PFEIFFER
VACUUM+FAB SOLUTIONS

Part of the BUSCH GROUP

HiPace 800

Turbomolecular Vacuum Pump

Instruction Manual

P/N: PT0894 | Ed. 01_en-US | Original instructions

2025/08/07

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1 About this Manual

NOTE

Important

Read carefully before use.

- Keep the manual for future consultation.

1.1 Validity

This instruction manual is a customer document of Pfeiffer Vacuum + Fab Solutions. The instruction manual describes the functions of the named product and provide the most important information for the safe use of the device. The description is written in accordance with the valid directives. The information in this instruction manual refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

1.1.1 Applicable Documents

Document	Number
Instruction manual, Electronic drive unit TC 400, standard	PT 0203 BN
Instruction manual, Electronic drive unit TC 400 PB, Profibus	PT 0244 BN
Instruction manual, Electronic drive unit TC 400 E74, according to Semi E74	PT 0302 BN
Instruction manual, Electronic drive unit TC 400 DN, DeviceNet	PT 0352 BN
Instruction manual, Electronic drive unit TC 400 EC, EtherCAT	PT 0452 BN
Declaration of conformity	A component of this instruction manual

1.1.2 Variants

- HiPace 800, DN 200 ISO-K, TC 400, 24 V DC
- HiPace 800, DN 200 ISO-K, TC 400, 48 V DC
- HiPace 800, DN 200 CF-F, TC 400, 24 V DC
- HiPace 800, DN 200 CF-F, TC 400, 48 V DC
- HiPace 800, DN 200 ISO-F, TC 400, 24 V DC
- HiPace 800, DN 200 ISO-F, TC 400, 48 V DC

1.2 Target Group

This instruction manual is aimed at all persons performing the following activities on the product:

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

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

1.3 Conventions

1.3.1 Instructions in the Text

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

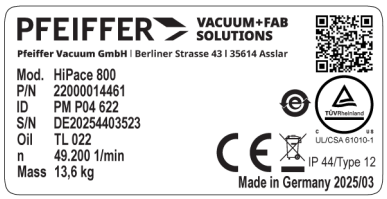
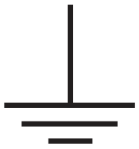
The bullet point list indicates an action with necessary steps followed by another.

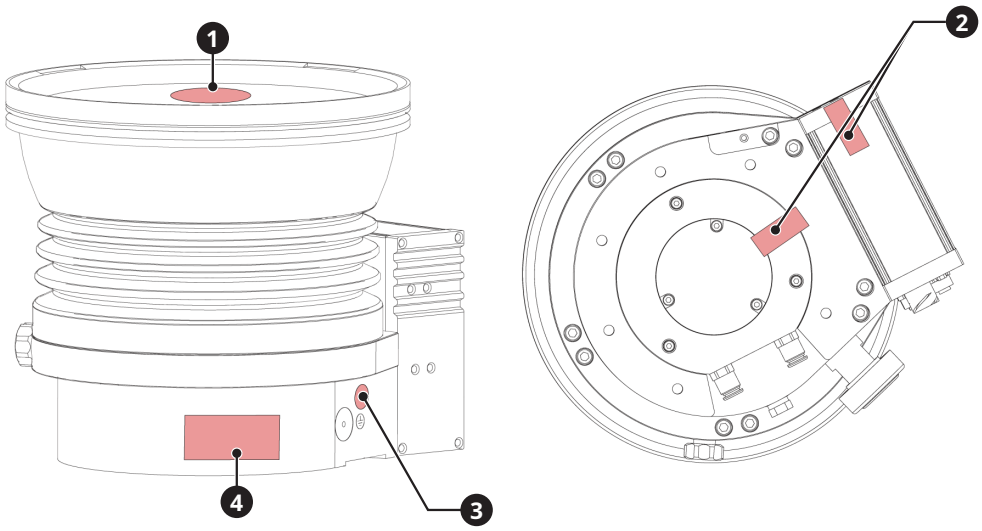
- Step 1
- Step 2
- Step 3
  - Step 3.1

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

1.3.2 Stickers on the Product

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

	**Nameplate (example)** The nameplate is located on the front side of the vacuum pump housing.
	**Instruction manual note** This sticker indicates that this instruction manual must be read before performing any tasks.
	**Protection class** The sticker describes protection class III for the product. The positioning indicates the position for the ground connection.
	**Warranty seal** The product is sealed ex factory. Damaging or removing a warranty seal results in loss of the warranty.



Graphic 1: Position of the stickers on the product

Description			
1	Instruction manual note	2	Warranty seal
3	Information regarding ground connection	4	Nameplate

1.4 Trademark Proof

- DeviceNet® is a registered trademark of Open DeviceNet Vendor Association Inc.
- Profibus® is a registered trademark of Profibus Nutzerorganisation e.V.
- EtherCAT® is a trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

2 Safety

2.1 General Safety Information

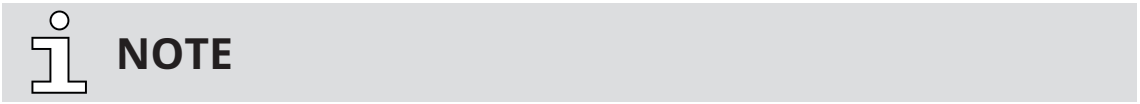
The following 4 risk levels and 1 information level are taken into account in this document.

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

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

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

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



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

2.2 Safety Precautions

NOTE

Duty to provide information on potential dangers.

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

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

NOTE

Infringement of conformity due to modifications to the product.

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

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

General safety precautions when handling the product

- Observe all applicable safety and accident prevention regulations.
- Check that all safety measures are observed at regular intervals.
- Do not expose body parts to the vacuum.
- Always ensure a secure connection to the earthed conductor (PE).
- Never disconnect plug connections during operation.
- Observe the above shutdown procedures.
- Before working on the high vacuum connection, wait until the rotor has stopped completely (rotation speed f = 0).
- Never put the device into operation with the high 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 protection class prior to installation or operation in other environments.

2.3 Limits of Use of the Product

NOTE

Notes on ambient conditions.

The specified permissible ambient temperatures apply to operation of the turbomolecular vacuum pump at maximum permissible backing pressure or at maximum gas throughput, depending on the cooling type. The turbomolecular vacuum pump is intrinsically safe thanks to redundant temperature monitoring.

- The reduction in backing pressure or gas throughput permits operation of the turbomolecular vacuum pump at higher ambient temperatures.
- If the maximum permissible operating temperature of the turbomolecular vacuum pump is exceeded, the electronic drive unit first reduces the drive output and then switches it off where necessary.

Parameter	Limit value
Installation location	Weatherproof (internal space)
Air pressure	530 hPa to 1060 hPa
Installation altitude	Max. 5000 m
Rel. air humidity	Max. 80 %, at T < 31 °C, up to max. 50 % at T < 40 °C
Protection class	III
Overvoltage category	II
Permissible protection degree	IP54 Type 12 according to UL 50E
Degree of pollution	2
Ambient temperature	5 °C – 35 °C with air cooling 5 °C – 40 °C with water cooling
Permissible radial magnetic field	6 mT
Maximum irradiated thermal output	4.2 W
Maximum permissible rotor temperature of the turbomolecular vacuum pump	90 °C
Maximum permissible bakeout temperature at the high vacuum flange	120 °C

Table 1: Permissible ambient conditions

2.4 Intended Use

- Use the turbomolecular vacuum pump only for generating vacuum.
- Use the turbomolecular vacuum pump only in combination with a suitable backing pump that can deliver up to the required maximum forevacuum pressure.
- Use the turbomolecular vacuum pump only in closed indoor areas.
- Use the turbomolecular vacuum pump only for the evacuation of dry and inert gases.

2.5 Foreseeable Misuse

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

- Establishing the voltage supply without correct installation
- Installing with non-specified fastening material
- Pumping explosive media
- Pumping of corrosive media
- Pumping of condensing vapors
- Pumping of fluids
- Pumping of dust
- Operating with impermissible high gas throughput
- Operating with impermissible high forevacuum pressure
- Operating with excessive irradiated heat output
- Operating in impermissible high magnetic fields
- Operating in an incorrect gas mode
- Venting with impermissible high venting rates
- Using for pressure generation
- Using in areas with ionizing radiation
- Operating in potentially explosive areas
- Using in systems in which sporadic loads and vibrations or periodic forces act on the device
- Causing of hazardous operating conditions by a presetting on the electronic drive unit that is contrary to the process
- Using of accessories or spare parts that are not listed in this instruction manual

2.6 Personnel Qualification

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

Training people

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

2.6.1 Ensuring Personnel Qualification

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

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

Trained individuals

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

2.6.2 Personnel Qualification for Maintenance and Repair

NOTE

Advanced training courses.

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

Adequately trained individuals are:

Maintenance level 1

– Customer (trained specialist)

Maintenance level 2

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

Maintenance level 3

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

2.6.3 Advanced Training with Pfeiffer Vacuum + Fab Solutions

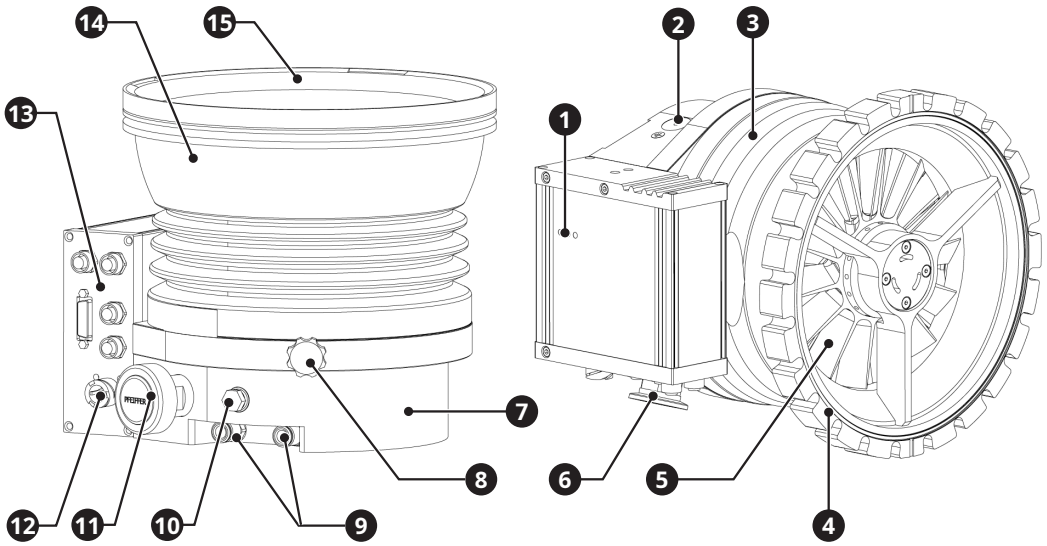
For optimal and trouble-free use of this product, Pfeiffer Vacuum + Fab Solutions offers a comprehensive range of courses and technical trainings.

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

3 Product Description

3.1 Function

The turbomolecular vacuum pump forms a compact unit with the electronic drive unit. Pfeiffer Vacuum + Fab Solutions power supply packs provide the voltage supply.



Graphic 2: HiPace 800 design

Description			
1	LED operating mode display for electronic drive unit	2	Ground terminal
3	Stainless steel pump housing	4	HV connection DN 200 CF
5	Turbo rotor	6	Forevacuum connection DN 25 ISO-KF
7	Pump bottom part	8	Venting screw
9	Connection couplings for cooling water	10	Barrier gas connection
11	Protective cap for forevacuum connection	12	Connecting plug for voltage supply DCin
13	Connection panel of the electronic drive unit	14	Aluminum pump housing
15	Protective cap for HV connection		

3.1.1 Cooling

- Water cooling
- Air cooling (optional)

The electronic drive unit automatically regulates the drive power down in the event of excessive temperatures.

3.1.2 Rotor Bearing

Hybrid-bearing turbomolecular vacuum pump

- High vacuum side: wear-free permanent magnetic bearing
- Forevacuum side: ball bearing with ceramic balls

Permanent lubrication of the rotor bearing on the forevacuum side is ensured by an operating fluid reservoir.

3.1.3 Drive

- Electronic drive unit TC 400 : Operating voltage 24 V DC
- Electronic drive unit TC 400 : Operating voltage 48 V DC

3.2 Identifying the Product

- To ensure clear identification of the product when communicating with Pfeiffer Vacuum + Fab Solutions, always keep all of the information on the nameplate to hand.
- Learn about certifications through test seals on the product or at *https://www.certipedia.com/*with company ID no. *000021320*.

3.2.1 Product Types

The product designation of Pfeiffer Vacuum + Fab Solutions turbomolecular vacuum pump from the HiPace series is composed of the family name, the size (which is based on the pumping speed of the turbomolecular vacuum pump) and, if required, an additional feature description.

Family	Size/model	Property, attribute, feature
HiPace	10 to 2800	**none**=Standard version
		mini=Compact version
		U=Overhead version
		C=Corrosive gas version
		P=Process
		M=Active magnetic bearing
		T=Temperature management
		Plus=Low vibration, low magnetic field
		E=High efficiency
		H=High compression
		I=Ion implantation

Table 2: Product designation of Pfeiffer Vacuum + Fab Solutions HiPace turbomolecular vacuum pump

3.2.2 Product Features

Feature	Version		
HV flange	DN 200 ISO-K	DN 200 ISO-F	DN 200 CF-F
Flange material	Aluminum	Aluminum	Stainless steel

3.3 Scope of Delivery

- Turbomolecular vacuum pump with electronic drive unit
- Protective cover for the high vacuum connection
- Protective cover for the forevacuum connection
- Mating plug for the *"remote*" (26-pin D-Sub connecting socket on the turbomolecular vacuum pump electronic drive unit) connection to the TC 400 (type-dependent)
- Mating plug for the *"E74"* connection to the TC 400 (type-dependent)
- Instruction manual

4 Transport and Storage

4.1 Transport

WARNING

Danger of serious injury due to falling objects.

Risk of injuries to limbs through to broken bones.

