

# INSTRUCTION MANUAL

**TLV** FREE FLOAT AIR / GAS DRAIN TRAPS  
**SHNLA(G) SERIES**

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**SH5NLA**  
**SH5NLG**



**SH6NLA**  
**SH6NLG**



**SH7NLA**  
**SH7NLG**

 **TLV**® **CO., LTD.**

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# Introduction

Before you begin, please read this manual to ensure correct usage of the product and keep it in a safe place for future reference.

These inline repairable drain traps with tight shut-off are suitable for air and inert gas systems (SHNLA-Series)\*, or gas systems (SHNLG-Series)\*\* with pressures up to 46 kg/cm<sup>2</sup>G (650 psig) and temperatures up to 220°C (428°F) The traps discharge condensate continuously and automatically without adjustment.



\*DO NOT USE SHNLA-Series drain traps with toxic, flammable, or otherwise hazardous gases

\*\*Consult TLV for toxic, flammable, or otherwise hazardous gases.

# 1. Safety Considerations

- Read this section carefully before use and follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, valve opening/closing and adjustment should be done 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. All three types of cautionary items are important for safety; be sure to observe all of them.
- In order to ensure the correct, safe use of this product, be sure to observe the safety precautions listed in this manual relating to its installation, use, maintenance, and repair. Further, TLV accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

**Symbols:**  Indicates a DANGER, WARNING or CAUTION item.

 **DANGER** Indicates an urgent situation that poses the danger of death or serious injury.

 **WARNING** Indicates that there is the potential for death or serious injury

 **CAUTION** Indicates that there is a possibility of injury, or equipment/product damage.

|  |  |
|--|--|
|  <b>WARNING</b>  | <b>NEVER apply direct heat to the float.</b> The float may explode due to increased internal pressure, causing accidents leading to serious injury or property and equipment damage.   |
|  <b>CAUTION</b>  | <b>DO NOT use this product outside the operating pressure, temperature and other specification ranges.</b> Such use may result in damage to the product or malfunctions that may lead to burns or other injury.  |
|  | <b>Use hoisting equipment for heavy objects (weighing approximately 20 kg or more).</b> Failure to do so may result in back strain or other injury if the object should fall.  |
|  | <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> Doing this when the product is hot or under pressure may lead to fluid leakage or burns or other injury resulting from the discharge of fluids. |
|  | <b>Be sure to use the proper components when repairing the product, and NEVER attempt to modify the product.</b> 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.  |
|  | <b>Do not use excessive force when connecting threaded pipes to the product.</b> Doing so may cause breakage leading to fluid discharge, which may cause burns or other injury.  |
| <b>Use 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 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. |  |

