

ISO 9001  
ISO14001



Manufacturer

**TLV** CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001:2001



# Instruction Manual

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**Temperature Control Trap (with Bimetal Element)**

Featured Model: LEX8-TZ

172-65379M-10

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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.

## 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



### 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

**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

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



### Caution

**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.

**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.

# 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?
3. Have isolation valves been installed at the inlet and outlet? If the outlet is subject to back pressure, has a check valve (TLV-CK) been installed?
4. Has the product been installed so that condensate will easily flow naturally down into the product by gravity?

# Specifications

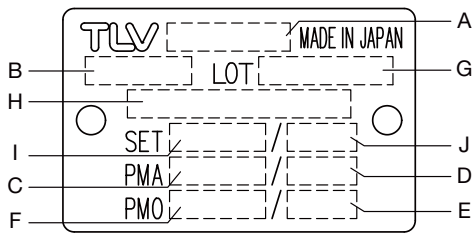


## Caution

**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.

**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.



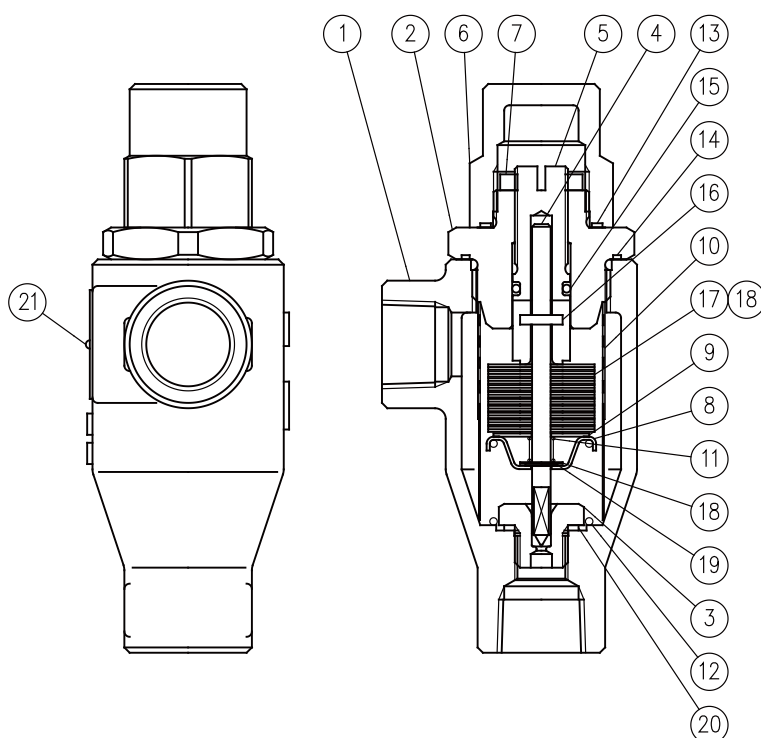
A	Model	F	Maximum Operating Pressure (PMO)
B	Nominal Diameter	G	Production Lot No.
C	Maximum Allowable Pressure (PMA) <sup>01</sup>	H	Valve No. <sup>02</sup>
D	Maximum Allowable Temperature (TMA) <sup>01</sup>	I	Set Pressure <sup>03</sup>
E	Maximum Operating Temperature (TMO)	J	Set Temperature <sup>03</sup>

<sup>01</sup>Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

<sup>02</sup>Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

<sup>03</sup>Set Pressure and Set Temperature are the initial settings when shipped from the factory.

# Configuration



No.	Part Name	R <sup>01</sup>	No.	Part Name	M <sup>01</sup>	R <sup>01</sup>
1	Body		12	Overexpansion Spring		✓
2	Cover		13	Cap Nut Gasket	✓	✓
3	Valve Seat	✓	14	Cover Gasket	✓	✓
4	Valve Stem	✓	15	O-ring	✓	✓
5	Adjusting Screw		16	Spring Pin		✓
6	Cap Nut		17	Bimetal Element		✓
7	Locknut		18	Washer		✓
8	Spring Guide	✓	19	Snap Ring		✓
9	Thrust Plate	✓	20	Valve Seat Gasket	✓	✓
10	Screen	✓	21	Nameplate		
11	Return Spring	✓				

<sup>01</sup>Replacement parts are available only in the following kits: M = Maintenance Kit, R = Repair Kit



# Installation



## 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 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.

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

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 product may be installed either horizontally or vertically; there are no restrictions on the orientation of installation. However, when installing horizontally, make sure that the product is installed with the temperature adjusting screw positioned higher than the piping in which the product 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



## Caution

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

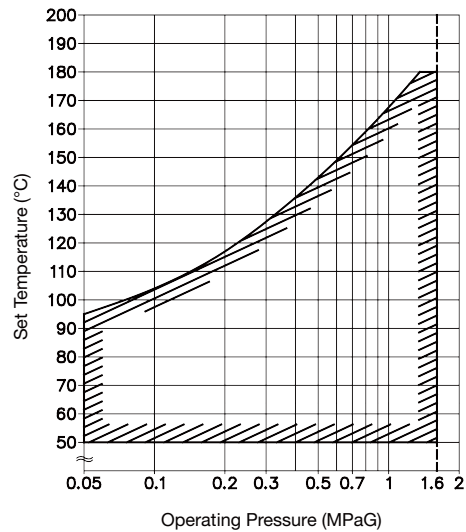
**Always wear heat-insulated gloves when handling products with high body temperatures, such as when in operation.** Failure to do so may result in burns.

