

Type 2301

Pneumatically operated globe control valve

Pneumatisch betätigtes Geradsitz-Regelventil

Vanne de régulation à siège droit à commande pneumatique



Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

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1 OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions in a location which is easily accessible to every user and make them available to every new owner of the device.

The operating instructions contain important safety information.

Failure to observe these instructions may result in hazardous situations.

- The operating instructions must be read and understood.

1.1 Definition of terms/abbreviations

The term “device” used in these instructions always refers to the Type 2301 globe control valve.

The abbreviation “Ex” used in these instructions always stands for “explosion-proof”.

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

1.2 Symbols



DANGER

Warns of an immediate danger.

- Failure to observe these instructions will result in death or serious injuries.



WARNING

Warns of a potentially hazardous situation.

- Failure to observe these instructions may result in serious injuries or death.



CAUTION

Warns of a potential danger.

- Failure to observe these instructions may result in moderate or minor injuries.

ATTENTION

Warns of damage.



Important tips and recommendations.



Refers to information in these operating instructions or in other documentation.

- Designates instructions to avoid a danger.
- Designates a procedure which you must carry out.

2 INTENDED USE

Unauthorised use of the Type 2301 globe control valve may be dangerous to people, nearby equipment and the environment.

- ▶ The device is designed to control the flow of liquid and gaseous media. It can only be operated in combination with a corresponding control unit.
- ▶ In potentially explosive environments, the Type 2301 globe control valve must only be used in accordance with the specifications on the separate Ex-type label. The additional information and safety instructions relating to Ex areas enclosed with the device must be adhered to when deploying the device.
- ▶ Devices without a separate Ex type label must not be used in the potentially explosive atmosphere.
- ▶ To use the device, observe the permitted data, operating conditions and application conditions. These specifications can be found in the contract documents, the operating instructions and on the type label.
- ▶ Protect device from harmful environmental influences (radiation, air humidity, fumes, etc.). For any matters requiring clarification, contact the relevant sales department.
- ▶ Prerequisites for safe and trouble-free operation are correct transportation, correct storage, installation, start-up, operation and maintenance.
- ▶ Use the device only in conjunction with third-party devices and components recommended or approved by Bürkert.
- ▶ Use the device only as intended.

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 personnel.



DANGER

Risk of injury due to high pressure and escaping medium.

- ▶ Before working on the system or device, switch off the pressure and vent or empty the lines.

Risk of injury due to electric shock (with installed electrical components).

- ▶ 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.

Risk of injury due to moving parts in the device.

- ▶ Do not reach into openings in the device.

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.



CAUTION

Risk of burns or fire from hot device surfaces due to prolonged operation.

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

Discharge of medium if packing gland worn.

- ▶ Relief bore must be regularly inspected for any medium leakages.
- ▶ If the medium is hazardous, secure the area around the leakage to prevent risks.

General hazardous situations.

To prevent injuries, observe the following:

- ▶ Secure device or system to prevent unintentional activation.
- ▶ Only trained technicians may perform installation and maintenance work.
- ▶ Perform installation work and maintenance work using suitable tools only.

▶ Following interruption of the process, ensure that the process is restarted in a controlled manner. Observe the sequence:

1. Apply electrical or pneumatic supply.
2. Charge with medium.

▶ Use the device only when it is in perfect condition and in accordance with the operating instructions.

▶ For applications planning and operation of the device, observe the plant-specific safety regulations.

▶ The plant owner is responsible for the safe operation and handling of the plant.

▶ Observe the general rules of technology.

Please observe the following in order to protect against damage to the device:

▶ Feed only those media listed in chapter [“7 Technical data”](#) into the medium ports.

▶ Do not place the valve under mechanical stress (e.g. by placing objects on it or standing on it).

▶ Do not make any external modifications to the valves. Do not paint housing parts or screws.

▶ Transport, install and dismantle a heavy device only with the aid of a second person and using suitable equipment.

▶ The exhaust air can be contaminated by lubricants in the actuator.

4 GENERAL NOTES

4.1 Contact addresses

Germany

Bürkert Fluid Control Systems
Sales Center
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 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 operating instructions.

They are also available online at: country.burkert.com

4.2 Warranty

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

4.3 Information on the Internet

Operating instructions and data sheets for Type 2301 can be found online at: country.burkert.com

5 PRODUCT DESCRIPTION

5.1 General description

The 2/2-way globe control valve Type 2301 is suitable for liquid and gaseous media.

Using neutral gases or air (control media), it controls the flow of water, alcohol, oil, fuel, hydraulic fluid, saline solution, lye, organic solvents and vapour (flow media).

The Type 2301 globe control valve can only be used in combination with a control unit. Possible control units are:

Positioner Type 8692, 8694 and 8696

Process controller Type 8693

5.2 Variants

The Type 2301 globe control valve is available in 2 variants:

- Standard device – **without** separate Ex type label.
Standard devices must not be used in the potentially explosive area.
- Ex variant – **with** separate Ex type label.
The Ex variant may be used in the potentially explosive area.
The specifications on the separate Ex type label and the additional device information with safety instructions for the Ex area must be followed.

5.3 Properties

- Direct installation of the positioner Type 8692/8694/8696 or process controller Type 8693.

- Optimal valve selection for the application via default 3 Kv values per DN (up to 5 Kv values for 1/2" DN).
- High seal tightness due to self-adjusting packing gland (spindle seal element).
- Tight-sealing when using the PTFE/PEEK control cone.
- High flow rate values due to the stainless steel valve body that aids in flow.
- Large expansion space above the valve seat that prevents body erosion caused by cavitation.
- Simple and quick replacement of the control cone and the screwed-in valve seat.
- Actuator can be seamlessly rotated by 360°.
- Maintenance-free under normal conditions.

5.4 Technical characteristics

- Body DN: DN10–DN100, valve seat size 3–100
- Nominal pressure valve body PN25 and PN40
- Body ports: Flange connection, threaded connection, welded connection, clamp connection
- Valve body 316L
- The globe series is distinctive for its screwed-in valve seats, which can be replaced to reduce the DN (in particular the control valve).

5.4.1 Options

Control unit

Depending on the requirements, various control unit variants are available.

- Positioner Type 8692, 8694 and 8696
- Process controller Type 8693
- Vacuum
- FDA foodstuff compliance
- DVGW
- ATEX
- Reduced pilot pressure

5.4.2 Device variants

The globe control valve is available for the following actuator sizes, depending on the DN:

Body size DN	Available actuator size [mm]				
15	50	70	-	-	-
20			90		
25	-	-	90	130	-
32					
40			-	130	225
50					
65			-	130	225
80					
100					

Tab. 1: Actuator sizes

5.5 Intended area of application



Observe the maximum pressure and temperature range on the type label!

- For neutral gases and liquids up to 40 bar
- Vapour up to 230 °C for steel and PEEK valve seat seal (see chapter [“7.4.2”](#))
 - Vapour up to 130 °C for PTFE valve seat seal
 - Hot water up to 200 °C for steel and PEEK valve seat seal (see chapter [“7.4.2”](#))
- Aggressive media

6 STRUCTURE AND FUNCTION



The Type 2301 globe control valve can only be used in combination with a control unit.

Possible control units are:

Positioner Type 8692, 8694 and 8696

Process controller Type 8693

6.1 Structure

The globe control valve consists of a pneumatically operated piston actuator, a control cone and a 2/2-way globe body.

The control cone is modularly connected to the actuator spindle via a spring-type straight pin, and can thus be quickly replaced.

Nearly all port connections are possible for the body. Threaded connection, welded connection and flange are offered as the standard device.

The valve seats are screwed in. Reduced seat sizes are easy to achieve by replacing the screwed-in valve seats. The flow direction is always below the valve seat.



The description of the control functions (CF) can be found in chapter [“6.2.1 Control functions \(CF\)”](#).

