Scan QR-Code for other languages.

OPERATING INSTRUCTIONS

EN

Translation of the Original

HISCROLL 46

Scroll pump with three-phase motor

PFEIFFER VACUUM

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new scroll pump is designed to support you with its performance, perfect operation and without impacting your individual application. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. From this extensive, practical experience we have gained a large volume of information that can contribute to efficient deployment and to your personal safety.

In the knowledge that our product must avoid consuming work output, we trust that our product can offer you a solution that supports you in the effective and trouble-free implementation of your individual application.

Please read these operating instructions before putting your product into operation for the first time. If you have any questions or suggestions, please feel free to contact info@pfeiffer-vacuum.de.

Further operating instructions from Pfeiffer Vacuum can be found in the Download Center on our website.

Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

Copyright

Table of contents

List of tables

List of figures

1 About this manual

IMPORTANT
Read carefully before use.
Keep the manual for future consultation.

1.1 Validity

These operating instructions are a customer document of Pfeiffer Vacuum. The operating instructions describe the functions of the named product and provide the most important information for the safe use of the device. The description is written in accordance with the valid directives. The information in these operating instructions refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

1.1.1 Applicable documents

Document	Number
Declaration of conformity	A component of these instructions

You can find this document in the Pfeiffer Vacuum Download Center.

1.1.2 Variants

- HiScroll 46, scroll pump, three-phase motor
- HiScroll 46, scroll pump, three-phase motor without GB

1.2 Target group

These operating instructions are aimed at all persons performing the following activities on the product:

- Transportation
- Setup (Installation)
- Usage and operation
- Decommissioning
- Maintenance and cleaning
- Storage or disposal

The work described in this document is only permitted to be performed by persons with the appropriate technical qualifications (expert personnel) or who have received the relevant training from Pfeiffer Vacuum.

1.3 Conventions

1.3.1 Pictographs

Pictographs used in the document indicate useful information.

Note

Tip

1.3.2 Instructions in the text

Usage instructions in the document follow a general structure that is complete in itself. The required action is indicated by an individual step or multi-part action steps.

Individual action step

A horizontal, solid triangle indicates the only step in an action.

► This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

1. Step 1
2. Step 2
3. ...

1.3.3 Labels on product

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

	**Rating plate, HiScroll 46** The rating plate is located clearly visible on a longitudinal side of the vacuum pump.
	**Warning hot surface** This label warns of injuries caused by high temperatures as a result of contact without protection during operation.
	**Operating instructions note** This sticker indicates that this operating instructions must be read before performing any tasks.

Tbl. 1: Labels on product

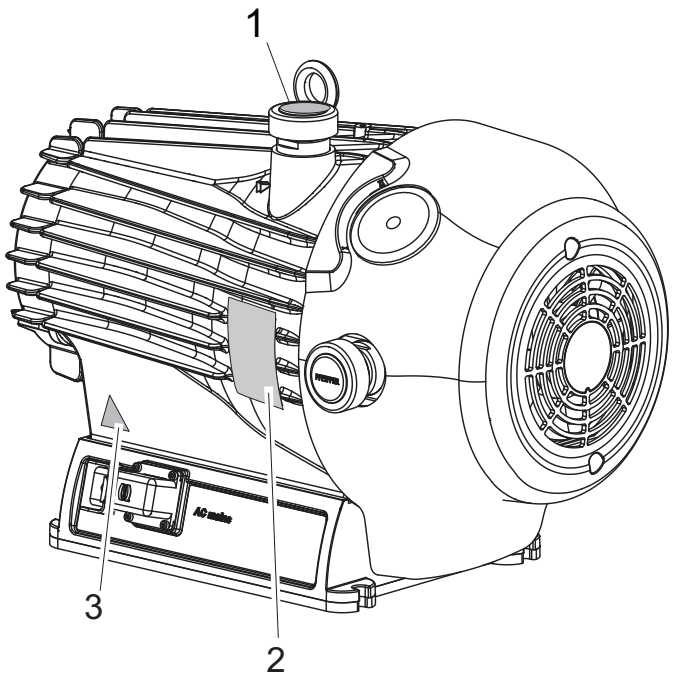


Fig. 1: Position of the labels on the product

1 Note: Read the operating instructions
2 Rating plate
3 Hot surface warning sign

1.3.4 Abbreviations

Abbreviation	Explanation
ATEX	ATmosphères EXplosibles
ATM	Atmospheric pressure
BA	Operating instructions
f	Rotation speed value of a vacuum pump (frequency, in rpm or Hz)
FKM	Fluorinated rubber
GB	Gas ballast
HV	High vacuum
MCB	Miniature circuit breaker
PE	Protective earth (earthed conductor)
PTFE	Polytetrafluoroethylene
RCCB	Residual current operated circuit breaker
RCD	Residual Current Device
SI	Service instructions
3-ph.	Three phase motor
Δ	Delta connection
人	Star circuit (alternative symbol variant: **Y**)

Tbl. 2: Abbreviations used

2 Safety

2.1 General safety information

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

⚠ DANGER

Immediately pending danger

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

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

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

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

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

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

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

► Instructions to avoid damage to property

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

2.2 Safety instructions

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

Risks during transport

⚠ WARNING

Risk of serious injury from swinging, toppling or falling objects

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

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

⚠ CAUTION

Danger of injuries due to improper transport

The fan cover fastener is torn off by improper lifting of the vacuum pump. There is a danger of the vacuum pump falling. Injuries to limbs are the consequence.

- ► Always lift the vacuum pump via the eye bolt with a lifting device.

Risks during installation

⚠ DANGER

Danger to life from electric shock

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

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

⚠ WARNING

Explosion hazard when using accessories outside the limits of use

When using accessories, there is a risk of an ignition source forming that could potentially result in an explosion when pumping explosive gases.

- ► When pumping explosive media, use only accessories that comply with the requirements of Directive 2014/34/EU.

⚠ WARNING

Explosion hazard if particles enter the vacuum connection

During commissioning, there is a risk of foreign particles entering the vacuum chamber, forming a source of ignition, and potentially resulting in an explosion in combination with explosive gases.

- ► Use a suitable protective strainer at the vacuum connection.
- ► Do not remove the strainer until you are sure that no solid particles can enter the vacuum pump.

⚠ WARNING

Explosion hazard if particles enter at the gas ballast valve

When connecting the gas ballast line, there is a risk of foreign particles entering, which may cause an exothermic reaction if the material pairing in the suction chamber is unfavorable.

- ► When connecting the external gas ballast supply, ensure that the gas ballast valve is closed.
- ► Clean the inlet area of the gas ballast valve by activating the gas supply with slight overpressure when the valve is closed.

⚠ WARNING

Risk of injury from reactive, potentially explosive or otherwise hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen may lead to the formation of potentially explosive gas/air mixtures in the vacuum system. Ignition can cause very serious injuries.

- ► Use inert gases only for the supply of ballast gas in order to prevent the formation of a potentially explosive atmosphere.
- ► Ensure a closed inert gas system in order to avoid zone entrainment as a result of process gas entering into the inert gas line.

⚠ WARNING

Risk of fatal injury due to electric shock on account of incorrect installation

The device's power supply uses life-threatening voltages. Unsafe or improper installation can lead to life-threatening situations from electric shocks obtained from working with or on the unit.

- ► Ensure safe integration into an emergency off safety circuit.
- ► Do not carry out your own conversions or modifications on the unit.

⚠ WARNING

Mortal danger from electric shock caused by water damage

The device is not protected against water ingress. Vacuum pumps operated on the floor lead to leakage current in penetrating and surrounding water. There is a danger to life from electric shock when making contact with live water.

- ► In case of water damage, disconnect the complete power supply from the area affected.
- ► Provide an on-site electrical fuse protection (e.g. RCD) in hazardous areas.
- ► When selecting the installation location, observe potential damage from water.

⚠ WARNING

Danger to life from poisoning where toxic process gases leak with no exhaust line

During normal operation, the vacuum pump expels exhaust gases and vapors freely into the air. In processes involving toxic media, there is a risk of injury and danger to life due to poisoning.

- ► Observe the relevant regulations for handling toxic substances.
- ► Safely purge toxic process gases via an exhaust line.

⚠ CAUTION

Danger of cutting injuries when reaching in towards rotating parts

Transport damage to the fan cover of the vacuum pump may expose rotating, sharp edged parts of the fan. Cutting injuries from accidental contact are the result.

- ► Before commissioning, ensure a sound state of your vacuum pump.
- ► Do not put the vacuum pump into operation if there is obvious external damage.

⚠ CAUTION

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

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

- ► Route the exhaust line without shut-off units.
- ► Observe the maximum permissible pressure (see technical data).
- ► Observe the permissible pressures and pressure differentials for the product.
- ► Check the function of the exhaust line on a regular basis.

⚠ CAUTION

Risk of injury from entrapment of body parts

The motor restarts automatically after power failure. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

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

⚠ CAUTION

Danger of burns on hot surfaces

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

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

Risks during operation

⚠ WARNING

Risk of explosion in the medium to be pumped as a result of increased pressure

With installation on the exhaust side, there is a risk of the exhaust pressure of the vacuum pump exceeding the atmospheric conditions. The ignition temperature of the medium to be pumped is lowered in the suction chamber. If the ignition temperature of the medium to be pumped falls below a temperature of T4 = +135°C, there is a risk of explosion, and consequently serious injury.

- ► Ensure that the ignition temperature of the medium to be pumped is maintained above a temperature of +135 °C at 3500 hPa abs.

⚠ WARNING

Risk of injury from reactive, potentially explosive or otherwise hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen may lead to the formation of potentially explosive gas/air mixtures in the vacuum system. Ignition can cause very serious injuries.

- ► Use inert gases only for the supply of ballast gas in order to prevent the formation of a potentially explosive atmosphere.
- ► Ensure a closed inert gas system in order to avoid zone entrainment as a result of process gas entering into the inert gas line.

⚠ WARNING

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

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

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

⚠ WARNING

Risk of poisoning from incorrect use of the gas ballast system

The gas ballast system of the scroll pump is vacuum sealed only when used in valid, snapped positions "0", "1" and "2". When operating the valves in intermediate stages, there is a risk that process media can escape to the environment uncontrolled. When using toxic process media, there is a risk of poisoning.

- ► Change the positions of the valve only for setting the gas ballast stages.
- ► Operate the gas ballast valve only in the snap positions.

⚠ WARNING

Mortal danger from electric shock during operation caused by transport damage

Damage to the transport packaging may favor the ingress of moisture or electrically conductive media into the vacuum pump. Devices connected to the mains may still be live. There is a danger to life from electric shock when making contact with live components.

- ► Before commissioning, convince yourself of the trouble-free state of your vacuum pump.
- ► Pay attention to residues of fluids or condensate.
- ► Do not put the vacuum pump into operation if there is obvious external damage.

⚠ WARNING

Mortal danger from electric shock caused by water damage

The device is not protected against water ingress. Vacuum pumps operated on the floor lead to leakage current in penetrating and surrounding water. There is a danger to life from electric shock when making contact with live water.

- ► In case of water damage, disconnect the complete power supply from the area affected.
- ► Provide an on-site electrical fuse protection (e.g. RCD) in hazardous areas.
- ► When selecting the installation location, observe potential damage from water.

⚠ WARNING

Risk of danger to life through missing mains disconnection device

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

- ► Unplug the mains cable in order to disconnect the mains supply.
- ► Install a residual circuit breaker (RCCB).

⚠ CAUTION

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

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

- ► Route the exhaust line without shut-off units.
- ► Observe the maximum permissible pressure (see technical data).
- ► Observe the permissible pressures and pressure differentials for the product.
- ► Check the function of the exhaust line on a regular basis.

⚠ CAUTION

Risk of injury from burns where hot process gases leak with no exhaust line

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. For processes with high temperatures, there is a risk of burns on hot exhaust gases.

- ► If necessary, safely purge hot process gases via an exhaust line.
- ► Wear personal protective equipment if necessary.

⚠ CAUTION

Risk of injury from entrapment of body parts

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

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

⚠ CAUTION

Danger of injury if hair or loose clothing is pulled in

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

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

⚠ CAUTION

Danger of burns on hot surfaces

In the event of a malfunction, it is possible that the surface temperature of the vacuum pump will rise to more than 105 °C if no motor protection switch is installed.

- ► Use a motor protection switch with the recommended settings.

⚠ CAUTION

Danger of burns on hot surfaces

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

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

Risks during maintenance

⚠ WARNING

Risk of injury from reactive, potentially explosive, or otherwise hazardous gas/air mixtures during maintenance

Uncontrolled leakage of process gases may result in the formation of explosive gas-air mixtures after opening the vacuum pump. Ignition can cause very serious injuries.

- ► Ensure that the suction chamber is sufficiently inert before starting maintenance work.
- ► Ensure a closed inert gas system in order to avoid zone entrainment as a result of process gas escaping.

⚠ WARNING

Danger to life from electric shock during maintenance and service work

There is a danger to life from electric shock when making contact with live components.

- ► Disconnect the vacuum pump safely from the mains.
- ► Wait until the vacuum pump comes to a standstill (rotation speed = 0).

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

⚠ WARNING

Crushing and cutting danger on unprotected parts from unforeseeable automatic run-up during maintenance.

During activities on exposed mechanical components, there is a risk of crushing or cut injuries from sudden run-up.

- ► Switch off the vacuum pump before any maintenance work and work.
- ► Vent the vacuum pump to atmospheric pressure.
- ► Disconnect the vacuum pump safely from the mains.
- ► Secure the vacuum pump against re-start.
- ► Disconnect the mains cable from the vacuum pump.

