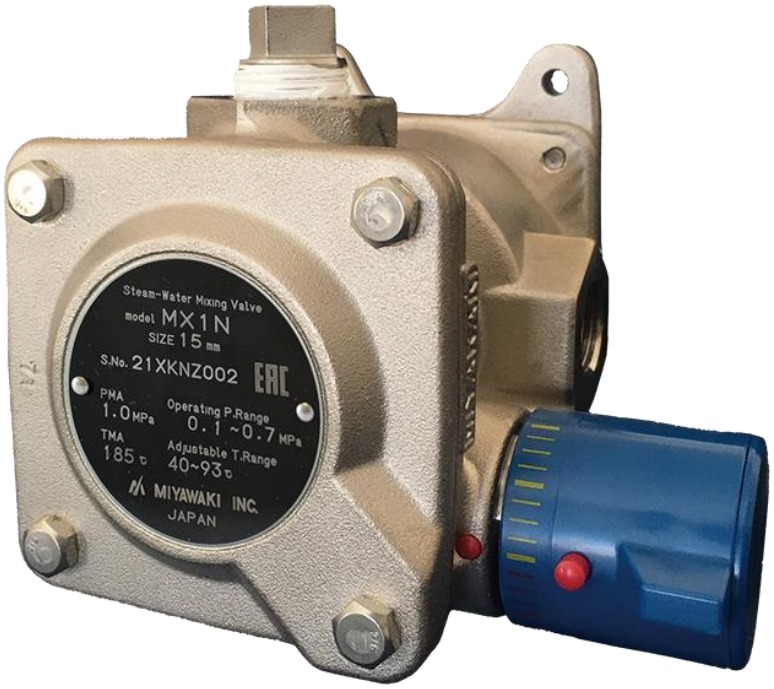
## STEAM WATER MIXING VALVE

# MX1N

# USER'S MANUAL




MIYAWAKI INC.

# SAFETY GUIDE

**The model MX1N is a steam water mixing valve which mixes steam and cold water directly, to create hot water. Typical applications include wash down floors or wall surfaces, cleaning vessels and parts, and wherever hot water is required.**

**In order to get maximum benefit from this product, be sure to read this manual before installing it.**

The following warnings and cautions are shown at appropriate places in this manual.

**WARNING**

Failure to observe this type of precaution may lead to serious injury or death.

**CAUTION**

Failure to follow this type of precaution can lead to injury or damage to equipment and property.

## Table of Contents

# GENERAL SAFETY INFORMATION

This manual describes how to maintain your product in good condition and how to operate it safety and correctly. In order to get maximum benefit from this product, be sure to read this manual before installing it. Keep this manual in a safe place for future reference, after you have read through it.
If you lose or damage this manual, you can ask for a new manual from our Miyawaki local dealer.
Due to continuing improvements, actual product may differ slightly from the product described herein.

## WARNING

- When supplying cold water to the steam boiler that supplies steam to the mixing valve, you may add boiler compound as a part of your daily maintenance routine for your boiler steam system. If your skin has been exposed directly or indirectly to hot water generated by the product, you may be seriously injured due to the boiler compound that has been contained in the cold water supply.
- Please check that hot water generated by the product is harmless on your skin. After confirming, hot water can be used for a variety of applications. Typical applications include wash down floors or wall surfaces, cleaning vessels, and wherever hot water is required.
  However, to prevent skin burns caused by exposure to hot water generated by the product, hot water cannot be used for hand-washing or showering.

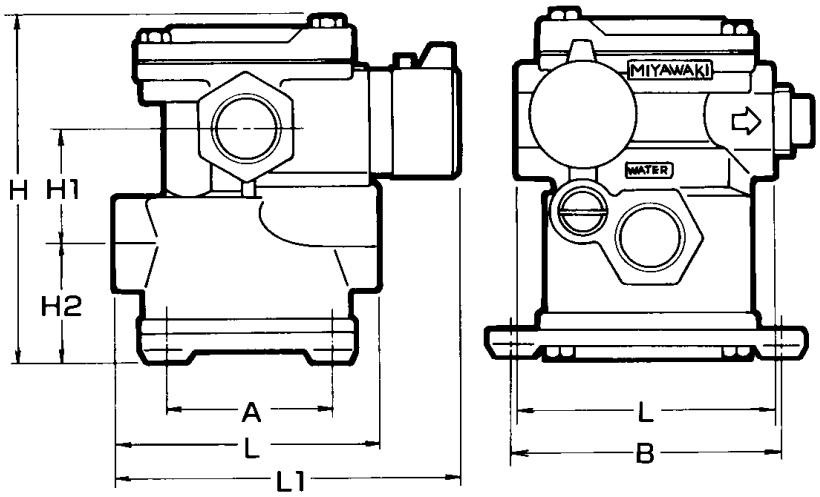
# 1 SPECIFICATIONS AND DIMENSIONS

## 1.1 Specifications

| | |
|---|---|
| Maximum allowable pressure | Steam 1.0MPa Cold water 1.0MPa |
| Operating pressure range (Flow pressure) | 15A~25A : Steam 0.1~0.7MPa Cold water 0.1~0.7MPa<br>40A : Steam 0.1~0.5MPa Cold water 0.1~0.5MPa |
| Maximum allowable temperature | 184℃ |
| Ratio between steam and cold water (Flow pressure) | Steam Pressure : Cold water = 1 : 3 ～ 3 : 1<br>(Recommended 1 : 1 ) |
| Adjustable temperature | 40※- 93°C |
| Body material | Brass (Nickel plated) |
| Actuation | Pilot operated mixing valve |
| Operating system | Safety Shut-off System |
| Size | 15A, 20A, 25A, 40A |

※ The temperature difference between the cold water temperature and the outlet temperature must be at least 10℃.

## 1.2 Dimensions




| Model | Connection | Size (A) | Dimensions（mm） | | | | | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | L1 | H | H1 | H2 | A | B | (kg) |
| MX1N | Screwed | 15 | 100 | 138 | 134 | 43 | 47 | 62 | 102 | 3.9 |
| | | 20 | 100 | 138 | 134 | 43 | 47 | 62 | 102 | 3.9 |
| | | 25 | 140 | 179 | 168 | 57 | 51 | 86 | 147 | 8.6 |
| | | 40 | 160 | 189 | 197 | 70 | 60 | 86 | 147 | 14.1 |

## 1.3 Hot Water Flow Rate (Simplified Tables)

**WARNING** **Operate hot water at any flow rate between the maximum and minimum figures indicated. You cannot get hot water if the flow rate is less than the minimum.**

- **When the pressure ratio of Steam to water is equal in the model MX1N-A, the following table is an example of a case when a cold water temperature of 15°C will be raised to maximum and minimum temperatures. If the pressure ratio between steam and cold water is different, please contact our local representative.**
- **If the hot water temperature must be above 50°C, confirm that the pressure ratio of steam to water is equal, or greater.**

**15A Size** (The maximum set temperature is 93°C.)

| Cold water Pressure/Steam pressure (Flow pressure) (MPa) | Hot Water Flow Rate by Temperature (kg /min) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40℃ | | 50℃ | | 60℃ | | 70℃ | | 80℃ | | 90℃ | |
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 0.1 | 3 | 12 | 3 | 12 | 3 | 13 | 5 | 13 | 5 | 11 | 5 | 10 |
| 0.2 | 3 | 20 | 3 | 21 | 3 | 21 | 5 | 20 | 5 | 17 | 10 | 14 |
| 0.3 | 6 | 25 | 6 | 25 | 6 | 26 | 9 | 26 | 9 | 22 | 13 | 19 |
| 0.4 | 6 | 29 | 6 | 29 | 6 | 29 | 12 | 30 | 12 | 28 | 17 | 24 |
| 0.5 | 7 | 32 | 7 | 32 | 8 | 33 | 13 | 34 | 18 | 34 | 29 | 29 |
| 0.6 | 7 | 35 | 7 | 36 | 16 | 36 | 17 | 37 | 27 | 37 | 34 | 34 |
| 0.7 | 8 | 38 | 9 | 38 | 21 | 39 | 21 | 40 | 37 | 40 | 38 | 38 |

**20A Size** (The maximum set temperature is the temperature of the cold water + 75°C. However, it can not exceed 93°C.)

| Cold water Pressure/Steam pressure (Flow pressure) (MPa) | Hot Water Flow Rate by Temperature (kg /min) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40℃ | | 50℃ | | 60℃ | | 70℃ | | 80℃ | | 90℃ | |
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 0.1 | 5 | 22 | 5 | 23 | 5 | 20 | 8 | 17 | 8 | 14 | 9 | 12 |
| 0.2 | 5 | 32 | 5 | 32 | 5 | 31 | 8 | 25 | 8 | 21 | 13 | 18 |
| 0.3 | 8 | 39 | 8 | 39 | 8 | 40 | 10 | 34 | 10 | 28 | 25 | 25 |
| 0.4 | 9 | 45 | 9 | 45 | 9 | 46 | 14 | 42 | 20 | 36 | 31 | 31 |
| 0.5 | 11 | 50 | 11 | 51 | 11 | 52 | 15 | 51 | 23 | 43 | 37 | 37 |
| 0.6 | 12 | 55 | 12 | 55 | 23 | 56 | 23 | 57 | 42 | 50 | 43 | 43 |
| 0.7 | 14 | 59 | 15 | 60 | 44 | 61 | 45 | 62 | 56 | 56 | 49 | 49 |