## 2. Specifications

| Model<br>S=Screwed<br>W=Socket Weld<br>F=Flanged |   | Size<br>mm<br>(in.) | Maximum<br>Operating<br>Temperature<br>TMO<br>°C (F) | Orifice No. (upper lines)<br>Maximum Operating Pressure PMO<br>kg/cm <sup>2</sup> G (psig)<br>Maximum Differential Pressure ΔPMX<br>kg/cm <sup>2</sup> (psi) |
|--|---|---------------------|--|--|
| <b>Rubber Orifice</b>                            |   |                     |  |  |
| SH5NLA   | F | 20, 25 (¾, 1)       | 150<br>(300)   | 10, 22<br>(150, 315)   |
|  | S | 25 (1)              |  |  |
|  | W | 20, 25 (¾, 1)       |  |  |
| SH6NLA   | F | 25, 40 (1, 1½)      | 150<br>(300)   | 10, 22, 40<br>(150, 315, 600)  |
|  | S | 25 (1)              |  |  |
|  | W | 25, 40 (1, 1½)      |  |  |
| SH7NLA   | F | 25, 40 (1, 1½)      | 150<br>(300)   | 10, 22, 40<br>(150, 315, 600)  |
|  | W | 25, 40 (1, 1½)      |  |  |
| <b>Metal Orifice</b>                             |   |                     |  |  |
| SH5NLA   | F | 20, 25 (¾, 1)       | 220<br>(428)   | 5, 10, 22, 32, 46<br>(75, 150, 315, 450, 650)  |
|  | S | 25 (1)              |  |  |
|  | W | 20, 25 (¾, 1)       |  |  |
| SH6NLA   | F | 25, 40 (1, 1½)      | 220<br>(428)   | 5, 10, 22, 32, 46<br>(75, 150, 315, 450, 650)  |
|  | S | 25 (1)              |  |  |
|  | W | 25, 40 (1, 1½)      |  |  |
| SH7NLA   | F | 25, 40 (1, 1½)      | 220<br>(428)   | 5, 10, 22, 32, 46<br>(75, 150, 315, 450, 650)  |
|  | W | 25, 40 (1, 1½)      |  |  |
| <b>Rubber Orifice</b>                            |   |                     |  |  |
| SH5NLG   | F | 20, 25 (¾, 1)       | 150<br>(300)   | 10, 22<br>(150, 315)   |
|  | S | 25 (1)              |  |  |
|  | W | 25, 40 (1, 1½)      |  |  |
| SH6NLG   | F | 20, 25 (¾, 1)       | 150<br>(300)   | 10, 22, 40<br>(150, 315, 600)  |
|  | S | 25 (1)              |  |  |
|  | W | 25, 40 (1, 1½)      |  |  |
| SH7NLG   | F | 25, 40 (1, 1½)      | 150<br>(300)   | 10, 22, 40<br>(150, 315, 600)  |
|  | W | 25, 40 (1, 1½)      |  |  |
| <b>Metal Orifice</b>                             |   |                     |  |  |
| SH5NLG   | F | 20, 25 (¾, 1)       | 220<br>(428)   | 5, 10, 22, 32*, 40**, 46<br>(75, 150, 315, 450*, 600**, 650)   |
|  | S | 25 (1)              |  |  |
|  | W | 25, 40 (1, 1½)      |  |  |
| SH6NLG   | F | 20, 25 (¾, 1)       | 220<br>(428)   | 5, 10, 22, 32*, 40**, 46<br>(75, 150, 315, 450*, 600**, 650)   |
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| SH7NLG   | F | 25, 40 (1, 1½)      | 220<br>(428)   | 5, 10, 22, 32*, 40**, 46<br>(75, 150, 315, 450*, 600**, 650)   |
|  | W | 25, 40 (1, 1½)      |  |  |

\*North America only. \*\* Excluding North America.

**PRESSURE SHELL DESIGN CONDITIONS (NOT OPERATING CONDITIONS):**

Maximum Allowable Pressure kg/cm<sup>2</sup>G (psig) **PMA**: 65 (900).

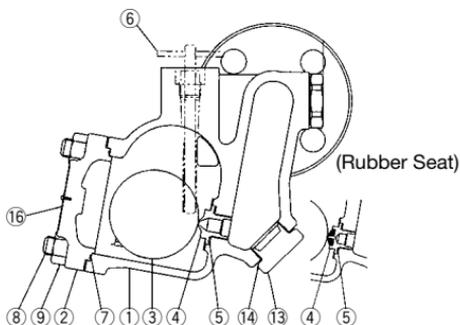
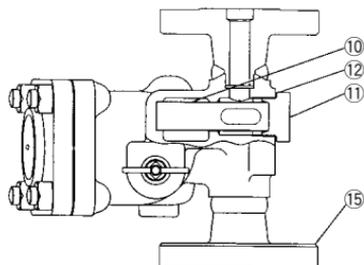
Maximum Allowable Temperature °C (F) **TMA**: 220 (428).



