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Manufacturer

**TLV** CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001/14001



# TLV®

## SQ-C01

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**Steam-fired Instantaneous Water Heater**

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# Introduction

Thank you for purchasing the TLV steam-fired instantaneous water heater, SteamAqua SQ-C01 (hereafter referred to as "the unit").

The SQ-C01 produces hot water by heating water using steam as a heat source. The unit does not require electrical wiring and can be used by installing steam and water piping. However, incorrect handling may cause an unexpected accident. Follow the instructions to be sure of using the unit properly.

Be sure to read the Instruction Manual and Installation/Piping Installation Procedures before installing the unit.

Be sure to read the Instruction Manual and "Operational Check/Cleaning Guide" packed with the unit when carrying out daily operation, maintenance and troubleshooting. Be sure to read the Instruction Manual and Maintenance Procedures packed with the unit before carrying out maintenance and repair work.

Please keep it in a safe place for future reference.

## Important Notice

The copyright of this manual belongs to TLV CO., LTD. Unauthorized reproduction of the contents of this manual in part or in whole is strictly prohibited.

This manual should be kept for future reference. If it becomes defaced or is misplaced, contact your local TLV representative, or download from the TLV website (<https://www.tlv.com>). Membership registration (free of charge) is required to download the instruction manual.

The contents of this manual are subject to change without notice. Please note that visuals such as the diagrams and illustrations found within this manual may differ slightly from the actual unit.

This manual was written for the purpose of use of the unit in the Japanese market. When the unit is operated by non-Japanese speaking personnel, translate the instruction manual in their language, explain the contents and implement safety training before work.

Please carefully read all other documentation included for this unit and its components.

Make sure that the person supervising operation of the unit has received a thorough briefing on the contents of the 'Report on Commissioning Results' which is issued after finishing the commissioning.

# Safety Considerations

- Read this section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: DANGER, WARNING and CAUTION.
- The three types of cautionary items above are very important for safety: be sure to observe all of them as they relate to installation, use, maintenance and repair. Furthermore, TLV accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

## Cautionary items and definitions



### Danger

Indicates an urgent situation which poses a threat of death or serious injury



### Warning

Indicates that there is a potential threat of death or serious injury



### Caution

Indicates that there is a possibility of injury or equipment/product damage

## Checking the Caution/Warning Stickers

Caution/Warning stickers can be found on both the unit and some components. The operator of this unit should understand what is written on the Caution/Warning stickers before operating the unit.

## Precautions for the Entire Unit



### Warning

**For applications such as handwashing in which hot water directly touches hands, when using the one-pass method, make sure to install a thermostatic mixing valve at the outlet.** Failure to observe this precaution may result in burns, as water at a temperature higher than the set temperature may flow due to load fluctuations.



### Caution

**Install properly and DO NOT use this unit outside the recommended operating pressure, temperature and other specification ranges.** Improper use may result in such hazards as damage to the unit or malfunctions that may lead to serious accidents.



### Caution

**When the unit is directly connected to municipal water supply piping, back flow prevention measures must be taken in accordance with the Water Supply Act (in Japan) or the applicable law where the unit is to be used.** Failure to do so may lead to serious accidents in the water main line.



### Caution

**The weight of the unit when empty is approximately 21 kg. If it is difficult for one person to carry or install the product, work with two or more people and use a lifting device so that work can be performed safely.** Failure to do so may result in back strain or other injury if the object should fall.

**Caution**

To use the unit safely and properly, read this instruction manual carefully to carry out the specified work. Installation, moving and incidental work of the unit requires professional qualifications and skills. The work should be carried out by a qualified personnel. Once installation is complete, make sure that the work is carried out based on the instruction manual. Work carried out improperly may lead to accidents or unit malfunction.

**Caution**

Do not use well water or water from a hot spring. Depending on the water quality, foreign matter may adhere to, or corrosion may occur in, the unit piping, resulting in water leaks. In this case, there will be a charge for repair work even during the warranty period.

**Caution**

The unit consists of steam-using equipment and piping. Proper insulation should be installed to avoid burns or heat loss. Steam piping is hot, and even water piping may reach temperatures up to 65 °C. Insulate piping, as touching piping directly may result in burns.

**Caution**

The unit is not designed to withstand the surrounding piping and equipment loads. Install the necessary piping or equipment supports prior to unit installation, to prevent any load being applied to the unit. The impact of external force may damage the unit, leading to fluid discharge, which may cause burns or other injury.

**Caution**

When all the piping work is completed based on the system flow diagram, inspect once again that all the piping connections and internal G threaded connectors are properly tightened, gaskets have been installed and that no parts or connections are loose. Failure to do so may result in burns or other injury from discharge of fluids.

**Caution**

Take measures to prevent people from coming into direct contact with outlets of the unit. Failure to do so may result in burns or other injury from the discharge of fluids.

**Caution**

Do not use excessive force when connecting threaded pipes to the unit. Over tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.

**Caution**

Use only under conditions in which no freeze-up will occur. Freezing may damage the unit, leading to fluid discharge, which may different cause burns or other injury.

**Caution**

In case of an abnormality, install a safety fence or restrict access to the room with a sign stating "Authorized personnel only." etc. to prevent personnel unauthorized for the unit (including those who have not received the relevant safety education) touching the components. When doing so, stop the supply of steam, electrical power, water and air. Failure to prevent the access of unauthorized personnel may result in burns, electric shock, injury, or falls.

## Precautions for Operation



### Caution

**Hot water may flow out when water is initially supplied after restarting operation. In addition, pay extra attention when changing the set temperature or when the flow rate of hot water changes significantly and check the temperature before use.** To prevent burns, do not touch hot water for at least five seconds after restarting operation. Residual hot water in the piping may flow out when supplying hot water.



### Caution

**The unit should be operated in accordance with the proper operating steps, within the specifications of the unit, such as the maximum operating pressure (PMO) and maximum operating temperature (TMO). Refrain from sudden operation of any valves.** Failure to observe these precautions is dangerous and may result in damage to the unit, malfunctions or failure of the unit, or lead to serious accidents.



### Caution

**Do not rapidly reduce the valve opening on the hot water outlet.** Failure to observe this precaution is dangerous, as there is a possibility that water at a temperature higher than the set temperature may temporarily flow.



### Caution

**Do not change the temperature settings without informing the water user when washing hands, using a shower or cleaning.** Failure to do so may result in burns to the water user.



### Caution

**Unit components such as steam piping may become hot during operation.** Do not touch components with bare hands.



### Caution

**In the event of an earthquake, close the main steam supply valve and shut down the unit promptly.** If the tube inside the heat exchanger of this unit is damaged due to an earthquake, a large amount of steam will enter the hot water piping, which may result in burns.



### Caution

**Valve and unit operation must be carried out by personnel who have attended operation training ensuring the use of heat-resistant gloves, helmet, protective glasses, etc. to prevent burns.** Failure to do so may result in burns, as the piping and cover of the unit become hot during operation.



### Caution

**When finishing operation, the operation should be stopped in accordance with the proper steps.** Incorrect operation of the unit during use for hand washing, showering, or cleaning, etc., may result in burns due to malfunction, which causes the temperature of the water to rise above the set temperature.



### Caution

**When draining water from the unit, make sure to wait until the unit has cooled down.** If carrying out work after hot water use, there is a risk of burns, as the components and the water inside the unit are hot.

## Precautions when the unit is shut down for a long period of time



### Caution

**When the unit is shut down for a long period of time or there is a possibility of freezing, make sure to completely discharge steam condensate or water in the unit and its components such as the steam piping, heat exchanger, etc.** After doing so, there is a risk of burns or injury during operation start-up, as fluid may be discharged from piping.

## Precautions when maintenance or inspection is conducted



### Caution

**Be sure to use only the recommended components when repairing the unit and its components, and NEVER attempt to modify the unit in any way.** Failure to observe these precautions may result in damage to the unit or burns or other injury due to malfunction or the discharge of fluids.



### Caution

**Do not apply excessive force to the unit, pipings, and peripheral piping.** Failure to do so may result in injury or deformation of the device.



### Caution

**When disassembling or removing the unit, wait until the internal pressure equals atmospheric pressure and the surface of the unit has cooled to room temperature.** Disassembling or removing the unit when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.



### Caution

**Make sure to wear protective gear such as a helmet, safety glasses, long-sleeve shirt, heat-resistant gloves, protective footwear, etc.** Failure to do so may result in burns or injuries.



## Precautions for Opening the Package

Make sure that the following items have been delivered and are inside the package. If not, please contact TLV immediately.

### Items packed with the unit

Description	Quantity
SteamAqua SQ-C01 unit	1
SteamAqua SQ-C01 Instruction Manual (this instruction manual)	1
Installation/Piping Installation Procedures for SteamAqua SQ-C01	1
Maintenance Procedures for SteamAqua SQ-C01	1
Operational Check/Cleaning Guide for SteamAqua SQ-C01	1

### Standard accessories (delivered separately from the unit)

Description	Quantity
Steam Trap, TLV J3X-8, size 15 mm (Rc <sup>1/2</sup> ) <sup>01</sup>	1
Strainer, size 15 mm (Rc <sup>1/2</sup> )	1

<sup>01</sup>If a stainless steel or other type of steam trap is ordered, the listed product will not be included as standard, the one you ordered will be included.

### Valve/strainer set (Option for JIS model only; delivered separately)

Description	Quantity
Strainer, TLV Y3, size 15 mm (Rc <sup>1/2</sup> )	1
Ball Butterfly Valve, TLV BB1N, size 15 mm (Rc <sup>1/2</sup> )	2



#### Note

Gaskets, bolts and nuts required to connect the unit to piping are not included. Make sure to read the documentation packed with the unit as well as this instruction manual, and always follow instructions.

Handle with particular care when unpacking the unit. Do not allow any impact to the unit when unpacking, as this may affect performance. In the event of deformation, damage, parts breakage, or missing unit components found when unpacking the unit, contact TLV immediately.

When keeping the unit in storage, make sure to store it in a dry area inside the building. Do not store the unit outdoors (e.g. covered with a waterproof sheet). The performance of the unit cannot be guaranteed in the event of rust due to exposure to rain or condensation.

Additional copies of instruction manuals can be supplied on request. a) Contact TLV. (Please quote the serial no. of the unit.) b) Access from the TLV website.

# Precautions for Moving the Package

Observe the following precautions when removing the unit from the box to transport. In the event of failure to observe precautions, TLV is not liable for damage of the unit or injury.



