TRIMTECK®
OPTIMUX®

OpVEE™ V-Notch Control Valve

TECHNICAL BROCHURE

ENLARGE Engineering

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OpVEE™
Introduction

Trimteck's **OpVEE** Control Valve is the highest performance V-Notch Ball Valve on the market today. Its advanced design features have taken into account the requirements and recommendations of process control engineers and plant personnel from across varying industries: Pulp & Paper, Chemical, Oil & Gas, Power Generation, and others. Its signature v-notch ball with an equal percent flow characterization delivers an astounding 300 to 1 turndown.

Trimteck's design engineers have combined unique features such as an oversized post bearing system, and a large packing box with a robust bolted flange and stem blowout prevention. Special care has been given to the mechanical connection between shaft and ball, which is splined using precise EDM techniques for maximum grip to avoid any lost motion or dead band.

The **OpVEE** valve body is casted as a single piece, using investment casting technology, which assures an integral metallurgy, zero porosity, accurate mechanical tolerances, and perfect alignment of all moving parts.

For flexibility in actuation alternatives, the tops of our shafts have been designed according to standard ISO mounting patterns so as to facilitate the use of a large variety of rotary actuators, including Trimteck's own models (OpTK-R Piston-Cylinder, OpRPA Rack & Pinion, OpSY Scotch Yokes, etc.), as well as other manufacturers' models.

To summarize: the Trimteck-Optimux **OpVEE** is a state-of-the-art v-notch ball control valve that provides affordable, precise process control to users in a multitude of demanding industries.

Figure 1: OpVEE V-Notch Control Valve

OpVEE™
Control Valve

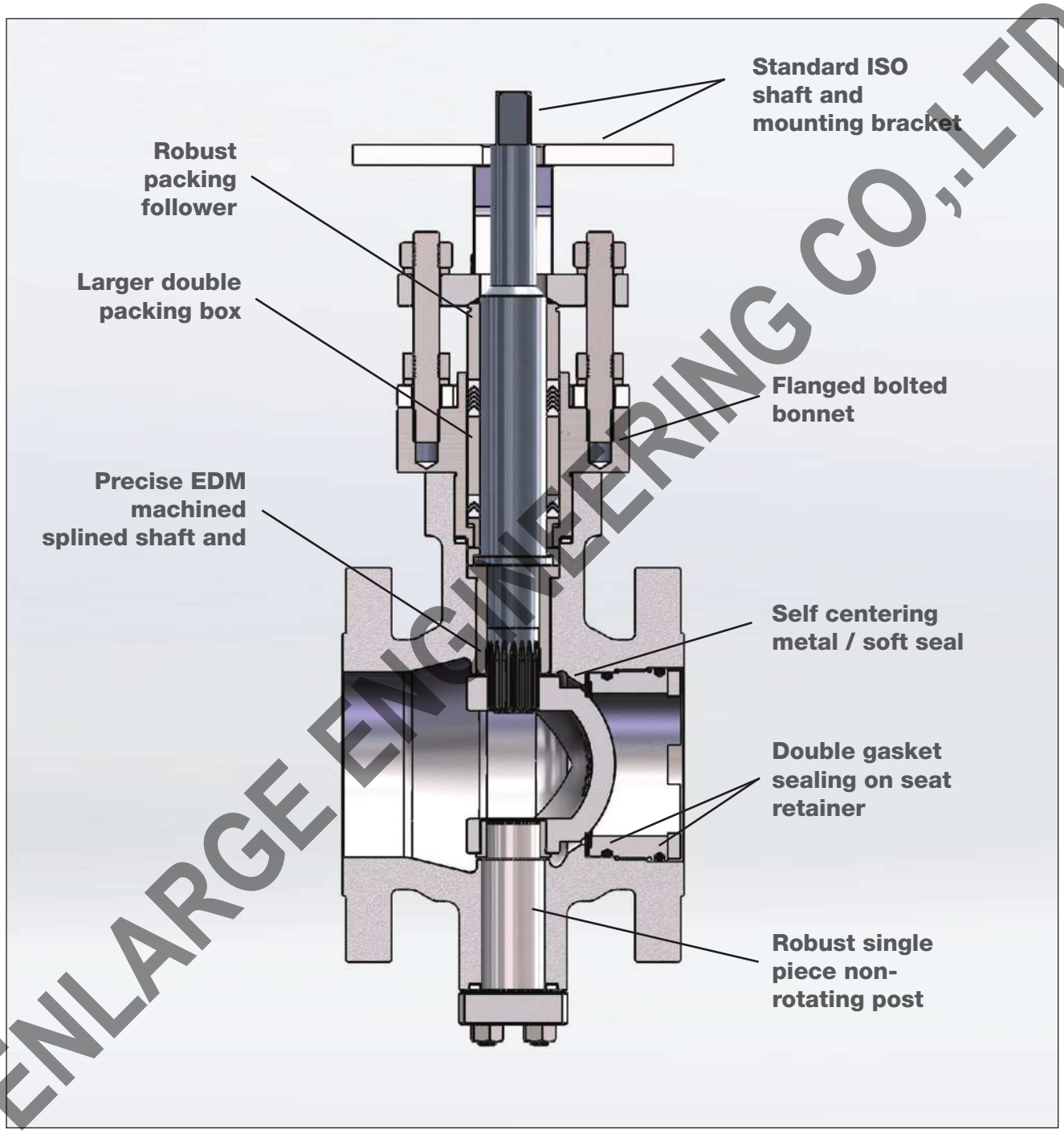


Figure 2: **OpVEE** Differentiated Features

OpVEE™
Seat Rings

Soft Seal Rings

The soft seal ring standard design for the OpVEE utilizes a 316 stainless steel Inconel ring in conjunction with PEEK or PTSE. This design provides for a quick and easy soft seal replacement in case of failure allowing for an easy removal or cutting operations. In some applications such as those for alloy bodies, back-up rings cannot be used due to occasional harsh problems on the ball, specially if it is surface-plated or hardened. In those cases a soft seal ring design can be used instead where metal back-up ring is not permitted such as for alloy bodies. This sealing design also permits a bi-directional flow as well as applications such as oxygen or corrosive media where 316 stainless steel or 625 Inconel is not compatible with the process flow media or ball material.