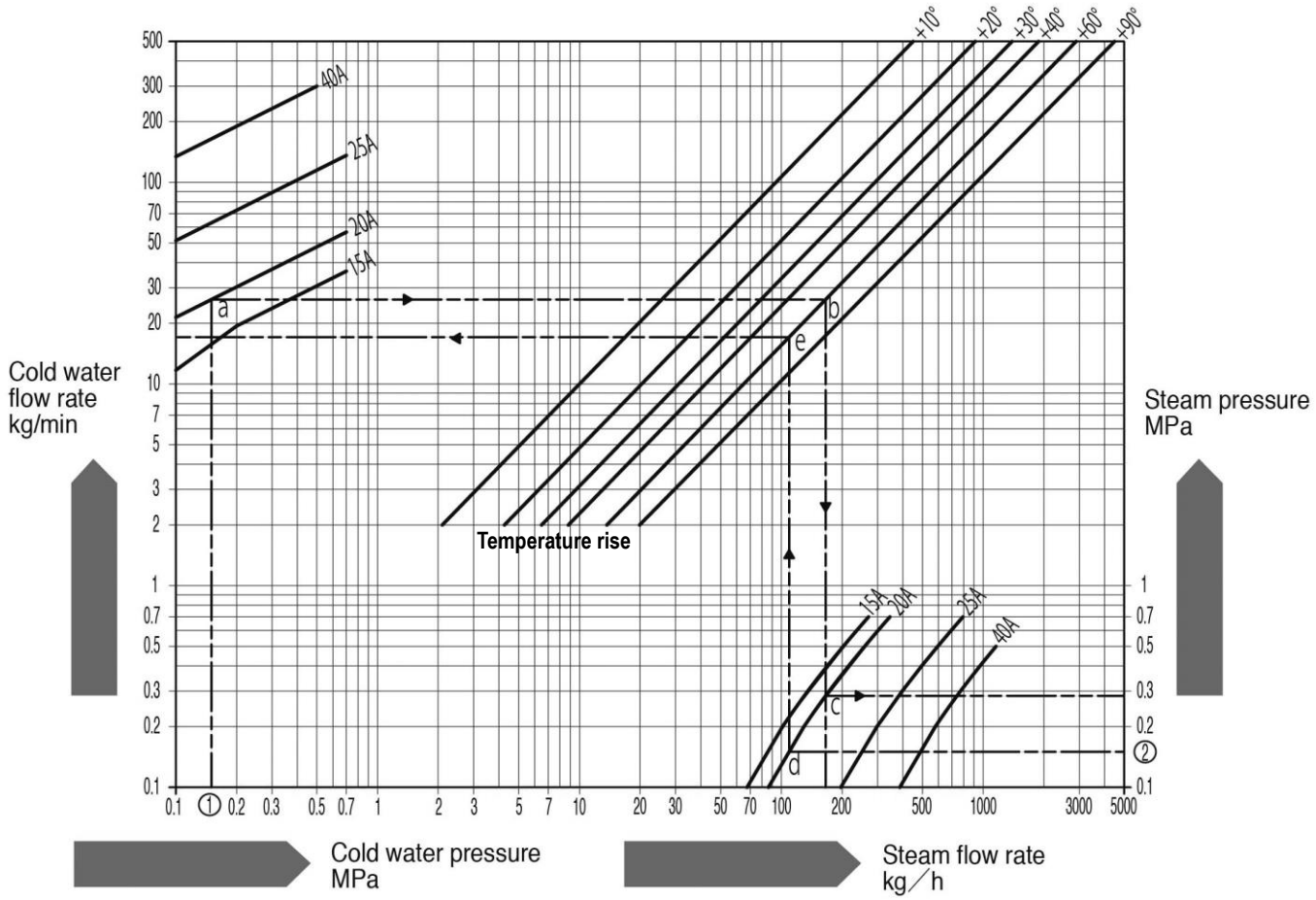
**25A Size** (The maximum set temperature is 93°C.)

| Cold water Pressure/Steam pressure (Flow pressure) (MPa) | Hot Water Flow Rate by Temperature (kg /min) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40℃ | | 50℃ | | 60℃ | | 70℃ | | 80℃ | | 90℃ | |
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 0.1 | 30 | 54 | 30 | 54 | 29 | 47 | 23 | 38 | 20 | 32 | 17 | 28 |
| 0.2 | 38 | 76 | 39 | 77 | 48 | 70 | 37 | 57 | 31 | 49 | 27 | 42 |
| 0.3 | 48 | 93 | 48 | 94 | 65 | 94 | 52 | 77 | 44 | 65 | 38 | 56 |
| 0.4 | 54 | 107 | 55 | 109 | 66 | 111 | 67 | 97 | 57 | 82 | 49 | 71 |
| 0.5 | 60 | 120 | 61 | 122 | 67 | 124 | 82 | 116 | 69 | 98 | 60 | 85 |
| 0.6 | 66 | 131 | 67 | 133 | 68 | 135 | 97 | 136 | 82 | 115 | 71 | 100 |
| 0.7 | 71 | 142 | 72 | 144 | 73 | 146 | 107 | 149 | 93 | 130 | 81 | 112 |

**40A Size** (The maximum set temperature is 93°C.)

| Cold water Pressure/Steam pressure (Flow pressure) (MPa) | Hot Water Flow Rate by Temperature (kg /min) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 40℃ | | 50℃ | | 60℃ | | 70℃ | | 80℃ | | 90℃ | |
| | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. |
| 0.1 | 91 | 140 | 83 | 116 | 64 | 90 | 53 | 74 | 45 | 63 | 39 | 54 |
| 0.2 | 116 | 197 | 137 | 175 | 100 | 136 | 82 | 112 | 69 | 94 | 60 | 82 |
| 0.3 | 136 | 242 | 170 | 235 | 136 | 183 | 112 | 149 | 94 | 126 | 82 | 110 |
| 0.4 | 153 | 279 | 170 | 284 | 172 | 229 | 141 | 188 | 119 | 159 | 103 | 138 |
| 0.5 | 171 | 312 | 173 | 317 | 210 | 276 | 172 | 226 | 146 | 191 | 126 | 166 |

## 1.4 Capacity Chart




## How to Read the Capacity Chart

Determine the steam flow rate under the following conditions:
Cold water pressure: 0.15MPa, Cold water temperature: 10°C, Steam pressure: 0.3MPa, Hot water temperature: 70°C, and Size: 20A

- The cold water flow rate given by the intersection point "a" of the cold water pressure 0.15MPa ① and the 20A size is about 27kg/min.
- Plot the cold water flow rate 27kg/min to the right in the chart. The steam flow rate given by the intersection point "b" of the cold water flow rate 27kg/min and the temperature rise 60°C is about 166kg/h.
- The steam pressure given by the intersection point "c" of the steam flow rate 166kg/h and the steam flow rate of 20A size is about 0.28MPa. If the steam pressure is less than 0.28MPa, please refer to below.
- You can get the hot water flow rate by adding values which the steam flow rate is divided by 60, to the cold water flow rate. The equation takes the following form.
  Hot water flow rate (about 30kg/min) = Cold water flow rate (27kg/min) + Steam flow rate (166kg/h) /60.

Under the above conditions, if the steam pressure is 0.15MPa,

- The steam rate given by the intersection point "d" of the steam pressure 0.15MPa② and the steam flow rate of 20A size is about 107kg/h.
- Move from the intersection point "d" to "e" by plotting upwards. The cold water flow rate given by the intersection point "e" of the steam flow rate 107kg/h and the temperature rise 60°C is about 17kg/min. The equation takes the following form.
  Hot water flow rate (about 19kg/min) = Cold water flow rate (17kg/min) + Steam flow rate (107kg/h) /60.

# 2 CHECKLIST BEFORE INSTALLING

(1) Please check the steam and the cold water pressures.

**CAUTION**

- **In the case of both the steam and the cold water pressures, make sure that you can supply the pressure of at least 0.1MPa.**
- **The pressure ratio between the steam supply and cold water supply must not exceed 3:1 or 1:3. Ratios greater than this will not allow the mixing valve to obtain the specified hot water flow rate.**
- **If pressure ratios are greater than the specified range, install the pressure reducing valve on the high pressure side of the system, to adjust the pressure.**
- **If you want to use a small once-through boiler, since pressure variations is likely to occur due to any variations in load, please be sure to install a pressure reducing valve on the high-pressure side of the system.**
- **Please select the type of pressure reducing valve for satisfying the steam flow rate (166kg/h) given in the Capacity Chart of 1.4. If the pressure reducing valve is same size as the mixing valve, according to the relationship between the hot water set temperature and the hot water flow rate, it may be difficult to get hot water due to lack of the steam supply rate.**
- **If the hot water temperature of above 50°C will be required, confirm that the steam pressure is set the same as the cold water pressure, or greater than that of cold water.**
- **If you want to check the cold water pressure, be sure to check the pressure indicated by a Pressure Gauge. And also, if the Pressure Gauge is installed on the upstream of the mixing valve than the strainer, please note that there will be the differences between the pressure on the upstream side of the mixing valve and the pressure indicated by a Pressure Gauge, due to strainer clogs.**
- **According to changes in (steam and cold water) supply pressures, please note that the hot water outlet temperature also will vary.**
- **Plastic pipes such as PVC plastic pipe and plastic lined pipe are not recommended for use. If the PVC plastic and the plastic lined pipes are used for a cold water supply line on the upstream side of the mixing valve, there is a possibility that the steam will flow in the cold water line and hot water outlet line sides and damage them. Use care when handling a PVC plastic pipe.**

(2) Please check that you have all of the necessary parts before beginning installation.
* In addition, you need the following parts other than accessories.

| | |
|---|---|
| Union | 3 pcs. |
| Pressure Gauge | 2 pcs. |
| Ball Valve (full bore type) | 3 pcs. |
| Thermometer | 1 pc. |
| Steam Trap | 1 pc. |
| T-shaped pipe fitting | 1 pc. |
| Copper pipe fitting: Rc3/8—（φ6） | 1 pc. |
| Copper pipe (about φ6) | |

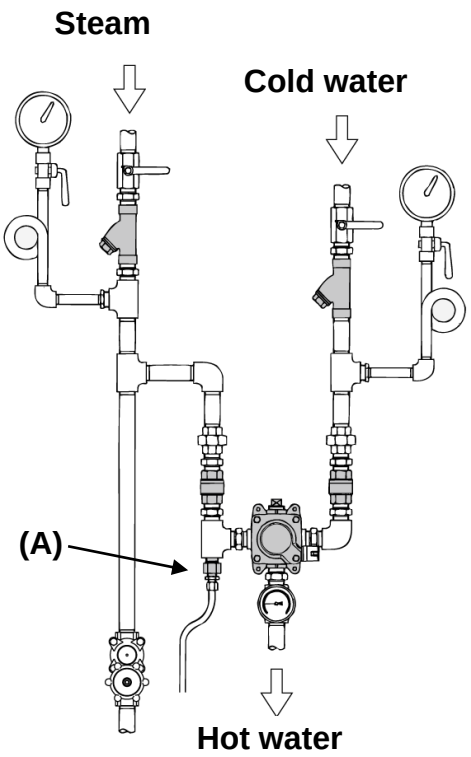
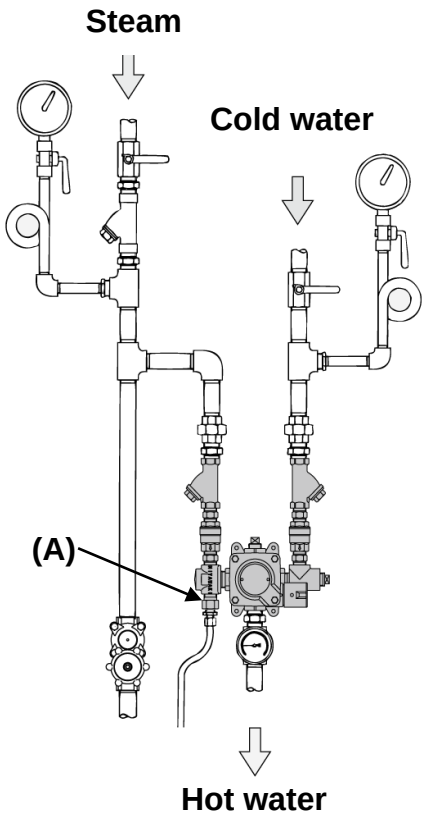
We recommend that install the following parts other than parts in the above table.

| | |
|---|---|
| Safety Valve | 2 pcs. |

(3) Please check the type of piping system, and accessories.

