



# **TRAP STAR**<sup>TM</sup> MODEL TSF-13, 13F STEAM TRAP

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.

 <b>Warning</b>	This symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.
 <b>Caution</b>	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

---


1. Specifications.....	1
2. Dimensions and Weights .....	2
3. Operation.....	3
4. Maximum Continuous Discharge Capacity.....	4
5. Installation	
5.1 Piping example .....	5-6
5.2 Precaution for installation .....	7-8
6. Operating Procedure	
6.1 Precaution for operating procedure .....	9
7. Maintenance	
7.1 Precaution for maintenance.....	9
7.2 Daily and periodic inspections.....	10
7.3 Troubleshooting.....	11
7.4 Exploded drawing .....	12
7.5 Disassembly .....	13-14
7.6 Reassembly.....	15-17
7.7 Parts replacement procedure.....	17
8. TSF-13, 13F with Steam Lock Release (SLR) .....	18
Warranty Information	

## 1. Specifications

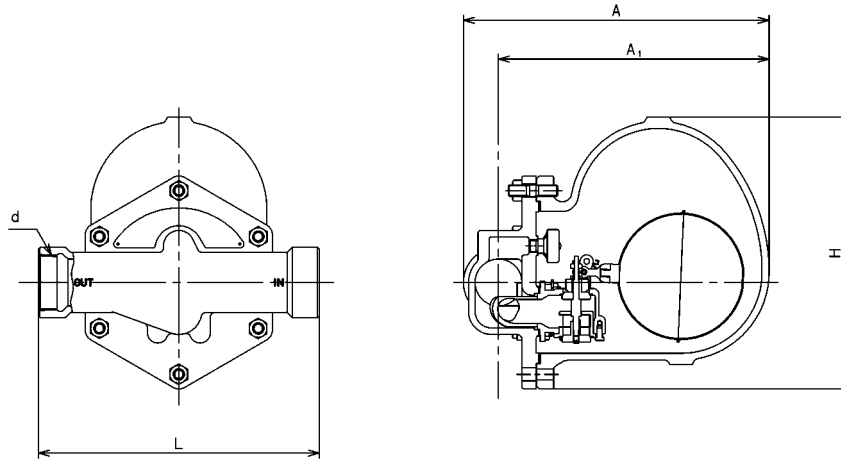
Model	TSF-13	TSF-13F	
Nominal size	40A,50A		
Application	Steam condensate		
Max. pressure	1.6MPa	1.0MPa	1.6MPa
Maximum working differential pressure (ΔPMX)	TSF-13-5: 0.5 MPa TSF-13-10:1.0 MPa TSF-13-14:1.4 MPa	TSF-13F-5: 0.5MPa TSF-13F-10: 1.0 MPa	TSF-13F-5: 0.5MPa TSF-13F-10: 1.0MPa TSF-13F-14: 1.4 MPa
Minimum working differential pressure	0.01MPa		
Max. temperature	220°C		
Material	Body	Ductile cast iron	
	Float	Stainless steel	
	Valve, valve seat	Stainless steel	
Connection	JIS Rc screwed NPT screwed	JIS10KRF ASME150 LB	JIS20KRF EN PN16/25 ASME300 LB

\* For installation posture, see 3 of “5.2 Precaution for installation” .

\* Install a strainer (recommended: 80 mesh) at the inlet side to protect TSF-13 from scale or other foreign substances. Due to the double-port structure, foreign substances stuck on the valve and valve seat may cause significant steam leakage.

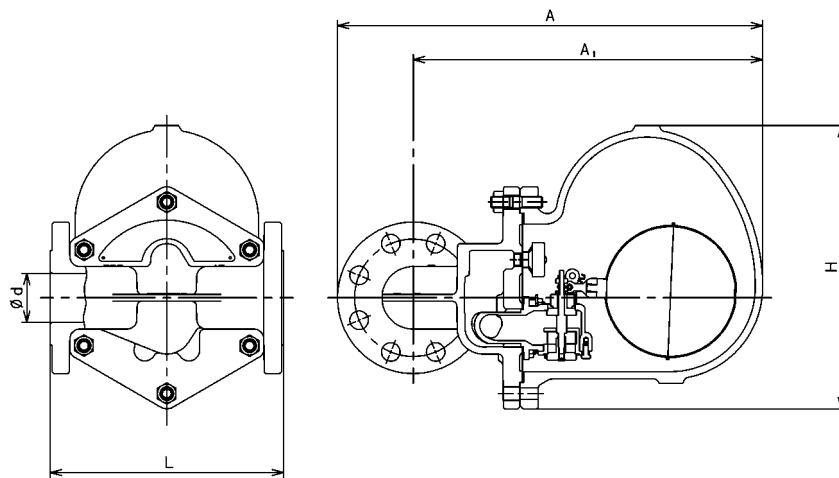
 <p style="margin: 0;"><b>Caution</b></p>	<ol style="list-style-type: none"> <li>1. Depending on application, specification of the product shall be selected. Refer to Technical material, e.g. Operating instruction, Technical guidebook, and drawing, and select suitable specification. Regarding technical material like drawing, contact our sales office.</li> <li>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.</li> </ol>
--	--

## 2. Dimensions and Weights



(mm)

Model	Nominal size	Connection	d	L	A	A <sub>1</sub>	H	Weight (kg)
TSF-13	40A	JIS Rc	1 1/2	270	313	281	290	19.0
	50A	NPT	2	300	328	291	290	20.0



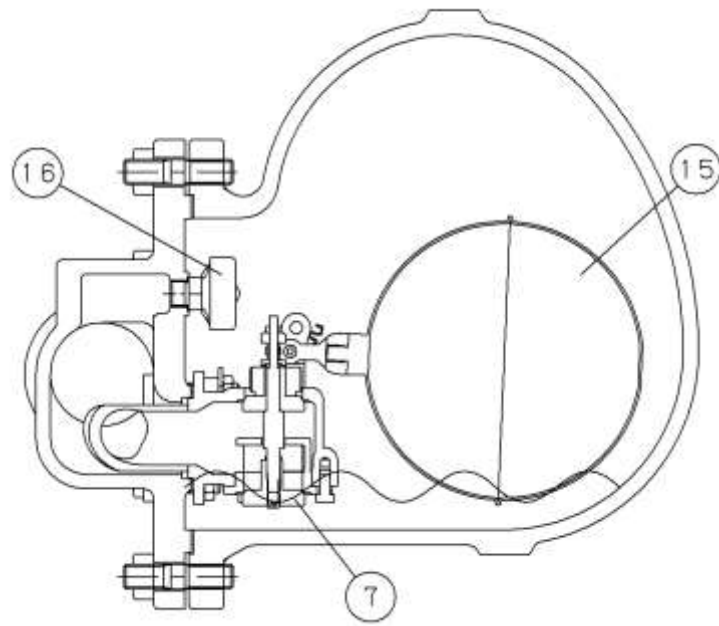
(mm)

