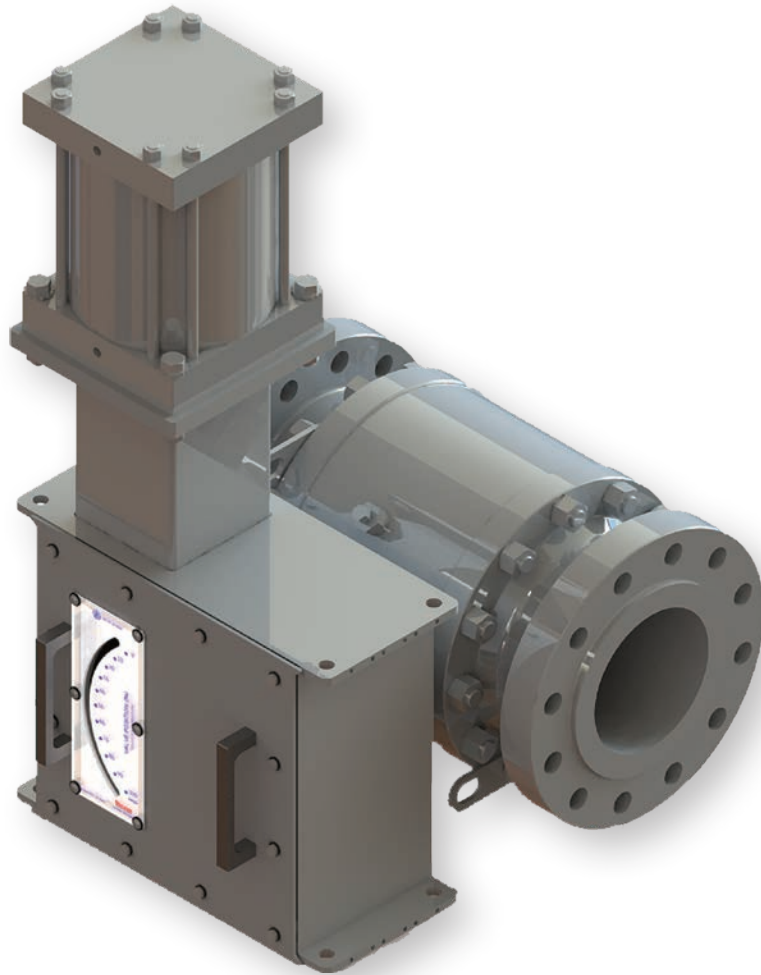


Becker™ Rotary Piston Double Acting RPDA Actuator

Heavy-duty, high
performance
applications require
RPDA Actuators.



Description

The Becker RPDA Rotary Piston Double Acting Actuator is designed for heavy duty control applications that require optimum performance. The RPDA actuator incorporates a crank-arm mechanism specifically designed for the rigors of throttling control valve applications. The RPDA actuator can accept high pressure power supply gas up to 400 psig (2758 kPa) enabling the use of smaller actuators or Becker's exclusive Bleed to Pressure System (BPS) feature.

Features

- Bleed to Pressure System can eliminate bleed gas emissions
- Retrofits to almost any pipeline valve
- High pressure RPDA actuator accepts high-pressure natural gas up to 400 psig (2758 kPa)
- Upright actuator design saves space and promotes longer actuator piston life
- Designed to be maintenance free
- Comes equipped with a high visibility scale that indicates valve position
- Crank-arm design actuators are specifically suited for control valve applications
- May be mounted in any installation orientation
- Optimized low center of gravity to minimize effects of application vibration and in-service wear to enable long installed life



Becker RPDA Actuated Control Valves

A pressure control regulator station is shown here with Becker RPDA actuators and *T-Ball™* Control Valves. The RPDA actuators are equipped with Becker VRP-CH Valve Regulator Pilots (VRP). The VRP is capable of providing extremely accurate pressure control with fast response necessary for power plant type applications. Additionally, note that the VRP-CH pressure control pilots are equipped with Model VB-250 Volume Boosters to increase stroking speed. The primary regulator is equipped with a QTCV-T2 Quiet Trim Control Valve to provide decreased noise during operation. The monitor regulator is equipped with a FPCV-T0 Full Port Control Valve that ensures bubble tight shutoff with class VI shutoff.

Technical Specifications

Actuator Mechanism Type	Pneumatic crank arm
Rotation (Output)	90° (standard)
Actuator Stops	Integral
Installation	Vertical (recommended), Horizontal
Coating	Epoxy (standard)
Power Gas Requirements	Sweet natural gas
Maximum Power Gas	400 psig (2758 kPa)
Minimum Power Gas	50 psig (345 kPa) recommended
Operating Temperature Range	-20°F to +160°F (-29°C to +71°C) standard, -30°F to +160°F (-34°C to +71°C) (Optional low temp. spec.)
Torque Output	See page 11
Dimensions	See pages 7, 8, and 9
Sweet Natural Gas Specification	Filtered to 100μ nominal. Free of excessive moisture (< 7 lbs. entrained H ₂ O per 1.0 mmscf) and liquid hydrocarbons.

If excessive moisture or hydrocarbon content is present, a Filter-Dryer may be necessary. For adequate filtration and elimination of moisture, a Becker Model FD-1500 Filter-Dryer should be installed. Refer to Becker FD-1500 literature to determine if a Model FD-1500 Filter-Dryer is necessary.



RPDA Rotary Piston Double Acting Actuator Components

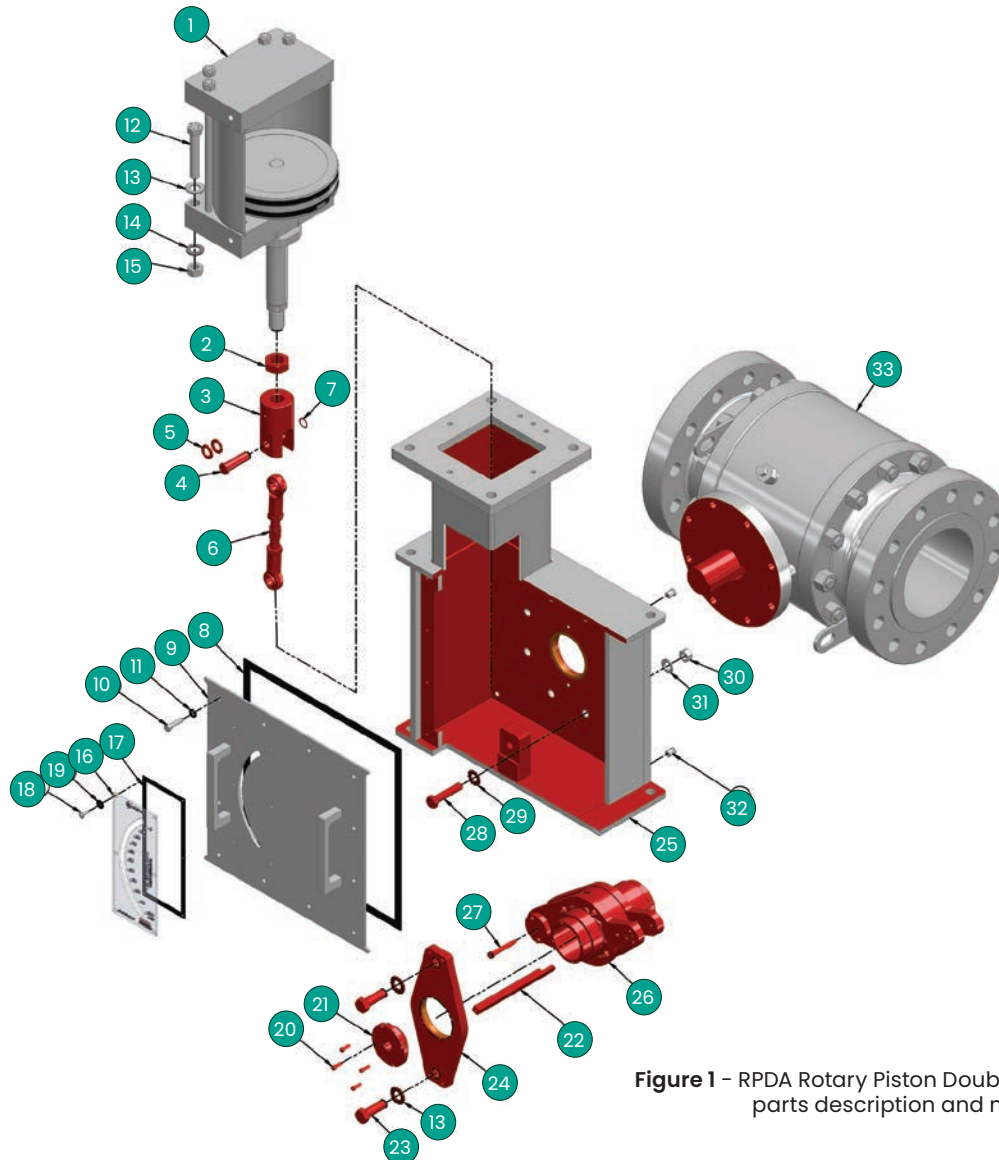


Figure 1 – RPDA Rotary Piston Double Acting Actuator parts description and materials

Table 1 – RPDA Rotary Piston Double Acting Actuator Parts List

Item	Description	Material	Item	Description	Material
1	Cylinder	Various	18	Screw	Stainless Steel
2	Hex Nut	Alloy Steel	19	Washer	PTFE
3	Clevis	Carbon Steel	20	Screw	Stainless Steel
4	Clevis Pin	High Strength Alloy Steel	21	Key Cover	Stainless Steel
5	Thrust Bearing	Bronze	22	Key	Carbon Steel
6	Adjustable Connecting Link	Carbon Steel w/SS Bearings	23	Outboard Plate Mounting Bolt	Stainless Steel
7	Retaining Ring	Carbon Steel	24	Outboard Plate	Carbon Steel
8	Gasket	Neoprene	25	Actuator Housing	Carbon Steel
9	Cover Plate	Carbon Steel	26	Torque Arm	Carbon Steel
10	Cover Screw	Stainless Steel	27	Shoulder Bolt	Stainless Steel
11	Washer	Stainless Steel with Rubber Seal	28	Mounting Bolt	Stainless Steel
12	Cylinder Mounting Bolt	Carbon Steel	29	Hytorc Washer	Stainless Steel
13	HYTORC Washer	Carbon Steel	30	Hex Nut	Carbon Steel
14	HYTORC Washer	Carbon Steel	31	Hytorc Washer	Carbon Steel
15	Hex Nut	Carbon Steel	32	Fitting, Mud Dauber	Stainless Steel
16	Position Indicator	Lexan	33	Valve	Various
17	Indicator Gasket	Viton			

Becker RPDA Rotary Piston Double Acting Actuator Cylinder Components

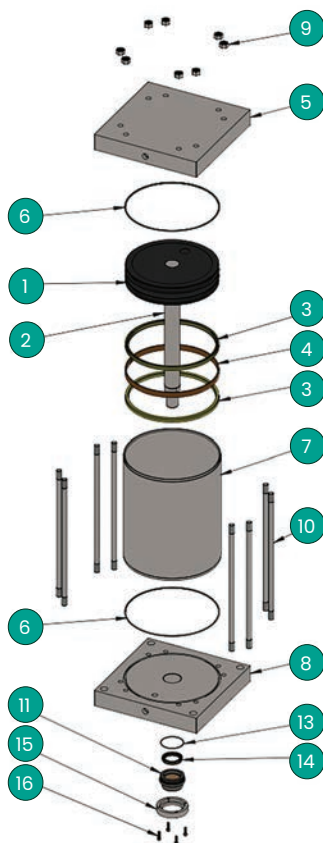


Figure 2 – RPDA Actuator Cylinder Exploded View

Table 2 – Becker RPDA Cylinder Components Parts List

Item	Description	Material
1	Piston	Nodular Iron
2	Piston Rod	Hard Chrome Plate
3 ⁽¹⁾	Piston U-Cup Seal (top)	Buna-N
4	Piston Wear Strip	Reinforced Teflon*
5 ⁽²⁾	Piston Head (top)	Steel
6 ⁽¹⁾	Tube Seal (top)	Buna-N O-Ring
7 ⁽²⁾	Piston Tube	Precision Honed Steel
8	Piston Head (bottom)	Steel
9	Hex Nut	Steel
10	Cylinder Tie-Rod	High Strength Steel
11	Gland Plate	Steel
13	Piston Rod Bearing	Duralon*
14	Rod Packing	Buna-N
15	Piston Rod Seal	Polyuerthane
16	Gland Plate Screws (SHCS)	Alloy Steel

1. For low temperature design, alternate Buna-N (low temp) utilized for items 3 & 6.
2. For high temperature design, alternate Buna-N (high temp) utilized for items 5 & 7.

