



Manufacturer

**TLV** CO., LTD.

Kakogawa, Japan

is approved by LRQA Ltd. to ISO 9001/14001



# Instruction Manual

## Vacuum Breaker **VB3/VB3-H**

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## Introduction

Thank you for purchasing the TLV VB3/VB3-H vacuum breaker.

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 VB3/VB3-H vacuum breaker automatically opens both of its valves to introduce air when a vacuum begins to form due to a stopped supply pump, protecting piping and other equipment by preventing a vacuum from forming. On startup, the float of the VB3/VB3-H allows for rapid air discharge until the water level rises and the float shuts off the valve.

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

	Indicates a <b>DANGER, WARNING or CAUTION</b> item.
	Indicates an urgent situation which poses a threat of death or serious injury
	Indicates that there is a potential threat of death or serious injury
	Indicates that there is a possibility of injury or equipment/product damage
	<p><b>DO NOT use for toxic, flammable or otherwise hazardous fluids.</b></p> <p>This product is a vacuum breaker for water piping systems. Use only for water and/or air. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.</p>
	<p><b>NEVER apply direct heat to the float.</b></p> <p>The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.</p>
	<p><b>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.</b></p> <p>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>Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more).</b></p> <p>Failure to do so may result in back strain or other injury if the object should fall.</p>

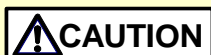
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	<p><b>Take measures to prevent people from coming into direct contact with product outlets.</b> Failure to do so may result in burns or other injury from the discharge of fluids.</p>
	<p><b>When disassembling or removing the product, wait until the 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>
	<p><b>Use only 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.</p>
	<p><b>Use only 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.</p>

## Features

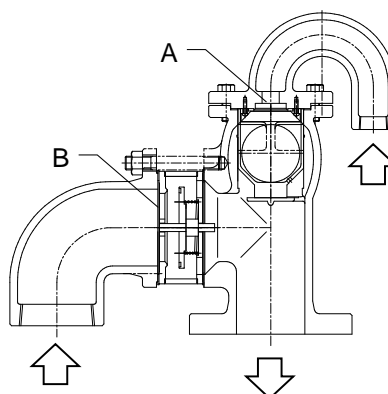
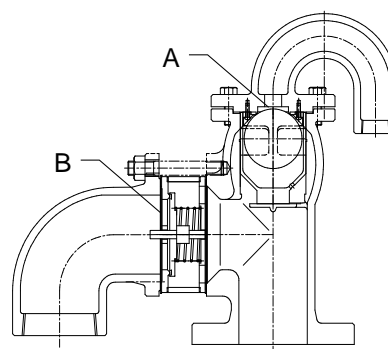
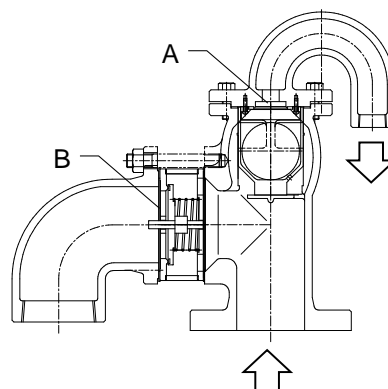
1. The product has no hinges or levers: the only moving parts are the check valve disc and the self-leveling grounded free float, which minimize malfunction and provides long service life.
2. The product is made up of few parts and the construction has been kept simple, so maintenance checks are also simple.

## Operation



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.

1. The product also functions as a rapid initial air vent. As water is initially supplied to the piping, the air in the piping enters the vacuum breaker. As the float is in the lowered position at this time, valve "A" is open fully, and the air entering the vacuum breaker is rapidly discharged. At this time check valve disc "B" at the check valve stays closed.
2. When the last of the initial air is discharged, water enters the product, causing the float to rise, closing valve "A". If there is a rapid rise in water level, a small amount of water may leak with discharged air immediately before valve "A" closes.
3. Once valve "A" has closed, it remains closed even if air accumulates inside the vacuum breaker, so there is no discharge of air during operation. Check valve disc "B" remains closed.
4. When stopping the supply pump and draining the piping, the pressure inside the piping becomes near to or less than atmospheric pressure, and the float falls with the water level in the vacuum breaker opening valve "A" and introducing air. At the same time, check valve disc "B" opens and introduces air into the piping, which prevents a vacuum from forming and protects the piping and other equipment.



