



OPERATING INSTRUCTIONS

EN

Translation of the Original

DUOVANE 6 | 12 | 18 | 22

Rotary vane pump

PFEIFFER  **VACUUM**

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new rotary vane pump is designed to support you by its performance, its perfect operation and without interfering your individual application. 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.

1.1.1 Applicable documents

| Designation | Document |
|---------------------------|---------------------------------------------|
| Declaration of conformity | A component of these operating instructions |

1.1.2 Variants

These instructions apply to DuoVane series vacuum pumps:

| Pump type | Pump version |
|------------|--------------------------------------------------------------------------------------------|
| DuoVane 6 | <ul style="list-style-type: none"> Rotary vane pump for non-corrosive media |
| DuoVane 12 | <ul style="list-style-type: none"> Rotary vane pump for non-corrosive media |
| DuoVane 18 | <ul style="list-style-type: none"> Rotary vane pump for non-corrosive media |
| DuoVane 22 | <ul style="list-style-type: none"> Rotary vane pump for non-corrosive media |

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 Labels on product

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

| | |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>Rating plate (example) The rating plate is located on the front side of the pump housing.</p> <p>Motor rating plate (not shown) The motor rating plate is located below the mains connection.</p> |
| | <p>Warning hot surface This label warns of injuries caused by high temperatures as a result of contact without protection during operation.</p> |
| | <p>Sticker for preset input voltage Preset input voltage (115 V or 230 V) of single phase motor with voltage selection</p> |
| | <p>Operating instructions note This sticker indicates that this operating instructions must be read before performing any tasks.</p> |

Tbl. 1: Labels on product

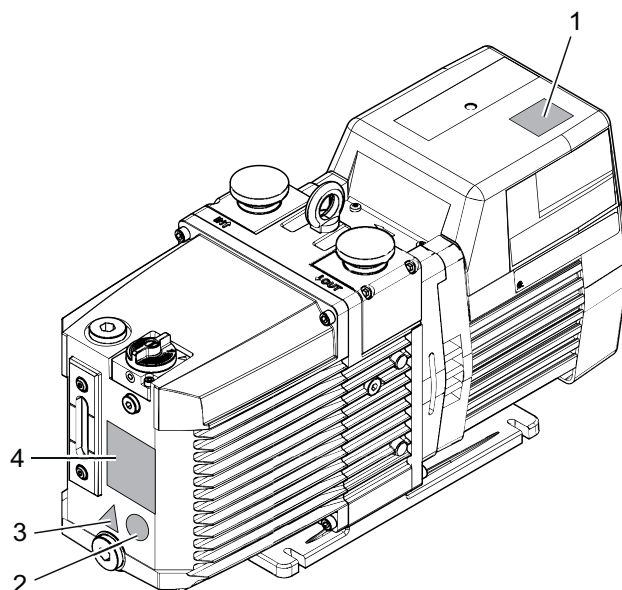


Fig. 1: Position of the labels on the product

- | | |
|-----------------------------------------|------------------------|
| 1 Sticker for preset input voltage | 3 Warning: Hot surface |
| 2 Note: Read the operating instructions | 4 Rating plate |

1.3.4 Abbreviations

| Abbreviation | Explanation |
|--------------|-------------------------------------------------------------|
| BA | Operating instructions |
| DN | Nominal diameter (diamètre nominal) |
| FKM | Fluorinated rubber |
| GBV | Gas ballast valve |
| HV | High voltage |
| I_N | Rated current |
| I_{max} | Maximum current |
| ISO | Flange: Connection in accordance with ISO 1609 and ISO 2861 |
| MCB | Miniature circuit breaker |
| N.C. | Normally closed contact |
| PE | Protective earth (earthed conductor) |
| ODK | Operating fluid return line (oil drain kit) |
| OME | Oil mist filter (oil mist eliminator) |
| RCCB | Residual current operated circuit breaker |
| RSSR | Radial shaft seal ring |
| WAF | Width Across Flats |
| MM | Maintenance manual |

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 |
| <p>Immediately pending danger</p> <p>Indicates an immediately pending danger that will result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation |

| |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ⚠ WARNING |
| <p>Potential pending danger</p> <p>Indicates a pending danger that could result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation |

| |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ⚠ CAUTION |
| <p>Potential pending danger</p> <p>Indicates a pending danger that could result in minor injuries if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation |

| |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NOTICE |
| <p>Danger of damage to property</p> <p>Is used to highlight actions that are not associated with personal injury.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid damage to property |

| | |
|----------|---------------------------------------------------------------------------------------------------------|
| i | <p>Notes, tips or examples indicate important information about the product or about this document.</p> |
|----------|---------------------------------------------------------------------------------------------------------|

2.2 Safety instructions

All safety instructions in this document are based on the results of the risk assessment carried out in accordance with Machinery Directive 2006/42/EC Annex I and EN ISO 12100 Section 5. Where applicable, all life cycle phases of the product were taken into account.

Risks during transport

| |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ⚠ WARNING |
| <p>Risk of serious injury from swinging, toppling or falling objects</p> <p>During transport, there is a risk of crushing and impact on swinging, toppling or falling objects. There is a risk of injuries to limbs, up to and including bone fractures and head injuries.</p> <ul style="list-style-type: none"> ▶ Secure the danger zone if necessary. ▶ Pay attention to the center of gravity of the load during transport. ▶ Ensure even movements and moderate speeds. ▶ Observe safe handling of the transport devices. ▶ Avoid sloping attachment aids. ▶ Never stack products. ▶ Wear protective equipment, e.g. safety shoes. |

Risks during installation

⚠ DANGER**Danger to life from electric shock**

Touching exposed and voltage-bearing elements causes an electric shock. Improper connection of the mains supply leads to the risk of touchable live housing parts. There is a risk to life.

- ▶ Before the installation, check that the connection leads are voltage-free.
- ▶ Make sure that electrical installations are only carried out by qualified electricians.
- ▶ Provide adequate grounding for the device.
- ▶ After connection work, carry out an earthed conductor check.

⚠ WARNING**Danger of poisoning from toxic vapors**

Igniting and heating synthetic operating fluid generates toxic vapors. Danger of poisoning if inhaled.

- ▶ Observe the application instructions and precautions.
- ▶ Do not allow tobacco products to come into contact with the operating fluid.

⚠ CAUTION**Risk of injury from entrapment of body parts**

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

⚠ CAUTION**Danger of injury from bursting as a result of high pressure in the exhaust line**

Faulty or inadequate exhaust pipes lead to dangerous situations, e.g. increased exhaust pressure. There is a danger of bursting. Injuries caused by flying fragments, the escaping of high pressure, and damage to the unit cannot be excluded.

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.

⚠ CAUTION**Danger of burns on hot surfaces**

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C. If access to the vacuum pump is unrestricted, there is a danger of burns due to contact with hot surfaces.

- ▶ Install suitable touch protection if the vacuum pump is unrestrictedly accessible.
- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Contact Pfeiffer Vacuum for suitable touch protection in system solutions.

Risks during operation

⚠ WARNING**Danger of poisoning due to toxic process media escaping from the exhaust pipe**

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ▶ Observe the pertinent regulations for handling toxic process media.
- ▶ Safely purge toxic process media via an exhaust line.
- ▶ Use appropriate filter equipment to separate toxic process media.

⚠ CAUTION

Risk of injury from entrapment of body parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

⚠ CAUTION

Danger of injury if hair or loose clothing is pulled in

There is a danger of injury from getting pulled in at rotating parts of the fan.

- ▶ Do not wear loose-fitting jewelry, or hide it under clothing.
- ▶ Wear close-fitting clothing.
- ▶ Use a hair net if necessary.

⚠ CAUTION

Danger of injury from bursting as a result of high pressure in the exhaust line

Faulty or inadequate exhaust pipes lead to dangerous situations, e.g. increased exhaust pressure. There is a danger of bursting. Injuries caused by flying fragments, the escaping of high pressure, and damage to the unit cannot be excluded.

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.

⚠ CAUTION

Danger of burns on hot surfaces

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C. If access to the vacuum pump is unrestricted, there is a danger of burns due to contact with hot surfaces.

- ▶ Install suitable touch protection if the vacuum pump is unrestrictedly accessible.
- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Contact Pfeiffer Vacuum for suitable touch protection in system solutions.

⚠ CAUTION

Scalding from hot operating fluid

Danger of burns when draining operating fluid if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.

Risks during maintenance, decommissioning and malfunctions

⚠ 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.

⚠ WARNING**Danger of poisoning from toxic vapors**

Igniting and heating synthetic operating fluid generates toxic vapors. Danger of poisoning if inhaled.

- ▶ Observe the application instructions and precautions.
- ▶ Do not allow tobacco products to come into contact with the operating fluid.

⚠ WARNING**Health hazard and risk of environmental damage from toxic contaminated operating fluid**

Toxic process media can cause operating fluid contamination. When changing the operating fluid, there is a health hazard due to contact with poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Wear suitable personal protective equipment when handling these media.
- ▶ Dispose of the operating fluid according to locally applicable regulations.

⚠ WARNING**Danger to life from electric shock in the event of a fault**

In the event of a fault, devices connected to the mains may be live. There is a danger to life from electric shock when making contact with live components.

- ▶ Always keep the mains connection freely accessible so you can disconnect it at any time.

⚠ CAUTION**Scalding from hot operating fluid**

Danger of burns when draining operating fluid if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.

⚠ CAUTION**Risk of injury from entrapment of body parts**

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

⚠ CAUTION**Danger of injury if hair or loose clothing is pulled in**

There is a danger of injury from getting pulled in at rotating parts of the fan.

- ▶ Do not wear loose-fitting jewelry, or hide it under clothing.
- ▶ Wear close-fitting clothing.
- ▶ Use a hair net if necessary.

⚠ CAUTION**Danger of burns on hot surfaces**

In the event of a fault, the surface temperature of the vacuum pump can increase to above 105 °C.

- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Wear personal protective equipment if necessary.

⚠ CAUTION

Danger of injury from moving parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. There is a risk of injury to fingers and hands if they enter the operating range of rotating parts.

- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against reactivation.
- ▶ Dismantle the vacuum pump for inspection, away from the system if necessary.

Risks during 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

i

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.

i

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.
- ▶ Do not expose body parts to the vacuum.
- ▶ Always ensure a secure connection to the earthed conductor (PE).
- ▶ Never disconnect plug connections during operation.
- ▶ Observe the above shutdown procedures.
- ▶ Keep lines and cables away from hot surfaces (> 70 °C).
- ▶ Never fill or operate the unit with cleaning agents or cleaning agent residues.
- ▶ Do not carry out your own conversions or modifications on the unit.
- ▶ Observe the unit protection class prior to installation or operation in other environments.
- ▶ Provide suitable touch protection, if the surface temperature exceeds 70 °C.

2.4 Limits of use of product

| | |
|----------------------------------------------|-------------------------------------------|
| Installation location | Weatherproof (internal space) |
| Installation altitude | max. 2000 m above sea level ¹⁾ |
| Protection class (according to IEC 61010) | I |
| Degree of pollution (according to IEC 61010) | 2 |

| | |
|----------------------------------------|--------------------------------------------------------------------------------|
| Overvoltage category | II |
| Protection class | IP40 (single phase motor) IP43 (three phase motor) |
| Housing type (according to UL 50E) | Type 1 |
| Permissible angle of inclination | $\pm 1^\circ$ in longitudinal direction, $\pm 2^\circ$ in transverse direction |
| Ambient temperature | +12 °C to +40 °C |
| Relative air humidity | max. 85% |
| Pumped medium intake temperature, max. | +40 °C |
| Exhaust pressure of the vacuum pump | \geq atmospheric pressure \leq 1500 hPa absolute |
| Exhaust pressure at OME | max. atmospheric pressure |
| Constant intake pressure, max. | 50 hPa absolute |

Tbl. 3: Limits of use of product

2.5 Proper use

- ▶ Use the vacuum pump for vacuum generation only.
- ▶ When pumping media with an oxygen concentration level of $\geq 21\%$, only use perfluorinated, synthetic oils (F4, F5, A113) as operating fluid.
- ▶ Adhere to the installation, commissioning, operating, and maintenance instructions.
- ▶ Do not use any accessory parts other than those recommended by Pfeiffer Vacuum.

2.6 Foreseeable improper use

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 improper use; in particular:

- Pumping of corrosive media (exception: C version of the rotary vane pumps)
- Pumping radioactive media
- Pumping of gases that introduce an ignition source to the suction chamber
- Pumping of gases that contain contamination such as particles, dust, or condensate
- Pumping explosive media
- Pumping of media with a propensity to sublimation
- Pumping of fluids
- Using the vacuum pump in potentially explosive atmospheres
- Using the vacuum pump outside the specified area of application
- Using for pressure generation
- Use in strong electrical, magnetic, or electromagnetic fields
- Connecting to vacuum pumps and units that are not designed for this purpose according to their operating instructions
- Connecting to units with exposed live parts
- Use of accessories or spare parts not listed in these instructions
- Use of operating fluids other than those specified by Pfeiffer Vacuum
- Utilize mineral oil as operating fluid with an oxygen concentration level of $> 21\%$

Mineral oils are combustible and ignite at high temperatures and when they come into contact with pure oxygen. These oils oxidize heavily and thus lose their lubricating capacity.

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.

- 1) When installing at altitudes > 1000 m above sea level, reduce the power of the motor or limit the ambient temperature, as the vacuum pump will heat up more.

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

DuoVane series rotary vane pumps are two-stage, oil-sealed rotary displacement pumps for use in a low and medium vacuum. The rotary vane pump is available in the standard version with claw coupling and asynchronous motor.

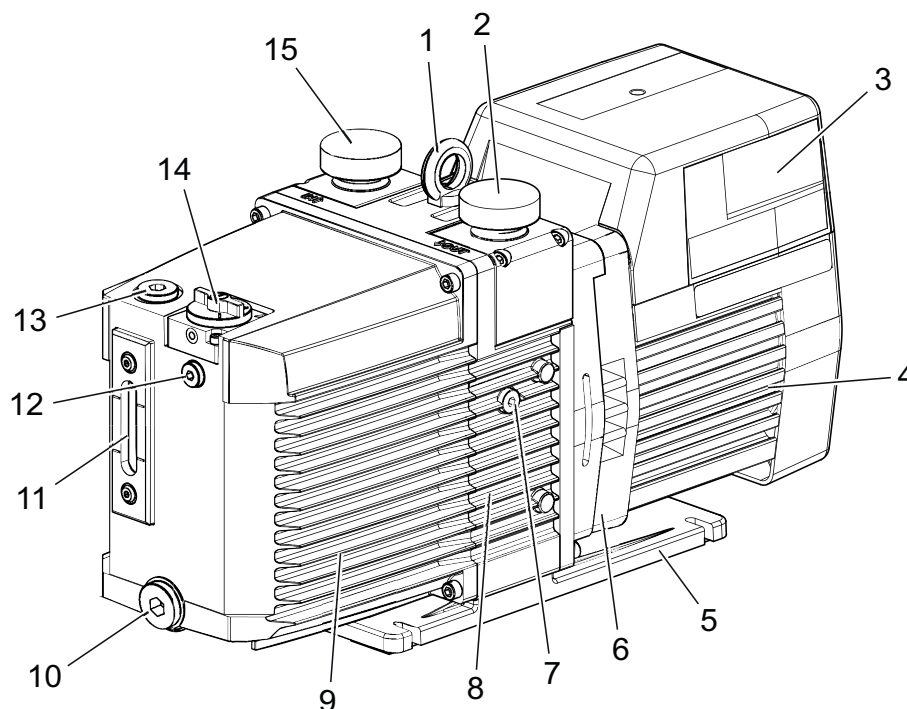


Fig. 2: Structure of the rotary vane pump

| | |
|--------------------------------------|-----------------------------------------------------------------|
| 1 Lifting eye | 9 Cap |
| 2 Exhaust flange with protective cap | 10 Drain screw |
| 3 Electrical connection | 11 Sight glass |
| 4 Motor | 12 Locking screw for optional operating fluid return line (ODK) |
| 5 Base plate | 13 Filler screw |
| 6 Motor flange | 14 Gas ballast valve |
| 7 Locking screw | 15 Vacuum flange with protective cap |
| 8 Stand | |

3.1.1 Actuator

The rotary vane pump has a three phase or single phase motor rated at 50 Hz or 60 Hz.

