

# High Pressure and Severe Service Valve

## U.S. Type 1711 (Includes RC300)

### DESCRIPTION

The U.S. Type 1711 globe control valve is designed for modulating flow or pressure control in industrial and research applications at temperatures of 850° F (454° C) or less (400° F, 204° C) maximum for TFE chevron packing and standard bonnet). The unit features an oversized stem and extra heavy guided innervalve for added strength and longevity. The stem packing is designed for tight sealing, long life and quick, easy maintenance. The union bonnet with a graphite gasket provides excellent sealing without having bonnet threads in contact with the process fluid. The multi-spring, 35-square-inch, diaphragm actuator can be either ATO or ATC action. Maximum corrosion protection on all non-stainless actuator components is standard. The spring preload is fully adjustable.

### APPLICATION

The valve is suited for many applications in chemical, petroleum and other industries requiring a rugged, compact, heavy duty valve.

### MATERIALS

<b>Body – Bonnet</b>	
Standard	316 stainless steel
Optional	Exotic alloys
<b>Body Gasket</b>	Grafoil® Gr GTA
<b>Innervalve</b>	
Standard	316 stainless steel or Stellite® inlaid seat and plug
Optional	Titanium nitride coating, exotic alloys
<b>Packing</b>	
Standard	TFE chevron rings
Optional	Reduced Emissions Kalrez® (REK), Grafoil, others; consult factory

### ACTUATOR OPTIONS

<b>Standard</b>	Air-to-open, fail close Air-to-close, fail open
<b>Optional</b>	Side-mounted positioner
<b>Standard Signals</b>	3-15#, 3-27#, 6-30#
<b>Optional Signals</b>	3-9#, 9-15# with positioner
<b>Accessories</b>	Filter regulator, gauges, I/P converter, limit switches, solenoids



Type 1711 Valve

### STANDARD FEATURES

- 1/2 in. (12 mm), 3/4 in. (19 mm) and 1 in. (25 mm) models
- Interchangeable trim sets
- Heavy duty union bonnet
- Trim characteristics: Linear, equal percent, quick open or double taper
- TFE chevron packing
- Stellite inlaid innervalves
- ANSI Class IV shutoff
- High pressure and temperature rating
- Encapsulated graphite body bonnet gasket
- Dual IEC 534 (NAMUR) accessory mounts
- Adjustable spring preload and up-travel stop

### OPTIONAL FEATURES

- Butt and socket weld ends, BSPP, tube connection and others
- Bonnet extensions for temperature extremes
- Bellows packing solutions
- Reduced Emissions Kalrez (REK), graphite, spring-loaded chevron and others
- Exotic alloys for complete valves or trims
- Stellite trims and soft seats (PTFE & Kel-F)
- TiN coating of innervalve stem and seat
- Purge or leak ports

**SPECIFICATIONS**

**Pressure vs Temperature Rating for Valve Superstructure Excluding Packing or End Fittings**

Temp (° F)	1/2 in. (12.7 mm) (psig)	3/4 in. (19.1 mm) (psig)	1 in. (25.4 mm) (psig)	Temp (° C)	1/2 in. (12.7 mm) (bar)	3/4 in. (19.1 mm) (bar)	1 in. (25.4 mm) (bar)
75	7500	5000	5000	24	517	345	345
100	7475	4980	4980	38	515	343	343
200	6625	4415	4415	93	457	304	304
300	6000	4000	4000	149	414	276	276
400	5375	3580	3580	204	371	247	247
500	5075	3380	3380	260	350	233	233
600	4825	3215	3215	316	333	222	222
700	4600	3065	3065	371	317	211	211
800	4560	3015	3015	427	314	204	204
850	4525	2965	2965	454	312	208	208

Consult factory for high temperatures.

