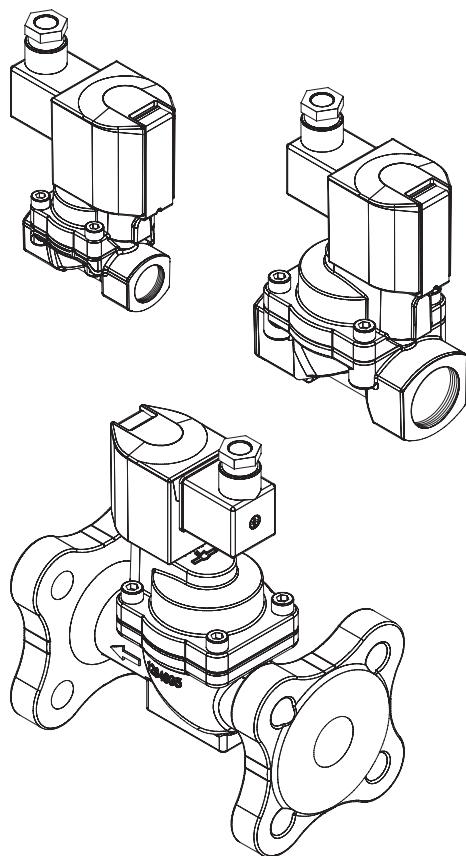


Operation manual for pre-controlled piston valves

Document No. 1377028.0000.10011 Revision 3

Keep documentation for future use!



Series

85360^G 85370^N

85660^F

^G G-Thread
^N NPT-Thread
^F Flange

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Translation of the original operating manual
Status as of October 2018

1 About this documentation

These mounting instructions guides you to mount, operate and maintain pre-controlled piston valves safely.



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

1.1 Documentation validity

This operation manual applies of the following series

- 85360(G-Thread)
- 85370 (NPT-Thread)
- 85660 (Flange)
- Special version. Based on the above series

in combination with these **Click-on** solenoids:

9151	9176 	9186 
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Order No.	Connec- tion	Connec- tion	Connec- tion
xxxx0xx	G 1/4	1/4 NPT	-
xxxx1xx	G 3/8	3/8 NPT	-
xxxx2xx	G 1/2	1/2 NPT	DN 15
xxxx3xx	G 3/4	3/4 NPT	DN 20
xxxx4xx	G 1	1 NPT	DN 25
xxxx5xx	G 1 1/4	1 1/4 NPT	DN 32
xxxx6xx	G 1 1/2	1 1/2 NPT	DN 40
xxxx7xx	G 2	2 NPT	DN 50
Series	85360	85370	85660

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 on 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.	Preset order of instructions
2.	
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" (refer to 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 may shorten the solenoid coil's product life cycle.

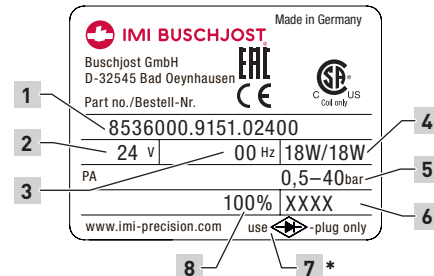
- You must not cover the solenoid with paint.
- You must not encase the solenoid in a tight housing or in a thermal insulation.

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

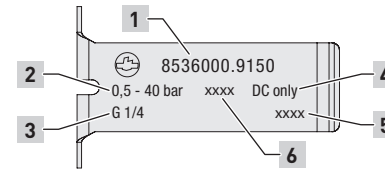
The rating plate is situated on the solenoid body.



Rating plate (example)

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

An additional marking is applied to the spring clip of the **Click-on**-solenoid.



