OpExc

Eccentric Plug Control Valve

OPTIMUX

OpExc
Eccentric Control Valve

Introduction

The OpExc is a high performance rotary control valve characterized by its eccentric and innovative plug. The OpExc has been designed for optimal performance in a wide array of process control applications, such as: Low pressures, high Cv's, slurry fluids, Oil&Gas, etc. The OpExc operates comfortably under high shut-off pressure drop conditions as much as 100 bars (1450psig) and operating temperatures from -100C to 430C (-150F to 800F).

Its eccentric plug offers excellent and extended rangeability of 160:1 compared to 50:1 in a globe valve and 20:1 in the majority of the butterfly valves. The robustness of the OpExc reduces significantly common problems caused by knocking and battering.

The OpExc has low hysteresis as well as high strength on actuation and accurate control enhanced by the utilization of our piston actuator, which grants additional robustness to the complete assembly when compared to other actuators found in the market.

The OpExc has a very robust "not-through" shaft anchored by a fixed post in the other end, and which allows for uninterrupted flow of fluids. This characteristic increases Cv's up to 70% when compared to other valves displaying rotary plugs.

The OpExc is manufactured in diameters of 1" to 12" and comes in two types of bodies: With flanges (ANSI class 150, 300, and 600) and flangeless (ANSI class 150 and 300). The OpExc ability to handle large Cv's in normal or severe applications is unmatched by any other valve design in the Oil, Chemical, and Pulp & Paper industries. All these attributes make the OpExc the choice for many process control engineers.

