172-65486MA-00 (SH5VL) 5 September 2012

ISO 9001/ ISO 14001

Manufacturer

TLV. CO., LTD.

Kakogawa, Japan

is approved by LRQA LTD. to ISO 9001/14001

Instruction Manual

Free Float Steam Trap

SH5VL

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Contents

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 drain trap uses a precision-polished float and three-point support for the valve body. With no hinges or levers, the trap continuously discharges condensate, preventing it from collecting. The three-point seating for the valve body supports the precision-polished float securely at three points and ensures a high degree of sealing for even minute quantities of condensate. The trap can also be disassembled and reassembled while still installed in the piping. This results in considerable time savings and facilitates repair and maintenance.

The outstanding features of the precision-polished float and 3-point valve body support, combined with a mechanism that has a proven record of success, increases the efficiency of a variety of systems and reduces time and labor needed for maintenance and bypass blowdown operations

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.**
⚠ DANGER	Indicates an urgent situation which poses a threat of death or serious injury
⚠ WARNING	Indicates that there is a potential threat of death or serious injury
⚠ CAUTION	Indicates that there is a possibility of injury or equipment / product damage

⚠ 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	**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 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.

Safety cautions continued on next page.

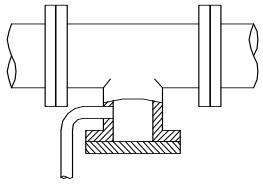
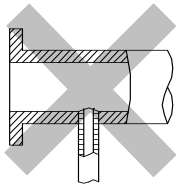
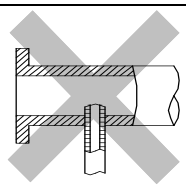
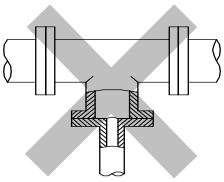
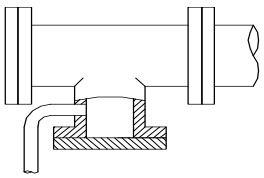
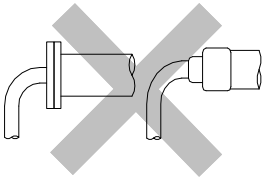
⚠CAUTION	**When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature**. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.
	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.
	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.
	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.

Checking the Piping

⚠CAUTION **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 trap have been installed properly.

1. Is the pipe diameter suitable?
2. Is the piping where the trap is to be installed or vertical (for model SH5VL)?
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 trap?
6. Has the piping work been done with the proper methods, shown in the figures below?

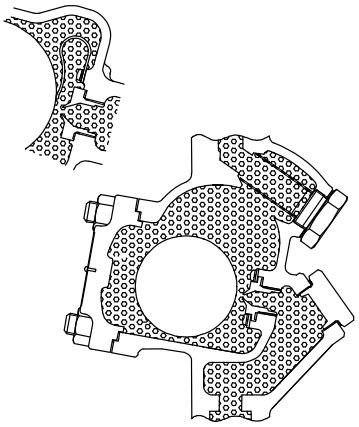
Requirement	Correct	Incorrect
Install catchpot with the proper diameter.		 Diameter is too small.
Make sure the flow of condensate is not obstructed.		 Diameter is too small and inlet protrudes into pipe interior.
To prevent rust and scale from flowing into the trap, the inlet pipe should be connected 25 – 50 mm (1 – 2 in) above the base of the T-pipe.		 Rust and scale flow into the trap 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:

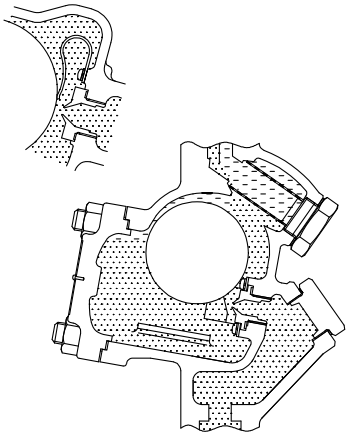
1. Start-up Air and Cold Condensate Discharge

At start-up, before steam is supplied, the system is cold and the bimetal air vent strip is expanded, holding the float off of the orifice. This allows for the rapid discharge of air and cold condensate through the orifice when steam is first supplied to the system.



