



Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA LTD. to ISO 9001/14001



Instruction Manual

Free Float Steam Trap with X-element **SJ3V-X**

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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 is a revolutionary design that employs a high-performance X-element as an air vent. It is best suited for steam equipment use. The X-element is very sensitive to changes in temperature, and responds with great accuracy, allowing for the quick discharge of large quantities of initial air and cold condensate immediately after operation start-up, reducing start-up times. It also reacts with great sensitivity to the inflow of large quantities of condensate and hot air during operation, preventing air binding.

This steam trap, which combines the superior features of the X-element with the proven performance record of the free float, increases heating efficiency and reduces manpower requirements for maintenance and bypass blowdown.







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 |
|  | 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. |
|  | 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). |
| | 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 considerations continued on 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> |

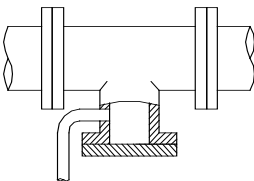
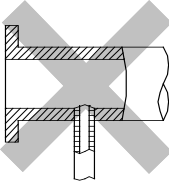
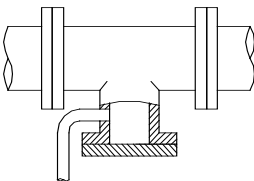
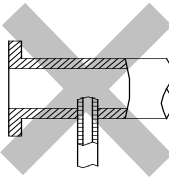
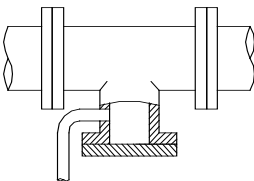
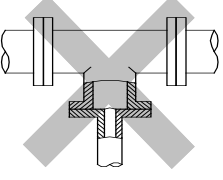
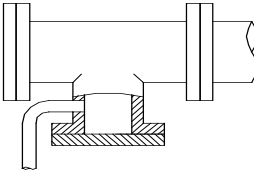
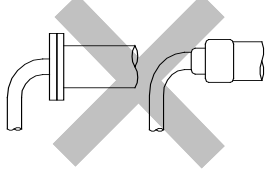
Checking the Piping



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 trap have been installed properly.

1. Is the pipe diameter suitable?
2. Is the piping where the trap is to be installed vertical?
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 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 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. |

Specifications



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.

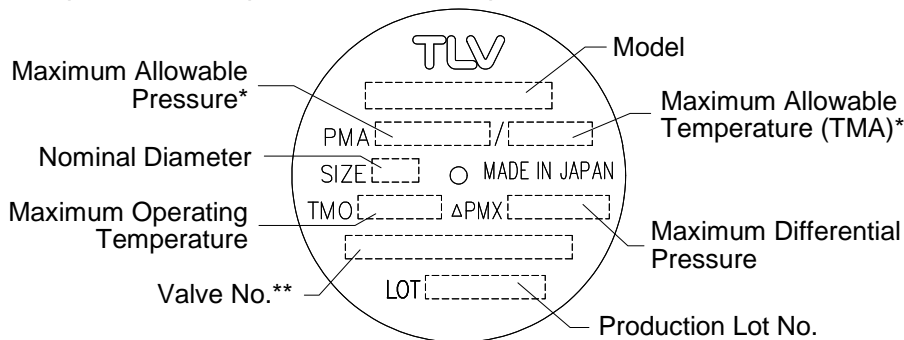


DO NOT use this product in excess of the maximum operating pressure differential; such use could make discharge impossible (blocked).



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.

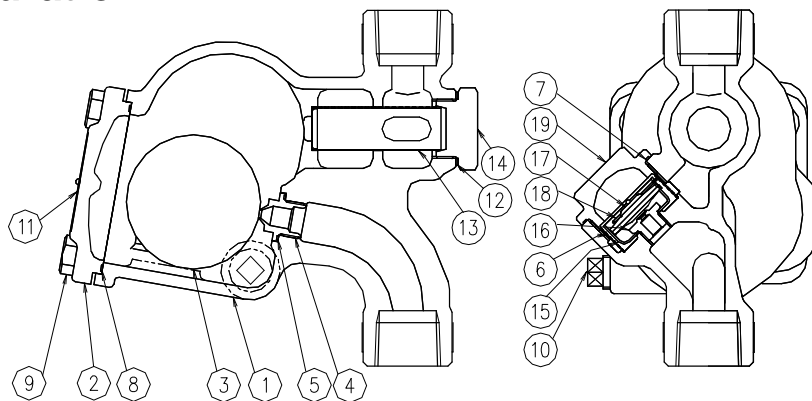
Refer to the product nameplate for detailed specifications.



