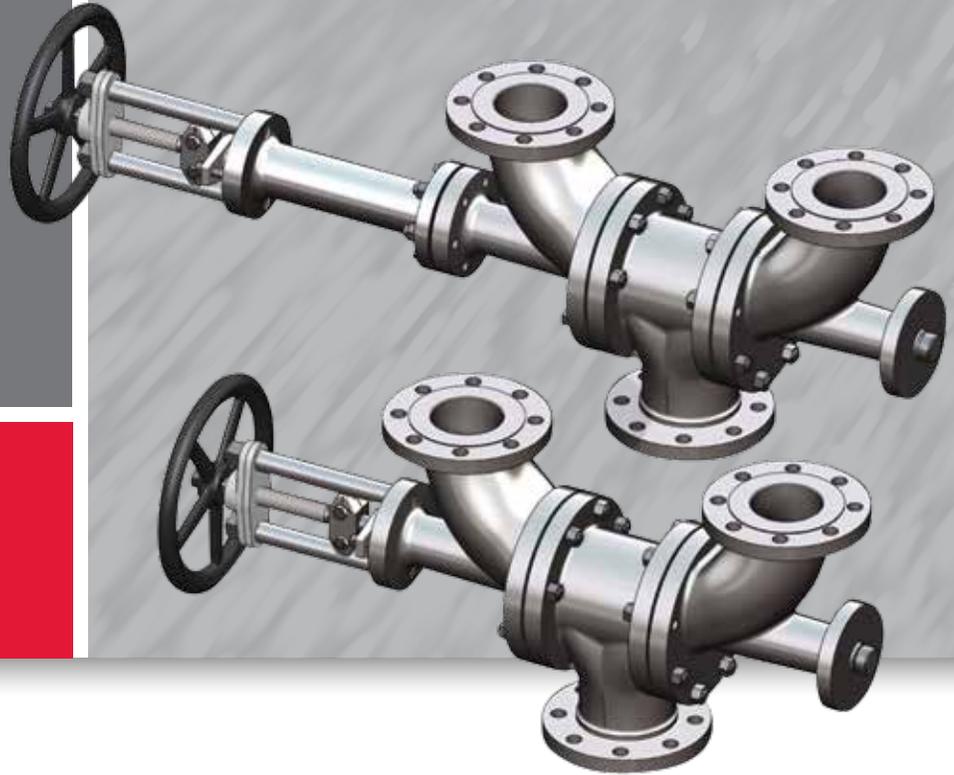


**CURTISS -
WRIGHT**

Valve Group



Changeover Valves

Models 320B & 370B
Farris Engineering



Table of Contents

Farris Changeover Valve	IFC
General Information	1
Design Features	2
Interlockable Combination Units	3
Model 320B & 370B	4-5
Codes and Standards	5
Model 320B Changeover Valve Bill of Materials	6
Model 370B Changeover Valve Bill of Materials	7
Weight, Dimensions and Flow Coefficients	
Class 150	8
Class 300	9
Class 600	10
Reducer Flange Dimensions, Separated.....	11
Reducer Flange Dimensions, Integrated.....	12
Farris Standard Options	13
Farris Product & Order Code	16
Farris Engineering Products.....	17

Farris Changeover Valve

The Farris changeover valve is a three-way globe valve that is useful in all locations where a shutdown cannot be tolerated, either for safety reasons or due to plant and production conditions. With its globe valve style design, the Farris valve offers advantages over conventional three-way ball or plug valves like bubble tight conical metal seating or an optional bellows stem seal. These and other features make the valve extremely useful for a wide range of applications.

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.

General Information

Changeover Valves:

Changeover valves used in conjunction with two associated pressure relief devices will provide continuous overpressure protection to a process or protected system.

When used as a diverter valve, changeover valves enable a quick and safe switch between product lines, safety systems, or to start-up tanks for solvent flushing. To accommodate different piping situations the Farris changeover valve allows the rotation of the elbows to any 90° angle.

Changeover valves enable pressurized systems to be equipped with dual safety relief devices, allowing frequent maintenance to the relief devices without interrupting the overpressure protection. Relief valves are subject to maintenance due to operating conditions and Farris changeover valves (Figure 2) offer an efficient and safe solution to switch between the in-service safety relief valve and the standby valve. In addition, utilization of a COV addresses an important safety aspect of preventing the accidental isolation of both relief valves simultaneously. The COV solution replaces the common practice of using three isolation valves by eliminating two full-bore shutoff valves as well as the reduction from two vessel/system connections to one provides additional cost benefits and overall weight reduction. The applicable standards, technical requirements, and recommendations allow the use of changeover valves when their design ensures that even during the switchover, choke free flow is guaranteed. Farris changeover valves comply with this requirement and are designed for a high flow rate with minimal pressure drop to meet these requirements.

Combination COV Units:

A combination COV unit has the addition of a second changeover valve at the outlet of relief devices. Combined COV units are useful for critical services involving toxic, aggressive or corrosive products that pose direct or indirect threats to people, plant, or the environment where discharge into a closed collecting system may be required. For this purpose, Farris offers the combination COV to allow the mechanical link of two changeover valves, one upstream and one downstream of the safety relief devices. The mechanical link allows operation of both valves in the same direction and prevents involuntary isolation of the safety relief devices.

Both the upstream and downstream changeover valve must have identical dimensions in order to provide a synchronized controllable operation. Pipe reducers must be placed between the upstream changeover valve and the safety relief valves. The reducers have to be accounted for in the overall inlet pressure drop calculation.

Bellows or Gland Packed COV:

To suit the nature of the process fluid, Farris offers either bellows sealed or gland packed valves. Both options are part of the standard manufacturing program and can be equipped with manual, pneumatic, or electric actuation. For fluids that tend to polymerize or crystallize, the valves are available with optional heating jackets. For more information regarding design, standard materials, and options please refer to the product description of valve models 320B and 370B on pages 13-16.



