



# Instruction Manual

## Pressure Reducing Valve for Steam **S-COS-16/S-COSR-16**

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## Introduction

Thank you for purchasing the TLV S-COS/S-COSR pressure reducing valve for steam.

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.

Steam-using equipment can achieve its intended efficiency only if the steam being used is very dry. Using steam in which matter such as condensate, scale, types of grease or air is entrained can result not only in problems with the steam-using equipment and in lowered productivity, but can also lead to shortened service life for and malfunction of the pressure reducing valves.

The TLV S-COS, with a built-in separator and steam trap, eliminates these problems and makes possible the supply of very dry steam at a constant pressure.

Both the TLV S-COS and S-COSR provide a more stable secondary pressure than conventional pressure reducing valves. They are 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

	<b>Indicates a DANGER, WARNING or CAUTION item.</b>
	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
	<b>NEVER apply direct heat to the float.</b> The float may explode due to increased internal pressure, causing accidents leading to serious injury or damage to property and equipment.
	<b>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.</b> Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.
	<b>DO NOT use the product in excess of the maximum operating pressure differential.</b> Such use could make discharge through the steam trap impossible (blocked).
	<b>Take measures to prevent people from coming into direct contact with product outlets.</b> Failure to do so may result in burns or other injury from the discharge of fluids.
	<b>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature.</b> Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

Continued on the next page

 <b>CAUTION</b>	<p><b>Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way.</b> Failure to observe these precautions may result in damage to the product and burns or other injury due to malfunction or the discharge of fluids.</p>
	<p><b>Do not use excessive force when connecting threaded pipes to the product.</b> Over-tightening may cause breakage leading to fluid discharge, which may cause burns or other injury.</p>
	<p><b>Use only under conditions in which no freeze-up will occur.</b> Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>
	<p><b>Use only under conditions in which no water hammer will occur.</b> The impact of water hammer may damage the product, leading to fluid discharge, which may cause burns or other injury.</p>

## Specifications



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.

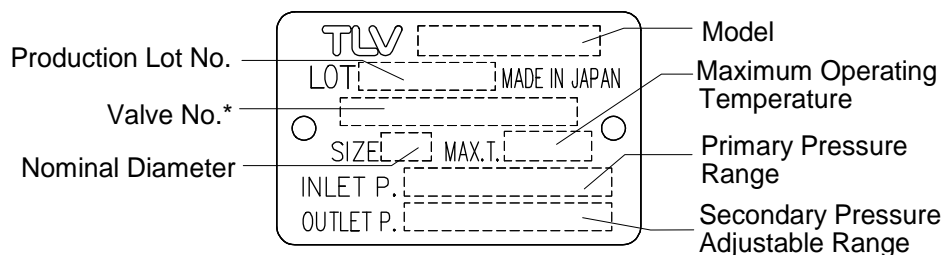


**DO NOT** use the product in excess of the maximum operating pressure differential; such use could make discharge impossible (blocked).



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.



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

## Acceptable Operating Range

Model	S-COS-16	S-COSR-16
Primary Pressure Range	0.2 to 1.6 MPaG (30 to 250 psig)	
Adjustable Secondary Pressure Range (all conditions must be met)	Within 10 – 84% of the primary pressure	
	Minimum adjustable pressure of 0.03 MPaG (5 psig)	
	Pressure differential between 0.07 to 0.80 MPa (10 to 116 psi)	
Maximum Operating Temperature	220 °C (428 °F)	
Minimum Adjustable Flow Rate	10% of rated flow rate	

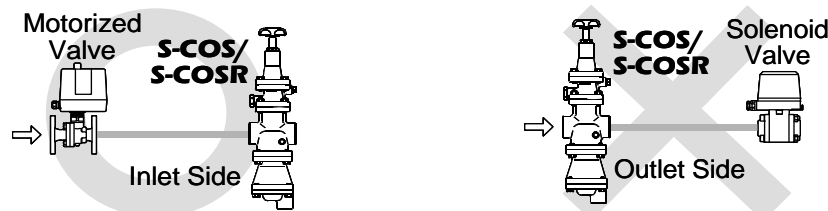
(1 MPa = 10.197 kg/cm<sup>2</sup>)

## Correct Usage of S-COS/S-COSR Pressure Reducing Valve



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.

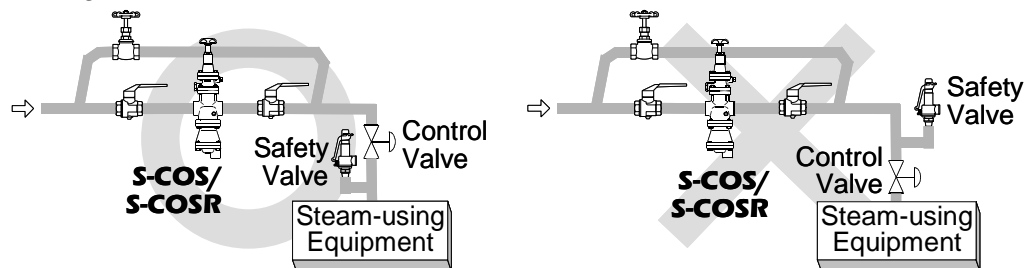
1. The S-COS/S-COSR should be operated only within its specifications.
2. Installing an ON/OFF Valve (Solenoid Valve or Motorized Valve)



If an on-off valve, such as a motorized valve, is required to stop supply of steam to the steam-using equipment, install it at the inlet side of the S-COS/S-COSR. If a solenoid valve is installed at the outlet of the S-COS/S-COSR, 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 S-COS/S-COSR 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. To save energy, it is recommended to install the on-off valve as near to the boiler as possible.

NOTE: To prevent water hammer, it is recommended that a slow-acting motorized on-off valve be used. In particular, if a fast-acting on-off solenoid valve is used for frequent temperature control, the potential water hammer effect can damage the steam-using equipment and the S-COS/S-COSR.

3. Installing a Control Valve



A control valve installed between the S-COS/S-COSR and the steam-using equipment (downstream of the S-COS/S-COSR) for controlling equipment temperature may raise the pressure between the S-COS/S-COSR and the control valve when the control valve is closed, depending on the spatial relationship.

A safety valve should be installed downstream of the control valve.

