



Manufacturer  
**TLV. CO., LTD.**  
Kakogawa, Japan  
is approved by LRQA LTD. to ISO 9001/14001



# Instruction Manual

Temperature Control Trap  
(with Bimetal Element)

**LEX3N-TZ**

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## Introduction

Thank you for purchasing the **TLV** temperature control 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.

Unlike most steam traps, this temperature control trap (with bimetal element) enables the desired condensate discharge temperature to be set. Note: only the temperature of condensate discharged can be controlled; this temperature control trap does not control product temperature nor temperature of condensate accumulating in the system.

This temperature control trap is also ideal for heating of heavy oil tank and oil feed pipe lines, and for the tracing of valves, instrumentation, etc.





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 needed 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

	<b>Indicates a DANGER, WARNING or CAUTION item.</b>
	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

	<b>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.</b> 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.
	<b>Take measures to prevent people from coming into direct contact with product outlets.</b> Failure to do so may result in burns or other injury from the discharge of fluids.
	<b>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.</b> Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.
	<b>Do not remove cap nut or cover while trap is under pressure. Allow trap body temperature to cool to room temperature before removing cap nut or cover.</b> Failure to do so may result in burns or other injury.

Safety considerations are continued on the next page.

 <b>CAUTION</b>	<b>Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way.</b>
	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.
	<b>Use only under conditions in which no freeze-up will occur.</b> Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.
	<b>Use only under conditions in which no water hammer will occur.</b> The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

## Checking the Piping



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

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

1. Is the pipe diameter suitable?
2. Has sufficient space been secured for maintenance?
3. Have isolation valves been installed at the inlet and outlet?  
If the outlet is subject to back pressure, has a check valve been installed?
4. Has the trap been installed so that condensate will easily flow naturally down into the trap by gravity?

## Specifications

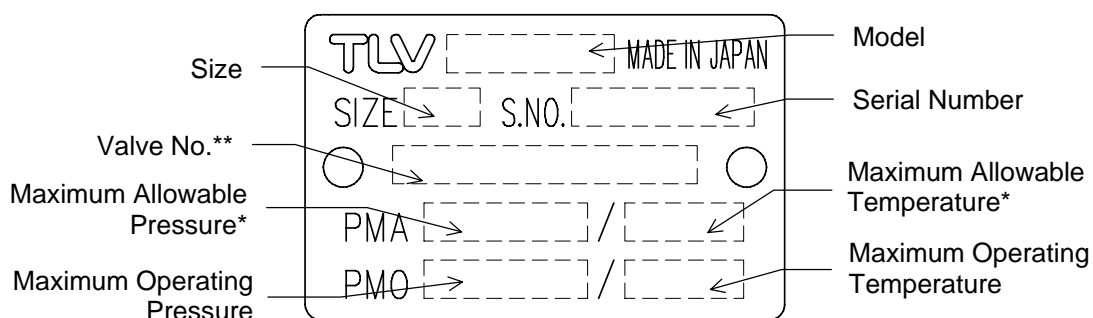


Install properly and **DO NOT** use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this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

