

Pressure reducing valves

for steam and industrial fluids



Pressure reducing valves

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A well designed steam system will produce clean dry steam in the boiler house ready for delivery at high pressure through the distribution network. This maximizes the potential to generate and supply saturated steam of the best quality at the lowest overall cost.

The majority of applications however require a reduction in pressure at the point of use. The benefits of this include:

- A reduction in the capital cost of equipment.
- Operating plant costs will decrease by reducing flash steam.
- Saturated steam pressure is directly related to temperature. Controlling the pressure will therefore automatically control the temperature avoiding the need for additional temperature control equipment.
- The flexibility to supply steam at the optimal pressure for each individual application.

However, there are some applications that have a need to sense and control upstream of the valve to maintain or disperse excess pressure in the distribution pipeline in order to safeguard the equipment using it - this requires a back pressure regulator.

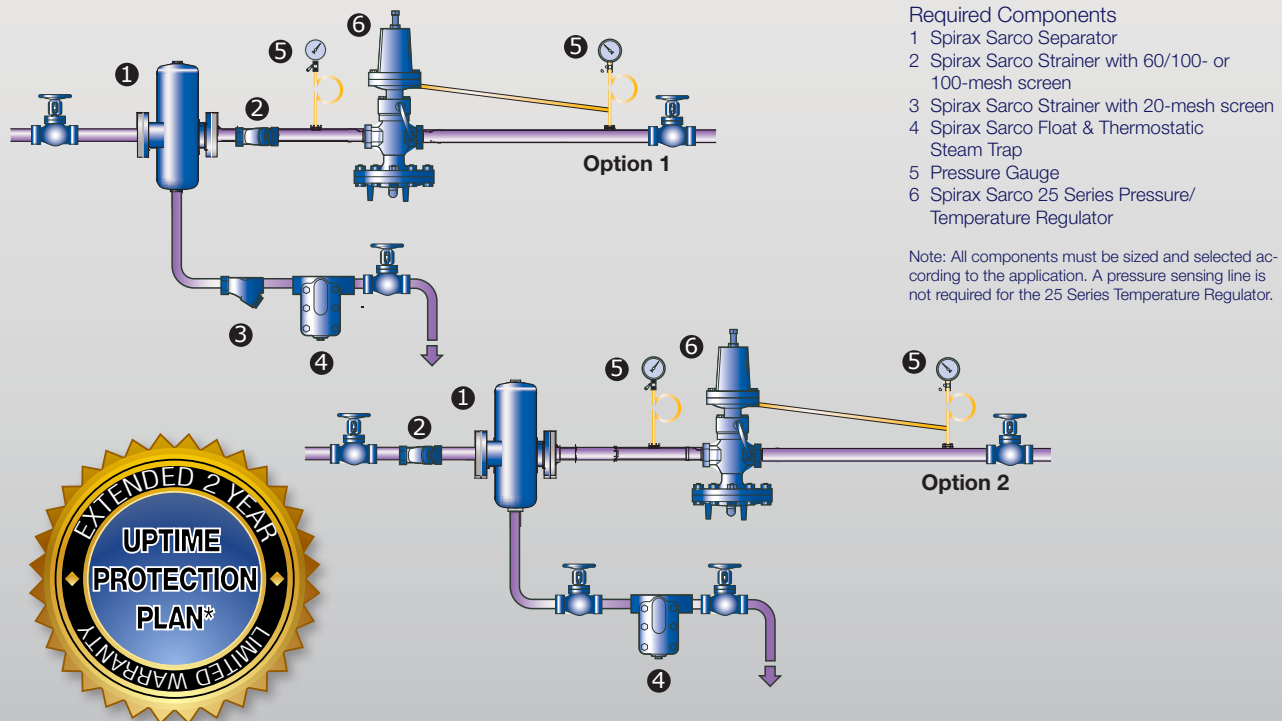
Two main groups of pressure control valves are available for either pressure reduction or back pressure applications:

- Self-acting, requiring no external power or input.
- Pneumatically & Electrically Actuated with either a pneumatic or electrical control system.

The final selection will depend on the requirements of the application and customer preferences.

Whatever the reason for reducing or maintaining pressure, proper control at any time demands an automatic valve that can reduce or maintain steam pressure accurately, reliably and economically.

