



Farris 2400 Product Series

Maintenance Manual

Focused On Customer Solutions

Our Commitment; Provide customers with total pressure and flow control management solutions transforming and ensuring plant function and safety.

Experienced Sales and Engineers

To support and engineer solutions

Service Support

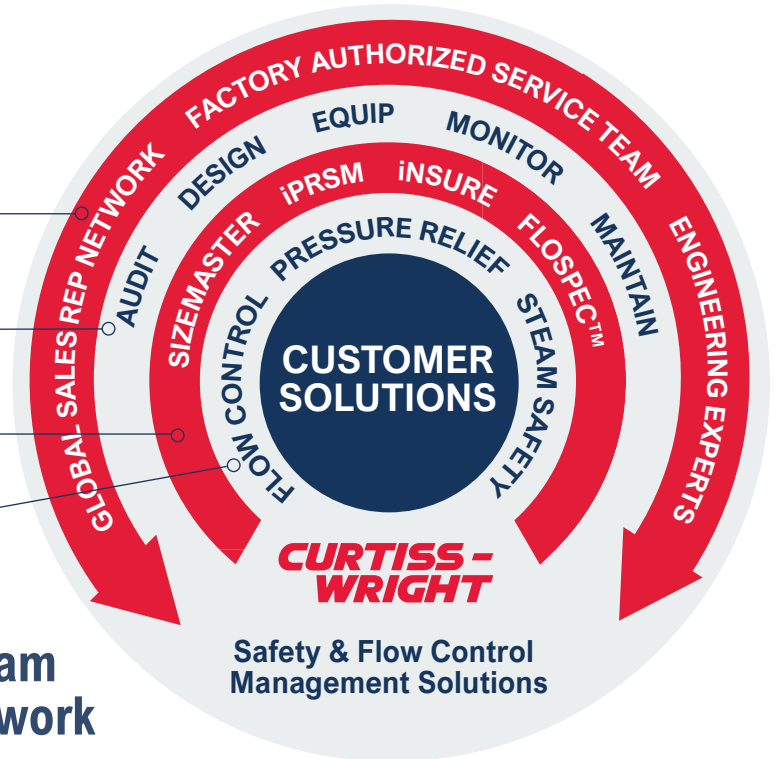
Providing entire life cycle solutions

Innovative Tools

To calculate the accurate solution

Superior Product

Valves for the appropriate solution



Factory Authorized Service Team and Sales Representative Network

- Factory trained technicians in OEM specifications
- Local service and in-line testing reducing maintenance cost.
- Capability to track and manage relief valve maintenance and repair history
- Access to sales network, and keeping global inventory local

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valves.curtisswright.com



Company Profile

Curtiss-Wright Corporation (NYSE: CW) has a long history with its roots dating back to Orville and Wilbur Wright's first flight in 1903, and Mr. Glenn Curtiss, the father of naval aviation. In 1929, the companies founded by these three great aviation pioneers, the Curtiss Aeroplane and Motor Company and Wright Aeronautical Corporation, merged to form the largest aircraft company at the time, Curtiss-Wright Corporation.

We have continued on the path of innovation and advanced engineering, and have applied that expertise to a number of critical applications in high-performance markets. Our success has resulted in a world-renowned reputation for performance, long-standing customer relationships and significant growth.

Today, we are a global, integrated provider of highly engineered, technologically advanced products and services. Our revenues are generated by providing our critical solutions through three segments: Aerospace & Industrial, Defense Electronics and Naval & Power, which support several of the largest, most vital industries in the world.

Introduction

This manual is intended to provide necessary information to keep your Farris pressure relief valve in optimal operating condition. All installation and maintenance activity should be performed by qualified personnel and done in accordance with all applicable codes and standards.

Pressure Relief Valves 2400 Series Maintenance Manual

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Oxygen Service Valves Special Considerations

This maintenance manual is provided as a general guide for the maintenance of the Farris Engineering pressure relief valves described herein. It does not include procedures covering all valve configurations and variations manufactured by Farris Engineering or for specific applications. Certain applications and/or process fluids may require special handling procedures when the valve is removed from service for periodic inspection, maintenance, testing or replacing parts.

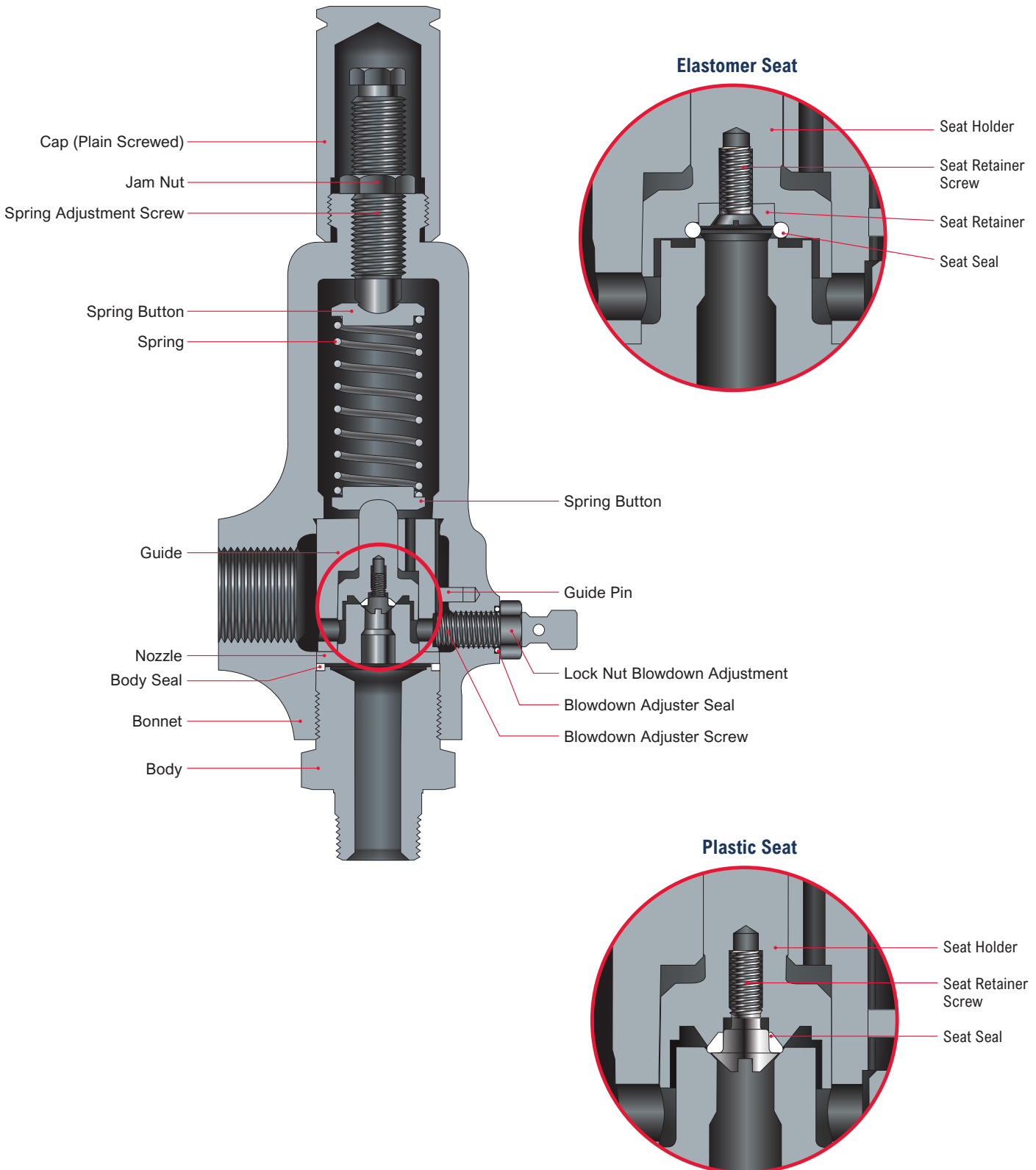
Oxygen service is one such application requiring special handling.

