

ISO 9001
ISO14001



Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001:2001



Instruction Manual

Free Float Steam Trap

Featured Models: JH3S-B/JH5SL-B/JH5SH-B

172-65484M-08

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Table of Contents

Introduction	3
Safety Considerations	4
Checking the Piping	6
Operation	7
Specifications	9
Configuration	10
Installation	11
Maintenance	12
Disassembly/Reassembly	13
Instructions for Plug/Holder Disassembly and Reassembly	17
Troubleshooting	18
TLV EXPRESS LIMITED WARRANTY	19
Service	21
Options	22

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.

Cautionary items and definitions



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

Safety Considerations for the Product



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.



Caution

DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).



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

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.

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

**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.

**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.

Checking the Piping

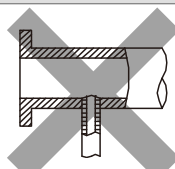
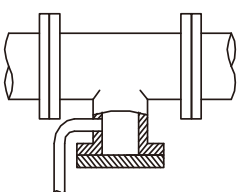
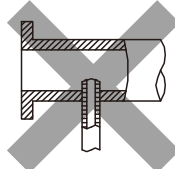
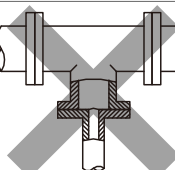
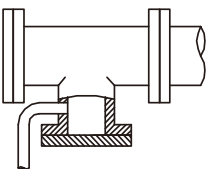
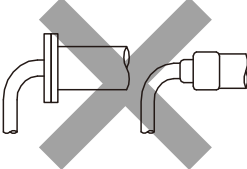


Caution

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 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?

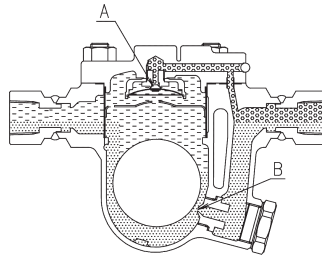
Requirement	Correct	Incorrect
Install catchpot with the proper diameter.		 Diameter is too small.
Make sure the flow of condensate is not obstructed.		 Diameter is too small and inlet protrudes into pipe interior.
To prevent rust and scale from flowing into the product, the inlet pipe should be connected 25 to 50 mm 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 condensate discharge:

1. Initial Air and Cold Condensate Discharge

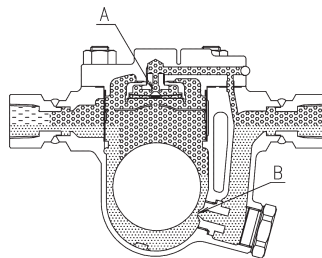
At start-up, before steam is supplied the system is cold and the bimetal plate is flexed downward, keeping the air vent valve (A) open. When steam is first supplied to the system, air is discharged through the vent (A) while cold condensate is discharged through the orifice (B).



2. Condensate Discharge

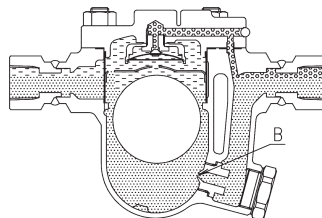
After the discharge of initial air and cold condensate, the heat of the inflowing steam and condensate cause the bimetal plate to flex upward, closing the air vent valve (A). The rising condensate level causes the float to rise due to buoyancy, opening the orifice (B) and allowing condensate to be discharged.

The flexed bimetal keeps the valve closed while in normal operation.



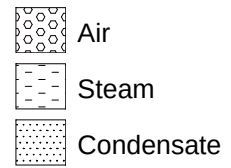
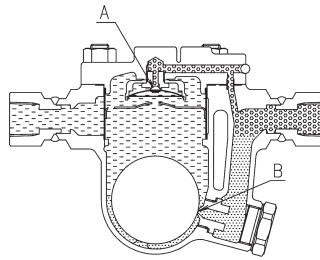
3. Discharge of large quantities of condensate

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

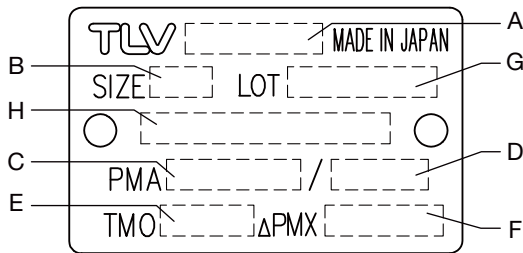


Caution
Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this 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.

