

# MODEL TSD-7 and TSD-7F STEAM TRAP with BYPASS

## 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.

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# YOSHITAKE

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## Usage of the product

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The TSD-7 (TSD-7F) disc type steam trap with bypass meets a wide variety of needs such as in building facilities.

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### 1. Features

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1. Four functions (STOP, BY-PASS, TRAP, and TEST) can be switched easily with an optional handle, spanner or monkey wrench.
2. The integrated bypass function helps reduce piping and construction work costs significantly.
3. The product can be checked without being affected by back pressure.
4. The product is equipped with a built-in strainer and an asbestos-free gasket.
5. The adoption of bimetal solves the problem of air locking and, at the same time, ensures a smooth discharge of cold condensate or air at the start of operation, enabling steam equipment to efficiently start to run.
6. The stainless steel valve disc and valve seat are subjected to special heat treatment and very durable.
7. The disc, the valve seat and the bimetal can be easily replaced without dismounting the body of this product from the piping.

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### 2. Specifications

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Model		TSD-7	TSD-7F
Nominal size		15A , 20A , 25A	
Application		Steam condensate	
Working pressure		0.035-1.0 MPa	
Allowable back pressure		50% of inlet pressure	
Max. temperature		183°C	
Installation posture		At any angle between vertical and horizontal (Do not put the cover under the horizontal level.)	
Connection		JIS Rc screwed	JIS 10K FF flanged
Material	Body	FCD450 Ductile cast iron	
	Disc	SUS420J2 Stainless steel	



#### Caution

Please confirm that the indications on the product correspond with the specifications of the ordered model before usage.

\* If they do not correspond, please do not use the product and contact us before use.

### 3. Dimensions and Weight

#### 3.1 Model TSD-7

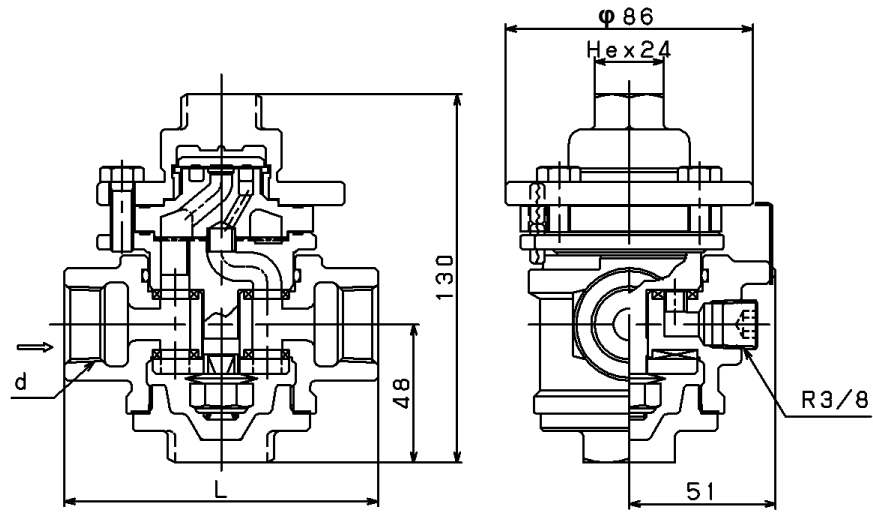


Fig.1

Nominal size	d	L	Weight (kg)
15A	Rc 1/2	107	2.5
20A	Rc 3/4	109	2.6
25A	Rc 1	115	2.7