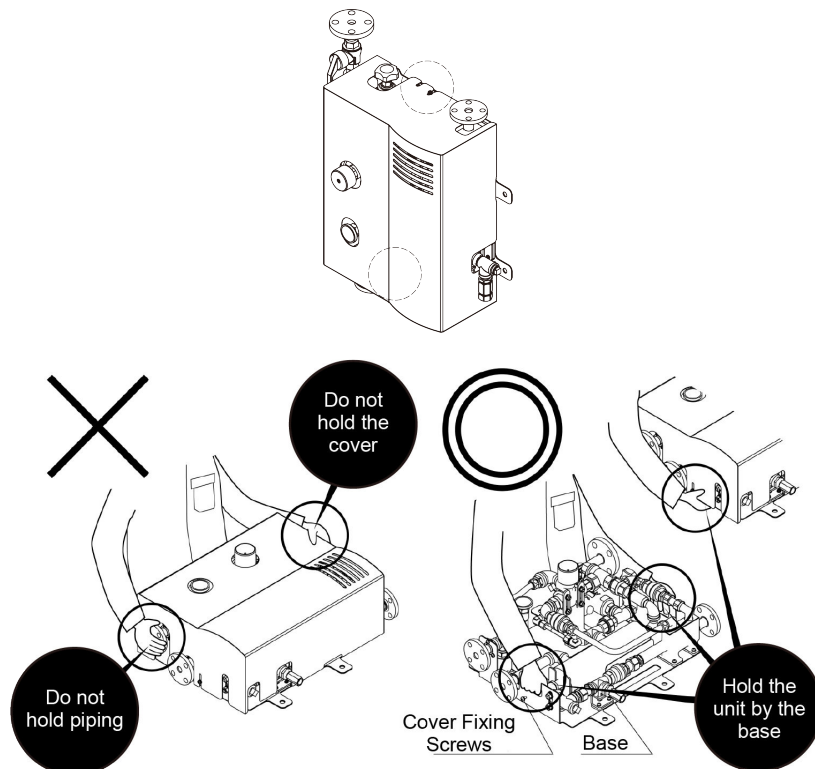
## Caution

The weight of the unit when empty is approximately 21 kg. If it is difficult for one person to carry or install the product, work with two or more people and use a lifting device so that work can be performed safely. Failure to do so may result in back strain or other injury if the object should fall.

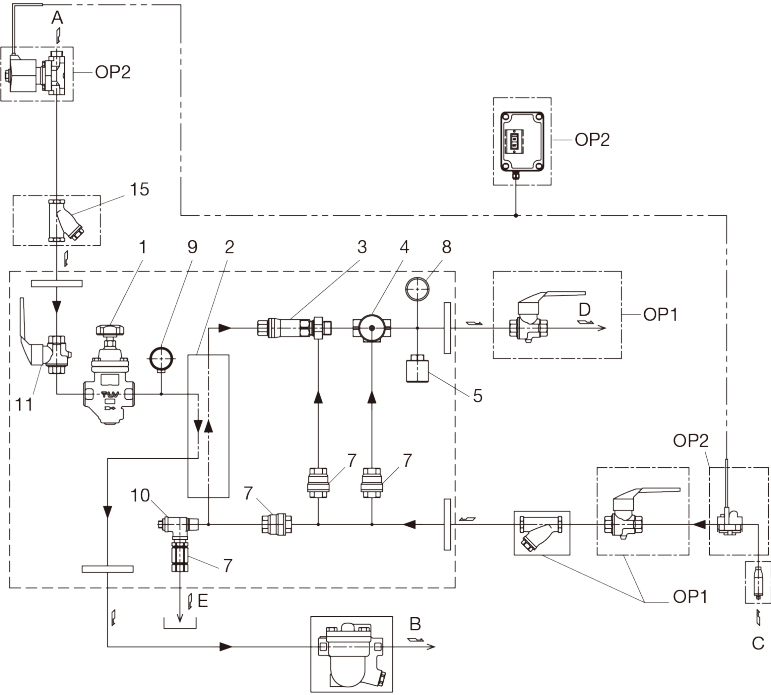
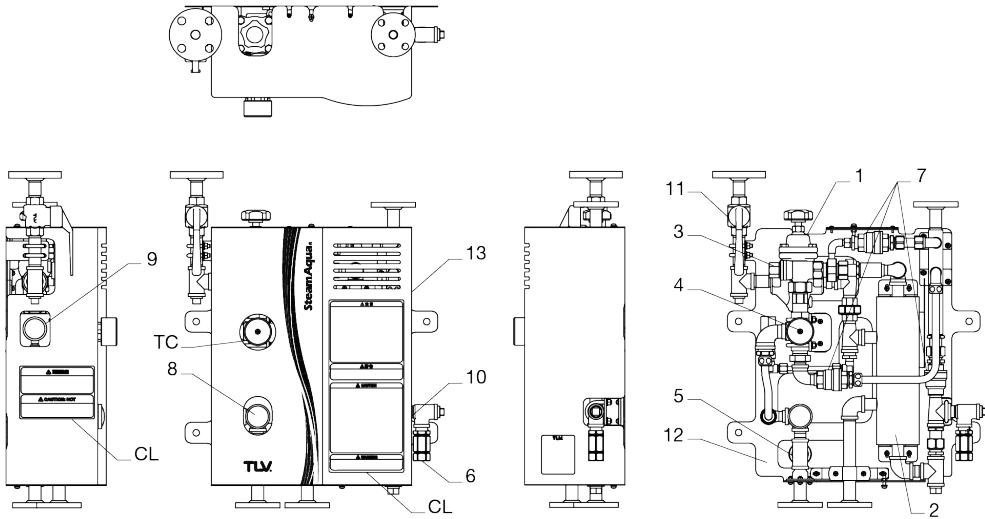
Follow the procedures below for moving the unit.

## Moving procedures

1. Remove all items from the packaging except the unit.
2. Remove the unit from the box, then before moving the unit, remove the cover. Loosen the screws (cover fixing screws (M5)) fixing the cover to the base. The screws are located at the center of the top and bottom of the cover.
3. When moving the unit, make sure to hold the base or the handles on the base as shown below. Do not hold the unit by the cover, as the unit may fall, resulting in damage or injury. Do not hold the unit by the piping, as internal equipment may be damaged and pipe joints may be loosened, resulting in water or steam leakage when fluid is supplied.



# Configuration (Component Name and Function)



- Unit components
- Standard accessories (delivered separately)
- Optional accessories for JIS model (delivered separately)

	Description	Connection
A	Steam Inlet	15 mm JIS 5KFF or 15 ASME Class 150 RF
B	Condensate Outlet	15 mm JIS 5KFF or 15 ASME Class 150 RF
C	Cold Water Inlet	15 mm JIS 10KFF or 15 ASME Class 150 RF
D	Hot Water Outlet	15 mm JIS 5KFF or 15 ASME Class 150 RF
E	Water Safety Valve Outlet	Rc(PT) 3/8

## Component Configuration

Name	No.	Component	Description
Steam Supply Unit	1	Pressure reducing valve for steam	<b>Adjusts the steam pressure supplied to the unit.</b> <ul style="list-style-type: none"> <li>Fine adjustment of the steam pressure is possible with the built-in pressure reducing valve.</li> </ul>
	11	Steam Inlet Valve	<b>Manually shuts off steam supply when the hot water is not in use.</b> <ul style="list-style-type: none"> <li>When the hot water is not in use, the valve and preventing steam from entering the unit, the life of the internal equipment of the unit is further improved.</li> </ul>
Heat Exchanger Unit	2	Heat Exchanger	<b>Produces hot water by exchanging heat from steam supplied by the steam supply unit (heating side) to water (heated side).</b>
	9	Pressure gauge for steam	
Water Inlet Piping Unit	6	Relief valve (Water supply valve)	<b>Channels supplied cold water to each unit.</b> <ul style="list-style-type: none"> <li>Cold water is channelled to three locations: heat exchanger unit, pre-mixing unit, and mixing unit.</li> <li>The relief valve prevents the internal pressure of the equipment from exceeding a certain level.</li> </ul>
	7	Heat insulating joint	
	10	L-shaped screen	
Pre-mixing Unit	3	Pre-mixing valve	<b>The hot water produced in the heat exchanger unit is mixed with cold water to prevent the water from exceeding a certain temperature.</b> <ul style="list-style-type: none"> <li>The pre-mixing valve is one of the safety features that prevents abnormally high temperature water from being discharged.</li> </ul>
	7	Heat insulating joint	
Mixing Unit	4	Mixing Valve	<b>Produces hot water of the required temperature by mixing hot water and cold water that have passed through the pre-mixing unit.</b> <ul style="list-style-type: none"> <li>The temperature of the mixing valve can be adjusted by turning the temperature adjustment dial (TC).</li> </ul>
	7	Heat insulating joint	
Hot Water Outlet Unit	5	Shock absorber	<b>Displays the water temperature produced in the mixing unit and supplied.</b> <ul style="list-style-type: none"> <li>Temperature can be adjusted while checking the thermometer.</li> <li>Absorbs a certain amount of shock generated inside and around the water piping inside the equipment to prevent damage to the equipment.</li> </ul>
	8	Thermometer (for water)	
Cover Frame	12	Frame	<b>Fix internal components and piping, and fix the unit to the wall.</b> <ul style="list-style-type: none"> <li>Protects internal high-temperature areas or in the event of leakage.</li> <li>Be sure to keep the cover on when using the uit.</li> </ul>
	13	Cover	

**Standard accessories** (delivered separately)

Name	No.	Description
Steam Trap	14	<p><b>Installed on the condensate outlet piping to discharge the condensate in the heat exchanger unit.</b></p> <ul style="list-style-type: none"> <li>• J3X-8 (Rc<sup>1/2</sup>)</li> </ul>
Strainer (for cold water inlet)	15	<p><b>Removes dust and scale from the supplied cold water. Make sure to install the strainer correctly.</b></p> <ul style="list-style-type: none"> <li>• TLV strainer (Rc<sup>1/2</sup>), certified as conforming to the Water Supply Act (Japan).</li> </ul>



**Note**

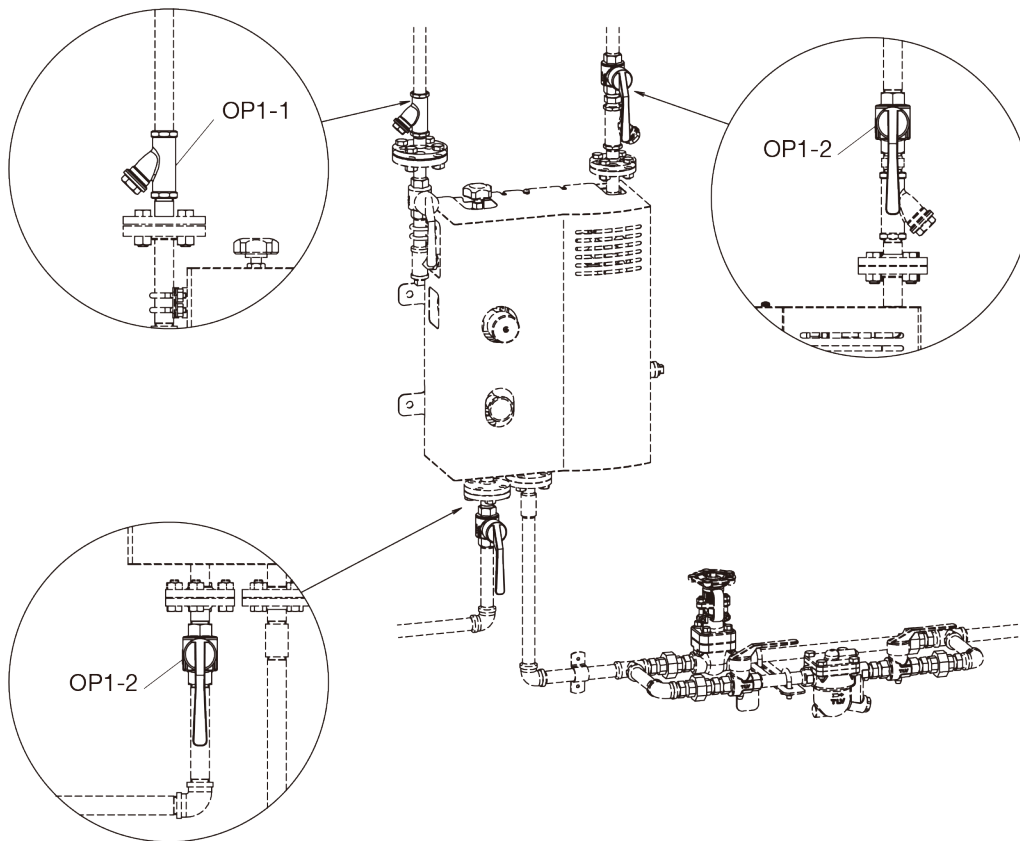
- The gaskets and bolts included are intended for use with standard accessories only
- Accessories do not conform to the Water Supply Act (Japan) unless stated otherwise

# Options

In addition to standard accessories, there are two options of the valve/strainer set and steam shut-off/control set is available as an option for the JIS specification model.

