

Type 2100

2/2 and 2/3-way angle seat valve



Operating Instructions

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1 ABOUT THESE INSTRUCTIONS

The operating instructions describe the entire life cycle of the device.

→ Keep these instructions ready to hand at the operation site.



Important safety information!

- ▶ Carefully read these instructions.
- ▶ Observe in particular the safety instructions, intended use and operating conditions.
- ▶ Persons, who work on the device, must read and understand these instructions.

1.1 Symbols



DANGER!

Warns of an immediate danger.

- ▶ Failure to observe the warning will result in fatal or serious injuries.



WARNING!

Warns of a potentially dangerous situation.

- ▶ Failure to observe the warning may result in serious or fatal injuries.



CAUTION!

Warns of a possible danger.

- ▶ Failure to observe the warning may result in moderate or minor injuries.

ATTENTION!

Warns of damage to property.

- ▶ Failure to observe the warning may result in damage to the device or system.



Indicates important additional information, tips and recommendations.



Refers to information in these instructions or in other documentation.

- ▶ Designates an instruction for risk prevention.

→ Designates a procedure which you must carry out.

- ✔ Indicates a result.

1.2 Definition of terms

In these instructions the term "device" denotes the following device types:

Angle seat valve Type 2100

The abbreviation "Ex" used in these instructions always stands for "potentially explosive atmosphere".

The term "büS" (Bürkert system bus) used in this manual refers to the communication bus developed by Bürkert, based on the CANopen protocol.

In these instructions, the unit bar stands for relative pressure. The absolute pressure is stated separately in bar(abs).

2 INTENDED USE



The angle seat valve Type 2100 is designed to control the flow rate of media. The permitted media are listed in the "Technical data [▶ 15]".

- ▶ Use the device for its intended purpose only. Non-intended use of the device may be dangerous to people, nearby equipment and the environment.
- ▶ Correct transportation, correct storage as well as correct installation, commissioning, operation and maintenance are essential for reliable and problem-free operation.
- ▶ When using the device, observe the permitted data, operating conditions and application conditions. This information can be found in the contractual documents, the operating instructions and on the type label.
- ▶ Use the device only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- ▶ In potentially explosive atmospheres, only use devices approved for use in those areas. These devices are labeled with a separate Ex type label. For such use, note the information provided on the separate Ex type label and the additional explosion-related information or separate explosion-related operating instructions.
- ▶ Protect device from environmental influences (e.g. radiation, air humidity, fumes). If you have any questions, contact your Bürkert sales department.

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not take into account any unforeseen circumstances and events which occur during installation, operation and maintenance.

The operator is responsible for observing the location-specific safety regulations, also with reference to the personnel.

DANGER!

Risk of injury from high pressure and discharge of medium.

- ▶ Before working on the device or system, switch off the pressure. Vent or drain lines.

DANGER!

Electric shock due to installed electrical component.

- ▶ Before working on the device or system, switch off the power supply. Secure against reactivation.
- ▶ Observe the applicable accident prevention and safety regulations for electrical devices.

WARNING!

Risk of injury when opening the actuator.

The actuator contains a spring under tension. When the actuator is opened, the spring will jump out and may cause injuries.

- ▶ Do not open the actuator.

WARNING!

Risk of injury due to moving parts.

- ▶ Do not reach into openings in the device.
- ▶ Operate 3-position actuator with transparent cap only.

WARNING!

Danger of burns and risk of fire.

Quickly switching actuators or hot medium may cause the surface of the device to become hot.

- ▶ Only touch the device while wearing protective gloves.
- ▶ Keep the device away from highly flammable substances and media.

WARNING!

Danger due to loud noises.

Depending on the usage conditions, the device may generate loud noises. Detailed information on the probability of loud noises is available from the respective sales department.

- ▶ Wear hearing protection when in the vicinity of the device.

WARNING!

Discharge of medium if packing gland worn.

- ▶ If media are hazardous, safeguard the environment around the discharge point.



To prevent injuries, observe the following:

- ▶ Secure device or plant to prevent unintentional activation.
- ▶ Only trained technicians may perform installation and maintenance work.
- ▶ Perform installation and maintenance with suitable tools only.
- ▶ Heavy equipment must only be transported, assembled, installed or dismantled with the help of a second person as appropriate and using suitable apparatus.
- ▶ Following interruption of the process, ensure that the process is restarted in a controlled manner. Observe sequence:
 1. Apply electrical or pneumatic supply.
 2. Charge with medium.
- ▶ Do not make any changes to the device and do not subject it to mechanical stress.
- ▶ Feed only those media, which are listed in the chapter "Technical data", into the medium ports.
- ▶ Operate the device only in perfect state and in consideration of the operating instructions.
- ▶ For applications planning and operation of the device, observe the plant-specific safety regulations.
- ▶ Observe the general rules of technology.
- ▶ The plant owner is responsible for the safe operation and handling of the plant.



To protect the environment, observe the following:

- ▶ The pilot exhaust air of the device may be contaminated by lubricants.

4 GENERAL INFORMATION

4.1 Contact address

Germany

Bürkert Fluid Control Systems

Sales Center

Christian-Bürkert-Str. 13–17

D-74653 Ingelfingen

Phone: + 49 (0) 7940 - 10 91 111

Fax: + 49 (0) 7940 - 10 91 448

E-mail: info@burkert.com

International

The contact addresses can be found on the back pages of the printed Quickstart. Also on the Internet at:

<http://www.burkert.com>

4.2 Warranty

A precondition for the warranty is that the device is used as intended in consideration of the specified usage conditions.

4.3 Information on the Internet

Operating instructions and data sheets for the Bürkert products can be found online at:

<https://www.burkert.com/en>

5 PRODUCT DESCRIPTION

The device is specially optimised for decentralised process automation and meets all the relevant requirements, even under difficult usage conditions.

Its design enables the easy integration of automation modules in all extension stages, whether they are electrical/optical position feedback, pneumatic control units, or even an integrated fieldbus interface. Long service life and high tightness are achieved by the tried and tested self-adjusting packing gland. The system, consisting of valve and automation module is distinguished by a compact and sleek design, integrated pilot air ducts, a high chemical resistance, the degrees of protection IP65 or IP67 as well as the NEMA protection class 4X.

The device uses neutral gases or air to control the flow rate of liquid or gaseous media, such as water, alcohol, oil, fuel, saline solution, lye, organic solvent or vapour.

5.1 Features

- Stainless steel valve body
- Easy integration of automation modules
- Actuator can be rotated steplessly by 360°
- High chemical resistance
- High flow values through flow rate-optimised valve body made of stainless steel
- High seat tightness by swivel plate
- Integrated pilot air duct in combination with a Bürkert automation module
- High tightness and long service life due to self-adjusting packing gland
- Maintenance-free under normal conditions

5.2 Structure and function

The device consists of a pneumatically actuated piston actuator and a 2-way valve body. The actuator is manufactured from polyphenylene sulphide (PPS). Valve body and actuator housing made of stainless steel. Spring force or pneumatic pilot pressure generate the closing force on the swivel plate. The closing force is transferred by a spindle connected to the actuator piston.

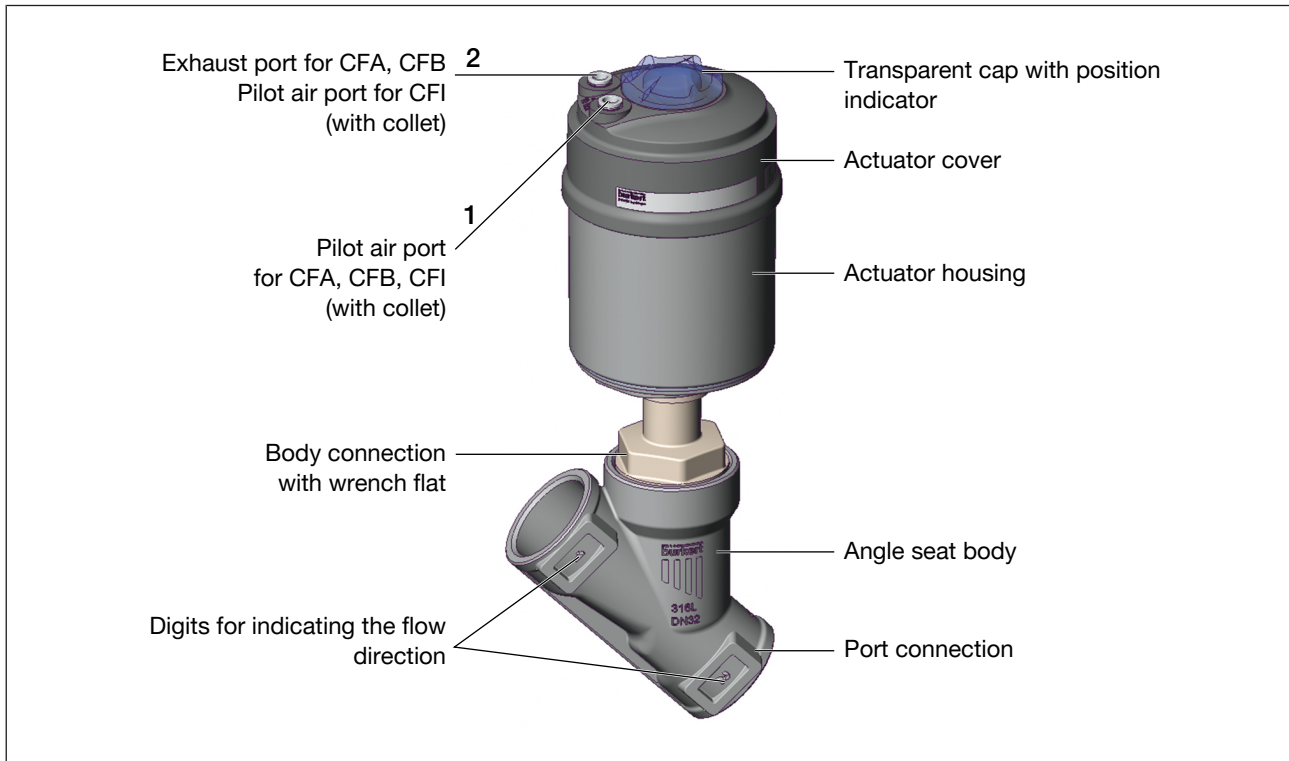


Fig. 1: Structure and description of the device

5.2.1 Control functions

Control function	Definition	Circuit symbol	Figure
A (CFA)	Closed by spring force in rest position.		
B (CFB)	Opened by spring force in rest position.		
I (CFI)	Actuating function via reciprocal pressurisation.		

Tab. 1: Control functions

5.2.2 Flow direction below seat

WARNING!

Valve seat not sealed when control pressure too low or operating pressure too high.

If control pressure for control function B and control function I is too low or operating pressure is too high, this can cause the valve seat to leak.

- ▶ Comply with minimum control pressure and maximum operating pressure values.

Depending on the control function, the valve closes by spring action (control function A) or pilot pressure (control function B and I) against the fluid flow.

As the medium is present under the swivel plate, the operating pressure contributes to the opening of the valve.

5.2.3 Flow direction above the seat

DANGER!

Risk of injury from rupturing lines and device when flow direction above the seat.

A pressure surge of liquid media may cause the lines and device to rupture.

- ▶ Do not use valves with flow direction above the seat for liquid media.

Flow direction above the seat is possible only on valves with control function A (closed by spring action in rest position).¹

The valve closes by spring action with the fluid flow. As the medium is present above the swivel plate, the operating pressure contributes to the closing of the valve. The operating pressure also supports the sealing of the valve seat.

The valve opens due to pilot pressure.

5.3 Variant 3-position actuator

With the 3-position actuator the valve can have a middle position. This variant is available only in control function A (closed by spring force in rest position).

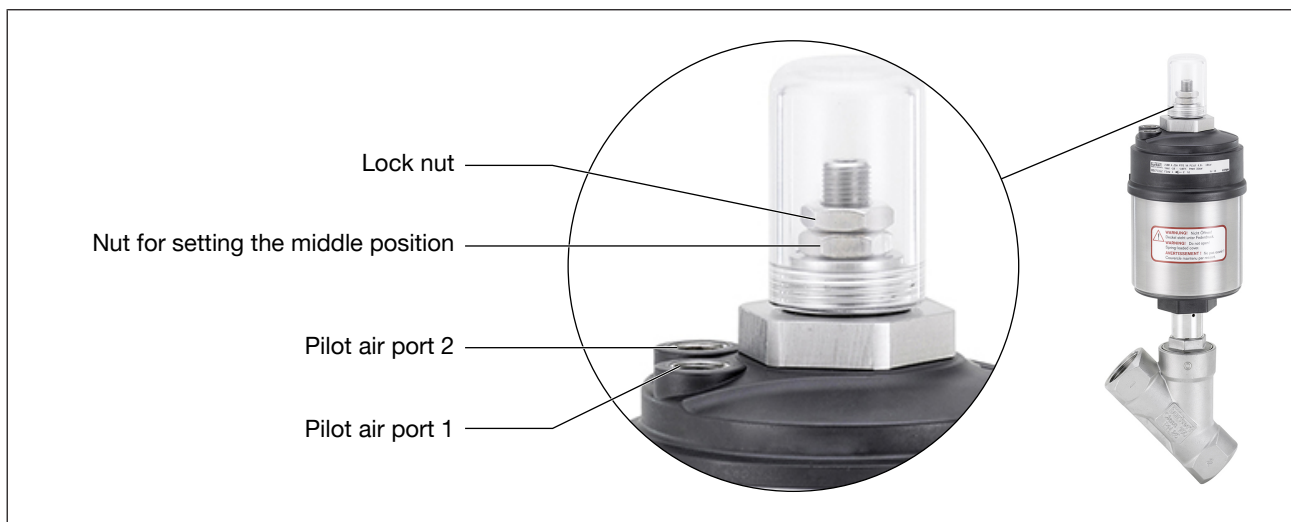


Fig. 2: Variant 3-position actuator

¹ Not for seat size 80

The closing force on the swivel plate is transferred by a spindle. The spindle is connected to the actuator piston.

Middle position

The middle position corresponds to a specific, adjustable flow rate of the medium. It is reached by an additional piston in the upper part of the actuator. The middle position is set with a nut (see figure).

The additional piston is used as a stop for the actuator piston. If pilot air port 2 is pressurised, the additional piston moves downwards to the set position. If pilot air port 1 is then pressurised, the actuator piston moves upwards until it hits the additional piston and stops.

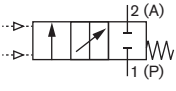
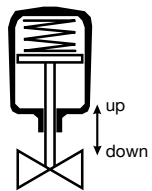
Maximum stroke

If the upper air chamber is vented by pilot air port 2, both pistons move upwards. As a result, the maximum stroke is reached.

Closing the valve

If the lower air chamber is vented by pilot air port 1, the spring force acts on the actuator piston. The spring force moves the actuator piston downwards until the valve is closed (rest position).

5.3.1 Control function variant 3-position actuator

Control function	Definition	Circuit symbol	Figure
A (CFA)	Closed by spring force in rest position.		

Tab. 2: Control functions

The inflow (2->1; 1->2) depends on the flow direction.