- Take particular care and pay special attention when transporting products manually.
- Do not stack the products.
- Wear safety shoes.

NOTE

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

Safe transport of the product

- Transport the turbomolecular vacuum pump only within the permissible temperature limits.
- Observe weight specified on the nameplate.
- Where possible, always transport or ship the turbomolecular vacuum pump in its original packaging.
- Always carry the turbomolecular vacuum pump with both hands.
- Remove the protective cover only immediately prior to installation.

4.2 Storage

NOTE

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

Storing the turbomolecular vacuum pump

- Seal all flange openings with the original protective caps.
- Seal all other connections (e.g. venting connection) with the corresponding original parts.
- Store the turbomolecular vacuum pump only indoors within the permissible temperature limits.
- In rooms with humid or aggressive atmospheres: Hermetically seal the turbomolecular vacuum pump together with a drying agent in a plastic bag.

5 Installation

The installation of the turbomolecular vacuum pump and its fastening is of outstanding importance. The rotor of the turbomolecular vacuum pump revolves at very high speed. In practice it is not possible to exclude the risk of the rotor touching the stator (e.g. due to the penetration of foreign bodies into the high vacuum connection). The kinetic energy released acts on the housing and on the anchoring of the turbomolecular vacuum pump within fractions of a second.

Comprehensive tests and calculations conforming to ISO 27892 confirm the safety of the turbomolecular vacuum pump both against crashes (destruction of the rotor blades) and against bursting (breakage of the rotor shaft). The experimental and theoretical results are expressed in safety measures and recommendations for the correct and safe fastening of the turbomolecular vacuum pump.

5.1 Preparatory Work

WARNING

Risk of cuts on moving, sharp-edged parts when reaching into the open high vacuum flange.

With the high vacuum flange open, access to sharp-edged parts is possible. A manual rotation of the rotor increases the danger situation. There is the risk of cuts, up to the separation of body parts (e.g. fingertips). There is a risk of hair and loose clothing being drawn in. Objects falling in destroy the turbomolecular vacuum pump during subsequent operation.

- Only remove the original protective covers immediately prior to connecting the high vacuum flange.
- Do not reach into the high vacuum connection.
- Wear protective gloves during installation.
- Do not start the turbomolecular vacuum pump with open vacuum connections.
- Always carry out the mechanical installation before electrical connection.
- Prevent access to the high vacuum connection of the turbomolecular vacuum pump from the operator side (e.g. open vacuum chamber).

General notes for installation

- Choose an installation location that permits access to the product and to supply lines at all times.
- Observe the ambient conditions given for the limits of use.
- Provide the highest possible level of cleanliness during assembly.
- Ensure that flange components during installation are grease-free, dust-free and dry.
- Observe the instructions for transport to the installation location.
- Make sure that there are sufficient cooling options for the turbomolecular vacuum pump.
- Install suitable shielding if the surrounding magnetic fields exceed the permissible levels.
- Install suitable shielding so that the irradiated thermal output does not exceed the permissible values when high temperatures occur due to the process.
- Observe the permissible temperatures for the vacuum connection.

5.2 Fastening the Pump to its Bottom Part

NOTICE

Damage to the turbomolecular vacuum pump due to force acting on the high vacuum side.

When fastened to the pump bottom part and simultaneously attached to the high vacuum side with a rigid pipe connection, there is risk of reactive forces acting on the turbomolecular vacuum pump. This can produce mechanical loads up to and including destruction of the turbomolecular vacuum pump.

- Create a flexible connection to the high vacuum flange.
- Observe the requirements for fastening the turbomolecular vacuum pump due to the bottom part.
- If the rotor blocks suddenly, make sure that all the torques generated are absorbed by the mounting plate on the operator side.

Required aids

- Hole circle in accordance with the dimensions of the turbomolecular vacuum pump
- Fixing screws, strength class ≥ 8.8, galvanized
- Washer, DIN EN ISO 7090 or DIN EN ISO 7092
- Mounting plate supplied by the customer

Required tools

- Hex key, **WAF 6**
- Wrench, alternative for DIN 933 hexagon head screws
- Calibrated torque wrench (tightening factor ≤ 1.6)

Fastening turbomolecular vacuum pump to bottom part

- Remove existing plastic plugs from the turbomolecular vacuum pump bottom part.
- Place the turbomolecular vacuum pump upright on the mounting plate.
- Bolt the pump bottom part to the mounting plate with the required quantity of permissible fixing screws and washers.
- Observe the specified screw-in depth.
- Observe the permissible tightening torque.

Turbo molecular pump	Mounting plate min. thickness | Tensile strength	Thread size	Quantity	Screw-in depth	Tightening torque
HiPace 800	3 mm | > 270 MPa	M8	6	≥ 1.3 × d	25 Nm ± 10 %

Table 3: Requirements for fastening the turbomolecular vacuum pumps to the bottom part

5.3 Connecting the High Vacuum Side

5.3.1 Designing the Counter Flange

NOTICE

Risk of damage due to incorrect counter flange design.

Unevenness on the operator-side counter flange results in stresses in the turbomolecular vacuum pump housing, even when properly attached. This can produce leakage or negative changes in running characteristics.

- Adhere to the shape tolerances for the counter flange.
- Observe the maximum flatness deviations over the entire surface.

NOTE

Superstructural parts and fittings on the high vacuum connection.

Installing superstructural parts and fittings to the high vacuum connection is the responsibility of the operating company. The loading capacity of the high vacuum flange is specific for the turbomolecular vacuum pump used.

- The total weight of superstructural parts must not exceed the maximum axial values specified.
- Make sure that all the torques generated if the rotor blocks suddenly, are absorbed by the system on the operator side and the high vacuum connection.
- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the high vacuum connection of the turbomolecular vacuum pump.

Parameter	HiPace 800
Maximum torque occurring in the event of a burst [1]	4200 Nm
Permissible axial load on the high vacuum flange [2] max.	1000 N (equivalent to 100 kg)
Flatness	± 0.05 mm
Minimum tensile strength of the flange material in all operating states in relation to the screw-in depth	170 N/mm^2 at 2.5 × d 270 N/mm^2 at 1.5 × d
Permissible radial magnetic field max.	6 mT
Permissible irradiated thermal output max.	4.2 W
Permissible rotor temperature max.	90 °C

Table 4: Requirements for the dimensioning of the customers high vacuum connection

[1] The theoretically calculated torque in the event of a burst (rotor shaft breakage) according to ISO 27892 was not reached in any experimental test.

[2] A one-sided load is not permitted.

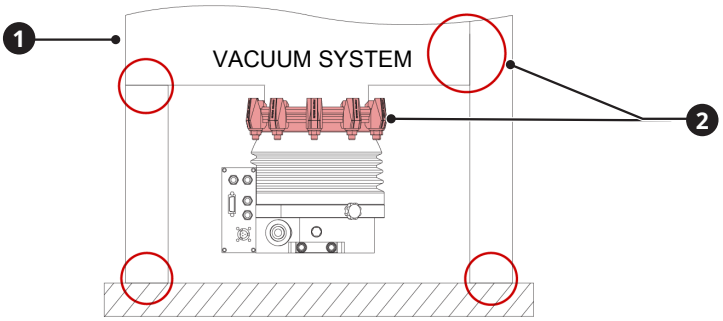
5.3.2 Considering Earthquake Protection

NOTICE

Turbomolecular vacuum pump damage caused by external vibrations.

In the event of earthquakes or other external vibrations, there is the risk of the rotor coming into contact with the safety bearings, or the housing touching the turbomolecular vacuum pump. This can produce mechanical loads up to and including destruction of the turbomolecular vacuum pump.

- Make sure that all flange and safety connections absorb the resulting forces.
- Secure the vacuum chamber against displacement or tipping.



Graphic 3: Safety connections turbomolecular vacuum pump

Description			
1	Vacuum system	2	Safety connections, customer-side

5.3.3 Using a Splinter Shield or Protective Screen

Pfeiffer Vacuum + Fab Solutions centering rings with splinter shield or protective screen in the high vacuum flange protect the turbomolecular vacuum pump against foreign matter from the vacuum chamber. The pumping speed of the turbomolecular vacuum pump reduces according to the passage guide values and the size of the high vacuum flange.

Flange size	Reduced pumping speed in % by gas type			
	H_2	He	N_2	Ar
Splinter shield DN 200	10	13	26	28
Protective screen DN 200	3	3	8	9

- With ISO flanges, use centering rings with protective screen or splinter shield.
- Use additional protective screen or splinter shield for CF flanges.

5.3.4 Using a Vibration Compensator

DANGER

Risk of injury caused by the turbomolecular vacuum pump breaking away with the vibration compensator in the event of a malfunction.

Sudden jamming of the rotor generates high destructive torques in accordance with ISO 27892. When using a vibration compensator, this will probably lead to the turbomolecular vacuum pump being sheared off in use. The energy that this would release could throw the entire turbomolecular vacuum pump or shattered pieces from its interior through the surrounding space. Potentially dangerous gases can escape. There is a risk of very serious injuries, including death, and extensive property damage.

- Take suitable safety precautions on-site for the compensation of the occurring torques.
- Before installing a vibration compensator, you must first contact Pfeiffer Vacuum + Fab Solutions.

Pfeiffer Vacuum + Fab Solutions vibration compensators are suitable for use on vibration-sensitive systems.

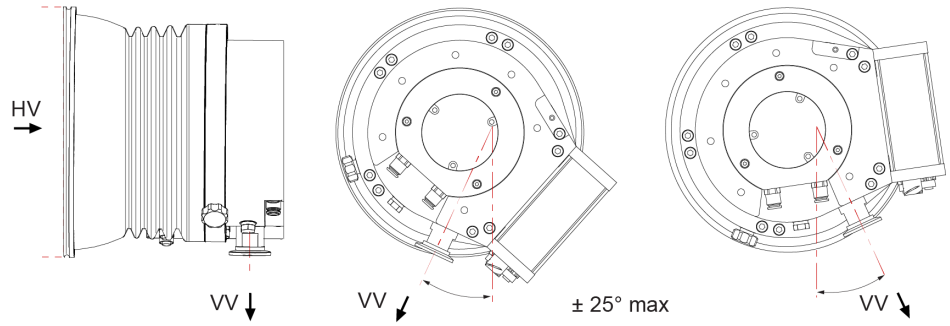
Installing the vibration compensator

- Install the vibration compensator only with vertical passage.
- Consider the flow resistance.
- Secure the vacuum pump additionally to the high vacuum flange.
- Observe the fastening of the ISO flanges.

5.3.5 Observing the Mounting Orientation

Pfeiffer Vacuum + Fab Solutions turbomolecular vacuum pumps of the HiPace series are suitable for use with dry compressing backing pumps for mounting in **all** orientations.

- When using oil-sealed backing pumps, avoid backflow from the forevacuum range.



Graphic 4: Recommended alignment when using oil-leaked backing pumps

Determine a horizontal mounting orientation of the turbomolecular vacuum pump with oil-sealed backing pumps

- Always align the forevacuum connection downwards vertically.
  - Permissible deviation ± 25°
- Support the tube connections in front of the turbomolecular vacuum pump.
- Do not allow any forces from the piping system to act on the turbomolecular vacuum pump.
- Do not load the high vacuum flange of the turbomolecular vacuum pump on one side.

5.3.6 Attaching ISO-K flange to ISO-K

NOTE

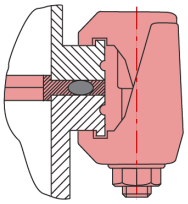
ISO flange connections.

For the connection of flanges in ISO-KF or ISO-K design, twisting may occur in the event of sudden blockage of the rotor, despite correct installation.

- Leak-tightness of the flange connection, however, is not jeopardized in this regard.

Required tools

- Wrench, WAF 15
- Calibrated torque wrench (Tightening factor ≤ 1.6)



Graphic 5: Flange connection ISO-K to ISO-K, bracket screws

Connecting with bracket screws

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Connect the flange with the components of the mounting kit according to the figure.
- Use for all prescribed components for the turbomolecular vacuum pump.
- Tighten the bracket screws crosswise in 3 steps.
  - **Tightening torque: 5, 15, 25 ± 2 Nm**

5.3.7 Attaching ISO-K Flange to ISO-F

The connection types for ISO-K flange installation with ISO-F flange are:

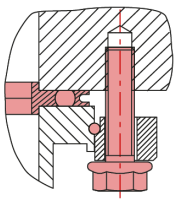
- "Hexagon head screw and tapped hole"
- “Hexagon head screw and through hole”
- "Stud screw with tapped hole"
- "Stud screw with through hole"

NOTE

ISO flange connections.

For the connection of flanges in ISO-KF or ISO-K design, twisting may occur in the event of sudden blockage of the rotor, despite correct installation.

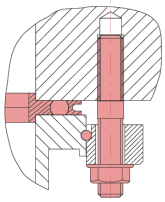
- Leak-tightness of the flange connection, however, is not jeopardized in this regard.



Graphic 6: Flange connection ISO-K to ISO-F, hexagon head screw and tapped hole

Connecting a hexagon head screw with a tapped hole

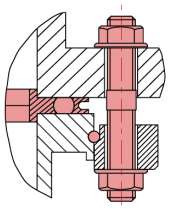
- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Place the collar flange over the high vacuum flange of the turbomolecular vacuum pump.
- Insert the snap ring in the side groove on the high vacuum flange of the turbomolecular vacuum pump.
- Attach the turbomolecular vacuum pump with collar flange, snap ring and centering ring to the counter flange according to the figure.
- Use all prescribed components for the turbomolecular vacuum pump.
- Screw the hexagon head screws into the tapped holes. Observe the minimum tensile strength of the flange material and the screw depth.
- Tighten the hexagon head screws cross-wise in 3 steps.