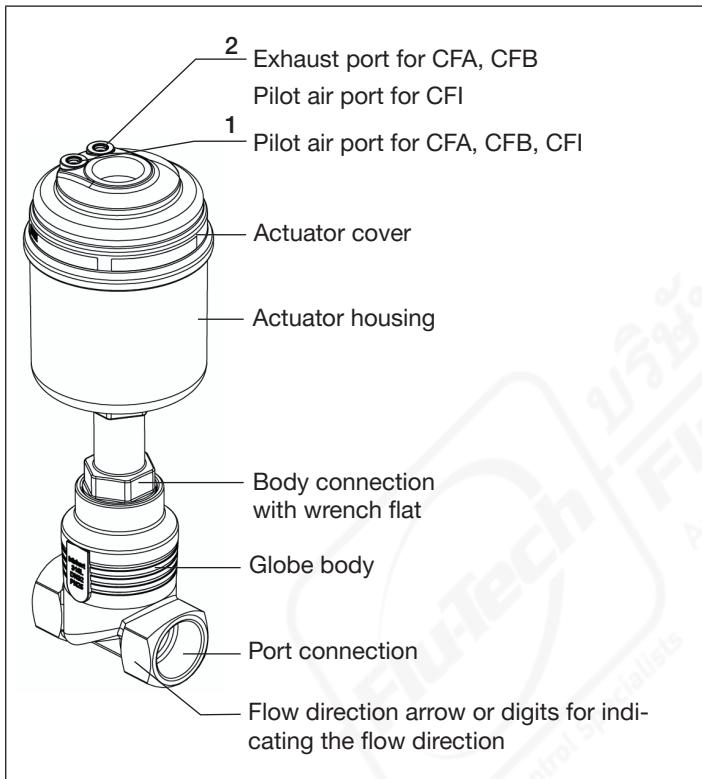


Fig. 1: Globe control valve Type 2301, structure and description

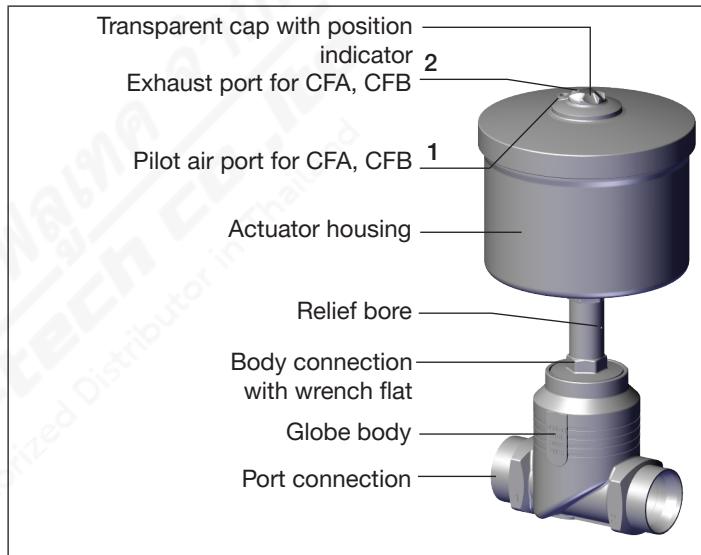


Fig. 2: Structure and description, actuator size 225

6.2 Function

The valve seat is always closed against the medium flow. Spring force (CFA) or pneumatic pilot pressure (CFB and CFI) generate the closing force on the control cone. A spindle connected to the actuator piston transmits the force.

6.2.1 Control functions (CF)



WARNING

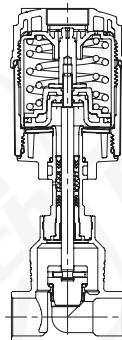
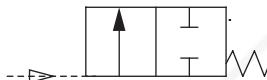
For control function I – risk of pilot pressure failure.

With control function I, the control unit and reset are pneumatic. No defined position is reached during a pressure failure.

- To ensure a controlled restart of the device, first apply pilot pressure and then activate the medium.

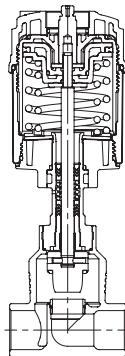
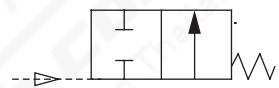
Control function A (CFA)

Closed by spring force in rest position



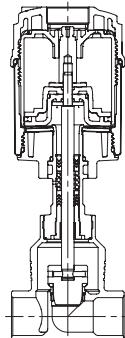
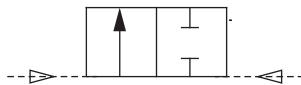
Control function B (CFB)

Opened by spring force in rest position



Control function I (CFI)

Actuating function via reciprocal pressurisation.



6.2.2 Flow direction below seat

Depending on the variant, the valve is closed against the medium flow with spring action (CFA) or with pilot pressure (CFB or CFI). Because the operating pressure is below the control cone, it helps open the valve.



WARNING

Valve seat leak if there is too little minimum pilot pressure or high operating pressure.

Minimum pilot pressure for CFB and CFI that is too low, or failing to meet the permitted operating pressure, can cause a leak in the valve seat.

- ▶ Adhere to minimum pilot pressure.
- ▶ Do not exceed the operating pressure.
- ▶ See chapter "[7.4.4 Pressure ranges](#)".

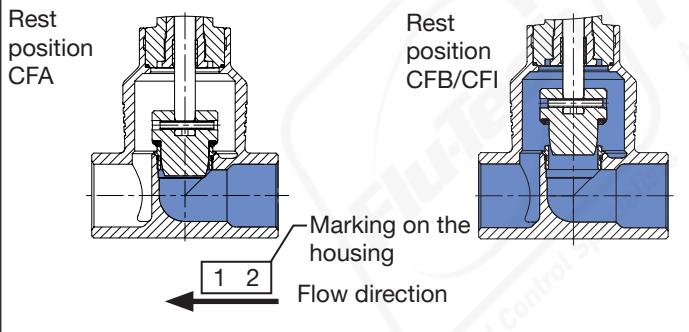


Fig. 3: Flow direction below seat (closing against medium)

7 TECHNICAL DATA

7.1 Standards and directives

The device complies with the relevant EU harmonisation legislation. In addition, the device also complies with the requirements of the laws of the United Kingdom.

The harmonised standards that have been applied for the conformity assessment procedure are listed in the current version of the EU Declaration of Conformity/UK Declaration of Conformity.

According to Pressure Equipment Directive observe the following operating conditions:

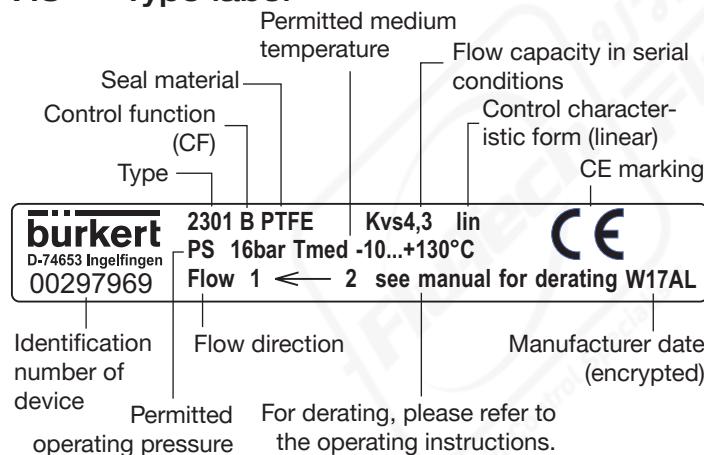
Housing size DN	Maximum pressure for compressible fluids of Group 1 (dangerous gases and vapours according to Art. 3, no. 1.3, letter a, first dash)
DN65	15 bar
DN80	12.5 bar
DN100	10 bar

7.2 Conversion of actuator sizes

Actuator size [mm]	Designation	Outer diameter A [mm]	Scale drawing
50	D	64,5	
70	M	91	
90	N	120	
130	P	159	
225	L	245	

Tab. 2: Conversion of actuator sizes

7.3 Type label



7.4 Operating conditions



Note the permitted ranges on the device type label.

7.4.1 Actuator temperature ranges

Actuator size [mm]	Environment ¹⁾
50, 70, 90, 130, 225	-10 – +60 °C ²⁾
	-10 – +100 °C ³⁾

Tab. 3: Actuator temperature ranges



The globe control valve is suitable for steam sterilisation.



¹⁾ When using a control unit, the max. ambient temperature of these components must be noted and adhered to.

²⁾ Pilot air connector as push-in connector

³⁾ Control air connector as threaded bushing

7.4.2 Valve seat seal temperature range

Recommendation for the valve seat seal of leak class III and IV: Steel.

Valve seat seal for leak class VI

For medium temperatures up to max. 130 °C:

PTFE

For medium temperature over 130 °C:

PEEK

Derating pressure and temperature ranges

Usage limits of the valve (derating operating pressure)

Temperature	Operating pressure	
	PN25	PN40
-10...+50 °C	25 bar	40 bar
100 °C	24.5 bar	39.2 bar
150 °C	22.4 bar	-
200 °C	20.3 bar	-
230 °C	19 bar	-

Tab. 4: Derating the operating pressure as per DIN EN 12516-1

Temperature	Operating pressure
-29 – +38 °C	19 bar
50 °C	18.4 bar
100 °C	16.2 bar
150 °C	14.8 bar
200 °C	13.7 bar
230 °C	12.7 bar

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

Temperature	Operating pressure
-10 – +50 °C	14 bar
100 °C	14 bar
150 °C	13.4 bar
200 °C	12.4 bar
230 °C	11.7 bar

Tab. 6: Derating the operating pressure as per JIS B 2220 10K

Usage limits of medium and ambient temperature

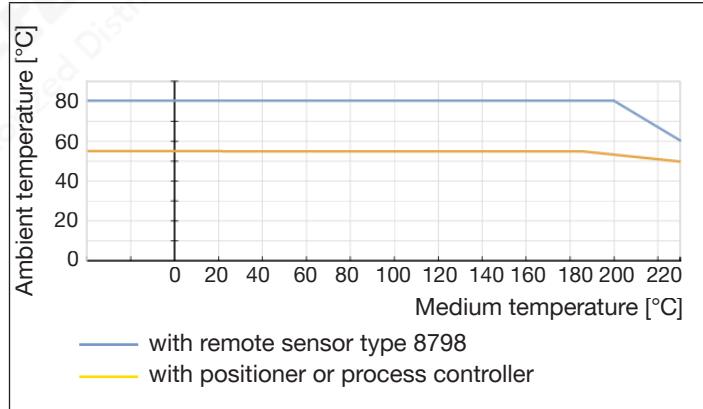


Fig. 4: Derating ELEMENT ANTG 50, 70, 90, 130 and 225

7.4.3 Control medium

In conjunction with pneumatic control units (positioner or process controller), pilot air as per DIN ISO 8573-1 must be used:

- Class 3 (for water content)
- Class 5 (for dust and oil content)



The exact specification is described in the operating instructions for the respective positioner/process controller in the chapter “Technical data”.

