off the water heater when the ambient temperature is lower than 5°C. If required, please drain out water completely in advance.
- Installation location to be away from oil smoke, severe electromagnetic waves, acid or alkaline steam.
- The airflow surrounding the unit must be unrestricted

Pipe connection

- Install the inlet and outlet according to the diagram.
- If the water pressure of the water inlet pipe is near to or exceeds the release value of relief valve (1.03MPa), install a pressure reducing valve in the water inlet pipe far from the water heater.
- Hot water outlet pipes should be properly insulated.
- There is a tube at the hot outlet connection of the water heater. Please do not remove or damage it during installation process.
- Apply proper sealant to the pipe joints to prevent leakage. Do not over-tighten the safety valve to avoid damage.

#	Item	Description	In-charge
1	Isolator (2)	32A, single phase	Electrician
2	T&P valve	0.8 MPa	AOS
3	Inlet/outlet	Ø22 mm	
4	Drain pipe	Below T&P valve	MainCon
5	Drain tube	Downward facing	Installer
6	Plinth	Min. 100mm height	MainCon
7	Data cable	CAT6, pre-run	MainCon
8	Double check valve (2)	22 mm	MainCon
9	Stop valve (3)	22 mm	MainCon



Water filling

- After all the pipes are connected, open the discharge valve of the water heater and then the feed valve.
- Fill the water heater with water and exhaust the air till a uniform water stream flows out of the hot water outlet.
- Close the hot water discharge valve and check all connections for any leakage. If leakage occurs, empty the water tank, repair the leaked connection and then refill the heater with water. Do not close the feed valve while filling in water.

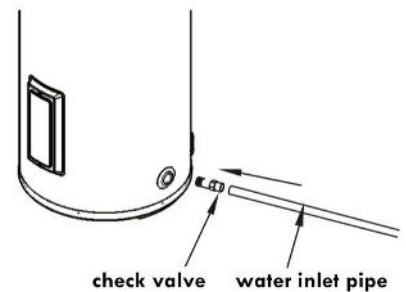
Caution

Do not connect the water heater to a power supply until the tank has been fully filled with water and a T&P valve has been installed.

Water temperature over 50°C can cause severe burns instantly or death from scalds. Children, the disabled and elderly are at highest risk of being scalded.

Condensation pipe connection

Ensure the condensation water pipe connected to the water outlet is unobstructed and connected to the floor drain.



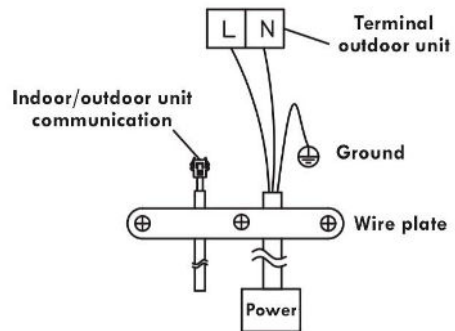
Installation of check valve

Power connection

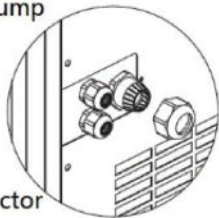
- All power connections should be done by an authorized installer.
- Ensure the water heater is reliably grounded at all times. The earth wire must be longer than the current carrying conductors. The maximum power of this water heater is 6000W. A single dedicated power supply circuit is compulsory.
- The core area of the electric supply wire should not be less than 10mm². Secure the wires with the plate after connections are complete.

To access to the connection terminal

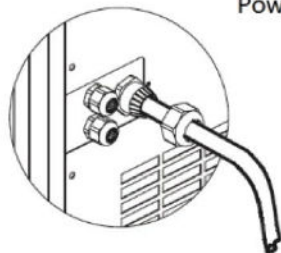
- Remove the top service panel
- Remove the cover of control box
- Remove screws securing the cable connector
- Run the main power cord through the cable connector
- Connect the terminal according to the diagram.



