

DuoVane 36

DuoVane 70

Rotary Vane Pump

Instruction Manual



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1 About this Manual



NOTE

Important

Read carefully before use.

- Keep the manual for future consultation.

1.1 Validity

This instruction manual is a customer document of Pfeiffer Vacuum + Fab Solutions. The instruction manual describes 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 this instruction manual refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

1.1.1 Applicable Documents

Document	Number
Declaration of conformity	A component of this instruction manual

1.1.2 Variants

These instructions apply to DuoVane series vacuum pumps:

Type	Version
DuoVane 36/70	Standard Version
DuoVane 36/70 C	C version; differs from the standard version as • Operating fluid F5 • Vane material changed • Hose connection and dosage spindle on gas ballast valve • Oiler for shaft feedthrough • Leakage rate $\leq 1 \times 10^{-7}$ Pa m³/s
DuoVane 36/70 M	M version; differs from the standard version as follows: • Magnetic coupling • Leakage rate $\leq 1 \times 10^{-7}$ Pa m³/s
DuoVane 36/70 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 $\leq 1 \times 10^{-7}$ Pa m³/s

1.2 Target Group

This instruction manual is 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 + Fab Solutions.

1.3 Conventions

1.3.1 Instructions in the Text

Usage instructions in the document follow a general structure. The action required is indicated by bullet points.

The bullet point list indicates an action with necessary steps followed by another.

- Step 1
- Step 2
- Step 3
 - Step 3.1

The indented bullet point above indicates an action, feature or additional information related to the previous step.

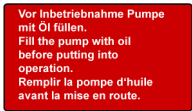
1.3.2 Pictographs

 **NOTE**

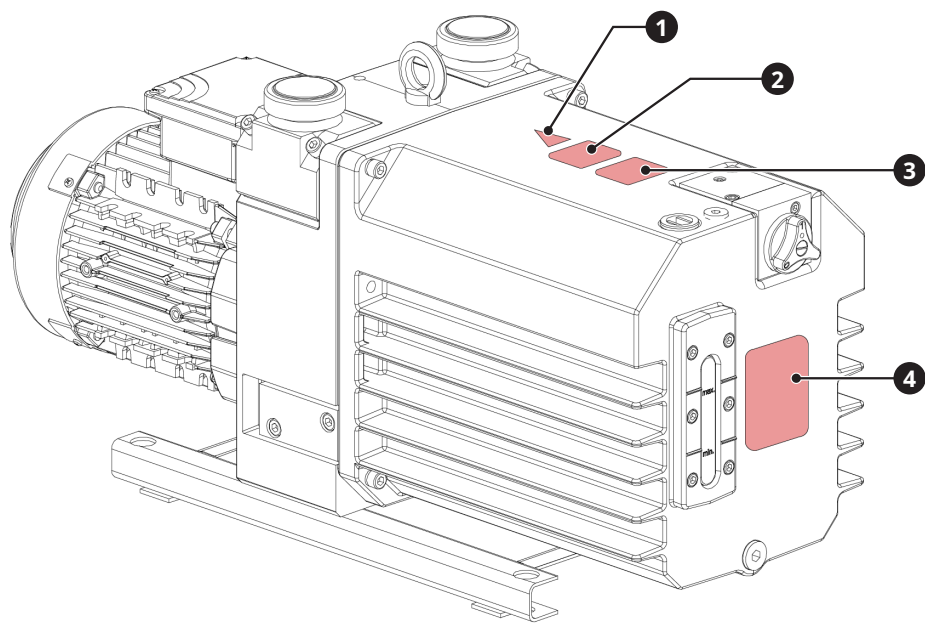
Pictographs used in the document indicate useful information.

1.3.3 Stickers on the Product

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

	Nameplate (example) The nameplate is located on the front side of the vacuum pump housing.
	Fill the vacuum pump with oil This sticker indicates that the vacuum pump must be filled with oil before putting it into operation.

Achtung! Vor dem Einfüllen des Öles Drehrichtung der Pumpe prüfen! ATTENTION! Before filling in the oil check direction of rotation of the pump! ATTENTION! Avant remplir l'huile vérifier le sens de rotation de la pompe!	Check the direction of rotation This sticker indicates that you must check the direction of rotation before filling the vacuum pump with oil.
	Warning of hot surface This sticker warns of injuries caused by high temperatures as a result of contact without protection during operation.



Graphic 1: Position of the stickers on the product

Description			
1	Warning of hot surface	2	Fill vacuum pump with oil
3	Check the direction of rotation	4	Nameplate

2 Safety

2.1 General Safety Information

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



DANGER

... indicates an imminent dangerous situation that will result in death or serious injuries if not prevented.



WARNING

... indicates a potentially dangerous situation that could result in death or serious injuries.



CAUTION

... indicates a potentially dangerous situation that could result in minor injuries.



NOTICE

... indicates a potentially dangerous situation that could result in damage to property.



NOTE

... indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

2.2 Safety Precautions



NOTE

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.



NOTE

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 reevaluate 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 ($> 70\text{ °C}$).
- 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 .

2.3 Limits of Use of the Product

Parameter	Limit value
Installation location	Weatherproof (internal space)
Protection class (according to IEC 61010)	I
Degree of pollution (according to IEC 61010)	2
Overvoltage category	II
Protection class	IP40 (single phase motor) IP43 (three phase motor)
Housing type (according to UL 50E)	Type 1
Permissible angle of inclination	$\pm 1^\circ$ in longitudinal direction, $\pm 2^\circ$ in transverse direction
Ambient temperature	$+12\text{ °C}$ to $+40\text{ °C}$

Relative air humidity	max. 85 %
Pumped medium intake temperature, max.	+40 °C
Exhaust pressure of the Rotary vane vacuum pump	≥ atmospheric pressure ≤ 1500 hPa absolute
Exhaust pressure at OME	max. atmospheric pressure
Constant intake pressure, max.	50 hPa absolute

2.4 Intended Use

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

2.5 Foreseeable Misuse

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

- Pumping explosive media
- Pumping corrosive media (exception: C version of the rotary vane vacuum pump)
- Pumping of fluids
- Pumping of dust
- Operating in impermissible high magnetic fields
- Using for pressure generation
- Operating in potentially explosive areas
- Using of accessories or spare parts that are not listed in this instruction manual
- Pumping radioactive media
- Pumping of gases that introduce an ignition source to the vacuum chamber
- Pumping of gases that contain contamination such as particles, dust, or condensate
- Pumping of media with a propensity to sublimation
- Using the rotary vane vacuum pump outside the specified area of application
- Using 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
- Using of operating fluids other than those specified by Pfeiffer Vacuum + Fab Solutions
- Utilize mineral oil as operating fluid with an oxygen concentration level of $> 21\%$. Mineral oils are combustible and ignite at high temperatures and when they come into contact with pure oxygen. These oils oxidize heavily and thus lose their lubricating capacity.

2.6 Personnel Qualification

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

Training people

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

2.6.1 Ensuring Personnel Qualification

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

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

Trained individuals

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

2.6.2 Personnel Qualification for Maintenance and Repair



NOTE

Advanced training courses.

Pfeiffer Vacuum + Fab Solutions offers advanced training courses to maintenance levels 2 and 3

Adequately trained individuals are:

Maintenance level 1

- Customer (trained specialist)

Maintenance level 2

- Customer with technical education
- Pfeiffer Vacuum + Fab Solutions service technician

Maintenance level 3

- Customer with Pfeiffer Vacuum + Fab Solutions service training
- Pfeiffer Vacuum + Fab Solutions service technician

2.6.3 Advanced Training with Pfeiffer Vacuum + Fab Solutions

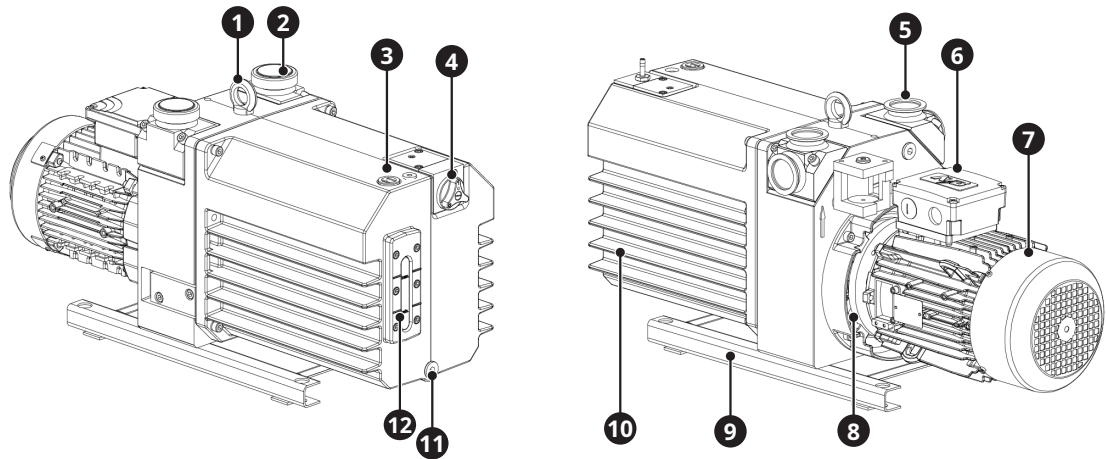
For optimal and trouble-free use of this product, Pfeiffer Vacuum + Fab Solutions offers a comprehensive range of courses and technical trainings.

For more information, please contact *Pfeiffer Vacuum + Fab Solutions technical training*.

3 Product Description

3.1 Function

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



Graphic 2: Structure of the rotary vane pump

Description			
1	Lifting eye	2	Exhaust flange with protective cap
3	Filler screw	4	Gas ballast valve
5	Vacuum flange	6	Electrical connection
7	Motor	8	Motor flange
9	Base plate	10	Cap
11	Drain screw	12	Oil sight glass

3.1.1 Actuator

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

Motor types

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

3.1.2 Gas Ballast

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

3.1.3 Vacuum Safety Valve

The rotary vane vacuum pumps are equipped with a vacuum safety valve. This separates the rotary vane vacuum pump from the vacuum chamber in the event of intentional or unintentional standstill and vents the pumping system with the displaced gas so that oil does not rise into the vacuum chamber. After switching on, the valve opens after a delay.

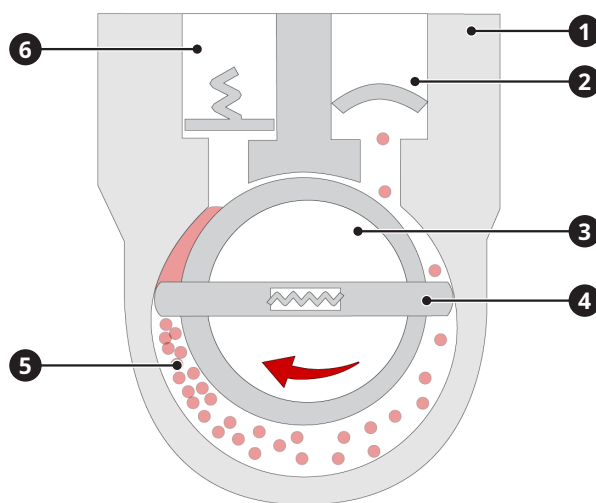
3.1.4 Operating Fluid, Oil

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

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

3.2 Operating Principle

The rotary vane vacuum pump is an oil-sealed rotary displacement pump. The pumping system comprises the housing, the eccentrically mounted rotor, and the centrifugal and spring-loaded radially sliding vanes, which divide the vacuum 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 vacuum 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 vacuum chamber. In addition to lubrication, this also causes the gaps between the rotor, stator, and vanes to seal.



