

TRAP STAR™ **MODEL TSF-8,8F** **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.

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1. Usage of the product


The TSF-8 can discharge condensate effectively without retention, and realize energy saving steam system without steam loss. In addition, built in thermostatic air vent discharges air inside the piping and shortens warming-up time. So, the product is suitable for steam equipments used in various industries such as air-conditioning equipment, hot-water supply equipment, plant, and food.

2. Specifications

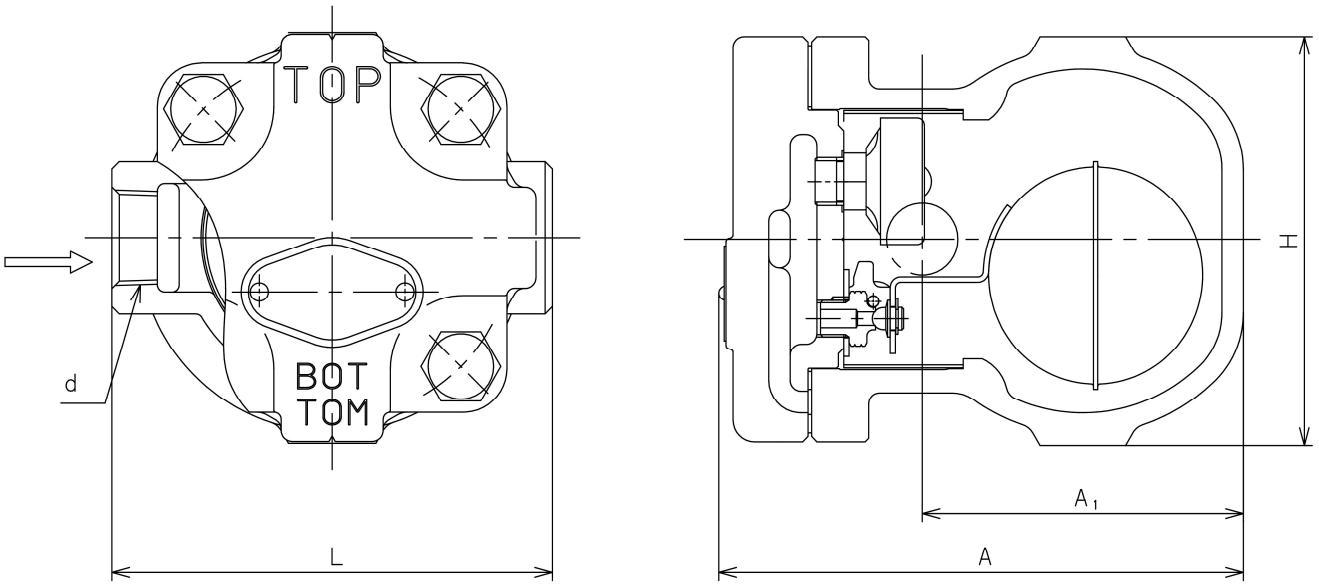
Model	TSF-8	TSF-8F
Nominal size	15A-25A	
Application	Steam condensate	
Working pressure (Maximum working differential pressure)	TSF-8-5, 8F-5: 0.01-0.5 MPa (0.5 MPa) TSF-8-10, 8F-10: 0.01-1.0 MPa (1.0 MPa) TSF-8-21, 8F-21: 0.01-2.1 MPa (2.1 MPa)	
Max. temperature	220°C	
Material	Body	Ductile cast iron
	Float	Stainless steel
	Valve, valve seat	Stainless steel
Connection	JIS Rc screwed NPT screwed	JIS10K/20KFF ENPN25 RF ASME 150lb/300lb RF
Flow direction	Left to Right (Standard)	

* Suffix "V" for "Top to Bottom" flow, and "R" for "Right to Left" flow.

* For installation posture, see 3 of "6.2 Precaution for installation" on Page 8.

