RCV
Research Control® | ReCo® Valves

Process Control Valves

U.S. Model 9100 (Includes OR800)

DESCRIPTION

The U.S. Model 9100 process control valve is a 2-way, high capacity globe available in 6 sizes, 1/2…2 in. (12.7…50.8 mm) with a B62 bronze body/bonnet. Comes with a field-reversible actuator and standard live loaded TFE packing.

BODY ASSEMBLY DESCRIPTION

Type	2-way high capacity globe, modulating
Size in. (mm)	1/2 (12.7), 3/4 (19.1), 1 (25.4), 1-1/4 (31.7), 1-1/2 (38.1), 2 (50.8)
Pressure Rating	ANSI CL 150: 300 psi @ 100° F (20.7 bar @ 37.8° C)
Body Material	Bronze ASTM B62
Bonnet Material	Bronze ASTM B62
Body Gasket Material	Copper
Innervalve Assembly	316L stainless steel
Seat Ring	316L stainless steel
Packing	PTFE "V" rings—live loaded
Packing	Optional Grafoil
Packing Spring	302 stainless steel
Packing Follower	PTFE-PFA
Packing Follower	Optional bronze (Grafoil)
Other Hardware	300 stainless steel

DESIGN CRITERIA

- Meets MSS SP-80 and ANSI B16.24
- Heavy duty high-capacity body
- Standard Characteristic: Equal percent
- Standard replaceable seat/innervalve
- Standard ANSI Class IV shutoff
- Standard live-loaded TFE packing
- Heavy duty post-guided innervalve
- Stem welded into innervalve guide
- Precision CNC cut NPT body threads

OPTIONS

- Linear characteristic or Quick open on-off
- Double packing, REK® fugitive emission packing
- Alarm/Purge port with double packing
- Stainless steel bonnet extensions for cryogenic service
- Positioners, Limit switches, Airset, and others
- Carbon steel "Lap-Joint Flange Kit," for conversion to CL150 flanges (meets ASME/ANSI face-to-face length)

ACTUATOR ASSEMBLY DESCRIPTION

Type	Pneumatic multi-spring and diaphragm actuator
Effective Area	35 in.^{2} (225 cm^2)
Stroke	3/4 in. (19.1 mm) or 1 in. (25.4 mm)
Spring (bench) Loading	Adjustable (some ranges)
Action	ATO or ATC (reversible without additional parts)
Accessory Mounting	IEC534 (Namur)
Rec. Max. Oper. Press.	60 psig @ 70° F (4 bar @ 21° C)
Max. Diaphragm Pressure	90 psig @ 70° F (6 bar @ 21° C)
Upper Ambient Temperature Limit	160° F @ 30 psig (71° C @ 2.07 bar))
Lower Ambient Temperature Limit	–20° F @ 30 psig (–29° C @ 2.07 bar))
Signal Range	Standard: 3…15 psig (0.2…1.03 bar) Others available
Pressure Cases and Yoke	Steel/epoxy coated
Diaphragm Material	Nitrile/polyester
Spring Material	17…7Ph stainless steel
Stem Seal	ELF Buna O-ring
Stem Guide Bushings	Filled composite bearing material
Hardware Material	300 stainless steel
Travel Indication	Adjustable, nylon safety pointer

Badger Meter

RCV-DS-00261-EN-06 (February 2021)

