

MODEL TS-5V, 5S, 5BP

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.

Please download the English instruction manual for this product from
“<https://www.yoshitake-inc.com>”.



English



日本語



汉语



ภาษาไทย

The symbols used in this manual have the following meanings.

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

Table of Contents

1. Specifications.....	1
2. Operation	2
3. Discharge capacity	3
4. Installation	4
4.1 Piping example as trap	4
4.2 Piping example as air vent	7
4.3 Precaution for installation	7
5. Operation	9
6. Maintenance	10
6.1 Precaution for maintenance	10
6.2 Daily and periodic inspections	11
6.3 Troubleshooting	11
6.4 Exploded drawing	13
6.5 Disassembly	14
6.6 Reassembly	14

Warranty Information

YOSHITAKE

1. Specifications

Model		TS-5V	TS-5S	TS-5BP
Nominal size		8A, 10A, 15A, 20A, 25A		15A, 20A
Application		Steam, Steam condensate		
Max. working pressure		2.1 MPa		1 MPa
Max. allowable back pressure		0.4 MPa		
Operation temperature		TS-5□-15: 15 °C below saturated steam temperature (Standard)* ¹		
Max. temperature		220 °C		185 °C
Material	Body	Stainless steel		
	Valve seat	Stainless steel		
Connection		JIS Rc, NPT		
Flow direction		Horizontal or vertical * ²		

*¹: The standard product has the operation temperature that is 15°C below saturated steam temperature. Use the product with operating temperature of 5°C below (model: TS-5□-5) or 25°C below (model: TS-5□-25) according to application.

- TS-5□-5 (5°C below) is recommended if inclusion of condensate in steam should be avoided, for example, when the product is used for equipment utilizing direct steam.
- The product can be used as an air vent valve to exhaust air at start-up in steam line. When using it as an air vent for steam, TS-5□-25 (25°C below) is recommended to minimize flash steam.

*²: Refer to “4.3 Precaution for installation” for the installation position.



Caution

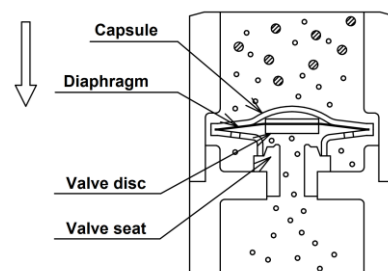
Please confirm that the indications on the product correspond with the specifications of the ordered product model before use.

* If they are different, please contact us without using the product.

2. Operation

1. Starting-up

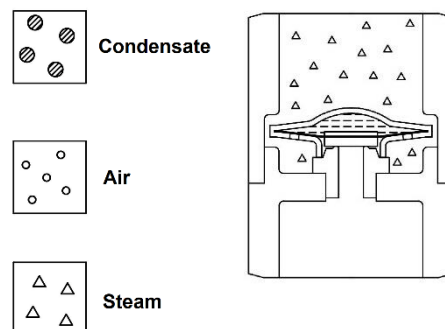
At start-up, there is a gap between the valve disc and the valve seat, and the trap is open. In this state, condensate and air is discharged



2. Closing

When steam flows into the trap, the pressure inside of the capsule increases due to the heat of steam and pushes down the diaphragm.

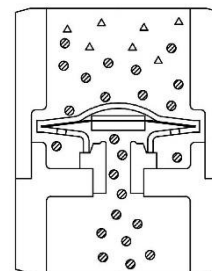
This closes the gap between the valve disc and the valve seat, and thus the trap closes.



3. Opening

When the steam temperature drops and condenses, the pressure inside of the capsule decreases, and thus the diaphragm is pushed up and the trap opens to discharge condensate.

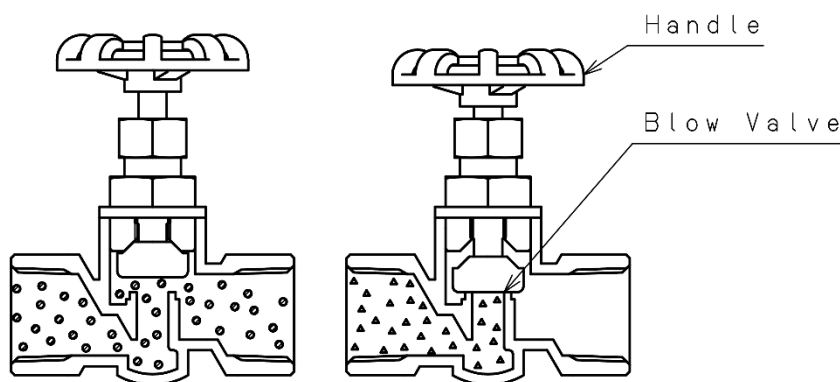
The trap repeats closing and opening according to the inflow of steam and condensate.