Product range and options



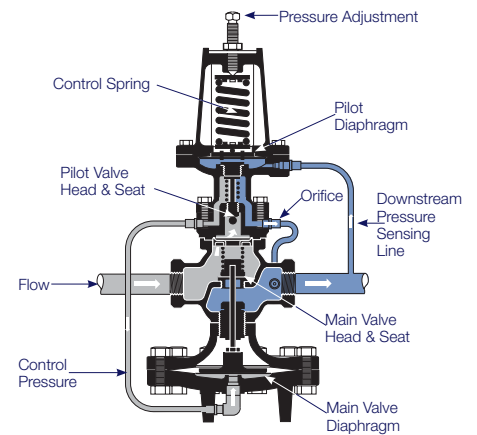
How self acting pressure regulators work

How the 25P pilot regulator works

The Spirax Sarco pilot operated pressure regulator works by balancing the downstream pressure against a control spring. This modulates a small valve head over a seat (the pilot). The flow through this seat is directed, in turn, to the main valve diaphragm, where it modulates the main valve.

In order to achieve the most stable operating condition, an external pressure sensing line must be used. This allows downstream pressure to feed back to the underside of the pilot diaphragm, balancing the spring force, causing the pilot valve to throttle. This settles the pilot valve, allowing a constant flow across the main diaphragm. This ensures that the main valve is also settled to give a stable downstream pressure.

When downstream pressure rises, the pilot valve closes, and pressure is released from the main valve diaphragm through the control orifice, to close the main valve. Any variations in load or pressure will immediately be sensed on the pilot diaphragm, which will act to adjust the position of the main valve, ensuring a constant downstream pressure.



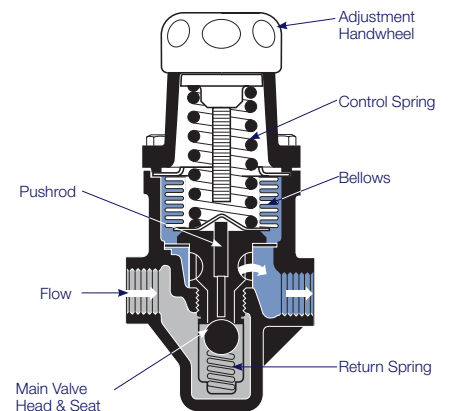
How direct operated regulators work

On start-up, upstream pressure, aided by a return spring, holds the valve head against the seat in the closed position.

Downstream pressure is set by rotating the hand wheel in a clockwise direction which compresses the control spring and extends the bellows. This downward movement is transmitted via a push rod, which causes the main valve to open.

Steam then passes through the open valve into the downstream pipework and also surrounds the bellows.

As downstream pressure increases, it acts through the bellows to counteract the spring force and closes the main valve when the set pressure is reached. The main valve modulates to give constant pressure.



Impact on the environment

Our aim is to provide a solution that helps you achieve operational improvement through enhanced production capability, usually in the form of reduced energy usage, improved product quality, lower emissions and greater production throughout. Reducing emissions, carbon footprint, and your company's impact on the environment is Spirax Sarco's goal. Not only will this have a strong social and environmental impact but also a positive economic impact today and well into the future.

Although your processes and steam systems may be highly efficient, our experience demonstrates that there is always room for improvement. Spirax Sarco surveys hundreds of systems annually in the USA and has identified the actions required to modernize plants, using the latest best practices, technologies and products. The results for plants like yours are reductions in millions of dollars in energy losses and hundreds of thousands of tons of carbon dioxide emissions pumped into the atmosphere. With Spirax Sarco services, the savings to both your bottom line and the environment are just waiting to be realized.

Pressure reducing valve station with safety valves

Separator

This removes water particles and entrained moisture eradicating erosion, corrosion, waterhammer, and maximizing the heat transfer capability of downstream equipment.

Benefit

Guaranteed longer life and maximum plant performance.

Upstream stop valve

This allows the station to be shut down, and is positioned after the separator so that the condensate cannot build up in the supply line during this period.

Benefit

Maximum safety during the start-up procedure, minimum downtime.

Strainer

Strainers arrest any dirt before it is able to pass into the pressure reducing valve.

