

## Type 2103, 2104, 2105

Piston-controlled diaphragm valve  
Kolbengesteuertes Membranventil  
Vanne à membrane commandée par piston

### Quickstart

English    Deutsch    Français



We reserve the right to make technical changes without notice.  
Technische Änderungen vorbehalten.  
Sous réserve de modifications techniques.

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Operating Instructions 1807/05\_EU-ML\_00810349 / Original DE

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## 1 QUICKSTART

The quickstart contains the most important information and notes regarding the use of the device. Keep these instructions in a location which is easily accessible to every user, and make these instructions available to every new owner of the device.

### Important safety information.

Failure to observe these instructions may result in hazardous situations.

- ▶ Quickstart must be read and understood.

A detailed description of the device can be found in the operating instructions for Type 2103, 2104 and 2105.



The operating instructions can be found on the Internet at:

[www.burkert.com](http://www.burkert.com)

### 1.1 Definition of term

The term “device” used in these instructions always stands for the diaphragm valve Type 2103, 2104 or 2105.

## 1.2 Symbols



### DANGER!

Warns of an immediate danger.

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



### WARNING!

Warns of a potentially dangerous situation.

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



### CAUTION!

Warns of a possible danger.

- ▶ Failure to observe this warning may result in a moderate or minor injury.

### NOTE!

Warns of damage to property.



Important tips and recommendations.



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

▶ designates an instruction to prevent risks.

→ designates a procedure which you must carry out.

## 2 AUTHORIZED USE

Non-authorized use of the device may be a hazard to people, nearby equipment and the environment.

- ▶ The device is designed for the controlled flow of liquid and gaseous media.
- ▶ In areas at risk of explosion, only use devices approved for use in those areas. These devices are labeled with a separate Ex type label. When utilized in a potentially explosive atmosphere, always pay attention to the details on the separate Ex type label and the Ex additional instructions contained in the scope of delivery.
- ▶ During use observe the authorized data, the operating conditions and conditions of use specified in the contract documents and operating instructions.
- ▶ Protect device from damaging environmental influences (e.g. radiation, humidity, steam, etc.). If anything is unclear, consult the relevant sales office.
- ▶ The device may be used only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- ▶ Correct transportation, correct storage and installation and careful use and maintenance are essential for reliable and faultless operation.
- ▶ The exhaust air may be contaminated with lubricants in the actuator.
- ▶ Use the device only as intended.

### 3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any

- contingencies and events which may arise during the installation, operation and maintenance of the devices.
- local safety regulations, whereby the operator is responsible for their compliance, by the installation personnel too.



#### **Danger – high pressure.**

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

#### **Danger of bursting from overpressure.**

- ▶ Observe the specifications on the type label for maximal control and medium pressure.
- ▶ Observe permitted medium temperature.

#### **Risk of injury from electric shock (when electrical component installed).**

- ▶ Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!

Observe applicable accident prevention and safety regulations for electrical equipment!

#### **Risk of injury when opening the actuator!**

The actuator contains a tensioned spring. If the actuator is opened, there is a risk of injury from the spring jumping out!

- ▶ Do not open the actuator.

#### **Risk of injury from moving parts in the device!**

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

#### **Risk of burns and risk of fire if used continuously through hot device surface.**

- ▶ Keep the device away from highly flammable substances and media and do not touch with bare hands.

#### **Danger due to loud noises.**

- ▶ Depending on the operating conditions, the device may generate loud noises. More detailed information on the likelihood of loud noises is available from the relevant sales office.
- ▶ Wear hearing protection when in the vicinity of the device.

#### **Leaking medium when the diaphragm is worn.**

- ▶ Regularly check relief bore for leaking medium.
- ▶ If medium is leaking out of the relief bore, change the diaphragm.
- ▶ If the media is hazardous, protect the area surrounding the discharge point against dangers.

