

**CURTISS -
WRIGHT**

Valve Group



3800 Series

Farris Engineering
Pressure Relief Valves



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Piloting the Way to Precision Control

This catalog is provided to aid in the proper selection of a Farris 3800 Series.

Farris' 3800 Series valves feature an innovative, integrally cast, flanged body with a semi-nozzle design. Series 3800 valves are self-contained units actuated by either the snap-acting or modulating style pilot controls. Valves in this series are certified under Section VIII of the ASME Code for Air, Gas, Vapor, Steam and Liquid Service.

3800 Series valves are available in API Orifice sizes D through T as well as full port models. Series 3800 valves offers raised face or ring joint inlet flanges from 150 through 2500 ASME classes with 150, 300 and selected 600 class outlets. Standard options support applications in pressures range from 15 to 6170 psig with temperatures of -450°F to 450°F. For higher temperature and pressure requirements, please consult the Factory.

All Series 3800 valves have non-flowing pilot controls. Standard materials of construction include a carbon steel main valve body with 316 stainless steel trim and all 316 stainless steel pilot control. The main valve is also available in optional materials in a full 316 stainless steel, NACE, Monel®, Hastelloy®, Duplex with other materials available upon request.

Viton® soft goods are standard in both pilot control and main valves. Buna-N, neoprene, ethylene propylene, silicone, PTFE and Kalrez® soft goods are available as options; contact Factory for more information.

Sizing software and support is available at <http://www.cw-valvegroup.com/SizeMaster>

Warranty

All products manufactured by Farris Engineering are warranted free of defects in material and workmanship when used within the range recommended for a period of one year after installation or eighteen months from delivery. When authorized, any defective product may be returned to the factory and if found defective will be repaired or replaced free of charge, solely at the discretion of Farris Engineering, ex-works our factory. No charge for labor or other expense incurred will be allowed, as the liability of Farris Engineering is measured by the refund price of the defective product only. All warranties are based on the product being used within the range recommended and does not cover damages or defects due to normal wear and tear, misuse, alteration or neglect. The purchaser shall determine the suitability of the product for use and assumes all risks and liabilities in connection therewith.

This warranty does not cover the performance of valves tested at site on test equipment that is not to the same technical standard as that used by the manufacturer.

Viton and Kalrez are registered trademarks of DuPont Performance Elastomers.
PTFE is a registered trademark of the DuPont Corporation.
Monel is a registered trademark of Inco Alloys International, Inc.
Hastelloy is a registered trademark of Haynes International, Inc.

Selection Table Matrix

3800 Series Pilot Control Application Summary			PCF5 (2)	PCL (3)	PCM (4)	PCMS (5)	HPCM (6)	HPCM (7)
Type of Actuation	Snap-Acting		✓	✓				
	Modulating				✓	✓	✓	✓
Blowdown	Adjustable		✓					
	Non-adjustable			✓	✓	✓	✓	✓
Set Pressure Ranges psig (barg)	15 to 740 (1.03 to 51.03)		✓	✓	✓	✓		
	741 to 2220 (51.1 to 153.1)		✓	✓			✓	
	2221 to 6170 (153.2 to 425.5)		✓	✓				✓
Fluid Services	Air/Gas/Vapor		✓		✓	✓	✓	✓
	Liquid			✓	✓	✓	✓	✓
	Steam					✓		
Temp. Range °F (°C)	-50 to 500 (-45 to 260)		✓	✓	✓	✓	✓	✓
	-450 to -51 (-267 to -46)		✓					
Soft Goods (O-Rings) °F (°C)	Fluorocarbon (Viton)	-20 to 450 (-29 to 232)	✓	✓	✓	✓	✓	✓
	Ethylene Propylene (EPDM)	-65 to 250 (-54 to 121)	✓	✓	✓	✓	✓	✓
	Nitrile (Buna)	-55 to 225 (-48 to 107)	✓	✓	✓	✓	✓	✓
	Aflas	-20 to 450 (-29 to 232)	✓	✓	✓	✓	✓	✓
	Kalrez	0 to 500 (-18 to 260)	✓	✓		✓	✓	✓
	Kalrez Steam	212 to 500 (100 to 260)				✓		

Soft Goods Disclaimer

All PORVs use soft goods for their seats and seals. In selecting a soft good, please note the following guidelines:

- The main valve and pilot control soft goods selection is based on meeting the set pressure and temperature ranges shown as well as being chemically compatible with the process fluid.
- The soft goods selected should not exceed the above limits. For most applications both the operating and relieving temperatures should fall within the ranges shown. Where the sole relieving scenario is external fire, the relieving temperature may be ignored as long as the operating temperature falls within the range of the elastomer selected.
- Because of the wide variety of fluids and process conditions used in the process industry, it is the customer's responsibility to select the proper soft goods material for each specific application.

Principles of Operation – Snap Acting

Closed Valve Position

The pilot control valves use system pressure to keep the main valve closed. System pressure is transmitted through the pressure pickup from the inlet of the main valve, through the pilot control and into the dome of the main valve. The system pressure exerts force upon the top of the piston in the dome, holding the piston firmly against the seat on the nozzle in the main valve. The surface area of the piston in the dome of the main valve is greater than the seat area, so the greater the system pressure, the greater the force holding the piston onto the main valve seat. As a result, the pilot operated relief valve gets tighter as the system pressure approaches set pressure.

Relieving Cycle

As system pressure reaches set pressure, the force acts upon the surface area of the pilot control disc, overcoming the spring force in the pilot valve, and the pilot valve lifts. As the seat assembly in the pilot control begins to lift, it seals off the flow of pressure to both the vent and the main valve dome. At the same time, the pressure in the dome is released through the pilot vent. Once the pressure in the main valve's dome has been released, the system pressure, acting on the bottom of the piston, will lift the piston and relieve system pressure until normal process conditions are restored.

Re-Closing Cycle

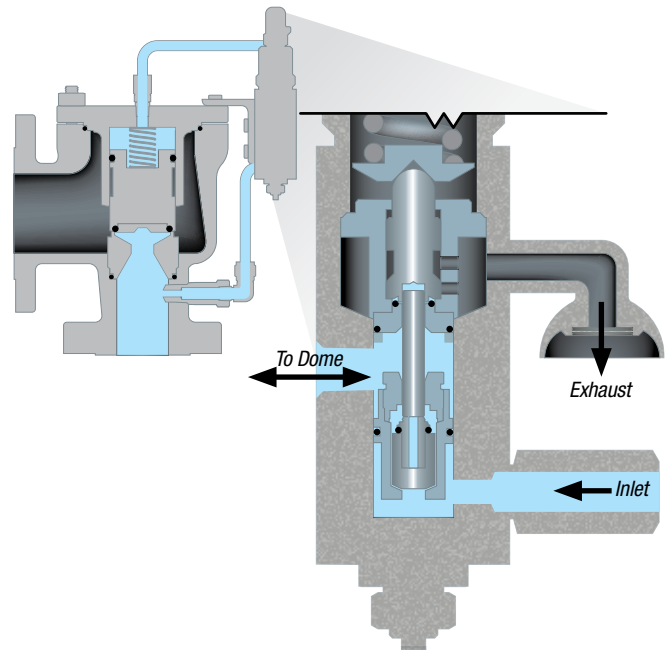
At the point where the system pressure blows down, the spring force in the pilot control overcomes the force of system pressure acting on the pilot control seat assembly, closing the upper seat and reopening the lower seat. This re-establishes flow through the pilot control, allowing system pressure to be redirected back into the main valve dome, closing the main valve. Blowdown can be precisely adjusted externally by raising or lowering the blowdown adjuster position in the pilot control.

Operating Advantages:

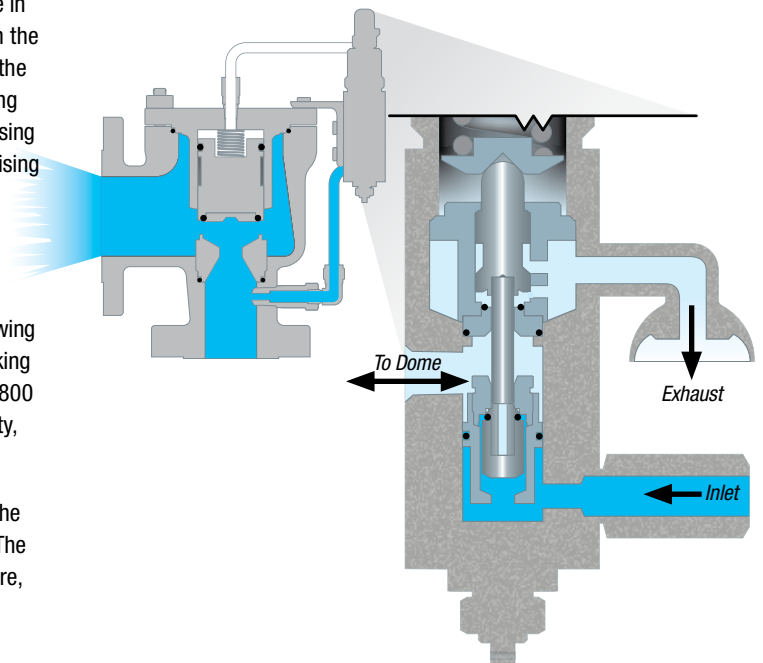
Bubble-tight closer to set pressure: Series 3800 valves operate bubble-tight at higher operating pressure to set pressure ratios, allowing operators to run very close to the system's maximum allowable working pressure. While protecting the system from overpressure, Series 3800 allows maximum product throughput, increased system profitability, and reduced fugitive emissions.

Unaffected by back pressure: Unlike a direct spring loaded valve, the pilot operated valve's set pressure is not affected by back pressure. The pilot control valve, isolated from the influence of downstream pressure, controls the main valve's opening and closing.

Snap Acting Valve – Closed Position



Snap Acting Valve – Open Position



Principles of Operation – Modulating

Closed Valve Position

At normal operating system pressure, the modulating control performs the same as the snap acting control. The pressure pickup directs system pressure from the inlet of the main valve through to the pilot control inlet port and into the dome of the main valve. The pressure area of the piston in the dome of the main valve is greater than the nozzle seat area. The greater the system pressure, the greater the seating force holding the main valve piston onto the nozzle seat.

As system pressure increases and approaches the valve's set pressure, the force acting upward on the pilot control increases, overcoming the spring force of the pilot control causing the inlet seat to lift and seal against the floating spool. Pressure is maintained in the dome because the inlet and outlet seals remain closed.

Relieving Cycle

Any further incremental increase in system pressure near set pressure raises both the inlet seat and spool causing the outlet seat seal to crack open. This allows a partial venting of dome pressure in the event of an increase in system pressure. Similarly, any further decrease in system pressure near set pressure lowers both the inlet seat and spool causing the outlet seat seal to close. This allows for a re-pressurizing of the dome when the inlet seat opens at decrease in system pressure.

As the system pressure increases to set point, the modulating action of the pilot control, as described above, reduces the pressure in the main valve dome. The further decrease in dome pressure caused by increasing system pressure reduces the seating force to zero and opens the main valve seat to allow flow. The opening of the main valve responds gradually and proportionally to the rise in system pressure, either at or above the set pressure. The main valve will achieve full open and rated flow by 10% overpressure.

Re-Closing Cycle

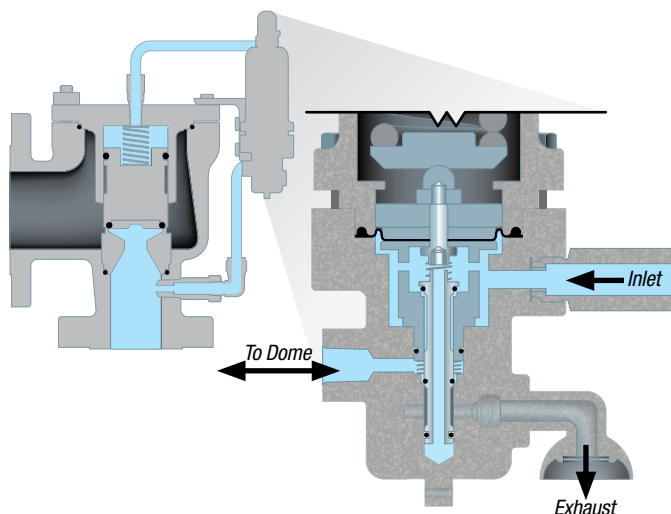
As the system pressure is decreased below set pressure, the spring force in the modulating pilot control overcomes the system pressure acting on the diaphragm/piston assembly and re-closes the outlet seat. The inlet seat then opens and allows system pressure back into the main valve dome, reseating the main valve.

Operating Advantages:

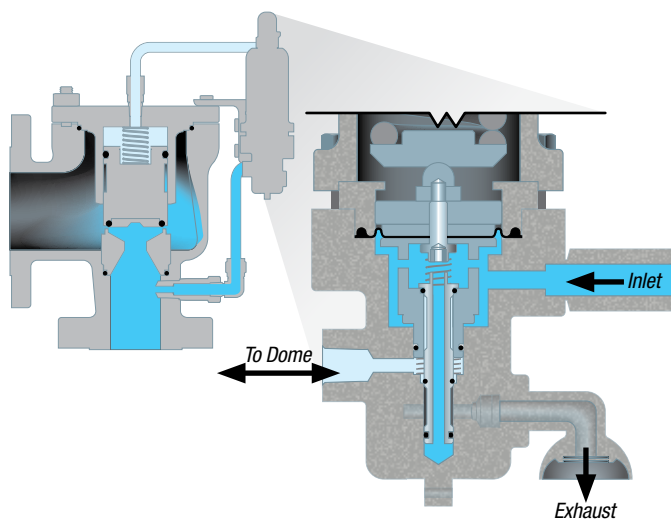
A pilot valve with a modulating control has the same operating advantages as a snap acting pilot control: operates bubble-tight close to set pressure and is unaffected by back pressure.

Minimizes product losses: In addition, the modulating control responds gradually and proportionately to the rise in over pressure, minimizing product losses and reducing reaction forces when the flow requirement is below the maximum rated flow of the valve.

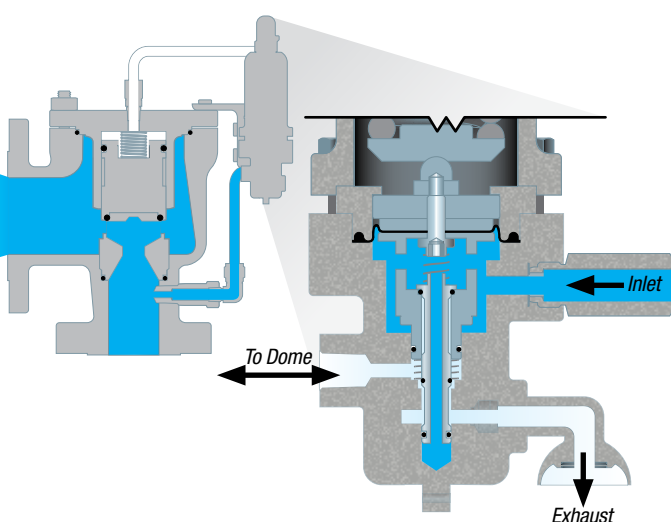
Modulating Valve – Closed Position



Modulating Valve – Partially Open Position



Modulating Valve – Fully Open Position





Numbering System

To simplify the selection and specifying of Farris pressure relief valves, use the following type numbering system. The type numbering system is ideal as the digits which comprise a specific type number have a distinct significance. The digits describe the basic valve series, orifice, seat and internal construction, inlet temperature range, body, and spring material, inlet flange class as well as Code liquid design.

38 D C 1											
Series Number		Orifice Area				Construction		Materials & Temperatures			
38	Orifice Letter	Area, in ²		Area, mm ²		C Elastomer O-Ring Seat & Seals*	T PTFE O-Ring Seat & Seals (Main Valve Only)**	Designation	Material		Inlet Temperature Range °F
		API	Actual	API	Actual				Body & Cover	Piston	
	D	0.110	0.150	71	97			1	Carbon Steel*	Stainless Steel	-20* to 450
	E	0.196	0.225	126	145						
	F	0.307	0.371	198	239			2**	Carbon Steel	PH St. St.	-20 to 500
	G	0.503	0.559	325	361						
	H	0.785	0.873	506	563						
	J	1.287	1.430	830	923			8***	Stainless Steel	Stainless Steel	-450 to -50
	K	1.838	2.042	1186	1317						
	L	2.853	3.170	1841	2045						
	M	3.60	4.000	2323	2581						
	N	4.34	4.822	2800	3111						
	P	6.38	7.087	4116	4572						
	Q	11.05	12.27	7129	7916						
	R	16.0	17.78	10323	11471						
	T	26.0	28.94	16774	18671						
	A	—	0.719	—	464						
	1	—	1.767	—	1140						
	2	—	2.953	—	1905						
	3	—	6.605	—	4261						
	4	—	11.50	—	7419						
	6	—	26.07	—	16819						
	8	—	45.66	—	29458						

*For set pressures above 1480 psig, main seat seal for all valves with 900#, 1500# and 2500# inlet flanges use PTFE.
 **Required for steam services
 ***Use for cryogenic applications, S4 special material suffix is not required.

Ordering Information

To properly process your order and avoid delay please specify the following:

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Quantity 2. Inlet and Outlet Size 3. Farris Type Number* 4. Inlet and Outlet Flange Class and Facing 5. Materials of Construction, if other than Standard 6. O-Ring Seal Material (Viton is Standard) 7. Set Pressure* 8. Maximum Inlet Temperature* 9. Allowable Overpressure* 10. Fluid and Fluid State* | <ol style="list-style-type: none"> 11. Backpressure, Superimposed Constant and/or Variable and Built-up* 12. Required Capacity* 13. Physical Properties of Fluid (Molecular Weight, Specific Gravity, etc.)* 14. Accessories, if any required such as: <ol style="list-style-type: none"> a) Manual or Remote Depressurizing b) Field Test Connection c) Reverse Flow Preventer d) Auxiliary Filter e) Any other 15. Code Requirements, if any required |
|--|--|

*If you would like Farris to verify your selection and sizing, this information is required.

General Notes:

If valve modification or set pressure changes are required, consideration must be given to correct the nameplate and other data.

2 X - 1 2 0 /S4

Inlet Class		Special Construction (If applicable)	Inlet Facing	Pilot Control	Options	Special Material
Designation	ASME Nominal Inlet Flange Class	L Liquid Service (Standard Connections) X Air & Vapor Service (Oversize Connections) Y Liquid Service (Oversize Connections) D Air & Vapor Service (Dual Outlet)* E Liquid Service (Dual Outlet)* U Air & Vapor Service (Non-Standard API Connections) N Air & Vapor Service (Non-Standard API Connections)	1 Raised Face, ASME Std. (125 to 160 AARH) 9 Ring Joint ASME Std. (Octagonal) H 63 to 83 AARH Raised Face (Inlet only) Although not applicable to the inlet facing only, the following first digit letters are also used: J 63 to 83 AARH (Outlet only) K 63 to 83 AARH (Inlet and outlet) X High Pressure Hub Connection*	2 PCF5 Snap Acting Control 3 PCL Liquid Snap Acting Control 4 PCM Modulating Control 5 PCMS Modulating Control 6 HPCM High Pressure Modulating Control 7 HPCM7 High Pressure Modulating Control	0 No Options 1 Test Gag 2 Dual Pilot Controls 3 Auxiliary Filter 4 Manual Depressurizing 5 Field Test Connection 6 Reverse Flow Preventer 7 Pressure Spike Snubbers 8 Remote Depressurizing F Field Test Connection with Indicator R Remote Sensing V Pilot Control Discharge Connected to Main Valve Outlet	S3 Complete 316 St. St. PH St. St. Piston S4 Complete 316 St. St. N1 NACE Compliant Carbon St. Body N3 NACE Compliant PH St. St. Piston N4 NACE Compliant Complete 316 St. St. M4* Complete Monel H4* Complete Hastelloy C D4* Duplex St. St. DB* Super Duplex St. St. LB* Low temperature carbon steel - LCB Body LC* Low temperature carbon steel - LCC Body
0	150					
2	300					
3	600					
4	900					
5	1500					
6	2500					
		*Available on 6" and 8" inlet size valves only. Other sizes consult factory	*Limited valve sizes and pressure classes. Consult factory.		See table below for combinations	*Add "N" for NACE E.g. M4N, H4N, etc.

Parts Replacement

Valves: If an exact replacement valve is required, the valve type, size and serial number must be specified to assure proper dimensions and material being supplied. If a specific valve has become obsolete, a recommendation for the current equivalent, if any, will be made.

Spare Parts: When ordering parts, use part names as listed in the bills of material in this catalog. Specify valve type, size and serial number. If serial number is not available, the original Farris factory order number will assist in our supplying the proper part and material.

