MODEL TSD-46
STEAM TRAP
PRODUCT MANUAL

Thank you very much for choosing the Yoshitake's product. To ensure the correct and safe use of the product, please read this manual before use. This manual shall be kept with care for future references.
The symbols used in this manual have the following meanings.

Warning	This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
Caution	This symbol indicates a hazardous situation that, if not avoided, may result in minor or moderate injury or may result in only property damage.

Table of Contents

YOSHITAKE

1. Specifications

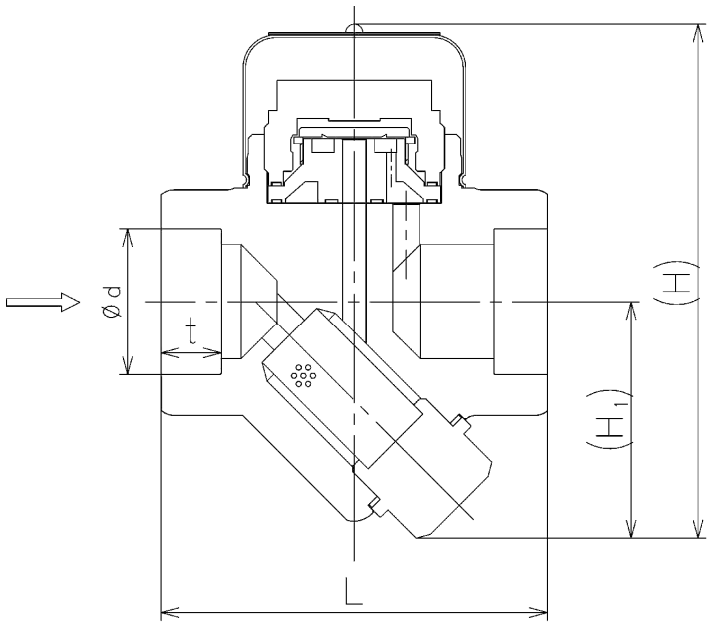
Model		TSD-46
Connection		Socket weld (ASME)
Nominal size		15A, 20A, 25A
Application		Steam condensate
Working pressure		0.05～4.6MPa
Max. permissible back pressure		50% of inlet pressure
Max. temperature		425 °C
Installation position		Horizontal or Vertical
Material	Body	Forged stainless steel
	Disc	Stainless steel
	Valve seat	Stainless steel

Caution

Please confirm that the indications on the product correspond with the specifications of the ordered product model before use.
* If they are different, please contact us without using the product.
Do not use the product in a place where it is liable to freeze.
* Failure to follow this notice may result in injury due to breakage of the product.

2. Dimensions and Weights

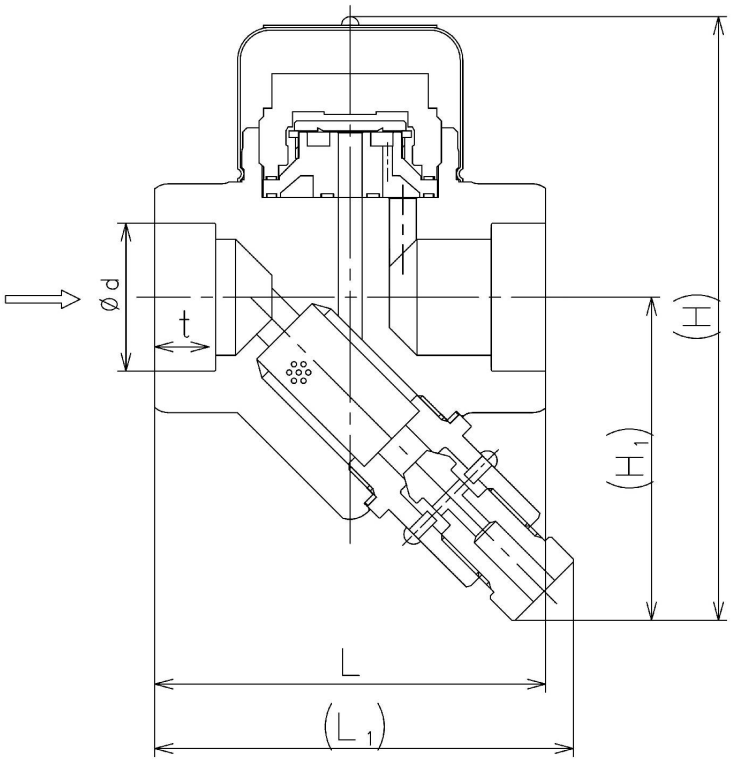
・TSD-46



(mm)