### General hazardous situations.

#### To prevent injury, ensure:

- ▶ That the system cannot be activated unintentionally.
- ▶ Installation and repair work may be carried out by authorized technicians only and with the appropriate tools.
- ▶ After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- ▶ The device may be operated only when in perfect condition and in consideration of the operating instructions.
- ▶ Observe the safety regulations specific to the plant for application planning and operation of the device.
- ▶ The plant operator is responsible for the safe operation and handling of the plant.
- ▶ The general rules of technology apply to application planning and operation of the device.

#### To prevent damage to property of the device, ensure:

- ▶ Supply the media connections only with those media which are specified as flow media in the chapter entitled “6 Technical data”.
- ▶ Do not put any loads on the valve (e.g. by placing objects on it or standing on it).
- ▶ Do not make any external modifications to the valves. Do not paint the body parts or screws.
- ▶ Do not transport, install or remove heavy devices without the aid of a second person and using suitable auxiliary equipment.

## 4 GENERAL INFORMATION

### 4.1 Contact address

#### Germany

Bürkert Fluid Control Systems  
Sales Center  
Chr.-Bürkert-Str. 13-17  
D-74653 Ingelfingen  
Tel. : 07940 - 10 91 111  
Fax: 07940 - 10 91 448  
E-mail: info@burkert.com

#### International

Contact addresses are found on the final pages of the printed operating manual.

You can also find information on the Internet under:

[www.burkert.com](http://www.burkert.com)

### 4.2 Warranty

The warranty is only valid if the device is used as authorized in accordance with the specified application conditions.

### 4.3 Information on the internet

The operating instructions and data sheets for Type 2103, 2104 and 2105 can be found on the Internet at: [www.burkert.com](http://www.burkert.com)

## 5 STRUCTURE AND FUNCTION

### 5.1 Structure

The piston-controlled diaphragm valve consists of a pneumatically operated piston actuator and a 2/2-way valve body.

The actuator is manufactured from polyphenylene sulphide (PPS) and stainless steel.

