



Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001/14001



Instruction Manual

Free Float Steam Trap **JH7RH-B**

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Introduction

Thank you for purchasing the TLV free float steam trap.

This product has been thoroughly inspected before being shipped from the factory. When the product is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary. Also be sure to read this manual carefully before use and follow the instructions to be sure of using the product properly.

This free float steam trap employs a hinge-less and lever-less free float to rapidly, automatically and continuously discharge the inflowing condensate that is continuously generated inside the equipment, thus preventing the accumulation of condensate and thereby improving the heat transfer efficiency of the equipment. In addition, the integral bimetal type automatic air vent allows for the rapid release of start-up air and thereby reduces start-up time.

These features make this free float steam trap suitable for applications requiring condensate discharge from process systems and equipment (steam-using equipment).

This steam trap also employs a precision-ground float and three-point seating that supports the float securely at three points and ensures a high degree of sealing when even only minute quantities of condensate are present.

This free float steam trap is also ideal for places at which extremely small amounts of condensate are generated, such as superheated and saturated steam mains and branches, and trace lines.

If detailed instructions for special order specifications or options not contained in this manual are required, please contact TLV for full details.

This instruction manual is intended for use with the model(s) listed on the front cover. It is necessary not only for installation but for subsequent maintenance, disassembly/reassembly and troubleshooting. Please keep it in a safe place for future reference.


Safety Considerations

- Read this section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: DANGER, WARNING and CAUTION.
- The three types of cautionary items above are very important for safety: be sure to observe all of them as they relate to installation, use, maintenance, and repair. Furthermore, TLV accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

Symbols

	Indicates a DANGER, WARNING or CAUTION item.
	Indicates an urgent situation which poses a threat of death or serious injury
	Indicates that there is a potential threat of death or serious injury
	Indicates that there is a possibility of injury or equipment/product damage
	<p>NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.</p>
	<p>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.</p> <p>DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).</p> <p>Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.</p> <p>Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.</p>

Continued on the next page

 CAUTION	<p>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.</p>
	<p>Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product and burns or other injury due to malfunction or the discharge of fluids.</p>
	<p>Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>
	<p>Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>

Checking the Piping

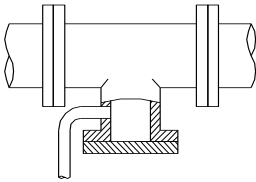
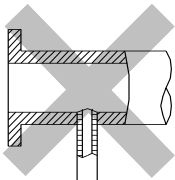
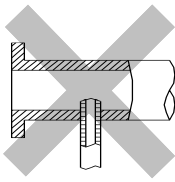
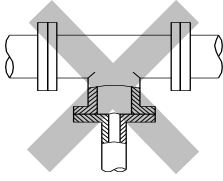
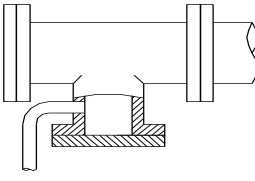
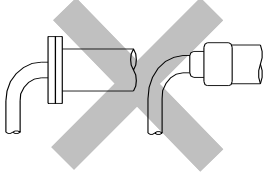


Use only under conditions in which no water hammer will occur.

The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

Check to make sure that the pipes to be connected to the product have been installed properly.

1. Is the pipe diameter suitable?
2. Is the piping where the product is to be installed horizontal?
3. Has sufficient space been secured for maintenance?
4. Have maintenance valves been installed at the inlet and outlet? If the outlet is subject to back pressure, has a check valve (TLV-CK) been installed?
5. Is the inlet pipe as short as possible, with as few bends as possible, and installed so the liquid will flow naturally down into the product?
6. Has the piping work been done correctly, as shown in the figures below?

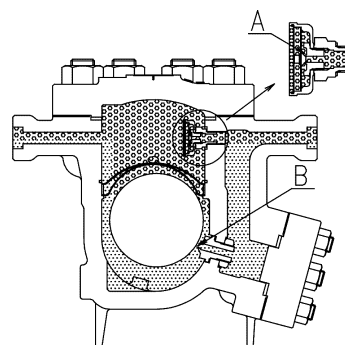
Requirement	Correct	Incorrect
Install catchpot with the proper diameter.		 Diameter is too small.
Make sure the flow of condensate is not obstructed.		 Diameter is too small and inlet protrudes into pipe interior.
To prevent rust and scale from flowing into the product, the inlet pipe should be connected 25 to 50 mm (1 to 2 in) above the base of the T-pipe.		 Rust and scale flow into the product with the condensate.
When installing on the blind end, make sure the flow of condensate is not obstructed.		 Condensate collects in the pipe.

