OPERATING INSTRUCTIONS

EN

Original

ANGLE VALVE

Pneumatic & Electropneumatic Angle Valve

PFEIFFER VACUUM

Dear customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new Pfeiffer Vacuum valves should support you in your individual application with full performance and without malfunctions. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. With this expertise, we have acquired a multitude of skills contributing to an efficient and secure implementation of our product.

Knowing that our product must not interfere with your actual work, we are convinced that our product offers you the solution that supports you in the effective and trouble-free execution of your individual application.

Please read these operating instructions before putting your product into operation for the first time. If you have any questions or suggestions, please feel free to contact info@pfeiffer-vacuum.de.

Further operating instructions from Pfeiffer Vacuum can be found in the Download Center on our website.

Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

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1 About this manual

IMPORTANT
Read carefully before use.
Keep the manual for future consultation.

1.1 Validity

These operating instructions are a customer document of Pfeiffer Vacuum. The operating instructions describe the functions of the named product and provide the most important information for the safe use of the device. The description is written in accordance with the valid directives. The information in these operating instructions refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

Products concerned
This document applies to products with the following part numbers:

Part number	Description
PAV-XXXXXX	Pneumatic and electropneumatic angle valves

1.2 Target group

These operating instructions are aimed at all persons performing the following activities on the product:

- Transportation
- Setup (Installation)
- Usage and operation
- Decommissioning
- Maintenance and cleaning
- Storage or disposal

The work described in this document is only permitted to be performed by persons with the appropriate technical qualifications (expert personnel) or who have received the relevant training from Pfeiffer Vacuum.

1.3 Conventions

1.3.1 Instructions in the text

Usage instructions in the document follow a general structure that is complete in itself. The required action is indicated by an individual step or multi-part action steps.

Individual action step

A horizontal, solid triangle indicates the only step in an action.

► This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

1. Step 1
2. Step 2
3. ...

1.3.2 Pictographs

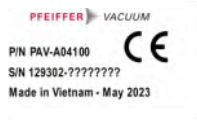
Pictographs used in the document indicate useful information.

Note

Tip

1.3.3 Stickers on product

This section describes all the stickers on the product along with their meanings.

	**Rating plate (example)**

Tbl. 1: Stickers on product

1.3.4 Abbreviations

Abbreviation	Meaning in this document
CDA	Clean dry air
Delta P	Delta pressure
DN	Nominal diameter as size description
FKM	Fluoropolymer rubber
HV	High vacuum
IPA	Isopropyl alcohol
ISO	Flange: Connection in accordance with ISO 1609 and ISO 2861

Tbl. 2: Abbreviations used in this document

2 Safety

2.1 General safety information

The following 4 risk levels and 1 information level are taken into account in this document.

⚠ DANGER

Immediately pending danger

Indicates an immediately pending danger that will result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

Indicates a pending danger that could result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

Indicates a pending danger that could result in minor injuries if not observed.

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

Is used to highlight actions that are not associated with personal injury.

► Instructions to avoid damage to property

Notes, tips or examples indicate important information about the product or about this document.

2.2 Safety instructions

Risks during installation

⚠ WARNING

Risk of injury due to incorrect installation

Dangerous situations may arise from unsafe or incorrect handling

► Do not put hands or any other body part or objects in the valve.

⚠ WARNING

Risk of injury due to overpressure in the vacuum system > 1000 hPa

Released parts and escaped gases can result in injury.

► Do not open clamps while the vacuum system is pressurized.
► Use the clamp types that are suited for overpressure.

⚠ WARNING

Risk of injury due to overpressure in the vacuum system > 2000 hPa

KF flange connections with elastomer seals cannot withstand such pressures. Process media can leak and cause potential damage to your health.

► Use O-rings provided with an outer centering ring.

Risks during maintenance, decommissioning and disposal

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
► Decontaminate affected parts before carrying out maintenance work.
► Wear protective equipment.

2.3 Safety precautions

Duty to provide information on potential dangers

The product holder or user is obliged to make all operating personnel aware of dangers posed by this product.

Every person who is involved in the installation, operation or maintenance of the product must read, understand and adhere to the safety-related parts of this document.

Infringement of conformity due to modifications to the product

The Declaration of Conformity from the manufacturer is no longer valid if the operator changes the original product or installs additional equipment.

- Following the installation into a system, the operator is required to check and re-evaluate the conformity of the overall system in the context of the relevant European Directives, before commissioning that system.

General safety precautions when handling the product

- ► Observe all applicable safety and accident prevention regulations.
- ► Check that all safety measures are observed at regular intervals.
- ► Never put hands or any other object in the valve.