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

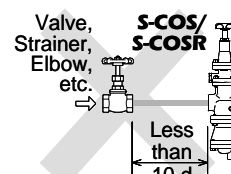
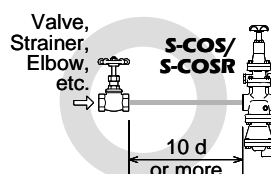
4. Precautions for the Installation of Additional Fittings Before or After the S-COS/S-COSR  
 In order to ensure stable steam flow, the piping upstream and downstream of the S-COS/S-COSR must be straight runs. If a S-COS/S-COSR is installed either directly before or after an elbow or control valve, unevenness in steam flow may result in chattering and unstable pressure. To ensure stable steam flow, it is recommended that the S-COS/S-COSR be installed on straight runs of piping, as illustrated below.

① Inlet (primary side) of the S-COS/S-COSR  
 diameter)

(d = pipe

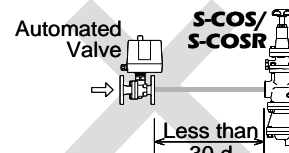
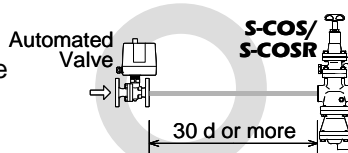
Maintain a straight piping run of **10 d or more** when a manual valve, a strainer or an elbow, etc. is installed.

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



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

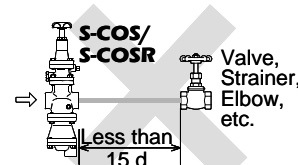
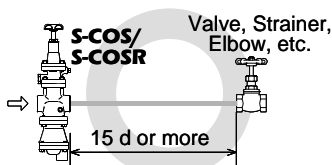
(Example: if nominal size is 25 mm (1 in), have 750 mm (30 in) or more)



② Outlet (secondary side) of the S-COS/S-COSR

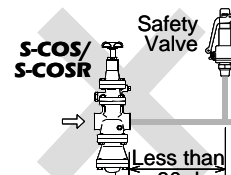
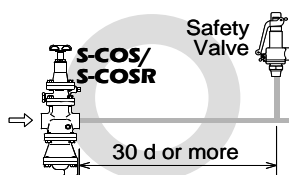
Maintain a straight piping run of **15 d or more** when a manual valve, a strainer or an elbow, etc. is installed.

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



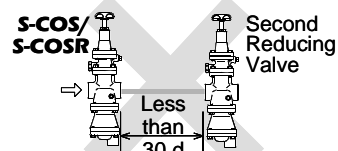
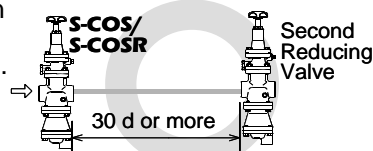
Maintain a straight piping run of **30 d or more** when a safety valve is installed.

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



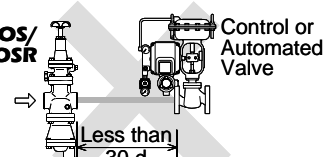
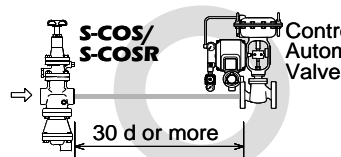
Maintain a straight piping run of **30 d or more** when another pressure reducing valve is installed. (Two-stage pressure reduction)

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



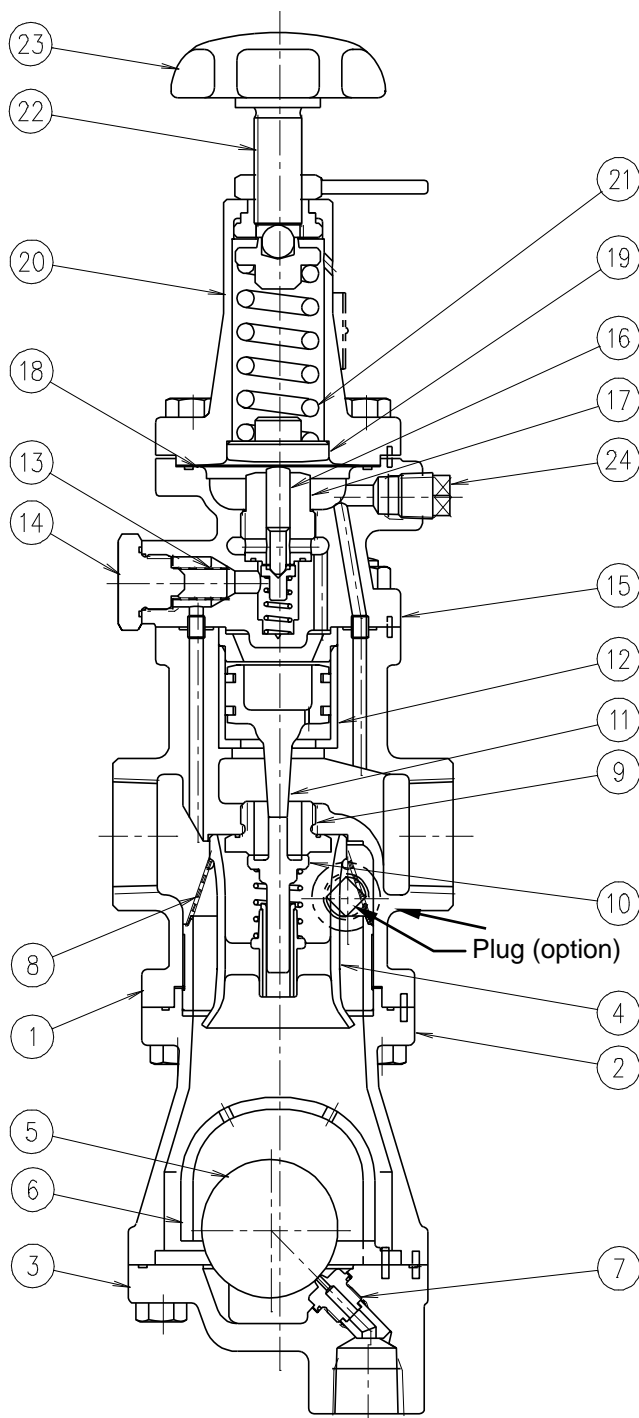
Maintain a straight piping run of **30 d or more** when a control valve or an automated valve (on-off valve) is installed.