* 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. | Name | M* | R* | F* | No. | Name | M* | R* | F* |
|-----|------------------------|----|----|----|-----|----------------------|----|----|----|
| 1 | Body | | | | 11 | Nameplate | | | |
| 2 | Cover | | | | 12 | Screen Holder Gasket | ✓ | ✓ | |
| 3 | Float | | | ✓ | 13 | Main Screen | | ✓ | |
| 4 | Orifice | | ✓ | | 14 | Screen Holder | | | |
| 5 | Orifice Gasket | ✓ | ✓ | | 15 | X-element Guide | | ✓ | |
| 6 | Air Vent Screen | | ✓ | | 16 | Air Vent Valve Seat | | ✓ | |
| 7 | X-element Cover Gasket | ✓ | ✓ | | 17 | X-element | | ✓ | |
| 8 | Cover Gasket | ✓ | ✓ | | 18 | Spring Clip | | ✓ | |
| 9 | Cover Bolt | | | | 19 | X-element Cover | | | |
| 10 | Drain Plug | | | | | | | | |

*Replacement parts are available only in the following kits: M = maintenance kit, R = repair kit, F = float

Installation



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.

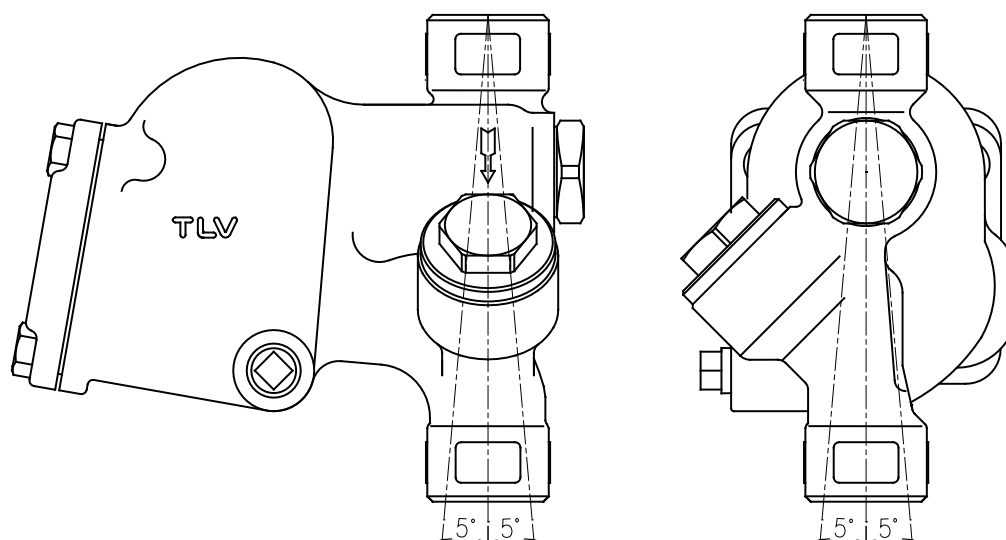


Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

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 trap should be inclined no more than 5° vertically 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.

