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

Instruction Manual

(Information for Use in Hazardous Locations)

iTrapSensor Monitoring System

Surface Temperature/Ultrasound Sensor for FISCO Field Device: iT5-FF-SUN-H/L-PF Series

(ATEX/IECEx/UKEX Certified Model)

172-65800MA-00
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Introduction

Thank you for purchasing the TLV iT5 monitoring system.

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.

To ensure safe and correct use of this product, be sure to observe the safety precautions listed in this manual as they relate to installation, operation, maintenance and repair of the product. Please keep it in a safe place for future reference.

TLV accepts no responsibility for incorrect use of the product by the customer or any third-party, malfunction occurring during use, other defects and any damage caused by this product, excluding cases in which it is under obligation to pay reparations by law.

This product has undergone strict quality management and product inspection before being shipped from the factory. However, in the event of malfunction or defects, please contact your local TLV representative or the TLV customer service center.

This instruction manual and product are subject to modification without notice, for the purpose of improvement.

Unauthorized reprinting or reproduction, in whole or in part, of this instruction manual or contents of the hardware/software of the product is strictly prohibited.

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

General Precautions

Danger
Do not disassemble or modify. Failure to observe this precaution could result in personal injury, electrocution, ignition or fire.

Danger
Do not wipe/rub the surfaces of this product with a dry cloth etc. There is the danger of electrostatically charging the unit, which may result in ignition or explosions, especially in hazardous locations.

Danger
Do not use this product in hospitals or airplanes. Failure to observe this precaution could result in malfunction of medical equipment, instrumentation, etc.

Danger
Ensure the specifications for the intrinsically safe structure of this product meet the requirements for installation in hazardous locations. Specifications for the intrinsically safe structure of this product are described in the "Specifications" section.

Danger
Aluminum is used in this product. Do not expose the product to impact or friction. Exposure to impact or friction may result in ignition or accidental explosions.

Danger
When installing or working at high elevations, take measures to ensure against dropping the product or parts. Failure to take such measures could result in personal injury if persons passing below are struck by a falling object, or other accidents.

Danger
The equipment contains non-metallic materials and that the user should consider the performance of these materials with respect to chemicals which may be present in the hazardous area. If in doubt, please contact the manufacturer.

Danger
In order to change from the normal communication mode to simulation mode, turn the TEST switch on, however do not operate the switch or use in hazardous areas when the TEST switch is on.

Warning
As this is an industrial product, it is not to be used on consumer applications nor in residential areas.

Warning
Do not substitute components, as this may impair the intrinsic safety of the product.

Warning
Do not install this product on objects exceeding maximum allowable operating temperature. Overheating could result in damage to internal parts, excessive heat generation, rupture or ignition.

Warning
Do not subject the unit to strong shocks or throw it against anything. Failure to observe this precaution could result in damage to internal parts, excessive heat generation, rupture, ignition or personal injury.

Warning
Do not place device in microwave ovens or high-pressure vessels, or in the vicinity of electromagnetic devices. Such handling could result in excessive heat generation, smoke, damage to circuitry, battery fluid leakage, rupture or ignition.

Caution
Do not allow any foreign matter to enter the unit. In areas with small foreign matter such as metal dust, use the product after taking measures to prevent foreign matter entering the unit. Failure to observe this precaution could result in fire or malfunction.

Caution
Do not let the unit become immersed in water. If liquid gets inside the unit, it may result in excessive heat generation, electrical shock or unit malfunction. Be mindful of the location of use and handling.

Conditions of safe use (Information for use in hazardous locations)

- Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. This is particularly important if the equipment is installed in a zone 0 or Division 1 location. In addition, the equipment shall only be cleaned with a damp cloth.
- The enclosure is manufactured from aluminum alloy. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered during installation, particularly if the equipment is installed in a zone 0 or Division 1 location.
- Maximum ambient temperature is different depending on measuring surface temperature and model type. Read ambient temperature range in specification chart carefully before use.

Intrinsic Safety Specifications

This instrument complies with the “Constructional Requirements for Electrical Equipment for Explosive Atmospheres” (Japan) as an “Intrinsically safe explosion-proof structure” and has been fitted with a nameplate describing the required specifications for intrinsic safety.

Check these specifications, and use the instrument accordingly.