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



## Configuration

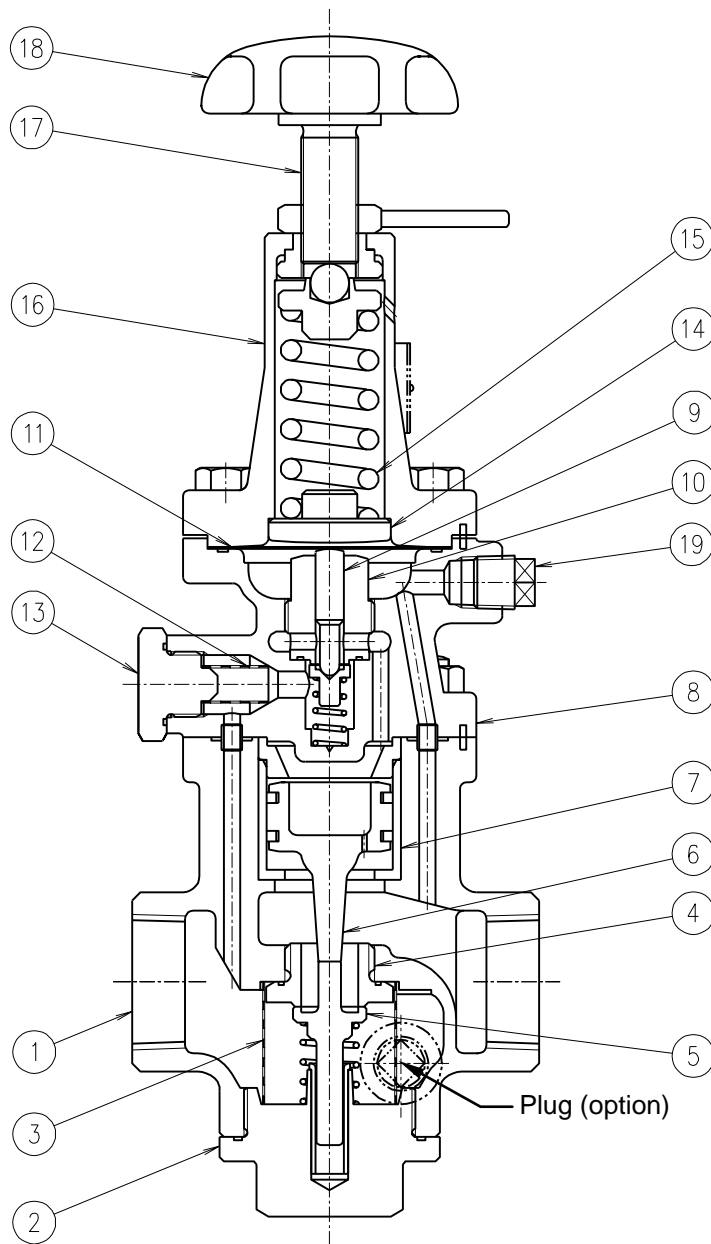
### S-COS-16



No.	Name
1	Main Body
2	Trap Body
3	Trap Cover
4	Separator
5	Float
6	Float Cover
7	Trap Valve Seat
8	Separator Screen
9	Main Valve Seat
10	Main Valve
11	Piston
12	Cylinder
13	Pilot Screen
14	Pilot Screen Holder
15	Pilot Body
16	Pilot Valve Stem & Valve
17	Pilot Valve Seat
18	Diaphragm
19	Diaphragm Support
20	Spring Housing
21	Coil Spring
22	Adjustment Screw
23	Adjustment Handle
24	Plug



## S-COSR-16



No.	Name
1	Main Body
2	Cover Plug
3	Screen
4	Main Valve Seat
5	Main Valve
6	Piston
7	Cylinder
8	Pilot Body
9	Pilot Valve Stem
10	Pilot Valve Seat
11	Diaphragm
12	Pilot Screen
13	Pilot Screen Holder
14	Diaphragm Support
15	Coil Spring
16	Spring Housing
17	Adjustment Screw
18	Adjustment Handle
19	Plug

## Installation



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.

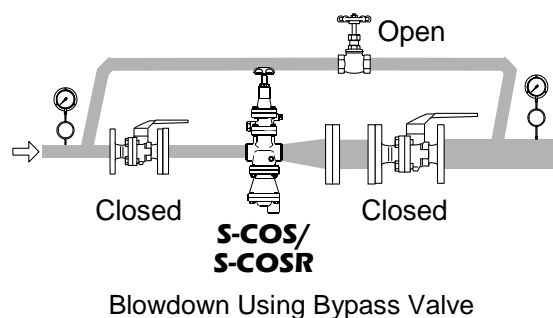


Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

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

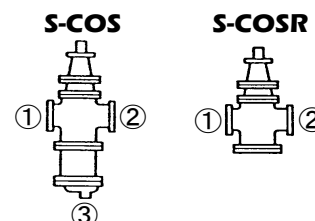
### 1. Blowdown

Before installing the S-COS/S-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.



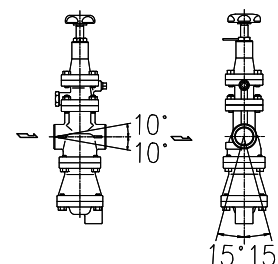
### 2. Removing Seal and Cap

Before installation, be sure to remove all protective seals and caps from the product inlet and outlet(s). (Found in 3 locations on S-COS, 2 locations on S-COSR.)



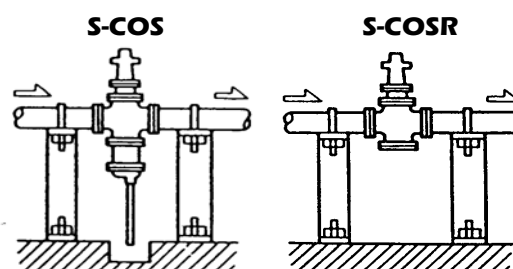
### 3. Installation Angle

Make sure the S-COS/S-COSR is installed on horizontal piping, so that the arrow mark on the body matches the direction of steam flow and the adjustment screw faces up. Allowable inclination is 10 degrees in the fore-aft direction and 15 degrees in the plane perpendicular to the steam flow line.

