



Instruction Manual

Clean Steam Trap **LV6-CE / LV6-SF / LV6-P / LV6-EP**

Contents

Introduction	1
Safety Considerations	2
Checking the Piping	3
Operation	4
Specifications	5
Configuration	5
Installation	6
Maintenance	7
Disassembly/Reassembly	8
Troubleshooting.....	9
Product Warranty	10
Option (2-piece Clamp with Bolts and Nuts)	11

Introduction

Thank you for purchasing the TLV clean steam trap.

This product has been thoroughly inspected before being shipped from the factory. When the product is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary. Also be sure to read this manual carefully before use and follow the instructions to be sure of using the product properly.

This clean steam trap is of a revolutionary design that employs a high-performance X-element. This is a new type of valve mechanism in which a thermoliquid is sealed inside the X-element and the valve opens or closes based on the difference between the saturation temperatures of the thermoliquid and the water.

The X-element is very sensitive to changes in temperature and responds with great accuracy, quickly discharging air and the large quantities of condensate created immediately after operation start-up, thereby greatly reducing start-up time. It also reacts with great sensitivity to the inflow of large quantities of condensate and hot air during operation, thus preventing air-binding.

The above-listed superior features of the X-element employed in this clean steam trap help to increase heating efficiency and reduce 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

	<p>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.</p> <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 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>
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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 product have been installed properly.

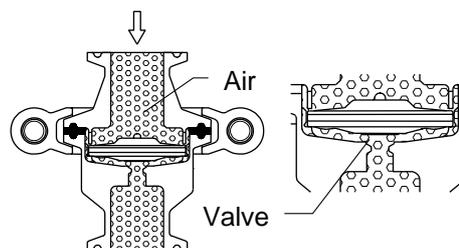
1. Is the pipe diameter suitable?
2. Has sufficient space been secured for maintenance?
3. Have maintenance valves been installed at the inlet and outlet? If the outlet is subject to back pressure, has a check valve been installed?
4. Is the inlet pipe as short as possible, with as few bends as possible, and installed so the liquid will flow naturally down into the trap?
5. Is there any vibration in the piping?

Operation

Principles of air and condensate discharge:

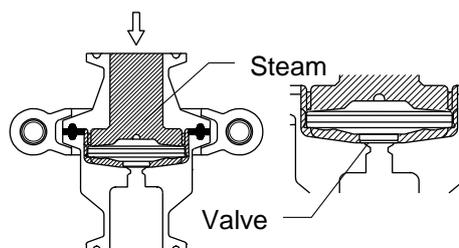
1. Start-up air and cold condensate discharge

When the system is cold before the supply of steam, the X-element is in its contracted state and the valve is open. This allows for the rapid discharge of large quantities of air and cold condensate through the open valve, thus reducing start-up time.



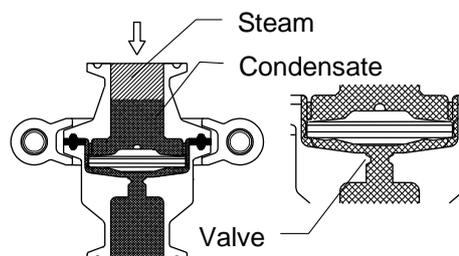
2. Closed position

When the discharge of initial air and cold condensate is completed, steam flows into the trap. This raises the temperature of the interior of the trap, causing the thermoliquid inside the X-element to expand. The valve remains open as the temperature inside the trap approaches the inlet steam pressure's saturation temperature. When the temperature reaches a point slightly below the saturation temperature, the valve closes.



3. Condensate discharge

With the influx of condensate, the X-element is cooled, causing the valve to immediately open and discharge the condensate. Additionally, the X-element responds with great sensitivity to the temperature difference of air that is close to saturation temperature and discharges the air rapidly.



