RCV
Research Control® | ReCo® Valves

Process Control Valves

U.S. Series 9000, GCF (Includes OR910)

DESCRIPTION

The U.S. Series 9000 GCF control valve is available with ANSI raised-face flanges. The flanges are socket welded to the body and flange. The flange and nipple material is the same material as the body material. Flange faces have concentric serrations to provide superior gasket sealing. The unit is rated for either ANSI Class 150 or 300, depending on the flange.

When the valve is supplied with CL150 flanges, the pressure vs. temperature rating of the valve assumes the rating of the flange or the packing, whichever is lower. Consult the factory for limits of standard and optional innervalve materials.

MATERIALS

Body and Bonnet	
Standard	316 stainless steel [CF8M] Flanges/Nipples, 316 stainless steel [AI82]
Optional	Alloy C [CW12MW] B/B/Flanges
Innervalve	
Standard	Same as body
Optional	Stellite®, PTFE-PFA Soft Seat
Packing	
Standard	PTFE chevron ring
Optional	REK®, Graphite
Body Gasket	Grafoil®

DESIGN INFORMATION

Body

- Globe with integral full port seat
- Globe with replaceable seat (reduced trims)

Bonnet

- Standard for temperatures up to 450° F (232° C) with TFE
- Short extension for up to 700° F (371° C) with TFE
- Cryogenic (3 sizes) for down to –450° F (267° C)
- Double packing with or without purge port

Actuator: Pneumatic multi-spring

Shown with optional stainless steel actuator

DESIGN STANDARDS

- ANSI B16.34-1988
- Face-to-face dimensions: According to ANSI B16.10-1973
- Flange face surface: According to ANSI B16.5-1988 (concentric serrations)
- ASME Section III, Part UHA-105
- ASME Section VIII

OPTIONAL FEATURES

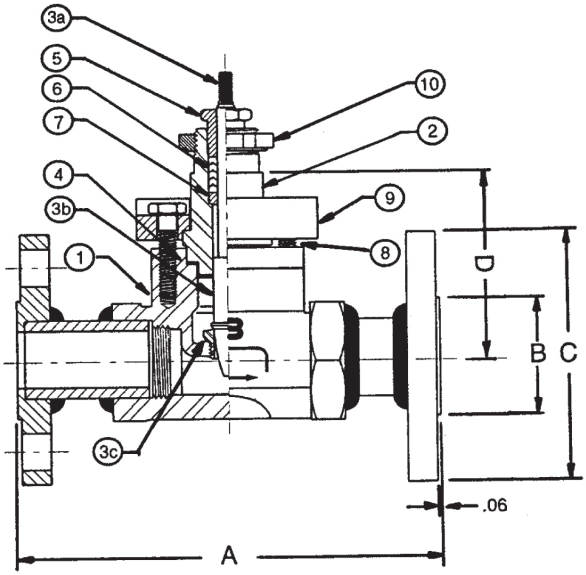
- Alternative raised-face surfaces
- Alternative flange types
- DIN flanges
- Alternative face-to-face lengths to suit special piping requirements

Badger Meter

RCV-DS-00271-EN-05 (January 2021)

Product Data Sheet

DIMENSIONS



Dimensions in Inches (mm)

Valve/Flange Size & Class	A Length	B R.F. ø	C Flg ø	D Height
1 in. (25.4 mm) x 150	7.25 in. (184 mm)	2.0 in. (51 mm)	4.25 in. (108 mm)	3.2 in. (81 mm)
3 in. (73.2 mm) x 300	7.75 in. (197 mm)	2.0 in. (51 mm)	4.88 in. (124 mm)	3.2 in. (81 mm)
1-1/2 in. (38.1 mm) x 150	8.75 in. (222 mm)	2.88 in. (73 mm)	5.0 in. (127 mm)	3.47 in. (88 mm)
1-1/2 in. (38.1 mm) x 300	9.25 in. (235 mm)	2.88 in. (73 mm)	6.13 in. (156 mm)	3.47 in. (88 mm)
2 in. (50.8 mm) x 150	10.0 in. (254 mm)	3.62 in. (92 mm)	6.0 in. (152 mm)	3.6 in. (91 mm)
2 in. (50.8 mm) x 300	10.5 in. (267 mm)	3.62 in. (92 mm)	6.5 in. (165 mm)	3.6 in. (91 mm)

Description of Items

1. Valve Body
2. Bonnet
3. Innervalve (trim set):
   a. Innervalve stem
   b. Innervalve guide/plug
   c. Seat (when applicable)
4. Gasket
5. Packing gland
6. Packing set
7. Packing adapter
8. Bonnet flange hex screws
9. Bonnet flange
10. Yoke lock nut

Pressure vs. Temperature Rating		
Temp ° F (°C)	**CL 150 psig (bar)**	**CL 300 psig (bar)**
100 (38)	275 (19)	720 (50)
200 (93)	240 (16.6)	620 (43)
300 (149)	215 (15)	560 (39)
400 (204)[1]	195 (13)	515 (36)
500 (260)[2]	170 (12)	480 (33)
600 (316)	140 (97)	450 (31)
700 (371)	110 (8)	430 (30)
800 (427)	80 (5)	415 (29)
900 (482)	50 (3)	395 (27)
1000 (538)	20 (1.4)	365 (25)

[1] Max. temp for PTFE with standard bonnet is 450° F (232° C).
[2] Above 500° F (260° C), use stainless steel strain hardened studs.

