



Operating Instructions

EN

Translation of the Original

HiPace 80 Neo

Turbopump

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new turbopump is designed to support you by its performance, its perfect operation and without interfering your individual application. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. With this expertise, we have acquired a multitude of skills contributing to an efficient and secure implementation of our product.

Knowing that our product must not interfere with your actual work, we are convinced that our product offers you the solution that supports you in the effective and trouble-free execution of your individual application.

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

Further operating instructions from Pfeiffer Vacuum can be found in the [Download Center](#) on our website.

Disclaimer of liability

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

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

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We reserve the right to make changes to the technical data and information in this document.

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1 About this manual



IMPORTANT

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

1.1 Validity

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

1.1.1 Applicable documents

| Document | Number |
|--|-----------------------|
| Operating instructions, "electronic drive unit" TC 80 standard | PT 0659 BN |
| Declaration of conformity | Part of this document |

You can find these documents in the [Pfeiffer Vacuum Download Center](#).

1.1.2 Variants

| Turbopump | High vacuum flange versions | Sealing gas | Fore-vacuum connection versions |
|----------------------|-----------------------------|--------------|---------------------------------|
| HiPace 80 Neo, TC 80 | DN 63 ISO-K | with/without | G 1/4" |
| | DN 63 CF-F | with/without | DN 16 ISO-KF |
| | DN 40 ISO-KF | with/without | DN 25 ISO-KF |

Tbl. 1: Variants

1.2 Target group

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

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

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

1.3 Conventions

1.3.1 Instructions in the text

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

Individual action step

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

- ▶ This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

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

1.3.2 Pictographs

Pictographs used in the document indicate useful information.



Note



Tip



Qr code is linked to further online information.
We recommend viewing on a tablet computer.
Pay attention to the amount of data that is generated.

1.3.3 Stickers on the product

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

| | |
|--|---|
| | <p>Rating plate The rating plate of the turbopump is located on the lower part of the vacuum pump.</p> <p>Rating plate of the electronic drive unit The rating plate for the electronic drive unit is on the side</p> |
| | <p>Operating instructions note This sticker indicates that this operating instructions must be read before performing any tasks.</p> |
| | <p>Protection class This sticker describes protection class 3 for the product. Its position indicates the functional earth connector.</p> |
| | <p>Warranty seal The product is sealed ex factory. Damaging or removing a warranty seal results in loss of the warranty.</p> |

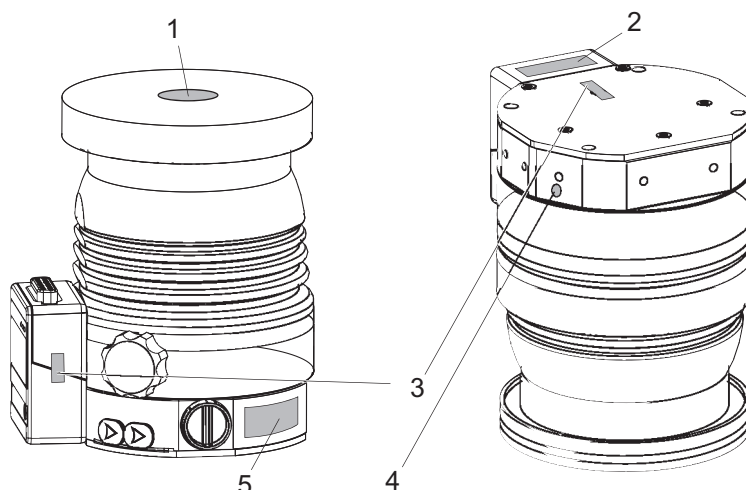


Fig. 1: Position of the stickers on the product

- | | | | |
|---|--|---|-------------------------------|
| 1 | Operating instructions note | 4 | Functional earth indication |
| 2 | Rating plate for electronic drive unit | 5 | Rating plate of the turbopump |
| 3 | Warranty seal | | |

1.3.4 Abbreviations

| Abbreviation | Meaning in this document |
|--------------|---|
| CF | Flange: Metal-sealed connector in accordance with ISO 3669 |
| d | Diameter value (in mm) |
| DC | Direct current |
| DN | Nominal diameter as size description |
| f | Rotation speed value of a vacuum pump (frequency, in rpm or Hz) |
| HV | High vacuum flange, high vacuum side |
| ISO | Flange: Connection in accordance with ISO 1609 and ISO 2861 |
| LED | Light emitting diode |
| FE | Functional earth |
| [P:xxx] | Electronic drive unit control parameters. Printed in bold as a three-digit number in square brackets. Frequently displayed in conjunction with a short description. Example: [P:312] software version |
| S1 | S1 switch on power supply pack |
| WAF | Width Across Flats |
| T | Temperature (in °C) |
| TC | Turbopump electronic drive unit (turbo controller) |
| TPS | Voltage supply (turbo power supply) |
| USB | Universal Serial Bus |
| VV | Fore-vacuum flange, fore-vacuum connection |
| X3 | 15-pole D-Sub connecting socket on the turbopump electronic drive unit |

Tbl. 2: Abbreviations used in this document

1.4 Trademark proof

- Torx® is a trademark of Acument Intellectual Properties, LLC.
- Profibus® is a trademark of Profibus Nutzerorganisation e.V.

