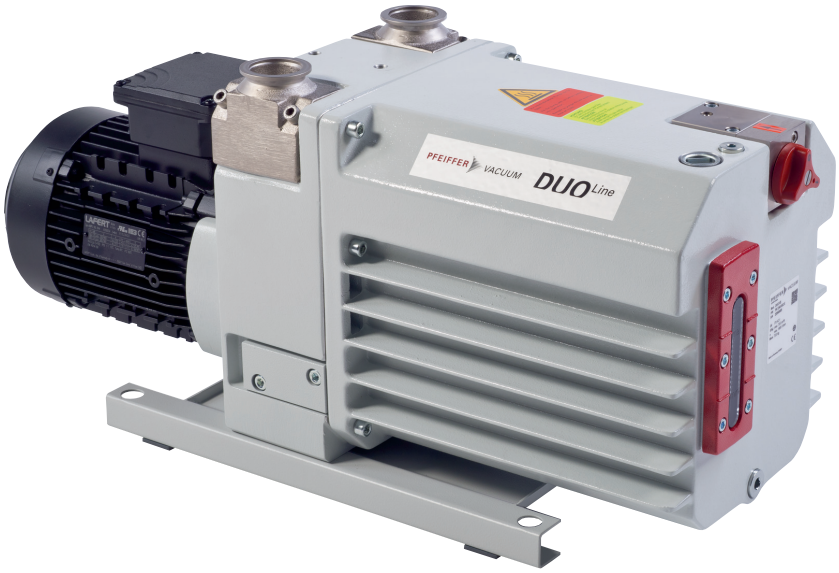


OPERATING INSTRUCTIONS

EN

Translation of the Original

UNO 35/65 | DUO 35/65

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.

Copyright

Table of contents

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 Related documents

Uno 35/65 | Duo 35/65	Operating instructions
Declaration of conformity	A component of these instructions

Current documents are available from the Pfeiffer Vacuum Download Center.

1.1.2 Variants

These instructions apply to Uno/DuoLine series vacuum pumps:

Pump type	Pump version
Uno 35/65 Duo 35/65	Standard version
Duo 35/65 C	C version; differs from the standard version as follows: ● Operating fluid F5 ● Vane material changed ● Hose connection and dosage spindle on gas ballast valve ● Oiler for shaft feedthrough ● Leakage rate ≤ 1×10^{-7} Pa m^3/s
Uno 35/65 M Duo 35/65 M	M version; differs from the standard version as follows: ● Magnetic coupling ● Leakage rate ≤ 1×10^{-7} Pa m^3/s
Duo 35/65 MC	MC version; differs from the standard version as follows: ● Operating fluid F5 ● Vane material changed ● Hose connection and dosage spindle on gas ballast valve ● Magnetic coupling ● Leakage rate ≤ 1×10^{-7} Pa m^3/s

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 Abbreviations

Abbreviation	Meaning in this document
C version	Corrosive gas version
M version	Version with magnetic coupling
MC version	Corrosive gas version with magnetic coupling
OME	Oil mist filter (Oil Mist Eliminator)
RSSR	Radial shaft seal ring
3TF	PTC thermistor temperature sensor

Tbl. 1: Abbreviations used in this document

1.3.2 Pictographs

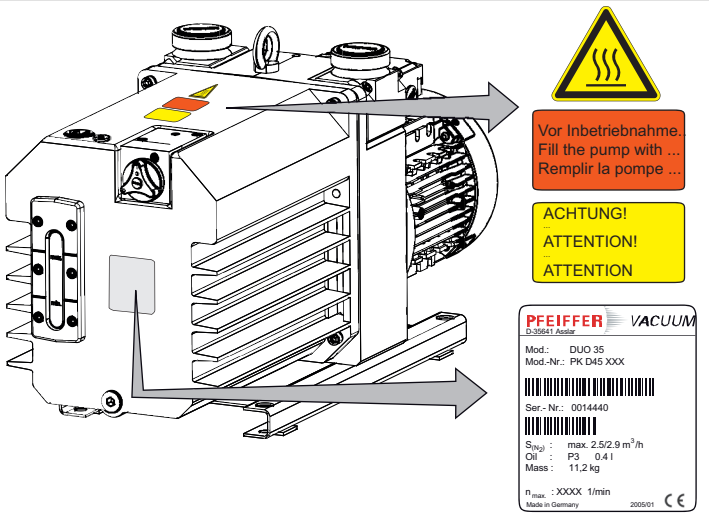
Pictographs used in the document indicate useful information.

Note

Tip

1.3.3 Stickers in the product

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



- **Warning**
  Hot surface
- **Label**
  Fill pump with oil prior to commissioning.
- **Label**
  CAUTION! Check the direction of rotation of the pump before filling with oil.
- **Rating plate**
  The rating plate is located on the pump housing next to the sight glass.
- **Motor rating plate**
  The motor rating plate is located on the motor (not shown).

Tbl. 2: Product stickers

1.3.4 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. ...

2 Safety

2.1 General safety information

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

⚠ DANGER

Immediately pending danger

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

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

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

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

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

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

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

► Instructions to avoid damage to property

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

2.2 Safety instructions

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

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.

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.

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

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.

- ► Provide suitable touch protection.

Risks during maintenance

⚠ WARNING

Danger of injury from strong magnetic field

There is a risk of injury for people with pacemakers and medical implants.

- ► Make sure that such individuals do not enter the sphere of influence (≤ 2 m) of the magnetic field.
- ► Identify rooms in which magnetic couplings are openly accessible with the symbol: "**No access for people with pacemakers**".
- ► Always keep disassembled couplings away from computers, data carriers, and other electronic components.

⚠ 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.

⚠ 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.

⚠ 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.

2.3 Safety precautions

Duty to provide information on potential dangers

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

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

Infringement of conformity due to modifications to the product

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

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

General safety precautions when handling the product

- ► Observe all applicable safety and accident prevention regulations.
- ► Check that all safety measures are observed at regular intervals.
- ► 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 Safety precautions for vacuum pumps with magnetic coupling

The following safety instructions are only valid for the working with a drive system of a vacuum pump with a magnetic coupling:

Safety precautions

- ► Keep a magnetic coupling away from people with pacemakers.
  - – Minimum distance: **2 m**
- ► Avoid convergence of magnetic coupling components.
- ► Keep magnetized parts away from the magnetic coupling.
- ► Always keep a disassembled magnetic coupling away from computers, data carriers and other electronic components.
  - – The magnetic coupling can influence operational reliability of electrical and electronic devices.

2.5 Limits of use of product

Installation location	Weatherproof (internal space)
Installation altitude	Max. 2000 m above m.s.l. [1)]
permissible angle of inclination	±1°
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	≤ 1500 hPa absolute
Exhaust pressure at OME	max. atmospheric pressure

Tbl. 3: Limits of use of product

2.6 Proper use

- ► Use the vacuum pump for vacuum generation only.
- ► When pumping media with an oxygen concentration level of ≥ 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.

2.7 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
- Use of D2 or 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.
- Transporting with operating fluid filling

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.

3 Product description

3.1 Product identification

To ensure for a clear identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the rating plate to hand.

The following information is shown on the rating plate:

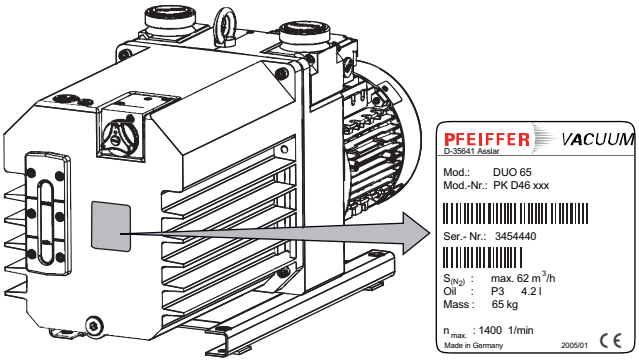


Fig. 1: Uno/Duo 35/65 rating plate

The following information is shown on the rating plate:

- Pump model
- Model number
- Operating fluid type and quantity
- Date of manufacture

► You can obtain motor-specific data such as input voltage range from the separately attached motor rating plate.

3.2 Scope of delivery

- Rotary vane vacuum pump with motor
- Operating fluid (other than F4, F5 and A113)
- Centering ring with cone sieve and O-ring for the connection flange
- Locking caps for both connection flanges
- Operating instructions

3.3 Functional description

The UnoLine™ and DuoLine™ rotary vane pumps are single-stage, or two-stage, oil-sealed rotary positive displacement pumps with air cooling and pressure oil lubrication, for coarse and medium vacuum applications. The vacuum pumps are equipped with a safety valve that vacuum seals the vacuum chamber and simultaneously vents the pump when the pump is at a standstill. The pump is available in the standard version with a conventional seal, or as an M version with non-contact and wear-proof drive with magnetic coupling. The pump housing in the M version is hermetically sealed.

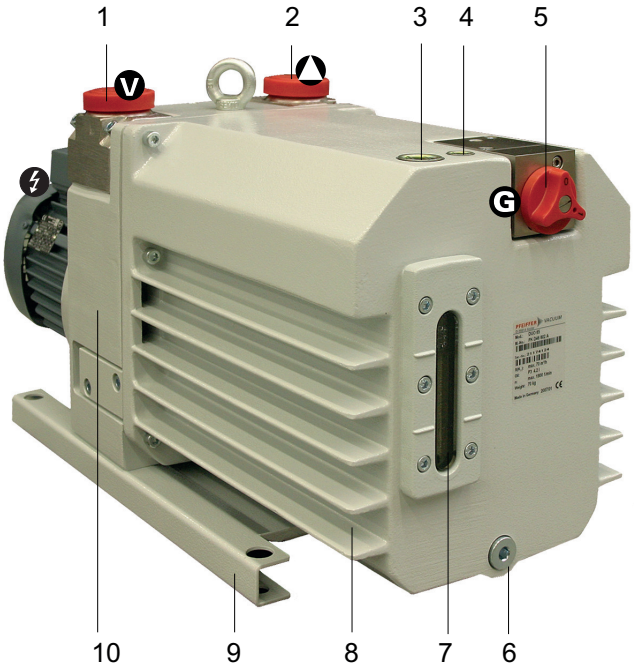


Fig. 2: Design of Uno 35/65 | Duo 35/65

1 Vacuum flange
2 Exhaust flange
3 Filling screw for operating fluid
4 Locking screw for flushing gas pipe
5 Gas ballast valve
6 Drain screw for operating fluid
7 Sight glass
8 Cap
9 Base plate
10 Support stand

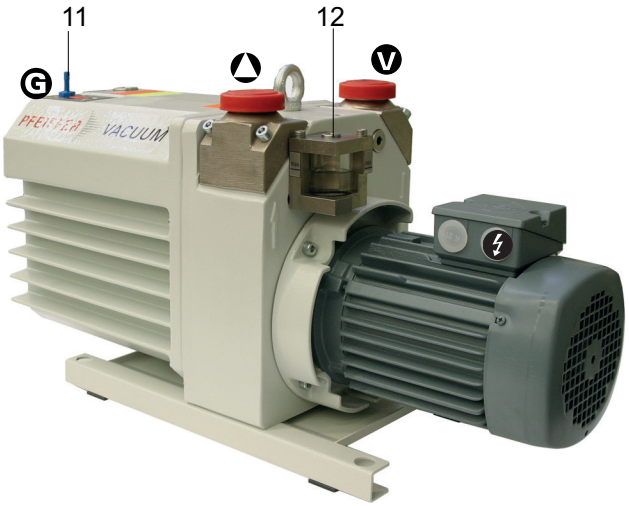


Fig. 3: Design of Duo 35/65 MC

11 Gas ballast valve with flushing gas connection
12 Oiler

3.4 Operating principle

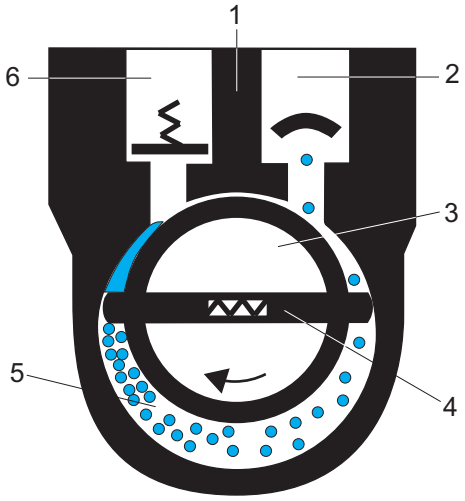


Fig. 4: Rotary vane vacuum pump functional principle

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

The rotary vane pump is an oil-sealed rotational displacement pump. The pumping system is made up of the housing, the eccentrically mounted rotor, and the centrifugally- 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.

Vacuum safety valve
Depending on the pump type, 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.

Gas ballast valve
The gas ballast device is used to blend ambient air or inert gas with the process gas in the pumping system. The increase of air content compresses and expels a pumped gas-vapor-mixture within specific limits, without causing condensation in the suction chamber.