7.4.4 Pressure ranges

Maximum pilot pressure for valves without a pneumatic control unit

Actuator size [mm]	Max. permitted pilot pressure ⁴⁾
50, 70, 90	10 bar
130	7 bar
225, CFA	7 bar
225, CFB	5 bar

Tab. 7: Pilot pressure without a pneumatic control unit



4) Observe the maximum pressure range on the type label!

Operating pressure for control function A

Actuator size [mm]	Valve body DN	Max. sealed operating pressure [bar]		
		Steel/steel	PTFE/steel	PEEK/steel
50	10/15	16	16	10
	20	10	10	-
	25	5	5	-
70	10 / 15	25 / 40**	25 / 40**	10
	20	16	16	10
	25	12	12	7
90	20	25 / 40**	25 / 40**	10
	25	25	25	10
	32	16	16	10
	40	12	12	7
	50	7	7	-
130	32/40	25	25	10
	50	25	25	10
	65	16 (15 *)	16 (15 *)	10
	80	10	10	6
	100	6	6	-
225	65	25 (15*)	25 (15*)	16
	80	25 (12.5*)	25 (12.5*)	15
	100	16 (10)	16 (10*)	10

Tab. 8: Operating pressure for CFA

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

** Operating pressure 40 bar only with V-code MP03



Variants with lower pilot pressure (reduced spring force) are available on request.

Contact your Burkert sales department or the Burkert Sales Center.

Required minimum control pressure with control function B depending on operating pressure

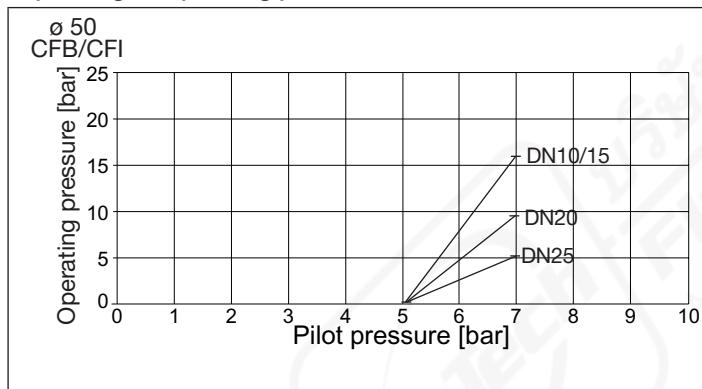


Fig. 5: Pressure diagram, actuator ø 50 mm, control function B

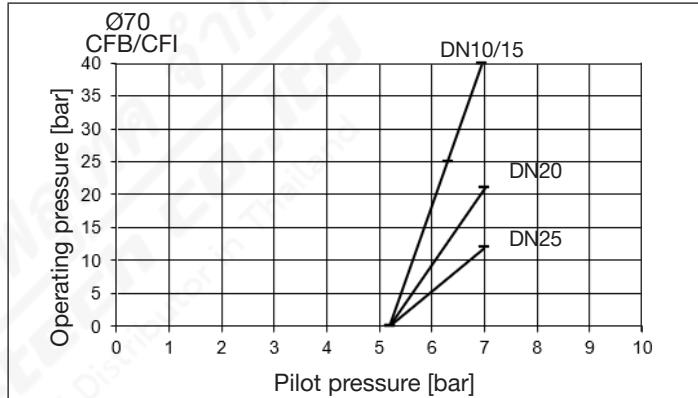


Fig. 6: Pressure diagram, actuator ø 70 mm, control function B

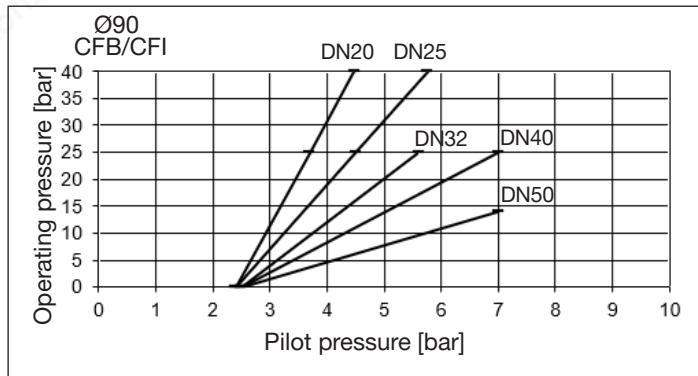


Fig. 7: Pressure diagram, actuator ø 90 mm, control function B

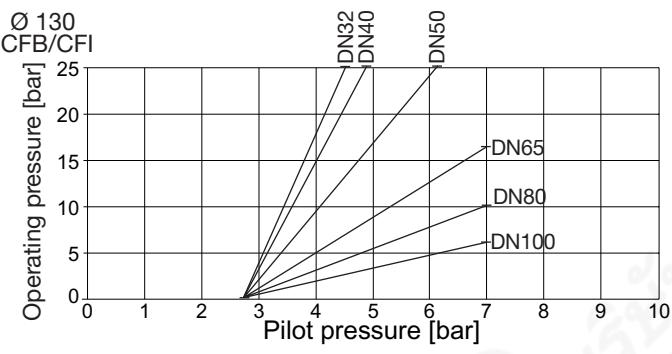


Fig. 8: Pressure diagram, actuator \varnothing 130 mm, control function B

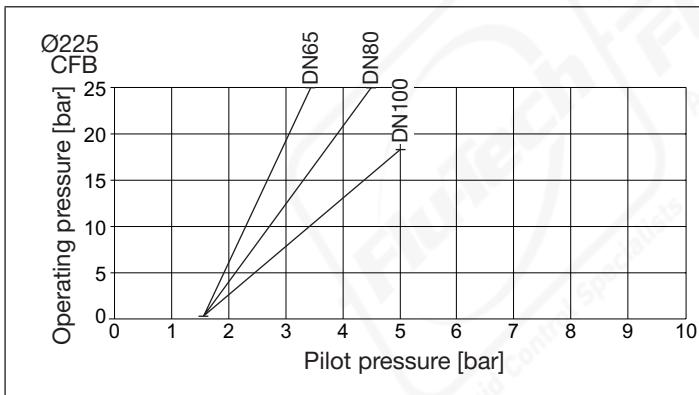


Fig. 9: Pressure diagram, actuator \varnothing 225 mm, control function B

7.5 Flow characteristics

Graphical presentation

The detailed values are listed in the following tables.

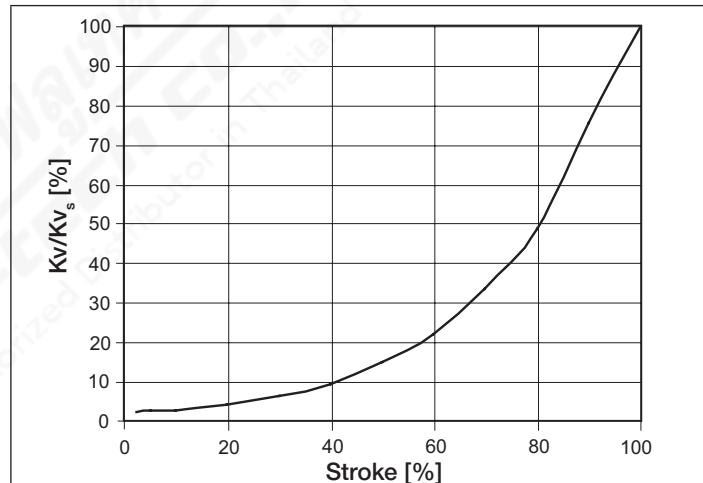


Fig. 10: Flow characteristic

Notes on the flow characteristic:

- Linear cone for valve seat size 3 to 6
- Cone of equal per cent for valve seat sizes 8 to 100 (valve seat size 6 optional with cone of equal per cent)
- Flow characteristic as per DIN EN 60534-2-4

- Theoretical rangeability (K_{vs}/K_{vo}) for actuator size 70, 90, 130:
 - 50: 1 for valve sizes 8 to 100
 - 25: 1 for valve seat size 6
 - 10: 1 for valve sizes 3 and 4
- K_{vr} value at 5% of the stroke for valve seat sizes > 10
 K_{vr} value at 10% of the stroke for valve seat sizes \leq 10
 (K_{vr} value = lowest K_v value at which the tilt tolerance as per DIN EN 60534-2-4 is still observed)
- Actuator size 70 offers better control quality over actuator size 50, and is thus preferable.

