# DOROT S300L Series

Advanced hydraulic solutions for optimal management of liquid conveyance system.

Aquestia

Directing the Flow

# DOROT S300L

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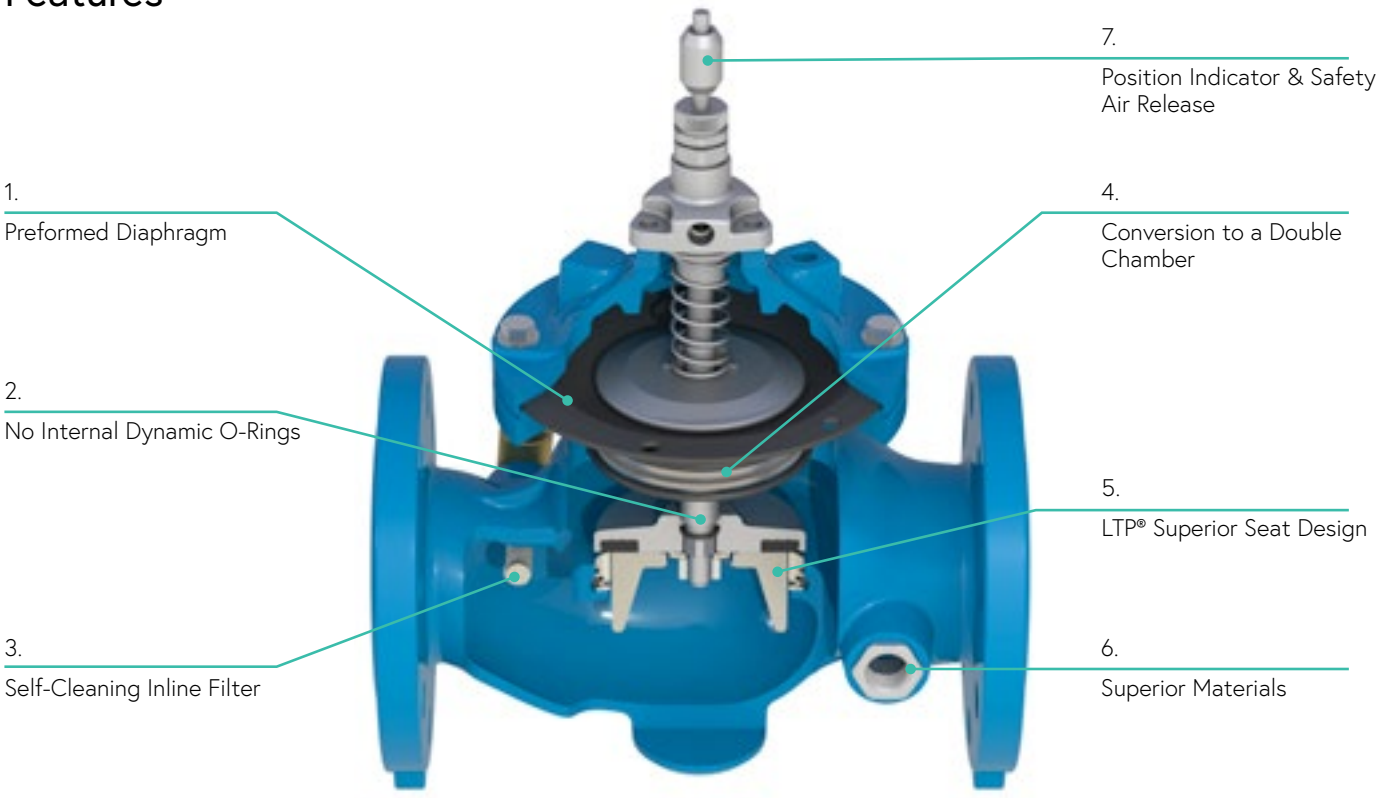
## General Information

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 are made of stainless steel.
7. Position Indicator & Safety Air Release — the stainless steel position indicator rod enables smooth, precise tracking of valve opening. The unique Safety Air Release mechanism easily removes air from the control valve chamber, ensuring stability and optimal system performance.
8. Certified Performance: UL Water Quality/NSF 61-G & 372

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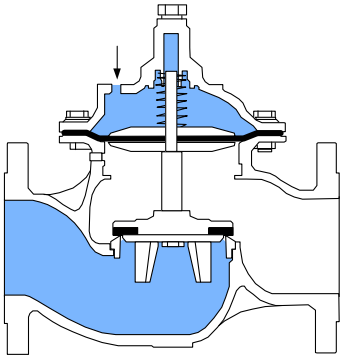
## Basic Valve Operating Modes