※ Depending on the piping configuration, the mixing valve will be classified into the following two basic types.

※ Depending on the type of piping systems, each piping will have a different accessory.

| | Basic Model | U-type Unit |
|---|---|---|
| Model No. | MX1N-A | MX1N-U、15A、20A |
| Schematic illustration |  (A) Relief valve |  (A) Relief valve |

| Accessories / Model No. | MX1N-A | MX1N-U |
|---|---|---|
| Y-Type strainer (100 mesh screens) | 2 pcs. | 2 pcs. |
| Check valve | 2 pcs. | 2 pcs. |
| Nipple | — | 4 pcs. |
| T-shaped fitting | — | 2 pcs. |
| Plug | — | 1 pc. |
| (A) Relief valve (Size more than 20 A: Relief valve with bush) | 1 pc. | 1 pc. |
| Screws (with wall plugs) for mounting the mixing valve | 4 pcs. | 4 pcs. |
| User's manual | 1 pc. | 1 pc. |

- For the model MX1N-A, please prepare pipe accessories (nipple, T-shaped fitting and plug) yourself, and assemble them yourself.
- For the model MX1N-U, the mixing valve and the pipe accessories (except screws with wall plugs) will be pre-assembled at Miyawaki prior to shipment and then shipped.

# 3 INSTALLATION

## 3.1 Installation Instructions

(1) Determine the desired location for installing the mixing valve.

**CAUTION**

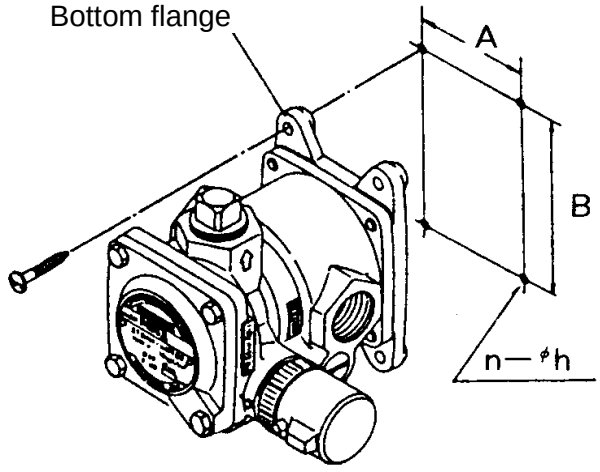
- **Please choose a location to fix the mixing valve.**
- **Make sure to install the Y-Type strainer and the check valve on the upstream side of the mixing valve. Also, be sure to install the relief valve on the steam side.**
- **Do not use a room temperature pipe sealant or a rust inhibitor when installing the mixing valve to the pipe. If a pipe sealant or a rust inhibitor (applied to the inside surface of the pipe) flows in the mixing valve, there is a possibility that valve problems like the maladjusted valve or continuous valve steam leaks will occur. Be careful not to apply a pipe sealant or a rust inhibitor to the inside surface of the pipe, to avoid such valve problems.**

(2) Layout and open a hole in the wall. (Refer to a figure/table below.)

(3) Fix the bottom flange to the wall using the four screws (with wall plugs) supplied by a manufacturer.

| Size | A | B | n | h | Depth of h |
|---|---|---|---|---|---|
| 15 A | 62 | 102 | 4 pcs. | 6 | 35 |
| 20 A | 62 | 102 | 4 pcs. | 6 | 35 |
| 25 A | 86 | 147 | 4 pcs. | 9 | 55 |
| 40 A | 86 | 147 | 4 pcs. | 9 | 55 |

Unit: mm




- The recommended size of bolt is as follows when you fix the bottom flange using the commercially available types of bolt.
- Determine the bolt length depending on the bottom flange mounting situation.

| Size | Recommended size of bolt |
|---|---|
| 15 A | M5 |
| 20 A | |
| 25 A | M8 |
| 40 A | |

(4) Be sure to connect the steam line to the intake marked "STEAM" (cold water supply line to the "WATER") on the body. Identify the steam supply line. There should be the "STEAM" embossed in the body where the steam supply line attaches.

## WARNING

**If you connect the steam supply line to the intake marked "WATER", a steam blow will occur.**

(5) Install the following equipment on the steam supply, cold water supply or hot water outlet side.

| Related equipment | Steam side | Cold water side | Hot water outlet side |
|---|---|---|---|
| Stop valve or Ball valve | Required | Required | Required |
| Y-shaped strainer | Required | Required | |
| Check valve | Required | Required | |
| Pressure gauge | Required | Required | |
| Thermometer | | | Required |
| Steam trap DV1 | Required | | |
| Plug | Required | Required | |
| Relief valve (Use a T-shaped fitting to create branch lines.) | Required | | |

## CAUTION

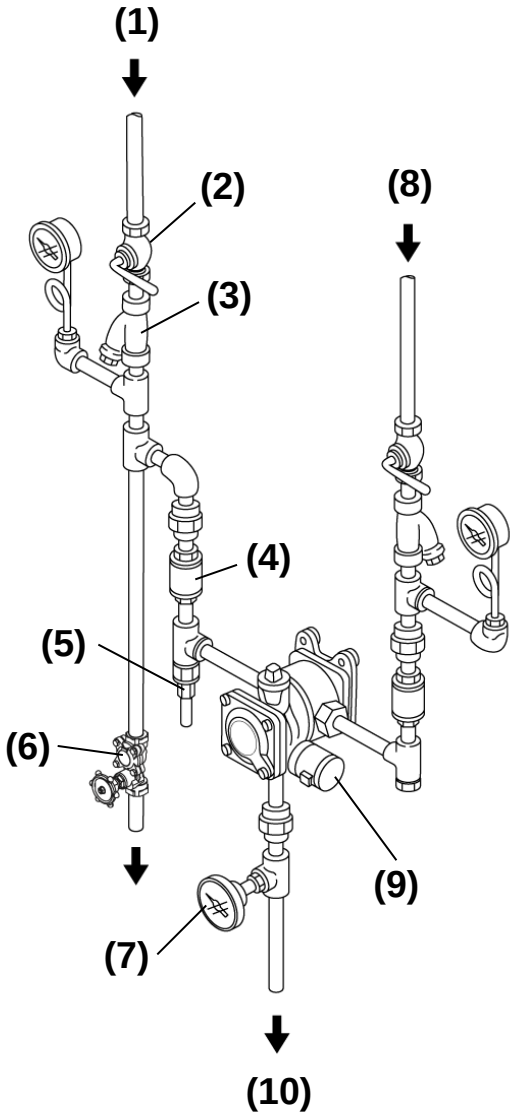
- **For the hot water valve to be installed on the hot water outlet side, please install only items with low flow resistance to reduce the back pressure to a minimum. For instance, ball valves with full bore should be used.**
- **If hot water is used less frequently, please install a steam trap to drain the condensate accumulated in the steam line.**
- **Install a steam trap on the upstream side of a check valve.**
- **At the steam supply side, install a supplied relief valve between the mixing valve and the check valve. After you connect the copper pipe into the downstream side of relief valve (outlet: 3/8" Rc), please discharge a buildup of fluid during the opening of a relief valve into the pit.**
- **When you install the model CVC3 check valve that is provided by manufacturer to the steam supply line, do not use a room temperature pipe sealant. The pipe sealant will be stuck to the valve, and the valve leakage may occur. Please wind fluorine resin sealing tape around threads.**

The relief valve (RV) is a type of valve used to control or limit the sudden rise in pressure due to water hammer in a line between the check valve on the steam supply side and the mixing valve. Install the relief valve on the branch line. Use a T-shaped fitting to create branch lines.

After closing the valve on the hot water outlet side of the model MX1N mixing valve, immediately open the relief valve and discharge a few drops of warm water. Therefore, discharge the outlet side to the pit pipe with a copper pipe.

(6) If you want to remove the mixing valve itself easily, make sure that all pipes will be connected to each side (Steam inlet, cold water inlet and hot water outlet) of the mixing valve, using union nuts.

(1) Steam
(2) Ball Valve
(3) Strainer (100 mesh)
(4) Check Valve
(5) Relief Valve
(6) DV1 Steam Trap
(7) Thermometer
(8) Cold water
(9) MX1N Mixing Valve
(10) Hot Water

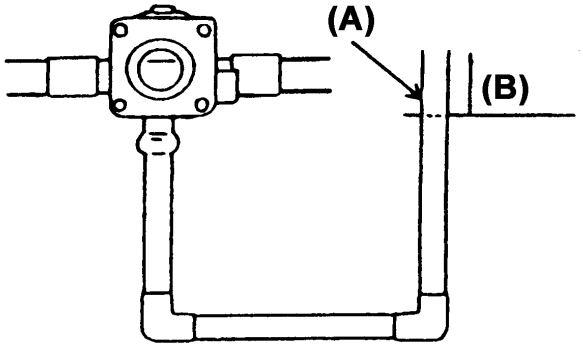


## CAUTION

- **The mixing valve has two hot water outlets on its top and bottom.**
- **One of them can be closed by a plug. You can change the position of installation of a plug, if needed. Hot water will be come out regardless of the installation position of a plug.**
- **You can use each hot water outlet at the same time.**
- **When the hot water outlet is not in use, please close it with a plug nut.**

## Precautions for the riser piping

When a hot water outlet piping of the mixing valve is a rise piping, hot water outlet flow rates will be reduced due to the back pressure. If a flow rate will fall below the minimum flow rate required for operation, you cannot get hot water.



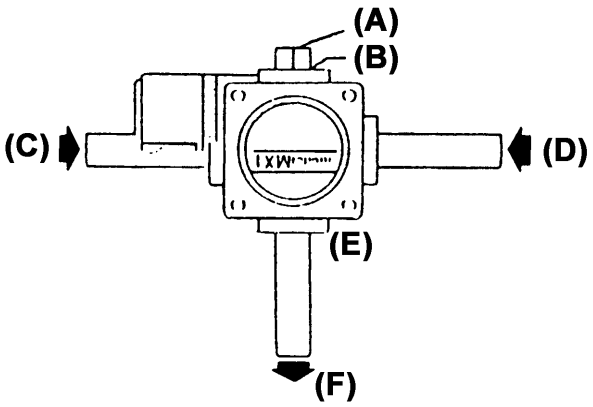

(A) The back pressure is imposed.
(B) Rise piping: Increase by 0.01MPa per 1m

## How to find the flow rate (In the case of the rise piping)

(1) Reference back pressure: Increase by 0.01MPa per 1m
(2) Differential pressure= Cold water pressure - Back pressure
(3) Replace the differential pressure with the cold water pressure, and read off the flow rate from the 1.4 capacity chart.
(4) Minimum required pressure = Back pressure + 0.1 MPa (in both the case of cold water pressure and of steam pressure)
However, the minimum pressure will differ depending on the inlet pressure or the temperature of hot water. If you will adopt the combination of inlet pressure and high temperature hot water, you cannot design a rise piping. Please contact your Miyawaki local dealer for details.

