



Manufacturer

**TLV** CO., LTD.

Kakogawa, Japan

is approved by LRQA LTD. to ISO 9001/14001



# Instruction Manual

Surplussing Valve  
**SP-COSR-16**

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## Introduction

Thank you for purchasing the **TLV** Surplussing valve.

This product has been thoroughly inspected before being shipped from the factory. When the product is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary. Also be sure to read this manual carefully before use and follow the instructions to be sure of using the product properly.

If detailed instructions for special order specifications or options not contained in this manual are required, please contact **TLV** for full details.

This instruction manual is intended for use with the model(s) listed on the front cover. It is necessary not only for installation but for subsequent maintenance, disassembly/reassembly and troubleshooting. Please keep it in a safe place for future reference.


## Safety Considerations

- Read this section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: DANGER, WARNING and CAUTION.
- The three types of cautionary items above are very important for safety: be sure to observe all of them as they relate to installation, use, maintenance, and repair. Furthermore, TLV accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

### 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
	<p><b>Install properly and DO NOT use this product outside the recommended operating pressure, temperature and other specification ranges.</b> Improper use may result in such hazards as damage to the product or malfunctions that may lead to serious accidents. Local regulations may restrict the use of this product to below the conditions quoted.</p> <p><b>Use hoisting equipment for heavy objects (weighing approximately 20 kg (44 lb) or more).</b> Failure to do so may result in back strain or other injury if the object should fall.</p> <p><b>Take measures to prevent people from coming into direct contact with product outlets.</b> Failure to do so may result in burns or other injury from the discharge of fluids.</p> <p><b>When disassembling or removing the product, wait until the internal pressure equals atmospheric pressure and the surface of the product has cooled to room temperature.</b> Disassembling or removing the product when it is hot or under pressure may lead to discharge of fluids, causing burns, other injuries or damage.</p>

Safety considerations are 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>

## Piping

Install the **SP-COSR** as follows:

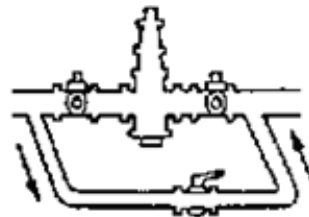
### Blowdown

Before installing the **SP-COSR**, be sure to blow down all piping thoroughly. If this is not possible, use a bypass valve. Blowdown is especially important for newly installed piping or after the system has been shut down for a long period of time.

Blowdown  
(before installation)



Blowdown  
(using bypass valve)  
SP-COSR



### Removing the Seals and Caps

Before installation, remove the dust seals and caps covering the apertures on the main body (on the inlet and outlet).

### Installing Spacers

When spacing adjustment is required to accommodate installation, install the spacer on the outlet flange. The spacer should consist of a spacer, gaskets, nuts and bolts. Fit the gaskets on both sides of the spacer between the **SP-COSR** outlet and the pipe flange. Fasten with the bolts and nuts.

### Piping Supports

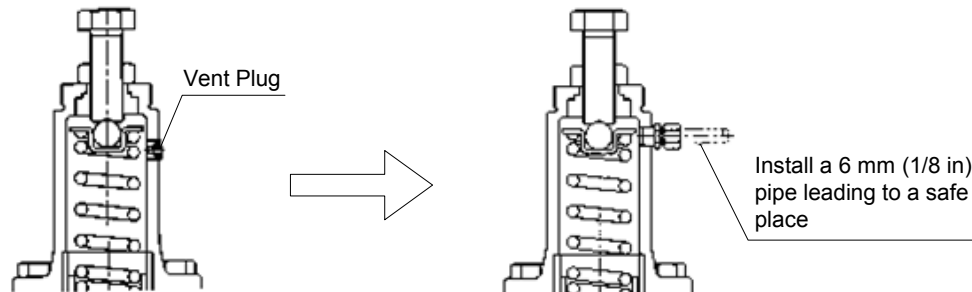
When installing the **SP-COSR**, make sure it will not be subjected to excessive load, bending or vibration. We recommend that you support the inlet and outlet pipes securely.

### Clearance (Withdrawal Distance)

Be sure to leave sufficient space for maintenance, inspection and repair. Refer to the product nameplate for detailed specifications.

## Piping for Safety

Using a hex wrench, remove the vent plug and then use the coupler provided with the valve to attach a pipe leading to a safe location. This should be done so that people nearby will not be burned even if the diaphragm should break and allow steam or condensate to escape.

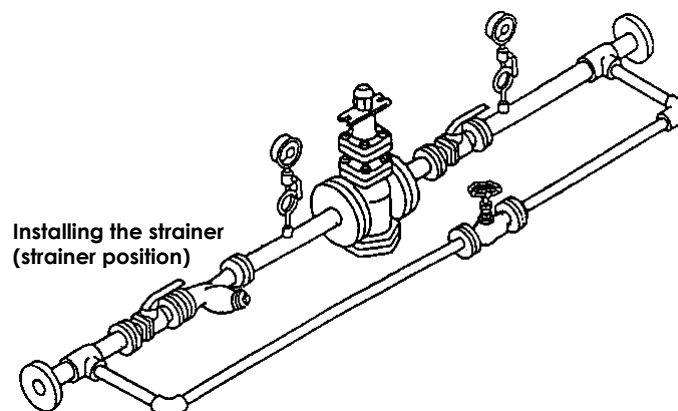


## Installing a Diffuser and Strainer

If the steam flow velocity in the pipe on the secondary side is expected to exceed 30 meters per second (100 ft/sec)\*, install a diffuser to increase the pipe size and reduce the flow in the pipe to below that level.

A strainer should be installed ahead of the **SP-COSR**. The strainer should be 60-mesh or greater but not so fine that it causes constriction of the flow area and a subsequent pressure drop. The strainer should be installed horizontally and at 90 degrees to its normal orientation to the pipeline in order to prevent condensate accumulation in the screen body.