### On-Off Mode

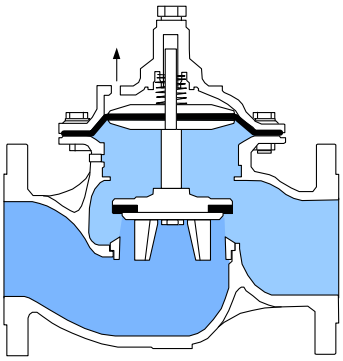
#### Standard (Single Chamber) Valve

**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.

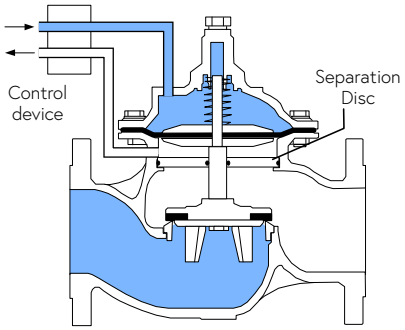


Opened Mode

#### Double Chamber Valve (Version D)

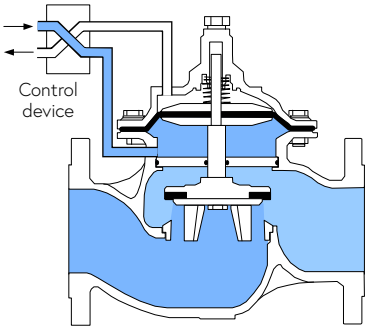
The double chamber version is created by inserting a separation disc between the diaphragm and the seal. This assembly creates a second control chamber below the diaphragm, permitting the activation of the valve in low-pressure systems and enabling a faster valve response. The response to varying conditions 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

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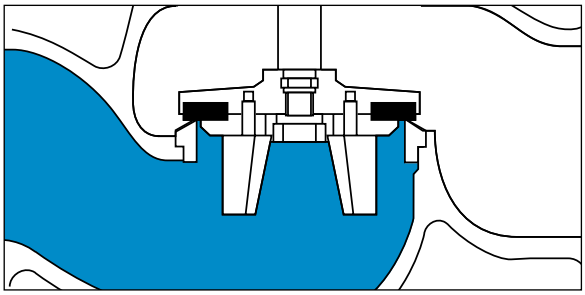
## Modulating Mode

### General

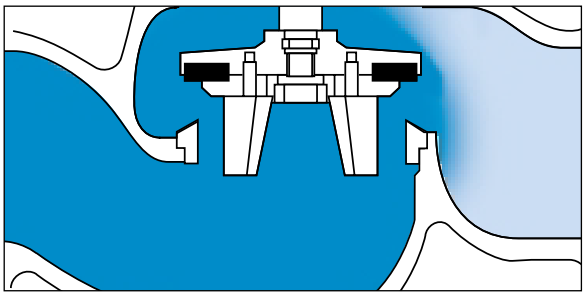
Positioning the seal a short distance (less than 1/4 of the seat diameter) from the seat, creates friction and turbulence, causing energy loss in the fluid passing through the valve. The results are:
- Reduction of pressure and flow rate.
- Increase of inlet pressure.

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.

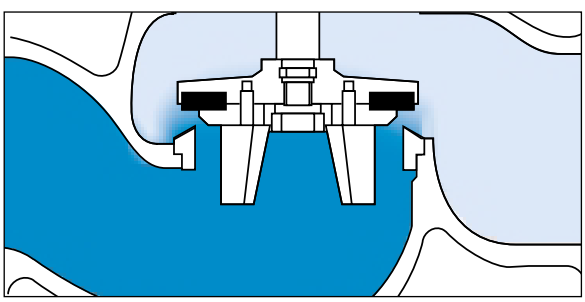
Modulating mode in standard (single chamber) valves.