Figure No. 1
Changeover Valve

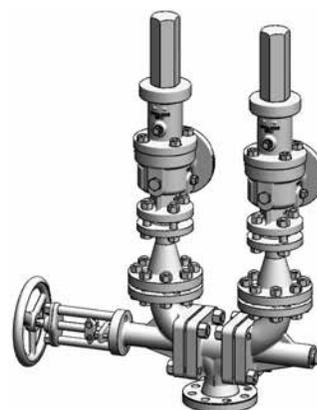
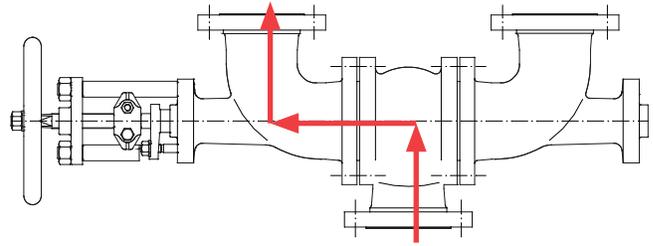


Figure No. 2
COV with Two Relief Valves

Design Features

Optimized Design:

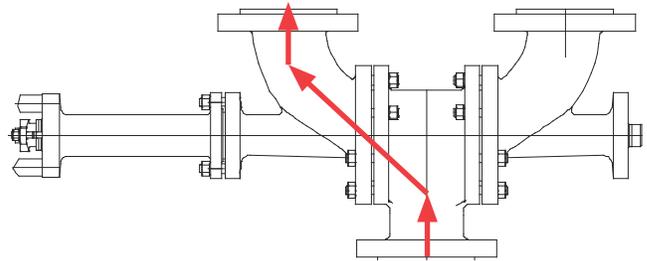
- Superior flow behaviors and a low pressure loss verified by using 3D flow simulations.
- Optimization of the body interior and the trim parts
- Optimization of the deflection angle $< 30^\circ$
- Compact height allows for a short pipe feed to the safety relief valve
- Elimination of sharp passages that might cause flow disruption



Conventional Design:
Flow path deflection angle 90°

Design Basics

As derived from imperial test data, Farris' optimized COV design provides high C_v values, resulting in less than 3% pressure drop to the active PRV inlet, when used with the largest API orifice available in a given valve size, in accordance with the recommendations of API RP520 Part II and ASME Section VIII, Division 1, Appendix M. This will help reduce the possibility of destructive chatter of the PRV during a relief cycle.



Farris Optimized COV Design:
Flow path deflection angle $< 30^\circ$

COV Model 320B / 370B Flow Coefficients 150#, 300#, 600# Flange Classes ¹										
Nominal Size	1/2"	3/4"	1"	1-1/2"	2"	3"	4"	6"	8"	10" ³
Resistance Coefficient (K)	0.750	0.868	0.600	0.786	0.832	0.913	0.859	0.873	0.751	0.900
Flow Coefficient (C_v)	12	20	37	83	127	310	500	1116	2133	3046
Inside Diameter (d) In	0.59	0.79	0.98	1.57	1.97	3.15	3.94	5.91	7.87	9.84

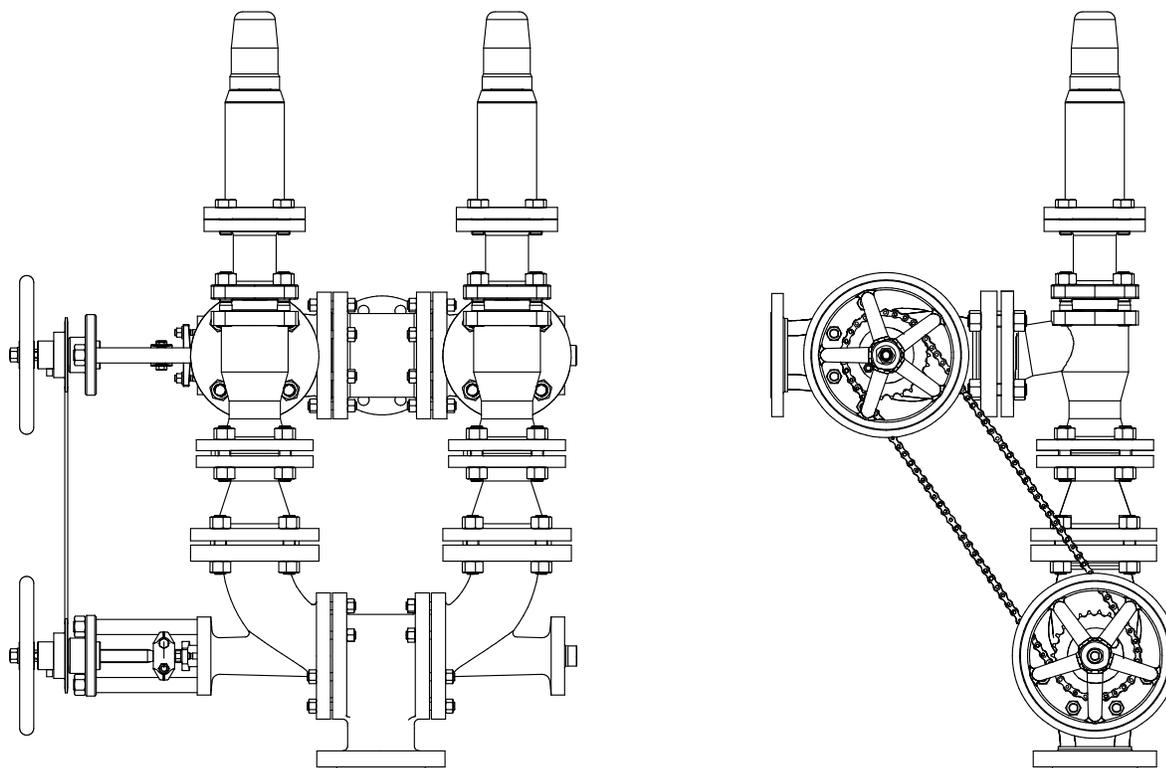
Notes:

1. Valves for COV unit only, 150, 300 and 600# flange classes.
2. Resistance Coefficient Formula $K = 891 d^4 / C_v^2$. Referenced from Crane Technical Publication 410; 2010 publication; Equation 6-23.
3. For valve factors for greater than 10", contact the factory.

Interlockable Combination Units

Interlockable combinations are those that have a changeover valve at the inlet and at the outlet of a safety relief valve. It is necessary that both the change over valves have the same valve size and diameter to assure important dimensions being equal to the stroke of the change over valve. The sizing of the change over valve is performed by using the one that is connected at the outlet of the safety relief valve.

Both COVs will be adjusted to each other during the assembly into the line and afterwards connected via chain at the chainwheel. This assures that the stand by safety relief valve is cut off from the medium at the inlet and at the outlet.



Model 320B & 370B

Application

The 320B / 370B series is designed for dual relief valve systems to allow maintenance of the relief valves without the system being down, for reduction of vessel connections, for fast and easy operation, and for protection against involuntary isolation of both safety relief devices at the same time. For applications that require discharge into a collecting system model 320.1B / 370.1B provides a simple mechanism for the linkage of two changeover valves for simultaneous operation.

Model 320B Gland Packed

Models 320B / 320.1B with a reliable, bubble tight shut-off can replace conventional three-way ball or plug valves. They are commonly used with non-hazardous media such as boiler and cooling water, saturated steam, and in similar systems as a bypass station to avoid shutdowns or as changeover valve in combination with safety relief devices. Additionally, in polymer systems the changeover valves are used to switch to start-up tanks for solvent flushing.