**INNERVALVE CHART**

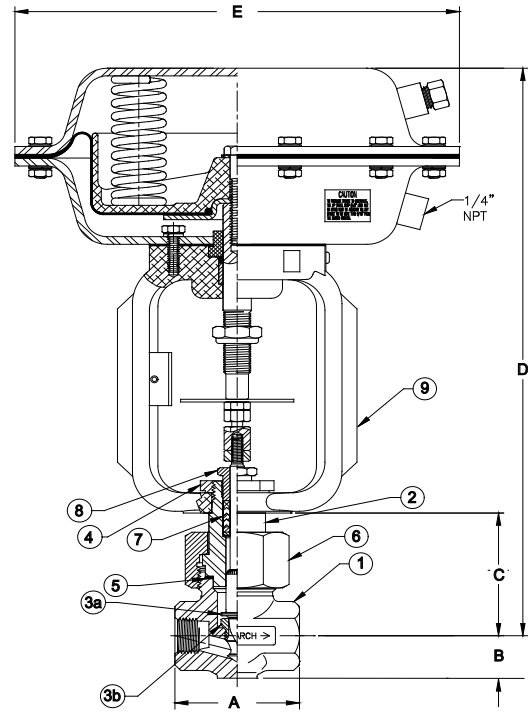
Valve Size in. (mm)	Trim	Nominal Cv	Theoretical Turbulent Cv	Orifice Dia. in. (mm)	Orifice Area in. <sup>2</sup> (mm <sup>2</sup> )	Maximum Rangeability	
						Linear	Equal %
1 (25.4)	6.0	6.0	6.0	0.625 (15.9)	0.307 (198.1)	50:1	60:1
	5.0	5.0	5.0	0.625 (15.9)	0.307 (198.1)	50:1	60:1
	4.5	4.5	4.5	0.500 (12.7)	0.197 (12.71)	50:1	60:1
3/4 (19.1) and 1 (25.4)	4.0	4.0	4.0	0.500 (12.7)	0.197 (12.71)	50:1	60:1
	3.5	3.5	3.5	0.500 (12.7)	0.197 (12.71)	50:1	60:1
1/2 (12.7), 3/4 (19.1), and 1 (25.4)	A	2.5	2.5	0.375 (9.5)	0.1105 (71.3)	50:1	50:1
	B	2.0	2.0	0.375 (9.5)	0.1105 (71.3)	40:1	50:1
	C	1.25	1.25	0.281 (7.1)	0.0621 (40.1)	40:1	50:1
	D	0.8	0.8	0.250 (6.4)	0.0491 (31.7)	40:1	50:1
	E	0.5	0.5	0.250 (6.4)	0.0491 (31.7)	40:1	50:1
	F	0.32	0.32	0.156 (4.0)	0.0191 (12.3)	30:1	40:1
	G	0.2	0.2	0.156 (4.0)	0.0191 (12.3)	30:1	40:1
	H	0.13	0.13	0.156 (4.0)	0.0191 (12.3)	30:1	40:1
	I	0.08	0.08	0.156 (4.0)	0.0191 (12.3)	30:1	40:1
	J	0.05	0.05	0.156 (4.0)	0.0191 (12.3)	30:1	40:1

**Maximum Shutoff**

Valve Size in. (mm)	Trim	Maximum Shutoff	
		1/2 in. (12.7 mm) psig (bar)	3/4 in. (19.1 mm), 1 in. (25.4 mm) psig (bar)
1 (25.4)	6.0	—	1700 (117)
	5.0	—	1700 (117)
	4.5	—	2650 (183)
3/4 (19.1) and 1 (25.4)	4.0	—	2650 (183)
	3.5	—	2650 (183)
1/2 (12.7), 3/4 (19.1), and 1 (25.4)	A	4700 (324)	4700 (324)
	B	4700 (324)	4700 (324)
	C	7500 (517)*	5000 (345)*
	D	7500 (517)*	5000 (345)*
	E	7500 (517)*	5000 (345)*
	F	7500 (517)*	5000 (345)*
	G	7500 (517)*	5000 (345)*
	H	7500 (517)*	5000 (345)*
	I	7500 (517)*	5000 (345)*
	J	7500 (517)*	5000 (345)*

\* Maximum allowable shutoff is determined by the maximum force that can be preloaded using six springs loaded to 525 psig (36 bar). Although the unit will close the valve, this is no guarantee that the metal will not erode. Life of the innervalve is related to the fluid, temperature, nature of the media and the pressure.