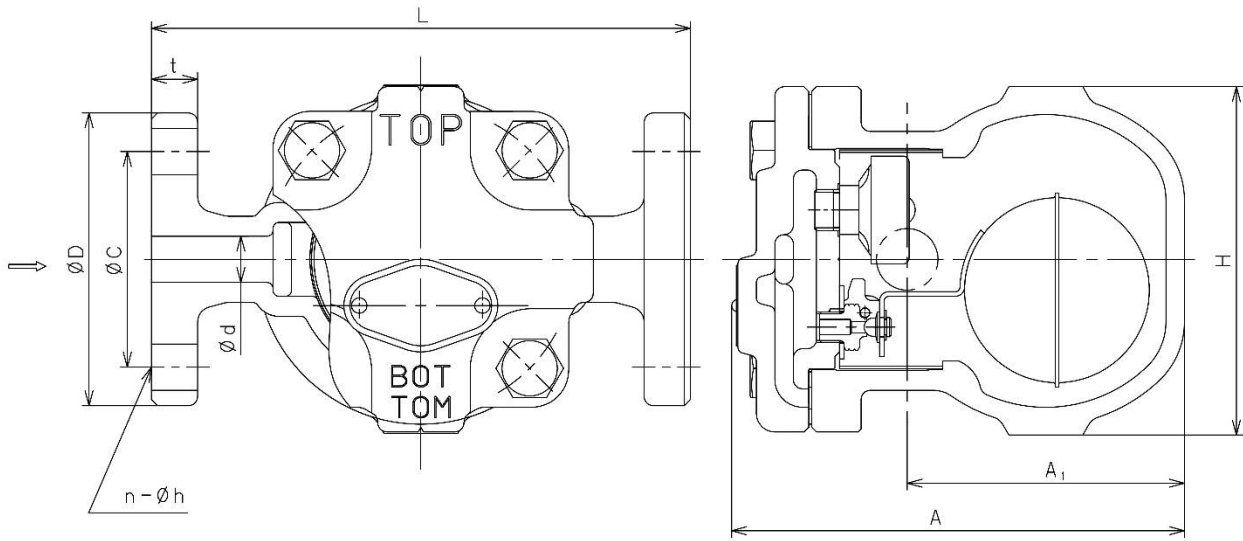
	<p>Caution</p> <p>1. Depending on application, specification of the product shall be selected. Refer to Technical material, e.g. Product manual, Technical guidebook, and drawing, and select suitable specification. Regarding technical material like drawing, contact our sales office.</p> <p>2. Please confirm that the indications on the product correspond with the specifications of the ordered product model before use. * If they are different, do not use the product and contact us.</p>
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3. Dimensions and Weights



(mm)

model	Nominal size	d	L	A	A ₁	H	Weight (kg)
TSF-8	15A	Rc1/2	121	147	90	113	3.7
	20A	Rc3/4	121	147	90	113	3.7
	25A	Rc1	145	147	90	113	4.1



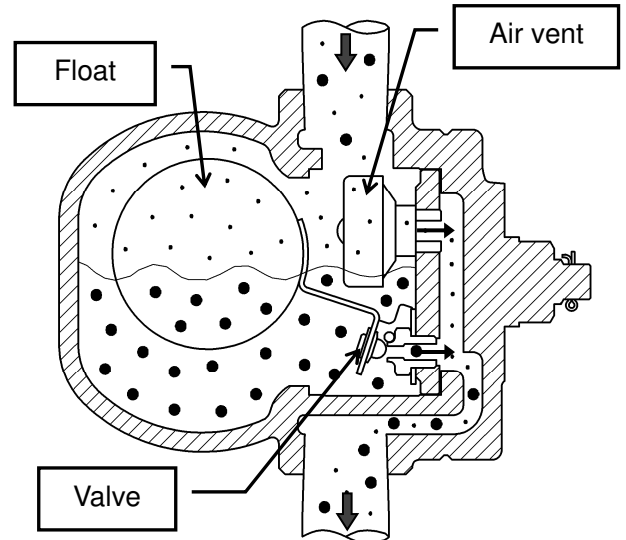
(mm)

model	Nominal size	L	A	A ₁	H	Flange JIS10K/20K FF					Weight (kg)
						d	D	C	t	n-h	
TSF-8F	15A	175	147	90	113	15	95	70	14	4-15	5.2
	20A	195	147	90	113	20	100	75	16	4-15	6.0
	25A	215	147	90	113	25	125	90	18	4-19	7.1

4. Operation

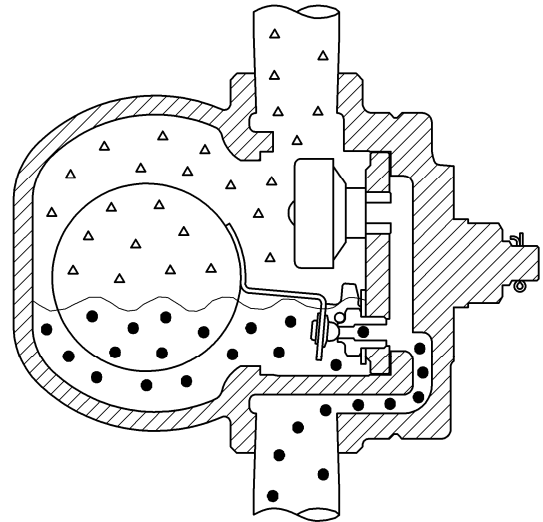
1. Start-up of the operation

At start-up, since the float is down, the valve is closed. In this state, air in the system and piping is discharged out through the air vent which is opened. When condensate flows into the product, the float lifts up and opens the valve, and then discharges condensate. Air is continuously discharged out from the air vent.



2. Condensate discharging operation

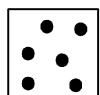
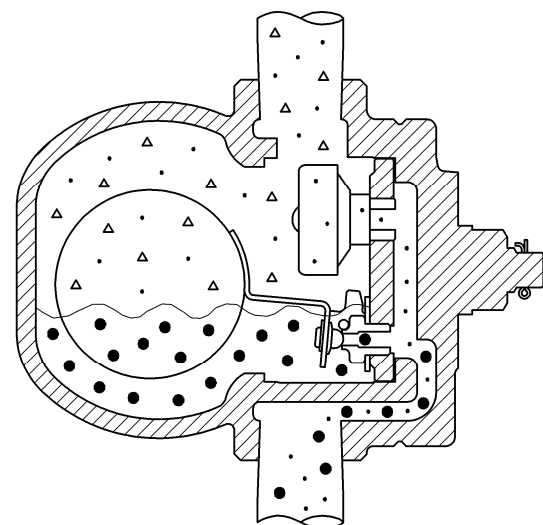
When steam flows into the product, internal pressure of the air vent rises by steam temperature, and the air vent closes. According to the amount of condensate inflow, the float position moves up and down changing the opening degree of the valve, and thus condensate is continuously discharged. The float moves down and the valve closes when condensate inflow stops.



