

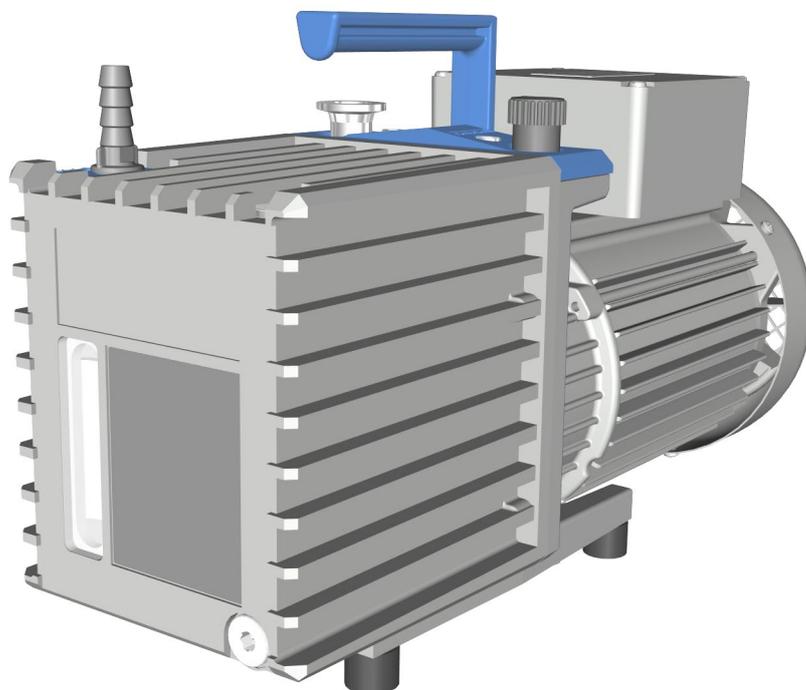
ROTARY VANE PUMP

RE 2.5

RZ 2.5

RE 6

RZ 6



Instructions for use



Original instructions Keep for further use!

This manual is only to be used and distributed in its complete and original form. It is strictly the user's responsibility to carefully check the validity of this manual with respect to the product.

Manufacturer:

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
GERMANY

Phone:

Head office +49 9342 808-0
Sales +49 9342 808-5550
Service +49 9342 808-5660

Fax: +49 9342 808-5555

Email: info@vacuubrand.com

Web: www.vacuubrand.com

*Thank you for purchasing this product from **VACUUBRAND GMBH + CO KG**. You have chosen a modern and technically high quality product.*

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1 Introduction

This manual is part of your product. The manual applies to all versions of the vacuum pump and is intended in particular for laboratory staff.

1.1 User information

Safety

Instructions for use
and safety

- Read this manual thoroughly and completely before using the product.
- Keep this manual in an easily accessible location.
- Correct use of the product is essential for safe operation. Comply with all safety information provided!
- In addition to this manual, adhere to the accident prevention regulations and industrial safety regulations applicable in the country of use.

General

General information

- If passing the product on to a third party, also give them this manual.
- The illustrations in this manual are only intended to facilitate comprehension.
- We reserve the right to make technical changes in the course of continuous product improvement.
- For easier readability, the general term *vacuum pump* is used as an equivalent to and instead of the product name *rotary vane pump Rx y*.

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Contact

- Contact us
- If your manual is incomplete, you can request a replacement. Alternatively, you can use our download portal: www.vacuubrand.com
 - You are welcome to contact us at any time in writing or by telephone if you would like more information, have questions about our products or wish to share feedback with us.
 - When contacting our Service Department, please have the serial number and product type at hand → *see Rating plate on the product.*

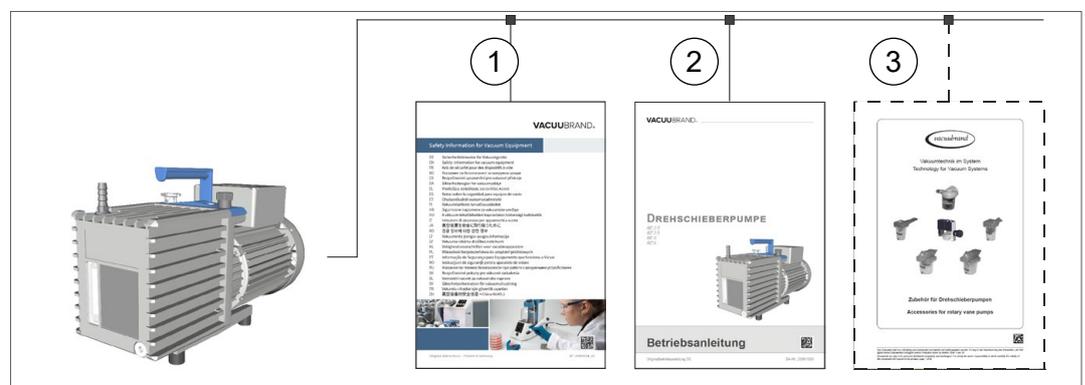
1.2 About this document

1.2.1 Manual structure

Specific information The manual has a modular structure with separate instruction modules for the vacuum pump and any accessories.

Instruction module

Vacuum pump and modular instruction manuals



Description

- 1 Safety information for vacuum equipment
- 2 Description: Vacuum pump – connection, operation, service
- 3 Optional description: Accessories

1.2.2 Display conventions

Warning levels

Presentation
conventions

	DANGER
	<p>Indicates an imminent hazardous situation. Disregarding the situation could result in extremely serious injury or death.</p> <p>⇒ Take appropriate action to avoid dangerous situations!</p>

	WARNING
	<p>Warns of a potentially hazardous situation. Disregarding the situation could result in serious injury or death.</p> <p>⇒ Take appropriate action to avoid dangerous situations!</p>

	CAUTION
	<p>Indicates a potentially hazardous situation. Disregarding the situation could result in minor injury or damage to property.</p> <p>⇒ Take appropriate action to avoid dangerous situations!</p>

NOTE	
<p>Indicates a potentially harmful situation. Disregarding the situation could result in damage to property.</p>	

Additional notes

IMPORTANT!

- ⇒ Information or specific recommendation which must be observed.
- ⇒ Important information for trouble-free operation of your product.



- ⇒ Helpful tips + tricks
- ⇒ Additional information

1.2.3 Symbols and icons

This manual uses symbols and icons. Safety symbols indicate specific risks associated with handling the product. Symbols and icons are designed to help you identify risks more easily.

Safety symbols

Explanation
of safety symbols



Hazardous substance – hazards to human health.



General prohibition sign.



General warning symbol.



Warning: hot surface.



Danger: electricity.



General mandatory sign.



Disconnect power plug.



Wear chemical-resistant protective gloves.



Wear protective goggles.

Additional symbols and icons

Additional
symbols



Refers to content in this manual.



Refers to content in other supplementary documents.



Electric/electronic devices must not be disposed of in domestic waste at the end of their service life.



Ensure sufficient air circulation.

1.2.4 Handling instructions (action steps)

Instructions (single step)

Action steps as text ⇒ Perform the step described.

Result of action

Instructions (multiple steps)

1. First step

2. Next step

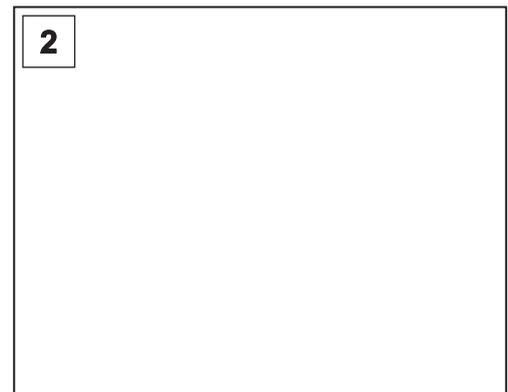
Result of action

Instructions (shown graphically)

Schematic diagram
Action steps as
graphics



1. First step



2. Next step

Result of action

⇒ Perform the steps in the order described.

1.2.5 Abbreviations

Abbreviations

DN	Nominal diameter
FKM	Fluoroelastomer
IN	Inlet, vacuum connection
KF	Small flange
max.	Maximum
min.	Minimum
NBR	Nitrile butadiene rubber
OUT	Outlet
PBT	Polybutylene terephthalate
PEEK	Polyether ether ketone
PPS	Polyphenylene sulfide
Resp.	Responsible
RMA no.	Return Merchandise Authorization number

1.2.6 Term definitions

Product-specific terms

Fine vacuum	Pressure range in vacuum technology, from: 1 mbar – 0.001 mbar (0.75 Torr – 0.00075 Torr)
Rough vacuum	Pressure range in vacuum technology, from: atmospheric pressure – 1 mbar (atmospheric pressure – 0.75 Torr)
VACUU·VIEW extended	External vacuum sensor with VACUU·BUS port, 1100 – 0.001 mbar. ▶ with own plug-in power supply

2 Safety information

The information in this chapter must be observed by everyone who works with the product described here.

The safety information is valid for the entire life cycle of the product.

2.1 Usage

Only use the product if it is in perfect working condition.

Only use the product with oil filling.

2.1.1 Intended use

Intended use The rotary vane pump is an oil-sealed vacuum pump for the fine vacuum range in the laboratory. The vacuum pump may only be used indoors in a dry, non-explosive atmosphere.

Intended use also includes:



- observing the information in the document **Safety information for vacuum equipment**,
- observing the manual,
- complying with all notes on correct vacuum and electrical connections, → *see chapter: 4.3 Connection on page 34*,



- observing the manual of connected components,
- operating the vacuum pump only within its limitation of use, → *see chapter: Observe limitation of use on page 33*,
- ensuring adequate ventilation, especially if installing the vacuum pump in a cabinet or a housing, and installing an external automatic ventilation system if necessary,
- observing the maximum permitted gas temperature at the inlet,
- regularly inspecting the vacuum pump according to its operating conditions and have this carried out by qualified personnel,
- regularly replacing wear parts,
- using the vacuum pump and all system parts only for generation of vacuum in vessels designed for that purpose,
- using only original **VACUUBRAND** parts and original or approved accessories or spare parts. The CE mark or the cTÜVus mark (see rating plate) may be voided if not using original manufacturer's spare parts.

Any other use is considered improper use.

2.1.2 Improper use

Improper use Incorrect use or any application which does not correspond to the technical data may result in injury or damage to property.

Improper use includes:

- using the product contrary to its intended use,
- using the product in non-commercial environments, unless the necessary protective measures and precautions have been taken by the company,
- operation under inadmissible environmental and operating conditions,
- operation despite obvious errors or defective safety devices,
- operation without oil filling,
- unauthorized extensions, conversions, or repairs, in particular when these impair safety,
- the use of unauthorized accessories or spare parts,
- usage despite incomplete assembly,
- operation by insufficiently trained or qualified personnel,
- switching on/off with tools or one's foot,
- operation with sharp-edged objects,
- pulling plug-in connections on the cable out of the socket,
- extracting or conveying solids, dusts, or liquids.

2.1.3 Foreseeable misuse

Misuse In addition to improper use, there are types of use which are prohibited when handling the product:

Prohibited types of use include, in particular:



- use on humans or animals,
- use on equipment and vessels which are not vacuum proof,
- installation and operation in potentially explosive atmospheres,
- pumping of potentially explosive atmospheres,
- use in mines or underground,
- pumping oxidizing and pyrophoric substances, liquids or solids,

- pumping hot, unstable, or explosive media,
- pumping self inflammable substances,
- pumping substances which are inflammable without air,
- pumping substances which may react explosively under impact and/or elevated temperature without an air supply,
- pumping substances which may form deposits inside the vacuum pump,
- pumping liquids,
- unauthorized modifications,
- switching on/off with tools or one's foot,
- operation with sharp-edged objects,
- using the product to generate pressure,
- operation with closed pump outlet,
- fully exposing the product to the vacuum, immersing it in liquids, exposing it to water spray or steam jets.

IMPORTANT!

No foreign bodies, hot gases or flames from the application must be allowed to enter the equipment.

→ see chapter: *8.1 Technical data on page 61.*

2.2 Obligations

2.2.1 Operator obligations

Operator obligations

The owner defines the responsibilities and ensures that only trained personnel or specialists work on the product. This applies in particular to connection work and troubleshooting.

Users must have the appropriate qualifications for the listed activities, see ***Responsibility matrix***. In particular work on electrical equipment must be performed only by qualified electricians.

2.2.2 Personnel obligations

Personnel obligations

In the case of activities which require protective clothing, personal protective equipment as specified by the operator is to be worn.

If the product is not in proper working order, it must be prevented from being accidentally switched back on.

⇒ Always be conscious of safety and work in a safe manner.

⇒ Observe instructions issued by the operator, and national regulations on accident prevention and industrial safety.



The way individuals act can help to prevent accidents at work.

2.3 Target group description

Target groups

The manual must be read and observed by every person who is tasked with the activities described below.

Qualification description

Personnel qualification

Operator	Laboratory staff, such as chemists, laboratory technicians
Specialist	Person with professional qualification in mechanics, electrical equipment or laboratory devices
Responsible specialist	Specialist with additional specialist, departmental or area responsibility

Responsibility matrix

Responsibility matrix

Activity	Operator	Specialist	Responsible specialist
Transport	x	x	x
Installation	x	x	x
Commissioning	x	x	x
Operation	x	x	x
Oil change		x	x
Replacing the device fuses		x	x
Repair ¹		x	x
Repair order			x
External cleaning	x	x	x

Shutdown	x	x
Decontamination ²	x	x

1 see also homepage:

VACUUBRAND > Support > [Repair instructions](#)

2 Or have decontamination carried out by a qualified service provider.

2.4 General safety information

Quality standard and safety

Products from **VACUUBRAND GMBH + CO KG** are subject to stringent quality testing with regard to safety and operation. Each product undergoes a comprehensive test program prior to delivery.

⇒ Observe the instructions for all actions as specified in this manual.