**DIMENSIONS**



- |   |                |  |
|---|----------------|--|
| 1. Body                                       | 4. Locknut     | 9. Actuator* (shown ATO; refer to CD-951593 & CD-951594 for details) |
| 2. Bonnet                                     | 5. Gasket      |  |
| 3. Innervalve set<br>a. Innervalve<br>b. Seat | 6. Union nut   |  |
|   | 7. Packing kit |  |
|   | 8. Gland       |  |

\*Without positioner: 4 springs must be used.  
With positioner: 3, 4, or 6 springs may be used.

PS	A	B	C	D	Stroke
0.50 in. (12.7 mm)	2.75 in. (70.0 mm)	1.00 in. (25.4 mm)	2.89 in. (73.4 mm)	13.37 in. (339.6 mm)	0.562 in. (14.3 mm)
0.75 in. (19.1 mm)	3.38 in. (85.9 mm)	1.19 in. (30.2 mm)	3.08 in. (78.2 mm)	13.56 in. (344.4 mm)	
1 in. (25.4 mm)	4 in. (101.6 mm)	1.50 in. (38.1 mm)	3.72 in. (94.5 mm)	14.20 in. (360.7 mm)	
Removal clearance:	1.75 in. (44.4 mm)				
Valve stem travel:	0.563 in. (14.3 mm)				

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# Severe Service Control Valves

## U.S. Type 1711 with Bellows

### DESCRIPTION

The Type 1711 bellows sealed globe control valve is especially suited to applications where the possibility of packing leakage cannot be tolerated. The bellows forms a flexible static seal that is virtually leak-free as long as the integrity of the bellows remains intact. The unit contains a set of backup packing that, in many cases, allows the valve to continue in service until repairs can be made, should the bellows fail. A purge-port between the bellows and the packing allows a leak to be detected before the media will get contact to the environment. This connection is closed with a bolt.

The bellows is available in the pressure range: The high pressure bellows fits 1/2 in. (DN15) through 1 in. (DN25) valves and is rated PN200 (2900 psi).

**NOTE:** Consult the factory when using this bellows.

### APPLICATION

The Type 1711 valve with bellows is widely used in industrial applications, research, and process plants on liquids, gases or steam. The statically sealed bonnet makes it especially suited to applications where expensive concentrates are controlled and cannot be allowed to leak. Other applications arise when fugitive emissions must be prevented or when sensitive flow streams must be isolated from the ambient atmosphere. This type seal performs well in high vacuum service where standard packing is not desired.

### MATERIALS

<b>Body – Bonnet</b>	
Standard	316 SST
Optional	Monel
<b>Bellows</b>	
High Pressure	DIN 2.4856 (Alloy 625)
<b>Innervalve</b>	
Standard	316 SST
Optional	Alloy 20, Alloy C-276, Alloy B2 or ASTM equivalent, Ni-Cu Alloy 400, Stellite SST
Packing	TFE CV rings, Graphite
<b>Actuator</b>	
Standard	Epoxy coated CS
Optional	Nickel coated CS, 304 SST or 316 SST

### ACTUATOR OPTIONS

<b>Standard</b>	Air-to-open, Type #35sqi Air-to-close, Type #35sqj
<b>Standard Signals</b>	3-15#, 6-30#
<b>Optional Signals</b>	With positioner, 3-9#, 9-15#
<b>Accessories</b>	Filter regulator, gauges, I/P, limit switches, handwheel on standard unit, solenoids