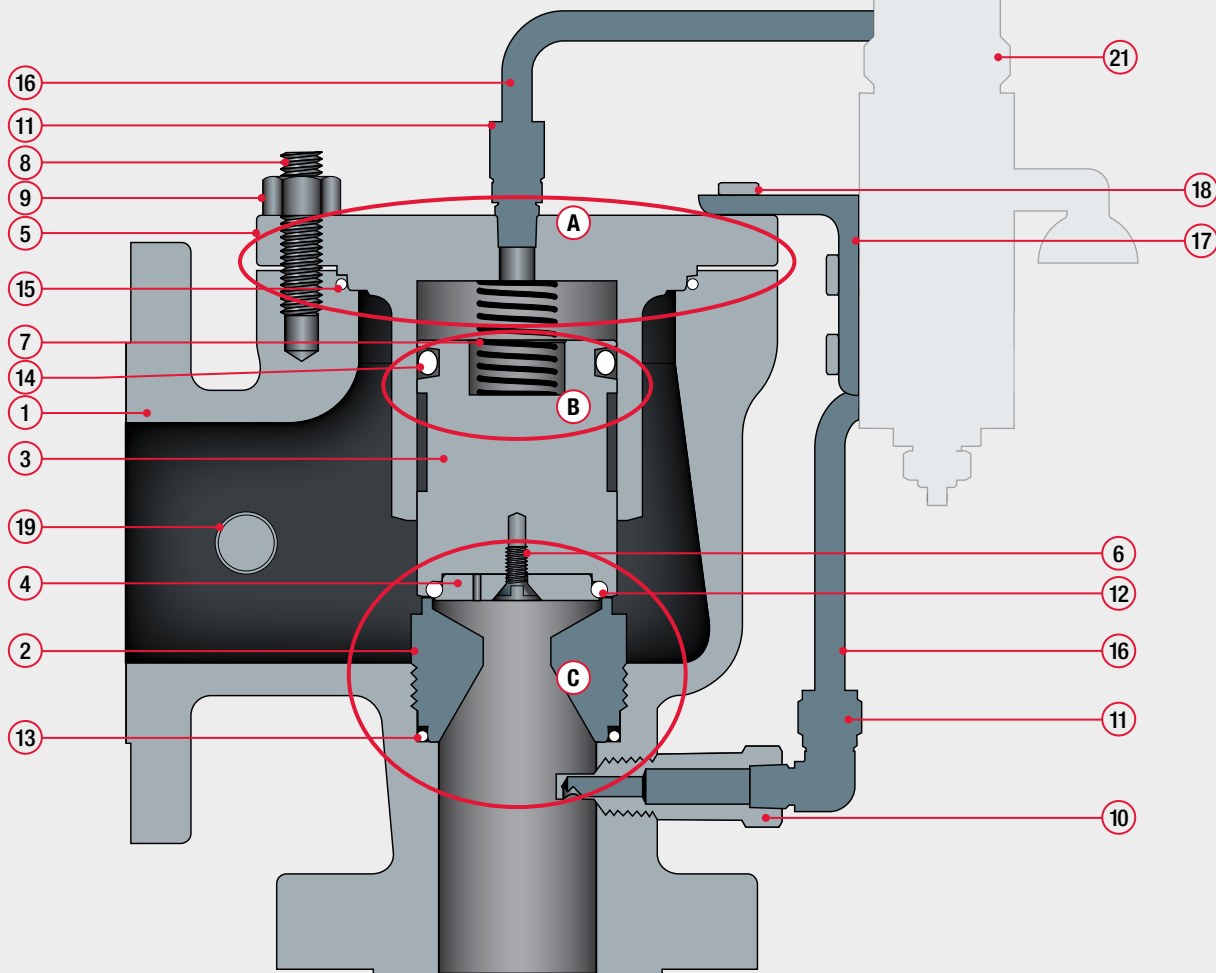
Springs: Order as an assembly to include spring with upper and lower spring buttons. Specify valve type, size, serial number, set pressure and back pressure, if any.

Codes for Common Accessory Combinations

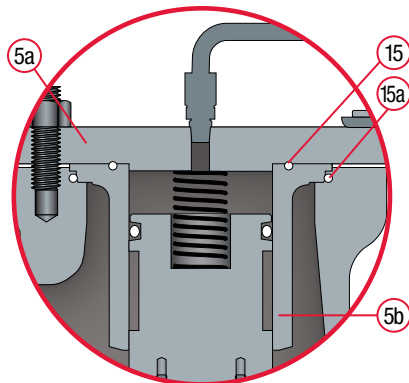
9	Four Auxiliary Functions: Options 4, 5 or F*, 6 & 8
A	Combo – Auxiliary Filter (3) & Field Test Connection (5 or F)*
B	Combo – Field Test Connection (5 or F)* & Reverse Flow Preventer (6)
E	Combo – Auxiliary Filter (3), Field Test Connection (5 or F)* & Reverse Flow Preventer (6)
C	Designation for combinations of options not listed

* For Modulating Controls, Field Test Connection w/ Indicator (F) is automatically supplied, unless specified otherwise.

Main Valve: Advantage Farris

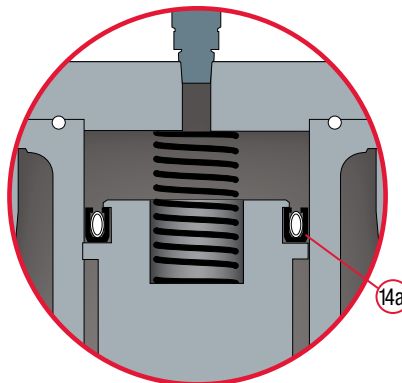


A Two Piece Cover and Guide



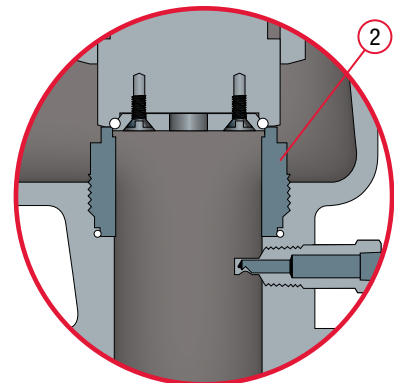
Valves with 3" inlet and larger

B Energized Piston Seal



Used for cryogenic, steam and special service

C Full Port Nozzle



Not available for liquid service

3800 Series Bill of Materials – Main Valve

Bill of Materials – Main Valve									
Item No.	Part Name	Standard Material	S3/S4	N1 NACE	N3/N4 NACE	M4	H4	D4	D8
1	Body	SA-216 Gr. WCB Carbon St.	SA-351 Gr. CF8M St. St.	SA-216 Gr. WCB Carbon St. ²	SA-351 Gr. CF8M St. St. ²	SA-494 Gr. M35-1 Monel	SA-494 Gr. CW-12MW Hastelloy	SA-995 Gr. 4A Duplex	SA-995 Gr. 6A Duplex
2	Nozzle	316 St. St.	316 St. St.	316 St. St. ²	316 St. St. ²	Monel	Hastelloy C	Duplex	Duplex
3	Piston	316 St. St.	S3 = PH St. St. S4 = 316 St. St.	316 St. St. ²	N3 = PH St. St. N4 = 316 St. St.	Monel	Hastelloy C	Duplex	Duplex
4	O-Ring Retainer	316 St. St.	316 St. St.	316 St. St. ²	316 St. St. ²	Monel	Hastelloy C	Duplex	Duplex
5	Cover/Guide	SA-351 Gr. CF8M St. St.	SA-351 Gr. CF8M St. St.	SA-351 Gr. CF8M St. St. ²	SA-351 Gr. CF8M St. St. ²	SA-494 Gr. M35-1 Monel	SA-494 Gr. CW-12MW Hastelloy	SA-995 Gr. 4A Duplex	SA-995 Gr. 6A Duplex
5a	Cover ¹	Carbon St.	316 St. St.	Carbon St. ²	316 St. St. ²	Monel	Hastelloy C	Duplex	Duplex
5b	Guide ¹	316 St. St.	316 St. St.	316 St. St. ²	316 St. St. ²	Monel	Hastelloy C	Duplex	Duplex
6	Retainer Screw	St. St.	St. St.	St. St.	St. St.	Monel	Hastelloy C	Duplex	Duplex
7	Return Spring	316 St. St.	316 St. St.	Inconel™ X750	Inconel X750	Inconel X750	Inconel X750	Inconel X750	Inconel X750
8	Body Stud	ASME SA-193 Gr. B7 Alloy St.	ASME SA-193 Gr. B8M St. St.	ASME SA-193 Gr. B7M Alloy Steel	ASME SA-193 Gr. B8MA St. St.	ASME SB-574 UNS N10276 Hastelloy	ASME SB-574 UNS N10276 Hastelloy	Duplex UNS S31803	Duplex UNS S31803
9	Hex Nut (Body)	ASME SA-194 Gr. 2H Alloy St.	ASME SA-194 Gr. 8M St. St.	ASME SA-194 Gr. 2HM Alloy St.	ASME SA-194 Gr. 8MA St. St.	ASME SB-574 UNS N10276 Hastelloy	ASME SB-574 UNS N10276 Hastelloy	Duplex UNS S31803	Duplex UNS S31803
10	Pressure Pickup	316 St. St.	316 St. St.	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex	Duplex
11	Tube Fittings	316 St. St.	316 St. St.	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex	Duplex
12	Main Seat Seal ⁴	Viton ⁵	Viton ⁵	EPDM ⁶	EPDM ⁶	Viton ⁵	Viton ⁵	Viton ⁵	Viton ⁵
13	Nozzle Seal	Viton ⁵	Viton ⁵	EPDM ⁶	EPDM ⁶	Viton ⁵	Viton ⁵	Viton ⁵	Viton ⁵
14	Piston Seal	Viton ⁵	Viton ⁵	EPDM ⁶	EPDM ⁶	Viton ⁵	Viton ⁵	Viton ⁵	Viton ⁵
14a	Energized Piston Seal	PTFE / SS ⁷	PTFE / SS ⁷	PTFE / SS ⁷	PTFE / SS ⁷	PTFE / SS ⁷	PTFE / SS ⁷	PTFE/SS ⁷	PTFE/SS ⁷
15	Cover Seal	Viton ⁵	Viton ⁵	EPDM ⁶	EPDM ⁶	Viton ⁵	Viton ⁵	Viton ⁵	Viton ⁵
15a	Guide Seal ¹	Viton ⁵	Viton ⁵	EPDM ⁶	EPDM ⁶	Viton ⁵	Viton ⁵	Viton ⁵	Viton ⁵
16	Tubing	316 St. St.	316 St. St.	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex	Duplex
17	Bracket	St. St.	St. St.	St. St.	St. St.	St. St.	St. St.	St. St.	St. St.
18	Cap Screws, Mounting Bracket	Plated Steel	St. St.	Plated Steel	St. St.	St. St.	St. St.	Plated Steel	Plated Steel
19	Pipe Plug, Outlet	Carbon St.	St. St.	Carbon St.	St. St.	Monel	Hastelloy C	Duplex	Duplex
20	Pipe Plug, Body (not shown)	Carbon St.	St. St.	Carbon St.	St. St.	Monel	Hastelloy C	Duplex	Duplex
21	Pilot Control	St. St.	St. St.	St. St.	St. St.	Monel	Hastelloy C	Duplex	Duplex

Threaded Convertible Design: the unique convertible design minimizes the number of components and maximizes their interchangeability, reducing parts inventories and overall costs.

Convertible Nozzle: threaded convertible nozzles can be removed and replaced easily without factory service. They can be installed with common tools while the valve is in line, saving time and money.

Fewer Internal Components: the valve design requires no lift stops and the main valve opens fully at set pressure. The orifice area is controlled by the nozzle, eliminating the need for additional parts to restrict lift.

One Piece Body: integrally cast flanges assure the highest material integrity and eliminate problems that may occur with welding.

Full Port Option: the full port option provides maximum capacity per inlet size.

General Notes:

- Part used on 3" inlet sizes and larger.
- Materials certified in compliance with NACE specifications.
- PTFE for seals required in main valve for temperatures below -20°F. Consult the Factory.
- PTFE used for Main Seat Seal (item 12) for all valves with 900#, 1500#, and 2500# inlet flanges.

Main Valve Soft Seat: unlike metal seated valves which require costly machining and lapping procedures, the main valve soft seat is easily maintained and repaired.

Less Weight, Lower Profile: system pressure provides the seating force in pilot operated relief valves so pilot valves are smaller in size and weight than direct spring loaded valves.

Full 316 Stainless Steel Trim: this trim is standard and includes nozzle, piston, retainer and guide for long and versatile service life.

Suitable for NACE Service: for high quality materials of construction that meet NACE MR0103 or MR0175/ISO 15156 service, refer to N1 trim for carbon steel body and N4 trim for stainless steel.

- We reserve the right to substitute comparable fluorocarbon materials.
- EPDM is standard offering for NACE; other materials can be selected. Please specify at time of order.
- Graphite reinforced PTFE with stainless steel spring.

Inconel is a registered trademark of Inco Alloys International, Inc.



Snap Acting Pilot Control Features

Snap-Acting, Non-Flowing: the PCF5 and PCL pilot controls are snap acting and non-flowing, minimizing the flow of process media through the pilot for reduced fugitive emissions and extended valve life.

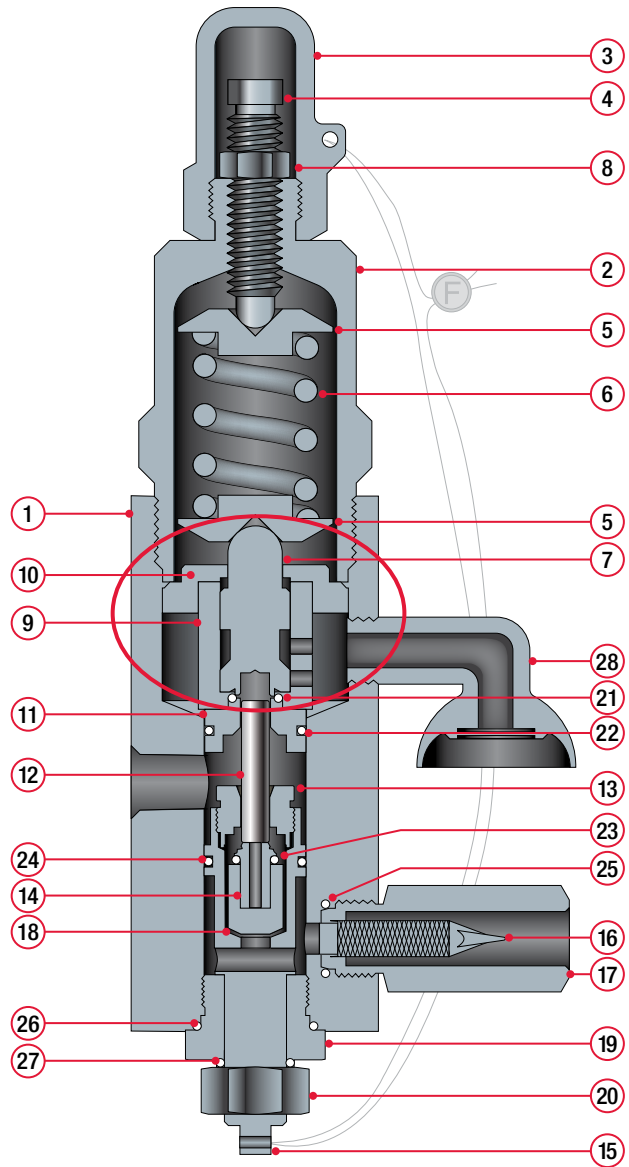
Full 316 Stainless Steel Construction: resists corrosion and extends the life and versatility of the PCF5 and PCL controls.

Adjustable Blowdown: allows setting blowdown at 3% of set pressure so that product loss is minimized and fugitive emissions reduced.

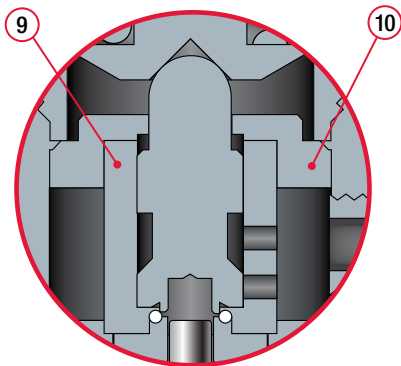
Viton Seats and Seals: these chemical-resistant seals and seats enhance a control's life. Neoprene, ethylene propylene, silicone, and Buna-N soft goods are optional and extend temperature ranges from -65°F to 450°F. Kalrez available when maximum resistance to chemical attack is required. Contact factory for more information.

Set Pressures and Blowdown Set at Pilot Control: in line service, settings and blowdown adjustments are completed quickly and easily without main valve intrusion. Subsequent reduction in product loss and fugitive emissions add to system profitability.

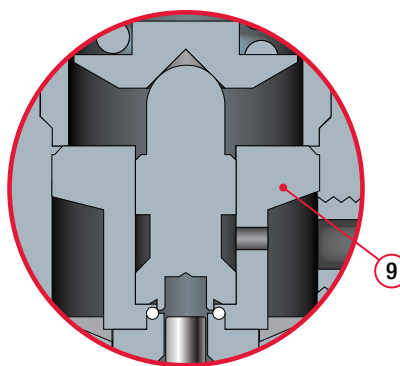
Accessory Options for Farris' snap acting controls are outlined on pages 31-35 of this brochure.



PCF5(2): Snap Acting Control – Air, Gas, Vapor Service



PCL(3): Snap Acting Control – Liquid Service



3800 Series Bill of Materials – Snap Acting Control

Bill of Materials – PCF5 and PCL						
Item No.	Part Name	Standard	NACE	Monel	Hastelloy	Duplex
1	Body	316 St. St.	316 St. St. ²	Monel	Hastelloy C	Duplex
2	Bonnet	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
3	Cap	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
4	Spring Adjusting Screw	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
5	Spring Buttons	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
6	Spring	316 St. St.	Inconel X750	Inconel X750	Inconel X750	Inconel X750
7	Disc	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
8	Jam Nut	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
9	Guide	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
10	Guide Flange ¹	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
11	Upper Seat	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
12	Blowdown Relay	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
13	Lower Seat	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
14	Retainer, Lower Seat Seal	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
15	Blowdown Adjuster	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
16	Filter	St. St.	St. St.	Monel	Monel	Monel
17	Filter Housing	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
18	Poppet	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
19	Blowdown Adjuster Cap	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
20	Blowdown Adjuster Lock Nut	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
21	Upper Seat Seal	Viton ³	EPDM ⁴	Viton ³	Viton ³	Viton ³
22	Static Seal, Body	Viton ³	EPDM ⁴	Viton ³	Viton ³	Viton ³
23	Lower Seat Seal	Viton ³	EPDM ⁴	Viton ³	Viton ³	Viton ³
24	Static Seal, Adjuster	Viton ³	EPDM ⁴	Viton ³	Viton ³	Viton ³
25	Static Seal, Filter	Viton ³	EPDM ⁴	Viton ³	Viton ³	Viton ³
26	Adjuster Cap Seal	Viton ³	EPDM ⁴	Viton ³	Viton ³	Viton ³
27	Thread Seal, O-Ring	PTFE	PTFE	PTFE	PTFE	PTFE
28	Bug Vent	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

General Notes:

1. Part used on PCF5 only.
2. Materials certified in compliance with NACE specifications.
3. We reserve the right to substitute comparable fluorocarbon materials.
4. EPDM is standard offering for NACE; other materials can be selected. Please specify at time of order.

Modulating Pilot Control Features

Modulating, Non-Flowing: the PCM, PCMS and HPCM pilot controls are modulating and non-flowing, minimizing the flow of process media through the pilot for reduced fugitive emissions and extended valve life. Also suitable for 2-phase flow applications.