Graphic 3: Rotary vane vacuum pump functional principle

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

3.3 Identifying the Product

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

3.3.1 Product Features

Pump type	Pumping speed	Characteristics
DuoVane 36	32 m ³ /h (50 Hz) 36 m ³ /h (60 Hz)	• Two-stage rotary vane pump • Asynchronous motor and claw coupling • Gas ballast valve • Intake side vacuum safety valve
DuoVane 70	62 m ³ /h (50 Hz) 70 m ³ /h (60 Hz)	• Two-stage rotary vane pump • Asynchronous motor and claw coupling • Gas ballast valve • Intake side vacuum safety valve

Table 1: Features of rotary vane pumps

3.4 Scope of Delivery

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

4 Transport and Storage

4.1 Transport



WARNING



Risk of serious injury from swinging, toppling or falling.

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 safety shoes.

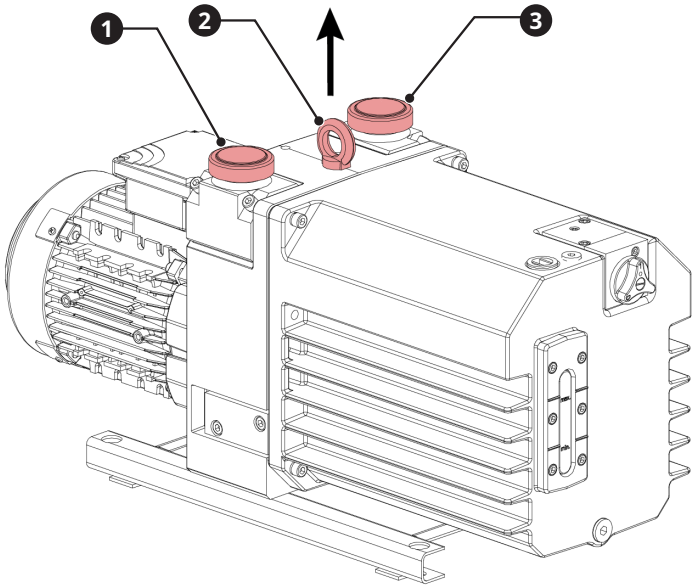


NOTE

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

Safe transport of the product

- Transport the rotary vane vacuum pump only within the permissible temperature limits.
- Observe weight specified on the nameplate.
- Where possible, always transport or ship the rotary vane vacuum pump in its original packaging.
- Fully drain the operating fluid.
- Remove the protective cover only immediately prior to installation.



Graphic 4: Transporting rotary vane vacuum pump

Description			
1	Vacuum flange safety cap	2	Lifting eye
3	Exhaust flange safety cap		

Transport the rotary vane vacuum pump without its packaging

- Unpack the rotary vane vacuum pump.
- To protect the inside of the rotary vane vacuum pump, leave both protective caps on the connection flanges during transport.
- For lifting, use the lifting eye provided for this purpose, located on the top of the rotary vane vacuum pump.
- Lift the rotary vane vacuum pump out of the transport packaging.
- Always place the rotary vane vacuum pump on an adequately sized, level surface.

4.2 Storage



NOTE

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

Storing the rotary vane vacuum pump

- Seal all flange openings with the original protective caps.
- Seal all other connections (e.g. venting connection) with the corresponding original parts.
- Store the rotary vane vacuum pump only in dry, dust-free rooms, within the specified ambient conditions.
- In rooms with humid or aggressive atmospheres: Hermetically seal the rotary vane vacuum pump together with a drying agent in a plastic bag.
- Make sure that the gas ballast valve is closed.
- Fill the rotary vane vacuum pump with operating fluid up to the upper edge of the sight glass.
- Change the operating fluid if the storage period is longer than 2 years.

5 Installation

5.1 Setting up the Vacuum Pump

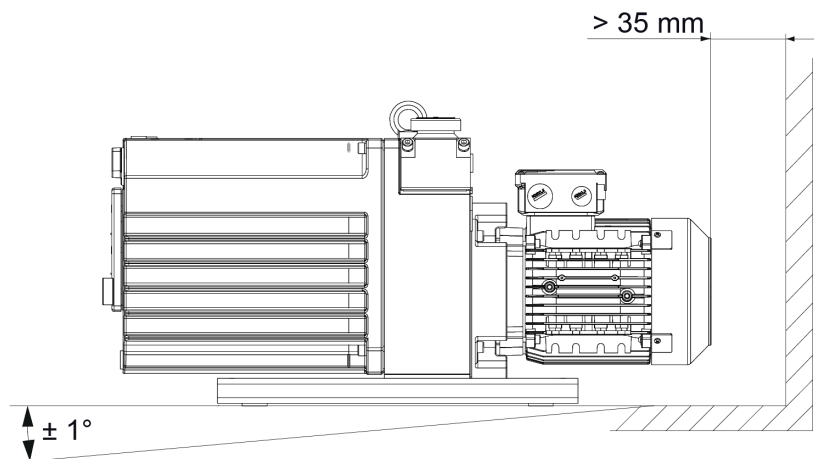


CAUTION

Danger of burns on hot surfaces.

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

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

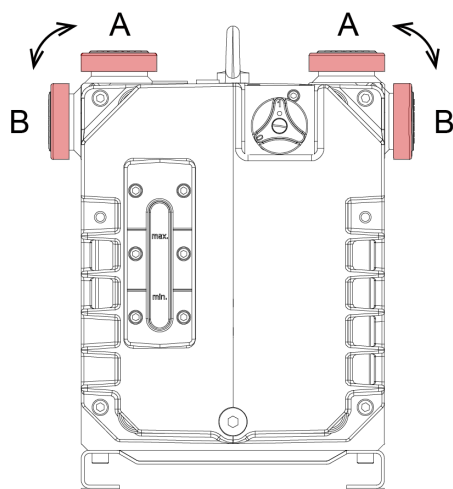


Graphic 5: Minimum Distances and Permissible Inclination

- 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
- Place the rotary vane vacuum pump on a flat, horizontal surface, to safeguard the operating fluid supply.
- Screw the base plate of the rotary vane vacuum pump to the mounting surface if necessary.
- Observe the max. permissible angles of inclination.
- When installing the rotary vane vacuum pump in a closed housing, ensure adequate air circulation.
- Keep the oil sight glass and gas ballast valve visible and freely accessible.
- Keep the voltage and frequency specifications on the motor nameplate visible and freely accessible.
- Fill with operating fluid prior to first commissioning.
 - Quantity and type of the operating fluid can be found on the nameplate.

5.2 Changing the Flange Positions

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



Graphic 6: Possible Flange Positions

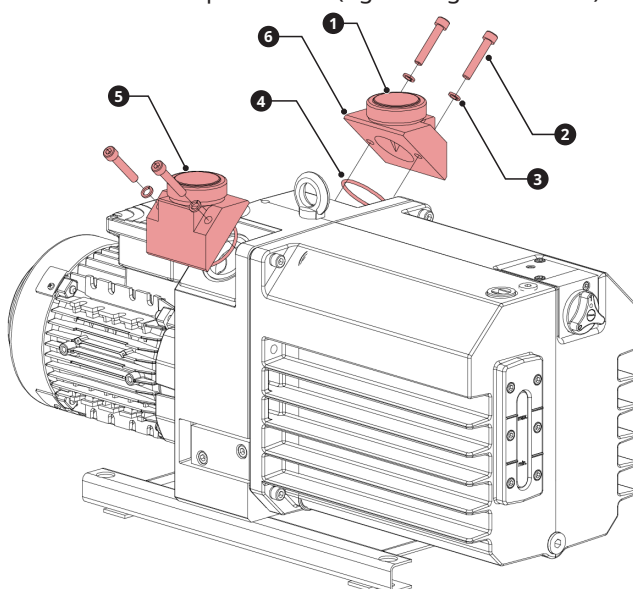
Description			
A	Vertical position	B	Horizontal position

Required consumables

- Paper towels
- Isopropanol, as required

Required tools

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



Graphic 7: Changing the Flange Positions

Description			
1	Protective cap	2	Allen head screw
3	Washer	4	Sealing ring
5	Interchangeable flange (vacuum inlet)	6	Interchangeable flange (vacuum outlet)

Procedure

- Remove the allen head screws.
- Remove the interchangeable flange with the sealing ring.
- Clean the parts and sealing surfaces.
- Hold the interchangeable flange with the sealing ring in the new position.
- Fasten the allen head screws.
 - Tightening torque: **5 Nm**

5.3 Connecting the Vacuum Side



NOTICE

Property damage due to contaminated gases.

Pumping gases that contain contamination damages the rotary vane vacuum pump.

- Use suitable filters or separators from the Pfeiffer Vacuum + Fab Solutions range of accessories, to protect the rotary vane vacuum pump.



NOTE

Installation and operation of accessories.

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

- Information and ordering options for *accessories* can be found online.

Procedure

- Remove the protective cap from the vacuum flange.
- Make sure that the centering ring with cone sieve and the O-ring are in the vacuum flange.
- Establish the shortest possible connection between vacuum pump and vacuum chamber.
- Choose a minimum vacuum line cross section equal to the nominal diameter of the connection flange.
- Depending on the pump type, use PVC or metallic hoses with flange connections from the *Pfeiffer Vacuum + Fab Solutions component shop*.
- Support or suspend the piping to the vacuum pump so that no piping system forces act on the vacuum pump.
- Connect both flanges with a circlip.
- Use a separator or filter from the Pfeiffer Vacuum + Fab Solutions line of *accessories* if necessary.

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



NOTICE

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

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

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



NOTE

Condensate separator.

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

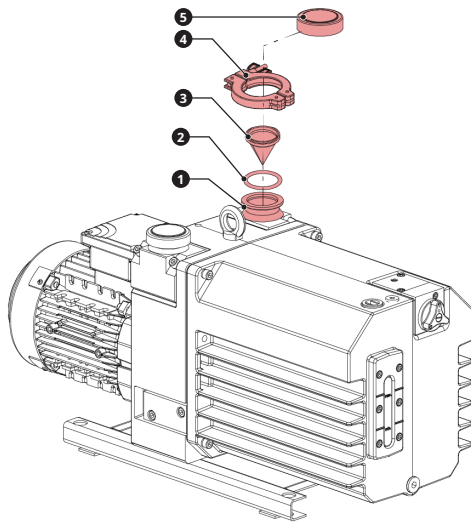


NOTE

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Graphic 8: Connecting the Exhaust Side

Description			
1	Exhaust flange	2	O-Ring
3	Centering ring with cone sieve	4	Circlip
5	Protective cap		

Procedure

- Remove the protective cap from the exhaust flange.
- Make sure that the centering ring with cone sieve and the O-ring are seated correctly in the exhaust flange.
- Choose a minimum exhaust line cross section equal to the nominal diameter of the connection flange.
- Depending on the pump type, use PVC (polyvinyl chloride) or metallic hoses with flange connections from the *Pfeiffer Vacuum + Fab Solutions component shop*.
- Route the piping downwards from the rotary vane vacuum pump, to prevent condensate return.
- Support or suspend the piping to the rotary vane vacuum pump, so that no piping system forces act on the rotary vane vacuum pump.
- Connect both flanges with a circlip.

