Solenoid Valve Basics

Click-on® Solenoid Valves

Pressure Actuated Valves

Pressure, Flow and Media

Dust Collector Cleaning

Commercial Vehicles

Buschjost Technologies

Pressure Equipment Directive

Safety Instructions

ATEX and Buschjost Valves

Solenoid Valves without Differential Pressure

Pressure bar	Connection	Temperature	Brass	Stainless steel	Grey cast iron	PVDF	Cast steel	Gun metal	Aluminium	PPS	PA	PPO GF30	Hot water / steam
0 - 1.5	G 1/2 - G 2	+90 °C	82660	82670									
0 - 7	G 1/4 - G 3/8	+110 °C				82080							82080 max. 110 °C
0 - 8	Subbase / Cartridge	+50 °C		Chipsol									
	Subbase	+30 °C								Picosol			
	G 1/4 - G 1	+60 °C	82370										*
0 - 10	Subbase	+30 °C								Microsol	Microsol		
	G 1/4 - G 1	+150 °C	84360										84360 max. 150 °C
	G 1/4 - G 1/2	+90 °C	82530	82560									82530 option 51 max. 150 °C
0 - 14	G 1/4	+80 °C	95000										
0 - 16	DN 15 - DN 50	+110 °C		85140									85140 max. 110 °C
	DN 15 - DN 50	+200 °C			85120		85220						85120 max. 200 °C
	DN 15 - DN 50	+90 °C			85100								85100 option 14 max. 110 °C
	DN 15 - DN 50	+90 °C			83340								83340 option 14 max. 110 °C
	DN 65 - DN 100	+110 °C		84140									84140 max. 110 °C
	DN 65 - DN 100	+150 °C			84120		84220						84120 max. 150 °C
	DN 65 - DN 100	+90 °C			84100								84100 option 14 max. 110 °C
	G 1/4 - G 2	+200 °C	85720										85720 max. 200 °C
	G 1/4 - G 2	+90 °C	82540	82590									82540 option 14 max. 110 °C
0 - 23	G 1/8 - G 1/4	+80 °C	Bacosol										
0 - 25	DN 15 - DN 50	+90 °C		85240			85200						85240 option 14 max. 110 °C
	DN 15 - DN 50	+90 °C		85640									85640 option 14 max. 110 °C **
	DN 65 - DN 100	+90 °C		84240			84200						84240 option 14 max. 110 °C
	G 1/4 - G 2	+90 °C	85700	85740									85700 option 14 max. 110 °C
	G 3/8 - G 1	+90 °C		85040									85040 option 14 max. 110 °C
0 - 40	G 1/8 - G 3/8	+90 °C	82510	82610									on request
0 - 50	G 1/8 - G 1/4	+120 °C		95100									95100 max. 120 °C
0.5 - 15	Subbase	+50 °C									Intersol		

* DVGW EN 161 and EN 162 approval, ** 3.1 test certificate

Solenoid Valves with Differential Pressure

Pressure bar	Connection	Temperature	Brass	Stainless steel	Grey cast iron	PVDF	Cast steel	Gun metal	Aluminium	PPS	PA	PPO GF30	Hot water / steam
0 - 10	Subbase	+30 °C								Microsol	Microsol		
0.1 - 10	G 1/4 - G 1	+150 °C	82470										82470 max. 150 °C
0.1 - 16	G 1/4 - G 2	+90 °C	82400	82730									82400 option 14 max. 110 °C
0.3 - 10.5	G 1/2 - G 3/4	+50 °C										84070	
	NPT 1/2 - NPT 3/4	+50 °C										84080	
0.5 - 10	DN 65 - DN 150	+90 °C			83580								
0.5 - 16	DN 15 - DN 100	+90 °C			84320								
0.5 - 40	G 1/4 - G 2	+90 °C	85300										85300 option 14 max. 130 °C
	DN 15 - DN 100	+90 °C					84340						84340 option 14 max. 110 °C
1.0 - 16	DN 20 - DN 50	+80 °C			83050								83050 option 14 max. 110 °C
1.0 - 25	G 1/4 - G 1	+200 °C	85320										85320 max. 200 °C

Pressure Actuated Valves

Pressure bar	Connection	Temperature	Brass	Stainless steel	Grey cast iron	PVDF	Cast steel	Gun metal	Aluminium	PPS	PA	PPO GF30	Hot water / steam
-0.9 - 6	G 1/4 - G 1/2	+90 °C	82710										82710 option 14 max. 110 °C
0 - 10	DN 15 - DN 150	+80 °C			83380								on request
	DN 32 - DN 50	+180 °C		84880									84880 option 60 max. 200 °C
	DN 32 - DN 50	+180 °C		84890									84890 option 60 max. 200 °C
	G 1/2 - G 2	+60 °C	82580										*
	G 1/2 - G 2	+80 °C			83350								on request
0 - 12	G 1/8	+120 °C		96100									96100 max. 120 °C
0 - 16	DN 15 - DN 100	+180 °C			83200								83200 option 95 max. 300 °C
	DN 15 - DN 100	+180 °C			83240								83240 max. 180 °C
	DN 15 - DN 25	+180 °C		84760									84760 max. 180 °C
	DN 15 - DN 25	+180 °C		84770									84770 max. 180 °C
	DN 15 - DN 50	+180 °C		84540									84540 max. 180 °C
	DN 15 - DN 50	+180 °C		84550									84550 max. 180 °C
	DN 15 - DN 50	+180 °C		84580									84580 option 60 max. 200 °C
	DN 15 - DN 50	+180 °C		84590									84590 option 60 max. 200 °C
	G 1 1/4 - G 2	+180 °C	82280	82480									82280 option 59 max. 200 °C
	G 1/2 - G 1	+180 °C	84720	84740									84720 max. 180 °C
	G 1/2 - G 2	+180 °C	82180	82380									82180 option 59 max. 200 °C
	G 1/2 - G 3	+180 °C	84500	84520									84500 max. 180 °C
	G 1/2 - G 2	+180 °C						83250					83250 max. 180 °C
0 - 18	G 1/4	+80 °C	96000										
0 - 25	G 1/8 - G 1/2	+110 °C	84180	84190									on request
	DN 15 - DN 25	+140 °C					83860						*
0.2 - 16	G 1/4 - G 2	+90 °C	82160										
1.0 - 10	DN 1.6	+60 °C	84660										
	DN 3.0	+60 °C	84680										
2 - 8	G 1/4	+120 °C							97100				

* DVGW EN 161 approval

Pilot valves for pressure actuated valves

Pressure bar	Connection	Temperature	Brass	Stainless steel	Grey cast iron	PVDF	Cast steel	Gun metal	Aluminium	PPS	PA	PPO GF30	Hot water / steam
0 - 12	G 1/8	+120 °C		96100									
0 - 18	G 1/4	+80 °C	96000										
1.0 - 10	DN 1.6	+60 °C	84660										
	DN 3.0	+60 °C	84680										
2 - 8	G 1/4	+50 °C							97100*				

* NAMUR

Valves and Systems for Dust Filters

Pressure bar	Connection	Temperature	Brass	Stainless steel	Grey cast iron	PVDF	Cast steel	Gun metal	Aluminium	PPS	PA	PPO GF30	Hot water / steam
0.4 - 8	G 3/4 - G 2 1/2	+85 °C							82900				
	G 3/4 - G 2 1/2	+85 °C							82960				
	DN 25 and DN 40	+85 °C							83920				
	DN 25 and DN 40	+85 °C							83930				
	G 1 and G 1 1/2	+85 °C		83300									
	G 1 and G 1 1/2	+85 °C		83320									

Proportional Valves

Pressure (bar)	Connection	Temperature	Brass	Stainless steel	Grey cast iron	PVDF	Cast steel	Gun metal	Aluminium	PPS	PA	PPO GF30	Hot water / steam
0 - 12	Flange / Cartridge	+50 °C	Flatprop	Flatprop									
-0.9 - 10	G 1/2 - G 1	+90 °C	82880										on request

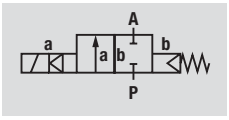
Switching Functions & Symbols

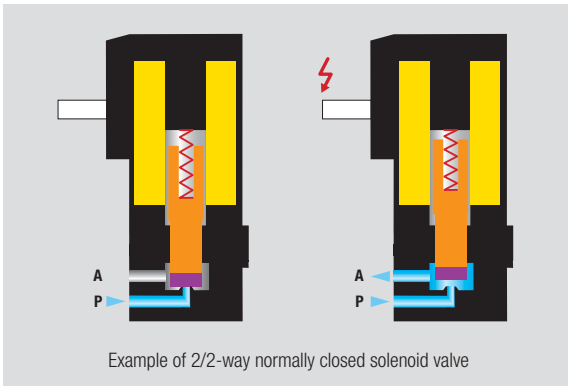
Most solenoid valves operate on a digital principle. They therefore possess two distinct states, which are (1) - when the coil is activated by an electrical current, and (2) - when the valve is resting (without electricity). Valve functions are defined from the resting position.

The direct acting or pilot operated solenoid valves may have two functions:

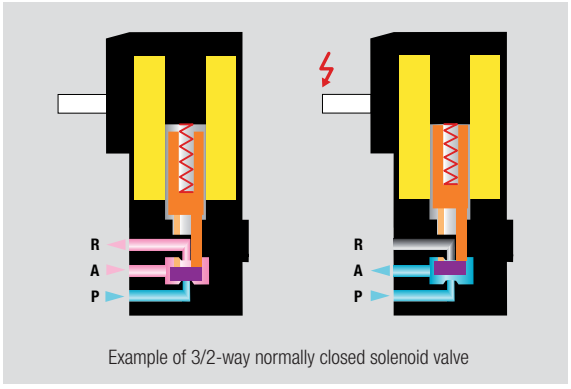
Normally closed (NC)
A solenoid valve is normally closed (abbreviated - NC) if there is no flow across the valve in its resting position (with no current on the solenoid contacts).

Symbol





Example of 2/2-way normally closed solenoid valve

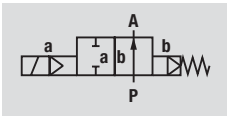


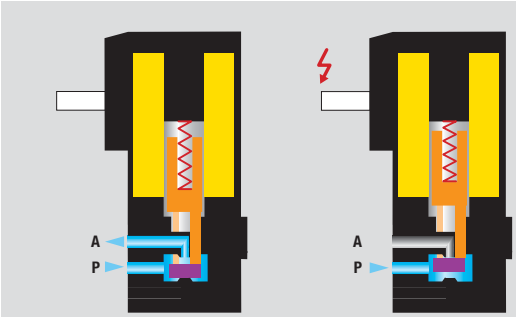
Example of 3/2-way normally closed solenoid valve

Please note that in the case of 3-way solenoid valves, port A is open to port R which, for example, enables the valve's single-action cylinder to be exhausted to atmosphere.

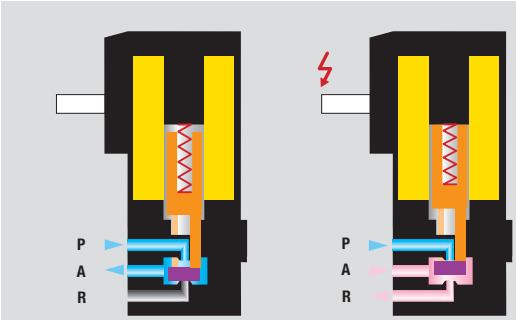
Normally open (NO)
A solenoid valve is said to be"normally open" (abbreviated NO) when it enables fluid to pass in its resting position (with no current on the solenoid contacts).

Symbol





Example of 2/2-way normally open solenoid valve



Example of 3/2-way normally open solenoid valve

A specific choice of entry ports can change a valve's function. However, since balanced-force calculations take rebound effects, coil effects and the effects of pressure exerted on the seal into account, the performance of an NC valve fitted in an NO position would be reduced. In this configuration it would be better to choose a universal solenoid valve.

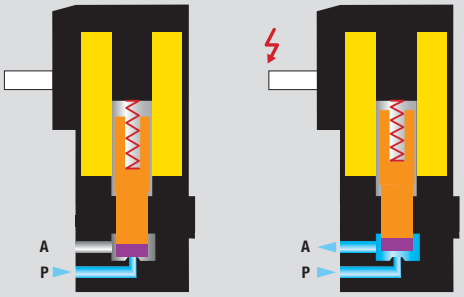
Latching or Bi-stable
We manufacture solenoid valves designed for applications where reduced energy consumption is the determining factor. For these applications a short electrical impulse enables the solenoid valve to be opened or closed, and thanks to the residual effects of a permanent magnet this is sufficient for maintaining the valve in a particular working position with **no electrical energy consumption**.

A short impulse of inverted polarity ensures the valve's return to its previous position. Electrical power consumption and heating are almost negligible.

Number of Ways

2 Ways (2/2-Valves)
The solenoid valves have two ports (one inlet, one outlet) and only one orifice (seat) allowing fluid control.

a. 1 port inlet fluid P
1 port outlet fluid A



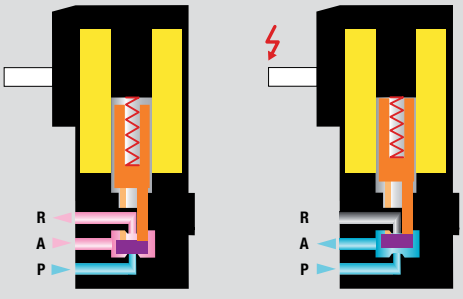
Example of solenoid valve de-energized to stop or energized to allow a flow of pressurized fluid

3 Ways
These solenoid valves have three ports (one inlet, one outlet and one exhaust) and two orifices (seats) allowing fluid control.

