CURTISS-WRIGHT

2400 SERIES

Pressure Relief Valve

Farris Engineering

Product Catalog

Table of Contents

Our Company

Farris Engineering, a division of Curtiss-Wright, has been at the forefront in the design and manufacture of spring-loaded and pilot-operated pressure relief valves since 1943. With over 75 years of proven performance, we provide customers with total pressure relief management solutions that support a facility's entire lifecycle, transforming the way you ensure plant safety.

Curtiss-Wright is a worldwide leader in delivering solutions that improve safety, plant flexibility, reliability, and efficiency. The businesses of Curtiss-Wright pioneer highly engineered solutions to deliver profound value to their customers and enable them to transform the way their business is done.

Farris Engineering is Available to Help You.

We provide a spectrum of services including product sizing, selection, system design and audit services.

Product Sizing & Selection

For optimal system performance it is critical to determine the correct product for your application. Our sizing selection software, **SizeMaster™**, assists with the task of deciding the right relief valve for your application.

You can access the software by visiting, **www.sizemaster.com** or contacting your local representative.

Relief System Design

For pressure relief system design and audit services turn to **Farris Engineering Services**. Our team of experienced engineers offer complete relief system design and audit services using a patented, web-based software package, iPRSM, which provides a comprehensive approach to the management of pressure relief systems for safety compliance. Contact your local representative for more information.

Local Support

We are a global company with local presence. Find your service support at **www.cw-valvegroup.com/farrisdistributors**.

Factory trained sales representatives are available to understand and meet your needs.

How to Order

All orders should be placed with your local Farris Engineering representative.

Our factory trained representatives are experts in:

- Determining valve size
- Identifying the right valve for the application
- Compliance with codes and standards

Visit **www.cw-valvegroup.com/farrisdistributors** to find your local representative.

Aftermarket Services

Our network of certified valve technicians can provide quick service and repair through our local Farris Authorized Service Team (FAST). Contact your local FAST Center for valve repair and maintenance.

Factory Maintenance Certification Training is available for valve repair technicians. Contact the Farris Engineering Technical Trainer at techtrainer@curtisswright.com.

2400 Series Pressure Relief Valve

A high performance direct spring loaded pressure relief valve with a soft seat design to provide reliable overpressure protection.

Target Markets & Applications

- Oil & Gas
- Chemical & Petrochemical
- Air Separation / Industrial Gas
- Cryogenic Service

Features & Benefits

Suitable for a wide range of service fluids and operating temperatures involving gas and vapor relief.

External blowdown control allows accurate blowdown adjustment without affecting set pressure.

The packed lifting lever is an optional accessory used to manually open the valve to test valve functionality.

Bubble tight seat design allows for processes to operate closer to set pressure minimizing leakage and frequent maintenance.

Full lift at set pressure reduces the potential for freeze-up in cryogenic applications.

Recommended spare parts are available as a kit, which allows for ease of ordering and reducing inventory items.

Soft seat design to minimize fugitive emissions and costly product loss.

Back pressure assists the spring to close the valve after relief cycle.

Certifications:
ASME Section VIII
CRN (Canadian Registration Number)

