ISO 9001
ISO14001

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

Instruction Manual

Thermostatic Air Vent for Steam
Featured Models: LA13/LA13L/LA21

172-65133M-06
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Introduction

Thank you for purchasing the TLV thermostatic air vent for steam.

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 air vent for steam is of a revolutionary design that uses 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 hot air accumulated during operation, preventing air-locking. The superior features of the X-element help 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.

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
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.

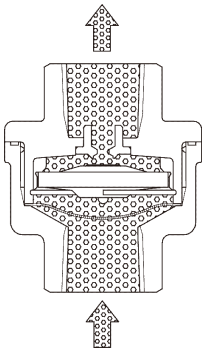
Caution
Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.

Caution

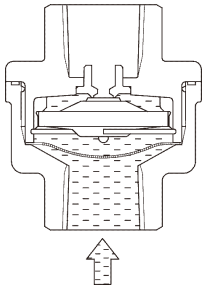
Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

Operation

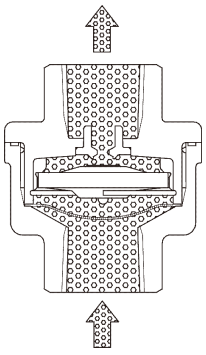
1. Start-up air discharge: Initially, the X-element is open and air in piping is quickly vented, significantly shortening equipment start-up time.



2. Closed position: When steam flows in, the increased temperature causes the X-element to close immediately. If the temperature around the X-element is near steam saturation temperature, the vent will remain closed.



3. Discharge during operation: When the temperature of the X-element decreases due to inflowing air, the X-element contracts opening the vent and allowing air discharge.



Air/Gas
Steam

Specifications

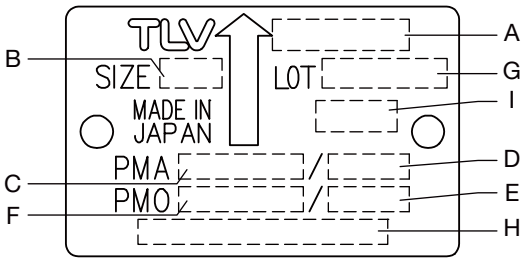
Caution

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.

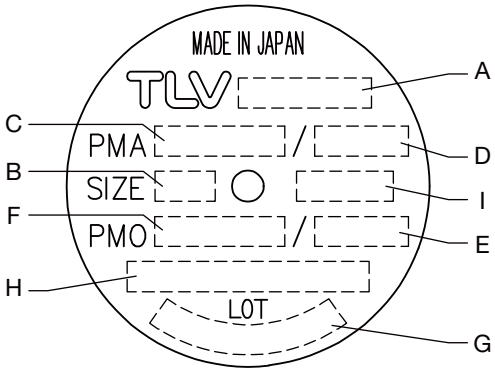
Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

Refer to the product nameplate for detailed specifications.

LA13/LA21



LA13L

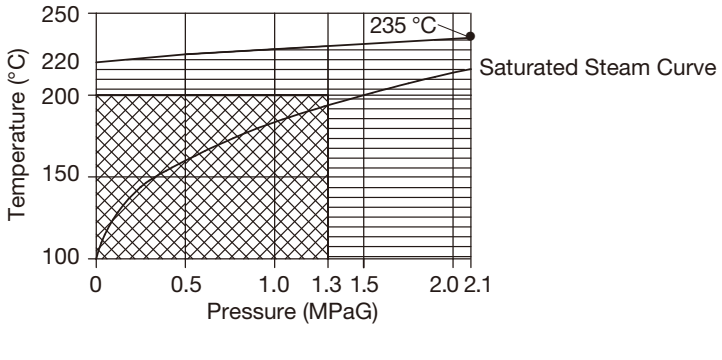


A	Model	F	Maximum Operating Pressure (PMO)
B	Nominal Diameter	G	Production Lot No.
C	Maximum Allowable Pressure (PMA) [01]	H	Valve No. [02]
D	Maximum Allowable Temperature (TMA) [01]	I	X-element Type
E	Maximum Operating Temperature (TMO)		