## Specifications



### WARNING

DO NOT use for toxic, flammable or otherwise hazardous fluids. This product is a vacuum breaker for water piping systems. Use only for water and/or air. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.



### CAUTION

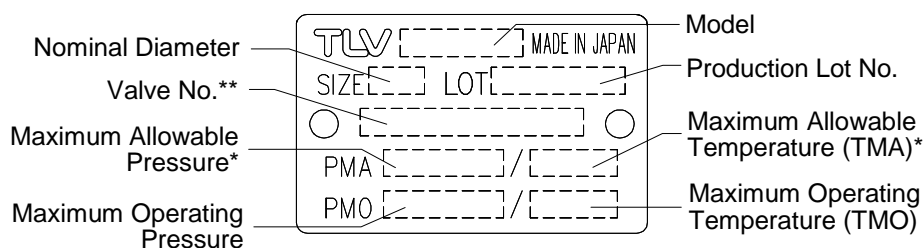
Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this product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



### 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.

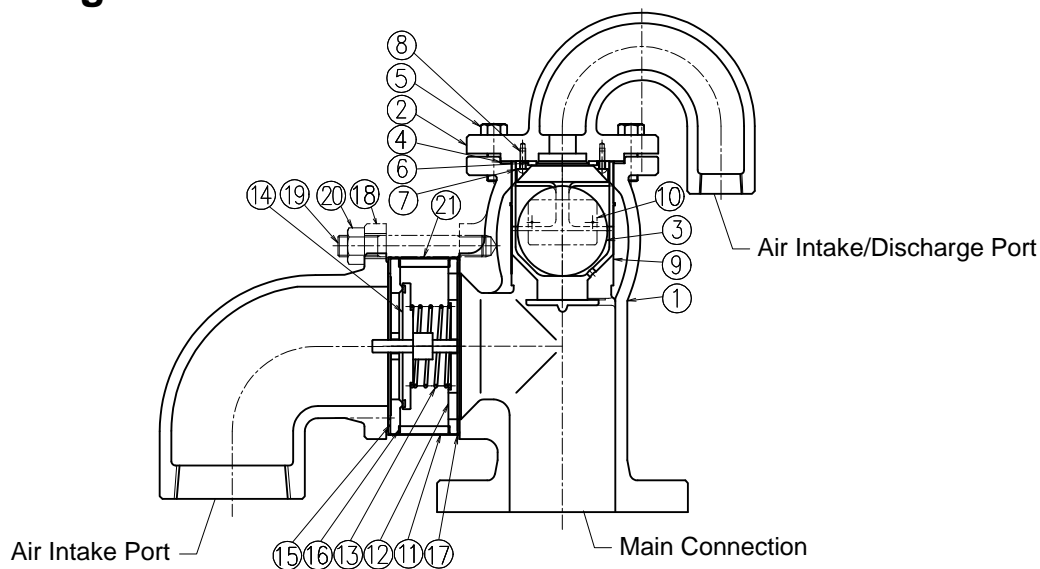
Refer to the product nameplate for detailed specifications.



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

\*\* Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

## Configuration



No.	Part Name	No.	Part Name	No.	Part Name
1	Body	8	Set Screw	15	Check Valve Seat
2	Cover	9	Float Guide	16	Check Valve Inner Gasket
3	Float	10	Nameplate	17	Check Valve Outer Gasket
4	Cover Gasket	11	Check Valve Body	18	Intake Pipe
5	Cover Bolt	12	Spring Holder	19	Intake Pipe Bolt
6	Valve Seat	13	Coil Spring	20	Intake Pipe Nut
7	Valve Seat Retainer	14	Check Valve Disc	21	Ring*

\* Ring featured only in VB3-H, not in VB3.