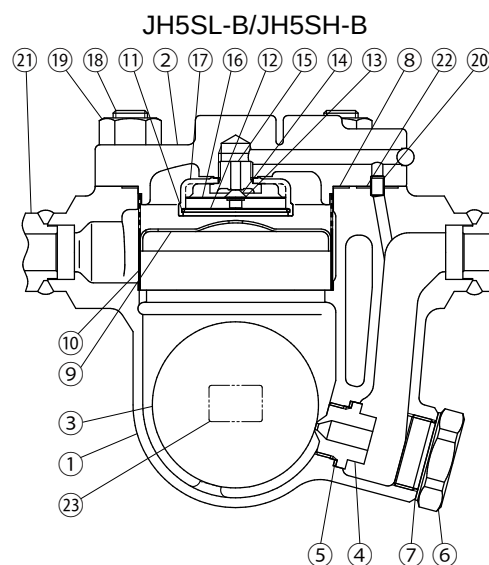
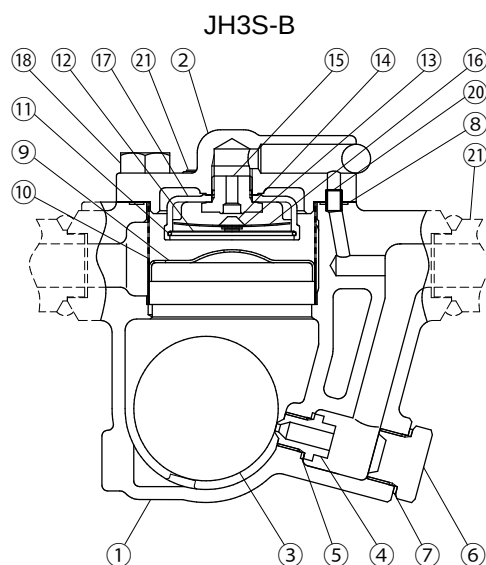


A	Model	E	Maximum Operating Temperature (TMO)
B	Nominal Diameter	F	Maximum Differential Pressure (PMX)
C	Maximum Allowable Pressure (PMA) ⁰¹	G	Production Lot No.
D	Maximum Allowable Temperature (TMA) ⁰¹	H	Valve No. ⁰²

⁰¹Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

⁰²Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

Configuration



No.	Part Name	A ⁰¹	B ⁰¹	C ⁰²	No.	Part Name	A ⁰¹	B ^{01f}
1	Body				13	Snap Ring		✓
2	Cover				14	Air Vent Valve Plug		✓
3	Float			✓	15	Air Vent Valve Seat		✓
4	Orifice		✓		16	Bimetal Plate		✓
5	Orifice Gasket	✓	✓		17	Air Vent Case		✓
6	Orifice Plug				18	Cover Bolt		
7	Orifice Plug Gasket	✓	✓		19	Cover Nut		
8	Cover Gasket	✓	✓		20	Connector		
9	Float Cover		✓		21	Flange/Socket		
10	Screen		✓		22	Connector Gasket	✓	✓
11	Snap Ring		✓		23	Nameplate		
12	Air Vent Screen		✓					

⁰¹Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit

⁰²C = Float

Installation



Caution

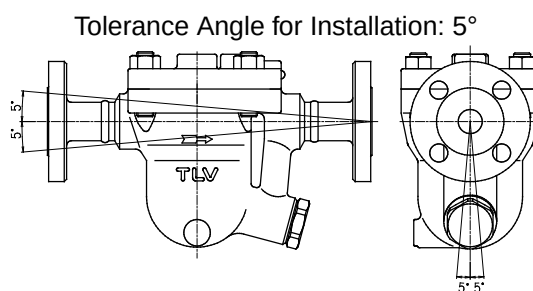
Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.

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 and 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 must 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.



Make sure the product is installed with the raised TLV lettering on the body horizontal.

Maintenance



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 and burns or other injury due to malfunction or the discharge of fluids.

When using this product, NEVER stand close to, or leave tools anywhere near moving parts such as the shaft. Contact with moving parts or objects becoming caught in moving parts could lead to injury, damage or other accidents.

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, thermometer, TLV Pocket TrapMan or TLV TrapMan.

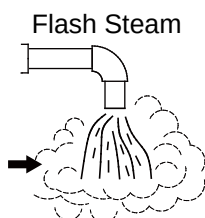
If the product should fail, it may cause damage to piping and equipment, resulting in faulty or low quality products or losses due to steam leakage.