Model	Nominal size	Connection	d	L	A	A <sub>1</sub>	H	Weight (kg)
TSF-13F	40A	JIS10KRF/20KRF	40	228	423	353	290	24.0
		EN PN16/25	40	230	428	353	290	24.5
		ASME150LB	40	221	416	353	290	23.0
		ASME300 LB	40	221	431	353	290	25.7
	50A	JIS10KRF/20KRF	50	239	436	358	290	25.0
		EN PN16/25	50	230	441	358	290	25.3
		ASME150 LB	50	220	433	358	290	24.5
		ASME300 LB	50	239	441	358	290	26.8

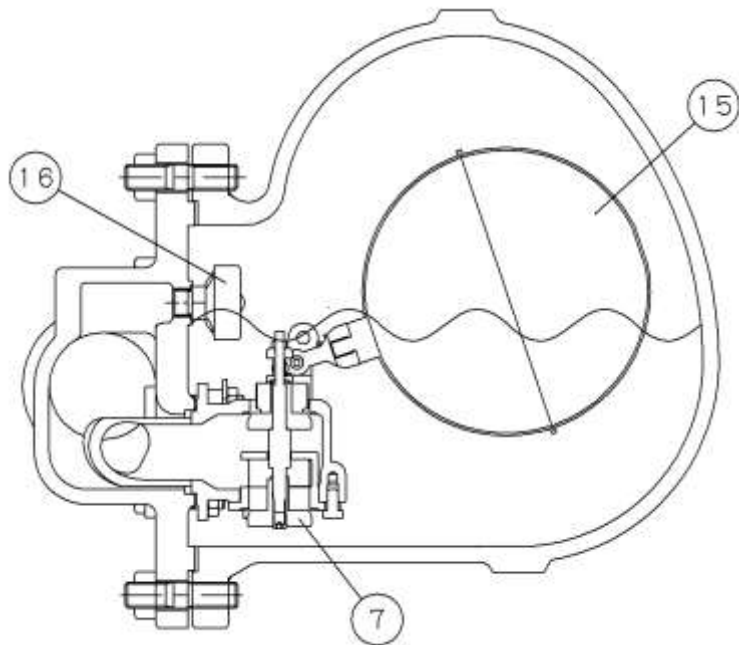
---

### 3. Operation

---



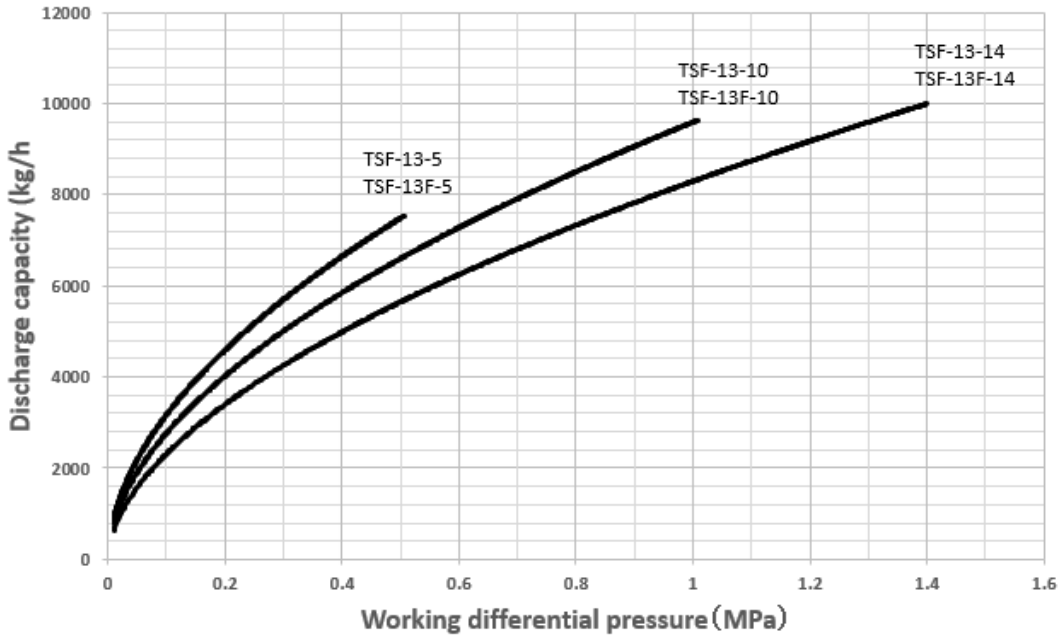
At start-up, since the ⑮float is down, the ⑦valve set is closed. In this state, air in the system and piping is discharged out through the ⑯air vent which is opened.



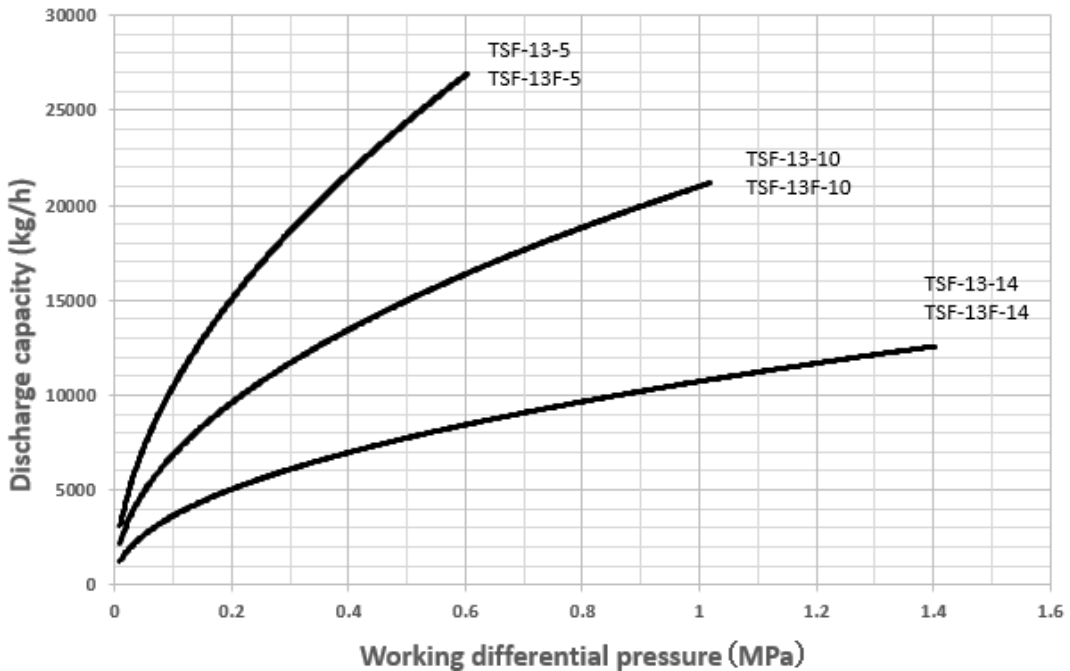
When condensate flows into the product, the ⑮float lifts up and opens the ⑦valve set, and then discharges condensate. Air is continuously discharged out from the ⑯air vent. When steam flows into the product, internal pressure of the ⑯air vent rises by steam temperature, and the ⑯air vent closes. According to the amount of condensate inflow, the ⑮float position moves up and down changing the opening degree of the ⑦valve set, and thus condensate is continuously discharged.