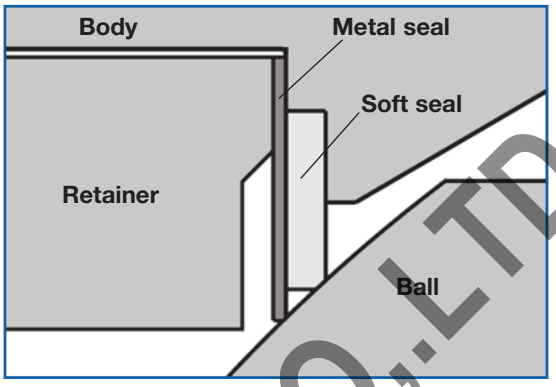


Figure 3: Dual Ring

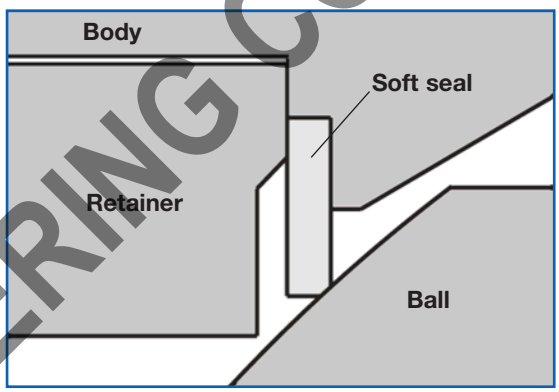


Figure 4: Soft Seal

Bi-directional Seal Rings

The metal seal design for the OpVEE utilizes the pressure drop across the ring to energize the seal to bubble-tight shutoff in either flow direction. As pressure enters the cavity with the shaft downstream, the flexible seal deflects into the ball, causing it to seal tighter against the ball. As pressure enters the cavity with the shaft upstream, the back-up ring locks the seal ring against the ball, causing it to increase sealing between the ring and the ball itself.

The ANSI Class IV shutoff can be achieved by utilizing a metal seal and ANSI Class VI shutoff by utilizing a soft seal. As pressure drop increases, OpVEE uses that pressure to achieve a tighter shutoff.

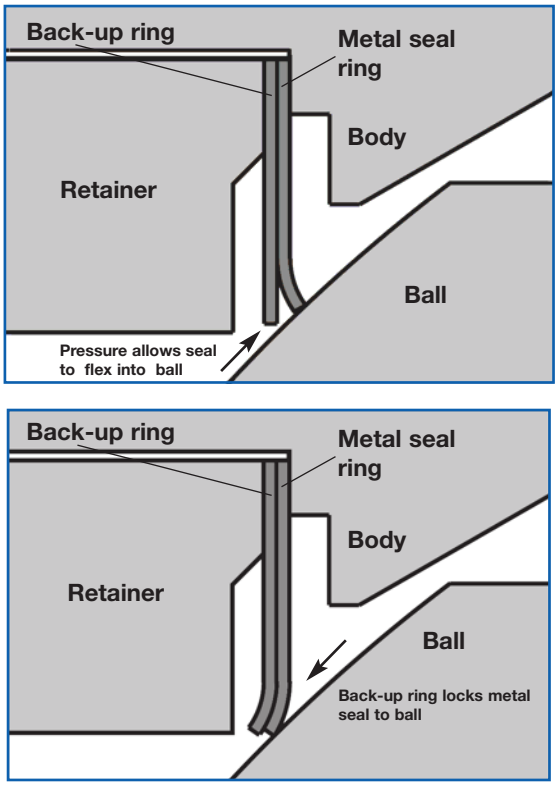


Figure 5: Bi-Directional Seal Rings

OpVEE™
Features and Advantages

OpVEE incorporates the following characteristics for ruggedness and high performance

One piece body

- High performance ensured regardless of flange
- Seat tightness not altered by piping forces, as in two-piece bodies
- One leak path eliminated

Segmented V-notch ball

- Clogging reduced
- "V" shaped ball characterization exceeds 300 to 1 rangeability
- Shearing action in fibrous media

Bi-directional assisted type shutoff seal

- Metal seal provides greater than ANSI Class IV shutoff
- Soft seal achieves tight ANSI Class VI shutoff

Self-centering seal

- Seal installation improved and simplified
- Shutoff further improved

No-shim seal

- Servicing and installation problems reduced

Thick-walled retainer

- Extends service life of valve in abrasive or corrosive media

Integral flange standard

- Bolt length reduced, avoiding leakage in event of fire

Interchangeability

- Actuators fully interchangeable with our OpDX High Performance Butterfly Valve and OpEXL Eccentric Rotary Plug Valve actuators
- OpVEE bonnets, shafts and posts are interchangeable with those of our OpEXL eccentric plug control valve which improves asset management and lower operational costs at industrial plants

Seal replaceable without removing ball and shaft

- Maintenance is fast and easy

Shaft serviceable from outboard end of valve

- The need for actuator removal to replace ball and shaft is eliminated
- Shaft protected from blowout

Full, uninterrupted gasket surface

- Gasket alignment problems reduced
- Wider range of gasketing possible, including spiralwound

Piston cylinder actuator

- High-thrust for a high performance throttling
- Actuator air pressures allowable up to 150 psi (10.3 Bar)

Splined shaft

- Using EDM machining, extra stiffness and resolution provided with no lost motion or dead band

Available in variety of materials

- Materials include carbon steel, 316 stainless steel and other alloys

Each OpVEE feature contributes to a product measurably superior to other Vee Ball valves, as illustrated by the following pages which contain additional information and specifications.