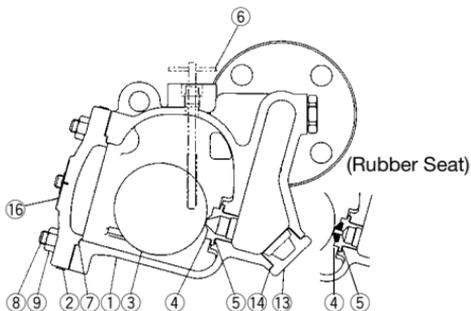
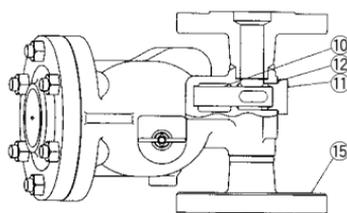
To avoid malfunctions, product damage, accidents or serious injury,  
DO NOT use this product outside the specification range.

### 3. Configuration

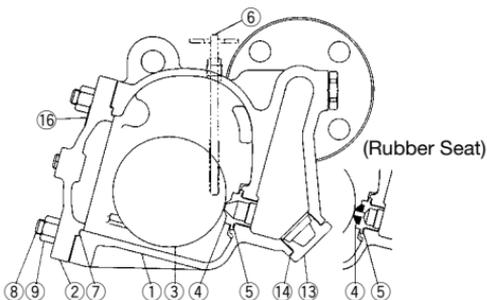
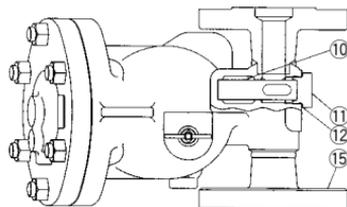
SH5NLA(G)



SH6NLA(G)



SH7NLA(G)



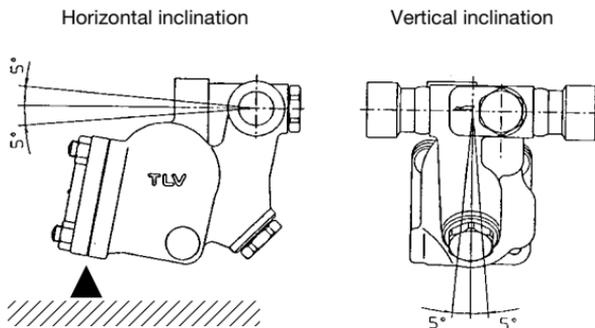
| No. | Description    | No. | Description          | No. | Description      |
|-----|----------------|-----|----------------------|-----|------------------|
| 1   | Body           | 7   | Cover Gasket         | 13  | Orifice Plug     |
| 2   | Cover          | 8   | Cover Bolt           | 14  | Plug Gasket      |
| 3   | Float          | 9   | Cover Nut            | 15  | Flange or Socket |
| 4   | Orifice        | 10  | Screen               | 16  | Nameplate        |
| 5   | Orifice Gasket | 11  | Screen Holder        |     |                  |
| 6   | Holder Rod     | 12  | Screen Holder Gasket |     |                  |

## 4. Proper Installation



1. Installation, inspection, maintenance, repairs, disassembly, valve opening/closing and adjustment should be done only by trained maintenance personnel.
  2. Take measures to prevent people from coming into direct contact with product outlets.
  3. Do not use excessive force when connecting threaded pipes.
  4. Use hoisting equipment for heavy objects.
  5. Install for use under conditions in which no freeze-up will occur.
  6. Install for use under conditions in which no water hammer will occur.
- 
1. Before installing the drain trap, blow out the inlet piping to remove all dirt and oil.
  2. Install a bypass valve to discharge condensate, and inlet and outlet valves to isolate the trap in the event of trap failure or maintenance.
  3. Install the trap in the lowest part of the pipeline or equipment so the condensate flows naturally downward into the trap by gravity. The inlet pipe should be as short and have as few bends as possible.
  4. Install the drain trap within the allowable inclination, as shown below. Also make sure that the arrow mark on the body corresponds with the direction of flow.
  5. Install a check valve at the trap outlet whenever the condensate discharge pipe leads to a tank or recovery line; or whenever the condensate collection pipeline is connected to more than one trap.
  6. When completing the piping, support the pipes within 0.8 meters (2.5 ft.) on either side of the trap.
  7. The use of unions is recommended to facilitate connection and disconnection of the screwed versions.
  8. Connect a pressure-balancing pipe to the trap and the tank or to the air or gas section of the main as shown on page 6.