3. Air vent operation

When air or non-condensable gas flows into the product, it accumulates in the upper part of the product. When temperature of air or non-condensable gas decreases with condensate inflow, the air vent opens and discharges it to outside of the product.

Then, operations 2 and 3 repeats according to the inflow amount of condensate and air.



Condensate



Steam

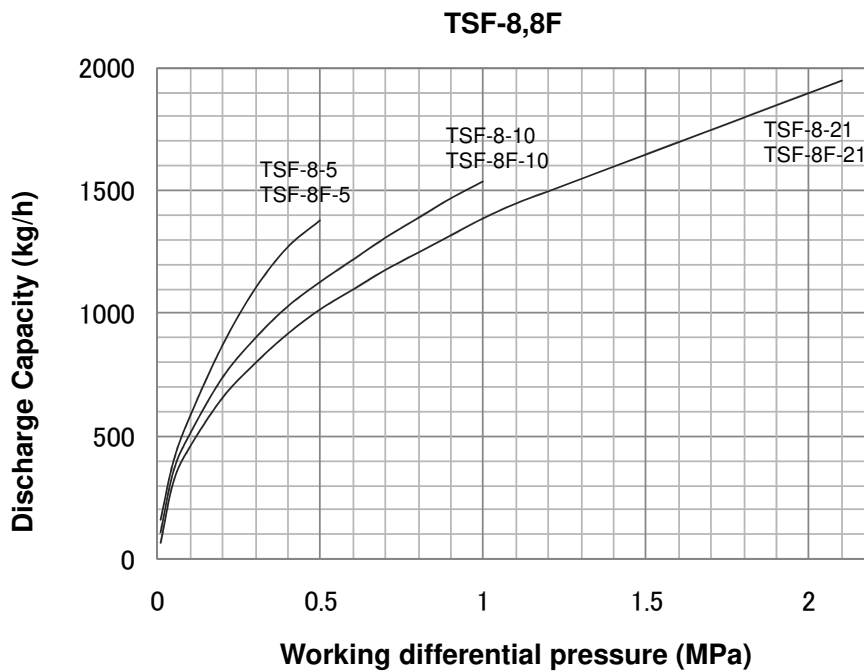


Air

5. Maximum Continuous Discharge Capacity

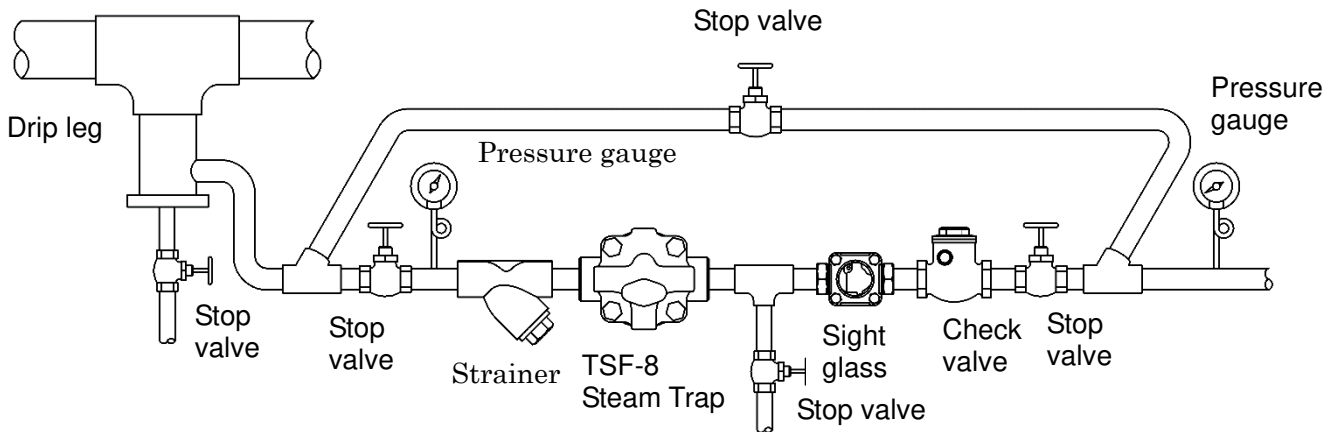
1. Discharging capability of the steam trap differs by working differential pressure, that is, difference between inlet pressure and outlet pressure (back pressure). In selecting discharge capacity, consider outlet pressure. If inlet pressure is 0.5 MPa and outlet pressure is 0.2 MPa, discharge capacity is of working differential pressure of 0.3 MPa.
2. The discharge capacity shown in the charts below is the maximum value. In designing a system, select a steam trap with a sufficient safety factor (two times the regular level). That is, for example, if a discharge capacity of 500 kg/h is required, select a steam trap capable of discharging more than 1,000 kg/h (maximum discharge).