#### 3.2 Model TSD-7F

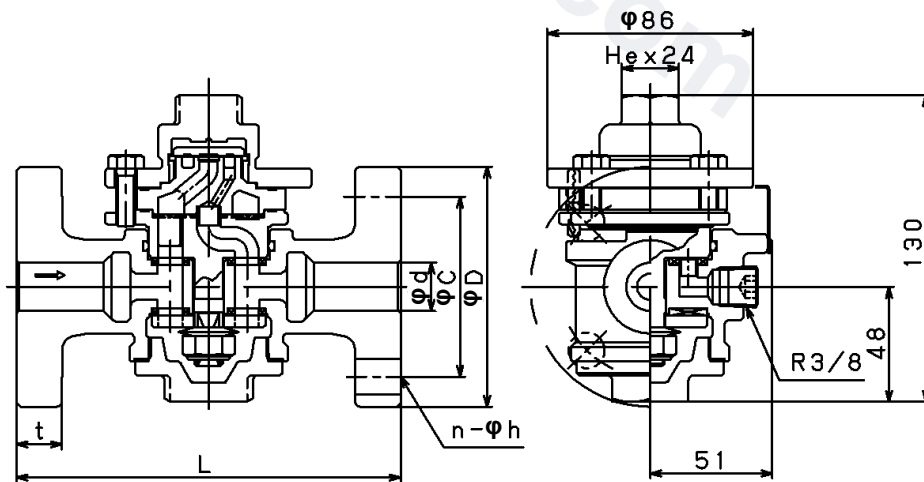
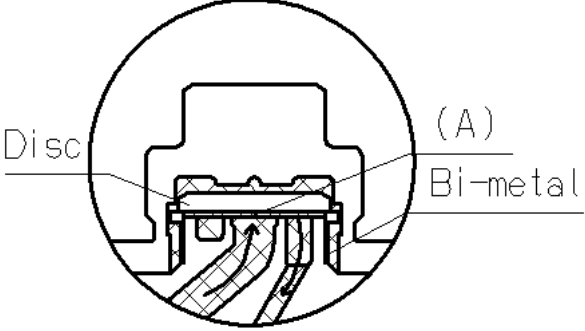
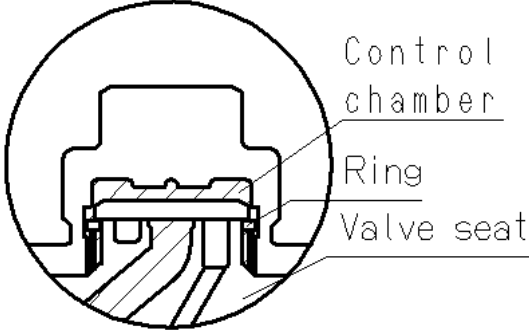
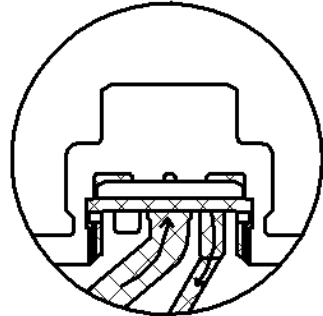
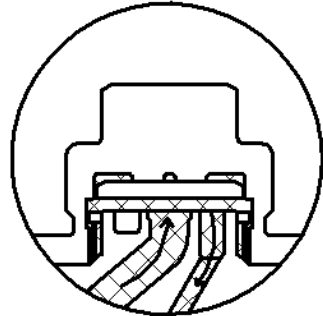


Fig.2

Nominal size	L	JIS 10K FF flanged					Weight (kg)
		D	D	C	t	n-h	
15A	156	15	95	70	16	4-15	4.1
20A	160	20	100	75	18	4-15	4.6
25A	160	25	125	90	18	4-19	5.7

