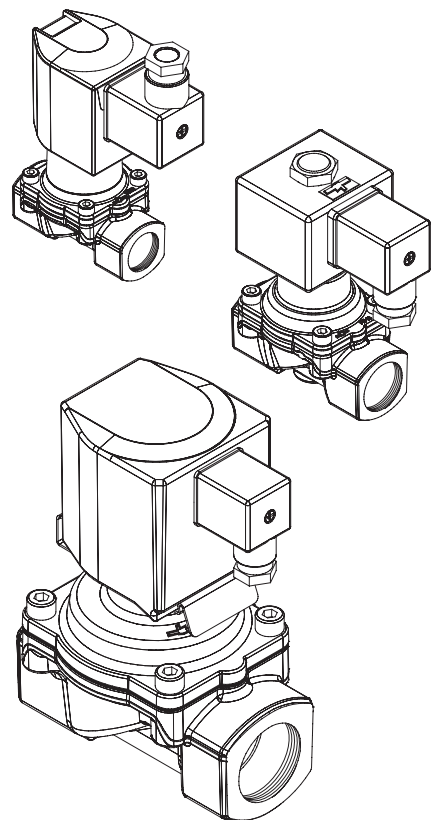


Operation manual – pre-controlled diaphragm valves with forced lifting

Document No. 1377006.0000.10011 Revision 8

Keep documentation for future use!



Series

82540^G **82640^N**

82590^G **84490^N** ^G G-Thread
^N NPT-Thread

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Translation of the original operating manual
Status as of November 2018

1 About this documentation

These mounting instructions guides you to mount, operate and maintain pre-controlled diaphragm valves with forced lifting safely.





This operation manual is intended for:
plant operators, installers, maintenance and service technicians.

1.1 Documentation validity

This operation manual applies to the following series

- 82540, 82590 (G-Thread)
- 82640, 84490 (NPT-Thread)
- for special products that are based on the series mentioned above

in combination with these solenoid:

| Series | 9151 9154 9176  9191  | 9301 9304 9356  9326  | 9401 9404 |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 82540 ^G | • | • | • |
| 82590 ^G | • | | • |
| 82640 ^N | • | • | • |
| 84490 ^N | • | | • |

| Order No. | Connection | Connection |
|-----------|-----------------|-----------------|
| xxxx0xx | G 1/4 | 1/4 NPT |
| xxxx1xx | G 3/8 | 3/8 NPT |
| xxxx2xx | G 1/2 | 1/2 NPT |
| xxxx3xx | G 3/4 | 3/4 NPT |
| xxxx4xx | G 1 | 1 NPT |
| xxxx5xx | G 1 1/4 | 1 1/4 NPT |
| xxxx6xx | G 1 1/2 | 1 1/2 NPT |
| xxxx7xx | G 2 | 2 NPT |
| Series | 82540, 82590 | 82640, 84490 |

1.2 Structure of safety instructions

Safety instructions warns against dangerous situations and must be observed in particular. Safety instructions are structured as follows:

SIGNAL WORD

Type of hazard

Consequences of non-observance

→ Precautions necessary to avoid the hazard

1.3 Hazard classes (ANSI Z535.6)

DANGER

Safety information indicates a hazardous situation with high risk which, if not avoided, will certainly result in death or (serious) injury.

WARNING

Safety information indicates a hazardous situation with moderate risk which, if not avoided, can cause death or severe injury.

CAUTION

Safety information indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Information indicates a hazardous situation which, if not avoided, could result damage to property.

1.4 Styles and symbols

This documentation uses the following styles and symbols:

| | |
|------------|--------------------------------------|
| • | List |
| → | Instruction |
| 1. 2. | Preset order of instructions |
| 701 | Part number (according to part list) |
| 1 | Flexible part number (section) |
| X | Replace spare part |

⚠ + **DANGER / WARNING / CAUTION;**
NOTICE: embedded safety message

given limits or fixed value

1.5 Intended use

The valve is solely intended to control or stop a fluid flow within approved operating limits. The fluid must only flow through the valve in the determined flow direction.

You may only operate the valve with fluids that will not cause any chemical reaction with the valve's materials or lead to abrasive effects.

Under the following conditions, a valve with nominal diameter > DN 25 is not approved as the only shut-off valve at the end of a pressure line:

- The contents of the pressure system must not be released into the atmosphere.
- The contents of the pressure system must not be transferred to a downstream system with lower nominal pressure rating (PN).

1.6 Improper use

In the following cases it is prohibited to operate the valve:

- The valve is not used for the designated purpose.
- The permitted temperature and pressure ranges are exceeded.
- Damages to the valve – e.g. cracks, deformation – were detected but the valve remains in operation.
- Malfunctions were detected but the valve remains in operation.
- The valve has been modified without authorization of the manufacturer.
- The safety instructions of this documentation are not observed.

For damages caused by improper use, the liability of the manufacturer is excluded.

Our guarantee expires in the following cases:

- Undue intervention and altering are done to the valve.
- This documentation or the operating limits as shown in the particular datasheet are not observed.

1.7 Obligations of operator

Product

- Over the entire life cycle of the valve all applicable regulations must be observed. The instructions of this operation manual must be observed and followed.
- Initiate a risk assessment of the overall installation, to detect potential dangers that may occur in combination of the valve with other components.

Persons

- Initiate the instruction of each person who is working with the valve. Applicable regulations about occupational safety and safety engineering must be known and applied.

Documentation

- This documentation must be fully read and understood.

- The instructions given in this operation manual must be put into practice.
- This documentation must be available at any time.

Markings at the operating site

- Ensure adequate warning of the risks linked to the valve. Use in the area of the installed valve the following warning and prohibition signs in compliance with EN ISO 7010 und BGV A8 (VBG125):

| | |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------|
|  | Warning sign to indicate risk of burns at the solenoid |
|  | Warning sign to indicate electrical hazards at the solenoid |
|  | Prohibition sign to prevent people from entering hazardous areas |

1.8 Personnel qualification

- Ensure as operator that persons who work on or with the valve are sufficiently qualified for this job.
- Comprehensively train the operating personnel in terms of safety.
- Only allow trained specialists to perform electric connections, commissioning, maintenance and trouble shooting

Demands

Operating personnel must be instructed on operational sequences and procedures.

Operating personnel must know its responsibilities regarding the work to be performed.

Trained specialists must possess profound knowledge in mechanical engineering, electrical engineering, hydraulic and pneumatic.


Trained specialists must be authorized to commission, ground and designate devices, systems and power circuits according to the standards of safety technology.

Trained specialists must possess profound

knowledge about design and principle of operation of the valves and the plant.

1.9 Personal protection equipment

- Wear appropriate protection equipment. Observe the personal protection equipment as requested in "residual risks" (see chapter 2).

| | |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Protective eye glasses to protect from escaping fluids or exhausting compressed air |
|  | Protective gloves resistance to cutting to protect from sharp edges or ridges; resistance to acids to protect from hazardous fluids |
|  | Protective footwear to protect from parts or tools falling down |

2 General safety instructions

These safety instructions are only related to the single valve. In combination with other plant components there may be other potential dangers, which must be taken into account by carrying out a risk analysis for the system.

- Compare the details on rating plate and data sheet to the operating data. The limits for the particular application (e.g. pressure, temperature) must not be exceeded.
- Only perform assembly and maintenance works when the pipe system is in depressurized state.
- Flood the valve slowly during commissioning. Fast pressurizing will cause the valve to open briefly.
- Strength tests with the valve seat open are permitted maximum up to 1.5 times of the nominal pressure rating (PN) at room temperature. The valve must not be operated during these tests.

⚠ DANGER



Hazardous electrical voltage (>25V AC; >60V DC)

There are risks from electrical voltage during assembly and maintenance.

- The electrical connection of the solenoid must be carried out only by a qualified electrician.
- You may only plug or remove the device socket in de-energized state.
- Disconnect the power supply off the solenoid prior to assembly or disassembly.

⚠ WARNING



Danger from pressurized pipelines

Pressurized pipelines may burst resulting in injuries.

- Depressurize pipe system and block the fluid flow prior to opening or unmounting the valve.

⚠ CAUTION






Risk of burns at the solenoid
Solenoid is heating up during operation. Touching the solenoid leads to risk of burns.

- Let the solenoid to cool down before working on the valve.