## 4. Maximum Continuous Discharge Capacity

1. Discharging capacity 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 (at least twice). That is, for example, if a discharge capacity of 2000 kg/h is required, select a steam trap capable of discharging more than 4000 kg/h (maximum discharge).



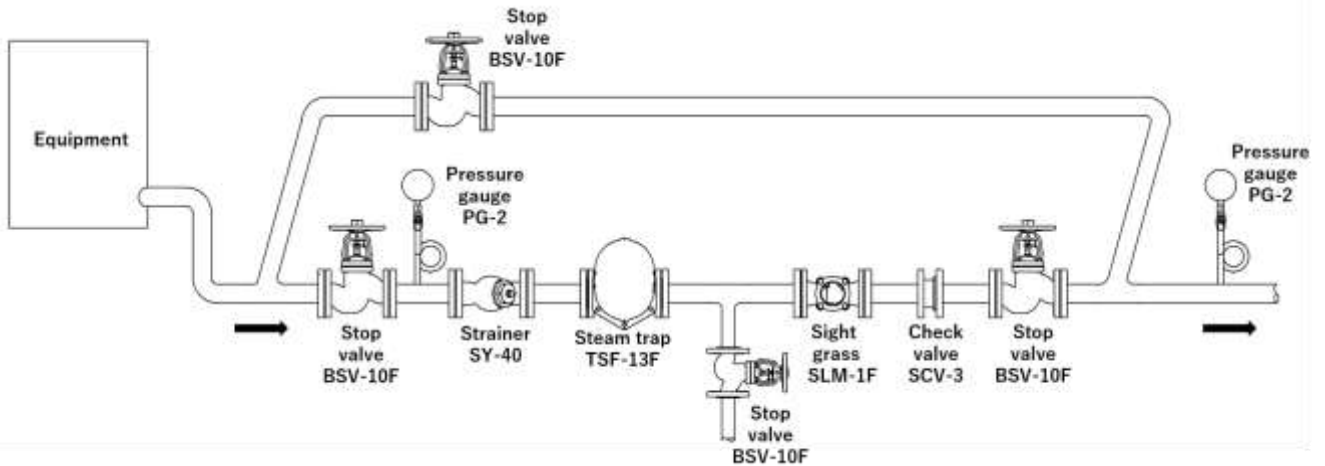
### Maximum Continuous Discharge Capacity of TSF-13 40A



### Maximum Continuous Discharge Capacity of TSF-13 50A

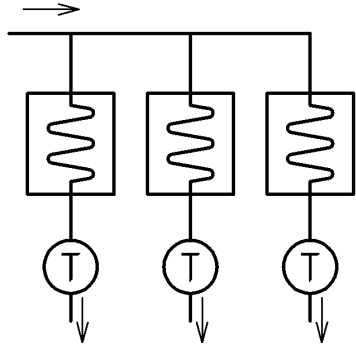
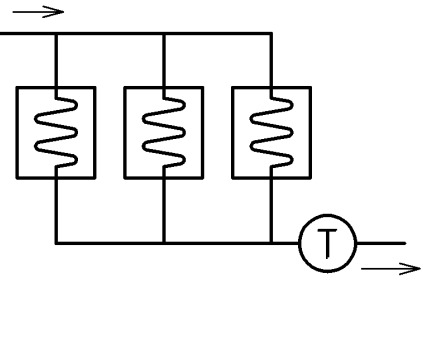
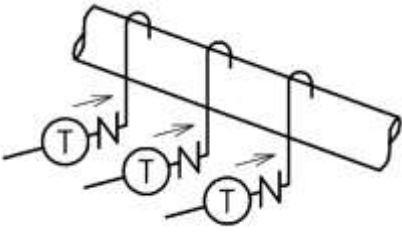
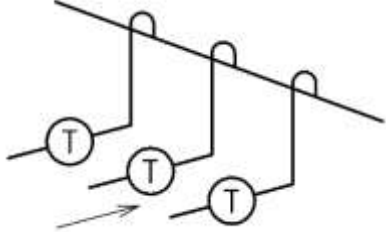
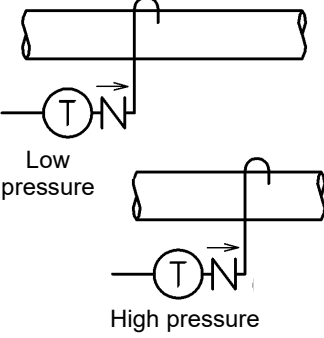
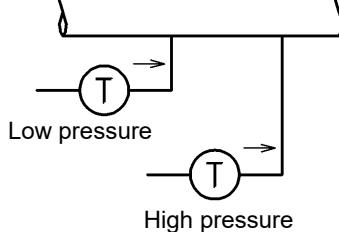
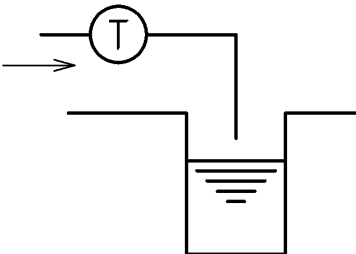
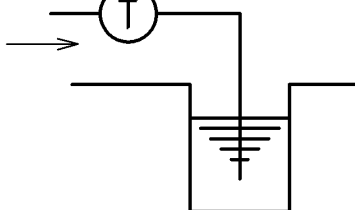
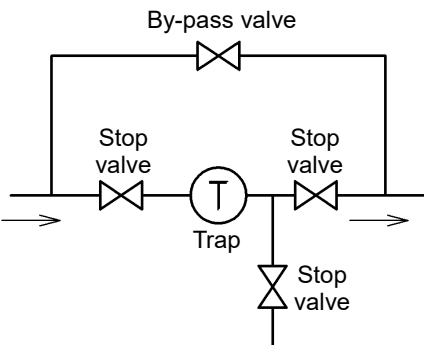
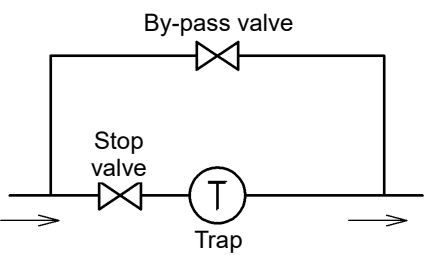
## 5. Installation

### 5.1 Piping example



\*Pipe size of the outlet side of the product should be large enough so that the discharged condensate flows without any resistance.