Size	Connection (Standard)	d	L	t	H_1	H	Weight (kg)
15A	Socket weld (ASME)	22	90	11	55	120	1.8
20A		27.4	90	14	55	120	1.7
25A		34.1	90	14	55	120	1.6

・TSD-46 with Option



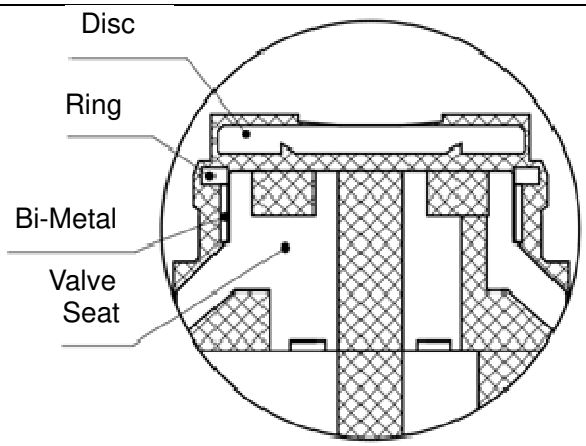
（mm）

Size	Connection (Standard)	d	L	L_1	t	H_1	H	Weight (kg)
15A	Socket weld (ASME)	22	90	97	11	75	140	1.9
20A		27.4	90	97	14	75	140	1.8
25A		34.1	90	97	14	75	140	1.7

3. Operation

1. Start-up of the operation

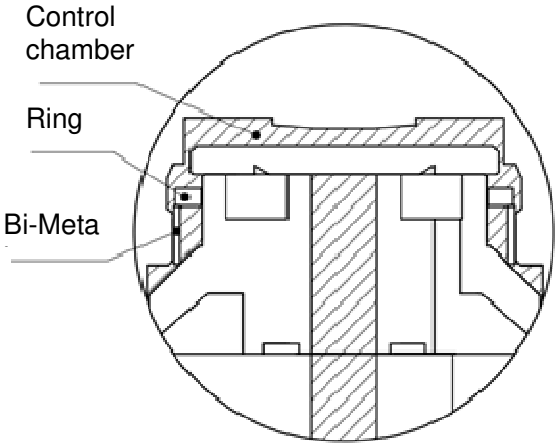
At start-up, the bi-metal is so cooled in shrunk and closed condition as to keep the disc lifted up.
In this state, incoming air and condensate are discharged out through the outlet smoothly without air-induced troubles.



2. Closing operation

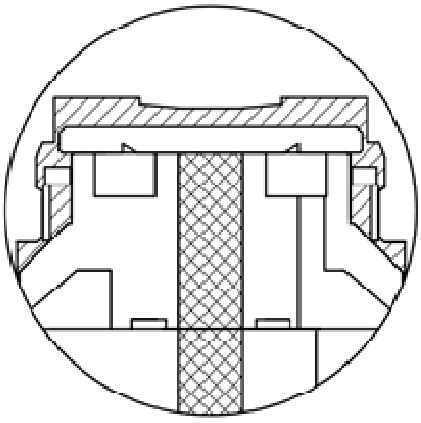
When hot condensate flowing into the trap, the bi-metal expands by the heat, slipping down the slant of the valve seat. At the same time, the ring falls below the top surface level of the valve seat.

When condensate temperature approaches the steam saturation temperature, it releases flash steam moving at high velocity under the disc. The high velocity makes a low pressure area between the disc and the valve seat. Then, the pressure in the control chamber, which becomes higher than the pressure between the disc and the valve seat, forces the disc down until it seats.



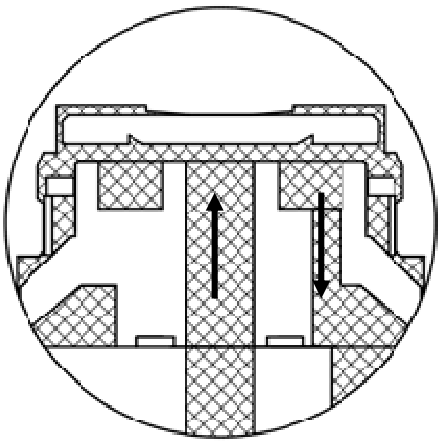
3. Inflow of condensate

Condensate flowing into the trap reduces temperature, causing the steam inside the control chamber to condensate. This causes the pressure drop, which decreases the force pressing down the disc.