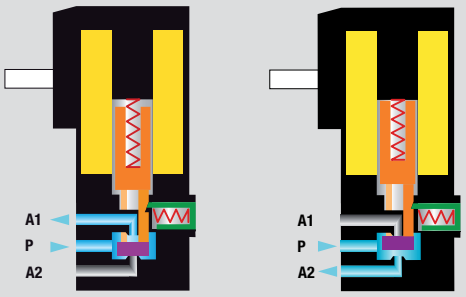
a. 1 port inlet fluid P
1 port outlet fluid A
1 port exhaust fluid R
Typical application: to operate a single acting cylinder

b. 1 port inlet fluid P
2 port outlet fluid A1, A2
Typical application: to select or divert flow

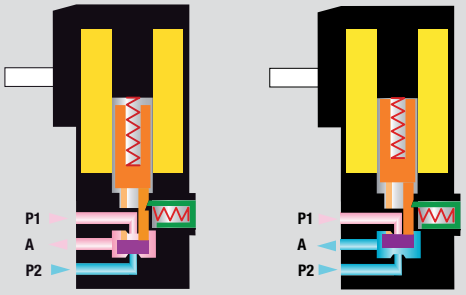
c. 2 port inlet fluid P1, P2
1 port outlet fluid A
Typical application: to mix two fluids



Example of solenoid valve operating a single acting cylinder

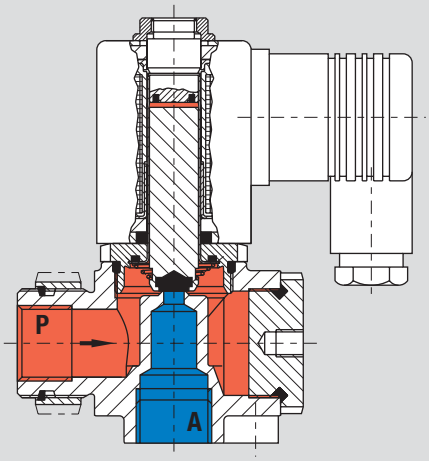


Example: "Selector" pneumatic connection where the pressure "P" is directed either to outlet "A1" or outlet "A2"



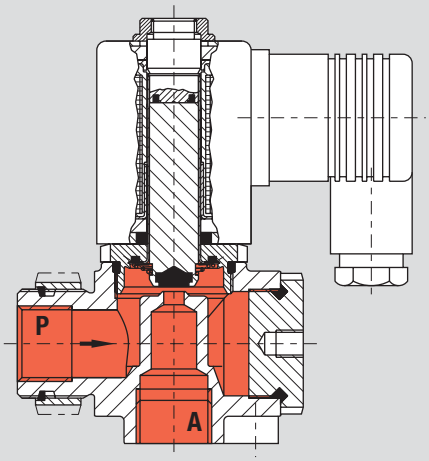
Example: "Mixer" pneumatic connection where either pressure "P1" or pressure "P2" are directed to outlet "A"

Direct Acting Solenoid Valves



Valve closed

This type of valve is actuated entirely by the solenoid force. The plunger with a seal acting as the main closure device is forced directly onto the valve seat by the fluid pressure and closing spring. The valve is opened directly by the solenoid force only.

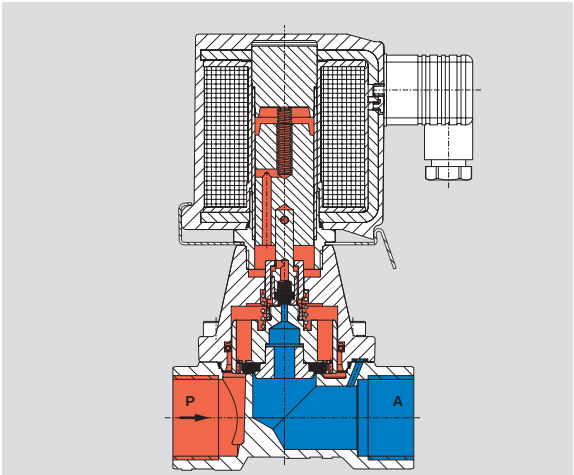


Valve open

Note: You will find a video showing how our valves operate on our website: www.buschjost.com

Solenoid Valves without Differential Pressure

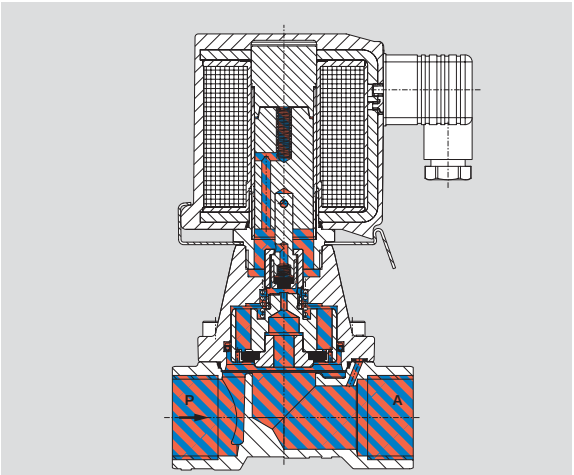
(direct acting or indirect acting with forced lifting)



Valve closed

The force produced by the solenoid plunger, which is mechanically coupled to the main closure device, opens this type of valve.
The sequence starts with the solenoid opening the pilot seat.
This relieves the pressure on the main closure device, bringing it into balance so the solenoid force can lift it into the open position.

When the pilot seat is closed, bleed orifices allow a force to build up on the closure device that pushes it down into the closed position on the valve seat.
These valves are preferred for use where the differential pressure is very low or zero.

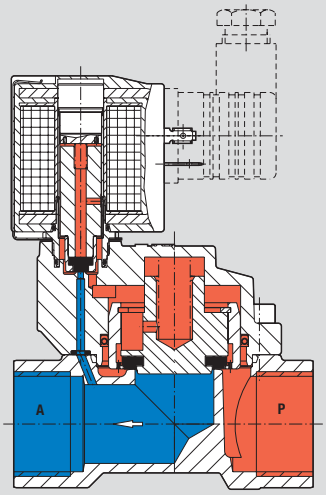


Valve open

Note: You will find a video showing how our valves operate on our website: www.buschjost.com

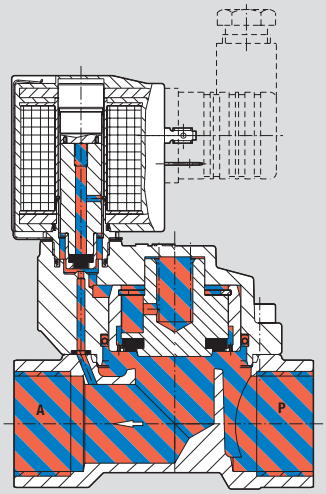
Solenoid Valves with Differential Pressure

(servo assisted, pilot operated or indirect acting)



Valve closed

These valves operate on the servo assistance principle, which requires a specified differential pressure for opening and closing. The solenoid opens the pilot seat. This relieves the pressure on the main closure device, which is raised into the open position by the increasing effective force on its underside.
Closure of the pilot seat builds up a closing force on the main closure device via bleed orifices. Provided the inlet pressure is at least the required differential higher than the outlet pressure, the valve remains securely closed.



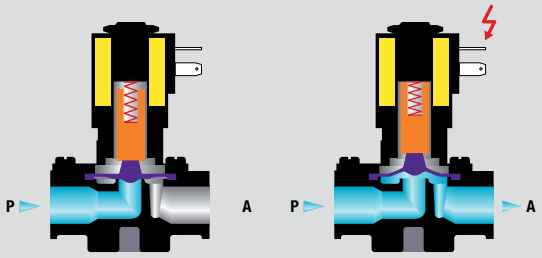
Valve open

Note: You will find a video showing how our valves operate on our website: www.buschjost.com

Media Separated Solenoid Valves

Media separated (MS) solenoid valves are specially designed for transporting corrosive or ultra-pure fluids.

They are designed so that the valve's membrane (violet) enables the medium to be separated from the operating part of the valve (orange) while maintaining a minimum dead (unswept) volume. Both the membrane and the valve body are highly resistant to chemical corrosion and can be easily opened for cleaning.



An example of a separated membrane solenoid valve

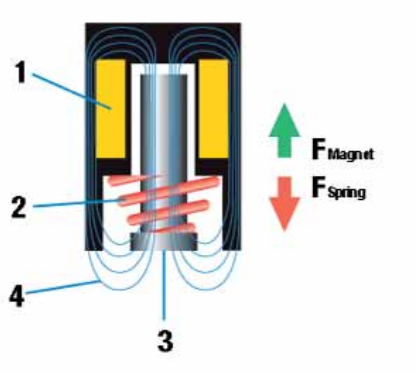
Proportional Solenoid Valves

Introduction

The key to the operation of a proportional valve is a balance established between the forces in action on the plunger.

These balanced forces include a mechanical force provided by a spring specially developed for proportional valves and a magnetic force created by the current level passing through the coil.

The spring force is proportionally opposed by the magnetic force.



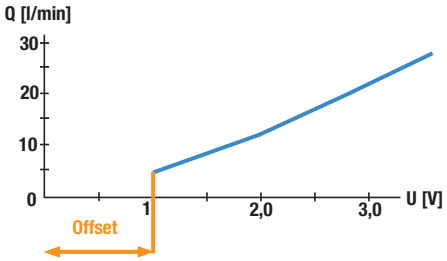
1	Coil
2	Spring
3	Plunger
4	Magnetic field
F_{Magnet}	Magnetic force
F_{Spring}	Spring force

Power Supply

A common assumption is that proportional valves react proportionally to the voltage supplied. However, in practice, the current passing through the valve will heat the coil and eventually increase the internal resistance. At constant voltage, increasing the resistance will provoke a current drop and thus a drop of the magnetic force. As a result, the valve will tend to slowly close.
To avoid this problem, one can use a stabilized current supply. The current supply will be independent of the coil resistance. The only draw-back is that such a device is more expensive than a voltage supply.

Sealing

To ensure a positive shut-off when the valve is de-energized, there is always a voltage/current offset before obtaining a flow (liftoff point).



Control

Usually, a closed control loop circuit and a pressure (or flow) sensor are used with the power supply.
If high precision is not an issue, one can also use an open control loop.

Essential Parametres

Our catalogue presents a series of standard proportional valves. However, in order to guarantee the correct operation of our products for a given application, it is essential to provide the following parameters:

- Maximum pressure
- Minimum pressure
- Maximum flow
- Back-pressure range
- Fluid type
- Ambient temperature range
- Fluid temperature range

Motorised Proportional Valves

Production and process automation with electronic regulation and control equipment requires interfaces between the electronic and fluidic control loops.

The valve described below for regulating the flow rate of liquids and gases represents such an interface. Motorised valves are used wherever exact adjustment to the actual requirements is needed. There is a choice of different designs to suit the application and requisite accuracy.

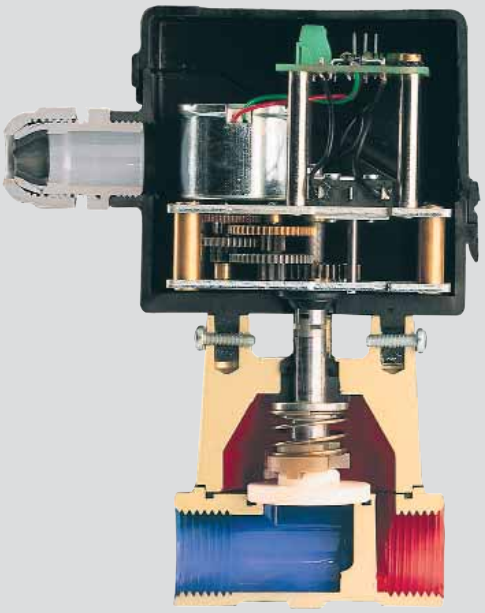
A motorised proportional valve is a rotary valve, with two oxide ceramic throttling disks that resist dirt and do not wear.
The maintenance-free electric actuator consists of a powerful, reversible motor; with a choice of DC, synchronous and stepper designs to suit different types of control systems.

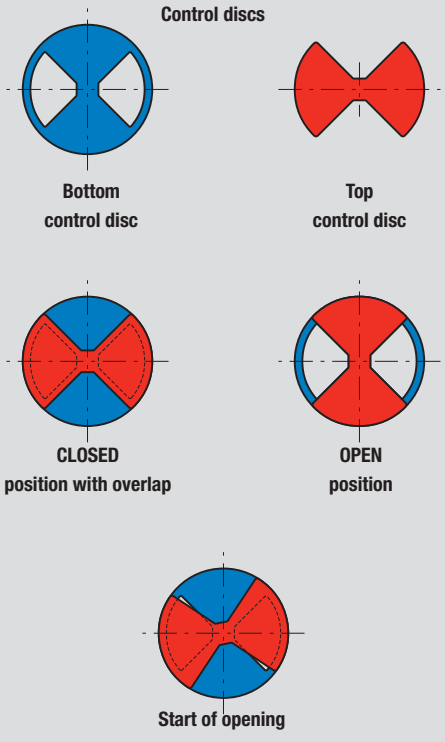
The control disc is rotated by the output shaft of gearing that is free from backlash to guarantee a reproducible control characteristic. Two separate, floating microswitches detect the closed and fully open limits of the valve. The low power consumption of between 1.5 and 5W means the electronic regulator can drive certain types of motor directly.

Various motorised valve regulators and electronic components are offered to complement the valve in solving control problems of varying complexity, e.g. flow and temperature regulation kits, and electronic control cards such as a servo amplifier and stepper motor controller.

One of the two control discs opens two opposite triangular flow apertures in the other disc continuously, over an angle of rotation of 90°. The matching geometry of the pair of discs achieves a virtually linear flow characteristic. The particular throttling cross-section adopted is retained if the control voltage is switched off. The overlap in the closed position provides a sufficiently tight seal to prevent dripping.

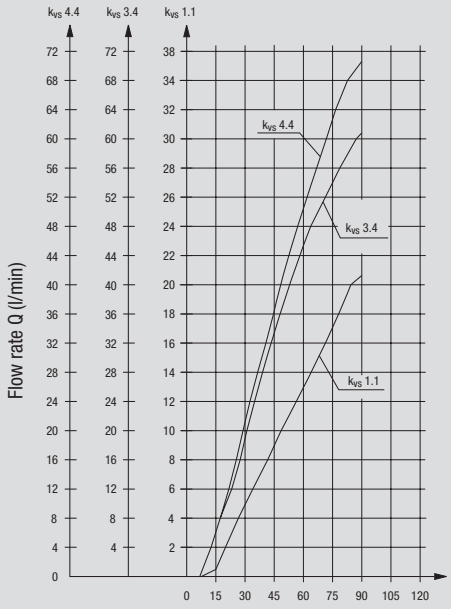
Note: You will find a video showing how our valves operate on our website: www.buschjost.com





Motorised Proportional Valve Characteristic

The linear characteristic of the 82880 series of motorised valves is a sound basis for control and regulation.



Characteristic
Fluid: water
Δp: 1 bar

Seat Valves

Buschjost solenoid valves have a seated design, with a diaphragm or piston for tight flow shut-off. The axial movement of this closure device opens and closes the valve seat.

The low leak rates we achieve are optimised by using the appropriate combination of materials for each application.

Piston seat valves

An internal piston is moved axially into the position required by the particular function.
This type of valve is available in materials suited for relatively high pressure and temperature ranges.