4. TS-5BP Blow function

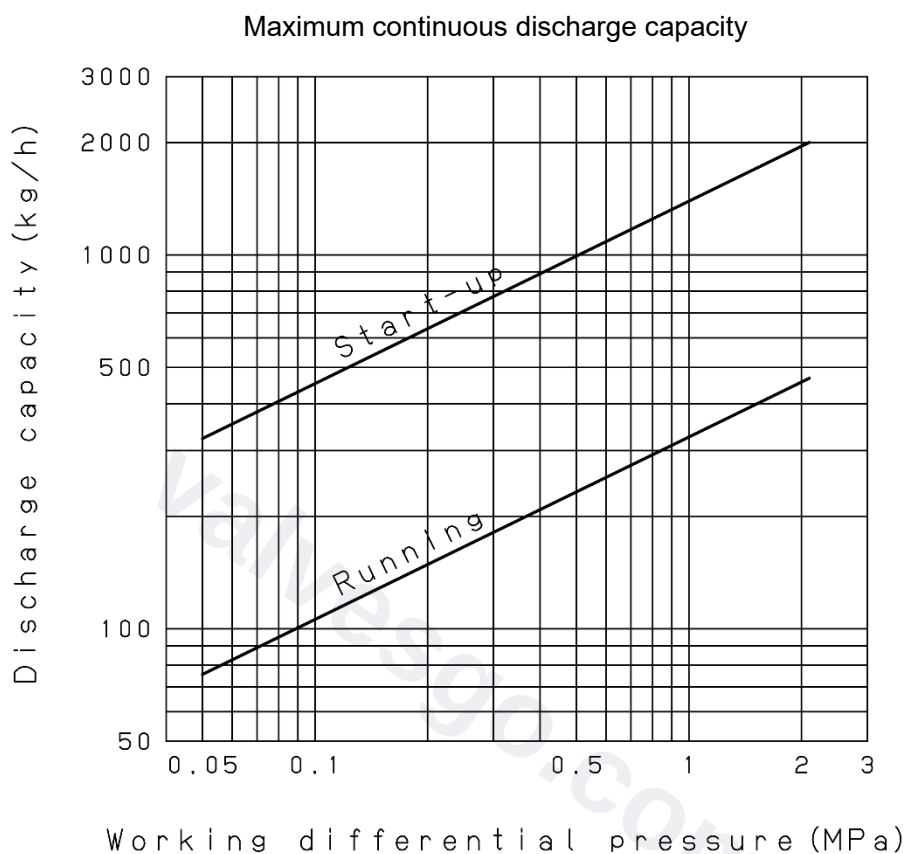
TS-5BP efficiently discharges condensate and air at start-up when its handle is turned counterclockwise to open the blow valve.

Close the blow valve after condensate is discharged by turning the handle fully clockwise.



3. Discharge capacity

1. 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 working differential pressure). For example, the discharge capacity obtained with the inlet pressure of 0.5 MPa and the outlet pressure of 0.2 MPa is that with the working differential pressure of 0.3 MPa.
2. To select a nominal size, secure the safety factor of 2 or more. If you need a steam trap with a capacity of 50 kg/h, the product with a maximum capacity of 100 kg/h or more should be selected.



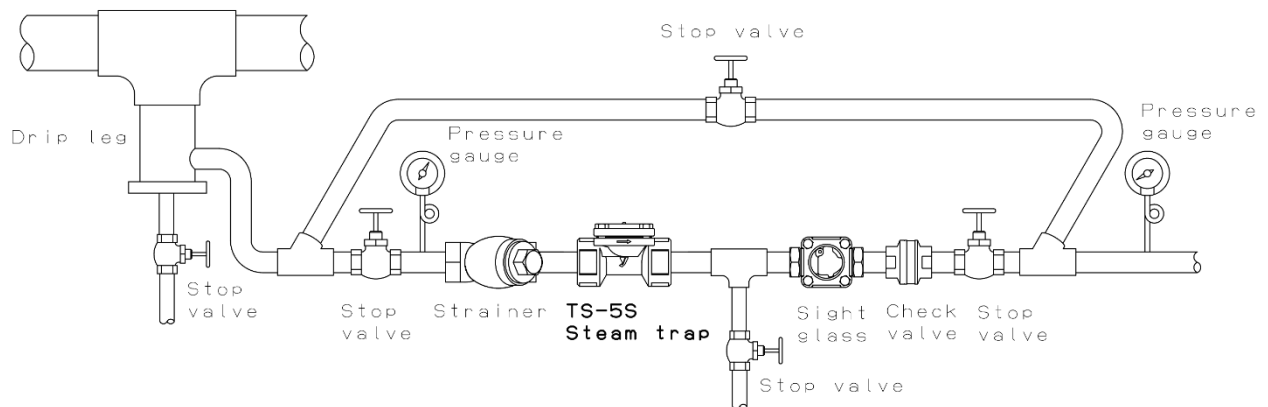
Caution

Use the product with the outlet pressure of 0.4 MPa or less.

