

ISO 9001
ISO14001



Manufacturer

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



Instruction Manual

Free Float Steam Trap QuickTrap.

Featured Models: FS1NL/FS1NH

Optional Models: FS1NL-TZ/FS1NH-TZ

Trap Units: S1NL/S1NH (For Connector Body F46)

Optional Models: S1NL-TZ/S1NH-TZ

Manufacturer

TLV CO., LTD.

881 Nagasuna, Noguchi, Kakogawa, Hyogo, 675-8511, Japan
Tel: [81]-(0)79-427-1800 Fax: [81]-(0)79-422-2277

172-65635A-01

Publication date 31 October 2024

Copyright © 2024 TLV CO., LTD.

TLV CORPORATION

Table of Contents

Introduction	3
Safety Considerations	4
Checking the Piping	6
Operation	7
Specifications	8
Compatibility	9
Configuration	10
Installation	11
Maintenance	13
Disassembly/Reassembly	14
Instructions for Plug/Holder Disassembly and Reassembly	18
Troubleshooting	19
TLV EXPRESS LIMITED WARRANTY	20
Options	22

Introduction

Thank you for purchasing the TLV free float steam trap.

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 manual is edited based on the QuickTrap FS1N series steam traps and S1N series trap units. FS1N-TZ series steam traps or S1N-TZ trap units equipped with the scale removal function are described at the end of this manual in the 'Options' section.

This free float steam trap uses a universal flange, a precision-ground float and three-point support for the valve body. The three-point seating for the valve body supports the precision-ground float securely at three points and ensures a high degree of sealing for even minute quantities of condensate.

The universal flange allows the trap to be installed in either horizontal or vertical piping. This flexibility greatly reduces the time required for installation and removal, as compared to conventional steam traps, and also facilitates repair and maintenance operations.

The product contains a built-in air vent, allowing a large amount of initial condensate and air to be discharged, significantly reducing start-up time.

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.

Cautionary items and definitions



Danger

Indicates an urgent situation which poses a threat of death or serious injury



Warning

Indicates that there is a potential threat of death or serious injury



Caution

Indicates that there is a possibility of injury or equipment/product damage

Safety Considerations for the Product



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

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



Caution

DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).



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

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.

**Caution**

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 and burns or other injury due to malfunction or 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**

Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

Checking the Piping



Caution

Use only under conditions in which no water hammer will occur. The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.

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

1. Is the pipe diameter suitable?
2. Is the trap unit installed horizontally?
3. Has sufficient space been secured for maintenance?
4. Have isolation valves been installed at the inlet and outlet?
If the outlet is subject to back pressure, has a check valve (TLV-CK) been installed?
5. Is the inlet pipe as short as possible, with as few bends as possible, and installed so the liquid will flow naturally down into the product?
6. Has the piping work been done correctly, as shown in the figures below?
7. Using the appropriate tools, have the screws been tightened enough?

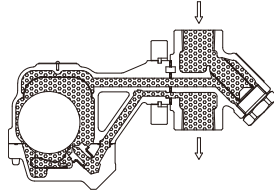
Requirement	Correct	Incorrect
Install catchpot with the proper diameter.		 Diameter is too small.
Make sure the flow of condensate is not obstructed.		 Diameter is too small and inlet protrudes into pipe interior.
To prevent rust and scale from flowing into the product, the inlet pipe should be connected 25 to 50 mm (1 to 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 the flow of condensate is not obstructed.		 Condensate collects in the pipe.

Operation

Principles of air and condensate discharge:

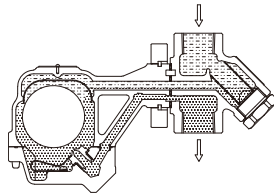
1. Air and Cold Condensate Discharge at Startup

At startup, before steam is supplied, the system is cold and the air vent strip (bimetal) is contracted, holding the float off the orifice. This allows for the rapid discharge of air and cold condensate through the valve when steam is first supplied to the system.



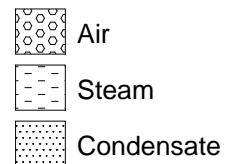
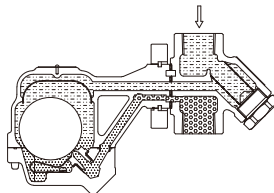
2. Condensate Discharge

If the temperature of the condensate rises above 90°C (194 °F), the air vent strip (bimetal) expands allowing the float to block the orifice. Rising condensate levels cause the float to rise due to buoyancy, opening the valve and allowing hot condensate to be discharged.



3. Closed Position

When the condensate flow rate decreases, the float falls, closing off the orifice. A water seal is maintained at all times over the orifice to prevent steam loss.