2.4.1 Safety precautions

Safety precautions

- ⇒ Use your product only if you have understood its function and this manual.
- ⇒ Replace defective parts immediately, e.g., a broken power cord, or faulty hoses.
- ⇒ Use only original accessories and components which are designed for the vacuum technology, such as a vacuum hose, vacuum valve, etc.
- ⇒ When handling contaminated parts, follow the relevant regulations and protective measures; this also applies to equipment sent in for repair.

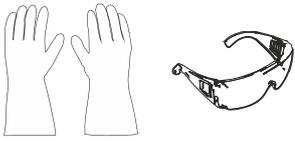
Prior to returning any product to our Service Department for repair, contamination from hazardous substances needs to be excluded.

IMPORTANT!

- ⇒ Therefore, send us the carefully completed and signed [Health and Safety Clearance](#) certificate before sending your product for repair

2.4.2 Protective clothing

Protective clothing



No special protective clothing is required to operate the vacuum pump. Observe instructions issued by the operator for your workplace.

During cleaning, we recommend wearing chemical-resistant protective gloves, protective clothing, and protective goggles.

IMPORTANT!

⇒ When handling chemicals and pump oils, wear your personal protective equipment.

2.4.3 Laboratory and working materials

	DANGER
	<p>Hazardous substances could be discharged at the outlet.</p> <p>The discharge from the pump invariably contains the pumped gases or vapors. During aspiration, hazardous, toxic substances at the outlet can get into the ambient air.</p> <ul style="list-style-type: none"> ⇒ Observe the relevant safety regulations for safe handling of hazardous substances. ⇒ Please note that residual process media may pose a danger to people and the environment. ⇒ Mount and use suitable separators, filters or fume hood devices.

⇒ In case of a leak in the manifold or at the shaft seal, pumped substances might be released into the environment or into the pump housing or motor.

Prevent the release of hazardous, toxic, explosive, corrosive fluids, gases, or vapors or those that are harmful to health or the environment, or of oil vapors, for example through suitable laboratory facilities with a fume hood and ventilation control.

	DANGER
	<p>Occurrence of explosive mixtures in the vacuum pump or at the outlet.</p> <p>Mechanically generated sparks, hot surfaces or static electricity may ignite explosive mixtures.</p> <ul style="list-style-type: none"> ⇒ Prevent any formation of explosive mixtures in the expansion chamber, in the oil reservoir, or at the outlet of the pump. ⇒ Connect inert gas for gas ballast or venting. ⇒ Drain appropriately or otherwise remove any potentially explosive mixtures at the outlet of the pump. ⇒ Dilute any potentially explosive mixtures at the outlet of the pump to non-explosive concentrations.

- ⇒ Comply with applicable regulations when disposing of chemicals. Take into consideration that chemicals may be contaminated.
- ⇒ Wear your personal protective equipment and take precautions to avoid contact with the skin, inhalation, and possible irritations.

Hazards due to different substances

Pumping different substances

Pumping different substances or media can cause the substances to react with one another.

- ⇒ Be aware of interactions and possible chemical reactions of the pumped media.
- ⇒ Purge the vacuum pump with ambient air or inert gas before changing the medium to be pumped. Thereby you will pump residues out of the vacuum pump and reduce the possibility of reactions of the pumped substances with each other and with the pump's materials.

2.4.4 Chemical compatibility of materials

	CAUTION
	<p>Deposits and condensate inside the vacuum pump.</p> <p>Deposits and condensate in the pump may lead to increased temperatures even to the point of exceeding the maximum permitted temperatures. Deposits may cause seizing of the pump unit.</p> <ul style="list-style-type: none"> ⇒ Check the inlet and outlet of the vacuum pump for deposits. ⇒ Check the oil condition. ⇒ Inspect the pump unit regularly, if there is a danger of forming deposits inside the vacuum pump. Clean the pump unit if necessary.

Working materials which get into the vacuum pump with the gas flow can damage the vacuum pump. Substances can be deposited in the vacuum pump.

Compatibility of the vacuum pump with pumped substances

- ⇒ Check the compatibility of the pumped substances with the wetted materials of the vacuum pump
→ *see chapter: 8.3 Wetted materials on page 65.*
- ⇒ Install a cold trap in front of the vacuum pump if pumping aggressive or corrosive gases or vapors.

2.4.5 Eliminate sources of danger

Connect the tubing correctly

Avoid overpressure

No inadmissible pressure must be created at the vacuum pump outlet, → *see chapter: 8.1 Technical data on page 61.*

- ⇒ Always ensure that the outlet line is clear and has no back pressure. The outlet must not be blocked, to ensure that gases can exit freely.
- ⇒ Prevent uncontrolled overpressure (e.g., due to a locked or blocked piping system, condensate, or clogged outlet line).
- ⇒ Do not operate the pump with closed outlet. Closing the outlet during operation may cause damage to pump or components next in line.

- ⇒ Due to the high compression ratio, the pump may generate overpressure at the outlet. Check pressure compatibility with system components (e. g., exhaust pipeline) at the pump outlet.
- ⇒ At the gas connections, the connections for the inlet and outlet must not be mixed up.
- ⇒ Hose connections at the vacuum pump inlet and outlet must always be gas tight.
- ⇒ Observe the maximum pressures at the inlet and outlet of the vacuum pump, as specified in chapter **8.1 Technical data on page 61**.
- ⇒ The system to be evacuated as well as all hose connections must be mechanically stable.
- ⇒ Attach hoses to hose nozzles so that they do not come loose unintentionally.

Usage of pump oil

Usage of pump oil The vacuum pump is oil-sealed.

	WARNING
	<p>Oil vapors at the outlet of the vacuum pump.</p> <p>Even if the pumped medium is only air or a pure gas, the discharge from rotary vane pumps will contain small quantities of oil vapor and petroleum fractions. These substances are particularly contaminating in closed spaces or in case of insufficient ventilation.</p> <ul style="list-style-type: none"> ⇒ Ensure that the pump location is well ventilated. ⇒ Do not inhale oil vapors. ⇒ Connect a gas-tight exhaust line at the pump outlet. Always vent exhaust gases appropriately (e. g., into a fume hood). ⇒ Prevent any dangerous reactions with oil or oil vapors and the formation of impermissible or dangerous emissions.

- ⇒ Comply with all relevant statutory requirements and regulations concerning the handling, storage and disposal of oil.
- ⇒ Do not allow oils to enter the drainage system or other bodies of water.
- ⇒ Do not spill oil. Clean up spilled oil immediately. Spillage can cause accidents (slip hazard)!

- ⇒ Operate the vacuum pump only with oil filling.
- ⇒ Check the oil level through the sight glass every time before starting the pump.
- ⇒ Check the pump's oil level and the condition of the oil on a regular basis, → see *chapter: Oil level check on page 42*.
- ⇒ Use only oil of the recommended type. Other oils or operating fluids may cause damage of the pump or danger.
- ⇒ Use special oils for the rotary vane pump, if extremely high aging stability is required or if oxygen or other strong oxidizing agents are pumped, → see *chapter: 7.3 Oil change on page 56*.



- ⇒ Wear your personal protective equipment when working with pump oils to avoid contact with the skin and possible irritations.

Prevent condensate return

Condensate in the outlet line

Condensate in the outlet line can damage the vacuum pump. Condensate must not flow back into the outlet or vacuum pump through the hose line. Liquid must not accumulate inside the outlet line.

- ⇒ Preferably route the outlet line with a fall from the outlet, i.e., running downward so that no backup forms.

Prevent foreign bodies inside the pump

Foreign bodies

Particles, liquids, and dust must not enter the vacuum pump.

- ⇒ Do not pump any substances which could form deposits inside the vacuum pump.
- ⇒ Install suitable filters upstream of the inlet. Suitable filters are chemically resistant, clog-proof and have a reliable flow rate, for example.
- ⇒ Replace porous vacuum hoses without delay.

Hazards during venting

Hazards during venting

If the manual gas ballast valve of the rotary vane pump is open, a power failure or switching off the pump may cause accidental ventilation of the pump or the vacuum system.

- ⇒ Install a solenoid operated gas ballast valve to avoid accidental ventilation.

Dangers due to automatic restart

Dangers due to automatic restart of the vacuum pump

The vacuum pump restarts automatically when the power supply is switched off and then back on, e.g.:

- after a power failure,
- after switching the vacuum pump off and on,
- after disconnecting and reconnecting the power plug.

An ongoing process starts automatically when the power supply is disconnected and reconnected.

- ⇒ Ensure that the automatic restart of the process does not pose any danger to persons or equipment.
- ⇒ Take appropriate safety precautions (e.g., shut-off valve, relay switch, protection against restart) if an automatic restart of the vacuum pump can lead to a dangerous situation.

Hazards due to residual energy

Hazards due to residual energy

After the vacuum pump has been switched off and disconnected from the power supply, there may still be dangers due to residual energy:

- Thermal energy: engine waste heat, compression heat.
- Electrical energy: Motor capacitors have a discharge time of up to 5 seconds.

Please note the following before performing actions:

- ⇒ Let the vacuum pump cool down
- ⇒ Wait until the capacitors have discharged.

Hazards due to hot surfaces or overheating

Hot surfaces, overheating

	CAUTION
	<p>Risk of burns from hot surfaces</p> <p>Depending on operation conditions and ambient conditions dangers due to hot surfaces may arise.</p> <ul style="list-style-type: none"> ⇒ Avoid direct contact with the surface or wear heat-resistant safety gloves if contact cannot be excluded. ⇒ Provide contact protection if the surface temperature should be elevated on a regular basis.

Hot surfaces,
overheating

	CAUTION
	<p>Risk of burns from hot surfaces</p> <p>In case of failure the pump surface can heat up to temperatures above 221 °F (105 °C).</p> <ul style="list-style-type: none"> ⇒ Provide a suitable contact guard to protect yourself from accidental contact with hot surfaces. ⇒ Wear adequate personal protective equipment, if necessary. ⇒ Ensure the cooling-down of the vacuum pump prior to any further work.

The vacuum pump can be damaged due to overheating. Possible causes include insufficient air supply to the fan, failure to maintain minimum distances, ambient temperature outside the specified operating conditions.

- ⇒ When installing the product, ensure that there is a minimum distance of 5 cm between the vacuum pump and adjacent parts (such as the housing, walls, etc.).
- ⇒ Ensure that there is always sufficient air supply to the fan, especially if installing the vacuum pump in a cabinet or a housing. Install an external automatic ventilation system if necessary.
- ⇒ Check the fan regularly for dirt.
- ⇒ Clean soiled fan guard grills.
- ⇒ Clean the vacuum pump regularly from external soiling and deposits to avoid an increase of the pump's operating temperature, → *see chapter: 7.2 Cleaning on page 55.*
- ⇒ Avoid excessive heat input due to hot process gases.
- ⇒ Observe the maximum admissible media temperature → *see chapter: 8.1 Technical data on page 61.*

Keep signs legible

Labels and signs

Keep any signs affixed to the product in an easily readable condition:

- ⇒ Labels
- ⇒ Rating plates

2.5 Motor protection

	CAUTION
	<p>Impaired lock of the thermal cutout in case of supply voltage below 115 VAC.</p> <p>In case of supply voltage below 115 V, the lock of the thermal cutout might be impaired. The pump may restart on its own after sufficient cooling down.</p> <p>⇒ In case of excess temperature, switch off the vacuum pump or disconnect the pump from the power source to avoid an automatic restart.</p>

Overheating
protection

The pump motor is equipped with a self-hold thermal cutout in the winding as overload protection. In case of excess temperature the vacuum pump switches off.

If the vacuum pump is switched off due to these safety precautions, the error must be cleared manually: Unplug vacuum pump from power supply → eliminate cause of error → switch vacuum pump back on after a waiting time of 5 minutes. Allow the vacuum pump to cool down prior to switching on again.

2.6 Disposal



NOTE

Electronic devices must not be disposed of in domestic waste at the end of their service life.

Used electronic devices contain harmful substances that can cause damage to the environment or human health. Disused electrical devices also contain valuable raw materials, which can be recovered for reuse if the device is disposed of correctly within the recycling process.

End users are legally obliged to take used electric and electronic devices to a licensed collection point.

- ⇒ Correctly dispose of all electronic scrap and electronic components at the end of their service life.
- ⇒ Observe the national regulations regarding disposal and environmental protection.

3 Product description

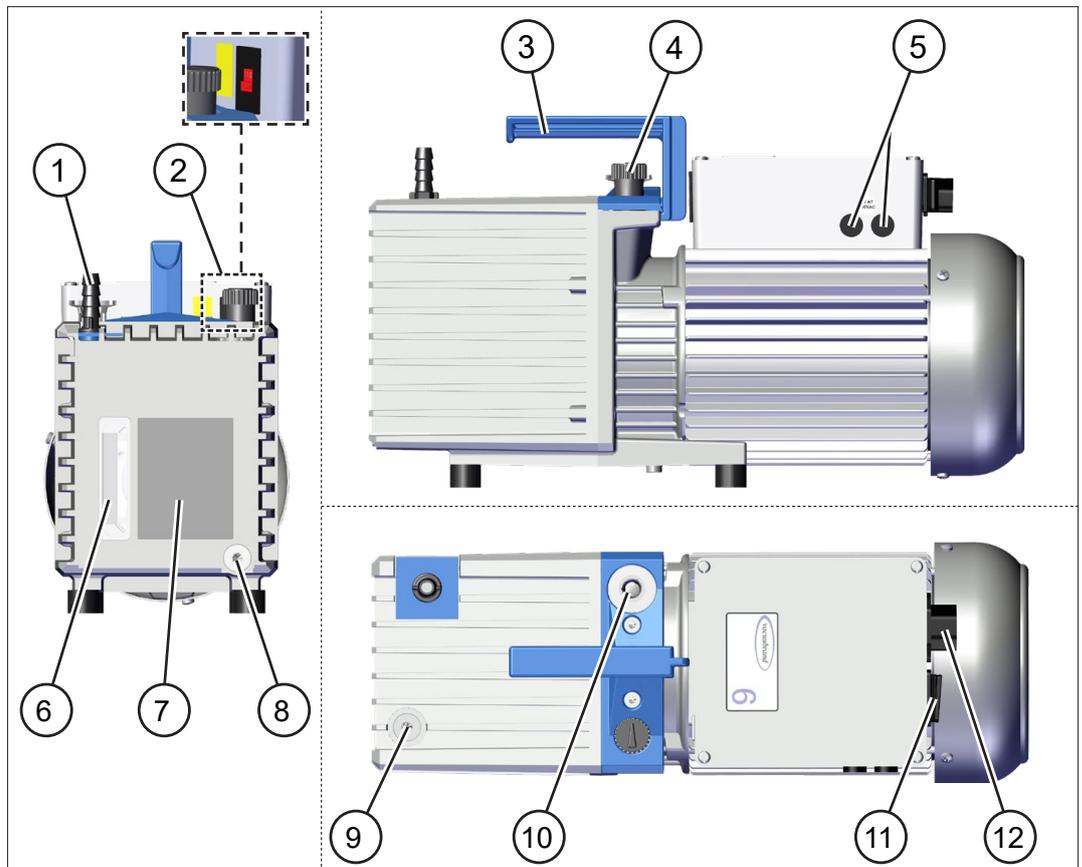
Product description The *Rotary vane pumps Rx y* are oil-sealed vacuum pumps for the vacuum range from atmospheric pressure to the fine vacuum range in the laboratory.