Closed



Fully Open



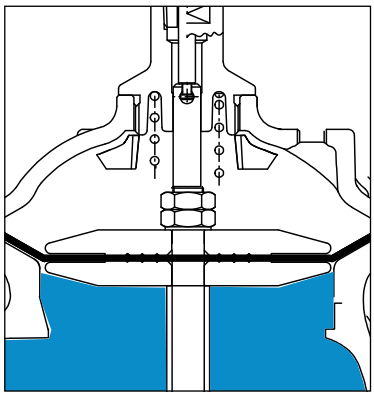
Regulating

### Regulation at High Pressure

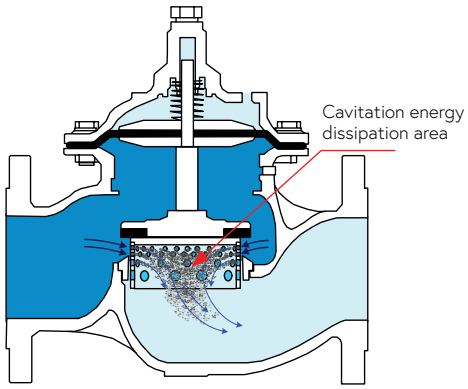
The S300L has exceptional resistance to damage, caused by cavitation conditions. This feature was certified by extensive tests, carried out by independent laboratories in the US and Europe.

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

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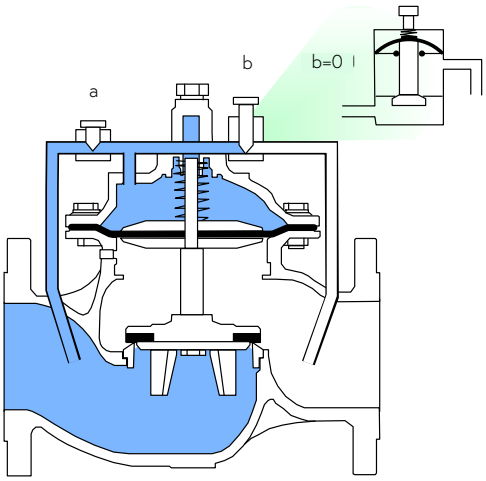
## 2-Way Control Device

The 2-way control device is assembled on a control circuit, connecting upstream to downstream through the control chamber.

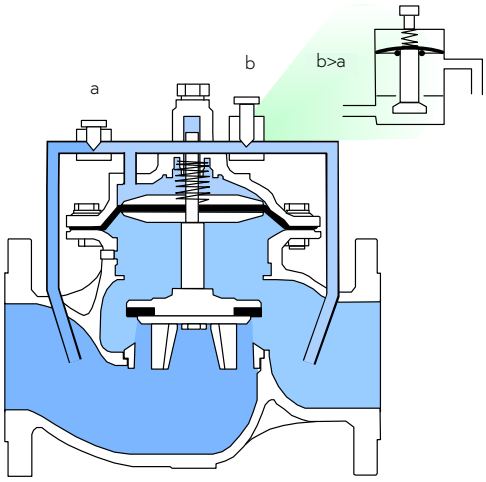
There are two restrictors assembled in this circuit:
(a) A nozzle or a needle valve, at a fixed opening.
(b) A modulating device (pilot), whose passage may vary from complete closure (b=o) to a fully open size (when b>a).
The volume of the control media in the chamber is determined by the relative passages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

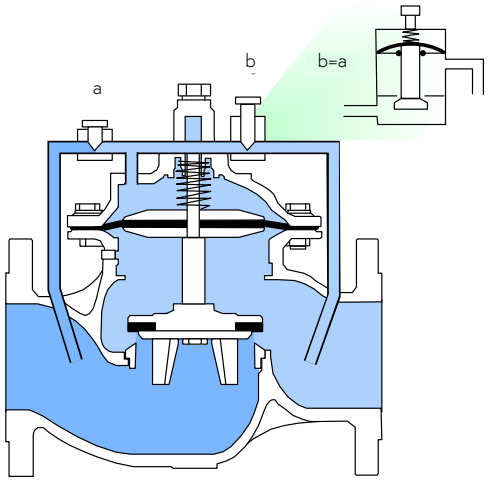
### Regulating Mode

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

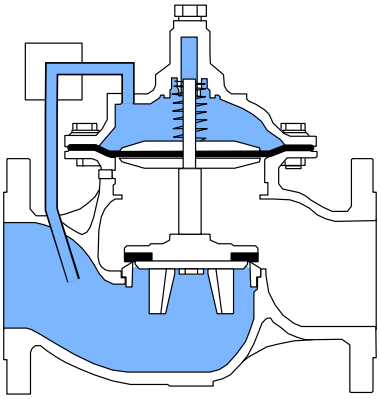
The 3-way control device is a small selector valve which:
1. Permits passage of the control media into the main valve control chamber (initiating the "closing" procedure), or
2. Permits drainage of the control media from the control chamber to the atmosphere (initiating the "opening" procedure).