7.6 General technical data

Control functions (CF)	Valve seat always closes against medium flow
Control function A	Closed by spring force in rest position
Control function B	Opened by spring force in rest position
Control function I	Settings function of the alternating pressurisation (not for actuator size 50 mm)
Actuator sizes	50 mm, 70 mm, 90 mm, 130 mm, 225 mm
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
Control cone	Control cone with PTFE seal, PEEK seal or steel/steel seal
Spindle	1.4401/1.4404
Spindle guide	1.4401/1.4404/316L
Ports	
Pilot air port	prepared for direct coupling

Valve body ports

Flange:	DIN EN 1092-1, ANSI B 16.5, JIS 10K
Thread:	G, RC, NPT (EN ISO 228-1, ISO 7/1/ DIN EN 10226-2, ASME B 1.20.1)
Welded connection:	EN ISO 1127 row 1/ISO 4200/ DIN 11866 row B, DIN 11850 row 2/DIN 11866 row A/ DIN EN 10357 row A, ASME BPE/DIN 11866 row C, BS 4825-1, SMS 3008
Clamp:	ISO 2852, DIN 32676 row A and row B, ASME BPE/DIN 32676 row C, BS 4825-3

Media

Control medium	Instrument air as per DIN ISO 8573-1
Flow media	Water, alcohols, fuels, hydraulic fluids, saline solutions, lyes, organic solvents
Any	installation position, preferably actuator face up
Degree of protection	IP67 as per IEC 529/EN 60529

8 INSTALLATION

**WARNING****Risk of injury due to improper installation.**

- ▶ Installation may be carried out by authorised technicians only and with the appropriate tools.
- ▶ Secure the system against unintentional activation.
- ▶ Following installation, ensure a controlled restart.

For control function I – risk of pilot pressure failure.

With control function I, the control unit and reset are pneumatic. No defined position is reached during a pressure failure.

- ▶ To ensure a controlled restart of the device, first apply pilot pressure and then activate the medium.

**CAUTION****Risk of injury due to heavy device.**

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

- ▶ Transport, install and remove heavy device with the aid of a second person only.
- ▶ Use suitable tools.

ATTENTION

Loose screw connection of the valve body connection with high mechanical stress or in applications with increased temperatures.

If the pipeline is subject to high mechanical stress (vibrations) or in applications with temperatures above 140 °C, the screw connection on the valve body connection must be checked before installation and regularly during operation (for tightening torques, see table "Tab. 9").

8.1 Notes on installation

- The installation location must be easily accessible and provide sufficient clearance for installation, removal and maintenance of the device
- Use suitable lifting gear to lift a heavy device
- Only lift heavy valves by the valve body and pneumatic actuator, not by the control unit (if present)
- Ensure that the pipes are aligned before connecting the valve
- Observe the direction of flow. Observe the information on the type label

8.2 Before installation

- The globe valve can be installed in any position, preferably with the actuator facing upwards

8.2.1 Preparatory work

- Before working on the system or device, switch off the pressure and vent or drain the lines.
- Clear impurities from pipelines (seal material, metal chips,etc.).

Devices with welded connection

ATTENTION

For valves with a mounted control unit:

When welding the valve body into the pipeline, the control unit must not be installed.

- ▶ Uninstall the control unit from the actuator as described below.

Uninstall the control unit from the actuator (if present):

- Clamp valve body into a holding device.
- Loosen fastening screws (2 x).
- Pull the control unit upward.

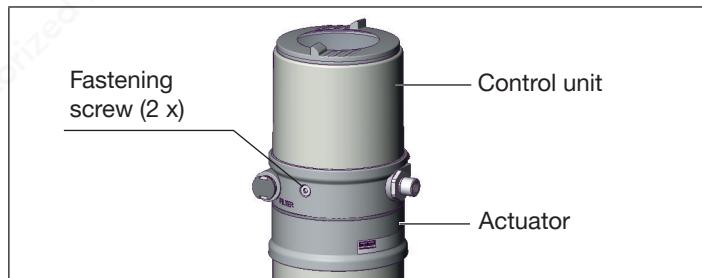


Fig. 11: Uninstall control unit

Remove the actuator from the valve body:

- Install collet (white nozzle) in pilot air port 1.
For actuator size 225: Use G1/8 internal thread for the hose connection.

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 on the body connection with a suitable open-end wrench.
- Unscrew actuator from the valve body.

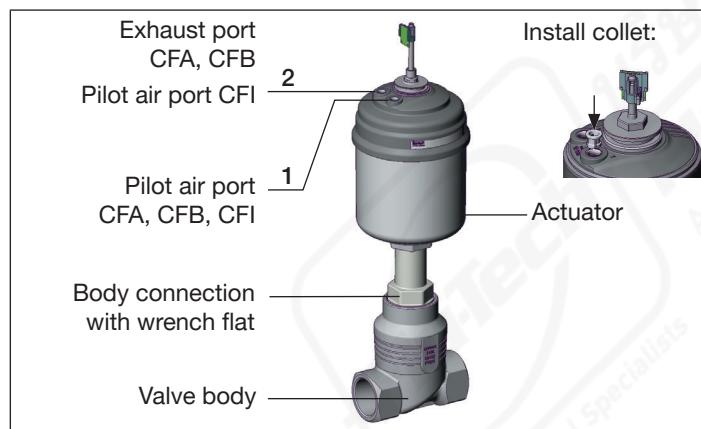


Fig. 12: Installation

Other device variants

- Only uninstall the actuator if required by the customer (for procedure see ["Devices with welded connection"](#)).

8.3 Installation



Risk of injury due to improper installation.

Failure to observe the tightening torque value is dangerous due to the risk of damage to the device.

- ▶ Use an open-end wrench for installation, never a pipe wrench.
- ▶ Observe tightening torque (see ["Tab. 9"](#)).

Dirt trap for devices with approval according to EN 161

According to 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.

8.3.1 Installing the body

Welded connection

- Weld or bond valve body in pipeline system.

Other body variants

- Connect body to pipeline.

8.3.2 Install actuator (welded connection)

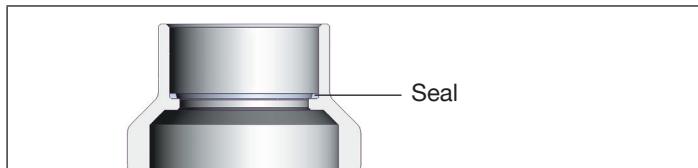


Fig. 13: Seal

→ Replace seal.



WARNING

Danger due to incorrect lubricants.

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

- ▶ For specific applications, e.g. oxygen or analysis applications, use approved lubricants only.

→ Grease the external thread of the body connection (e.g. using 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 torque (see "Tab. 1").

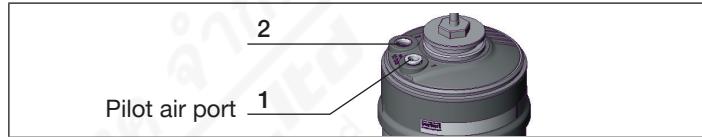


Fig. 14: Ports

Tightening torques for body connection

Body DN	Tightening torque [Nm]
10/15	45 ± 3
20	50 ± 3
25	60 ± 3
32	65 ± 3
40	
50	70 ± 3
65	100 ± 3
80	120 ± 5
100	150 ± 5

Tab. 9: Tightening torques for body connection

8.3.3 Install control unit



Before installation, check the state of the control unit connections and align the actuator if necessary.
For a description see chapter “[8.3.4 Turning actuator](#)”.

- Remove the collet from pilot air port 1.
- Check the correct position of the O-rings in the pilot air ports.
- Align the puck and control unit such that
 1. the puck enters into the guide rail of the control unit and
 2. the connection pieces of the control unit enter into the pilot air connections of the actuator (see “[Fig. 16](#)”).

ATTENTION

Damage to the printed circuit board or functional failure!

- Make sure that the puck is lying flat on the guide rail.

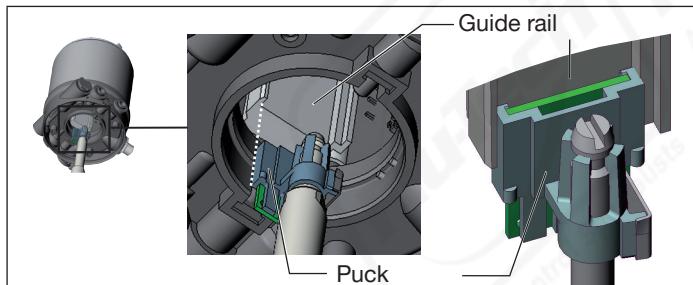


Fig. 15: Aligning the puck

→ Push the control unit onto the actuator without rotating it until no gap is visible at the form seal.

ATTENTION

Excessive torque when tightening the fastening screw cannot ensure the degree of protection IP65/IP67.

- The fastening screws must only be applied with a maximum torque of 1.5 Nm.

→ Attach the control unit to the actuator using the two lateral fastening screws. Only lightly tighten the screws (maximum torque: 1.5 Nm).