Maximum Continuous Discharge Capacity Chart

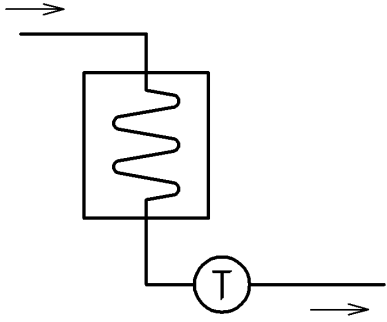
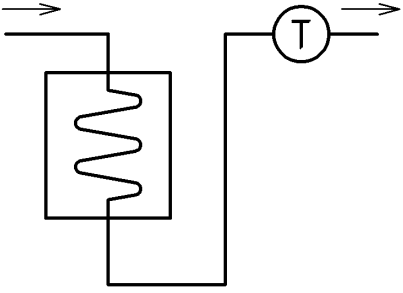
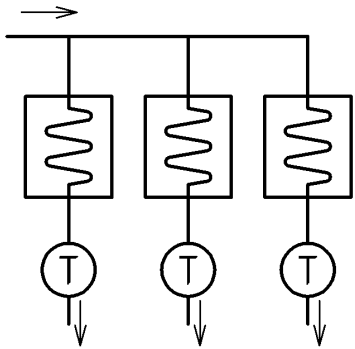
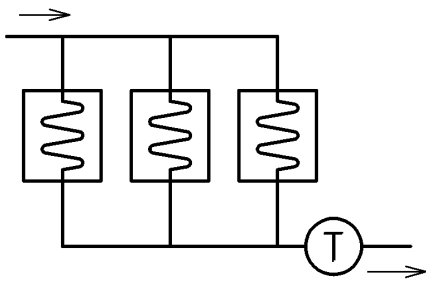
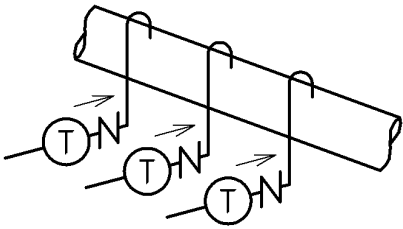
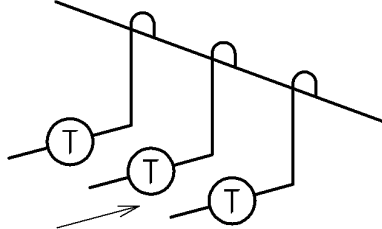
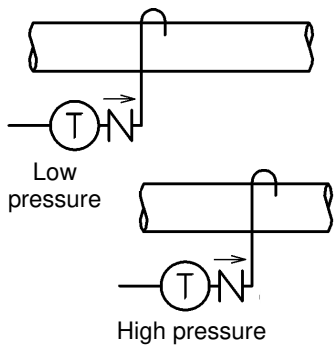
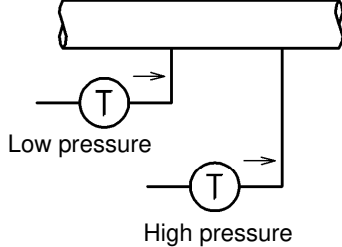


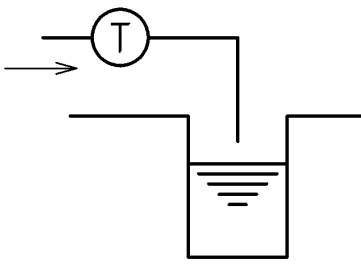
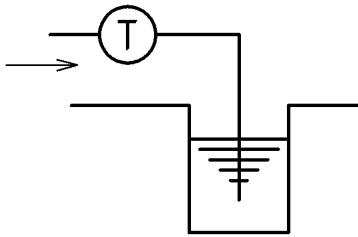
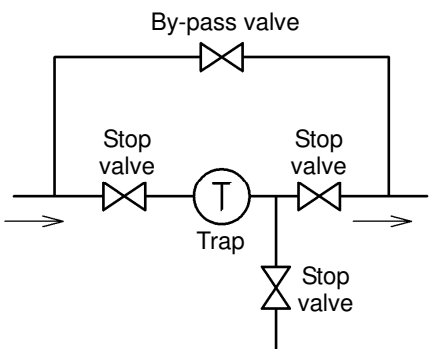
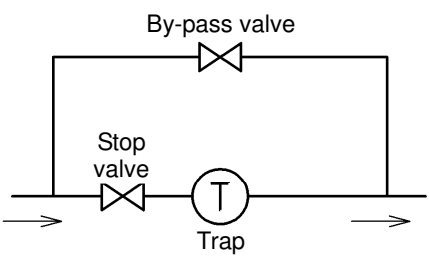
6. Installation

6.1 Piping example



Description	Correct	Incorrect
<p>If the product is installed close to a regulating valve, make sure to install the product at the inlet side of the regulating valve.</p>		
<p>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.</p>		