Specifications



Caution

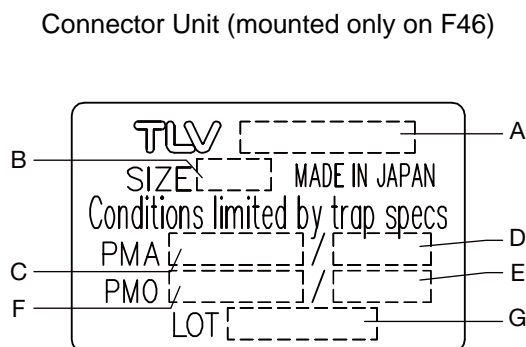
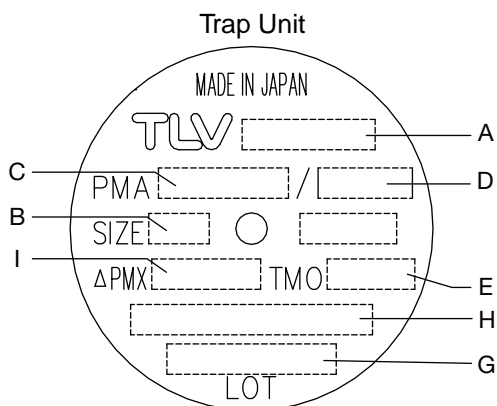
Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product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

DO NOT use this product in excess of the maximum operating pressure differential. Such use could make discharge impossible (blocked).

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.

The specifications displayed on each nameplate apply only to the unit on which it is mounted. When a trap unit is installed on a connector unit and the PMA/TMA and/or PMO/TMO values displayed on the two nameplates differ, the specifications for the assembled product are restricted to the lower values.



A	Model	F	Maximum Operating Pressure (PMO)
B	Nominal Diameter ⁰¹	G	Production Lot No.
C	Maximum Allowable Pressure (PMA) ⁰²	H	Valve No. ⁰³
D	Maximum Allowable Temperature (TMA) ⁰²	I	Maximum Differential Pressure (PMX)
E	Maximum Operating Temperature (TMO)		

⁰¹The nominal diameter is not printed on the trap unit nameplate when the trap unit is shipped by itself.

⁰²Maximum allowable pressure (PMA) and maximum allowable temperature (TMA) are PRESSURE SHELL DESIGN CONDITIONS, **NOT** OPERATING CONDITIONS.

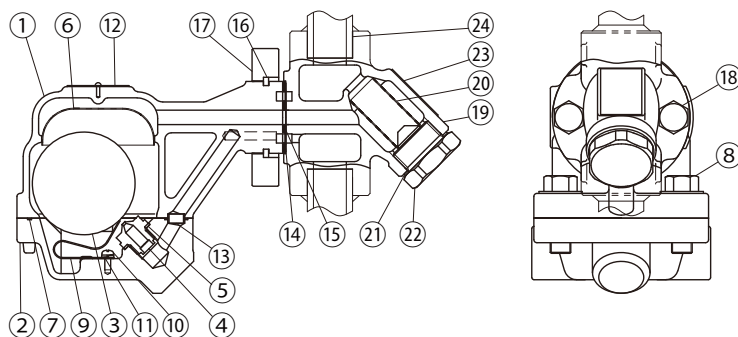
⁰³Valve No. is displayed for products with options. This item is omitted from the nameplate when there are no options.

Compatibility

- Trap units S1NL/S1NH are compatible with TLV F46 and F32 connector units, trap stations (V1/V2/V1P/V2P Series) and QuickStation QS10/QS18.

The connector unit name is indicated on the connector body.

Configuration



No.	Part Name	A ⁰¹	B ⁰²	C ⁰³	D ⁰³	E ⁰⁴
1	Trap Body	✓				
2	Cover	✓				
3	Float	✓				✓
4	Orifice	✓			✓	
5	Orifice Gasket	✓		✓	✓	
6	Trap Screen	✓			✓	
7	Cover Gasket	✓		✓	✓	
8	Cover Bolt	✓				
9	Air Vent Strip (bimetal)	✓			✓	
10	Screw	✓			✓	
11	Spring Washer	✓			✓	
12	Nameplate	✓				
13	Connector	✓				
14	Outer Connector Gasket	✓		✓	✓	
15	Inner Connector Gasket	✓		✓	✓	
16	Snap Ring	✓				
17	Connector Flange	✓				
18	Connector Bolt	✓				
19	Connector Body		✓			
20	Screen		✓		✓	
21	Screen Holder Gasket		✓	✓	✓	
22	Screen Holder		✓			
23	Connector Nameplate		✓			
24	Flange		✓			

⁰¹A = Trap unit: S1NL/S1NH

⁰²B = Connector unit: F46

⁰³Replacement parts are available only in the following kits: C = Maintenance Kit, D = Repair Kit

⁰⁴E = Float



Note

Replacement parts for former connector body F32 differ from those for F46. When ordering replacement parts, please include the trap unit name, size, connection type and the connector unit name.

