The so-called Tiny Tubes are our smallest valves. Besides their small physical dimensions, they feature respectable pneumatic power density and a long life time. Even though they are not part of a modular system, there is a versatile product portfolio of application-specific “plug & play” solutions.

All of the compact valves are micro-calibrated in order to attain constantly high flow rates in the automation industry. Attractive for medical application: nass magnet provides a special version of the Tiny Tubes for a lubrication-free operation with teflon-coated components.
The type System 3–10 stands for a compact solenoid valve with a width of 10 mm (block assembly is possible). Each variation has an armature diameter of 3 mm, which has been determined as the optimum for this pneumatic class through simulation and practical testing.

APPLICATION OF SYSTEM 3–10

Usually, the solenoids are used in automation as 3/2 way valves or 2/2 way valves with the switching functions *normally closed (NC)* or *normally open (NO)*. Typical maximum operating pressure and nominal orifice for the 3/2 way model are 10 bar / 0.7 mm. This type has been designed for the use with filtered compressed air and inert gases. The use of other substances, especially in medical applications, requires prior agreement with *nass magnet*.

FUNCTION

The plunger\(^1\) of System 3–10 is pressed downwards by the reset spring\(^2\). The plunger itself does not feature any sealing elements. The plunger movement transfers to the actuator, which is gathering the sealing element\(^3\).

In the de-energized state, the reset spring is taking effect on the sealing element through the armature and the actuator. The sealing element is pushed on the lower valve seat\(^4\). The plunger will move once the solenoid coil is under current. The actuator is now unloaded and moves upwards, supported by the lower pressure spring\(^5\).

The sealing element exposes the lower valve seat and seals towards the upper valve seat\(^6\). In a 2/2 way model or for the NO switching function, the valve seats are charged with individual pressures. In this case, a modified spring design is provided by the manufacturer.
SOLENOID VALVE SYSTEM 3-10

Switching function: 3/2 way (2/2 way on request)
De-energized state: NC (normally closed), NO (normally open)
Electrical connection: USC
Operating voltage: 12 V DC, 24 V DC

General Data
Voltage tolerance: ± 10 %
Ambient temperature: -10 °C to +50 °C
Relative duty cycle: 100 %
Activation/deactivation period: nominal 5 ms/5 ms
Insulation class of insulating materials: F
Degree of protection according to EN 60529: IP 40 (see type of contact)
Class of protection: III
Quality of medium according to ISO 8573-1: compressed air class 3, 3, 3
Mounting position: any (preferably plunger in vertical direction)
Imprint: nass magnet (customer imprint possible)

Note: The picture shows the 3/2 way NC type with electric/pneumatic interface on opposite side (OPS).
## Technical Data 3/2 Way Standard Versions with Electrical USC-Connector

<table>
<thead>
<tr>
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</tbody>
</table>

1. OPS: electric/pneumatic interface on opposite side
2. SAS: electric/pneumatic interface on the same side
SOLENOID VALVE SYSTEM 3-10

Switching function: 3/2 way (2/2 way on request)
De-energized state: NC (normally closed), NO (normally open)
Electrical connection: JPC
Operating voltage: 6 V DC, 12 V DC, 24 V DC

General Data
Voltage tolerance ± 10 %
Ambient temperature - 10 °C to + 50 °C
Relative duty cycle 100 %
Activation/deactivation period nominal 5 ms/5 ms
Insulation class of insulating materials F
Degree of protection according to EN 60529 IP 40 (see type of contact)
Class of protection III
Quality of medium according to ISO 8573-1 compressed air class 3, 3, 3
Mounting position any (preferably plunger in vertical direction)
Imprint nass magnet (customer imprint possible)

Note: The picture shows the 3/2 way NC type with electric/pneumatic interface on opposite side (OPS).
### Technical Data 3/2 Way Standard Versions with Electrical JPC-Connector

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<td>0,9</td>
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<td>X</td>
<td>OPS</td>
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</tbody>
</table>

<sup>1</sup> OPS: electric/pneumatic interface on opposite side

<sup>2</sup> SAS: electric/pneumatic interface on the same side
SOLENOID VALVE SYSTEM 3-10

Switching function: 3/2 way (2/2 way on request)
De-energized state: NC (normally closed), NO (normally open)
Electrical connection: M
Operating voltage: 24 V DC