Motor types

- Three phase motor (without switch and mains cable) with
 - built-in thermic winding protection
- Single-phase motor with reversible voltage range,
 - thermal protection switch,
 - mains switch and
 - Rubber connector

3.1.2 Gas ballast

An integrated gas ballast system serves the controlled supply of ambient air or inert gas into the suction chamber. Gas ballast supports the reduction of condensate accumulating in the pumping system.

3.1.3 Vacuum safety valve

The rotary vane pumps are equipped with a vacuum safety valve. This separates the rotary vane pump from the vacuum chamber in the event of intentional or unintentional standstill, and vents the pumping

system with the displaced gas so that oil does not rise into the vacuum chamber. After switching on, the valve opens after a delay.

3.1.4 Operating fluid, oil

The pump oil, also known as operating fluid, fulfills various tasks in a rotary vane pump:

- lubrication of all moving parts
- filling part of the dead volume under the exhaust valve
- sealing the gap between the intake and exhaust channel, and between the vanes and the working chamber
- ensuring an optimal temperature balance through heat transfer

3.2 Operating principle

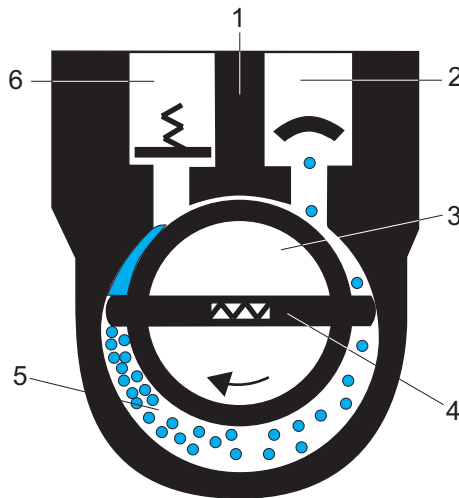


Fig. 3: Rotary vane vacuum pump functional principle

- | | |
|-------------------------|--------------------|
| 1 Housing | 4 Vane |
| 2 Vacuum flange (inlet) | 5 Suction chamber |
| 3 Rotor | 6 Exhaust (outlet) |

The rotary vane pump is an oil-sealed rotary displacement pump. The pumping system comprises the housing, the eccentrically mounted rotor, and the centrifugal and spring-loaded radially sliding vanes, which divide the suction chamber into multiple chambers. The volume of each chamber changes periodically as the rotor rotates. This causes the gas to be drawn in at the vacuum flange, and compressed in the suction chamber by the rotation of the rotor until the exhaust valve opens against the atmospheric pressure at the outlet and expels the gas. The exhaust valve is oil-sealed. When the valve opens, a small quantity of oil penetrates into the suction chamber. In addition to lubrication, this also causes the gaps between the rotor, stator, and vanes to seal.

3.3 Product features

| Pump type | Pumping speed | Characteristics |
|------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DuoVane 6 | 5.5 m ³ /h(50 Hz) 6.5 m ³ /h(60 Hz) | <ul style="list-style-type: none"> • Two-stage rotary vane pump • Asynchronous motor and claw coupling • Gas ballast valve • Intake side vacuum safety valve |
| DuoVane 12 | 9.5 m ³ /h(50 Hz) 11.8 m ³ /h(60 Hz) | |
| DuoVane 18 | 14 m ³ /h(50 Hz) 16.9 m ³ /h(60 Hz) | |
| DuoVane 22 | 19 m ³ /h(50 Hz) 22.5 m ³ /h(60 Hz) | |

Tbl. 4: Features of rotary vane pumps

3.4 Identifying the product

- ▶ To ensure clear identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the rating plate to hand.
- ▶ Observe the motor-specific data on the motor rating plate attached separately.

3.5 Scope of delivery

- Rotary vane vacuum pump with motor
- Operating fluid (other than F4, F5 and A113)
- Locking caps for both connection flanges
- Operating instructions

4 Transportation and Storage

4.1 Transporting vacuum pump

⚠ WARNING

Risk of serious injury from swinging, toppling or falling objects

During transport, there is a risk of crushing and impact on swinging, toppling or falling objects. There is a risk of injuries to limbs, up to and including bone fractures and head injuries.

- ▶ Secure the danger zone if necessary.
- ▶ Pay attention to the center of gravity of the load during transport.
- ▶ Ensure even movements and moderate speeds.
- ▶ Observe safe handling of the transport devices.
- ▶ Avoid sloping attachment aids.
- ▶ Never stack products.
- ▶ Wear protective equipment, e.g. safety shoes.



Preparations for transport

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

Safe transport of the product

1. Observe the weight specified on the packaging.
2. Use a transport aid if necessary (trolley, lift truck).
3. Transport the product in its original packaging.
4. Always place the product on an adequately sized, level surface.
5. Fully drain the operating fluid.

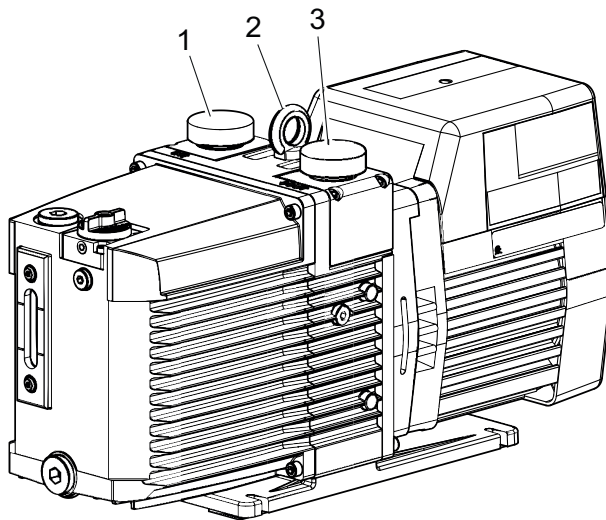


Fig. 4: Transporting vacuum pump

- | | |
|----------------------------|-----------------------------|
| 1 Vacuum flange safety cap | 3 Exhaust flange safety cap |
| 2 Lifting eye | |

Transporting the vacuum pump without its packaging

1. Unpack the vacuum pump.
2. To protect the inside of the pump, leave both protective caps on the connection flanges during transport.
3. For lifting, use the crane lug provided for this purpose, located on the top of the pump.
4. Lift the vacuum pump out of the transport packaging.
5. Always place the vacuum pump on an adequately sized, level surface.

4.2 Storing vacuum pump

**Storage**

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

Safe storing vacuum pump

1. Fill the vacuum pump with operating fluid up to the upper edge of the sight glass.
2. Close both connection flanges and all openings on the vacuum pump.
3. Make sure that the gas ballast valve is closed.
4. Store the vacuum pump only in dry, dust-free rooms, within the specified ambient conditions.
5. In rooms with humid or aggressive atmospheres: Hermetically seal the vacuum pump together with a drying agent in a plastic bag.
6. Change the operating fluid if the storage period is longer than 2 years.

5 Installation

5.1 Setting up vacuum pump

⚠ CAUTION

Danger of burns on hot surfaces

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C. If access to the vacuum pump is unrestricted, there is a danger of burns due to contact with hot surfaces.

- ▶ Install suitable touch protection if the vacuum pump is unrestrictedly accessible.
- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Contact Pfeiffer Vacuum for suitable touch protection in system solutions.

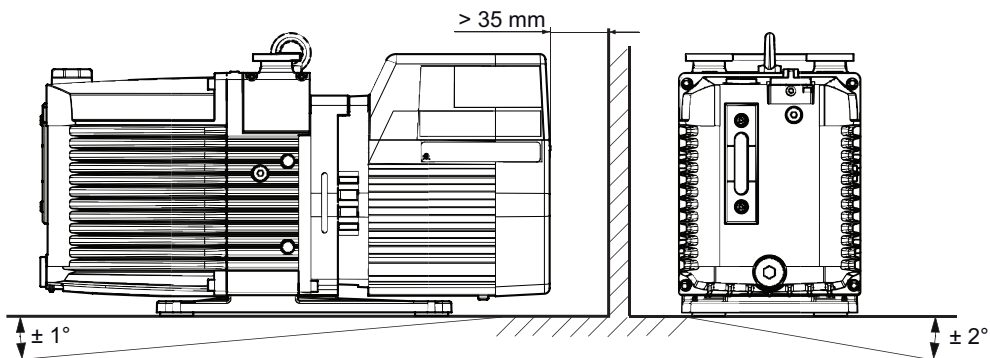


Fig. 5: Minimum distances and permissible inclinations

Procedure

- When selecting the installation location, observe the requirement for touch protection to prevent burns.
 - Closed housing: no touch protection required
 - Access for trained individuals only: no touch protection required
 - Unrestricted access for untrained individuals: Touch protection required
 - Pfeiffer Vacuum supports you in implementing the touch protection.
1. Place the vacuum pump on a flat, horizontal surface, to safeguard the operating fluid supply.
 2. Screw the base plate of the vacuum pump to the mounting surface if necessary.
 3. Observe the max. permissible angles of inclination.
 4. When installing the pump in a closed housing, ensure adequate air circulation.
 5. Keep the sight glass and gas ballast valve visible and freely accessible.
 6. Keep the voltage and frequency specifications on the motor rating plate visible and freely accessible.
 7. Fill with operating fluid prior to first commissioning.
 - Quantity and type of the operating fluid can be found on the rating plate.

5.2 Changing flange positions

Depending on the application and accessories, you can change the position of the vacuum flange and the exhaust flange independently of one another. Pfeiffer Vacuum supplies the vacuum pump with flanges positioned vertically.

Required consumables

- Paper towels
- Isopropanol, as required

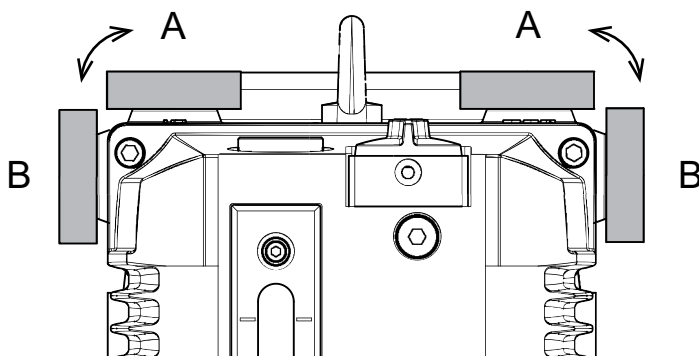


Fig. 6: Possible flange positions

A Vertical position B Horizontal position

Required tools

- Allen key, **WAF 5**
- Calibrated torque wrench (tightening factor ≤ 2.5)

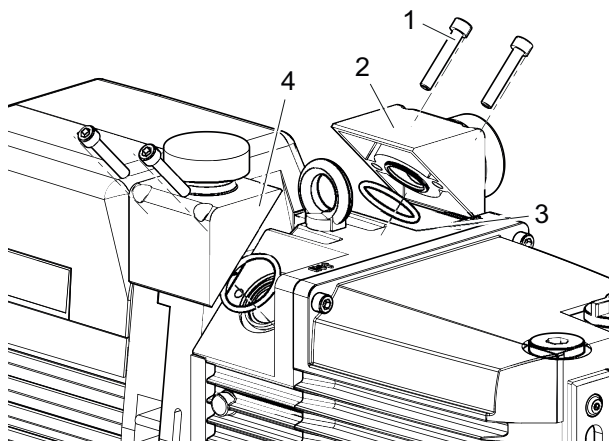


Fig. 7: Changing the flange positions

- | | |
|-------------------------------------------------------------------|------------------------------------------------------------------|
| 1 Allen head screws | 3 O-ring |
| 2 Interchangeable flange with protective cap (exhaust connection) | 4 Interchangeable flange with protective cap (vacuum connection) |

Procedure

1. Remove the hexagon socket screws.
2. Remove the interchangeable flange with the o-ring.
3. Clean the parts and sealing surfaces.
4. Hold the interchangeable flange with the o-ring in the new position.
5. Fasten the hexagon socket screws.
 - Tightening torque: **5 Nm**

5.3 Connecting vacuum side

NOTICE

Property damage from contaminated gases

Pumping gases that contain contamination damages the vacuum pump.

- Use suitable filters or separators from the Pfeiffer Vacuum range of accessories, to protect the vacuum pump.



Installation and operation of accessories

Pfeiffer Vacuum offers a series of special, compatible accessories for its rotary vane pumps.

- You can find information and ordering options for approved [accessories](#) online.
- Described accessories are not included in the shipment.

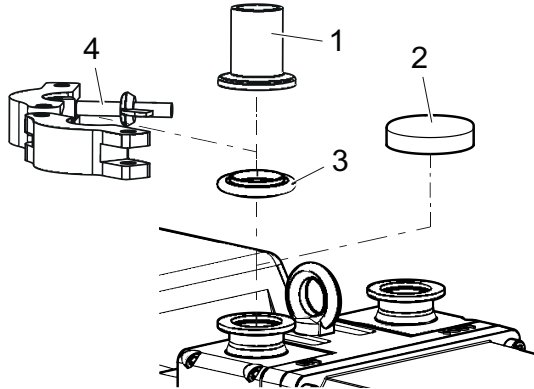


Fig. 8: Vacuum connection with flange connection

- | | |
|------------------|------------------------------|
| 1 Intake line | 3 Centering ring with O-ring |
| 2 Protective cap | 4 Circlip |

Procedure

1. Remove the protective cap from the vacuum flange.
2. Make sure that the centering ring and o-ring are seated correctly in the vacuum flange.
3. Establish the shortest possible connection between vacuum pump and vacuum chamber.
4. Choose a minimum vacuum line cross section equal to the nominal diameter of the connection flange.
5. Depending on the pump type, use PVC or metallic hoses with flange connections from the [Pfeiffer Vacuum component shop](#).
6. Support or suspend the piping to the vacuum pump so that no piping system forces act on the vacuum pump.
7. Connect both flanges with a circlip.
8. Use a separator or filter from the Pfeiffer Vacuum line of [accessories](#) if necessary.

5.4 Connecting exhaust side

⚠ CAUTION

Danger of injury from bursting as a result of high pressure in the exhaust line

Faulty or inadequate exhaust pipes lead to dangerous situations, e.g. increased exhaust pressure. There is a danger of bursting. Injuries caused by flying fragments, the escaping of high pressure, and damage to the unit cannot be excluded.

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.

NOTICE

Malfunction and damage to the vacuum pump from improper exhaust line installation

Negative pressure in the exhaust line causes malfunctions and damage to the vacuum pump. Negative pressure is not permissible.

- ▶ Make sure that the exhaust pressure is within the approved limits.



Installation and operation of accessories

Pfeiffer Vacuum offers a series of special, compatible accessories for its rotary vane pumps.

- You can find information and ordering options for approved [accessories](#) online.
- Described accessories are not included in the shipment.



Condensate separator

Pfeiffer Vacuum recommends installing a condensate separator, with condensate drain at the lowest point of the exhaust line.