Marking of the spring clip (example)

- Order number (without voltage/frequency)
- Operating pressure range
- Size of connection
- DC only (only with DC coils)
- Date of manufacture (week/year)
- 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 or protective collars 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 < 1 m
- 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

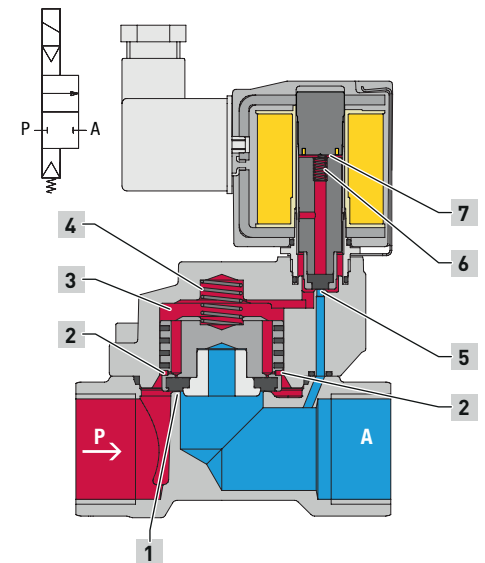
Design

2/2-Way seat valve with piston as sealing device.

Operation

The valve is electromagnetic indirectly-controlled. The switching function needs a pressure difference between valve inlet **P** and valve outlet **A**.

6.1 NC-valve (normally closed)



Sectional view (NC-valve; closed)

- Main valve seat
- Control bore in the piston (pressure build-up)
- Chamber
- Compression spring above the piston
- Pilot seat (pressure reduction)
- Compression spring inside the core
- Magnet face of the core tube

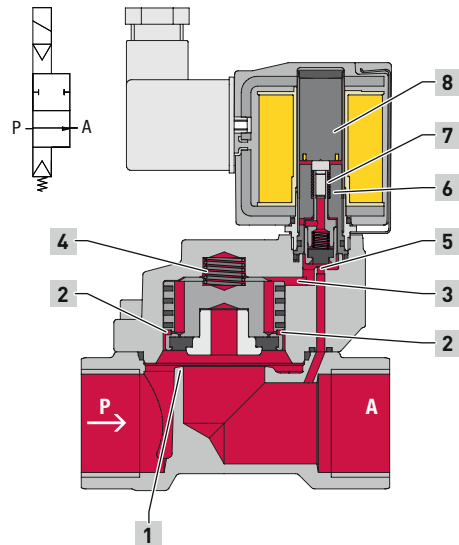
Normal position: closed

Due to the effect of the compression spring **6** inside the core the pilot seat **5** is closed. The compression spring **4** presses the piston sealingly to the main valve seat **1**. The operating fluid flows through the control bore **2** in the piston to the chamber **3** above the piston 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 piston. The differential pressure lifts up the piston and opens the main valve seat **1**.

6.2 NO-valve (normally open)



Sectional view (NO-valve; open)

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

Normal position: open

When the solenoid is de-energized, the pilot seat **5** is opened by the effect of the compression spring **7** and the control bore inside the valve is opened. The pressure difference inside chamber **3** keeps the piston open against the power of the compression spring **4**. The main valve seat **1** is open.

Switching position: closed

When the solenoid is energized, the core **8** is attracted by the pole piece **6**. The core **8** presses the seal plug sealingly against the force of compression spring **7** on the pilot seat **5**. The outflow of the fluid flow from the chamber **3** is interrupted. A compression spring **4** presses the piston sealingly to the main valve seat **1**. The operating fluid flows through the control bore **2** in the piston to the chamber **3** above the piston and increases the closing force.

6.3 Solenoid types

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.

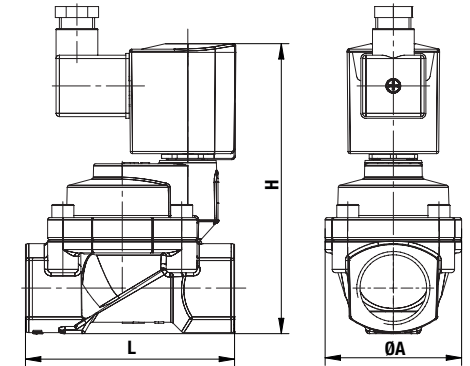
- Implement adequate measures if back flow is to expect; for example by adding check valves to the pipe system.

