ISO 9001
ISO14001

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

Instruction Manual

Pressure Reducing Valve for Steam
Featured Models: COSR-3/COSR-16/COSR-21/COSR-16HT

172-65174M-14
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Introduction

Thank you for purchasing the TLV 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.

The TLV pressure reducing valve for steam, model COSR provides a more stable secondary pressure than conventional reducing valves. The 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.

Cautionary items and definitions

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

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

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

Safety considerations for the product

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

Caution
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.

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

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

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

Caution

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.

Caution

Use only under conditions in which no freeze-up will occur. Freezing may damage the product, leading to fluid discharge, which may cause burns or other injury.

Caution

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

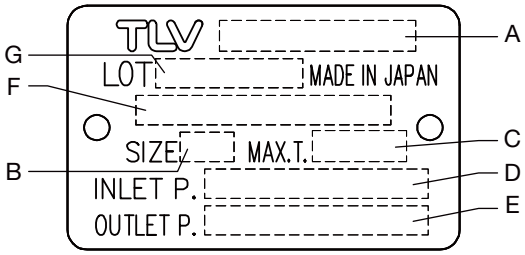
Specifications

Caution

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

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.



A	Model	E	Secondary Pressure Range
B	Nominal Diameter	F	Valve No. [01]
C	Maximum Operating Temperature (TMO)	G	Production Lot No.
D	Primary Pressure Range		

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

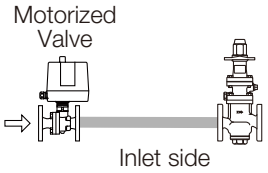
Acceptable Operating Range

Model	COSR-3	COSR-16	COSR-16HT	COSR-21
Primary Pressure Range	0.1 to 0.3 MPaG	0.2 to 1.6 MPaG		1.35 to 2.1 MPaG
Secondary Pressure Adjustable Range (All conditions must be met)	0.01 to 0.05 MPaG	Within 10 to 84% of the primary pressure		
		Minimum adjustable pressure of 0.03 MPaG		Minimum adjustable pressure of 0.55 MPaG
		Pressure differential between 0.07 to 0.85 MPa		Maximum pressure differential of 0.85 MPa
Maximum Operating Temperature (TMO)	220 °C	220 °C	300 °C	220 °C
Minimum Adjustable Flow Rate	5% of rated flow rate	5% of rated flow rate; 10% of rated flow rate for sizes 65 mm and larger		

Correct usage of the product

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

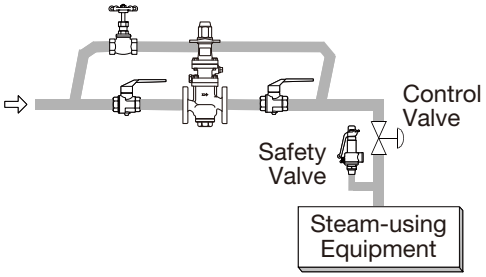
1. The product should be operated only within its specifications.
2. Installing an ON/OFF valve (solenoid valve or motorized valve)



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 product. If a solenoid valve is installed at the outlet of the product, 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 product 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. 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 product.

3. Installing a control valve and a safety valve



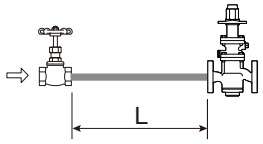
A control valve (i.e. for temperature control) installed between the product and the steam-using equipment (downstream of the product) may raise the pressure between the product and the control valve when the control valve is closed, depending on their proximity. Therefore, the control valve should be installed closed to the steam-using equipment. Also, a safety valve should be installed downstream of the control valve.

Note
When installing a safety valve to protect steam-using equipment, be sure to install it on, or directly before, the inlet of the steam-using equipment. If the safety valve is installed between the product and a control valve, an eventual pressure rise could activate the safety valve.

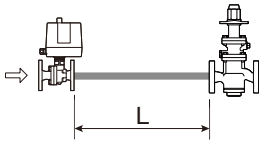
Recommended straight pipe runs

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

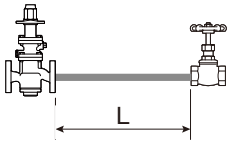
1. Inlet (primary) side
   - Maintain a straight piping run of **10d or more** (L) when a manual valve, a strainer or an elbow, etc. is installed. (Example: if nominal size is 25 mm, have 250 mm or more)



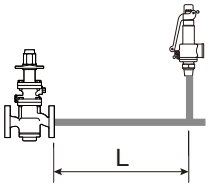
   - Maintain a straight piping run of **30d or more** (L) when an automated valve (on-off valve) is installed. (Example: if nominal size is 25 mm, have 750 mm or more)



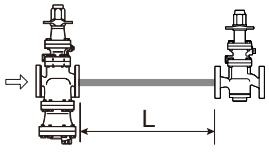
2. Outlet (secondary) side
   - Maintain a straight piping run of **15d or more** (L) when a manual valve, a strainer or an elbow, etc. is installed. (Example: if nominal size is 25 mm, have 375 mm or more)



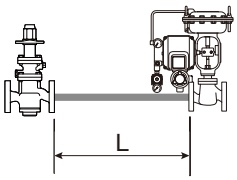
   - Maintain a straight piping run of **30d or more** (L) when a safety valve is installed. (Example: if nominal size is 25 mm, have 750 mm or more)



   - Maintain a straight piping run of **30d or more** (L) when another pressure reducing valve is installed. (Two-stage pressure reduction) (Example: if nominal size is 25 mm, have 750 mm or more)