2.4 Limits of use of the product

Parameter	Limit value
Installation orientation	Product may be installed in any orientation, with flow in either direction.
Allowable ambient humidity	0 - 95 % non-condensing
Maximum temperature	200°C (body), 100°C (actuator)
Maximum internal pressure	1000 hPa in open positon. 2000 hPa in closed position.
Maximum Delta P across poppet	1000 hPa in open direction
Pneumatic supply	4000 - 7000 hPa
Solenoid electrical specifications[1)]	24 V DC 1.3 W
Position indicators	microswitch
Reliability, MTTF	3 million cycles in clean environment
Leak rate	1 x 10^{-9} hPa l/s[2)]
Installation altitude	max. 5000 m
Degree of pollution	2

Tbl. 3: Limits of use for pneumatic angle valves

2.5 Proper use

- ► Use the valve to isolate vacuum.
- ► Use the valve only in closed indoor areas.
- ► Use the valve only for the evacuation of dry and inert gases.
- ► If the valve is operated under harsh or dirty conditions, clean / maintain the valve before the specified service time to maintenance has been reached.

2.6 Foreseeable misuse

Improper use of the product invalidates all warranty and liability claims. Any use that is counter to the purpose of the product, whether intentional or unintentional, is regarded as misuse, in particular:

- Use outside the mechanical and electrical application limits in accordance with the technical data
- Use with corrosive or explosive media, if this is not explicitly permitted
- Use outdoors
- Use with bare hands or with powder gloves
- Use after unauthorized technical changes (on the inside or the outside of the product)
- Use with replacement or accessory parts that are unsuitable or are not approved

1) only applies to electropneumatic valves

2) for valves with FKM seals

2.7 Personnel qualification

The work described in this document may only be carried out by persons who have appropriate professional qualifications and the necessary experience or who have completed the necessary training as provided by Pfeiffer Vacuum.

Training people

1. Train the technical personnel on the product.
2. Only let personnel to be trained work with and on the product when under the supervision of trained personnel.
3. Only allow trained technical personnel to work with the product.
4. Before starting work, make sure that the commissioned personnel have read and understood these operating instructions and all applicable documents, in particular the safety, maintenance and repair information.

2.7.1 Ensuring personnel qualification

Specialist for mechanical work

Only a trained specialist may carry out mechanical work. Within the meaning of this document, specialists are people responsible for construction, mechanical installation, troubleshooting and maintenance of the product, and who have the following qualifications:

- Qualification in the mechanical field in accordance with nationally applicable regulations
- Knowledge of this documentation

Specialist for electrotechnical work

Only a trained electrician may carry out electrical engineering work. Within the meaning of this document, electricians are people responsible for electrical installation, commissioning, troubleshooting, and maintenance of the product, and who have the following qualifications:

- Qualification in the electrical engineering field in accordance with nationally applicable regulations
- Knowledge of this documentation

In addition, these individuals must be familiar with applicable safety regulations and laws, as well as the other standards, guidelines, and laws referred to in this documentation. The above individuals must have an explicitly granted operational authorization to commission, program, configure, mark, and earth devices, systems, and circuits in accordance with safety technology standards.

Trained individuals

Only adequately trained individuals may carry out all works in other transport, storage, operation and disposal fields. Such training must ensure that individuals are capable of carrying out the required activities and work steps safely and properly.

2.7.2 Personnel qualification for maintenance and repair

Advanced training courses

Pfeiffer Vacuum offers advanced training courses to maintenance levels 2 and 3.

Adequately trained individuals are:

- **Maintenance level 1**
  - Customer (trained specialist)
- **Maintenance level 2**
  - Customer with technical education
  - Pfeiffer Vacuum service technician
- **Maintenance level 3**
  - Customer with Pfeiffer Vacuum service training
  - Pfeiffer Vacuum service technician

2.7.3 Advanced training with Pfeiffer Vacuum

For optimal and trouble-free use of this product, Pfeiffer Vacuum offers a comprehensive range of courses and technical trainings.

For more information, please contact Pfeiffer Vacuum technical training.

3 Product description

3.1 Function

Pneumatic and electropneumatic valves are pneumatically operated bellows sealed angle valves, designed for light weight and compact size as well as robust operation and long life.