## 4. Operation

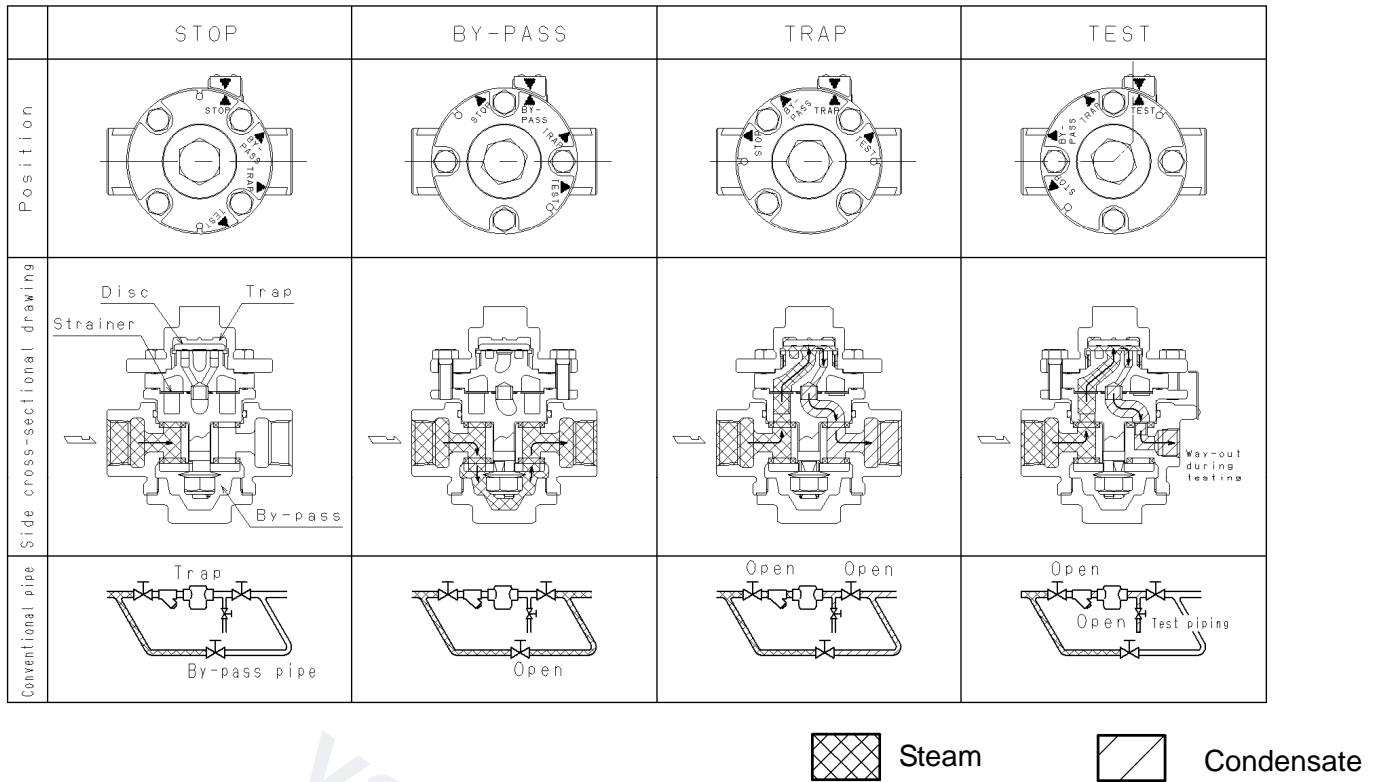
### 4.1 Trap mechanism

<p>1. Start-up of the operation</p> <p>On start-up, the bi-metal is so cooled in shrunk and closed condition as to keep the disc lifted up.</p> <p>In this state, incoming air and condensate are discharged out through the outlet smoothly without air-induced troubles.</p>	
<p>2. Closing operation</p> <p>Steam flowing through the trap heats the bi-metal causing it to expand so that it slips down the slant of the valve seat. At the same time, the ring falls below the top surface level of the valve seat.</p> <p>When condensate's temperature approaches steam saturation temperature, a low-pressure area is created under the disc (A) since the condensate flowing under the disc (A) re-evaporates to form a jet of flash steam. Some of the jet flowing into the control chamber increases in pressure so that the disc is pressed down to closed position.</p>	
<p>3. Inflow of condensate</p> <p>Condensate flowing through 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.</p>	
<p>4. Opening operation</p> <p>When the force pushing up the disc (induced from the jetting-out port under the disc) exceeds the force pressing down the disc, the disc is raised to opened position and condensate is discharged.</p>	

\* The cycle 2 to 4 repeats.



