

RPDA Series Rotary Piston Double Acting Actuators

RPDA Rotary Piston Double Acting Actuators Are Suited for Below Ground Regulation and Bleed to Pressure System™ Applications

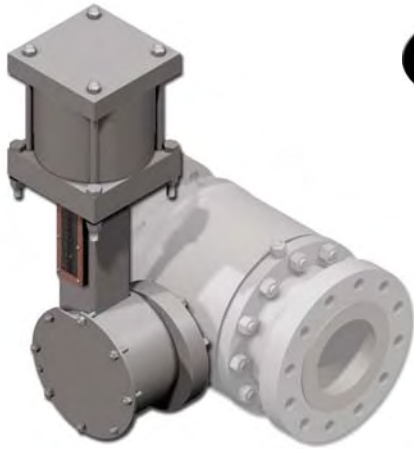


Figure 1 - Becker RPDA Rotary Piston Double Acting Actuator

The Becker RPDA is a rugged, quarter-turn actuator design for the rigors or 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 allows power gas pressures up to 500 psig (3447 kPa). This extended power gas range permits the implementation of Becker's unique Bleed to Pressure System™ which eliminates all atmospheric emissions. Additionally, the RPDA is available with a Below Ground Option to substantially reduce noise with minimal additional expense.

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	500 psig (3447 kPa) Models 10L and smaller 4 50 psig (3103 kPa) Models 12L and larger
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 Table 7
Weight	See Table 3, 4, and 5
Dimensions	See Table 3, 4, and 5
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.	

Description

The RPDA Rotary Piston Double Acting Actuator is designed for heavy duty control applications that require optimum performance. The RPDA is typically utilized when applications require a lock last failure mode. The RPDA incorporates a crank-arm mechanism specifically designed for the rigors of throttling control valve applications. The RPDA can accept high pressure power supply gas up to 500 psig (3447 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 500 psig (3447 kPa).
- Upright actuator design saves space and promotes longer actuator piston seal life
- Designed to be maintenance free
- Comes equipped with a precision linear scale that indicates valve position in ten degree increments.
- Crank-arm design actuators specifically suited for control valve applications
- May be mounted in any installation orientation



Figure 2 - 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. 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.

RPDA Rotary Piston Double Acting Actuator Components

Figure 3 - RPDA Rotary Piston Double Acting Actuator Exploded View

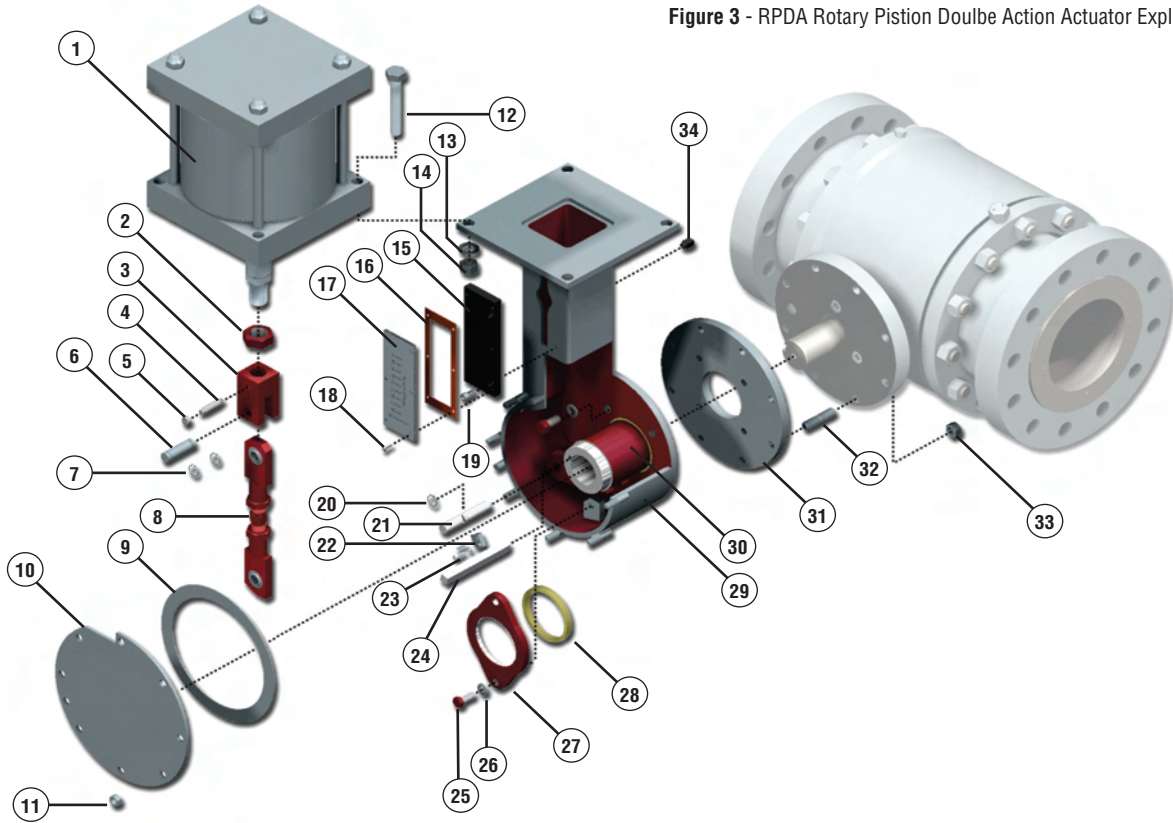


Table 1 - RPDA Rotary Piston Double Acting Actuator parts description and materials