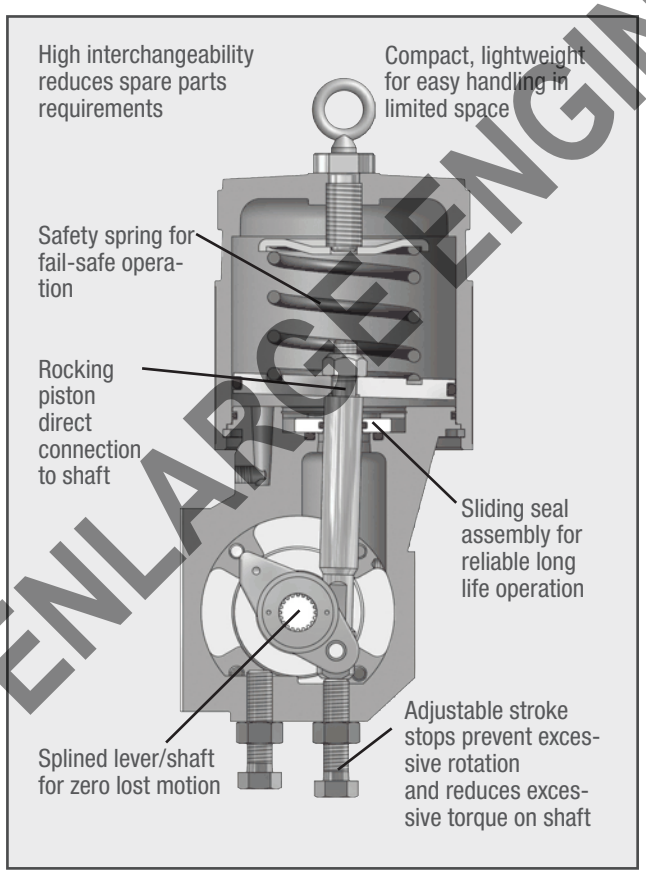
OpTK
OpTK-R Piston Actuator

RA Piston

Optimux's OpTK-R Piston-Cylinder-Rotary-Actuators obtain maximum performance and resolution of our OpVEE V-Notch Ball Control Valves. The Optimux OpTK-R piston cylinder rotary actuators with fail-safe spring combine high torques with pneumatic stiffness which together deliver excellent throttling characteristics. The OpTK-R compared to regular spring-diaphragm actuators, are lightweight, compact, efficient and in general, they take a smaller foot-print for installation in pipelines, they are simply, one of the best choices in actuation systems for rotary control valves.

The OpTK-R piston cylinder actuators are offered as a standard for all of our Rotary valves.

The Optimux OpTK-R piston cylinder actuator was designed to work with supply pressures of up to 150 psi (10.3 bar), which significantly increases torque capacity. The OpTK-R performance and reliability in the field has no par, as it has proven life service above one million cycles.



The pneumatic stiffness achieved by the Series RA assures excellent throttling and control characteristics specially in near closing control positions.

Table I: Rotary Actuator Specifications

Type	Double-acting piston and cylinder with fail-safe spring
Sizes	25, 50
Action	Air-to-open Air-to-close Last position Field reversible
Operating Pressure	Max 150 psig Max 10,3 bars
Stroking Speed	≤ 1 second
***Temperature Range**	-40˚ to 350˚F (-40˚ to 175˚ C)
Auxiliary Handwheels	Declutchable side-mounted handwheel Lever-gear operated handwheel Lever operator
Positioners	Digital HPP-3000 Digital HPP-3500

Table II: Construction Materials

Yoke	Ductile Iron
Transfer Case	Anodized Aluminum
Splined Lever Arm	Nickel-plated Ductile Iron
Stern	UNS S 41600 Stainless Steel
Bearings	Filament wound fiberglass with Teflon liner
Sliding Seal	Delrin, aluminum
Retaining Ring	Cadmium plated steel
Piston	Anodized Aluminum
Cylinder	Anodized Aluminum
O-Ring*	Buna-N (standard)
Actuator Spring	Coated steel (rust proof)
Spring Button	Cadmium-plated steel

* Ambient temperatures higher than 180˚ F (82˚ C) require Viton O-rings. Ambient temperatures below -40˚ F (-40˚C) require fluorosilicone O-rings.

OpTK
Rotary Actuators, Features and Characteristics

RPA Rack and Pinion Actuators

Optimux's Series RPA represent an excellent alternative to our RA Piston-Cylinder Series for rotary valves applications. As with the RA Series the RPA actuators are compact, allow for field reversibility, provide adequate torque for most standard applications and are easy to maintain. RPA actuators are designed for extremely long cycle life when utilized in normal loading applications. The RPA actuators will take service temperatures of -10º to 275º F (-23º to 135º C).

The Series RPA actuators are also offered for all our rotary valves: Series DX and Series VB.

Table III: Double Acting Torque Values (in. Lbs)

PSI	40	60	80	100	120
RPA052	263	395	526	658	789
RPA148	740	1,109	1,479	1,849	2,219
RPA222	1,109	1,664	2,218	2,773	3,327
RPA470	2,071	3,106	4,142	5,177	6,123
RPA900	4,550	6,825	9,100	11,375	13,650

*Other model numbers and torque options are also available

Optimux® HPP4000 Smart Valve Positioners

Our new HPP4000 brings to the market all the field proven attributes of our former HPP3000 plus all the additional features our users have requested for the past few years: LCD Display, 4-20mA feedback signal, HART® communication protocol and Auxiliary Limit Switches, all of these within our legendary and well proven robust enclosure capable of sustaining the most rigorous industrial plant conditions.