Diaphragm seat valves

A specially shaped diaphragm clamped between body and cover is moved into the position dictated by the valve function. This extremely effective design offers the ideal technology for use in systems with neutral gases and liquids.

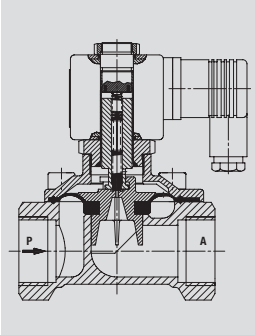
Zero Delta P Valves

(diaphragm valves without differential pressure)

The Zero series is designed for reliable service in the vacuum and low-pressure range, where the differential pressure available is insufficient to allow the use of servo assisted solenoid valves.

It is also suited for higher pressure ranges up to 16 bar.
The pressure or vacuum level and presence of a pressure differential are therefore no longer important considerations.

These combined advantages are the basis for the application versatility of Zero Delta P Valves.



In the 0 to 16 bar pressure range the Zero series is available with G 1/4 to G 2 connections.

We will gladly provide you with any further information required.

Operating Voltage

We differ basically between DC and AC solenoids. As alternating voltage is more frequently available, it would seem obvious to give preference to the AC solenoids.

However, from a certain size the latter have definite disadvantages in comparison to the DC solenoids in terms of lifetime and magnetic force, so that DC solenoids with intermediate rectifiers are preferred.

This voltage rectifier is integrated in the electrical connector or within the solenoid.

The main advantage of the DC solenoid is its constant current consumption, which leads to smooth switching and a coil that can cope with mechanical obstructions.

Voltage surges (inductive peaks) can be avoided by connecting a varistor, diode or RC-network in parallel.

The voltage tolerances permitted are ±10 %. If AC solenoids designed for 50 Hz have to be used with 60 Hz, this entails a reduction in performance. In such cases our technical services should be consulted beforehand.

DC coils supplied via rectifiers can be operated between 40 and 60 Hz.

Explosion Protection

The goal of explosion protection is to prevent oxygen, flammable substances and ignition sources arising simultaneously.

Electrical devices in hazardous areas are regarded as an ignition source, and are therefore subject to special building and installation regulations that have undergone international harmonisation.

The members of the "European Committee for Electrotechnical Standardisation", or CENELEC for short, have devised European standards that have been adopted as national standards in all countries. The test certificates issued by the national bodies are therefore recognised throughout the EU.

Hazardous areas are defined as areas in which local and service conditions can give rise to a dangerous, explosive atmosphere. The frequency of occurrence is used to subdivide the areas into zones.

Electrical devices installed in these areas must be approved for the relevant zones and marked as defined in EN 50014.

Example **Ex me II T4**
Ⓔx II 2 G
EEx
Examples of devices with European certification for hazardous areas.

Explosion protection techniques (e.g. "me")
Type of measures adopted to prevent ignition of the ambient atmosphere

Gas groups (e.g. II)

Group I	Methane
Group II	Other explosive gases

Temperature classifications (e.g. T4)
Maximum permissible surface temperature on any part of the electrical device.
Ignition temperature of the explosive atmosphere.

The organisation operating the installation is responsible for determining the zone and use of approved apparatus therein.

We will gladly provide you with any further information required.

Response Time & Cycling Rate

The response time of a solenoid valve is the lapse of time between the electrical signal and the outlet of a fluid signal.
The C.E.T.O.P. defines the test conditions as follows:
Test pressure: air at 6 kg/cm^2
Ambient temperature: 20 °C

Response Time at Energising
Lapse of time between energizing of the solenoid until the outlet pressure reaches 90 % of the maximum test pressure (see chart for AC and DC).

Response Time at De-Energising
Lapse of time between de-energizing of the solenoid until the pressure outlet drops to 10 % of the test pressure (see chart for AC and DC).

Effect of Alternating Current on Response Time
The response time of a solenoid valve operating on alternating current depends on the phase of the current at the time of the electrical command. If the command is given at an unfavorable moment, the system will be delayed for a fraction period, which is generally unknown, until the available current is sufficient to re-activate the solenoid valve. This lapse of time should be added to the nominal response time of the solenoid valve.

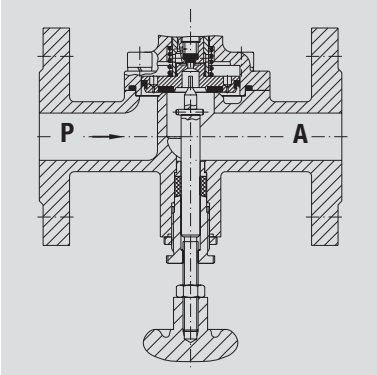
Cycling Rate
The cycling rate of a solenoid valve depends directly on its response time. It is the number of cycles per minute calculated for continuous operations. The valve should not be reversed at less than 90 %, or above 10 % of reference pressure. The cycling rates shown in this catalogue are the maximum possible cycles per minute of the solenoid valve. It varies when the valve is mounted in a circuit which then depends on the installation pressure drop.

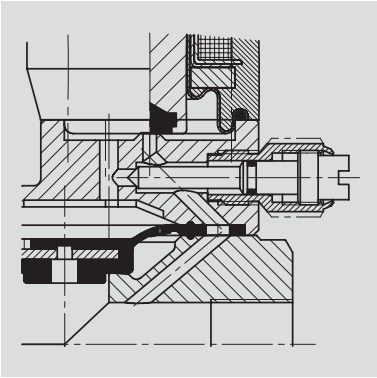
Manual Override

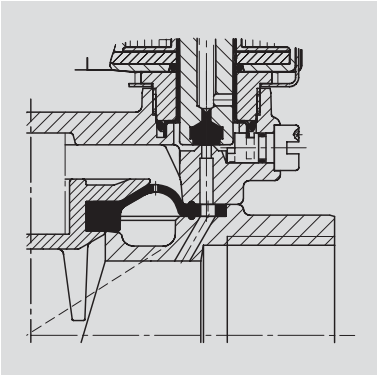
If the actuating supply fails, solenoid and pressure actuated valves are brought into their normal position.

A manual override allows the valve to be opened or closed.

A wide variety of manual overrides are offered for most of our valve designs.







We will gladly provide you with any further information required.

Protection Class (IP Protection)

Protection
The Ingress Protection (IP) code always consists of the letters IP followed by two digits. It specifies the degree of protection to DIN VDE 0470 (EN60529) provided by enclosures of electrical apparatus.

The first digit applies to protection against electric shock hazard and solid bodies, the second to protection against liquids. A letter indicating protection against access to hazardous parts may follow the last digit.
The individual protection codes are defined in the following table:

1st digit
Electric shock hazard protection and protection against solid bodies

0	No protection
1	Objects greater than 50 mm
2	Objects greater than 12 mm
3	Objects greater than 2.5 mm
4	Objects greater than 1.0 mm
5	Dust-protected
6	Dust-tight

2nd digit
Protection against liquids

0	No protection
1	Vertically dripping water
2	Angled dripping water
3	Sprayed water
4	Splashed water
5	Water jets
6	Heavy seas
7	Effects of immersion
8	Indefinite immersion

The exact definitions from which these generalised descriptions are derived are to be found in DIN EN 60529.

Special regulations have to be followed when using solenoids in hazardous areas.

Valve Selection Criteria

The following factors are important in making the right commercial and technical choice:

- **Valve actuation**
  · solenoid
  · pressure
  · proportional
  · motorised
- **Number of ways**
  · 2/2 Valve
  · 3/2 Valve
- **Switching function**
  · normally closed (NC)
  · normally open (NO)
- **Connection size**
  · flow rate
  · kv (flow coefficient) value
- **Type of connection**
  · threaded
  · flanged
  · weld ends
- **Working pressure**
  · upstream of valve
  · downstream of valve
  · differential pressure
  · vacuum
- **Process fluid**
  · neutral to aggressive
  · gas to liquid
  · filtered to contaminated
- **Fluid temperature**
  · range from - to + °C
- **Ambient temperature**
  · range from - to + °C
  · ambient atmosphere
- **Solenoid power supply**
  · voltage
  · frequency
- **Protection classification**
  · IP
  · EEx
- **Control fluid supply**
  · control fluid
  · control pressure
  · temperature of control fluid from - to + °C
  · ambient temperature from - to + °C
- **Accessories and options**
- **Safety requirements**
  · TÜV approval/test certificates
  · specific certifications

Materials - Seals

Material selection
Information about the concentration, temperature and the degree of contamination of the fluid is important in making the right choice of materials. Further criteria are the operating pressure and maximum flow rate.
Besides extreme temperatures, pressures and flow rates must be taken into consideration when choosing a material.

NBR **Nitrile Butadiene Rubber**
Standard flexible material for neutral fluids such as air, water, oil. Good resistance to mechanical loads. Temperature range depending on working conditions from -10 to +90 °C.

HNBR **Hydrogenated Nitrile Rubber**
Similar in many features to NBR. Particularly suitable for hot water and steam. Temperature range depending on working conditions from -20 to +150 °C.

EPDM **Ethylene Propylene Diene Monomer Rubber**
Resistant to alkalis and acids of mid-range concentration, water, hot water and steam. Not resistant to oils and greases. Temperature range depending on working conditions from -20 to +130 °C.

FPM **Fluorocarbon Rubber**
A highly temperature and weatherproof elastomer. Suitable for many acids, bases, fuels and oils (including synthetic). Not resistant to steam. Temperature range depending on working conditions from -10 to +180 °C.

CR **Polychloroprene Rubber**
Similar in many features to NBR. Particularly suitable for most refrigerants. Temperature range depending on working conditions from -20 to +90 °C.

PTFE **Polytetrafluoroethene**
A duroplastic, not a flexible material and therefore not suitable for the conventional diaphragms (separating membranes are possible). Resistance is almost universal in the temperature ranges from -20 to +200 °C.
Valve bodies and internal parts are also made of this material.

FFPM **Perfluoride Elastomer**
A flexible material with the same resistance as PTFE and excellent sealing qualities. Temperature range depending on working conditions from -30 to +200 °C.

TPE **Thermoplastic elastomers**
Very durable yet flexible over a wide temperature range. Resist oils, grease, many solvents and weathering.

Materials - Polymers

Material selection
The design of the valve is decided by the application, with the materials' ability to resist the operating fluid constituting an important factor.
Information about the concentration, temperature and the degree of contamination of the fluid is important in making the right choice of materials. Further criteria are the operating pressure and maximum flow rate.
All of the materials used for the bodies, seals, solenoids, etc. of Buschjost valves are carefully selected to suit various applications.

Plastics for valve bodies

PVC **Polyvinyl Chloride**
Resistant to most acids, alkalis, salt solutions and organic solutions; miscible with water. Not resistant to aromatic and chlorinated hydrocarbons.

PVDF **Polyvinylidene Fluoride**
Suitable for nearly all aggressive fluids in the temperature range from -20 to +100 °C.

PFA **Perfluoralkoxy**
As resistant as PVDF but in a higher temperature range from -20 to +150 °C.

PP **Polypropylene**
Resistant to aqueous solutions of acids, alkalis and salts, depending on concentration and temperature.

POM **Polyoxymethylene**
A material with a high degree of hardness and low water absorption. Not suitable for bases, acids or oxidising agents.

PA **Polyamid**
Suitable for all neutral fluids and gases

PPS **Polyphenylene Sulfide**
Suitable for all neutral fluids and gases.

Materials - Metals

Material selection
Information about the concentration, temperature and the degree of contamination of the fluid is important in making the right choice of materials. Further criteria are the operating pressure and maximum flow rate.

Brass (Ms 58)
Has many applications, not suitable for aggressive and ammoniacal fluids.

Brass
(CuZn36Pb2As)
Suitable in agressive fluids and seawater.

Grey cast iron (G 1/4-25)
Mainly for flanged valve bodies up to PN 16, the temperature range is limited, suitable for neutral fluids.

Spheroidal cast iron (GGG-40.3)
Mainly for flanged valve bodies up to PN 16, suitable for neutral fluids.

Cast steel (GS-C 25)
Mainly for flanged valve bodies up to PN 40, high temperature range, suitable for neutral fluids.

Gun metal (Rg 5)
(CuSn 5 ZnPb)
Seawater,mildly aggressive water or steam.

Cast stainless steel
(G-X 7 CrNiMo 18 10)
Austenitic high-alloy steel for aggressive fluids.

Stainless steel - Ingot material
(X 10 CrNiMoTi 18 10)
Austenitic high-alloy steel for aggressive fluids.

Stainless steel
(X 5 CrNi 18 9)
Low-alloy austenitic stainless steel for valve's internal parts.

Stainless steel
(X 12 CrMo S 17)
- Corrosion-resistant magnetisable stainless steel, not suitable aggressive fluids or seawater.
- Sandvik Stainless steel 1802.
- Magnetic stainless steel, suitable for aggressive fluids.

Aluminium
(AlSi 8 Cu 3)
Aluminium die casting for bodies up to PN 16, suitable for neutral fluids.

