



Instruction Manual

Pressure Reducing Valve for Air **A-COSR-10**

Manufacturer



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TLV CORPORATION

Contents

Introduction	1
Safety Considerations	2
Specifications	4
Acceptable Operating Range	4
Correct Usage of the Product.....	5
Configuration	8
Installation	9
Adjustment	12
Maintenance.....	13
Disassembly	14
Reassembly	18
Troubleshooting	19
TLV EXPRESS LIMITED WARRANTY	21

Introduction

Thank you for purchasing the TLV A-COSR pressure reducing valve for air.

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 pressure reducing valve for air, model A-COSR provides a more stable secondary pressure than conventional reducing valves. The A-COSR is designed for long service life, with all major components made of stainless steel for superior durability.





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 needed not only for installation, but also 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 DANGER, WARNING or CAUTION 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

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

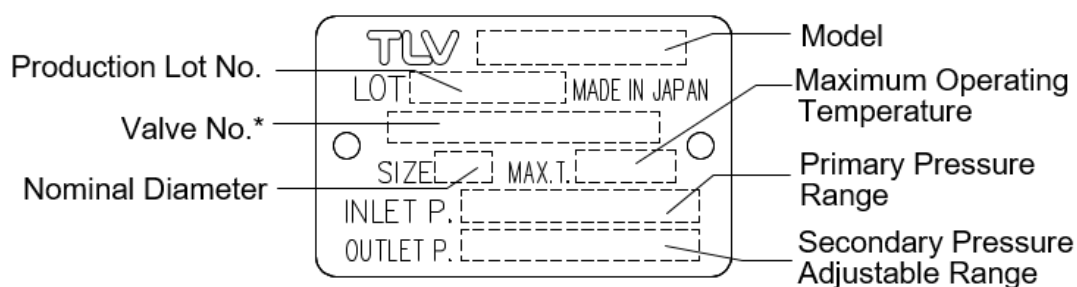
Continued on the next page.

 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 and 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 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.

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 which 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), and may damage the equipment.
	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.



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

Acceptable Operating Range

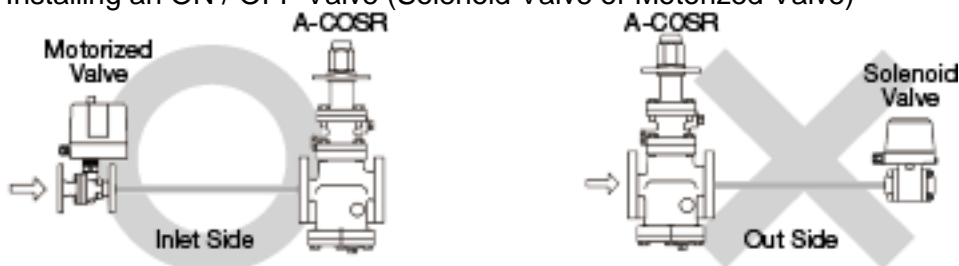
Model	A-COSR-10
Applicable Fluid	Air
Primary Pressure Range	0.1 to 0.9 MPaG (15 to 125 psig)
Secondary Pressure Adjustable Range	0.05 to 0.7 MPaG (7 to 100 psig)
Minimum Differential Pressure	0.05 MPa (7 psi) and larger
Maximum Operating Temperature	100 °C (212 °F)
Minimum Adjustable Flow Rate	10% of rated flow rate and larger

Correct Usage of the Product



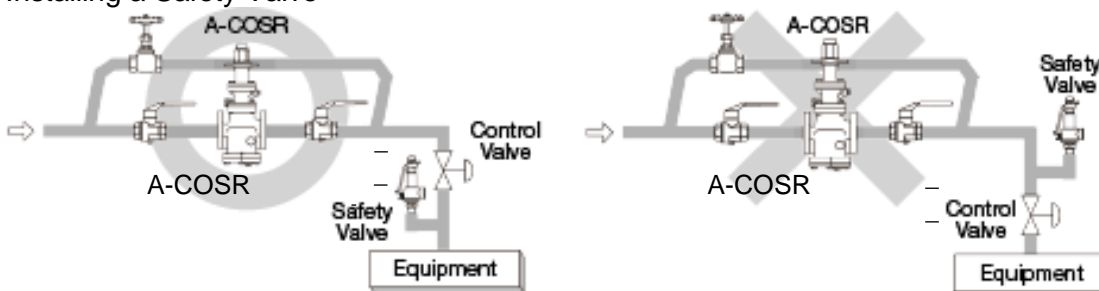
Install properly and **DO NOT** use this product outside the recommended operating pressure, temperature and other specification ranges. Improper use may result in such hazards as damage to the product or malfunctions which may lead to serious accidents. Local regulations may restrict the use of this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

1. The A-COSR should be operated only within its specifications.
2. Installing an ON / OFF Valve (Solenoid Valve or Motorized Valve)



If an on-off valve, such as a motorized valve is required, install it at the inlet side of the A-COSR. If a solenoid valve is installed at the outlet of the reducing valve, its opening and closing will cause heavy chattering and may lead to damage of the piston and main valve. (When the on-off valve opens, the secondary pressure of the reducing valve changes from zero to the set pressure. Passing through an area of the reducing ratio of less than 10:1, where adjustment is impossible, chattering occurs momentarily.)