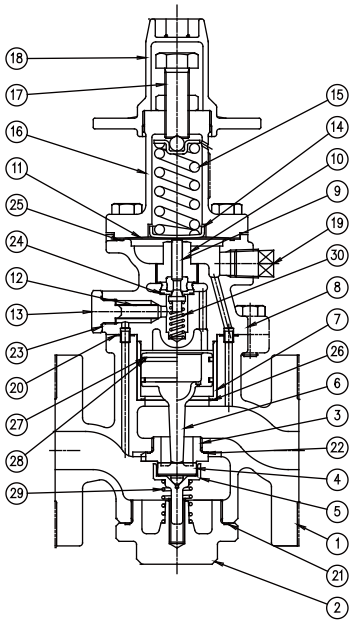


   - Maintain a straight piping run of **30d or more** (L) when a control valve or an automated valve (on-off valve) is installed. (Example: if nominal size is 25 mm, have 750 mm or more)



Configuration

COSR-3/COSR-16 Sizes 15 to 25 mm

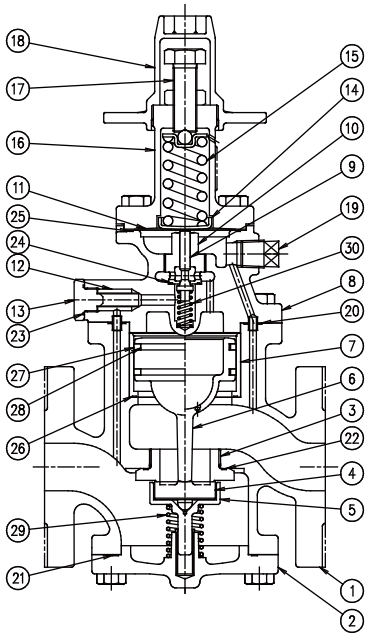


No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
1	Main Body					
2	Cover Plug [02]					
3	Main Valve Seat		✔			
4	Main Valve		✔			
5	Main Valve Holder		✔			
6	Piston			✔		
7	Cylinder			✔		
8	Pilot Body					
9	Pilot Valve					✔
10	Pilot Valve Seat					✔
11	Diaphragm					
12	Pilot Screen					✔
13	Pilot Screen Holder					
14	Diaphragm Support					
15	Coil Spring					
16	Spring Housing					
17	Adjustment Screw					
18	Spanner Cap					
19	Plug for Sensing Line Port					
20	Lower Pilot Body Gasket	✔		✔	✔	
21	Cover Plug Gasket	✔	✔			
22	Main Valve Seat Gasket	✔	✔			
23	Pilot Screen Holder Gasket	✔				✔
24	Pilot Valve Seat Gasket	✔				✔
25	Upper Pilot Body Gasket	✔				✔
26	Cylinder Gasket	✔		✔		
27	Piston Ring			✔	✔	
28	Tension Ring			✔	✔	
29	Main Valve Spring		✔			

No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
30	Pilot Valve Spring					✔

[01]Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit for Main Valve, C = Repair Kit for Piston, D = Repair Kit for Piston Rings, E = Repair Kit for Pilot Valve
[02]Size 15 mm not available for COSR-3

COSR-3 Sizes 32 to 50 mm/**COSR-16** Sizes 32 to 50 mm/**COSR-21** Sizes 15 to 50 mm



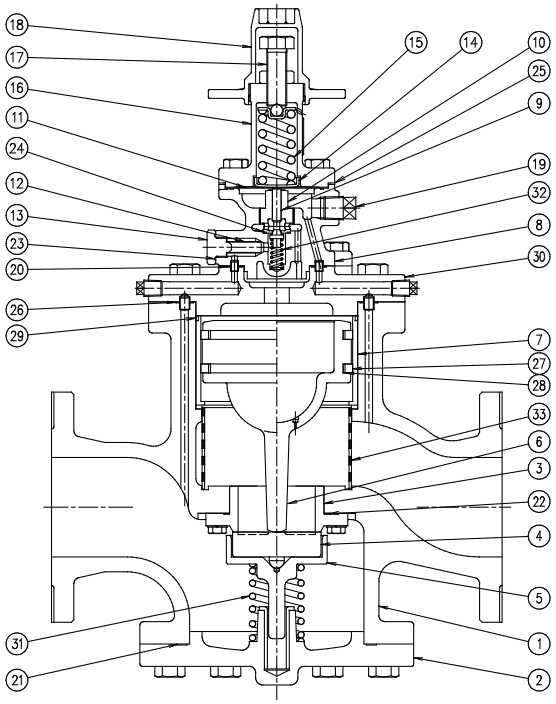
No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
1	Main Body					
2	Cover Plug [02]					
3	Main Valve Seat		✔			
4	Main Valve		✔			
5	Main Valve Holder		✔			
6	Piston			✔		
7	Cylinder			✔		
8	Pilot Body					
9	Pilot Valve					✔
10	Pilot Valve Seat					✔
11	Diaphragm					
12	Pilot Screen					✔
13	Pilot Screen Holder					
14	Diaphragm Support					
15	Coil Spring					
16	Spring Housing					
17	Adjustment Screw					
18	Spanner Cap					
19	Plug for Sensing Line Port					
20	Lower Pilot Body Gasket	✔		✔	✔	
21	Cover Plug Gasket	✔	✔			
22	Main Valve Seat Gasket	✔	✔			
23	Pilot Screen Holder Gasket	✔				✔
24	Pilot Valve Seat Gasket	✔				✔
25	Upper Pilot Body Gasket	✔				✔
26	Cylinder Gasket	✔		✔		
27	Piston Ring			✔	✔	

No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
28	Tension Ring			✔	✔	
29	Main Valve Spring		✔			
30	Pilot Valve Spring					✔

[01]Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit for Main Valve, C = Repair Kit for Piston, D = Repair Kit for Piston Rings, E = Repair Kit for Pilot Valve
[02]Size 15 mm not available for COSR-3

Note
Contact TLV for COSR-21 replacement parts.