#### 5.1.1 2/2-way valve type 2103

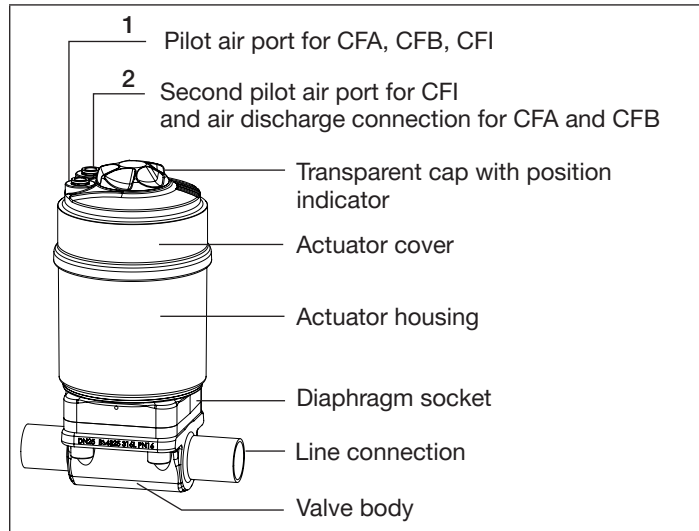


Fig. 1: Piston-controlled diaphragm valve, structure and description

#### 5.1.2 2/3-way valve type 2103

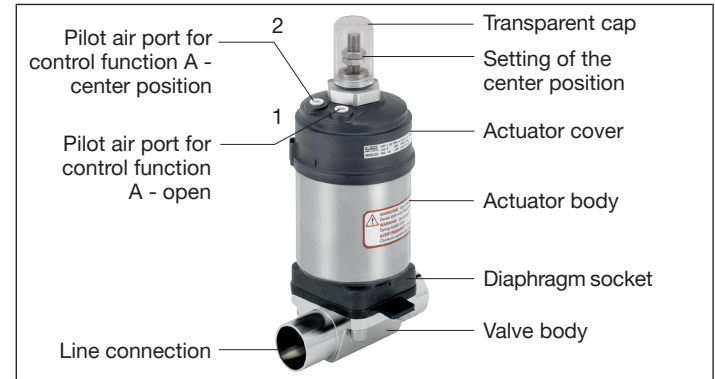


Fig. 2: Structure and description, 2/3-way valve type 2103

#### 5.1.3 T-valve type 2104

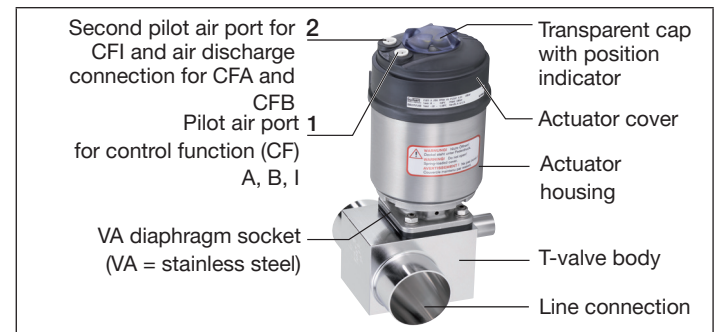


Fig. 3: Structure and description type 2104

### 5.1.4 Tank bottom valve type 2105

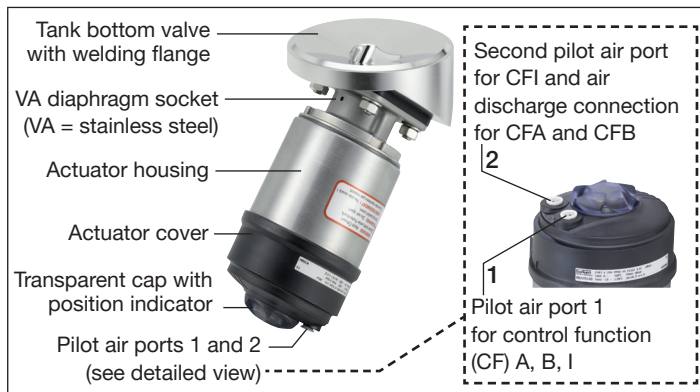


Fig. 4: Structure and description type 2105

## 5.2 Function

Spring force (CFA) or pneumatic pilot pressure (CFB and CFI) generates the closing force on the diaphragm pressure piece. The force is transferred via a spindle which is connected to the actuator piston.

### 5.2.1 Control functions (CF)



**WARNING!**

For control function I: Danger if pilot pressure fails.

For control function I (CFI) control and resetting occur pneumatically. If the pressure fails, no defined position is reached.

- ▶ To ensure a controlled restart, first pressurize the device with pilot pressure, then switch on the medium.

CFA		Closed by spring force in rest position.
CFB		Opened by spring force in rest position.
CFI		Actuating function via reciprocal pressurization.

## 6 TECHNICAL DATA



**WARNING!**

Risk of injury from high pressure.

Excessive pressure can damage the device.

- ▶ Comply with pressure range values on the type label.

### 6.1 Conformity

Type 2103, 2104 and 2105 conforms with the EU Directives according to the EU Declaration of Conformity.

### 6.2 Standards

The applied standards, which verify conformity with the EU Directives, can be found on the EU-Type Examination Certificate and / or the EU Declaration of Conformity.

### 6.3 Type label

Example:

<b>bürkert</b> D-74633 Heppenheim 00175139	2103 A 20M PTFE VS Tamb 0°C - +60°C Tmed xxx°C - +130°C	Pilot 4,8-10bar Pmed 10,0bar Da=26,9 s=1,6	CE W3ZLT
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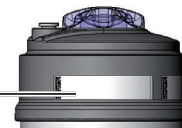
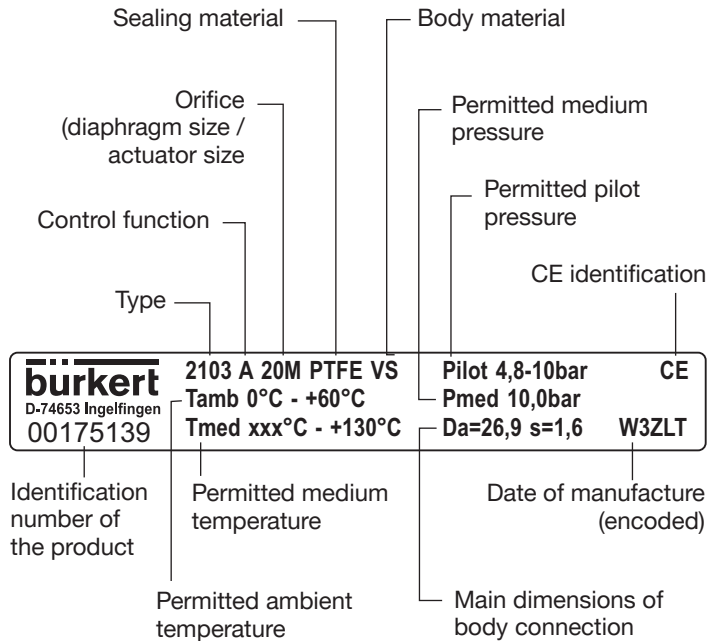


