

ISO 9001
ISO14001



Manufacturer

TLV CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001:2001



Instruction Manual

Bypass Blowdown Steam Trap (Free Float Steam Trap with X-element)

Featured Models: J3S-X-BV/J3S-X-PB/J3S-X-MB

172-65594M-05

Publication date 30 January 2025

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Introduction

Thank you for purchasing the TLV bypass blowdown 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.

The TLV bypass blowdown steam trap features a combination of: a compact ball valve, with superior long-lasting sealing properties; and an actuator unit (electric, pneumatic). 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.

The following models are contained in this manual:

J3S-X-BV: Steam trap with an integrated compact bypass blowdown ball valve with a manual operation handle

J3S-X-MB: Steam trap with an integrated compact bypass blowdown ball valve with an electric actuator

J3S-X-PB: Steam trap with an integrated compact bypass blowdown ball valve with a pneumatic actuator

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**

Do not use excessive force when connecting threaded pipes to the product. Over-tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.

**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.

**Caution**

Do not stand on or apply body weight to the handle. The handle may break, resulting in injury or other accidents.

**Caution**

Make sure the power supply switch is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.

**Caution**

Make sure that wiring work requiring a special license is carried out only by qualified personnel. If carried out by unqualified personnel, overheating or short circuits leading to injury, fires, damage or other accidents may occur.

**Caution**

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.

Checking the Piping

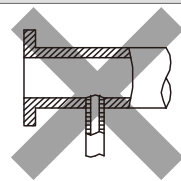
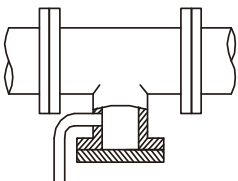
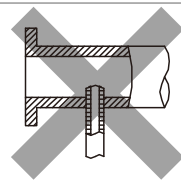
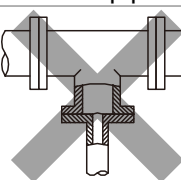
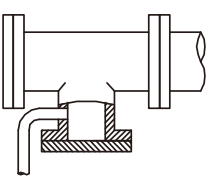
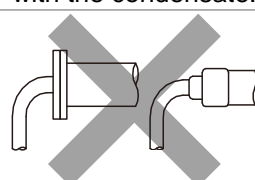


Caution

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. Has sufficient space been secured for maintenance?
(Refer to step 3. in the "Installation" section.)
3. Is the piping where the product is to be installed horizontal?
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.		 <p>Diameter is too small.</p>
Make sure the flow of condensate is not obstructed.		 <p>Diameter is too small and inlet protrudes into pipe interior.</p>
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.		 <p>Rust and scale flow into the trap with the condensate.</p>
When installing on the blind end, make sure the flow of condensate is not obstructed.		 <p>Condensate collects in the pipe.</p>

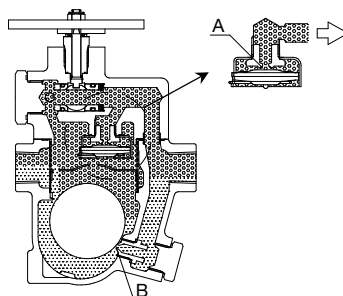
Operation

Principles of air and condensate discharge:

1. Initial air and cold condensate discharge

At startup, before steam is supplied, the trap is cold so the X-element is contracted and the air vent valve seat (A) is open. This allows for the rapid discharge of air through the air vent valve (A) and cold condensate through the orifice (B), when steam is first supplied to the system. Initial air/condensate can be discharged rapidly using the bypass blowdown valve as necessary.

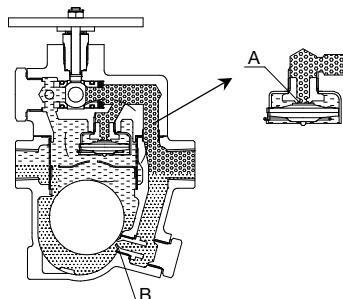
Bypass Blowdown Valve: Open



2. Condensate discharge

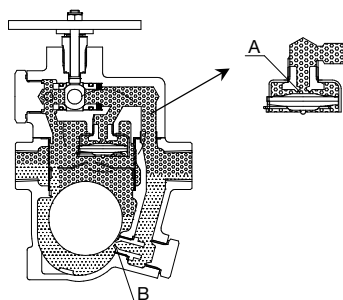
After the discharge of initial air and cold condensate (bypass blowdown valve closed), the heat of the inflowing steam and condensate causes the X-element to expand, closing the air vent valve (A). The rising condensate level causes the float to rise due to buoyancy, opening the orifice (B) and allowing condensate to be discharged.

Bypass Blowdown Valve: Closed



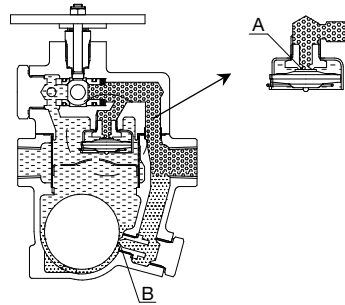
3. Hot air discharge

Should hot air flow into the trap with the steam during normal operation, the temperature of the X-element drops, causing it to momentarily contract and open the air vent valve (A), which allows for the rapid discharge of the air. After the air is discharged and steam contacts the X-element, the temperature will increase causing the air vent valve (A) to close.



4. Closed position

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



Note

The high steam temperature causes the X-element to expand, keeping the air vent closed.



Air



Steam



Condensate

Specifications



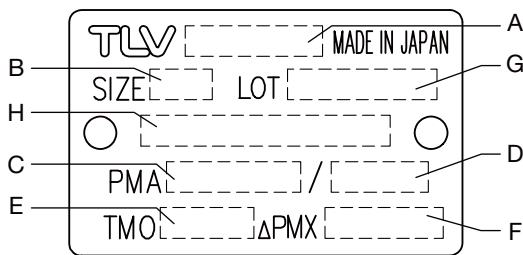
Caution
Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this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

Steam Trap Body

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.