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.



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.

Gaskets: Check for warping or scratches

Screen: Check for clogging or corrosion

Bimetal Plate: Check for damage

Air Vent Valve Plug: Check for damage

Air Vent Valve 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

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 Name	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; coat surfaces with anti-seize

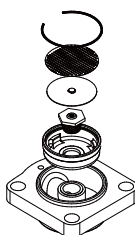
Detaching/Reattaching the Cover

Part Name & No.		During Disassembly	During Reassembly
Cover Nut	19	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover Bolt	18		
Cover	2	Remove by lifting up and off	Make sure there are no pieces of the old gasket left on the sealing surfaces of the body and cover, then reattach, lining up the connector
Cover Gasket	8	Remove the gasket and clean sealing surfaces	Replace with a new gasket
Connector	20	Remove the connector	Reinsert into hole in body
Connector Gasket ⁰¹	22	Remove the gasket and clean sealing surfaces	Replace with a new gasket

⁰¹Only JH5SL-B/JH5SH-B

Disassembly/Reassembly of Components Inside the Cover

Part Name & No.		During Disassembly	During Reassembly
Snap Ring	11	Pinch the insides together and remove from the cover	Insert securely into the groove
Screen	10	Remove, being careful not to misshape	Replace, being careful not to misshape
Bimetal Plate	16	Remove the air vent parts from cover	Make sure to reinsert in the proper orientation
Air Vent Valve	14		
Plug	13		
Snap Ring			
Air Vent Valve Seat	15	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Air Vent Case	17	Remove from the cover	Place in cover



Disassembly/Reassembly of Components Inside the Body

Part Name & No.		During Disassembly	During Reassembly
Float Cover	9	Lift straight up and out while gently rocking	Align the arrows (a) on the float cover/ screen and body and insert the tab (b) on the bottom of the float cover/ screen into the slot in the body; make sure the top of the float cover/screen does not stick up out of the body
Screen	10		
Float	3	Remove, being careful not to scratch the polished surface	Insert, being careful not to scratch the polished surface
Orifice Plug	6	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Orifice Plug Gasket	7	Remove the gasket and clean sealing surfaces	Replace with a new gasket; coat surfaces with anti-seize
Orifice	4	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Orifice Gasket	5	Remove the gasket and clean sealing surfaces	Replace with a new gasket; coat surfaces with anti-seize

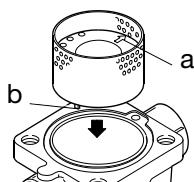


Table of Tightening Torques

Part Name & No.		Torque N·m	Distance Across Flats mm
JH3S-B			
Orifice	4	30	10
Orifice Plug	6	80	24
Air Vent Valve Seat	15	30	17
Cover Bolt	18	50	16/17 ⁰¹
JH5SL-B			
Orifice	4	140	17
Orifice Plug	6	180	38
Air Vent Valve Seat	15	30	19
Cover Nut	19	110	22
JH5SH-B			
Orifice	4	140	17
Orifice Plug	6	180	38
Air Vent Valve Seat	15	30	19
Cover Nut	19	170	24