2400 Series – Valve Diagram

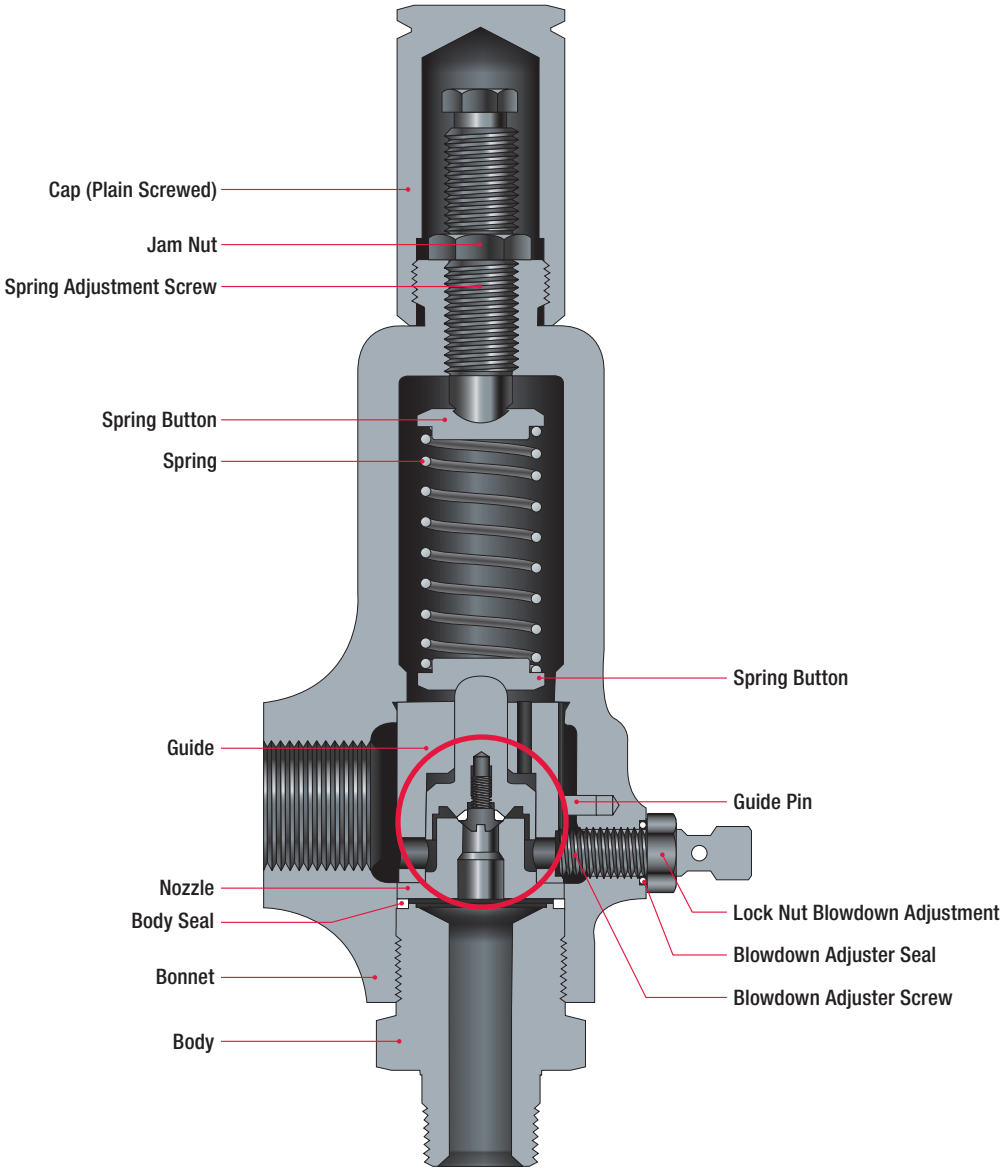
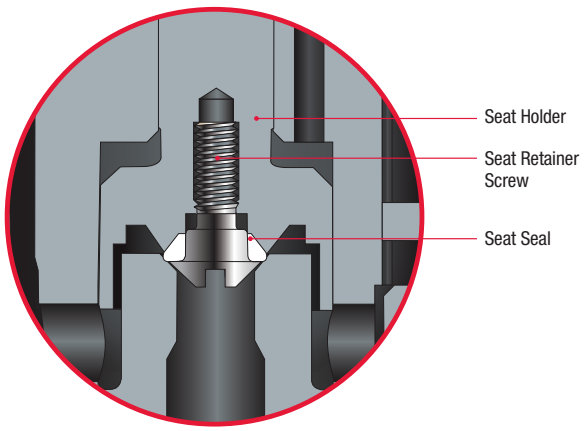
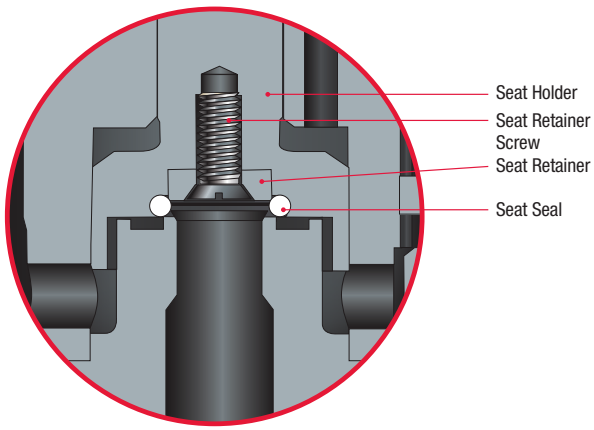