Residual risks



Weight of the valve
Phases: transport, storage, assembly, maintenance, disposal
Risk: falling off, tipping over
Personal protection equipment (PPE): Protective footwear

| | |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Hazardous fluids Phases: assembly, operation, maintenance, disposal Risk: skin contact, eye contact, breathing vapors PPE: protective gloves, protective eye glasses, breathing protection |
|  | Potentially explosive atmosphere Risk: danger of explosion ⚠ WARNING: use solenoid an device socket with Ex-protection. |
|  | Sharp-edges and threads Phases: transport, assembly, maintenance, disposal Risk: risk of cuts PPE: protective gloves |

3 Avoid damage to property

NOTICE

Deposits and dirt lead to malfunctions

If the control bores are clogged or the core is blocked by soil the valve no longer closes or opens.



- Install a strainer (mesh size ≤ 0.25 mm) in front of the valve inlet **P** if necessary.

Damages through accumulation of heat

The solenoid will overheat during continuous duty if the heat can not be radiated. This shortens the service life of the solenoid.

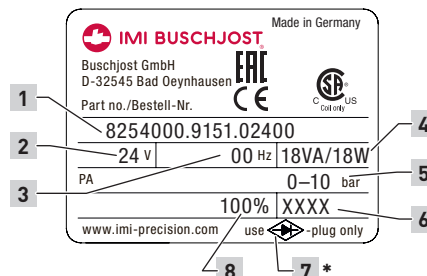
- You must not cover the solenoid with paint.
- You must not encase the solenoid in a tight housing or in a thermal insulation.

Residual risks

| | |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|  | Pressure against valve outlet The valve only firmly closes in flow direction. |
|  | Fluid freezing The valve is not designed to withstand the fluid freezing. |

4 Identifying the valve

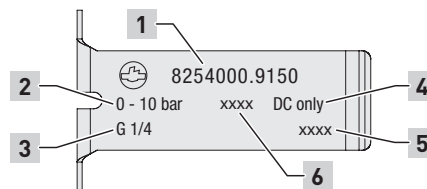
The rating plate is situated on the solenoid body.



Rating plate (example)

- 1 Order number
- 2 Operating voltage
- 3 Frequency of voltage
- 4 Power consumption inrush/holding
- 5 Operating pressure range
- 6 Date of manufacture (week/year)
- 7 * if this marking is shown on the rating plate: use device socket with rectifier
- 8 Duty cycle

An additional marking is applied to the spring clip of the **Click-on**-solenoid 9151, 9154, 9176 and 9191.



Marking of the spring clip (example)

- 1 Order number (without voltage/frequency)
- 2 Operating pressure range
- 3 Size of connection
- 4 DC only (only with DC coils)
- 5 Date of manufacture (week/year)
- 6 Serial number

5 Transport and storage

NOTICE

Damage of the valve

Valve may be damaged if foreign particles get into the valve.

- Transport and store the valve dry and only in the delivery packaging.
- Take valve out of the packaging immediately prior to assembly.
- Let the blanking plugs into valve connections.

Prolonged storage at -10 °C to +20 °C

Avoid during transport:

Mechanical loads: falling off, tipping over
Damages to the electrical terminal elements

Avoid during storage:

Thermal stress: permanently increased storage temperatures; distance to heat sources < 1m
Chemical load: at the storing site through solvents, chemicals, acids, fuels and similar
Weather conditions: at construction sites strong, watertight containers are necessary

Unfavourable storing conditions may reduce the service life of the sealing materials

6 Function

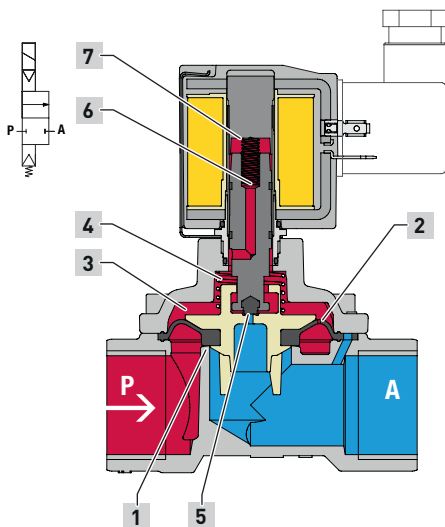
Design

2/2-way seat valve with diaphragm as sealing device.

Operation

The valve is electromagnetic indirectly-controlled with forced lifting.

6.1 NC-valve (normally closed)



Sectional view (NC-valve; closed)

- 1 Main valve seat
- 2 Control bore in the diaphragm (pressure build-up)
- 3 Chamber
- 4 Compression spring above the diaphragm
- 5 Pilot seat (pressure reduction)
- 6 Compression spring inside the core
- 7 Magnet face of the core tube

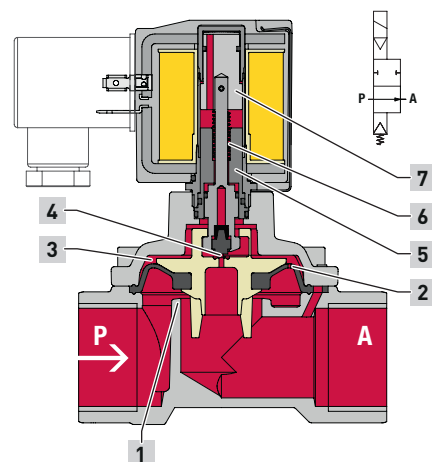
Normal position: closed

Due to the effect of the compression spring **6** inside the core the pilot seat **5** is closed. A compression spring **4** presses the diaphragm sealingly to the main valve seat **1**. The operating fluid flows through the control bore **2** in the diaphragm to the chamber **3** above the diaphragm and increases the closing force.

Switching position: open

The magnetic force lifts the core towards the magnet face of core tube **7** when the solenoid is energized. Since the pilot seat **5** is open the fluid pressure is reducing from chamber **3** towards valve outlet. More fluid is flowing off via the pilot seat **5** to the chamber **3** than the amount flowing in via the control bore **2** in the diaphragm. The differential pressure lifts up the diaphragm and opens the main valve seat **1**. Through the mechanical coupling with the core, the diaphragm is lifted into open position. In the absence of differential pressure only the solenoid force moves the diaphragm in the open position.

6.2 NO-valve (normally open)



Sectional view (NO-valve; open)

- 1 Main valve seat
- 2 Control bore in the diaphragm (pressure build-up)
- 3 Chamber
- 4 Pilot seat (pressure reduction)
- 5 Pole piece
- 6 Compression spring inside pole piece
- 7 Core

Normal position: open

When the solenoid is de-energized, the pilot seat **4** is opened by the effect of the compression spring **6**. Through the mechanical coupling with the core, the diaphragm is lifted into open position. More fluid is flowing off via the pilot seat **4** to the chamber **3** than the amount flowing in via the control bore **2** in the diaphragm. The resulting differential pressure supports the opening movement. The main valve seat **1** is open.

Switching position: closed

When the solenoid is energized, the core **7** is attracted by the pole piece **5**. The core **7** presses the seal plug sealingly against the force of compression spring **6** on the pilot seat **4**. Through the mechanical coupling with the core, presses the diaphragm sealingly to the main valve seat **1**. The outflow of the fluid flow from the chamber **3** is interrupted. The operating fluid flows through the control bore **2** in the diaphragm to the chamber **3** above the diaphragm and increases the closing force.

6.3 Solenoid types AC/DC

The valve may be equipped without changing of the mechanical part with an DC voltage solenoid or AC voltage solenoid. In both cases the permissible voltage tolerance amounts to $\pm 10\%$. Special versions may cause deviations.

7 Mounting

NOTICE

Damage of the valve

The valve may be damaged through inappropriate installation.

- Only trained and authorized specialists may install the valve..
- Only use appropriate tools and suitable sealing materials.
- Make sure that the valve is mounted in flow direction.
- Make sure not to distort the valve body, particularly in case of a misaligned pipe-work.

There must be no mechanical loads applied to the solenoid.

- Do not use solenoid as a lever during mounting.

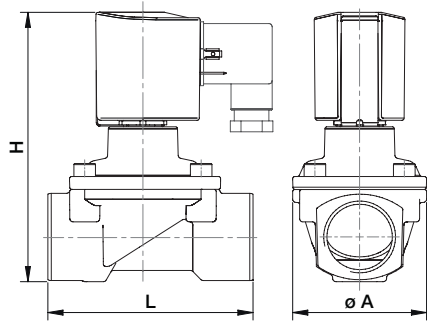
Valve only firmly closes in flow direction. Inflow against the valve's flow direction may lead to the destruction of components.

- Implement adequate measures if back flow is to expect; for example by adding check valves to the pipe system.

