



# Masoneilan\*

# 35002 Camflex\* II

## Eccentric Plug Rotary Control Valve



# Camflex\* II Eccentric Plug Rotary Control Valve

## Setting the Standard

Unlike some valves in the industry, the Masoneilan 35002 Series Camflex II eccentric plug rotary control valve is not an automated valve pieced together in a valve automation shop. Its thoughtful design elevates overall product integrity and reduces the risk of component failure and process upset. Offering process plant owners and operators an exceptional control valve choice, BHGE helps drive results on your key business metrics:

- Process uptime
- Asset utilization
- Control performance

## Simply Reliable

Uncomplicated, yet attentive to all the right details, the Camflex II eccentric plug rotary control valve offers a universal integrated system of valve, actuator and positioner. The valve's key design objectives -- reducing friction, reducing drive-train slop, and mitigating component wear -- are accomplished through a standard and simplified design architecture that helps this control valve reliably perform the basic functions of shut-off, throttling and emission control, over an extended lifetime.

### *Employing an Uncomplicated Geometry*

The essentially linear flow characteristic of the Camflex II is established by the spherical geometry of the eccentric rotating plug. While the major portion of the flow curve is linear, there is a slight modification as the plug approaches the seat. As the plug cams into the seat, the rate of change in flow is gradually reduced until the plug makes full contact with the seat. This simple architecture provides the following benefits:

- Cv Ratio of 100:1 provides stable operation over a wide range of conditions
- Improved control at start-up (low flow/high control pressure drop)

## Broadly Capable

The Camflex II eccentric plug rotary control valve is built on a standard platform with enormous versatility and breadth of application. Camflex created the eccentric plug, a true rotary globe control valve that packages the best features of a globe-style valve within rotary valve architecture. In addition, high-end features such as the extension bonnet,

hardened trim, and high-performance low-emission packing are all standard, providing exceptional long-term reliability. In fact, Camflex valves regularly outperform other control valves in a variety of severely erosive applications where abrasive solids tend to tear apart other types of valves.

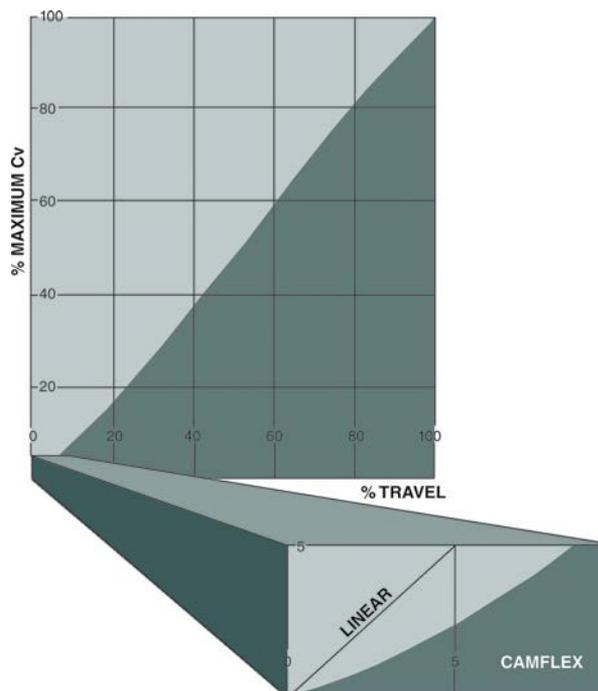
## Custom Solutions

Optional constructions, such as the patented DVD\* (Differential Velocity Device) noise reduction trim, alloy constructions and a cryogenic extension bonnet allow these valves to be tailored to fit your specific application needs. All of this combines to offer a low life cycle cost, from purchase and installation through start-up, operation and maintenance.

- Standard platform
- Wide-ranging applications
- Globe-valve performance
- Customized configurations

## Field Proven

More than 1 million Camflex valves have been successfully installed and operated in a variety of process industries and applications. The latest Camflex design maintains the valve's legendary dependability based on a field-proven concept that remains a standard of excellence for eccentric plug rotary control valves.



