RCV
Research Control® | ReCo® Valves

Ultra High Pressure Valve Assembly

Type HP-60 (60,000 psi)

DESCRIPTION

The HP-60 is an ultra high pressure control valve using a 17-4 PH body along with a solid Stellite® innervalve assembly. The HP-60 can be used for both flow control as well as a Class IV shutoff valve. The versatility of the HP-60 creates a singular solution for your high pressure applications.

APPLICATION

The HP-60 valve is used in industrial applications, research and process pilot plants on liquids and gases. The main use is in high-pressure chemical injection, which is used in the production of high-pressure low density polyethylene (HPLDPE).

STANDARD FEATURES

- Wide range of interchangeable trims
- Choice of linear or quick opening trims
- ANSI Class III shutoff for sizes P-1 through P-6
- ANSI Class IV shutoff for sizes K through O
- Solid Stellite innervalve
- 9/16 in. high-pressure cone and collar fittings (F562C)
- Pressure rating of 60,000 psi (4136.85 bar) at 100° F (37.78° C)
- Maximum upstream pressure is 60,000 psi (4136.85 bar)
- Maximum downstream pressure is 47,150 psi (3250.88 bar) (for higher downstream pressure, consult the factory)

OPTIONAL FEATURES

- Stainless steel actuator and hardware for explosion-proof requirements

Shown with optional stainless steel actuator

MATERIALS

Body	17-4 PH
Innervalve	Stellite 6B (plug and seat)
Packing	Standard is glass-filled PTFE/PFA CV rings or Torlon®/PFA CV rings
Actuator	Painted carbon steel, nickel plated carbon steel, and stainless steel

ACTUATOR CHOICES

Standard	Air-to-open, fail close Air-to-close, fail open
Effective Area	35 square inches
Standard Signals	3-15#, 3-27#, 6-30#, 22-45#*
Optional Signals	With positioner, 3-9#, 9-15#
Accessories	Filter regulator, gauges, I/P, limit switches, handwheel on standard unit, solenoids