Item	Description	Material	Item	Description	Material
1	Cylinder*	Carbon Steel	18	Indicator Screw	Stainless Steel
2	Jam Nut	Carbon Steel	19	Indicator Frame Screw	Carbon or Stainless Steel
3	Rod Clevis	Carbon Steel	20	Tru-Arc Ring	Carbon Steel
4	Indicator Bar	Stainless Steel	21	Torque Arm Pin	Stress Proof Steel
5	Position Indicator	Aluminum	22	Pin Clamp	Carbon Steel
6	Rod Clevis Pin	Stress Proof Steel	23	Pin Clam Hardware	Carbon Steel
7	Tru-Arc Ring	Carbon Steel	24	Square Key	Carbon Steel
8	Connecting Link	Carbon Steel	25	Outboard Bearing Bolt	Carbon Steel
9	Cover Plate Gasket	Rubber	26	Outboard Bearing Washer	Carbon Steel
10	Cover Plate	Carbon Steel	27	Outboard Bearing Plate	Carbon Steel
11	Cover Plate Nut	Carbon Steel	28	Outboard Bearing	Duralon®
12	Cylinder Bolt	Carbon Steel	29	Actuator Housing	Carbon Steel
13	Cylinder Lockwasher	Carbon Steel	30	Torque Arm	Carbon Steel
14	Cylinder Nut	Carbon Steel	31	Adapter Plate	Carbon Steel
15	Indicator Frame	PVC	32	Stud	Carbon Steel
16	Indicator Gasket	Rubber	33	Nut	Carbon Steel
17	Lexan Cover	Lexan	34	Vent Elbow	Plastic
*Note - See page 3, Figure 4 for complete description of RPDA actuator cylinder					

Becker RPDA Rotary Piston Double Acting Actuator Cylinder Components

Figure 4 - RPDA Rotary Piston Double Acting Actuator Cylinder Exploded View

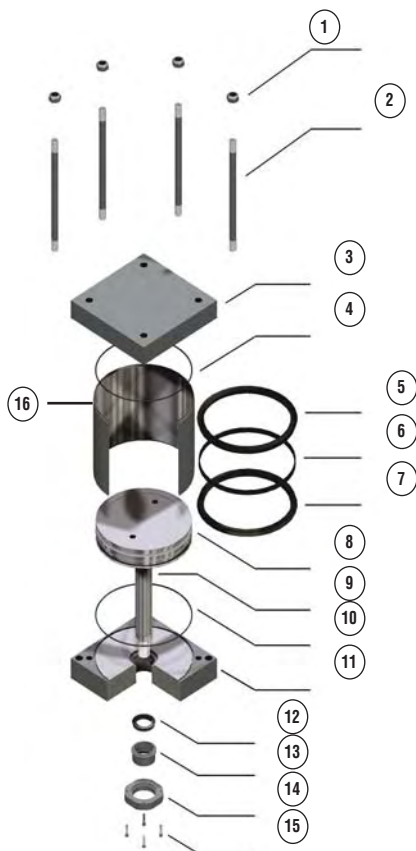


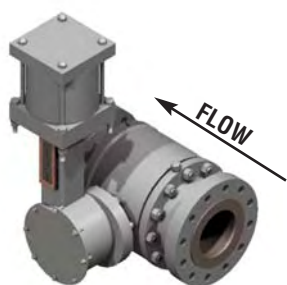
Table 2 - Components & Materials for construction of RPDA Rotary Piston Double Acting Actuator Cylinder

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

Notes:
 * Teflon is a registered trademark of Dupont Company
 ** Duralon is a registered trademark of Rexnord, Inc.

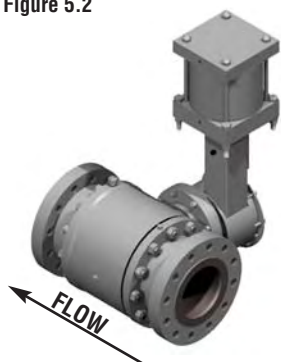
RPDA Actuators Standard Mounting Configurations

Figure 5.1



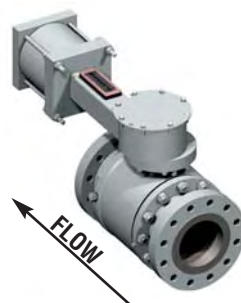
Mount #1 - Left Hand (Standard)
 with clean sweep feature
 Actuator located on left hand side of valve when looking in direction of flow (actuator vertical / valve stem horizontal).

Figure 5.2



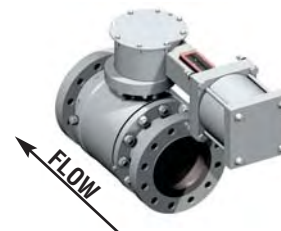
Mount #2 - Right Hand
 Actuator located on right hand side of valve when looking in direction of flow (actuator vertical/valve stem horizontal).

Figure 5.3



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 5.4



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 Actuator Built Solid for All Your Control Valve Needs



Bleed to Pressure System™ Can Eliminate Bleed Gas Emissions

Becker RPDA Actuators feature the unique ability to incorporate the Bleed to Pressure System™ feature. Becker RPDA Actuators and control instrumentation can accept high pressure power gas and discharge bleed gas to lower pressure systems. Bleed to Pressure System™ eliminates all atmospheric emissions!



Below Ground Actuator Option Reduces Noise Attenuation up to 37 dBA

Becker RPDA Actuators are available with a unique below ground option that provides superior noise attenuation in regulator stations at minimal cost. Additionally, below ground stations minimize ambient heat loss by maintaining piping systems below ground.

Maintenance Free

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

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.

High Pressure Capability

The RPDA is specifically constructed to accept high pressure natural gas up to 500 psig (3448 kPa). Higher pressure power gas allows use of smaller actuators and implementation of Becker's unique Bleed to Pressure System™.