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 product (the “inlet isolation valve”).
3. Close the external valve to which the condensate flows from the product (the “outlet isolation valve”).
4. Wait until the pressure between the inlet isolation valve and the product equals atmospheric pressure (when the product 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 “Table of Tightening Torques”). 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 product’s inlet side at least 30 minutes after supplying steam with the new setting. The product 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.

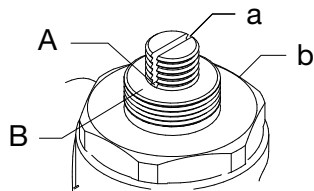
Temperature Setting Range



## 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 70 °C at 0.5 MPaG setting. This is the standard factory setting.

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.

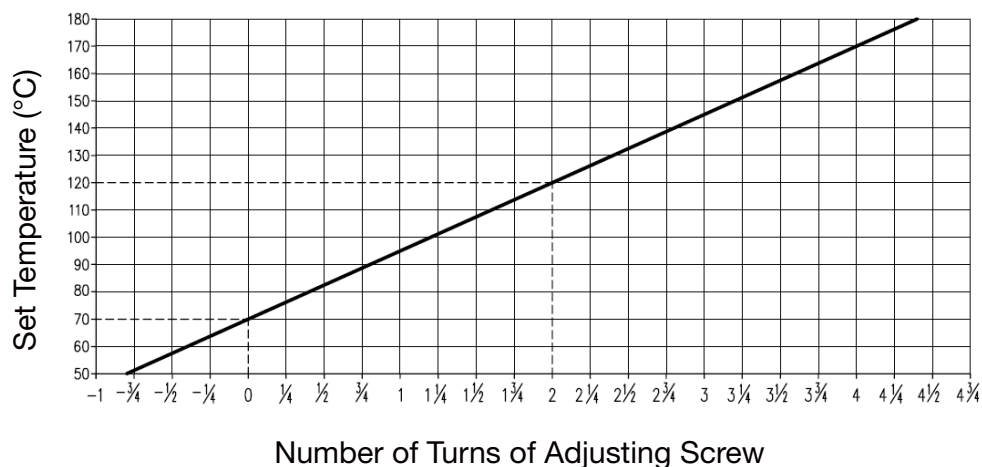


a	Adjuster slot
b	Cover

For example, to set the product to 120 °C (from 70 °C factory setting position), refer to the adjustment chart on the previous page determine the number of turns.

1. From 120 °C, go straight across until intersection the oblique line.
2. From the intersection point, go straight down and find the number of turns required (+2).
3. Turn the adjusting screw 2 turns counterclockwise

### Adjustment Chart



#### Note

The standard factory setting is 70 °C at 0.5 MPaG. Since the set-temperature is little affected by steam pressure, the temperature Adjustment Chart shows only the relationship between set temperature and the number of turns from factory setting. Change from this to the desired setting, as indicated in the Adjustment Chart.

– : Turn Clockwise (decrease set temperature)

+ : Turn Counterclockwise (increase set temperature)

# 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.

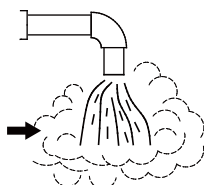
## Operational Check

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 (at least biannually) the operation should also be checked by using diagnostic equipment such as a stethoscope, thermometer, TLV TrapMan or TLV Pocket 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.

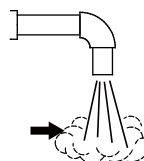
Normal:	Condensate is being discharged from the discharge outlet. Condensate temperature should be around the set temperature. (The surface temperature of the product should be about 10 to 20 °C lower than the set temperature.)
Blocked (Discharge Impossible):	No condensate is discharged and the surface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

Flash Steam



White jet containing water droplets

Live Steam Leakage



Clear, slightly bluish jet

## 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.

Gasket(s): Check for warping and damage

O-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



## Caution

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

Use the following procedures to remove components. Use the same procedures in reverse to reassemble.