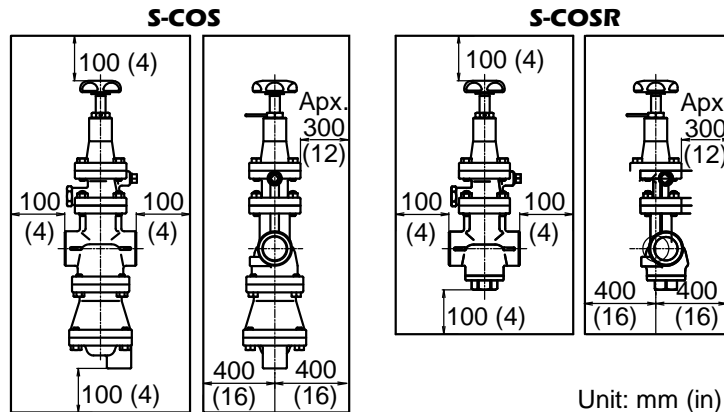


### 4. Piping Support

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



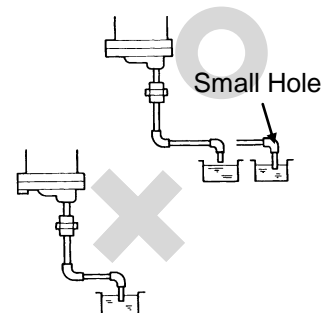
5. Maintenance Space  
Leave sufficient space for maintenance, inspection and repair.



Unit: mm (in)

6. Trap Outlet Pipe (S-COS Only)

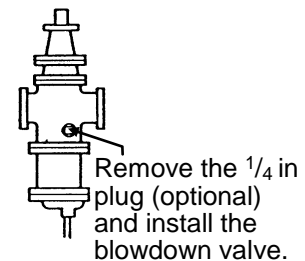
For ease of maintenance, installation of a union connection is recommended for the trap outlet pipe. Connect the outlet pipe to a condensate return line, or extend it to a trench. In the case of the latter, make sure the end of the pipe is above the waterline. (Dirt and water may be sucked up by the vacuum formed during trap closure and system shutdown.)



7. Blowdown Valve (requires optional plug)

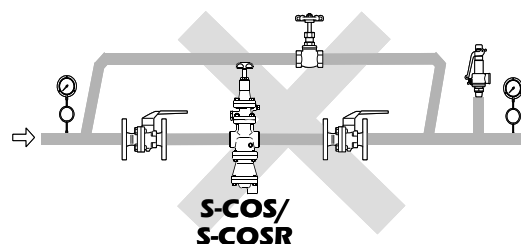
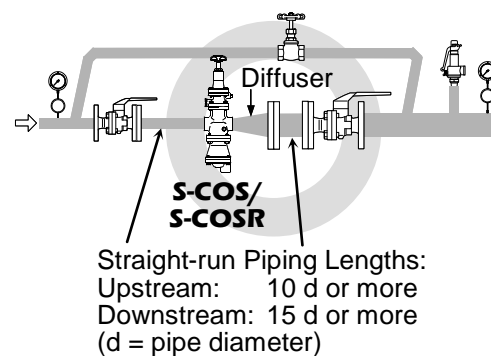
In an environment of heavy dirt or scale, or when the steam-using equipment is used only periodically, such as for room heating equipment, be sure to use a blowdown valve.

- 1) Remove the plug from the main body.
- 2) Install the blowdown valve.
- 3) Open the blowdown valve (while S-COS/S-COSR is pressurized) and blow any residual dirt and scale off of the screen.
- 4) Periodically activate the blowdown valve to keep the system free of dirt and scale.



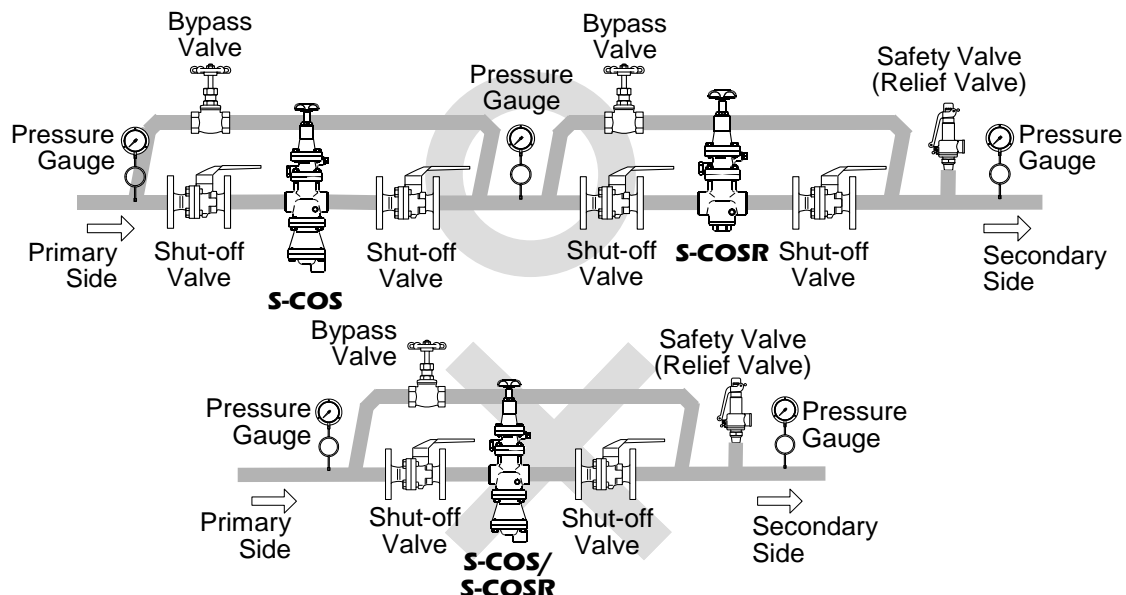
8. Piping Size/Diffuser

If it is expected that the secondary steam flow velocity will 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 S-COS/S-COSR and the steam-using equipment is great, a possible drop in pressure should be taken into consideration when selecting the piping size. In addition, when installing the strainer, the strainer screen should be either at the 3 o'clock or 9 o'clock position to prevent condensate accumulation.



