DOROT S300L series

Advanced hydraulic solutions for optimal management
of liquid conveyance systems

Aquestia

Directing the Flow

DOROT S300L

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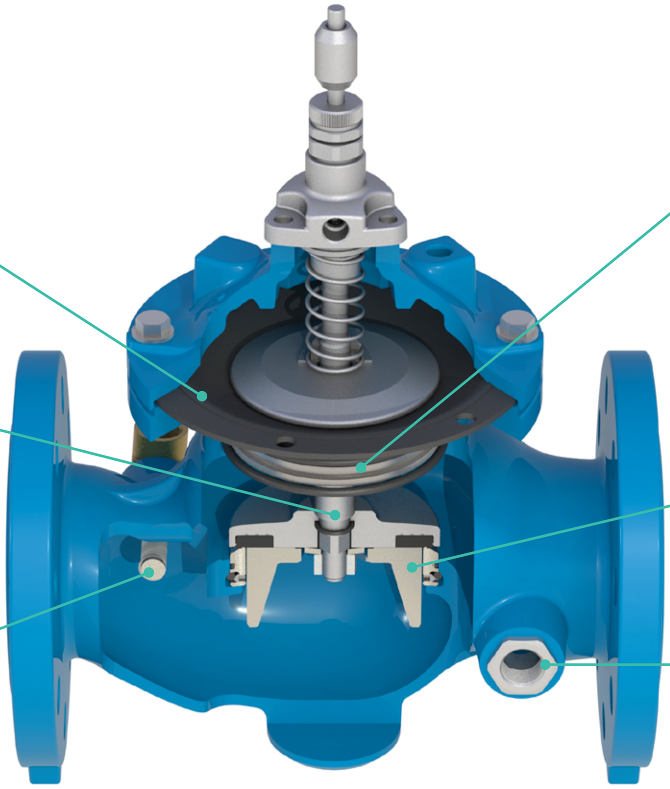
General Information

DOROT S300L Series, state-of-the-art automatic control valves are designed to withstand the most demanding requirements of water system control. Developed by engineering experts, DOROT S300L offers technically advanced capabilities that go far beyond any other control valve available on the market.

The following guideline will assist you in selecting the optimal DOROT S300L valve best suited to your needs:

Features



1. Preformed Diaphragm — no stress on the diaphragm after assembly, ensuring durability and longevity.
2. No Internal Dynamic O-rings — no maintenance on the O-rings is required. The valve has a unique internal floating shaft design that allows for frictionless operation and easy in-the-field maintenance.
3. Self-cleaning Inline Filter — the filter turns during flow, filtering the trim water without the need for service.
4. Conversion to a double-chamber — the standard single-chamber valve design provides smooth operation in the most sensitive regulation conditions. If needed, conversion to a double-chamber valve is easily made by inserting the innovative DOROT Separation Disc; without removing the valve from the pipeline.
5. LTP® Superior Seat Design — LTP (Linear Throttling Plug) completely eliminates the need for a low-flow bypass valve, or internal throttling device, such as U-port or V-port. The DOROT S300L can throttle to near zero flow without the need for a bypass. During valve closure the rate slows, preventing potential damage from water hammer or surges.
6. Superior Materials — all control ports are protected by SST-316 inserts as standard, eliminating the risk of corroded and clogged ports. The valve is supplied with a replaceable Stainless Steel seat for excellent durability against erosion and a drip-tight seal. All internal parts up to 6" are made of Stainless Steel.
7. Certified Performance: NSF61, WRAS, ACS, DVGW, IS

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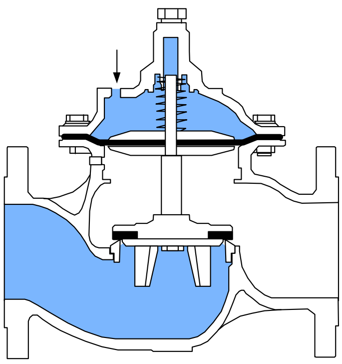
Basic Valve Operating Modes

On-Off Mode

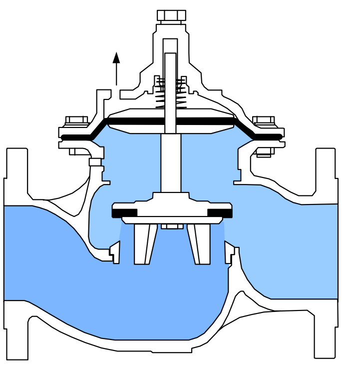
Standard (Single Chamber) Valve

Closed Mode
The control pressure (taken from the pipeline) is applied by the control device to the control chamber (top of the diaphragm). The pipeline pressure pushes the seal to open, and the control chamber pressure forces the diaphragm to close. Since the diaphragm area is larger than the seal area, it has greater hydraulic force so the valve remains in the closed position.