But this is not all, the HPP4000 was designed to accurately position your control valve and to operate it efficiently at the lowest possible air consumption (LPM) bellow 3 LPM @ 100 psi.

Optimux® HPP4500 Smart Valve Positioners

Our new HPP4500 microprocessor equipped, current-topneumatic digital positioner is a reliable, accurate and robust positioner which offers as a standard many features and technical characteristics traditionally offered as options by other digital positioner's manufacturers.

The HPP4500 offers as a standard, Hart® communication, 4-20mA Feedback Signal and a LCD display.

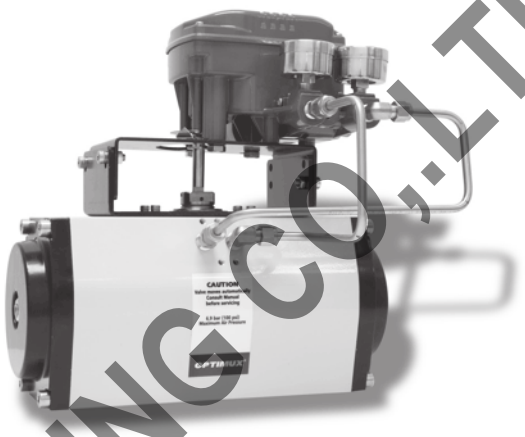


Figure 6: RPA Rack and Pinion Actuator

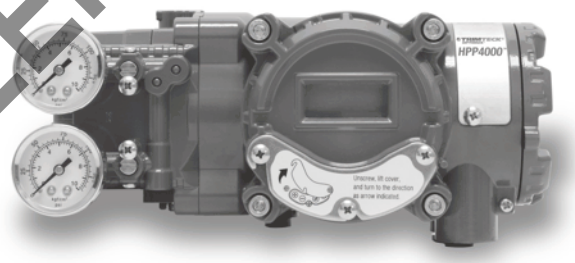


Figure 7: HPP4000 Digital Series

Figure 8: HPP4500 Digital Series

OpVEE™
Packings

The **OpVEE** rotary valve is built with a large packing box which gives a longer service life to the packing assembly. The **OpVEE** Packing box design allows for the use of a large number of packing system options, and fully complies with the most demanding fugitive emission control regulations in modern industrial processes.

Standard Packing

The **OpVEE** standard packing set is composed by PTFE "V" rings, Figures 8A and 8B. The PTFE "V" rings are the most used packing system since their introduction, providing exceptional tight sealing. They provide a very low friction coefficient, good mechanical resistance and excellent resistance to corrosion. The PTFE "V" rings are the most common application choice for gasketing material.

The PTFE "V" rings are used within temperature ranges of - 150º to 450°F (-101 to 232° C). High Temperature Packing The **OpVEE** formed packing rings, Figures 9A and 9B, is an alternative choice whenever the operating temperature exceeds that determined for the use of PTFE "V" rings. The materials employed in the formed packing rings of the **OpVEE** are braided PTFE for use in temperatures up to 500°F (260°C) and Grafoil for use in temperatures up to 752°F (400°C). The Grafoil formed packing rings are an excellent choice whenever packing is subjected to high operating temperatures, however it should be noted that the demand of high forces required to achieve a tight sealing results in a significant friction increase forces as the valve plug turns.

Special Packing

The PT type packing set, Figure 10A, is composed by a set of "V" type rings under compression by an assembly of disc springs that result in a "live-loading" effect. This system achieves a sealing level of below 500 ppm. The PT type packing combines the superior virgin PTFE "V" rings quality with the PTFE "V" rings combined with carbon filament wound. The PTG type packing, Fig. 10B, is composed of an advanced packing set that is capable of keeping a sealing rate very below 500 ppm (at a 10 ppm step rate). The PTG packing set is composed by the combination of PTFE "V" rings with carbon filament wound and Kalrez® "V" rings, an advanced material that provides a superior performance to the packing set. For temperatures higher than 450°F (232°C) the PTG XT packing set is employed. This type of packing utilizes Zymax® rings instead the PTFE/carbon rings.