3. Installing a Safety Valve



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

4. Precautions for the Installation of Additional Fittings Before or After the Reducing Valve

In order to ensure stable air flow, the piping upstream and downstream of the reducing valve must be straight runs. If a pressure reducing valve is installed either directly before or after an elbow or control valve, unevenness in air flow may result in chattering and unstable pressure.

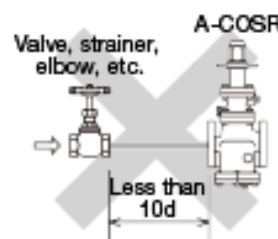
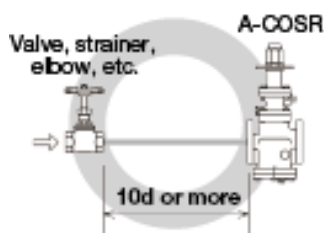
To ensure stable air flow, it is recommended that the pressure reducing valve be installed on straight runs of piping, as illustrated below.

① Inlet (primary side) of the pressure reducing valve

NOTE: d = pipe diameter

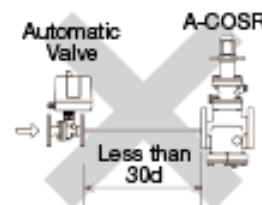
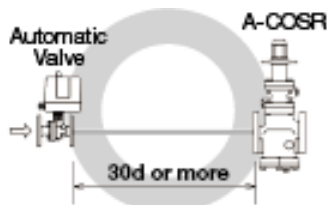
Maintain a straight piping run of **10d or more** when a manual valve, a strainer or an elbow, etc. is installed.

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



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

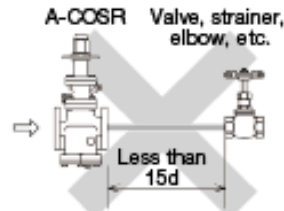
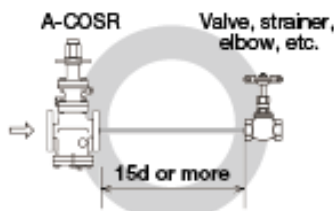
(Example: if nominal size is 25 mm (1 in), have 750 mm (30 in) or more)



② Outlet (secondary side) of the pressure reducing valve

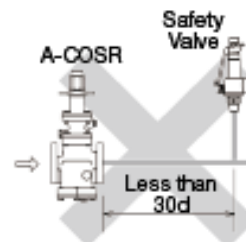
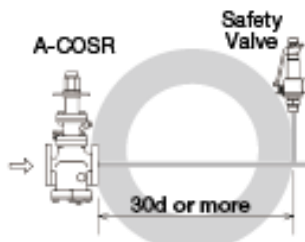
Maintain a straight piping run of **15d or more** when a manual valve, a strainer or an elbow, etc. is installed.

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



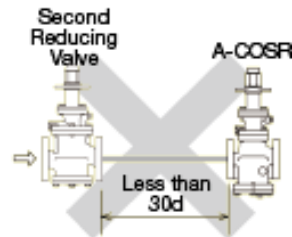
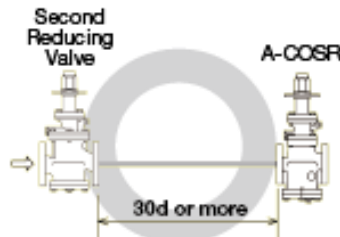
Maintain a straight piping run of **30d or more** when a safety valve is installed.

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



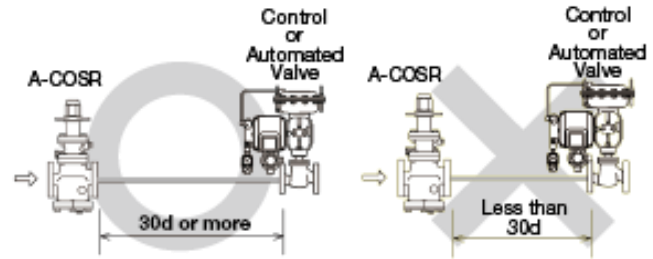
Maintain a straight piping run of **30d or more** when another pressure reducing valve is installed. (Two-stage pressure reduction)