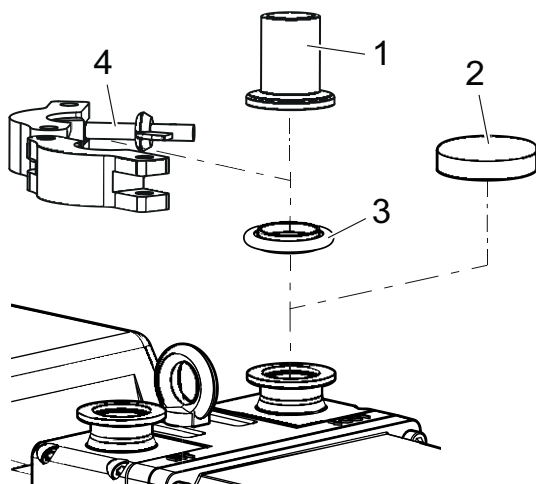


Fig. 9: Exhaust connection with flange connection

- | | |
|------------------|------------------------------|
| 1 Exhaust line | 3 Centering ring with O-ring |
| 2 Protective cap | 4 Circlip |

Procedure

1. Remove the protective cap from the exhaust flange.
2. Make sure that the centering ring and o-ring are seated correctly in the exhaust flange.
3. Choose a minimum exhaust line cross section equal to the nominal diameter of the connection flange.
4. Depending on the pump type, use PVC or metallic hoses with flange connections from the [Pfeiffer Vacuum component shop](#).
5. Route the piping downwards from the vacuum pump, to prevent condensate return.
6. Support or suspend the piping to the vacuum pump so that no piping system forces act on the vacuum pump.
7. Connect both flanges with a circlip.

5.5 Implementing electrical safety measures

⚠ WARNING

Risk of danger to life through missing mains disconnection device

The vacuum pump and electronic drive unit are **not** equipped with a mains disconnection device (mains switch).

- ▶ Install a mains disconnection device with a suitable miniature circuit breaker (MCB).
- ▶ Install a residual current circuit breaker (RCCB).

Installing mains disconnection device

- ▶ Install a mains disconnection device as a main switch.
- ▶ Use a miniature circuit breaker with an interruption rating of at least **10 kA**.
- ▶ Install the miniature circuit breaker within reach of the vacuum pump during building installation.
- ▶ Label the miniature circuit breaker as a disconnect device for the vacuum pump.

5.5.1 Installing miniature circuit breaker

| Miniature circuit breaker (MCB) | |
|---------------------------------|-----------------------------------------|
| Tripping characteristic | B or C according to IEC 60947-2 |
| Interruption rating (AIC) | 10 kA |
| Rated current I_N | 16 A, for voltage 200 – 240 V, 50/60 Hz |

Tbl. 5: Technical requirements for a miniature circuit breaker

Procedure

- ▶ Observe the technical requirements for a miniature circuit breaker.
- ▶ Connect the vacuum pump to a mains grid with miniature circuit breaker.
- ▶ Label the miniature circuit breaker as a switch-off device for the vacuum pump.

5.5.2 Installing a residual current circuit breaker

In the event of an insulation fault, installation of a residual current circuit breaker ensures protection against personal injury.

| Residual current operated circuit breaker (RCCB) | |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated fault current $I_{\Delta N}$ | 30 mA |
| Residual current waveform | Type A <ul style="list-style-type: none"> • Independent of line voltage • Triggering of AC fault currents and pulsating DC fault currents |

Tbl. 6: Technical requirements for a residual current circuit breaker

Procedure

- ▶ Observe the technical requirements for a residual current circuit breaker.
- ▶ Observe the prescribed inspection periods for electrical protective devices.

5.6 Connecting to mains power supply

⚠ DANGER

Danger to life from electric shock

Touching exposed and voltage-bearing elements causes an electric shock. Improper connection of the mains supply leads to the risk of touchable live housing parts. There is a risk to life.

- ▶ Before the installation, check that the connection leads are voltage-free.
- ▶ Make sure that electrical installations are only carried out by qualified electricians.
- ▶ Provide adequate grounding for the device.
- ▶ After connection work, carry out an earthed conductor check.

⚠ CAUTION

Risk of injury from entrapment of body parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

NOTICE**Risk of property damage from excess voltage**

Incorrect or excessive mains voltage will destroy the motor.

- ▶ Always observe the motor rating plate specifications.
- ▶ Route the mains connection in accordance with locally applicable provisions.
- ▶ Always provide a suitable mains fuse to protect the motor and supply cable in the event of a fault.
 - Pfeiffer Vacuum recommends type "K" circuit breakers with slow tripping characteristics.

NOTICE**Property damage from the voltage range being set incorrectly**

Recommissioning after longer downtimes of the vacuum pump or after changing the oil requires the current settings to be checked.

- ▶ Before switching the vacuum pump on each time, check the currently set voltage range.
- ▶ Make changes to the voltage range only after the vacuum pump has been disconnected from the mains.

5.6.1 Removing/attaching upper motor cover

Required tools

- Torx screwdriver, TX 20

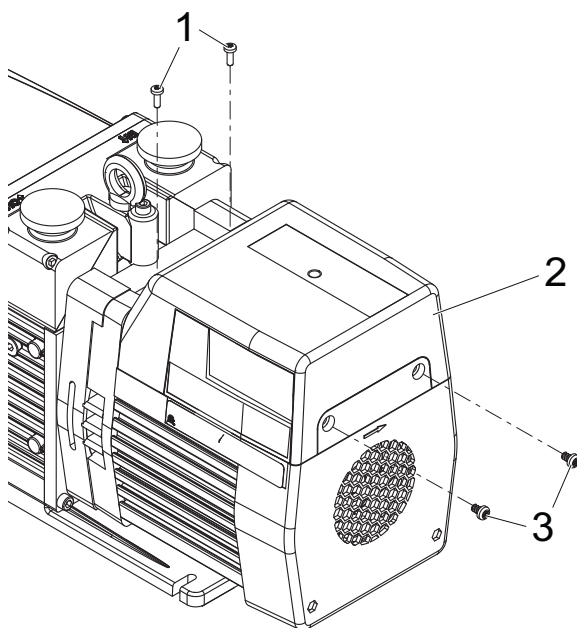


Fig. 10: Removing/attaching upper motor cover

- | | |
|---------------------|------------------|
| 1 Torx screw, 2× | 3 Torx screw, 2× |
| 2 Upper motor cover | |

Procedure

1. The mains voltage must be determined on-site each time before the vacuum pump is installed or moved to a different location.
2. Loosen the Torx screws on the upper motor cover.
3. Remove the upper motor cover.
4. Install the grid connection according to local regulations and the instructions in the following chapter.
5. Attach the upper motor cover.
6. Fasten the Torx screws on the upper motor cover.

5.6.2 Connecting single-phase motors

The vacuum pumps are equipped with an inbuilt thermal protection switch. In event of excess temperature, the protection switch interrupts the motor current, but does not offer a permanent shut-down of the motor. The motor's direction of rotation is set ex factory.

On-site fuse protection

- For the protection of the motor in case of malfunction, always provide fuse protection according to the regulations applicable for the region.

| Motor voltage [V], ±10 % | Frequency [Hz] | Motor rating [kW] | Rated current I _N [A] | Max. current I _{max} [A] |
|--------------------------|----------------|-------------------|----------------------------------|-----------------------------------|
| 100 – 115 | 50 | 0.45 | 6.0 | 48 |
| | | 0.55 | 7.5 | 60 |
| 200 – 230 | 50 | 0.45 | 3.0 | 24 |
| | | 0.55 | 3.7 | 30 |
| | 60 | 0.55 | 3.5 | 28 |
| | | 0.65 | 4.0 | 32 |

Tbl. 7: Recommended fuse ratings for on-site fuse protection

| Switch position: | “LV” | “HV” |
|------------------|----------------------|----------------------|
| Voltage range | 100 V – 115 V, 50 Hz | 200 V – 230 V, 50 Hz |
| | 100 V – 115 V, 60 Hz | 200 V – 230 V, 60 Hz |

Tbl. 8: Permissible voltage ranges

Prerequisites

- Vacuum pump switched off
- Power cable disconnected
- Upper motor cover removed

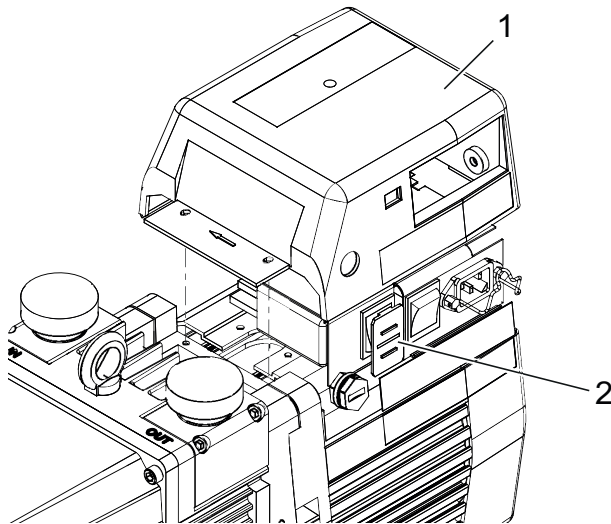


Fig. 11: Example of a voltage selector switch on the motor

- 1 Upper motor cover
- 2 Voltage selector switch

Changing the voltage range

1. The mains voltage must be determined on-site each time before the vacuum pump is installed or moved to a different location.
2. Remove the cover of the voltage selector switch.
3. Press the voltage selector switch.

4. Turn the cover of the voltage selector switch so that the set voltage range can be read on the outside of the motor cover.
 - The voltage selector switch locks into the correct position when you replace the upper motor cover.
5. Attach the upper motor cover.

5.6.3 Connecting three-phase motor with 6-pin terminal board

NOTICE

Risk of short circuit due to incorrect installation

In the case of incorrect installation, it is possible that the distance between the grounding connection and the motor phase is too short. There is a risk of flashover and short circuit.

- ▶ Maintain the required distance of ≥ 6 mm between the grounding connection and the motor phase connection.
- ▶ Use an isolated plug for the grounding connection.

NOTICE

Property damage from high starting torque

The specific load behavior of the vacuum pump requires direct on-line starting at full motor power. Engine damage occurs if a different starting circuit is used.

- ▶ Always start the motor directly.
- ▶ **Never** use a star-delta start-up circuit.

Prerequisites

- Vacuum pump switched off
- Upper motor cover removed

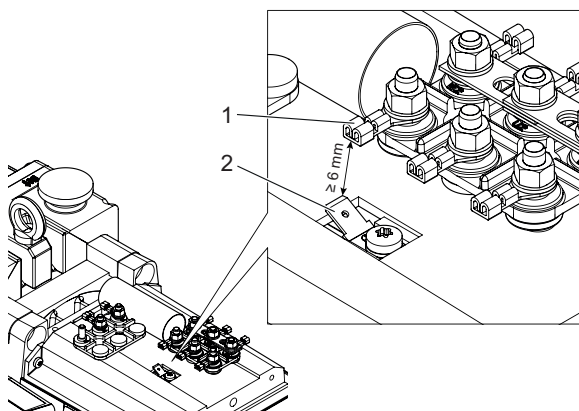


Fig. 12: Ground terminal

- 1 Motor phase connection 2 Ground terminal

Connectors U1 – L2, V1 – L1 and W1 – L3 rotate the motor shaft clockwise when looking at the motor fan.

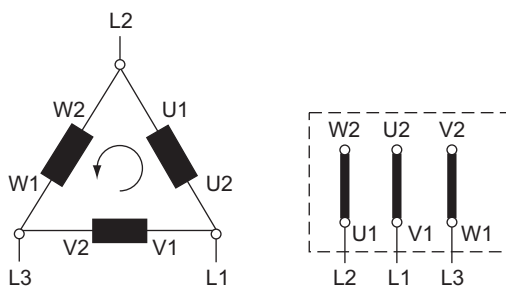


Fig. 13: Delta connection for low voltage

The 3 phases are connected in series, and their connection points connected to the mains. The voltage per phase is equal to the mains voltage, while the mains current is $\sqrt{3}$ times the phase current. The delta connection is marked with the Δ symbol. The voltage between the incoming mains supply lines is called mains voltage. The mains current is the current flowing in the incoming supply lines.

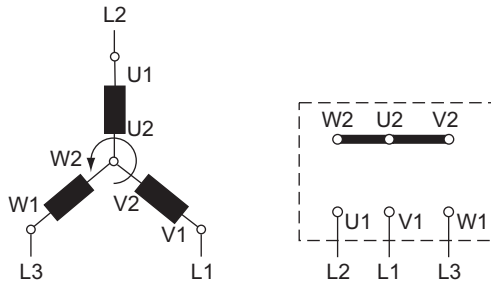


Fig. 14: Star circuit for high voltage

The ends of the 3 phases are connected in the star point. The terminal voltage is $\sqrt{3}$ times the phase voltage, the mains current is equal to the phase current. The star circuit is marked with the Y symbol.

5.6.4 Setting motor protection switch

Motor protection switches are current-dependent protective devices for the drive motors. Protection switches with slow tripping characteristics are suitable. When adjusting the motor protection switch, take into consideration that certain operating conditions (for example, cold pump start) can cause short-term increases in power input.

An increase of 1.5 times the rated current over a 2 minute period is permissible for the drive motors (in accordance with EN 60034-1), without tripping the motor protection switch.

| Voltage [V] | Frequency [Hz] | Motor rating [kW] | I_N [A] | I_{max} [A] |
|-------------|----------------|-------------------|-----------|---------------|
| 200 – 220 | 50 | 0.55 | 2.7 | 18 |
| 240 | 50 | 0.55 | 2.8 | 19 |
| 380 – 415 | 50 | 0.55 | 1.6 | 11 |
| 280 | 60 | 0.66 | 2.8 | 20 |
| 480 | 60 | 0.66 | 1.6 | 12 |

Tbl. 9: Motor protection switch settings

Procedure

- ▶ Set the appropriate value on the contactor.

5.6.5 Connecting the thermic winding protection

The three phase motor is equipped with a bi-metallic contact in the stator winding. The floating contact is routed to the terminal box for on-site use and has a cut-off temperature of 150 °C.

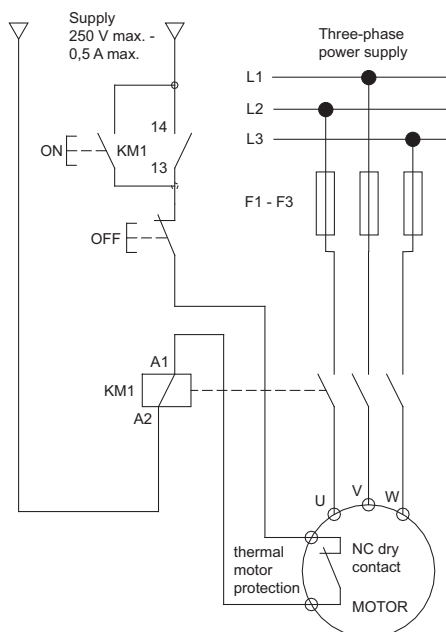


Fig. 15: Thermic winding protection with three-phase motor

Procedure

- ▶ Use the signal for temperature monitoring and, if necessary, for switching off the motor.
- ▶ To protect the motor against thermal overload, use the bi-metallic contact as on the circuit diagram for permanent cutoff.

5.6.6 Checking direction of rotation



Operating fluid leaks out

The direction of rotation must be checked on vacuum pumps with three phase motors. If the direction of rotation for the vacuum pump is incorrect, there is a risk of operating fluid escaping at the vacuum flange.

- Check the direction of rotation before refilling operating fluid.

Procedure

1. Switch on the rotary vane pump briefly (2 to 3 seconds).
 - The motor and motor fan must rotate clockwise (see the arrow on the fan cover).
2. If the direction of rotation is incorrect, exchange the 2 phases on the connection cable.
3. Refill the operating fluid.

5.7 Filling up operating fluid

⚠ WARNING

Danger of poisoning from toxic vapors

Igniting and heating synthetic operating fluid generates toxic vapors. Danger of poisoning if inhaled.

- ▶ Observe the application instructions and precautions.
- ▶ Do not allow tobacco products to come into contact with the operating fluid.

NOTICE

Risk of damage due to the use of non-approved operating fluid

Product-specific performance data are not achieved. All liability and warranty claims against Pfeiffer Vacuum are also excluded.

- ▶ Only use approved operating fluids.
- ▶ Only use other application-specific operating fluids after consultation with Pfeiffer Vacuum.