Vertical Advantage

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

Easy to Read Travel Indicator

All RPDA actuators come equipped with a precision linear scale that indicates valve position in ten percent increments.

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.

Torque Arm Bearings

RPDA Actuators features 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.

U-Cup 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.

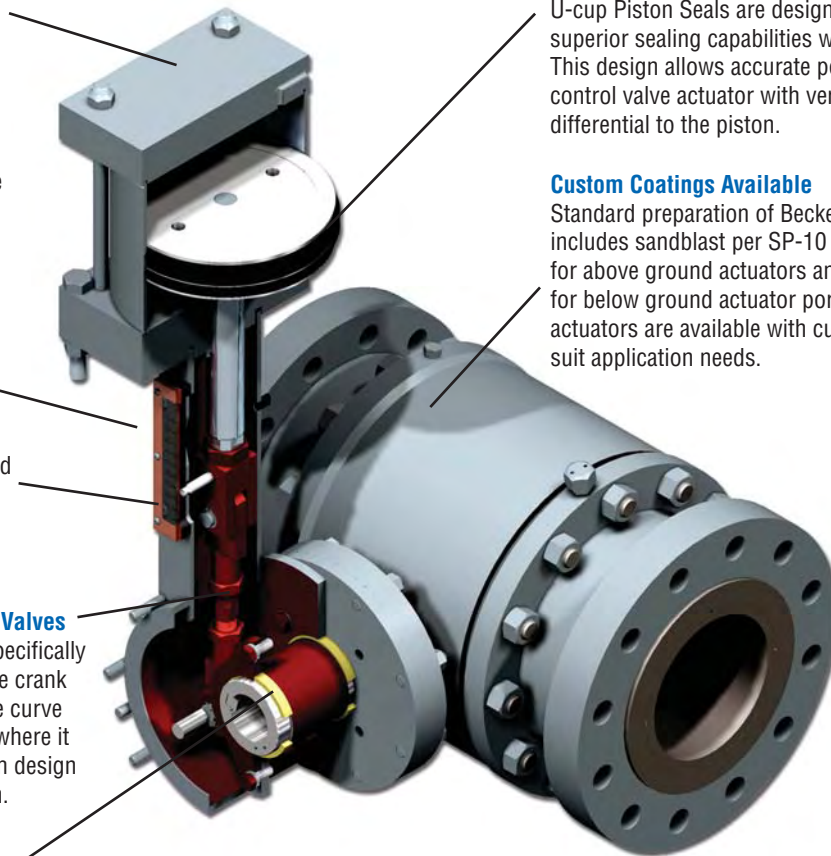


Figure 6 - Cutaway view of RPDA Actuator and Cylinder.