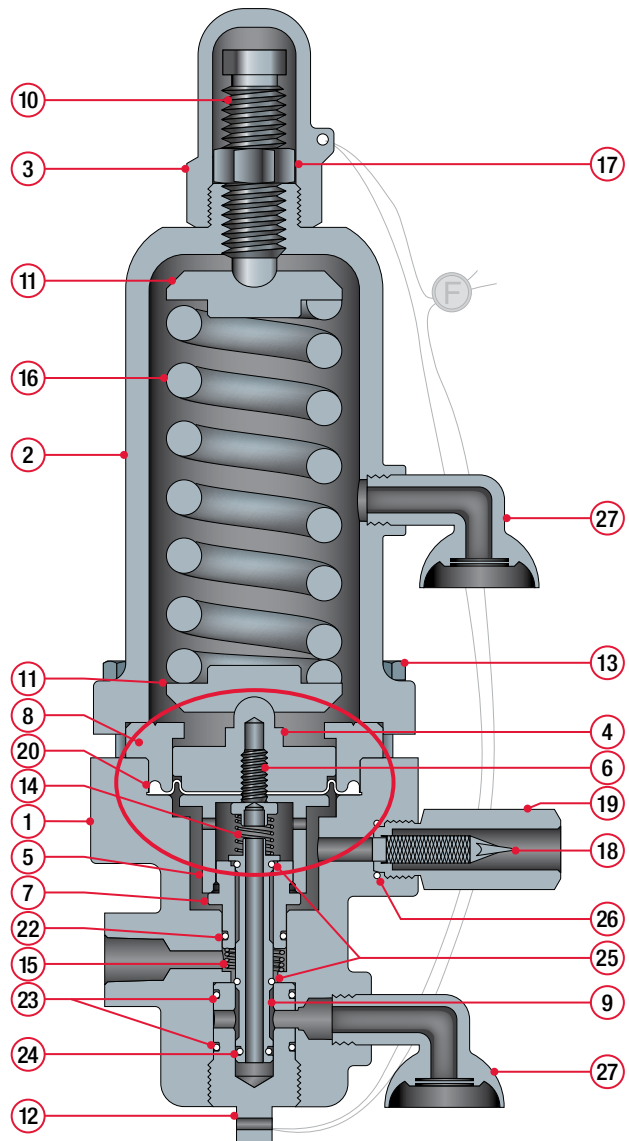
Full 316 Stainless Steel Construction: resists corrosion and extends the operation and versatility of the modulating control.

Fixed Blowdown: The modulating controls are a fixed blowdown pilot control with no external adjustment. Depending on fluid service, a blowdown of 3% to 6% is typical.

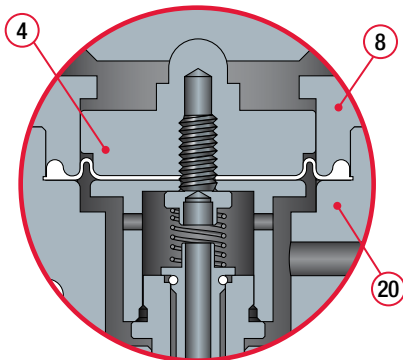
Viton Seats and Seals: have a wide spectrum of chemical compatibility and temperature range to meet most applications and enhance valve life. Buna-N and ethylene propylene soft goods are optional and extend temperature ranges from -65°F to 450°F. Contact the Farris factory for more information on other construction materials.

Set Pressure Set at Pilot Control: in-line service and setting adjustments are done quickly and easily without main valve intrusion. Subsequent reduction in product loss and fugitive emissions adds to the system's profitability.

Accessory Options for Farris' modulating pilot controls are outlined on pages 31-35 of this brochure.

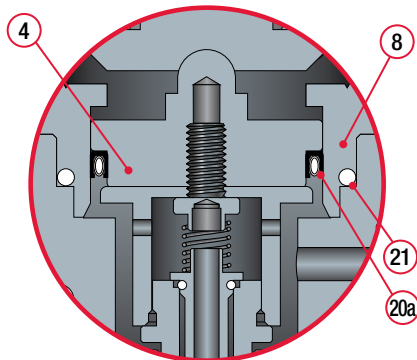


PCM(4): Modulating Control – 15 to 740 psig



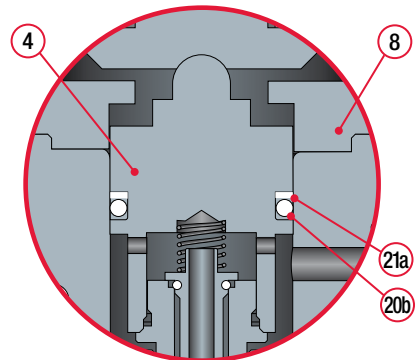
Air, Gas, Vapor and Liquid Service

PCMS(5): Modulating Control – 15 to 740 psig



Air, Gas, Vapor, Liquid and Steam Service

HPCM(6): Modulating Control – 740 to 2220 psig



Air, Gas, Vapor and Liquid Service



Built in conformance to ASME Code Section VIII for Air, Gas, Steam, and Liquid Service. ASME Code stamping not available on full port design in liquid service.

3800 Series Bill of Materials – Modulating Control

Bill of Materials – PCM, PCMS and HPCM						
Item No.	Part Name	Standard	NACE	Monel	Hastelloy	Duplex
1	Body	316 St. St.	316 St. St. ²	Monel	Hastelloy C	Duplex
2	Bonnet	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
3	Cap	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
4	Piston	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
5	Retainer ¹	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
6	Retainer Screw ¹	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
7	Inlet Seat	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
8	Guide	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
9	Spool	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
10	Spring Adjusting Screw	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
11	Spring Buttons	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
12	Spool Cap	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
13	Bonnet Cap Screw	316 St. St.	316 St. St.	Monel	Hastelloy C	316 St. St.
14	Spool Return Spring	316 St. St.	Inconel X750	Inconel X750	Inconel X750	Inconel X750
15	Lower Return Spring	316 St. St.	Inconel X750	Inconel X750	Inconel X750	Inconel X750
16	Spring	St. St.	St. St.	St. St.	St. St.	St. St.
17	Jam Nut	316 St. St.	316 St. St.	316 St. St.	316 St. St.	316 St. St.
18	Filter	St. St.	St. St.	Monel	Monel	Monel
19	Filter Housing	316 St. St.	316 St. St.	Monel	Hastelloy C	Duplex
20	Diaphragm	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
20a	Spring Energized Seal ⁴	PTFE/HC ⁷	PTFE/HC ⁷	PTFE/HC ⁷	PTFE/HC ⁷	PTFE/HC ⁷
20b	Piston Seal ⁵	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
21	Guide Seal ⁴	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
21a	Backup Ring ⁵	PTFE	PTFE	PTFE	PTFE	Teflon
22	Body Seal	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
23	Spool Cap Seal	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
24	Spool Seal	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
25	Seat Seal	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
26	Filter Seal	Viton ³	EPDM ⁶	Viton ³	Viton ³	Viton ³
27	Bug Vent	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum

General Notes:

1. Part used on PCM and PCMS only.
2. Materials certified in compliance with NACE specifications.
3. We reserve the right to substitute comparable fluorocarbon materials.
4. Part used on PCMS only.
5. Part used on HPCM only.
6. EPDM is standard offering for NACE; other materials can be selected. Please specify at time of order.
7. Graphite reinforced PTFE with Hastelloy C spring.

HPCM7 Modulating Control Features

Modulating, Non-Flowing: the HPCM7 pilot control is modulating and non-flowing, minimizing the flow of process media through the pilot for reduced fugitive emissions and extended valve life.

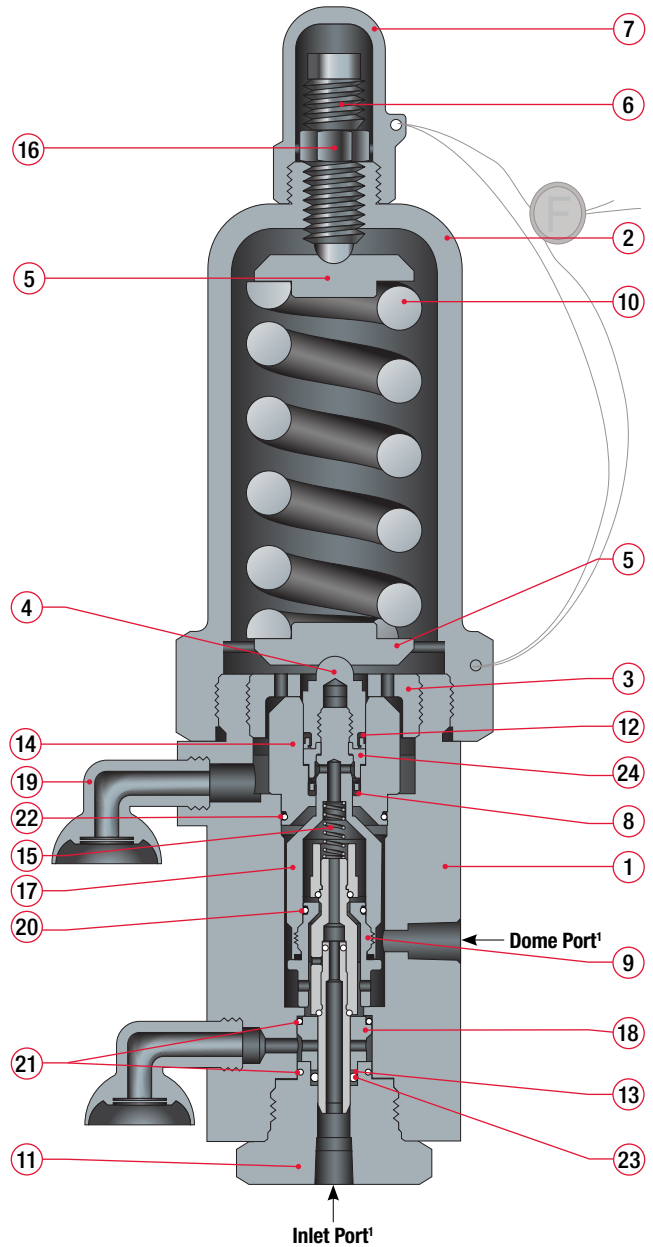
Full 316 Stainless Steel Construction: resists corrosion and extends the operation and versatility of the modulating control.

HPCM7 Modulating Pilot Control is available on valves with 1500 & 2500 class inlet flanges extending the set pressure range of modulating controls from 2220 up to 6170 psig.

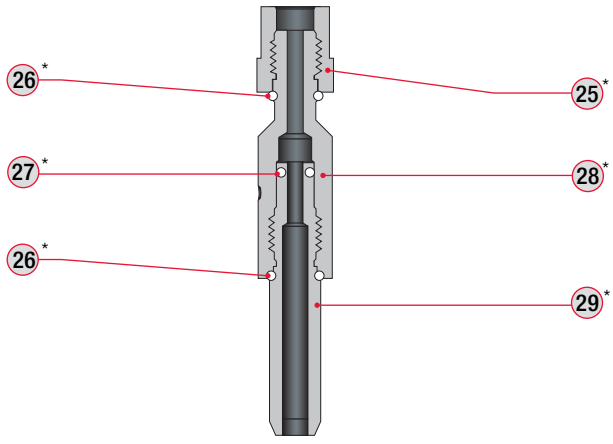
Fixed Blowdown: The modulating controls are a fixed blowdown pilot control with no external adjustment. Depending on fluid service, a blowdown of 3% to 6% is typical.

Viton Seats and Seals: have a wide spectrum of chemical compatibility and temperature range to meet most applications and enhance valve life. Buna-N and ethylene propylene soft goods are optional and extend temperature ranges from -65°F to 450°F. Contact the Farris Factory for more information on other construction materials.

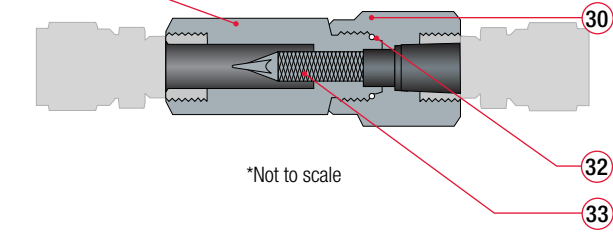
Accessory Options for Farris' modulating pilot control are outlined on pages 31-35 of this brochure.



Inlet Spool Assembly



Inline Filter Assembly²



*Not to scale

3800 Series Bill of Materials – High Pressure Modulating Control

Bill of Materials – HPCM7					
Item	Name	Standard	NACE	Hastelloy	Duplex
1	Body	316 St. St.	316 St. St. ¹	Hastelloy C	Duplex
2	Bonnet	316 St. St.	316 St. St.	Hastelloy C	Duplex
3	Piston Housing Retainer	316 St. St.	316 St. St.	Hastelloy C	Duplex
4	Piston Button	316 St. St.	316 St. St.	Hastelloy C	Duplex
5	Spring Button	316 St. St.	316 St. St.	Hastelloy C	Duplex
6	Spring Adjusting Screw	316 St. St.	316 St. St.	Hastelloy C	Duplex
7	Cap	316 St. St.	316 St. St.	Hastelloy C	Duplex
8	Housing Seal	Polymer Filled PTFE/SS	Polymer Filled PTFE/SS	Polymer Filled PTFE/SS	Polymer Filled PTFE/SS
9	Inlet Seat	316 St. St.	316 St. St.	Hastelloy C	Duplex
10	Spring	St. St.	St. St.	St. St.	St. St.
11	Inlet Housing	316 St. St.	316 St. St.	Hastelloy C	Duplex
12	Piston Seal	Polymer Filled PTFE/SS	Polymer Filled PTFE/SS	Polymer Filled PTFE/SS	Polymer Filled PTFE/SS
13	Back-up Ring Spool Seal	PTFE	PTFE	PTFE	PTFE
14	Piston Housing	316 St. St.	316 St. St.	Hastelloy C	Duplex
15	Spring	Inconel X750	Inconel X750	Inconel X750	Inconel X750
16	Jam Nut	316 St. St.	316 St. St.	316 St. St.	316 St. St.
17	Inlet Plenum	316 St. St.	316 St. St.	Hastelloy C	Duplex
18	Outlet Seat	316 St. St.	316 St. St.	Hastelloy C	Duplex
19	Bug Vent	Aluminum Alloy	Aluminum Alloy	Aluminum Alloy	Aluminum Alloy
20	Plenum Seal	Viton ²	EPDM ³	Viton ²	Viton ²
21	Vent Seal	Viton ²	EPDM ³	Viton ²	Viton ²
22	Body Seal	Viton ²	EPDM ³	Viton ²	Viton ²
23	Spool Seal	Viton ²	EPDM ³	Viton ²	Viton ²
24	Piston Seal Retainer	316 St. St.	316 St. St.	Hastelloy C	Duplex
Inlet Spool Assembly		See below items 25 through 29			
25*	Inlet Seat Retainer	316 St. St.	316 St. St.	Hastelloy C	Duplex
26*	Seat Seal	Viton ²	EPDM ³	Viton ²	Viton ²
27*	Internal Spool Seal	Viton ²	EPDM ³	Viton ²	Viton ²
28*	Inlet Spool	316 St. St.	316 St. St.	Hastelloy C	Duplex
29*	Exhaust Seat Retainer	316 St. St.	316 St. St.	Hastelloy C	Duplex
Inline Filter Assembly		See below items 30 through 33			
30	Filter Head	316 St. St.	316 St. St.	Hastelloy C	Duplex
31	Filter Housing	316 St. St.	316 St. St.	Hastelloy C	Duplex
32	Seal	Viton ²	EPDM ³	Viton ²	Viton ²
33	Filter	316 St. St.	316 St. St.	Monel	Monel

General Notes:

1. Materials certified in compliance with NACE specifications.
2. We reserve the right to substitute comparable fluorocarbon materials.
3. EPDM is standard offering for NACE; other materials can be selected. Please specify at time of order.



Selection Table – API

API – U.S. Customary and Metric												
Letter	Orifice		Valve Size Inlet x Outlet	ASME Flange Class		Type Number	Maximum Set Pressure				Maximum Back Pressure	
	API Area Sq. In. (mm)	Actual Area Sq. In. (mm)		Inlet RF or RJ	Outlet RF		psig -20°F 100°F	psig 500°F (note 1)	barg -29°C 38°C	barg 260°C (note 1)	psig @ 100°F	barg @ 38°C
D	0.110 (71)	0.150 (97)	1 x 2	150#	150#	38DC10	285	170	19.6	11.7	285	19.6
				300#		38DC12	740	605	51.0	41.7		
				600#		38DC13	1480	1205	102	83		
			1-1/2 x 2	900#	300#	38DC14	2220	1810	153	125	740	51.0
				1500#		38DC15	3705	3015	255	208		
				2500#		38DC16	6170	5025	425	346		
E	0.196 (126)	0.225 (145)	1 x 2	150#	150#	38EC10	285	170	19.6	11.7	285	19.6
				300#		38EC12	740	605	51.0	41.7		
				600#		38EC13	1480	1205	102	83		
			1-1/2 x 2	900#	300#	38EC14	2220	1810	153	125	740	51.0
				1500#		38EC15	3705	3015	255	208		
				2500#		38EC16	6170	5025	425	346		
F	0.307 (198)	0.371 (239)	1 x 2	150#	150#	38FC10	285	170	19.6	11.7	285	19.6
				300#		38FC12	740	605	51.0	41.7		
				600#		38FC13	1480	1205	102	83		
			1-1/2 x 2	900#	300#	38FC14	2220	1810	153	125	740	51.0
				1500#		38FC15	3705	3015	255	208		
				2500#		38FC16	6170	5025	425	346		
G	0.503 (325)	0.559 (361)	1-1/2 x 3	150#	150#	38GC10	285	170	19.6	11.7	285	19.6
				300#		38GC12	740	605	51.0	41.7		
				600#		38GC13	1480	1205	102	83		
			2 x 3	900#	300/600# (note 2)	38GC14	2220	1810	153	125	1480	102
				1500#		38GC15	3705	3015	255	208		
				2500#		38GC16	6170	5025	425	346		
H	0.785 (506)	0.873 (563)	1-1/2 x 3	150#	150#	38HC10	285	170	19.6	11.7	285	19.6
				300#		38HC12	740	605	51.0	41.7		
				600#		38HC13	1480	1205	102	83		
			2 x 3	900#	300#	38HC14	2220	1810	153	125	740	51.0
				1500#		38HC15	3705	3015	255	208		
				2500#		38HC16	6170	5025	425	346		
2 x 3	150#	150#	38HC10X	285	170	19.6	11.7	285	19.6			
	300#		38HC12X	740	605	51.0	41.7					
	600#		38HC13X	1480	1205	102	83					
2 x 3	900#	300/600# (note 2)	38HC14X	2220	1810	153	125	1480	102			
	1500#		38HC15X	3705	3015	255	208					
	2500#		38HC16X	6170	5025	425	346					

General Notes:

- Standard elastomer is Viton which is suitable to a maximum temperature of 450°F. For temperatures above 450°F the o-ring seals must be specified as Kalrez.
- The 300# and 600# flanges have identical drilling with flange thickness equal to the 600# class.
- For liquid service applications, add "L" to the end of the base type number for valves with standard size connections. Change the "X" to a "Y" for valves with oversize connections and change "D" to an "E" for valves with dual outlet. Examples: 38FC10L-120, 38FC10Y-120, 38TC10E-120.

