



Control Valves

UNICON



UNICON SYSTEM Co.,Ltd
www.uniconvalve.com

Oct-2024

About Company



Unicon provides valuable support for future industries in Power, Chemical, Petrochemical, Oil Refinery, and Oil & Gas. We aim to be a global leader with reliable, advanced and state-of-art technology with valuable experience.

Company Information

- Established - September 1st, 2006
- Capacity - Annual: About 4000 complete valves
- Site Area - 7,314 m²
- Office and Shop area - 7,604 m²
- No. of Employees - Approx.55 (incl. Sales & Manufacturing)

Company History

2006

Establishment of UNICON System Inc.
Custom-made Control valves of all types

2007-2011

CE PED Certificate
ISO 14001 certificate
Approved Valve Repair Center of KOSEP, KOMIPO (Branch of Korean Power)
R&D Center approved by KOITA(Korea Industrial technology Association)

2012

Obtain Approval of Doosan Enerbility for Nuclear Power Control Valves
SMEs Technology Development Agreement with KEIT(Korea Planning & Evaluation Institute of Industrial Technology) for Desuperheater control Valve

2013

Factory expansion and relocation (Present)
Approved Supplier of KOSPO, KOWEPO, KOMIPO, EWP and KOSEP

2014

SIL2 Certificate for Globe Valve Body & Pneumatic Diaphragm Actuator, Cylinder Actuator
Utility Model Registration Certificate : control valve provided with a high temperature and high-pressure seat

2015

Approved Manufacturer for Korea Gas Safety Corp
EAC Certificate (Russia)
Development Cooperation with Doosan Enerbility : Control Oil System

2016

Cooperate with Doosan Enerbility for National Project : Development of 50% hydrogen co-firing technology for large gas turbine
Patent Certificate : Pneumatic Valve Actuator Design

2017-2018

ABS / LR Certificate (Cryogenic Valve)
Patent Certificate : Spray Nozzle with Uniform Mixing Spray function for superheated steam
Business agreement with Doosan for Revitalize Gas Turbine Industry

2019-2021

Special Equipment Production License (China)

2022

2024 - Present



Certificates

ISO 9001

ISO 14001

CE PED

Qualified Supplier for Korean Power (High Pr. & High Temp.)

Qualified Supplier for Korean Power (General)

LR Classification (Cryogenic Valve)

ABS Classification (Cryogenic Valve)

Fugitive Emission (ISO 15848-1)

Production License of Special Equipment (TS)

SIL

Inno-Biz

R&D Center

Fire Test (API 6FA)

High-Growth Company by Government

Specific Gas Production License (Ansan City Reg.)

Certificates - Patent & Utility Model Registration

Desuperheater with Pressure reducing and Overheat control system

Pneumatic Valve Actuator

Spray Nozzle with Uniform Mixing Spray function for Superheated steam

Volume Booster for Actuator

Control Valve provided with a High Temperature and High-Pressure seat

UNICON

Control Valves

Control Valves

Unicon has provided world-class automated process control solutions such as the highly reliable V100/V200 series top/cage guided 2-way valves and V300 series 3-way valves.

Bypass Valves, Attemperators and Desuperheaters

Unicon has provided world-class PRDS (Pressure Reducing and Desuperheating Systems), attemperators, desuperheaters, ventilators, turbine bypass valves, and let-down valves, such as the V400/D400 series products.

Shut-off(isolation) Valves

Unicon has provided world-class trunnion-mounted ball valves (V800 series), rising stem ball valves (V860 series), and triple-offset butterfly valves (V600 series).

Self-Regulators

Unicon has provided tank blanketing valves and pressure reducing/relief valves for air, gas, and water.



Products

- Control Globe / Angle Valve
- Turbine Bypass System
- Let-down Valve (PRDS)
- Desuperheater
- Ball Valve (Orbit, Trunnion)
- Butterfly Valve (Triple Offset)
- PRV (Pressure Reducing/Relief Valve)
- Actuator (Pneumatic, Hydraulic)



Wide Application

- Power - CCPP, CHP, TPP, NPP, DH, Co-Gen
- Oil & Gas - Onshore, Offshore, Refinery
- Petro Chemical - NCC, Ethylene, BTX, PS, SM, VCM, PVC
- Fine Chemical - HCL, H₂SO₄, NHO₃, Acetit Acide, PTA, NH₃
- Chemical - Dyes, Cosmetics, Caprolactam
- LNG
- Pulp & Paper
- Steel

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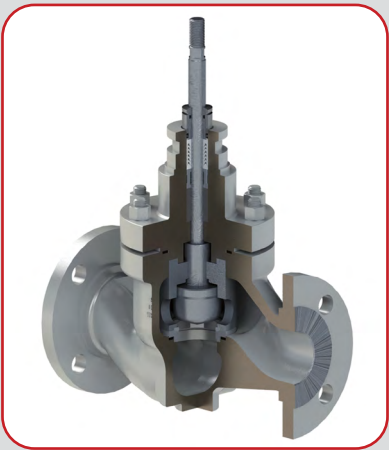
Unbalanced Type Globe Control Valves

V100 SERIES

The V100 series single-seated valves are designed for a wide range of applications involving liquids, steam, and gases. Their construction is simple, yet they feature a design that accommodates specialized applications. The V100 series valves offer reliable performance and cost-effectiveness, ensuring they will meet your control requirements.

Key Features & Benefits

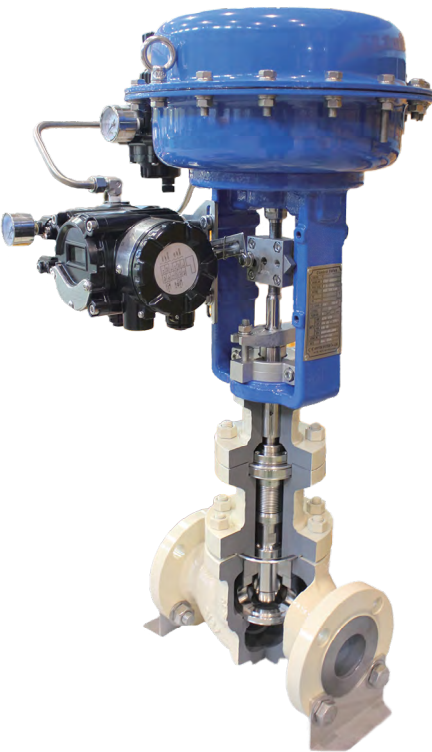
- Variety of Trim Type:**
Various trim designs provide a wide range of flow control, noise attenuation, and anti-cavitation control.
- Low Emissions Packing and Emissions Free:**
Low emissions packing is available to meet environmental safety and emissions control requirements, and bellows seals are available to meet zero emissions requirements.
- Suitable for Low Differential Pressure Systems:**
Suited for applications where the pressure differential across the valve is relatively low, these valves are efficient in systems requiring fine flow adjustments.
- Tight Shutoff:**
Tight shutoff capability prevents fluid leakage, which enhances system safety and reduces fluid loss.
- Ease of Maintenance:**
The quick change trim design makes maintenance easy, and component replacement or repairs are relatively straightforward. This minimizes downtime and reduces long-term maintenance costs.



Standard Valve Specification

Basic Design Standard : ASME B16.34

BODY TYPE	Globe / Angle Type
BONNET TYPE	Standard Type
	Extension Type
	Long Extension (Cryogenic Service) Type
NOMINAL SIZE	1/2" to 6" (DN 15 to DN150)
PRESSURE RATING	ASME Cl. 150 to 4500
	JIS 10K to 180K
	PN 20 to PN 420
END CONNECTION	Socket Weld – ASME B16.11
	Butt Weld - ASME B16.25
	FF/RF/RTJ Flange – ASME B16.5
	API 601 Connection B
	Option: JIS Flange, DIN Flange, NPT/PT Screw GOST 33259 Flange
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC, A105, A352-LCB/LCC
	Chrome-moly Steel : ASTM A217-WC6/WC9/C12A A182- F11/F22/F91/F92
	Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M, A182-F304/F304L/F316/F316L/ F321/F321H/F347
	Duplex Stainless Steel, Monel, AL Bronze, Inconel 625
	Hastelloy B/C, Other Alloy
ACTUATOR	Multi-Spring Rolling Diaphragm Actuators
	Pneumatic Cylinder Actuators
	Electric Motor Actuators
	Hydraulic Actuators



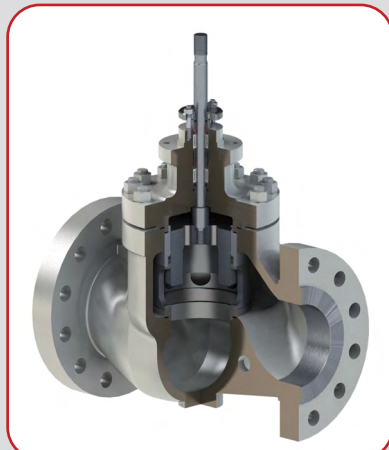
Balanced Type Globe Control Valves

V200 SERIES

The V200 series cage-guided valves are specially designed to incorporate the latest developments in control valve technology. They are intended for controlling various liquids and gases across a wide range of pressure differentials and temperatures.

