



# Instruction Manual

## Automatic Non-freeze Valve **NF6**

**Manufacturer**

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## Introduction

Thank you for purchasing the TLV non-freeze valve.

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.

This non-freeze valve is compact with simple construction. It comes with an integrated screen, installation is easy and no adjustment is necessary. This product is especially effective for steam traps installed in cold areas where freezing is likely to occur. Condensate remaining inside the trap is discharged to prevent possible damage caused by its expansion when freezing. This non-freeze valve is also useful for reducing labor requirements for maintenance and operation (bypass blowdown).

This non-freeze valve can be easily installed on most TLV steam traps. Please contact TLV for more details.






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.

### Symbols

	<p>Indicates a <b>DANGER, WARNING or CAUTION</b> item.</p>
	<p>Indicates an urgent situation which poses a threat of death or serious injury</p>
	<p>Indicates that there is a potential threat of death or serious injury</p>
	<p>Indicates that there is a possibility of injury or equipment/product damage</p>
	<p><b>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.</b> Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.</p> <p><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.</p> <p><b>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature.</b> Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.</p> <p><b>Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way.</b> Failure to observe these precautions may result in damage to the product and burns or other injury due to malfunction or the discharge of fluids.</p> <p><b>Do not use excessive force when connecting threaded pipes to the product.</b> Over-tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.</p>

## Specifications



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

Model	Connection		Max. Operating Pressure PMO MPaG (psig)	Max. Operating Temperature TMO °C (°F)	Max. Allowable Pressure* PMA MPaG (psig)	Max. Allowable Temperature* TMA °C (°F)
	Inlet (male)	Outlet (female)				
NF6	G(PF) <sup>1/4</sup> ** R(PT) <sup>1/4</sup>	G(PF) <sup>1/4</sup> **	2.0 (285)	220 (428)	2.0 (285)	220 (428)

Valve Closing Pressure: 0.016 to 0.047 MPaG (2.3 to 6.8 psig)  
(Average: approx. 0.03 MPaG (5 psig))

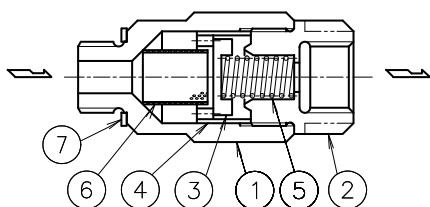
Valve Opening Pressure: 0.012 to 0.026 MPaG (1.7 to 3.8 psig)  
(Average: approx. 0.02 MPaG (3 psig))

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

\*\*Equivalent to BSPP<sup>1/4</sup>

NOTE: For special order products, confirm the details on the drawing, etc., as the specification may be different from the above.

## Configuration



No.	Name	No.	Name
1	Body	5	Coil Spring
2	Valve Seat	6	Screen
3	Valve Disc	7	Gasket*
4	Valve Disc Guide		

\*Only on NF6 with straight G(PF) thread. NF6 with tapered R(PT) thread has no gasket

## Installation



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



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



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 non-freeze valve, blow out any piping scraps, dirt and oil from the piping and steam trap the non-freeze valve is to be installed on.
2. Before installation, be sure to remove any protective seals.

3. Install the non-freeze valve at the proper location on the steam trap so that the flow direction of the valve matches with that of condensate. (See the “Disassembly/Reassembly” section for the proper torque.)
4. Install outlet piping. Make sure that the internal diameter of the pipe and joints are thick and short with an inner diameter of  $\varnothing 6$  mm ( $^{15}/_{64}$ ) or larger.
5. Do not install a needle or other valve at the outlet (except for full-bore ball valves).
6. Open the inlet and outlet valves of the steam trap and allow the trap to operate normally. After that, close the inlet and outlet valves and check to make sure that the non-freeze valve opens and functions properly when the internal pressure (temperature) decreases.

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

## Special Considerations for Product Use

1. **Outlet pipe should have as steep a downward incline as possible so that the condensate can smoothly and rapidly flow out from the pipe.**

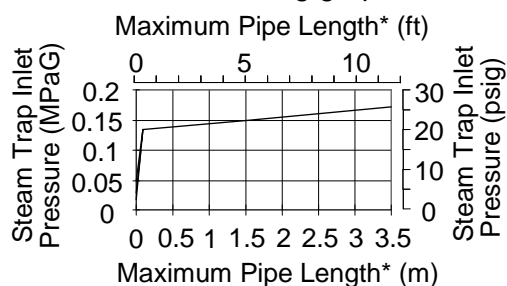
Condensate needs to be discharged from the piping before the temperature decreases below the freezing point. This product cannot function once freezing has occurred at the outlet side. Do not recover the condensate.