Diagram represents plastic seat design



Plastic Seat



Elastomer Seat

Materials of Construction

Part Name	Standard Carbon Steel C1	316 SS S4	Brass/Bronze B4
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[1]
Guide			
Seat Holder			
Seat Retainer			
Seat Retainer Screw			
Seat Seal, Elastomer	**See page 9**		
Seat Seal, Plastic			
Spring Adjustment Screw	316 SS	316 SS	Brass
Jam Nut			
Guide Pin			316 SS
Blowdown Adjuster Screw			Brass
Lock Nut, Blowdown Adjustment			
Cap, Plain Screwed	Carbon Steel	316 SS	Brass
Body Seal, Elastomer Seat	FKM	FKM	FKM
Body Seal, Plastic Seat	Glass filled PTFE	Glass filled PTFE	Glass filled PTFE
Blowdown Adjuster Seal	PTFE	PTFE	PTFE
Spring	Stainless Steel	316 SS	Stainless Steel
Spring Buttons	316 SS	316 SS	Brass
Wire Seal (Not Shown)	SS Wire / Lead Seal	SS Wire / Lead Seal	SS Wire / Lead Seal
Nameplate (Not Shown)	Stainless Steel	Stainless Steel	Stainless Steel

Notes:
1. For other materials, contact your representative. www.cw-valvegroup.com/farrisdistributors
2. Plastic seated valves have a 316 SS seat retainer screw.

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2400 Series – 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 9 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 the relieved.

Materials of Construction – Select to assure 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	Orifice Area Sq. In.	Orifice Area mm²	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	31.61	**V** FKM	**1** 1/2"	**M** Male NPT	**2** 3/4"	**F** Female NPT	G Gas / Vapor		**C1** Stainless Body Carbon Steel Bonnet	**2** Plain	**0** No Gag
	D	0.110	70.97	**B** Buna N	**2** 3/4"		**3** 1"					**4** Packed Lever	**1** Test Gag
	E	0.196	126.45	**E** EPDM	**3** 1"	**F** Female NPT					**S4** Complete 316 SS		
				K Kalrez®	**See available combinations below**						**B4** Brass/ Bronze		
				T PTFE							**N1** NACE, Standard Trim		
				L PCTFE							**N4** NACE Trim All SS[2]		

Notes:
1. Selection of soft seat materials compatible with the service conditions is the customer's responsibility. See available options on page 9.
2. Inconel spring.
3. Kalrez is a registered trademark of DuPont Performance Elastomers.

Available Inlet, Outlet Sizes and Connection Type Combinations

Orifice Area Sq. In. [mm²]	Orifice Designation	Valve Size Inlet x Outlet	Inlet, Outlet Designation	Inlet Connection	Inlet Connection Designation	Outlet Connection
0.049 [31.61]	B	1/2 x 3/4 1/2 x 1 3/4 x 3/4 3/4 x 1 1 x 1	12 13 22 23 33	Male NPT	M	Female NPT
0.110 [70.97]	D	1/2 x 1 3/4 x 1 1 x 1	13 23 33	Female NPT	F	
0.196 [126.45]	E	3/4 x 1 1 x 1	23 33			

Seat Capabilities and Material Selection

The 2400 Series is provided with either an elastomer or a plastic seat. Valves with both seat materials are tested to meet the requirements of American Petroleum Institute (API) Standard 527 and provide zero leakage up to 95% of set pressure.

Seat Tightness Capabilities

Seat Pressures Range	Operating Press. Range
100 psig (6.9 barg) and higher	0% to 95% of Set
50 to 99 psig (3.4 to 6.8 barg)	0% to 90% of Set
Below 50 psig (3.4 barg)	5 psig (.34 barg) below Set

Elastomer seat – Minimizes fugitive emissions and product loss.

Plastic seat– Suitable in cryogenic temperatures or corrosive applications.