Closed Mode

Open Mode
The control device relieves the pressure from the control chamber. The pipeline pressure forces the seal to the "open" position so that the fluid can pass through the valve. While the valve is open, outlet pressure is applied to the lower side of the diaphragm, assisting with opening.

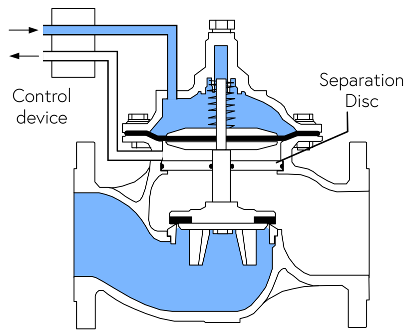


Opened Mode

Double Chamber Valve (Version D)

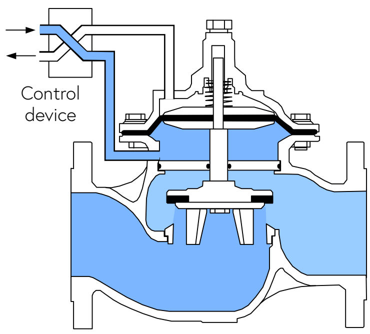
The double chamber version is created by inserting a separation disc between the diaphragm and the seal. This assembly creates a second control chamber below the diaphragm, permitting the activation of the valve in low-pressure systems and enabling a faster valve response. The response to varying conditions is quick, since downward movement closure is not resisted by pressure below the diaphragm.

Closed Mode
The control pressure (taken from the pipeline or supplementary pressure source) is applied to the top of the external diaphragm. The bottom control chamber drains. The pipeline pressure pushes the seal to open, but since the diaphragm area is larger than the seal area it creates greater hydraulic force which forces the valve to close. At this stage, the bottom chamber should be drained.



Closed Mode

Open Mode
The control device releases pressure from the top control chamber. The seal assembly is forced to the "open" position by the pipeline pressure, allowing flow through the valve.



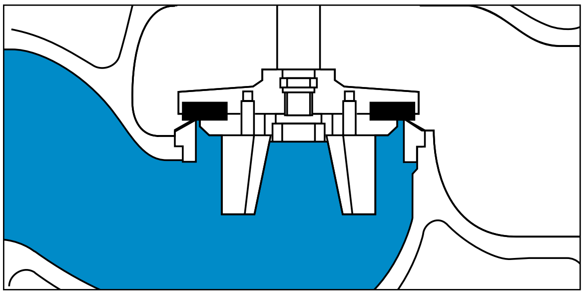
Opened Mode

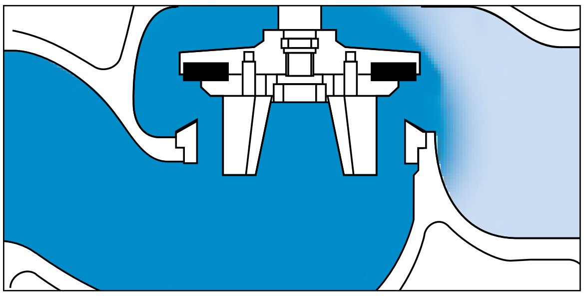
Modulating Mode

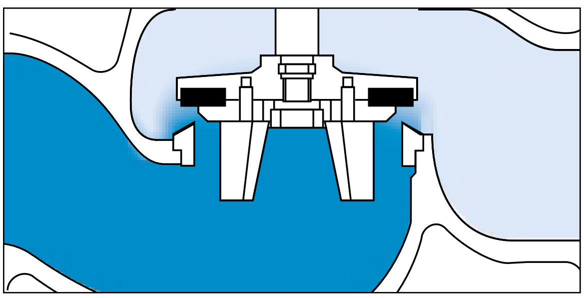
General

Positioning the seal a short distance (less than 1/4 of the seat diameter) from the seat, creates friction and turbulence, causing energy loss in the fluid passing through the valve.
The results are:
- Reduction of pressure and flow rate.
- Increase of inlet pressure.

The position of the seal assembly is dictated by the volume of control fluid in the top control chamber, which is determined by the control device. The control device is operated by hand (manual control), by electric current (solenoid valve), or by hydraulic pressure (pilot valves, hydraulic relays). All can be used in standard (single chamber) valves as well as in double chamber valves.
Modulating mode in standard (single chamber) valves.