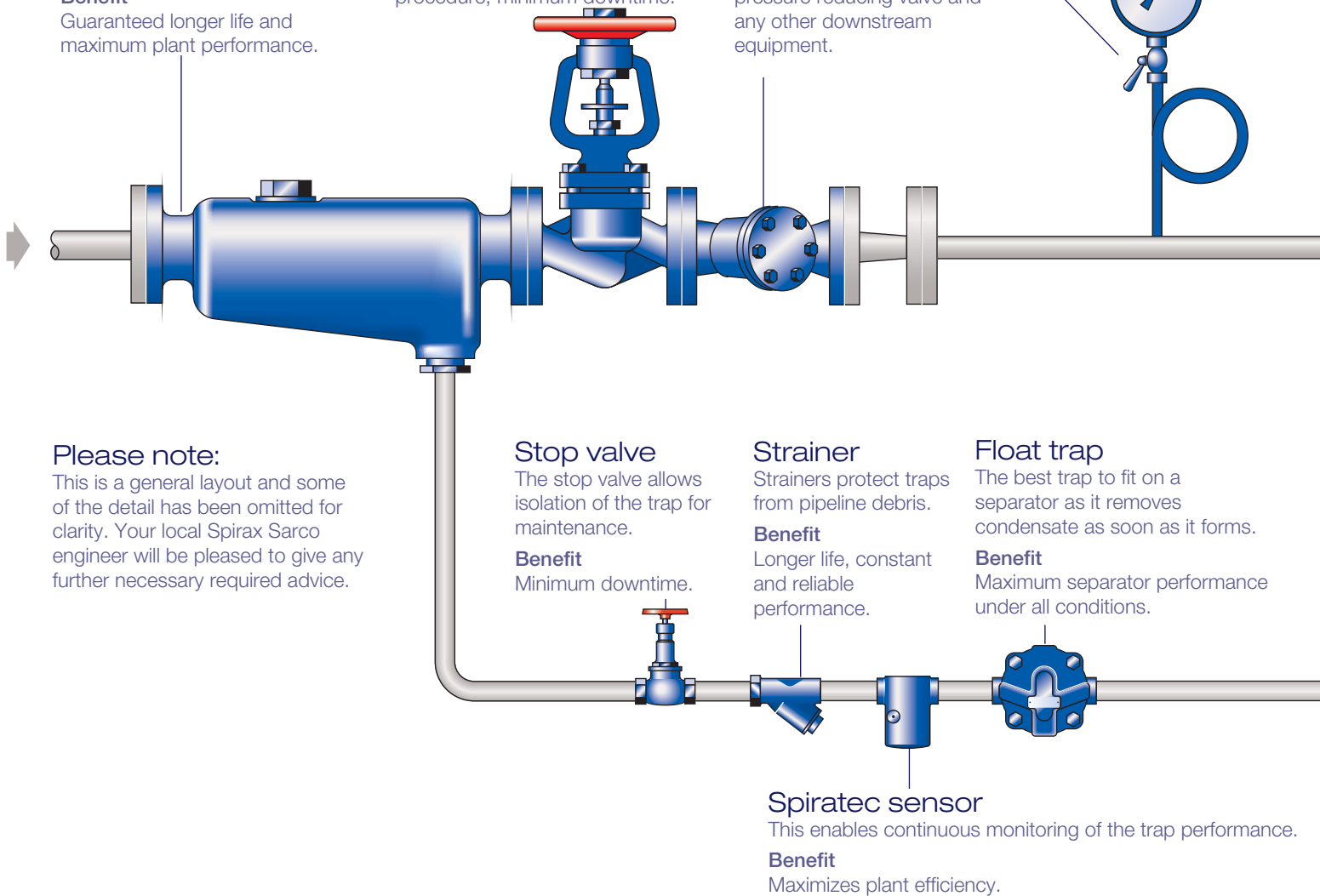
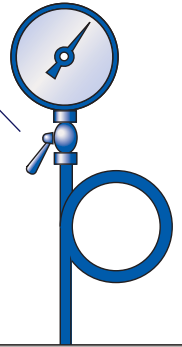
Benefit

Reduced downtime, constant and reliable performance from the pressure reducing valve and any other downstream equipment.

Upstream pressure gauge

This monitors the status of the supply pressure.

Benefit: Immediate indication of any problems associated with the steam supply.



Please note:

This is a general layout and some of the detail has been omitted for clarity. Your local Spirax Sarco engineer will be pleased to give any further necessary required advice.

Stop valve

The stop valve allows isolation of the trap for maintenance.

Benefit

Minimum downtime.

Strainer

Strainers protect traps from pipeline debris.

Benefit

Longer life, constant and reliable performance.

Float trap

The best trap to fit on a separator as it removes condensate as soon as it forms.

Benefit

Maximum separator performance under all conditions.

Spiratec sensor

This enables continuous monitoring of the trap performance.

Benefit

Maximizes plant efficiency.

A properly designed system will consist of the equipment shown above

All steam pressure reducing valve stations will benefit from the installation of key items of critical upstream and downstream accessories. Separators and strainers will keep the steam dry and clean, protecting the pressure reducing valve from wear. Isolating valves and pressure gauges allow easy commissioning and maintenance.

Safety valves are an essential part of those installations where the upstream pressure is higher than the maximum allowable working pressure (MAWP) of any downstream plant.

Back pressure regulator valves are also referred to as maintaining, excess-pressure or surplussing valves. Unlike a pressure reducing valve, they will sense upstream pressure and act to maintain a minimum upstream pressure or disperse excess pressure. Installation guidelines are similar to a pressure reducing valve, but in this type of installation upstream pressure is sensed and a safety valve may not be required.