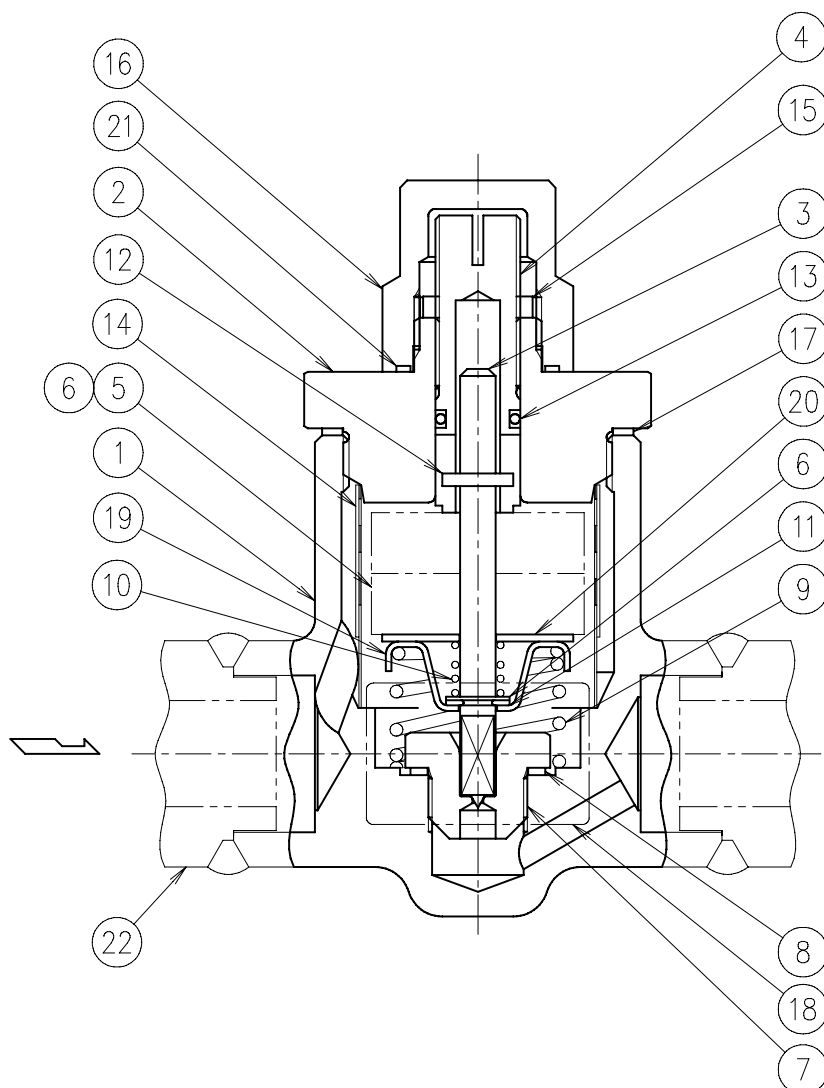
Refer to the product nameplate for detailed specifications.



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

\*\* Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

## Configuration



No.	Name	M	R	No.	Name	M	R
1	Body			12	Spring Pin		√
2	Cover			13	Seal Ring	√	√
3	Valve Stem		√	14	Screen		√
4	Adjusting Screw			15	Locknut		
5	Bimetal Element		√	16	Cap Nut		
6	Washer		√	17	Cover Gasket	√	√
7	Valve Seat		√	18	Nameplate		
8	Valve Seat Gasket	√	√	19	Spring Guide		√
9	Overexpansion Spring		√	20	Thrust Plate		√
10	Return Spring		√	21	Cap Nut Gasket	√	√
11	Snap Ring		√	22	Flange (Flanged type only)		

Replacement parts are available only in the following kits: M = Maintenance Kit; R = Repair Kit

## 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.

Note: For products with socket weld connections, electric weld with a single pass.

As internal parts are not damaged by the welding process if limited to a single pass, there is no need to remove them before welding.

1. Before installing the product, open the inlet valve and blow out the piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
2. Before installation, be sure to remove all protective seals.
3. Install the product so the arrow on the body is pointing in the direction of condensate flow.
4. The trap may be installed either horizontally or vertically; there are no restrictions on the orientation of installation. However, when installing horizontally, make sure that the trap is installed with the temperature adjusting screw positioned higher than the piping in which the trap is installed. (Upside-down installation is not permissible.)
5. Open the inlet valve gradually and check to make sure that the product functions properly.

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

## Adjusting the Set Temperature



Do not remove cap nut or cover while trap is under pressure. Allow trap body temperature to cool to room temperature before removing cap nut or cover. Failure to do so may result in burns or other injury.



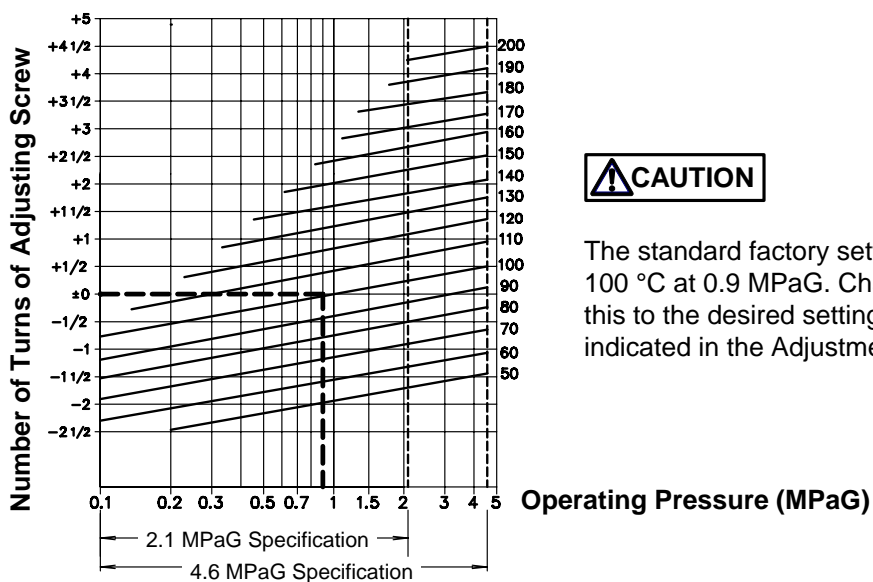
Always wear heat-insulated gloves when handling products with high body temperatures, such as when in operation. Failure to do so may result in burns.