\*Steam flow velocity in pipe 30 m/s (100 ft/sec): this value has been taken from the standard value for steam flow velocity in piping as noted in the Piping Handbook.



## Flowrate Calculation Formula

$$V = \frac{2.78 W \cdot V''}{a} = \frac{3.53 W \cdot V''}{d^2} \quad (\text{m/s})$$

$$V = \frac{0.0509 W \cdot V}{d^2} \quad (\text{ft/s})$$

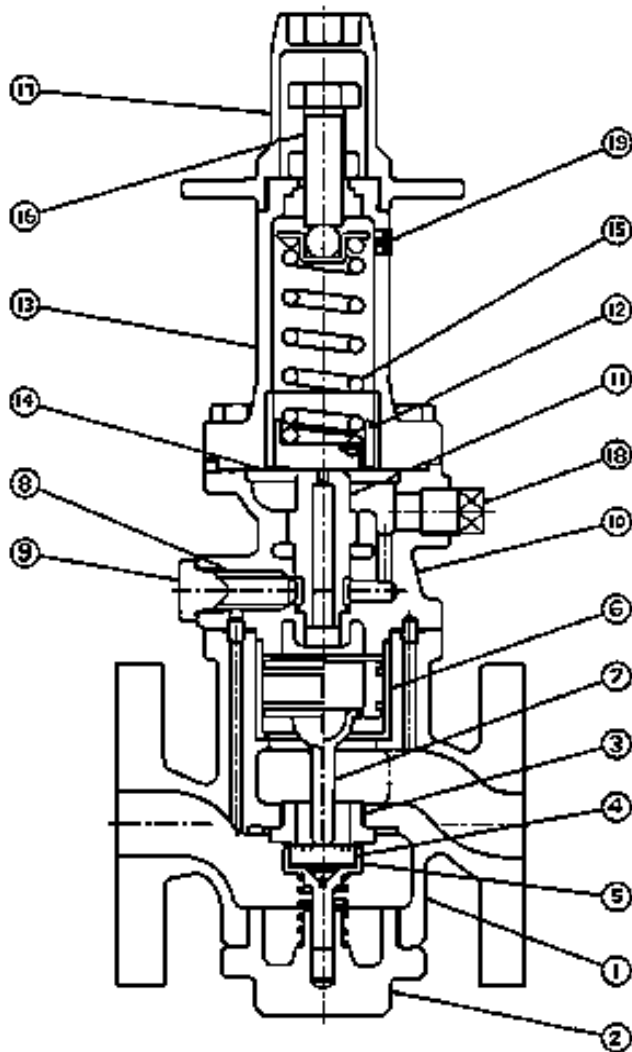
W = average-flow · (kg/hr)(lb/hr)

V'' = specific-volume · (m<sup>3</sup>/kg)(ft<sup>3</sup>/lb)

a = inside-pipe-area · (cm<sup>2</sup>)(in<sup>2</sup>)

d = pipe-ID · (cm)(in)

## Configuration



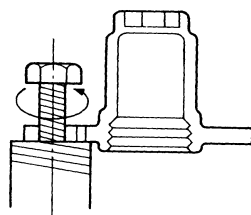
No.	Name
1	Main Body
2	Cover Plug (15 – 25 mm) Cover (32 – 50 mm)
3	Main Valve Seat
4	Main Valve
5	Main Valve Holder
6	Cylinder
7	Piston
8	Pilot Screen
9	Pilot Screen Holder
10	Pilot Body
11	Pilot Valve
12	Diaphragm Support
13	Spring Housing
14	Diaphragm
15	Coil Spring
16	Adjustment Screw
17	Spanner Cap
18	Plug (R <sup>3</sup> / <sub>8</sub> )
19	Vent Plug (R <sup>1</sup> / <sub>8</sub> )

NOTE: Sizes 15 – 25 mm ( $\frac{1}{2}$  – 1 in) shown.  
Configuration for sizes 32 – 50 mm ( $1\frac{1}{4}$  – 2 in) differs slightly.

## Adjustment

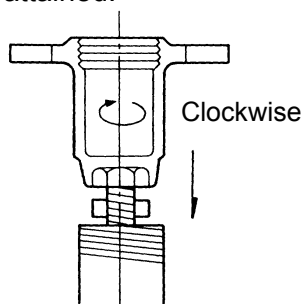
The **SP-COSR** must be properly adjusted for protection of the steam-using equipment against water hammer.

1. On newly installed piping or after the system has been shut down for a long period of time, use the bypass valve to blow out the pipes thoroughly. Be especially careful that no condensate and rust, etc. is left in the steam-using equipment.
2. Make sure that the bypass valve and the shut-off valves upstream and downstream of the **SP-COSR** are completely closed.
3. The **SP-COSR** has been preset to the designated pressure at the factory.
4. Open the shut-off valve on the secondary side all the way and then open the shut-off valve on the primary side slightly.
5. After supplying steam to the **SP-COSR**, check to make sure that the **SP-COSR** operates properly and there is no leakage from the pipes, etc. Then closely open the shut-off valve on the primary side all the way.
6. When the set pressure must be readjusted, use the following procedure.
7. Open the shut-off valve on the secondary side all the way, then open the shut-off valve on the primary side slightly.
8. Remove the spanner cap and loosen the locknut by turning it counter-clockwise.

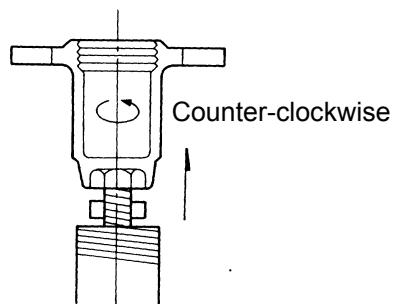


Loosen the locknut

9. While monitoring the primary pressure gauge, decrease the pressure by turning the adjustment screw counter-clockwise to loosen it, or increase the pressure by turning the adjustment screw clockwise to tighten it. Do this until the desired pressure is attained.