RPDA Actuators Standard Mounting Configurations

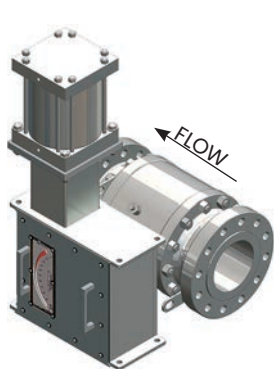


Figure 3.1

Mount #1 – Left Hand (Standard) with clean sweep feature

Actuator located on left hand side of valve when looking in direction of flow (actuator vertical/valve stem horizontal).

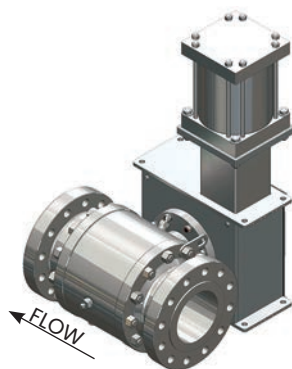


Figure 3.2

Mount #2 – Right Hand
Actuator located on right hand side of valve when looking in direction of flow (actuator vertical/valve stem horizontal).

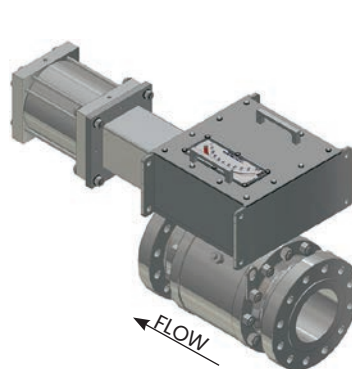


Figure 3.3

Mount #3 – Vertical Stem (Actuator Downstream)

Actuator located on downstream side of valve when looking in direction of flow (actuator horizontal/valve stem vertical).

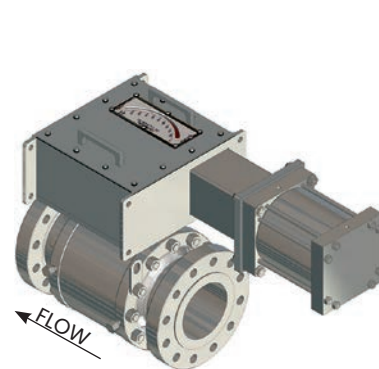


Figure 3.4

Mount #4 – Vertical Stem (Actuator Upstream)

Actuator located on up-stream side of valve when looking in direction of flow (actuator horizontal/valve stem vertical).

RPDA high pressure actuators, engineered for all your control valve applications

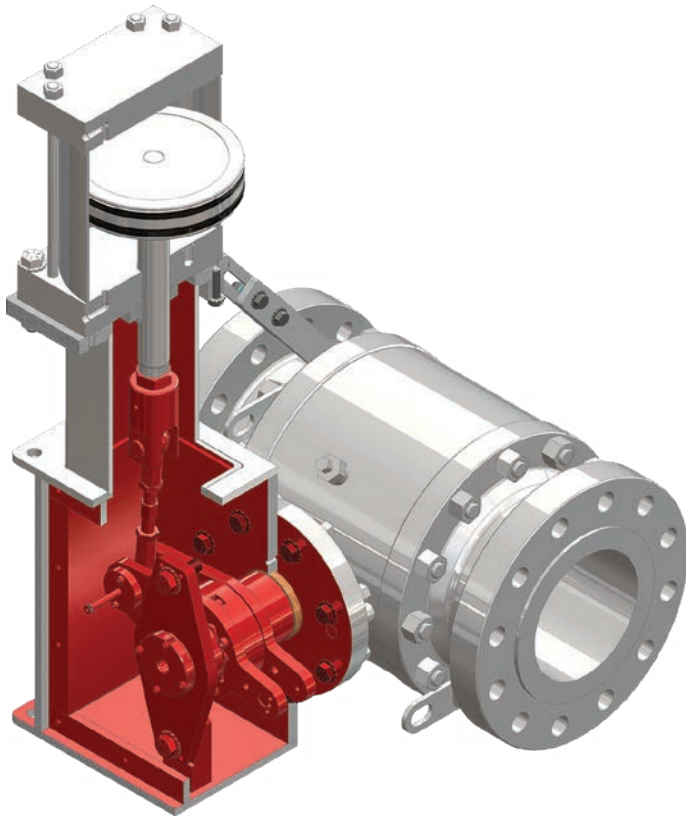


Figure 4 - Cutaway view of RPDA Actuator and Cylinder

Maintenance Free

The RPDA Actuator is designed to be maintenance free, no regular lubrication is required for the piston cylinder or the actuator.

Vertical Advantage

Upright actuator promotes longer actuator piston seal life, saves space, and requires less maintenance than other actuators.

Connecting Link with Stainless Steel Spherical Bearings Eliminates Side Load

Easy to Read Travel Indicator

All RPDA actuators come equipped with high visibility scale that indicates valve position.

Crank Arm Designed For Control Valves

Crank arm design actuators are specifically suited for control applications. The crank arm provides an increasing torque curve that develops high torque output where it counts. Additionally, the crank arm design minimizes friction and lost motion.

Simplified Maintenance and Handling

The torque arms and hub feature threaded holes to simplify removal. Using common bolts inserted through those holes, the hub and levers can be easily pushed (jacked) outward and off the valve shaft. The flat bottom housing design allows for simplified handling and easier support installation when necessary. A low Center of Gravity reduces vibration/seismic loads transmitted to the valve mounting.

High Pressure Capability

The RPDA Actuator is specifically constructed to accept high pressure natural gas up to 400 psig (2478 kPa). Higher pressure power gas allows use of smaller actuators and implementation of Becker's unique Bleed to Pressure System.

We can retrofit to almost any valve in your pipeline!

We can provide high quality actuators to mate to almost any quarter turn valve, regardless of manufacturer or age. We have years of experience successfully adapting our actuators to fit a multitude of valves.

U-Cup Piston Seals

U-cup Piston Seals are designed to provide superior sealing capabilities with minimal friction. This design allows accurate positioning of the control valve actuator with very slight pressure differential to the piston.

Custom Coatings Available

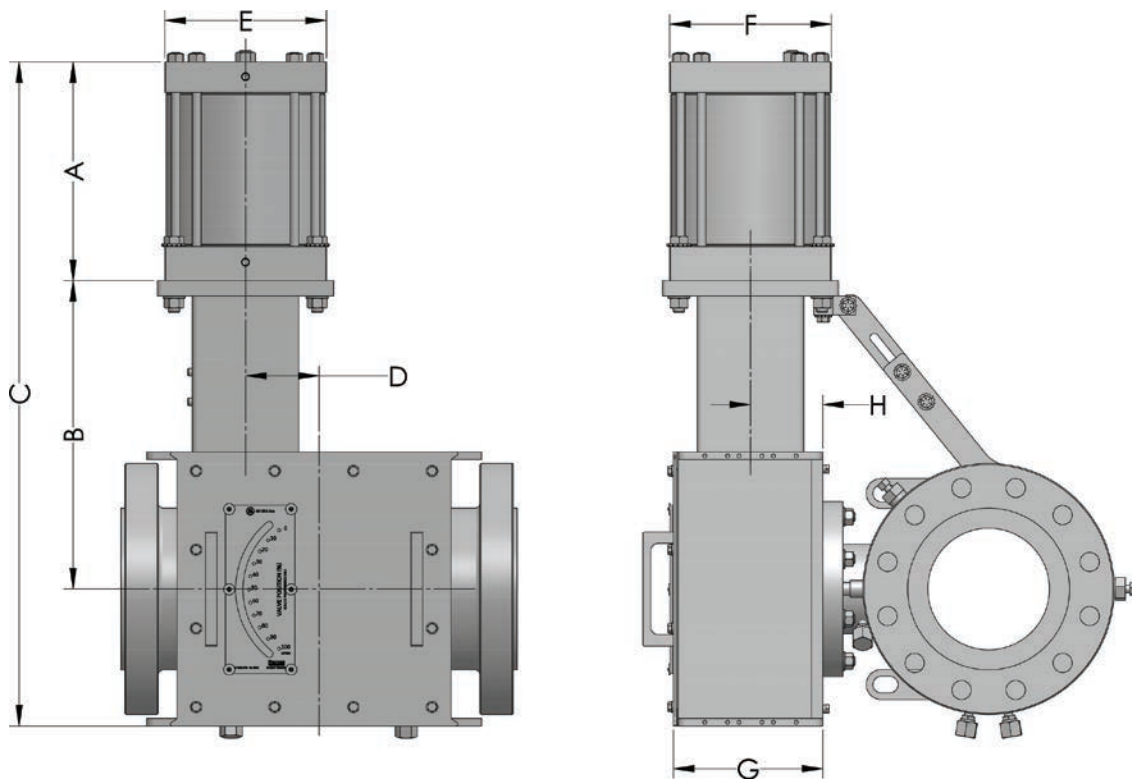
Standard preparation of Becker RPDA actuators includes sandblast per SP-10 and epoxy coating for above ground actuators and coal tar epoxy for below ground actuator portions. RPDA actuators are available with custom coatings to suit application needs.

Precision Machined Torque Hub & Arms

RPDA Actuators feature a precision machined torque hub and arms. Combined with two large Torque Arm Bearings, the precise machining ensures a low friction design for precise control.

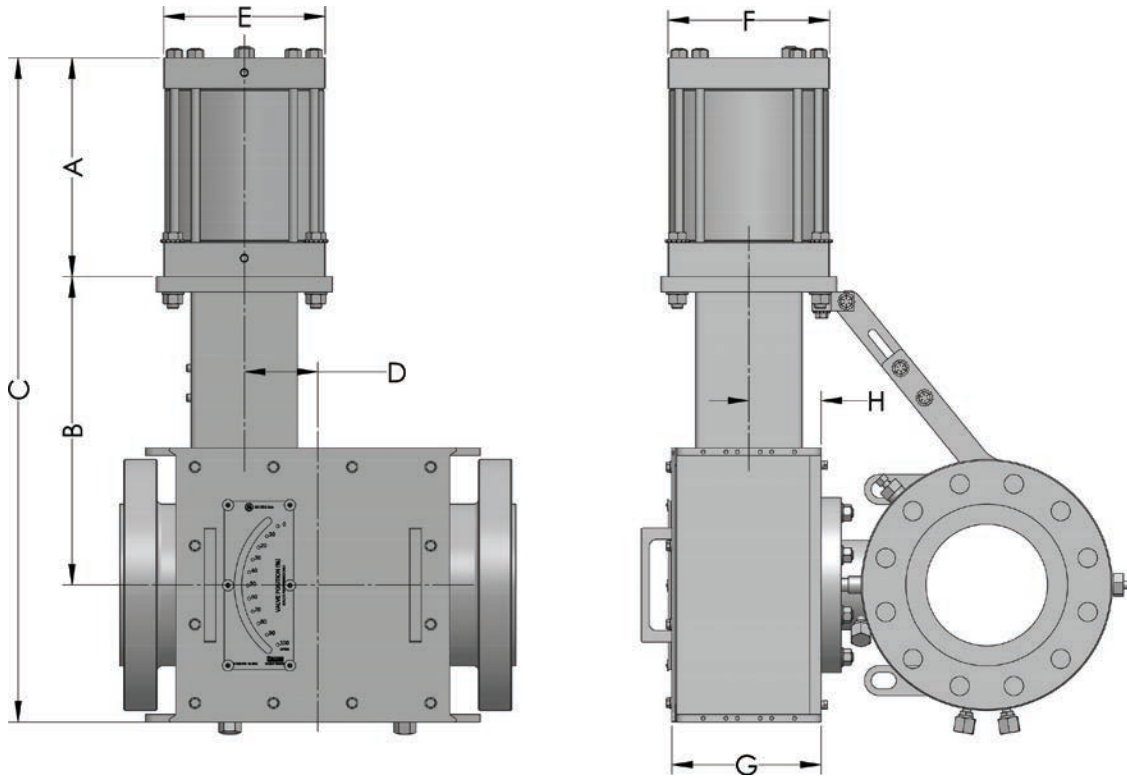
Torque Arm Bearings

RPDA Actuators feature two large Torque Arm Bearings to eliminate side load to control valve stem. Both inboard and outboard torque arm bearings are manufactured from non-metallic Duralon™ material to ensure maximum load bearing capacity.