- Upon receipt, valves packaged and marked for Oxygen service shall be handled and opened by qualified, and trained O2 personnel shortly before installation.
- In most cases, valves for Oxygen service are specified to be manufactured from materials approved by the end user, including individual component parts. Should any part(s) need to be replaced during valve maintenance, only original spare parts suitable for Oxygen shall be used.
- Additionally, only Oxygen-approved lubricants shall be used for Oxygen service when re-assembling
- When in doubt, the Farris Engineering valve serial number (taken from the valve nameplate), drawing number (where applicable) and/or original sales order number should be reviewed with the factory to ensure compliance with the special requirements.



2400 Series – Valve Diagram

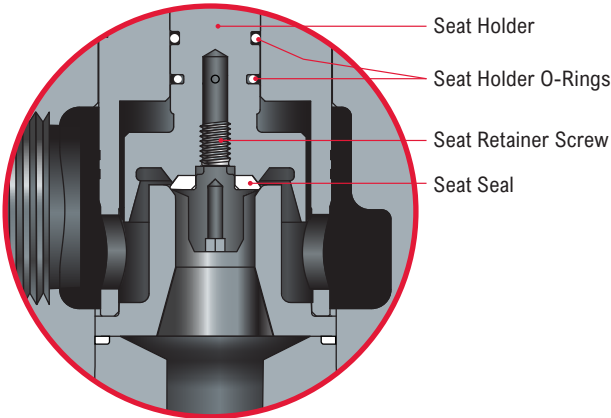
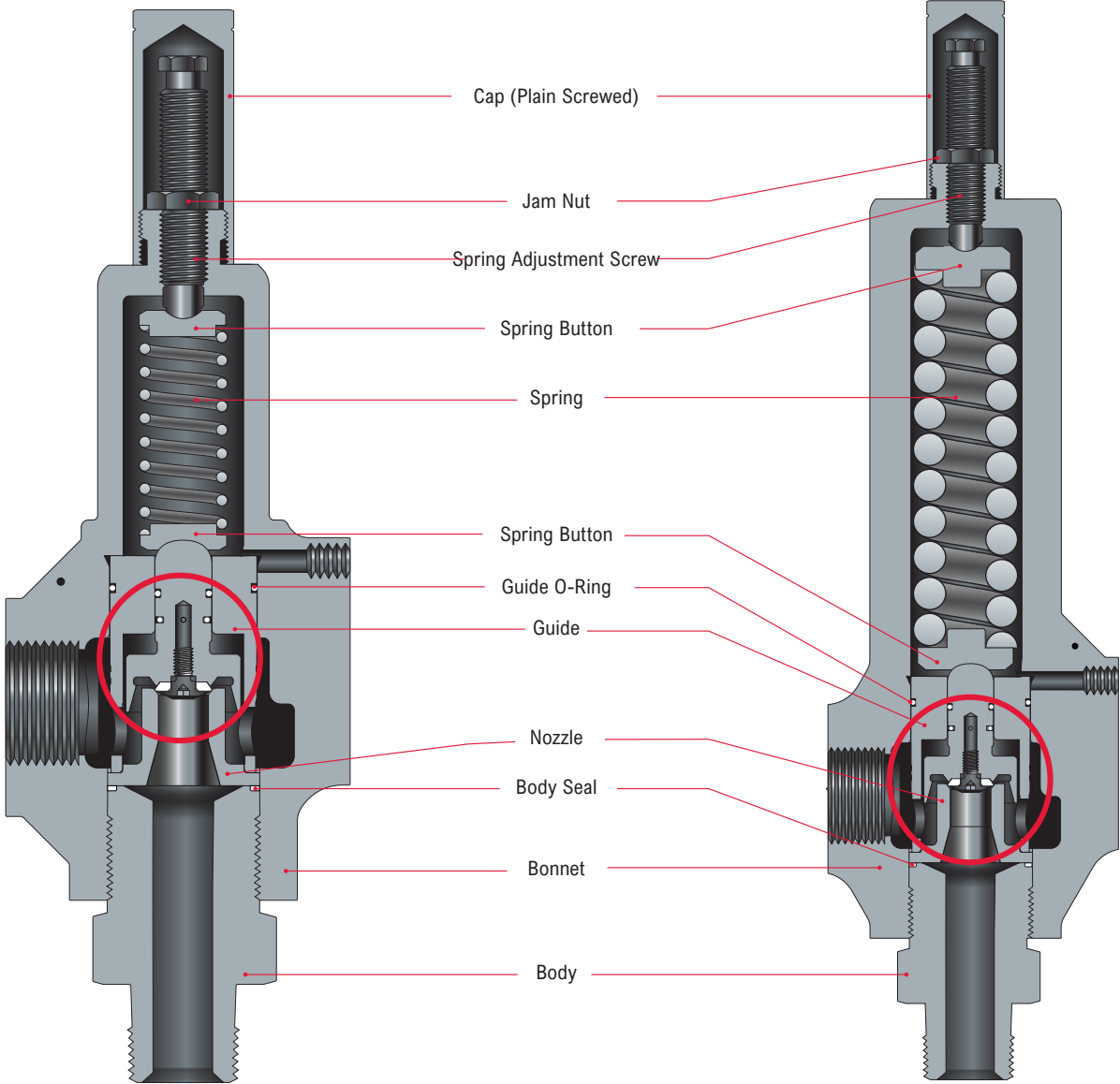
Diagram represents plastic seat design