Key Features & Benefits

- Pressure Balancing:**
The valve plug receives equal pressure from both the top and bottom sides, allowing for stable operation even under high differential pressure. This pressure-balancing design reduces the actuator force required to operate the valve.
- Versatile Trim Designs:**
P-Port and Window Cage are used for low differential pressure service. Multi-hole Cage (single-stage to multi-stage) and Disc Stack are designed for low-noise, anti-cavitation, and flashing services.
- Tight Shutoff:**
Tight shutoff capability prevents fluid leakage, which enhances system safety and reduces fluid loss.
- Ease of Maintenance:**
The quick-change trim design makes trim replacement and repairs easy, minimizing downtime and reducing long-term maintenance costs.
- Customized Trim Designs:**
With about 40 years of experience in design engineering and advanced engineering services for control valves, various customized trim designs are available as upgrades for special process conditions.



Standard Valve Specification

Basic Design Standard : ASME B16.34

BODY TYPE	Globe / Angle Type
BONNET TYPE	Standard Type
	Extension Type
	Long Extension (Cryogenic Service) Type
NOMINAL SIZE	1-1/2" to 32" (DN 40 to DN800)
PRESSURE RATING	ASME Cl. 150 to 4500
	JIS 10K to 180K
	PN 20 to PN 420
END CONNECTION	Socket Weld – ASME B16.11
	Butt Weld - ASME B16.25
	FF/RF/RTJ Flange – ASME B16.5
	API 601 Connection B
	Option: JIS Flange, DIN Flange, NPT/PT Screw GOST 33259 Flange
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC, A105, A352-LCB/LCC
	Chrome-moly Steel : ASTM A217-WC6/WC9/C12A A182- F11/F22/F91/F92
	Stainless Steel : ASTM A315-CF8/CF8M/CF3/CF3M, A182-F304/F304L/F316/F316L/ F321/F321H/F347
	Duplex Stainless Steel, Monel, AL Bronze, Inconel 625
	Hastelloy B/C, Other Alloy
ACTUATOR	Multi-Spring Rolling Diaphragm Actuators
	Pneumatic Cylinder Actuators
	Electric Motor Actuators
	Hydraulic Actuators



Unbalanced/Balanced Type Globe Control Valves

TRIM TYPES

The V100/V200 series are specifically designed with Quick Change Trim with no screwed or welded parts into the valve body or bonnet to make maintenance and replacement easier. This design optimizes valve performance, reduces downtime, and lowers maintenance costs. Versatile Trim Designs of the V100/V200 series valves provide wide flow range control, noise attenuation and anti-cavitation control.

Contoured Trim (P - Port)



The trim is unbalanced. By plug throttling, using parabolic contoured plugs in globe control valves provides precise flow control and high-pressure recovery, making it effective for various industrial processes. The design of these plugs maximizes valve performance and allows for flexible response to diverse control requirements.

Micro Flow Trim (V-Notch Plug)



V-notch trim features a design with a V-shaped cut on the valve plug. This design allows for more precise control of fluid flow especially very small flow rates must be accurately controlled, making it a highly effective solution for applications requiring fine and stable flow control. Due to its design and operational benefits, it is the preferred choice in many industries where accurate flow regulation is essential for process efficiency and product quality.



Anti-Cavitation Trim (Multi-Step Plug)



Multi-step trim is a technology designed to handle liquids pressure drop in a series by dividing the pressure reduction into multiple stages of labyrinth grooves. By gradually reducing the pressure through multiple steps, it effectively minimizes cavitation, noise, and erosion. The characteristics of this design provide stable and efficient control in various applications with high-pressure differentials, reducing noise and vibration, and enhancing the overall performance of the system.



Anti-Cavitation & Low-Noise Trim (Multi Hole, 1-Stage)



Multi Hole, 1-Stage Trim is a cost-effective single-stage globe valve trim that provides proven performance in high-pressure drop applications to reduce noise with compressible fluids and to reduce flashing effected erosion and to prevent cavitation that would occur with p-port trims. This trim design is suitable for most pressure drop services except for extremely severe services with very high pressure drops. It is designed with durability, reliability, performance, and parts interchangeability in mind, offering long service life and low maintenance costs.

Anti-Cavitation Trim (Multi Hole, Multi-Stage)



Multi Hole, Multi-Stage Anti-Cavitation trim consists of concentric cylinders with drilled holes and grooved channels. The expansion and contraction of the fluid as it moves through the channels, enters the holes, and then returns to the channels handle the pressure drop in multiple stages. This design gradually reduces pressure at each stage, preventing vapor bubble formation and minimizing fluid noise. Choosing this trim effectively addresses cavitation issues and maximizes valve performance in high-pressure applications, enhancing long-term operational efficiency and reducing maintenance costs.



Low-Noise Trim (Multi Hole, Multi-Stage)



The Multi Hole Cage in the low-noise trim offers excellent noise reduction and vibration control performance with multiple pressure breakdown under various high-pressure compressible fluid conditions. This enhances system stability and efficiency while contributing to reduced maintenance costs.

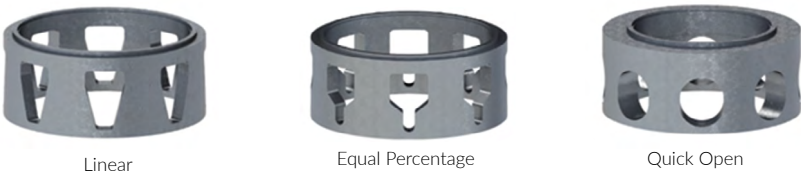


Window Cage



Window Cage Type is a balanced trim. This trim type is for relatively low pressure differentials for modulating control by characterized window cage, or for on/off control with large opening widows. The design and arrangement of the window cage are crucial factors in determining the flow characteristics of the valve. By selecting and designing the appropriate window cage, precise flow control can be achieved to meet the system's requirements.

Characterized Window Cages



Unbalanced/Balanced Type Globe Control Valves



V100 Series and V200 Series, high-performance flanged globe control valves, ensure precise flow, pressure and temperature control, as well as reliability in critical chemical, petrochemical, and oil & gas plants within demanding industrial environments.



V100 Series and V200 Series, weld-end globe control valves for power plants provide precise flow, pressure and temperature control, as well as durability in high-pressure and high-temperature environments.