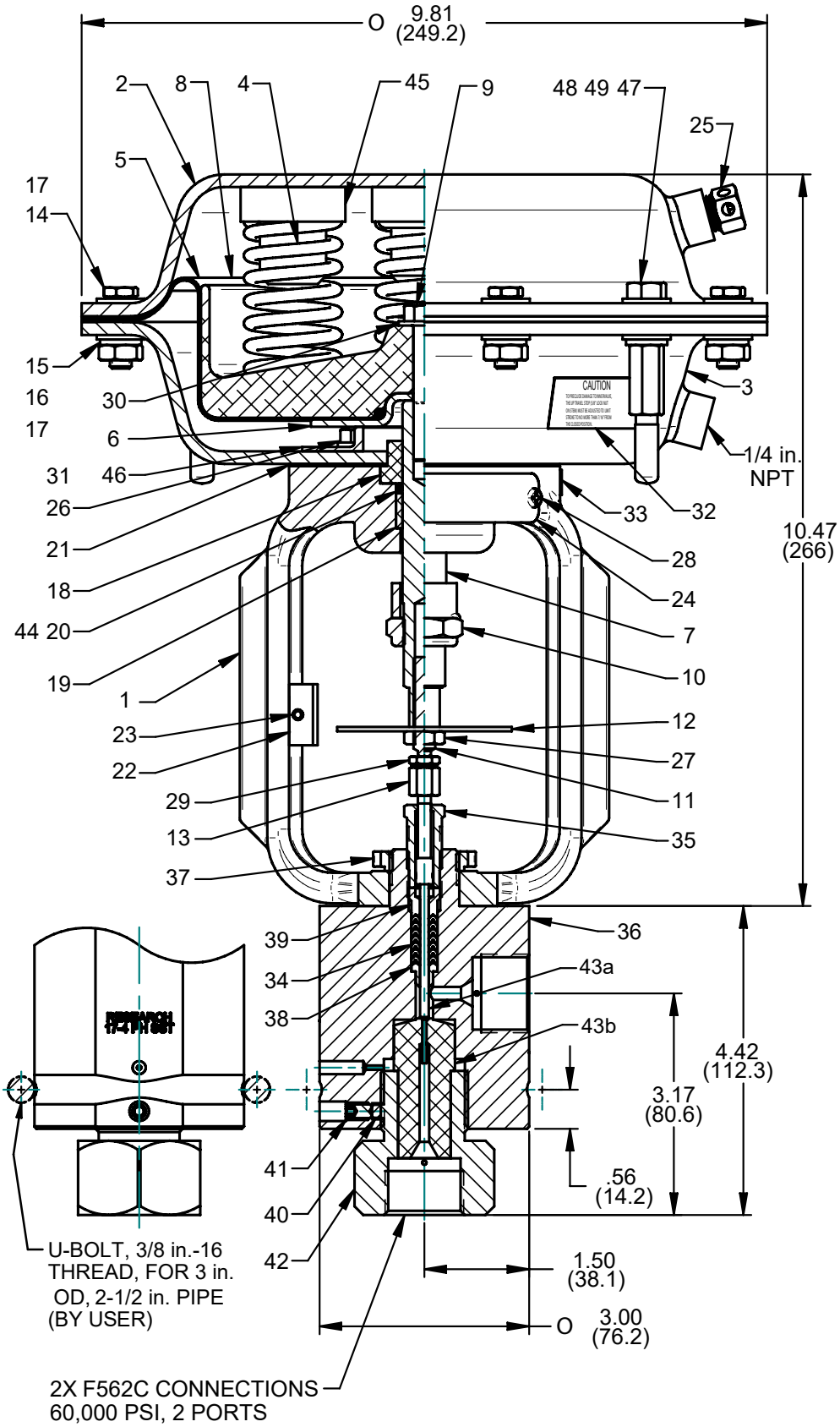
**Positioner Required*

Badger Meter

RCV-DS-00573-EN-05 (May 2021)

Product Data Sheet

DIMENSIONS


O 9.81
(249.2)
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48 49 47
25
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18
44 20
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22
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13
37
3
1/4 in.
NPT
33
32
28
24
7
10
12
27
11
35
10.47
(266)
36
39
34
38
43a
43b
4.42
(112.3)
3.17
(80.6)
.56
(14.2)
41
40
42
1.50
(38.1)
O 3.00
(76.2)
U-BOLT, 3/8 in.-16
THREAD, FOR 3 in.
OD, 2-1/2 in. PIPE
(BY USER)
2X F562C CONNECTIONS
60,000 PSI, 2 PORTS

PARTS AND MATERIALS LIST

Quantities are for one unit only.