2400L Series – Valve Diagram

Standard Model with E Orifice

High-Pressure Model with E Orifice



B and D Orifice Seat

Materials of Construction

Part Name	Standard Carbon Steel	316 SS	Brass/Bronze
Body	316 SS ASME SA-479	316 SS ASME SA-479	Brass ASTM B16 H. H.
Bonnet	Carbon Steel ASME SA-216 Grade WCB	Stainless Steel ASME SA-351 Grade CF8M	Bronze ASME SB 62
Nozzle	316 SS	316 SS	Brass
Guide			
Seat Holder			
Seat Retainer ¹			
Seat Retainer Screw	See table on next page		
Seat Seal, Elastomer ^{1,3}			
Seat Seal, Plastic ³			
Guide O-rings ^{2,3}			
Seat Retainer O-rings ^{2,3}			
Spring Adjustment Screw	316 SS	316 SS	Brass
Jam Nut			
Guide Pin ¹			316 SS
Blowdown Adjuster Screw ¹			Brass
Lock Nut, Blowdown Adjustment ¹	Brass		
Cap, Plain Screwed	Carbon Steel	316 SS	Brass
Body Seal, Elastomer Seat ^{1,3}	Same as selected seat material		
Body Seal, Plastic Seat ³	Glass filled PTFE	Glass filled PTFE	Glass filled PTFE
Blowdown Adjuster Seal ^{1,3}	PTFE	PTFE	PTFE
Spring	Stainless Steel	316 SS	Stainless Steel
Spring Buttons	316 SS	316 SS	Brass
Wire Seal	SS Wire / Lead Seal	SS Wire / Lead Seal	SS Wire / Lead Seal
Nameplate	Stainless Steel	Stainless Steel	Stainless Steel

¹2400 only. Part not used in 2400L

²2400L only. Part not used in 2400

³ Recommended replacement/spare part

Elastomer & Plastic Seat, Pressure and Set Pressure Range

Type	Service Fluid	Seat Material	Seat Code	Set Pressure Range						Max. Back Pressure psig [barg] at 100 °F [37.8 °C]
				B Orifice		D Orifice		E Orifice		
				psig	barg	psig	barg	psig	barg	
Elastomer	Gas/Vapor	FKM	V	20 to 2000	1.38 to 137.9	20 to 1410	1.38 to 97.2	20 to 600	1.38 to 41.4	400 [27.6]
		Buna N	B							
		EPDM	E							
		Kalrez	K							
		HNBR	H							
Plastic ¹		PTFE	T	50 to 1000	3.45 to 68.95	50 to 900	3.45 to 62.05	50 to 600	3.45 to 41.4	
		PCTFE	L	1001 to 2000	69.0 to 137.9	901 to 1410	62.15 to 97.2	--	--	
Plastic ¹	Liquid	PTFE	T	50 to 1160	3.45 to 79.98	50 to 600	3.45 to 41.37	50 to 600	3.45 to 41.37	90% of Set
	Liquid High Pressure	PTFE	T	1161 to 2000	80.05 to 137.9	601 to 2000	41.44 to 137.9	601 to 2000	41.44 to 137.9	90% of Set
		PCTFE	L	2001 to 6000	138.0 to 413.7	2001 to 5000	138.0 to 344.7	2001 to 4000	138.0 to 275.8	90% of Set

¹Plastic seat material selection is set pressure dependent.

Absolute back pressure limit for Brass/Bronze bonnet is 2700 psig which limits the 3000 psig set pressure limit (@90% BP)

Brass/Bronze limited to temperature limited to 300°F and 3000 psig set pressure.

Model Number System

Whether you are specifying a new valve, replacing a valve or identifying an existing valve, our model number system will help.

Series Number – 2400 Series Pressure Relief Valve.

Orifice Letter – Letter is based on orifice area, generated after sizing calculation is performed using SizeMaster* to ensure proper fit

*SizeMaster is our web-based sizing selection software. www.sizemaster.com.

Seat Material – Elastomer or Plastic. To determine appropriate seat material you must know the system pressure and temperature ranges. Tables are provided on page 7 to assist with selection.

Inlet and Outlet Size and Connection Type – Based on compatibility with system piping.

Service Fluid – The type and state of fluid to be relieved.

Materials of Construction – Select to ensure compatibility with process conditions.

Cap Type – Selection of a plain or packed lever cap should be based on code requirements and process conditions.

Accessory – Test gag option is available to hold valve closed when the system is being hydrostatically tested.

The valve model number consists of designators in the sequence shown below.

24	B	V	2	M	3	F	G	-	C1	2	0
Series Number	Orifice Letter (Sq. In.)	Seat Material ¹	Inlet Size	Inlet Connection Type	Outlet Size	Outlet Connection Type	Service Fluid		Materials of Construction	Cap Type	Accessory
24	B (0.049) D (0.110) E (0.196)	V FKM	1 1/2"	M Male NPT	2 3/4"	F Female NPT	G Gas / Vapor	-	C1 Standard Construction S4 Complete 316 SS B4 Brass/ Bronze N1 NACE C1 Construction ² N4 NACE S4 Construction ²	2 Plain	0 No Gag
		B Buna N	2 3/4"	F Female NPT	3 1"	1 Flange 150 RF	L Liquid			4 Packed Lever	1 Test Gag
		E EPDM	3 1"	1 Flange 150 RF	1 Flange 150 RF	2 Flange 300 RF	H High-Pressure Liquid				
		K Kalrez [®]		2 Flange 300 RF	2 Flange 300 RF	3 Flange 600 RF					
		H HNBR		3 Flange 600 RF	3 Flange 600 RF	4 Flange 900 RF					
		T PTFE		4 Flange 900 RF	4 Flange 900 RF	5 Flange 1500 RF					
L PCTFE		5 Flange 1500 RF	5 Flange 1500 RF	6 Flange 2500 RF							
				6 Flange 2500 RF							

¹ Selection of soft seat materials compatible with the service conditions is the customer's responsibility. See available options on page 10.

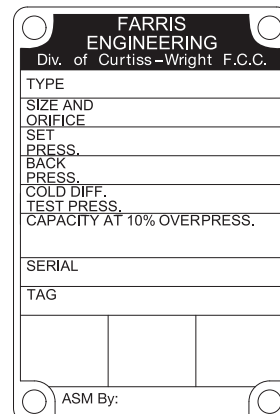
² Inconel spring.

³ Kalrez is a registered trademark of DuPont Performance Elastomers.

2400 Series Nameplate

The nameplate identifies the valve and provides critical information about the valve.

- Identifies the manufacturer, set pressure, and capacity for valve.
- Lists serial number for tracing key information such as the component parts, assembly location and date.
- Will include applicable code and compliance stamps (example UV, NB, CE, CRN, etc).