5.5 Implementing Electrical Safety Measures



DANGER

Risk of danger to life through missing mains disconnection device.

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

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

Installing mains disconnection device

- Install a mains disconnection device as a main switch.
- Use a miniature circuit breaker with an interruption rating of at least **10 kA**.

- Install the miniature circuit breaker within reach of the Rotary vane vacuum pump during building installation.
- Label the miniature circuit breaker as a disconnect device for the rotary vane vacuum pump.

5.6 Connecting to the Mains Power Supply



DANGER

Danger to life from electric shock.

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

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



CAUTION

Risk of injury from entrapment of body parts.

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

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



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 rotary vane vacuum pump with a frequency converter.
- When operating with an IE3 motor, you must use a soft start relay or operate the rotary vane vacuum pump with a frequency converter.



NOTICE

Risk of property damage from excess voltage.

Incorrect or excessive mains voltage will destroy the motor.

- Always observe the motor nameplate 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 + Fab Solutions recommends type "K" circuit breakers with slow tripping characteristics.

5.6.1 Connecting a Three-Phase Motor with a 6-pin Terminal Board



NOTICE

Property damage from high starting torque.

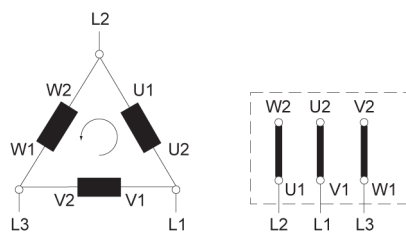
The specific load behavior of the rotary vane vacuum pump requires direct on-line starting at full motor power. Engine damage occurs if a different starting circuit is used.

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

Prerequisites

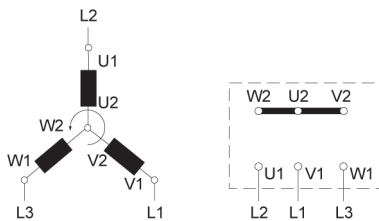
- Rotary vane vacuum pump switched off

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



Graphic 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 $\sqrt{3}$ times the phase current. The delta connection is marked with the Δ symbol. The voltage between the incoming mains supply lines is called mains voltage. The mains current is the current flowing in the incoming supply lines.



Graphic 10: Star Connection for High Voltage

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

5.6.2 Connecting a Three-Phase Motor with a 9-pin Terminal Board

! NOTICE

Property damage from high starting torque.

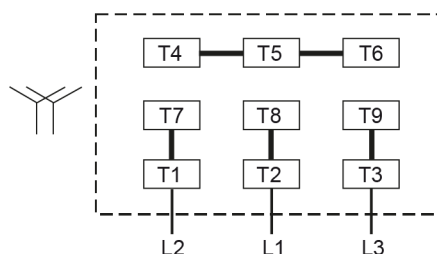
The specific load behavior of the rotary vane vacuum pump requires direct on-line starting at full motor power. Engine damage occurs if a different starting circuit is used.

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

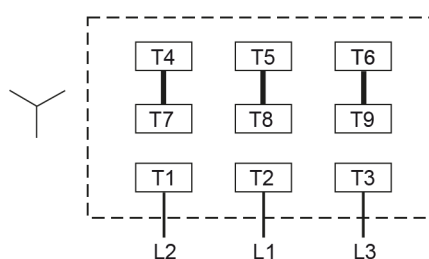
Prerequisites

- Rotary vane vacuum pump switched off

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



Graphic 11: Double Star Connection for Low Voltage



Graphic 12: Star Connection for High Voltage

5.6.3 Setting the Motor Protection Switch

i NOTE

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

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

Table 2: Motor protection switch settings for DuoVane 36

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

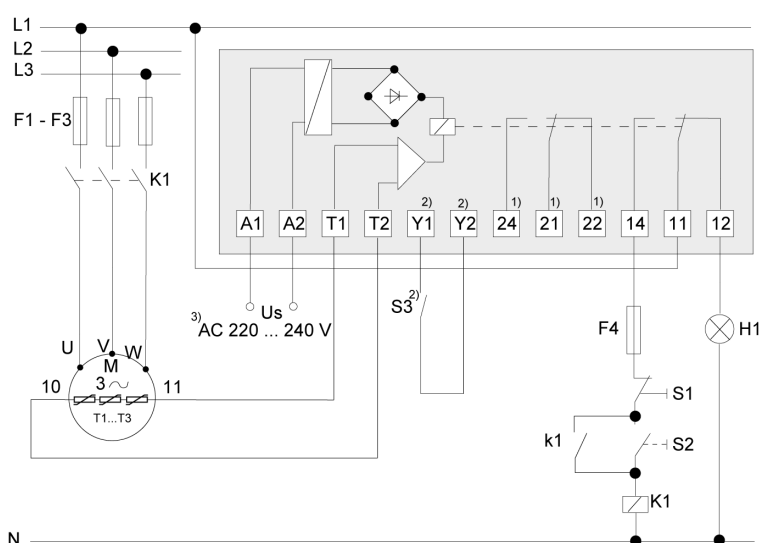
Table 3: Motor protection switch settings for DuoVane 70

5.6.4 Connecting a PTC Thermistor Tripping Unit

i NOTE

Tripping units store the shut-down.

Pfeiffer Vacuum + Fab Solutions recommends connecting motors with PTC (positive temperature coefficient) in the stator winding to a PTC thermistor tripping unit for protection against overload.



Graphic 13: Connection example with PTC thermistor tripping unit

Position	Description	Position	Description
U _s	Supply voltage	T1-T3	PTC resistor sensor
S ₁	OFF button	H1	Tripping indicator
S ₂	ON 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 article number: P 4768 052 FQ and P 4768 052 FE

Procedure

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

5.6.5 Checking the Direction of Rotation



NOTE

Operating fluid leaks out.

The direction of rotation must be checked on rotary vane vacuum pumps with three phase motors. If the direction of rotation for the rotary vane 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

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

5.6.6 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.

5.6.7 Starting 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

- Set the start voltage to > 70 %.
- Set the **run-up time to max. 5 s**.

5.7 Filling up the 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 + Fab Solutions are also excluded.

- Only use approved operating fluids.
- Only use other application-specific operating fluids after consultation with Pfeiffer Vacuum + Fab Solutions.

Permitted operating fluid

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

The operating fluid type is listed on the nameplate

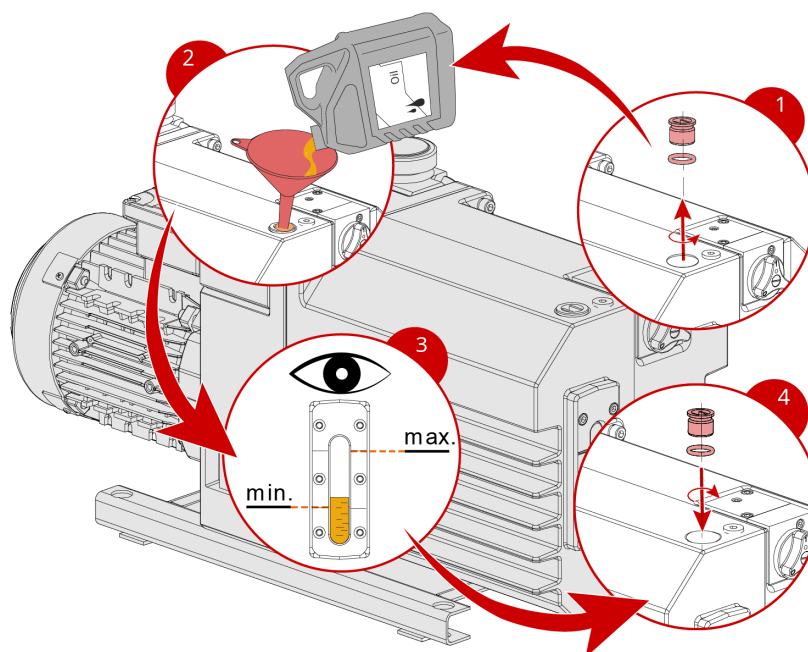
- Please refer to nameplate for type and quantity of intended operating fluid.

Consumables

- Operating fluid of the vacuum pump

Required tools

- Hex key, **WAF 8**
- Calibrated torque wrench (tightening factor ≤ 2.5)



Graphic 14: Filling in Operating Fluid

Procedure

- Unscrew the filler screw.
 - Be careful with the sealing ring.
- Refill the operating fluid.
 - Initial filling with cold vacuum pump: A maximum of 3/4 of the min./max. range.
- Check the level at the oil sight glass.
- Screw in the filler screw.
 - Tightening torque: **max. 6 Nm**

6 Operation

6.1 Commissioning



WARNING

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

During operation with no exhaust line, the rotary vane 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 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 oil sight glass.
- Compare the voltage and frequency specifications on the motor nameplate with the available mains voltage and frequency.
- Protect the rotary vane 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 Vacuum Pump



CAUTION

Risk of injury from entrapment of body parts.

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

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



CAUTION

Danger of injury if hair or loose clothing is pulled in.

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

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



CAUTION

Danger of burns on hot surfaces.

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

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



NOTICE

Risk of damage to the drive from increased motor current consumption.

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

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



NOTE

Cycle operation.

Cycle operation with maximum 10 cycles per hour is possible.

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

Operating conditions

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

Switching on the rotary vane vacuum pump

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

Checking the operating fluid level

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

6.3 Operating the Vacuum Pump with Gas Ballast



NOTICE

Risk of damage from condensation in rotary vane vacuum pump.

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

- Pump condensable vapors only when the rotary vane vacuum pump is warm and the gas ballast valve open.
- Allow the rotary vane 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 rotary vane vacuum pump against corrosion.

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

Behavior with process gases with condensable vapors

Operate the rotary vane vacuum pump with gas ballast, i.e. with the gas ballast valve open.

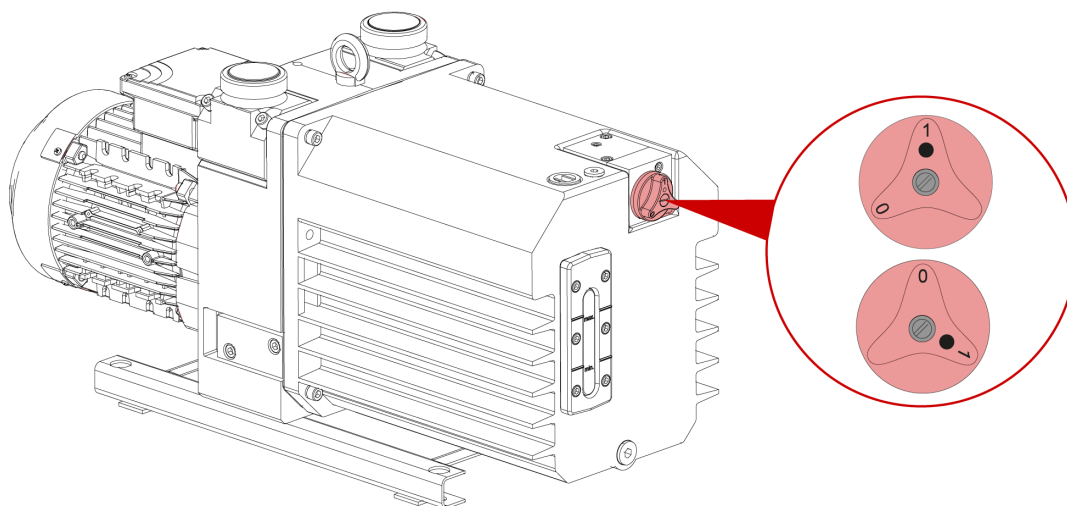
6.3.1 Gas Ballast Valve – Standard Version



NOTE

No intermediate settings possible.

