

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: Clean Steam Trap

Featured Models

SS3-E/SS3-P/SS3-EP/SS5-P/SS5-EP

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Introduction

Thank you for purchasing the TLV clean 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 clean steam trap is suitable for applications requiring condensate discharge from steam transport lines, process systems and equipment (steam-using equipment). This clean steam trap 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.

For products with special order specifications or options, if detailed instructions for the special order specifications or options are not contained in this manual, 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

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

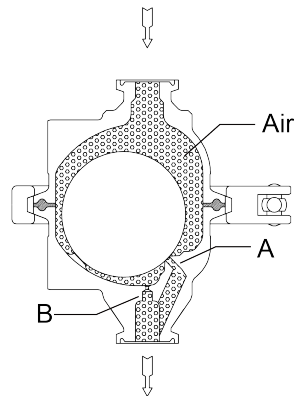
Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

Operation

Principles of air and condensate discharge:

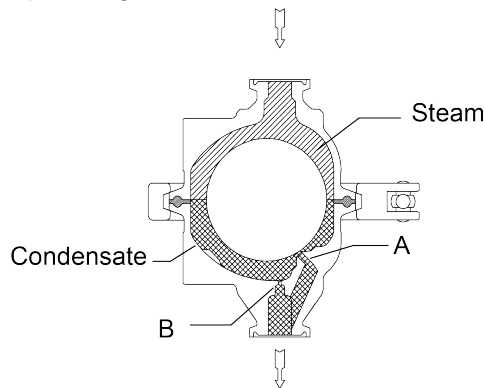
1. Initial Air Discharge

At start-up, before steam is supplied the system is cold and air occupies the system. When steam is first supplied to the system, air is discharged through the drain hole (B) while the orifice (A) is closed by the float.



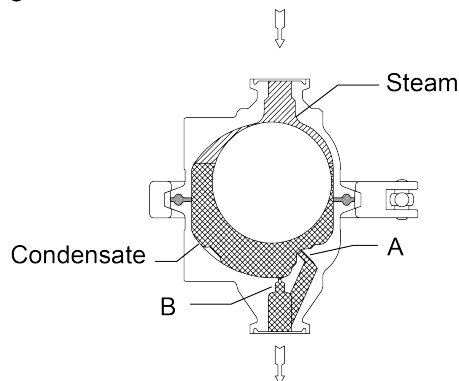
2. Condensate Discharge

As steam is supplied, condensate flow begins. The rising condensate level causes the float to rise due to buoyancy, opening the orifice (A) and allowing 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.



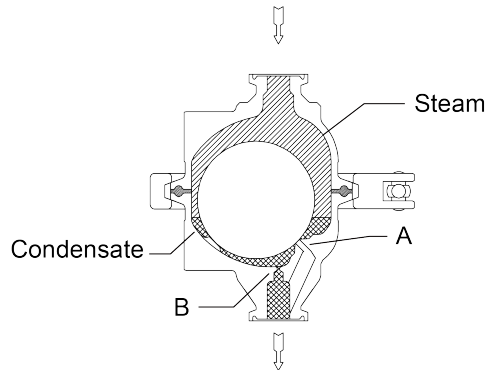
3. Discharge of Large Quantities of Condensate

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 (A), allowing more condensate to be discharged.



4. Closed Position

When the condensate flow rate decreases, the float falls, closing off the orifice opening (A). When condensate flow rate becomes less than the minimum amount of condensate required to prevent steam discharge, some amount of steam is discharged from the drain hole (B). Once the system stops operating, condensate remaining in the trap drains through the drain hole (B) by gravity.



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.

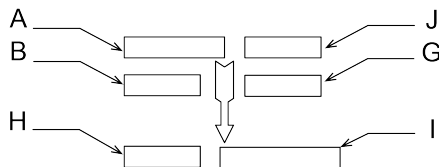
DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).

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.