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

[02]Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

Maximum Operating Temperature



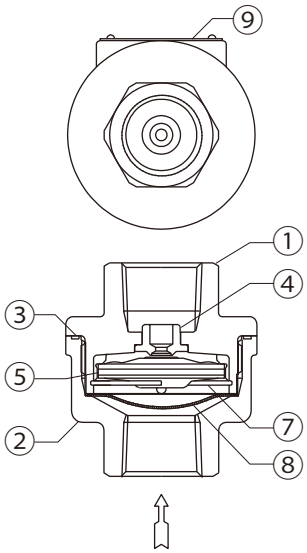
Operating temperature range

LA13/LA13L

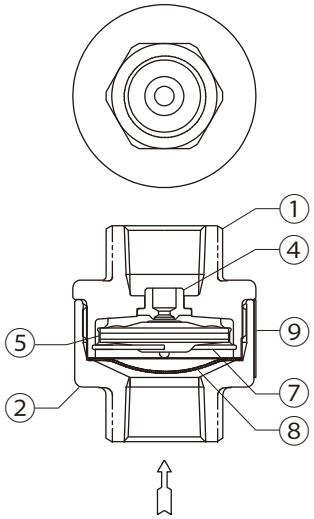
LA21

Configuration

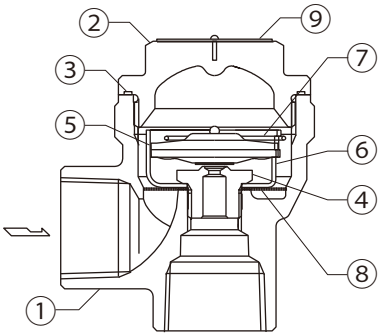
LA13



LA21



LA13L



No.	Part Name	No.	Part Name
1	Body	6	X-element Guide
2	Cover	7	Spring Clip
3	Cover Gasket	8	Screen
4	Valve Seat	9	Nameplate
5	X-element		

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.

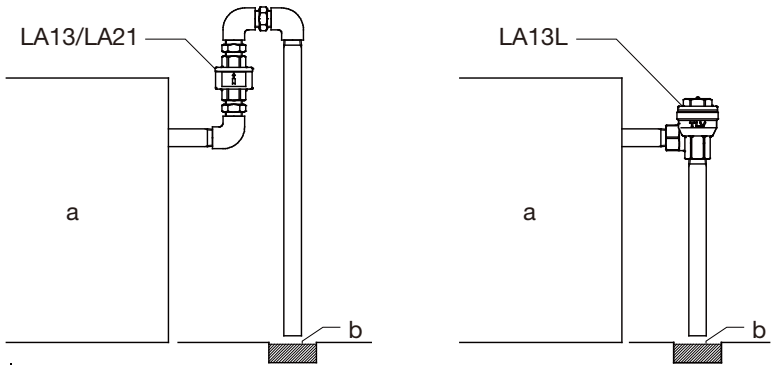
Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

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 from the product.
2. 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.
3. When using the product to remove air from steam-using equipment, install at a point where air tends to collect (essentially, a place away from the steam inlet). To increase the effectiveness of air removal, also install an air vent in front of the steam-using equipment (at the primary side).
4. Install the product vertically, making sure the arrow on the product is pointing in the direction of flow.
5. Be sure to connect the pipe to the discharge side at the outlet. If air, etc. is discharged from the outlet, connect a pipe leading to a drain, etc. so the discharge does not affect operations. Do not submerge the outlet pipe in water; this may result in air vent failure if the pipe sucks up water containing rust and scale.
6. Open the inlet valve 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.

Installation Example



a	Equipment	b	Pit

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.

If the product should fail, it may cause water leakage or hindrance to water flow.