## 9. Two-stage Pressure Reduction

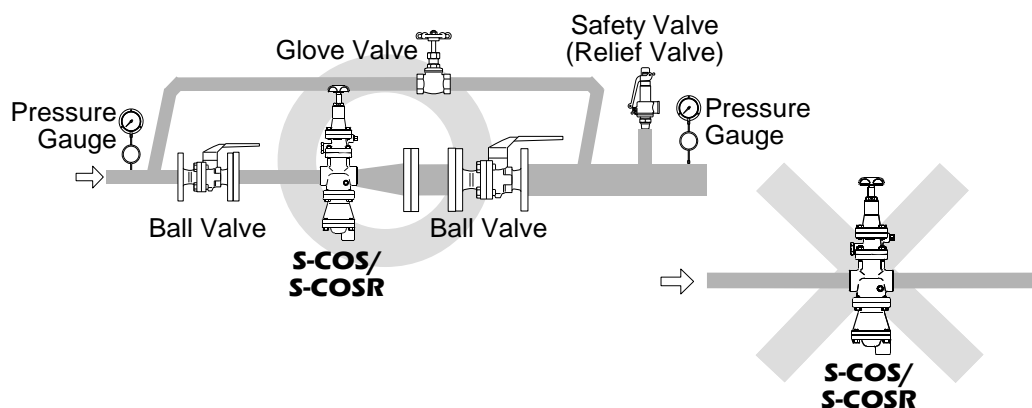
Two-stage pressure reduction should be performed whenever the pressure cannot be reduced to the desired level with a single S-COS/S-COSR due to operating range limitations, such as when the reduction ratio is greater than 10:1.



## 10. Accessories

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 the size of the inlet (primary side) pipe.

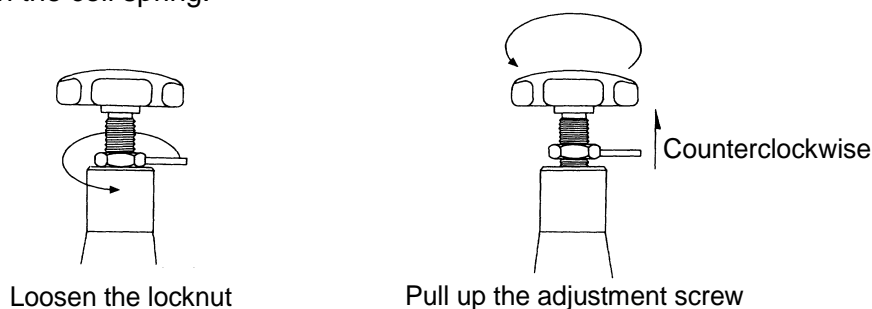
A strainer should always be installed ahead of the S-COS/S-COSR has a built-in strainer, however in case an external strainer is installed, it should be installed ahead of S-COS/S-COSR and the strainer should be installed horizontally with the basket at the 3 or 9 o'clock position in order to prevent condensate accumulation.



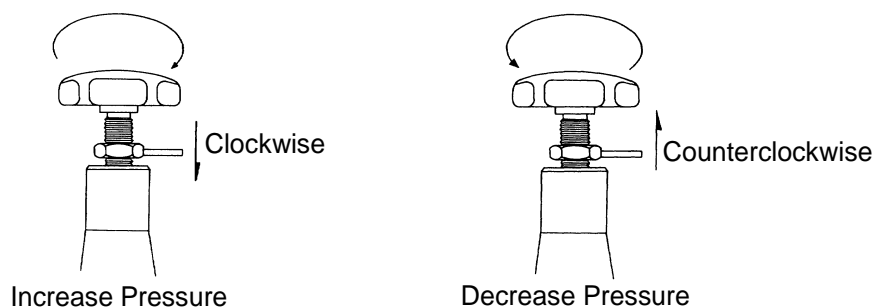
## Adjustment

The **S-COS/S-COSR** pressure reducing valve should be properly adjusted for protection of the steam-using 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 steam-using 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 S-COS/S-COSR are completely closed.
3. Loosen the locknut and turn the adjustment screw counterclockwise to reduce tension on the coil spring.



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



7. Slowly, fully open the shut-off valve at the outlet of the S-COS/S-COSR.
8. After adjustment, retighten the locknut.
9. When shutting down the system, always close the outlet shut-off valve first and then the inlet valve.

## Maintenance



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



Be sure to use only the recommended components when repairing the product, and NEVER attempt to modify the product in any way. Failure to observe these precautions may result in damage to the product or burns or other injury due to malfunction or the discharge of fluids.

## Operational Check

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

Part	Inspection and Maintenance Frequency
Main Screen, Pilot Screen	Disassemble and clean annually. If there is substantial blockage, install a strainer (approximately 60 mesh) ahead of the S-COS/S-COSR.
Main Valve, Main Valve Seat, Pilot Valve, 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.
Trap Valve Seat (S-COS Only)	Replace after approximately 40,000 hours. If scale build-up is severe, blockage may occur in a short period of time.
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



**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**

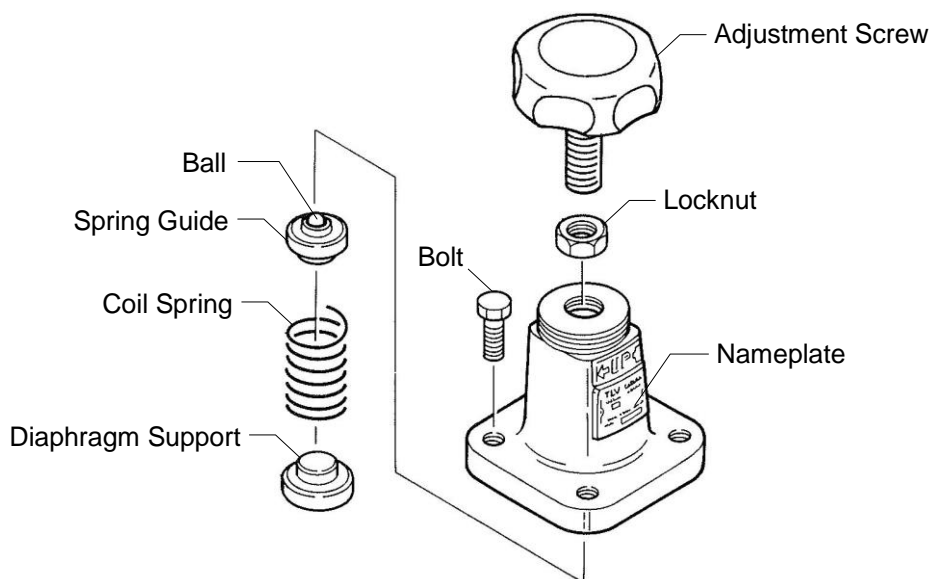
When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature. Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.