Product Data Sheet

SPECIFICATIONS

Innervalve Information, Equal Percent Characteristic

Valve Size in. (mm)	Orifice Dia. in. (mm)	Orif. area in.² (mm²)	Lift in. (mm)	Max. ΔP*	Cv vs Stem Travel *											
					100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	5%	2.5%
3/4 (19.1)	1.00 (25.4)	0.785 (506.5)	0.75 (19.1)	300	**12.0**	10.7	9.32	6.75	4.49	3.01	2.29	1.69	1.10	0.53	0.264	0.132
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**8.0**	5.3	3.56	2.37	1.58	1.05	0.70	0.47	0.31	0.15	0.076	0.038
3/4 (19.1), 1/2 (12.7)	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**6.0**	4.0	2.67	1.78	0.09	0.79	0.53	0.35	0.23	0.11	0.057	0.029
	0.50 (12.7)	0.196 (126.5)	0.75 (19.1)	300	**3.0**	2.0	1.34	0.89	0.59	0.40	0.26	0.18	0.11	0.06	0.029	0.014
1 (25.4)	1.00 (25.4)	0.785 (506.5)	0.75 (19.1)	300	**15.0**	12.3	9.36	6.37	4.81	3.66	2.75	2.05	1.35	0.66	0.329	0.165
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**10.0**	6.7	4.44	2.97	1.98	1.32	0.88	0.59	0.38	0.19	0.096	0.048
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**6.0**	4.0	2.67	1.78	1.19	0.79	0.53	0.35	0.23	0.11	0.057	0.029
	0.50 (12.7)	0.196 (126.5)	0.75 (19.1)	300	**3.0**	2.0	1.33	0.89	0.59	0.40	0.26	0.18	0.11	0.06	0.029	0.014
1-1/4 (31.7)	1.63 (41.4)	2.074 (1338.1)	1 (25.4)	135	**29.0**	25.2	21.5	17.7	10.5	6.78	5.02	3.69	2.51	1.29	0.642	0.321
	1.25 (31.7)	1.227 (791.7)	1 (25.4)	225	**20.0**	13.3	8.90	5.92	3.95	2.63	1.76	1.17	0.76	0.38	0.189	0.095
	1.25 (31.7)	1.227 (791.7)	1 (25.4)	225	**12.0**	8.0	5.34	3.55	3.27	1.58	1.05	0.70	0.46	0.23	0.113	0.057
1-1/2 (38.1)	1.63 (41.4)	2.074 (1338.1)	1 (25.4)	135	**35.0**	31.0	26.8	20.7	14.4	10.0	6.74	4.49	2.95	1.54	0.766	0.383
	1.25 (31.7)	1.227 (791.7)	1 (25.4)	225	**24.0**	16.0	10.7	7.11	4.74	3.16	2.11	1.40	0.91	0.46	0.226	0.113
	1.25 (31.7)	1.227 (791.7)	1 (25.4)	225	**15.0**	10.0	6.67	4.45	2.96	1.98	1.32	0.88	0.57	0.29	0.142	0.071
2 (50.8)	2.00 (50.8)	3.142 (2027.1)	1 (25.4)	90	**54.0**	45.4	36.4	28.2	20.3	14.5	10.1	6.98	4.67	2.40	1.181	0.590
	1.75 (44.5)	2.405 (1551.6)	1 (25.4)	115	**36.0**	24.0	16.0	10.7	7.10	4.74	3.16	2.11	1.38	0.69	0.338	0.169
	1.75 (44.5)	2.405 (1551.6)	1 (25.4)	115	**22.0**	14.7	9.78	6.51	4.34	2.90	1.93	1.29	0.84	0.42	0.207	0.103

NOTE: Maximum Shutoff ΔP for Air-To-Open configuration, with 6 springs (280 pounds spring loading) and 0…23 psi air, may require a positioner to achieve full travel. Constantly high flowing ΔP, such as those listed in the Max. ΔP column can cause deterioration of the guide or innervalve material. Caution is advised when flowing ΔP is above 1/2 of the shutoff pressure listed.

*Data is for comparison only. Controlling in the 1…5% travel range is not usually recommended due to normal system and valve hysteresis. Precise signaling and positioning of the stem is critical and may require a positioner to achieve acceptable results.