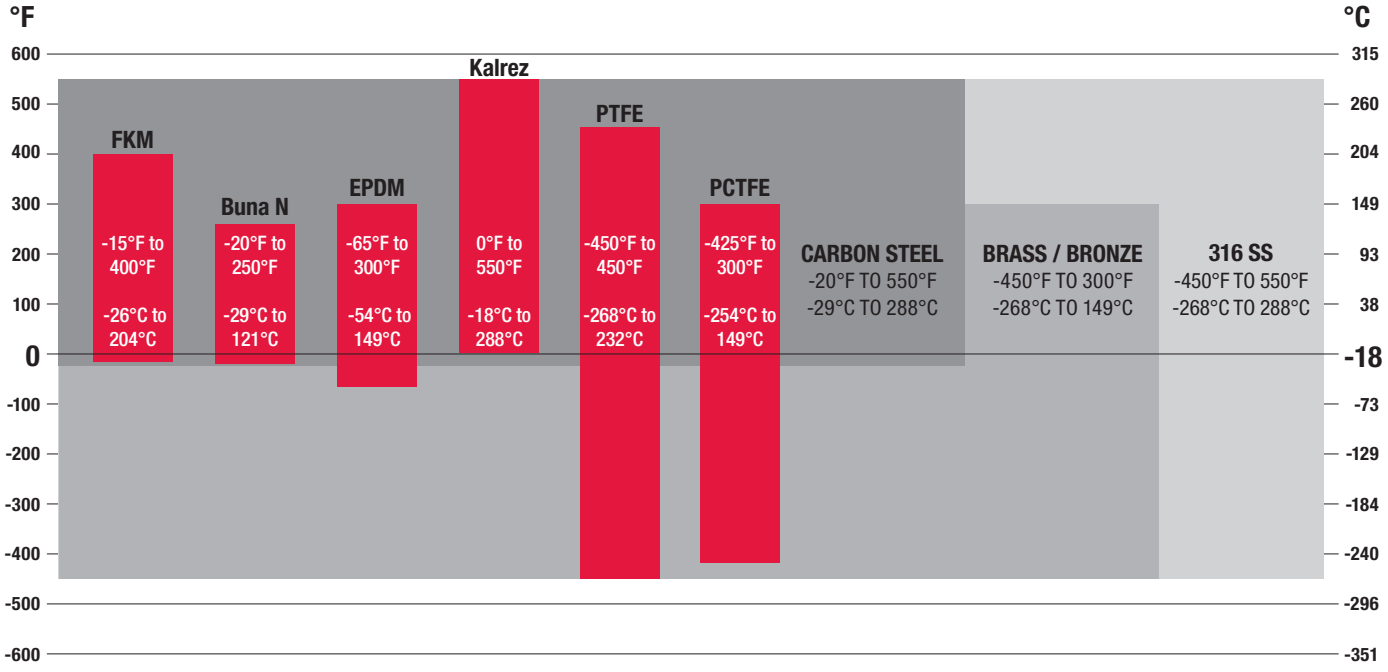
The following tables provide the set pressure and temperature range for both elastomeric and plastic seat options.

Elastomer & Plastic Seat, Pressure and Set Pressure Range

	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	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							
Plastic*	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	--	--	

Note:
*Plastic seat material selection is set pressure dependent.

Temperature Range



Note:
Temperature range may vary depending on service fluid & specific compound in a given material class.

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2400 Series – Capacity Tables

Complies with ASME Pressure Vessel Code, Section VIII.
For sizing purposes the coefficient of discharge K_d is 0.817 for air, gas and vapor service.

AIR - 10% Overpressure Capacities in Standard Cubic Feet Per Minute at 60°F (Standard Cubic Meters Per Minute at 15.6°C)

Set Pressure (psig)	Orifice Area, Sq. In.		
	B	D	E
	0.049	0.110	0.196
20*	28	62	111
30*	35	79	140
40	43	97	172
50	51	115	205
60	59	133	237
70	67	151	269
80	75	169	301
90	83	187	334
100	92	205	366
150	132	296	527
200	172	387	689
250	213	477	850
300	253	568	1012
350	293	658	1173
400	334	749	1335
450	374	840	1496
500	414	930	1658
550	455	1021	1819
600	495	1112	1981
650	535	1202	
700	576	1293	
750	616	1383	
800	657	1474	
850	697	1565	
900	737	1655	
950	778	1746	
1000	818	1836	
1050	858	1927	
1100	899	2018	
1150	939	2108	
1200	979	2199	
1250	1020	2289	
1300	1060	2380	
1350	1101	2471	
1400	1141	2561	
1450	1181		
1500	1222		
1550	1262		
1600	1302		
1650	1343		
1700	1383		
1750	1423		
1800	1464		
1850	1504		
1900	1545		
2000	1625		

*Capacities at 30 psig and below are based on 3 psi overpressure.