Selection Table – API, continued

API – U.S. Customary and Metric												
Letter	Orifice		Valve Size Inlet x Outlet	ASME Flange Class		Type Number	Maximum Set Pressure				Maximum Back Pressure	
	API Area Sq. In. (mm)	Actual Area Sq. In. (mm)		Inlet RF or RJ	Outlet RF		psig -20°F 100°F	psig 500°F (note 1)	barg -29°C 38°C	barg 260°C (note 1)	psig @ 100°F	barg @ 38°C
J	1.287 (830)	1.430 (923)	2 x 3	150#	150#	38JC10	285	170	19.6	11.7	285	19.6
						38JC12	740	605	51.0	41.7		
						38JC13	1480	1205	102	83		
				900#	300/600# (note 2)	38JC14	2220	1810	153	125		
			1500#	38JC15		3705	3015	255	208			
			2500#	38JC16	6170	5025	425	346	1480	102		
			3 x 4	150#	150#	38JC10X	285	170	19.6	11.7	285	19.6
						38JC12X	740	605	51.0	41.7		
38JC13X	1480	1205				102	83					
900#	300#	38JC14X		2220	1810	153	125					
1500#		38JC15X	3705	3015	255	208	740	51.0				
K	1.838 (1186)	2.042 (1317)	3 x 4	150#	150#	38KC10	285	170	19.6	11.7	285	19.6
						38KC12	740	605	51.0	41.7		
						38KC13	1480	1205	102	83		
				900#	300#	38KC14	2220	1810	153	125		
				1500#		38KC15	3705	3015	255	208		
				740		51.0						
L	2.853 (1841)	3.170 (2045)	3 x 4	150#	150#	38LC10	285	170	19.6	11.7	285	19.6
						38LC12	740	605	51.0	41.7		
						38LC13	1480	1205	102	83		
				900#	300#	38LC14	2220	1810	153	125		
				1500#		38LC15	3705	3015	255	208		
				740		51.0						
			4 x 6	150#	150#	38LC10X	285	170	19.6	11.7	285	19.6
						38LC12X	740	605	51.0	41.7		
						38LC13X	1480	1205	102	83		
				900#	300#	38LC14X	2220	1810	153	125		
1500#	38LC15X	3705	3015	255		208	740	51.0				
M	3.60 (2323)	4.000 (2581)	4 x 6	150#	150#	38MC10	285	170	19.6	11.7	285	19.6
						38MC12	740	605	51.0	41.7		
						38MC13	1480	1205	102	83		
				900#	300#	38MC14	2220	1810	153	125		
				1500#		38MC15	3705	3015	255	208		
				740		51.0						
N	4.34 (2800)	4.822 (3111)	4 x 6	150#	150#	38NC10	285	170	19.6	11.7	285	19.6
						38NC12	740	605	51.0	41.7		
						38NC13	1480	1205	102	83		
				900#	300#	38NC14	2220	1810	153	125		
				1500#		38NC15	3705	3015	255	208		
				740		51.0						
P	6.38 (4116)	7.087 (4572)	4 x 6	150#	150#	38PC10	285	170	19.6	11.7	285	19.6
						38PC12	740	605	51.0	41.7		
						38PC13	1480	1205	102	83		
				900#	300#	38PC14	2220	1810	153	125		
				1500#		38PC15	3080	3015	212	208		
				740		51.0						
Q	11.05 (7129)	12.27 (7916)	6 x 8	150#	150#	38QC10	285	170	19.6	11.7	285	19.6
						38QC12	740	605	51.0	41.7		
						38QC13	1480	1205	102	83		
			150#	150#	38QC10D	285	170	19.6	11.7			
			300#		38QC12D	740	605	51.0	41.7			
			600#		38QC13D	1480	1205	102	83			
R	16.0 (10323)	17.78 (11471)	6 x 8	150#	150#	38RC10	285	170	19.6	11.7	285	19.6
						38RC12	740	605	51.0	41.7		
						38RC13	1480	1205	102	83		
			150#	150#	38RC10D	285	170	19.6	11.7			
			300#		38RC12D	740	605	51.0	41.7			
			600#		38RC13D	1480	1205	102	83			
T	26 (16774)	28.94 (18671)	8 x 10	150#	150#	38TC10	285	170	19.6	11.7	285	19.6
						38TC12	740	605	51.0	41.7		
						38TC13	1480	1205	102	83		
			150#	150#	38TC10D	285	170	19.6	11.7			
			300#		38TC12D	740	605	51.0	41.7			
			600#		38TC13D	1480	1205	102	83			
8 x 10 x 10	150#	150#	38TC10D	285	170	19.6	11.7	285	19.6			
			38TC12D	740	605	51.0	41.7					
			38TC13D	1480	1205	102	83					

General Notes Continued:

4. Valves with ring joint inlet connections available. Consult the factory for final dimensions.
5. Dual outlet only available for 6" and 8" inlet valves. Other sizes consult factory.



Selection Table – Non Standard API

Non Standard API – U.S. Customary and Metric												
Letter	Orifice		Valve Size Inlet x Outlet	ASME Flange Class		Type Number	Maximum Set Pressure				Maximum Back Pressure	
	API Area Sq. In. (mm)	Actual Area Sq. In. (mm)		Inlet RF or RJ	Outlet RF		psig -20°F 100°F	psig 500°F (note 1)	barg -29°C 38°C	barg 260°C (note 1)	psig @ 100°F	barg @ 38°C
G ^s	0.503 (325)	0.559 (361)	1 x 2	150#	150#	38GC10U	285	170	19.6	11.7	285	19.6
				300#		38GC12U	740	605	51.0	41.3		
				600#		38GC13U	1480	1205	102	82.7		
			1-1/2 x 2	900#	300#	38GC14U	2220	1810	153	124	740	51.0
				1500#		38GC15U	3705	3015	255	206		
				2500#		38GC16U	6170	5025	425	344		
H	0.785 (506)	0.873 (563)	1-1/2 x 2	150#	150#	38HC10N	285	170	19.6	11.7	285	19.6
				300#		38HC12N	740	605	51.0	41.3		
				600#		38HC13N	1480	1205	102	82.7		
			1-1/2 x 2	900#	300#	38HC14N	2220	1810	153	124	740	51.0
				1500#		38HC15N	3705	3015	255	206		
				2500#		38HC16N	6170	5025	425	344		
J	1.287 (830)	1.430 (923)	1-1/2 x 2	150#	150#	38JC10U	285	170	19.6	11.7	285	19.6
				300#		38JC12U	740	605	51.0	41.3		
				600#		38JC13U	1480	1205	102	82.7		
			1-1/2 x 3	900#	300#	38JC14U	2220	1810	153	124	740	51.0
				1500#		38JC15U	3705	3015	255	206		
				2500#		38JC16U	6170	5025	425	344		
K	1.838 (1186)	2.042 (1317)	2 x 3	150#	150#	38KC10N	285	170	19.6	11.7	285	19.6
				300#		38KC12N	740	605	51.0	41.3		
				600#		38KC13N	1480	1205	102	82.7		
			2 x 3	900#	300/600# (note 2)	38KC14N	2220	1810	153	124	1480	102
				1500#		38KC15N	3705	3015	255	206		
				2500#		38KC16N	6170	5025	425	344		
M	3.60 (2323)	4.000 (2581)	3 x 4	150#	150#	38MC10N	285	170	19.6	11.7	285	19.6
				300#		38MC12N	740	605	51.0	41.3		
				600#		38MC13N	1480	1205	102	82.7		
			3 x 4	900#	300#	38MC14N	2220	1810	153	123.7	740	51.0
				1500#		38MC15N	3705	3015	255	206		
				2500#		38MC16N	6170	5025	425	344		
N	4.34 (2800)	4.822 (3111)	3 x 4	150#	150#	38NC10N	285	170	19.6	11.7	285	19.6
				300#		38NC12N	740	605	51.0	41.3		
				600#		38NC13N	1480	1205	102	82.7		
			3 x 4	900#	300#	38NC14N	2220	1810	153	124	740	51.0
				1500#		38NC15N	3705	3015	255	206		
				2500#		38NC16N	6170	5025	425	344		

General Notes:

- Standard elastomer is Viton which is suitable to a maximum temperature of 450°F. For temperatures above 450°F the o-ring seals must be specified as Kalrez.
- The 300# and 600# flanges have identical drilling with flange thickness equal to the 600# class.
- Valves only certified for air, gas, vapor and steam service.
- Valves with ring joint inlet connections available. Consult the Factory for final dimensions.
- A 1" x 2" valve with an "G" orifice is only available when configured with a remote sensing option.

Selection Table – Full Port

Full Port – U.S. Customary and Metric															
Letter	Orifice		Valve Size Inlet x Outlet	ASME Flange Class		Type Number	Maximum Set Pressure				Maximum Back Pressure				
	API Area Sq. In. (mm)	Actual Area Sq. In. (mm)		Inlet RF or RJ	Outlet RF		psig -20°F 100°F	psig 500°F (note 5)	barg -29°C 38°C	barg 260°C (note 5)	psig @ 100°F	barg @ 38°C			
A ¹	—	0.719 (464)	1 x 2	150#	150#	38AC10	285	170	19.6	11.7	285	19.6			
				300#		38AC12	740	605	51.0	41.3					
600#	38AC13	1480	1205	102		82.7									
1	—	1.767 (1140)	1-1/2 x 2	900#	300#	38AC14	2220	1810	153	124	740	51.0			
				1500#		38AC15	3705	3015	255	206					
				2500#		38AC16	6170	5025	425	344					
			1-1/2 x 3	150#	150#	381C10X	285	170	19.6	11.7	285	19.6			
				300#		381C12X	740	605	51.0	41.3					
				600#		381C13X	1480	1205	102	82.7					
2	—	2.953 (1905)	2 x 3	900#	300/600# (note 2)	382C14	2220	1810	153	124	1480	102			
				1500#		382C15	3705	3015	255	206					
				2500#		382C16	6170	5025	425	344					
			3	—	6.605 (4261)	3 x 4	150#	150#	383C10	285	170	19.6	11.7	285	19.6
							300#		383C12	740	605	51.0	41.3		
			600#	383C13	1480	1205	102		82.7						
4	—	11.50 (7419)	4 x 6	900#	300#	383C14	2220	1810	153	124	740	51.0			
				1500#		383C15	3705	3015	255	206					
6	—	26.07 (16819)	6 x 8	150#		150#	384C10	285	170	19.6	11.7	285	19.6		
				300#	384C12		740	605	51.0	41.3					
				600#	384C13		1480	1205	102	82.7					
			6 x 8 x 8	150#	150#	386C10D	285	170	19.6	11.7	285	19.6			
				300#		386C12D	740	605	51.0	41.3					
				600#		386C13D	1480	1205	102	82.7					
8	—	45.66 (29458)	8 x 10	150#	150#	388C10	285	170	19.6	11.7	285	19.6			
				300#		388C12	740	605	51.0	41.3					
				600#		388C13	1480	1205	102	82.7					
			8 x 10 x 10	150#	150#	388C10D	285	170	19.6	11.7	285	19.6			
				300#		388C12D	740	605	51.0	41.3					
				600#		388C13D	1480	1205	102	82.7					

General Notes:

1. A 1" x 2" valve with an "A" orifice is only available when configured with a remote sensing option.
2. The 300# and 600# flanges have identical drilling with flange thickness equal to the 600# class.
3. Valves with ring joint inlet connections available. Consult the factory for final dimensions.
4. Dual outlets only available for 6" and 8" inlet valves. Other sizes consult factory.
5. Standard elastomer is Viton which is suitable to a maximum temperature of 450°F. For temperatures above 450°F the o-ring seals must be specified as Kalrez.
6. Full port orifices require that inlet piping have a flow area equal to or greater than the full port orifice flow area.
7. Full port valves only certified for air, gas, vapor and steam service.



Air Capacities – 3800 Series: 10% Overpressure, API

ASME Pressure Vessel Code (UV) – Capacities in Standard Cubic Feet Per Minute at 60°F – U.S. Customary Units														
Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
Areas	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	0.110	0.196	0.307	0.503	0.785	1.287	1.838	2.853	3.600	4.34	6.38	11.05	16.00	26.0
Actual	0.150	0.225	0.371	0.559	0.873	1.43	2.042	3.170	4.000	4.822	7.087	12.27	17.78	28.94
15	77	115	191	287	449	736	1051	1632	2059	2482	3649	6317	9155	14901
20	89	133	220	331	518	848	1212	1881	2374	2862	4207	7283	10554	17179
30	112	168	278	419	655	1074	1533	2380	3004	3621	5323	9215	13354	21736
40	138	207	342	516	806	1321	1887	2930	3697	4457	6550	11341	16434	26749
50	164	246	407	613	958	1569	2241	3479	4390	5292	7778	13466	19513	31762
60	190	285	471	710	1109	1817	2594	4028	5082	6127	9005	15591	22593	36774
70	216	324	535	807	1260	2064	2948	4577	5775	6962	10233	17717	25673	41787
80	242	363	599	903	1411	2312	3302	5126	6468	7797	11460	19842	28752	46800
90	268	402	664	1000	1562	2560	3655	5675	7161	8633	12688	21967	31832	51812
100	294	441	728	1097	1714	2807	4009	6224	7854	9468	13915	24092	34912	56825
150	424	636	1049	1581	2470	4046	5778	8969	11318	13644	20053	34719	50310	81889
200	554	831	1371	2065	3226	5284	7546	11715	14782	17820	26191	45345	65708	106952
250	684	1026	1692	2549	3982	6523	9315	14460	18246	21996	32328	55972	81107	132015
300	814	1221	2013	3034	4738	7761	11083	17205	21711	26172	38466	66598	96505	157079
350	944	1416	2335	3518	5494	9000	12851	19951	25175	30348	44604	77225	111903	182142
400	1073	1610	2656	4002	6250	10238	14620	22696	28639	34524	50741	87851	127302	207206
450	1203	1805	2977	4486	7006	11477	16388	25442	32103	38700	56879	98477	142700	232269
500	1333	2000	3298	4970	7762	12715	18157	28187	35567	42876	63017	109104	158098	257333
550	1463	2195	3620	5454	8518	13953	19925	30932	39032	47053	69154	119730	173497	282396
600	1593	2390	3941	5938	9274	15192	21694	33678	42496	51229	75292	130357	188895	307459
650	1723	2585	4262	6422	10030	16430	23462	36423	45960	55405	81430	140983	204293	332523
700	1853	2780	4584	6907	10786	17669	25231	39168	49424	59581	87567	151609	219692	357586
750	1983	2974	4905	7391	11542	18907	26999	41914	52888	63757	93705	162236	235090	382650
800	2113	3169	5226	7875	12299	20146	28768	44659	56352	67933	99843	172862	250488	407713
850	2243	3364	5548	8359	13055	21384	30536	47405	59817	72109	105981	183489	265887	432777
900	2373	3559	5869	8843	13811	22623	32305	50150	63281	76285	112118	194115	281285	457840
950	2502	3754	6190	9327	14567	23861	34073	52895	66745	80461	118256	204741	296683	482903
1000	2632	3949	6511	9811	15323	25099	35842	55641	70209	84637	124394	215368	312082	507967
1050	2762	4144	6833	10295	16079	26338	37610	58386	73673	88813	130531	225994	327480	533030
1100	2892	4339	7154	10780	16835	27576	39379	61131	77138	92989	136669	236621	342878	558094
1150	3022	4533	7475	11264	17591	28815	41147	63877	80602	97166	142807	247247	358277	583157
1200	3152	4728	7797	11748	18347	30053	42915	66622	84066	101342	148944	257873	373675	608221
1250	3282	4923	8118	12232	19103	31292	44684	69368	87530	105518	155082	268500	389073	633284
1300	3412	5118	8439	12716	19859	32530	46452	72113	90994	109694	161220	279126	404472	658348
1350	3542	5313	8761	13200	20615	33769	48221	74858	94459	113870	167357	289753	419870	683411
1400	3672	5508	9082	13684	21371	35007	49989	77604	97923	118046	173495	300379	435268	708474
1450	3802	5703	9403	14168	22127	36246	51758	80349	101387	122222	179633	311006	450667	733538
1500	3931	5897	9724	14653	22883	37484	53526	83094	104851	126398	185770			
1550	4061	6092	10046	15137	23639	38722	55295	85840	108315	130574	191908			
1600	4191	6287	10367	15621	24395	39961	57063	88585	111780	134750	198046			
1650	4321	6482	10688	16105	25152	41199	58832	91331	115244	138926	204183			
1700	4451	6677	11010	16589	25908	42438	60600	94076	118708	143103	210321			
1750	4581	6872	11331	17073	26664	43676	62369	96821	122172	147279	216459			
1800	4711	7067	11652	17557	27420	44915	64137	99567	125636	151455	222597			
1850	4841	7261	11974	18041	28176	46153	65906	102312	129101	155631	228734			
1900	4971	7456	12295	18525	28932	47392	67674	105057	132565	159807	234872			
2000	5231	7846	12938	19494	30444	49868	71211	110548	139493	168159	247147			
2100	5490	8236	13580	20462	31956	52345	74748	116039	146421	176511	259423			
2200	5750	8625	14223	21430	33468	54822	78285	121530	153350	184863	271698			
2300	6010	9015	14865	22398	34980	57299	81822	127020	160278	193216	283973			
2400	6270	9405	15508	23367	36492	59776	85359	132511	167207	201568	296249			
2500	6530	9795	16151	24335	38005	62253	88896	138002	174135	209920	308524			
2600	6789	10184	16793	25303	39517	64730	92433	143493	181063	218272	320799			
2700	7049	10574	17436	26271	41029	67207	95970	148983	187992	226624	333075			
2800	7309	10964	18078	27240	42541	69684	99506	154474	194920	234976	345350			
2900	7569	11354	18721	28208	44053	72161	103043	159965	201849	243329	357626			
3000	7829	11743	19364	29176	45565	74637	106580	165456	208777	251681	369901			
3500	9128	13692	22577	34017	53126	87022	124265	192909	243419	293442	431278			
4000	10427	15640	25790	38859	60686	99406	141950	220363	278061	335202	492655			
4500	11726	17589	29003	43700	68247	111791								
5000	13025	19538	32216	48541	75808	124175								
5500	14324	21486	35429	53382	83368	136560								
6000	15623	23435	38642	58223	90929	148944								
6170	16065	24097	39734	59869	93499	153155								

General Notes:
 1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
 2. For sizing purposes the effective coefficient of discharge, K_d for air, gas, and steam is 0.954 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.859.



Air Capacities – 3800 Series: 10% Overpressure, Full Port

ASME Pressure Vessel Code (UV) – Capacities in Standard Cubic Feet Per Minute at 60°F – U.S. Customary Units							
Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches						
Areas	A	#1	#2	#3	#4	#6	#8
Actual	0.719	1.767	2.953	6.605	11.50	26.07	45.66
15	345	848	1417	3171	5521	12517	21923
20	398	978	1634	3656	6365	14431	25275
30	503	1237	2068	4626	8054	18259	31979
40	619	1522	2545	5692	9911	22469	39354
50	735	1808	3022	6759	11769	26680	46729
60	851	2093	3499	7826	13626	30891	54103
70	968	2379	3976	8893	15484	35101	61478
80	1084	2664	4452	9960	17341	39312	68853
90	1200	2949	4929	11026	19198	43523	76228
100	1316	3235	5406	12093	21056	47733	83602
150	1897	4662	7791	17427	30343	68787	120476
200	2477	6089	10176	22761	39630	89840	157350
250	3058	7516	12561	28095	48917	110894	194224
300	3639	8943	14945	33429	58204	131947	231097
350	4219	10370	17330	38763	67491	153000	267971
400	4800	11797	19715	44097	76778	174054	304845
450	5380	13224	22100	49431	86065	195107	341719
500	5961	14651	24484	54765	95352	216161	378592
550	6542	16078	26869	60099	104640	237214	415466
600	7122	17505	29254	65433	113927	258267	452340
650	7703	18932	31639	70767	123214	279321	489214
700	8284	20359	34024	76101	132501	300374	526087
750	8864	21786	36408	81435	141788	321428	562961
800	9445	23213	38793	86769	151075	342481	599835
850	10026	24640	41178	92103	160362	363534	636709
900	10606	26067	43563	97437	169649	384588	673582
950	11187	27494	45947	102771	178936	405641	710456
1000	11768	28920	48332	108105	188223	426695	747330
1050	12348	30347	50717	113439	197510	447748	784204
1100	12929	31774	53102	118773	206797	468801	821077
1150	13510	33201	55486	124107	216085	489855	857951
1200	14090	34628	57871	129441	225372	510908	894825
1250	14671	36055	60256	134775	234659	531962	931699
1300	15251	37482	62641	140110	243946	553015	968572
1350	15832	38909	65025	145444	253233	574069	1005446
1400	16413	40336	67410	150778	262520	595122	1042320
1450	16993	41763	69795	156112	271807	616175	1079194
1500	17574	43190	72180	161446	281094		
1550	18155	44617	74564	166780	290381		
1600	18735	46044	76949	172114	299668		
1650	19316	47471	79334	177448	308955		
1700	19897	48898	81719	182782	318242		
1750	20477	50325	84104	188116	327529		
1800	21058	51752	86488	193450	336817		
1850	21639	53179	88873	198784	346104		
1900	22219	54606	91258	204118	355391		
2000	23380	57460	96027	214786	373965		
2100	24542	60314	100797	225454	392539		
2200	25703	63168	105566	236122	411113		
2300	26864	66022	110336	246790	429687		
2400	28026	68876	115105	257458	448262		
2500	29187	71730	119875	268126	466836		
2600	30348	74584	124644	278794	485410		
2700	31509	77438	129414	289462	503984		
2800	32671	80292	134183	300130	522558		
2900	33832	83146	138953	310798	541132		
3000	34993	86000	143723	321466	559707		
3500	40800	100269	167570	374806	652577		
4000	46606	114539	191418	428146	745448		
4500	52413	128809	215265				
5000	58219	143079	239113				
5500	64026	157349	262961				
6000	69832	171619	286808				
6170	71806	176470	294916				

General Notes:
 1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
 2. For sizing purposes the coefficient of discharge, K for air, gas, and steam is 0.801.
 3. Full port orifices require that inlet piping have a flow area equal to or greater than the full port orifice flow area.



