

PLUNGER VALVE

SIZES: 8" - 72"



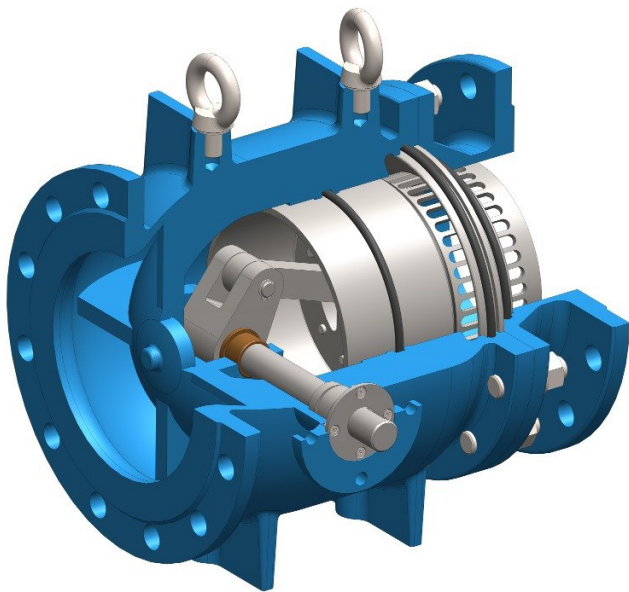
UNDERSTANDING CAVITATION

What Causes Cavitation

Cavitation is the process in which a vapor bubble in a liquid rapidly collapses producing a violent shock wave. The shock waves formed by the collapsing bubble can cause significant damage to adjacent pipe, valves, and fittings.

How Cavitation Works in Simple Terms

Water has a vapor pressure approximately -14.7psi at sea level and 70 degrees F. A restriction in a pipeline (valve, fitting, orifice plate, etc....) causes higher velocity through the restriction. Due to the conservation of energy, as the velocity increases, the pressure decreases. If the velocity increases to the point that the pressure decreases below the vapor pressure, bubbles form in the water. As the water exits the restriction and the velocity slows (resulting in a higher pressure) the pressure increases above the vapor pressure resulting in the violent collapse of the bubbles. It is the collapsing bubbles that one hears on the pipeline that is the sound of "rocks rolling down the pipe". Material adjacent to the collapsing bubbles can be destroyed due to the violent nature of the collapse. Cavitation cannot be eliminated but knowing how it works can help us "control" it.



DECREASING CAVITATION

Decreasing Cavitation

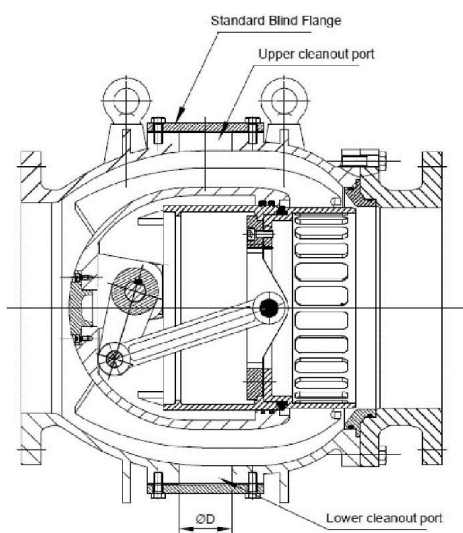
Shut-Off Valves, such as Gate Valves, and Butterfly Valves can restrict the flow of liquids and can cause very high flow velocity in the throttled position. The design of these valves impinging the flow to the pipe walls and the valve interior surfaces. Plunger Valves, by contrast, direct the flow of liquids passing through the plunger valve to the center of the flow element so that the implosions take place in the center of the flow stream away from adjacent pipe and valve surfaces. By redirecting and “controlling” the location of the collapsing bubbles, cavitation damage is significantly reduced.