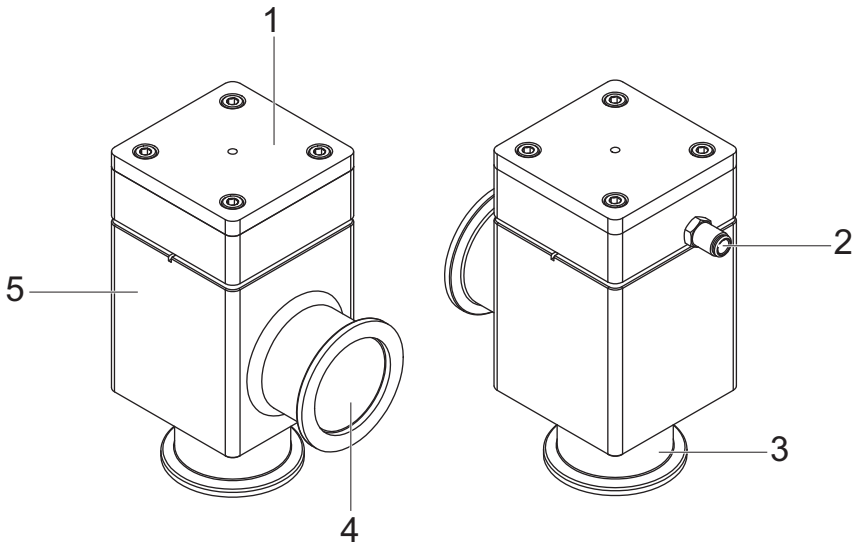


Fig. 1: Pneumatic angle valve

1 Actuator cap
2 Air fitting
3 Bottom port
4 Side port
5 Body

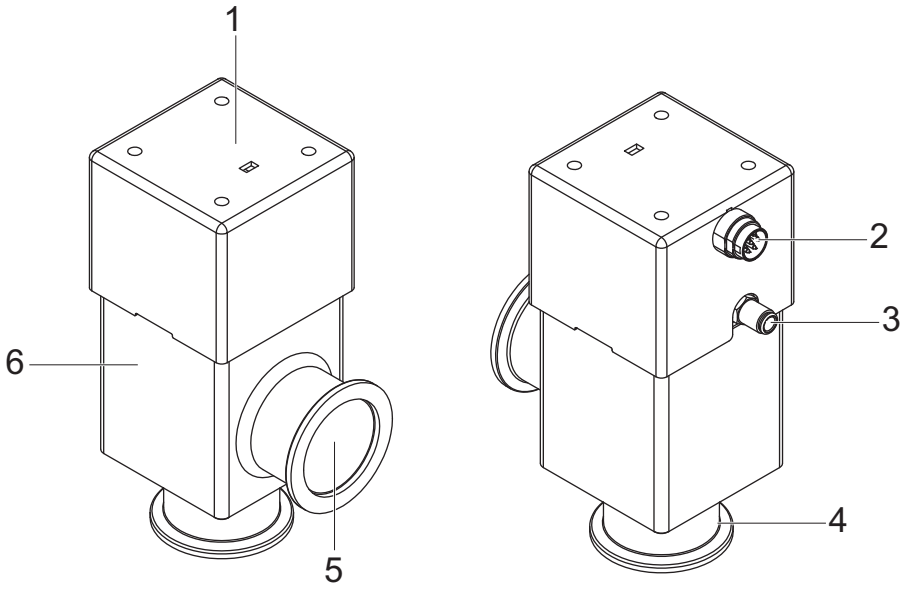


Fig. 2: Electropneumatic angle valve

1 Actuator cap
2 Connector
3 Air fitting
4 Bottom port
5 Side port
6 Body

3.2 Scope of delivery

- Angle valve
- Operating instructions

3.3 Identifying the product

► To ensure clear identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the model number and serial number on hand.

3.3.1 Product types

The product designation of Pfeiffer Vacuum pneumatic angle valves from the PAV angle series is composed of the family name, the size and, if required, any additional feature description.

Family	Size/model
PAV	DN 16 to 50

Tbl. 4: Product designation of pneumatic angle valves

3.3.2 Product features

Feature	Description
Valve body material	Aluminum, stainless steel
Welded bellows	Stainless steel 316L
Bonnet / poppet seals	FKM elastomer
Actuation	Pneumatic, electropneumatic

Tbl. 5: Pneumatic angle valve features

4 Transportation and Storage

4.1 Transport

⚠ WARNING

Danger of serious injury due to falling objects

Due to falling objects there is a risk of injuries to limbs through to broken bones.

► Take particular care and pay special attention when transporting products manually.
► Do not stack the products.
► Wear protective equipment, e.g. safety shoes.

We recommend

Pfeiffer Vacuum recommends keeping the transport packaging and original protective cover.

Instructions for safe transport

► Transport the valve only within the permissible temperature limits.
► Where possible, always transport or ship the valve in its original packaging.
► Always carry the valve with both hands.
► Remove the protective cover only immediately prior to installation.
► Transport the valve in the closed position.

4.2 Storage

We recommend

Pfeiffer Vacuum recommends storing the products in their original transport packaging.

Storing the pneumatic angle valve

1. Seal all flange openings with the original protective caps.
2. Seal all other connections (e.g. venting connection) with the corresponding original parts.
3. Store the valve only indoors within the permissible temperature limits.

5 Installation

5.1 Preparatory work

⚠ WARNING

Risk of injury due to incorrect installation

Dangerous situations may arise from unsafe or incorrect handling

► Do not put hands or any other body part or objects in the valve.

General notes for the installation of vacuum components

► Choose an installation location that permits access to the product and to supply lines at all times.
► Observe the ambient conditions given for the limits of use.
► Provide the highest possible level of cleanliness during assembly.
► Ensure that flange components during installation are grease-free, dust-free and dry.

Required tools and materials

- Lint-free, dry wipe
- Powder-free latex gloves
- High Vacuum Lubricant

Pre-installation

1. Observe the instructions for transport to the installation location.
2. Determine that the valve and adjacent plumbing in the vacuum system will be adequately supported when installed.
3. Make sure the mating flanges are in line, flat, parallel, and the correct distance aparty to minimize straining of the valve body.
4. Remove the flange cover and wipe the flange and gaskets with a lint-free, dry wipe.
5. If installing an o-ring seal flange, apply a light film of high vacuum lubricant to the o-ring and install in the flange groove.

5.2 Mounting the valve

- Bending moments across the inlet and outlet flange connections should never exceed 5.65 Nm.