Steam Capacities – 3800 Series: 10% Overpressure, API

ASME Pressure Vessel Code (UV) – Capacities in Pounds Per Hour at Saturation Temperature – U.S. Customary Units														
Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
Areas	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	0.110	0.196	0.307	0.503	0.785	1.287	1.838	2.853	3.600	4.34	6.38	11.05	16.00	26.0
Actual	0.150	0.225	0.371	0.559	0.873	1.43	2.042	3.170	4.000	4.822	7.087	12.27	17.78	28.94
15	216	325	536	808	1262	2068	2953	4585	5786	6975	10252	17749	25720	41864
20	250	375	618	932	1455	2384	3405	5286	6671	8042	11819	20463	29653	48265
30	316	474	782	1179	1842	3017	4308	6689	8440	10175	14954	25891	37518	61068
40	389	584	963	1451	2267	3713	5302	8231	10387	12521	18403	31862	46171	75151
50	462	693	1143	1723	2691	4409	6296	9774	12333	14868	21852	37833	54823	89234
60	535	803	1324	1995	3116	5105	7290	11317	14280	17214	25300	43804	63475	103317
70	608	912	1505	2267	3541	5801	8283	12859	16226	19561	28749	49775	72127	117400
80	681	1022	1685	2539	3966	6496	9277	14402	18173	21907	32198	55746	80779	131482
90	754	1131	1866	2811	4391	7192	10271	15944	20119	24254	35647	61717	89431	145565
100	827	1241	2046	3083	4815	7888	11264	17487	22066	26600	39095	67687	98084	159648
150	1192	1788	2949	4443	6940	11368	16233	25200	31798	38333	56339	97542	141344	230063
200	1557	2336	3852	5803	9064	14847	21201	32913	41531	50065	73582	127396	184605	300477
250	1922	2883	4754	7164	11188	18326	26170	40626	51263	61798	90826	157251	227866	370891
300	2287	3431	5657	8524	13312	21806	31138	48339	60996	73530	108069	187105	271127	441306
350	2652	3978	6560	9884	15436	25285	36106	56052	70728	85263	125313	216959	314388	511720
400	3017	4525	7462	11244	17560	28764	41075	63765	80460	96995	142556	246814	357649	582135
450	3382	5073	8365	12604	19684	32244	46043	71478	90193	108728	159800	276668	400909	652549
500	3747	5620	9268	13964	21808	35723	51012	79191	99925	120460	177043	306522	444170	722964
550	4112	6168	10170	15324	23932	39202	55980	86904	109658	132193	194287	336377	487431	793378
600	4477	6715	11073	16684	26057	42682	60949	94617	119390	143925	211530	366231	530692	863792
650	4842	7263	11976	18044	28181	46161	65917	102330	129123	155658	228774	396085	573953	934207
700	5207	7810	12878	19405	30305	49640	70885	110043	138855	167390	246017	425940	617214	1004621

Steam Capacities – 3800 Series: 10% Overpressure, Full Port

ASME Pressure Vessel Code (UV) – Capacities in Pounds Per Hour at Saturation Temperature – U.S. Customary Units							
Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches						
Areas	A	#1	#2	#3	#4	#6	#8
Actual	0.719	1.767	2.953	6.605	11.50	26.07	45.66
15	969	2383	3983	8909	15512	35166	61591
20	1118	2748	4592	10271	17884	40543	71009
30	1414	3476	5810	12996	22628	51297	89845
40	1741	4278	7150	15993	27846	63127	110564
50	2067	5080	8490	18990	33065	74957	131282
60	2393	5882	9830	21988	38283	86786	152001
70	2719	6684	11170	24985	43501	98616	172720
80	3046	7485	12510	27982	48720	110446	193439
90	3372	8287	13850	30979	53938	122276	214158
100	3698	9089	15190	33976	59156	134105	234877
150	5329	13098	21890	48962	85248	193254	338472
200	6961	17107	28590	63947	111339	252402	442067
250	8592	21116	35290	78933	137431	311551	545662
300	10223	25125	41989	93919	163523	370699	649257
350	11855	29134	48689	108904	189614	429848	752852
400	13486	33143	55389	123890	215706	488996	856447
450	15117	37152	62089	138876	241797	548144	960042
500	16748	41161	68789	153861	267889	607293	1063637
550	18380	45170	75489	168847	293980	666441	1167231
600	20011	49179	82189	183832	320072	725590	1270826
650	21642	53188	88888	198818	346164	784738	1374421
700	23274	57197	95588	213804	372255	843887	1478016

General Notes:

- Capacities at 30 PSIG and below are based on 3 PSI overpressure.
- For sizing purposes the effective coefficient of discharge, K_d for air, gas, and steam is 0.954 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.859.
- For full port sizing purposes the coefficient of discharge, K for air, gas, and steam is 0.801.
- Full port orifices require that inlet piping have a flow area equal to or greater than the full port orifice flow area.



Water Capacities – 3800L Series: 10% Overpressure, API

ASME Pressure Vessel Code (UV) – Capacities in Gallons Per Minute at 70°F – U.S. Customary Units														
Set Pressure (psig)	Orifice Letter Designation & Areas, Sq. Inches													
Areas	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	0.110	0.196	0.307	0.503	0.785	1.287	1.838	2.853	3.600	4.34	6.38	11.05	16.00	26.0
Actual	0.150	0.225	0.371	0.559	0.873	1.43	2.042	3.170	4.000	4.822	7.087	12.27	17.78	28.94
15	18.9	28.3	46.7	70.4	110	180	257	399	504	607	893	1546	2241	3648
20	21.3	32.0	52.8	79.6	124	203	291	451	570	687	1009	1748	2533	4124
30	25.6	38.4	63.3	95.4	149	244	348	541	682	823	1209	2094	3035	4940
40	29.5	44.3	73.1	110	172	281	402	624	788	950	1396	2418	3504	5704
50	33.0	49.5	81.7	123	192	315	450	698	881	1062	1561	2703	3918	6377
60	36.2	54.3	89.5	134	210	345	492	765	965	1164	1710	2962	4292	6986
70	39.1	58.6	96.7	145	227	372	532	826	1042	1257	1847	3199	4636	7546
80	41.8	62.7	103	155	243	398	569	883	1115	1344	1975	3420	4956	8067
90	44.3	66.5	109	165	258	422	603	937	1182	1425	2095	3627	5256	8556
100	46.7	70.1	115	174	272	445	636	987	1246	1502	2208	3824	5541	9019
150	57.2	85.8	141	213	333	545	779	1209	1526	1840	2705	4683	6786	11046
200	66.1	99.1	163	246	384	630	900	1397	1762	2125	3123	5407	7836	12755
250	73.9	110	182	275	430	704	1006	1562	1971	2376	3492	6046	8761	14260
300	80.9	121	200	301	471	771	1102	1711	2159	2602	3825	6623	9597	15621
350	87.4	131	216	325	509	833	1190	1848	2332	2811	4132	7154	10366	16873
400	93.4	140	231	348	544	891	1272	1975	2493	3005	4417	7648	11082	18038
450	99.1	148	245	369	577	945	1350	2095	2644	3187	4685	8111	11754	19132
500	104	156	258	389	608	996	1423	2209	2787	3360	4938	8550	12390	20167
550	109	164	271	408	638	1045	1492	2316	2923	3524	5179	8968	12995	21152
600	114	171	283	426	666	1091	1558	2419	3053	3681	5410	9366	13573	22092
650	119	178	294	444	693	1136	1622	2518	3178	3831	5631	9749	14127	22994
700	123	185	305	460	719	1179	1683	2613	3298	3976	5843	10117	14660	23862
750	128	192	316	477	745	1220	1742	2705	3414	4115	6048	10472	15175	24700
800	132	198	327	492	769	1260	1800	2794	3525	4250	6247	10815	15672	25510
850	136	204	337	507	793	1299	1855	2880	3634	4381	6439	11148	16155	26295
900	140	210	346	522	816	1336	1909	2963	3739	4508	6626	11472	16623	27057
950	144	216	356	536	838	1373	1961	3045	3842	4631	6807	11786	17079	27799
1000	147	221	365	550	860	1409	2012	3124	3942	4752	6984	12092	17522	28521
1050	151	227	374	564	881	1444	2062	3201	4039	4869	7156	12391	17955	29225
1100	155	232	383	577	902	1478	2110	3276	4134	4984	7325	12682	18378	29913
1150	158	237	392	590	922	1511	2158	3350	4227	5096	7490	12967	18791	30585
1200	161	242	400	603	942	1543	2204	3422	4318	5205	7651	13246	19195	31243
1250	165	247	408	615	961	1575	2250	3492	4407	5313	7808	13519	19591	31887
1300	168	252	416	628	980	1606	2294	3562	4494	5418	7963	13787	19979	32519
1350	171	257	424	640	999	1637	2338	3629	4580	5521	8115	14050	20359	33138
1400	174	262	432	651	1018	1667	2381	3696	4664	5622	8264	14308	20733	33747
1450	178	267	440	663	1036	1697	2423	3761	4746	5722	8410	14561	21100	34344
1500	181	271	447	674	1053	1726	2464	3826	4828	5820	8554			
1550	184	276	455	685	1071	1754	2505	3889	4907	5916	8695			
1600	186	280	462	696	1088	1782	2545	3951	4986	6011	8834			
1650	189	284	469	707	1105	1810	2585	4013	5063	6104	8971			
1700	192	289	476	718	1121	1837	2623	4073	5139	6196	9106			
1750	195	293	483	728	1138	1864	2662	4132	5214	6286	9239			
1800	198	297	490	739	1154	1890	2700	4191	5288	6375	9370			
1850	201	301	497	749	1170	1916	2737	4249	5361	6463	9499			
1900	203	305	503	759	1185	1942	2773	4306	5433	6550	9627			
2000	209	313	517	779	1216	1993	2846	4418	5575	6720	9877			
2100	214	321	529	798	1246	2042	2916	4527	5712	6886	10121			
2200	219	328	542	817	1276	2090	2984	4633	5847	7048	10359			
2300	224	336	554	835	1304	2137	3052	4738	5978	7207	10592			
2400	229	343	566	853	1332	2183	3117	4839	6107	7362	10820			
2500	233	350	578	871	1360	2228	3181	4939	6233	7513	11043			
2600	238	357	589	888	1387	2272	3245	5037	6356	7662	11262			
2700	242	364	600	905	1413	2315	3306	5133	6477	7808	11476			
2800	247	371	611	921	1439	2358	3367	5227	6596	7952	11687			
2900	251	377	622	938	1465	2399	3427	5320	6713	8092	11894			
3000	256	384	633	954	1490	2441	3485	5411	6828	8231	12097			
3500	276	414	684	1030	1609	2636	3764	5844	7375	8890	13066			
4000	295	443	731	1101	1720	2818	4024	6248	7884	9504	13969			
4500	313	470	775	1168	1825	2989								
5000	330	495	817	1231	1923	3151								
5500	346	520	857	1292	2017	3305								
6000	362	543	895	1349	2107	3452								
6170	367	550	908	1368	2137	3500								

General Notes:
 1. Capacities at 30 PSIG and below are based on 3 PSI overpressure.
 2. For sizing purposes the effective coefficient of discharge, K_d for liquids is 0.869 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for water is 0.782.
 3. Values in this table assume no backpressure.



Air Capacities – 3800 Series: 10% Overpressure, API

ASME Pressure Vessel Code (UV) – Capacities in Standard Cubic Meters Per Minute at 15.6°C – Metric Units														
Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
Areas	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18671
1	2.1	3.2	5.3	8.0	12.5	20.5	29.3	45.5	57.4	69.2	101	176	255	415
2	3.1	4.6	7.7	11.6	18.1	29.7	42.5	66.0	83.3	100	147	255	370	602
3	4.1	6.2	10.3	15.5	24.3	39.8	56.9	88.4	111	134	197	342	496	807
4	5.2	7.8	12.9	19.5	30.5	50.0	71.4	110	140	168	248	429	622	1013
5	6.3	9.4	15.6	23.5	36.7	60.2	86.0	133	168	203	298	516	749	1219
6	7.3	11.0	18.2	27.5	42.9	70.4	100	156	196	237	348	604	875	1425
7	8.4	12.6	20.9	31.5	49.2	80.5	115	178	225	271	399	691	1002	1630
8	9.0	14.2	23.5	35.4	55.4	90.7	129	201	253	306	449	778	1128	1836
9	10.5	15.8	26.1	39.4	61.6	100	144	223	282	340	500	866	1255	2042
10	11.6	17.4	28.8	43.4	67.8	111	158	246	310	374	550	953	1381	2248
12	13.7	20.6	34.1	51.3	80.2	131	187	291	367	443	651	1127	1634	2660
14	15.9	23.8	39.3	59.3	92.6	151	216	336	424	511	752	1302	1887	3072
16	18.0	27.0	44.6	67.2	105	172	245	381	481	580	853	1477	2140	3484
18	20.1	30.2	49.9	75.2	117	192	274	426	538	649	954	1651	2393	3895
20	22.3	33.4	55.2	83.2	129	212	303	471	595	717	1054	1826	2646	4307
22	24.4	36.6	60.5	91.1	142	233	333	516	652	786	1155	2000	2899	4719
24	26.5	39.8	65.7	99.1	154	253	362	562	709	854	1256	2175	3152	5131
26	28.7	43.0	71.0	107	167	273	391	607	766	923	1357	2350	3405	5543
28	30.8	46.2	76.3	115	179	294	420	652	823	992	1458	2524	3658	5954
30	32.9	49.4	81.6	122	192	314	449	697	879	1060	1559	2699	3911	6366
32	35.1	52.7	86.8	130	204	334	478	742	936	1129	1659	2873	4164	6778
34	37.2	55.9	92.1	138	216	355	507	787	993	1198	1760	3048	4417	7190
36	39.4	59.1	97.4	146	229	375	536	832	1050	1266	1861	3223	4670	7602
38	41.5	62.3	102	154	241	395	565	877	1107	1335	1962	3397	4923	8013
40	43.6	65.5	108	162	254	416	594	922	1164	1403	2063	3572	5176	8425
42	45.8	68.7	113	170	266	436	623	968	1221	1472	2164	3746	5429	8837
44	47.9	71.9	118	178	279	457	652	1013	1278	1541	2265	3921	5682	9249
46	50.0	75.1	123	186	291	477	681	1058	1335	1609	2365	4096	5935	9661
48	52.2	78.3	129	194	303	497	710	1103	1392	1678	2466	4270	6188	10072
50	54.3	81.5	134	202	316	518	739	1148	1449	1746	2567	4445	6441	10484
60	65.0	97.5	160	242	378	619	885	1373	1733	2090	3071	5318	7706	12543
70	75.6	113	187	282	440	721	1030	1599	2018	2433	3575	6191	8971	14602
80	86.3	129	213	321	502	823	1175	1825	2302	2776	4080	7064	10236	16661
90	97.0	145	239	361	564	925	1320	2050	2587	3119	4584	7937	11501	18720
100	107	161	266	401	626	1026	1466	2276	2872	3462	5088	8810	12766	20779
110	118	177	292	441	688	1128	1611	2501	3156	3805	5592			
120	129	193	319	480	751	1230	1756	2727	3441	4148	6097			
130	139	209	345	520	813	1331	1902	2952	3725	4491	6601			
140	150	225	371	560	875	1433	2047	3178	4010	4834	7105			
150	161	241	398	600	937	1535	2192	3403	4295	5177	7609			
160	171	257	424	639	999	1637	2337	3629	4579	5520	8113			
170	182	273	451	679	1061	1738	2483	3854	4864	5863	8618			
180	193	289	477	719	1123	1840	2628	4080	5148	6206	9122			
190	203	305	503	759	1185	1942	2773	4305	5433	6549	9626			
200	214	321	530	799	1247	2044	2919	4531	5717	6892	10130			
210	225	337	556	838	1310	2145	3064	4756	6002	7236	10634			
220	235	353	583	878	1372	2247	3209	4982	6287	7579	11139			
230	246	369	609	918	1434	2349	3354	5208	6571	7922	11643			
240	257	385	635	958	1496	2451	3500	5433	6856	8265	12147			
250	267	401	662	997	1558	2552	3645	5659	7140	8608	12651			
260	278	417	688	1037	1620	2654	3790	5884	7425	8951	13156			
270	289	433	715	1077	1682	2756								
280	299	449	741	1117	1744	2858								
290	310	465	767	1157	1806	2959								
300	321	481	794	1196	1869	3061								
310	331	497	820	1236	1931	3163								
320	342	513	847	1276	1993	3265								
330	353	529	873	1316	2055	3366								
340	363	545	899	1355	2117	3468								
350	374	561	926	1395	2179	3570								
370	395	593	979	1475	2303	3773								
390	417	625	1031	1554	2428	3977								
410	438	657	1084	1634	2552	4180								
425	454	681	1124	1693	2645	4333								

General Notes:

1. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
2. For sizing purposes the effective coefficient of discharge, K_d for air, gas, and steam is 0.954 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.859.

Air Capacities – 3800 Series: 10% Overpressure, Full Port

ASME Pressure Vessel Code (UV) – Capacities in Standard Cubic Meters Per Minute at 15.6°C – Metric Units							
Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm						
Areas	A	#1	#2	#3	#4	#6	#8
Actual	464	1140	1905	4261	7419	16819	29458
1	9.6	23.6	39.5	88.4	154	349	611
2	13.9	34.3	57.3	128	223	506	886
3	18.7	45.9	76.8	171	299	678	1187
4	23.4	57.6	96.4	215	375	851	1490
5	28.2	69.4	116	259	451	1024	1793
6	33.0	81.1	135	303	528	1197	2096
7	37.7	92.8	155	347	604	1370	2399
8	42.0	104	174	390	680	1542	2702
9	47.3	116	194	434	756	1715	3005
10	52.0	128	213	478	833	1888	3308
12	61.6	151	253	566	985	2234	3914
14	71.1	174	292	653	1138	2580	4519
16	80.7	198	331	741	1290	2926	5125
18	90.2	221	370	829	1443	3272	5731
20	99.7	245	409	916	1596	3618	6337
22	109	268	449	1004	1748	3964	6943
24	118	292	488	1092	1901	4310	7549
26	128	315	527	1179	2053	4656	8155
28	137	339	566	1267	2206	5002	8760
30	147	362	605	1354	2359	5348	9366
32	157	385	644	1442	2511	5693	9972
34	166	409	684	1530	2664	6039	10578
36	176	432	723	1617	2816	6385	11184
38	185	456	762	1705	2969	6731	11790
40	195	479	801	1793	3122	7077	12395
42	204	503	840	1880	3274	7423	13001
44	214	526	880	1968	3427	7769	13607
46	223	550	919	2056	3579	8115	14213
48	233	573	958	2143	3732	8461	14819
50	242	596	997	2231	3884	8807	15425
60	290	714	1193	2669	4647	10536	18454
70	338	831	1389	3107	5410	12266	21483
80	385	948	1585	3545	6173	13995	24512
90	433	1065	1781	3984	6936	15725	27541
100	481	1183	1977	4422	7699	17454	30571
110	529	1300	2173	4860	8462		
120	576	1417	2368	5298	9225		
130	624	1534	2564	5736	9988		
140	672	1651	2760	6175	10751		
150	719	1769	2956	6613	11514		
160	767	1886	3152	7051	12277		
170	815	2003	3348	7489	13040		
180	863	2120	3544	7927	13803		
190	910	2238	3740	8366	14566		
200	958	2355	3936	8804	15329		
210	1006	2472	4132	9242	16092		
220	1053	2589	4328	9680	16854		
230	1101	2707	4523	10118	17617		
240	1149	2824	4719	10557	18380		
250	1196	2941	4915	10995	19143		
260	1244	3058	5111	11433	19906		
270	1292	3175	5307				
280	1340	3293	5503				
290	1387	3410	5699				
300	1435	3527	5895				
310	1483	3644	6091				
320	1530	3762	6287				
330	1578	3879	6483				
340	1626	3996	6678				
350	1673	4113	6874				
360	1721	4230	7070				
370	1769	4348	7266				
380	1817	4465	7462				
390	1864	4582	7658				
400	1912	4699	7854				
410	1960	4817	8050				
420	2007	4934	8246				
425	2031	4992	8344				

General Notes:
 1. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
 2. For sizing purposes the coefficient of discharge, K_d for air, gas, and steam is 0.801.
 3. Full port orifices require that inlet piping have a flow area equal to or greater than the full port orifice flow area.



