

UnoLine™

DuoLine™

Rotary Vane Pump



**UNO/DUO 2.5, DUO 2.5 C
UNO 5**

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1 Preliminary remarks

1.1 Validity

This operating manual is for customers of Pfeiffer Vacuum. It describes the functioning of the designated product and provides the most important information for safe use of the unit. The description follows applicable EU guidelines. All information provided in this operating manual refer to the current state of the product's development. The documentation remains valid as long as the customer does not make any changes to the product.

Up-to-date operating instructions can also be downloaded from www.pfeiffer-vacuum.net.

Applicable documents

| UNO/DUO 2.5, UNO 5 | Operating instructions |
|---|----------------------------|
| Safety information for vacuum pumps "Safety Guide" | PT 0300 BN* |
| Declaration of Conformity | Part of this document |
| Operating instructions for accessories (order-specifically) | see section "accessories"* |

*also available via www.pfeiffer-vacuum.net

1.2 Conventions

Safety instructions

The safety instructions in Pfeiffer Vacuum operating manuals are the result of risk evaluations and hazard analyses and are oriented on international certification standards as specified by UL, CSA, ANSI Z-535, Semi-S1, ISO 3864 and DIN 4844. In this document, the following hazard levels and information are considered:

| DANGER |
|---|
| <p>Immediate danger Death or very severe injuries occur.</p> |

| WARNING |
|--|
| <p>Possible danger Death or injuries may occur.</p> |

| CAUTION |
|--|
| <p>Possible danger Medium to slight injuries may occur.</p> |

| NOTE |
|--|
| <p>Command or note Command to perform an action or information about properties, the disregarding of which may result in damage to the product.</p> |

Pictograph definitions



Prohibition of an action or activity in connection with a source of danger, the disregarding of which may result in serious accidents.



Warning of a displayed source of danger in connection with operation of the unit or equipment.



Command to perform an action or task associated with a source of danger, the disregarding of which may result in serious accidents.

Instructions in the text

→ Work instruction: here you have to do something.

Abbreviations used

C version: Corrosive gas version

Symbols used

The following symbols are used consistently throughout the diagrams.

- Ⓟ Vacuum flange
- Ⓛ Exhaust flange
- Ⓜ Gas ballast valve
- ⚡ Power connection

2 Safety

2.1 Safety precautions



NOTE

Duty to inform

Each person involved in the installation, operation or maintenance of the vacuum pump must read and observe the safety-related parts of these operating instructions.

- Absolute observe the safety information for vacuum pumps (PT 0300 BN) !
- The operator is obligated to make operating personnel aware of dangers originating from the vacuum pump, the pumped medium and the entire system.

- Do not expose any body parts to the vacuum.
- Observe the safety and accident prevention regulations.
- Check regularly that all safety precautions are being complied with.
- Do not carry out any unauthorised modifications or conversions to the pumps.
- Depending on the operating and ambient conditions, the surface temperature of the pumps may rise above 70 °C. Use suitable finger guards if necessary.
- When returning the pump to us please note the instructions in the Service section.

2.2 Proper use



NOTE

CE conformity

The manufacturer's declaration of conformity becomes invalid if the operator modifies the original product or installs additional components.

- Following installation into a plant and before commissioning, the operator must check the entire system for compliance with the valid EU directives and reassess it accordingly.

- The vacuum pump may only be used to generate a vacuum.
- Installation, operating and maintenance regulations must be complied with.
- Using accessories not mentioned in this manual is not permitted without authorisation from Pfeiffer Vacuum.

2.3 Improper use

Improper use will cause all claims for liability and guarantees to be forfeited. Improper use is deemed to be all use for purposes deviating from those mentioned above, especially:

- Pumping of corrosive gases (with exception of corrosiv gas versions).
- Pumping of explosive media.
- Operation of the pump in potentially explosive areas.
- Pumping of gases containing impurities such as particles, dusts and condensate; note the vapour compatibility levels of the pump.
- Pumping of substances that tend to sublime.
- Use of the vacuum pump to generate pressure.
- Pumping of liquids.
- Connection to pumps or units which are not suitable for this purpose according to their operating instructions.
- Connection to units which have touchable and voltage carrying parts.

3 Transport and storage

3.1 Transport

Transport instructions

- Remove the locking cap from the vacuum and exhaust flange immediately before connecting!
 - Check the cone strainer, paying attention to the o-ring.
- Use only the handle on the top side of the pump to lift the pump.

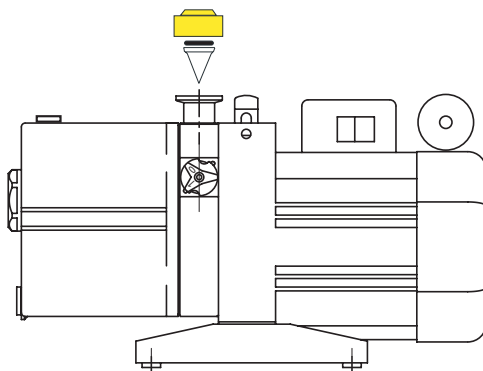


Fig. 1: Transporting the pump

3.2 Storage

- Check that all the openings on the pump are securely closed.
- Store the pump in a cool, dry place; preferably at room temperature (approx. 20°C).
 - For a longer period of storage, seal the pump in a PE bag with drying agents enclosed.
 - For a period of storage longer than one year, it is recommended to carry out maintenance and change the operating fluid.

4 Product description

4.1 Product identification

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available and use it:

- Pump model and model number
- Type and amount of operating fluid
- Date of manufacture

Please find the voltage range and motor-related data on the separately attached motor rating plate.

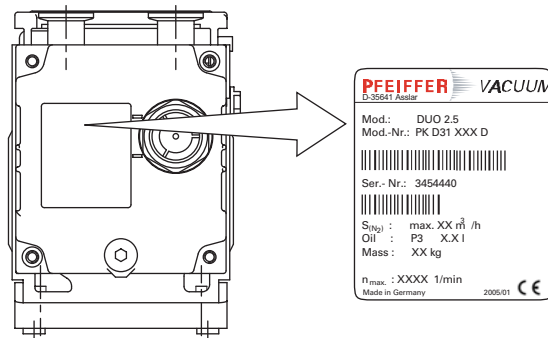


Fig. 2: Product identification on the rating plate

Scope of delivery

- Pump with motor and power cord
- Operating fluid P3 (for standard pump)
- Cone strainer and centering ring/centering ring with nozzle with O-rings
- Locking cap for vacuum and exhaust flange
- Operating instructions

Differences between the pump types

| Pump type | Pump versions |
|----------------|---|
| UNO 5, UNO 2.5 | Standard version of pump <ul style="list-style-type: none"> • Centering ring at the exhaust flange |
| DUO 2.5 | Standard version of pump <ul style="list-style-type: none"> • Centering ring with nozzle at the exhaust flange |
| DUO 2.5 C | C version of pump; differences from the standard version: <ul style="list-style-type: none"> • Operating fluid F4 • Gas ballast valve with dosable flushing gas connection • Vane material different • Leak rate $\leq 1 \cdot 10^{-5}$ mbar * l/s |

4.2 Design and function

Vacuum pumps of the UNO/DUO series are oil-sealed, single-/two-stage rotary vane vacuum pumps. The vacuum pumps are equipped with a high vacuum safety valve that vacuum seals the vacuum chamber and vents the pump at the same time when the pump is at standstill.