Normal:	The sound of flow can be heard while air is discharged. When air discharge finishes, the valve closes along with slight discharge of steam.
Blocked (discharge impossible):	No air is discharged. The product is quiet and makes no noise, and its surface temperature is low.
Blowing:	Live steam continuously blows from the outlet and there is a continuous metallic sound.
Steam leakage:	Live steam is leaking through the outlet, 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.

Gasket(s): Check for warping and damage

Screen: Check for clogging or corrosion damage

X-element valve area and valve seat area of body: Check for scratches, foreign matter or oil film

X-element: Check for damage

Valve Seat: Check for scratches or wear

Body interior: Check for build-up, oil film, scratches and 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.

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.

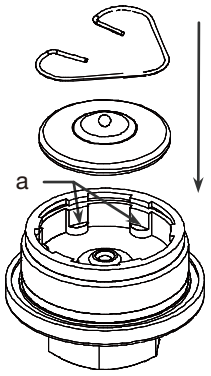
Use the following procedures to remove components. Use the same procedures in reverse to reassemble. (Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

Removing/Reattaching the Body (LA13/LA21)

Part Name & No.	During Disassembly	During Reassembly
Body 1	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque

Removing/Reassembling Components Inside the Cover (LA13/LA21)

Part Name & No.	During Disassembly	During Reassembly
Screen 8	Remove without bending	Insert, being careful not to bend it; insert with the right side up
Spring Clip 7	Remove with a needle-nose pliers	Fit securely into the spring clip slots
X-element 5	Grasp the ball on the top of the X-element with pliers and remove	Make sure the side of the X-element with the ball on it is facing up and insert, keeping the X-element level and making sure it does not catch on the cover (a)
Cover Gasket 3 (LA13 only)	Remove the gasket and clean sealing surfaces	Replace with a new gasket only if warped or damaged



Removing/Reattaching the Cover (LA13L)

Part Name & No.	During Disassembly	During Reassembly
Cover 2	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover Gasket 3	Remove the gasket and clean sealing surfaces	Replace with a new gasket only if warped or damaged

Removing/Reassembling Components Inside the Body (LA13L)

Part Name & No.	During Disassembly	During Reassembly
Spring Clip 7	Remove with a needle-nose pliers	Insert securely into the slots (b) in the X-element guide
X-element 5	Grasp the ball on the top of the X-element with pliers and remove	Make sure the side of the X-element with the ball (c) on it is facing up and insert, keeping the X-element level and making sure it does not catch on the guide
Valve Seat 4	Remove with a socket wrench	Consult the table of tightening torques and tighten to proper torque
X-element Guide 6	Remove without bending	Fix with the valve seat and make sure the X-element can be inserted smoothly
Screen 8	Remove without bending	Replace with a new gasket only if warped or damaged