Installation



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

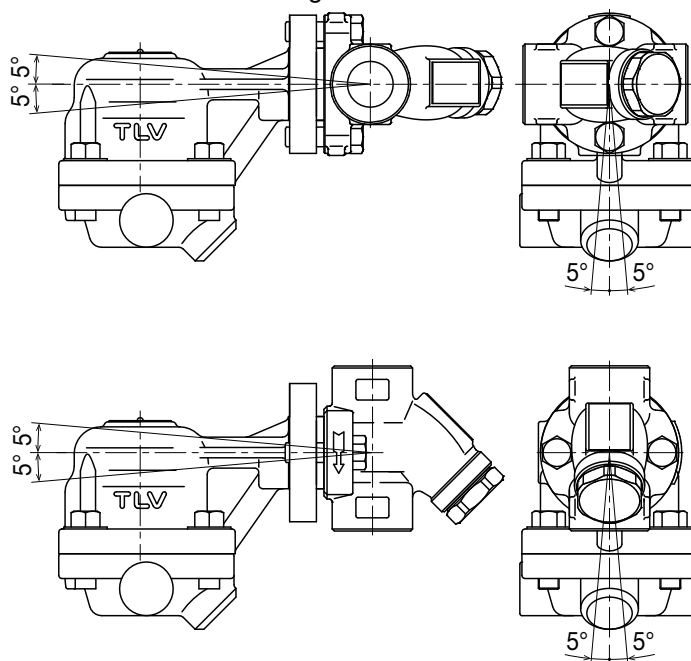
Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

Installation, inspection, maintenance, repairs, disassembly and 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. Install the product so the arrow on the body is pointing in the direction of flow.
4. The product must be installed within the allowable angles of inclination of 5° horizontally and front-to-back.
5. The connector body has no restrictions on installation orientation except for the following conditions: the universal flange face (for connecting to the trap unit) must be in the vertical plane, and the trap unit must be installed with the nameplate facing upwards.
6. Install a condensate outlet valve and outlet piping.
7. Open the inlet and outlet valves and ensure that the product functions properly.

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

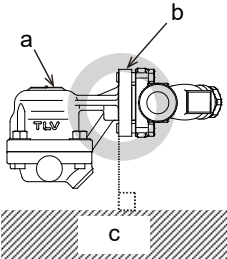
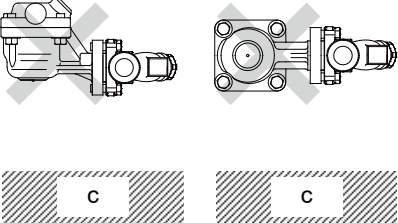
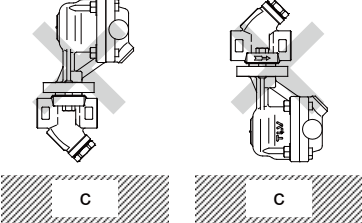
Tolerance Angle for Installation: 5°



Flanged connector bodies for optional -TZ models can only be installed horizontally. Install with the arrow on the connector body pointing in the direction of flow, with the universal flange (for connecting to the trap unit) in the vertical plane and the trap unit with the nameplate facing upwards.

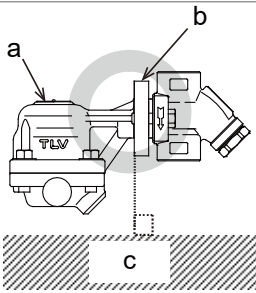
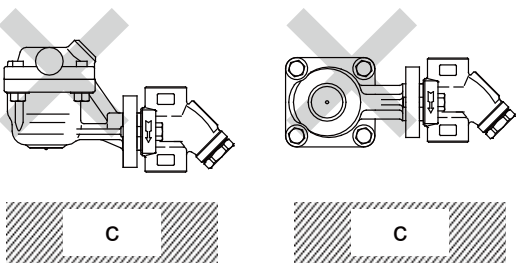
Installation Examples

Horizontal Piping

Correct	Incorrect	
	Nameplate is not facing upwards	Connector Flange is not in the vertical plane
		

a= Name Plate, b= Connector Flange, c= Ground

Vertical Piping

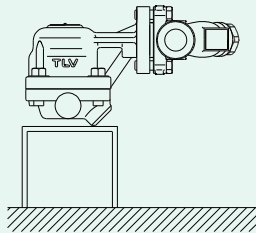
Correct	Incorrect	
	Nameplate is not facing upwards	
		

a= Name Plate, b= Connector Flange, c= Ground



Note Screwed Connection

When products with screwed connections are installed on horizontal piping, there is a danger that the weight of the trap unit will cause the connector body to rotate on the pipe beyond the allowable angle of inclination preventing proper trap operation. To prevent this, tighten the screws securely. In cases where the product is affected by vibrations or by external contact, it is recommended that the trap unit should be supported to prevent rotation (sample support shown to the right).