## Valve/Strainer set (option for JIS model only; delivered separately)

The piping layout is an example. Optional accessories will be delivered separately. Refer to the option drawings.



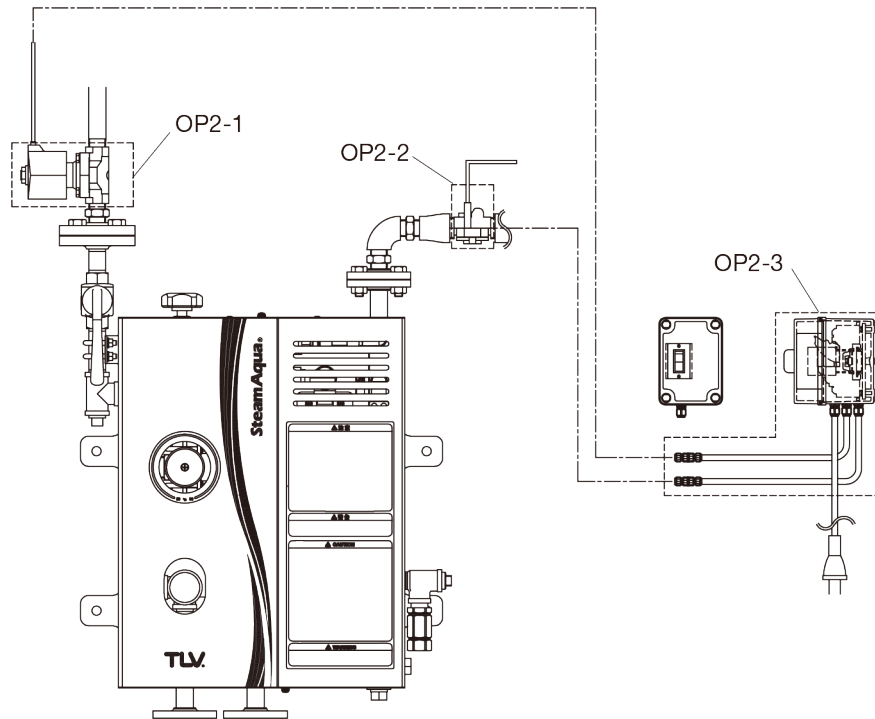
Part Name	No.	Description
Strainer (for steam inlet)	OP1-1	<b>Remove dust and scale from the supplied steam to prevent it from flowing into the unit.</b> <ul style="list-style-type: none"> <li>• TLV Y3 strainer (Rc<sup>1</sup>/<sub>2</sub>)</li> </ul>
Ball Butterfly Valve (for steam inlet, cold water inlet, and hot water outlet)	OP1-2	<b>Install valves on each piping connection for emergency shutoff and maintenance.</b> (Includes one for: steam inlet, cold water inlet, and hot water outlet.) Valves are intended for maintenance or emergency use to shut off steam and water supply.



### Note

The gaskets and bolts included are intended for use with standard accessories only.

## Steam shut-off/control set<sup>1</sup>



The piping layout is an example. Optional accessories will be delivered separately. Refer to the option drawings.

Part Name	No.	Description
Solenoid valve for steam	OP2-1	<p><b>When water is not flowing through the unit, steam is shut off to prevent steam from entering the unit.</b></p> <ul style="list-style-type: none"> <li>One solenoid valve is included. (Refer to the specifications for model, material, connection, etc.)</li> </ul>
Flow switch	OP2-2	<p><b>Senses cold water flow (supply?) and sends signals to the solenoid valve (OP2-1) to open and close at appropriate timings.</b></p> <ul style="list-style-type: none"> <li>One flow switch is included. (Refer to the specifications for model, material, connection, etc.)</li> <li>Due to the minimum operating water flow rate of 5 L/min or more, the unit will not operate at less than 5 L/min.</li> </ul>
Compact control box	OP2-3	<p><b>Receives a signal from the flow switch to open/close the solenoid valve for steam.</b></p> <ul style="list-style-type: none"> <li>One compact control box is included.</li> </ul> <p>Wiring is provided at a minimum (wall fixing materials are not included), so if the length is not sufficient, please prepare separately for installation.</p>



**Note**

The gaskets and bolts included are intended for use with standard accessories only.

<sup>1</sup>This option is currently only available in certain regions. Contact TLV for availability. (Option for JIS model only; delivered separately)

# Considerations for Installation Personnel



## Caution

**When the unit is directly connected to municipal water supply piping, back flow prevention measures must be taken in accordance with the Water Supply Act (in Japan) or the applicable law where the unit is to be used.** Failure to do so may lead to serious accidents in the water main line.

1. Repair work on failure or damage to the unit as a result of installation or piping work not adhering to the contents of this instruction manual or the attached "Installation/Piping Procedures" will be billed even during the warranty period.
2. Installing water supply system  
When the unit is directly connected to municipal water supply piping, back flow prevention measures must be taken in accordance with the Water Supply Act (in Japan) or the applicable law where the unit is to be used.
3. When commissioning the unit after installation, make sure to check the following items:
  - a. After completion of the installation work, confirm the installation work based on the "Before commissioning" in the "Installation Check List" on the following page.
  - b. Make sure to observe the safety precautions when performing commissioning.
  - c. After completing commissioning, confirm the items based on the "After commissioning" in the "Installation Check List" on the following page.
4. Handling instructions for the user  
The information necessary for handling of the unit should be explained to the user according to this instruction manual. In particular, clearly explain the "Safety Considerations" in the "Operation" section of this manual. Once all the necessary instructions have been given to the user, pass the instruction manual to the user.
5. Cleaning/sterilization  
The unit has been cleaned only with water from a municipal water supply. If special sterilization etc. is required, please follow the instructions provided by the party responsible for installation.
6. Measures for prevention of damage due to freezing  
If there is a possibility of freezing where the unit is used, water should be drained from the unit after commissioning. Refer to the "Prevention of Damage due to Freezing" section. If the unit is damaged as a result of freezing, repair work will be billed even during the warranty period.



## Installation Check List

	Item	Description	✓
Before commissioning	The unit and its surroundings	Have all packed items been included?	
		Has the unit been installed in accordance with the procedures packed with the product? Have all five connection ports been connected correctly?	
		Has the unit been installed securely and stably? Has sufficient space required for inspection and repair been provided?	
		Have all the necessary parts and piping been connected?	
		Have bolts and plugs been securely tightened?	
		Have piping supports been firmly installed?	
		Are the supply conditions for steam and water appropriate? ?	
		Has piping in the unit been additionally tightened after installation?	
After commissioning	Initial blowdown	Has initial blowdown been conducted?	
	Commissioning	Has the water temperature stabilized after start-up?	
	Fluid leakage	Are there any leaks from any area of the unit?	
	Abnormal sounds/vibrations	Does the unit vibrate, or is there a sound of 80 dB or more?	
	Preventative measures against freezing	Have any measures been taken for prevention of damage due to freezing if the unit is not used for a long period of time?	
	Explanation to the customer	Have instructions for safe use been provided to the customer?	

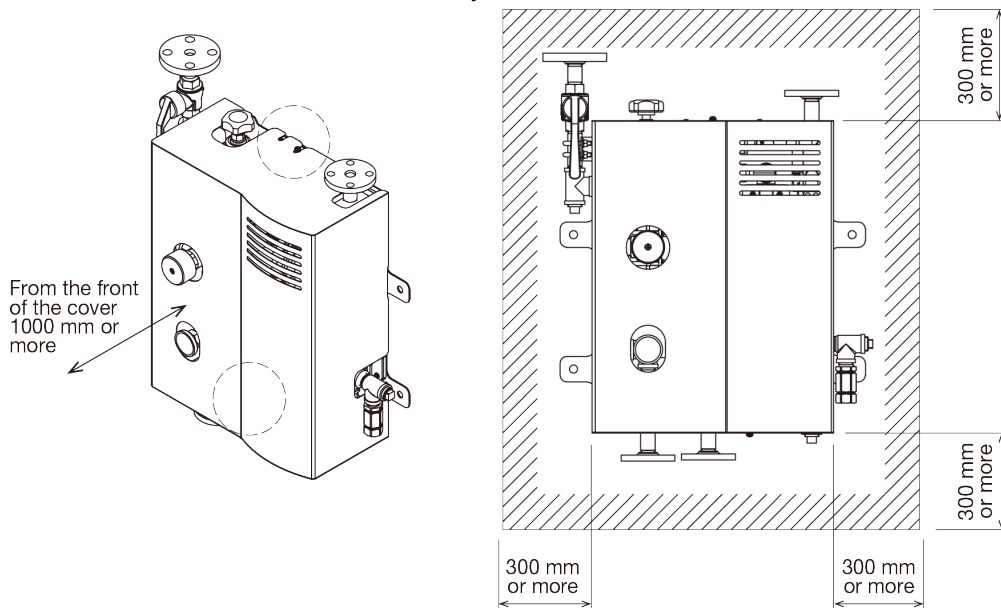
# Precautions before Unit and Piping Installation



## Caution

The weight of the unit when empty is approximately 21 kg. If it is difficult for one person to carry or install the product, work with two or more people and use a lifting device so that work can be performed safely. Failure to do so may result in back strain or other injury if the object should fall.

1. Be sure to read the "Installation/Piping Installation Procedures" packed with the unit before installing the product.
2. Make sure to consult the user about the specific installation location.
  - a. Where possible, discuss and confirm the unit installation method and piping/wiring work from the building's design stage.
  - b. The unit should not be installed near staircases or evacuation exits.
  - c. Check the drainage situation of the location where the unit is to be installed. Make sure that the unit will not be flooded or immersed in water.
3. When installing the unit in a high place, make sure to install the unit at a location where maintenance work etc. can be carried out, and where handrails etc. are installed to prevent falling. If work cannot be performed, TLV may refuse after-sales service.
4. In areas where salt damage is likely (areas close to the ocean that receive a sea breeze), the unit should be installed in a downwind area of the building. When it is necessary to install the unit facing the coast, take measures to protect the unit from the sea breeze, such as installing a windbreak screen, etc.
5. Installation and maintenance space
  - a. Before installing the unit, determine the installation position and then set the anchor bolts. (M10 bolts with an embedded length of 4.5 cm or more are recommended.)
  - b. Maintenance space: In order to inspect and repair unit components, install the unit with maintenance space in accordance with the diagram shown below to secure sufficient distance from the surrounding walls and components. If there is insufficient maintenance space, maintenance work may be refused.
  - c. Make sure to install the unit on a sturdy, vertical wall.



## 6. Precautions before connecting to piping

Make sure to flush the steam piping and water supply piping before connecting the unit. The purpose of flushing the piping is different from the initial blowdown, which is carried out to discharge condensate before operation. Flushing is performed to remove the residual sealing material, metal chips, sand or scale in the piping. Therefore, it is necessary to vigorously flush the piping from as large an opening as possible. Keep personnel and components away from the opening when flushing the piping. Sealing material or dust entering the piping may cause problems such as deterioration of heat transfer efficiency, improper operation of the unit, valve leakage, etc.