2400 Series Valve Disassembly

Required Tools and Materials

- 3/8" to 1-1/4" (1/16" increments) open and boxed ended wrenches
- 3/8" to 1-1/4" (1/16" increments) crowfoot adapters
- 3/8" to 1-1/4" (1/16" increments) deep well sockets
- Flat-blade screwdriver set
- Phillips-head screwdriver set
- Adjustable wrench set (Crescent or similar)
- Pipe wrench set
- 1/8" Punch
- Elastomer removal tool set
- Bench vise
- Torque wrench 10-70 ft lbs range
- Dow Corning Molykote 33 Lubricant
- Recommended replacement/spare parts as identified on page 6 and 10
- Optional - Alignment tools 44544 and 44544X1

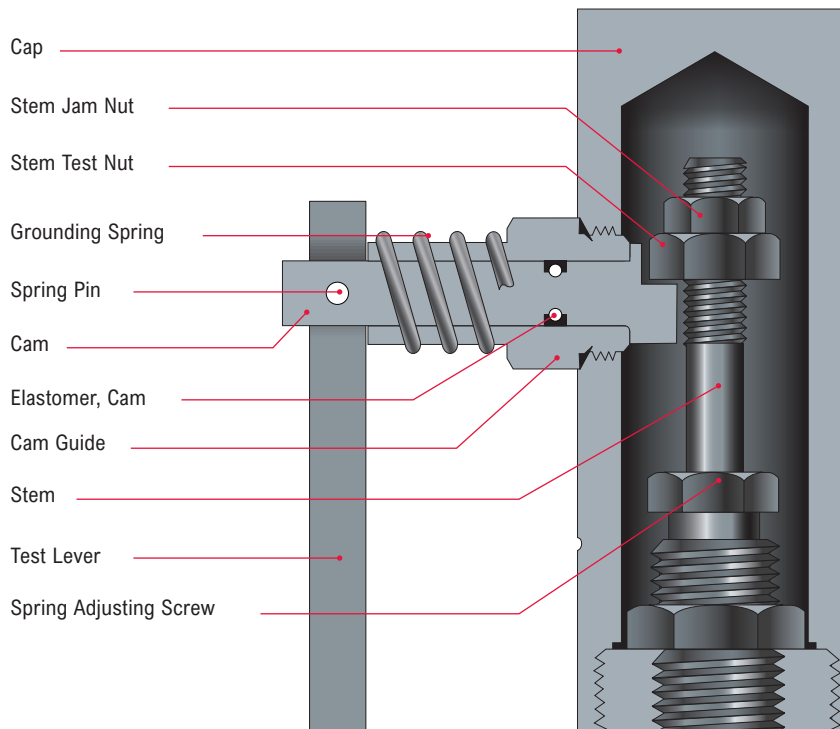
Disassembly

1. Place the valve at a suitable height. The work surface should be clean, and strong enough to handle the weight of the parts and the forces required during disassembly and assembly.
2. Mount valve vertically on the repair bench.
3. Remove wire seal. Unscrew cap by turning counterclockwise. For packed cap construction, remove the lever assembly prior to removing the cap. See instructions on page 10.
4. Measure the distance from the top of the spring adjusting screw to the top of the bonnet. Use this information when reassembling the valve to approximately duplicate the original set pressure.
5. Loosen the spring adjusting screw (SAS) jam nut. Remove the spring adjusting screw and jam nut together by turning the SAS counterclockwise.
6. 2400 Only, loosen the blowdown adjusting screw jam nut. Remove the blowdown adjusting screw and jam nut together by turning the blowdown adjusting screw counterclockwise.
7. Mount the valve horizontally in a vise clamping the valve by the bonnet flats. Remove the body from the bonnet along with the body elastomer seal.
8. Remove the valve from the vise and orientate it vertically, making sure to not allow the trim to drop.
9. Carefully remove the semi-nozzle/guide subassembly from of the bonnet by allowing it to slide out the bottom of the bonnet. If necessary, use a dowel or narrow rod (or stem for lever handle valves) through the bonnet hole at the top to guide the subassembly out.
10. Remove the nozzle from the guide. If the nozzle and guide are sticking together, turn the entire assembly upside down and tap the back of the seat holder lightly on a flat surface.
11. Remove the seat holder from the guide.
12. For elastomer valves, remove the elastomer retaining screw, elastomer retainer, and elastomer from the seat holder. For plastic seated valves, remove the seat retaining screw and plastic seat from the seat holder. Discard the elastomer or plastic seat.
13. Remove the spring buttons, spring, and stem (only lever handle valves have a stem).
14. Clean all parts and threaded surfaces thoroughly. Examine and replace damaged parts. Particular attention should be paid to the nozzle seating surface to ensure it is clean and free of any nicks or scratches. Replace all elastomer and plastic components.

2400 Series Disassembly

Packed Lifting Lever Disassembly

1. Loosen and remove the entire lever/cam assembly prior to removing the cap.
2. Loosen and remove the cap from the valve bonnet.
3. While holding the stem test nut, loosen and remove the stem jam nut from the stem.
4. Remove the stem test nut from the stem.
5. If the cam elastomer needs changed, use punch to remove the spring pin from the assembly and remove the handle, cam and elastomer.



Cap Type	Part Name	Materials of Construction		
		Carbon Steel	316 SS	Brass/Bronze
Packed Lever	Cap, Packed	316 SS		316 SS
	Stem Jam Nut		316 SS	
	Stem Test Nut	Stainless Steel		Stainless Steel
	Grounding Spring		Stainless Steel	
	Spring Pin	Steel, Plated	Steel, Plated	Steel, Plated
	Cam	Stainless Steel	316 SS	Stainless Steel
	Elastomer, Cam*	Same as selected seat material		
	Cam Guide		316 SS	
	Stem	Stainless Steel		Stainless Steel
	Test Lever		Stainless Steel	
Spring Adjusting Screw		Stainless Steel		