Innervalve Information, Linear Characteristic

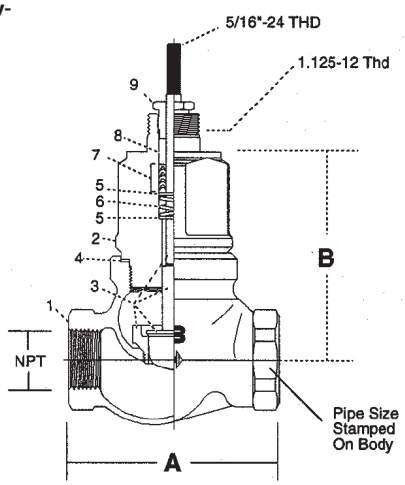
Valve Size in. (mm)	Orifice Dia. in. (mm)	Orif. area in.² (mm²)	Lift in. (mm)	Max. ΔP*	Cv vs Stem Travel *											
					100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	5%	2.5%
1/2 (12.7)	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**6**	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.20	0.60	0.300	0.15
	0.50 (12.7)	0.196 (126.5)	0.75 (19.1)	300	**3**	2.70	2.40	2.10	1.80	1.50	1.20	0.90	0.60	0.30	0.15	0.08
3/4 (19.1)	1.00 (25.4)	0.785 (506.5)	0.75 (19.1)	300	**12**	10.80	9.60	8.40	7.20	6.00	4.80	3.60	2.40	1.20	0.60	0.30
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**8**	7.20	6.40	5.60	4.80	4.00	3.20	2.40	1.60	0.80	0.40	0.20
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**6**	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.20	0.60	0.30	0.15
	0.50 (12.7)	0.196 (126.5)	0.75 (19.1)	300	**3**	2.70	2.40	2.10	1.80	1.50	1.20	0.90	0.60	0.30	0.15	0.08
1 (25.4)	1.00 (25.4)	0.785 (506.5)	0.75 (19.1)	300	**15**	13.50	12.00	10.50	9.00	7.50	6.00	4.50	3.00	1.50	0.75	0.38
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**10**	9.00	8.00	7.00	6.00	5.00	4.00	3.00	2.00	1.00	0.50	0.25
	0.75 (19.1)	0.442 (285.2)	0.75 (19.1)	300	**6**	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.20	0.60	0.30	0.15
	0.50 (12.7)	0.196 (126.5)	0.75 (19.1)	300	**3**	2.70	2.40	2.10	1.80	1.50	1.20	0.90	0.60	0.30	0.15	0.08
1-1/4 (31.7)	1.63 (41.4)	2.074 (1338.1)	1 (25.4)	135	**32**	28.80	25.60	22.40	19.20	16.00	12.80	9.60	6.40	3.20	1.60	0.80
	1.25 (31.7)	1.227 (791.7)	1 (25.4)	225	**20**	18.00	16.00	14.00	12.00	10.00	8.00	6.00	4.00	2.00	1.00	0.50
	1.25 (31.7)	1.227 (791.7)	1 (25.4)	225	**12**	10.80	9.60	8.40	7.20	6.00	4.80	3.60	2.40	1.20	0.60	0.30
1-1/2 (38.1)	1.63 (41.4)	2.074 (1338.1)	1 (25.4)	135	**37**	33.30	29.60	25.90	22.20	18.50	14.80	11.10	7.40	3.70	1.85	0.93
	1 (25.4)	1.227 (791.7)	1 (25.4)	225	**24**	21.60	19.20	16.80	14.40	12.00	9.60	7.20	4.80	2.40	1.20	0.60
	1 (25.4)	1.227 (791.7)	1 (25.4)	225	**15**	13.50	12.00	10.50	9.00	7.50	6.00	4.50	3.00	1.50	0.75	0.38
2 (50.8)	2 (50.8)	3.142 (2027.1)	1 (25.4)	90	**56**	50.40	44.80	39.20	33.60	28.00	22.40	16.80	11.20	5.60	2.80	1.40
	1.75 (44.5)	2.405 (1551.6)	1 (25.4)	115	**36**	32.40	28.80	25.20	21.60	18.00	14.40	10.80	7.20	3.60	1.80	0.90
	1.75 (44.5)	2.405 (1551.6)	1 (25.4)	115	**22**	19.80	17.60	15.40	13.20	11.00	8.80	6.60	4.40	2.20	1.10	0.55

NOTE: Maximum Shutoff ΔP for Air-To-Open configuration, with 6 springs (280 pounds spring loading) and 0…23 psi air, may require a positioner to achieve full travel. Constantly high flowing ΔP, such as those listed in the Max. ΔP column can cause deterioration of the guide or innervalve material. Caution is advised when flowing ΔP is above 1/2 of the shutoff pressure listed.

*Data is for comparison only. Controlling in the 1…5% travel range is not usually recommended due to normal system and valve hysteresis. Precise signaling and positioning of the stem is critical and may require a positioner to achieve acceptable results.