4. Opening operation

When the force pressing down the disc become lower than the force pushing up the disc (induced from the jetting-out port under the disc), the disc is lifted up to opened position and condensate is discharged.



* The cycle 2 to 4 repeats.

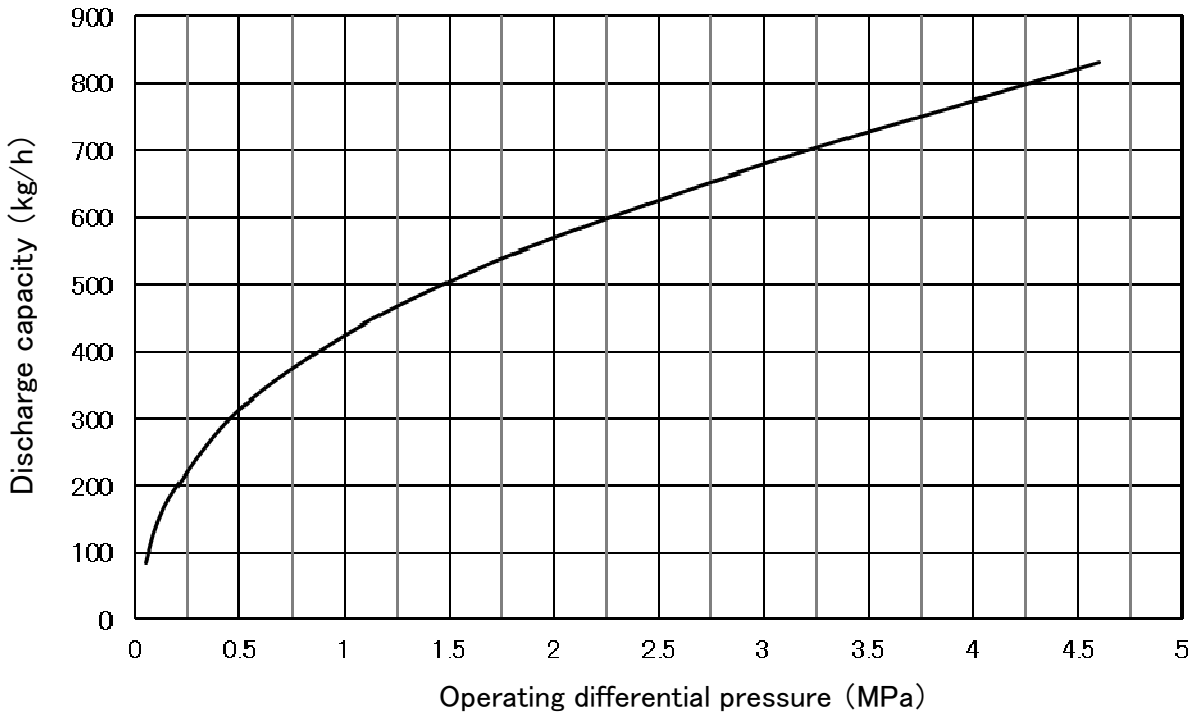
Condensate Steam

4. Nominal Size Selection

1. To select the nominal size, secure the safety factor of 4 to 5. If you need a steam trap with a capacity of 100 kg/h, the product with a capacity of 400 to 500 kg/h should be selected for maximum efficiency.

2. Make sure to consider the back pressure (outlet pressure) in selecting discharge capacity. This is because discharge capacity of a trap varies on the difference between the inlet and the outlet pressures (the operating differential pressure). For example, to find the discharge capacity obtained at the inlet pressure of 1.0 MPa and the outlet pressure of 0.2 MPa, trace up from the point of the operating differential pressure of 0.8 MPa in the following chart.

Max. continuous discharge capacity chart (Nominal size: 15A, 20A and 25A)