Click-on® - Solenoid Valves

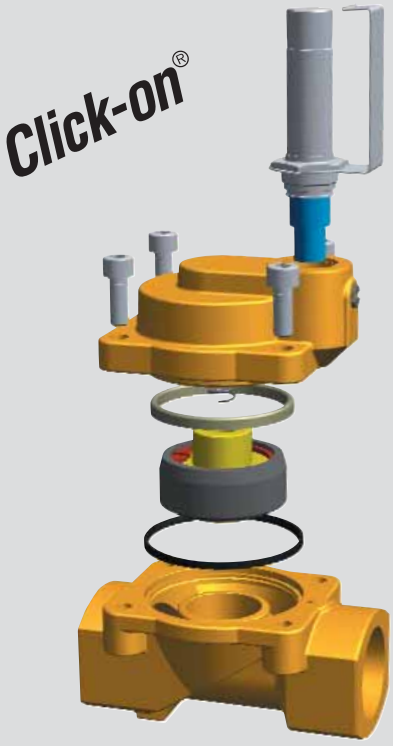
Click-on® - Diaphragm Valve

- Optimised flow range
- Compact
- New design
- Reliable switching function
- Solenoid mounted without tools
- Solenoid secured with stainless steel spring clip
- Any mounting position
- Excellent flow capacities
- Conforms to international safety requirements
- Ideal match of materials
- Damped operation
- Minimal number of components
- Solenoid plastic encapsulated
- Optional NPT thread
- Dry solenoid system
- Low power consumption
- CE mark
- Optionally for fluids up to +200 °C

Click-on® - Piston Valve

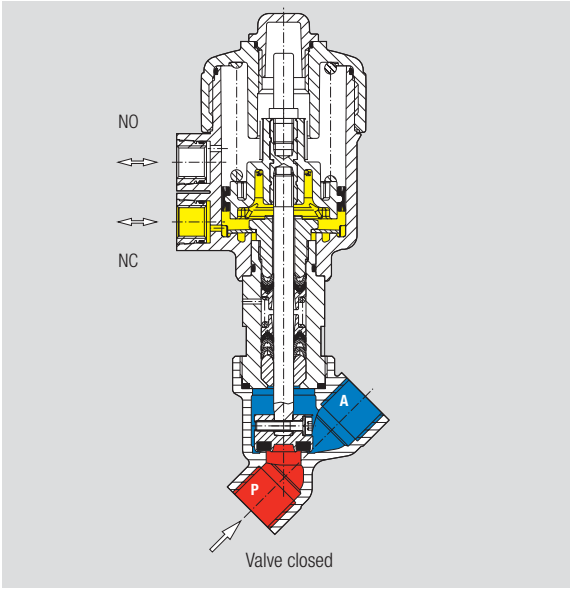
Click-on® - Diaphragm Valve

Click-on® - Piston Valve



Pressure Actuated Valves – Principle of Operation

(pneumatically actuated isolating valves)

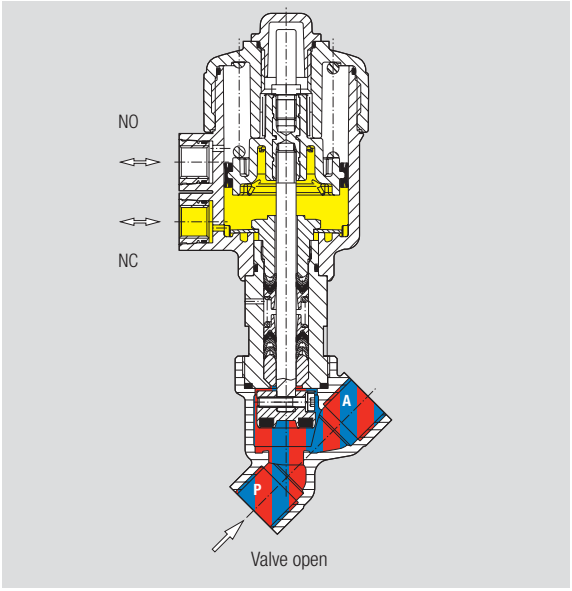


Valve closed

This type of valve is controlled by a pilot fluid supplied to the actuator by means of a pilot valve.

A stem connects the closure device to the control element of the actuator. The spring acting on the control element forces the closure device down into the closed position on the valve seat. The pilot supply overcomes the spring force to lift the control element into the open position.

These valves are mainly suitable for contaminated or extremely viscous process fluids.



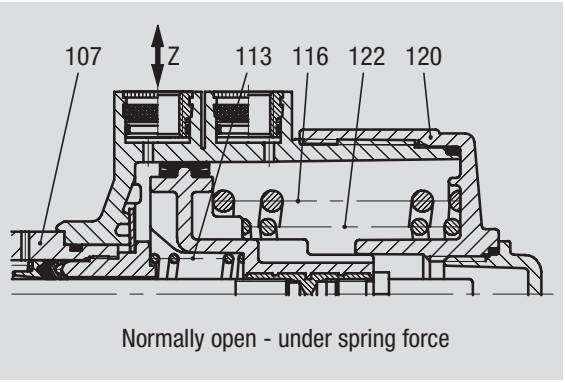
Valve open

Note: You will find a video showing how our valves operate on our website: www.buschjost.com

Pressure Actuated Valves – Conversion from NC to NO

The pressure actuated 84 500, 84 520 and 84 540 series of valves are designed to allow relatively simple conversion of the standard switching function – normally closed (NC) – to normally

open (NO).



Normally open - under spring force

NC to NO the easy way:

Step 1	Vent actuator
Step 2	Use 36 mm ring or socket spanner to release and unscrew actuator cover (120). This fully releases the compression spring(s) in the actuator.
Step 3	Remove the compression springs (116 and 122) (not present in all types of valve).
Step 4	Replace actuator cover (120) and tighten firmly. The factory fitted compression spring (113) will now move the depressurised piston into the normally open (NO) position.
Step 5	The top port of the two is to be used as the pilot.
Step 6	Prior to commissioning, it is advisable to carry out an operating test of the actuator with air as the pilot fluid and without process fluid.
Step 7	Check actuator and valve body leak tightness to atmosphere, and tightness of the stem seals using the vent in the screw piece (107).

Electric Position Indicator

for piloted angle seat valves

The electric position indicator with 2 microswitches monitors the OPEN & CLOSED positions of the piloted angle seat valves of the 845xx and 847xx series.

The limit switches wired in series with a terminal block are screwed onto supports and can be adjusted independently of each other with threaded spindles. Switches, operating mechanism and terminal block are protected by a transparent cover on the plastic bottom section of the case, which can be turned to any direction.

This position indicator can also be retrofitted to unmodified piloted angle seat valves of the above-mentioned series.

The operating spindle is connected to the valve spindle frictionally and axially without any slack.

This indicator can be ordered for retrofitting under Catalogue number 1257000.

Features
- Reproducible switching point accuracy
- Long mechanical and electrical service life
- Readily retrofitted
- Simple, accurate adjustment of switching point
- With LED indicator

Stroke Limiting System

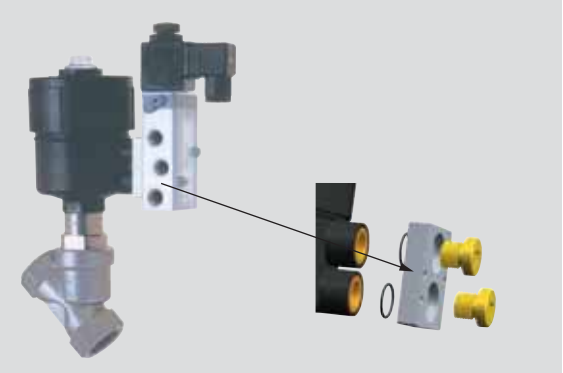
For 84500, 84520 and 84540 isolating valves

This system is available as an option for adjusting the minimum and maximum flow rate.

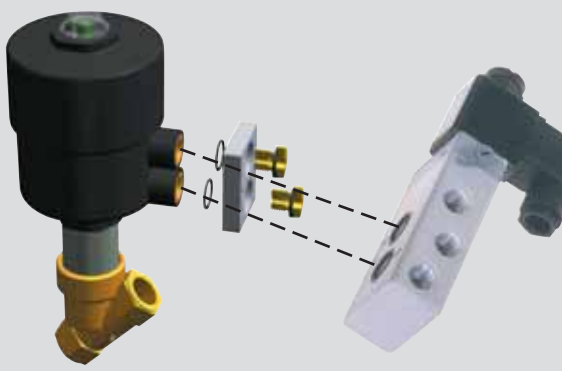
It can also be retrofitted after removal of the standard position indicator.

NAMUR Adapter Plate

for the 845XX and 847XX isolating valves



An adapter plate can be used to mount pilot valves with NAMUR interface on the actuators of these valve series.



Pressure Ranges

The valves must be operated within the pressure ranges specified in the respective datasheets.

The commissioning procedure must include a check on whether the actual pressures correlate to the data on the valve tags.

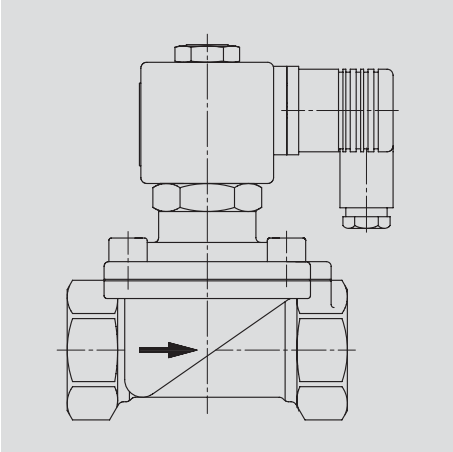
With vacuum operation, ensure that the negative pressure is present at the valve outlet.

Observe the minimum differential pressures specified for servo assisted valves in the technical data of this publication.

The difference between the inlet and the outlet pressure is the effective differential pressure.

The permissible static pressure in a system is the nominal pressure. Working and nominal pressure can differ depending on the type of valve. The valve will continue to operate up to the maximum permissible working pressure.

The valves will only close provided the specified direction of flow is observed. Flow in the opposite direction may irreparably damage components.



An arrow marked on the body of the valve indicates flow direction.

Vacuum and Buschjost Valves

The term vacuum is used loosely for any gas pressure lower than atmospheric, i.e. a negative pressure. The unit of measurement is the millibar (mbar) or hecto pascal (1 hPa = 1 mbar).

The user often specifies the degree of vacuum as a percentage. For example, a relative vacuum of 40 % indicates an absolute residual pressure of 600 mbar.

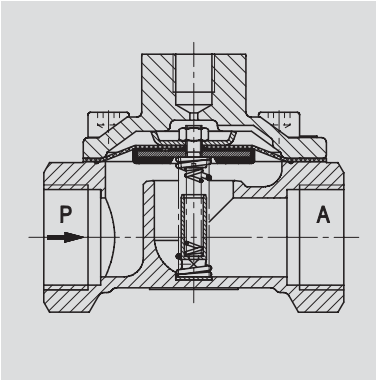
Most mechanical engineering applications with solenoid valves or pressure actuated valves lie within the rough vacuum range.

Since only very small differential pressures are available in this type of application, valves that optimise the flow and therefore have a high coefficient (Kv) should be chosen. These valves should also operate without differential pressure. The actual pressure condition has to be carefully examined before valves requiring differential pressure can be used.

Valves must always be mounted so the flow is from P to A, i.e. the vacuum has to be present at their outlet.

The supply available to actuate the valve against the vacuum must be sufficient to move the closure device into the open position and hold it there during the system sequence.

If this supply is interrupted, the vacuum, assisted by the forces tending to close the valve, will shut the valve by forcing the closure device back onto its seat.



We will gladly provide you with any further information required.

Calculating Flow Rates

With kv (flow coefficient)
Valve models must be carefully selected and accurately sized to suit the system application.
Once the switching function and the nominal pressure have been chosen, together with the permissible pressure drop across the valve, the medium type, density, viscosity, temperature and flow rate govern the connection size.

The flow coefficient tabulated for each valve allows calculation of service parameters such as flow rate or pressure drop for steady-state flow.

kv is the flow rate in m^3/h of water at a temperature between 5 and 30 °C, with a pressure drop of 1 bar across the valve. Its value has been determined for the different models according to VDI/ VDE 2173 guidelines and tabulated in the catalogue's characteristic data.

Example:

Calculation of the flow rate through
8240400.9101 valve
Water at 20 °C, kv = 9.5, $\Delta p = 3$ bar

$$Q = kv \cdot \sqrt{\Delta p}$$

$Q = 16.45\ m^3/h$

Calculation of the pressure drop across
82 404.00.9101 valve
Water at 20 °C, $Q = 12 m^3/h$, kv = 9.5

$$\Delta p = \left(\frac{Q}{kv}\right)^2$$

$\Delta p = 1.6$ bar

Viscosity

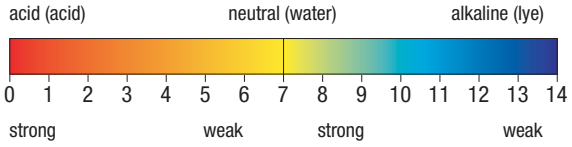
The kinematic viscosity in mm^2/s is a measure of the internal friction of gases and liquids. It represents the resistance to movement of the contact surfaces of adjoining layers of different (external friction) or identical (internal friction, viscosity) material.

The viscosity depends on pressure and temperature, and decreases with increasing temperature. Its value is measured at +20 °C from the rate of efflux from capillaries or speed at which balls sink in test fluids.

pH-Value

The pH-value represents a measure of the neutrality, acidity or basicity of an aqueous solution.

Pure water is neutral and has a pH of 7. The range below 7 is described as acidic and that above as basic or alkaline.



A strong acid has a low pH.
A value of 5.5 is unlikely to cause skin irritation.

Ammonia & Buschjost Valves

Solenoid valves are used to control ammonia refrigerants.
There is a special range of Buschjost valves designed to meet the stringent and specific safety requirements for this application, through:

- Avoidance of nonferrous metals
- Use of special seal materials
- High tightness to atmosphere to prevent emissions
- Explosion protection
- Position indication
- Type approval
- Design to power station specifications
- Grooved connecting flanges according to DIN 2512, type NA

The Buschjost range of equipment for use in ammonia systems includes various sizes and types of solenoid valves and pressure actuated valves.

We will gladly provide you with any further information required.

Steam, Hot Water & Buschjost Valves

Process engineering valves for steam and hot water have to withstand pressure and heat. Valve selection must take account of any influencing factors.

Solenoid valves with the following features are suitable:

- Seated design
- Heat-resistant seals
- Suitable material combinations
- Powerful, heat-resistant solenoids
- Corrosion resistance
- High tightness to atmosphere
- Tight valve seat seal
- Optional position indicators
- Variable mounting positions
- High durability
- Glandless valve system

Steam pressure table

t °C	p bar	t °C	p bar	t °C	p bar
0	0,006108	46	0,10086	92	0,7561
2	0,007055	48	0,11162	94	0,8146
4	0,008129	50	0,12335	96	0,8769
6	0,009345	52	0,13613	98	0,9430
8	0,010720	54	0,15002	100	1,0133
10	0,012270	56	0,16511	105	1,2080
12	0,014014	58	0,18147	110	1,4327
14	0,015973	60	0,19920	115	1,6906
16	0,018168	62	0,2184	120	1,9854
18	0,02062	64	0,2391	125	2,3210
20	0,02337	66	0,2615	130	2,7013
22	0,02642	68	0,2856	135	3,131
24	0,02982	70	0,3116	140	3,614
26	0,03360	72	0,3396	145	4,155
28	0,03778	74	0,3696	150	4,760
30	0,04241	76	0,4019	155	5,433
32	0,04753	78	0,4365	160	6,181
34	0,05318	80	0,4736	165	7,008
36	0,05940	82	0,5133	170	7,920
38	0,06624	84	0,5557	175	8,924
40	0,07375	86	0,6011	180	10,027
42	0,08198	88	0,6495	185	11,233
44	0,09100	90	0,7011		

We will gladly provide you with any further information required.

Liquefied Gas & Buschjost Valves

Liquefied gas applications imply sophisticated valve technology.