2. **Outlet piping should be as thick and as short as possible.**

Freezing occurs from the outside of the outlet pipe. If the outlet pipe is thin and long, the condensate temperature can decrease while flowing, gradually freezing along the pipe’s inner surface. Eventually, the pipe may become blocked, with condensate backing up and freezing in the steam trap, possibly causing damage. To prevent such an occurrence, the outlet pipe should be as thick and as short as possible with an internal diameter  $\varnothing 6$  mm ( $^{15}/_{64}$ ) or larger and discharge to atmosphere. When used in extreme cold, due to the possibility of freezing while discharging, prevention of freezing cannot be guaranteed.

3. **Relation between required inlet pressure and length of NF6 outlet pipe.**

If there are any bends, or the pipe length is long, outlet pressure of NF6 increases due to high resistance from the pipe, and the valve may not close. To avoid such a phenomenon, use the non-freeze valve on a steam trap with an inlet pressure shown on the following graph.



Use the non-freeze valve on a steam trap with an inlet pressure as shown on the graph

\*  $\varnothing 6$  mm ( $^{15}/_{64}$ ) or larger internal diameter and bending at no more than 3 locations.

## Maintenance



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



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

### Operational Check

A visual inspection should be done on a daily basis to determine whether the product is operating properly or is leaking.

### Parts Inspection

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

Procedure	
Valve Disc & Valve Seat:	Check for oil film, warping, scratches or other wear
Screen:	Check for clogging or corrosion

## Disassembly/Reassembly



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



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

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 Outer Cover

Part	During Disassembly	During Reassembly
Valve Seat	Hold the body with one wrench and remove the valve seat with another	Consult the table of tightening torques and tighten to the proper torque
Coil Spring	Remove	Reinsert
Valve Disc	Remove being careful not to scratch the seating surface	Insert with the proper orientation (refer to Configuration and Exploded View)
Valve Disc Guide	Remove	Insert with the proper orientation (refer to Configuration and Exploded View)
Screen	Remove without bending	Reinsert without bending

## Table of Tightening Torques

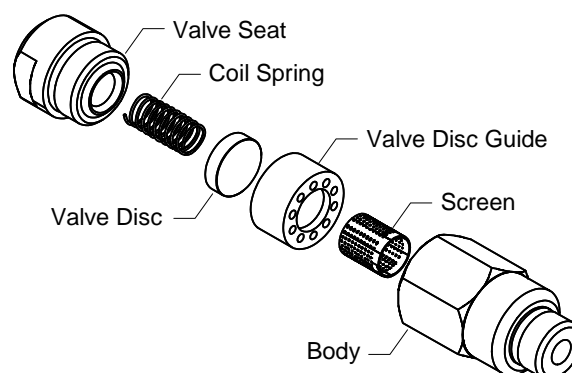
Part	Torque		Distance Across Flats	
	N·m	(lbf·ft)	mm	(in)
Valve Seat*	35	(26)	17	( <sup>21</sup> / <sub>32</sub> )
Body	Straight G(PF) thread*	35	21	( <sup>13</sup> / <sub>16</sub> )
	Tapered R(PT) thread**	30	21	( <sup>13</sup> / <sub>16</sub> )

NOTE: \*Coat threads with anti-seize (1 N·m ≈ 10 kg·cm)

\*\*Wrap threads with 3 - 3.5 turns of sealing tape

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

## Exploded View



## Troubleshooting



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

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

Problem	Cause	Remedy
No condensate is discharged (blocked) or discharge is poor	Valve disc, valve seat, screen, or piping is clogged with rust or scale	Clean parts
	Freezing occurs on outlet pipe, etc.	Examine the size, length and installation of the outlet pipe and take appropriate corrective measures
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	Rust or scale or other build up have accumulated on the valve disc or valve seat	Clean parts
	Valve disc or valve seat are damaged	Replace with a new valve and valve seat
	Improper installation orientation	Reinstall with correct flow direction
	Improper installation, size or length of outlet pipe	Make sure outlet pipe is at least $\varnothing 6$ mm ( <sup>15</sup> / <sub>64</sub> ) internal dia., of appropriate length and has no more than 3 bends
Steam leaks 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 Corporation, a North Carolina corporation (“**TLV**”) warrants that products which are sold by it, TLV CO., LTD., a Japanese corporation (“**TLVJ**”) or TLV International, Inc., a Japanese corporation (“**TII**”), (hereinafter the “**Products**”) are designed and manufactured by TLVJ, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. 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 other than TLV 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 other than TLV 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; 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 the earlier of: (i) three (3) years after delivery of Products to the first end user in the case of sealed SST-Series Products for use in steam pressure service up to 650 psig; (ii) two (2) years after delivery of Products to the first end user in the case of PowerTrap® units; or (iii) one (1) year after delivery of Products to the first end user in the case of all other Products. Notwithstanding the foregoing, asserting a claim under this warranty must be brought by the earlier of one of the foregoing periods, as applicable, or within five (5) 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 TLV.

### 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 TLV IN WRITING WITHIN THE APPLICABLE 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 TLV, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY TLV. 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. TLV 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 TLV'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY TLV 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 TLVJ 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.

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