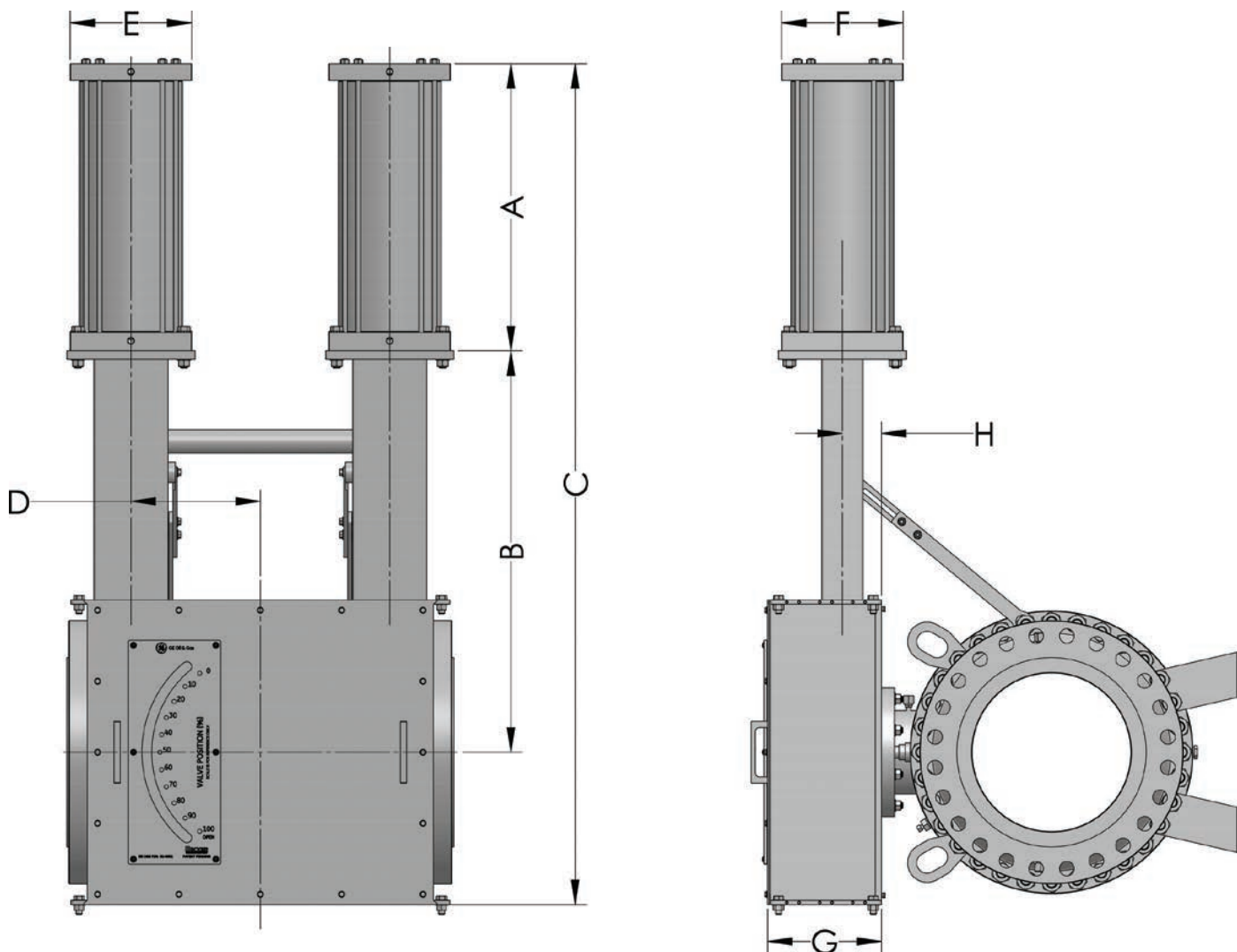
RPDA Single Cylinder Actuator Dimensions up to 12 inch stroke

Dimensions in inches (mm)									Weight
Model	A	B	C	D	E	F	G	H	lbs (kg)
4D	9.25 (235)	15.75 (400)	30.50 (775)	2.42 (61)	6.25 (159)	4.50 (114)	8.19 (208)	3.50 (89)	180 (82)
5D	9.56 (243)	15.75 (400)	30.81 (783)	2.42 (61)	7.63 (194)	5.50 (140)	8.19 (208)	3.50 (89)	185 (84)
6D	10.19 (259)	15.75 (400)	31.44 (799)	2.42 (61)	8.63 (219)	6.50 (165)	8.19 (208)	3.50 (89)	205 (93)
6F	12.19 (310)	19.00 (483)	37.93 (963)	3.62 (92)	6.50 (165)	6.50 (165)	9.82 (249)	4.75 (121)	330 (150)
8F	11.69 (297)	19.00 (483)	38.12 (968)	3.62 (92)	8.50 (216)	8.50 (216)	9.82 (249)	4.75 (121)	340 (154)
8H	13.06 (332)	19.81 (503)	41.93 (1065)	4.83 (123)	8.50 (216)	8.50 (216)	9.82 (249)	4.75 (121)	400 (181)
8L	17.69 (449)	25.50 (648)	52.51 (1334)	7.25 (184)	8.50 (216)	8.50 (216)	9.82 (249)	4.75 (121)	545 (247)
10F	13.06 (332)	19.25 (489)	40.62 (1032)	3.62 (92)	10.63 (270)	10.63 (270)	9.82 (249)	4.75 (121)	500 (227)
10H	15.06 (383)	20.38 (518)	43.62 (1108)	4.83 (123)	10.63 (270)	10.63 (270)	9.82 (249)	4.75 (121)	510 (231)
10L	19.06 (484)	25.50 (648)	53.88 (1369)	7.25 (184)	10.63 (270)	10.63 (270)	9.82 (249)	4.75 (121)	590 (268)
12L	19.06 (484)	25.50 (648)	54.37 (1381)	7.25 (184)	12.75 (324)	14.75 (375)	9.82 (249)	4.75 (121)	715 (324)
14L	20.94 (532)	29.00 (737)	58.62 (1489)	7.25 (184)	14.75 (375)	14.75 (375)	9.82 (249)	4.75 (121)	880 (399)



RPDA Single Cylinder Actuator Dimensions greater than 12 inch stroke

Dimensions in inches (mm)									Weight
Model	A	B	C	D	E	F	G	H	lbs (kg)
12T	29.56	41.13	82.25	12.08	12.75	12.75	9.82	4.75	1150
	(751)	(1045)	(2089)	(307)	(324)	(324)	(249)	(121)	(522)
12X	33.56	48.00	100.00	14.49	12.75	12.75	9.82	4.75	1350
	(852)	(1219)	(2540)	(368)	(324)	(324)	(249)	(121)	(612)
12Z	35.56	48.75	102.12	15.70	12.75	12.75	9.82	4.75	1500
	(903)	(1238)	(2594)	(399)	(324)	(324)	(249)	(121)	(680)
14T	30.94	42.50	83.63	12.08	14.75	14.75	9.82	4.75	1400
	(786)	(1080)	(2124)	(307)	(375)	(375)	(249)	(121)	(635)
14X	34.94	48.00	100.00	14.49	14.75	14.75	9.82	4.75	1560
	(887)	(1219)	(2540)	(368)	(375)	(375)	(249)	(121)	(708)
14Z	36.94	48.75	103.50	15.70	14.75	14.75	9.82	4.75	1700
	(938)	(1238)	(2629)	(399)	(375)	(375)	(249)	(121)	(771)



RPDA Double Cylinder Actuator Dimensions greater than 12 inch stroke

Model	Dimensions in inches (mm)								Weight
	A	B	C	D	E	F	G	H	lbs (kg)
D12T	29.56 (751)	41.13 (1045)	82.25 (2089)	12.08 (307)	12.75 (324)	12.75 (324)	13.81 (351)	4.75 (121)	2097 (951)
D12X	33.56 (852)	47.63 (1210)	102.19 (2596)	14.49 (368)	12.75 (324)	12.75 (324)	13.81 (351)	4.75 (121)	2375 (1077)
D12Z	35.56 (903)	48.75 (1238)	102.12 (2594)	15.7 (399)	12.75 (324)	12.75 (324)	13.81 (351)	4.75 (121)	2565 (1163)
D14T	30.94 (786)	42.5 (1080)	83.63 (2124)	12.08 (307)	14.75 (375)	14.75 (375)	13.81 (351)	4.75 (121)	2110 (957)
D14X	34.94 (887)	48 (1219)	103.94 (2640)	14.49 (368)	14.75 (375)	14.75 (375)	13.81 (351)	4.75 (121)	2380 (1080)
D14Z	36.94 (938)	48.75 (1238)	103.5 (2629)	15.7 (399)	14.75 (375)	14.75 (375)	13.81 (351)	4.75 (121)	2580 (1170)

Choose the Perfect Rotary Control Valve for your Application

RPDA Actuator Selection Tables

T-Ball Valve Size	500 (3447 kPa) = ΔP	1000 (6895 kPa) = ΔP	1500 (10342 kPa) = ΔP
	Double Acting	Double Acting	Double Acting
2" (50 mm)	5D	5D	5D
3" (80 mm)	5D	5D	6D
4" (100 mm)	6F	6F	6F
6" (150 mm)	8F	8F	8H
8" (200 mm)	10F	10F	10H
10" (250 mm)	10H	10H	10L
12" (300 mm)	10L	10L	12L

Temperature -20° F (-28.9° C) 100 psig (689 kPa) Power Gas

T-Ball Valve Size	500 (3447 kPa) = ΔP	1000 (6895 kPa) = ΔP	1500 (10342 kPa) = ΔP
	Double Acting	Double Acting	Double Acting
2" (50 mm)	5D	5D	5D
3" (80 mm)	5D	5D	6D
4" (100 mm)	6F	6F	6F
6" (150 mm)	8F	8F	8H
8" (200 mm)	10F	10F	10H
10" (250 mm)	10H	10H	10L
12" (300 mm)	10L	10L	12L

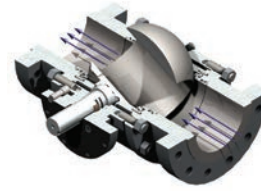
Temperature 20° F (-6.7° C) 100 psig (689 kPa) Power Gas

T-Ball Valve Size	500 (3447 kPa) = ΔP	1000 (6895 kPa) = ΔP	1500 (10342 kPa) = ΔP
	Double Acting	Double Acting	Double Acting
2" (50 mm)	5D	5D	5D
3" (80 mm)	5D	5D	6D
4" (100 mm)	6F	6F	6F
6" (150 mm)	8F	8F	8H
8" (200 mm)	10F	10F	10H
10" (250 mm)	10H	10H	10L
12" (300 mm)	10L	10L	12L

Temperature -20° F (-28.9° C) 125 psig (861 kPa) Power Gas

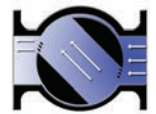
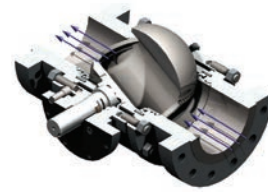
T-Ball Valve Size	500 (3447 kPa) = ΔP	1000 (6895 kPa) = ΔP	1500 (10342 kPa) = ΔP
	Double Acting	Double Acting	Double Acting
2" (50 mm)	5D	5D	5D
3" (80 mm)	5D	5D	6D
4" (100 mm)	6F	6F	6F
6" (150 mm)	8F	8F	8H
8" (200 mm)	10F	10F	10H
10" (250 mm)	10H	10H	10L
12" (300 mm)	10L	10L	12L

Temperature 20° F (-6.7° C) 125 psig (861 kPa) Power Gas



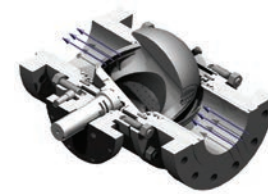
FPCV-T0 Series Full Port Control Valve:

- High turndown capability up to 100:1
- High pressure drop shutoff capability to Class VI



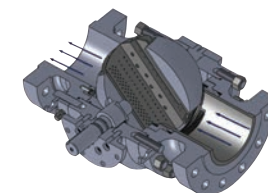
QTCV-T1 Series Quiet Trim Control Valve:

- Noise attenuation up to 7 dBA
- High turndown capability up to 200:1
- High pressure drop shutoff capability to Class V



QTCV-T2 Series Quiet Trim Control Valve:

- Noise attenuation up to 17 dBA
- High turndown capability up to 300:1
- High pressure drop shutoff capability to Class IV



QTCV-T4 Series Quiet Trim Control Valve:

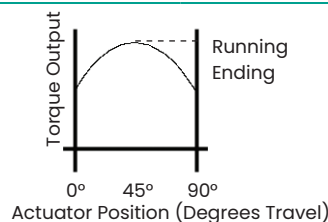
- Noise attenuation up to 25 dBA
- High turndown capability up to 200:1
- High pressure drop shutoff capability to Class IV

1. Contact Baker Hughes representative for valve sizes over 12" bore.
2. T-Ball valves are comprised of the following: FPCV-T0, FPBV, QTCV-T1, QTCV-T2, and QTCV-T4
3. For power gas pressures greater/less than 100 psig (689 kPa) contact Baker Hughes.
4. For higher ΔP applications contact Baker Hughes representative.
5. Power Gas = $P_{\text{supply}} - P_{\text{discharge}}$ for applications that utilize Bleed to Pressure System Feature.