Maintenance



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.

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 and 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. Periodically (at least biannually) the operation should also be checked by using diagnostic equipment such as a stethoscope, thermometer, TLV Pocket TrapMan or TLV TrapMan.

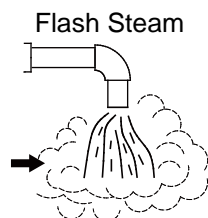
If the product should fail, it may cause damage to piping and equipment, resulting in faulty or low quality products or losses due to steam leakage.

Normal: Condensate is discharged continuously, together with flash steam, and the sound of flow can be heard. If there is very little condensate, there is almost no sound of flow.

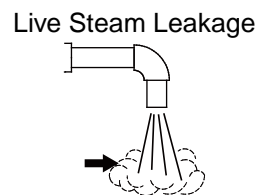
Blocked (Discharge Impossible): No condensate is discharged. The product is quiet and makes no noise, and the surface temperature of the product is low.

Blowing: Live steam continually flows from the outlet and there is a continuous metallic sound.

Steam Leakage: Live steam is discharged through the product outlet together with condensate, accompanied by a high-pitched sound.



White jet containing water droplets



Clear, slightly bluish jet

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.

Gaskets: Check for warping or scratches

Screen: Check for clogging and corrosion

Float: Check for scratches or dents

Body Interior: Check for build-up

Orifice: Check for damage

Orifice Opening: Check for dirt, oil film, wear or scratches

Disassembly/Reassembly



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.

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

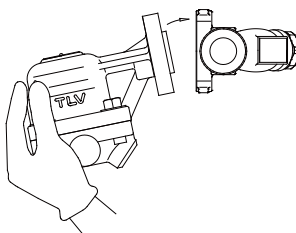
(Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

Detaching/Reattaching the Trap Unit and Connector Body

Part Name & No.	During Disassembly	During Reassembly
Connector Bolts 18	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Trap Unit	Remove the trap unit	Follow the special instructions below
Connector Gaskets 14,15	Remove with a flat-head screwdriver and clean sealing surfaces	Replace with new gaskets; to facilitate assembly and prevent loosening of the gaskets, apply a small amount of adhesive at 120° intervals around the outer edge of the gaskets

Attaching the Trap Unit to the Connector Body

1. If attaching a new trap unit, be sure to remove the protective cap from the connector flange. Be careful not to drop the gaskets when removing the cap.
2. Grasp the end of the trap unit and align its gasket housing with the indentation on the connector body. Be sure to have the nameplate facing upwards.
3. Once aligned, insert and finger tighten the connector bolts. Verify that the trap unit is within the allowable inclination.



Detaching/Reattaching the Cover and Float

Part Name & No.	During Disassembly	During Reassembly
Cover Bolt 8	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Cover 2	Remove, being careful not to damage the float, which may fall out when the cover is removed	Make sure there are no pieces of the old gasket on the sealing surfaces, align the cover with the body and connector and reattach
Float 3	Remove, being careful not to scratch the polished surface	Place inside the body (or on the cover), being careful not to scratch the polished surface
Cover Gasket 7	FS1NH: Remove the gasket and clean sealing surfaces	Replace with a new gasket
	FS1NL: Remove only if damaged	Replace with a new gasket if damaged

Disassembly/Reassembly of Components Inside the Trap Body

Part Name & No.	During Disassembly	During Reassembly
Trap Screen 6	Remove without bending	Reassemble after removing any scale build-up on the surface

Disassembly/Reassembly of Components Inside the Cover

Part Name & No.	During Disassembly	During Reassembly
Connector 13	Remove the connector	Reinsert the connector
Screw 10 Spring Washer 11	Remove with a Phillips screwdriver	Consult the table of tightening torques and tighten to the proper torque
Air Vent Strip 9 (Bimetal)	Remove without bending	Reinstall without bending
Orifice 4	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Orifice Gasket 5	Remove the gasket and clean sealing surfaces	Replace with a new gasket

Disassembly/Reassembly of Components Inside the Connector Body

Part Name & No.	During Disassembly	During Reassembly
Screen Holder 22	Remove with a socket wrench	Consult the table of tightening torques and tighten to the proper torque
Screen Holder Gasket 21	Remove the gasket and clean sealing surfaces	Replace with a new gasket; coat surfaces with anti-seize
Screen 20	Remove with needle-nose pliers	Insert securely into the connector body

Table of Tightening Torques

Part Name & No.			Trque N-m	Distance Across Flats mm
Orifice 4			20	13
Cover Bolt 8			45	17
Connector Bolt 18			39	14
Screw 10, Spring Washer 11			0.3	+
Screen Holder 22 (when F46 is used)			100	30
Screen Holder 22 (when F32 is used)	Flanged	15 to 25 mm	60	22
	Screwed	15, 20 mm	60	22
	Socket Welded	25 mm	150	38