Operation

Principles of air and condensate discharge:

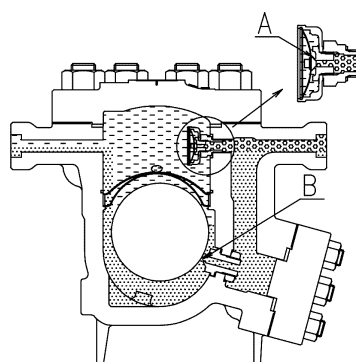
1. Initial Air and Cold Condensate Discharge

At startup, before steam is supplied the system is cold and the bimetal plate is flexed downward, keeping the air vent valve (A) open. When steam is first supplied to the system, air is discharged through the vent (A) while cold condensate is discharged through the orifice (B).



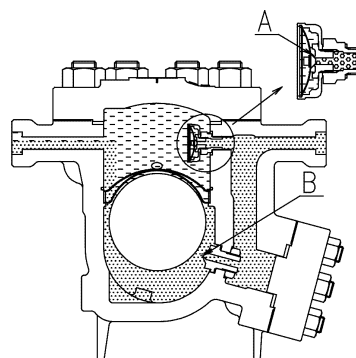
2. Condensate Discharge

After the discharge of initial air and cold condensate, the heat of the inflowing steam and condensate cause the bimetal plate to flex upward, closing the air vent valve (A). The rising condensate level causes the float to rise due to buoyancy, opening the orifice (B) and allowing condensate to be discharged. The flexed bimetal keeps the valve closed while in normal operation.



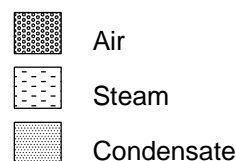
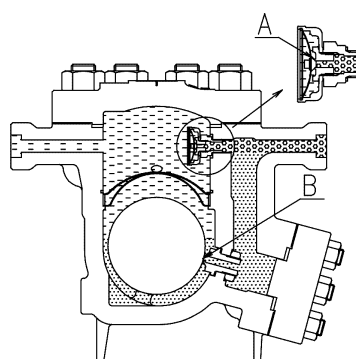
3. Discharge of Large Quantities of Condensate

Increases in the condensate inflow rate cause the condensate level in the trap to rise. The float consequently rises and enlarges the opening of the orifice (B), allowing more condensate to be discharged. In this manner, continuous condensate discharge occurs while the opening size of the orifice varies depending on the condensate flow rate.




4. Closed Position

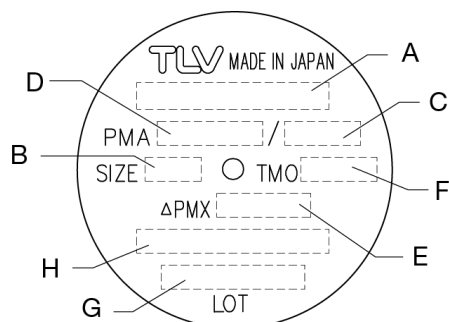
When the condensate flow rate decreases, the float falls, closing off the orifice (B) opening. A water seal is maintained at all times over the orifice (B) to prevent steam loss.



Specifications

 CAUTION	Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.
	DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).
	Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.

Refer to the product nameplate for detailed specifications.