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

4 Transportation and Storage

4.1 Transporting the 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.

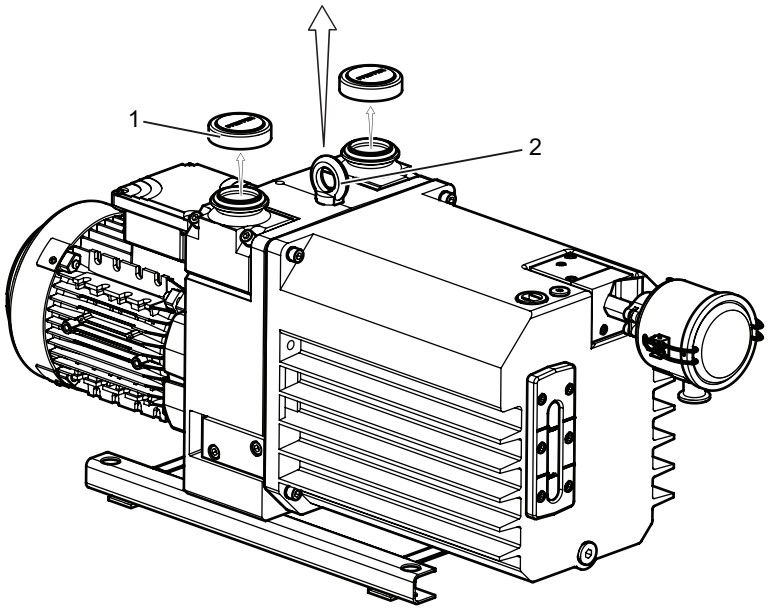


Fig. 5: Transporting the vacuum pump

1 Protective cap 2 Crane lug

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

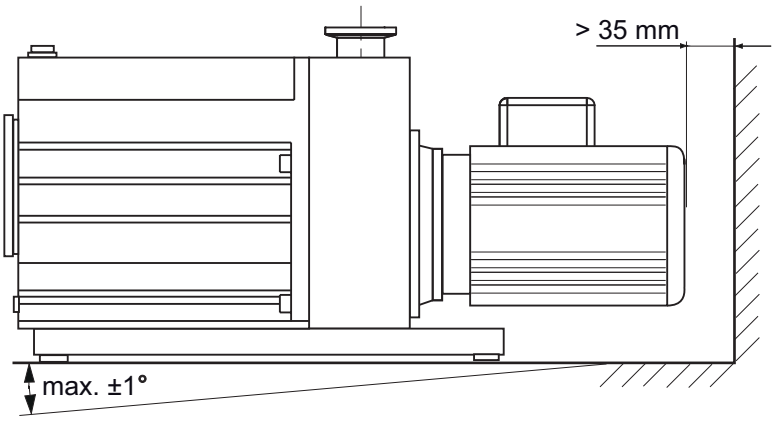


Fig. 6: Minimum distances and permissible inclination

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 Connecting the 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.

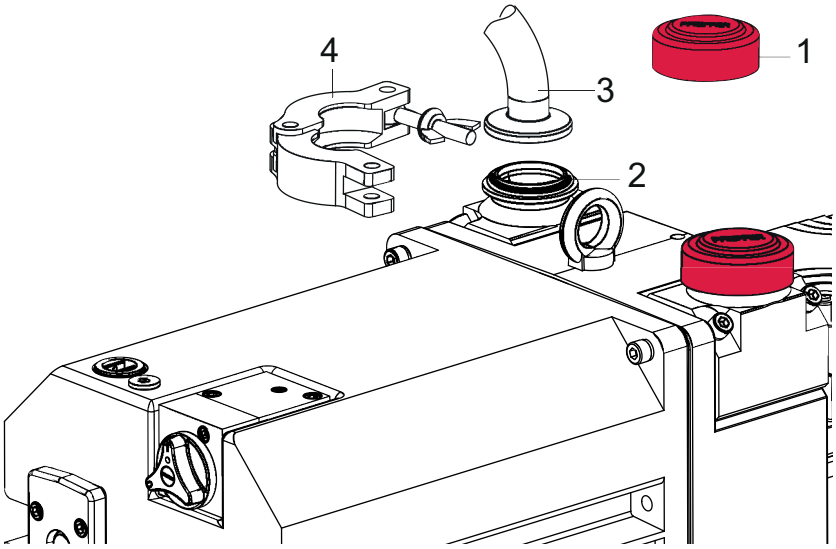


Fig. 7: Vacuum connection with flange connection

1 Protective cap
2 Centering ring with cone sieve and O-ring
3 Intake line
4 Circlip

Procedure

1. Remove the protective cap from the vacuum flange.
2. Make sure that the centering ring with cone sieve and the O-ring are 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.

5.3 Connecting the 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 maximum permissible pressure of 1,500 hPa (absolute).
- ► 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 inadmissible exhaust line installation

Negative pressure in the exhaust line causes malfunctions and damage to the vacuum pump. Negative pressure is permitted only in rotary vane vacuum pumps with magnetic coupling.

- ► When dissipating gases, make sure that the exhaust pressure is at least 250 hPa higher than the intake pressure.

Condensate separator

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

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.

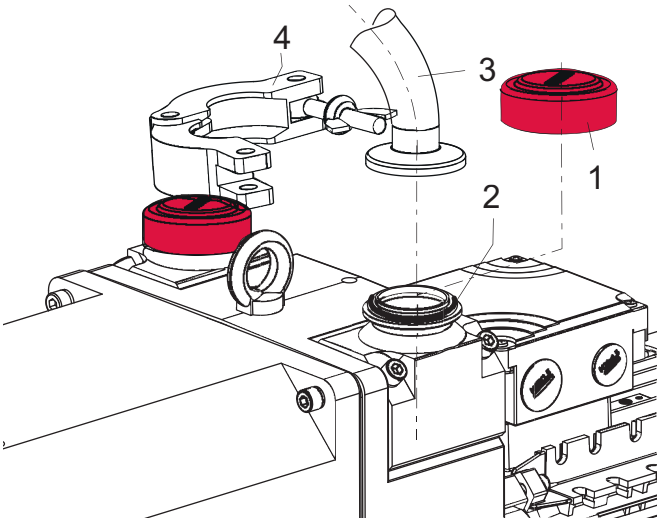


Fig. 8: Exhaust connection with flange connection

1 Protective cap
2 Centering ring with cone sieve and O-ring
3 Exhaust line
4 Circlip

Procedure

1. Remove the protective cap from the exhaust flange.
2. Ensure that the centering ring with cone sieve is fitted in the exhaust flange.
3. Choose a minimum exhaust line diameter 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.

5.4 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.

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

Danger of magnetic coupling overload!

Energy-efficient motors have a higher starting torque that may lead to cranking of the motor and to the demagnetization of the magnetic coupling.

- ► During operation with an IE2 motor, we **recommend** starting up with a soft start relay or operating the vacuum pump with a frequency converter.
- ► When operating with an IE3 motor, you **must** use a soft start relay or operate the vacuum pump with a frequency converter.

Depending on the pump type, there are different motor designs or mains voltages:

- Three phase motor (without switch and mains cable) with PTC

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

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.

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

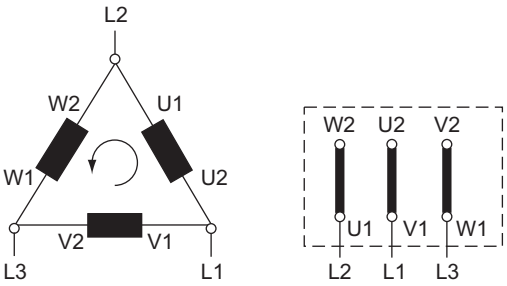


Fig. 9: Delta connection for low voltage

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 √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.

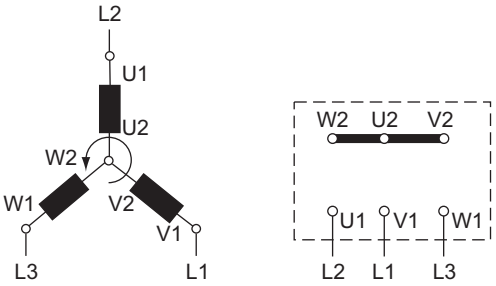


Fig. 10: Star circuit for high voltage

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

5.4.2 Connect three phase motor with 9-pin terminal board

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.

Ports T1 – L2, T2 – L1 and T3 – L3 rotate the motor shaft clockwise when looking at the motor fan.

Double star circuit

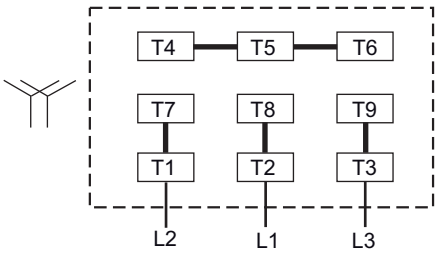


Fig. 11: Terminal board for low voltage

Star circuit

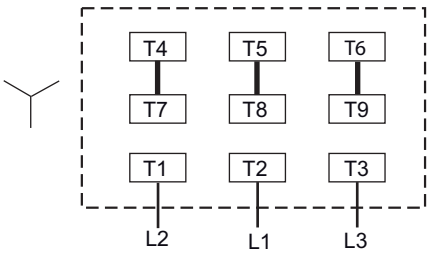


Fig. 12: Terminal board for high voltage

5.4.3 Setting motor protection switch

The magnetic coupling does not offer an overload protection.

The magnetic coupling's torque is so strong that it does not provide any overload protection for the motor.

Motor protection switches are current-dependent protective devices for the drive motors. Protection switches with slow tripping characteristics are suitable. 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.

Procedure

1. Take the settings for the motor protection switch from the following table.
2. Take into consideration that certain operating conditions (for example, cold vacuum pump start) can cause short-term increases in current consumption.
3. Set the desired value on the motor protection switch.

Voltage [V]	Frequency [Hz]	Motor rating [kW]	I_N[A]	I_{max}[A]
230	50	1.1	4.3	31
400	50	1.1	2.5	18
265	60	1.3	4.2	31
460	60	1.3	2.45	18
220	60	1.3	4.82	31
380	60	1.3	2.78	18
200	50	1.5	7.3	49
400	50	1.5	3.65	28
200	60	1.5	7.3	63
400	60	1.5	3.65	35

Tbl. 4: Motor protection switch settings for Uno 35 | Duo 35

Voltage [V]	Frequency [Hz]	Motor rating [kW]	I_N[A]	I_{max}[A]
230	50	1.5	6.1	41
400	50	1.5	3.5	24
265	60	1.8	6.1	41
460	60	1.8	3.5	24
220	60	1.8	6.7	51
380	60	1.8	3.85	29
230	60	1.8	6.44	55
400	60	1.8	3.72	36
200	50	1.5	6.35	43
200	60	1.8	6.95	47
200	50	1.8	7.6	56
400	50	1.8	3.8	32
200	60	2.2	8.8	82
400	60	2.2	4.4	46

Tbl. 5: Motor protection switch settings for Uno 65 | Duo 65

5.4.4 Connecting the PTC thermistor tripping unit

Tripping units store the shut-down

Pfeiffer Vacuum recommends connecting motors with PTC in the stator winding to a PTC resistor tripping device for protection against overload.

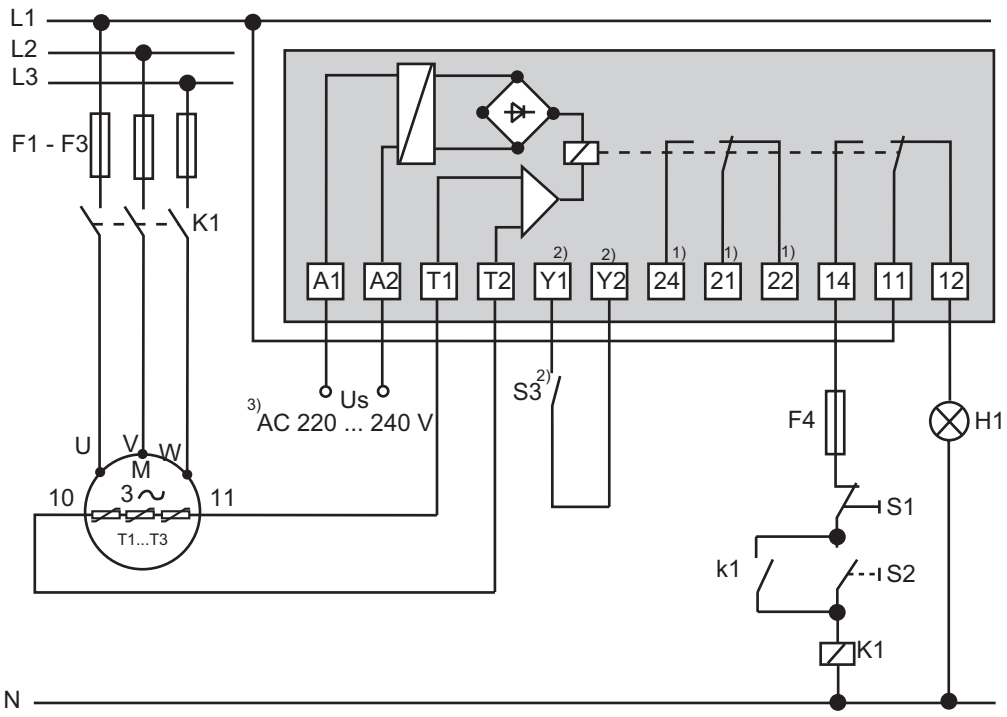


Fig. 13: Connection example with PTC thermistor tripping unit

U_S	Supply voltage	T1 – T3	PTC resistor sensor
S_1	AUS button	H1	Tripping indicator
S_2	EIN button	M	Motor, 3-phase
S_3	RESET button	1)	For devices with two relay outputs only
K1	Contactor	2)	For MSR type (model) only
F1 – F4	Fuses	3)	Only for order no.: P 4768 052 FQ

Procedure

► After shut-down, switch the tripping unit back on manually via the installed RESET button or via the external RESET S3.
  – Switching on mains detected as automatic RESET.