Part Name & No.			Trque lbf-ft	Distance Across Flats in
Orifice 4			15	$\frac{1}{2}$
Cover Bolt 8			33	$\frac{21}{32}$
Connector Bolt 18			28	$\frac{9}{16}$
Screw 10, Spring Washer 11			0.2	+
Screen Holder 22 (when F46 is used)			73	$1\frac{3}{16}$
Screen Holder 22 (when F32 is used)	Flanged	$\frac{1}{2}$ to 1 in	43	$\frac{7}{8}$
	Screwed	$\frac{1}{2}$, $\frac{3}{4}$ in	43	$\frac{7}{8}$
	Socket Welded	$\frac{1}{2}$ in	110	$1\frac{1}{2}$

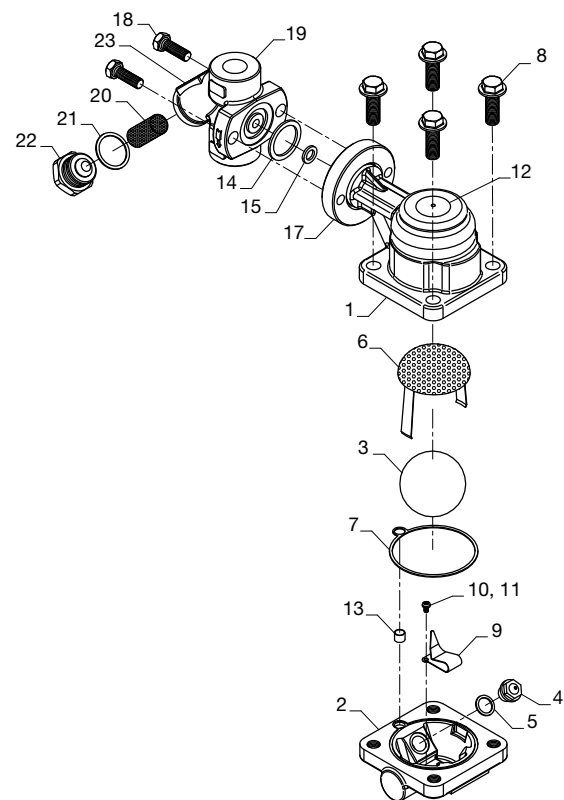


Note

- Coat all threaded portions with anti-seize.
- If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Screen Holder for Connector Units F32 and F46 can be used only with their respective connector body. When disassembling and reassembling the components, make sure the correct connector unit (F32 or F46) is used. The type of connector unit can be identified by the name embossed on its body.

Exploded View



No.	Part Name	No.	Part Name
1	Trap Body	13	Connector
2	Cover	14	Outer Connector Gasket
3	Float	15	Inner Connector Gasket
4	Orifice	16	Snap Ring ⁰¹
5	Orifice Gasket	17	Connector Flange
6	Trap Screen	18	Connector Bolt
7	Cover Gasket	19	Connector Body
8	Cover Bolt	20	Screen
9	Air Vent Strip (bimetal)	21	Screen Holder Gasket
10	Screw	22	Screen Holder
11	Spring Washer	23	Connector Nameplate
12	Nameplate	24	Flange ⁰¹

⁰¹Not shown



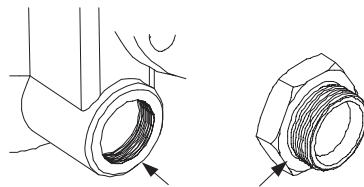
Note
Do not remove the snap ring used to fix the connector frange

Instructions for Plug/Holder Disassembly and Reassembly

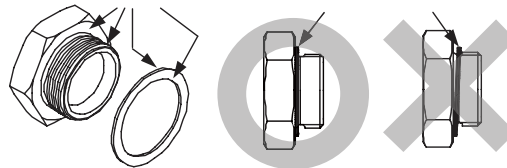
The seal on the threaded plugs/holders found on TLV products is formed by a flat metal gasket. There are various installation orientations for the gaskets, such as horizontal, diagonal and downward, and the gasket may be pinched in the thread recesses during assembly.

Instructions for Disassembly and Reassembly

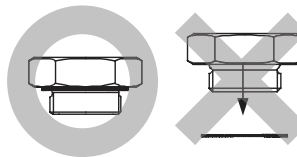
1. Remove the plug/holder using a tool of the specified size (distance across flats).
2. The gasket should not be reused. Be sure to replace it with a new gasket.
3. Clean the gasket surfaces of the plug/holder and the product body using a rag and/or cleaning agents, then check to make sure the surfaces are not scratched or deformed.