An intermediate setting between open and closed is not possible.



Graphic 15: Gas ballast valve, standard version

Open gas ballast valve

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

Closing gas ballast valve

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

6.3.2 Gas Ballast Valve with inert Gas Connection



NOTICE

Property damage from impermissibly high inert gas pressure.

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

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



NOTICE

Property damage due to inert gas intake during rotary vane vacuum pump standstill.

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

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



NOTE

No intermediate settings possible.

An intermediate setting between open and closed is not possible.

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

Required consumables

- Inert gas, e.g., nitrogen (N₂)

Required aids

- Hose (external diameter 6 mm)
- Inert gas pressure **max. 1500 hPa (absolute)**

Accessories required

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

Connecting gas ballast valve with inert gas connection

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

Selecting an inert gas and setting the inert gas pressure

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

Open gas ballast valve

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

Closing gas ballast valve

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

6.4 Refilling the 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.



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.



NOTE

Recommendation.

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

Prerequisite

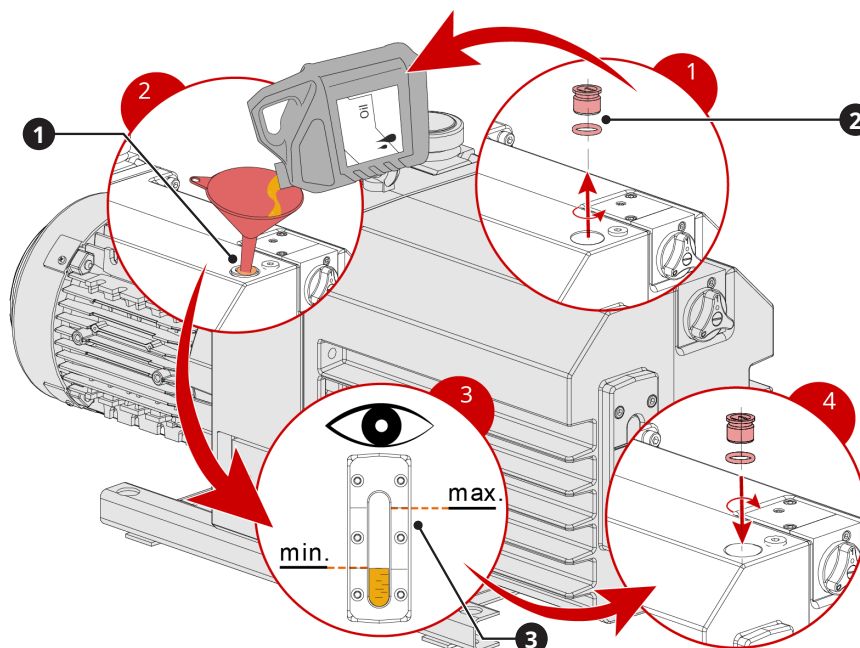
- Rotary vane vacuum pump switched off

Consumables

- Operating fluid of the rotary vane vacuum pump

Required tools

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



Graphic 16: Refilling operating fluid

Description			
1	Filler hole	2	Filler screw incl. sealing ring
3	Oil sight glass		

Procedure

- Unscrew the filler screw.
 - Be careful with the sealing ring.
- Top up operating fluid up to the "Max." marking.
- Screw in the filler screw again.
 - Tightening torque: **6 Nm**

6.5 Switching off

! NOTICE

Contamination from operating fluid backflow.

After the rotary vane vacuum pump is switched off, there is a risk that the connected vacuum system can become contaminated by backflow. The safety valve on the rotary vane 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 rotary vane vacuum pump.

Procedure

- If required, switch the rotary vane vacuum pump off in each pressure range.
- Switch the mains switch off or securely disconnect the drive motor from the mains.
 - The vacuum safety valve closes automatically when the rotary vane vacuum pump is switched off, preventing the backflow of gas and operating fluid into the intake line.
- 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 General Maintenance Information



WARNING



Health hazard through poisoning from toxic contaminated machines or parts.

Toxic process media result in contamination of machines 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 rotary vane 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 rotary vane vacuum pump as a climbing aid.
- Do not exert any force on the product.
- Ensure that the product has a safe center of gravity, when mounting components.
- Wear protective shoes.



CAUTION

Risk of injury from entrapment of body parts.

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

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



CAUTION

Danger of injury if hair or loose clothing is pulled in.

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

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



NOTICE

Damage from incorrect maintenance work.

Unprofessional work on the rotary vane vacuum pump will lead to damage for which Pfeiffer Vacuum + Fab Solutions accepts no liability.

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

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

Prerequisites

- Rotary vane vacuum pump switched off.
- Rotary vane vacuum pump vented to atmospheric pressure.
- Rotary vane vacuum pump cooled.

Preparing maintenance

- Disconnect the drive motor from the mains.
- Secure the motor against switching back on.
- For maintenance work, only dismantle the rotary vane vacuum pump to the extent needed.
- Dispose of used operating fluid according to applicable regulations in each case.
- When using synthetic operating fluid, please observe the associated application instructions.
- Only clean the rotary vane vacuum 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 versions with magnetic coupling.

7.3 Checklist for Inspection and Maintenance



NOTE

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 + Fab Solutions Service if you wish to reduce the maintenance frequency.



NOTE

Spare part packages.

Detailed descriptions of the spare part packages and the order numbers: (see chapter "Spare Parts").

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

We recommend Pfeiffer Vacuum + Fab Solutions Service for carrying out maintenance work at **maintenance level 2 and maintenance level 3** (revision). If the required intervals listed below are exceeded, or if maintenance work is carried out improperly, no warranty or liability claims are accepted on the part of Pfeiffer Vacuum + Fab Solutions. 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 dokument	Instruction Manual	Instruction Manual			
Interval	daily	≤ yearly	≤ 2 years	≤ 4 years	
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 • Replace diaphragm on vacuum safety valve		■ as required			Gas ballast valve spare part package Diaphragm spare part package

Action	Inspection	Maintenance level 1	Maintenance level 2	Maintenance level 3	Required material
described in dokument	Instruction Manual	Instruction Manual			
Interval	daily	≤ yearly	≤ 2 years	≤ 4 years	
Replace filter in external accessory (where present), in accordance with the respective instruction manual		■ as required			
Maintenance level 2 – changing radial shaft seal ring					
- Partially dismantle the rotary vane vacuum pump - Replace RSSR and coupling spider			■		Operating fluid spare part package RSSR spare part package
Additional activities (minoroverhaul): Dismantle and clean rotary vane vacuum pump, replace seals and the following wear parts: - Wear parts, vacuum safety valve (hydraulic piston and diaphragm) - Wear parts for exhaust valve (valve buffer) - Wear parts for gas ballast valve (valve flap) - Vane springs			■ as required		Operating fluid spare part package Valves/springs spare part package Seals spare part package
Maintenance level 3 / overhaul					
Dismantle and clean rotary vane vacuum pump, replace seals and all wear parts: - Vane - Valves, springs, and oil sight glass - Silencer nozzle				■	Spare part package maintenance level 3 / overhaul

Table 4: Maintenance intervals

7.4 Changing the Operating Fluid



WARNING



Health hazard through poisoning from toxic contaminated machines or parts.

Toxic process media result in contamination of machines 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.



NOTE

Pfeiffer Vacuum + Fab Solutions 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.



NOTE

Operating fluid type.

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



NOTE

Safety data sheets.

Safety data sheets for operating fluids can be obtained from Pfeiffer Vacuum + Fab Solutions on request, or from the Pfeiffer Vacuum + Fab Solutions 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

- Rotary vane 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 through poisoning from toxic contaminated machines or parts.

Toxic process media result in contamination of machines 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.



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 + Fab Solutions Download Center* on request.

Prerequisites

- Rotary vane vacuum pump switched off.
- Rotary vane vacuum pump is vented to atmospheric pressure on the suction side.
- Rotary vane vacuum pump cooled.

Required aids

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

Determining degree of aging of P3 operating fluid

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

7.4.2 Changing Operating Fluid



WARNING



Health hazard through poisoning from toxic contaminated machines or parts.

Toxic process media result in contamination of machines 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.



NOTE

Cleaning by changing the operating fluid.

Pfeiffer Vacuum + Fab Solutions recommends, in cases of heavy contamination with process residues, cleaning the inside of the rotary vane vacuum pump with several operating fluid changes. Type and source of hazard

Prerequisites

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

Spare parts required

- Operating fluid spare part package

Required consumables

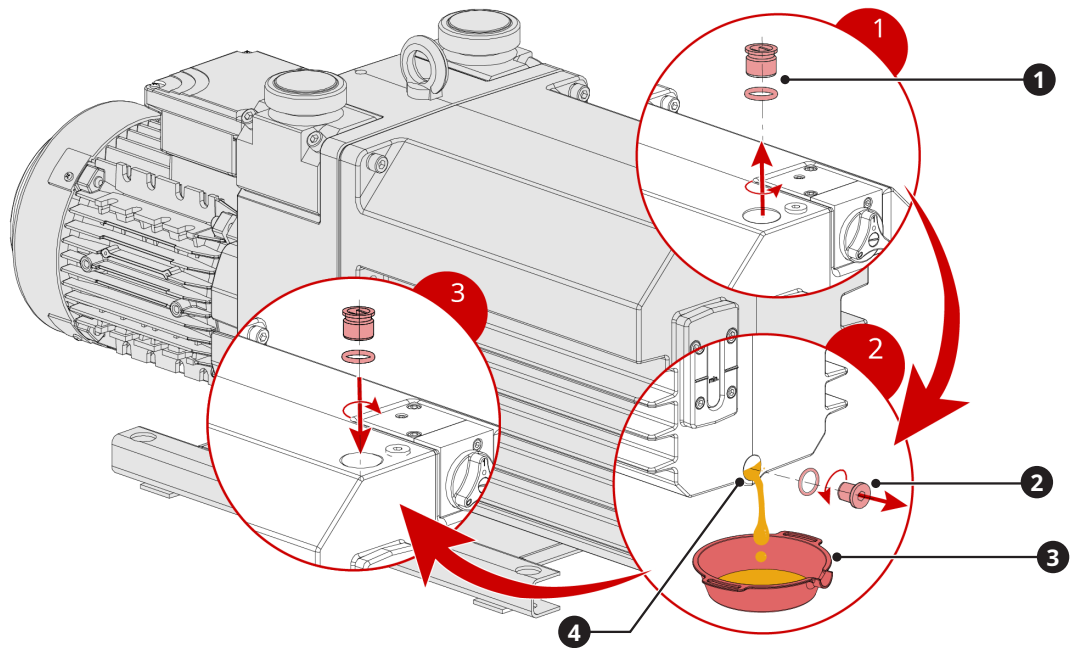
- Operating fluid of the rotary vane vacuum pump

Required tools

- Hex key, **WAF 10**
- Calibrated torque wrench
 - tightening factor ≤ 2.5

Required aids

- Collection receptacle (> 1.5 l)



Graphic 17: Draining operating fluid

Description			
1	Filler plug with sealing ring	2	Drain plug with sealing ring
3	Collection receptacle	4	Drain hole

Draining operating fluid

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

Agitating remaining operating fluid

- Screw in the filler screw hand tight.
- Screw in the drain screw hand tight.
- Switch on the rotary vane vacuum pump with the vacuum flange open for a maximum of 5 seconds.