5.4.5 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.

5.4.6 Frequency converter for vacuum pumps with three-phase motor

Rotary vane pumps with variable rotation speed can be operated within a mains frequency range of 35 to 60 Hz. Start-up is ramped (maximum run-up time: 30 s). Shutdown can take place immediately.

5.4.7 Start the vacuum pump with soft start

The upstream soft start relay limits the power input during the start up of the vacuum pump. As a result, no load peaks occur on the mains side. The soft start limits the starting torque of the motor and thus reduces the mechanical load of the motor and vacuum pump.

Perform the recommended settings

1. Set the **start voltage to > 70 %**.
2. Set the **ramp time to max. 5 s**.

5.5 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.

Approved operating fluid

- P3 (standard operating fluid)
- F5 (operating fluid for corrosive gas versions)
- D2 for special applications (such as higher operating temperatures)
- A113 (operating fluid for corrosive gas versions)

Reading operating fluid type on rating plate

- ► Please refer to rating plate of the vacuum pump for type and quantity of intended operating fluid.
  - – Only the operating fluid used during initial installation is permissible.
  - – D2 is permitted as a replacement for D1.
- ► Contact Pfeiffer Vacuum if you want to use another type of operating fluid.

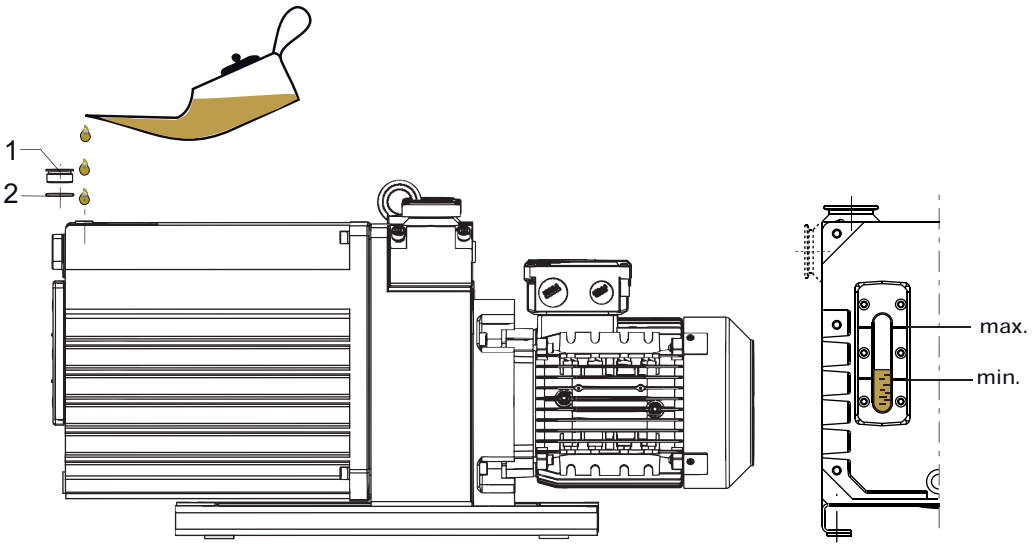


Fig. 14: Filling up operating fluid

1 Filling screw for operating fluid 2 O-ring

Consumables

- Operating fluid of the vacuum pump

Required tools

- Allen key, WAF 8 mm
- Calibrated torque wrench (tightening factor ≤ 2.5)

Filling the operating fluid

1. Unscrew the filler screw.
2. Fill the operating fluid according to the sight glass:
   – Fill level of the initial filling when the vacuum pump is cold: A maximum of 3/4 of the min./max. range.
3. Screw in the filler screw again.
   – Be careful with the O-ring.
   – Tightening torque: **max. 6 Nm**

5.6 Connecting accessories

Installation and operation of accessories

Pfeiffer Vacuum offers a series of special, compatible accessories for its products.

- Information and ordering options for approved accessories can be found online.
- The following accessories are not included in the scope of supply.

5.6.1 Solenoid valve for gas ballast valve (standard version)

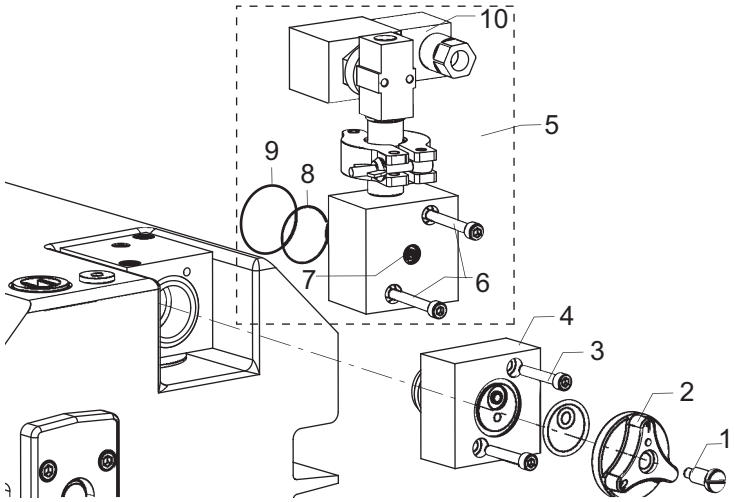


Fig. 15: Solenoid valve connection for gas ballast valve

1	Fixing screw	6	Screws
2	Gas ballast knob	7	Dosing screw
3	Screws	8	O-ring
4	Flange	9	O-ring
5	Conversion kit	10	Protective cap

Required tools

- Screwdriver
- Allen key, 4 mm
- Torque wrench

Remove gas ballast valve from pump

1. Unscrew fixing screw from gas ballast knob.
2. Remove gas ballast knob.
3. Unscrew both screws from flange.
4. Pull the valve flange axially out of the housing.

Installing conversion kit with solenoid valve

1. Insert solenoid valve axially into the housing.
2. Be careful with the O-rings.
3. Tighten the screws,
   – Tightening torque: **3 Nm**.
4. Open dosing screw by rotating to the left up to the stop.
5. Remove protective cap.

6. Establish the electric connection.
7. Install the protective cap.

Part number	PK 223 717 -U
Type designation extended	Gas ballast valve conversion kit with solenoid valve
Connection flange (in)	–
Overpressure max.	500 hPa
Electrical connection	Cable screw connection PG9
For pump	Duo 35 | Duo 65
Input voltage(s)	24 V DC (±10 %)
Contact	Normally closed

Tbl. 6: Technical data, solenoid valve for gas ballast valve

5.6.2 Solenoid valve for gas ballast valve (C version)

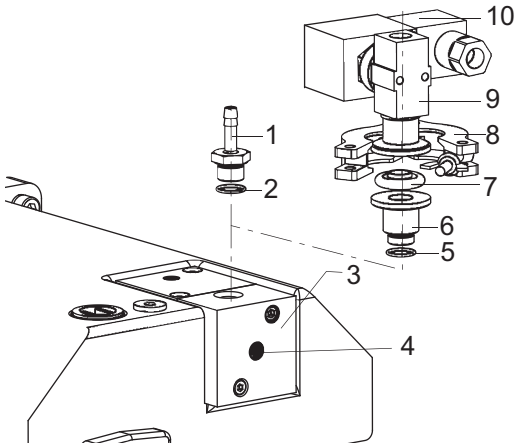


Fig. 16: Solenoid valve connection for gas ballast valve (C version)

1	Hose nozzle	6	Small flange
2	O-ring	7	Centering ring
3	Flange	8	Circlip
4	Dosing screw	9	Solenoid valve
5	O-ring	10	Protective cap

Required tools

- Open-end wrench, 17 mm

Installing conversion kit with solenoid valve

1. Unscrew the hose nozzle from the flange and remove the O-ring.
2. Screw the small flange with O-ring into the gas ballast valve flange.
3. Install the solenoid valve with centering ring and circlip.
4. Open dosing screw by rotating to the left up to the stop.
5. Remove protective cap.
6. Establish the electrical connection.
7. Install the protective cap.

5.6.3 Process monitoring (option)

To monitor the rotary vane pump oil pressure during operation, an operating fluid monitoring unit can be mounted to the side of the stand. The contact in the pressure switch opens when the pressure drops and when the pump is at a standstill. The signal can be used to control external valves.

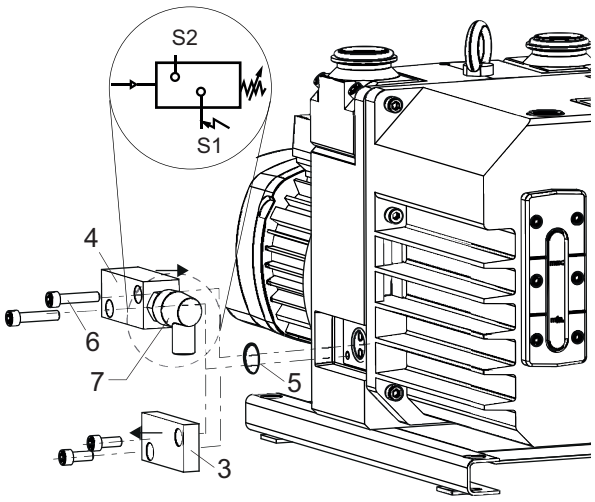


Fig. 17: Installation location and circuit diagram

S1+S2	N.O. contact	5	O-ring
3	Oil duct cover	6	Screws
4	Flange	7	Oil pressure switch

Installing operating fluid monitoring

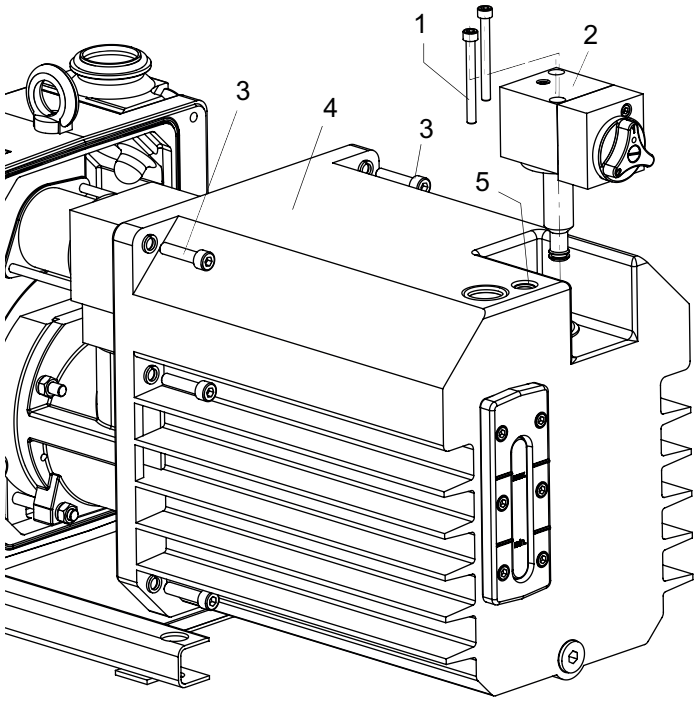
1. Shut down the vacuum pump and allow it to cool if necessary.
2. Vent the pump to atmospheric pressure via the intake side.
3. Remove the oil duct cover and collect the escaping operating fluid.
4. Dispose of the operating fluid according to locally applicable regulations.
5. Install the flange with O-ring and tighten the two screws to
   – Tightening torque: **10 Nm**.
6. Screw the oil pressure switch with O-ring into the flange.
   – Tightening torque: **6 Nm**.
7. Remove protective cap.
8. Establish the electrical connection to the pressure switch.
9. Replace the protective cap.

Part number	PK 223 720 -U
Type designation	Oil pressure switch
Switching current V AC	< 2 A
Switch-point	1500 hPa
Switching voltage	5 – 250 V
For pump	Duo 35 / 65 | Uno 35 / 65
Monitored characteristics	Operating fluid pressure
Protection degree	IP55
Contact	Closing contact, normally open

Tbl. 7: Technical data, oil pressure switch

5.6.4 Gas flushing device

For situations where gases or vapors that are corrosive or can contaminate the operating fluid need to be pumped, we recommend that you flush the vacuum pump with inert gas in order to prolong the usable life of the operating fluid. The flushing gas device is installed via a bore in the pump cap, and the gas is introduced into the operating fluid reservoir of the pump via a pipe. This saturates the operating fluid with inert gas and prevents the pumped gases from dissolving in the oil. The injected gas also reduces the oil temperature, thus reducing the risk of corrosion.



1 Screws
2 Gas ballast valve
3 Screws
4 Cap
5 Locking screw

Required tools

- Allen key, 5 mm
- Allen key, 6 mm
- Open-end wrench, 14 WAF
- Open-end wrench, 19 WAF

Removing the cap

1. Drain the operating fluid (see chapter “Draining the operating fluid”, page 40).
2. Unscrew the screws and remove the gas ballast valve.
3. Disconnect the cap and remove axially; be careful with the spring washers.
4. Clean the inside of the cap.
5. Unscrew the locking screw.