Specifications

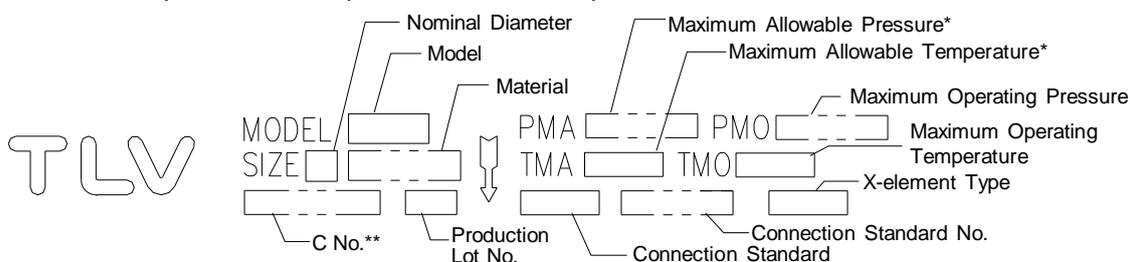


Install properly and **DO NOT** use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this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



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.



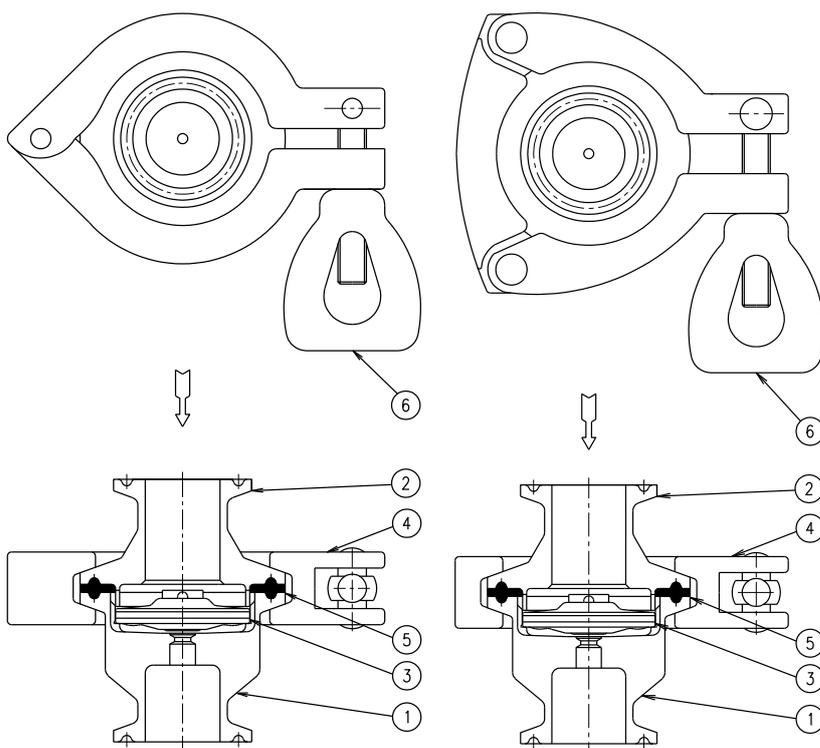
* Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are **PRESSURE SHELL DESIGN CONDITIONS, NOT OPERATING CONDITIONS.**

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

Configuration

LV6-CE/LV6-SF

LV6-P/LV6-EP



No.	Name
1	Lower Body
2	Upper Body
3	X-Element
4	Body Clamp
5	Gasket
6	Wing Nut

NOTE:
The direction of inlet flow must be from the top.

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

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

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 product is operating properly or has failed. Periodically the operation should also be checked by using diagnostic equipment such as a stethoscope, thermometer, TLV Pocket TrapMan or TLV TrapMan.

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

- Normal : During either intermittent or continual condensate discharge flash steam is discharged and the sound of flow can be heard.
- Blocked (Discharge Impossible) : No condensate is discharged. The trap is quiet, making 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.

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
Gasket: check for warping or damage
X-element valve area and valve seat area of body: check for scratches, foreign matter or oil film
Body interior: Check for build-up, oil film, scratches and wear

Disassembly/Reassembly



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

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.)