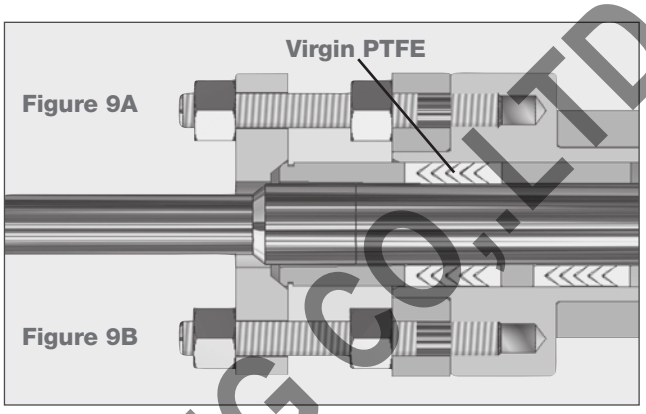


Figure 9A: Standard Packing: "V" rings
Figure 9B: Double Packing: "V" rings

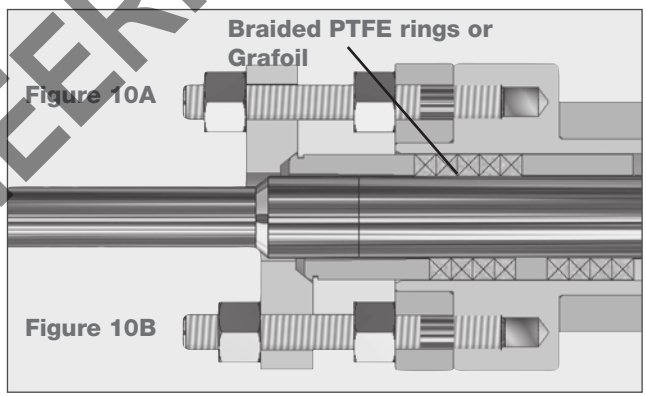


Figure 10A: Packing: Formed Rings
Figure 10B: Double Packing: Formed Rings

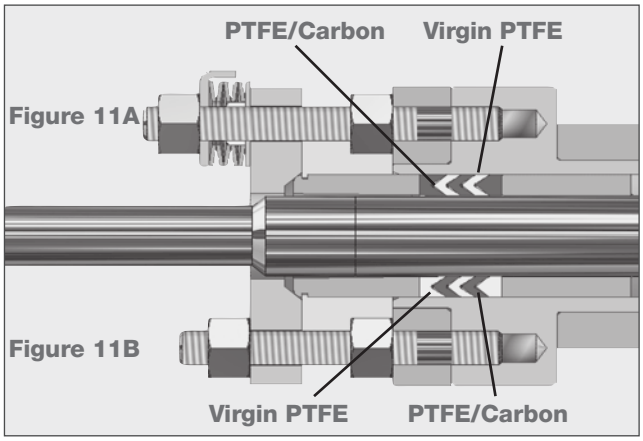


Figure 11A: PT Packing Set
Figure 11B: PTG Packing Set

OpVEE™
Specifications

Table IV: Packing: Temperature Limitations(°F/ °C)

Packing material	Standard body (1)		Extended body (1)		Cryogenic extended	
	°F	°C	°F	°C	°F	°C
Teflon TFE	-20 to 450	-28 to 232	-150 to 600 (2)	-101 to 315 (2)	-420	-251
Braided PTFE (3)	-20 to 500	-28 to 260	-150 to 650	-101 to 343	-420	-251
Glass-filled Teflon PTFE	-20 to 500	-28 to 260	-150 to 650	-101 to 343	-420	-251
Asbestos-free with Inconel AFPI (4)	-20 to 750	-28 to 398	-20 to 1200	-28 to 649	N/R	N/R
Grafoil (5)	-20 to 750	-28 to 398	-20 to 1500	-28 to 815	N/R	N/R
PTG	-20 to 450	-28 to 232	-150 to 600	-101 to 315	-420	-251
PT	-20 to 450	-28 to 232	-20 to 600	-28 to 315	-250	-156
PTXT	-20 to 550	-28 to 289	-20 to 700	-28 to 371	-250	-156

(1) The ANSI B16.34 Standard determines the pressure/temperature limitations for the valve body materials
Consult Optimux engineering dept. for additional information
(2) When adequate material for body and extension are used
(3) 8 to 12 inch ANSI Class 150-600, 3-12 inch Class 900-1500 can be used up to 850°F (455°C)
(4 Asbestos-free, high temperature packing
(5) Do not use Grafoil in temperatures above 800°F (427°C) in oxiding medium such as oxygen or air

Table V: Bearings

Bearing	Temperature		Description
	°F	°C	
MBT	-50 a 425	-45 a 218	316 Stainless steel with Teflon liner
Ultimet	-50 a 600	-45 a 315	Cobalt - Chrome - Nickel - Molybdenium - Tungsten
Stellite	-50 a 600	-45 a 315	No. 6 Stellite

Table VI: Seats Configuration

Seat	Configuration	Shaft Position	Seal leakage ANSI Class	Materials	Maximum Temperature	
					°F	°C
Metal seat	One metal seal	Upstream	IV	316 s. steel	300	150
				Monel	400	204
				Inconel	600	315
Dual seat	One metal seal One soft seal	Downstream	VI	PTFE Metal	350	177
Soft seat	One soft seal	Downstream	VI	PTFE	350	177
				PEEK	500	260
Bi-directional Metal seat	Two metal seals	Upstream Downstream	IV	316 s. steel	300	150
				Inconel	600	315
Flow ring	No seal	Upstream Downstream	II*	N/F	600	315

* Flow rings are used in control applications. With the valve totally closed an approximate Class II shutoff can be obtained.

OpVEE™
Specifications: △P/Temperature

Table VII: Maximum Allowable Differential Pressures (psi) versus Temperature: SHAFTS

Temperature		Shaft Material: 17-4 PH Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315	850/675	1200/675	760/410	2550/1060	920/380	1515/875	850/515	745/440	705/690
425	218	915/740	1330/750	850/460	2770/1180	1080/415	1670/980	895/550	835/490	770/755
400	204	925/750	1350/760	865/470	2800/1200	1085/450	1675/985	945/585	840/495	775/760
300	149	925/800	1430/805	920/500	2940/1275	1175/485	1750/1040	980/610	890/525	815/785
200	93	925/850	1510/850	980/530	3085/1350	1265/525	1840/1100	1030/650	940/555	850/835
70	21	925/900	1585/890	1040/560	3245/3585	1370/565	1935/1165	1090/700	1000/590	900/880
-50	-45	925/900	1585/890	1040/560	3245/3585	1370/565	1935/1165	1090/700	1000/590	900/880