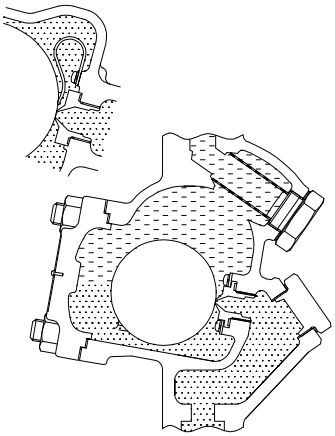
2. Condensate Discharge

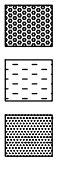
As steam is supplied, hot condensate flow begins. When condensate temperature becomes 90°C (194°F) or higher, the bimetal air vent strip contracts, allowing the float to close off the orifice. However, the rising condensate level causes the float to rise due to buoyancy, opening the orifice and allowing hot condensate to be discharged.



3. Closed Position

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





Air

Steam

Condensate

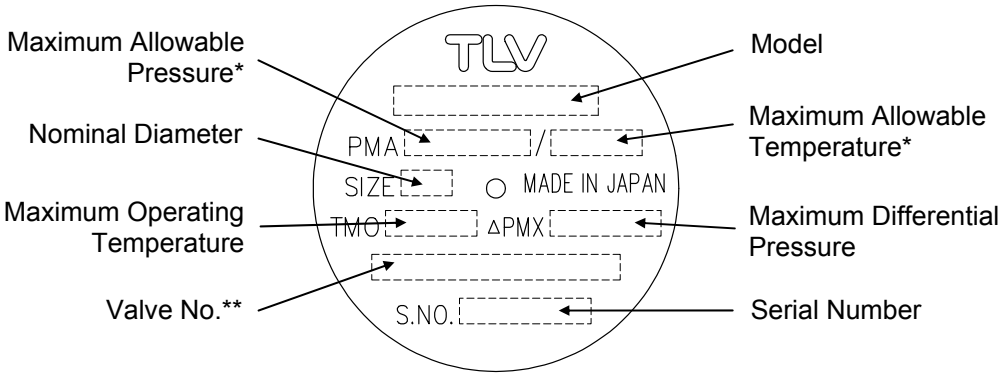
Specifications

⚠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 which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.**

⚠CAUTION **DO NOT use the trap in excess of the maximum operating pressure differential; such use could make discharge impossible (blocked).**

⚠CAUTION **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.

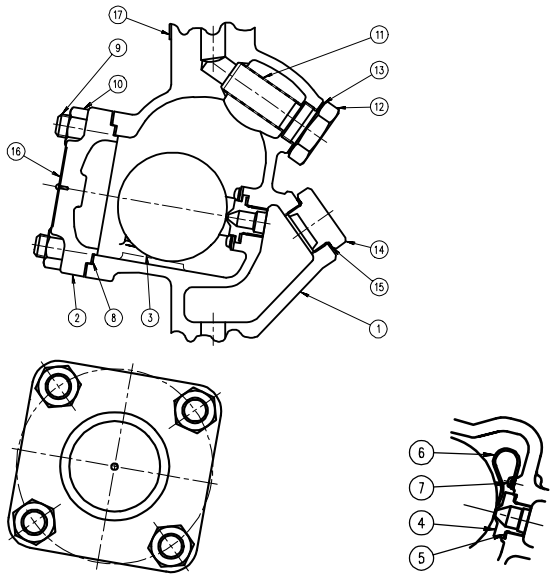


* Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

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

Configuration

SH5VL



No.	Name	M*	R*	F*
1	Body			
2	Cover			
3	Float			✓
4	Orifice		✓	
5	Orifice Gasket	✓	✓	
6	Air Vent Strip (Bimetal)		✓	
7	Screw with Spring Washer		✓	
8	Cover Gasket	✓	✓	
9	Cover Bolt			
10	Cover Nut			
11	Screen		✓	
12	Screen Holder			
13	Screen Holder Gasket	✓	✓	
14	Plug			
15	Plug Gasket	✓	✓	
16	Nameplate			
17	Seal			

* Replacement parts are available only in the following kits:
M = Maintenance Kit; R = Repair Kit; F = Float

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 which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.**