COSR-16/COSR-21 Sizes 65 to 150 mm



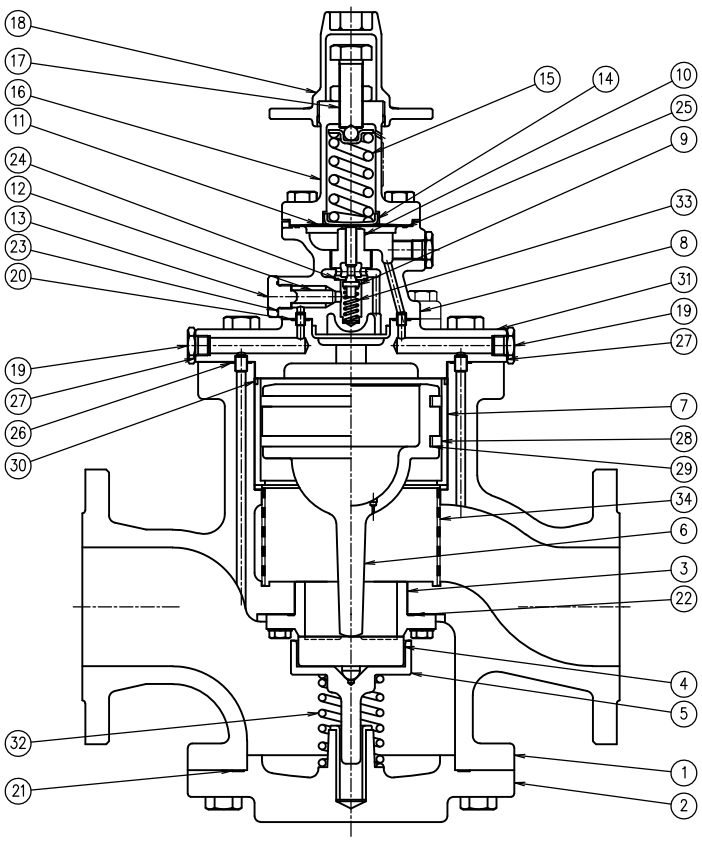
No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
1	Main Body					
2	Cover					
3	Main Valve Seat		✔			
4	Main Valve		✔			
5	Main Valve Holder		✔			
6	Piston			✔		
7	Cylinder			✔		
8	Pilot Body					
9	Pilot Valve					✔
10	Pilot Valve Seat					✔
11	Diaphragm					
12	Pilot Screen					✔
13	Pilot Screen Holder					
14	Diaphragm Support					
15	Coil Spring					
16	Spring Housing					
17	Adjustment Screw					
18	Spanner Cap					
19	Plug-Sensing Line Port					
20	Lower Pilot Body Gasket	✔				

No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
21	Cover Gasket	✔	✔			
22	Main Valve Seat Gasket	✔	✔			
23	Pilot Screen Holder Gasket	✔				✔
24	Pilot Valve Seat Gasket	✔				✔
25	Upper Pilot Body Gasket	✔				✔
26	Cylinder Gasket	✔		✔	✔	
27	Piston Ring			✔	✔	
28	Tension Ring			✔	✔	
29	Seal Ring	✔		✔		
30	Pilot Valve Cover					
31	Main Valve Spring		✔			
32	Pilot Valve Spring					✔
33	Silencer					

[01]Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit for Main Valve, C = Repair Kit for Piston, D = Repair Kit for Piston Rings, E = Repair Kit for Pilot Valve

Note
Contact TLV for COSR-21 replacement parts.

COSR-16HT Sizes 65 to 100 mm



No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
1	Main Body					
2	Cover					
3	Main Valve Seat		✔			
4	Main Valve		✔			
5	Main Valve Holder		✔			
6	Piston			✔		
7	Cylinder			✔		

No.	Part Name	A [01]	B [01]	C [01]	D [01]	E [01]
8	Pilot Body					
9	Pilot Valve					✔
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	Spanner Cap					
19	Plug-Sensing Line Port					
20	Lower Pilot Body Gasket	✔				✔
21	Cover Gasket	✔	✔			
22	Main Valve Seat Gasket	✔	✔			
23	Pilot Screen Holder Gasket	✔				✔
24	Pilot Valve Seat Gasket	✔				✔
25	Upper Pilot Body Gasket	✔				✔
26	Cylinder Gasket	✔		✔	✔	
27	Plug Gasket	✔				
28	Piston Ring			✔	✔	
29	Tension Ring			✔	✔	
30	Seal Ring	✔		✔		
31	Pilot Valve Cover					
32	Main Valve Spring		✔			
33	Pilot Valve Spring					✔
34	Silencer					

[01]Replacement parts are available only in the following kits: A = Maintenance Kit, B = Repair Kit for Main Valve, C = Repair Kit for Piston, D = Repair Kit for Piston Rings, E = Repair Kit for Pilot Valve

Installation

Caution

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

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.

DO NOT use only the actuator eye bolt when hoisting or lifting the assembled product. Failure to observe this precaution may lead to product damage.

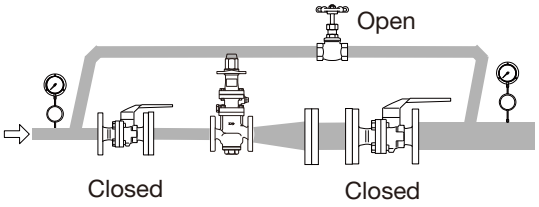
Take measures to prevent people from coming into direct contact with product outlets. Failure to do so may result in burns or other injury from the discharge of fluids.

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.

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

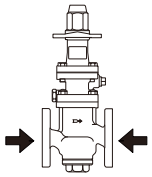
1. Blowdown

   Before installing the product or supplying steam to the product, 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. This will reduce operation failure caused by condensate or foreign matter.



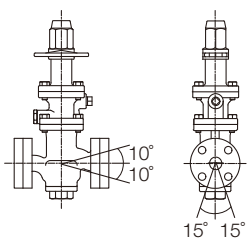
2. Removing protective caps and seals

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



3. Installation angle

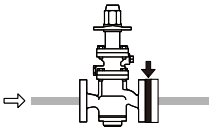
   Install the product vertically, so that the arrow mark on the body points horizontally in the direction of flow. Allowable inclination is 10 degrees in the fore-aft direction and 15 degrees in the plane perpendicular to the flow line.