The valve subassembly may get damaged by external loads at the operating site.

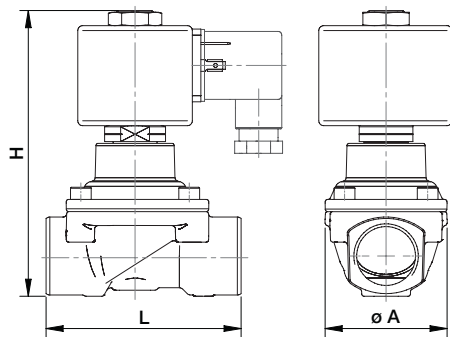
- Protect valve from objects falling down.
- Secure the valve against direct weather influences and the possible effects.

7.1 Valve dimensions in mm



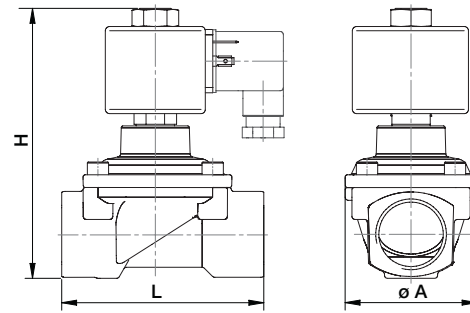
with solenoid 9151, 9154, 9176, 9191

| Connection size | | L | H | ø A |
|-----------------|---------|----|-----|-----|
| G 1/4 | 1/4 NPT | 60 | 107 | 44 |
| G 3/8 | 3/8 NPT | 60 | 107 | 44 |
| G 1/2 | 1/2 NPT | 67 | 108 | 44 |
| G 3/4 | 3/4 NPT | 80 | 115 | 50 |
| G 1 | 1 NPT | 95 | 124 | 62 |



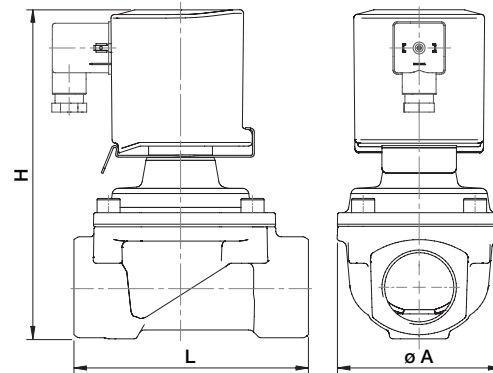
with solenoid 9301, 9304, 9356, 9326 / NC

| Connection size | | L | H | ø A |
|-----------------|---------|----|-----|-----|
| G 1/4 | 1/4 NPT | 60 | 108 | 44 |
| G 3/8 | 3/8 NPT | 60 | 108 | 44 |
| G 1/2 | 1/2 NPT | 67 | 110 | 44 |
| G 3/4 | 3/4 NPT | 80 | 117 | 50 |
| G 1 | 1 NPT | 95 | 126 | 62 |



with solenoid 9301, 9304, 9356 and 9326 / NO

| Connection size | | L | H | ø A |
|-----------------|---------|----|-----|-----|
| G 1/4 | 1/4 NPT | 60 | 109 | 44 |
| G 3/8 | 3/8 NPT | 60 | 109 | 44 |
| G 1/2 | 1/2 NPT | 67 | 111 | 44 |
| G 3/4 | 3/4 NPT | 80 | 118 | 50 |
| G 1 | 1 NPT | 95 | 127 | 62 |



with solenoid 9401 and 9404

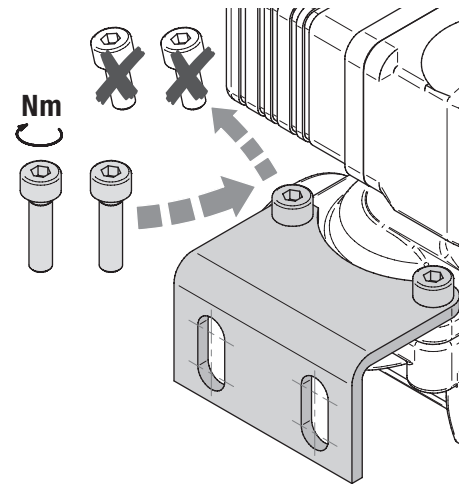
| Connection size | | L | H | ø A |
|-----------------|-----------|-----|-----|-----|
| G 1 1/4 | 1 1/4 NPT | 132 | 186 | 92 |
| G 1 1/2 | 1 1/2 NPT | 132 | 186 | 92 |
| G 2 | 2 NPT | 160 | 200 | 109 |

7.2 Mounting accessories

Mounting bracket

With an optional mounting bracket, you can connect the valve to a load-bearing structure at the installation site, thus protecting against vibration, for example.

→ Attach the mounting bracket to a long site of valve cover before to assembly. Use the fixing screws delivered with the mounting bracket to achieve the necessary screw-in depth.



Mounting bracket (example)

Available mounting brackets

| Order No. | Connection size | |
|-----------|-----------------|-----------|
| 1258986 | G 1/4 | 1/4 NPT |
| | G 3/8 | 3/8 NPT |
| | G 1/2 | 1/2 NPT |
| 1258991 | G 3/4 | 3/4 NPT |
| 1258996 | G 1 | 1 NPT |
| 1259005 | G 1 1/4 | 1 1/4 NPT |
| | G 1 1/2 | 1 1/2 NPT |

7.3 Conditions of installation

Compliance with operating limits

Ensure to comply with the operating limits prior to mounting the valve. Observe the valve's data sheet.

Planning of the pipe system

The manufacturer recommends to include manual stop valves and drain valves in the plant so that the pipe system may be depressurized and drained prior to working on the valve.

Valve's mounting position

Valve's mounting position may be any.

preferably: Solenoid vertical on top

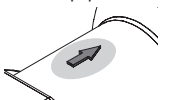


7.4 Preparation

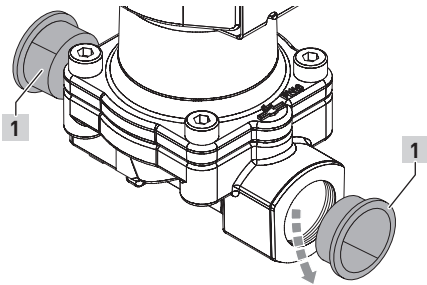
- Check the valve for externally visible damages.
- Let the valve in its protective package prior to mounting.
- Make sure that there is enough free space for disassembly the valve in case of maintenance.
- ⚠ **WARNING** Depressurize the pipe system.
- **NOTICE** Clean the pipe system prior to mounting the valve.

7.5 Mounting valve to pipeline

- Mount the valve to the designated pipeline. Comply with existing connections.
- Arrange the valve according to the pipeline's flow direction. An arrow on the valve body marks the flow direction.

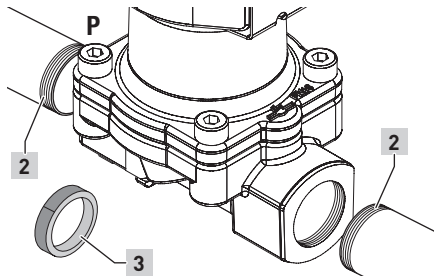


1. Take out the blanking plugs **1** from valve inlet and valve outlet.



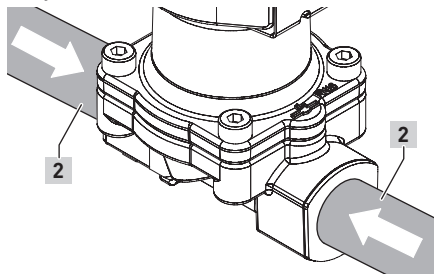
Take out blanking plugs

2. Install a strainer in front of the valve inlet **P** if necessary.
3. Firmly seal pipeline's thread **2** with an appropriate sealing material (e.g. PTFE sealing tape **3**).