Figure 7 - RPDA Single Cylinder Actuator up to 12 inch stroke

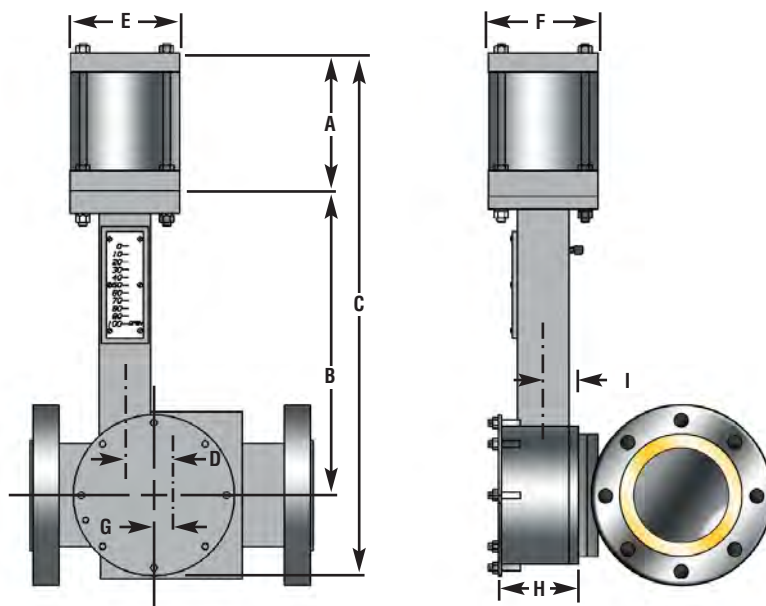


Table 3 - RPDA Single Cylinder Actuator Dimensions up to 12 inch stroke

Dimensions in inches (mm)										Weight	Volume
Model	A	B	C	D	E	F	G	H	I	lbs (kg)	in ³ (cm ³)
4D	9.25 (235)	14.13 (359)	28.63 (727)	2.38 (60)	6.25 (159)	4.50 (114)	0.38 (10)	5.38 (137)	2.13 (54)	120.00 (54)	50.2 (823)
5D	9.56 (243)	14.13 (359)	28.94 (735)	2.38 (60)	7.63 (194)	5.50 (140)	0.38 (10)	5.38 (137)	2.13 (54)	125.00 (57)	78.5 (1,286)
6D	10.19 (259)	14.63 (371)	30.06 (764)	2.38 (60)	8.63 (219)	6.50 (165)	0.38 (10)	5.38 (137)	2.13 (54)	150.00 (68)	113.0 (1,852)
6F	12.19 (310)	18.19 (462)	34.81 (884)	3.63 (92)	6.50 (165)	6.50 (165)	1.38 (35)	7.00 (178)	2.75 (70)	210.00 (95)	169.6 (2,779)
8F	11.69 (297)	18.81 (478)	36.50 (927)	3.63 (92)	8.50 (216)	8.50 (216)	1.38 (35)	7.00 (178)	2.75 (70)	245.00 (111)	301.4 (4,940)
8H	13.06 (332)	19.81 (503)	36.75 (933)	4.75 (121)	8.50 (216)	8.50 (216)	1.50 (38)	7.00 (178)	2.75 (70)	295.00 (134)	401.9 (6,586)
8L	17.69 (449)	25.06 (637)	51.50 (1308)	7.25 (184)	8.50 (216)	8.50 (216)	4.00 (102)	8.50 (216)	3.50 (89)	440.00 (200)	602.9 (9,879)
10F	13.06 (332)	19.25 (489)	38.56 (979)	3.63 (92)	10.63 (270)	10.63 (270)	1.38 (35)	7.00 (178)	2.75 (70)	345.00 (157)	471.0 (7,718)
10H	15.06 (383)	20.25 (514)	42.44 (1078)	4.75 (121)	10.63 (270)	10.63 (270)	1.50 (38)	7.00 (178)	2.75 (70)	390.00 (177)	628.0 (10,291)
10L	19.06 (484)	25.50 (648)	53.31 (1354)	7.25 (184)	10.63 (270)	10.63 (270)	4.00 (102)	8.50 (216)	3.50 (89)	545.00 (247)	942.0 (15,437)
12L	19.06 (484)	25.50 (648)	53.81 (1367)	7.25 (184)	12.75 (324)	12.75 (324)	4.00 (102)	8.63 (219)	3.63 (92)	655.00 (297)	1356.5 (22,229)
14L	20.94 (532)	25.75 (654)	55.56 (1411)	7.25 (184)	14.75 (375)	14.75 (375)	4.00 (102)	8.63 (219)	3.63 (92)	850.00 (386)	1846.3 (30,256)
Note: Dimensions "B" and "C" will change for below ground units according to depth of burial											

Figure 8 - RPDA Single Cylinder Actuator greater than 12 inch stroke

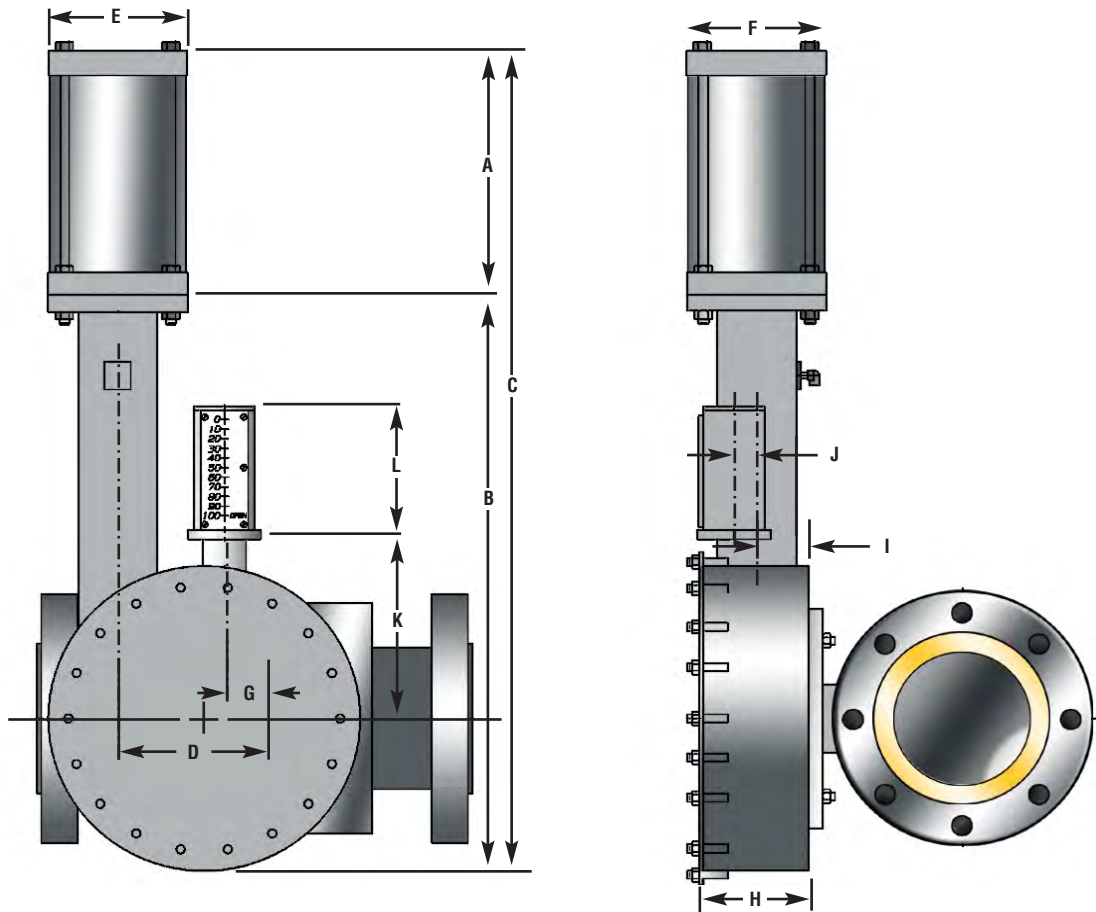


Table 4 - RPDA Single Cylinder Actuator Dimensions greater than 12 inch stroke

Dimensions in inches (mm)													Weight	Volume
Model	A	B	C	D	E	F	G	H	I	J	K	L	lbs (kg)	in ³ (cm ³)
12T	29.56 (751)	41.00 (1041)	86.56 (2199)	12.00 (305)	12.75 (324)	12.75 (324)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	985 (447)	2262.0 (37,068)
12X	33.56 (852)	47.63 (1210)	100.38 (2550)	14.50 (368)	12.75 (324)	12.75 (324)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	1135 (515)	2715.0 (44,491)
12Z	35.56 (903)	48.63 (1235)	103.38 (2626)	15.75 (400)	12.75 (324)	12.75 (324)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	1295 (588)	2941.0 (48,194)
14T	30.94 (786)	41.63 (1057)	88.31 (2243)	12.00 (305)	14.75 (375)	14.75 (375)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	1165 (529)	3079.0 (50,456)
14X	34.94 (887)	48.00 (1219)	101.94 (2589)	14.50 (368)	14.75 (375)	14.75 (375)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	1335 (606)	3695.0 (60,550)
14Z	36.94 (938)	49.00 (1245)	104.94 (2665)	15.75 (400)	14.75 (375)	14.75 (375)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	1425 (647)	4003.0 (65,597)
Note: Dimensions "B" and "C" and "K" will change for below ground units according to depth of burial														