Type 1711 Valve with Bellows

### STANDARD FEATURES

- 1/2 in. (DN15), 3/4 in. (DN20) and 1 in. (DN25) models
- Graphoil or 316 SST Body-Bonnet Gasket
- Interchangeable trim sets
- Trim characteristics: Linear, equal percent, quick open or double taper
- PN 200 Bellows packing
- Purge port 1/8 in. NPT between bellows and backup packing, standardly closed with a lock screw
- TFE CV ring backup packing
- 316 bellows gasket

### OPTIONAL FEATURES

- Butt and socket weld ends, BSPP, tube connection and others
- Stellite trims
- Tin coating of innervalve stem and seat
- Exotic alloys for trims

## DIMENSIONS



PS	1/2 in. (DN15)	3/4 in. (DN20)	1 in. (DN25)
Body length	2.75 in. (70 mm)	3.37 in. (86 mm)	4.00 in. (102 mm)
High over all	24.6 in. (625 mm)	24.8 in. (630 mm)	25.0 in. (633 mm)
Stroke	0.562 in. (14 mm)	0.562 in. (14 mm)	0.562 in. (14 mm)

## PRESSURE/TEMPERATURE RATING

Temperature		Maximum Pressure	
32° F	0° C	2900 psi/g	200 bar/g
122° F	50° C	2900 psi/g	200 bar/g
212° F	100° C	2900 psi/g	200 bar/g
302° F	150° C	2900 psi/g	200 bar/g
392° F	200° C	2900 psi/g	200 bar/g
482° F	250° C	2900 psi/g	200 bar/g
572° F	300° C	2900 psi/g	200 bar/g
662° F	350° C	2900 psi/g	200 bar/g
752° F	400° C	2900 psi/g	200 bar/g
842° F	450° C	2900 psi/g	200 bar/g
932° F	500° C	—	—

**NOTE:**The pressure ratings above are for valves constructed of 316 SS with the bellows in Alloy 625 (DIN 2.4856).

## INNERVALVE CHART

Valve Size in. (mm)	Trim	Nominal Cv	Theoretical Turbulent Cv	Orifice Dia. in. (mm)	Orifice Area in. <sup>2</sup> (mm <sup>2</sup> )	Maximum Rangeability	
						Linear	Equal %
1 (DN25)	6.0	6.0	6.0	0.6250 (15.9)	0.3068 (197.9)	50:1	60:1
	5.0	5.0	5.0	0.6250 (15.9)	0.3068 (197.9)	50:1	60:1
	4.5	4.5	4.5	0.5000 (12.7)	0.1963 (129.6)	50:1	60:1
3/4 (DN20) & 1 (DN25)	4.0	4.0	4.0	0.4375 (11.1)	0.1503 (96.9)	50:1	60:1
	3.5	3.5	3.5	0.4375 (11.1)	0.1503 (96.9)	50:1	60:1
1/2 (DN15), 3/4 (DN20), & 1 (DN25)	A	2.5	2.5	0.3750 (9.5)	0.1104 (71.2)	40:1	50:1
	B	2.0	2.0	0.3750 (9.5)	0.1104 (71.2)	40:1	50:1
	C	1.25	1.25	0.2810 (7.1)	0.0620 (40.0)	40:1	50:1
	D	0.8	0.8	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	E	0.5	0.5	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	F	0.32	0.32	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	G	0.2	0.2	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	H	0.13	0.13	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	I	0.08	0.08	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	J	0.05	0.05	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1

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### DESCRIPTION

The Type NRMA Non-Rotating Manual Actuation design is used in applications where either our low-flow trims, cooling fins or bellows are needed and when applications demand human interaction. The manual actuator can be mounted on all RC series valves, including all "P" Trims and all Bonnets. Exchanging between electrical, pneumatic and manual actuators is therefore possible at any time with simple additions. The actuator is encapsulated and completely maintenance-free—designed for fine control.