Steam Capacities – 3800 Series: 10% Overpressure, API

ASME Pressure Vessel Code (UV) – Capacities in Kilograms Per Hour at Saturation Temperature – Metric Units														
Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
Areas	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18671
1	96	145	239	361	564	924	1319	2048	2584	3116	4579	7929	11489	18701
2	140	210	347	523	818	1340	1913	2971	3749	4519	6642	11500	16664	27124
3	188	282	465	701	1095	1795	2563	3979	5021	6053	8897	15404	22321	36332
4	236	354	584	880	1375	2253	3217	4994	6302	7597	11166	19332	28013	45597
5	284	426	703	1059	1654	2710	3871	6009	7582	9141	13435	23260	33706	54862
6	332	498	822	1238	1934	3168	4524	7024	8863	10684	15703	27188	39398	64127
7	380	570	940	1417	2213	3626	5178	8039	10144	12228	17972	31117	45090	73392
8	428	642	1059	1596	2493	4084	5832	9054	11424	13772	20241	35045	50782	82657
9	476	714	1178	1775	2772	4542	6486	10068	12705	15316	22510	38973	56475	91923
10	524	786	1297	1954	3052	4999	7139	11083	13985	16860	24779	42901	62167	101188
12	620	930	1534	2312	3611	5915	8447	13113	16547	19947	29317	50758	73551	119718
14	716	1074	1772	2670	4170	6831	9754	15143	19108	23035	33855	58614	84936	138248
16	812	1218	2009	3028	4729	7746	11062	17173	21669	26122	38392	66471	96321	156779
18	908	1362	2247	3386	5288	8662	12369	19202	24230	29210	42930	74327	107705	175309
20	1004	1507	2484	3744	5847	9578	13677	21232	26791	32297	47468	82184	119090	193839
22	1100	1651	2722	4102	6406	10493	14984	23262	29353	35385	52006	90040	130474	212369
24	1196	1795	2960	4460	6965	11409	16292	25292	31914	38472	56544	97897	141859	230900
26	1292	1939	3197	4817	7524	12325	17599	27321	34475	41560	61082	105753	153243	249430
28	1388	2083	3435	5175	8083	13240	18907	29351	37036	44647	65619	113610	164628	267960
30	1484	2227	3672	5533	8642	14156	20214	31381	39597	47735	70157	121466	176012	286491
32	1580	2371	3910	5891	9201	15071	21522	33411	42159	50822	74695	129323	187397	305021
36	1773	2659	4385	6607	10319	16903	24137	37470	47281	56997	83771	145036	210166	342082
40	1965	2947	4860	7323	11437	18734	26752	41530	52403	63172	92846	160749	232935	379142
44	2157	3235	5335	8039	12555	20565	29367	45589	57526	69348	101922	176462	255704	416203
48	2349	3523	5810	8755	13673	22396	31982	49649	62648	75523	110997	192175	278473	453263

Steam Capacities – 3800 Series: 10% Overpressure, Full Port

ASME Pressure Vessel Code (UV) – Capacities in Kilograms Per Hour at Saturation Temperature – Metric Units							
Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm						
Areas	A	#1	#2	#3	#4	#6	#8
Actual	464	1140	1905	4261	7419	16819	29458
1	433	1064	1779	3980	6929	15709	27514
2	628	1544	2580	5772	10050	22784	39906
3	823	2023	3382	7565	13171	29860	52298
4	1018	2503	4183	9357	16292	36935	64689
5	1213	2982	4985	11150	19413	44010	77081
6	1408	3462	5786	12942	22534	51085	89473
7	1604	3942	6588	14735	25655	58161	101865
8	1799	4421	7389	16528	28777	65236	114257
9	1994	4901	8190	18320	31898	72311	126649
10	2189	5380	8992	20113	35019	79386	139041
12	2579	6339	10595	23698	41261	93537	163824
14	2969	7298	12198	27283	47503	107687	188608
16	3360	8258	13800	30868	53745	121838	213392
18	3750	9217	15403	34453	59987	135988	238175
20	4140	10176	17006	38038	66229	150139	262959
22	4531	11135	18609	41623	72471	164289	287743
24	4921	12094	20212	45208	78713	178440	312527
26	5311	13053	21815	48794	84955	192590	337310
28	5701	14012	23417	52379	91197	206741	362094
30	6092	14971	25020	55964	97439	220891	386878
32	6482	15930	26623	59549	103681	235042	411661
36	7262	17849	29829	66719	116165	263343	461229
40	8043	19767	33035	73889	128650	291644	510796
44	8823	21685	36240	81060	141134	319945	560364
48	9604	23603	39446	88230	153618	348246	609931

General Notes:

- Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
- For sizing purposes the effective coefficient of discharge, K_d for air, gas, and steam is 0.954 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for air, gas, and steam service is 0.859.
- For full port sizing purposes the coefficient of discharge, K for air, gas, and steam is 0.801.
- Full port orifices require that inlet piping have a flow area equal to or greater than the full port orifice flow area.

Water Capacities – 3800L Series: 10% Overpressure, API

ASME Pressure Vessel Code (UV) – Capacities in Liters Per Minute at 21°C – Metric Units														
Set Pressure (barg)	Orifice Letter Designation & Areas, Sq. mm													
Areas	D	E	F	G	H	J	K	L	M	N	P	Q	R	T
API	71	126	198	325	506	830	1186	1841	2323	2800	4116	7129	10323	16774
Actual	97	145	239	361	563	923	1317	2045	2581	3111	4572	7916	11471	18671
1	70.5	105	174	263	410	672	960	1491	1882	2269	3334	5773	8366	13617
2	95.4	143	236	355	555	909	1299	2017	2545	3068	4509	7807	11313	18414
3	116	175	288	434	679	1112	1588	2466	3112	3752	5514	9547	13834	22518
4	134	202	333	502	784	1284	1834	2848	3593	4332	6367	11024	15975	26002
5	150	226	372	561	876	1436	2051	3184	4018	4843	7119	12325	17860	29071
6	165	247	408	615	960	1573	2247	3488	4401	5306	7798	13502	19565	31846
7	178	267	440	664	1037	1699	2427	3767	4754	5731	8423	14584	21133	34397
8	190	285	471	710	1109	1817	2594	4027	5082	6127	9005	15590	22592	36772
9	202	303	500	753	1176	1927	2752	4272	5390	6498	9551	16536	23962	39003
10	213	319	527	794	1240	2031	2900	4503	5682	6850	10068	17431	25258	41113
12	233	350	577	869	1358	2225	3177	4933	6224	7504	11029	19094	27669	45037
14	252	378	623	939	1467	2403	3432	5328	6723	8105	11912	20624	29886	48645
16	269	404	666	1004	1568	2569	3669	5696	7187	8665	12735	22048	31950	52004
18	285	428	707	1065	1663	2725	3892	6041	7623	9190	13507	23386	33888	55159
20	301	452	745	1123	1753	2872	4102	6368	8036	9687	14238	24651	35721	58142
22	316	474	781	1177	1839	3013	4302	6679	8428	10160	14933	25854	37465	60980
24	330	495	816	1230	1921	3147	4494	6976	8803	10612	15597	27004	39130	63692
26	343	515	849	1280	1999	3275	4677	7261	9162	11045	16234	28106	40728	66293
28	356	534	881	1328	2075	3399	4854	7535	9508	11462	16847	29168	42266	68795
30	369	553	912	1375	2148	3518	5024	7800	9842	11865	17438	30191	43749	71210
32	381	571	942	1420	2218	3634	5189	8055	10165	12254	18010	31181	45184	73545
34	392	589	971	1464	2286	3745	5349	8303	10478	12631	18564	32141	46575	75809
36	404	606	1000	1506	2353	3854	5504	8544	10781	12997	19102	33073	47925	78006
38	415	623	1027	1548	2417	3960	5654	8778	11077	13353	19626	33979	49238	80144
40	426	639	1054	1588	2480	4063	5801	9006	11365	13700	20136	34862	50517	82226
42	436	655	1080	1627	2541	4163	5945	9229	11645	14038	20633	35723	51765	84257
44	446	670	1105	1665	2601	4261	6085	9446	11919	14369	21118	36564	52983	86239
46	457	685	1130	1703	2659	4357	6221	9658	12187	14692	21593	37385	54174	88178
48	466	700	1154	1739	2717	4450	6355	9866	12449	15008	22058	38189	55339	90074
50	476	714	1178	1775	2773	4542	6486	10069	12706	15317	22512	38977	56480	91932
60	521	782	1291	1945	3037	4976	7105	11031	13919	16779	24661	42697	61871	100706
70	563	845	1394	2101	3281	5374	7675	11914	15034	18124	26637	46118	66828	108775
80	602	904	1490	2246	3507	5745	8205	12737	16072	19375	28476	49302	71443	116285
90	639	958	1581	2382	3720	6094	8702	13510	17047	20550	30204	52293	75776	123339
100	673	1010	1666	2511	3921	6424	9173	14241	17969	21662	31837	55122	79875	130011
110	706	1060	1748	2633	4113	6737	9621	14936	18846	22719	33391			
120	738	1107	1825	2750	4296	7037	10049	15600	19684	23730	34876			
130	768	1152	1900	2863	4471	7324	10459	16237	20488	24699	36300			
140	797	1195	1972	2971	4640	7601	10854	16850	21262	25631	37671			
150	825	1237	2041	3075	4803	7868	11235	17441	22008	26531	38993			
160	852	1278	2108	3176	4960	8126	11603	18013	22730	27401	40272			
170	878	1317	2173	3274	5113	8376	11960	18568	23429	28244	41511			
180	904	1356	2236	3369	5261	8618	12307	19106	24109	29063	42715			
190	928	1393	2297	3461	5405	8855	12644	19629	24769	29859	43885			
200	952	1429	2357	3551	5546	9085	12973	20139	25413	30635	45025			
210	976	1464	2415	3639	5683	9309	13293	20637	26040	31392	46137			
220	999	1499	2472	3724	5817	9528	13606	21122	26653	32130	47223			
230	1021	1532	2527	3808	5947	9742	13912	21597	27252	32852	48284			
240	1043	1565	2582	3890	6075	9952	14211	22062	27838	33559	49323			
250	1065	1598	2635	3970	6201	10157	14504	22517	28412	34251	50340			
260	1086	1629	2687	4049	6323	10358	14791	22963	28975	34929	51337			
270	1107	1660	2738	4126	6444	10556								
280	1127	1691	2788	4202	6562	10749								
290	1147	1721	2838	4276	6678	10940								
300	1167	1750	2886	4349	6792	11127								
310	1186	1779	2934	4421	6905	11310								
320	1205	1808	2981	4492	7015	11491								
330	1224	1836	3027	4561	7124	11670								
340	1242	1863	3073	4630	7231	11845								
350	1260	1891	3118	4698	7337	12018								
370	1296	1944	3205	4830	7543	12357								
390	1330	1996	3291	4959	7745	12686								
410	1364	2046	3374	5084	7941	13008								
425	1389	2083	3435	5177	8085	13243								

General Notes:
 1. Capacities at 2.0 Barg set pressure and below are based on 0.2 Bar overpressure.
 2. For sizing purposes the effective coefficient of discharge, K_d for liquids is 0.869 when sizing using the API effective areas. When sizing using the ASME actual areas, the certified coefficient of discharge K for water is 0.782.
 3. Values in this table assume no backpressure.



Sizing Information

The following equations are presented in U.S. customary units. For metric equivalents please consult our sizing software, SizeMaster at www.cw-valvegroup.com/sizemaster.

General Equations

Before beginning any calculations, it is necessary to establish the general category of the pressure relief valve to be used. This section covers pilot operated relief valves.

Given the rate of fluid flow to be relieved, the usual procedure is to first calculate the minimum area required in the valve orifice for the conditions contained in one of the following equations. In the case of steam, air or water, the selection of an orifice may be made directly from the capacity tables.

The second step is to select the specific type of valve that meets the pressure and temperature requirements.

General equations are given first, to identify the basic terms that correlate with ASME Pressure Vessel Code, Section VIII.

Since these equations are conservative, it is recommended that computations of relieving loads avoid cascading of safety factors or multiple contingencies beyond the reasonable flow needed to protect the pressure vessel.

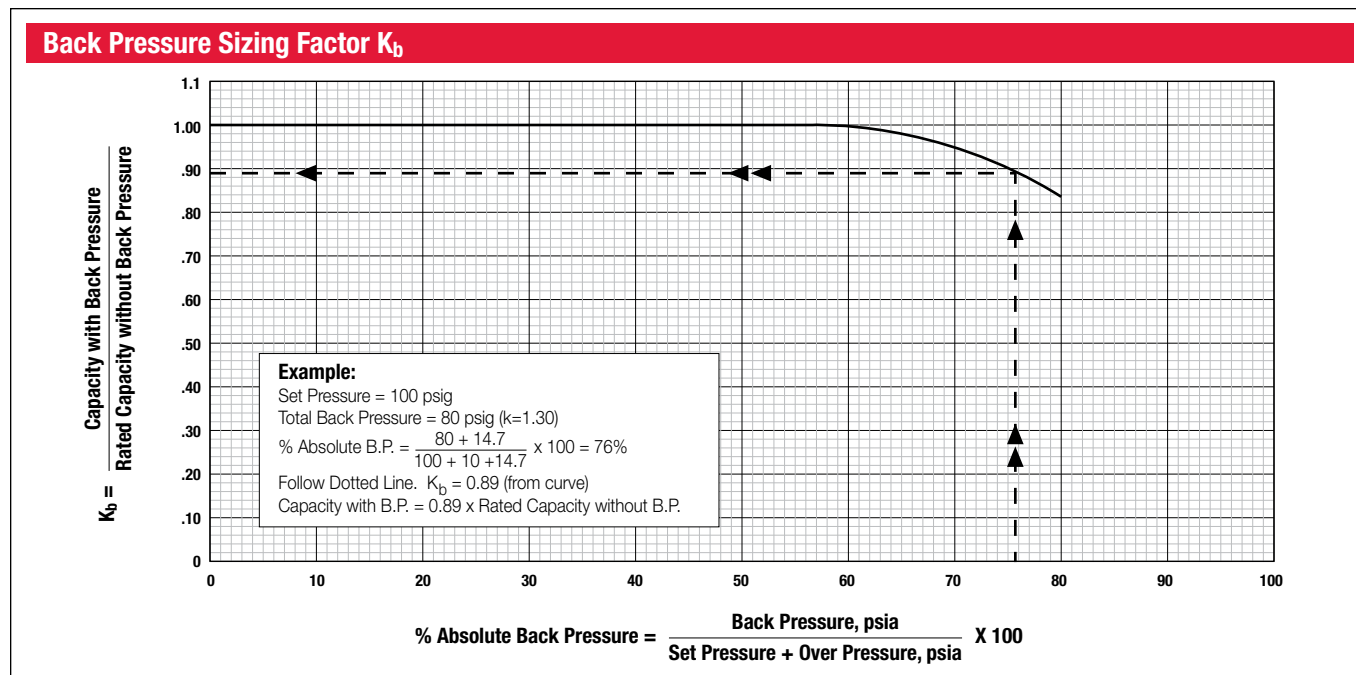
Nomenclature

- A = Required orifice area in square inches. This value may be compared with the API effective areas included in this catalog and defined in ASME/API Standard 526 or the ASME actual area.
- W = Required vapor capacity in pounds per hour.
- W_s = Required steam capacity in pounds per hour.
- V = Required gas capacity in SCFM.
- V_L = Required liquid capacity in U.S. gallons per minute.
- G = Specific gravity of gas (air = 1) or specific gravity of liquid (water = 1) at actual discharge temperature.
- M = Average molecular weight of vapor.
- P = Relieving pressure in psia = set pressure + over pressure + 14.7
Minimum overpressure is 10% or 3 psi, whichever is greater.
- P₁ = Set pressure at inlet, psig.
- P₂ = Back pressure at outlet, psig.
- ΔP = Set pressure + overpressure, psig – back pressure, psig. At 10% overpressure ΔP = 1.1P₁-P₂. Below 30 psig set, ΔP = P₁+3-P₂.
- T = Inlet temperature absolute (°F+460).
- Z = Compressibility factor corresponding to T and P (if this factor is not available, compressibility correction can be safely ignored by using a value of Z = 1.0).
- C = Gas or vapor flow constant.
- k = Ratio of specific heats, C_p/C_v. This value is constant for an ideal gas. If this ratio is unknown, the value k = 1.001, C = 315 will result in a safe valve size. Isentropic coefficient n maybe used instead of k.
- K_b = Vapor or gas flow correction factor for back pressures above critical pressure. See curve.
- K_u = Liquid viscosity correction factor.
- K_{sh} = Steam superheat correction factor. K_{sh} = 1 for saturated steam.
- K_n = Napier steam correction factor for set pressures between 1500 and 2900 psig.
- K_d = Coefficient of Discharge, where:

Orifice Area Calculations	Constant Back Pressure
VAPORS or GASES – Lbs./hr.: $A = \frac{W \sqrt{T} \sqrt{Z}}{C K_d P \sqrt{M} K_b}$	K _b = 1 when back pressure is below 55% of abs. relieving pressure.
VAPORS or GASES – S.C.F.M.: $A = \frac{V \sqrt{G} \sqrt{T} \sqrt{Z}}{1.175 C K_d P K_b}$	K _b = 1 when back pressure is below 55% of abs. relieving pressure.
STEAM – Lbs./hr.: $A = \frac{W_s}{51.5 K_d P K_b K_{sh} K_n}$	K _b = 1 when back pressure is below 55% of abs. relieving pressure. K _{sh} = 1 for Sat. Steam
AIR – S.C.F.M.: $A = \frac{V_a \sqrt{T}}{418 K_d P K_b}$	K _b = 1 when back pressure is below 55% of abs. relieving pressure.
LIQUIDS – 3800L Series, G.P.M., ASME Code: $A = \frac{V_L \sqrt{G}}{38.0 K_d \sqrt{\Delta P} K_u}$	K _u = 1 at normal viscosities

Service Fluid	K _d when sizing using	
	API Effective Areas	ASME Actual Areas
Air, Steam, Vapor & Gas (API nozzles)	0.954	0.859
Liquid (API nozzles)	0.869	0.782
Air, Steam, Vapor & Gas (Full Port nozzles)	n/a	0.801

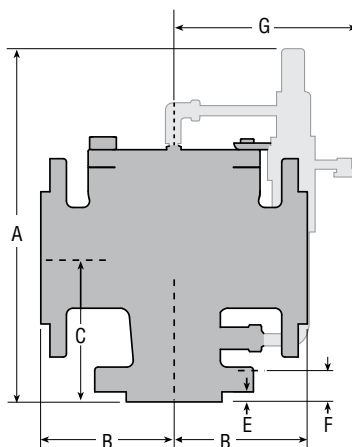
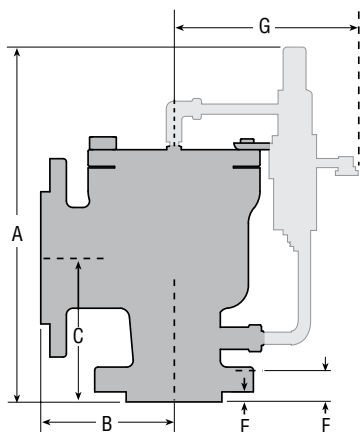
Sizing Factors for Vapors and Gases



Superheat Steam Correction Factor

Set Pressure psig	Saturated Steam Temp. °F	Total Temperature in Degrees Fahrenheit													
		280	300	320	340	360	380	400	420	440	460	480	500	520	
15	250	1.00	1.00	1.00	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	
20	259	1.00	1.00	1.00	.99	.99	.98	.98	.97	.96	.95	.94	.93	.92	
40	287		1.00	1.00	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	
60	308			1.00	1.00	.99	.99	.98	.97	.96	.95	.94	.93	.92	
80	324				1.00	1.00	.99	.99	.98	.97	.96	.94	.93	.92	
100	338					1.00	1.00	.99	.98	.97	.96	.95	.94	.93	
120	350					1.00	1.00	.99	.98	.97	.96	.95	.94	.93	
140	361						1.00	1.00	.99	.98	.96	.95	.94	.93	
160	371						1.00	1.00	.99	.98	.97	.95	.94	.93	
180	380							1.00	.99	.98	.97	.96	.95	.93	
200	388							1.00	.99	.99	.97	.96	.95	.93	
220	395							1.00	1.00	.99	.98	.96	.95	.94	
240	403								1.00	.99	.98	.97	.95	.94	
260	409								1.00	.99	.98	.97	.96	.94	
280	416								1.00	1.00	.99	.97	.96	.95	
300	422									1.00	.99	.98	.96	.95	
350	436									1.00	1.00	.99	.97	.96	
400	448										1.00	.99	.98	.96	
450	460											1.00	.99	.97	
500	470												1.00	.98	
550	480													1.00	
600	489													1.00	
650	497													1.00	
700	506													1.00	