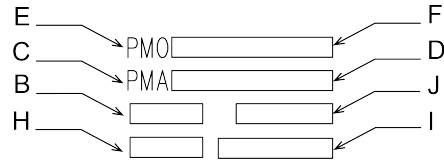
Refer to the indication on the body and cover for detailed specifications.

SS3-E/SS3-P/SS3-EP

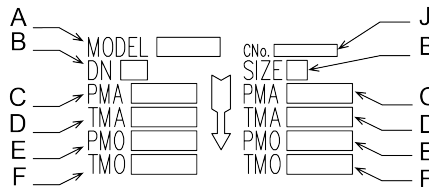
Cover



Body



SS5-P/SS5-EP



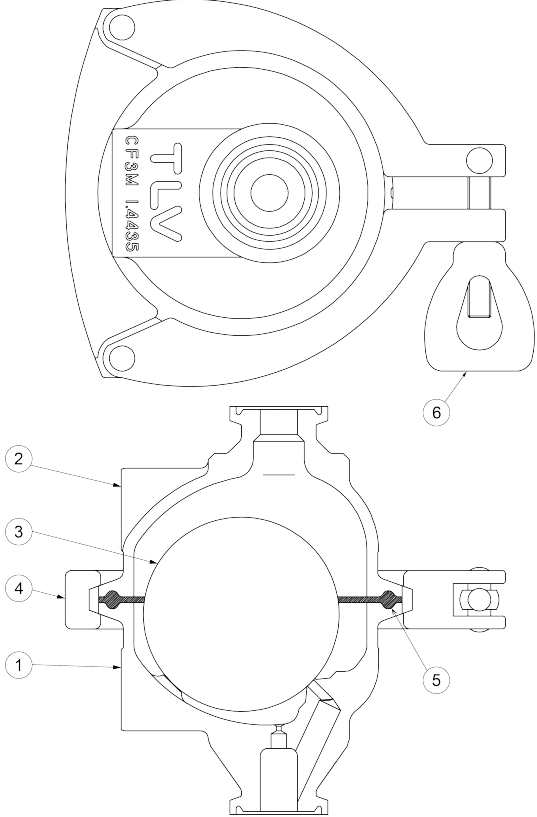
A	Model
B	Nominal Diameter
C	Maximum Allowable Pressure (PMA) ⁰¹
D	Maximum Allowable Temperature (TMA) ⁰¹
E	Maximum Operating Pressure (PMO)
F	Maximum Operating Temperature (TMO)
G	Production Lot No.
H	Connection Standard
I	Connection Standard No.
J	CNo. ⁰²

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

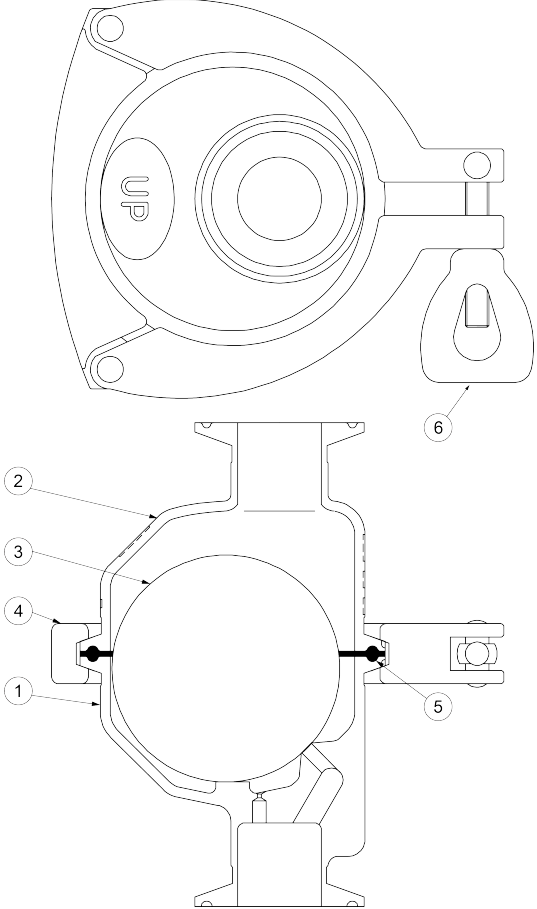
⁰²CNo. (Charge/Mill No.) is displayed for products with options. This item is omitted when there are no options.