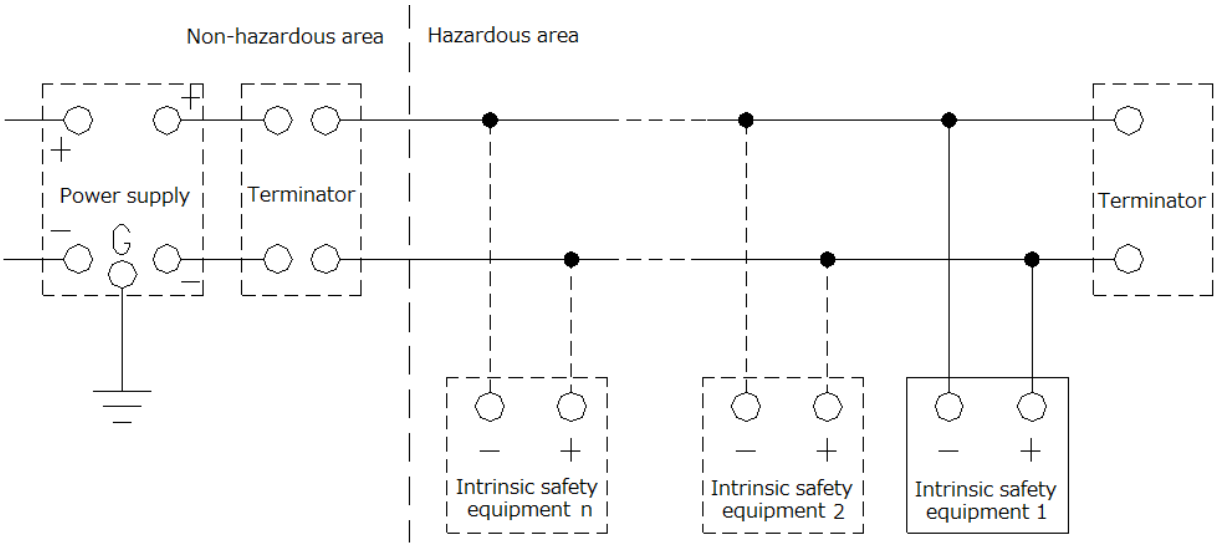
Operation

This monitoring system sensor (surface temperature/ultrasound sensor) connects via FOUNDATION^{TM} Fieldbus.

This instrument periodically measures the ultrasonic vibration and surface temperature of steam traps mounted on steam-using equipment in industrial environments and, and transmits the data to the fieldbus.

The following figure shows the common connection method when connecting the sensor via to Fieldbus.

Fieldbus connection diagram

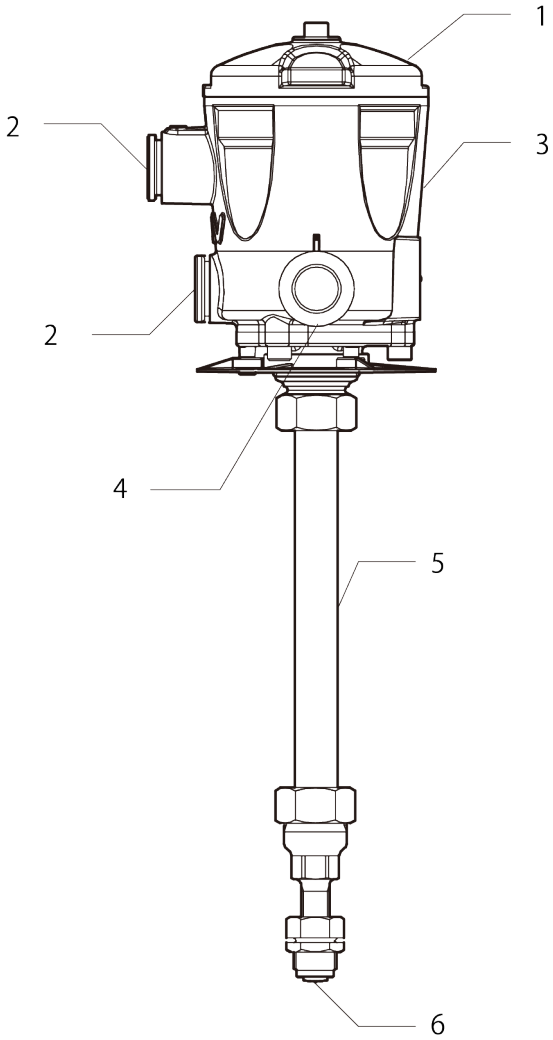


Assembly and Disassembly

In order to maintain intrinsic safety and waterproof performance, do not assemble or disassemble the instrument. Contact TLV for inquiries related to maintenance.