5. Installation

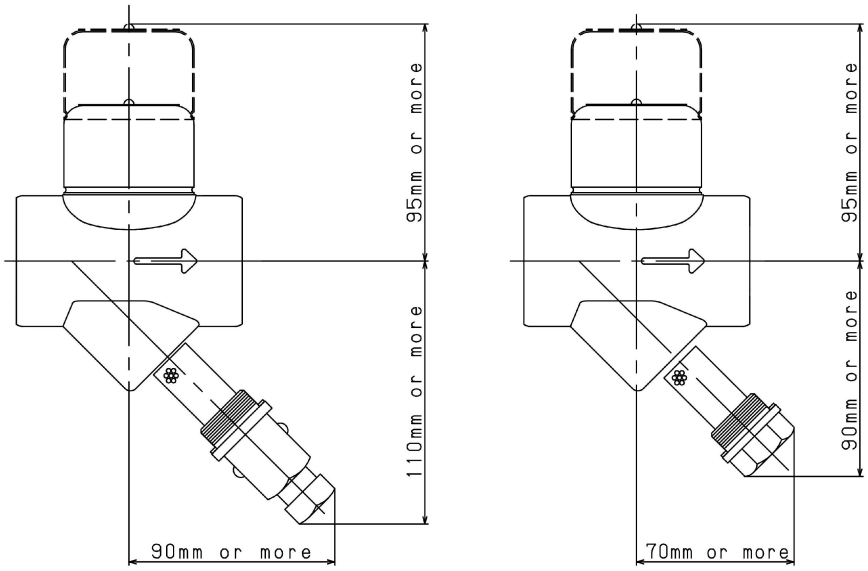
5.1 Precaution for installation

Warning	To discharge condensate to the atmosphere, lead the outlet to a place where there is no possibility of physical damage. * Failure to follow this notice may result in injury and scalds when condensate blows out.

Caution

1. Before connecting the product to piping, remove foreign substances and scale from the piping.
   * Failure to follow this notice may prevent the product from functioning properly.
   * To plumb the product, be careful to keep seal materials from entering into the product.
2. Before installation, check the direction of the product so that the fluid flowing and the arrow marked on the product are in the same direction.
   * Setting the product in wrong directions prevents it from functioning properly.
3. Make sure to support the piping immovably.
   * If an excessive piping stress is applied, the product may not open or close.
4. Do not disassemble the product unless it is necessary.
   * Failure to follow this notice may prevent the product from functioning properly.

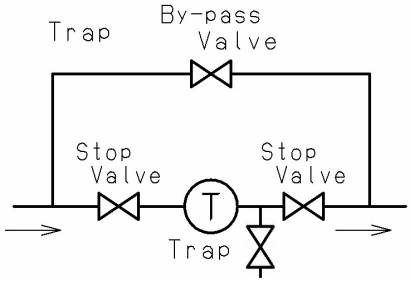
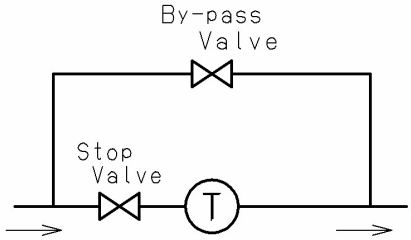
5. Secure enough space for maintenance (such as cleaning of strainer), inspections and repair as shown below.
   * Failure to follow this notice prevents maintenance, inspection and repair.

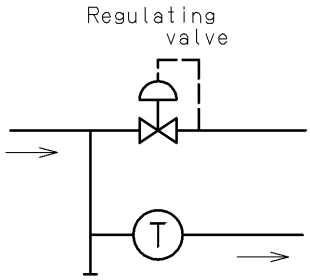
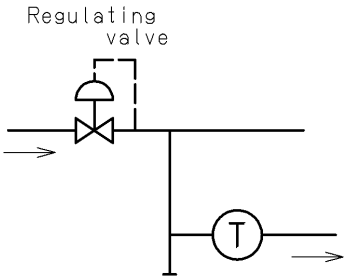
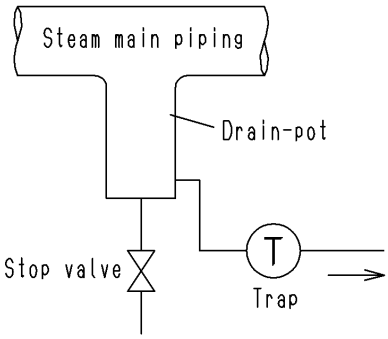
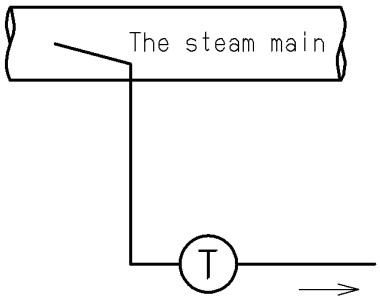
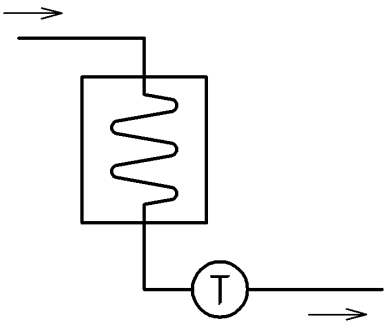
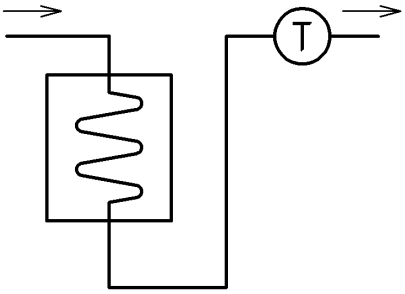
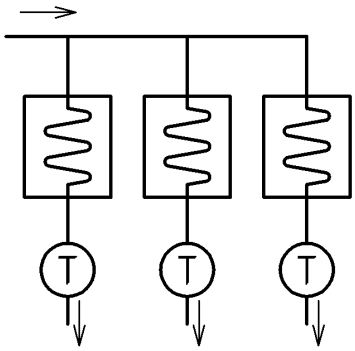
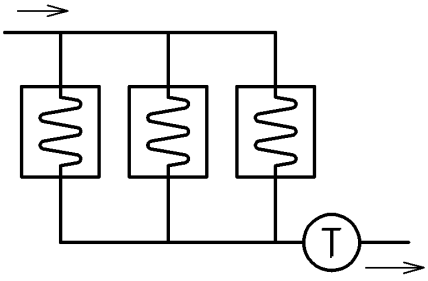