Graphic 7: Flange connection ISO-K to ISO-F, stud screw and tapped hole

Connecting a stud screw to a tapped hole

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Screw in the required number of stud screws with the shorter end in the holes on the counter flange. Observe the minimum tensile strength of the flange material and the screw-in depth.
- Insert the snap ring in the side groove on the high vacuum flange of the turbomolecular vacuum pump.
- Attach the turbomolecular vacuum pump with collar flange, snap ring and centering ring to the counter flange according to the figure.
- Use all prescribed components for the turbomolecular vacuum pump.
- Tighten the nuts cross-wise in 3 steps.



Graphic 8: Flange connection ISO-K to ISO-F, stud screw and through hole

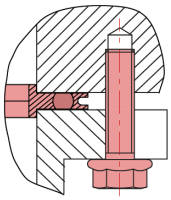
Connecting a stud screw to a through hole

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Place the collar flange over the high vacuum flange of the turbomolecular vacuum pump.
- Insert the snap ring in the side groove on the high vacuum flange of the turbomolecular vacuum pump.
- Attach the turbomolecular vacuum pump with collar flange, snap ring and centering ring to the counter flange according to the figure.
- Use all prescribed components for the turbomolecular vacuum pump.
- Tighten the nuts cross-wise in 3 steps.

5.3.8 Attaching ISO-F Flange to ISO-F

The connection types for ISO-F flange installation with ISO-F flange are:

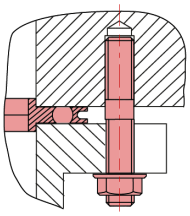
- "Hexagon head screw and tapped hole"
- “Hexagon head screw and through hole”
- "Stud screw with tapped hole"
- "Stud screw with through hole"



Graphic 9: Flange connection ISO-F, hexagon head screw and tapped hole

Connecting a hexagon head screw to a tapped hole

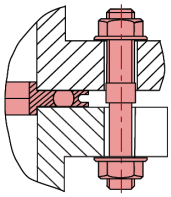
- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Attach the turbomolecular vacuum pump with centering ring to the counter flange according to the figure.
- Use for all prescribed components for the turbomolecular vacuum pump.
- Screw the required number of hexagon head screws into the tapped holes. Observe the minimum tensile strength of the flange material and the screw-in depth.
- Tighten the hexagon head screws cross-wise in 3 steps.
  - **Tightening torque: 10, 20, 38 ± 3 Nm**



Graphic 10: Flange connection ISO-F, stud screw and tapped hole

Connecting a stud screw to a tapped hole

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Screw in the stud screws with the shorter end into the tapped holes on the counter flange. Observe the minimum tensile strength of the flange material and the screw-in depth.
- Attach the turbomolecular vacuum pump with centering ring to the counter flange according to the figure.
- Use all prescribed components for the turbomolecular vacuum pump.
- Secure the hexagon nuts.
- Tighten the nuts cross-wise in 3 steps.
  - **Tightening torque: 10, 20, 38 ± 3 Nm**



Graphic 11: Flange connection ISO-F, stud screw and through hole

Connecting a stud screw to a through hole

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Attach the turbomolecular vacuum pump with centering ring to the counter flange according to the figure.
- Use for all prescribed components for the turbomolecular vacuum pump.
- Tighten the screw connections cross-wise in 3 steps.
  - **Tightening torque: 10, 20, 38 ± 3 Nm**

5.3.9 Attaching CF-flange to CF-F

NOTICE

Leaks may occur due to the incorrect installation of CF flanges.

Inadequate cleanliness when handling CF flanges and copper gaskets results in leaks and may cause process damage.

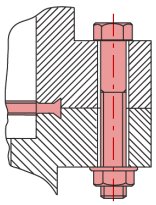
- Always wear suitable gloves before touching or fitting any components.
- Fit seals only if dry and free of grease.
- Take care of damaged surfaces and cut edges.
- Replace the damaged components.

The connection types for CF installation with CF flange are:

- "Hexagon head screw and through hole"
- "Stud screw with tapped hole"
- "Stud screw with through hole”

Required tools

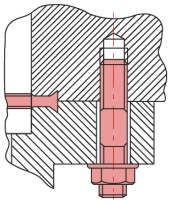
- Hexagonal wrench, WAF 13
- Calibrated torque wrench (tightening factor ≤ 1.6)



Graphic 12: Flange connection CF-F, hexagon head screw and through hole

Connecting a hexagon head screw to through holes

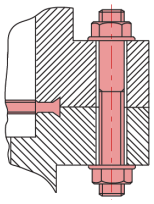
- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- If used: Insert a protective screen or splinter shield with clamping lugs downwards in high vacuum flange of the turbomolecular vacuum pump.
- Place the seal exactly in the hollow.
- Connect the flange with the components of the mounting kit according to the figure.
- Tighten the screw couplings all the way around.
  - Tightening torque: **22 ± 2 Nm**
- Check the torque, since creeping of the sealing material may make it necessary to re-tighten the screws.



Graphic 13: Flange connection CF-F, stud screw and tapped hole

Connecting a stud screw to a tapped hole

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- Screw in the required number of stud screws with the shorter end in the holes on the counter flange.
- If used: Insert a protective screen or splinter shield with clamping lugs downwards in high vacuum flange of the turbomolecular vacuum pump.
- Place the seal exactly in the hollow.
- Connect the flange with the components of the mounting kit according to the figure.
- Tighten the screw couplings all the way around.
  - Tightening torque: **22 ± 2 Nm**
- Check the torque, since creeping of the sealing material may make it necessary to re-tighten the screws.



Graphic 14: Flange connection CF-F, stud screw and through hole

Connecting a stud screw to a through hole

- Only use the approved mounting kits of Pfeiffer Vacuum + Fab Solutions for the connection of the turbomolecular vacuum pump.
- If used: Insert a protective screen or splinter shield with clamping lugs downwards in high vacuum flange of the turbomolecular vacuum pump.
- Place the seal exactly in the hollow.
- Connect the flange with the components of the mounting kit according to the figure.
- Tighten the screw couplings all the way around.
  - Tightening torque: **22 ± 2 Nm**
- Check the torque, since creeping of the sealing material may make it necessary to re-tighten the screws.

5.4 Connecting the Forevacuum Side

DANGER

Danger to life from poisoning where toxic process media leak from damaged connections.

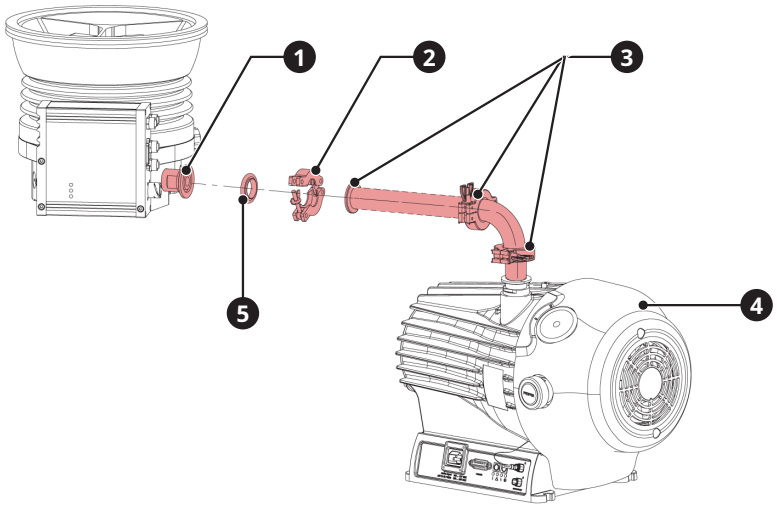
Sudden twisting of the turbomolecular vacuum pump in the event of a fault causes fittings to accelerate. There is the risk of damaging on-site connections (e.g., forevacuum line) and resulting leaks. This results in leakage of process media. In processes involving toxic media, there is a risk of injury and danger to life due to poisoning.

- Keep masses connected to the turbomolecular vacuum pump as low as possible.
- Use flexible lines to connect to the turbomolecular vacuum pump where necessary.

NOTE

Suitable backing pump.

Use the turbomolecular vacuum pump only in combination with a suitable backing pump that can deliver up to the required maximum backing pressure. To achieve the backing pressure, use a suitable backing pump or a pumping station from the Pfeiffer Vacuum + Fab Solutions range. In this case, the backing pump is also controlled directly via the turbomolecular vacuum pump electronic drive unit interfaces (e.g., relay box or connection cable).



Graphic 15: Example of forevacuum connection on HiPace 800

Description			
1	Turbomolecular vacuum pump forevacuum connection	2	Circlip
3	Vacuum components DN 25 ISO-KF	4	Backing pump
5	Centering ring		

Establishing the forevacuum connection

- With rigid pipe connections, include bellows to attenuate external vibrations.
- Install a forevacuum connection using small flange components, e.g. connection elements and pipe components DN 25 ISO-KF from the *Pfeiffer Vacuum + Fab Solutions Components Shop*.
- Implement measures to counteract the backflow of operating fluids or condensate from the forevacuum area.
- Observe the information in the instruction manual of the backing pump or pumping station when connecting and operating it.

5.5 Connecting the Cooling Water

WARNING

Risk of scalding from suddenly escaping hot cooling water.

The turbomolecular vacuum pump water connections are open to both sides. When connecting the cooling water supply, there is a risk of scalding from suddenly escaping, hot cooling water at over pressure.

- Prior to installation, ensure that pressure is discharged from the cooling water system, and that it is cooled down.
- Wear safety goggles and gloves.

Recommendations for cooling the turbomolecular vacuum pump

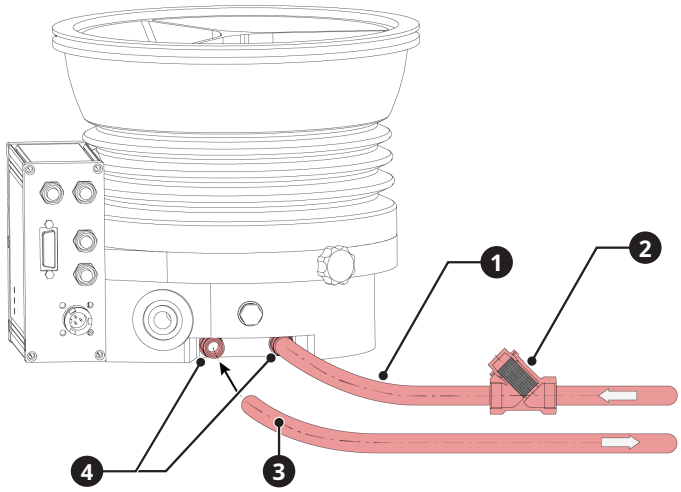
- Use additional cooling in the event of increased forevacuum pressure (> 0.1 hPa).
- Use additional cooling if operating with high gas throughput.
- Always use water cooling at ambient temperatures > 35 °C.

Parameter	Cooling water
Appearance	• filtered • mechanically clear • visually clear • no turbidity • no sediment • free from grease and oil
pH value	7 to 9
Carbonate hardness, max.	10 °dH 12.53 °e 17.8 °fH 178 ppm $CaC0_3$
Chloride content, max.	100 mg/l
Sulfate content, max.	240 mg/l
Carbonic acid content, max.	not detectable
Ammonia content, max.	not detectable
Electrical conductivity, max.	500 µS/cm
Particle size, max.	150 µm
Cooling water temperature	see "Technical data"
Cooling water flow	see "Technical data"
Cooling water pressure, max.	6000 hPa

Table 5: Requirements on the cooling water composition

Connection to the turbomolecular vacuum pump	External cooling water supply
Banjo fitting with insertion system	Hose connection: • External hose diameter 8 mm • Internal hose diameter 6 mm

Table 6: Requirements on the cooling water connection



Graphic 16: Connecting the cooling water supply

Description			
1	Feed line	2	Dirt trap
3	Return line	4	Cooling water connection

Connecting a cooling water supply

Requirements: The customer-side cooling system is closed and depressurized. The provided hose connections correspond to the turbomolecular vacuum pump connections.

- If necessary, use a dirt trap in the feed line.
- Insert the hoses for the cooling water feed line and return line into the respective connections on the turbomolecular vacuum pump.

5.6 Connecting Accessories

NOTE

Installation and operation of accessories.

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

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

NOTE

Accessory connection to electronic drive unit TC 400.

The electronic drive unit of the turbomolecular vacuum pump offers the connection of maximum 4 accessory devices. M12 connector sockets with the designation "accessory" are available for this purpose.

- The accessory connections have been preconfigured at the factory.
- After connecting pre-configured accessory devices, these are immediately ready for operation according to the factory settings.
- The use of other accessories for turbomolecular vacuum pumps is possible and requires settings in the configuration of the electronic drive unit.
- The desired accessory output is configured via RS-485 using Pfeiffer Vacuum + Fab Solutions control units or a PC.
- For detailed information see the “Electronic drive unit TM 700” or “Electronic drive unit TC 400” instruction manual.

	Electronic drive unit	Accessory connection	Y-Connector	Default
	Acc. A	A1	Y-1	Fan (continuous operation)
		A2	Y-2	Backing pump
	Acc. B	B1	Y-3	Venting valve
		B2	Y-2	Heating

Table 7: Preconfigured accessory connections to electronic drive unit TC 400

Connect pre-configured accessories

- Observe the instruction manual for the relevant accessory.
- Note the existing configuration of existing connections and control lines.
- Connect only matching accessory devices to the electronic drive unit.
- Use the Y-connector from the accessories range if you want to connect 3 or 4 devices.

Using additional accessories

- Observe the instruction manual for the relevant accessory.
- Note the existing configuration of existing connections.
- Use a Pfeiffer Vacuum + Fab Solutions control unit for the configuration if needed.

5.7 Connecting the Electrical Supply

DANGER

Risk of danger to life through missing mains disconnection device.

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

- Install a mains disconnection device according to SEMI-S2.
- Install a circuit breaker with an interruption rating of at least 10,000 A.