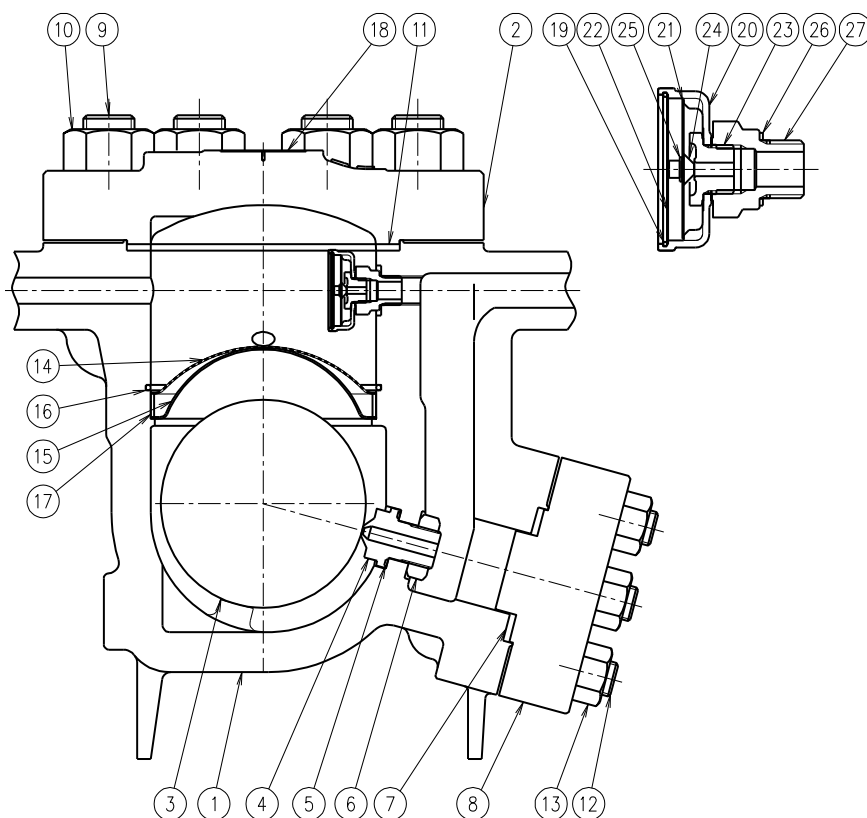


A	Model
B	Nominal Diameter
C	Maximum Allowable Temperature (TMA) *
D	Maximum Allowable Pressure (PMA) *
E	Maximum Differential Pressure (PMX)
F	Maximum Operating Temperature (TMO)
G	Production Lot No.
H	Valve No. **

* Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.


** Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

Configuration



No.	Part Name	Maintenance Kit	Repair Kit	Float
1	Body			
2	Cover			
3	Float			✓
4	Orifice		✓	
5	Orifice Gasket	✓	✓	
6	Orifice Locknut		✓	
7	Outlet Cover Gasket	✓	✓	
8	Outlet Cover			
9	Cover Bolt			
10	Cover Nut			
11	Cover Gasket	✓	✓	
12	Outlet Cover Bolt			
13	Outlet Cover Nut			
14	Screen		✓	
15	Screen Holder			
16	Snap Ring			
17	Screen Holder Retainer			
18	Nameplate			
19	Snap Ring		✓	
20	Air Vent Case		✓	
21	Bimetal Plate		✓	
22	Air Vent Screen		✓	
23	Air Vent Valve Seat		✓	
24	Air Vent Valve Plug		✓	
25	Snap Ring		✓	
26	Air Vent Guide Gasket	✓	✓	
27	Air Vent Guide			

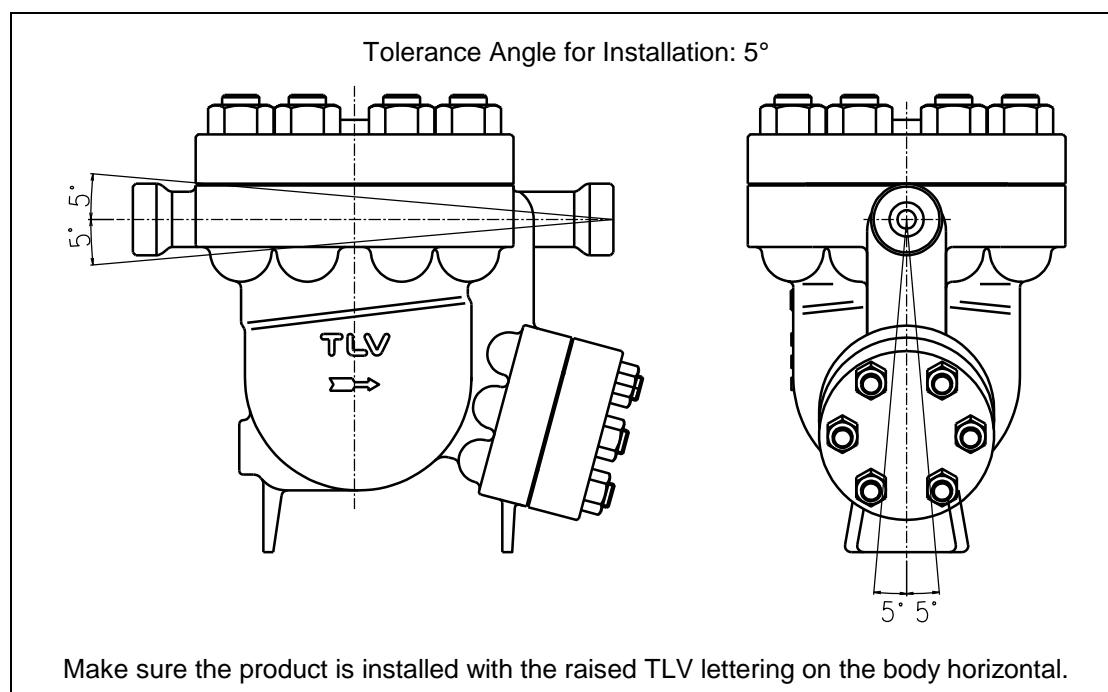
Installation

 CAUTION	Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.
	Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.
	Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.


Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.

1. Before installation, be sure to remove all protective seals.
2. Before installing the product, open the inlet valve and blow out the piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
3. Install the product so the arrow on the body is pointing in the direction of flow.
4. The product should be inclined no more than 5° horizontally and front-to-back.
5. Install a condensate outlet valve and outlet piping.
6. Open the inlet and outlet valves and ensure that the product functions properly.

If there is a problem, determine the cause using the “Troubleshooting” section in this manual.



Maintenance

 CAUTION	Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.
	Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product and burns or other injury due to malfunction or the discharge of fluids.

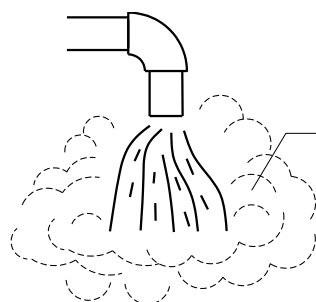
Operational Check

A visual inspection of the following items should be done on a daily basis to determine whether the product is operating properly or has failed. Periodically (at least biannually) the operation should also be checked by using diagnostic equipment, such as a stethoscope or thermometer.

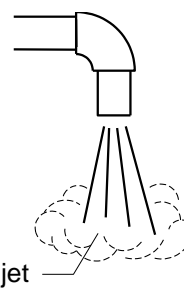
If the product should fail, it may cause damage to piping and equipment, resulting in faulty or low quality products or losses due to steam leakage.

Normal:	Condensate is discharged continuously, together with flash steam, and the sound of flow can be heard. If there is very little condensate, there is almost no sound of flow.
Blocked: (Discharge Impossible)	No condensate is discharged. The product is quiet and makes no noise, and the surface temperature of the product is low.
Blowing:	Live steam continually flows from the outlet and there is a continuous metallic sound.
Steam Leakage:	Live steam is discharged through the product outlet together with condensate, accompanied by a high-pitched sound.

Flash Steam



Live Steam Leakage



White jet containing water droplets



Clear, slightly bluish jet

Parts Inspection

When parts have been removed, or during periodic inspections, use the following table to inspect the parts and replace any that are found to be defective.

Procedure	
Gaskets:	Check for warping or scratches
Screen:	Check for clogging or corrosion
Bimetal Plate:	Check for damage
Air Vent Valve (and Seat):	Check for damage
Float:	Check for scratches or dents
Body Interior:	Check for build-up
Orifice Opening:	Check for dirt, oil film, wear or scratches

Disassembly/Reassembly

 WARNING	NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.
 CAUTION	Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall. When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

Use the following procedures to remove components. Use the same procedures in reverse to reassemble. (Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

Drain Plug (Option)

Part	During Disassembly	During Reassembly
Drain Plug	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Drain Plug Gasket	Remove the gasket and clean sealing surfaces	Replace with a new gasket

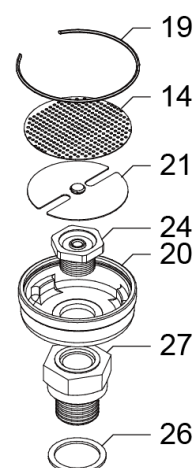
Detaching/Reattaching the Cover

Part	During Disassembly	During Reassembly
Cover Nut 10	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover 2	Remove, being careful not to scratch the gasket sealing surfaces	Make sure there are no pieces of the old gasket left on the sealing surfaces of the body and cover, align the arrows on the body and cover and reattach
Cover Gasket 11	Remove the gasket and clean sealing surfaces	Replace with a new gasket

Disassembly/Reassembly of Air Vent Valve Unit*

Part	During Disassembly	During Reassembly
Snap Ring 19	Pinch the insides together and remove from the cover	Insert securely into groove
Screen 14	Remove, being careful not to misshape	Replace, being careful not to misshape
Bimetal Plate 21, Air Vent Valve Plug 24, Snap Ring 25	Remove air vent parts from case	Make sure to reinsert in the proper orientation (Fig. A)
Air Vent Valve Seat 23	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Air Vent Case 20	Remove Air Vent Case	Place in position
Air Vent Guide 27*	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Air Vent Guide Gasket 26	Remove the gasket and clean sealing surfaces	Replace with a new gasket

Fig. A



*When disassembly is not required, the entire unit may be removed and replaced at the Air Vent Guide with an open wrench.