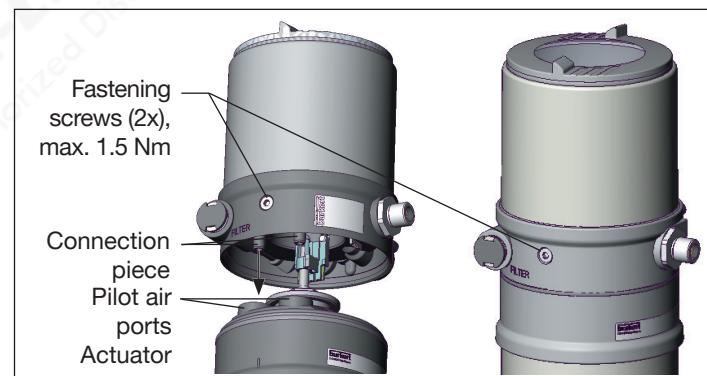


Fig. 16: Control unit installation

8.3.4 Turning actuator

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



Only the actuator can be rotated. It is not possible to rotate the control unit against the actuator.

ATTENTION

Damage to the valve seat seal or seat contour.

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

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

→ For control function A:

Without control unit: pressurise the pilot air port 1 with compressed air (5 bar): Valve opens.

With control unit: open the valve in accordance with the operating instructions of the control unit.

→ Hold the body connection with a suitable open-end wrench.

→ Place a suitable open-end wrench to the hexagon of the actuator bottom (actuator size 225).



WARNING

Risk of injury from discharge of pressure and escaping medium.

The body connection can loosen when rotated incorrectly.

- Only turn the actuator in the specified direction.

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

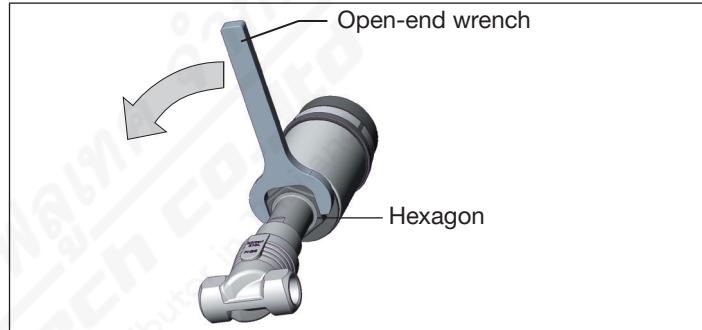


Fig. 17: Turning actuator

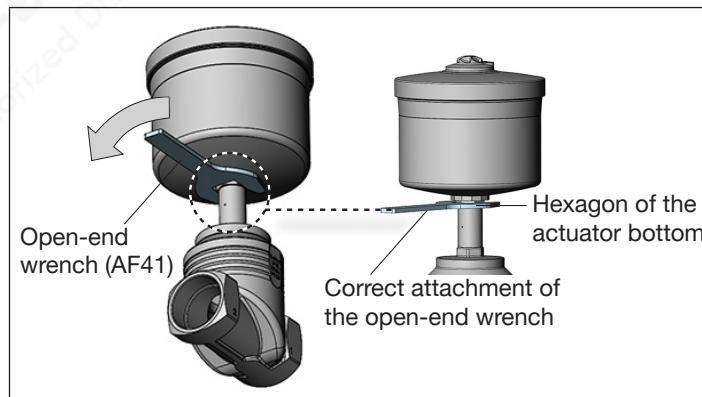


Fig. 18: Turning actuator for actuator size 225

8.4 Attaching a sensor or fitting to the relief bore

The optional variant (V-Code NA99) for leak detection and discharge allows for the connection of a sensor or a fitting to the relief bore.

ATTENTION

Damage caused by operating medium in the actuator.

Do not attach any closed vessels to the relief bore.

When attaching anything to the relief bore, ensure that there is no back pressure that could hinder the flow of the leakage. Otherwise there is a risk of operating medium entering the actuator and causing permanent damage to it.

ATTENTION

Risk of failure due to damage to the actuator.

Operating medium that has entered the actuator can weaken it to such an extent that the actuator fails during normal operation.



Sensors and fittings with M5 threads can be used with the M4 variant with the help of the included adapter.

The circlip serves as a stop to prevent the item being screwed in too far.



Always seal the thread when screwing in, e.g. with PTFE tape or thread sealant.



Note the wall thickness:

- M4 variant: 2.3 mm
- M5 variant: 3.5 mm

If no adapter is used, ensure that the screwed-in threaded pin of the component used does not exceed the following dimensions.

Actuator size	Description	DN	Thread of relief bore	Incl. enclosed adapter
50	D	20/25	M4x0.35	M5x0.8
70	M	20/25	M4x0.35	M5x0.8
90	N	20/25	M5x0.8	-

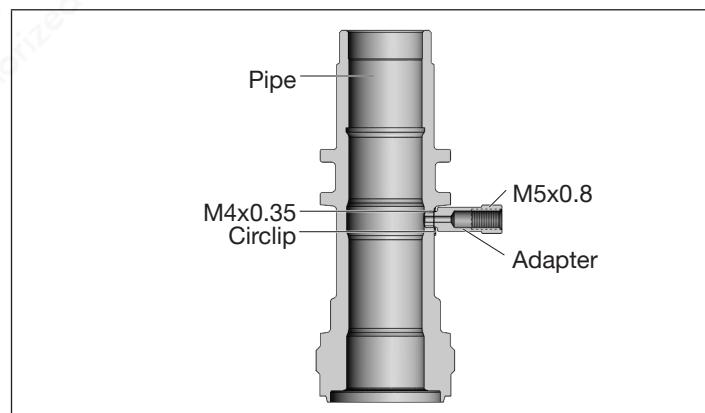


Fig. 19: Adapter for relief bore

8.5 Connect device pneumatically



DANGER

Risk of injury from high pressure in the system.

- ▶ Before loosening lines and valves, turn off the pressure and vent the lines.



WARNING

Risk of injury due to unsuitable connection hoses.

Hoses that cannot withstand the pressure and temperature range can cause hazardous situations.

- ▶ Only use hoses that are permitted for the specified pressure and temperature range.
- ▶ Note the data sheet information from the hose manufacturers.

For control function I – risk of pilot pressure failure.

With control function I, the control unit and reset are pneumatic. No defined position is reached during a pressure failure.

- ▶ To ensure a controlled restart of the device, first apply pilot pressure and then activate the medium.



The pneumatic connection of the globe control valve can only be performed in conjunction with the corresponding control unit.

Possible control units are:

Positioner Type 8692, 8694 and 8696

Process controller Type 8693

8.5.1 Connecting the control medium

- Connect the control medium to the pilot air port (1) (3–7 bar; instrument air, oil-/water-/dust-free).
- Mount the exhaust air line or a silencer onto the exhaust air port (3) and, if available, onto the additional exhaust air port (3.1).



For usage in an aggressive environment, we recommend using a pneumatic hose to drain all free pneumatic ports in a neutral atmosphere.

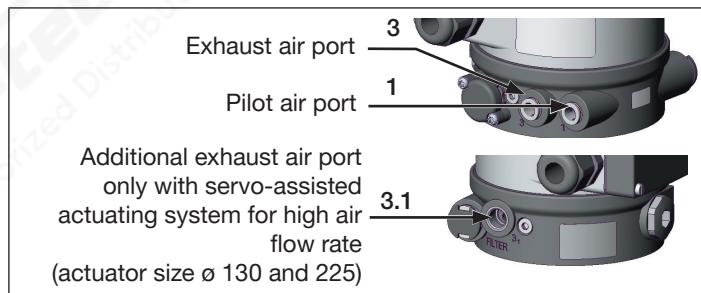


Fig. 20: Pneumatic connection

Pilot air hose:

Pilot air hoses of sizes 6/4 mm or 1/4" can be used. Optionally a pilot air port via G1/8 thread is possible.

8.6 Start-up

For actuator with control unit perform the *X.TUNE* after installing the device. This function presets the control parameters.



For a description, please refer to the operating instructions of the control unit.

8.7 Disassembly



DANGER

Risk of injury from discharge of pressure and escaping medium.

Dismantling a device which is under pressure is hazardous due to a sudden discharge of pressure or escaping medium.

► Before disassembly, shut off the pressure and vent all lines.

Procedure:

- Loosen pneumatic connection.
- Disassemble the device.

9 ELECTRICAL CONTROL UNIT

The Type 2301 valve can be combined with the following control units:

- Type 8692 Positioner
- Type 8694 Positioner
- Type 8696 Positioner
- Type 8693 Process controller



The electrical port of the pilot valve or the control units is described in the respective operating instructions of the pilot valve/control unit.

10 MAINTENANCE, CLEANING



DANGER

Risk of injury from high pressure in the system.

- Before loosening lines and valves, turn off the pressure and vent the lines.

Risk of injury due to electric shock.

- Before reaching into the system, switch off the power supply and secure against reactivation.
- Observe the applicable accident prevention and safety regulations for electrical devices!



WARNING

Risk of injury due to improper maintenance work.

- Maintenance may be carried out by authorised technicians only.
- Use an open-end wrench, never a pipe wrench, to screw the valve body or actuator in or out, and observe the tightening torque.

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

- Secure the system against unintentional activation.
- Following maintenance, ensure a controlled restart.



WARNING

For control function I – risk of pilot pressure failure.

With control function I, the control unit and reset are pneumatic. No defined position is reached during a pressure failure.

- To ensure a controlled restart of the device, first apply pilot pressure and then activate the medium.

Risk of injury due to moving parts in the device.

- Do not reach into openings.

10.1 Maintenance work

Actuator:

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

Wearing parts of the globe control valve:

Parts which are subject to natural wear are:

- Valve seat
- Control cone
- Seals

→ If there is a leak, replace the respective wearing part with a corresponding spare part.