RPDA Actuator Output Torque Table

Model Number	Angular Position ¹	RPDA Actuator Output Torque/ Power Gas			MAOP ³
		100 psig (689 kPa)	125 psig (862 kPa)	150 psig (1034 kPa)	
5D	Ending	3600 in-lb (24821 n-m)	4500 in-lb (31026 n-m)	5400 in-lb (37232 n-m)	400 psig (2758 kPa)
	Running	5334 in-lb (36777 n-m)	6669 in-lb (45978 n-m)	8002 in-lb (55173 n-m)	
6F	Ending	7557 in-lb (52104 n-m)	9446 in-lb (65128 n-m)	11336 in-lb (78159 n-m)	400 psig (2758 kPa)
	Running	11377 in-lb (78442 n-m)	14221 in-lb (98050 n-m)	17066 in-lb (117668 n-m)	
8F	Ending	13761 in-lb (94879 n-m)	17201 in-lb (118597 n-m)	20642 in-lb (142322 n-m)	400 psig (2758 kPa)
	Running	20717 in-lb (142839 n-m)	25896 in-lb (178547 n-m)	31076 in-lb (214264 n-m)	
8H	Ending	18117 in-lb (124912 n-m)	22646 in-lb (156139 n-m)	27176 in-lb (187372 n-m)	400 psig (2758 kPa)
	Running	26253 in-lb (181009 n-m)	32816 in-lb (226259 n-m)	39380 in-lb (271519 n-m)	
10F	Ending	21477 in-lb (148079 n-m)	26846 in-lb (185097 n-m)	32216 in-lb (222121 n-m)	400 psig (2758 kPa)
	Running	32334 in-lb (222932 n-m)	40417 in-lb (278662 n-m)	48501 in-lb (334403 n-m)	
10H	Ending	28277 in-lb (194963 n-m)	35346 in-lb (243702 n-m)	42416 in-lb (292448 n-m)	400 psig (2758 kPa)
	Running	40976 in-lb (282519 n-m)	51220 in-lb (353146 n-m)	61465 in-lb (423783 n-m)	
10L	Ending	41501 in-lb (286139 n-m)	51876 in-lb (357672 n-m)	62252 in-lb (429212 n-m)	400 psig (2758 kPa)
	Running	61222 in-lb (422109 n-m)	76527 in-lb (527634 n-m)	91833 in-lb (633169 n-m)	
12L	Ending	58760 in-lb (405136 n-m)	73450 in-lb (506420 n-m)	88140 in-lb (607704 n-m)	400 psig (2758 kPa)
	Running	93781 in-lb (646595 n-m)	117226 in-lb (808244 n-m)	140671 in-lb (969893 n-m)	
14L	Ending	79642 in-lb (549112 n-m)	99553 in-lb (686394 n-m)	119463 in-lb (823668 n-m)	400 psig (2758 kPa)
	Running	127108 in-lb (876381 n-m)	158886 in-lb (1095481 n-m)	190662 in-lb (1314571 n-m)	
12T	Ending	100412 in-lb (692316 n-m)	125515 in-lb (865395 n-m)	150618 in-lb (1038475 n-m)	400 psig (2758 kPa)
	Running	156116 in-lb (1076381 n-m)	195145 in-lb (1345476 n-m)	234174 in-lb (1614571 n-m)	
12X	Ending	120017 in-lb (827488 n-m)	150021 in-lb (1034358 n-m)	180026 in-lb (1241236 n-m)	400 psig (2758 kPa)
	Running	187277 in-lb (1291230 n-m)	234096 in-lb (1614035 n-m)	280916 in-lb (1936851 n-m)	
14T	Ending	136093 in-lb (938328 n-m)	170116 in-lb (1172908 n-m)	204140 in-lb (1407496 n-m)	400 psig (2758 kPa)
	Running	211591 in-lb (1458868 n-m)	264488 in-lb (1823582 n-m)	317387 in-lb (2188307 n-m)	
14X	Ending	162665 in-lb (1121536 n-m)	203331 in-lb (1401918 n-m)	243998 in-lb (1682307 n-m)	400 psig (2758 kPa)
	Running	253826 in-lb (1750068 n-m)	317282 in-lb (2187583 n-m)	380740 in-lb (2625108 n-m)	
14Z	Ending	174886 in-lb (1205796 n-m)	218608 in-lb (1507249 n-m)	262329 in-lb (1808695 n-m)	400 psig (2758 kPa)
	Running	275168 in-lb (1897216 n-m)	343961 in-lb (2371525 n-m)	412752 in-lb (2845824 n-m)	
D12T	Ending	200824 in-lb (1384633 n-m)	251030 in-lb (1730791 n-m)	301236 in-lb (2076949 n-m)	400 psig (2758 kPa)
	Running	312232 in-lb (2152761 n-m)	390290 in-lb (2690951 n-m)	468347 in-lb (3229142 n-m)	
D12X	Ending	240034 in-lb (1654976 n-m)	300043 in-lb (2068724 n-m)	360051 in-lb (2482464 n-m)	400 psig (2758 kPa)
	Running	374554 in-lb (2582460 n-m)	468194 in-lb (3228081 n-m)	561831 in-lb (3873690 n-m)	
D12Z	Ending	258066 in-lb (1779302 n-m)	322583 in-lb (2224131 n-m)	387099 in-lb (2668954 n-m)	400 psig (2758 kPa)
	Running	406044 in-lb (2799577 n-m)	507556 in-lb (3499477 n-m)	609067 in-lb (4199366 n-m)	
D14T	Ending	272187 in-lb (1876663 n-m)	340234 in-lb (2345831 n-m)	408281 in-lb (2814998 n-m)	400 psig (2758 kPa)
	Running	423183 in-lb (2917747 n-m)	528980 in-lb (3647186 n-m)	634776 in-lb (4376626 n-m)	
D14X	Ending	325331 in-lb (2243078 n-m)	406664 in-lb (2803849 n-m)	487997 in-lb (3364621 n-m)	400 psig (2758 kPa)
	Running	507653 in-lb (3500147 n-m)	634567 in-lb (4375187 n-m)	761481 in-lb (5250226 n-m)	
D14Z	Ending	349772 in-lb (2411593 n-m)	437215 in-lb (3014491 n-m)	524658 in-lb (3617389 n-m)	400 psig (2758 kPa)
	Running	550336 in-lb (3794431 n-m)	687920 in-lb (4743039 n-m)	825504 in-lb (5691647 n-m)	

1. See graph to right.
2. Power Gas = P_{supply} when discharge (vent to atmosphere).
3. Power Gas = P_{supply} - P_{discharge} when utilizing Bleed to Pressure System feature.
4. Consult Becker when P_{supply} > 150psig to ensure satisfactory operation

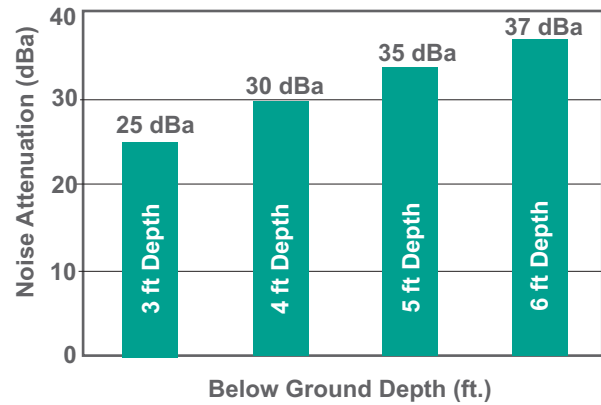


The Becker below ground ball valve

Regulator option is unique to Becker's Products and provides a multitude of benefits by direct burial of the control valve. The valve actuator, lubrication lines, and drain lines are extended above ground while the ball valve remains below ground. The primary advantage of Becker below ground regulators is inexpensive noise attenuation in excess of 25 dBA.

- More than 25 dBA noise attenuation
- Less ambient heat loss
- May use smaller adjacent piping diameter
- Smaller station footprint
- Most economical noise attenuation
- May eliminate need for buildings/enclosures by utilizing the fiberglass cabinet

Below Ground Regulator Option providing additional noise attenuation



Noise Attenuation as Factor of Below Ground Depth Typical below ground depths range from 3 feet to 6 feet burial.

The below ground depth is measured from centerline of pipe to ground. Below ground usually provides from 25 dBA to 37 dBA noise attenuation.



Installation of Becker Below Ground Regulators (Prior to Backfill)

A large natural gas transmission/distribution company installed Becker Below Ground Ball Valve Regulators to achieve maximum noise attenuation, minimal maintenance, and optimum cost effectiveness. The Below ground regulator can provide up to 37 dBA additional noise attenuation with minimal additional cost. Model QTCV-T2 Quiet Trim Control Valves were added to provide additional 15 dBA noise attenuation, bringing total overall noise attenuation up to 50 dBA. The Below Ground Ball Valve regulators are shown during installation, prior to backfill of the regulator station.



Installation of Becker Below Ground Regulators (After Backfill)

The above installation photo demonstrates the "clean" design of the regulator station. After backfill of the station, only the top works portion of the RPDA actuators extend above ground. The piping system remains below ground, minimizing noise and ambient heat loss. Additionally, technicians find the station design to be easily accessible due to absence of above ground piping and fittings.

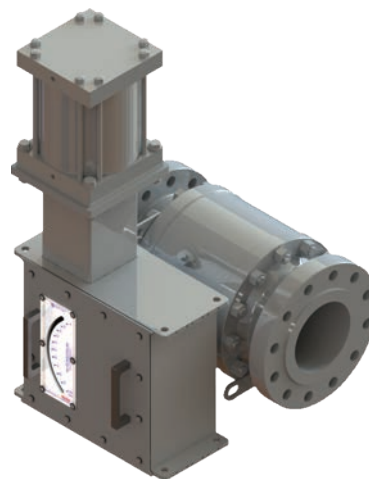
Let Baker Hughes Help Select the Perfect Rotary Control Valve Actuator

Selection table for Becker Control Valves and Actuators

	RPDA (Small Models)	RPDA (Large Models)	SYDA (Small Models)	SYDA (Large Models)	RPDA	SYSR	LPDA (Small Models)	LPDA (Large Models)	LPSR	LD
Actuator Instrumentation										
VRP-CH-Pilot	•	•	•	•			•	•		
VRP-B-CH Pilot	•		•							
VRP-SB-CH-Pilot					•	•			•	•
VRP-SB-PID Pilot					•	•			•	•
HPP-4 Positioner	•	•	•	•			•	•		
HPP-5 Positioner	•		•				•			
HPP-SB Positioner					•	•			•	•
DNGP Positioner	•	•	•	•	•	•	•	•	•	•
VRP-SB-GAP	•	•	•	•	•	•	•	•	•	•
Compatible Valves										
FPCV-T0	•	•	•	•	•	•				
QTCV-T1	•	•	•	•	•	•				
QTCV-T2	•	•	•	•	•	•				
QTCV-T4	•	•	•	•	•	•				
Globe Series							•		•	•
Actuator Options										
Bleed to Pressure System BPS	•		•	•		•	•	•	•	
AB Series Atmospheric Bleed Control	•		•	•		•	•	•	•	
NBV Series No-Bleed Valve	•	•				•	•			
DPS-2 Series Non-Bleed Sensor	•	•				•	•			
PS-2 Series Non-Bleed Sensor	•					•				
SP Series Setpoint Pump	•	•	•	•	•					
RSM Series Remote Setpoint Module	•	•	•	•	•					
Panel Mounting	•	•	•	•	•				•	
Stainless Steel Option	•	•	•	•	•	•	•	•		
VB Series Volume Booster	•		•		•	•		•		
QEV Series Quick Exhaust Valve				•				•		
I/P Transducer						•	•	•		
SLV Series Signal Lock Valve						•	•	•		

Notes: RPSR, SYDA, and LPDA Small Models are defined as actuator size <2000 in³ (0.333m³)
 RPSR, SYDA, and LPDA Large Models are defined as actuator size >2000 in³ (0.333m³)
 LD Series Actuators are limited to Becker Series Globe Valves
 BPS is limited to discharge pressure systems below 300 psig (2068 kPa). Please consult Baker Hughes for application assistance

The Baker Hughes line of Becker valves has a wide variety of control valve actuators with a variety of features that ensure the optimum solution for your application needs. Refer to the Figures on page 10 to assist you in selecting the proper control valve actuator and accessories.



Becker RPDA Rotary Piston Double Acting Actuator

The Becker RPDA Actuator is a rugged, quarter-turn actuator design for the rigors of aggressive throttling service. The RPDA features a high pressure crank-arm design specifically geared for control valve service. The high pressure capability of the RPDA allow power gas pressures up to 500 psig. This extended power gas range permits the implementation of its unique "bleed to pressure system" that eliminates all atmospheric emissions. Additionally, the RPDA is available with a Below Ground Option to substantially reduce noise with minimal additional expense.

CAUTION

This information is intended as a guideline for application of Becker Control Valve products. Baker Hughes strongly recommends consulting Becker Engineering prior to application of any product.

Accessories

Becker Control Valve Actuators provide reliability and accuracy for all of your control valve applications



Limit Switches

Limit switches provide an indication of valve status and are commonly utilized on both on-off and control valves. A limit switch assembly will close a contact at both the full-open and at the full-closed position of valve travel. The switches provide a remote indication to gas control, RTU or a flow computer as to the status of a valve. Limit switch assemblies are available with a variety of configurations.