Figure 1: Model 320B

Design Features:

Body and bonnet

- Split-body design allows for rotation of elbows to any 90° angle to accommodate different installation situation
- Body-bonnet joint gasket is fully confined to prevent gasket flow or blowout
- Body parts are one-piece forgings or castings with larger than required wall thickness and integral flanges

Seats

- Solid hard facings for outstanding corrosion and wear resistance
- Knife edge metal-to-metal seat for bubble-tight shutoff
- Replaceable disc for inexpensive maintenance

Stem

- Two-piece stem design eliminates stem bearings along with their maintenance needs
- Cold-rolled and polished stem for reduced packing wear
- Easily adaptable for any type of actuation

Model 370B Bellows Sealed

Model 370B & 370.1B are designed for critical service applications involving lethal, toxic, corrosive, inflammable, volatile, radiating, or expensive fluids. The most common applications are:

- Dry chlorine (Cl₂)
- Anhydrous hydrogen chloride (HCl)
- Anhydrous hydrofluoric acid (HF)
- Phosgene (COCl₂)
- Vinyl chloride monomer (VCM)
- Ethylene dichloride (EDC)
- Propane, butane, natural gas
- Fluids of similar nature

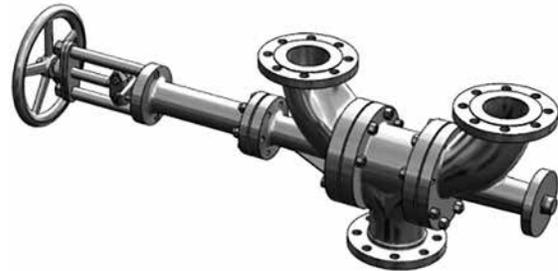


Figure 2: Model 370B

Model 370B & 370.1B replaces conventional three-way valves that cannot provide reliable protection against leaks or fugitive emissions. The stem seal requires virtually no maintenance due to leak free weld connections of the bellows with bonnet and stem. Constant valve monitoring and re-adjustment of the packing is eliminated. In the unlikely event of a bellows failure the backup packing guarantees safe valve performance until the next scheduled shutdown.

Our bellows sealed design features the bellows integrated into the valve stem, not at the seat. The result is that our bellows design does not experience a loss in flow and maintains the same performance as the gland sealed version.

Design Features:

Bellows and Packing

- Multiple walls and hydroformed bellows
- Welded to body and stem for zero leakage
- Up to 50,000 bellows operations guaranteed
- Bellows are protected from the flow and encapsulated in the bonnet

Body and Bonnet

- Split-body design allows for rotation of elbows to any 90° angle to accommodate different installation situation
- Body-bonnet joint gasket is fully confined to prevent gasket flow or blowout

Stem

- Two-piece stem protects the bellows against torque stress
- Design eliminates stem bearings along with their maintenance needs
- Allows easy adaption for any type of actuation

Seats

- Solid hardfacings for outstanding corrosion and wear resistance
- Knife edge metal-to-metal seat for bubble-tight shutoff
- Replaceable disc for inexpensive maintenance = zero emission, zero seat leakage, low maintenance

Codes and Standards

Design / Marking

- ASME B16.34 and BPVC
- ISO 4126
- API 520-2
- EN19
- AD 2000 A2
- Preservation according to manufacturer standard
- Connections:
 - Flanges in accordance to ASME B16.25
 - Butt weld ends in accordance to ASME B16.25
 - Socket weld ends in accordance to ASME B16.11
- FTF Dimensions: manufacturer standard
- Pressure temperature ratings are in accordance to ASME B16.34

Testing

- API 598
- DIN EN12266
- ISO 5208

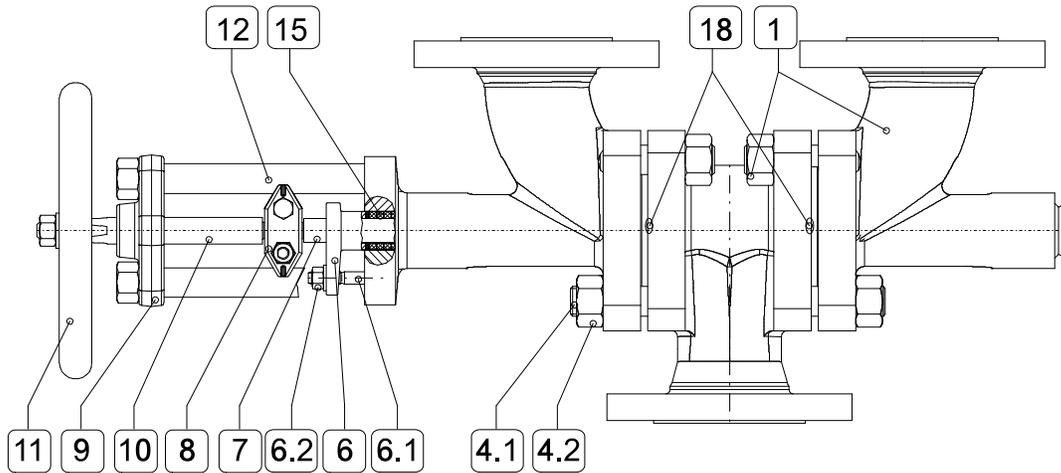
Options

Other materials per customer requirements are available, contact factory.

Notes

Farris reserves the right to change product design and specification without notice.