Required tools and materials

- Seal with centering ring
- Clamps
- KF connection flange
- Lint-free gloves

Prerequisites

- Make sure no foreign particles enter the valve.
- Leave protective caps in place until the product is ready to be installed.

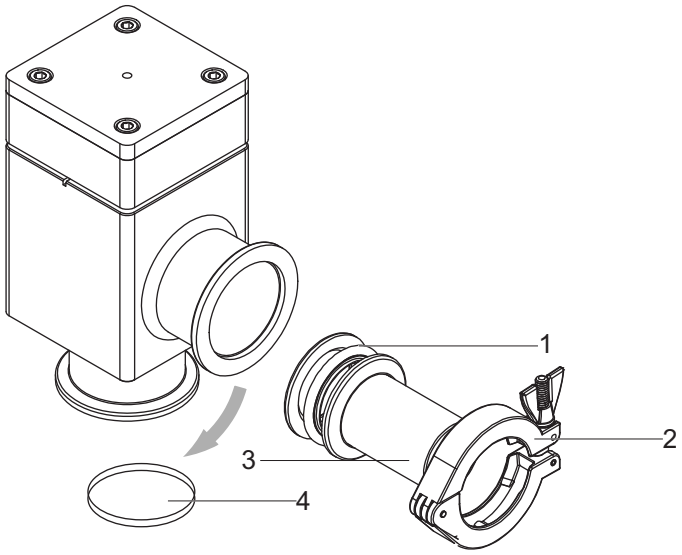


Fig. 3: Vacuum connection

1	Seal with centering ring	3	KF connection flange
2	Clamp	4	Protective lid

Mounting the valve

1. Remove protective lids from the valve.
2. Connect the valve to the vacuum system using the clamps.

5.3 Pneumatic connection

Connection to the compressed air supply may only be established if:

- The compressed air line is not pressurized
- The product is installed in a vacuum system or
- The moving parts are protected to avoid accidental contact

Required tools and materials

- Lint free gloves
- Plastic tube for air inlet:
  - Size ø6 mm
  - Material: polyamide soft or polyurethane

Prerequisites

- Prepare the plastic tube to ensure leak tightness
  - Cut the plastic tube orthogonally
  - Make sure the outside of the plastic tube is not damaged

Connect air line

1. Push the plastic tubes into the instant push-in fittings until the stop position is reached.
2. Check for correct mounting by slightly pulling.

5.4 Power supply and electrical position indicator connection

⚠ WARNING

Risk of electric shock due to non-compliant electrical installations

The product is permanently connected to the mains voltage. Non-compliant electrical installations or installations not done to professional standards may endanger the user's life.

- ► Only qualified technicians trained in the relevant electrical safety and EMC regulations are authorized to work on the electrical installation.
- ► This product must not be modified or converted arbitrarily.

Connection to the power supply may only be established if:

- The power supply is de-energized
- The product is installed in a vacuum system
- The moving parts are protected to avoid accidental contact

Required tools and materials

- Appropriate mating cable, e.g.
  - Amphenol T3476-002
  - Amphenol T3476-055
  - Amphenol T3476-551

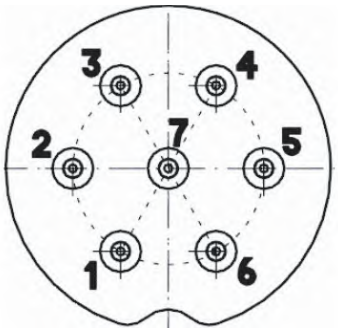


Fig. 4: Connector pin usage

Pin	Label	Description
1	Not used	
2	Control	Valve control input, 24 V DC
3	Not used	
4	Open	Open signal switch
5	Common	Common for signal switches
6	Closed	Closed signal switch
7	Ground	Return path of power

Tbl. 6: Connector pin definition

Connecting power supply and position indicator

1. Plug in the connector using the respective pin definitions.
2. Secure the connector with the union nut.

6 Operation

Information on operation

- For continued trouble-free operation, keep the valve clean and free of contaminants.
- Use lint-free gloves to avoid contaminating the valve with finger oils.
- Work in a clean environment to avoid other contamination.
- The product is ready for operation as soon as it has been installed.

7 Maintenance

7.1 General maintenance information

Required spare parts

1. To order replacement parts or repair kits, contact Pfeiffer Vacuum service.
2. Please provide the model number and serial number when ordering replacement parts.

Serviceable parts

► Contact Pfeiffer Vacuum service for repair of non-user-serviceable parts.