Temperature		Shaft Material: Nitronic Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315	740/475	960/540	580/315	1725/690	470/195	1100/580	620/335	490/290	510/500
425	218	800/515	1025/575	625/340	1890/755	555/225	1180/635	655/365	535/315	545/530
400	204	805/520	1035/580	635/345	1915/765	560/230	1185/640	660/370	540/320	550/535
300	149	880/775	1125/630	705/385	2080/830	755/265	1260/690	700/400	585/350	585/570
200	93	950/625	1225/685	775/420	2260/900	725/300	1340/750	755/430	630/375	620/605
70	21	1025/675	1325/745	850/460	2575/1030	880/365	1480/850	830/500	725/420	685/670
-50	-45	1025/675	1325/745	850/460	2575/1030	880/365	1480/850	830/500	725/420	685/670

Temperature		Shaft Material: Inconel Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315	1290/855	1280/1000	1170/635	3085/1350	1265/525	1840/1100	1040/650	940/555	850/835
425	218	1315/875	1790/1040	1225/665	3140/1375	1300/535	1865/1115	1055/665	955/565	865/845
400	204	1320/880	1860/1045	1235/670	3145/1380	1305/540	1870/1120	1060/670	960/570	870/850
300	149	1330/890	1880/1055	1250/675	3165/1390	1320/545	1880/1130	1065/675	965/570	875/855
200	93	1340/900	1900/1070	1265/685	3185/1400	1330/550	1900/1140	1070/680	970/570	880/860
70	21	1355/905	1925/1085	1285/695	2345/1435	1370/565	1930/1160	1090/700	1000/590	895/880
-50	-45	1355/905	1925/1085	1285/695	2345/1435	1370/565	1930/1160	1090/700	1000/590	895/880

Temperature		Shaft Material: Monel Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315	830/500	825/585	755/370	1990/795	600/245	1220/665	680/380	565/330	565/550
425	218	850/515	1160/610	795/390	2040/810	620/255	1240/675	690/685	575/325	570/555
400	204	855/520	1205/615	800/395	2045/815	625/260	1245/680	700/390	580/340	575/560
300	149	870/530	1235/630	820/400	2080/830	645/270	1260/690	710/400	590/345	580/570
200	93	890/545	1265/645	840/415	2125/850	665/275	1280/700	720/410	600/355	590/580
70	21	915/560	1300/670	870/430	2230/890	715/295	1320/740	740/430	870/630	615/600
-50	-45	915/560	1300/670	870/430	2230/890	715/295	1320/740	740/430	870/630	615/600

(1) Determine the operating temperature
(2) Select the shaft material according to △P (psi) required
(3) The numbers at left are for shaft upstream; the number at right for shaft downstream
(4) Check medium compatibility with shaft material
(5) Shafts in Monel are not recommended for non-lubricating fluids operation

OpVEE™
Specifications: △P/Temperature

Table VIII: Maximum Allowable Differential Pressures (psi) versus Temperature: SEAL RINGS

Temperature		Seat Material: TFE Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315									
425	218									
400	204									
300	149	400/400	400/400	400/400	350/470	275/360	260/350	270/350	265/230	275/165
200	93	600/600	600/600	500/550	350/480	280/360	265/355	275/355	270/230	280/170
70	21	925/925	616/702	500/550	350/480	280/370	270/360	280/360	275/235	280/170
-50	-45	925/925	616/702	500/550	350/480	280/370	270/360	280/360	275/235	280/170

Temperature		Seat Material: 316 stainless steel Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315	996/1566	536/613	448/488	318/426	252/323	236/315	244/315	240/206	246/149
425	218	1080/1702	583/665	485/530	342/461	270/350	253/340	264/341	259/221	265/159
400	204	1090/1712	588/670	490/534	346/446	274/353	258/345	268/345	262/225	270/163
300	149	1105/1736	546/680	495/542	351/473	278/368	261/350	272/350	266/228	274/165
200	93	1120/1761	604/690	504/549	356/480	282/364	264/355	276/355	270/232	278/168
70	21	1140/1794	616/702	512/559	364/489	288/370	270/362	280/361	276/236	282/171
-50	-45	1140/1794	616/702	512/559	364/489	288/370	270/362	280/361	276/236	282/171

Temperature		Seat Material: Inconel Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315	1390/2185	750/856	624/681	442/595	350/451	328/440	342/440	334/287	344/205
425	218	1440/2270	777/890	650/709	460/619	362/367	340/455	352/455	346/296	354/215
400	204	1450/2282	782/894	652/712	462/622	366/471	344/460	356/459	350/300	358/218
300	149	1500/2363	810/926	675/737	479/644	379/488	356/476	369/475	362/311	371/225
200	93	1550/2445	838/958	698/763	496/666	392/505	368/493	382/492	374/322	384/233
70	21	1700/2600	894/1021	746/814	528/711	418/538	392/526	408/525	400/343	410/249
-50	-45	1700/2600	894/1021	746/814	528/711	418/538	692/526	408/525	400/343	410/249

(1) Select seat material and find the value of DP (psi) required
(2) Numbers at left are for shaft upstream; number at right for shaft downstream
(3) Check for medium compatibility with seat material

Table IX: Maximum Allowable Differential Pressures (psi) versus Temperature:BEARINGS

Temperature		Bearings Material: MBT Valve Size (inch)								
˚F	˚C	1	1 1/2	2	3	4	6	8	10	12
600	315									
425	218	350	350	350	350	350	350	350	350	350
400	204	375	375	375	375	375	375	375	375	375
300	149	490	490	490	490	490	490	490	490	490
200	93	600	600	600	600	600	600	600	600	600
70	21	740	740	740	740	740	740	740	740	740
-50	-45	925	925	925	925	925	925	925	925	925

Table X: Maximum Allowable Differential Pressures (psi) versus Temperature:BEARINGS (cont.)