Description	Correct	Incorrect
If the product is installed close to a regulating valve, make sure to install the product at the inlet side of the regulating valve.		
To discharge condensate from the steam main, be sure to install the product on piping taken from the lower part of drip leg.		
Install the product below a device which generates condensate.		

Description	Correct	Incorrect
Install the products for each device independently.		
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.		
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 data-bbox="1034 1149 1453 1249">* Re-evaporated steam in high pressure line increases the back pressure of low pressure trap.</p>
End portion of discharge pipe shall be off the water surface in the pit.		 <p data-bbox="1034 1525 1453 1648">* If the discharge pipe is in contact with the water, it absorbs dirty water in the pit and causes malfunction of the product.</p>
Provide a by-pass line around the product, and install stop valves at the outlet side of the product.		

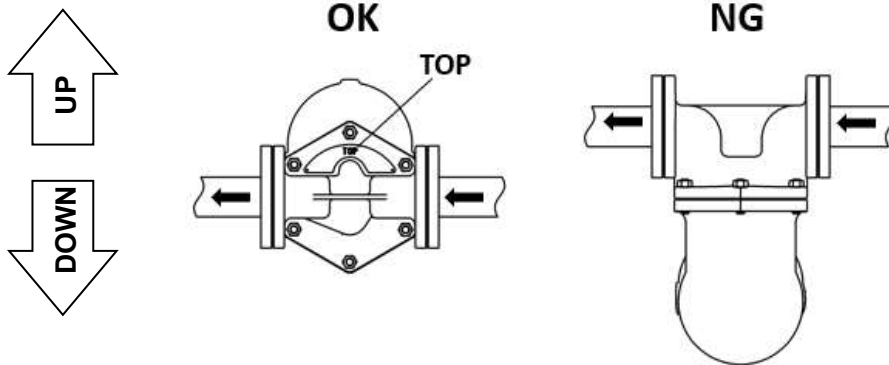
## 5.2 Precaution for installation

### ⚠ Warning

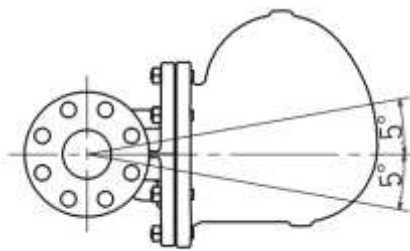
1. In order to discharge condensate to the atmosphere, lead the outlet to a safe place where there is no possibility of physical damage even if condensate blows out.
  - \* There are risks of scalding or injury when the condensate blows out.

### ⚠ 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. To install the product, check the direction of the product so that the fluid flowing and the arrow mark on the product are in the same direction.
  - \* Setting the product in wrong directions prevents it from functioning properly.
3. **The mounting position of the product is horizontal piping. Do not tilt the product during use.**
  - \* Do not install in vertical piping.
  - \* Wrong posture hampers proper operation.



- \* Allowable tilt from horizontal line is within  $\pm 5^\circ$ .
- \* Support the product cover when it is necessary.



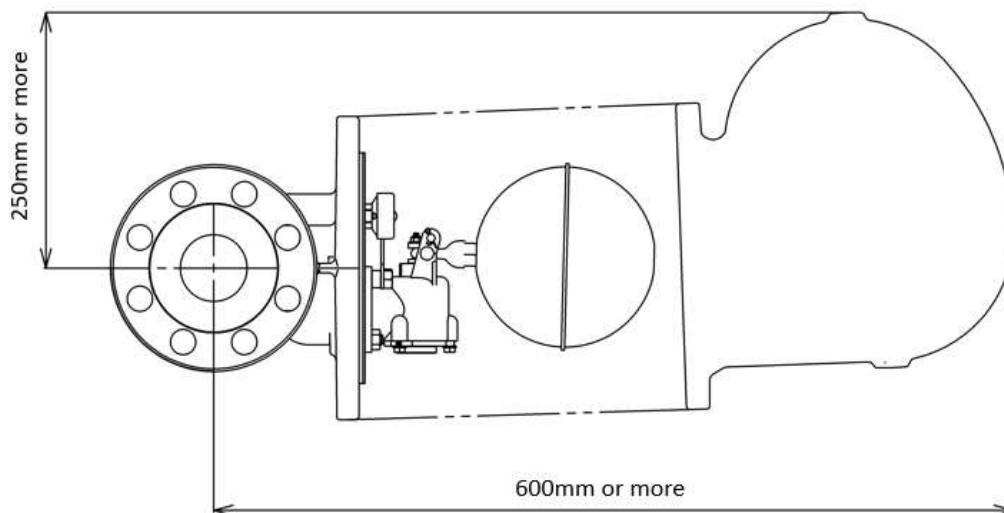
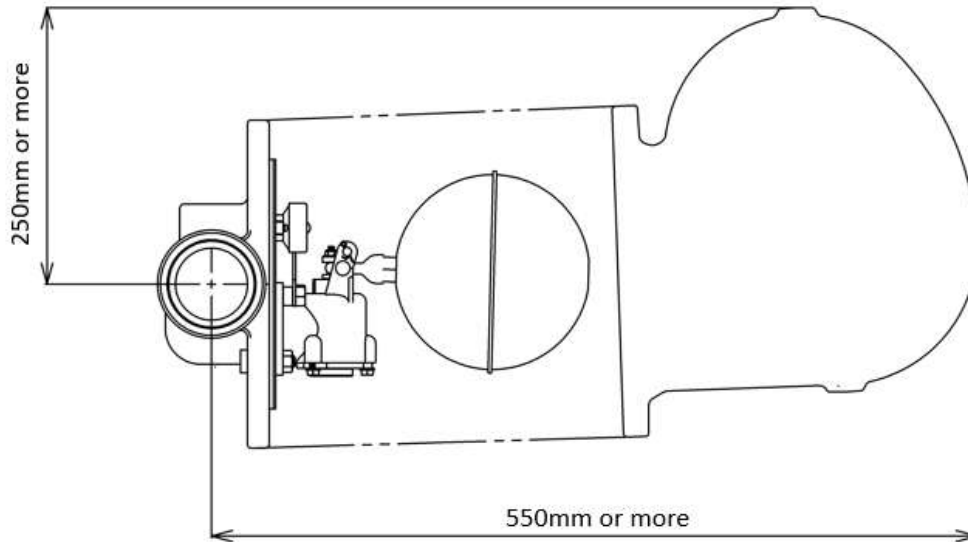
4. Make sure to support the piping immovably.
  - \* If an excessive piping stress is applied, there are cases when the product will not open or close.
5. Do not disassemble the product unless it is necessary.
  - \* Unnecessary disassembly may prevent the product from functioning properly.