7.2 Replacing O-ring seal

- Always wear powder-free latex gloves when servicing the valve
- Be careful not to scratch O-ring groove
- Avoid twisting, stretching, or deforming the O-ring
- Avoid damaging the materials

Required tools and materials

- M2.5 hex key for DN 16 & DN 25
- M4 hex key for DN 40 & DN 50
- Lint-free gloves
- Replacement O-rings
- O-ring pick
- Vacuum grease
- Screwdriver
- Calibrated torque wrench

Prerequisites

- Dismount valve from the vacuum system

7.2.1 Disassembling the valve

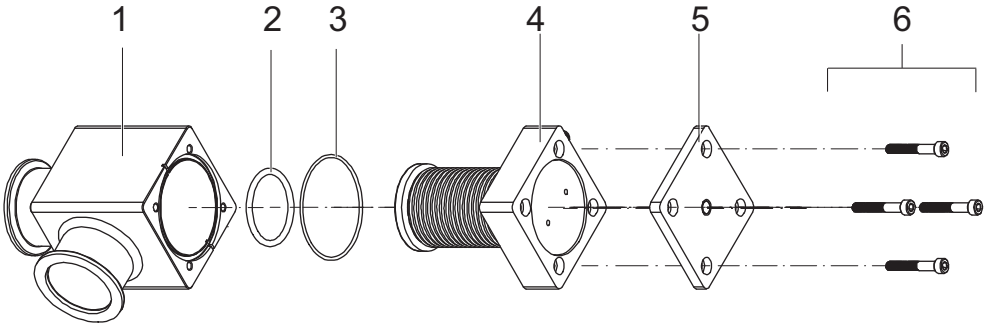


Fig. 5: Remove and clean O-rings pneumatic angle valve

1	Body	4	Bellows/actuator assembly
2	Poppet O-Ring	5	Actuator cap
3	Bonnet O-ring	6	Socket head screw, 4x

Remove and clean O-rings pneumatic angle valve

1. Remove the socket head screws at the top of the actuator using a hex key.
   – DN 16 screws are located below the actuator on the body.
2. Lift bellows/actuator assembly out of body.
3. Remove and discard the old bonnet and poppet O-rings.
   – Avoid scratching the seal surfaces by using a plastic O-ring pick to remove the O-rings.
4. Clean the bonnet and poppet o-ring grooves using IPA soaked cleanroom wipe.
5. Wipe o-rings with IPA.
6. Blow-dry with CDA.

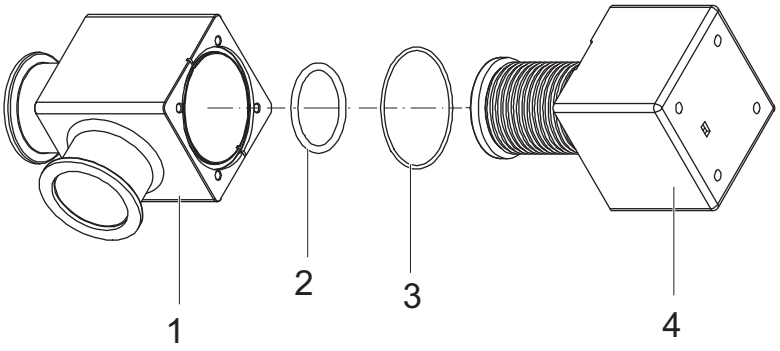


Fig. 6: Remove and clean O-rings electropneumatic angle valve

1 Body
2 Poppet O-Ring
3 Bonnet O-ring
4 Bellows/actuator assembly

Remove and clean O-rings electropneumatic angle valve

1. Remove the socket head screws at the top of the actuator using a hex key.
   – DN 16 screws are located below the actuator on the body.
2. Lift bellows/actuator assembly out of body.
3. Remove and discard the old bonnet and poppet O-rings.
   – Avoid scratching the seal surfaces by using a plastic O-ring pick to remove the O-rings.
4. Clean the bonnet and poppet o-ring grooves using IPA soaked cleanroom wipe.
5. Wipe o-rings with IPA.
6. Blow-dry with CDA.

7.2.2 Assembling the valve

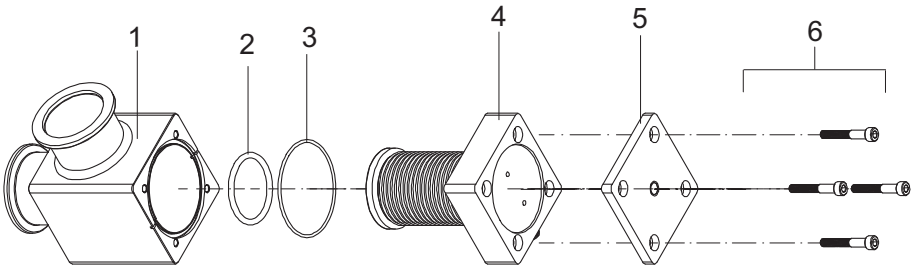


Fig. 7: Assemble pneumatic angle valve

1 Body
2 Poppet O-Ring
3 Bonnet O-Ring
4 Bellows/actuator assembly
5 Socket head screw, 4x
6 Actuator cap

Assemble pneumatic angle valve

1. Evenly apply a light sheen of Krytox to both O-rings.
2. Install the O-rings.
3. Wipe off any excess Krytox with IPA.
4. Carefully install the bellows/actuator assembly into the body.
   – Be sure that the body O-ring is seated into the groove.
5. Insert and tighten down socket head screws.
   – Torque to 3 Nm using a cross pattern.