Disassembly/Reassembly of Upper and Lower Bodies

Part	During Disassembly	During Reassembly
Wing Nut Body Clamp	Loosen the wing nut with a tool such as an adjustable wrench, then remove the body clamp	Consult the table of tightening torques and tighten the wing nut to the proper torque; open inlet valve and allow live steam to enter and heat the trap, then close the inlet valve; after the internal and atmospheric pressures have equalized and the trap surface has cooled, tighten the wing nut to the proper torque again; Steam may leak if the wing nut is not re-tightened
Upper Body, Lower Body	Take apart, being careful not to scratch the gasket sealing surfaces	Reattach, being careful not to scratch the gasket sealing surfaces
Gasket	Remove the gasket and clean the sealing surfaces	Replace with a new gasket if damaged

Removing/Reassembling Parts Inside Lower Body

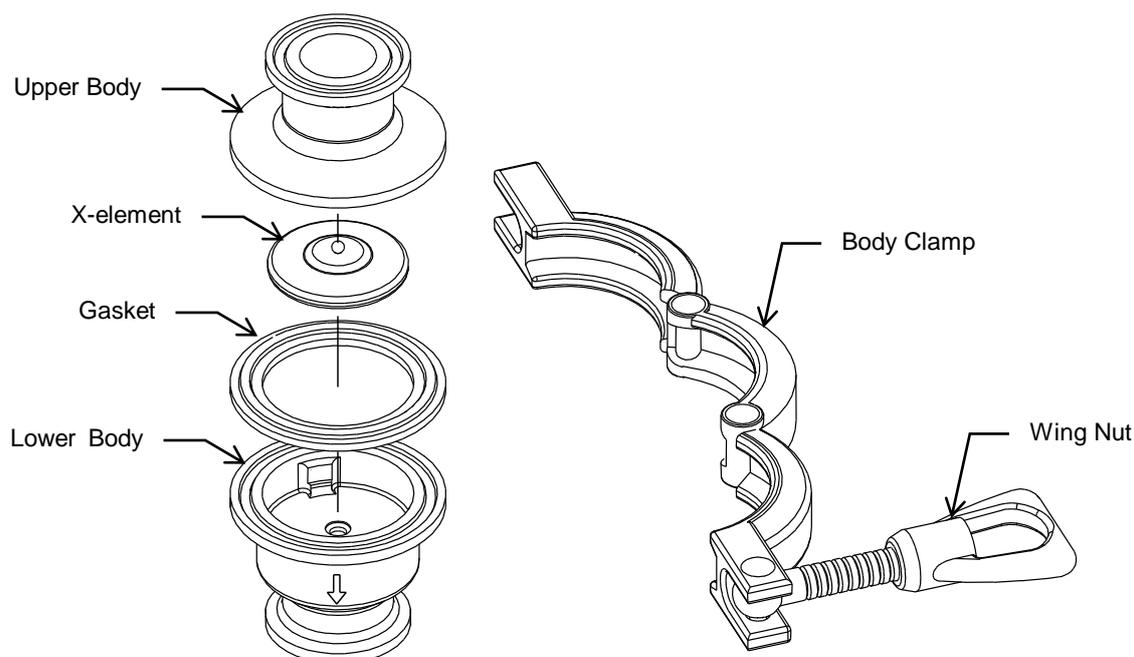
Part	During Disassembly	During Reassembly
X-element	Grasp the steel ball on the top of the X-element and remove	After making sure that the X-element is right-side-up, insert straight down into the guide-part of the lower body, making sure it does not catch on the sides

Table of Tightening Torques

Part Name	Torque		Distance Across Flats	
	N·m	(lbf·ft)	mm	(in)
Wing Nut	8.0	(5.9)	—	

(1 N·m ≈ 10 kg·cm)

Exploded View



Troubleshooting



When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

If the product fails to operate properly, use the following table to locate the cause and remedy.

Problem	Cause	Remedy
No condensate is discharged (blocked) or discharge is poor	The X-element is sticking to the valve seat	Clean parts
	The Valve seat is blocked	Clean valve area of the lower body or replace lower body
	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)	There is build-up of rust or scale between the X-element valve and valve seat on the lower body	Clean parts
	The X-element valve and/or the valve seat on the lower body are damaged	Replace with a new X-element and/or replace with new lower body
	The X-element is broken	Replace with a new X-element
	Improper installation	Correct the installation
	Trap vibration	Lengthen the inlet piping and fasten it securely
Steam is leaking from a place other than the outlet	Gasket deterioration or damage	Replace with a new gasket
	Improper tightening torque was used on the clamp bolt and nut	Tighten to the proper torque
	The piping has been forcibly joined using a coupling with the incorrect bore	Correct the piping

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.

