



# Instruction Manual

Ball Butterfly Valve  
**BB1N · BBF1N**

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## Introduction

Thank you for purchasing the TLV ball butterfly 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.

The TLV ball butterfly valve offers a combination of the superior sealing properties of the ball valve and the smooth rotary movement of the butterfly 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 models 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</b> , <b>WARNING</b> or <b>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> Use only for fluids listed in the specification table. 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>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>

Continued on the next page

 <b>CAUTION</b>	<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.
	<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.
	<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.
	<b>Do not stand on or apply body weight to the handle.</b> The handle may break, resulting in injury or other accidents.
	<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.

## Specifications



### WARNING

DO NOT use for toxic, flammable or otherwise hazardous fluids. Use only for fluids listed in the specification table. 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.

Model	BB1N	BBF1N																					
Connection	Screwed	Flanged																					
Size (mm)	15, 20, 25, 32, 40, 50																						
Max. Operating Pressure (MPaG) PMO	1.0																						
Max. Operating Temp. (°C) TMO	185																						
Max. Allowable Pressure (MPaG) PMA*	1.0																						
Max. Allowable Temp. (°C) TMA*	185																						
Applicable Fluid	Steam, water, air																						
Cv Values (Cv US)	<table border="1"> <thead> <tr> <th>Size (mm)</th> <th>BB1N</th> <th>BBF1N</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>9.6</td> <td>8.0</td> </tr> <tr> <td>20</td> <td>18.4</td> <td>15.5</td> </tr> <tr> <td>25</td> <td>29.0</td> <td>26.0</td> </tr> <tr> <td>32</td> <td>50.2</td> <td>47.0</td> </tr> <tr> <td>40</td> <td>81.5</td> <td>78.0</td> </tr> <tr> <td>50</td> <td>135.0</td> <td>135.0</td> </tr> </tbody> </table>		Size (mm)	BB1N	BBF1N	15	9.6	8.0	20	18.4	15.5	25	29.0	26.0	32	50.2	47.0	40	81.5	78.0	50	135.0	135.0
Size (mm)	BB1N	BBF1N																					
15	9.6	8.0																					
20	18.4	15.5																					
25	29.0	26.0																					
32	50.2	47.0																					
40	81.5	78.0																					
50	135.0	135.0																					

(1 MPa  $\approx$  10.197 kg/cm<sup>2</sup>)

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

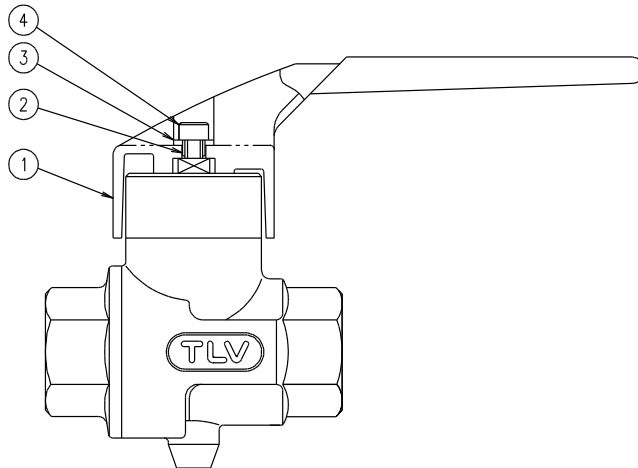
Avoid using the ball valve in the half-open position, as it may result in damage to the valve seat. **Be sure to use it in the fully open or fully closed positions.**

Also, do not use with slurries.

Specifications for special order products may vary. Check the drawings, etc. for specifications.