The Plunger Valve Advantage

Valves, such as gate valves are designed to provide unobstructed flow in the fully opened position or to totally obstruct flow when fully closed. These inherently asymmetrical cross sections are unable to provide a linear control over their operating range. In contrast, the Plunger Valve has characterized trim that facilitates linear control over the entire operating range. The customized trims allow for characterized flow control for each unique application.

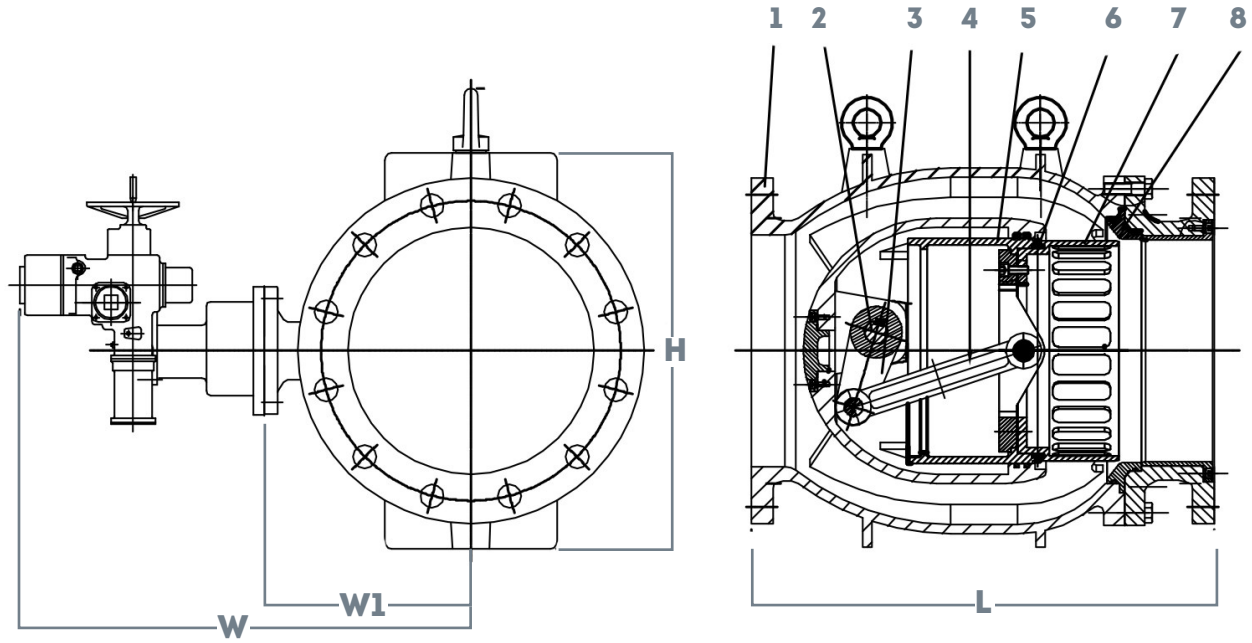
Centering Bursts

The Plunger Valve passes the liquid through a characterized element that prevents the cavitation from impinging on the valve and pipeline surfaces. Liquids travel into the center of the valve or pipeline, and the cavitation “event” is directed away from the adjacent walls. Different valve trim packages allow for customized flow control based on the application. Trim packages include vanned, slotted and perforated trim. All anti-cavitation control valves are not made equally and the control of cavitation by directing the flow to the center of the valve is the proven method for controlling cavitation damage. A J&S Valve consultant can assist with the proper trim package for your application.