Pressure reducing valve

Depending on the system requirements this can be any of the following:

- Compact valves
- Pilot operated valves
- Direct acting valves
- Pneumatically actuated valves

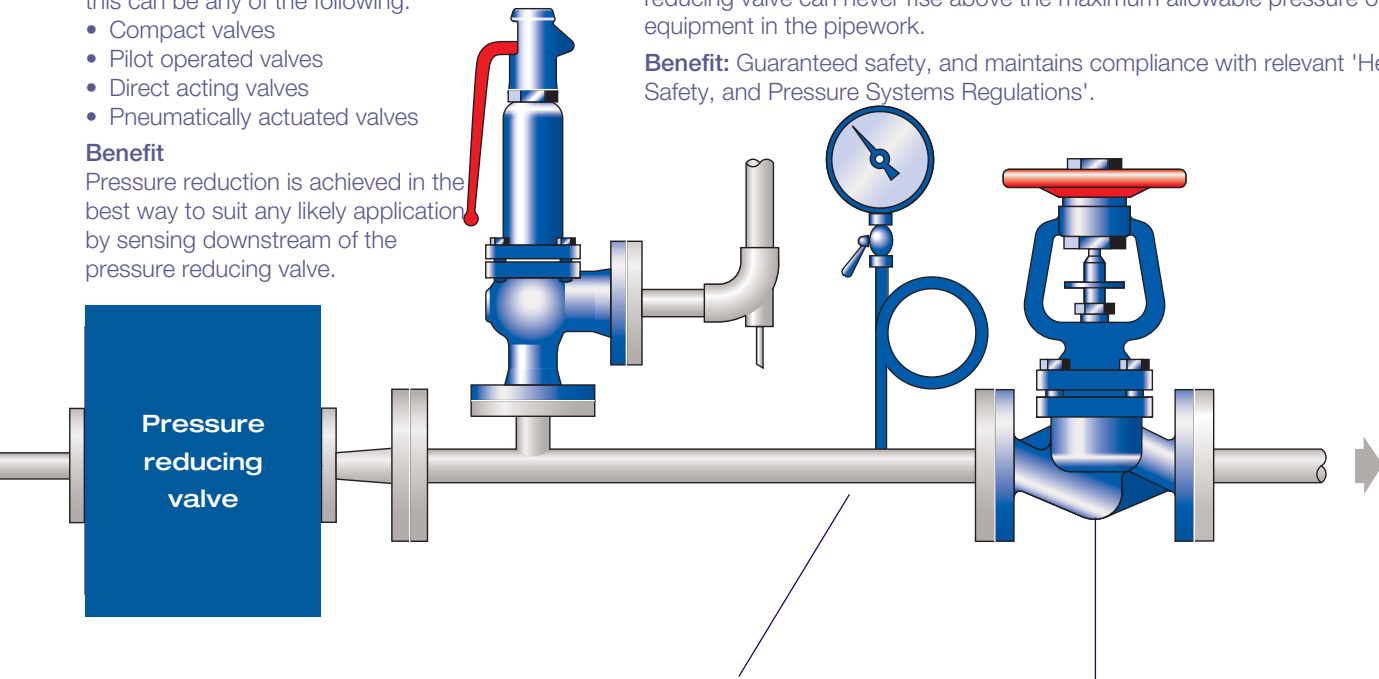
Benefit

Pressure reduction is achieved in the best way to suit any likely application by sensing downstream of the pressure reducing valve.

Safety valve

This is required by law to ensure the pressure downstream of the pressure reducing valve can never rise above the maximum allowable pressure of any equipment in the pipework.

Benefit: Guaranteed safety, and maintains compliance with relevant 'Health and Safety, and Pressure Systems Regulations'.

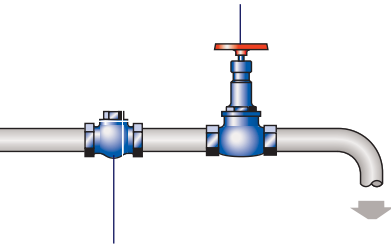


Stop valve

The stop valve allows isolation of the trap for maintenance.

Benefit

Minimum downtime.



Downstream pressure gauge

This monitors the status of the downstream pressure.

Benefit

Immediate indication of abnormal conditions associated with the malfunction of any upstream equipment, and allows a correct commissioning procedure, by monitoring the set pressure during this time.

Downstream stop valve

This allows any downstream equipment to be double isolated during maintenance periods, when used in conjunction with the upstream stop valve. It also allows the pressure reducing valve to be correctly adjusted during commissioning by isolating the flow.

Benefit

Maximum safety during maintenance on the downstream pipework and equipment, and allows the pressure reducing valve to be adjusted correctly.