Tolerance Angle for Installation - 5°



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

Maintenance



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

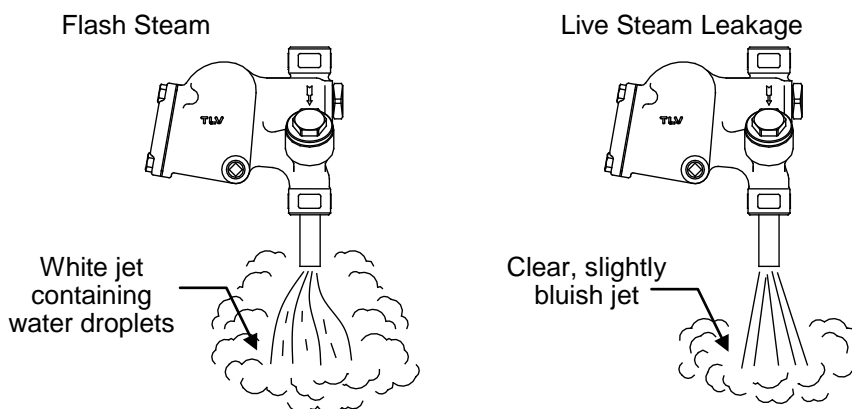
Operational Check

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 or 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. If there is very little condensate, there is almost no sound of flow. |
| 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 – such as 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 |
|--|
| Gaskets: check for warping or scratches |
| Screen: check for clogging or corrosion |
| X-element, Air Vent Valve Seat: check for scratches |
| 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.

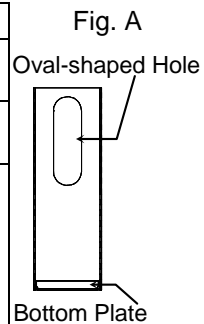
(Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

Drain Plug

| Part | During Disassembly | During Reassembly |
|------------|----------------------|---|
| Drain Plug | Remove with a wrench | Wrap 3 – 3.5 turns of sealing tape around threads, consult the table of tightening torques and tighten to the proper torque |

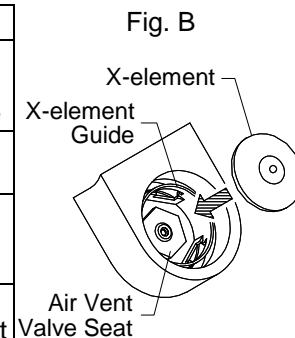
Detaching/Reattaching the Main Screen

| 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 the gasket and clean sealing surface | Replace with a new gasket |
| Main Screen | Remove, being careful not to bend | Insert with the proper orientation (Fig. A); set the screen with the bottom plate facing towards the inside of the trap, and the oval-shaped hole facing towards the trap inlet side |



Disassembly/Reassembly of the X-element

| Part | During Disassembly | During Reassembly |
|------------------------|---|--|
| X-element Cover | Remove with a socket wrench | Consult the table of tightening torques and tighten to the proper torque |
| X-element Cover Gasket | Remove the gasket and clean sealing surface | Replace with a new gasket if warped or damaged |
| Spring Clip | Pinch the insides together and remove from the X-element guide | Insert securely into the slot in the X-element guide |
| X-element | Grasp the ball on the top of the X-element with pliers and remove | Make sure the side of the X-element with the ball on it is facing up and insert, making sure it does not catch on the X-element guide (Fig. B) |
| Air Vent Valve Seat | Remove with a socket wrench | Consult the table of tightening torques and tighten to the proper torque |
| X-element Guide | Remove without bending | Fix with the air vent valve seat and make sure the X-element can be inserted smoothly |
| Air Vent Screen | Remove without bending | Insert without bending |



Detaching/Reattaching the Cover

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

Disassembly/Reassembly of Components Inside the Body

| Part | During Disassembly | During Reassembly |
|----------------|--|--|
| Float | Remove, being careful not to scratch the surface | Insert, being careful not to scratch the surface |
| Orifice | Remove with a socket wrench | Consult the table of tightening torques and tighten to the proper torque |
| Orifice Gasket | Remove the gasket | Replace with a new gasket if warped or damaged |