# Tackling Key Challenges

## Reliable Long-Term Shut-off

With its eccentric rotating valve plug, the Camflex II eccentric plug rotary control valve reduces two common valve shortcomings: excessive seal ring friction inherent in ball valves and high actuator forces required for tight shut-off of either conventional globe valves or butterfly valves.

Because of its unique seating action, the Camflex plug makes no contact with the seat until it rotates into its full closed position. Once seating occurs, continued shaft rotation causes the plug arm to flex, forcing the plug into deeper contact with the seat ensuring consistent tight shut-off. This reliable seating method reduces wear from rubbing contact, and the tight shut-off performance greatly reduces the possibility of clearance flow-induced wear or erosion. Camflex seating mechanics and resulting long-term reliable shut-off offer the following benefits:

- Reduced rubbing – greatly reduced friction and wear
- Improved uptime – extended maintenance cycles
- Reduced unplanned outages and production loss

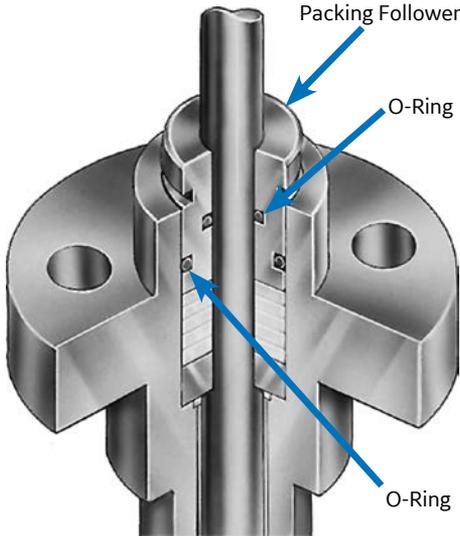
By combining eccentric plug action with a long actuation lever, this valve achieves a 3:1 force multiplication. This means that only one-third of the force required to stroke a conventional single-seated globe valve is required for the Camflex actuator to stroke against a given pressure drop.

- Smaller actuator size
- Faster response speed
- Improved control performance

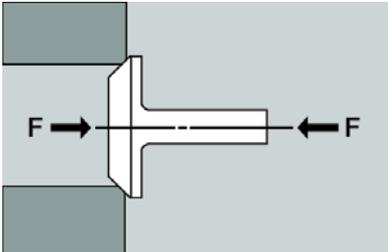
## Environmental Emissions Compliance

Why pay extra to comply with current environmental emissions requirements? Unlike some control valves that require expensive specialized packing systems to satisfy low emission requirements, Camflex II eccentric plug rotary control valves come standard with the Masoneilan EF\* seal (Emissions Free seal) technology.

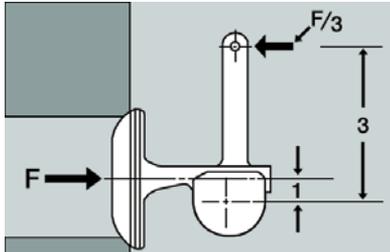
- Standard at no extra cost
- Satisfies global low emissions standards requirements
- Simple and reliable with long life



The Camflex plug makes no contact with the seat until it rotates into its full closed position.