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

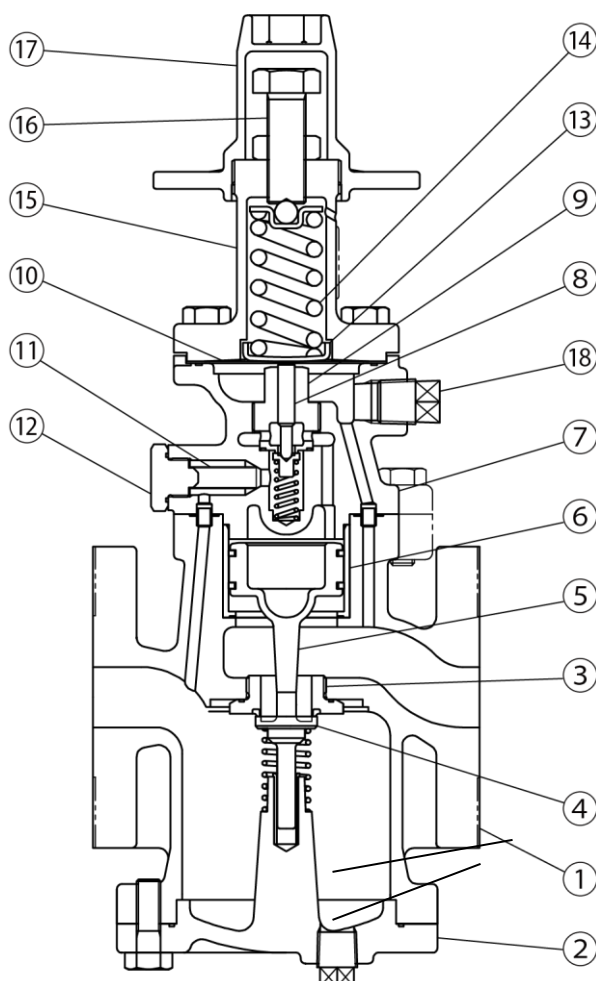


Maintain a straight piping run of **30d or more** when a control valve or an automated valve (on-off valve) is installed.

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




Configuration



No.	Part Name	No.	Part Name
1	Main Body	10	Diaphragm
2	Cover	11	Pilot Screen
3	Main Valve Seat	12	Pilot Screen Holder
4	Main Valve	13	Diaphragm Support
5	Piston	14	Coil Spring
6	Cylinder	15	Spring Housing
7	Pilot Valve Body	16	Adjustment Screw
8	Pilot Valve	17	Spanner Cap
9	Pilot Valve Seat	18	Plug – Sensing Line Port

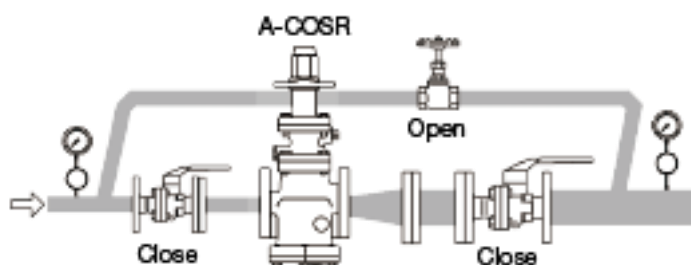
Installation

 CAUTION	<p>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.</p>
	<p>Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more). Failure to do so may result in back strain or other injury if the object should fall.</p>
	<p>DO NOT use excessive force when connecting threaded pipes to the product. Over-tightening may cause breakage leading to fluid discharge, which may cause injuries, burns, chemical burns, as well as fires or other damage to / destruction of property.</p>

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

1. Blowdown

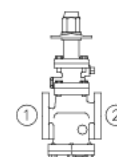
Before installing the A-COSR, be sure to blow down all piping thoroughly. If this is not possible, perform a blowdown using the bypass valve.



Blowdown is especially important for newly installed piping or after the system has been shut down for a long period of time.

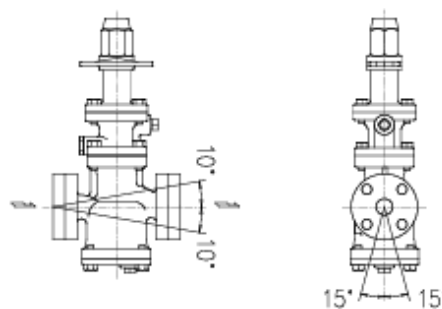
2. Removing Seal and Cap

Before installation, be sure to remove all protective seals and caps. (Found in 2 locations, on the product inlet and outlet.)



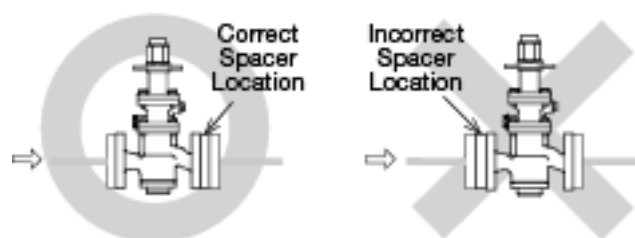
3. Installation Angle

Install the A-COSR vertically, so that the arrow mark on the body points horizontally in the direction of air flow. Allowable inclination is 10 degrees in the fore-aft direction and 15 degrees in the plane perpendicular to the air flow line.



4. Spacer Installation

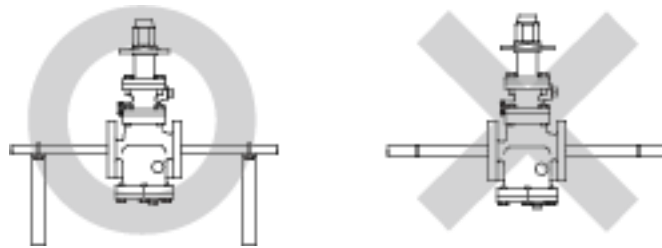
If spacing adjustment is necessary to accommodate installation, install a spacer on the outlet flange. The spacer should consist of a spacer, gaskets, bolts and nuts.



Fit gaskets to both sides of the spacer between the A-COSR outlet and the pipe flange. Fasten with bolts and nuts.

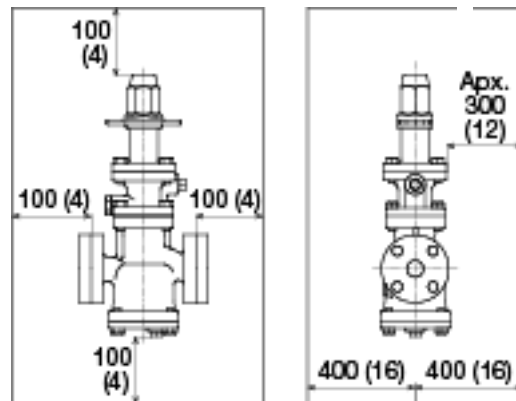
5. Piping Support

Install the A-COSR, paying attention to avoid excessive load, bending and vibration. Support the inlet and outlet pipes securely.