Table of Tightening Torques

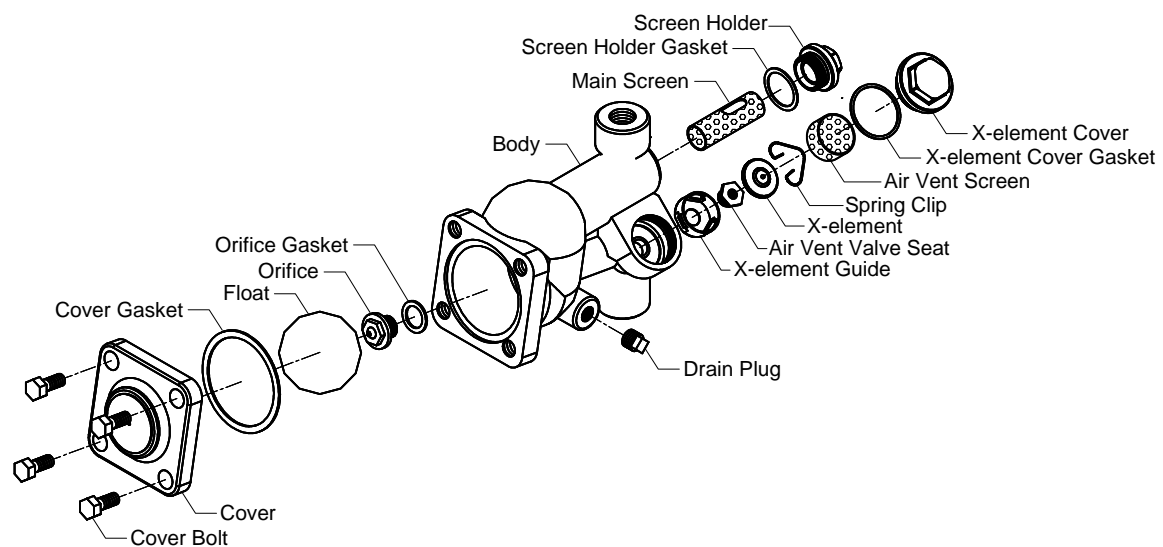
| Parts | Torque | | Distance Across Flats | |
|---------------------|--------|----------|-----------------------|---------------------|
| | N·m | (lbf·ft) | mm | (in) |
| Cover Bolt | 40 | (29) | 13 | ($\frac{1}{2}$) |
| Orifice | 40 | (29) | 17 | ($\frac{21}{32}$) |
| Screen Holder | 140 | (100) | 38 | ($1\frac{1}{2}$) |
| Drain Plug | 30* | (22)* | 12 | ($\frac{15}{32}$) |
| Air Vent Valve Seat | 35 | (26) | 19 | ($\frac{3}{4}$) |
| X-element Cover | 140 | (100) | 32 | ($1\frac{1}{4}$) |

*This value represents tightening torques for threads that are wrapped with 3 - 3.5 turns of sealing tape. (1 N·m \approx 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

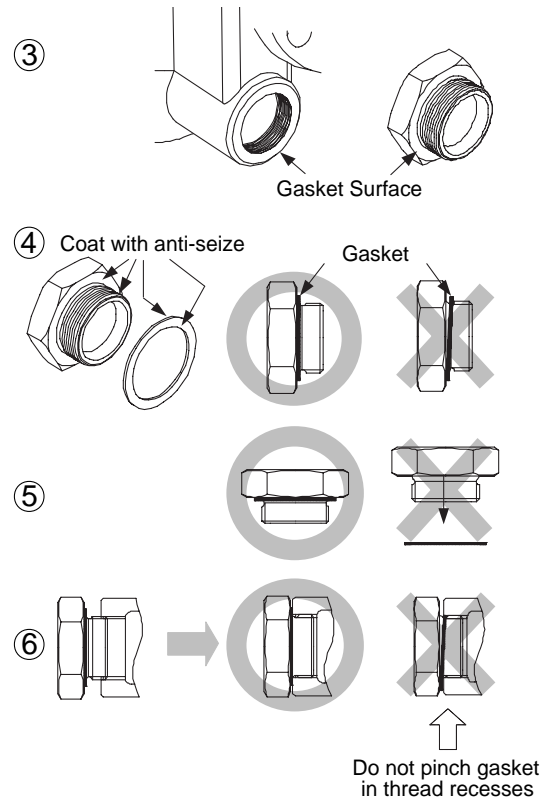


Instructions for Plug/Holder Disassembly and Reassembly

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 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



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.



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 and remedy the cause.

| 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 X-element is scratched or damaged | Replace with a new X-element |
| | Steam locking has occurred | Perform a bypass blowdown or close the trap inlet valve and allow the trap to cool |
| | The trap operating pressure exceeds the maximum specified pressure, or 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) | 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 surface 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 X-element air vent valve seating and/or air vent valve seat have surface build-up or are scratched | Clean or replace with a new X-element/air vent valve seat |
| 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.

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

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