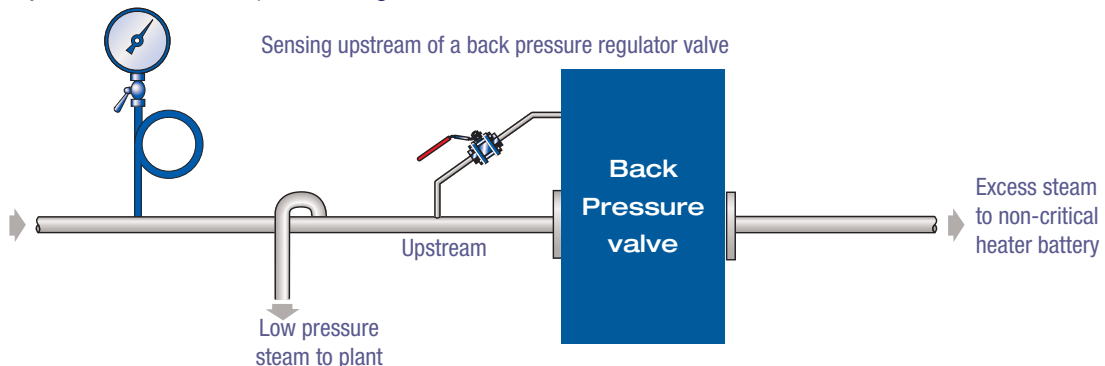
Check valve

This prevents reverse flow and protects the trap from waterhammer.

Benefit











Prolongs service life.

A typical application utilizing a back pressure regulator valve to maintain a minimum upstream pressure is illustrated below. This ensures that at times of peak demand the non-critical heating line can close, maintaining a secure supply of steam to the process plant. Note that under normal conditions the complete line would be the same pressure rating, consequently there is no need for a safety valve after the back pressure regulator valve.



Applications and product range

Pressure reducing valves

		Steam applications	Gas applications	Liquid applications	Compact	No external power required	Relative cost	Accurate control of variable loads	Variety of control options	High capacity	Poor media conditions	Further information
	Pilot operated 25 Series	•	•			•	\$\$	•	•	•		Page 7
	Pilot operated DP163	•	•			•	\$\$	•	•	•		Page 8
	Pilot operated 25MP	•	•		•	•	\$					Page 9
	Direct acting BRV2 Series	•	•		•	•	\$				•	Page 9
	Balanced BRV71 / 73	•	•		•	•	\$				•	Page 10
	Stainless steel SRV2S	•	•		•	•	\$					Page 11
	For liquids LRV2 Series			•	•	•	\$					Page 12
	SRV6	•	•		•	•	\$\$					Page 13
	STERI-TROL	•	•	•			\$\$	•	•	•		Page 14
	Actuated, Pneumatic & Electric Control Valves	•	•	•			\$\$	•	•	•	•	Page 15

Backpressure valves

	Pilot operated 25BP	•	•			•	\$\$	•	•	•		Page 7
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Pressure reducing valves

Pilot Operated 25 Series

The Spirax Sarco 25-Series regulators are a versatile family of self-acting pressure regulators with control pilots and interchangeable main valves for most steam applications.

Options include pressure reduction (25P), combined pressure reduction with electrical on/off override (25PE), pressure reduction with air loaded pilot (25PA), and as a back pressure regulator (25BP). Designed with the user in mind, the 25-Series offers versatility and simplicity. Color coded, interchangeable springs allow quick and easy change of downstream pressure range eliminating the need to isolate the valve or break the steam line.

Typical applications include main line pressure reduction or where high accuracy of control is required.

Key Features

- Combination of pilots allow for different types of control in one regulator.
- Accurate control of pressure with choice of color coded springs.
- Stainless steel internals for excellent durability and resistance to corrosion.
- Wide range of screwed and flanged connections to match plant standards.
- Patented self scrubbing guide for long, trouble-free service.
- Fatigue-tested diaphragm designed without a piston to prevent danger of sticking.



Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions	Options
½" to 6" (DN15 to DN150)	NPT, Flanged ANSI 125, ANSI 150, ANSI 250 and ANSI 300	Cast Iron or Cast Steel	(See technical sheet for options) Max. Operating Pressure (PMO) Up to 300 psig (20 barg) Max. Operating Temperature (TMO) Up to 450°F (232°C)	Max allowable pressure (PMA) Cast Iron 250 psig/0-450°F (17 barg/0-232°C) Cast Steel 300 psig/0-600°F (21 barg/0-316°C) Max allowable temperature (TMA) Cast Iron 450°F/0-250 psig (232°C/0-17 barg) Cast Steel 600°F/0-300 psig (316°C/0-21 barg)	Reduced orifices Other end connections

For further technical information, search our website using product designation 25P

Pilot Operated DP163

The Spirax Sarco DP163 is a self-powered, pilot-operated, pressure reducing regulator constructed entirely of 316 stainless steel, suitable for steam, air or industrial gases. Its self-acting operation eliminates the cost of an external power source. The DP163 pressure reducing valve will accurately control downstream pressure, regardless of the upstream pressure, or load variations.