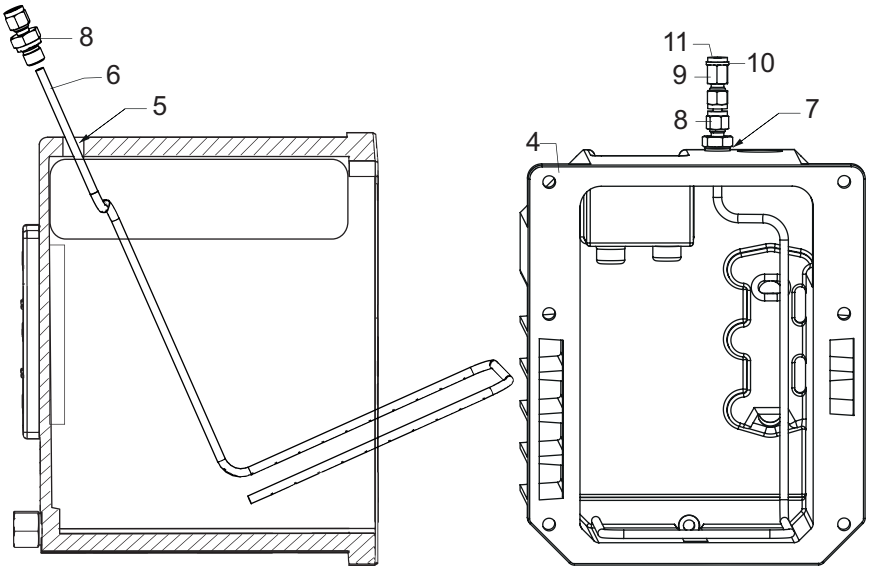


Fig. 18: Installing the flushing gas pipe

4	Cap	8	Coupling I
5	Bore	9	Coupling II
6	Flushing gas pipe	10	Sealing ring
7	O-ring	11	Locking screw

Installing the flushing gas pipe

1. Install the flushing gas pipe from the inside of the cap, and insert it through the bore.
2. Slide the coupling I with the O-ring over the pipe end, and screw the coupling into the cap.
3. Tighten the coupling I lock nut.
4. Align the pipe so that it is positioned close to the cap base, but not touching the wall.
5. Push the coupling II downwards onto the pipe and tighten it. At the same time, secure with a second key.
6. Seal the connecting thread with the locking screw and sealing ring.
7. Install the cap.
   – Make sure that the sealing surfaces and O-rings are clean and undamaged.

The flushing gas pipe cannot be **dismantled** without destroying it. If necessary, we recommend that you pull the pipe upwards slightly, and sever it above the coupling with a pipe cutter.

Carry out a leak test.

To make sure that the system is sealed, Pfeiffer Vacuum recommends that you carry out a leak test prior to installing the gas supply.

Carrying out the leak test

In C, M, and MC version pumps, a helium leak test must be carried out after the flushing gas device has been installed.

1. Carry out a leak test on the pump housing before filling the operating fluid.
   – Helium leakage rate: $< 1 \cdot 10^{-7}$ Pa m^3/s

Installing the flushing gas supply

1. Unscrew the locking screw. Simultaneously secure coupling II.
   – Be careful with the sealing ring.
2. Connect the flushing gas supply line (female thread, 1/8" NPT).
   – Be careful with the seal.

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

The pump can be switched on in each pressure range, between atmospheric pressure and ultimate pressure. The optimal operating condition of the pump is achieved in continuous operation. Cycle mode is possible, however do not exceed 10 cycles per hour. The operating phase should always be longer than the downtime.

When pumping down dry gases, no special precautions are required. In order to achieve the lowest possible ultimate pressures, the gas ballast valve should be closed.

⚠ 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.

- ► Provide suitable touch protection.

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).

Switching on the pump

1. Switch the pump on at the mains switch.
2. Close the vacuum flange and gas ballast valve.
3. Allow the pump to warm up prior to process start, with the vacuum flange closed, for approximately 30 minutes.
4. Check the operating fluid level with the pump running and at operating temperature.
   – The fill level must move within the marks on the sight glass edge during operation.
   – Check the operating fluid fill level daily during continuous operation, and every time the pump is switched on.
     – The fluid can be refilled during operation in the final vacuum.

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

To avoid condensation of condensable vapors in the pump when pumping them down, air is fed into the working chamber periodically via the gas ballast valve at the start of the compression phase.

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

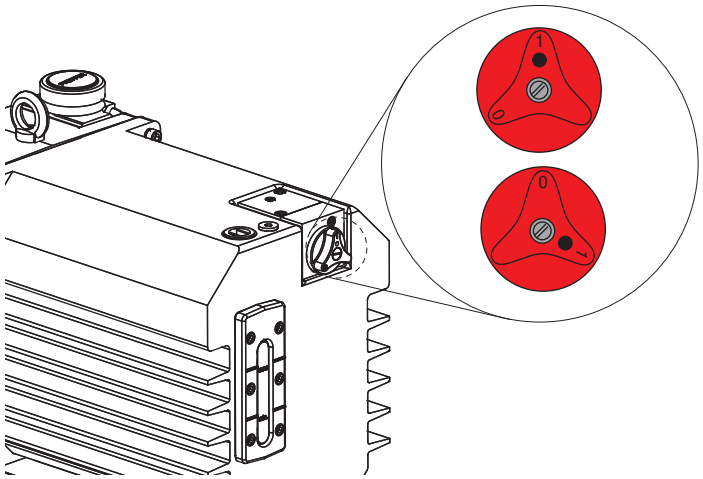


Fig. 19: Gas ballast valve, standard version

6.3.2 Gas ballast valve with flushing gas connection (option)

NOTICE

Risk of damage from unacceptably high flushing gas pressure

Increased flushing gas pressure compromises the operational reliability of the pump, and causes increases in power input and operating temperature.

- ► Observe the maximum permissible flushing gas pressure of **1,500 hPa (absolute)**.
- ► Dose the flushing gas quantity with the dosing screw in the gas ballast valve or on site.

The ingress of flushing gas dilutes the process gas and avoids condensation in the pump.

Closing the gas ballast valve

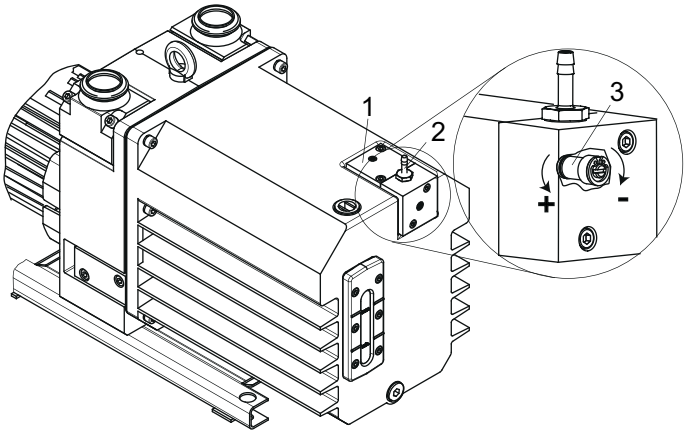


Fig. 20: Gas ballast valve with flushing gas connection

1 Gas ballast valve
2 Flushing gas connection (hose nozzle)
3 Dosing screw

1. Connect the hose (DN 5 mm) to the flushing gas connection.
2. Select the type and quantity of the flushing gas used according to the process.
3. Consult Pfeiffer Vacuum if necessary.
4. Set the flushing gas pressure to max. **1,500 hPa (absolute)**.
5. Set the desired gas quantity using the dosing screw: **Max. 1,700/1,875 l/h** (Duo 35/65).
6. Close the dosing screw by rotating to the right up to the stop.
7. Open the dosing screw by rotating to the left up to the stop.

6.3.3 Gas ballast valve with solenoid valve (option)

NOTICE

Risk of damage from unacceptably high flushing gas pressure

Increased flushing gas pressure compromises the operational reliability of the pump, and causes increases in power input and operating temperature.

- ► Observe the maximum permissible flushing gas pressure of **1,500 hPa (absolute)**.
- ► Dose the flushing gas quantity with the dosing screw in the gas ballast valve or on site.

Using an electromagnetic valve to externally control the flushing gas flow facilitates handling of the gas ballast, and allows the process-driven intake of clean air or other gases.

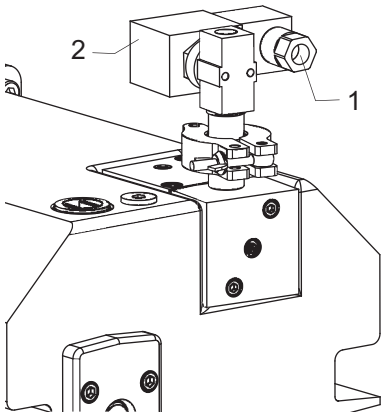


Fig. 21: Gas ballast inlet with solenoid valve

1 Flushing gas connection 2 Solenoid valve

6.4 Operation with flushing gas

NOTICE

Risk of damage from unacceptably high flushing gas pressure!

As the flushing gas quantity increases, the discharge of operating fluid via the pump exhaust increases.

► Observe the max. permissible flushing gas pressure.
► Dose the flushing gas quantity on site.

Continuous operation

After switching off, condensate or penetrating moisture can react with process residues and damage the pump.

- Operate the pump in continuous operation where possible.

Before shutting down the pump, observe the following instructions to adequately protect the interior of the pump (pumping system) against corrosion.

Supply pump with flushing gas

1. Switch on the pump and bring it to operating temperature.
2. Open the flushing gas supply and check the flow.
3. Adjust the flushing gas pressure.
   – Recommended pressure: **max. 200 hPa (relative)**. This is equivalent to a gas flow of approximately **2,000 Nl/h**.
4. Open the shut-off valve on the vacuum flange.

Interrupting/stopping the flushing gas supply

To degas the operating fluid effectively, Pfeiffer Vacuum recommends that you shut off the pump on the intake side following process end, and continue operation for around an hour at ultimate pressure with the flushing device switched on. The duration depends on the quantity of gas required.

1. Stop the flushing gas supply and shut off the supply line.
2. Switch off the vacuum pump.
3. Vent the pump to atmospheric pressure.

6.5 Refilling 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.

Refill during operation

Operating fluid can be refilled during operation in the final vacuum.

Required consumables

- Operating fluid of the vacuum pump

Required tools

- Screwdriver
- Calibrated torque wrench (tightening factor ≤ 2.5)

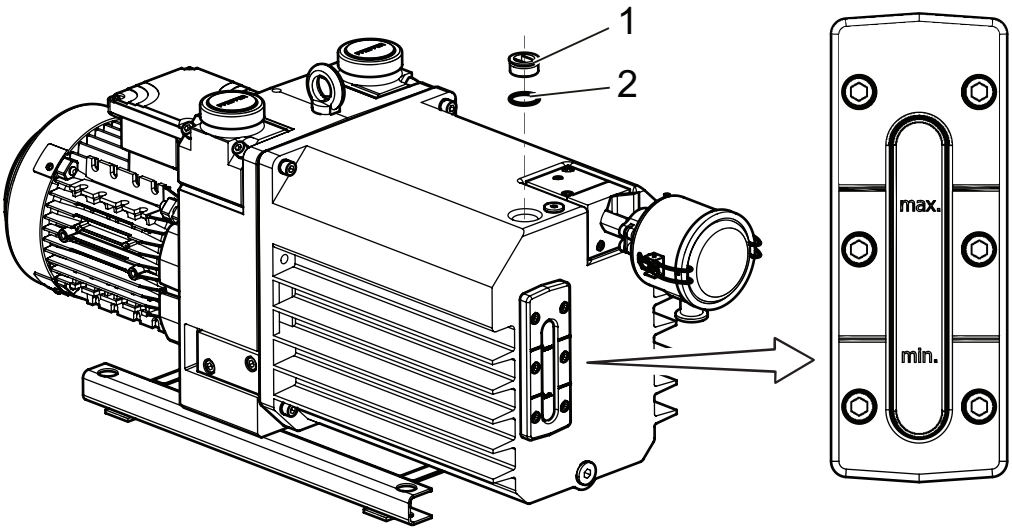


Fig. 22: Fill with operating fluid

1 Filler screw 2 O-ring

Procedure

1. Unscrew the filler screw.
2. Refill with operating fluid up to the top marking before the minimum fill level is reached.
3. Screw in the filler screw again.
   - – Be careful with the O-ring.
   - – Tightening torque: **max. 6 Nm**

6.6 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

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.

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

- ► Safely disconnect the drive motor from the mains.
- ► Secure the motor against switching back on.
- ► For maintenance work, only dismantle the vacuum pump to the extend 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 Maintenance instructions for magnetic coupling

⚠ WARNING

Danger of injury from strong magnetic field

There is a risk of injury for people with pacemakers and medical implants.

- ► Make sure that such individuals do not enter the sphere of influence (≤ 2 m) of the magnetic field.
- ► Identify rooms in which magnetic couplings are openly accessible with the symbol: "**No access for people with pacemakers**".
- ► Always keep disassembled couplings away from computers, data carriers, and other electronic components.

This safety note applies to **drive system disassembly** in pump versions with magnetic coupling.

7.3 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.

You can carry out maintenance work at **Maintenance Level 1** yourself.