The pumps are suitable for use in laboratories to generate coarse and medium vacuums and can also be used as backing pumps on diffusion or turbomolecular pumps.

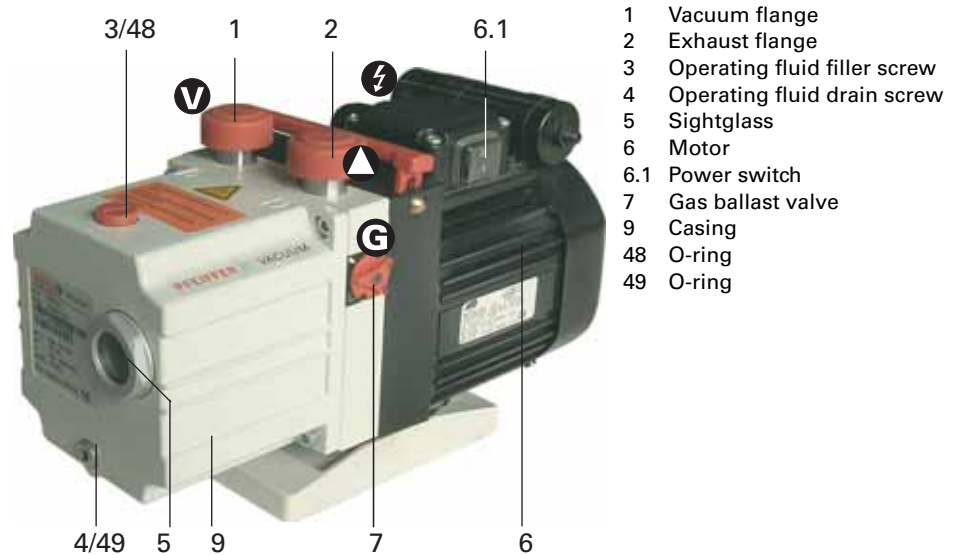


Fig. 3: UNO/DUO 2.5 Rotary vane vacuum pump

5 Installation

5.1 Setting up the pump

Installation location

Observe the following requirements when setting up the pump:

- Note the load-bearing capacity of the mounting surface
- Maximum angle of inclination 10° to each side
- Maximum erection height 2000 m N.N.
- Permissible ambient temperature: +12 ... +40°C
- Maximum relative humidity 85%

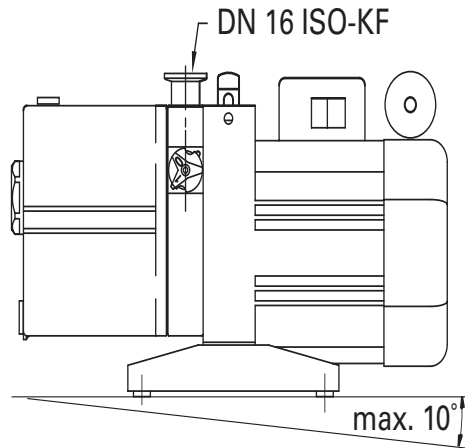


Fig. 4: Setting up

- Fill up with operating fluid before operating the first time (see p. 9, chap. 5.2).
 - Amount and type according to rating plate
- Always place the pump on a firm, even surface.
- Where stationary installation is involved, anchor the pump on site; if necessary, exchange the base for one with mounting holes (on request).
- When installing the pump in a closed housing, ensure there is sufficient air circulation.
 - Sightglass and gas ballast valve must be visible and readily accessible.
 - Voltage and frequency information given on the motor rating plate must be visible.

5.2 Filling up the operating fluid

The type and amount of operating fluid should be visible on the pump's rating plate for every rotary vane vacuum pump.

The delivery consignment for the **standard pump** contains sufficient operating fluid for one filling. Pumps for special applications (e.g. for pumping corrosive gases) can be operated with other operating fluids. These operating fluids must be ordered separately, and using them requires prior authorisation from Pfeiffer Vacuum.

Permissible operating fluids

- P3 (Standard operating fluid)
- F4 (Operating fluid for corrosive gas versions)
- D1 (for special applications and higher operating temperature)
 - Final pressure of measurement, depending on the type of gas: $< 5 \cdot 10^{-2}$ mbar



NOTE

Guarantees relating to attainment of final pressures and trouble free functioning of the pump apply only providing one of the permissible operating fluids is used.

Filling up the operating fluid

- Unscrew operating fluid filler screw.
- Fill up operating fluid.
 - Correct filling level during operations: Middle of sightglass
 - Minimum filling level: lower sightglass marking at the casing

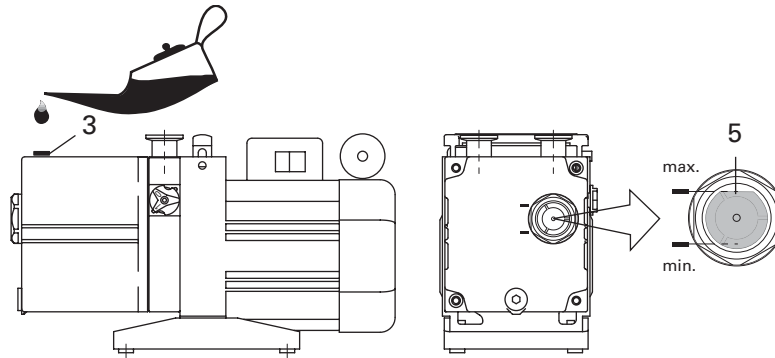


Fig. 5: Filling up the operating fluid

- Screw in operating fluid filler screw 3.
- Check operating fluid level only when the pump is warm and running; close
 - vacuum flange and gas ballast valve to do so.
 - Check operating fluid daily in non-stop operation, otherwise whenever the pump is switched on. Refilling is possible when the pump is in final vacuum operation.



WARNING

Toxic vapours!

Danger of poisoning when igniting and heating synthetic operating fluids (e.g. F4/F5) above 300°C.

- Observe the application instructions of the operating fluid manufacturer.
- Do not allow operating fluid to make contact with tobacco products; observe safety precautions when handling chemicals.

5.3 Connecting the vacuum side

- Before attaching the piping at the vacuum flange remove locking cap and insert protective strainer with the respective O-ring.
- The connection between the pump and the recipient should be kept as short as possible.
 - Depending on the pump type, use metallic hoses or PVC hoses with flange connections.
 - Separators, filters etc. may be installed upstream to protect the pump (see accessories). However, please observe the loss of pumping capacity due to the conductivity of the accessories.

If a protective strainer is inserted into the intake port, the suction capacity loss is negligible.

5.4 Connecting the exhaust side

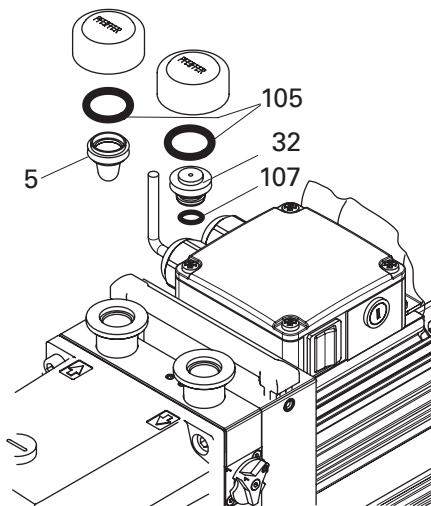


CAUTION

High pressure in the exhaust line!