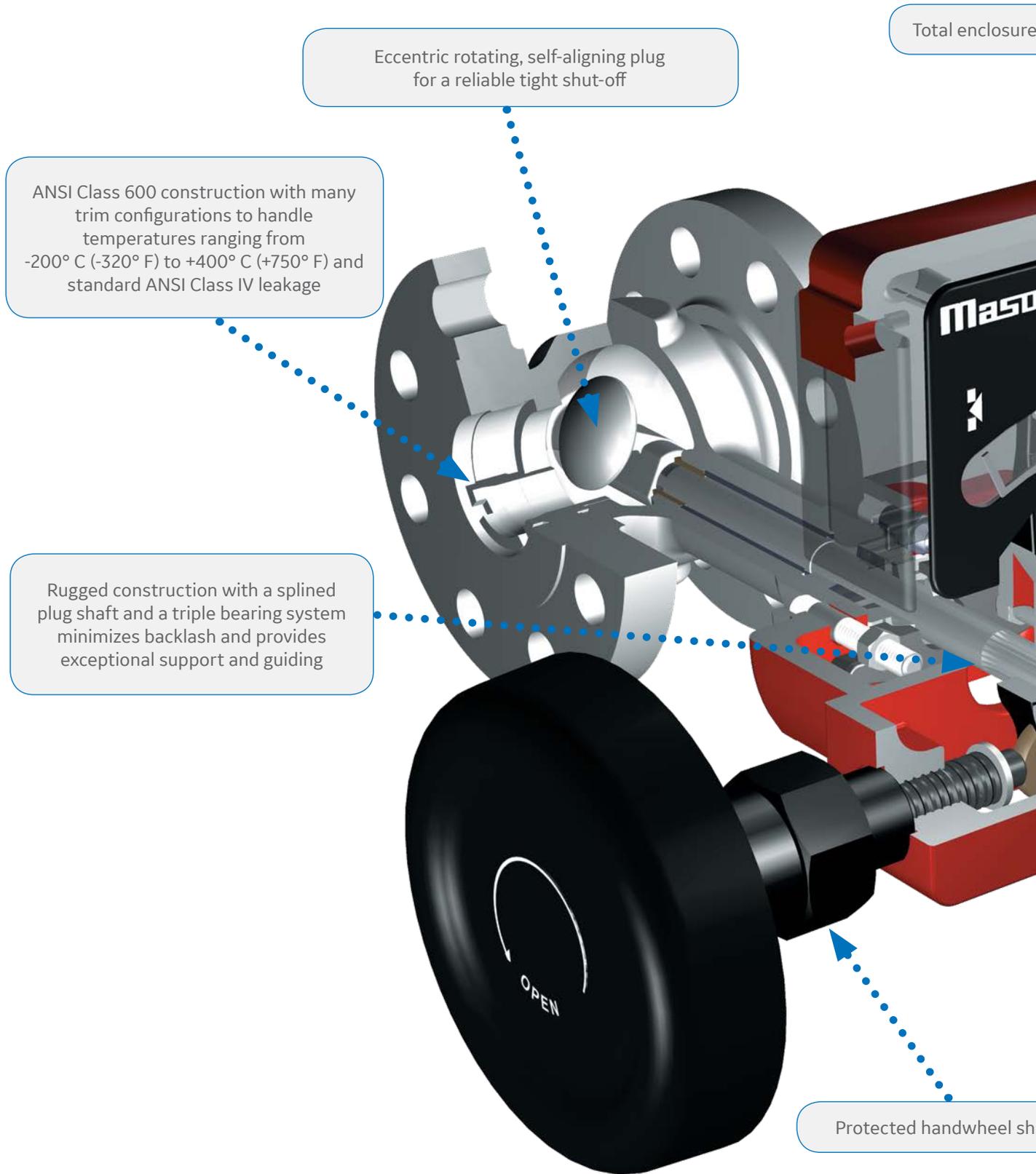


Conventional Valve Design  
1:1 ratio of forces requires large actuator

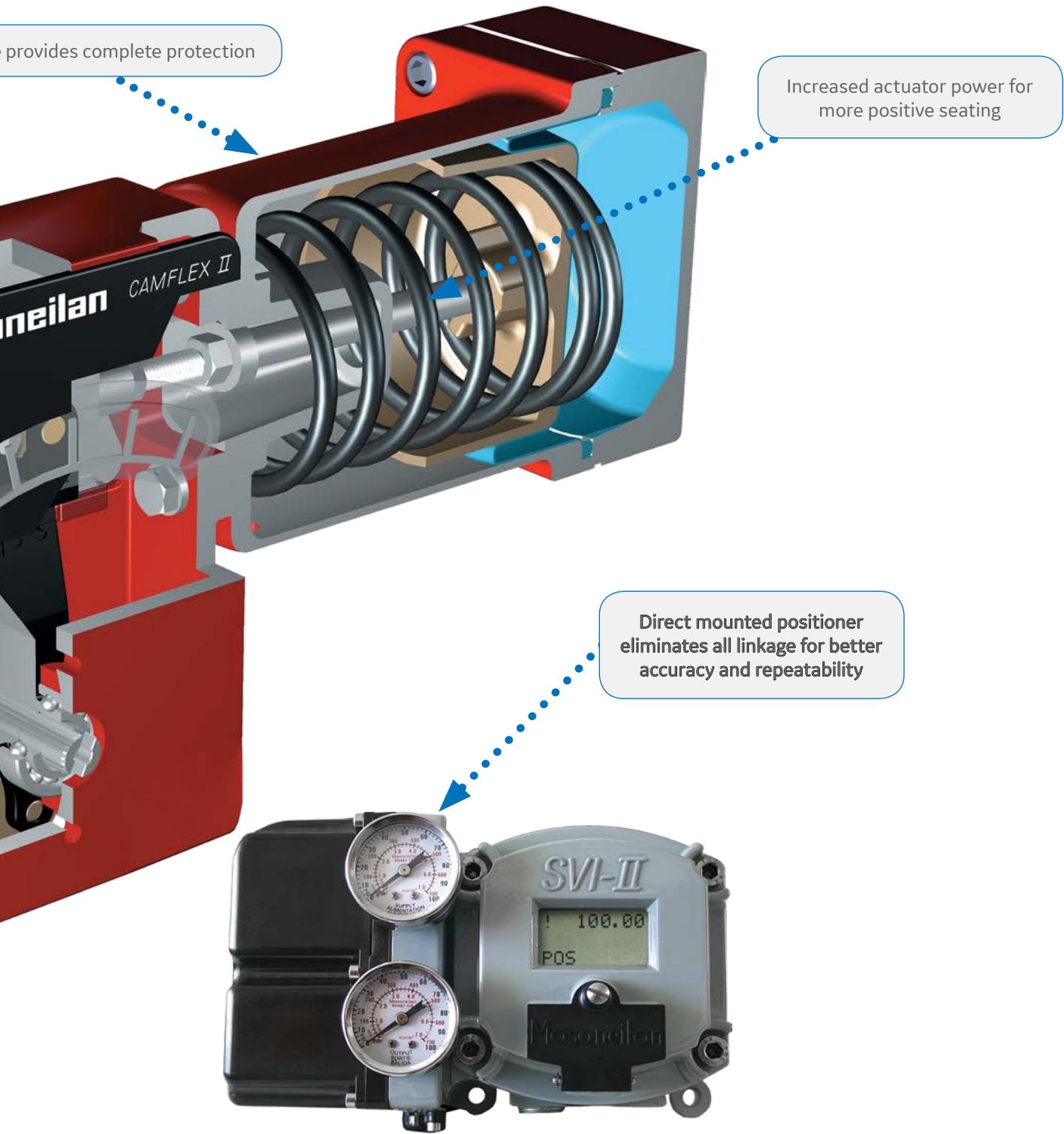


The Camflex Principle  
3:1 multiplication of forces

# Camflex II Eccentric Plug Rotary C



# Control Valve



SVI II AP  
Advanced Performance  
digital valve positioner

craft

# Providing Exceptionally Reliable Control

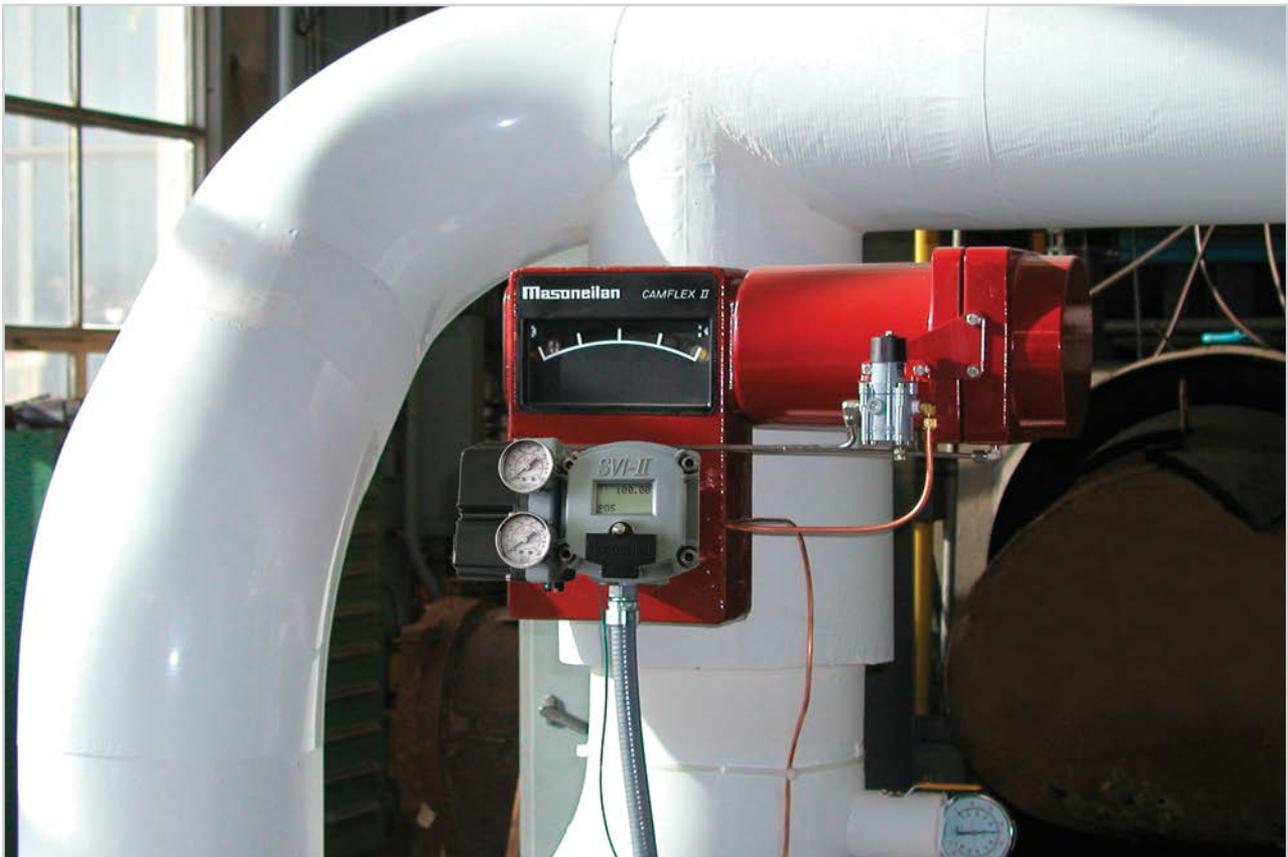
The Camflex II eccentric plug rotary control valve is manufactured to high standards using precise techniques, quality craftsmanship, advanced technology, industry knowledge and expertise, and more than 130 years of process control experience.

Combining the features and control accuracy of Camflex valves with Masonellan digital valve positioning technology takes your control accuracy to new heights. The Masonellan SVI\* II AP (HART®) or SVI II FF (FOUNDATION™ Fieldbus) positioners share innovative features that optimize control performance.

- Directly connected valve shaft provides reliable mechanics
- Patented non-contacting stem feedback promotes long-term positioning reliability
- Patented control methods provide impressive speed and accuracy (qualified for compressor anti-surge and emergency applications)



SVI II AP  
Digital Valve Positioner



# Offering Cost-effective, Solutions for a Variety of Applications

## Simply Versatile

The Camflex II eccentric plug rotary control valve easily adapts to a variety of applications, offering an efficient solution at competitive prices. Standard Camflex parts are available off the shelf, allowing for product enhancements that are typically offered as options on many of our competitors' valve products. Such unique features as the standard extended bonnet allow for operation within a wide temperature range.