Risks in the event of malfunctions

⚠ WARNING

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

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

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

⚠ WARNING

Danger to life due to poisoning if hazardous process gases escape in the event of a malfunction

The vacuum pump does not have redundant safety devices. In the event of damage, process gases may escape. There is a risk of injury and death due to poisoning in processes with gases that are hazardous to health

- ► When pumping hazardous process gases, take additional safety precautions in accordance with the applicable legal regulations.
  - – The pumping of hazardous process gases is the responsibility of the operator.
- ► Observe all safety recommendations of the gas manufacturer.

⚠ CAUTION

Danger of burns on hot surfaces

In the event of a malfunction, it is possible that the surface temperature of the vacuum pump will rise to more than 105 °C if no motor protection switch is installed.

- ► Use a motor protection switch with the recommended settings.

2.3 Safety precautions

Duty to provide information on potential dangers

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

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

Infringement of conformity due to modifications to the product

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

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

General safety precautions when handling the product

- ► Observe all applicable safety and accident prevention regulations.
- ► Check that all safety measures are observed at regular intervals.

- ► Do not expose body parts to the vacuum.
- ► Always ensure a secure connection to the earthed conductor (PE).
- ► Never disconnect plug connections during operation.
- ► Observe the above shutdown procedures.
- ► Before working on the vacuum pump, wait until complete standstill (rotation speed f = 0).
- ► Never put the device into operation with the vacuum connection open.
- ► Keep lines and cables away from hot surfaces (> 70°C).
- ► Never fill or operate the unit with cleaning agents or cleaning agent residues.
- ► Do not carry out your own conversions or modifications on the unit.
- ► Observe the unit's protection degree prior to installation or operation in other environments.

2.4 Limits of use of product

Limit value	Parameter
Installation location	Interiors, protected against the accumulation of dust and weather influences, in a non-explosive, dry environment
Air pressure	750 hPa to 1060 hPa
Installation altitude	max. 3000 m
Installation surface flatness	±10°
Rel. air humidity	max. 90%, non-condensing
Recommended continuous inlet pressure, max.	See "Technical data"
Ambient temperature	See "Technical data"
Temperature: Transport	See "Technical data"
Temperature: Storage	See "Technical data"
Protection degree	See "Technical data"
Protection class	I
Overvoltage category	II
Degree of pollution	2

Tbl. 3: Permissible ambient conditions

2.5 Proper use

- ► Use the scroll pump only for generating vacuum.
- ► Use the vacuum pump to convey potentially explosive atmospheres in accordance with the labeling.
- ► Use the scroll pump with an on-site motor protection switch.
- ► Use the scroll pump only in closed indoor areas.
- ► Use the scroll pump for the evacuation of dry and inert gases.
- ► Use the scroll pump with gas ballast to evacuate moist gases.
- ► Use only inert gases as gas ballast when evacuating explosive gases.

2.6 Foreseeable improper use

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

- Transporting, installing, or operating the vacuum pump in an impermissible spatial position
- Establishing the voltage supply without correct installation
- Connecting the vacuum pump to unsuitable operating voltages
- Pumping of explosive media when using accessories that do not comply with the pump classification.
- Pumping of corrosive media
- Pumping of dust and media containing particles
- Pumping of fluids
- Operating with impermissible high gas throughput
- Operating with impermissible gas ballast quantities

- Operating with impermissibly set stages of the gas ballast valve
- Operating vacuum pump outside temperature ranges stated on rating plate
- Operating with excessive irradiated heat output
- Operating with impermissibly high exhaust pressure
- Operating in impermissible high magnetic fields
- Operating with external frequency converter (frequencies >60 Hz)
- Using the vacuum pump outside the specified range of application
- Using for pressure generation
- Using in areas with ionizing radiation
- Use in potentially explosive areas
- Using in systems in which sporadic loads and vibrations or periodic forces act on the device
- Using the vacuum pump as a climbing aid
- Using of accessories or spare parts that are not listed in these instructions
- Separating, replacing, or reusing electronic unit in pump foot.

2.7 Personnel qualification

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

Training people

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

2.7.1 Ensuring personnel qualification

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

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

Trained individuals

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

2.7.2 Personnel qualification for maintenance and repair

Advanced training courses

Pfeiffer Vacuum offers advanced training courses to maintenance levels 2 and 3.

Adequately trained individuals are:

- **Maintenance level 1**
  - Customer (trained specialist)
- **Maintenance level 2**
  - Customer with technical education
  - Pfeiffer Vacuum service technician
- **Maintenance level 3**
  - Customer with Pfeiffer Vacuum service training
  - Pfeiffer Vacuum service technician

2.7.3 Advanced training with Pfeiffer Vacuum

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

For more information, please contact Pfeiffer Vacuum technical training.

3 Product description

3.1 Function

The Pfeiffer Vacuum scroll pump is a vacuum pump operating dry in a suction chamber for generating a coarse or medium vacuum according to the physical pumping principle of a spiral vacuum pump. A three-stage gas ballast system supports the prevention of condensation accumulating in the vacuum pump.

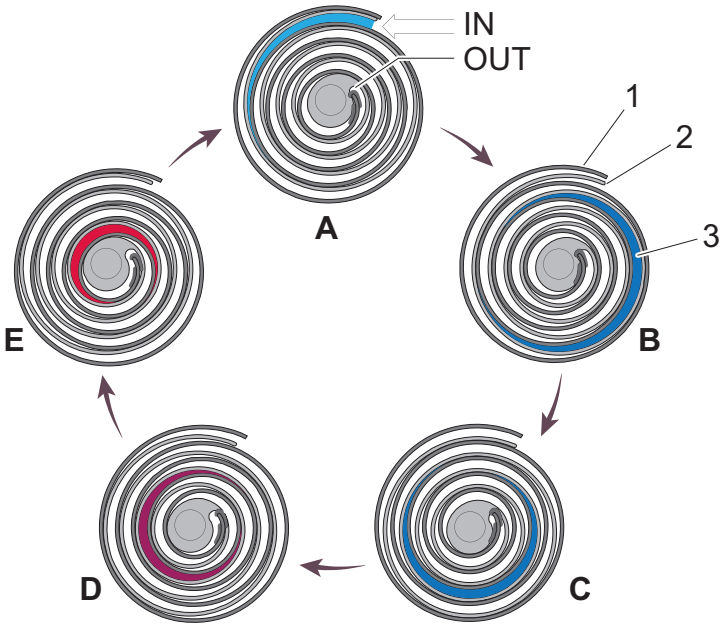


Fig. 2: Schematic compression cycle of scroll pumps

IN	Gas inlet	2	Orbiting spiral
OUT	Gas outlet	3	Gas compression
1	Stationary spiral	A bis E	Sections of increasing compression in the pumping cycle

Spiral vacuum pumps comprise a stationary and orbiting spiral. Varying cavities are generated at the pump inlet by the movements of the orbiting spiral, which suck in the gas. The movement of the rotor compresses the gas continuously until being expelled into the atmosphere at the pump outlet. The suction chamber is completely free from lubricants.

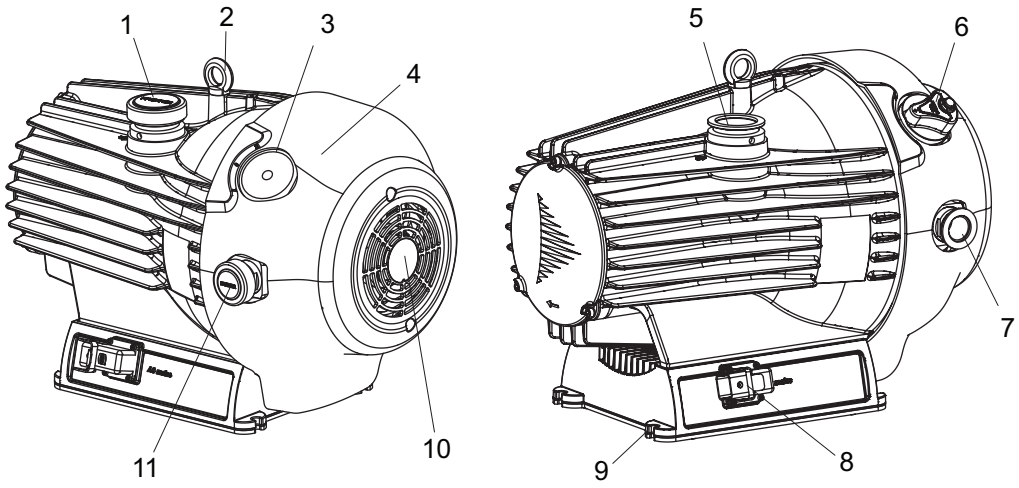


Fig. 3: HiScroll design

1 Protective cap for DN 40 vacuum connection
2 Eye bolt
3 Dummy cover for version without GB
4 Fan cover
5 Vacuum connection
6 Gas ballast valve for version with GB
7 Exhaust connection
8 Mains connection "AC in"
9 Base with fixing hole
10 Fan
11 Protective cap for DN 25 exhaust

3.1.1 Drive

Three-phase asynchronous motor

3.1.2 Cooling

- Air cooling

3.1.3 Shaft bearing

Ball bearing-mounted eccentric shaft. The dry running working chamber of the vacuum pump is separated hermetically from the shaft bearing.

- 2 x deep groove ball bearings, maintenance-free

3.1.4 Gas ballast

Depending on the pump version, the vacuum pump has a gas ballast system for manual supply of inert gas to the suction chamber. Gas ballast supports the reduction of condensate accumulating in the pumping system.

3.2 Identifying the product

► To ensure clear identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the rating plate to hand.
► Learn about certifications through test seals on the product or at www.certipedia.com with company ID no. 000021320.

3.3 Product features

Version	Pumping speed at 50 Hz	Pumping speed at 60 Hz
HiScroll 46, scroll pump, three-phase motor	35 m³/h	43 m³/h

Tbl. 4: Features of scroll pumps

3.4 Scope of delivery

- Scroll pump
- Protective cap for vacuum connection
- Protective cap for the exhaust connection
- Operating instructions

4 Transportation and Storage

4.1 Transporting vacuum pump

⚠ WARNING

Risk of serious injury from swinging, toppling or falling objects

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

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

⚠ CAUTION

Danger of injuries due to improper transport

The fan cover fastener is torn off by improper lifting of the vacuum pump. There is a danger of the vacuum pump falling. Injuries to limbs are the consequence.

- ► Always lift the vacuum pump via the eye bolt with a lifting device.

Packing

We recommend keeping the transport packaging and original protective cover.

Safe transport of the product

1. Observe weight specified on the rating plate.
2. Wherever possible, always transport or ship the vacuum pump in its original packaging.
3. Remove the protective cap only immediately prior to installation.

Transporting the vacuum pump in its packaging

1. Use a pallet truck to transport the vacuum pump in its packaging.
2. Note the center of gravity of the load.
3. Observe safe handling of manually operated transport devices.
4. Ensure harmonious movements and moderate speeds.
5. Ensure a flat substrate.
6. Wear protective equipment, e.g. safety shoes.

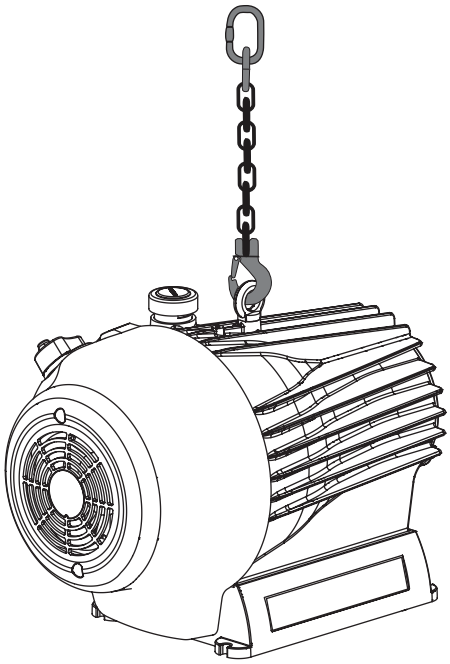


Fig. 4: Slinging points for transport of the scroll pump

Transporting vacuum pump without packaging

1 eye bolt is included in the scope of delivery. It is securely bolted to the vacuum pump at the factory.

1. Attach suitable lifting tools to the eye bolt.
2. Pay attention to the correct use and fastening of the lifting equipment.
3. Lift the vacuum pump vertically (e.g. out of the packaging).
4. Remove the eye bolt following transport and installation as required.
   – Keep the eye bolt for future use.

4.2 Storing vacuum pump

Packing

We recommend storing the product in its original packaging.

Storing vacuum pump

1. Close all flange openings with the original protective caps.
2. Close the gas ballast valve (position “0”).
3. Store the vacuum pump only indoors within the permissible temperature limits.
4. In rooms with humid or aggressive atmospheres: Hermetically seal the vacuum pump together with a drying agent in a plastic bag.

5 Installation

5.1 Setting up vacuum pump

⚠ WARNING

Mortal danger from electric shock caused by water damage

The device is not protected against water ingress. Vacuum pumps operated on the floor lead to leakage current in penetrating and surrounding water. There is a danger to life from electric shock when making contact with live water.

- ► In case of water damage, disconnect the complete power supply from the area affected.
- ► Provide an on-site electrical fuse protection (e.g. RCD) in hazardous areas.
- ► When selecting the installation location, observe potential damage from water.

⚠ CAUTION

Danger of cutting injuries when reaching in towards rotating parts

Transport damage to the fan cover of the vacuum pump may expose rotating, sharp edged parts of the fan. Cutting injuries from accidental contact are the result.