It is a recommended practice to dismantle and inspect the S-COS/S-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 such as a 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 steam from the piping (both upstream and downstream). If the steam supply to the system cannot be shut off, change over to bypass operation. Close shut-off valves at the inlet and outlet of the S-COS/S-COSR completely. Relieve residual steam pressure by loosening slightly the spring housing bolt and screen holder or plug. Wait for the body to cool before attempting to remove the S-COS/S-COSR from the line. Then remove inlet and outlet flange retaining bolts and nuts to permit removal of the S-COS/S-COSR. Secure the S-COS/S-COSR in a vise to perform the inspection.

### Disassembling the Adjustment Section

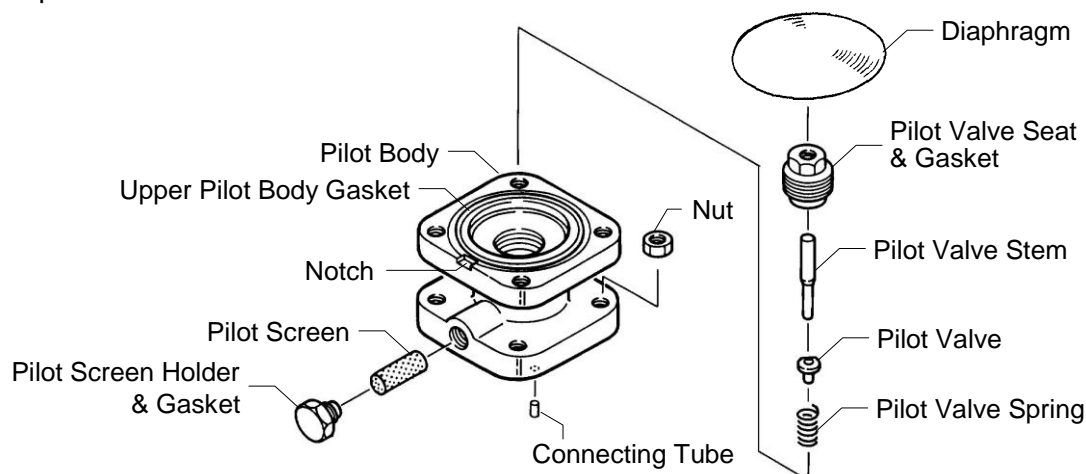
Loosen the adjustment screw completely and remove the bolts. Having removed the spring housing, you will see the diaphragm support, coil spring and spring retainer.  
⇒ Check for seizure or any damaged screw threads.



### 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 seat of the pilot valve, 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.

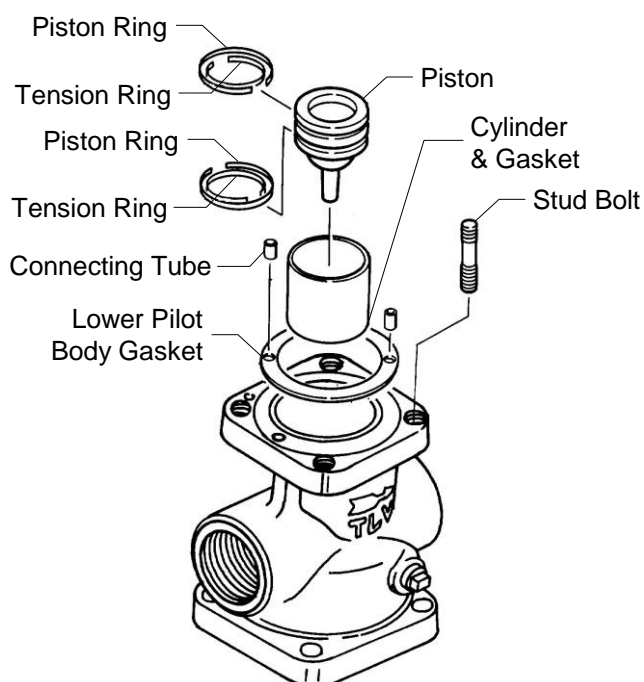


### Disassembling the Piston Section

Remove the pilot body after loosening and removing the nuts from the stud 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.

⇒ Check for 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.





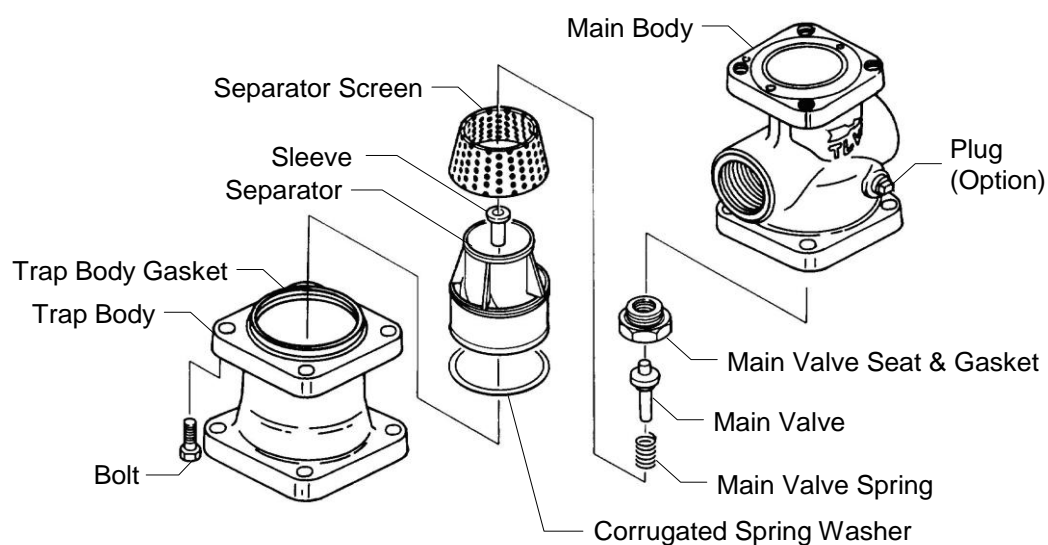
### Disassembling the Separator and Main Valve Section (S-COS only)

Turn the S-COS upside down for easy dismantling of the separator and main valve. Loosen the bolts and remove the trap body. Be careful, as the separator may drop off when the **S-COS** is returned to the normal attitude.