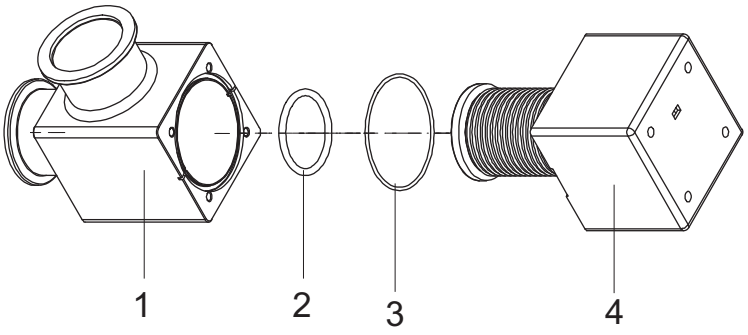


Fig. 8: Assemble electropneumatic angle valve

1	Body	3	Bonnet O-Ring
2	Poppet O-Ring	4	Bellows/actuator assembly

Assemble electropneumatic angle valve

1. Evenly apply a light sheen of Krytox to both O-rings.
2. Install the O-rings.
3. Wipe off any excess Krytox with IPA.
4. Carefully install the bellows/actuator assembly into the body.
   – Be sure that the body O-ring is seated into the groove.
5. Insert and tighten down socket head screws.
   – Torque to 3 Nm using a cross pattern.

8 Decommissioning

Required tools and materials

- Lint-free gloves
- Protective covers for the valve flanges

Prerequisites

- Vacuum system vented to atmosphere
- Control system turned off
- Valve closed

Dismounting the valve

1. Loosen the power supply connector and unplug it.
2. Remove the valve from the vacuum system.
3. Install the protective lids.

9 Recycling and disposal

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

Environmental protection

You **must** dispose of the product and its components in accordance with all applicable regulations for protecting people, the environment and nature.

- Help to reduce the wastage of natural resources.
- Prevent contamination.

General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

► Dispose of our products according to the following:
  – Iron
  – Aluminium
  – Copper
  – Synthetic
  – Electronic components
  – Oil and fat, solvent-free
► Observe the special precautionary measures when disposing of:
  – Fluoroelastomers (FKM)
  – Potentially contaminated components that come into contact with media

10 Malfunctions

Problem	Possible causes	Possible solution
Valve does not open	Obstruction inside valve	Clear/remove any obstructions
	Degraded or inadequate lubrication	Clean and relubricate appropriately
	Blockage of the air vent	Clear air vent
	Faulty pilot valve	Check/replace pilot valve
	Inadequate air supply pressure	Ensure there is at least minimum pressure of 4000 hPa
	Kink or blockage in pneumatic supply line or inlet fitting	Clear or replace line
Valve does not seal adequately	O-ring is defective or contaminated	Clean/replace o-ring
	Process contamination has caused seal degradation	Replace seal(s)
Vacuum system will not pump down to ultimate pressure	Leaks due to damage of flanges or o-rings	Repair flanges/replace o-rings
	Valve body leaks due to severe bending moments during installation	Look for signs of deformation or cracking
	Ambient air leak due to damaged bellows	Contact Pfeiffer Vacuum Service.
Position indicators not sending signals	Valve not opening or closing fully	Refer to sections above regarding valve not opening or closing
	Sensor cable not connected properly	Ensure cable is connected
	Position indicator is broken or needs replacement	Contact Pfeiffer Vacuum Service.

Tbl. 7: Troubleshooting the valve

11 Service solutions by Pfeiffer Vacuum

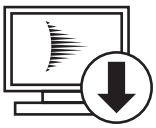
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

We are always focused on perfecting our core competence – servicing of vacuum components. Once you have purchased a product from Pfeiffer Vacuum, our service is far from over. This is often exactly where service begins. Obviously, in proven Pfeiffer Vacuum quality.

Our professional sales and service employees are available to provide you with reliable assistance, worldwide. Pfeiffer Vacuum offers an entire range of services, from original replacement parts to service contracts.

Make use of Pfeiffer Vacuum service
Whether preventive, on-site service carried out by our field service, fast replacement with mint condition replacement products, or repair carried out in a Service Center near you – you have various options for maintaining your equipment availability. You can find more detailed information and addresses on our homepage, in the section.

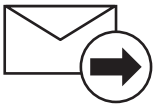
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



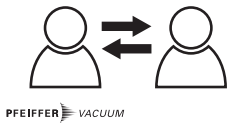
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

a) Remove and store all accessories (all external parts, such as valves, protective screens, etc.).
b) If necessary, drain operating fluid/lubricant.
c) If necessary, drain coolant.

2. Complete the service request and contamination declaration.

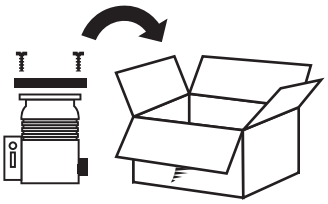


3. Send the forms by email, fax, or post to your local Service Center.

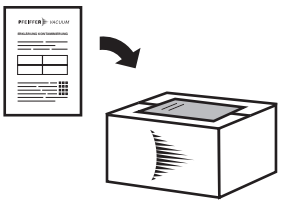


4. You will receive an acknowledgment from Pfeiffer Vacuum.

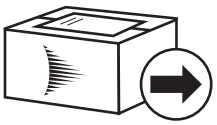
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination costs** may be incurred.



