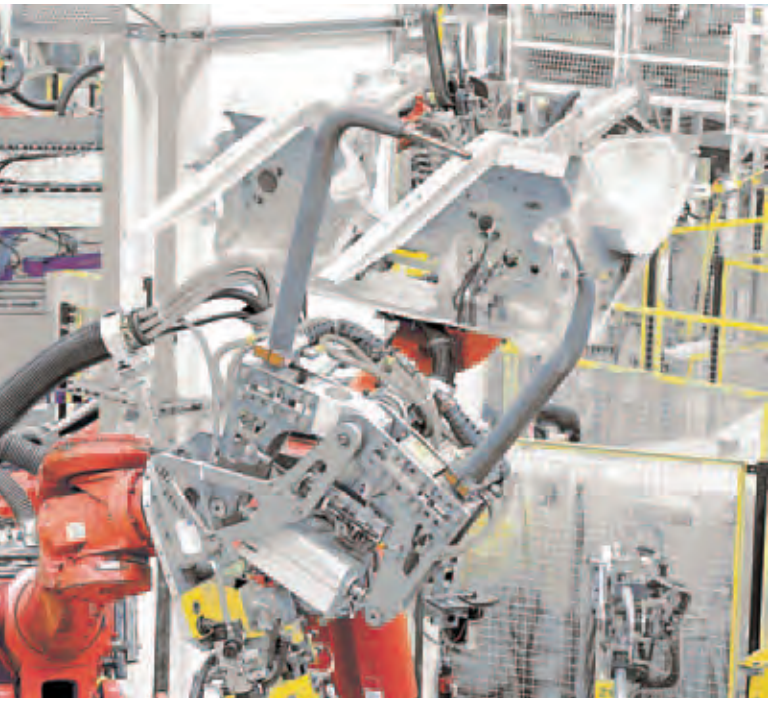
AVENTICS

DYNAMIC PNEUMATICS
REGULATING WITH E/P PRESSURE CONTROL VALVES

Rexroth
Pneumatics

Sensitive and highly dynamic – electro-pneumatic pressure regulation

Speed and precision are crucial to controlling dynamic processes reliably. State-of-the-art control valve technology from AVENTICS meets these requirements like no other. No matter if it is pressure, quantity, speed, or weight – each one is precisely controlled with AVENTICS.



We'll take control: precisely and energy-efficiently

Sophisticated systems with E/P pressure control valves frequently replace other pneumatic solutions or simply take over due to their clear advantages over non-pneumatic control technology. Classical applications include precise positioning of parts and components, variable control of welding tips, weight-independent balancer technology in assembly, and exact controlling and metering in cutting-edge painting systems.

Our product range includes the entire spectrum of E/P pressure control valves with all useful control principles: pilot control, direct control or high-dynamic control. So you can always apply the best technology for the specific task.

Precise energy use with intelligent pressure control – Energy on demand

Situational pressure control ensures that only as much energy is accessed as is currently required by the respective process. In addition, decreased pressure can be used to actuate cylinder return strokes; the required pressure is only provided when the application demands full performance.

At home in a multitude of applications and industries

Electro-pneumatic pressure control technology in all industries

The examples shown offer a general idea of the range of applications for solutions with controlled air. These are solutions that have been fulfilling their tasks for years and illustrate our extensive competence in many industries.

Painting technology

In painting technology, electro-pneumatic valves ensure exact turbine speeds and precise air and paint quantities for even layers of paint. They also take over important functions when changing colors and cleaning sprayers.

Assembly technology

Pneumatic systems play an important role in assembly technology. Electronically controlled weight-independent balancers deal with heavy loads, parts, and components and make handling easier.

▲ Balancer
Our balancer systems make lifting and moving easy.

◀ Printing industry
An electro-pneumatic pressure regulator in a printing press ensures precise roller adjustment and a consistent web tension.

Automation

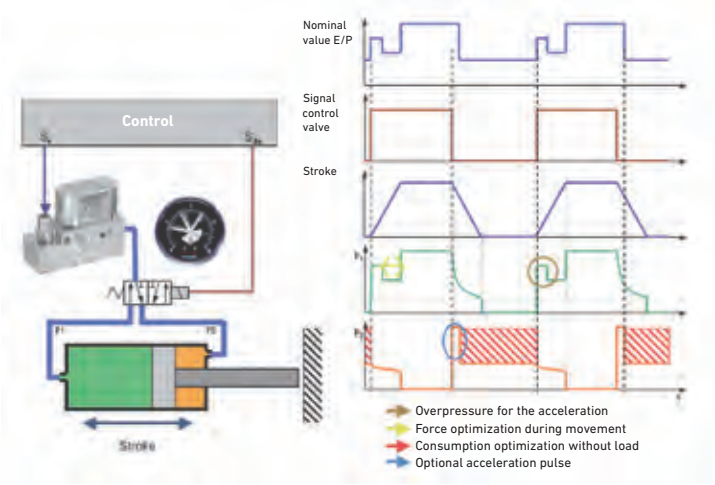
Dynamic movements, precise timing, and always the right force are all musts in handling and automation technology. Electro-pneumatic control valves are an essential interface between the controller and process. They are used to individually control pressures and forces for each process step, both reliably and precisely.