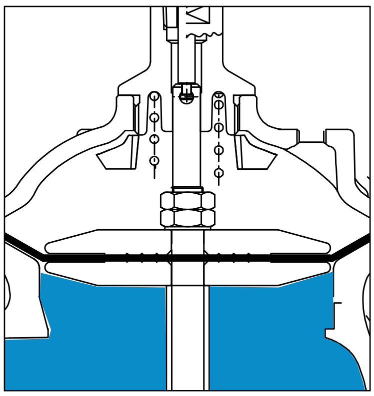

Closed

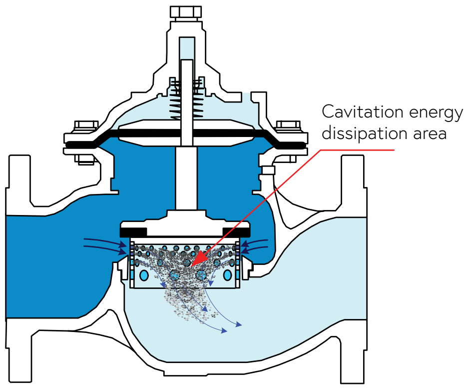

Fully Open


Regulating

Regulation at High Pressure

The S300L has exceptional resistance to damage, caused by cavitation conditions. This feature was certified by extensive tests, carried out by independent laboratories in the US and Europe.
The operation limits, as found in these tests, can be calculated for any specific location- using a simple computer program (supplied upon request). For operating conditions that exceed the safe limit- a special cavitation-free valve can be supplied. This version, marked by the suffix "F" (example 30F-3 is a cavitation-free, 80mm/3" valve), can operate at any pressure differential without sustaining damage. The internal structure includes a Stainless Steel, perforated cylinder, that is connected below the standard seal disc that moves freely inside the seat.
The valve is assembled to generate "over the seat" flow, so the water stream enters the cylinder from its external side and emerges through the internal side. The energy is dissipated by the high-velocity, turbulent flow through the exposed holes above the seat (due to varying trim positions). The pressure recovery, the cause of cavitation damage, occurs inside the cylinder and not adjacent to the valve body wall. The SST cylinder is cavitation resistant.

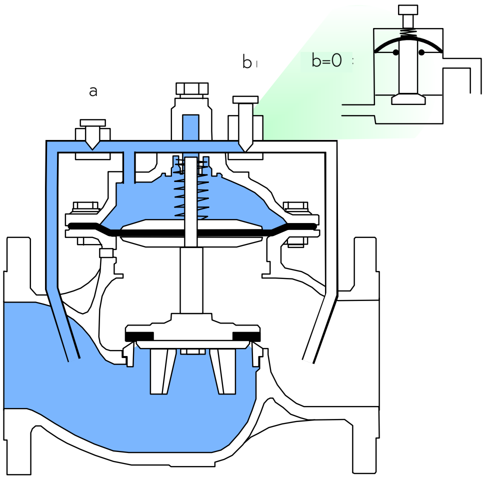

Closed Valve



Fully-opened Valve

2-Way Control Device

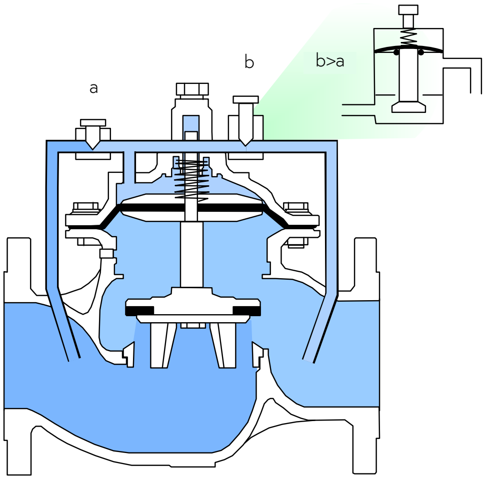
The 2-way control device is assembled on a control circuit, connecting upstream to downstream through the control chamber.
There are two restrictors assembled in this circuit:
(a) A nozzle or a needle valve, at a fixed opening.
(b) A modulating device (pilot), whose passage may vary from complete closure (b=o) to a fully open size (when b>a).
The volume of the control media in the chamber is determined by the relative passages (a) and (b), or, in fact, by the opening of (b), as (a) is fixed.



Closed Valve

Closed Mode

Pilot (b) senses a downstream pressure higher than the set-point and closes passage (b). Through passage (a) the upstream water flows directly into the upper part of the control chamber, forcing the diaphragm to close the valve.