Follow the procedure below to adjust.

1. For your safety, wear heat-insulated gloves or eye protectors, etc. to prevent burns.
2. Close the external valve from which the steam and condensate flow to the trap (the "inlet isolation valve").
3. Close the external valve to which the condensate flows from the trap (the "outlet isolation valve").
4. Wait until the pressure between the inlet isolation valve and the trap equals atmospheric pressure (when the trap body temperature cools to room temperature).
5. Hold the cover with one wrench and use another wrench to slowly loosen the cap nut carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately stop the work and proceed with maintenance referring to "Disassembly / Reassembly" section.
6. Remove the cap nut.
7. Hold the adjusting screw in place with a flat-head screwdriver and loosen the locknut slowly carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately stop the work and proceed with maintenance referring to "Disassembly / Reassembly" section.
8. Remove the locknut.
9. Use a flat-head screwdriver to turn the adjusting screw to adjust temperature. To raise the temperature setting, turn the adjusting screw counterclockwise. To lower the temperature setting, turn the adjusting screw clockwise. Refer to set temperature adjustment chart for the number of turns required from the "0" position to reach the desired temperature.
10. After completing the adjustment, replace the locknut. Hold the adjusting screw in place with a flat-head screwdriver and tighten the locknut securely.
11. Replace the cap nut and tighten it to the proper torque (see page 14). Hold the cover with one wrench and use another wrench to tighten.
12. First fully open the outlet isolation valve slowly.
13. Slowly open the inlet isolation valve carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately close the inlet isolation valve, then the outlet isolation valve, and repair the source of leakage.
14. Check the temperature setting by observing an inline temperature sensor or by measuring the temperature at the wrench flat on the trap's inlet side at least 30 minutes after supplying steam with the new setting. The trap set temperature will be approximately 10 to 20 °C higher than the surface reading. If the resultant temperature is not as required, repeat procedure from step "2" above.
15. Fully open the outlet isolation valve slowly.

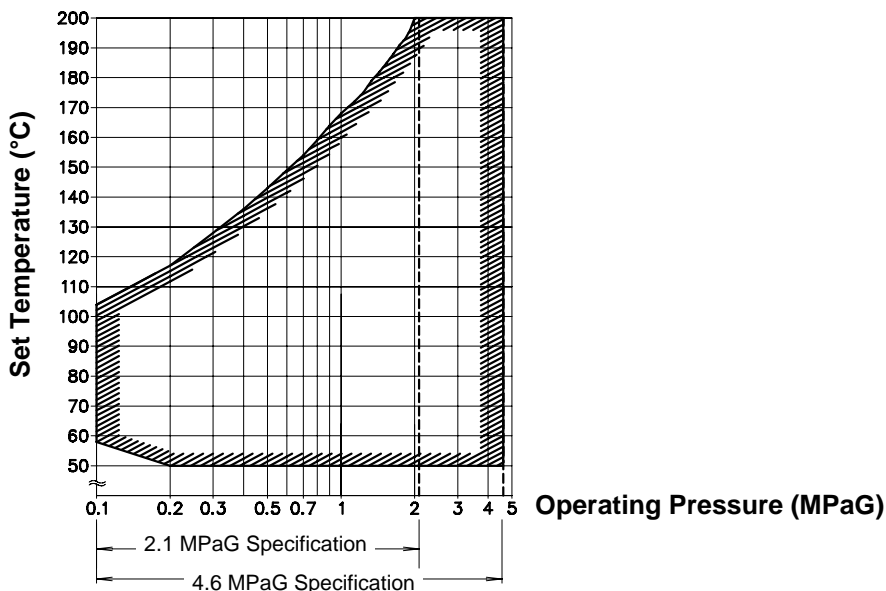


16. Slowly open the inlet isolation valve carefully checking for any steam leaks that might occur.
17. In the event steam leaks are detected, immediately close the inlet isolation valve, then the outlet isolation valve, and repair the source of leakage. In the event steam leaks are detected somewhere other than the outlet piping, immediately close the inlet isolation valve, then the outlet isolation valve and repair the leaks referring to "Disassembly / Reassembly" section.