### Allowable Inclination



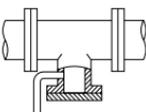
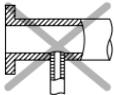
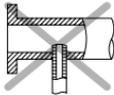
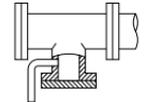
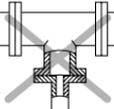
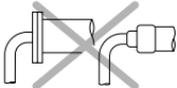
The trap should be installed so that the letters **TLV** on the body are horizontal.

### IMPORTANT

NOTE for installation of screwed type.

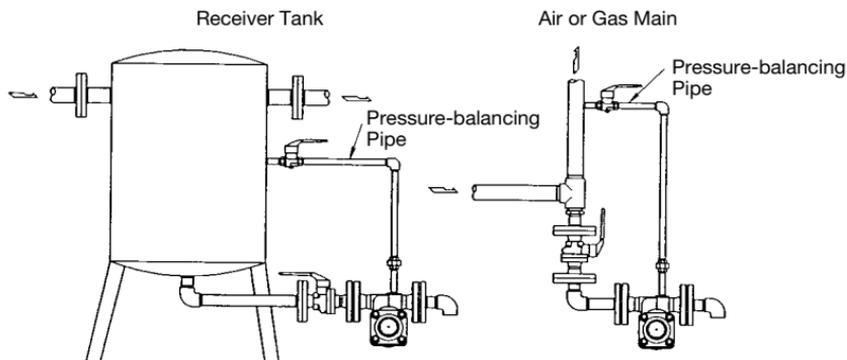
There is a possibility that the screwed connection will loosen due to vibration and/or other operating conditions, allowing the body to rotate in the piping. To prevent this, install the trap near the ground and support the body at the point marked ▲ in the drawing above to fix the trap in place.

## 5. Piping Arrangement

| Requirement   | Correct   | Incorrect  |
|---|---|--|
| Install a catchpot with the proper diameter.  |  |  Diameter is too small.                                 |
| Make sure the flow of condensate is not obstructed.   |   |  Diameter is too small and inlet protrudes into pipe.   |
| To prevent rust and scale from flowing into the trap, connect the inlet pipe 25 ~ 50 mm (1 ~ 2 in.) above the base of the T - pipe. |  |  Rust and scale flow into the trap with the condensate. |
| When installing on the blind end, make sure nothing obstructs the flow of condensate.   |   |  Condensate collects in the pipe.                       |

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

1. Is the pipe diameter suitable?
2. Has the trap been installed within the allowable inclination and with the arrow on the body pointing in the direction of flow?
3. Has sufficient space been secured for maintenance?
4. Have maintenance valves been installed at inlet and outlet? If the outlet is subject to back pressure, has a check valve been installed?
5. Is the inlet pipe as short as possible, with as few bends as possible, and installed so that the condensate will flow naturally down into the trap?
6. Has the piping work been done with the proper methods as shown in the table above?
7. Has the pressure-balancing pipe been connected to the trap and the tank or to the air or gas section of the main as shown below?



### IMPORTANT

Be sure to take precautions on the secondary side when fluids used are flammable, toxic or other hazardous gases. Sample precautionary procedures are:

1. Flare method.
2. Collection in seal pot.
3. Collection in a sealed container.

## 6. Operational Check

A visual inspection can be done to help decide about necessary immediate maintenance or repair if the trap is open to atmosphere. Use diagnostic equipment; such as a stethoscope, thermometer or TLV PenCheck if the trap does not discharge to atmosphere.

|                                     |  |
|-------------------------------------|--|
| Normal:                             | Condensate is discharged continuously and the sound of flow like that of water draining from a bathtub can be heard. If there is very little condensate, there is almost no sound of flow. |
| Blocked:<br>Discharge<br>Impossible | No condensate is discharged. The trap is quiet and makes no noise. The surface temperature of the trap is low.   |
| Blowing:                            | Gas or air continually flows from the outlet and there is a continuous sound of a forceful stream against a surface.   |
| Gas or Air<br>Leakage:              | Gas or air is discharged through the trap outlet together with the condensate and there is a hissing sound.  |

## 7. Inspection and Maintenance

Periodic operational inspections should be performed at least biannually or at intervals according to use.