Model 320B Changeover Valve

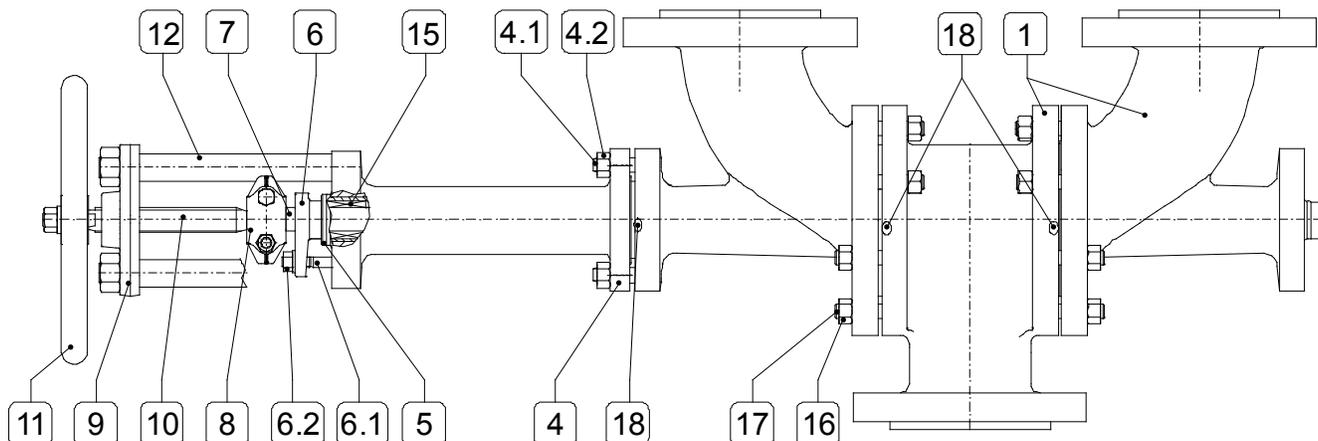


Bill of Materials		Model 320B C	Model 320B T	Model 320B V
Item	Part Name	Carbon Steel -20°F to 800°F	Low Temp. Carbon Steel -50°F up to 600°F	Stainless Steel -450°F up to 1,000°F
1	Body Seat Overlay	A105 / A216 WCB ER307 (≈ 200 HRB)	A350 LF2 / A352 LCC ER307 (≈ 200 HRB)	A182 F316L / A351 CF8M Like Body (≈ 200 HRB)
	Disc Overlay	AISI 420 Hardened / A105 ER410 (≈ 300 HRB)	A479 GR.316TI / A350 LF2 Stellite 6 (≈ 42 HRC)	A479 GR.316TI Stellite 6 (≈ 42 HRC)
4.1	Stud Bolt	A193 GR.B7	A193 GR.B8M	A193 GR.B8M
4.2	Hex. Nut	A194 GR.4	A194 GR.8M	A194 GR.8M
6	Gland Follower	A216 WCB	A352 LC3	A351 CF8M
6.1	Stud Bolt	Carbon Steel	A193 GR.B8M	A193 GR.B8M
6.2	Hex. Nut	Carbon Steel	A194 GR.8M	A194 GR.8M
7	Lower Stem	A479 GR.316TI	A479 GR.316TI	A479 GR.316TI
8	Coupling	A351 CF8M	A351 CF8M	A351 CF8M
9	Bridge	A105 / QPQ Nitrided	A105 / QPQ Nitrided	A105 / QPQ Nitrided
10	Upper Stem	AISI 431	AISI 431	AISI 431
11	Handwheel	Cast Iron	Cast Iron	Cast Iron
12	Pillar	C35	AISI 431	AISI 431
15	Packing	Graphite	PTFE-Silk ¹	PTFE-Silk ¹
18	Gasket	Kammprofil/Graphite+SS	Kammprofil/Graphite+SS	Kammprofil/Graphite+SS

General Notes:

1. Temperature ≥ 428°F, packing is pure graphite

Model 370B Changeover Valve

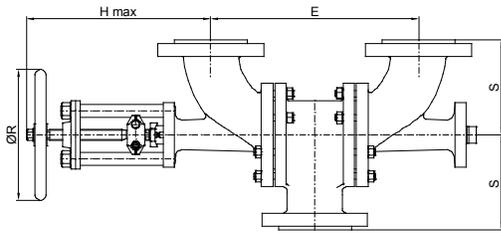


Bill of Materials		Model 370B C	Model 370B T	Model 370B V
Item	Part Name	Carbon Steel -20°F to 800°F	Low Temp. Carbon Steel -50°F up to 600°F	Stainless Steel -450°F up to 1,000°F
1	Body	A105 / A216 WCB	A350 LF2 / A352 LCC	A182 F316L / A351 CF8M
	Seat Overlay	ER307 (≈ 200 HRB)	ER307 (≈ 200 HRB)	Like Body (≈ 200 HRB)
	Disc Overlay	AISI 420 Hardened / A105 ER410 (≈ 300 HRB)	A479 GR.316TI / A350 LF2 Stellite 6 (≈ 42 HRC)	A479 GR.316TI Stellite 6 (≈ 42 HRC)
	Bellows	A240 GR.316TI	A240 GR.316TI	A240 GR.316TI
4	Bonnet	A216 WCB	A352 LCC	A351 CF8M
4.1/17	Stud Bolt	A193 GR.B7	A193 GR.B8M	A193 GR.B8M
4.2/16	Hex. Nut	A194 GR.4	A194 GR.8M	A194 GR.8M
5	Packing Sleeve	A479 GR.316TI	A479 GR.316TI	A479 GR.316TI
6	Gland Follower	A216 WCB	A352 LC3	A351 CF8M
6.1	Stud Bolt	Carbon Steel	A193 GR.B8M	A193 GR.B8M
6.2	Hex. Nut	Carbon Steel	A194 GR.8M	A194 GR.8M
7	Lower Stem	A479 GR.316TI	A479 GR.316TI	A479 GR.316TI
8	Coupling	A351 CF8M	A351 CF8M	A351 CF8M
9	Bridge	A105 / QPQ Nitrided	A105 / QPQ Nitrided	A105 / QPQ Nitrided
10	Upper Stem	AISI 431	AISI 431	AISI 431
11	Handwheel	Cast Iron	Cast Iron	Cast Iron
12	Pillar	C35	AISI 431	AISI 431
15	Packing	Graphite	Braided PTFE ¹	Braided PTFE ¹
18	Gasket	Kammprofil/Graphite+SS	Kammprofil/Graphite+SS	Kammprofil/Graphite+SS

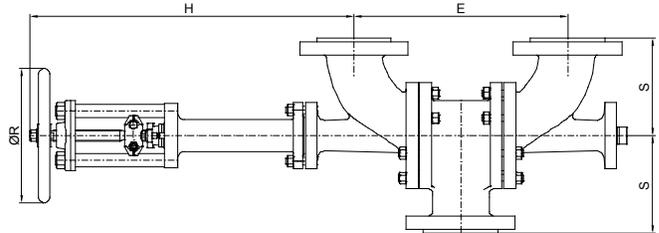
General Notes:

