Technical Information

Solenoid Valve Basics
Switching Functions & Symbols .......................... 280
Number of Ways ............................................ 281
Direct Acting Solenoid Valves ............................ 282
Solenoid Valves without Differential Pressure ........ 282
Solenoid Valves with Differential Pressure ............ 283
Media Separated Solenoid Valves ....................... 283
Proportional Solenoid Valves ............................ 284
Motorised Proportional Valves ........................... 285
Motorised Proportional Valve Characteristic .......... 286
Seat Valves .................................................... 286
Zero Delta P Valves ......................................... 287
Operating Voltage .......................................... 287
Explosion Protection ....................................... 288
Response Time & Cycling Rate ........................... 288
Manual Override ............................................. 289
Protection Class (IP Protection) ......................... 289
Valve Selection Criteria .................................. 290
Materials - Seals ............................................. 290
Materials - Polymers ....................................... 291
Materials - Metals ........................................... 291

Click-on® Solenoid Valves
Click-on® - Solenoid Valves ............................. 292
Click-on® - Diaphragm Valve ............................. 292
Click-on® - Piston Valve .................................... 292

Pressure Actuated Valves
Pressure Actuated Valves – Principle of Operation .... 293
Pressure Actuated Valves – Conversion from NC to NO 293
Electric Position Indicator .................................. 294
Stroke Limiting System .................................... 294
NAMUR Adapter Plate ..................................... 295

Pressure, Flow and Media
Pressure Ranges ............................................. 296
Vacuum and Buschjost Valves ............................ 296
Calculating Flow Rates .................................... 297
Viscosity ....................................................... 297
pH-Value ..................................................... 298
Ammonia & Buschjost Valves ............................ 298
Steam, Hot Water & Buschjost Valves ................. 299
Liquefied Gas & Buschjost Valves ....................... 299
Oxygen & Buschjost Valves ............................... 300

Dust Collector Cleaning
Dust Collector Valves and Systems ....................... 301
Facts about Buschjost Dust Collectors Valves ........ 302
Dust Collector Valves & Blow Tubes .................... 302
Differential Pressure Regulators ......................... 303
Pressure Build-up Time .................................... 303
Air Tanks ...................................................... 304
Timer Solenoids ............................................ 304
Pneumatic Valve Controller ............................... 305
Humidity and Frost ......................................... 305

Commercial Vehicles
Valves in Commercial Vehicles .......................... 306
Heating Circuits In Commercial Vehicles ............. 306

Buschjost Technologies
Buschjost Part Numbering System ....................... 307
Installation ................................................... 307
Maintenance ............................................... 308
Electrical Connection ..................................... 308
Buschjost Solenoids ....................................... 309
Buschjost Solenoids - Heating ........................... 309
Latch Buschjost Valves ..................................... 310
Timer Solenoid .............................................. 310
EMC Electromagnetic Compability ...................... 311
Flange Dimensions ........................................ 311
Available Strainers ........................................ 312
Position Indicators ......................................... 312
Servo Amplifier ............................................. 313
Valve Seat Tightness ...................................... 313
Valve Blocks ................................................ 314
EC Type examined Valves to DVGW requirements .... 314
Test Certificates to DIN 50 049 / EN 10 204 .......... 315
Quality and Environmental Management ............. 315

Pressure Equipment Directive
Pressure Equipment Directive (PED) ................. 316

Safety Instructions
Safety Instructions for all Norgren and FAS series .... 318

ATEX and Buschjost Valves
ATEX .......................................................... 319

Test Certificates to DIN 50 049 / EN 10 204 .......... 315

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## Solenoid Valves without Differential Pressure

<table>
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<th>Grey cast iron</th>
<th>PVDF</th>
<th>Cast steel</th>
<th>Gun metal</th>
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<th>PA</th>
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<th>Hot water / steam</th>
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* DVGW EN 161 and EN 162 approval, ** 3.1 test certificate

## Solenoid Valves with Differential Pressure

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<th>Grey cast iron</th>
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### Technical Information

#### Pressure Actuated Valves

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* DV/GW EN 161 approval

#### Pilot valves for pressure actuated valves

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<th>Temperature</th>
<th>Brass</th>
<th>Stainless steel</th>
<th>Grey cast iron</th>
<th>PTFE</th>
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<th>Gun metal</th>
<th>Aluminium</th>
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* NAMUR