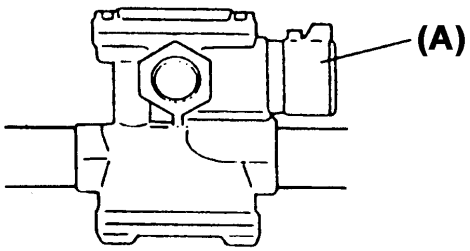
## 3.2 Precautions for the Mixing Valve Mounting Direction

(1) The hot water line will generally be located on the left side of the mixing valve when viewed from the front. (The cold water line will be located on the right side.)
If the left and right are reversed for convenience of piping, you can use the mixing valve itself without being bothered, by rotating it 180°.
In addition, please do not install a valve that will open and close rapidly in the immediate vicinity of the hot water outlet. Due to water hammering effect, Leaks in piping joints or any serious damage to the internal parts of the mixing valve will be caused by the water hammering effect.




(A) Plug
(B) Alternative Hot Water Outlet
(C) Cold Water (D) Steam
(E) Hot Water Outlet (G) Hot Water

(2) The mixing valve can be installed horizontally.




(A) Blue Handle

**CAUTION**

**Before installing the mixing valve kit, check the inside of the pipes for dirt or scale. If any is present, remove with compressed air.**

## 3.3 When connecting the hose to the hot water outlet (15A/20A)

**CAUTION**

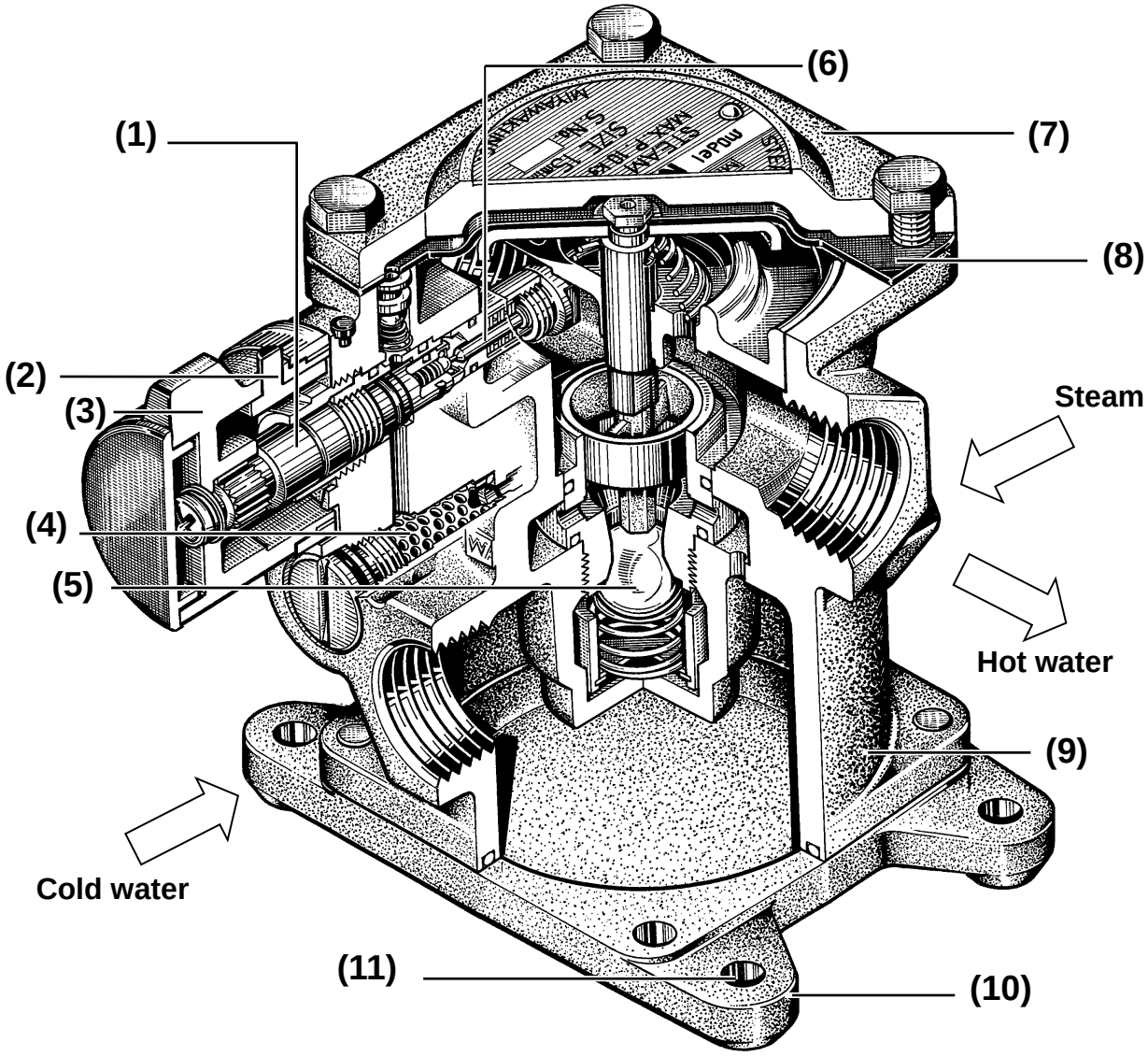
- **Make sure to use a steam hose 19mm (3/4") internal diameter.**
- **Use with an open-ended hose is not recommended. Make sure to attach the specified spray nozzle to the open end of a steam hose.**
- **Make sure that the hose in use is not snaking due to the hot water outlet flow force.**

**※The hose connection to the hot water outlet as described above cannot be used in case of the model MX1N (25A/40A).**

**WARNING**

**To prevent skin burns caused by exposure to the hot water generated by the mixing valve, you cannot connect directly the hot water outlet line to the shower port.**

# 4 CONSTRUCTION DETAILS




(1) Adjust Unit (Stainless)
(2) Safety Button
(3) Blue Handle
(4) Screen
(5) Main Valve Unit (Stainless)
(6) Bimetal Unit (Special alloy)
(7) Cover (Electroless Nickel Plating Brass)
(8) Diaphragm Unit (EPDM)
(9) Body (Electroless Nickel Plating Brass)
(10) Bottom Flange (Electroless Nickel Plating Brass)
(11) Wall Mounting Holes

# 5 OPERATING PROCEDURES

## 5.1 Start-up Procedure

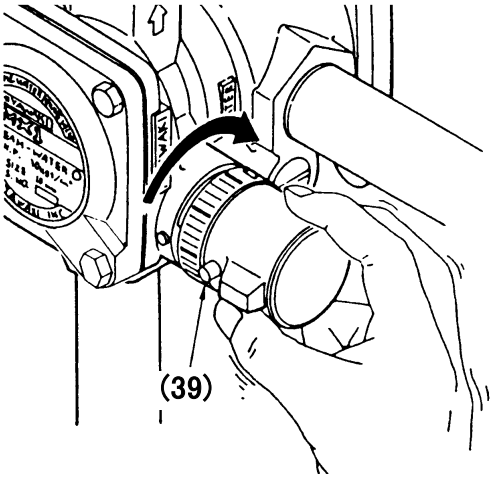
**WARNING**

- **For safety reasons, the temperature control blue handle is set to a cold water position that does not turn in a counterclockwise direction at a factory.**
- **Do not turn the blue handle clockwise before use absolutely.**
- **When you start operating the mixing valve, hot water may be blown out temporarily from the hot water outlet side, due to the air that remains inside the piping. Make sure that you operate the mixing valve according to the operating procedures.**
- **The model MX1N incorporates a safety shut-off system. After opening the ball valve on the inlet side of the mixing valve, open the valve on the outlet side. When you will not want to use hot water, after closing the valve on the outlet side, close the ball valve. Incorrect use of the mixing valve would lead to problems such as blowing high temperature hot water temporarily from the hot water outlet side.**

### How to stop the mixing valve urgently (if anything unforeseen abruptly happens in the piping system,)

- Stop the mixing valve urgently, if anything unforeseen (For example: A sudden drop in cold water pressure, Discharge cold water to prevent it to freeze in the pipes, Cold water shortage in the cold water storage tank, Malfunction, and Condition outside specification range, etc.) abruptly happens in the piping system. Close the manual steam and cold water supply valves on the upstream side of the mixing valve, and close the valve on the hot water outlet side.
  The situation that the steam will flow in the cold water supply line or will be blown out from the outlet can be also considered unforeseen.

1) Open the cold water inlet ball valve slowly.
2) Open the hot water outlet ball valve and check that cold water comes out.
3) Open the steam inlet ball valve slowly.
4) Do not push the red safety button (39) on the temperature control blue handle. Turn the blue handle slowly clockwise (in the direction of arrow) until it stops. Hot water that comes out will be about 40°C. (Please check the temperature using a thermometer.)
5) If you need the hot water temperature higher than 40°C, turn the blue handle slowly clockwise (in the direction of arrow) while pushing the red safety button (39). (Please adjust the temperature change while watching the thermometer.)




6) Once hot water has reached the temperature you have set, it will be in a stable state. Check whether hot water is in a stable state, and then you can use hot water.
7) If you want to use hot water after that, perform the opening/closing operation of the valve on the hot water outlet side.

**WARNING**

**Do not suddenly turn the blue handle, high temperature hot water will be blown out forcefully.**

## 5.2 Procedure to Stop Operation

1) Turn the blue handle counterclockwise until it stops, and return it to a cold water position.

**WARNING**

**If you need the hot water temperature higher than 40°C, make sure to return the blue handle to a cold water position. If not, when hot water is coming out next time, high temperature hot water will be blown out forcefully and you are at risk for burn injuries.**

2) Close the steam inlet ball valve slowly.
3) Close the cold water inlet ball valve.
4) Open hot water outlet cock, to discharge hot water that exists inside the mixing valve. After discharging hot water, close the valve on the hot water outlet side to prevent internal corrosion or valve freezing.

**CAUTION**

- **When the mixing valve is not in use, please close the steam inlet ball valve and the cold water inlet ball valve.**
- **If the cold water pressure is higher than that of steam, there is a possibility that the main valve will be pressed down and cold water flows in check valve on the steam inlet side of the mixing valve. If dirt/contaminates will be stuck to the check valve, the valve leakage may occur. In this case, cold water will be flown in the further upstream direction.**

# 6 INSPECTION

- Please perform the daily inspection for the temperature of hot water, the steam pressure and the cold water pressure, using the thermometer and the pressure gauge.
- Please perform the periodic inspection whether the screen of the Y-shaped strainer becomes clogged. If clogged, take the screen out and clean it.

# 7 TROUBLESHOOTING

When a failure or malfunction of the mixing valve will occur, please contact your local dealer.