Detaching/Reattaching Components Inside the Body

Part	During Disassembly	During Reassembly
Snap Ring 16	Pinch the insides together and remove from the body	Insert securely into the slot in the body
Screen 14	Remove by grasping the wire ring and lifting straight up and out	Set the screen on the screen holder and screen holder retainer and insert as far as the snap ring groove
Screen Holder Retainer 17	Remove without bending	Set on the screen holder without tilting
Screen Holder 15	Remove without bending	Place on the ledge inside the body, making sure that the rounded side is on top
Float 3	Remove, being careful not to scratch the polished surface	Insert, being careful not to scratch the polished surface
Outlet Cover Nut 13	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Outlet Cover 8	Remove, being careful not to scratch the gasket sealing surfaces	Make sure there are no pieces of the old gasket left on the sealing surfaces and reattach
Outlet Cover Gasket 7	Remove the gasket and clean sealing surfaces	Replace with a new gasket
Orifice Locknut 6	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque – see NOTE below
Orifice 4	Pull out from inside the product body	Fix with a orifice locknut – see NOTE below
Orifice Gasket 5	Remove, being careful not to scratch the orifice	Replace with a new gasket; clean sealing surface on the orifice – see NOTE below

NOTE: Special points pertaining to orifice and orifice gasket reassembly

Follow the steps below when inserting the orifice into the body in order to ensure that the gasket does not fall off and is inserted correctly without protruding from the groove.

1. First, insert the orifice alone into the orifice-housing section of the body, in order to ascertain how much of it should be sticking out.
2. Take the orifice out again, and then fill the groove in the orifice with water and insert the gasket. The surface tension of the water will now hold the gasket in place, and it will not fall out even if the orifice is pointed downwards.
3. Without altering anything, insert it into the orifice-housing section of the body and check to make sure that the amount of orifice sticking out of the body is the same as the amount that was sticking out when only the orifice was inserted in step 1.
4. Hold it in that position by hand and, after hand-tightening the orifice locknut from the outlet side, hold the orifice in place from the body float chamber side using a drive wrench and then tighten the orifice locknut to the proper torque using a torque wrench.

Table of Tightening Torques

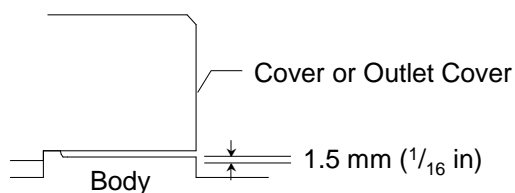
Part Name	Torque		Distance Across Flats	
	N·m	(lbf·ft)	mm	(in)
Air Vent Valve Seat 23	30	(22)	19	(³ / ₄)
Air Vent Guide 27	100	(73)	24	(¹⁵ / ₁₆)
Cover Nut 10	700	(510)	46	(1 ¹³ / ₁₆)
Orifice Locknut 6	250	(185)	32	(1 ¹ / ₄)
Outlet Cover Nut 13	200	(150)	30	(¹³ / ₁₆)

NOTE: -Coat all threaded portions with anti-seize. (1 N·m ≈ 10 kg·cm)