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

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

Part Name & No.	During Disassembly	During Reassembly
Cap Nut 6	Remove with a spanner or socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cap Nut Gasket 13	Remove the gasket and clean sealing surfaces	Replace with a new gasket if warped or damaged
Locknut 7	Remove with a spanner or socket wrench	Tighten enough to prevent the adjustment screw from turning
Cover 2	Remove with a spanner or socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover Gasket 14	Remove the gasket and clean sealing surfaces	Replace with a new gasket; coat surfaces with anti-seize
Adjusting Screw 5 O-ring 15	Screw in by using a flat-head screwdriver	Be careful not to damage the O-ring during reassembly and coat O-ring surface with silicon type heat resistant grease

## Disassembly/Reassembly of the Valve Unit

Part Name & No.	During Disassembly	During Reassembly
Snap Ring 15	Remove the snap ring from the valve stem	Reattach to the valve stem
Washer 18	Remove the washer from the valve stem by lifting up and off	Slide onto the valve stem
Return Spring 11	Remove the return spring from the valve stem by lifting up and off	Place on the valve stem
Thrust Plate 9	Remove the plate from the valve stem by lifting up and off	Slide onto the valve stem
Bimetal Element 17 (2 discs) <sup>01</sup>	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 18 <sup>01</sup>	Remove the washer from the valve stem by lifting up and off	Place 1 washer between each pair of bimetal disks

<sup>01</sup>10 sets

## Disassembly/Reassembly of the Body Unit

Part Name & No.	During Disassembly	During Reassembly
Screen 10	Remove without bending	Reinsert without bending
Spring Guide 8	Remove from the product body	Reassemble, being extremely careful to reinsert in the correct orientation
Overexpansion Spring 12	Remove from the product body	Reassemble, being careful not to place it on the valve seat
Valve Seat 3	The surfaces of the valve seat are highly polished; remove with a socket wrench, being careful not to scratch the sealing surfaces	Consult the table of tightening torques and tighten to the proper torque, being careful not to scratch the seating surfaces
Valve Seat Gasket 20	—	Replace with a new gasket; coat surfaces with anti-seize

## Table of Tightening Torques

Part Name & No.	Torque N·m	Distance Across Flats mm
Cap Nut 6	35	24
Locknut 7	—	14
Cover 2	100	32
Valve Seat 3	22	14

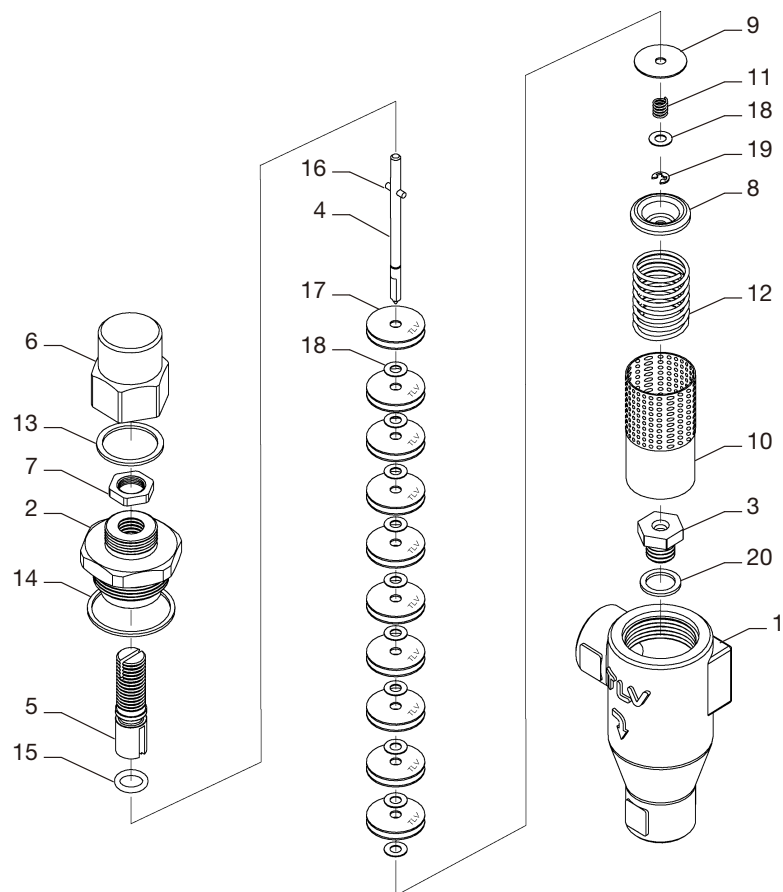


### Note

- 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



No.	Part Name	No.	Part Name
1	Body	12	Overexpansion Spring
2	Cover	13	Cap Nut Gasket
3	Valve Seat	14	Cover Gasket
4	Valve Stem	15	O-ring
5	Adjusting Screw	16	Spring Pin
6	Cap Nut	17	Bimetal Element <sup>01</sup>
7	Locknut	18	Washer
8	Spring Guide	19	Snap Ring
9	Thrust Plate	20	Valve Seat Gasket
10	Screen	21	Nameplate (not shown)
11	Return Spring		