Draining remaining operating fluid

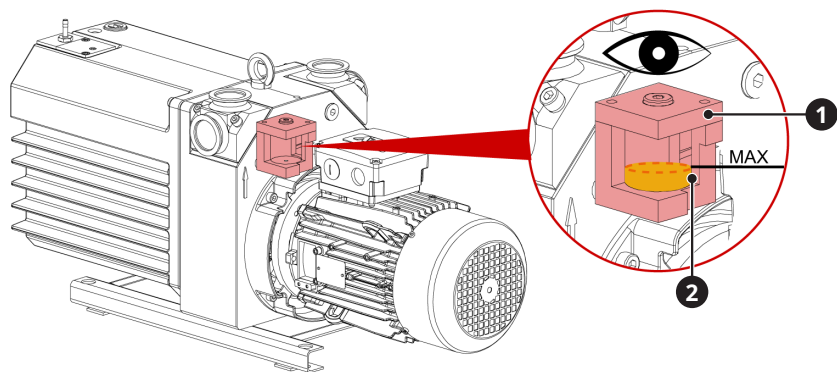
- Unscrew the drain screw.
 - Be careful with the sealing ring.
- Gently tilt the rotary vane vacuum pump.
- Drain remaining operating fluid.
- Screw in the drain screw hand tight.
- Dispose of old operating fluid according to valid regulations.

Filling up fresh operating fluid

- Screw the drain screw in up to the stop.
 - Tightening torque: **6 Nm**
- Unscrew the filler screw.
 - Be careful with the sealing ring.
- Fill new operating fluid.
- Check level.
- Screw the drain screw in completely.
 - Tightening torque: **6 Nm**

7.4.3 Checking the Oil Level in the Oiler (C Version Only)

Rotary vane 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.



Graphic 18: Checking the oil level in the oiler (C version only)

Description			
1	Oiler	2	Oil sight glass

Checking the oiler fill level

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

7.4.4 Rinsing and Cleaning Rotary Vane Vacuum Pump



NOTE

Cleaning by changing the operating fluid.

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

Prerequisite

- Fresh operating fluid filled.

Required tools

- Hex key, **WAF 5**
- Hex key, **WAF 10**
- Calibrated torque wrench
 - tightening factor ≤ 2.5

Spare parts required

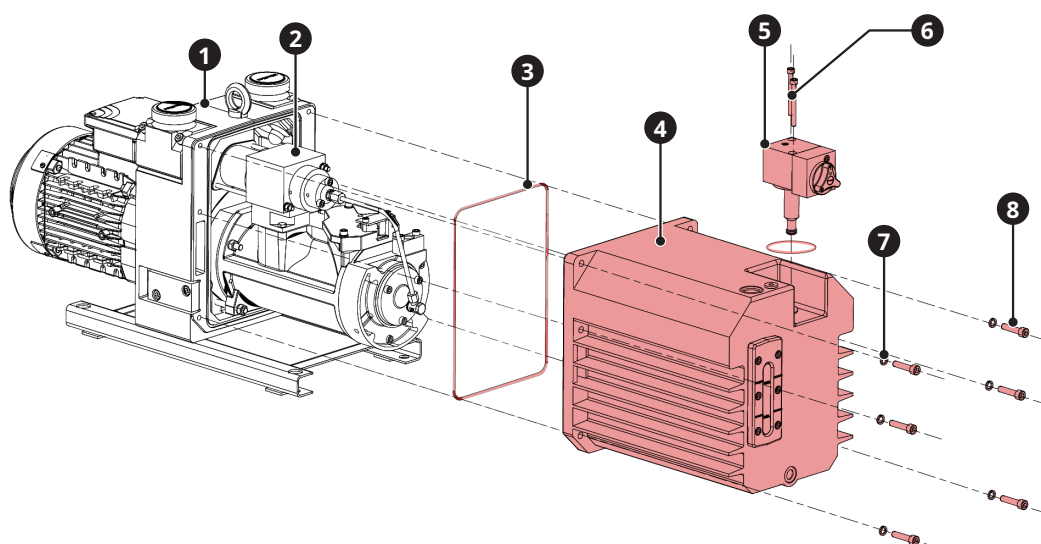
- Operating fluid spare part package

Required aids

- Collection receptacle (> 1.5 l)

Changing operating fluid for cleaning

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



Graphic 19: Removing/fitting the cap on the rotary vane vacuum pump

Description			
1	Stand	2	Pumping system
3	O-ring	4	Cap
5	Silencer	6	Hexagon socket screw, 6x
7	Lock washer, 6x	8	Hexagon socket screw, 6x

Removing the cap.

- Drain the operating fluid.
- Unscrew the hexagon socket screws from the cap.
- Remove the cap from the stand in axial direction.
 - Take care with the O-ring between cap and stand.

- Collect any leaking operating fluid.
- Dispose of operating fluid according to applicable regulations.

Cleaning the pumping system and cap

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

Installing cap

- Insert the O-ring in the groove in the cap.
- Install cap on stand.
- Tighten the hexagon socket screws.
 - Tightening torque: **10 Nm**.

Filling up fresh operating fluid

- Screw the drain screw in up to the stop.
 - Tightening torque: **6 Nm**
- Unscrew the filler screw.
 - Be careful with the sealing ring.
- Fill new operating fluid.
- Check level.
- Screw the drain screw in completely.
 - Tightening torque: **6 Nm**

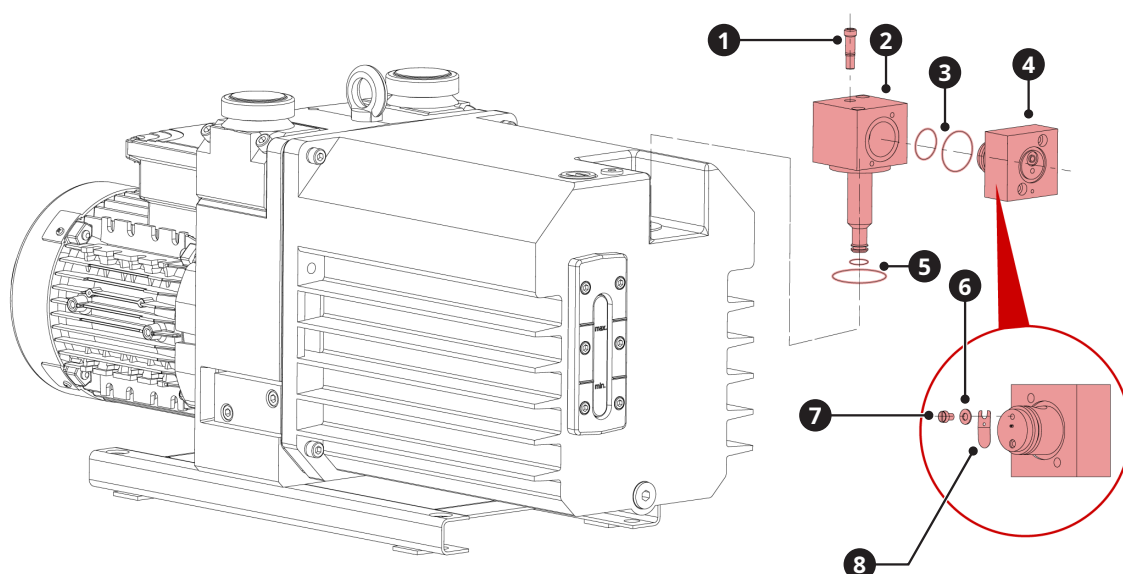
7.5 Removing and Cleaning the Gas Ballast Valve

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

7.5.1 Removing Gas Ballast Valve

Required tools

- Hex key, **WAF 3**



Graphic 20: Removing gas ballast valve

Description			
1	Cylinder screw	2	Gas ballast valve
3	O-ring, 2x	4	Gas ballast flange
5	O-ring, 2x	6	Washer
7	Cylinder screw	8	Plate spring

Procedure

- Unscrew cylinder screws.
- Remove valve housing from cover.
- Be careful with the O-ring.

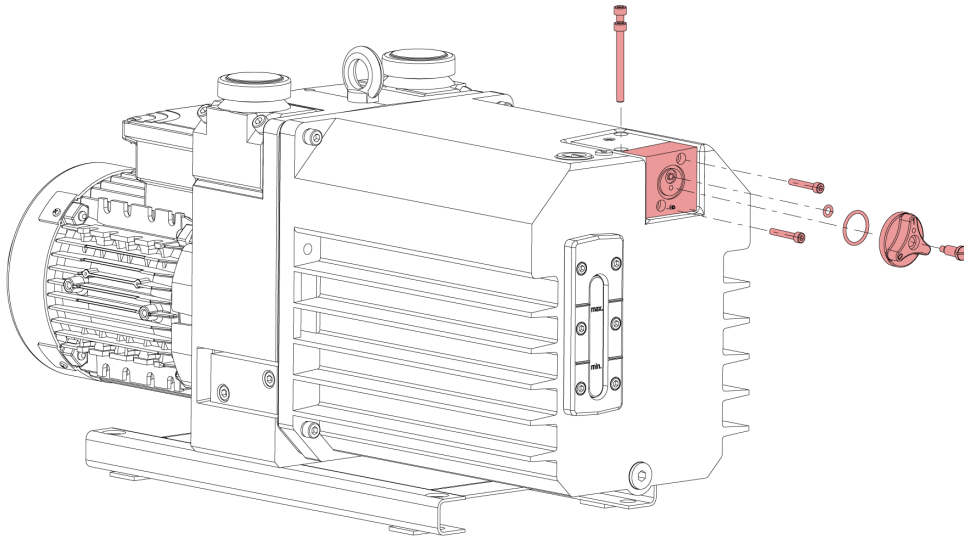
7.5.2 Disassembling and Cleaning Gas Ballast Valve



NOTE

Do not loosen dowel pins.

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



Graphic 21: Individual parts of the gas ballast valve

Required tools

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

Spare parts required

- Gas ballast valve spare part package

Required consumables

- Paper towels
- Isopropanol, as required

Procedure

- Unscrew cylinder screw from valve housing bottom side.
- Remove the washer and leaf spring.
- Unscrew and remove the special screw.
- Remove rotary knob.
- Remove the O-rings.
- Clean all parts and check parts for wear.
- Replace the spare parts from the spare part package.