With the gas ballast valve closed, the rotary vane pump shuts off vacuum tight. This, in turn, prolongs the intervals between oil changes and improves corrosion resistance. The oil system incorporates an oil pump; this forced-lubrication system ensures an adequate supply of oil to the pump unit even at high inlet pressures. A mechanical retaining valve in the oil system prevents oil suck-back into the vacuum system.

3.1 Basic configuration of rotary vane pump series

Views and basic configuration

Views and basic configuration



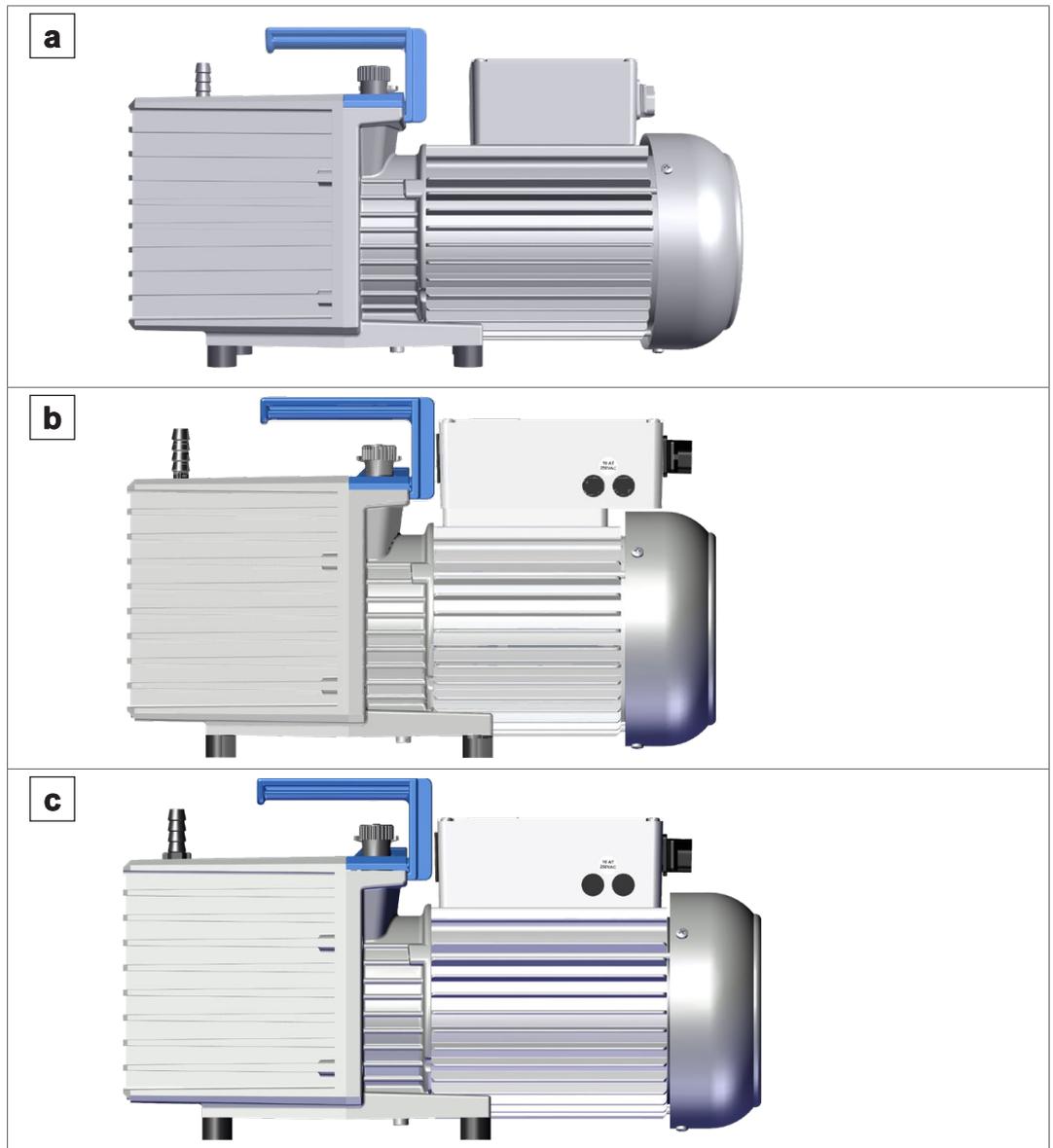
Description

- | | |
|-----------|--|
| 1 | Outlet (OUT) |
| 2 | Voltage selection switch – only versions with dual-voltage motor |
| 3 | Handle |
| 4 | Manual gas ballast valve |
| 5 | Device fuse – only versions with dual-voltage motor |
| 6 | Sight glass for oil level |
| 7 | Rating plate with min. / max. mark for oil level |
| 8 | Oil drain plug / Oil outlet |
| 9 | Oil inlet port / Oil inlet |
| 10 | Inlet (IN), vacuum connection |
| 11 | ON/OFF switch |
| 12 | Power connection |

3.2 Rotary vane pump series

Pump types and voltage versions

Overview of rotary vane pumps



Description

Rotary vane pump	Voltage version
a RE 2.5 / RZ 2.5 / RE 6 / RZ 6	230 V
b RE 2.5 / RZ 2.5	100 – 120 V / 220 – 230 V
c RE 6 / RZ 6	100 – 120 V / 220 – 230 V

3.3 Optional accessories

Optional accessories
for the vacuum
pump

Separators, oil mist separators, vacuum valves, and a solenoid operated gas ballast valve are available as separate accessories to be mounted at the vacuum pump, → *see also chapter: 8.4 Ordering information on page 66.*

Separator AK

The separator AK at the inlet retains droplets and particles and protects the recipient against back flow of pump oil. The separator is mounted directly on the inlet port.

Oil mist separator FO

The oil mist separator FO at the outlet with integrated overpressure valve protects the environment against aerosols and oil mist. The oil mist separator is mounted directly on the outlet port.

Vacuum valves

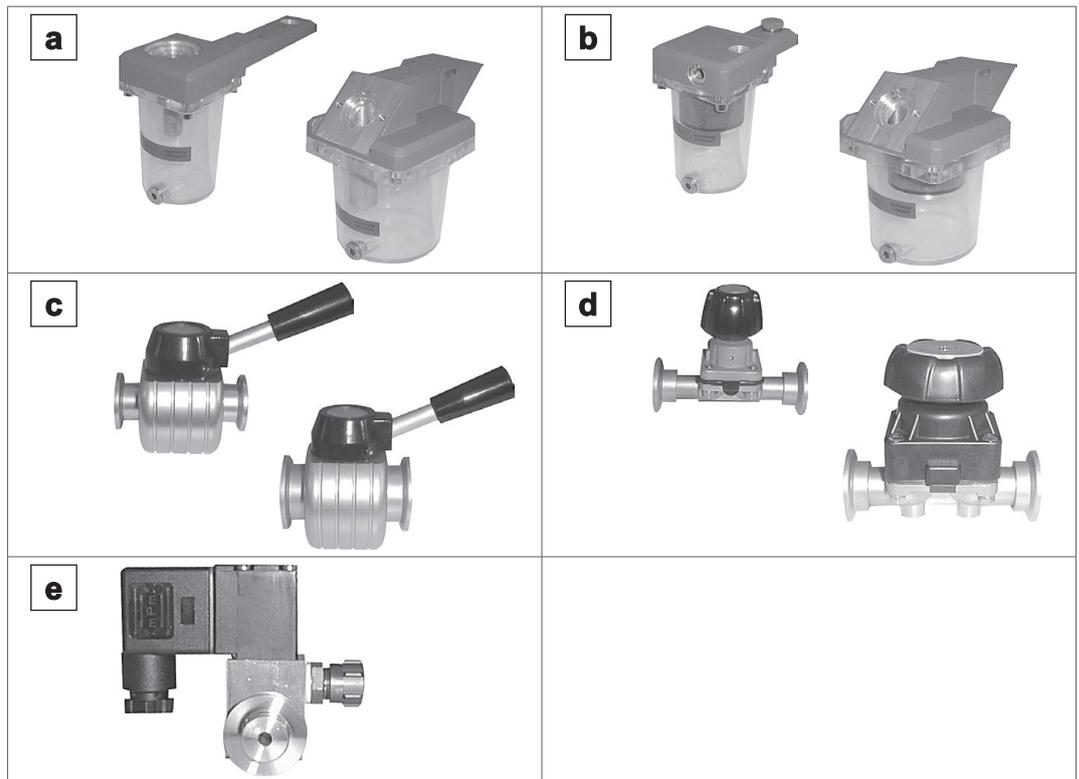
In-line butterfly-type valves (VS) and diaphragm valves (VM) for connection via small flange KF DN 16 or KF DN 25.

Solenoid operated gas ballast valve VB M-B

The solenoid operated gas ballast valve with hose nipple for connection of inert gas controls the gas ballast and replaces the manual gas ballast valve. The valve operates in conjunction with the VACUU-SELECT vacuum controller or the vacuum gauge DCP 3000. The valve is mounted via adapter directly on the manual gas ballast.

Overview of vacuum pump accessories

Overview vacuum pump accessories



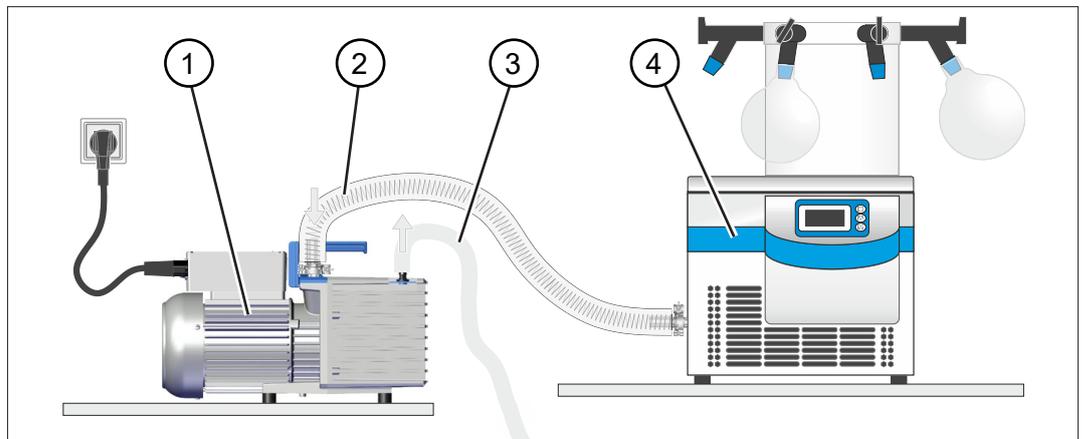
Description

<p>a Separator AK</p>
<p>b Oil mist separator FO</p>
<p>c Butterfly valve VS</p>
<p>d Diaphragm valve VM</p>
<p>e Solenoid operated gas ballast valve</p>

3.4 Application example

Freeze drying

→ Example
Freeze drying



Description

- | | |
|---|---|
| 1 | Vacuum pump <i>RZ 2.5</i> |
| 2 | Inlet line |
| 3 | Outlet line (diverted into a fume hood) |
| 4 | Example of use: Lab freeze dryer |

4 Installation and connection

4.1 Transport

Products from **VACUUBRAND** are packed in sturdy, recyclable packaging.



The original packaging is accurately matched to your product for safe transport.

If possible, please keep the original packaging, e.g., for returning the product for repair.

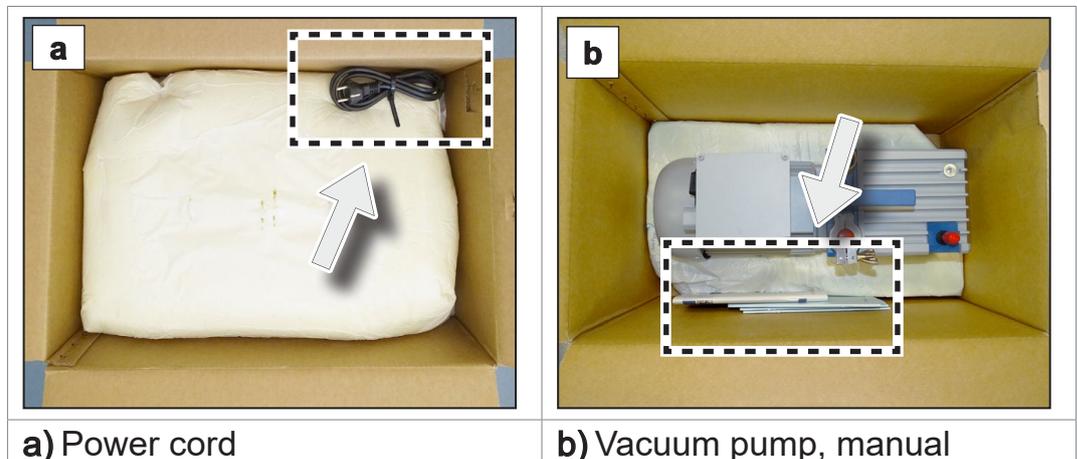
Goods receipt

Check the shipment for transport damage and completeness.