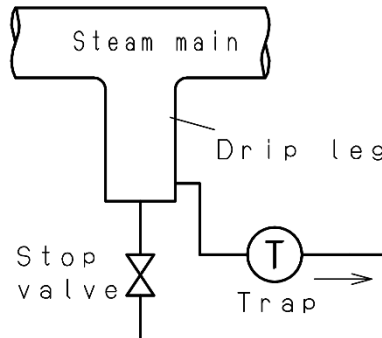
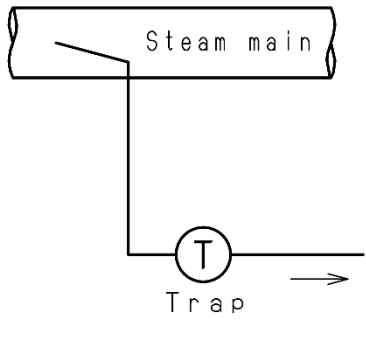
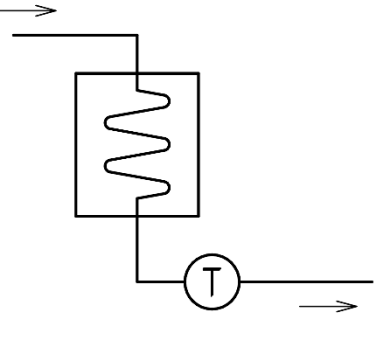
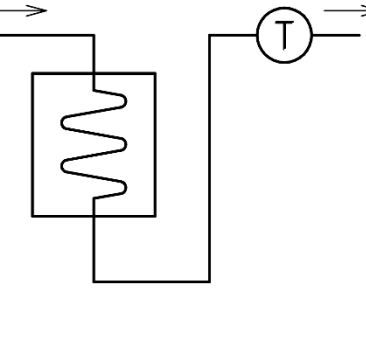
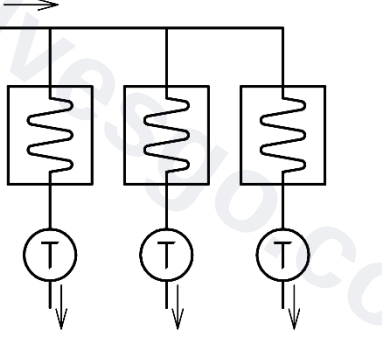
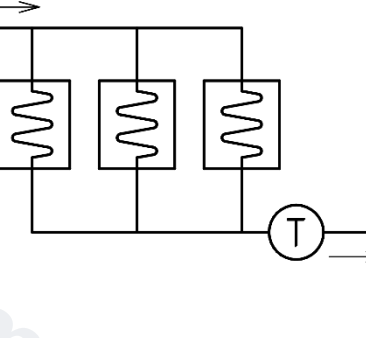
* The capsule may be damaged when high pressure is applied at room temperature, resulting in malfunction.

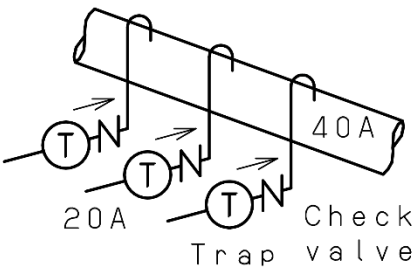
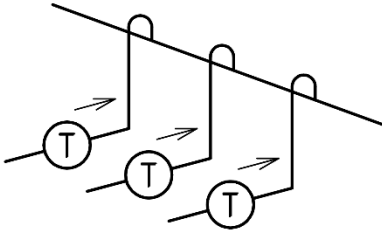
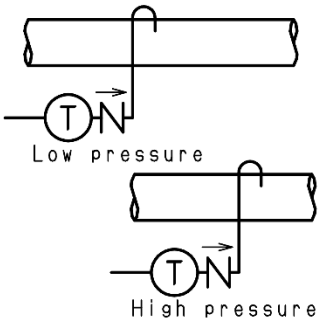
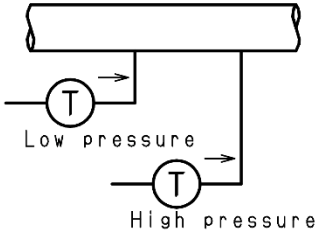
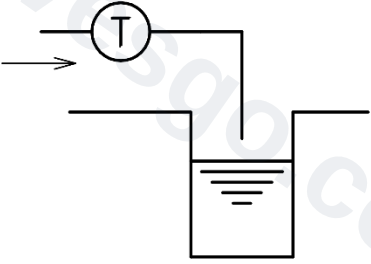
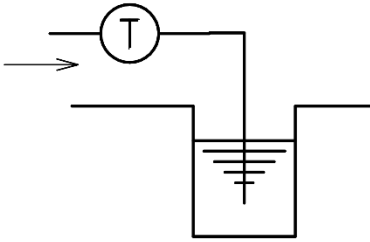
4. Installation