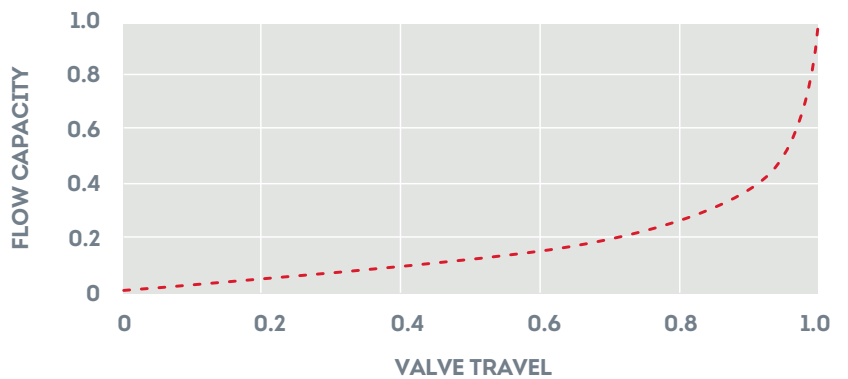
SIZE	FROM 8" TO 24"	FROM 30" TO 36"	FROM 42" TO 60"
D	4"	6"	8"

INSTALLATION DIMENSIONS



No.	PART NAME	MATERIALS
1	Body	Ductile Iron ASTM A536 65-45-12
2	Stem	Stainless Steel 304
3	Crank	Stainless Steel 304
4	Rocker	Stainless Steel 304
5	Cylinder	Stainless Steel 304
6	Sealing Ring	EPDM
7	Cage	Stainless Steel 304
8	Seat	Stainless Steel 304

FLOW CHARACTERISTICS



DIMENSIONS - PLUNGER VALVE SERIES 8000

MODEL	8008	8010	8012	8016	8018	8020	8024	8030	8036	8042	8048	8054	8060	8072
SIZE	8"	10"	12"	16"	18"	20"	24"	30"	36"	42"	48"	54"	60"	72"
L	15.7"	19.7"	23.6"	31.5"	35.4"	39.4"	47.2"	59"	70.9"	82.5"	94.5"	106"	118"	140"
H	18"	22"	23.5"	31"	31.5"	35.4"	43"	48"	56"	68"	72"	78.5"	97"	120.5"
W1	8"	10"	11.5"	15.5"	16.5"	18"	24"	26"	33"	35.5"	38.5"	41"	51"	59"
W	20"	23"	24"	28"	30"	32"	33"	37"	42"	47"	51"	59"	70"	80"

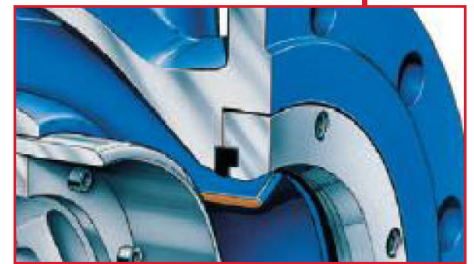
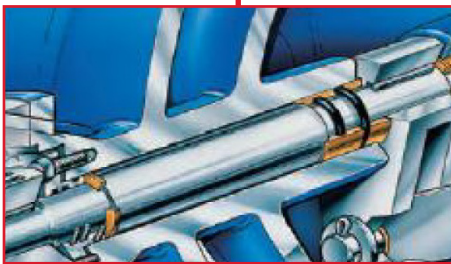
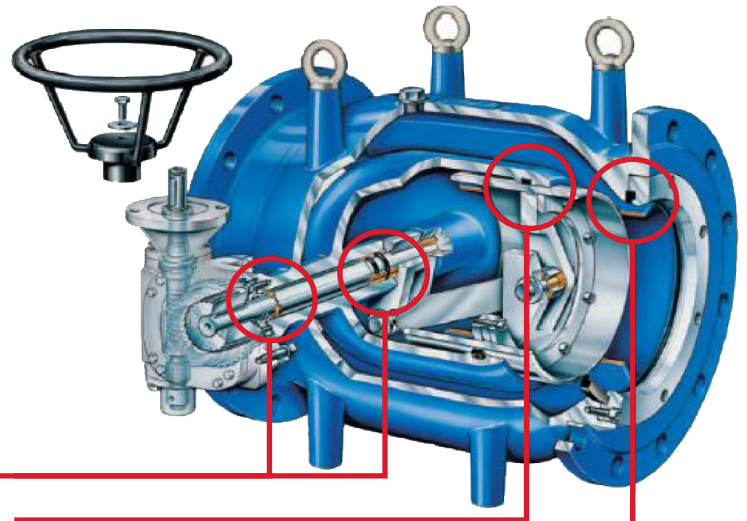
PLUNGER VALVE FEATURES

RANGE OF APPLICATION

Plunger valves are designed to fulfill regulating functions in the water supply. Unlike butterfly or gate valves assuming only shut-off functions in pipeline systems, plunger valves meet the special requirements of regulating operations.