*Recommended replacement/spare part

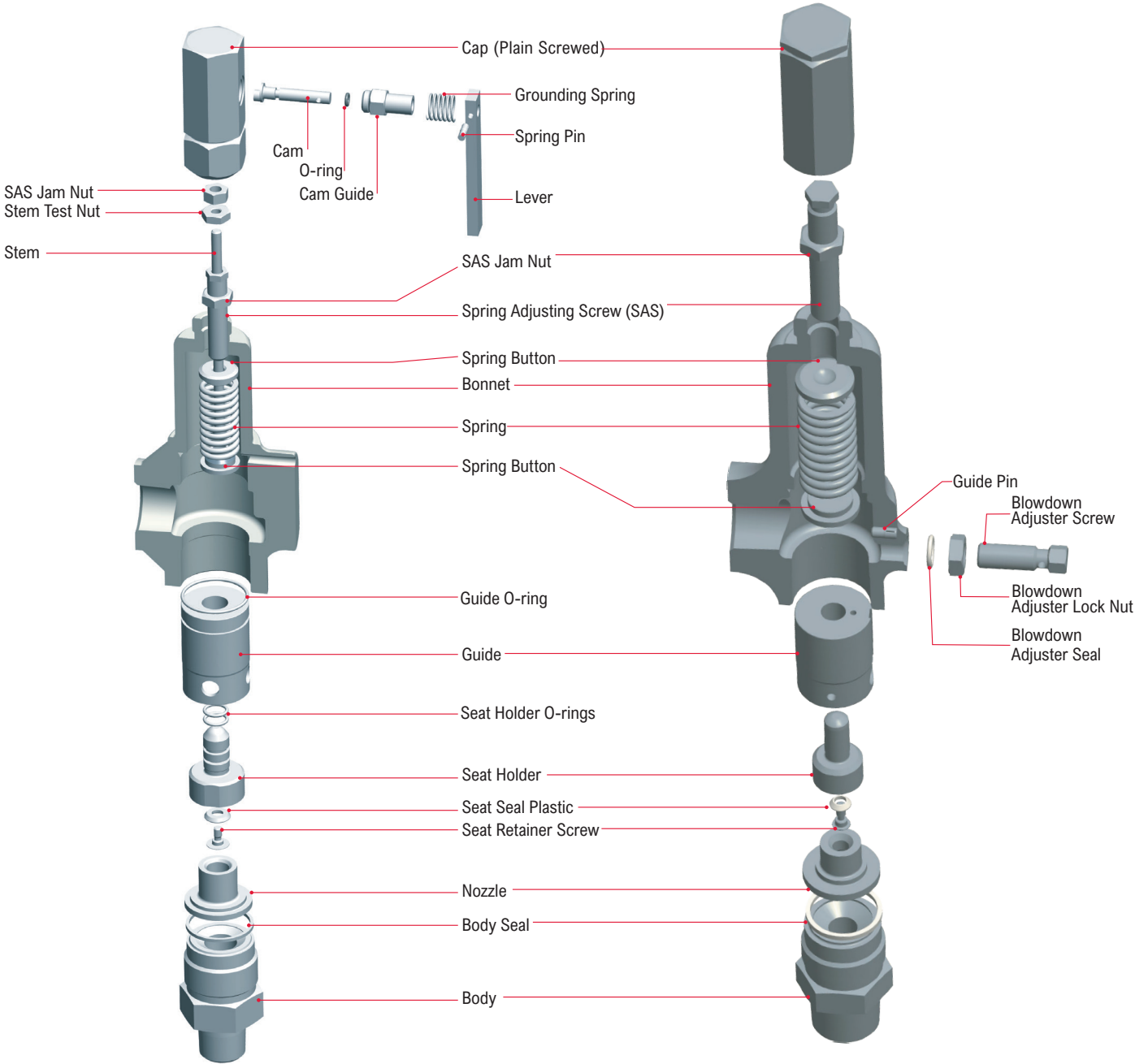
2400 Series Parts Diagram

Valve Components

Exploded view of all of the components of the 2400 Series assembly.

2400L Optional Packed Cap

2400 Series Plain Cap, Plastic Seat



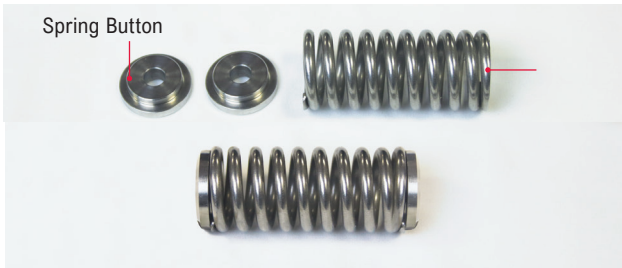
2400 Series Assembly

Assembly Procedure

1. Spring subassembly

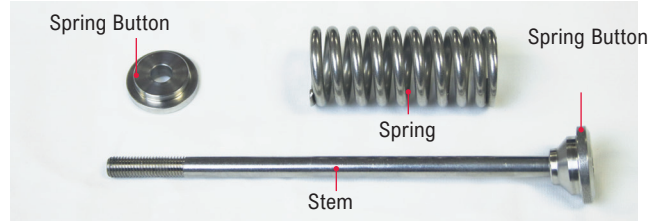
Plain cap: position spring buttons on either side of the spring with the smaller diameter surfaces resting inside of the spring.

Note: Plain cap valves do not have a stem.



Plain Cap Spring Subassembly

Packed lever cap: The lower spring button will be crimped onto the stem prior to assembly. Slide spring onto stem, then place upper spring button onto spring where the smaller diameter surface rests inside the spring.

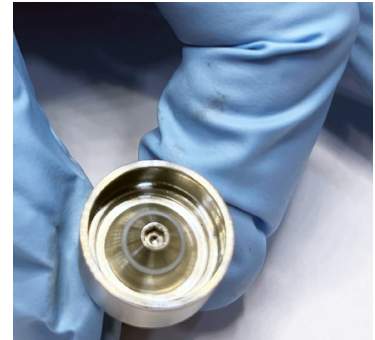
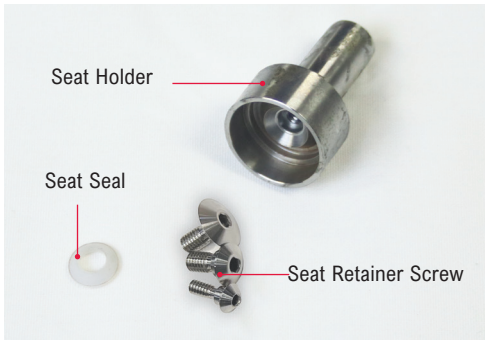


Packed Lever Cap Spring Subassembly

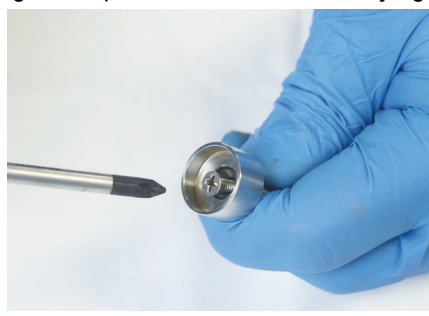
2. Seat holder assembly

Caution: Do not use a vise or pliers to hold any part of the seat holder during these steps, this will damage the surface. Seat holders should only be held by hand.

Plastic seated valves: Assemble the seat seal with the smaller diameter facing down into the seat holder and fix in place with the seat retainer screw. Place a small amount of thread locker on the seat retaining screw (not to be used in clean room for O2 applications). Using a 1/8" or 3/32" hex bit socket and a torque screwdriver, tighten seat retainer screw to 2.5 in-lbs. Note: Valves with the flat head screw already installed, remove screw and discard during a scheduled repair. Replace with hex screw.



Elastomer seated valves: Place the elastomer into the groove in the seat holder. Place a small amount of thread locker on the seat retaining screw (not to be used in clean room for O2 applications). Firmly press the seat retainer through the center of the elastomer into the seat holder. Using a Phillips head screwdriver firmly tighten retainer screw into seat holder.