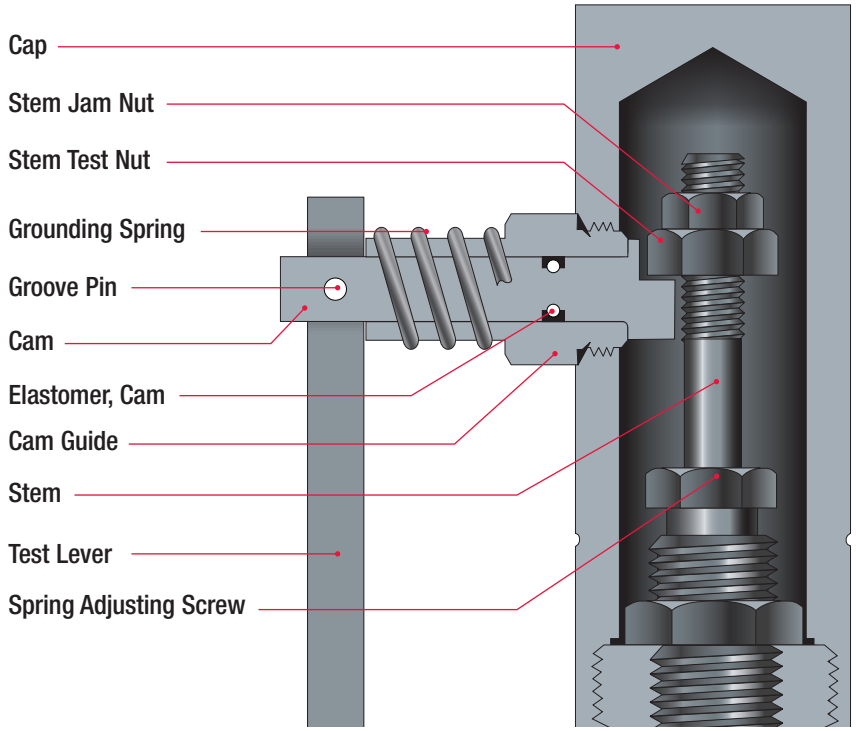
Set Pressure (barg)	Orifice Area, mm²		
	B	D	E
	31.61	70.97	126.45
1.4*	0.8	1.9	3.2
2*	1.0	2.3	3.9
3	1.3	2.9	5.2
4	1.6	3.7	6.5
5	2.0	4.4	7.9
6	2.3	5.2	9.2
7	2.6	5.9	10.5
8	3.0	6.6	11.8
9	3.3	7.4	13.2
10	3.6	8.1	14.5
12	4.3	9.6	17.1
14	4.9	11.1	19.8
16	5.6	12.6	22.4
18	6.3	14.1	25.1
20	6.9	15.6	27.7
25	8.6	19.3	34.4
30	10.3	23.0	41.0
35	11.9	26.7	47.6
40	13.6	30.5	54.3
45	15.2	34.2	
50	16.9	37.9	
55	18.5	41.6	
60	20.2	45.3	
65	21.9	49.1	
70	23.5	52.8	
75	25.2	56.5	
80	26.8	60.2	
85	28.5	64.0	
90	30.1	67.7	
95	31.8	71.4	
100	33.5		
105	35.1		
110	36.8		
115	38.4		
120	40.1		
125	41.8		
130	43.4		
135	45.1		
138	46.1		

*Capacities at 2.0 barg and below are based on 0.2 bar overpressure.

Packed Lifting Lever Option

The packed lifting lever is for applications where periodic testing is desirable. The lifting lever allows the valve to be tested at operating pressures of at least 75% of the valve set pressure.

ASME Boiler and Pressure Vessel Code Section VIII requires a lifting device for pressure relief valves used on air, steam, and water (over 140°F / 60°C).