We recommend Pfeiffer Vacuum Service for carrying out maintenance work of **Maintenance Level 2** and **Service 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 check Check operating fluid: ● Check fill level ● Check color (contamination) ● Check vacuum pump for leaks	■				
Check accessories (in accordance with respective operating instructions)	■				
Maintenance level 1 – operating fluid replacement					
Clean the outside of the vacuum pump: ● Pump housing ● Clean motor fan cap Changing the operating fluid		■			Operating fluid Maintenance kit 1
Additional activities: ● 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		■ as required			

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**	
Replace filter in external accessory (where present), in accordance with the respective operating instructions		■ as required			
Maintenance level 2 – RSSR change					
• Partially dismantle the vacuum pump • Replace RSSR and coupling spider **Not applicable for vacuum pumps with magnetic coupling**			■		Operating fluid Maintenance kit 2
Replace filter in external accessory (where present), in accordance with the respective operating instructions			■ as required		
Maintenance level 3 – overhaul					
Dismantle and clean vacuum pump, replace seals and all wear parts: • Vane • Valves, springs, and sight glass • Silencer nozzle				■	Operating fluid Overhaul kit

Tbl. 8: Maintenance intervals

7.4 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)

7.4.1 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 tools

- Screwdriver
- Calibrated torque wrench (tightening factor ≤ 2.5)

Required aids

- Test tube
- Pipette with flexible hose

Determine degree of aging of P3 operating fluid

1. Unscrew the filler screw.
   – Be careful with the O-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.
   – Be careful with the O-ring.
   – Tightening torque: **6 Nm**

7.4.2 Draining 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.

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

Required tools

- Allen key, **WAF 8**
- Screwdriver

Required aids

- collection receptacle (> 5 l)

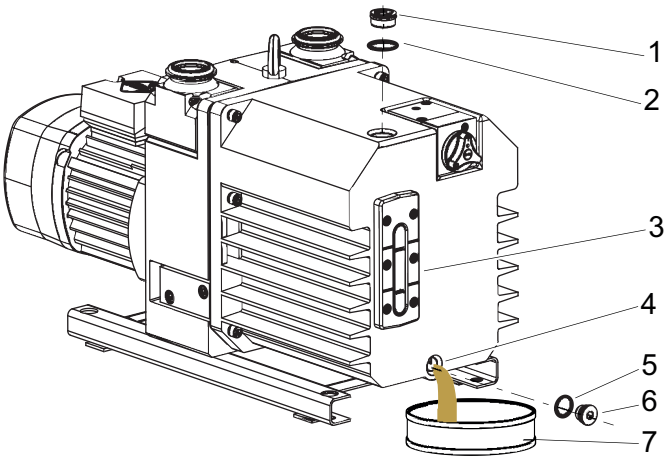


Fig. 23: Draining the operating fluid

1	Filler screw	5	O-ring
2	O-ring	6	Drain screw
3	Sight glass	7	Collection vessel
4	Drain hole		

Draining the operating fluid

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

7.4.3 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.

Required tools

- Allen key, **WAF 5**
- Allen key, **WAF 6**
- Allen key, **WAF 8**
- Calibrated torque wrench (tightening factor ≤ 2.5)

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.

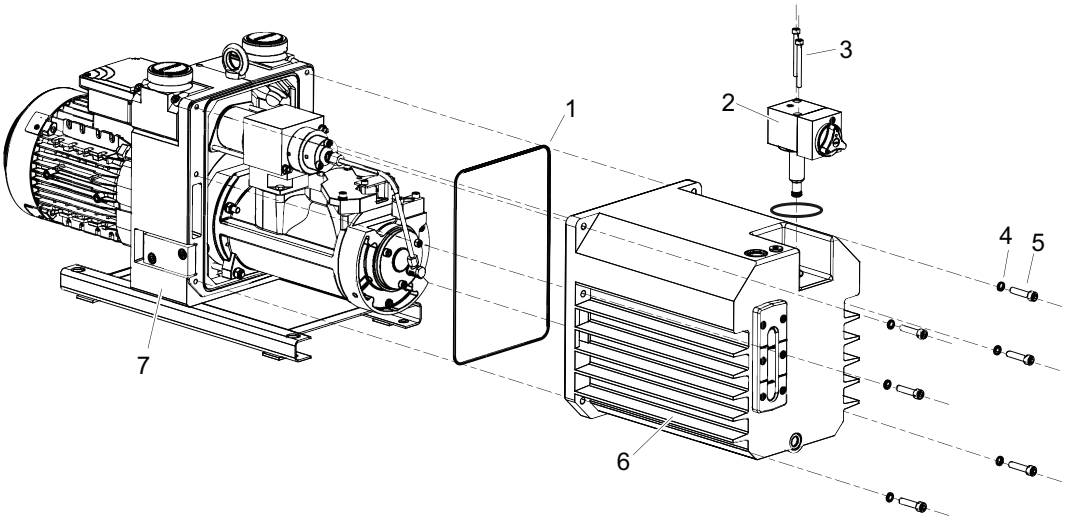


Fig. 24: Remove/fit rotary vane vacuum pump cap

1	Hexagon socket screw (6×)	4	O-ring
2	Lock washer (6×)	5	Stand
3	Cap	6	Pumping system

Remove cap

1. Disconnect the gas ballast valve from the cap.
   – Unscrew the screws on the opposite side of the gas ballast valve.
2. Unscrew the Allen head screws with spring washers 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.

Install cap

1. Insert the O-ring in the groove in the cap.
2. Install cap on stand.
3. Tighten the Allen head screws and spring washers.
   – Tightening torque: **10 Nm**.
4. Mount the gas ballast valve back onto the cap.
   – Tightening torque: **6 Nm**.

7.5 Cleaning and setting the gas ballast valve

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

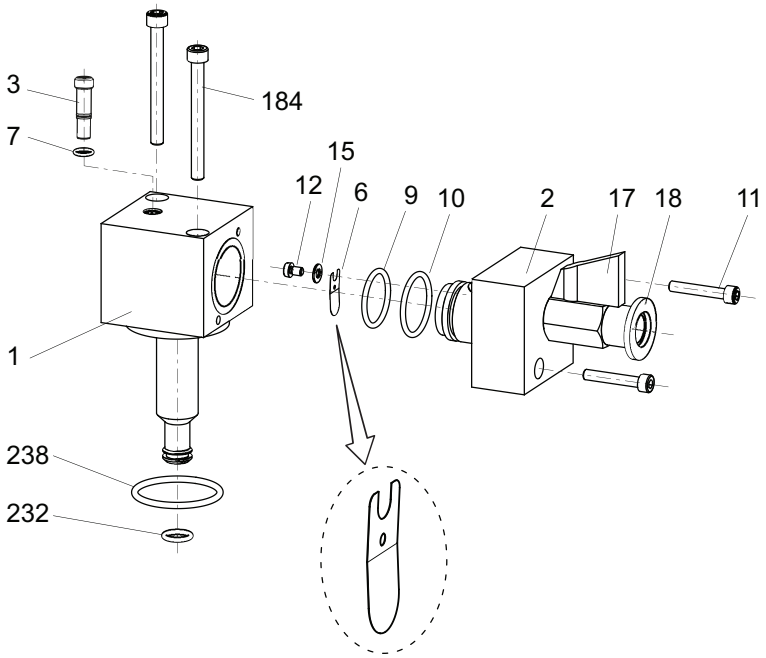


Fig. 25: Individual parts of the gas ballast valve

1	Valve housing
2	Valve flange
3	Noise reduction screw
6	Plate spring
7	O-ring 5×1.5 mm
9	O-ring 24×2.5 mm
10	O-ring 27×2.5 mm
11	Allen head screw M5×30 (2×)
12	Cheesehead screw M4×6
15	Washer
17	Ball valve
18	Threaded flange DN 16 ISO-KF
184	Allen head screw M6×60 (2×)
232	O-ring 38×3 mm
238	O-ring 10×2.5 mm

7.5.1 Disassembling gas ballast valve

Required tools

- Slot screwdriver
- Allen key, **WAF 4**
- Allen key, **WAF 5**
- O-ring picker

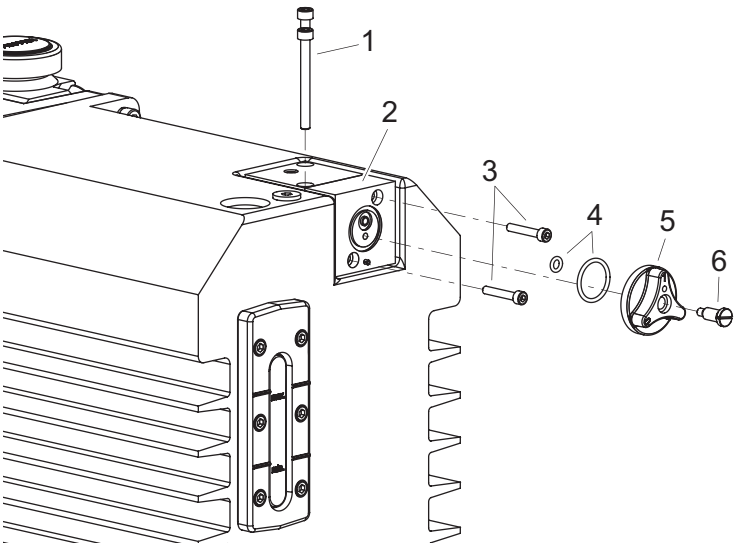


Fig. 26: Disassembling gas ballast knob

1	Cylinder screw, 2x	4	O-ring, 2x
2	Gas ballast flange	5	Gas ballast knob
3	Cylinder screw, 2x	6	Gas ballast special screw

Disassembling gas ballast knob

1. Unscrew the special gas ballast screw from the gas ballast knob.
2. Remove the gas ballast knob.
3. Remove the O-rings between the gas ballast knob and the gas ballast flange.
4. Unscrew the cylinder screws from the gas ballast valve.

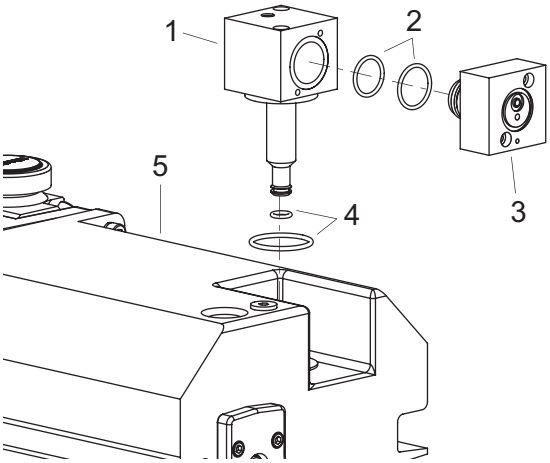


Fig. 27: Disassembling gas ballast valve

1	Gas ballast valve housing	4	O-ring, 2x
2	O-ring, 2x	5	Cap
3	Gas ballast flange		

Disassembling gas ballast valve

1. Pull the gas ballast valve out of the cap.
2. Remove the gas ballast flange from the gas ballast valve housing.
3. Remove the O-rings between the gas ballast flange and the gas ballast valve housing.
4. Remove the O-rings between the gas ballast valve housing and the cap.

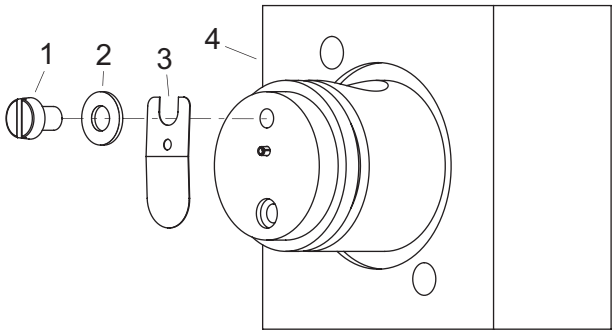


Fig. 28: Disassembling gas ballast flange

1	Cylinder screw	3	Plate spring
2	Washer	4	Gas ballast flange

Disassembling gas ballast flange

1. Unscrew the cylinder screw with the washer from the gas ballast flange.
2. Remove the leaf spring.

7.5.2 Gas ballast valve – corrosive gas version

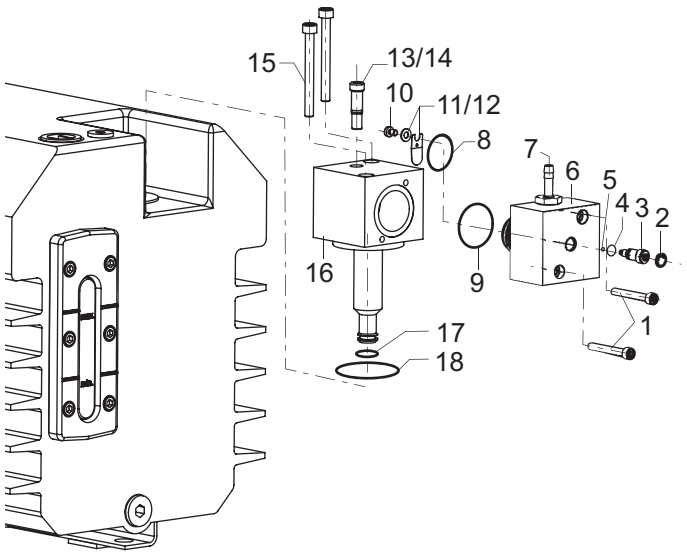


Fig. 29: Remove and clean gas ballast valve (C version)

1	Screws	10	Screw
2	Circlip	11	Washer
3	Dosing screw	12	Plate spring
4	O-ring	13	Noise reduction screw
5	O-ring	14	O-ring
6	Flange	15	Screw
7	Hose nozzle	16	Valve housing
8	O-ring	17	O-ring
9	O-ring	18	O-ring

Disassembling gas ballast valve

Required tools

- Open-end wrench, 17 WAF
- Screwdriver
- Allen key, 4 mm
- Allen key, 5 mm
- Torque wrench

1. Unscrew the hose nozzle from the flange.
   – Be careful with the o-ring.
2. Remove the circlip.
3. Rotate the dosing screw out of the flange.
   – Be careful with the O-rings.
4. Unscrew both screws from flange.
5. Remove the flange.
   – Be careful with the O-rings.
6. Unscrew the rear screw from the flange and remove washer and plate spring.
7. Unscrew the noise reduction screw the from valve housing.
   – Be careful with the o-ring.
8. Unscrew screws from valve housing.
   – Be careful with the O-rings.
9. Clean all parts and replace wearing parts in accordance with maintenance kit.