6. Maintenance Space

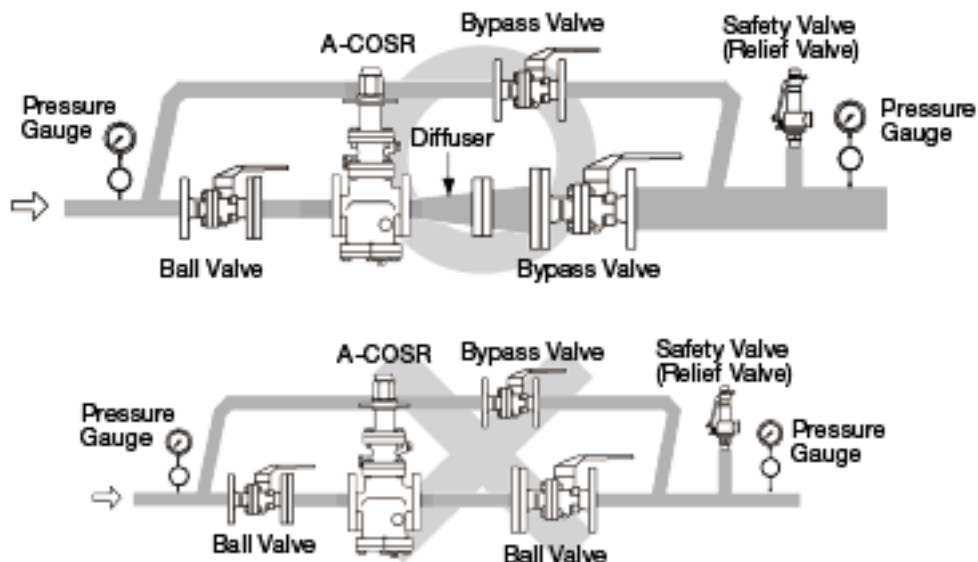
Leave sufficient space for maintenance, inspection and repair.



(Unit: mm (in))

7. Piping Size

If it is expected that the secondary air flow velocity will be more than 30 m/s, install a diffuser in order to keep the flow velocity below 30 m/s. If the distance between the reducing valve and the air equipment is great, a possible drop in pressure should be taken into consideration when selecting the piping size. Strainer should be angled in the 3 o 9 o'clock positions for horizontal installations to prevent condensate accumulation.



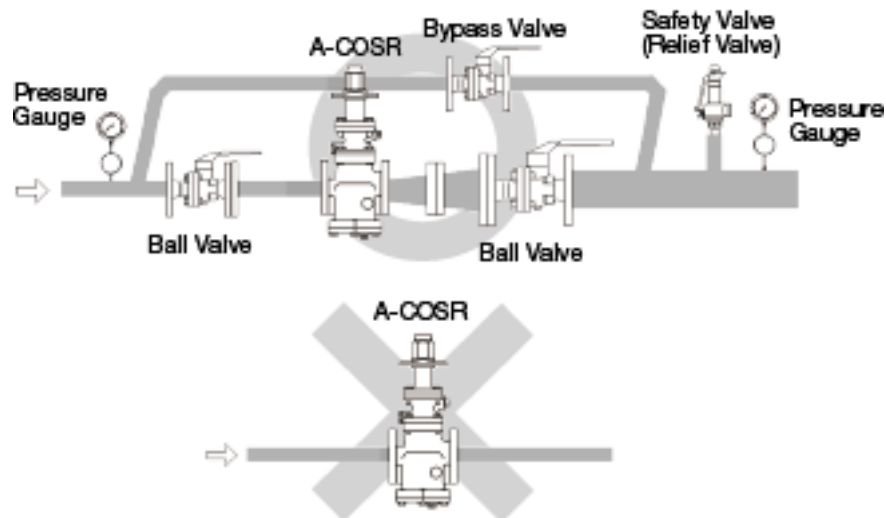
Straight-run Piping Lengths: Upstream = 10 d or more; Downstream = 15 d or more (d = pipe diameter)

8. Accessories

A strainer should always be installed ahead of the A-COSR. The strainer should be 60 mesh or finer, but not so fine as to constrict flow area resulting in a pressure drop. The strainer should be installed horizontally with the basket at the 3 or 9 o'clock position in order to prevent condensate accumulation.

Always install a shut-off valve, pressure gauge and bypass line at both inlet and outlet.

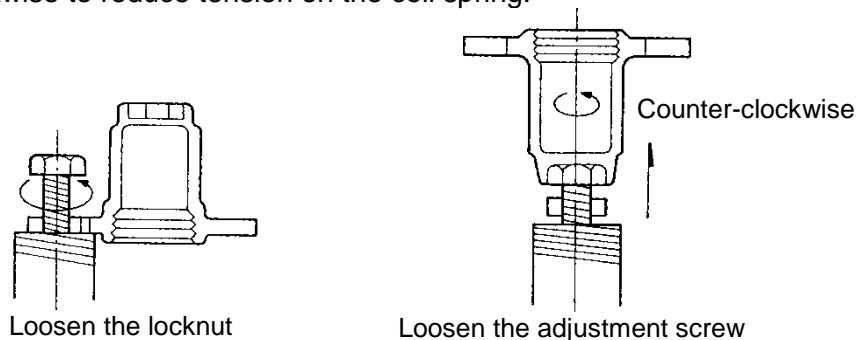
Ball valves, which will not retain condensate, are recommended for inlet and outlet shut-off valves. The bypass pipe should be at least one half of the size of the inlet (primary side) pipe.