◀ Painting technology
Uniform coatings are possible thanks to our precise sprayer control.

A permanent comparison of set and actual values ensures needs-based control

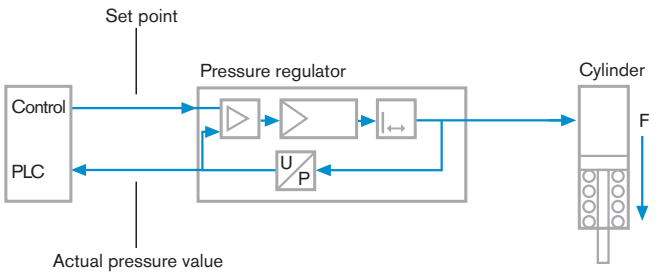
Dynamic with ultimate precision

The tasks for pressure regulators are varied and cover everything from extremely fast changes to set points that must be immediately implemented (sometimes with a brief overpressure), to smooth transitions with exact movements. Electropneumatic pressure control valves provide sensitive pressure control by combining digital control electronics with innovative proportional technology.



▲ Applying needs-based pressure control

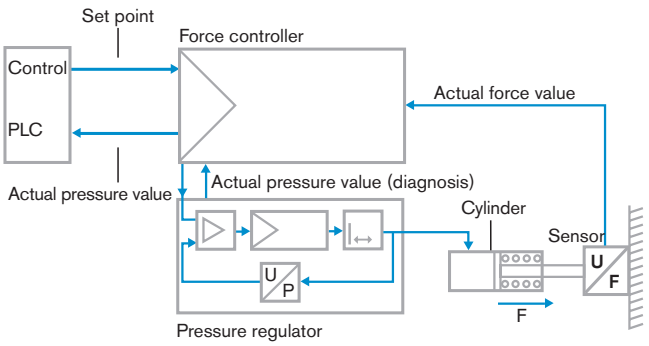
Open control loop



Open control loop

For many simple applications, a clear mechanical interrelation between the controlled pressure and a surface is enough to regulate the output quantity with sufficient precision.

Closed control loop



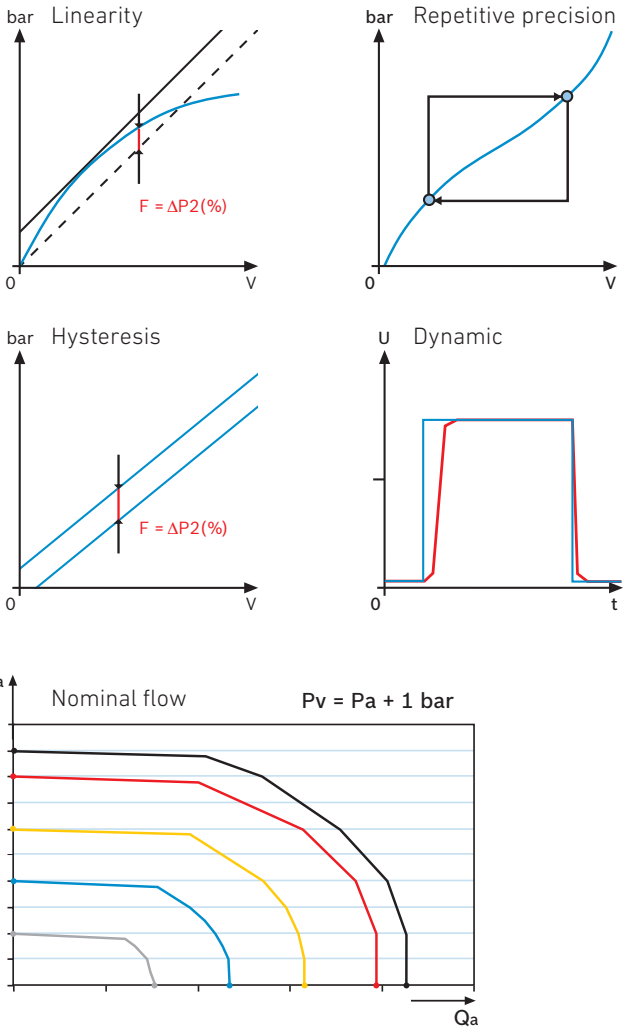
Closed control loop

For very precise control tasks, however, it is necessary to directly record the controlled variable and override the pressure control with a force controller, for example. AVENTICS also offers solutions for this purpose.