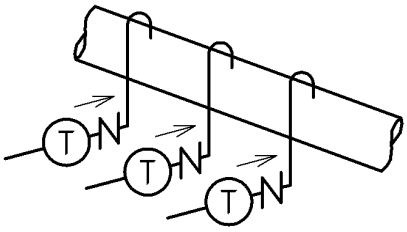
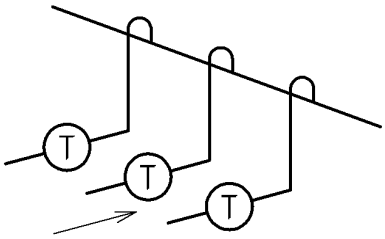
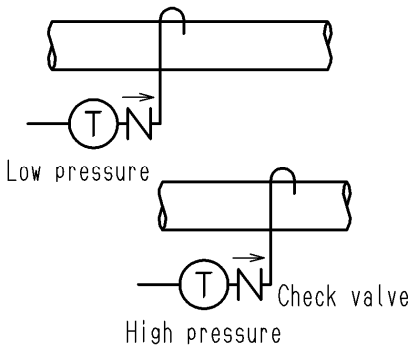
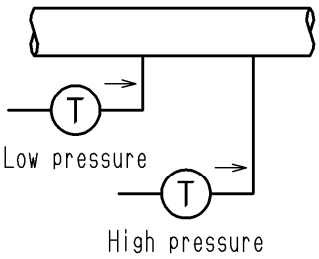
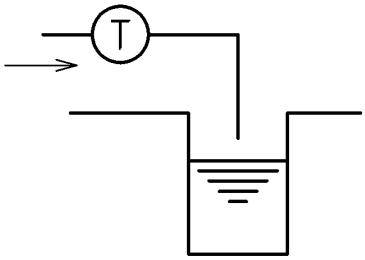
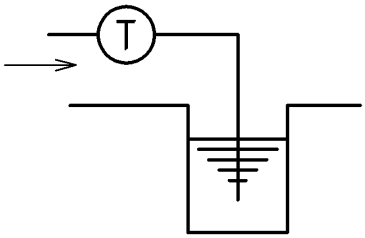
With Option　　Without Option

6. Connect the product to the piping properly.
   * Improper connection may cause fluid leakage from the connected part.
7. Slope the piping and place the product at as a low position as possible in order to make condensate flow into the product by its own weight.
8. Do not insulate the product.
9. To install the product in a main steam pipe, provide a drip leg at the inlet side of the product.
10. Installing a by-pass line in parallel to the product gives the following advantages:
    - By opening the by-pass valve, large volume of condensate and air on start up can be quickly discharged.
    - After newly plumbing, piping can be blown off easily by closing the stop valves at the inlet and outlet of the product and opening the by-pass valve.
    - Inspection and part replacement of the product can be done without stopping the system operation.
11. The product should be installed by electric welding using the same material as the product, as single or double layer.
    * Using a different material or multi-layer welding may cause leakage due to deformation of the product.

5.2 Piping example

Description	Correct	Incorrect
When a by-pass line is installed in parallel to the product, install stop valves to the outlet side of the product.		