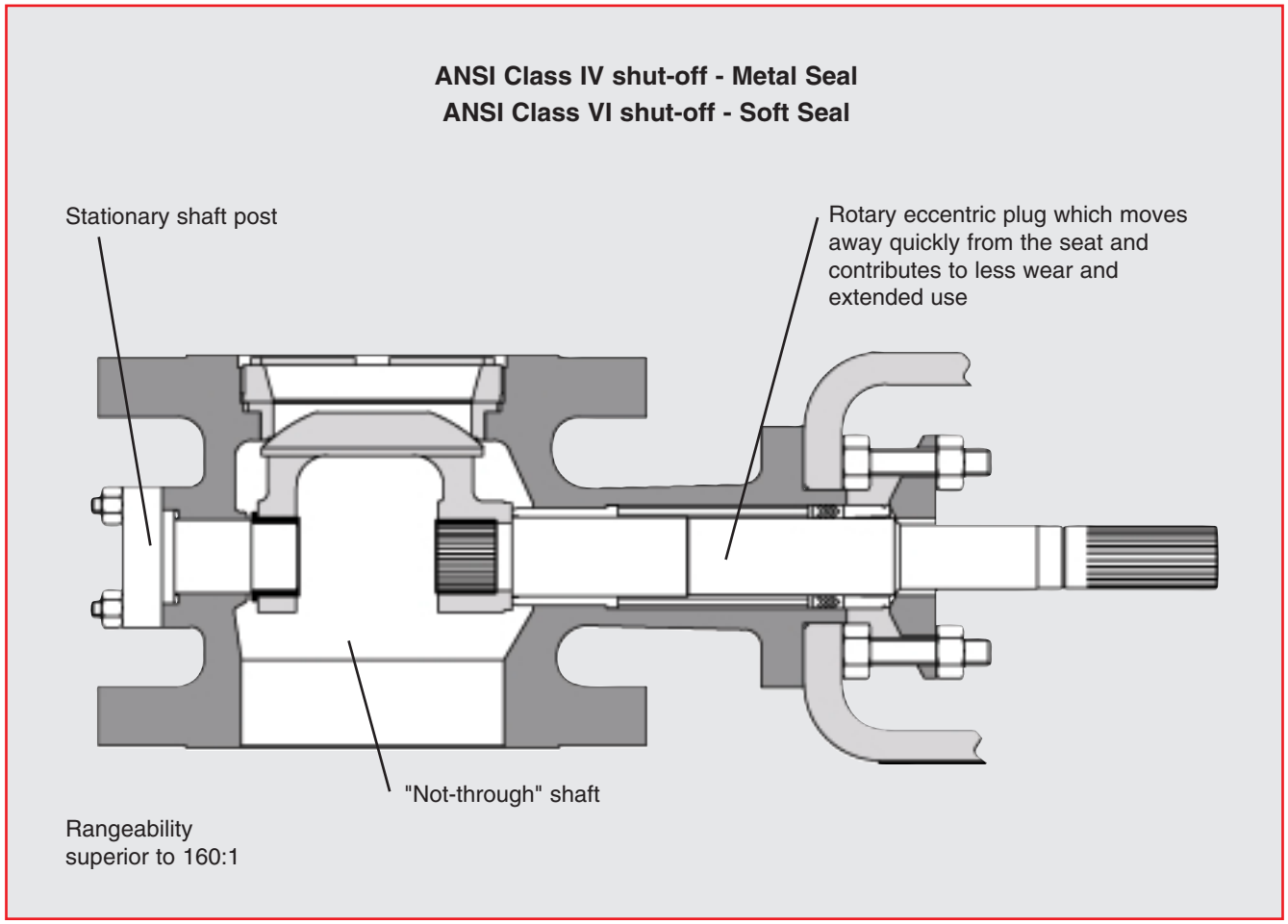


Figure 1: OpExc Rotary Plug Control Valve

OpExc
Closing/Construction

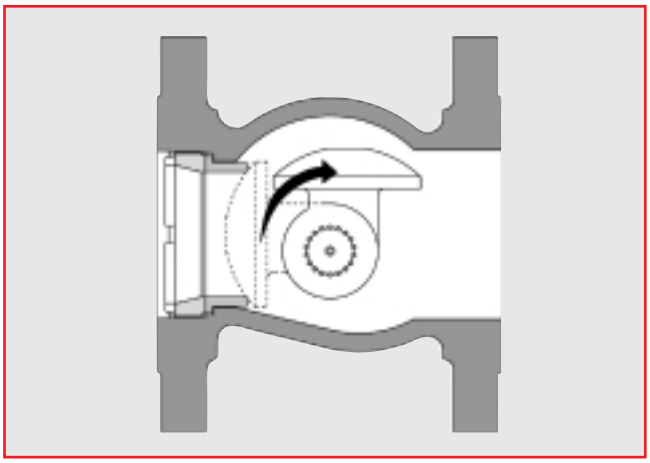


Figure 2: Opening Valve

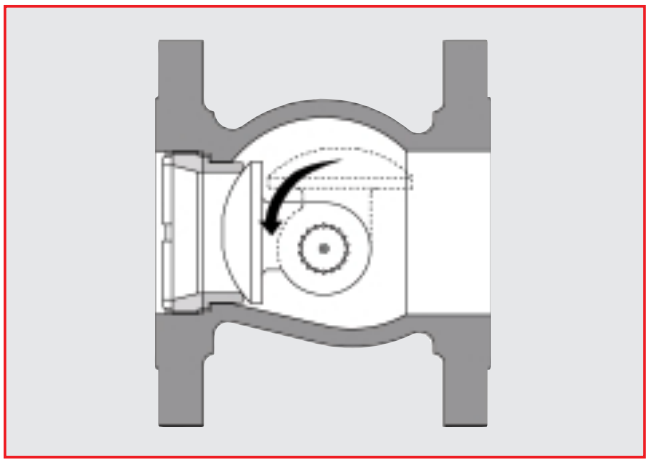


Figure 3: Closing Valve

Adjusted Closing, Low Maintenance

The valve configuration warrants a high flow capacity. In the open position (figure 2), the plug travels away from the center of the flow and direction, the shaft as well, stays out of contact.

As the valve opens and the plug turns away from the seat the possibility of knocking or battering is greatly reduced. The eccentric shape of the OpExc has zero breakout torque which allows the use of smaller actuators thus reducing costs and maintenance time.

High C_V, Initial Zero Dynamic Par

The eccentric plug with double separation turns towards the seat up to a given angle that eliminates skidding over its own surface (figure 3). This type of design reduces wear of the seat and consequently the need for frequent maintenance and making the OpExc one of the highest performance valves for severe applications.

Due to the fact that plug and shaft do not constraint flow, it produces one of the highest CV's in the industry.

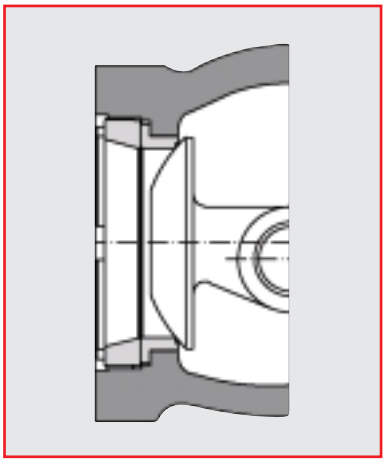


Figure 4: Integral Seat

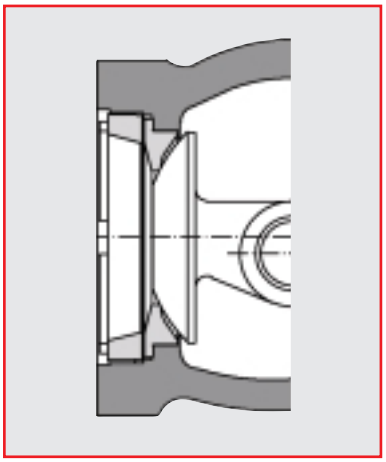


Figure 5: Reduced Seat

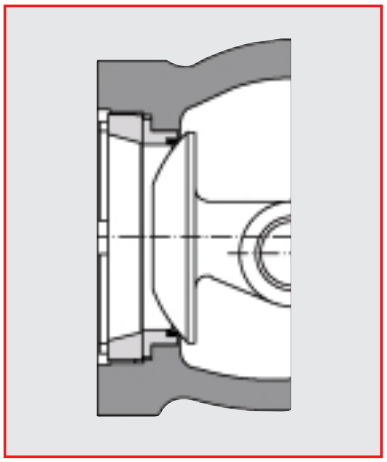


Figure 6: Soft Seat

Seats

The OpExc amply serves the demands of different flows. The internals are supplied with 100%, 70% in valves diameters from 1" to 12" and 40% in valves from 1" to 6".