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.

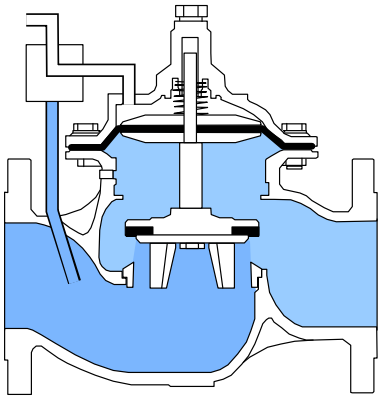
The 3-way mode is used in on/off valves or when the regulating valve is fully open, in order to obtain specific operating conditions. Once in position, there is no water flow through the control chamber.

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

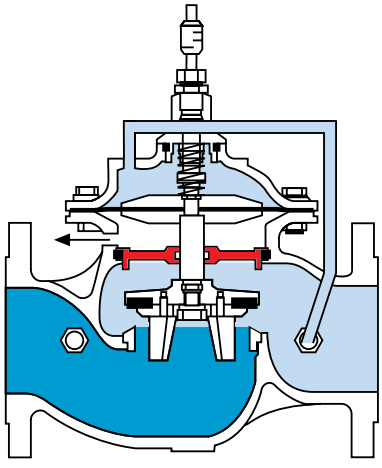
## Proportional Pressure Reducer

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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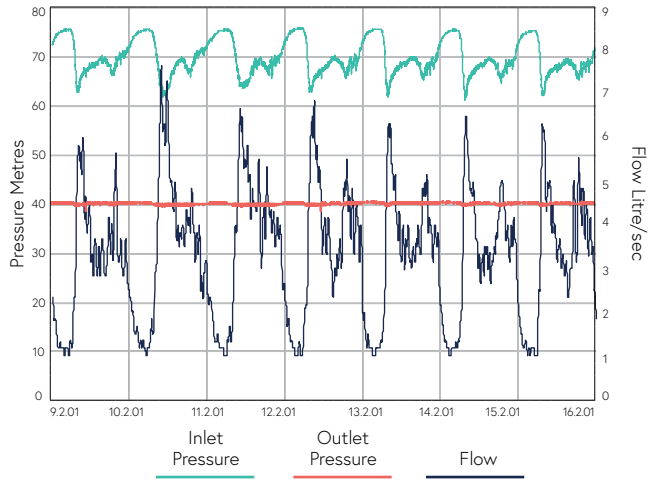
## Typical Pressure Reducing Performance Chart

### DOROT S300L 4" (100mm)

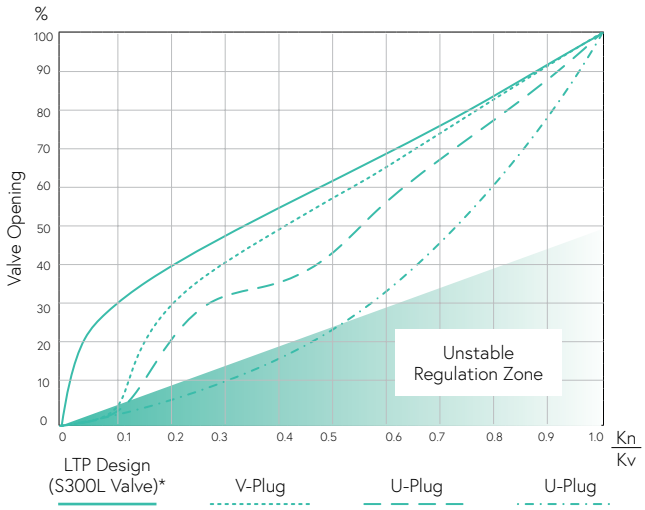
Pressure Reducing Valve




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

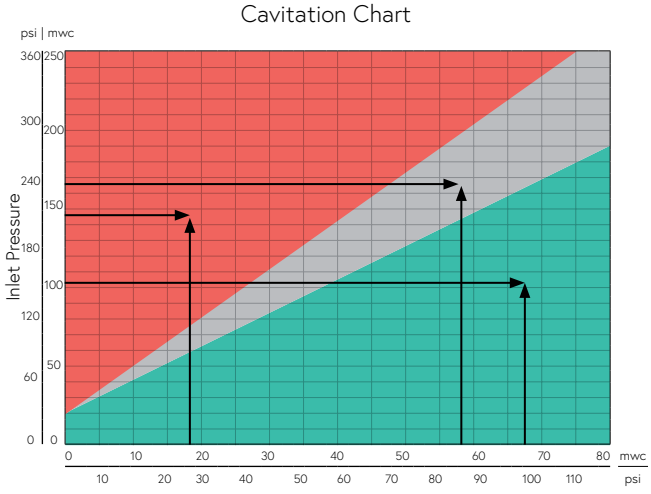
**Limits of operating conditions**
The chart sets the safe limits for valves designed to operate at a considerable pressure differential.