1. Temperature ≥ 428°F, packing is pure graphite

Weights and Dimensions



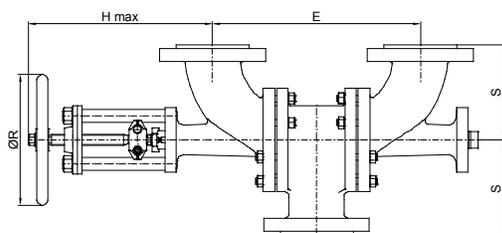
320B / A0150



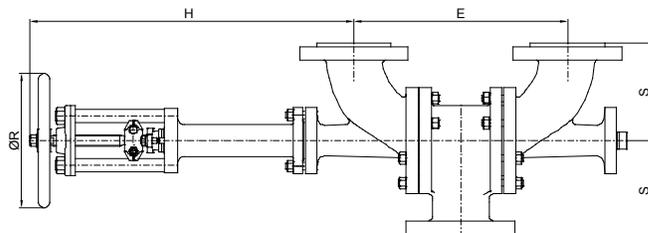
370B / A0150

Flange Class 150#					Model 320B & 320.1B				Model 370B & 370.1B			
Inlet	Unit	E	S	ØR	H max 320B	H max 320.1B	Weight 320B	Weight 320.1B	H 370B	H 370.1B	Weight 370B	Weight 370.1B
1/2"	[mm]	147	90	150	255	310	14 kg	18 kg	385	405	15 kg	19 kg
	[in]	5.8	3.5	5.9	10	12.2	31 lbs	40 lbs	15.2	15.9	33 lbs	41.9 lbs
3/4"	[mm]	147	90	150	255	310	14 kg	18 kg	385	405	15 kg	19 kg
	[in]	5.8	3.5	5.9	10	12.2	31 lbs	40 lbs	15.2	15.9	33 lbs	41.9 lbs
1"	[mm]	147	90	150	255	310	15 kg	19 kg	385	405	16 kg	20 kg
	[in]	5.8	3.5	5.9	10	12.2	33 lbs	42 lbs	15.2	15.9	35.2 lbs	44.1 lbs
1 1/4"	[mm]	260	130	200	330	425	31 kg	35 kg	575	615	35 kg	39 kg
	[in]	10.2	5.1	7.9	13	16.7	68 lbs	77 lbs	22.6	24.2	77.2 lbs	86 lbs
1 1/2"	[mm]	260	130	200	330	425	33 kg	38 kg	575	615	37 kg	42 kg
	[in]	10.2	5.1	7.9	13	16.7	73 lbs	84 lbs	22.6	24.2	81.6 lbs	92.6 lbs
2"	[mm]	260	130	200	390	475	38 kg	45 kg	575	615	42 kg	49 kg
	[in]	10.2	5.1	7.9	15.4	18.7	84 lbs	99 lbs	22.6	24.2	92.6 lbs	108 lbs
2 1/2"	[mm]	404	180	250	485	450	72 kg	90 kg	767	734	109 kg	125 kg
	[in]	15.9	7.1	9.8	19.1	17.7	176 lbs	198 lbs	30.2	28.9	242 lbs	278 lbs
3"	[mm]	404	180	250	485	450	80 kg	96 kg	767	734	110 kg	126 kg
	[in]	15.9	7.1	9.8	19.1	17.7	176 lbs	211 lbs	30.2	28.9	242 lbs	278 lbs
4"	[mm]	500	220	315	525	490	125 kg	137 kg	860	820	136 kg	141 kg
	[in]	19.7	8.7	12.4	20.7	19.3	276 lbs	301 lbs	33.9	32.3	300 lbs	311 lbs
5"	[mm]	500	220	400	525	490	137 kg	147 kg	860	820	142 kg	149 kg
	[in]	19.7	8.7	15.7	20.7	19.3	301 lbs	324 lbs	33.9	32.3	312 lbs	329 lbs
6"	[mm]	760	320	400	675	690	325 kg	355 kg	1121	1141	330 kg	360 kg
	[in]	29.9	12.6	15.7	26.6	27.2	715 lbs	781 lbs	44.1	44.9	728 lbs	794 lbs
8"	[mm]	1019	430	640	925	1070	625 kg	675 kg	1490	1530	675 kg	725 kg
	[in]	40.1	16.9	25.2	36.4	42.1	1378 lbs	1488 lbs	58.7	60.2	1485 lbs	1598 lbs
10"	[mm]	1259	580	640	1116	1265	765 kg	815 kg	1675	1825	815 kg	860 kg
	[in]	49.6	22.8	25.2	43.9	49.8	1687 lbs	1797 lbs	65.9	71.9	1797 lbs	1896 lbs
12"	[mm]	ON REQUEST										
	[in]											
14"	[mm]											
	[in]											
16"	[mm]											
	[in]											
20"	[mm]											
	[in]											