Standard Trim Specification

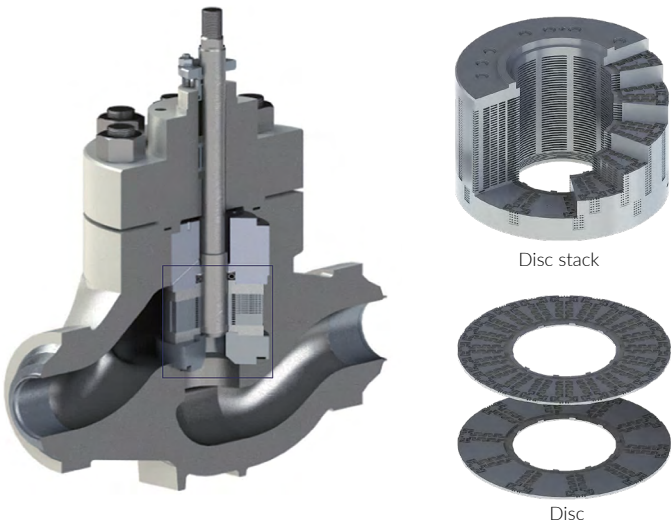
VALVE SERIES	V100 Series Unbalanced Plug Type Quick Changed Trim	V200 Series Balanced Plug Type Quick Changed Trim
NOMINAL SIZE	1/4" to 6" (DN8 to DN150)	1-1/2" to 32" (DN 40 to DN800)
TRIM TYPE	P-Port (Contoured) V-Notch Plug Anti-Cavitation Multi-Step Multi Turn Plug Low-Noise Multi Hole Cage (1/2/Multi-Stage) Anti-Cavitation Multi Hole Cage (1/2/Multi-Stage) Disc Stack Hybrid Trim (Disc Stack + Multi Hole Cage)	P-Port (Contoured) Cage Window Multi Turn Plug Low-Noise Multi Hole Cage (1/2/Multi-Stage) Anti-Cavitation Multi Hole Cage (1/2/Multi-Stage) Disc Stack Hybrid Trim (Disc Stack + Multi Hole Cage)
PLUG GUIDE METHOD	Top Guided, Cage Guided	Cage Guided
FLOW DIRECTION	Flow to Open : Contoured (P-Port) Low-Noise Multi Hole Cage Disc Stack for Gas & Steam Flow to Close : Anti-Cavitation Multi Hole Cage Disc Stack for Liquid	Flow to Open : Contoured (P-Port) Low-Noise Multi Hole Cage Disc Stack for Gas & Steam Flow to Close : Anti-Cavitation Multi Hole Cage Disc Stack for Liquid
Cv RANGE	0.003 to 400	12 to 6800
FLOW CHARACTERISTIC	Linear, Equal %, Modified %, Quick Open	Linear, Equal %, Modified %, Quick Open
SEAT LEAKAGE	ANSI/FCI 70-2 Class IV, V, VI (Soft Seat) MSS-SP61	ANSI/FCI 70-2 Class IV, V, VI (Soft Seat) MSS-SP61
MATERIAL	316 SS, 316 SS + Stellite, 316L SS, 316L SS + Stellite Hardened 410 SS / 440C SS 17-4PH, F11/F22/F91/F92 (Nitride treatment), F11/F22/F91/F92 + Stellite Inconel 718, XM19 Monel, Hastelloy Solid Tungsten Carbide Etc.	316 SS, 316 SS + Stellite,316 LSS, 316 LSS + Stellite Hardened 410 SS / 440C SS 17-4PH, F11/F22/F91/F92 (Nitride treatment), F11/F22/F91/F92 + Stellite Inconel 718, XM19 Monel, Hastelloy Solid Tungsten Carbide Etc.

Engineered Options - Disc Stack

The design of disc stack trim forces the fluid to follow a complex path at right angles through the valve trim, controlling the flow rate. The flow resistance provided by these rotations (or stages) limits the exit velocity at the trim to a safe level, regardless of the pressure drop. This is a powerful solution for handling severe pressure drops, reducing noise levels, and eliminating the effects of cavitation. The Unicon uses CFD simulation in the design and optimization process of the disc stack to create custom solutions for complex service problems. This approach achieves higher reliability and efficient valve performance even in demanding applications.

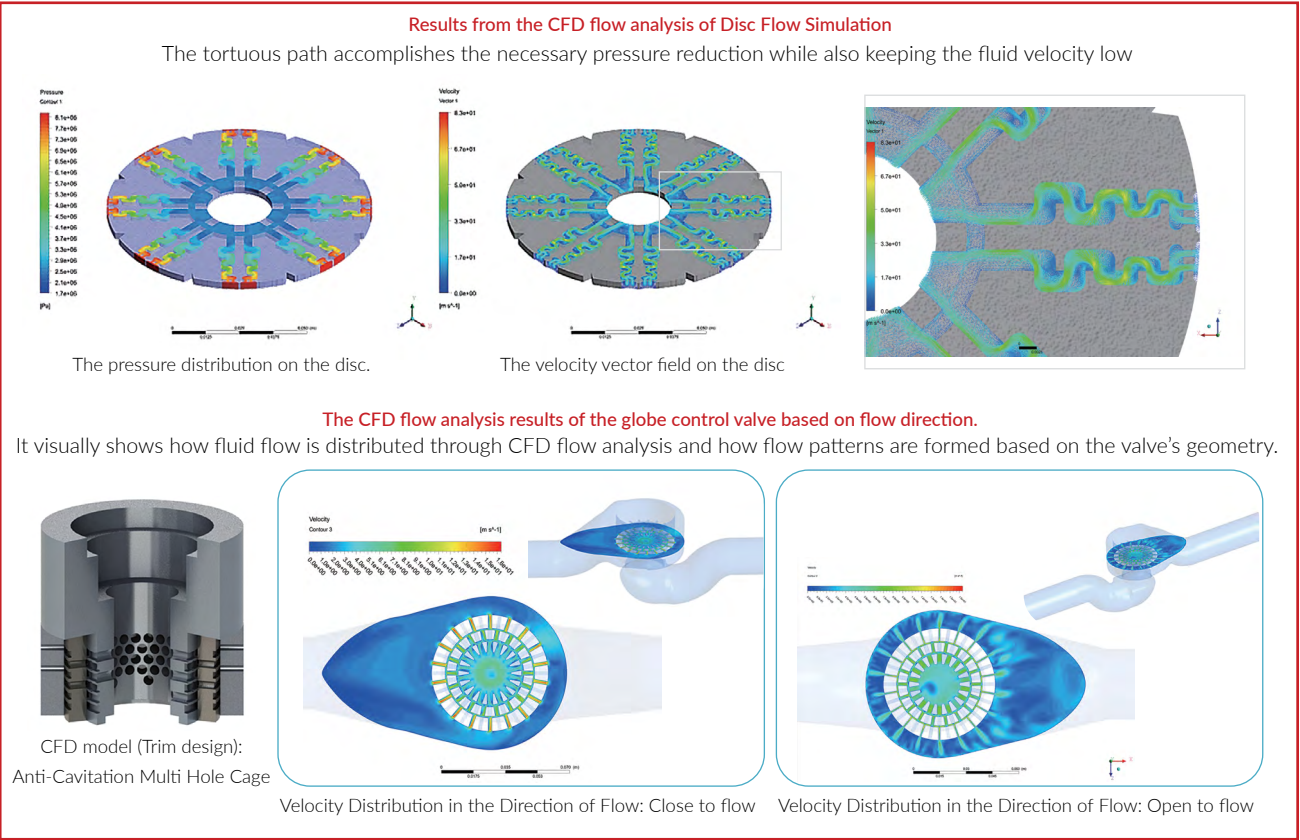
Benefits

- Pressure Reduction
- Noise Reduction
- Cavitation Control
- Erosion and Wear Resistance
- Flow Control Precision
- Reduced maintenance costs
- Prolonged trim life



Advanced Technology

UNICON uses Computational Fluid Dynamics (CFD), a Computer-Aided Engineering (CAE) tool, to evaluate concepts and improve valve designs. This approach allows them to predict valve performance, address potential issues early, and optimize designs for the best performance.



3 Way Globe Control Valves

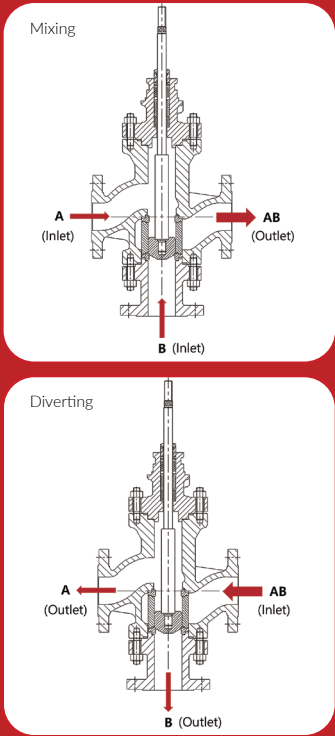
V300 SERIES

The V300 series valves are versatile devices used for controlling fluid flow in various industrial applications. They can perform both mixing and diverting functions, making them ideal for processes that require blending or splitting fluid streams. This range of valves has been designed in two forms, designated as V310 and V320. The V310 conventional type provides an economical solution for all mixing and selected diverting services. The V320 balanced trim is specially designed for high-duty diverting service applications.

Key Features
& Benefits

- Mixing and Diverting Functions:**
Can combine two fluid streams into one or split one fluid stream into two separate paths.
- Design:**
Typically has three ports – two inlets and one outlet, or one inlet and two outlets.
- Flexibility:**
Available in various sizes and configurations to meet different application needs.
- High Capacity:**
Broad and streamlined fluid passages allow a larger amount of fluid to pass through compared to other three-way valves of the same size.
- Stable Operation:**
Port and cage guiding system ensures stable operation of the plug, regardless of its travel.
- Durability:**
Guarantees a long, maintenance-free service life due to its rugged structure and smooth operation.