- ► Before commissioning, ensure a sound state of your vacuum pump.
- ► Do not put the vacuum pump into operation if there is obvious external damage.

⚠ CAUTION

Danger of burns on hot surfaces

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

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

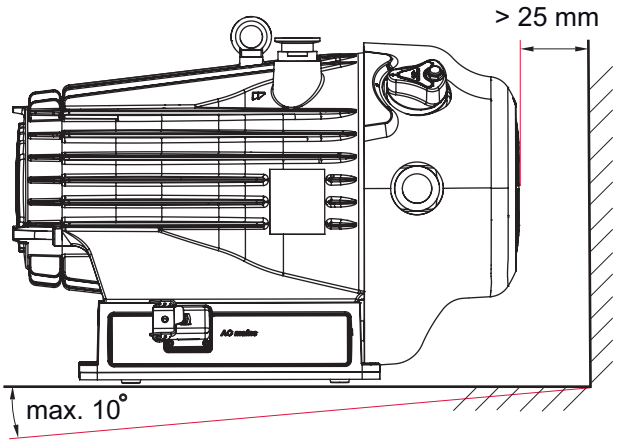


Fig. 5: Minimum distances and permissible inclination

Procedure

- ► Place the vacuum pump on a flat, horizontal surface.
- ► Always keep the connections and manual control elements freely accessible.
- ► Keep the specifications on the motor rating plate visible and freely accessible.
- ► For stationary installation, screw the vacuum pump directly to the base if necessary.
  - – Remove the rubber feet.
- ► When installing the pump in a closed housing, ensure adequate air circulation.

5.2 Connecting vacuum side

⚠ WARNING

Explosion hazard if particles enter the vacuum connection

During commissioning, there is a risk of foreign particles entering the vacuum chamber, forming a source of ignition, and potentially resulting in an explosion in combination with explosive gases.

- ► Use a suitable protective strainer at the vacuum connection.
- ► Do not remove the strainer until you are sure that no solid particles can enter the vacuum pump.

Preventing throttling losses

Using short vacuum lines with a large nominal diameter prevents throttling losses.

Condensate separator

Pfeiffer Vacuum recommends the installation of a condensate separator in case vapors are formed from moisture during evacuation.

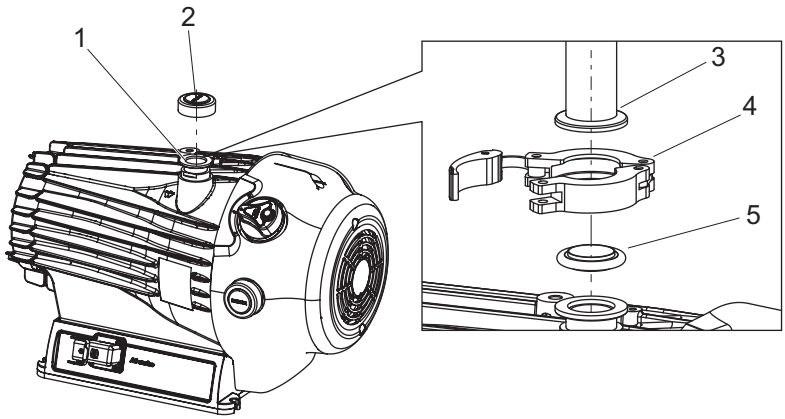


Fig. 6: Example of vacuum connection

1 Vacuum connection of the scroll pump
2 Protective cap
3 Vacuum components DN 40 ISO-KF
4 Clamping ring
5 Centering ring

Procedure

1. Take the protective cap off the scroll pump vacuum connection.
2. Install the connection between vacuum pump and vacuum system so that it is as short as possible.
3. Install a vacuum connection with small flange components, e.g. fasteners and pipe components DN 40 ISO-KF from the Pfeiffer Vacuum Components Shop.
4. Connect the vacuum pump to the vacuum system using the vacuum connection.

5.3 Connecting exhaust side

⚠ WARNING

Danger to life from poisoning where toxic process gases leak with no exhaust line

During normal operation, the vacuum pump expels exhaust gases and vapors freely into the air. In processes involving toxic media, there is a risk of injury and danger to life due to poisoning.

- ► Observe the relevant regulations for handling toxic substances.
- ► Safely purge toxic process gases via an exhaust line.

⚠ CAUTION

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

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

- ► Route the exhaust line without shut-off units.
- ► Observe the maximum permissible pressure (see technical data).
- ► Observe the permissible pressures and pressure differentials for the product.
- ► Check the function of the exhaust line on a regular basis.

Condensate separator

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

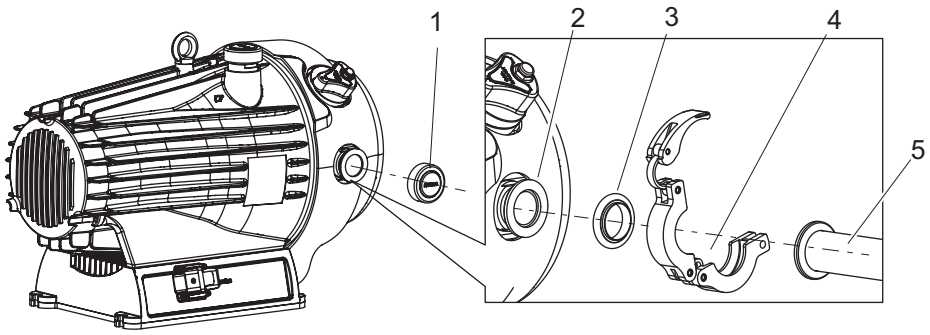


Fig. 7: Example of exhaust connection

1 Protective cap
2 Exhaust connection of the scroll pump
3 Centering ring
4 Clamping ring
5 Vacuum components DN 25 ISO-KF

Procedure

1. Remove the protective cap from the exhaust connection.
2. Choose a minimum exhaust line cross section equal to the connection nominal diameter.
3. Install a vacuum connection with small flange components, e.g. fasteners and pipe components DN 25 ISO-KF from the Pfeiffer Vacuum Components Shop.
4. Route the piping downwards from the vacuum pump, to prevent condensate return.
5. Support or suspend the piping to the vacuum pump so that no piping system forces act on the vacuum pump.

5.4 Connecting gas ballast external supply

⚠ WARNING

Explosion hazard if particles enter at the gas ballast valve

When connecting the gas ballast line, there is a risk of foreign particles entering, which may cause an exothermic reaction if the material pairing in the suction chamber is unfavorable.

- ► When connecting the external gas ballast supply, ensure that the gas ballast valve is closed.
- ► Clean the inlet area of the gas ballast valve by activating the gas supply with slight overpressure when the valve is closed.

⚠ WARNING

Risk of injury from reactive, potentially explosive or otherwise hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen may lead to the formation of potentially explosive gas/air mixtures in the vacuum system. Ignition can cause very serious injuries.

- ► Use inert gases only for the supply of ballast gas in order to prevent the formation of a potentially explosive atmosphere.
- ► Ensure a closed inert gas system in order to avoid zone entrainment as a result of process gas entering into the inert gas line.

NOTICE

Risk of damage from condensation in vacuum pump

Exceeding the saturation vapor pressure of process media during the compression phase leads to condensation in the suction chamber. This results in an increase of the achievable ultimate pressure and to a general deterioration of the performance data of the vacuum pump as a whole. Corrosion and contamination impair service life.

- ► Use the gas ballast.
- ► Supply dry room air or inert gas in order to increase the vapor capacity of the process medium.
- ► Pump condensable vapors only when the vacuum pump is warm and the gas ballast valve open.
- ► Operate the vacuum pump with gas ballast a further approx. 30 minutes after finishing the process in order to dissipate any residual moisture.

The gas ballast system of the scroll pump is suitable for being connected to a gas external supply. Couplings for the G 1/8" connection from the Pfeiffer Vacuum accessories range are available for this purpose.

Required tools

- Wrench, **WAF 13**
- Calibrated torque wrench (tightening factor ≤ 1.6)

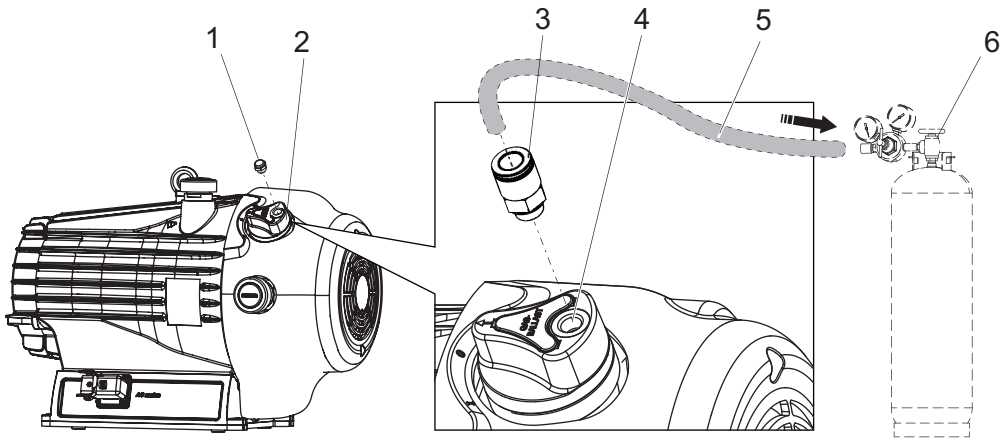


Fig. 8: Connecting gas ballast external supply

1 Sinter filter
2 Gas ballast valve
3 Example of connecting coupling
4 Gas ballast connection opening
5 External gas supply line
6 External gas supply

Connecting gas supply

1. Turn the gas ballast valve to position “0”.
2. Unscrew the sinter filter the from valve housing.
3. Screw a connecting coupling with sealing ring into the G 1/8" filter bore.
   – Tightening torque: **2.5 Nm**.
4. Connect an external supply with nitrogen (N_2) or another dry, inert gas to the coupling.
5. With the gas supply, observe the maximum permissible inlet pressure.
6. Briefly open the gas ballast valve by turning the selector switch to position “1”.
   – Letting in inert gas removes any particles from the inlet area of the gas ballast valve.

5.5 Implementing electrical safety measures

⚠ WARNING

Risk of danger to life through missing mains disconnection device

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

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

Installing mains disconnection device

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

5.5.1 Installing miniature circuit breaker

Circuit breaker (MCB)	
Tripping characteristic	B or C according to IEC 60947-2
Interruption rating (AIC)	10 kA
Rated current I_N	2.5 A for voltage 380 – 415 V, 50 Hz

Tbl. 5: Technical requirements for a miniature circuit breaker

Procedure

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

5.5.2 Installing a residual current circuit breaker

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

Residual current operated circuit breaker (RCCB)	
Rated fault current $I_{\Delta N}$	30 mA
Residual current waveform	Type A ● Independent of line voltage ● Triggering of AC fault currents and pulsating DC fault currents

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

Procedure

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

5.5.3 Installing motor protection switch

The motor protection switch is a current-dependent protective device for the drive motor.

Voltage [V]	Frequency [Hz]	Motor rating [kW]	I_N [A]
Δ: 190 – 220	50	1.2	4.1
人: 381 – 415	50	1.2	2.5
Δ: 200 – 240	60	1.5	4.5
人: 380 – 480	60	1.5	2.5

Tbl. 7: Motor protection switch settings

Procedure

1. Install a motor protection switch on site which has been tested according to DIN IEC EN 60947-1/-2/-4-1.
2. Set the appropriate value on the contactor.

5.6 Connecting to mains power supply

⚠ DANGER

Danger to life from electric shock

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

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

⚠ WARNING

Risk of injury due to incorrect installation

Dangerous situations may arise from unsafe or incorrect installation.

- ► Do not carry out your own conversions or modifications on the unit.
- ► Ensure the integration into an Emergency Off safety circuit.

⚠ WARNING

Mortal danger from electric shock caused by water damage

The device is not protected against water ingress. Vacuum pumps operated on the floor lead to leakage current in penetrating and surrounding water. There is a danger to life from electric shock when making contact with live water.

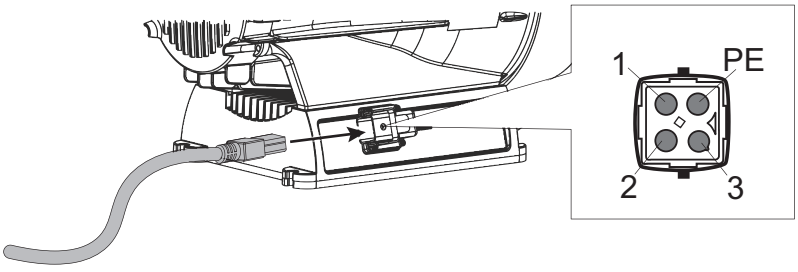
- ► In case of water damage, disconnect the complete power supply from the area affected.
- ► Provide an on-site electrical fuse protection (e.g. RCD) in hazardous areas.
- ► When selecting the installation location, observe potential damage from water.

⚠ CAUTION

Risk of injury from entrapment of body parts

The motor restarts automatically after power failure. A risk exists of minor injury to fingers and hands (e.g., hematoma), from direct contact with the vacuum flange.

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



Pin	Assignment
1	Phase L1
2	Phase L2
3	Phase L3
PE	Earthed conductor

Tbl. 8: Connection assignment of power supply connector

Mains supply

The drive starts when the mains supply is established.

Connecting to mains power supply

1. Assemble the power supply cable from the accessories.
2. Always ensure a secure connection to the earthed conductor (PE).
3. If necessary, change the pre-set star circuit to a delta connection.
4. Secure the mains cable using a mounting bracket.
5. Connect the mains cable to the mains.

