

INSTRUCTION MANUAL

Keep this manual in a safe place for future reference

TLV® FREE FLOAT STEAM TRAPS J3S-X/J5S-X/J6S-X/J3S-X S1/J3S-X S2



J3S-X/J5S-X



J6S-X



J3S-X S1/J3S-X S2

Manufacturer

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Introduction

Before you begin, please read this manual to ensure correct usage of the product, and keep it in a safe place for future reference.

The J3S-X/J5S-X/J6S-X steam traps with thermostatic air vent (X-element) are suitable for a wide range of applications up to 2.1 MPaG (300 psig), such as tracer lines, unit and process heaters, heating coils, heat exchangers, etc.

The J3S-X S1/J3S-X S2 steam traps with thermostatic air venting (X-element) are designed especially for use in rubber vulcanizer applications up to 1.4 MPaG (200 psig). They feature a cover plug for retrofitting a lock release valve against steam locking, a drain plug for installing a blowdown valve, and an internal screen with (S2) or without (S1) wire mesh.

The traps discharge condensate continuously and automatically, at a temperature slightly lower than saturation temperature.

1 MPa = 10.197 kg/cm², 1 bar = 0.1 MPa



For products with special specifications or with options not included in this manual, contact TLV for instructions.

The contents of this manual are subject to change without notice.


1. 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.

|  DANGER |  WARNING |  CAUTION |
|---|--|--|
| 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. |

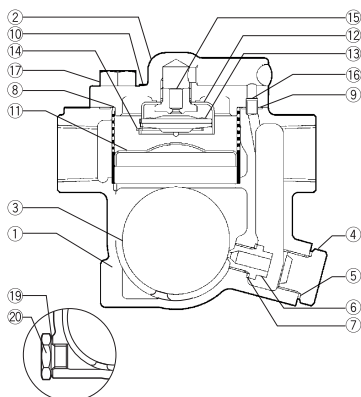
| | |
|---|---|
|  WARNING | NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment. |
|  CAUTION | Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions, 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. |
| | DO NOT subject this product to condensate loads that exceed its discharge capacity. Failure to observe this precaution may lead to condensate accumulation upstream of the trap, resulting in reduced equipment performance or damage to the equipment. |

Continued on the next page

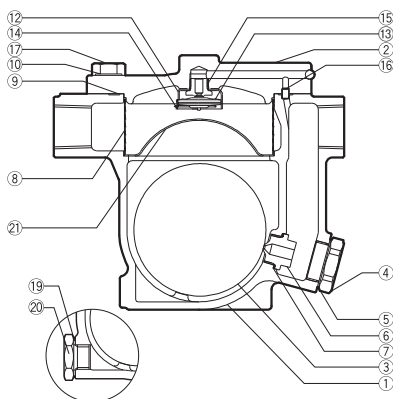
| | |
|---|--|
|  CAUTION | <p>Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.</p> |
| | <p>When disassembling or removing the product, wait until the internal pressure equals atmospheric 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 or burns or other injury due to malfunction or the discharge of fluids.</p> |
| | <p>Do not use excessive force when connecting threaded pipes to the product. Overtightening may cause breakage leading to fluid discharge, which may cause burns or other injury.</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 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> |

2. Configuration

J3S-X/J5S-X



J6S-X



| No. | Description | M | R | F | No. | Description | M | R | F | No. | Description | M | R | F |
|-----|---------------------|---|---|---|-----|-----------------|---|---|---|-----|---------------------|---|---|---|
| 1 | Body | | | | 8 | Screen | | ✓ | | 15 | Air Vent Valve Seat | | | ✓ |
| 2 | Cover | | | | 9 | Cover Gasket | ✓ | ✓ | | 16 | Connector | | | |
| 3 | Float | | | ✓ | 10 | Nameplate | | | | 17 | Cover Bolt | | | |
| 4 | Orifice Plug | | | | 11 | Float Cover | | ✓ | | 18 | Flange* | | | |
| 5 | Orifice Plug Gasket | ✓ | ✓ | | 12 | X-element Guide | | ✓ | | 19 | Drain Plug Gasket** | | | |
| 6 | Orifice | | | ✓ | 13 | X-element | | ✓ | | 20 | Drain Plug** | | | |
| 7 | Orifice Gasket | ✓ | ✓ | | 14 | Spring Clip | | ✓ | | 21 | Screen Holder | | | ✓ |