Fig. 5: Example of type label



### 6.3.1 Wording on the type label

Example:



### 6.4 Labeling of the tube valve body (VP)

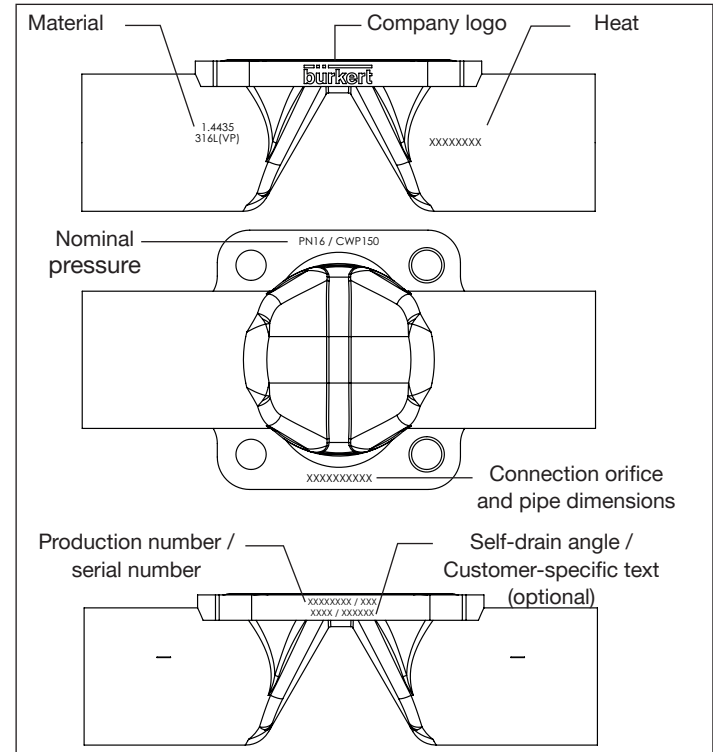


Fig. 6: Labeling of the tube valve body (VP)

## 6.5 Labeling of the forged bodies

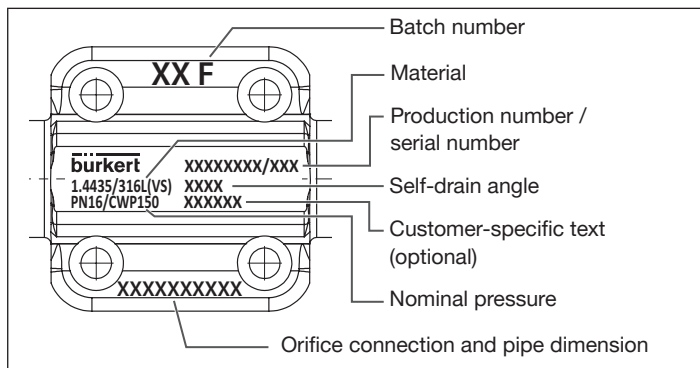


Fig. 7: Labeling of the forged bodies

## 6.6 Operating conditions

Ambient temperature for actuator -10...+60 °C / +100 °C<sup>1)</sup>

Medium temperature for body:

Body material	Temperature
Stainless steel	-10...+150 °C
PVC (see PT graph)	-10...+60 °C
PVDF (see PT graph)	-10...+120 °C
PP (see PT graph)	-10...+80 °C