4. Installing a spacer

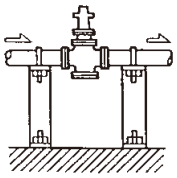
   If spacing adjustment is necessary to accommodate installation, install a spacer on the outlet flange.

   The spacer should consist of a spacer, gaskets, bolts and nuts. Fit gaskets to both sides of the spacer between the product outlet and the pipe flange. Fasten with bolts and nuts.



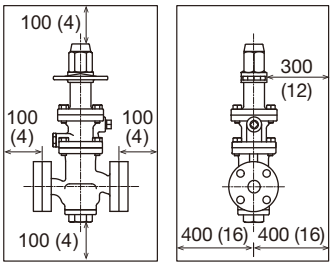
5. Piping support

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



6. Maintenance space

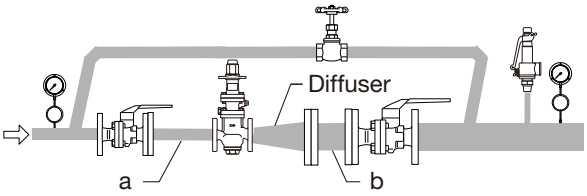
   Leave sufficient space for maintenance, inspection and repair. (Unit: mm (in))



7. Piping size/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 product and the steam-using equipment is great, a possible drop in pressure should be taken into consideration when selecting the piping size.

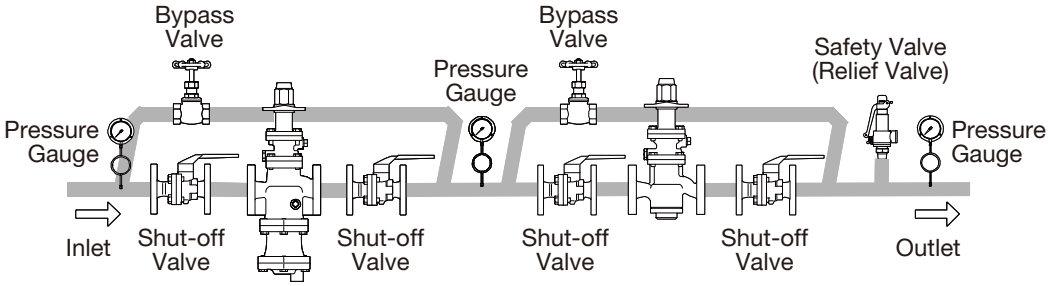
   In addition, when installing the strainer, the strainer screen should be either at the 3 o'clock or 9 o'clock position to prevent condensate accumulation.



Straight piping (d = pipe diameter)	
a	10d or longer upstream
b	15d or longer downstream

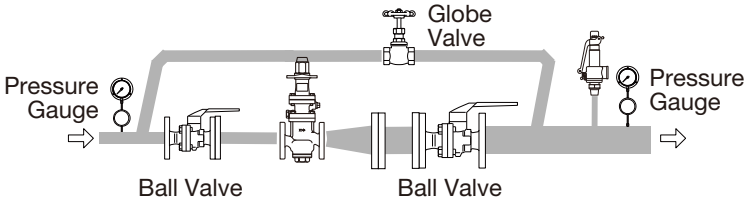
8. Two-stage pressure reduction

   Two-stage pressure reduction should be performed whenever the pressure cannot be reduced to the desired level with a product due to operating range limitations.



9. Accessories

   Ball valves, which will not retain condensate, are recommended for inlet and outlet shut-off valves. The bypass pipe should be at least $^1/_2$ of the size of the inlet (primary side) pipe.



External Secondary Pressure Sensing Line

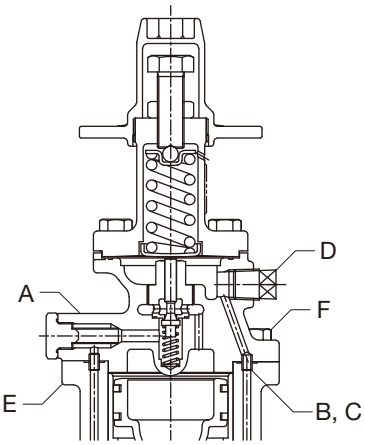
Non-North American Models

Non-North American models are factory prepared for internal sensing.

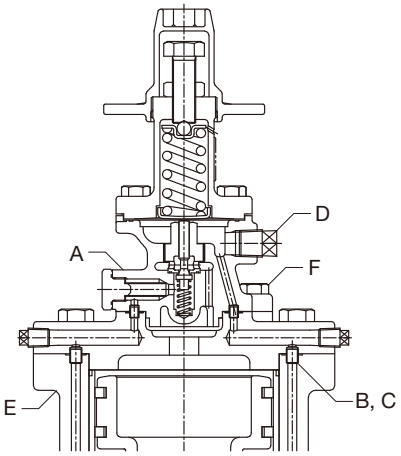
A secondary pressure detection port has been added to all pilot bodies to allow for installation of a 10 mm secondary pressure sensing line, which improves performance and increases valve capacity (flow rate). This model is delivered with a secondary pressure sensing line plug installed in this port. When the external sensing method is used, follow the installation procedure shown below.

(For North American models, the blind pin has been factory installed and no secondary pressure sensing line plug is provided.)