Figure 9 - RPDA Double Cylinder Actuator Dimensions greater than 12 inch stroke

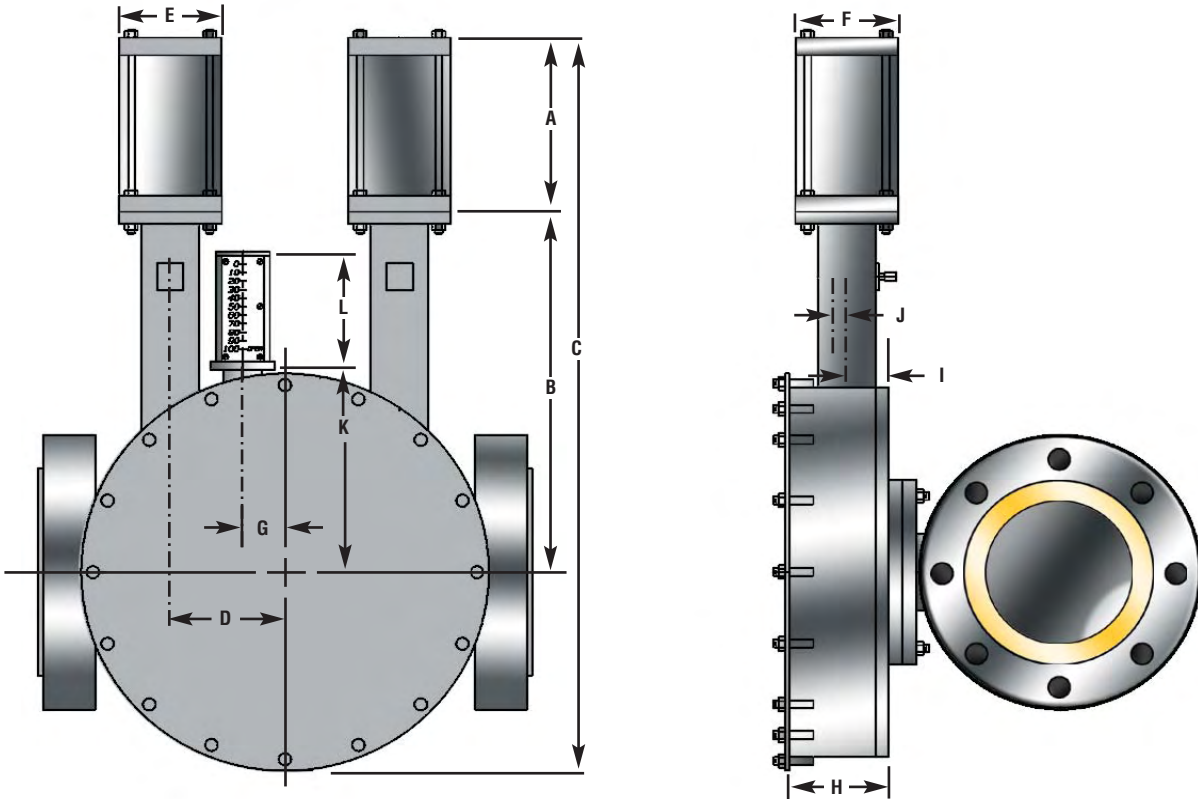


Table 5 - RPDA Double Cylinder Actuator Dimensions greater than 12 inch stroke

Model	Dimensions in inches (mm)												Weight	Volume
	A	B	C	D	E	F	G	H	I	J	K	L	lbs (kg)	in ³ (cm ³)
D12T	29.56 (751)	41.00 (1041)	89.56 (2275)	12.00 (305)	12.75 (324)	12.75 (324)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	2097 (952)	4524.0 (74,135)
D12X	33.56 (852)	47.63 (1210)	102.19 (2596)	14.50 (368)	12.75 (324)	12.75 (324)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	2375 (1078)	5430.0 (88,982)
D12Z	35.56 (903)	48.63 (1235)	106.19 (2697)	15.75 (400)	12.75 (324)	12.75 (324)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	2565 (1165)	5882.0 (96,389)
D14T	30.94 (786)	41.63 (1057)	91.31 (2319)	12.00 (305)	14.75 (375)	14.75 (375)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	2110 (958)	6158.0 (100,912)
D14X	34.94 (887)	48.00 (1219)	103.94 (2640)	14.50 (368)	14.75 (375)	14.75 (375)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	2380 (1081)	7390.0 (121,100)
D14Z	36.94 (938)	49.00 (1245)	107.94 (2742)	15.75 (400)	14.75 (375)	14.75 (375)	3.63 (92)	12.00 (305)	5.00 (127)	3.75 (95)	20.00 (508)	9.56 (243)	2580 (1171)	8006.0 (131,195)
Note: Dimensions "B" and "C" and "K" will change for below ground units according to depth of burial														