Danger of damage to the seals and danger of the pump bursting.

- Install the line without shut-off valves on the exhaust side.
- If there is danger of a build-up of excess pressure (> 1500 mbar abs.) in the lines, observe all official accident prevention safety regulations.
- If the exhaust gases are being extracted, the exhaust pressure must be at least 250 mbar greater than the pressure at the intake side.



- 5 Cone strainer
- 32 Centering ring/Centering ring with nozzle
- 105 O-ring
- 107 O-ring

- Before attaching the piping at the exhaust flange remove locking cap and insert centering ring/centering ring with nozzle with the respective O-rings.
- Choose the cross-section of the exhaust line to be at least the size of the nominal connection diameter of the vacuum pump's exhaust connection.
- Piping to the pump must be suspended or supported.
 - Forces from the piping system must not be allowed to act on vacuum pumps.
- Lay piping from the pump, sloping downward so that no condensate can flow back into the pump; otherwise fit a condensate separator.
 - If an air trap is created in the system then a device for draining condensation water must be provided at the lowest point.



WARNING

Emission of toxic substances from the exhaust!

Danger of poisoning from emitted gases or vapours, which can be detrimental to health and/or can pollute the environment, depending on the particular application.

- Comply with the applicable regulations when working with toxic substances.
- Only officially approved filter systems may be used to separate out these substances.

5.5 Connecting to the mains power supply



CAUTION

Excess voltage!

Danger of destroying the motor.

→ Power connections must comply with local regulations. Voltage and frequency information given on the motor rating plate must correspond to the mains voltage and frequency values.

→ To protect the motor and supply cable in case of malfunction, mains fuse protection must be implemented.

Single phase motors

The vacuum pumps are fitted with a built-in thermal protection switch. Depending on the type of pump, different motor versions with a power cord are possible:

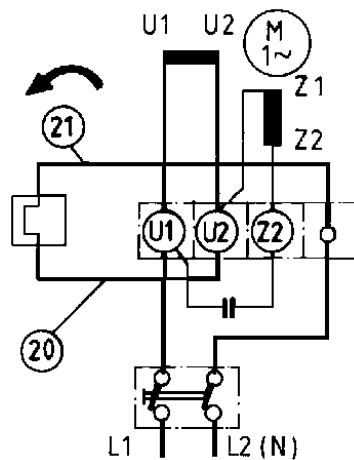


Fig. 6: Motor circuit diagram with switch

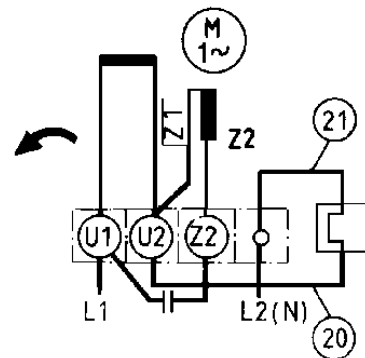


Fig. 7: Motor circuit diagram without switch

Deliverable motor versions

| Motor volt- age [V] | Frequency [Hz] | Nominal cur- rent [A] | Recommended fuse, slow [A] | Cable/plug version |
|----------------------------|-------------------|--------------------------|-------------------------------|--|
| 95 ... 105 100 ... 115 | 50 60 | 3.2 3.8 | 6 6 | with 2 m cable, Japanese plug und UL certificate (only for winding insulation) |
| 100 ... 105 110 ... 130 | 50 60 | 3.2 3.6 | 6 6 | mit 2 m cable, USA plug and UL certificate (for motor) |
| 190 ... 210 200 ... 220 | 50 60 | 1.6 2 | 4 4 | mit 2 m cable, without plug and UL certificate (for motor) |
| 220 ... 240 220 ... 240 | 50 60 | 1.4 1.8 | 4 4 | with 2 m cable and three-pin plug |
| 115/230 115/230 | 50 60 | 2.8/1.4 3.6/1.8/ | 6/4 6/4 | with 2 m cable, without plug with UL certificate for motor (motor switchable) |



WARNING

Danger of injury from moving parts!

After power failure or motor shutdown due to overheating, the motor may restart automatically.

- Secure the motor so that it cannot be switched on while any work is being performed on the pump.
- If necessary, dismantle the pump from the installation for inspection.

Motor protection

- To protect the motor in case of malfunction, carry out fuse protection in accordance with the regional regulations.
 - Select a fuse with slow characteristics.

6 Operation

6.1 Before switching on the pump

- Check the operating fluid level in the sightglass.
- Compare the voltage and frequency information on the rating plate with the mains voltage and frequency values.
- Check that the exhaust connection allows free flow (max. permissible pressure 1.5 bar absolute).
 - Activate the shut-off valves in such a way that they open before or at the same time as the pump is started.
- Protect the pump sufficiently from taking in contaminants by means of suitable precautions (e.g. dust filters); if necessary, check operating fluid regularly or replace at shorter intervals.

6.2 Switching on the pump

The pump can be switched on in any pressure range.

No special precautions are necessary when pumping dry gases. In order to attain the lowest possible final pressures, the gas ballast valve should be closed.



CAUTION

Hot surface!

Danger of burns if hot parts are touched. Depending on the operating and ambient conditions, the surface temperature of the pump may rise above 70 °C.

- In this case, use suitable finger guards.

6.3 Pumping condensable vapours

Should the process gases contain condensable gases present at high percentages, the rotary vane pump must be operated with a gas ballast (i.e. with an open gas ballast valve).



CAUTION

Bad final vacuum and damage to the pump!

Danger of condensation and corrosion due to exceeding the water vapour compatibility (see Technical data) during operation without a gas ballast or in case of insufficient supply of flushing gas.

- Only pump vapours when the pump is warm and the gas ballast valve is open.
- When the process has been completed, allow the pump to continue running for about 30 minutes with the vacuum flange closed and the gas ballast open for operating fluid regeneration purposes.

Gas ballast valve, standard version

To avoid condensation in the pump when pumping condensable vapours, air is periodically fed into the working chamber at the beginning of the compression phase via the gas ballast valve 7.

The gas ballast valve is closed when turning to the right to position 0 and open when turning to the left to position 1. Intermediate settings are not possible.

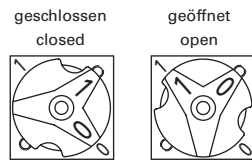
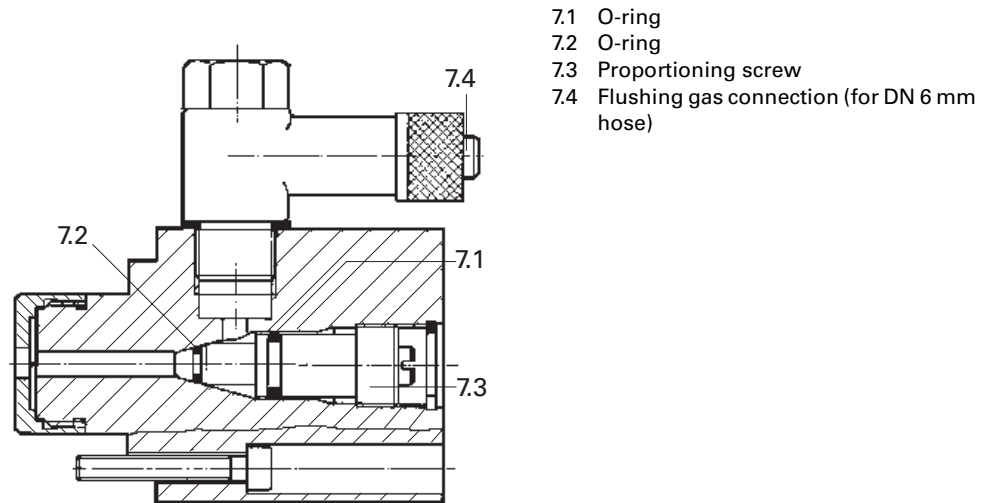


Fig. 8: Standard version of gas ballast valve

Gas ballast valve, corrosive gas version

If the pumping process requires the connection of flushing gas, the C version of the gas ballast with the flushing gas connection must be used.