Important parameters

Correct consideration of all parameters determines the quality of the solution

Linearity, hysteresis and nominal flow, repetitive precision and dynamics – the specific relevance of these important parameters depends on the respective task and application. Only specialist know-how and many years of practical experience can lead to the right results that optimally
meet the varying demands.



Actual value

The actual value of a physical quantity (pressure, force, temperature, flow, etc.)

Set point

The stipulated value for the controlled variable, which must be maintained by the controller.

Linearity

This value is the maximum deviation of the measured characteristic from the ideal, linear relationship between the set point and the outlet pressure.

Repetitive precision

The span within which the secondary pressure can deviate, if the same set point is repeatedly set.

Hysteresis

The largest pressure difference for the same set point signal running up and down throughout the full signal range.

Dynamic

The course of time of the controlled outlet pressure as the result of a sudden set point change.

Nominal flow

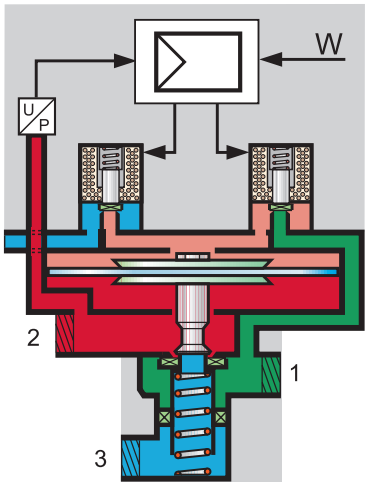
The quantity of air that a control valve can provide at the outlet depends on the primary pressure and the necessary secondary pressure. The stipulated value for AVENTICS control valves is based on a 6 bar set point with a primary pressure of 7 bar and a secondary pressure of ΔP = 0.2 bar.

Infinite control of compressed air and air flow – piloted, directly controlled, highly dynamic

The technical principles behind the different variants

In electro-pneumatic pressure control technology, three different control principles have developed over time.

Pilot control



W = Set point
U/P = Compressed air sensor
1 = Air supply line
2 = Operating line
3 = Atmosphere

Poppet valve

The poppet valve is the basis of E/P pressure control technology from AVENTICS. The valve is impervious to contamination due to a relatively large cross-section of the opening and the use of a soft-sealing poppet valve.

Suitable media

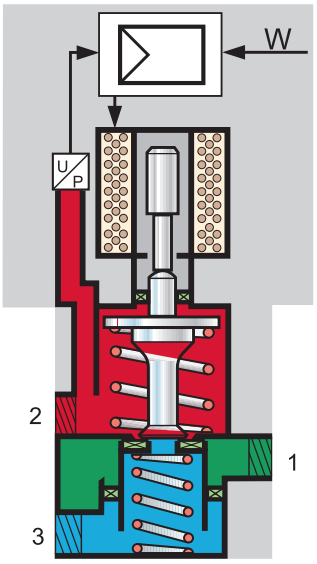
Pressure regulators are suitable for dry compressed air and inert gases. If the devices are operated with lubricated air, lubrication must be used afterwards, since the lubricant may have washed away the original valve lubrication. A suitable media converter (relay valve) must be used to control reactive, aggressive, or liquid materials.

Indirect control with pilot valves

With this type of control, pressure is applied to a volume using pilot valves. The pressure in these pilot volumes operates the valve until a balance between the pilot pressure and the outlet pressure is achieved through the dynamic effect of the pressures on the membrane. In control valves from AVENTICS that work according to this principle, the outlet pressure is always measured, thus electronically compensating for interference from the valve mechanics. An important feature of controlling with pilot valves is that, in case of a power loss and thus a failure of the electrical control, mechanical pressure control is maintained by the pressure in the pilot volumes, even if air escapes from the main valve. If the pilot is controlled with pilot valves, the device is optimally suited for static conditions. Since the pilot valves must switch several times for each control process, continually changing set pressure points would result in a high number of operations and a high level of wear. This effect is mostly eliminated if proportional valves are used for pilot control.