Maintenance

Please make sure that there is no damage to each part shown in the figure below. If any damage is found, contact TLV immediately.



No.	Part Name
1	Sensor Cover (Aluminum)
2	Cover Cap (Resin)
3	Sensor Body (Aluminum)
4	Wiring Connection Port (Cable Gland)
5	Connecting Pipe (Stainless Steel)
6	Tip Section (Stainless Steel)

Installation

Danger

Ensure the specifications for the intrinsically safe structure of this product meet the requirements for installation in hazardous locations. Specifications for the intrinsically safe structure of this product are described in the "Specifications" section.

Aluminum is used in this product. Do not expose the product to impact or friction. Exposure to impact or friction may result in ignition or accidental explosions.

Do not wipe/rub the surfaces of this product with a dry cloth etc. There is the danger of electrostatically charging the unit, which may result in ignition or explosions, especially in hazardous locations.

The equipment contains non-metallic materials and that the user should consider the performance of these materials with respect to chemicals which may be present in the hazardous area. If in doubt, please contact the manufacturer.

Note

Install in accordance with National Electric Code, Canadian Electrical Code or other applicable Local Codes.

Installing the sensor on iTrap

1. Remove the plug from the sensor mounting seat on the iTrap body or sensor mounting socket.
2. Place the sensor mounting union into the sensor mounting seat and tighten it to the proper torque. (Torque: 20 N·m (15 lbf·ft))
   - Check the base of the sensor mounting seat, and remove any dirt or foreign matter if present.
   - Lift the locknut as far as possible while placing the sensor tip into the seat, then tighten the sensor mounting union.
     If the locknut is not lifted properly, the tip of the sensor (the sensing part) may not touch the base of the sensor mounting seat.
3. Tighten the locknut, making sure it is firmly secured.

Installing the sensor on non-iTraps

1. Temporarily secure the mounting bracket to the inlet side of the trap.

2. Screw the sensor tip into the threaded portion of the mounting bracket and adjust the installation height.

3. Secure the mounting bracket by tightening the clamp nut on the lower part of the mounting bracket. (Torque: 8 N·m (6 lbf·ft))

Wiring

Danger

Ensure the specifications for the intrinsically safe structure of this product meet the requirements for installation in hazardous locations. Specifications for the intrinsically safe structure of this product are described in the "Specifications" section.

In order to change from the normal communication mode to simulation mode, turn the TEST switch on, however do not operate the switch or use in hazardous areas when the TEST switch is on.

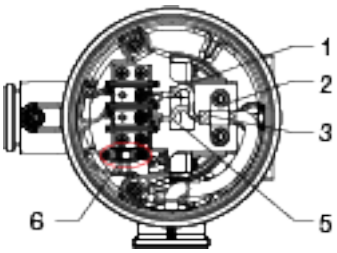
Refer to the "System Engineering Guidelines (AG-181) Ver 3.2.1" issued by the Fieldbus Foundation for details of FOUNDATION™ Fieldbus.

1. **Usage of the instrument in combination with a barrier (power supply)**
   This instrument has two intrinsic safety specifications (intrinsically safe ia IIC and ib IIC), and the usability of barriers (power supplies) depends on their respective specifications.
   Use a barrier (power supply) with intrinsic safety that matches the following table.