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

NOTICE

Property damage from high starting torque

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

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

There are 2 different circuit configurations:

- Star circuit for high voltage
- Delta connection for low voltage

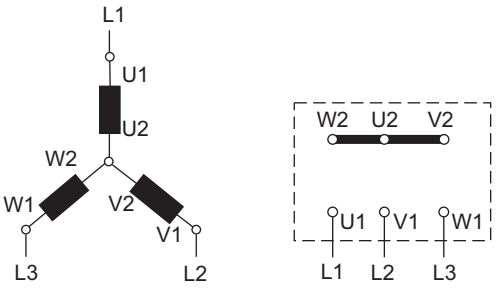


Fig. 9: Star circuit for high voltage (factory setting)

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

Connect the three phase motor with star circuit

- ► Connect the three phase motor according to the connection diagram.

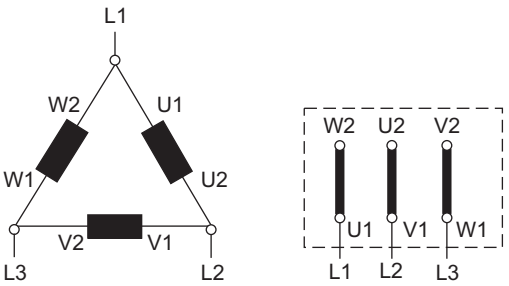


Fig. 10: Delta connection for low voltage

The voltage for each phase is equal to the mains voltage. The mains current is √3 times the phase current. The delta connection is marked with the Δ symbol. The voltage between the incoming mains supply lines is called mains voltage. The mains current is the current flowing in the incoming supply lines.

Connect the three phase motor with delta connection

- ► Connect the three phase motor according to the connection diagram.

5.6.2 Choosing fan voltage supply

The fan connector on the circuit board is dependent on the motor connection voltage and may need to be adapted to the mains voltage on site.

Prerequisites

- Supply voltage switched off
- Drive motor disconnected from mains and secured against activation

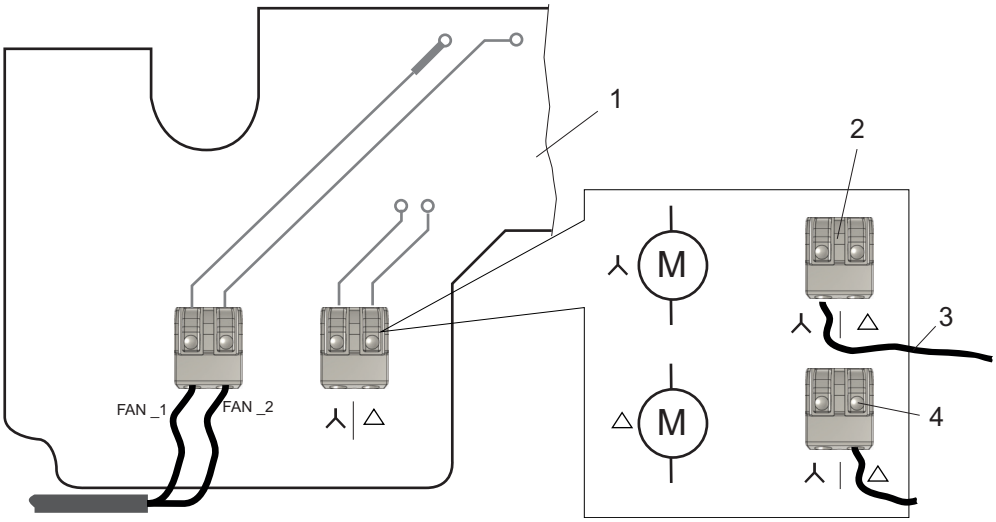


Fig. 11: Clamping fan connecting cable onto circuit board

1 Circuit board
2 Spring clamp for motor in star circuit
3 Fan connecting cable from terminal block
4 Spring clamp for motor in delta connection

Connecting fan

1. If the motor is connected in star circuit (factory setting), connect the fan connecting cable to the spring clamp with symbol ⅄ .
2. If the motor connection is a delta connection, connect the fan connecting cable to the spring clamp with symbol Δ.
3. When inserting the wires into the spring clamp, make sure that no individual strands protrude at the side of the clamp.

5.6.3 Checking direction of rotation with rotary field measuring instrument

Checking direction of rotation with rotary field measuring instrument

1. Check the required direction of rotation using a rotary field measuring instrument.
   – There must be a clockwise rotation for the direction of rotation to be correct.
2. If the direction of rotation is incorrect, exchange 2 phases on the connection cable.

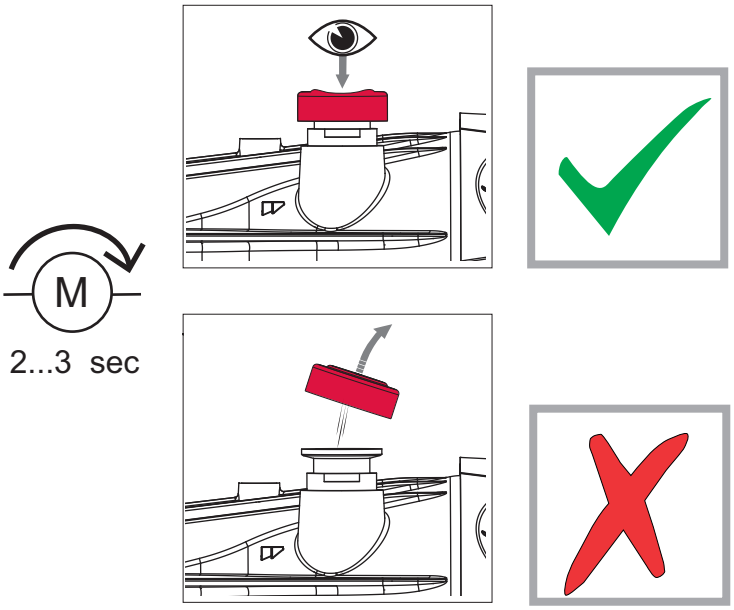


Fig. 12: Checking direction of rotation

Visually checking direction of rotation

1. Seal off the vacuum connection with the original protective cap.
2. Remove the original protective cover from the exhaust connection if necessary.
3. Switch on the scroll pump briefly (2 to 3 seconds).
   – The protective cap on the vacuum connection is sucked in and bulges downwards.
4. If the protective cap is pushed upwards or raised, replace the 2 phases on the connecting cable.

6 Operation

6.1 Commissioning vacuum pump

⚠ WARNING

Risk of explosion in the medium to be pumped as a result of increased pressure

With installation on the exhaust side, there is a risk of the exhaust pressure of the vacuum pump exceeding the atmospheric conditions. The ignition temperature of the medium to be pumped is lowered in the suction chamber. If the ignition temperature of the medium to be pumped falls below a temperature of T4 = +135°C, there is a risk of explosion, and consequently serious injury.

- ► Ensure that the ignition temperature of the medium to be pumped is maintained above a temperature of +135 °C at 3500 hPa abs.

⚠ WARNING

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

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

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

⚠ CAUTION

Danger of burns on hot surfaces

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

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

Procedure

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

6.2 Switching on vacuum pump

⚠ CAUTION

Risk of injury from entrapment of body parts

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

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

⚠ CAUTION

Danger of injury if hair or loose clothing is pulled in

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

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

Operating conditions

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

Switching on vacuum pump

1. If required, switch vacuum pump on in each pressure range.
2. Switch the vacuum pump on via an on-site motor protection switch.
3. Prior to process start, allow vacuum pump to warm up for approx. 30 minutes with vacuum connection closed.

6.3 Temperature monitoring

⚠ CAUTION

Danger of burns on hot surfaces

In the event of a malfunction, it is possible that the surface temperature of the vacuum pump will rise to more than 105 °C if no motor protection switch is installed.

- ► Use a motor protection switch with the recommended settings.

A bimetal switch monitors the temperature and interrupts the current if the temperature threshold is exceeded. The installed motor protection switch switches the vacuum pump off. When the reset temperature is reached, the contact automatically closes again.

Bimetal switch type	N.C. contact, automatically resetting
Nominal switch-on temperature	70 °C
Reset temperature	50 °C to 35 °C

Tbl. 9: Bimetal switch technical data

Procedure when temperature threshold value is exceeded

- ► When the reset temperature is reached, switch the vacuum pump back on manually via the motor protection switch.

6.4 Operating with gas ballast

⚠ WARNING

Risk of injury from reactive, potentially explosive or otherwise hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen may lead to the formation of potentially explosive gas/air mixtures in the vacuum system. Ignition can cause very serious injuries.

- ► Use inert gases only for the supply of ballast gas in order to prevent the formation of a potentially explosive atmosphere.
- ► Ensure a closed inert gas system in order to avoid zone entrainment as a result of process gas entering into the inert gas line.

⚠ WARNING

Risk of poisoning from incorrect use of the gas ballast system

The gas ballast system of the scroll pump is vacuum sealed only when used in valid, snapped positions "0", "1" and "2". When operating the valves in intermediate stages, there is a risk that process media can escape to the environment uncontrolled. When using toxic process media, there is a risk of poisoning.

- ► Change the positions of the valve only for setting the gas ballast stages.
- ► Operate the gas ballast valve only in the snap positions.

NOTICE

Risk of damage from condensation in vacuum pump

Exceeding the saturation vapor pressure of process media during the compression phase leads to condensation in the suction chamber. This results in an increase of the achievable ultimate pressure and to a general deterioration of the performance data of the vacuum pump as a whole. Corrosion and contamination impair service life.

- ► Use the gas ballast.
- ► Supply dry room air or inert gas in order to increase the vapor capacity of the process medium.
- ► Pump condensable vapors only when the vacuum pump is warm and the gas ballast valve open.
- ► Operate the vacuum pump with gas ballast a further approx. 30 minutes after finishing the process in order to dissipate any residual moisture.

Gas flow

The flow rate (gas flow) increases according to inlet pressure.

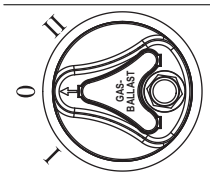
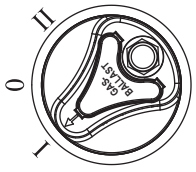
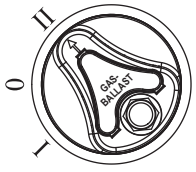
Depending on the pump version, the vacuum pump has a mechanically operated two-stage gas ballast valve for controlled supply of inert gas to the suction chamber.

Prerequisites

- Vacuum pump is warm
- An external gas supply is connected
- The inlet area of the gas ballast valve is flushed with inert gas in the ATEX version

Operating with gas ballast

1. If necessary, connect an existing shut-off unit to the vacuum side.
2. Turn the selector switch of the gas ballast valve to the desired position.
   – Allow the selector switch to completely engage in position.
3. In case an external gas supply is used, open the supply.
   – Observe the permissible inlet pressure.

	**Position "0":** ● Switch setting for media without condensation ● The gas ballast valve is closed ● No gas flow into the suction chamber
	**Position "1":** ● Switch setting for slight to medium condensation ● The gas ballast valve is open ● The gas flow depends on the type
	**Position "2":** ● Switch setting for medium to severe condensation ● The gas ballast valve is open ● The gas flow depends on the type

Tbl. 10: HiScroll gas ballast valve switch settings

6.5 Switching off vacuum pump

⚠ WARNING

Risk of danger to life through missing mains disconnection device

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

- ► Unplug the mains cable in order to disconnect the mains supply.
- ► Install a residual circuit breaker (RCCB).

Procedure

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

7 Maintenance

7.1 Maintenance information

⚠ WARNING

Risk of injury from reactive, potentially explosive, or otherwise hazardous gas/air mixtures during maintenance

Uncontrolled leakage of process gases may result in the formation of explosive gas-air mixtures after opening the vacuum pump. Ignition can cause very serious injuries.

- ► Ensure that the suction chamber is sufficiently inert before starting maintenance work.
- ► Ensure a closed inert gas system in order to avoid zone entrainment as a result of process gas escaping.

⚠ WARNING

Danger to life from electric shock during maintenance and service work

There is a danger to life from electric shock when making contact with live components.

- ► Disconnect the vacuum pump safely from the mains.
- ► Wait until the vacuum pump comes to a standstill (rotation speed = 0).

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

⚠ WARNING

Crushing and cutting danger on unprotected parts from unforeseeable automatic run-up during maintenance.

During activities on exposed mechanical components, there is a risk of crushing or cut injuries from sudden run-up.

- ► Switch off the vacuum pump before any maintenance work and work.
- ► Vent the vacuum pump to atmospheric pressure.
- ► Disconnect the vacuum pump safely from the mains.
- ► Secure the vacuum pump against re-start.
- ► Disconnect the mains cable from the vacuum pump.

NOTICE

Danger of property damage from improper maintenance

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

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

General cleaning and maintenance work

- Clean the ventilation grille
- Clean the outside of the vacuum pump

7.2 Checklist for inspection and maintenance

Maintenance frequency and service lives

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

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

Maintenance level

We recommend that Pfeiffer Vacuum Service (PV) carry out maintenance work at level 3. Pfeiffer Vacuum will be released from all warranty and liability claims if maintenance work is not carried out properly. This also applies wherever parts other than original spare parts are used.