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 a 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 ANSI<br>Threaded NPT<br>Grooved | ISO 7005 / AS10 / JIS B22 / ABNT and others |
| Pressure Range | Model 33 0.5 – 16 bar (7 – 250 psi)<br>Model 34 0.5 – 25 bar (7 – 360 psi)<br>Note: higher pressure rating available on special demand and for tailor-made projects | 0 min. press. with N.O spring assisted opening<br>0.2 bar / 3 psi min. pressure without a spring<br>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 (ASTM A-536) | Cast Steel A-216 WCB<br>Duplex<br>Cast Stainless Steel CF8M (316)<br>NAB<br>Others |
| Main Valve Internals | Stainless Steel | Stainless Steel 316, Hastelloy, SMO, Duplex |
| Spring | Stainless Steel | Stainless Steel 316, Inconel, Hastelloy |
| Diaphragm | Nylon fabric reinforced EPDM (NSF Approved) | NBR |
| Seals | EPDM | NBR, Viton |
| Coating | Fusion Bonded Epoxy (FBE) RAL 5010 | UV protected FBE RAL 5010<br>FBE RAL 3000 (fire red)<br>UV protected FBE RAL 3000<br>Rilsan (Nylon)<br>Halar |
| Control Trim: Fittings & Control Devices | Stainless Steel | Stainless Steel 316, Duplex |
| Control Trim: Tubes | Stainless Steel | Copper, Stainless Steel 316, Duplex |

# DOROT S300L

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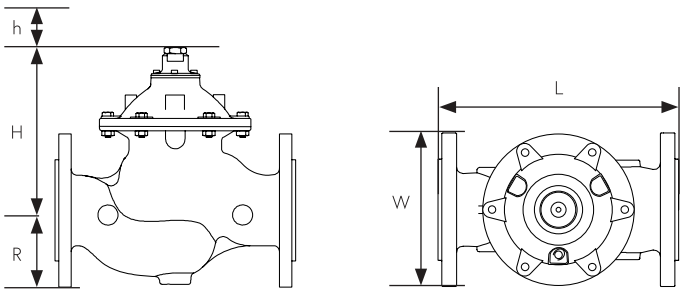
## Dimensions & Weights

### 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 | 235 | 9¼ | 279 | 11 | 305 | 12 | 381 | 15 | 508 | 20 | 645 | 25⅜ |
| H | 266 | 10½ | 266 | 10½ | 292 | 11½ | 340 | 13⅜ | 413 | 16¼ | 476 | 18¾ |
| h ** | 140 | 5½ | 140 | 5½ | 170 | 6 11/16 | 180 | 7 | 230 | 9 | 300 | 11 13/16 |
| W | 169 | 6⅝ | 185 | 7¼ | 203 | 8 | 238 | 9⅜ | 330 | 13 | 413 | 16¼ |
| R | 82.5 | 3¼ | 92.5 | 3⅝ | 100 | 3 15/16 | 110 | 4 5/16 | 142.5 | 5⅝ | 172.5 | 6¾ |
| 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
** h - Minimal required maintenance space