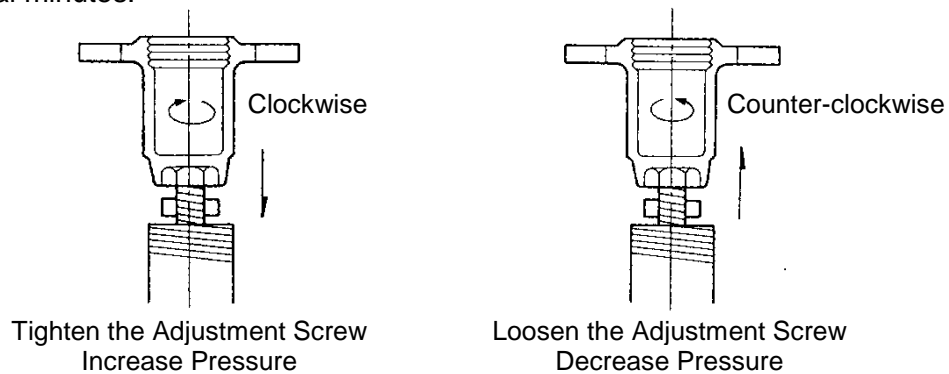
Adjustment

The A-COSR reducing valve should be properly adjusted for protection of the air equipment.

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 air equipment.
(Stay clear of any pressurized blow-out from the safety valve.)
2. Make sure that the shut-off valve and the bypass valve located upstream and downstream of the A-COSR are completely closed.
3. Remove the spanner cap, loosen the locknut and turn the adjustment screw counter-clockwise to reduce tension on the coil spring.




4. Slowly, fully open the shut-off valve at the inlet of the A-COSR. Allow sufficient time for condensate remaining at the inlet of the A-COSR to be discharged.
5. Slightly open the shut-off valve at the outlet of the A-COSR.
6. Turn the adjustment screw until the desired outlet pressure is obtained. Wait several minutes.



7. Slowly, fully open the shut-off valve at the outlet of the A-COSR.
8. After setup, retighten the locknut and replace the cap.
9. When shutting down the system, always close the outlet shut-off valve first and then the inlet valve.

Maintenance

 CAUTION	<p>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.</p>
	<p>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.</p>

Operational Check

To ensure long service life of the A-COSR, the following inspection and maintenance should be performed regularly.

Part Name	Inspection and Maintenance Frequency
Pilot Screen	Disassemble and clean annually. If there is substantial blockage, install a strainer (approximately 60 mesh) ahead of the A-COSR.
Main Valve, Main Valve Seat, Pilot Valve and Pilot Valve Seat	Replace after approximately 15,000 hours. If there is chattering or dirt, premature wear may result.
Piston Ring	Replace after approximately 8,000 hours. If there is chattering or if scale build-up is severe, premature wear may result.
Piston	Replace after approximately 30,000 hours. If hunting or chattering takes place, premature wear may result.
Diaphragm	Replace after approximately 30,000 hours. If hunting or chattering takes place, cracks or fatigue may develop in a short period of time.

Disassembly

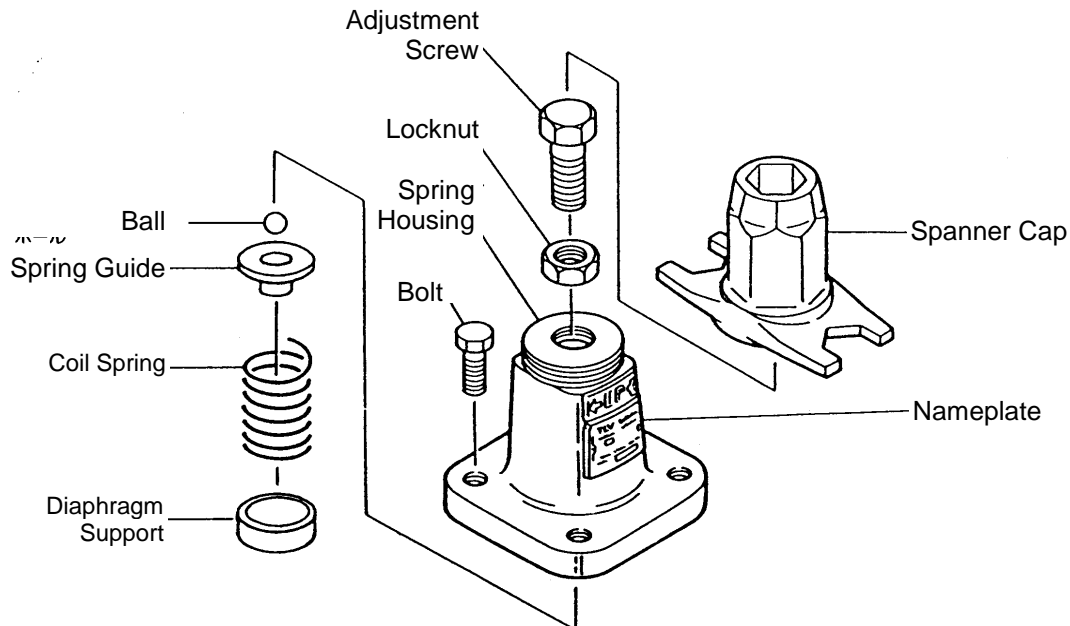
CAUTION	<p>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature.</p>
	<p>Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.</p>
	<p>Use hoisting equipment for heavy objects (weighing approximately 20 kg or more). Failure to do so may result in back strain or other injury if the object should fall.</p>