6. Secure enough space for maintenance, inspections and repair as shown below.

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

\*Common to 40A and 50A



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 in a way 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 ⑮float or ⑯air 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.

12. Pipe size of the outlet side of the product should be large enough so that the discharged condensate flows without any resistance.

\* If the outlet piping causes resistance, the specified discharge amount may not be obtained.

---

## 6. Operating Procedure

---

### 6.1 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.
  - \* There are risks of scalding or injury when the steam or condensate blows out.
2. Do not touch the product with bare hands while the product operates.
  - \* There are risks of scalding.
3. Do not stand in front of the outlet opening of the product while the product operates.
  - \* There are risks of scalding or injury due to blow off.

#### **Caution**

1. Slowly open each stop valve to prevent water hammer.
  - \* When opening stop valves quickly, there are cases when the equipment will be damaged due to hunting or water hammer.

---

## 7. Maintenance

---

### 7.1 Precaution for maintenance

#### **Warning**

1. Do not touch the product with bare hands.
  - \* There are risks of scalding.
2. Completely discharge internal pressure of the product, piping and equipment, and cool down the product prior to disassembly or maintenance.
  - \* There are risks of scalding 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 "7.3 Troubleshooting" on Page12 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.

#### **Caution**

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.)

## 7.2 Daily and periodic inspections

Conduct daily and periodic inspections in order to maintain the optimal performance of the product. See "7.3 Troubleshooting" on Page 13 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)

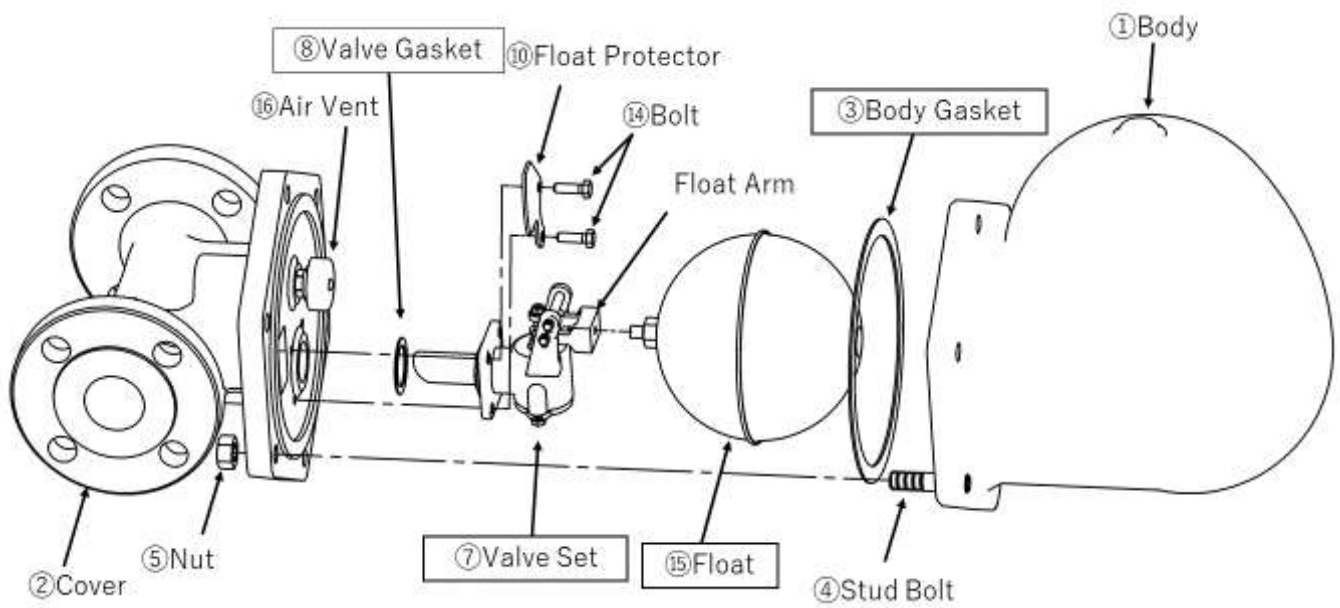
Conduct disassembly inspection periodically.

Items	Standards for Inspection
Seat surfaces of the valve and valve seat	No scratch or foreign substances on seat surfaces. *See Procedure 3, "7.5 Disassembly" on Page 15.
Shape of float	No deformation or damage on the ⑮float *See Procedure 1~2, "7.5 Disassembly" on Page 15. See Procedure 3~5, "7.6 Reassembly" on Page 19.