Tighten the Adjustment Screw  
Increase Pressure



Loosen the Adjustment Screw  
Decrease Pressure

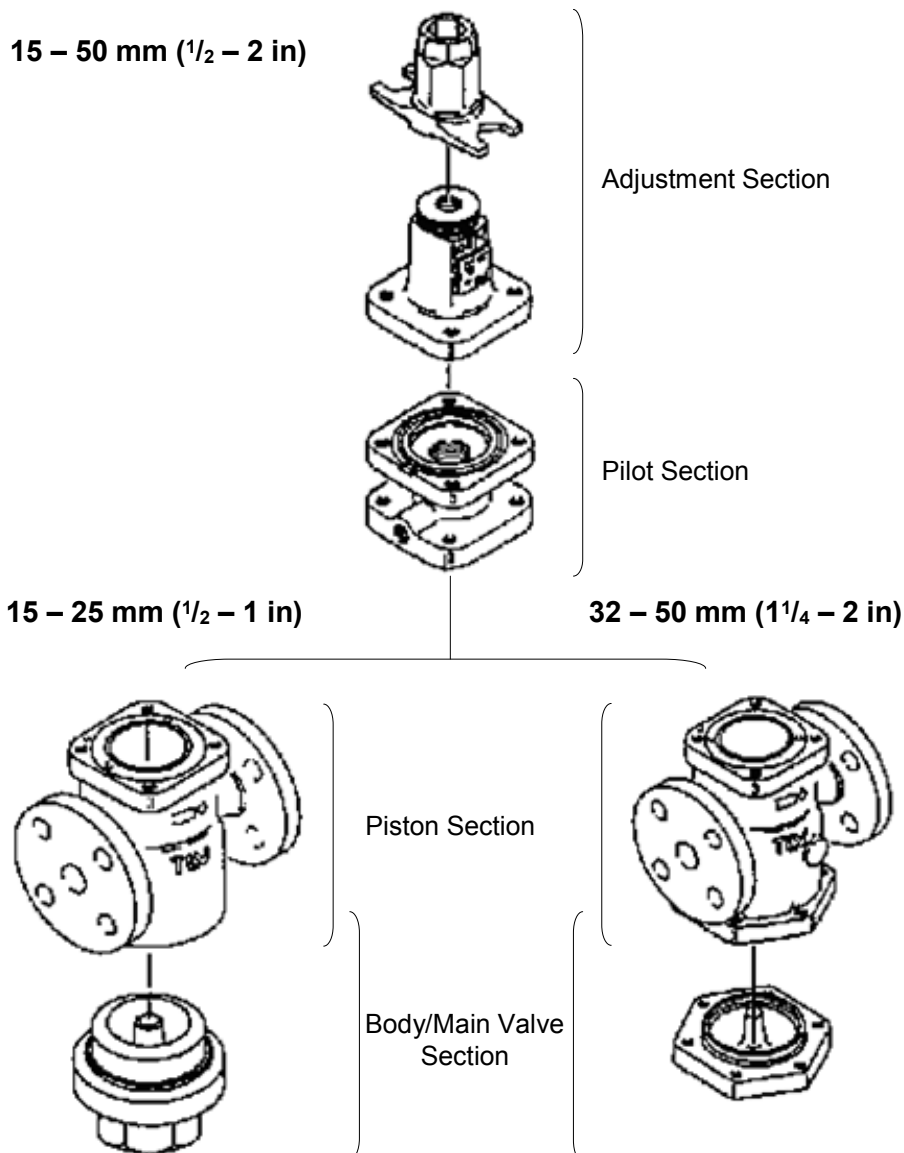
10. If the pressure is too high or low, turn the adjustment screw to adjust the pressure to a suitable setting. After the adjustment, retighten the locknut before opening the shut-off valve on the primary side all the way.
11. Replace the spanner cap.
12. To stop steam supply, close the shut-off valves upstream and downstream of the valve.



## Disassembly and Inspection

Disassembling and inspecting the valve once a year can help prevent unexpected failure. We recommend that you inspect the valve right after operating the system with newly installed piping or after the system has been out of service for a long period of time.

### Exploded Diagram



First release the pressure in the piping completely (on both primary and secondary sides). If the pressure cannot be eliminated, switch to bypass operation and completely close the shut-off valves upstream and downstream of the **SP-COSR**. Then slightly loosen the hex bolt on the spring housing and the pilot screen holder or plug to relieve the residual steam pressure.

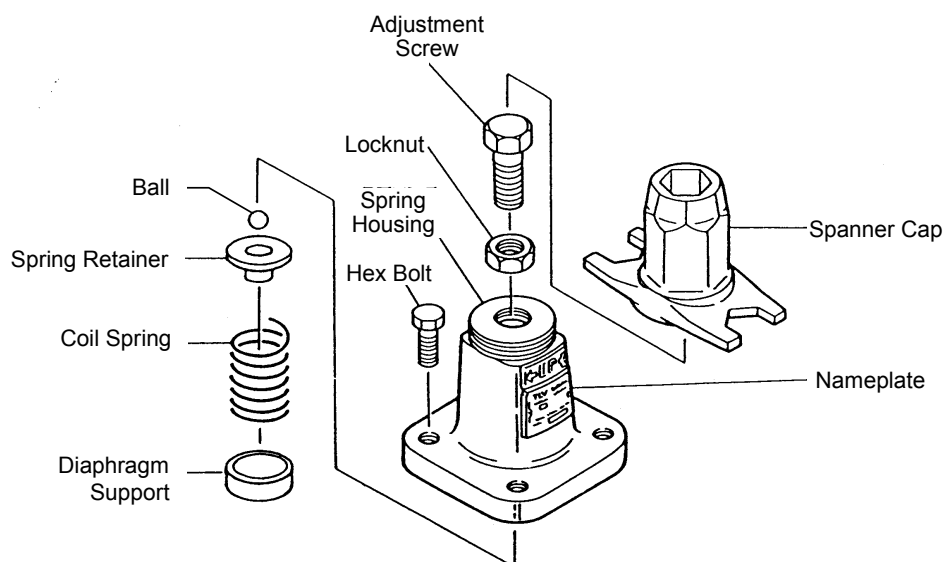
To disassemble the valve, remove the bolts and nuts on the inlet and outlet flanges and fasten the valve in a vise before starting the inspection.