# Piping Work



## Warning

**For applications such as handwashing in which hot water directly touches hands, when using the one-pass method, make sure to install a thermostatic mixing valve at the outlet.** Failure to observe this precaution may result in burns, as water at a temperature higher than the set temperature may flow due to load fluctuations.



## Caution

**Install properly and DO NOT use this unit outside the recommended operating pressure, temperature and other specification ranges.** Improper use may result in such hazards as damage to the unit or malfunctions that may lead to serious accidents.

**To use the unit safely and properly, read this instruction manual carefully to carry out the specified work. Installation, moving and incidental work of the unit requires professional qualifications and skills. The work should be carried out by a qualified personnel. Once installation is complete, make sure that the work is carried out based on the instruction manual.** Work carried out improperly may lead to accidents or unit malfunction.

**Do not use well water or water from a hot spring.** Depending on the water quality, foreign matter may adhere to, or corrosion may occur in, the unit piping, resulting in water leaks. In this case, there will be a charge for repair work even during the warranty period.

**Do not use excessive force when connecting threaded pipes to the unit.** Over tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.

**The unit consists of steam-using equipment and piping. Proper insulation should be installed to avoid burns or heat loss. Steam piping is hot, and even water piping may reach temperatures up to 65 °C.** Insulate piping, as touching piping directly may result in burns.

**The unit is not designed to withstand the surrounding piping and equipment loads. Install the necessary piping or equipment supports prior to unit installation, to prevent any load being applied to the unit.** The impact of external force may damage the unit, leading to fluid discharge, which may cause burns or other injury.

**When all the piping work is completed based on the system flow diagram, inspect once again that all the piping connections and internal G threaded connectors are properly tightened, gaskets have been installed and that no parts or connections are loose.** Failure to do so may result in burns or other injury from discharge of fluids.

**Take measures to prevent people from coming into direct contact with outlets of the unit.** Failure to do so may result in burns or other injury from the discharge of fluids.

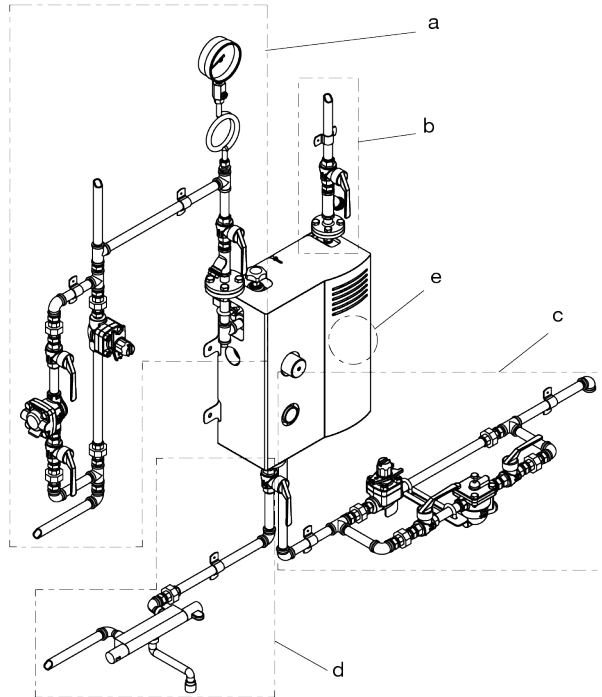
1. For piping
  - a. The pipe diameter should not be smaller than the diameter of the unit connections.
  - b. For steam piping, make sure the piping is connected with a downward slope on the downstream side.
  - c. The piping should be kept simple, with as few joints as possible in order to avoid pressure loss.
  - d. Take measures for the location where air may accumulate, such as installing an air vent valve, etc. so that air does not accumulate.
  - e. When installing the peripheral piping, be sure to support the surroundings so that the load and stress of the piping and other equipment are not applied to the unit.
  - f. For the water supply system and components to be connected to the unit, follow the instructions provided by the organization that designed and installed the system.
2. Precautions for installing piping



**Caution**

**Do not apply excessive force to the unit, pipings, and peripheral piping.** Failure to do so may result in injury or deformation of the device.

Precautions for installing piping at locations **a** to **e** (as shown in the following) are on the following page.



a	Steam Inlet Piping
b	Cold Water Inlet Piping
c	Condensate Outlet Piping
d	Hot Water Outlet Piping
e	Outlet Piping for Relief Valve

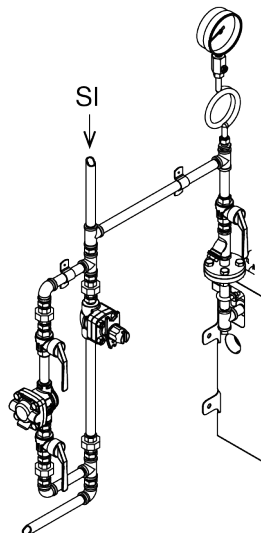


**Note**

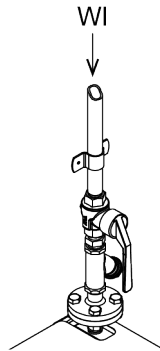
This piping layout is for explanation purposes only. Components other than the unit and the set are not included.

Images of this unit shown in the piping installation layout may differ from the latest version.

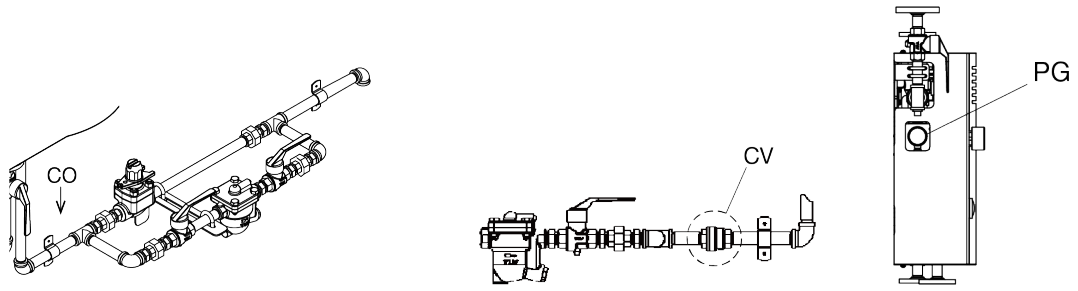
**a. Steam inlet piping**



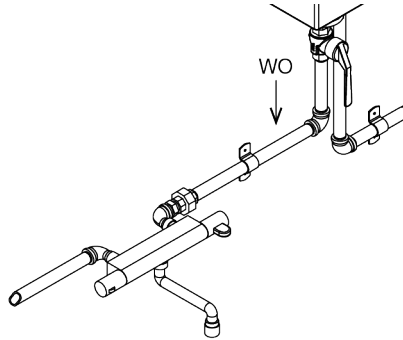
1. Install a pressure gauge at the steam inlet [SI]. Supply steam pressure range: 0.2 to 0.7 MPaG.
  2. Make sure to install piping support(s) for the steam inlet piping.
  3. Install a valve for emergency shutoff and maintenance at the steam inlet. (The valve installed at the steam inlet in the unit can be used instead.)
  4. Make sure to install a strainer at steam inlet.
  5. Install a steam trap upstream of the unit to prevent condensate in the steam transportation line from flowing into the unit.
  6. When recovering the condensate, install a check valve on the secondary side of the steam trap to prevent backflow.
  7. Make sure to insulate the steam piping as it becomes very hot.
  8. When using a pressure reducing valve to supply steam to the unit, make sure to install a safety valve on the secondary side of the pressure reducing valve if the pressure on the primary side of the pressure reducing valve exceeds 0.7 MPaG.
  9. If the steam pressure is higher than the water pressure, take measures to prevent steam from flowing into the unit when hot water is not in use, for example, by using a steam shut-off/control set (optional). Failure to do so may result in premature deterioration of internal equipment, etc.
- b. Cold water inlet piping



1. Make sure to install piping support(s) for the cold water inlet piping.
  2. Install a valve at the cold water inlet [WI] for maintenance. (The valve is included with the optional valve/strainer set for the JIS specification model.)
  3. Install a strainer at the cold water inlet to prevent malfunction of internal safety functions.
- c. Condensate outlet piping
1. There is no steam trap installed in the unit. Make sure to install the steam trap provided as a standard accessory. (When using another steam trap, contact TLV.)
  2. Make sure that the piping installed between the unit and the steam trap is as short as possible, with as few bends as possible so the condensate will flow naturally down into the trap.
  3. Make sure to pipe the discharged condensate to a safe area such as a pit. The temperature of steam condensate discharged from the unit exceeds 100 °C. Do not use PVC or lead piping intended for water supply.
  4. When recovering the condensate, install a check valve on the secondary side of the steam trap to prevent backflow when the unit is shut down. The back pressure of the condensate recovery piping should be lower than the steam pressure in the unit. (The internal steam pressure can be confirmed with the pressure gauge installed on the left side of the unit.)
  5. Make sure to insulate the condensate outlet piping as it becomes very hot.

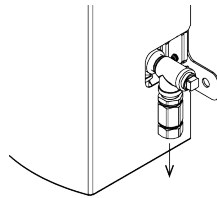


d. Hot water outlet piping



1. Install a valve at the hot water outlet for maintenance. (When operating water with a valve, it is recommended to install different valves for operation and maintenance.)
2. For use in applications where hot water is in direct contact with skin, such as handwashing, make sure to install a safety equipment such as a thermostatic faucet on the secondary side on the unit.

e. Outlet piping for relief valve



Make sure pipe the outlet piping of the relief valve to a safe area such as a pit. Make sure that the end of the pipe is opened to the atmosphere and do not install a valve. Even when the unit is not in operation, the relief valve may operate and hot water may flow out to prevent the internal pressure from rising. Failure to follow precautions may result in burns or other injury from discharge of hot water. Do not use PVC pipes and lead pipes for water supply as the discharged water may become very hot. When supply pressure of the cold water exceeds 0.4 MPaG, which is the maximum operating pressure (PMO), water may flow out.

# Commissioning



## Caution

**Hot water may flow out when water is initially supplied after restarting operation. In addition, pay extra attention when changing the set temperature or when the flow rate of hot water changes significantly and check the temperature before use.** To prevent burns, do not touch hot water for at least five seconds after restarting operation. Residual hot water in the piping may flow out when supplying hot water.

**The unit should be operated in accordance with the proper operating steps, within the specifications of the unit, such as the maximum operating pressure (PMO) and maximum operating temperature (TMO). Refrain from sudden operation of any valves.** Failure to observe these precautions is dangerous and may result in damage to the unit, malfunctions or failure of the unit, or lead to serious accidents.

**Do not rapidly reduce the valve opening on the hot water outlet.** Failure to observe this precaution is dangerous, as there is a possibility that water at a temperature higher than the set temperature may temporarily flow.

**Do not change the temperature settings without informing the water user when washing hands, using a shower or cleaning.** Failure to do so may result in burns to the water user.

**Unit components such as steam piping may become hot during operation.** Do not touch components with bare hands.

**In the event of an earthquake, close the main steam supply valve and shut down the unit promptly.** If the tube inside the heat exchanger of this unit is damaged due to an earthquake, a large amount of steam will enter the hot water piping, which may result in burns.

**Valve and unit operation must be carried out by personnel who have attended operation training ensuring the use of heat-resistant gloves, helmet, protective glasses, etc. to prevent burns.** Failure to do so may result in burns, as the piping and cover of the unit become hot during operation.