Housing NEMA 4, 4X, 7, Class I, Groups C & D, Division 1 & 2
Switches 2 or 4
Option 2 or 4 Hermetically Sealed Switches

SPDT Single Pole, Double Throw
DPDT Double Pole, Double Throw
up to 125 V D.C. at .5 amps
up to 250 V A.C. at 15 amps



Position Transmitter

The Valve Position Feedback assembly provides a quantitative indication of the exact position of a control valve. The Valve Position Feedback assembly provides 4-20 mA analog remote position feedback proportional to the control valve position. The feedback signal may be utilized as an integral portion of the control loop or merely as an additional feedback signal to gas control for monitoring valve status. Valve Position Feedback is typically utilized on flow control valves.

Transmitter 4-20 mA Output
Housing NEMA 4, 4X, 7, Class I, Groups C & D, Division 1 & 2
Switches 2 or 4
Option 2 or 4 Hermetically Sealed Switches

SPDT Single Pole, Double Throw
DPDT Double Pole, Double Throw
up to 125 V D.C. at .5 amps
up to 250 V A.C. at 15 amps



Becker DNGP Digital Valve Positioner

The Becker Digital Natural Gas Positioner (DNGP) features Zero Bleed technology, supports pressure and flow control applications, is compatible with all Becker actuators and may be retrofit to other manufacturers' control valve packages. Its features make the DNGP a true plug-and-play positioner, one that configures easily with any control valve actuator, application logic via menu selections, or tubing configuration. Simple, reliable and versatile, and with multiple redundant safeguards for natural gas pipelines, the Becker DNGP is designed specifically to work with advanced, pneumatically actuated natural gas control valve applications that use electronic communication. A variety of accessories are available to optimize the positioner's performance.



Becker Valve Regulator Pilot (VRP)

The Becker Valve Regulator Pilot (VRP) provides pneumatic pressure control for gas applications. The VRP measures the downstream pressure and utilizes pipeline gas to power the actuator and position the valve to maintain the desired setpoint.

- Maintains control within 0.75% of desired setpoint
- Combines the functions of a positioner and a controller into a single device
- Zero steady state emissions

Direct Sales Office Locations

Australia

Brisbane
Phone: +61-7-3001-4319

Perth
Phone: +61-8-6595-7018

Melbourne
Phone: +61-3-8807-6002

Brazil

Phone: +55-19-2104-6900

China

Phone: +86-10-5738-8888

France

Courbevoie
Phone: +33-1-4904-9000

India

Mumbai
Phone: +91-22-8354790

New Delhi

Phone: +91-11-2-6164175

Italy

Phone: +39-081-7892-111

Japan

Tokyo
Phone: +81-03-6871-9008

Korea

Phone: +82-2-2274-0748

Malaysia

Phone: +60-3-2161-03228

Mexico

Phone: +52-55-3640-5060

Russia

Veliky Novgorod
Phone: +7-8162-55-7898

Moscow

Phone: +7-495-585-1276

Saudi Arabia

Phone: +966-3-341-0278

Singapore

Phone: +65-6861-6100

South Africa

Phone: +27-11-452-1550

South & Central America and the Caribbean

Phone: +55-12-2134-1201

Spain

Phone: +34-935-877-605

United Arab Emirates

Phone: +971-4-8991-777

United Kingdom

Phone: +44-7919-382-156

United States

Houston, Texas
Phone: +1-713-966-3600

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Baker Hughes 

bakerhughes.com

Becker™ Rotary Piston Spring Return RPSR Actuators

**Durable, fatigue-resistant
and maintenance free, RPSR
Actuators meet severe service
applications requirements.**



Description

The RPSR Rotary Piston Spring Return Actuator is designed for heavy duty control applications that require optimum performance. The RPSR actuator is typically utilized when applications require the control valve to fail-open or fail-closed upon loss of power supply gas. The RPSR actuator incorporates a crank-arm mechanism specifically designed for the rigors of throttling control valve applications. The RPSR actuator can accept high pressure power supply gas up to 400 psig (2478 kPa) enabling the use of smaller actuators or Becker's exclusive Bleed to Pressure System (BPS) feature.

Features

- Bleed to Pressure System can eliminate bleed gas emissions
- Retrofits to almost any pipeline valve
- High pressure RPSR actuator accepts high-pressure natural gas up to 400 psig (2478 kPa)
- Upright actuator design saves space and promotes longer actuator piston life
- Designed to be maintenance free
- Comes equipped with a high visibility scale that indicates valve position
- Crank-arm design actuators are specifically suited for control valve applications
- May be mounted in any installation orientation
- Optimized low center of gravity to minimize effects of application vibration and in-service wear to enable long installed life

Technical Specifications

Actuator Type	Quarter turn (90° Rotation)
Mechanism	Crank-arm
Usage	Heavy-duty
Action	Single-acting (fail-open or fail-closed)
Applications	Throttling, On-Off, surge control
Maximum Gas Supply	400 psig (2478 kPa)
Bleed to Pressure System	Yes
Below Ground Design	Yes
Maximum Valve Size	16" bore (406 mm)
Minimum Valve Size	2" bore (50 mm)
Stop Adjustment	Internal
Torque Output	1100 - 130,000 + in. lbs.
Compatible Valves	FPCV-T0, QTCV-T1, QTCV-T2, QTCV-T3 and QTCV-T4



Becker RPSR Rotary Piston Spring Return Actuator Components

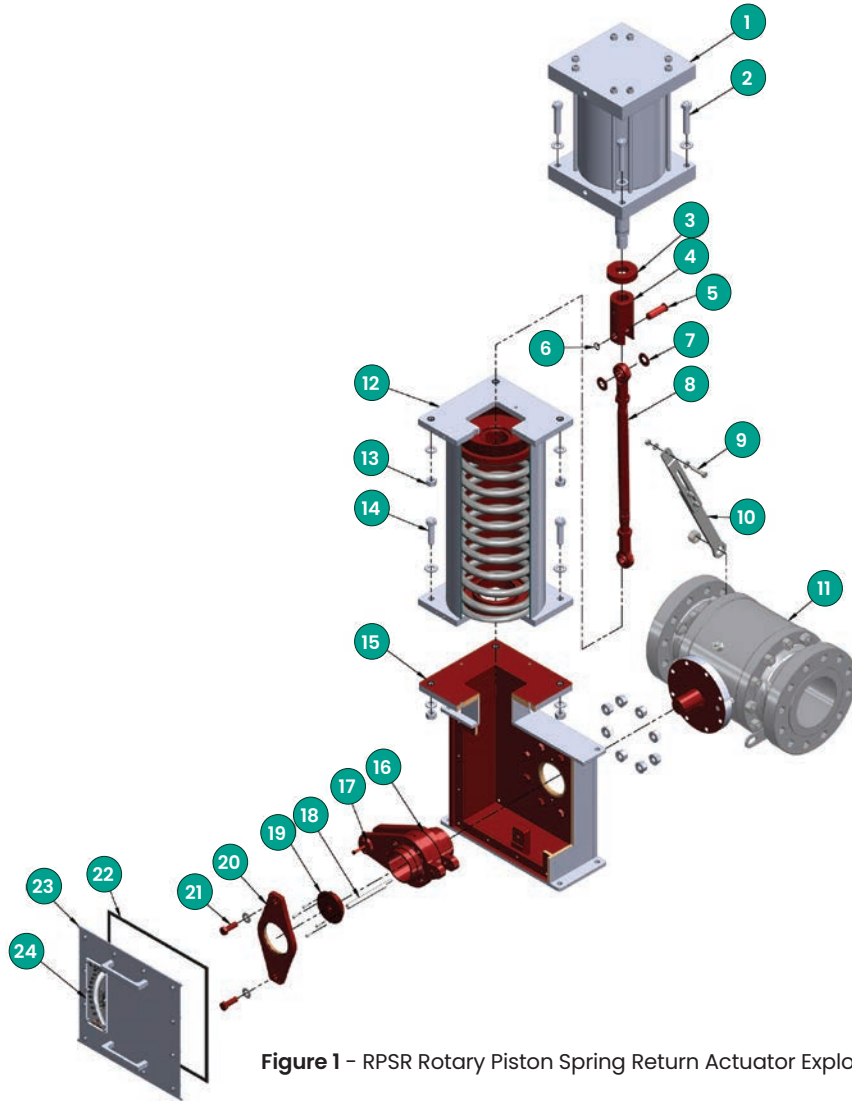


Figure 1 – RPSR Rotary Piston Spring Return Actuator Exploded View

Table 1 – RPSR Rotary Piston Spring Return Actuator Parts List

Item	Qty	Description	Material	Item	Qty	Description	Material
1	1	Cylinder	Various	13	4	Cylinder Mtg. Nut	Carbon Steel
2	1	Cylinder Mtg. Bolt	Carbon Steel	14	4	Spring Crtg. Mtg. Bolt	Carbon Steel
3	1	Cylinder Rod Flange	Carbon Steel	15	1	Actuator Housing	Carbon Steel
4	1	Rod Clevis	Carbon Steel	16	1	Torque Arm	Carbon Steel
5	1	Rod Clevis Pin	High Strength Alloy Steel	17	1	Torque Arm Pin	High Strength Alloy Steel
6	1	Tru-arc Ring	Carbon Steel	18	1	Key	Carbon Steel
7	2	Bushing	Bronze	19	1	Key Cover	Stainless Steel
8	1	Adjustable Connecting Link	Carbon Steel w/ SS Bearings	20	1	Outboard Plate	Carbon Steel w/ Duralon 15
9	1	knee Brace Mtg. Bolt	Carbon Steel	21	2	Outboard Plate Mtg. Bolt	Carbon Steel
10	1	knee Brace	Carbon Steel	22	1	Gasket	Neoprene
11	1	Valve	Various	23	1	Cover Plate	Carbon Steel
12	1	Spring Cartridge	Carbon Steel	24	1	Position Indicator	Lexan

Becker RPSR Rotary Spring Return Actuator Cylinder Components

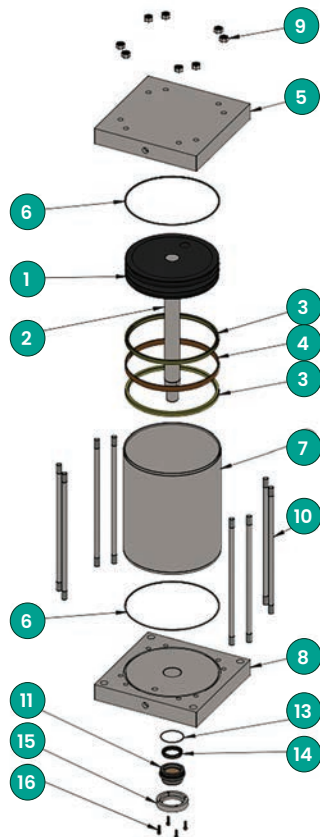


Figure 2 – RPSR Actuator Cylinder Exploded View

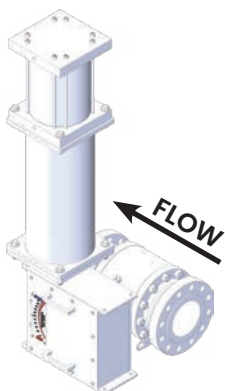
Table 2 – Becker RPSR Cylinder Components Parts List

Item	Description	Material
1	Piston	Nodular Iron
2	Piston Rod	Hard Chrome Plate
3	Piston U-Cup Seal (top)	Buna-N
4	Piston Wear Strip	Reinforced Teflon*
5 ⁽¹⁾	Piston Head (top)	Steel
6	Tube Seal (top)	Buna-N O-Ring
7 ⁽¹⁾	Piston Tube	Precision Honed Steel
8	Piston Head (bottom)	Steel
9	Hex Nut	Steel
10	Cylinder Tie-Rod	High Strength Steel
11	Gland Plate	Steel
13	Piston Rod Bearing	Duralon*
14	Rod Packing	Buna-N
15	Piston Rod Seal	Polyuerthane
16	Gland Plate Screws (SHCS)	Alloy Steel

1. For low temperature design, alternate Buna-N (low temp) utilized for items 5 & 7. For high temperature design, alternate Buna-N (high temp) utilized for items 5 & 7.

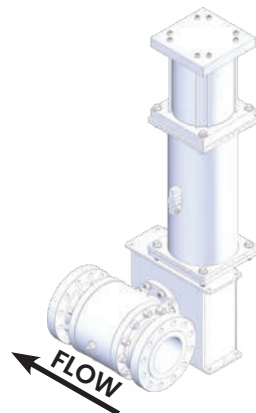
RPSR Actuators Standard Mounting Configurations

Figure 3.1



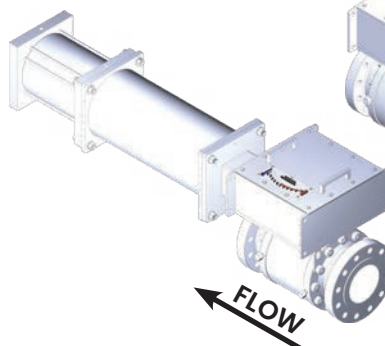
Mount #1 – Left Hand (Standard) with clean sweep feature
Actuator located on left hand side of valve when looking in direction of flow (actuator vertical/valve stem horizontal).