Control principles, basic valve, and suitable media

Direct control



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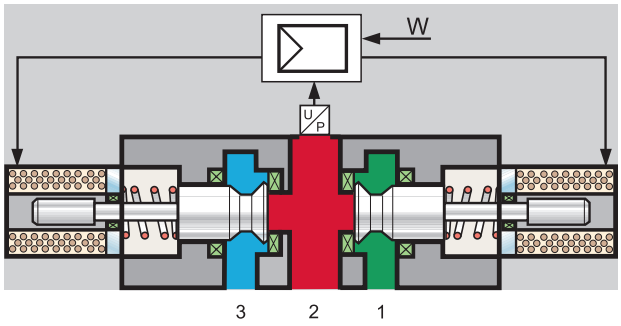
Direct control with a proportional magnet

With the direct control principle, the force to adjust the valve seat is directly provided by a proportional magnet. Pressure is measured at the outlet and sent to the electronics, making it possible to control the current strength, and, as a result, the opening of the valve. With a direct drive, inertia and hysteresis can be avoided in mechanical transfer elements. Control precision is basically only dependent upon the quality of the pressure sensor used.

Thus, much higher dynamics can be achieved with the smallest control deviations. Also, a nearly wear-free adjustment of the valve seat offers the best prerequisite for a final control element in constantly changing processes. The pressure regulators with direct control bleed the operation line if there is a power loss.

High-dynamic control



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High-dynamic control

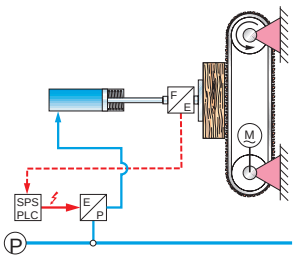
Two 2/2-way valves are used instead of a 3/2-way valve in this type of control. Besides the possibility for a higher air volume with a larger valve, another advantage of this type of control is its dynamic characteristics. Ventilation and exhaust valves can be controlled directly and independently of each other. This drive principle is ideal for dynamic processes.

Theoretically possible and useful in practice

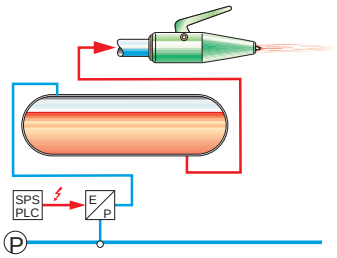
Whether for pressure, quantity, speed, rpm, or weight – controlled to exactly the right point

Our systems with electro-pneumatic pressure control are used today in nearly all industries in a wide variety of applications. The possibilities for new applications have not been exhausted by any means. Sophisticated systems with E/P pressure control valves are replacing other pneumatic solutions or non-pneumatic control technologies more and more. AVENTICS is the technological leader and constantly works to perfect existing solutions, as well as to open up new fields of application. Innovative and professional.

Contact pressure control



Paint quantity control



Contact pressure control

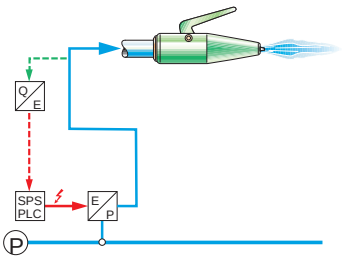
Keeping the surface pressure of the tool constant provides uniform results for surface processing.

Paint quantity control

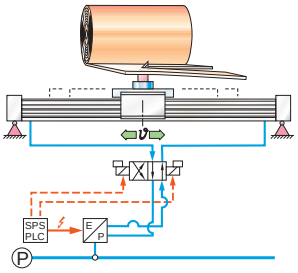
The E/P pressure control valve keeps the pressure in the container constant, which allows for even painting.

A wide spectrum of applications

Air quantity control



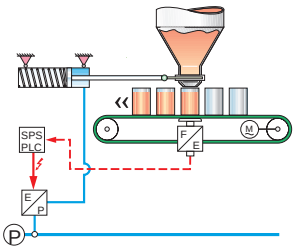
Speed control



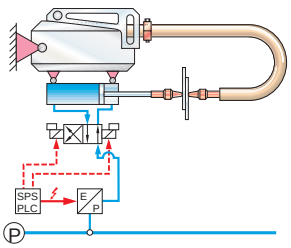
Air quantity control
The air flow through a nozzle can be adjusted exactly using controlled pressure. Precision can be optimized by installing a flow rate sensor and an overriding rate control.

Speed control
By controlling the pressure in the cylinder chamber, defined movement of the piston with various speed profiles is possible.