**WARNING**

- **When disassembling, bleed off of residual pressure inside the mixing valve, to prevent skin burns. And then, perform inspection services after the mixing valve has cooled down completely.**
- When inspecting the mixing valve, you must always make sure to wear the appropriate safety equipment, including safety gloves.

## How to bleed off of residual pressure

1) Close the steam inlet ball valve slowly.
2) Open hot water outlet cock, to discharge hot water that exists inside the mixing valve.
3) After discharging cold water for just a short time, close the valve on the cold water outlet side.

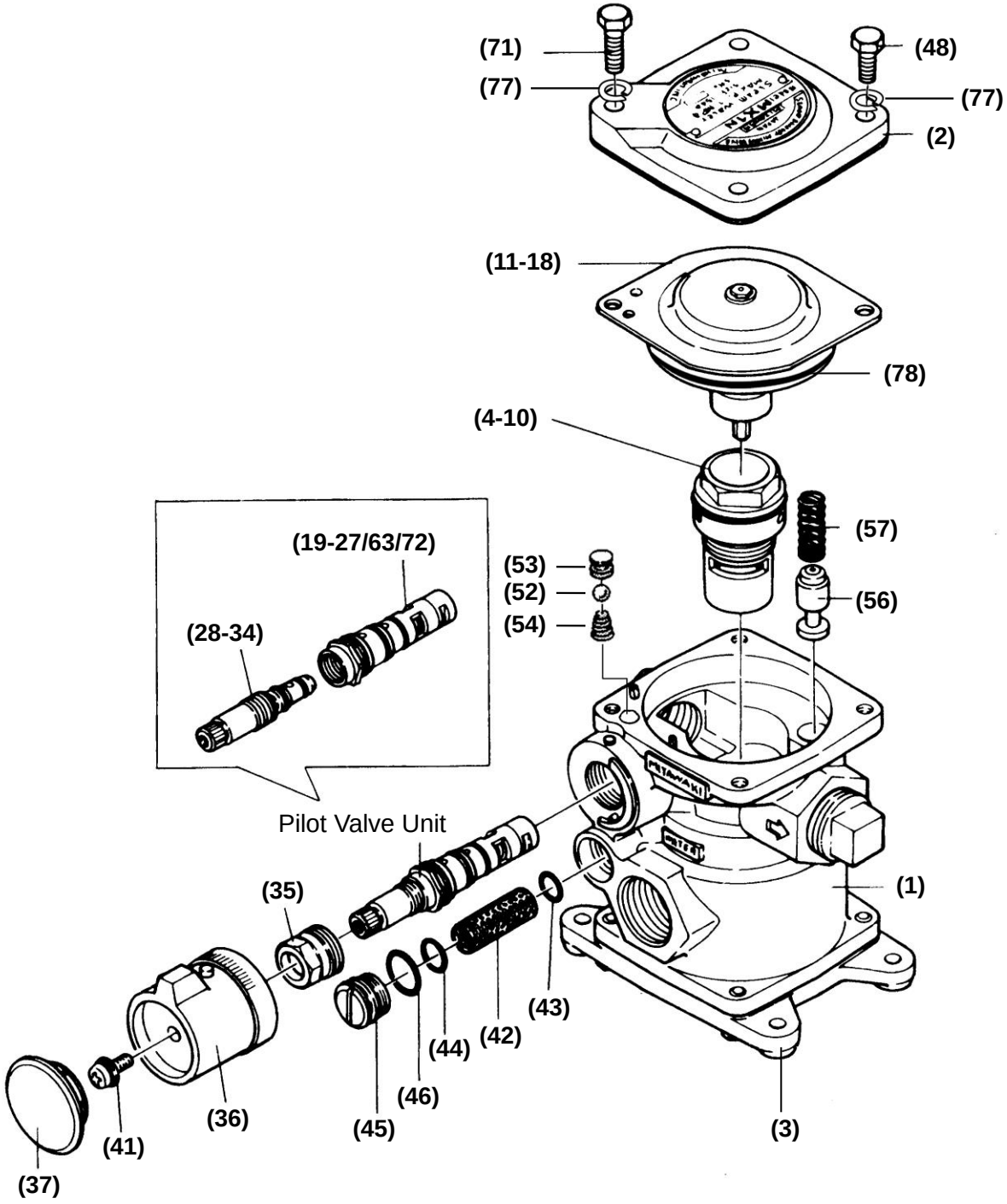
| Problem | | Possible causes | Solution |
|---|---|---|---|
| Both cold and hot water do not come out from the hot water outlet of the mixing valve. - | | An outage of the water supply | - |
| | | The cold water inlet ball valve is closed. | Open the valve slowly. |
| | | Clogged strainer on the cold water inlet side | Clean the strainer. |
| | | The check valve mounting direction on the cold water inlet side is reversed. | Ensure the correct mounting of check valve. |
| The hot water coming out does not reach the desired temperature. | Cold water only comes out. | The steam inlet ball valve is closed. | Open the valve slowly. |
| | | Clogged strainer on the steam inlet side | Clean the strainer. |
| | | Poor cold water pressure due to the clogged strainer on the cold water inlet side | Clean the strainer. |
| | | A built in screen (42) is clogged. | Clean the screen. |
| | | The check valve mounting direction on the steam inlet side is reversed. | Ensure the correct mounting of check valve. |
| | | The cold water pressure is less than or equal to 0.1MPa. | Increase the cold water pressure. |
| | | The cold water flow rate is equal to or much less than the required minimum flow rate. | Change the size of the pipe. If you cannot, please consult us separately concerning details. |
| | | The valve that is in use is not the valve of the same diameter as the outlet valve, or is not the full bore ball valve. | You should use the valve of the same diameter, or the full bore ball valve. |
| | | The pressure ratio between steam and cold water exceeds the operating range (3:1 or 1:3). | Adjust the inlet pressure using the pressure reduction valve not to exceed the operating range. |

| Problem | | Possible causes | Solution |
|---|---|---|---|
| The hot water coming out does not reach the desired temperature. | Cold water only comes out. | Diaphragm breakage | Replace the diaphragm with a new one. |
| | | Relief valve failure<br>·If the cold water pressure is higher than that of steam, insufficient supply of steam will be caused by the sudden rise in pressure due to water hammer in a line between the check valve on the steam supply side and the mixing valve. | Disassemble, clean or replace the relief valve. |
| | Hot water outlet temperature too low | Insufficient supply of steam | Increase the steam pressure. |
| | | Clogged strainer on the steam inlet side | Clean the strainer. |
| | | A built in screen (42) is clogged. | Take out the screen and clean it. |
| | | Dirt or damage of the diaphragm unit | Clean the diaphragm unit. If the diaphragm unit is damaged, replace the entire unit. |
| | | The cause of water valve slide problem is dirt caught in water valve. | Replace the diaphragm unit. |
| | | Dirty bimetal unit | Clean the bimetal unit. |
| | | A foreign object may be caught in the bimetal sliding parts. | Replace the bimetal unit. |
| | | The pressure ratio between steam and cold water exceeds the operating range (3:1 or 1:3). | Adjust the inlet pressure using the pressure reduction valve not to exceed the operating range. |
| | Hot water outlet temperature too low | Dirty main valve unit | Clean the main valve unit. |
| | | The cause of water valve slide problem is dirt caught in water valve. | Replace the diaphragm unit. |
| | | Dirt or damage of the diaphragm unit | Clean the diaphragm unit. If the diaphragm unit is damaged, replace the entire unit. |
| | | Dirty pilot valve unit | Clean the pilot valve unit. Or replace the entire pilot valve unit. |
| | | Dirt, deformation or scratches of the quick valve. | Clean the quick valve. If there is deformation or scratches, replace the quick valve with a new one. |
| | The temperature of hot water will not be in a stable state. | The pressure ratio between steam and cold water exceeds the operating range (3:1 or 1:3). | Adjust the inlet pressure using the pressure reduction valve not to exceed the operating range. |
| | | The hot water flow rate is equal to or much less than the required minimum flow rate. | Change the size of the pipe. If you cannot, please consult us separately concerning details. |
| | The temperature of hot water is lowered when it has approached to its minimum flow rate. | Forget to attach the spring (57) to the pressure valve. Or leaking at the pressure valve (56) occurs. (only for 15A-20A sizes) | When installing, do not forget to attach the spring (57) to the pressure valve.<br>If you have a problem with your pressure valve leaking periodically, replace it with a new one. |

| Problem | Possible causes | | Solution |
|---|---|---|---|
| There is steam leaking out the hot water outlet. | The main valve unit is dirt due to an outage of the water supply. Or any dirt may be caught in the valve, and so you have a problem with your valve leaking. | | Clean the main valve unit.<br>If you find any scratches on the valve contact, replace the main valve unit with a new one. |
| | The pressure ratio between steam and cold water exceeds the operating range. And also, the main valve unit is dirt due to an outage of the water supply. Moreover, the valve leakage occurs due to dirt caught in the valve. (1:3). | | Adjust the inlet pressure using the pressure reduction valve not to exceed the operating range, and clean the main valve.<br>If you find any scratches on the valve contact, replace the main valve unit with a new one. |
| | A foreign object may be caught in the bimetal sliding parts. | | Replace the bimetal unit. |
| | Dirty pilot valve unit | | Clean the pilot valve unit. Or replace the entire pilot valve unit. |
| | Dirt, deformation or scratches of the quick valve. | | Clean the quick valve. If there is deformation or scratches, replace the quick valve with a new one. |
| The flow rate of hot water outlet is too small. | The desired flow rate exceeds the programmed flow rate. | | Replace it with a larger capacity mixing valve that satisfies the desired flow rate. Use in a flow rate range between the required minimum flow rate and the programmed flow rate. |
| | The cold water inlet ball valve that is in use is not the full bore ball valve. | | You should use the full bore ball valve. |
| | The valve on the hot water inlet side is not fully "open". | | Turn the valve to the fully open position slowly. |
| | The valve on the cold water inlet side is not fully "open". | | Turn the valve to the fully open position slowly. |
| | The clogged strainer on the cold water inlet side. | | Clean the strainer. |
| | Wrong pressure valve (56) installation (only for 15A-20A sizes) | | Install the pressure valve correctly. |
| | You cannot get enough differential pressure due to a rise piping to the hot water outlet side. | | Increase the cold water pressure. Care should be taken that the pressure ratio between steam and cold water does not exceed the operating range (1:3). The rise line length to the hot water outlet side should be as short as possible. |
| The blue handle does not rotate. | The threaded portion of adjust unit does not rotate. | | Replace the pilot valve unit. |
| Cold or hot water leaks from the mixing valve body to the outside. | Cover (2) | For the common cause, the threaded portion is loose or the internal parts are damaged. | Tighten bolts (71) and (48).<br>Replace the diaphragm unit (11-18). |
| | Bottom flange (3) | | Tighten the bolt (49).<br>Replace the O-ring. |
| | Screen plug (45) | | Tighten the screen plug (45).<br>Replace the O-ring. |
| | Plug (47) | | Tighten the plug (47). |
| | Bush (35) | | Tighten the bush (35). |
| Leakage at the U-shaped unit and at the pipe connection | Cold water inlet side | | Loosen the union nut. Insert the pipe tightly and tighten it. |
| | Steam inlet side | | |
| | Hot water outlet side | | |

※ Tighten the threaded portion to the specified torque.