Weights and Dimensions



320B / A0300

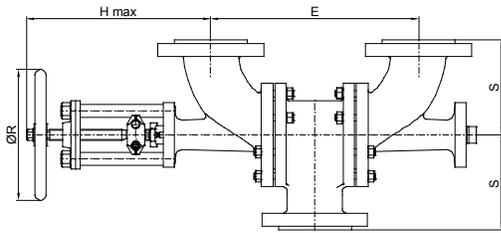


370B / A0300

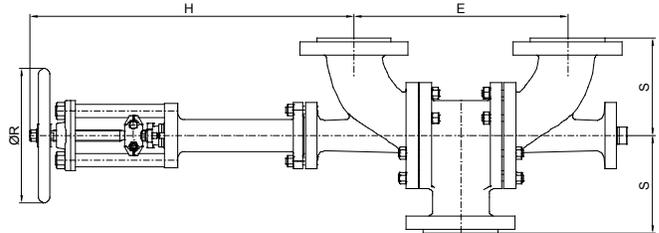
Flange Class 300#					Model 320B & 320.1B				Model 370B & 370.1B			
Inlet	Unit	E	S	ØR	H max 320B	H max 320.1B	Weight 320B	Weight 320.1B	H 370B	H 370.1B	Weight 370B	Weight 370.1B
1/2"	[mm]	147	90	150	255	310	14.5 kg	18.5 kg	385	405	16 kg	20 kg
	[in]	5.8	3.5	5.9	10	12.2	32 lbs	41 lbs	15.2	15.9	35.2 lbs	44.1 lbs
3/4"	[mm]	147	90	150	255	310	14.5 kg	18.5 kg	385	405	16 kg	20 kg
	[in]	5.8	3.5	5.9	10	12.2	32 lbs	41 lbs	15.2	15.9	35.2 lbs	44.1 lbs
1"	[mm]	147	90	150	255	310	15 kg	19.5 kg	385	405	16.5 kg	21 kg
	[in]	5.8	3.5	5.9	10	12.2	33 lbs	43 lbs	15.2	15.9	36.4 lbs	47 lbs
1 1/4"	[mm]	260	130	200	330	425	32 kg	36 kg	575	615	36 kg	40 kg
	[in]	10.2	5.1	7.9	13	16.7	71 lbs	79 lbs	22.6	24.2	79 lbs	88 lbs
1 1/2"	[mm]	260	130	200	330	425	34 kg	39 kg	575	615	38 kg	43 kg
	[in]	10.2	5.1	7.9	13	16.7	75 lbs	86 lbs	22.6	24.2	84 lbs	95 lbs
2"	[mm]	260	130	200	390	425	40 kg	47 kg	575	615	44 kg	51 kg
	[in]	10.2	5.1	7.9	15.4	16.7	88 lbs	104 lbs	22.6	24.2	97 lbs	112 lbs
2 1/2"	[mm]	404	180	250	485	450	80 kg	96 kg	767	734	106 kg	122 kg
	[in]	15.9	7.1	9.8	19.1	17.7	176 lbs	211 lbs	30.2	28.9	233 lbs	268 lbs
3"	[mm]	404	180	250	485	450	86 kg	102 kg	767	734	112 kg	128 kg
	[in]	15.9	7.1	9.8	19.1	17.7	190 lbs	224 lbs	30.2	28.9	247 lbs	282 lbs
4"	[mm]	500	220	315	525	490	138 kg	145 kg	860	820	140kg	150 kg
	[in]	19.7	8.7	12.4	20.7	19.3	304 lbs	320 lbs	33.9	32.3	308 lbs	330 lbs
5"	[mm]	500	220	400	525	490	150 kg	155 kg	860	820	155 kg	163 kg
	[in]	19.7	8.7	15.7	20.7	19.3	330 lbs	341 lbs	33.9	32.3	341 lbs	360 lbs
6"	[mm]	760	320	400	675	690	340 kg	370 kg	1121	1141	350 kg	380 kg
	[in]	29.9	12.6	15.7	26.6	27.2	750 lbs	816 lbs	44.1	44.9	772 lbs	838 lbs
8"	[mm]	1019	430	640	925	1070	700 kg	750 kg	1490	1530	710 kg	760 kg
	[in]	40.1	16.9	25.2	36.4	42.1	1543 lbs	1653 lbs	58.7	60.2	1565 lbs	1676 lbs
10"	[mm]	1259	580	640	1110	1240	775 kg	825 kg	1890	2020	825 kg	875 kg
	[in]	49.6	22.8	25.2	43.7	48.8	1709 lbs	1819 lbs	74.4	79.5	1819 lbs	1929 lbs
12"	[mm] [in]	ON REQUEST										
14"	[mm] [in]											
16"	[mm] [in]											
20"	[mm]											

Note: Other customer specific designs on request

Weights and Dimensions



320B / A0600



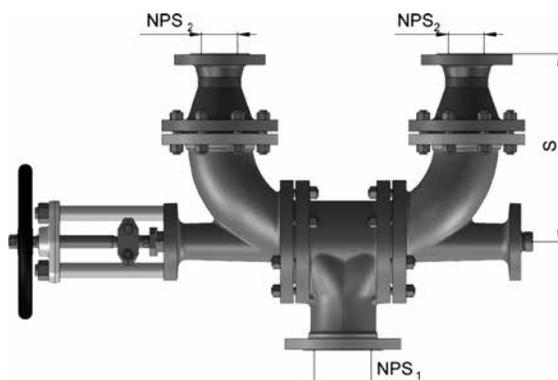
370B / A0600

Flange Class 600#					Model 320B & 320.1B				Model 370B & 370.1B			
Inlet	Unit	E	S	ØR	H max. 320B	H max. 320.1B	Weight 320B	Weight 320.1B	H 370B	H 370.1B	Weight 370B	Weight 370.1B
1/2"	[mm]	147	100	150	255	310	16 kg	20 kg	ON REQUEST			
	[in]	5.8	3.9	5.9	10.0	12.2	35.2 lbs	44 lbs				
3/4"	[mm]	147	100	150	255	310	16 kg	20 kg				
	[in]	5.8	3.9	5.9	10.0	12.2	35.2 lbs	44 lbs				
1"	[mm]	147	100	150	255	310	17 kg	23 kg				
	[in]	5.8	3.9	5.9	10.0	12.2	37.4 lbs	50.6 lbs				
1 1/4"	[mm]	260	145	250	420	430	40 kg	44 kg				
	[in]	10.2	5.7	9.8	16.5	16.9	88 lbs	96.6 lbs				
1 1/2"	[mm]	260	145	250	420	430	41 kg	46 kg				
	[in]	10.2	5.7	9.8	16.5	16.9	90 lbs	101.2 lbs				
2"	[mm]	260	145	250	420	430	51 kg	58 kg				
	[in]	10.2	5.7	9.8	16.5	16.9	112 lbs	127.6 lbs				
2 1/2"	[mm]	404	190	315	520	479	99 kg	115 kg				
	[in]	15.9	7.1	12.4	20.5	18.9	218 lbs	253 lbs				
3"	[mm]	404	190	315	520	479	106 kg	122 kg				
	[in]	15.9	7.1	12.4	20.5	18.9	233 lbs	268 lbs				
4"	[mm]	530	240	400	625	600	200 kg	212 kg				
	[in]	20.9	9.4	15.7	24.6	23.6	440 lbs	466 lbs				
5"	[mm]	530	240	400	625	600	219 kg	231 kg				
	[in]	20.9	9.4	15.7	24.6	23.6	482 lbs	508 lbs				
6"	[mm]	760	340	640	760	875	450 kg	489 kg				
	[in]	29.9	13.9	25.2	29.9	34.4	990 lbs	1076 lbs				
8"	[mm]	ON REQUEST										
	[in]											
10"	[mm]											
	[in]											
12"	[mm]											
	[in]											
14"	[mm]											
	[in]											
16"	[mm]											
	[in]											
20"	[mm]											
	[in]											

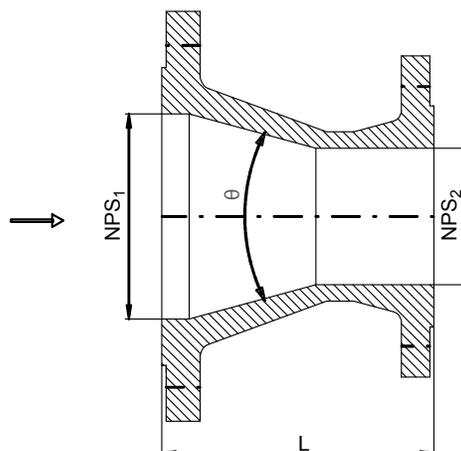
Reducer Flange Dimensions, Separated

NPS ₁	NPS ₂	Class 150				Class 300				Class 600				θ	K-value
		L		S		L		S		L		S			
		[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]		
2	1 ½	125	4.92	259	10.2	125	4.92	259	10.2	140	5.51	289	11.38	20°	0.06
	1	140	5.51	274	10.79	140	5.51	274	10.79	140	5.51	289	11.38	30°	1.25
3	2	140	5.51	324	12.76	140	5.51	324	12.76	160	6.30	354	13.94	20°	0.28
	1 ½	140	5.51	324	12.76	140	5.51	324	12.76					30°	1.25
4	3	170	6.69	394	15.51	170	6.69	394	15.51	185	7.28	429	16.89	20°	0.06
6	4	180	7.09	504	19.84	200	7.87	524	20.63					20°	0.2
8	6	200	7.87	634	24.96	235	8.66	669	26.34					20°	0.1
	4	240	9.45	674	26.53									30°	1.25