Item	Description	Material	Number	Qty
1	Yoke	Steel	527588-0001	1
2	Spring case	Steel	526041-0001	1
3	Pressure case	Steel	526042-0001	1
4	Spring	17-7 SST	510031-0149	6
5	Diaphragm	Buna-N	512698-0002	1
6	Retainer diaph.	Steel	512883-0001	1
7	Stem	316/316L SST	527448-0001	1
8	Piston	Aluminum	512882-0001	1
9	Screw 5/16-24	Steel	400013-0085	1
10	Nut, travel stop	300 Series SST	527628-0001	1
11	Stem connector	17-4 PH SST	527589-0001	1
12	Travel indicator	Nylon	512879-0003	1
13	Connector 10-32	316/316L SST	520391	1
14	Screw 5/16-18	300 Series SST	400013-0002	10
15	Lock washer	300 Series SST	430004-0021	12
16	Nut 5/16-18	300 Series SST	410001-0060	10
17	Washer 5/16	300 Series SST	430002-0107	24
18	Upper bushing	Nylatron	512880-0001	1
19	Lower bushing	Polymer	460019-0001	1
20	O-Ring	ELF Nitrile	490018-0003	1
21	Gasket	Carbon/Nitrile	512712-0001	1
22	Travel scale	Aluminum	527233-0004	1
23	Set screw	300 Series SST	400006-0056	1
24	Nameplate	300 Series SST	512923-0001	1
25	Vent plug	Plastic	526037-0001	1
26	Screw 1/4-20	STL/Fluro	526119-0002	6
27	Nut 5/16-24	300 Series SST	410001-0058	1
28	Screw 6-32	300 Series SST	400001-0013	2
29	Nut 10-32	300 Series SST	410011	1
30	Washer thrust	Steel	527432-0001	1
31	Lock washer 1/4	300 Series SST	430004-0014	6
32	Caution decal	Mylar	512717-0001	1
33	Decal	Vinyl/Mylar	512914-0002	1
34	Packing set	GF PTFE / PFA	541859	1
or 34	Packing set	Torlon / PFA	544489-0001	1
35	Packing gland	300 Series SST	522622-0003	1
36	Body & bonnet	17-4 PH SST	529048-0001	1
37	Yoke lock nut	316/316L SST	526328-0001	1
38	Adaptor	17-4 PH SST	523185-0003	1
39	Follower	17-4 PH SST	522774-0003	1
40	Adaptor lock	Brass	522569	1
41	Set screw	300 Series SST	400006-0045	1
42	Lower adaptor	17-4 PH SST	522694-0003	1
43a	Innervalve	Stellite 6B	—	1
43b	Seat	Stellite 6B	—	1
44	Grease	—	500458-0025	—
45	Spring Spacer	PVC	537624-0002	1
46	Spacer	300 Series SST	528911-0001	1
47	Screw	300 Series SST	400013-0088	2
48	Nut	18-8 SST	410001-0072	2
49	Cap	Vinyl	501658-0001	1

TRIM CHART

Trim Size	Max. Cv	Orifice Dia. (in.)	Orifice Area (sq. in.)
I*	0.08	0.1000	0.0079
J*	0.05	0.1000	0.0079
K	0.03	0.0860	0.0058
L	0.02	0.0860	0.0058
M	0.01	0.0860	0.0058
N	0.006	0.0860	0.0058
O	0.003	0.0860	0.0058
P-1	0.002	0.0625	0.0031
P-2	0.0013	0.0625	0.0031
P-3	0.001	0.0625	0.0031
P-4	0.0006	0.0625	0.0031
P-5	0.0004	0.0625	0.0031
P-6	0.00027	0.0625	0.0031

* Special order

VALVE RATING

Temp ° F (° C)	Pressure psi (bar)
100 (37.78)	60,000 (4136.85)
200 (93.33)	60,000 (4136.85)
300 (148.89)	60,000 (4136.85)
400 (204.44)	58,290 (4018.95)
500 (260.00)	57,202 (3943.94)
600 (315.56)	56,269 (3879.61)
650 (343.33)	55,803 (3847.48)

RCV
Research Control® | ReCo® Valves

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

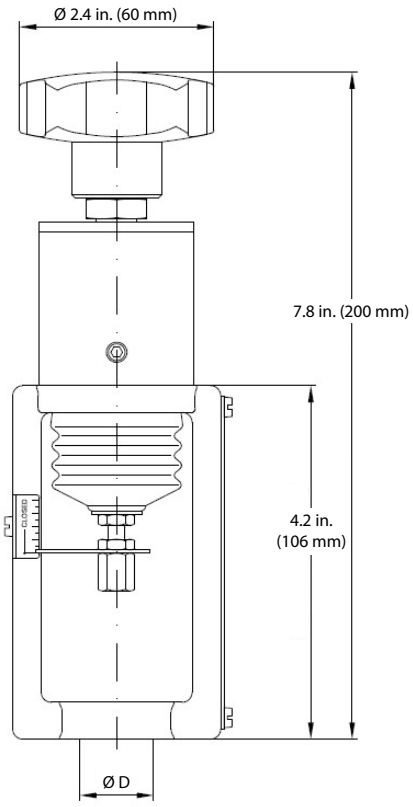
SPECIFICATIONS

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
Research Control® | ReCo® Valves

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%