Metal seats fulfill shut-off requirements for ANSI Class IV and ANSI Class VI, using soft seats.

OpExc
Special Constructions

Plugs
For slurry fluid applications the OpExc is manufactured with O-rings that control the emission of aggressive liquids to the seal sets and the stationary shaft (figure 7).

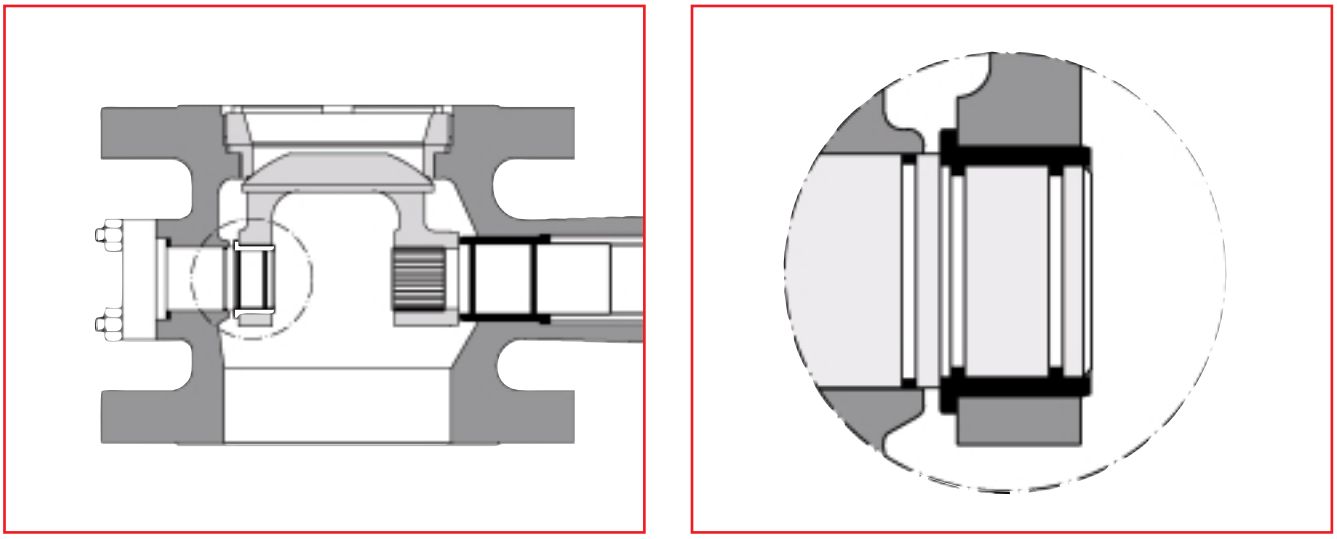


Figure 7: Sealed System

Ceramic Internals
For solids in suspension fluid applications, the OpExc is furnished with a set of internals fabricated in high resistance ceramic, to withstand the effects of abrasion and corrosion (figure 8).