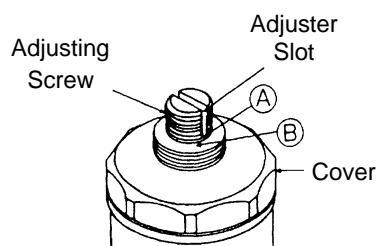
The standard factory setting is 100 °C at 0.9 MPaG. Change from this to the desired setting, as indicated in the Adjustment Chart.

Temperature Setting Range (°C)



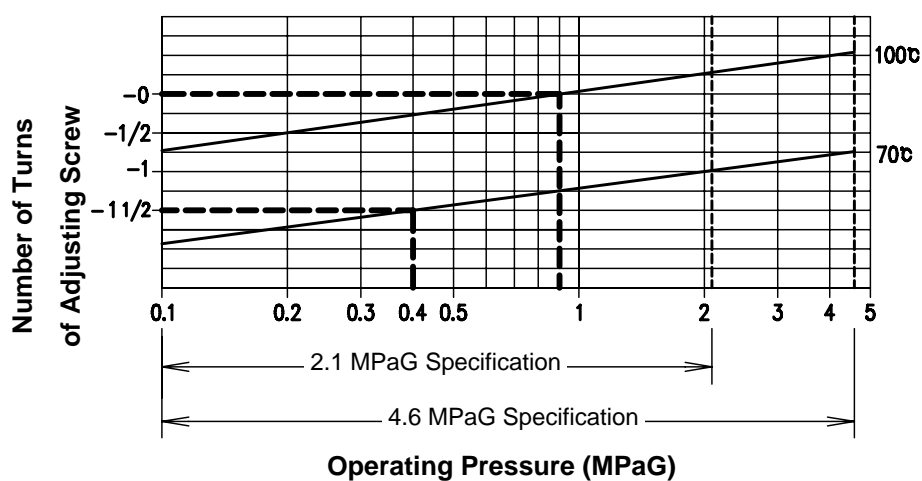
## Temperature Setting Example

As shown in the figure on the right, this temperature control trap is positioned with the bottom of the adjuster slot in the adjusting screw (A) even with the very top of the cover (B), which represents the 100 °C at 0.9 MPaG setting.



This is the standard factory setting.

For example, to set the trap to 70 °C at 0.4 MPaG, refer to the adjustment chart below to determine the number of turns.



For this example, the number of turns is  $-1\frac{1}{2}$ . Because this is a negative number, turn the adjusting screw clockwise (tighten) one and a half turns.

## Cleaning Function



Do not remove cap nut or cover while trap is under pressure. Allow trap body temperature to cool to room temperature before removing cap nut or cover. Failure to do so may result in burns or other injury.



Always wear heat-insulated gloves when handling products with high body temperatures, such as when in operation. Failure to do so may result in burns.

Rust, scale and other buildup on the valve seat can hinder the sealing ability of the steam trap leading to steam leakage and higher product temperatures, or block the valve seat opening preventing condensate discharge and resulting in the decrease of the product temperature. Follow the steps below to remove any accumulation from around the valve opening.