Figure 3.2



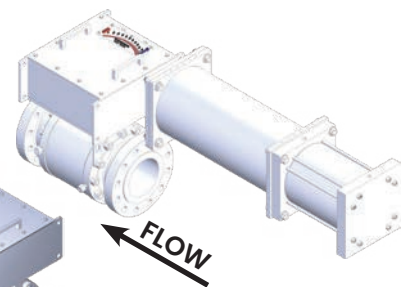
Mount #2 – Right Hand
Actuator located on right hand side of valve when looking in direction of flow (actuator vertical/valve stem horizontal).

Figure 3.3



Mount #3 – Vertical Stem (Actuator Downstream)
Actuator located on downstream side of valve when looking in direction of flow (actuator horizontal/valve stem horizontal).

Figure 3.4



Mount #4 – Vertical Stem (Actuator Upstream)
Actuator located on upstream side of valve when looking in direction of flow (actuator horizontal/valve stem vertical).

RPSR Actuators are specifically suited for fast-acting applications, such as surge control/recycle valves

Maintenance Free

The RPSR Actuator is designed to be maintenance free, no regular lubrication is required for the piston cylinder or the actuator.

Vertical Advantage

Upright actuator promotes longer actuator piston seal life, saves space, and requires less maintenance than other actuators.

Non-Field Serviceable Spring Cartridge Ensures Safety

The RPSR actuator's spring cartridge features an all-welded design that is serviceable only via our manufacturing facility. The non-Field Serviceable design minimizes potential for injury by prohibiting field disassembly of the spring cartridge portion of the RPSR actuator.

Connecting Link with Stainless Steel Spherical Bearings Eliminates Side Load. Actuator Spring Designed for High Speed, High Frequency Operation

The RPSR Actuator spring is manufactured from heat-treated 6150H alloy steel for superb fatigue resistance and virtually infinite life. The RPSR actuator's spring is capable of providing long-life, even under the most demanding applications.

Easy to Read Travel Indicator

All RPSR actuators come equipped with high visibility scale that indicates valve position.

Crank Arm Designed For Control Valves

Crank arm design actuators are specifically suited for control applications. The crank arm provides an increasing torque curve that develops high torque output where it counts. Additionally, the crank arm design minimizes friction and lost motion.

Simplified Maintenance and Handling

The torque arms and hub feature threaded holes to simplify removal. Using common bolts inserted through those holes, the hub and levers can be easily pushed (jacked) outward and off the valve shaft. The flat bottom housing design allows for simplified handling and easier support installation when necessary. A low Center of Gravity reduces vibration/seismic loads transmitted to the valve mounting.

High Pressure Capability

The RPSR Actuator is specifically constructed to accept high pressure natural gas up to 400 psig (2478 kPa). Higher pressure power gas allows use of smaller actuators and implementation of Becker's unique Bleed to Pressure System.

We can retrofit to almost any valve in your pipeline!

We can provide high quality actuators to mate to almost any quarter turn valve, regardless of manufacturer or age. We have years of experience successfully adapting our actuators to fit a multitude of valves.

U-Cup Piston Seals

U-cup Piston Seals are designed to provide superior sealing capabilities with minimal friction. This design allows accurate positioning of the control valve actuator with very slight pressure differential to the piston.

Custom Coatings Available

Standard preparation of Becker RPSR actuators includes sandblast per SP-10 and epoxy coating for above ground actuators and coal tar epoxy for below ground actuator portions. RPSR actuators are available with custom coatings to suit application needs.

Precision Machined Torque Hub & Arms

RPSR Actuators feature a precision machined torque hub and arms. Combined with two large Torque Arm Bearings, the precise machining ensures a low friction design for precise control.

Torque Arm Bearings

RPSR Actuators feature two large Torque Arm Bearings to eliminate side load to control valve stem. Both inboard and outboard torque arm bearings are manufactured from non-metallic Duralon™ material to ensure maximum load bearing capacity.

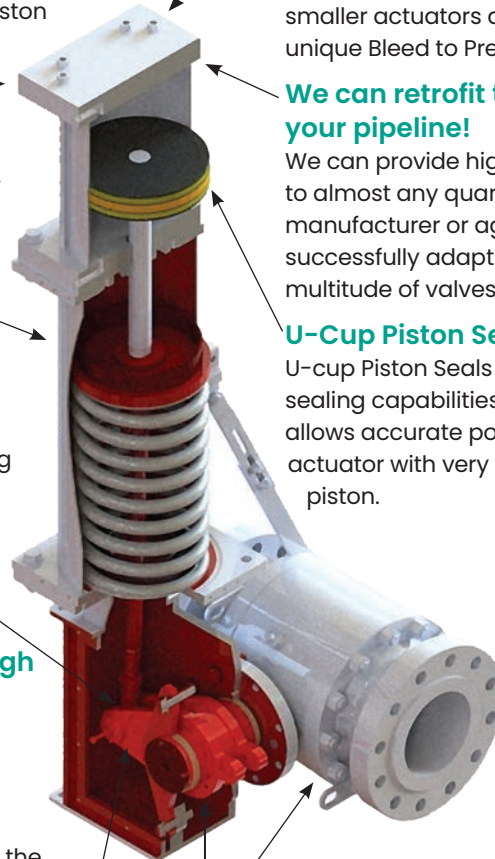


Figure 4 - Cutaway view of RPSR Actuator and Cylinder

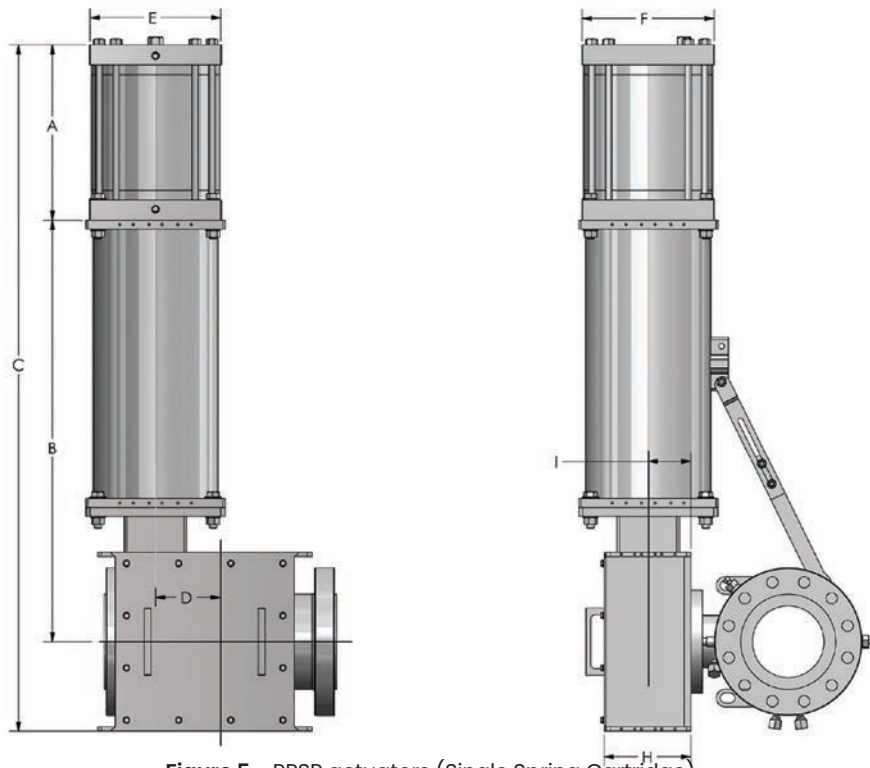


Figure 5 – RPSR actuators (Single Spring Cartridge)

Table 3 – RPSR actuators Dimensions (Single Spring Cartridge)

Model	Dimensions inches (mm)								Weight
	A	B	C	D	E	F	H	I	lbs (kg)
5D-SR-2	9.56 (243)	26.76 (680)	44.32 (1126)	2.42 (61)	7.62 (194)	6.5 (165)	9.82 (249)	4.75 (121)	280 (127)
6F-SR-7	12.19 (310)	32.44 (824)	53.63 (1362)	3.62 (92)	7.62 (194)	6.5 (165)	9.82 (249)	4.75 (121)	470 (213)
6D-SR-2	10.5 (267)	26.76 (680)	45.26 (1149)	2.42 (61)	7.62 (194)	6.5 (165)	9.82 (249)	4.75 (121)	310 (141)
6D-SR-7	10.19 (259)	29.44 (748)	47.63 (1210)	2.42 (61)	7.62 (194)	6.5 (165)	9.82 (249)	4.75 (121)	420 (191)
8F-SR-7	11.69 (297)	33.19 (843)	53.88 (1369)	3.62 (92)	8.5 (216)	8.5 (216)	9.82 (249)	4.75 (121)	500 (227)
8F-SR-8	11.69 (297)	36.38 (924)	57.07 (1450)	3.62 (92)	10.62 (270)	10.62 (270)	9.82 (249)	4.75 (121)	570 (259)
10F-SR-33	13.06 (332)	38.26 (972)	60.32 (1532)	3.62 (92)	10.62 (270)	10.62 (270)	9.82 (249)	4.75 (121)	670 (304)
8H-SR-33	13.69 (348)	40.26 (1022)	62.95 (1599)	4.83 (123)	10.62 (270)	10.62 (270)	9.82 (249)	4.75 (121)	640 (290)
10H-SR-33	14.38 365	40.26 (1022)	63.64 (1616)	4.83 (123)	10.62 (270)	10.62 (270)	9.82 (249)	4.75 (121)	730 (331)
10H-SR-39	14.38 (365)	41.13 (1045)	64.51 (1639)	4.83 (123)	12.75 (324)	12.75 (324)	9.82 (249)	4.75 (121)	900 (408)

Notes: Dimensions "B" & "C" will change for below ground units according to depth of burial.

For surge control design RPSR Actuator dimensions, refer to Becker Surge Control Valves Brochure.

Dimensions and weights are representative only. Consult valve drawings for actual values.

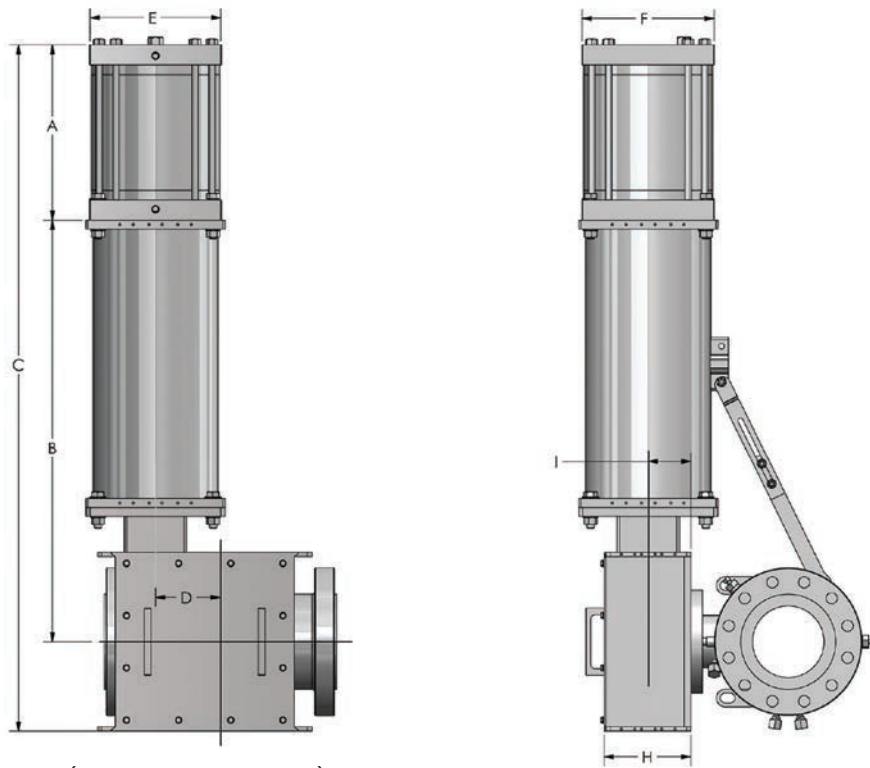


Figure 6 - RPSR actuators (Single Spring Cartridge)

Table 4 - RPSR actuators Dimensions (Single Spring Cartridge)

Dimensions inches (mm)									Weight
Model	A	B	C	D	E	F	H	I	lbs (kg)
10L-SR-33	19.06 (484)	45.26 (1149)	74.32 (1888)	7.25 (184)	10.62 (270)	10.62 (270)	9.82 (249)	4.75 (121)	880 (399)
10L-SR-39	14.37 (365)	46.13 (1172)	70.5 (1791)	7.25 (184)	12.75 (324)	12.75 (324)	9.82 (249)	4.75 (121)	950 (431)
10L-SR-41	19.06 (484)	47.13 (1197)	76.19 (1935)	7.25 (184)	14.75 (375)	14.75 (375)	9.82 (249)	4.75 (121)	980 (445)
12L-SR-39	18.87 (479)	46.13 (1172)	75 (1905)	7.25 (184)	12.75 (324)	12.75 (324)	9.82 (249)	4.75 (121)	1020 (463)
12L-SR-41	19.56 (479)	47.13 (1197)	76.69 (1948)	7.25 (184)	14.75 (375)	14.75 (375)	9.82 (249)	4.75 (121)	1150 (522)

Table 5 - RPSR Actuators Dimensions (Dual Spring Cartridge)

Dimensions inches (mm)									Weight
Model	A	B	C	D	E	F	H	I	lbs (kg)
12L-SR-41/33	19.56 (497)	47.13 (1197)	76.69 (1948)	7.25 (184)	14.75 (375)	14.75 (375)	9.82 (249)	4.75 (121)	1215 (551)
12L-SR-39/7	19.56 (497)	46.13 (1172)	75.69 (1923)	7.25 (184)	12.75 (324)	12.75 (324)	9.82 (249)	4.75 (121)	1130 (513)
14L-SR-41/33	19.62 (498)	47.13 (1197)	76.75 (1949)	7.25 (184)	14.75 (375)	14.75 (375)	9.82 (249)	4.75 (121)	1360 (617)
14L-SR-39/7	19.06 (484)	46.13 (1172)	75.19 (1910)	7.25 (184)	14.75 (375)	14.75 (375)	9.82 (249)	4.75 (121)	1280 (581)

Notes: Dimensions "B" & "C" will change for below ground units according to depth of burial.