## Globe Replacement (GR) Body

The optional "GR" (Globe Replacement) body configuration provides a longer body face to face dimension that matches most traditional globe control valves. This allows direct replacement of those valves without the need for piping modifications or spool pieces.



Camflex II GR (Globe Replacement) Body

## Broad Trim Size Selection

Unlike ball valves that typically offer only one trim size ( $C_v$  rating) per valve size, this valve is offered with full-area and at least two reduced-capacity options per size. In most cases, changing the  $C_v$  rating of a Camflex II eccentric plug rotary control valve requires only a simple change of the seat ring, rather than the complex replacement of multiple and often expensive parts required for a  $C_v$  change of a conventional globe valve.

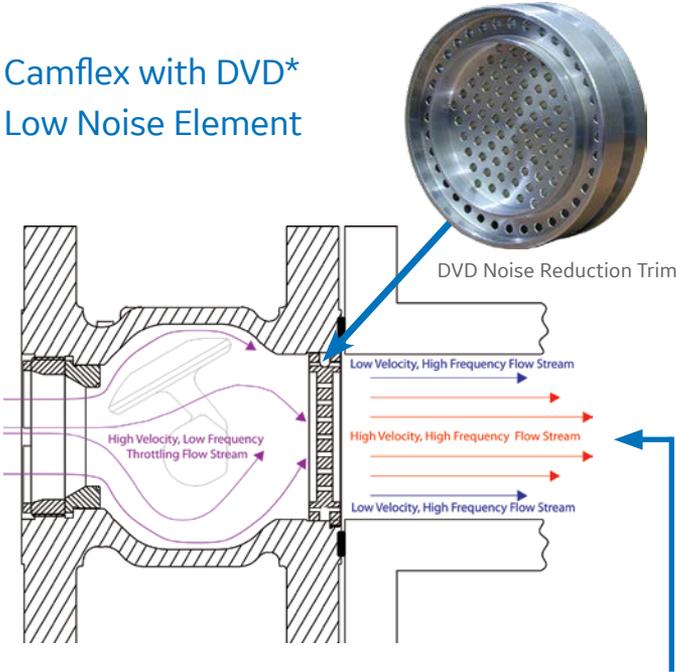
- Cost-effective  $C_v$  changes compared to conventional globe valves
- Available in 1-inch through 16-inch sizes from  $C_v$  of 0.5 to  $C_v$  of 3650
- Optimized trim selection improves control performance and durability

## Low Noise Solution

Camflex II valves are available with patented Masoneilan DVD (Differential Velocity Device) noise reduction trim. This highly efficient yet economical low noise solution applies a concept from turbo-fan jet technology. The DVD device uses larger diameter outer holes to create a lower velocity annular flow stream around the flow area perimeter. This lower velocity flow stream reduces noise transmission from the higher velocity inner flow, resulting in lower external noise levels.

- Simple construction
- Efficient noise abatement
- Easy to retrofit

## Camflex with DVD\* Low Noise Element



Reduced downstream pipe wall noise levels achieved by valve outlet flow stream conditioning

# Severe Service Capability (High Temp, Low Temp, Erosive, Corrosive)

Since not all control applications involve easy-to-handle or non-hazardous fluids, we offer cost-effective valve options that tackle the challenges presented by extremely high or low temperatures, or corrosive/erosive fluid streams.

Standard Camflex II valves handle temperatures up to 750° F (400° C) using low-friction TFE packing. This is a big improvement over many competing designs that require graphite packing above 450° F (232° C), greatly increasing stem friction and reducing control accuracy. Its hardened trim handles mildly abrasive applications with ease. In addition, these valves include options that excel under even harsher conditions:

- Cryogenic Extended Bonnet option is available for use in applications to -320°F (-212° C).
- Steam Jacket construction available to maintain minimum flowing temperature
- Ceramic Trim option handles more severe erosive applications
- Alloy Construction is available for highly corrosive services
- High Temperature constructions available to extend the application range
- Flashing Trim option

## Tight Shut-off

Optional soft seat. ANSI Class V for reciprocating or Class VI or better for rotary.