1. For your safety, wear heat-insulated gloves or eye protector, etc. to prevent burns.
2. Close the external valve from which the steam and condensate flow to the trap (the "inlet isolation valve").
3. Close the external valve to which the condensate flows from the trap (the "outlet isolation valve").
4. Wait until the pressure between the inlet isolation valve and the trap equals atmospheric pressure (when the trap body temperature cools to room temperature).
5. Hold the cover with one wrench and use another wrench to slowly loosen the cap nut carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately stop the work and proceed with maintenance referring to "Disassembly / Reassembly" section.
6. Remove the cap nut.
7. Hold the adjusting screw in place with a flat-head screwdriver and loosen the locknut slowly carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately stop the work and proceed with maintenance referring to "Disassembly / Reassembly" section.
8. Remove the locknut.
9. Check the current set position of the adjusting screw.
10. Check and record the number of turns required to return to the standard factory setting (when points (A) and (B) are even with each other as shown on page 9).
11. Use a flat-head screwdriver to slowly turn the adjusting screw clockwise (to tighten) until it stops. (This causes the cleaning edge of the stem to reach the valve seat and loosen debris).
12. Slowly turn the adjusting screw counterclockwise (to loosen) until it stops. (This will allow flushing once the steam is safely turned on using the instructions that follow).
13. Replace the cap nut and tighten it to the proper torque (see page 14). Hold the cover with one wrench and use another wrench to tighten.
14. First fully open the outlet isolation valve slowly.
15. Slowly open the inlet isolation valve carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately close the inlet isolation valve, then the outlet isolation valve, and repair the source of leakage.

16. Wait 10 seconds to allow any loose scale to be flushed internally. Be aware of any external steam leak including the outlet connection if opened to atmosphere. Be careful to not come in contact with any steam that is discharging from an open outlet connection. If any steam leaks are detected somewhere other than the outlet piping, immediately close the inlet isolation valve, then the outlet isolation valve, and repair the source of leakage.
17. Close the inlet isolation valve.
18. Close the outlet isolation valve.
19. Wait until the pressure between the inlet isolation valve and the trap equals atmospheric pressure (when the trap body temperature cools to room temperature).
20. Hold the cover with one wrench and use another wrench to slowly loosen the cap nut carefully checking for any steam leaks that might occur. In the event steam leaks are detected, immediately stop the work and proceed with maintenance referring to "Disassembly / Reassembly" section.
21. Remove the cap nut.
22. Slowly turn the adjusting screw clockwise (to tighten) to return to the original position checked in step "10" above.
23. Hold the adjusting screw in place with a flat-head screwdriver and tighten the locknut securely.
24. Replace the cap nut and tighten to the proper torque (see page 14).
25. First fully open the outlet isolation valve.
26. Slowly open the inlet isolation valve carefully checking for any steam leaks. In the event steam leaks are detected, immediately close the inlet isolation valve, then the outlet isolation valve, and repair the source of leakage.
27. Check the temperature setting by observing an inline temperature sensor or by measuring the temperature at the trap inlet wrench flat at least 30 minutes after supplying steam with the new settings. The trap set temperature will be approximately 10 to 20°C higher than the temperature reading on the trap body surface.
28. If the resultant temperature is not as desired, use the above instructions for adjusting temperature settings. (See "Adjusting the Set Temperature")

## Maintenance



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



Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product or burns or other injury due to malfunction or the discharge of fluids.

## Operational Check

A visual inspection of the following items should be done on a daily basis to determine whether the trap is operating properly or has failed. Periodically (at least biannually) the operation should also be checked by using diagnostic equipment such as a trap diagnostic instrument or a thermometer.

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

- Normal : Condensate is being discharged from the discharge outlet. Condensate temperature should be around the set temperature. (The surface temperature of the trap should be about 10 to 20°C lower than the set temperature.)
- Blocked (Discharge Impossible) : No condensate is discharged and the surface temperature of the trap is low.
- Blowing : Live steam continually flows from the outlet and there is a continuous hissing sound of flow.

(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 if appropriate] in conjunction with the visual inspection is highly recommended.)

## Parts Inspection

When parts have been removed, or during periodic inspections, use the following table to inspect the parts and replace any that are found to be defective.

Procedure	
Gasket(s):	Check for warping and damage
Seal Ring:	Check for scratches and wear
Valve Stem:	Check for scratches and wear
Bimetal Element:	Check wear and deformation
Over-expansion and Return Springs:	Check for wear
Screen:	Check for clogging and corrosion
Valve Seat:	Check the seating surfaces for damage or wear
(After cleaning inside the body)	Check gasket for warping and damage Check valve seat for damage or 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.

Use the following procedures to remove components. Use the same procedures in reverse to reassemble. (Installation, inspection, maintenance, repairs, disassembly and adjustment should be done only by trained maintenance personnel.)