Cable Connector of
Circulating Pump

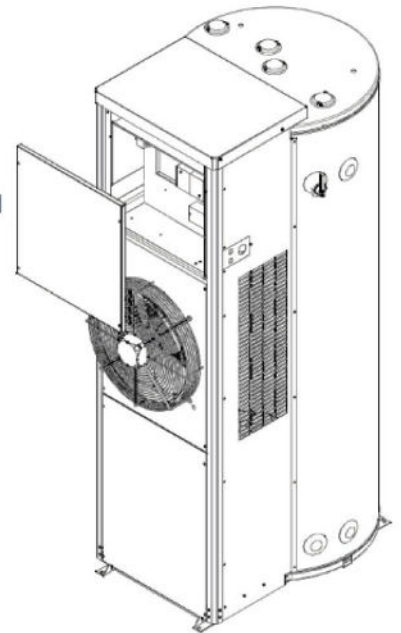


Cable Connector
of Display Box



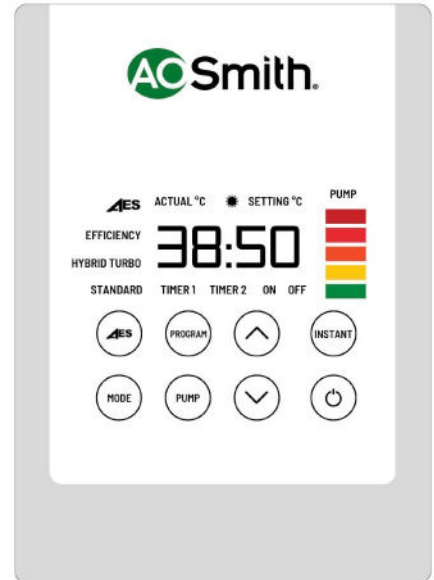
Top Service Panel

Power Cable

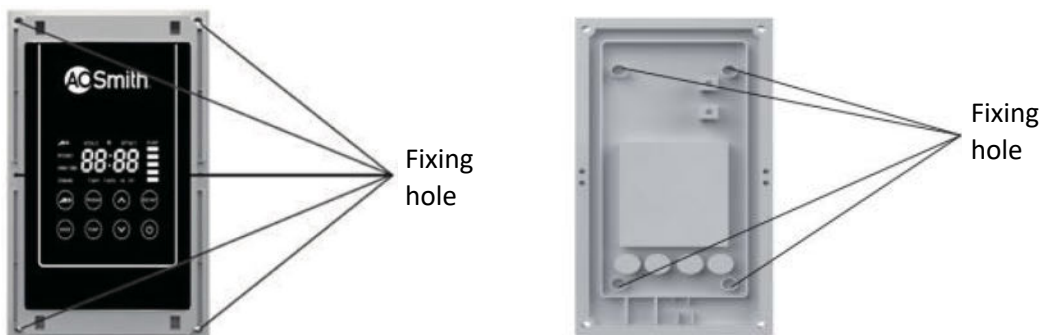
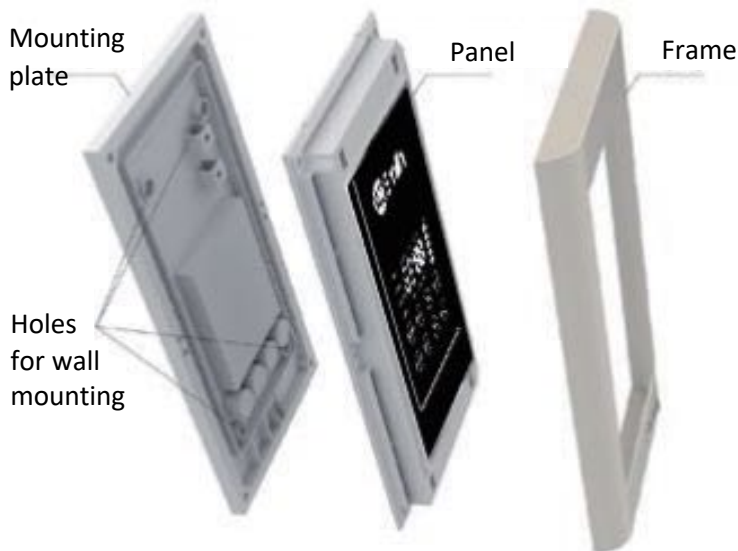