Opened Valve

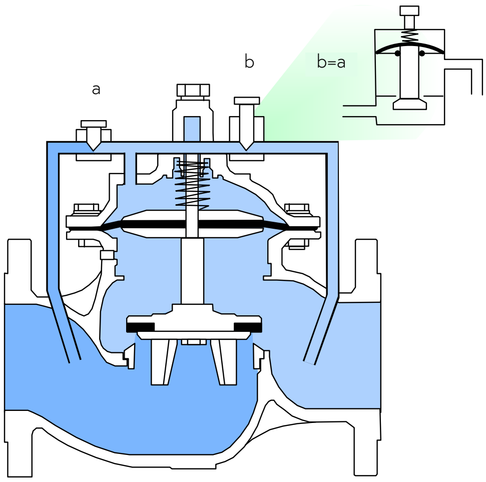
Open Mode

Pilot (b) senses a downstream pressure lower than the set-point, and fully opens passage (b), larger than (a). All the water from the upstream flows through (a) and (b), directly to the downstream, allowing water from the upper part of the control chamber to partially drain until the pressure in the chamber equals the downstream pressure.
Pressure in the upper part of the control chamber is decreased and the upstream water pressure forces the seal disc to rise (opening the valve).

Regulating Mode

The pilot is set to the required downstream pressure.
The pilot senses when the downstream pressure reaches the required value causing passage (b) to equal passage (a) b=a.
Now, water that flows through the control loop passes from (a) through (b) and into the downstream. The control media in the upper part of the control chamber is now steady, keeping the diaphragm and seal in a fixed position. Any change in the downstream pressure will change the b=a balance. This change adds or drains water from the control chamber, thus opening or closing the main valve until it reaches the balanced regulating position b=a once again.

The 2-way control device provides sensitive, accurate, and constant modulating control of the main valve. The main valve does not fully open, as the control device prevents total drainage of the control chamber.
The 2-way control device is standard in most pressure regulating valves.



Regulating Valve

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3-Way Control Device

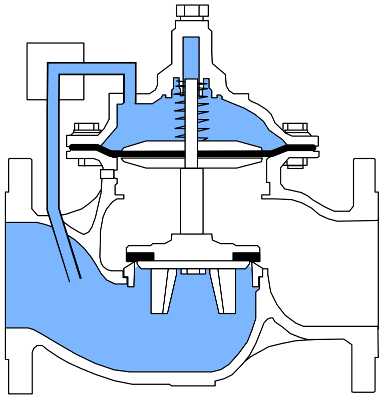
The 3-way control device is a small selector valve which:
1. Permits passage of the control media into the main valve control chamber (initiating the "closing" procedure), or
2. Permits drainage of the control media from the control chamber to the atmosphere (initiating the "opening" procedure).

Some 3-way control devices have a third mode as well, which prevents inflow or outflow from the control chamber, so that the main valve remains fixed when the device is in this mode.

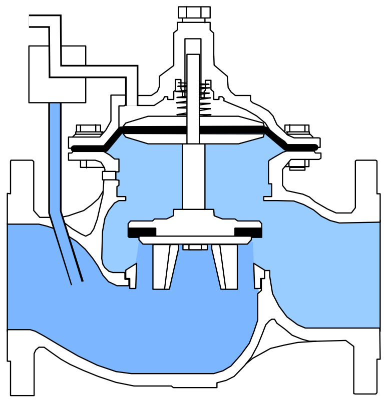
The 3-way mode is used in on-off valves or when the regulating valve is fully open, in order to obtain specific operating conditions. Once in position, there is no water flow through the control chamber.

The 3-way control circuit may open the main valve entirely, creating minimum head loss.

The 3-way control device must be used when external media (not pipeline water) is used to control the valve, or when the control media is dirty or abrasive.



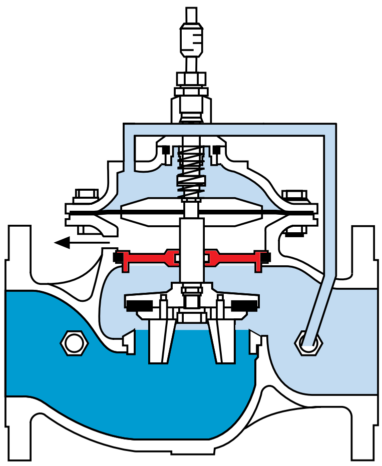
Closed Valve



Opened Valve

Proportional Pressure Reducer

The proportional pressure reducer is a valve that has a control chamber permanently connected to the downstream.
This valve must be a double chamber [D] type.
The balance of hydraulic forces created between the high pressure on the small seal area, and the lower downstream pressure on the larger diaphragm area, causes a fixed ratio of inlet/outlet pressure of approximately 3:1.
No other control device is needed.