## Installation



### WARNING

DO NOT use for toxic, flammable or otherwise hazardous fluids. This product is a vacuum breaker for water piping systems. Use only for water and/or air. This product is for intended use only. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents.



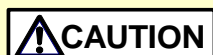
### CAUTION

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 which may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.



### CAUTION

Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.



### 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.

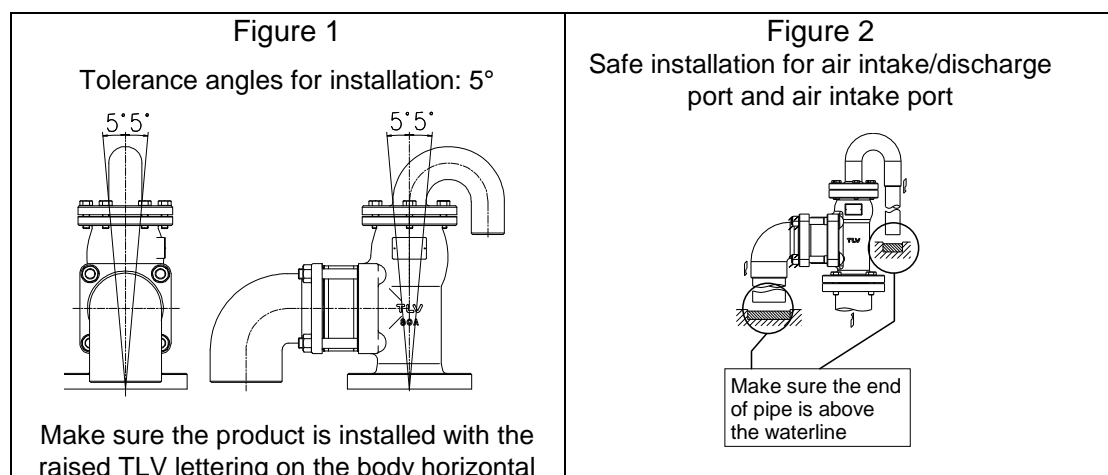


### CAUTION

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 installation, be sure to remove all protective seals.
2. Before installing the product, blow out the piping connected to the main connection to remove any piping scraps, dirt, sand or oil, etc.
3. Install the product at a point where air is likely to collect such as a bend in the piping.
4. This product must be installed vertically with the main connection at the bottom, and both the air intake/discharge port and air intake port must face downwards. Also it should be inclined horizontally and front-to-back within the limits shown in Figure 1.
5. Install piping on both the air intake/discharge port and air intake port leading to a drainage vessel or ditch. Make sure the ends of the pipes connected to the air intake port and air intake/discharge port are above the waterline, so that dirt and water cannot be sucked up by a vacuum when the system shuts down (Figure 2).

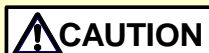


6. For the piping connected to the main connection, piping with no horizontal portion is recommended for water/air displacement. If there is a horizontal portion, make the pipe diameter of the horizontal portion larger than the vertical portion or make the horizontal portion as short as possible.
7. Make sure the main connection piping diameter is at least as large as the diameter of the main connection.
8. Installation of an isolation valve just before the product's main connection is recommended as it enables maintenance during operation. A full-bore ball valve is recommended.
9. Make sure to take measures to prevent foreign matter from flowing into the product.
10. This product does not vent air automatically while the supply pump is in operation. If air venting is necessary during system operation, install an automatic air vent as well.

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



## 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 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, hindrance to water flow, or damage to equipment and piping as a result of vacuum formation.

- Normal:** When air flows into the product initially, the air intake/discharge port opens and the air is discharged.  
When water flows into the product, the air intake/discharge port closes, and no water leaks from either the air intake/discharge port or the air intake port. When there is a vacuum in the piping, the air intake/discharge port and air intake port open and air enters the product.
- Leakage:** Water is leaking from the air intake/discharge port or the air intake port when the ports are in the closed position.