General Data
Voltage tolerance ± 10 %
Ambient temperature -10 °C to +50 °C
Relative duty cycle 100 %
Activation/deactivation period nominal 5 ms/5 ms
Insulation class of insulating materials F
Degree of protection according to EN 60529 IP 40 (see type of contact)
Class of protection III
Quality of medium according to ISO 8573-1 compressed air class 3, 3, 3
Mounting position any (preferably plunger in vertical direction)
Imprint nass magnet (customer imprint possible)

Note: The picture shows the 3/2 way NC type with electric/pneumatic interface on opposite side (OPS).
**Technical Data** 3/2 Way Standard Versions with Electrical M-Connector

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<td>0,9</td>
<td>X X X</td>
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<td>OPS¹</td>
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</table>

¹ OPS: electric/pneumatic interface on opposite side
Electrical connection: USC
Operating voltage: 12 V DC, 24 V DC

Electrical connection: JPC
Operating voltage: 6 V DC, 12 V DC, 24 V DC

Electrical connection: M
Operating voltage: 24 V DC

SPECIAL REMARKS

System 3–10 is designed in compliance with VDE 0580. The alignment of the valves on manifolds without lateral gaps is permitted without any restriction of the operating conditions. A general lifetime of the products cannot be specified, as it is decisively influenced by ambient and operating conditions. Optionally, the solenoid valves can be designed for a lifetime of up to 400 million cycles.

nass magnet will be glad to assist you and to develop individual concepts for specifically required applications.
Connector with flying leads · USC form
Part No.: 616-202-0004
Length of flying leads: 300 mm

Connector with flying leads · JPC form
Part No.: 616-202-0012
Length of flying leads: 100 mm
Explanation: also suitable for connector type M

Connector with flying leads · JPC form
Part No.: 616-202-0002
Length of flying leads: 300 mm
Explanation: also suitable for connector type M

Connector with flying leads · JPC form
Part No.: 616-202-0003
Length of flying leads: 600 mm
Explanation: also suitable for connector type M

Fastening screw · M 1.6 x 14 mm
Part No.: 900-822-0033
Tightening torque: 0.1 Nm
Explanation: Two fastening screws are required per solenoid valve.

Interface inclusive seal and screws
Part No.: 130-080-0002
Explanation: For adaption of the pneumatic interface consultation with *nass magnet* is necessary.
PNEUMATIC CONNECTION OF SOLENOID VALVE SYSTEM 3–10
ACCORDING TO ISO 15218

Sizes [mm]

A min: 1,0
A max: 1,2
B min: 10,0
B max: 10,5
C ± 0,1: 6,8
D min: 3,8
D max: 4,0
E min: 6,2
E max: 6,4
F ± 0,1: 2,8
G ± 0,1: 1,0
T: M 1,6
P min: 3,0
Y min: 11,0
The type System 6–15 stands for a compact solenoid valve with a width of 15 mm (block assembly is possible). Each variation has an armature diameter of 6 mm, which has been determined as the optimum for this pneumatic class through simulation and practical testing.

APPLICATION OF SYSTEM 6–15

Usually, the solenoids are used in automation as 3/2 way valves or 2/2 way valves with the switching functions *normally closed (NC)* or *normally open (NO)*. Typical maximum operating pressure and nominal orifice for the 3/2 way model are 10 bar/1.2 mm. This type has been designed for the use with filtered compressed air and inert gases. The use of other substances, especially in medical applications, requires prior agreement with *nass magnet*.

FUNCTION

The plunger\(^1\) of System 6–15 is pressed downwards by the reset spring\(^2\). The plunger itself does not feature any sealing elements. The plunger movement transfers to the actuator, which is gathering the sealing element\(^3\).

In the de-energized state, the reset spring is taking effect on the sealing element through the armature and the actuator. The sealing element is pushed on the lower valve seat\(^4\). The plunger will move once the solenoid coil is under current. The actuator is now being unloaded and moves upwards, supported by the lower pressure spring\(^5\).