WARNING

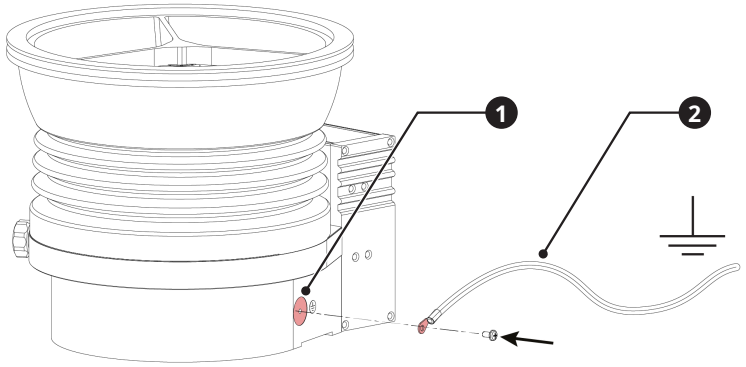
Risk of injury due to incorrect installation.

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.

5.7.1 Earthing the Vacuum Pump

Pfeiffer Vacuum + Fab Solutions recommends connecting a suitable earthing cable to discharge applicative interferences.



Graphic 17: Example: Connecting the earthing cable

Description			
1	Turbomelecular vacuum pump earthing connection	2	Earthing cable

Procedure

- Use the turbomolecular vacuum pump earthing connection (M4 female thread).
- Route the connection in accordance with locally applicable provisions.

5.7.2 Establishing the Electric Connection

DANGER

Danger to life from electric shock.

Power supply packs that are not specified or are not approves will lead to severe injury to death.

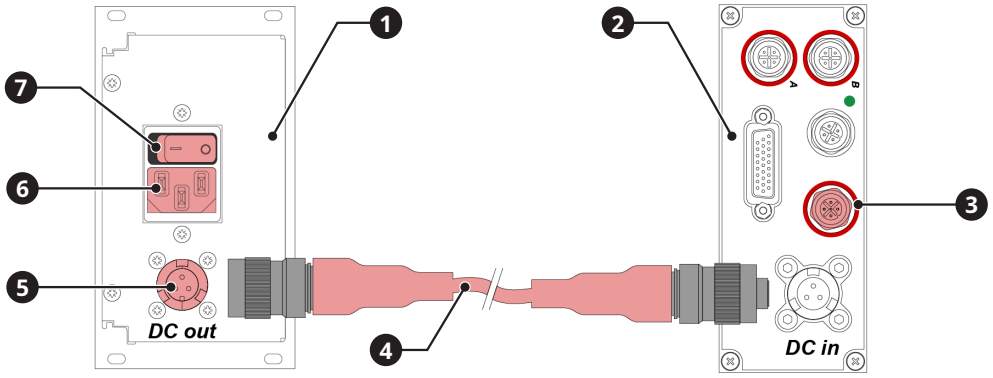
- Make sure that the power supply pack meets the requirements for double isolation between mains input voltage, in accordance with IEC 61010-1 IEC 60950-1 and IEC 62368-1.
- Where possible, use original power supply packs or only power supply packs that correspond with the applicable safety regulations.

WARNING

Danger of cut injuries from unexpected start up.

The use of mating plugs of the electronic drive unit (accessories) enables the automatic run-up of the turbomolecular vacuum pump as soon the power is turned on. Attaching mating plugs before or during the installation leads to the movement of parts hence the risk of cut injuries by sharp-edged in the exposed high vacuum flange.

- Only connect mating plugs after the mechanical installation.
- Only switch on the turbomolecular vacuum pump immediately prior to operation.



Graphic 18: Connecting electronic drive unit to power supply pack

Description			
1	Power supply pack | Control unit with power supply pack	2	Turbomolecular vacuum pump electronic drive unit
3	DC in connection	4	Connection cable, e. g., PM 061 132-T
5	Connecting socket DC out	6	Mains connection AC in
7	Main switch		

Connecting electronic drive unit

- Ensure the correct supply voltage.
- Make sure that the power supply pack main switch is off prior to connection.
- Use a suitable connection cable from the Pfeiffer Vacuum + Fab Solutions accessories range.

- Insert the connecting cable into the connection "DC in" on the electronic drive unit and close the bayonet lock.
- Insert the connecting cable into the connection "DC out" on the power supply pack and close the bayonet lock.

6 Operation

6.1 Commissioning

WARNING

Danger of cut injuries from unexpected start up.

The use of mating plugs of the electronic drive unit (accessories) enables the automatic run-up of the turbomolecular vacuum pump as soon the power is turned on. Attaching mating plugs before or during the installation leads to the movement of parts hence the risk of cut injuries by sharp-edged in the exposed high vacuum flange.

- Only connect mating plugs after the mechanical installation.
- Only switch on the turbomolecular vacuum pump immediately prior to operation.

NOTICE

Destruction of the turbomolecular vacuum pump due to excessive energy input during operation.

Simultaneous loading by means of high drive power (gas throughput, backing pressure), high heat radiation, or strong magnetic fields results in uncontrolled heating of the rotor and can destroy the turbomolecular vacuum pump.

- Consult Pfeiffer Vacuum + Fab Solutions before combining varying loads on the vacuum pump. Lower limit values apply.

NOTICE

Destruction of the turbomolecular vacuum pump due to gases with too high molecular masses.

The pumping of gases with impermissible high molecular masses leads to the destruction of the turbomolecular vacuum pump.

- Make sure that the gas mode is set correctly by **[P:027]** in the electronic drive unit.
- Consult Pfeiffer Vacuum + Fab Solutions before you use gases with higher molecular masses (>80).

Important settings and function-related variables are factory-programmed into the turbomolecular vacuum pump electronic drive unit as parameters. Each parameter has a three-digit number and a description. Parameter driven operation and control is supported via control units, or externally via RS-485 using the Pfeiffer Vacuum + Fab Solutions protocol.

Parameter	Name	Designation	Default
[P:027]	GasMode	Gas mode	0 = heavy gases
[P:035]	CfgAccA1	Accessory connection A1	0 = fan (continuous operation)
[P:036]	CfgAccB1	Accessory connection B1	1 = Venting valve
[P:037]	CfgAccA2	Accessory connection A2	3 = backing pump
[P:038]	CfgAccB2	Accessory connection B2	2 = heating
[P:700]	RUTimeSVal	Set value run-up time	8 min

[P:701]	SpdSwPt1	Rotation speed switch point 1	80 %
[P:707]	SpdSVal	Speed-control operation specification	65 %
[P:708]	PwrSVal	Set value power consumption	100 %
[P:720]	VentSpd	Venting at rotation speed, delayed venting	50 %
[P:721]	VentTime	Venting time, delayed venting	3 600 s

Table 8: Factory setting of the electronic drive unit when delivered

Notes for turbomolecular vacuum pump commissioning

- Observe the cooling water flow and flow rate.
- When using barrier gas, observe the barrier gas flow and throughput.
- Provide the current supply for the product.

6.2 Operating Modes

The turbomolecular vacuum pump can be operated in different modes

- Operation without control unit
- Operation via connection "E74"
- Operation via "remote" connection
- Operating via RS-485 interface from Pfeiffer Vacuum + Fab Solutions control unit or PC
- Operation via field bus

6.2.1 Operating without Operating Unit

NOTE

Automatic start.

When using the supplied mating plug on the electronic drive unit or bridging contacts according to the terminal lay-out, the turbomolecular vacuum pump is ready for operation. Once the supply voltage is provided, the turbomolecular vacuum pump starts up immediately.

Instructions for operation without control panel

- Use only the approved Pfeiffer Vacuum + Fab Solutions mating plug with bridges on the connection of the electronic drive unit.
- Switch on the mains supply of the turbomolecular vacuum pump only immediately before operation.

After applying the operating voltage, the electronic drive unit carries out a self-test to check the supply voltage. After completing the self-test successfully, the turbomolecular vacuum pump starts and activates connected additional equipment according to the configuration.

6.2.2 Operation via Multi-Function Connection "Remote"

Remote control is available via the 26-pin D-sub connector with the “remote” designation on the electronic drive unit. The accessible individual functions are mapped to "PLC levels".

Instructions for remote control operation

- See the instruction manual of the electronic drive unit for the standard version.

6.2.3 Operation via Connection "E74"

Operation is possible via the 15-pin D-sub connection with the “E74” designation on the electronic drive unit. Besides the signals defined in the Directive SEMI E74-0301, the connection is provided with an inverted alarm signal and an analog output.

Instructions for operation with “E74”

- See the instruction manual of the electronic drive unit with “E74” version.

6.2.4 Operation via Pfeiffer Vacuum + Fab Solutions Control Unit

Connecting a Pfeiffer Vacuum + Fab Solutions control unit allows the turbomolecular vacuum pump to be controlled via static parameters stored in the electronic drive unit.

Using control unit

- Observe the appropriate instruction manual for handling Pfeiffer Vacuum + Fab Solutions control units: Instruction manual available from the *Download Center*.
- Observe the electronic drive unit instruction manual from the scope of delivery of the turbomolecular vacuum pump.
- Connect the control unit to the "RS-485" port on the electronic drive unit.
- Use a suitable connection cable with an "RS-485" connector for this.
- Switch on the turbomolecular vacuum pump power supply via the external power supply pack or the control unit with integrated power supply pack.

6.2.5 Operation via Field Bus

Integrating and operating Pfeiffer Vacuum + Fab Solutions turbomolecular vacuum pump in the customer's field bus system is possible when using an electronic drive unit with a corresponding connection panel.

The following are available:

- Profibus
- Profinet
- EtherCAT
- DeviceNet

Instructions for operating via field bus

- See the instruction manual of the electronic drive unit with corresponding connection panel.

6.3 Switching on the Vacuum Pump

WARNING

Danger of cut injuries from unexpected start up.

The use of mating plugs of the electronic drive unit (accessories) enables the automatic run-up of the turbomolecular vacuum pump as soon the power is turned on. Attaching mating plugs before or during the installation leads to the movement of parts hence the risk of cut injuries by sharp-edged in the exposed high vacuum flange.

- Only connect mating plugs after the mechanical installation.
- Only switch on the turbomolecular vacuum pump immediately prior to operation.

WARNING

Risk of burns on hot surfaces when using additional equipment for heating during operation.

The use of additional equipment for heating the turbomolecular vacuum pump or for optimizing the process generates very high temperatures on surfaces that can be touched. There is a risk of burning.

- If necessary, set up a contact protection.
- If necessary, apply the warning stickers provided for this at the danger points.
- Ensure adequate cooling down before working on the turbomolecular vacuum pump or in its vicinity.
- Wear protective gloves.

WARNING

Risk of serious injury in the event of turbomolecular vacuum pump destruction due to over pressure.

Gas entry with very high over pressure results in destruction of the turbomolecular vacuum pump. There is a risk of serious injury due to ejected objects.

- Never exceed the permissible 1500 hPa (absolute) inlet pressure on the suction side or the venting and barrier gas connection.
- Make sure that high, process-related over pressures cannot directly enter the turbomolecular vacuum pump.

Switching on the turbomolecular vacuum pump

- Connect the power supply pack to the mains power supply on the customer-side.
- Switch on the power supply pack.

6.4 Operating Monitoring

6.4.1 Operating Mode Display via LED

LEDs on the electronic drive unit show the basic operating states of the turbomolecular vacuum pump. A differentiated error and warning display is only possible for operation with the Pfeiffer Vacuum + Fab Solutions control unit or a PC.

LED	Symbol	LED status	Display	Meaning
Green 		OFF		Currentless
		ON flashing		"Pumping station OFF", rotation speed ≤ 60 min^{-1}
		ON inverse flashing		"Pumping station ON", set rotation speed not reached
		ON constant		"Pumping station ON", set rotation speed reached
		ON flashing		"Pumping station OFF", speed > 60 min^{-1}
Yellow 		OFF		No warning
		ON constant		Warning
Red 		OFF		No error, no warning
		ON constant		Error, malfunction

Table 9: Behavior and meaning of the LEDs on the electronic drive unit

6.4.2 Temperature Monitoring

If threshold values are exceeded, output signals from temperature sensors bring the turbomolecular vacuum pump to a safe condition. Depending on the type, temperature thresholds for warning and error messages are immutably stored in the electronic drive unit. For information purposes, various status requests are set up in the parameter set.

- In order to avoid switching off the turbomolecular vacuum pump, the electronic drive unit already reduces the power consumption in case of exceeding the warning threshold for excess temperature. Examples are an impermissible motor temperature, or impermissibly high housing temperature.
- Further reduction of drive power and thus decreasing speed can potentially lead to underrun the rotation speed switchpoint. The turbomolecular vacuum pump switches off.
- Exceeding the temperature threshold for error messages switches off the turbomolecular vacuum pump immediately.

6.5 Switching off and Venting

NOTE

We recommend.

Vent the turbomolecular vacuum pump after shutdown. By doing so, you prevent particles flowing back into the vacuum system from the forevacuum side.

6.5.1 Switching off

Notes for switching off the turbomolecular vacuum pump

- Shut down the turbomolecular vacuum pump via the control unit or remote control.
- Close the forevacuum line.
- Switch off the backing pump, if necessary.

- Vent the turbomolecular vacuum pump.
- Close the supply lines (e.g. for cooling water or barrier gas).

6.5.2 Venting

CAUTION

Risk of injuries due to contact with vacuum when venting.

While venting the turbomolecular vacuum pump there is a risk of minor injuries due to the direct contact of body parts with the vacuum, e.g. hematomas.

- Do not fully unscrew the venting screw out of the housing during venting.
- Keep a distance from automatic venting device, such as venting valves.

NOTICE

Damage to the turbomolecular vacuum pump due to impermissibly fast pressure rise during venting.

Impermissibly high pressure rise rates place a significant load on the rotor and the magnetic bearing of the turbomolecular vacuum pump. During venting very small volumes in the vacuum chamber or the turbomolecular vacuum pump, there is a risk of uncontrollable pressure rises. This causes mechanical damage to the turbomolecular vacuum pump, including potential failure.

- Observe the maximum rate of pressure rise of **15 hPa/s**.
- Avoid manual and uncontrolled venting of very low volumes.
- Where necessary, use a venting valve from the Pfeiffer Vacuum + Fab Solutions accessories.