Removal of the separator and pressed-in sleeve permits the removal of the main valve spring, main valve and separator screen. Loosen the main valve seat with a box wrench and remove it from the main body.

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

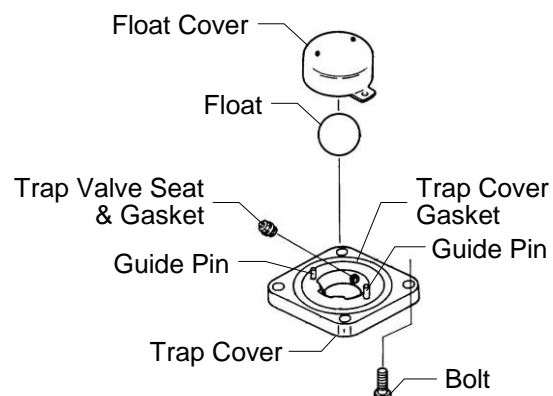
At start-up following shut-down for a long period, always blow down the piston section of the main body through the plug (if optional plug is supplied).



### Disassembling the Steam Trap Section (S-COS Only)

Loosen the bolts and remove the trap cover. Be careful, as hot condensate may splash out. Remove the bolt from the float cover to reveal the float. Remove the float, then loosen the valve seat with a box wrench and remove it.

⇒ Check to verify that there is no deformation of the float, abnormality in the trap valve seat or dirt accumulation in the trap cover.

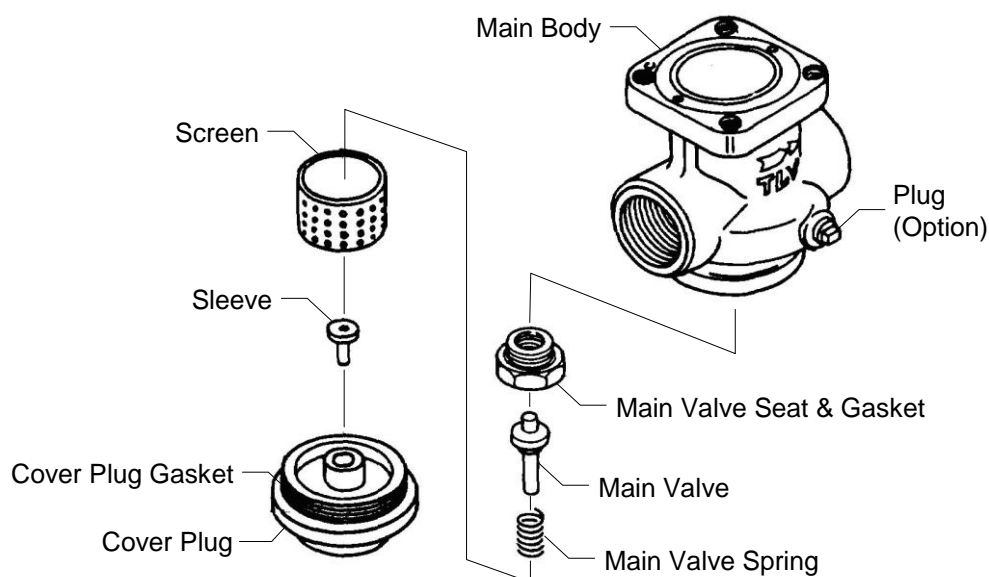


### Disassembling the Cover Plug and Main Valve Section (S-COSR Only)

Turn the S-COSR upside down for easy dismantling of the cover plug and main valve. Loosen and remove the cover plug. Removal of the cover plug and pressed-in sleeve permits the removal of the main valve, main valve spring and the screen. Loosen the main valve seat with a box wrench and remove it from the main body.

⇒ Check for damage on the seating and sliding surfaces of the main valve seat and the seating surface of the 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 (if optional plug is supplied).