Functionality



The V300 series have three ports and can perform the following operations:

1. MIXING

Combining two fluid streams into one.

2. DIVERTING

Splitting one fluid stream into two separate paths.



• V310 series

This configuration features an unbalanced plug for simple maintenance and economical installation. It is designed with two side pipeline connections and one bottom pipeline connection.



• V320 series

This configuration uses a balanced plug design to minimize actuator forces and provide stable control in large valve sizes with pneumatic actuators. The quick-change trim, with the plug accessible from the bonnet, allows for easy maintenance. It is designed with two side pipeline connections and one bottom pipeline connection.



Standard Valve Specification

V310/V320 Series Mixing & Diverting 3Way Valve

VALVE SERIES	V310 series	V320 series
BODY STYLE	Bottom Flanged 3Way	Bottom Flanged 3Way
BONNET TYPE	Standard Fin & Extension Bellows Seal	Standard Fin & Extension Bellows Seal
NOMINAL SIZE	Mixing : 1" to 12" (DN25 - DN300) Diverting : 1" to 4" (DN25 - DN100)	3" to 12" (DN80 - DN300)
PRESSURE RATING	ASME Cl.150 to 600 (JIS 10K to 40K)	ASME Cl.150 to 600 (JIS 10K to 40K)
END CONNECTION	Socket Weld – ASME B16.11 Butt Weld - ASME B16.25 FF/RF/RTJ Flange – ASME B16.5 Option: JIS Flange, DIN Flange	Socket Weld – ASME B16.11 Butt Weld - ASME B16.25 FF/RF/RTJ Flange – ASME B16.5 Option: JIS Flange, DIN Flange
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC, A105 Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M Hastelloy B/C, Other Alloy	Carbon Steel : ASTM A216-WCB/WCC Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M Hastelloy B/C, Other Alloy
ACTUATOR	Multi-Spring Rolling Diaphragm Actuators Pneumatic Cylinder Actuators Electric Motor Actuators	Multi-Spring Rolling Diaphragm Actuators Pneumatic Cylinder Actuators Electric Motor Actuators
TRIM TYPE	V-Port, Window Cage, Multi Hole Cage	Window Cage, Multi Hole Cage
PLUG GUIDE METHOD	Cage Guide	Cage Guide
CV RANGE	Up to 1400	Up to 1400
FLOW CHARACTERISTIC	Linear, Equal %, Quick Open	Linear, Equal %, Quick Open
SEAT LEAKAGE	ANSI/FCI 70-2 (Class IV, V)	ANSI/FCI 70-2 (Class IV, V)
TRIM MATERIAL	316 SS, 316L SS Hardened 410 SS	316 SS, 316L SS Hardened 410 SS

Pressure Reducing Desuperheating System (PRDS)

V400 SERIES

Employing patented fluid flow conditioning technology and a unique nozzle arrangement, the V400 series steam conditioning valve is used for turbine bypass and steam conditioning. It is designed to reduce the pressure with minimizing noise and vibration, and to reduce the steam temperature to meet the downstream requirements. UNICON's new and improved PRDS easily meet today's most challenging steam conditioning applications.

Key Features & Benefits

- Forged or casting valve body with uniform thickness to withstand thermal cycling
- Pressurized pilot plug design requires smaller actuating forces, and has tight shut-off class V or MSS SP-61
- Pressure seal bonnet, Bolted bonnet
- Special packing box allows packing replacement without bonnet disassembling
- Optimized pressure reduction stages and spray nozzle arrangements for the customer designed operating conditions to reduce vibration and noise
- Hydraulic, pneumatic, electrical actuators available
- High rangeability
- Various type of steam conditioning valve

Standard Valve Specification

Straight way & Angle body Cage Guide style

NOMINAL SIZE	3" to 68" (DN80- DN1700)
PRESSURE RATING	ASME Cl. 150 to 4500
LEAKAGE	ANSI/FCI 70-2 Class IV, V MSS-SP61
END CONNECTION	FF/RF/RTJ Flange - ANSI B16.5 Butt Weld - ANSI B16.25
DESIGN TEMPERTURE	Up to 630 °C
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC, A105 Chrome-moly Steel : ASTM A217-WC6/WC9/C12A A182- F11/F22/F91/F92
ACTUATOR	Pneumatic Cylinder Actuators Electric Motor Actuators Hydraulic Actuators



Design Flexibility

Modular Construction:
The V400 series features a modular design that offers a variety of end connection styles and sizes, allowing for greater adaptability to different piping systems and installation requirements.

Noise Control Options:
A wide range noise reduction options are available, enabling the system to be tailored to specific noise reduction needs in various industrial environments.

Ease of Maintenance:
All trim components can be easily removed from the valve body, simplifying maintenance and reducing downtime during service.

Multiple Trim Sizes:
The V400 series offers various trim sizes, allowing the system to be optimized for different flow conditions and pressure requirements. This enables flexible system design and the implementation of solutions tailored to specific process conditions.

Atomizing Spray Nozzle



Spray pattern of a working mechanically atomized UNICON spray nozzle.

3D Modeling Option Available

UNICON provides 3D modeling that accurately replicates the actual product, offering the following advantages in pre-simulation for power plants and other facilities.

- **Accurate Distance Management:** 3D modeling allows for precise measurement of valve-to-valve distances, optimizing piping design.
- **Piping Route Optimization:** It enables visualization of the piping route, reducing pressure loss and enhancing fluid flow efficiency.
- **Interference Prevention:** Potential interference issues can be identified and corrected in the design phase, preventing rework.
- **Space Efficiency:** Limited space can be utilized effectively, improving maintenance accessibility.
- **Consistency Between Design and Manufacturing:** Ensures consistency between design and manufacturing, reducing installation errors.



3D model rendering of UNICON valves provided to an actual combined cycle power plant.
Project : Gimpo combinaed Heat & Power PJT (Korea)

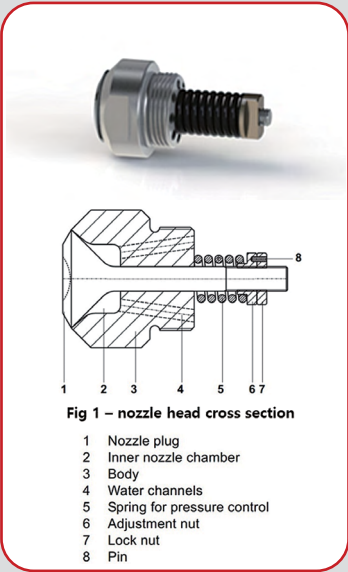
Nozzle Spray Steam Desuperheater

D400 SERIES

UNICON D400 Series Desuperheaters provide excellent and reliable steam temperature control with various types of desuperheaters for a wide range of steam pipe sizes.

Key Features & Benefits

- Wide Range of Design Options:**
Offers customized design solutions tailored to various demands.
- Broad Selection of Nozzle Sizes:**
Provides a wide range of nozzle sizes optimized for different steam conditions.
- Erosion-Resistant Materials:**
Designed with materials that ensure long service life and reliability in harsh conditions.
- Easy Maintenance:**
Minimal components make maintenance straightforward and cost-effective.
- Simple Installation:**
Quick and efficient installation shortens project timelines.
- Optimized Design:**
Ensures efficient operation and reliable performance.
- Swirled Discharge Nozzle:**
Enhances mixing and evaporation efficiency for effective desuperheating.



Technical Data

The selection of optimum equipment and an appropriate piping plan is necessary to achieve excellent temperature control. Guidelines for selecting equipment and precautions for the piping plan are provided in a separate UNICON technical book

1. Selecting a Desuperheater

When selecting a desuperheater, it's important to understand the type of equipment that will use the desuperheated steam. In particular, you should carefully consider the operating conditions, including the range of load fluctuations in downstream equipment and the acceptable range for drainage. It's also essential to account for the conditions of the cooling water, auxiliary steam, and any transient states during plant start-up and shutdown. Therefore, when designing a new plant, special attention should be given to the desuperheater design. It is recommended to select the desuperheater and configure the control loop through detailed discussions with the manufacturer's engineers.

2. Control Range for the Valve

To maintain stable and accurate temperature control, the cooling water control valve must operate smoothly across the entire load range. It should effectively regulate the cooling water flow required during high-load conditions while also precisely controlling the minimum water flow during low-load conditions to match the downstream requirements. As the load decreases, the steam temperature at the desuperheater inlet typically drops, necessitating a turn-down ratio for the cooling water control valve (the ratio of the minimum controllable Cv value to the maximum Cv value) that is considerably higher than that of the desuperheater itself.