Table 6 - Becker RPDA Actuator Selection Table

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" (50mm)	5D	5D	5D
3" (80mm)	5D	5D	6D
4" (100mm)	6F	6F	6F
6" (150mm)	8F	8F	8H
8" (200mm)	10F	10F	10H
10" (250mm)	10H	10H	10L
12" (300mm)	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" (50mm)	5D	5D	5D
3" (80mm)	5D	5D	5D
4" (100mm)	6F	6F	6F
6" (150mm)	8F	8F	8H
8" (200mm)	10F	10F	10H
10" (250mm)	10H	10H	10L
12" (300mm)	10L	10L	12L

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

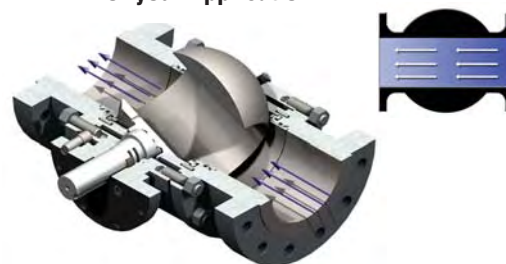
T-Ball Valve Size	500 (3447 kPa) = ΔP	1000 (6895 kPa) = ΔP	1500 (10342 kPa) = ΔP
	Double Acting	Double Acting	Double Acting
2" (50mm)	5D	5D	5D
3" (80mm)	5D	5D	5D
4" (100mm)	6F	6F	6F
6" (150mm)	8F	8F	8H
8" (200mm)	10F	10F	10H
10" (250mm)	10H	10H	10L
12" (300mm)	10L	10L	12L

Temperature -20° F (-6.7°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" (50mm)	5D	5D	5D
3" (80mm)	5D	5D	5D
4" (100mm)	6F	6F	6F
6" (150mm)	8F	8F	8H
8" (200mm)	10F	10F	10H
10" (250mm)	10H	10H	10H
12" (300mm)	10L	10L	10L

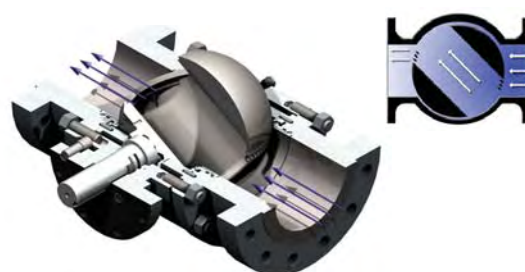
1. Contact Becker Precision Equipment for valve sizes over 12" bore.
2. T-Ball valves are comprised of the following: FPCV-T0, FPBV, QTCV-T1, QTCV-T2, and QTCV-T4
3. For power gas pressures greater/less than 100 psig (689 kPa) contact Becker Precision Equipment.
4. For higher ΔP applications contact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

Choose the Perfect Rotary Control Valve for your Application



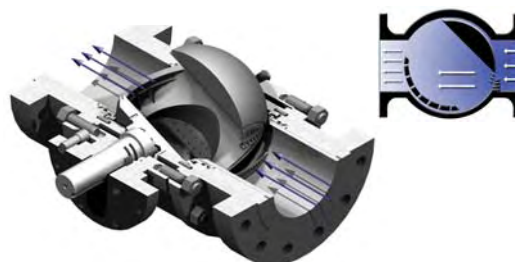
FPCV-T0 Series Full Port Control Valve:

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



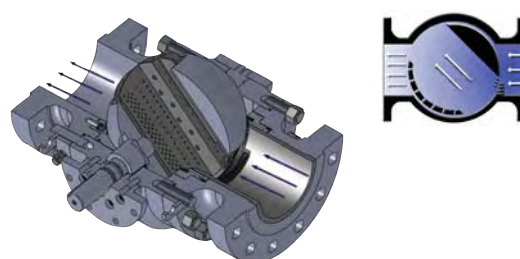
QTCV-T1 Series Quiet Trim Control Valve:

- 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:

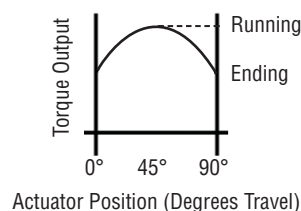
- Noise attenuation up to 25 dBA
- High turndown capability up to 200:1
- High pressure drop shutoff capability to Class IV