7.5.3 Removing and Cleaning Silencer Nozzle

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

Prerequisite

- Gas ballast filter removed

Required tools

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

Required consumables

- Compressed air

Procedure

- Unscrew silencer nozzle.
 - Be careful with the O-ring.
- Clean silencer nozzle with compressed air.
- Screw silencer nozzle back in up to stop.
 - Be careful with the O-ring.

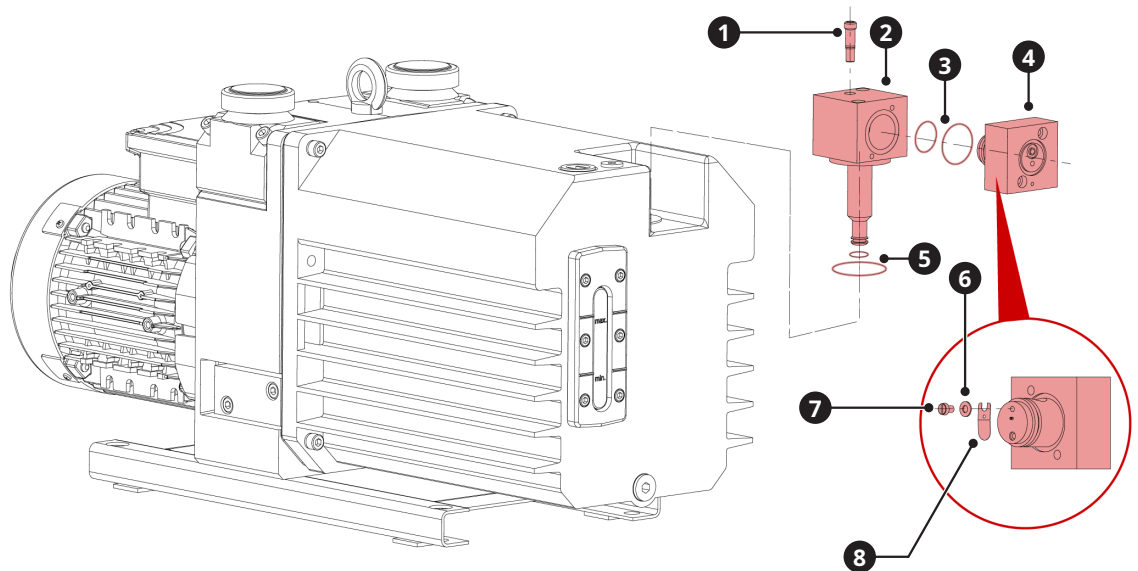
7.5.4 Assembling and Installing Gas Ballast Valve

Required tools

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

Required consumables

- Operating fluid of rotary vane vacuum pump



Graphic 22: Assembling and installing gas ballast valve

Description			
1	Cylinder screw	2	Gas ballast valve
3	O-ring, 2x	4	Gas ballast flange
5	O-ring, 2x	6	Washer
7	Cylinder screw	8	Plate spring

Assemble gas ballast valve

- Wet the O-rings slightly with the operating fluid used.
- Insert the O-rings evenly.
- Fit the rotary knob.
- Screw in the special screw.
 - Tightening torque: **3 Nm**.

- Position leaf spring on dowel pin (curvature facing housing).
- Bias and fixate leaf spring with cylinder screw and washer.
 - Tightening torque: **3 Nm**.

Install gas ballast valve

- Install the complete valve with O-ring in the rotary vane vacuum pump.
- Tighten the cylinder screws.
 - Tightening torque: **6 Nm**.

7.6 Replacing Diaphragm on Vacuum Safty Valve

Prerequisite

- Cap removed

Required tools

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

Spare parts required

- Diaphragm spare part package

Required consumables

- Paper cloths for cleaning off operating fluid

Dismantling diaphragm cover and diaphragm

- Unscrew and remove the hexagon socket screw from the top side of the rotary vane vacuum pump block.
- Remove the diaphragm cover.
- Remove the operating fluid above the diaphragm.
- Remove the diaphragm from its seat in the vacuum safety valve.

Cleaning and replacing parts

- Clean the diaphragm cover and the holes in the diaphragm cover.
- Replace the diaphragm.

Installing diaphragm cover and diaphragm

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

8 Decommissioning

8.1 Shutting down for longer Periods

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

Procedure

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

8.2 Recommissioning



NOTICE

Risk of damage to rotary vane 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 + Fab Solutions if necessary.



NOTE

Ejection of operating fluid.

Overfilled operating fluid will be ejected at the exhaust connection when starting up the rotary vane 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 machines or parts.

Toxic process media result in contamination of machines 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.



NOTE

Environmental protection.

Disposal of the product and its components must be carried out in accordance with all applicable regulations for the protection of people, the environment and nature.

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

9.1 General Disposal Information

Pfeiffer Vacuum + Fab Solutions products contain materials that must be recycled.

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 Disposing

Pfeiffer Vacuum + Fab Solutions rotary vane vacuum pumps of the DuoVane 36, DuoVane 70 series contain materials that must be recycled.

- Fully drain the operating fluid.
- Dismantle the motor.
- Decontaminate the components that come into contact with process gases.
- Separate the components into recyclable materials.
- Recycle the non-contaminated components.
- 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 restart.



CAUTION

Danger of burns on hot surfaces.

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

- Allow the rotary vane 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 rotary vane vacuum pump for inspection, away from the system if necessary.



NOTICE

Danger of property damage from improper maintenance.

Unprofessional work on the rotary vane vacuum pump will lead to damage for which Pfeiffer Vacuum + Fab Solutions 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
Rotary vane vacuum pump will not start up	No mains voltage or voltage not corresponding to the motor data	- Check the mains voltage and mains fuse. - Check the motor switch.
	Rotary vane vacuum pump temperature too low	Heat the rotary vane vacuum pump to > 12 °C.
	Thermal protection switch has triggered	- Determine and eliminate the cause. - Allow the rotary vane vacuum pump to cool down.
	Pumping system contaminated	- Clean the rotary vane vacuum pump. - Contact the Pfeiffer Vacuum + Fab Solutions Service.
	Pumping system damaged	- Clean and maintain the rotary vane vacuum pump. - Contact the Pfeiffer Vacuum + Fab Solutions Service.
	Motor faulty	Replace the motor.
Rotary vane 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 the rotary vane vacuum pump to permissible ambient temperature range.
	Exhaust pressure too high	Check exhaust line outlet opening and exhaust side accessories.
Rotary vane vacuum pump does not reach the specified final pressure	Measurement result distorted	- Check the measurement instrument. - Check the final pressure without system connected.
	Rotary vane vacuum pump or connected accessory contaminated	- Clean the rotary vane vacuum pump. - Check the components for contamination.
	Operating fluid contaminated	Operate the rotary vane 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 the system	Locate and eliminate the leak.
	Rotary vane vacuum pump damaged	Contact the Pfeiffer Vacuum + Fab Solutions Service.
Pumping speed of rotary vane vacuum pump too low	Intake line 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.

Problem	Possible causes	Remedy
Loss of operating fluid	• Casing seal is leaking	• Check and replace the seal.
	• Radial shaft seal ring (RSSR) leaking – not applicable to rotary vane vacuum pump with magnetic coupling	• Check and replace the RSSR. • Check and replace the associated bushing, too.
	• Operational operating fluid loss – no OME	• Install an oil mist eliminator (OME).
Unusual noises during operation	• Noise reduction contaminated	• Clean the noise reduction or replace it.
	• Pumping system contaminated or damaged	• Clean and maintain the rotary vane vacuum pump . • Contact the Pfeiffer Vacuum + Fab Solutions Service.
	• Motor bearing defective	• Replace the motor. • Contact the Pfeiffer Vacuum + Fab Solutions Service.

Table 5: Troubleshooting rotary vane vacuum pumps

11 Service Solutions

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 + Fab Solutions, our service is far from over. This is often exactly where service begins. Obviously, in proven Pfeiffer Vacuum + Fab Solutions quality.

For a quick and smooth service process, we recommend the following steps:

- Fill out the *online service request*.
- Your request will be sent to the competent Service Center in your country/region.

A copy of your request and a ticket number will be emailed to you.

Remember to print out the declaration of contamination, sign it and return it to Pfeiffer Vacuum + Fab Solutions.

You will receive the pre-filled declaration by E-mail after submitting the online service request.

In addition, follow the steps below:

- Prepare the product for safe transport according to the specifications from the declaration on contamination.
- Attach the Declaration of Contamination on the outside of the shipping box.
- Next, send your product to your local *Service Center* (you will receive the shipping address by E-Mail).
- You will receive response from Pfeiffer Vacuum + Fab Solutions.

12 Spare Parts

12.1 Ordering Spare Part Packages

Ordering spare part packages

- Have the rotary vane vacuum pump article number to hand, along with other details from the nameplate if necessary.
- Install original spare parts only.
- When ordering the inspection set, observe the respective article number of the rotary vane vacuum pump.

Spare Part Packages

Spare part package	DuoVane 36	DuoVane 70
Spare part package maintenance level 3 / overhaul	PK E32 203 -T	PK E32 202 -T
Operating fluid spare part package	PK E39 200 -T	PK E39 200 -T
Gas ballast valve spare part package	PK E39 205 -T	PK E39 205 -T
Diaphragm spare part package	PK E34 210 -T	PK E34 210 -T
Radial shaft seal ring (RSSR) spare part package	PK E36 200 -T	PK E36 200 -T
Seals spare part package	PK E30 203 -T	PK E30 202 -T
Valves and springs spare part package	PK E34 203 -T	PK E34 202 -T
Oil sight glass spare part package	PK E39 206 -T	PK E39 206 -T
Vane spare part package	PK E38 203 -T	PK E38 202 -T

Spare parts DuoVane 36/70

Spare part package	Pump version	Order number
Set of seals	DuoVane 36	PK E20 001 -T
	DuoVane 70	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	DuoVane 36	PK E21 001 -T
	DuoVane 70	
Service level 3 Overhaul kit	DuoVane 36	PK E22 005 -T
	DuoVane 70	PK E22 011 -T
Set of vanes	DuoVane 36	PK E28 003 -T
	DuoVane 70	PK E28 005 -T
Coupling set	DuoVane 36	PK E26 001 -T
	DuoVane 70	

DuoVane 36/70 C/MC

Spare part package	Pump version	Order number
Set of seals	DuoVane 36 C	PK E20 003 -T
	DuoVane 70 C	
	DuoVane 36 MC	PK E20 001 -T
	DuoVane 70 MC	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	DuoVane 36 C	PK E21 003 -T
	DuoVane 70 C	PK E21 002 -T
	DuoVane 36 MC	
	DuoVane 70 MC	
Maintenance level 3 Overhaul kit	DuoVane 36 C	PK E22 007 -T
	DuoVane 70 C	PK E22 014 -T
	DuoVane 36 MC	PK E22 017 -T
	DuoVane 70 MC	PK E22 016 -T
Set of vanes	DuoVane 36 C/MC	PK E28 004 -T
	DuoVane 70 C/MC	PK E28 006 -T
Coupling set	DuoVane 36 C	PK E26 001 -T
	DuoVane 70 C	
	DuoVane 36 MC	PK E26 004 -T
	DuoVane 70 MC	

DuoVane 36/70 M

Spare part package	Pump version	Order number
Set of seals	DuoVane 36 M	PK E20 001 -T
	DuoVane 70 M	
Maintenance level 1 Maintenance kit 1	all	PK E21 005 -T
Maintenance level 2 Maintenance kit 2	DuoVane 36 M	PK E21 002 -T
	DuoVane 70 M	
Maintenance level 3 Overhaul kit	DuoVane 36 M	PK E22 010 -T
	DuoVane 70 M	PK E22 012 -T
Set of vanes	DuoVane 36 M	PK E28 003 -T
	DuoVane 70 M	PK E28 005 -T
Coupling set	DuoVane 36 M	PK E26 002 -T
	DuoVane 70 M	

12.2 Contents of Spare Part Packages

- Spare part package maintenance level 3 / overhaul
 - Radial shaft seal ring (RSSR) spare part package
 - Seals spare part package
 - Valves and springs spare part package
 - Oil sight glass spare part package

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

13 Accessories

Please contact your manufacturer representative for accessories list and references.