Separation Disc

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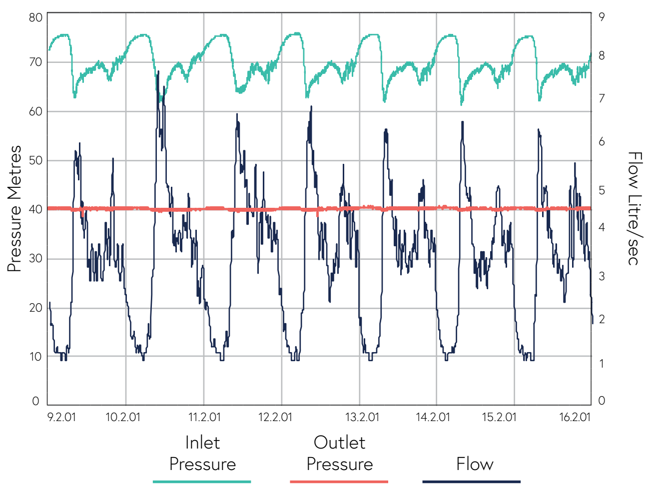
Typical Pressure Reducing Performance Chart

DOROT S300L 4" (100mm)

Pressure Reducing Valve

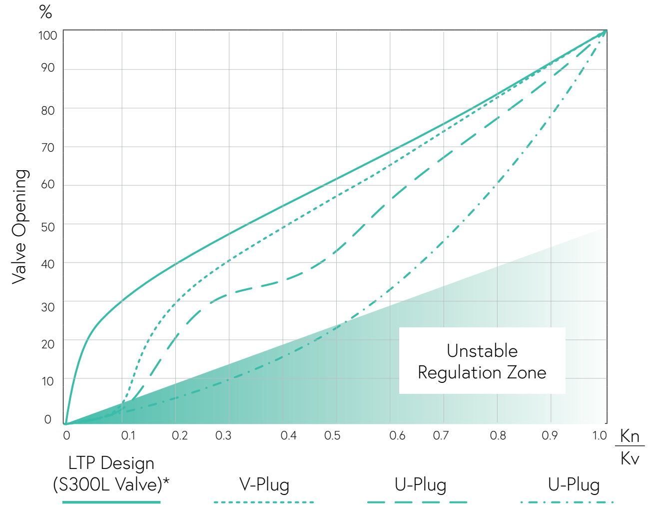
Saughton Hall under 100mm CX Pilot Control



Pressure logged at 1 minute intervals
Flow logged at 15 minute intervals

Comparison of different seal structures

Characteristic curve comparison
with competitive designs



* Independent laboratory report data source

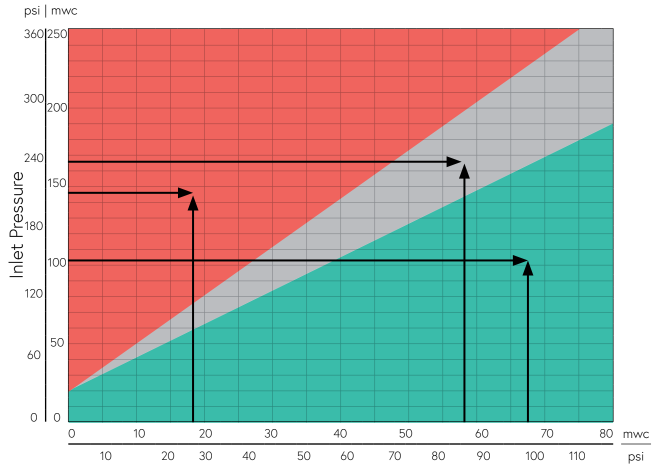
Cavitation Data

Limits of operating conditions
The chart sets the safe limits for valves designed to operate at a considerable pressure differential.
Such conditions generate noise and possible cavitation damage to the valve body.

How to use the chart

1. Determine the maximum dynamic pressure that may be applied to the valve inlet.
2. Draw an horizontal line from the pressure scale at the left side of the chart.
3. Find the requested outlet pressure in the pressure scale at the bottom of the chart.
4. Draw an upward line at this point.
5. The intersection of the two lines defines the cavitation characteristics of the valve operation.

Cavitation Chart



Destructive Cavitation - the valve may sustain damage in a fairly short time.

Noisy Operation - the valve may generate noise that exceeds 80db.

Safe Operation Conditions - the valve will perform safely and quietly.

* The cavitation and noise data are based on tests done by the Utah State University, USA, and Delft Hydraulic Laboratories, Holland.

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S300L Models

Model	Pressure Rating	Flow Port	Pattern	Standard
33	16 bar / 250 psi	Full-bore	Globe	ANSI B16.42
34	25 bar / 360 psi	Full-bore	Globe	ANSI B16.42

Technical Specifications

Parameter	Standard	Optional
Connections	Flanged ISO 7005 / AS10 / ANSI Threaded BSP / NPT Grooved	JIS B22 / ABNT and others
Pressure Range	Model 33 0.5 – 16 bar (7 – 250 psi) Model 34 0.5 – 25 bar (7 – 360 psi) Note: higher pressure rating available on special demand and for tailor-made projects	0 min. press. with N.O spring assisted opening 0.2 bar / 3 psi min. pressure without a spring Note: both options require usage of external higher closing pressure
Max. Water Temp.	80°C / 180°F	110°C / 233°F