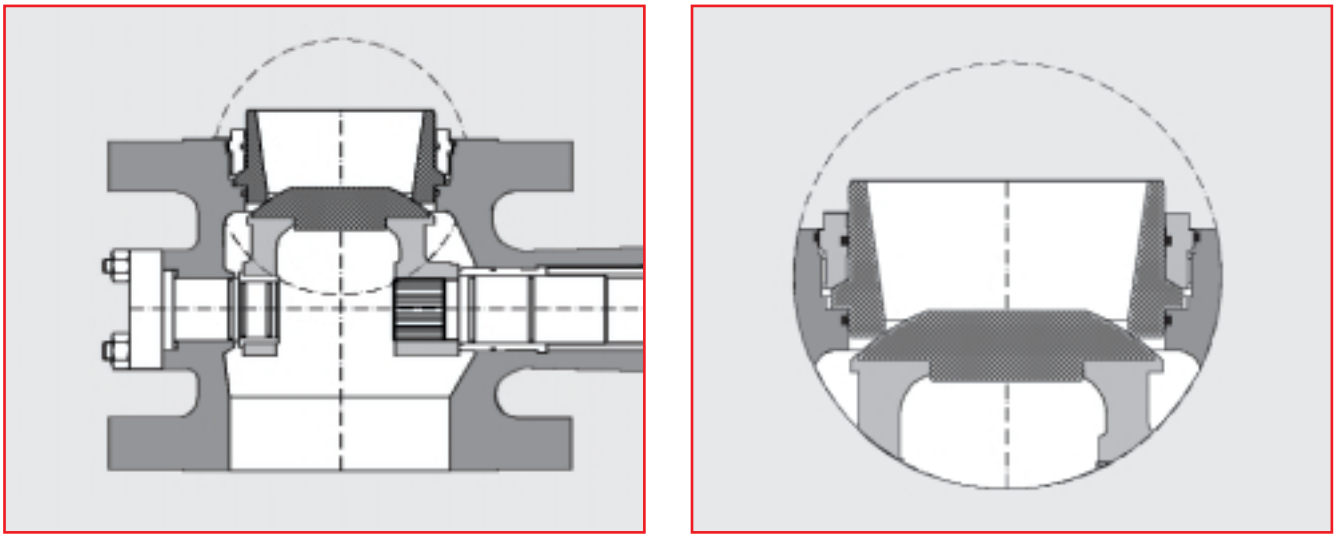


Figure 8: Ceramic Internals

OpExc
Construction Materials

Dependability

The shaft of the OpExc has been designed and built robust and oversized as to eliminate any possibility of failure. Its design offers ample contact between the shaft and its bearings, this way reducing unnecessary wear and increasing the life expectancy of the valve. The plug made of 17-4pH and hardened by thermal treatment provides excellent shut-off characteristics that broadens its applications such as flashings, corrosive fluids, medium cavitations, and water steam, in general.

The "not-through" shaft design eliminates obstructions to the fluids. When the valve is open, the fluid is not deviated towards the seat or to the seat retainer, which gives the OpExc high dependability even after many years of intensive use.

The union between shaft and plug is made via a well adjusted and precise splined system, which helps to eliminate the traditional pins or other mechanical elements conducive to corrosion and/or damages caused by vibrations.

The strong seat allows the utilization of the OpExc under high differential pressures. For severe applications the plug and its seat can be fabricated with a surface partially or totally in stellite # 6.

In addition the packing set is placed away from the effects of the fluid, increasing its life under either low or high temperatures.

The typical maintenance cycle for the OpExc surpasses 5 years, and its life expectancy surpasses 20 years. Our OpTk actuators have a life superior to one million cycles, making the OpExc the most dependable valve.

Performance

CV capacity and rangeability of 160:1 far surpasses any other eccentric plug valve in the market.

Table I: Standard Construction Materials

Component	Standard Materials	
	Carbon Steel Sub-Assembly	Stainless Steel Sub-Assembly
Body*	Carbon Steel ASTM A 216 WCB/WCC	Stainless Steel ASTM A 351 CF8M
Plug	A 564 Gr 630 (17-4 PH) 316 w/ Stellite #6	A 564 Gr 630 (17-4 PH) 316 w/ Stellite #6
Shaft	A 564 Gr 630 (17-4 PH)	A 564 Gr 630 (17-4 PH)
Shaft Post	A 564 Gr 630 (17-4 PH)	A 564 Gr 630 (17-4 PH)
Bearings	AISI 440C & Sealed	Duplex 2205 & Sealed
Packing Spacer	AISI 316	AISI 316
Anti-Extrusion Ring	AISI 316	AISI 316
Seat Retaining	AISI 316 Cr Plated (Screw)	AISI 316 Cr Plated (Screw)
Metal Seat Soft Seat	AISI 316 AISI 316 with Stellite #6, 416HT PTFE	AISI 316 AISI 316 with Stellite #6, 416HT PTFE
Packings	PTFE V-Ring braided Asbestos free AFPI Grafoil PT; PTXT PTG	PTFE V-Ring braided Asbestos free AFPI Grafoil PT; PTXT PTG

* Other cast materials

OpExc
Characteristics & Advantages

High Flow Coefficients, Cv

- Up to 70% higher than other valve models with rotary plugs. Also available with reduced internals.

Superior quality

- Shaft and internals made of standardized materials. Withstands higher pressure drops than other valve models with rotary plugs.

Not-through shaft

- Shaft is placed away from the flow line which offers high Cv's and less wear caused by erosion.
- The OpExc can be used in pulp applications with concentrations of up to 3%.

Anti-Expulsion Security System

- Conventional rotary valves do not feature a shaft security system that avoids personal damages and operational risks.

Eccentric Rotary Plug

- Zero breakout torque requirement
- Closing pressure warrants a high shutoff
- Plug moves off the seat instantly, causing considerable less wear.

Reinforced Plug Construction

- Higher resistance to intense knocking.

Precise Control Characteristics

- The plug profile permits for effortless rotation with no contact with the seat.

High Capacity for Control

- Rangeability higher than 160:1

Increased security

- The fluid flow will help on the fail position (open or close), in case of lack of air.

High pressure drops

- Due to its design the OpExc supports Delta P up to 100 Bars (1450 psi).

Bi-directional Closing

Valve can be mounted with shaft upstream or downstream.