NOTE

Installation and operation of accessories.

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

- Information and ordering options for *accessories* can be found online.

13.1 Accessory Information

Dust separator

Protects the rotary vane vacuum pump against particles from the processes.

Condensate separator

Protects the rotary vane 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 vacuum pump.

Activated carbon filter

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

Catalyser trap

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

Sorption trap

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

Cooling trap

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

13.2 Ordering Accessories

Standard version

Description	Order number
SAS 40, dust separator	PK Z60 510
KAS 40, Condensate separator	PK Z10 008
OME 40 M, oil mist separator	PK Z40 150

Description	Order number
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
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
Adapter Uno/Duo 35/65	PK 223 787 -T
Adapter Uno/Duo 35/65	PK 224 629 -T

C and MC versions

Description	Order Number
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

Description	Order Number
Soft starter, 3.6 Av	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

14 Technical Data and Dimensions

14.1 General

This section describes the basis for the technical data of Pfeiffer Vacuum + Fab Solutions rotary vane vacuum pump.



NOTE

Technical Data.

Maximum values refer exclusively to the input as a single load.

- Specifications according to PNEUROP committee PN5
- ISO 27892 2010: "Vacuum technology - Turbomolecular pumps - Measurement of rapid shut-down torque"
- ISO 21360 2012: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- ISO 21360 2018: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 4: Turbomolecular vacuum pumps"
- ISO 3744 2010: "Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane"
- Ultimate pressure with test dome after 48 h bake out duration
- Gas throughput with water cooling; backing pump = rotary vane pump (10 m³/h)
- Cooling water consumption at maximum gas throughput, cooling water temperature 25 °C
- Integral leakage rate with 100% helium concentration, 10 s measurement duration
- Sound pressure level at distance to vacuum pump = 1 m
- Technical data measured without splinter shield at pump inlet.

Conversion table: Pressure units

	mbar	bar	Pa	hPa	kPa	Torr mm Hg
mbar	1	1 · 10 ⁻³	100	1	0.1	0.75
bar	1000	1	1 · 10 ⁵	1000	100	750
Pa	0.01	1 · 10 ⁻⁵	1	0.01	1 · 10 ⁻³	7.5 · 10 ⁻³
hPa	1	1 · 10 ⁻³	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr mm Hg	1.33	1.33 · 10 ⁻³	133.32	1.33	0.133	1
1 Pa = 1 N/m ²						

Conversion table: units for gas throughput

	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 · 10 ⁻²	1.69 · 10 ⁻³	1	1.27 · 10 ⁻²	1.67 · 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
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14.2 Substances in Contact with Media

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

Table 6: Materials in contact with the process media

14.3 Technical Data

DuoVane 36

Type designation	Standard	w/o Motor	M-Version	MC-Version
Main flange type	ISO-KF	ISO-KF	ISO-KF	ISO-KF
Main flange size	DN 40	DN 40	DN 40	DN 40
Secondary flange type	ISO-KF	ISO-KF	ISO-KF	ISO-KF
Secondary flange size	DN 40	DN 40	DN 40	DN 40
Pumping speed at 50 Hz	32 m ³ /h	32 m ³ /h	32 m ³ /h	32 m ³ /h
Pumping speed at 60 Hz	36 m ³ /h	36 m ³ /h	36 m ³ /h	36 m ³ /h
Gas ballast	Yes	Yes	Yes	Yes
Ultimate pressure with gas ballast	3 · 10 ⁻³ hPa	3 · 10 ⁻³ hPa	3 · 10 ⁻³ hPa	4 · 10 ⁻³ hPa
Ultimate pressure	2 · 10 ⁻³ hPa	2 · 10 ⁻³ hPa	2 · 10 ⁻³ hPa	3 · 10 ⁻⁵ hPa
Leakage rate safety valve	1 · 10 ⁻⁵ Pa m ³ /s	1 · 10 ⁻⁵ Pa m ³ /s	1 · 10 ⁻⁵ Pa m ³ /s	1 · 10 ⁻⁵ Pa m ³ /s
Exhaust pressure, min.	Atmospheric pressure	Atmospheric pressure	250 hPa	250 hPa
Exhaust pressure, max.	1500 hPa	1500 hPa	1500 hPa	1500 hPa
Rotation speed at 50 Hz	1500 rpm	1500 rpm	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm	1800 rpm	1800 rpm
Ambient temperature	12 – 40 °C	12 – 40 °C	12 – 40 °C	12 – 40 °C
Temperature: Shipping	-25 – 55 °C	-25 – 55 °C	-25 – 55 °C	-25 – 55 °C
Temperature: Storage	-25 – 55 °C	-25 – 55 °C	-25 – 55 °C	-25 – 55 °C
Continuous gas input temperature, max.	–	40 °C	–	40 °C
Motor type	3-phase motor	Without motor	3-phase motor	3-phase motor
Motor protection	3TF	3TF	3TF PTC	PTC 3TF

Type designation	Standard	w/o Motor	M-Version	MC-Version
Protection degree	IP55	IP55	IP55	IP55
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	1.3 kW
Operating fluid amount	3.2 l	3.2 l	3.2 l	3.2 l
Cooling method	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)
Weight	68 kg	55 kg	70 kg	74 kg

DuoVane 70

Type designation	Standard	M-Version	MC-Version
Main flange type	ISO-KF	ISO-KF	ISO-KF
Main flange size	DN 40	DN 40	DN 40
Secondary flange type	ISO-KF	ISO-KF	ISO-KF
Secondary flange size	DN 40	DN 40	DN 40
Pumping speed at 50 Hz	62 m³/h	62 m³/h	62 m³/h
Pumping speed at 60 Hz	70 m³/h	70 m³/h	70 m³/h
Gas ballast	Yes	Yes	Yes
Ultimate pressure with gas ballast	$3 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa	$4 \cdot 10^{-3}$ hPa
Ultimate pressure	$2 \cdot 10^{-3}$ hPa	$2 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa
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
Exhaust pressure, min.	Atmospheric pressure	Atmospheric pressure	250 hPa
Exhaust pressure, max.	1500 hPa	1500 hPa	1500 hPa
Rotation speed at 50 Hz	1500 rpm	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm	1800 rpm
Ambient temperature	12 – 40 °C	12 – 40 °C	12 – 40 °C
Temperature: Shipping	-25 – 55 °C	-25 – 55 °C	-25 – 55 °C
Temperature: Storage	-25 – 55 °C	-25 – 55 °C	-25 – 55 °C
Continuous gas input temperature, max.	–	40 °C	40 °C
Motor type	3-phase motor	3-phase motor	3-phase motor
Motor protection	3TF PTC	PTC	3TF PTC
Protection degree	IP55	IP55	IP55
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
Operating fluid amount	4.2 l	4.2 l	4.2 l
Cooling method	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)
Weight	75 kg	78 kg	88 kg

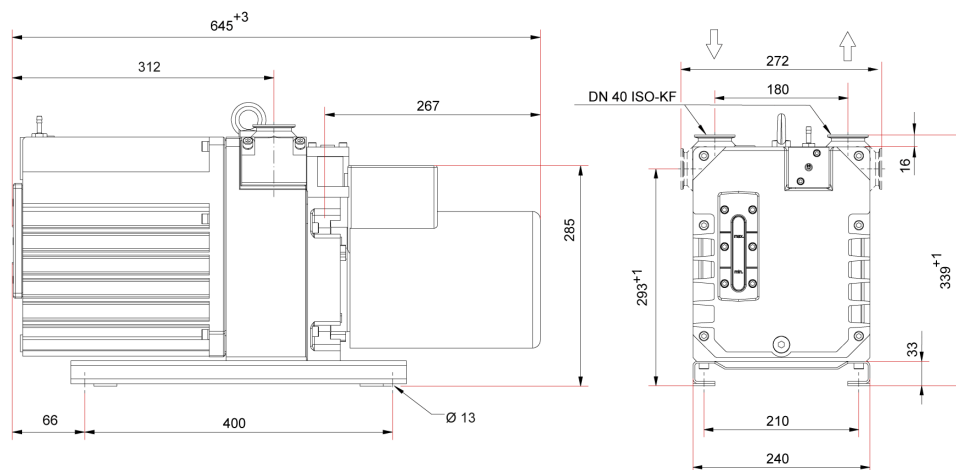
DuoVane 36/70 C-Version

Type designation	DuoVane 36 C-Version	DuoVane 70 C-Version
Main flange type	ISO-KF	ISO-KF
Main flange size	DN 40	DN 40
Secondary flange type	ISO-KF	ISO-KF

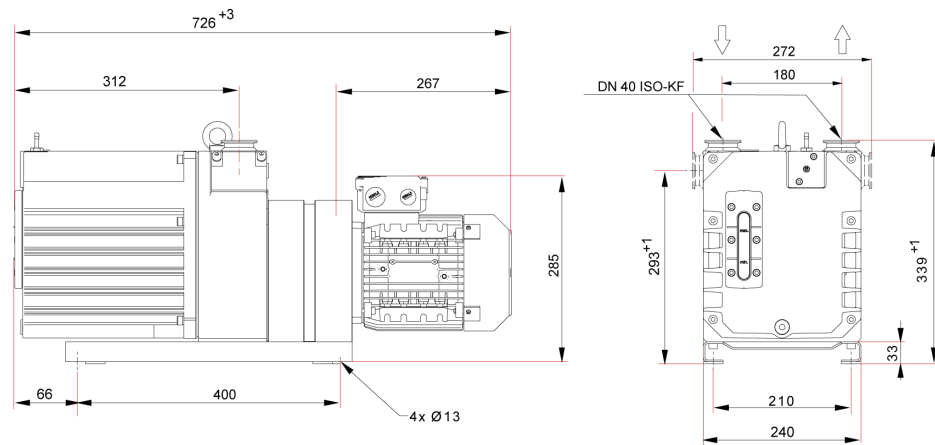
Type designation	DuoVane 36 C-Version	DuoVane 70 C-Version
Secondary flange size	DN 40	DN 40
Pumping speed at 50 Hz	32 m ³ /h	62 m ³ /h
Pumping speed at 60 Hz	36 m ³ /h	70 m ³ /h
Gas ballast	Yes	Yes
Ultimate pressure with gas ballast	$4.5 \cdot 10^{-3}$ hPa	$4.5 \cdot 10^{-3}$ hPa
Ultimate pressure	$3 \cdot 10^{-3}$ hPa	$3 \cdot 10^{-3}$ hPa
Leakage rate safety valve	$1 \cdot 10^{-5}$ Pa m ³ /s	$1 \cdot 10^{-5}$ Pa m ³ /s
Exhaust pressure, min.	Atmospheric pressure	Atmospheric pressure
Exhaust pressure, max.	1500 hPa	1500 hPa
Rotation speed at 50 Hz	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm
Ambient temperature	12 – 40 °C	12 – 40 °C
Temperature: Shipping	-25 – 55 °C	-25 – 55 °C
Temperature: Storage	-25 – 55 °C	-25 – 55 °C
Continuous gas input temperature, max.	–	–
Motor type	3-phase motor	3-phase motor
Motor protection	3TF	3TF
Protection degree	IP55	IP55
Rated power 50 Hz	1.1 kW	1.5 kW
Rated power 60 Hz	1.3 kW	1.8 kW
Operating fluid amount	3.2 l	4.2 l
Cooling method	Air (Forced convection)	Air (Forced convection)
Weight	68 kg	75 kg