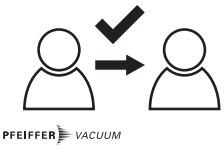
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product in suitable, stable transport containers only.
e) Maintain applicable transport conditions.



6. Attach the contamination declaration to the **outside** of the packaging.



7. Now send your product to your local Service Center.



8. You will receive an acknowledgment/quotation, from Pfeiffer Vacuum.

Our sales and delivery conditions and repair and maintenance conditions for vacuum devices and components apply to all service orders.

12 Accessories and spare parts

Spare parts	Part number
DN 16	2000209690
DN 25	2000209691
DN 40	2000209692
DN 50	2000209693

Tbl. 8: O-ring kits

Accessories	Accessories number
Straight connector	2000209790
Right angle connector	2000209791

Tbl. 9: Accessories for pneumatic angle valve

13 Technical data and dimensions

13.1 General

	mbar	bar	Pa	hPa	kPa	Torr | mm Hg
mbar	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
bar	1000	1	$1 \cdot 10^{5}$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	1	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75

	mbar	bar	Pa	hPa	kPa	Torr | mm Hg
kPa	10	0.01	1000	10	1	7.5
Torr | mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	1
1 Pa = 1 N/m^2						

Tbl. 10: Conversion table: Pressure units

	mbar l/s	Pa m^3/s	sccm	Torr l/s	atm cm^3/s
mbar l/s	1	0.1	59.2	0.75	0.987
Pa m^3/s	10	1	592	7.5	9.87
sccm	$1.69 \cdot 10^{-2}$	$1.69 \cdot 10^{-3}$	1	$1.27 \cdot 10^{-2}$	$1.67 \cdot 10^{-2}$
Torr l/s	1.33	0.133	78.9	1	1.32
atm cm^3/s	1.01	0.101	59.8	0.76	1

Tbl. 11: Conversion table: Units for gas throughput

13.2 Technical data

Part number	PAV-A02100	PAV-A03100	PAV-A04100	PAV-A05100
Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
Actuator	Pneumatic	Pneumatic	Pneumatic	Pneumatic
Closing/opening time	90 ms/50 ms	160 ms/60 ms	420 ms/270 ms	720 ms/390 ms
Tightness	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Differential pressure in opening direction	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Differential pressure in closing direction	2000 hPa	2000 hPa	2000 hPa	2000 hPa
Bakeout temperature: housing	200 °C	200 °C	200 °C	200 °C
Temperature range	0 – 200 °C	0 – 200 °C	0 – 200 °C	0 – 200 °C
Service life	3000000 cycles	3000000 cycles	3000000 cycles	3000000 cycles
Housing	Aluminum	Aluminum	Aluminum	Aluminum
Valve plate	Stainless steel (AISI 316)	Stainless steel (AISI 316)	Stainless steel (AISI 316)	Stainless steel (AISI 316)
Seal	FKM	FKM	FKM	FKM
Weight	0.4 kg	0.5 kg	1.2 kg	1.6 kg

Tbl. 12: Technical data for pneumatic angle valves

Part number	PAV-A02132	PAV-A03132	PAV-A04132	PAV-A05132
Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
Actuator	Electro-pneumatic	Electro-pneumatic	Electro-pneumatic	Electro-pneumatic
Input voltage(s)	24 V DC	24 V DC	24 V DC	24 V DC
Closing/opening time	100 ms/50 ms	165 ms/60 ms	350 ms/215 ms	565 ms/330 ms
Tightness	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s	$1 \cdot 10^{-9}$ mbar l/s
Differential pressure in opening direction	1000 hPa	1000 hPa	1000 hPa	1000 hPa
Differential pressure in closing direction	2000 hPa	2000 hPa	2000 hPa	2000 hPa
Bakeout temperature: housing	200 °C	200 °C	200 °C	200 °C
Temperature range	0 – 200 °C	0 – 200 °C	0 – 200 °C	0 – 200 °C
Service life	3000000 cycles	3000000 cycles	3000000 cycles	3000000 cycles

Part number	PAV-A02132	PAV-A03132	PAV-A04132	PAV-A05132
Housing	Aluminum	Aluminum	Aluminum	Aluminum
Valve plate	Stainless steel (AISI 316)	Stainless steel (AISI 316)	Stainless steel (AISI 316)	Stainless steel (AISI 316)
Seal	FKM	FKM	FKM	FKM
Weight	0.8 kg	0.5 kg	1.2 kg	1.6 kg
Position indicator: Load capacity	≤ 48 V AC / DC / 500 mA	≤ 48 V AC / DC / 500 mA	≤ 48 V AC / DC / 500 mA	≤ 48 V AC / DC / 500 mA
Bakeout temperature: actuator, pilot valve	100 °C	100 °C	100 °C	100 °C
Power control valve	0.6 W	0.6 W	0.6 W	0.6 W