5.4 Device options

- Stroke limit
Limiting the maximum or minimum flow rate volume with an adjusting screw.
- Position feedback sensors and control units
Different variants are available depending on the requirement.

5.5 Variants



Information on the variants of the device can be found in the data sheet at <https://www.burkert.com/en> or in your sales department.

6 TECHNICAL DATA

6.1 Conformity

The device conforms to the EC directives as per the EC Declaration of Conformity (if applicable).

6.2 Standards

The applied standards, which are used to demonstrate conformity with the directives, are listed in the EU type examination certificate and/or the EU Declaration of Conformity (if applicable).

According to Pressure Equipment Directive observe the following operating conditions:	
Nominal diameter port connection	Maximum pressure for compressible fluids of Group 1 (dangerous gases and vapours according to Art. 3, No. 1.3, letter a, first dash)
DN65	15 bar

Tab. 3: Maximum pressure for compressible fluids of Group 1

6.3 Type label

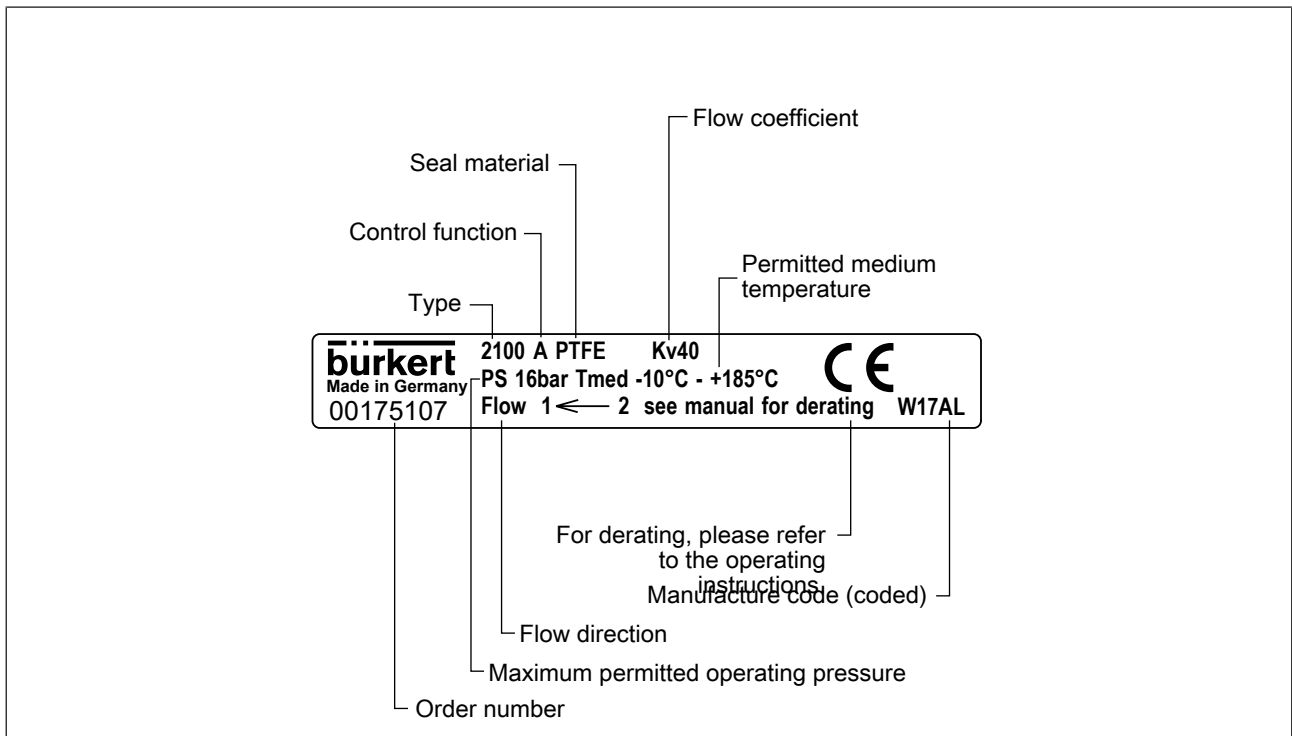


Fig. 3: Example of a type label

6.3.1 Designation of the actuator size

Actuator size [mm]	Designation
ø50	D
ø70	M
ø90	N
ø130	P

Tab. 4: Designation of the actuator size

6.4 Operating conditions

Degree of protection	IP67 according to IEC 529 / DIN EN 60529
Flow media	Water, alcohols, oils, fuels, hydraulic fluids, saline solutions, lyes, organic solvents, vapour, air, neutral gases
Control media	Neutral gases, air
Sound pressure level	<70 dB(A) The sound pressure level may be higher depending on the usage conditions

6.4.1 Temperature ranges

Medium

Actuator size [mm]	Actuator material	Medium temperature (for PTFE seal) [°C] ²	Ambient temperature ³ [°C]
ø 50	PPS	-10...+230	0...+60 ⁴
ø 70			0...+100 ⁵
ø 90			
ø 130			

Tab. 5: Temperature range of medium

Environment

Pilot air port	Ambient temperature [°C] ⁶
Push-in connector	-10...+60
Threaded bushing	-10...+100

Tab. 6: Temperature range of environment

²For applications at $T_{max} > 130$ °C a PEEK seal is recommended.

³When using a pilot valve the maximum ambient temperature is +55 °C

⁴Pilot air connector as push-in connector.

⁵Control air connector as threaded bushing.

⁶When using an attachment part, observe its temperature range.

Usage limits of the armature

Temperature [°C]	Pressure (bar)
-10 ... +50	25.0
100	24.5
150	22.4
200	20.3
230	19.0

Tab. 7: Derating the operating pressure as per DIN EN 12516-1/PN25

Temperature [°C]	Pressure (bar)
-29 ... +38	19.0
50	18.4
100	16.2
150	14.8
200	13.7
230	12.7

Tab. 8: Derating the operating pressure as per ASME B16.5/ASME B16.34 Cl.150

Temperature [°C]	Pressure (bar)
-10 ... +50	14.0
100	14.0
150	13.4
200	12.4
230	11.7

Tab. 9: Derating the operating pressure as per JIS B 2220 10K

Usage limits of medium and ambient temperature

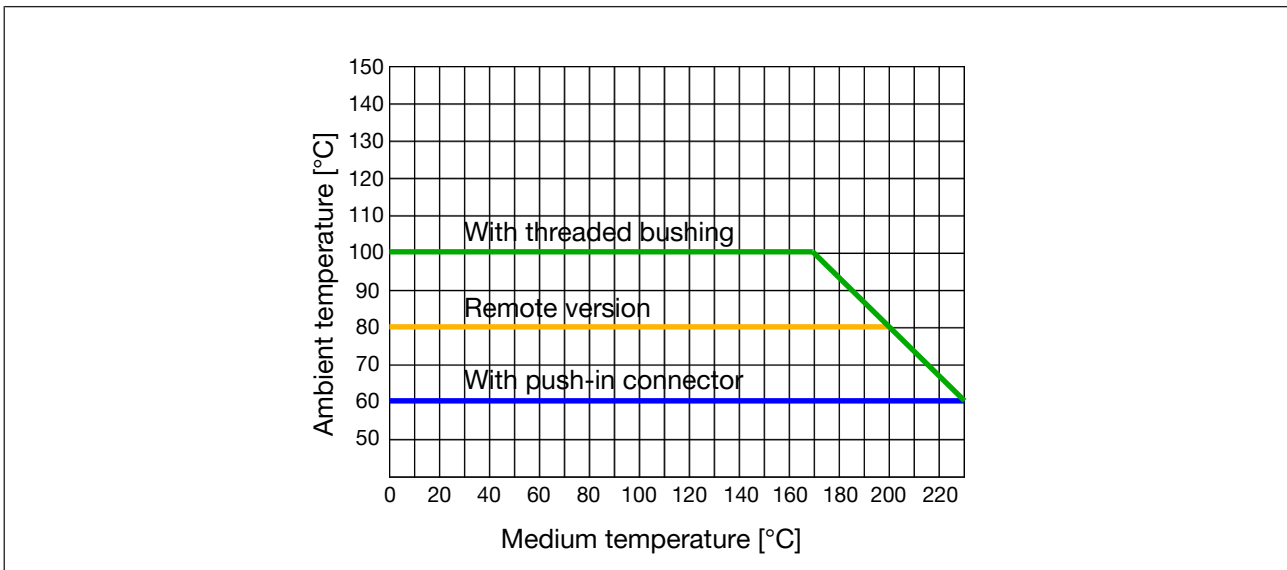


Fig. 4: Derating ELEMENT ANTG 50 70, 90

6.4.2 Pressure ranges 2/2-way valve

Maximum pilot pressure

Actuator size [mm]	Maximum pilot pressure [bar]
ø50	10
ø70	10 ⁷
ø90	10
ø130	7

Tab. 10: Maximum pilot pressure

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⁷ The maximum permitted pilot pressure is limited to 7 bar for the following device variant: Actuator size ø70, seat size 50, flow direction above the seat

Operating pressure and pilot pressure for control function A, flow direction below seat (standard)

Seat size	Maximum operating pressure [bar]				Minimum pilot pressure [bar]			
	Actuator size [mm]				Actuator size [mm]			
	ø50	ø70	ø90	ø130	ø50	ø70	ø90	ø130
15	25	25	-	-	5.2	5	-	-
20	16	25						
25	9	16	25					
32	-	8.5	25	-	-	5	5	5
40		6	16	25				
50	-	4	10	25	-	4.8	5	5
65		-	5	16 (15 ⁸)				
80	-	-	-	10	-	-	-	5.6

Tab. 11: Operating pressure and pilot pressure, control function A, standard

Operating pressure and pilot pressure for control function A, flow direction below seat, reduced spring action (EC04)

Seat size	Maximum operating pressure [bar]				Minimum pilot pressure [bar]			
	Actuator size [mm]				Actuator size [mm]			
	ø50	ø70	ø90	ø130	ø50	ø70	ø90	ø130
15	14	16	-	-	3.2	2.5	-	-
20	6	12						
25	3	6						
32	-	3.5	9	-	-	2.5	2.5	-
40		2	6	16				
50	-	-	3.5	11	-	-	2.5	2.5
65			-	7.5				

Tab. 12: Operating pressure and pilot pressure, control function A, reduced spring action (EC04)

Required minimum control pressure depending on the operating pressure

The following graphs show the required minimum control pressure for the respective control function depending on the operating pressure.

⁸ According to the Pressure Equipment Directive for compressible fluids of Group 1 (hazardous gases and vapours according to Art. 3 No. 1.3 letter a, first dash)