Firmly seal pipeline's thread

4. Attach pipelines threads **2** to the valve's connection threads.
NOTICE Make sure not to distort the valve body.



Attach pipelines to valve

8 Connecting solenoid electrically

→ Always connect the device socket which was delivered by Buschjost.

| solenoid | 915x | 930x | 940x |
|----------|------|------|------|
|----------|------|------|------|

⚠ DANGER

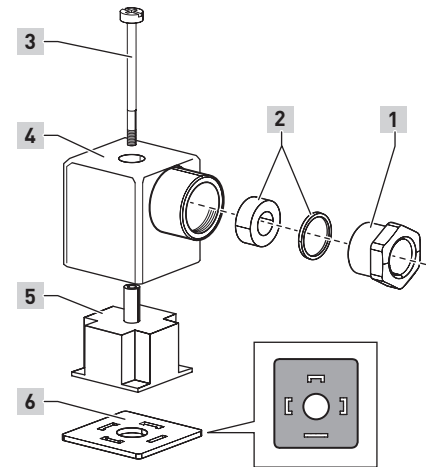


**Hazardous electrical voltage
(>25V AC; >60V DC)**
There are high risks from electrical voltage during assembly works.

- Work on electrical installations may only be carried out by a qualified and authorized electrician (refer to 1.8).
- You must connect the earth wire to the terminal marked with the grounding symbol \oplus .
- You may only plug the device socket in de-energized state.
- Make sure that the insulation of the strands is not pinched.

Connection errors lead to dangers

- After connecting the solenoid carefully close the terminal compartment to restore protection.
- To secure IP65 protection after connecting: Carefully close the device socket. Check whether the flat seal between solenoid and device socket is properly seated. Check whether cable gland is properly sealed.
- Connect solenoid in accordance with the electrical regulations.
- Use a **round** cable with diameters from 5 mm to 10 mm. The wire cross section must not exceed 1.5 mm².

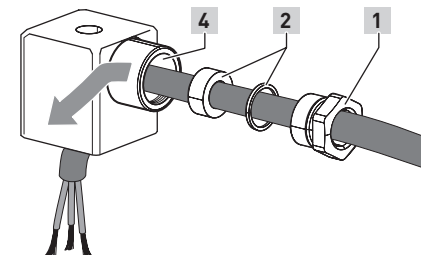


Overview: Device socket

- 1 Pressure screw
- 2 Washers
- 3 Middle screw
- 4 Device socket's housing
- 5 Socket insert
- 6 Flat gasket

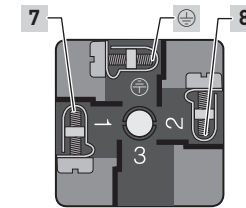
→ Make sure that the flat gasket **6** and socket insert **5** are mounted congruently with the connecting lugs of the solenoid.

1. Slide pressure screw **1**, washers **2** and device socket's housing **4** on the cable.



Feed cable through device socket

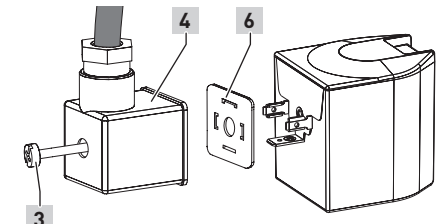
2. Attach the protective conductor at first (insulation: yellow/green) to the terminal marked with the grounding symbol \oplus .



Configuration of the socket insert

- \oplus Protective earth (PE)
- 7 Terminal 1
- 8 Terminal 2

3. Attach the other wires to the terminals **7** and **8** of the socket insert **5**.
⚠ WARNING Ensure the correct polarity of terminals marked „+“ and „-“.
4. Put the housing of the device socket **4** in the chosen position (9 o'clock, 12 o'clock, 3 o'clock, 6 o'clock) onto socket insert **5**.
5. Tighten pressure screw **1** to cable gland.
NOTICE Cable gland must firmly seal.
6. Pull protective cap from the plug contacts of the solenoid.
7. Attach flat gasket **6** and housing **4** with socket insert to the connection lugs of the solenoid.
⚠ WARNING Make sure that the seal is evenly positioned on the entire surface between solenoid and device socket.



place mounted device socket (example)

8. Tighten middle screw **3** with 40 Ncm.
NOTICE Avoid visible distortion of the device socket's housing.

Tightening torque 40 Ncm \pm 10 Ncm

| | | | | |
|----------|------|------|------|------|
| solenoid | 9176 | 9191 | 9356 | 9326 |
|----------|------|------|------|------|

Solenoid 9176 and 9326

→ Observe operation manual 1262559 supplied with the solenoid.

Solenoid 9191

→ Observe operation manual 1377066 supplied with the solenoid.

Solenoid 9356

→ Observe operation manual 1258739 supplied with the solenoid.

9 Operating conditions

→ Ensure that all operating limits of the valve are considered during the configuration of the overall system.

Operating limits

| | | |
|----------------------------------|-----------|-------------------------------------------|
| Operating pressure ≤ G1 | | 0 to 10 bar 0 to 16 bar ^[1] |
| Operating pressure > G1 | | 0 to 16 bar |
| Fluid temperature ^[2] | with NBR | −10°C to +90°C |
| | with FPM | −5°C to +110°C |
| | with EPDM | −10°C to +110°C |
| Ambient temperature | | −10°C to +50°C |

^[1] applies only to solenoid 9300; and to 8259635.94xx.xxxxx, 8259735.94xx.xxxxx

^[2] depending on diaphragm material

info For special products apply the operating limits specified on the article data sheet and the rating plate.

Permitted media

| |
|-------------------------------------------------------------------------|
| Series 82540, 82640 for neutral, gases and liquid fluids |
| Series 82590, 84490 for slightly aggressive, gases and liquid fluids |

10 Commissioning

⚠ CAUTION

Danger through escaping fluid
NO-type valves are open in de-energized state.

→ Apply protective measures to prevent any fluid escaping during commissioning.

→ Ensure compliance with the operating conditions specified in chapter 9.

10.1 Checking the switching function

→ Check valve's switching function without fluid prior to flooding the valve and exposing valve to the operating pressure. A metallic clicking sound must be heard during the electrical actuation of the valve. This sound is caused by the impact of the core.

10.2 Flooding the valve

1. Check whether all connections to pipe lines are firmly sealed.
2. Slowly increase the pressure to flood the valve. Thus to prevent pressure hammers.
NOTICE Fast pressurizing will cause the valve to open briefly.
⚠ WARNING To fast flooding of the valve may lead fluid to escape. **NOTICE** Do not exceed the maximum operating pressure.

11 Operation

NOTICE

Thermal destruction of AC solenoids
Operating AC solenoids in unmounted state will cause them to burn out.

→ Do not operate AC voltage solenoids without being mounted above core tube with core.

Actuate valve periodically

→ **NOTICE** Actuate the valve at least once a month to prevent functional parts getting blocked.

12 Maintenance

Maintenance work must only be carried out by qualified personnel (refer to section 1.8). Deposits of the medium, dirt particles, aged or worn out seals may lead to malfunctions.

→ Individually determine as the operator application specific maintenance intervals.

12.1 Cleaning and visual inspection

→ Periodically clean the valve and perform a visual inspection at the same time.

1. ⚠ **DANGER** Disconnect the solenoid from power supply.
2. ⚠ **CAUTION** Leave the solenoid to cool down prior to working on the valve.
3. Check whether cover screws are properly fixed. Refer to section 12.7.
4. Check whether the device socket is firmly sealed. (refer to chapter 8)
5. Check for damages and leakages.

12.2 Checking for tightness and strength

NOTICE

Risk of damaging the valve
Invalid test conditions may lead to damage of the valve.

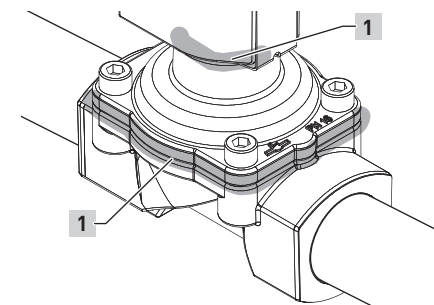
- Do not exceed the maximum operating pressure during the test for internal tightness (valve seat closed).
- The test for strength and external leakage (valve seat opened) according to EN12266 is permitted with maximum 1.5 times of the nominal pressure rating (PN) at room temperature.
- The valve must not be operated during these tests.
- Ensure to increase the pressure slowly.
- After each test, depressurize the valve outlet first.

Checking internal tightness

1. Close the valve (NC valve: solenoid de-energized; NO valve: solenoid energized).
2. Flood the valve.
3. Gradually pressurize up to the maximum operating pressure. There must no fluid escape.

Checking strength and external tightness

1. Open the valve (NC valve: solenoid energized; NO valve: solenoid de-energized).
2. Flood the valve.
3. Gradually pressurize maximum up to 1.5 times of the nominal pressure rating (PN) at room temperature.
4. Apply soap sud to the outer sealing edges 1 and check for the formation of bubbles. There must no bubbles appear.



Check sealing edges

12.3 Preparing maintenance of internal parts

The valve body may remain in the pipework during maintenance.