Performance

- High efficiency atomization.
- High rangeability variable area spray unit.
- Accurate and repeatable control of fluid temperature to within 6 °C, providing appropriate installation and instrumentation are used.
- High spray water pressure capability.

D410M Multiple Variable Spray Nozzle

Multi-variable nozzle desuperheater is used as a primary attemperator (inter-stage) and a secondary attemperator (final stage) to regulate the output temperature of the boiler/HRSG.



D410M

D420 Venturi Nozzle

Venturi-type desuperheater is used for temperature control of steam in small-sized pipes. The spray water is controlled through a separate spray water control valve.



D420

D410S Variable Spray Nozzle

Desuperheater with a single variable nozzle is used for desuperheating steam in small and medium-sized pipes.



D410S

D410SM Multiple Variable Spray Nozzle

Desuperheater with several variable nozzles is used for desuperheating steam that requires large spray water flow quantities.



D410SM

D410V

Combination of D410S or D410SM and a control valve is used for desuperheating steam that requires a high rangeability of spray water.



D410V

Pilot Type Tank Blanket Valves

V510 SERIES

The blanket gas regulator is one of the principal components typically installed on a storage tank to protect the tank and its contents. It is a precision regulator capable of maintaining a very low gas pressure (minimum 0.005 barg) in the tank by controlling the flow of a high-pressure (maximum 13 barg) blanketing gas. It maintains a positive pressure in the tank when fluid is pumped out or as fluid temperature decreases. Typically, nitrogen or another compatible gas is used to suppress the tank product vapors. This reduces losses due to product evaporation and prevents atmospheric contaminants, including moisture, from entering the tank, thereby preventing tank corrosion and product contamination. The V510 Valves are self-contained, fully balanced, and pilot-operated, and is used for accurate pressure control in tank blanketing systems.

Key Features & Benefits

- Accurate Pressure Control:**
The pilot valve's precise sensing and control maintain the tank's internal pressure at the desired set point.
- High Sensitivity:**
The large diaphragm actuator and balanced design ensure quick and accurate responses to pressure changes.
- Balanced Valve Design:**
Fully balanced valve design reduces sensitivity to inlet pressure changes.
- Bubble-Tight Shutoff:**
Provides complete sealing to prevent gas leakage.
- Reduced Maintenance and Operational Costs:**
The self-contained design minimizes the need for additional equipment, simplifying installation and operation.
- Various Material Options :**
Available in materials like stainless steel, offering durability and suitability for various environments.

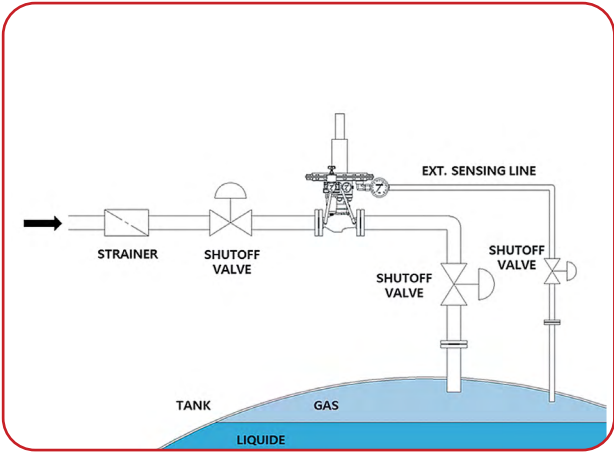
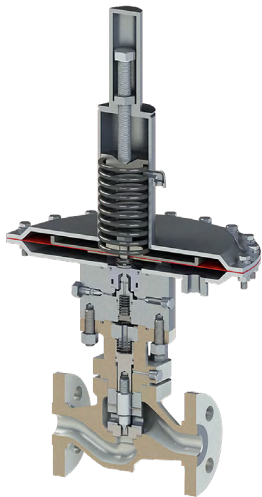
Standard Valve Specification

Nominal Size	1/2" to 2" (DN15- DN50)
Pressure Rating	ASME Cl. 150, 300 JIS 10K, 20K
End Connection	Screwed (NPT) FF/RF Flange – ASME B16.5 Option: JIS Flange, DIN Flange
Set Pressure Sensing Connection	Extenal - 1/2" NPT (Standard)
Construction Materials	Body : Stainless Steel (ASTM A351-CF8/CF8M, CF3M) Trim : Stainless Steel (316SS) Actuator : Stainless Steel (304SS, 316SS) Spring : Spring Steel Diaphragm : PTFE Tubing : 316L SS (904L - Option)
Cv Range	0.5 to 55
Maximum Operating Inlet Pressure	200 psig (13.8 barg)
Maximum Operating Outlet Pressure	1.5 psig (0.1 barg)
Outlet Set Pressure Range	0.005 ~ 0.1 barg
Differential Operating Pressure	Minimum: 30 psig (2 barg) Maximum: 200 psig (13.8 barg)
Operating Temperature	0 to 200°F (-18 to 100 °C)



Operating Principle

- 1. Pressure Sensing:**
When liquid is pumped out of the tank or vapor inside the tank condenses, the pressure in the tank decreases. The tank pressure is sensed by the large actuator diaphragm.
- 2. Pilot Valve Operation:**
When the tank pressure falls below the setpoint, the actuator diaphragm moves downward, opening the pilot valve. This allows loading pressure to flow into the tank.
- 3. Main Valve Adjustment:**
As loading pressure decreases, the inlet pressure overcomes the main valve spring force, opening the main valve to allow gas flow. When tank pressure rises above the setpoint, the pilot valve closes, equalizing pressure and closing the main valve.
- 4. Pressure Control:**
The valve continuously senses and adjusts to maintain stable vapor space pressure for tank protection, keeping the protective gas blanket at the desired level.



Direct Acting - Pressure Reducing Valve

V515 SERIES

Pressure Reducing Valves automatically reduce a high initial pressure to a lower delivery pressure and maintain that lower pressure within reasonably close limits, depending on the specific design selected. A Pressure Reducing Valve is a single-seated, self-actuating, diaphragm or piston type regulator commonly used in gas or liquid systems to maintain safe and efficient operation by regulating pressure. The V515 series valve offers various modifications of the pressure regulating valve.

Key Features

- Simple Design:** Direct acting-pressure reducing valves are designed with a simple mechanism, making them easy to install and maintain.
- Quick Response Time:** They respond quickly to pressure changes, ensuring stable system pressure.
- Compact Size:** Helps maintain a consistent flow, improving system efficiency.
- Self-Operating:** These valves operate independently without the need for external power or additional control systems, helping to reduce operational costs.
- High Durability:** Made from durable materials like stainless steel, they offer long service life and excellent corrosion resistance.



Triple Offset Butterfly Valves

V600 SERIES

The V600 series triple offset butterfly valves offer high performance in rotary valve packages. UNICON is recognized in the market for its excellent flow and control characteristics, sealing capability and reliability in various applications. The UNICON triple offset butterfly valves meet industrial requirements and provides end users with a lower total cost of ownership through improved life cycle costs, emission control, and reduced maintenance costs.

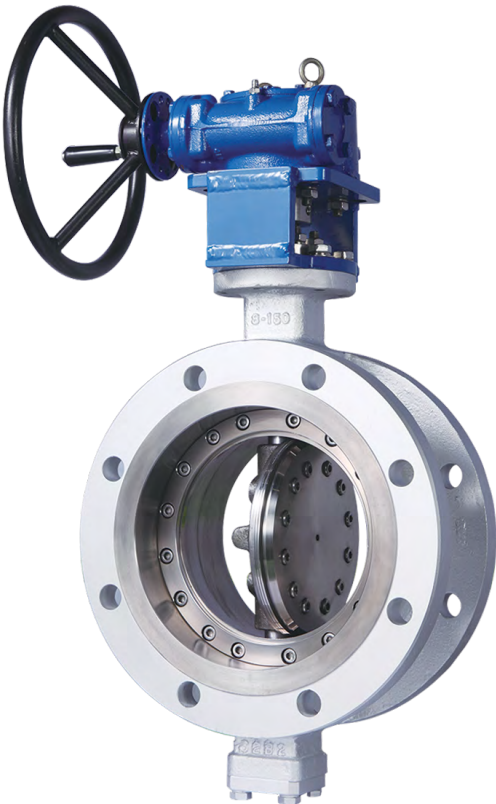
Key Features & Benefits

- No-Friction:**
The triple offset eliminates all friction throughout the operating cycle, resulting in a vastly extended valve life.
- No-Overtravel:**
The triple offset refers to the geometric design of the angled cone disc sealing components. Contact is only made at the final point of closure, with the 90-degree angle acting as a mechanical stop, which prevents any overtravel of the disc.
- Wide Range:**
The non-galling design enables a wide variety of material options and a wide range of applications from low to high temperature and pressure
- Zero-Leakage:**
Metal-to-metal sealing allows for higher pressure and temperature applications while still providing tight shut off.
- Easy Maintenance:**
Field-replaceable seat and seal ring reduce maintenance costs.