Control function A (CFA), flow direction above the seat

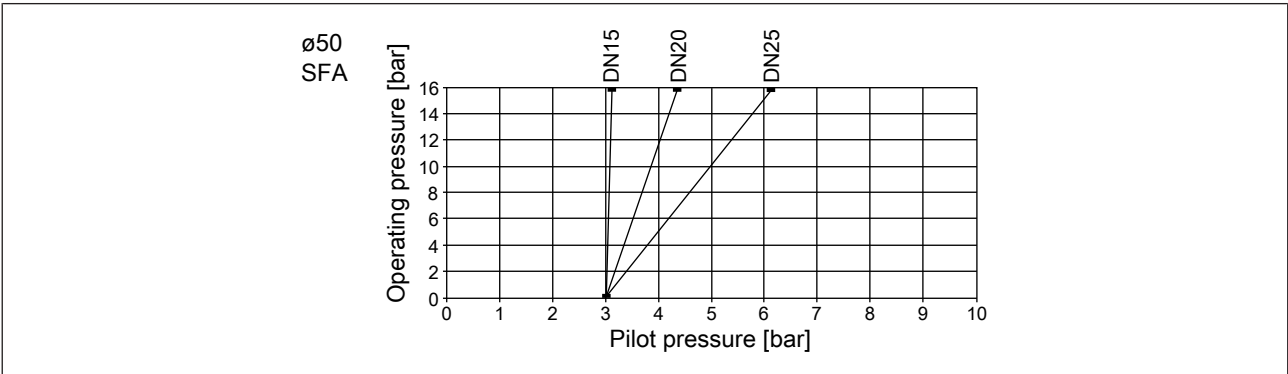


Fig. 5: Actuator ø50 mm, CFA, flow direction above the seat

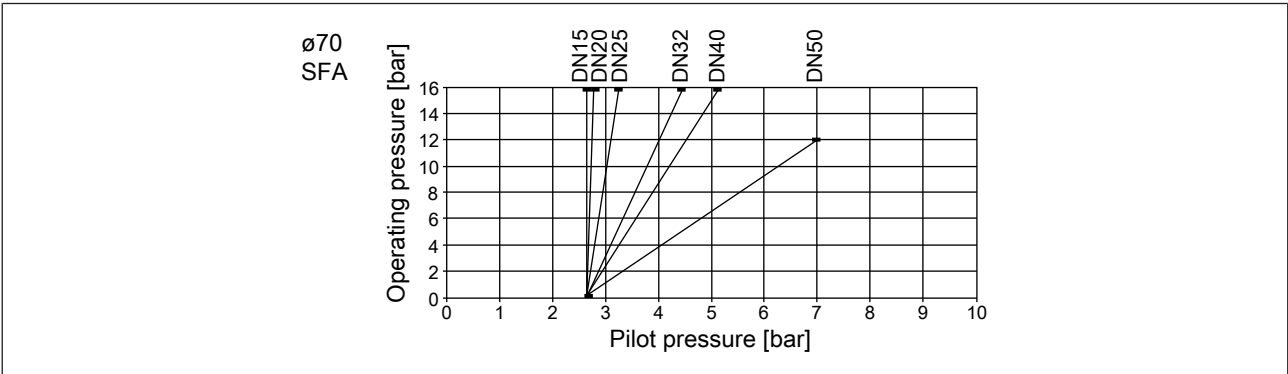


Fig. 6: Actuator ø70 mm, CFA, flow direction above the seat

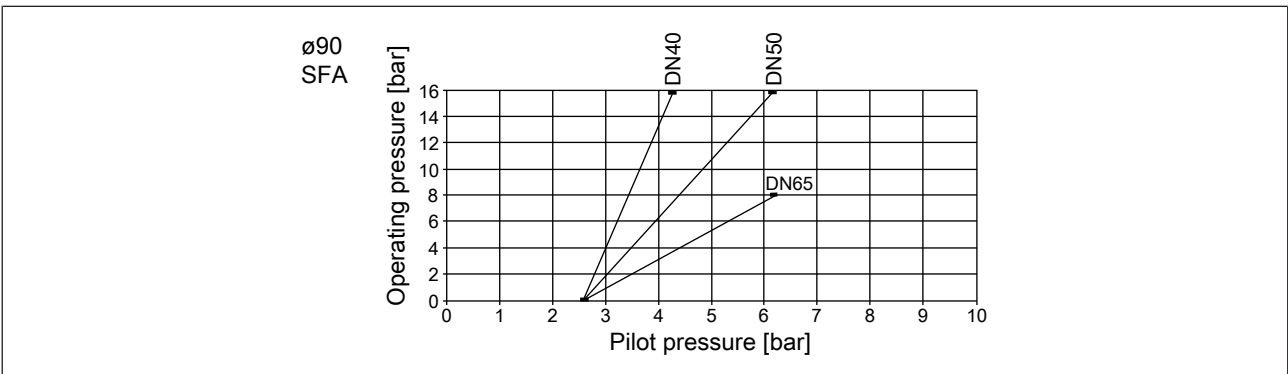


Fig. 7: Actuator ø90 mm, CFA, flow direction above the seat

Control function B and I, flow direction below seat

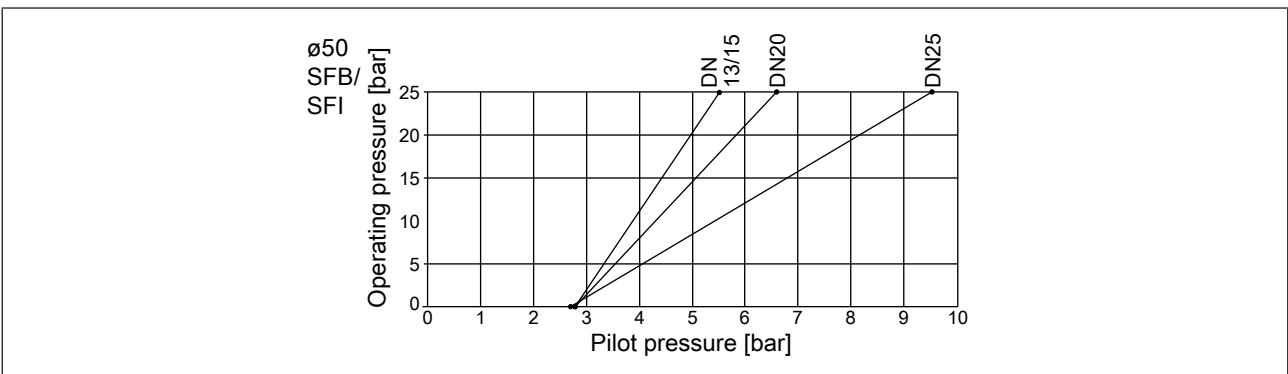


Fig. 8: Actuator ø50 mm, CFB and CFI, flow direction below seat

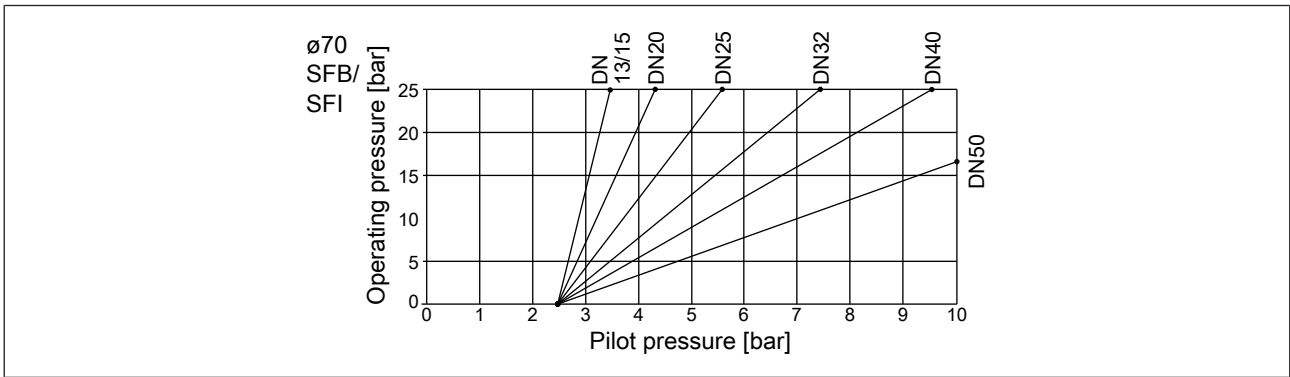


Fig. 9: Actuator ø70 mm, CFB and CFI, flow direction below seat

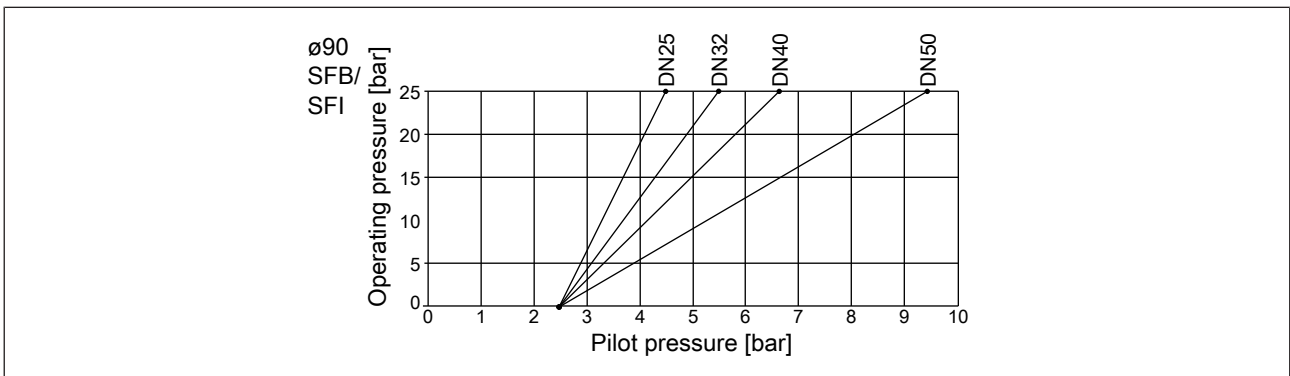


Fig. 10: Actuator ø90 mm, CFB and CFI, flow direction below seat

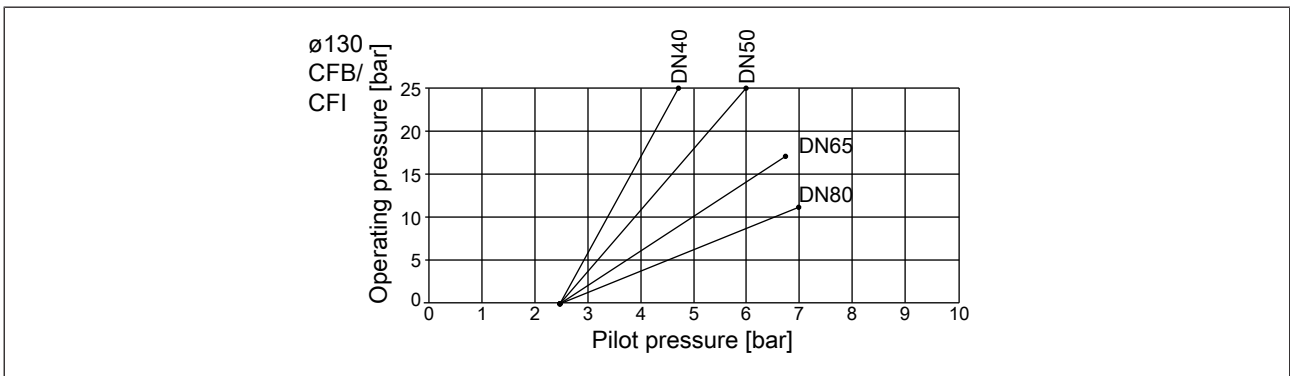


Fig. 11: Actuator ø130 mm, CFB and CFI, flow direction below seat

6.4.3 Pressure ranges 2/3-way valve

Maximum pilot pressure

Actuator size [mm]	Maximum pilot pressure [bar]
ø50	7
ø70	
ø90	

Tab. 13: Maximum pilot pressure

Operating pressure and pilot pressure for control function A, flow direction below seat (standard)

Seat size	Maximum operating pressure [bar]			Minimum pilot pressure [bar]		
	Actuator size [mm]			Actuator size [mm]		
	ø50	ø70	ø90	ø50	ø70	ø90
15	16	16	-	5	5	-
20	10	16				
25	5	12				
32	-	8.5	16	-	5	5
40		5	12			
50	-	-	7	-	-	5

Tab. 14: Operating pressure and pilot pressure, control function A, standard



Variants with lower pilot pressure (reduced spring force) are available on request. Contact your Bürkert sales department or the Bürkert Sales Center (info@burkert.com).

Required minimum control pressure depending on the operating pressure

The following graphs show the required minimum control pressure for control function A depending on the operating pressure.

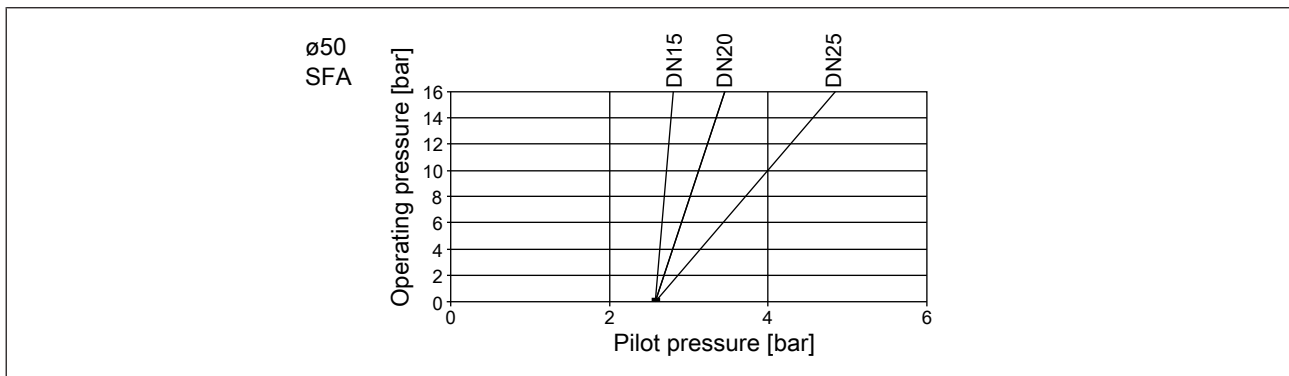


Fig. 12: Actuator ø50 mm, control function A, flow direction above the seat

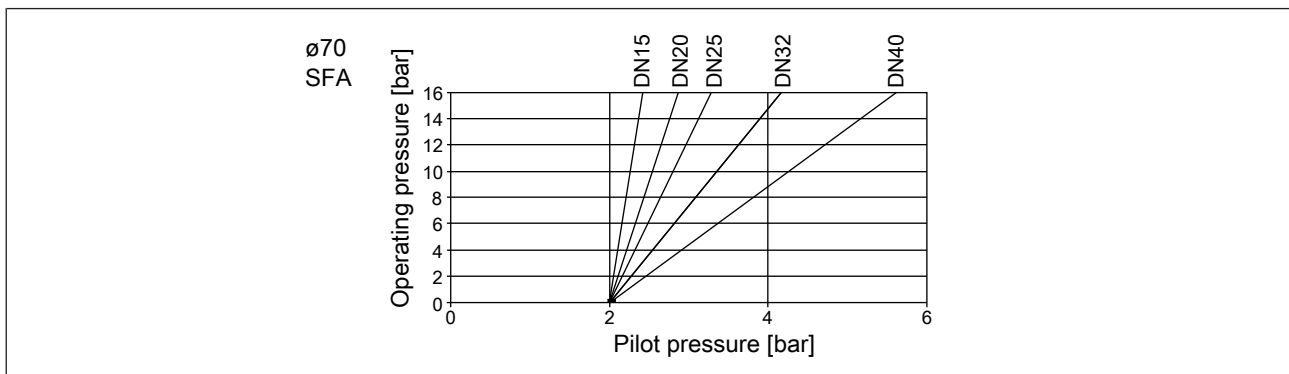


Fig. 13: Actuator ø70 mm, control function A, flow direction above the seat

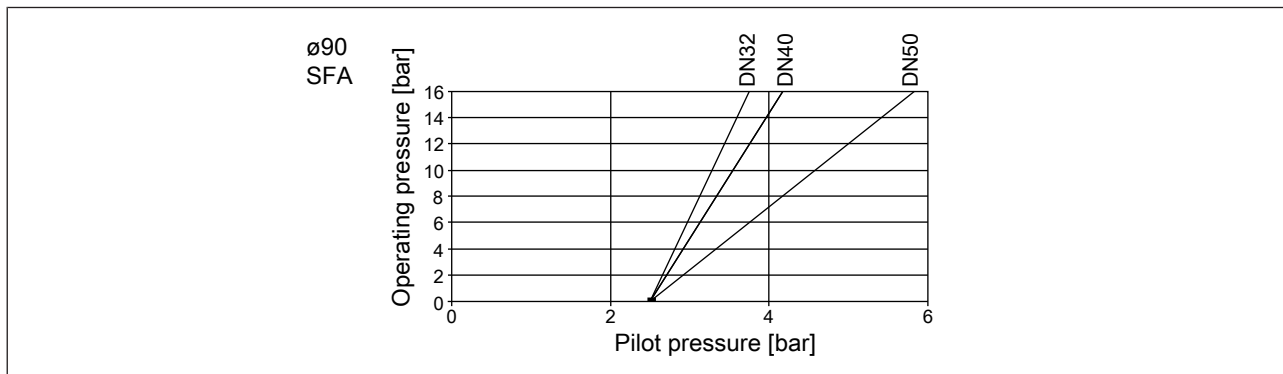


Fig. 14: Actuator $\varnothing 90$ mm, control function A, flow direction above the seat

6.5 Flow values and characteristics 2/3-way valve

Seat size 15

Stroke [%]	Flow coefficient [m ³ /h]	Stroke [%]	Flow coefficient [m ³ /h]
0	0	60	4.3
10	1.8	70	4.5
20	2.5	80	4.7
30	3.1	90	4.8
40	3.6	100	5.0
50	4.0		

Tab. 15: Flow values seat size 15, actuator size D ($\varnothing 50$)

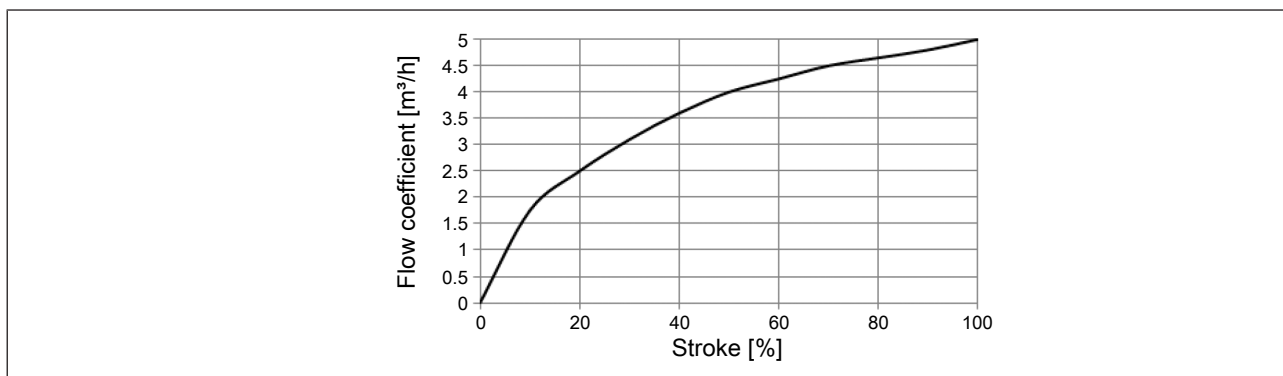


Fig. 15: Flow characteristics seat size 15, actuator size D ($\varnothing 50$)