1. ⚠ **DANGER** Disconnect the solenoid from power supply.
2. ⚠ **WARNING** Depressurize the pipe system.
3. ⚠ **CAUTION** Risk of burns at the heated solenoid. Let the solenoid to cool down before working at the valve.
4. ⚠ **WARNING** Drain the pipelines completely if the fluids are harmful to the environment or health. Handle water polluting fluids in accordance with legal requirements.

12.4 Checking valve parts

perform after disassembly

1. Check disassembled valve parts for damages and wear.
2. Check whether valve seat is intact. The valve seat must not have any damages.
3. If the valve seat is **damaged** you must replace valve body **101**.

12.5 Cleaning valve parts and valve

perform after disassembly

1. Clean diaphragm **103**. **NOTICE** Use only neutral, non-aggressive cleaners.
2. Clean all contact surfaces between o-rings and diaphragm.
3. Remove dirt in control bores, chambers and threads.
4. **NC valve:** Clean core **705**.
NO valve: Clean core **705** and pole piece **704**.

12.6 Replacing spare parts

perform after disassembly

⚠ CAUTION

Risk of injury caused through the installation of wrong parts

The installation of wrong components may lead to early wear and early failure of the component. This increases the risk of injury.

- Ensure that only original spare parts are installed.
- Specify the valve number when ordering a spare part kit.

- The manufacturer recommends to replace all spare parts at the same time.
- **NOTICE** Protect all components from dirt.
- The spare parts are marked with **X** in section **12.9** in the respective **component overview** for **A** to **E**.

12.7 Tightening torque screws

observe for reassembly

- Following tightening torque of fixing screws **104** must be observed during reassembly:

| Connections | Thread | Torque |
|-------------|-----------|--------|
| G 1/4 | 1/4 NPT | M4 |
| G 3/8 | 3/8 NPT | M4 |
| G 1/2 | 1/2 NPT | M4 |
| G 3/4 | 3/4 NPT | M5 |
| G 1 | 1 NPT | M6 |
| G 1 1/4 | 1 1/4 NPT | M8 |
| G 1 1/2 | 1 1/2 NPT | M8 |
| G 2 | 2 NPT | M8 |

¹ Nm ±10%

12.8 Lubricating valve parts accordingly

perform prior to reassembly

NOTICE

Damage of the valve

The installation of wrong components may lead to early wear and early failure of the component.

- Use appropriate lubricants.

- Coat the following spare parts thinly with appropriate lubricant:

- each o-ring
- for valves with solenoid 9401 and 9404: inner space of core tube **701** and the metallic sealing surface between core tube **701** and valve cover **102**
- for series 82590 and 84490: thread of fixing screws **104** and the thread of the core tube **701**

12.9 Valve-specific disassembly/reassembly

| A | NC valves* | | | |
|----------|------------|------|------|------|
| solenoid | 9151 | 9154 | 9176 | 9191 |

→ refer to page 9

| B | NC valves* | | | |
|----------|------------|------|------|------|
| solenoid | 9301 | 9304 | 9356 | 9326 |

→ refer to page 10

| C | NC valves* | | | |
|----------|------------|------|--|--|
| solenoid | 9401 | 9404 | | |

→ refer to page 11

| D | NO valves** | | | |
|----------|-------------|------|------|------|
| solenoid | 9151 | 9154 | 9176 | 9191 |

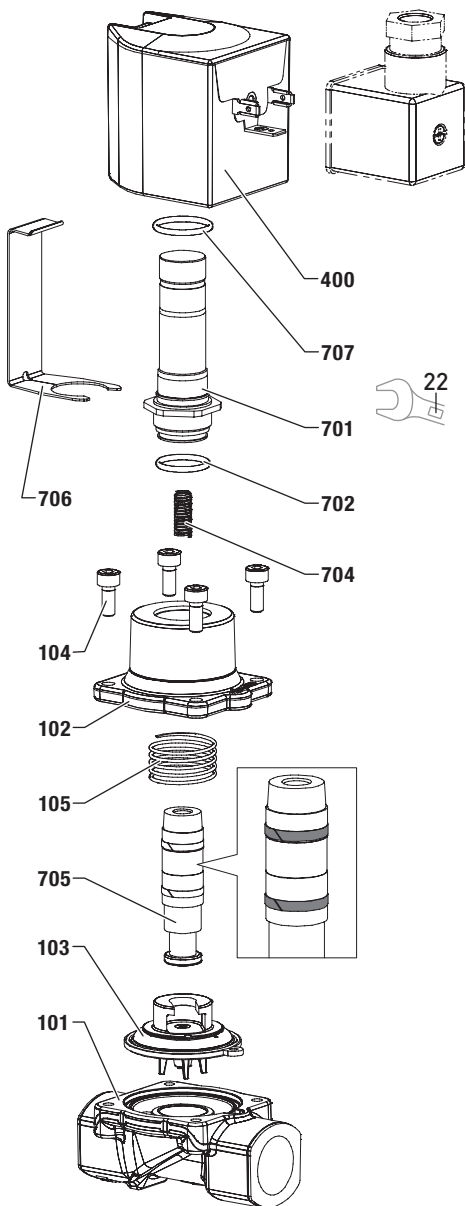
→ refer to page 12

| E | NO valves** | | | |
|----------|-------------|------|------|------|
| solenoid | 9301 | 9304 | 9356 | 9326 |

→ refer to page 13

* normally closed

** normally open



NC valve (example: G 1/2; series 82540)

| A | NC valve | | | |
|----------|----------|------|------|------|
| solenoid | 9151 | 9154 | 9176 | 9191 |

| | | | | |
|-----|--------------------|--|---|--|
| 101 | Valve body | | | |
| 102 | Valve cover | | | |
| 103 | Diaphragm | | X | |
| 104 | Fixing screws | | | |
| 105 | Compression spring | | X | |
| 400 | Solenoid body | | | |
| 701 | Core tube | | | |
| 702 | O-ring | | X | |
| 704 | Compression spring | | X | |
| 705 | Core | | X | |
| 706 | Spring clip | | | |
| 707 | O-ring | | X | |

Unmounting solenoid

→ Disconnect solenoid from valve by slightly pulling on the spring clip **706** and pulling the solenoid away from the core tube **701** with a rotational motion.
NOTICE O-ring **707** may get stripped away. Not lose! Without this O-ring, the IP protective class is no longer guaranteed.

Disassembling valve parts

1. Loosen core tube **701** (wrench size 22).
2. Take off core tube **701** together with spring clip **706** from core **705**.
3. Pay attention to loose compression spring **704**.
4. Slide O-rings **702** and **707** from core tube **701**.
5. Loosen four fixing screws **104** from valve cover **102**.
6. Take off valve cover **102** from core **705**.
7. Take off compression spring **105**.
8. Take off diaphragm **103** and core **705** from valve body **101**.
9. Slide core **705** sideways out of holder of the diaphragm **103**.

→ After disassembly, comply with the instructions in section 12.4 to 12.8.

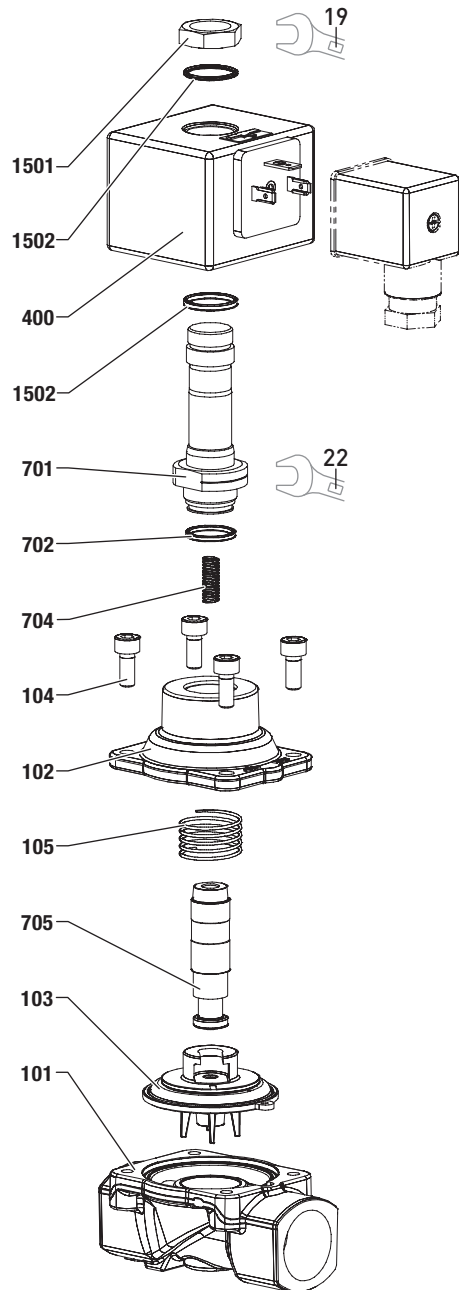
Reassembling valve parts

1. Slide core **705** sideways in holder of the diaphragm **103**.
2. Place diaphragm **103** together with core **705** correctly positioned on valve body **101**. The diaphragm's nose must be positioned in the recess above the bleed orifice.
3. Put compression spring **105** centered on diaphragm **103**.
4. Put valve cover **102** on.
NOTICE Make sure that the diaphragm is not jammed by valve cover.
5. Insert four fixing screws **104**. Tighten fixing screws crosswise. Observe tightening torque – refer to table in 12.7.
6. Insert compression spring **704** into core **705**.
7. Insert O-ring **702** into groove of core tube **701**.
8. Slide core tube **701** over core **705** on valve cover **102**.
9. Insert spring clip **706** between core tube **701** and valve cover **102**.
10. Screw and tighten core tube **701** (wrench size 22) on valve cover **102**.