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

Action	**Inspection**	**Maintenance level 1**	**Maintenance level 3**	**Required material**
described in	**OI**	**OI**	**SI**	
Interval	**daily**	**as required**	**5 years or 40,000 operating hours**	
Inspection • Visual and acoustic test • Vacuum pump performance test • Equipment check for abrasion, discoloration and other anomalies • Creation of an action plan	■			
Maintenance level 1 • Replacement of tip seal • Replacement of valves		■		Tip seal maintenance set Valve set
Maintenance level 3 • Replacement of all wear parts • Complete cleaning			■ (PV)	Maintenance set level 3

Tbl. 11: Maintenance intervals

7.3 Replacing valves

Prerequisites

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

Required tools

- Face wrench, **pin diameter 3 mm**, article number: PV D40 012
- Calibrated torque wrench (tightening factor ≤ 2.5)
- O-ring picker

7.3.1 Disassembling fan cover

Prerequisite

- Preparatory work carried out

Required tools

- Allen key, **WAF 4**

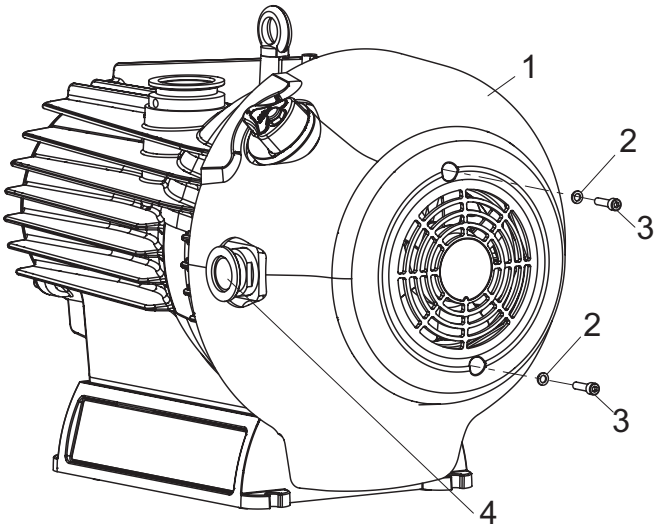


Fig. 13: Unscrewing and removing cylinder screws

1	Fan cover	3	Cylinder screw
2	Washer	4	Exhaust connection without protective cap

Unscrewing and removing cylinder screws

- ► Unscrew and remove the cylinder screws with washers from the fan cover.
- ► Remove the protective cap from the exhaust flange.

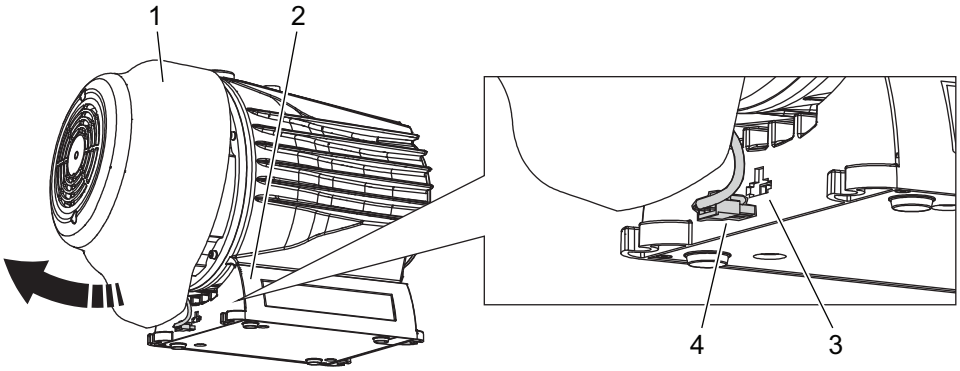


Fig. 14: Removing fan plug

1	Fan cover	3	Connecting socket for air cooling
2	Pump foot	4	Fan cable

Removing fan plug

1. For easier disassembly, place the vacuum pump on the edge of the work surface so that the fan guard protrudes above the work surface.
2. If needed, turn the gas ballast valve to "0".
3. Pull the fan cover at the bottom slightly to the front.
4. Undo the plug of the fan cable on the electronic drive unit.

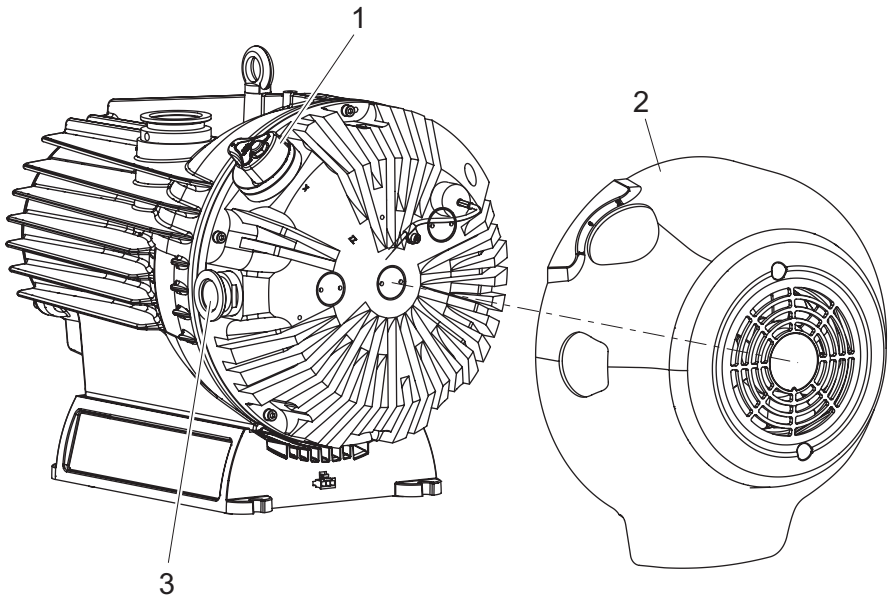


Fig. 15: Removing fan cover

1 Gas ballast valve
2 Fan cover
3 Exhaust connection

Removing fan cover

► Turn the fan cover slightly to remove it from the gas ballast valve and exhaust connection.

7.3.2 Disassembling valves

Function of valves

- Centrally arranged valve: Non-return valve
- Outer valves: Bypass valves

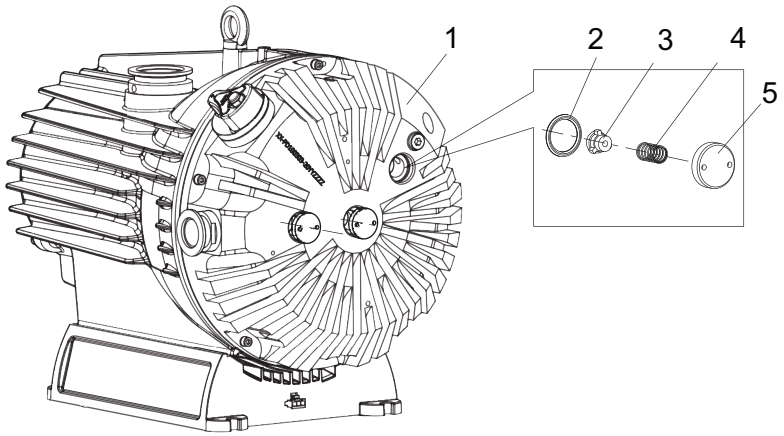


Fig. 16: Disassembling valves

1 Spiral housing
2 O-ring
3 Valve plate
4 Compression spring
5 Valve guide

Disassembling valves

1. Use the face spanner to unscrew the valve guide with compression spring and valve plate from the spiral housing.
2. Remove the O-ring from the hole in the spiral housing.
3. Unscrew the valve plate from the compression spring.

4. Clean the valve seat and the valve guide.
5. Replace all wear parts.

7.3.3 Assembling valves

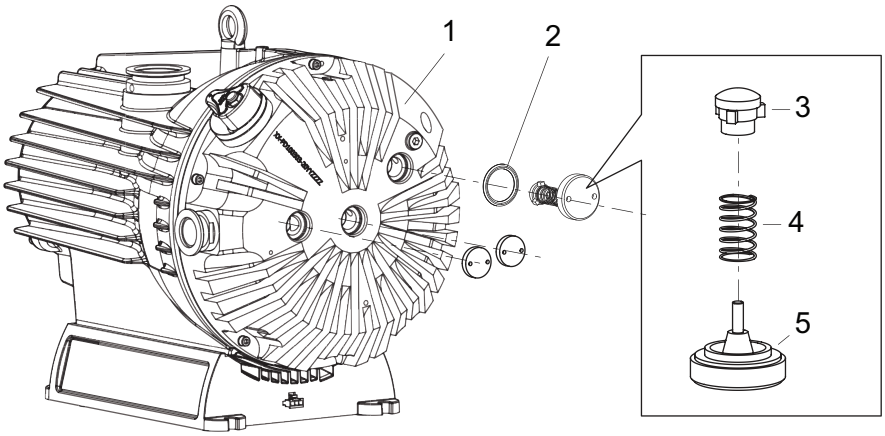


Fig. 17: Assembling valves

1 Spiral housing
2 O-ring
3 Valve plate
4 Compression spring
5 Valve guide

Assembling valves

1. Insert the o-ring into the designated groove in the spiral housing.
2. Turn the compression spring on the valve plate to open it.
   – The valve guide centers and fixes the compression spring.
3. Place the valve plate on the valve guide.
4. Insert the valve into the spiral housing.
5. Make sure that the O-ring and valve are seated correctly.
6. Screw the valve into the spiral housing using the face spanner.
   – Tightening torque: **5 Nm**

7.4 Replacing the gas ballast valve

Prerequisites

- Vacuum pump switched off
- Vacuum system vented to atmospheric pressure
- Electrical supply disconnected
- Mains cable disconnected
- Vacuum inlet sealed with the original protective cover

Required tools

- Slot screwdriver
- Allen key, **WAF 2.5**
- Hexagon socket torque wrench, **WAF 2.5**

7.4.1 Disassembling gas ballast valve

Required tools

- Slot screwdriver
- Allen key, **WAF 2.5**
- O-ring picker

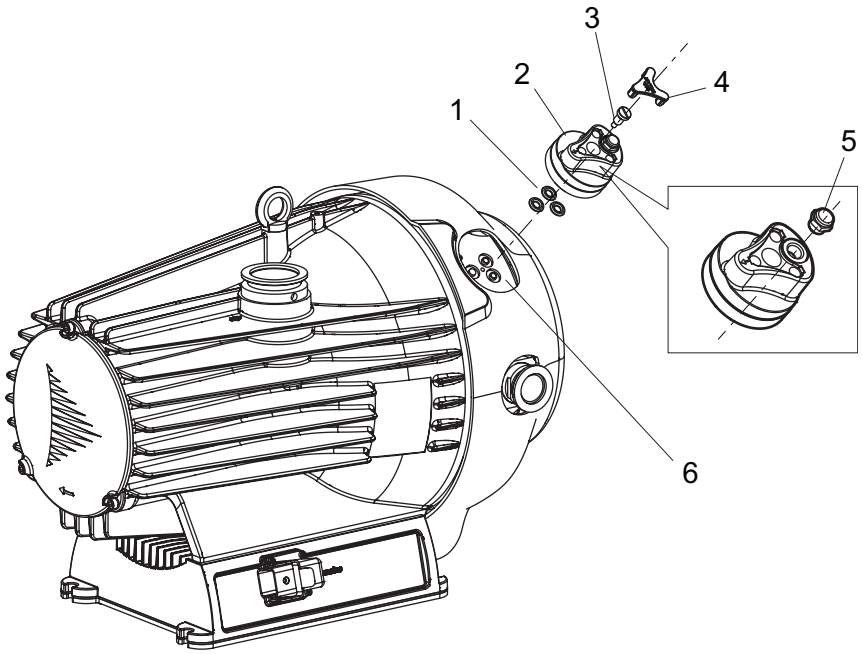


Fig. 18: Disassembling gas ballast valve

1	O-ring, 3x	4	Cover
2	Gas ballast valve	5	Sinter filter
3	Special screw	6	Spiral housing

Removing the gas ballast valve

1. Pry the cover off the gas ballast valve using a small screwdriver.
2. Unscrew the special screw from the base plate.
3. Remove the gas ballast valve part from the spiral housing.
4. Replace the O-rings between the gas ballast valve and the spiral housing.

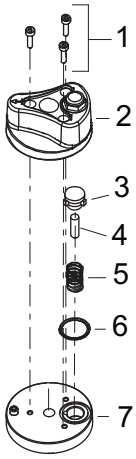


Fig. 19: Disassembling gas ballast valve

1	Cylinder screw, 3x	5	Compression spring
2	Gas ballast handle	6	O-ring
3	Valve plate	7	Base plate
4	Weight		

Disassembling gas ballast valve

1. Unscrew the cylinder screws from the gas ballast handle.
2. Remove the gas ballast handle from the base plate.
3. Remove the compression spring with valve plate from the gas ballast handle.
4. Unscrew the valve plate from the compression spring.

5. Pull the weight out of the valve plate.
   – The weight for loading the valve plate must be reused when replacing it.
6. Replace the O-ring between the gas ballast handle and the base plate.

