INSTRUCTION MANUAL

Keep this manual in a safe place for future reference

TLV® DIRECT-ACTING PRESSURE REDUCING VALVE FOR STEAM AND/OR AIR

MODEL DR20/A-DR20

DR20

A-DR20

Manufacturer

TLV® CO., LTD.

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Introduction

Before beginning installation or maintenance, please read this manual to ensure correct use of the product. Keep the manual in a safe place for future reference.

The DR20 direct-acting pressure reducing valve for steam and air is capable of reducing from primary pressures of between 0.2 and 1.6 MPaG (30 – 230 psig) to secondary pressures between 0.014 and 1.0 MPaG (2 – 150 psig).
The A-DR20 direct-acting pressure reducing valve for air is capable of reducing from primary pressures of between 0.2 and 1.0 MPaG (30 – 150 psig) to secondary pressures between 0.014 and 0.9 MPaG (2 – 135 psig).
They are designed for a long service life, and are made of stainless steel for superior durability.

1 MPa = 10.197 kg/cm^2, 1 bar = 0.1 MPa

For products with special specifications or with options not included in this manual, contact TLV for instructions.

The contents of this manual are subject to change without notice.

1. 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.

Indicates a DANGER, WARNING or CAUTION item.

DANGER Indicates an urgent situation that 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.

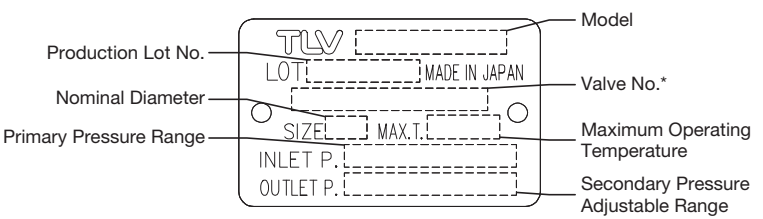
CAUTION	**Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.** Improper use may result in such hazards as damage to the product or malfunctions, which may lead to serious accidents. Local regulations may restrict the use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

Continued on the next page

⚠ 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 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 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.
	Use 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.

2. Specifications

Refer to the product nameplate for detailed specifications.



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

Applicable Fluids	DR20: Steam, Air
	A-DR20: Air

Operating Range

Model	**DR20-2**	**DR20-6**	**DR20-10**
Primary Pressure Range	0.2 – 1.6 MPaG 2 – 16 barg 30 – 230 psig		0.6 – 1.6 MPaG 6 – 16 barg 85 – 230 psig
Adjustable Pressure Range*	0.014** – 0.2 MPaG 0.14** – 2 barg 2** – 30 psig	0.18 – 0.6 MPaG 1.8 – 6 barg 27 – 85 psig	0.54 – 1.0 MPaG 5.4 – 10 barg 76 – 150 psig
Minimum Adjustable Flow Rate	Steam: 20 kg/h (44 lb/h) Air: 5% of rated flow rate		

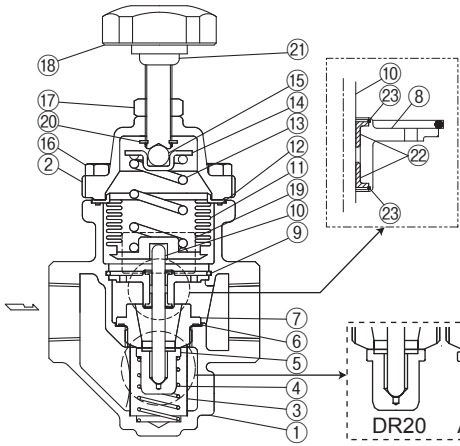
Model	**A-DR20-2**	**A-DR20-6**	**A-DR20-10**
Primary Pressure Range	0.2 – 1.0 MPaG 2 – 10 barg 30 – 150 psig		0.6 – 1.0 MPaG 6 – 10 barg 85 – 150 psig
Adjustable Pressure Range*	0.014** - 0.2 MPaG 0.14** - 2 barg 2** – 30 psig	0.18 - 0.6 MPaG 1.8 - 6 barg 27 – 85 psig	0.54 – 0.9 MPaG 5.4 – 9 barg 76 – 135 psig
Minimum Adjustable Flow Rate	Air: 5% of rated flow rate		

* Secondary pressure must not exceed 90% of primary pressure 1 MPa = 10 bar = 10.197 kg/cm^2
** But not less than $1/30$ of primary pressure

CAUTION

To avoid malfunctions, product damage, accidents or serious injury, install properly and DO NOT use this product outside the specification range. Local regulations may restrict the use of this product to below the conditions quoted.