Stroke [%]	Flow coefficient [m ³ /h]	Stroke [%]	Flow coefficient [m ³ /h]
0	0	60	3.8
10	1.0	70	4.1
20	1.8	80	4.5
30	2.5	90	4.8
40	3.0	100	5.0
50	3.4		

Tab. 16: Flow values seat size 15, actuator size M ($\varnothing 70$)

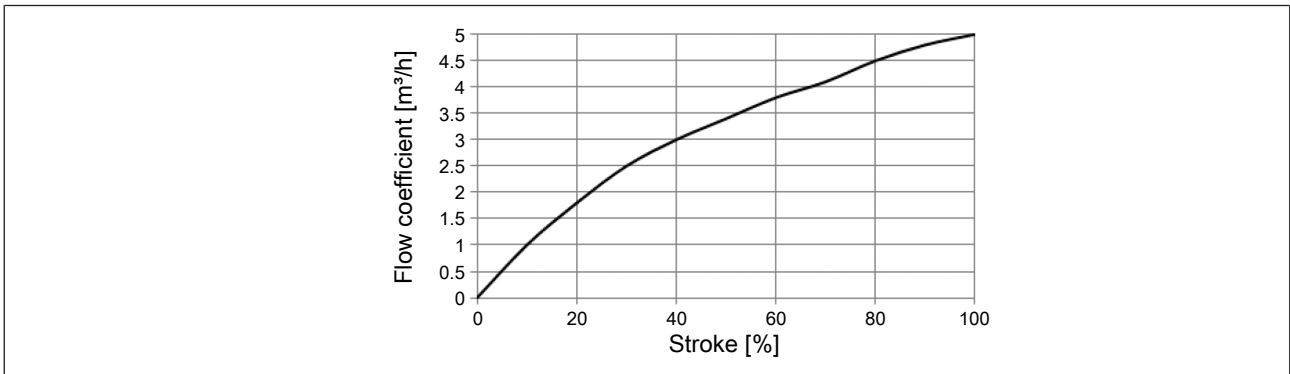


Fig. 16: Flow characteristics seat size 15, actuator size M (ø70)

Seat size 20

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	8.3
10	2.6	70	8.8
20	4.5	80	9.2
30	5.8	90	9.6
40	6.8	100	10.0
50	7.7		

Tab. 17: Flow values seat size 20, actuator size D (ø50)

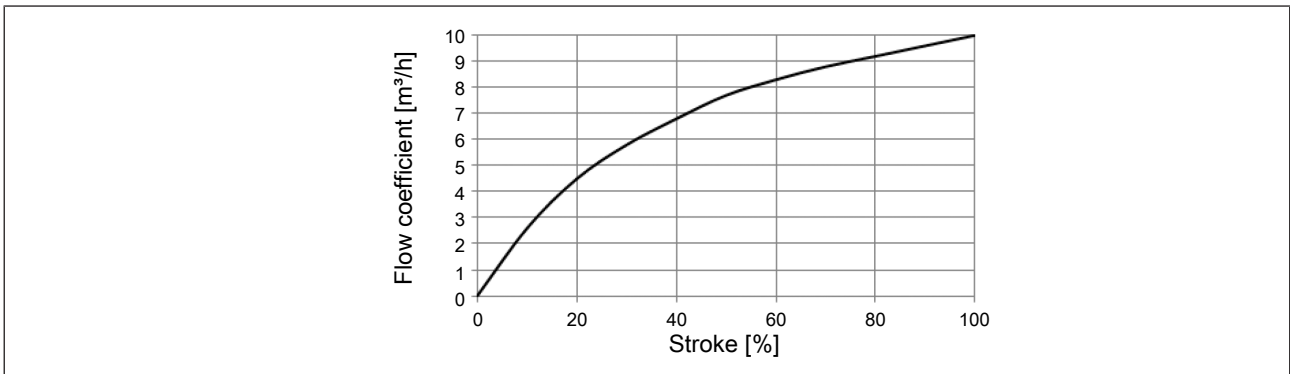


Fig. 17: Flow characteristics seat size 20, actuator size D (ø50)

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	8.9
10	1.5	70	9.4
20	4.3	80	10.0
30	6.4	90	10.6
40	7.5	100	11.0
50	8.2		

Tab. 18: Flow values seat size 20, actuator size M (ø70)

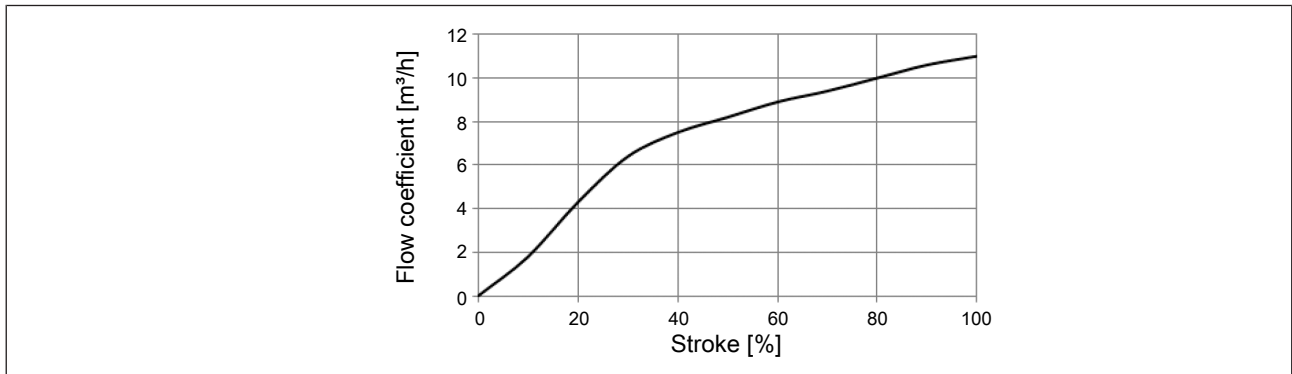


Fig. 18: Flow characteristics seat size 20, actuator size M (ø70)

Seat size 25

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	12.2
10	3.0	70	13.1
20	5.8	80	13.8
30	7.9	90	14.4
40	9.9	100	15.0
50	11.1		

Tab. 19: Flow values seat size 25, actuator size D (ø50)

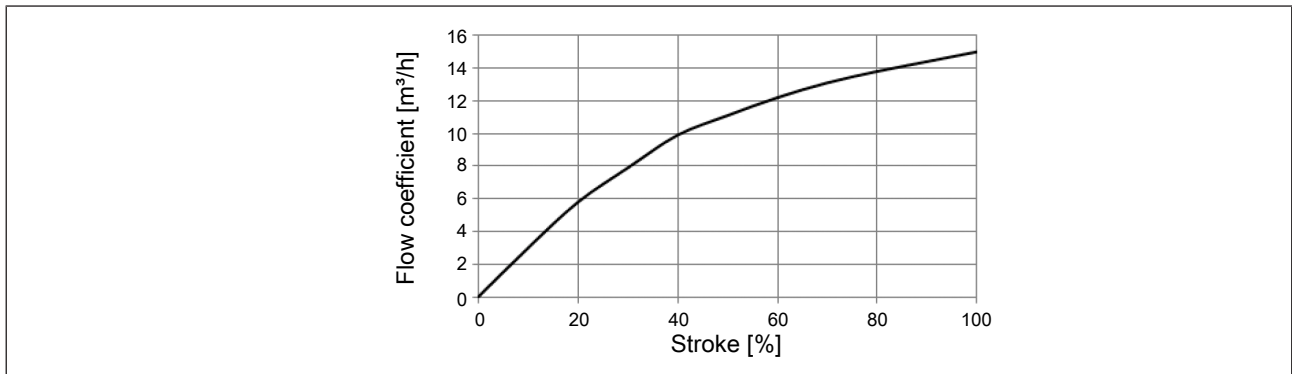


Fig. 19: Flow characteristics seat size 25, actuator size D (ø50)

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	13.5
10	1.5	70	14.8
20	4.4	80	15.7
30	7.8	90	16.5
40	10.3	100	18.0
50	12.1		

Tab. 20: Flow values seat size 25, actuator size M (ø70)

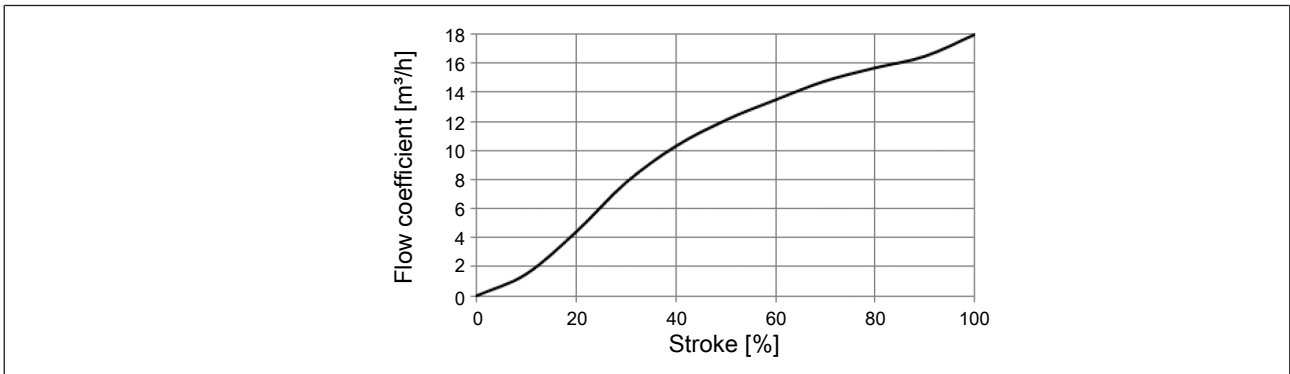


Fig. 20: Flow characteristics seat size 25, actuator size M (ø70)

Seat size 32

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	19.7
10	5.2	70	22.0
20	9.4	80	24.0
30	12.5	90	25.0
40	15.0	100	26.0
50	17.4		

Tab. 21: Flow values seat size 32, actuator size M (ø70)

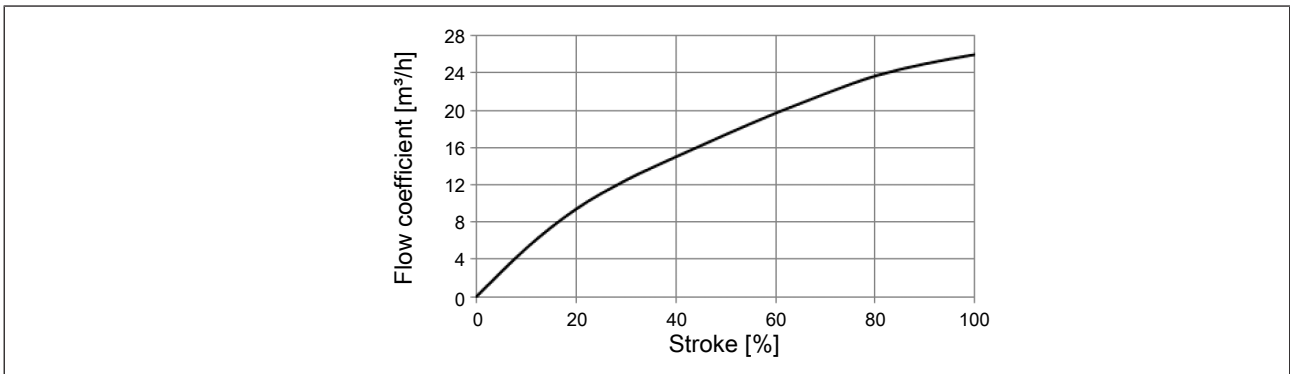


Fig. 21: Flow characteristics seat size 32, actuator size M (ø70)

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	21.0
10	5.4	70	23.0
20	10.1	80	25.0
30	13.2	90	26.0
40	16.2	100	27.0
50	18.7		

Tab. 22: Flow values seat size 32, actuator size N (ø90)

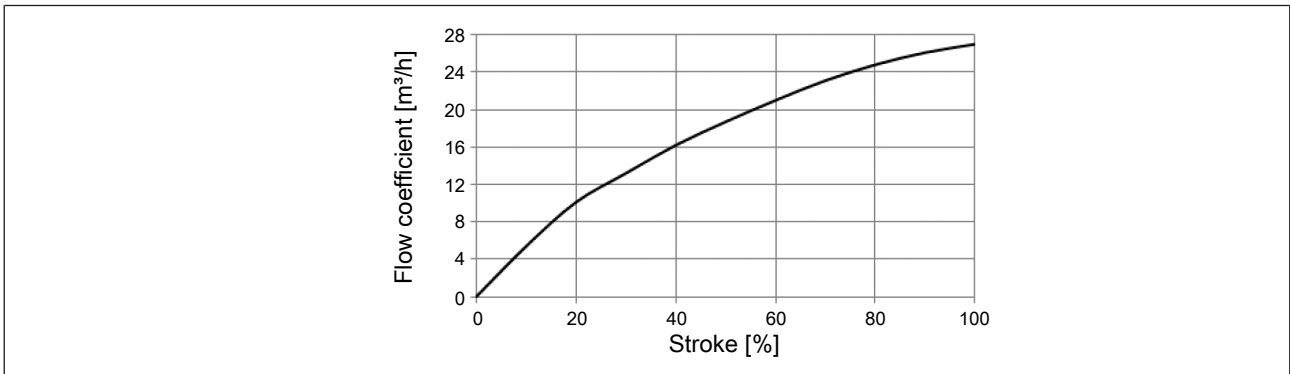


Fig. 22: Flow characteristics seat size 32, actuator size N (ø90)

Seat size 40

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	25.5
10	5.5	70	28.5
20	10.5	80	31.0
30	14.9	90	34.0
40	18.8	100	36.0
50	22.5		

Tab. 23: Flow values seat size 40, actuator size M (ø70)

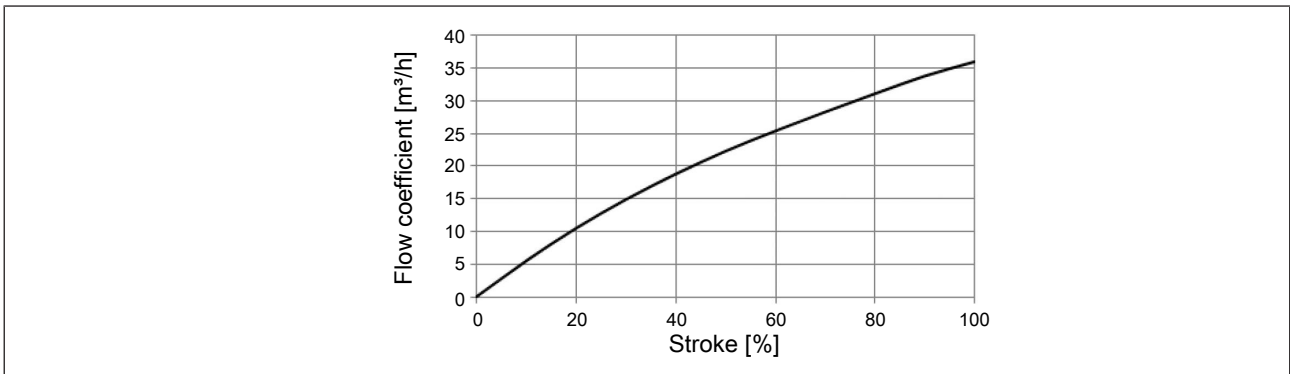


Fig. 23: Flow characteristics seat size 40, actuator size M (ø70)