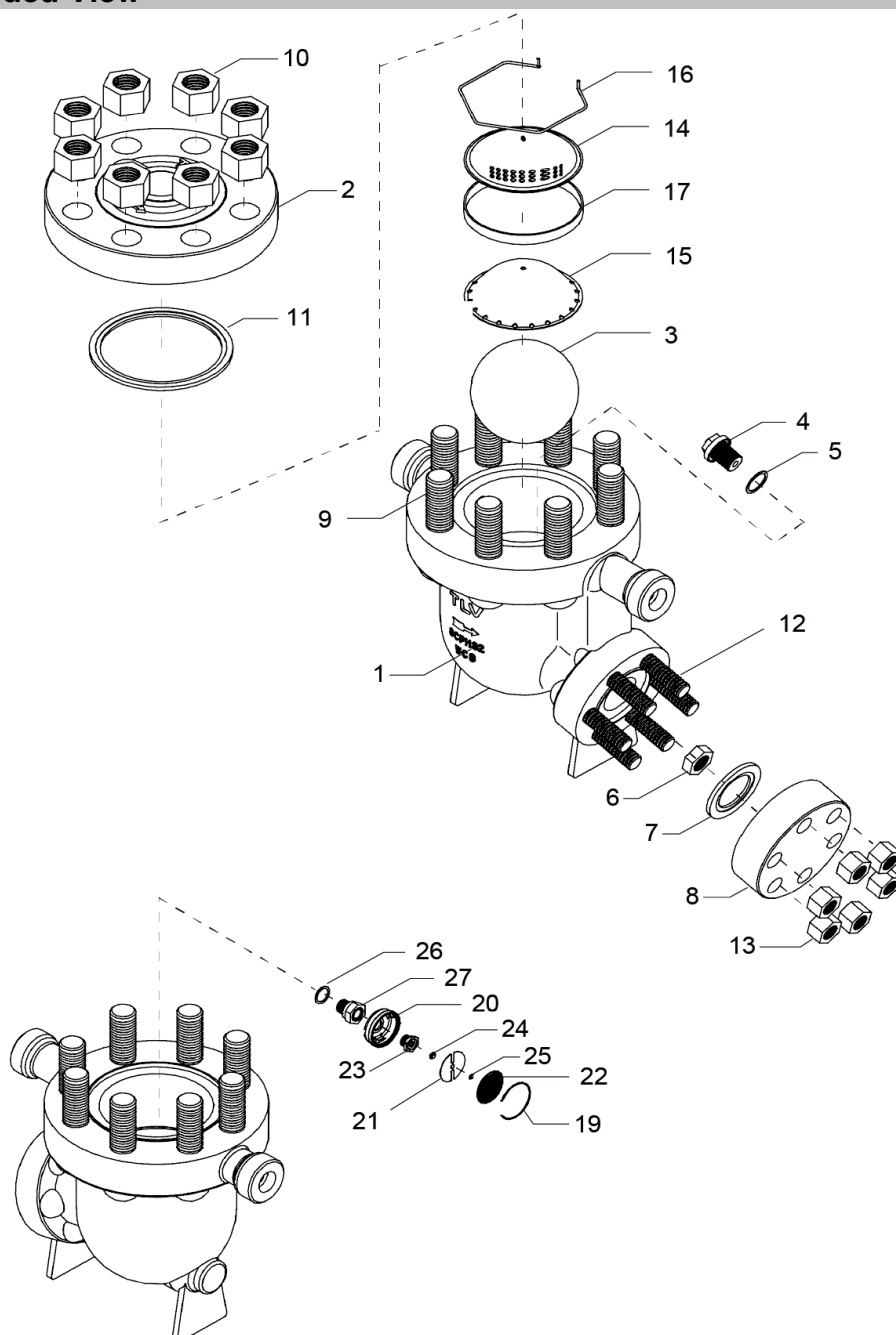
-If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Special Notes

1. After operation following disassembly and reassembly, it is recommended that the product be let to sit for a day and then receive additional tightening.
2. Using the tightening torques for the cover nuts and outlet cover nuts as a reference, tighten until the cover and outlet cover gaps are uniform. The gaps should be 1.5 mm (¹/₁₆ in) or less.



Exploded View



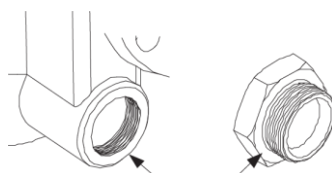
No.	Part Name	No.	Part Name
1	Body	15	Screen Holder
2	Cover	16	Snap Ring
3	Float	17	Screen Holder Retainer
4	Orifice	18	Nameplate
5	Orifice Gasket	19	Snap Ring
6	Orifice Locknut	20	Air Vent Case
7	Outlet Cover Gasket	21	Bimetal Plate
8	Outlet Cover	22	Air Vent Screen
9	Cover Bolt	23	Air Vent Valve Seat
10	Cover Nut	24	Air Vent Valve Plug
11	Cover Gasket	25	Snap Ring
12	Outlet Cover Bolt	26	Air Vent Guide Gasket
13	Outlet Cover Nut	27	Air Vent Guide
14	Screen		

Instructions for Plug/Holder Disassembly and Reassembly

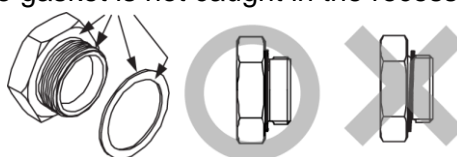
The seal on the threaded plugs/holders found on TLV products is formed by a flat metal gasket. There are various installation orientations for the gaskets, such as horizontal, diagonal and downward, and the gasket may be pinched in the thread recesses during assembly.

Instructions for Disassembly and Reassembly

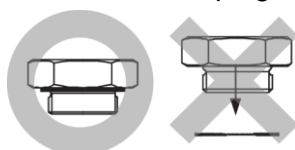
1. Remove the plug/holder using a tool of the specified size (distance across flats).
2. The gasket should not be reused. Be sure to replace it with a new gasket.
3. Clean the gasket surfaces of the plug/holder and the product body using a rag and/or cleaning agents, then check to make sure the surfaces are not scratched or deformed.