Dimensions & Weights: API Nozzle Design



API Nozzle Design																	
Valve Size Inlet x Outlet	Type Number	ASME Flange Class		Dimensions, Inches						Approx. Wt. Lbs. ⁶	Dimensions, mm						Approx. Wt. Kg. ⁶
		Inlet RF	Outlet RF	A ³	B	C	E	F ⁴	G		A ³	B	C	E	F ⁴	G	
1 x 2	38 (D, E, F) C10	150#	150#	12-5/8	4-1/2	4-1/8	1/16	11/16	8 3/4	35	321	115	105	2	18	223	16
	38 (D, E, F) C12	300#		12-7/8	4-1/2	4-3/8	1/4	15/16	8 3/4	36	328	115	112	7	24	223	17
	38 (D, E, F) C13	600#		12-7/8	4-1/2	4-3/8	1/4	15/16	8 3/4	36	328	115	112	7	24	223	17
	38 (D, E, F) C14	900#	300#	13 3/8	4-3/4	4-15/16	1/4	1-7/16	9	49	340	121	126	7	37	229	23
	38 (D, E, F) C15	1500#		13 3/8	4-3/4	4-15/16	1/4	1-7/16	9	49	340	121	126	7	37	229	23
	38 (D, E, F) C16	2500#		13-1/2	4-3/4	4-15/16	1/4	1-11/16	9	55	343	121	126	7	43	229	25
1 x 2 ⁵	38GC10U	150#	150#	12-5/8	4-1/2	4-1/8	1/16	11/16	8 3/4	35	321	115	105	2	18	223	16
	38GC12U	300#		12-7/8	4-1/2	4-3/8	1/4	15/16	8 3/4	36	328	115	112	7	24	223	17
	38GC13U	600#		12-7/8	4-1/2	4-3/8	1/4	15/16	8 3/4	36	328	115	112	7	24	223	17
	38GC14U	900#	300#	13-3/8	4-3/4	4-15/16	1/4	1-7/16	9	49	340	121	126	7	37	229	23
	38GC15U	1500#		13-3/8	4-3/4	4-15/16	1/4	1-7/16	9	49	340	121	126	7	37	229	23
	38GC16U	2500#		13-1/2	4-3/4	4-15/16	1/4	1-11/16	9	55	343	121	126	7	43	229	25
1-1/2 x 2	38 (D, E, F) C10X	150#	150#	14	4-3/4	4-7/8	1/16	1-1/8	9 1/4	48	356	121	124	2	29	235	22
	38 (D, E, F) C12X	300#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	38 (D, E, F) C13X	600#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	38 (D, E, F) C14X	900#	300#	15	5-1/2	5 7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	38 (D, E, F) C15X	1500#		15	5-1/2	5 7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	38 (D, E, F) C16X	2500#		15-1/8	5-1/2	5 7/8	1/4	2-1/8	9 1/2	85	385	140	150	7	54	242	39
1-1/2 x 2	38 (G, H) C10N	150#	150#	14	4-3/4	4-7/8	1/16	1-1/8	9 1/4	48	356	121	124	2	29	235	22
	38 (G, H) C12N	300#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	38 (G, H) C13N	600#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	38 (G, H) C14N	900#	300#	15	5-1/2	5 7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	38 (G, H) C15N	1500#		15	5-1/2	5 7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	38 (G, H) C16N	2500#		15-1/8	5-1/2	5 7/8	1/4	2-1/8	9 1/2	85	385	140	150	7	54	242	39
1-1/2 x 2	38JC10U	150#	150#	14	4-3/4	4-7/8	1/16	1-1/8	9 1/4	48	356	121	124	2	29	235	22
	38JC12U	300#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	38JC13U	600#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	38JC14U	900#	300#	15	5-1/2	5 7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	38JC15U	1500#		15	5-1/2	5 7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	38JC16U	2500#		15-1/8	5-1/2	5 7/8	1/4	2-1/8	9 1/2	85	385	140	150	7	54	242	39
1-1/2 x 3	38 (G, H) C10	150#	150#	14	4-7/8	5-1/8	1/16	1-3/16	9 1/4	50	356	124	131	2	31	235	23
	38 (G, H) C12	300#		14	4-7/8	5-1/8	1/4	1 3/16	9 1/4	52	356	124	131	7	31	235	24
	38 (G, H) C13	600#		14	4-7/8	5-1/8	1/4	1 3/16	9 1/4	52	356	124	131	7	31	235	24
	38 (G, H) C14	900#	300#	15-1/4	6-3/4	6-3/8	1/4	1-9/16	9 1/2	75	388	172	162	7	40	242	35
	38 (G, H) C15	1500#		15-1/4	6-3/4	6-3/8	1/4	1-9/16	9 1/2	75	388	172	162	7	40	242	35
	38 (G, H) C16	2500#		15-3/8	6-3/4	6-3/8	1/4	2-1/8	9 1/2	96	391	172	162	7	54	242	44
1-1/2 x 3	38JC10N	150#	150#	14	4-7/8	5-1/8	1/16	1-3/16	9 1/4	50	356	124	131	2	31	235	23
	38JC12N	300#		14	4-7/8	5-1/8	1/4	1-3/16	9 1/4	52	356	124	131	7	31	235	24
	38JC13N	600#		14	4-7/8	5-1/8	1/4	1-3/16	9 1/4	52	356	124	131	7	31	235	24
	38JC14N	900#	300#	15-1/4	6-3/4	6-3/8	1/4	1-9/16	9 1/2	75	388	172	162	7	40	242	35
	38JC15N	1500#		15-1/4	6-3/4	6-3/8	1/4	1-9/16	9 1/2	75	388	172	162	7	40	242	35
	38JC16N	2500#		15-3/8	6-3/4	6-3/8	1/4	2-1/8	9 1/2	96	391	172	162	7	54	242	44

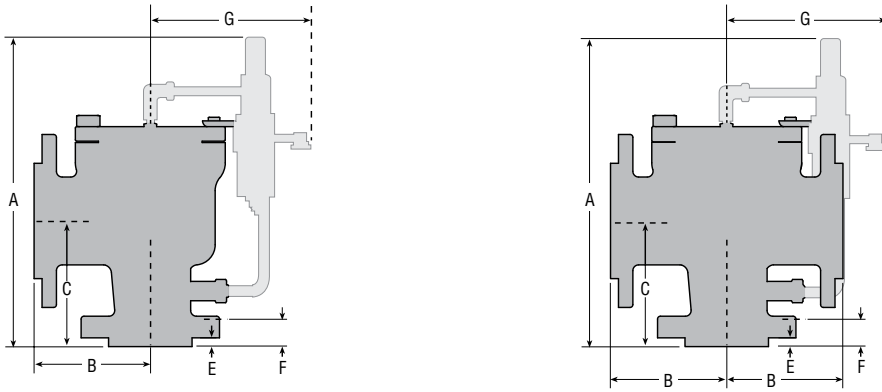
Dimensions & Weights: API Nozzle Design, continued

API Nozzle Design																	
Valve Size Inlet x Outlet	Type Number	ASME Flange Class		Dimensions, Inches						Approx. Wt. Lbs. ⁶	Dimensions, mm						Approx. Wt. Kg. ⁶
		Inlet RF	Outlet RF	A ³	B	C	E	F ⁴	G		A ³	B	C	E	F ⁴	G	
2 x 3	38 (G, H) C10X	150#	150#	15	4-7/8	5-3/8	1/16	1-1/4	9 1/2	65	381	124	137	2	32	242	30
	38 (G, H) C12X	300#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	38 (G, H) C13X	600#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	38 (G, H) C14X	900#	300#	16-1/8	6-3/4	6-9/16	1/4	1-7/8	9 3/4	102	410	172	167	7	48	248	47
	38 (G, H) C15X	1500#		16-1/8	6-3/4	6-9/16	1/4	1-7/8	9 3/4	102	410	172	167	7	48	248	47
	38 (G, H) C16X	2500#		16-3/4	6-3/4	7	1/4	2-3/8	9 3/4	130	426	172	178	7	61	248	59
2 x 3	38JC10	150#	150#	15	4-7/8	5-3/8	1/16	1-1/4	9 1/2	65	381	124	137	2	32	242	30
	38JC12	300#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	38JC13	600#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	38JC14	900#	300#	16-1/8	6-3/4	6-9/16	1/4	1-7/8	9 3/4	102	410	172	167	7	48	248	47
	38JC15	1500#		16-1/8	6-3/4	6-9/16	1/4	1-7/8	9 3/4	102	410	172	167	7	48	248	47
	38JC16	2500#		16-3/4	6-3/4	7	1/4	2-3/8	9 3/4	130	426	172	178	7	61	248	59
2 x 3	38KC10N	150#	150#	15	4-7/8	5-3/8	1/16	1-1/4	9 1/2	65	381	124	137	2	32	242	30
	38KC12N	300#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	38KC13N	600#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	38KC14N	900#	300#	16-1/8	6-3/4	6-9/16	1/4	1-7/8	9 3/4	102	410	172	167	7	48	248	47
	38KC15N	1500#		16-1/8	6-3/4	6-9/16	1/4	1-7/8	9 3/4	102	410	172	167	7	48	248	47
	38KC16N	2500#		16-3/4	6-3/4	7	1/4	2-3/8	9 3/4	130	426	172	178	7	61	248	59
3 x 4	38JC10X	150#	150#	17-5/8	6-3/8	6-1/8	1/16	1-1/4	10 3/4	135	448	162	156	2	32	274	62
	38JC12X	300#		17-5/8	6-3/8	6-1/8	1/16	1-1/4	10 3/4	140	448	162	156	2	32	274	64
	38JC13X	600#		17-7/8	6-3/8	6-3/8	1/4	1-1/2	10 3/4	140	455	162	162	7	39	274	64
	38JC14X	900#	300#	19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	195	486	181	191	7	58	293	89
	38JC15X	1500#		19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	204	486	181	191	7	58	293	93
	38 (K, L) C10	150#		150#	17-5/8	6-3/8	6-1/8	1/16	1-1/4	10 3/4	135	448	162	156	2	32	274
38 (K, L) C12	300#	17-5/8	6-3/8		6-1/8	1/16	1-1/4	10 3/4	140	448	162	156	2	32	274	64	
38 (K, L) C13	600#	17-7/8	6-3/8		6-3/8	1/4	1-1/2	10 3/4	140	455	162	162	7	39	274	64	
3 x 4	38 (K, L) C14	900#	300#	19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	195	486	181	191	7	58	293	89
	38 (K, L) C15	1500#		19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	204	486	181	191	7	58	293	93
	38 (M, N) C10N	150#		150#	17-5/8	6-3/8	6-1/8	1/16	1-1/4	10 3/4	135	448	162	156	2	32	274
	38 (M, N) C12N	300#	17-5/8		6-3/8	6-1/8	1/16	1-1/4	10 3/4	140	448	162	156	2	32	274	64
	38 (M, N) C13N	600#	17-7/8		6-3/8	6-3/8	1/4	1-1/2	10 3/4	140	455	162	162	7	39	274	64
	3 x 4	38 (M, N) C14N	900#	300#	19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	195	486	181	191	7	58	293
38 (M, N) C15N		1500#	19-1/8		7-1/8	7-1/2	1/4	2-1/4	11 1/2	204	486	181	191	7	58	293	93
38LC10X		150#	150#		20-1/4	8-1/4	7-3/4	1/16	1-3/4	11	212	515	210	197	2	45	280
38LC12X		300#		20-1/4	8-1/4	7-3/4	1/16	1-3/4	11	218	515	210	197	2	45	280	99
38LC13X		600#		20-1/4	8-1/4	7-3/4	1/4	1-3/4	11	220	515	210	197	7	45	280	100
4 x 6		38LC14X	900#	300#	22	9-3/16	9-13/16	1/4	2-1/2	12	320	559	234	250	7	64	305
	38LC15X	1500#	22		9-3/16	9-13/16	1/4	2-1/2	12	325	559	234	250	7	64	305	148
	38 (M, N, P) C10	150#	150#		20-1/4	8-1/4	7-3/4	1/16	1-3/4	11	212	515	210	197	2	45	280
	38 (M, N, P) C12	300#		20-1/4	8-1/4	7-3/4	1/16	1-3/4	11	218	515	210	197	2	45	280	99
	38 (M, N, P) C13	600#		20-1/4	8-1/4	7-3/4	1/4	1-3/4	11	220	515	210	197	7	45	280	100
	4 x 6	38 (M, N, P) C14	900#	300#	22	9-3/16	9-13/16	1/4	2-1/2	12	320	559	234	250	7	64	305
38 (M, N, P) C15		1500#	22		9-3/16	9-13/16	1/4	2-1/2	12	325	559	234	250	7	64	305	148
38 (Q, R) C10		150#	150#		24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	465	626	242	240	2	48	324
38 (Q, R) C12		300#		24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	480	626	242	240	2	48	324	218
38 (Q, R) C13		600#		24-7/8	9-1/2	9-11/16	1/4	2-1/8	12 3/4	500	632	242	247	7	54	324	227
6 x 8 x 8		38 (Q, R) C10D	150#	150#	24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	504	626	242	240	2	48	324
	38 (Q, R) C12D	300#	24-5/8		9-1/2	9-7/16	1/16	1-7/8	12 3/4	519	626	242	240	2	48	324	236
	38 (Q, R) C13D	600#	24-7/8		9-1/2	9-11/16	1/4	2-1/8	12 3/4	539	632	242	247	7	54	324	245
8 x 10	38TC10	150#	150#	29	11	10-7/8	1/16	1-5/8	14 1/4	830	737	280	277	2	42	362	377
	38TC12	300#		29	11	10-7/8	1/16	1-5/8	14 1/4	835	737	280	277	2	42	362	379
	38TC13	600#		29-7/8	11	11-11/16	1/4	2-7/16	14 1/4	925	759	280	297	7	62	362	420
8 x 10 x 10	38TC10D	150#	150#	29	11	10-7/8	1/16	1-5/8	14 1/4	885	737	280	277	2	42	362	402
	38TC12D	300#		29	11	10-7/8	1/16	1-5/8	14 1/4	890	737	280	277	2	42	362	404
	38TC13D	600#		29-7/8	11	11-11/16	1/4	2-7/16	14 1/4	980	759	280	297	7	62	362	445

General Notes:

- For liquid service valves with standard size connections (L in the type number), use the standard type number dimensions, i.e. 38DC10-120. For liquid service valves with oversize connections (Y in the type number), use the oversize type number dimensions, i.e. 38DC10X-120.
- Valves with ring joint inlet connections available. Consult the Factory for final dimensions.
- For modulating valves, add 6-1/2" (160 mm) to the A dimension.
- F dimension meets or exceeds ANSI thickness requirement.
- A 1" x 2" valve with a "G" orifice is only available with a remote sensing option.
- Weights listed are for valves with snap acting controls without any optional accessories. For valves with modulating controls maximum added weight is 15 lbs (6.8 Kg).

Dimensions & Weights: Full Port Design



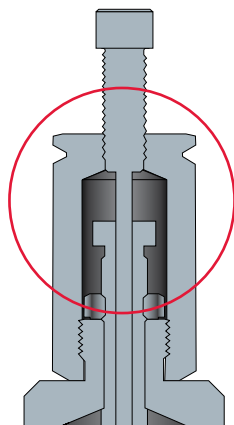
Full Port Design																	
Valve Size Inlet x Outlet	Type Number	ASME Flange Class		Dimensions, Inches						Approx. Wt. Lbs. ⁵	Dimensions, mm						Approx. Wt. Kg. ⁶
		Inlet RF	Outlet RF	A ³	B	C	E	F ⁴	G		A ³	B	C	E	F ⁴	G	
1 x 2 ¹	38AC10-12R	150#		12-5/8	4-1/2	4-1/8	1/16	11/16	8 3/4	35	321	115	105	2	18	223	16
	38AC12-12R	300#	150#	12-7/8	4-1/2	4-3/8	1/4	15/16	8 3/4	36	328	115	112	7	24	223	17
	38AC13-12R	600#		12-7/8	4-1/2	4-3/8	1/4	15/16	8 3/4	36	328	115	112	7	24	223	17
	38AC14-12R	900#		13-3/8	4-3/4	4-15/16	1/4	1-7/16	9	49	340	121	126	7	37	229	23
	38AC15-12R	1500#	300#	13-3/8	4-3/4	4-15/16	1/4	1-7/16	9	49	340	121	126	7	37	229	23
	38AC16-12R	2500#		13-1/2	4-3/4	4-15/16	1/4	1-11/16	9	55	343	121	126	7	43	229	25
1-1/2 x 2	381C10-120	150#		14	4-3/4	4-7/8	1/16	1-1/8	9 1/4	48	356	121	124	2	29	235	22
	381C12-120	300#	150#	14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	381C13-120	600#		14	4-3/4	4-7/8	1/4	1-1/8	9 1/4	50	356	121	124	7	29	235	23
	381C14-120	900#		15	5-1/2	5-7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	381C15-120	1500#	300#	15	5-1/2	5-7/8	1/4	1-9/16	9 1/2	71	381	140	150	7	40	242	33
	381C16-120	2500#		15-1/8	5-1/2	5-7/8	1/4	2-1/8	9 1/2	85	385	140	150	7	54	242	39
1-1/2 x 3	381C10X-120	150#		14	4-7/8	5-1/8	1/16	1-3/16	9 1/4	50	356	124	131	2	31	235	23
	381C12X-120	300#	150#	14	4-7/8	5-1/8	1/4	1-3/16	9 1/4	52	356	124	131	7	31	235	24
	381C13X-120	600#		14	4-7/8	5-1/8	1/4	1-3/16	9 1/4	52	356	124	131	7	31	235	24
	381C14X-120	900#		15-1/4	6-3/4	6-3/8	1/4	1-9/16	9 1/2	75	388	172	162	7	40	242	35
	381C15X-120	1500#	300#	15-1/4	6-3/4	6-3/8	1/4	1-9/16	9 1/2	75	388	172	162	7	40	242	35
	381C16X-120	2500#		15-3/8	6-3/4	6-3/8	1/4	2-1/8	9 1/2	96	391	172	162	7	54	242	44
2 x 3	382C10-120	150#		15	4-7/8	5-3/8	1/16	1-1/4	9 1/2	65	381	124	137	2	32	242	30
	382C12-120	300#	150#	15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	382C13-120	600#		15	4-7/8	5-3/8	1/4	1-1/4	9 1/2	65	381	124	137	7	32	242	30
	382C14-120	900#		16-1/8	6-3/4	6-9/16	1/4	1 7/8	9 3/4	102	410	172	167	7	48	248	47
	382C15-120	1500#	300#	16-1/8	6-3/4	6-9/16	1/4	1 7/8	9 3/4	102	410	172	167	7	48	248	47
	382C16-120	2500#		16-3/4	6-3/4	7	1/4	2 3/8	9 3/4	130	426	172	178	7	61	248	59
3 x 4	383C10-120	150#		17-5/8	6-3/8	6-1/8	1/16	1-1/4	10 3/4	135	448	162	156	2	32	274	62
	383C12-120	300#	150#	17-5/8	6-3/8	6-1/8	1/16	1-1/4	10 3/4	140	448	162	156	2	32	274	64
	383C13-120	600#		17-7/8	6-3/8	6-3/8	1/4	1-1/2	10 3/4	140	455	162	162	7	39	274	64
	383C14-120	900#		19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	195	486	181	191	7	58	293	89
	383C15-120	1500#	300#	19-1/8	7-1/8	7-1/2	1/4	2-1/4	11 1/2	204	486	181	191	7	58	293	93
	384C10-120	150#		20-1/4	8-1/4	7-3/4	1/16	1-3/4	11	212	515	210	197	2	45	280	97
4 x 6	384C12-120	300#	150#	20-1/4	8-1/4	7-3/4	1/16	1-3/4	11	218	515	210	197	2	45	280	99
	384C13-120	600#		20-1/4	8-1/4	7-3/4	1/4	1-3/4	11	220	515	210	197	7	45	280	100
	384C14X-120	900#		22	9-3/16	9-13/16	1/4	2-1/2	12	320	559	234	250	7	64	305	146
	384C15X-120	1500#	300#	22	9-3/16	9-13/16	1/4	2-1/2	12	325	559	234	250	7	64	305	148
	386C10-120	150#		24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	465	626	242	240	2	48	324	211
	386C12-120	300#	150#	24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	480	626	242	240	2	48	324	218
6 x 8 x 8	386C13-120	600#		24-7/8	9-1/2	9-11/16	1/4	2-1/8	12 3/4	500	632	242	247	7	54	324	227
	386C10D-120	150#		24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	504	626	242	240	2	48	324	229
	386C12D-120	300#	150#	24-5/8	9-1/2	9-7/16	1/16	1-7/8	12 3/4	519	626	242	240	2	48	324	236
	386C13D-120	600#		24 7/8	9-1/2	9-11/16	1/4	2-1/8	12 3/4	539	632	242	247	7	54	324	245
	388C10-120	150#		29	11	10-7/8	1/16	1-5/8	14 1/4	830	737	280	277	2	42	362	377
	388C12-120	300#	150#	29	11	10-7/8	1/16	1-5/8	14 1/4	835	737	280	277	2	42	362	379
8 x 10 x 10	388C13-120	600#		29-7/8	11	11-11/16	1/4	2-7/16	14 1/4	925	759	280	297	7	62	362	420
	388C10D-120	150#		29	11	10-7/8	1/16	1 5/8	14 1/4	885	737	280	277	2	42	362	402
	388C12D-120	300#	150#	29	11	10-7/8	1/16	1 5/8	14 1/4	890	737	280	277	2	42	362	404
	388C13D-120	600#		29-7/8	11	11-11/16	1/4	2 7/16	14 1/4	980	759	280	297	7	62	362	445

General Notes:

1. A 1" x 2" valve with an "A" orifice is only available when configured with a remote sensing option.
2. Valves with ring joint inlet connections available. Consult the Factory for final dimensions.
3. For modulating valves, add 6-1/2" (160 mm) to the A dimension.
4. F dimension meets or exceeds ASME thickness requirement.
5. Full port orifices require that inlet piping have a flow area equal to or greater than the Full port orifice flow area.
6. Weights listed are for valves with snap acting controls without any optional accessories. For valves with modulating controls maximum added weight is 15 lbs (6.8 Kg).