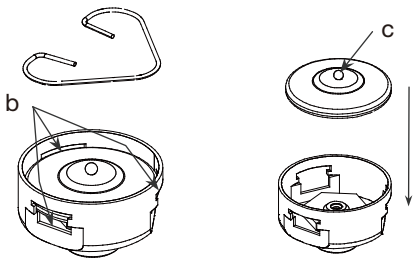


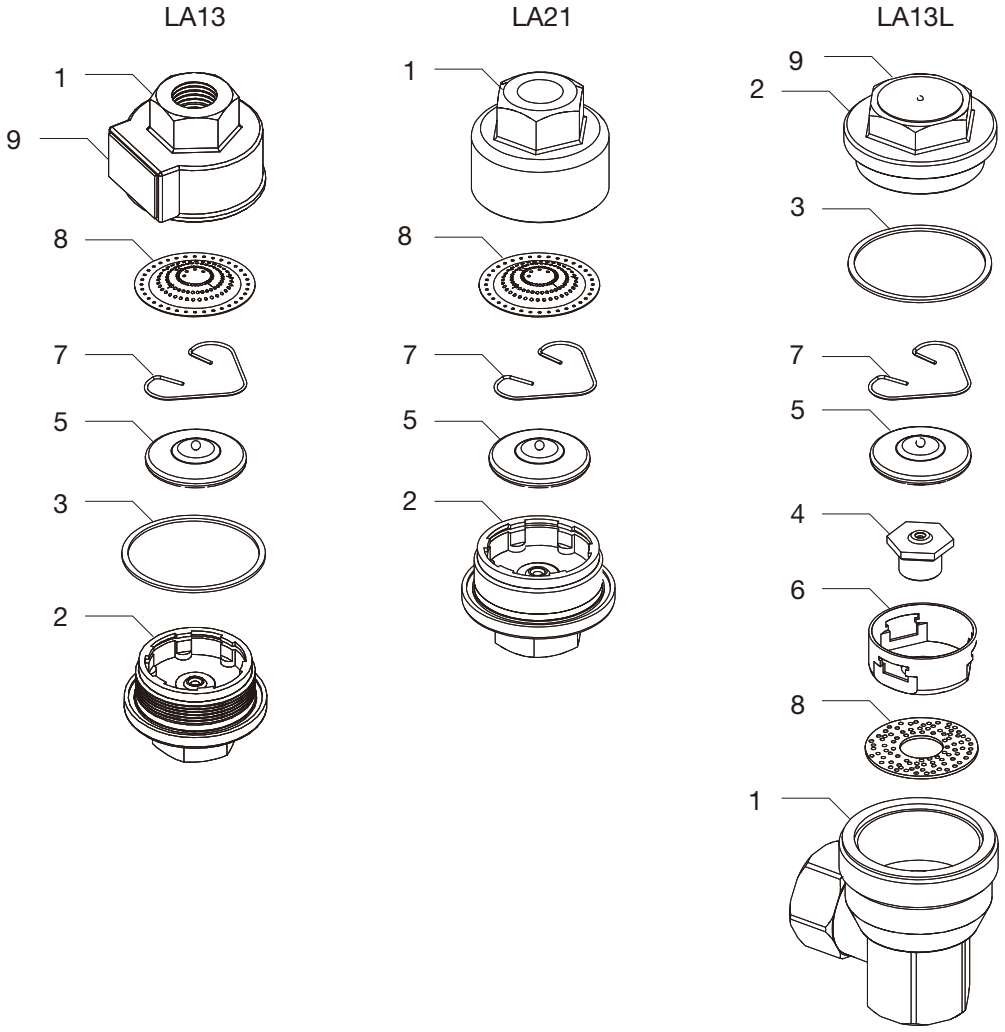
Table of Tightening Torques

Model	Part Name & No.	Size mm	Torque N·m	Distance Across Flats mm
LA13	Body 1	15	80	27
	Cover 2	20, 25	80	41
LA21	Body 1 Cover 2	10, 15	120	27
LA13L	Cover 2	—	80	32
	Valve Seat 4	—	35	19

Note

- LA13, LA13L: DO NOT coat threaded portions with anti-seize.
- LA21: 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	6	X-element Guide
2	Cover	7	Spring Clip
3	Cover Gasket	8	Screen
4	Valve Seat	9	Nameplate
5	X-element		

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 air is discharged (blocked) or discharge is poor	The X-element is stuck to the valve seat	Clean parts
	The valve seat is blocked	Clean the valve seat, or replace with a new valve seat (LA13L) or cover
	The screen is clogged	Clean parts
	The product operating pressure exceeds the maximum specified pressure, or there is insufficient pressure differential between the product inlet and outlet	Compare specifications and actual operating conditions
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	There is rust or scale between the X-element valve and valve seat	Clean parts
	The X-element valve and valve seat are damaged	Replace with a new X-element and/or cover
	The X-element is broken	Replace with a new X-element
	Improper installation	Correct the installation
	Product 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 torques were used	Tighten to the proper torque

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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