Tightening torque 20 Nm ± 2 Nm

Mounting solenoid

1. Push o-ring **707** onto core tube until the o-ring is flush to screw piece **703**.
2. Arrange solenoid **400** parallel to spring clip above core tube **701**.
3. Slightly bend back spring clip **709**. Place solenoid **400** on the core tube **701**. Let solenoid snap to spring clip.
4. **NOTICE** Penetrating humidity may cause corrosion of the solenoid cavity. Press solenoid with a little twist towards valve cover. Thus to ensure that solenoid is flush to screw piece **703**. Otherwise o-ring **707** will not seal sufficiently.



NC valve (example: G 3/4; series 82540)

| B | NC valve | | | |
|----------|----------|------|------|------|
| solenoid | 9301 | 9304 | 9356 | 9326 |

| | | |
|------|---------------------|---|
| 101 | Valve body | |
| 102 | Valve cover | |
| 103 | Diaphragm | X |
| 104 | Fixing screws | |
| 105 | Compression spring | X |
| 400 | Solenoid body | |
| 701 | Core tube | |
| 702 | O-ring | X |
| 704 | Compression spring | X |
| 705 | Core | X |
| 1501 | Special hexagon nut | |
| 1502 | O-ring (2x) | X |

Unmounting solenoid

1. Loosen special hexagon nut **1501** (wrench size 19) and remove located below O-ring **1502**.
2. Take off solenoid **400** from core tube **701**.
NOTICE The O-ring **1502** may get stripped away. Not lose! Without this O-ring, the IP protective class is no longer guaranteed.

Disassembling valve parts

1. Loosen core tube **701** (wrench size 22).
2. Take off core tube **701** from core **705**.
3. Pay attention to loose compression spring **704**.
4. Slide O-rings **702** and **1502** from core tube **701**.
5. Loosen four fixing screws **104** from valve cover **102**.
6. Take off valve cover **102** from core **705**.
7. Take off compression spring **105**.
8. Take off diaphragm **103** and core **705** from valve body **101**.
9. Slide core **705** sideways out of the holder of the diaphragm **103**.

→ After disassembly, comply with instructions in section 12.4 to 12.8.

Reassembling valve parts

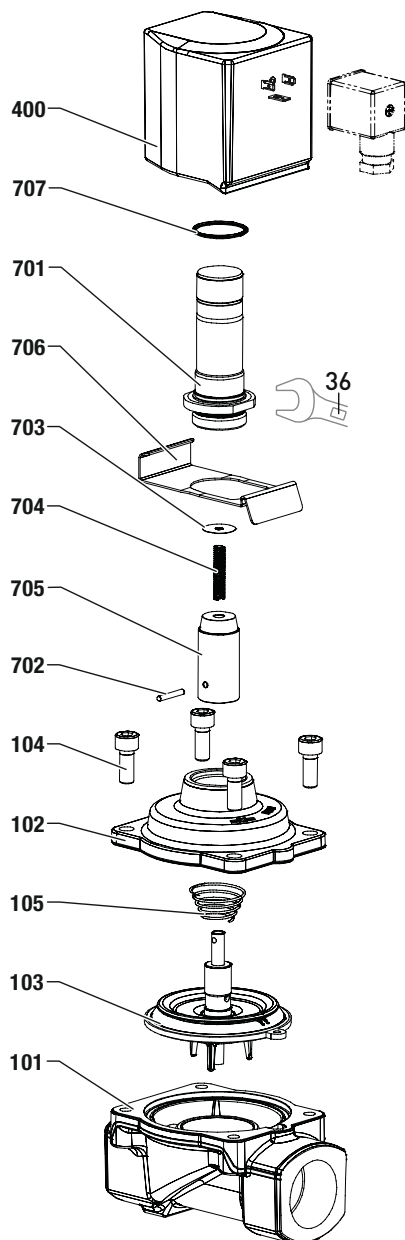
1. Slide core **705** sideways in the holder of the diaphragm **103**.
2. Place diaphragm **103** together with core **705** correctly positioned on valve body **101**. The diaphragm's nose must be positioned in the recess above bleed orifice.
3. Put compression spring **105** centered on diaphragm **103**. Put valve cover **102** on.
NOTICE Make sure that the diaphragm is not jammed by valve cover.
4. Insert the four fixing screws **104**. Tighten fixing screws crosswise. Observe tightening torque – refer to table in 12.7.
5. Insert the compression spring **704** into core **705**.
6. Insert O-ring **702** into the groove of core tube **701**.
7. Slide core tube **701** over the core **705** on valve cover **102**.
8. Screw and tighten core tube **701** (wrench size 22) on valve cover **102**.

Tightening torque 20 Nm ± 2 Nm

Mounting solenoid

1. Push O-ring **1502** onto core tube **701** until it rests smooth on the tube's basis.
2. Place solenoid **400** on core tube **701**.
3. Put O-ring **1502** onto core tube **701**, in the groove of solenoid **400**.
4. Align solenoid **400** to the desired direction.
5. Fix solenoid **400** with hexagon screw **1501** (wrench size 19).

Tightening torque 12 Nm ± 2 Nm



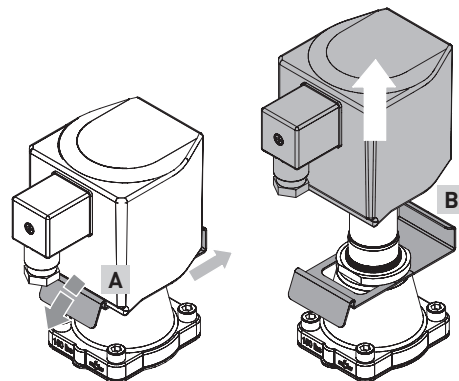
NC valve (example: G 1 1/4; series 82540)

| C | NC valve | |
|----------|----------|------|
| solenoid | 9401 | 9404 |

| | | |
|-----|------------------------|---|
| 101 | Valve body | |
| 102 | Valve cover | |
| 103 | Diaphragm with spindle | X |
| 104 | Fixing screws | |
| 105 | Compression spring | X |
| 400 | Solenoid body | |
| 701 | Core tube | |
| 702 | Straight pin | X |
| 703 | Round plate | |
| 704 | Compression spring | X |
| 705 | Core | X |
| 706 | Spring clip | |
| 707 | O-ring | X |

Unmounting solenoid

- A** Push down the downwardly angled tab of the spring clip **706**. And move the spring clip **706** towards the middle to release the solenoid.
- B** Take off the solenoid **400** from the core tube **701**.
NOTICE The O-ring **707** may get stripped away. Not lose! Without this O-ring, the IP protective class is no longer guaranteed.



Dissassemble solenoid 9401 (example)

Disassembling valve parts

- Loose core tube **701** (wrench size 36).
- Take off core tube **701** together with spring clip **706** from core **705**.
NOTICE Pay attention to loose components: compression spring **704**, round plate **703**.
- Slide O-ring **707** from core tube **701**.
- Press out straight pin **702** with a bolt (\varnothing 3 mm) and take off core **705** from the spindle of the diaphragm **103**.
- Loosen four fixing screws **104** from valve cover **102**.
- Take off valve cover **102** from core **103**.
- Take off compression spring **105**.
- Take off diaphragm **103** from valve body **101**.