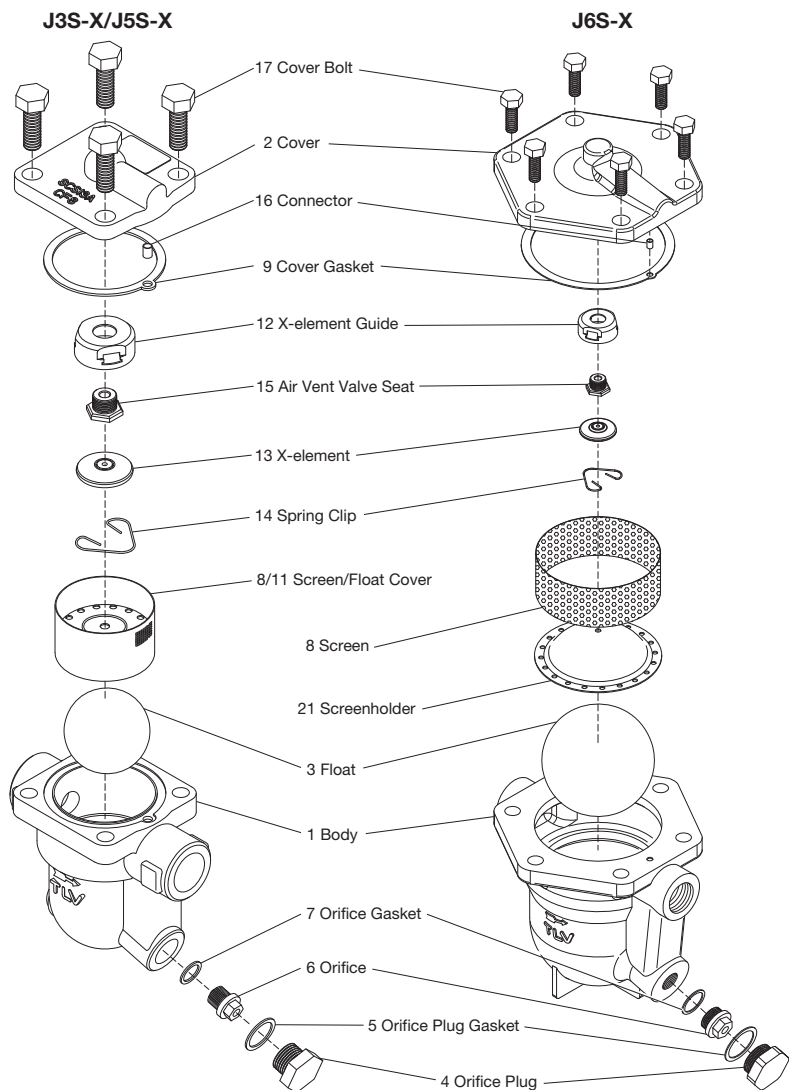
Replacement kits available: (M) maintenance parts, (R) repair parts, (F) float

* Not shown

** Option

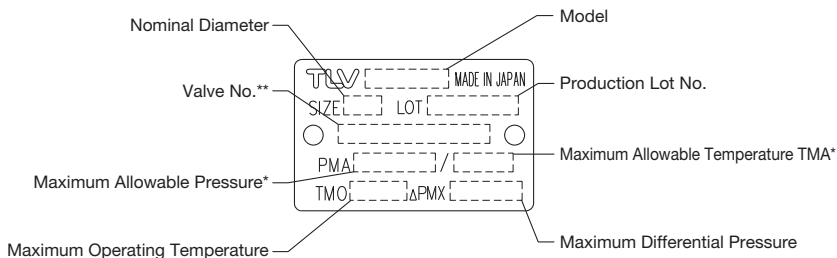
3. Exploded View

See also: Lock release valve, page 10.



4. Specifications

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.



To avoid malfunctions, product damage, accidents or serious injury, install properly and DO NOT use this product outside the specification range. Local regulations may restrict the use of this product to below the conditions quoted.