4.1 Piping example as trap

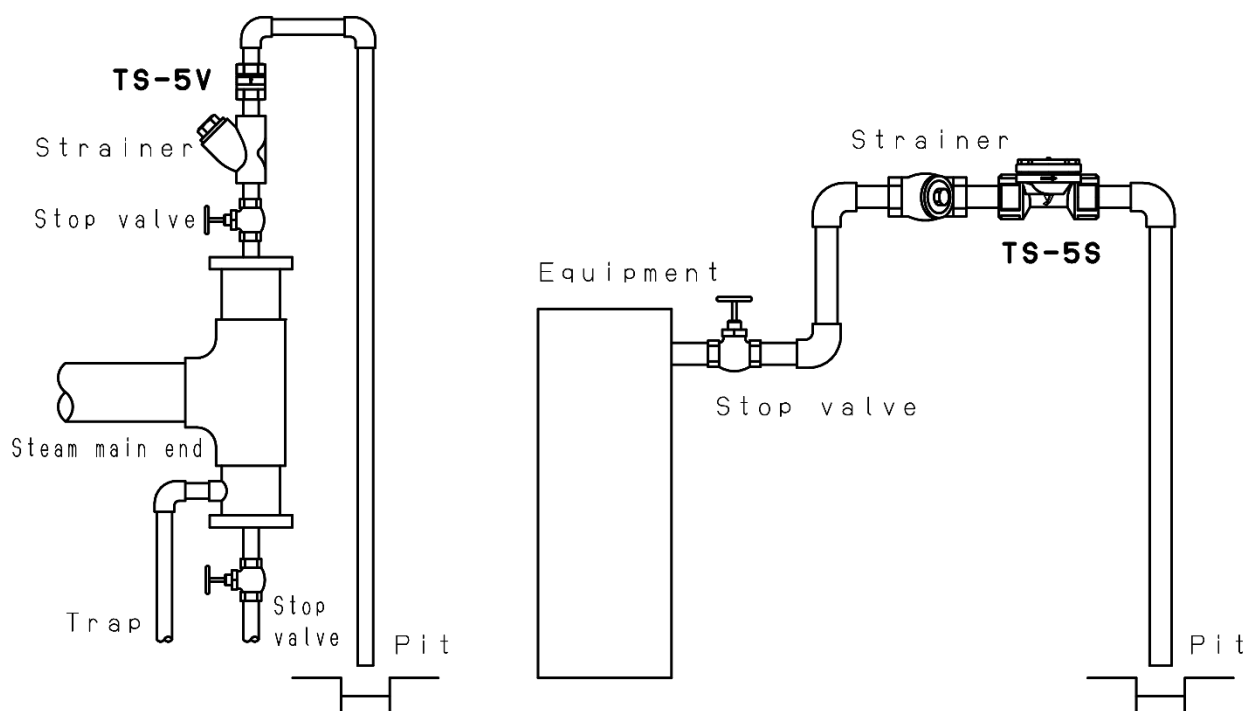


Description	Correct	Wrong
Provide a by-pass line around the product, and install stop valves at the outlet side of the product.	The correct diagram shows a horizontal line with a 'Trap' (represented by a circle with a 'T'). A 'Bypass valve' (represented by a circle with an 'X') is connected to the line above the trap. 'Stop valves' (represented by circles with an 'X') are installed on the horizontal line on both sides of the trap, and on the bypass line between the trap and the bypass valve. Arrows indicate flow direction.	The wrong diagram shows a similar setup but lacks the stop valves on the horizontal line downstream of the trap and on the bypass line, which is an unsafe configuration.
When installing the product around a regulating valve, be sure to install it at the inlet side of the regulating valve.	The correct diagram shows a 'Regulating valve' (represented by a circle with a triangle) on a horizontal line. A 'Trap' is installed on a vertical branch pipe that connects to the main line at the inlet side of the regulating valve. Arrows indicate flow direction.	The wrong diagram shows the 'Trap' installed on a vertical branch pipe that connects to the main line at the outlet side of the regulating valve, which is incorrect.