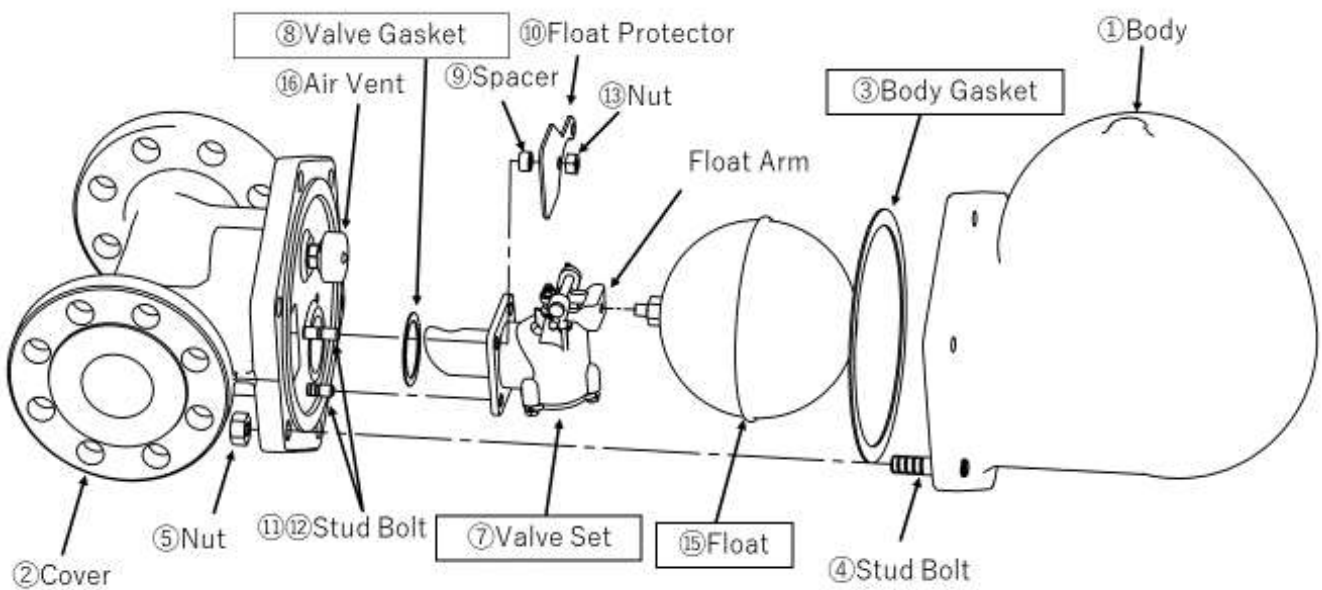
### 7.3 Troubleshooting

Trouble	Cause	Remedy
Condensate is not discharged.	1. Blockage of foreign substances in the valve seat.	1. Clean the ⑦valve set. *See Procedure 3, "7.5 Disassembly" on Page 15.
	2. ⑮Float is broken	2. Change it into new one.
	3. Breakage as a result of abnormal pressure rising due to freezing or water hammer, etc.	3. Replace the product with new one. *See Procedure 1~2, "7.5 Disassembly" on Page 15. *See Procedure 3~5, "7.6 Reassembly" on Page 19.
	4. Steam locking.	4. Change the piping system layout.
	5. Product is in wrong posture.	5. Install it correctly. *See Caution No. 3, "5.2 Precaution for Installation" on Page 7.
Trouble	Cause	Remedy
Continuous blowout.	1. Foreign substances stuck on valve or valve seat.	1. Clean the valve set. *See Procedure 3, "7.5 Disassembly" on Page 15.
	2. scratches on the valve or valve seat.	2. Replace the ⑦valve set. *See Procedure 1~2,4 "7.5 Disassembly" on Page 15~16. *See Procedure 1~5, "7.6 Reassembly" on Page 17~19.
	3. Insufficient capacity of the product.	3. Replace the product with another model of sufficient capacity.
	4. Product is in wrong position.	4. Install it correctly *See Caution No. 3, "5.2 Precaution for Installation" on Page 6.
Steam leakage.	1. Leakage due to loosening of the ⑤nut fixing the ①body and ②cover, or damage due to deterioration of ③body gasket.	1. Replace the ③body gasket with new one, and retighten the ⑤nut. *See Procedure 1, "7.5 Disassembly" on Page 15. *See Procedure 4~5, "7.6 Reassembly" on Page 19.
	2. Leakage as a result of abnormal pressure rising due to freezing or water hammer, etc.	2. Replace the product with new one.

## 7.4 Exploded drawing



40A Exploded drawing



50A Exploded drawing

\*The parts shown in the rectangle boxes are available as consumable supply.

\*The ⑯air vent cannot be removed from the ②cover.

\*⑦Valve Set can not be disassembled.

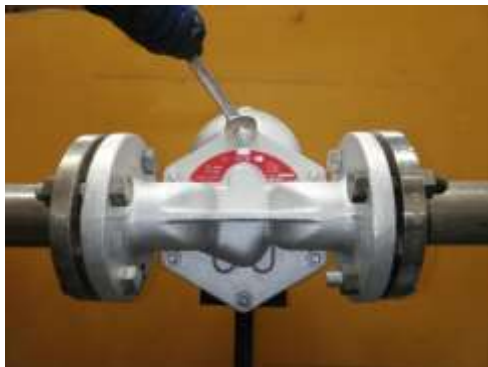
## 7.5 Disassembly

- Tools to be used

Name of tool	Size (Nominal size)
Spanner	Width across flat:10 mm*1, 13 mm*2, 17mm, 19mm

\*1For 40A \*2 For 50A

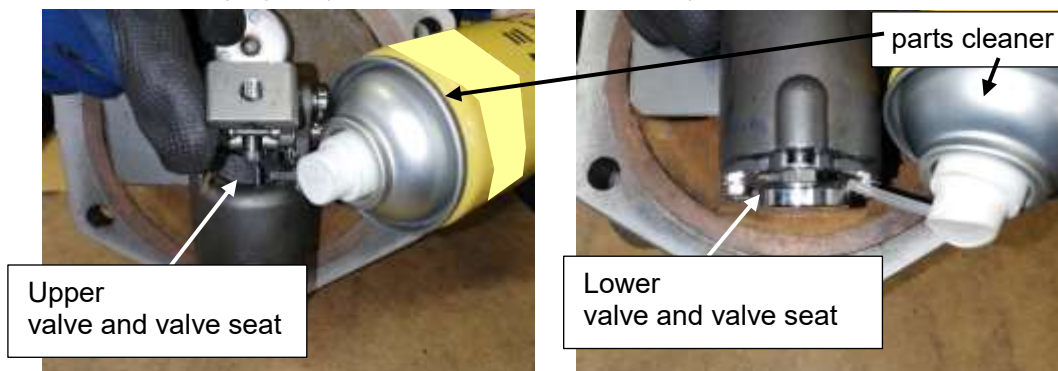
- [Procedure 1] Remove the ⑤ nut that secures the ① body with a spanner (19 mm width across flats), and remove the ① body and the ③ body gasket from the ② cover.



- [Procedure 2] Remove the ⑮ float from the float arm with a wrench (width across flats 17mm).



- [Procedure 3] Clean the upper and lower valve and valve seat of the ⑦ valve set with a cleaning agent (recommended: parts cleaner).



\*⑦ Valve Set can not be disassembled.

[Procedure 4] Remove the ⑦valve set from the ②cover.

40A :Remove the ⑭hexagon bolt with a spanner (width across flats: 10 mm).



Remove the ⑩float protector and remove the ⑦valve set from the ②cover.



50A :Remove the ⑬nut with a spanner (13 mm width across flats) and remove the ⑩float protector.



Remove the ⑨spacer and remove the ⑦valve set from the ②cover.



## 7.6 Reassembly

- Tools to be used

Name of tool	Size (Nominal size)
Torque Wrench	Tightenable with torque of 70N·m Width across flat: 19 mm
Torque Wrench	*1 Tightenable with torque of 9 N·m, Open-head type Width across flat: 10 mm
Torque Wrench	*2 Tightenable with torque of 15 N·m Width across flat: 13 mm

\*1For 40A \*2 For 50A

[Procedure 1] Check that the following set is complete.



Apply a paste-like lubricant (recommended: STT Inc, SOLVEST No. 110) to the ⑧ valve gasket, and attach it to the ⑦ valve set.





[Procedure 2] Attach the ⑦ valve set to the ② cover.



40A: Attach the ⑩ float protector and tighten the ⑭ hexagon bolt with a wrench (width across flats: 10 mm) to a torque of 9 Nm. Also, tighten the ⑭ hexagon bolts of each part uniformly so that they are not one-sided.