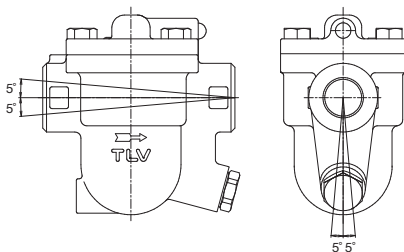
5. Proper Installation



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

- Take measures to prevent people from coming into direct contact with product outlets.
 - Do not use excessive force when connecting threaded pipes.
 - Install for use under conditions in which no freeze-up will occur.
 - Install for use under conditions in which no water hammer will occur.
1. Before installation, be sure to remove all protective seals.
 2. Before installing the trap, blow out the inlet piping to remove all dirt and oil.
 3. Install the steam trap within the allowable inclination, as shown below. Also make sure that the arrow mark on the body corresponds with the direction of flow.
 4. Install the trap in the lowest part of the pipeline or equipment so the condensate flows naturally into the trap by gravity. The inlet pipe should be as short and have as few bends as possible.
 5. Support the pipes properly within 800 mm (2.5 ft) on either side of the trap.
 6. Install a bypass valve to discharge condensate, and inlet and outlet valves to isolate the trap in the event of trap failure or when performing maintenance.
 7. Install a check valve at the trap outlet whenever more than one trap is connected to the condensate collection pipeline.
 8. The use of unions is recommended to facilitate connection and disconnection of screwed models.

Allowable Inclination



6. Piping Arrangement

| Requirement | Correct | Incorrect |
|---|---------|--|
| Install a 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. |
| To prevent rust and scale from flowing into the trap, connect the inlet pipe 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 nothing obstructs the flow of condensate. | | |

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

1. Is the pipe diameter suitable?
2. Has the trap been installed within the allowable inclination and with the arrow on the body pointing in the direction of flow?
3. Has sufficient space been secured for maintenance?
4. Have maintenance valves been installed at inlet and outlet? If the outlet is subject to back pressure, has a check valve been installed?
5. Is the inlet pipe as short as possible, with as few bends as possible, and installed so that the condensate will flow naturally down into the trap?
6. Has the piping work been done with the proper methods as shown in the table on page 5?

7. Inspection and Maintenance

Operational inspections should be performed at least twice per year, or as called for by trap operating conditions. Steam trap failure may result in a temperature drop in the equipment, poor product quality or losses due to steam leakage.



WARNING

NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or property and equipment damage.



CAUTION

- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- Before attempting to open the trap, close the inlet and outlet isolation valves and wait until the trap has cooled completely. Failure to do so may result in burns.
- Be sure to use the proper components and NEVER attempt to modify the product.

| Parts Inspection Procedure | |
|------------------------------|--|
| Body, Cover | Check inside for damage, dirt, grease, oil film, rust or scale |
| Gaskets | Check for warping or damage |
| X-element | Check for damage |
| Screen | Check for clogging, corrosion or damage |
| Float | Check for deformation, damage, oil film or water inside |
| Air Vent Valve Seat, Orifice | Check for rust, scale, oil film, wear or damage |

| Tightening Torque and Distance Across Flats | | | | | | |
|---|--------------|--------------------------|--------------|------------|--------------|------------|
| Part & No. | J3S-X | | J5S-X | | J6S-X | |
| | N·m (lbf·ft) | mm (in) | N·m (lbf·ft) | mm (in) | N·m (lbf·ft) | mm (in) |
| Cover Bolt 17 | 50 (37) | 16, 17* (5/8, 21/32)* | 80 (59) | 22 (7/8) | 110 (81) | 22 (7/8) |
| Air Vent Valve Seat 15 | 35 (26) | 19 (3/4) | 35 (26) | 19 (3/4) | 35 (26) | 19 (3/4) |
| Orifice Plug 4 | 80 (59) | 24 (15/16) | 180 (130) | 38 (1 1/2) | 180 (130) | 38 (1 1/2) |
| Orifice 6 | 30 (22) | 10 (3/8) | 140 (100) | 17 (21/32) | 140 (100) | 17 (21/32) |
| Drain Plug** 20 | 35 (26) | 21 (13/16) | 35 (26) | 21 (13/16) | 35 (26) | 21 (13/16) |