Tab. 1: Medium temperature for body

Medium temperature for diaphragms:

Material	Temperature [°C] <sup>2)</sup>	Remarks
EPDM (AB)	-10...+130	Steam sterilization up to +140 °C / 60 min
EPDM (AD)	-10...+143	Steam sterilization up to +150 °C / 60 min
FKM (FF)	0...+130	No steam / dry heat up to +150 °C / 60 min
PTFE (EA)	-10...+130	Steam sterilization up to +140 °C / 60 min
Advanced PTFE (EU)	-5...+143	Steam sterilization up to +150 °C / 60 min
Gylon (ER)	-5...+130	Steam sterilization up to +140 °C / 60 min

Tab. 2: Permitted medium temperature for diaphragms

- 1) Pilot air ports with push-in connector or threaded bushing
- 2) The indicated medium temperatures apply only to media which do not corrode or swell the diaphragm materials. The behavior of the medium with respect to the diaphragm may be changed by the medium temperature. The function properties, in particular the service life of the diaphragm, may deteriorate if the medium temperature increases. Do not use the diaphragms as steam shut-off element.

### 6.6.1 Permitted medium pressure

Permitted medium pressure depending on the medium temperature.  
Plastic body:

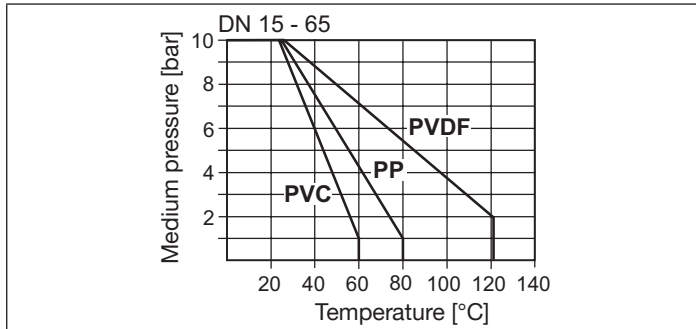


Fig. 8: Graph of medium pressure / Medium temperature

## 6.7 General technical data

### Media

Control medium	neutral gases, air
Flow media	liquids; ultrapure, sterile, dirty, aggressive or abrasive media

### Installation position

Type 2103, 2104	any position, preferably with the actuator face up
Type 2105 (Tank bottom valve)	preferably with the actuator to the bottom

Degree of protection	IP67 in accordance with IEC 529 / EN 60529
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## 7 INSTALLATION

### 7.1 Safety instructions



#### DANGER!

Risk of injury from high pressure in the equipment or device.

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



#### WARNING!

Risk of injury from improper installation.

- ▶ Installation may be carried out by authorised technicians only and with the appropriate tools.

Risk of injury from unintentional activation of the system and an uncontrolled restart.

- ▶ Secure system from unintentional activation.
- ▶ Following assembly, ensure a controlled restart.

**For control function I: Danger if pilot pressure fails.**

For control function I control and resetting occur pneumatically. If the pressure fails, no defined position is reached.

- ▶ To ensure a controlled restart, first pressurize the device with pilot pressure, then switch on the medium.



**CAUTION!**

**Risk of injury due heavy devices!**

- ▶ During transport or during assembly, a heavy device may fall and cause injury.
- ▶ Do not transport, install or remove heavy devices without the aid of a second person and using suitable auxiliary equipment.
- ▶ Use appropriate tools.

**NOTICE!**

**Note the following when installing the device in the plant**

- ▶ The device and the leakage detection bore must be accessible to allow inspection and maintenance work.

**7.2 Installation position**

**Installation for self-drainage of the body**



It is the responsibility of the installer and operator to ensure self-drainage.

**Installation for leakage detection**



One of the bores in the diaphragm socket for monitoring leakage must be at the lowest point.

**7.2.1 Installation position type 2103**

- The piston-controlled diaphragm valve can be installed in any installation position, preferably with the actuator face up.