### Detaching / Reattaching the Cap Nut, Locknut and Cover Unit

Part	During Disassembly	During Reassembly
Cap Nut	Remove with a spanner or socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cap Nut Gasket	Remove gasket and clean sealing surface	Replace with a new gasket if warped or damaged
Locknut	Remove with a spanner or socket wrench	Tighten enough to prevent the adjustment screw from turning
Cover	Remove with a spanner or socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover Gasket	Remove gasket and clean sealing surface	Replace with a new gasket; coat surfaces with anti-seize
Adjusting Screw & Seal Ring	Screw in by using a flat-head screwdriver	Be careful not to damage the seal ring during reassembly and coat seal ring surface with heat resistant silicon grease.

### Disassembly / Reassembly of the Valve Unit

Part	During Disassembly	During Reassembly
Snap Ring	Remove the snap ring from the valve stem	Reattach to the valve stem
Washer	Remove washer from the valve stem by lifting up and off	Slide onto the valve stem
Return Spring	Remove the return spring from the valve stem by lifting up and off	Place on the valve stem
Thrust Plate	Remove the thrust plate from the valve stem by lifting up and off	Slide onto the valve stem
Bimetal Element (2 discs)	5 sets Remove the bimetal element from the valve stem by lifting up and off	Reassemble the bimetal elements, paying special attention to the proper orientation (the TLV marks on the outside)
Washer		Place 1 washer between each pair of bimetal disks

**Disassembly / Reassembly of the Body Unit**

Part	During Disassembly	During Reassembly
Screen	Remove without bending	Reinsert without bending
Spring Guide	Remove from the trap body	Reassemble, being extremely careful to reinsert in the correct orientation
Overexpansion Spring	Remove from the trap body	Reassemble, being careful not to place it on the valve seat
Valve Seat	The surfaces of the valve seat are highly polished; remove by using a socket wrench, being careful not to scratch the sealing surfaces	Consult the table of tightening torques and tighten to the proper torque; be careful not to scratch the seating surfaces during reassembly
Valve Seat Gasket	Remove without bending and clean sealing surface	Replace with a new gasket; coat surfaces with anti-seize

**Table of Tightening Torques**

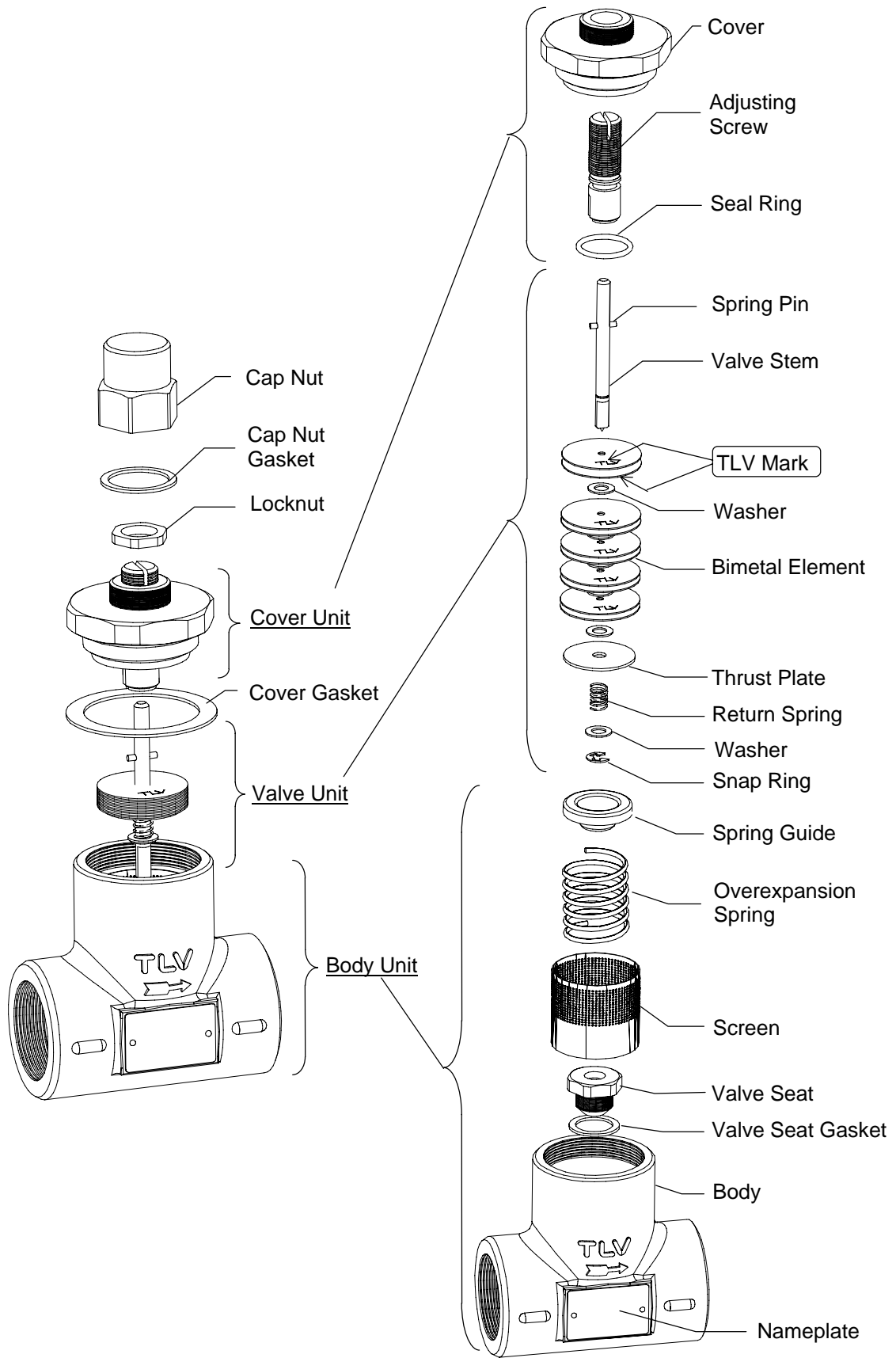
Cap Nut		Locknut		Cover		Valve Seat	
Torque N·m	Distance Across Flats mm	Torque N·m	Distance Across Flats mm	Torque N·m	Distance Across Flats mm	Torque N·m	Distance Across Flats mm
35	24	-	14	250	46	30	19