## Available Configurations/Applications

By combining a rugged, standardized platform with wide-ranging material and construction options, the Camflex II offers exceptional long-term performance for a broad set of applications.

Utility <sup>1</sup> Service	General <sup>2</sup> Service	TSO <sup>3</sup>	High <sup>4</sup> Temp	Low <sup>5</sup> Temp	Erosive	Corrosive	Flashing	Noise
Standard	Standard	Optional Soft Seat	Optional	Optional	Optional Ceramic	Optional Alloy Materials	Optional Trim	Optional DVD Trim

### Segment Served by Camflex II

- Notes:
1. Water, steam to 100° F (38° C), other non-corrosive/erosive fluids at temperatures <300° F (149° C)
  2. Pressure to 250 psi (17.2 bar), temperature to 450° F (232° C)
  3. Tight Shut-off: ANSI Class V for reciprocating or Class VI or better for rotary
  4. Temperature above 750° F (400° C)
  5. Temperature below -250° F (-157° C)



# Camflex Sets the Standard

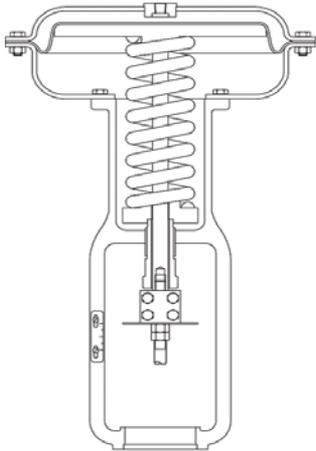
## Enhanced Control Performance

Camflex II eccentric plug rotary control valves effectively offer a combination of superior control performance, simplicity and long-term reliability over a broad range of applications. Our value is evident when you compare our valve with the competition.

Specifications	Masoneilan Camflex	Competitor A	Competitor B	Competitor C
Body Sizes	1" - 16" DN25 - DN400	1" - 8" DN25 - DN200	1" - 10" DN25 - DN250	1" - 12" DN25 - DN300
Body Ratings (ANSI Class)	150, 300 & 600	150, 300 & 600	150, 300 & 600	150, 300
End Connections	Threaded, Flanged, Flangeless	Flanged, Flangeless	Flanged, Flangeless	Flanged, Flangeless
Body Materials	Carbon Steel Stainless Steel Alloy 20 Hastelloy Uranus B6	Carbon Steel Stainless Steel  Hastelloy	Carbon Steel Stainless Steel	Carbon Steel Stainless Steel
Bonnet Type	Integral	Integral	Separate	Integral
Face to Face	ISA S75.08.02 (IEC 60534-3-2)	ISA S75.08.02 (IEC 60534-3-2)	ISA S75.08.02 (IEC 60534-3-2) ANSI B16.10	ISA S75.08.02 (IEC 60534-3-2)
Weight lbs (kg) 2" (DN50) Flanged 2" (DN50) Flangeless	54 (24) 45 (20)	81 (37)	82 (37.2) 70 (32)	49 (22) 40 (18)
Overall Height	15" (381 mm)	22" (558 mm)	24" (610 mm)	16" (406 mm)
No. of Body Gaskets	0	0	2	0
Plug to Shaft Connection	Long Spline	Sleeved Taper Pin	Long Spline	Square Shaft Connection
Rotation	50°	90°	90°	90°
Stellite Trim Standard Available Option	Yes Yes	No Yes	Yes Yes	No Yes
Low Noise Trim	Yes	No	Yes	No
Reduced Trim Options	0.6 / 0.4 / 0.2	0.4	0.5	0.7 / 0.4
Guide Bushings	440C, Stellite, Alloy 25	PTFE, 440C, Stellite	Stellite	440C
Low Emission Stem Seal Standard Available Option	Yes Yes	No Yes	No Yes	No Yes



