OPERATING INSTRUCTIONS

EN

Original

SERIES E ANGLE VALVE

Electric 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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We reserve the right to make changes to the technical data and information in this document.

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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.

1.1.1 Applicable documents

Document	Reference
Declaration of conformity	included with these operating instructions

1.1.2 Products concerned

This document applies to products with the following part numbers:

Part number	Description
EAV-XXXXXX	Models for Series E 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
DC	Direct current
Delta P	Delta pressure
DN	Nominal diameter as size description
FKM	Fluoroelastomers
ISO	Flange: Connection in accordance with ISO 1609 and ISO 2861
LED	Light-emitting diode

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. Recommended installation orientation is the valve seat towards the vacuum chamber.
Allowable ambient humidity	0 - 95 % non-condensing
Ambient temperature	0 - 50 °C
Heating capabilities	Body can be heated up to 150 °C Actuator can be heated up to 60 °C
Maximum internal pressure	2000 hPa
Maximum Delta P before opening	1300 hPa in open direction
Open/close speed	DN16: <150 ms (open)/<120 ms (close) DN25: <210 ms (open)/<160 ms (close) DN40: <460 ms (open)/<290 ms (close) DN50: <680 ms (open)/<570 ms (close)
Voltage	24 V DC ± 2 V DC
Reliability, MTTF	1 million cycles in clean environment
Leak rate	1 x 10^{-9} hPa l/s

Parameter	Limit value
Installation altitude	max. 5000m
Degree of pollution	2

Tbl. 3: Limits of use for Series E electric angle valve

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

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

Overview

Supply voltage:
The valve supply voltage is 24V DC.
Opening action:
When the control voltage is supplied, the electric actuator opens the angle valve. The open LED lights up white to indicate the valve is open.
Closing action:
When the control voltage is removed, the electric actuator closes the angle valve. The closed LED lights up white to indicate the valve is closed.
Position upon loss of control voltage (power loss):
Valve returns to the default position (open or close)
Power loss occurs:
Power LED blinks blue to indicate a power supply issue

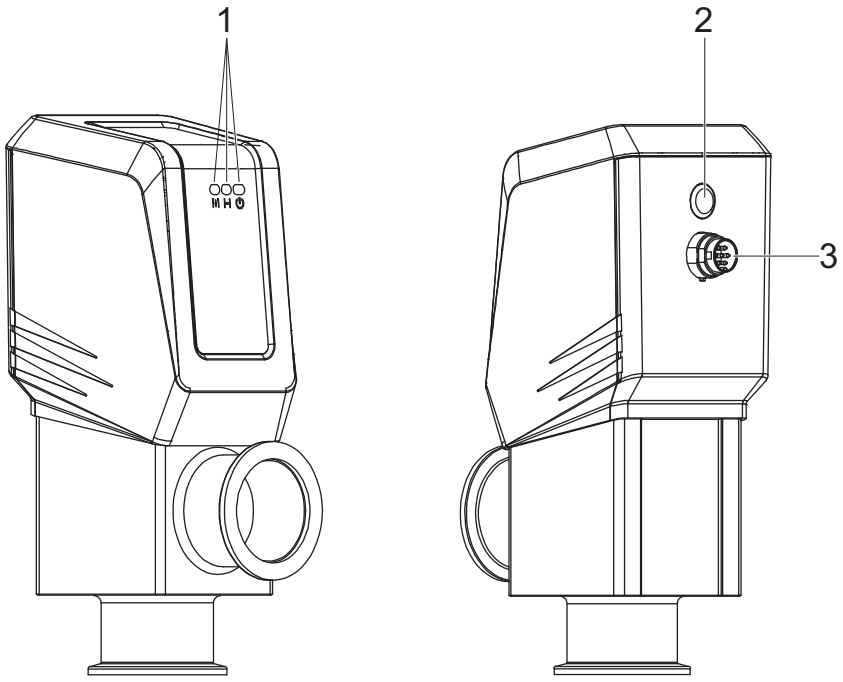


Fig. 1: Series E electric angle valve

1 LED indicators (open/close/power)
2 Button for manual actuation
3 24V DC connector

3.2 Scope of delivery

- Series E electric 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 electric angle valves from the Series E is composed of the family name, the size and, if required, an additional feature description.