50A: Attach the ⑩ float protector and ⑨ spacer, and tighten the ⑬ nut with a torque wrench to a torque of 15 Nm. Also, tighten the ⑬ nuts of each part uniformly so that they are not completely tightened. If the ⑪ ⑫ stud bolt is loose, use a double nut and tighten with a spanner (width across flats 13 mm).



[Procedure 3] Apply adhesive (Henkel LOCTITE 272 recommended) to the threads of the ⑮float. Then attach the ⑮float to the float arm using a spanner (width across flats 17mm).



[Procedure 4] Apply paste-like lubricant (recommended: STT Inc, SOLVEST No.110) to the ③body gasket, and attach it to the ①body. If the ④stud bolt is loose, use a double nut and tighten with a spanner (width across flats 19 mm).



[Procedure 5] Attach the ②cover to the ①body and use a ⑤nut with a torque wrench (19 mm width across flats) at a torque of 70 Nm. Also, tighten the ⑤nuts of each part uniformly so that they are not completely tightened.



## 7.7 Parts replacement procedure

Part name	Disassembly (See 7.5.)	Reassembly (See 7.6.)
③Body gasket	Procedure 1	Procedures 4 to 5
⑮Float	Procedures 1 to 2	Procedures 3 to 5
⑦Valve Set	Procedures 1 to 2 & 4	Procedures 1 to 5

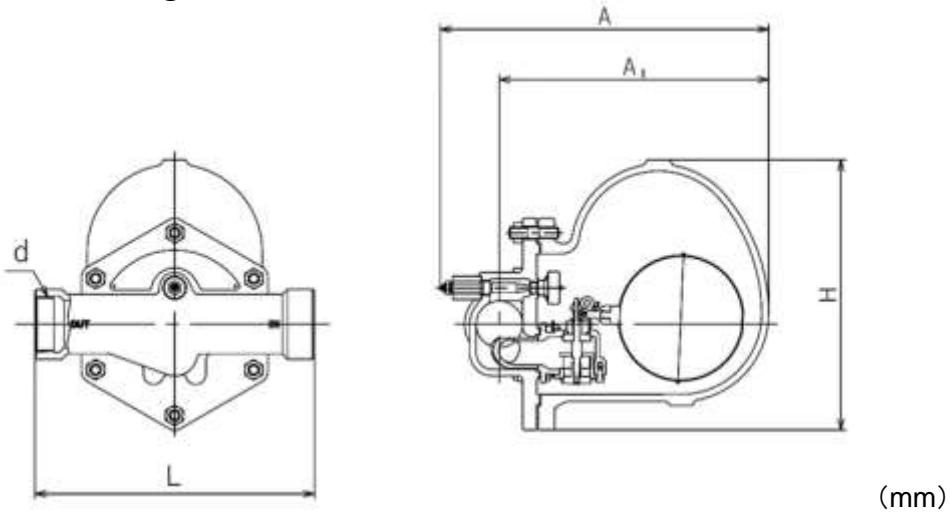
## 8. TSF-13,13F with Steam Lock Release (SLR)

### 8.1 What is SLR

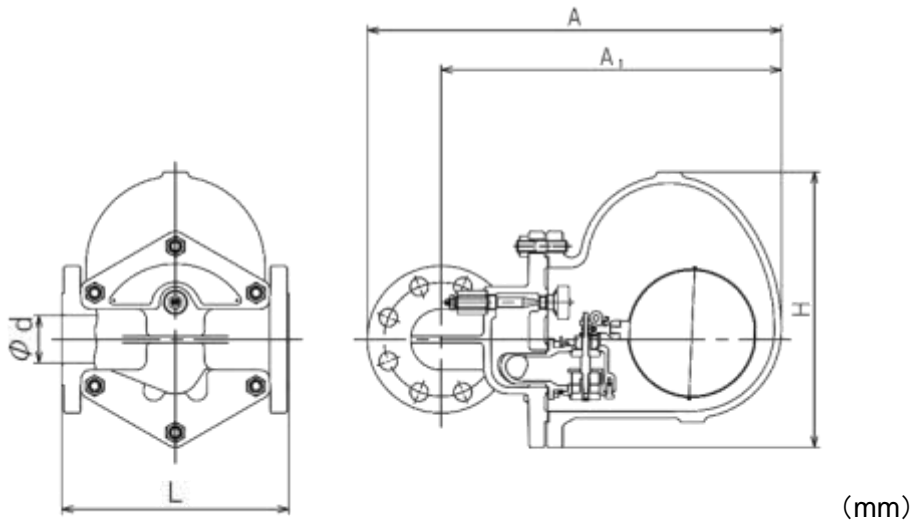
If you need the product with ⑩ Steam Lock Release (SLR), please let us know when you purchase. It cannot be attached to the standard product later.

Steam locking occurs when the pipe to the trap is filled with steam and the steam prevents condensate from flowing into the trap. The ⑩ SLR bypasses the ⑩ Air Vent to discharge steam and prevent steam locking.