Installing the panel

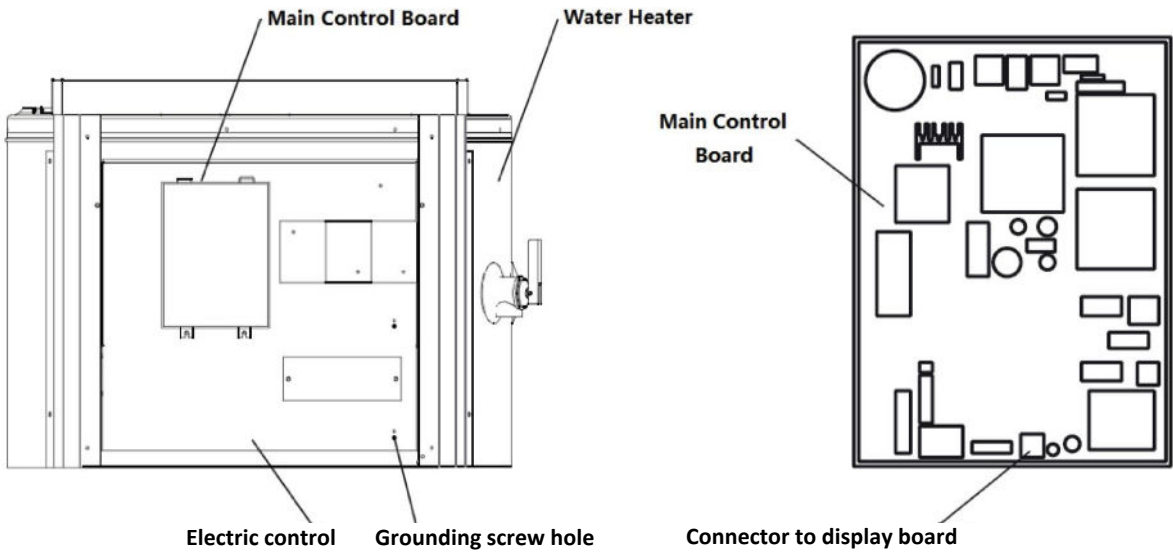
- The panel should be installed in an area free from gas leaks, oil vapor or sulfur.
- The panel should be installed in a well ventilated, dry area away from direct sunlight.
- Do not connect the panel to a voltage circuit that exceeds 230V.
- Use a CAT6 cable to connect the panel.
- Dimensions: 181 x 128 x 28mm



Panel assembly



Panel cable connection



Directions for use

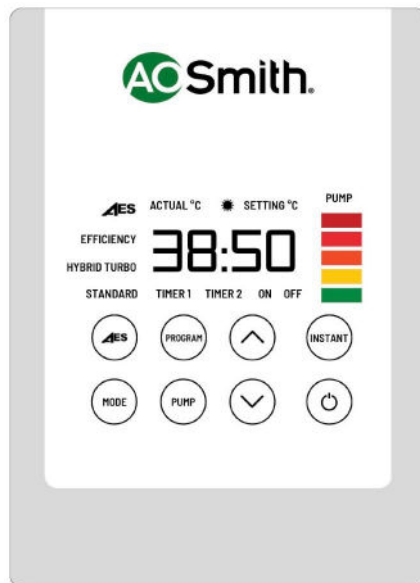
Caution

Before using the water heater, ensure it is filled with water and that the power plug has been connected properly.

Initial power up

When the heater is connected to the power source for the first time, the electronic controller will detect the system. All screen indicators will glow momentarily.

If the heat pump system is disconnected from the power source at this point, all settings revert to factory settings. Programmed settings will only be retained if heater remains switched on for over 4 hours. The system can keep clock settings for 48 hours without power.



Power on/off

Press the power button to turn the water heater on. The actual temperature and setting/preset temperatures are displayed and if the actual water temperature in the tank is lower than the preset temperature, heating begins and the heating indicator is lit.

By default, the water heater is set to 'Efficiency' mode, Time: 12:00 and Temperature: 65°C.

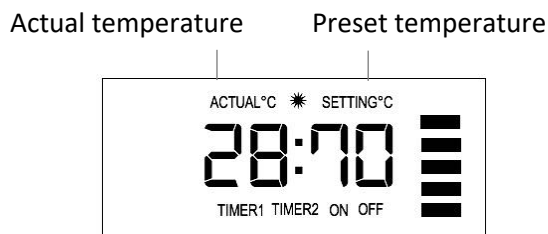
Setting the clock

Ensure the indicator lights for 'Timer 1' and 'Timer 2' are off. Hold down the 'Program' button for 3 seconds till the time on the screen flashes. Press the "▲" the "▼" buttons to set the hour, then press the 'Program' button again to confirm the hour. At this point, use the "▲" and "▼" buttons to set the minute. Holding down the adjustment buttons will cause the digits to increase or decrease continually. Press the 'Program' button to confirm the minute. At any point after 10 seconds of inactivity, the system will exit setting mode and the time at that point will be saved.