# 8 EXPLODED VIEW




(1) Body
(2) Cover
(3) Bottom Flange
(4)-(10) Main Valve Unit
(11)-(18) Diaphragm Unit
(19)-(27)(63)(72) Bimetal Unit
(28)-(34) Adjust Unit
(35) Bush
(36) Blue Handle
(37) Handle Cap
(41) Screw
(42) Screen
(43) O-Ring
(44) O-Ring
(45) Plug
(46) O-Ring
(48) Bolt
(52) Quick Valve
(53) Quick Valve Seat
(54) Spring
(56) Pressure Valve (only for 15A-20A sizes)
(57) Spring (only for 15A-20A sizes)
(77) Washer (only for 25A-40A sizes)
(78) O-Ring (only for 25A-40A sizes)

# 9 MAINTENANCE

**WARNING**

- **When disassembling, bleed off the residual pressure inside the mixing valve, to prevent skin burns. And then, perform inspection services after the mixing valve has cooled down completely.**
- **When inspecting the mixing valve, you must always make sure to wear the appropriate safety equipment, including safety gloves.**

## How to bleed off the residual pressure

1) Close the valve on the steam inlet side slowly.
2) Open the valve on the hot water outlet side. And then, discharge hot water that remains within the mixing valve body.
3) After discharging cold water for just a short time, close the valve on the cold water inlet side.

## List of tools required for assembly and disassembly

| Parts | Size (A) | Tools | Across the flats | Torque*（N･m） |
|---|---|---|---|---|
| Cover bolt | 15･20 | Box wrench | 10 | 7 |
| | 25･40 | | 17 | 30 |
| Diaphragm unit | 25･40 | Spanner* | 8 | — |
| Blue handle | 15～40 | Phillips head screwdriver | — | — |
| Bush | 15～40 | Spanner | 17 | 10 |
| Pilot valve unit | 15～40 | Flathead screwdriver | — | — |
| Main valve unit | 15･20 | Box wrench | 27 | 44 |
| | 25 | | 38 | 78 |
| | 40 | | 46 | 127 |
| Quick valve unit | 15～40 | Long nose pliers | — | — |
| Pressure valve | 15･20 | Long nose pliers | — | — |

* Remove the diaphragm unit using two M5 bolts included.

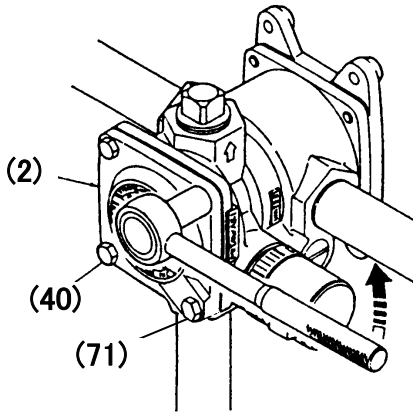
## Disassembly procedures

## 9.1 Disassembly procedure of the diaphragm unit

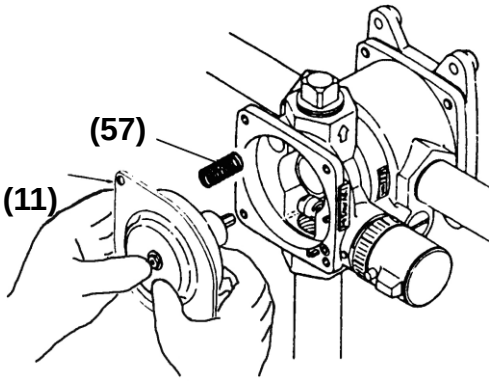
*For parts (not shown by a number in the figure), see an Exploded View in Section 8.

**In the case of the sizes 15A and 20A:**

1) Loosen the cover bolts (40) and (71). And then, remove the cover (2).




2) Carefully pull the diaphragm unit (11) straight backwards with your both hands.



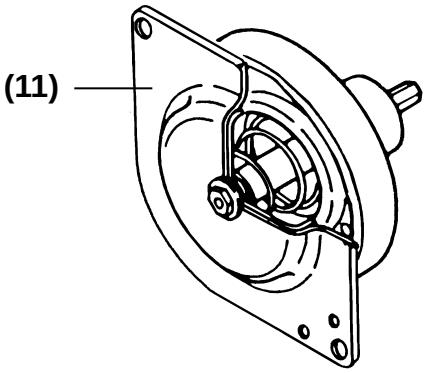

**CAUTION**

- The spring (57) may jump out of a pressure valve if you want to move the diaphragm unit (11-18) in the horizontal direction. Carefully pull the diaphragm unit (11) straight backwards to prevent the pressure valve (56) and the spring (57) from suddenly jumping out of a pressure valve.
- If the pressure valve (56) and the spring (57) have jumped out, put them back in place as they were before.

3) Wash the diaphragm unit in cold water. And then, make sure there are no scratches or damage. If there are, replace the diaphragm unit.

(11) : Diaphragm unit

Diaphragm unit

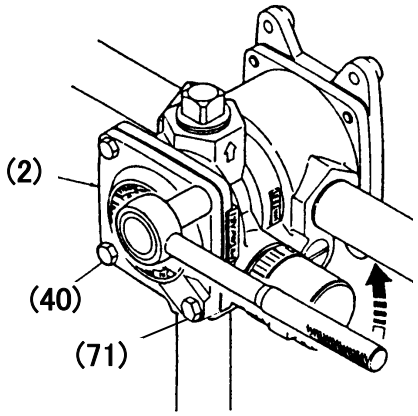



**CAUTION**

**To prevent damage, you should always pull or push the diaphragm unit with both hands.**

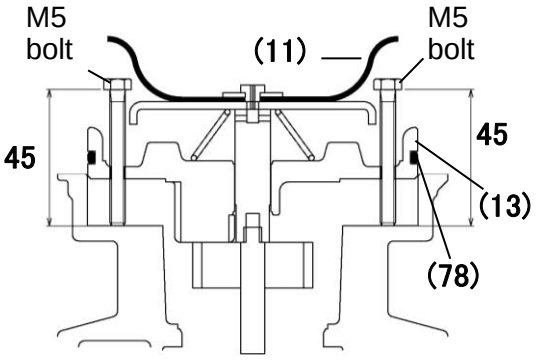
**In the case of the sizes 25A and 40A:**

1) Loosen the cover bolts (40) and (71). And then, remove the cover (2).

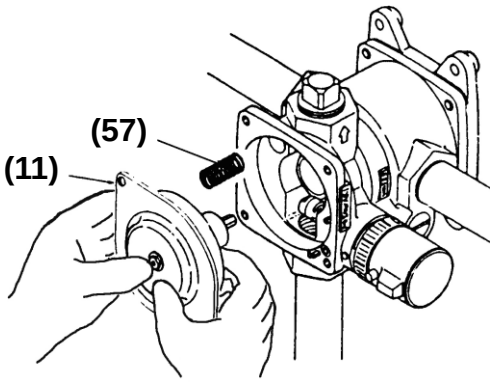



2) Lift the diaphragm unit (11-18) (black rubber plate)、and screw the two M5 bolts into the two bolt holes in the guide (13).

3) Turn the two M5 bolts alternately, to lift the guide gradually just like a jack-up manner.



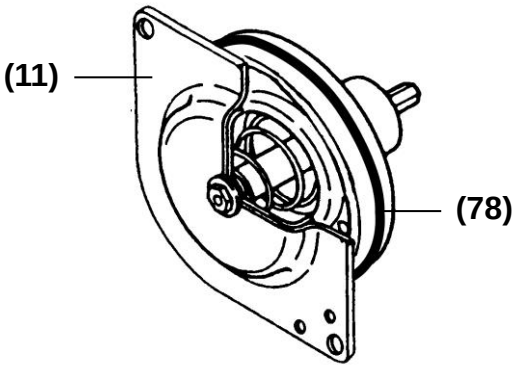

4) Check that the guide is lifted to the position that the O- ring (78) on the guide side is pulled out from the inner diameter surface of the body (1)、and then carefully pull the diaphragm unit (11-18) straight backwards with your both hands.
After removing the diaphragm unit, remove the two M5 bolts from the guide.



5) Wash the diaphragm unit in cold water. And then, make sure there are no scratches or damage. If there are, replace the diaphragm unit.

(11) : Diaphragm unit
(78) : O-ring

Diaphragm unit

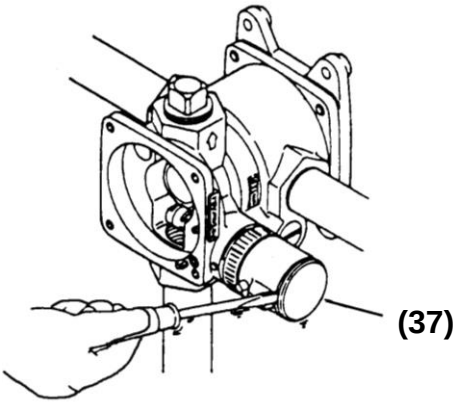



**CAUTION**

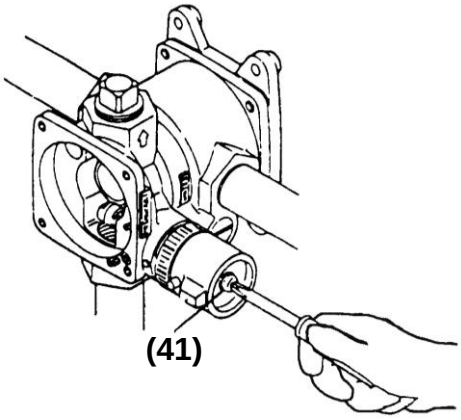
**To prevent damage, you should always pull or push the diaphragm unit with both hands.**

## 9.2 Disassembly procedure of the pilot valve unit

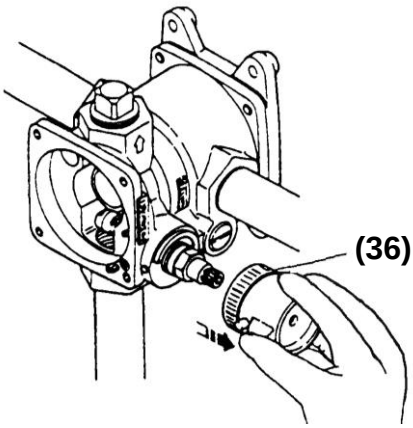
1) You will use your flathead screwdriver to pry the handle cap (37) from its handle.