Permitted operating fluid

- P3 for standard applications and non-corrosive media

The operating fluid type is listed on the rating plate

- ▶ Please refer to rating plate for type and quantity of intended operating fluid.

Consumables

- Operating fluid of the vacuum pump

Required tools

- Allen key, **WAF 10**
- Calibrated torque wrench (tightening factor ≤ 2.5)

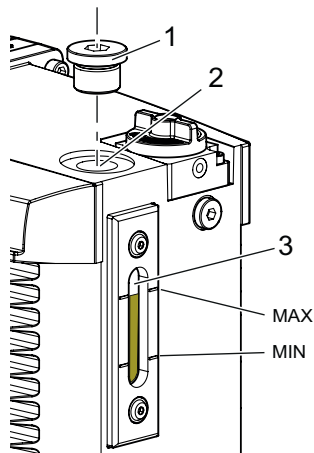


Fig. 16: Filling up operating fluid

- | | |
|-----------------------------------|---------------|
| 1 Filler screw incl. sealing ring | 3 Sight glass |
| 2 Filler hole | |

Procedure

1. Unscrew the filler screw.
 - Be careful with the sealing ring.
2. Refill the operating fluid:
 - Initial filling with cold vacuum pump: A maximum of 3/4 of the min./max. range.
3. Screw in the filler screw.
 - Tightening torque: **10 Nm**

6 Operation

6.1 Commissioning vacuum pump

WARNING

Danger of poisoning due to toxic process media escaping from the exhaust pipe

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ▶ Observe the pertinent regulations for handling toxic process media.
- ▶ Safely purge toxic process media via an exhaust line.
- ▶ Use appropriate filter equipment to separate toxic process media.

CAUTION

Danger of injury from bursting as a result of high pressure in the exhaust line

Faulty or inadequate exhaust pipes lead to dangerous situations, e.g. increased exhaust pressure. There is a danger of bursting. Injuries caused by flying fragments, the escaping of high pressure, and damage to the unit cannot be excluded.

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.

Procedure

- ▶ Check the operating fluid in the sight glass.
- ▶ Compare the voltage and frequency specifications on the motor rating plate with the available mains voltage and frequency.
- ▶ Protect the vacuum pump from sucking in contamination using suitable measures.
- ▶ Check the operating fluid at regular intervals.
- ▶ Check the exhaust connection for free passage (max. permissible pressure: 1,500 hPa absolute).

6.2 Switching on vacuum pump

CAUTION

Risk of injury from entrapment of body parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

CAUTION

Danger of injury if hair or loose clothing is pulled in

There is a danger of injury from getting pulled in at rotating parts of the fan.

- ▶ Do not wear loose-fitting jewelry, or hide it under clothing.
- ▶ Wear close-fitting clothing.
- ▶ Use a hair net if necessary.

⚠ CAUTION

Danger of burns on hot surfaces

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C. If access to the vacuum pump is unrestricted, there is a danger of burns due to contact with hot surfaces.

- ▶ Install suitable touch protection if the vacuum pump is unrestrictedly accessible.
- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Contact Pfeiffer Vacuum for suitable touch protection in system solutions.

NOTICE

Risk of damage to the drive from increased motor current consumption

At an intake pressure of approximately 300 hPa and under unfavorable operating conditions (such as for example exhaust side counterpressure), the power input exceeds the rated current.

- ▶ Limit the maximum power input of 1.5 times the rated current to max. 2 minutes (in accordance with EN 60034-1).

i

Cycle operation

Cycle operation with maximum 10 cycles per hour is possible.

Longer operating phases and short downtimes permit a functionally safe operating condition of the vacuum pump.

Operating conditions

- The optimal operating condition of the vacuum pump is continuous operation.
- When pumping down dry gases, no special precautions are required.
- Low final pressures are possible with the gas ballast valve closed.

Switching on vacuum pump

1. If required, switch vacuum pump on in each pressure range.
2. Switch vacuum pump on at mains switch, or, in the case of three-phase motors, on site via a protective circuit.
3. Prior to process start, allow vacuum pump to warm up for approx. 30 minutes with vacuum connection closed.

Checking operating fluid level

1. Regularly check operating fluid level while vacuum pump is running and at operating temperature.
2. Make sure that the fill level is within the markings on the sight glass frame.
3. Check operating fluid fill level daily during continuous operation, and every time vacuum pump is switched on.

6.3 Operating rotary vane pump with gas ballast

NOTICE

Risk of damage from condensation in vacuum pump

During operation without gas ballast, condensation may form as a result of the vapor compatibility of the vacuum pump being exceeded.

- ▶ Pump condensable vapors only when the vacuum pump is warm and the gas ballast valve open.
- ▶ Allow the vacuum pump to run on after process end for another 30 minutes with the gas ballast valve open.
 - This cleans the operating fluid and protects the vacuum pump against corrosion.

The gas ballast valve supplies air to the working chamber of the vacuum pump periodically at the beginning of the compression phase. When pumping down vapors, this air prevents condensation within certain limits in the vacuum pump.

Behavior with process gases with condensable vapors

- ▶ Operate the vacuum pump with gas ballast, i.e. with the gas ballast valve open.

6.3.1 Gas ballast valve – standard version



No intermediate settings possible

An intermediate setting between open and closed is not possible.

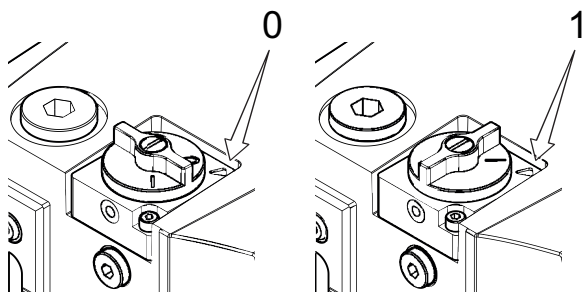


Fig. 17: Gas ballast valve, standard version

0 GBV closed

1 GBV open

Open gas ballast valve

- ▶ To open the gas ballast valve, turn its knob up to the stop in position “1”.

Closing gas ballast valve

- ▶ To close the gas ballast valve, turn its knob up to the stop in position “0”.

6.3.2 Gas ballast valve with inert gas connection

NOTICE

Property damage from impermissibly high inert gas pressure

Increased inert gas pressure compromises operational reliability of the vacuum pump, and causes an increase in power input and operating temperature.

- ▶ Observe the maximum permissible inert gas pressure of **1500 hPa (absolute)**.
- ▶ Dose the inert gas quantity with the dosing screw on the gas ballast valve or on site.

NOTICE

Property damage due to inert gas intake during vacuum pump standstill

Continued inert gas intake after switching off the vacuum pump will expel the oil film in the pump system, resulting in damage during restart.

- ▶ After switching off the vacuum pump, close the supply of inert gas at the gas ballast valve or by closing the on-site gas supply.



No intermediate settings possible

An intermediate setting between open and closed is not possible.

For some processes, Pfeiffer Vacuum recommends the addition of inert gas to dilute the process gas and, within certain limits, prevent condensation in the vacuum pump.

Required consumables

- Inert gas, e.g., nitrogen (N₂)

Required aids

- Hose (external diameter 6 mm)
- Max. inert gas pressure **1500 hPa (absolute)**

Accessories required

- L push-in fitting (order number: P 0996 105)

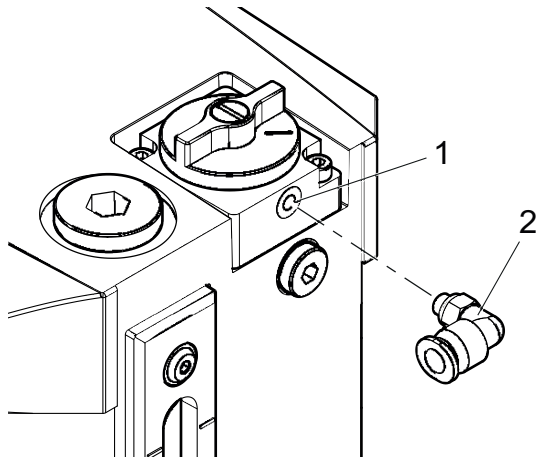


Fig. 18: Inert gas connection on gas ballast valve

- 1 Inert gas connection
- 2 L push-in fitting

Connecting gas ballast valve with inert gas connection

1. Screw in the L push-in fitting on the inert gas connection.
2. Connect a hose (external diameter 6 mm) to the inert gas connection, or utilize the M5 threaded connector directly.

Selecting an inert gas and setting the inert gas pressure

1. Select the type and quantity of the inert gas used according to the specific process.
2. Consult Pfeiffer Vacuum if necessary.
3. Set the on-site inert gas pressure to **max. 1500 hPa (absolute)**.
4. Set the desired on-site quantity of inert gas.

Open gas ballast valve

- ▶ To open the gas ballast valve, turn its knob up to the stop in position “1”.

Closing gas ballast valve

- ▶ To close the gas ballast valve, turn its knob up to the stop in position “0”.

6.4 Refilling operating fluid

⚠ CAUTION

Scalding from hot operating fluid

Danger of burns when draining operating fluid if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.



Recommendation

Refill with operating fluid before the minimum fill level is reached.

Prerequisite

- Vacuum pump switched off

Consumables

- Operating fluid of the vacuum pump

Required tools

- Allen key, **WAF 10**
- Calibrated torque wrench (tightening factor ≤ 2.5)

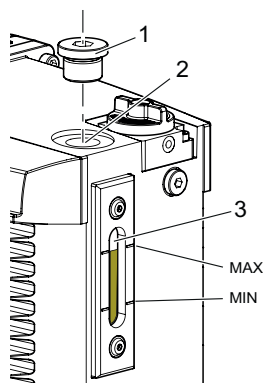


Fig. 19: Refilling operating fluid

- | | |
|-----------------------------------|---------------|
| 1 Filler screw incl. sealing ring | 3 Sight glass |
| 2 Filler hole | |

Procedure

1. Unscrew the filler screw.
 - Be careful with the sealing ring.
2. Top up operating fluid up to the “Max.” marking.
3. Screw in the filler screw again.
 - Tightening torque: **10 Nm**

6.5 Switching off vacuum pump

NOTICE

Contamination from operating fluid backflow

After the vacuum pump is switched off, there is a risk that the connected vacuum system can become contaminated by backflow. The safety valve on the vacuum pump is not suitable for longer-term sealing.

- ▶ Install an additional shut-off valve in the intake line.
- ▶ Shut off the intake line immediately after switching off the vacuum pump.

Procedure

1. If required, switch the vacuum pump off in each pressure range.
2. Switch the mains switch off or securely disconnect the drive motor from the mains.
 - The vacuum safety valve closes automatically when the vacuum pump is switched off, preventing the backflow of gas and operating fluid into the intake line.
3. Install an additional shut-off valve in the intake line to ensure that the vacuum is maintained in the vacuum chamber.

7 Maintenance

7.1 Maintenance instructions

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.

WARNING

Tilting danger! Serious injury due to tilting of the product

There is a danger of the vacuum pump not attached tipping over due to changes in the center of gravity or incorrect loading. Serious injuries due to trapping or crushing of limbs, e.g. feet, are the result.

- ▶ Do not use the vacuum pump as a climbing aid.
- ▶ Do not exert any force on the product.
- ▶ Ensure that the product has a safe centre of gravity, when mounting components.
- ▶ Wear protective equipment, e.g. protective shoes

CAUTION

Risk of injury from entrapment of body parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

CAUTION

Danger of injury if hair or loose clothing is pulled in

There is a danger of injury from getting pulled in at rotating parts of the fan.

- ▶ Do not wear loose-fitting jewelry, or hide it under clothing.
- ▶ Wear close-fitting clothing.
- ▶ Use a hair net if necessary.

NOTICE

Damage from incorrect maintenance work

Unprofessional work on the vacuum pump will lead to damage for which Pfeiffer Vacuum accepts no liability.

- ▶ Ensure that only the following categories of persons are authorized to perform servicing tasks:
 - Pfeiffer Vacuum employees with corresponding qualifications.
 - Persons who have undergone training from Pfeiffer Vacuum and have subsequently taken part in refresher courses at intervals of no more than every two years.
 - Persons who have been awarded official certification in accordance with Article 14 (6) Betr-SichV (Ordinance on Industrial Safety and Health).
- ▶ We recommend taking advantage of our service training offering.

The following section describes the tasks for cleaning and maintaining the vacuum pump. More advanced works are described in the service instructions.

Prerequisites

- Vacuum pump switched off
- Vacuum pump vented to atmospheric pressure
- Vacuum pump cooled

Preparing maintenance

- ▶ Disconnect the drive motor from the mains.
- ▶ Secure the motor against switching back on.
- ▶ For maintenance work, only dismantle the vacuum pump to the extent needed.
- ▶ Dispose of used operating fluid according to applicable regulations in each case.
- ▶ When using synthetic operating fluid, please observe the associated application instructions.
- ▶ Only clean the pump parts using industrial alcohol, isopropanol or similar media.

7.2 Checklist for inspection and maintenance



Maintenance frequency and service lives

Maintenance frequency and service lives are process-dependent. Chemical and thermic loads or contamination reduce the recommended reference values.

- Determine the specific service lives during the first operating interval.
- Consult with Pfeiffer Vacuum Service if you wish to reduce the maintenance frequency.



Spare part packages

Detailed descriptions of the spare part packages and the order numbers: [\(see chapter "Spare parts", page 55\)](#).

You can carry out maintenance work at **maintenance level 1** yourself.

We recommend Pfeiffer Vacuum Service for carrying out maintenance work at **maintenance level 2** and **maintenance level 3** (revision). If the required intervals listed below are exceeded, or if maintenance work is carried out improperly, no warranty or liability claims are accepted on the part of Pfeiffer Vacuum. This also applies if original spare parts are not used.

| Action | Inspection | Maintenance level 1 | Maintenance level 2 | Maintenance level 3 | Required material |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------|---------------------|---------------------|------------------------------------|
| described in document | BA | BA | MM | MM | |
| Interval | daily | ≤ yearly | ≤ 2 years | ≤ 4 years | |
| Inspection | | | | | |
| Visual and acoustic pump check | ■ | | | | |
| Check operating fluid: <ul style="list-style-type: none"> • Check fill level • Check color (contamination) • Check vacuum pump for leaks | | | | | |
| Check accessories (in accordance with respective operating instructions) | ■ | | | | |
| Maintenance level 1 – Operating fluid change | | | | | |
| Clean the outside of the vacuum pump: <ul style="list-style-type: none"> • Pump housing • Cleaning fan cap and cooling fins of motor Changing operating fluid | | ■ | | | Operating fluid spare part package |

| Action | Inspection | Maintenance level 1 | Maintenance level 2 | Maintenance level 3 | Required material |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------|---------------------|---------------------|-----------------------------------------------------------------------------------------------------|
| described in document | BA | BA | MM | MM | |
| Interval | daily | ≤ yearly | ≤ 2 years | ≤ 4 years | |
| Additional activities: <ul style="list-style-type: none"> Remove cap Clean inside of cap and outside of pumping system (without cleaning agent) Remove and clean gas ballast valve, replace wearing parts Clean noise reduction Replace diaphragm on vacuum safety valve | | ■ as required | | | Gas ballast valve spare part package Diaphragm spare part package |
| Replace filter in external accessory (where present), in accordance with the respective operating instructions | | ■ as required | | | |
| Maintenance level 2 – changing radial shaft seal ring | | | | | |
| <ul style="list-style-type: none"> Partially dismantle the vacuum pump Replace RSSR and coupling spider | | | ■ | | Operating fluid spare part package RSSR spare part package |
| Additional activities (minor overhaul): Dismantle and clean vacuum pump, replace seals and the following wear parts: <ul style="list-style-type: none"> Wear parts, vacuum safety valve (hydraulic piston and diaphragm) Wear parts for exhaust valve (valve buffer) Wear parts for gas ballast valve (valve flap) Vane springs | | | ■ as required | | Operating fluid spare part package Valves/springs spare part package Seals spare part package |
| Maintenance level 3 / overhaul | | | | | |
| Dismantle and clean vacuum pump, replace seals and all wear parts: <ul style="list-style-type: none"> Vane Valves, springs, and sight glass Silencer nozzle | | | | ■ | Spare part package maintenance level 3 / overhaul |

Tbl. 10: Maintenance intervals

7.3 Change the operating fluid

⚠ WARNING

Health hazard and risk of environmental damage from toxic contaminated operating fluid

Toxic process media can cause operating fluid contamination. When changing the operating fluid, there is a health hazard due to contact with poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Wear suitable personal protective equipment when handling these media.
- ▶ Dispose of the operating fluid according to locally applicable regulations.