Configuration

SS3-E/SS3-P/SS3-EP



SS5-P/SS5-EP



No.	Part Name
1	Body
2	Cover
3	Float
4	Body Clamp
5	Cover Gasket
6	Wing Nut

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.

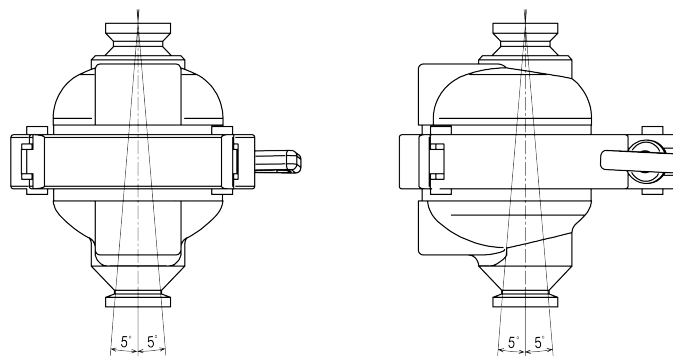
Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

Installation, inspection, maintenance, repairs, disassembly, 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, blow out the inlet piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
3. Install the product vertically with the inlet at the top and the outlet at the bottom within the allowable inclination as shown below, and with the arrow on the body pointing in the direction of flow.
4. Install condensate outlet valve and outlet piping.
5. The outlet pipe should lead to a safe place such as a drainage vessel, pit, etc. Make sure the end of the pipe is above the water level, so that dirt and water cannot be sucked up by vacuum when the system shuts down.
6. Open the inlet and outlet valves and check to make sure that the product functions properly.
7. After steam has passed through the piping, allow the trap to cool by closing the inlet valve and then further tighten the clamp.
8. Open the inlet valve again for normal operation.

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

Tolerance Angle for Installation: 5°



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

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, thermometer, TLV Pocket TrapMan or 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:	During either intermittent or continual condensate discharge flash steam is discharged and the sound of flow can be heard.
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 trap outlet together with condensate, accompanied by a high-pitched sound.



Note

The SS3-E/SS3-P/SS3-EP/SS5-P/SS5-EP clean steam traps have a small built-in drain hole to ensure no condensate remains in the trap after operation. Therefore, a minimum condensate load is required during operation to prevent any steam discharge. If the condensate load is less than the minimum condition, a small amount of live steam will be discharged along with any condensate.

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
Cover Gasket: Check for warping or scratches
Float: Check for warping or scratches
Body: Check for build-up inside the body Check for dirt, oil film, wear or scratches Make sure opening of the orifice and a drain hole are not plugged with foreign matter

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.)

Detaching/Reattaching the Body and the Cover

Part Name	During Disassembly	During Reassembly
Wing Nut 6 Body Clamp 4	Loosen the wing nut with a tool such as an adjustable wrench, then remove the body clamp	Consult the table of tightening torques and tighten the wing nut to the proper torque; open inlet valve and allow live steam to enter and heat the trap, then close the inlet valve; after the internal and atmospheric pressures have equalized and the trap surface has cooled, tighten the wing nut to the proper torque again. Steam may leak if the wing nut is not re-tightened
Body 1 Cover 2	Remove, being careful not to scratch the surface	With gasket in place, align grooves and gently place the cover on the body (Fig. A)
Cover Gasket 5	-	Replace with a new gasket if damaged

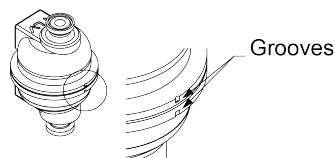


Figure A

Detaching/Reassembly of Components Inside the Cover

Part Name	During Disassembly	During Reassembly
Float 3	Remove being careful not to scratch the polished surfaces of the float, the cover and the body	Insert into body, being careful not to scratch its polished surface, take care not to scratch or damage the seating surface of the orifice (Fig. B)