Easy Serviceable Shafts and Plugs

- Easier maintenance
- Reduced costs by substitution of only damaged parts.

With Flanges

- ANSI Class 150, 300 y 600.

Without Flanges

- ANSI Class 150-300.

Reduced Internals

- Only one component changes for its utilization with reduced internals in 70% and 40% of area.

Excellent Shut Off Characteristics

- Metallic seat offers shut off ANSI Class IV
- Soft seat offers shut off ANSI Class VI

Multiple Options for Gaskets

- Materials and configurations available for most applications
- Options for emission controls fulfill EPA* norms

All these characteristics have made the OpExc a superior valve within its category.

*EPA (U.S. Environmental Protection Agency)

OpExc
Rotary Actuator

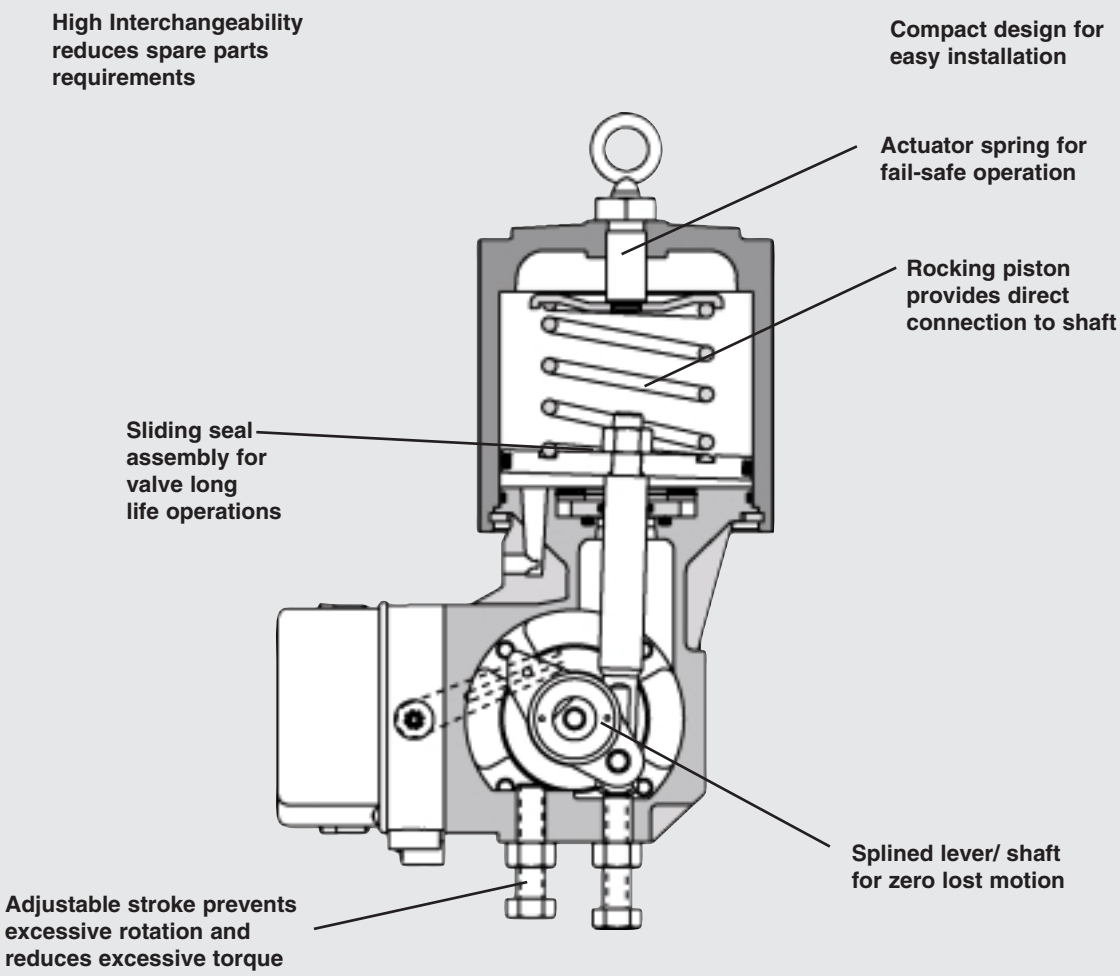


Figure 9: OpTk Series RA Rotary Actuator

OpTk Series RA spring cylinder rotary actuator combines high stiffness of pneumatic equipment with excellent throttling capabilities. These characteristics are designed into a lightweight, rugged and compact assembly, making the OpTk rotary actuator, the foremost choice for quarter turn applications. The OpTk rotary actuator is designed to operate the OpVee performance V-notch ball valve as well as the OpDx rotary eccentric disk valve, and the OpExc rotary eccentric plug, or other applications where precise rotary motion is required. The OpTk double-acting spring cylinder actuator is designed for supply pressures up to 150psi (10.3 Bars).