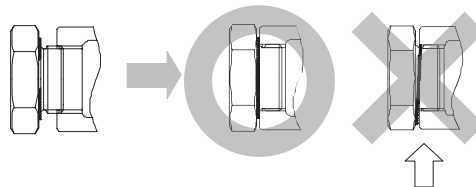
4. Coat both the gasket surface of the plug/holder and the threads of the plug/holder with anti-seize, then press the gasket onto the center of the gasket surface of the plug/holder, making sure the anti-seize affixes the gasket tightly to the plug/holder. Check to make sure the gasket is not caught in the recesses of the threads.



5. Hold the plug/holder upside down to make sure that the anti-seize makes the gasket stick to the plug/holder even when the plug/holder is held upside down.



6. Screw the plug/holder by hand into the product body while making sure that the gasket remains tightly affixed to the center of the gasket surface of the plug/holder. Make sure the entire gasket is making contact with the gasket surface of the product body. It is important at this point to make sure the gasket is not pinched in the thread recesses of the plug/holder.



7. Tighten the plug/holder to the proper torque.
8. Next, begin the supply of steam and check to make sure there is no leakage from the part just tightened. If there is leakage, immediately close the inlet valve and, if there is a bypass valve, take the necessary steps to release any residual pressure. After the surface of the product cools to room temperature, repeat the procedure beginning from step 1.

Troubleshooting



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
No condensate is discharged (blocked) or discharge is poor	The float is damaged or filled with condensate	Replace with a new float
	The float is sticking to the orifice	Clean parts
	The orifice, screen or piping is clogged with rust and scale	Clean parts
	The capacity of the product is insufficient	Compare specifications and actual operating conditions
	The product operating pressure exceeds the maximum specified pressure, or whether there is insufficient pressure differential between the product inlet and outlet	Compare specifications and actual operating conditions
	Steam locking has occurred	Perform a bypass blowdown or close the product inlet valve and allow the product to cool
Steam is discharged or leaks from the outlet (blowing) (steam leakage)	The orifice is clogged or there is rust or scale build-up on the surface of the float	Clean parts
	The orifice is damaged	Replace with a new orifice
	The float is damaged	Replace with a new float
	The installation is not correct	Correct the installation
	The air vent strip (bimetal) is damaged	Replace with a new air vent strip (bimetal)
	Product vibration	Lengthen the inlet piping and fasten it securely
Steam is leaking from a place other than the outlet	Gasket deterioration or damage	Replace with new gaskets
	Improper tightening torque was used	Tighten to the proper torque
Float frequently becomes damaged	Water hammer has occurred	Study and correct the piping



Note

When replacing parts with new, use the parts list for reference, and replace with parts from the maintenance kit and/or repair kit. Please note that replacement parts are only available as part of a replacement parts kit.

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 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 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.

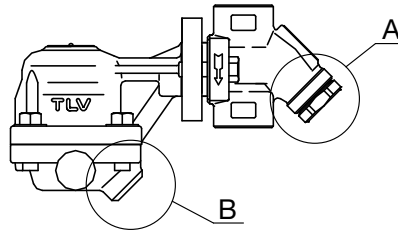
TLV CORPORATION

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

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

Options

The options shown below are available for this product on request. Please compare with the product you received.



Options for Area A (Screen Holder)

With Blowdown Valve (TLV BD2)



Caution

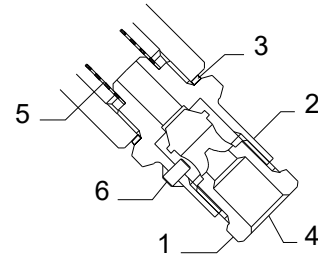
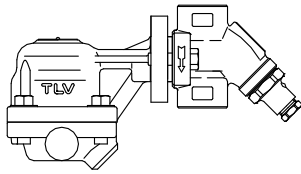
Always wear eye protection and heat-resistant gloves when operating the blowdown valve. Failure to do so may result in burns or other injury.

When operating the blowdown valve, stand to the side well clear of the outlet to avoid contact with internal fluids that will be discharged. Operate the valve slowly and surely, taking care to avoid the area from which internal fluids are discharged and any fluids deflected off piping or the ground etc. Failure to do so may result in burns or other injury.

Do not tighten the BD2 valve or the BD2 valve seat in excess of the appropriate tightening torque. Over tightening may cause breakage to threaded portions, which may cause burns, other injuries or damage.

Do not excessively loosen the BD2 valve when opening the blowdown valve. The valve stopper pin installed to prevent the BD2 valve from being removed may break and internal pressure may result in the BD2 valve being blown off, leading to injuries, damage and fluid discharge, causing burns.