To ensure self-drainage:

→ Install valve body inclined by an angle  $\alpha = 10^\circ - 55^\circ$  to the horizontal.

Forged body, cast body and tube valve body: Mark on the valve body must point upwards (12 o'clock position, see "Fig. 9").

→ Observe an inclination angle of  $1^\circ - 5^\circ$  to the line axis.

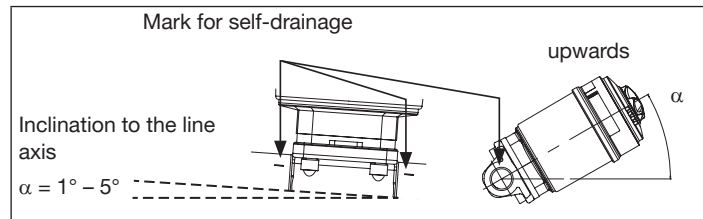


Fig. 9: Installation position for self-drainage of the valve body

### 7.2.2 Installation position T-valve type 2104

For the installation of the T-valves into circular pipelines, we recommend the following installation positions:

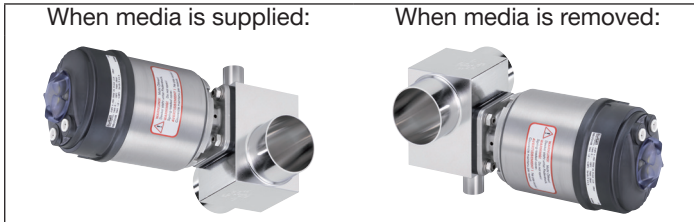


Fig. 10: Installation position type 2104

### 7.2.3 Installation position tank bottom valve type 2105

Preferably with the actuator to the bottom.

## 7.3 Before installation

### NOTE!

**Damage to the diaphragm or the actuator.**

▶ Devices with welded or bonded body: Before welding or bonding the body, the actuator and diaphragm must be removed

- Before connecting the valve, ensure the pipelines are flush.
- The flow direction is optional.

#### 7.3.1 Preparatory work

- Clean pipelines (sealing material, swarf, etc.).
- Support and align pipelines.

## 7.4 Remove the actuator from the valve body

### NOTICE!

**Damage to the diaphragm or the seat contour.**

▶ When removing the actuator, ensure that the valve is open.

- Control function A pressurize the pilot air port 1 with compressed air (5,5 bar): valve opens.
- Remove actuator with diaphragm by loosening the body screws.

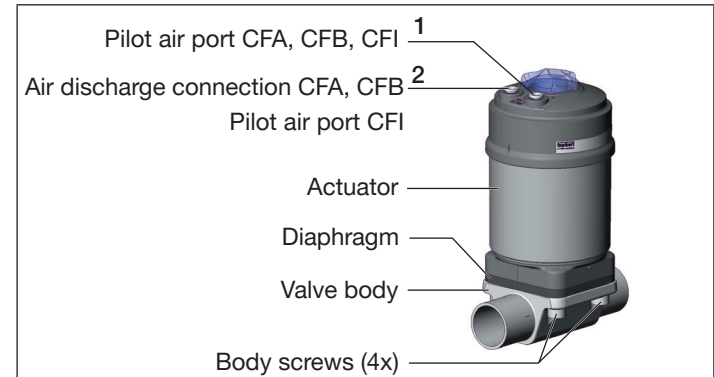


Fig. 11: Installation

## 7.5 Installation



If used in an aggressive environment, we recommend conveying all free pneumatic connections into a neutral atmosphere with the aid of a pneumatic hose.



### **WARNING!**

**Risk of injury from improper installation.**

Non-observance of the tightening torque is dangerous as the device may be damaged.

- ▶ Observe the tightening torques (see “Tab. 3”, page 15).

### 7.5.1 Installation of the valve body type 2103 and 2104

#### Welded or glued bodies

→ Weld or glue valve body in pipeline system.

#### Other bodies

→ Connect body to pipeline.

### 7.5.2 Welding tank bottom body



**Observe sequence:**

1. Weld the tank bottom body onto the base of the tank before installing the tank.  
Welding onto a tank which has already been installed is possible but more difficult.  
Weld the tank bottom body in the middle of the tank base so that the tank can be optimally drained.
2. Weld valve body into the pipeline.