### APPLICATIONS

When you turn the hand wheel, the valve interior moves in a linear motion. This linear movement, from the hand wheel to the internal coupling, prevents damage to the trim and seat, distinguishing this design from conventional manual control valves.

### FEATURES

- Hand drive, linear
- Suitable for Badger Meter® modular construction

### MATERIALS

<b>Case</b>	1.4404 (316L)
<b>Yoke</b>	1.4404 (316L)
<b>Hand Wheel</b>	Duroplast

### SPECIFICATIONS

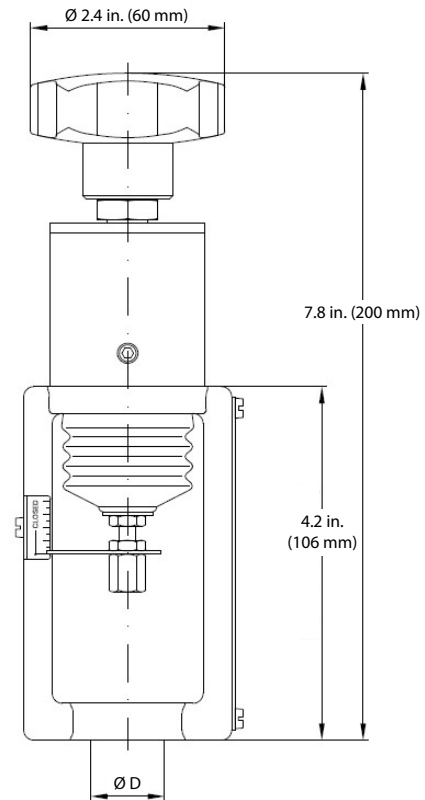
<b>Weight</b>	Approximately 3.3 lb (1.5 kg)
<b>Temperature</b>	-40...176° F (-40...80° C)
<b>Valve Lift</b>	0.04 in. (1 mm) / 360° turn

### SIZES FOR RESEARCH CONTROL VALVES

Sizes	Ø Average	Stroke
1/4 in. standard	0.625 in.	11.1 mm
1/2 in., 3/4 in., 1 in. standard	0.875 in.	14.3 mm
1/2 in., 3/4 in., 1 in. heavy duty guiding	0.875 in.	14.3 mm



### DIMENSIONS



RCV Valves		Trim Sizes Equal %															
% Lift	% Cv	6.0	5	4.5	4	3.5	A	B	C	D	E	F	G	H	I	J	% Lift
0%	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5%	1.0%	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.008	0.005	0.003	0.002	0.001	0.001	0.000	5%
10%	1.9%	0.11	0.10	0.09	0.08	0.07	0.05	0.04	0.02	0.015	0.010	0.006	0.004	0.002	0.002	0.001	10%
20%	3.8%	0.23	0.19	0.17	0.15	0.13	0.10	0.08	0.05	0.031	0.019	0.012	0.008	0.005	0.003	0.002	20%
25%	4.8%	0.29	0.24	0.22	0.19	0.17	0.12	0.10	0.06	0.038	0.024	0.015	0.010	0.006	0.004	0.002	25%
30%	5.9%	0.35	0.29	0.26	0.23	0.20	0.15	0.12	0.07	0.047	0.029	0.019	0.012	0.008	0.005	0.003	30%
40%	8.8%	0.53	0.44	0.40	0.35	0.31	0.22	0.18	0.11	0.070	0.044	0.028	0.018	0.011	0.007	0.004	40%
50%	13.2%	0.79	0.66	0.59	0.53	0.46	0.33	0.26	0.16	0.105	0.066	0.042	0.026	0.017	0.011	0.007	50%
60%	19.8%	1.19	0.99	0.89	0.79	0.69	0.49	0.40	0.25	0.158	0.099	0.063	0.040	0.026	0.016	0.010	60%
70%	29.6%	1.78	1.48	1.33	1.19	1.04	0.74	0.59	0.37	0.237	0.148	0.095	0.059	0.039	0.024	0.015	70%
75%	36.3%	2.18	1.81	1.63	1.45	1.27	0.91	0.73	0.45	0.290	0.181	0.116	0.073	0.047	0.029	0.018	75%
80%	44.4%	2.67	2.22	2.00	1.78	1.56	1.11	0.89	0.56	0.356	0.222	0.142	0.089	0.058	0.036	0.022	80%
90%	66.7%	4.00	3.33	3.00	2.67	2.33	1.67	1.33	0.83	0.533	0.333	0.213	0.133	0.087	0.053	0.033	90%
100%	100%	6.00	5.00	4.50	4.00	3.50	2.50	2.00	1.25	0.800	0.500	0.320	0.200	0.130	0.080	0.050	100%
Valve Sizes		1"	1"	1"	1", 3/4"	1", 3/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	