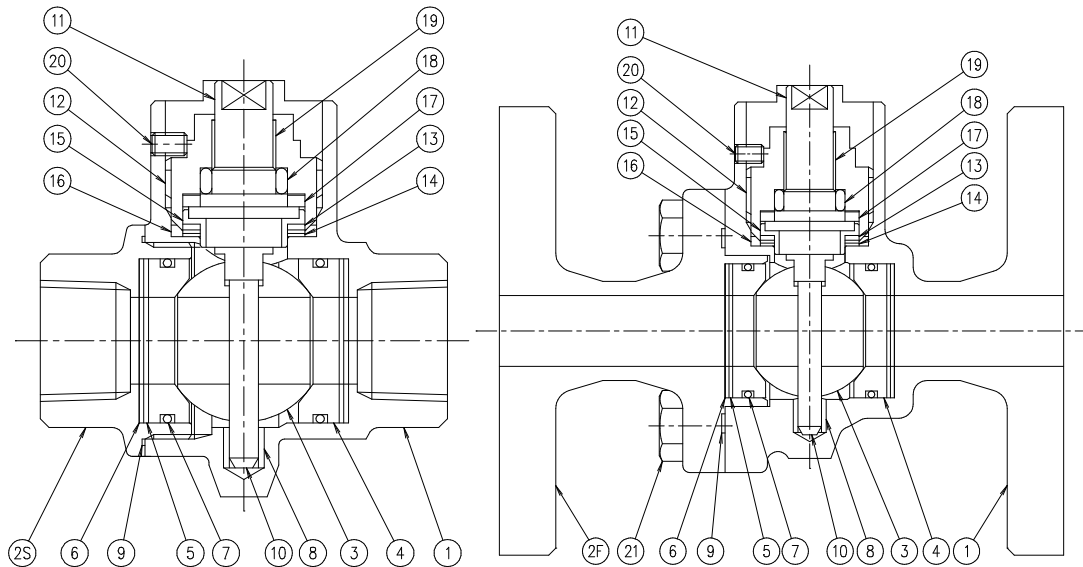
## Configuration

### Handle Unit (Both BB1N and BBF1N)



No.	Name
1	Handle
2	Bushing
3	Belleville Washer
4	Handle Bolt

### Valve Unit



No.	Name	No.	Name	No.	Name
1	Body	8	Bushing	16	Gasket
2S	Inlet Union	9	Gasket	17	Stem Packing
2F	Flange	10	Valve Shaft	18	Seal
3	Ball	11	Spindle	19	Guide Bushing
4	Valve Seat	12	Holder	20	Holder Screw
5	Washer	13	Washer	21	Flange Bolt
6	Belleville Washer	14	Belleville Washer		
7	O-ring	15	Gland Seat		

## Installation



**WARNING**

DO NOT use for toxic, flammable or otherwise hazardous fluids. Use only for fluids listed in the specification table. 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.



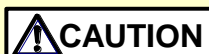
**CAUTION**

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**

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**

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



**CAUTION**

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.



**CAUTION**

Do not stand on or apply body weight to the handle. The handle may break, resulting in injury or other accidents.

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 inlet piping to remove any piping scraps, dirt and oil. Close the inlet valve after blowdown.
3. There are no inlet or outlet restrictions for installation.
4. To facilitate maintenance of screwed products, the installation of a union at the outlet is recommended.

If there is a problem, determine the cause by 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.

### Valve Seat Replacement

Replacement of the valve seat with a new valve seat after approximately 100,000 cycles depending on fluid quality and operation conditions will allow for prolonged use of the product.

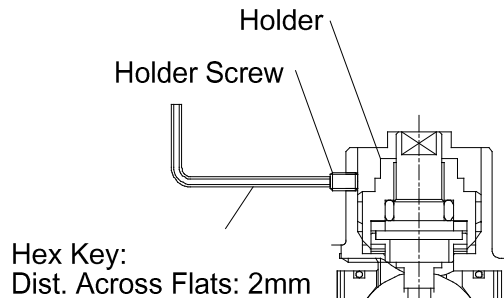
For instructions on valve seat replacement, see the Disassembly/Reassembly section.

### Additional Tightening of the Valve Unit Gland Section

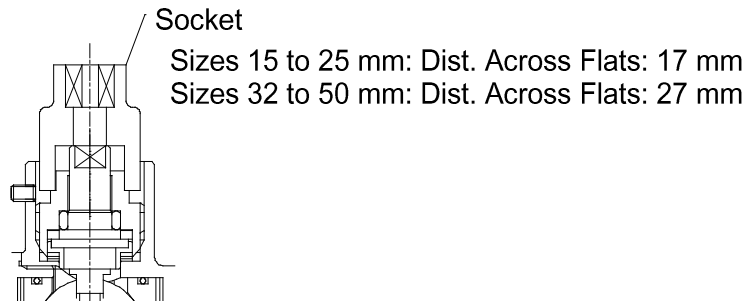
It is possible to further tighten the gland section in the valve unit. Where there is leakage from the gasket or seal, tighten the gland section further using the following instructions:

1. Detach the handle unit (see instructions on p. 8).
2. Tighten, using the following steps:

- 1) Loosen the holder screw.