Capacity control



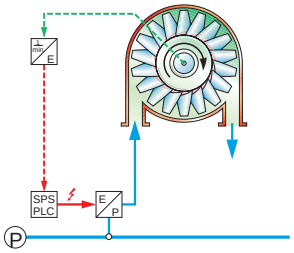
Welding tips



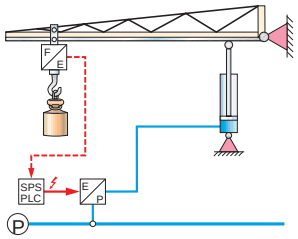
Capacity control
Electro-pneumatically controlled metering valves allow containers to be filled precisely down to the gram with high cycle time and repetitive precision.

Welding tips
Electro-pneumatic pressure control in welding tips makes it possible to quickly and gently close the tips and enable welding forces with repetitive precision.

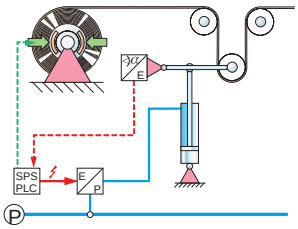
Rpm control



Counter-balancing control



Compensating roller control



Rpm control
Controlled air flow pressure provides an even and easily adjustable rpm for pneumatic motors/turbines. An extremely precise control can be achieved using an rpm sensor.

Counter-balancing control
A cylinder with applied pressure helps to handle heavy loads. Using an E/P control, the supporting force can always be adapted optimally to the load to be moved.

Compensating roller control
Pressure-controlled tensioning devices prevent lengths of fabric from tearing or getting tangled and provide an optimal material flow.

User-oriented product concept

Different models for different tasks

Making the best use of any E/P-type valve depends on the kind of application and the actual tasks involved. AVENTICS is the technological leader in every aspect of electro-pneumatic pressure control and offers a range of products for all required nominal widths. AVENTICS control valves are not only suited to a wide range of applications; they can also be connected with universal ports threads. Besides standard analog current and voltage interfaces, AVENTICS offers many field bus options that can be combined with the control valves.

ED02

ED05

ED07/ED12

EV04/EV07

ED02 – the smallest

The extremely compact yet powerful ED02 offers perfect control solutions in a variety of applications. Reliable, dynamic, and cost-effective.

ED05 – the all-rounder

The principle of direct control with a proportional solenoid enables highly precise control while remaining extremely dynamic. This also minimizes inertia and hysteresis in mechanical transfer elements.

ED07/ED12 – highly dynamic

As well as enabling higher air flow rates, another advantage of this arrangement is its highly dynamic behavior.

EV04/EV07 – pilot-controlled

Perfect for static requirements, the EV series works according to the indirect control principle. A key feature of the series is its extremely low energy consumption – yet it still guarantees pressure control during a power loss.

Series	ED02	ED05	ED 07/12	EV 04/07
Dynamics	++	+	++	–
Precision	+	+	++	+
Sturdiness	++	++	++	+
Protection class	++	++	++	–
Flexibility	+	○	+	–
Electric connection	+	++	++	+

++ highly recommended + recommended ○ suitable – less suitable

Consulting and service

AVENTICS experience not only shows in every detail – it is the basis of our whole agenda

Our control valves are used worldwide to control air flows, rpm, forces, positions, speeds, etc. They are used as pressure control components, for example, but can also integrate the complete control process and communication with external sensors.

Pneumatic functions must be conducted exactly, also under extreme ambient conditions on occasion. The robust poppet valve technology can handle it, even at temperatures between -40°C and +120°C (-40°F and +248°F) – and under water if need be. Talk to us today!

We do not just offer products, but also the right customer service, so that you get the best solution for your application with our control valves.

Around-the-clock information

The AVENTICS Internet Portal never sleeps. In the online catalog, you can find additional information covering the entire product range, including all technical details, as well as the use of user-friendly Engineering Tools.

Online catalog
The fastest point of entry is via our online catalog. Here you can start your search directly by entering a part number or keyword.

CAD
Your desired object can be issued here directly as a CAD file in various formats, as a PDF file, or for further configuration in your software.

Configurators
The configurator can be reached by clicking the selected product. After selecting your product, you can begin to adapt it to your own specifications.

Calculation programs
Here you can specify the dimensions or loadbearing capacity of your components with a wide variety of calculation options. We also provide an air consumption calculator as a special feature.

Circuit diagram software
With the D&C Scheme Editor, you can quickly and easily create circuit diagrams that are based on your component layout and linked to your catalog selection.

eShop
The eShop is our online shop that answers your price requests and monitors the whole order process up to delivery.

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