3. Configuration



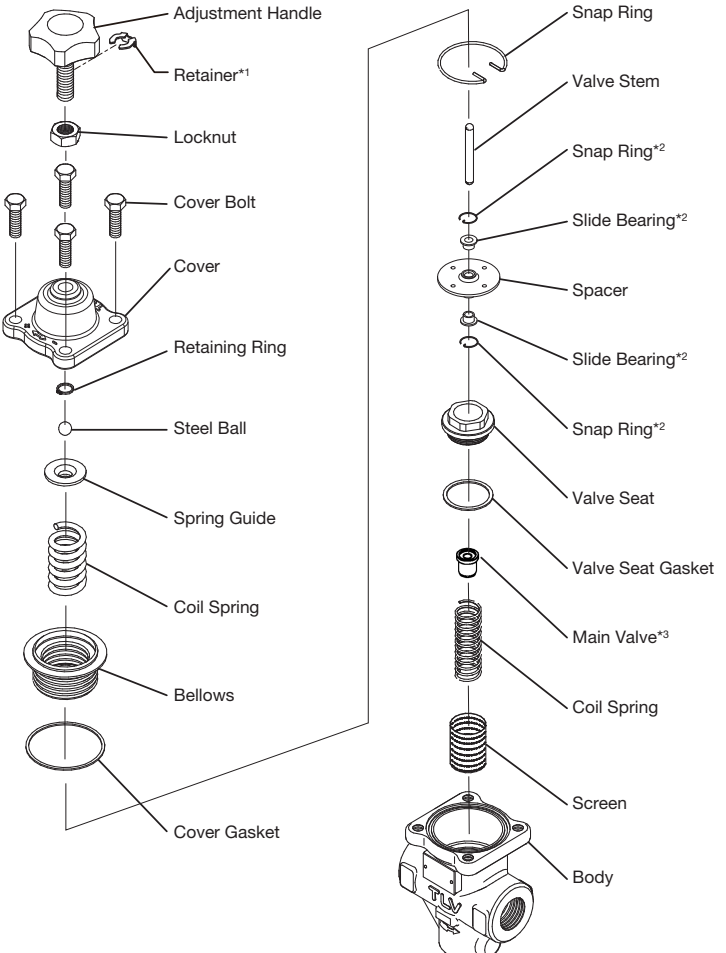
For A-DR20: Rubber (standard: fluorine rubber) is used in the seating area. The rubber is inlaid in the main valve.

Soft Seat (Fluorine rubber)

No.	Description	A*1	B*1	C*1	D*1	E*1	No.	Description	A*1	B*1	C*1	D*1	E*1
1	Body						13	Coil Spring					
2	Cover						14	Spring Guide					
3	Screen			✓		✓	15	Steel Ball					
4	Coil Spring			✓		✓	16	Cover Bolt					
5	Main Valve			✓		✓	17	Locknut					
6	Valve Seat Gasket	✓		✓		✓	18	Adjustment Handle					
7	Valve Seat			✓		✓	19	Nameplate					
8	Spacer*2		✓			✓	20	Retaining Ring					
9	Snap Ring					✓	21	Retainer*3					
10	Valve Stem		✓			✓	22	Slide Bearing*2 *4		✓			✓
11	Bellows				✓	✓	23	Snap Ring*2 *4		✓			✓
12	Cover Gasket	✓	✓	✓	✓	✓							

*1 Replacement parts are available only in the following kits:
A: Maintenance kit
B: Repair kit for Spacer
C: Repair kit for Main Valve
D: Repair kit for Bellows
E: Repair kit
*2 Shipped as a unit
*3 DR20 only
*4 Number of parts: 2 pieces

4. Exploded View



*1 DR20 only.