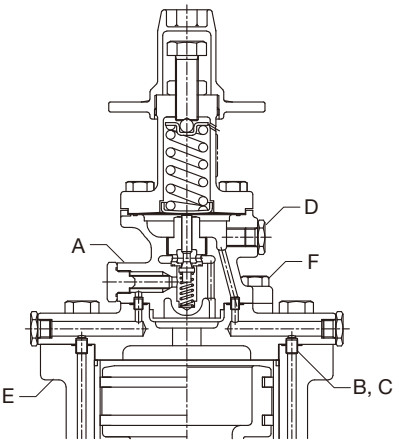
15 to 50 mm



65 to 150 mm

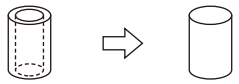


65 to 100 mm
(for COSR-16HT)



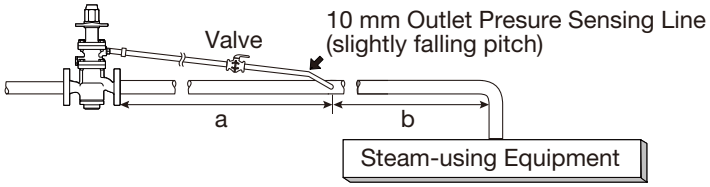
A	Pilot Body	D	Plug Rc(PT) $^3/_8$ Plug PF$^3/_8$ (sizes 65 to 100 mm for COSR-16HT)
B	Blind Pin	E	Main Body
C	Connecting Tube	F	Pilot Body Bolt

1. Loosen and remove the pilot body bolt (F) or the pilot cover (65 to 150 mm) and remove the pilot body (A).
2. Install the provided blind pin (B) by first removing the connecting tube (C) from the main body or pilot cover and then substituting the pin.



B C

3. Re-install the pilot body and fasten the four (4) bolts (nuts) evenly to the tightening torque (see the tightening torque table in the "Reassembly" section).
4. Loosen and remove the plug (D) to install the external pressure sensing line.
5. Install the secondary pressure sensing line with a slightly falling pitch. The 10 mm pipe should be connected to a point where the pressure is to be sensed. The connection must be at a point on the main piping where there is a straight section of upstream main piping of a length of 15d (d = pipe diameter), or 1 m, whichever is greater (a), and a straight section of downstream main piping of a length of at least 15d (b).

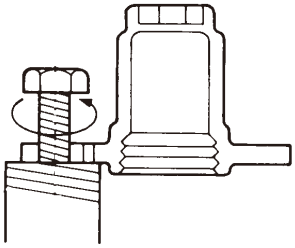


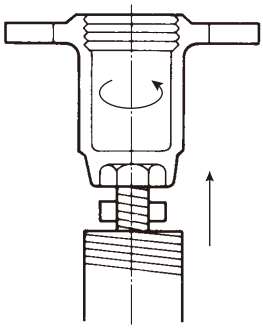
A shutoff valve and pipe union should be installed in the secondary pressure sensing line, to be used when the valve is taken out of service.

Adjustment

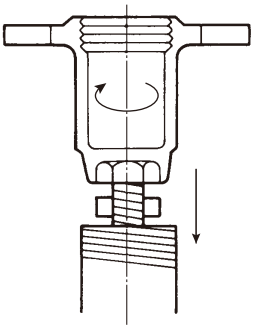
The product should be properly adjusted for protection of the equipment against water hammer.

1. It is necessary to blow down all pipe lines thoroughly. The blowdown is especially important if the line is new or has been shut down for a long period of time.
   Take particular care to ensure that matter such as condensate and dirt does not remain inside the equipment. (Stay clear of any pressurized blow-out from the safety valve.)
2. Make sure that the shutoff valve and the bypass valve located upstream and downstream of the product are completely closed.
3. Remove the spanner cap, loosen the locknut and turn the adjustment screw counterclockwise to reduce tension on the coil spring.

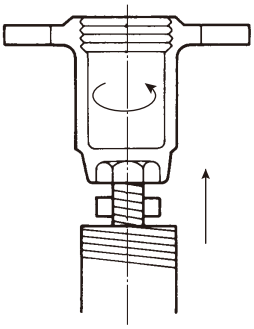




4. Slowly, fully open the shutoff valve at the inlet of the product.
   Allow sufficient time for condensate remaining at the inlet of the product to be discharged.
5. Slightly open the shutoff valve at the outlet of the product.
6. Turn the adjustment screw clockwise until the desired outlet pressure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



Clockwise to increase pressure



Counter-clockwise to decrease pressure

7. Slowly, fully open the shutoff valve at the outlet of the product.
8. After setup, tighten the locknut.
9. When shutting down the system, always close the outlet shutoff valve first and then the inlet valve.

Maintenance

Caution

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

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.

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

Operational check

To ensure long service life of the product, regularly performing the following inspection and maintenance are recommended.

To prevent unforeseen malfunctions, annual disassembly and inspection are recommended. Particularly, inspecting the product, especially after operations following the installation of new piping or during extended periods of shutdown.

Part Name	Inspection and Maintenance Frequency
Screens (Separator and Pilot)	Disassemble and clean annually. If there is substantial blockage, install a strainer (approximately 60 mesh) ahead of the product.
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.
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
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.

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 product 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 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.)

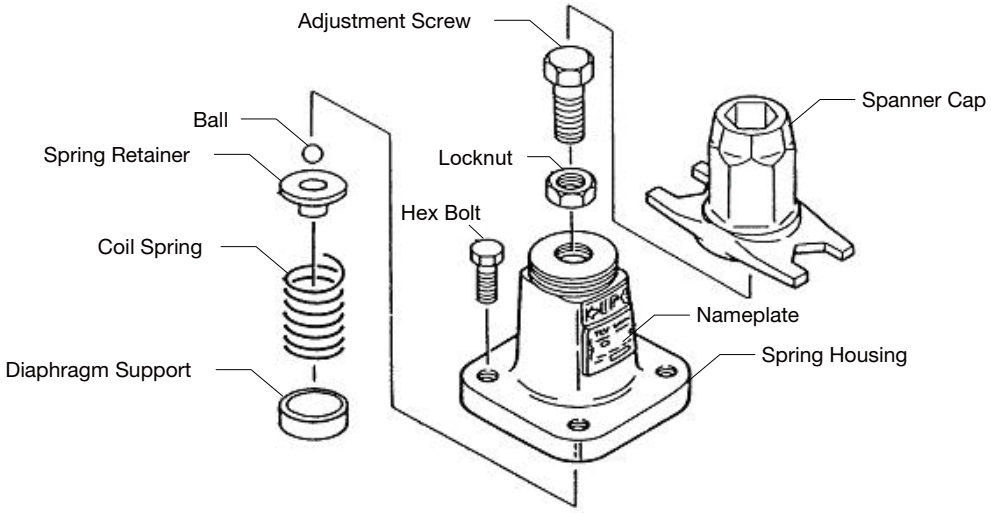
Remove all steam from the piping (both upstream and downstream). Wait for the body to cool before attempting to remove the product from the line. Then remove the product from the piping, and secure it in a vise to perform the inspection.