* Size depends on bolt standard

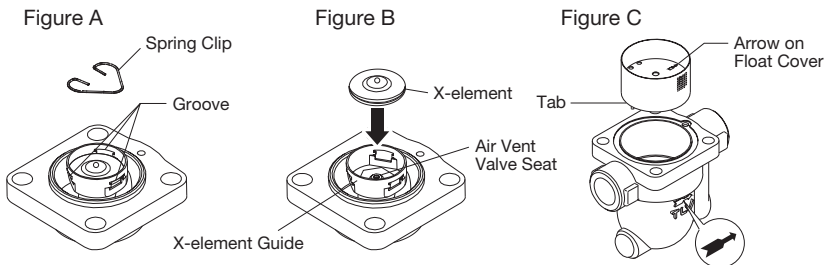
1 N·m ≈ 10 kg·cm

** Option

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

| Disassembly/Reassembly (to reassemble, follow procedures in reverse) | | | |
|--|---|---|--|
| Part & No. | During Disassembly | During Reassembly | |
| Cover Bolt 17 | Use a wrench to remove | Coat threads with anti-seize and tighten to the proper torque | |
| Cover 2 | Lift up the cover | Align the cover with the connector to attach the cover | |
| Connector 16 | Remove the connector | Insert the connector | |
| Cover Gasket 9 | Remove gasket only if worn or damaged | Replace with a new gasket only if worn or damaged | |
| Drain Plug* 20 | Use a wrench to remove | Coat threads with anti-seize, and tighten to the proper torque | |
| Drain Plug Gasket* 19 | Remove and clean sealing surfaces | Replace with a new gasket, coat surfaces with anti-seize | |
| Spring Clip 14 | Squeeze the spring clip to remove it from the guide | Squeeze the spring clip and insert it into the X-element guide (figure A) | |
| X-element 13 | Remove from the X-element guide | Make sure the X-element is not upside down (figure B) | |
| Air Vent Valve Seat 15 | Use a wrench to remove | Coat threads with anti-seize and tighten to the proper torque | |
| X-element Guide 12 | Remove without bending | Fix with Air Vent Valve Seat and make sure the X-element can be inserted smoothly | |
| Screen 8 & Float Cover 11 | J3S-X/ J5S-X | Lift straight up and out while rocking slowly | Align arrows and insert, insert tab on bottom into guide on body and push in until top is flush (figure C) |
| Screen 8 | J6S-X | Lift straight up and out while turning | Place on the screen holder, making sure the top of the screen does not stick up out of the body |
| Screen Holder 21 | | Remove without bending | Place on the ledge inside the body, making sure the rounded side is on top |
| Float 3 | Remove, being careful not to scratch its polished surface | Insert into body, being careful not to scratch its polished surface | |
| Orifice Plug 4 | Use a wrench to remove | Coat threads with anti-seize and tighten to the proper torque | |
| Orifice Plug Gasket 5 | Remove gasket only if worn or damaged | Replace with a new gasket only if worn or damaged | |
| Orifice 6 | Use a wrench to remove | Coat threads with anti-seize, and tighten to the proper torque | |
| Orifice Gasket 7 | Remove the gasket and clean sealing surfaces | Replace with a new gasket, coat surfaces with anti-seize | |

* Option

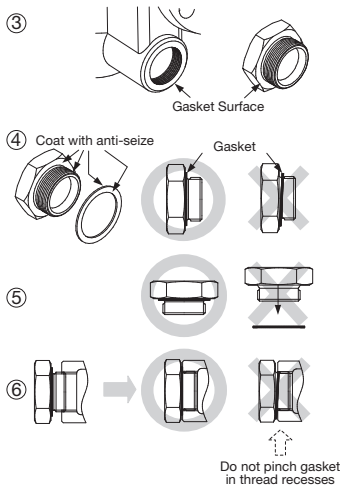


Instructions for Plug / Holder Disassembly and Reassembly

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.

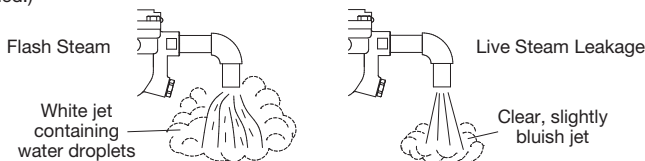


8. Operational Check

A visual inspection can be carried out to aid in determining the necessity for immediate maintenance or repair, if the trap is open to atmosphere. If the trap does not discharge to atmosphere, use diagnostic equipment such as TLV TrapMan or TLV Pocket TrapMan (within its pressure and temperature measuring range).

| | |
|----------------|--|
| Normal: | Condensate is discharged continuously 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: | 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 the condensate and there is 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 is highly recommended.)