The sealing element exposes the lower valve seat and seals towards the upper valve seat\(^6\). In a 2/2 way model or for the NO switch function, the valve seats are charged with individual pressures. In this case, a modified spring design is provided by the manufacturer.
SOLENOID VALVE SYSTEM 6-15

Switching function: 3/2 way (2/2 way on request)
De-energized state: NC (normally closed), NO (normally open)
Electrical connection: form C - EN 175301-803-C
Operating voltage: 24 V DC
Sealing material: sealing element HNBR, gasket NBR

General Data
Voltage tolerance: ± 10 %
Ambient temperature: -10 °C to +50 °C
Relative duty cycle: 100 %
Activation/deactivation period: nominal 8 ms/6 ms
Insulation class of insulating materials: F
Degree of protection according to EN 60529: IP 65
Class of protection: I/III, je nach Operating voltage
Quality of medium according to ISO 8573-1: compressed air class 3, 3, 3
Mounting position: any (preferably plunger in vertical direction)
Imprint: nass magnet (customer imprint possible)

Note: The picture shows the 3/2 way NC type with electric/pneumatic interface on opposite side (OPS) with a 2-pole connector form C.
## Technical Data 3/2 Way Standard Versions

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<td>X</td>
<td>OPS(^1)</td>
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<td>0,4</td>
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<td>1,8</td>
<td>X</td>
<td>OPS</td>
<td>III</td>
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### Available on request:
- 2/2 way and NO versions;
- moulded, two-core wire;
- electric/pneumatic interface on the same side (SAS);
- alternative operating voltages such as 24 V AC/115 V AC/230 V AC;
- alternative sealing materials;
- alternative manual operation modes such as bistable/latching;
- electronic protective circuit;
- UL-/ATEX-certification

\(^1\) OPS: electric/pneumatic interface on opposite side
Fastening screw · M3 x 25 mm

**Part No.:** 900-822-0049  
**Tightening torque:** 0.4 Nm  
**Explanation:** Two fastening screws are required per solenoid valve.

---

Form seal

**Part No.:** 131-723-0008  
**Explanation:** Included in delivery of the solenoid valve; available as spare part.
PNEUMATIC CONNECTION OF SOLENOID VALVE SYSTEM 6-15
ACCORDING TO ISO 15218

Sizes [mm]

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<thead>
<tr>
<th>Measurement</th>
<th>Minimum</th>
<th>Maximum</th>
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</thead>
<tbody>
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<td>A min</td>
<td>1,6</td>
<td></td>
</tr>
<tr>
<td>A max</td>
<td>2,0</td>
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<td>B min</td>
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<td>B max</td>
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<td>C ± 0,1</td>
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<tr>
<td>D min</td>
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<td></td>
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<tr>
<td>D max</td>
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<td>E min</td>
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<td>E max</td>
<td>9,3</td>
<td></td>
</tr>
<tr>
<td>F ± 0,1</td>
<td>3,8</td>
<td></td>
</tr>
<tr>
<td>G ± 0,1</td>
<td>1,4</td>
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<tr>
<td>T</td>
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<tr>
<td>Y min</td>
<td>17,0</td>
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</table>
The type Cartridge 13 (C 13) stands for a compact, cylindric valve cartridge with a diameter of 13 mm. This allows for block assembly on a 15 mm grid. Therefore, C 13 satisfies the power characteristics of the solenoid valve type 6-15.

APPLICATION OF CARTRIDGE 13

Usually, valve cartridges are used in automation as 3/2 way valves or 2/2 way valves with the switching functions normally closed (NC) or normally open (NO). Typical maximum operating pressure and nominal orifice for the 3/2 way model are 13 bar/1.1 mm. This type has been designed for the use with filtered compressed air and inert gases. The use of other substances, especially in medical applications, requires prior agreement with nass magnet.

FUNCTION

The plunger\(^1\) of C 13 is being pushed into the extreme position by the reset spring\(^2\). The plunger itself does not feature any sealing elements. The plunger movement transfers to the actuator, which is gathering the sealing element\(^3\).

In a de-energized state, the reset spring is taking effect on the sealing insert through the plunger and the actuator. The sealing element is pushed on the lower valve seat\(^4\). The plunger will move once the solenoid coil is under current. The actuator is now unloaded and moves upwards, supported by the lower pressure spring\(^5\).