⚠ CAUTION**Scalding from hot operating fluid**

Danger of burns when draining operating fluid if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.

**Pfeiffer Vacuum recommends determining the precise service life of the operating fluid within the first maintenance frequency.**

The usable life may deviate from the reference value specified depending on thermic and chemical loads, and the accumulation of suspended particles and condensate in the operating fluid.

**Operating fluid type**

Fundamentally, when filling, refilling, or changing operating fluid, you must always use the operating fluid type specified on the rating plate. Should process conditions change, you can convert to a different operating fluid type.

**Safety data sheets**

You can obtain the safety data sheets for operating fluids from Pfeiffer Vacuum on request, or from the [Pfeiffer Vacuum Download Center](#).

The usable life of operating fluid is dependent on the area of application of the rotary vane vacuum pumps.

Instructions for when operating fluid should be changed

- Vacuum pump does not reach the specified final pressure.
- Operating fluid soiled, milky or unclear
- Mineral operating fluid with thermic aging (color number > 4)

7.3.1 Determining degree of aging of P3 operating fluid**⚠ WARNING****Health hazard and risk of environmental damage from toxic contaminated operating fluid**

Toxic process media can cause operating fluid contamination. When changing the operating fluid, there is a health hazard due to contact with poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Wear suitable personal protective equipment when handling these media.
- ▶ Dispose of the operating fluid according to locally applicable regulations.



Scan this QR code or click [here](#) and view a document that will help you determine the degree of aging of the P3 operating fluid in clean processes using a color chart (according to DIN 51578). The document with the number PK0219 can also be obtained from the [Pfeiffer Vacuum Download Center](#) on request.

Prerequisites

- Vacuum pump switched off
- Vacuum pump is vented to atmospheric pressure on the suction side
- Vacuum pump cooled

Required aids

- Test tube
- Pipette with flexible hose
- Allen key, **WAF 10**
- Calibrated torque wrench (tightening factor ≤ 2.5)

Determining degree of aging of P3 operating fluid

1. Unscrew the filler screw.
 - Be careful with the sealing ring.
2. Use the pipette to extract a sample of the operating fluid from the filling port.
3. Pour the sample into a test tube.
4. Check the sample in bright light.
5. If it is a reddish-brown color at the latest (corresponding with color identification number 5), change the operating fluid.
6. Screw in the filler screw.
 - Tightening torque: **10 Nm**

7.3.2 Changing operating fluid**⚠ WARNING****Health hazard and risk of environmental damage from toxic contaminated operating fluid**

Toxic process media can cause operating fluid contamination. When changing the operating fluid, there is a health hazard due to contact with poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Wear suitable personal protective equipment when handling these media.
- ▶ Dispose of the operating fluid according to locally applicable regulations.

⚠ CAUTION**Scalding from hot operating fluid**

Danger of burns when draining operating fluid if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.

**Cleaning by changing the operating fluid**

Pfeiffer Vacuum recommends, in cases of heavy contamination with process residues, cleaning the inside of the vacuum pump with several operating fluid changes.

Prerequisites

- Vacuum pump switched off
- Vacuum pump vented to atmospheric pressure
- Vacuum pump has cooled so that it can be touched
- Operating fluid still warm

Spare parts required

- Operating fluid spare part package

Required consumables

- Operating fluid of the vacuum pump

Required tools

- Allen key, **WAF 10**
- Calibrated torque wrench (tightening factor ≤ 2.5)

Required aids

- Collection receptacle (> 1.5 l)

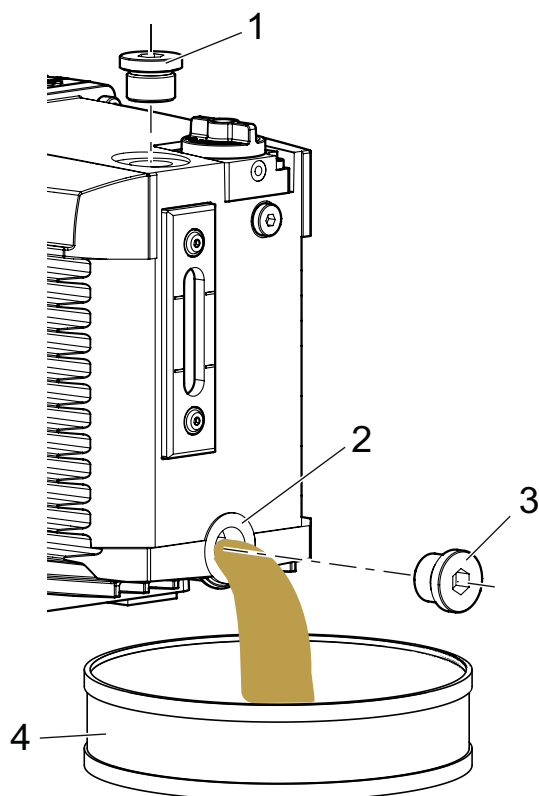


Fig. 20: Draining operating fluid

- | | |
|-----------------------------------|----------------------------------|
| 1 Filler screw incl. sealing ring | 3 Drain screw incl. sealing ring |
| 2 Drain hole | 4 Collection receptacle |

Draining operating fluid

1. Unscrew the filler screw.
 - Be careful with the sealing ring.
2. Place a collection receptacle below the drain hole.
3. Unscrew the drain screw.
 - Be careful with the sealing ring.
4. Allow operating fluid to drain into collection receptacle.

Agitating remaining operating fluid

1. Screw in the filler screw hand tight.
2. Screw in the drain screw hand tight.
3. Switch on the vacuum pump with the vacuum flange open for a maximum of 5 seconds.

Draining remaining operating fluid

1. Unscrew the drain screw.
 - Be careful with the sealing ring.
2. Gently tilt the vacuum pump.
3. Drain remaining operating fluid.
4. Screw in the drain screw hand tight.
5. Dispose of old operating fluid according to valid regulations.

Filling up fresh operating fluid

1. Screw the drain screw in up to the stop.
 - Tightening torque: **10 Nm**
2. Unscrew the filler screw.
 - Be careful with the sealing ring.
3. Fill new operating fluid.
4. Check level.
5. Screw the drain screw in completely.
 - Tightening torque: **10 Nm**

7.3.3 Rinsing and cleaning rotary vane pump



Cleaning by changing the operating fluid

Pfeiffer Vacuum recommends, in cases of heavy contamination with process residues, cleaning the inside of the vacuum pump with several operating fluid changes.

Prerequisite

- Fresh operating fluid filled

Required tools

- Allen key, **WAF 5**
- Allen key, **WAF 10**
- Calibrated torque wrench (tightening factor ≤ 2.5)

Spare parts required

- Operating fluid spare part package

Required aids

- Collection receptacle (> 1.5 l)

Changing operating fluid for cleaning

1. Operate the vacuum pump with the gas ballast open, until it is warm.
2. Perform an operating fluid change.
3. Check the pollution level and repeat the changing of the operating fluid if necessary.
4. Replace the corresponding filter elements wherever the accessory is installed.

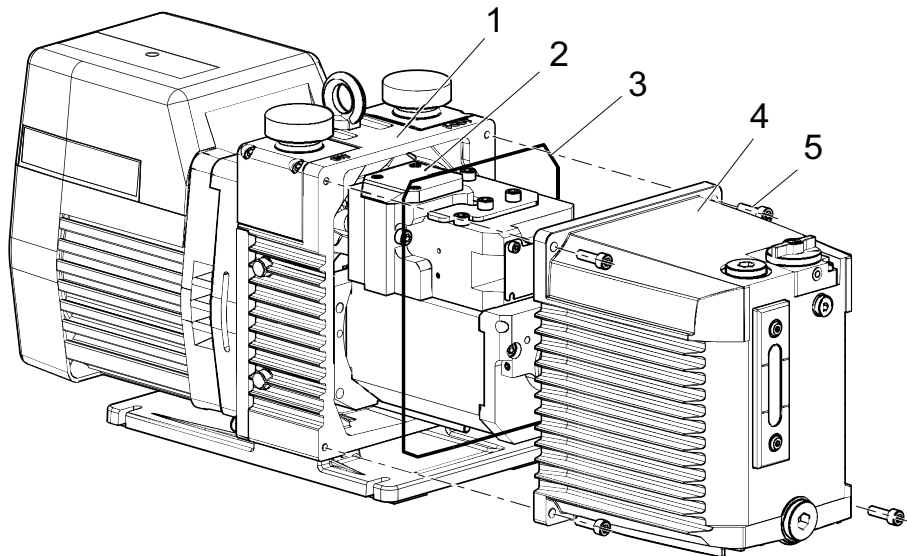


Fig. 21: Removing/fitting the cap on the rotary vane pump

- | | |
|------------------|-----------------------------|
| 1 Stand | 4 Cap |
| 2 Pumping system | 5 Hexagon socket screw (4×) |
| 3 O-ring | |

Removing the cap

1. Drain the operating fluid.
2. Unscrew the hexagon socket screws from the cap.
3. Remove the cap from the stand in axial direction.
 - Take care with the o-ring between cap and stand.
4. Collect any leaking operating fluid.
5. Dispose of operating fluid according to applicable regulations.

Cleaning the pumping system and cap

1. Clean the pumping system from the outside without cleaning agent.
2. Clean the cap from the inside without cleaning agent.

Installing cap

1. Insert the O-ring in the groove in the cap.
2. Install cap on stand.
3. Tighten the hexagon socket screws.
 - Tightening torque: **5.0 Nm**.

Filling up fresh operating fluid

1. Screw the drain screw in up to the stop.
 - Tightening torque: **10 Nm**
2. Unscrew the filler screw.
 - Be careful with the sealing ring.
3. Fill new operating fluid.
4. Check level.
5. Screw the drain screw in completely.
 - Tightening torque: **10 Nm**

7.4 Removing and cleaning the gas ballast valve

The gas ballast valve is soiled if the vacuum pump takes in ambient air containing dust.

7.4.1 Removing gas ballast valve

Required tools

- Allen key, **WAF 3**

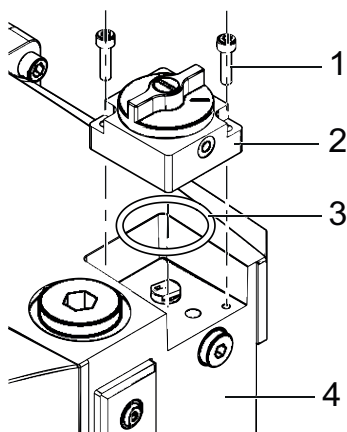


Fig. 22: Removing gas ballast valve

- | | |
|-----------------------|----------------------|
| 1 Cylinder screw (2×) | 3 O-ring 32 × 2.5 mm |
| 2 Valve housing | 4 Cap |

Procedure

1. Unscrew cylinder screws.
2. Remove valve housing from cover.
3. Be careful with the o-ring.

7.4.2 Disassembling and cleaning gas ballast valve

Required tools

- Allen key, **WAF 3**
- Slot-head screwdriver, **7 mm**

Spare parts required

- Gas ballast valve spare part package

Required consumables

- Paper towels
- Isopropanol, as required


Do not loosen dowel pins

Do not loosen the two dowel pins on the top and bottom side of the valve housing.

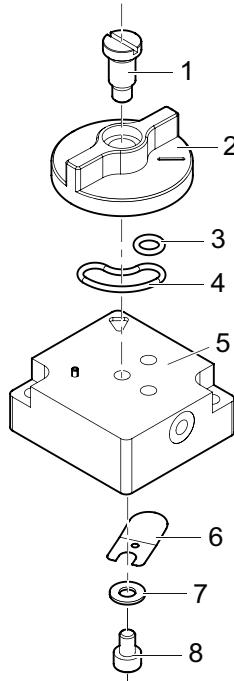


Fig. 23: Individual parts of the gas ballast valve

- | | |
|---------------------|------------------|
| 1 Special screw | 5 Valve housing |
| 2 Rotary knob | 6 Plate spring |
| 3 O-ring, 5×1.5 mm | 7 Washer |
| 4 O-ring, 15×1.5 mm | 8 Cylinder screw |

Procedure

1. Unscrew cylinder screw from valve housing bottom side.
2. Remove the washer and leaf spring.
3. Unscrew and remove the special screw.
4. Remove rotary knob.
5. Remove the o-rings.
6. Clean all parts and check parts for wear.
7. Replace the spare parts from the spare part package.

7.4.3 Removing and cleaning silencer nozzle

The silencer nozzle is installed below the gas ballast valve. The nozzle has a type-specific opening. Clean the nozzle in case of contamination.

Prerequisite

- Gas ballast filter removed

Required tools

- Open-end wrench, **WAF 8**

Required consumables

- Compressed air

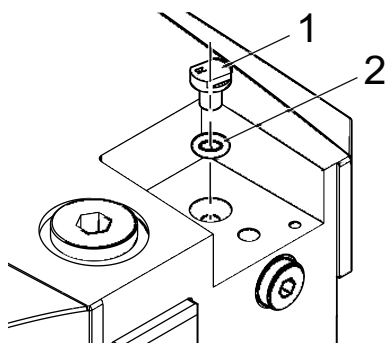


Fig. 24: Remove silencer nozzle

- 1 Silencer nozzle 2 O-ring

Procedure

1. Unscrew silencer nozzle.
 - Be careful with the o-ring.
2. Clean silencer nozzle with compressed air.
3. Screw silencer nozzle back in up to stop.
 - Be careful with the o-ring.

7.4.4 Assembling and installing gas ballast valve

Required tools

- Allen key, **WAF 3**
- Slot-head screwdriver, **7 mm**
- Calibrated torque wrench (tightening factor ≤ 2.5)

Required consumables

- Operating fluid of rotary vane pump

Assemble gas ballast valve

1. Wet the o-rings slightly with the operating fluid used.
2. Insert the o-rings evenly.
3. Fit the rotary knob.
4. Screw in the special screw.
 - Tightening torque: **2.5 Nm**.
5. Position leaf spring on dowel pin (curvature facing housing).
6. Bias and fixate leaf spring with cylinder screw and washer.
 - Tightening torque: **2.5 Nm**.

Install gas ballast valve

1. Install the complete valve with o-ring in the vacuum pump.
2. Tighten the cylinder screws.
 - Tightening torque: **2.5 Nm**.