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For Service or Technical Assistance:
Contact your TLV representative or your regional TLV office.

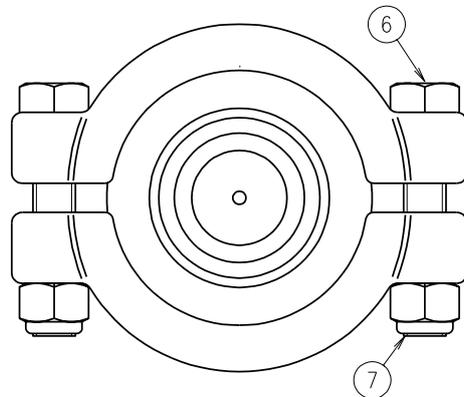
Manufacturer

TLV CO., LTD.

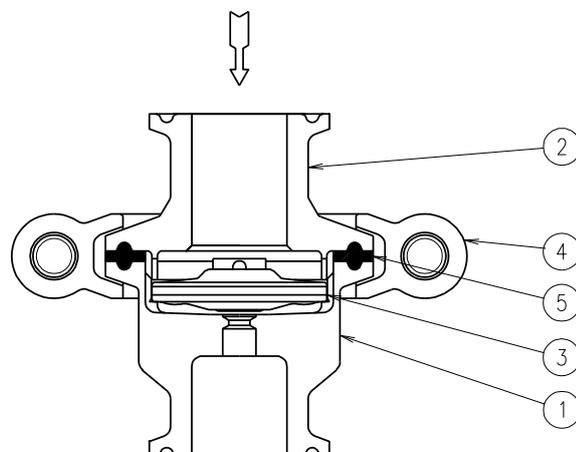
881 Nagasuna, Noguchi
Kakogawa, Hyogo 675-8511, JAPAN
Tel: 81-(0)79-427-1800

Option (2-piece Clamp with Bolts and Nuts)

Configuration



No.	Name
1	Lower Body
2	Upper Body
3	X-Element
4	Body Clamp
5	Gasket
6	Clamp Bolt
7	Clamp Nut



Disassembly/Reassembly



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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.

Use the procedures on the following page 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.)

Disassembly/Reassembly of Upper and Lower Bodies

Part	During Disassembly	During Reassembly
Body Clamp, Clamp Bolt, Clamp Nut	Loosen clamp nuts with a tool such as an adjustable wrench, then remove the body clamp	When threading the clamp nut onto the clamp bolt, the direction of the clamp nut must be like that shown in the "Exploded View" section on the next page. Consult the table of tightening torques and tighten clamp nuts to the proper torque; avoid lopsided tightening by making sure that both sides are tightened evenly; open inlet valve and allow live steam to enter and heat the trap, then close the inlet valve; after the internal and atmospheric pressure have equalized and the trap surface has cooled, tighten clamp nuts to the proper torque again; Steam may leak if clamp nuts are not re-tightened
Upper Body, Lower Body	Take apart, being careful not to scratch the gasket sealing surfaces	Reattach, being careful not to scratch the gasket sealing surfaces
Gasket	Remove the gasket and clean the sealing surfaces	Replace with a new gasket if damaged

Removing/Reassembling Parts Inside Lower Body

Part	During Disassembly	During Reassembly
X-element	Grasp the steel ball on the top of the X-element and remove	After making sure that the X-element is right-side-up, insert straight down into the guide-part of the lower body, making sure it does not catch on the sides

Table of Tightening Torques

Part Name	Torque		Distance Across Flats	
	N·m	(lbf·ft)	mm	(in)
Clamp Bolt, Clamp Nut	8.0	(5.9)	13	(1/2)

(1 N·m ≈ 10 kg·cm)

Exploded View