- 2) Tighten the holder further in with a socket wrench.



- 3) Retighten the holder screw.

Cautions when applying additional tightening:

- Do not tighten the holder completely the first time. Do not tighten the holder any more than is necessary to stop leakage.
- If leakage continues even after the holder has been tightened, replace worn parts.



## 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.



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.

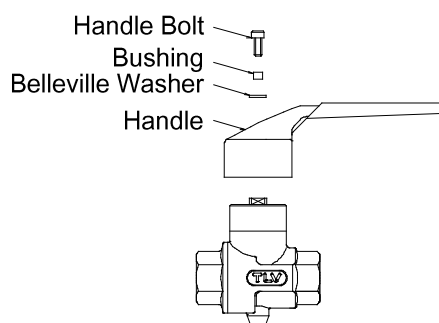
Use the following procedures to remove components. Use the same procedures in reverse to reassemble.

(Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

### Detaching/Reattaching the Handle and Valve Units

Part	During Disassembly	During Reassembly	During Inspections
Handle Bolt	Remove with a hex key	Coat threaded portions with anti-seize, and tighten to the proper torque	—
Bushing	Remove the bushing	Reinsert the bushing	—
Belleville Washer	Remove the Belleville washer	Reinsert the Belleville washer	—
Handle	Remove the handle	Reattach the handle	Check for damage, or deformation, particularly the area in contact with the spindle

(1 N·m ≈ 10 kg·cm)



### Disassembly/Reassembly of the Valve Unit Gland Section

Part	During Disassembly	During Reassembly	During Inspections
Holder Screw	Remove with a hex key	For stainless steel valve bodies, coat the threaded portions with anti-seize and tighten to the proper torque	—
Holder	Remove with a socket wrench	For stainless steel valve bodies, coat the threaded portions with anti-seize and tighten to the proper torque	—
Guide Bushing	Remove guide bushing	Reinsert guide bushing	Check for wear
Seal	Remove the seal	Use a new part	—
Stem Packing	Remove the packing	Use a new part	—
Spindle	Remove the spindle	Reinsert the spindle	Check both faces for deformation. Check for wear, damage and corrosion
Valve Shaft	Remove the valve shaft	Reinsert the valve shaft	Check for wear or deformation
Gland Seat	Remove the gland seat	Use a new part	—
Washer	Remove the washer	Reinsert the washer	Check for damage or deformation
Belleville Washer	Remove the Belleville washer	Reinsert the Belleville washer, referring to the drawing on the following page for proper orientation	Check for damage or deformation
Gasket	Remove the gasket and clean sealing surfaces	Replace with a new gasket if damaged or deformed, referring to the drawing on the following page for proper orientation.	—

(1 N·m ≈ 10 kg·cm)

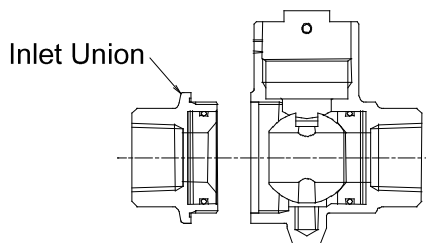
- NOTE:
1. Reassemble the gland section after reassembling the valve section (see the Disassembly/Reassembly of the Valve Section in the Disassembly/Reassembly section).
  2. When reinserting the spindle and valve shaft into the ball:  
for the screwed model, finger-tighten the inlet union; for the flanged model, finger-tighten the flange bolt. This serves as preparation for centering the ball.  
When reassembly is completed, tighten the valve holder.