**When finishing operation, the operation should be stopped in accordance with the proper steps.** Incorrect operation of the unit during use for hand washing, showering, or cleaning, etc., may result in burns due to malfunction, which causes the temperature of the water to rise above the set temperature.

**When draining water from the unit, make sure to wait until the unit has cooled down.** If carrying out work after hot water use, there is a risk of burns, as the components and the water inside the unit are hot.

**When the unit is shut down for a long period of time or there is a possibility of freezing, make sure to completely discharge steam condensate or water in the unit and its components such as the steam piping, heat exchanger, etc.** After doing so, there is a risk of burns or injury during operation start-up, as fluid may be discharged from piping.

1. Commissioning should be performed by the person who installed the unit or by the water system manager. Make sure no-one touches the water (e.g. handwashing) at the location for water usage as this is a test operation as part of commissioning.
2. Checking each area before commissioning
  - a. Check the piping connections  
Check to make sure that the steam inlet piping, cold water inlet piping, condensate outlet piping and hot water outlet piping are properly connected to the unit.
  - b. Check tightening of internal piping, bolts and plugs  
Make sure that piping inside the unit has been retightened after installation. Make sure that all joints for flanges and plugs are properly tightened.
  - c. Checking opening/closing of valves



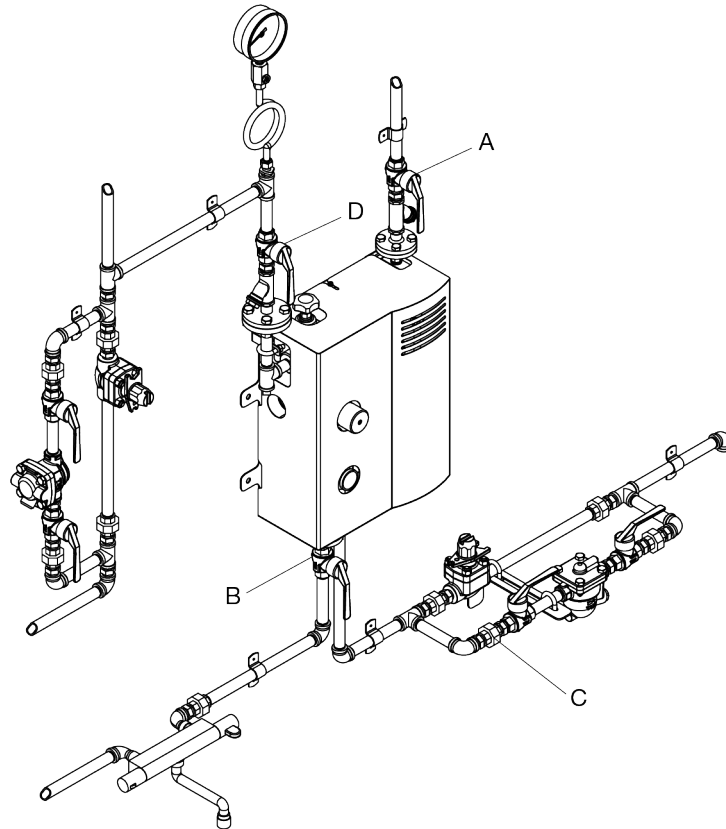
Check to make sure that valves installed on the steam inlet piping, cold water inlet piping and hot water outlet piping are closed. Furthermore, close the valves related to supply steam or discharge hot water, such as the valves on the supply water system.

d. Initial blowdown

Before commissioning, make sure to perform flashing and blowdown. If blowdown has not been adequately performed, TLV cannot guarantee against damage or performance loss of valves and the unit due to scale.

e. Check to make sure that steam is supplied just before the valve at the steam inlet and that the pressure gauge reading is 0.2 to 0.7 MPaG.

3. Starting commissioning



1. Make sure that all the valves are closed.
2. Open the valve on the cold water inlet piping [A] slowly to supply water.
3. Open the valve on the hot water outlet piping [B] slowly to supply water to the unit and vent the air.
4. Open the valve on the condensate outlet piping [C] so the condensate is discharged.
5. Close the valve on the steam inlet piping [D] (or a steam inlet valve installed in the unit) slowly and supply steam.
6. When the pressure reducing valve in the unit is not adjusted, slowly turn the handle and adjust to the designated pressure.
7. Check to make sure the steam pressure is stable and adjust the water temperature by checking the thermometer. (Turn the dial on the front of the unit to adjust the temperature.)
8. Check the water temperature and adjust as needed.

Once commissioning is complete, the unit is ready for use. Refer to the "Shutdown in the Operation" section when stopping the operation after commissioning.

# Operation



## Caution

**Hot water may flow out when water is initially supplied after restarting operation. In addition, pay extra attention when changing the set temperature or when the flow rate of hot water changes significantly and check the temperature before use.** To prevent burns, do not touch hot water for at least five seconds after restarting operation. Residual hot water in the piping may flow out when supplying hot water.

**The unit should be operated in accordance with the proper operating steps, within the specifications of the unit, such as the maximum operating pressure (PMO) and maximum operating temperature (TMO). Refrain from sudden operation of any valves.** Failure to observe these precautions is dangerous and may result in damage to the unit, malfunctions or failure of the unit, or lead to serious accidents.

**Do not rapidly reduce the valve opening on the hot water outlet.** Failure to observe this precaution is dangerous, as there is a possibility that water at a temperature higher than the set temperature may temporarily flow.

**Do not change the temperature settings without informing the water user when washing hands, using a shower or cleaning.** Failure to do so may result in burns to the water user.

**Unit components such as steam piping may become hot during operation.** Do not touch components with bare hands.

**In the event of an earthquake, close the main steam supply valve and shut down the unit promptly.** If the tube inside the heat exchanger of this unit is damaged due to an earthquake, a large amount of steam will enter the hot water piping, which may result in burns.

**Valve and unit operation must be carried out by personnel who have attended operation training ensuring the use of heat-resistant gloves, helmet, protective glasses, etc. to prevent burns.** Failure to do so may result in burns, as the piping and cover of the unit become hot during operation.

**When finishing operation, the operation should be stopped in accordance with the proper steps.** Incorrect operation of the unit during use for hand washing, showering, or cleaning, etc., may result in burns due to malfunction, which causes the temperature of the water to rise above the set temperature.

**When draining water from the unit, make sure to wait until the unit has cooled down.** If carrying out work after hot water use, there is a risk of burns, as the components and the water inside the unit are hot.

**When the unit is shut down for a long period of time or there is a possibility of freezing, make sure to completely discharge steam condensate or water in the unit and its components such as the steam piping, heat exchanger, etc.** After doing so, there is a risk of burns or injury during operation start-up, as fluid may be discharged from piping.

1. When using the unit continuously
  - a. Open the valve on the steam inlet piping [D] (or a steam inlet valve) installed in the unit) slowly to supply steam.
  - b. Supply water by opening such as a thermostat faucet at the secondary side on the unit. (If the valve on the hot water outlet piping [B] is closed, open it slowly.)
  - c. When the temperature adjustment is required, turn the dial on the front of the unit for adjustment.

Initial blowdown of the steam piping and the water piping just before the unit should be carried out when operating the unit after the unit is shut down for a long period of time (more than a day). Initial blowdown means the elimination of condensate remained in the steam piping and the elimination of rusty water in the water piping. If initial blowdown is not carried out problems such as water hammer in the steam piping and discharge of rusty water from the water piping may occur.

## 2. Operating procedures after the unit is shut down for long periods of time

1. Make sure that all the valves are closed.
2. Open the valve on the cold water inlet piping [A] slowly to supply water.
3. Open the valve on the hot water outlet piping [B] slowly to supply water to the unit and vent air.
4. Open the valve on the condensate outlet piping [C] so the condensate is discharged.
5. Close the valve on the steam inlet piping [D] (or a steam inlet valve) installed in the unit) slowly and supply steam.
6. When the pressure reducing valve in the unit is not adjusted, open the pressure reducing valve by slowly turning the handle and adjust to the designated pressure.
7. Check to make sure that the steam pressure is stable, and adjust the water temperature. (Turn the dial on the front of the unit to adjust the temperature.)
8. Check the water temperature and adjust it as needed.

If the unit has not been used for a long period of time, the water temperature should be carefully checked during operation. The steam pressure may fluctuate during operation, but it is normal when the hot water temperature is stable.

## 3. Temperature adjustment

The water temperature can be adjusted by turning the temperature setting dial.

Temperature set range is as follows:

Standard specification: 30 to 50 °C

High-temperature specification: 40 to 65 °C

(Supply water amount and temperature vary depending on operating conditions. Refer to the thermal capacity graph.)

When adjusting the water temperature, inform the user(s) in advance that the temperature will be adjusted and to be careful not to be burned by the hot water supplied if the temperature has been increased.



### Caution

**Do not change the temperature settings without informing the water user when washing hands, using a shower or cleaning.** Failure to do so may result in burns to the water user.

Do not operate the dial suddenly or too frequently. Excessive operation may cause a setting error or malfunction.

## 4. Shutdown

Before finishing operation, make sure that hot water is not being used at the intended location for use.

1. Close the valve on the steam inlet piping [D] (or a steam inlet valve) slowly.
2. When the valve on the hot water outlet piping [B] is closed, open the valve slowly and supply water for a while.
3. After confirming that the steam pressure in the unit becomes 0 MPaG, close the valve on the hot water outlet piping [B] slowly.

## 5. Shutdown when not used for a long period time (one day or more)

If the product is not used for a long period of time (one day or more) after the operation, stop steam and water supply to the unit and then shut down the unit.

Before finishing operation, make sure that hot water is not being used at the intended location for use.

1. Close the valve on the steam inlet piping [D] (or a steam inlet valve) slowly.

2. When the valve on the hot water outlet piping [B] is closed, open the valve slowly and supply water for a while.
3. After supplying water for one minute or more and confirming that the steam pressure in the unit becomes 0 MPaG, close the valve on the hot water outlet piping [B] slowly.
4. Close the valve on the cold water inlet piping [A] slowly.
5. Finally, close the valve on the condensate outlet piping [C] slowly.

# Prevention of Damage due to Freezing



## Caution

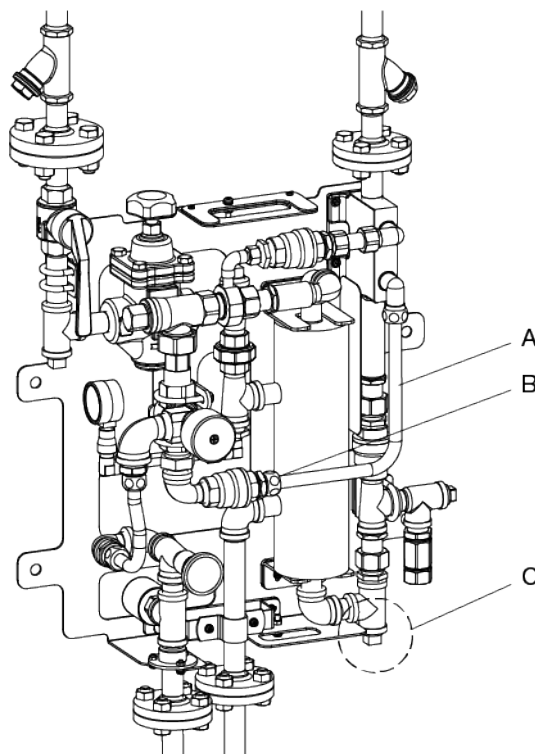
**Use only under conditions in which no freeze-up will occur.** Freezing may damage the unit, leading to fluid discharge, which may different cause burns or other injury.