The valve 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 Dimensions

In-line valve



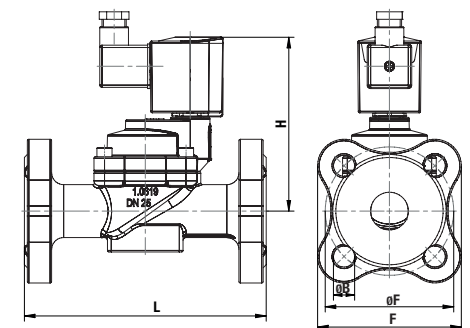
Dimensions in mm

85360, 85370 with internal threads

Connections		L	H ^[1]	ØA
G 1/4	1/4 NPT	60	105	44
G 3/8	3/8 NPT	60	105	44
G 1/2	1/2 NPT	67	108	44
G 3/4	3/4 NPT	80	119	50
G 1	1 NPT	95	131	62
G 1 1/4	1 1/4 NPT	132	166	92
G 1 1/2	1 1/2 NPT	132	166	92
G 2	2 NPT	160	186	109

^[1] measured with solenoid 9150

Flange valve



Dimensions in mm

85660 with flange design; sealing strip according to DIN EN 1092-1B)

Connections	L	H ^[1]	F	ØF	ØB
DN 15	130	96	77	65	14
DN 20	150	109	86.6	75	14
DN 25	160	115	95.1	85	14
DN 32	180	139	110.7	100	18
DN 40	200	144	117.8	110	18
DN 50	230	157	128.4	125	18

^[1] measured with solenoid 9150

85660 with flange design; sealing strip according to DIN EN 1092-1B; hole according to ASME B16.5 Class 150, RF

Connections	L	H ^[1]	F	ØF	ØB
DN 15	130	96	77	60.3	15.9
DN 20	150	109	86.6	69.9	15.9
DN 25	160	115	95.1	79.4	15.9
DN 32	180	139	110.7	88.9	15.9
DN 40	200	144	117.8	98.4	15.9
DN 50	230	157	128.4	120.7	19

^[1] measured with solenoid 9150

85660 with flange design; sealing strip according to DIN EN 1092-1B; hole according to ASME B16.5 Class 300, RF

Connections	L	H ^[1]	F	ØF	ØB
DN 15	130	96	77	66.5	15.9
DN 20	150	109	86.6	82.6	19
DN 25	160	115	95.1	88.9	19
DN 32	180	139	110.7	98.4	19
DN 40	200	144	117.8	114.3	22.2
DN 50	230	157	128.4	127	19 ^[2]

^[1] measured with solenoid 9150

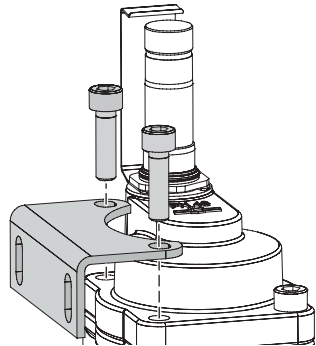
^[2] flange with 8 holes

7.2 Mounting accessories

Mounting bracket

With an optional mounting bracket, you can connect the valve to an 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.



Mount bracket with longer screws

Available mounting brackets

Order No.	for valve with connection size		
1258988	G 1/4	1/4 NPT	
	G 3/8	3/8 NPT	
	G 1/2	1/2 NPT	DN 15
1258993	G 3/4	3/4 NPT	DN 20
1258998	G 1	1 NPT	DN 25
on request	G 1 1/4	1 1/4 NPT	DN 32
	G 1 1/2	1 1/2 NPT	DN 40
	G 2	2 NPT	DN 50

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

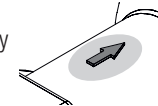


7.4 Preparation

- 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.

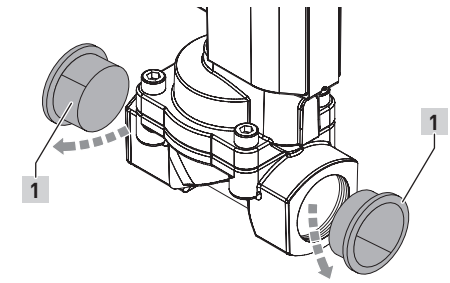
7.5 Mounting valve to pipeline

- 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.