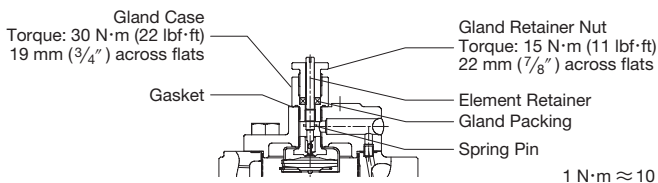
9. Troubleshooting

If the expected performance is unachievable after installation of the steam trap, read chapters 5 and 6 again and check the following points to take appropriate corrective measures.

| Problem | Cause | Remedy |
|---|--|--|
| No condensate is discharged (blocked) or discharge is poor | Float is damaged or filled with condensate | Replace the float |
| | Orifice, screen or piping is clogged with rust or scale | Clean |
| | Steam-locking has occurred | Blowdown through the bypass or close the trap inlet valve and allow the trap to cool |
| | X-element is damaged | Replace the X-element |
| Steam is discharged or leaks from the trap outlet (blowing) (steam leakage) | 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 |
| | Rust and scale have accumulated around the orifice or under the float | Clean |
| | Orifice is damaged | Replace the orifice |
| | Float is deformed or coated with scale | Clean or replace the float |
| | Trap is installed above the maximum allowable inclination angle | Correct the installation |
| | Vibration of trap occurs | Lengthen inlet piping, then fasten it securely |
| Steam leaks from a place other than the trap outlet | The X-element is damaged, or clogged with rust or scale | Clean or replace the X-element |
| | Deterioration of or damage to gaskets | Replace with new gaskets |
| Float is frequently damaged | Improper tightening torque for cover was used | Tighten to the proper torque |
| | Water hammer occurs | Examine the piping for problems that can cause water hammer |

For maintenance parts and repair parts see page 3

10. Lock Release Valve (Option : J3S-LR/J5S-LR/J6S-LR)



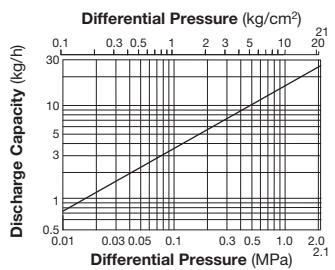
CAUTION Use heat-resistant gloves when operating the lock release valve and keep all body parts well clear of the product. Failure to do so could result in burns, other injury or damage from the blowing of small amounts of steam and condensate.

Note: Use of the lock release valve puts pressure on the X-element, and may reduce condensate discharge capacity. For more details, contact TLV.

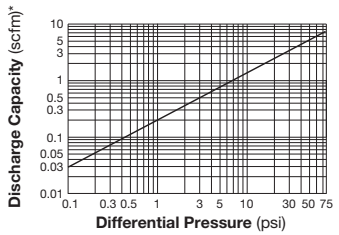
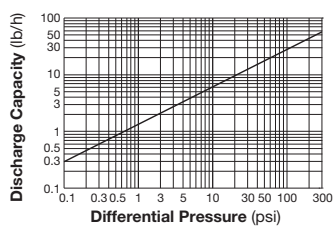
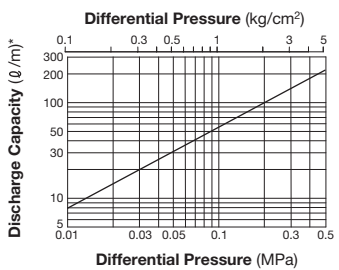
Use on equipment where steam locking/air binding, which slows the discharge of condensate and reduces equipment efficiency, tends to occur (cylindrical dryers, air fin heater, etc.).