**When draining water from the unit, make sure to wait until the unit has cooled down.** If carrying out work after hot water use, there is a risk of burns, as the components and the water inside the unit are hot.

Make sure measures are taken to prevent freezing of the unit's steam piping system in cold climates. If the unit is damaged due to freezing, repair will be billed even during the warranty period. Water in the water supply system cannot be discharged with the unit. To prevent freezing of the water supply system, contact the administrator of the water system.

## Draining procedure

1. Make sure the valve at the cold water inlet is closed and has cooled down.
2. Loosen the cover fixing screws and remove the cover.
3. Loosen the plug on the right end of the bottom pipe of the heat exchanger. (Be careful as water flows out when plug is loosened.)
4. Loosen the cap nut [B] that are holding the flexible tube [A] and the heat insulation fittings to drain water accumulated in the tube. (Be careful not to lose the gasket when the nut is removed.)
5. After water is drained, reattach the plug [C], flexible tube and the cover.



# Maintenance and Inspection



## Caution

**Be sure to use only the recommended components when repairing the unit and its components, and NEVER attempt to modify the unit in any way.** Failure to observe these precautions may result in damage to the unit or burns or other injury due to malfunction or the discharge of fluids.

**Do not apply excessive force to the unit, pipings, and peripheral piping.** Failure to do so may result in injury or deformation of the device.

**When disassembling or removing the unit, wait until the internal pressure equals atmospheric pressure and the surface of the unit has cooled to room temperature.** Disassembling or removing the unit when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

**Make sure to wear protective gear such as a helmet, safety glasses, long-sleeve shirt, heat-resistant gloves, protective footwear, etc.** Failure to do so may result in burns or injuries.

**When all the piping work is completed based on the system flow diagram, inspect once again that all the piping connections and internal G threaded connectors are properly tightened, gaskets have been installed and that no parts or connections are loose.** Failure to do so may result in burns or other injury from discharge of fluids.

There are two types of inspection for maintenance of the unit, operational checks and cleaning.

- The operational check includes inspection items based on visual and hearing sounds to see if there is any abnormal condition during operation.
- The "Cleaning" section describes how to clean the unit. When carrying out the maintenance of the unit, stop supplying utilities and stop operating the unit.

## Operational Check

For trouble-free use of the unit, perform an operational check at least once a month or on a regular basis.

Make sure to wear protective gear such as a helmet, protective footwear, heat-resistant gloves, etc. when carrying out the inspection and pay close attention to high temperature piping.

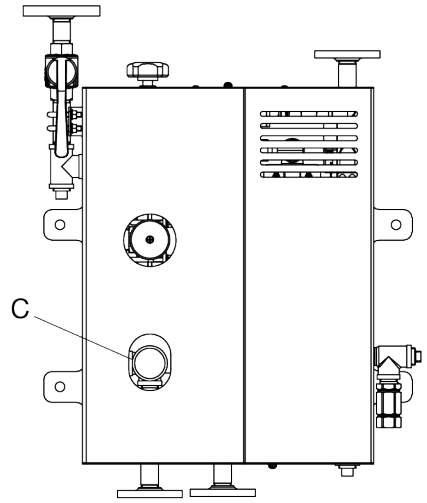
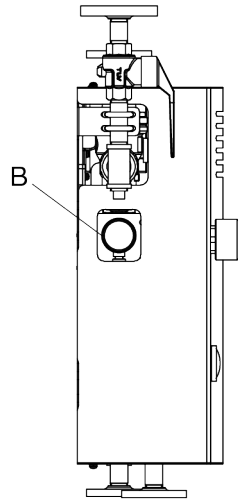
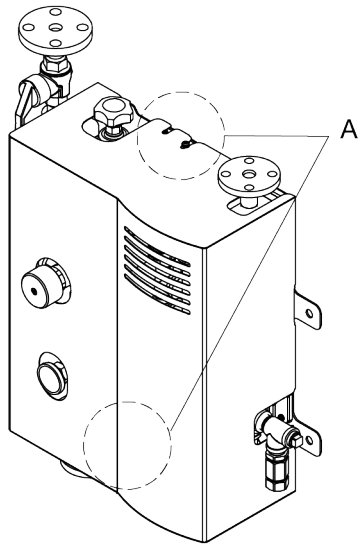
### 1. Removing the cover

Remove the cover from the body when carrying out the operational check. Loosen the cover fixing screws (M5) [A] at the top and bottom of the unit and remove the cover. Do not touch piping or components during the check as there is a risk of injury and burns.

### 2. Operational check items

- a. Check for water and steam leakage from the internal unit and peripheral piping.
- b. Check for abnormalities in the water temperature while the unit is in operation. (Check the water temperature with the thermometer [C] installed on the front of the unit.)
- c. Check whether the steam pressure in the unit is within the normal range. (Operating range is from 0.18 to 0.4 MPaG. Check with the steam pressure gauge [B] installed on the side of the unit.)
- d. Check for any abnormal noise during the operation.

If there are any abnormalities in the operational check items, inspection and repair should be requested immediately.



# Cleaning



## Caution

**When disassembling or removing the unit, wait until the internal pressure equals atmospheric pressure and the surface of the unit has cooled to room temperature.**

Disassembling or removing the unit when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

## 1. Appearance

To keep the unit clean, wipe the cover and operation part with a soft, damp cloth on a regular basis. If the exterior of the unit becomes dirty, wipe it off with a neutral detergent (for washing dishes and vegetables).

Use of a non-neutral detergent (such as for washing dishes and vegetables) or a hard material such as polishing powder, thinner, benzene, ethanol or scrubbing brush, the surface gloss, printing, letters, etc. on the unit may be faded or damaged.

When the unit becomes extremely dirty, contact TLV.

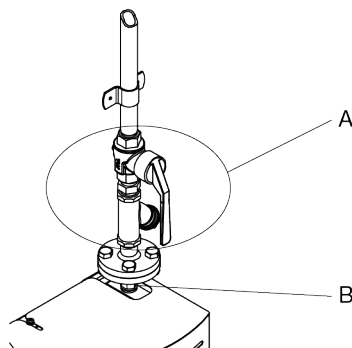
## 2. When a strainer is clogged

If sufficient water is not supplied even after opening the water supply faucet to supply hot water, the strainer installed at the cold water inlet of the unit may be clogged. Follow the steps below to clean the screen in the strainer.



## Note

Make sure to close the supply water tap before cleaning the strainer.



1. Close the supply water tap.
2. Loosen the screen holder with tools such as an adjustable spanner or hex spanner.
3. Remove the screen holder to remove the screen with a tool such as needle-nose pliers. (Remove the screen while being careful not to deform it.) Water will flow out when the screen is removed. Make sure to receive the water in a suitable container.
4. Rinse the screen with water to remove any dirt. If it is difficult to remove dust and scale, scrub gently with a stiff brush. (Scrubbing hard on the screen may cause damage or deformation.)
5. Reassemble the screen and screen holder.
6. Check to make sure that water is not leaking by supplying water.

Contact TLV if the water does not flow sufficiently after completing the steps mentioned above.

## Recommendation of periodic inspection by TLV



For longer and safer use, it is recommended to have the product inspected by TLV regularly (about once every six months to one year) in addition to the operational check. Contact TLV for details.

If water hammer or unusual noise is heard from inside the unit during operation, inspection and repair should immediately be requested. Maintenance fee will be billed even during the warranty period. Contact TLV for details.

# Maintenance



## Caution

Be sure to use only the recommended components when repairing the unit and its components, and NEVER attempt to modify the unit in any way. Failure to observe these precautions may result in damage to the unit or burns or other injury due to malfunction or the discharge of fluids.

**When disassembling or removing the unit, wait until the internal pressure equals atmospheric pressure and the surface of the unit has cooled to room temperature.**

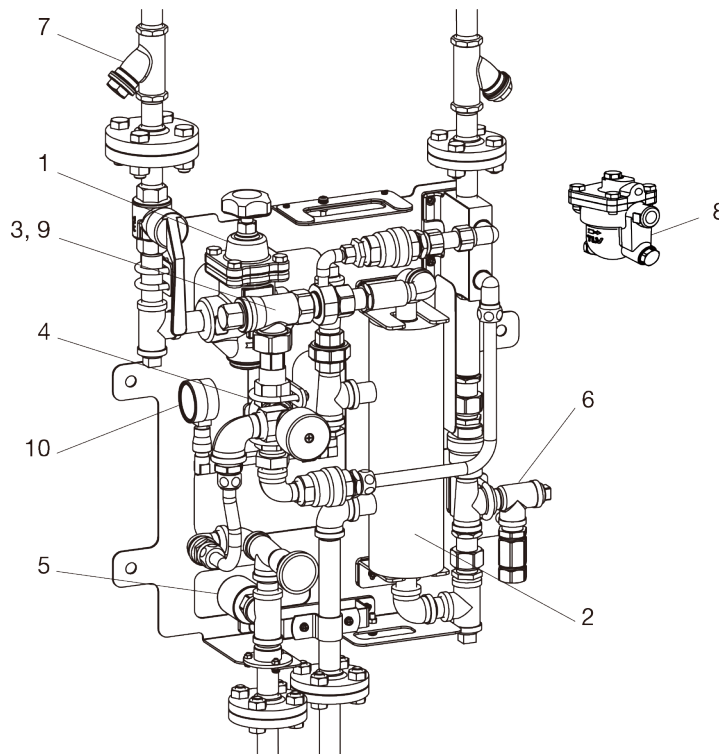
Disassembling or removing the unit when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

**When all the piping work is completed based on the system flow diagram, inspect once again that all the piping connections and internal G threaded connectors are properly tightened, gaskets have been installed and that no parts or connections are loose.** Failure to do so may result in burns or other injury from discharge of fluids.

**Make sure to wear protective gear such as a helmet, safety glasses, long-sleeve shirt, heat-resistant gloves, protective footwear, etc.** Failure to do so may result in burns or injuries.

Stop steam and water supply and make sure operation is stopped when performing maintenance (part replacement). In addition, maintenance should only be performed by trained and experienced personnel.

The locations where maintenance (part replacement) should be performed and the recommended maintenance cycle are as follows.



No.	Description	Maintenance cycle	Component to be replaced
1	Steam Supply Unit <sup>01</sup>	Two years	Pressure reducing valve
2	Heat Exchanger Unit	Two years	Heat exchanger, pressure gauge
3	Pre-mixing Unit	One year	Thermowax (internal parts)
4	Mixing Unit	One year	Mixing valve, heat insulation fitting

No.	Description	Maintenance cycle	Component to be replaced
5	Hot Water Outlet Unit	Two years	Thermometer, shock absorber
6	Line Relief Unit	One year	Line relief valve, heat isolation fitting
7	Strainer	When abnormalities are confirmed at inspection	
8	Steam Trap <sup>02</sup>	When abnormalities are confirmed at inspection	
9	Pre-mixing Unit	When abnormalities are confirmed at inspection	Pre-mixing valve, heat isolation fitting
10	Pressure Gauge Unit	(When abnormalities are confirmed at inspection)	Pressure gauge

<sup>01</sup>When replacing only internal parts of the pressure reducing valve, refer to the instruction manual for DR20.

<sup>02</sup>Refer to the steam trap instruction manual for the maintenance procedure.

The recommended maintenance cycles in the table are examples. The recommended maintenance cycle differs depends on the usage and operation frequency. Parts that have a standard replacement period of one year are particularly important devices related to safety. Make sure to perform maintenance within the maintenance cycle.