Configuration



No.	Part Name			Trque N·m	Distance Across Flats mm
1	BD2 Valve			30	17
2	BD2 Valve Seat (Screen Holder) (when F46 is used)			100	30
	BD2 Valve Seat (Screen Holder) (when F32 is used)	Flanged	15 to 25 mm	60	22
		Screwed	15, 20 mm	60	22
		Socket Welded	25 mm	150	38
3	Screen Holder Gasket			—	—
4	Discharge Hole			—	—
5	Screen			—	—
6	Valve Stopper Pin			—	—

No.	Part Name			Trque lbf·ft	Distance Across Flats in
1	BD2 Valve			22	$2\frac{1}{32}$
2	BD2 Valve Seat (Screen Holder) (when F46 is used)			73	$1\frac{3}{16}$
	BD2 Valve Seat (Screen Holder) (when F32 is used)	Flanged	$\frac{1}{2}$ to 1 in	44	$\frac{7}{8}$
		Screwed	$\frac{1}{2}$, $\frac{3}{4}$ in	44	$\frac{7}{8}$
		Socket Welded	1 in	110	$1\frac{1}{2}$
3	Screen Holder Gasket			—	—
4	Discharge Hole			—	—
5	Screen			—	—
6	Valve Stopper Pin			—	—



Note

Avoid the use of excessive tightening torques, as threaded parts may become damaged.

TLV Blowdown Valve: BD2

The BD2 Blowdown Valve, installed in the screen area of the body, uses the trap's internal pressure to blow any condensate, steam, dirt or scale accumulated around the screen area out to the atmosphere.

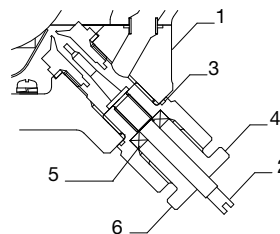
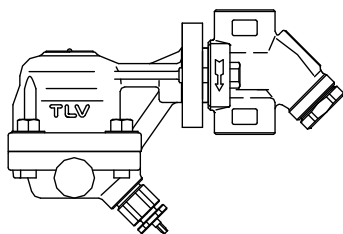
BD2 Blowdown Valve Operation

1. The BD2 valve is in the closed position when the BD2 is shipped from the factory. Before attempting to operate the BD2, reconfirm that the BD2 valve is still in the closed position. Locate the blow outlet and, during operation, stand to the side and well clear of it, as the jet of condensate or steam could cause burns.
2. Remain in the area the entire time the BD2 valve is in the open position. Before opening the BD2 valve, grip the BD2 valve seat with a wrench and hold firmly in place so that it will not rotate when the BD2 valve is loosened. Grip the BD2 valve with another wrench and slowly loosen. Condensate and steam will discharge from the blow outlet in a jet stream. Be careful not to loosen the BD2 valve so far that it becomes removed from the BD2 valve seat. (If the valve stopper pin becomes damaged, large quantities of steam will be discharged in a jet stream.)
3. Close the BD2 valve until the flow of fluid completely stops. If the flow of fluid does not stop, re-open the BD2 valve (as in step “2”) to blow out any scale or dirt that may be caught in the BD2. Re-tighten the BD2 valve until the flow of fluid stops completely.

Options for Area B (Trap Unit Cover)

With Scale Removal Function (Model: FS1NL-TZ/FS1NH-TZ)

Configuration



No.	Part Name	No.	Part Name
1	Cover	4	Gland Case
2	Removal Rod	5	Gland Packing
3	Gland Gasket	6	Gland Retainer Nut

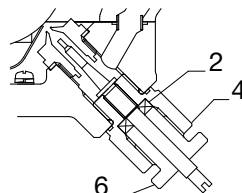
These models are not available in all regions.

TLV Scale Removal Function: -TZ

The -TZ Scale Removal Function, installed in the cover of the trap unit, uses a specially designed rod to remove dirt or scale accumulated in the orifice to prevent/eliminate blockage.

Guidelines for Scale Removal Procedure

1. For your safety, wear heat-insulated gloves and eye protection, etc. to prevent burns.
2. Make sure that the inlet valve on the trap is tightly closed.
3. Make sure that the outlet valve on the trap is also tightly closed. (When there is pressure at the outlet side.)
4. Wait until the trap's internal pressure equals atmospheric pressure and the surface of the trap has cooled to room temperature.
5. Perform step 3 listed under "Procedure for Removing Scale from Orifice."
6. Perform step 4 listed under "Procedure for Removing Scale from Orifice."
7. Fully open the outlet valve on the trap.
8. Slowly open the inlet valve on the trap and check to make sure there is no leakage from the interior. If there is leakage, immediately close the inlet valve tightly, then close the outlet valve. Perform remedial measures such as disassembling and cleaning the location of the leak and applying additional tightening where possible. If there is leakage from the gland retainer nut, grasp the gland case with an open-end wrench and apply additional tightening to the gland retainer nut using a tool such as a socket wrench. If the leak continues after the application of additional tightening, replace the gland packing with a new packing.