- 7.1 O-ring
- 7.2 O-ring
- 7.3 Proportioning screw
- 7.4 Flushing gas connection (for DN 6 mm hose)

Fig. 9: Corrosive gas version of gas ballast valve

- Connect flushing gas at the flushing gas connection 7.4.
- Set flushing gas pressure; maximum pressure 1.2 bar (absolute).
 - Select the type and amount of flushing gas depending on the process; consult Pfeiffer Vacuum if necessary.
- Use the proportioning screw 7.3 to set the desired amount of gas.
 - Closed when fully turned to the right; open when fully turned to the left.

Gas ballast valve with solenoid valve

To control the flow of the flushing gas externally, an electromagnetic valve can also be used as an alternative to the versions described above. The valve makes it easier to operate the gas ballast and allows clean air or other gas to be let in in a process-controlled manner.



| CAUTION | |
|---|--|
| Flushing gas pressure higher than allowed endangers the operational reliability of the pump. | |
| The power input of the pump, the temperature and the ejection of operating fluid will increase. | |
| → Observe the maximum permissible flushing gas pressure. | |
| → Set the amount of flushing gas on site; dosing is not possible on the solenoid valve! | |

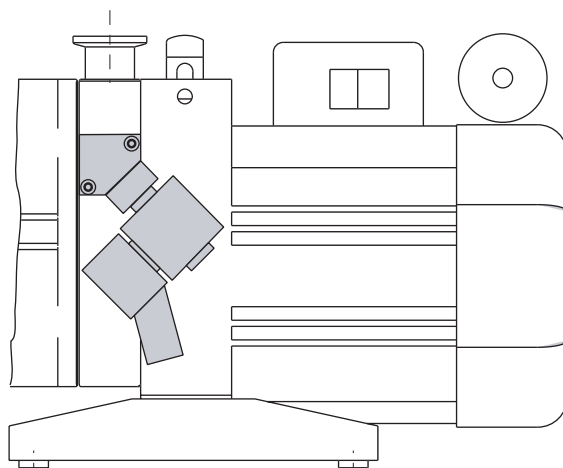


Fig. 10: Solenoid valve for controlling the gas ballast inlet

| Performance data of the solenoid valve | |
|---|--------------------------|
| 2/2 way valve | closed when disconnected |
| Supply voltage | 24 VDC, +/- 10 % |
| Power input | 4 W |
| Socket | Type 2506 |
| Threaded connection of flushing gas | 1/8" inside |
| Flushing gas pressure | max. 1.2 bar (absolute) |
| Amount of flushing gas | max. 250 l/h |

6.4 Switching off the pump

The pump can be switched off in any pressure range.

Rotary vane pumps have an integrated safety valve on the intake side. If the differential pressure between the exhaust side and the intake side is ≥ 250 mbar, then the valve closes automatically and vents the pump when the pump is switched off.

→ Switch the pump off at the mains switch or disconnect from the mains in a secure manner.

Venting the vacuum chamber



CAUTION

Danger of backflow of operating fluid into the intake line!

Contamination of the connected vacuum system!

- Vent the vacuum chamber within 30 s, regardless of the chamber size.
- For a longer venting process, use an additional shut-off valve and shut off the intake line after switching off the pump.

Maintaining the vacuum in the chamber



CAUTION

Danger of backflow of operating fluid into the intake line!

Contamination of the connected vacuum system!

- Because the safety valve of the 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 pump.

7 Maintenance

7.1 Precautions



WARNING

Danger of injury from moving parts!

After power failure or motor shutdown due to overheating, the motor may restart automatically.

- Secure the motor so that it cannot be switched on while any work is being performed on the pump.
- If necessary, dismantle the pump from the installation for inspection.



WARNING

Pump parts may be contaminated from pumped media!

Danger of poisoning due to contact with harmful substances.

- Decontaminate the pump before carrying out any maintenance work.
- In the event of contamination, take suitable safety precautions to prevent your health from being harmed by any dangerous substances.

- Allow the pump to cool to a safe temperature.
- Only dismantle the pump as far as necessary in order to repair defects.
- Dispose of used operating fluid in compliance with local regulations.
- When using synthetic operating fluids or working with toxic substances or substances contaminated with corrosive gases, the relevant instructions governing their use must be observed.
- Use only alcohol or similar agents for cleaning pump parts.

7.2 Changing the operating fluid

The changing interval for the operating fluid depends on the pump applications.



NOTE

Depending on the applications, Pfeiffer Vacuum recommends determining the exact service life of the operating fluid during the first year of operation.

The replacement interval may vary from the guide value specified by Pfeiffer Vacuum depending on the thermal and chemical loads, and the accumulation of suspended particles and condensation in the operating fluid.

- Change the operating fluid at least once every year.
- The level of deterioration of operating fluid P3 can be read off the colour scale in accordance with DIN 51578; request the supplementary sheet PK 0219 BN or download it from the Internet.
- Fill the specimen in a test tube or some similar vessel and test by holding against the light.
- Where discolouration is dark yellow to red brown (equivalent to 4 ... 5 on the scale) change operating fluid.
- Switch off pump.
- Unscrew operating fluid drain screw 4 and drain operating fluid.

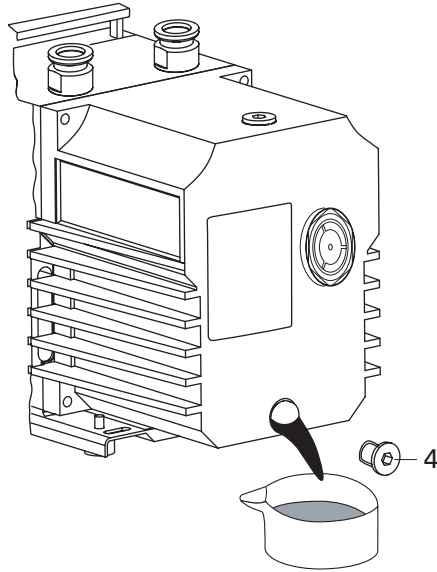


Fig. 11: Draining the operating fluid



| WARNING | |
|----------------|---|
| | Hot operating fluid! |
| | Danger of burns when draining due to contact with skin. |
| | → Wear suitable protective clothing. |



| WARNING | |
|----------------|--|
| | Operating fluid may contain toxic substances from the pumped media! |
| | Danger of poisoning from the emission of harmful substances (radioactive, toxic, etc.) from the operating fluid. |
| | → Wear suitable protective clothing and respirators. |
| | → Dispose of operating fluid according to the local regulations |