For replacement maintenance, make sure to replace internal parts of entire components and not of their individual parts. Installation/removal of the pipe thread (taper thread) may be difficult as a sealant is used to prevent water leakage.

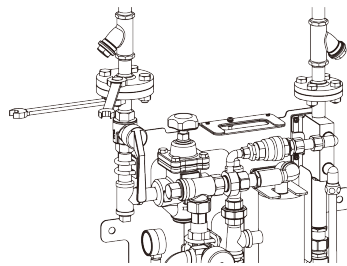
### Replacing the Components

The procedure for maintenance (part replacement) of 1 to 10 in the figure above is described below. Gaskets required for replacement are included in the maintenance kit.

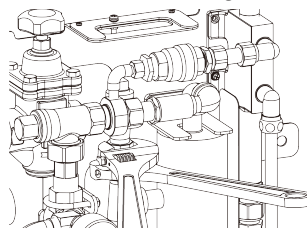
#### 1. Steam Supply Unit

Components required: Steam Supply Unit [1] × 1 pc.

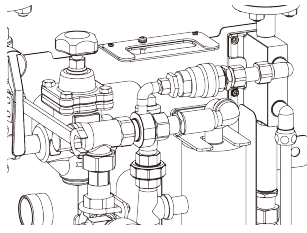
1. Remove the flange connected to the steam piping. Be careful as the condensate may flow out.



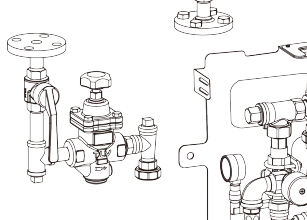
2. Loosen the union connected to the heat exchanger unit.



3. Loosen the U bolt nuts in two locations fixing the steam supply unit to the base and remove the U bolt.



4. Remove the steam supply unit, holding it with two hands. If the pressure gauge interferes, remove it as well. (The pressure gauge can be removed by loosening the stainless steel pipe fitting on the siphon pipe.)

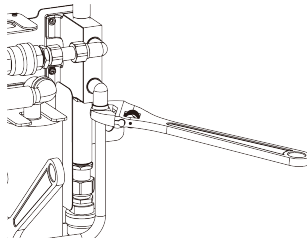


5. Remove the steam supply unit to be replaced and install the new unit by following the same procedures in reverse. Gaskets must be replaced if disassembled.

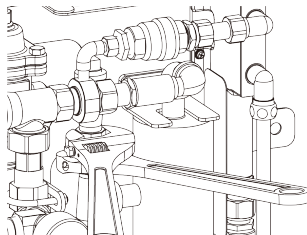
## 2. Heat Exchanger Unit

Components required: Heat Exchanger Unit [1] × 1 pc.

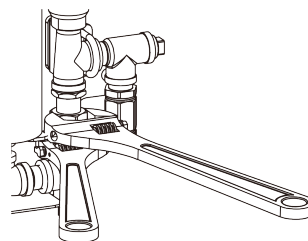
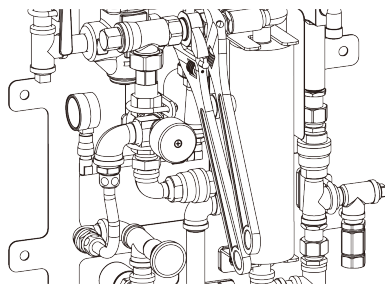
1. Remove the flexible tube for cold water connected to the mixing valve located in front of the heat exchanger. (There are two locations where G<sup>1/2</sup> threaded connectors are used.)



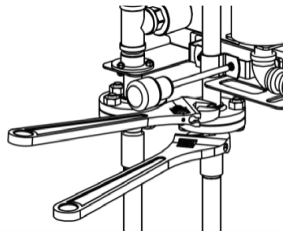
2. Loosen the union connected to the steam supply unit.



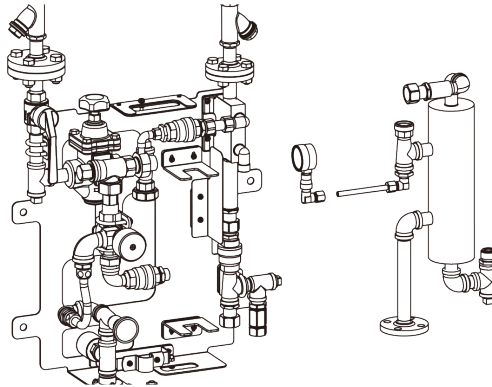
3. Loosen the G threaded connectors on both cold and hot water sides.



4. Remove the flange connected to the condensate piping. Remove screws fixing the condensate outlet piping of the unit to the base and then remove the piping band.



5. Remove the heat exchanger unit, holding it with two hands. If the pressure gauge interferes, remove it as well. (The pressure gauge can be removed by loosening the stainless steel pipe fitting on the siphon pipe.)

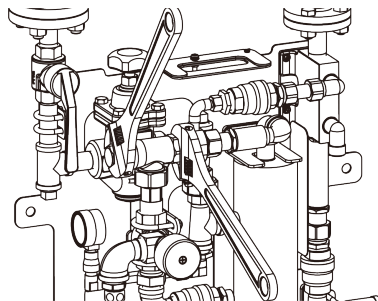


6. Remove the heat exchanger unit to be replaced and install the new unit by following the above procedures in reverse. Gaskets must be replaced if disassembled.

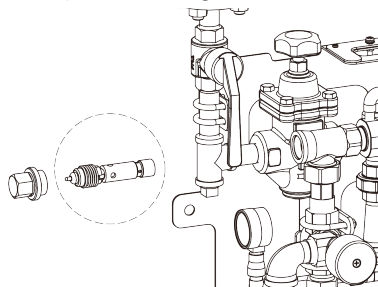
### 3. Pre-mixing Valve

Components required: Pre-mixing Valve Replacement Kit x 1 pc.

1. Loosen and remove the cover of the pre-mixing valve.



2. Take out the replacement parts. (Do not forget to take out the part to be replaced.)



3. Insert the replacement kit for the pre-mixing valve. Tighten the cover. (Tightening torque of the cover: 40 N·m)

### 4. Mixing Unit

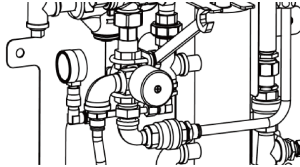
Components required: Mixing Valve Unit x 1 pc.

1. Loosen the G threaded connector on the flexible tube connected to the mixing valve unit. (Two locations)

Loosen the union that is connecting the mixing unit and the pre-mixing unit and remove the screw.



2. Loosen nuts of the U bolt in two locations fixing the mixing valve to the base and remove the U bolt.

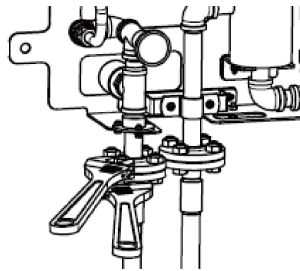


3. Remove the mixing valve unit, holding it with two hands. Replace the mixing valve unit to be replaced and install the new unit by following the same procedures in reverse. Gaskets must be replaced if disassembled.

#### 5. Hot Water Outlet Unit

Components required: Hot Water Outlet Unit [5] × 1 pc.

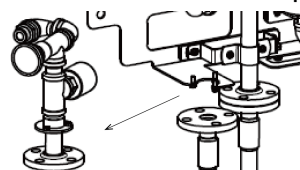
1. Remove the flange connected to the hot water piping. Be careful as residual condensate may flow out.



2. Loosen the G threaded connector on the flexible tube. Remove hex bolts (M4, with washer) that are holding the frame and the piping. (Be careful not to drop the nuts.)



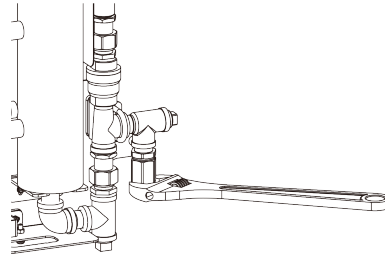
3. Remove the hot water outlet unit, holding it with two hands. Remove the hot water outlet piping unit to be replaced and install the new one by using the same procedures in reverse to removal. Gaskets must be replaced if disassembled.



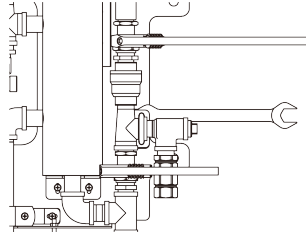
#### 6. Line Relief Unit

Components required: Line relief Unit × 1 pc.

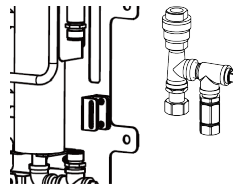
1. Remove the outlet piping connected to the line relief valve. Be careful as residual condensate may flow out.



2. Remove the U bolt holding the line relief unit. Loosen and remove the G threaded connectors at the inlet and outlet of the line relief unit.



3. Remove the line relief unit, holding it with two hands. Replace the line relief unit to be replaced and install the new unit by following the same procedures in reverse. Gaskets must be replaced if disassembled.



## 7. Strainer

Refer to the "Cleaning" section for cleaning the strainer.

## 8. Steam Trap

Refer to the steam trap instruction manual for the maintenance procedure. The following model is a steam trap included with the unit as standard.

TLV free float steam trap: Model J3X-8 (Rc<sup>1</sup>/<sub>2</sub>)

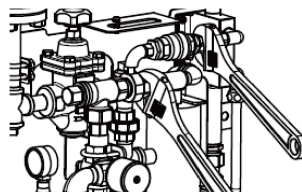
## 9. Pre-mixing Unit

Components required: Pre-mixing Unit × 1 pc.

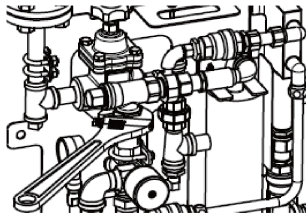
Normally, replacing the pre-mixing unit means replacing only the pre-mixing valve [3].

Follow the procedure below to replace the valve section and body of the pre-mixing valve, which is the main equipment in the pre-mixing unit and the heat isolation fitting.

1. Loosen the two G threaded connectors at the inlet of the pre-mixing unit. Be careful as residual condensate may flow out.



2. Loosen the G threaded connector connecting the pre-mixing unit and the mixing unit. Be careful as residual condensate may flow out.



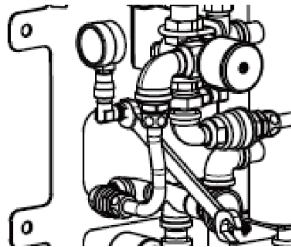
3. Remove the pre-mixing unit, holding it with two hands. Remove the pre-mixing unit to be replaced and install the new unit by following the same procedures in reverse. Gaskets must be replaced if disassembled.

#### 10. Pressure Gauge Unit

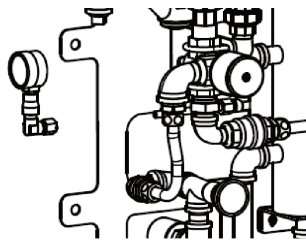
Components required: Pressure Gauge Unit × 1 pc.

The pressure gauge for steam is included in the heat exchanger unit, but it may be replaced as a individual component by following the procedure below.

1. Loosen the threaded portion of the stainless steel fitting located directly under the pressure gauge and remove the pressure gauge unit.



2. Remove the pressure gauge unit to be replaced and install the new unit by following the same procedures in reverse.





# Troubleshooting



## Caution

**Be sure to use only the recommended components when repairing the unit and its components, and NEVER attempt to modify the unit in any way.** Failure to observe these precautions may result in damage to the unit or burns or other injury due to malfunction or the discharge of fluids.