Description	Correct	Incorrect
If the product is installed close to a regulating valve, make sure to place the product at the inlet side of the regulating valve.		
To discharge condensate from the steam main, be sure to install the product so that the condensate can be discharged from the bottom of the steam main (drain-pot).		
The product should be installed below a device which causes condensate.		
To discharge condensate from more than one device, install the product for each device independently.		

Description	Correct	Incorrect
The diameter of collecting pipe should be more than summation of sectional areas of discharge pipes. In addition, install check valves for back flow prevention.		
To recover condensate, connect the discharge pipes at the top of the collecting pipe. For traps of different pressure lines, install individual collecting pipe for each pressure level. In addition, install check valves for back flow prevention.		 * In this piping, re-evaporated steam in high pressure line increases the back pressure of low pressure trap.
End portion of discharge pipe should be off the water surface in the pit.		 * If the discharge pipe is in contact with the water, it takes dirty water from the pit, which causes failure of traps due to foreign substances.

6. Operating Procedure

6.1 Precaution for operation

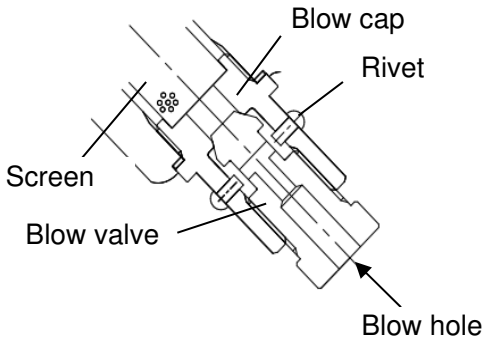
⚠ Warning

1. Before leading fluid, make sure that there is no danger when the fluid flows to the end of piping.
   * Failure to follow this notice may result in scalds or injury due to blow-off.
2. Do not stand in front of the outlet of the product whenever the product is operating.
   * Failure to follow this notice may result in scalds or injury due to blow-off.

Option (With Blowdown valve)

Blowdown valve is attached to the screen, and exhausts condensates, fluid, and foreign substances by internal pressure.

Structure



How to Operate Blowdown Valve

1. Install the blowdown valve, and confirm that it is closed before operation. Check the blow hole position, which is center of the blow valve, to be careful not to be injured or scalded by steam and condensate. Do not put your face, hand, foot, or any other body part in front of the hole while operation.

2. To open the blow valve, put a tool (width across flat: 24 mm) on the blow cap first, and then put another tool (width across flat: 22 mm) on the blow valve and turn it slowly to loosen and open the valve by within one turn. (Within one turn is recommended.) Steam, condensate, and etc. are discharged from the blow hole. Do not apply excessive force to avoid fall-off of the blow valve.

3. To close the blow valve, put a tool (width across flat: 22mm) on the blow valve, and fasten it at a torque of 40 N･m.
   If the valve exhausts steam and condensate even after closing, there is a possibility that foreign substances are stuck. In this case, open the blow valve again and then close it at a torque of 40 N･m. (Do not fasten the valve at a torque greater than specified.)

⚠ Caution

1. Wear protective glasses and gloves while operating the blowdown valve.
   * Failure to do so may result in scalds or injury.
2. While operating the blowdown valve, be careful of the bounce back from the pipe or floor/ground as well as blowout from the blow hole. Securely and slowly operate the valve, and do not quickly open/close it.
   * Failure to do so may result in scalds or injury due to steam and condensate.
3. Do not excessively turn the blow valve.
   Operation by within one turn is recommended.
   * Failure to do so may result in scalds or injury due to steam blowout caused by the breakage of rivets and the fall-off of the blow valve.

7. Maintenance

7.1 Precaution for maintenance

⚠ Warning

Disassembly and inspections must be performed by a professional or a valve manufacturer.

1. Do not touch the product with bare hands.
   * Failure to follow this notice may scald your skin.
2. Completely discharge internal pressure of the product, piping and equipment, and cool down the product prior to disassembly or maintenance.
   * Failure to follow this notice may result in scalds or injury due to residual pressure.

⚠ Caution

1. Conduct daily inspection in order to maintain the optimal performance of the product.
   * See “7.2 Troubleshooting” if trouble is observed.
2. After leaving the product not operated for a long period, perform inspection before start-up of operation.
   * Failure to follow this notice may cause malfunction due to rust inside of the product and piping.
3. Put a container under the product at disassembly since condensate may flow out.
   * Failure to follow this notice may result in making the surroundings dirty.
4. Be careful not to drop the parts at the time of disassembly. The disassembled parts should be placed on soft cloth in order to avoid scratches and damage.
   * Damage on the parts may cause malfunction and affect the optimal performance.
5. To reassemble, connect all the parts securely.
   * Failure to follow this notice may cause malfunction or outside leakage.
6. When replacing parts, do not use the parts other than the dedicated parts manufactured by Yoshitake. Do not modify the product.
   * Failure to follow this notice may cause damage to the product, or may result in scalds or injury due to blow-off or malfunction.
7. In case of problems due to foreign substances or scale, the product needs repair or part replacement. Please contact us for details.
   (Please note that any repair due to foreign substances or scale in the product is subject to a charge even during the warranty period.)