## 4.2 Function changeover of cock



In order to switch the cock, be sure that each mark ▲ of the functions meets the mark ▼ on the indicator accurately. If not, the product does not function correctly.

- (1) STOP  
Fluid is blocked off since the inlet and outlet sides of the product and the bypass are closed. Select this position for cleaning of the strainer and inspection of the disc and seat.
- (2) BY-PASS  
Fluid flows through the bypass directly to the outlet. Select this position to blow the piping during plumbing or to discharge a large quantity of condensate at start-up of the operation. Since fluid does not flow to the trap portion, the strainer can be cleaned and the disc and seat can be inspected. Do not keep the product positioned in this function for a long period.
- (3) TRAP  
The product performs regular trap operation. Condensate is discharged from the inlet to the outlet through the trap without flowing out from the bypass.
- (4) TEST  
Condensate is discharged from the inlet to the test-line outlet through the trap without flowing out from the bypass so that the trap operation can be tested. In this position, test can be carried out without being affected by back pressure due to closing of the usual outlet.

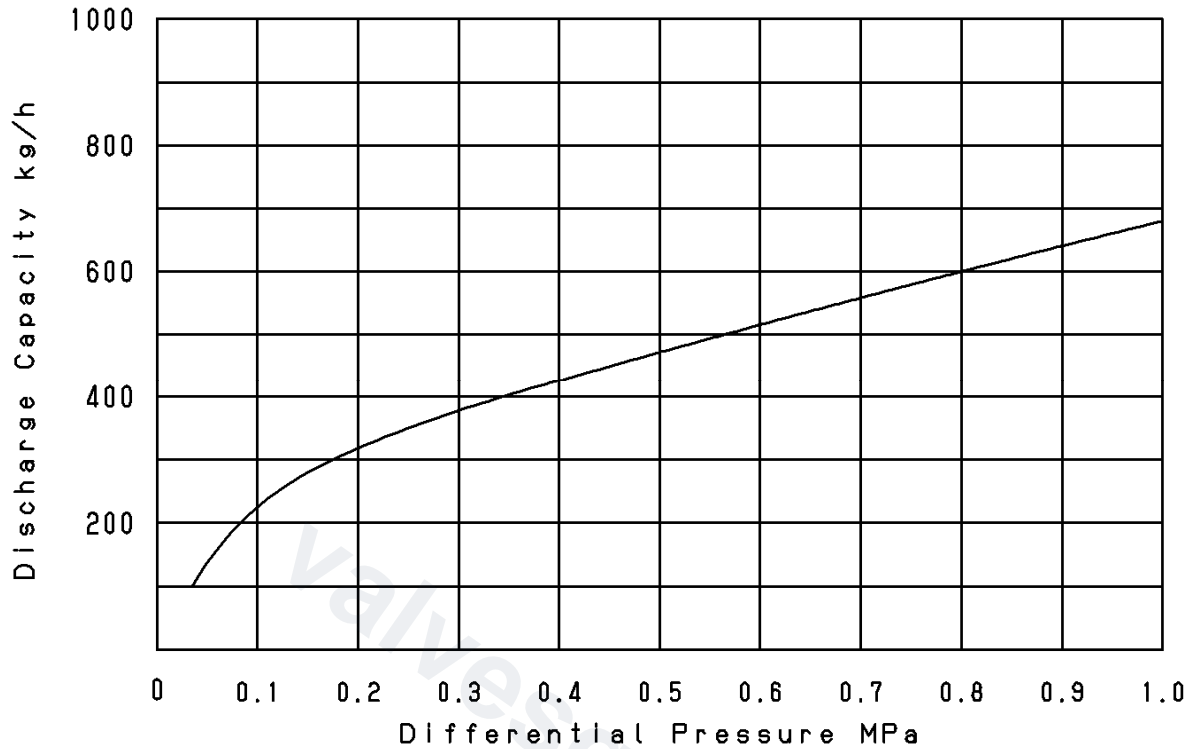
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## 5. Nominal Size Selection

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Since the maximum discharge capacity of the product is shown in the following chart, select the product size with an enough safety factor of 4 to 5.