→ After disassembly, comply with instructions in section 12.4 to 12.8.

Reassembling valve parts

- Place the diaphragm **103** correctly positioned on the valve body **101**. The diaphragm's nose must be positioned in the recess above bleed orifice.
- Put compression spring **105** centered on diaphragm **103**. Put valve cover **102** on.
NOTICE Make sure that the diaphragm is not jammed by valve cover.
- Insert the four fixing screws **104**. Tighten fixing screws crosswise. Observe tightening torque – refer to table in 12.7.
- Put core **705** on diaphragm's spindle **103**.
- Align spindle and core **705** to cross bore.
- Insert straight pin **702** flush to fix core **705** to diaphragm **103**.
- Insert compression spring **704** into core **705**.
- Insert round plate **703**, with smooth side facing the pole surface, into core tube **701** from below.

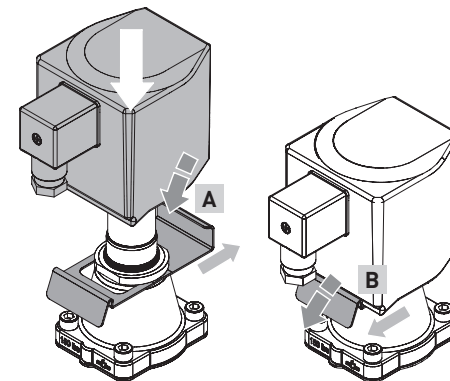
Note for overhead mounting: Fix round plate **703** to pole surface with a little lubricating grease.

- Mount spring clip **706** on the guide shoulder of the screw sleeve of core tube **701**.
- Slide core tube **701** over core **705** on valve cover **102**.
- Screw core tube **701** (wrench size 36) on valve cover **102**.

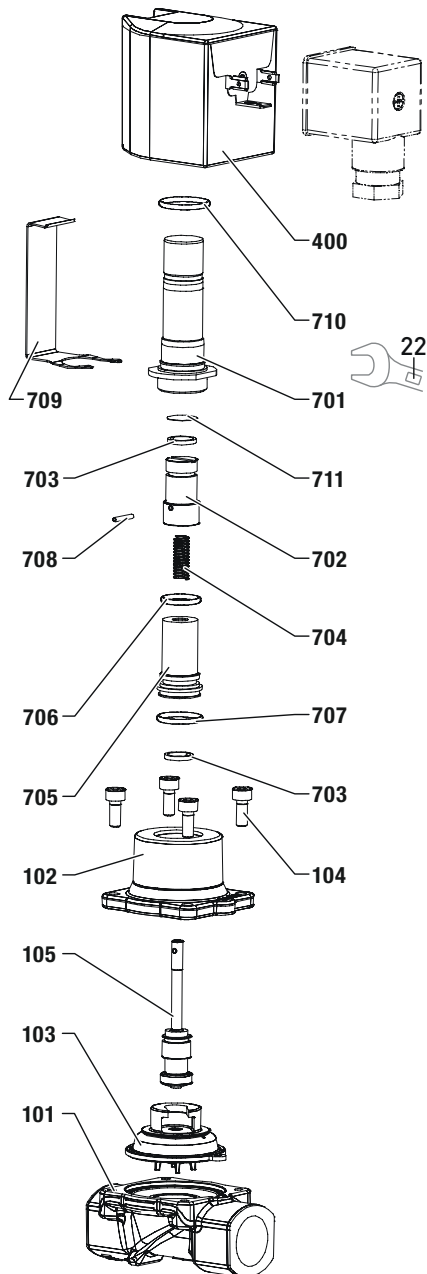
Tightening torque 80 Nm \pm 5 Nm

Mounting solenoid

- Push O-ring **707** onto core tube **701** until it rests smooth on the tube's basis.
- A** Attach solenoid **400** on core tube **701**.
- Move spring clip **706** so far that solenoid **400** can be lowered down to the downwardly angled tab.
- Slightly lift the upwardly angled tab and slide spring clip **706** towards solenoid.
- B** Move spring clip **706** into engaged position while pushing solenoid **400** onto core tube.
NOTICE The downwardly angled tab of spring clip must then grip the solenoid's body securely.



Mounting solenoid 9401 (example)



NO valve (example: G 1/2; series 82540)

| D | NO valve | | | |
|----------|----------|------|------|------|
| solenoid | 9151 | 9154 | 9176 | 9191 |

| | | | | |
|-----|--------------------|--|---|--|
| 101 | Valve body | | | |
| 102 | Valve cover | | | |
| 103 | Diaphragm | | X | |
| 104 | Fixing screws | | | |
| 105 | Valve spindle | | X | |
| 400 | Solenoid body | | | |
| 701 | Core tube | | | |
| 702 | Core | | X | |
| 703 | Guiding ring (2x) | | X | |
| 704 | Compression spring | | X | |
| 705 | Pole piece | | | |
| 706 | O-ring | | X | |
| 707 | O-ring | | X | |
| 708 | Straight pin | | X | |
| 709 | Spring clip | | | |
| 710 | O-ring | | X | |
| 711 | Round plate | | X | |

Unmounting solenoid

→ Slightly bend back fixing clamp **709** and pull solenoid with a twist upwards to take off solenoid from core tube **701**.
NOTICE O-ring **710** underneath the solenoid may get stripped away. Do not lose! Without this O-ring the IP protection can no longer be guaranteed.

Disassembling valve parts

1. Loosen core tube **701** at screw piece (wrench size 22).
2. Take off core tube **701** together with spring clip **709** from core **702** and pole piece **705**.
3. Pay attention to loose round plate **711**.
4. Slide o-ring **710** from core tube **701**.
5. Press out straight pin **708** with a bolt (Ø 3 mm) and take off core **702** and compression spring **704** from valve spindle **105**.
6. Take off guiding ring **703** from core **702**.
7. Also pull pole piece **705** from valve spindle **105**.
8. Slide O-rings **706** and **707** from pole piece **705**.
9. Loosen four fixing screws **104** from valve cover **102**.
10. Take off valve cover **102** from valve spindle **105**.
11. Take off diaphragm **103** and valve spindle **105** from valve body **101**.
12. Slide valve spindle **105** sideways out of the holder of diaphragm **103**.
13. Take off guiding ring **703** from valve spindle **702**.

→ After disassembly, comply with instructions in section **12.4** to **12.8**.

Reassembling valve parts

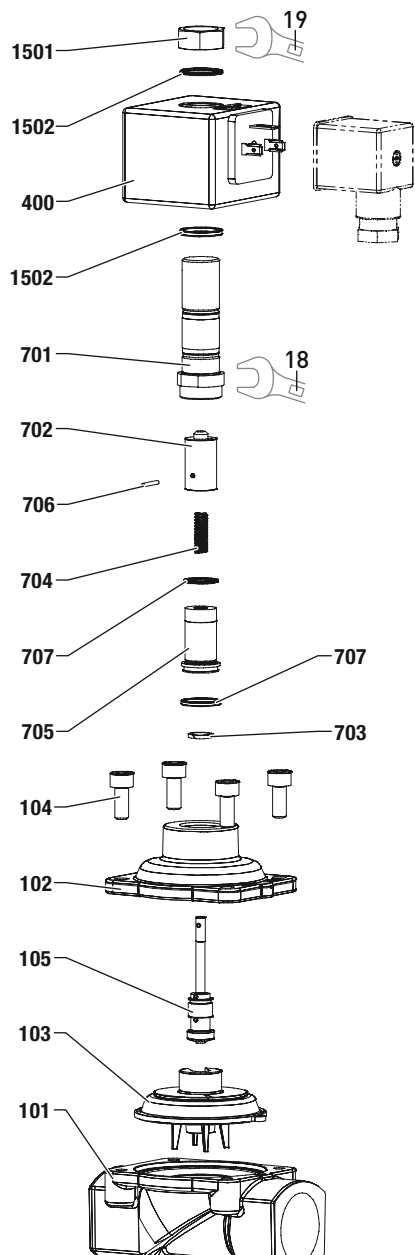
1. Slide valve spindle **105** sideways in the holder of diaphragm **103**.
2. Put guiding ring **703** into the groove of valve spindle **105**.
3. Place diaphragm **103** with valve spindle **105** correctly positioned on valve body **101**. The diaphragm's nose must be positioned in the recess above bleed orifice.
4. Put valve cover **102** on.
NOTICE Make sure that the diaphragm is not jammed by valve cover.
5. Insert four fixing screws **104**. Tighten fixing screws crosswise. Observe tightening torque – refer to table in **12.7**.