7.2 Troubleshooting

Trouble	Cause	Remedy
Condensate is not discharged.	1. Blockage of foreign substances in a discharge hole of the valve seat.	1. Disassemble and clean it.
	2. The screen ⑧ is clogging.	2. Disassemble and clean it.
	3. Breakage as a result of abnormal pressure rising due to freezing or water hammer, etc.	3. Replace the product with a new one and use it within the working pressure range.
	4. Steam locking.	4. Change the piping system layout.
Continuous blowout.	1. Foreign substances stuck on the disc ③ and/or valve seat.	1. Disassemble and clean them.
	2. Abrasion or scratches on the disc ③ and/or valve seat.	2. Replace the product with a new one.
	3. Back pressure exceeding over the maximum allowable value.	3. Keep the back pressure not more than the maximum allowable value.
	4. Applied pressure is less than the minimum working pressure.	4. Replace the product with an appropriate model.
Steam leakage.	1. Leakage due to loosen joint between the body ① and disc cover ④.	1. Retighten cap ④.
	2. Leakage due to loosen joint between the body ① and strainer cap ⑨.	2. Replace the gasket ⑩ with a new one, and retighten the strainer cap⑨.
	3. Leakage as a result of abnormal pressure rising due to freezing or water hammer, etc.	3. Replace the product with a new one and use it within the specified working pressure.
No-load operation.	1. Abrasion or scratches on the disc ③ and/or valve seat.	1. Replace the product with a new one.
	2. Foreign substances stuck on the disc ③ and/or valve seat.	2. Disassemble and clean them.

* Refer to “Exploded Drawing” for the part names mentioned above.
* Contact us or your local distributer if you are uncertain whether damaged parts need to be replaced or not.

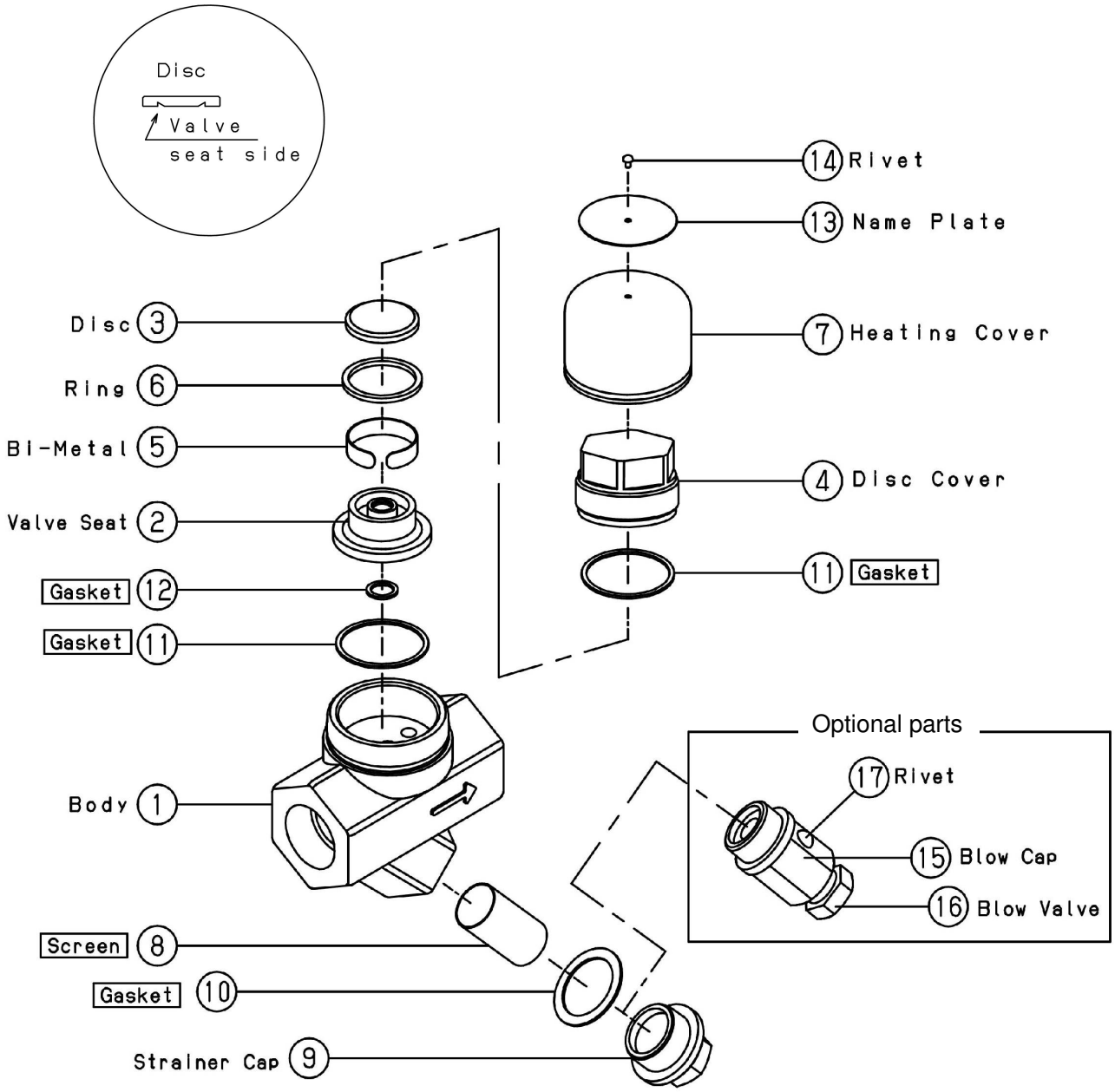
7.3 Disassembly and reassembly procedures