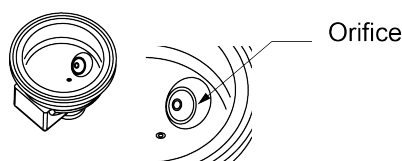


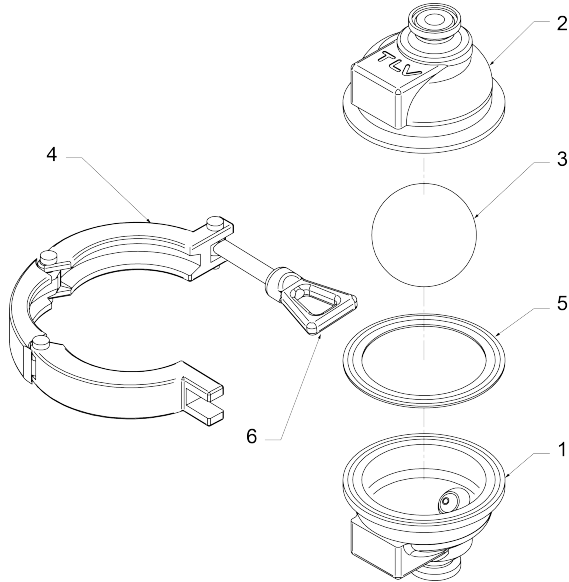
Figure B

Table of Tightening Torques

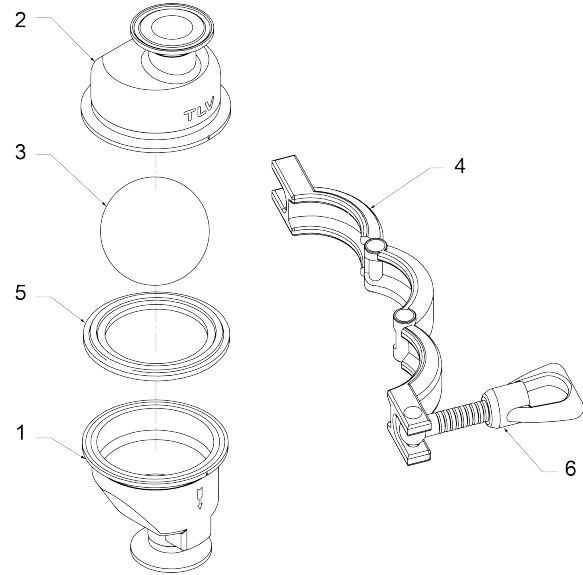
Part Name	Torque N•m (lbf•ft)
Wing Nut 6	10 (7)

Exploded View

SS3-E/SS3-P/SS3-EP



SS5-P/SS5-EP



No.	Part Name
1	Body
2	Cover
3	Float
4	Body Clamp
5	Cover Gasket
6	Wing Nut

Troubleshooting



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.

If 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 float is sticking to the orifice	Clean parts
	The orifice opening of the drain hole or piping are clogged with rust and scale	Clean parts
	Flow exceeds trap's rate capacity	Check specifications and reselect the trap suitable for actual flow
	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 trap inlet valve and allow the trap 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 body
	The float is damaged or has build-up	Replace with a new float
	Trap is installed above the maximum allowable inclination angle	Correct the installation
	Trap vibration	Lengthen the inlet piping and fasten it securely
Steam is leaking from a place other than the outlet	Gasket deterioration or damage	Replace with a new gasket
	Improper tightening torques was used on the body clamp wing nut	Tighten to the proper torque
Float frequently becomes damaged	Water hammer has occurred	Study and correct the piping
Some condensate is held in the trap	The small drain hole is blocked or clogged with foreign matter	Clean

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.