DIMENSIONS

Valve Body-Bonnet Assembly



Body Pressure vs Temp

Temp. °F	Pressure in psi	Temp °C	Pressure in bar
–20…150	300	–29…66	20.67
200	270	93	18.6
250	240	121	16.54
300	210	149	14.47
350	180	177	12.4
400	—	204	—
406	150	207	10.33

Item Descriptions

NOTE: Detailed assembly drawings, with part numbers, can be obtained from the factory. Item numbers shown may not match prints. Part numbers listed are universal to all model 9100 valve sizes.

Item	Description	Part Number	Material
1	Body	Consult Factory	Bronze, B-62
2	Bonnet	Consult Factory	Bronze, B-62
3	Innervalve set	Consult Factory	316L stainless steel
4	Body gasket	Consult Factory	Copper
5	Washer (2)	430002-0115	316 stainless steel
6	Spring	510031-0158	302 stainless steel
7	Packing set (3 rings)	543242-0001	PTFE (std)
8	Follower	527241-0001	Teflon PFA
9	Packing gland	525950-0001	316 stainless steel

Items 5 through 8 are available as a kit: P.N. 544057-0001

Weights

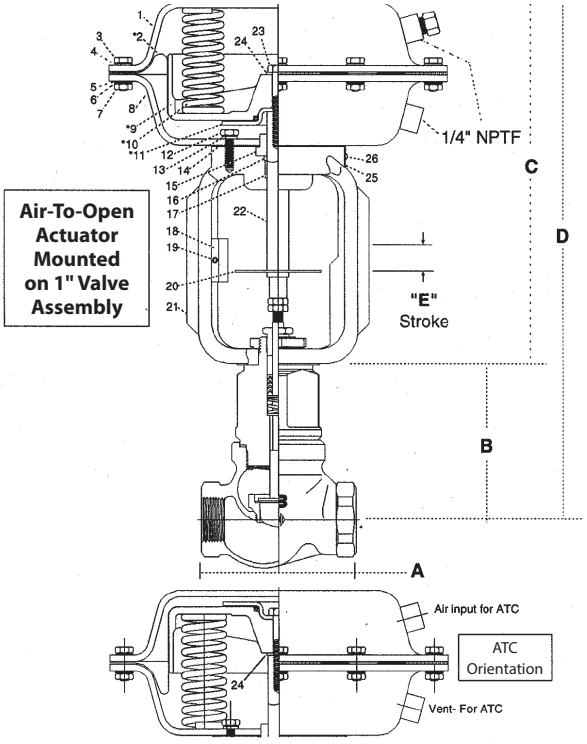
Valve Size	1/2 in., 3/4 in. and 1 in.	1-1/4 in. and 1-1/2 in.	2 in.
Pounds	29	36	44
Kilograms	13.2	16.3	20

Approx. average weight per size. Depends on options and accessories.

Dimensions

	1/2 in., 3/4 in. and 1 in.	1-1/4 in. and 1-1/2 in.	2 in.
A	4.5 in. (115 mm)	6.25 in. (159 mm)	7.0 in. (179 mm)
B	4.44 in. (113 mm)	5.22 in. (133 mm)	5.62 in. (143 mm)
C	10.5 in. (267 mm)	10.5 in. (267 mm)	10.5 in. (267 mm)
D	14.94 in. (380 mm)	15.72 in. (400 mm)	16.12 in. (410 mm)
E	3/4 in. (19.1 mm) Stroke	1 in. (25.4 mm) Stroke	1 in. (25.4 mm) Stroke

Air-To-Open Actuator Mounted on 1" Valve Assembly



Item	Description (Qty)
1	Upper Housing (1)
2	*Diaphragm (1)
3	Hex Screw (12)
4	Flat Washer, top (12)
5	Flat Washer, bottom (12)
6	Lock Washer (12)
7	Hex Nut (12)
8	Lower Housing (1)
9	*Piston (1)
10	*Springs (3 or 6)
11	*Diaphragm Retainer (1)
12	Hex Screw, Gr 8 (6)
13	Lock Washer (6)
14	Gasket (1)
15	Upper Guide Bushing (1)
16	O-ring (1)
17	Lower Guide Bushing (1)
18	Travel Scale (1)
19	Set Screw (1)
20	Pointer, Nylon (1)
21	Yoke (1)
22	Stem (1)
23	Hex Screw, Gr 8 (1)
24	Thrust Washer (1)
25	Nameplate (1)
26	Nameplate Screw (2)

NOTE: Detailed assembly drawings, with part numbers, can be obtained from the factory. Item numbers shown may not match prints.