Assembling gas ballast valve

1. Install the gas ballast valve in reverse order.
2. Note screw torques:
   - Screw (1) – tightening torque: **3 Nm**.
   - Screw (10) – tightening torque: **3 Nm**.
   - Screw (15) – tightening torque: **6 Nm**.

7.5.3 Adjusting the noise reduction

The noise reduction is a screw in the gas ballast housing used to reduce air intake. This reduces the knocking sound of the oil. If the noise reduction becomes dirty, it must be cleaned and readjusted.

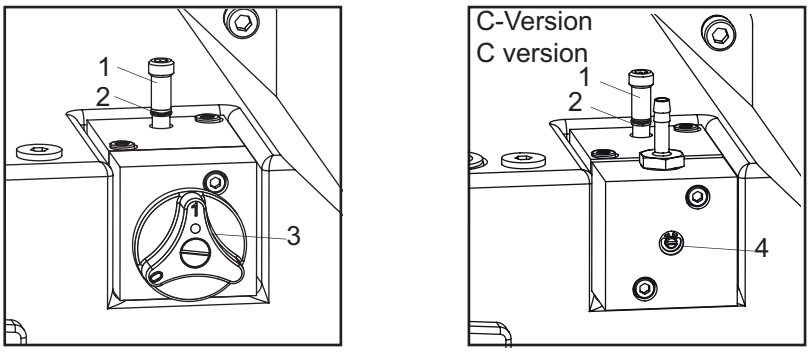


Fig. 30: Adjusting the noise reduction

1 Noise reduction screw
2 O-ring
3 Gas ballast knob (standard version)
4 Dosing screw (C version)

Noise reduction

► Dismantle and clean the gas ballast valve parts (see chapter “Disassembling gas ballast valve”, page 42).

Adjusting the noise reduction

1. Screw the noise reduction screw in fully.
2. **C version**: Turn the dosing screw to the right up to the stop.
3. Turn the gas ballast knob to the right into position “0”.
   – If the pump is running and warm, a knocking noise will soon be audible (oil hammer).
4. Open the noise reduction screw very slowly, until the knocking noise is minimal.

7.6 Changing the operating fluid type

Possibilities for changing the operating fluid type

The operating fluid type can be changed between mineral operating fluid – **P3** – and synthetic operating fluid – **D2** – only.

It is not possible to change from **P3/D2** to **F4/F5** or vice versa.

Required consumables

- 3 times the filling quantity of the new operating fluid

Changing the operating fluid type

1. Change the operating fluid with the new operating fluid **twice** in order to rinse the vacuum pump.
2. Clean any accessories if necessary, such as oil mist filter or oil return, and replace their filter elements.
3. Fill the vacuum pump with operating fluid to one third full.
4. Note the currently used operating fluid type at a suitable location on the vacuum pump, e.g. on the rating plate.

7.7 Checking the oil level in the oiler (C version only)

Vacuum pumps in the corrosive gas version come equipped with an additional oiler. An oiler ensures that the chamber is supplied with operating fluid between the radial shaft seal rings on the rotor shaft.

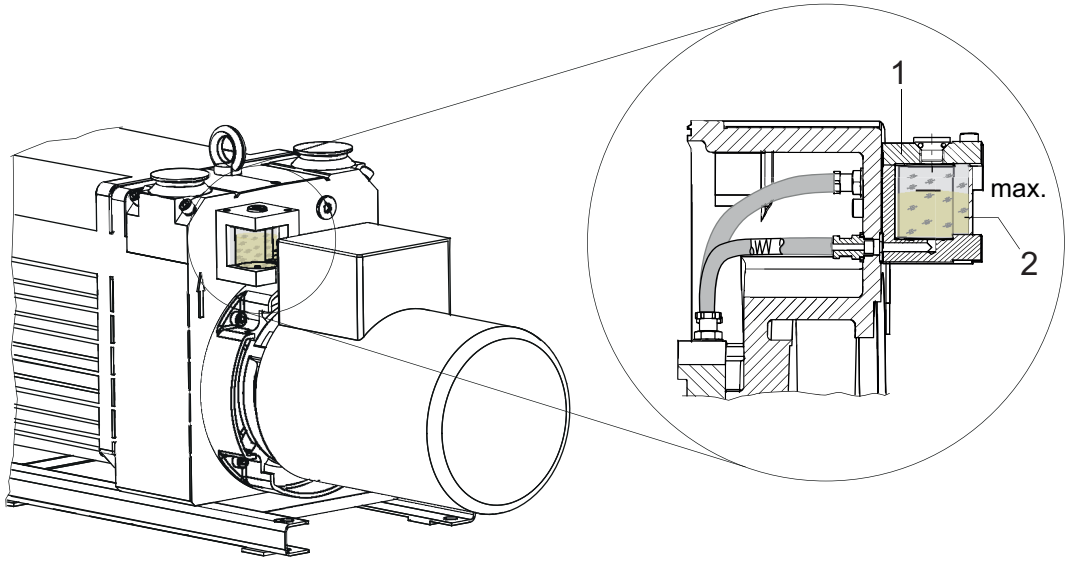


Fig. 31: Oiler in C version pumps

1 Oiler 2 Sight glass

Checking the oiler fill level

1. Check the fill level daily, or after each time the vacuum pump is switched on.
2. Use the same operating fluid as in the vacuum pump.
3. Fill the oiler up to the “max” marking on the sight glass.

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 potential causes and how to fix them here:

Problem	Possible causes	Remedy
Vacuum pump will not start up	• No mains voltage or voltage does not correspond to the motor data	• Check the mains voltage and mains fuse. • Check the motor switch.
	• Pump temperature too low	• Heat the vacuum pump to > 12°C.
	• Thermal protection switch has triggered	• Determine and eliminate the cause. • Allow the vacuum pump to cool down.
	• Pumping system contaminated	• Clean the vacuum pump. • Contact Pfeiffer Vacuum Service.
	• Pumping system damaged	• Clean and maintain the vacuum pump. • Contact Pfeiffer Vacuum Service.
	• Motor faulty	• Replace the motor.

Problem	Possible causes	Remedy
Vacuum pump switches off after a while after being started	• Thermal protection switch of the motor has triggered	• Determine and eliminate the cause of overheating. • Allow the motor to cool down.
	• Mains fuse triggered due to overload (e.g. cold start)	• Bring vacuum pump to permissible ambient temperature range.
	• Exhaust pressure too high	• Check exhaust line outlet opening and exhaust side accessories.
Vacuum pump does not reach the specified final pressure	• Measurement result distorted	• Check the measurement instrument. • Check the final pressure without system connected.
	• Vacuum pump or connected accessory contaminated	• Clean the vacuum pump. • Check the components for contamination.
	• Operating fluid contaminated	• Operate the vacuum pump for an extended period of time with gas ballast valve open, or change the operating fluid.
	• Operating fluid level too low	• Top up the operating fluid.
	• Leak in system	• Locate and eliminate the leak.
	• Vacuum pump is damaged	• Contact Pfeiffer Vacuum Service.
Pumping speed of vacuum pump too low	• The intake line is not suitably dimensioned	• Make sure that connections are short and cross sections adequately dimensioned.
	• Exhaust pressure too high	• Check exhaust line outlet opening and exhaust side accessories.
Loss of operating fluid	• Casing seal is leaking	• Check and replace the seal.
	• Radial shaft seal ring (RSSR) leaking – not applicable to vacuum pumps with magnetic coupling	• Check and replace the RSSR • Check and replace the associated bushing also.
	• Operational operating fluid loss – no oil mist filter	• Install ONF/OME.
Unusual noises during operation	• Noise reduction is contaminated	• Clean the noise reduction or replace it.
	• Pumping system is contaminated or damaged	• Clean and maintain the vacuum pump. • Contact Pfeiffer Vacuum Service.
	• Motor bearing is faulty	• Change the motor. • Contact Pfeiffer Vacuum Service.

Tbl. 9: Troubleshooting for rotary vane pumps

11 Service solutions by Pfeiffer Vacuum

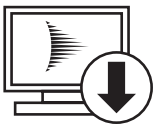
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

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.

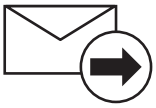
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



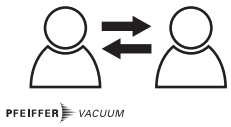
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

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.

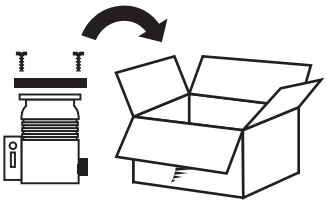


3. Send the forms by email, fax, or post to your local Service Center.

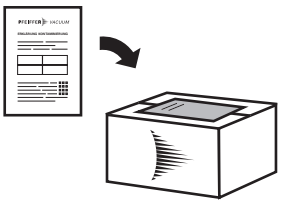


4. You will receive an acknowledgment from Pfeiffer Vacuum.

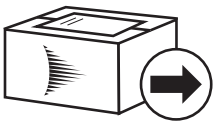
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



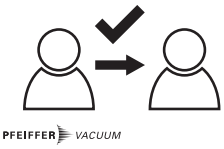
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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



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



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



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

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

12 Spare parts

12.1 Spare parts packs

Observe the following instructions when ordering spare parts:

Spare parts ordering

- ► Where possible, have the pump part number to hand, along with other details from the rating plate if necessary.
- ► Only use original spare parts.

Spare part package	Pump version	Order number
Set of seals	Uno 35	PK E20 001 -T
	Uno 65/Uno 65 M	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	Uno 35/65	PK E21 001 -T
	Uno 65 M	PK E21 002 -T
Maintenance level 3 Overhaul kit	Uno 35	PK E22 001 -T
	Uno 65	PK E22 003 -T
	Uno 65 M	PK E22 004 -T
Set of vanes	Uno 35	PK E28 001 -T
	Uno 65	PK E28 002 -T
	Uno 65 M	PK E28 002 -T
Coupling set	Uno 35/65	PK E26 001 -T
	Uno 65 M	PK E26 002 -T

Tbl. 10: Uno 35/65, Uno 65 M

Spare part package	Pump version	Order number
Set of seals	Duo 35	PK E20 001 -T
	Duo 65	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	Duo 35	PK E21 001 -T
	Duo 65	
Service level 3 Overhaul kit	Duo 35	PK E22 005 -T
	Duo 65	PK E22 011 -T
Set of vanes	Duo 35	PK E28 003 -T
	Duo 65	PK E28 005 -T
Coupling set	Duo 35	PK E26 001 -T
	Duo 65	

Tbl. 11: Spare parts Duo 35/65

Spare part package	Pump version Pump part no.	Order number
Set of seals	Duo 35 M	PK E20 001 -T
	Duo 65 M	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	Duo 35 M	PK E21 002 -T
	Duo 65 M	

Spare part package	Pump version Pump part no.	Order number
Maintenance level 3 Overhaul kit	Duo 35 M	PK E22 010 -T
	Duo 65 M	PK E22 012 -T
Set of vanes	Duo 35 M	PK E28 003 -T
	Duo 65 M	PK E28 005 -T
Coupling set	Duo 35 M	PK E26 002 -T
	Duo 65 M	

Tbl. 12: Duo 35/65 M

Spare part package	Pump version	Order number
Set of seals	Duo 35 C	PK E20 003 -T
	Duo 65 C	
	Duo 35 MC	PK E20 001 -T
	Duo 65 MC	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	Duo 35 C	PK E21 003 -T
	Duo 65 C	
	Duo 35 MC	PK E21 002 -T
	Duo 65 MC	
Maintenance level 3 Overhaul kit	Duo 35 C	PK E22 007 -T
	Duo 65 C	PK E22 014 -T
	Duo 35 MC	PK E22 017 -T
	Duo 65 MC	PK E22 016 -T
Set of vanes	Duo 35 C/MC	PK E28 004 -T
	Duo 65 C/MC	PK E28 006 -T
Coupling set	Duo 35 C	PK E26 001 -T
	Duo 65 C	
	Duo 35 MC	PK E26 004 -T
	Duo 65 MC	

Tbl. 13: Duo 35/65 C/MC

12.1.1 Set of seals

The set of seals contains:

- all seals from the main- and sub-assemblies,
- Radial shaft seal rings (RSSR)

12.1.2 Maintenance set 1 – maintenance level 1

Maintenance set 1 contains the filler and drain screw seals for an operating fluid change, and the seal of the cap for cleaning the oil chamber. It also contains the seals and wearing parts for cleaning the gas ballast valve.