## 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	
Gaskets:	Check for warping and damage
Valve Seats:	Check for damage, scratches, or wear on sealing surface
Float:	Check for scratches or dents
Float Guide:	Check for warping
Check Valve Disc:	Check for scratches, dents, or wear
Coil Spring:	Check for scratches, dents, or cracks
Spring Holder:	Check for warping, scratches, or wear

## Disassembly/Reassembly



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



Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.



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.)

### Dissassembly/Reassembly Procedure

Part	During Disassembly	During Reassembly
Cover Bolt	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover	Remove by lifting up and off	Make sure there are no pieces of the old gasket left on the sealing surfaces and reattach
Cover Gasket (rubber)	Remove the gasket and clean sealing surfaces	Replace with a new gasket
Valve Seat Retainer	Loosen set screws and remove from the cover	Consult the table of tightening torques for the set screws and tighten to the proper torque
Valve Seat	Remove from the cover together with the valve seat retainer	Clean or replace with a new valve seat if warped or damaged
Float	Remove, being careful not to scratch the polished surface	Insert, being careful not to scratch the polished surface
Float Guide	Remove, being careful not to misshape	Insert, being careful not to misshape
Intake Pipe Nut	Remove with a wrench	Consult the table of tightening torques and tighten to the proper torque
Intake Pipe	Pull out to remove (Be careful, the check valve sets can be removed together; do not drop any parts)	Make sure there are no pieces of the old gasket left on the sealing surfaces and reattach

Continued on the next page

Part	During Disassembly	During Reassembly
Check Valve Body	Remove along with intake pipe, check valve inner/outer gaskets, check valve seat, check valve disc, coil spring, spring holder and ring*	Make a set with check valve inner/outer gaskets, check valve seat, check valve disc coil spring, spring holder and ring*, and carefully set in the proper direction
Check Valve Outer Gasket (VB3: rubber/2 pcs) (VB3-H: graphite/2 pcs) (for check valve and spring holder)	Remove gaskets and clean sealing surfaces	Replace with new check valve outer gaskets and place each in the proper position
Check Valve Inner Gaskets (VB3: PTFE/2 pcs) (VB3-H: graphite/2 pcs) (for check valve body)	Do not remove unless damaged	Replace with new check valve inner gaskets if damaged and place each in the proper position
Check Valve Seat	Remove, being careful not to scratch the sealing surface	Clean or replace with a new check valve seat if sealing surface is damaged and carefully set the seat surface protrusion facing rubber seat side of the check valve disc
Check Valve Disc	Remove, being careful not to scratch the inlaid rubber	While holding the coil spring on the stem of the check valve disc, face the rubber seat surface against the check valve seat
Coil Spring	Remove, being careful not to bend	Place it on the stem of the check valve disc and fit it onto the protrusion, the other side of the coil spring will go into the depressed side of the spring holder
Spring Holder	Remove, being careful not to bend	Carefully set it in the proper direction, the depressed side of the spring holder will face to the reverse side of the check valve disc seating side