Description	Correct	Incorrect
<p>Install the product below a device which generates condensate.</p>		
<p>Install the products for each device independently.</p>		
<p>The diameter of collecting pipe shall be more than summation of sectional areas of discharge pipes. In addition, install check valves for back flow prevention.</p>		
<p>For condensate recovery, connect the discharge pipe to the upper part of collecting pipe. For traps of different pressure lines, install collecting pipes individually for each pressure. In addition, install check valves for back flow prevention.</p>		 <p>* Re-evaporated steam in high pressure line increases the back pressure of low pressure trap.</p>

Description	Correct	Incorrect
<p>End portion of discharge pipe shall be off the water surface in the pit.</p>		 <p>* If the discharge pipe is in contact with the water, it sucks up dirty water in the pit and causes malfunction of the product.</p>
<p>Provide a by-pass line around the product, and install stop valves at the outlet side of the product.</p>		

6.2 Precaution for installation

Warning

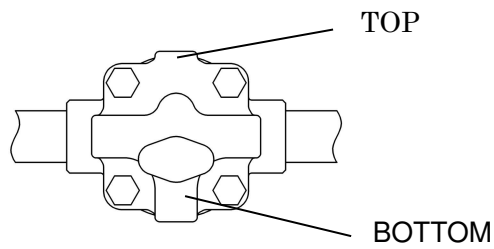
- In order to discharge condensate to the atmosphere, lead the outlet to a safe place where there is no possibility of physical damage even if condensate blows out.
 - * Failure to follow this notice may result in scalds or injury when condensate blows out.

Caution

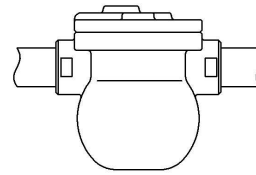
- Before connecting the product to piping, remove foreign substances and scale from the piping.
 - * Failure to follow this notice may prevent the product from functioning properly.
 - * To plumb the product, be careful to keep seal materials from entering into the product.
- To install the product, 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. Check installation posture.

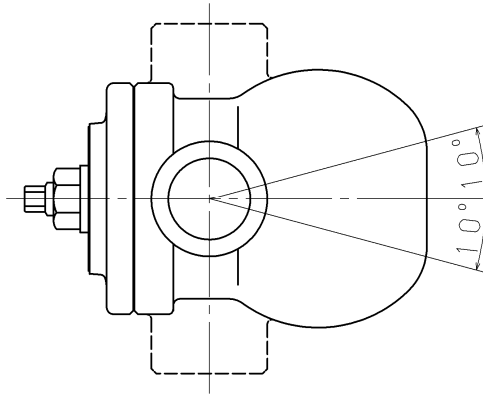
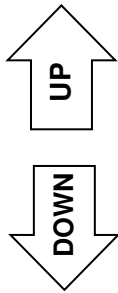
* Wrong posture hampers proper operation.



WRONG



* Allowable tilt from horizontal line is within $\pm 10^\circ$.



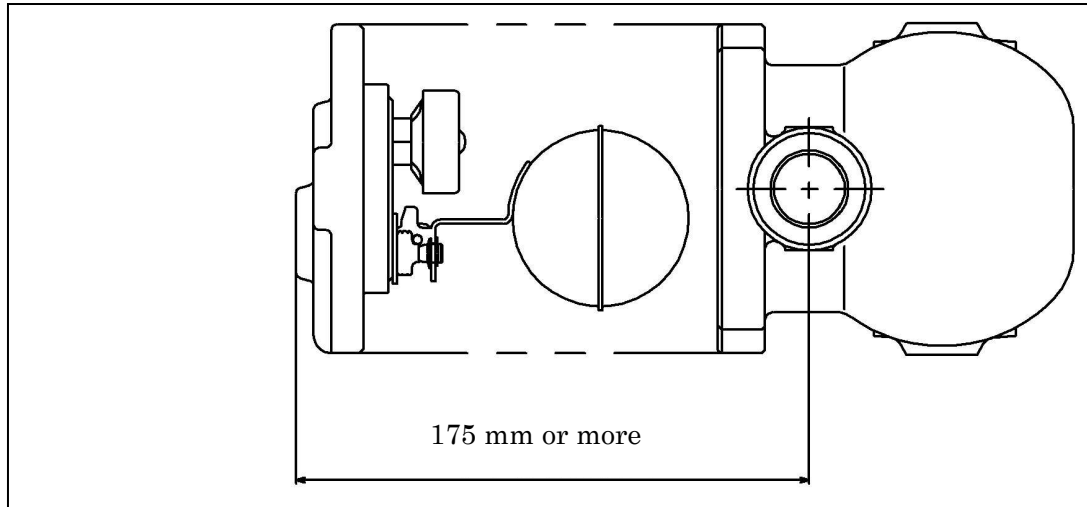
4. Make sure to support the piping immovably.

* If an excessive piping stress is applied, the product may not open or close.

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

* Disassembly may prevent the product from functioning properly.

6. 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.



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. To install the product in a main steam pipe, provide a drip leg at the inlet side of the product.
9. Install a strainer (mesh size of 80 or more is recommended) at the inlet side of the product.
10. Install the product so that it is not subjected to the shock of water hammer. Do not install a quick operating valve before and/or after the product.
 - * Failure to follow this notice may result in malfunction due to damage to the float or air vent, or may result in scalds or injury due to blow off when the product is subjected to an excessive shock and damaged.
11. Install a bypass line.
 - * The system has to stop operation while inspection and maintenance of the product if the bypass line is not installed.