Tbl. 13: Technical data for electropneumatic angle valves

13.3 Dimensions

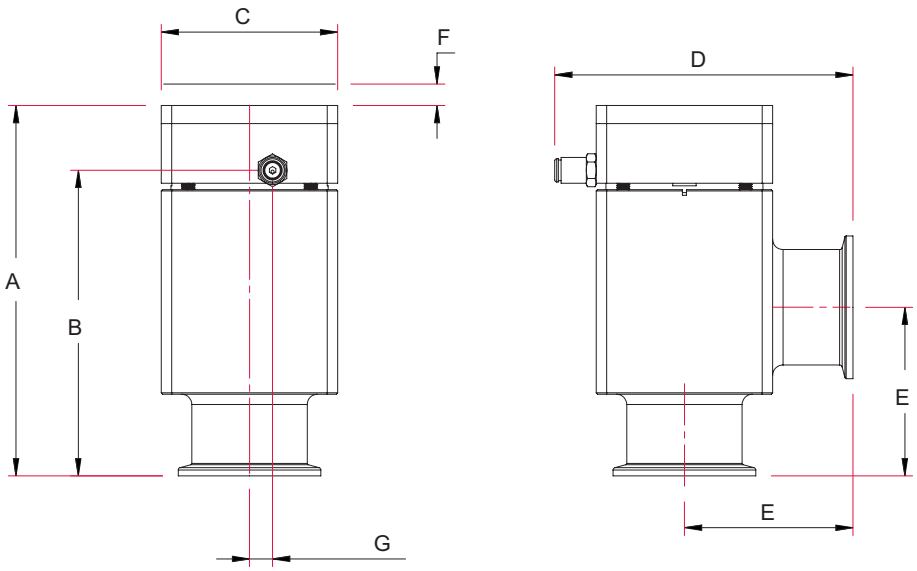


Fig. 9: Dimensions for pneumatic angle valves

Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
A	97 mm	102 mm	143 mm	153 mm
B	76 mm	81 mm	118 mm	124 mm
C	45 mm	54 mm	68 mm	78 mm
D	78 mm	93 mm	115 mm	127 mm
E	40 mm	50 mm	65 mm	72 mm
F	7 mm	8 mm	9 mm	17 mm

Tbl. 14: Dimensions for pneumatic angle valves

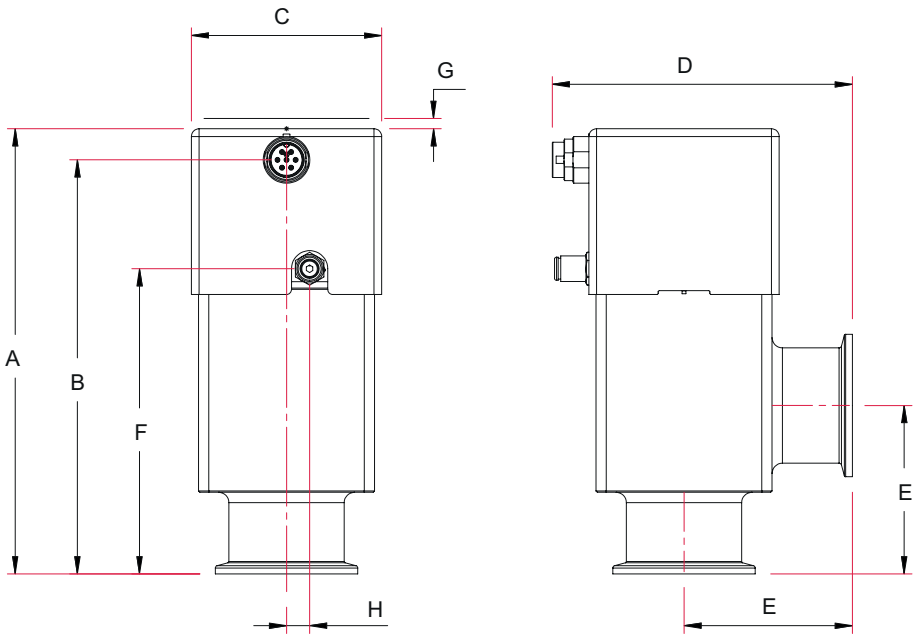


Fig. 10: Dimensions for electropneumatic angle valves

Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
A	124 mm	127 mm	172 mm	186 mm
B	110 mm	113 mm	160 mm	173 mm
C	50 mm	59 mm	73 mm	83 mm
D	79 mm	93 mm	116 mm	128 mm
E	40 mm	50 mm	65 mm	72 mm
F	7 mm	8 mm	9 mm	17 mm
G	76 mm	81 mm	118 mm	124 mm
H	128 mm	131 mm	176 mm	190 mm

Tbl. 15: Dimensions for electropneumatic angle valves

VACUUM SOLUTIONS FROM A SINGLE SOURCE

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.

COMPLETE RANGE OF PRODUCTS

From a single component to complex systems:
We are the only supplier of vacuum technology that provides a complete product portfolio.

COMPETENCE IN THEORY AND PRACTICE

Benefit from our know-how and our portfolio of training opportunities!
We support you with your plant layout and provide first-class on-site service worldwide.

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