Cap Type	Part Name	Materials of Construction		
		Carbon Steel C1	316 SS S4	Brass/Bronze B4
Packed Lever	Cap, Packed	316 SS	316 SS	316 SS
	Stem Jam Nut	Stainless Steel		Stainless Steel
	Stem Test Nut			
	Grounding Spring		Stainless Steel	
	Groove Pin	Steel, Plated	Steel, Plated	Steel, Plated
	Cam	Stainless Steel	316 SS	Stainless Steel
	Elastomer, Cam	FKM	FKM	FKM
	Cam Guide	Stainless Steel	316 SS	Stainless Steel
	Stem			
	Test Lever		Stainless Steel	
	Spring Adjusting Screw			

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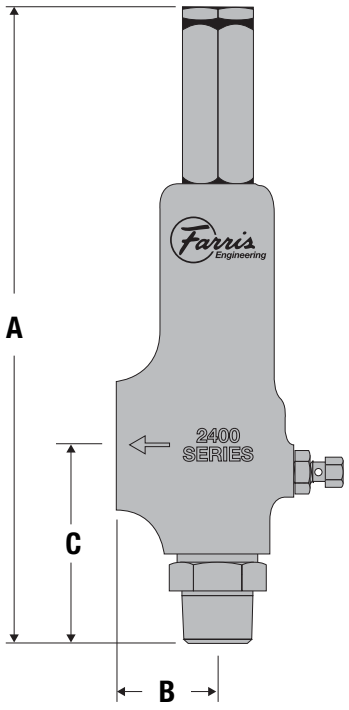
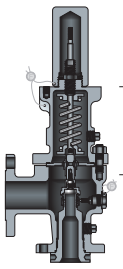
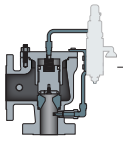
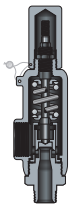
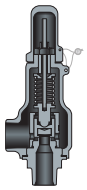
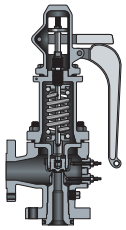
2400 Series – Dimensions & Weights

Valve Size	Connection Type	US Customary Units (inches)			Metric Units (millimeters)			Approx. Weight	
Inlet x Outlet		A (Max.) Plain Cap[1] Construction	B[2]	C[2]	A (Max.) Plain Cap Construction	B	C	Lbs.	Kgs.
B Orifice									
1/2 x 3/4	MNPT x FNPT FNPT x FNPT	9 9/16	1 1/2	2 7/8	243	38	73	4 1/2	2.1
1/2 x 1	MNPT x FNPT FNPT x FNPT	9 9/16	1 1/2	2 7/8	243	38	73	4 1/2	2.1
3/4 x 3/4	MNPT x FNPT FNPT x FNPT	9 9/16 9 3/4	1 1/2	2 7/8 3 1/16	243 248	38	73 78	4 1/2	2.1
3/4 x 1	MNPT x FNPT FNPT x FNPT	9 9/16 9 3/4	1 1/2	2 7/8 3 1/16	243 248	38	73 78	4 1/2	2.1
1 x 1	MNPT x FNPT FNPT x FNPT	9 3/4 —	1 1/2 —	3 1/16 —	248 —	38 —	78 —	4 1/2 —	2.1 —
D Orifice									
1/2 x 1	— FNPT x FNPT	— 11	— 1 13/16	— 3 11/16	— 279	— 46	— 94	— 8 1/2	— 3.9
3/4 x 1	MNPT x FNPT FNPT x FNPT	11	1 13/16	3 13/16 3 11/16	279	46	97 94	8 1/2	3.9
1 x 1	MNPT x FNPT FNPT x FNPT	11	1 13/16	3 13/16 3 11/16	279	46	97 94	8 1/2	3.9
E Orifice									
3/4 x 1 1 x 1	MNPT x FNPT FNPT x FNPT	11	1 13/16	3 13/16 3 11/16	279	46	97 94	8 1/2	3.9

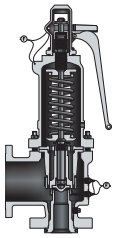
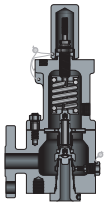
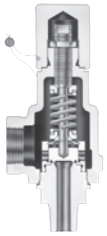
Notes:
1. “A” dimensions shown are for plain cap valves, for packed lever cap, add 1".
2. Tolerance for “B” and “C” dimensions are ±1/8".