Description	Correct	Wrong
To discharge condensate from the steam main, be sure to install the product so that condensate can be discharged from the bottom of the steam main by drip leg.		
Install the product at the lowest bottom of the condensate-generating equipment.		
To discharge condensate from more than one equipment, install the product for each.		

Description	Correct	Wrong
The diameter of a collecting pipe should be more than summation of sectional areas of discharge pipes. In addition, install check valves for back flow prevention.		
For condensate recovery, connect the discharge pipe to the upper part of the collecting pipe. If the product is used in the lines of different pressures, install it on each collecting pipe connected to each pressure line. In addition, install check valves for back flow prevention.		 ● Re-evaporated steam from high pressure line increases the back pressure of the product on low pressure line.
The discharge pipe end should be off the water surface in the pit.		 ● If the discharge pipe end is in contact with water, it takes the dirty water from the pit while the system is not operated, which may cause malfunction of the product due to foreign substances.

4.2 Piping example as air vent



4.3 Precaution for installation

Warning

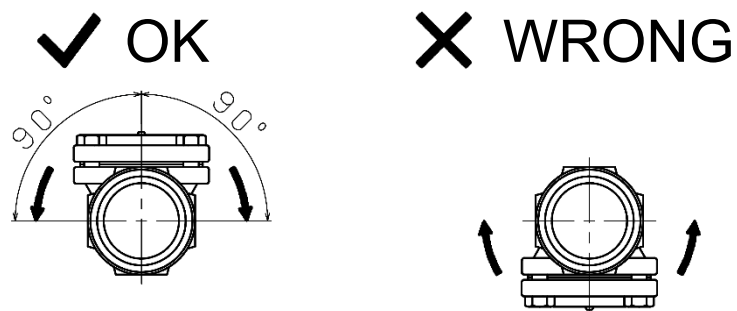
1. To discharge condensate to the atmosphere, lead the outlet to a safe place where there is no possibility of physical damage even when condensate blows out.
* Failure to follow this notice may result in scalds or injury when condensate blows out.

Caution

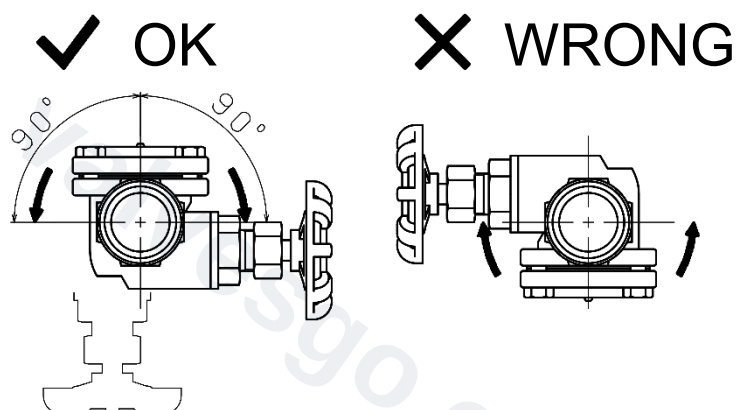
1. Before installation, remove foreign substances and scale from the piping.
* Failure to follow this notice may prevent the product from functioning properly.
* To plumb the product, be careful to keep seal materials from entering the product.
2. Before connecting the product to piping, check the inlet and outlet of the product so that the fluid flow direction and the arrow marked on the product are in the same direction.
* Installing the product in a wrong position prevents it from functioning properly.
3. Do not apply excessive load, torque, or vibration to the product. Securely connect the product to piping.
* Failure to follow this notice may cause fluid leakage resulting in scalds and property damage.

4. Be sure to install the product in a right position.

TS-5S can be installed either horizontally or vertically, as long as the cover is kept upward at an angle between 0 to 90 degrees.



TS-5BP can be installed either horizontally or vertically, as long as the cover is kept upward at an angle between 0 to 90 degrees. And the handle should be in the position where it can be operated smoothly.



5. Make sure to support the piping immovably.

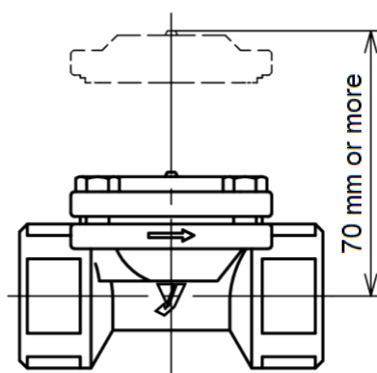
* Excessive piping stress applied to the product may cause malfunction.

6. Do not disassemble the product unless it is necessary.

* Unnecessary disassembly may cause malfunction.