<sup>01</sup>"TLV Mark"

# Cleaning Function



## Caution

**Do not remove cap nut or cover while the product is under pressure. Allow the product 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 product (the “inlet isolation valve”).
3. Close the external valve to which the condensate flows from the product (the “outlet isolation valve”).
4. Wait until the pressure between the inlet isolation valve and the product equals atmospheric pressure (when the product 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 the figure in the “Temperature Setting Example” section).
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 “Table of Tightening Torques”). 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 product equals atmospheric pressure (when the product 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 "Table of Tightening Torques").
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 product inlet wrench flat at least 30 minutes after supplying steam with the new settings. The product set temperature will be approximately 10 to 20 °C higher than the temperature reading on the product body surface.
28. If the resultant temperature is not as desired, use the above instructions for adjusting temperature settings. (See "Adjusting the Set Temperature")

# Troubleshooting



## 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.

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
There is leakage to the outside of the product	The adjusting screw is not correctly positioned	Readjust the screw
	Leakage from the cap nut gasket: The gasket or the O-ring is damaged or deteriorated	Replace with a new gasket or O-ring
	Leakage from the adjusting screw: The O-ring is damaged or deteriorated	Replace with a new O-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.

# 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.

### In Europe:

#### **TLV EURO ENGINEERING GmbH**

Daimler-Benz-Straße 16-18, 74915 Waibstadt, **Germany**

Tel: [49]-(0)7263-9150-0

Fax: [49]-(0)7263-9150-50

#### **TLV EURO ENGINEERING UK LTD.**

Units 7 & 8, Furlong Business Park, Bishops Cleeve,  
Gloucestershire GL52 8TW, **U.K.**

Tel: [44]-(0)1242-227223

Fax: [44]-(0)1242-223077

#### **TLV EURO ENGINEERING FRANCE SARL**

Parc d'Ariane 2, bât. C, 290 rue Ferdinand Perrier, 69800 Saint  
Priest, **France**

Tel: [33]-(0)4-72482222

Fax: [33]-(0)4-72482220

### In North America:

#### **TLV CORPORATION**

13901 South Lakes Drive, Charlotte, NC 28273-6790, **U.S.A.**

Tel: [1]-704-597-9070

Fax: [1]-704-583-1610

#### **TLV ENGINEERING S. A. DE C.V.**

Av. Jesús del Monte 39-B-1001, Col. Hda. de las Palmas,  
Huixquilucan, Edo. de México, 52763, **Mexico**

Tel: [52]-55-5359-7949

Fax: [52]-55-5359-7585

### In Oceania:

#### **TLV PTY LIMITED**

Unit 8, 137-145 Rooks Road, Nunawading, Victoria 3131,  
**Australia**

Tel: [61]-(0)3-9873 5610

Fax: [61]-(0)3-9873 5010

### In East Asia:

#### **TLV PTE LTD**

36 Kaki Bukit Place, #02-01/02, **Singapore** 416214

Tel: [65]-6747 4600

Fax: [65]-6742 0345

#### **TLV SHANGHAI CO., LTD.**

5/F, Building 7, No.103 Caobao Road, Xuhui District, Shanghai,  
**China** 200233

Tel: [86]-(0)21-6482-8622

Fax: [86]-(0)21-6482-8623

#### **TLV ENGINEERING SDN. BHD.**

No.16, Jalan MJ14, Taman Industri Meranti Jaya, 47120  
Puchong, Selangor, **Malaysia**

Tel: [60]-3-8052-2928

Fax: [60]-3-8051-0899

#### **TLV PRIVATE LIMITED**

252/94 (K-L) 17th Floor, Muang Thai-Phatra Complex Tower B,  
Rachadaphisek Road, Huaykwang, Bangkok 10310, **Thailand**

Tel: [66]-2-693-3799

Fax: [66]-2-693-3979

#### **TLV INC.**

#302-1 Bundang Technopark B, 723 Pangyo-ro, Bundang,  
Seongnam, Gyeonggi, 13511, **Korea**

Tel: [82]-(0)31-726-2105

Fax: [82]-(0)31-726-2195

### In the Middle East:

#### **TLV ENGINEERING FZCO**

Building 2W, No. M002, PO Box 371684, Dubai Airport Free  
Zone, Dubai, **UAE**

Email: sales-me@tlv.co.jp

### In Other Countries:

#### **TLV INTERNATIONAL, INC.**

881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, **Japan**

Tel: [81]-(0)79-427-1818

Fax: [81]-(0)79-425-1167

### Manufacturer:

#### **TLV CO., LTD.**

881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, **Japan**

Tel: [81]-(0)79-427-1800

Fax: [81]-(0)79-422-2277