7.5 Replacing diaphragm on vacuum safety valve

Prerequisite

- Cap removed

Required tools

- Allen key, **WAF 3**
- Calibrated torque wrench (tightening factor ≤ 2.5)

Spare parts required

- Diaphragm spare part package

Required consumables

- Paper cloths for cleaning off operating fluid

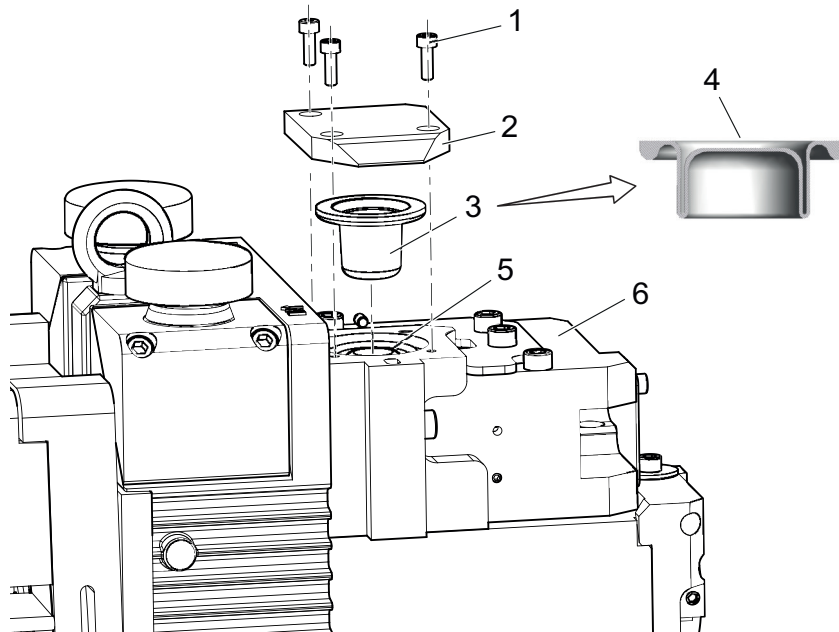


Fig. 25: Diaphragm of vacuum safety valve

- | | |
|--------------------------------|--------------------------------|
| 1 Hexagon socket screw M4 (3x) | 4 Diaphragm installation shape |
| 2 Diaphragm cover | 5 Vacuum safety valve |
| 3 Diaphragm | 6 Pump block |

Dismantling diaphragm cover and diaphragm

1. Unscrew and remove the hexagon socket screw from the top side of the pump block.
2. Remove the diaphragm cover.
3. Remove the operating fluid above the diaphragm.
4. Remove the diaphragm from its seat in the vacuum safety valve.

Cleaning and replacing parts

1. Clean the diaphragm cover and the holes in the diaphragm cover.
2. Replace the diaphragm.

Installing diaphragm cover and diaphragm

1. Make sure the new diaphragm has the right shape for installation.
2. Install the diaphragm.
 - Guide the diaphragm bead into the gap on the vacuum safety valve.
3. Ensure correct seating of the edge of the diaphragm.
4. Fasten the diaphragm cover with the hexagon socket screws.
5. Tighten the hexagon socket screws.
 - Tightening torque: **2.5 Nm**

8 Decommissioning

8.1 Shutting down for longer periods

Before shutting down the vacuum pump, observe the following instructions to adequately protect the interior of the vacuum pump (suction chamber) from corrosion:

Procedure

1. Switch off the vacuum pump.
2. Vent the vacuum pump.
3. Allow the vacuum pump to cool down.
4. Change the operating fluid.
5. Start the vacuum pump and take it up to operating temperature in order to wet the inside of the pumping system with fresh operating fluid.
6. Fill the vacuum pump to above the “**max.**” mark with operating fluid, up to the upper edge of the sight glass.
7. Seal the vacuum and exhaust flanges as well as any other openings with blank flanges from the Pfeiffer Vacuum [accessories range](#).
8. Store the vacuum pump in dry, dust-free rooms, within the specified ambient conditions.
9. Pack the vacuum pump together with a drying agent in a plastic bag, and seal the vacuum pump airtight if it is to be stored in rooms with damp or aggressive atmospheres.
10. For longer storage periods (> 2 years), Pfeiffer Vacuum recommends changing the operating fluid again prior to recommissioning.

8.2 Recommissioning

NOTICE

Risk of damage to vacuum pump as a result of operating fluid aging

The operating fluid usability is limited (max. 2 years). Prior to recommissioning, following a shutdown of **2 years or more**, carry out the following work.

- ▶ Change the operating fluid.
- ▶ Change the radial shaft seal rings and other elastomer parts if required.
- ▶ Observe the maintenance instructions – consult Pfeiffer Vacuum if necessary.



Ejection of operating fluid

Overfilled operating fluid will be ejected at the exhaust connection when starting up the vacuum pump.

- Reduce the operating fluid level to the normal level before recommissioning.

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

9.2 Dispose of rotary vane pump

Pfeiffer Vacuum rotary vane pumps contain materials that you must recycle.

1. Fully drain the lubricant.
2. Dismantle the motor.
3. Decontaminate the components that come into contact with process gases.
4. Separate the components into recyclable materials.
5. Recycle the non-contaminated components.
6. Dispose of the product or components in a safe manner according to locally applicable regulations.

10 Malfunctions

⚠ CAUTION

Risk of injury from entrapment of body parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

- ▶ Maintain sufficient distance to the vacuum flange during all work.
- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against re-start.

⚠ CAUTION

Danger of burns on hot surfaces

In the event of a fault, the surface temperature of the vacuum pump can increase to above 105 °C.

- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Wear personal protective equipment if necessary.

⚠ CAUTION

Danger of injury from moving parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. There is a risk of injury to fingers and hands if they enter the operating range of rotating parts.

- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against reactivation.
- ▶ Dismantle the vacuum pump for inspection, away from the system if necessary.

NOTICE

Danger of property damage from improper maintenance

Unprofessional work on the vacuum pump will lead to damage for which Pfeiffer Vacuum accepts no liability.

- ▶ We recommend taking advantage of our service training offering.
- ▶ When ordering spare parts, specify the information on the nameplate.

Should malfunctions occur, you can find information about possible causes and how to fix them here:

| Problem | Possible causes | Remedy |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Vacuum pump will not start up | <ul style="list-style-type: none"> ● No mains voltage or voltage does not correspond to the motor data | <ul style="list-style-type: none"> ● Check the mains voltage and mains fuse. ● Check the motor switch. |
| | <ul style="list-style-type: none"> ● Pump temperature too low | <ul style="list-style-type: none"> ● Heat the vacuum pump to > 12 °C. |
| | <ul style="list-style-type: none"> ● Thermic protection switch has triggered | <ul style="list-style-type: none"> ● Determine and eliminate the cause. ● Allow the vacuum pump to cool down. |
| | <ul style="list-style-type: none"> ● Pumping system contaminated | <ul style="list-style-type: none"> ● Clean the vacuum pump. ● Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> ● Pumping system damaged | <ul style="list-style-type: none"> ● Clean and maintain the vacuum pump. ● Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> ● Motor faulty | <ul style="list-style-type: none"> ● Replace the motor. |

| Problem | Possible causes | Remedy |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vacuum pump switches off after a while after being started | <ul style="list-style-type: none"> Thermic protection switch of the motor has triggered | <ul style="list-style-type: none"> Determine and eliminate the cause of overheating. Allow the motor to cool down. |
| | <ul style="list-style-type: none"> Mains fuse triggered due to overload (e.g. cold start) | <ul style="list-style-type: none"> Bring vacuum pump to permissible ambient temperature range. |
| | <ul style="list-style-type: none"> Exhaust pressure too high | <ul style="list-style-type: none"> Check the exhaust line outlet opening and exhaust side accessories. |
| Vacuum pump does not reach the specified final pressure | <ul style="list-style-type: none"> Measurement result distorted | <ul style="list-style-type: none"> Check the measurement instrument. Check the final pressure without system connected. |
| | <ul style="list-style-type: none"> Vacuum pump or connected accessory contaminated | <ul style="list-style-type: none"> Clean the vacuum pump. Check the components for contamination. |
| | <ul style="list-style-type: none"> Operating fluid contaminated | <ul style="list-style-type: none"> Operate the vacuum pump for an extended period of time with gas ballast valve open, or change the operating fluid. |
| | <ul style="list-style-type: none"> Operating fluid level too low | <ul style="list-style-type: none"> Top up the operating fluid. |
| | <ul style="list-style-type: none"> Leak in system | <ul style="list-style-type: none"> Locate and eliminate the leak. |
| | <ul style="list-style-type: none"> Diaphragm on safety valve damaged or faulty | <ul style="list-style-type: none"> Check the diaphragm. Replace the diaphragm. |
| | <ul style="list-style-type: none"> Vacuum pump is damaged | <ul style="list-style-type: none"> Contact Pfeiffer Vacuum Service. |
| Pumping speed of vacuum pump too low | <ul style="list-style-type: none"> The intake line is not suitably dimensioned | <ul style="list-style-type: none"> Make sure that connections are short and cross sections adequately dimensioned. |
| | <ul style="list-style-type: none"> Exhaust pressure too high | <ul style="list-style-type: none"> Check the exhaust line outlet opening and exhaust side accessories. |
| | <ul style="list-style-type: none"> Diaphragm on safety valve damaged or faulty | <ul style="list-style-type: none"> Check the diaphragm. Replace the diaphragm. |
| Loss of operating fluid | <ul style="list-style-type: none"> Casing seal is not tight | <ul style="list-style-type: none"> Check and replace the seal. |
| | <ul style="list-style-type: none"> Radial shaft seal ring (RSSR) not tight | <ul style="list-style-type: none"> Check and replace the RSSR Check and replace the associated bushing also. |
| | <ul style="list-style-type: none"> Diaphragm on safety valve damaged or faulty | <ul style="list-style-type: none"> Check the diaphragm. Replace the diaphragm. Check the intake line for operating fluid contamination. |
| | <ul style="list-style-type: none"> Operating fluid loss due to operating conditions – no oil mist filter | <ul style="list-style-type: none"> Install an OME. |
| Unusual noises during operation | <ul style="list-style-type: none"> Noise reduction is contaminated | <ul style="list-style-type: none"> Clean the noise reduction or replace it. |
| | <ul style="list-style-type: none"> Pumping system is contaminated or damaged | <ul style="list-style-type: none"> Clean and maintain the vacuum pump. Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> Motor bearing is faulty | <ul style="list-style-type: none"> Change the motor. Contact Pfeiffer Vacuum Service. |

Tbl. 11: Troubleshooting for rotary vane pumps

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](#).

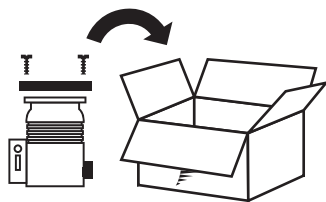


4. You will receive an acknowledgment from Pfeiffer Vacuum.

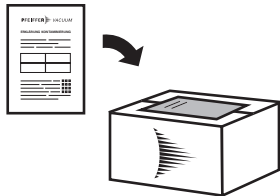
PFEIFFER VACUUM

Submission of contaminated products

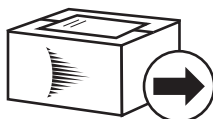
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



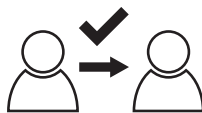
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package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

PFEIFFER VACUUM

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

12 Spare parts

12.1 Ordering spare part packages

Ordering spare part packages

- ▶ Have the vacuum pump part number to hand, along with other details from the rating plate if necessary.
- ▶ Install original spare parts only.
- ▶ When ordering the inspection set, observe the respective part number of the diaphragm pump.

| Spare part package | Order number | | | |
|---------------------------------------------------|---------------|---------------|---------------|---------------|
| | DuoVane 6 | DuoVane 12 | DuoVane 18 | DuoVane 22 |
| Spare part package maintenance level 3 / overhaul | PK E32 203 -T | PK E32 202 -T | PK E32 201 -T | PK E32 200 -T |
| Operating fluid spare part package | PK E39 200 -T | PK E39 200 -T | PK E39 200 -T | PK E39 200 -T |
| Gas ballast valve spare part package | PK E39 205 -T | PK E39 205 -T | PK E39 205 -T | PK E39 205 -T |
| Diaphragm spare part package | PK E34 210 -T | PK E34 210 -T | PK E34 210 -T | PK E34 210 -T |
| Radial shaft seal ring (RSSR) spare part package | PK E36 200 -T | PK E36 200 -T | PK E36 200 -T | PK E36 200 -T |
| Seals spare part package | PK E30 203 -T | PK E30 202 -T | PK E30 201 -T | PK E30 200 -T |
| Valves and springs spare part package | PK E34 203 -T | PK E34 202 -T | PK E34 201 -T | PK E34 200 -T |
| Sight glass spare part package | PK E39 206 -T | PK E39 206 -T | PK E39 206 -T | PK E39 206 -T |
| Vane spare part package | PK E38 203 -T | PK E38 202 -T | PK E38 201 -T | PK E38 200 -T |

Tbl. 12: Spare part packages

12.2 Contents of spare part packages

- Spare part package maintenance level 3 / overhaul
 - Radial shaft seal ring (RSSR) spare part package
 - Seals spare part package
 - Valves and springs spare part package
 - Sight glass spare part package
 - Vane spare part package
 - Small parts (e.g. silencer nozzle, filler and drain screws, etc.)
- Operating fluid spare part package
 - Operating fluid P3 (1.4 liters)
- Gas ballast valve spare part package
 - O-rings and leaf spring
- Diaphragm spare part package
 - Cap seal for cleaning oil chamber
 - Diaphragm for the vacuum safety valve
- Radial shaft seal ring (RSSR) spare part package
 - RSSR, bushing, and o-rings
 - Coupling spider
- Seals spare part package
 - All O-rings of the vacuum pump
- Valves and springs spare part package
 - Diaphragm for the vacuum safety valve
 - Wear parts of the gas ballast valve
 - Wear parts of the vacuum safety valve
 - Vane springs
- Sight glass spare part package
 - Sight glass plate
 - O-ring for sight glass plate
- Vane spare part package
 - Vane

13 Accessories



View the [range of accessories for rotary vane pumps](#) on our website.

13.1 Accessory information

Dust separator

Protects the pump against particles from the processes

Condensate separator

Protects the vacuum pump from liquids from intake line or condensate return flow from the exhaust line

Oil mist filter

Prevents oil mist from escaping

Oil return

Guides separated operating fluid from the oil mist eliminator back into the rotary vane pump

Activated carbon filter

When mounted on the intake side, protects the vacuum pump and operating fluid against gaseous inorganic contaminants such as acids and lyes

Catalyser trap

Prevents backflow of operating fluid vapors (mineral oil only) into the vacuum equipment by separating the oil molecules into CO₂ and water

Sorption trap

Uses an absorption medium with an extremely porous surface to absorb water or hydrocarbon from the pumped gas

Cooling trap

For cooling, e.g. with liquid nitrogen. Prevents backflow of any operating fluid vapors through condensation and protects the vacuum pump and operating fluid against vapors from the process

13.2 Ordering accessories

| Selection field | Part number |
|-----------------------------------------------------------------------------------|-----------------|
| Sorption trap ST 25 S | 104107 |
| Oil mist separator OME 25 S | 104200 |
| HV angle valve, DN 25 ISO-KF, manually operated, 304/FKM, "A"-dim. 50 mm | ESV-S03100 |
| Cold Trap, LN ₂ , angled, DN 25 ISO-KF, 4" body, stainless steel / FKM | FTNA-4-1002-NWB |
| Push-in L-fitting, M5 A for tube 6 mm, with sealing NBR | P 0996 105 |
| Oil return unit from OME 16M / 25M / 25ML in Duo Vane 6, 12, 18, 22 | PK 150 560 -T |
| KAS 25, condensate separator for pumping speeds up to 12 m ³ /h | PK Z10 032 |
| FAK 025, activated carbon filter | PK Z30 006 |
| OME 25 M, oil mist separator for pumping speeds up to 12 m ³ /h | PK Z40 157 |
| SAS 25, dust separator, DN 25 ISO-KF | PK Z60 508 |
| SAS 25 SB, dust separator, DN 25 ISO-KF | PK Z60 527 |
| URB 025, catalytic trap, 230 V | PT U10 760 |
| URB 025, catalytic trap, 115 V | PT U10 761 |