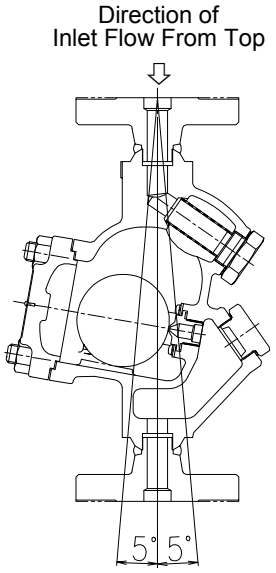
⚠CAUTION **Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.**

⚠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.**

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 trap, blow out the inlet piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
3. Install the trap with the arrow pointing in the direction of condensate flow.
4. Ensure that the direction of the installation is correct:
   - The inlet and outlets must be vertical.
   The installation tolerance angle shall be within 5° left-to-right and front-to-back (see diagrams right).
5. Fix the trap securely to the piping
6. Connect the outlet piping.
7. Open the inlet valve and check to make sure that the trap functions properly.

If there is a problem, determine the cause by 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.**

⚠CAUTION **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 or burns or other injury due to malfunction or the discharge of fluids.**

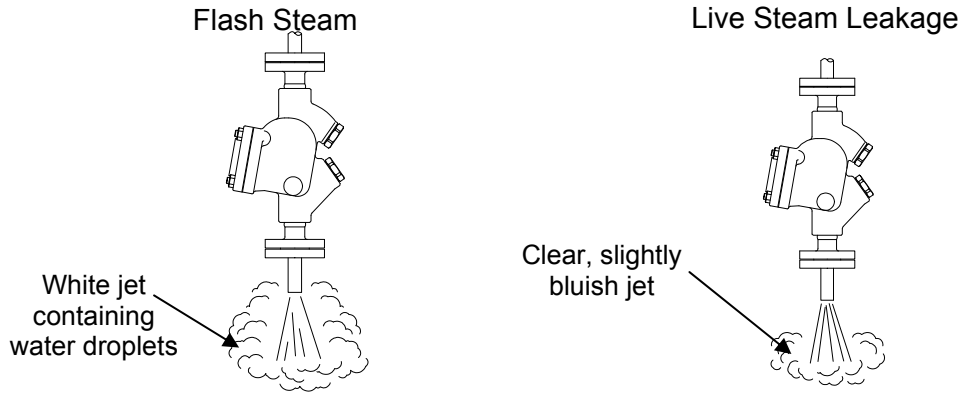
Operational Check

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

If the trap 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.
Blocked: (Discharge Impossible)	No condensate is discharged. The trap is quiet and makes no noise, and the surface temperature of the trap 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 trap outlet together with condensate, accompanied by a high-pitched sound.

(When conducting a visual inspection, flash steam is sometimes mistaken for steam leakage. For this reason, the use of a steam trap diagnostic instrument [TLV: TrapMan] in conjunction with the visual inspection is highly recommended.)



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
Screen: check for clogging or corrosion damage
Surface where orifice and float meet: check for scratches
Float: check for scratches or deformation
Check for build-up inside the body 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.**

⚠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.**

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 gasket	Replace with new gasket; coat surfaces with anti-seize

Removing / Replacing the Screen and its Parts

Part	During Disassembly	During Reassembly
Screen Holder	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Screen Holder Gasket	Remove gasket	Replace with new gasket; coat surfaces with anti-seize
Screen	Remove screen	—

Removing / Replacing the Cover

Part	During Disassembly	During Reassembly
Cover Nut	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover	Remove cover	Make sure there are no pieces of the old gasket left on the sealing surfaces of the body and cover
Cover Gasket	Remove gasket	Replace with new cover gasket

Removing / Replacing the Parts Inside the Body

Part	During Disassembly	During Reassembly
Float	Remove carefully, being careful not to scratch the polished surface	Insert, being careful not to scratch or misshape
Screw	Remove with a Phillips screwdriver	Consult the table of tightening torques and tighten to the proper torque
Air Vent Strip (Bimetal)	Remove without bending	Reinstall without bending
Orifice	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Orifice Gasket	Remove gasket	If misshapen or damaged, replace with new gasket
Plug	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Plug Gasket	Remove gasket	Replace with new gasket; coat surfaces with anti-seize