### 5.1 Maximum continuous discharge capacity chart



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

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## 6. Installation

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### 6.1 Piping example

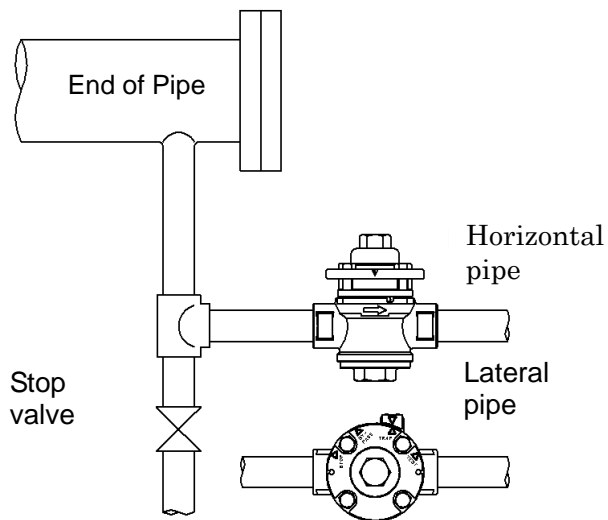


Fig.3

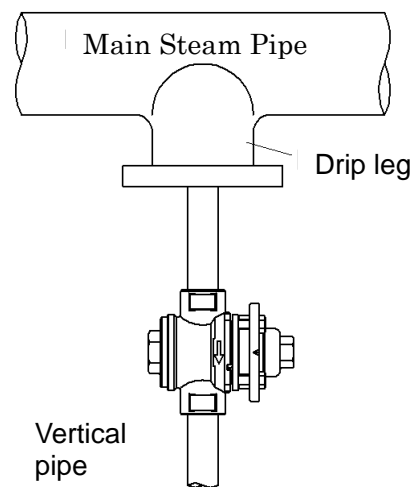


Fig.4

## 6.2 Precautions for installation



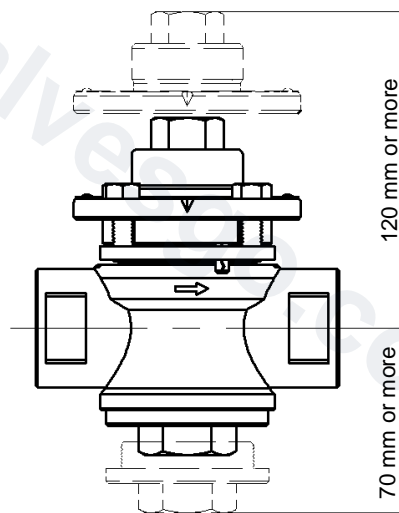
### Warning

In order 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/close properly.
4. Do not disassemble the product unless necessary.  
\* Failure to follow this notice may affect the original performance.
5. Secure enough space for maintenance (such as cleaning the strainer), inspection and repair.  
\* Failure to follow this notice prevents maintenance, inspection and repair.



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. For outdoor operation, equip the product with the rain cover which is available as an optional extra.  
\* Failure to follow this notice cause no-load operation when used in rainy conditions.

## 7. Operating Procedure

### 7.1 Precautions 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 side of the product while the product operates.  
\* Failure to follow this notice may result in scalds or injury due to blow-off.

### 7.2 Cock operation

- (1) Rotate the hexagonal top cover (nominal size: 24 mm) with an optional handle, spanner or monkey wrench as shown in Fig. 5.
- (2) Switch the cock to the desired position. Be sure that the mark ▲ on the name plate meets the mark ▼ on the indicator accurately as shown in Fig. 6.