**Do not apply excessive force to the unit, pipings, and peripheral piping.** Failure to do so may result in injury or deformation of the device.

**When disassembling or removing the unit, wait until the internal pressure equals atmospheric pressure and the surface of the unit has cooled to room temperature.**

Disassembling or removing the unit when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

**When all the piping work is completed based on the system flow diagram, inspect once again that all the piping connections and internal G threaded connectors are properly tightened, gaskets have been installed and that no parts or connections are loose.** Failure to do so may result in burns or other injury from discharge of fluids.

**Make sure to wear protective gear such as a helmet, safety glasses, long-sleeve shirt, heat-resistant gloves, protective footwear, etc.** Failure to do so may result in burns or injuries.

When the unit fails to operate properly, use the following table to locate the cause and remedy. If it is not possible to resolve the problem even after performing the remedy below, contact TLV.

Problem	Cause	Diagnosis	Remedy
No hot water is discharged	Valves on piping are closed	Check valves	Operate the valve in accordance with the operating procedures
	The strainer on the cold inlet piping is clogged	Check the strainer on the cold inlet piping	Clean the strainer on the cold inlet piping
	The adjustment valve at the hot water side in the mixing valve is clogged	Confirm that the water temperature at the outlet of the heat exchanger is high	Replace with a new mixing valve

<b>Problem</b>	<b>Cause</b>	<b>Diagnosis</b>	<b>Remedy</b>
Temperature does not rise as required Water temperature is unstable	Supply steam pressure is decreased or steam supply quantity is insufficient	Check the settings of the pressure reducing valve (at the water supply side and in the unit)	Set the maximum steam pressure that can be supplied below 0.7 MPaG Set the pressure of the pressure reducing valve in the unit designated pressure
	Supply steam pressure is unstable	Check the steam pressure Check for pipe leakage	Make sure that steam with a pressure of 0.6 MPaG or less can be obtained stably before the unit.
	The supply water system valve is closed or the designated water amount is not discharged	Check the supply water system valve Check the amount of water used	Open the supply water system valve.
	The thermometer is broken.	Check the temperature with another thermometer.	Replace with a new thermometer if it is judged to be defective.
	Large fluctuations of the amount of hot water used.	Check hot water usage	When a large amount of hot water is required, make sure to gradually increase the amount of hot water used. (There is a risk of burns.)
	Temperature adjustment dial has not been adjusted	Confirm the position of the temperature adjustment dial	Adjust the temperature adjustment dial. (Discharge water amount and temperature vary depending on operating conditions.) Refer to the heating capacity graph.)



**Note**

Refer to individual instruction manuals for further details on components mentioned in this manual.

# Specifications



**Caution**  
**Install properly and DO NOT use this unit outside the recommended operating pressure, temperature and other specification ranges.** Improper use may result in such hazards as damage to the unit or malfunctions that may lead to serious accidents.

Specifications are subject to change without notice for product improvement.

Model		SQ-C01	
Type		Standard	High Temp.
Thermal capability class		42 kW	
Heating method		Steam/water shell & spiral tube indirect heating	
Applicable hot water supply piping		One-pass	
Material	Wetted parts (water)	Stainless steel SUS304, A351 Gr.CF8, Brass CAC406 (NPb treated), C3771, etc.	
	Steam parts	Stainless steel SUS304, A351 Gr.CF8., etc.	
	Base, cover	Stainless steel SUS304	
Temperature adjustment method		Dial type	
Temperature adjustment range		30 to 50 °C	40 to 65 °C
Supply pressure	Steam	0.2 to 0.7 MPaG	
	Cold water (fluid pressure)	0.1 to 0.4 MPaG (Temperature: 5 to 28 °C)	
Maximum Operating Pressure (PMO)		0.4 MPaG (Adjustable steam pressure: The secondary side of the pressure reducing valve to the trap primary side)	
Maximum Operating Temperature (TMO)		152 °C	
Connection	Cold water	Inlet	15 mm JIS 5KFF or 15 ASME Class 150 RF 50/50, JIS10KFF
	Hot water	Outlet	15 mm JIS 5KFF or 15 ASME Class 150 RF
	Steam	Inlet	15 mm JIS 10KFF or 15 ASME Class 150 RF
	Condensate	Outlet	15 mm JIS 5KFF or 15 ASME Class 150 RF
	Relief valve	Outlet	Rc <sup>3</sup> / <sub>8</sub>
Installation location		Indoor/outdoor	

Maximum allowable pressure (PMA): PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

- Steam piping system: 0.7 MPaG
- Water piping system: 0.7 MPa

Maximum Allowable Temperature TMA: PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

- Steam piping system: 171 °C
- Water piping system: Cold water side: 70 °C, hot water side: 110 °C

## Disposal of the Unit

When disposing of the unit, disassemble and sort components in a way that adheres to local regulations, while considering environmental conservation, recycling and the pollution prevention.

## Storage

The openings of the unit are sealed with a label, plastic sheet, etc., and delivered after taking measures to prevent rust and contamination.

Observe the storage instructions until the unit is installed on the piping. If the following storage instructions cannot be observed, rust or foreign matter may void the warranty.

## Storage Instructions

1. Store the unit indoors to prevent it from getting wet by rainwater, dew, etc.
2. Store the unit indoors with humidity less than 80%.
3. If the label or plastic sheet used for sealing or packaging of the unit is damaged, replace it immediately or repair it with appropriate tape to maintain the seal.
4. When repacking the unit, pack it with cushioning material so that it does not fall or collide when moving or transporting.
5. If the unit is stored for a long period of time (approx. six months or more), unpack it at intervals of six months or less to check visually for rust and foreign matter. If an antitrust agent is used, replace it with a new one of the same amount.  
After no abnormalities are confirmed, seal the opening as it was.
6. Remove labels, plastic sheets, etc. sealing the opening just before installing the unit.

# TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV CO., LTD., a Japanese corporation (“**TLV**”), warrants that products which are sold by it, TLV International Inc. (“**TII**”) or one of its group companies excluding TLV Corporation (a corporation of the United States of America), (hereinafter the “**Products**”) are designed and manufactured by TLV, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. The party from whom the Products were purchased shall be known hereinafter as the “**Seller**”. With regard to products or components manufactured by unrelated third parties (the “**Components**”), TLV provides no warranty other than the warranty from the third party manufacturer(s), if any.

## Exceptions to Warranty

This warranty does not cover defects or failures caused by:

1. improper shipping, installation, use, handling, etc., by persons other than TLV, TII or TLV group company personnel, or service representatives authorized by TLV; or
2. dirt, scale or rust, etc.; or
3. improper disassembly and reassembly, or inadequate inspection and maintenance by persons other than TLV or TLV group company personnel, or service representatives authorized by TLV; or
4. disasters or forces of nature or Acts of God; or
5. abuse, abnormal use, accidents or any other cause beyond the control of TLV, TII or TLV group companies; or
6. improper storage, maintenance or repair; or
7. operation of the Products not in accordance with instructions issued with the Products or with accepted industry practices; or
8. use for a purpose or in a manner for which the Products were not intended; or
9. use of the Products in a manner inconsistent with the Specifications; or
10. use of the Products with Hazardous Fluids (fluids other than steam, air, water, nitrogen, carbon dioxide and inert gases (helium, neon, argon, krypton, xenon and radon)); or
11. failure to follow the instructions contained in the TLV Instruction Manual for the Product.

## Duration of Warranty

This warranty is effective for a period of one (1) year after delivery of Products to the first end user. Notwithstanding the foregoing, asserting a claim under this warranty must be brought within three (3) years after the date of delivery to the initial buyer if not sold initially to the first end user.

ANY IMPLIED WARRANTIES NOT NEGATED HEREBY WHICH MAY ARISE BY OPERATION OF LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY EXPRESS WARRANTIES NOT NEGATED HEREBY, ARE GIVEN SOLELY TO THE INITIAL BUYER AND ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF SHIPMENT BY THE SELLER.

## Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT**; PROVIDED: (a) THE CLAIMED DEFECT IS

REPORTED TO THE SELLER IN WRITING WITHIN THE WARRANTY PERIOD, INCLUDING A DETAILED WRITTEN DESCRIPTION OF THE CLAIMED DEFECT AND HOW AND WHEN THE CLAIMED DEFECTIVE PRODUCT WAS USED; AND (b) THE CLAIMED DEFECTIVE PRODUCT AND A COPY OF THE PURCHASE INVOICE IS RETURNED TO THE SELLER, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY THE SELLER. ALL LABOR COSTS, SHIPPING COSTS, AND TRANSPORTATION COSTS ASSOCIATED WITH THE RETURN OR REPLACEMENT OF THE CLAIMED DEFECTIVE PRODUCT ARE SOLELY THE RESPONSIBILITY OF BUYER OR THE FIRST END USER. THE SELLER RESERVES THE RIGHT TO INSPECT ON THE FIRST END USER'S SITE ANY PRODUCTS CLAIMED TO BE DEFECTIVE BEFORE ISSUING A RETURN MATERIAL AUTHORIZATION. SHOULD SUCH INSPECTION REVEAL, IN THE SELLER'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY THE SELLER FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

### **Exclusion of Consequential and Incidental Damages**

IT IS SPECIFICALLY ACKNOWLEDGED THAT THIS WARRANTY, ANY OTHER EXPRESS WARRANTY NOT NEGATED HEREBY, AND ANY IMPLIED WARRANTY NOT NEGATED HEREBY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DO NOT COVER, AND NEITHER TLV, TII NOR ITS TLV GROUP COMPANIES WILL IN ANY EVENT BE LIABLE FOR, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOST PROFITS, THE COST OF DISASSEMBLY AND SHIPMENT OF THE DEFECTIVE PRODUCT, INJURY TO OTHER PROPERTY, DAMAGE TO BUYER'S OR THE FIRST END USER'S PRODUCT, DAMAGE TO BUYER'S OR THE FIRST END USER'S PROCESSES, LOSS OF USE, OR OTHER COMMERCIAL LOSSES. WHERE, DUE TO OPERATION OF LAW, CONSEQUENTIAL AND INCIDENTAL DAMAGES UNDER THIS WARRANTY, UNDER ANY OTHER EXPRESS WARRANTY NOT NEGATED HEREBY OR UNDER ANY IMPLIED WARRANTY NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) CANNOT BE EXCLUDED, SUCH DAMAGES ARE EXPRESSLY LIMITED IN AMOUNT TO THE PURCHASE PRICE OF THE DEFECTIVE PRODUCT. THIS EXCLUSION OF CONSEQUENTIAL AND INCIDENTAL DAMAGES, AND THE PROVISION OF THIS WARRANTY LIMITING REMEDIES HEREUNDER TO REPLACEMENT, ARE INDEPENDENT PROVISIONS, AND ANY DETERMINATION THAT THE LIMITATION OF REMEDIES FAILS OF ITS ESSENTIAL PURPOSE OR ANY OTHER DETERMINATION THAT EITHER OF THE ABOVE REMEDIES IS UNENFORCEABLE, SHALL NOT BE CONSTRUED TO MAKE THE OTHER PROVISIONS UNENFORCEABLE.

### **Exclusion of Other Warranties**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.

### **Severability**

Any provision of this warranty which is invalid, prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such invalidity, prohibition or unenforceability without invalidating the remaining provisions hereof, and any such invalidity, prohibition or unenforceability in any such jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.



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