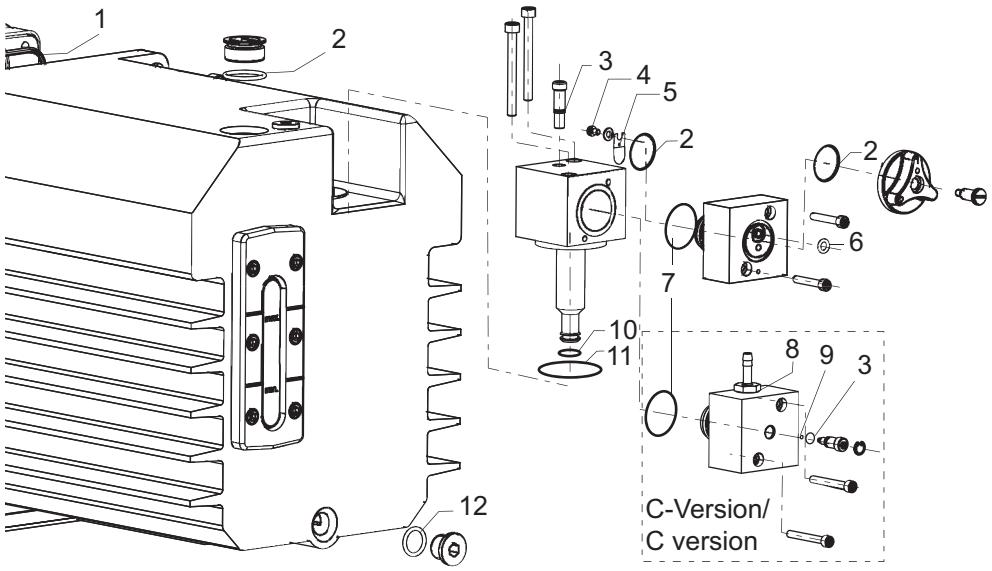


Fig. 32: Maintenance set 1

Item no.	Designation	Size	Shipment
1	O-ring, FPM	270 x 5	1
2	O-ring, FPM	24 x 2.5	3
3	O-ring, FPM	5 x 1.5	2
4	Cylinder screw	M4 x 6	1
5	Plate spring	—	1
6	O-ring, FPM	6 x 2.2	1
7	O-ring, FPM	27 x 2.5	1
8	O-ring, FPM	12 x 1.5	1
9	O-ring, FPM	2.1 x 1	1
10	O-ring, FPM	10 x 2.5	1
11	O-ring, FPM	38 x 3	1
12	O-ring, FPM	15 x 2.5	2 of which 1 is for ODK connection (not shown in figure)

Tbl. 14: Order no.: PK E01 050 CT

12.1.3 Overhaul kit – maintenance level 3

The overhaul kit contains all the wear parts of the vacuum pump that must be replaced after the vacuum pump has been dismantled and cleaned:

- Set of seals with all seals from the main assemblies and sub-assemblies
- Wear parts of the pumping system (including vane and springs)
- Wearing parts of the valves
- Coupling spider

12.1.4 Set of vanes

The set of vanes contains:

- Vane
- Vane springs

12.1.5 Coupling set

The coupling set contains:

- 2 coupling halves,
- coupling spider with fan,
- containment shell with O-ring (in version with magnetic coupling only)

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 CO_2 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

Description	Uno/Duo 35/65 -/M
SAS 40, dust separator	PK Z60 510
KAS 40, Condensate separator	PK Z10 008
OME 40 M, oil mist separator	PK Z40 150
Oil return unit ODK from OME 40 M/C to Duo 35/65	PK 005 950 -T
OME 40 MR, oil mist separator	PK Z40 151
Oil mist separator OME 40 S	104887
OFM 35/65, mechanical oil filter	PK Z90 321
OFC 35/65, chemical oil filter	PK Z90 320
OFM 35/65, mechanical oil filter	PK Z90 321
External oil filter DE 1, 110 V	068991
External oil filter DE 1, 230 V	068990
External oil filter DE 2, 110 V	104375
External oil filter DE 2, 230 V	104374
FAK 040, activated carbon filter	PK Z30 008
KLF 040, cold trap	PK Z80 008
URB 040, Catalyzer Trap	PT U10 260
URB 040, Catalyzer Trap	PT U10 261
Oil pressure switch	PK 223 720 -U

Description	Uno/Duo 35/65 -/M
Oil pressure switch	PK 223 741 -U
PTC Resistor tripping device 220 – 240 V AC	P 4768 052 FQ
Soft starter, 3.6 A	P 4769 001
Soft starter, 6.5 A	P 4769 003
Soft starter 9 A	P 4769 004
Operations monitoring unit 3	PK 223 739 -U
Operations monitoring unit 1	PK 223 718 AU
Gas Flushing Device for Duo 35 and Duo 65	PK 007 300 -T
Blank flange, gas ballast valve	PK 223 797 -T
Gas ballast valve with dosing spindle and Inert gas connection	PK 223 713 -U
Gas ballast valve conversion kit with solenoid valve	PK 223 717 -U
Gas ballast valve, complete, in C-version	PK 223 747 -U
Adapter Uno/Duo 35/65	PK 223 787 -T
Adapter Uno/Duo 35/65	PK 224 629 -T

Tbl. 15: Standard version

Description	Duo 35/65 C/MC
KAS 40 C, condensate separator, corrosive version	PK Z10 408
OME 40 C, oil mist separator	PK Z40 152
Oil return unit ODK from OME 40 M/C to Duo 35/65	PK 005 950 -T
OME 40 CR, oil mist separator with oil return to pump	PK Z40 153
OFC 35/65, chemical oil filter	PK Z90 320
External oil filter DE 1, 110 V	068991
External oil filter DE 1, 230 V	068990
External oil filter DE 2, 110 V	104375
External oil filter DE 2, 230 V	104374
KLF 040, cold trap	PK Z80 008
Oil pressure switch	PK 223 720 -U
Oil pressure switch	PK 223 741 -U
PTC Resistor tripping device 220 – 240 V AC	P 4768 052 FQ
Soft starter, 3.6 A	P 4769 001
Soft starter, 6.5 A	P 4769 003
Soft starter, 9 A	P 4769 004
Operations monitoring unit 3	PK 223 739 -U
Operations monitoring unit 1	PK 223 718 AU
Blank flange, gas ballast valve	PK 223 797 -T
Gas ballast valve with solenoid valve, 24 V DC	PK 223 816 -T
Adapter Uno/Duo 35/65	PK 223 787 -T
Adapter Uno/Duo 35/65	PK 224 629 -T

Tbl. 16: C and MC versions

Description	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
D2, synthetic diester based oil, 1 l	PK 005 875 AT
D2, synthetic diester based oil, 5 l	PK 005 876 AT
D2, synthetic diester based oil, 20 l	PK 005 877 AT

Description	Order number
F5, Perfluoropolyether, 0.5 l	PK 001 851 -T
F5, Perfluoropolyether, 1 l	PK 001 852 -T
F5, Perfluoropolyether, 5 l	PK 001 853 -T

Tbl. 17: 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 Pa = 1 N/m^2						

Tbl. 18: 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. 19: Conversion table: Units for gas throughput

14.2 Technical data

Part number	PK D35 602	PK D36 602
Selection field	Uno 35, 3-phase motor, 230/400 V, 50 Hz | 265/460 V, 60 Hz	Uno 65, 230/400 V, 50 Hz | 265/460 V, 60 Hz
Type designation extended	Uno 35, 3-phase motor, 3TF	Uno 65, Rotary vane pump
Type designation	Uno 35	Uno 65
Water vapor capacity 50 Hz	–	1400 g/h
Water vapor capacity 60 Hz	–	1600 g/h
Water vapor tolerance at 50 Hz	–	30 hPa
Water vapor tolerance at 60 Hz	–	30 hPa
Cooling method	Air (Forced convection)	Air (Forced convection)
Motor protection	–	3TF
Motor type	3-phase motor	3-phase motor
Motor for region	Asia, Europe	–
Ambient temperature	12 – 40 °C	12 – 40 °C
Ambient temperature, min.	12 °C	12 °C
Ambient temperature, max.	40 °C	40 °C
Connection flange (out)	DN 40 ISO-KF	DN 40 ISO-KF

Connection flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Final pressure with gas ballast	1 hPa	≤ 1 hPa
Final pressure	$5 \cdot 10^{-2}$ hPa	$5 \cdot 10^{-2}$ hPa
Emission sound pressure level without gas ballast at 50 Hz	61 dB(A)	≤ 61 dB(A)
Exhaust pressure, max.	1500 hPa	1500 hPa
Exhaust pressure, min.	–	Atmospheric pressure
Exhaust pressure, min.	250 hPa	–
Weight	60 kg	70 kg
Weight: with motor	–	–
Pumping speed at 60 Hz	36 m³/h	70 m³/h
Pumping speed at 50 Hz	32 m³/h	62 m³/h
Safety Data Sheets	–	–
Input voltage: tolerance	±5 %	±5 %
Input voltage(s)	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz
Mains cable	No	No
Gas ballast	–	–
Operating fluid	P3	P3
Operating fluid amount	4.5 l	5.4 l
Rotation speed at 50 Hz	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm
Rated power 50 Hz	1.1 kW	1.5 kW
Rated power 60 Hz	1.3 kW	1.8 kW
Protection degree	IP55	IP55
Leakage rate safety valve	$1 \cdot 10^{-5}$ Pa m³/s	≤ $1 \cdot 10^{-5}$ Pa m³/s
Filter time constant, rapid	–	–

Tbl. 20: Technical data, Uno 35/65

Part number	PK D45 602	PK D45 028	PK D45 027
Selection field	Duo 35, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	Duo 35 M, 3-phase motor, PTC, 230/400 V, 50 Hz | 265/460 V, 60 Hz	Duo 35 MC, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz
Type designation extended	Duo 35, 3-phase motor, 3TF	Duo 35 M , 3-phase motor, PTC	Duo 35 MC, 3-phase motor, 3TF
Type designation	Duo 35	Duo 35 M	Duo 35 MC
Sealing gas	No	–	–
Cooling method	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)
Motor protection	3TF	PTC	PTC
Motor type	3-phase motor	3-phase motor	3-phase motor
Motor for region	Asia, Europe	–	–
Operating temperature max.	80 °C	–	–
Ambient temperature	12 – 40 °C	12 – 40 °C	12 – 40 °C
Ambient temperature, min.	12 °C	12 °C	12 °C
Ambient temperature, max.	40 °C	40 °C	40 °C
Connection flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Connection flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Final pressure with gas ballast	$3 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa	$4 \cdot 10^{-3}$ hPa
Final pressure	$2 \cdot 10^{-3}$ hPa	$2 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa

Emission sound pressure level without gas ballast at 50 Hz	61 dB(A)	≤ 61 dB(A)	≤ 61 dB(A)
Exhaust pressure, max.	–	–	–
Exhaust pressure, min.	Atmospheric pressure	–	–
Weight: with motor	–	–	–
Pumping speed at 60 Hz	36 m³/h	36 m³/h	36 m³/h
Pumping speed at 50 Hz	32 m³/h	32 m³/h	32 m³/h
Safety Data Sheets	–	–	–
Input voltage: tolerance	±5 %	±5 %	±5 %
Input voltage(s)	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz
Mains cable	No	No	No
Operating fluid	P3	P3	A113, F5
Operating fluid amount	3.2 l	3.2 l	3.2 l
Rotation speed at 50 Hz	1500 rpm	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm	1800 rpm
Rated power 50 Hz	1.1 kW	1.1 kW	1.1 kW
Rated power 60 Hz	1.3 kW	1.3 kW	1.3 kW
Protection degree	IP55	IP55	IP55
Leakage rate safety valve	$1 \cdot 10^{-5}$ Pa m³/s	≤ $1 \cdot 10^{-5}$ Pa m³/s	≤ $1 \cdot 10^{-5}$ Pa m³/s
Filter time constant, rapid	–	–	–
Operating fluid included in delivery	Yes	Yes	No

Tbl. 21: Technical data, Duo 35

Part number	PK D46 602	PK D46 035	PK D46 036
Selection field	Duo 65, 3-phase motor, PTC, 230/400 V, 50 Hz | 265/460 V, 60 Hz	Duo 65 M, 3-phase motor, PTC, 230/400 V, 50 Hz | 265/460 V, 60 Hz	Duo 65 MC, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz
Type designation extended	Duo 65, 3-phase motor, PTC	Duo 65 M , 3-phase motor, PTC	Duo 65 MC, 3-phase motor, 3TF
Type designation	Duo 65	Duo 65 M	Duo 65 MC
Sealing gas	–	–	–
Cooling method	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)
Motor protection	PTC	PTC	3TF
Motor type	3-phase motor	3-phase motor	3-phase motor
Motor for region	–	–	–
Ambient temperature	12 – 40 °C	12 – 40 °C	12 – 40 °C
Ambient temperature, min.	12 °C	12 °C	12 °C
Ambient temperature, max.	40 °C	40 °C	40 °C
Connection flange (out)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Connection flange (in)	DN 40 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Final pressure with gas ballast	$3 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa	$4 \cdot 10^{-3}$ hPa
Final pressure	$2 \cdot 10^{-3}$ hPa	$2 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa
Emission sound pressure level without gas ballast at 50 Hz	≤ 61 dB(A)	≤ 61 dB(A)	≤ 61 dB(A)
Exhaust pressure, max.	1500 hPa	1500 hPa	1500 hPa