Temperature		Bearings Material: Ultimet Valve Size (inch)								
°F	°C	1	1 1/2	2	3	4	6	8	10	12
600	315	750	750	750	750	750	750	750	750	750
425	218	925	925	925	925	925	925	925	925	925
400	204	925	925	925	925	925	925	925	925	925
300	149	925	925	925	925	925	925	925	925	925
200	93	925	925	925	925	925	925	925	925	925
70	21	925	925	925	925	925	925	925	925	925
-50	-45	925	925	925	925	925	925	925	925	925

Temperature		Bearings Material: Stellite Valve Size (inch)								
°F	°C	1	1 1/2	2	3	4	6	8	10	12
600	315	850	850	850	850	850	850	850	850	850
425	218	925	925	925	925	925	925	925	925	925
400	204	925	925	925	925	925	925	925	925	925
300	149	925	925	925	925	925	925	925	925	925
200	93	925	925	925	925	925	925	925	925	925
70	21	925	925	925	925	925	925	925	925	925
-50	-45	925	925	925	925	925	925	925	925	925

(1) Select bearings material
(2) Check for medium compatibility with bearings material
(3) Ultimet bearings with shafts in Monel are not recommended for non-lubricating medium operations

Table XI: Material Selection

Part	Material
Body	Carbon steel; 316, 316L, 304, 304L, Monel, Hastelloy C, Hastelloy B/B-2, Titanium
Ball	317, 316, 316L, 304, 304L stainless steel, Hard chrome plating, stellite, Hastelloy C, Hastelloy B/B-2, Monel, Alloy 20, Titanium
Shaft / pins	17-4 pH, Nitronic 50, Nitronic 50/Stellite, Hastelloy C, Hastelloy B/B-2, K-Monel, Alloy 20, Titanium
Bearings	MBT, Stellite, Ultimet.
Metal seal	316 stainless steel, Inconel
Soft seal	Glass-filled Teflon, PEEK, TEFZEL.
Packing	TFE V-rings, AFPI, Glass-filled Teflon/TFE, Grafoil, PTG, PT, PTXT
Back-up ring	316, 316L, 304, 304L stainless steel, hard-chrome plating, Stellited 316 stainless steel, stellited 316L stainless steel, Monel,Hastelloy C, Hastelloy B/B-2, Alloy 20, Titanium
Bearings seal	Viton, Graphite "O"-rings.
Yoke bolting	Carbon steel, stainless steel

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Table XII:
Estimated Weight for Shipping
(With Standard actuator and positioner)

Valve size (inch)	Flangeless body		Body end flanges	
	pounds	kg	pounds	kg
1	41	19	47	22
1 1/2	45	21	55	25
2	47	22	59	27
3	61	28	80	36
4	80	36	111	50
6	146	66	197	89
8	186	84	266	121
10	278	126	400	181
12	496	225	653	296
16	908	412	1259	571

The OpVEE seat configurations are defined according to the shaft position. See Table VI to determine both type of seat and shaft position.

Table XIII:
End Connections

Valve size (inch)	ANSI Class	Connection type
1	150 - 600	Flangeless Integral Flanges
1 1/2	150 - 600	Flangeless Integral Flanges
2	150	Flangeless Integral Flanges
	300 - 600	Flangeless Integral Flanges
3	150 - 600	Flangeless Separable flanges Integral Flanges
4	150 - 600	Flangeless Separable flanges Integral Flanges
6	150 - 600	Flangeless Integral Flanges
8	150 - 600	Flangeless Integral Flanges
10	150 - 600	Flangeless Integral Flanges
12	150 - 600	Flangeless Integral Flanges
16	150 - 600	Integral Flanges

* For OpVEE size 2 inch ANSI Class 300-600 all flange holes are screwed.

Table XIV: Valve/Actuator Compatibility

Actuator Size	Spring type	Valve size (inch)									
		1	1 1/2	2	3	4	6	8	10	12	16
25	Standard										
	Heavy-duty										
50	Standard										
	Heavy-duty										
100	Standard										
	Heavy-duty										
200	Standard										
	Heavy-duty										

Table XV: Additional Specifications

Characteristics: equal-percentage, Linear (defined by the positioner)
Ball rotation: Counterclockwise to open, as seen form actuator side

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Specifications: Flow Coefficients – C_V

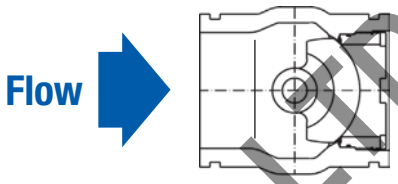

Table XVI : Shaft UPSTREAM

Size (inch)	C_V versus Percent opening									
	100	90	80	70	60	50	40	30	20	10
1	25	21	15.8	11.6	8	5.2	3	1.38	0.47	0.08
1 1/2	51	44	33	23	16.2	10.3	5.9	2.8	0.81	0.11
2	107	84	59	41	27	18.1	10.8	5.2	1.76	0.16
3	272	233	174	124	81	54	31	14.4	4.3	0.40
4	444	372	278	186	121	72	37	16	7	1
6	836	757	599	437	303	196	122	66	26	4
8	1370	1198	928	674	466	308	184	94	37	5.2
10	3320	2580	2170	1680	1190	806	570	320	195	83
12	4150	3220	2700	2090	1490	1010	646	400	243	104
16	7150	5580	4676	3700	2580	1808	1140	700	440	185