Color coded, interchangeable springs allow quick and easy change of downstream pressure range eliminating the need to isolate the valve or break the steam line. Downstream pressure is sensed either internally or through an external sensing pipe.

These are recommended for medium duty or process type applications, branch lines to OEM equipment, for accurate process control or where an external interface or remote adjustment is required. Typical applications include main line pressure reduction or where high accuracy of control is required. This versatile and compact valve will provide an efficient and economic solution in many pressure reduction applications.

Key Features

- Self-acting using spring and diaphragm operation - no need for electrical supplies.
- Fatigue tested diaphragm - no piston, no danger of sticking.
- Easily serviced using off-the-shelf spares and standard tools.



Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions
½" to 3" (DN15 to DN80)	Flanged ANSI 300 (Option: ANSI 150)	316L Stainless Steel	Max. Operating Pressure (PMO) 304 psig (21 barg) Max. Operating Temperature (TMO) 432°F (250°C)	Max allowable pressure (PMA) 580 psig @ 0-248°F (40 barg @ 0-120°C) 472 psig @ 464°F (32 barg @ 240°C) 304 psig @ 752°F (21 barg @ 400°C) Max allowable temperature (TMA) 752°F @ 0-304 psig (400°C @ 0-21 barg)

For further technical information, search our website using product designation DP163



Pilot Operated 25MP

The Spirax Sarco 25MP direct-operated pressure regulator is designed for accurate control of very light loads. Color coded interchangeable springs allow quick and easy changes of downstream pressure ranges. This durable, compact regulator offers a competitive solution to uncomplicated steam applications.

Typical applications include small steam pressure reducing applications where an 80% to 90% accuracy of regulation is acceptable.

Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions
½" screwed	NPT	Cast Iron	Max. Operating Pressure (PMO) 250 psig (17 barg) Max. Operating Temperature (TMO) 450°F (232°C)



For further technical information, search our website using product designation 25MP

Compact - Direct Acting BRV2 Series

The Spirax Sarco compact, direct-acting pressure reducing valve is designed for use with steam, compressed air and other gases and is perfectly suited for light duty, simple OEM applications and where ultimate control is not important. Standard is the BRV2S which has a stainless steel control bellows.

The compact design makes it ideal for point of use installations, providing accurate pressure control under stable load conditions. It offers a cost effective alternative to more sophisticated valves.

Advanced manufacturing technology has been used to produce a highly durable pressure reducing valve, with all stainless steel internals to meet the needs of most industrial applications.

Key Features

- Compact size, with a single spring mechanism, ideal for small processes.
- Stainless steel valve and seat assembly provides high wear resistance under low load conditions.
- Anti-vibration adjustment handwheel with color indication of control spring range.
- Alloy spring housing with 4 bolts for easy in-line removal, giving access to all internals.
- A bronze bellows version is available for special applications where halide contamination may exist.



Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions	Options
Screwed ½" to 1"	NPT	Ductile Iron	Max. Operating Pressure (PMO) 275 psig (19 barg) Max. Operating Temperature (TMO) 410°F (210°C)	Max allowable pressure (PMA) 362 psig @ 248°F (25 barg @ 120°C) Max allowable temperature (TMA) 410°F @ 275 psig (210° @ 19 barg)	Phosphor bronze control bellows for systems with halide contamination Downstream pressure sensing connection for enhanced stability

For further technical information, search our website using product designation BRV2

Compact - Balanced BRV71 & BRV73

The BRV71/73 is extremely compact in size and maintains the added benefit of enhanced resistance to pressure and load fluctuations. BRV valves are designed for use with steam, compressed air and other gases and are ideal for point of use installations, offering a cost effective alternative to more sophisticated valves.

Advanced manufacturing technology has been used to produce a highly durable pressure reducing valve, constructed with all stainless steel internals to meet the needs of most industrial applications.

Key Features

- Compact size with a single spring mechanism, ideal for small processes.
- Stainless steel valve and seat assembly provides high wear resistance under low load conditions.
- Anti-vibration adjustment handwheel with color identification of control spring range.
- Stainless steel control and balancing bellows assemblies offer high fatigue resistance and stable control.



Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions	Options
1" to 2"	Screwed NPT Flanged ANSI 150	Ductile Iron	Max. Operating Pressure (PMO) 150 psig (10 barg) Max. Operating Temperature (TMO) 363°F (184°C)	Max allowable pressure (PMA) 232 psig @ 248°F (16 barg @ 120°C) Max allowable temperature (TMA) 363°F @ 232 psig (184° @ 10 barg)	BSP, PN16, JIS10

For further technical information, search our website using product designation BRV7



Compact - Stainless Steel SRV2S

The SRV2S is an all stainless steel version of the BRV2S - a compact, direct-acting pressure reducing valve designed for use with steam, compressed air and other gases.