NEVER apply direct heat to the float. The float may explode due to increased internal pressure, causing accidents leading to serious injury or property and equipment damage.



1. Inspection, disassembly, maintenance and repairs should be done only by trained maintenance personnel.
2. Before attempting to open the trap, close the inlet and outlet isolating valves, and wait until the trap has cooled to room temperature. Then reduce the internal pressure to 0 kg/cm<sup>2</sup>G (0 psig) by slowly and cautiously turning the screen holder plug a few degrees so that the air or gas can escape. Failure to do so may result in burns or injuries.
3. Before removing any parts, be sure to drain the condensate from inside the body through the orifice plug.
4. Be sure to use the proper components and NEVER try to modify the product.

### Parts Inspection Procedure

|             |   |
|-------------|---|
| Body, Cover | Check inside for dirt, grease, oil film, rust or scale. |
| Gaskets     | Check for warping or damage.                            |
| Screen      | Check for clogging corrosion or damage.                 |
| Orifice     | Check for rust, scale, oil film, wear or damage.        |

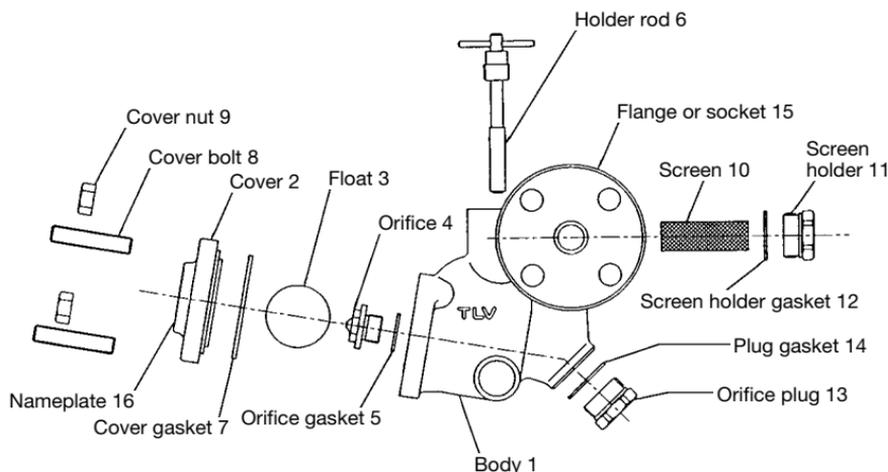
### Removing and Replacing the Parts

| Part & No.       | During Disassembly                       | During Reassembly   |
|------------------|--|---|
| Orifice plug 13  | Use a socket wrench to remove.           | Coat threads with anti-seize and tighten to the proper torque, (see page 8).    |
| Plug gasket 14   | Remove the gasket and keep it for reuse. | Replace only if visibly damaged. Coat it with anti-seize before reinstallation. |
| Cover nut 9      | Use a socket wrench to remove.           | Coat threads with anti-seize and Tighten to the proper torque, (see page 8).    |
| Cover 2          | Remove the cover.                        | Attach the cover.   |
| Cover gasket 7   | Remove the gasket and keep it for reuse. | Replace with new gasket only if visibly damaged. Do not apply anti-seize.       |
| Screen holder 11 | Use a socket wrench to remove            | Coat threads with anti-seize and tighten to the proper torque, (see page 8).    |

## Removing and Replacing the Parts

| Part & No.                 | During Disassembly                        | During Reassembly  |
|----------------------------|---|--|
| Screen holder<br>Gasket 12 | Remove the gasket and keep it for reuse.  | Replace only if visibly damaged. Coat it with anti-seize before reinstallation.                    |
| Screen 10                  | Remove the screen.                        | Insert securely on to the tab.   |
| Float 3                    | Carefully remove the float from the body. | Insert carefully. The float is precision machined; do not scratch or otherwise damage its surface. |
| Orifice 4                  | Use a socket wrench to remove             | Coat threads with anti-seize and tighten to the proper torque, (see page 8).                       |
| Orifice gasket 5           | Remove the gasket                         | Replace with a new gasket. Do not apply anti-seize.  |

## 8. Exploded View



The holder rod fastened to the trap body is installed to protect the valve seat orifice and float from damage during shipment. When installing the trap in the piping, remove the holder rod and connect a pressure-balancing pipe in its place. Connect the other end of the pressure-balancing pipe to the air or gas section (above the water level) or a receiver tank.