## Typical Globe Valve



Spring-Diaphragm Actuator Provides Smooth Control

Open Actuator Linkage

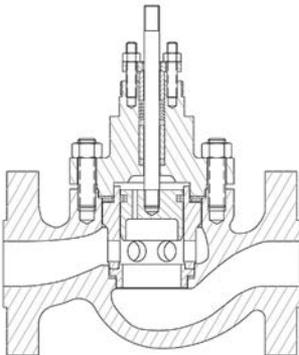
- Exposed to environment
- Contaminants can affect performance

Positioner Mounting Uses Complex Linkage

- Increased risk of lost motion, adjustment errors
- Performance is installation dependent

Sliding Stem Reduces Packing Durability

- Increased wear
- Higher friction
- Contaminants can be dragged through packing
- Expensive optional systems required for low-emission compliance



Gasketed Pressure Boundary Joint

- Risk of leakage
- Multiple gaskets and shims depending on trim size – Qty. 3 to 5

Linear Seating Motion

1:1 Ratio of Unbalance Force

- Large unbalanced area requires balance seals that limit tight shut off
- Larger required actuator slows dynamic performance

Cage Guiding

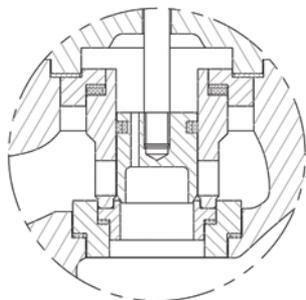
- Guide surface in flow stream
- Fluid contaminants can damage guiding surfaces
- Not trash tolerant

Typical 50:1  $C_v$  Ratio or Turndown

Typical Total Parts: 88

Typical Weight (2" size): 133 lbs (59 kg)

- Even in small sizes, some valve styles may require use of lifting devices during installation and removal





# Camflex II Universal Control Valve



Spring-Diaphragm Actuator with Rolling Diaphragm (Constant Area) Offers Superior Linear Control



Fully Enclosed Actuator Linkage

- Protected from environment



Direct, Linkageless Positioner Mounting

- Positioner directly connected to valve shaft
- No lost motion
- Consistent long-term performance across all installations



Rotary Shaft Motion Provides Increased Packing Life

- Low wear
- Low friction
- Rotating motion prevents contaminants from being dragged through packing
- Standard EF<sup>2</sup> Seal low emission packing system



No Gasketed Joints / No Gaskets / No Shims



Linear Seating Motion Due to Cam Action of Plug



3:1 Force Amplification Reduces Unbalance Force

- Lower force reduces required actuator size
- Smaller actuator volume area improves dynamic performance for faster system response



Heavy Triple Guiding

- Guide surfaces out of flow stream
- Fluid contaminants do not impinge on guides
- Trash tolerant



100:1 C<sub>v</sub> Ratio or Turndown

- Improves control range, especially at low openings

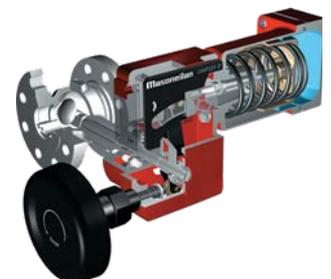
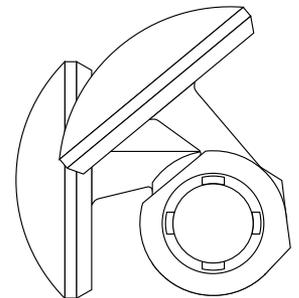
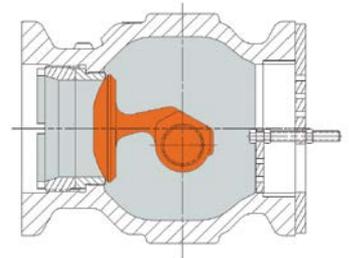
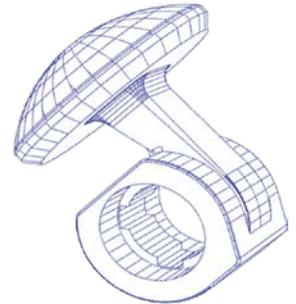


Total Parts: 72



Weight (2" size): 45 lbs (20 kg)

- Camflex's lower weight makes handling a breeze and the low profile allows installation into tight areas with low overhead room



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