**Disassembly/Reassembly of the Valve Section**

**Screwed:**

Part	During Disassembly	During Reassembly	During Inspections
Inlet Union	Remove with a socket wrench or monkey wrench	For stainless steel valve bodies, coat the threaded portions with anti-seize and tighten to the proper torque	—

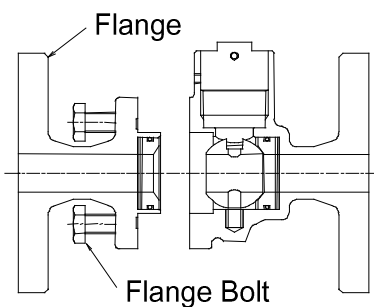
(1 N·m ≈ 10 kg·cm)



**Flanged:**

Part	During Disassembly	During Reassembly	During Inspections
Flange Bolt	Remove with socket wrench or box wrench	For stainless steel valve bodies, coat the threaded portions with anti-seize and tighten to the proper torque	—
Flange	Remove the flange	Reattach the flange	—

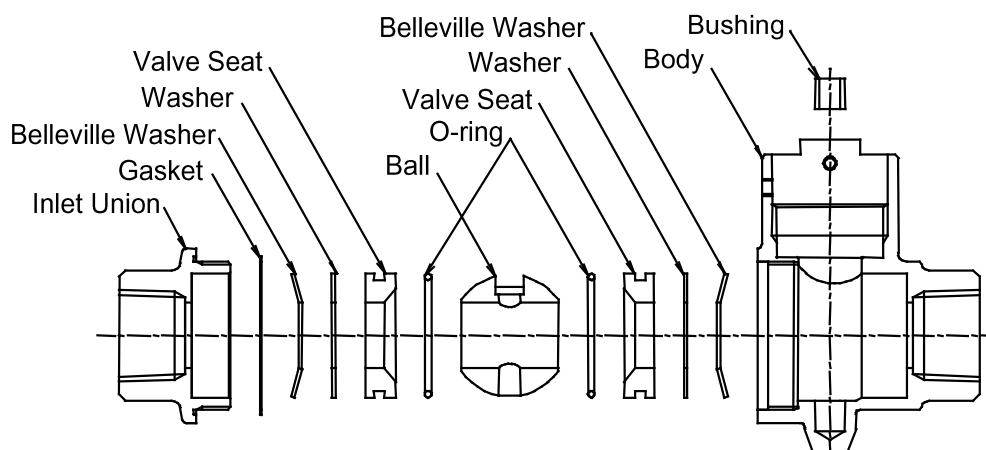
(1 N·m ≈ 10 kg·cm)



**Common Items for both Screwed and Flanged Models:**

Part	During Disassembly	During Reassembly	During Inspections
Gasket	Remove the gasket	Replace with new gasket	—
Valve Seat (Inlet Union Side)	Remove the valve seat	Replace with new valve seat	—
O-ring	Remove the O-ring	Replace with new O-ring, insert into the valve seat	—
Washer	Remove the washer	Reinsert the washer	Check for wear or deformation
Belleville Washer	Remove the Belleville washer	See the drawing below for proper orientation of the Belleville washer	Check for wear or deformation
Ball	Remove the ball	Insert the ball	Check the sealing area for scratches, wear, etc.
Valve Seat (Body Side)	Remove the valve seat	Replace with new valve seat	—
O-ring	Remove the O-ring	Replace with new O-ring	—
Washer	Remove the washer	Reinsert the washer	Check for wear or deformation
Belleville Washer	Remove the Belleville washer	See the drawing below for proper orientation of the Belleville washer	Check for wear or deformation
Bushing	Remove the bushing	Replace with new bushing	—

NOTE: Clean, then check the inside of the body for scratches and erosion.