## Disassembling the Adjustment Section

Check to make sure there are no damaged or missing screws.

Loosen the locknut by turning it counter-clockwise, then loosen the adjustment screw all the way and remove the hex bolt. Removing the spring housing will reveal the diaphragm support, coil spring and spring retainer.

15 – 50 mm ( $\frac{1}{2}$  – 2 in)

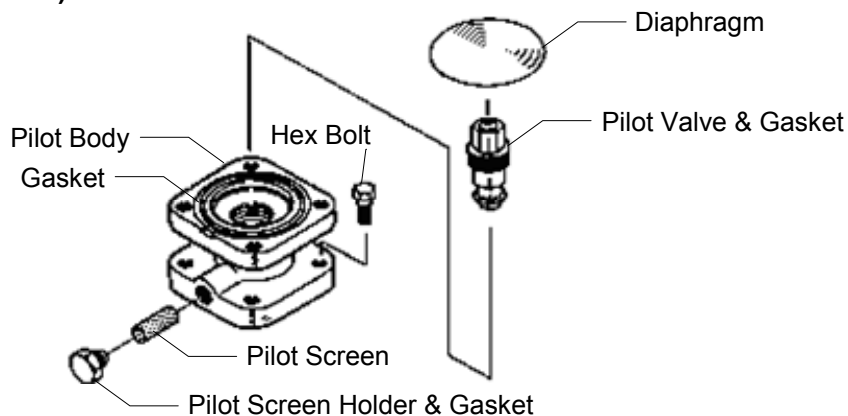


## Disassembling the Pilot Section

Check to make sure there are no scratches on the pilot valve seat or flaws in the gasket and that the pilot screen is not clogged. Also check to make sure the diaphragm is not warped, scratched or corroded. The diaphragm should be convex (open downward).

To remove the diaphragm, place the tip of a screw driver in the notch in the pilot body and lift up. Using a box wrench, loosen the pilot valve and remove it. Then remove the pilot screen holder and pilot screen.

15 – 50 mm ( $\frac{1}{2}$  – 2 in)

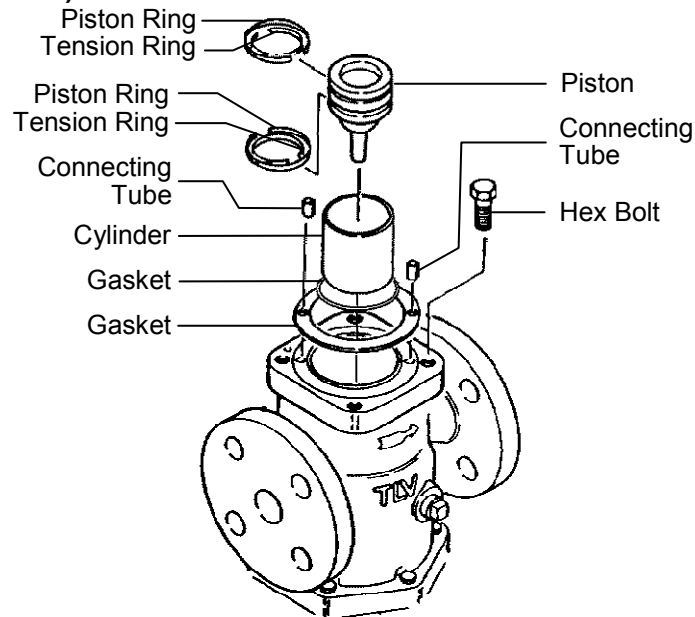


### Disassembling the Piston Section

Check the inside of the cylinder, the outside of the piston ring, the tiny holes in the piston and the gasket to make sure all are in good condition.

Loosen the hex (stud) bolt and then remove the pilot body. During this process, be careful not to lose the two connecting tubes. Take the piston and cylinder out of the body, then remove the piston ring and tension ring from the piston. Be careful not to apply excessive force when removing the piston and tension rings.