Exhaust pressure, min.	Atmospheric pressure	–	–
Weight: with motor	–	–	–
Pumping speed at 60 Hz	70 m³/h	70 m³/h	70 m³/h
Pumping speed at 50 Hz	62 m³/h	62 m³/h	62 m³/h
Safety Data Sheets	–	–	–
Input voltage: tolerance	±5 %	±5 %	±5 %
Input voltage(s)	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz
Mains cable	No	No	No
Operating fluid	P3	P3	A113, F5
Operating fluid amount	4.2 l	4.2 l	4.2 l
Rotation speed at 50 Hz	1500 rpm	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm	1800 rpm
Rated power 50 Hz	1.5 kW	1.5 kW	1.5 kW
Rated power 60 Hz	1.8 kW	1.8 kW	1.8 kW
Protection degree	IP55	IP55	IP55
Leakage rate safety valve	≤ 1 · 10^{-5} Pa m³/s	≤ 1 · 10^{-5} Pa m³/s	≤ 1 · 10^{-5} Pa m³/s
Power consumption max.	–	3000 W	3000 W
Current, max.	–	4.2 A	4.2 A
Filter time constant, rapid	–	–	–
Operating fluid included in delivery	Yes	Yes	No

Tbl. 22: Technical data, Duo 65

Part number	PK D45 202	PK D46 202
Selection field	Duo 35 C, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	Duo 65 C, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz
Type designation extended	Duo 35 C, 3-phase motor, 3TF	Duo 65 C, 3-phase motor, 3TF
Type designation	Duo 35 C	Duo 65 C
Sealing gas	No	No
Cooling method	Air (Forced convection)	Air (Forced convection)
Motor protection	3TF	3TF
Motor type	3-phase motor	3-phase motor
Motor for region	Asia, Europe	Asia, Europe
Operating temperature max.	80 °C	–
Ambient temperature	12 – 40 °C	12 – 40 °C
Ambient temperature, min.	12 °C	12 °C
Ambient temperature, max.	40 °C	40 °C
Connection flange (out)	DN 40 ISO-KF	DN 40 ISO-KF
Connection flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Final pressure with gas ballast	≤ 4.5 · 10^{-3} hPa	≤ 4.5 · 10^{-3} hPa
Final pressure	3 · 10^{-3} hPa	3 · 10^{-3} hPa
Emission sound pressure level (EN ISO 2151) level 1	–	–
Emission sound pressure level without gas ballast at 50 Hz	≤ 61 dB(A)	≤ 61 dB(A)
Exhaust pressure, max.	1500 hPa	1500 hPa
Exhaust pressure, min.	Atmospheric pressure	Atmospheric pressure
Weight: with motor	–	–

Pumping speed at 60 Hz	36 m³/h	70 m³/h
Pumping speed at 50 Hz	32 m³/h	62 m³/h
Safety Data Sheets	–	–
Input voltage: tolerance	±5 %	±5 %
Input voltage(s)	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz	230 / 400 V AC, 50 Hz | 265 / 460 V AC (±5 %), 60 Hz
Mains cable	No	No
Gas ballast	–	–
Operating fluid	A113, F5	A113, F5
Operating fluid amount	3.2 l	4.2 l
Rotation speed at 50 Hz	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm
Rated power 50 Hz	1.1 kW	1.5 kW
Rated power 60 Hz	1.3 kW	1.8 kW
Protection degree	IP55	IP55
Leakage rate safety valve	≤ 1 · 10^{-5} Pa m³/s	≤ 1 · 10^{-5} Pa m³/s
Operating fluid included in delivery	No	No

Tbl. 23: Technical data, Duo 35/65 C

Typical ultimate pressure according to PNEUROP

14.3 Dimensions

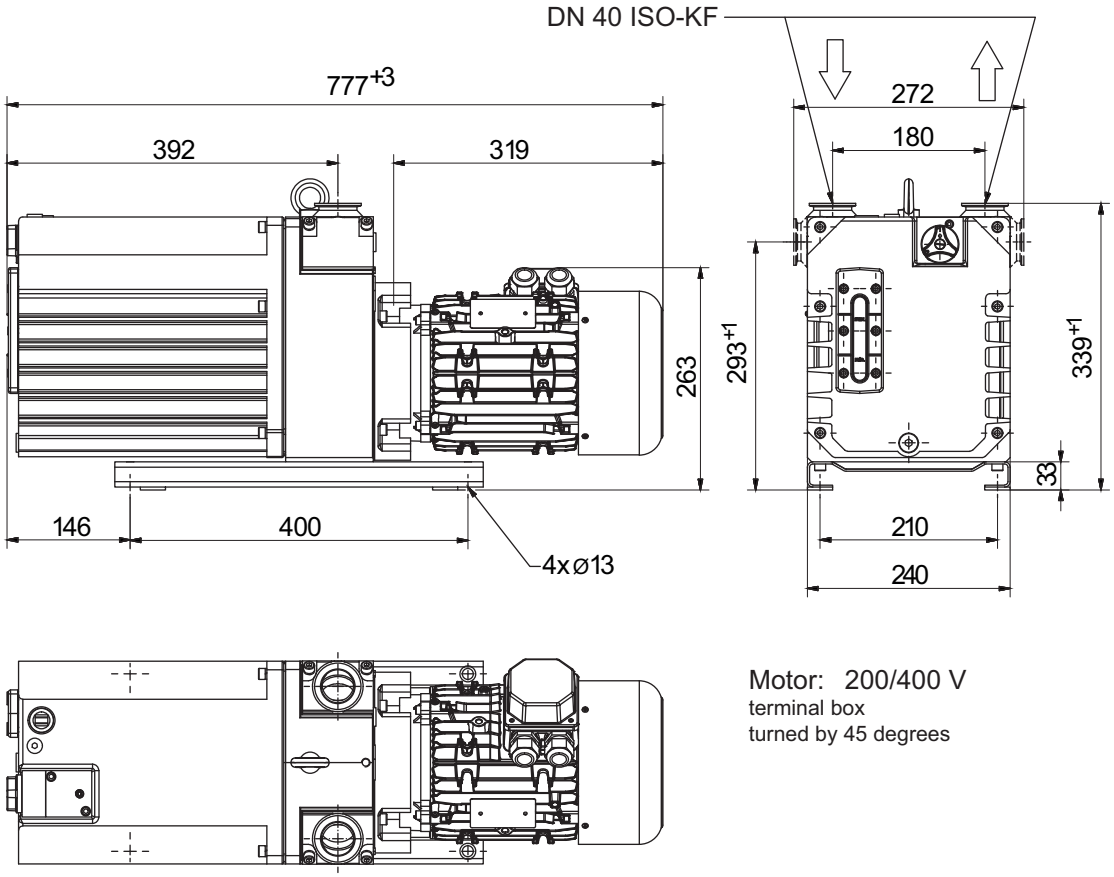


Fig. 33: Duo 65 | PK D46 630 E

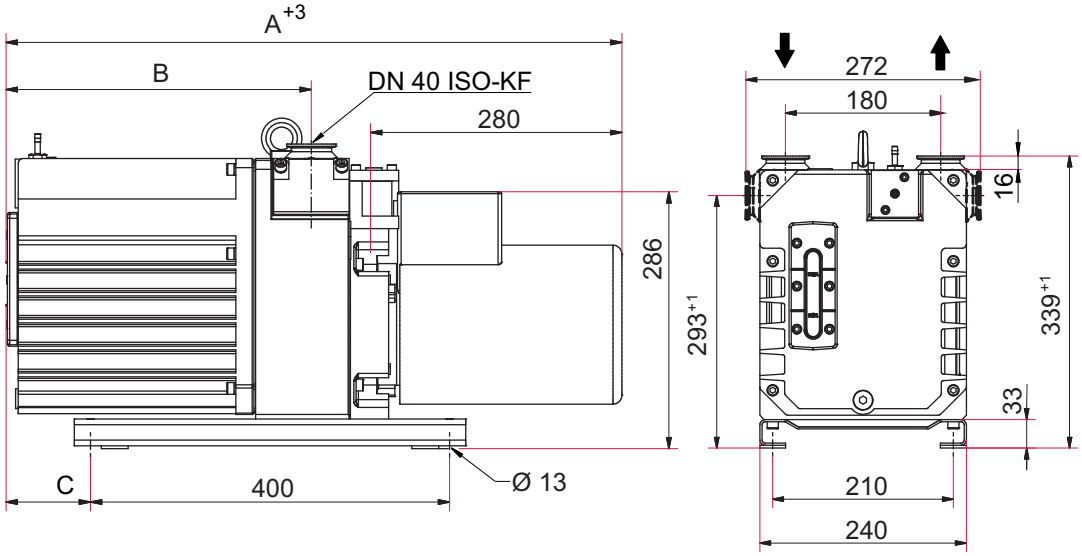


Fig. 34: Uno/Duo 35/65

Dimensions	PK D35 602 Uno 35, 3-phase motor, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D36 602 Uno 65, 230/400 V, 50 Hz | 265/460 V, 60 Hz
A	645 mm	725 mm
B	312 mm	392 mm
C	66 mm	146 mm

Tbl. 24: Uno 35/65

Dimensions	PK D45 602 Duo 35, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D45 642 Duo 35, 220/380 V, 60 Hz, 3TF	PK D46 602 Duo 65, 3-phase motor, PTC, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D46 642 Duo 65, rotary vane pump, 220/380 V, 60 Hz, 3TF
A	645 mm	668 mm	725 mm	780 mm
B	312 mm	312 mm	392 mm	392 mm
C	66 mm	66 mm	146 mm	146 mm

Tbl. 25: Duo 35/65

Dimensions	PK D45 202 Duo 35 C, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D45 242 Duo 35 C, 3-phase motor, 3TF, 220/380 V, 60 Hz	PK D46 202 Duo 65 C, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D46 242 Duo 65 C, 3-phase motor, 3TF, 200/346 V, 50 Hz | 220/380 V, 60 Hz
A	645 mm	668 mm	725 mm	780 mm
B	312 mm	312 mm	392 mm	392 mm
C	66 mm	66 mm	146 mm	146 mm

Tbl. 26: Duo 35/65 C

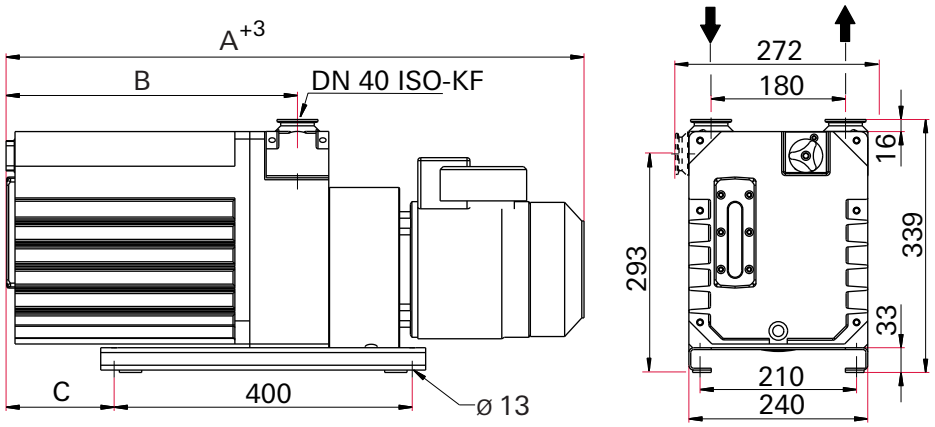


Fig. 35: Duo 35/65 M, Duo 35/65 MC

Dimensions	PK D45 028 Duo 35 M, 3-phase motor, PTC, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D45 023 und andere Pumpen	PK D46 035 Duo 65 M, 3-phase motor, PTC, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D46 049 and other pumps
A	691 mm	714 mm	771 mm	826 mm
B	312 mm	312 mm	392 mm	392 mm
C	66 mm	66 mm	146 mm	146 mm

Tbl. 27: Duo 35/65 M

Dimensions	PK D45 027 Duo 35 MC, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D46 036 Duo 65 MC, 3-phase motor, 3TF, 230/400 V, 50 Hz | 265/460 V, 60 Hz	PK D46 025 and other pumps
A	726 mm	806 mm	861 mm
B	312 mm	392 mm	392 mm
C	66 mm	146 mm	146 mm

Tbl. 28: Duo 35/65 MC

EC Declaration of Conformity

Declaration for product(s) of the type:

Rotary vane pump
Uno 35 | 65
Duo 35 | 65

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

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

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Aßlar, 2022-08-30

CE

PFEIFFER VACUUM

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

Uno 35 | 65

Duo 35 | 65

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

Supply of Machinery (Safety) Regulations 2008

Electrical Equipment (Safety) Regulations 2016

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 21360-1:2020	EN ISO 2151:2:2008
ISO 21360-2:2020	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:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2024-09-11

UK CA

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