- Screw in operating fluid drain screw 4; pay attention to o-ring.
- Allow pump to run for a maximum of 5 seconds with the vacuum flange open.
- Drain off remaining operating fluid.
 - In case of serious contamination, the operating fluid will have to be changed several times (flushing):

Flushing

- Fill up with operating fluid to the middle of the sight glass.
- Operate the pump with the gas ballast open until the pump has warmed up.
- Drain the operating fluid again and check for contamination, flush again if necessary.
- Screw the operating fluid drain screw back in.
- Fill up with operating fluid and check the filling level (see p. 9, chap. 5.2).



| NOTE | |
|-------------|---|
| | Request safety data sheets for operating fluids and lubricants |
| | from Pfeiffer Vacuum or download them from the Internet. |
| | → Dispose of operating fluid according to the local regulations. |

8 Shutdown

8.1 Shutting down for longer periods

Before shutting down the pump, observe the following procedure and adequately protect the pump system against corrosion:

- Switch off pump.
- Change operating fluid (*see p. 18, chap. 7.2*).
- Start the pump and allow the pump to warm up.
- Fill up the pump with new operating fluid to the top edge of the sightglass.
- Close vacuum flange and exhaust flange with locking caps.



CAUTION

Emission of operating fluid!

Danger of the operating fluid being emitted at the exhaust flange if overfilled.

- Drain the operating fluid to the normal level before restarting the pump.

8.2 Restarting the pump

Visually inspect the inner of the pump before taking it into operation. If there is evidence of rust on the parts of the pump which form the housing then do not take it into operation and contact Pfeiffer Vacuum Service.

Depending on how long the pump is taken out of operation, it may be necessary to replace the radial shaft sealing rings. With reference to DIN 7716 and the manufacturer's specifications we recommend replacing the installed elastomer parts after 2 years.

- If drying pearls were inserted then they should be removed now. Improper handling can cause failure of the pump.

8.3 Disposal

Products or parts thereof (mechanical and electrical components, operating fluids, etc.) may cause environmental burden.

- Safely dispose of the materials according to the locally applicable regulations.

9 Malfunctions

Please note the following instructions should the pump malfunction:



CAUTION

Hot surface!

Danger of burns if hot parts are touched. The surface temperature of the pump may rise above 105 °C in case of malfunction.

→ Carry out work on the pump only after it has cooled to a safe temperature.



NOTE

Motor overload!

Depending on the malfunction (e.g. blocking during cold start), the motor may not be sufficiently protected by the built-in thermal protection switch from damage through overheating.

→ Implement an additional network safety device.

9.1 Troubleshooting

| Problem | Possible causes | Remedy |
|---|---|--|
| Pump will not start up | No mains voltage or voltage does not correspond to the motor data | Check mains voltage and mains fuse protection; check motor switch |
| | Pump temperature too low | Warm up pump to $> 12^{\circ}\text{C}$ |
| | Thermal protection switch has responded | Detect and fix cause of overheating; allow pump to cool off if necessary. |
| | Pump system dirty | Clean pump; contact Pfeiffer Vacuum Service if necessary. |
| | Pump system damaged | Clean and overhaul pump; contact Pfeiffer Vacuum Service if necessary. |
| | Motor defective | Replace motor |
| Pump switches off after a while after being started | Thermal protection switch of the motor has responded | Detect and fix cause of overheating; allow motor to cool off if necessary. |
| | Mains fuse protection triggered due to overload (e.g. cold start) | Warm up pump |
| | Exhaust pressure too high | Check opening of exhaust line and exhaust accessories |
| Pump does not attain final pressure | Measurement reading is false | Check gauge, check final pressure without installation connected. |
| | Pump or connected accessories are dirty | Clean pump and check components for contamination. |
| | Operating fluid dirty | Operate pump for a longer period with gas ballast valve open or change operating fluid |
| | Leak in system | Repair leak |
| | Operating fluid filling level too low | Top off operating fluid |
| | Pump damaged | Contact Pfeiffer Vacuum Service. |
| Pumping speed of pump too low | Intake line not well-dimensioned | Keep connections as short as possible and see that cross-sections are sufficiently dimensioned |
| | Exhaust pressure too high | Check opening of exhaust line and exhaust accessories |
| Loss of operating fluid | Swivel gasket leaky | Check tightness; replace gasket if necessary |
| | Radial shaft seal ring leaky | Replace seal ring and check bushing |
| | Operational loss of operating fluid | If necessary, install oil mist filter and oil return unit |
| Unusual operating noises | Silencer dirty | Clean or replace the silencer. |
| | Damage to the pump system | Clean and overhaul pump; contact Pfeiffer Vacuum Service if necessary. |
| | Motor bearing defective | Replace motor; contact Pfeiffer Vacuum Service if necessary |



NOTE

Service work should only be carried out by qualified personal!

Pfeiffer Vacuum is not liable for any damage to the pump resulting from work carried out improperly.

- Take advantage of our service training programs from technical training; additional information at www.pfeiffer-vacuum.net.
- Please state all the information on the pump rating plate when ordering spare parts.

10 Service

Pfeiffer Vacuum offers first-class service!

- Maintenance/repairs on the spot by Pfeiffer Vacuum field service
- Maintenance/repairs in the nearby service center or service point
- Fast replacement with exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information and addresses at: www.pfeiffer-vacuum.net (**Service**).

Maintenance and repairs in the Pfeiffer Vacuum ServiceCenter

The following steps are necessary to ensure a fast, smooth servicing process:

- Download the RMA¹⁾ form and contamination declaration.
- Fill in the RMA form and send it by fax or e-mail to your service address.
- Enclose the RMA confirmation of receipt from Pfeiffer Vacuum in the shipment.
- Fill in the contamination declaration and enclose it in the shipment (required!).
- Dismantle all accessories.
- Drain operating fluid/lubricant.
- Drain cooling medium, if used.
- Send the pump in its original packaging if at all possible.

Returning contaminated vacuum pumps

Units which are microbiologically, explosively or radioactively contaminated will not be accepted by Pfeiffer Vacuum as a matter of principle. Hazardous substances are substances and compounds in accordance with the hazardous goods directive (current version). Should pumps be contaminated or the contamination declaration be missing, Pfeiffer Vacuum will decontaminate the pumps at your cost.

Returning contaminated pumps or units

- Neutralise the pump by flushing it with nitrogen or dry air.
- Close off all openings so that they are air-tight.
- Seal the pump or unit in suitable protective film.
- Only return the pump/unit in a suitable and sturdy transport container.

All service orders are carried out exclusively according to our repair conditions for vacuum units and components.

¹⁾ RMA: Return Material Authorization

11 Spare parts

11.1 Spare parts package

The spare parts packages listed here are only applicable for standard models. Please state all information on the rating plate when ordering spare parts. Other spare parts than those described in this manual must not be used without the agreement of Pfeiffer vacuum.

Set of seals

The set of seals contains all seals including all o-rings of the assembly groups and the subassemblies.

Maintenance kit

The pack contains the o-rings of the operating fluid filler and drain screw for changing the operating fluid. Also the radial shaft seal ring(s) and the o-ring for the casing after cleaning the operating fluid sump is included.

Set of vanes

The pack contains the vanes of the pump stages and the vane springs.

