

### DESCRIPTION

The ORION® Series 9100 bronze control valve is available with a Stainless Steel bonnet extension for cold service to  $-325^{\circ}\text{F}$  ( $-198^{\circ}\text{C}$ ), see ASME/ANSI B16.24.

This option uses the standard bronze bonnet with a removable extension made of 316SST:

- Available in a short 4 in. (101 mm) or long 6 in. (152 mm) extension (SST portion).
- Standard packing is a single set of PTFE chevron rings with live spring loading.
- Mounting brackets are available for use in high-vibration applications.

### APPLICATION

This option is suitable for cold, non-corrosive liquids and vapors, whenever external icing is possible or when the packing must be insulated from the cold fluid passing through the valve body.

### FEATURES

The stainless steel extension is a superior insulator, compared to conventional bronze extensions, due to its greater strength and resistance to heat transfer.

### MATERIALS

<b>Body &amp; Bonnet</b>	B62 Bronze
<b>Extension</b>	316 SST Hex (ASTM A 479)
<b>Gaskets</b>	Copper
<b>Innervalve</b>	316L SST
<b>Packing</b>	PTFE chevron rings
<b>Optional</b>	Graphite and REK® (Kalrez) or double packing with 1/8 in. (3 mm) NPT purge port

### DESIGN REFERENCES

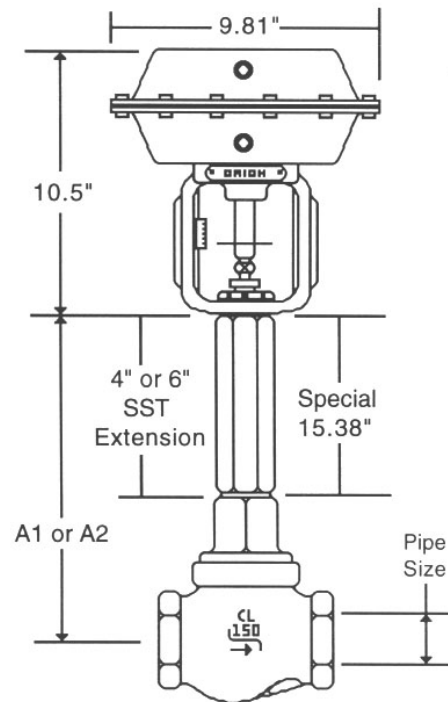
- ASME/ANSI B16.25 Class 150 (copper alloy standard)
- MSE SP-80 and ASME B31.3

**NOTE:** Along with other design criteria, the degree of exterior icing possible will determine the required length of bonnet extension, which is a function of fluid temperature and ambient humidity.  $-325^{\circ}\text{F}$  ( $-198^{\circ}\text{C}$ ) is the minimum allowable temperature for B62 bronze material, regardless of packing or extension.

### PRESSURE VS TEMPERATURE RATING

<b>300 psig (20.7 bar)</b>	@ $-325\text{...}70^{\circ}\text{F}$ ( $-198.3\text{...}21.1^{\circ}\text{C}$ )
<b>150 psig (10.3 bar)</b>	@ $406^{\circ}\text{F}$ ( $207^{\circ}\text{C}$ )
<b>Max. Pressure Drop</b>	Consult the factory
<b>Upper Temperature Limit</b>	$406^{\circ}\text{F}$ ( $207^{\circ}\text{C}$ )
<b>Lower Temperature Limit</b>	Long extension: $-325^{\circ}\text{F}$ ( $-198^{\circ}\text{C}$ ) Short extension: $-224^{\circ}\text{F}$ ( $-123^{\circ}\text{C}$ )

### DIMENSIONS



Valve Size NPT	Dimension "A" (C/L of Body to Actuator Match Point)	
	A1 Short Extension 4 in. (101.6 mm)	A2 Long Extension 6 in. (152.4 mm)
3/4 in. (19.1 mm)	8.44 in. (215 mm)	10.44 in. (266 mm)
1 in. (25.4 mm)	8.44 in. (215 mm)	10.44 in. (266 mm)
1-1/4 in. (31.8 mm)	9.22 in. (235 mm)	11.22 in. (285 mm)
1-1/2 in. (38.1 mm)	9.22 in. (235 mm)	11.22 in. (285 mm)
2 in. Std. (50.8 mm)	9.62 in. (245 mm)	11.62 in. (296 mm)
Special "A" = 21.0 in. (533.4 mm) (Extension made from round material.)		

### 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

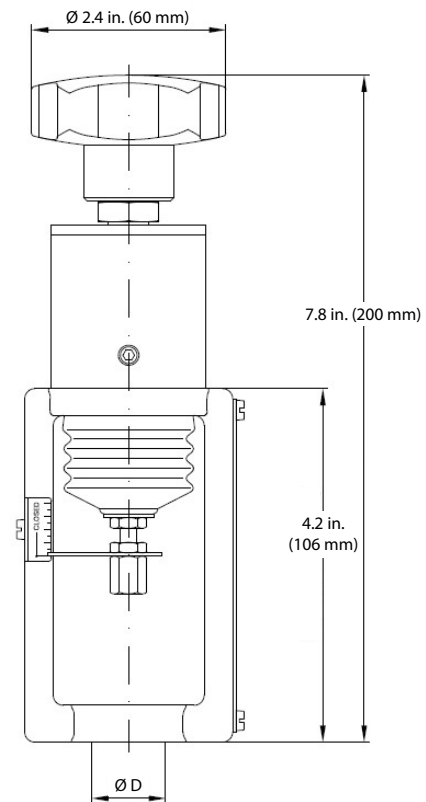
<b>Weight</b>	Approximately 3.3 lb (1.5 kg)
<b>Temperature</b>	-40...176° F (-40...80° C)
<b>Valve Lift</b>	0.04 in. (1 mm) / 360° turn

### 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.

# Research Control Valves

## CV vs Lift Curve

% 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%