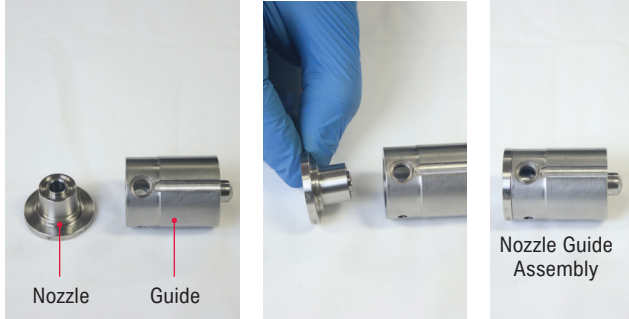
3. 2400 Guide subassembly: Slide seat holder subassembly into guide.



2400L: Lube both seat holder O-rings with DOW Corning Moykote 33 and assemble onto the shaft of the seat holder as shown below. These two O-rings are interchangeable.

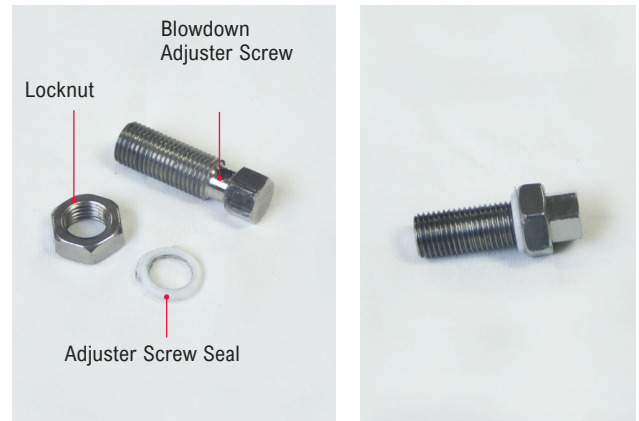


4. Nozzle/guide subassembly: Gently place nozzle into the guide. There may be a slight interference fit between the radius at the nozzle flange and the inner diameter (ID) of the guide.



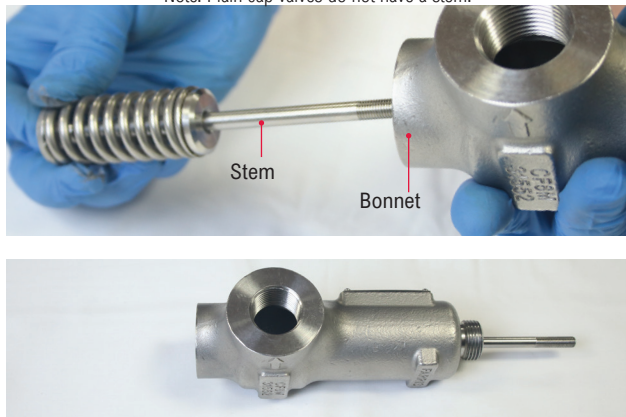
5. Blowdown adjuster screw subassembly:

(not applicable to the 2400L) Lightly lubricate the blowdown adjuster screw threads and blowdown adjuster screw seal. Thread locknut and seal onto blowdown adjuster screw, turning the nut the entire way to the head of the screw.



6. Bonnet subassembly: Lubricate concave surface of upper and lower spring button and insert the stem through the bottom of the bonnet until the stem exits through the top. Alignment tools available 44544 and 44544X1

Note: Plain cap valves do not have a stem.



7. Hold the bonnet subassembly upside down, gently lower the nozzle/guide subassembly into the bonnet.
The 2400L does not have a Guide Pin

Adjacent to the blowdown adjuster screw hole there is a guide pin pressed into the interior wall of the bonnet, align the slot in the OD of the guide with the bonnet pin. The nozzle/guide subassembly will then drop into place.

The hole in the guide should be fully visible at the bottom of the bonnet outlet when the nozzle/guide subassembly is fully inserted.



8. Lubricate the body seal and insert body seal into bonnet subassembly below the nozzle/guide subassembly.
Ensure the body seal is resting flat against the nozzle/guide subassembly.

Note: Plastic seated valves body seal is a PTFE ring with a square cross section.

Elastomer seated valves body seal will be a standard elastomer matching the appropriate elastomer material designator.

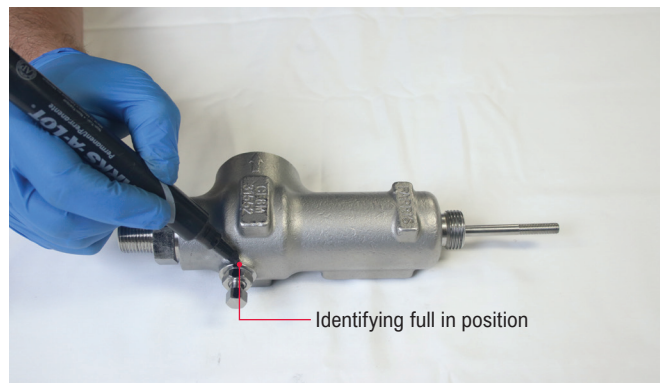
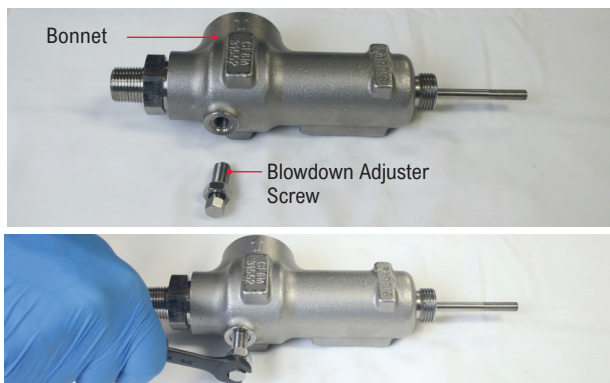


9. Lubricate the straight threads of the body and thread body completely into the bonnet subassembly.
Tighten the body in accordance to torque values on page 16.



10. 2400 only: Gently tighten the blowdown adjuster screw all the way into the bonnet until it comes to a stop, making firm contact with the guide.

Identify the full in position for the blowdown adjuster screw setting by placing corresponding marks on the bonnet and blowdown adjuster screw with a marker.

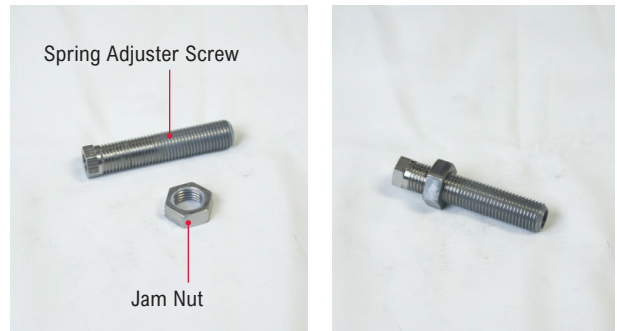


- 11. 2400 only:** Reference the blowdown adjuster screw settings on page 16 and turn blowdown adjuster screw counterclockwise the appropriate number of turns.