The above characteristics ensure high pressure operations. The Optimux OpTk actuator provides a proved life time cycle above one million cycles, so becoming the most trustworthy actuator in the market today. The positioner delivers air simultaneously to both sides of the piston in the cylinder maintaining exceptional stiffness with precise throttling control and a high frequency response. Fail safe inherent position is achieved by both flow direction through the valve and actuators spring assembly position. Because of the above intrinsic characteristics, the series RA OpTk rotary actuators provide a high performance operation significantly superior than that of a diaphragm actuator.

OpExc
Rotary Actuator, Features and Advantages

Important features and advantages of the OpTk Series RA rotary actuators are guaranteed by the following characteristics:

Accepts up to 150 psi (10.3 Bars) air supply
* Achieves higher torques
* Obtains stiff piston positioning
* Permits higher DP on valve

Rocking Piston
* Provides direct connection to shaft
* Assures zero lost motion between actuator and valve
* Utilizes fewer parts

Splined shaft lever
* Allows zero lost motion

Compact, lightweight, rugged
* Permits easy maintenance
* Installs in limited space applications
* Easily meets seismic requirements

Low friction bearings
* Provides millions of cycles with minimal wear
* Provides low hysteresis

Field reversible
* Requires no extra parts
* Permits fast, easy field reversing
* Requires no change of spring action

Fail safe spring
* Moves actuator to failure position

Air-purged, fully enclosed transfer case
* Prevents corrosion of linkage
* Ensures safe operation
* Contains external position indicator
* Allows four mounting positions w/o retubing, changing or adding parts

Interchangeability
* Standard to all rotary valves

Double acting high performance positioner
* Pneumatic 3-15 psi
* Electropneumatic 4-20mA
* Digital

Optimux's OpTk Series RA rotary actuator is a high-performance compact actuator which combined with its design characteristics, construction materials and quality, easily achieves both precise throttling and on/off control applications.

OpExc
Rotary Actuator, Specifications

Table II: Actuator Specifications

Size	Stroke		Maximum Inlet Air Pressure		Spring Type	Cylinder Top Area		Cylinder Bottom Area	
	Cm	Inches.	Bar	Psi		Cm^2	$Inch^2$	Cm^2	$Inch^2$
25	47.8	1.88	10.3	150	Standard Heavy	153.3	23.76	148.8	23.07
50	82.6	3.25	10.3	150	Standard Heavy	304.3	47.17	297.2	46.07
100	101.6	4.00	10.3	150	Standard Heavy	613.1	95.03	601.7	93.26
200	101.6	4.00	5.5	80	Standard Heavy	1217.4	188.69	1206.0	186.92

Table III: Actuator Specifications

Type	Cylinder with Double Acting Piston with spring for fail position
Sizes	25, 50, 100, 200; Handwheel type Manual-Rotary
Type of Action	Air-to-Open Air-to-Close Field Reversible
Operating Pressure*	Max. 10.3 Bars (150 psi)
Operating Temperature**	-40˚C a 175˚C (-40˚a 35˚F)

* See Table II for limitations in certain sizes.

** Ambient temperatures superior to 82˚C (180˚F) require Viton rings.
Ambient temperatures inferior to -40˚C (-40˚F) require Fluorsilicone rings.

Table IV: Construction Materials

Yoke	Ductile Iron
Transfer case	Anodized Aluminum
Shaft	Stainless Steel 420
Bearings	Fiberglass with Teflon
Retaining Ring	Derlin, Aluminum
Sliding Seal	Steel with Cadmium
Piston	Anodized Aluminum
Cylinder	Anodized Aluminum
“O” Ring**	Buna N (Standard)
Spring Base	Stainless Steel

OpExc

Specifications, Limitations of the Stem

Table V: Maximum Differential Pressure of the Stem (Psi)= Downstream

Size (Inches)	Area of the Internals	Degrees of Opening									
		0	10	20	30	40	50	60	70	80	90
1	Total	1450	1427	1277	1156	1214	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
1 1/2	Total	1421	1086	972	880	924	1231	1231	1450	1450	1450
	70%	1450	1450	1347	1218	1250	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
2	Total	1450	1111	994	899	945	1260	1260	1450	1450	1450
	70%	1450	1450	1440	1302	1367	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
3	Total	1450	1450	1434	1298	1363	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
4	Total	1272	972	972	1032	1032	918	918	1180	1450	1450
	70%	1450	1362	1362	1447	1447	1286	1286	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
6	Total	751	574	574	610	610	542	542	697	976	976
	70%	983	752	752	799	799	711	711	913	1278	1278
	40%	1450	1146	1146	1218	1218	1082	1082	1392	1450	1450
8	Total	540	372	418	480	395	326	312	370	447	447
	75%	714	493	553	635	523	431	413	490	592	592
10	Total	224	156	173	199	163	135	129	153	185	185
	75%	296	204	229	263	217	179	171	203	245	245
12	Total	348	277	348	332	258	193	164	164	219	219
	75%	461	367	462	441	342	257	218	218	291	291