Buschjost has been inspected by the Hanover TÜV and approved as a manufacturer of products in accordance with the German Pressure Vessel Regulations (TRB 801 No 45).
The solenoid valves are certified as meeting the required test criteria. Approvals are covered by authorised 3.1. DIN 50 049 / EN 10204 test certificates with batch identification.

The requirements for supplying such products are often underestimated.
The first step is to appoint TÜV tested and approved factory experts, who are independent of production and have exclusive certification authorisation.
They are also responsible for ensuring that the production department adopts all of the measures and specifications applicable to a valve ordered and supplied for a particular application.
These include monitoring of stockkeeping of certified parts, for example ensuring that even the screws procured are never separated from the subcontractor's Approval Test Certificate.

The factory experts are authorised by the TÜV to carry out re-stamping. It is necessary to ensure that certified materials are permanently marked even after machining. Traceability to the starting material must be guaranteed. Expert re-stamping must be carried out before any removal of the original manufacturer's stamp for production purposes.

The TÜV Hannover Sachsen-Anhalt e. V. has approved and registered Buschjost as a manufacturer under the German Pressure Vessel Regulations (TRB 801 No 45).

We will gladly provide you with any further information required.

Oxygen & Buschjost Valves

Increasing importance is being attached to the safe handling and control of oxygen.
Buschjost has had the Bundesanstalt für Material-forschung und -prüfung (BAM) (German Federal Institute of Materials Research and Testing) carry out the necessary tests for certain series of valves.
The materials in contact with the medium in the following valves conform to the German Safety Regulations for Oxygen (UVV Sauerstoff VBG 62). All nonmetallic materials have been subjected to a special test by the BAM.
Valve testing covers the following criteria:
- Material strength and durability.
- Burnout resistance under pressure surge.

Oxygen up to 16 bar
82 400 36.9101 series
Technical requirements:
- Working pressure up to 16 bar
- Pressure rating PN16
- Degreased
- FPM seals
- Maximum fluid temperature +60 °C
- Maximum ambient temperature +60 °C

Oxygen up to 25 bar
The type and materials of the following types of valve were tested by the BAM for burnout resistance at higher pressures. The valves can be used for oxygen at up to 25 bar.
Technical requirements:
- Working pressure up to 25 bar
- Pressure rating PN25
- Degreased
- FPM seals
- Maximum fluid temperature +60 °C
- Maximum ambient temperature +60 °C

Buschjost

G 1/2	8497300.84XX.00000
G 3/4	8497301.84XX.00000
G 1	8497302.84XX.00000
G 1 1/4	8497303.84XX.00000
G 1 1/2	8497304.84XX.00000
G 2	8497305.84XX.00000

FAS
FAS miniature valves are available for applications involving oxygen. Please contact our technical services.

We will gladly provide you with any further information required.

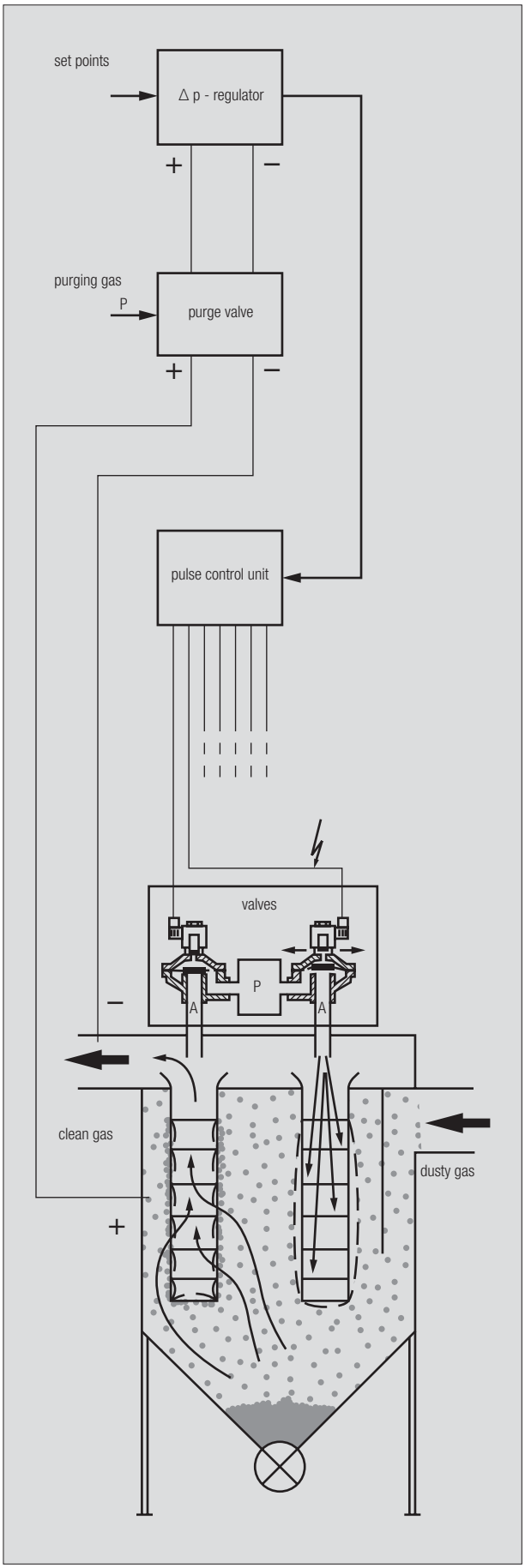
Dust Collector Valves and Systems

Valves
Filter pulse valves produce the pressure intensity crucial for effective cleaning of filter media with compressed air.

To meet the requirements these valves have to be designed to open and close extremely quickly and allow high flow rates. This response also reduces air consumption.

Control systems
An electronic control unit or pneumatic controller presets the duration of the pulse and interval required of the valves in this application. These control systems actuate the valves directly. The timing can be adjusted if service conditions change.

Differential pressure regulator
This regulator initiates cleaning on the basis of the differential pressure between the dusty and clean gas sides of the filter. When the pressure drop across the filter reaches the preset upper limit, the regulator actuates the cleaning valves by means of the control system. Cleaning is stopped as soon as the lower limit is reached. This type of control extends the life of the filter media and valves. Another bonus is considerably reduced air consumption.



Facts about Buschjost Dust Collectors Valves

The 82960 series solenoid system with bayonet connection is easily mounted – just push down and turn.

The internal components of the pilot system are captive.

The plastic encased solenoid can be turned to 3 different positions, 120° apart, without using tools.

The factory fitted silencer prevents annoying noise and stops ingress of foreign matter into the valve.

The solenoid design of the pilot offers maximum security against frost.

The volume above the diaphragm is minimised for extremely fast opening with optimised peak pressures.

The similarly ideal closing time ensures low air consumption.

All of the dynamically loaded valve elements are designed for a long lifetime.

The various parts of the case are designed for high air flow. Available with internal BSP or NPT threaded connection to international standards.

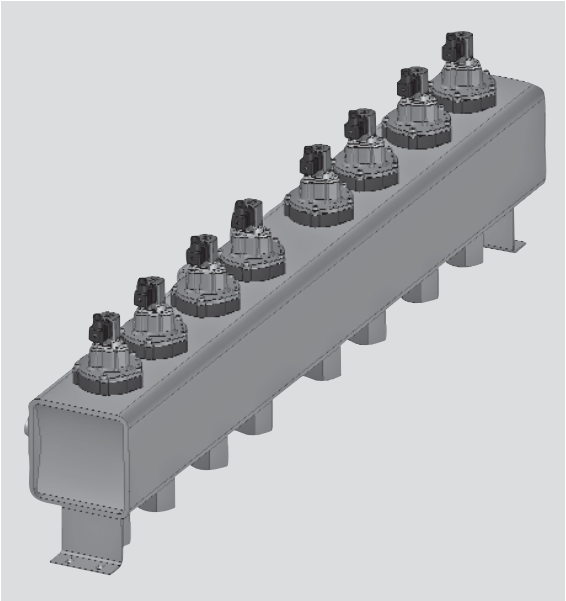
Dust Collector Valves & Blow Tubes

Valves for dust filter cleaning with through-type blow tube

2/2-way valve
Buschjost has enhanced the existing dust filter cleaning range with a valve with blow tube. This variant offers easy, cost-effective installation and other significant benefits.

Features:

- Higher peak pressures produced by radial flow
- Spacing from 75 mm (between pipe centres)
- No welding or adjustment necessary
- Simple, economical connection of valve to irregularly shaped tanks
- Available pipe lengths: 70 to 200 mm
- High-grade aluminium tube



We will gladly provide you with any further information required.

Differential Pressure Regulators

The 83400 series of regulators can be used in combination with the 83720 series of electronic pulse control units to automatically adapt the cleaning to the dust loading.

A dust-resistant piezoresistive pressure sensor measures the differential between the clean and dusty sides of the filter system, which depends on the build-up, and provides a continuous digital readout.

All of the settings can be programmed with the buttons.

The host pulse control unit continues to operate until cleaning has progressed to the extent where the preset limit is reached.

Any after-cleaning programmed is then started. Its duration is adjustable.

Two other switching points, Alarm 1 and Alarm 2, set above or below the set points as required, can be used to give an alarm in the event of faults.

The switching outputs can also be operated manually.
The regulator can be switched between 0 to 10V, 0 to 20mA or 4 to 20mA analog output signals and can be operated off 230V AC or 24V DC.

The unit conforms to the Electromagnetic Compatibility Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC.

Pressure Build-up Time

Background
The valves used are designed to release almost explosive pulses of air that shake the dust particles off the filter bags.
However, this method is not effective if the pressure rises too slowly or the flow coefficient (kv) of the filter pulse valve is too low. The nominal diameter of the valve also has to match the filter volume. The flow coefficient and the pressure rise time therefore represent the most important technical parameters for filter valves.

Reasons
If the pressure rises too slowly, the flow rate increases too gradually to shake the dust off the filter bags. Effective cleaning therefore requires the valve to open abruptly and blow a very short burst of compressed air (just a few milliseconds) into the filter. If the flow time is too long (just a few hundred milliseconds), the cleaning is not much more effective, but the air consumption is much higher.

The dust is also not shaken off if the pressure increases very quickly but the air throughput is insufficient. The volume released is then too small to subject the filter bags to a shock wave.

Summary
For effective cleaning, the pressure rise time has to be very short and the flow coefficient (kv) as large as possible.

Air Tanks

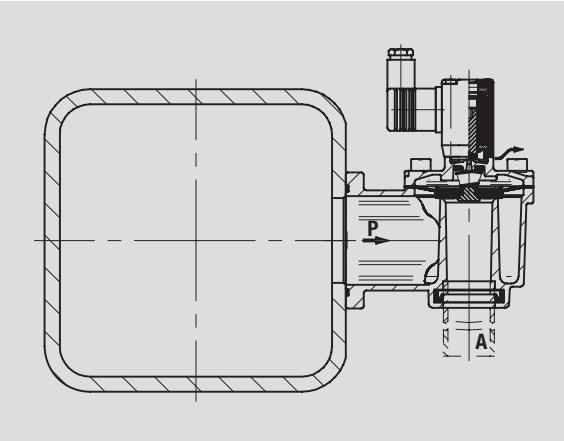
These designs offer a valve that retains the well established solenoid and diaphragm system capable of withstanding extremely high loads, yet can be flanged directly onto the air tank.

The 8495714.8001 valve has a DN 50 inlet suitable for connection of this large reservoir of compressed air directly to its seat.

The high resultant flow rate and cleaning pressure guarantee substantial pneumatic energy for even more effective cleaning than with conventional valves.

The valve seat corresponds to a DN 32 valve with a kv-value of 30 m^3/h. The working connection with the filter can be made with a G 1 female thread or push-in connection for a DIN DN 25 tube.

With the 8497186.8001 valve, a push-in working connection can be made for a DIN DN 40 tube.



Tank system

The design of these valves ensures quick and reliable mounting.

The 90 mm flange allows ideal spacing on the tank.

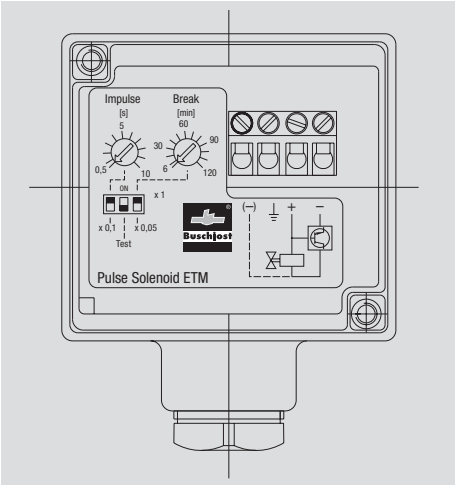
We will gladly provide you with any further information required.

Timer Solenoids

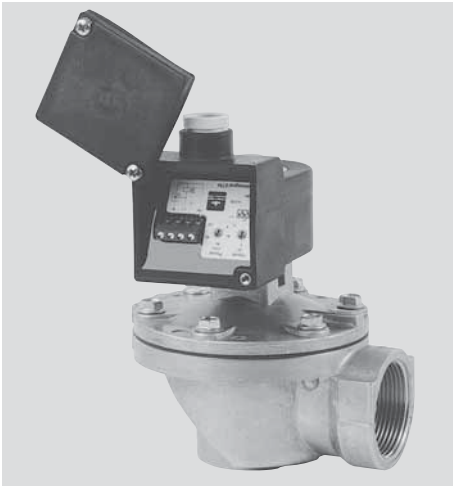
Solenoid with built-in electronic timer

Combination with a timer built into the solenoid offers a way of cleaning filter systems with just one filter pulse valve.

The necessary terminals and two graduated potentiometers for separate adjustment of pulse duration and interval are behind the solenoid's cover.



When power is supplied to the solenoid, the electronic control system is activated with a pulse in the preset time window. This repeated sequence of pulse followed by interval is maintained until the power supply is interrupted.
The time ranges that are typically used for this application are made available.