The compact design makes it ideal for OEM and point of use installations, providing accurate pressure control under stable load conditions. It offers a cost effective alternative to more sophisticated pilot-or piston-operated valves for clean steam service.

Advanced manufacturing technology has been used to produce results in a highly durable pressure reducing valve, with all stainless steel internals to meet the needs of most industrial applications. Typical applications include sterilizers, autoclaves, humidifiers, culinary steam supplies, and other equipment requiring reduced pressure to operate.



Key Features

- Compact size with a single spring mechanism ideal for small processes.
- Electropolished body.
- Stainless steel valve and seat assembly provides high wear resistance under low load conditions.
- All wetted parts constructed from 316 grade stainless steel.
- Anti-vibration adjustment handwheel with color identification of control spring range.

Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions	Options
Screwed ½" to 1"	Screwed NPT	316L stainless steel	Max. Operating Pressure (PMO) 275 psig (19 barg) Max. Operating Temperature (TMO) 413°F (212°C)	Max allowable pressure (PMA) 362 psig @ 248°F (25 barg @ 120°C) Max allowable temperature (TMA) 413°F @ 275 psig (212°C @ 19 barg)	Flanged ANSI 150, Ductile Iron

For further technical information, search our website using product designation SRV2



Compact - For Liquids LRV2 Series

The LRV2 is a direct-acting pressure reducing valve intended for use on liquids. The compact design makes it ideal for point of use applications, and the pressure balanced head enables accurate and stable control of pressure under all load conditions. Standard is the LRV2S with a stainless steel control bellows.

Advanced manufacturing technology has been used to produce a highly durable pressure reducing valve, with all stainless steel internals to meet the needs of most liquid applications.

Key Features

- Compact size with a single spring mechanism ideal for small processes and OEM applications.
- Bronze body and stainless steel pressure control bellows provide reliable and corrosion free operation on water systems.
- Nitrile-faced, pressure-balanced head provides stable liquid control and a bubble tight shut-off.
- Anti-vibration adjustment handwheel with color identification of control spring range.



Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions	Options
Screwed ½" to 1"	Screwed NPT	Bronze	Max. Operating Pressure (PMO) 203 psig (14 barg) Max. Operating Temperature (TMO) 167°F (75°C)	Max allowable pressure (PMA) 363 psig @ 248°F (25 barg @ 120°C) Max allowable temperature (TMA) 212°F @ 246 psig (100°C @ 17 barg)	Phosphor bronze control bellows

For further technical information, search our website using product designation LRV2



SRV6 Sanitary Pressure Regulator

The SRVs The SRV6 is an angle-pattern, sanitary pressure regulator with polished 316/316L stainless steel construction for use on steam, process liquids and gases.

Advanced manufacturing technology has been used to produce a highly durable pressure reducing valve, with all stainless steel internals to meet the needs of most industrial applications. Typical applications include clean steam, gas, and liquid supplies to bioreactors, centrifuges, freeze dryers (lyophilizers), sterilizers, autoclaves, process tanks, production suites, humidifiers, and culinary equipment.

Key Features

- Angle pattern design is fully self-draining.
- Diaphragm actuated with integral valve guide.
- All wetted parts are constructed from 316 grade stainless steel, polished to 20 microinch Ra, then electropolished.
- Valve travel stops prevent overextension of diaphragm.



Technical Specification

Sizes	End Connections	Body Materials	Limiting Operating Conditions	Pressure Shell Design Conditions
Screwed ½" to 2"	Tri-Clamp®	316 L Stainless Steel	Max. Operating Pressure (PMO) 116 psig (8 barg) Max. Operating Temperature (TMO) 347°F (175°C)	Max allowable pressure (PMA) 232 psig (15 barg) Max allowable temperature (TMA) 347°F (212°C)

For further technical information, search our website using product designation SRV2



Pneumatically & Electrically Actuated Control Valves

For critical process control or for integration with supervisory control systems, use a pneumatically actuated valve. These valves are ideal for pressure control applications involving high capacities, poor quality steam or rapidly changing conditions.

The SPIRA-TROL valve is modular in design offering many options within one body envelope, this provides a comprehensive selection of control valve, allowing for pressure control of steam, water, oils and other industrial fluids.

The modular SPIRA-TROL valve offers many options within one body envelope, providing for a comprehensive range of pressure control attributes for steam, water, oils and other industrial fluids.