#### Installation requirements:

Pipelines: Ensure that the pipelines are aligned.

Preparation: Support and align pipelines. To ensure that the pipeline is self-draining, observe an inclination angle of  $1^\circ - 5^\circ$ .



### **DANGER!**

**Risk of injury from high pressure!**

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



For information on tanks and instructions on welding observe the standard ASME VIII Division I.  
Before you start welding, check the batch number indicated on the supplied manufacturer's certificate 3.1 .



Observe the applicable laws and regulations of the respective country with regard to the qualification of welders and the execution of welding work.

#### 1. Welding tank bottom body onto the tank:

### **ATTENTION!**

**Before welding, note the following:**

- ▶ Use only welding material which is suitable for the tank bottom body.
- ▶ The tank bottom valve must not collide with any other installation part. The actuator must be easy to install and remove.

**2. Welding tank bottom body into the pipeline:**

→ Weld in tank bottom body.

Ensure installation is de-energized and low-vibration.

**After welding in the valve body:**

Install the diaphragm and the actuator.

**7.6 Installation of the actuator (welded or glued body)**

**NOTICE!**

**Damage to the diaphragm or the seat contour.**

▶ When installing the actuator, ensure that the valve is open.

**Installation for actuator with control function A:**

- Control function A pressurize the pilot air port 1 with compressed air (5,5 bar): valve opens.
- Place actuator on the body
- Lightly cross-tighten the body screws until the diaphragm lies between the body and actuator. Do not tighten the screws yet.
- Actuate the diaphragm valve twice to position the diaphragm correctly.
- Tighten body screws without pressurization in diagonal pairs in three stages (approx. 1/3, approx. 2/3, 3/3 of the tightening torque), according to Table ( see “[Tab. 3](#)”). The diaphragm should be positioned and pressed evenly all around the actuator and body.

**Installation for actuator with control functions B and I:**

- Place actuator on the body
- Gently tighten the body screws in diagonal pairs without pressurization until the diaphragm lies between the body and actuator.  
**Do not fully tighten the screws yet.**

- Pressurize pilot air port 1 of the actuator with compressed air (5,5 bar).
- Actuate the diaphragm valve twice to position the diaphragm correctly.
- Tighten body screws with pressurization in diagonal pairs in three stages (approx. 1/3, approx. 2/3, 3/3 of the tightening torque), according to Table ( see “[Tab. 3](#)”). The diaphragm should be positioned and pressed evenly all around the actuator and body.

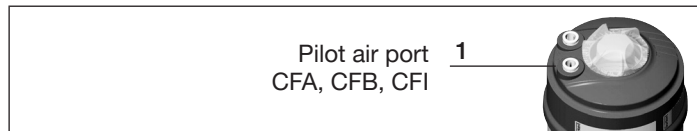


Fig. 12: Pilot air port

Orifice DN (diaphragm size)	Tightening torques for diaphragms [Nm]	
	EPDM/ FKM	PTFE / advanced PTFE / laminated PTFE
8	2.5	2.5
15	3.5	4
20	4	4.5
25	5	6
32	8	10
40	8	10
50	12	15

Tab. 3: Tightening torques for diaphragms

- A tolerance of +10% of the respective tightening torque applies to all values.

## 7.7 Align actuator

**!** If the valve features a stainless steel diaphragm socket, the actuator can be rotated steplessly by 360°.

→ Rotate actuator using a hook wrench. See [“Fig. 13”](#).  
Rotate actuator only as far as required (max. 360°).

Recommended hook wrenches as per DIN 1810.

Actuator size:

ø 50 = A 52 - 55,

ø 70 - 130 = A 68 - 75

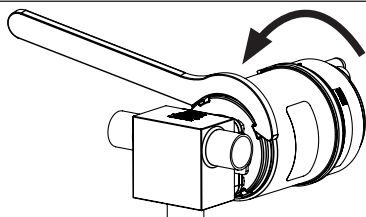


Fig. 13: Align actuator

## 7.8 Pneumatic connection

**!** **DANGER!**

Danger – high pressure in the equipment.