**15 - 50 mm ( $\frac{1}{2}$  - 2 in)**

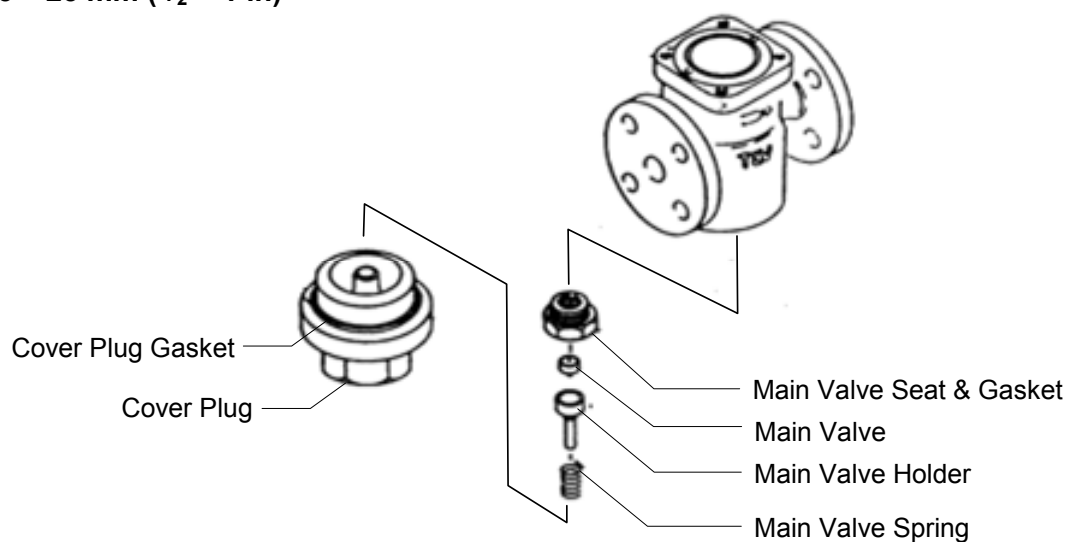


## Disassembling the Main Body and Main Valve Section

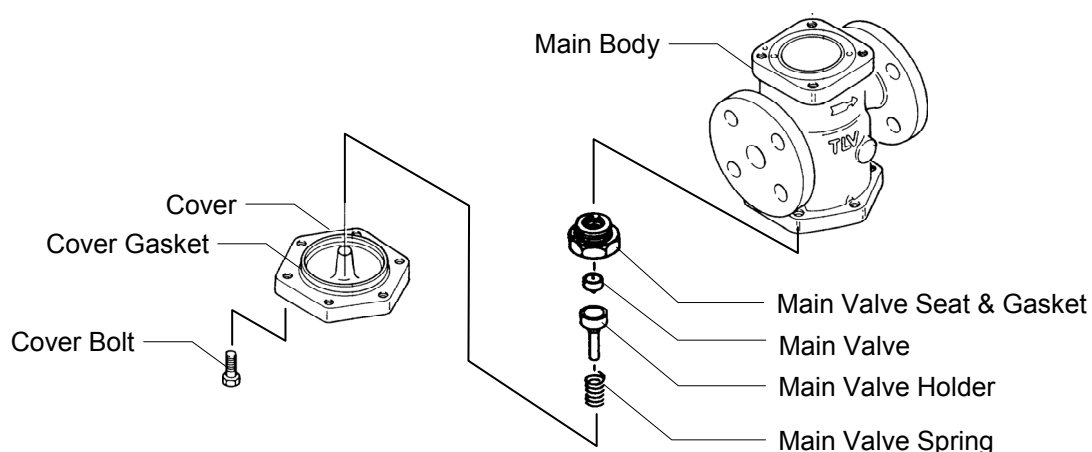
Check the seating and sliding surfaces of the main valve and main valve seat to make sure that they are not damaged. When starting up the equipment after it has been idle for a long period of time, always blow out the piston section of the body through the cover plug when steam is supplied.

Turn the **SP-COSR** upside down to make it easier to disassemble the main body and main valve section. For 15, 20 and 25 mm ( $\frac{1}{2}$ ,  $\frac{3}{4}$  and 1 in.) valves, turn the cover counter-clockwise and remove it. For 32, 40 and 50 mm ( $1\frac{1}{4}$ ,  $1\frac{1}{2}$  and 2 in) valves, loosen the cover bolts and remove the cover. This will enable the main valve and main valve spring to be removed. Use a box wrench to loosen the main valve seat and remove it from the body.

### 15 – 25 mm ( $\frac{1}{2}$ – 1 in)



### 32 – 50 mm ( $1\frac{1}{4}$ – 2 in)



## Cleaning

Check each section and, if there are no problems, clean and reassemble the parts. The following parts will require cleaning before reassembly:

Piston and Tension Rings		
Diaphragm Support		
Inside of Spring Housing (parts that come into contact with the diaphragm retainer)		
Cylinder	Pilot Screen	Main Valve seat
Pilot Valve	Diaphragm	Main Valve
Adjustment Screw	Piston	

Although these parts may be simply rinsed in water, it would be more effective to use a mild detergent. Carefully wipe components dry after cleaning; especially, the inside of the spring housing, the diaphragm retainer, adjustment screw and diaphragm.

## Assembly

Assemble by following the disassembly procedure in reverse. Use the following guidelines:

1. PTFE gaskets may be used if they are not damaged, crushed or warped.
2. Apply anti-seize agent to screws and bolts, spring retainer ball and adjustment screw. On the threads of main valve seats, pilot valves and pilot screen holder screws, use the anti-seize agent sparingly to make sure it does not come into contact with other parts.
3. Fasten the bolts one at a time in a diagonally alternate pattern to provide uniform seating.
4. During assembly, check to make sure the piston moves smoothly.
5. Assemble the piston and tension rings as follows:
  - Fit the piston ring to the outside of the tension ring.
  - Make sure the ring gaps are opposite one another.
6. The following table shows the screw tightening torque and tool width across flats:

Parts Name	Size		Distance Across Flats		*Torque	
	mm	(in)	mm	(in)	N·m	(ft·lb)
Bolt for Spring Housing	–		17	( <sup>11</sup> / <sub>16</sub> )	40	(29)
Pilot Valve	–		19	( <sup>3</sup> / <sub>4</sub> )	70	(51)
Pilot Screen Holder	–		24	( <sup>15</sup> / <sub>16</sub> )	40	(29)
Bolt for Pilot Body	15–40	( <sup>1</sup> / <sub>2</sub> – <sup>1</sup> / <sub>2</sub> )	17	( <sup>11</sup> / <sub>16</sub> )	60	(43)
	50	(2)	19	( <sup>3</sup> / <sub>4</sub> )	70	(51)
Main Valve Seat	15–20	( <sup>1</sup> / <sub>2</sub> – <sup>3</sup> / <sub>4</sub> )	36	( <sup>1</sup> / <sub>16</sub> )	100	(72)
	25	(1)	41	( <sup>5</sup> / <sub>8</sub> )	125	(90)
	32–40	( <sup>1</sup> / <sub>4</sub> – 1 <sup>1</sup> / <sub>2</sub> )	60	( <sup>2</sup> / <sub>8</sub> )	250	(180)
	50	(2)	70	( <sup>3</sup> / <sub>4</sub> )	300	(216)
Cover Plug	15–20	( <sup>1</sup> / <sub>2</sub> – <sup>3</sup> / <sub>4</sub> )	41	( <sup>5</sup> / <sub>8</sub> )	250	(180)
	25	(1)	46	( <sup>13</sup> / <sub>16</sub> )	350	(253)
Cover Bolt	32–40	( <sup>1</sup> / <sub>4</sub> – 1 <sup>1</sup> / <sub>2</sub> )	17	( <sup>11</sup> / <sub>16</sub> )	60	(43)
	50	(2)	19	( <sup>3</sup> / <sub>4</sub> )	70	(51)

(1 N·m ≈ 10kg·cm)

\*Tightening screws and bolts to greater than the recommended torque may damage the body or parts.

## Regular Inspection and Maintenance

When using the **SP-COSR** over an extended period of time, inspections and maintenance should be done regularly as described in the table below. For newly installed piping, even if the pipes are blown out during installation, the strainer in the **SP-COSR** and the strainer in front of the **SP-COSR** will need to be cleaned frequently, as there will be welding chips and sealant residue from the pipe threads and gaskets.

Part	Guidelines for Inspection and Maintenance
Pilot Screen	Disassemble and clean annually. If the pilot screen is substantially blocked, install a strainer (60-mesh) at the <b>SP-COSR</b> inlet.
Pilot Valve Main Valve Seat Diaphragm	Replace after approximately 15,000 hours. If there is obstruction from rust and scale, these parts may wear out more quickly.
Piston Rings and Tension Rings	Replace after approximately 8,000 hours. If scale buildup is severe, these parts may wear out more quickly.
Piston	Replace after approximately 30,000 hours.

## Troubleshooting

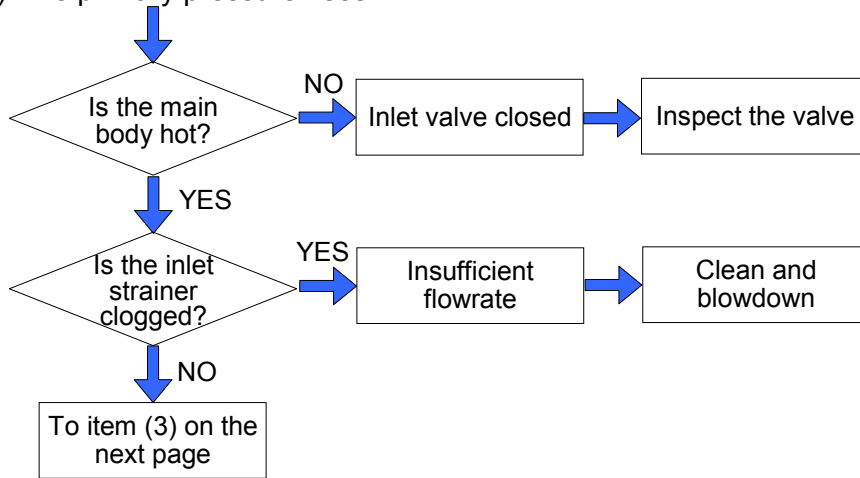
This product is shipped after stringent quality checks and inspections and should perform its intended function for a long period of time without failure. However, in the event that trouble should occur, check the flow diagram on the following pages and take the appropriate measure. Problems can be classified into three major categories:

1. The primary pressure rises.
2. Abnormal drop in primary pressure. [Hunting (primary pressure fluctuates)].
3. Primary pressure adjustment is not possible or primary pressure rises.  
[Hunting occurs (primary pressure fluctuates)].

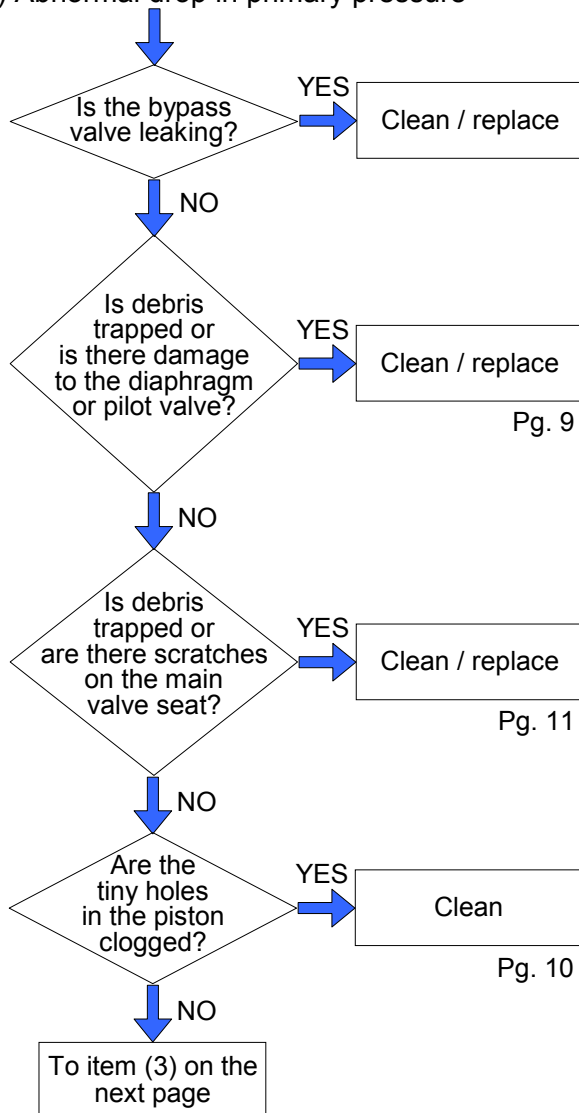
Problems are particularly likely to occur when the valve is used outside the range of specifications; when the flow rate used for valve selection is insufficient, or when valve closure is hindered by trapped rust or scale. In order to ensure proper performance, review the Piping (page 4) and Adjustment (page 7) procedures given in this manual.