Overhaul kit

The pack contains all wearing parts of the pump to replace the following parts after dismantling the whole pump:

- Set of seals
- Wearing parts of the pumping system
- Wearing parts of the vacuum safety valve
- Wearing parts of the gas ballast valve.

Set of vacuum safety valve

The pack contains the wearing parts of the vacuum safety valve. Also the o-rings between the valve housing and the pumping system and the o-ring of the casing are included.

Set of discharge valves

The pack contains the wearing parts of the discharge valves. Also the wearing parts of the exhaust valve and the o-ring of the casing are included.

Coupling kit

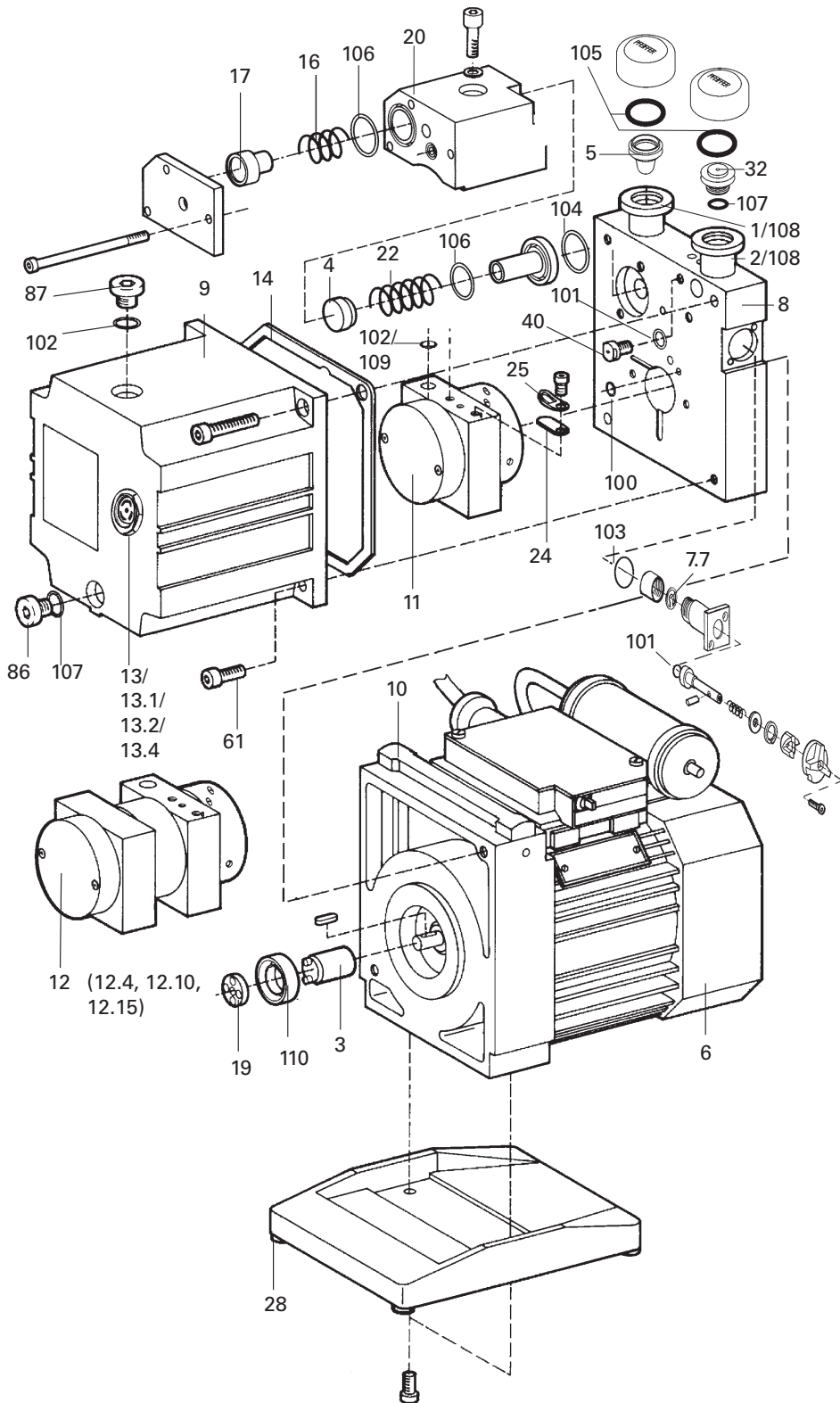
The pack contains the coupling halves, the can and the radial shaft seal rings.

| Standard pump type | Pump type | Set of seals | Set of vanes | Maintenance kit | Overhaul kit | Set of vacuum safety valves | Discharge valves | Coupling kit |
|------------------------------|-----------|---------------|---------------|-----------------|---------------|-----------------------------|------------------|---------------|
| PK D31 707 ... PK D31 712 | UNO 2.5 | PK E00 002 -T | PK E08 003 -T | PK E01 004 -T | PK E02 005 -T | PK E04 001 -T | PK E05 001 -T | PK E06 001 -T |
| PK D41 707 ... PK D41 712 | DUO 2.5 | PK E00 002 -T | PK E08 014 -T | PK E01 004 -T | PK E02 008 -T | PK E04 001 -T | PK E05 001 -T | PK E06 001 -T |
| PK D31 807 ... PK D31 812 | UNO 5 | PK E00 002 -T | PK E08 004 -T | PK E01 004 -T | PK E02 026 -T | PK E04 007 -T | PK E05 010 -T | PK E06 001 -T |

| Spare parts package | No. | Parts according to the exploded view on the following page |
|-----------------------------|---------------|--|
| Set of seals | PK E00 002 -T | 13.1, 14, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109*, 110. |
| Set of vanes | PK E08 003 -T | 12.4, 12.10, 12.15 |
| | PK E08 004 -T | |
| | PK E08 014 -T | |
| Maintenance kit | PK E01 004 -T | 14, 101, 102, 107, 110. |
| Overhaul kit | PK E02 005 -T | PK E00 002 -T, 3, 4, 7.7, 13, 16, 17, 19, 22, 24, 12.4, 12.10, 12.15 |
| | PK E02 008 -T | |
| | PK E02 026-T | |
| Set of vacuum safety valves | PK E04 001 -T | 4, 14, 16, 17, 22, 102, 104, 106. |
| | PK E04 007 -T | 4, 14, 16, 17, 22, 104, 106, 109. |
| Discharge valves | PK E05 001 -T | 14, 24, 25, 102, 104, 106. |
| | PK E05 010 -T | 14, 24, 25, 104, 106, 109. |
| Coupling kit | PK E06 001 -T | 3, 19, 110. |

* only for UNO 5

Exploded view



- 1 Intake connection
- 2 Exhaust connection
- 3 Coupling half
- 4 Valve plate
- 5 Cone strainer
- 6 Motor
- 7 Gas ballast valve
- 7.1 O-ring (Fig. see Chap. 6.3)
- 7.2 O-ring (Fig. see Chap. 6.3)
- 7.7 Valve flap/gas ballast valve
- 8 Support stand
- 9 Casing
- 10 Handle
- 11 Pump system (UNO)
- 12 Pump system (DUO)
- 12.4 Vane
- 12.10 Hydraulic vane
- 12.15 Vane spring
- 13 Sightglass
- 13.1 Sightglass seal (round)
- 13.2 Sightglass seal (oval)
- 13.4 Sightglass seal (oval)
- 14 Seal of casing
- 16 Compression spring
- 17 Hydraulic valve
- 19 Coupling disk
- 20 Valve safety valve housing
- 22 Compression spring
- 24 Valve flap
- 25 Valve trap
- 28 Rubber foot
- 32 Centering ring/Centering ring with nozzle
- 40 Silencer
- 86 Operating fluid drain screw
- 87 Operating fluid filler screw
- 100 O-ring
- 101 O-ring
- 102 O-ring
- 103 O-ring
- 104 O-ring
- 105 O-ring
- 106 O-ring
- 107 O-ring
- 108 O-ring
- 109 O-ring
- 110 Radial shaft seal ring