ADVANTAGES

- Single-piece, compact body for all diameter therefore reduction of the number of components and elimination of a sealing point.
- Operation against pressure balanced conditions.



- Primary and secondary sealing of the shaft by multiple O-ring seals
- Maintenance and disassembly of the valve possible in accessible pipelines without dismantling the valve from pipeline
- Inner parts made of stainless steel as standard for valve sizes 6" - 24" (Crank, connecting rod, connecting rod bearing).

- Quadring design insensitive to deposits on the piston
- High efficiency of the valve due to its optimised design and improved flow path
- Connecting rod running on bearings in maintenance-free, robust bronze-plastic compound bushings.

- Sealing seat in the no-flow zone to ensure maximum service life.
- Actuated by self-locking worm gear with constant transmission ratio to achieve a linear control curve in connection with an optimal control insert.

BODY STYLE

8" to 72" Compact Ductile Iron Body, ANSI class 150 to 300. Larger sizes and higher pressure ratings available upon request.

RUGGED AND CORROSION RESISTANT

High strength ductile iron and internal stainless steel components, full enclosed shaft bearings, and bronze overlay piston guides create long term corrosion resistance and long life.

SUPERIOR FLOW CHARACTERISTICS

The design of the Plunger Valve offers superior linear flow control characteristics by directing the flow around the inner core within the body. This balances the pressure within the valve, prevents damaging cavitation, and eliminates vibration.

DRIP TIGHT SHUT-OFF

The unique plunger seating profile creates a drip tight shut-off with a downstream profile ring and a piston O-ring.

LOW OPERATING TORQUE

The bronze weld plunger overlay guides interact with the stainless steel plunger for a friction-free, smooth sliding action. The balanced pressure flows created by the superior flow characteristics reduce the amount of movement needed to operate the valve, thus reducing the operating torque.

VERSATILE, COMPACT DESIGN

The J&S Valve Series 8000 Plunger Valve can be installed in a vertical or horizontal position, and can be manufactured in larger sizes than other types of high-pressure discharge valves. It can also be easily adjusted to handle variations in flow conditions.

PROVEN PERFORMANCE

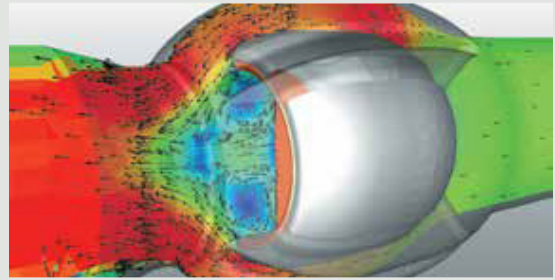
With many years of experience, our Plunger Valves have never needed a replacement component due to wear or corrosion.