*2 Cannot be removed individually as it is incorporated with the spacer and must be replaced as a set with the spacer.

*3 For A-DR20: The rubber is inlaid in the main valve and cannot be removed. The main valve itself must be replaced.

5. Piping and Installation

CAUTION

- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- Take measures to prevent people from coming into direct contact with product outlets.
- Install for use under conditions in which no freeze-up will occur.
- Install for use under conditions in which no water hammer will occur.

5.1 Recommended Straight Pipe Runs

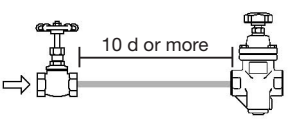
If a pressure reducing valve is installed either directly before or after an elbow or control valve, unevenness in flow may result in chattering and unstable pressure.
To ensure stable flow, it is recommended that the pressure reducing valve be installed on straight runs of piping, as illustrated below.

① Inlet (primary side) of the pressure reducing valve

d = pipe diameter

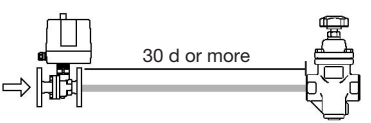
- Maintain a straight piping run of 10 d or more when a manual valve, a strainer or an elbow, etc. is installed.

  (Example: if nominal size is 25 mm (1”), have 250 mm (10”) or more)



- Maintain a straight piping run of 30 d or more when an automated valve (on-off valve) is installed.

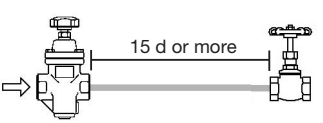
  (Example: If nominal size is 25 mm (1”), have 750 mm (30”) or more)



② Outlet (secondary side) of the pressure reducing valve

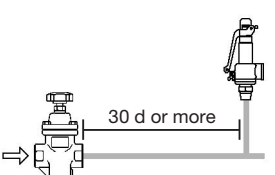
- Maintain a straight piping run of 15 d or more when a manual valve, a strainer or an elbow, etc. is installed.

  (Example: If nominal size is 25 mm (1”), have 375 mm (15”) or more)



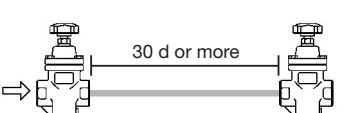
- Maintain a straight piping run of 30 d or more when a safety valve is installed.

  (Example: If nominal size is 25 mm (1”), have 750 mm (30”) or more)



- Maintain a straight piping run of 30 d or more when another pressure reducing valve is installed. (Two-stage pressure reduction)

  (Example: If nominal size is 25 mm (1”), have 750 mm (30”) or more)



5.2 Installing an ON / OFF Valve (solenoid valve or motorized valve)

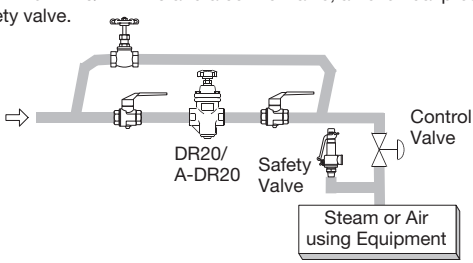
If an on-off valve is required to stop the supply of steam or air to the equipment, install it on the inlet side of the DR20/A-DR20. If a solenoid valve is installed at the outlet of the DR20/A-DR20, it will cause heavy chattering and may lead to damage of the DR20/A-DR20. (When the on-off valve opens, the secondary pressure of the DR20/A-DR20 changes from 0 to the set pressure, passing through an area where the reduction ratio is less than 30:1, where adjustment is normally impossible, causing momentary chattering.) To save energy, install the on-off valve as near to the boiler or air compressor as possible.