6. Put O-rings **706** and **707** in the groove of pole piece **705**.
7. Place pole piece **705** over valve spindle **105** in valve cover **102**.
8. Insert compression spring **704** into pole piece **705**.
9. Put core **702** on valve spindle **105**.
10. Put guiding ring **703** into the groove of core **702**.
11. Align valve spindle **105** and core **702** to cross bore.
12. Insert straight pin **708** flush to fix core **702** of diaphragm **703**.
13. Insert round plate **711** into core tube **701** from below.
Note for overhead mounting: Fix round plate **703** to pole surface with a little lubricating grease.
14. Slide core tube **701** over core **702** and pole piece **705** on valve cover **102**.
15. Screw core tube **701** (wrench size 22) on valve cover **102**.
16. Insert spring clip **709** between core tube **701** and valve cover **102**.

Tightening torque 20 Nm ± 2 Nm

Mounting solenoid

1. Push O-ring **707** onto core tube until the O-ring is flush to screw piece **703**.
2. Arrange solenoid **400** parallel to spring clip above core tube **701**.
3. Slightly bend back spring clip **709**. Place solenoid **400** on core tube **701**. Let solenoid snap to spring clip.
4. **NOTICE** Penetrating humidity may cause corrosion of the solenoid cavity. Press the solenoid with a little twist towards the valve cover. Thus to ensure that solenoid is flush to screw piece **703**. Otherwise O-ring **707** will not seal sufficiently.



NO valve (example: G 1; series 82540)

| E | NO valve | | | |
|----------|----------|------|------|------|
| solenoid | 9301 | 9304 | 9356 | 9326 |

| | | | | |
|------|-----------------------|--|---|--|
| 101 | Valve body | | | |
| 102 | Valve cover | | | |
| 103 | Diaphragm | | X | |
| 104 | Fixing screws | | | |
| 105 | Valve spindle | | X | |
| 400 | Solenoid body | | | |
| 701 | Core tube | | | |
| 702 | Core | | X | |
| 703 | Guiding ring | | X | |
| 704 | Compression spring | | X | |
| 705 | Pole piece | | | |
| 706 | Straight pin | | X | |
| 707 | O-ring (2x) | | X | |
| 1501 | Special hexagon screw | | | |
| 1502 | O-ring (2x) | | X | |

Unmounting solenoid

1. Loosen special hexagon nut **1501** (wrench size 19) and remove located below o-ring **1502**.
2. Take off solenoid **400** from core tube **701**.
NOTICE O-ring **1502** may get stripped away. Do not lose! Without this O-ring, the IP protective class is no longer guaranteed.

Disassembling valve parts

1. Loosen core tube **701** (wrench size 18).
2. Take off core tube **701** from core **702** and pole piece **705**.
3. Slide O-ring **1502** from core tube **701**.
4. Press out straight pin **706** with a bolt (Ø 3 mm) and take off core **702** and compression spring **704** from valve spindle **105**.
5. Also pull pole piece **705** from valve spindle **105**.
6. Slide O-ring **707** from pole piece **705**.
7. Loosen four fixing screws **104** from valve cover **102**.
8. Take off valve cover **102** from valve spindle **105**.
9. Take off diaphragm **103** and valve spindle **105** from valve body **101**.
10. Slide valve spindle **105** sideways out of the holder of diaphragm **103**.
11. Take off guiding ring **703** from valve spindle **702**.

→ After disassembly, comply with instructions in section **12.4** to **12.8**.

Reassembling valve parts

1. Slide valve spindle **705** sideways into the holder of diaphragm **103**.
2. Put guiding ring **703** into the groove of valve spindle **105**.
3. Place diaphragm **103** with valve spindle **105** correctly positioned on valve body **101**. The diaphragm's nose must be positioned in the recess above bleed orifice.
4. Put valve cover **102** on.
NOTICE Make sure that diaphragm **103** is not jammed by valve cover.
5. Insert four fixing screws **104**. Tighten fixing screws crosswise. Observe tightening torque – refer to table in **12.7**.
6. Put O-ring **707** in the groove of pole piece **705**.
7. Place pole piece **705** above valve spindle **105** in valve cover **102**.
8. Insert compression spring **704** into pole piece **705**.
9. Put core **702** on valve spindle **105**.
10. Align valve spindle **105** and core **702** to the cross bore.

11. Insert straight pin **706** flush to fix the core **702** to diaphragm **103**.
12. Slide core tube **701** over core **702** and pole piece **705** on valve cover **102**.
13. Screw core tube **701** (wrench size 18) on valve cover **102**.

Tightening torque 20 Nm ± 2 Nm

Mounting solenoid

1. Push O-ring **1502** onto core tube **701** until it rests smooth on the tube's basis.
2. Place solenoid **400** on core tube **701**.
3. Put O-ring **1502** onto core tube **701**, in the groove of solenoid **400**.
4. Align the solenoid **400**.
5. Fix solenoid **400** with hexagon screw **1501** (wrench size 19).

Tightening torque 12 Nm ± 2 Nm

13 Re-commissioning

1. Check valve's switching function without fluid (refer to 10.1).
2. Flood the valve slowly (refer to 10.2).
3. Perform a leak and strength tests (refer to 12.2).

14 Decommissioning

1. ⚠ **DANGER** Disconnect the solenoid from power supply.
2. ⚠ **WARNING** Depressurise the pipe system. Drain the pipework completely. Handle water polluting fluids in accordance with local regulations.
3. ⚠ **CAUTION** Leave the solenoid to cool down.
4. Disconnect the connection cable from the device socket or from the connection area of the solenoid.
5. ⚠ **CAUTION** Wear protective gloves. Loosen pipe connection.
6. Disassemble the valve.
7. Drain and dry the valve.

15 Replace complete valve

1. Disassemble the valve as described in chapter 14 "Decommissioning".
2. Assembly the new valve as described in chapter 7 "Mouting".
3. Connect the solenoid as described in chapter 8 "Connect solenoid electrically".

16 Trouble shooting

→ Observe safety information and instructions in chapter 12 "Maintenance".

Error table

| Not function |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Possible cause: the solenoid coil defective Remedy: replace solenoid |
| Possible cause: the control voltage must be $\geq 90\%$ of its nominal value. Remedy: measure the control voltage directly in front of the solenoid. If the operating voltage is lower or a long cable is used, a heavier conductor (crosssection up to 1.5 mm ²) must be chosen to keep the voltage drop small. |
| Impaired function |
| Possible cause: diaphragm soiled Remedy: clean the control bore in the diaphragm |
| Possible cause: core jammed Remedy: clean core and core tube |
| Possible cause: valve seat leaking Remedy: a) clean valve body b) clean or replace diaphragm c) valve seat damaged |
| inadmissible operating conditions |
| Possible cause: operating pressure too high or too low Remedy: check maximum operating pressure and reduce pressure accordingly. |

17 Return

1. Disassemble the valve as described in chapter 14 "Decommissioning".
2. Save the "goods return declaration" form – PDF file available online at:
<http://www.buschjost.com/service/other-documents/goods-return-declaration/>
3. Fill in the return form and work through the requirements listed there.
4. ⚠ **CAUTION** Consider the weight of the valve in the choice of packaging.
5. Attach the printed, completed and signed goods return declaration to the package.

18 Disposal

1. Disassemble the valve as described in chapter 14 "Decommissioning".
2. Disassemble the valve parts to enable reusable materials to be recycled.
3. Dispose of the valve parts as appropriate for their materials:

| Material | Way of disposal |
|-------------------------|------------------------------------------------------|
| Valve body, valve cover | Metal recycling |
| Diaphragm, O-rings | Industrial waste similar category to domestic refuse |
| Solenoid (copper wire) | Electrical waste recycling |

19 Directives and certificates

Note to Pressure Equipment Directive (PED)

This valves of this series, including the connection size DN 25 (G 1), are according to Art. 4 § 3 of the Pressure Equipment Directive 2014/68/EU (PED). This means interpretation an production are in accordance to engineers practice wellknown in the member countries.

The CE-marking at the valve refers not to the PED. Thus the declaration of conformity is not longer applicable for this directive.

For valves > DN 25 (G 1) Art. 4 § (1) No. 1.4 of the Pressure Equipment Directive 2014/68/EU (DGRL) applies. The basic requirements of the Enclosure I of the PED must be fulfilled. The CE-marking at the valve includes the PED. A certificate of conformity of this directive will be available on request.

Notes on EEC Directive

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/EG) satisfied. The CE-marking is related to this EU-requirements.



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