Table of Tightening Torques

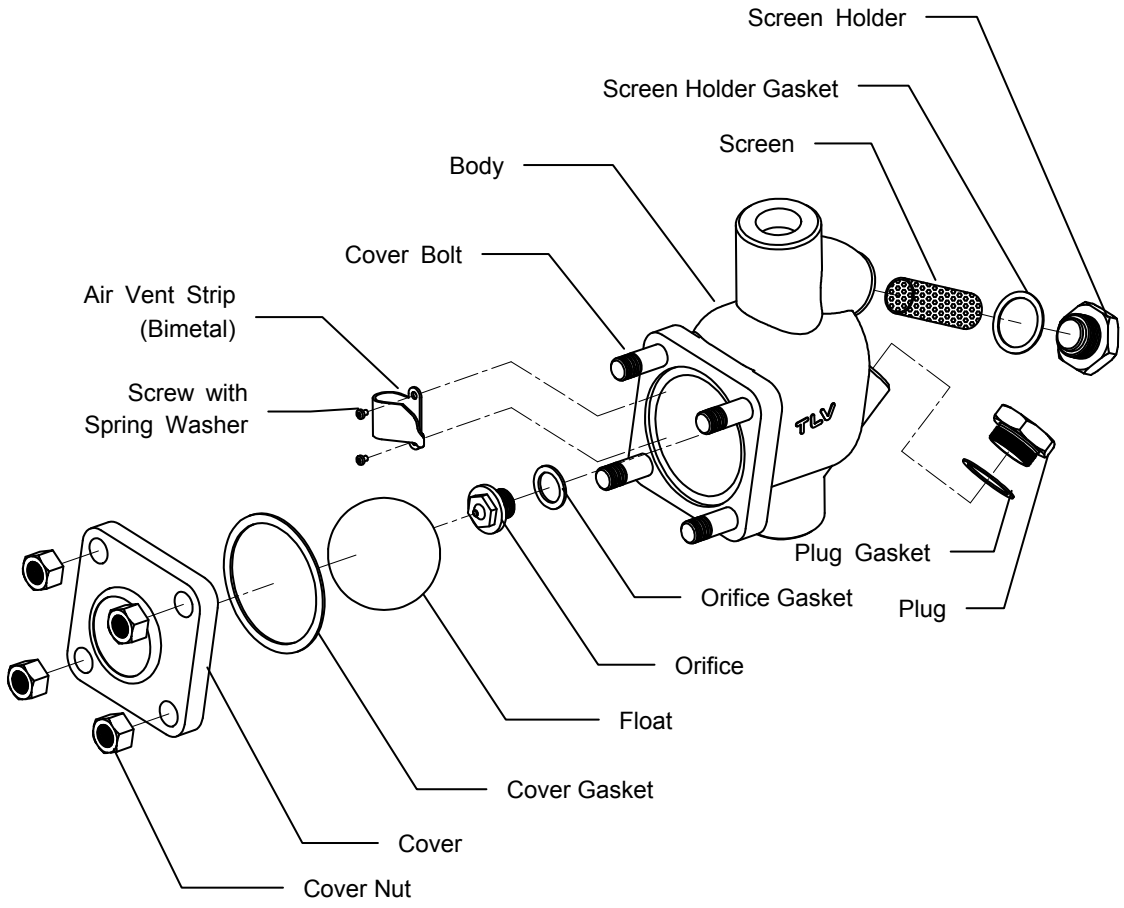
Model	Cover Nut		Orifice		Plug	
	Torque	Distance Across Flats	Torque	Distance Across Flats	Torque	Distance Across Flats
	N·m (lbf·ft)	mm (in)	N·m (lbf·ft)	mm (in)	N·m (lbf·ft)	mm (in)
SH5VL	120 (88)	22 ($^7/_8$)	80 (59)	19 ($^3/_4$)	200 (150)	38 ($1^1/_2$)

Model	Screen Holder		Screw and Spring Washer	
	Torque	Distance Across Flats	Torque	Distance Across Flats
	N·m (lbf·ft)	mm (in)	N·m (lbf·ft)	mm (in)
SH5VL	200 (150)	38 ($1^1/_2$)	0.3 (0.22)	+

(1 N·m ≈ 10 kg·cm)

NOTE: - Coat all threaded portions with anti-seize.
- If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Exploded View



Instructions for Plug / Holder Disassembly and Reassembly

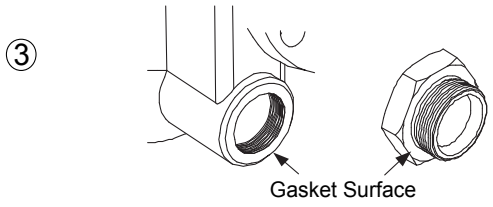
The seal on the threaded plugs/holders found on TLV products is formed by a flat metal gasket. There are various installation orientations for the gaskets, such as horizontal, diagonal and downward, and the gasket may be pinched in the thread recesses during assembly.