NOTE: To prevent water hammer in steam systems , it is recommended that a slow-acting motorized on-off valve be used. If a fast-acting solenoid valve is used, the potential water hammer effect can damage the steam equipment and the pressure reducing valve.

5.3 Installing a Control Valve and a Safety Valve

A control valve (i.e. for temperature control in steam systems) installed between the DR20/A-DR20 and the equipment (downstream of the DR20/A-DR20) may raise pressure between the DR20/A-DR20 and the control valve when the control valve is closed, depending on their spatial relationship. Therefore, the control valve should be installed close to the equipment. Also, a safety valve should be installed downstream of the control valve.

NOTE: When installing a safety valve to protect the equipment, be sure to install it on the equipment or directly before the inlet of the equipment. If the safety valve is installed between the DR20/A-DR20 and a control valve, an eventual pressure rise could activate the safety valve.



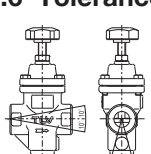
5.4 Blowdown

Before installing the DR20/A-DR20 unit, be sure to blow down all piping thoroughly. If this is not possible, perform a blowdown using the bypass valve. Blowdown is especially important for newly installed piping or after the system has been shut down for a long period of time.

5.5 Remove Protective Seals

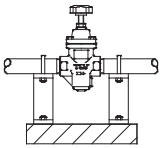
Before installation, remove the protective seals covering the product inlet and outlet.

5.6 Tolerance Angle for Installation

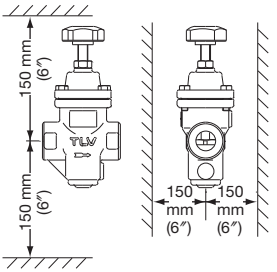


Make sure the DR20/A-DR20 is installed on horizontal piping with the adjustment handle facing up. Ensure the raised TLV lettering on the body is horizontal and the arrow is pointing in the direction of flow. The allowable inclination of the DR20/A-DR20 is 10° front-to-back and 15° horizontally.

5.7 Piping Supports / Maintenance Space



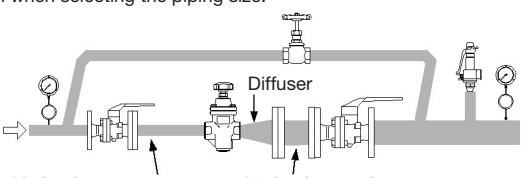
Install the DR20/A-DR20, paying attention to avoid excessive load, bending and vibration. Supporting the inlet and outlet pipes securely is recommended.



Leave sufficient space for maintenance, inspection and repair.

5.8 Piping Size / Diffuser

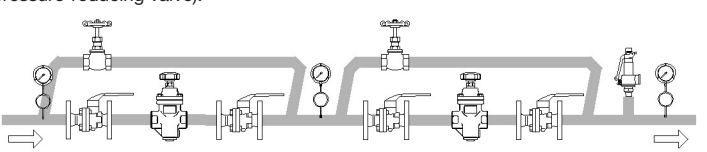
If the secondary side flow velocity is expected to be more than 30 m/s (100 ft/s), install a diffuser in order to keep the flow velocity below 30 m/s (100 ft/s). If the distance between the reducing valve and the equipment is great, a possible drop in pressure should be taken into consideration when selecting the piping size.



Straight piping: 10 d or longer upstream 15 d or longer downstream

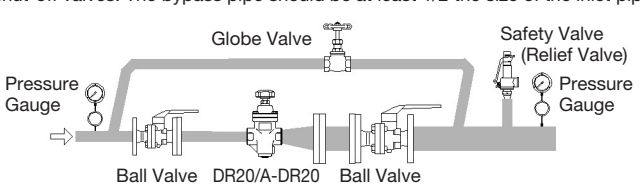
5.9 Two-stage Pressure Reduction

Employ 2-stage pressure reduction if the required reduction is not possible due to operating range limitations (when it is not possible to reduce the pressure to the desired pressure using a single pressure-reducing valve).