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.

Important
Check for seizure or any damaged screw threads.

Sizes 15 to 150 mm



Disassembling the pilot section

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

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

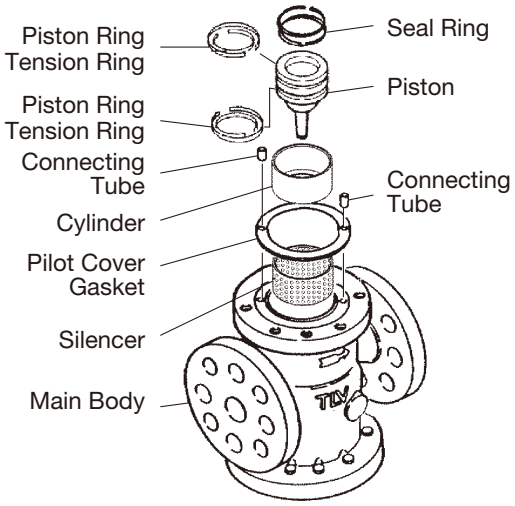
Remove the pilot body after loosening and removing the bolts (stud bolts). During this process, pay attention not to lose the connecting tubes (2 pieces).

Remove the piston, cylinder and the silencer (for 65 to 150 mm only) 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.

Important
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.

Sizes 15 to 50 mm

Sizes 65 to 150 mm



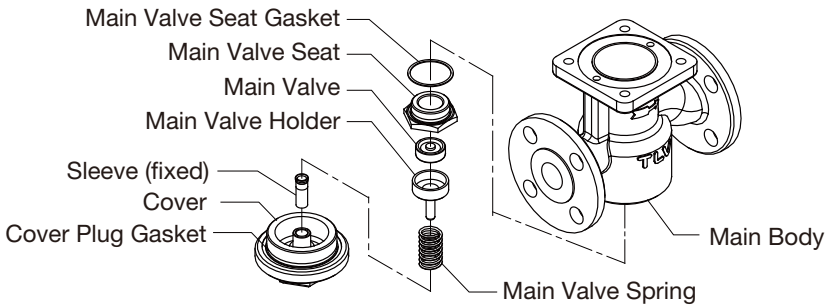
Disassembling the main valve and cover plug/cover section

Turn the product upside down for easy dismantling of the main valve.

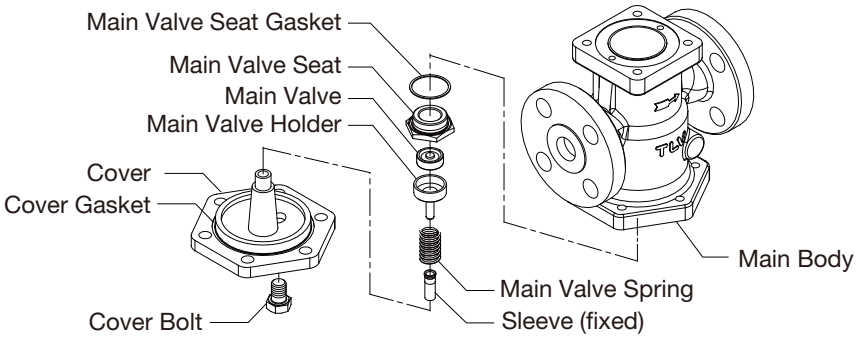
Remove the cover plug or loosen the bolts and remove the cover. Remove the main valve and the main valve spring. Loosen the main valve seat by using a box wrench and remove from the main body.

Important
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).

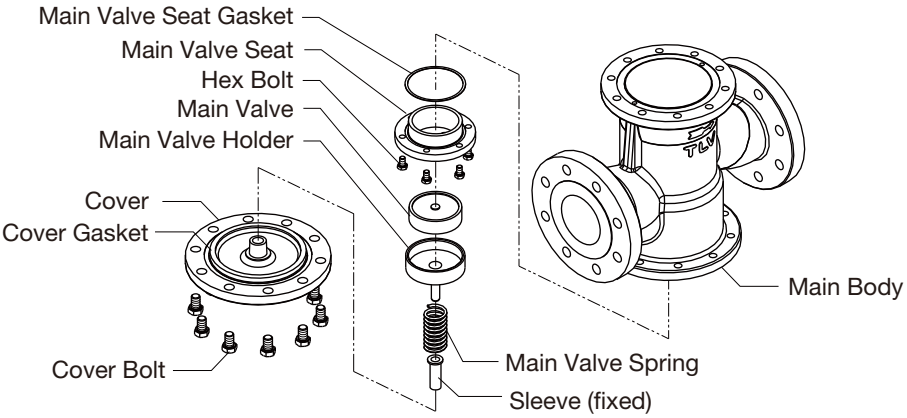
COSR-3: Sizes 20 and 25 mm/COSR-16 and COSR-16HT: Sizes15 to 25 mm