For surge control design RPSR Actuator dimensions, refer to Becker Surge Control Valves Brochure.

Dimensions and weights are representative only. Consult valve drawings for actual values.

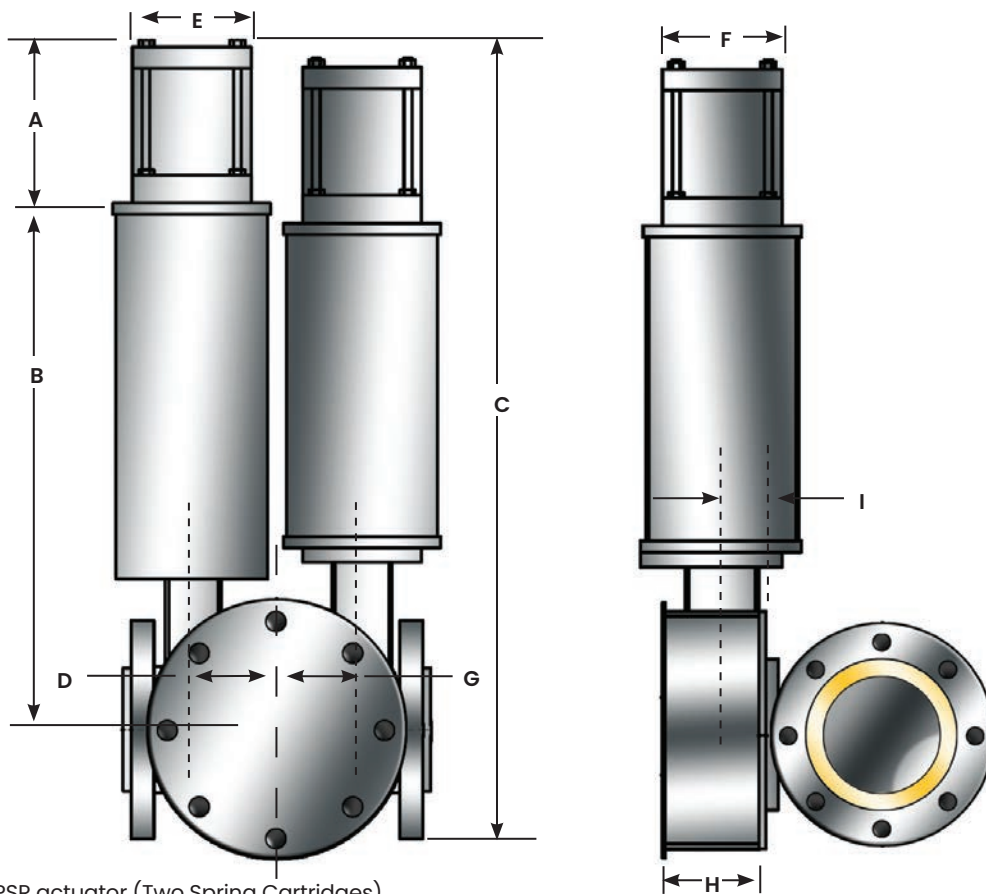


Figure 7 – RPSR actuator (Two Spring Cartridges)

Table 6 – RPSR actuators Dimensions (Two Spring Cartridge)

Dimensions inches (mm)										Weight
Model	A	B	C	D	E	F	G	H	I	lbs (kg)
D10L-SR-39/39/7	19.06 (484)	47.13 (1197)	79.19 (2011)	7.25 (184)	10.63 (270)	10.63 (270)	7.25 (184)	8.50 (216)	3.63 (92)	1815 (823)
D10L-SR-39/41	19.06 (484)	47.13 (1197)	79.19 (2011)	7.25 (184)	10.63 (270)	10.63 (270)	7.25 (184)	8.50 (216)	3.63 (92)	1785 (810)
D10L-SR-39/7/41	19.06 (484)	47.13 (1197)	80.19 (2037)	7.25 (184)	10.63 (270)	10.63 (270)	7.25 (184)	8.50 (216)	3.63 (92)	1875 (850)
I2L/10L-SR-39/7/39	19.56 (497)	47.13 (1197)	79.19 (2011)	7.25 (184)	10.63 (270)	10.63 (270)	7.25 (184)	8.63 (219)	3.63 (92)	1925 (873)
I2L/10L-SR-39/7/41	19.56 (497)	47.13 (1197)	79.19 (2011)	7.25 (184)	10.63 (270)	12.75 (324)	7.25 (184)	8.63 (219)	3.63 (92)	1985 (900)
D12L-SR-D39	19.56 (497)	47.13 (1197)	79.69 (2024)	7.25 (184)	10.63 (270)	12.75 (324)	7.25 (184)	8.63 (219)	3.63 (92)	1935 (878)
D12L-SR-39/39/7	19.56 (497)	47.13 (1197)	79.69 (2024)	7.25 (184)	10.63 (270)	12.75 (324)	7.25 (184)	8.63 (219)	3.63 (92)	2035 (923)
D12L-SR-39/41/33	19.56 (497)	47.13 (1197)	81.69 (2075)	7.25 (184)	12.75 (324)	12.75 (324)	7.25 (184)	8.63 (219)	3.63 (92)	2053 (931)
I2N/12M-SR-D41/8	21.53 (547)	51.13 (1299)	86.66 (2201)	7.88 (200)	10.63 (270)	12.75 (324)	8.50 (216)	10.75 (273)	3.63 (92)	2306 (1046)
I2N/12M-SR-41/43/33	21.53 (547)	51.13 (1299)	86.66 (2201)	7.88 (200)	12.75 (324)	12.75 (324)	8.50 (216)	10.75 (273)	3.63 (92)	2260 (1025)
14N/12M-SR-D41/8	22.79 (579)	21.13 (537)	57.92 (1471)	7.88 (200)	14.75 (375)	12.75 (324)	8.50 (216)	10.75 (273)	3.63 (92)	2490 (1129)

Notes: Dimensions "B" & "C" will change for below ground units according to depth of burial.
For surge control design RPSR Actuator dimensions, refer to Becker Surge Control Valves Brochure.
Dimensions and weights are representative only. Consult valve drawings for actual values.

Table 7– Becker RPSR Spring Return Rotary Piston Actuator Selection Table for Standard Control Service

Temperature = -20° F (-6.6°C) 80 psig (5.5 barg) Power Gas

T-Ball Valve Size	500 psi (34 bar) = ΔP		1000 psi (69 bar) = ΔP		1500 psi (104 bar) = ΔP	
	Fail Closed	Fail Open	Fail Closed	Fail Open	Fail Closed	Fail Open
2" (50 mm)	6D-SR-2	6D-SR-2	6D-SR-2	6D-SR-2	8D-SR-7	6D-SR-2
3" (80 mm)	8F-SR-7	8F-SR-7	8F-SR-7	8F-SR-7	8F-SR-7	8F-SR-7
4" (100 mm)	10F-SR-8	8F-SR-7	10F-SR-8	10F-SR-8	10F-SR-8	10F-SR-8
6" (150 mm)	10H-SR-33	10H-SR-33	10H-SR-33	10H-SR-33	12L-SR-39	10H-SR-33
8" (200 mm)	12L-SR-39	12L-SR-39	12L-SR-39	12L-SR-39	14L-SR-41/8	12L-SR-39
10" (250 mm)	14L-SR-41	12L-SR-39	D12L-SR-D39	14L-SR-41	12M/12N-SR-D41	14L-SR-41
12" (300 mm)	D12L-SR-41/39	10L/12L-SR-D39	12M/12N-SR-D41	D12L-SR-D39	14M/14N-SR-D41/8	D12L-SR-D39

Temperature = -20° F (-6.6°C) 100 psig (6.9 barg) Power Gas

T-Ball Valve Size	500 psi (34 bar) = ΔP		1000 psi (69 bar) = ΔP		1500 psi (104 bar) = ΔP	
	Fail Closed	Fail Open	Fail Closed	Fail Open	Fail Closed	Fail Open
2" (50 mm)	5D-SR-2	5D-SR-2	5D-SR-2	5D-SR-2	6F-SR-7	6F-SR-7
3" (80 mm)	6F-SR-7	6F-SR-7	8F-SR-7	8F-SR-7	8F-SR-8	8F-SR-7
4" (100 mm)	8F-SR-8	8F-SR-8	8F-SR-8	8F-SR-8	8F-SR-8	8F-SR-8
6" (150 mm)	10F-SR-33	10F-SR-33	10H-SR-33	10H-SR-33	10H-SR-39	10H-SR-33
8" (200 mm)	10L-SR-39	10L-SR-39	10L-SR-39	10L-SR-39	14L-SR-41/33	12L-SR-41
10" (250 mm)	12L-SR-41	12L-SR-41	14L-SR-41/33	12L-SR-39	14L-SR-41/33	12L-SR-41
12" (300 mm)	14L-SR-41/33	14L-SR-41/8	D10L-SR-39/39/7	14L-SR-41/8	12N/12M-SR-41/41/33	D12L-SR-D39

Temperature = -20° F (-6.6°C) 125 psig (8.6 barg) Power Gas

T-Ball Valve Size	500 psi (34 bar) = ΔP		1000 psi (69 bar) = ΔP		1500 psi (104 bar) = ΔP	
	Fail Closed	Fail Open	Fail Closed	Fail Open	Fail Closed	Fail Open
2" (50 mm)	5D-SR-2	5D-SR-2	5D-SR-2	5D-SR-2	6D-SR-7	6D-SR-7
3" (80 mm)	6F-SR-7	6F-SR-7	6F-SR-7	6F-SR-7	8F-SR-8	6F-SR-7
4" (100 mm)	8F-SR-8	8F-SR-8	8F-SR-8	8F-SR-8	8F-SR-8	8F-SR-8
6" (150 mm)	8H-SR-33	8H-SR-33	8H-SR-33	8H-SR-33	10F-SR-39	10F-SR-39
8" (200 mm)	10L-SR-39	10L-SR-39	10L-SR-39	10L-SR-39	12L-SR-41/33	10L-SR-41
10" (250 mm)	10L-SR-41	10L-SR-41	12L-SR-41/33	12L-SR-41	12L-SR-41/33	12L-SR-41
12" (300 mm)	12L-SR-41/33	12L-SR-39/7	D10L-SR-39/39/7	12L-SR-41/33	D12L-SR39/41/33	14L-SR-41/33

Notes: For valve sizes over 12" bore, please contact Baker Hughes

For Power Gas Pressures greater than 125 psig (862 kPa) or less than 100 psig (689 kPa), please contact Baker Hughes

For higher ΔP Applications, please contact Baker Hughes

Power Gas = P_{supply} - P_{discharge} for applications that utilize Bleed to Pressure System feature

Refer to Surge Control brochure for Surge Actuators selection table

Becker RPSR Actuators are available with optional “Surge Design” for quick stroking Applications where Speed of Response is Critical.