MAIN APPLICATIONS

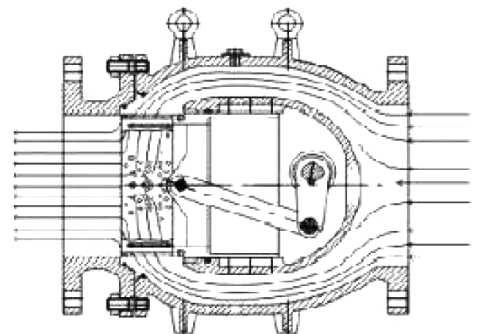
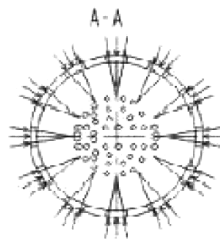
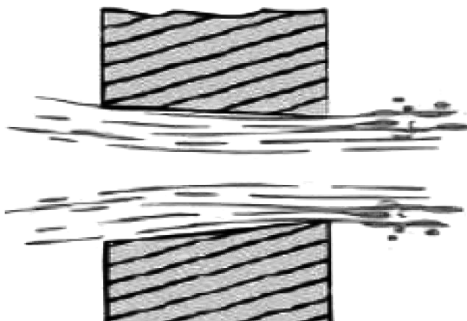
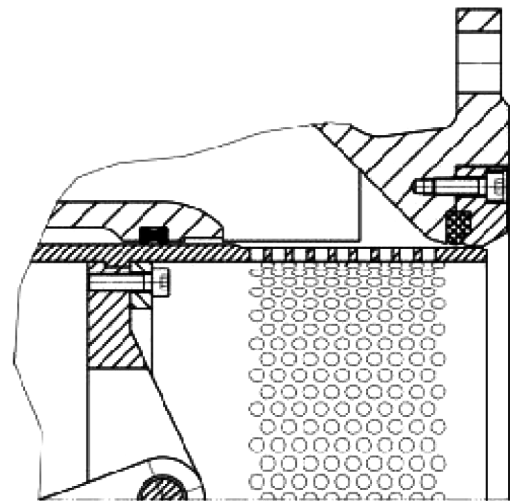
- Shut-off at high flow
Raw water, drinking and industrial water
- Flow control and level control

DESIGN FEATURES

- Different executions of cavitation reducers dependent on flow/pressure conditions.
- For high differential pressure and high flow rates
- Avoids cavitation damage
- Robust, no maintenance required
- Extremely low headloss
- Excellent control characteristic



Extensive empirical testing of the J&S Valve Series 8000 Plunger Valve provided sufficient data to corroborate the resultant output from FEA flow simulations. 3D modeling software optimized the efficiency and effectivity of the plunger valve to the greatest degree possible. Combine this engineering feat with a high precision production and assembly process, the performance values derived in controlled conditions are easily realized in typical field applications.



PRECISE CONTROL OF WATER SUPPLY SYSTEMS BY PLUNGER VALVES

Plunger valves are a special control valve, designed specifically for control tasks in water supply. Unlike gate valves and butterfly valves which are mainly used as shut-off valves only in pipeline networks, plunger valves meet the special requirements of control operation. Plunger valves are mainly used where volumetric flow rates need to be precisely apportioned or where water pressures have to be accurately controlled or reduced.

PLUNGER VALVES - FOR SAFE, RELIABLE AND EXACT CONTROL

Plunger valves are the correct valve to use whenever pressure heads or flow rates need to be safely and reliably reduced and controlled. They are used for two main tasks:

- By restricting the valve opening a change in flow conditions occurs where both flow velocity through the valve and pressure across the valve increases, resulting in a conditions that create cavitation.
- To be able to control the pressure and flow precisely and finely, the valves flow control characteristics must be as linear as possible over the whole opening range.

J&S Valve Series 8000 Plunger Valve meet these requirements to the greatest possible degree and are therefore the ideal valve for numerous control tasks. Butterfly and gate valves, due to their design as isolation or, open/closed valves, are not suitable for continuous use as a variable flow control valve.

J&S Valve Series 8000 Plunger Valve with the implementation of using computational fluid dynamics(CFD), our team of engineers has created the most efficient plunger valve to date. All valve components have undergone CFD design review to ensure optimal flow performance. This is results in precise guiding of the medium, fom the inlet up to and far beyond the controlled outlet. This enables controlled energy conversion (cavitation) in the center of the pipe. A range of flow guides at the valve outlet is available for a variety of installation conditions.

WIDE RANGE OF USES

J&S Valve Series 8000 Plunger Valve are especially suitable for drinking water, raw water and air.