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	27.5
10	6.2	70	30.5
20	11.6	80	33.5
30	16.1	90	36.5
40	20.0	100	38.0
50	23.5		

Tab. 24: Flow values seat size 40, actuator size N (ø90)

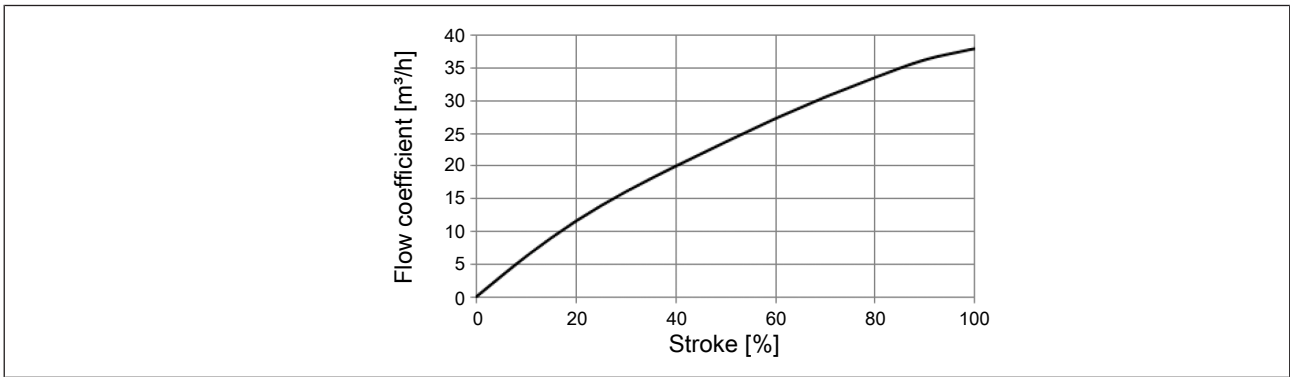


Fig. 24: Flow characteristics seat size 40, actuator size N (ø90)

Seat size 50

Stroke [%]	Flow coefficient [m³/h]	Stroke [%]	Flow coefficient [m³/h]
0	0	60	32.0
10	8.1	70	36.0
20	13.5	80	40.0
30	18.6	90	44.5
40	23.0	100	49.0
50	28.0		

Tab. 25: Flow values seat size 50, actuator size N (ø90)

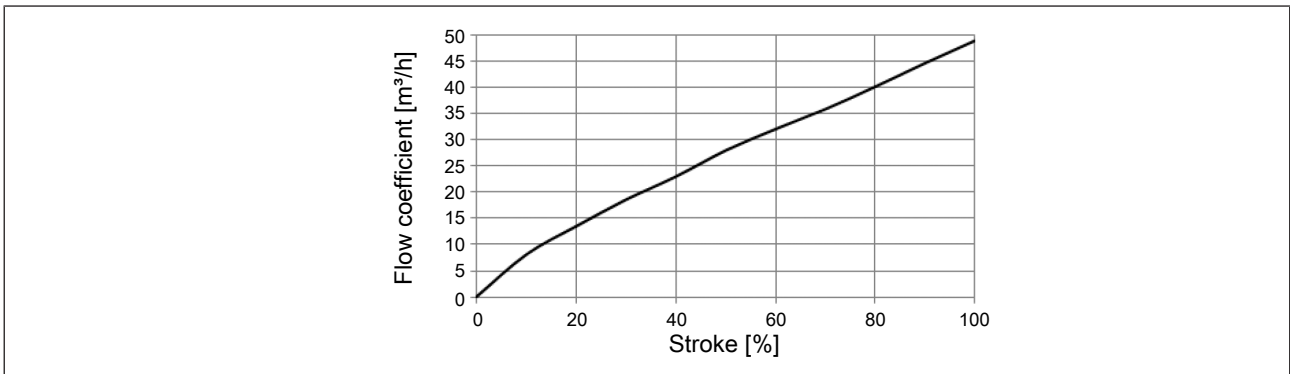


Fig. 25: Flow characteristics seat size 50, actuator size N (ø90)

6.6 Mechanical data

Actuator size	See type label
Installation position	any, preferably actuator face up

Materials

Valve body	316L
Actuator	PPS and stainless steel
Sealing elements	FKM and EPDM
Spindle seal (with silicone grease)	PTFE V-rings with spring compensation
Spindle	1.4401, 1.4404
Spindle guide	PEEK
Seat seal swivel plate	PTFE, PEEK Optional: EPDM, NBR, FKM

Ports

Pilot air port	Push-in connector 6/4 mm or threaded connection 1/4" More on request
Port connection	G1/2...G3 (NPT, RC on request)
	Welded connection as per ISO 4200, DIN 11850 R2 Others on request

7 INSTALLATION

7.1 Safety instructions installation

DANGER!

Risk of injury from high pressure and discharge of medium.

- ▶ Before working on the device or system, switch off the pressure. Vent or drain lines.

WARNING!

Risk of injury due to improper installation.

- ▶ Only trained technicians may perform installations.
- ▶ Perform installations with suitable tools only.

WARNING!

Risk of injury due to unintentional activation of the system and uncontrolled restart.

- ▶ Secure plant to prevent unintentional activation..
- ▶ Ensure that the plant starts up in a controlled manner only.

DANGER!

For control function I: Danger due to the control pressure failing.

If the control pressure fails, the valve remains in an undefined position.

- ▶ For a controlled restart, pressurize the device with control pressure and then connect the medium.

WARNING!

Risk of injury due to moving parts.

- ▶ Do not reach into openings in the device.
- ▶ Operate 3-position actuator with transparent cap only.

CAUTION!

Risk of injury due to heavy device.

During transportation or installation work, a heavy device may fall down and cause injuries.

- ▶ Heavy equipment must only be transported, assembled and disassembled with the help of a second person.
- ▶ Use suitable tools.

WARNING!

Valve seat not sealed when control pressure too low or operating pressure too high.

If control pressure for control function B and control function I is too low or operating pressure is too high, this can cause the valve seat to leak.

- ▶ Comply with minimum control pressure and maximum operating pressure values.

 **DANGER!**

Risk of injury from rupturing lines and device when flow direction above the seat.

A pressure surge of liquid media may cause the lines and device to rupture.

- ▶ Do not use valves with flow direction above the seat for liquid media.

7.2 Preparatory work

- Observe flow direction on the type label.
- Remove soiling from pipelines.
- Ensure that pipelines are in alignment.

7.2.1 Attach dirt trap

Dirt trap for devices with approval according to DIN EN 161

According to DIN EN 161 "Automatic shut-off valves for gas burners and gas appliances", a dirt trap, which prevents the penetration of a 1 mm test pin, must be installed upstream of the valve.

- Attach dirt trap upstream of the valve.

7.3 Installing valve body

- Connect valve body to pipeline.
- Devices with welded connection: Weld valve body into pipeline. To do this, observe chapter "Installing devices with welded connection".

7.4 Installing devices with welded connection

ATTENTION!

Damage to the actuator when welding the valve body into the pipeline.

- ▶ Before welding into the pipeline, remove the actuator.

7.4.1 Removing actuator from the valve body for devices without control unit

- Clamp valve body into a holding device.

Devices with collet

ATTENTION!

Damage to the valve seat seal or seat contour.

- ▶ When removing the actuator, the valve must be in the open position.

- For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.
- Place a suitable open-end wrench on the wrench flat of the body connection.
- Unscrew actuator from the valve body.

Devices without collet

→ For control function A: Install control unit. To do this, follow the operating instructions for the control unit.

ATTENTION!

Damage to the valve seat seal or seat contour.

▶ When removing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.

→ For control function A with pilot valve: Manually switch device with pilot valve. To do this, follow the operating instructions for the control unit. Valve opens.

→ Place a suitable open-end wrench on the wrench flat of the body connection.

→ Unscrew actuator from the valve body.

7.4.2 Removing actuator from the valve body for devices with installed control unit

→ Clamp valve body into a holding device.

ATTENTION!

Damage to the valve seat seal or seat contour.

▶ When removing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.

→ For control function A with pilot valve: Manually switch device with pilot valve. To do this, follow the operating instructions for the control unit. Valve opens.

→ Place a suitable open-end wrench on the wrench flat of the body connection.

→ Unscrew actuator from the valve body.

7.4.3 Installing actuator on valve body

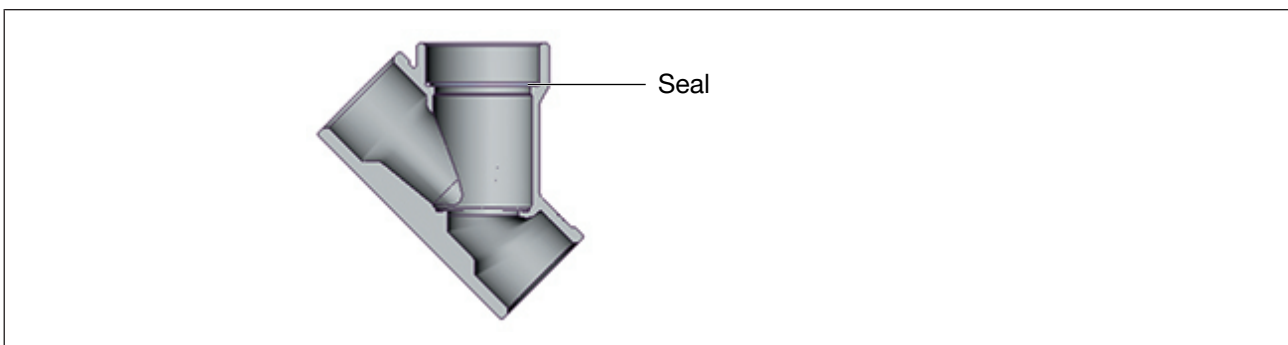


Fig. 26: Seal

→ Check seal and replace if required.

! DANGER!

Danger due to lubricant.

Lubricant may contaminate the medium. There is a risk of explosion in oxygen applications.

- ▶ For specific applications use only approved lubricants (e.g. for oxygen applications or analysis applications).

→ Before re-installation, grease the thread of the body connection (e.g. with Klüberpaste UH1 96-402 from Klüber).

ATTENTION!

Damage to the valve seat seal or seat contour.

- ▶ When installing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar): Valve opens.

→ Screw actuator into the valve body. Observe tightening torques of the following table.

Seat size	Tightening torque [Nm]
15	45 ±3
20	50 ±3
25	60 ±3
32	65 ±3
40	65 ±3
50	70 ±3
65	100 ±3
80	120 ±5

Tab. 26: Tightening torques valve body and body connection

7.5 Installing control unit



Description see chapter "Installation" in the operating instructions for the corresponding control unit.

7.6 Turning actuator

7.6.1 Turning the actuator, devices with hexagon nut



The following description applies only to devices with a hexagon head on the actuator.

For devices without a hexagon head on the actuator: in the operating instructions observe the chapter "Turning actuator, devices without a hexagon head".

The position of the ports can be steplessly aligned by turning the actuator through 360°.

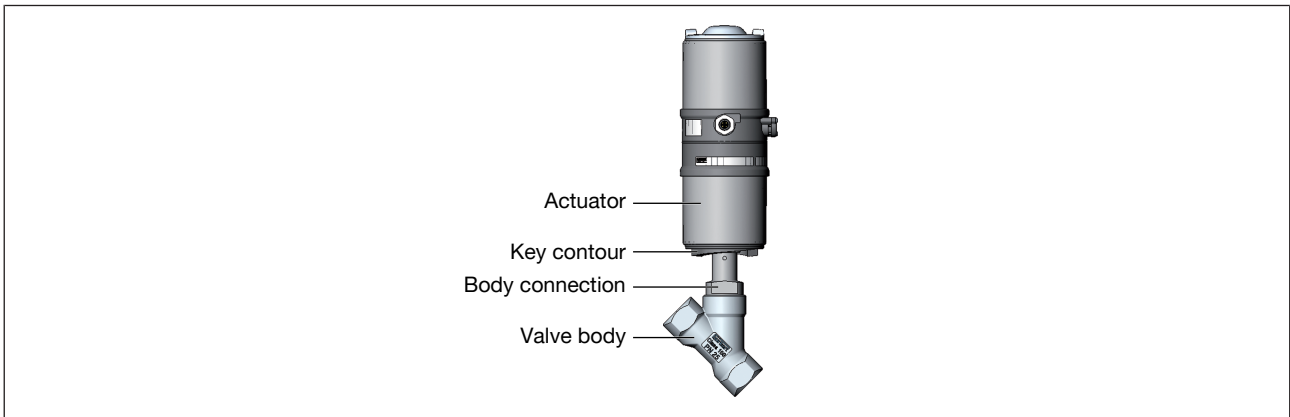


Fig. 27: Turn actuator (1)

→ Clamp valve body in a holding device (only for valves which have not yet been installed).

ATTENTION!

Damage to the seat seal or seat contour.

▶ When turning the actuator, the valve must be in the open position.

→ For control function A und I⁹:

pressurise the pilot air port 1 with compressed air. Valve opens.

→ For devices with control unit and pilot valve: Manually switch device with pilot valve (see operating instructions for the control unit).

→ Counter with a suitable open-end wrench on the wrench flat of the body connection.

→ Place a suitable open-end wrench on the hexagon head of the actuator.

! DANGER!

Risk of injury from high pressure and discharge of medium.

If the direction of rotation is wrong, the body connection may become detached.

▶ Only turn the actuator in the prescribed direction.

→ Move the actuator into the required position by turning it counterclockwise (seen from below).

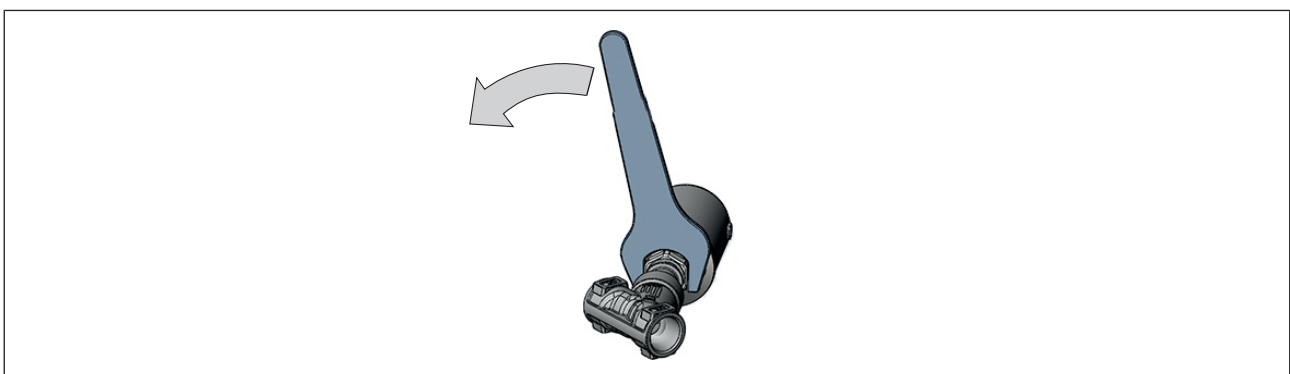


Fig. 28: Turn actuator (2)

7.6.2 Turning actuator, devices without hexagon head

The position of the ports can be steplessly aligned by turning the actuator through 360°.