(For spare part sets and assembly tools see chapter
“12 Spare parts”).



Replacement of the wearing parts is described in chapter
“10.2 Replacing wearing parts”.

Visual inspection:

According to the usage conditions, perform regular visual inspections:

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

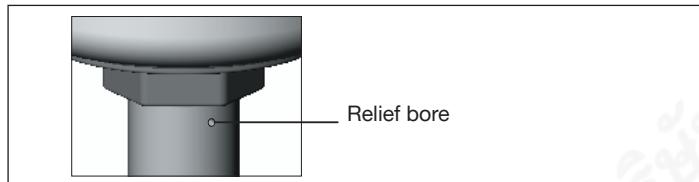


Fig. 21: Relief bore

10.1.1 Cleaning

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

ATTENTION

Avoid causing damage with cleaning agents.

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

10.2 Replacing wearing parts

10.2.1 Replacing the control cone set

The control cone set consists of

- Control cone
- Seal
- Spring-type straight pin
- Lubricant

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

**DANGER**

Risk of injury from discharge of pressure and escaping medium.

Dismantling a device which is under pressure is hazardous due to a sudden discharge of pressure or escaping medium.

- Before disassembly, shut off the pressure and vent all lines.

**WARNING**

Risk of injury due to using wrong tool.

Performing installation work, using unsuitable tools, is hazardous due to possible damage to the device.

- To remove the actuator from the valve body, use an open-end wrench, never a pipe wrench.

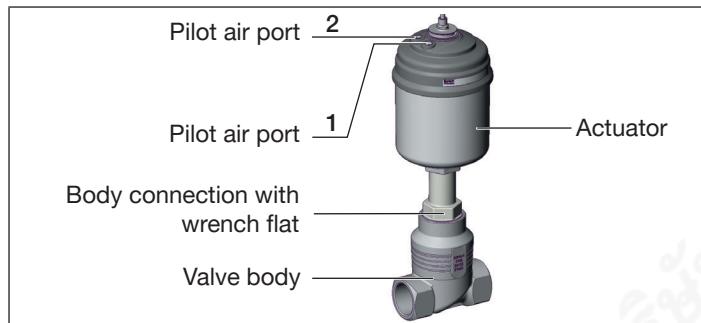
Remove the actuator from the valve body


Fig. 22: Valve

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

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

Without control unit: pressurise pilot air port 1 with compressed air (5 bar). Valve opens.

With control unit: Open the valve in accordance with the operating instructions of the control unit.

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

→ Unscrew actuator from the valve body.

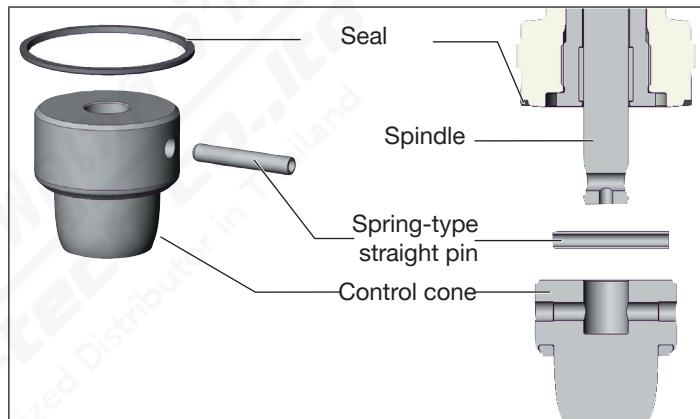
Change control cone set


Fig. 23: Replacing the control cone set

ATTENTION
Important for impeccable and stable device function.

The seal surface of the control cone must not be damaged.

→ Knock out spring-type straight pin using a suitable pin punch.

Pin punch ø 4 mm, with spindle diameter 10 mm

Pin punch ø 5 mm, with spindle diameter 14 mm

Pin punch ø 8 mm, with spindle diameter 22 mm

→ Remove control cone.

→ Place new control cone on the spindle.

→ Align boreholes in the control cone and spindle.

Type 2301

Maintenance, cleaning

- Support control cone on the cylindrical part using a prism or something similar.
- Set up the spring-type straight pin and carefully hammer it in.
- Centre the spring-type straight pin with the spindle axis.

Install actuator (with control unit) on the valve body

- Replace the seal if necessary.



WARNING

Danger due to incorrect lubricants.

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

- ▶ For specific applications, e.g. oxygen or analysis applications, use approved lubricants only.

- Before re-installation, grease the external thread of the body connection (e.g. using 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

Without control unit: pressurise pilot air port 1 with compressed air (5 bar). Valve opens.

With control unit: open the valve in accordance with the operating instructions of the control unit.

- Screw actuator into the valve body. Observe tightening torque (see "[Tab. 10: Tightening torques for body connection](#)").

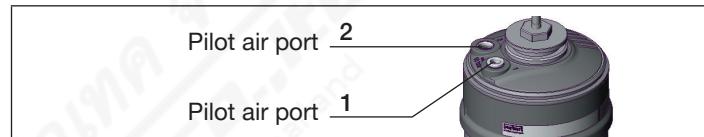


Fig. 24: Ports

Tightening torques for body connection

Body DN	Tightening torque [Nm]
10/15	45 ± 3
20	50 ± 3
25	60 ± 3
32, 40	65 ± 3
50	70 ± 3
65	100 ± 3
80	120 ± 5
100	150 ± 5

Tab. 10: Tightening torques for body connection



If the position of the pilot air ports is unfavourable for installing the hoses, these can be seamlessly aligned by rotating the actuator by 360°.

The procedure is described in chapter "[8.3.4 Turning actuator](#)".

10.2.2 Replacing the valve seat set



The actuator must be uninstalled when replacing the valve seat.

The necessary steps are described in chapter "[10.2.1 Replacing the control cone set](#)".



When installing a valve seat with another DN, the identification number of the globe control valve changes.

The valve seat set consists of

- Valve seat
- Seal
- O-ring (depending on variant)
- Lubricant



DANGER

Risk of injury from discharge of pressure and escaping medium.
Dismantling a device which is under pressure is hazardous due to a sudden discharge of pressure or escaping medium.

- ▶ Before disassembly, shut off the pressure and vent all lines.



WARNING

Risk of injury due to improper installation.

Failure to observe the tightening torque value is dangerous due to the risk of damage to the device.

- ▶ Only perform the replacement with special assembly tools (for order numbers see chapter "[12.2 Assembly tools](#)").
- ▶ Observe the tightening torque (see "[Tab. 10: Tightening torques for body connection](#)" and "[Tab. 11: Tightening torques valve seat assembly](#)").

→ Replace the valve seat as described below when the actuator is removed.

Replacing valve seat

- Use the assembly tool (with suitable tool attachment) and a wrench to unscrew the old valve seat.
- Clean the body thread and seal surface with compressed air.
- If applicable, replace the tool attachment in the assembly tool (depending on the DN of the new valve seat).
- Attach a new valve seat to the assembly tool.

Type 2301

Maintenance, cleaning

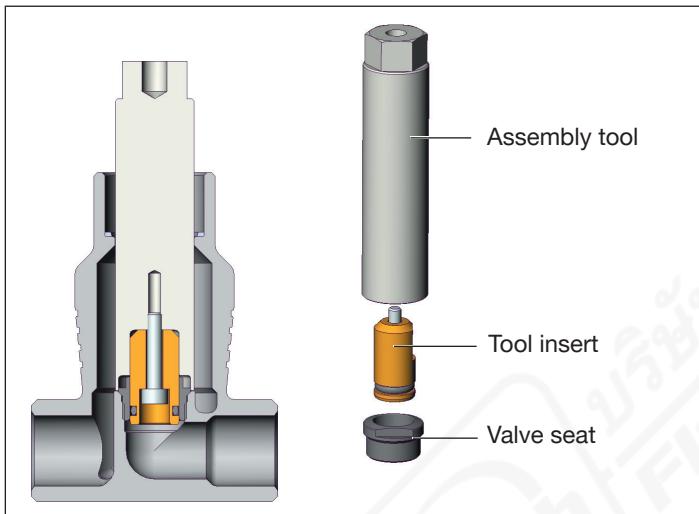


Fig. 25: Replacing the valve seat



WARNING

Danger due to incorrect lubricants.

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

- ▶ For specific applications, e.g. oxygen or analysis applications, use approved lubricants only.

- Grease the valve seat thread using a lubricant (e.g. Klüber-paste UH1 96-402 from Klüber).
- Manually screw attached valve seat into the body thread.
- Tighten valve seat using torque wrench. Observe tightening torque (see "Tab. 11").

Tightening torques valve seat assembly	
Valve seat size	Tightening torque [Nm]
	Coated valve seat
4-15	20 ± 3
20	28 ± 3
25	40 ± 5
32	65 ± 5
40	85 ± 8
50	120 ± 8
65	150 + 10
80	180 + 10
100	220 + 10

Tab. 11: Tightening torques valve seat assembly

Install actuator (with control unit) on the valve body

→ Replace the seal.

WARNING

Danger due to incorrect lubricants.

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

- ▶ For specific applications, e.g. oxygen or analysis applications, use approved lubricants only.