Optional Accessories

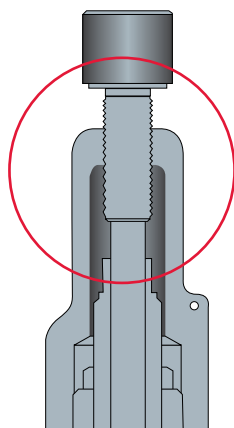
A full line of accessories is available to meet your service requirements.



**Snap Acting PCF5 Pilot Control
with Test Gag**



Dual Pilot Controls



**Modulating PCM Pilot Control
with Test Gag**

Test Gags

There are certain circumstances where it may be necessary to prevent a relief valve from opening; this can be done with the use of a test gag. The test gag is screwed into the cap of the pilot control, preventing the disc (or piston in the modulating style) from lifting; this keeps the main valve closed. When using a test gag on a relief valve, it is important to limit the hydrostatic test pressure to 10% above the nameplate set pressure to avoid valve damage. Prior test gags must be completely removed prior to placing valve into service. Select Option #1 from page 5.

Dual Pilot Controls

The dual pilot arrangement permits switching from an active control to a back-up control, ensuring uninterrupted pressure relief protection. The original, active control can be removed from the main valve for checking or maintenance purposes.

The spare pilot can be in place during operation or be installed just prior to switch over. When the pilot controls are subjected to corrosive service that can require more frequent maintenance cycles, this option maximizes in-service time of the PORV and increases the integrity level of the valve. Select Option #2 from page 5.

Optional Accessories, continued



Auxiliary Filters

Auxiliary Filters

All pilot controls are manufactured with an internal filter that reduces particles in the process stream, as these particles can impede the operation of the pilot valve. For services where particulates are present in the process media, additional filtration may be required. Auxiliary filters for the pilot valve sensing line are available to complement the internal filter. This filter is mounted upstream to the pilot's internal filter, reducing the amount of particles that can enter the pilot. As our pilot valves are non-flowing, the life cycle of the filter is dependent on the valve size, particle size and the valve usage. Select Option #3 from page 5.

Remote Sensing (no photo)

One of the causes of excessive chatter in a PRV is significant pressure losses on the inlet side during a relief episode. Recommended practice is to limit the non-recoverable (friction) losses to less than 3% of set pressure. When this cannot be accomplished with piping design changes, a pilot operated relief valve equipped with a remote sense line can mitigate this issue. This arrangement allows connecting the pilot sensing line at a location close to the equipment being protected, yet not affected by the inlet pipe pressure drop, thereby avoiding chatter, damage and unstable relieving flow. Select Option R from page 5.



Manual Depressurizing

Manual or Remote Depressurizing

Pilot operated relief valves potentially need an option to manually or remotely depressurize before the normal overpressure settings have been reached. In addition, this option allows for testing the main valve function without cycling the pilot control. It also allows for the pilot valve, in conjunction with other valves, to provide emergency reduction of system pressure due to potential safety situations. The main valve can be cycled to the open position by venting the pressure in the dome above the piston. A manual valve option will mount directly on the main valve, which allows for manual depressurizing of the dome. Alternately, a solenoid valve will cycle the main valve remotely. Neither the manual nor remote blowdown system will interfere with the normal overpressure protection provided by the main valve and pilot. Select Option #4 or #8 from page 5.



Remote Depressurizing

Optional Accessories, continued



Field Test Connection



Field Test Connection with Indicator



Reverse Flow Preventer

Field Test Connection or Field Test Connection with Indicator

With the addition of a field test connection, the set pressure of Farris pilot operated relief valves can be verified without interrupting system protection and does not require overpressure of the system. An auxiliary source of pressure, such as a nitrogen bottle, is connected to the pilot sensing line through a stop valve. Increasing pressure is applied through the field test connection to the pilot control, simulating the increase in system pressure. A check valve restricts the source pressure from back flowing into the main valve inlet. When the applied pressure reaches set point, the pilot control reacts as if it were sensing overpressure via the main valve sensing line. When this occurs, the auxiliary pressure reading can be compared to the nameplate value to verify set pressure. For snap acting valves, both the pilot and main valves will cycle at set pressure. For modulating valves, the modulating controls will crack slightly depending on current system pressure, the main valve may briefly cycle. To more accurately establish the modulating pilot relief valve's set pressure, a field test connection with indicator is recommended.

The field test connection with indicator provides positive verification that set pressure has been reached. The set pressure for the current modulating relief valves is defined as the point when dome pressure is reduced to 70% of set pressure. The field test indicator is activated when the applied pressure reaches the valve's set point and at this time, can be compared to nameplate value. Select Option #5 or F from page 5.

Reverse Flow Preventer

Reverse flow in a pilot relief valve can occur in systems where back pressure exceeds system pressure or where a vacuum can form at the inlet. In both cases a reverse differential pressure exists and it is possible for the main valve to open and allow flow from the discharge system to enter the inlet side.

A reverse flow preventer assures that the correct pressure differential is maintained and the main valve remains closed. A reverse flow preventer introduces outlet pressure into the dome of the main valve, keeping the piston firmly seated onto the nozzle, overcoming the effect of a reverse differential. This option also prevents reverse flow through the pilot control via the pilot sense line into the upstream side of the system. Select Option #6 from page 5.

Optional Accessories, continued



Pressure Spike Snubbers



Discharge to Outlet



Valve Lift Indicator

Pressure Spike Snubbers

Rapid pressure spikes often occur in systems with positive displacement pumps or compressors. When these pressure spikes approach or exceed the set pressure of the valve, the pilot control may actuate and cause a valve to open prematurely. A pressure spike snubber installed in the pilot valve sensing line will eliminate the negative effects of pressure pulsation. It assures that the pilot valve is sensing and reacting to mean pressure and not to instantaneous pressure spikes. Select Option #7 from page 5.

Discharge to Outlet

In order for a pilot operated relief valve to open, the system pressure retained in the main valve dome needs to be released. This small volume of process fluid in the dome is typically released to the atmosphere via the pilot control discharge port. This is true whether it is a snap-acting or a modulating pilot control.

Normally, the end user can accept this small amount of product loss and fugitive emissions when the process fluid is gaseous. However, if the process fluid is a liquid, flammable, or possibly hazardous, then the release to atmosphere may need to be minimized and/or eliminated.

The conventional solution is to pipe the discharge of the pilot control to a safe location or atmospheric collection system. This is not always possible or practical. In these cases, piping the modulating pilot control discharge directly to the main valve outlet is the solution. The design of the modulating pilot control features a balanced relief chamber that neutralizes the effects of back pressure to set pressure similar to that of a bellows-style spring loaded valve. Therefore the discharge for a modulating pilot control can be piped directly to the main valve outlet and is recommended for liquid applications.

This option is only available with the modulating pilot control and must be specified at the time of order. Select Option V from page 5.

Valve Lift Indicator

A valve lift indicator allows the operator to know when the pilot operated relief valve has opened. This auxiliary option consists of a differential pressure switch as the indicator. The switch is mounted to the dome of the main valve. When the dome pressure is reduced sufficiently so that the main valve opens, the switch is actuated, allowing a signal to be sent to a remote location. In order to supply this option, please be prepared to supply information regarding the electrical source, switch contact style, and switch rating, enclosure and hazard rating. This option will be designated under SP – special construction.

Optional Accessories, continued

Accessories Reference Table ¹						
	Snap Acting Control		Modulating Control			
	PCF5 (2)	PCL (3)	PCM (4)	PCMS (5)	HPCM (6)	HPCM7 (7)
Test Gag (1)	✓	✓	✓	✓	✓	
Dual Pilots (2)	✓	✓	✓	✓	✓	
Auxillary Filter (3)	✓	✓	✓	✓	✓	✓
Manual Depressurizing ⁴ (4)	✓	✓	✓	✓	✓	✓
Remote Depressurizing ³ (8)	✓	✓	✓	✓	✓	✓
Field Test Connection (5)	✓	✓	✓ ²	✓ ²	✓ ²	✓ ²
Field Test Connection w/ Indicator (F)			✓ ²	✓ ²	✓ ²	✓ ²
Reverse Flow Preventer (6)	✓	✓	✓	✓	✓	✓
Pressure Spike Snubber (7)	✓	✓	✓		✓	
Remote Sensing (R)	✓	✓	✓	✓	✓	✓
Discharge to Outlet (V)			✓ ⁵	✓ ⁵	✓ ⁵	✓ ⁵
Valve Lift Indicator ⁶	✓	✓	✓	✓	✓	

General Notes:

1. Materials of construction for optional accessories will remain consistent with main and pilot valve constructions. Not all optional accessories may be available for valves specified with special trim material, based on commercial availability.
2. Option with indicator is recommended for modulating pilot control applications.
3. Customer will need to provide supplemental information to specify this option.
4. The effective CV of the manual depressurizing unit should be at least 0.4 (KV = 0.35) including any associated tubing or piping.
5. When liquid service is specified, this option is recommended.
6. Furnish complete details on type of signal output desired and power supply available.

Conversion Factors

Area		
To Convert From	To	Multiply By
Square Inches	Square Centimeters	6.452
	Square Millimeters	645.2
	Square Feet	0.006944

Density		
To Convert From	To	Multiply By
Pounds Per Cubic Feet	Pounds/US Gallon	0.1337
	Pounds/Cubic Inch	0.0005787
	Grams/Cubic Centimeter	0.01602
	Kilograms/Cubic Meter	16.018

Flow Rate (Mass)		
To Convert From	To	Multiply By
Pounds Per Hour	Kilograms Per Hour	0.4536
	Tons Per Hour (Short)	0.0005

Flow Rate (Volume)		
To Convert From	To	Multiply By
Gallons Per Minute	Cubic Feet Per Second	0.02228
	Liters Per Minute	3.785
	Liters Per Second	0.06308
	Meters Cubed Per Hour	0.2271

Length		
To Convert From	To	Multiply By
Feet	Centimeters	30.48
	Inches	12
	Millimeters	304.8
	Meters	0.3048
	Miles	0.000189
Meters	Yards	0.3333
	Centimeters	100.0
	Feet	3.281
	Inches	39.37
	Millimeters	1000.0
	Yards	1.094

Mass (Weight)		
To Convert From	To	Multiply By
Pounds	Cubic Feet of Water	0.01603
	Gallons of Water	0.11995
	Grams	453.6
	Kilograms	0.4536
	Ounces	16
	Tons (Short)	0.0005
	Tons (Long)	0.0004464
	Tons (Metric)	0.0004536

Pressure		
To Convert From	To	Multiply By
Atmospheres	Bars	1.013
	Feet of Water	33.96
	Inches of Mercury	29.92
	Inches of Water	407.50
	Kilograms per cm ²	1.033
	Millimeters of Mercury	760.00
Pounds Per Sq. In.	Pounds per square inch	14.70
	Bars	0.06895
	Feet of Water	2.31
	Inches of Mercury	2.036
	Inches of Water	27.73
	Millimeters of Mercury	51.71
	Kilograms per square cm	0.07031
Kilopascals	6.895	

Temperature Conversion Equations	
Celsius (C) =	5/9 x (Fahrenheit - 32)
Fahrenheit (F) =	(9/5 x Celsius) + 32
Kelvin (K) =	Celsius + 273.15
Rankin (R) =	Fahrenheit + 459.67

Viscosity – Absolute or Dynamic		
To Convert From	To	Multiply By
Centipoise	lbf-sec/ft. ²	0.000208854
Centipoise	kg-sec/meter ²	0.000102
Lbf-sec/sq. ft.	Pascal-sec	47.8803
Pascal sec.	Centipoise	1000
Poise (gm/cm-sec)	Centipoise	100

Viscosity – Kinematic		
To Convert From	To	Multiply By
Centistokes	Stokes	0.01
Centistokes	sq. meters/sec	0.000001
Square Feet/Sec.	Centistokes	92903.04
Square Feet/Sec.	Square meters/sec	0.092903

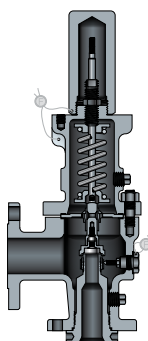
Viscosity – Absolute to Kinematic		
To Convert From	To	Multiply By
Centipoise	Centistokes	1/density (g/cm ³)

Volume		
To Convert From	To	Multiply By
Gallons (US)	Barrels	0.02381
	Cubic Inches	231.0
	Cubic Feet	0.1337
	Cubic Centimeters (or ml)	3785
	Imperial Gallons	0.8327
	Liters	3.785

Miscellaneous		
To Convert From	To	Multiply By
Specific Gravity-Gas, Water (Cubic Feet @ 60°F)	Molecular Weight-Gas	28.970
	Pounds per Cubic Feet @ 60°F	62.37
	Imperial Gallons	0.8327
	Liters	3.785

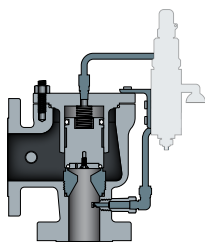
Farris Engineering Products

Process Pressure Relief Valves



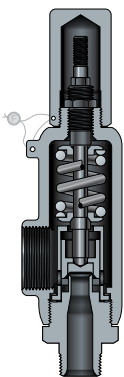
SERIES 2600/2600L

- ASME NB Certified: Air, Steam & Water
- Sizes: 1" x 2" to 20" x 24"
- Pressure Range: 15 psig to 6000 psig
- Temperature Range: -450°F to +1500°F
- Materials: Carbon Steel, Stainless Steel, Monel & Hastelloy C
- Options: Balanced Bellows, O-Ring Seat, Open Bonnet
- CE Approved



SERIES 3800 Pilot Operated

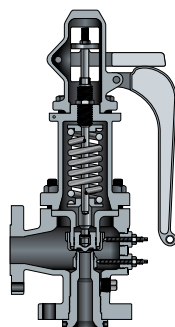
- ASME NB Certified: Air, Steam & Water
- Sizes: 1" x 2" to 12" x 16"
- Pressure Range: 15 psig to 6170 psig
- Temperature Range: -450°F to +500°F
- Materials: Carbon Steel, Stainless Steel, Monel & Hastelloy C
- Actuation: Snap and Modulating Controls
- Options: Field Test Connections, Reverse Flow Preventer, Remote Depressurizing & Auxiliary Filters
- CE Approved



SERIES 2700

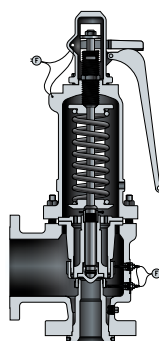
- ASME NB Certified: Air, Steam & Water
- Sizes: ½" x 1" to 1½" x 2½"
- Pressure Range: 15 psig to 6500 psig
- Temperature Range: -450°F to +750°F
- Materials: Carbon Steel, Stainless Steel, Monel & Hastelloy C
- Options: Balanced Design, O-Ring Seats, Flanged, Socket Weld, Welding Nipple, & Sanitary Connections
- CE Approved

Steam Safety Valves



SERIES 4200

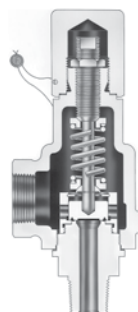
- ASME NB Section I & VIII Certified: Steam & Air
- Sizes 1¼" x 1½" to 6" x 8"
- Pressure Range: 15 psig to 1000 psig
- Temperature Range: -20°F to +1000°F
- Materials: Carbon Steel, Stainless Steel, Chrome-Moly
- Options: Test Gag
- CE Approved



SERIES 6400/6600

- ASME NB Section I & VIII Certified: Steam & Air
- Sizes: 1" x 2" to 4" x 6"
- Pressure Range: 15 psig to 1500 psig
- Temperature Range: -20°F to +1000°F
- Materials: Carbon Steel, Stainless Steel, Chrome-Moly
- Options: Closed Bonnet (6600) & Test Gag

Special Purpose Pressure Relief Valves



SERIES 1890/1896M

- ASME NB Certified: Air, Steam & Water
- Sizes: ½" x 1" & ¾" x 1" (1890)
½" x ¾" & ¾" x ¾" (1896M)
- Pressure Range: 15 psig to 800 psig (1890) 15 psig to 300 psig (1896M)
- Temperature Range: -20°F to +750°F (1890) -450°F to +400°F (1896M)
- Materials: Stainless Steel Body & Trim (1890) Brass Body & Trim, Bronze Bonnet (1896M)

*Other materials available upon request. Please consult the factory.

Farris Engineering Products and Services

Process Pressure Relief Valves – ASME Code Section VIII

Series 2600	ASME NB Certified for Air and Steam
Series 2600S	ASME NB Certified for Air and Steam
Series 2600L	ASME NB Certified for Air, Steam and Water
Series 3800	ASME NB Certified for Air, Steam and Water
Series 2700	ASME NB Certified for Air, Steam and Water
Series 1890 / 1896M	ASME NB Certified for Air, Steam and Water

Steam Safety Valves – ASME Code Section I & VIII

Series 4200	ASME NB Certified for Steam
Series 6400/6600	ASME NB Certified for Steam

Nuclear Pressure Relief Valves

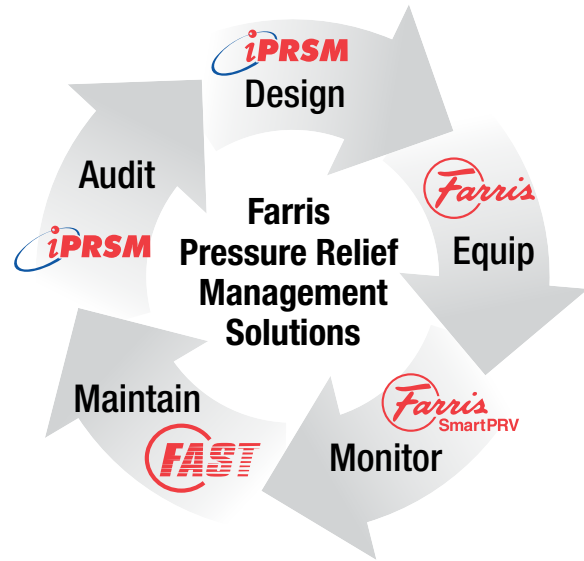
Series 4700/4700L	ASME NB Section III, Division 1 Class I, II & III
Series 2700/3700	ASME NB Section III, Division 1 Class I, II & III
Series 2600/2600L	ASME NB Section III, Division 1 Class I, II & III
Series 3800	ASME NB Section III, Division 1 Class I, II & III

Changeover Valves

Series 320B & 370B

Certifications and Approvals:

- ASME V, UV, NV and NPT
- National Board Approval, NB
- ISO 9001-2008
- PED 2014/68/EU (European Pressure Equipment Directive)
- ATEX 94/9/EC (European Potentially Explosive Atmospheres)
- CSA B51 (Canadian Registration)
- CSQI (China Safety Quality License)
- Customs Union TR CU 010-2011 and Customs Union TR CU 032-2013
- US Coast Guard
- Nuclear - 10 CFR 50 Appendix B, NCA-4000, NQA-1, N285.0
- First Point Assessment Limited



FAST Centers (Farris Authorized Service Team)

- Worldwide Network of Service Centers with Factory Trained Technicians
- Local Inventory and Support, 24 Hours a Day, 7 Days a Week
- Access to Worldwide Farris Inventory through the Web
- ASME/National Board Approved Assembly, Repair & Test Facilities
- Application, Sizing & Selection Support

SizeMaster™ Mark IV

Pressure Relief Valve Engineering Software for Sizing and Selection

PSM Engineering Services

- Pressure Relief System Design Services
- Pressure Relief System Audit Services
- iPRSM Pressure Relief System Management Software

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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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