OpExc
Specifications

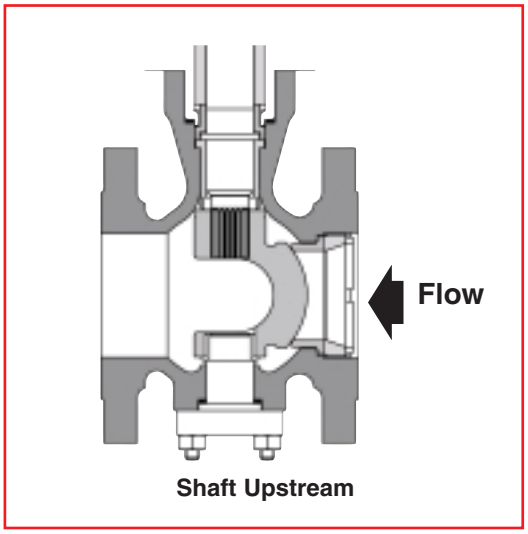
Table VI: Maximum Differential Pressure of the Stem(Psi) = Upstream

Size (Inches)	Area of the Internals	Degrees of Opening									
		0	10	20	30	40	50	60	70	80	90
1	Total	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
1 1/2	Total	1321	1450	1450	1450	1450	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
2	Total	1260	1450	1450	1450	1450	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
3	Total	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
4	Total	1102	1378	1450	1450	1450	1450	1450	1450	1450	1450
	70%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	40%	1450	1450	1450	1450	1450	1450	1450	1450	1450	1450
	6 Total	650	813	1450	1450	1450	1394	976	976	1450	1450
	70%	852	1065	1450	1450	1450	1450	1279	1279	1450	1450
	40%	1298	1450	1450	1450	1450	1450	1450	1450	1450	1450
8	Total	432	540	1296	1450	1450	926	648	648	1450	1450
	75%	572	715	1450	1450	1450	1226	858	858	1450	1450
10	Total	179	224	538	1343	1450	384	269	269	1343	1343
	75%	237	296	711	1450	1450	508	356	356	1450	1450
12	Total	232	290	667	1450	1450	497	348	348	1450	1450
	75%	309	386	925	1450	1450	660	462	462	1450	1450

Table VII: Maximum Differential Pressure on the seat

Type of Seat	Process Fluid	Open Position		Closed Position	
		Bar	Psi	Bar	Psi
Metal Seat	Liquids, Vapors	24.7	363	98.6	1450
Metal Seat	Gases	49.3	725	98.6	1450
Soft Seat	Liquids, Vapors	9.8	145	49.3	725
Soft Seat	Gases	19.7	290	49.3	725

OpExc
Specifications



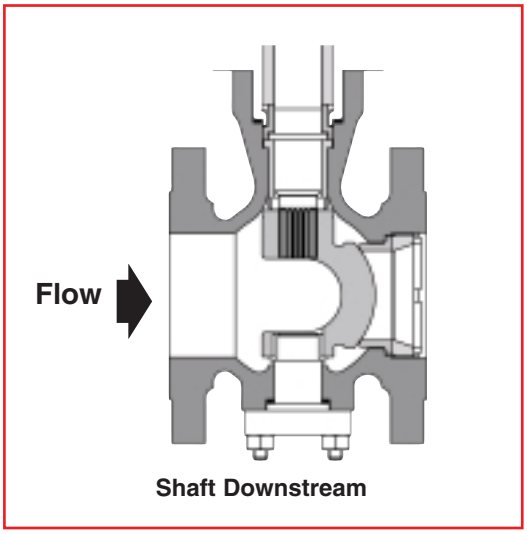


Table VIII: Maximum Flow Capacity (Cv)

Valve Size (Inches)	Trim Area					
	100		75/70		40	
	Shaft Orientation					
	Outlet					
	Metal	Soft	Metal	Soft	Metal	Soft
1	18	10	13	7	7	6
1 1/2	47	39	33	33	19	19
2	80	71	53	53	32	32
3	245	245	182	182	104	104
4	408	408	269	269	170	170
6	935	935	560	560	392	392
8	1500	1500	930	930		
10	2180	2180	1740	1740		
12	3200	3200	2020	2020		

Table IX: Maximum Flow Capacity (Cv)

Valve Size (Inches)	Trim Area					
	100		75/70		40	
	Shaft Orientation					
	Inlet					
	Metal	Soft	Metal	Soft	Metal	Soft
1	21	12	15	8	8	6
1 1/2	50	40	35	35	20	20
2	78	69	55	55	31	31
3	218	218	167	167	95	95
4	305	305	223	223	150	150
6	780	780	597	597	335	335
8	1100	1100	826	826		
10	1725	1725	1294	1294		
12	2440	2440	1830	1830		