Setting the temperature

The water heater can simultaneously display the actual temperature and preset temperature. The actual temperature is the actual temperature of the water heater and the preset temperature is the temperature the user would like the water to be heated to.

Press the "▲" the "▼" buttons to adjust the preset temperature. Holding down the adjustment buttons will cause the temperature to increase or decrease continually. The preset temperature can be set between 35°C to 75°C



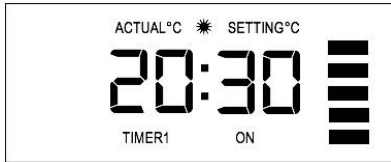
Setting the timers

Users can determine a time range for their showers so the heater can automatically ensure water is heated during this period of time. At other times, the water heater will go into energy saving mode, storing water at a lower temperature to optimize heat retention and thus, saving energy.

Before setting the timer, ensure the clock is adjusted to the right time. Note that the timer start time is set first, followed by the end time. If users choose not to activate the timer function, press the 'Program' button repeatedly till the 'Timer 1' and 'Timer 2' indicator lights are off.

To program timer 1, press 'Program' button till only the 'Timer 1' indicator is lit, then press and hold down the 'Program' button for 3 seconds till the time on the screen flashes. The indicator lights for 'Timer 1' and 'Time On' should be lit as you are now setting the start time for Timer 1. Press the "▲" the "▼" buttons to adjust the start time. The "▲" and "▼" buttons are programmed to make 30min increments or decrements.

Press the 'Program' button again to finalize the start time and to start setting the end time. The end time is set in the same manner as the start time. While setting this timing, the indicator lights for 'Timer 1' and 'Time Off' should be lit. For example, if the timer is set from 20:30 – 22:00, the setting panels should look like these:



Setting the start time for timer 1



Setting the start time for timer 2

The directions for setting the second timer are the same as setting the first timer. The difference is that while setting the second timer, ensure that the indicator light showing 'Timer 2' is lit before you press and hold the 'Program' button to enter the setting mode.

Timer 1 adjustment period: 21:00 ~ 08:00

Timer 2 adjustment period: 12:00 ~ 21:00

To turn on both timers at the same time, press the 'Program' button until both indication lights for 'Timer 1' and 'Timer 2' are on. The 'AES' program and timer will not run simultaneously.

To view the timer settings, press the 'Program' button repeatedly to select either Timer 1 or Timer 2. Press and hold down the 'Program' button for 3 seconds. The time that appears is the start time. Press the 'Program' button again to show the end time. Press the 'Program' button again to exit the menu.

Heating modes

There are two heating modes in the system. Upon making a mode selection, the system will take 3 minutes to reprogram to your selection.

Efficiency mode: energy efficient heat pump heating

Hybrid turbo mode: heat pump and speed (element) heating

MAX and AES

Toggle the AES/▶▶ button to activate either the MAX/▶▶ mode, AES mode, or both. AES mode will not run simultaneously with timers and will override them.

MAX is an A. O. Smith technology that allows users to get consistent hot water for long periods of time. You can turn it on to cater for an unexpected surge in demand for hot water.

AES is a memory chip that records up to 21 days of your family's usage habits. It preheats water according to your family's needs and sends the heater into energy saving mode at required intervals, saving energy by minimizing thermal loss.

Instant heat function

In situations where there is insufficient hot water in the tank, users may press the 'Instant' button to generate hot water quickly. This mode activates the heating elements and the heating indicator will flash 3 times upon activation. If the heat pump is running on 'efficiency' mode, it will switch to 'hybrid turbo' mode when running on instant mode.

When the desired temperature is reached, the heating light will go off and the water heater will resume normal operation. Otherwise, users may cancel this heating function by pressing 'Instant' again. The heating indicator will flash once and go off to indicate the operation is cancelled.

Hot water display

The heater can display the amount of hot water available. The five light blocks on the left of the panel are an indication of the quantity of hot water in the tank.

Red – hot
Orange – warm
Green - cool

System reset

Press and hold the 'program' and 'instant' buttons for 8 seconds to revert to factory state. When the system is reset, all screen indicators will glow for 2 seconds and the system will go offline.