7. Operating Procedure

7.1 Precaution for operating procedure

 **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 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 to prevent water hammer.
* Opening stop valves quickly may result in damage to other equipments due to hunting or water hammer.

8. Maintenance

8.1 Precaution for maintenance

 **Warning**

1. Do not touch the product with bare hands.
* Failure to follow this notice may result in burns.
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.
 * Failure to follow this notice may prevent the product from functioning properly.
 * See "8.3 Troubleshooting" on Page 12 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 assemble, 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 repairing, 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.)

8.2 Daily and periodic inspections

Conduct daily and periodic inspections in order to maintain the optimal performance of the product. See "8.3 Troubleshooting" on Page 12 for the remedies if trouble is observed.

- Daily inspection (once a day)

Conduct daily inspection during operation of the product.

Items	Standards for Inspection
Discharge condition of condensate	Condensate is discharged smoothly.
Outside leakage	No outside leakage of condensate or steam.

- Periodic inspection (once a year)

Conduct disassembly inspection periodically.

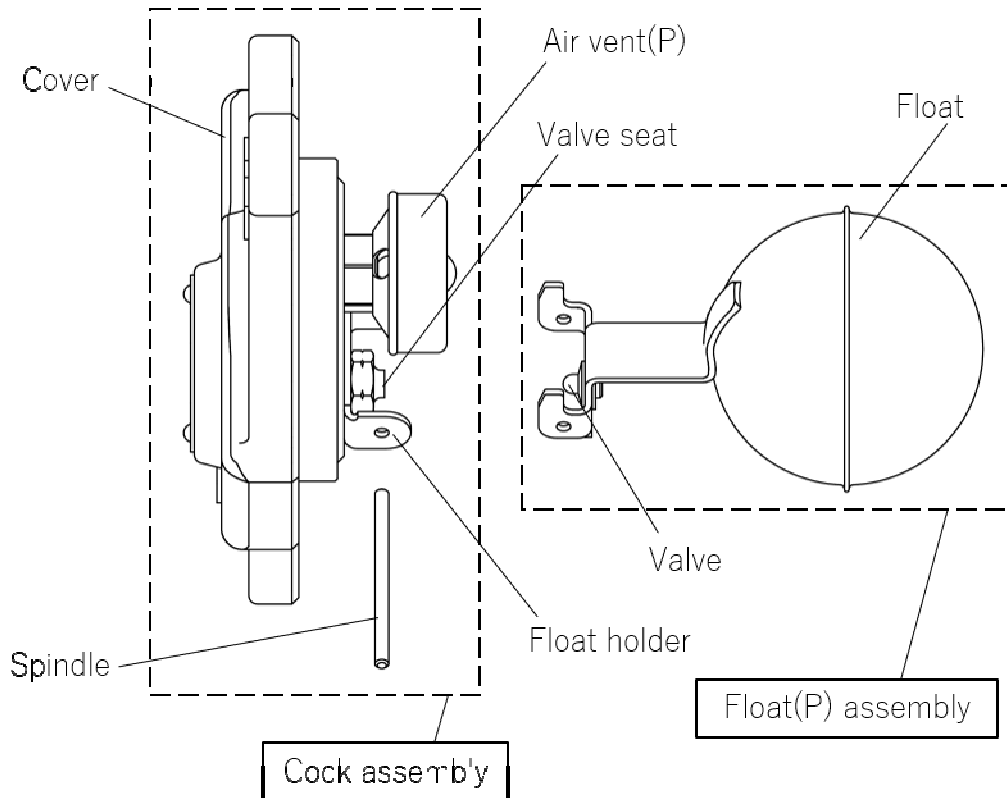
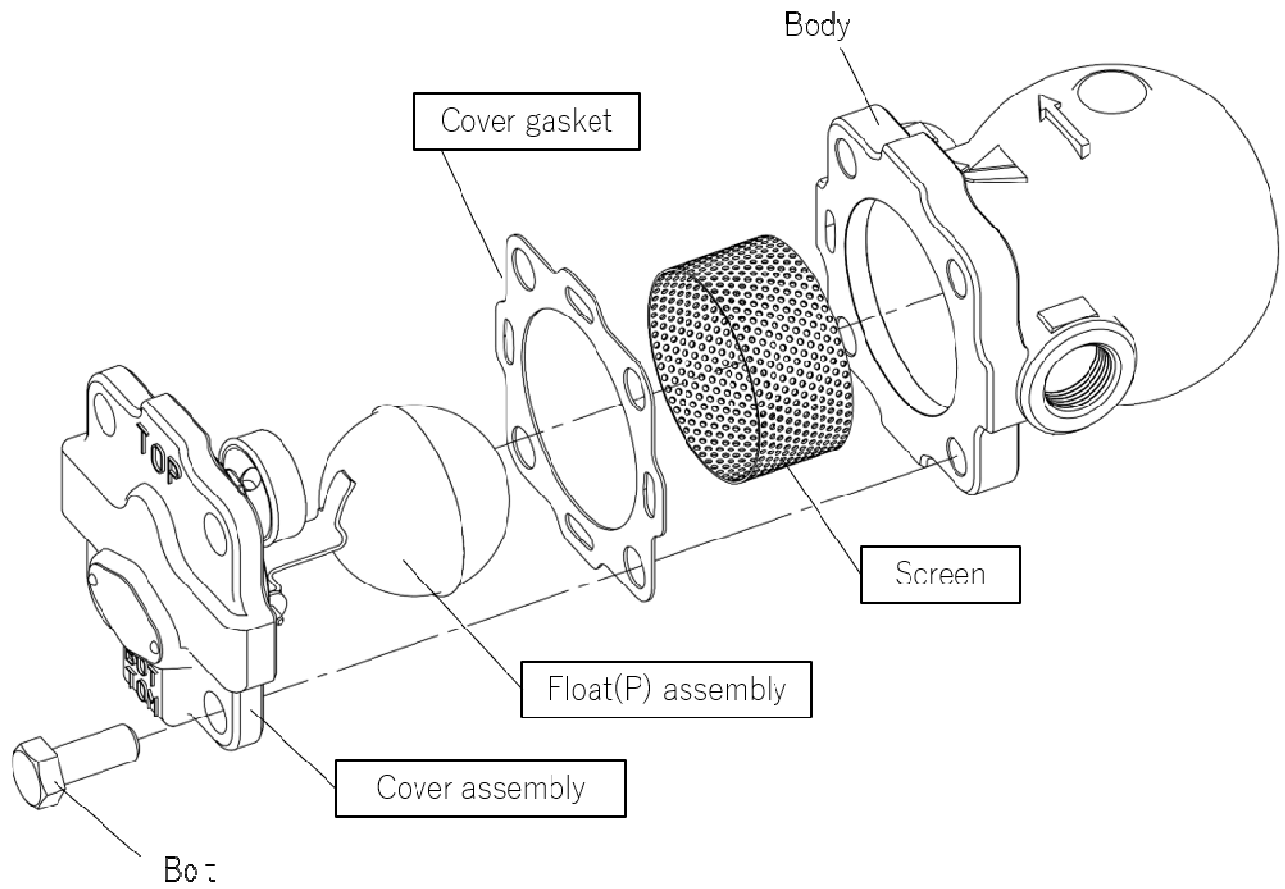
Items	Standards for Inspection
Seating surfaces of the valve and valve seat	No scratch, abrasion, or foreign substances on seating surfaces.
Shape of float (P)	No deformation or damage on the float (P)
Dirt on the screen	No clogging on the screen