→ Grease the external thread of the body connection (e.g. using 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

Without control unit: pressurise pilot air port 1 with compressed air (5 bar). Valve opens.

With control unit: Open the valve in accordance with the operating instructions of the control unit.

→ Screw actuator into the valve body. Observe tightening torque (see ["Tab. 12: Tightening torques for body connection"](#)).

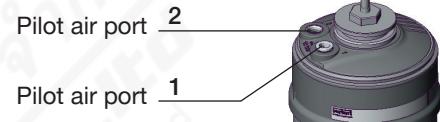


Fig. 26: Ports

Tightening torques for body connection

Body DN	Tightening torque [Nm]
10/15	45 ± 3
20	50 ± 3
25	60 ± 3
32	65 ± 3
40	70 ± 3
50	100 ± 3
65	120 ± 5
80	150 ± 5

Tab. 12: Tightening torques for body connection



If the position of the pilot air ports is unfavourable for installing the hoses, these can be seamlessly aligned by rotating the actuator by 360°.

The procedure is described in chapter ["8.3.4 Turning actuator"](#).

10.2.3 Replacing the packing gland

The seal set for the packing gland includes

SP10/SP14	
SP22	

Fig. 27: Seal set for packing gland

⁵⁾ depending on spindle diameter (10 or 14 mm)



DANGER

Risk of injury from discharge of pressure and escaping medium.

Dismantling a device which is under pressure is hazardous due to a sudden discharge of pressure or escaping medium.

- ▶ Before disassembly, shut off the pressure and vent all lines.



WARNING

Risk of injury due to using wrong tool.

Performing installation work, using unsuitable tools, is hazardous due to possible damage to the device.

- ▶ To remove the actuator from the valve body, use an open-end wrench, never a pipe wrench.
- ▶ To replace the packing gland, use special installation wrench, modified socket wrench or open-end wrench.
- ▶ Observe tightening torques.

To replace the packing gland, first remove the actuator from the valve body and remove the control cone.

Remove the actuator from the valve body

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

ATTENTION
Damage to the valve seat seal or seat contour.

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

→ For control function A

Without control unit: pressurise pilot air port 1 with compressed air (5 bar). Valve opens.

With control unit: Open the valve in accordance with the operating instructions of the control unit.

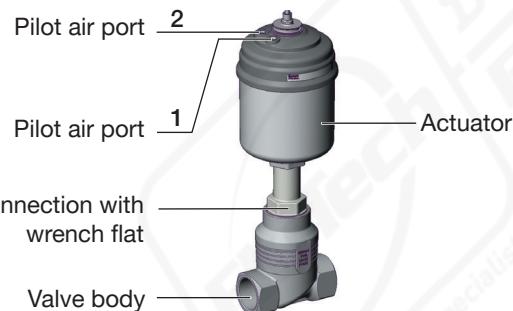


Fig. 28: Valve

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

→ Unscrew actuator from the valve body.

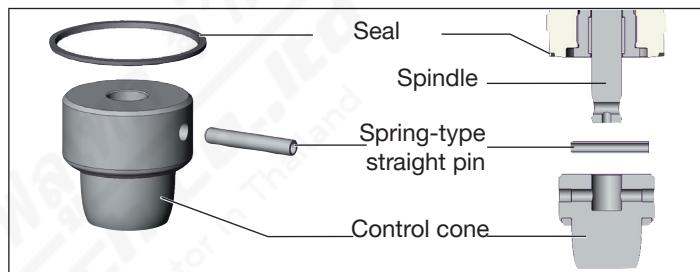
Remove control cone


Fig. 29: Replacing the control cone set

ATTENTION
Important for impeccable and stable device function!

The seal surface of the control cone must not be damaged.

Procedure:

→ Knock out spring-type straight pin using a suitable pin punch.

Pin punch \varnothing 4 mm, for spindle diameter 10 mm.

Pin punch \varnothing 5 mm, for spindle diameter 14 mm.

Pin punch \varnothing 8 mm, for spindle diameter 22 mm.

→ Remove control cone.

Type 2301

Maintenance, cleaning

Replacing packing gland

PEEK spindle guide (series-production status until April 2012):

→ Unscrew the spindle guide using the installation wrench^⑥ and an open-end wrench.

VA spindle guide SP10/SP14 (series-production status as of April 2012):

→ Unscrew the spindle guide using a modified socket wrench^⑥.

VA spindle guide SP22:

→ Unscrew the VA spindle guide using an open-end wrench.

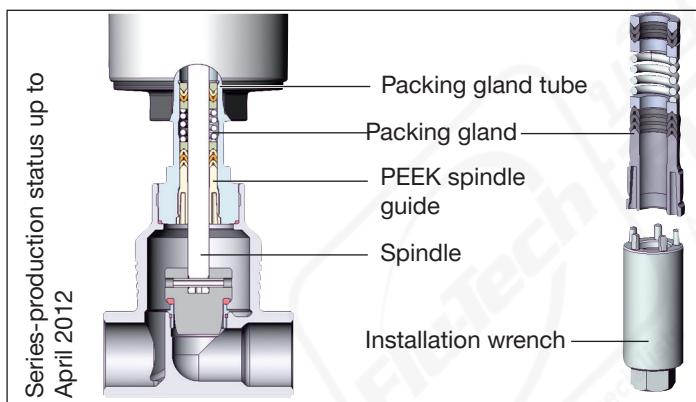


Fig. 30: Replacing the packing gland (PEEK spindle guide)

^⑥ The assembly wrench or modified socket wrench are available from your Burkert sales department.

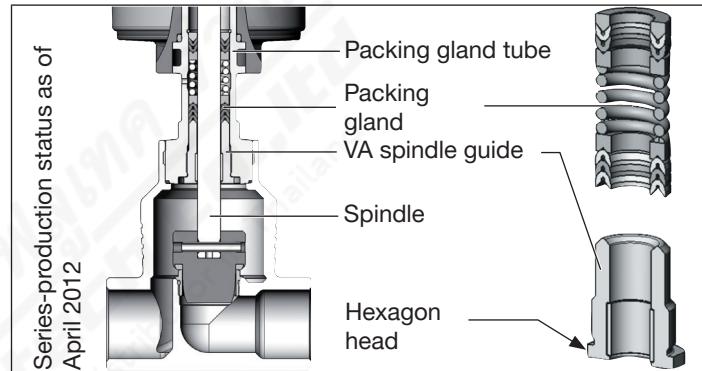


Fig. 31: Replacing the packing gland (VA spindle guide)

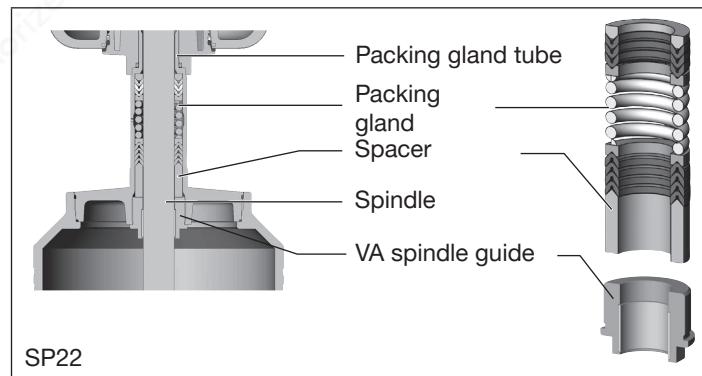


Fig. 32: Replacing the packing gland SP22



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 spindle on a firm surface).

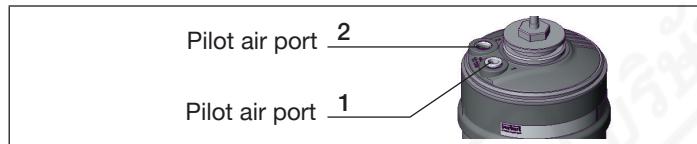


Fig. 33: Ports

- Push the packing gland out:
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 the individual parts of the new packing gland with the supplied lubricant.
- Place individual parts on the spindle in the specified direction and sequence (see “Fig. 34” or “Fig. 35”).
- Push the packing gland into the packing gland tube.



If the valve is equipped with a PEEK spindle guide (SP10/SP14 series-production status up to April 2012), we recommend replacing it with a VA spindle guide (see “[Tab. 21: VA spindle guide for packing gland](#)” on page 43).

- Lubricate the spindle guide thread (e. g. Klüberpaste UH1 96-402).
- Screw spindle guide back in. Observe tightening torque (see “[Tab. 13: Tightening torques spindle guide](#)”).