Tbl. 13: Accessories DuoVane 6 / DuoVane 12

| Selection field | Part number |
|-----------------------------|-------------|
| Sorption trap ST 25 S | 104107 |
| Oil mist separator OME 25 S | 104200 |

| Selection field | Part number |
|--------------------------------------------------------------------------------|-----------------|
| HV angle valve, DN 25 ISO-KF, manually operated, 304/FKM, "A"-dim. 50 mm | ESV-S03100 |
| Cold Trap, LN2, angled, DN 25 ISO-KF, 4" body, stainless steel / FKM | FTNA-4-1002-NWB |
| Push-in L-fitting, M5 A for tube 6 mm, with sealing NBR | P 0996 105 |
| Oil return unit from OME 16M / 25M / 25ML in Duo Vane 6, 12, 18, 22 | PK 150 560 -T |
| KAS 25 L, condensate separator for pumping speeds up to 35 m ³ /h | PK Z10 033 |
| FAK 025, activated carbon filter | PK Z30 006 |
| OME 25 ML, oil mist separator for pumping speeds of up to 30 m ³ /h | PK Z40 158 |
| SAS 25, dust separator, DN 25 ISO-KF | PK Z60 508 |
| SAS 25 SB, dust separator, DN 25 ISO-KF | PK Z60 527 |
| URB 025, catalytic trap, 230 V | PT U10 760 |
| URB 025, catalytic trap, 115 V | PT U10 761 |

Tbl. 14: Accessories DuoVane 18 / DuoVane 22

| Consumables | Order number |
|-----------------------|---------------|
| P3, mineral oil, 1 l | PK 001 106 -T |
| P3, mineral oil, 5 l | PK 001 107 -T |
| P3, mineral oil, 20 l | PK 001 108 -T |

Tbl. 15: Consumables

14 Technical data and dimensions

14.1 General

Basis for the technical data of Pfeiffer Vacuum rotary vane pumps:

- Specifications according to PNEUROP committee PN5
- ISO 21360-1: 2016: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- Leak test to ascertain the integral leakage rate according to EN 1779: 1999 technique A1; with 20 % helium concentration, 10 s measurement duration
- Sound pressure level according to ISO 3744, class 2

| | 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 |

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

Tbl. 16: 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. 17: Conversion table: Units for gas throughput

14.2 Substances in contact with media

| Pump parts | Substances in contact with media |
|-------------------------------|------------------------------------|
| Housing | Aluminum |
| Inlet/exhaust flange | Aluminum |
| Sight glass | Float glass |
| Stator/stator flange | Cast iron |
| Rotor | Cast iron |
| Vane | Artificial resin compound, polymer |
| Exhaust valve | Elastomer, stainless steel |
| Vacuum safety valve | Aluminum, stainless steel, FKM |
| Gas ballast valve | Aluminum, stainless steel, FKM |
| Screws | Galvanized steel, stainless steel |
| Seals | FKM |
| Radial shaft seal ring (RSSR) | FKM |

Tbl. 18: Materials that make contact with the process media

14.3 Technical data

| Type designation | DuoVane 6 | DuoVane 12 | DuoVane 18 | DuoVane 22 |
|----------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------|
| Connection flange (in) | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF |
| Connection flange (out) | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF |
| Pumping speed at 50 Hz | 5.5 m ³ /h | 9.5 m ³ /h | 14 m ³ /h | 19.5 m ³ /h |
| Pumping speed at 60 Hz | 6.5 m ³ /h | 11.8 m ³ /h | 16.9 m ³ /h | 22.5 m ³ /h |
| Gas ballast | Yes | Yes | Yes | Yes |
| Ultimate pressure with gas ballast | 1 · 10 ⁻² hPa | 1 · 10 ⁻² hPa | 1 · 10 ⁻² hPa | 1 · 10 ⁻² hPa |
| Ultimate pressure | 3 · 10 ⁻³ hPa | 3 · 10 ⁻³ hPa | 3 · 10 ⁻³ hPa | 3 · 10 ⁻³ hPa |
| Continuous inlet pressure, max. | 50 hPa | 50 hPa | 50 hPa | 50 hPa |
| Leakage rate safety valve | 1 · 10 ⁻⁵ Pa m ³ /s | 1 · 10 ⁻⁵ Pa m ³ /s | 1 · 10 ⁻⁵ Pa m ³ /s | 1 · 10 ⁻⁵ Pa m ³ /s |
| Exhaust pressure, min. | Atmospheric pressure | Atmospheric pressure | Atmospheric pressure | Atmospheric pressure |
| Exhaust pressure, max. | 1500 hPa | 1500 hPa | 1500 hPa | 1500 hPa |
| Rotation speed at 50 Hz | 1500 rpm | 1500 rpm | 1500 rpm | 1500 rpm |
| Rotation speed at 60 Hz | 1800 rpm | 1800 rpm | 1800 rpm | 1800 rpm |
| Ambient temperature | 12 – 40 °C | 12 – 40 °C | 12 – 40 °C | 12 – 40 °C |
| Temperature: Shipping | -25 – 55 °C | -25 – 55 °C | -25 – 55 °C | -25 – 55 °C |
| Continuous gas input temperature, max. | 40 °C | 40 °C | 40 °C | 40 °C |
| Operating altitude, max. | 2000 m | 2000 m | 2000 m | 2000 m |
| Motor type | 3-phase motor | 3-phase motor | 3-phase motor | 3-phase motor |
| Motor protection | Bimetal | Bimetal | Bimetal | Bimetal |
| Protection degree | IP43 | IP43 | IP43 | IP43 |
| Rated power 50 Hz | 0.55 kW | 0.55 kW | 0.55 kW | 0.55 kW |
| Rated power 60 Hz | 0.66 kW | 0.66 kW | 0.66 kW | 0.66 kW |
| Input voltage(s) | 200 – 220 / 240 / 380 – 415 V AC, 50 Hz 280 / 480 V AC (±5 %), 60 Hz | 200 – 220 / 240 / 380 – 415 V AC, 50 Hz 280 / 480 V AC (±5 %), 60 Hz | 200 – 220 / 240 / 380 – 415 V AC, 50 Hz 280 / 480 V AC (±5 %), 60 Hz | 200 – 220 / 240 / 380 – 415 V AC, 50 Hz 280 / 480 V AC (±5 %), 60 Hz |
| Operating fluid | P3 | P3 | P3 | P3 |
| Operating fluid amount | 1.1 l | 1.2 l | 1.3 l | 1.3 l |
| Cooling method | Air (Forced convection) | Air (Forced convection) | Air (Forced convection) | Air (Forced convection) |
| Weight: with motor | – | – | – | – |

Tbl. 19: Technical data, DuoVane with three phase motor

| Type designation | DuoVane 6 | DuoVane 12 | DuoVane 18 | DuoVane 22 |
|----------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Connection flange (in) | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF |
| Connection flange (out) | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF | DN 25 ISO-KF |
| Pumping speed at 50 Hz | 5.5 m ³ /h | 9.5 m ³ /h | 14 m ³ /h | 19.5 m ³ /h |
| Pumping speed at 60 Hz | 6.5 m ³ /h | 11.8 m ³ /h | 16.9 m ³ /h | 22.5 m ³ /h |
| Gas ballast | Yes | Yes | Yes | Yes |
| Ultimate pressure with gas ballast | 1 · 10 ⁻² hPa | 1 · 10 ⁻² hPa | 1 · 10 ⁻² hPa | 1 · 10 ⁻² hPa |
| Ultimate pressure | 3 · 10 ⁻³ hPa | 3 · 10 ⁻³ hPa | 3 · 10 ⁻³ hPa | 3 · 10 ⁻³ hPa |
| Continuous inlet pressure, max. | 50 hPa | 50 hPa | 50 hPa | 50 hPa |
| Leakage rate safety valve | 1 · 10 ⁻⁵ Pa m ³ /s | 1 · 10 ⁻⁵ Pa m ³ /s | 1 · 10 ⁻⁵ Pa m ³ /s | 1 · 10 ⁻⁵ Pa m ³ /s |
| Exhaust pressure, min. | Atmospheric pressure | Atmospheric pressure | Atmospheric pressure | Atmospheric pressure |
| Exhaust pressure, max. | 1500 hPa | 1500 hPa | 1500 hPa | 1500 hPa |
| Rotation speed at 50 Hz | 1500 rpm | 1500 rpm | 1500 rpm | 1500 rpm |
| Rotation speed at 60 Hz | 1800 rpm | 1800 rpm | 1800 rpm | 1800 rpm |
| Ambient temperature | 12 – 40 °C | 12 – 40 °C | 12 – 40 °C | 12 – 40 °C |
| Temperature: Shipping | -25 – 55 °C | -25 – 55 °C | -25 – 55 °C | -25 – 55 °C |
| Continuous gas input temperature, max. | 40 °C | 40 °C | 40 °C | 40 °C |
| Operating altitude, max. | 2000 m | 2000 m | 2000 m | 2000 m |
| Motor type | 1-phase motor | 1-phase motor | 1-phase motor | 1-phase motor |
| Motor protection | Thermal winding protection | Thermal winding protection | Thermal winding protection | Thermal winding protection |
| Protection degree | IP40 | IP40 | IP40 | IP40 |
| Rated power 50 Hz | 0.45 kW | 0.45 kW | 0.55 kW | 0.55 kW |
| Rated power 60 Hz | 0.55 kW | 0.55 kW | 0.65 kW | 0.65 kW |
| Input voltage(s) | 100 – 115 / 200 – 230 V AC, 50 Hz 100 – 115 / 200 – 230 V AC (±100 %), 60 Hz | 100 – 115 / 200 – 230 V AC, 50 Hz 100 – 115 / 200 – 230 V AC (±10 %), 60 Hz | 115 – 115 / 200 – 230 V AC, 50 Hz 100 – 115 / – 230 V AC (±10 %), 60 Hz | 100 – 115 / 200 – 230 V AC, 50 Hz 100 – 115 / 200 – 230 V AC (±10 %), 60 Hz |
| Operating fluid | P3 | P3 | P3 | P3 |
| Operating fluid amount | 1.1 l | 1.2 l | 1.3 l | 1.3 l |
| Cooling method | Air (Forced convection) | Air (Forced convection) | Air (Forced convection) | Air (Forced convection) |
| Weight: with motor | – | – | – | – |