Standard Valve Specification

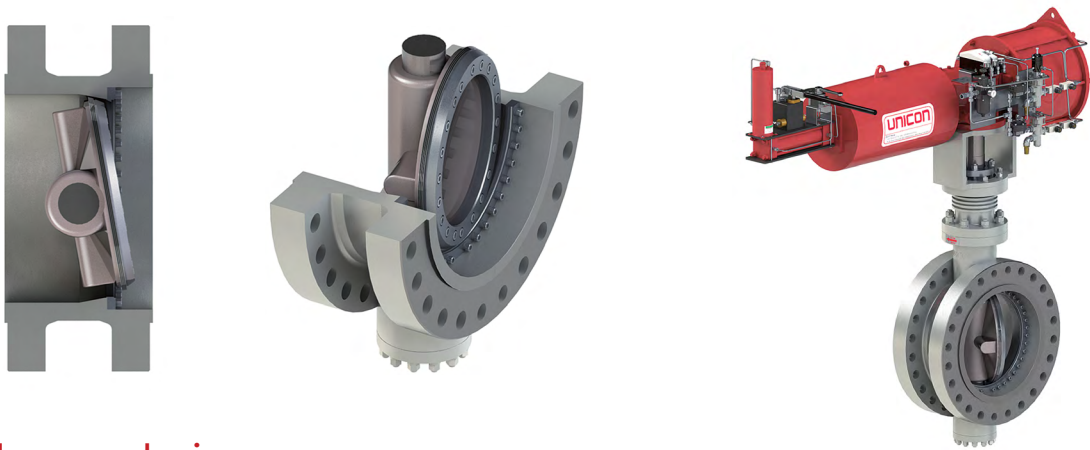
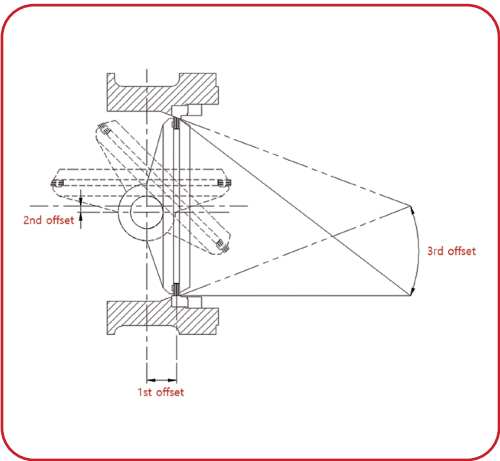
Triple Offset Butterfly Valves

NOMINAL SIZE	6" to 44" (DN150- DN1100)
PRESSURE RATING	ASME Cl. 150 to 1500 JIS 10K to 63K PN 10 to PN 250
LEAKAGE	ANSI/FCI 70-2 Standard : ASME Class V (Metal Seat) Option: ASME Class VI
END CONNECTION	Wafer (Flangeless) Lugged Double Flange
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC Chrome-moly Steel : ASTM A217-WC6/WC9 Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M Other Alloy
ACTUATOR	Manual Override Pneumatic Cylinder Actuators Electric Motor Actuators Hydraulic Actuators
APPLICATION	Fuel Gas Control Low Pressure Steam & Water General Services Flash Tank Condensate Recirculation Auxiliary Steam Deaerator Pegging Steam



Triple Offset Design

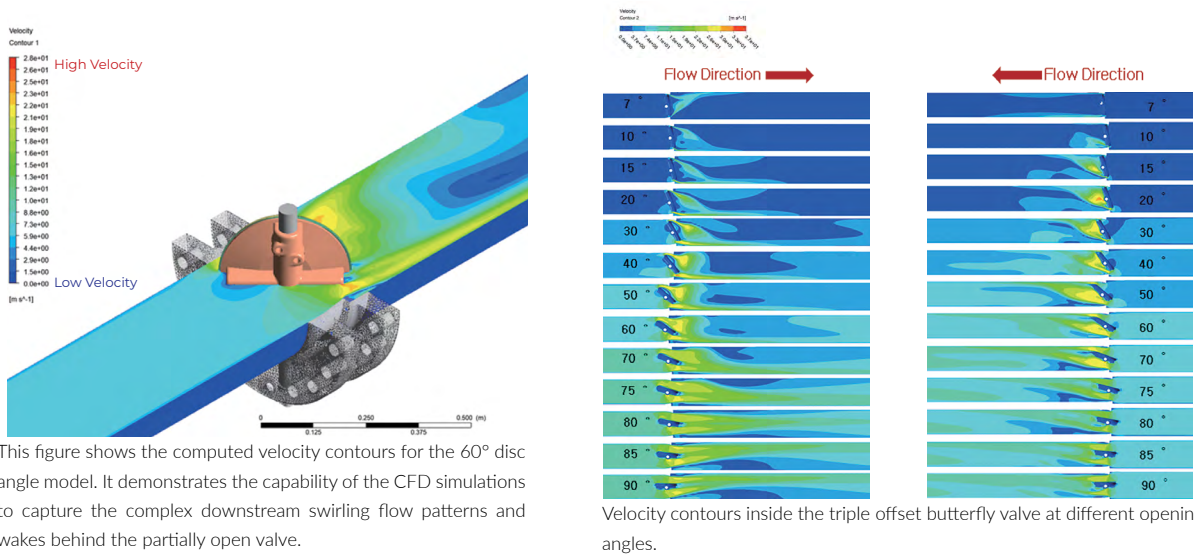
- **Single Offset - 1st offset**
The center of the valve disc is offset from the center of the valve seat, allowing the disc to rotate away from the seat without friction.
- **Double Offset - 2nd offset**
The rotation axis of the valve disc is offset from the center of the valve bore, facilitating easier separation of the disc from the seat.
- **Triple Offset - 3rd offset**
The seat and disc are asymmetrically arranged, creating a tapered shape at the contact area, which enhances the sealing performance.



CFD flow analysis

UNICON optimizes the design of triple offset butterfly valves to improve flow efficiency using CFD (Computational Fluid Dynamics) flow analysis. This analysis allows for the evaluation and enhancement of sealing performance under various pressure conditions. It also helps identify areas of high stress to reinforce durability and extend the valve's lifespan. By using virtual testing instead of actual prototypes, both costs and time are saved. Finally, extreme operating conditions are simulated to ensure safety and reliability.

Using CFD, the flow characteristics of fluid passing through the valve can be visualized and analyzed. This allows for accurate identification of turbulence, velocity distribution, and pressure drop in the flow.



Eccentric Rotary Plug Control Valves

V700 SERIES

The V700 Series Eccentric Rotary Plug Control Valves combine the ruggedness of a globe valve with the efficiency of a rotary valve. The V700 Series is a high-performance, safety-focused, economical, and feature-rich eccentric rotary plug control valve designed for applications demanding higher rangeability, precise control, and higher flow capacity. It is especially suitable for high-capacity applications involving heavy slurries, liquids, gases, and steam services.

Key Features & Benefits

Flanged Body Design:

- The flanged body design fully meets ASME Class 150, 300, and 600 standards, reducing piping alignment and installation time.
- The one-piece flanged body is designed to reduce production costs.

Eccentric Rotating Construction:

- The shape of the eccentric rotary control valve's disc provides benefits such as tight shut-off, high flow characteristics, and low unidirectional dynamic force.
- The disc of the eccentric rotary control valve contacts the seat only at the moment of seating due to the eccentric rotating design.

High Capacity Flow Design:

- This unique disc design provides high flow characteristics.
- The full port's Cv is normally 2-3 times greater than that of conventional globe valves. The high flow capacity combined with controllability at small openings provides excellent rangeability.

Available for High Temperatures:

- Metal seating and hardened trim parts allow use in high-temperature and abrasive services.