It is a recommended practice to dismantle and inspect the A-COSR once a year for preventive maintenance purposes. It is especially important to perform an inspection immediately after the initial run of a new line or before or after equipment that heater is out of service for a long period of time. (Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.)

Remove all pressure from the piping (both upstream and downstream). Then remove inlet and outlet flange retaining bolts and nuts to permit removal of the A-COSR. Secure the A-COSR in a vise to perform the inspection.

Disassembling the Adjustment Section

Loosen the adjustment screw completely and remove the bolts. Having removed the spring housing, you will see the diaphragm support, coil spring and spring guide. Check for seizure or any damaged screw threads.

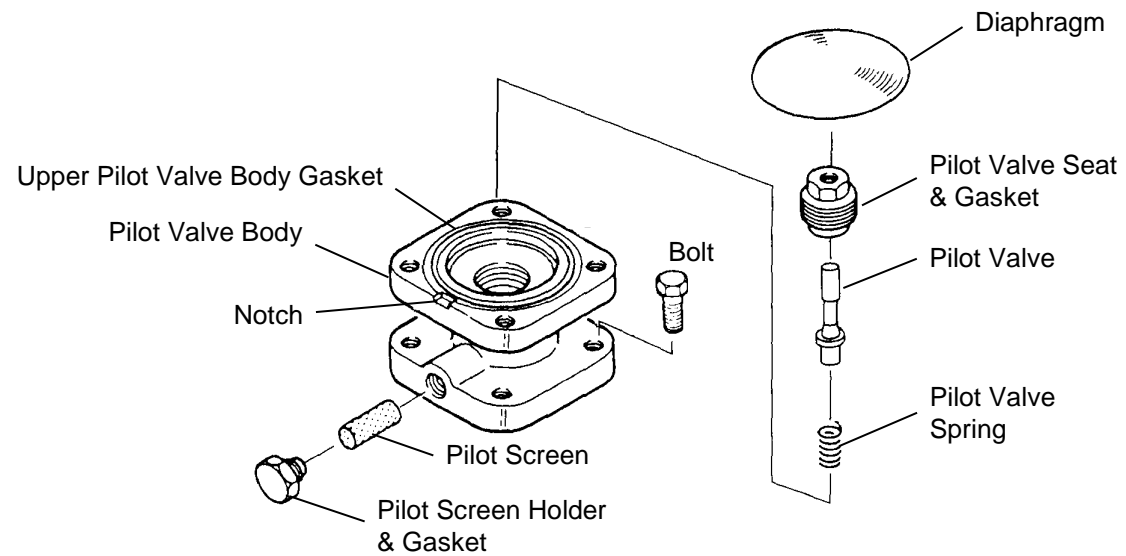


Disassembling the Pilot Section

The diaphragm is removed by utilizing the notch in the pilot body. Loosen the pilot valve seat with a box wrench and remove it. Lift the pilot valve spring up and out with a pair of tweezers. Then loosen and remove the pilot screen holder to remove the pilot screen.

Check for any fault on the pilot valve seat, flaws on the gaskets and clogging of the pilot screen.

Check for deformation, corrosion or faults on the diaphragm. The diaphragm should be convex (open downward), with the printed "UP" mark on the top.

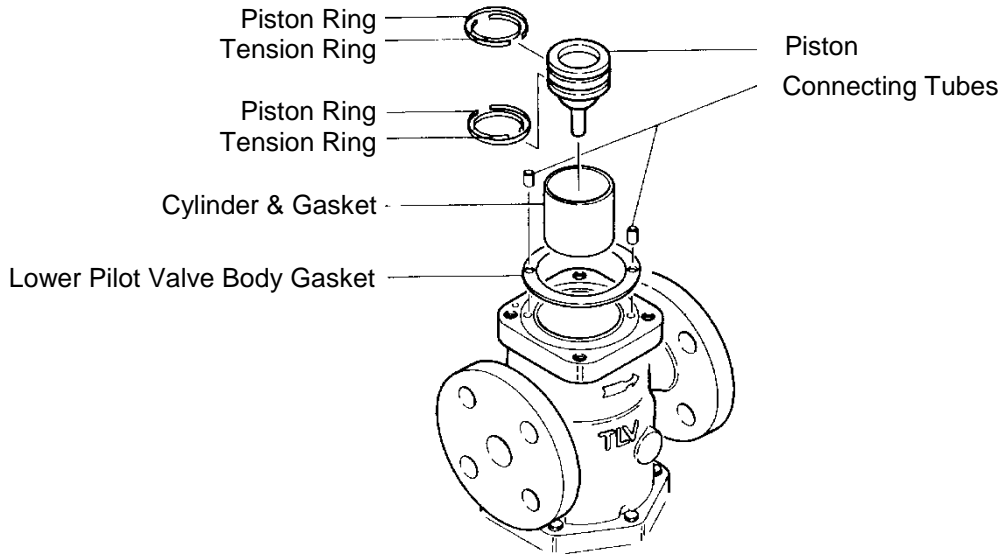


Disassembling the Piston

Remove the pilot valve body after loosening and removing the bolts. During this process, pay attention not to lose the connecting tubes (2).