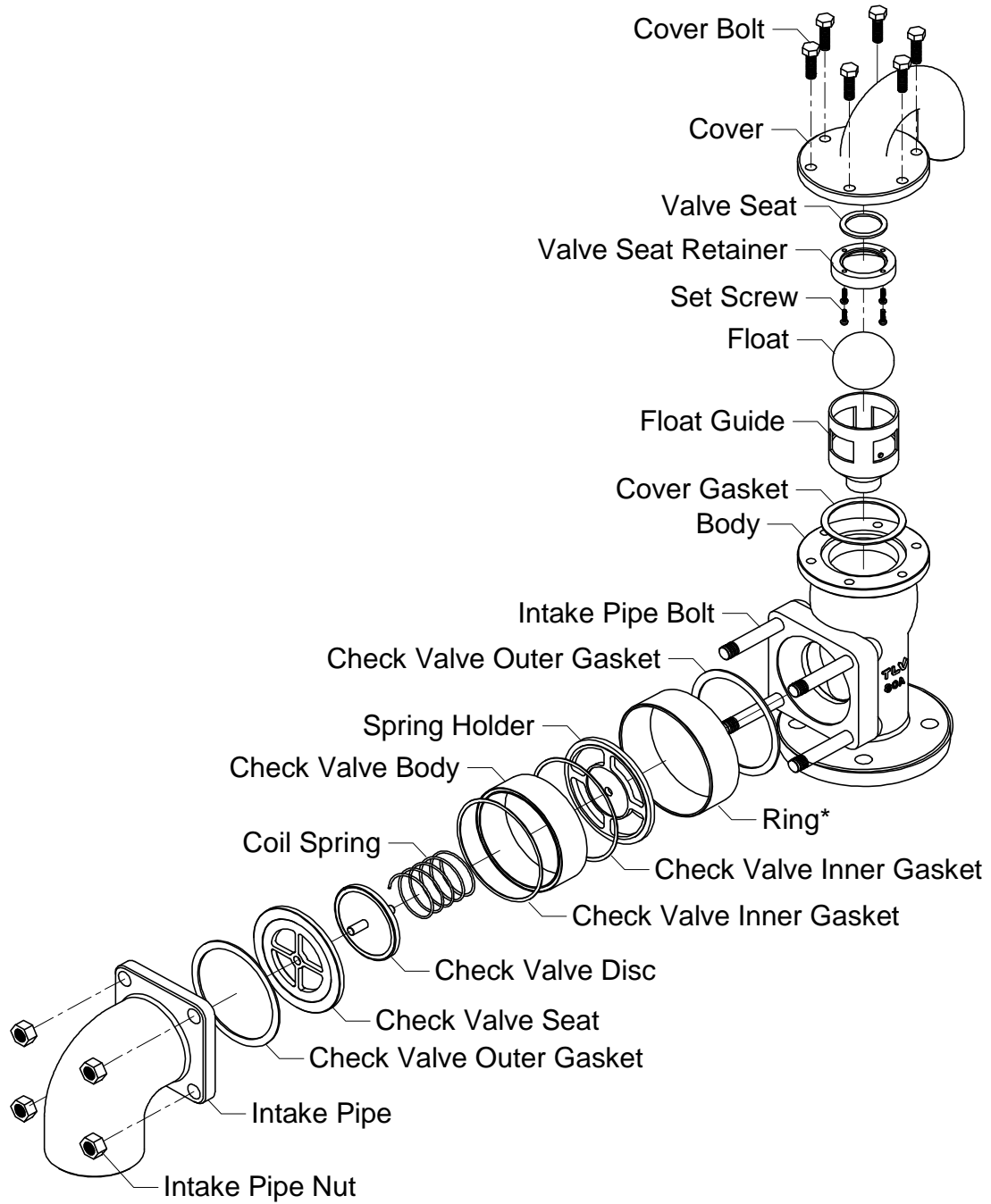
\*Ring featured only in VB3-H, not in VB3.

### Torque Tightening Table

Model	Intake Pipe Bolt		Intake Pipe Nut		Set Screw	
	Torque N·m (lbf·ft)	Dist. Across Flats mm (in)	Torque N·m (lbf·ft)	Dist. Across Flats mm (in)	Torque N·m (lbf·ft)	Screw Head
VB3	50 (37)	17 ( <sup>21</sup> / <sub>32</sub> )	100 (73)	24 ( <sup>15</sup> / <sub>16</sub> )	0.2 (0.15)	+
VB3-H		19 ( <sup>3</sup> / <sub>4</sub> )		30 ( <sup>13</sup> / <sub>16</sub> )		

NOTE: -Coat all threaded portions with anti-seize. (1 N·m ≈ 10 kg·cm)  
 -If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Exploded View



\*Ring featured only in VB3-H, not in VB3.