Materials

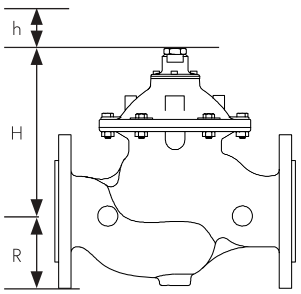
Part	Standard	Optional
Body & Cover	Ductile Iron GGG50 (ASTM A-536)	Cast Steel A-216 WCB DUPLEX Cast SST CF8M (316) Ni Aluminum Bronze Others
Main Valve Internals	SST, Coated Steel	SST 316, HASTELLOY, SMO, DUPLEX
Spring	SST 302	SST 316, INCONNEL, HASTELLOY
Diaphragm	Nylon fabric reinforced EPDM (WRAS and NSF approved)	NBR
Seals	EPDM	NBR, Viton
Coating	Fusion Bonded Epoxy (FBE) RAL 5010	UV protected FBE RAL 5010 FBE RAL 3000 (fire red) UV protected FBE RAL 3000 Rilsan (Nylon) Halar
Control Trim: Fittings & Control Devices	Brass	SST 316, Duplex
Control Trim: Tubes	Reinforced, heavy-duty Polypropylene	Copper, SST 316, Duplex

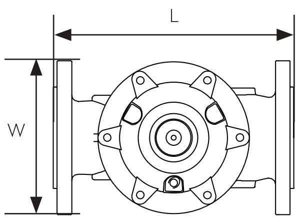
Dimensions & Weights

Models 33/34 Flanged

Valve Size	DN50 (2")		DN65 (2½")		DN80 (3")		DN100 (4")		DN150 (6")		DN200 (8")	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
L	238	9 3/8	279	10 63/64	305	12 1/64	381	15	508	20	645	25 25/64
L (ANSI#300)	-	-	-	-	-	-	397	15 5/8	533	20 63/64	670	26 3/8
H	185	7 5/16	185	7 5/16	230	9 1/16	240	9 7/16	330	13	390	15 3/8
h **	140	5 1/2	140	5 1/2	170	6 11/16	180	7	230	9	300	11 13/16
W	170	6 11/16	185	7 3/16	200	7 7/8	235	9 1/4	330	13	415	16 5/16
R	82.5	3 1/4	92.5	3 5/8	100	3 15/16	110	4 5/16	142.5	5 5/8	172.5	6 3/4
Weight * Kg/lbs	13 / 29		16 / 35		26 / 57		37 / 82		77 / 170		140 / 309	
Vol. control chamber lit/gal	0.1 / 0.02		0.1 / 0.02		0.3 / 0.08		0.7 / 0.2		1.5 / 0.4		4.3 / 1.1	

* Approximate shipping weight (PN 25)
** h - Minimal required maintenance space





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Hydraulic Performance

Models 33 / 34 Globe

Valve Size		DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN150 (6")	DN200 (8")
Max. recommended flow rate for continuous operation	m^3/h	25	40	40	100	160	350	620
	gpm	110	180	180	440	700	1600	2800
Min. recommended flow rate		<1m³/h (<5 gpm)						
Flow Rate Factor	Kv Cv	43 50	43 50	43 50	115 133	167 195	407 475	676 790
Head Loss Factor	K	2.2	5.4	15.4	4.8	5.6	4.8	5.5

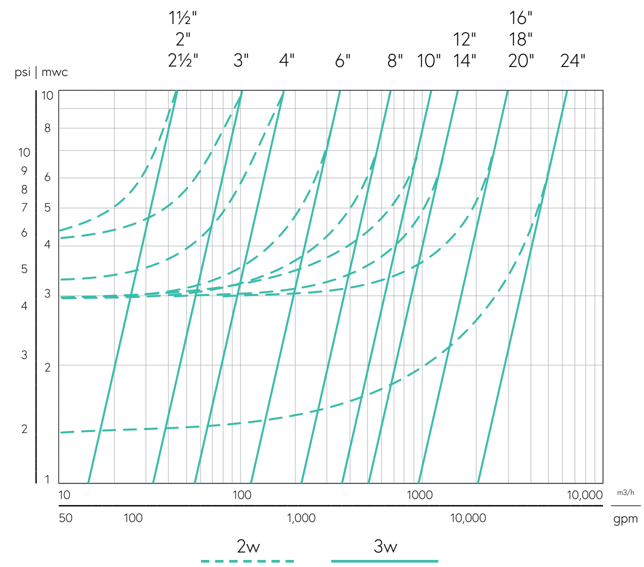
Valve Size		DN250 (10")	DN300 (12")	DN350 (14")	DN400 (16")	DN450 (18")	DN500 (20")	DN600 (24")
Max. recommended flow rate for continuous operation	m^3/h	970	1400	1900	2500	3100	3600	5600
	gpm	4300	6200	8400	11000	13660	15800	24700
Min. recommended flow rate		<1m³/h (<5 gpm)						
Flow Rate Factor	Kv Cv	1160 1360	1600 1900	1600 1900	3000 3500	3150 3700	3300 3860	6500 7600
Head Loss Factor	K	4.5	5	9	3.8	6	5.9	4.8