INNERVALVE CHART

Valve Size	Cv (Linear)	Cv (=%)	Orifice Dia in. (mm)	Area in.² (mm²)	F_L [2]	Seat Configuration	Max. Oper ΔP [3] psi (bar)	Max ΔP Shutoff [1] psi (bar)
2 in. (50.8 mm)	25	20	1.500 (38.1)	1.77 (1141.9)	0.85	Integral	150 (10)	300 (21)*
	21	17	1.125 (28.6)	1.00 (645.2)	0.86	Replaceable	275 (19)	550 (38)*
	15	14	0.812 (20.6)	0.52 (335.5)	0.88	Replaceable	540 (37)	720 (50)*
	7	6.5	0.625 (15.9)	0.31 (200.0)	0.90	Replaceable	600 (41)	720 (50)
1.5 in. (38.1 mm)	15.5	13	1.250 (31.8)	1.23 (793.5)	0.85	Integral	225 (16)	450 (31)*
	11	10	0.812 (20.6)	0.52 (335.5)	0.87	Replaceable	540 (37)	720 (50)*
	7	6.5	0.625 (15.9)	0.31 (200.0)	0.90	Replaceable	600 (41)	720 (50)
	4	4	0.625 (15.9)	0.31 (200.0)	0.92	Replaceable	600 (41)	720 (50)
1 in. (25.4 mm)	8.3	7.0	0.812 (20.6)	0.52 (335.5)	0.85	Integral	540 (37)	720 (50)*
	5.3	4.5	0.500 (12.7)	0.20 (129.0)	0.87	Replaceable	660 (46)	720 (50)
	2	2	0.500 (12.7)	0.20 (129.0)	0.89	Replaceable	660 (46)	720 (50)
	1	1	0.500 (12.7)	0.20 (129.0)	0.91	Replaceable	660 (46)	720 (50)
	0.5	0.5	0.156 (4.0)	0.02 (12.9)	0.93	Replaceable	720 (50)	720 (50)
	0.2	0.2	0.156 (4.0)	0.02 (12.9)	0.94	Replaceable	720 (50)	720 (50)
	0.1	0.1	0.156 (4.0)	0.02 (12.9)	0.95	Replaceable	720 (50)	720 (50)
	0.05	0.05	0.156 (4.0)	0.02 (12.9)	0.96	Replaceable	720 (50)	720 (50)
	0.02	—	0.156 (4.0)	0.02 (12.9)	0.97	Replaceable	720 (50)	720 (50)

Rangeability:

Linear = 50:1, Percentage = 60:1

Listed ΔP pressures are applicable to CL300.

Notes:

1. Pressure drop limits for soft seated trims are 50% of those listed.
2. Body recovery coefficient (F_L) per ISA 75.02-1988 at maximum innervalve opening.
3. Shutoff pressures marked with an asterisk (*) require six actuator springs to obtain the required preload. Pressures listed under Max. Oper ΔP or Max. Shutoff ΔP relate to the actuator preload requirements and innervalve guide limits. Since fluid and application criteria have a bearing on innervalve performance, some applications may require hardened trim and/or extra preload. In certain applications, the pressures listed may wear or erode the innervalve material.

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RCV
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Non-Rotating Manual Actuation

Type NRMA

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 coventional manual control valves.

FEATURES

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

MATERIALS

Case	1.4404 (316L)
Yoke	1.4404 (316L)
Hand Wheel	Duroplast

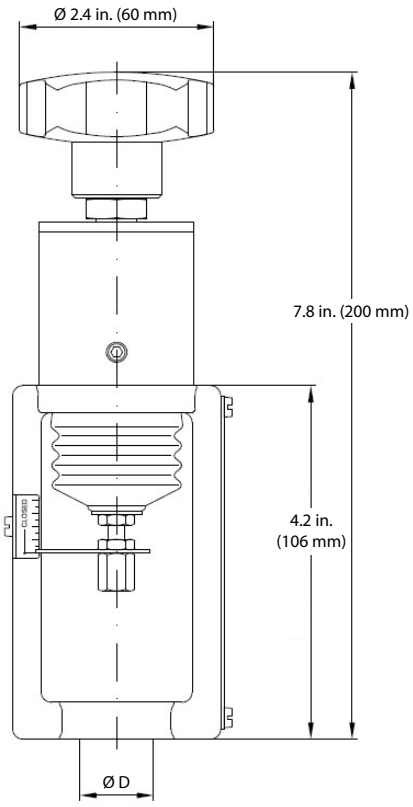
SPECIFICATIONS

Weight	Approximately 3.3 lb (1.5 kg)
Temperature	-40…176° F (-40…80° C)
Valve Lift	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



Badger Meter

RCV-DS-03324-EN-01 (November 2020)

Product Data Sheet

RCV
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Research Control Valves

CV vs Lift Chart

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.

Badger Meter

Product Data Sheet

Research Control Valves

CV vs Lift Curve

	% Maximum Cv	
% Lift	**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%