Table 7 - Becker RPDA Actuator Output Torque Table

RPDA Actuator Model No.	Angular Position¹	RPDA Actuator Output Torque / Power Gas						MAOP³
		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)	500 psig			
	Running	5334 in-lb (36777 n-m)	6669 in-lb (45978 n-m)	8002 in-lb (55173 n-m)	(3447 kPa)			
6F	Ending	7557 in-lb (52104 n-m)	9446 in-lb (65128 n-m)	11336 in-lb (78159 n-m)	500 psig			
	Running	11377 in-lb (78442 n-m)	14221 in-lb (98050 n-m)	17066 in-lb (117668 n-m)	(3447 kPa)			
8F	Ending	13761 in-lb (94879 n-m)	17201 in-lb (118597 n-m)	20642 in-lb (142322 n-m)	500 psig			
	Running	20717 in-lb (142839 n-m)	25896 in-lb (178547 n-m)	31076 in-lb (214264 n-m)	(3447 kPa)			
8H	Ending	18117 in-lb (124912 n-m)	22646 in-lb (156139 n-m)	27176 in-lb (187372 n-m)	500 psig			
	Running	26253 in-lb (181009 n-m)	32816 in-lb (226259 n-m)	39380 in-lb (271519 n-m)	(3447 kPa)			
10F	Ending	21477 in-lb (148079 n-m)	26846 in-lb (185097 n-m)	32216 in-lb (222121 n-m)	500 psig			
	Running	32334 in-lb (222932 n-m)	40417 in-lb (278662 n-m)	48501 in-lb (334403 n-m)	(3447 kPa)			
10H	Ending	28277 in-lb (194963 n-m)	35346 in-lb (243702 n-m)	42416 in-lb (292448 n-m)	500 psig			
	Running	40976 in-lb (282519 n-m)	51220 in-lb (353146 n-m)	61465 in-lb (423783 n-m)	(3447 kPa)			
10L	Ending	41501 in-lb (286139 n-m)	51876 in-lb (357672 n-m)	62252 in-lb (429212 n-m)	500 psig			
	Running	61222 in-lb (422109 n-m)	76527 in-lb (527634 n-m)	91833 in-lb (633169 n-m)	(3447 kPa)			
12L	Ending	58760 in-lb (405136 n-m)	73450 in-lb (506420 n-m)	88140 in-lb (607704 n-m)	400 psig			
	Running	93781 in-lb (646595 n-m)	117226 in-lb (808244 n-m)	140671 in-lb (969893 n-m)	(2758 kPa)			
14L	Ending	79642 in-lb (549112 n-m)	99553 in-lb (686394 n-m)	119463 in-lb (823668 n-m)	400 psig			
	Running	127108 in-lb (876381 n-m)	158886 in-lb (1095481 n-m)	190662 in-lb (1314571 n-m)	(2758 kPa)			
12T	Ending	100412 in-lb (692316 n-m)	125515 in-lb (865395 n-m)	150618 in-lb (1038475 n-m)	400 psig			
	Running	156116 in-lb (1076381 n-m)	195145 in-lb (1345476 n-m)	234174 in-lb (1614571 n-m)	(2758 kPa)			
12X	Ending	120017 in-lb (827488 n-m)	150021 in-lb (1034358 n-m)	180026 in-lb (1241236 n-m)	400 psig			
	Running	187277 in-lb (1291230 n-m)	234096 in-lb (1614035 n-m)	280916 in-lb (1936851 n-m)	(2758 kPa)			
14T	Ending	136093 in-lb (938328 n-m)	170116 in-lb (1172908 n-m)	204140 in-lb (1407496 n-m)	400 psig			
	Running	211591 in-lb (1458868 n-m)	264488 in-lb (1823582 n-m)	317387 in-lb (2188307 n-m)	(2758 kPa)			
14X	Ending	162665 in-lb (1121536 n-m)	203331 in-lb (1401918 n-m)	243998 in-lb (1682307 n-m)	400 psig			
	Running	253826 in-lb (1750068 n-m)	317282 in-lb (2187583 n-m)	380740 in-lb (2625108 n-m)	(2758 kPa)			
14Z	Ending	174886 in-lb (1205796 n-m)	218608 in-lb (1507249 n-m)	262329 in-lb (1808695 n-m)	400 psig			
	Running	275168 in-lb (1897216 n-m)	343961 in-lb (2371525 n-m)	412752 in-lb (2845824 n-m)	(2758 kPa)			
D12T	Ending	200824 in-lb (1384633 n-m)	251030 in-lb (1730791 n-m)	301236 in-lb (2076949 n-m)	400 psig			
	Running	312232 in-lb (2152761 n-m)	390290 in-lb (2690951 n-m)	468347 in-lb (3229142 n-m)	(2758 kPa)			
D12X	Ending	240034 in-lb (1654976 n-m)	300043 in-lb (2068724 n-m)	360051 in-lb (2482464 n-m)	400 psig			
	Running	374554 in-lb (2582460 n-m)	468194 in-lb (3228081 n-m)	561831 in-lb (3873690 n-m)	(2758 kPa)			
D12Z	Ending	258066 in-lb (1779302 n-m)	322583 in-lb (2224131 n-m)	387099 in-lb (2668954 n-m)	400 psig			
	Running	406044 in-lb (2799577 n-m)	507556 in-lb (3499477 n-m)	609067 in-lb (4199366 n-m)	(2758 kPa)			
D14T	Ending	272187 in-lb (1876663 n-m)	340234 in-lb (2345831 n-m)	408281 in-lb (2814998 n-m)	400 psig			
	Running	423183 in-lb (2917747 n-m)	528980 in-lb (3647186 n-m)	634776 in-lb (4376626 n-m)	(2758 kPa)			
D14X	Ending	325331 in-lb (2243078 n-m)	406664 in-lb (2803849 n-m)	487997 in-lb (3364621 n-m)	400 psig			
	Running	507653 in-lb (3500147 n-m)	634567 in-lb (4375187 n-m)	761481 in-lb (5250226 n-m)	(2758 kPa)			
D14Z	Ending	349772 in-lb (2411593 n-m)	437215 in-lb (3014491 n-m)	524658 in-lb (3617389 n-m)	400 psig			
	Running	550336 in-lb (3794431 n-m)	687920 in-lb (4743039 n-m)	825504 in-lb (5691647 n-m)	(2758 kPa)			

Notes:

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



The Becker Below Ground Ball Valve Regulator

option is unique to Becker 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



**Add up to 37 dBA
Noise Attenuation**

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

A large natural gas transmission/distribution company based in Southern California 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. Two different size Below Ground Ball Valve Regulators are shown here. 16" Bore Below Ground Regulators are shown in background, while 30" bore Below Ground Ball Valve Regulators are shown in foreground. The Below Ground Ball Valve Regulators are shown during installation, prior to backfill of the regulator station.

Below Ground Regulator Option Providing Additional Noise Attenuation

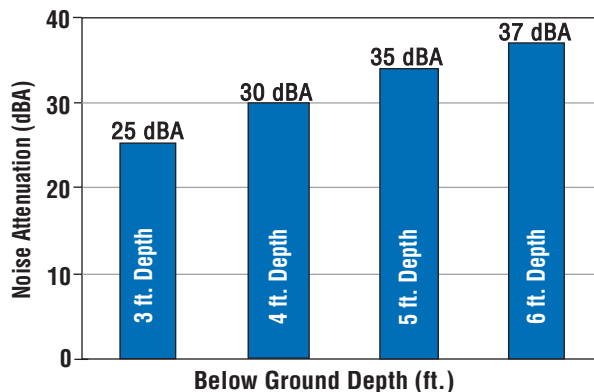


Figure 10 - Below Ground Noise Attenuation Compared to Depth.