High Temperature and Corrosion Capabilities:

- Uses metal seals, and top and bottom bearings for high temperature and corrosion resistance.

Standard Valve Specification

Eccentric Rotary Plug Control Valve

NOMINAL SIZE	1" to 12" (DN25 DN300)
PRESSURE RATING	ASME Cl. 150 to 600
	JIS 10K to 63K PN 10 to PN 150
LEAKAGE	ANSI/FCI 70-2 Standard : ASME Class V (Metal Seat) Option: ASME Class VI (Soft Seat)
Cv Range	2.8 to 1750
END CONNECTION	Flangeless RF Flanged
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC Chrome-moly Steel : ASTM A217-WC6/WC9 Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M Other Alloy
ACTUATOR	Multi-Spring Rolling Diaphragm Actuators
APPLICATION	Fuel Gas Control, Low Pressure Steam & Water General Services, Flash Tank, Condensate Recirculation Auxiliary Steam, Deaerator Pegging Steam



Operating Principle

• **Open Position:**

The center of the valve disc is offset from the center of the valve seat, allowing the disc to rotate away from the seat without friction.

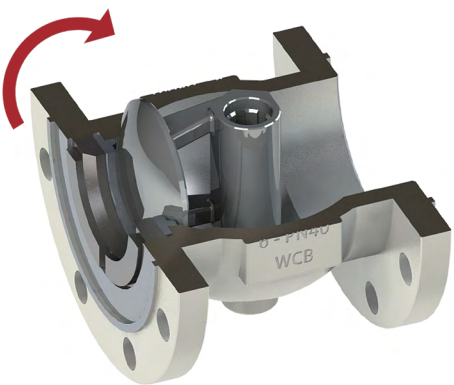
• **Closed Position:**

The actuator rotates the plug so that the sealing face of the plug contacts the seat, completely blocking the fluid flow.

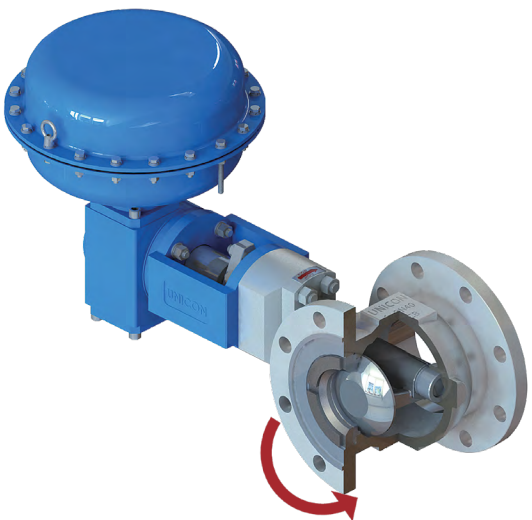
• **Control Function:**

The rotation angle of the plug can be adjusted to partially open or close the flow of the fluid. The asymmetrical design of the plug helps optimize flow characteristics during this process.

Rotation to Open (CW)

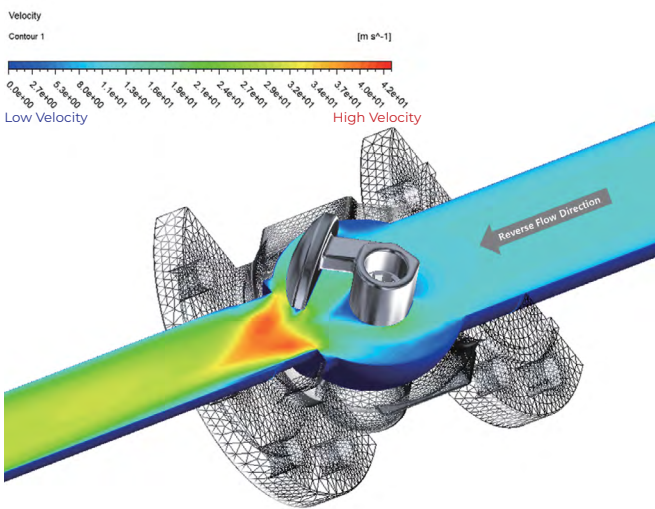


Rotation to Close (CCW)



Typical Applications

Eccentric rotary plug control valves are designed to manage challenging fluids such as those that are erosive or prone to coking, offering both throttling and on/off capabilities. With flanged connections, these valves have optimized flow paths and durable metal trim components, ensuring reliable performance in slurry environments. Commonly found in industries like mining, oil refining, power generation, and pulp and paper production, these valves provide consistent and efficient fluid control in demanding applications.



Reverse Flow Advantage

In erosive applications, the recommended flow direction for eccentric rotary plug valves is with the shaft positioned upstream. This reverse flow design directs high-velocity fluids to the outlet area, preventing direct erosion on the plug and seat. Additionally, the seat ring and retainer can be made from erosion-resistant materials, enhancing durability and making maintenance easier, ultimately extending the valve's lifespan.

High Performance Ball Valves

V800 SERIES

The V800 Series metal-seated ball valves incorporate flow conditioning technology and a unique ball arrangement. UNICON manufactures the most comprehensive line of quality ball valves and provides valves and actuators that meet the most demanding application requirements. The internal parts of the valves are designed and selected to ensure reliability under all types of working conditions. With a variety of materials available, UNICON valves are suitable for use with various fluids.

Key Features & Benefits

- Independent Ball and Stem:**
The ball and stem are manufactured as two separate pieces to reduce the effect of the side load generated by the pressure acting on the ball.
- Anti-Static Design:**
The continuity of electrical conductance between all metallic components is guaranteed and certified.
- Low Emission Valves:**
Accurate machining of stem and bonnet sealing surfaces ensures compliance with the most stringent pollution control regulations. Special “live” seals are available upon request.
- Ball Seat Alignment:**
Stem/flange mechanical stops ensure control and precise alignment of ball rotation.
- Longevity of Life:**
Special consideration was given to enhancing the longevity and performance of our valves throughout the design, development, testing, and manufacturing stages. The valve designs, combined with the selection of advanced materials, ensure that long periods of inactivity do not affect operational efficiency.

Standard Valve Specification

Trunnion Mounted 3-Piece & top entry style

NOMINAL SIZE	1/2" to 24" (DN15 - DN600)
PRESSURE RATING	ASME Cl. 150 to 2500 JIS 10K to 63K PN 10 to PN 450
LEAKAGE	ANSI/FCI 70-2 Standard : ASME Class IV Option: ASME Class V, VI
END CONNECTION	NPT/PT RF/FF/RTJ Flanged Socket weld Butt weld
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC, A105, A350-LF2 Chrome-moly Steel : ASTM A217-WC6/WC9, A182-F11/F22/F91 Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M, A182-F304/F304L/F316/F316L Other Alloys
ACTUATOR	Pneumatic Cylinder Actuators Electric Motor Actuators Hydraulic Actuators
APPLICATION	Low Pressure Steam & Water General Services Flash Tank, Fuel Gas, Condensate Recirculation Superheater and Reheat Spray Desuperheater Water Spray, Gland Steam Pressure Soot Blower, Steam Pressure, Auxiliary Steam



Trunnion - Mounted Ball

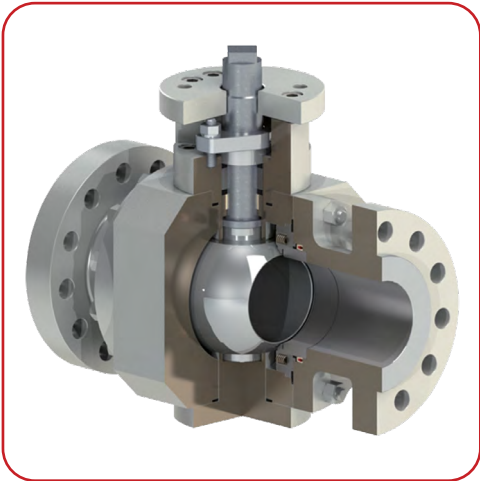
Technical Features

An additional shaft at the bottom secures the ball, and the seat rings are floating, free to move along the valve axis. Side loads generated by the pressure acting on the ball are absorbed by the bearings. At low pressure, the seat sealing is achieved by the thrust of springs acting on the seat rings. As the pressure increases, fluid pressure pushes the seat rings against the ball.

Trunnion-mounted ball valves provide reliable operation and long service life in high-pressure and large piping systems, featuring excellent sealing performance.