5.10 Accessories

Always install a shut-off valve and pressure gauge at both the inlet and outlet, and a shut-off valve in the bypass line. Ball valves, which will not retain condensate, are recommended for inlet and outlet shut-off valves. The bypass pipe should be at least 1/2 the size of the inlet pipe.



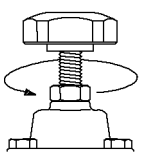
6. Adjustment

Follow the below procedures for adjusting DR20/A-DR20. Especially if the DR20 pressure reducing valve is installed in a steam system, it should be properly adjusted for protection of the steam equipment against water hammer.

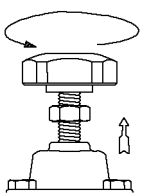
1. It is necessary to blow down all pipe lines thoroughly.
   The blowdown is especially important if the line is new or has been shut down for a long period of time. Take particular care to ensure that matter such as condensate and dirt does not remain inside the equipment.
   (Stay clear of any pressurized blow-out from the safety valve.)

2. Make sure that the shut-off and bypass valves located upstream and downstream of the DR20/A-DR20 are completely closed.

3. Loosen the locknut, then turn the adjustment handle counter-clockwise to free the coil spring.



Loosen the locknut



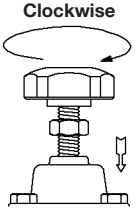
Raise the adjustment handle

4. Slowly, fully open the shut-off valve at the inlet of the DR20/A-DR20.

5. Slightly open the shut-off valve at the outlet of the DR20/A-DR20.

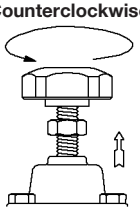
6. Turn the adjustment handle clockwise until the desired outlet pressure is obtained. Wait several minutes.

Clockwise



Increase Pressure

Counterclockwise



Decrease Pressure

7. Slowly, fully open the shut-off valve at the outlet of the DR20/A-DR20.

8. After setting, retighten the locknut.

9. When shutting down the system, always close the outlet shut-off valve first and then the inlet valve.

7. Inspection and Maintenance

To ensure the long service life of the DR20/A-DR20, the following inspection and maintenance should be performed regularly, at least once a year. It is especially important to perform an inspection immediately after the initial run of a new line or before or after equipment such as a heater is out of service for a long period of time.

⚠ CAUTION

- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- Before attempting to open the product, close the inlet and outlet isolating valves and wait until the body has cooled completely. Failure to do so may result in burns.
- Be sure to use the proper components and NEVER attempt to modify the product.

Parts Inspection Procedure	
Body, Cover	Check inside for damage, dirt, grease, oil film, rust or scale
Screen	Check for clogging, damage or deformation
Valve and Valve Seat	Check for rust, scale, oil film, wear or damage
Valve Stem	Check for wear or damage
Bellows	Check for cracks, damage or deformation
Gaskets	Check for warping or damage

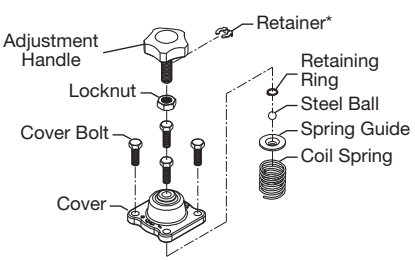
Wait for the body to cool before attempting to remove the DR20/A-DR20 from the line. Then remove the DR20/A-DR20 from the piping and secure it in a vise to perform the inspection.

7.1 Disassembling the Adjustment Section

Loosen the adjustment handle completely and remove the cover bolts. After removing the cover, you will see the steel ball, the spring guide and the coil spring.

⇨ Check for seizure or any damaged screw threads.

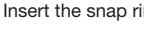
* DR20 only

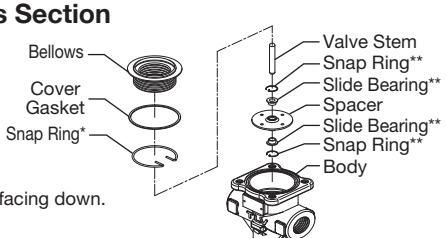


7.2 Disassembling the Bellows Section

Remove the bellows from the body, then the valve stem. Pinch the straight sections of the snap ring that is holding the spacer together using a tool such as a needle-nose pliers and remove the snap ring. Remove the spacer.