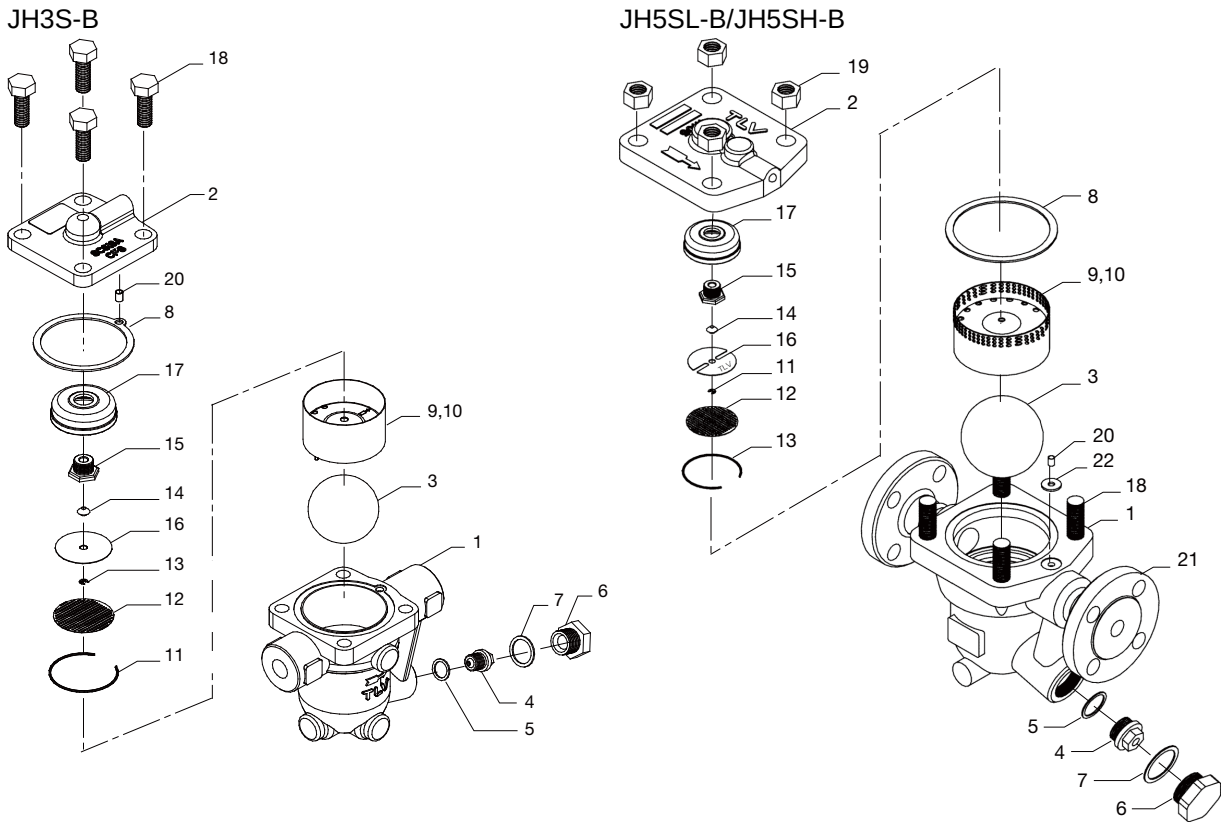
⁰¹Size depends on bolt standard



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



No.	Part Name	No.	Part Name
1	Body	13	Snap Ring
2	Cover	14	Air Vent Valve Plug
3	Float	15	Air Vent Valve Seat
4	Orifice	16	Bimetal Plate
5	Orifice Gasket	17	Air Vent Case
6	Orifice Plug	18	Cover Bolt
7	Orifice Plug Gasket	19	Cover Nut
8	Cover Gasket	20	Connector
9	Float Cover	21	Flange/Socket
10	Screen	22	Connector Gasket
11	Snap Ring	23	Nameplate ⁰¹
12	Air Vent Screen		

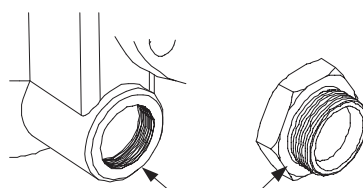
⁰¹Not shown

Instructions for Plug/Holder Disassembly and Reassembly

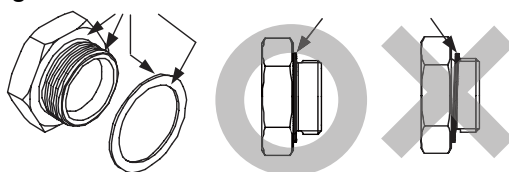
The seal on the threaded plugs/holders found on TLV products is formed by a flat metal gasket. There are various installation orientations for the gaskets, such as horizontal, diagonal and downward, and the gasket may be pinched in the thread recesses during assembly.

Instructions for Disassembly and Reassembly

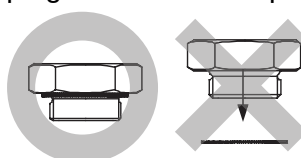
1. Remove the plug/holder using a tool of the specified size (distance across flats).
2. The gasket should not be reused. Be sure to replace it with a new gasket.
3. Clean the gasket surfaces of the plug/holder and the product body using a rag and/or cleaning agents, then check to make sure the surfaces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