7.4.2 Assembling gas ballast valve

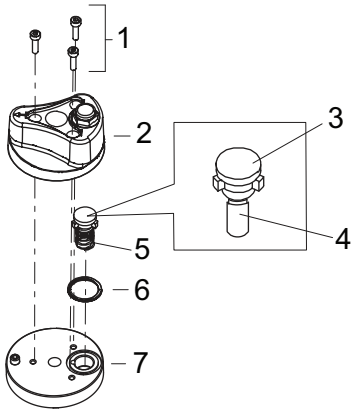


Fig. 20: Assembling gas ballast valve

1	Cylinder screw, 3x	5	Compression spring
2	Gas ballast handle	6	O-ring
3	Valve plate	7	Base plate
4	Weight		

Assembling gas ballast valve

1. Turn the compression spring on the valve plate to open it.
2. Insert the O-ring into the designated groove in the base plate.
3. Insert the valve plate with compression spring and weight into the base plate.
4. Place the gas ballast handle on the valve plate.
5. Screw the cylinder screws into the gas ballast handle.
   – Tightening torque: **1 Nm**

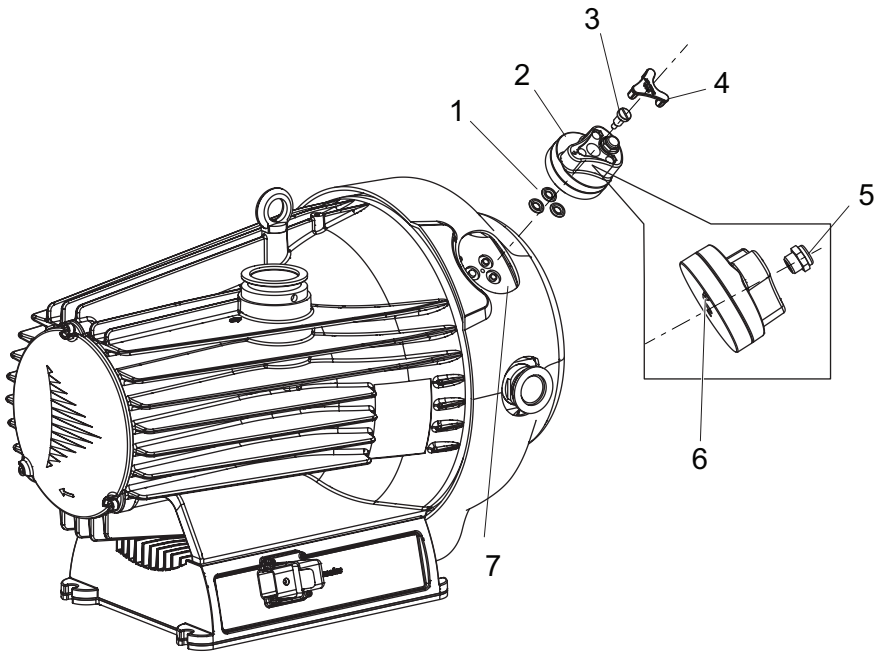


Fig. 21: Assembling gas ballast valve

1	O-ring, 3x	5	Sinter filter
2	Gas ballast valve	6	Ball
3	Special screw	7	Spiral housing
4	Cover		

Assembling gas ballast valve

1. Insert the o-rings into the designated grooves in the spiral housing.
2. Place the gas ballast valve on the spiral housing while making sure that the ball is seated in the groove in the spiral housing.
3. Screw the special screw into the gas ballast valve.
   – Tightening torque: **2.5 Nm**
4. Check the function of the gas ballast valve by turning it to all positions.
5. Press the cover into the gas ballast valve.

7.5 Changing the tip seal

Prerequisites

- Vacuum pump switched off
- Vacuum system vented to atmospheric pressure
- Electrical supply disconnected
- Mains cable disconnected
- Vacuum inlet sealed with the original protective cover

7.5.1 Disassembling spiral housing

Required tools

- Allen key, **WAF 4**

Required consumables

- Laboratory gloves

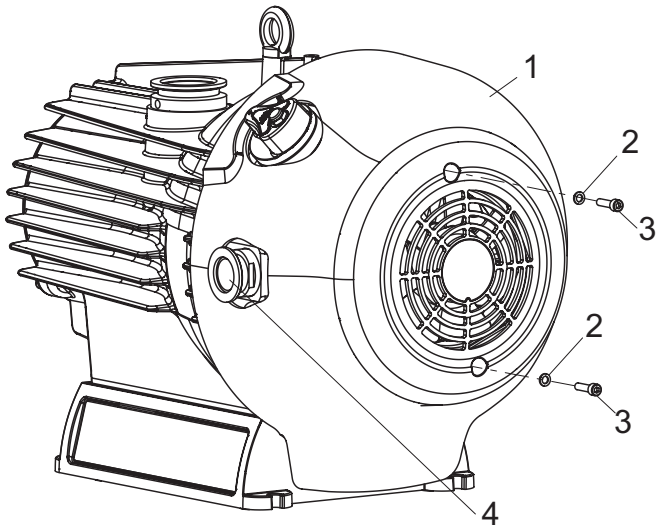


Fig. 22: Loosening the fan cover on the scroll pump

1	Fan cover	3	Hexagon socket screw
2	Washer	4	Exhaust connection without protective cap

Loosening the fan cover

1. Unscrew the 2 hexagon socket screws with washers from the fan cover.
2. Remove the protective cap from the exhaust connection.

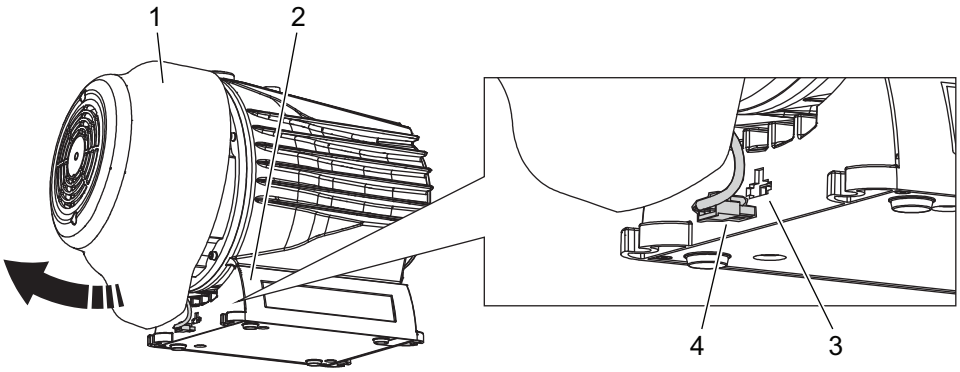


Fig. 23: Removing the fan cover from the scroll pump

1 Fan cover
2 Electronic drive unit
3 Connecting socket for air cooling
4 Fan cable

Removing fan cover

1. Pull the fan cover at the bottom slightly to the front.
2. Undo the plug of the fan cable on the electronic drive unit.
   – Be careful with the circlip.
3. Lift the fan cover over the gas ballast valve and the exhaust connection.
4. Seal off the exhaust connection with the original protective cover.

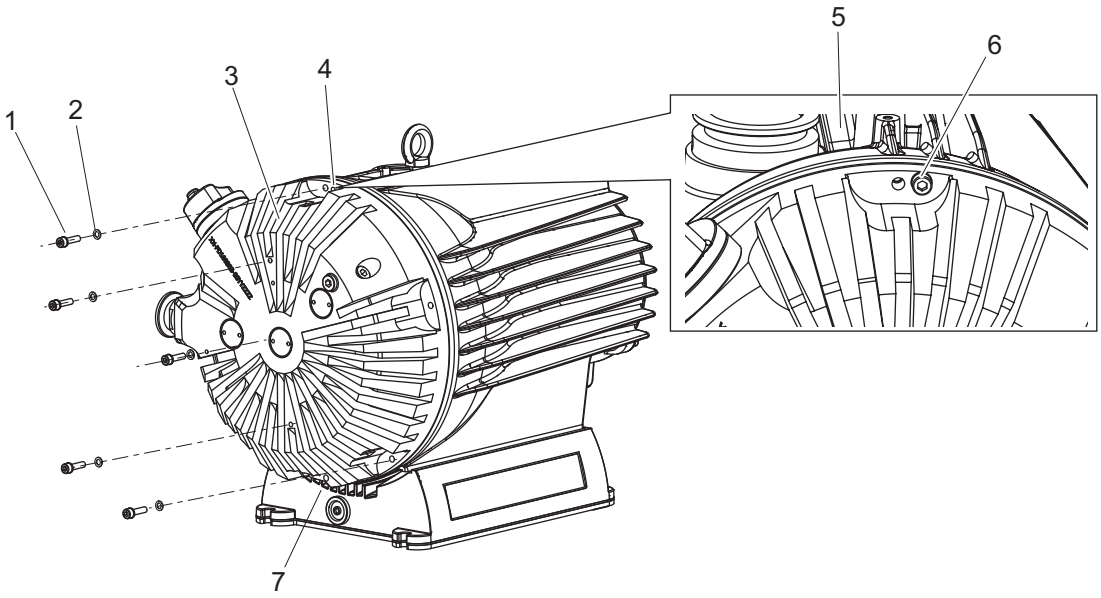


Fig. 24: Removing the scroll pump spiral housing

1 Hexagon socket screw (5×)
2 Washer (5×)
3 Spiral housing
4 Top auxiliary hole
5 Pump housing
6 Hexagon socket screw as an auxiliary hole
7 Bottom auxiliary hole

Removing the spiral housing

1. Unscrew all 5 hexagon socket screws from the spiral housing.
   – Pay attention to the washers.
2. Screw the 2 hexagon socket screws evenly and alternately into the top and bottom auxiliary holes.
3. Push the spiral housing off the pump housing, ensuring that it does not tilt.
4. Unscrew the auxiliary screws from the spiral housing.

7.5.2 Replacing tip seals

Required tools

- O-ring picker
- Side cutter

Required consumables

- Laboratory gloves
- Clean, lint-free cloth
- Isopropanol
- Spare parts package 1 (includes 3 tip seals)

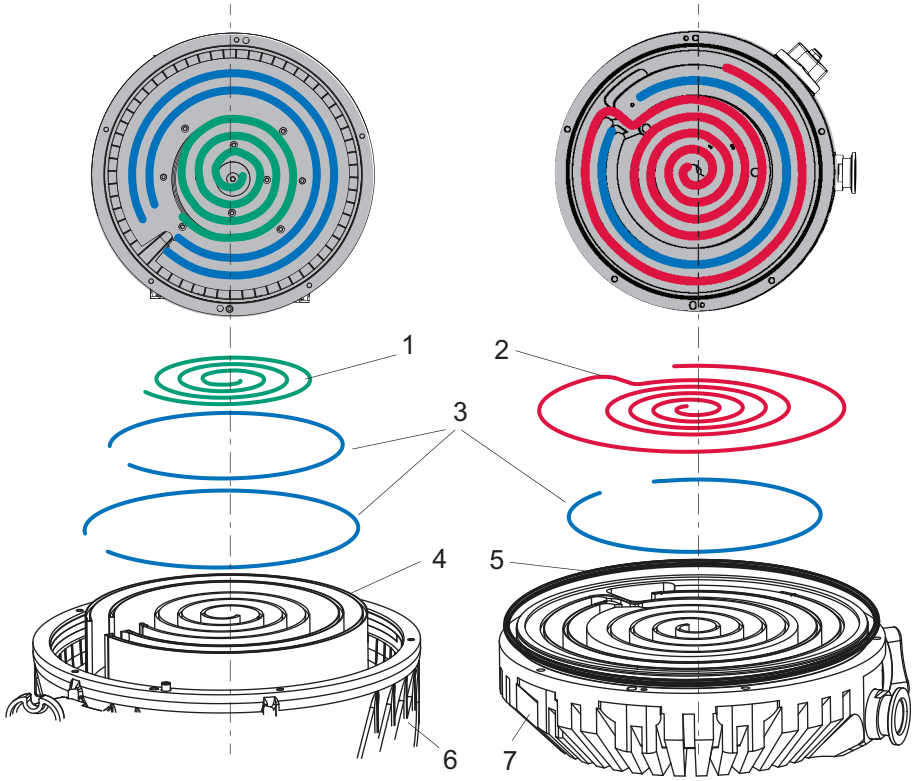


Fig. 25: Replacing tip seals on scroll pump

1 Tip seal 1, 767 mm
2 Tip seal 2, 1541 mm
3 Tip seal 3, 461 mm, 512 mm, 566 mm
4 Orbiter
5 O-ring
6 Pump housing
7 Spiral housing

Removing tip seals

1. Place the pump housing in an upright position.
2. Use the segment ring picker and remove the segment ring from the spiral housing.
3. Use the segment ring picker and remove the tip seal from the orbiter.
4. Use the segment ring picker and remove the tip seal from the spiral housing.
5. Clean the working area of the orbiter and spiral housing, and the spiral groove on both sides, using a clean, lint-free cloth and isopropanol.
6. Clean the cooling fins on the spiral housing.
   – Soiling impacts on the cooling performance.

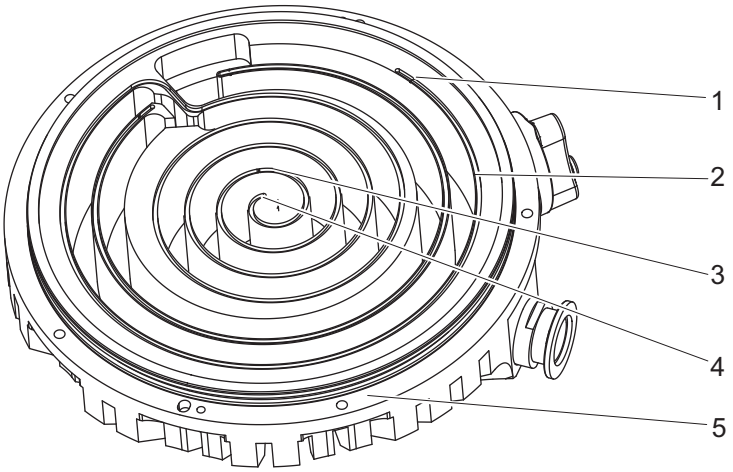


Fig. 26: Spiral housing overview

1 Cut mark
2 Spiral groove
3 Clamping point
4 Start of spiral
5 O-ring groove

Inserting tip seals

The described steps apply equally to the spiral housing and the orbiter in the pump housing.