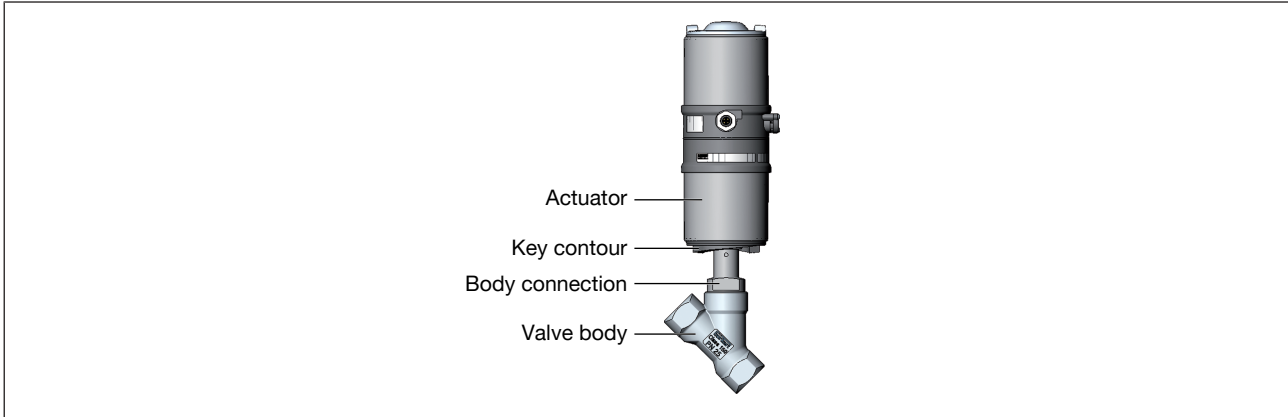


Fig. 29: Turn actuator (1), devices without hexagon head

→ Clamp valve body in a holding device (only for valves which have not yet been installed).

ATTENTION!

Damage to the seat seal or seat contour.

▶ When turning the actuator, the valve must be in the open position.

→ For control function A und I¹⁰:

pressurise the pilot air port 1 with compressed air. Valve opens.

→ Counter with a suitable open-end wrench on the wrench flat of the body connection.

→ Place special wrench¹¹ in the key contour of the actuator.

DANGER!

Risk of injury from high pressure and discharge of medium.

If the direction of rotation is wrong, the body connection may become detached.

▶ Only turn the actuator in the prescribed direction.

→ Move the actuator into the required position by turning it clockwise (seen from below).

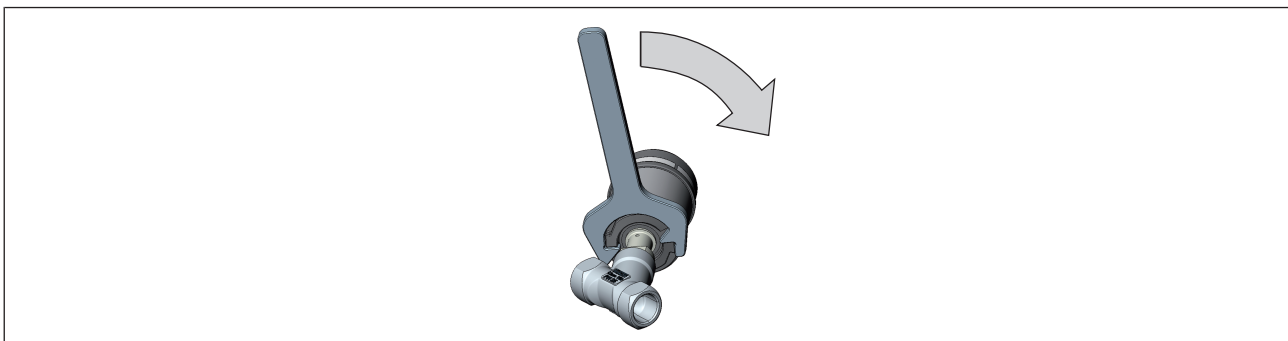


Fig. 30: Turn actuator (2), devices without hexagon head

¹⁰ If variant available

¹¹ The special wrench (00665702) is available from your Bürkert sales department.

7.7 Connecting device pneumatically



DANGER!

Risk of injury due to connection of unsuitable hoses.

- ▶ Use only hoses which can withstand the pressure and temperature of the medium.
- ▶ Observe technical data of the hose manufacturer.



DANGER!

For control function I: Danger due to the control pressure failing.

If the control pressure fails, the valve remains in an undefined position.

- ▶ For a controlled restart, pressurize the device with control pressure and then connect the medium.



For devices with control unit follow the operating instructions for the corresponding control unit.

7.7.1 Connecting control medium



The position of the ports can be steplessly aligned by turning the actuator through 360°. The procedure is described in the chapter "Turning actuator".

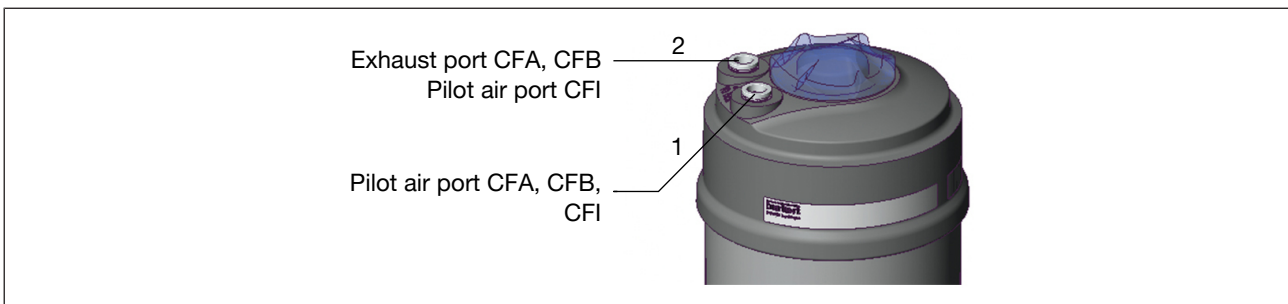


Fig. 31: Pneumatic ports

Control function A and B:

- Connect control medium to pilot air port 1 of the actuator.

Control function A, 3-position actuator:

- Connect control medium to pilot air port 1 and 2 of the actuator.
- Pressure on pilot air port 1: Valve opens.
- Pressure on pilot air port 1 and 2: Valve in middle position.

Control function I:

- Connect control medium to pilot air port 1 and 2 of the actuator.
- Pressure on pilot air port 1: Valve opens.
- Pressure on pilot air port 2: Valve closes.

Silencer

For devices with push-in connection, the silencer to reduce the exhaust air volume is loosely supplied.

- Connect the silencer to the free exhaust port 2.



When operating in an aggressive environment, divert free pneumatic ports into a neutral atmosphere using a pneumatic hose.

Pilot air hose

Pilot air hoses of sizes 6/4 mm or 1/4" can be used.

8 START-UP



WARNING!

Risk of injury from high pressure or hot medium.

Excessively high pressure or temperatures may damage the device and cause leaks.

► Observe values for pressure and medium temperature indicated on the type label.



In the case of devices with control unit, observe start-up in the operating instructions for the corresponding control unit.

8.1 Set middle position on 3-position actuator

Open position [100 % stroke]

Pilot air port 1: 5...7 bar

Pilot air port 2: 0 bar

Middle position [0...100 % stroke]

Pilot air port 1: 5...7 bar

Pilot air port 2: 5...7 bar

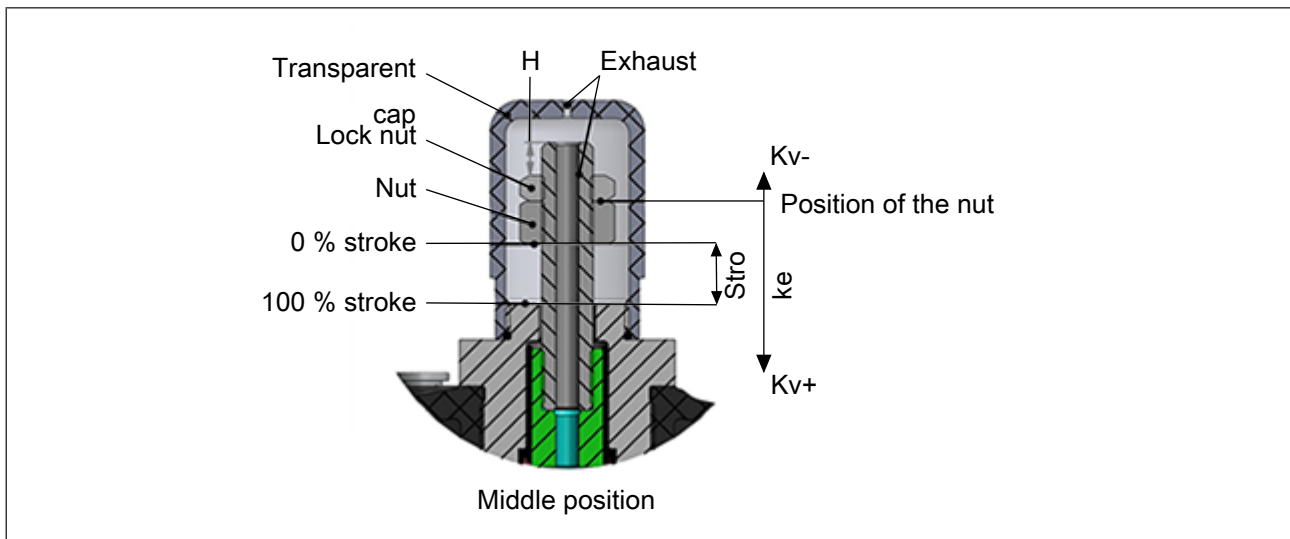


Fig. 32: Setting middle position

→ Unscrewing transparent cap: Actuator sizes $\varnothing 50$, $\varnothing 70$ and $\varnothing 90$: Width across flats 28.

→ Pressurise pilot air port 1 of the actuator with compressed air (5 bar).

→ Loosening lock nut: Actuator size $\varnothing 50$: Width across flats 13; actuator size $\varnothing 70$ and $\varnothing 90$: Width across flats 17.

→ Adjust the middle position with the nut.

→ Retightening lock nut: Actuator size $\varnothing 50$ max. $20+5$ Nm; actuator size $\varnothing 70$ max. $30+5$ Nm; actuator size $\varnothing 90$ max. $45+5$ Nm.

→ Screw transparent cap back on.

To limit the middle position to 50 % of the total stroke, set dimension H on the nuts.

Actuator size [mm]	Seat size	Dimension H ± 0.3 [mm]	Total stroke [mm]
ø50	15	10.4	10.8
	20	8.4	14.8
	25	6.4	18.8
ø70	15	12.9	10
	20	8.9	18
	25	8.9	18
	32	8.9	18
	40	8.9	18
ø90	32	10.6	20.4
	40	10.6	20.4
	50	10.6	20.4

Tab. 27: Setting the middle position to 50 % of the total stroke

9 DEINSTALLATION



DANGER!

Risk of injury from high pressure and discharge of medium.

▶ Before working on the device or system, switch off the pressure. Vent or drain lines.

→ Loosen pneumatic connection.

→ Disassemble the device.

10 MAINTENANCE

10.1 Safety instructions maintenance

DANGER!

Risk of injury from high pressure and discharge of medium.

- ▶ Before working on the device or system, switch off the pressure. Vent or drain lines.

DANGER!

For control function I: Danger due to the control pressure failing.

If the control pressure fails, the valve remains in an undefined position.

- ▶ For a controlled restart, pressurize the device with control pressure and then connect the medium.

DANGER!

Risk of injury due to electric shock.

- ▶ Before working on the device or system, switch off the power supply. Secure against reactivation.
- ▶ Observe the applicable accident prevention and safety regulations for electrical devices.

WARNING!

Risk of injury due to unintentional activation of the system and uncontrolled restart.

- ▶ Secure plant to prevent unintentional activation..
- ▶ Ensure that the plant starts up in a controlled manner only.

WARNING!

Risk of injury due to moving parts.

- ▶ Do not reach into openings in the device.
- ▶ Operate 3-position actuator with transparent cap only.

DANGER!

Risk of injury due to improper maintenance.

- ▶ Only trained technicians may perform maintenance work.
- ▶ Perform maintenance work using suitable tools only.

10.2 Maintenance work

The maintenance work is described in the separate service instructions. These instructions can be found on our homepage at www.buerkert.de.

10.2.1 Actuator

When used in accordance with these operating instructions, the actuator is maintenance-free.

10.2.2 Wearing parts

The following parts are subject to natural wear:

- Seal
- Swivel plate with seal

→ If leaks occur, replace the respective wearing part.

10.2.3 Visual inspection

According to the usage conditions, perform regular visual inspections:

- Check medium ports for tightness.
- Check relief bore on the pipe for leaks.

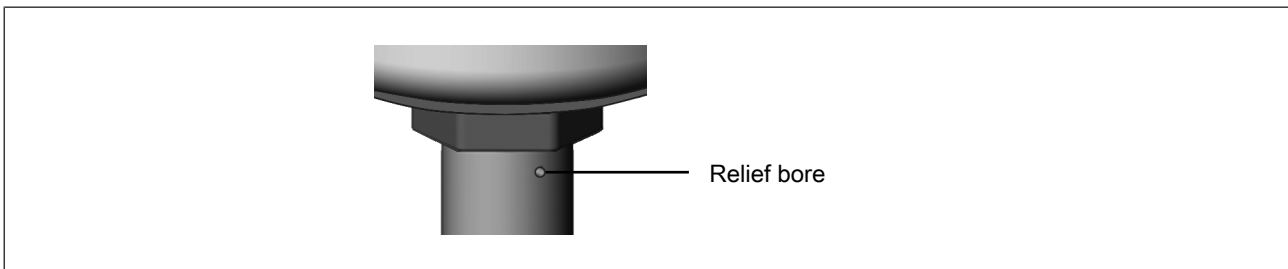


Fig. 33: Relief bore

10.2.4 Cleaning

Commercially available cleaning agents can be used to clean the outside.

ATTENTION!

Avoid causing damage with cleaning agents.

- ▶ Before cleaning, check that the cleaning agents are compatible with body materials and seals.

10.3 Changing the valve set

The valve set consists of:

- Swivel plate with seal
- Pin
- Seal

To change the valve set, first remove the actuator from the valve body.



DANGER!