14.4 Dimensions

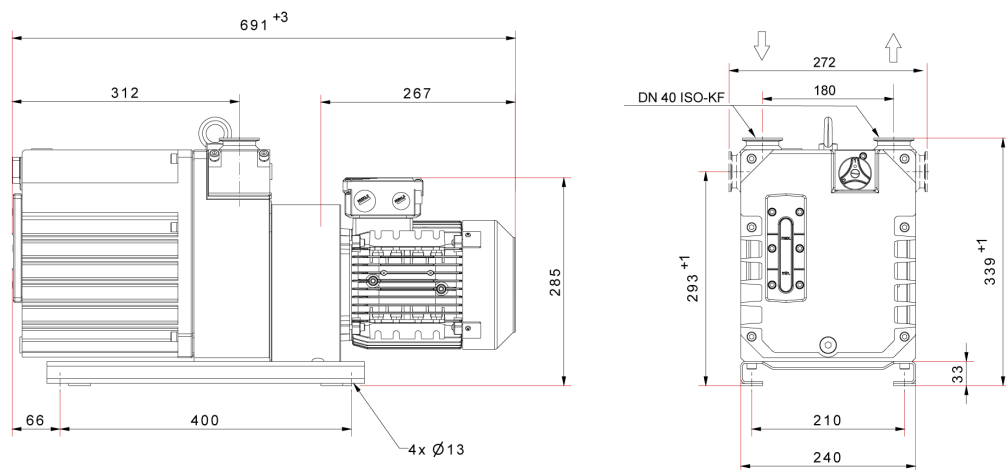
Dimensions in mm



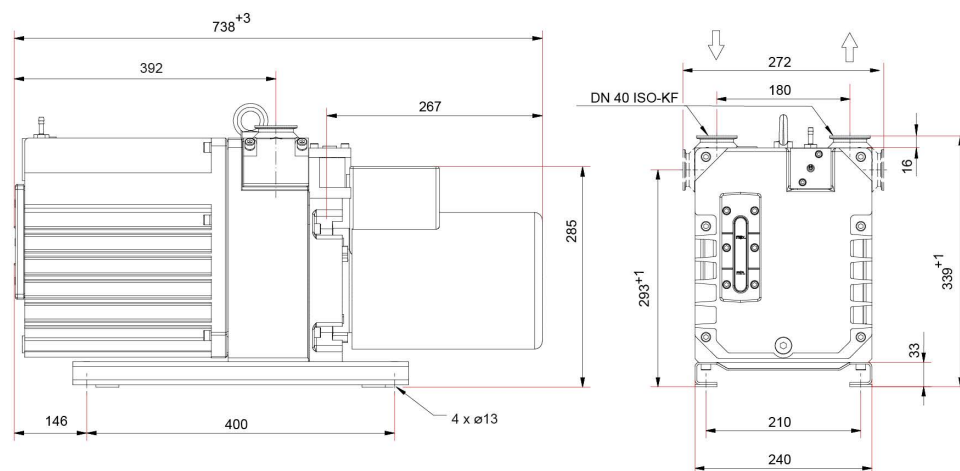
Graphic 23: Dimensions DuoVane 36



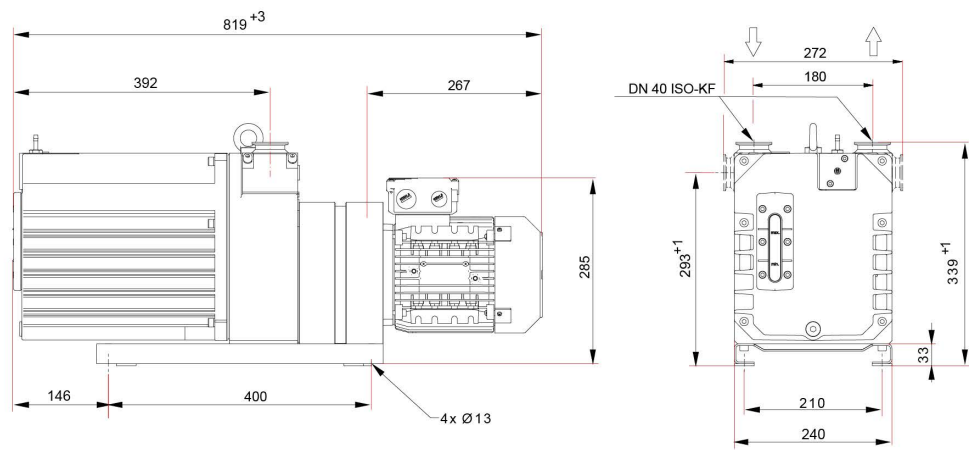
Graphic 24: Dimensions DouVane 36MC



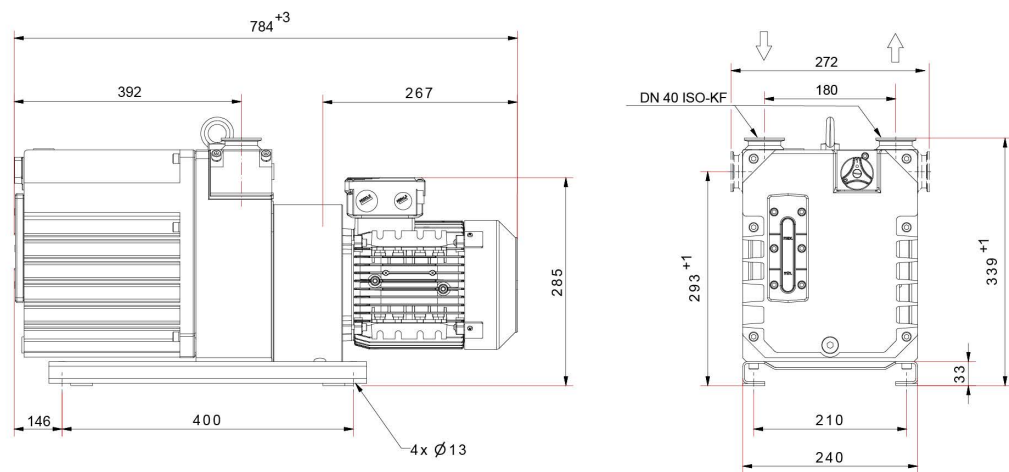
Graphic 25: Dimensions DuoVane 36M



Graphic 26: Dimensions DuoVane 70



Graphic 27: Dimensions DuoVane 70MC



Graphic 28: Dimensions DuoVane 70M

15 EU Declaration of Conformity

This Declaration of Conformity and the CE-markings affixed to the nameplate are valid for the machine(s) within the Pfeiffer Vacuum + Fab Solutions scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine(s) is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the CE-marking.

The manufacturer

Pfeiffer Vacuum GmbH
Berliner Straße 43
DE-35614 Asslar

declares that the machine(s): DuoVane 36, DuoVane 70

fulfill(s) all the relevant provisions from EU directives:

- 'Machinery' 2006/42/EC
- 'Electromagnetic Compatibility' (EMC) 2014/30/EU
- 'RoHS' 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)
- 'RoHS' 2015/863/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)

and comply(-ies) with the following harmonized standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN ISO 12100 : 2011	Safety of machinery - Basic concepts, general principles of design
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN ISO 2151 : 2009	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN 61326-1 : 2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN IEC 63000 : 2019	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 61010-1 : 2020	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
EN IEC 60034-1 : 2017	Rotating electrical machines - Part 1: Rating and performance
EN IEC 61000-6-4 : 2020	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments
EN 61000-3-2 : 2019 Class A (industry)	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3 : 2020	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

Legal person authorized to compile the technical file and authorized representative in the EU (if the manufacturer is not located in the EU):

Dr. Adrian Wirth
Pfeiffer Vacuum+Fab Solutions GmbH
Berliner Str. 43
DE-35614 Asslar

Asslar, 2025.01.16



Daniel Sälzer, General Manager

16 UK Declaration of Conformity

This Declaration of Conformity and the UKCA-markings affixed to the nameplate are valid for the machine(s) within Pfeiffer Vacuum + Fab Solutions scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

When this machine(s) is integrated into a superordinate machinery the manufacturer of the superordinate machinery (this can be the operating company, too) must conduct the conformity assessment process for the superordinate machine or plant, issue the Declaration of Conformity for it and affix the UKCA-marking.

The manufacturer

Pfeiffer Vacuum GmbH
Berliner Straße 43
DE-35614 Asslar

declares that the machine(s): DuoVane 36, DuoVane 70

fulfill(s) all the relevant provisions from UK legislations:

- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2012

and comply(-ies) with the following designated standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN ISO 12100 : 2011	Safety of machinery - Basic concepts, general principles of design
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN ISO 2151 : 2009	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
EN 61326-1 : 2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN IEC 63000 : 2019	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 61010-1 : 2020	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
EN IEC 60034-1 : 2017	Rotating electrical machines - Part 1: Rating and performance
EN IEC 61000-6-4 : 2020	Electromagnetic compatibility (EMC) - Generic standards. Emission standard for industrial environments
EN 61000-3-2 : 2019 Class A (industry)	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3 : 2020	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.

Legal person authorized to compile the technical file and importer in the UK (if the manufacturer is not located in the UK):

Pfeiffer Vacuum+Fab Solutions Ltd
16 Plover Close, Interchange Park
UK-MK169PS Newport Pagnell

Asslar, 2025.01.16



Daniel Sälzer, General Manager

Notes

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Grid of dots for notes.

BUSCH GROUP

The Busch Group is one of the world's largest manufacturers of vacuum pumps, vacuum systems, blowers, compressors and gas abatement systems. Under its umbrella, the group houses two well-known brands: Busch Vacuum Solutions and Pfeiffer Vacuum+Fab Solutions. Together, they offer solutions to a wide range of industries. A global network of highly competent local teams in 44 countries ensures that expert, tailor-made support is always available near you. Wherever you are. Whatever your business.



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▲ Busch Group production sites

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