Venting manually

- Ensure that the vacuum system is shut down.
- Open the black venting screw on the turbomolecular vacuum pump by one revolution maximum.
- Wait for pressure equalization to atmospheric pressure in the vacuum system.
- Close the venting screw again.

Using a Pfeiffer Vacuum + Fab Solutions venting valve

The Pfeiffer Vacuum + Fab Solutions venting valve is an optional accessory for installation on the turbomolecular vacuum pump. The venting valve is normally closed. Control is via the turbomolecular vacuum pumpelectronic drive unit and by configuration of parameters **[P:012]** and **[P:030].** In the event of a power failure, the turbomolecular vacuum pump continues to deliver sufficient energy during its run-down period to initiate a proper venting process. When power is restored, the venting process is interrupted.

- Switch off the turbomolecular vacuum pump. The venting process starts automatically.

Venting speed [P:720]	Venting duration [P:721]	Venting duration in the event of a power failure
50 % of rotation speed max.	3600 s	3600 s

Table 10: Factory settings for delayed venting in turbomolecular vacuum pump

General information for fast venting

We recommend fast venting of larger volumes in 4 steps.

- Use a Pfeiffer Vacuum + Fab Solutions venting valve for the turbomolecular vacuum pump, or match the valve cross-section to the size of the recipient and maximum venting rate.
- Vent the vacuum system with a maximum rate of pressure rise of **15 hPa/s** for a duration of 20 seconds.
- Then vent the system using a second venting valve of any size; e. g. directly at the vacuum chamber.
- Wait for pressure equalization to atmospheric pressure in the vacuum system.

7 Maintenance

7.1 General Maintenance Information

WARNING

Danger to life from electric shock during maintenance and service.

The turbomolecular vacuum pump is only completely de-energized when the mains plug has been disconnected and the turbomolecular vacuum pump is at a standstill. There is a danger to life from electric shock when making contact with live components.

- Before performing work, switch off the main switch.
- Wait until the turbomolecular vacuum pump comes to a standstill (rotation speed f = 0).
- Remove power supply lines from the turbomolecular vacuum pump.
- Secure the device against unintentional restarting.

WARNING

Health hazard through poisoning from toxic contaminated machines or parts.

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

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

WARNING

Risk of cuts on moving, sharp-edged parts when reaching into the open high vacuum connection.

Incorrect handling of the turbomolecular vacuum pump before maintenance work results in hazardous situations with risk of injury. There is a risk of cuts from accessing sharp-edged, rotating parts when removing theturbomolecular vacuum pump.

- Wait until the turbomolecular vacuum pump comes to a standstill (rotation speed f = 0).
- Switch the turbomolecular vacuum pump off properly.
- Secure the turbomolecular vacuum pump against re-start.
- Seal open connections immediately following removal, using the original protective covers.

7.2 Checklist for Inspection and Maintenance

NOTICE

Maintenance frequency and service lives.

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

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

NOTE

Maintenance Level 2 and Level 3.

We recommend Pfeiffer Vacuum + Fab Solutions Service carry out maintenance work at Level 2 and Level 3 (inspection). If the specified intervals are exceeded, or if maintenance work is carried out improperly, no warranty or liability claims are accepted on the part of Pfeiffer Vacuum + Fab Solutions. This also applies wherever parts other than original spare parts are used.

Recommendations for performing maintenance measures

- You can carry out maintenance work at Level 1 yourself.
- Utilize a lint-free cloth and a little isopropanol for cleaning.
- Pay attention to when the operating fluid must be changed.
- For any questions relating to maintenance, contact the appropriate Pfeiffer Vacuum + Fab Solutions Service location.

Maintenance intervals

Action	Inspection	Maintenance level 1	Maintenance level 2	Maintenance level 3	Required material
Described in	Instruction Manual	Instruction/ Maintenance Manual	Maintenance Manual	Service Instructions	
Interval	If required	≤ 5 years	≤ 5 years	≤ 5 years	
Inspection	■				
Visual and acoustic check	■				
Read out and analyze pump data (for maintenance by Pfeiffer Vacuum + Fab Solutions service)	■				
Optional software update (for maintenance by Pfeiffer Vacuum + Fab Solutions service)	■				

Prepare a recommendation for action (for maintenance by Pfeiffer Vacuum + Fab Solutions service)	■				
Maintenance level 1 Replacing the operating fluid reservoir					
Clean the outside of the vacuum pump, clean the bottom part, Replace the operating fluid reservoir, Function test		■			Operating fluid reservoir
Maintenance level 2 – Replacing relevant wear parts					
Clean the outside of the vacuum pump, clean the bottom part, Partially disassemble the vacuum pump, Replace the operating fluid reservoir, Replace the Bearing Cartridge, Function test			■		Spare parts package 1 - bearing
Maintenance level 3 – Overhaul					
Dismantle and clean the vacuum pump, Replace all seals and wear parts, Function test				■	Spare parts package 1 – bearing Set of seals

7.3 Replacing Operating Fluid Reservoir

WARNING

Risk of poisoning from contact with harmful substances.

The operating fluid reservoir and parts of the turbomolecular vacuum pump may contain toxic substances from pumped media.

- Decontaminate affected parts before carrying out maintenance work.
- Prevent health hazards or environmental impacts with adequate safety precautions.
- Observe the operating fluid safety data sheet.
- Dispose of the operating fluid reservoir according to applicable regulations.

NOTICE

Damage to sealing surfaces from unsuitable tools.

The use of unsuitable tools for removal or insertion of sealing rings damages the sealing surfaces, causing turbomolecular vacuum pump leakage.

- Never use sharp, metallic tools (e.g. tweezers).
- Only remove sealing rings with an O-ring picker.

NOTE

Replacing the operating fluid reservoir.

Depending on its design, turbomolecular vacuum pumps operating fluid reservoir may feature capillary rods.

- When ordering spare parts, make sure you use the turbomolecular vacuum pump article number and the operating fluid reservoir.
- You can find this information on the turbomolecular vacuum pump nameplate.

Scan the QR code or *click here* to view Service Level 1 Replacement of operating fluid reservoir.

You can find the safety data sheet in the *Pfeiffer Vacuum + Fab Solutions Download Center*.

Prerequisites

- Turbomolecular vacuum pump off.
- Vacuum system vented to atmospheric pressure.
- Electrical supply disconnected.
- All cables disconnected.
- All openings sealed with the original protective covers and any plugs.

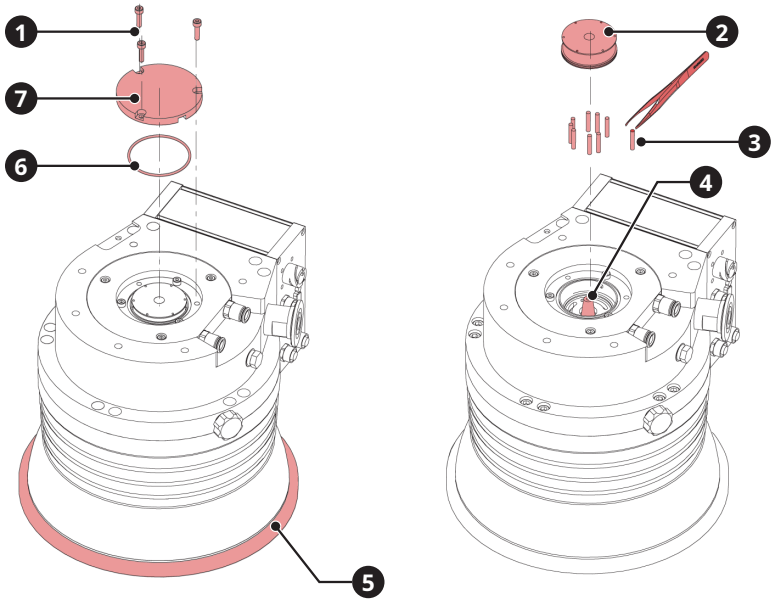
7.3.1 Removing the Operating Fluid Reservoir

Required tools

- Hex key, **WAF 3**
- Tweezers
- O-ring picker

Required consumables

- Clean, lint-free cloth
- Laboratory gloves



Graphic 19: Removing the operating fluid reservoir

Description			
1	Hexagon socket crew, 3x	2	Operating fluid reservoir
3	Capillary rod, 9x	4	Injection tip
5	Protection cover	6	O-ring
7	Closing cap		

Removing the operating fluid reservoir

- Wear laboratory gloves to avoid skin contact.
- Place the turbomolecular vacuum pump on the closed high vacuum flange.
- Unscrew all Allen head screws from the screw cap.
- Remove the screw cap.
- Be careful with the O-ring; use an O-ring picker to remove if needed.
- Avoid damage caused by scratches.
- Remove the operating fluid reservoir from the bearing housing by hand.
- Pull the old capillary rods out of the pump base with the tweezers.
- Clean the screw cap with a clean, lint-free cloth.
- Do not use cleaning agents.

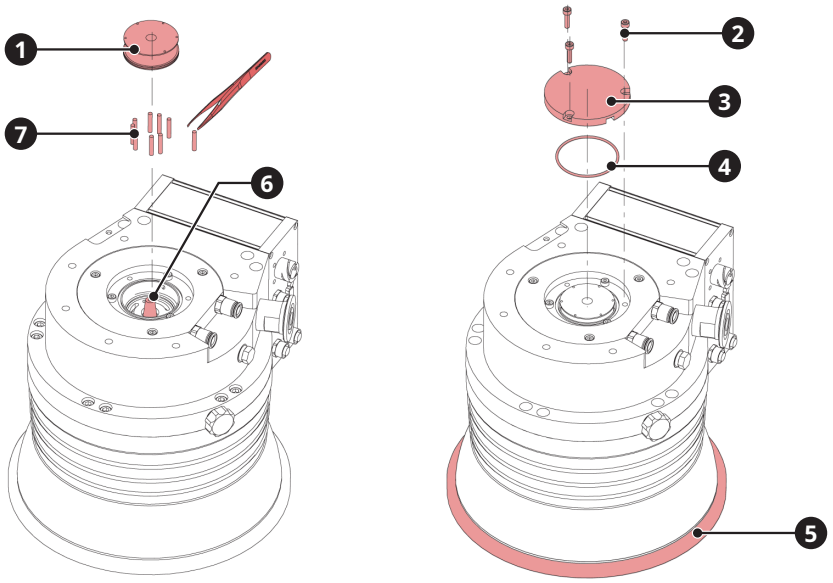
7.3.2 Installing the Operating Fluid Reservoir

Required consumables

- Laboratory gloves

Required tools

- Hex key, **WAF 3**
- Tweezers
- Calibrated torque wrench (tightening factor ≤ 1.6)



Graphic 20: Installing the operating fluid reservoir

Description			
1	Opearing fluid reservoir	2	Hexagon socket screw, 3x
3	Closing cap	4	O-ring
5	Protection cover	6	Injection tip
7	Capillary rods, 9x		

Installing the operating fluid reservoir

- Insert all new capillary rods with the tweezers.
- Insert the operating fluid reservoir into the bearing housing with the felt side in the direction of the splash nut.
- When doing so, do **not** exert pressure on the operating fluid reservoir.
- Insert the O-ring in the groove in the pump base.
- Fit the screw cap.
- Tighten all 3 Allen head screws uniformly.
  - Tightening torque: **2.5 Nm**.

7.4 Replacing Electronic Drive Unit

NOTICE

Damage to the turbomolecular vacuum pump and electronic drive unit due to improper disconnection of components.

Even after the power supply has been switched off, turbomolecular vacuum pump continues to deliver electrical energy during its run-down period. If the turbomolecular vacuum pump and electronic drive unit are disconnected prematurely, there is the risk of body contact and consequently the destruction of electronic components.

- Never disconnect the turbomolecular vacuum pump and electronic drive unit from each other if power is still connected or if the rotor is running.
- Monitor the rotation speed via the parameters available in the electronic drive unit (e.g. **[P:398]**).
- Wait until the turbomolecular vacuum pump comes to a standstill (rotation speed f = 0).

NOTICE

Property damage from electrostatic discharge.

Neglecting the electrostatic hazard for electronic components results in their damage or destruction.

- Implement ESD safety measures at the workstation.
- Observe EN 61340 "Protection of electronic devices from electrostatic phenomena".

NOTE

Backing up settings made by the customer.

The factory operating parameters are always preset in replacement units. All settings made by the customer to the original electronic drive unit are lost when it is replaced. To preserve your custom settings, you have the following options:

- Back up all your settings as a parameter set in an HPU.
- Load a backup parameter set by means of HPU into the new electronic drive unit.
- Program the individual settings into the new electronic drive unit by hand.
- See the instruction manual of the electronic drive unit and the HPU.

The electronic drive unit of the turbomolecular vacuum pump cannot be repaired. In the event of a defect, replace the entire electronic drive unit with a spare part.

Prerequisites

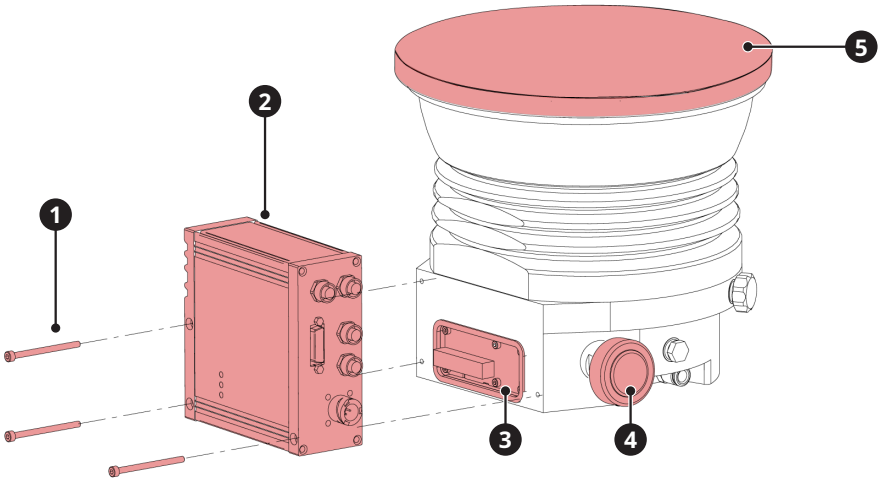
- Turbomolecular vacuum pump off.
- Turbomolecular vacuum pump cooled.
- Vacuum system vented to atmospheric pressure.
- Electrical supply disconnected.
- All cables disconnected from the electronic drive unit.
- All openings sealed with the original protective covers, and any screw plugs.