J3S-X-MB: Motor Unit

Motor Type	Reversible motor (condenser run type single-phase induction motor)
Power Consumption	52 VA (100 to 110 V), 62 VA (200 to 220 V)
Control System	ON-OFF (fully open/fully closed)
Overload Protection	Built-in thermal protector 120 ±5 °C
Direction of Rotation	90° reciprocating
Open/Close Time (90° rotation)	3.5 seconds/50 Hz 3.0 seconds/60 Hz
Water Resistance	Rainproof
Manual Override	Possible when the power is OFF
Ambient Temp. Range and Operation Cycles (within 1 cm of the trap cover)	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>Example: When the ambient temperature is 40 °C, and the medium in use is steam at 0.5 MPaG, allow for a cycle operation interval of at least 36 seconds. When the cycle operation interval is less than 36 seconds, a thermal protector will prevent the motor unit from operating until it cools down sufficiently.</p> </div> <div style="flex: 1; padding-left: 20px;"> <p>Operation Cycle</p> <p>A: Closed-to-open B: Open-to-closed</p> <p>“Operation cycle” is the interval between the motor stop at the end of one open or close operation and the motor start at the beginning of the next.</p> </div> </div>

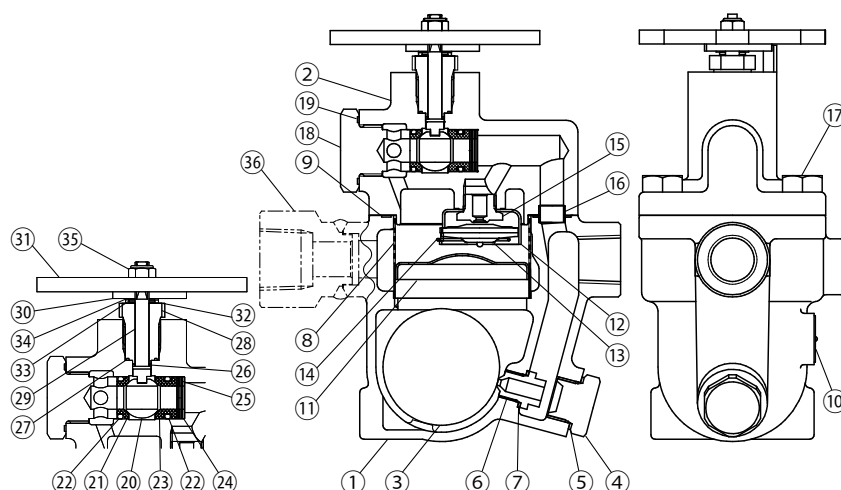
J3S-X-PB: Actuator Unit

Actuator Type	Vane rotary actuator
Air Supply Pressure	0.3 to 1.0 MPaG
Air Supply Port Size	Rc(PT) ¹ / ₈
Control System	ON-OFF (fully open/fully closed) reciprocating
Open/Close Time (90° rotation)	0.09 to 0.8 seconds
Actuator Capacity	42 cm ³
Ambient Temp. Range	60 °C or lower
Water Resistance	Rainproof
Manual Override	Possible in absence of motive pressure
Air Consumption ⁰¹ (Graph represents consumption for one reciprocating cycle)	

⁰¹Air at 20 °C under atmospheric pressure

Configuration

J3S-X-BV



Note

Removing the handle or locknut causes degradation of the gland section seal. Do not remove the handle or locknut except when performing a disassembly inspection.

No.	Part Name	A ⁰¹	B ⁰¹	C ⁰²	D ⁰³	No.	Part Name	A ⁰¹	B ⁰¹	D ⁰³
1	Body					19	Valve Holder Gasket	✓	✓	✓
2	Cover				✓	20	Ball			✓
3	Float			✓		21	Inlet Valve Seat			✓
4	Orifice Plug					22	O-ring (Inlet/Outlet Valve Seat)			✓
5	Orifice Plug Gasket	✓	✓			23	Outlet Valve Seat			✓
6	Orifice		✓			24	Washer			✓
7	Orifice Gasket	✓	✓			25	Disc Spring			✓
8	Screen		✓			26	Gland Packing			✓
9	Cover Gasket	✓	✓		✓	27	Gland Gasket	✓	✓	✓
10	Nameplate					28	Gland			✓
11	Float Cover		✓			29	Spindle			✓
12	X-element Guide		✓		✓	30	Handle Stopper			✓
13	X-element		✓		✓	31	Handle			✓
14	Spring Clip		✓		✓	32	Thrust Washer			✓
15	Air Vent Valve Seat		✓		✓	33	Washer			✓
16	Connector					34	Disc Spring			✓
17	Cover Bolt					35	Locknut			✓
18	Valve Holder				✓	36	Socket ⁰⁴			

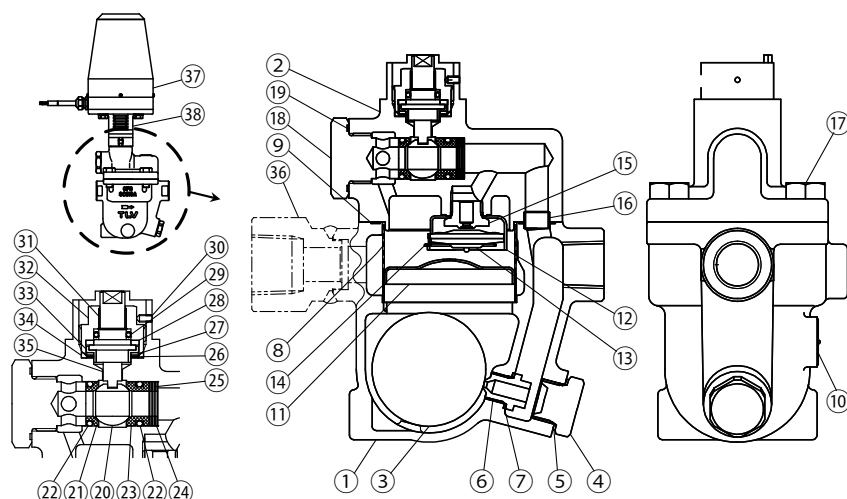
⁰¹Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit

⁰²C = Float

⁰³D = Cover Unit

⁰⁴For size 20, 25mm

J3S-X-MB



No.	Part Name	A ⁰¹	B ⁰¹	C ⁰²	D ⁰³	No.	Part Name	A ⁰¹	B ⁰¹	D ⁰³
1	Body					20	Ball			✓
2	Cover				✓	21	Inlet Valve Seat			✓
3	Float			✓		22	O-ring (Inlet/Outlet Valve Seat)			✓
4	Orifice Plug					23	Outlet Valve Seat			✓
5	Orifice Plug Gasket	✓	✓			24	Washer			✓
6	Orifice		✓			25	Disc Spring			✓
7	Orifice Gasket	✓	✓			26	Disc Spring			✓
8	Screen		✓			27	Washer			✓
9	Cover Gasket	✓	✓		✓	28	Gland Packing			✓
10	Nameplate					29	Seal			✓
11	Float Cover		✓			30	Hex Socket Set Screw			✓
12	X-element Guide		✓		✓	31	Guide Bushing			✓
13	X-element		✓		✓	32	Gland Holder			✓
14	Spring Clip		✓		✓	33	Gland Seat			✓
15	Air Vent Valve Seat		✓		✓	34	Gland Holder Gasket	✓	✓	✓
16	Connector					35	Spindle			✓
17	Cover Bolt					36	Socket ⁰⁴			
18	Valve Holder				✓	37	Motor Unit			
19	Valve Holder Gasket	✓	✓		✓	38	Shaft Coupling			

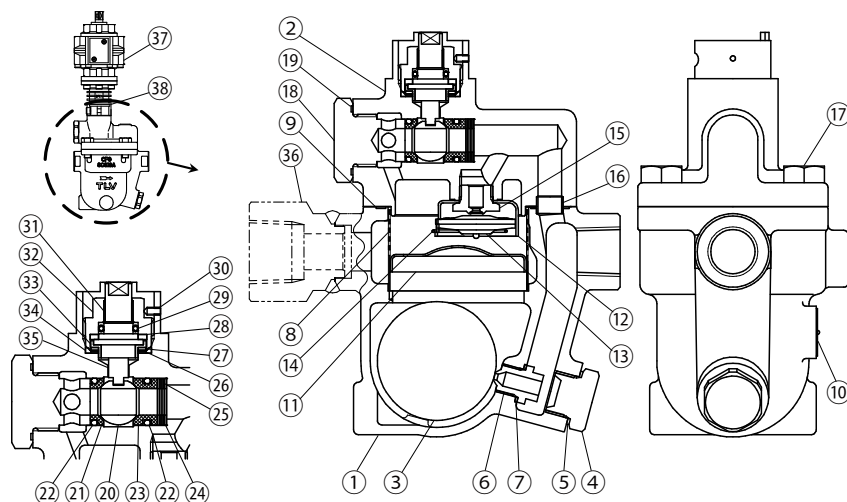
⁰¹Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit

⁰²C = Float

⁰³D = Cover Unit

⁰⁴For sizes 20, 25 mm

J3S-X-PB



No.	Part Name	A ⁰¹	B ⁰¹	C ⁰²	D ⁰³	No.	Part Name	A ⁰¹	B ⁰¹	D ⁰³
1	Body					20	Ball			✓
2	Cover				✓	21	Inlet Valve Seat			✓
3	Float			✓		22	O-ring (Inlet/Outlet Valve Seat)			✓
4	Orifice Plug					23	Outlet Valve Seat			✓
5	Orifice Plug Gasket	✓	✓			24	Washer			✓
6	Orifice		✓			25	Disc Spring			✓
7	Orifice Gasket	✓	✓			26	Disc Spring			✓
8	Screen		✓			27	Washer			✓
9	Cover Gasket	✓	✓		✓	28	Gland Packing			✓
10	Nameplate					29	Seal			✓
11	Float Cover		✓			30	Hex Socket Set Screw			✓
12	X-element Guide		✓		✓	31	Guide Bushing			✓
13	X-element		✓		✓	32	Gland Holder			✓
14	Spring Clip		✓		✓	33	Gland Seat			✓
15	Air Vent Valve Seat		✓		✓	34	Gland Holder Gasket	✓	✓	✓
16	Connector					35	Spindle			✓
17	Cover Bolt					36	Socket ⁰⁴			
18	Valve Holder				✓	37	Actuator Unit			
19	Valve Holder Gasket	✓	✓		✓	38	Shaft Coupling			

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

⁰²C = Float

⁰³D = Cover Unit

⁰⁴For size 20, 25 mm

Installation and Operation



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.

Do not stand on or apply body weight to the handle. The handle may break, resulting in injury or other accidents.

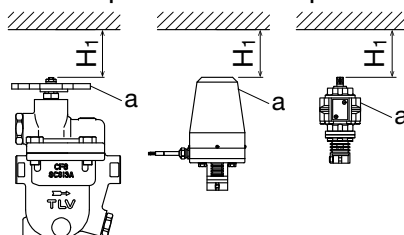
Make sure the power supply switch is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.

Make sure that wiring work requiring a special license is carried out only by qualified personnel. If carried out by unqualified personnel, overheating or short circuits leading to injury, fires, damage or other accidents may occur.

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.

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

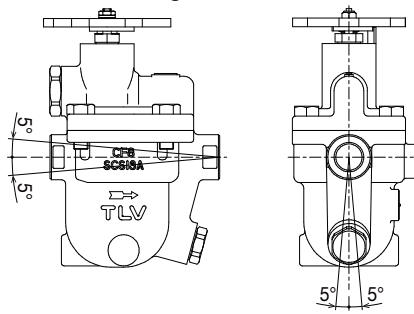
1. Before installation, be sure to remove all protective seals.
2. Before installing the product, open the inlet valve and thoroughly blow out the piping to remove any piping scraps, dirt and oil. Blowdown is possible after the product has been installed, however it is recommended that you remove all dirt, oil, etc. from the inlet piping before installation. Close the inlet valve after blowdown.
3. Confirm that sufficient maintenance space has been provided around the product.



Model	a	H ₁ mm
J3S-X-BV	Handle	100
J3S-X-MB	Motor Unit	25
J3S-X-PB	Actuator Unit	25

4. Where the product is installed in a location that may be affected by radiant heat from nearby heat-generation, install a device to block the radiant heat, such as a protective plate.
5. Install the product so that the arrow on the product is pointing in the direction of condensate flow.
6. The product should be inclined no more than 5° horizontally and front-to-back.
7. Install the condensate outlet valve and the outlet piping.

Tolerance Angle for Installation: 5°



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

J3S-X-BV: Operation

1. Turn the handle clockwise to until it is stopped by the handle stopper.
(The integrated ball valve will close and the arrow on the handle will be perpendicular to the piping, causing the product to function as a trap.)
Open the inlet and outlet valves slowly and check to make sure that the product functions properly as a steam trap. If there is a problem, determine the cause by using the "Troubleshooting" section in this manual.
2. To use the bypass function, turn the handle counterclockwise until it is stopped by the handle stopper.
(The integrated ball valve will open and the arrow on the handle will be parallel to the piping.)
3. To stop using the bypass function, turn the handle clockwise until it is stopped by the handle stopper (the arrow on the handle will be perpendicular to the piping).
(The integrated ball valve will close, causing the product to function as a trap.)
4. The integrated ball valve should be closed when the product is used as a trap.