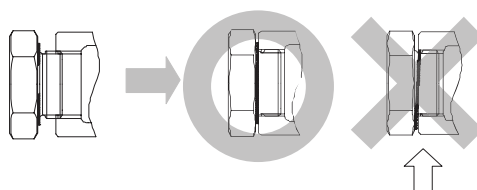
4. Coat both the gasket surface of the plug/holder and the threads of the plug/holder with anti-seize, then press the gasket onto the center of the gasket surface of the plug/holder, making sure the anti-seize affixes the gasket tightly to the plug/holder. Check to make sure the gasket is not caught 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
	The product operating pressure exceeds the maximum specified pressure, or there is insufficient pressure differential between the product inlet and outlet	Compare specifications and actual operating conditions
	Steam locking has occurred	Perform a bypass blowdown or close the product inlet valve and allow the product to cool
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	Build-up on the seating surface of the orifice 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 surface build-up	Clean or replace with a new float
	Improper installation orientation	Correct the installation
	Product vibration	Lengthen the inlet piping and fasten it securely
	The bimetal air vent valve surface and/or the air vent valve seat has a 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.

In Europe:

TLV EURO ENGINEERING GmbH

Daimler-Benz-Straße 16-18, 74915 Waibstadt, **Germany**

TLV EURO ENGINEERING UK LTD.

Units 7 & 8, Furlong Business Park, Bishops Cleeve,
Gloucestershire GL52 8TW, **U.K.**

TLV EURO ENGINEERING FRANCE SARL

Parc d'Ariane 2, bât. C, 290 rue Ferdinand Perrier, 69800 Saint
Priest, **France**

In North America:

TLV CORPORATION

13901 South Lakes Drive, Charlotte, NC 28273-6790, **U.S.A.**

TLV ENGINEERING S. A. DE C. V.

Av. Jesús del Monte 39-B-1001, Col. Hda. de las Palmas,
Huixquilucan, Edo. de México, 52763, **Mexico**

In Oceania:

TLV PTY LIMITED

Unit 8, 137-145 Rooks Road, Nunawading, Victoria 3131,
Australia

In East Asia:

TLV PTE LTD

36 Kaki Bukit Place, #02-01/02, **Singapore** 416214

TLV SHANGHAI CO., LTD.

5/F, Building 7, No.103 Caobao Road, Xuhui District, Shanghai,
China 200233

TLV ENGINEERING SDN. BHD.

No.16, Jalan MJ14, Taman Industri Meranti Jaya, 47120 Puchong,
Selangor, **Malaysia**

TLV PRIVATE LIMITED

252/94 (K-L) 17th Floor, Muang Thai-Phatra Complex Tower B,
Rachadaphisek Road, Huaykwang, Bangkok 10310, **Thailand**

TLV INC.

#302-1 Bundang Technopark B, 723 Pangyo-ro, Bundang,
Seongnam, Gyeonggi, 13511, **Korea**

In the Middle East:

TLV ENGINEERING FZCO

Building 9W, B163, PO Box 371684, Dubai Airport Free Zone,
Dubai, **UAE**

In Other Countries:

TLV INTERNATIONAL, INC.

881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, **Japan**

Manufacturer:

TLV CO., LTD.

881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, **Japan**

Tel: [49]-(0)7263-9150-0

Tel: [44]-(0)1242-227223

Tel: [33]-(0)4-72482222

Fax: [33]-(0)4-72482220

Tel: [1]-704-597-9070

Fax: [1]-704-583-1610

Tel: [52]-55-5359-7949

Fax: [52]-55-5359-7585

Tel: [61]-(0)3-9873 5610

Fax: [61]-(0)3-9873 5010

Tel: [65]-6747 4600

Fax: [65]-6742 0345

Tel: [86]-(0)21-6482-8622

Fax: [86]-(0)21-6482-8623

Tel: [60]-3-8052-2928

Fax: [60]-3-8051-0899

Tel: [66]-2-693-3799

Fax: [66]-2-693-3979

Tel: [82]-(0)31-726-2105

Fax: [82]-(0)31-726-2195

Email: sales-me@tlv.co.jp

Tel: [81]-(0)79-427-1818

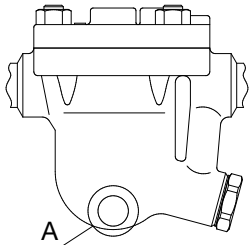
Fax: [81]-(0)79-425-1167

Tel: [81]-(0)79-427-1800

Fax: [81]-(0)79-422-2277

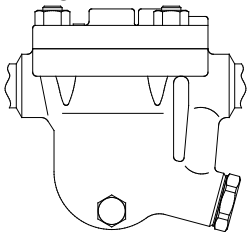
Options

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	Distance Across Flats mm
35	21