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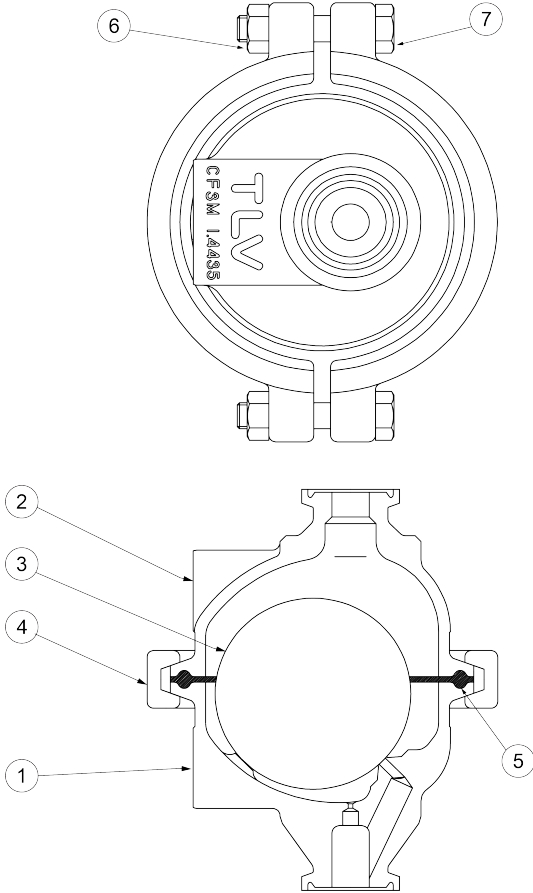
Tel: [81]-(0)79-427-1800

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

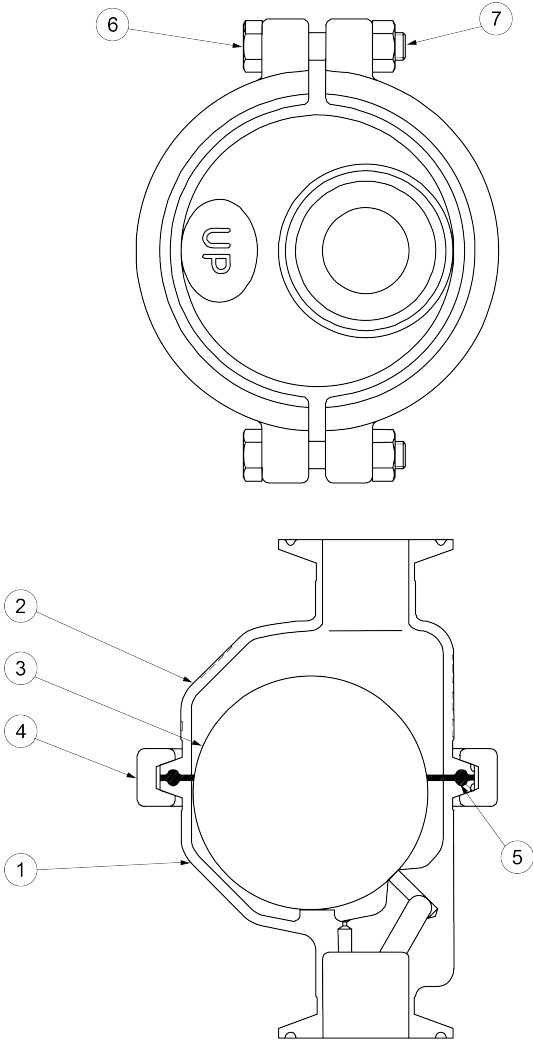
Option (2-piece Clamp with Bolts and Nuts)

Configuration

SS3-E/SS3-P/SS3-EP




SS5-P/SS5-EP



No.	Part Name
1	Body
2	Cover
3	Float
4	Body Clamp
5	Cover Gasket
6	Clamp Nut
7	Clamp Bolt

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.)