Overview of Farris Engineering Pressure Relief Valves

Valve	Material	Size Inches	Temperature Range	Pressure Range	ASME	Balanced or Bellows	Service				Nuclear	CE Stamped
							Air	Steam	Water	Multi		
 2600 Series	Carbon Steel, Stainless Steel, Monel & Hastelloy C	1" x 2" to 20" x 24"	-450°F to +1500°F	15 psig to 6000 psig	UV	✓	✓	✓			✓	✓
2600L Series					UV	✓	✓	✓	✓	✓	✓	✓
2600S Series					UV	✓	✓	✓				✓
 3800 Series Modulating Pilot	Carbon Steel, Stainless Steel, Monel & Hastelloy C	1" x 2" to 12" x 16"	-450°F to +500°F	15 psig to 6170 psig	UV	✓	✓	✓	✓	✓	✓	✓
3800 Series Snap Acting Pilot					UV	✓	✓		✓			
 2700 Series	Carbon Steel, Stainless Steel, Monel & Hastelloy C	1/2" x 1" to 1-1/2" x 2-1/2"	-450°F to +750°F	15 psig to 6500 psig	UV	✓	✓	✓	✓	✓	✓	✓
 3700 Series	Carbon Steel, Stainless Steel	1/2" x 1" to 1-1/2" x 2-1/2"	-450°F to +750°F	15 psig to 6500 psig	UV		✓	✓	✓	✓	✓	
 2400 Series	Carbon Steel, Stainless Steel and Brass/Bronze	1/2" x 3/4" to 1" x 1"	-450°F to + 550°F	20 psig to 2000 psig	UV		✓					
 4200/4400 Series	Carbon Steel, Stainless Steel, Chrome-Moly	1-1/4" x 1-1/2" to 6" x 8"	-20°F to +1000°F	15 psig to 1000 psig	UV & V			✓				✓

Overview of Farris Engineering Pressure Relief Valves

Valve	Material	Size Inches	Temperature Range	Pressure Range	ASME	Balanced or Bellows	Service				Nuclear	CE Stamped
							Air	Steam	Water	Multi		
 6400/6600 Series	Carbon Steel, Stainless Steel, Chrome-Moly	1" x 2" to 4" x 6"	-20°F to +1000°F	15 psig to 1500 psig	UV & V		✓	✓				
 4700 Series	Stainless Steels, Carbon Steels	1/2" x 3/4" to 1" x 1-1/2"	-450°F to 1000°F	5 psig to 6000 psig	UV	✓	✓	✓			✓	
4700L Series					UV	✓			✓	✓	✓	
 1890/1896M Series	Carbon Steel, Stainless Steel, Brass/Bronze	1/2" x 3/4" to 3/4" x 1"	-20°F to 750°F	15 psig to 800/300 psig	UV		✓	✓	✓			

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.

V UV NV

Pressure Relief Valve Sizing and Selection Worksheet

The specification of the appropriate pressure relief valve size and type requires calculations with specific criteria. This worksheet is a guide when collecting information to properly size a pressure relief valve. For additional information on sizing contact your local representative.

PROCESS CONDITIONS

Set Pressure*	
Operating Pressure	
Operating Temperature*	
Relieving Temperature*	
Constant Back Pressure*	
Variable Back Pressure*	
Fluid State	
Fluid/Media*	
Required Capacity	
% Allowable Overpressure	
Compressibility	
Molecular Weight	
Viscosity	
Ratio of Specific Heats	
Latent Heat of Vaporization	
ASME Code	

*Items required for order entry

MATERIALS

Body and Bonnet	
Nozzle	
Seat Seal	
Guide	
Spring	
Cap/Lever	

VALVE DESIGN DATA & ACCESSORIES

Size (Inlet x Outlet)	

Test Gag	☐ **Yes**	☐ **No**

Warranty

All Farris Engineering 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 www.cw-industrialgroup.com/About/Group-Policies/Terms-Conditions.aspx. or contact your local representative.

CURTISS-WRIGHT

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Offices Worldwide: For a listing of our global sales network, visit our website at www.cw-valvegroup.com/farrisdistributors.

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