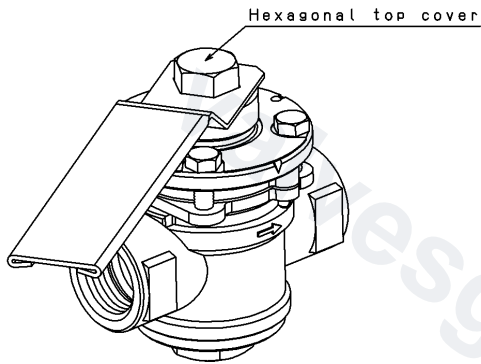
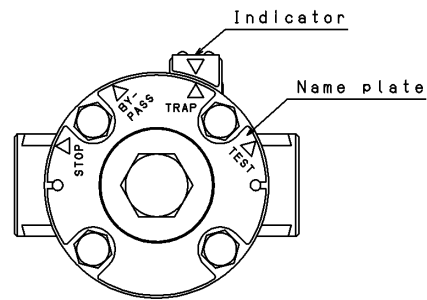


Fig.5



Ex.) "Trap" position

Fig.6

## 8. Maintenance procedures

### 8.1 Troubleshooting

Trouble	Cause	Remedy
Condensate not discharged	1. The cock is positioned at "STOP."	1. Switch the cock to "TRAP."
	2. Blockage in a discharge hole of valve seat.	2. Disassemble the product and clean the valve seat.
	3. Strainer is clogged.	3. Disassemble the product and clean the strainer.
	4. Damage as a result of abnormal pressure rising due to freezing or water hammer, etc.	4. Replace the product with a new one and use it within the specified working pressure.
	5. Steam locking	5. Change the piping system layout.
Continuous blow-off of condensate or steam	1. The cock is positioned at "BY-PASS."	1. Switch the cock to "TRAP."
	2. Foreign substances stuck on the disc and/or the valve seat.	2. Disassemble the product and clean these parts.
	3. Scratches or wear on the disc and/or the valve seat.	3. Disassemble the product and replace these parts with new ones.
	4. Back pressure exceeding the max. permissible value.	4. Keep the back pressure within the max. permissible value.
	5. Applied pressure is less than the minimum working pressure.	5. Replace the product with an appropriate model.
Outside leakage	1. Leakage due to joint loose between the cock and the valve seat.	1. Replace two pieces of large gaskets and one piece of small gasket with new ones and assemble them.
	2. Leakage due to joint loose between the cover and the valve seat.	2. Replace two pieces of large gaskets and one piece of small gasket with new ones and assemble them.
	3. Damage 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. Scratches or wear on the disc or the valve seat.	1. Replace the parts with new ones.
	2. Foreign substances stuck between the disc and the valve seat.	2. Disassemble and clean the product.
	3. The product is used outdoors in rainy conditions.	3. Equip the product with the rain cover which is available as an optional extra.

\* Refer to Fig .9 for the part names mentioned above.

## 8.2 Precautions for inspection and maintenance

### Warning

Disassembly and inspection must be done by experienced professional or valve manufacturer.

1. Do not touch the product with bare hands.
  - \* Failure to follow this notice may burn or scald your skin.
2. Completely discharge internal pressure of the product, piping and equipment and cool down the product prior to disassembling or maintenance.
  - \* Failure to follow this notice may result in scalds or injury due to the residual pressure.
3. In order to use "TEST" function for operational check of the trap, remove the plug (Rc 3/8) on the test-line outlet of the product at first. Then, after plumping the product as shown in Fig.7, switch the cock to "TEST" position.

To remove the plug during operation, switch the cock to "BY-PASS" or "TRAP" position before removing the plug.

\* Removing the plug with the cock at "STOP" position causes blow-out of residual pressure between the disc and the valve seat, resulting in injury or scalds.