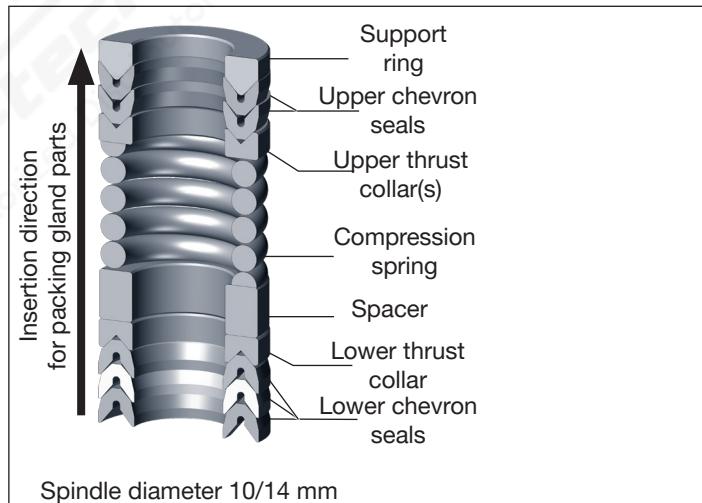


Fig. 34: Seal set for packing gland

Type 2301

Maintenance, cleaning

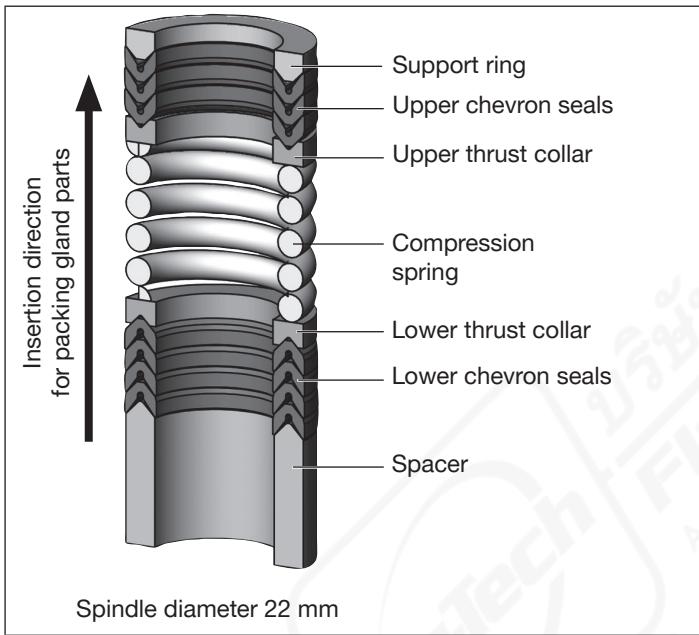


Fig. 35: Seal set for packing gland SP22

Tightening torques spindle guide

Spindle diameter	Body DN	Spindle guide material	Tightening torque [Nm]
10 mm	-	PEEK	6
	10/15	1.4401/1.4404/316L	15
	20/25		25
	32		50
14 mm	-	PEEK	15
	20-25	1.4401/1.4404/316L	25
	32-50		60
22 mm	65-100	1.4401/1.4404	60

Tab. 13: Tightening torques spindle guide

Mount control cone

- Place control cone on the spindle.
- Align boreholes in the control cone and spindle.
- Support control cone on the cylindrical part using a prism or something similar.
- Set up the spring-type straight pin and carefully hammer it in.
- Centre the spring-type straight pin with the spindle axis.

Install actuator (with control unit) on the valve body

→ Replace the seal.



WARNING

Danger due to incorrect lubricants.

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

- ▶ For specific applications, e.g. oxygen or analysis applications, use approved lubricants only.

→ Grease the external thread of the body connection (e.g. using Klüberpaste UH1 96-402 from Klüber).

ATTENTION

Damage to the valve seat seal or seat contour.

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

→ For control function A

Without control unit: pressurise pilot air port 1 with compressed air (5 bar). Valve opens.

With control unit: Open the valve in accordance with the operating instructions of the control unit.

→ Screw actuator into the valve body.

Observe tightening torque (see ["Tab. 14"](#)).

Type 2301

Maintenance, cleaning

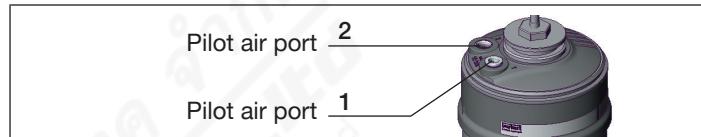


Fig. 36: Ports

Tightening torques for body connection

Body DN	Tightening torque [Nm]
10/15	45 ± 3
20	50 ± 3
25	60 ± 3
32	65 ± 3
40	70 ± 3
50	100 ± 3
65	120 ± 5
80	150 ± 5
100	150 ± 5

Tab. 14: Tightening torques for body connection



If the position of the pilot air ports is unfavourable for installing the hoses, these can be seamlessly aligned by rotating the actuator by 360°.

The procedure is described in chapter ["8.3.4 Turning actuator"](#).

11 FAULTS

Fault	Elimination
Actuator does not switch	Pilot air port interchanged ⁷⁾ CFA → Connect pilot air port 1 CFB → Connect pilot air port 1 CFI → Pilot air port 1: Open Pilot air port 2: closing
	Pilot pressure too low → Observe pressure specifications on the type label
	Operating pressure too high → Observe pressure specifications on the type label
	Flow direction interchanged → Note arrow direction on the body

Tab. 15: Faults – 1

Fault	Elimination
Valve is not tight	Dirt between seal and valve seat → Install dirt trap
	Valve seat seal worn → install new control cone
	Flow direction interchanged → Note arrow direction on the body
	Operating pressure too high → Observe pressure specifications on the type label
	Pilot pressure too low → Observe pressure specifications on the type label
Valve is leaking on the relief bore	Packing gland worn → Replacing packing gland

Tab. 16: Faults – 2

⁷⁾ see ["Fig. 20: Pneumatic connection"](#) in the eponymous chapter.

12 SPARE PARTS



WARNING

Risk of injury when opening the actuator.

The actuator contains a spring under tension. The spring that ejects when the actuator opens may cause injuries.

- The actuator must not be opened.



CAUTION

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

Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and the area around it

- Use only original accessories and original spare parts from Burkert.

12.1 Replacement part set

The following replacement part sets are available for the globe control valve Type 2301:

- Control cone set
consists of control cone, spring-type straight pin, seal, lubricant.
- Valve seat set
consists of valve seat, O-ring (depending on variant), seal, lubricant.
- 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).

- Spindle guide for packing gland
VA spindle guide, seal, lubricant

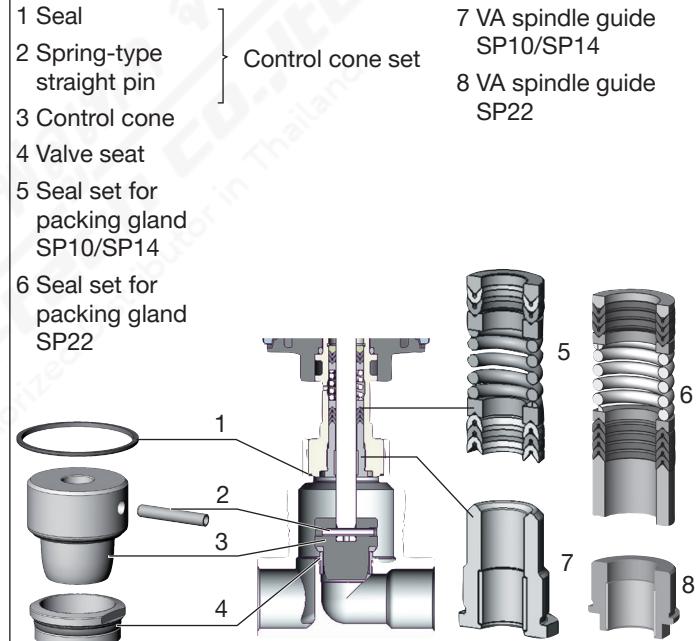


Fig. 37: Spare parts



When installing a valve seat with a changed DN, the identification number of the globe control valve changes.

12.2 Assembly tools

Only for PEEK spindle guide:

Installation wrench for packing gland

(Series-production status up to January 2013)

Installation wrench	Order number
Spindle diameter 10 mm	665 700
Spindle diameter 14 mm	665 701

Tab. 17: Installation wrench for PEEK spindle guide

Modified socket wrench for packing gland

(Series-production status as of January 2013)

 SW	Socket wrench	Body DN	SW	Order number
Spindle Ø 10 mm	15	19	683 220	
Spindle Ø 10 mm	20–25	21	683 222	
Spindle Ø 14 mm	25–50	21	683 223	

Tab. 18: Modified socket wrench

Assembly tool for replacing valve seat

Body DN	Valve seat size	Order number
15	4, 6, 8, 10, 15	652 604
20	10, 15, 20	652 605
25	15, 20, 25	652 606
32	20, 25, 32	652 607
40	25, 32, 40	652 608
50	32, 40, 50	652 609
65	40, 50, 65	655 562
80	50, 65, 80	655 563
100	65, 80, 100	655 564

Tab. 19: Assembly tool



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

13 TRANSPORT, STORAGE, PACKAGING



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.

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.

Incorrect storage may damage the device.

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

Environmentally friendly disposal



- ▶ Follow national regulations regarding disposal and the environment.
- ▶ Collect electrical and electronic devices separately and dispose of them as special waste.



FLU-TECH CO. LTD.



Email: sales@flutech.co.th Website: <https://flutech.co.th>

Tel: 02-384-6060, 086-369-5871-3 Fax: 02-384-5701 LINE OA: @flutech.co.th

Address (HQ): 845/3-4, Moo 3, Theparak Rd., T. Theparak, A. Mueang Samut Prakan, Samut Prakan, 10270, Thailand