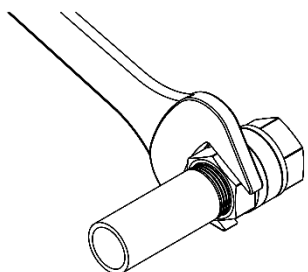
7. Secure enough space for maintenance (such as cleaning of strainer), inspections and repair as shown below.

* Failure to follow this notice prevents maintenance, inspection, and repair.

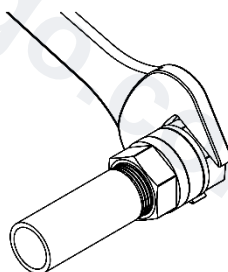


8. When using the product as a trap, slope the piping and place the product at as a low position as possible in order to make condensate flow into the product by its own weight.
9. To install the product in a main steam pipe, provide a drip leg at the inlet side of the product.
10. When using the product as an air vent, install it at a place where air is easy to accumulate, such as top of piping or equipment.
11. Install a stop valve and a strainer at the inlet side of the product. (80 mesh or more is recommended.)
 - * The system must stop operation while inspection and maintenance of the product if the stop valve is not installed.
12. Install the product so that it is not subjected to the shock of water hammer. Do not install a quick opening valve before and/or after the product.
 - * Failure to follow this notice may result in malfunction due to damage to the capsule, or may result in scalds or injury due to blow-off caused by an excessive shock and damage to the product.
13. In case of conducting an airtightness test or a pressure test, apply the pressure of 0.4 MPa or less during the testing.
 - * The capsule may be damaged when high pressure is applied at room temperature, resulting in malfunction.
14. If there is a possibility of freezing, take proper measures to remove water inside of the product and piping, and insulate the product.
 - * Freezing may damage the product.
15. When connecting the product to a pipe, apply a tool on the flat surfaces of the product at the pipe side, and use an appropriate tool such as a spanner.

✓ OK



✗ WRONG



5. Operation



Warning

1. Before leading fluid, make sure that the product is securely connected to piping and that there is no loose.
 - * Failure to follow this notice may result in scalds or injury due to blow-off.
2. Do not touch the product with bare hands while the product operates.
 - * Failure to follow this notice may result in burns and scalds.
3. Do not stand in front of the outlet opening of the product while the product operates.
 - * Failure to follow this notice may result in scalds or injury due to blow-off.



Caution

1. Slowly open each stop valve or TS-5BP (blow function by handle) to prevent water hammer.
* Opening stop valves or TS-5BP quickly may result in damage to other equipment due to hunting or water hammer.
2. Use TS-5BP with its blow valve closed for normal operation.
* Close the blow valve by turning the handle clockwise within one minute after TS-5BP starts discharging steam at the outlet. If TS-5BP keeps being used with the blow valve open, the capsule may be damaged resulting in malfunction of the product.

6. Maintenance

6.1 Precaution for maintenance



Warning

1. Disassembly and inspections must be performed by a professional or a valve manufacturer.
2. If the fluid is hot, do not touch the product with bare hands.
* Failure to follow this notice may scald your skin.
3. 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.
* Daily inspection is necessary to maintain the optimal performance of the product.
* See "6.3 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 and tighten the bolts uniformly in diagonal order.
* Failure to follow this notice may cause malfunction or outside leakage.
6. When replacing parts, be sure to use the dedicated parts manufactured by Yoshitake. Do not modify the product.
* Failure to follow this notice may result in scalds or injury due to damage to the product, blow-off, or malfunction.
7. In case of troubles 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.)
8. When reassembling, be sure to replace the gaskets to new ones.
* Failure to follow this notice may cause outside leakage.

6.2 Daily and periodic inspections

Conduct daily and periodic inspections and replace the parts periodically to maintain the optimal performance of the product.

See “6.3 Troubleshooting” for the remedies if trouble is observed.

- Daily inspection (once a day)

Conduct daily inspection during operation of the product.

To be inspected	Inspection criteria
Condensate discharge condition	Condensate is discharged smoothly.
Outside leakage	No outside leakage of condensate or steam

- Periodic inspection (once a year)

Conduct disassembly inspection periodically. (TS-5S and TS-5BP)

To be inspected	Inspection criteria
Sealing surfaces of capsule [4] and valve seat [3]	No damage or abrasion, and no foreign substance stuck.
Shape of capsule [4]	No deformation or damage on capsule [4].
Dirt on screen [6]	No clogging on screen [6].

* TS-5V cannot be disassembled.