⇒ Immediately report any transport damage in writing to the supplier.

Unpacking

→ Example
Vacuum pump in
original packaging



⇒ Remove the upper part of the foam packaging.



- ⇒ Note that the **weight of the vacuum pump is up to approx. 53 lbs. (24 kg), depending on the type of pump.**
- ⇒ Carefully lift the vacuum pump out of the packaging using the handle.

- ⇒ Retain the transport caps for future use.
- ⇒ Use the handle to transport the vacuum pump.
- ⇒ The vacuum pump is delivered with oil filling. Check the oil level of the vacuum pump through the sight glass.

4.2 Set up the vacuum pump

NOTE

Condensate can damage the vacuum pump.

A large temperature difference between the storage location and the installation location can cause condensation.

- ⇒ After goods receipt or storage, allow your product to acclimatize before initial use. The acclimatization can take several hours.

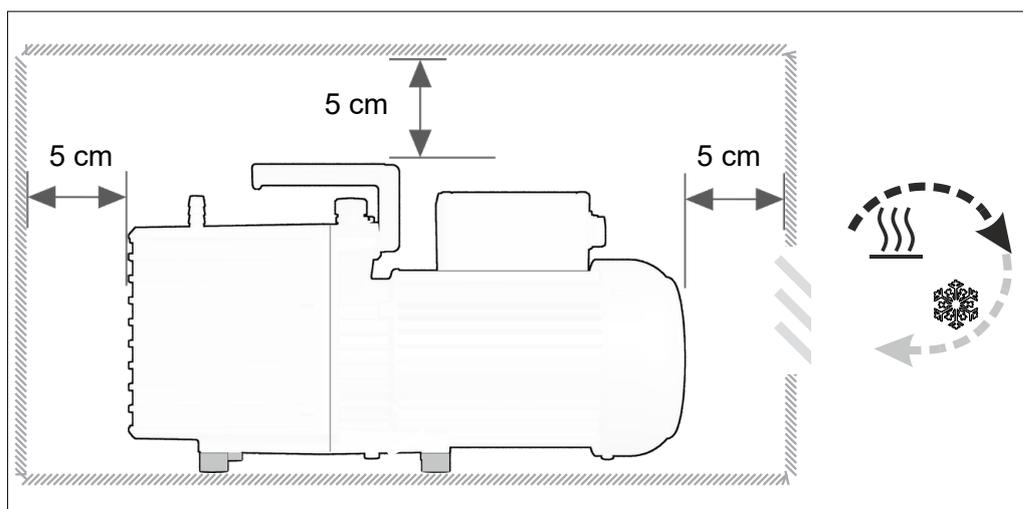
Check installation conditions

Check installation conditions

- The product is acclimatized.
- The ambient conditions are within the limitation of use, → see *chapter: Observe limitation of use on page 33.*
- The ambient temperature should be at least 54 °F (+12 °C). Otherwise the pump may not start because of the high oil viscosity at low temperature.
- The vacuum pump must have a stable and secure base without additional mechanical contact apart from the pump feet.

Set up the vacuum pump

→ Example
Sketch of
minimum distances
in lab furniture



IMPORTANT!

- ⇒ Place the vacuum pump on a stable, non-vibrating, level surface.
- ⇒ When installing in lab furniture, maintain a minimum distance of 5 cm (2 in) to adjacent objects or surfaces.
- ⇒ The product must be positioned so that the on/off switch and the power plug can be reached and are accessible. For this purpose a minimum distance of 12 cm (5 in) to adjacent objects or surfaces must be kept at one side of the pump. The on/off switch is at the rear of the terminal box.
- ⇒ Prevent heat accumulation and ensure sufficient air circulation, especially in closed housings.

Observe limitation of use

Limitation of use		(US)
Operating ambient temperature	12 – 40 °C	54 – 104 °F
Max. altitude	2000 m above sea level	6500 ft above sea level
Minimum distance to adjacent parts	5 cm (12 cm)	2 in (5 in)
Relative humidity	30 – 85 %, non-condensing	
Pollution degree	2	
Protection class	IP 40	type 1
Prevent condensation or external contamination from dust, liquids, and corrosive gases.		

IMPORTANT!

- ⇒ Note the IP protection class. IP protection is only guaranteed if the product is appropriately mounted and connected.
- ⇒ When connecting, observe the information on the rating plate and the chapter *8.1 Technical data on page 61*.

4.3 Connection

The vacuum pumps have a vacuum connection and an outlet connection. Connect your vacuum pump as described below.

- ⇒ Ensure that you do not mix up the inlet and outlet ports of the vacuum pump. Confusing inlet and outlet will cause overpressure in the connected apparatus.
- ⇒ After assembly, check the whole system for leaks.

4.3.1 Vacuum connection (IN)

- ⇒ Connect the vacuum port of your application to the inlet of the vacuum pump.

Vacuum connection
(IN)

	CAUTION
	<p>Flexible vacuum hoses can contract during evacuation.</p> <p>Connected components that are not secured can cause injury or damage due to the jerky movement (shrinkage) of a flexible vacuum hose. The vacuum hose can come loose.</p> <ul style="list-style-type: none"> ⇒ Secure the vacuum hose to the connections. ⇒ Secure connected components. ⇒ Take the maximum shrinkage into account when sizing the flexible vacuum hose.

NOTE**Foreign bodies in the inlet line can damage the vacuum pump.**

- ⇒ Prevent particles and contaminants from being aspirated or being able to flow back.
- ⇒ If necessary, install suitable filters upstream of the vacuum pump to avoid the aspiration of particles and dust. Ensure that the filters are chemically resistant, clog-proof and have a reliable flow rate, appropriate for your application.

IMPORTANT!

- ⇒ Do not use rigid pipelines. Rigid pipelines can transmit mechanical load between the vacuum pump and the application.
- ⇒ Use elastic hoses or flexible elements to avoid mechanical load due to rigid pipelines.
- ⇒ Use a sufficiently stable vacuum hose that is designed for the required vacuum range.
- ⇒ Keep the vacuum hose as short as possible.
- ⇒ Connect a vacuum hose with as large as possible cross-section.
- ⇒ The connection between vacuum hose and the vacuum pump must be gas-tight.
- ⇒ Avoid kinks in the vacuum hose.

Connect the vacuum hose

Vacuum hose at the inlet

1. Remove the blind flange on the inlet flange.
 - ⇒ Connect a vacuum hose with small flange KF DN 16 to the inlet flange, ensuring the connection is gas-tight.
 - ⇒ Alternatively, you can use an adapter from small flange KF DN 16 to hose nozzle and attach a vacuum hose to it. Secure hose connections on hose nozzles, e.g., with a hose clip.
 - ⇒ If necessary, install an in-line solenoid valve or shut-off valve in the inlet line to isolate your application from the vacuum pump to allow the pump to warm up before pumping condensable vapors and to clean the pump after use before it is switched off.



- Observe the following points for optimum results:
- ⇒ Keep the vacuum line as short as you can with as large a cross-section as possible.

4.3.2 Outlet connection (OUT)

Outlet connection
(OUT)

- ⇒ Connect a gas-tight exhaust line at the pump outlet if necessary. The outlet is marked "OUT".
- ⇒ Always vent exhaust gases appropriately, e. g., into a fume hood.



WARNING

Overpressure at the outlet of the vacuum pump.

Due to the high compression ratio, the pump may generate overpressure at the outlet.

- ⇒ The outlet line (exhaust gas, gas outlet) must always be clear and non-pressurized.
- ⇒ Never block the gas outlet. Do not kink the outlet line.
- ⇒ Use an outlet line with sufficient cross-section. The cross-section of the outlet line must be at least the size of the pump's exhaust connection.

Connect the outlet line

Connect the outlet
line to the outlet

1. Remove the red protection cap on the outlet of the vacuum pump.
2. Attach the outlet line to the hose nozzle DN 10.
 - ⇒ Secure hose connections on hose nozzles, e.g., with a hose clip.
 - ⇒ Route the outlet line with a fall from the outlet, i.e., running downward so that no backup forms.

4.3.3 Electrical connection

⇒ Check the power source and the pump's rating plate to be sure that the power source and the equipment match in voltage, phase, and frequency.

Vacuum pump with switchable dual-voltage motor

Dual-voltage motor, switchable

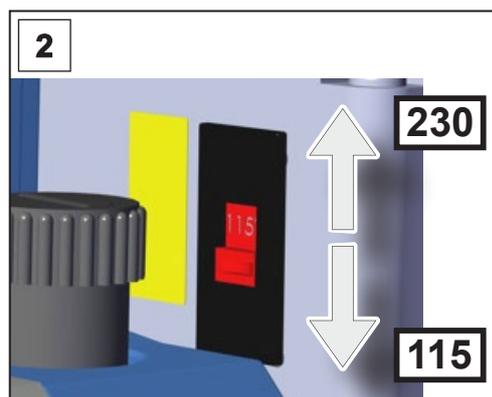
	CAUTION
	<p>Possible damage to the pump motor.</p> <p>If the vacuum pump is switched on with wrong voltage selection at the voltage selection switch, the motor may be damaged.</p> <ul style="list-style-type: none"> ⇒ Check the setting of the voltage selection switch every time before switching on the pump. ⇒ The selected voltage range must correspond to the supply voltage of the power supply. ⇒ Disconnect the vacuum pump from the mains supply prior to adjusting the voltage selection switch.

Adjusting the voltage selection switch



1. Ensure that the vacuum pump is separated from the power supply. Switch off the pump and disconnect the electrical power cord.

Adjusting the voltage selection switch



⇒ "230" corresponds to 220 – 230 V

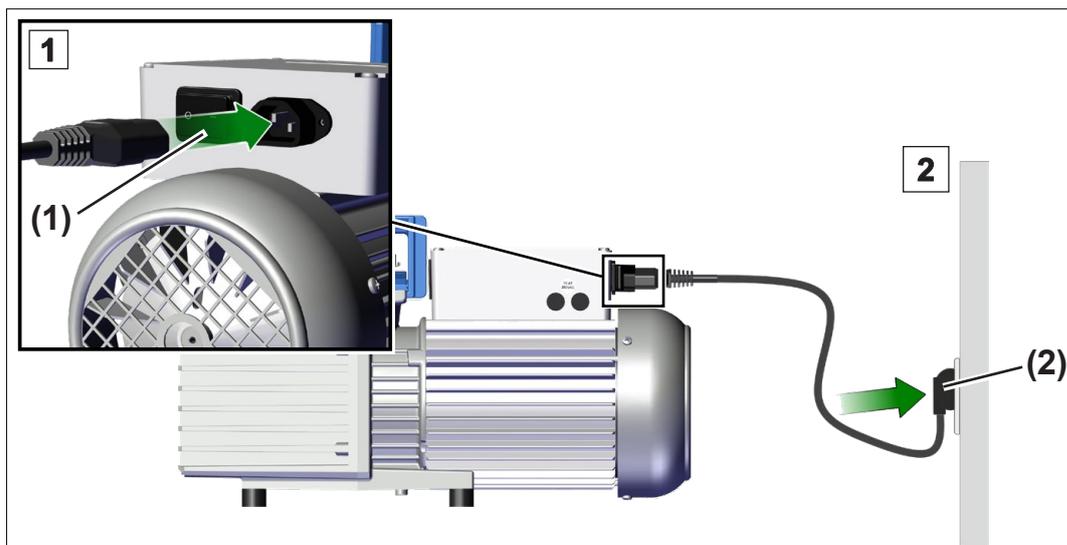
⇒ "115" corresponds to 100 – 120 V

2. Adjust the voltage selection switch to the supply voltage of the power supply.

Voltage selection switch adjusted.

Connect the vacuum pump electrically

→ Example
Electrical connection
of vacuum pump



1. Plug connector **(1)** of the power cord into the power connection of the vacuum pump.
2. Plug power plug **(2)** into the power outlet.
 - Vacuum pump electrically connected.

IMPORTANT!

- ⇒ Only use a power cord which is undamaged and meeting the regulations.
- ⇒ Plug the power plug only into a properly grounded power outlet.
- ⇒ Lay the power cord such that it cannot be damaged by sharp edges, chemicals, or hot surfaces.
- ⇒ Keep the electrical power cord away from hot surfaces.
- ⇒ Keep the electrical power cord away from heated surfaces.
- ⇒ The power plug serves as a disconnecting device from the electrical supply voltage. The product must be installed in such a way that the power plug is easily reached and accessible at all times to disconnect the product from the mains supply.

Mains connection

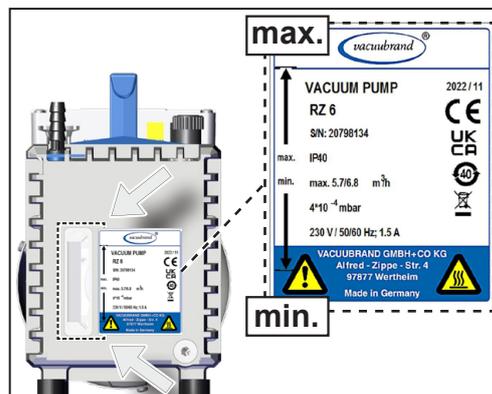
The vacuum pump is delivered ready for use with the appropriate power plug.

IMPORTANT!

- ⇒ Use the power plug which fits your power supply.
- ⇒ Do not use multiple sockets connected in series as power connection.