Once positioned correctly, firmly hold the blowdown adjuster screw while tightening the locknut against the bonnet in accordance to torque values on page 16.

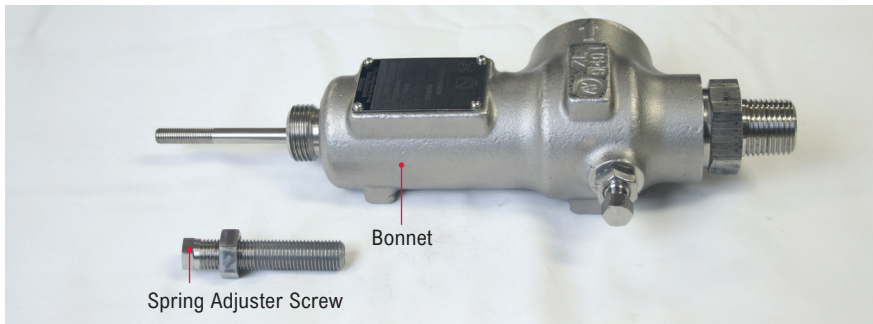


- 12. Lightly lubricate the spring adjuster screw and thread**



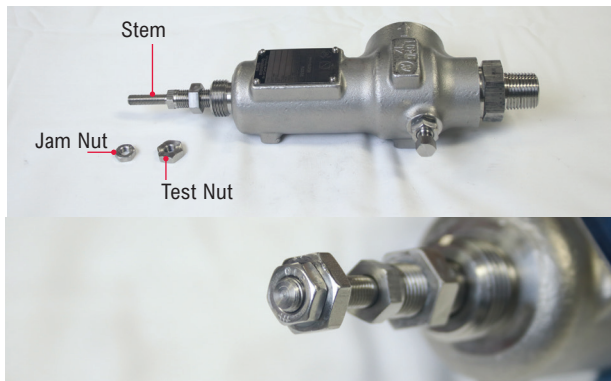
- 13. Thread spring adjuster screw into the bonnet by hand until it begins to engage the upper spring button and spring.**

Note: Plain cap valve assemblies will not have a stem and the SAS will not have a bore in the center.



- 14. Thread the test nut onto the stem,** until there is room for jam nut.

Thread the jam nut onto stem above the test nut and tighten jam against test nut and position so that 2 threads of the stem are exposed.

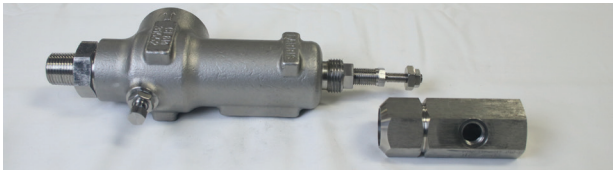


- 15. Lock down spring:** Using the procedures outlined in the Setting and Testing section on page 17, set the valve and lock down spring adjuster screw jam nut using the appropriate torque. Follow torque value guidance on page 16.



16. Lightly lube the cap threads on the bonnet and the bottom “nose” of the cap. Screw the cap onto the valve subassembly and tighten to the appropriate torque value.

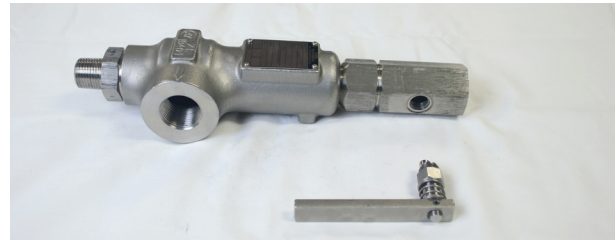
Tighten cap onto bonnet using the appropriate torque value.



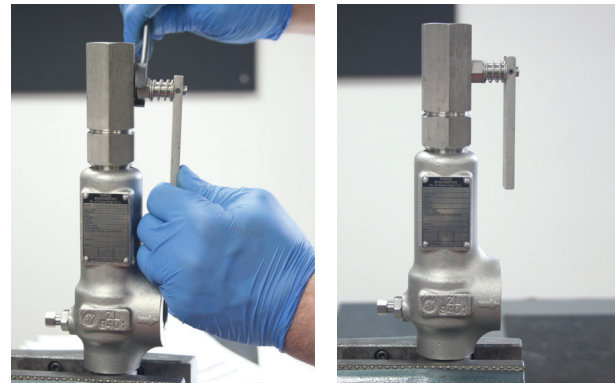
17. Lightly lube the threads of the lever handle subassembly and screw the subassembly into the cap while keeping the long side of the handle oriented toward the inlet of the valve.

Tighten the lever handle subassembly to the appropriate torque value.

Take lever assembly and screw into the cap while keeping the long side of the handle oriented toward the inlet of the valve. Tighten the lever handle to the appropriate torque value.



18. Wire Sealed: After successfully completing assembly and testing the valves should be wire sealed as shown below to prevent tampering.



Torque Values and Blowdown Adjuster Screw Settings

Series	Valve Orifice Size	Torque Values (ft-lbs)						Seat Retainer Screw
		Body/Bonnet	Cap	Lever Handle Sub	SAS Jam Nut	BD Adj Screw Lock Nut	Stem Test Nut/ Stem Jam Nut	
2400	B	70	40	20	15	10	10	2.5 in-lb
	D & E	120	40	20	15	25	10	
2400L	B, D & E	120	40	20	15	n/a	10	

2400 Only - Blowdown Adjuster Screw Settings (turns)			
Valve Orifice Size	20 – 600 psig Set	601 – 1410 psig Set	1411 - 2000 psig Set
B	1	1	1
D	1 ½	1 ½	-
E	1	-	-

Setting & Testing

Testing Procedures

Testing consists of adjusting the valve set pressure, performing a seat leakage test and a backpressure test. The set pressure test is always performed first.

Set Pressure Test

1. The 2400 series is only for use in air, gas, & vapor services. Set pressure testing is therefore always performed using air as the test fluid.

The 2400L Series is only for use in liquid service. Set pressure testing is always performed using water as the test fluid

2. Mount valve on test stand, making a note of set pressure and cold differential test pressure (CDTP). The valve will be set at the CDTP. See Table below.
3. Hold the stem tightly (lever handle valves only) and tighten (clockwise) spring adjusting screw to increase the set pressure. Make sure stem does not rotate while tightening the adjusting screw as this could damage the valve seat.
4. Slowly raise test drum pressure and observe the opening (set) pressure. For the 2400, the set pressure on air is the point at which the valve makes an audible pop. The set pressure for the 2400L on water is calculated as 93% of the full pop pressure.
5. If necessary, reduce test drum pressure 25% below the opening pressure and adjust the spring adjusting screw. Repeat until the valve opens at the required pressure, designated as the cold differential test pressure (CDTP). The actual set pressure tolerance is equal to +/-3% of the indicated set pressure. For set pressures up to and including 70 psig set pressure tolerance will be +/- 2 psig.
6. Lock the jam nut in place and pop valve two more times to ensure the set pressure adjustment was not disturbed.