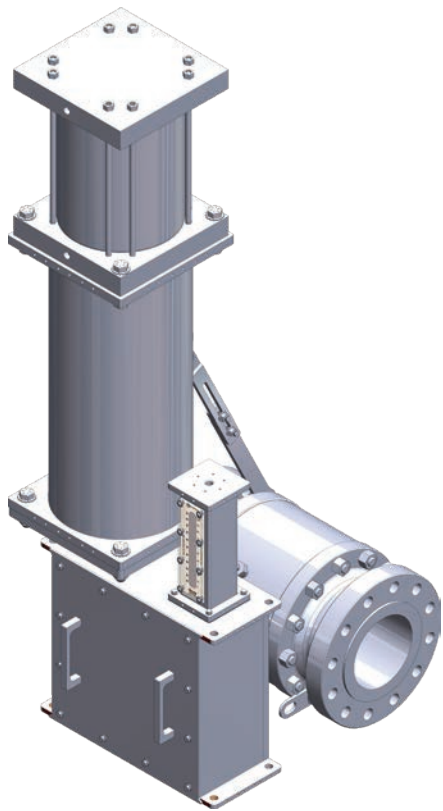


Figure 8 – Becker Surge Control Valve

The Becker Surge Control Valve incorporates the Surge Design RPSR Actuator to provide protection on centrifugal natural gas pipeline compressors. The Surge Control Valve can provide stroking times less than 750 mSec.

The RPSR actuator's Surge Design features components necessary to handle the rigors of high speed control valve applications:

- Stroke times 750 mSec or less
- Pneumatic cushion for protection of actuator piston at end of travel
- Heavy duty pneumatic piston to accommodate fast, frequent stroking with superior reliability
- QEV Series Quick Exhaust Valves for fast dump of pneumatic loading

Note: When the RPSR actuator's Surge Design is incorporated, caution must be exercised to ensure that the mated control valve can accommodate the impulse loading without damage to the control valve stem and trim components. For implementation of Becker T-Ball™ control valves (Models FPCV-T0, QTCV-T1, QTCV-T2, and QTCV-T4), Surge Design must be utilized to accommodate quick stroking speeds. Becker's Surge Design T-Ball valves are designated as follows: FPCV-T0S, QTCV-T1S, QTCV-T2S and QTCV-T4S. Failure to utilize proper control valves and actuators for fast-acting control valve applications could result in damage to the equipment and/or the operator. For complete guidelines for application of Surge Design RPSR Actuators and Surge Design T-Ball control valves, please contact Baker Hughes.

Typical applications for “Surge Design” RPSR actuators:

- Surge control valves
- Slam shut valves
- Fast-acting monitor regulators
- Other quick stroking control valve applications



Figure 9 – Surge Control Valves Centrifugal Natural Gas Compressors (Natural Gas Transmission Industry)

Becker Surge Control valves provide increased protection for centrifugal natural gas compressors. The Surge Control Valve will open rapidly upon potential surge to protect the centrifugal compressor mechanism. Becker Surge Control Valves are well accepted by many natural gas transmission companies and natural gas compressor manufacturers throughout the industry. For additional information see Becker's Surge Control Valve Brochure (SCV).



Figure 10 – Slam Shut and Fast-Acting Monitor Regulators Natural Gas Fired Power Plants (Power Generation Industry)

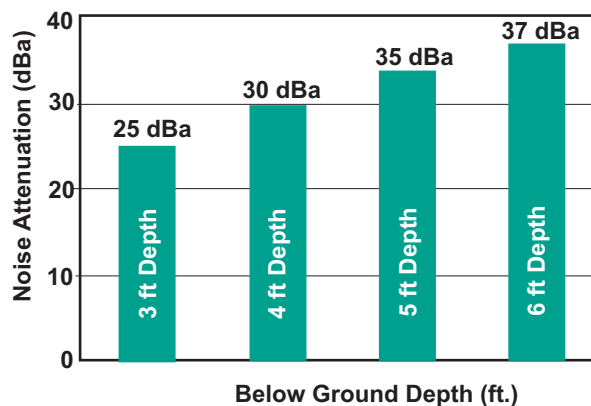
Fast-acting monitor regulators and Slam Shut valves provide the ultimate protection to natural gas Fired turbines from overpressure occurrence. These monitor regulators and slam shut valves utilize Surge Design RPSR actuators to ensure quick stroking and minimize potential of damage to downstream pipe and equipment in the event of potential over-pressurization. Slam Shut valves and fast stroking monitor regulators are standard to most Becker pressure regulator stations that feed power plants due to their reliability and purpose built design.

The Becker below ground ball valve

Regulator option is unique to Becker Products and provides a multitude of benefits by direct burial of the control valve. The valve actuator, lubrication lines, and drain lines are extended above ground while the ball valve remains below ground. The primary advantage of Becker below ground regulators is inexpensive noise attenuation in excess of 25 dBA.

- More than 25 dBA noise attenuation
- Less ambient heat loss
- May use smaller adjacent piping diameter
- Smaller station footprint
- Most economical noise attenuation
- May eliminate need for buildings/enclosures by utilizing the fiberglass cabinet

Below Ground Regulator Option providing additional noise attenuation



Noise Attenuation as Factor of Below Ground Depth Typical below ground depths range from 3 feet to 6 feet burial

The below ground depth is measured from centerline of pipe to ground. Below ground usually provides from 25 dBA to 37 dBA noise attenuation.



Figure 11 – Installation of Becker Below Ground Regulators (Prior to Backfill)

A large natural gas transmission/distribution company installed Becker Below Ground Ball Valve Regulators to achieve maximum noise attenuation, minimal maintenance, and optimum cost effectiveness. The Below ground regulator can provide up to 37 dBA additional noise attenuation with minimal additional cost. Model QTCV-T2 Quiet Trim Control Valves were added to provide additional 15 dBA noise attenuation, bringing total overall noise attenuation up to 50 dBA. The Below Ground Ball Valve regulators are shown during installation, prior to backfill of the regulator station.



Figure 12 – Installation of Becker Below Ground Regulators (After Backfill)

The above installation photo demonstrates the “clean” design of the regulator station. After backfill of the station, only the top works portion of the RPSR actuators extend above ground. The piping system remains below ground, minimizing noise and ambient heat loss. Additionally, technicians find the station design to be easily accessible due to absence of above ground piping and fittings.

Accessories

Becker Control Valve Actuators provide reliability and accuracy for all of your control valve applications



Limit Switches

Limit switches provide an indication of valve status and are commonly utilized on both on-off and control valves. A limit switch assembly will close a contact at both the full-open and at the full-closed position of valve travel. The switches provide a remote indication to gas control, RTU or a flow computer as to the status of a valve. Limit switch assemblies are available with a variety of configurations.

Housing NEMA 4, 4X, 7, Class I, Groups C & D, Division 1 & 2
Switches 2 or 4
Option 2 or 4 Hermetically Sealed Switches

SPDT Single Pole, Double Throw
DPDT Double Pole, Double Throw up to 125 V D.C. at .5 amps up to 250 V A.C. at 15 amps



Position Transmitter

The Valve Position Feedback assembly provides a quantitative indication of the exact position of a control valve. The Valve Position Feedback assembly provides 4-20 mA analog remote position feedback proportional to the control valve position. The feedback signal may be utilized as an integral portion of the control loop or merely as an additional feedback signal to gas control for monitoring valve status. Valve Position Feedback is typically utilized on flow control valves.

Transmitter 4-20 mA Output
Housing NEMA 4, 4X, 7, Class I, Groups C & D, Division 1 & 2
Switches 2 or 4
Option 2 or 4 Hermetically Sealed Switches

SPDT Single Pole, Double Throw
DPDT Double Pole, Double Throw up to 125 V D.C. at .5 amps up to 250 V A.C. at 15 amps



Becker DNGP Digital Valve Positioner

The Becker Digital Natural Gas Positioner (DNGP) features Zero Bleed technology, supports pressure and flow control applications, is compatible with all Becker actuators and may be retrofit to other manufacturers' control valve packages. Its features make the DNGP a true plug-and-play positioner, one that configures easily with any control valve actuator, application logic via menu selections, or tubing configuration. Simple, reliable and versatile, and with multiple redundant safeguards for natural gas pipelines, the Becker DNGP is designed specifically to work with advanced, pneumatically actuated natural gas control valve applications that use electronic communication. A variety of accessories are available to optimize the positioner's performance.



Becker Valve Regulator Pilot (VRP)

The Becker Valve Regulator Pilot (VRP) provides pneumatic pressure control for gas applications. The VRP measures the downstream pressure and utilizes pipeline gas to power the actuator and position the valve to maintain the desired setpoint.

- Maintains control within 0.75% of desired setpoint
- Combines the functions of a positioner and a controller into a single device
- Zero steady state emissions

Let Baker Hughes Help Select the Perfect Rotary Control Valve Actuator

Table 8– Selection table for Becker Control Valves and Actuators

	RPDA (Small Models)	RPDA (Large Models)	SYDA (Small Models)	SYDA (Large Models)	RPSR	SYSR	LPDA (Small Models)	LPDA (Large Models)	LPSR	LD
Actuator Instrumentation										
VRP-CH-Pilot	•	•	•	•			•	•		
VRP-B-CH Pilot	•		•							
VRP-SB-CH-Pilot					•	•			•	•
VRP-SB-PID Pilot					•	•			•	•
HPP-4 Positioner	•	•	•	•			•	•		
HPP-5 Positioner	•		•				•			
HPP-SB Positioner					•	•			•	•
DNGP Positioner	•	•	•	•	•	•	•	•	•	•
VRP-SB-GAP	•	•	•	•	•	•	•	•	•	•
Compatible Valves										
FPCV-T0	•	•	•	•	•	•				
QTCV-T1	•	•	•	•	•	•				
QTCV-T2	•	•	•	•	•	•				
QTCV-T4	•	•	•	•	•	•				
Globe Series							•		•	•
Actuator Options										
Bleed to Pressure System BPS	•		•	•		•	•	•	•	
AB Series Atmospheric Bleed Control	•		•	•		•	•	•	•	
NBV Series No-Bleed Valve	•	•				•	•			
DPS-2 Series Non-Bleed Sensor	•	•				•	•			
PS-2 Series Non-Bleed Sensor	•					•				
SP Series Setpoint Pump	•	•	•	•	•					
RSM Series Remote Setpoint Module	•	•	•	•	•					
Panel Mounting	•	•	•	•	•				•	
Stainless Steel Option	•	•	•	•	•	•	•	•		
VB Series Volume Booster	•		•		•	•		•		
QEV Series Quick Exhaust Valve				•				•		
I/P Transducer						•	•	•		
SLV Series Signal Lock Valve						•	•	•		

Notes: RPSR, SYDA, and LPDA Small Models are defined as actuator size <2000 in³ (0.333m³)
RPSR, SYDA, and LPDA Large Models are defined as actuator size >2000 in³ (0.333m³)
LD Series Actuators are limited to Becker Series Globe Valves
BPS is limited to discharge pressure systems below 300 psig (2068 kPa). Please consult Baker Hughes for application assistance

The Baker Hughes line of Becker valves has a wide variety of control valve actuators with a variety of features that **ensure the optimum solution for your application needs**. Refer to the Figures in the Table 8 to assist you in selecting the proper control valve actuator and accessories.



Figure 13 – Becker RPSR Actuated Control Valves in Power Plant

A Becker RPSR actuated control valve is used to provide primary pressure regulation and overpressure protection (monitor regulators) on a feed to a gas-fired power plant. The RPSR shown here are equipped with Becker Model HPP-SB High Pressure Positioners to provide maximum speed of response combined with optimum accuracy.



Figure 14 – Becker RPSR Actuators are ideal for Surge Control/Recycle Valves

Becker RPSR Actuators are ideal for use as Surge Control/Recycle Valves installed on centrifugal gas pipeline compressors. The RPSR may be equipped with a pneumatic cushion system to enable quick stroking of control valves from closed to open position in 750 mSec or less. The RPSR may also be configured for other high speed applications such as high speed slam shut valves.

CAUTION

This information is intended as a guideline for application of Becker Control Valve products. Baker Hughes strongly recommends consulting Becker Engineering prior to application of any product.

Direct Sales Office Locations

Australia

Brisbane
Phone: +61-7-3001-4319

Perth
Phone: +61-8-6595-7018

Melbourne
Phone: +61-3-8807-6002

Brazil

Phone: +55-19-2104-6900

China

Phone: +86-10-5738-8888

France

Courbevoie
Phone: +33-1-4904-9000

India

Mumbai
Phone: +91-22-8354790

New Delhi

Phone: +91-11-2-6164175

Italy

Phone: +39-081-7892-111

Japan

Tokyo
Phone: +81-03-6871-9008

Korea

Phone: +82-2-2274-0748

Malaysia

Phone: +60-3-2161-03228

Mexico

Phone: +52-55-3640-5060

Russia

Veliky Novgorod
Phone: +7-8162-55-7898

Moscow

Phone: +7-495-585-1276

Saudi Arabia

Phone: +966-3-341-0278

Singapore

Phone: +65-6861-6100

South Africa

Phone: +27-11-452-1550

South & Central America and the Caribbean

Phone: +55-12-2134-1201

Spain

Phone: +34-935-877-605

United Arab Emirates

Phone: +971-4-8991-777

United Kingdom

Phone: +44-7919-382-156

United States

Houston, Texas
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