– Other sizes on request



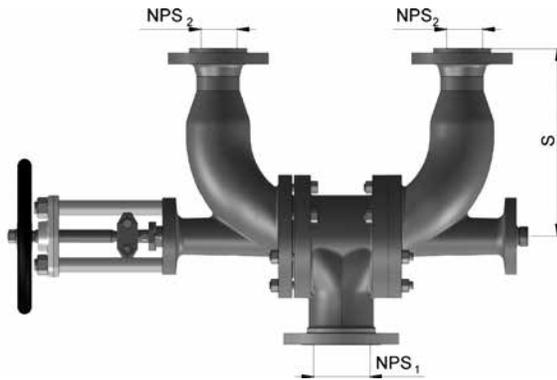
Separated Reducer Design



Reducer Flange Dimensions, Integrated

NPS ₁	NPS ₂	Class 150		Class 300		Class 600		K-value
		S		S		S		
		[mm]	[in]	[mm]	[in]	[mm]	[in]	
2	1 ½	245	9.65	245	9.65	245	9.65	0.88
	1	245	9.65	245	9.65	245	9.65	0.93
3	2	300	11.81	300	11.81	300	11.81	1.00
	1 ½	300	11.81	300	11.81	300	11.81	1.00
4	3	365	14.37	365	14.37	380	15.96	0.9
6	4	490	19.29	490	19.29	510	20.08	0.97
8	6	670	26.38	670	26.38	700	27.56	0.81
	4	670	26.38	670	26.38	-	-	0.85

– Other sizes on request

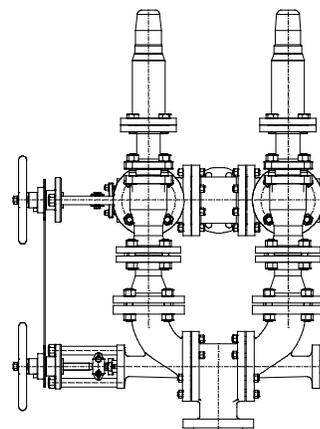
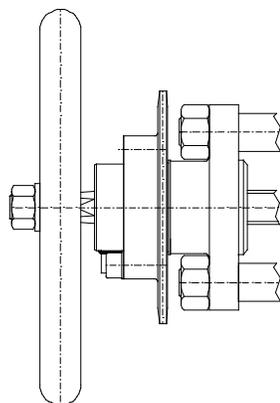


Integrated Design

Farris Standard Options

Valve Type Order Code (Section 1):

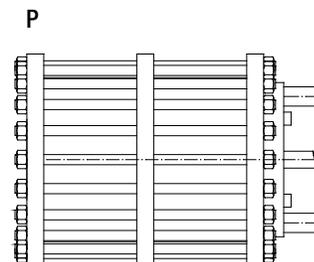
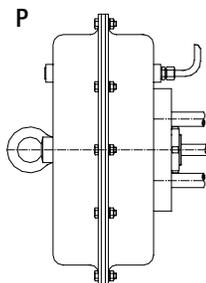
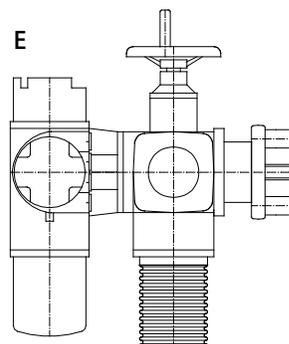
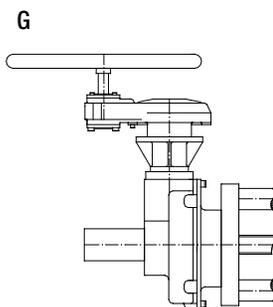
- Gland Packed 320.1B
- Bellows 370.1B



Valve Operation Order Code (Section 2):

- Pneumtical P
- Electrical E
- Hydraulic C*
- Gear G
- Handwheel H*

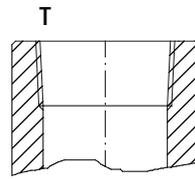
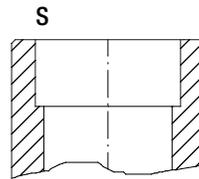
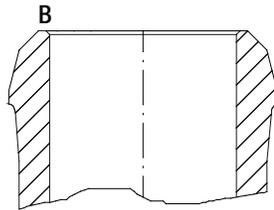
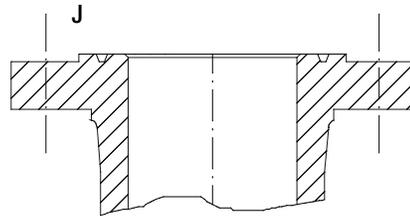
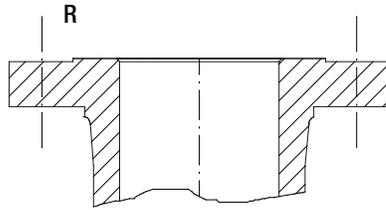
*Options C and H not shown



Farris Standard Options, continued

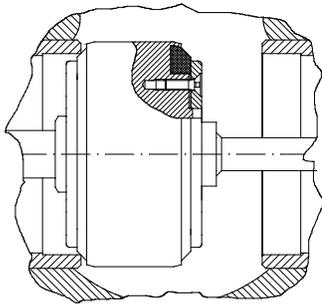
Inlet Facing Connections Order Code (Section 6):

Raised face	R
Ring joint	J
Butt-weld	B
Socket weld	S
Threaded	T



Trim Options Order Code (Section 7):

Soft Seats Disc Option	W
------------------------	---



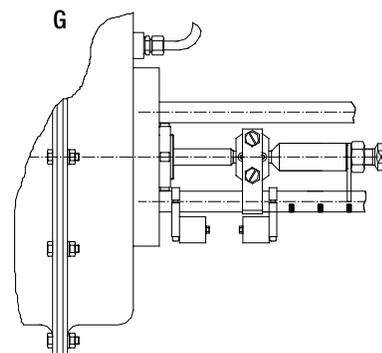
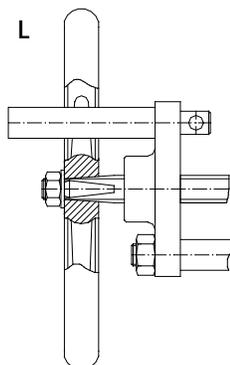
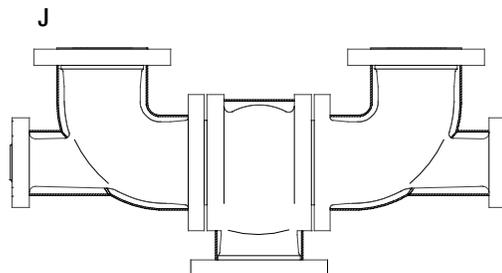
Farris Standard Options, continued