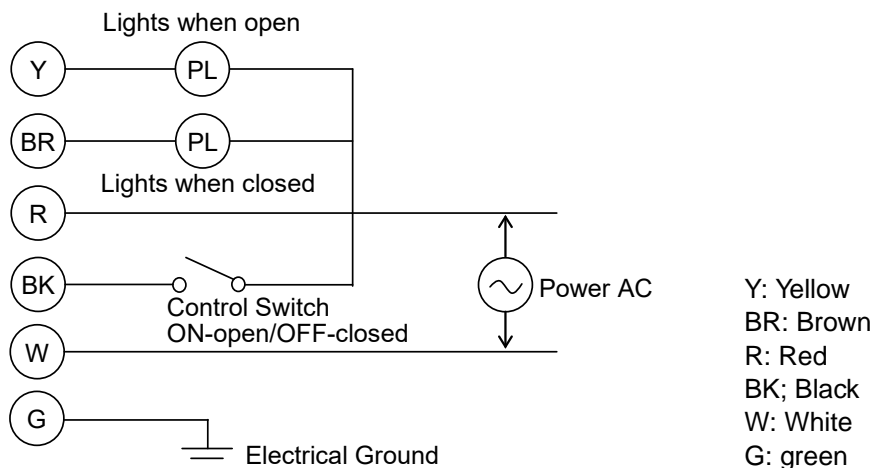


Note

Operate the bypass valve (ball valve) in only the fully open or fully closed positions. Operation in an intermediate position will damage the valve seat and may lead to leaking of the valve.

J3S-X-MB: Wiring/Operation

1. Connect the ON/OFF control switch as follows: When the control switch is ON, the valve will open; when it is OFF, the valve will close.
2. If connected to the yellow wire, a pilot lamp will light when the valve is open; if to the brown, a pilot lamp will light when the valve is closed.
3. When checking the operation of the motor unit before installation, keep fingers well clear of the bypass blowdown valve section.



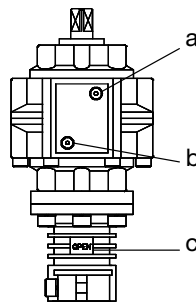
4. Carry out an operational check of the motor under no-load conditions (no pressure) before actual operation to ensure that the wiring is done properly. You can check whether the valve is open or closed by checking the orientation of the flat surfaces on the shaft coupling at the base of the motor unit. (See “J3S-X-PB: Air Supply Piping/Operation” section) When the flat surfaces of the shaft coupling are lined up with the piping, the valve is open; when they are perpendicular, the valve is closed.
5. Make sure the control switch is OFF at start-up. (The integrated ball valve is closed, causing the product to function as a trap.) Open the inlet and outlet valves slowly and check to make sure that the product functions properly as a steam trap. If there is a problem, determine the cause by using the “Troubleshooting” section of this manual.
6. Turn the control switch ON to use the bypass function.
(The integrated ball valve will be open.)
7. Turn the control switch OFF to stop using the bypass function.
(The integrated ball valve will be closed.)
8. The integrated ball valve should be closed when the product is used as a trap.

J3S-X-PB: Air Supply Piping/Operation

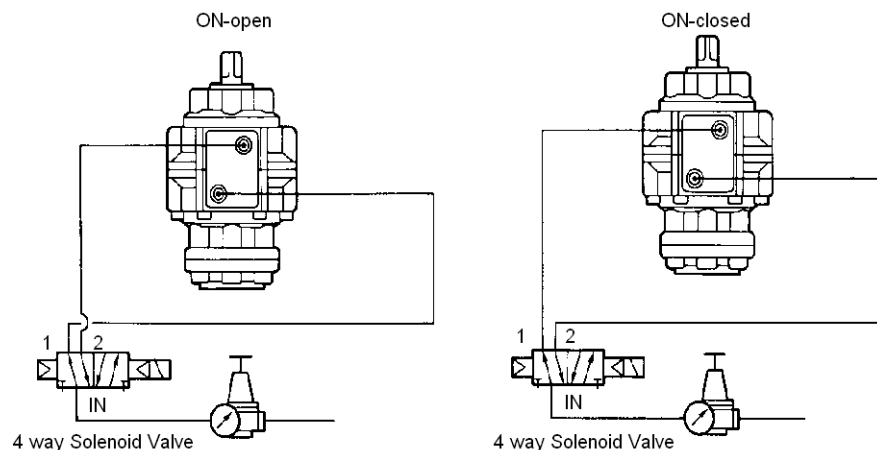
1. Use only clean air, which has been run through an air trap, filter, oiler, etc.
2. Make sure there is no foreign matter, particularly dirt or sealing tape, in the pneumatic actuator.
3. The table below shows the relationship between the air supply and valve opening/closing.

Port: A	Port: B	Valve
Supply	Exhaust	Open
Exhaust	Supply	Closed

4. When checking operation of the pneumatic actuator before installation, keep fingers well clear of the bypass blowdown valve section.



a: Air Supply to Port A (air-to-open)
 Air supply pressure: 0.3 to 1.0 MPaG
 b: Air Supply to Port B (air-to-close)
 Air supply pressure: 0.3 to 1.0 MPaG
 c: Open/Closed Indicator



5. Carry out an operational check of the actuator under no-load conditions (no pressure) before actual operation to ensure that the air is supplied properly. The "Open/Closed" Indicator located in the lower part of the actuator indicates whether the valve is opened/closed.
6. Make sure that the integrated ball valve is closed at start-up, causing the product to function as a trap. The state of the integrated ball valve can be confirmed using the "open/closed" indicator. Open the inlet and outlet valves slowly and check to make sure that the product functions properly. If there is a problem, determine the cause by using the "Troubleshooting" section in this manual.
7. To use the bypass function, supply air through port A and exhaust the air in the actuator through port B. The integrated ball valve will open.
8. To stop using the bypass function, supply air through port B and exhaust the air in the actuator through port A. Integrated ball valve will close.
9. The integrated ball valve should be closed when the product is used as a trap.