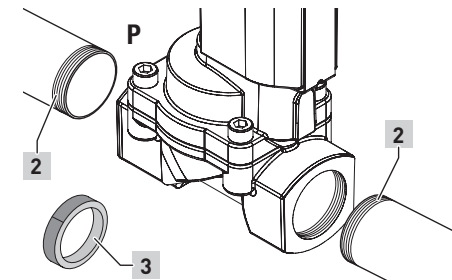
Valve with thread connection

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



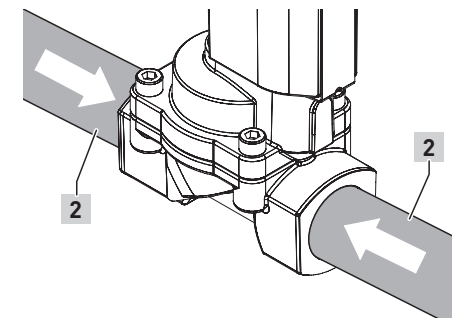
Take out blanking plugs

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

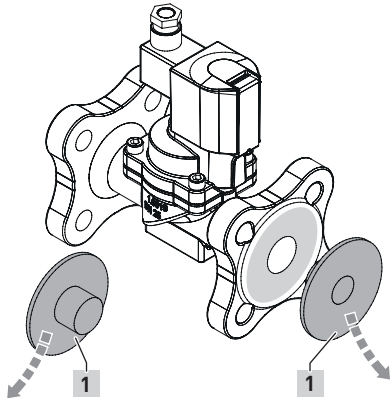
4. Attach pipelines threads **2** to the valve's connection threads. **NOTICE** Make sure not to distort the valve body.



Attach pipelines to valve

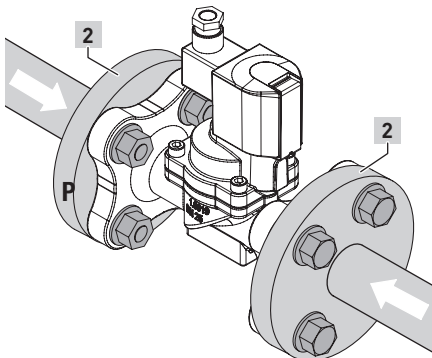
Valve with flange connection

1. Take out the protective collars from valve inlet and valve outlet **1**.



Take out protective collars

2. Install a strainer in front of the valve inlet **P** if necessary.
3. Connect the flange connections of the valve body with flanges of the pipe line **2**.
NOTICE Make sure that the flange seal is correctly positioned.



Connect pipe line flanges to flange connections

8 Connecting solenoid electrically

→ Connect solenoid in accordance with the electrical regulations.


8.1 Connecting solenoid 9151

DANGER



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

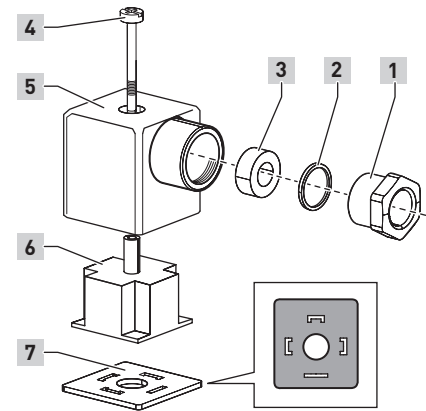
There are high risks from electrical voltage during assembly works.

- Work on electrical installations may only be carried out by a qualified and authorized electrician (siehe 1.8).
- You must connect the earth wire to the terminal marked with the grounding symbol .
- You may only plug the device socket in de-energized state.
- Take care that the insulation is not trapped in the terminals.

Connection errors lead to dangers

- After connecting the solenoid carefully close the terminal compartment to restore protection.
- To secure IP 65 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.