12 Accessories

| Description | Size | Number | Comments/ (relevant manual) |
|--|---------------|---------------|-----------------------------|
| Oil mist filter ONF 016 | DN 16 ISO-KF | PK Z40 003 | PK 0213 BN |
| Oil return unit of ONF 016 via special gas ballast valve | | PK 194 315 -T | PK 0207 BN |
| Condensate separator KAS 16 | DN 16 ISO-KF | PK Z10 003 | PK 0220 BN |
| Dust separator STP 016 | DN 16 ISO-KF | PK Z60 203 | PK 0120 BN |
| Zeolite trap ZFO 016 | DN 16 ISO -KF | PK Z70 003 | PD 0005 BN |
| Operating fluid P3 | 0.5 litres | PK 001 136 -T | |
| Operating fluid P3 | 1 litre | PK 001 106 -T | |
| Operating fluid P3 | 5 litres | PK001 107 -T | |
| Operating fluid F4 | 0.5 litres | PK 005 886 -T | |
| Operating fluid F4 | 1 litre | PK 005 887 -T | |
| Operating fluid D1 | 1 litre | PK 005 875 -T | |
| Operating fluid D1 | 5 litre | PK 005 876 -T | |
| Operating fluid D1 | 20 litre | PK 005 877 -T | |

13 Technical data

| Size | Unit | UNO 5 | UNO 2.5 | DUO 2.5 DUO 2.5 C |
|--|-------------------|-------------------------------|-------------------------------|--|
| Connection nominal diameter Input Output | | DN 16 ISO-KF DN 16 ISO-KF | DN 16 ISO-KF DN 16 ISO-KF | DN 16 ISO-KF DN 16 ISO-KF |
| Volume flow rate at 50 Hz 60 Hz | m ³ /h | 4.6 5.1 | 2.5 3.9 | 2.5 3.9 |
| Final pressure:Total with gas ballast Final pressure:Total without gas ballast | mbar | < 1 < 5 · 10 ⁻² | < 1 < 5 · 10 ⁻² | < 6 · 10 ⁻³ < 6 · 10 ⁻³ |
| Exhaust pressure, min. Exhaust pressure, max. | mbar | > 250 < 1500 | > 250 < 1500 | > 250 < 1500 |
| Water vapour compatibility 50 Hz 60 Hz | mbar | 20 20 | 15 15 | 15 15 |
| Water vapour capacity 50 Hz 60 Hz | g/h | 65 75 | 26 30 | 30 34 |
| Noise level without gas ballast | dB(A) | 55 | 53 | 53 |
| Amount of operating fluid | l | 0.40 | 0.45 | 0.4 |
| Min. run-up temperature acc. to DIN 28 426 | °C | + 12 | + 12 | + 12 |
| Max. permissible operating temperature (at 25°C ambient temperature and operating fluid P3, with gas ballast) | °C | 80 | 80 | 80 |
| Rotation speed at 50 Hz 60 Hz | 1/min | 2880 3420 | 2880 3420 | 2880 3420 |
| Rated power, motor 50 Hz 60 Hz | kW | 0.15 0.18 | 0.15 0.18 | 0.15 0.18 |
| Weight | kg | 10.5 | 10.2 | 10.5 |

13.1 Dimensions

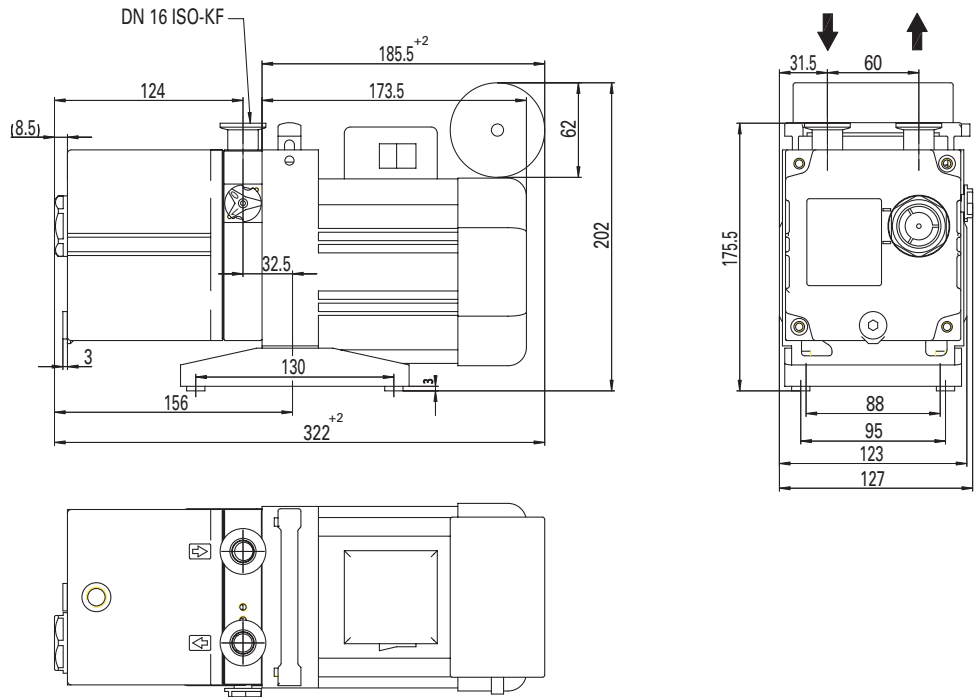
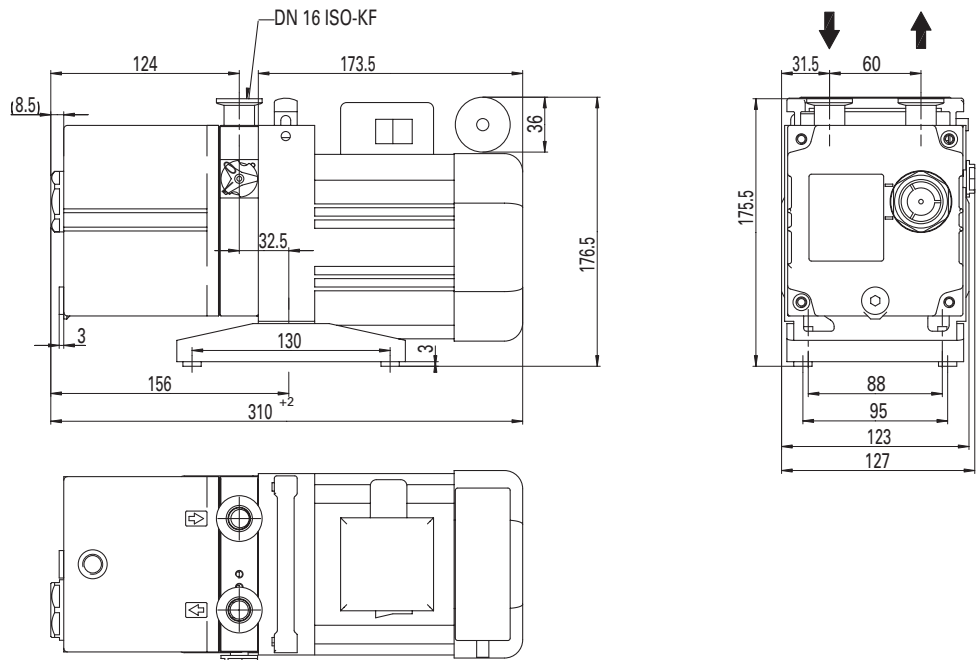