* Insert the snap ring so that both ends are facing down.



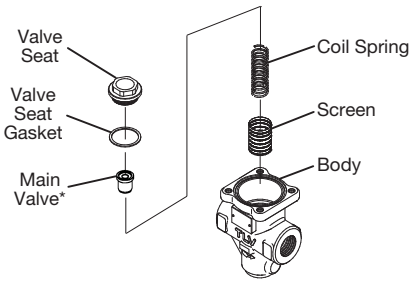


** Cannot be removed individually as it is incorporated with the spacer and must be replaced as a set with the spacer.

7.3 Disassembling the Valve Section

Loosen the valve seat with a wrench and remove it from the body. The coil spring is exerting an upward pressure on the bottom of the valve seat, so be careful that the valve seat is not thrown out. After removing the valve seat, remove the valve, the coil spring and the screen.

* For A-DR20: The rubber is inlaid in the main valve and cannot be removed. The main valve itself must be replaced.



7.4 Cleaning

After inspection and removal of any abnormality, clean and reassemble the parts.
The following parts will require cleaning before reassembly:

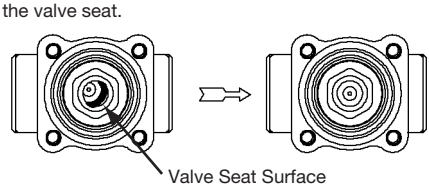
Threads of the Adjustment Handle	Bellows	Main Valve
	Spacer (including slide bearing)	Valve Seat
Threads of the Cover	Valve Stem	Screen

It is permissible to clean using water. However, cleaning with a mild detergent is recommended for more effective cleaning.

7.5 Reassembling

Reassemble the unit using the same procedure as used for disassembling it; but in reverse order. In addition, observe the following precautions:

1. PTFE gaskets may be re-used if free from fault, crushing or deformation.
2. Apply anti-seize to the steel ball and threaded portions of screws, bolts and the adjustment handle. Apply a small amount of anti-seize agent to the threads of the valve seat carefully to ensure it does not come into contact with other parts.
3. Fasten the bolts one at a time in a diagonal pattern alternately to provide uniform seating.
4. After assembly, make sure that the valve stem operates smoothly without binding. When the valve is tightened, it may become off-centered under the valve seat. When this occurs, center the valve under the valve seat.



Tightening Torques and Distance Across Flats		
Part	Tightening Torque N·m (lbf·ft)	Distance Across Flats mm (in)
Cover Bolt	25 (19)	13 (1/2)
Valve Seat	120 (88)	27 (1 1/16)

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.

8. Troubleshooting

This product is shipped after stringent checks and inspection, and should perform its intended function for a long period of time without failure. However, should there be any problem encountered in the operation of the DR20/A-DR20, Consult the troubleshooting guide below.