- Use a round cable with diameters from 5 mm to 10 mm. The wire cross section must not exceed 1.5 mm².

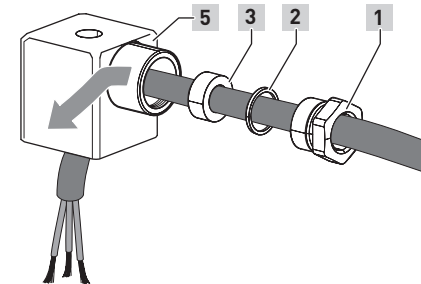


Overview: Device socket


- 1 Pressure screw
- 2 Pressure ring (metall)
- 3 Seal ring
- 4 Middle screw
- 5 Device socket's housing
- 6 Socket insert
- 7 Flat gasket

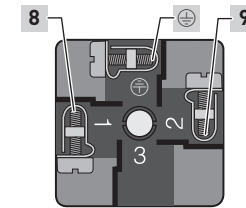
- Make sure that the flat gasket **7** and socket insert **6** are mounted congruently with the connecting lugs of the solenoid.

1. Slide pressure screw **1**, pressure ring (metall) **2** and seal ring **3** as well as device socket's housing **5** on the cable.




Feed cable through device socket

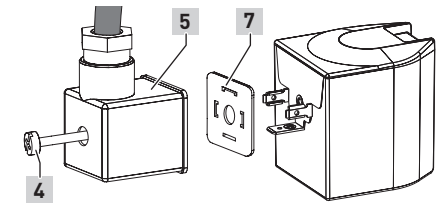
2. Attach the protective conductor at first (insulation: yellow/green) to the terminal marked with the grounding symbol .



Configuration of the socket insert

-  Protective earth (PE)
- 8** Terminal 1
- 9** Terminal 2

3. Attach the other wires to the terminals **8** and **9** of the socket insert **6**.
⚠ WARNING Ensure the correct polarity of terminals marked „+“ and „-“.
4. Put the housing of the device socket **5** in the chosen position (9 o'clock, 12 o'clock, 3 o'clock, 6 o'clock) onto socket insert **6**.
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 **7** and housing **5** 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 **4** with 40 Ncm.
NOTICE Avoid visible distortion of the device socket's housing.

Tightening torque 40 Ncm ±10 Ncm

8.2 Connecting solenoid 9176 and 9186

Solenoid 9176

Observe the instructions for valve solenoid 1262559 supplied with the valve.

Solenoid 9186

Observe the instructions for valve solenoid 13770066 supplied with the valve.

9 Operating conditions

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

Operating limits series 85360/85370/85660 with solenoid 9151

Operating pressure	0.5 to 40 bar ^{[1], [2]}
Fluid temperature	−20°C to +90°C ^[3]
Ambient temperature	−20°C to +50°C
for neutral, gases and liquid fluids; differential pressure of 0.1 bar necessary	

^[1] applies to piston seal made of NBR, FPM and EPDM
PTFE: P_B from 1 to 25 bar

^[2] applies only NC-valve (normally closed)
NO-valve (normally open):
≤ 1": P_B from 0.5 to 35 bar
> 1": P_B from 0.5 to 25 bar

^[3] applies to piston seal made of NBR
FPM: T_M from −10°C to +110°C;
EPDM: T_M from −20°C to +110°C;
PTFE: T_M from −10°C to +110°C.

Special version according to article data sheet

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.
3. Check,
 - whether cover screws are properly fixed,
 - whether the device socket is firmly sealed,
 - 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.

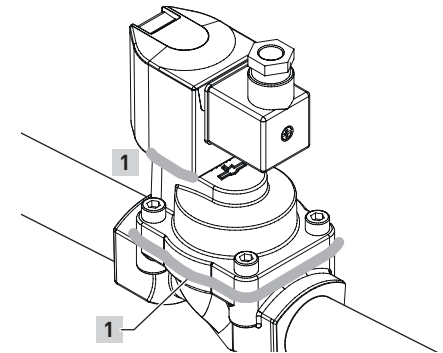
- Do not exceed the maximum operating pressure during the test for internal tightness (valve seat closed).
- The test for strength and external leakage (valve seat opened) according to EN12266 is permitted with maximum 1.5 times of the nominal pressure rating (PN) at room temperature.
- The valve must 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. Pressurize up to the maximum operating pressure. There must be 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. Pressurize maximum up to 1.5 times of the nominal pressure rating (PN) at room temperature. Apply soap suds to the outer sealing edges 1 and check for the formation of bubbles. There must be no bubbles appear.