\* Removing the plug with the cock at "TEST" position causes fluid blow-out, resulting in injury or scalds.

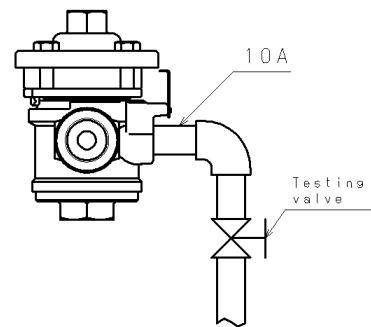


Fig. 7

### Caution

1. Conduct daily inspection in order to maintain the optimal performance of the product.
  - \* See "8.1 Troubleshooting" if trouble is observed.
2. After leaving the product not operated for a long period, perform daily inspection before start-up of operation.
  - \* Failure to follow this notice may cause malfunction due to rusting inside of the product and pipe.
3. When disassembling, put a container under the product to collect condensate flowing out from it.
  - \* Failure to follow this notice may result in making the surroundings dirty.
4. Be careful not to drop the product at the time of disassembling. The disassembled parts should be placed on soft cloth in order to avoid scratches and damage.
  - \* Damage on the product or parts may cause malfunction and affect the original performance.
5. To reassemble, connect all the parts securely.
  - \* Failure to follow this notice may cause malfunction or outside leakage.
6. When replacing parts, make sure to use only replacement parts supplied by Yoshitake. Do not make any alteration to the product.
  - \* Failure to follow this notice may cause damage to the product or may result in injury or scalds due to blowout or malfunction.
7. In case of problems due to foreign substances, 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.)

### 8.3 Disassembly and Reassembly Procedure



#### Warning

Do not switch the position of the cock during disassembly.  
\* It is dangerous because steam blows out.

Follow the steps below with reference to Fig 9.

#### ■ 8.3.1 Disassembly

- (1) To disassemble the product, position the cock at “STOP” or “BY-PASS.”
- (2) Unscrew the four bolts, keeping the cock from moving by holding the hexagonal top cover (nominal size: 24 mm) with an optional handle, a spanner or a monkey wrench as shown in Fig. 8.
- (3) Disassemble the product into the parts as shown in Fig 9.

#### ■ 8.3.2 Reassembly

Replace the two pieces of gasket (large) and one piece of gasket (small) with new ones when reassembling.

- (1) Attach two pieces of gasket (large: 1, small: 1) into the grooves on the cock.
- (2) Insert the guide on the bottom side of the valve seat into the center hole in the cock.  
(Insert the spring pin on the cock into the hole “A” in the valve seat.)
- (3) After attaching the other piece of gasket (large) into the groove on the valve seat, set the bi-metal, ring and disc on the valve seat in this order. Refer to Fig 9 to avoid setting the disc upside down.  
\* Improper setting of the disc results in continuous blow-off of steam or condensate.
- (4) Equip the valve seat with the cover.  
(Insert the spring pin on the cover into the hole “A” in the valve seat.)
- (5) Tighten the four bolts evenly with the torque specified in the table below, keeping the cock from moving by holding the hexagonal top cover (nominal size: 24 mm) with an optional handle, a spanner or a monkey wrench as shown in Fig. 8.