4.4 Oil level check

Check oil level ⇒ The vacuum pump is delivered with oil filling. Check the oil level of the vacuum pump through the sight glass.



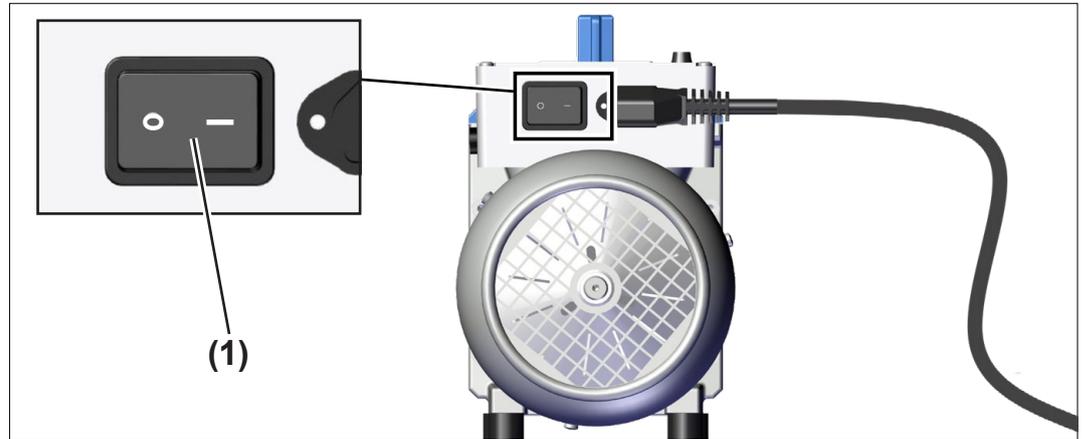
- ⇒ The oil level has to be between the marks "min." and "max." on the rating plate.
- ⇒ Adjust the oil level, if necessary, → see *chapter: 7.3 Oil change on page 56.*

5 Commissioning (operation)

5.1 Switch on

Switch on the vacuum pump

Switch on the vacuum pump



⇒ Switch rocker switch (1) on – switch position I.

5.2 Operation

Warm-up (warm-up time)

- ⇒ The warm-up time enables the vacuum pump to reach full operating capacity. A warm up period of typically 30 minutes is required to ensure that the rated ultimate vacuum and pumping speed and the full vapor pumping rate are attained.
- ⇒ If necessary, install an in-line solenoid valve or shut-off valve in the inlet line to isolate your application from the vacuum pump to allow the pump to warm up.

Operating conditions

Inlet pressure,
outlet pressure

- ⇒ Pumping down can be started at any pressure at the inlet below atmospheric pressure.
- ⇒ Do not start the pump, if the pressure at the outlet port exceeds 16.0 psi (1.1 bar) absolute.
- ⇒ Continuous operation is possible at any pressure below atmospheric pressure.
- ⇒ Avoid overpressure of more than 17.5 psi absolute (1.2 bar absolute) in the event that inert gas is connected to the pump, to the gas ballast or to a venting valve.

Operation with condensable vapors

- Condensable vapors
- ⇒ Allow the pump to attain its operating temperature before pumping condensable vapors. Keep the vapor inlet pressure below the permitted maximum.
 - ⇒ Open the manual gas ballast valve in case of pumping significant amounts of vapor, → *see chapter: 5.2.1 Operation with gas ballast on page 43.*

Oil level check

Check oil level

NOTE

A too low oil level during operation may damage the vacuum pump.

- ⇒ Check the oil level of the vacuum pump every time before starting the pump.
- ⇒ Check the oil level of the vacuum pump at least once a week.
- ⇒ Check the oil level more frequently if high amounts of gas or vapor are pumped or if operating the vacuum pump with open gas ballast valve.
- ⇒ Oil consumption will increase at inlet pressures above 75 Torr (100 mbar). In that case check the oil level more frequently.
- ⇒ Adjust the oil level, if necessary, → *see chapter: 7.3 Oil change on page 56.*

Pay attention to pumped media



CAUTION

Possible damage due to aggressive or corrosive media.

Aggressive or corrosive gases or vapors can damage personnel, environment or the vacuum pump.

- ⇒ Use appropriate accessories to protect personnel, environment, and the vacuum pump.
- ⇒ Use accessories such as cold trap, separator, oil separator, or shut-off valves, → *see chapter: 8.4 Ordering information on page 66.*
- ⇒ Use special oil to protect the pump, if necessary.

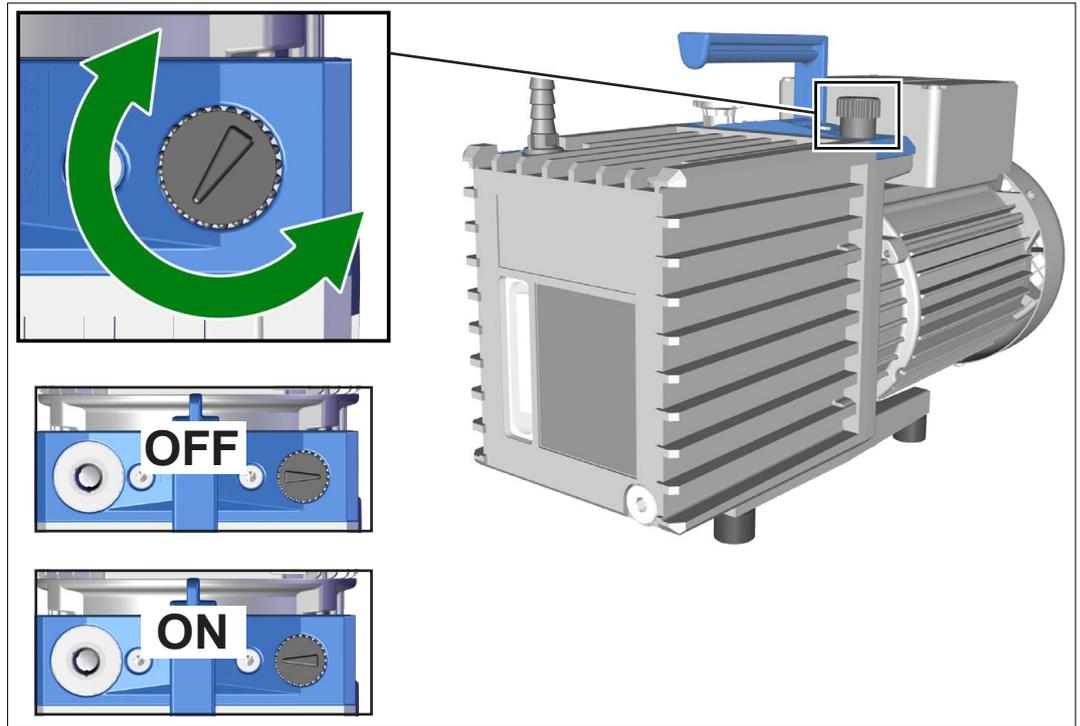
5.2.1 Operation with gas ballast

Gas ballast The supply of gas ballast reduces the condensation of pumped substances (e. g., water vapor, solvents) inside the pump or decontaminates the pump oil from volatile substances. With gas ballast valve open, the ultimate vacuum will be slightly reduced.

	DANGER
	<p>Explosion risk due to air as gas ballast.</p> <p>By using air as a gas ballast, a small amount of oxygen enters the inside of the vacuum pump. Depending on the process, a potentially explosive mixture can form due to oxygen in the air, or other dangerous situations can occur, if the pumped media react with the oxygen.</p> <ul style="list-style-type: none">⇒ Make sure that air/gas intake through the gas ballast valve can never lead to hazardous, explosive or otherwise dangerous mixtures.⇒ In the presence of flammable substances and for processes in which a potentially explosive mixture can occur, use only inert gas as a gas ballast, e. g., nitrogen (max. 1.2 bar/900 Torr absolute).⇒ If in doubt, always use inert gas for gas ballast.

	CAUTION
	<p>Possible damage due to accidental venting in case of open gas ballast valve.</p> <p>If the manual gas ballast valve of the rotary vane pump is open, a power failure or switching off the pump may cause accidental ventilation of the pump or the vacuum system.</p> <ul style="list-style-type: none">⇒ Take appropriate safety measures, if accidental ventilation constitutes a potential source of danger, e. g., install a solenoid operated gas ballast valve.

Open / close the gas ballast valve



Open / close the gas ballast valve

- ⇒ Turn the black gas ballast cap in any direction to open or close the gas ballast valve.
The manual gas ballast valve is open if the arrow on the gas ballast cap is pointing towards the inlet of the vacuum pump (RE 2.5 / RZ 2.5 / RE 6 / RZ 6) or towards the labeling "GB" (RE 9 / RZ 9).
- ⇒ Evacuate condensable vapors, e. g., water vapor, solvents, etc., only once the vacuum pump has reached its operating temperature and with the gas ballast valve open.
- ⇒ Do not pump vapor before the pump has reached its operating temperature. In case, install an in-line valve in the inlet line of the vacuum pump and open it only approx. 30 minutes after the pump has been started.
- ⇒ Operate the vacuum pump without gas ballast only in case of a clean vacuum system or when no condensable vapors can occur.
- ⇒ To connect inert gas as gas ballast, remove the black gas ballast cap and install a gas ballast adapter instead.
→ see chapter: **8.4 Ordering information on page 66.**

5.2.2 Condensate in catchpots (optional)

Operating the pump with condensate in the catchpots

Condensates in optional catchpots

- ⇒ Observe the condensate levels in the catchpots of the separator at the inlet (optional) and of the oil mist filter (optional).
 - The condensate level in the separator at the inlet must always be kept below the bottom of the separator tube.
 - The condensate level in the oil mist filter must always be kept below the bottom edge of the filter.
 - In case of a clogged filter, oil mist might be visible in the oil filter housing, or the filter might be discolored or exhibit deposits on the inside. Replace the filter element of the oil mist filter if it is clogged. Disassemble the oil mist filter to replace the filter element. Under certain circumstances, clogged filter elements can be cleaned using suitable solvents. However, it is safer to use a new filter element.

Drain condensate

Drain condensate



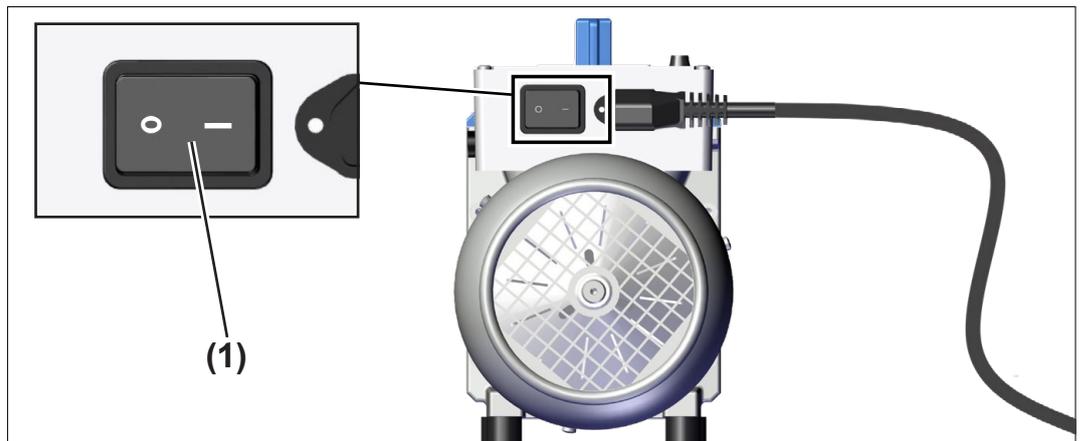
Drain the catchpots in time.

- ⇒ Wear your personal protective equipment.
- ⇒ Switch off the vacuum pump.
- ⇒ Ventilate the vacuum pump.
- ⇒ Open the drain screw of the transparent catchpot and drain the condensate.
- ⇒ Comply with regulations when disposing of condensates and chemicals thereby taking contaminations due to pumped substances into account.
- ⇒ Do not reuse separated oil if it is contaminated or discolored.

5.3 Switch off

Switch off the vacuum pump

- Switch off
1. Stop the process.
 2. In case, close the in-line valve in the inlet line of the vacuum pump.
 3. Allow the vacuum pump to continue running for approx. 30 minutes with open gas ballast valve if the vacuum pump has been exposed to condensate.



4. Switch off rocker switch **(1)** – switch position **0**.
 - Vacuum pump switched off.
5. Disconnect the vacuum pump from the apparatus.
6. Check the vacuum pump for possible damage and contamination.

5.4 Shutdown (storage)

Take the vacuum pump out of operation

- Shutdown
1. Carry out the steps for switch off, → see *chapter: 5.3 Switch off on page 46*.
 2. Flush the pump with dry nitrogen.
Connect dry nitrogen (max. 1,2 bar / 900 Torr absolute) to the pump inlet or to the gas ballast and operate the pump briefly (for approximately 1 minute).
 3. Carry out oil change to protect the pump, → see *chapter: 7.3 Oil change on page 56*.

4. Fill the pump completely with new oil (more than mark "max.") for corrosion protection.
Attention: Before restarting the pump, drain oil to the maximum oil level (mark "max.").
5. Close the manual gas ballast valve.
6. Clean the vacuum pump in the event of external contamination.
7. Close the vacuum pump's inlet and outlet, e.g., with the transport caps.
8. Package the vacuum pump such that it is protected from dust; enclose desiccants if necessary.
9. Store the vacuum pump in a cool, dry location.

IMPORTANT!

If damaged parts are stored for operational reasons, these should be clearly identified as **not ready for use**.

Carry out oil change and, if necessary, maintenance prior to use if the pump has been stored for longer than one year.

6 Troubleshooting

6.1 Technical support

⇒ To identify errors and potential remedies, please refer to the troubleshooting table

Error – Cause – Remedy.

For technical assistance or errors for which you require additional support, please contact your local distributor or our [Service Department](#)¹.



Only operate the product if it is in perfect working condition.