Risk of injury from high pressure and discharge of medium.

- ▶ Before working on the device or system, switch off the pressure. Vent or drain lines.



DANGER!

Risk of injury due to improper maintenance.

- ▶ Only trained technicians may perform maintenance work.
- ▶ Perform maintenance work using suitable tools only.

10.3.1 Removing actuator from the valve body for devices without control unit

→ Clamp valve body into a holding device.

Devices with collet

ATTENTION!

Damage to the valve seat seal or seat contour.

▶ When removing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.

→ Place a suitable open-end wrench on the wrench flat of the body connection.

→ Unscrew actuator from the valve body.

Devices without collet

→ For control function A: Install control unit. To do this, follow the operating instructions for the control unit.

ATTENTION!

Damage to the valve seat seal or seat contour.

▶ When removing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.

→ For control function A with pilot valve: Manually switch device with pilot valve. To do this, follow the operating instructions for the control unit. Valve opens.

→ Place a suitable open-end wrench on the wrench flat of the body connection.

→ Unscrew actuator from the valve body.

10.3.2 Changing the valve set

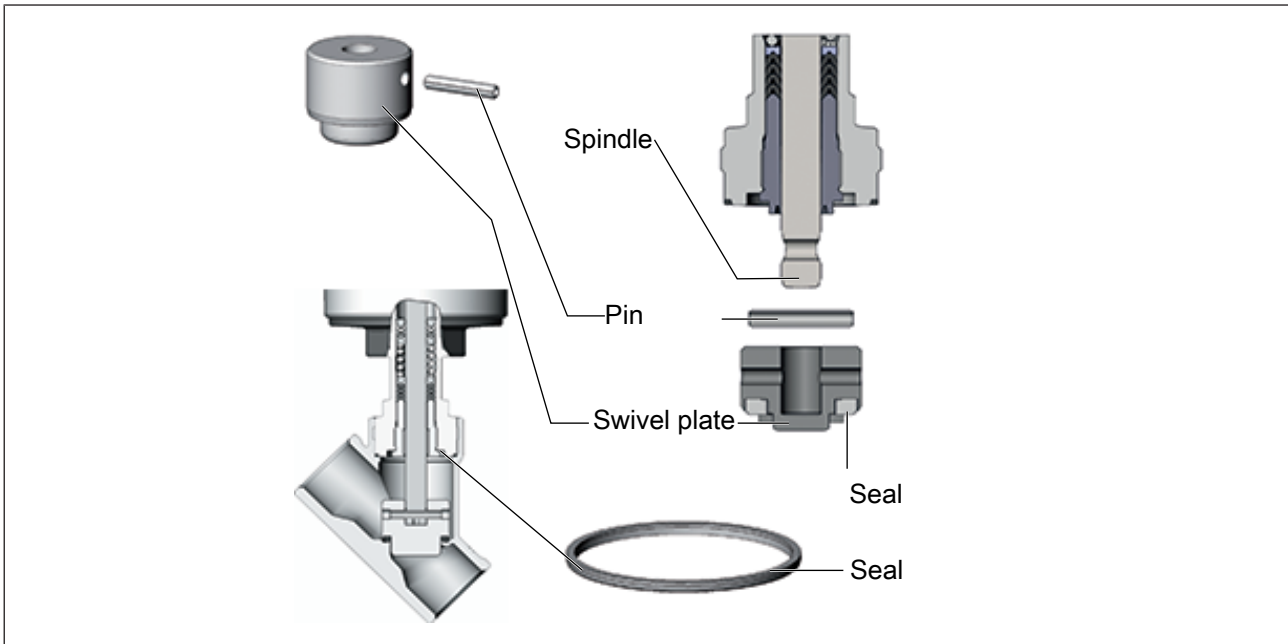


Fig. 34: Valve set

- Support swivel plate on the cylindrical part using a prism or something similar.
- Knock out pin using a suitable pin punch. Pin punch $\varnothing 3$ mm, for 10 mm spindle diameter on the swivel plate. Pin punch $\varnothing 5$ mm, for 14 mm spindle diameter on the swivel plate.
- Remove swivel plate.
- Connect new swivel plate to the spindle.
- Align boreholes in the swivel plate and spindle.
- Support swivel plate on the cylindrical part using a prism or something similar.
- Insert pin into the borehole.
- Caulk pin boreholes on both sides of the swivel plate using a chisel or centre punch.

10.3.3 Installing actuator on valve body

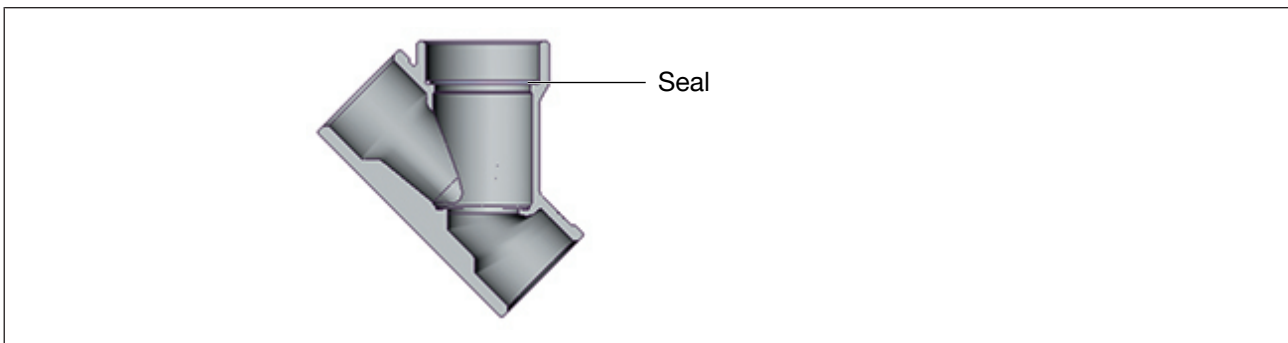


Fig. 35: Seal

- Check seal and replace if required.

 **DANGER!**

Danger due to lubricant.

Lubricant may contaminate the medium. There is a risk of explosion in oxygen applications.

- ▶ For specific applications use only approved lubricants (e.g. for oxygen applications or analysis applications).

→ Before re-installation, grease the thread of the body connection (e.g. with Klüberpaste UH1 96-402 from Klüber).

ATTENTION!

Damage to the valve seat seal or seat contour.

- ▶ When installing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar): Valve opens.

→ Screw actuator into the valve body. Observe tightening torques of the following table.

Seat size	Tightening torque [Nm]
15	45 ±3
20	50 ±3
25	60 ±3
32	65 ±3
40	65 ±3
50	70 ±3
65	100 ±3
80	120 ±5

Tab. 28: Tightening torques valve body and body connection

10.4 Changing the packing gland

The seal set for the packing gland includes

- 1 support ring
- 7 chevron seals
- 2 thrust collars
- 1 compression spring
- 1 spindle guide
- Seal
- Lubricant



For devices of actuator size $\varnothing 70$ with seat size 50 the packing gland can be changed as of series-production status January 2017.



DANGER!

Risk of injury from high pressure and discharge of medium.

- ▶ Before working on the device or system, switch off the pressure. Vent or drain lines.

! DANGER!

Risk of injury due to improper maintenance.

- ▶ Only trained technicians may perform maintenance work.
- ▶ Perform maintenance work using suitable tools only.

! WARNING!

Risk of injury due to using wrong tool.

- ▶ To replace the packing gland, use special installation wrench or socket wrench.
- ▶ Observe tightening torques.

To change the packing gland, first remove the actuator from the valve body and remove the swivel plate.

10.4.1 Removing actuator from the valve body for devices without control unit

→ Clamp valve body into a holding device.

Devices with collet

ATTENTION!

Damage to the valve seat seal or seat contour.

- ▶ When removing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.

→ Place a suitable open-end wrench on the wrench flat of the body connection.

→ Unscrew actuator from the valve body.

Devices without collet

→ For control function A: Install control unit. To do this, follow the operating instructions for the control unit.

ATTENTION!

Damage to the valve seat seal or seat contour.

- ▶ When removing the actuator, the valve must be in the open position.

→ For control function A pressurise the pilot air port 1 with compressed air (5 bar). Valve opens.

→ For control function A with pilot valve: Manually switch device with pilot valve. To do this, follow the operating instructions for the control unit. Valve opens.

→ Place a suitable open-end wrench on the wrench flat of the body connection.

→ Unscrew actuator from the valve body.

10.4.2 Removing swivel plate

→ Knock out pin using a suitable pin punch. Pin punch $\varnothing 3$ mm, for 10 mm spindle diameter on the swivel plate. Pin punch $\varnothing 5$ mm, for 14 mm spindle diameter on the swivel plate.

→ Remove swivel plate.

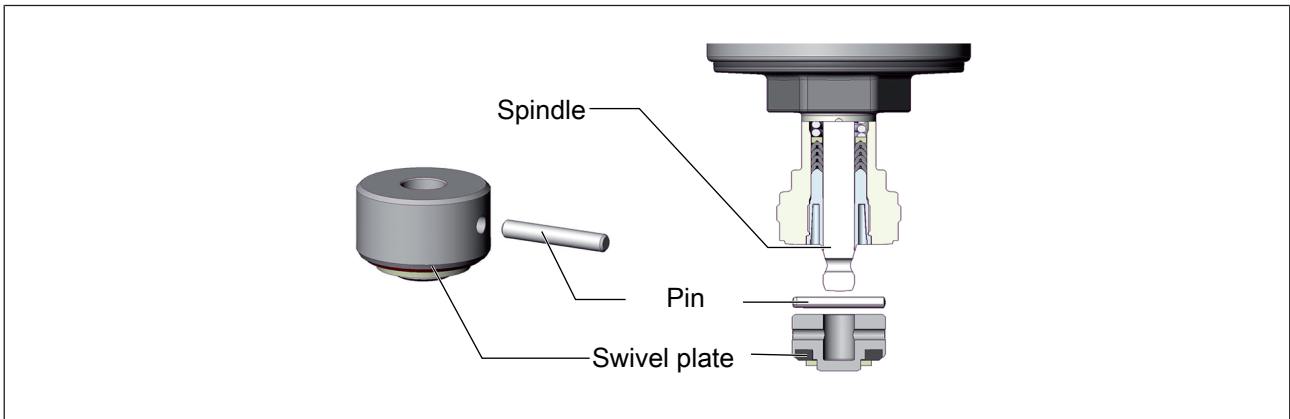


Fig. 36: Removing the swivel plate

10.4.3 Changing packing gland

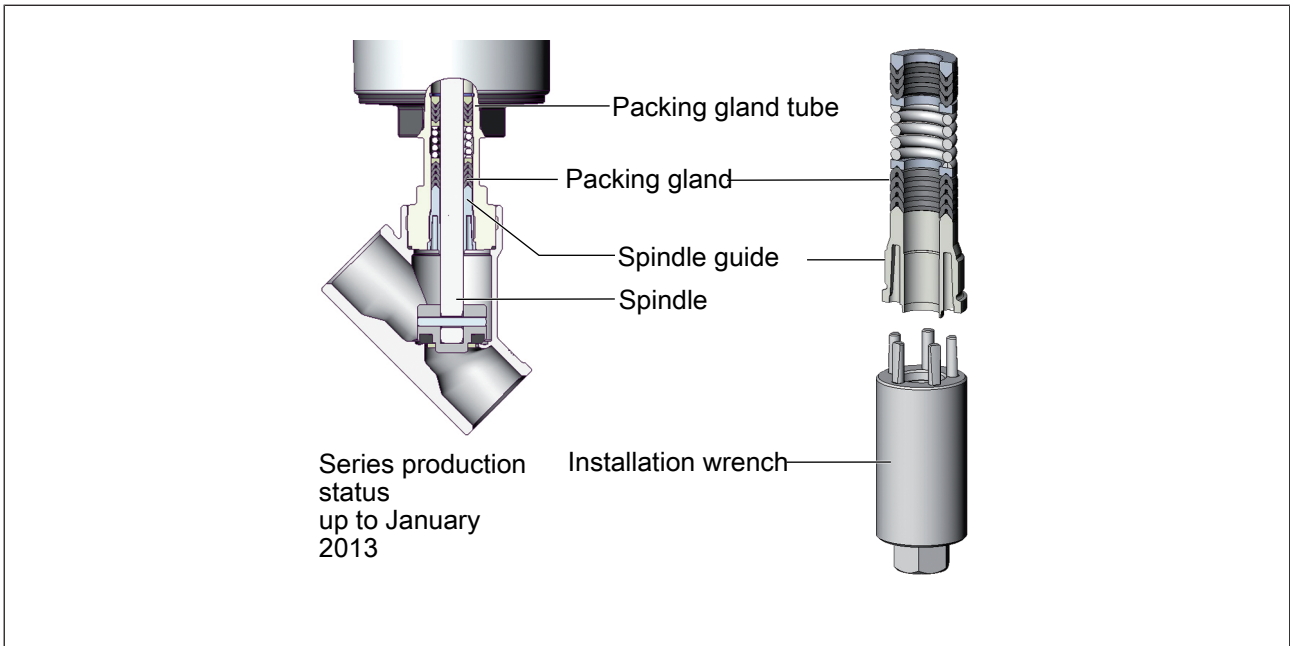


Fig. 37: Changing packing gland (series-production status up to January 2013)

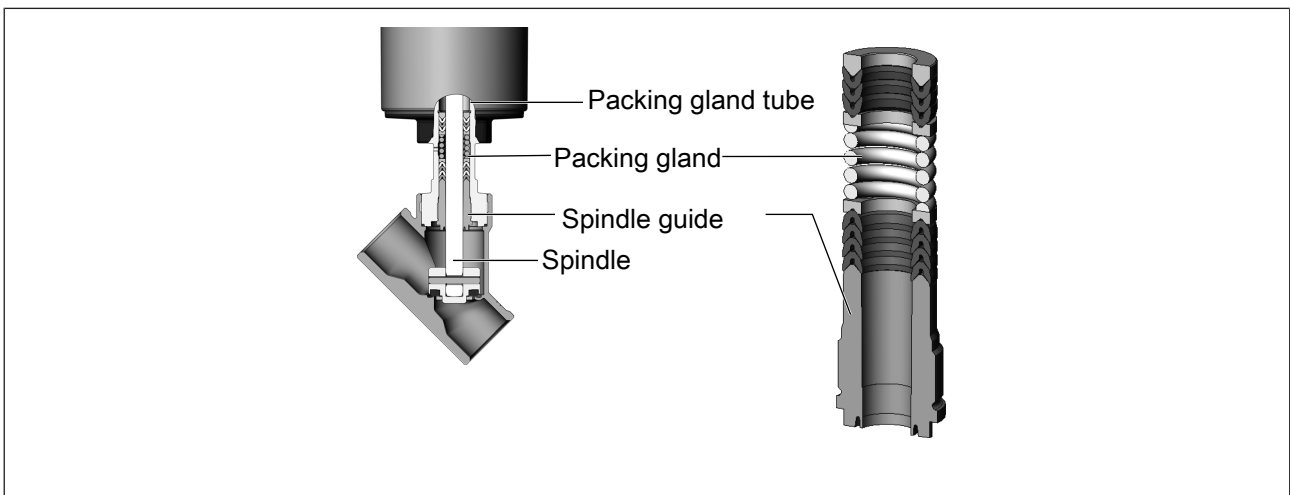


Fig. 38: Changing packing gland (series-production status since January 2013)

Series-production status up to January 2013:

→ Unscrew spindle guide using the installation wrench¹², simultaneously countering with an open-end wrench on the hexagon head of the valve body.