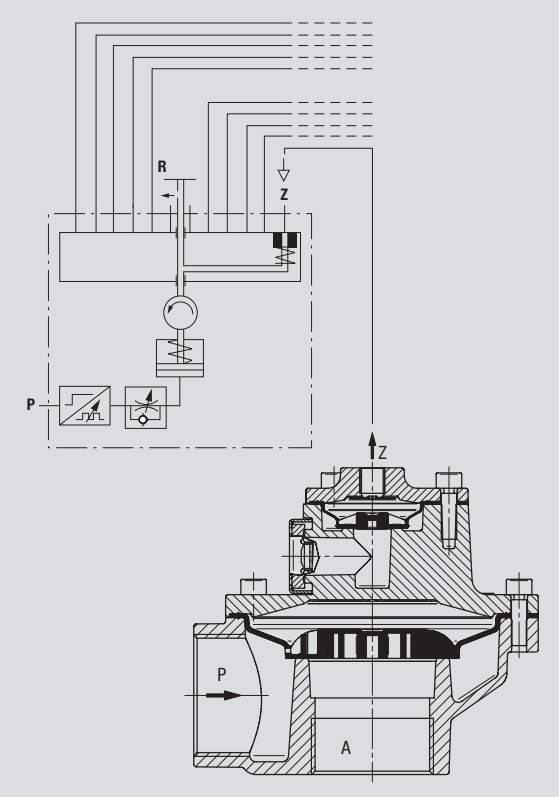


We will gladly provide you with any further information required.

Pneumatic Valve Controller

Operation of filter systems in difficult environments or hazardous areas calls for expensive electronic control systems and solenoid valves. Pneumatic control systems offer an effective technological alternative at the right price.

Principle of operation
The valves are connected to the pressure chamber of the controller by air lines. The control shaft assembly of the controller is operated by a pneumatic ratchet drive. It pauses between valve connections for an interval that can be preset by the user.
The duration of the air pulse is also user adjustable by means of a throttle valve accessed after removal of the bottom casing. During this period the control shaft passes beneath a valve connection port and vents the pilot line to that particular valve. The valve opens and remains open until the control shaft moves on to the next position. The pilot air is vented through the port marked R



.

A spring return mechanism positions the control shaft reliably during each interval of the intermittent operation.

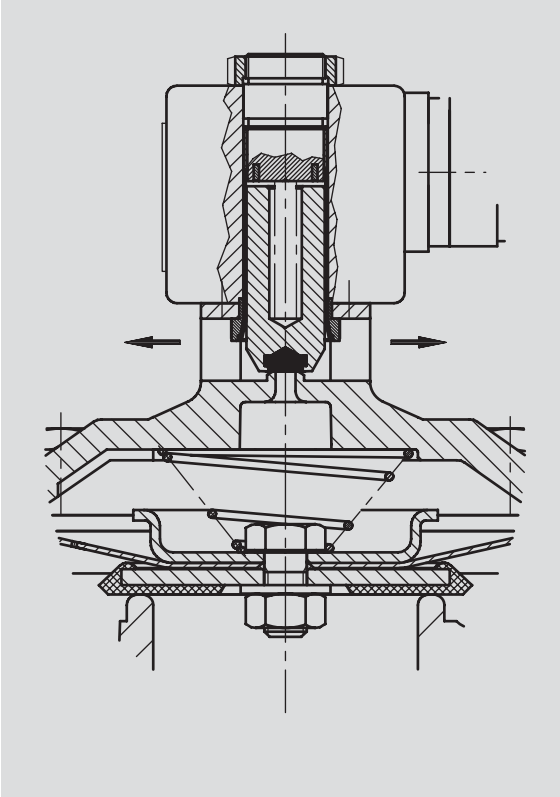
Humidity and Frost

When operated with damp compressed air, even at negative temperatures, the 82960 series of filter pulse valves should not be expected to malfunction as a result of the plunger and/or diaphragm freezing solid.

Laboratory tests have show that diaphragms frozen onto the seat open even at operating pressure under 0.5 bar, and confirm that no malfunctions have yet become known as a result of use at minus temperatures.

In the case of the diaphragms this is attributable to the high opening force and the very small sealing area of the seat.

The reason the plunger does not ice up is that the plunger tube is not under pressure and no moisture can arise as a result of the temperature falling below the dew point during exhausting of the compressed air during an operating cycle.



Valves in Commercial Vehicles

One of Buschjost's key design areas involves the manufacture of special valves for commercial vehicles. These are used to solve quite specific problems:

- Valves supply diesel engines with additional air in order to minimise soot formation.

- Valves in air conditioning systems ensure comfortable temperatures in the cab.

- Valves are used to control the plumbing systems in carriages, restaurant cars and the bathroom facilities of City Nightliner sleeper trains across Europe.

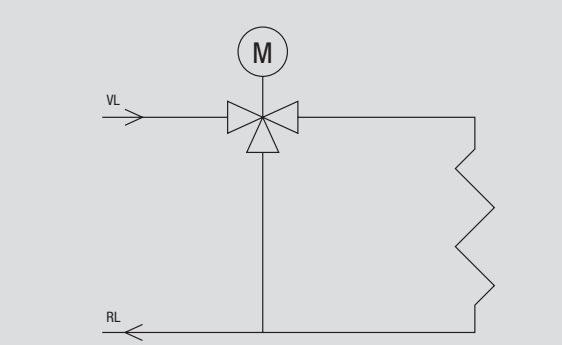
These are just a few of the exciting challenges for our designers. Each new development has to take account of every conceivable demand placed on our products by ensuring optimal design, materials, mechanisms, electronics, electrics and reliability.

Control valve for the heating circuit in coaches

We will gladly provide you with any further information required.

Heating Circuits In Commercial Vehicles

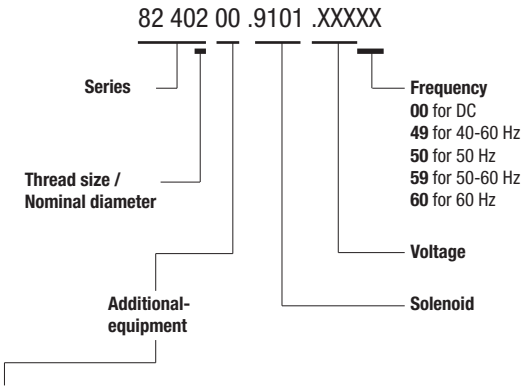
with a 3/2-way motorised valve



We will gladly provide you with any further information required.

Buschjost Part Numbering System

Standard valves

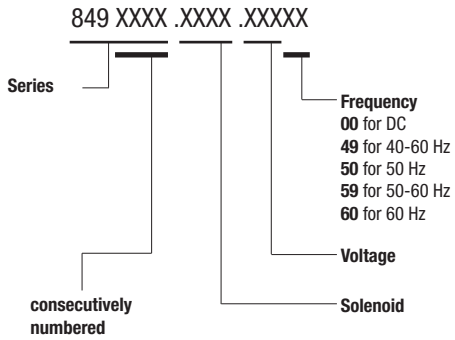


00	Standard
01	Normally closed
02	Manual override
03	FPM seals
06	PTFE seals
14	EPDM seals, for hot water
18	Degreased version; FPM seals
23/40	Position indicator with two solenoid switches
41	Electrical Position indicator with two switches

01 ... 49 = Additional equipment, applicable for all series, but not available in every series.
50 ... 99 = Additional equipment, only applicable for one series.

further versions on request

Special valves



Installation

Clean pipework beforehand. Dirty conditions lead to malfunctions, so fit strainer upstream of valve inlet if necessary. The valve will no longer open or close if bleed orifices are blocked or the plunger is jammed by dirt.
Avoid distorting the body of the valve in misaligned pipework, or by using inappropriate tools or sealing material. Do not use solenoid as a lever.
The valve will only close tightly in the direction of flow. Flow in the opposite direction to the arrow may irreparably damage components.
The preferred mounting position is with the solenoid upright, as this considerably reduces the risk of wear and contamination. If the fluid temperature exceeds +150 °C or the valve function is normally open, the mounting position is restricted as detailed in the data sheets.

Maintenance

It is advisable to carry out preventive maintenance at intervals depending on the service conditions, and whenever there is a noticeable deterioration in the speed of switching.
Deposits on guide surfaces, dirt in the valve system, perished or worn seals may lead to malfunctions. To maintain protection, include the solenoid seals in the maintenance.
Maintenance may only be carried out with the pipework depressurised and the solenoid disconnected from the power supply.
Brochures with sectional diagram, key to parts and fitting instructions for kits of parts subject to wear are available on request.
Solenoid surface temperatures may get as high as +120 °C during continuous duty.
Leak or strength tests may be carried out with the valve open or closed. The maximum test pressure = 1.5 x maximum working pressure. The valve must not be switched during these tests.

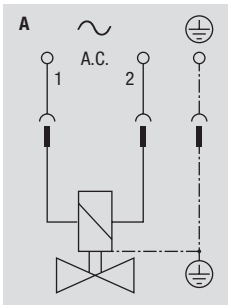
Electrical Connection

Connect solenoid in accordance with the electrical regulations. Then close the terminal compartment carefully to maintain protection. Make sure the cable entry is sealed properly.
Tighten central screw of the power lead socket to a maximum of 60 N cm. The housing must not show signs of deformation. Ensure correct polarity of terminals marked + and -. If unmarked the live wires can be connected either way round. It is absolutely essential to connect the earth wire to the marked terminal provided.

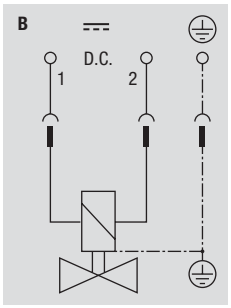
DANGER: Earth connection essential

It is advisable to carry out an operating test before pressurising. The clicking of the plunger must be audible during switching.
The power lead socket may only be connected with the power disconnected. Operation of AC solenoids without the plunger causes irreparable damage.
The surface of the solenoid will heat up to a maximum of +120 °C during continuous duty.

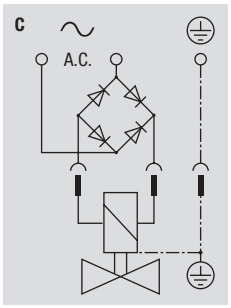
Wiring



AC voltage



DC voltage



AC voltage
via rectifier

Buschjost Solenoids

General
Valve actuating solenoids are designed for the service conditions and conform to VDE 0580.

Power supply, voltage ranges
The preferred voltages are specified in the separate publications. Special voltages are possible on request.

The permissible voltage range is ±10 % of the nominal value.

Type of supply
Solenoids are available for connection to a DC or AC supply. Those designed for AC may only be used at the specified frequency. The more powerful solenoids are a DC design. They can be operated off an AC supply via a rectifier, which is connected in series as standard. The permissible frequency is then 40 to 60Hz.

Duty cycle
All standard solenoids are designed for continuous duty in order to rule out the possibility of the winding overheating during normal service conditions.

DC solenoids
The main advantage of this type is constant current consumption. This gives soft switching and makes the winding less sensitive to binding of the plunger. The maximum frequency of operation is only limited by the system's electrical and mechanical inertia.

AC solenoids
The current consumption of this system depends on the position of the plunger. The plunger must be able to reach its limit unhindered, otherwise the winding will overheat.
Special spark quenching is generally not necessary.

Ensure that the mains frequency agrees with the value specified on the name plate. If it is higher, the solenoid will develop less force and may burn out, since the plunger cannot reach its limit. At a lower frequency the smaller inductive reactance causes more heating, which can influence the lifetime of the coil.

Buschjost Solenoids - Heating

The solenoids are normally designed for continuous duty, so under normal conditions there is no danger of the permanent operating temperature of the coil reaching an impermissible value.

The coil temperature that is reached during operation is influenced by 3 factors:

- the self-heating
- the temperature of the fluid flowing through
- the ambient temperature

The highest permissible solenoid temperature is generally determined by the thermal durability of the material used for insulation.

In order to ensure that there is no thermal damage, the specifications for the maximum permitted fluid and ambient temperatures should not be exceeded.

In this context, particular attention should be paid to the power consumption of the solenoids. Many valve manufacturers give their power consumption at operating temperature, which is lower than the specifications given in this catalogue, because of the high coil resistance.

Particular attention should be paid to the passage in the Buschjost data sheets:

The power consumption is measured according to VDE 0580 at a coil temperature of +20 °C. Physical factors reduce the value by up to about 30 % when the DC solenoid coil has reached normal operating temperature.

The actuating solenoids are offered with a range of different connections. The most common are the sockets to DIN EN175 301-803, terminals in the terminal compartment with cable passing through a gland or directly encapsulated in the coil area (moulded cable).

At continuous duty the surface temperature of the solenoid can reach up to 120 °C.

Latching Buschjost Valves

Operation

The force exerted by the permanent magnet is not sufficient to attract the plunger against the force of the spring. The valve is closed.
A short pulse of current assists the force of a permanent magnet to operate the solenoid valve.
After an interruption in the current, the permanent magnetic maintains the operating position reached without any power consumption. An approximately 30 millisecond pulse of current is sufficient to guarantee switching.
The valve is open. Another pulse of current of the same duration but reverse polarity forces the spring-assisted plunger back onto the seat of the valve. The valve is closed.
These solenoid valves are suitable for applications with a battery or solar power supply.

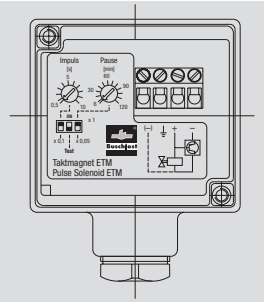
Features

- Single coil system with permanent magnet
- Bistable solenoid valves
- Switching to OPEN/CLOSED position by short pulses of current
- OPEN position maintained without power consumption
- Extremely low power consumption
- Low self-heating
- Supplied by battery or solar power
- Valve can be switched from OPEN to CLOSED position with a pulse of current of reverse polarity
- Pulse design in combination with 82400 Click-on® series of valves

We will gladly provide you with any further information required.

Timer Solenoid

Solenoid with built-in electronic timer.



This model can be combined with certain types of valve. Potentiometers and slide switches installed in the terminal compartment can be used to preset pulse duration and interval. When power is supplied to the solenoid, after a delay of about 1.5 seconds the valve is opened for the duration of the pulse. The preset interval then elapses. Pulse duration and interval are generated by a microcontroller. The solenoid conforms to the Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the Low Voltage Directive 73/23/EEC.

Features

- Tamper resistant
- No additional wiring costs for the electronics. Only requires power supply for solenoid
- Adjustable timing
- Precise sequence of intervals
- Internationally approved:
- Quick and easy operational test
- Compact and robust design
- Simple commissioning
- Wide time window for adjustment ranges
- Additional solenoids can be operated without affecting the timing

We will gladly provide you with any further information required.

EMC
Electromagnetic Compability

Electromagnetic compatibility is the ability of an item of equipment, installation or system to work satisfactorily in the electromagnetic environment, without itself causing electromagnetic interference that would be unacceptable for all of the other equipment present.

EU Declaration of Conformity (sample)

We hereby declare that all IMI Norgren Buschjost GmbH + Co. KG solenoid actuators marketed under our sole responsibility conform to the EU Directives listed below. Unauthorised modification invalidates this declaration.