### 8.2 Dimensions and Weights

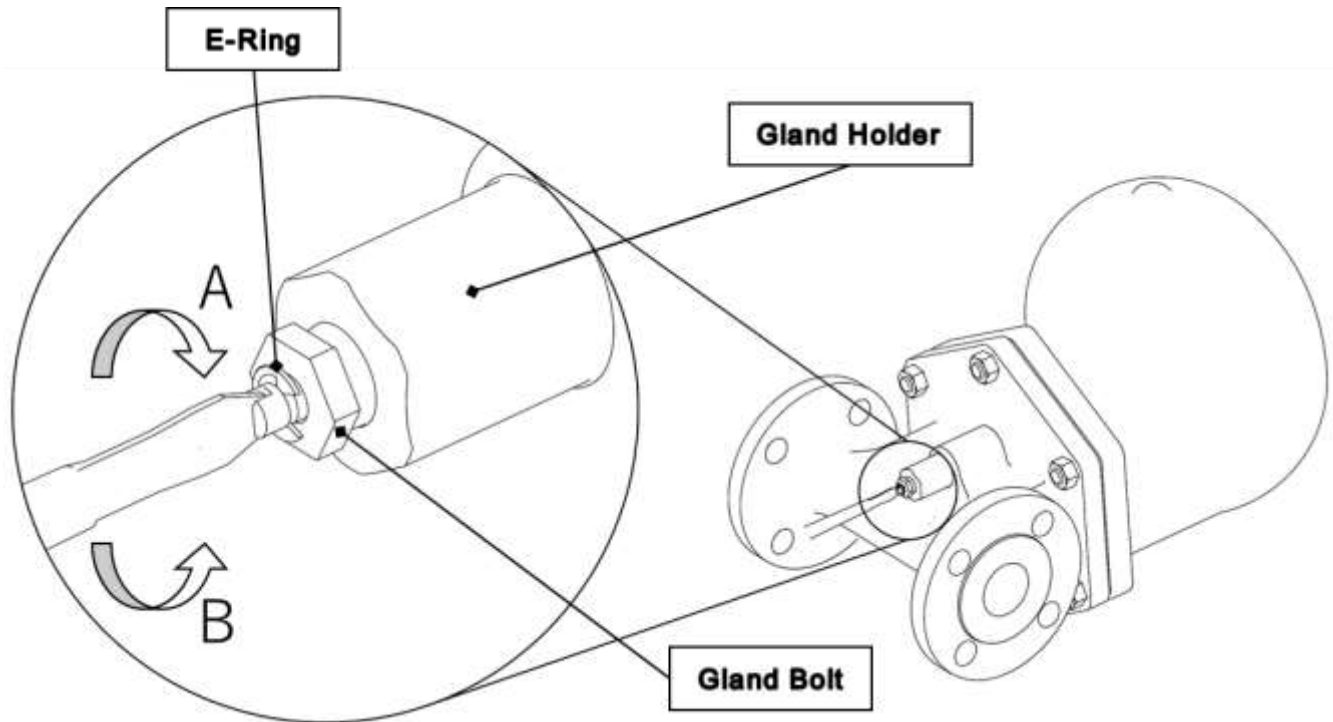


Model	Nominal size	Connection	d	L	A	A <sub>1</sub>	H	Weight (kg)
TSF-13	40A	JIS Rc	1 1/2	270	355	281	290	19.0
	50A	NPT	2	300	355	291	290	20.0



Model	Nominal size	Connection	d	L	A	A <sub>1</sub>	H	Weight (kg)
TSF-13F	40A	JIS10KRF/20KRF	40	228	423	353	290	24.0
		EN PN16/25	40	230	428	353	290	24.5
		ASME150LB	40	221	416	353	290	23.0
		ASME300 LB	40	221	431	353	290	25.7
	50A	JIS10KRF/20KRF	50	239	436	358	290	25.0
		EN PN16/25	50	230	441	358	290	25.3
		ASME150 LB	50	220	433	358	290	24.5
		ASME300 LB	50	239	441	358	290	26.8

### 8.3 How to use SLR



(1) To open the ⑩ Air Vent

Turn the slotted head of ⑩ SLR in the direction of A by a flathead screwdriver. The more you screw in, the more the ⑩ Air Vent opens. However, do not screw in beyond E ring stopper. If you turn it any further, the ⑩ Air Vent may be damaged.

(2) To use the ⑩ Air Vent normally

Turn the slotted head of ⑩ SLR in the direction of B until it stops. At the time of product shipment, the ⑩ SLR is in this state.

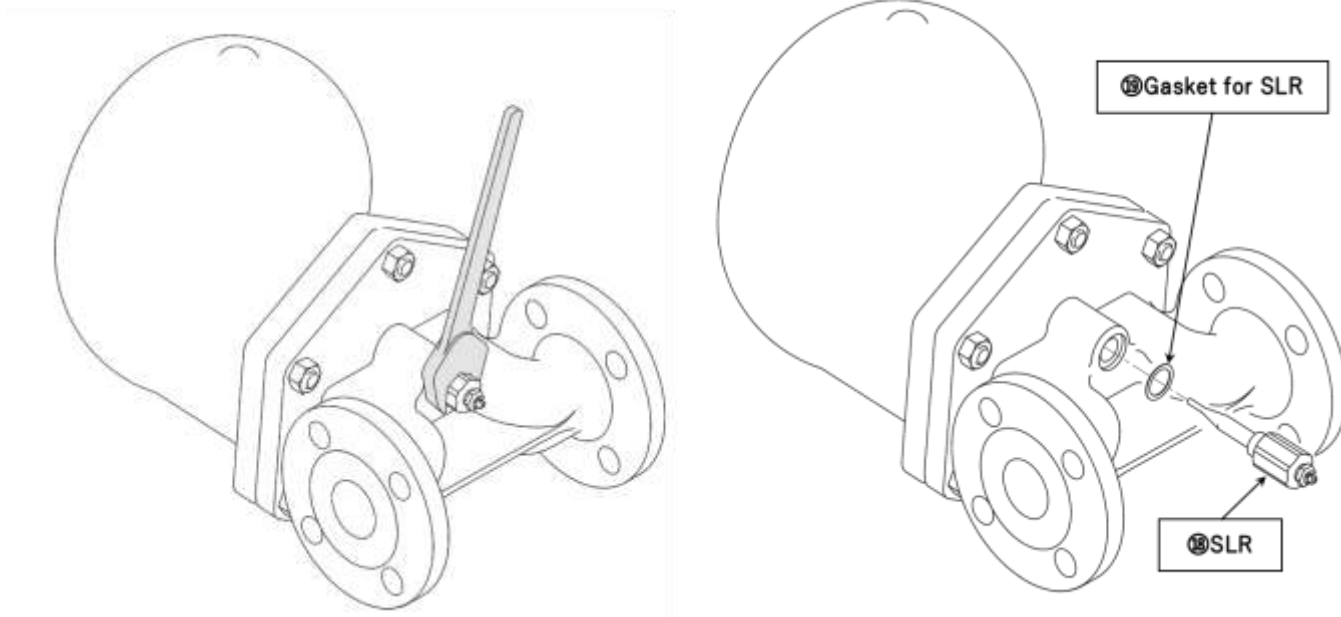
※ Be careful not to strip the slotted head when you turn it.

※ Do not turn Gland Holder or Gland Bolt, or outside leakage may occur.

### 8.4 Troubleshooting

Trouble	Cause	Remedy
Steam leakage	1. Leakage due to loosening of the ⑩ SLR fixing the ② Cover, or damage due to deterioration of ⑩ SLR Gasket.	1. Replace the ⑩ SLR Gasket with new one. *See "8.5 How to replace SLR"
	2. Leakage due to loosening of the Gland Bolt on the ⑩ SLR.	2. Tighten the gland bolt to a torque of 6 Nm.
	3. ⑩ Leakage due to deterioration of the Gland Packing inside the SLR.	3. Replace the ⑩ SLR, ⑩ SLR Gasket with new one. *See "8.5 How to replace SLR"

## 8.5 How to replace SLR



- 【Procedure 1】** Remove the ⑩SLR from ②Cover with a spanner (width across flats: 23mm).
- 【Procedure 2】** Apply a paste-like lubricant (recommended: STT Inc, SOLVEST No. 110) to the ⑪ SLR Gasket, and attach it to the ②Cover.
- 【Procedure 3】** Tighten the ⑩SLR with a wrench (width across flats: 23 mm) to a torque of 50 Nm.