7.4.1 Removing the Electronic Drive Unit

The electronic drive unit of the turbomolecular vacuum pump cannot be repaired. In the event of a defect, replace the entire electronic drive unit with a spare part.

Required tools

- Hex key, **WAF 3**
- Calibrated torque wrench (tightening factor ≤ 1.6)



Graphic 21: Removal of electronic drive unit TC 400

Description			
1	Hexagon socket screw, 4x	2	Electronic drive unit
3	Elastomer seal	4	Forevacuum connection protective cover
5	High vacuum connection protective cover		

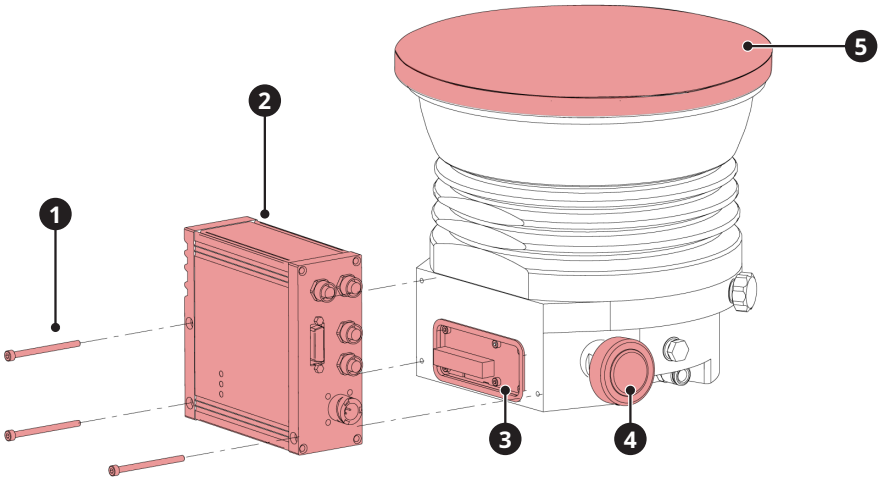
Procedure

- Install the turbomolecular vacuum pump upright if required.
- Unscrew all 3 Allen head screws from the electronic drive unit.
- Pull the old electronic drive unit off the the turbomolecular vacuum pump, taking care to keep it straight.

7.4.2 Installing the Electronic Drive Unit

Required tools

- Hex key, **WAF 3**
- Calibrated torque wrench (tightening factor ≤ 1.6)



Graphic 22: Installation of electronic drive unit TC 400

Description			
1	Hexagon socket screw, 4x	2	Electronic drive unit
3	Elastomer seal	4	Forevacuum connection protective cover
5	High vacuum connection protective cover		

Procedure

- Place a new electronic drive unit straight onto the adapter plate connection of the turbomolecular vacuum pump.
- Screw the electronic drive unit to the turbomolecular vacuum pump with all 3 Allen head screws.
  - Tightening torque: **2.5 Nm**

7.4.3 Confirming the Speed Specification

The typical nominal rotation speed of a turbomolecular vacuum pump is preset ex factory in the electronic drive unit. If the electronic drive unit is replaced or a different pump type is used, the set value settings of the nominal rotation speed is cleared. The manual confirmation of the nominal rotation speed is part of a redundant safety system as a measure for preventing excess rotation speed.

The redundant confirmation of the nominal rotation speed of a turbomolecular vacuum pump is possible by adjusting the **[P:777] NomSpdConf** parameter in the electronic drive unit.

HiPace	Nominal rotation speed
800	820 Hz

Required aids

- Connected Pfeiffer Vacuum + Fab Solutions control unit
- Knowledge of the configuration and setting of electronic drive unit operating parameters

Adjusting nominal rotation speed confirmation

- Observe the instruction manual of the control unit.
- Observe the instruction manual of the electronic drive unit.
- Open and edit the parameter **[P:777]**.
- Set the parameter **[P:777]** to the required value of the nominal rotation speed in Hertz.

NOTE

Alternative to adjusting the nominal rotation speed confirmation.

A Pfeiffer Vacuum + Fab Solutions SpeedConfigurator for the one-time immediate setting of parameter [P:777] is included with the replacement units.

8 Decommissioning

8.1 Shutting down for longer Periods

WARNING

Health hazard through poisoning from toxic contaminated machines or parts.

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

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

- Remove the turbomolecular vacuum pump from the vacuum system if necessary.
- Change the operating fluid reservoir of the turbomolecular vacuum pump if necessary.
- Close the high vacuum flange of the turbomolecular vacuum pump.
- Evacuate the turbomolecular vacuum pump via the forevacuum connection.
- Vent the turbomolecular vacuum pump via the venting connection with dry, oil-free air or inert gas.
- Seal all flange openings with the original protective caps.
- Store the turbomolecular vacuum pump upright with the high vacuum flange upwards.
- Store the turbomolecular vacuum pump indoors only, within the specified temperature range.
- In rooms with humid or aggressive atmospheres: Hermetically seal the turbomolecular vacuum pump together with a drying agent in a plastic bag.

8.2 Recommissioning

NOTICE

Risk of damage to the turbomolecular vacuum pump as a result of operating fluid aging after recommissioning.

The shelf life of the operating fluid of the turbomolecular vacuum pump is limited. Aging of the operating fluid may lead to the failure of the ball bearing and cause damage to the turbomolecular vacuum pump.

- Pay attention to when the operating fluid must be changed:
  - ➔ after maximum 2 years without operation,
  - ➔ after maximum 5 years combined operation and downtimes.
- Observe the maintenance manual and inform Pfeiffer Vacuum + Fab Solutions Service.

Procedures for recommissioning the turbomolecular vacuum pump

- Check the turbomolecular vacuum pump for contamination and moisture.
- Clean the turbomolecular vacuum pump externally with a lint-free cloth and a little isopropanol.
- If necessary, arrange for Pfeiffer Vacuum + Fab Solutions Service to completely clean the turbomolecular vacuum pump.

- Observe the total running time of the turbomolecular vacuum pump and if necessary, arrange for Pfeiffer Vacuum + Fab Solutions Service to replace the bearing.
- Change the operating fluid reservoir of the turbomolecular vacuum pump.
- Install the turbomolecular vacuum pump according to these instruction manuals *(see chapter "Installation", page 21)*.
- Recommission the turbomolecular vacuum pump according to these instruction manuals *(see chapter "Commissioning", page 35)*.

9 Recycling and Disposal

WARNING

Health hazard through poisoning from toxic contaminated machines or parts.

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

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

NOTE

Environmental protection.

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

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

9.1 General Disposal Information

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

Dispose of our products according to the following:

- Iron
- Aluminium
- Copper
- Synthetic
- Electronic components
- Oil and fat, solvent-free

Observe the special precautionary measures when disposing of:

- Fluoroelastomers (FKM)
- Potentially contaminated components that come into contact with media

9.2 Disposing of Turbomolecular Vacuum Pumps

Pfeiffer Vacuum + Fab Solutions turbomolecular vacuum pumps contain materials that you must recycle.

- Remove the complete operating fluid reservoir.
- Remove the electronic drive unit.
- Decontaminate components that come into contact with process gases.
- Separate the components into recyclable materials.
- Recycle the non-contaminated components.
- Dispose of the product or components in a safe manner according to locally applicable regulations.

10 Malfunctions

DANGER

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.

DANGER

Danger to life from poisoning where toxic process media leak from damaged connections.

Sudden twisting of the turbomolecular vacuum pump in the event of a fault causes fittings to accelerate. There is the risk of damaging on-site connections (e.g., forevacuum line) and resulting leaks. This results in leakage of process media. In processes involving toxic media, there is a risk of injury and danger to life due to poisoning.

- Keep masses connected to the turbomolecular vacuum pump as low as possible.
- Use flexible lines to connect to the turbomolecular vacuum pump where necessary.

DANGER

Danger to life from the turbomolecular vacuum pump breaking away in the event of a fault.

Sudden jamming of the rotor generates high destructive torques in accordance with ISO 27892. If the turbomolecular vacuum pump is not properly secured, it can shear off. The energy that this would release could throw the entire turbomolecular vacuum pump or shattered pieces from its interior through the surrounding space. Potentially dangerous gases can escape. There is a risk of very serious injuries, including death, and extensive property damage.

- Follow the installation directions for this turbomolecular vacuum pump.
- Observe the requirements regarding stability and design of the counter flange.
- Use only original accessories or fixing material approved by Pfeiffer Vacuum + Fab Solutions for the installation.

DANGER

Risk of injury caused by the turbomolecular vacuum pump breaking away with the vibration compensator in the event of a malfunction.

Sudden jamming of the rotor generates high destructive torques in accordance with ISO 27892. When using a vibration compensator, this will probably lead to the turbomolecular vacuum pump being sheared off in use. The energy that this would release could throw the entire turbomolecular vacuum pump or shattered pieces from its interior through the surrounding space. Potentially dangerous gases can escape. There is a risk of very serious injuries, including death, and extensive property damage.

- Take suitable safety precautions on-site for the compensation of the occurring torques.
- Before installing a vibration compensator, you must first of all contact Pfeiffer Vacuum + Fab Solutions.

Should malfunctions occur, you can find information about potential causes and how to fix them here. The instruction manual of the associated electronic drive unit contains more detailed error descriptions.

Problem	Possible causes	Remedy
Turbomolecular vacuum pump will not start up; none of the built-in LEDs on the electronic drive unit light up.	• Current supply interrupted.	• Check the plug contacts on the power supply pack. • Check the current supply lines. • Check the output voltage at the power supply pack “DC out” connection. ➔ Depending on the version of the power supply pack, 24 V DC or 48 V DC are present.
	• Incorrect operating voltage.	• Observe the electronic drive unit name plate. • Supply the correct operating voltage.
	• No operating voltage present.	• Supply the correct operating voltage. • Switch on the power supply pack.
	• Electronic drive unit defective.	• Replace the electronic drive unit. • Contact Pfeiffer Vacuum + Fab Solutions Service.
Turbomolecular vacuum pump will not start up; green LED on the electronic drive unit is flashing.	• **For operation without control unit:** Pins 1-3 and 1-14 on the “remote” connection are not connected.	• Connect the connections according to the electronic drive unit connection diagram. • Check the bridges on the connection cable.
	• **For operation via RS-485:** The bridge between pins 1 and 14 inhibits control commands.	• Remove the bridge at the “remote” connection. • Check the connection cable.
	• **For operation via RS-485:** Parameters not set in the electronic drive unit.	• Set the parameters [**P:010]** and **[P:023]** via the interface RS-485 to 1 = "ON".
	• Voltage drop in the cable is too high.	• Check the connection cable. • Use a suitable connection cable.

Problem	Possible causes	Remedy
Turbomolecular vacuum pump fails to reach the nominal rotation speed within the set run-up time.	• Forevacuum pressure too high.	• Check backing pump compatibility (see technical data). • Check that the backing pump is working.
	• Leakage on the turbomolecular vacuum pump.	• Carry out leak detection. • Check seals and flange connections. • Eliminate leaks.
	• Gas throughput too high.	• Reduce the process gas load.
	• Rotor not running smoothly, defective bearing.	• Check the turbomolecular vacuum pump for noise development. • Contact Pfeiffer Vacuum + Fab Solutions Service.
	• Run-up time setpoint adjusted too low.	Use a control unit to extend the set value run-up time **[P:700]**.
	Thermal load due to: • Lack of ventilation. • Water flow too low. • Forevacuum pressure too high. • Ambient temperature too high.	**Reduce the thermal load:** • Ensure adequate air supply. • Adjust the cooling water flow. • Reduce the forevacuum pressure. • Adapt the ambient conditions.
Turbomolecular vacuum pump not achieving the ultimate pressure.	• Turbomolecular vacuum pump is polluted.	• Heat the turbomolecular vacuum pump if required. • Have it cleaned. • Contact Pfeiffer Vacuum + Fab Solutions Service.
	• Vacuum chamber, pipes or turbomolecular vacuum pumpleaking.	• Carry out leak detection starting from the vacuum chamber. • Check seals and flange connections. • Eliminate leaks in the vacuum system.
Unusual noises during operation.	• Rotor bearing damaged.	• Contact Pfeiffer Vacuum + Fab Solutions Service.
	• Rotor damaged.	• Contact Pfeiffer Vacuum + Fab Solutions Service.
	• Splinter shield or protective screen loose.	• Check and correct the seat of the splinter shield or protective screen in the high vacuum flange. • Follow the installation directions.

Problem	Possible causes	Remedy
Red LED on the electronic drive unit illuminates.	• Group error.	• Reset the malfunction by switching the current supply off and on. • Reset the malfunction with V+ on pin 13 on the “remote” connection. • Set the parameter **[P:009]** via the RS-485 interface to 1 = malfunction acknowledgment. • Set the parameter **[P:010]** via the RS-485 interface to 0 = off and then 1 = on and malfunction acknowledgment. • Carry out a differentiated malfunction analysis with a control unit. • Contact Pfeiffer Vacuum + Fab Solutions Service.

Table 11: Troubleshooting turbomolecular vacuum pumps

11 Service Solutions

We offer first-class service

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

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

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

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

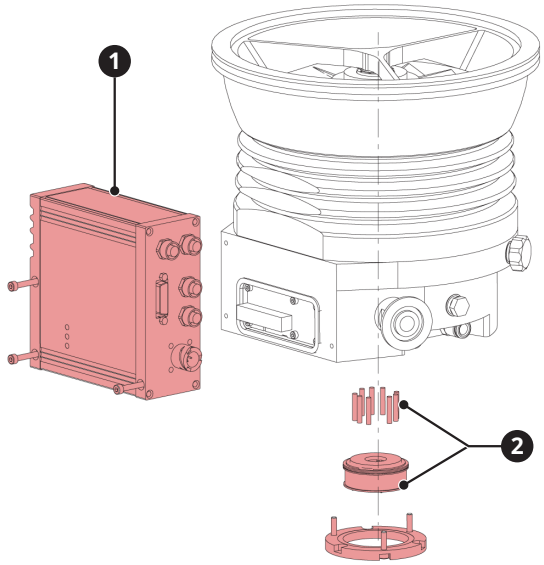
A copy of your request and a ticket number will be emailed to you.