Pump Circulation

Press 'pump' button and the character 'pump' will be lit. This will activate the circulation pump immediately.

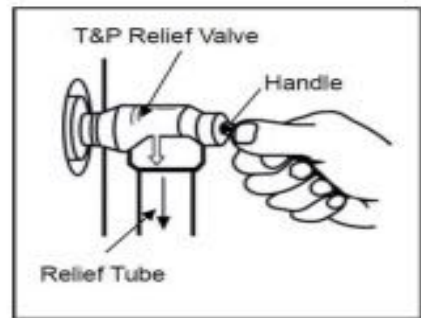
Electrical safety

In the event of any circuitry issues, the system will cut off power and prompt for a reset. The colour of the power indicator will also go from green to orange. In the event of this happening, reset the system to restore it. If this fails, contact your local authorized dealer.

Pressure relief valve inspection

The pressure relief valve is a safety device installed to protect the tank against excessive pressure build up. The valve relieves pressure when it exceeds 0.8MPa in the form of intermittent water droplets.

Users should check the valve regularly by lifting the handle on the valve to discharge any calcium carbonate deposits. The relief valve must not be blocked. If water does not discharge from your valve, please contact your local authorized dealer.



Maintenance instructions

Declaration

Before using the water heater, ensure it is filled with water and that the power plug has been connected properly.

Warning

Electric shock: before repairing the water heater, be sure to disconnect the water heater from the power source.

Maintenance

If the water heater needs to be serviced, close the water inlet valve, then open the drain valve. Rotate the handle of the relief valve, release the nut connected to the water outlet joint of the inner tank and drain the water from the discharge pipe.

It is recommended that the tank be flushed to remove sediments which may have built up during operation. Specific operating procedures are as follows:

1. Disconnect the power.
2. Screw off the relief valve and remove the internal water inlet pipe of the water heater.
3. Connect the water outlet pipe connection of the water heater to the tap water pipeline and fill water from this end. The water inlet pipe connection is connected to floor drain by pipes. Discharge water from this end.
4. Open the water inlet valve to get the maximum tap water flow and flush the tank till the drained water from the tank becomes clean.
5. Connect the water inlet and outlet pipes again and put the water heater to use after a leakage test.

Caution

The water in the tank might be very hot and may scald.

Troubleshooting

Problem	Possible causes	Corrective action
Display is off No hot water	<ol style="list-style-type: none"> 1. No power to heater 2. No power at electric socket 3. Failure in control circuit or internal wiring 	<ol style="list-style-type: none"> 1. Switch on power to heater 2. Check power socket 3. Contact local authorized dealer
Display is off High water temperature	<ol style="list-style-type: none"> 1. High temperature limit switch tripped 2. Electrical circuit failure 	<ol style="list-style-type: none"> 1. Switch off power supply 2. Contact local authorized dealer
Display on, no hot water	Heating element or internal circuit failure	Contact local authorized dealer
Leaking from tank	Leaking tank or components	<ol style="list-style-type: none"> 1. Switch off power supply 2. Contact local authorized dealer
Dripping from pipe joints	Unsealed joints	Reconnect pipes of the water heater and be sure to use sealant
Display "E1"	Mid-lower tank temperature error	Contact local authorized dealer
Display "E2"	Lower tank temperature error	Contact local authorized dealer
Display "E4"	Mid-upper tank temperature error	Contact local authorized dealer
Display "E5"	Low voltage alarm	Contact local authorized dealer
Display "E6"	Upper tank temperature error	Contact local authorized dealer
Display "E9"	High voltage alarm	Contact local authorized dealer
Display "EA"	Dry combustion	Contact local authorized dealer
Display "EC"	Communication error	Contact local authorized dealer
Display "EF"	Abnormal heating	Contact local authorized dealer
Display "H0"	Circulating temperature error	Contact local authorized dealer
Display "H2"	Compressor low pressure error	Contact local authorized dealer
Display "H3"	High discharge temperature error	Contact local authorized dealer
Display "H6"	Evaporator temperature error	Contact local authorized dealer
Display "H7"	Ambient temperature error	Contact local authorized dealer
Display "H8"	Discharge temperature error	Contact local authorized dealer
Display "H9"	Suction temperature error	Contact local authorized dealer
Display "HF"	Fan error	Contact local authorized dealer

Wiring Diagram