Typical applications include:

- Pump start-up and control valve
- Reservoir inlet
- Control device in the bottom outlet valve of dams (with or without venting)
- Control device inlet and bypass of turbines
- Safety device in the bypass outlet of turbines for quick opening
- Surge anticipating device in pumping or pressurized systems

NOTES ON PROJECT PLANNING AND INSTALLATION

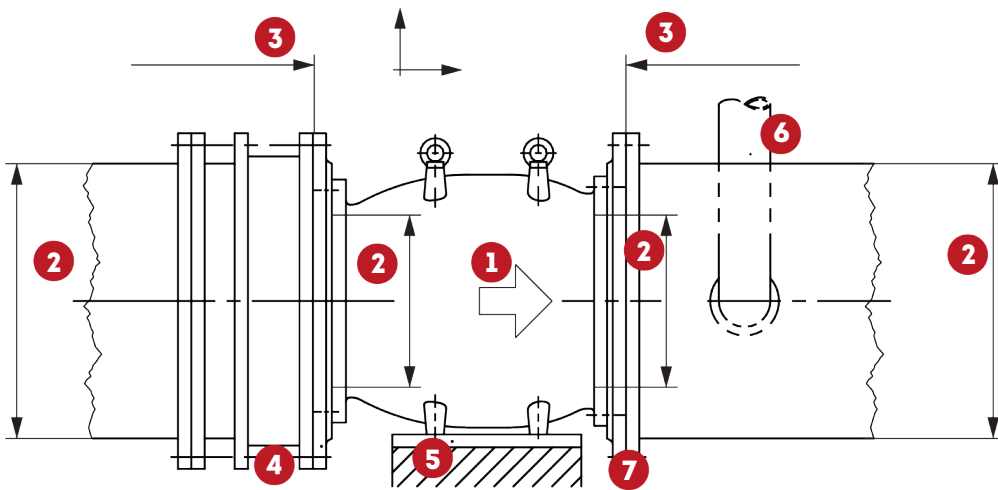
J&S Valve engineering support is available from your planning and design phase through to final assembly. Especially valuable is our consultation regarding correct arrangement and optimum installation of the Plunger Valve. In most cases the advice provided will be based on your installation drawings or sketches and these will be evaluated for the best installation location of the J&S Valve Series 8000 Plunger Valve.

For the most accurate response, the following data is required:

- Flow rates Q_{max} . and Q_{min} .
- Pressure p_1 upstream of the valve at Q_{max} . and Q_{min} .
- Back-pressure p_2 downstream of the valve at Q_{max} . and Q_{min} .
- Operating medium, any water analysis available
- Type of use (control device, bottom outlet, etc.)
- Required mode of actuation
- Operating mode (continuous or short-term operation, etc.)

INSTALLATION CONSIDERATIONS

- 1 J&S Valve Series 8000 Plunger Valve are designed for installation in horizontal or vertical pipes. It is important to confirm that the valve is installed in the pipe according to the flow arrow cast onto the pipe.
- 2 Nominal size reduction is possible, as J&S Valve Series 8000 Plunger Valve are designed according to the flow velocity. We recommend achieving the transition to the pipe nominal size with abrupt extension flanges, which we can supply with the valve if required.
- 3 To ensure perfect operation, for velocities above 5 feet per second we recommend a straight pipe section of at least 3-5 x pipe diameters upstream and 5-10 x pipe diameters downstream of the valve, within which there must be no fittings or valves.
- 4 If using an adapter or extension section, wherever possible, we recommend installing it in the pipe upstream of the Plunger Valve.
- 5 Plunger Valves may not be used as the pipe support. The feet cast onto the housings are solely for supporting the valve and not as a pipe fixing point. Upon request, J&S Valve Series 8000 Plunger Valve are supplied with baseplates mounted on the underside.
- 6 When using J&S Valve Series 8000 Plunger Valve in the bottom outlet, an appropriately dimensioned venting device (which we can also supply if deemed required) must be installed downstream of the valve if the valve does not flow directly into the open air.
- 7 When the valve flows directly into the open air a venting device is not necessary. In this case the valve should be equipped with an outlet flange only.
- 8 An in-line fixed throttling cylinder may be used for additional pressure reduction for installation in pipes.



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