To the disassemble the product, follow the procedure below while referring to “Exploded drawing”

1. Disassembly of body①, disc cover④, valve seat②, and disc③
   - Remove the heating cover⑦ by holding it from both sides and pulling it up.
   - Remove the screw by putting a spanner (width across flats: 36 mm) across the flats of disc cover ④ and loosen it.
   - Remove the valve seat② and disc ③.
2. Disassembly of strainer
   Remove the strainer cap⑨ / blow cap⑮ by putting a spanner (width across flat: 22mm, 24mm) and loosen the screw, and then remove the screen⑧.
3. Reassembly
   Reassemble in the reverse order of disassembly procedures 1 and 2. Check the side of the disc with referring to “Exploded drawing.” Replace the gaskets with new ones.
   *If the disc is attached wrongly, steam and condensate is continuously discharged.
   - Apply lubricant agent to the gasket⑩,⑪,⑫ and threaded area of disc cover④, strainer cap⑨, and blow cap⑮.
     (Recommendation: SOLVEST No.110 paste, STT Inc.)
   - Tighten the disc cover④, strainer cap⑧, blow cap⑮, and blow valve⑯ with the torque specified below.

Part name	Tightening torque (N・m)
Disc cover④	250
Strainer cap ⑨	100
Blow cap⑮	100
Blow valve⑯	40

7.4 Exploded Drawing



Part names shown in boxes are consumable items and available as replacements.
(Optional parts are not available as replacements.)

Warranty Information

1. Limited warranty

   This product has been manufactured using highly-advanced techniques and subjected to strict quality control. Please be sure to use the product in accordance with instructions on the manual and the label attached to it.

   Yoshitake warrants the product to be free from any defects in material and workmanship under normal usage for a period of one year from the date of receipt by the original user, but no longer than 24 months from the date of shipment from Yoshitake's factory.

2. Parts supply after product discontinuation

   This product may be subject to discontinuation or change for improvement without any prior notice. After the discontinuation of the product, Yoshitake supplies the repair parts for 5 years otherwise individually agreed.

3. This warranty does not cover the damage due to any of below:

   (1) Valve seat leakage or malfunction caused by foreign substances inside piping.
   (2) Improper handling or misuse.
   (3) Improper supply conditions such as abnormal water pressure/quality.
   (4) Water scale or freezing.
   (5) Trouble with power/air supply.
   (6) Any alteration made by other than Yoshitake.
   (7) Use under severe conditions deviating from the design specifications
   (e.g. in case of corrosion due to outdoor use).
   (8) Fire, flood, earthquake, thunder and other natural disasters.
   (9) Consumable parts such as O-ring, gasket, diaphragm and etc.

   Yoshitake is not liable for any damage or loss caused by malfunction or defect of the product.

YOSHITAKE