1 N·m ≈ 10 kg·cm

NOTE: - Coat all threaded portions with anti-seize.

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

Exploded View





## 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.

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

Problem	Cause	Remedy
No condensate is discharged or temperature doesn't rise to the set temperature	The bimetal element is broken	Replace with a new bimetal element
	The assembly (orientation) of the bimetal elements is not correct	Correct the assembly of the bimetal elements
	There is a build-up of dirt, etc. in the spaces between the bimetal elements	Clean the bimetal elements
	The valve seat is clogged with rust and scale	Use built-in cleaning function
	The screen or piping are clogged with rust and scale	Clean parts
	The adjusting screw is not correctly positioned	Readjust the screw
Steam is blowing or the temperature rises above the set temperature	There is a build-up of dirt or scale on the valve stem or seating surfaces of the valve seat	Use built-in cleaning function
	The valve stem is worn	Replace with a new valve stem
	The valve seat is worn	Replace with a new valve seat
	The sealing surfaces of the valve stem are damaged	Replace with a new valve stem
	The sealing surfaces of the valve seat are damaged	Replace with a new valve seat
	The valve seat has loosened	Retighten to the proper torque
	The valve seat gasket is damaged	Replace with a new gasket
The adjusting screw is not correctly positioned	Readjust the screw	
There is leakage to the outside of the trap	Leakage from the cap nut gasket: The gasket or the seal ring is damaged or deteriorated	Replace with a new gasket or seal ring
	Leakage from the adjusting screw: The seal ring is damaged or deteriorated	Replace with a new seal ring
	Leakage from the cover gasket: The gasket is damaged	Replace with a new gasket

NOTE: When replacing parts with new, use the parts list for reference, and replace with parts from the Maintenance Kit, Repair Kit, etc. Please note that replacement parts are only available as part of a replacement parts kit.

## Product Warranty

1. Warranty Period  
One year following product delivery.
2. Warranty Coverage  
TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.
3. This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
  - 1) Malfunctions due to improper installation, use, handling, etc., by other than TLV CO., LTD. authorized service representatives.
  - 2) Malfunctions due to dirt, scale, rust, etc.
  - 3) Malfunctions due to improper disassembly and reassembly, or inadequate inspection and maintenance by other than TLV CO., LTD. authorized service representatives.
  - 4) Malfunctions due to disasters or forces of nature.
  - 5) Accidents or malfunctions due to any other cause beyond the control of TLV CO., LTD.
4. Under no circumstances will TLV CO., LTD. be liable for consequential economic loss damage or consequential damage to property.

\* \* \* \* \*

For Service or Technical Assistance:

Contact your **TLV** representative or your regional **TLV** office.

### Manufacturer

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