6.3 Troubleshooting

Trouble	Cause	Remedy
Condensate or air is not discharged.	Screen [6] is clogged.	Disassemble or disconnect from pipe and clean it.
	Capsule [4] is deformed or damaged.	Replace the part.
	Capsule [4] is damaged due to abnormal pressure rise caused by freezing or water hammer, etc.	Replace the part. Use the product within the working pressure range.
	Steam locking occurs.	Change the piping system layout.
	Inlet pressure is low and outlet pressure is high.	Change the piping system layout.

Trouble	Cause	Remedy
Continuous blowout.	Foreign substance is stuck between capsule [4] and valve seat [3]. Scale is accumulated.	Close the stop valve at the inlet side of the product and stop steam flowing in. After confirming the pressure and temperature drop, open the stop valve and blow the product. If leakage remains, disassemble and clean. Install a stop valve and strainer if these are not installed at the inlet of the product.
	Capsule [4] and/or valve seat [3] is damaged, abraded or deformed.	Replace the parts.
	Discharge capacity is insufficient.	Replace the product with another model of enough capacity.
	Valve seat [3] is loose.	Retighten it with proper torque referring to specified tightening torque.
	Blow valve leaks. (TS-5BP)	Close blow valve by turning handle [21] clockwise. In case leakage does not stop, replace the product with new one.
Steam leakage.	Body [1] and cover [2] are loose. (TS-5V)	Retighten body [1] and cover [2]. If the leakage does not stop, replace the product with new one.
	Bolts [7] are loose. (TS-5S, TS-5BP)	Replace cover gasket [8] with new one. Retighten bolts [7] with proper torque referring to specified tightening torque.
	Bonnet [14] and gland nut [18] are loose. (TS-5BP)	Retighten them with proper torque referring to specified tightening torque.
	Body [1] and bonnet [14] are loose. (TS-5BP)	Retighten body [1] and bonnet [14]. If the leakage does not stop, replace the product with new one.
	Leakage occurs due to abnormal pressure rise caused by freezing or water hammer, etc.	Replace the product with new one. Use the product within the working pressure range.
Stuck Handle (TS-5BP)	Handle [21] is opened/closed exceeding its operation range.	Operate handle [21] by hands. Do not apply excessive turning force.
	Gland nut [18] is overtightened.	Retighten it with proper torque referring to specified tightening torque.
	Threaded area of bonnet [14] and spindle [19] are stuck.	Replace the product with new one.

* Refer to "6.6 Reassembly" for specified tightening torque.

* TS-5V cannot be disassembled. If you have a problem that requires disassembly, please contact us.

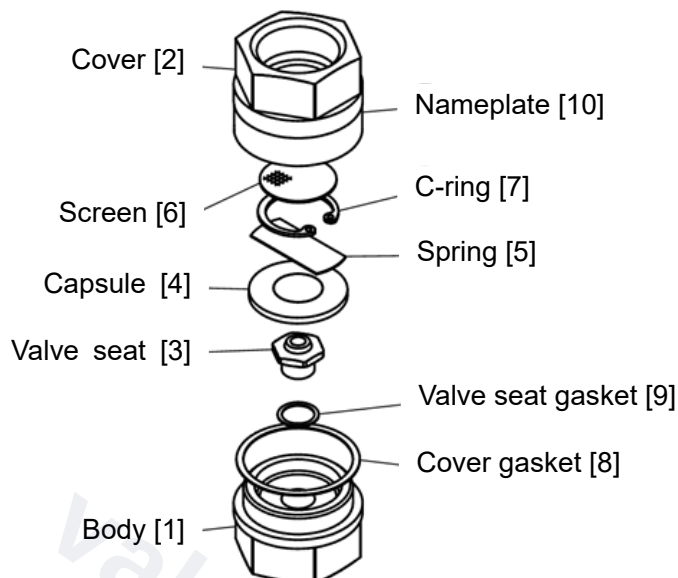


Caution

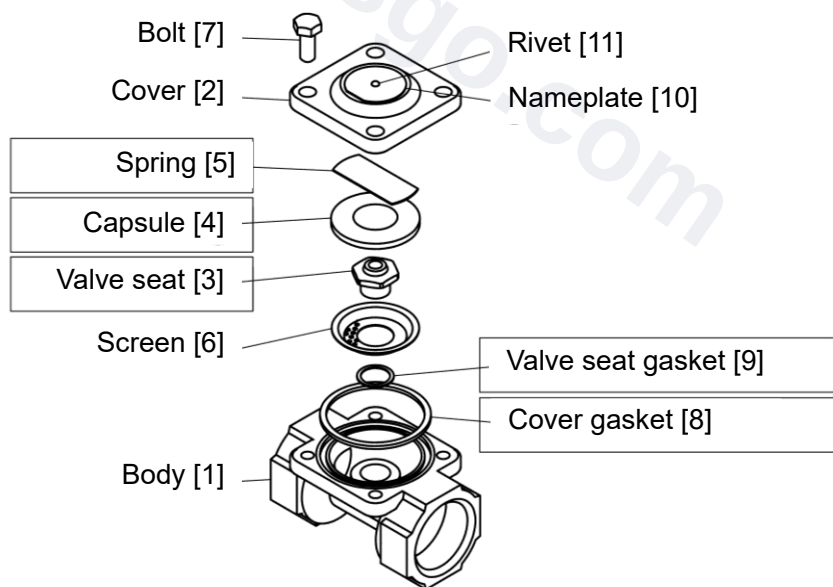
Before retightening bonnet [14], gland nut [18], and nut [20] of TS-5BP, open the blow valve by turning the handle [21] counterclockwise. Retightening these parts with the blow valve closed may damage the internal parts resulting in malfunction.