## Troubleshooting



### WARNING

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



### 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
Air is leaking from places other than the air intake/discharge port or the air intake port	Gaskets are warped or damaged	Replace with new gaskets
	Improper tightening torques were used (Cover bolts or intake pipe nuts are loose)	Tighten to the proper torque
No air is discharged (blocked)* or discharge is poor	The trapped air cannot displace the water in the piping	Correct the main connection piping
	The valve seat is clogged with dirt or foreign matter	Clean or replace with a new valve seat
	The main connection piping, air intake/discharge port piping or air intake port piping is clogged	Clean the piping
Abnormal flow sounds during normal operation	The check valve disc is catching due to wear, dirt, rust, etc.	Clean or replace with a new valve seat/check valve seat
	There is a build-up of rust or scale on the valve seat or the valve seat is damaged	Clean or replace with a new valve seat
	Coil spring is dislodged or broken	Replace with a new coil spring
Water leaks when the valve seat or check valve seat are closed	The float is misshapen, dirty or has a film build-up	Clean or replace with a new float
	The check valve disc is catching due to wear, dirt, rust, etc.	Clean or replace with new parts related to this phenomenon
	There is a build-up of rust or scale on the valve seat/check valve seat or the valve seat/check valve seat is damaged	Clean or replace with a new valve seat/check valve seat
	The installation angle of inclination is incorrect	Correct the installation
The valve seat or check valve seat does not close and water is blowing	The float is damaged or filled with water	Replace with a new float
	The check valve disc is catching due to wear, dirt, rust, etc.	Clean or replace with a new check valve disc
	There is a build-up of rust or scale on the valve seat/check valve seat or the valve seat/check valve seat is damaged	Clean or replace with a new valve seat/check valve seat

\*NOTE: Once the air intake/discharge port closes, it will remain closed until internal pressure drops to near or below atmospheric pressure. This condition may be confused with a malfunction (blocked). If air is expected to accumulate in the piping during operation, use together with an automatic air vent.

## TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV CO., LTD., a Japanese corporation (“**TLV**”), warrants that products which are sold by it, TLV International Inc. (“**TII**”) or one of its group companies excluding TLV Corporation (a corporation of the United States of America), (hereinafter the “**Products**”) are designed and manufactured by TLV, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. The party from whom the Products were purchased shall be known hereinafter as the “**Seller**”. With regard to products or components manufactured by unrelated third parties (the “**Components**”), TLV provides no warranty other than the warranty from the third party manufacturer(s), if any.

### Exceptions to Warranty

This warranty does not cover defects or failures caused by:

1. improper shipping, installation, use, handling, etc., by persons other than TLV, TII or TLV group company personnel, or service representatives authorized by TLV; or
2. dirt, scale or rust, etc.; or
3. improper disassembly and reassembly, or inadequate inspection and maintenance by persons other than TLV or TLV group company personnel, or service representatives authorized by TLV; or
4. disasters or forces of nature or Acts of God; or
5. abuse, abnormal use, accidents or any other cause beyond the control of TLV, TII or TLV group companies; or
6. improper storage, maintenance or repair; or
7. operation of the Products not in accordance with instructions issued with the Products or with accepted industry practices; or
8. use for a purpose or in a manner for which the Products were not intended; or
9. use of the Products in a manner inconsistent with the Specifications; or
10. use of the Products with Hazardous Fluids (fluids other than steam, air, water, nitrogen, carbon dioxide and inert gases (helium, neon, argon, krypton, xenon and radon)); or
11. failure to follow the instructions contained in the TLV Instruction Manual for the Product.

### Duration of Warranty

This warranty is effective for a period of one (1) year after delivery of Products to the first end user. Notwithstanding the foregoing, asserting a claim under this warranty must be brought within three (3) years after the date of delivery to the initial buyer if not sold initially to the first end user.

ANY IMPLIED WARRANTIES NOT NEGATED HEREBY WHICH MAY ARISE BY OPERATION OF LAW, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY EXPRESS WARRANTIES NOT NEGATED HEREBY, ARE GIVEN SOLELY TO THE INITIAL BUYER AND ARE LIMITED IN DURATION TO ONE (1) YEAR FROM THE DATE OF SHIPMENT BY THE SELLER.

### Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT**; PROVIDED: (a) THE CLAIMED DEFECT IS REPORTED TO THE SELLER IN WRITING WITHIN THE WARRANTY PERIOD, INCLUDING A DETAILED

WRITTEN DESCRIPTION OF THE CLAIMED DEFECT AND HOW AND WHEN THE CLAIMED DEFECTIVE PRODUCT WAS USED; AND (b) THE CLAIMED DEFECTIVE PRODUCT AND A COPY OF THE PURCHASE INVOICE IS RETURNED TO THE SELLER, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY THE SELLER. ALL LABOR COSTS, SHIPPING COSTS, AND TRANSPORTATION COSTS ASSOCIATED WITH THE RETURN OR REPLACEMENT OF THE CLAIMED DEFECTIVE PRODUCT ARE SOLELY THE RESPONSIBILITY OF BUYER OR THE FIRST END USER. THE SELLER RESERVES THE RIGHT TO INSPECT ON THE FIRST END USER'S SITE ANY PRODUCTS CLAIMED TO BE DEFECTIVE BEFORE ISSUING A RETURN MATERIAL AUTHORIZATION. SHOULD SUCH INSPECTION REVEAL, IN THE SELLER'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY THE SELLER FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

### **Exclusion of Consequential and Incidental Damages**

IT IS SPECIFICALLY ACKNOWLEDGED THAT THIS WARRANTY, ANY OTHER EXPRESS WARRANTY NOT NEGATED HEREBY, AND ANY IMPLIED WARRANTY NOT NEGATED HEREBY, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DO NOT COVER, AND NEITHER TLV, TII NOR ITS TLV GROUP COMPANIES WILL IN ANY EVENT BE LIABLE FOR, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO LOST PROFITS, THE COST OF DISASSEMBLY AND SHIPMENT OF THE DEFECTIVE PRODUCT, INJURY TO OTHER PROPERTY, DAMAGE TO BUYER'S OR THE FIRST END USER'S PRODUCT, DAMAGE TO BUYER'S OR THE FIRST END USER'S PROCESSES, LOSS OF USE, OR OTHER COMMERCIAL LOSSES. WHERE, DUE TO OPERATION OF LAW, CONSEQUENTIAL AND INCIDENTAL DAMAGES UNDER THIS WARRANTY, UNDER ANY OTHER EXPRESS WARRANTY NOT NEGATED HEREBY OR UNDER ANY IMPLIED WARRANTY NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) CANNOT BE EXCLUDED, SUCH DAMAGES ARE EXPRESSLY LIMITED IN AMOUNT TO THE PURCHASE PRICE OF THE DEFECTIVE PRODUCT. THIS EXCLUSION OF CONSEQUENTIAL AND INCIDENTAL DAMAGES, AND THE PROVISION OF THIS WARRANTY LIMITING REMEDIES HEREUNDER TO REPLACEMENT, ARE INDEPENDENT PROVISIONS, AND ANY DETERMINATION THAT THE LIMITATION OF REMEDIES FAILS OF ITS ESSENTIAL PURPOSE OR ANY OTHER DETERMINATION THAT EITHER OF THE ABOVE REMEDIES IS UNENFORCEABLE, SHALL NOT BE CONSTRUED TO MAKE THE OTHER PROVISIONS UNENFORCEABLE.

### **Exclusion of Other Warranties**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.

### **Severability**

Any provision of this warranty which is invalid, prohibited or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such invalidity, prohibition or unenforceability without invalidating the remaining provisions hereof, and any such invalidity, prohibition or unenforceability in any such jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

## Service

For Service or Technical Assistance: Contact your TLV representative or your regional TLV office.

### In Europe:

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

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

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

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

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

Tel: [44]-(0)1242-227223  
Fax: [44]-(0)1242-223077

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

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

Tel: [33]-(0)4-72482222  
Fax: [33]-(0)4-72482220

### In North America:

#### **TLV CORPORATION**

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

Tel: [1]-704-597-9070  
Fax: [1]-704-583-1610

### In Mexico and Latin America:

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

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

Tel: [52]-55-5359-7949  
Fax: [52]-55-5359-7585

### In Oceania:

#### **TLV PTY LIMITED**

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Tel: [61]-(0)3-9873 5610  
Fax: [61]-(0)3-9873 5010

### In East Asia:

#### **TLV PTE LTD**

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

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