Series-production status as of January 2013:

→ Unscrew spindle guide using the modified socket wrench¹³.

! WARNING!

Risk of injury due to parts being ejected.

When the spindle opening is exposed, the individual parts of the packing gland will be pressed out at an undefined speed when the pilot air port is pressurised.

- ▶ Before pressurising with pilot air, safeguard the area around the outlet, e.g. place the spindle on a firm surface.

→ For control function A and I pressurise the pilot air port 1 with 6...8 bar of compressed air.

→ For control function B pressurise the pilot air port 2 with 6...8 bar of compressed air.

→ Grease individual parts of the new packing gland with the supplied lubricant.

→ Place individual parts on the spindle in the specified direction and sequence.

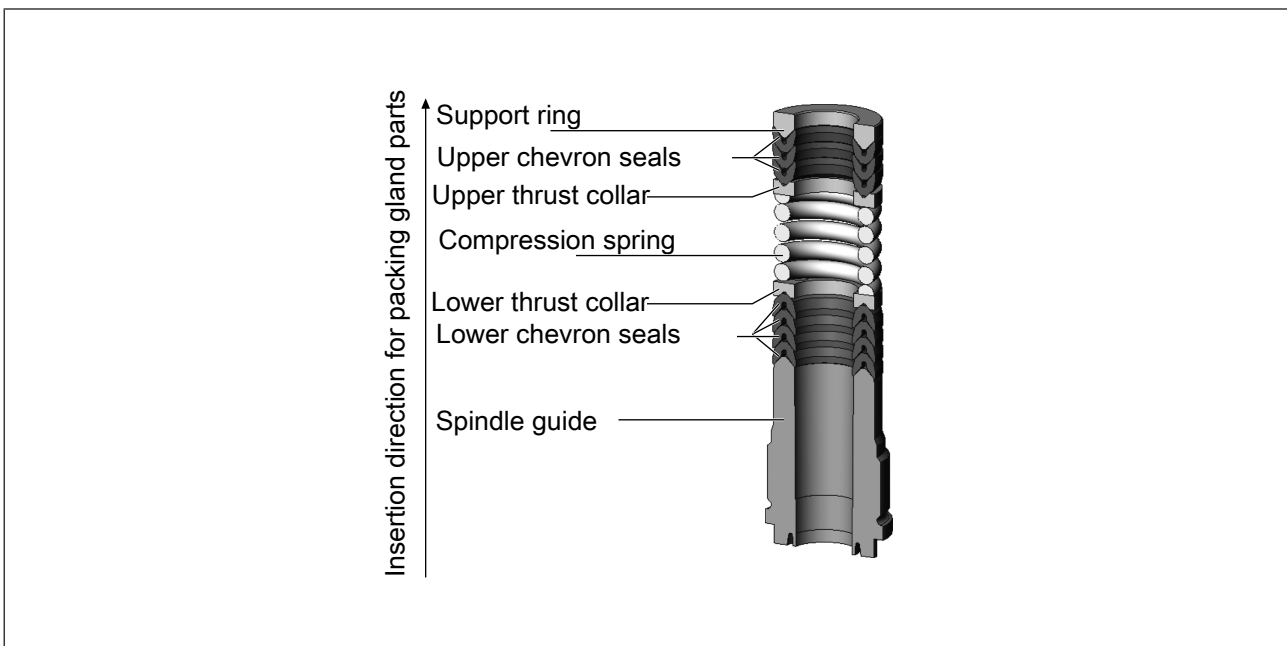


Fig. 39: Seal set for packing gland

→ Push the packing gland pack into the packing gland tube.

→ Screw the spindle guide back in using the socket wrench. Observe tightening torque.

Tightening torques spindle guide	
Spindle diameter [mm]	Tightening torque [Nm]
ø10	6
ø14	15

Tab. 29: Tightening torques spindle guide

¹² The installation wrench is available from your Bürkert sales department.

¹³ The modified socket wrench is available from your Bürkert sales department.

10.4.4 Installing swivel plate

- Connect swivel plate to the spindle.
- Align boreholes in the swivel plate and spindle.
- Support swivel plate on the cylindrical part using a prism or similar object.
- Insert pin into the borehole.
- Caulk pin boreholes on both sides of the swivel plate using a chisel or centre punch.

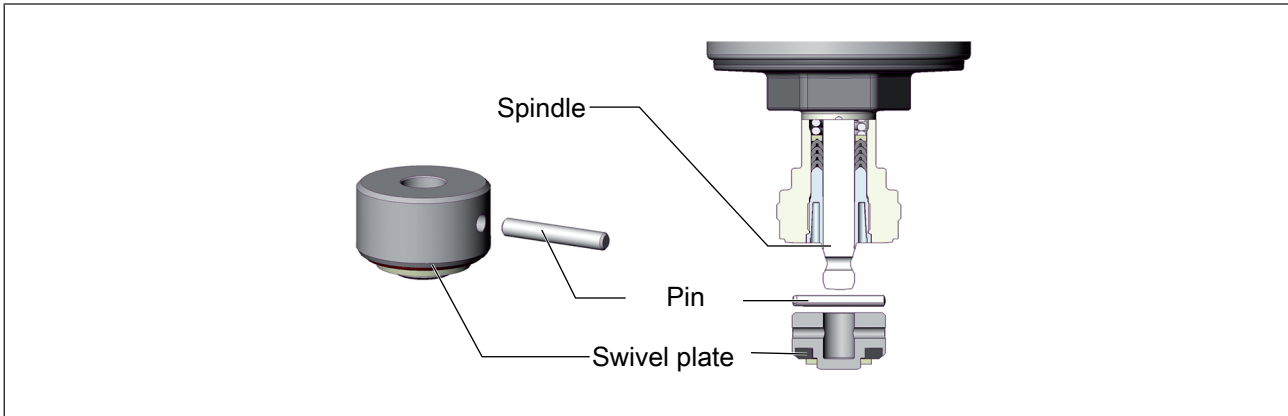


Fig. 40: Swivel plate

10.4.5 Installing actuator on valve body

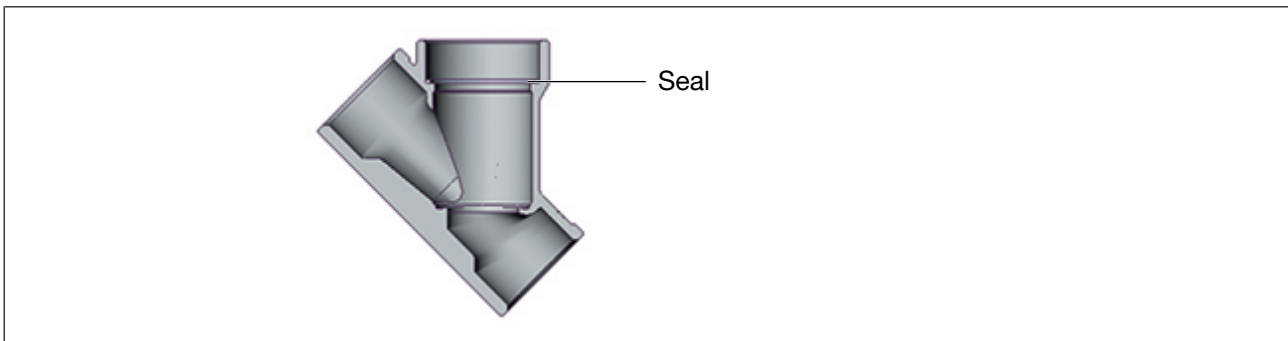


Fig. 41: Seal

- Check seal and replace if required.

! DANGER!

Danger due to lubricant.

Lubricant may contaminate the medium. There is a risk of explosion in oxygen applications.

- ▶ For specific applications use only approved lubricants (e.g. for oxygen applications or analysis applications).

- Before re-installation, grease the thread of the body connection (e.g. with Klüberpaste UH1 96-402 from Klüber).

ATTENTION!

Damage to the valve seat seal or seat contour.

- ▶ When installing the actuator, the valve must be in the open position.

- For control function A pressurise the pilot air port 1 with compressed air (5 bar): Valve opens.

→ Screw actuator into the valve body. Observe tightening torques of the following table.

Seat size	Tightening torque [Nm]
15	45 ±3
20	50 ±3
25	60 ±3
32	65 ±3
40	65 ±3
50	70 ±3
65	100 ±3
80	120 ±5

Tab. 30: Tightening torques valve body and body connection

11 FAULTS

Fault	Cause	Elimination	
Actuator does not switch	Pilot air port inter- changed	CFA (2/2-way valve)	Connect pilot air port 1
		CFB	Connect pilot air port 1
		CFI	Pilot air port 1: Opening; pilot air port 2: Closing
		CFA (2/3-way valve)	Pilot air port 1: Opening; pilot air port 2: Middle position
	Pilot pressure too low	Observe pressure specifications on the type label	
	Operating pressure too high		
	Flow direction inter- changed	Observe direction of arrow on the type label	
Valve is not tight	Dirt between seal and valve seat	Install dirt trap	
	Seal on the swivel plate worn	Install new swivel plate	
	Flow direction inter- changed	Observe direction of arrow on the type label	
	Operating pressure too high	Observe pressure specifications on the type label	
	Pilot pressure too low		
Valve is leaking on the relief bore	Packing gland worn	Replace packing gland or actuator	

Tab. 31: Faults

12 REPLACEMENT PARTS, ACCESSORIES

! CAUTION!

Risk of injury and/or damage due to the use of incorrect parts.

Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and its environment.

- ▶ Use original accessories and original spare parts from Bürkert only.

12.1 Replacement part set

The following replacement part sets are available for the angle seat valve:

- Valve set consists of swivel plate with seal, pin and seal.
- Seal set for packing gland consists of the individual parts of the packing gland, seal and lubricant. The modified socket wrench is not included in the seal set.

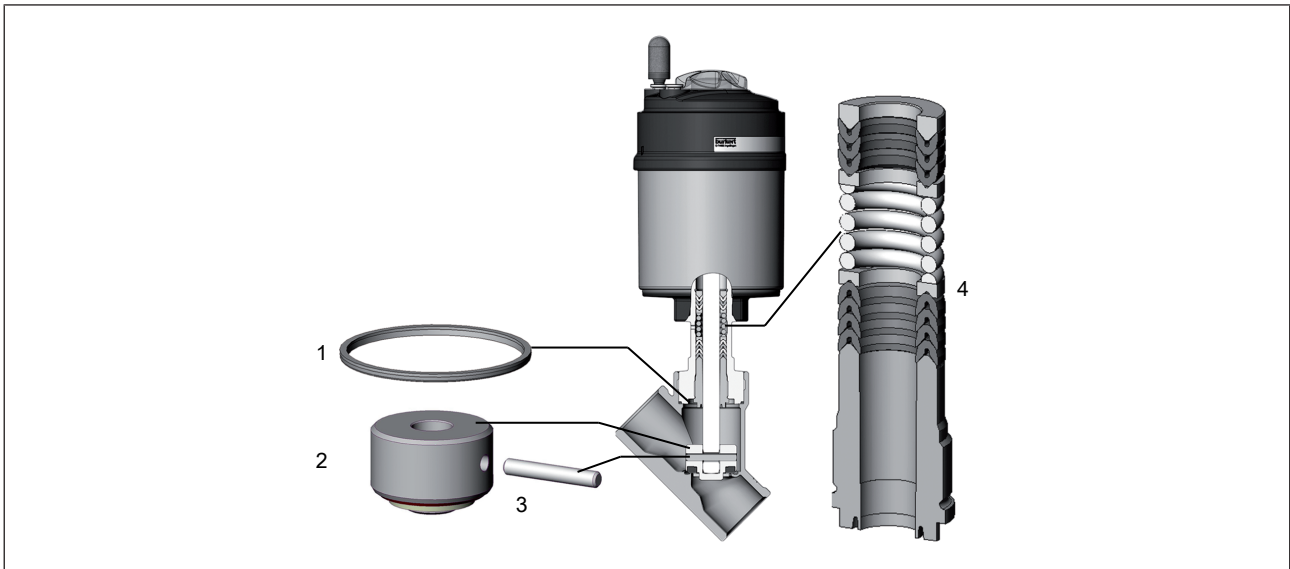


Fig. 42: Replacement parts

Item	Description	
1	Seal	Valve set
2	swivel plate with seal	
3	Pin	
4	Seal set for packing gland	

Tab. 32: Legend

Seal set for valve set

Seat size valve	Order no.
15	011134
20	011171
25	160737
32	011208

Seat size valve	Order no.
40	011209
50	216431
50 (actuator size $\varnothing 70$) ¹⁴	307392
65	241777
80	350831

Tab. 33: Seal set for valve set

Seal set for packing gland

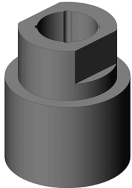
Seat size	Actuator size [mm]	Order number for standard version	Order number for water version (up to 200 °C)	Order number for high temperature version (up to 230 °C)
15...50 ¹⁵	$\varnothing 50$	216433	372661	372662
	$\varnothing 70$			
32...80	$\varnothing 90$	216435	372653	372655
	$\varnothing 130$			

Tab. 34: Seal set for packing gland

12.2 Installation tools

Installation wrench for packing gland (series-production status up to January 2013)		
Spindle [mm]	Seat size	Order No.
$\varnothing 10$	15...40	665700
$\varnothing 14$	32...65	665701

Tab. 35: Installation wrench

Modified socket wrench for packing gland (series-production status as of January 2013)				
	Spindle [mm]	Seat size	Width across flats	Order No.
	$\varnothing 10$	15...50 ¹⁶	19	683221
	$\varnothing 14$	32...80	21	683223

Tab. 36: Modified socket wrench

Special wrench for turning the actuator (series-production status up to end of 2011)	
Order No.	665702

Tab. 37: Special wrench



If you have any questions, contact your Bürkert sales department.

¹⁴ As of series production status January 2017, change also possible for seat size 50, spindle $\varnothing 10$ mm.

¹⁵ As of series production status January 2017, change also possible for seat size 50, spindle $\varnothing 10$ mm.

¹⁶ As of series-production status January 2017 also for seat size 50

13 TRANSPORTATION, STORAGE, DISPOSAL

ATTENTION!

Damage in transit due to inadequately protected devices.

- ▶ Protect the device against moisture and dirt in shock-resistant packaging during transportation.
- ▶ Observe permitted storage temperature.

ATTENTION!

Incorrect storage may damage the device.

- ▶ Store the device in a dry and dust-free location.
- ▶ Storage temperature: -20 to +65 °C

ATTENTION!

Damage to the environment caused by device components contaminated with media.

- ▶ Dispose of the device and packaging in an environmentally friendly manner.
- ▶ Observe applicable disposal and environmental regulations.



Observe national regulations on the disposal of waste.