OpExc
Dimensions

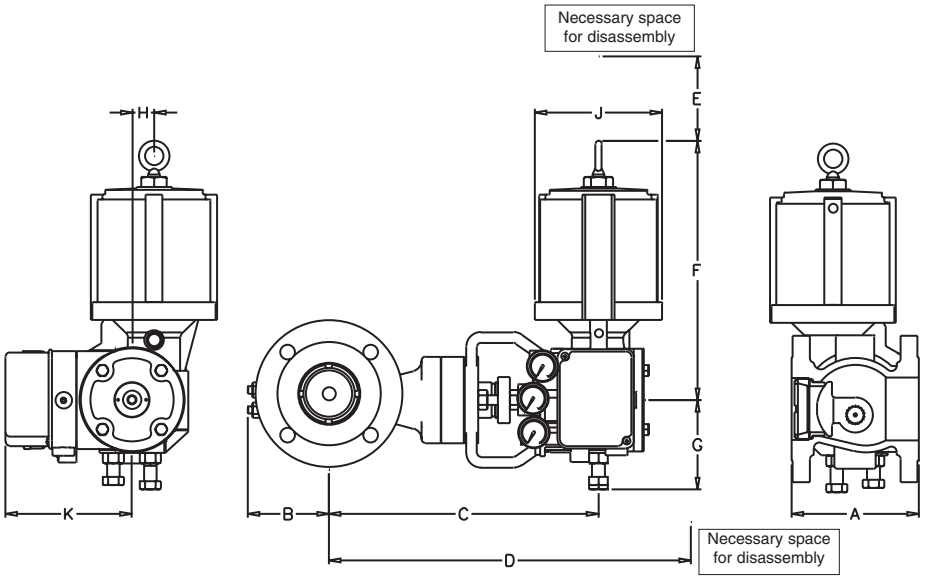


Table X: Dimensions for the OpExc

Valve Size (Inches)	Actuator Size	Stem Diameter		A*		B		C		D		E		F		G		H		J		K	
		mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.	mm	In.
1	25	11	0.4	102	4.0	61	2.4	297	11.7	510	20.0	152	6.0	332	13.1	142	5.6	28	1.1	165	6.5	165	6.5
1 1/2	25	16	0.6	114	4.5	79	3.1	322	12.7	535	21.0	152	6.0	332	13.1	142	5.6	28	1.1	165	6.5	165	6.5
2	25	16	0.6	124	4.9	86	3.4	324	12.8	535	21.0	152	6.0	332	13.1	142	5.6	28	1.1	165	6.5	165	6.5
	50	16	0.6	124	4.9	86	3.4	324	12.8	535	21.0	203	8.0	457	18.0	170	6.7	51	2.0	231	9.1	188	7.4
3	25	23	0.9	165	6.5	119	4.7	419	16.5	635	25.0	152	6.0	332	13.1	142	5.6	28	1.1	165	6.5	165	6.5
	50	23	0.9	165	6.5	119	4.7	419	16.5	635	25.0	203	8.0	457	18.0	170	6.7	51	2.0	231	9.1	188	7.4
4	25	23	0.9	194	7.6	127	5.0	423	16.7	661	26.0	152	6.0	332	13.1	142	5.6	28	1.1	165	6.5	165	6.5
	50	23	0.9	194	7.6	127	5.0	423	16.7	661	26.0	203	8.0	457	18.0	170	6.7	51	2.0	231	9.1	188	7.4
6	50	26	1.0	229	9.0	160	6.3	468	18.4	680	27.0	203	8.0	457	18.0	170	6.7	51	2.0	231	9.1	188	7.4
	100	38	1.5	229	9.0	160	6.3	468	18.4	722	29.0	279	11.0	574	22.6	231	9.1	61	2.4	318	12.5	216	8.5
8	50	26	1.0	243	9.6	190	7.5	479	18.8	685	27.0	203	8.0	457	18.0	170	6.7	51	2.0	231	9.1	188	7.4
	100	38	1.5	243	9.6	190	7.5	479	18.8	733	29.0	279	11.0	574	22.6	231	9.1	61	2.4	318	12.5	216	8.5
10	50	26	1.0	273	10.7	226	8.9	548	21.6	751	30.0	203	8.0	457	18.0	170	6.7	51	2.0	231	9.1	188	7.4
	100	38	1.5	273	10.7	226	8.9	548	21.6	802	32.0	279	11.0	576	22.6	231	9.1	61	2.4	318	12.5	216	8.5
12	100	38	1.5	292	11.5	267	10.5	573	22.5	827	33.0	279	11.0	576	22.6	231	9.1	61	2.4	318	12.5	216	8.5

OpExc

The information and specification described in this brochure are considered accurate. However these are for information purposes only and should not be considered as certified information. Considering that Optimux products are continuously improved and updated, specifications, dimensions and information described herein are subject to change without notice. For further information or verification, consult your Optimux representative. Specific instructions for the installation, operation, troubleshooting and maintenance of the OpExc is contained in the OpExc installation and maintenance manual.

For more information, visit our website at www.optimuxcontrols.com

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