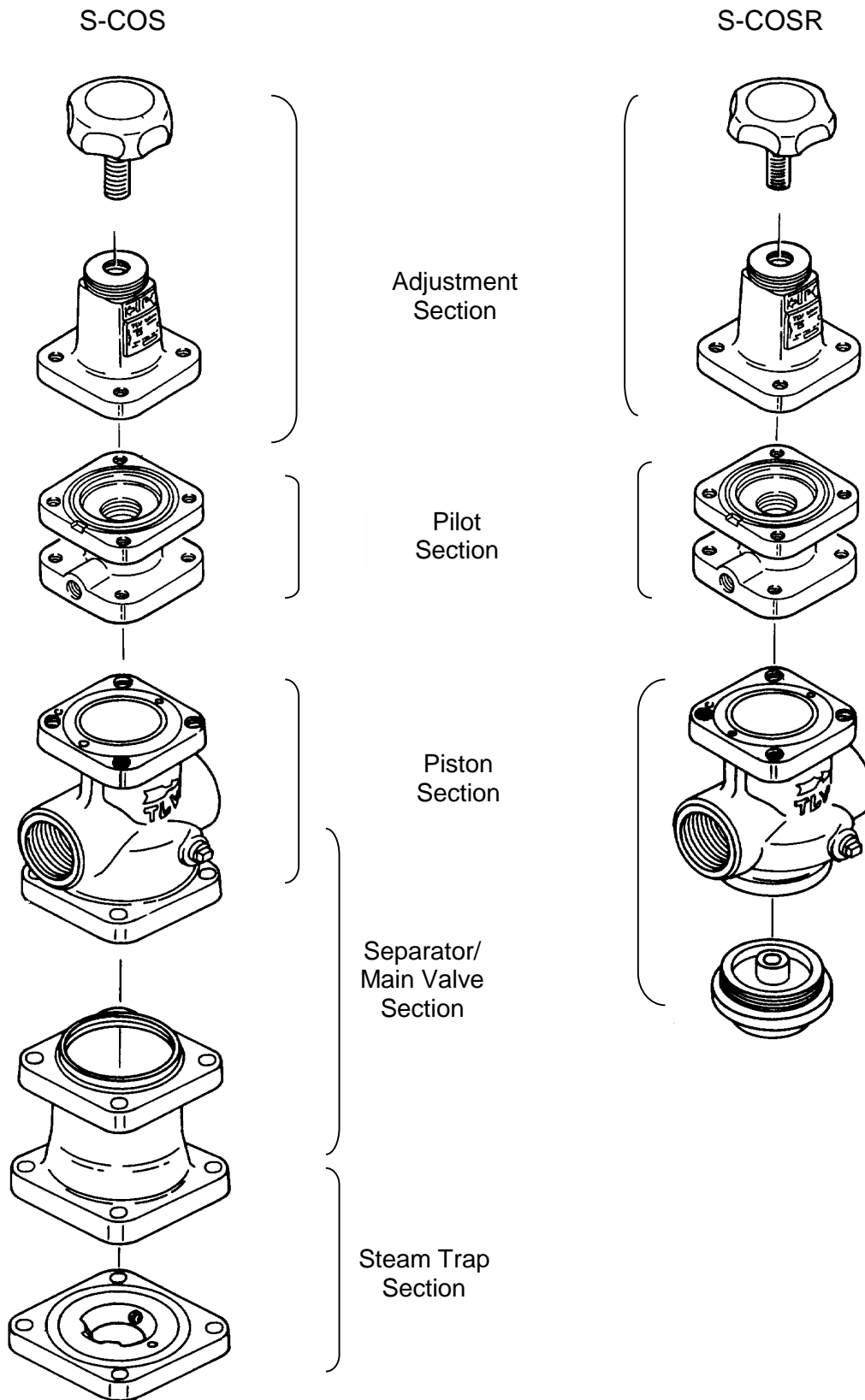
### Cleaning

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

S-COS		S-COSR	
Trap Cover	Adjustment Screw	Cover Plug	Adjustment Screw
Pilot Valve	Pilot Valve Seat	Pilot Valve	Pilot Valve Seat
Main Valve	Main Valve Seat	Main Valve	Main Valve Seat
Pilot Screen	Pilot Valve Stem	Pilot Screen	Pilot Valve Stem
Piston	Separator Screen	Piston	Screen
Piston Ring	Cylinder	Piston Ring	Cylinder
Float	Trap Valve Seat		

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

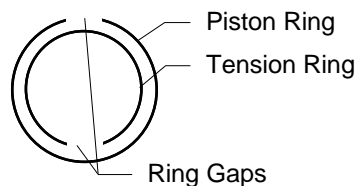
Exploded View



## 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 guide, 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 valve stem operate smoothly without binding.
  - 1) Fit the piston ring to the outside of the tension ring.
  - 2) The ring gaps should be opposite each other.



Assembling the Piston Ring

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

Part	Tightening Torque		Distance Across Flats	
	(N·m)	(lbf·ft)	(mm)	(in)
Bolt for Spring Housing / Pilot Body	25	(19)	13	(1/2)
Pilot Valve Seat	50	(37)	17	(21/32)
Pilot Screen Holder	40	(29)	24	(15/16)
Nut & Bolt for Pilot Body / Main Body	30	(22)	13	(1/2)
Bolt for Main Body / Trap Body (S-COS only)	30	(22)	13	(1/2)
Main Valve Seat	70	(51)	27	(11/16)
Trap Valve Seat (S-COS only)	10	(7)	11	(7/16)
Bolt for Trap Cover / Trap Body (S-COS only)	30	(22)	13	(1/2)
Cover Plug (S-COSR only)	120	(88)	32	(1 1/4)

(1 N·m  $\approx$  10 kg·cm)

- NOTE: -If a torque greater than that recommended is applied, the pressure reducing valve 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



### 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.

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 pressure reducing valve, 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. Steam leaks from the steam trap or condensate is not discharged.(S-COS only)
6. 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 “Correct Usage of S-COS/S-COSR Pressure Reducing Valve”, “Acceptable Operating Range” and “Adjustment” sections be reviewed.

Problem	Symptom	Cause	Remedy
The secondary pressure does not increase	The S-COS/S-COSR body is not warm	No steam is being supplied or the inlet valve is closed	Check the valves and piping at the primary side
	The body is warm, but the pressure does not increase	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 steam flow	Check the flow, replace the S-COS/S-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 pilot valve stem, pilot valve, piston 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	The small hole on the piston is clogged	Clean
		The diaphragm is distorted or damaged	Replace with a new diaphragm
		There is fluctuation in steam consumption	Check the flow rate, replace the S-COS/S-COSR if necessary
		The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace the S-COS/S-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 bypass valve if necessary
		There is a build-up of dirt on or damage to the pilot valve or main valve seating surfaces	Clean Align Replace if necessary
Hunting or chattering occurs	Occurs at low steam demand	It is being operated below the lower flow rate limit	Check the volume of steam supply, replace with a smaller diameter valve
	Hunting never stops	There is too high a reduction ratio (operated at below 10% of the primary pressure)	Use a two-stage reduction arrangement
		The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace the S-COS/S-COSR if necessary
	Chattering never stops	Condensate is contained, or the trap is blocked (S-COS only)	Check the trap Check the piping
		The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace the S-COS/S-COSR if necessary
	Abnormal noises	Makes a high-pitched noise	There is too high a reduction ratio, the flow is too great, or there is a high-speed open/close valve nearby
Faulty steam trap (S-COS only)	Steam is blowing	There is a build-up of dirt on the trap valve seat or at the float base	Clean
		The body is installed tilted	Check the piping
		The float is deformed	Check for water hammer Replace with a new float
		There is vibration in the piping	Secure the piping

Continued on the next page

<b>Problem</b>	<b>Symptom</b>	<b>Cause</b>	<b>Remedy</b>
Faulty steam trap (S-COS only) (continued)	No condensate is discharged	The primary pressure exceeds the trap valve seat maximum working pressure	Adjust primary pressure
		Water is inside the float	Replace with a new float
		The outlet piping is clogged	Check the piping Clean
		The trap valve seat is clogged	Clean Replace with a new trap valve seat

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This warranty does not cover defects or failures caused by:

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

### Duration of Warranty

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

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