The seal element exposes the lower valve seat and seals towards the upper valve seat\(^6\). The 2/2 way model does not require a modified spring. It can be derived from the 3/2 way model by closing the aspiration channel in the customer-provided cavity.

Note: The shown cavity is to illustrate the customer’s pneumatic interface and is not included in the scope of delivery of C 13.
SOLENOID VALVE CARTRIDGE 13

Switching function: 3/2 way, 2/2 way
De-energized state: NC (normally closed), NO (normally open)
Operating voltage: 6 V DC, 12 V DC, 24 V DC
Sealing material: sealing element NBR

General Data
Voltage tolerance ± 10 %
Ambient temperature - 10 °C to + 50 °C (+ 70 °C with accessories possible)
Relative duty cycle 100 %
Activation/deactivation period
according to ISO/CD12238 nominal 5 ms/6 ms
Insulation class of insulating materials
according to DIN VDE 0580 F
Degree of protection according to EN 60529 IP 00
High voltage test according to VDE 0580 500 V
Class of protection III
Quality of medium according to ISO 8573-1 compressed air class 3, 3, 3
Mounting position any (preferably plunger in vertical direction)

Note: The picture shows the 3/2 way NC type without optional electronics. The NO version features an inverted order from 1 (P) to 3 (R).
## Technical Data 3/2 Way Standard Versions

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<td>15</td>
<td>24 V DC</td>
<td>0,8 X</td>
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</tr>
</tbody>
</table>

Available on request (amongst others):

- electronic protective circuit;
- PWM power reduction;
- increased ambient temperature;
- increased voltage tolerances;
- individual voltages.
PNEUMATIC CONNECTION OF SOLENOID VALVE CARTRIDGE 13

Interface for manual override

Pneumatic interface

Inactive

Active

Actuating pin
The type Cartridge 9 (C 9) identifies a high-compact, cylindric valve cartridge with a diameter of 9.5 mm. This allows for block assembly on a 12 mm grid.

APPLICATION OF CARTRIDGE 9

Usually, valve cartridges are used in automation as 3/2 way valves or 2/2 way valves with the switching functions normally closed (NC) or normally open (NO). Typical maximum operating pressure and nominal orifice for the 3/2 way model are 10 bar/0.5 mm. This type has been designed for the use with filtered compressed air and inert gases. The use of other substances, especially in medical applications, requires prior agreement with nass magnet.

FUNCTION

The plunger\(^1\) of Cartridge 9 is pushed into the extreme position by the reset spring\(^2\). The plunger itself does not feature any sealing elements. The plunger movement transfers to the actuator, which is gathering the sealing element\(^3\).

In a de-energized state, the reset spring is taking effect on the sealing element through the plunger and the actuator. The sealing element is pushed on the lower valve seat\(^4\). The plunger will move once the solenoid coil is under current. The actuator is now being unloaded and moves upwards, supported by the lower pressure spring\(^5\).

The sealing element exposes the lower valve seat and seals towards the upper valve seat\(^6\).
SOLENOID VALVE CARTRIDGE 9

Switching function: 3/2 way, 2/2 way
De-energized state: NC (normally closed), NO (normally open)
Operating voltage: 24 V DC
Sealing material: sealing element NBR

General Data
Voltage tolerance: ± 10 %
Ambient temperature: -10 °C to +40 °C (+50 °C with accessories possible)
Relative duty cycle: 100 %
Activation/deactivation period: nominal 6 ms/6 ms
Insulation class of insulating materials: Y
Degree of protection according to EN 60529: IP 00
High voltage test according to VDE 0580: 500 V
Quality of medium according to ISO 8573-1: compressed air class 2, 3, 3
Mounting position: any (preferably plunger in vertical direction)

3/2 way NC (normally closed) 2/2 way NO (normally open)
**Technical Data** Standard Versions

<table>
<thead>
<tr>
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<td>exhaust</td>
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<td>2–3</td>
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<td>2,8</td>
<td>4,6</td>
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</table>

Available on request (amongst others):
- electronic protective circuit;
- PWM power reduction;
- increased ambient temperature;
- increased voltage change;
- modified pressure tolerances;
- individual voltages.
PNEUMATIC CONNECTION OF SOLENOID VALVE CARTRIDGE 9

3/2 way NC (normally closed)  

2/2 way NO (normally open)