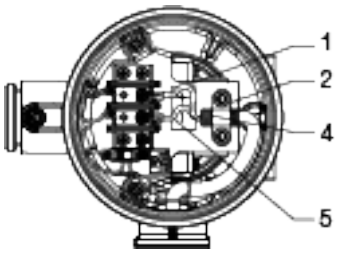
			Barrier (power supply)			
			ia		ib	
			IIC	IIB	IIC	IIB
This product	ia	IIC	**Usable**	Prohibited	Prohibited	Prohibited
	ib	IIC	**Usable**	Prohibited	**Usable**	Prohibited

2. **Cable to be used**
   Single-twisted pair stranded tinned copper cables that are individually shielded and overall shielded (Type A), 0.8 mm^2 (#18 AWG) are recommended.
   If the ambient temperature is greater than or equal to 60 °C (140 °F), use heat-resistant wire rated at 80 °C (176 °F) or more.
3. **Wiring**
   Isolate the wiring from other cables to prevent any effect on intrinsic safety and measurement performance from contact with other cables or electromagnetic induction, etc. If necessary, use a protective metal tube or duct.
   The wiring connection port is fitted with a $G^1/_2$ (CTG-16) cable gland. Ensure an air-tight connection.
4. **Terminal connection**
   Connect terminals as in the figure below.

Ungrounded connection



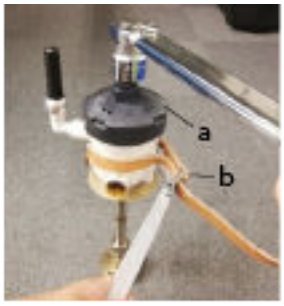
Grounded connection

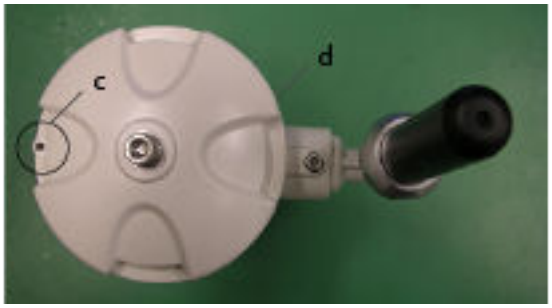


1	FOUNDATION™ Fieldbus+	4	Cable Shield
2	Secure with a cable clamp	5	FOUNDATION™ Fieldbus-
3	Cover the shield with insulating material	6	Test Switch

5. Opening/closing the sensor cover

Make sure to use the special tool (a) (sold separately) to open/close the IS sensor cover. Select a belt wrench (b) with a belt width of 20 mm ($^{13}/_{16}$ in) or less, including 90 mm ($3^{9}/_{16}$ in) in the range of use.
Loosen the set screw (c) and remove the sensor cover (d) with a special tool . After installing the sensor cover using the special tool (tightening torque: 15 N·m (11 lbf·ft)), tighten the set screw.





Adjustment

This instrument has been calibrated at the factory. No adjustments are required when installing.

Calibration

Although this product is thoroughly inspected before shipping, periodic calibration is recommended according to the installation environment to ensure the quality of measurement.

Frequency: Annual inspection is recommended. However, requirements may vary depending on the installation environment, therefore inspection guidelines should be set by the purchaser

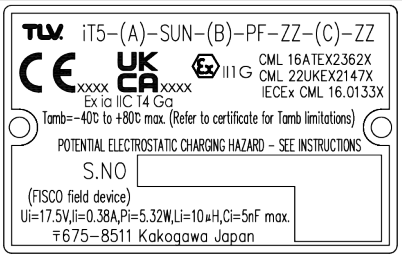
Calibration can only be performed with special equipment at TLV's factory. Contact your local TLV representative or your regional TLV office for details.

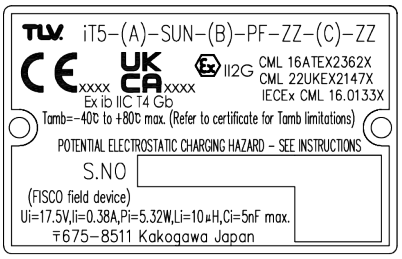
Specifications

Type	**iTrapSensor Monitoring System – Sensor**
Model	**iT5-FF-SUN-*-PF**
Classification Markings of Hazardous Locations	**ATEX** CE2776 Ex II 1 G Ex ia IIC T4 Ga CE2776 Ex II 2 G Ex ib IIC T4 Gb (Certificate No.: CML 16ATEX2362X) **IECEx** Ex ia IIC T4 Ga Ex ib IIC T4 Gb (Certificate No.: IECEx CML 16.0133X) **UKEX** Ex ia IIC T4 Ga Ex ib IIC T4 Gb (Certificate No.: CML 22UKEX2147X)

Mark for Certified Electrical Equipment	**Ex**	—
Type of Protection	**ia**	Intrinsically safe structure (can be used in especially hazardous locations)
	ib	Intrinsically safe structure (cannot be used in especially hazardous locations)
Applicable Gas Groups	**IIC**	Applicable to gases (Hydrogen, Acetylene, etc.) with minimum ignition current ratio is less than 0.45.
Temperature Class	**T4**	Applicable when maximum surface temperature of the unit is 130 °C (266 °F) and gas ignition temperature is 135 °C (275 °F) or more.
EPL (Equipment Protection Level)	**Ga**	This equipment can be used in Zone 0.
	Gb	This equipment can be used in Zone 1. But it cannot be used in Zone 0.