**Problems and Solutions**

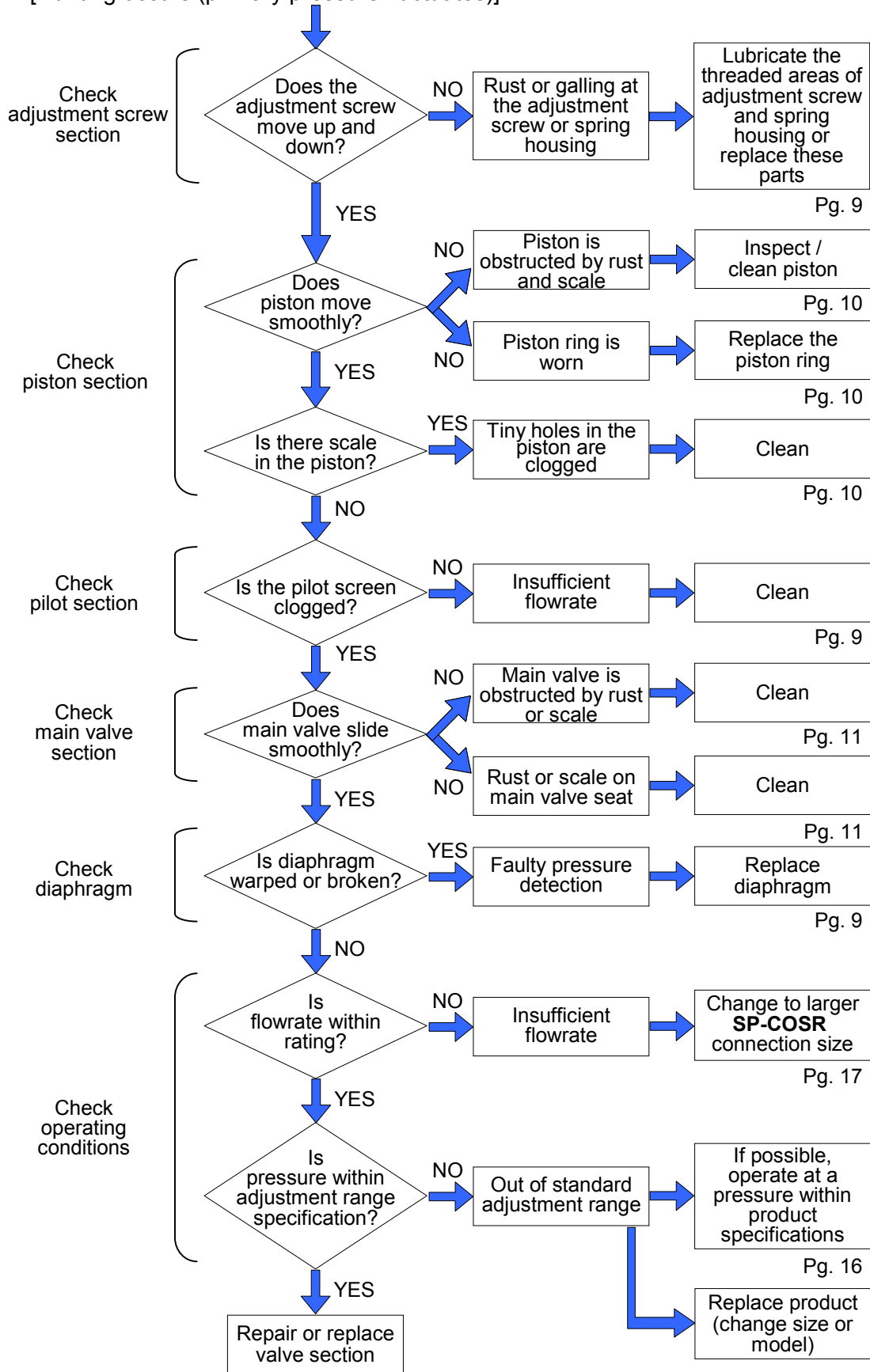
(1) The primary pressure rises



(2) Abnormal drop in primary pressure



(3) Primary pressure adjustment is not possible or primary pressure rises.  
 [Hunting occurs (primary pressure fluctuates)].