Problem	Cause	Remedy
The secondary pressure does not increase	No steam/air is being supplied	Check the primary/secondary piping and valves of the unit
	The valve at the primary side is closed	
	The entrance to the screens or strainer is clogged	Clean or blow down
	Flow rate exceeds specifications	Check the flow rate; check the model selection, replace with a more suitable unit if necessary
	It exceeds the adjustable pressure range	Check the model selection, replace with a more suitable unit if necessary
Adjustment is difficult and set pressure varies	The flow rate is too low	Check the flow rate; check the model selection, replace with a unit that has smaller nominal diameter or a more suitable unit if necessary
	Pressure fluctuation at the primary side is large	Check the primary pressure; check the model selection, replace with a more suitable unit if necessary
	Buildup on the valve stem prevents smooth movement through the spacer	Clean and inspect the valve stem and spacer
	Flow rate fluctuation is too large	Check the flow rate, re-set the pressure; check the model selection, replace with a more suitable unit if necessary
Upon closing the valves at the secondary side, the secondary pressure abruptly rises as high as the primary pressure	The adjustment handle has seized	Replace with a new adjustment handle
	The holes in the spacer are clogged	Clean
	The slide bearing is distorted or damaged	Replace with a new spacer (when replacing the slide bearing or snap ring, these parts need to be replaced as a set with the spacer)
	The bellows is distorted or damaged	Replace with a new bellows
	The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace with a more suitable unit if necessary
	The bypass valve is leaking	Check, clean, and replace with a new valve if necessary
	There is a build-up of dirt on or damage to the main valve or the valve seat	Clean and align
Hunting or chattering occurs at low steam/air demand	The flow rate is too low	Check the flow rate; check the model selection, replace with a unit that has smaller nominal diameter or a more suitable unit if necessary
Hunting never stops	There is too high a reduction ratio	Use two-stage reduction
	The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace with a more suitable unit if necessary
Chattering never stops	Condensate is entrained	Install a steam trap; check the piping
	The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace with a more suitable unit if necessary
Makes a high-pitched noise	The required pressure reduction exceeds specifications	Use two-stage reduction
	Flow rate exceeds specifications	Check the flow rate; check the model selection, replace with a unit that has larger nominal diameter or a more suitable unit if necessary
	The valve installed close to the reducing valve opens/closes too quickly	Install the valve at as great a distance away as possible

9. TLV EXPRESS LIMITED WARRANTY

Subject to the limitations set forth below, TLV Corporation, a North Carolina corporation (“**TLV**”) warrants that products which are sold by it, TLV CO., LTD., a Japanese corporation (“**TLVJ**”) or TLV International, Inc., a Japanese corporation (“**TII**”), (hereinafter the “**Products**”) are designed and manufactured by TLVJ, conform to the specifications published by TLV for the corresponding part numbers (the “**Specifications**”) and are free from defective workmanship and materials. With regard to products or components manufactured by unrelated third parties (the “**Components**”), TLV provides no warranty other than the warranty from the third party manufacturer(s), if any.

Exceptions to Warranty

This warranty does not cover defects or failures caused by:

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

Duration of Warranty

This warranty is effective for a period of the earlier of: (i) three (3) years after delivery of Products to the first end user in the case of sealed SST-Series Products for use in steam pressure service up to 650 psig; (ii) two (2) years after delivery of Products to the first end user in the case of PowerTrap® units; or (iii) one (1) year after delivery of Products to the first end user in the case of all other Products. Notwithstanding the foregoing, asserting a claim under this warranty must be brought by the earlier of one of the foregoing periods, as applicable, or within five (5) years after the date of delivery to the initial buyer if not sold initially to the first end user.

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

Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT;** PROVIDED: (a) THE CLAIMED DEFECT IS REPORTED TO TLV IN WRITING WITHIN THE APPLICABLE WARRANTY PERIOD, INCLUDING A DETAILED WRITTEN DESCRIPTION OF THE CLAIMED DEFECT AND HOW AND WHEN THE CLAIMED DEFECTIVE PRODUCT WAS USED; AND (b) THE CLAIMED DEFECTIVE PRODUCT AND A COPY OF THE PURCHASE INVOICE IS RETURNED TO TLV, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY TLV. ALL LABOR COSTS, SHIPPING COSTS, AND TRANSPORTATION COSTS ASSOCIATED WITH THE RETURN OR REPLACEMENT OF THE CLAIMED DEFECTIVE PRODUCT ARE SOLELY THE RESPONSIBILITY OF BUYER OR THE FIRST END USER. TLV RESERVES THE RIGHT TO INSPECT ON THE FIRST END USER’S SITE ANY PRODUCTS CLAIMED TO BE DEFECTIVE BEFORE ISSUING A RETURN MATERIAL AUTHORIZATION. SHOULD SUCH INSPECTION REVEAL, IN TLV’S REASONABLE DISCRETION, THAT THE

CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY TLV FOR THE TIME AND EXPENSES RELATED TO SUCH ON-SITE INSPECTION.

Exclusion of Consequential and Incidental Damages

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

Exclusion of Other Warranties

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

Severability

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

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