- When the product is shipped from the factory, the element retainer is raised in the maximum, valve-closed position.
- Before operating the lock release valve, examine the trap outlet and confirm that the trap is functioning properly.
- Operate the lock release valve as follows: (tools required: flat-head screwdriver)
To Open: Insert the screwdriver into the slot on the top of the element retainer and slowly turn clockwise. (Do not turn the element retainer past the point at which it stops.) See charts below for steam/air discharge (maximums are shown).
To Close: Insert the screwdriver into the slot on the top of the element retainer and close by turning counterclockwise. Raise the element retainer until the spring pin contacts the bottom of the gland case. (Do not turn the element retainer past the point at which it stops.)
- If steam should leak from the gland retainer nut or gland case, it can be stopped by further tightening the gland retainer nut. (Do not over tighten, otherwise element retainer may seize and become unworkable.)

Steam Discharge (valve fully open)



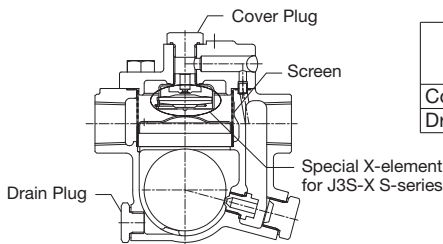
Air Discharge (valve fully open)



* Capacities are equivalent capacities of air at 20 °C (68 °F) under atmospheric pressure.

11. J3S-X S1 / J3S-X S2

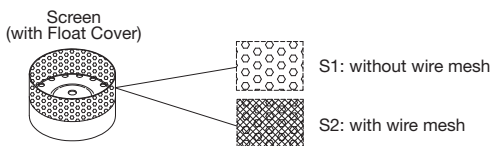
• Configuration



| Part | Torque | Distance Across Flats |
|------------|--------------|-----------------------|
| | N-m (lbf-ft) | mm (in) |
| Cover Plug | 30 (22) | 19 (3/4) |
| Drain Plug | 35 (26) | 21 (13/16) |

• Built-in Screen

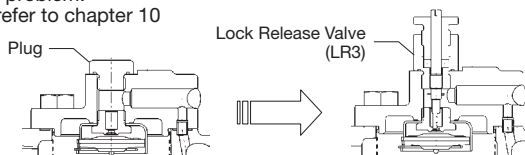
- J3S-X S1: without wire mesh
- J3S-X S2: with wire mesh



• Countermeasures for Steam Locking

A lock release valve (model: LR3) can be added afterwards. The S series has a plug in the cover that can be removed to allow an LR3 lock release valve to be installed to alleviate this problem.

For details, refer to chapter 10

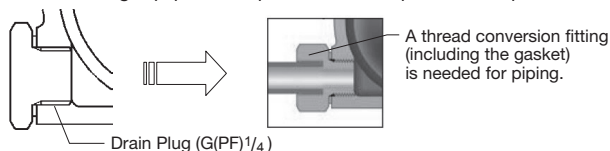


• X-element

A special C11-type X-element is used for the S series (a C6-type X-element is equipped on the Standard J3S-X). This X-element is for venting air not only at batch run startup, but also during operation, preventing temperature drops. In addition, it ensures secure sealing.

• Installation of the Blowdown Piping

A drain plug at the bottom of the body is equipped as standard. By removing the plug and installing an automatic or manual valve, condensate blowdown can be carried out when the steam-using equipment experiences a temperature drop.



12. TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV Corporation, a North Carolina corporation (“**TLV**”) warrants that products which are sold by it, TLV CO., LTD., a Japanese corporation (“**TLVJ**”) or TLV International, Inc., a Japanese corporation (“**TII**”), (hereinafter the “**Products**”) are designed and manufactured by TLVJ, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. 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 other than TLV 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 other than TLV 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; 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 the earlier of: (i) three (3) years after delivery of Products to the first end user in the case of sealed SST-Series Products for use in steam pressure service up to 650 psig; (ii) two (2) years after delivery of Products to the first end user in the case of PowerTrap® units; or (iii) one (1) year after delivery of Products to the first end user in the case of all other Products. Notwithstanding the foregoing, asserting a claim under this warranty must be brought by the earlier of one of the foregoing periods, as applicable, or within five (5) 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 TLV.

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 TLV IN WRITING WITHIN THE APPLICABLE 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 TLV, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY TLV. 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. TLV 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 TLV'S REASONABLE DISCRETION, THAT THE

CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY TLV FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

Exclusion of Consequential and Incidental Damages

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