Check sealing edges

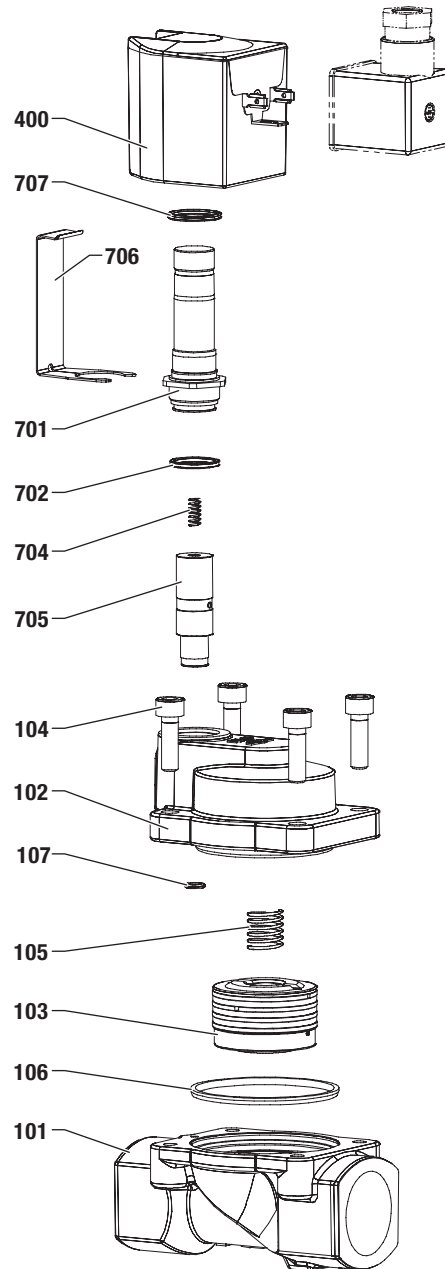
12.3 Preparing maintenance of internal parts

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 pipes completely in the case of fluids that are hazardous to the environment and health. Deal with water-endangering fluids according to legal regulations.

12.4 Component overview

NC-valve (normally closed)



NC-valve (Series 85360)

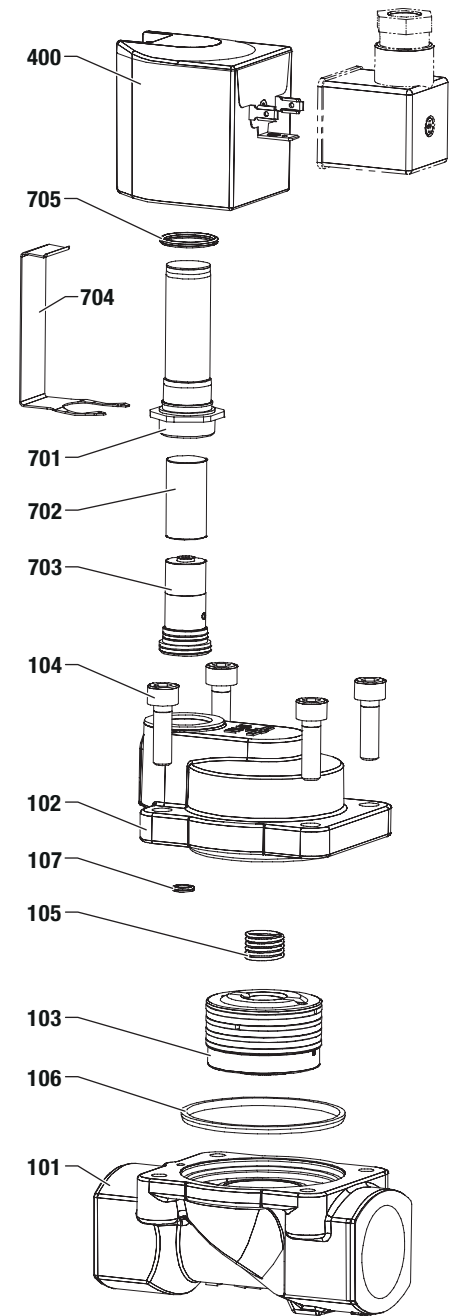
Parts list NC-valve (left figure)