Applicable Standards	**ATEX/UKEX:** • EN IEC 60079-0:2018 • EN 60079-11:2012 **IECEx:** • IEC 60079-0:2017, Edition 7 • IEC 60079-11:2011, Edition 6

<table>
<tr><td>Nameplate</td><td> 


</td></tr>
<tr><td>Rating</td><td>Power circuit
Allowable voltage: 17.5 V
Allowable current: 380 mA
Allowable Power: 5.32 W
Internal inductance: 10 uH, Internal capacitance: 5 nF</td></tr>
<tr><td>Enclosure</td><td>IP67 (Evaluation for intrinsic safety rating is carried out under IP20)</td></tr>
<tr><td>Maximum Measurement Temperature</td><td>iT5-FF-SUN-L-PF-ZZ-S-ZZ: 250 °C (482 °F)
iT5-FF-SUN-H-PF-ZZ-S-ZZ: 400 °C (752 °F)</td></tr>
<tr><td>Ambient Temperature Range</td><td>If the measurement temperature exceeds 135 °C (275 °F), the maximum permissible equipment ambient temperature is reduced as follows.
iT5-FF-SUN-L-PF-ZZ-S-ZZ
<table>
<tr><th rowspan="2">Measurement temp. TM</th><th colspan="2">Max. permissible ambient temp.</th></tr>
<tr><th>Vertical Mounting</th><th>Horizontal Mounting</th></tr>
<tr><td>-40 °C ≤ Tm < 135 °C
(-40 °F ≤ Tm < 275 °F)</td><td>80 °C
(176 °F)</td><td>80 °C
(176 °F)</td></tr>
<tr><td>135°C ≤ Tm < 200 °C
(392 °F ≤ Tm < 482 °F)</td><td>75 °C
(167 °F)</td><td>77 °C
(170 °F)</td></tr>
<tr><td>200 °C ≤ Tm ≤ 250 °C
(392 °F ≤ Tm ≤ 482 °F)</td><td>67 °C
(152 °F)</td><td>75 °C
(167 °F)</td></tr>
</table>
iT5-FF-SUN-H-PF-ZZ-S-ZZ
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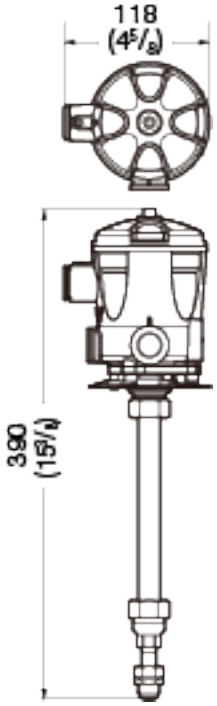
<tr><td>135°C ≤ Tm < 200 °C
(392 °F ≤ Tm < 482 °F)</td><td>75 °C
(167 °F)</td><td>77 °C
(170 °F)</td></tr>
<tr><td>200 °C ≤ Tm < 300 °C
(392 °F ≤ Tm < 572 °F)</td><td>67 °C
(152 °F)</td><td>75 °C
(167 °F)</td></tr>
<tr><td>300 °C ≤ Tm ≤ 400 °C
(572 °F ≤ Tm ≤ 752 °F)</td><td>62 °C
(143 °F)</td><td>72 °C
(161 °F)</td></tr>
</table></td></tr>
<tr><td>Material</td><td>Sensor body, Sensor cover: Aluminum alloy die castings (ADC3, SG100A)
Tip Section: Stainless Steel
Heat Shield Plate: Heat-resistant Resin (Polyetheretherketone (PEEK))</td></tr>
</table>

Dimensions (Unit: mm (in))	
Weight	Approx. 1.2 kg (2.7 lb)

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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