COSR-3/COSR-16 and COSR-16HT: Sizes 32 to 25 mm/COSR-21: Sizes15 to 50 mm



COSR-16: Sizes 65 to 150 mm/COSR-16HT and COSR-21: 65 to 100 mm



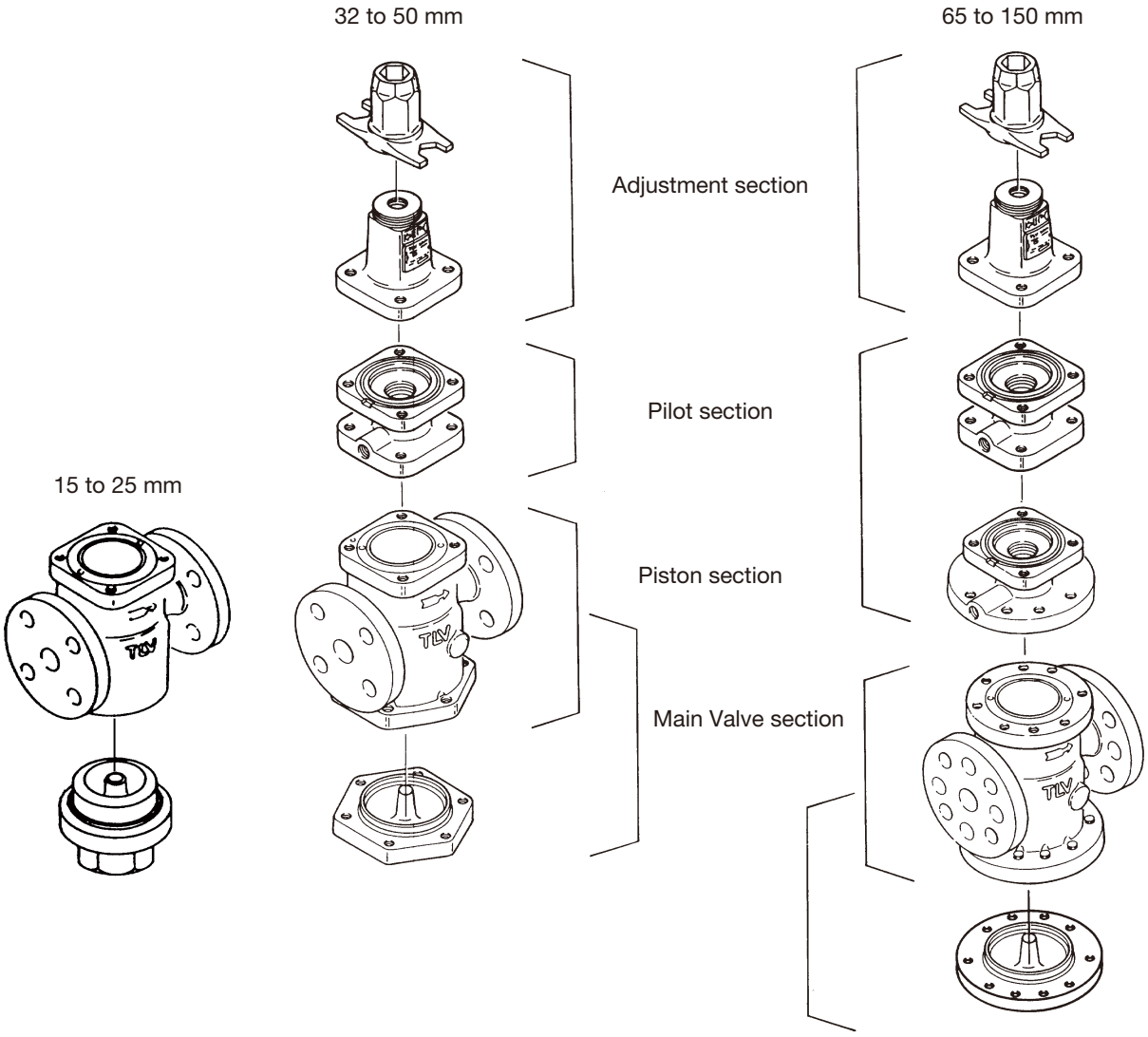
Cleaning

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

Cover Plug/Cover, Pilot Screen, Main Valve Seat, Main Valve, Main Valve Holder, Piston, Piston Ring, Cylinder, Pilot Valve, Pilot Valve Seat, 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.

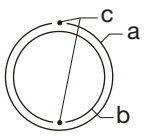
Exploded View



Reassembly

Reassemble the unit using the same procedure as used for disassembly; but in reverse order. In addition, 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 valve seat, pilot valve seat and 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. 65 to 100 mm ($2^1/_2$ to 4 in): Assemble the pilot section and pilot cover before attaching to the main body, and make sure the screen holder faces the inlet side of the product.
5. After assembly, make sure that the piston and the pilot valve operate smoothly without binding.



Assembling the Piston Ring

a. Fit the piston ring (a) to the outside of the tension ring (b).
b. The ring gaps (c) should be opposite each other.

Table of tightening torques

Part Name	Connection Size mm	Tightening Torque N·m	Distance Across Flats mm
Bolts (Spring Housing)	All	40	16 or 17 [01]
Pilot Valve Seat	All	70	18 or 19 [01]
Screen Holder	All	40	24
Bolts (Pilot Body/Main Body)	15 to 40	60	16 or 17 [01]
	50	70	18 or 19 [01]
Bolts (Body/Pilot Cover)	65 to 150	60	16 or 17 [01]
Bolts (Pilot Cover/Main Body)	65, 80	70	18 or 19 [01]
	100, 125	150	24
	150	300	36
Main Valve Seat	15, 20	100	36
	25	125	41
	32, 40	250	60
	50	300	70
Bolts (Main Valve Seat)	65, 80	30	13
	100, 125	40	17
	150	70	22
Cover Plug (COSR-3, COSR-16)	15 to 20	250	41
	25	350	46
Cover Bolt	15 to 25[02]	60	16 or 17 [01]
	32, 40	60	16 or 17 [01]
	50 to 80	70	18 or 19 [01]
	100, 125	150	24
	150	300	36

[01]Size depends on bolt standard
[02]For COSR-21 only

Note

- If a torque greater than that recommended is applied, the body or components may be damaged.
- Coat all threaded portions with anti-seize.
- If drawings or other special documentation were supplied for the product, any torque given there takes precedence over values shown here.