Reversing Actuator Action

The items indicated (*) should be re-oriented as shown to convert to ATC action. Details of this and other assemblies are available from the factory.

MODEL 9100 ORDERING MATRIX

The order number has 18 characters.

[1]		[2]		[3]		[4]		[5]		[6]		[7]		[8]		[9]		[10]
9106	-	**GC**	-	**N**	-	**BZ**	-	**SV**	-	**1**	-	**A**	-	**54**	-	**P**	-	**36**

[1] VALVE SIZE
9101 = 1/2 in.
9102 = 3/4 in.
9103 = 1 in.
9104 = 1-1/4 in.
9105 = 1-1/2 in.
9106 = 2 in.

[2] BODY TYPE
GC = Globe case

[3] END CONNECTIONS
N = NPT

[4] BODY ASSEMBLY MATERIAL
BZ = BRONZE / ASTM B62

[5] BONNET AND PACKING TYPE
SV = Standard bonnet/Spring loaded TFE V-rings
SG = Standard bonnet/Single Grafoil® packing
DV* = Standard bonnet/Double TFE V-rings
DG* = Standard bonnet/Double Grafoil packing
PV* = Standard bonnet with 1/8 in. NPT purge port and double TFE V-rings
PG* = Standard bonnet with 1/8 in. NPT purge port and double Grafoil packing
ES* = Extended [4 in. SST] bonnet with spring loaded V-rings
EL* = Extended [6 in. SST] bonnet with spring loaded V-rings
*** Optional:** Consult factory for price and delivery.

ABOUT THE MODEL NUMBER

When ordering by model number (required by the factory), please give a full description of the unit also. This will decrease the possibility of error. The model number will be shown on all acknowledgements, as well as the nameplate attached to the actuator. When inquiring about a valve in service, please give the serial number and the model number from the nameplate. An **X** in any location within the model number denotes a special item.

[6] ACTUATOR
1 = size 35, ATO, no positioner
2 = size 35, ATO, with positioner *
3 = size 35, ATC, no positioner
4 = size 35, ATC, with positioner *
* Side [yoke] mounted
5 = size 58, ATO, no positioner
6 = size 58, ATO, with positioner *
7 = size 58, ATC, no positioner
8 = size 58, ATC, with positioner *
9 = Electric actuator
* Side [yoke] mounted

[7] SIGNAL RANGE
A = 3…5 psig [adj. 3…4 psi]
B = 6…30 psig [adj. 6…8 psi]
C = 3…9 psig [positioner required]
D = 9…15 psig [positioner required]
E = 6…15 psig [3/4 in. stroke, fixed rate]
F = 10…15 psig [3/4 in. stroke, fixed rate]
H = 6…15 psig [1 in. stroke, fixed rate]
J = 9…15 psig [1 in. stroke, fixed rate]
K = 4…20 mA [incr. signal opens valve]
L = 4…20 mA [incr. signal closes valve]
NOTE: K and L are for electric actuators only.
O = 4.0…14.5 psig [1 in. stroke only]

[8] INNERVALVE SIZE
3/4 in. Valve Size

Code	Cv
12	12.0 [3/4 in. only]
08	8.0 [3/4 in. only]
06	6.0 [1/2 in. or 3/4 in.]
03	3.0 [1/2 in. or 3/4 in.]

1 in. Valve Size

Code	Cv
15	15.0
10	10.0
06	6.0
03	3.0

1-1/4 in. Valve Size

Code	Cv
29	29.0
20	20.0
12	12.0

1-1/2 in. Valve Size

Code	Cv
35	35.0
24	24.0
15	15.0

2 in. Valve Size

Code	Cv
54	54.0 [=%]
56	56.0 [Linear]
36	36.0
22	22.0

[9] INNERVALVE CHARACTERISTIC
P = Equal percent
L = Linear
Q = Quick open [special order]

[10] INNERVALVE MATERIAL
36 = 316L SST
3T = 316L & TFE-PFA [special order]
3S = Stellited 316L SST [special order]
NOTE: For other innervalve sized, characteristics and materials, consult the factory for price and delivery.

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