Remember to print out the declaration of contamination, sign it and return it to Pfeiffer Vacuum + Fab Solutions.
You will receive the pre-filled declaration by E-mail after submitting the online service request.

In addition, follow the steps below:

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

12 Spare Parts



Graphic 23: Spare parts HiPace 800

Pos.	Designation	Order number	Remark	Qty.
1	Electronic drive unit TC 400	Refer to the nameplate	Depending on the connection panel	1
2	Operating fluid reservoir	PM 213 325 -T	Incl. capillary rod	1

Table 12: Available spare parts

13 Accessories

NOTE

Accessory connection to electronic drive unit TC 400.

The electronic drive unit of the turbomolecular vacuum pump offers the connection of maximum 4 accessory devices. M12 connector sockets with the designation "accessory" are available for this purpose.

- The accessory connections have been preconfigured at the factory.
- After connecting pre-configured accessory devices, these are immediately ready for operation according to the factory settings.
- The use of other accessories for turbomolecular vacuum pumps is possible and requires settings in the configuration of the electronic drive unit.
- The desired accessory output is configured via RS-485 using Pfeiffer Vacuum + Fab Solutions control units or a PC.
- For detailed information see the “Electronic drive unit TM 700” or “Electronic drive unit TC 400” instruction manual.

NOTE

View the range of accessories for Pfeiffer Vacuum + Fab Solutions turbomolecular vacuum pumps on our website.

13.1 Accessory Information

Fixing materials

Type-specific assembled packages, with centering ring and seal, ensure the secure fastening of the vacuum pump. Optionally with splinter shield or protective screen.

Power supply packs and control units

Power supply packs for optimal voltage supply of Pfeiffer Vacuum + Fab Solutions products are characterized by their compact size and adapted power supply with maximum reliability. Control units are used to check and adjust operating parameters.

Cable and adapter

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

Venting accessories

A Pfeiffer Vacuum + Fab Solutions venting valve offers maximum operating and process security. Automatic control through the integrated electronic drive unit of the vacuum pump.

Barrier gas supply

Barrier gas is used to protect the vacuum pump from dusty and corrosive processes, or excessive gas throughputs. Barrier gas prevents the ingress of damaging substances into the motor and bearing area. The supply is carried out either via a barrier gas valve or a barrier gas throttle without control.

Air cooling

For processes with low gas throughputs and good forevacuum pressure, air cooling can be used independently of a water supply. Automatic control through the integrated electronic drive unit of the vacuum pump.

Heating

Heating jackets enable the ultimate pressure to be reached more quickly during process cleaning. Automatic control through the integrated electronic drive unit of the vacuum pump.

Backing pump control

The electronic drive unit of the Vacuum pump enables useful control of backing pumps. Depending on the backing pump used, different operating modes are available.

Integrated pressure measurement

Evaluation and control by the integrated electronic drive unit, independently of an additional power supply.

13.2 Ordering Accessories

Accessories for HiPace 800 | 48 V

Selection field	Article number
Centering ring with multifunction coating, DN 200 ISO-K/-F	PM 016 220
Centering ring with multi-functional coating and integrated splinter shield, DN 200	PM 016 221
Centering ring with multi-functional coating and integrated protection screen	PM 016 222
Mounting kit for HiPace 800, DN 200 ISO-K, including coated centering ring and bracket screws	PM 016 354 -T
Mounting kit for HiPace 800, DN 200 ISO-K, including coated centering ring, splinter shield, bracket screws	PM 016 355 -T
Mounting kit for HiPace 800, DN 200 ISO-K, including coated centering ring, protective screen, bracket screws	PM 016 356 -T
Sealing gas monitoring unit G 1/8"	PM 016 911 -U
Mounting kit for DN 200 ISO-K to ISO-F, with collar flange, coated centering ring, hexagon bolts	PM 016 960 -T
Mounting kit for DN 200 ISO-K to ISO-F, with collar flange, coated centering ring with splinter shield, hexagon bolts	PM 016 961 -T
Mounting kit for DN 200 ISO-K to ISO-F, with collar flange, coated centering ring with protection screen, hexagon bolts	PM 016 962 -T
Mounting kit for DN 200 ISO-K to ISO-F, with collar flange, coated centering ring, stud screws	PM 016 965 -T
Mounting kit for DN 200 ISO-K to ISO-F, with collar flange, coated centering ring with splinter shield, stud screws	PM 016 966 -T
Mounting kit for DN 200 ISO-K to ISO-F, with collar flange, coated centering ring with protection screen, stud screws	PM 016 967 -T
Mounting kit for DN 200 ISO-F, including coated centering ring, hexagon screws	PM 016 470 -T
Mounting kit for DN 200 ISO-F, including coated centering ring, splinter shield, hexagon screws	PM 016 471 -T
Mounting kit for DN 200 ISO-F, including coated centering ring, protective screen, hexagon screws	PM 016 472 -T
Mounting kit for DN 200 ISO-F, including coated centering ring, stud screws	PM 016 475 -T

Selection field	Article number
Mounting kit for DN 200 ISO-F, including coated centering ring, splinter shield, stud screws	PM 016 476 -T
Mounting kit for DN 200 ISO-F, including coated centering ring, protective screen, stud screws	PM 016 477 -T
Hexagon screw set for flanges with through holes, DN 200 CF-F	PM 016 687 -T
Set of stud screws for flanges with a threaded hole, DN 200 CF-F	PM 016 688 -T
Set of stud screws for flanges with through-hole, DN 200 CF-F	PM 016 736 -T
Elastomer seal, FKM, DN 200 CF	402DFL200-S2
Elastomer seal, FKM, DN 200 CF, with centering lip	402DFL200-Z
Copper gasket, vacuum-annealed, DN 200 CF	490DFL200-G-S5
Copper gasket, OFHC copper, DN 200 CF	490DFL200-S5
Copper gasket, silver-plated, vacuum-annealed, DN 200 CF	490DFL200-S-G-S5
Copper gasket, silver-plated, DN 200 CF	490DFL200-S-S5
Vibration damper for HiPace 800/1200, DN 200 CF-F	PM 006 669 -X
Splinter shield for turbomolecular vacuum pump , DN 200 CF-F	PM 016 321
Protection screen for DN 200 CF-F	PM 016 342
Connection kit for mounting pumps, DN 25 ISO-KF	120SWS025-1000
Wall rail fitting for TPS 110/180/310/400	PM 061 392 -T
HV gate valve, DN 200 ISO-F, electro-pneumatic, PI (RS)/PV 24 V DC, SS/FKM	GVP-S11342
Mains cable, 230 V AC, CEE 7/7 to C13, 3 m	P 4564 309 ZA
Mains cable 115 V AC, NEMA 5-15 to C13, 3 m	P 4564 309 ZE
Mains cable 208 V AC, NEMA 6-15 to C13, 3 m	P 4564 309 ZF
Y-connector M12 for RS-485	P 4723 010
Y-Connector, shielded, M12 for accessories	P 4723 013
OmniControl 001 Mobile, control units without data without gauge/IO	PE D20 000 0
OmniControl 001, rack unit without integrated power supply pack, 24 V DC	PE D40 000 0
OmniControl 400, rack unit with integrated power supply pack	PE D70 000 0
OmniControl 400, rack unit with integrated power supply pack, No Data Option, 1xGauge/IO Option	PE D70 100 0
OmniControl 400, table unit with integrated power supply pack , No Data, No Gauge/IO Option, IP20	PE E70 000 0
OmniControl 200 with PKR 361, 25 KF	PT 440 955 -T
OmniControl 200 with PKR 361, 40 CF	PT 440 957 -T
Vibration damper for HiPace 800/1200/1800, DN 200 ISO-K/F	PM 006 668 -X
HPU 001, handheld programming unit	PM 051 510 -T
RJ 45 interface cable on M12 for HiPace	PM 051 726 -T
Accessories package for HPU 001/PC	PM 061 005 -T
USB RS-485 converter	PM 061 207 -T
Coupling M12 for RS-485	PM 061 270 -X
Interface cable, M12 m straight / M12 m straight, 3 m	PM 061 283 -T
TPS 400, power supply pack 48 V DC, for wall/standard rail fitting	PM 061 343 -T
TPS 401, power supply pack 48 V DC, 19" partial plug-in 3HU	PM 061 347 -T
Connection cable for HiPace with TC 400/TM 700 to power supply pack TPS/DCU 310/311/400/401	PM 061 352 -T
Relay box for backing pumps, 1-phase motor 20 A for TC 400 and TCP 350, M12 plug	PM 061 375 -T
Front panel kit for TPS 401	PM 061 396 -T

Selection field	Article number
Control cable for pumping stations 0.7 m	PM 061 675 AT
connection cable HiPace – ACP	PM 071 142 -X
Relay box, shielded, for backing pumps, 1-phase motor 7 A for TC 400/1200, TM 700 and TCP 350, M12	PM 071 284 -X
TTV 001, Drier for venting turbomolecular vacuum pump	PM Z00 121
TVV 001, forevacuum safety valve, 230 V AC	PM Z01 205
TVV 001, forevacuum safety valve, 115 V AC	PM Z01 206
Venting valve, shielded, 24 V DC, G 1/8", for connection to TC 400/1200 and TM 700	PM Z01 291
UHV gate valve, DN 200 CF, UNF, electro-pneumatic, PI (RS)/PV 24 V DC, SS/Cu/FKM	GVMP-S11642
Air cooling for HiPace 400/700 and 800 with TC 400	PM Z01 303
Sealing gas valve, shielded for HiPace 300 with TC 400 and TM 700, TCP 350	PM Z01 312
Sealing gas throttle for HiPace 300	PM Z01 317
Terminal resistor for RS-485	PT 348 105 -T
Power separator for RS-485	PT 348 132 -T
TIC 010, adapter for two sensors	PT R70 000
RPT 010, digital Piezo/Pirani sensor, 5 V DC	PT R71 100
IKT 010, digital cold cathode sensor, low current, IP40	PT R72 100
IKT 011, digital cold cathode sensor, high current, IP40	PT R73 100
Heating sleeve for HiPace® 400/700/800 with TC 400, 230 V AC, safety plug	PM 061 369 -T
Heating sleeve for HiPace® 400/700/800 with TC 400, 208 V AC, ul plug	PM 061 370 -T
Heating sleeve for HiPace® 400/700/800 with TC 400, 115 V AC, ul plug	PM 061 371 -T

Deviating accessories for HiPace 800 | 24 V

Selection field	Article number
OmniControl 300, rack unit with integrated power supply pack, No Data, No Gauge/IO Option	PE D60 000 0
OmniControl 300, table unit with integrated power supply pack, No Data, No Gauge/IO Option	PE E60 000 0
TPS 310, power supply pack for wall/standard rail fitting	PM 061 342 -T
TPS 311, power supply pack 3HU 19" rack module	PM 061 346 -T

14 Technical Data and Dimensions

14.1 General

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

NOTE

Technical Data.

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

- Specifications according to PNEUROP committee PN5
- ISO 27892 2010: "Vacuum technology - Turbomolecular pumps - Measurement of rapid shutdown torque"
- ISO 21360 2012: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- ISO 21360 2018: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 4: Turbomolecular vacuum pumps"
- ISO 3744 2010: "Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane"
- Ultimate pressure with test dome after 48 h bake out duration
- Gas throughput with water cooling; backing pump = rotary vane pump (10 m^3/h)
- Cooling water consumption at maximum gas throughput, cooling water temperature 25 °C
- Integral leakage rate with 100% helium concentration, 10 s measurement duration
- Sound pressure level at distance to vacuum pump = 1 m
- Technical data measured without splinter shield at pump inlet.