8.3 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 is clogging.	2. Disassemble and clean it.
	3. The float (P) is damaged.	3. Replace it with a new one.
	4. Breakage as a result of abnormal pressure rising due to freezing or water hammer, etc.	4. Replace the product with new one and use it within the working pressure range.
	5. Steam locking.	5. Change the piping system layout.
	6. "TOP" and "BOTTOM" signs on the name plate are in wrong positions.	6. Adjust direction of the name plate to position "TOP" and "BOTTOM" signs on upside and downside respectively. * See Caution No. 3, "6.2 Precaution for installation" on Page 8.
Continuous blowout.	1. Foreign substances stuck on valve, valve seat or air vent (P).	1. Disassemble and clean them.
	2. Abrasion or scratches on the valve, valve seat or air vent (P).	2. Replace the parts with new ones.
	3. Insufficient capacity of the product.	3. Replace the product with another model of sufficient capacity.
	4. "TOP" and "BOTTOM" signs on the name plate are in wrong positions.	4. Adjust direction of the name plate to position "TOP" and "BOTTOM" signs on upside and downside respectively. * See Caution No. 3, "6.2 Precaution for installation" on Page 8.
Steam leakage.	1. Leakage due to loosening of the bolt.	1. Replace the cover gasket with new one, and retighten the bolt.
	2. Leakage as a result of abnormal pressure rising due to freezing or water hammer, etc.	2. Replace the product with new one and use it within the working pressure range.

8.4 Exploded drawing

The parts shown in the rectangle boxes are available as consumable supply.
The air vent(P) cannot be removed from the cover.

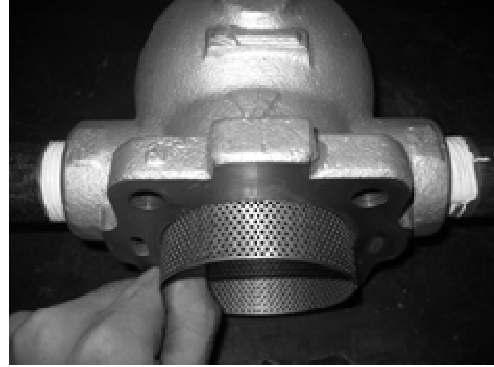


8.5 Disassembly

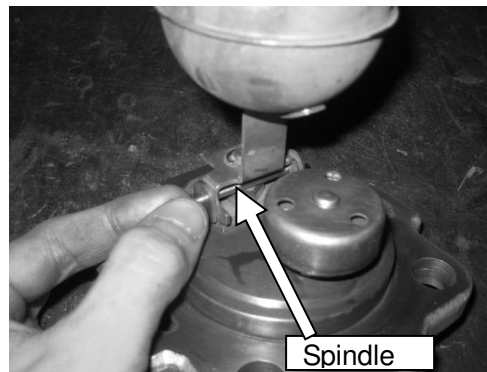
- Tools to be used

Name of tool	Size (Nominal size)
Ring wrench	19 mm

- [Procedure 1] Loosen the bolts fixing the cover with ring wrench (width across flat: 19 mm), and remove the cover and gasket from the body. Pull out the screen from the body.