1. Cut the tip seals from the spare part package to the appropriate lengths.
   – Pay attention to the cut marks in the spiral grooves.
2. Working from the inside, press tip seal 1 into the spiral groove of the orbiter.
   – The clamping points in the groove fix the tip seal in place.
3. Press tip seal 2 into the spiral groove of the orbiter.
4. Press the separate tip seals 3 into the spiral groove of the orbiter and the spiral housing.

Inserting O-ring

1. Moisten the O-ring groove of the spiral housing with a little isopropanol as an assembly aid for the O-ring.
2. Carefully insert the o-ring into the spiral housing.

7.5.3 Assembling pump housing

Required tools

- Allen key, **WAF 5**
- Calibrated torque wrench

Required consumables

- Laboratory gloves
- Isopropanol

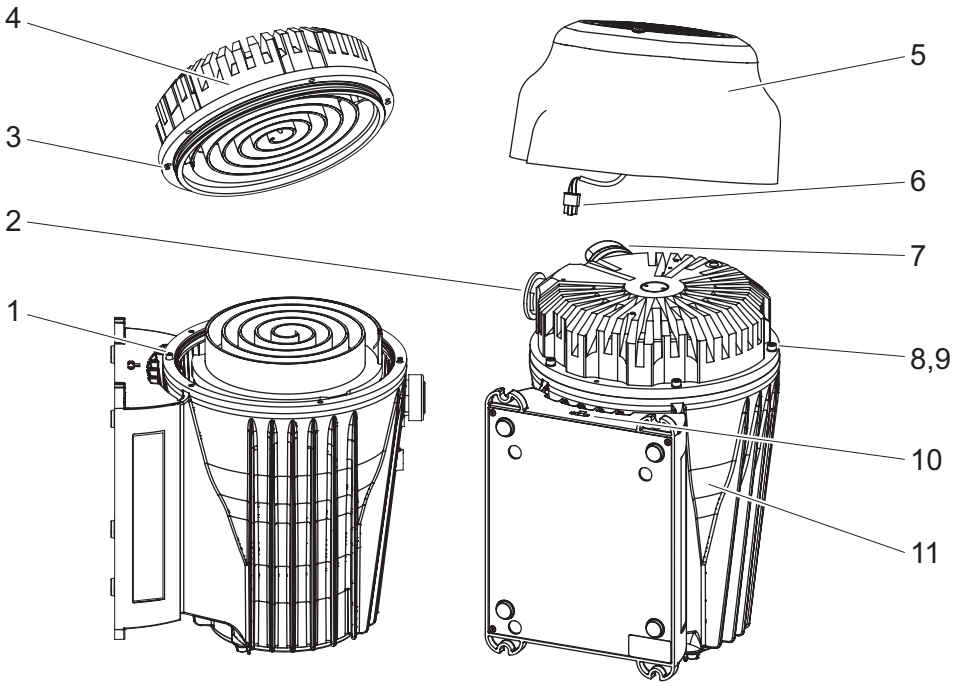


Fig. 27: Assembling the housing parts

1 Guide pin
2 Exhaust connection without protective cap
3 Guide hole
4 Spiral housing
5 Fan cover
6 Fan cable
7 Gas ballast valve
8 Hexagon socket screw
9 Washer
10 Connecting socket for air cooling
11 Pump housing

Assembling spiral housing

1. Remove the protective cap from the exhaust connection.
2. Moisten the O-ring in the spiral housing with a little isopropanol as an assembly aid for the O-ring.
3. Fit the spiral housing with the guide hole exactly on the guide pin of the pump housing.
   – Make sure that the tip seals remain in the grooves.
4. Screw the spiral housing with hexagon socket screws (5×) and washers firmly onto the pump housing.
5. Tighten the screws evenly and crosswise in steps.
   – Tightening torque: **5 Nm**

Assembling fan cover

1. Fix the fan cable in place in the groove provided on the fan cover.
2. Place the fan cover over the gas ballast valve and exhaust connection on the spiral housing, ensuring that it is not tilted.
   – Pay attention to the existing cabling and the distance pin within the fan cover.
3. Plug the fan cable into the connecting socket of the electronic drive unit.
4. Secure the fan housing with both hexagon socket screws and washers.
   – Tightening torque: **3.5 Nm**

7.6 Final inspection

Prerequisite

- Maintenance work carried out on opening the housing
- Fan disassembled or replaced

Carrying out final inspection

► Perform a functional test.
► Check to make sure the fan is working.
► Carry out a high voltage and protective earthing test.

Recommended final check

► Carry out a leak test.

8 Decommissioning

8.1 Shutting down for longer periods

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

Procedure for longer vacuum pump shutdowns

1. Switch off the vacuum pump.
2. Vent the vacuum pump.
3. Allow the vacuum pump to cool down.
4. Close the vacuum connection.
5. Evacuate the vacuum pump via the exhaust connection.
6. Evacuate the pump interior to p < 1 hPa.
7. Vent the vacuum pump with dry, oil-free air or inert gas.
8. Seal all connections with the original protective caps.
9. Store the vacuum pump in dry, dust-free rooms, within the specified ambient conditions.
10. In rooms with humid or aggressive atmospheres: Hermetically seal the vacuum pump together with a drying agent in a plastic bag.
11. Do not store the vacuum pump in the vicinity of machines, traffic routes, etc., as strong vibrations may damage the bearing.

8.2 Recommissioning

Checking the state

- ► Check the vacuum pump for visible damage.
- ► Check the vacuum pump for contamination and moisture.
- ► Put the vacuum pump into operation only if it is in a correct state.
- ► If necessary, consult Pfeiffer Vacuum Service

Procedure for recommissioning the vacuum pump

1. Clean the vacuum pump exterior with a lint-free cloth and a little isopropanol.
2. If necessary, arrange for Pfeiffer Vacuum Service to completely clean the vacuum pump.
3. Observe the total running time of the vacuum pump and if necessary, use support services of Pfeiffer Vacuum.
4. Install the vacuum pump according to these instructions (see chapter “Installation ”, page 25).
5. Recommission the vacuum pump according to these instructions (see chapter “Operation”, page 34).

9 Recycling and disposal

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

Environmental protection

You **must** dispose of the product and its components in accordance with all applicable regulations for protecting people, the environment and nature.

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

9.1 General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

- ► Dispose of our products according to the following:
  - – Iron
  - – Aluminium
  - – Copper
  - – Synthetic
  - – Electronic components
  - – Oil and fat, solvent-free
- ► Observe the special precautionary measures when disposing of:
  - – Fluoroelastomers (FKM)
  - – Potentially contaminated components that come into contact with media

9.2 Disposing of the scroll pump

Pfeiffer Vacuum scroll pumps contain materials which must be recycled.

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

10 Malfunctions

10.1 General

⚠ WARNING

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

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

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

⚠ WARNING

Danger to life due to poisoning if hazardous process gases escape in the event of a malfunction

The vacuum pump does not have redundant safety devices. In the event of damage, process gases may escape. There is a risk of injury and death due to poisoning in processes with gases that are hazardous to health

► When pumping hazardous process gases, take additional safety precautions in accordance with the applicable legal regulations.
  – The pumping of hazardous process gases is the responsibility of the operator.

► Observe all safety recommendations of the gas manufacturer.

⚠ CAUTION

Danger of burns on hot surfaces

In the event of a malfunction, it is possible that the surface temperature of the vacuum pump will rise to more than 105 °C if no motor protection switch is installed.

► Use a motor protection switch with the recommended settings.

Problem	Possible causes	Remedy
Fan is not working	• Connecting cable defective or loose • Incorrect mains voltage	• Check the mains voltage and connecting cable.
Vacuum pump will not start up	• Incorrect mains voltage	• Check the mains voltage.
	• Fuse on site defective • Motor protection switch defective • Vacuum pump blocked • Motor faulty	• Check the fuse. • Check the motor protection switch. • Contact Pfeiffer Vacuum Service. • Contact Pfeiffer Vacuum Service.
	• Temperature threshold value of bimetal switch reached • Motor protection switch triggered	• Reduce the thermal load. — Ensure adequate air supply. — Check the fan function — Adapt the ambient conditions. • When the reset temperature is reached, switch the vacuum pump back on manually via the motor protection switch.

Vacuum pump does not reach ultimate pressure	• Leakage on the vacuum pump	1. Carry out leak detection. 2. Check seals and flange connections. 3. Eliminate leaks.
	• Gas throughput too high	• Reduce the process gas load.
	• Rotor not running smoothly, defective bearing	1. Check the vacuum pump for noise development 2. Contact Pfeiffer Vacuum Service.
	Thermal load due to: • lack of ventilation • ambient temperature too high	1. Check to make sure the fan is working. — Check the fan connecting cable for a correct fit and damage. 2. Reduce the thermal load. — Ensure adequate air supply. — Adapt the ambient conditions.
	• The vacuum pump is contaminated	1. Contact Pfeiffer Vacuum Service. 2. Have it cleaned.
	• Vacuum chamber, pipes or vacuum pump are leaking	1. Carry out leak detection starting from the vacuum chamber. 2. Check seals and flange connections. 3. Eliminate leaks in the vacuum system.
	• Condensate in the suction chamber	1. Check the process medium. 2. Operate the scroll pump with gas ballast.
	• Seal the tip seal	• Contact Pfeiffer Vacuum Service. • Replace the tip seal.
	• Tip seal insufficiently run in (e.g., after tip seal replacement)	• Operate the vacuum pump with no load for a while
Vacuum pump switches off unexpectedly during operation	• Temperature threshold value of bimetal switch reached • Motor protection switch triggered	• Reduce the thermal load. — Ensure adequate air supply. — Check the fan function — Adapt the ambient conditions. • When the reset temperature is reached, switch the vacuum pump back on manually via the motor protection switch.
Unusual noises during operation	• Bearing is damaged	• Contact Pfeiffer Vacuum Service.
	• Rotor damaged	• Contact Pfeiffer Vacuum Service.
	• Spiral element contaminated or damaged	• Contact Pfeiffer Vacuum Service.

Tbl. 12: Troubleshooting with scroll pumps

11 Service solutions by Pfeiffer Vacuum

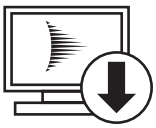
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

We are always focused on perfecting our core competence – servicing of vacuum components. Once you have purchased a product from Pfeiffer Vacuum, our service is far from over. This is often exactly where service begins. Obviously, in proven Pfeiffer Vacuum quality.

Our professional sales and service employees are available to provide you with reliable assistance, worldwide. Pfeiffer Vacuum offers an entire range of services, from original replacement parts to service contracts.

Make use of Pfeiffer Vacuum service
Whether preventive, on-site service carried out by our field service, fast replacement with mint condition replacement products, or repair carried out in a Service Center near you – you have various options for maintaining your equipment availability. You can find more detailed information and addresses on our homepage, in the section.

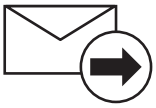
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



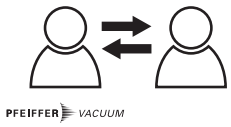
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

a) Remove and store all accessories (all external parts, such as valves, protective screens, etc.).
b) If necessary, drain operating fluid/lubricant.
c) If necessary, drain coolant.

2. Complete the service request and contamination declaration.

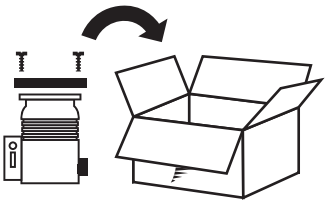


3. Send the forms by email, fax, or post to your local Service Center.

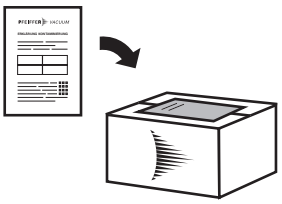


4. You will receive an acknowledgment from Pfeiffer Vacuum.

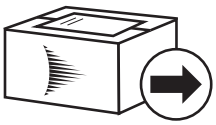
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



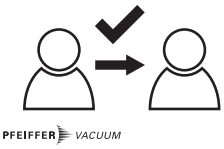
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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



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



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



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

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

12 Spare parts

Observe the following instructions when ordering spare parts:

Ordering spare parts

- ► Read the data on the product rating plate.
- ► Always have the vacuum pump article number at hand, along with other details from the rating plate.
- ► Install original spare parts only.