Remove the piston and the cylinder from the main body. Then remove the piston rings and the tension rings from the piston. Do not apply too much force when removing the piston rings and tension rings.

Inspect the interior of the cylinder, the exterior of the piston rings, the small hole on the piston and the gaskets for any fault or abnormality.



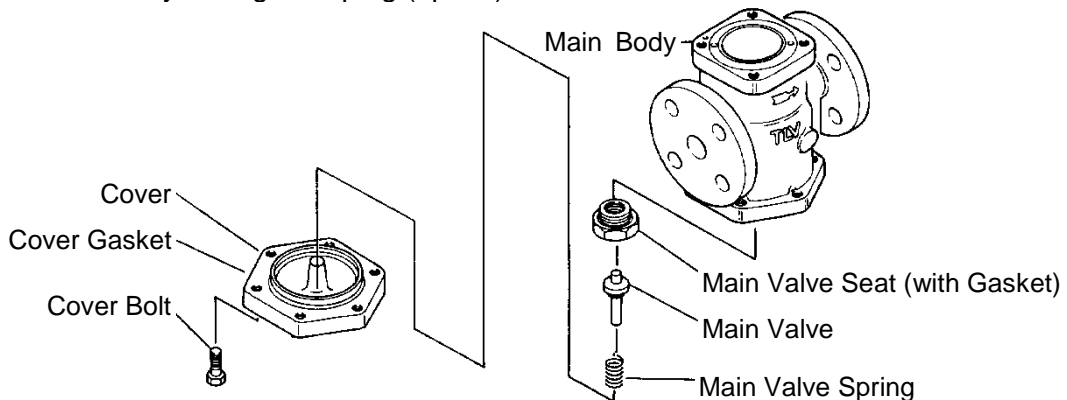
Disassembling the Main Valve

Turn the A-COSR upside down for easy dismantling of the main valve.

Remove the cover plug or loosen the bolts and remove the cover. Remove the main valve and the main valve spring. Loosen the main valve seat by using a box wrench and remove from the main body.

Check for damage on the seating and sliding surfaces of the main valve and main valve holder, the seating surface of the main valve seat, and for damage on the gaskets.

At start-up following shut-down for a long period, always blow down the piston section of the body through the plug (option).



Cleaning

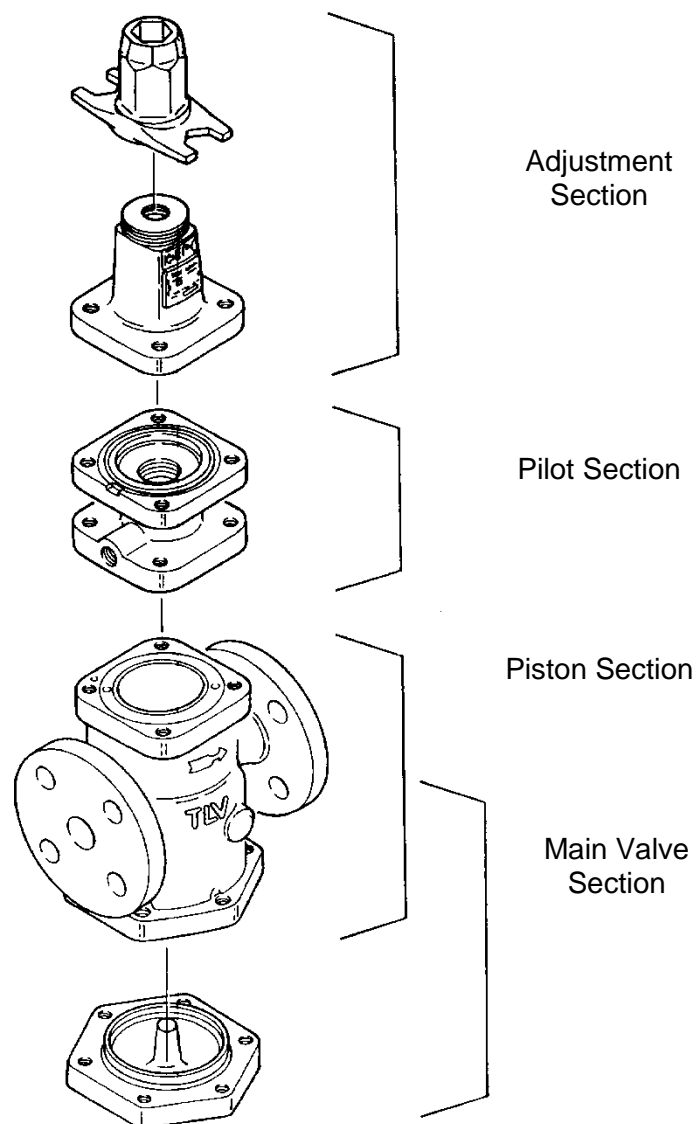
After inspection and removal of any abnormality, clean and reassemble the parts.
The following parts will require cleaning before reassembly:

Cover Plug / Cover	Main Valve	Cylinder
Pilot Screen	Main Valve Holder	Pilot Valve
Main Valve Seat	Piston	Pilot Valve Seat
	Piston Ring	Adjustment Screw

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

(Coat threaded position with anti-seize after cleaning.)