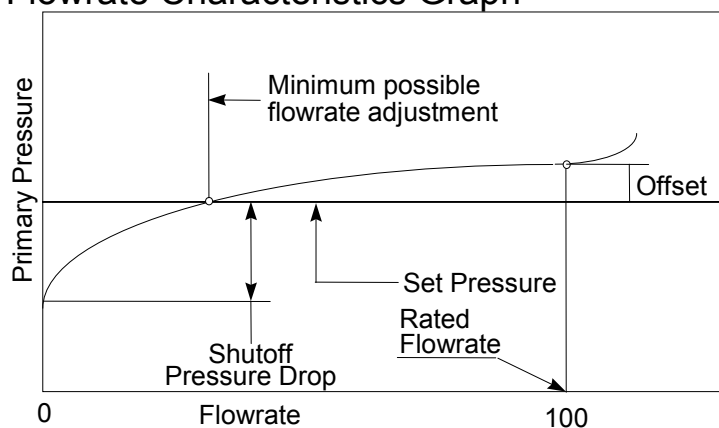


## Specifications

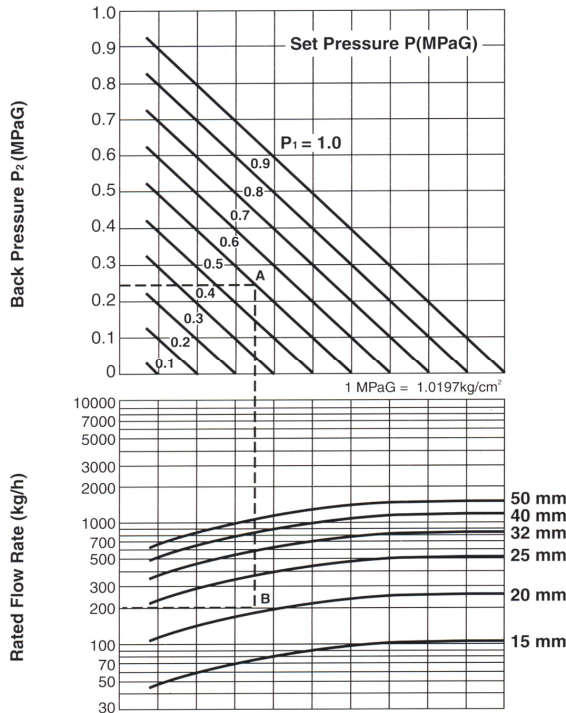
### Specifications for **SP-COSR-16** Primary Pressure Control Valve

Applicable Fluid		Steam
Pressure Setting Range: MPaG (psig)		0.1 – 1.0 (15 - 150)
Nominal Diameter: mm (in.)		15, 20, 25, 32, 40, 50 (1/2, 3/4, 1, 1 1/4, 1 1/2, 2)
Max. Operating Pressure: MPaG (psig)		1.6 (230)
Max. Operating Temperature: °C (°F)		220 (428)
Material	Main Body	Cast Iron or Ductile Cast Iron
	Main Valve and Main Valve Seat	Stainless Steel
	Pilot Valve Seat	Stainless Steel
	Diaphragm	Stainless Steel
	Connection	Flange: FF/RF Screwed: Rc(PT), NPT, BSP

### Flowrate Characteristics Graph



Performance	
Offset	Max. 0.03 MPa (5 psi)
Shutoff Pressure	Max. 0.02 MPa (3 psi)
Minimum Flowrate Adjustment	5% of rated flow
Main Valve Seat Leakage	Max. 0.05% of rated flow



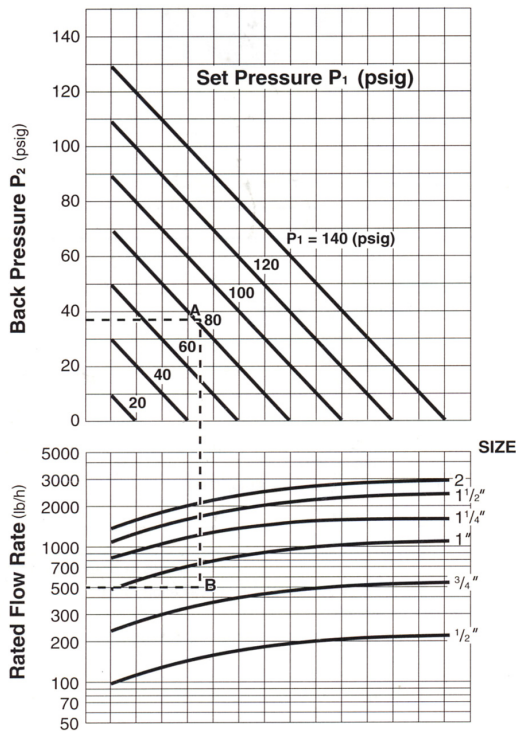
In the graph at left, find the nominal diameter for **SP-COS-16** that meets the following conditions:

Set Pressure:  $(P_1)$  0.6 MPaG  
 Secondary Pressure:  $(P_2)$  0.25 MPaG  
 Flowrate: 200 kg/H

First find the intersection (point A) of the set pressure ( $P_1$ : 0.6 MPaG) and the secondary pressure ( $P_2$ : 0.25 MPaG).

Draw a vertical line from point A and find the intersection (point B) with 200 kg/H.

Point B is between nominal dia. 20 mm and 25 mm, so choose the larger size. Accordingly, the 25 mm size should be selected.



In the graph at left, find the nominal diameter for **SP-COS-16** that meets the following conditions:

Set Pressure:  $(P_1)$  80 psig  
 Secondary Pressure:  $(P_2)$  35 psig  
 Flowrate: 500 lb/H

First find the intersection (point A) of the set pressure ( $P_1$ : 80 psig) and the secondary pressure ( $P_2$ : 35 psig).

Draw a vertical line from point A and find the intersection (point B) with 500 lb/H.

Point B is between nominal dia. 3/4 in. and 1 in., so choose the larger size. Accordingly, the 1 in. size should be selected.

## Product Warranty

1. Warranty Period  
One year following product delivery.
2. Warranty Coverage  
TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.
3. This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:
  - 1) Malfunctions due to improper installation, use, handling, etc., by other than TLV CO., LTD. authorized service representatives.
  - 2) Malfunctions due to dirt, scale, rust, etc.
  - 3) Malfunctions due to improper disassembly and reassembly, or inadequate inspection and maintenance by other than TLV CO., LTD. authorized service representatives.
  - 4) Malfunctions due to disasters or forces of nature.
  - 5) Accidents or malfunctions due to any other cause beyond the control of TLV CO., LTD.
4. Under no circumstances will TLV CO., LTD. be liable for consequential economic loss damage or consequential damage to property.

\* \* \* \* \*

For Service or Technical Assistance:

Contact your **TLV** representative or your regional **TLV** office.

### Manufacturer

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