Part name	Tightening torque (N·m)
Bolt	15

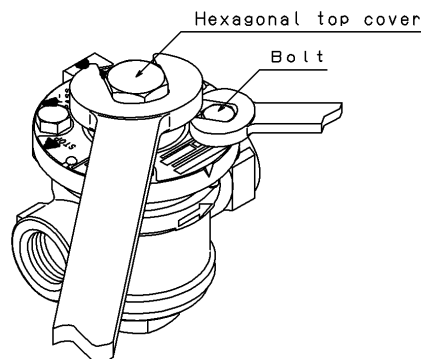


Fig.8

## 8.4 Exploded drawing

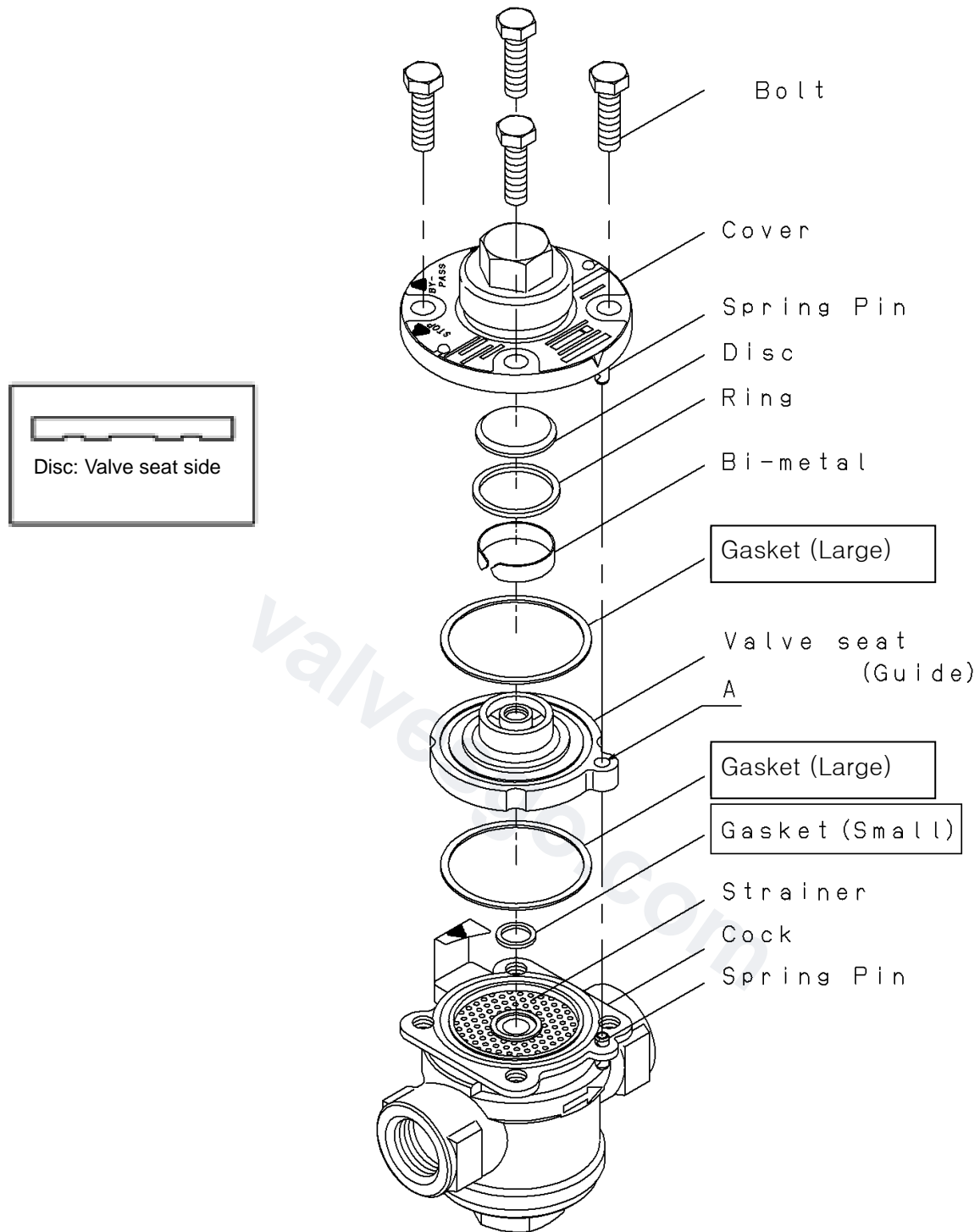


Fig.9

Parts shown in the boxes are consumable items and available as replacements.