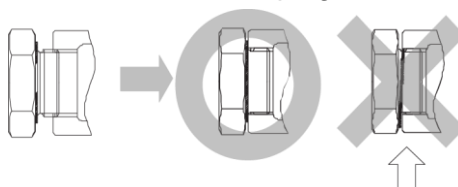
4. Coat both the gasket surface of the plug/holder and the threads of the plug/holder with anti-seize, then press the gasket onto the center of the gasket surface of the plug/holder, making sure the anti-seize affixes the gasket tightly to the plug/holder. Check to make sure the gasket is not caught in the recesses of the threads.



5. Hold the plug/holder upside down to make sure that the anti-seize makes the gasket stick to the plug/holder even when the plug/holder is held upside down.





6. Screw the plug/holder by hand into the product body while making sure that the gasket remains tightly affixed to the center of the gasket surface of the plug/holder. Make sure the entire gasket is making contact with the gasket surface of the product body. It is important at this point to make sure the gasket is not pinched in the thread recesses of the plug/holder.



7. Tighten the plug/holder to the proper torque.
8. Next, begin the supply of steam and check to make sure there is no leakage from the part just tightened. If there is leakage, immediately close the inlet valve and, if there is a bypass valve, take the necessary steps to release any residual pressure. After the surface of the product cools to room temperature, repeat the procedure beginning from step 1.

Troubleshooting

 WARNING	NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.
 CAUTION	When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

When the product fails to operate properly, use the following table to locate the cause and remedy.

Problem	Cause	Remedy
No condensate is discharged (blocked) or discharge is poor	The float is damaged or filled with condensate	Replace with a new float
	The orifice opening, screen or piping are clogged with rust and scale	Clean parts
	The bimetal is damaged	Replace with a new bimetal
	Steam locking has occurred	Perform a bypass blowdown or close the product inlet valve and allow the product to cool
	The product operating pressure exceeds the maximum specified pressure, or whether there is insufficient pressure differential between the product inlet and outlet	Compare specifications and actual operating conditions
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	Clogged orifice opening or rust and scale build-up beneath the float	Clean parts
	Scratches on the orifice	Replace with a new orifice
	The float is misshapen or has a build-up	Clean or replace with a new float
	Improper installation orientation	Correct the installation
	Trap vibration	Lengthen the inlet piping and fasten it securely
	The bimetal air vent valve surface and/or the air vent valve seat has surface build-up or is scratched	Clean or replace with a new bimetal and/or air vent valve seat
	The bimetal is damaged	Replace with a new bimetal
Steam is leaking from a place other than the outlet	Gasket deterioration or damage	Replace with new gasket(s)
	Improper tightening torques were used	Tighten to the proper torque
Float frequently becomes damaged	Water hammer has occurred	Study and correct the piping

NOTE: When replacing parts with new, use the parts list for reference, and replace with parts from the Maintenance Kit, Repair Kit, etc. Please note that replacement parts are only available as part of a replacement parts kit.

TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV CO., LTD., a Japanese corporation (“**TLV**”), warrants that products which are sold by it, TLV International Inc. (“**TII**”) or one of its group companies excluding TLV Corporation (a corporation of the United States of America), (hereinafter the “**Products**”) are designed and manufactured by TLV, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. The party from whom the Products were purchased shall be known hereinafter as the “**Seller**”. With regard to products or components manufactured by unrelated third parties (the “**Components**”), TLV provides no warranty other than the warranty from the third party manufacturer(s), if any.

Exceptions to Warranty

This warranty does not cover defects or failures caused by:

1. improper shipping, installation, use, handling, etc., by persons other than TLV, TII or TLV group company personnel, or service representatives authorized by TLV; or
2. dirt, scale or rust, etc.; or
3. improper disassembly and reassembly, or inadequate inspection and maintenance by persons other than TLV or TLV group company personnel, or service representatives authorized by TLV; or
4. disasters or forces of nature or Acts of God; or
5. abuse, abnormal use, accidents or any other cause beyond the control of TLV, TII or TLV group companies; or
6. improper storage, maintenance or repair; or
7. operation of the Products not in accordance with instructions issued with the Products or with accepted industry practices; or
8. use for a purpose or in a manner for which the Products were not intended; or
9. use of the Products in a manner inconsistent with the Specifications; or
10. use of the Products with Hazardous Fluids (fluids other than steam, air, water, nitrogen, carbon dioxide and inert gases (helium, neon, argon, krypton, xenon and radon)); or
11. failure to follow the instructions contained in the TLV Instruction Manual for the Product.

Duration of Warranty

This warranty is effective for a period of one (1) year after delivery of Products to the first end user. Notwithstanding the foregoing, asserting a claim under this warranty must be brought within three (3) years after the date of delivery to the initial buyer if not sold initially to the first end user.