- [Procedure 2] Pull out the spindle from the float holder and remove the float (P) assembly.

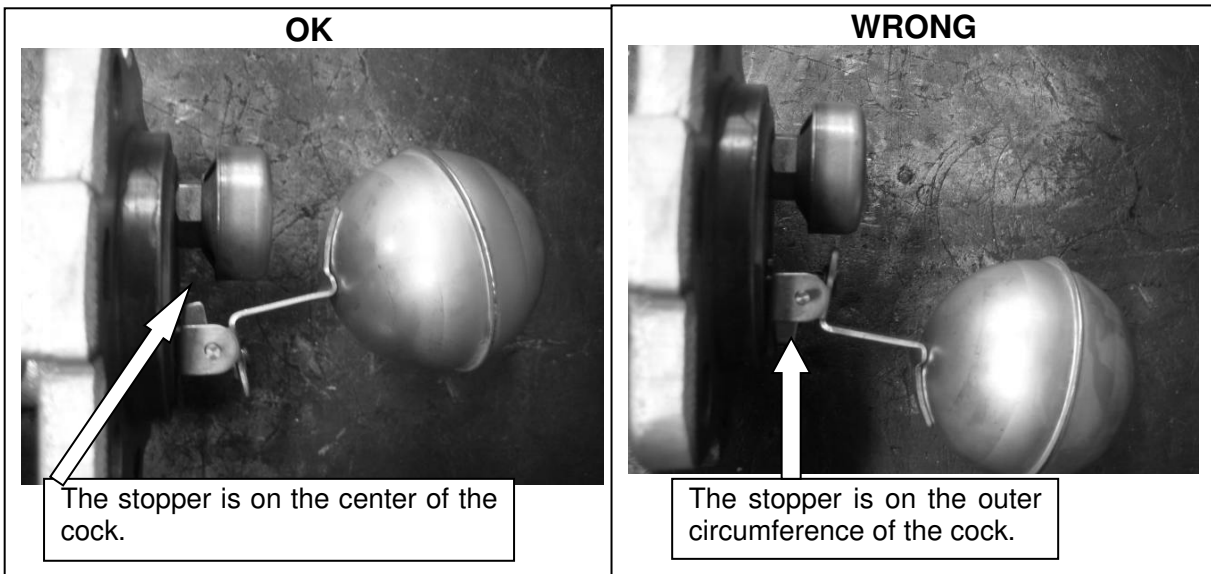


8.6 Reassembly

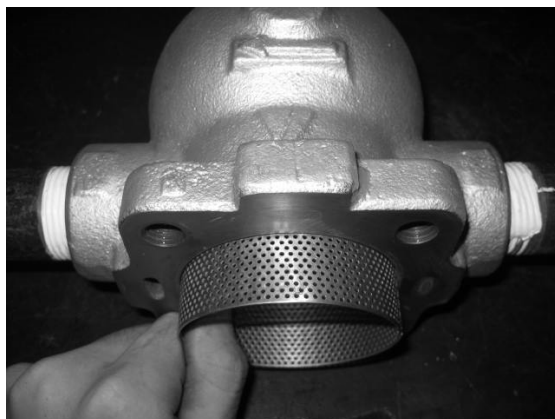
- Tools to be used

Name of tool	Size (Nominal size)
Torque Wrench	* Tightenable with torque of 45 N·m Width across flat: 19 mm

[Procedure 1] Connect the float holder and float (P) assembly with the spindle. Check that the float (P) assembly moves smoothly, and that the seat surface of the valve is in contact with that of the valve seat.



[Procedure 2] Attach the screen to the body. The screen can be inserted from either end.



[Procedure 3] Install the cover gasket to the cover. Make the oval-shaped holes on the cover and on the cover gasket in the same position. Make sure to use a new cover gasket. Apply lubricant agent to the cover gasket (Recommendation: SOLVEST No.110 paste, STT Inc.).



[Procedure 4] Install the cover to the body. Tighten the bolt with torque wrench (width across flat: 19 mm) with torque of 45 N·m.
 * Do not use impact wrench to tighten the bolt. Using it may cause unevenly tightened bolt or damaged gasket, resulting in outside leakage of condensate or steam.



8.7 Parts replacement procedure

Part name	Disassembly (See 8.5.)	Reassembly (See 8.6.)
Cover gasket	Procedure 1	Procedures 3 to 4
Float (P) assembly	Procedures 1 to 2	Procedures 1 to 4
Cover assembly	Procedures 1 to 2	Procedures 1 to 4
Screen	Procedure 1	Procedures 2 to 4

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.