* Approximate shipping weight (PN 25)
** h - Minimal required maintenance space

Headloss Charts

Models 33 / 34 Globe

Pressure Loss Chart



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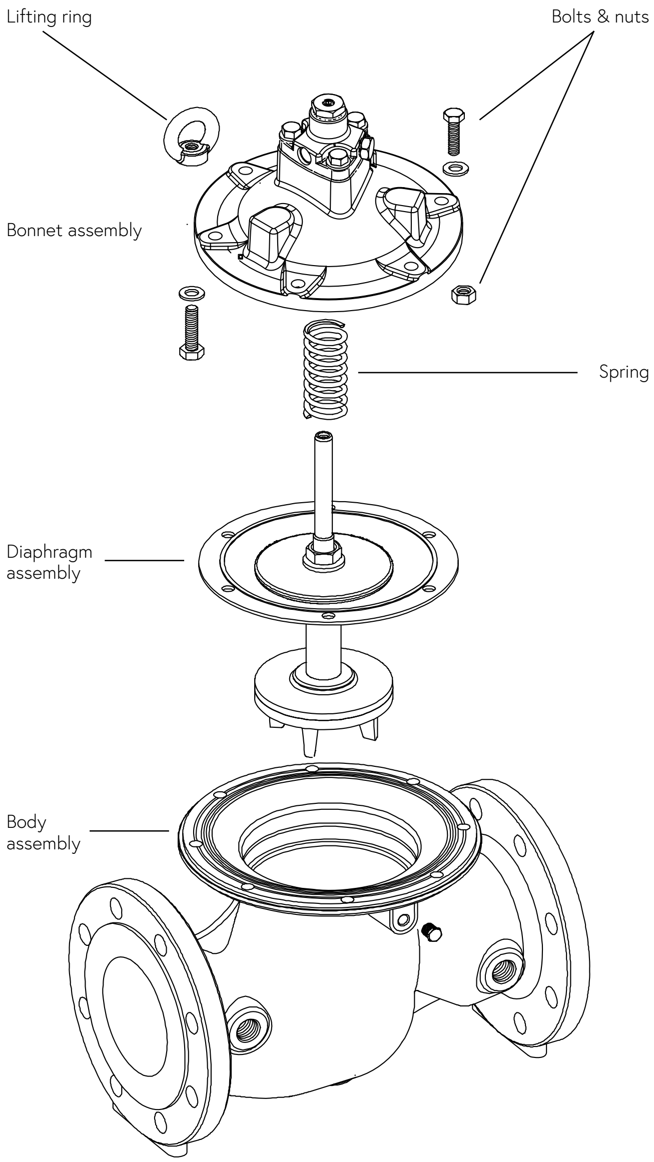
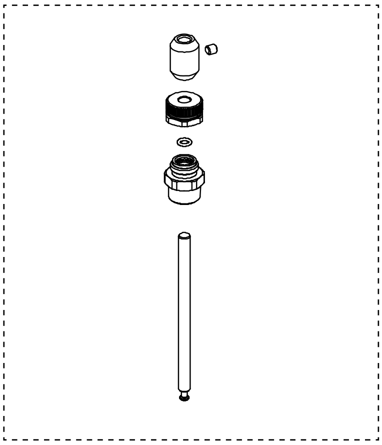
Components