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## Technical Information

### Valves and Systems for Dust Filters

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<tr>
<th>Pressure (bar)</th>
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<th>Temperature</th>
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<td>DN 25 and DN 40</td>
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<td>DN 25 and DN 40</td>
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<td>83300</td>
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<td>G 1 and G 1 1/2</td>
<td>+85 °C</td>
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### Proportional Valves

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<th>Temperature</th>
<th>Brass</th>
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<th>Grey cast iron</th>
<th>PVDF</th>
<th>Cast steel</th>
<th>Gun metal</th>
<th>Aluminium</th>
<th>PPS</th>
<th>PA</th>
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<th>Hot water / steam</th>
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<td>-0.9 - 10</td>
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<td>+90 °C</td>
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<td></td>
<td></td>
<td></td>
<td>82880</td>
</tr>
</tbody>
</table>

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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**

![Symbol of a normally closed solenoid valve](image)

![Example of 2/2-way normally closed solenoid valve](image)

![Example of 3/2-way normally closed solenoid valve](image)

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 of a normally open solenoid valve](image)

![Example of 2/2-way normally open solenoid valve](image)

![Example of 3/2-way normally open solenoid valve](image)

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

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

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: “Mixer” pneumatic connection where either pressure “P1” or pressure “P2” are directed to outlet “A”

Example of solenoid valve operating a single acting cylinder

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Solenoid Valve Basics

Direct Acting Solenoid Valves

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.

Solenoid Valves without Differential Pressure

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 releases 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.

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)

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.

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.

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

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.

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 drawback 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 Parameters
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.

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.

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.

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.

Characteristic
Fluid: water
Δp: 1 bar
**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.

---

**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.

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/cm²
- **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.

---

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
© II 2 G
Ex

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.
**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.

**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:

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<th>1st digit</th>
<th>Electric shock hazard protection and protection against solid bodies</th>
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<td>No protection</td>
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<tr>
<td>1</td>
<td>Objects greater than 50 mm</td>
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<tr>
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<td>Objects greater than 12 mm</td>
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<td>3</td>
<td>Objects greater than 2.5 mm</td>
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<tr>
<td>4</td>
<td>Objects greater than 1.0 mm</td>
</tr>
<tr>
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<td>2</td>
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<td>3</td>
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<td>Water jets</td>
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<td>6</td>
<td>Heavy seas</td>
</tr>
<tr>
<td>7</td>
<td>Effects of immersion</td>
</tr>
<tr>
<td>8</td>
<td>Indefinite immersion</td>
</tr>
</tbody>
</table>

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.

We will gladly provide you with any further information required.
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 - 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 aggressive 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 for 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.

### 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

<table>
<thead>
<tr>
<th>Plastic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride&lt;br&gt;Resistant to most acids, alkalis, salt solutions and organic solutions; miscible with water. Not resistant to aromatic and chlorinated hydrocarbons.</td>
</tr>
<tr>
<td>PVDF</td>
<td>Polyvinylidene Fluoride&lt;br&gt;Suitable for nearly all aggressive fluids in the temperature range from -20 to +100 °C.</td>
</tr>
<tr>
<td>PFA</td>
<td>Perfluoralkoxy&lt;br&gt;As resistant as PVDF but in a higher temperature range from -20 to +150 °C.</td>
</tr>
<tr>
<td>PP</td>
<td>Polypropylene&lt;br&gt;Resistant to aqueous solutions of acids, alkalis and salts, depending on concentration and temperature.</td>
</tr>
<tr>
<td>POM</td>
<td>Polyoxymethylene&lt;br&gt;A material with a high degree of hardness and low water absorption.&lt;br&gt;Not suitable for bases, acids or oxidising agents.</td>
</tr>
<tr>
<td>PA</td>
<td>Polyamid&lt;br&gt;Suitable for all neutral fluids and gases.</td>
</tr>
<tr>
<td>PPS</td>
<td>Polyphenylene Sulfide&lt;br&gt;Suitable for all neutral fluids and gases.</td>
</tr>
</tbody>
</table>
Click-on® Solenoid Valves

- 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
Pressure Actuated Valves – Principle of Operation
(pneumatically actuated isolating valves)

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.

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).

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).

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

www.pacontrol.com
**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.