Special Order Code (Section 8):

Handwheel Locking Device: L

Dual Containment/
Heating Jacket: J

Limit Switch: G



Specials, Unspecified Options: Contact factory

Drainage Hole



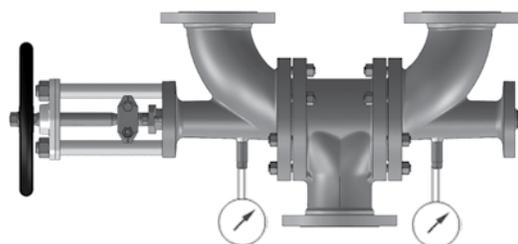
Reducer



Free of oil and grease



Test Connection



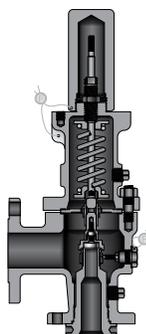


Farris Product & Order Code

	Section	Feature	Code									
			1	2	/	3	4	5	/	6	7	8
1	Valve Type	Packing sealed	320B									
		Packing sealed combination valve	320.1B									
		Bellows sealed	370B									
		Bellows sealed combination valve	370.1B									
2	Valve Operation	Handwheel		H								
		Gear box		G								
		Electrical		E								
		Pneumatical		P								
		Hydraulic		C								
3	Rating	Class 150				A0150						
		Class 300				A0300						
		Class 600				A0600						
		Class ...				A...						
4	Body Material	A105					0460					
		WCB					0619					
		LF2					0566					
		LCB					1138					
		LCC					6220					
		F316L					4404					
		CF8M					4408					
		Other					Xxxx					
5	Size	NPS 1/2"						0.50				
		NPS 3/4"						0.75				
		NPS 1"							1.00			
		NPS 1 1/2"							1.50			
		NPS 2"							2.00			
		NPS 3"							3.00			
				
NPS 20"							20.0					
6	Inlet and Facing Connection	Raised face							R			
		Ring type joint							J			
		Butt welding end								B		
		Socket welding end								S		
		Threaded end								T		
7	Bellows	316Ti SS								S		
		Hastelloy								H		
		Inconel								I		
		Monel								M		
	Stem	316Ti SS									S	
		Hastelloy									H	
		Inconel									I	
		Monel									M	
		13Cr									E	
	Seats	Hardfacing 13Cr / 18Cr										C
		Hardfacing stellite										S
		Hardfacing stellite / 18Cr-8Ni										V
Trim	Soft seats										W	
8	Specials	Limit Switches										G
		Handwheel locking device										L
		Seal welded body										S
		Heating jacket / double containment										J
		Unspecified...										

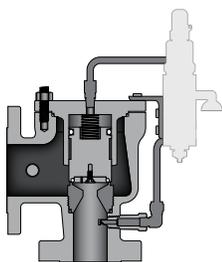
Farris Engineering Products

Process Pressure Relief Valves



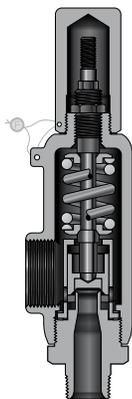
SERIES 2600/2600L

- 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

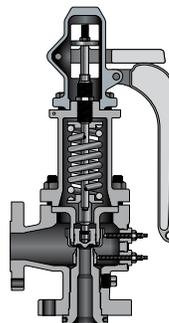
- ASME NB Certified: Air, Steam & Water
- Sizes: 1" x 2" to 12" x 16"
- Pressure Range: 15 psig to 6170 psig
- Temperature Range: -450°F to +500°F
- Materials: Carbon Steel, Stainless Steel, Monel & Hastelloy C
- Actuation: Snap and Modulating Controls
- Options: Field Test Connections, Reverse Flow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



SERIES 2700

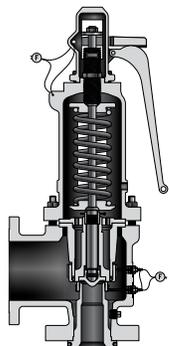
- ASME NB Certified: Air, Steam & Water
- Sizes: 1/2" x 1" to 1 1/2" x 2 1/2"
- Pressure Range: 15 psig to 6500 psig
- Temperature Range: -450°F to +750°F
- Materials: Carbon Steel, Stainless Steel, Monel & Hastelloy C
- Options: Balanced Design, O-Ring Seats, Flanged, Socket Weld, Welding Nipple, & Sanitary Connections
- CE Approved

Steam Safety Valves



SERIES 4200

- ASME NB Section I & VIII Certified: Steam & Air
- Sizes 1/4" x 1 1/2" 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

- 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

*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, 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 97/23/EC (European Pressure Equipment Directive)
- ATEX 94/9/EC (European Potentially Explosive Atmospheres)
- CSA B51 (Canadian Registration)
- CSQL (China Safety Quality License)
- Russian GOST-R Certification and RTN Permit
- US Coast Guard
- Nuclear - 10 CFR 50 Appendix B, NCA-4000, NQA-1, N285.0
- First Point Assessment Limited
- ISO 4126 (COV only)
- AD 2001 S1 (COV only)



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

CURTISS - WRIGHT

Farris Engineering, a business unit of Curtiss-Wright

Headquarters: 10195 Brecksville Road, Brecksville, OH 44141 USA • Telephone: 440-838-7690 • Fax: 440-838-7699 • www.cw-valvegroup.com/farris

Facilities: Brecksville, OH, USA; Brantford, Ontario and Edmonton, Alberta, CA; Corby, Northants, UK; São Carlos-SP, Brazil; Tianjin, Beijing, China; Delhi, India

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

While this information is presented in good faith and believed to be accurate, Farris Engineering, division of Curtiss-Wright Flow Control Corporation, does not guarantee satisfactory results from reliance on such information. Nothing contained herein is to be construed as a warranty or guarantee, expressed or implied, regarding the performance, merchantability, fitness or any other matter with respect to the products, nor as a recommendation to use any product or process in conflict with any patent. Farris Engineering, division of Curtiss-Wright Flow Control Corporation, reserves the right, without notice, to alter or improve the designs or specifications of the products described herein.