Manual Operation

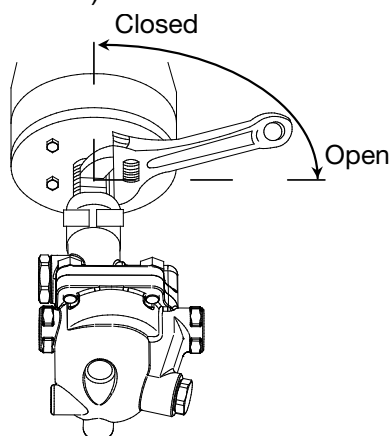


Caution

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.

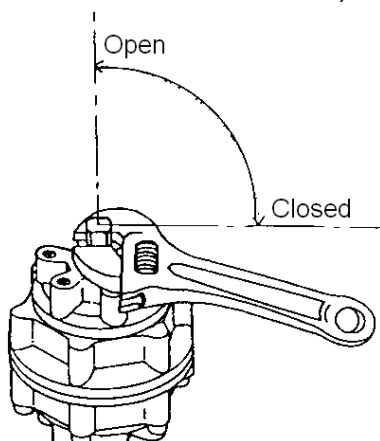
J3S-X-MB

1. Perform manual operation only after making sure that the power is OFF. Manual operation cannot be performed when the power is ON. For safety, make sure the power is OFF even during a power outage.
2. Grasp the flat surfaces of the shaft coupling at the base of the motor unit with a wrench, and turn in the direction of the arrows. When the flat surfaces of the shaft coupling are lined up with the piping, the valve is open; when they are perpendicular, the valve is closed (distance across flats: 19 mm).



J3S-X-PB

1. Perform manual operation only after shutting off the air supply first and making sure there is no pressure remaining inside the actuator unit. Manual operation can not be performed if there is pressure remaining inside the actuator unit.
2. Grasp the manual operation key on the top of the actuator unit with a wrench, and turn in the direction of the arrows (distance across flats: 10 mm).



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.

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.

J3S-X-BV/J3S-X-PB/J3S-X-MB: Operational Check of the Steam Trap

The following inspections should be carried out only after making sure that the bypass valve is closed: 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 or thermometer. (Inspection, installation, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

To determine whether the bypass valve is closed, make sure that the arrow on the handle (J3S-X-BV) or the flat surfaces of the shaft coupling (J3S-X-PB/J3S-X-MB) are perpendicular to the piping.

If the valve is not fully closed when the flat surfaces are in this position, there is a problem. Refer to the “Troubleshooting” section to determine the cause, then correct the problem.

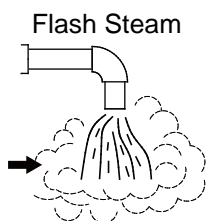
If the product or bypass blowdown valve should fail, it may cause damage to piping and equipment, resulting in faulty or low quality products or losses due to steam leakage.

Normal: Condensate, together with flash steam, is discharged continuously, accompanied by the powerful rushing sound of flow. When the amount of condensate being discharged is very slight, the sound of flow is almost inaudible.

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

J3S-X-MB: Operational Check of the Motor Unit and Bypass Valve Section

1. An operational check shall be performed at least once every 6 months.
2. Turn the motor unit power ON and check the operation of the motor unit (angle of rotation, time required to open/close the valve, sound).
3. After turning the motor unit power OFF, manually operate the valve, check for foreign matter in the valve and confirm torques.

Refer to the following table for tightening torques. A torque of more than 2 times the shown torque is considered abnormal, and an inspection should be performed.

Tightening Torque N-m		
No load	0.5 MPaG load	1.0 MPaG load
0.4	0.5	0.6

J3S-X-PB: Operational Check of the Actuator Unit and Bypass Valve Section

1. An operational check shall be performed at least once every 6 months.
2. Making sure there is air supplied to the actuator, check the operation (angle of rotation, time required to open/close the valve, sound).
3. After shutting off the air supply, manually operate the valve, check for foreign matter in the valve and confirm torques.

Refer to the following table for tightening torques. A torque of more than 2 times the shown torque is considered abnormal, and an inspection should be performed.

Tightening Torque N-m		
No load	0.5 MPaG load	1.0 MPaG load
0.4	0.5	0.6

J3S-X-BV: Additional Tightening of the Valve Unit Gland Section

It is possible to further tighten the gland section in the J3S-X-BV valve unit.

Holding the handle tightly, by hand, so that it cannot rotate, use a wrench to tighten the locknut at the top of the handle (distance across flats: 10 mm).

Cautions when applying additional tightening:

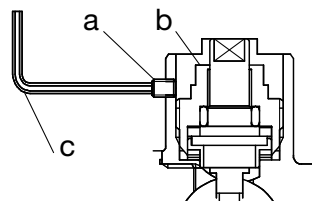
- Do not tighten the locknut completely the first time. Do not tighten it any more than is necessary to stop leakage.
- If leakage continues even after applying additional tightening to the locknut, replace parts (part No. 26, gland packing; part No. 27, gland gasket; part No. 29, spindle; part No. 35, locknut).

J3S-X-MB/J3S-X-PB: Additional Tightening of the Valve Unit Gland Section

It is possible to further tighten the gland section in the J3S-X-MB/J3S-X-PB valve units.

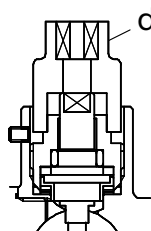
1. Detach the actuator unit (refer to the “Disassembly/Reassembly” section for details).
2. Follow the steps given below to apply additional tightening.

- 1) Loosen the Hex Socket Set Screw.



a: Hex Socket Set Screw
b: Gland Holder
c: Hex Key
Diameter: 2 mm

- 2) Tighten the gland holder further in with a socket wrench.



d: Socket Wrench
Diameter: 17 mm

- 3) Retighten the Hex Socket Set Screw.

Cautions when applying additional tightening:

- Do not tighten the gland holder completely the first time. Do not tighten it any more than necessary to stop leakage.
- If leakage continues even after applying additional tightening to the gland holder, replace parts.

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.

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.

Make sure the power supply switch is OFF before carrying out work on the wiring or inspections involving disassembly. If such work is carried out with the power on, there is a danger that equipment may malfunction or electric shock may occur, leading to injury or other accidents.