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



**WARNING!**

**Risk of injury from unsuitable connection hoses.**

- ▶ Use only hoses which are authorised for the indicated pressure and temperature range.
- ▶ Observe the data sheet specifications from the hose manufacturers.

**For control function I: Danger if pilot pressure fails.**

For control function I control and resetting occur pneumatically. If the pressure fails, no defined position is reached.

- ▶ To ensure a controlled restart, first pressurize the device with pilot pressure, then switch on the medium.

### 7.8.1 Connection of the control medium

Control functions A and B

→ Connect the control medium to the pilot air port 1 of the actuator (see [“Fig. 13: Align actuator”](#)).

Control function A, 3-position actuator

→ Connect the control medium to the pilot air port 1 and 2 of the actuator (see [“Fig. 2”](#) in chapter 5)  
Pressure on connection 1 opens the valve,  
Pressure on both connections sets the mid- position.

Control function I

→ Connect the control medium to the pilot air port 1 and 2 of the actuator (see [“Fig. 14: Pneumatic connection”](#))  
Pressure on connection 1 opens the valve.  
Pressure on connection 2 closes the valve.



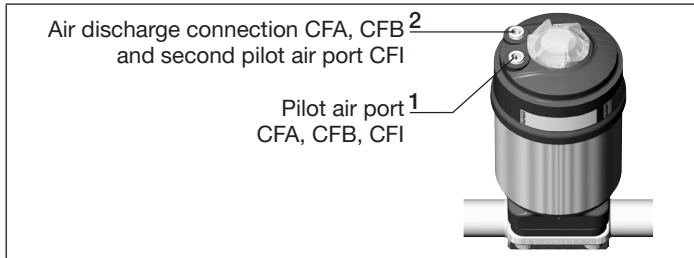


Fig. 14: Pneumatic connection

### Silencer

For the versions with a plug-in connection the silencer for reducing the exhaust air noise is supplied loose.

→ Plug the silencer into the free air discharge connection 2 (see “Fig. 14: Pneumatic connection”).



If used in an aggressive environment, we recommend conveying all free pneumatic connections into a neutral atmosphere with the aid of a pneumatic hose.

### Control air hose

Control air hoses of sizes 6/4 mm or 1/4“ can be used. Optionally a pilot air port is possible via a G 1/8 thread.

## 8 REMOVAL



### DANGER!

**Risk of injury from discharge of medium and pressure.**  
It is dangerous to remove a device which is under pressure due to the sudden release of pressure or discharge of medium.

- ▶ Before removing a device, switch off the pressure and vent the lines.

→ Loosen the pneumatic connection.

→ Remove the device.

## 9 MAINTENANCE WORK

### 9.1 Actuator

The actuator of the diaphragm valve is maintenance-free provided it is used according to these operating instructions.

### 9.2 Spare parts of the diaphragm valve

Parts which are subject to natural wear:

- Seals and diaphragm

→ If leaks occur, replace the particular wearing part with an appropriate spare part.



A bulging PTFE diaphragm may reduce the flow.



The replacement of spare parts is described in the operating instructions at: [www.burkert.com](http://www.burkert.com).

### 9.3 Inspection intervals

The following maintenance work is required for the diaphragm valve:

- After the first steam sterilization or when required retighten body screws crosswise.
- After maximum 10<sup>5</sup> switching cycles check the diaphragm for wear and replace if required.



Muddy and abrasive media require correspondingly shorter inspection intervals.

### 9.4 Cleaning

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

#### NOTE!

**Avoid causing damage with cleaning agents.**

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

## 10 TRANSPORT, REMOVAL

#### NOTE!

**Incorrect transport and storage may damage the device.**

- During transportation protect the device in shock-resistant packaging.
- Below the permitted storage temperature from -20 to +65 °C.
- Store the device in a dry and dust-free location.

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

- Dispose of the device and packaging in an environmentally friendly manner and observe applicable regulations on disposal.

[www.burkert.com](http://www.burkert.com)