Tbl. 20: Technical data, DuoVane with single phase motor

14.4 Dimensions

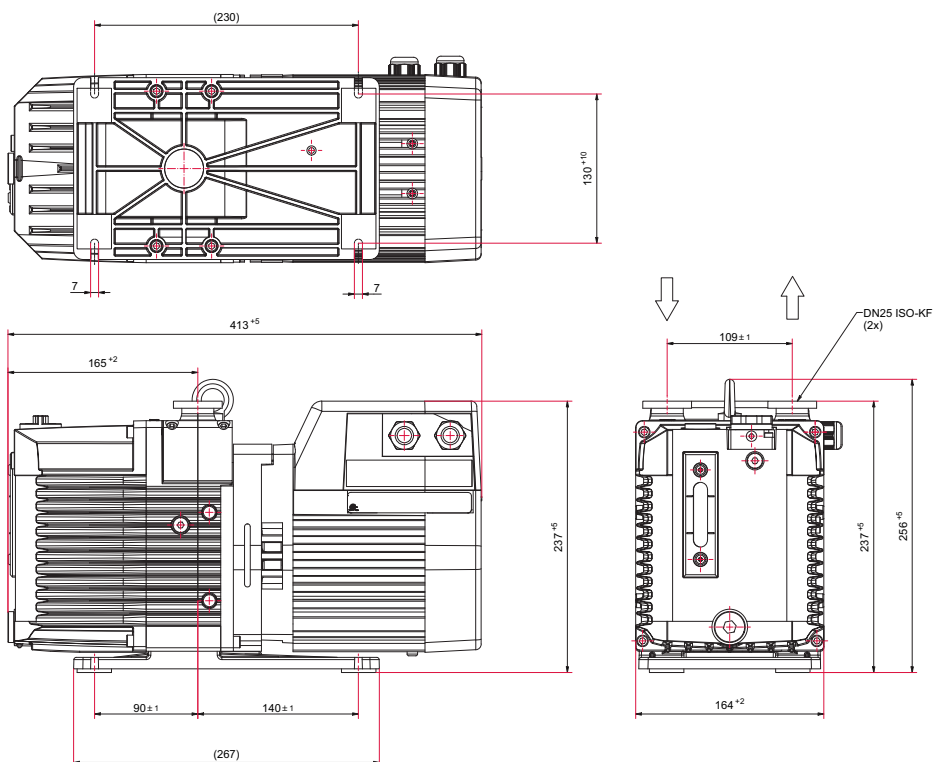


Fig. 26: Dimensions DuoVane 6 with three phase motor
Dimensions in mm

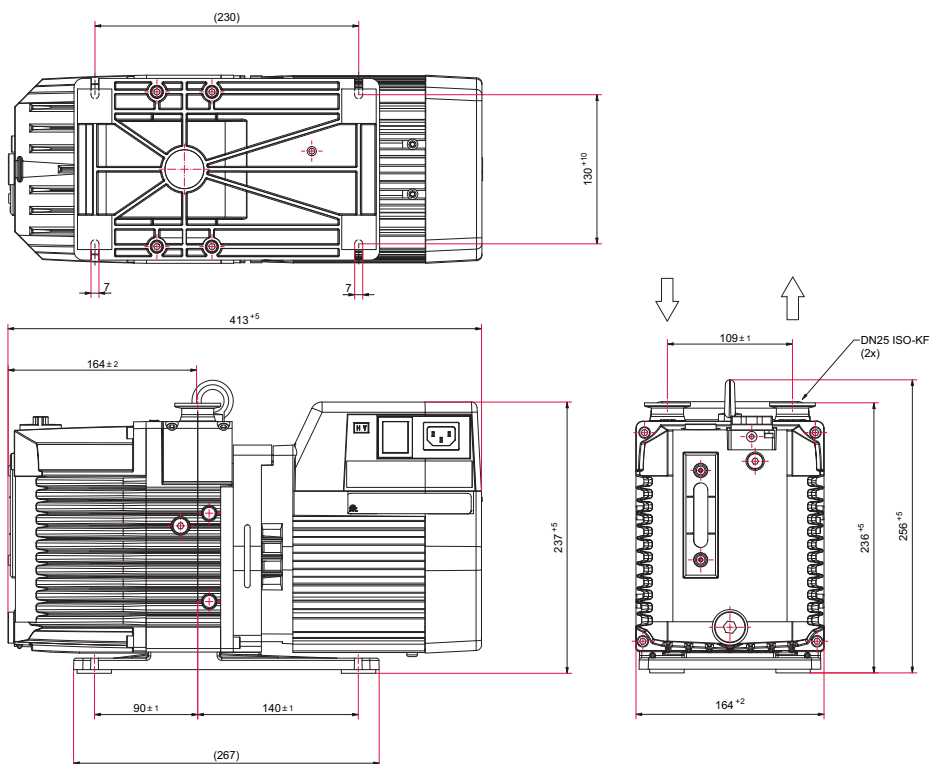


Fig. 27: Dimensions DuoVane 6 with single-phase motor
Dimensions in mm

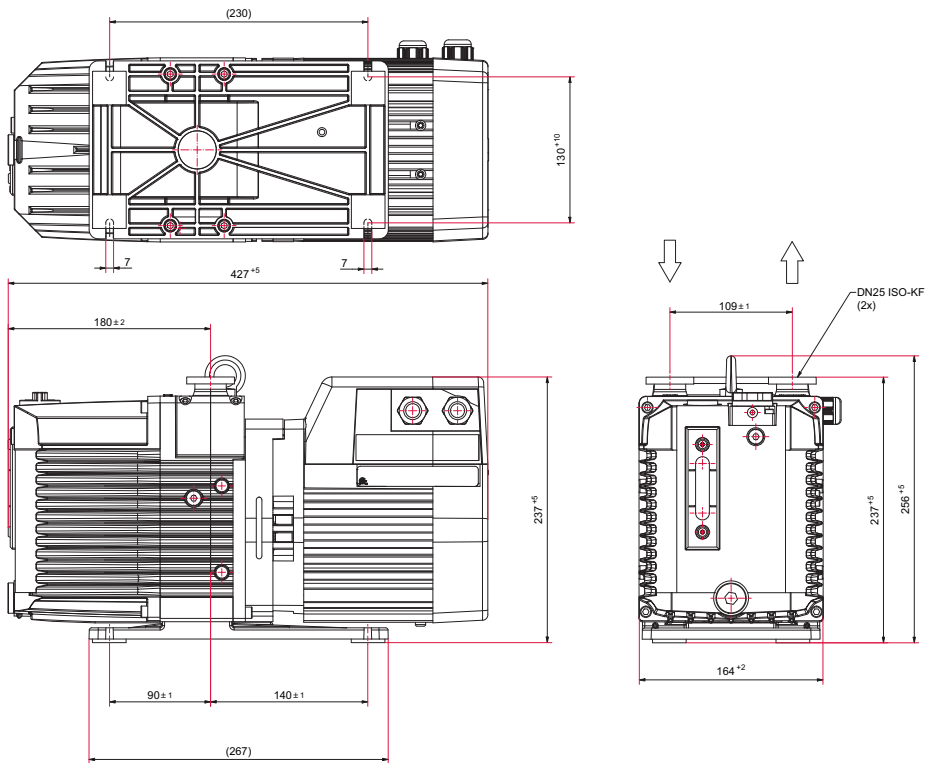


Fig. 28: Dimensions DuoVane 12 with three phase motor
Dimensions in mm

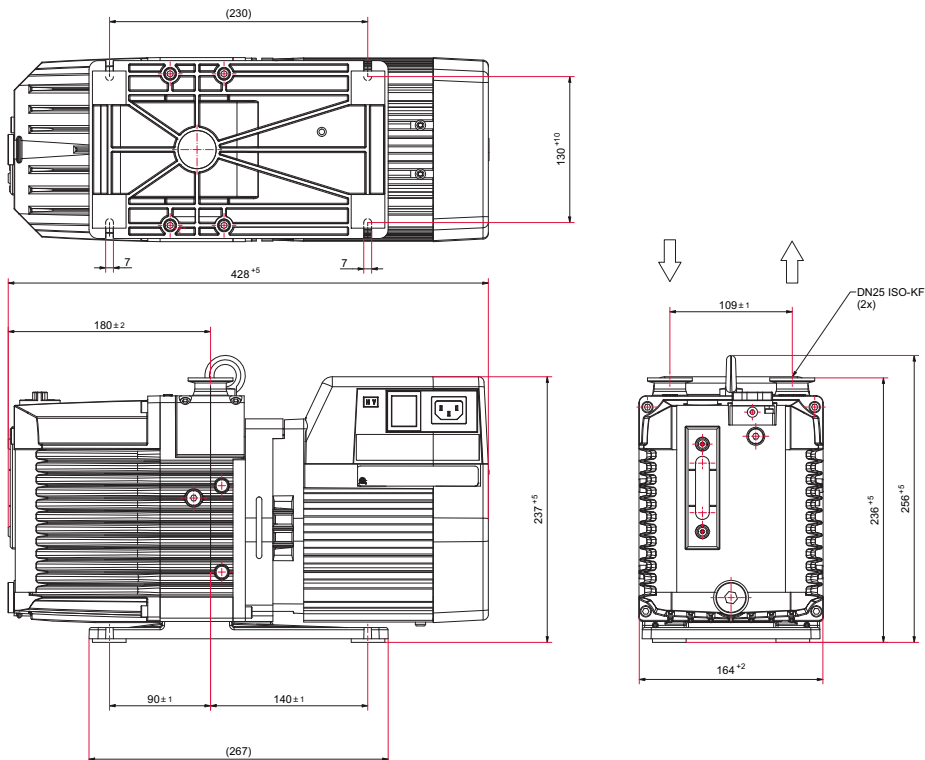


Fig. 29: Dimensions DuoVane 12 with single-phase motor
Dimensions in mm

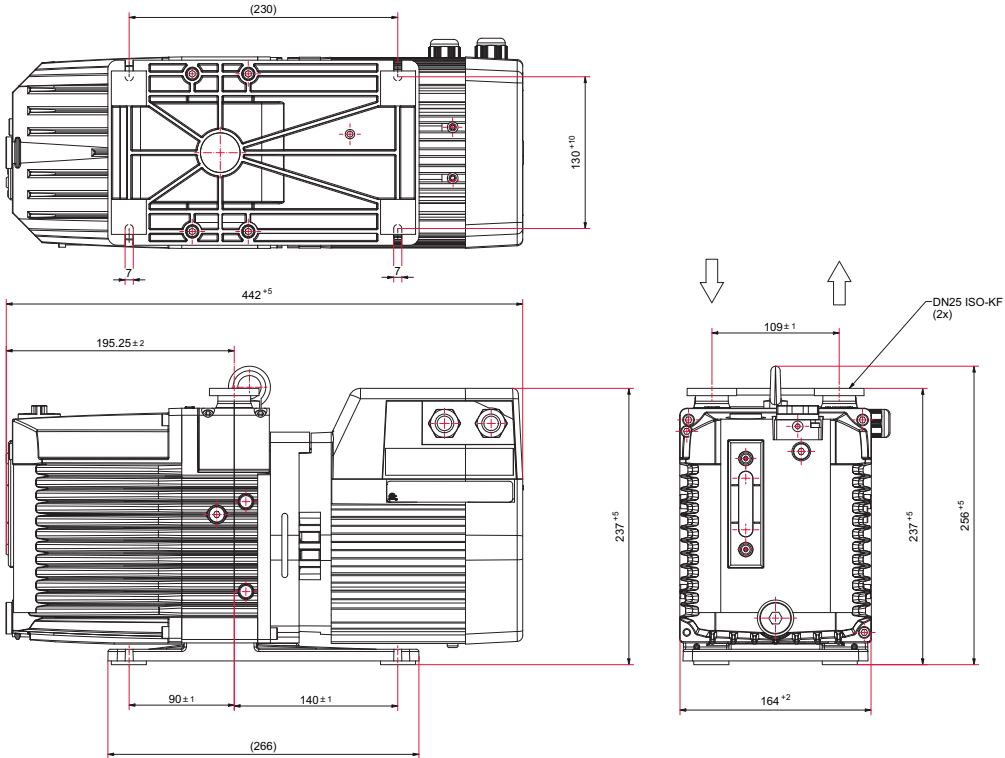


Fig. 30: Dimensions DuoVane 18 with three phase motor
Dimensions in mm

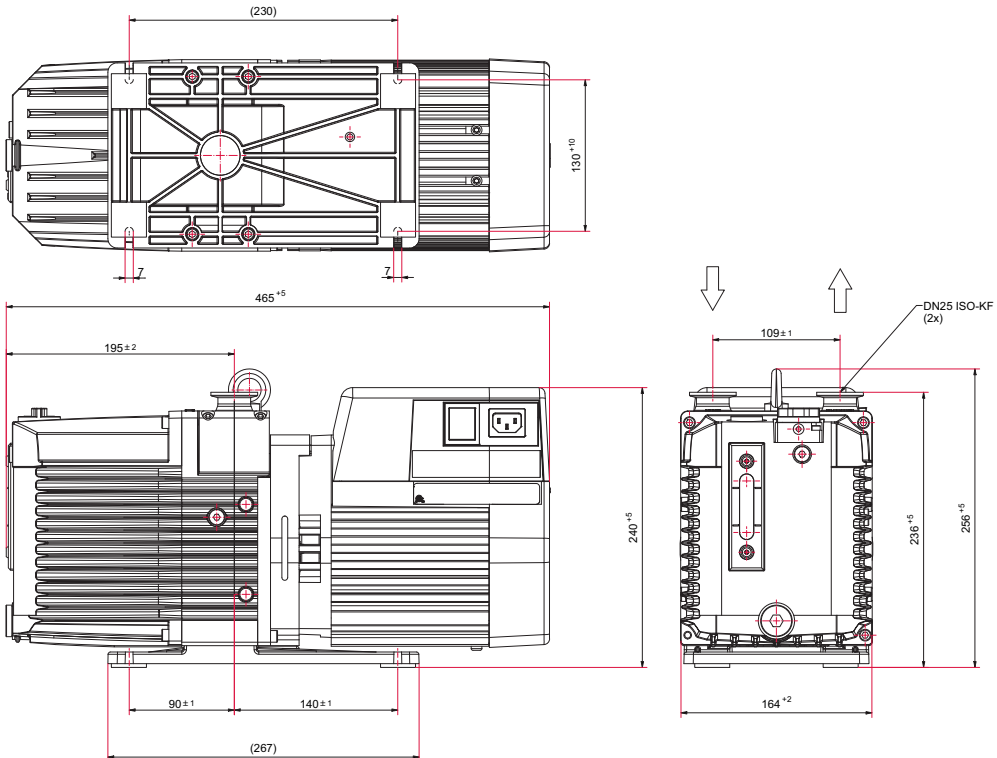


Fig. 31: Dimensions DuoVane 18 with single-phase motor
Dimensions in mm

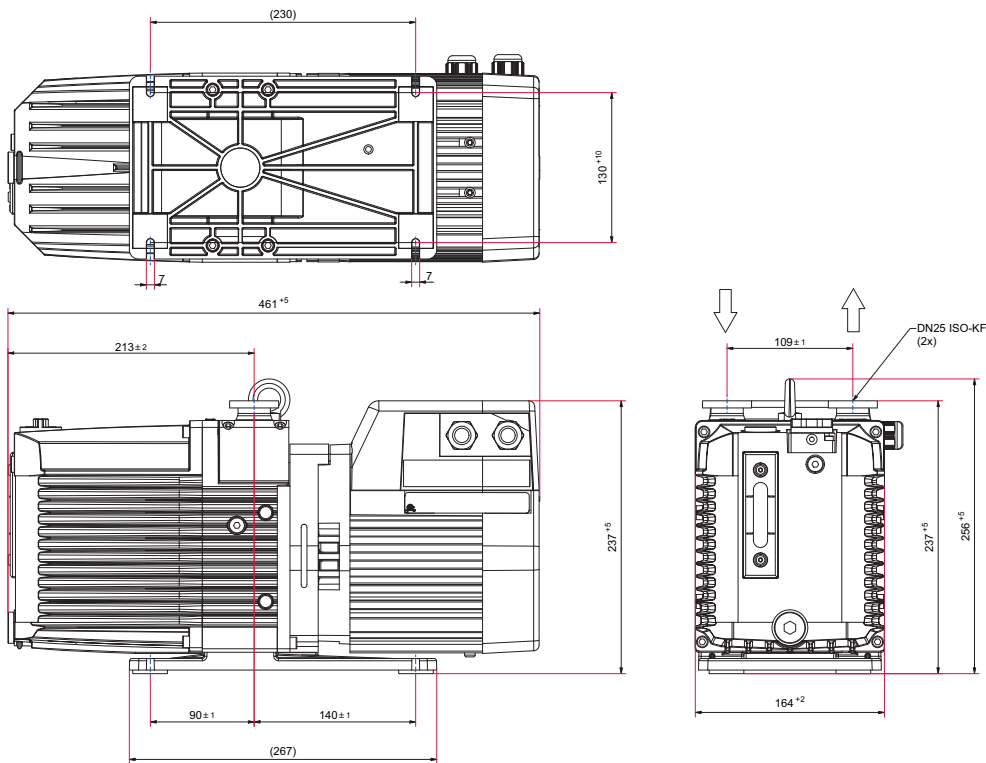


Fig. 32: Dimensions DuoVane 22 with three phase motor
Dimensions in mm

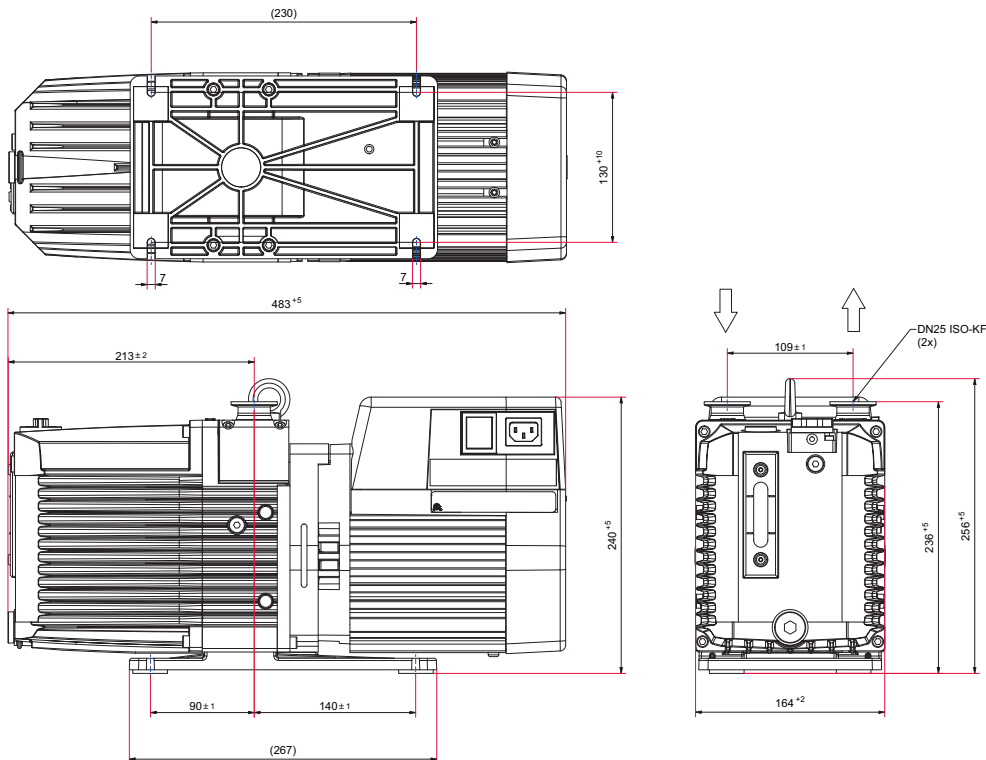


Fig. 33: Dimensions DuoVane 22 with single-phase motor
Dimensions in mm

EC Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

Rotary vane pump

DuoVane 6
DuoVane 12
DuoVane 18
DuoVane 22

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

Machinery 2006/42/EC (Annex II, no. 1 A)

Electromagnetic compatibility 2014/30/EU

Restriction of the use of certain hazardous substances 2011/65/EU

Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU

Harmonized standards and applied national standards and specifications:

| | |
|-----------------------|---------------------------|
| DIN EN ISO 12100:2011 | DIN EN 61010-1:2020 |
| DIN EN 1012-2: 2011 | DIN EN IEC 61000-6-2:2019 |
| DIN EN ISO 13857:2020 | DIN EN IEC 61000-6-4:2020 |
| DIN ISO 21360-1:2016 | DIN EN ISO 2151:2009 |
| ISO 21360-2:2020 | DIN EN IEC 63000:2019 |

The authorized representative for the compilation of technical documents is Dr. Adrian Wirth, Pfeiffer Vacuum GmbH, Berliner Strasse 43, 35614 Asslar, Germany.

Signature:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

Asslar, 2024-04-18



UK Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

Rotary vane pump

DuoVane 6
DuoVane 12
DuoVane 18
DuoVane 22

We hereby declare that the listed product satisfies all relevant provisions of the following **British Directives**.

Supply of Machinery (Safety) Regulations 2008

Electromagnetic Compatibility Regulations 2016

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Applied standards and specifications:

| | |
|------------------------|---------------------------------------------|
| EN ISO 12100:2010 | EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 |
| EN 1012-2:1996+A1:2009 | EN IEC 61000-6-2:2019 |
| EN ISO 13857:2019 | EN IEC 61000-6-4:2019 |
| ISO 21360-1:2012 | EN ISO 2151:2:2008 |
| ISO 21360-2: 2012 | EN IEC 63000:2018 |

The manufacturer's authorized representative in the United Kingdom and the authorized agent for compiling the technical documentation is Pfeiffer Vacuum Ltd, 16 Plover Close, Interchange Park, MK169PS Newport Pagnell.

Signature:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

Asslar, 2024-04-18

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