Relevant EU Directives:

89/336/EEC -	Electromagnetic Compatibility amended by 91/263/EEC, 92/31/EEC and 93/68/EEC
72/23/EEC	Low Voltage Directive amended by 93/68/EEC

The electromagnetic compatibility of the products has been assessed with reference to the following standards:

EN 50081-1	Interference (03/94 edition)
EN 50082-2	Interference Immunity (02/96 edition)

IMI Norgren Buschjost GmbH + Co. KG

Flange Dimensions

The latest edition of the relevant DIN standard brochure.

PN 16, EN 1092-1				
DN	ø D	ø k	ø d_2	z
10	90	60	14	4
15	95	65	14	4
20	105	75	14	4
25	115	85	14	4
32	140	100	18	4
40	150	110	18	4
50	165	125	18	4
65	185	145	18	4
80	200	160	18	8
100	220	180	18	8

PN 25/40, EN 1092-1				
DN	ø D	ø k	ø d_2	z
10	90	60	14	4
15	95	65	14	4
20	105	75	14	4
25	115	85	14	4
32	140	100	18	4
40	150	110	18	4
50	165	125	18	4
65	185	145	18	8
80	200	160	18	8
100	235	190	22	8

ASME B 16.5 Class 150 / 6 / sq. in				
DN	ø D	ø k	ø d_2	z
15	88.9	60.5	15.7	4
20	98.6	69.9	15.7	4
25	106.0	79.2	15.7	4
32	117.3	88.9	15.7	4
40	127.0	98.6	15.7	4
50	152.4	120.7	19.1	4
65	177.8	139.7	19.1	4
80	190.5	152.4	19.1	4
100	228.6	190.5	19.1	8

ASME B 16.5 Class 300 / 6 / sq. in.				
DN	ø D	ø k	ø d_2	z
15	95.2 (94.0)	66.5	15.7	4
20	117.3 (108.0)	82.6	19.1	4
25	124.0 (115.0)	88.9	19.1	4
32	133.4	98.6	19.1	4
40	155.4 (150.0)	114.3	22.4	4
50	165.1	127.0	19.1	8
65	190.5 (185.0)	149.4	22.4	8
80	209.6 (200.0)	168.1	22.4	8
100	254.0	200.2	22.4	8

ø D =
Flange diameter

ø k =
Pitch circle diameter

ø d_2 =
Hole diameter

z =
Number of holes

The Buschjost flange valve ø D values given in parentheses.

Available Strainers

RP	Filter 0.25	Brass	PN 25	Part Number
⅜				1239601.0000
½				1239602.0000
¾				1239603.0000
1				1239604.0000
1¼				1239605.0000
1½				1239606.0000
2				1239607.0000
RP	**Filter 0.25**	**Stainless steel**	**PN 40**	**Part Number**
½				1239612.0000
¾				1239613.0000
1				1239614.0000
1¼				1239615.0000
1½				1239616.0000
2				1239617.0000
DN	**Filter 0.25**	**Cast iron**	**PN 16**	**Part Number**
15				1239622.0000
20				1239623.0000
25				1239624.0000
32				1239625.0000
40				1239626.0000
50				1239627.0000
65				1239628.0000
80				1239629.0000
100				1239630.0000
DN	**Filter 0.25**	**Cast steel**	**PN 40**	**Part Number**
15				1239642.0000
20				1239643.0000
25				1239644.0000
32				1239645.0000
40				1239646.0000
50				1239647.0000
65				1239648.0000
80				1239649.0000
100				1239650.0000
DN	**Filter 0.25**	**Stainless steel**	**PN 16**	**Part Number**
15				1239662.0000
20				1239663.0000
25				1239664.0000
32				1239665.0000
40				1239666.0000
50				1239667.0000
65				1239668.0000
80				1239669.0000
100				1239670 0000
DN	**Filter 0.25**	**Stainless steel**	**PN 40**	**Part Number**
15				1239682.0000
20				1239683.0000
25				1239684.0000
32				1239685.0000
40				1239686.0000
50				1239687.0000
65				1239688.0000
80				1239689.0000
100				1239690.0000

Position Indicators

Noncontact electric type

This indicator has two magnetic switches; one for the CLOSED and one for the OPEN position of solenoid and pressure actuated valves.

The reed contact of the switch is deflected by a permanent magnet tightly screwed into a spindle. This spindle is connected to the valve piston or stem.
These indicators can be mounted with IP65 or EEx protection.

Features

- Emission-proof, switching magnet incorporated in valve system
- Easily mounted in any position
- Small valve strokes detected
- Accurately reproducible switching points
- Glass fibre reinforced thermoplastic housing
- Good mechanical and electrical durability

We will gladly provide you with any further information required.

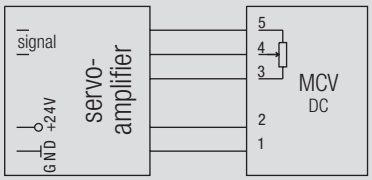
Servo Amplifier

for 82880 motorised valve

Electronic card for positioning valves with DC motor actuators.

An electronically programmed set point of either 0 to 20mA or 0 to 10V can be used to adjust the aperture angle and hence the flow cross-section. A potentiometer in the actuator provides position feedback. Actual value and set point are compared in the amplifier. A 0 to 20mA output is available for actual value feedback.

Models	Valve opening 0 to full
Catalogue No 8278300.0000	0....10V



We will gladly provide you with any further information required.

Valve Seat Tightness

Depending on their suitability, soft and hard seals are used for valve seats. Soft seals include all of the elastomers:
NBR, HNBR, FPM, EPDM, CR, ECO and TPE.
Hard seals include PTFE, PVDF, PEEK, PA and metal.

When new, our valves with soft seat seals achieve leakage rate A according to EN 12266-1. At this rate no bubbles are detected over a period of 15 seconds during the compressed air test in parallel with the manufacturing process.

Depending on their design, valves with hard seat seals can have much higher leakage rates. When new, leakage rate E according to EN 121266-1 or better is achieved. The maximum permissible rate of escape for E leakage is 0.3 x DN [mm^3/s] for liquids or 300 x DN [mm^3/s] for gases.

Dirt in the process fluid tends to increase the leakage rate more with hard seat seals than their soft counterparts.

Valve Blocks

System solutions achieved through integration
Professional system solutions offer the machine manufacturer the option of concentrating in-house resources on core competencies. As a valve specialist, Buschjost provides compact solutions that have been well thought out on the basis of relevant experience. These are realised in a modern Buschjost valve factory with optimised methods of production and assembly. The user receives a tested module with the added benefit of a significant reduction in spare parts inventory.

We will gladly provide you with any further information required.

EC Type examined Valves to DVGW (German GAS installation and plumbing association) requirements

Firing systems, gas turbines and other oil and gas appliances are operated with safety valves that shut off the fuel supply should dangerous conditions arise.

Type examination is mandatory to establish their suitability for this purpose.

For the gases specified by DVGW Code of Practice G 260, the requirements of EN 161 and DIN 3394 Part 1 have to be met for working pressures in excess of 4 bar. Liquid fuels are governed by the requirements of EN 264.

The old DIN DVGW registration number has been superseded in the course of EU harmonisation.

Safety shut-off valves are not gas appliances ready for use as defined in the Gas Appliance Directive. The valves are marked with the CE product identification number rather than the CE mark.

Buschjost has developed 3 series of electrically and electropneumatically actuated valves. The 82580 series is only suitable for gaseous fuels, the others cater for gaseous and liquid fuels.

These valves are described in greater detail on their data sheets.

Overview

Series	Product ID No	Page
82370	CE-0085AU0323	26
82580	CE-0085AT0091	138
83860	CE-0085AS0104	198

DVGW Zertifizierungsstelle

TÜV Rheinland

We will gladly provide you with any further information required.

Test Certificates to DIN 50 049 / EN 10 204

Type of certificate
Scope of certified testing
Catalogue number 1237461
Works test certificate according to EN 10 204 - 2.1
General confirmation of conformity based on performance of

- Operating and leak tests
- Pressure test
- Voltage test

Catalogue number 1237462
Works test certificate according to EN 10 204 - 2.2
General confirmation of conformity based on performance/issuing of

- Operating and leak tests
- Pressure test
- Voltage test
- Material identification certificate with numbers of constituent materials of individual parts according to parts list

Catalogue number 1237463
Approval test certificate according to EN 10 204 - 3.1
based on performance/issuing of

- Operating and leak tests according to DIN 3230 Part 3
- Pressure test according to DIN 3230 Part 3
- Voltage test according to DIN VDE 580 §38
- Material identification certificate from parts list with Material No according to EN 10 204 - 2.2

Catalogue number 1244316
Approval test certificate according to EN 10 204 - 3.1*
based on performance/issuing of

- Material quality certificate for valve body, cover, body screws and plunger tube according to EN 10 204 - 3.1.A and 3.1.B
- Material quality certificate for parts in contact with fluid according to EN 10 204 - 2.2
- Operating and leak tests according to EN 10 204 - 3.1
- Leakage rate 1 in test according to DIN 3230 Part 3

* not possible for all valves

Any tampering with the ex factory condition certified by Buschjost automatically invalidates the approval test certificate.

Quality and Environmental Management

Since August 2006 Buschjost valve technology has been certified according to quality standard **ISO TS 16949:2002**. A certified, company-wide quality management system **DIN EN ISO 9001** is in place since May 1994. Our management system encompasses all business processes. The quality products and services agreed with our customers are delivered on the basis of specified processes and methods.

Since September 2005 Buschjost's Environment Management System has been certified according to **DIN EN ISO 14001:2005**. The audit trail of regulation conformity has been rendered and was certified according to the TUV Cert-procedures.

DIN EN ISO 9001 : 2000

DIN EN ISO 14001 : 2005

ISO / TS 16949 : 2002

Pressure Equipment Directive (PED)

The Pressure Equipment Directive (PED) is generally applicable to equipment with a working pressure greater than 0.5 bar. Valves as components of this equipment come under the scope of the directive. However, only valves above a certain nominal size are required to bear CE markings.

Valves suitable for different (e.g. neutral, toxic or flammable) fluids only require CED markings above a nominal size of DN 25. Smaller valves **must not bear a CE mark in accordance with the Pressure Equipment Directive**. This equipment must be designed in line with standard engineering practice so that it meets the requirements of the directive.

Almost all of the valves over DN 25 in size requiring marking should be assigned to Categories I and II. This means their design and testing is in the responsibility of the manufacturer, i.e. Norgren Buschjost in the case. Module A1 has been chosen as the related method of evaluating conformity and certified by the "nominated body" (TÜV Nord).

The products are also subject to other EU Directives such as EMC, Low Voltage, etc. The products bear a CE mark as a declaration of conformity with all of these. Where applicable (sizes > DN 25) this mark also serves as a declaration of conformity with the Pressure Equipment Directive. Category II valves are also marked with the identification number of the nominated body; CE 0045 for TÜV Nord.

PED1

Note to Pressure Equipment Directive (PED):
The valves of this series are according to Art. 3 § 3 of the Pressure Equipment Directive (PED) 97/23/EG.
This means interpretation and production are in accordance to common engineering practices in the member countries.
The CE-sign at the valve does not refer to the PED. Thus the declaration of comformity is not longer applicable for this directive.

Note to Electromagnetic Compatibility Guideline (EEC):
The valves shall be provided with an electrical circuit which ensures the limits of the harmonised standards EN 61000-6-3 and EN 61000-6-1 are observed, and hence the requirements of the Electromagnetic Guildeline (2004/108/EC) satisfied.

Applies to the following series:
82370, 82380, 82480, 82510, 82530, 82560, 82960, 83320, 83860, 83920, 84070, 84080, 84660, 84680, 82080, 82610,

PED2

Note to Pressure Equipment Directive (PED):
The valves of this series are according to Art. 3 § 3 of the Pressure Equipment Directive (PED) 97/23/EG

This means interpretation and production are in accordance to common engineering practices in the member countries.
A certificate of conformity is not designated.

Applies to the following series:
82710, 82870, 82900, 83300, 83930, 82160

PED3

Note to Pressure Equipment Directive (PED):
The valves of this series, including the connection-size DN 25 (G 1), are according to Art. 3 § 3 of the Pressure Equipment Directive (PED) 97/23/EG. This means interpretation and production are in accordance to common engineering practices in the member countries.
The CE-sign at the valve does not refer to the PED. Thus the declaration of conformity is not longer applicable for this directive.
For valves > DN 25 (G 1) Art. 3 § (1) No.1.4 applies.
The basic requirements of the Enclosure I of the PED must be fulfilled.
The CE-sign at the valve includes the PED. A certificate of conformity of this directive will be available on request.

Note to Electromagnetic Compatibility Guideline (EEC):
The valves shall be provided with an electrical circuit which ensures th e limits of the harmonised standards EN 61000-6-3 and EN 61000-6-1 are observed, and hence the requirements of the Electromagnetic Compatibility Guideline (2004/108/EG) satisfied.

Applies to the following series:
82180, 82280, 82340, 82400, 82470, 82540, 82580, 82590, 82660, 82670, 83050, 83200, 83240, 83250, 83340, 83350, 83380, 83580, 84100, 84120, 84140, 84180, 84190, 84200, 84220, 84240, 84320, 84340, 84360, 84500, 84520, 84540, 84550, 84580, 84590, 84720, 84740, 84760, 84770, 84880, 84890, 85040, 85100, 85120, 85140, 85200, 85220, 85240, 85300, 85320, 85640, 85700, 85720, 85740

PED4

Note to Pressure Equipment Directive (PED):
The valves of this series are according to Art. 3 § 3 of the Pressure Equipment Directive (PED) 97/23/EG.
This means interpretation and production are in accordance to common engineering practices in the member countries.
The CE-sign at the valve does not refer to the PED. Thus the declaration of conformity is not longer applicable for this directive.

Note to Electromagnetic Compatibility Guideline (EEC):
The valves shall be provided with an electrical circuit which ensures th e limits of the harmonised standards EN 61000-6-3 and EN 61000-6-1 are observed, and hence the requirements of the Electromagnetic Compatibility Guideline (2004/108/EEC) satisfied.

Applies to the following series:
82730, 82880

Safety Instructions for the Norgren and FAS range

These products are intended for use in industrial compressed air systems only. Do not use these products where pressures and temperatures can exceed those listed under "Technical data".

Before using these products with fluids other than those specified, for non-industrial applications, life-support systems, or other applications not within published specifications, consult NORGREN FLUID CONTROLS.

Through misuse, age, or malfunction, components used in fluid power systems can fail in various modes.

The system designer is warned to consider the failure modes of all component parts used in fluid power systems and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure.