Trim Sizes O through P-18 are available only in linear characteristic. See Product Data Sheets for maximum Cvs.

RCV Valves		Trim Sizes Equal %															
% Lift	% Cv	6.0	5	4.5	4	3.5	A	B	C	D	E	F	G	H	I	J	% Lift
0%	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5%	1.0%	0.30	0.25	0.23	0.20	0.18	0.13	0.10	0.06	0.040	0.025	0.016	0.010	0.007	0.004	0.003	5%
10%	1.9%	0.60	0.50	0.45	0.40	0.35	0.25	0.20	0.13	0.080	0.050	0.032	0.020	0.013	0.008	0.005	10%
20%	3.8%	1.20	1.00	0.90	0.80	0.70	0.50	0.40	0.25	0.160	0.100	0.064	0.040	0.026	0.016	0.010	20%
25%	4.8%	1.50	1.25	1.13	1.00	0.88	0.63	0.50	0.31	0.200	0.125	0.080	0.050	0.033	0.020	0.013	25%
30%	5.9%	1.80	1.50	1.35	1.20	1.05	0.75	0.60	0.38	0.240	0.150	0.096	0.060	0.039	0.024	0.015	30%
40%	8.8%	2.40	2.00	1.80	1.60	1.40	1.00	0.80	0.50	0.320	0.200	0.128	0.080	0.052	0.032	0.020	40%
50%	13.2%	3.00	2.50	2.25	2.00	1.75	1.25	1.00	0.63	0.400	0.250	0.160	0.100	0.065	0.040	0.025	50%
60%	19.8%	3.60	3.00	2.70	2.40	2.10	1.50	1.20	0.75	0.480	0.300	0.192	0.120	0.078	0.048	0.030	60%
70%	29.6%	4.20	3.50	3.15	2.80	2.45	1.75	1.40	0.88	0.560	0.350	0.224	0.140	0.091	0.056	0.035	70%
75%	36.3%	4.50	3.75	3.38	3.00	2.63	1.88	1.50	0.94	0.600	0.375	0.240	0.150	0.098	0.060	0.038	75%
80%	44.4%	4.80	4.00	3.60	3.20	2.80	2.00	1.60	1.00	0.640	0.400	0.256	0.160	0.104	0.064	0.040	80%
90%	66.7%	5.40	4.50	4.05	3.60	3.15	2.25	1.80	1.13	0.720	0.450	0.288	0.180	0.117	0.072	0.045	90%
100%	100%	6.00	5.00	4.50	4.00	3.50	2.50	2.00	1.25	0.800	0.500	0.320	0.200	0.130	0.080	0.050	100%
Valve Sizes		1"	1"	1"	1", 3/4"	1", 3/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	

Numbers are for reference or comparison only.

% Lift	% Maximum Cv	
	Linear	Equal %
0%	0%	0%
5%	5%	1%
10%	10%	2%
20%	20%	4%
25%	25%	5%
30%	30%	6%
40%	40%	9%
50%	50%	13%
60%	60%	20%
70%	70%	30%
75%	75%	36%
80%	80%	44%
90%	90%	67%
100%	100%	100%