ANY IMPLIED WARRANTIES NOT NEGATED HEREBY WHICH MAY ARISE BY OPERATION OF LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY EXPRESS WARRANTIES NOT NEGATED HEREBY, ARE GIVEN SOLELY TO THE INITIAL BUYER AND ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF SHIPMENT BY THE SELLER.

Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT**; PROVIDED: (a) THE CLAIMED DEFECT IS REPORTED TO THE SELLER IN WRITING WITHIN THE WARRANTY PERIOD, INCLUDING A DETAILED

WRITTEN DESCRIPTION OF THE CLAIMED DEFECT AND HOW AND WHEN THE CLAIMED DEFECTIVE PRODUCT WAS USED; AND (b) THE CLAIMED DEFECTIVE PRODUCT AND A COPY OF THE PURCHASE INVOICE IS RETURNED TO THE SELLER, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY THE SELLER. ALL LABOR COSTS, SHIPPING COSTS, AND TRANSPORTATION COSTS ASSOCIATED WITH THE RETURN OR REPLACEMENT OF THE CLAIMED DEFECTIVE PRODUCT ARE SOLELY THE RESPONSIBILITY OF BUYER OR THE FIRST END USER. THE SELLER RESERVES THE RIGHT TO INSPECT ON THE FIRST END USER'S SITE ANY PRODUCTS CLAIMED TO BE DEFECTIVE BEFORE ISSUING A RETURN MATERIAL AUTHORIZATION. SHOULD SUCH INSPECTION REVEAL, IN THE SELLER'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY THE SELLER FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

Exclusion of Consequential and Incidental Damages

IT IS SPECIFICALLY ACKNOWLEDGED THAT THIS WARRANTY, ANY OTHER EXPRESS WARRANTY NOT NEGATED HEREBY, AND ANY IMPLIED WARRANTY NOT NEGATED HEREBY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DO NOT COVER, AND NEITHER TLV, TII NOR ITS TLV GROUP COMPANIES WILL IN ANY EVENT BE LIABLE FOR, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOST PROFITS, THE COST OF DISASSEMBLY AND SHIPMENT OF THE DEFECTIVE PRODUCT, INJURY TO OTHER PROPERTY, DAMAGE TO BUYER'S OR THE FIRST END USER'S PRODUCT, DAMAGE TO BUYER'S OR THE FIRST END USER'S PROCESSES, LOSS OF USE, OR OTHER COMMERCIAL LOSSES. WHERE, DUE TO OPERATION OF LAW, CONSEQUENTIAL AND INCIDENTAL DAMAGES UNDER THIS WARRANTY, UNDER ANY OTHER EXPRESS WARRANTY NOT NEGATED HEREBY OR UNDER ANY IMPLIED WARRANTY NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) CANNOT BE EXCLUDED, SUCH DAMAGES ARE EXPRESSLY LIMITED IN AMOUNT TO THE PURCHASE PRICE OF THE DEFECTIVE PRODUCT. THIS EXCLUSION OF CONSEQUENTIAL AND INCIDENTAL DAMAGES, AND THE PROVISION OF THIS WARRANTY LIMITING REMEDIES HEREUNDER TO REPLACEMENT, ARE INDEPENDENT PROVISIONS, AND ANY DETERMINATION THAT THE LIMITATION OF REMEDIES FAILS OF ITS ESSENTIAL PURPOSE OR ANY OTHER DETERMINATION THAT EITHER OF THE ABOVE REMEDIES IS UNENFORCEABLE, SHALL NOT BE CONSTRUED TO MAKE THE OTHER PROVISIONS UNENFORCEABLE.

Exclusion of Other Warranties

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.

Severability

Any provision of this warranty which is invalid, prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such invalidity, prohibition or unenforceability without invalidating the remaining provisions hereof, and any such invalidity, prohibition or unenforceability in any such jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

Service

For Service or Technical Assistance: Contact your TLV representative or your regional TLV office.

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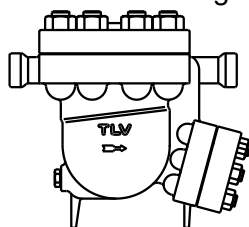
Options

 CAUTION	When operating the blowoff valve, stand to the side well clear of the outlet to avoid contact with internal fluids that will be discharged. Failure to do so may result in burns or other injury.
	Do not use excessive force when opening the blowoff valve. Such force may break the pin equipped as a valve stopper, causing a blowout from internal pressure resulting in burns or other injury.

The options shown below are available for this product on request. Please compare with the product you received.

Options for Area A (standard: without drain plug)

With Drain Plug



Torque		Distance Across Flats	
N·m	(lbf·ft)	mm	(in)
100	(73)	30	(1 ³ / ₁₆)

(1 N·m ≈ 10 kg·cm)