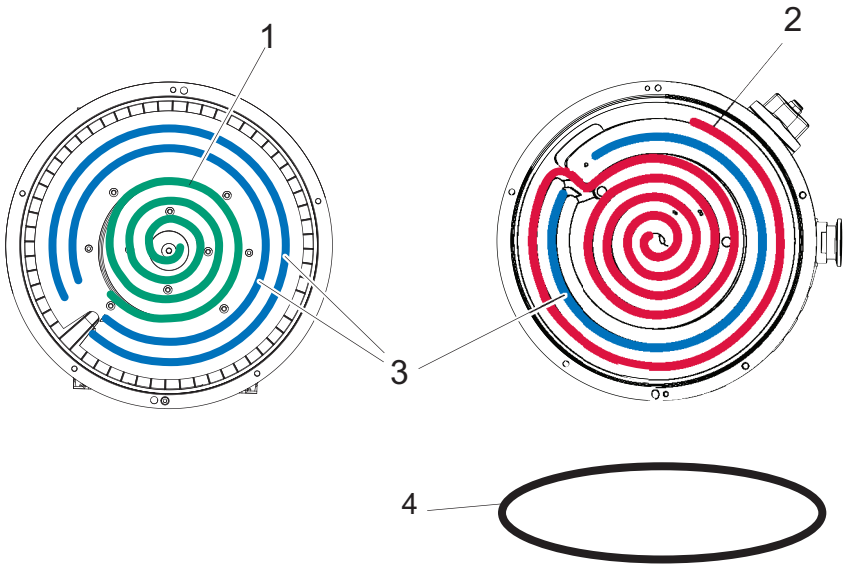


Fig. 28: HiScroll 46 tip seal maintenance set

1 Tip seal 1, 767 mm
2 Tip seal 2, 1541 mm
3 Tip seal 3, (512+566+461 mm)
4 O-ring

Spare part package	Order number
	HiScroll 46
Maintenance kit 1 – maintenance level 1	PD E40 000 -T

Tbl. 13: Spare part package

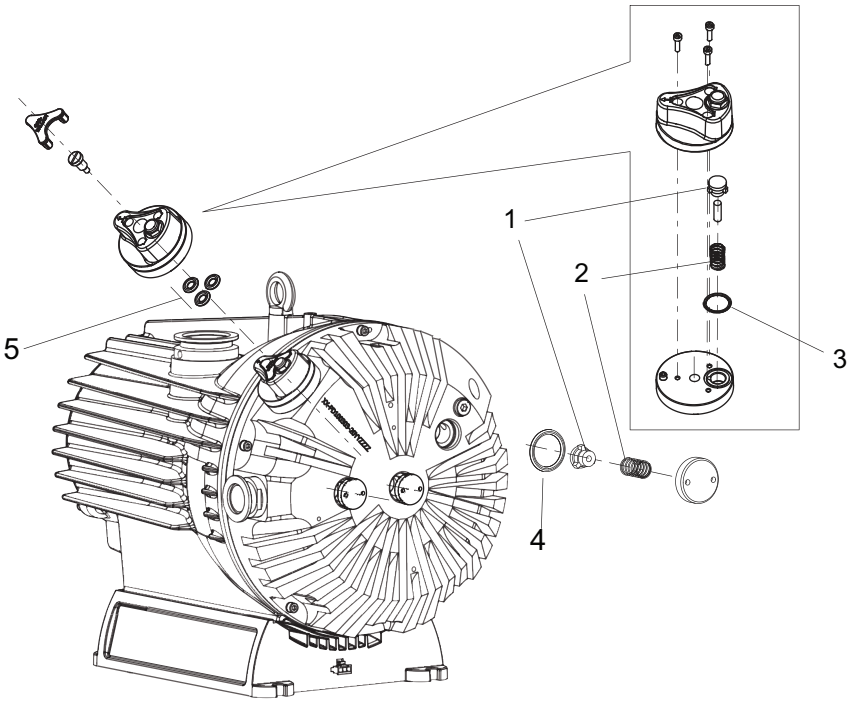


Fig. 29: HiScroll valve set

1 Valve plate, 4×
2 Compression spring, 4×
3 O-ring, 16 × 1.5
4 Segment ring 19 × 2.5 (4×)
5 O-ring, 6 × 3

Spare part package	Order number
	HiScroll 46
Valve set	PD E43 000 -T

Tbl. 14: Spare part package

13 Accessories

13.1 Accessory information

Cable and adapter
Mains, interface, connection, and extension cables provide a secure and suitable connection. Different lengths on request

Condensate separator
Protect the vacuum pump against fluids from the intake line and from the condensate return from the exhaust line

Dust separator
Protect the vacuum pump from particles from the process

13.2 Ordering accessories

Article	Order number
Gas ballast valve, 24 V DC, G 1/8"	PD Z10 100
Push-in fitting G 1/8" including seal for hose connection (8/6 mm)	P 4131 029
Screw cap for gas ballast valve	PD 100 067 AT
Mains cable with plug, can be assembled	PE 100 399 -U

Tbl. 15: Accessories for HiScroll

14 Technical data and dimensions

14.1 General

Basis for the technical data of Pfeiffer Vacuum spiral vacuum pumps:

- Specifications according to PNEUROP committee PN5
- ISO 21360-1 2016: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- Integral leakage rate with 100 % helium concentration, 60 s measurement duration

	mbar	bar	Pa	hPa	kPa	Torr | mm Hg
mbar	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
bar	1000	1	$1 \cdot 10^{5}$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	1	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr | mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	1
1 Pa = 1 N/m²						

Tbl. 16: Conversion table: Pressure units

	mbar l/s	Pa m³/s	sccm	Torr l/s	atm cm³/s
mbar l/s	1	0.1	59.2	0.75	0.987
Pa m³/s	10	1	592	7.5	9.87
sccm	$1.69 \cdot 10^{-2}$	$1.69 \cdot 10^{-3}$	1	$1.27 \cdot 10^{-2}$	$1.67 \cdot 10^{-2}$
Torr l/s	1.33	0.133	78.9	1	1.32
atm cm³/s	1.01	0.101	59.8	0.76	1

Tbl. 17: Conversion table: Units for gas throughput

14.2 Technical data

Performance data

- The **tested base pressure** is measured during quality control prior to delivery using a gas-type-independent measuring device (according to ISO 21360).

Selection field	HiScroll 46, scroll pump, three-phase motor	HiScroll 46, scroll pump, three-phase motor without GB
Part number	PD S40 200	PD S40 201
Connection flange (in)	DN 40 ISO-KF	DN 40 ISO-KF
Connection flange (out)	DN 25 ISO-KF	DN 25 ISO-KF
Tested base pressure	$7 \cdot 10^{-3}$ hPa	$7 \cdot 10^{-3}$ hPa
Intake pressure max.	1100 hPa	1100 hPa
Exhaust pressure, max.	1200 hPa	1200 hPa
Pumping speed at 60 Hz	43 m³/h	43 m³/h
Pumping speed at 50 Hz	35 m³/h	35 m³/h
Gas ballast	Yes	No
Gas ballast pressure	1500 hPa	–
Gas ballast flow stage 1	23 l/min	–
Gas ballast flow stage 2	35 l/min	–
Motor type	3-phase motor	3-phase motor

Selection field	HiScroll 46, scroll pump, three-phase motor	HiScroll 46, scroll pump, three-phase motor without GB
Rotation speed at 50 Hz	1460 rpm	1460 rpm
Rotation speed at 60 Hz	1760 rpm	1760 rpm
Input voltage 50 Hz	190 – 220 / 380 – 415 V	190 – 220 / 380 – 415 V
Input voltage 60 Hz	200 – 240 / 380 – 480 V	200 – 240 / 380 – 480 V
Input voltage: tolerance	±5 %	±5 %
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz
Current, max.	7.2 A	7.2 A
Cooling method	Air (Forced convection)	Air (Forced convection)
Protection degree	IP44, Type 1	IP44, Type 1
Mains cable included	No	No
Emission sound pressure level (EN ISO 2151)	55 dB(A)	55 dB(A)
Operating altitude, max.	3000 m	3000 m
Ambient temperature	5 – 40 °C	5 – 40 °C
Temperature: Storage	-10 – 50 °C	-10 – 50 °C
Temperature: Shipping	-25 – 55 °C	-25 – 55 °C
Integral leak rate	$1 \cdot 10^{-6}$ Pa m³/s	$1 \cdot 10^{-6}$ Pa m³/s
Weight	34 kg	34 kg

Tbl. 18: Technical data for HiScroll 46 | 3-phase

14.3 Substances in contact with the media

Pump parts	Substances in contact with the media	Standard
Housing	Aluminum	X
Inlet flange	Stainless steel	X
Outlet flange	Stainless steel	X
Corrugated bellows	Stainless steel	X
Pumping system	Anodized aluminum, PTFE compound	X
Non-return valve	Stainless steel, FKM	X
Gas ballast valve	Nickel-plated aluminum, stainless steel, FKM, PTFE	X
Screw-in filter gas ballast valve	Bronze/brass	X
Pressure sensor RPT	Ceramic, nickel, stainless steel, tungsten, silicon dioxide, araldite, solder	Option
Screws	Stainless steel	X
Seals	FKM	X

Tbl. 19: Materials that make contact with the process media

14.4 Dimensions

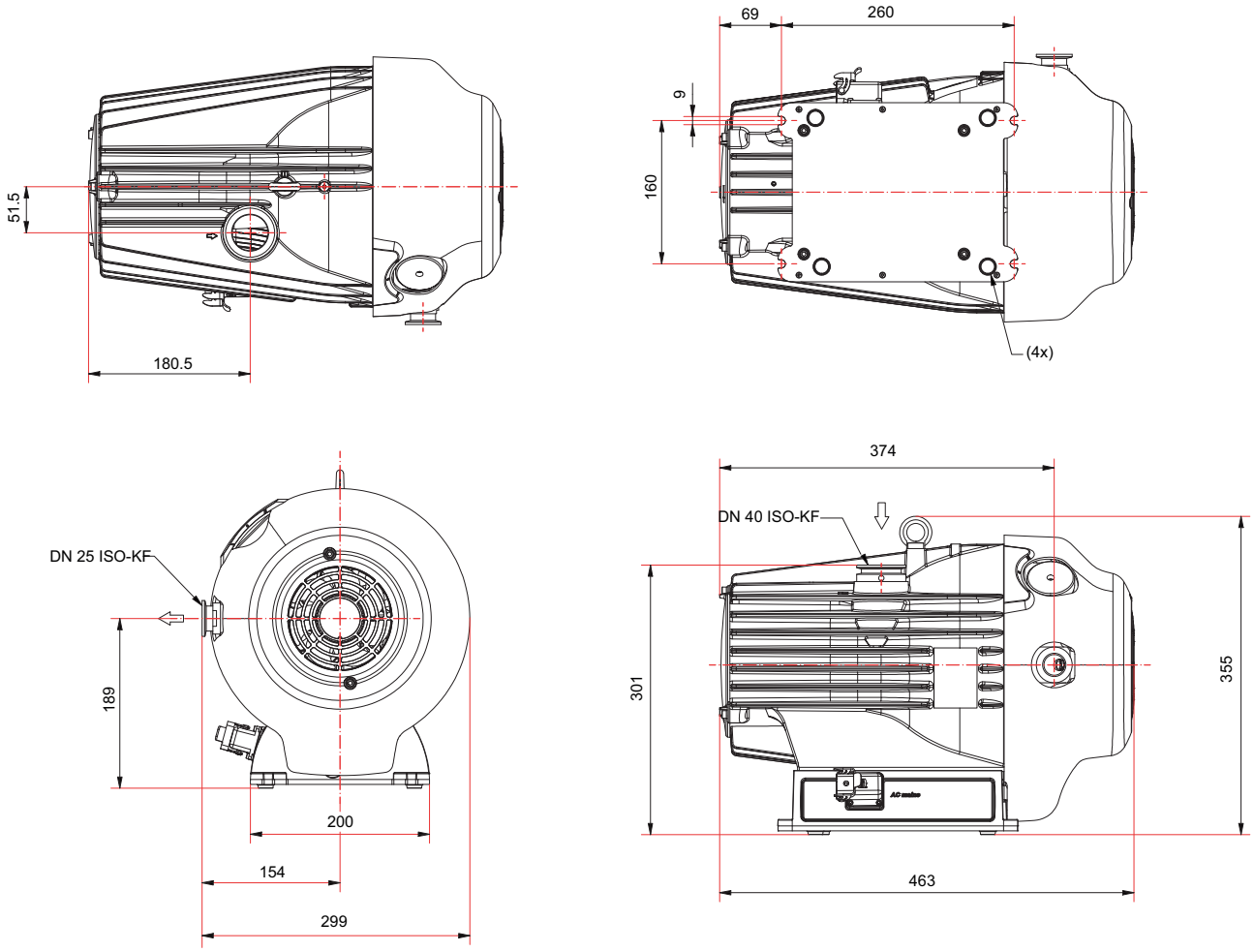


Fig. 30: HiScroll 46
Dimensions in mm

EC Declaration of Conformity

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

Declaration for product(s) of the type:

Scroll pump

HiScroll 46, Standard

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

- **Machinery 2006/42/EC (Annex II, no. 1 A)**
- **Electromagnetic compatibility 2014/30/EU**
- **Restriction of the use of certain hazardous substances 2011/65/EU**
- **Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU**

Harmonized standards and applied national standards and specifications

DIN EN ISO 12100: 2011
DIN EN 1012-2: 2011
DIN EN ISO 13857: 2020
DIN ISO 21360-1: 2016
ISO 21360-2: 2020
DIN EN 61000-3-2: 2019
DIN EN 61000-3-3: 2020
DIN EN IEC 61326-1: 2013
DIN EN IEC 63000: 2019
DIN EN 61010-1: 2020

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

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2024-02-05

CE

PFEIFFER VACUUM

VACUUM SOLUTIONS FROM A SINGLE SOURCE

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.

COMPLETE RANGE OF PRODUCTS

From a single component to complex systems:
We are the only supplier of vacuum technology that provides a complete product portfolio.

COMPETENCE IN THEORY AND PRACTICE

Benefit from our know-how and our portfolio of training opportunities!
We support you with your plant layout and provide first-class on-site service worldwide.

ed. A - Date 2502 - P/N:PU0115BEN

Are you looking for a perfect vacuum solution? Please contact us

Pfeiffer Vacuum GmbH
Headquarters • Germany
T +49 6441 802-0
info@pfeiffer-vacuum.de

www.pfeiffer-vacuum.com

PFEIFFER VACUUM