# DOROT S300L

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## Hydraulic Performance

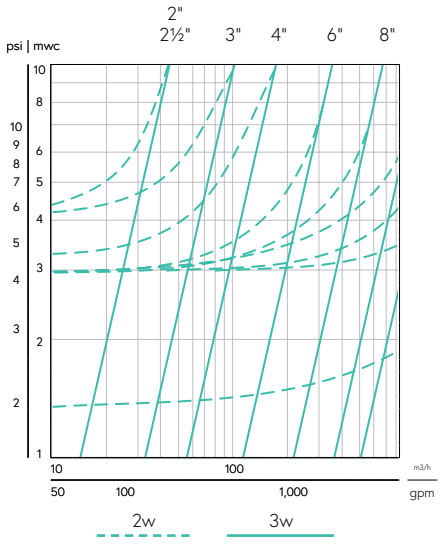
### Models 33/34 Globe

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

## Headloss Charts

### Models 33/34 Globe

Pressure Loss Chart



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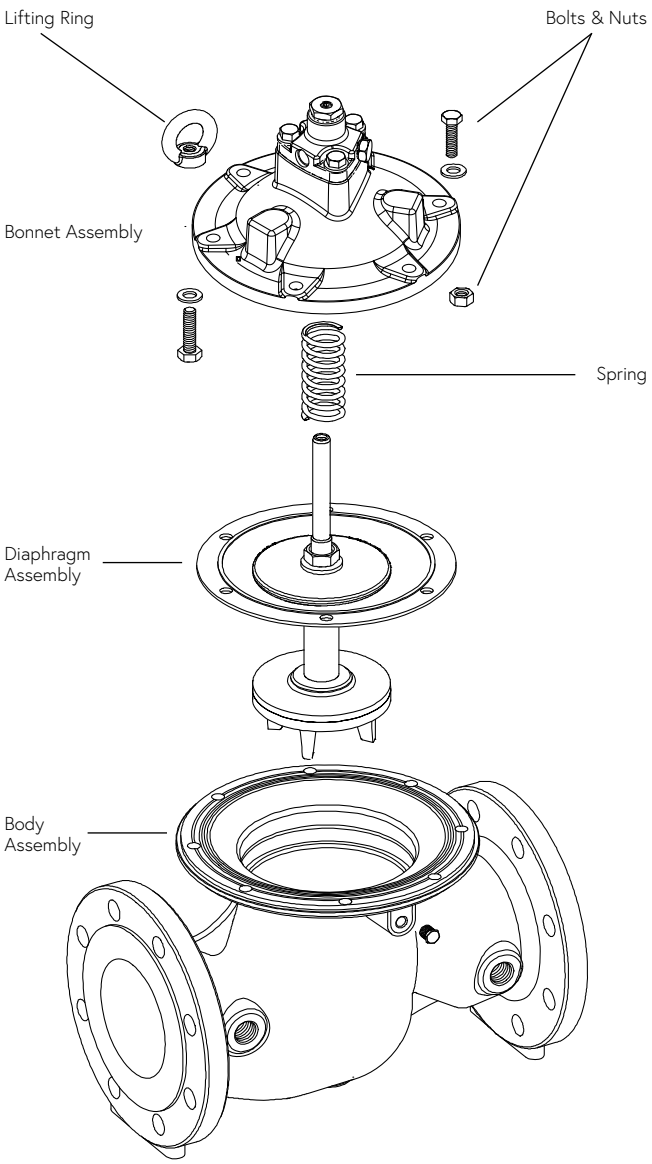
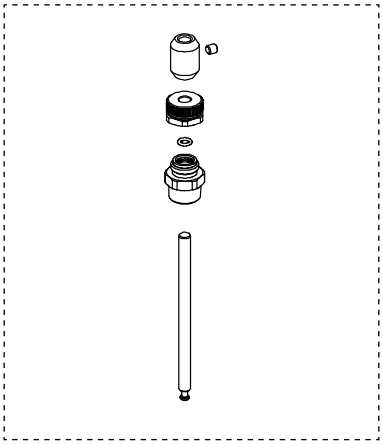
## Components

### Main Components

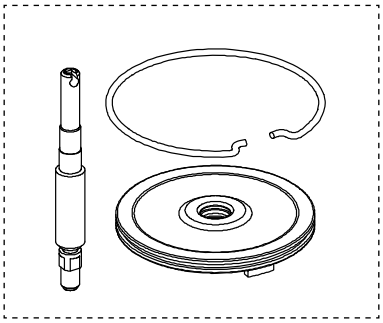



### Additional Components

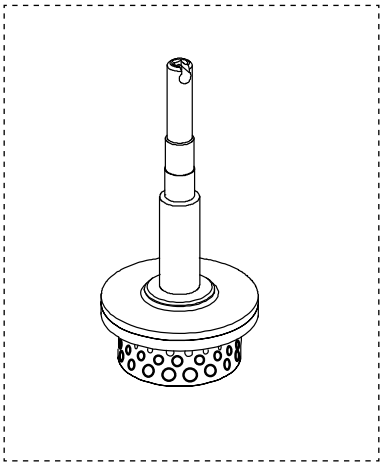
Position Indicator Kit



Double Chamber Conversion Kit



"F" Version Conversion Kit



# DOROT S300L

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## 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

# DOROT S300L

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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

# DOROT S300L

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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

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## 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 RE/EL

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.**