System designers must provide a warning to end users in the system instructional manual if protection against a failure mode cannot be adequately provided.

System designers and end users are cautioned to review specific warnings found in instructions sheets packed and shipped with these products.

Marking of Solenoid Valves in potentially explosive atmospheres

The Directive 94/9/EC is from 01 July 2003 onwards to be obligatory for manufacturers as well as users.

As from this date on only equipment for use as intended in hazardous areas which conforms to Directive 94/9/EC may be sold and delivered. This directive contains, amongst other items, a further division of the existing equipment group II into equipment categories, which regulate the safety level of the apparatuses for the respective zone. Additionally this directive differentiates Gas-Ex-Areas "G" and Dust-Ex-Areas "D". Furthermore for the Dust-Ex-Areas a new three-stage hazard classification in zones 20, 21 and 22 has been introduced.
The accompanying chart shows the required markings for the apparatuses according to the above-mentioned directive.

Marking of equipment for Gas-Ex-Areas

Zone	category of equipment	Marking
0	1	II 1 G
1	2	II 2 G
2	3	II 3 G

Marking of equipment for Dust-Ex-Areas

Zone	category of equipment	Marking
20	1	II 1 D
21	2	II 2 D
22	3	II 3 D

The Directive 94/9/EC (ATEX) refers, apart from electrical apparatuses, also to non-electrical apparatuses. For all equipment for use as intended in hazardous areas category 2 and 3 supplied by us, we issue EC-Declarations of Conformity for the electrical as well as non-electrical parts.
The customer/user of the product specifies the zone in which the machine is being used and /or which can arise inside the machine.

The solenoids of the series

8036....8045, 8136....8145, 8186....8195, 8336....8345, 8436....8445, 9136....9145, 9186....9195, 9236....9245, 9336....9345, 9350....9360, 9540....9564

with EEx me II T4 or T3 explosion protection are electrical apparatuses for use as intended in hazardous areas.
They are marked:

Ex II 2 GD or **Ex II 2 G**

according to Directive 94/9/EC.

The category 2 solenoids may be used in areas where potentially explosive mixtures of gases and/or vapours and/or air (zones 1 and 2), or of dust and air (Zones 21 and 22), are present. IP54 to IP67 protection is provided depending on the type of solenoid.
The solenoids are marked with the EC Type Examination Certificate number:

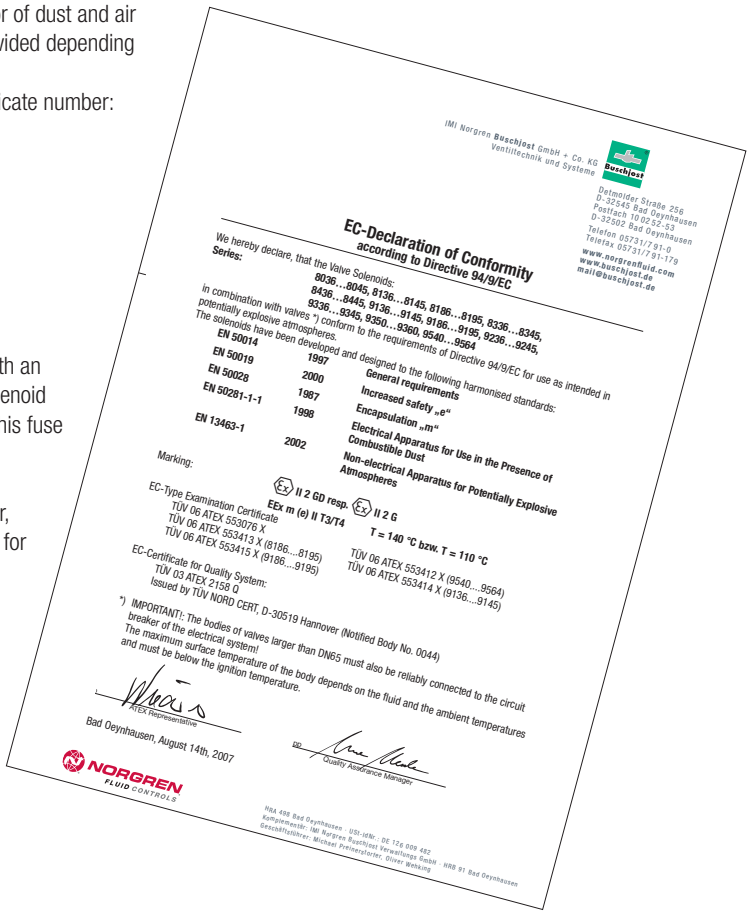
TÜV 06 ATEX 553076 X
TÜV 07 ATEX 553412 X (9540....9564)
TÜV 06 ATEX 553413 X (8186....8195)
TÜV 06 ATEX 553414 X (9136....9145)
TÜV 06 ATEX 553415 X (9186....9195)

The marking "**X**" indicates special conditions:

To each solenoid, connect a fuse for short circuit protection with an appropriate rating (of up to 3 times the rated current of the solenoid according to DIN 41571 or IEC 127). The braking capacity of this fuse must be equal to or greater than the maximum short circuit acceptable at the installation location.
The solenoids do not need conventional maintenance. However, depending on the service conditions regular visual inspections for cracks, dirt, etc, are recommended.

The EC-Type Examination Certificate can be downloaded from our homepage www.buschjost.de under Certificates.

Valve actuating solenoids are electrical components unsuitable for use without the associated valves.



IMI Norgren Buschjost GmbH + Co. KG
Ventiltechnik und Systeme

Buschjost

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www.norgrenfluid.com
www.buschjost.de
mail@buschjost.de

EC-Declaration of Conformity
according to Directive 94/9/EC

We hereby declare, that the Valve Solenoids:
Series: **8036...8045, 8136...8145, 8186...8195, 8336...8345, 8436...8445, 9136...9145, 9186...9195, 9236...9245, 9336...9345, 9350...9360, 9540...9564**
in combination with valves *) conform to the requirements of Directive 94/9/EC for use as intended in potentially explosive atmospheres.
The solenoids have been developed and designed to the following harmonised standards:

EN 50014	1997	General requirements
EN 50019	2000	Increased safety „e"
EN 50028	1987	Encapsulation „m"
EN 50281-1-1	1998	Electrical Apparatus for Use in the Presence of Combustible Dust
EN 13463-1	2002	Non-electrical Apparatus for Potentially Explosive Atmospheres

Marking: Ex II 2 GD resp. Ex II 2 G
EEx m (e) II T3/T4 T = 140 °C bzw. T = 110 °C

EC-Type Examination Certificate
TÜV 06 ATEX 553076 X
TÜV 06 ATEX 553413 X (8186...8195)
TÜV 06 ATEX 553415 X (9186...9195)
TÜV 06 ATEX 553412 X (9540....9564)
TÜV 06 ATEX 553414 X (9136...9145)

EC-Certificate for Quality System:
TÜV 03 ATEX 2158 Q
Issued by TÜV NORD CERT, D-30519 Hannover (Notified Body No. 0044)

*) IMPORTANT: The bodies of valves larger than DN65 must also be reliably connected to the circuit breaker of the electrical system!
The maximum surface temperature of the body depends on the fluid and the ambient temperatures and must be below the ignition temperature.

ATEX Representative

Bad Oeynhausen, August 14th, 2007

Quality Assurance Manager

NORGREN FLUID CONTROLS

HRA 498 Bad Oeynhausen · USt-IdNr.: DE 126 009 482
Komplementär: IMI Norgren Buschjost Verwaltungs GmbH · HRB 91 Bad Oeynhausen
Geschäftsführer: Michael Hellenkötter, Oliver Wenking

Solenoids for potentially explosive atmospheres

Category 3
Zone 2 and 22

Execution	Series	Description	Solenoid / Connection	8026	8326	8426	9116	9176	8176	9326	9526	9426	separate ATEX-socket kit* only with standard solenoid
			Category	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	Ex II 3 GD	
			Protection class	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	
			Body	Polymer	Polymer	Polymer	Polymer	Polymer	Polymer	Polymer	Steel	Polymer	
			Connection	Socket	Socket	Socket	Socket	Socket	Socket	Socket	Socket	Socket	
Diaphragm design													
2/2 way	**82400**	indirectly actuated	G1/4 – G2				●	●					
2/2 way	**82730**	indirectly actuated - stainless steel	G1/4 – G1				●	●					
2/2 way	**82540**	with forced lifting - DC only	G1/4 – G2					up to G 1				G1 1/4 – G2	
2/2 way	**82370**	with forced lifting - DVGW certificate - DC only	G1/4 – G1							●			1262560
2/2 way	**82530**	with forced lifting	G1/4 – G1/2	●									
2/2 way	**84360**	with forced lifting - steam +150° C - DC only	G1/4 – G1										1262560
2/2 way	**82560**	with forced lifting - stainless steel	G1/4 – G1/2	●									
Piston design													
2/2 way	**85300**	indirectly actuated	G1/4 – G2					●					
2/2 way	**85320**	indirectly actuated - steam +200° C - DC only	G1/4 – G1										1262560
2/2 way	**85000**	with forced lifting - DC only	G1/2 – G2		up to G1/2	G3/4 – G2							
2/2 way	**85040**	with forced lifting - stainless steel - DC only	G3/8 – G1		up to G1/2	G3/4 – G1							
2/2 way	**85140**	with forced lifting - stainless steel - DC only	DN15 – 50		DN15	DN20 – 50					DN65 – 100		
Sealed core tube with PTFE-bellows													
2/2 way	**82080**	directly actuated with sealed core tube	G1/4 – G3/8										1262560
Pilot valve													
3/2 way	**84660**	directly actuated	G1/4				●						
3/2 way	**84680**	directly actuated	G1/4					●					
Dust cleaning valves													
2/2 way	**82960**	indirectly actuated electromagnetic operated	G3/4, G1, G1 1/2						●				
2/2 way	**82860**	indirectly actuated electromagnetic operated	G2							●			

Further information please consult the data sheet.

* For use in explosive atmosphere category 3, zone 2 and 22 according to 94/9/EC a special electrical connector housing is required.
Please indicate this application explicitly in your order.

Solenoids for potentially explosive atmospheres

Category 2 Zone 1 and 21









			Solenoid	8036	8041	8042	8136	8186	8191	8336	8341	8436
			Category	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C
			Type of ex-protection	EEx me II T4	EEx me II T3	EEx me II T3	EEx me II T4	EEx me II T4	EEx me II T3	EEx me II T4	EEx me II T3	EEx me II T4
			Body	Polymer	Polymer	Polymer	Polymer	Polymer	Polymer	Polymer	Polymer	Polymer
Execution	Series	Description	Connection	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint
Diaphragm design												
2/2 way	**82400**	indirectly actuated	G1/4 – G2									
2/2 way	**82730**	indirectly actuated – stainless steel	G1/4 – G1									
2/2 way	**82540**	with forced lifting	G1/4 – G2									G1 1/4 – G2
2/2 way	**82370**	with forced lifting – DVGW certificate	G1/4 – G1									
2/2 way	**82530**	with forced lifting	G1/4 – G1/2		●							
2/2 way	**82560**	with forced lifting – stainless steel	G1/4 – G1/2		●							
Piston design												
2/2 way	**85300**	indirectly actuated	G1/4 – G2									
2/2 way	**85000**	with forced lifting	G1/2 – G2							up to G1/2	up to G1/2	G3/4 – G2
2/2 way	**85040**	with forced lifting – stainless steel	G3/8 – G1							up to G1/2	up to G1/2	G3/4 – G1
2/2 way	**85140**	with forced lifting – stainless steel	DN15 – 50							DN15	DN15	DN20 – 50
Sealed core tube with PTFE-bellows												
2/2 way	**82080**	directly actuated with sealed core tube	G1/4 – G3/8			●						
Pilot valve												
3/2 way	**84660**	directly actuated	G1/4									
3/2 way	**84680**	directly actuated	G1/4									
Dust cleaning valves												
2/2 way	**82960**	indirectly actuated electromagnetic operated	G3/4, G1, G1 1/2					●	●			
2/2 way	**82860**	indirectly actuated electromagnetic operated	G2									

Category 2 Zone 1 and 21









			Solenoid	8441	8900	8920	9136	9186	9191	9336	9356	9540
			Category	EX II 2 GD T 140 °C	EEX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EEX II 2 GD T 110 °C	EX II 2 G	EX II 2 G	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C	EX II 2 GD T 140 °C
			Type of ex-protection	EEx me II T3	EEx de IIC T4/T5	EEx de IIC T4/T5	EEx me II T4	EEx me II T4	EEx me II T4	EEx me II T4	EEx me II T3	EEx me II T3/T4
			Body	Polymer	Steel	Steel	Polymer	Polymer	Polymer	Polymer	Polymer	Steel
Execution	Series	Description	Connection	M16x1,5 screw joint	M20x1,5 screw joint	M20x1,5 screw joint	with 3m cable	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M16x1,5 screw joint	M20x1,5 screw joint
Diaphragm design												
2/2 way	**82400**	indirectly actuated	G1/4 – G2				●	●	●			
2/2 way	**82730**	indirectly actuated – stainless steel	G1/4 – G1				●	●				
2/2 way	**82540**	with forced lifting	G1/4 – G2						up to G1			
2/2 way	**82370**	with forced lifting – DVGW certificate	G1/4 – G1								●	
2/2 way	**82530**	with forced lifting	G1/4 – G1/2									
2/2 way	**82560**	with forced lifting – stainless steel	G1/4 – G1/2									
Piston design												
2/2 way	**85300**	indirectly actuated	G1/4 – G2				●	●	●		●	
2/2 way	**85000**	with forced lifting	G1/2 – G2	G3/4 – G2	●	●						
2/2 way	**85040**	with forced lifting – stainless steel	G3/8 – G1	G3/4 – G1	●	●						
2/2 way	**85140**	with forced lifting – stainless steel	DN15 – 50	DN20 – 50	DN20 – 50	DN20 – 50						DN65 – 100
Sealed core tube with PTFE-bellows												
2/2 way	**82080**	directly actuated with sealed core tube	G1/4 – G3/8									
Pilot valve												
3/2 way	**84660**	directly actuated	G1/4				●					
3/2 way	**84680**	directly actuated	G1/4					●	●			
Dust cleaning valves												
2/2 way	**82960**	indirectly actuated electromagnetic operated	G3/4, G1, G1 1/2									
2/2 way	**82860**	indirectly actuated electromagnetic operated	G2							●	●	

For further information please consult the data sheet.

Contents in order of series

* NPT-connection available

** = Sealed core tube (Unsusceptible to contaminated fluids)