Conversion table: Pressure units

	mbar	bar	Pa	hPa	kPa	Torr | mm Hg
mbar	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
bar	1000	1	$1 \cdot 10^{5}$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	1	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr | mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	1
1 Pa = 1 N/m^2						

Conversion table: units for gas throughput

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

14.2 Substances in Contact with Pumped Media

Substances in contact with the media
Aluminum alloy
Stainless steel
Rare-earth magnets
Carbon-fiber-reinforced plastic
Epoxy resin
FKM
Nickel
Felt
Operating fluid (ester oil)
Oxide ceramic, as required

Table 13: Materials that make contact with the process media

14.3 Technical Data

Technical data for HiPace 800 | 48 V | TC 400

Type designation extended	HiPace® 800 with TC 400	HiPace® 800 with TC 400	HiPace® 800 with TC 400
Article number	PM P04 300	PM P04 301	PM P04 302
Connection flange (in)	DN 200 ISO-K	DN 200 CF-F	DN 200 ISO-F
Connection flange (out)	DN 25 ISO-KF | G ¼"	DN 25 ISO-KF | G ¼"	DN 25 ISO-KF | G ¼"
Ultimate pressure	< $1 \cdot 10^{-7}$ hPa	< $5 \cdot 10^{-10}$ hPa	< $1 \cdot 10^{-7}$ hPa
Compression ratio for Ar	> $1 \cdot 10^{11}$	> $1 \cdot 10^{11}$	> $1 \cdot 10^{11}$
Compression ratio for H_2	$4 \cdot 10^{5}$	$4 \cdot 10^{5}$	$4 \cdot 10^{5}$
Compression ratio for He	$3 \cdot 10^{7}$	$3 \cdot 10^{7}$	$3 \cdot 10^{7}$
Compression ratio for N_2	> $1 \cdot 10^{11}$	> $1 \cdot 10^{11}$	> $1 \cdot 10^{11}$
Pumping speed for Ar	780 l/s	780 l/s	780 l/s
Pumping speed for H_2	580 l/s	580 l/s	580 l/s
Pumping speed for He	700 l/s	700 l/s	700 l/s
Pumping speed for N_2	790 l/s	790 l/s	790 l/s
Gas throughput at final rotation speed for Ar	3.5 hPa·l/s	3.5 hPa·l/s	3.5 hPa·l/s
Gas throughput at final rotation speed for H_2	> 14 hPa·l/s	> 14 hPa·l/s	> 14 hPa·l/s
Gas throughput at final rotation speed for He	20 hPa·l/s	20 hPa·l/s	20 hPa·l/s
Gas throughput at final rotation speed for N_2	6.5 hPa·l/s	6.5 hPa·l/s	6.5 hPa·l/s

Type designation extended	HiPace® 800 with TC 400	HiPace® 800 with TC 400	HiPace® 800 with TC 400
Fore-vacuum max. for N_2	11 hPa	11 hPa	11 hPa
Fore-vacuum max. for Ar	11 hPa	11 hPa	11 hPa
Fore-vacuum max. for H_2	6 hPa	6 hPa	6 hPa
Fore-vacuum max. for He	11 hPa	11 hPa	11 hPa
Rotation speed ±2 %	49200 rpm	49200 rpm	49200 rpm
Rotation speed variable	60 – 100 %	60 – 100 %	60 – 100 %
Performance curve in gas mode 0, vertex C	200/49200 W/min^{-1}	200/49200 W/min^{-1}	200/49200 W/min^{-1}
Performance curve in gas mode 0, vertex D	200/42000 W/min^{-1}	200/42000 W/min^{-1}	200/42000 W/min^{-1}
Performance curve in gas mode 1, vertex A	214/49200 W/min^{-1}	214/49200 W/min^{-1}	214/49200 W/min^{-1}
Performance curve in gas mode 1, vertex B	240/42000 W/min^{-1}	240/42000 W/min^{-1}	240/42000 W/min^{-1}
Performance curve in gas mode 2, vertex E	320/49200 W/min^{-1}	320/49200 W/min^{-1}	320/49200 W/min^{-1}
Performance curve in gas mode 2, vertex F	320/46800 W/min^{-1}	320/46800 W/min^{-1}	320/46800 W/min^{-1}
Operating voltage: DC	48 V	48 V	48 V
Input voltage: tolerance	±10 %	±10 %	±10 %
Power consumption max.	420 W	420 W	420 W
Current, max.	8.75 A	8.75 A	8.75 A
Run-up time	2 min	2 min	2 min
Electronic drive unit	TC 400	TC 400	TC 400
I/O interfaces	RS-485, Remote	RS-485, Remote	RS-485, Remote
Interfaces, extended	Profibus, DeviceNet, E74	Profibus, DeviceNet, E74	Profibus, DeviceNet, E74
Mounting orientation	Arbitrary	Arbitrary	Arbitrary
Bearing	Hybrid	Hybrid	Hybrid
Cooling method	Water	Water	Water
Cooling water flow	100 l/h	100 l/h	100 l/h
Cooling water temperature	15 – 35 °C	15 – 35 °C	15 – 35 °C
Cooling method, optional	Air (forced convection)	Air (forced convection)	Air (forced convection)
Emission sound pressure level (EN ISO 2151)	≤50 dB(A)	≤50 dB(A)	≤50 dB(A)
Venting connection	G 1/8"	G 1/8"	G 1/8"
Max. connection pressure (abs.) for venting/ barrier gas valve	1500 hPa	1500 hPa	1500 hPa

Type designation extended	HiPace® 800 with TC 400	HiPace® 800 with TC 400	HiPace® 800 with TC 400
Integral leak rate	< 1 · 10^{-8} Pa m³/s	< 1 · 10^{-8} Pa m³/s	< 1 · 10^{-8} Pa m³/s
Relative humidity of air	5 – 85 %, non-condensing	5 – 85 %, non-condensing	5 – 85 %, non-condensing
Protection degree	IP54, Type 12	IP54, Type 12	IP54, Type 12
Permissible radial magnetic field max.	6 mT	6 mT	6 mT
Permissible irradiated thermal output max.	4.2 W	4.2 W	4.2 W
Temperature: Shipping	-20 – 55 °C	-20 – 55 °C	-20 – 55 °C
Weight	12.8 kg	19.1 kg	13.6 kg

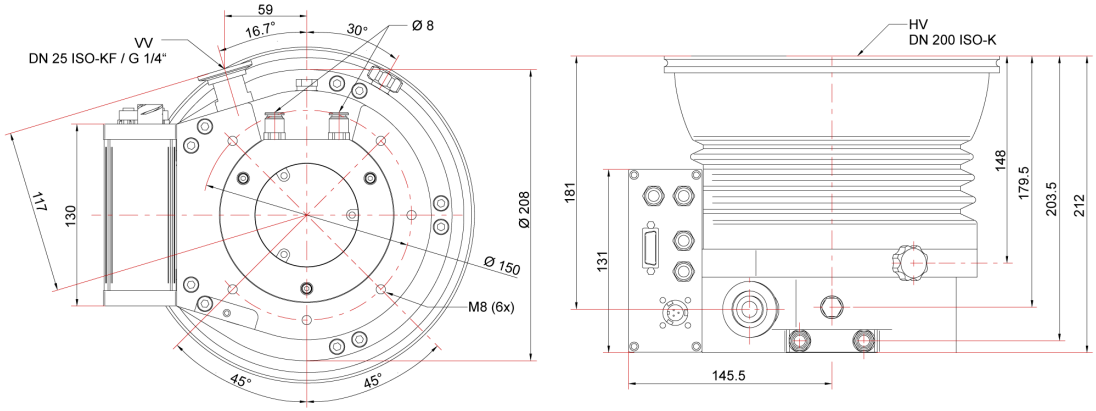
Technical data for HiPace 800 | 24 V | TC 400

Type designation extended	HiPace® 800 with TC 400
Part number	PM P04 622
Connection flange (in)	DN 200 ISO-F
Connection flange (out)	DN 25 ISO-KF | G ¼"
Ultimate pressure	< 1 · 10^{-7} hPa
Compression ratio for Ar	> 1 · 10^{11}
Compression ratio for H_2	4 · 10^{5}
Compression ratio for He	3 · 10^{7}
Compression ratio for N_2	> 1 · 10^{11}
Pumping speed for Ar	780 l/s
Pumping speed for H_2	580 l/s
Pumping speed for He	700 l/s
Pumping speed for N_2	790 l/s
Gas throughput at final rotation speed for Ar	3.5 hPa·l/s
Gas throughput at final rotation speed for H_2	> 14 hPa·l/s
Gas throughput at final rotation speed for He	10 hPa·l/s
Gas throughput at final rotation speed for N_2	6.5 hPa·l/s
Fore-vacuum max. for N_2	11 hPa
Fore-vacuum max. for Ar	11 hPa
Fore-vacuum max. for H_2	6 hPa
Fore-vacuum max. for He	11 hPa
Rotation speed ±2 %	49200 rpm
Rotation speed variable	60 – 100 %
Performance curve in gas mode 0, vertex C	200/49200 W/min^{-1}
Performance curve in gas mode 0, vertex D	200/42000 W/min^{-1}
Performance curve in gas mode 1, vertex A	214/49200 W/min^{-1}
Performance curve in gas mode 1, vertex B	240/42000 W/min^{-1}
Performance curve in gas mode 2, vertex E	320/49200 W/min^{-1}
Performance curve in gas mode 2, vertex F	320/46800 W/min^{-1}
Operating voltage: DC	24 V
Input voltage: tolerance	±10 %
Power consumption max.	300 W

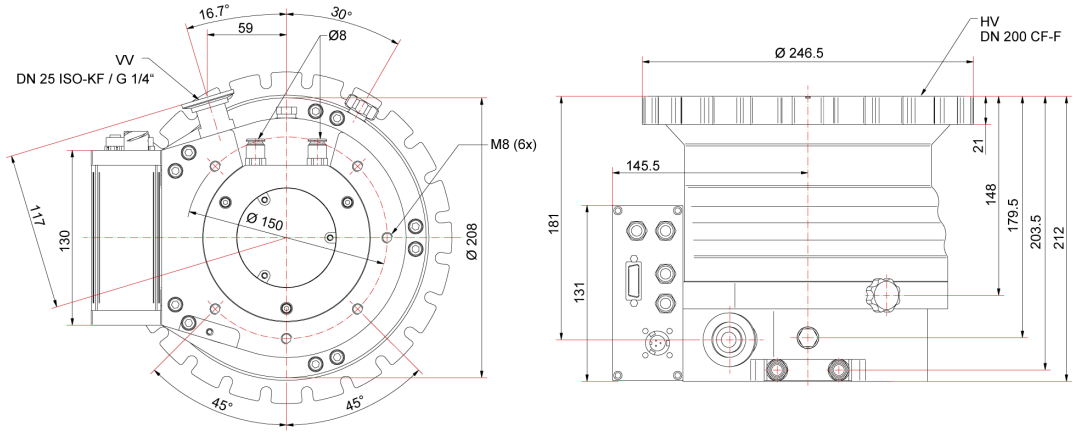
Type designation extended	HiPace® 800 with TC 400
Current, max.	12.5 A
Run-up time	4 min
Electronic drive unit	TC 400
I/O interfaces	RS-485, Remote
Interfaces, extended	Profibus, DeviceNet, E74
Mounting orientation	Arbitrary
Bearing	Hybrid
Cooling method	Water
Cooling water flow	100 l/h
Cooling water temperature	15 – 35 °C
Cooling method, optional	Air (forced convection)
Emission sound pressure level (EN ISO 2151)	≤50 dB(A)
Venting connection	G 1/8"
Max. connection pressure (abs.) for venting/ sealing gas valve	1500 hPa
Integral leak rate	$< 1 \cdot 10^{-8}$ Pa m^3/s
Relative humidity of air	5 – 85 %, non-condensing
Protection degree	IP54, Type 12
Permissible radial magnetic field max.	6 mT
Permissible irradiated thermal output max.	4.2 W
Temperature: Shipping	-20 – 55 °C
Weight	13.6 kg

14.4 Dimensions

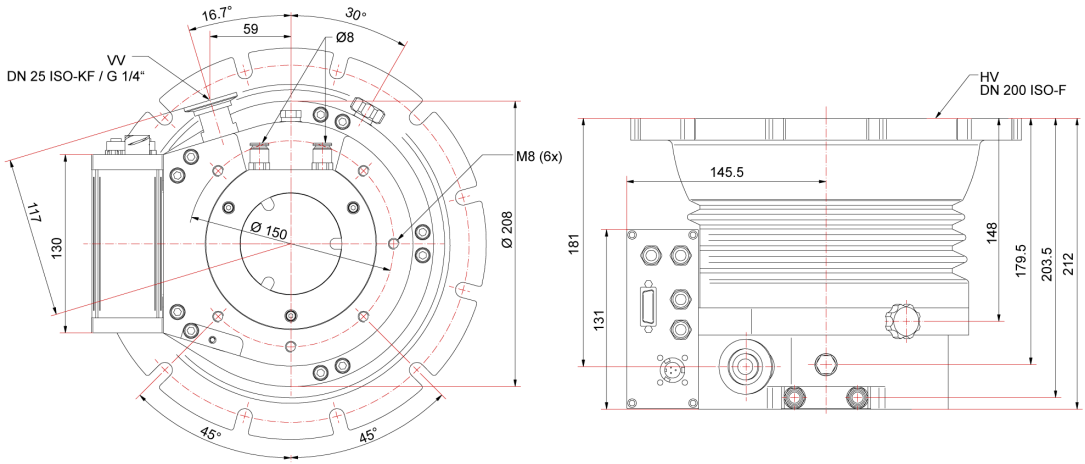
Dimensions in mm



Graphic 24: Dimensions of HiPace 800 | TC 400 | DN 200 ISO-K



Graphic 25: Dimensions of HiPace 800 | TC 400 | DN 200 CF-F



Graphic 26: Dimensions of HiPace 800 | TC 400 | DN 200 ISO-F

15 EU Declaration of Conformity

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

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

The manufacturer

Pfeiffer Vacuum GmbH
Berliner Straße 43
DE-35614 Asslar

declares that the machine(s): HiPace 800

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

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

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

Standard	Title of the Standard
EN ISO 12100 : 2011	Safety of machinery - Basic concepts, general principles of design
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN 61326-1 : 2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN IEC 63000 : 2019	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 61010-1 : 2020	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
EN IEC 60034-1 : 2017	Rotating electrical machines - Part 1: Rating and performance
EN 61000-3-2 : 2019 Class A (industry)	Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3 : 2020	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.
ISO 21360-4 : 2018	Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 4: Turbomolecular vacuum pumps
EN 62061 : 2016	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems

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

Mr. Tobias Stoll
Pfeiffer Vacuum+Fab Solutions GmbH
Berliner Str. 43
DE-35614 Asslar

Asslar, 2025.01.16

Daniel Sälzer, General Manager

16 UK Declaration of Conformity

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

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

The manufacturer

Pfeiffer Vacuum GmbH
Berliner Straße 43
DE-35614 Asslar

declares that the machine(s): HiPace 800

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

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

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

Standard	Title of the Standard
EN ISO 12100 : 2011	Safety of machinery - Basic concepts, general principles of design
EN 1012-2 : 1996 + A1 : 2009	Vacuum pumps - Safety requirements - Part 2
EN 61326-1 : 2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN IEC 63000 : 2019	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
EN 61010-1 : 2020	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
EN IEC 60034-1 : 2017	Rotating electrical machines - Part 1: Rating and performance
EN 61000-3-2 : 2019 Class A (industry)	Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)
EN 61000-3-3 : 2020	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.
ISO 21360-4 : 2018	Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 4: Turbomolecular vacuum pumps
EN 62061 : 2016	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems

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

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

Asslar, 2025.01.16

Daniel Sälzer, General Manager

BUSCH GROUP

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

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