Detaching/Reattaching the Body and the Cover

Part Name	During Disassembly	During Reassembly
Clamp Bolts 7 Clamp Nuts 6 Body Clamp 4	Loosen clamp nuts with a tool such as an adjustable wrench, then remove the body clamp	When threading the clamp nut onto the clamp bolt, the direction of the clamp nut must be like that shown in the “Exploded View” section on the next page. Consult the table of tightening torques and tighten clamp nuts to the proper torque; avoid lopsided tightening by making sure that both sides are tightened evenly; open inlet valve and allow live steam to enter and heat the trap, then close the inlet valve; after the internal and atmospheric pressures have equalized and the trap surface has cooled, tighten clamp nuts to the proper torque again; Steam may leak if clamp nuts are not re-tightened
Body 1 Cover 2	Remove, being careful not to scratch the polished surface	With gasket in place, align grooves and gently place the cover on the body (Fig. A)
Cover Gasket 5	-	Replace with a new gasket if damaged

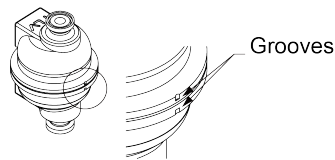


Figure A

Detaching/Reassembly of Components Inside the Cover

Part Name	During Disassembly	During Reassembly
Float 3	Remove being careful not to scratch the polished surfaces of the float, the cover and the body	Insert into body, being careful not to scratch its polished surface, take care not to scratch or damage the seating surface of the orifice (Fig. B)

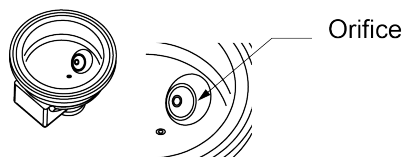


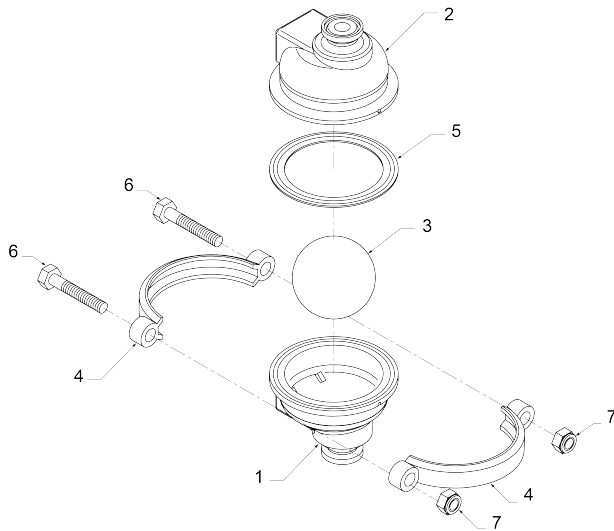
Figure B

Table of Tightening Torques

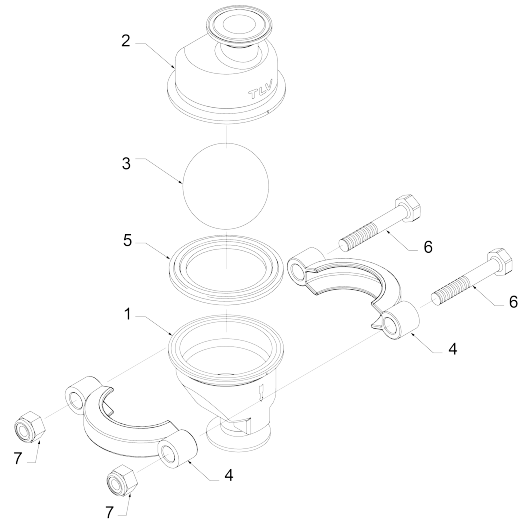
Part Name	Torque N•m (lbf•ft)	Distance Across Flats mm (in)
Clamp Bolts 6 Clamp Nuts 7	10 (7)	13 (1/2)

Exploded View

SS3-E/SS3-E/SS3-EP



SS5-E/SS5-EP



No.	Part Name
1	Body
2	Cover
3	Float
4	Body Clamp
5	Cover Gasket
6	Clamp Bolt
7	Clamp Nut