All Service	
Operating Temperature	% Increase in Set Pressure at Atmospheric Temperature
-450°F to 300°F (-268°C to 149°C)	None
301°F to 550°F (-150°C to 288°C)	1%

Caution: Never adjust the spring when the pressure at the valve inlet is near its popping point as the valve seat may be damaged. Always lower the test drum pressure to at least 25% below popping pressure before making adjustments.

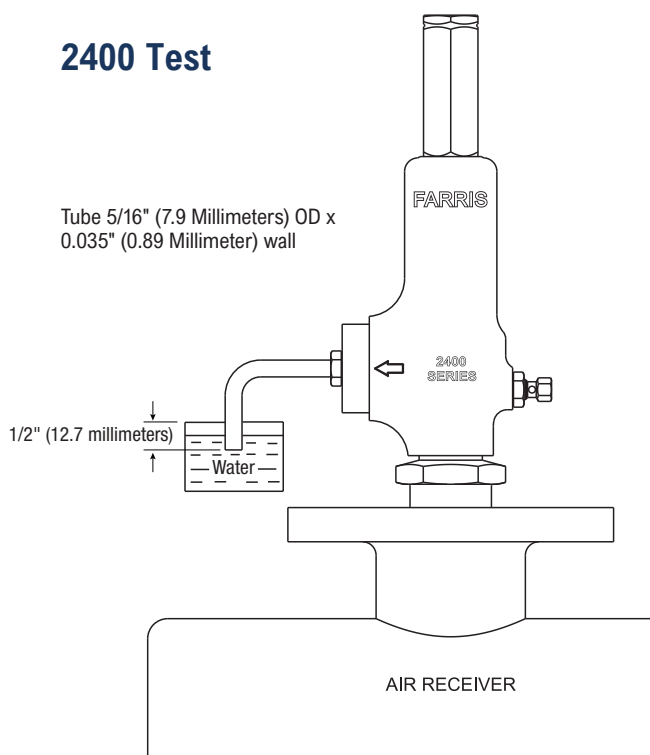
Seat Leakage Test

1. 2400 Series: After the set pressure test, perform the seat leakage test with air. With the valve mounted on the test stand, attach a bubble-tube test fixture to the outlet of the valve as shown below.

2400L: Mount the valve on the test stand so the outlet can be safely observed for signs of leakage.

2. For all seat styles, the pressure is held at 90% of the cold differential test pressure (CDTP) when CDTP is greater than 50 psig. For CDTP of 50 psig and below, the pressure should be held 5 psig below CDTP. There should be no leakage (zero bubbles per minute for 2400 and no water drips for 2400L.)

2400 Test



Backpressure Test

1. The backpressure test applies only to valves designed to discharge to a closed system, including valves with plain caps and packed lever assemblies.
2. Backpressure testing of the secondary pressure zone of all valves exceeding 1" inlet size with air or other suitable gas at a pressure of at least 30 psig is required. Backpressure testing of the secondary pressure zone for valves with inlet sizes of 1" or below is optional. Use a suitable leak detection solution to verify tightness of all gasket joints and vent/drain plugs.

Product Selection



2600 Series

Versatile and Customizable Spring Loaded Pressure Relief Valve

Product Description		
Pressure Range:	15 PSIG to 10,000 psig	1.03 to 689 barg
Temperature Range:	-450°F to +1500°F	-267.8°C to 815.6°C
Size Range:	1" x 2" to 20" x 24"	25 x 51 mm to 508 x 610 mm
Materials:	Carbon Steel, Stainless Steel, Monel, Hastelloy C, Duplex	
ASME Certification:	UV and V	
Service:	Steam/Water/Air/Multi-Media (CC 2787)	



2700 Series

Customizable Spring Loaded Pressure Relief Valve with a Compact Design

Product Description		
Pressure Range:	15 PSIG to 16,000 psig	(1.03 to 1103) BARG
Temperature Range:	-450°F to +750°F	-267.8°C to 398.9°C
Size Range:	1/2" x 1" to 1-1/2" x 2-1/2"	13 x 25.4 mm to 38 x 63.5 mm
Materials:	Carbon Steel, Stainless Steel, Monel, Hastelloy C	
ASME Certification:	UV	
Service:	Steam/Water/Air	



3800/3800L Series

Pilot Operated Relief Valve with Snap Acting or Modulating Control

Product Description		
Pressure Range:	15 PSIG to 10,000 psig	1.03 to 689 barg
Temperature Range:	-450°F to +500°F	-267.8°C to 260°C
Size Range:	1" x 2" to 12" x 16"	25 x 51mm to 305 x 406 mm
Materials:	Carbon Steel, Stainless Steel, Monel, Hastelloy C, Duplex	
ASME Certification:	UV	
Service:	Steam/Water/Multi-Media (CC2787)	



4200 Series

Spring Loaded Pressure Relief Valve for Section I Steam Applications

Product Description		
Pressure Range:	15 PSIG to 1,480 psig	1.03 to 102 barg
Temperature Range:	-20°F to +1000°F	-28.9°C to 537.8°C
Size Range:	1-1/4" x 1-1/2" to 6" x 8"	32 x 38 mm to 152 x 203 mm
Materials:	Carbon Steel, Stainless Steel, and Chrome-Moly	
ASME Certification:	UV and V	
Service:	Steam/Air	

Warranty and Certifications

Warranty

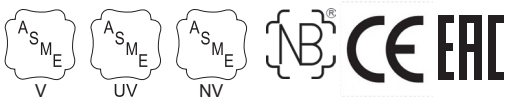
All Products have a Warranty Period of twelve months from first installation or eighteen months from delivery, whichever is sooner. All other warranty terms are as per Curtiss-Wright Industrial Standard Terms and Conditions, a copy which is available at valves.curtisswright.com or contact your local representative.



Certifications and Approvals:

- ASME V, UV, NV and NPT
- National Board Approval, NB
- ISO 9001:2015
- PED 2014/68/EU (European Pressure Equipment Directive)
- ATEX 2014/34/EU (European Potentially Explosive Atmospheres)
- CSA Z299.2/3/4, B51, N285.0 (Canadian Registration)
- CRN (Canadian Registration Number)
- CSQL (China Safety Quality License)
- Customs Union Certificates TR CU 010/2001 and TR CU 023/2013
- US Coast Guard
- Nuclear - 10 CFR 50 Appendix B, NCA-4000, NQA-1, N285.0
- First Point Assessment Limited

Refer to individual product catalogs for product specific certification.





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