- ⇒ Perform the recommended service activities, → see ***chapter: 7.1 Information on maintenance work on page 54***, and ensure that the product is in good working order.
- ⇒ Send defective products to our Service Department or your local distributor for repair!

¹ -> Phone: +49 9342 808-5660, fax: +49 9342 808-5555, service@vacuubrand.com

6.2 Error – Cause – Remedy

Error – Cause –
Remedy

Error	▶ Possible cause	✓ Remedy	Personnel
Pump does not start.	▶ Electrical power cord not plugged in.	✓ Plug in power cord.	Operator
	▶ Supply voltage does not correspond with the pump.	✓ Connect pump to a suitable supply voltage. ✓ In case check setting of the voltage selection switch.	Operator
	▶ Electrical supply failure.	✓ Check fuse.	Specialist
	▶ Device fuse defective (only pump with switchable dual-voltage motor).	✓ Replace device fuse.	Specialist
	▶ Oil temperature below 54 °F (+12 °C).	✓ Operate the pump in suitable ambient conditions.	Operator
	▶ Pump unit contaminated.	✓ Perform maintenance or clean the pump unit.	Resp. specialist
	▶ Motor thermally overloaded.	✓ Switch off pump, allow motor to cool down (< 122 °F (50 °C), provide sufficient ventilation.	Specialist
	▶ Overpressure in outlet line.	✓ Open outlet line.	Operator
	▶ Oil mist filter (optional) clogged/overfilled, filter element in contact with oil.	✓ Drain oil mist filter, replace filter element if necessary.	Specialist

Error – Cause –
Remedy

Error	▶ Possible cause	✓ Remedy	Personnel
Pump does not achieve its ultimate vacuum or usual pumping speed.	▶ Measuring procedure or vacuum gauge not suitable.	✓ Choose a suitable measuring procedure or vacuum gauge.	Operator
	▶ Inlet blocked.	✓ Ensure that the inlet line does not become blocked.	Operator
	▶ Centering ring not correctly positioned.	✓ Check small flange connections.	Operator
	▶ Long, narrow vacuum line.	✓ Use lines with larger cross-section.	Operator
	▶ Not enough oil.	✓ Top up oil to correct level.	Specialist
	▶ Oil contaminated (also with solvents).	✓ Change oil and flush with oil.	Specialist
	▶ Outgassing substances or vapor generated in the process.	✓ Check process parameters.	Operator
	▶ Pump has not yet reached its operating temperature.	✓ Allow the pump to reach its operating temperature.	Operator
	▶ None of the above mentioned causes.	✓ Send in vacuum pump.	Resp. specialist
Pump too noisy or strange noise.	▶ Too much oil.	✓ Lower oil level to mark "max.".	Specialist
	▶ Loud exhaust noise.	✓ Connect an outlet line.	Operator
		✓ Assemble an oil mist filter.	Specialist
▶ None of the above mentioned causes.	✓ Send in vacuum pump.	Resp. specialist	
Oil in the inlet line.	▶ Back diffusion (small amount of oil, oil film).	✓ Install a sorption trap or a separator, if necessary.	Specialist
	▶ Back streaming (large amount of oil).	✓ Send in vacuum pump.	Resp. specialist
Oil leakage.	▶ Oil spilled.	✓ Absorb the oil and dispose of according to regulations.	Specialist
	▶ None of the above mentioned causes.	✓ Send in vacuum pump.	Resp. specialist

Error – Cause –
Remedy

Error	▶ Possible cause	✓ Remedy	Personnel
High oil consumption.	▶ High inlet pressure.	✓ Normal. Top up oil whenever necessary. Install oil mist filter at outlet.	Specialist
	▶ Operation with gas ballast.	✓ Top up oil whenever necessary. Install oil mist filter at outlet.	Specialist
	▶ Oil level too high.	✓ Lower oil level to mark "max.".	Specialist
Fast aging of the oil.	▶ Pumping aggressive gases.	✓ Use suitable oil.	Specialist
	▶ Condensation in the pump.	✓ Use separator or cold trap.	Specialist

7 Cleaning and maintenance

	WARNING
	<p>Danger due to electrical voltage.</p> <ul style="list-style-type: none"> ⇒ Switch the product off before cleaning or maintenance work. ⇒ Unplug the power plug from the socket and afterwards wait 5 seconds for the capacitors to discharge.
	<p>Risk from contaminated parts.</p> <p>Pumping hazardous media can result in hazardous substances adhering to internal parts of the pump.</p> <ul style="list-style-type: none"> ⇒ Wear your personal protective equipment, e.g., protective gloves, eye protection and, if necessary, respiratory protection. ⇒ Take safety precautions according to your instructions for handling hazardous substances.

NOTE

Damage possible if work is performed incorrectly.

- ⇒ Have maintenance work performed by a trained specialist or at least by a trained person.
- ⇒ Recommendation: Before carrying out maintenance work for the first time, please read through all the instructions to get an overview of the required service work.
- ⇒ A service manual (available in English and German only) with exploded view drawings, spare parts list and directions for repair is available on request. The service manual is intended for trained service people only.

7.1 Information on maintenance work

Motor bearings have a typical durability of 40000 operating hours. Motor capacitors have a typical durability in the range of 10000 to 40000 operating hours depending strongly on operation conditions including ambient temperature, humidity or load.

Check motor capacitors

	WARNING
	<p>Overaged motor capacitors may get hot, melt or emit a darting flame.</p> <p>An overaged capacitor may get hot or even melt. Rarely it may emit a darting flame which could be dangerous for personnel and equipment in the vicinity.</p> <ul style="list-style-type: none"> ⇒ Check the capacitors in the terminal box of the vacuum pump regularly. ⇒ Measure the capacity of the capacitors and estimate their operating hours. ⇒ Replace overaged capacitors. The capacitors have to be replaced by an qualified electrician.

Recommended maintenance activities

Maintenance intervals	
Clean surfaces	if required
Clean fan grill	if required
▶ Oil change	if required
▶ Replace motor capacitors	after 10000 – 40000 operating hours or in case of decreasing capacity

Recommended aids

→ Example
Recommended aids



No.	Item
1	Slotted screwdriver (replacing the device fuse)
2	Allen key size 6 (oil change)
3	Safety goggles
4	Protective gloves
5	Receptacle for oil (oil change)
6	Funnel (oil change)

IMPORTANT!

⇒ Always wear your personal protective equipment when performing activities which may bring you into contact with hazardous substances.

7.2 Cleaning

This chapter does not contain descriptions for decontamination of the product. This chapter describes simple measures for cleaning and care.

⇒ Switch off vacuum pump before cleaning.

Clean surfaces



⇒ Clean dirty surfaces with a clean, slightly damp cloth. We recommend using water or mild soapy water to moisten the cloth.

Clean the fan grille

⇒ Clean dirty fan grilles, for example with a vacuum cleaner.

7.3 Oil change

Oil change



 	DANGER
	<p>Contamination of vacuum pump and pump oil with dangerous substances</p> <p>The vacuum pump and the pump oil might be contaminated with noxious or otherwise dangerous substances and chemicals that have been pumped during operation.</p> <ul style="list-style-type: none"> ⇒ Decontaminate or clean the vacuum pump before coming in contact. ⇒ Wear your personal protective equipment. ⇒ Avoid skin contact with contaminated parts and inhalation of vapors.

	CAUTION
	<p>Possible damage due to lubricants, pump fluids, and solvents.</p> <p>Lubricants (e. g., pump oil), pump fluids, and solvents may damage personnel and environment.</p> <ul style="list-style-type: none"> ⇒ Avoid skin contact. ⇒ Avoid inhalation of vapors. ⇒ Wear your personal protective equipment. ⇒ Comply with all relevant statutory requirements and regulations concerning the handling, storage and disposal of oil. ⇒ Take into account possible contaminations with pumped media when disposing of used oil. ⇒ Oil may drip. Use a suitable pad. ⇒ Use suitable receptacle when draining the pump oil.

	CAUTION
	<p>Risk of scalding due to hot oil.</p> <p>The pump oil inside the oil reservoir of the vacuum pump heats up due to operation.</p> <ul style="list-style-type: none"> ⇒ Wear your personal protective equipment. ⇒ Avoid direct contact with the oil.

Pump oil ages. Carry out an oil change, if one of the following points applies:

- the pump oil is of darker color compared to new oil,
- the pump oil is considerably discolored compared to new oil,
- the pump oil has a strange odor,
- there are particles in the oil.

Oil change interval

The oil change interval depends on of the individual application:

- Check oil level every time before starting the pump.
- Under normal operating conditions we recommend a yearly oil change.
- Especially if corrosive gases or vapors have been pumped, it may be appropriate to check the oil frequently and according to the users' experience and to carry out an oil change, if necessary.

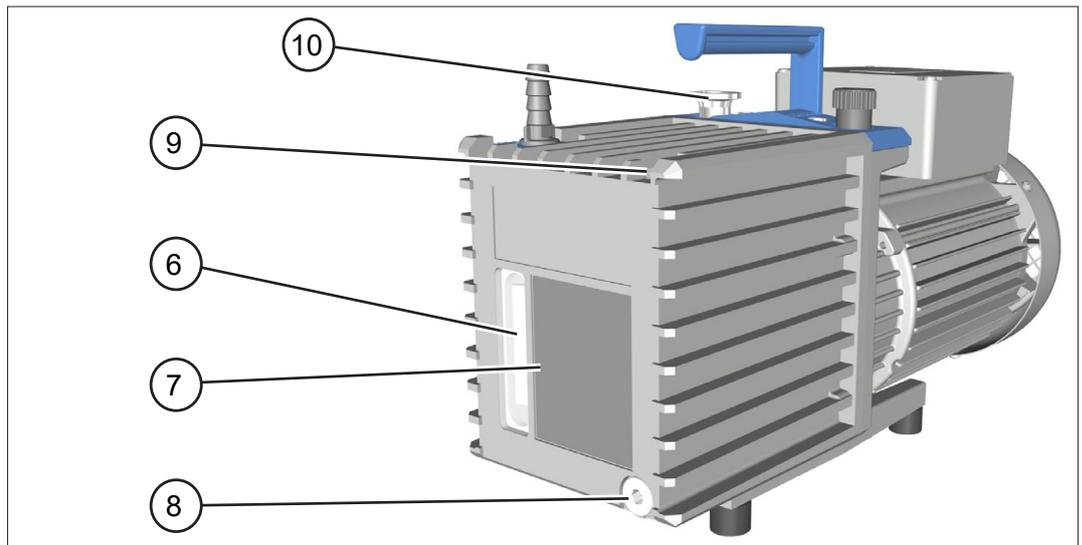
Oil change procedure

Oil change procedure

⇒ We recommend a temperature of the vacuum pump in the range from 12 to 40 °C (54 to 104 °F) for the oil change procedure. The viscosity of a cold pump's oil is increased making the oil change more difficult.



1. Switch off the pump and unplug the power plug from the socket. Ensure that the pump cannot be operated accidentally if parts of the pump are disassembled.
2. Disconnect the vacuum pump from the apparatus.
3. Ventilate the pump.
4. Allow the pump to cool down, if necessary.



5. Place a suitable receptacle beneath the oil outlet (8). In case, use a funnel.
6. Remove the oil drain plug (8) below the rating plate, paying attention to the O-ring; Allen key size 6.
7. Tilt the pump slightly and catch the oil in the receptacle.
8. Screw in oil drain plug (8) with O-ring; Allen key size 6.
9. Pour in approx. 0.05 quarts (50 ml) of fresh oil through the pump inlet (10). In case, use a funnel and remove any assembled separators (optional) at the inlet beforehand.
10. Operate the pump briefly (for approximately 1 minute).
11. Drain flushing oil and repeat flushing procedure, if necessary, until all contaminations are flushed out.
12. Remove the oil inlet plug (9), paying attention to the O-ring; Allen key size 6.
13. Fill in fresh oil through the oil inlet port until the oil level reaches the mark "max." (7). In case, use a funnel. Observe the oil level through the sight glass (6). Do not overfill!
14. Screw in oil inlet plug (9) with O-ring; Allen key size 6.

Notes on pump oils

Pump oils The **standard oil** for rotary vane pumps is the **B-oil for rotary vane pumps**. This is a mineral oil, which is used for the first filling of the pump.

The advantages of the B-oil are:

- flat viscosity curve,
- low vapor pressure,
- good chemical resistance,
- extended stability when pumping oxidants, acid or basic vapors compared to conventional mineral oils.

Certain pumped media may attack the standard oil in the pump. Special oils can be used preventively. It is at the users' responsibility to check if the materials of the wetted parts are resistant against the pumped substances. This is also mandatory if special oils are used.

Special oils

Use of synthetic oils, e. g., perfluoropolyether oil

Synthetic oil (perfluoropolyether oil, e. g., Fomblin®*)

Synthetic oils have an excellent chemical resistance and are certified for pumping pure oxygen. Therefore these oils are excellent for handling strong oxidants, e. g., halogens, nitrogen oxides, etc..

* reg. trade mark Montedison

NOTE

Damage of the vacuum pump due to formation of an emulsion.

- ⇒ Perfluoropolyether oils mixed with mineral oils result in an emulsion.
- ⇒ Pumps to be filled with perfluoropolyether oil must be diligently cleaned and must be absolutely free of any residues of mineral oils.

Due to a different viscosity or density compared to the standard oil, pumps filled with special oil may not achieve the specified ultimate pressure. The high viscosity and the high density of the perfluoropolyether oil make rotary vane pumps with this oil difficult to start at temperatures below 64 °F (18 °C).

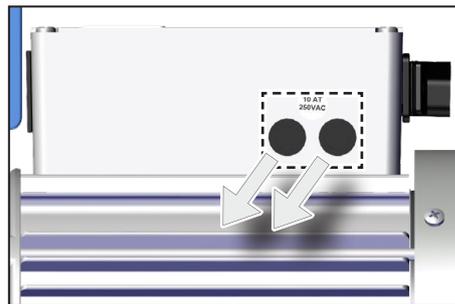
7.4 Replacing the device fuses

Vacuum pumps with switchable dual-voltage motor have two device fuses. Vacuum pumps in 230 V – version have no device fuse. The device fuses are located laterally at the terminal box, Type: 250 VAC / 10 AT – 5x20.