Key Features

- Wide range of body materials to suit most applications.
- Designed using computational fluid dynamics to optimize flow paths.
- Easily interfaced with a control system, using a double mount actuator yoke and a valve interface device such as a smart communicating positioner.
- High-performance, long-life valve internals and seal.
- Trim options available including 'low noise'.
- Quick and easy maintenance using standard fittings and self-aligning clamp-in-place internals.
- Sizing and selection software to determine the most suitable valve configuration.



Technical Specification

Sizes	End Connections	Body Materials	Maximum Temperature	Maximum Body Design Rating	Control Pressure Range	Options	
Screwed ½" to 2" Flanged ½" to 8" (DN15 to DN100)	Screwed BSP and NPT Socket weld Flanged PN16, PN25 and PN40 ANSI 125, ANSI 150 and ANSI 300 JIS / KS 10 and JIS / KS 20	Cast iron SG iron Carbon steel Stainless steel NACE	800°F (426°C)	PN40 and ANSI 300	0 to 600 psig (0 to 40 bar)	Flow characteristics Equal percentage Linear Fast opening Reduced flow including microflute characteristics Low noise Special trims Soft seal Hard facing	Spring loaded chevron and 'O' ring Stem seals Graphite Bellows Bonnet extension Pneumatic Actuation Electric Modulating On / Off

For further technical information, search our website using product designation SPIRA-TROL

STERI-TROL Clean Service Control Valve

Clean service applications demand the very best in valve performance and design. The STERI-TROL 'S' series are two-port and three-port control valves manufactured using 316L stainless steel. They are designed for mixing fluids (three-port only), and for on/off and modulating control of clean steam, pure steam and process fluids. The valve is operated by a pneumatic actuator and may be interfaced with a control system using any of the Spirax Sarco range of positioners.



Key Features

- Angle pattern or straight through body configuration.
- Valve and actuator in stainless steel.
- Self-draining design. No dead corners.
- Easy in-line maintenance.
- 0.4 µm internals finish as standard.
- EN 10204 3.1 surface roughness certification as standard.

Technical Valve Specification

Sizes	Styles	End Connections	Body Materials	Maximum Temperature	Maximum Body Design Rating	Trim
½" to 4" (DN15 to DN100)	SA Two-port angle pattern design	Sanitary clamp Tube weld Screwed aseptic thread BSP and NPT Flanged	Stainless steel AISI 316L	482°F (250°C)	PN16	Equal %, linear fast opening flow characteristics Soft seal option Reduced Kv and micro flow
	SH Two-port horizontal pattern design					
	SQ Three-port design					



Technical Actuator Specification

Types	Maximum Differential Pressure	Action	Supply	Options
Pneumatic	232 psi (16 bar)	Spring-to-close on air failure Spring-to-open on air failure	Compressed air: 4.5 bar (psi)	Handwheel Painted, ENP and stainless steel actuator All industrial standard control interface devices

For further technical information, search our website using the following key words 'STERI-TROL'



In our century-long commitment to sustainable energy use in buildings and industry, we dedicate our innovative expertise, products, services and business efforts to conserve our valued natural resources, and will actively guide our customers in attaining these same goals:

- Energy - Minimize energy demand, carbon footprint, emissions and maintenance;
- Balance - Apply energy precisely, recovering and reapplying low-grade energy, conserving wherever possible for future use;
- Flow - Precisely regulate fluid flow to optimize energy consumption, for consistent interior comfort and process control accuracy.

Regional sales offices

Northeast

Spirax Sarco, Inc.
7760 Olentangy River Road
Suite 120
Columbus, OH 43235
Phone: (614) 436-8055
Fax: (614) 436-8478

Mid Atlantic

Spirax Sarco, Inc.
4647 Saucon Creek Road
Suite 102
Center Valley, PA 18034
Phone: (800) 251-7676
Fax: (800) 996-3232

Southeast

Spirax Sarco, Inc.
400 Northeast Drive, Unit O
2021 Business Center
Columbia, SC 29203
Phone: (803) 714-2131
FAX: (803) 786-7050

Midwest

Spirax Sarco, Inc.
1500 Eisenhower Lane
Suite 600
Lisle, IL 60532
Phone: (630) 493-4525
Fax: (630) 724-9176

Southwest

Spirax Sarco, Inc.
203 Georgia Avenue
Deer Park, TX 77536
Phone: (281) 478-4002
Fax: (281) 478-4615

West

Spirax Sarco, Inc.
1820 W. Orangewood
Suite 207
Orange, CA 92868
Phone: (800) 883-4411
Fax: (714) 940-0183



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SPIRAX SARCO, INC.
1150 NORTHPOINT BLVD.
BLYTHEWOOD, SC 29016
t: 800.883.4411
or: 803.714.2000
f: 803.714.2222
www.spiraxsarco.com/us