Family	Size/model
Series E	DN 16 to 50 Electric valve with position indicator

Tbl. 4: Product designation of electric angle valve with position indication

3.3.2 Product features

Feature	Description
Valve body material	Aluminum 6061-T6 or stainless steel
Bellows/valve plate	Stainless steel 316L
Seals	FKM elastomer
Actuation	Electric, 24 V DC ± 2 V DC

Tbl. 5: Series E electric angle valve features

Energy consumption	DN16/DN25	DN40/DN50
Voltage, V	24	24
Current (nominal), mA	50.1	57.1
Power (nominal), W	1.3	1.5
Current, open/close (Peak), A	1.1	1.5
Energy, open/close, Ws	4	19

Tbl. 6: Series E electric angle valve energy consumption

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 Series E electric 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 Vacuum connection

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

Required tools and materials

- Seal with centering ring
- Clamp
- 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.

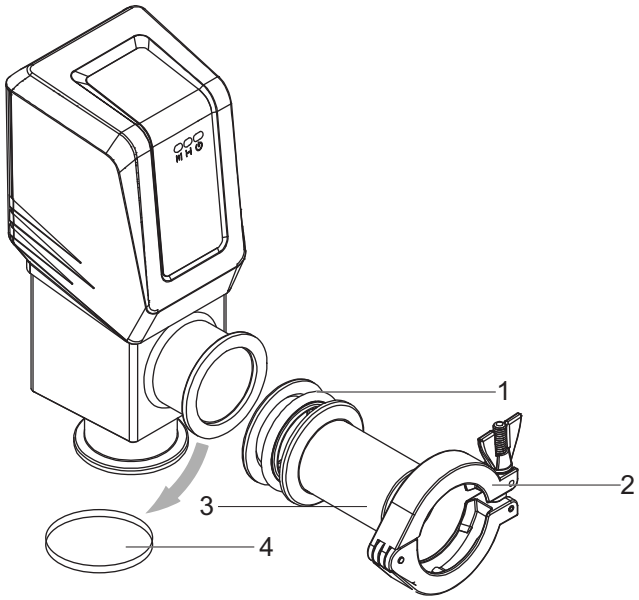


Fig. 2: Vacuum connection

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

Mounting the valve

1. Remove protective lid from the valve.
2. Connect the valve to the vacuum system using the clamp.

5.3 Power supply 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
- The external power input to the unit should be externally fused at 3A

Required tools and materials

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

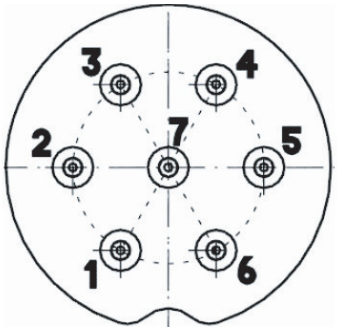


Fig. 3: Connector pin usage

Pin	Label	Description
1	Power	24 V DC power input
2	Control	Valve control input (5 – 24 V DC)
3		Not used
4	NO	Valve Open signal (max. 48 V AC/DC, 500 mA)
5	Common	Common for pins 4 and 6
6	NC	Valve Closed signal (max. 48 V AC/DC, 500 mA)
7	Ground	Return path of pin 1 (power)

Tbl. 7: Connector pin definition

Connecting power supply

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.

LED	Indication
White	Open/Closed
Blue	Power indicator
Blue on, white off	Error condition
Button ring blue	Local manual mode operation

Tbl. 8: LED indicators

Starting local mode

The local mode button places the valve in manual operation mode. In this mode you can control the valve operation by the button.

1. Press and hold the local mode button for 3 seconds to start local mode.
   – The button's LED illuminates, indicating the unit is in local mode.
2. Release the button.

Transitioning valve states

► When in local mode, press and hold the local mode button for 1 second to transition states.
   – Possible transition states: open to closed, closed to open

Exiting local mode

► Press and hold the local mode button for 3 seconds to exit local mode.

7 Maintenance

The valve does not require any maintenance on the customer’s premises other than the day-to-day servicing described in this manual. Any other maintenance operation must be carried out by Pfeiffer Vacuum service center.

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.

9.1 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

Please contact your Pfeiffer Vacuum Service team for support, if you experience valve malfunctions that are not listed below.

Problem	Remedy
Blue power light is blinking	● Check if power supply is within operational limits.
Error state: power cycle	● Check if valve is prevented from closing.
Valve is not moving when tool sends signal to the valve	● Check the button for manual actuation is not in local mode.

Tbl. 9: Troubleshooting

11 Service solutions by Pfeiffer Vacuum

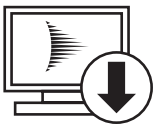
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

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.