**Table of Tightening Torques**

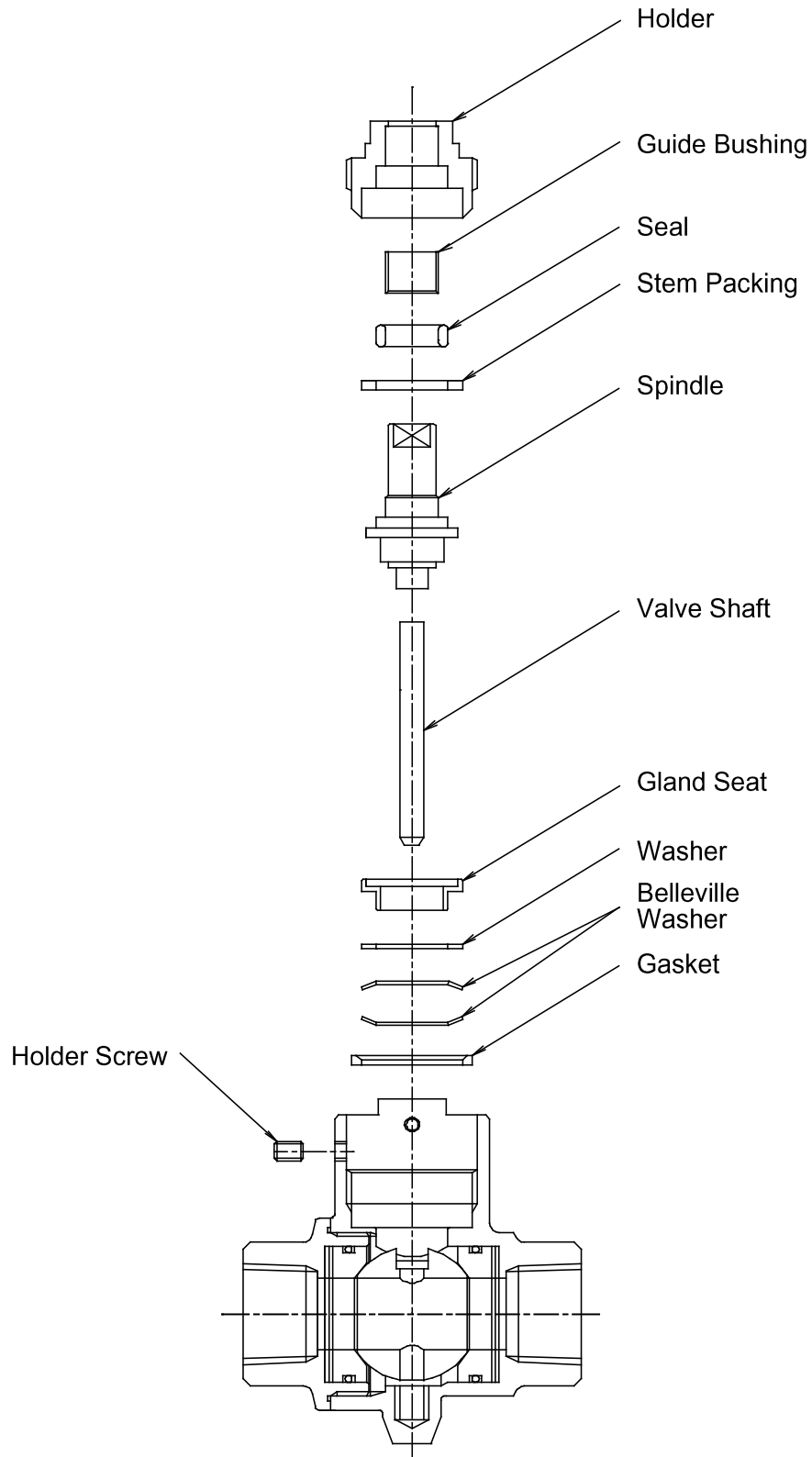
Part Name	Size mm	Torque N·m	Distance Across Flats mm
Handle Bolt	15 - 25	3	3
	32 - 50	23	8
Holder Screw	15 - 50	1.2	2
Holder	15 - 25	50	17
	32 - 50	80	27
Inlet Union	15	100	27
	20	150	32
	25	200	41
	32	300	50
	40	500	60
	50	700	70
Flange Bolt	15 (M8)	20	13
	20 (M10)	35	17
	25 (M12)	50	19
	32 (M12)	60	19
	40 (M16)	80	24
	50 (M16)	80	24

NOTE: -Coat all threaded portions with anti-seize.

(1 N·m  $\approx$  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



## 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
Fluid leaks from the outlet	The sealing area of the valve has build-up or is scratched, or if the o-ring is scratched or damaged	Clean or replace parts
Fluid leaks from the gland section	There is build-up, scratches or wear on the seal, stem packing or gasket	Apply additional tightening, clean or replace parts
The valve does not move or remains half-open	The valve seat or ball have build-up, if the valve seat is deformed, or if the ball turns smoothly.	Clean or replace parts
	The handle is worn or deformed	Replace with new handle
Fluid leaks from inlet union or flange connections	Gasket deterioration or wear	Replace with a new gasket
	The inlet union or flange bolt is loose	Tighten it to the proper torque
The valve seat becomes damaged	Check for the occurrence of water hammer	Examine the piping for problems that can cause water hammer
	The valve is being used in the half-open position	Use fully open or fully closed

## 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:

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