Main components

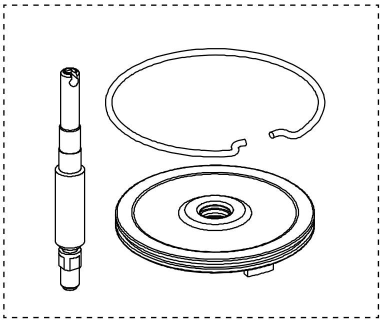


Additional components

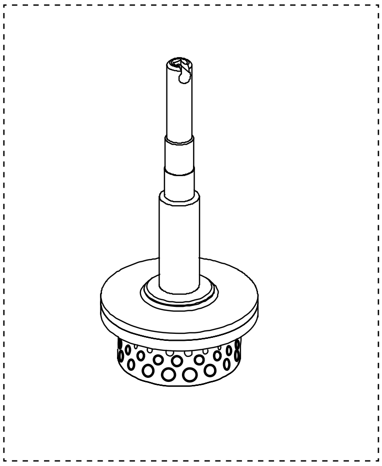
Position Indicator kit



Double chamber conversion kit



"F" version conversion kit



DOROT S300L

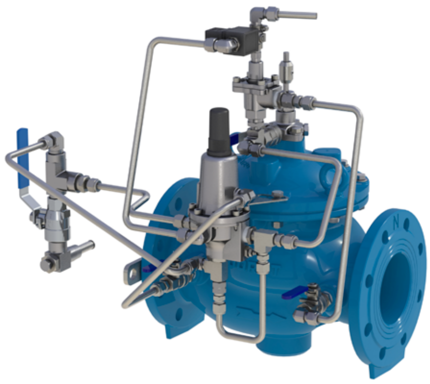
Pressure & Flow Applications

DOROT S300L-DI

Pressure Differential Sustaining Valve

DOROT S300L-FR/EL

Flow Control Valve

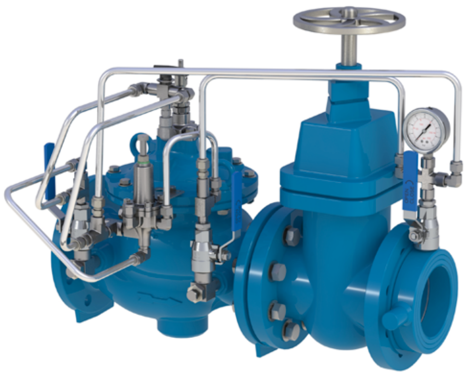


DOROT S300L-FR

Flow Control Valve

DOROT S300L-HyMod

Flow-modulated Pressure Reducing Valve



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Pressure & Flow Applications

DOROT S300L-PR[D]

Proportional
Pressure Reducing Valve

DOROT S300L-PR

Pressure Reducing Valve

DOROT S300L-PRM

Dual Set-point
Pressure Reducing Valve

DOROT S300L-PS

Pressure Sustaining Valve

DOROT S300L-PS[R]

Pressure Sustaining/Relief Valve

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Electronic Control Applications

DOROT S300L-EC

Electronic Control Valve

DOROT S300L-EL/TO

Two-stage Opening Solenoid
Control Valve

DOROT S300L-EL

Solenoid Control Valve

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Pumps and Safety Applications

DOROT S300L-BC/PS

Pump Control and Pressure Sustaining Valve

DOROT S300L-BC

Pump Control Valve

DOROT S300L-CV

Hydraulic Non-return Valve

DOROT S300L-DW

Deep Well (Borehole) Pump Control Valve

DOROT S300L-FE

Excessive Flow Shut-off Valve

DOROT S300L

Pressure & Flow Applications

DOROT S300L-NS

Two-stage,
Cushioned Closure Check Valve

DOROT S300L-QR

Quick Pressure Relief Valve

DOROT S300L-RE

Solenoid Control Valve

DOROT S300L-REEL

Surge Anticipating Valve

DOROT S300L

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Tank & Reservoir Applications

DOROT S300L-AL

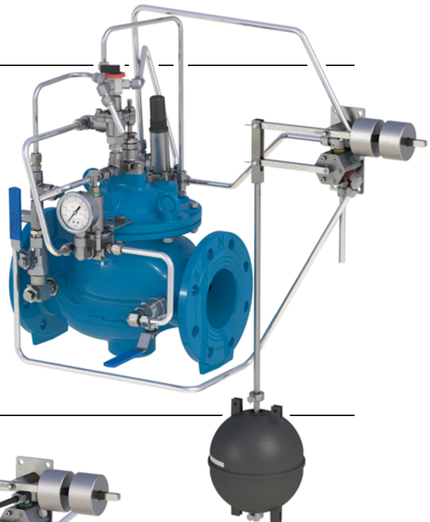
3W Altitude Pilot-controlled Valve

DOROT S300L-FL

Modulating Float Valve

DOROT S300L-FLDI/FR(PR)

Differential Float
and Flow Control Valve



DOROT S300L-FLDI/SP

Differential Float
and Pressure Sustaining Valve

DOROT S300L-FLEL

Electric Float Controlled Valve

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Advanced hydraulic solutions for optimal management of liquid conveyance systems

Aquestia is a world leader in providing optimal solutions for surge protection, water loss reduction and pressure management, by integrating uniquely developed products with innovatively designed software. Bringing together three strong brands - A.R.I., DOROT and OCV – we combine decades of experience, a wealth of knowledge and expertise, and a wide range of solutions and services. We are where liquid flows, serving customers in segments that include waterworks and wastewater systems, irrigation, fire protection, mining, ballast water, desalination, commercial plumbing, aviation fueling, oil & gas, and more.

Aquestia – high-quality, reliable products and committed service - for your peace of mind.