Operating Principle

- Turning the valve handle or actuator rotates the ball, opening or blocking the flow path.
- The trunnion structure fixes the ball vertically, ensuring stable positioning even under high-pressure conditions.
- The spring between the seat and the retainer maintains the sealing force, ensuring the valve's sealing performance under high pressure.



Floating Ball - Relieving Seat Rings

Technical Features

Two independent floating seat rings ensure the bi-directional tightness of the valve. The seats are designed to minimize the torque required to operate the valves without losing sealing power, which is assured from zero differential pressure to the valve's maximum rated pressure. Self-relieving seats are supplied as a standard feature.

Floating ball valves have a simple structure, are easy to maintain, and operate effectively in low and medium pressure systems.

Operating Principle

- When the valve closes, the floating ball is pushed towards the seat rings by fluid pressure, forming a seal.
- The relieving seat rings automatically move to relieve excess pressure when it occurs. This is achieved as the fluid pressure pushes the seat rings away from the ball.



Flow Coefficient Information

Cv for Full Bore Ball Valves

Size		Pressure Rating					
in	mm	150	300	600	900	1500	2500
1"	25	90	78	69	63	63	27
1-1/2"	40	227	211	187	167	167	92
2"	50	463	420	361	322	322	291
3"	80	1247	1057	943	911	820	739
4"	100	2489	2156	1811	1760	1610	1450
6"	150	5458	5359	4581	4386	4079	2528
8"	200	10721	10235	8920	8446	7978	5301
10"	250	17756	17202	14614	14164	13029	8431
12"	300	26714	25917	22782	21230	19619	12348
14"	350	32609	30936	28641	26625	24083	-
16"	400	44627	42550	39141	36642	33110	-
18"	450	57799	56171	51396	48645	43329	-
20"	500	74763	71830	65432	62207	55426	-
24"	600	113221	109381	98940	93948	83892	-

Scope

The values given below are applicable to Trunnion Mounted Ball Valve/ Floating Ball Valve, when the ball valve is in full open condition.

Flow Coefficient Cv

The coefficient of flow Cv expresses the rate of flow in US gallons/min. of water at 60°F with a pressure drop of 1 psig across the valve.

High Performance Rising Stem Top Entry Ball Valves

V860 SERIES

The Rising Stem Ball Valves V860 Series are developed to provide reliable performance under high pressure, high temperature, and frequent operation conditions. These valves offer high reliability, long lifespan, easy maintenance, and high safety, playing a crucial role in various industrial sectors.

Key Features & Benefits

Tilt-and-Turn Operation Mechanism:

The ball tilts and rotates before contacting the seat, eliminating seal rubbing. This mechanism minimizes wear between the ball and the seat.

Mechanically Energized Seal:

The cam angle at the lower end of the stem ensures the core is tightly wedged against the seat, providing a positive shutoff.

Self-Cleaning:

By tilting the core away from the seat before rotation, a 360° flow around the core surface is created, removing any foreign material.

Low Operation Torque:

With seal rubbing eliminated, the valve rotates easily. The dual action with a special mechanism achieves low operation torque

Enhanced Durability:

The core surface is made of hardened material, resistant to wear and corrosion, providing a long lifespan.

Top Entry Design:

Allows for in-line inspection and repair after system depressurizing, simplifying maintenance.

Dual Stem Guides:

Reinforced stem slots and robust guide pins regulate the stem's lift-and-turn movement.

Standard Valve Specification

NOMINAL SIZE	1" to 30" (DN25 - DN750)
PRESSURE RATING	ASME Cl. 150 to 2500 PN 16 to PN 450
LEAKAGE	ANSI/FCI 70-2 Standard : ASME Class IV Option: ASME Class V, VI
END CONNECTION	NPT/PT RF/FF/RTJ Flanged Socket weld Butt weld
MATERIAL	Carbon Steel : ASTM A216-WCB/WCC, A105, A350-LF2 Chrome-moly Steel : ASTM A217-WC6/WC9 Stainless Steel : ASTM A351-CF8/CF8M/CF3/CF3M, A182-F304/F304L/F316/F316L Other Alloys
ACTUATOR	Pneumatic Cylinder Actuators Electric Motor Actuators Hydraulic Actuators Manual
APPLICATION	Low Pressure Steam & Water General Services Flash Tank, Fuel Gas, Condensate Recirculation Superheater and Reheat Spray Desuperheater Water Spray, Gland Steam Pressure Soot Blower, Steam Pressure, Auxiliary Steam



Design and Operation

Unique Mechanism

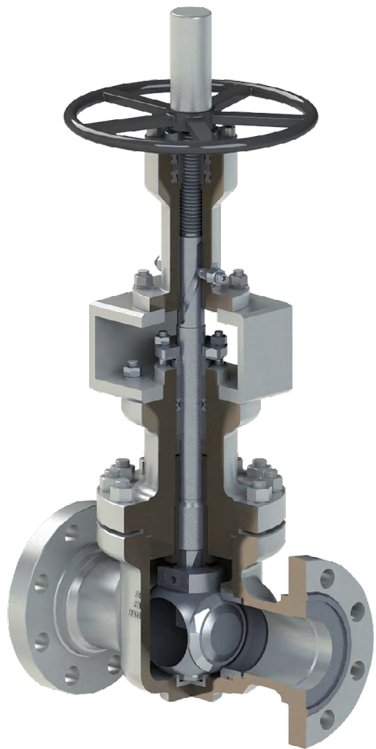
The Rising Stem Ball valve V860 Series features a distinct operational mechanism compared to standard ball valves. The key difference lies in the way the ball moves within the valve. Instead of the ball simply rotating within the valve body, the Rising Stem Ball Valve utilizes a combination of rotation and camming action to engage and disengage the seat.

Camming Action

When the valve is operated, the ball first moves away from the seat before rotating. This camming action ensures that there is no contact between the ball and the seat while the ball is rotating, thus significantly reducing friction and wear. Once the ball is in the desired open or closed position, it moves back to contact the seat, creating a tight seal.

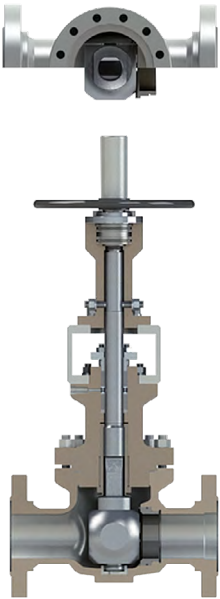
Sealing

The sealing mechanism in a Rising Stem Ball Valve is highly reliable. When the valve is closed, the ball is pressed against the seat with enough force to create a leak-tight seal. This force increases with line pressure, further enhancing the sealing capability.



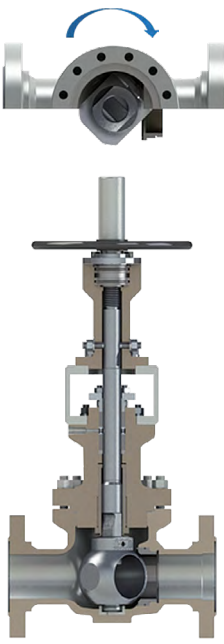
Open position

In this position, the valve is fully open, allowing fluid to flow freely. The ball is rotated to align the flow path with the pipeline.



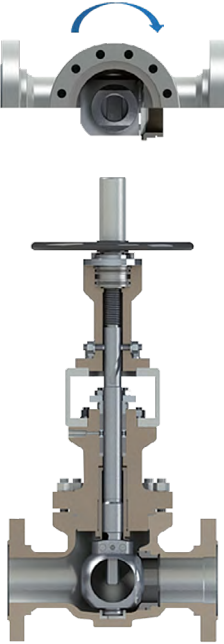
Rotating

To close the valve, start turning the handle, which lowers the stem. As the stem descends, its precision spiral grooves engage with the fixed guide pins, causing both the stem and core to rotate.



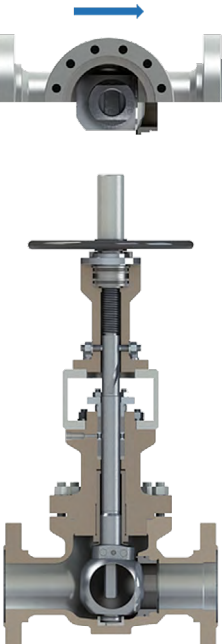
Closed position

The core rotates to a position that blocks the flow path without contacting the seat, thus preventing seal friction.



Sealing

Once the core reaches the closed position, the cam action of the stem mechanically wedges the core tightly against the seat, ensuring a positive shutoff.





UNICON

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