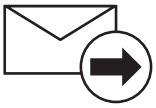
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



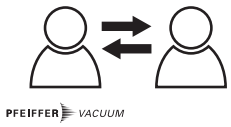
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

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.

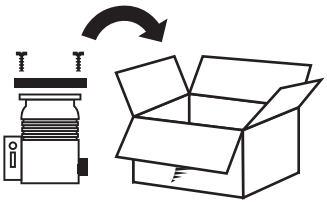


3. Send the forms by email, fax, or post to your local Service Center.

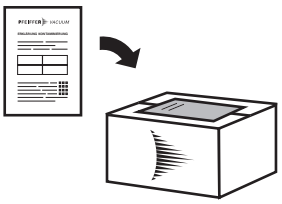


4. You will receive an acknowledgment from Pfeiffer Vacuum.

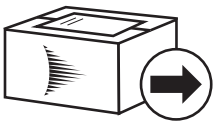
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



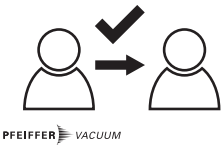
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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

12.1 Ordering accessories

Accessories	Accessories number
Straight connector	2000209790
Right angle connector	2000209791

Tbl. 10: Accessories for Series E

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
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. 11: 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. 12: Conversion table: Units for gas throughput

13.2 Technical data

Part number	EAV-A02150	EAV-A03150	EAV-A04150	EAV-A05150
Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
Actuator	Electric	Electric	Electric	Electric
Input voltage(s)	24 V DC	24 V DC	24 V DC	24 V DC
Closing/opening time	120 ms/150 ms	160 ms/210 ms	290 ms/460 ms	570 ms/680 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: actuator	50 °C	50 °C	50 °C	50 °C
Bakeout temperature: housing	150 °C	150 °C	150 °C	150 °C
Temperature range	0 – 150 °C	0 – 150 °C	0 – 150 °C	0 – 150 °C
Service life	1000000 cycles	1000000 cycles	1000000 cycles	1000000 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	0.8 kg	0.8 kg	1.5 kg	2 kg

Tbl. 13: Technical data for Series E electric angle valves

13.3 Dimensions

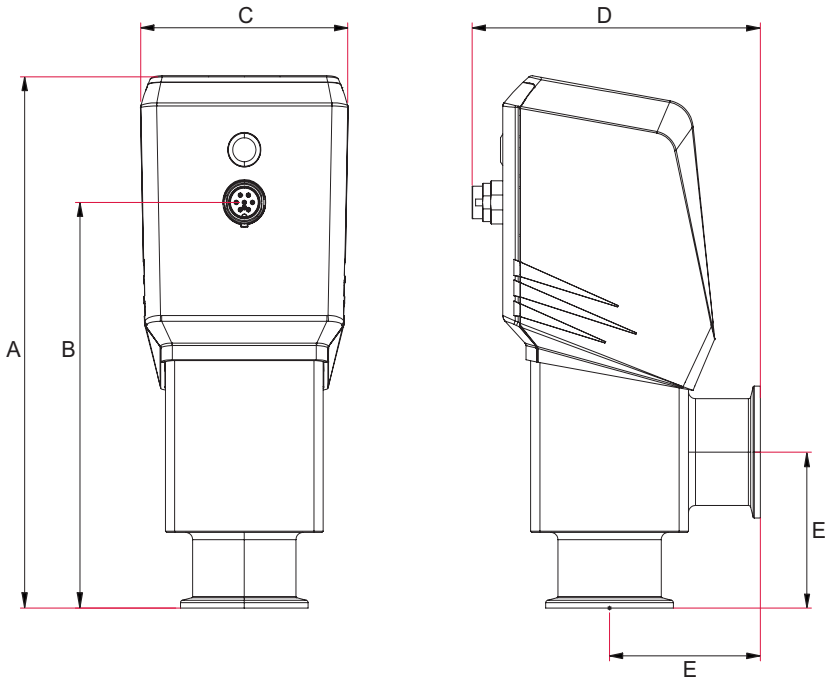


Fig. 4: Dimensions of Series E electric angle valves

Connection flange	DN 16 ISO-KF	DN 25 ISO-KF	DN 40 ISO-KF	DN 50 ISO-KF
A	175 mm	180 mm	221 mm	230 mm
B	128 mm	134 mm	169 mm	178 mm
C	73 mm	73 mm	89 mm	99 mm
D	97 mm	109 mm	124 mm	132 mm
E	38 mm	50 mm	65 mm	72 mm

Tbl. 14: Dimensions table for Series E electric angle valves

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