101	Valve body	
102	Valve cover	
103	Piston	X
104	Fixing screws	4 x
105	Compression spring	X
106	Seal ring	X
107	O-ring	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

Parts list NO-valve (right figure)

101	Valve body	
102	Valve cover	
103	Piston	X
104	Fixing screws	4 x
105	Compression spring	X
106	Seal ring	X
107	O-ring	X
400	Solenoid body	
701	Core tube	
702	Core	X
703	Pole piece	X
704	Spring clip	
705	O-ring	X

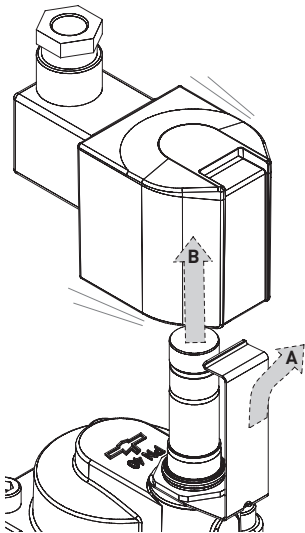
NO-valve (normally open)



NO-valve (Series 85360)

12.5 Unmounting solenoid

- Slightly bend back **A** spring clip **706** (NO-valve: **704**) and pull solenoid with a swivel movement **B** upwards to take off solenoid from core tube **701**.
NOTICE The O-ring **707** (NO-Ventil: **705**) may get stripped away. Do not lose! Without this O-ring the IP protection can no longer be guaranteed.



Unmounting solenoid

12.6 Disassembling the valve parts

1. Loosen the core tube **701** (wrench size 22).
2. Take off the core tube **701** together with spring clip **706** (NO-valve: **704**).
3. Core sub-assembly NC-valve: Pay attention to loose components: Core **705** and compression spring **704**.
 Core sub-assembly NO-valve: Pay attention to loose components: Core **702** and pole piece **703**
4. Slide the O-ring **702** and **707** from the core tube **701**. (NO-valve: only O-ring **705**)
5. Loosen four fixing screws **104** from the valve cover **102**.

6. Take off the valve cover **102** together with the valve piston **103**.
 7. Take off the seal ring **106** from the valve body **101**.
 8. Take off the O-ring **107** from the valve cover **102**.
 9. Push the valve piston **103** with the compression spring **105** out of the piston guide.
- ### 12.7 Checking valve parts
1. Check disassembled valve parts for damages and wear.
 2. Check if valve seat is intact. The valve seat must not have any damages.
 3. If the valve seat is **damaged** you must replace the valve body **101**.

12.8 Cleaning valve parts and valve

1. Clean the valve piston **103**, in particular the control bores. **NOTICE** Use only neutral, non-aggressive cleaners.
2. Clean all contact surfaces to O-rings and piston.
3. Remove dirt in control bores, chambers and threads.
4. Clean the core **705** and the pole piece **704** (only NO-valves).

12.9 Replacing spare parts

⚠ 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.
 → ⚠ CAUTION Ensure that only original spare parts are installed.
 → **NOTICE** Protect all components from dirt.
 → Spare parts marked with **X** - refer to **12.4**

Component Overview.

- **NOTICE** Observe that the pole piece **704** in the NO-valve consists of several individual parts. The external O-ring needs to be mounted.