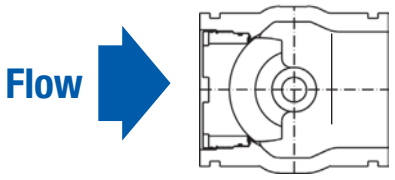

Table XVII : Shaft DOWNSTREAM

Size (inch)	C_V versus Percent opening									
	100	90	80	70	60	50	40	30	20	10
1	24	17.1	12.8	9.4	6.7	4.4	2.6	1.38	0.42	0.03
1 1/2	50	37	26	19.3	13.6	8.6	4.9	2.3	0.58	0.08
2	104	71	50	36	26	17.4	10.7	5.5	1.89	0.14
3	275	205	142	103	74	50	31	16.2	5.8	0.52
4	445	314	219	154	105	66	36	20	8	1
6	844	628	439	321	241	166	106	59	23	3.6
8	1338	955	710	532	384	265	170	95	42	5.7
10	3180	2340	1750	1290	960	705	486	314	195	83
12	4150	3060	2280	1680	1250	920	633	409	254	108
16	7150	5350	4060	2950	2210	1604	1110	708	438	190

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Dimensions

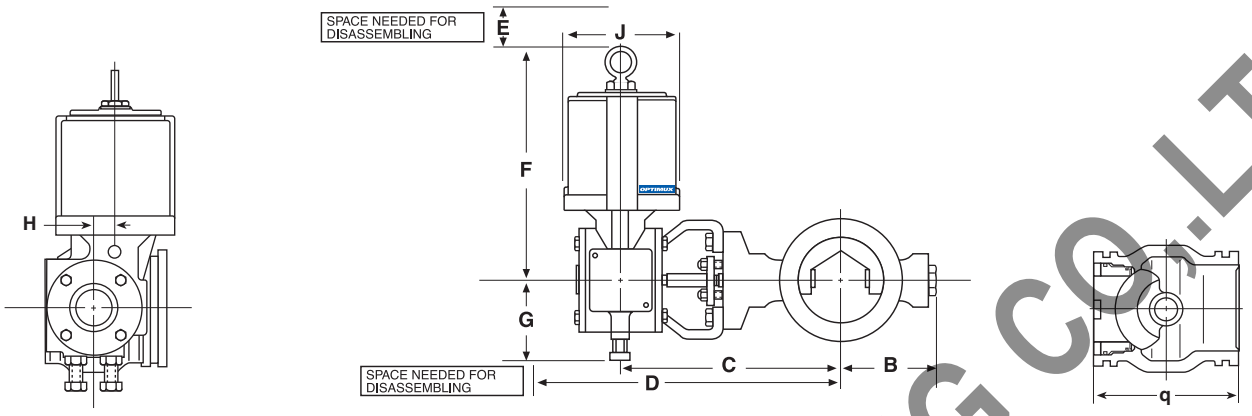

Table XVIII : OpVEE Dimensions

Valve size (inch)	Actuator size	Shaft diameter inch	A		B		C		D		E		F		G		H		J	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1	25	11.2	4.00	101.6	3.3	85	10.6	269	21.2	538	5.3	135	13.3	338	4.5	114	1.1	28	6.5	165
1 1/2	25	15.9	4.50	114.3	3.9	99	11.1	282	21.7	551	5.3	135	13.3	338	4.5	114	1.1	28	6.5	165
2	25	15.9	4.94	125.5	4.3	109	11.4	290	22.0	559	5.3	135	13.3	338	4.5	114	1.1	28	6.5	165
3	25	19.1	6.50	165.1	5.0	127	12.5	318	23.1	587	5.3	135	13.3	338	4.5	114	1.1	28	6.5	165
	50	19.1	6.50	165.1	5.0	127	12.5	318	23.3	592	7.5	191	18.3	465	5.8	147	2.0	51	9.1	231
4	25	19.1	7.62	193.5	5.5	140	13.7	348	24.3	617	5.3	135	13.3	338	4.5	114	1.1	28	6.5	165
	50	19.1	7.62	193.5	5.5	140	13.7	348	24.5	622	7.5	191	18.3	465	5.8	147	2.0	51	9.1	231
6	25	22.7	9.00	228.6	7.9	201	15.9	404	26.5	673	5.3	135	13.3	338	4.5	114	1.1	28	6.5	165
	50	22.7	9.00	228.6	7.9	201	15.9	404	26.7	678	7.5	191	18.3	465	5.8	147	2.0	51	9.1	231
	100	22.7	9.00	228.6	7.9	201	15.9	404	30.2	767	8.5	216	22.9	582	7.5	191	2.4	61	12.5	318
8	50	22.7	9.52	244.3	8.7	221	16.7	424	33.5	851	7.5	191	18.3	465	5.8	147	2.0	51	9.1	231
	100	22.7	9.62	244.3	8.7	221	16.7	424	37.0	940	8.5	216	22.9	582	7.5	191	2.4	61	12.5	318
10	50	28.6	11.70	297.2	11.0	279	17.7	450	28.5	724	7.5	191	18.3	465	5.8	147	2.0	51	9.1	231
	100	28.6	11.70	297.2	11.0	279	17.7	450	32.0	813	8.5	216	22.9	582	7.5	191	2.4	61	12.5	318
	200	28.6	11.70	297.2	11.0	279	17.7	450	34.5	876	9.0	229	23.4	594	7.5	191	2.4	61	17.5	445
12	100	38.1	13.30	337.8	12.0	305	17.7	450	32.0	813	8.5	216	22.9	582	7.5	191	2.4	61	12.5	318
	200	38.1	13.30	337.8	12.0	305	17.7	450	34.5	876	9.0	229	23.4	594	7.5	191	2.4	61	17.5	445
16	100	44.5	15.80	400.0	16.6	422	26.1	663	42.0	1067	8.5	216	22.9	582	7.5	191	2.4	61	12.5	318
	200	44.5	15.80	400.0	16.6	422	26.1	663	44.5	1130	9.0	229	24.3	594	7.5	191	2.4	61	17.5	445

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For further information or verification, consult your Optimux representative. Specific instructions for the installation, operation, troubleshooting and maintenance of the OpVEE control valves are contained on the OpVEE Maintenance bulletin.

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