**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.

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

www.pacontrol.com
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.

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.

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

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

\[
Q = kv \cdot \sqrt[2]{\frac{\Delta p}{2}}
\]

\( Q = 16.45 \) 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

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<th>p bar</th>
<th>t °C</th>
<th>p bar</th>
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<td>0,70113</td>
</tr>
</tbody>
</table>

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 Materialforschung 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.
Dust Collector Cleaning

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.


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.

www.pacontrol.com
# Dust Collector Cleaning

## 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 m³/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](image)

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.
Dust Collector Cleaning

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.

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.

We will gladly provide you with any further information required.
**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 Technologies

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.

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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

**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.

**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 easy 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:


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

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### Flange Dimensions

The latest edition of the relevant DIN standard brochure.

#### PN 16, EN 1092-1

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Ø D = Flange diameter

Ø k = Pitch circle diameter

Ø d₂ = Hole diameter

z = Number of holes

The Buschjost flange valve ø D values given in parentheses.
### 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

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### Available Strainers

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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

**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 [mm³/s] for liquids or 300 x DN [mm³/s] for gases.

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

We will gladly provide you with any further information required.
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.

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

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We will gladly provide you with any further information required.

We will gladly provide you with any further information required.
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.

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.
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.
Pressure Equipment Directive

**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 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 the limits of the harmonised standards EN 61000-6-3 and EN 61000-6-1 are observed, and hence the requirements of the Electromagnetic Guideline (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. 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 the 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/EC) 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 the 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/EC) satisfied.

**Applies to the following series:**
82730, 82880

www.pacontrol.com
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.

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 Ex me II T4 or T3 explosion protection are electrical apparatuses for use as intended in hazardous areas.

They are marked: ☞ II 2 GD or ☞ 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.
Solenoids for potentially explosive atmospheres

### Category 3
**Zone 2 and 22**

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### Execution
- 2/2 way
- 3/2 way
- Piston design
- Diaphragm design
- Solenoid actuated
- Directly actuated
- Indirectly actuated
- Indirectly actuated - stainless steel
- Indirectly actuated - steam +150° C - DC only
- Indirectly actuated - steam +200° C - DC only
- Directly actuated - electromagnetic operated
- Directly actuated - electromagnetic operated
- Directly actuated - electromagnetic operated
- Directly actuated - electromagnetic operated

### Protection class
- IP 65

### Body
- Polymer
- Steel

### 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**

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<tr>
<th>Solenoid</th>
<th>B036</th>
<th>B041</th>
<th>B042</th>
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<tr>
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### Diaphragm design:

- 2/2 way 82400
- 2/2 way 82730
- 2/2 way 82540
- 2/2 way 82550
- 2/2 way 82590
- 2/2 way 85000
- 2/2 way 85040
- 2/2 way 85090
- 2/2 way 85140
- 2/2 way 86000
- 2/2 way 86040
- 2/2 way 86090

### Piston design:

- 2/2 way 82400
- 2/2 way 82730
- 2/2 way 82540
- 2/2 way 82550
- 2/2 way 82590
- 2/2 way 85000
- 2/2 way 85040
- 2/2 way 85090
- 2/2 way 85140
- 2/2 way 86000
- 2/2 way 86040
- 2/2 way 86090

For further information please consult the data sheet.

### Category 2
**Zone 1 and 21**

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### Diaphragm design:

- 2/2 way 82400
- 2/2 way 82730
- 2/2 way 82540
- 2/2 way 82550
- 2/2 way 82590
- 2/2 way 85000
- 2/2 way 85040
- 2/2 way 85090
- 2/2 way 85140
- 2/2 way 86000
- 2/2 way 86040
- 2/2 way 86090

### Piston design:

- 2/2 way 82400
- 2/2 way 82730
- 2/2 way 82540
- 2/2 way 82550
- 2/2 way 82590
- 2/2 way 85000
- 2/2 way 85040
- 2/2 way 85090
- 2/2 way 85140
- 2/2 way 86000
- 2/2 way 86040
- 2/2 way 86090

For further information please consult the data sheet.

www.pacontrol.com
## Contents in order of series

<table>
<thead>
<tr>
<th>Series</th>
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<tbody>
<tr>
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* NPT-connection available
** = Sealed core tube (Unsusceptible to contaminated fluids)