Troubleshooting

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

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 product, 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 Product" and "Adjustment" sections be reviewed.

To prevent unforeseen malfunctions, annual disassembly and inspection are recommended. Particularly, inspecting the product, especially after operations following the installation of new piping or during extended periods of shutdown, such as before and after prolonged heating cessation.

Problem	Symptom	Cause	Remedy
The secondary pressure does not rise	The body is not warm	No steam is being supplied or the inlet valve is closed	Check the valves and piping
	The body is warm, but the pressure does not increase	The entrance to the screens or strainer is clogged	Clean or blow down

Problem	Symptom	Cause	Remedy
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 product 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
		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 product if necessary
		The selected model is inappropriate for the service conditions (specifications)	Check the model selection, replace the product 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 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 product 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 product if necessary

Problem	Symptom	Cause	Remedy
Abnormal noises	Makes a high-pitched noise	There is too high a reduction ratio	Use two-stage reduction
		The flow is too great,	Check the flow rate, use a larger size valve
		There is a high-speed open/close valve nearby	Install the valve as far away as possible

Note

When replacing parts with new for the COSR-3 and COSR-16, use the parts list for reference, and replace with parts from the kits shown there. Please note that replacement parts for the COSR-3 and COSR-16 are only available as part of a replacement parts kit.

Contact TLV if replacement parts for the COSR-21 are required.

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Subject to the limitations set forth below, TLV CO., LTD., a Japanese corporation ("**TLV**"), warrants that products which are sold by it, TLV International Inc. ("**TII**") or one of its group companies excluding TLV Corporation (a corporation of the United States of America), (hereinafter the "**Products**") are designed and manufactured by TLV, conform to the specifications published by TLV for the corresponding part numbers (the "**Specifications**") and are free from defective workmanship and materials. The party from whom the Products were purchased shall be known hereinafter as the "**Seller**". 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 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.

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

Exclusive Remedy

THE EXCLUSIVE REMEDY UNDER THIS WARRANTY, UNDER ANY EXPRESS WARRANTY OR UNDER ANY IMPLIED WARRANTIES NOT NEGATED HEREBY (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), IS **REPLACEMENT**; PROVIDED: (a) THE CLAIMED DEFECT IS

REPORTED TO THE SELLER IN WRITING WITHIN THE 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 THE SELLER, FREIGHT AND TRANSPORTATION COSTS PREPAID, UNDER A RETURN MATERIAL AUTHORIZATION AND TRACKING NUMBER ISSUED BY THE SELLER. 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. THE SELLER 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 THE SELLER'S REASONABLE DISCRETION, THAT THE CLAIMED DEFECT IS NOT COVERED BY THIS WARRANTY, THE PARTY ASSERTING THIS WARRANTY SHALL PAY THE SELLER 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 ITS TLV GROUP COMPANIES 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.

Service

For Service or Technical Assistance: Contact your TLV representative or your regional TLV office.

In Europe:

TLV EURO ENGINEERING GmbH
Daimler-Benz-Straße 16-18, 74915 Waibstadt, **Germany**
Tel: [49]-(0)7263-9150-0

TLV EURO ENGINEERING UK LTD.
Units 7 & 8, Furlong Business Park, Bishops Cleeve, Gloucestershire GL52 8TW, **U.K.**
Tel: [44]-(0)1242-227223

TLV EURO ENGINEERING FRANCE SARL
Parc d'Ariane 2, bât. C, 290 rue Ferdinand Perrier, 69800 Saint Priest, **France**
Tel: [33]-(0)4-72482222
Fax: [33]-(0)4-72482220

In North America:

TLV CORPORATION
13901 South Lakes Drive, Charlotte, NC 28273-6790, **U.S.A.**
Tel: [1]-704-597-9070
Fax: [1]-704-583-1610

TLV ENGINEERING S. A. DE C. V.
Av. Jesús del Monte 39-B-1001, Col. Hda. de las Palmas, Huixquilucan, Edo. de México, 52763, **Mexico**
Tel: [52]-55-5359-7949
Fax: [52]-55-5359-7585

In Oceania:

TLV PTY LIMITED
Unit 8, 137-145 Rooks Road, Nunawading, Victoria 3131, **Australia**
Tel: [61]-(0)3-9873 5610
Fax: [61]-(0)3-9873 5010

In East Asia:

TLV PTE LTD
36 Kaki Bukit Place, #02-01/02, **Singapore** 416214
Tel: [65]-6747 4600
Fax: [65]-6742 0345

TLV SHANGHAI CO., LTD.
5/F, Building 7, No.103 Caobao Road, Xuhui District, Shanghai, **China** 200233
Tel: [86]-(0)21-6482-8622
Fax: [86]-(0)21-6482-8623

TLV ENGINEERING SDN. BHD.
No.16, Jalan MJ14, Taman Industri Meranti Jaya, 47120 Puchong, Selangor, **Malaysia**
Tel: [60]-3-8052-2928
Fax: [60]-3-8051-0899

TLV PRIVATE LIMITED
252/94 (K-L) 17th Floor, Muang Thai-Phatra Complex Tower B, Rachadaphisek Road, Huaykwang, Bangkok 10310, **Thailand**
Tel: [66]-2-693-3799
Fax: [66]-2-693-3979

TLV INC.
#302-1 Bundang Technopark B, 723 Pangyo-ro, Bundang, Seongnam, Gyeonggi, 13511, **Korea**
Tel: [82]-(0)31-726-2105
Fax: [82]-(0)31-726-2195

In the Middle East:

TLV ENGINEERING FZCO
Building 9W, B163, PO Box 371684, Dubai Airport Free Zone, Dubai, **UAE**
Email: sales-me@tlv.co.jp

In Other Countries:

TLV INTERNATIONAL, INC.
881 Nagasuna, Noguchi, Kakogawa, Hyogo 675-8511, **Japan**
Tel: [81]-(0)79-427-1818
Fax: [81]-(0)79-425-1167

Manufacturer:

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