	DANGER
	<p>Danger due to electrical voltage. The vacuum pump has two fuses (double pole / neutral fusing) and might be energized, even when one fuse has blown or has been removed.</p> <p>⇒ Switch off the vacuum pump. ⇒ Unplug the power plug from the socket, before unscrewing the fuse holder.</p>

Replacing the device fuse

Replacing the device fuse



1. Identify and eliminate the cause of failure before switching on the pump again.
2. Unscrew the fuse holder at the terminal box of the pump using a slotted screwdriver.
3. Replace the defective fuse by a fuse of the same type → see *chapter: 8.1 Technical data on page 61*.
4. Reassemble the holder with fuse to the pump; slotted screwdriver.

8 Appendix

8.1 Technical data

Product names	Rotary vane pump series	
	RE 2.5	RZ 2.5
	RE 6	RZ 6

Ambient conditions

Technical data			(US)
	Max. ambient temperature during operation	12 – 40 °C	54 – 104 °F
	Storage/transport temperature	-10 – 60 °C	14 – 140 °F
	Max. altitude	2000 m above sea level	6562 ft above sea level
	Relative humidity	30 – 85 %, non-condensing	
	Pollution degree	2	
	Protection class (IEC 60529)	IP 40	
	Protection class (UL 50E)	type 1	

Operating conditions

		(US)
Maximum admissible media temperature (gas), non-explosive atmospheres:		
Short term (< 5 minutes), Inlet pressure < 100 mbar/75 Torr (low gas load)	-10 – 80 °C	14 – 176 °F
Continuous operation, inlet pressure < 100 mbar/75 Torr (low gas load)	0 – 60 °C	32 – 140 °F
Continuous operation, inlet pressure > 100 mbar/75 Torr (high gas load)	10 – 40 °C	50 – 104 °F

Connections

Vacuum connection IN (inlet)	Small flange KF DN 16 ¹
Exhaust connection OUT (outlet)	Hose nozzle DN 10 mm
Cold-device plug	+ power connection CEE, CH, CN, UK, IN, US

1 Version with switchable dual-voltage motor: additional adapter small flange KF DN 16 to hose nozzle DN 10 mm (material: PP)

Electrical data

Observe specifications of rating plate

Voltage version 230 V	
Overvoltage category	II
Motor protection	Self-hold thermal cutout, manual reset ²
Rated voltage	230 V ±10 %
Power frequency	50 / 60 Hz
No-load speed	1500 / 1800 min ⁻¹
Rated motor power Rx 2.5	0.1 kW
Rated motor power Rx 6 ³	0.18 kW
Rated current ⁴ Rx 2.5	1.1 / 1.3 A (50 / 60 Hz)
Rated current ⁴ Rx 6	1.3 / 1.5 A (50 / 60 Hz)

Observe specifications of rating plate

Voltage version 100 – 120 V / 220 – 230 V		(US)
Overvoltage category	II	
Motor protection	Self-hold thermal cutout, manual reset ²	
Rated voltage	220 – 230 V ±10 %	100 – 115 V ±10 % / 120 V ±10 %
Power frequency	50 / 60 Hz	50 / 60 Hz / 60 Hz
No-load speed	1500 / 1800 min ⁻¹	1500 / 1800 rpm 1800 rpm
Device fuse, slow blow fuse	2 x 10 AT 250 VAC, 5 x 20 mm breaking capacity: 1000 A at 250 VAC	
Rated motor power Rx 2.5	0.1 kW	0.13 hp
Rated motor power Rx 6 ³	0.18 kW	0.24 hp
Rated current ⁴ Rx 2.5	2.8 / 3.0 A (100 – 115 V 50 / 60 Hz) 3.0 A (120 V 60 Hz) 1.5 / 1.7 A (220 – 230 V 50 / 60 Hz)	
Rated current ⁴ Rx 6	3.5 / 3.6 A (100 – 115 V 50 / 60 Hz) 3.6 A (120 V 60 Hz) 1.6 / 1.8 A (220 – 230 V 50 / 60 Hz)	

² In case of supply voltage below 115 V, the lock of the cutout might be restricted.

³ Visit our website for information on the subject **Regulation on ecodesign for electric motors (EU) 2019/1781, 2021/341**: <https://www.vacuubrand.com/ie2>

⁴ When the pump is starting, the current draw might for a short period, depending on the ambient temperature, be two or three times as high as during operation.

Technical data

Vacuum data

Max. pumping speed 50 / 60 Hz		(US)
Rx 2.5	2.3 / 2.8 m ³ /h	1.4 / 1.7 cfm
Rx 6	5.7 / 6.8 m ³ /h	3.4 / 4.0 cfm
Ultimate partial pressure without gas ballast		
RE 2.5	3*10 ⁻¹ mbar	2.3*10 ⁻¹ Torr
RZ 2.5	4*10 ⁻⁴ mbar	3*10 ⁻⁴ Torr
RE 6	1*10 ⁻¹ mbar	7.5*10 ⁻² Torr
RZ 6	4*10 ⁻⁴ mbar	3*10 ⁻⁴ Torr
Ultimate total pressure without gas ballast		
RE 2.5	3*10 ⁻¹ mbar	2.3*10 ⁻¹ Torr
RZ 2.5	2*10 ⁻³ mbar	1.5*10 ⁻³ Torr
RE 6	1*10 ⁻¹ mbar	7.5*10 ⁻² Torr
RZ 6	2*10 ⁻³ mbar	1.5*10 ⁻³ Torr
Ultimate total pressure with gas ballast		
RE 2.5	8*10 ⁻¹ mbar	6*10 ⁻¹ Torr
RZ 2.5	1*10 ⁻² mbar	7.5*10 ⁻³ Torr
RE 6	6*10 ⁻¹ mbar	4.5*10 ⁻¹ Torr
RZ 6	1*10 ⁻² mbar	7.5*10 ⁻³ Torr
Max. permissible inlet pressure, absolute	1.1 bar	16 psi
Max. permissible outlet pressure, absolute	1.1 bar	16 psi
Max. permissible pressure difference between inlet and outlet	1.1 bar	16 psi
Max. permissible pressure at gas ballast valve, absolute	1.2 bar	17.5 psi

Mechanical data

Dimensions (L x W x H), approx.		(US)
Rx 2.5 (230 V)	389 mm x 156 mm x 240 mm	15.3 in x 6.1 in x 9.4 in
Rx 2.5 (100 – 120 V / 220 – 230 V)	389 mm x 156 mm x 240 mm	15.3 in x 6.1 in x 9.4 in
Rx 6 (230 V)	420 mm x 156 mm x 240 mm	16.5 in x 6.1 in x 9.4 in
Rx 6 (100 – 120 V / 220 – 230 V)	420 mm x 156 mm x 240 mm	16.5 in x 6.1 in x 9.4 in

Technical data

Weight with oil filling, approx.		(US)
RE 2.5 (230 V)	12.8 kg	28.2 lbs.
RE 2.5 (100 – 120 V / 220 – 230 V)	13.5 kg	29.8 lbs.
RZ 2.5 (230 V)	14.2 kg	31.3 lbs.
RZ 2.5 (100 – 120 V / 220 – 230 V)	14.7 kg	32.4 lbs.
RE 6 (230 V)	15.7 kg	34.6 lbs.
RE 6 (100 – 120 V / 220 – 230 V)	15.8 kg	34.8 lbs.
RZ 6 (230 V)	17.0 kg	37.5 lbs.
RZ 6 (100 – 120 V / 220 – 230 V)	17.0 kg	37.5 lbs.

Other specifications

		(US)
Water vapor tolerance		
Rx 2.5	–	–
Rx 6	40 mbar	30 Torr
Recommended oil		B-oil for rotary vane pumps
Oil capacity min. / max.		.
RE 2.5	400 / 1000 ml	0.42 / 1.06 quarts
RZ 2.5	360 / 840 ml	0.38 / 0.89 quarts
RE 6	360 / 930 ml	0.38 / 0.98 quarts
RZ 6	340 / 730 ml	0.36 / 0.77 quarts
A-weighted emission sound pressure level ⁵ (uncertainty K_{pA} : 3 dB(A))		
Rx 2.5	48 dB(A)	
Rx 6	50 dB(A)	

5 Measurement according to DIN EN ISO 2151:2009 and EN ISO 3744:1995 at ultimate vacuum with outlet line at outlet connection

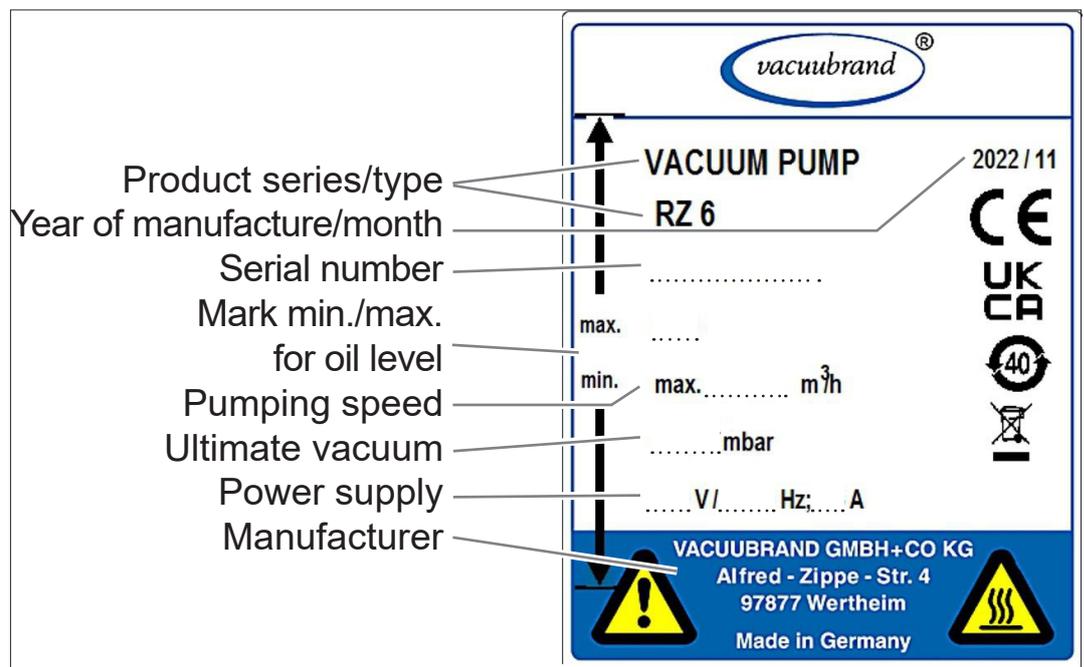
8.2 Rating plate



- ⇒ In the event of an error, make a note of the type and serial number on the rating plate.
- ⇒ When contacting our Service Department, please provide the type and serial number from the rating plate. This will allow us to provide you with specific support and advice for your device.

Vacuum pump rating plate

→ Example
Vacuum pump rating
plate



8.3 Wetted materials

Wetted materials

Component	Wetted materials
Metal parts	aluminum alloy, stainless steel, gray cast iron, steel (partly plasma nitrated), nickel-plated, zincked
Plastic materials	epoxy resin, FKM, NBR, PBT, PEEK, PPS glass-fiber reinforced

8.4 Ordering information

Ordering information
for accessories

Accessories	Order no.
Separator AK at the inlet for Rx 2.5	20698000
Separator AK at the inlet for Rx 6	20698006
Separator AK at the inlet for Rx 9	20698007
Oil mist separator FO at the outlet for Rx 2.5 / Rx 6	20698003
Oil mist separator FO at the outlet for Rx 9	20698017
Butterfly valve VS 16 for Rx 2.5 / Rx 6	20665004
Butterfly valve VS 25 for Rx 9	20665005
Diaphragm valve VM 16 for Rx 2.5 / Rx 6	20664010
Diaphragm valve VM 25 for Rx 9	20664011
Gas ballast adapter, connection KF DN 16, stainless steel	20636193
Solenoid operated gas ballast valve VB M-B KF DN 16 for Rx 2.5 / Rx 6 / Rx 9	20674217
Oil return kit for pumps with oil mist separator for Rx 2.5 / Rx 6 / Rx 9	20698048
Vacuum gauge DCP 3000 with gauge head VSP 3000 (Pirani); 1100 – 0,001 mbar, 100 – 230 V / 50 – 60 Hz	20683190
Vacuum gauge VACUU·VIEW extended, $1 \cdot 10^3 - 1 \cdot 10^{-3}$ mbar, 100 – 230 V / 50 – 60 Hz	20683210
Hose nozzle for hoses with inner diameter 3/8" (10 mm), aluminum, DN 10, for inlet Rx 2.5 / Rx 6	20662511
Hose nipple for hoses DN 19, aluminum, for Rx 2.5 / Rx 6	20662531
Vacuum hose (rubber, DN 10)	20686002
Vacuum hose (rubber, DN 20)	20686005
Metal hose KF DN 16, 250 mm	20673306
Metal hose KF DN 16, 500 mm	20673316
Metal hose KF DN 16, 750 mm	20673326
Metal hose KF DN 16, 1000 mm	20673336
Metal hose KF DN 25, 250 mm	20673307
Metal hose KF DN 25, 500 mm	20673317
Metal hose KF DN 25, 750 mm	20673327
Metal hose KF DN 25, 1000 mm	20673337
PVC hose with internal spiral, KF DN 16, 500 mm	20686010
PVC hose with internal spiral, KF DN 16, 1000 mm	20686020
PVC hose with internal spiral, KF DN 25, 500 mm	20686011
PVC hose with internal spiral, KF DN 25, 1000 mm	20686021
PTFE vacuum hose (antistatic), with stainless steel small flanges. PTFE hose with smooth inner side*. KF DN 16, 500 mm	20686030

PTFE vacuum hose (antistatic), with stainless steel small flanges. PTFE hose with smooth inner side*. KF DN 16, 1000 mm		20686031
PTFE vacuum hose (antistatic), with stainless steel small flanges. PTFE hose with smooth inner side*. KF DN 25, 500 mm		20686032
PTFE vacuum hose (antistatic), with stainless steel small flanges. PTFE hose with smooth inner side*. KF DN 25, 1000 mm		20686033
Power cord	CEE	20612058
	CH	20676021
	CN	20635997
	IN	20635365
	UK	20676020
	US	20612065

* For increased chemical resistance, reduced deposits, and high conductance.