6.4 Exploded drawing

(1) TS-5V

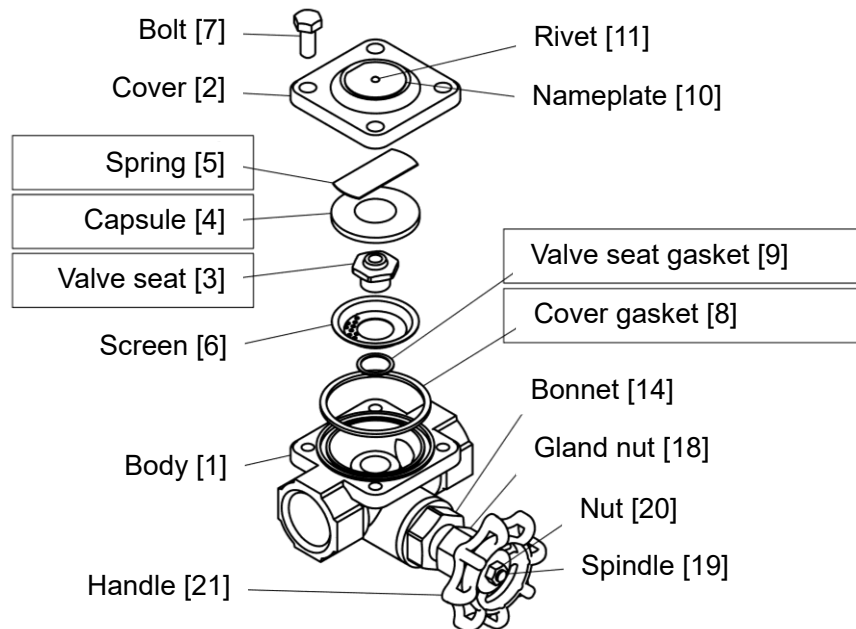


(2) TS-5S



The parts whose names are shown in boxes are consumable items and available as replacements.

(3) TS-5BP



The parts whose names are shown in boxes are consumable items and available as replacements.

6.5 Disassembly

- Tools

Part name	Width across flats / Nominal size	Tool to use
Bolt [7] (TS-5S)	10 mm	Socket wrench or Spanner
Valve seat [3]	17 mm	Socket wrench

- TS-5S, TS-5BP

- [Procedure 1] Loosen the bolts [7] with a socket wrench or a spanner (width across flats: 10 mm), and remove the bolts [7] and the cover [2]. Be careful not to drop the capsule [4].
- [Procedure 2] Remove the valve seat [3] and screen [6] with a socket wrench (width across flats: 17 mm).

6.6 Reassembly

- Tightening torque and tools

Part name	Width across flats / Nominal size	Torque	Tool to use
Bolt [7] (TS-5S)	10 mm	15 N·m	Torque wrench
Valve seat [3]	17 mm	25 N·m	Torque wrench
Gland nut [18] (TS-5BP)	19 mm	5 N·m	Open-end torque wrench
Nut [20] (TS-5BP)	8 mm	4 N·m	Torque wrench

- TS-5S, TS-5BP

- [Procedure 1] Put the valve seat gasket [9] and screen [6] on the body [1]. Screw the valve seat [3] into the body [1]. Fasten the valve seat [3] with a torque wrench (width across flats: 17 mm, 25 N·m) while holding the body [1].
- [Procedure 2] Put the cover gasket [8] onto the groove of the body [1].
- [Procedure 3] Put the capsule [4] on the valve seat [3].
- [Procedure 4] Apply lubricant (Recommendation: TB1901, ThreeBond) to the threaded area of the bolts [7].
- [Procedure 5] Make sure that the spring [5] fits well with the corresponding groove of the cover [2] and does not come off. Put the cover [2] onto the body [1] and screw the bolts [7] into the body [1]. Fasten the bolts with a torque wrench (width across flats: 10 mm, 15 N·m).

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