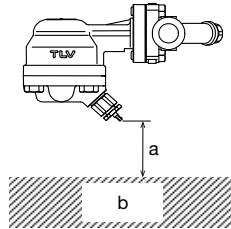
9. Fully open the outlet valve on the trap.
10. Slowly open the inlet valve on the trap and check to make sure there is no leakage from the interior.
11. Perform the check in step 5 listed under "Procedure for Removing Scale from Orifice."

Installation

This product is fitted with an orifice scale removal unit that requires a certain amount of maintenance space for this operation.

The recommended maintenance space (a = approx. 50 mm (2 in)), measured from the ground (b) to the product, is shown in the figure to the right. Install flanged connector bodies horizontally only.

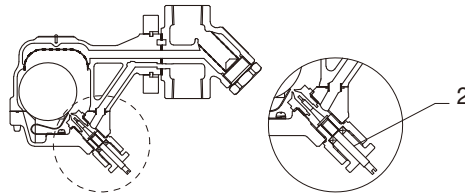
If installed vertically, the flange may interfere with the scale removal function.



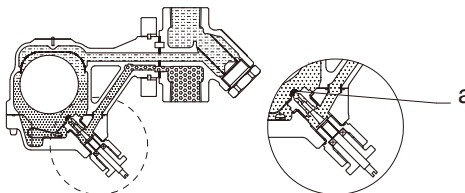
Procedure for Removing Scale from Orifice

A build-up of scale in the opening of the steam trap orifice impairs the ability of the valve to seal and may cause the product temperature to fall due to valve clogging, or result in steam leakage leading to an increase in temperature. If this occurs, use the scale removal procedure outlined below to remove any deposits from the orifice opening and return the steam trap to normal operation.

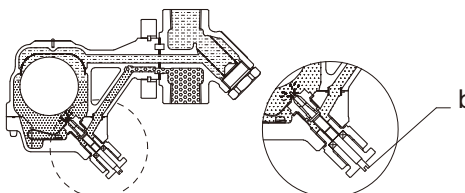
1. As shown in the figures below, the product is shipped from the factory with the removal rod pulled out of the orifice opening and in a lowered position.



2. The end of the removal rod is both hex-shaped and contains a slot for a screwdriver. Using either a flat-blade screwdriver in the slot or a socket wrench, turn the rod slowly to the right until it will turn no further. The rod will punch through the orifice opening, removing the deposit of scale (a).

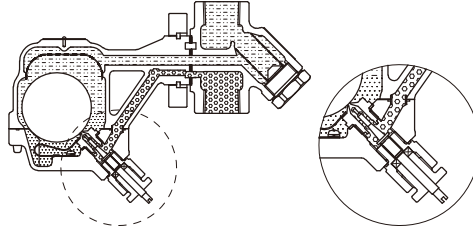


3. The end of the removal rod is both hex-shaped and contains a slot for a screwdriver. Using either a flat-blade screwdriver in the slot or a socket wrench, turn the rod slowly to the right until it will turn no further. The rod will punch through the orifice opening, removing the deposit of scale. Slotted Screw (b = Hex-shaped tip: Use a socket with a distance across flats of 4 mm ($\frac{3}{16}$ in). Select a suitable tool.)



4. Hold the gland case securely in place using a tool such as an adjustable wrench or an open-end wrench and slowly turn the removal rod back to the left until it will turn no further. The scale that

had been clogging the orifice opening has now been removed and the trap is restored to normal operation.



5. After removal of scale deposits, perform a survey/check, either visually or using a TrapMan (trap survey instrument).

If there is still failure due to leakage, perform step 3 once again. If the leakage persists after performing step 3 again, disassemble the product.

Table of Tightening Torques

Part Name & No.	Torque N-m	Distance Across Flats mm
Gland Case 4	30	22
Gland Retainer Nut 6	15	22

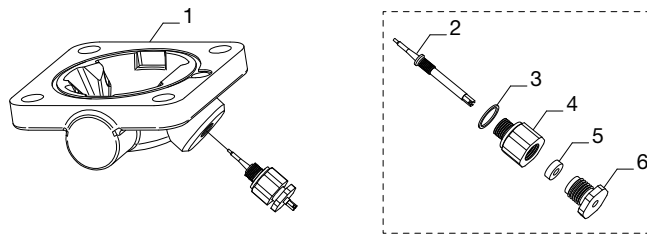
Part Name & No.	Torque lbf-ft	Distance Across Flats in
Gland Case 4	22	$\frac{7}{8}$
Gland Retainer Nut 6	11	$\frac{7}{8}$



Note

- Coat all threaded portions and orifice gasket with anti-seize.
- If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Exploded View



No.	Part Name	No.	Part Name
1	Cover	4	Gland Case
2	Removal Rod	5	Gland Packing
3	Gland Gasket	6	Gland Retainer Nut