**Table of Tightening Torque (T) and Distance Across Flats (W)**

| Part & Number    | SH5NLA·SH5NLG |       |     |                | SH6NLA·SH6NLG |       |     |                  | SH7NLA·SH7NLG |       |     |                  |
|------------------|---------------|-------|-----|----------------|---------------|-------|-----|------------------|---------------|-------|-----|------------------|
|                  | (T)           |       | (W) |                | (T)           |       | (W) |                  | (T)           |       | (W) |                  |
|                  | kg·cm         | ft·lb | mm  | in.            | kg·cm         | ft·lb | mm  | in.              | kg·cm         | ft·lb | mm  | in.              |
| Cover nut 9      | 1100          | 81    | 22  | $\frac{7}{8}$  | 1300          | 95    | 22  | $\frac{7}{8}$    | 2100          | 155   | 24  | $\frac{15}{16}$  |
| Orifice 4        | 800           | 59    | 19  | $\frac{3}{4}$  | 2000          | 150   | 30  | $1\frac{1}{16}$  | 2000          | 150   | 30  | $1\frac{1}{16}$  |
| Orifice plug 13  | 2000          | 150   | 38  | $\frac{1}{2}$  | 4000          | 290   | 50  | $1\frac{15}{16}$ | 4000          | 290   | 50  | $1\frac{15}{16}$ |
| Screen holder 11 | 2000          | 150   | 38  | $1\frac{1}{2}$ | 2000          | 150   | 38  | $1\frac{1}{2}$   | 2000          | 150   | 38  | $1\frac{1}{2}$   |

## 9. Troubleshooting

If the expected performance is unachievable after installation of the drain trap, read chapter 4 and chapter 5 again and check the following points to take appropriate corrective measures.

| Problem  | Cause   | Remedy   |
|--|---|--|
| No condensate is discharged or discharge is poor.                                      | Float is damaged or filled with condensate.   | Replace the float.   |
|  | Orifice, screen or piping are clogged with rust, scale or dirt.   | Clean.   |
|  | The trap operating pressure exceeds the maximum specified pressure, or there is insufficient pressure differential between the trap inlet and outlet. | Compare specifications and actual operating conditions.    |
|  | Air (Gas) binding occurs.   | Check and correct balance pipe and inlet pipe arrangement. |
| Gas or air is discharged or leaks from the trap outlet. (blowing) (gas or air leakage) | Orifice is clogged or rust and scale have accumulated under the float.  | Clean.   |
|  | Orifice is damaged.   | Replace the orifice.                                       |
|  | Float is deformed or coated with scale.   | Clean or replace the float.                                |
|  | Trap is installed above the maximum allowable inclination angle.  | Correct the installation.                                  |
|  | Vibration of trap occurs  | Lengthen inlet piping, then fasten it securely.            |
| Gas or air leaks from a place other than the trap outlet.                              | Deterioration of or damage to gaskets.  | Replace the gaskets.                                       |
|  | Improper tightening torque for cover was used.  | Tighten to the proper torque.                              |

## 9. Product Warranty

- 1) Warranty Period: one year after product delivery.
- 2) **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 labour.
- 3) This product warranty will not apply to appearance items nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
  1. Malfunction due to improper installation, use, handling, etc., by other than **TLV** Co., Ltd. authorized service representatives.
  2. Malfunctions due to dirt, scale or 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. Malfunction 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 damage or consequential damage to property.

## **For Service or Technical Assistance:**

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

### **In North America:**

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