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)

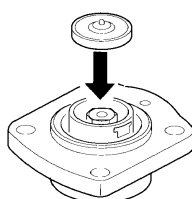
Part Name	During Disassembly	During Reassembly
Drain Plug	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Drain Plug Gasket	Remove the gasket and clean sealing surfaces	Replace with a new gasket; coat surfaces with anti-seize

Detaching/Reattaching the Cover

Part Name & No.		During Disassembly	During Reassembly
Cover Bolt	17	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
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, align the cover with the body and connector and reattach
Connector	16	Remove the connector	Reinsert into the hole in the body
Cover Gasket	9	Remove the gasket and clean sealing surfaces	Replace with a new gasket if misshapen or damaged

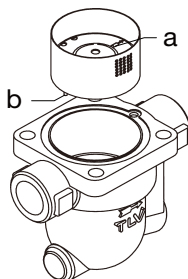
Disassembly/Reassembly of Components Inside the Cover (Where the X-element is mounted)

Part Name & No.		During Disassembly	During Reassembly
Spring Clip	14	Pinch the insides together and remove from the X-element guide	Insert securely into the groove in the guide
X-element	13	Remove from the X-element guide	Insert after making sure it is in the correct orientation
Air Vent Valve Seat	15	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
X-element Guide	12	Remove without bending	Fix with the air vent valve seat and make sure the X-element can be inserted smoothly



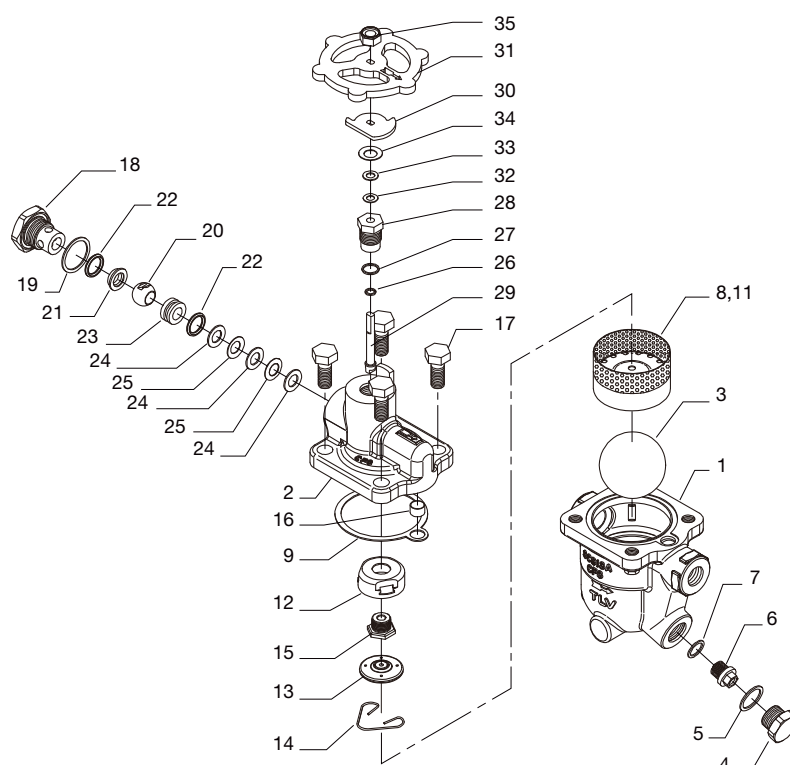
Disassembly/Reassembly of Components Inside the Body

Part Name & No.		During Disassembly	During Reassembly
Float Cover Screen	11 8	Lift straight up and out while rocking slowly	Align the arrows (a) on the float cover/ screen and the body, insert with the tab (b) on the bottom fitting into the slot in the body; make sure the screen does not stick out of the body
Float	3	Remove, being careful not to scratch the surface	Insert, being careful not to scratch the surface
Orifice Plug	4	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Orifice Plug Gasket	5	Remove the gasket and clean sealing surfaces	Replace with a new gasket; coat surfaces with anti-seize
Orifice	6	Remove with a socket wrench	Consult the table of tightening torques 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



Exploded View

J3S-X-BV



No.	Part Name	No.	Part Name
1	Body	19	Valve Holder Gasket
2	Cover	20	Ball ⁰¹
3	Float	21	Inlet Valve Seat ⁰¹
4	Orifice Plug	22	O-ring ⁰¹ (Inlet/Outlet Valve Seat)
5	Orifice Plug Gasket	23	Outlet Valve Seat ⁰¹
6	Orifice	24	Washer ⁰¹
7	Orifice Gasket	25	Disc Spring ⁰¹
8	Screen	26	Gland Packing
9	Cover Gasket	27	Gland Gasket
10	Nameplate (not shown)	28	Gland
11	Float Cover	29	Spindle
12	X-element Guide	30	Handle Stopper
13	X-element	31	Handle
14	Spring Clip	32	Thrust Washer
15	Air Vent Valve Seat	33	Washer
16	Connector	34	Disc Spring
17	Cover Bolt	35	Locknut
18	Valve Holder	36	Socket (not shown)

⁰¹Cannot be disassembled. Please contact TLV for repair.

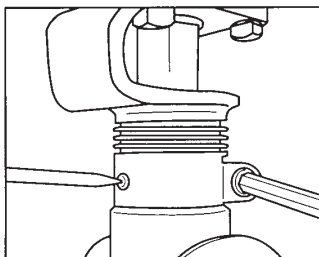


Note

Parts marked with an asterisk (*) cannot be disassembled. Please contact TLV for repair.

J3S-X-MB/J3S-X-PB: Detaching/Reattaching the Motor Unit or Actuator Unit

Part Name & No.		During Disassembly	During Reassembly
Screw & Spring Washers	—	Remove the screw & the spring washer	Consult the table of tightening torques and tighten to the proper torque
Hex Socket Set Screw	30	Remove with a hex key	Consult the table of tightening torques and tighten to the proper torque
Spring Washer	27	Remove the spring washer	Reinsert the spring washer
Motor or Actuator Unit	37	Detach the motor or the actuator unit	Reattach the motor or the actuator unit
Shaft Coupling	38	Detach the shaft coupling	Reattach the shaft coupling