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 12 - Installation of Becker Below Ground Regulators (After Backfill)

The customer was able to achieve up to 25 dBA noise attenuation over conventional above ground control valves with minimal costs. The RPDA utilizes an extended linkage to throttle the control valve below ground. Many Becker customers have utilized the below ground concept for many years with great success and minimal maintenance. The topworks of the control valve actuators are enclosed with Becker CAB Series Fiberglass Cabinets (green) after backfill of regulator station. 16" Below Ground Ball Valve Regulators are located at left, while 30" Below Ground Ball Valve Regulators are located at right. A masonry wall has been installed at the perimeter of the station. Upstream station isolation valves are located in the foreground of the picture.

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



Trip Valve

The Trip Valve protects double-acting actuators from loss of supply gas pressure. In the event that the supply gas pressure falls below a minimum level, the trip valve can be configured to do one of the following: lock the valve in last position, stroke the valve to the full-open position*, Stroke the valve to the full-closed position*

*These applications require an additional volume tank to perform the operation

Max. Allowable 150 psig (1034 kPa)
Weight 4.5 lbs (2.0 Kg)
Body Connections 1/4" FNPT
Temp. Limits -40°F to +180°F
 (-40°C to +82°C)

Trip Point Adjustable from 40 psig (276 kPa) to 70% of supply pressure
Volume Tank Required for fail-open or fail-closed modes. DOT approval LP Tank (240 psig (1655 kPa) Max with DOT Stamp). Size based on application.



Hydraulic Operator override

The Hydraulic pump override is utilized for manual operation of large control valves when pneumatic power is not available. The Hydraulic pump override utilizes a hydraulic pump and reservoir to develop necessary torque to close/open the control valve. Hydraulic pump overrides are typically utilized on ball control valves larger than 16" bore.



Gear Operator Override

The Manual Handwheel is utilized for manual operation of small/medium sized control valves when pneumatic power is not available. The handwheel utilizes a system of gear multipliers to develop necessary torque to close/open the control valve. Manual Handwheels are limited to ball type control valves 16" bore and smaller.



MCV

The MCV Series Manual Control Valve provides manual operation of pneumatic valve actuators. The MCV is the ideal device for maintenance and manual operation of control valves. The MCV allows the user to override the primary control instrumentation and position the control valve actuator in any position. The unique safety button feature of the MCV prevents unintentional operation. An optional locking feature is available for additional security.

Maximum Allowable Operation Pressure

Model MCV-3 Up to 150 psig (1034 kPa)
Model MCV-3M 150 psig (1034kPa) to 250 psig (1724 kPa)
Model MCV-3H 250 psig (1723kPa) to 500 psig (3447 kPa)

All Ports 1/4" FNPT
Weight 10 lbs (4.5 Kg)

Let Becker 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										
Below Grade Option	•	•			•					
Bleed to Pressure System™	•	•			•		•	•	•	
Limit Switch	•	•	•	•	•	•	•	•	•	•
Position Transmitter	•	•	•	•	•	•	•	•	•	•
Trip Valve	•	•	•	•			•	•		
Hydraulic Override	•	•	•	•	•	•	•	•		
Gear Override	•	•	•	•	•	•				•
Manual Control Valve	•	•	•	•	•	•	•	•	•	•

1. RPDA, SYDA & LPDA Small Models are defined as actuator sizes <2000 in³ (32,774 cm³)
2. RPDA, SYDA & LPDA Large Models are defined as actuator sizes >2000 in³ (32,774 cm³)
3. LD Series Actuators are limited to Becker CVE Series Globe Valves
4. BPS™ is limited to discharge pressure systems below 300 psig (2068 kPa). Consult Becker for application assistance.

***CAUTION:** This information is intended as a guideline for application of Becker Precision Equipment products. Becker strongly recommends consulting Becker Engineering prior to application of any product.

Becker Precision Equipment 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 to the left to assist you in selecting the proper control valve actuator & accessories.

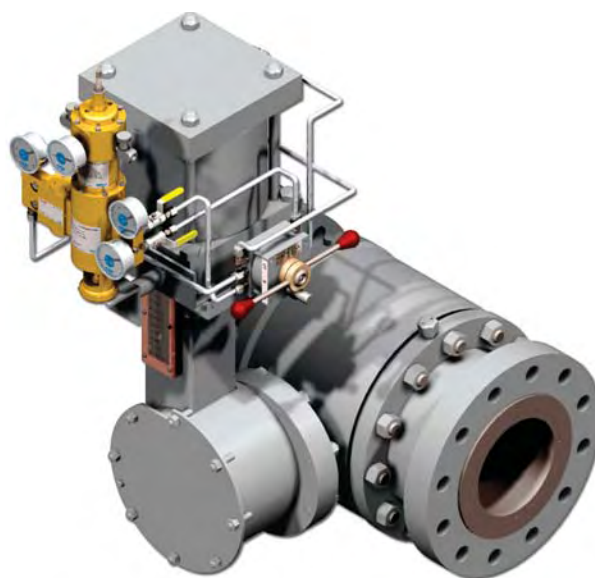


Figure 13 - Becker RPDA Rotary Piston Double Acting Actuator

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 Becker's 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.

Additional Resources are available on our website. Sales literature, sizing software, and technical manuals are available for download at www.dresser.com/becker

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