Exploded View

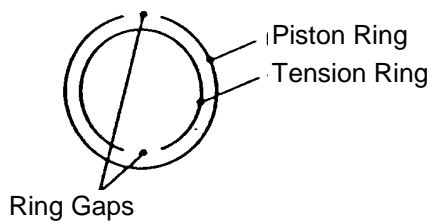


Reassembly

Assemble the unit using the same procedure as used for disassembling it; but in reverse order. Observe the following precautions:

1. The PTFE gaskets may be re-used if free from fault, crushing or deformation.
2. Apply anti-seize to the threaded portion of screws and bolts, the spring retainer, ball and adjustment screw. Apply a small amount of anti-seize to the threads of the main valve seat, pilot valve seat and pilot screen holder. Apply anti-seize carefully to ensure it does not come into contact with other parts.
3. Fasten the bolts one at a time in an alternating diagonal pattern to provide uniform seating.
4. After assembly, make sure that the piston and the pilot guide operate smoothly without binding.

Assembling the Piston Ring



- 1) Fit the piston ring to the outside of the tension ring.
- 2) The ring gaps should be opposite each other.

5. Standard fastening torque and the distance across flats for the tools to be used are as follows:


Part Name	A-COSR Connection Size		Distance Across Flats		Tightening Torque	
	mm	(in)	mm	(in)	N·m	(lbf·ft)
Bolts for Spring Housing/Pilot Body	All		17	(²¹ / ₃₂)	40	(29)
Pilot Valve Seat	All		19	(³ / ₄)	70	(51)
Pilot Screen Holder	All		24	(¹⁵ / ₁₆)	40	(29)
Bolt for Pilot Body	15 to 40	(¹ / ₂ to ¹ / ₂)	17	(²¹ / ₃₂)	60	(44)
	50	(2)	19	(³ / ₄)	70	(51)
Main Valve Seat	15, 20	(¹ / ₂ , ³ / ₄)	36	(¹⁷ / ₁₆)	100	(73)
	25	(1)	41	(¹⁵ / ₈)	125	(92)
	32, 40	(¹ / ₄ , ¹ / ₂)	60	(² / ₃)	250	(185)
	50	(2)	70	(² / ₃)	300	(220)
Cover Bolt	15 to 40	(¹ / ₂ to ¹ / ₂)	17	(²¹ / ₃₂)	60	(44)
	50	(2)	19	(³ / ₄)	70	(51)

NOTE: -If a torque greater than that recommended is applied, the body or its components may be damaged.

-Coat all threaded portions with anti-seize.

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

Troubleshooting

 CAUTION	<p>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.</p> <p>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>
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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 A-COSR, consult the troubleshooting guide below.

Problems are classified as follows:

1. The secondary pressure does not increase.
2. The secondary pressure cannot be adjusted or increases abnormally.
3. Hunting (fluctuation of the secondary pressure) occurs.
4. Chattering (a heavy mechanical noise) occurs.
5. Abnormal noises.

Major causes for the above problems are usage under non-specified conditions (out of specification), insufficient pressure or flow rate, and clogs by dirt and scale.

To ensure performance for a long period of time, it is recommended that the “Acceptable Operating Range”, “Correct Usage of the A-COSR Pressure Reducing Valve” and “Adjustment” sections be reviewed.

Problem	Symptom	Cause	Remedy
The secondary pressure does not rise	The pressure does not increase	No air is being supplied or the inlet valve is closed	Check the valves and pipings
		The entrance to the screens or strainer is clogged	Clean or blow down
The secondary pressure cannot be adjusted or increases abnormally	Adjustment is difficult, and set pressure varies	The pilot screen is clogged	Clean
		There is insufficient air flow	Check the flow, replace the A-COSR if necessary
		The piston is clogged with dirt	Clean Check the piston ring
		The piston ring is worn	Replace with a new piston ring
		There is a build-up of dirt on the sliding surfaces of the piston, pilot or main valve	Clean
		Flow rate exceeds rated flow rate	Check the flow rate, replace with a larger size
	The adjustment screw has seized	Replace with a new adjustment screw	

Continued on the next page

Problem	Symptom	Cause	Remedy
The secondary pressure cannot be adjusted or increases abnormally (continued)	Adjustment is difficult, and set pressure varies (continued)	The small hole on the piston is clogged	Clean
		The diaphragm is distorted or damaged	Replace with a new diaphragm
		There is fluctuation in air consumption	Check the flow rate, replace the A-COSR if necessary
	Upon closing the valves on the secondary side, the secondary pressure abruptly rises as high as the primary pressure	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 pilot valve seat or main valve seat	Clean Align Replace if necessary
	Hunting or chattering occurs	Occurs at low air demand	It is being operated below the lower flow rate limit
Hunting never stops		There is too high a reduction ratio	Change within the specification range
		The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace the A-COSR if necessary
Chattering never stops		Condensate is contained, or the trap is blocked	Check the trap Check the piping
		The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace the A-COSR if necessary

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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