Ordering information
for pump oil

Pump oils	Order no.
B-oil for rotary vane pumps, 1 liter	20687010
B-oil for rotary vane pumps, 5 liter	20687011
B-oil for rotary vane pumps, 20 liter	20687012
B-oil for rotary vane pumps, 200 liter	20687013
Perfluoropolyether oil, 500 ml	20687610

NOTE

Damage of the vacuum pump due to formation of an emulsion.

- ⇒ Perfluoropolyether oils mixed with mineral oils result in an emulsion.
- ⇒ Pumps to be filled with perfluoropolyether oil must be diligently cleaned and must be absolutely free of any residues of mineral oils.

Sources of supply

Purchase original accessories and original spare parts from a subsidiary of **VACUUBRAND GMBH + CO KG** or your local distributor or from the [VACUUBRAND Online-Shop](#).



Information about our complete product range is available in the current [product catalog](#).

⇒ Your local distributor or VACUUBRAND GMBH + CO KG [sales office](#) is available to assist you with orders, questions on vacuum control and optimal accessories.

Service

Take advantage of the comprehensive range of services available from **VACUUBRAND GMBH + CO K**

Service offer and
service range

Services in detail

- product consultation and practical solutions
 - fast delivery of spare parts and accessories
 - professional maintenance
 - immediate repairs processing
 - on-site service (on request)
 - with [Health and Safety Clearance](#): return, disposal
- ⇒ Visit our website for further information www.vacuubrand.com.

Service handling

⇒ Follow these headings: VACUUBRAND > Support > [Service](#)

Meet
terms of service



Reduce downtime, speed up processing. Please have the required data and documents at hand when contacting our Service Department.

- ▶ Your order can be quickly and easily processed.
- ▶ Hazards can be prevented.
- ▶ A brief description and/or photos will help locate the source of the error.

8.5 Index

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8.6 EC Declaration of conformity

EC Declaration of
conformity

EG-Konformitätserklärung für Maschinen
EC Declaration of Conformity of the Machinery
Déclaration CE de conformité des machines



Hersteller / Manufacturer / Fabricant:

VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hiermit erklärt der Hersteller, dass das Gerät konform ist mit den Bestimmungen der Richtlinien:

Hereby the manufacturer declares that the device is in conformity with the directives:

Par la présente, le fabricant déclare, que le dispositif est conforme aux directives:

- 2006/42/EG
- 2011/65/EU, 2015/863

Drehschieberpumpe / Rotary vane pump / Pompe à palettes

Typ / Type / Type: RE 2.5 / RZ 2.5 / RE 6 / RZ 6

Artikelnummer / Order number / Numéro d'article: 20797150, 20797151, 20797152, 20797156 / 20798024,
 20798029, 20798058, 20798120, 20798121, 20798122,
 20798126, 20798127 / 20797160, 20797161, 20797162,
 20797166 / 20798009, 20798039, 20798059, 20798130,
 20798131, 20798132, 20798136, 20798138

Seriennummer / Serial number / Numéro de série: Siehe Typenschild / See rating plate / Voir plaque signalétique

Angewandte harmonisierte Normen / Harmonized standards applied / Normes harmonisées utilisées:

DIN EN ISO 12100:2011, DIN EN 1012-2:2011, DIN EN 61010-1:2020,

IEC 61010-1:2010 + COR:2011 + A1:2016, modifiziert / modified / modifié + A1:2016/COR1:2019

DIN EN IEC 63000:2019

Bevollmächtigter für die Zusammenstellung der technischen Unterlagen / Person authorised to compile the
 technical file / Personne autorisée à constituer le dossier technique:

Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Ort, Datum / place, date / lieu, date: Wertheim, 20.03.2023

(Dr. Constantin Schöler)

Geschäftsführer / Managing Director / Gérant

ppa.

(Jens Kaibel)

Technischer Leiter / Technical Director /
 Directeur technique

VACUUBRAND GMBH + CO KG

Alfred-Zippe-Str. 4
 97877 Wertheim

Tel.: +49 9342 808-0

Fax: +49 9342 808-5555

E-Mail: info@vacuubrand.com

Web: www.vacuubrand.com

VACUUBRAND®

8.7 UKCA Declaration of conformity

UKCA Declaration of
Conformity

Declaration of Conformity



Manufacturer:

VACUUBRAND GMBH + CO KG · Alfred-Zippe-Str. 4 · 97877 Wertheim · Germany

Hereby the manufacturer declares that the device is in conformity with the directives:

- Supply of Machinery (Safety) Regulations 2008
(S.I. 2008 No. 1597, as amended by S.I. 2019 No. 696)
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012 No. 3032)

Rotary vane pump

Type: RE 2.5 / RZ 2.5 / RE 6 / RZ 6

Order number: 20797150, 20797151, 20797152, 20797156 / 20798024, 20798029, 20798058, 20798120, 20798121, 20798122, 20798126, 20798127 / 20797160, 20797161, 20797162, 20797166 / 20798009, 20798039, 20798059, 20798130, 20798131, 20798132, 20798136, 20798138

Serial number: See rating plate

Designated standards applied:

EN ISO 12100:2010, EN 1012-2:1996+A1:2009, EN 61010-1:2010+A1:2019, EN 61010-1:2010/A1:2019/AC:2019-04
EN IEC 63000:2018

Person authorised to compile the technical file:

Dr. Constantin Schöler · VACUUBRAND GMBH + CO KG · Germany

Place, date: Wertheim, 20.03.2023

(Dr. Constantin Schöler)

Managing Director

ppa.

(Jens Kaibel)

Technical Director

VACUUBRAND GMBH + CO KG

Alfred-Zippe-Str. 4
97877 Wertheim

Tel.: +49 9342 808-0
Fax: +49 9342 808-5555
E-Mail: info@vacuubrand.com
Web: www.vacuubrand.com

VACUUBRAND®

8.8 CU Certificate

CU Certificate

<h1>Certificate</h1>								
Certificate no.		CU 72239041 02						
License Holder: VACUUBRAND GMBH + CO KG Alfred-Zippe-Str. 4 97877 Wertheim Deutschland		Manufacturing Plant: VACUUBRAND GMBH + CO KG Alfred-Zippe-Str. 4 97877 Wertheim Deutschland						
Test report no.:	USA- 31984170 002	Client Reference: Dr. Madlen Meinert						
Tested to:	UL 61010-1:2012 R7.19 CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1							
Certified Product: Rotary vane pump		License Fee - Units						
cont. Types: Same types as page 1 with different motors/ratings Ratings: (RE 2.5/RZ 2.5) <table style="margin-left: 20px;"> <tr> <td>100 - 115V AC; 50/60Hz; 3.0A</td> </tr> <tr> <td>120V AC; 60Hz; 3.0A</td> </tr> <tr> <td>220 - 230V AC; 50/60Hz; 1.7A</td> </tr> <tr> <td>(RE 6/RZ 6/RE 6W) 100 - 115V AC; 50/60Hz; 3.6A</td> </tr> <tr> <td>120V AC, 60Hz; 3.6A</td> </tr> <tr> <td>220 - 230V AC; 50/60Hz; 1.8A</td> </tr> </table>			100 - 115V AC; 50/60Hz; 3.0A	120V AC; 60Hz; 3.0A	220 - 230V AC; 50/60Hz; 1.7A	(RE 6/RZ 6/RE 6W) 100 - 115V AC; 50/60Hz; 3.6A	120V AC, 60Hz; 3.6A	220 - 230V AC; 50/60Hz; 1.8A
100 - 115V AC; 50/60Hz; 3.0A								
120V AC; 60Hz; 3.0A								
220 - 230V AC; 50/60Hz; 1.7A								
(RE 6/RZ 6/RE 6W) 100 - 115V AC; 50/60Hz; 3.6A								
120V AC, 60Hz; 3.6A								
220 - 230V AC; 50/60Hz; 1.8A								
Protection Class:	I							
Remark:	Access to device should be avoided in end installation (hot surfaces)							
Licensed Test mark:		Date of Issue (day/mo/yr) 22/05/2023						
c u s	<small>TUV Rheinland of North America, Inc., 12 Commerce Road, Newtown, CT 06470, Tel (203) 426-0888 Fax (203) 426-4009</small>							

8.9 Declaration of conformity – China RoHS 2

VACUUBRAND®

DECLARATION OF CONFORMITY – China RoHS 2

VACUUBRAND GMBH + CO KG has made reasonable efforts to ensure that hazardous materials and substances may not be used in its products.

In order to determine the concentration of hazardous substances in all homogeneous materials of the subassemblies, a “Product Conformity Assessment” (PCA) procedure was performed. As defined in GB/T 26572 the “Maximum Concentration Value” limits (MCV) apply to these restricted substances:

- Lead (Pb): 0.1%
- Mercury (Hg): 0.1%
- Cadmium (Cd): 0.01%
- Hexavalent chromium (Cr(+VI)): 0.1%
- Polybrominated biphenyls (PBB): 0.1%
- Polybrominated diphenyl ether (PBDE): 0.1%

Environmentally Friendly Use Period (EFUP)

EFUP defines the period in years during which the hazardous substances contained in electrical and electronic products will not leak or mutate under normal operating conditions. During normal use by the user such electrical and electronic products will not result in serious environmental pollution, cause serious bodily injury or damage to the user’s assets. The Environmentally Friendly Use Period for VACUUBRAND products is 40 years.



MATERIAL CONTENT DECLARATION FOR VACUUBRAND PRODUCTS						
有毒有害物质或元素 Hazardous substances						
部件名称 Part name	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr(+VI)	多溴联苯 PBB	多溴二苯醚 PBDE
包装 Packaging	0	0	0	0	0	0
塑料外壳 / 组件 Plastic housing / parts	0	0	0	0	0	0
真空油 Vacuum oil	0	0	0	0	0	0
电池 Battery	0	0	0	0	0	0
玻璃 Glass	X	0	0	0	0	0
电子电气组件 Electrical and electronic parts	X	0	0	0	0	0
控制器 / 测量设备 Controller / measuring device	X	0	0	0	0	0
金属外壳 / 组件 Metal housing / parts	X	0	0	0	0	0
电机 Motor	X	0	0	0	0	0
配件 Accessories	X	0	0	0	0	0
此表格是按照SJ/T 11364-2014中规定所制定的。 This table is created according to SJ/T 11364-2014.						

Declaration of Conformity – China RoHS 2

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O:	表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
O:	Indicates that the above mentioned hazardous substance contained in all homogeneous materials of the part is below the required limit as defined in GB/T 26572.
X:	表示该有毒有害物质至少在该部件某一均质材料中的含量超出GB/T 26572规定的限量要求。
X:	Indicates that the above mentioned hazardous substance contained in at least one of the homogeneous materials of this part is above the required limit as defined in GB/T 26572.
<p>电池、玻璃器皿和配件可能不属于所附设备所包含的内容，它们可能有各自单独的EFUP标记和/或可能正在维护其部件EFUP标记的更新。</p> <p>Batteries, glassware and accessories might not be content of the enclosed device and may have its own EFUP-marking and/or might be maintaining parts with changing EFUP-marking.</p>	

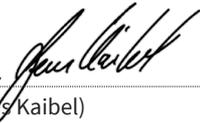
除上表所示信息外，还需声明的是，这些部件并非是有意图用铅 (Pb)、汞 (Hg)、镉 (Cd)、六价铬 (Cr(+VI))、多溴联苯 (PBB) 或多溴二苯醚 (PBDE) 来制造的。
 Apart from the disclosures in the above table, the subassemblies are not intentionally manufactured or formulated with lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr+VI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

Products manufactured by VACUUBRAND may enter into further devices (e.g., rotary evaporator) or can be used together with other appliances (e.g., usage as booster pumps).
 With these products and appliances in particular, please note the EFUP labeled on these products.
 VACUUBRAND will not take responsibility for the EFUP of those products and appliances.

Place, date: Wertheim, 06 September 2022



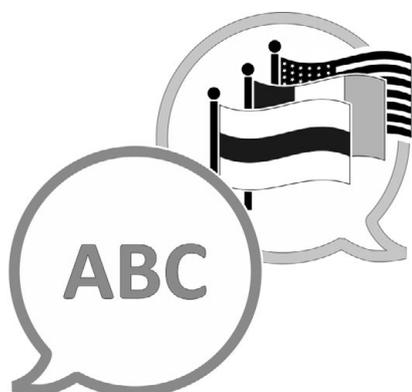
 (Dr. Constantin Schöler)
 Managing Director



 ppa. (Jens Kaibel)
 Technical Director

VACUUBRAND GMBH + CO KG
 Alfred-Zippe-Str. 4
 97877 Wertheim
 Germany

Tel.: +49 9342 808-0
 Fax: +49 9342 808-5555
 E-Mail: info@vacuubrand.com
 Web: www.vacuubrand.com



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Manufacturer:

VACUUBRAND GMBH + CO KG
Alfred-Zippe-Str. 4
97877 Wertheim
GERMANY

Phone:

Head office +49 9342 808-0

Sales +49 9342 808-5550

Service +49 9342 808-5660

Fax: +49 9342 808-5555

Email: info@vacuubrand.com

Web: www.vacuubrand.com