Fig. 12: Dimensions for motor versions: 95 ... 105 V, 50 Hz / 100 ... 115 V, 60 Hz



**Fig. 13: Dimensions for motor versions: 190 ... 210 V, 50 Hz / 200 ... 220 V, 60 Hz;
220 ... 240 V, 50/60 Hz**

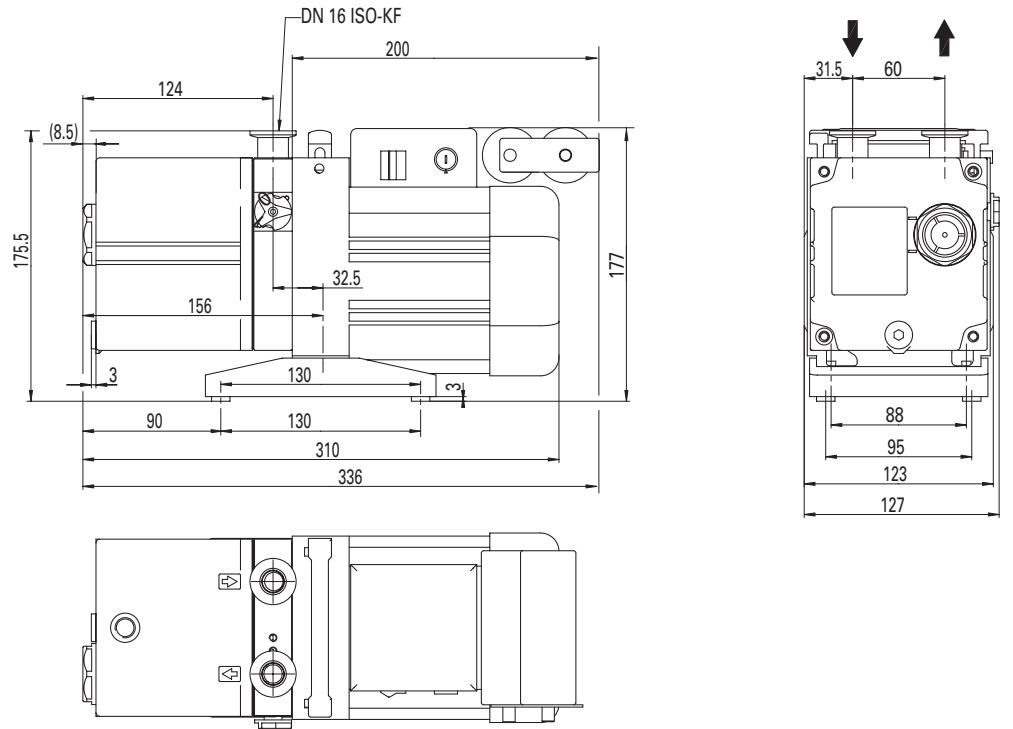


Fig. 14: Dimensions for motor versions: 115/230, 50/60 Hz

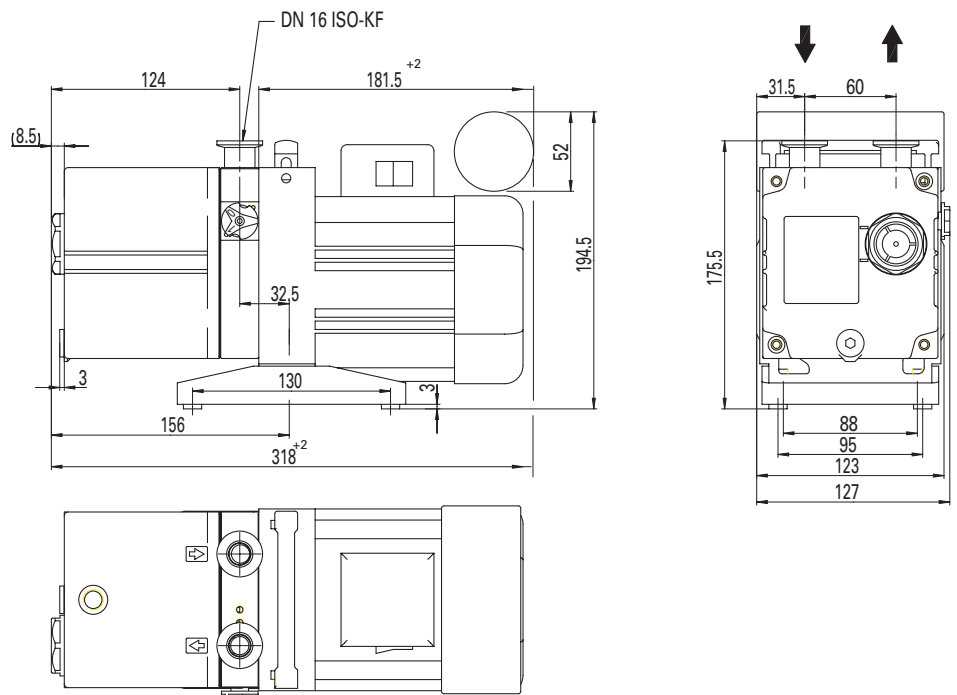


Fig. 15: Dimensions for motor versions: 100 ... 105 V, 50 Hz / 110 ... 130 V, 60 Hz



Declaration of conformity

pursuant to the following EU directives:

- **Machinery 98/37/EEC (Annex II A)**
- **Electromagnetic Compatibility 89/336/EEC**
- **Low Voltage 2006/95/EEC**

We hereby certify, that the product specified below is in accordance with the provision of EU Machinery Directive **98/37/EEC**, EU Electromagnetic Compatibility Directive **89/336/EEC** and der EU Low Voltage Directive **2006/95/EEC**.

UNO/DUO 2.5, DUO 2.5 C, UNO 5

Guidelines, harmonised standards, national standards in languages and specifications which have been applied:

| | | | |
|----------------------|----------------|----------------|----------|
| DIN EN ISO 12100-1/2 | EN 294 | EN 60335-1, 41 | EN 61010 |
| EN 60204 | EN 50081-1, -2 | EN 1012-2 | |

For other declaration, if applicable, please see the official seal on the rating plate.

Signatures / Unterschriften:

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35614 Asslar
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(M. Bender)
Managing Director
Geschäftsführer

(Dr. M. Wiemer)
Managing Director
Geschäftsführer

Konf/Herst/2007

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Turbopumps



Rotary vane pumps



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Dry compressing pumps



Leak detectors



Valves



Components and feedthroughs



Vacuum measurement



Gas analysis



System engineering



Service

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