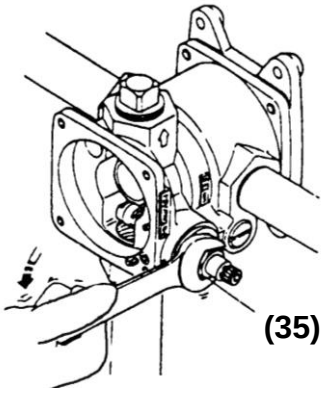

2) Loosen the screw (41) using a Phillips head screwdriver.



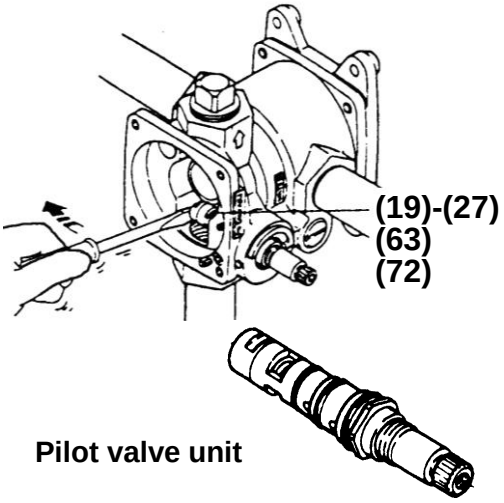
3) Remove the handle (36) from the adjust unit.




4) Loosen the bush (35) using a spanner and remove it.




5) Push the end of the bimetal unit (19-27/63/72) with a screwdriver, and then remove the pilot valve unit.



6) The pilot valve unit consists of the bimetal unit and the adjust unit. If you want to disassemble the pilot valve unit, unscrew the adjust unit from the bimetal unit slowly counterclockwise to remove.
Please inspect and clean them if necessary.

**Bimetal unit** **Adjust unit**

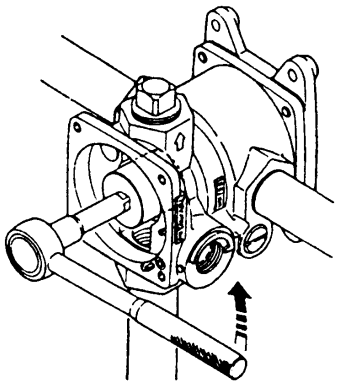
**CAUTION**

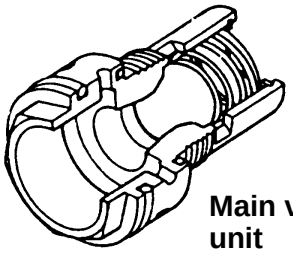
**Never disassemble the adjust unit and the bimetal unit.**

## 9.3 Disassembly procedure of the main valve unit

1) Loosen the main valve seat (5) using the box wrench. And then, remove the main valve unit (4-10).

2) Make sure whether dirt is caught in the main valve unit.



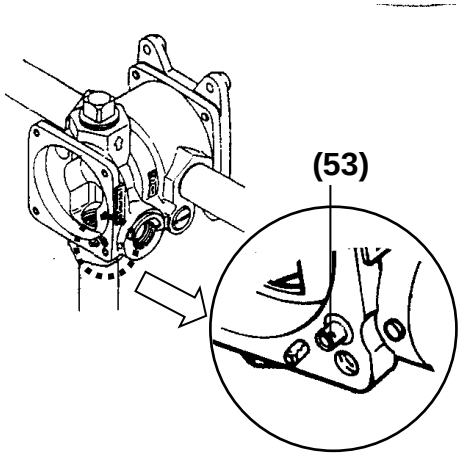


**Main valve unit**

## 9.4 Disassembly procedure of the quick valve unit

1) Lightly pinch the protrusion of the quick valve seat (53) using the long nose pliers, and take out it.

2) Make sure whether dirt is caught in the quick valve seat (53) or the quick valve (52).
Carefully inspect the valve, and make sure it is not deformed.
And also, check the O-ring to make sure that there is no scratches.




**CAUTION**

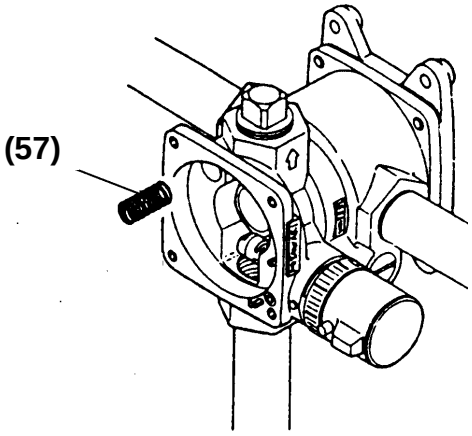
- When performing the inspection services, the spring (54) may jump out of a quick valve. Small parts like the quick valve, etc. are not so easy to find. So be careful not to lose them.
- When you take out the quick valve seat (53), you should lightly pinch the protrusion of the quick valve seat (53) using the long nose pliers. Do not use excessive force on the quick valve seat during disassembly, or it may be deformed.

## 9.5 Disassembly procedure of the pressure valve (only for the sizes 15A and 20A)

1) Remove the spring (57), and then take out the pressure valve at the back of the spring insertion location.

**How to remove the pressure valve:**
Lightly pinch the protrusion of the pressure valve using the long nose pliers, and take out it.

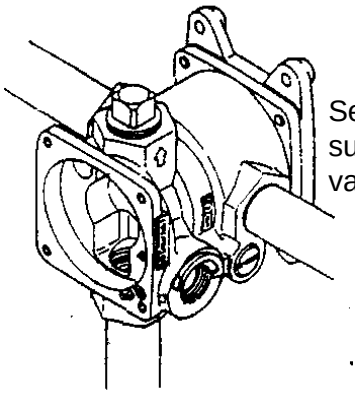
2) Make sure whether dirt is caught in the pressure valve.



## Assembly procedures

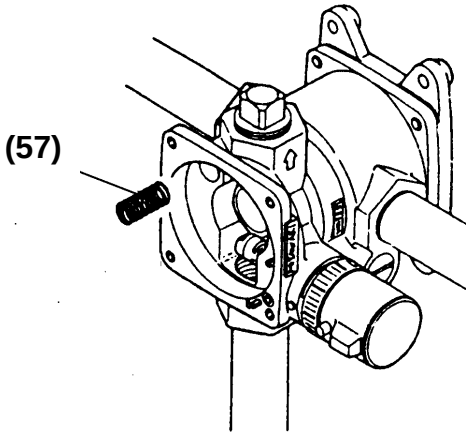
### 9.6 Assembly procedure of the quick valve seat

1) Set the large end of the spring (54) to the body side. And then, install the quick valve and the quick valve seat (53) with O-ring into the body, in this order.
When installing the quick valve seat, insert a tapered surface into the body so that the flange on the quick valve seat will mate to the sealing surface of a body. Please be careful not to use too much force in order to prevent any damage to the quick valve seat.




### 9.7 Assembly procedure of the pressure valve

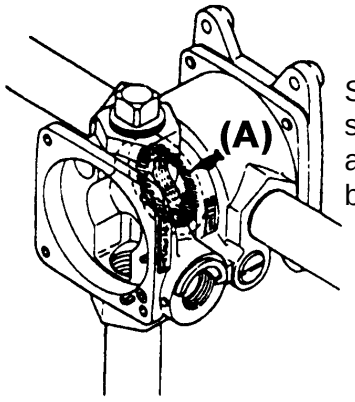
1) Insert the flat surface on the pressure valve (56) into the body.
Put the spring (57) on the protrusion of the pressure valve.




### 9.8 Assembly procedure of the main valve unit

1) Clean the sealing surface (A) of a threaded portion of the main valve seat inside the valve body.

2) Screw the main valve unit (4-10) slowly clockwise by hand until it stops. And then, tighten it to the specified torque.



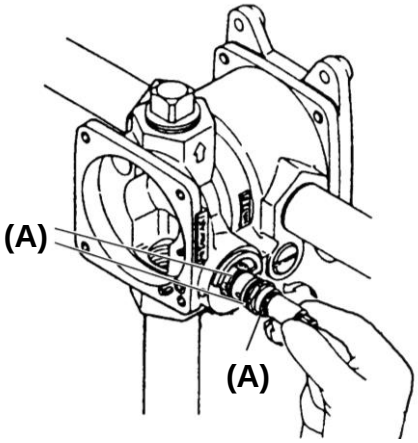
## 9.9 Assembly procedure of the pilot valve unit

1) Screw the adjust unit into the bimetal unit slowly clockwise by hand until it stops.

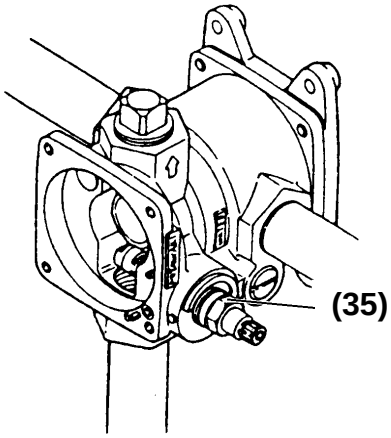
2) Insert the pilot valve unit into the valve body slowly clockwise by hand until it stops. When inserting the pilot valve, be very careful not to damage the O-ring (A).

**CAUTION**

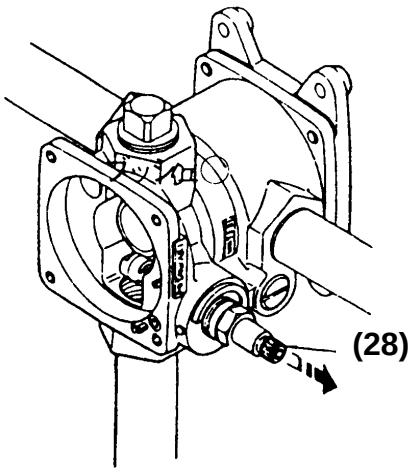
**Be very careful when assembling not to damage this O-ring.**




3) Screw the pilot valve unit slowly clockwise by hand until it stops. Then, tighten the bush (35) to the specified torque.

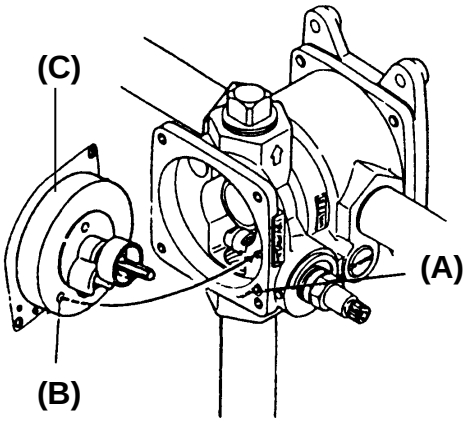



4) Turn the adjust unit (28) slowly counterclockwise by hand until it stops. And then, pull out it all the way.