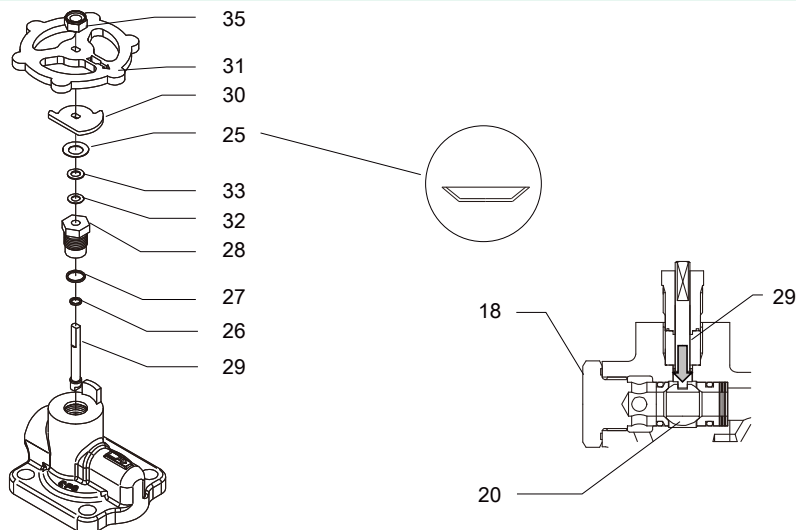
J3S-X-BV: Disassembly/Reassembly of the Bypass Valve Gland Section

Part Name & No.		During Disassembly	During Reassembly
Locknut	35	Remove with a wrench	<u>A new locknut must be used</u> Tighten to the proper torque
Handle	31	Pull the handle up off of the spindle	Reattach the handle, being careful of its orientation (see the drawing below)
Handle Stopper	30	Pull the handle stopper up off of the spindle	Be careful of its orientation (see the drawing below)
Disc Spring	25	Remove the disc spring	Reinsert the disc spring, referring to the drawing below for proper operation
Washer	33	Remove the washer	Reinsert the washer
Thrust Washer	32	Remove the thrust washer	Reinsert the thrust washer
Gland	28	Remove with a wrench	Consult the table of tightening torques and tighten to the proper torque
Spindle	29	Remove the spindle	Replace with a new spindle, coat sleeve area and threads with anti-seize Reinsert with the proper orientation (see the fig. below)
Gland Gasket	27	Remove the gasket and clean sealing surfaces	Replace with a new gasket only if warped or damaged
Gland Packing	26	Remove the gland packing	Replace with a new gland packing



Note

1. Finger-tightening the valve holder first makes it easier to reinsert the spindle into the ball. After reinserting the spindle, tighten the valve holder and the gland.
2. Removing the handle and the locknut from the J3S-X-BV destroys the gland section seal. Do not detach the handle and the locknut unless performing a disassembly inspection.



J3S-X-MB/J3S-X-PB: Disassembly/Reassembly of the Bypass Valve Gland Section

Part Name & No.		During Disassembly	During Reassembly
Hex Socket Set Screw	30	Remove with a hex key	Consult the table of tightening torques and tighten to the proper torque
Gland Holder	32	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Guide Bushing	31	Remove the guide bushing	Reinsert the guide bushing
Seal	29	Remove the seal	Replace with a new seal
Gland Packing	28	Remove the gland packing	Replace with a new gland packing
Spindle	35	Remove the spindle	Reinsert the spindle
Gland Seat	33	Remove the gland seat	Replace with a new gland seat
Washer (1 piece)	24, 27	Remove the washer	Reinsert the washer
Disc Spring (2 pieces)	26	Remove the disc springs	Reinsert with the proper orientation (see the fig. below)
Gland Holder Gasket	34	Remove the gasket and clean sealing surfaces	Replace with a new gasket only if misshapen or damaged, being careful of the orientation



Note

1. Reassemble the gland section after reassembling the valve section.
2. Finger-tightening the valve holder first makes it easier to reinsert the spindle into the ball. After reinserting the spindle, tighten the valve holder.

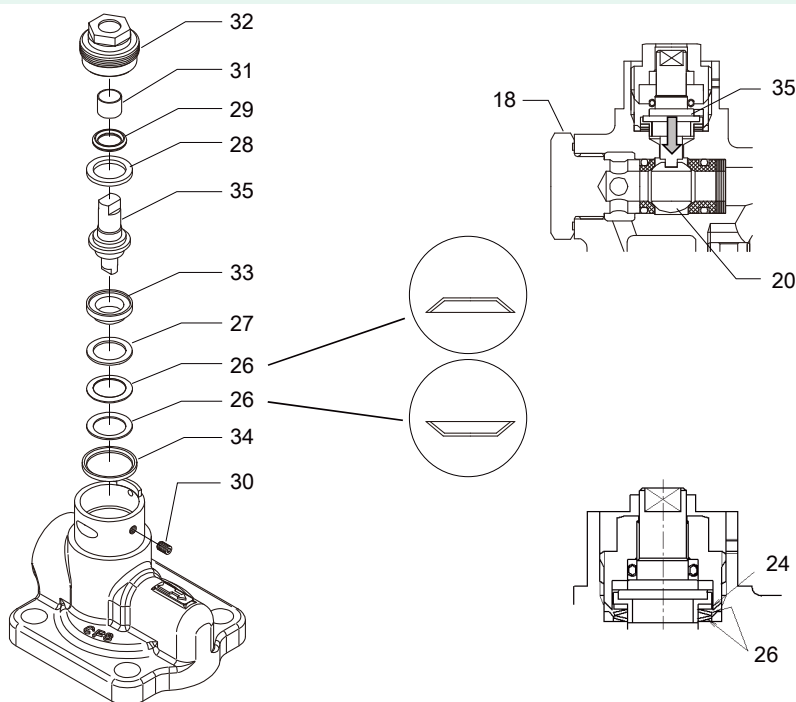


Table of Tightening Torques

Part Name	Torque N·m	Distance Across Flats mm
Cover Bolt	50	16/17 ⁰¹
Air Vent Valve Seat	35	19
Orifice Plug	80	24
Orifice	30	10
Screw Spring Washer (J3S-X-MB/J3S-X-PB)	0.8	+
Hex Key Bolt (J3S-X-MB/J3S-X-PB)	10	5
Locknut	2.5	10
Gland (J3S-X-BV)	35	17
Hex Socket Set Screw	1.0	2
Gland Holder	35	17
Valve Holder	80	32

⁰¹Size depends on bolt standard



Note

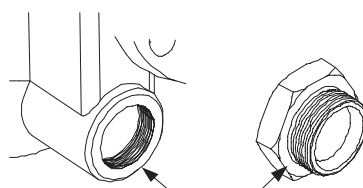
- Coat all threaded portions with anti-seize.
- If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Instructions for Plug/Holder Disassembly and Reassembly

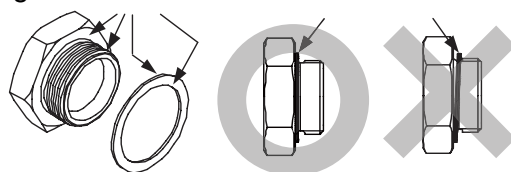
The seal on the threaded plugs/holders found on TLV products is formed by a flat metal gasket. There are various installation orientations for the gaskets, such as horizontal, diagonal and downward, and the gasket may be pinched in the thread recesses during assembly.