Instructions for Disassembly and Reassembly

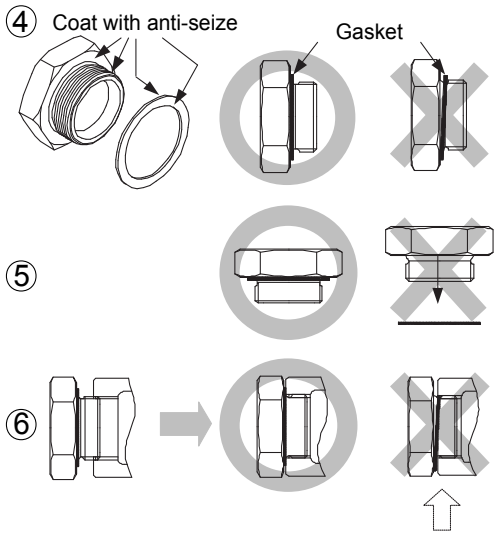
① Remove the plug/holder using a tool of the specified size (distance across flats).

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 trap fails to operate properly, use the following table to locate the cause.

Problem	Cause	Remedy
No condensate is discharged (blocked) or discharge is poor	Check to see if float is damaged or filled with condensate	Replace with new float
	Check the orifice, screen and piping to see if they are clogged with rust and scale	Clean parts
	Check to see if steam-locking has occurred	Perform a bypass blowdown, or close the trap inlet valve and allow the trap to cool
	Check to see if the trap operating pressure exceeds the maximum specified pressure, or whether there is insufficient pressure differential between the trap inlet and outlet	Compare specifications and actual operating conditions
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	Check for a clogged orifice or rust and scale under the float	Clean parts
	Check for damage to the orifice	Replace with new orifice
	Check that the float is not misshapen or coated with scale	Clean or replace the float
	Check for improper installation	Correct the installation
	Check for trap vibration	Lengthen inlet piping and fasten securely
Steam is leaking from a place other than the outlet	Check for gasket deterioration or damage	Replace with new gasket(s)
	Check to make sure that the proper tightening torques were used	Tighten to the proper torque
Float is frequently damaged	Check for water hammer	Examine the piping for problems that can cause water hammer

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

Product Warranty

1. Warranty Period
   One year following product delivery.
2. Warranty Coverage
   TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.
3. This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
   1) Malfunctions due to improper installation, use, handling, etc., by other than TLV CO., LTD. authorized service representatives.
   2) Malfunctions due to dirt, scale, rust, etc.
   3) Malfunctions due to improper disassembly and reassembly, or inadequate inspection and maintenance by other than TLV CO., LTD. authorized service representatives.
   4) Malfunctions due to disasters or forces of nature.
   5) Accidents or malfunctions due to any other cause beyond the control of TLV CO., LTD.
4. Under no circumstances will TLV CO., LTD. be liable for consequential economic loss damage or consequential damage to property.

* * * * * * *

For Service or Technical Assistance:

Contact your TLV representative or your regional TLV office.

Manufacturer:

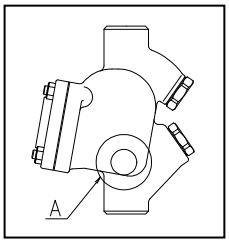
TLV CO., LTD.
881 Nagasuna, Noguchi
Kakogawa, Hyogo 675-8511 JAPAN
Tel: 81-(0)79 - 427 - 1800

Options

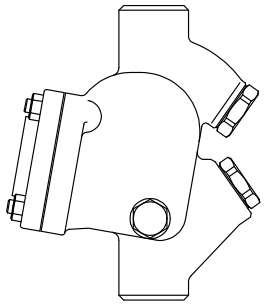
⚠CAUTION **When operating the blowoff valve, stand to the side well clear of the outlet to avoid contact with internal fluids that will be discharged. Failure to do so may result in burns or other injury.**

⚠CAUTION **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 N・m (lbf·ft)	Distance Across Flats mm (in)
100 (73)	26 (1)

(1N・m ≈ 10kg・cm)