## 9.10 Assembly procedure of the diaphragm unit

1) Align the pin hole (B) in the guide to the valve body alignment pin (A). And then, insert the diaphragm unit into the body. In this case, you can be easier to insert the diaphragm unit into the body, by turning it a little to the left or right with your both hands.

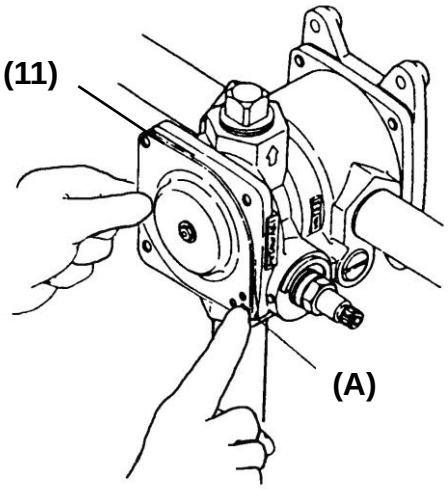



(C) O- ring (only for sizes 25A and 40A)

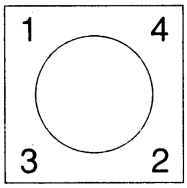
**CAUTION**

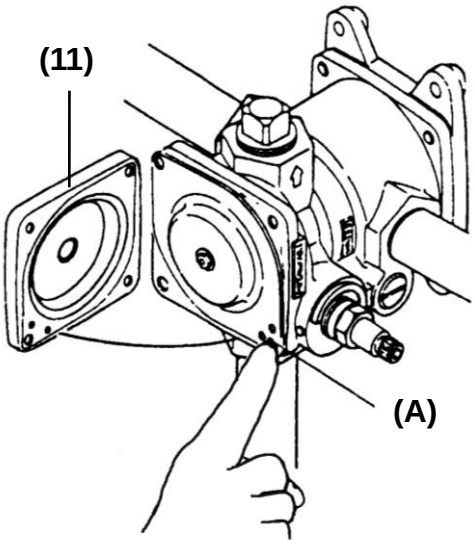
**Please install the guide so that you fit it to the valve body.**

2) Furthermore, align the pin hole in the diaphragm unit (11) to the valve body alignment pin (A).



3) After that, install the cover (2), by aligning the pin holes in the cover. (For the sizes 25A and 40A, put the washers over the cover bolts.)
Screw the cover bolts lightly by hand and tighten them evenly crosswise.




**CAUTION**

**The cover bolts should be tightened evenly and crosswise, according to the order of numbers.**

4) After installing the cover (2), open the valve on the cold water inlet side. Make sure there are no water leaks from the mixing valve body. And then, close the valve. If there are water leaks, again, assemble the diaphragm unit properly, according to the assembly procedure of the diaphragm unit.

## 9.11 Setting the temperature

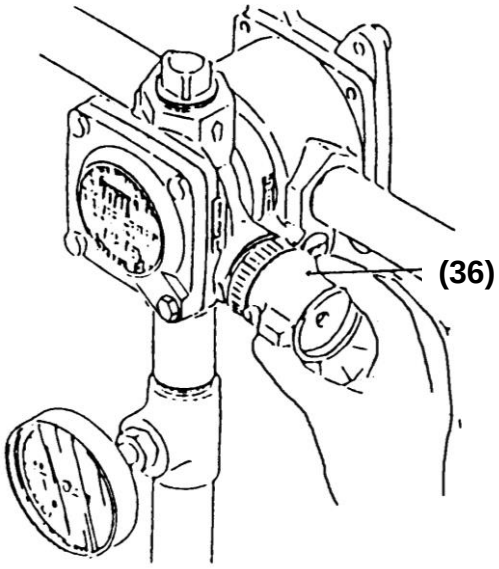
1) Make sure that the cover (2) and the bush (35) have been tightened properly.

2) Open the valve on the cold water inlet side.

3) Open the valve on the hot water outlet side. Then, check that there is cold water coming out from the hot water outlet opening.

4) Slowly open the valve on the steam inlet side.

5) Install the blue handle (36) to the adjust unit (28).

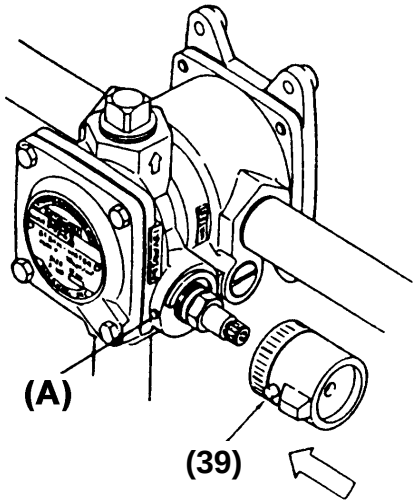



6) Set a safe hot water temperature to 40±3°C by turning the blue handle (36) clockwise. (Use a thermometer to check the temperature.)

7) After setting the hot water temperature to 40±3°C, close the hot water outlet opening.

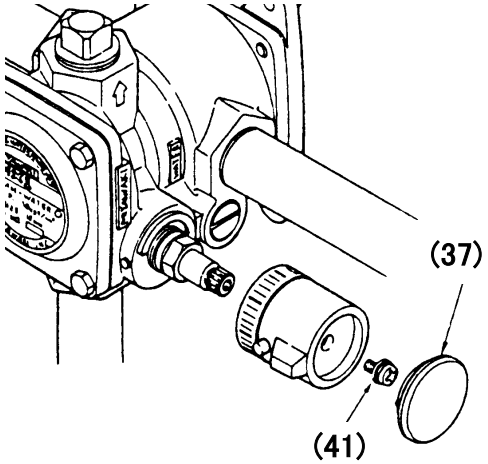
8) Remove the blue handle.

9) Place the red safety button (39) of the handle to fit with the red marker (A) on the valve body. Then, reinstall the blue handle to the adjust unit.




10) When the valve on the hot water outlet side is fully "open", make sure that the hot water temperature is 40±3°C.

11) Install the handle cap (37), tightening the screw (41) with a Phillips head screwdriver.



# 10 WARRANTY

### 10.1 Warranty period

The warranty period is 18 months after shipment or 12 months after installation, whichever occurs first.

### 10.2 Details of the warranty

If the product stops working correctly within the warranty period, we will repair or replace the product free of charge if the cause of the trouble is not one of the following items.

1) The precautions described in this manual were not observed.
2) User's errors or mistakes such as an inappropriate installation or incorrect handling, or an excessively large impact caused by dropping
3) Problems caused by devices or equipment other than ours, or a disallowed use environment
4) When a repair or modification has been performed by anyone other than us or people who are authorized to make such repairs
5) Intrusion of salt or other substances that promote significant rust or corrosion or problems from fluids that contain the same substances
6) Consumable parts such as Packing, Gasket, O-ring, Diaphragm, etc
7) Attachment or accumulation of foreign matter in the pipe, such as dust and scale
8) Problems from fires, natural disasters, or other force majeure which is not our responsibility

### 10.3 Warranty limitation

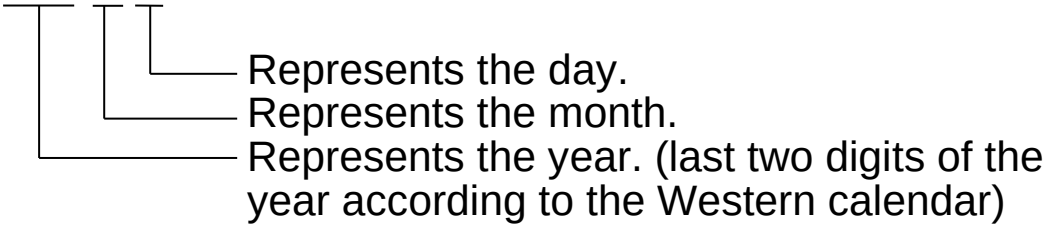
The remedy available under the warranty shall not exceed the sales price of the products delivered, for any cause whatsoever.

# 11 SERIAL NUMBER（S. No.）DESIGNATION

The following 4-digit or 9-digit “S. No.” is displayed on the product.

●For 4-digit display

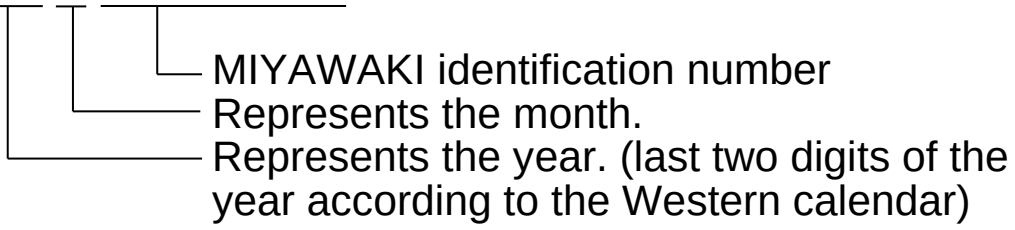
**S.No.** □□□□




Example of serial number designation
1 7 1 1 → Jan.1, 2017
2 9 X M → Oct. 21, 2029

●For 9-digit display

**S.No.** □□□□□□□□□




Example of serial number designation
1 7 1 1 2 C 0 2 0 → Jan., 2017
2 9 X 0 5 M 0 5 0 → Oct., 2029

**Month designation system**

| Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | X | Y | Z |

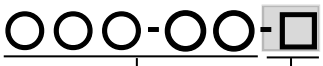
**Day designation system**

| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |

| Day | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol | D | E | F | G | H | J | K | L | M | N | O | P |

| Day | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|---|---|---|---|---|---|---|---|
| Symbol | Q | R | S | T | U | V | W |

# 12 GUIDANCE FOR READING SPECIAL PRODUCT NAME




**Special symbol:**
**Symbol apply only to special product**
**(Please refer to table 1 for details)**
English letter after "-"

**Model symbol:**
**Product model number**

Table 1 Symbol description

| Suffix | Special contents |
|---|---|
| A | Trap for high-pressure gas installed property (only for Gas Trap) |
| C | Blow valve attached |
| K | Change of gasket |
| L | Special face to face dimension |
| M | Change of parts material |
| P, T | Change of operating pressure, temperature, condensate capacity, etc |
| R | Change of screen mesh |
| V | Change of air vent |
| X | Other than mentioned above or complex of special contents above |

For any questions about the product that you purchased or about the details in this user’s manual, please contact the following.



- Some special specifications of the product you have, may found to be different from the ones in the user's manual. If you have any question, please contact MIYAWAKI, our local authorized agent, or the place where you purchased.

# MIYAWAKI INC.

If you need any assistance regarding this manual, please contact MIYAWAKI INC.'s International Sales Dept. or its local representative.
By scanning QR Code, you can access inquiry form.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**INTERNATIONAL SALES DEPT.**
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www.miyawaki.de e-mail: info@miyawaki.de

China Importer and Authorized representative:

**MIYAWAKI WEST Co.,Ltd**

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**MX1N**