12.10 Tightening torque screws

Following tightening torques for fixing screws **104** must be observed during re-assembly:

Valve connection size		Thread	Torque
G 1/4	1/4 NPT	M5	3.6 Nm ^[1]
G 3/8	3/8 NPT	M5	3.6 Nm ^[1]
G 1/2	1/2 NPT	DN 15	3.6 Nm ^[1]
G 3/4	3/4 NPT	DN 20	6 Nm ^[1]
G 1	1 NPT	DN 25	6 Nm ^[1]
G 1 1/4	1 1/4 NPT	DN 32	16 Nm ^[1]
G 1 1/2	1 1/2 NPT	DN 40	16 Nm ^[1]
G 2	2 NPT	DN 50	31 Nm ^[1]

¹ Nm ±10%

12.11 Mounting valve parts

NOTICE

Damage of the valve

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

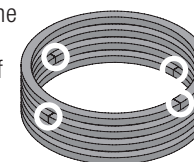
- Use appropriate lubricants.

- Coat the following spare parts thinly with appropriate lubricant:
- each O-ring

Mounting piston and cover

1. Put the compression spring **105** centered on the valve piston **103**.
2. Push the valve piston **103** from beneath into the valve cover **102**.

NOTICE The valve piston should move easily into the guide. The guiding rings should be arranged at an offset of 90°.



3. Put the guiding ring **106** into the groove of the valve body **101**.
4. Put the O-ring **107** into the groove of the valve cover **102**.
5. Put the valve cover **102** with the preassembled valve piston **103** on the valve body **101**.
6. Insert the four fixing screws **104**. Tighten the fixing screws crosswise. Observe the necessary tightening torque. Refer to **12.10** "Tightening torque screws".

Mounting core tube assembly

- Refer to **12.4** "Component overview".

1. NC-valve: Place compression spring **704** in the cavity of core **705**. Slide the core tube **701** over it. Keep core **705** and compression spring **704** inside core tube **701**. Move the O-ring **702** from beneath into the protruding edge of the core tube.
NOTICE Hold O-Ring **702** in position.
 NO-valve: Insert core **705** and multi-piece pole piece **704** into core tube **701**.
2. Insert core tube **701** on valve cover **102**.
3. Insert spring clip **706** (NO-valve: **704**) between core tube **701** and valve cover **102**.
4. Screw and tighten the core tube **701** (wrench size 22).

Tightening torque 20 Nm ± 2 Nm

12.12 Mounting the solenoid

1. Insert the O-ring **707** (NO-Ventil: **705**) into the groove of the core tube **701**.
2. Arrange the solenoid parallel to the spring clip above core tube **701**.
3. Slightly bend back spring clip **706** (NO-valve: **704**). Place the solenoid on the core tube **701**. Let the solenoid snap to spring clip.

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. Deal with water-endangering fluids according to legal 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 or the screws from the flange connections.
6. Disassemble the valve.
7. Drain and dry the valve.

15 Replacing complete valve

1. Disassemble the valve as described in chapter 14 "Decommissioning".
2. Assembly the new valve as described in chapter 7 "Mounting".
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: 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 (cross section up to 1.5 mm ²) must be chosen to keep the voltage drop small.
Impaired function
Possible cause: valve piston soiled Remedy: clean the control bores in the valve piston
Possible cause: core jammed Remedy: clean core and core tube
Possible cause: valve piston sticks Remedy: clean the piston gilding surface
Possible cause: valve seat leaking Remedy: a) clean valve body b) clean or replace valve piston 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, piston	Metal recycling
O-rings, guiding 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 well known in the member countries. The CE-marking at the valve refers not to the PED.

The valve's CE marking is not related to the PED. Thus the declaration of conformity is not longer applicable for this directive.

For valves > DN 25 (G 1) Art. 3 § (1) No. 1.4 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 harmonized 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.



Buschjost GmbH
Detmolder Str. 256
D-32545 Bad Oeynhausen
P.O. Box 10 02 52-53
D-32502 Bad Oeynhausen
Phone: 0 57 31/7 91-0
Fax: 0 57 31/79 11 79
www.imi-precision.com
buschjost@imi-precision.com