Instructions for Disassembly and Reassembly

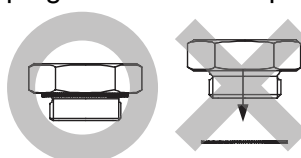
1. Remove the plug/holder using a tool of the specified size (distance across flats).
2. The gasket should not be reused. Be sure to replace it with a new gasket.
3. Clean the gasket surfaces of the plug/holder and the product body using a rag and/or cleaning agents, then check to make sure the surfaces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



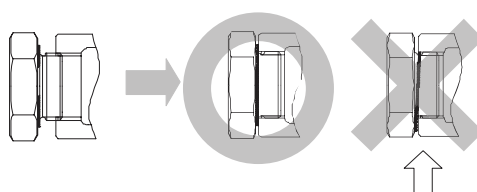
4. Coat both the gasket surface of the plug/holder and the threads of the plug/holder with anti-seize, then press the gasket onto the center of the gasket surface of the plug/holder, making sure the anti-seize affixes the gasket tightly to the plug/holder. Check to make sure the gasket is not caught 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.

J3S-X-BV/J3S-X-MB/J3S-X-PB: Troubleshooting for the Steam Trap and Bypass Valve

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
	The product operating pressure exceeds the maximum specified pressure, or whether there is insufficient pressure differential between the product inlet and outlet	Compare specifications and actual operating conditions
	Check to see if steam-locking has occurred	Perform a bypass blowdown
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	Check for a clogged orifice opening or rust and scale build-up beneath the float	Clean parts
	Check for scratches on the orifice	Replace with a new orifice
	The float is not 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 bypass valve is open	Close the bypass valve
	Check the valve sealing surfaces for dirt or scratches, and the o-rings (inlet/outlet valve seat) for scratches or damage	Clean or replace parts
	Check to see if the X-element 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 leaks from the bypass valve gland	Check for dirt, scratches or wear on the gland packing	Clean or replace with a new gland packing

Problem	Cause	Remedy
The bypass valve does not move or remains half-open	Check to see if the valve seat or the ball have build-up (the ball should turn easily: normal operation torque is less than 1.0 N·m)	Clean parts
	Check the shaft coupling for wear or deformation	Replace with a new shaft coupling
	Check the motor unit or actuator unit (see following pages)	Replace with a new motor unit or an actuator unit
Steam is leaking from a place other than the outlet	Gasket deterioration or damage	Replace with new gasket(s)
	Improper tightening torques are used	Tighten to the proper torque
Float frequently becomes damaged	Water hammer has occurred	Study and correct the piping

J3S-X-MB: Troubleshooting for the Motor Unit

When the motor unit fails to operate as it did when first installed, use the following table to locate and remedy the cause. Detach the motor unit from the trap body when checking the motor unit itself.

(For detaching the actuator unit from the trap body, refer to the “Disassembly/Reassembly” section.)

Problem	Cause	Remedy
Does not operate even though the control switch is ON	Turn OFF the power, and check to see if manual operation is possible	If it is, then the motor unit is broken; contact TLV
	Check for improper wiring or control method	Correct the problem
	Check to make sure that the main power is ON, and that the voltage is correct, also check current and fuses	Correct the problem
	Check whether the thermo-protector is in operation or not	After allowing the motor unit to cool down, check its operation again to ascertain whether the thermo-protector is the cause
Reciprocating action is repeated over and over	There is a problem with the control system	Correct the problem
Rotation only takes place in one direction	There is a problem with the control system	Correct the problem
Does not rotate the full 90°, stops at a partial rotation	There is a problem with the control system	Correct the problem



Note

If after attempting all of the above remedies the product still does not operate properly, contact TLV after confirming operating pressure, operating temperature, operating frequency and serial number.

All motor units must be repaired by TLV. DO NOT disassemble the motor unit yourself.

J3S-X-PB: Troubleshooting for the Actuator Unit

When the actuator unit fails to operate as it did when first installed, use the following table to locate and remedy the cause. Detach the actuator unit from the trap body when checking the actuator unit itself.

(For detaching the actuator unit from the trap body, refer to the “Disassembly/Reassembly” section.)

Problem	Cause	Remedy
Does not operate even though the control switch is ON	Shut off the air supply, make sure there is no pressure left in the actuator unit, then check to see if manual operation is possible	If it is, then the actuator unit is broken; contact TLV
	Check for a problem with the solenoid valve	Replace with a new solenoid valve
	Check to make sure that the power is reaching the solenoid valve and that the voltage is correct, also check current and fuses	Correct the problem
	Check for proper air supply	Correct irregularities
	The filter and the air supply ports are clogged	Clean parts
Reciprocating action is repeated over and over	There is a problem with the magnetic control system	Correct the problem
Rotation only takes place in one direction	There is a problem with the magnetic control system	Correct the problem
	The filter and the air supply ports are clogged	Clean parts
Does not rotate the full 90°, stops at a partial rotation	There is a problem with the air supply	Correct the problem
	The filter and the air supply ports are clogged	Clean parts



Note

If after attempting all of the above remedies the product still does not operate properly, contact TLV after confirming operating pressure, operating temperature, operating frequency and serial number.

All motor units must be repaired by TLV. DO NOT disassemble the motor unit yourself.

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.

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Gloucestershire GL52 8TW, **U.K.**

TLV EURO ENGINEERING FRANCE SARL

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Manufacturer:

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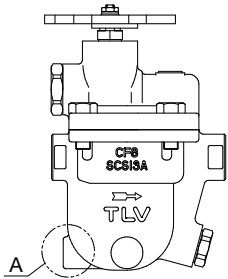
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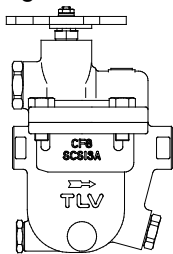
Options

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