2 Safety

2.1 General safety information

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

| |
|---|
| ⚠ DANGER |
| <p>Immediately pending danger</p> <p>Indicates an immediately pending danger that will result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation |

| |
|---|
| ⚠ WARNING |
| <p>Potential pending danger</p> <p>Indicates a pending danger that could result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation |

| |
|--|
| ⚠ CAUTION |
| <p>Potential pending danger</p> <p>Indicates a pending danger that could result in minor injuries if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation |

| |
|---|
| NOTICE |
| <p>Danger of damage to property</p> <p>Is used to highlight actions that are not associated with personal injury.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid damage to property |

| | |
|----------|---|
| i | <p>Notes, tips or examples indicate important information about the product or about this document.</p> |
|----------|---|

2.2 Safety instructions

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

Risks during transport

| |
|--|
| ⚠ WARNING |
| <p>Danger of serious injury due to falling objects</p> <p>Due to falling objects there is a risk of injuries to limbs through to broken bones.</p> <ul style="list-style-type: none"> ▶ Take particular care and pay special attention when transporting products manually. ▶ Do not stack the products. ▶ Wear protective equipment, e.g. safety shoes. |

Risks during installation

⚠ DANGER**Danger to life from electric shock**

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

- ▶ Make sure that the power supply pack meets the requirements for double isolation between mains input voltage and output voltage, in accordance with IEC 61010-1 IEC 60950-1 and IEC 62368-1.
- ▶ Make sure that the power supply pack meets the requirements 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**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 turbopump 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 turbopump with open vacuum connections.
- ▶ Always carry out the mechanical installation before electrical connection.
- ▶ Prevent access to the high vacuum connection of the turbopump from the operator side (e.g. open vacuum chamber).

⚠ WARNING**Risk of injury caused by the turbopump 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 turbopump being sheared off in use. The energy that this would release could throw the entire turbopump 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.

⚠ WARNING**Danger to life from poisoning where toxic process media leak from damaged connections**

Sudden twisting of the turbopump in the event of a fault causes fittings to accelerate. There is the risk of damaging on-site connections (e.g., fore-vacuum 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 turbopump as low as possible.
- ▶ Use flexible lines to connect to the turbopump where necessary.

⚠ WARNING**Risk of danger to life through missing mains disconnection device**

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

- ▶ Install a mains disconnection device 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.

⚠ 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 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 vacuum pump immediately prior to operation.

⚠ CAUTION

Danger of burns on hot surfaces

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

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

Risks during operation

⚠ WARNING

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

The use of additional equipment for heating the 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 guard.
- ▶ If necessary, apply the warning stickers provided for this at the danger points.
- ▶ Ensure adequate cooling down before working on the vacuum pump or in its vicinity.
- ▶ Wear protective equipment, e.g., gloves.

⚠ WARNING

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

Gas entry with very high over pressure results in destruction of the 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 sealing gas connection.
- ▶ Make sure that high, process-related over pressures cannot directly enter the vacuum pump.

⚠ CAUTION

Risk of injuries due to contact with vacuum when venting

While venting the 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.

⚠ CAUTION**Danger of burns on hot surfaces**

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

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

Risks during maintenance, decommissioning and disposal**⚠ WARNING****Danger to life from electric shock during maintenance and service work**

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

- ▶ Before performing all work, switch off the main switch.
- ▶ Wait until the turbopump comes to a standstill (rotation speed $f = 0$).
- ▶ Remove the mains plug from the device.
- ▶ Secure the device against unintentional restarting.

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

Incorrect handling of the turbopump 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 the turbopump.

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

⚠ WARNING**Health hazard through poisoning from toxic contaminated components or devices**

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

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

⚠ WARNING**Risk of poisoning from contact with harmful substances**

The operating fluid reservoir and parts of the turbopump 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.

Risks in the event of malfunctions

⚠ WARNING

Danger to life from the turbopump breaking away in the event of a fault

Sudden jamming of the rotor generates high destructive torques in accordance with ISO 27892. If the turbopump is **not** properly secured, it can shear off. The energy that this would release could throw the entire turbopump 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 instructions for this turbopump.
- ▶ Observe the requirements regarding stability and design of the counter flange.
- ▶ Use only original accessories or fixing material approved by Pfeiffer Vacuum for the installation.

⚠ WARNING

Risk of injury caused by the turbopump 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 turbopump being sheared off in use. The energy that this would release could throw the entire turbopump 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.

⚠ WARNING

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

Sudden twisting of the turbopump in the event of a fault causes fittings to accelerate. There is the risk of damaging on-site connections (e.g., fore-vacuum 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 turbopump as low as possible.
- ▶ Use flexible lines to connect to the turbopump where necessary.

2.3 Safety precautions

i **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.

i **Infringement of conformity due to modifications to the product**
 The Declaration of Conformity from the manufacturer is no longer valid if the operator changes the original product or installs additional equipment.

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

General safety precautions when handling the product

- ▶ Observe all applicable safety and accident prevention regulations.
- ▶ Check that all safety measures are observed at regular intervals.
- ▶ Do not expose body parts to the vacuum.
- ▶ Always ensure a secure connection to the earthed conductor (PE).
- ▶ Never disconnect plug connections during operation.
- ▶ Observe the above shutdown procedures.

- ▶ Before working on the 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 ($> 70^{\circ}\text{C}$).
- ▶ Never fill or operate the unit with cleaning agents or cleaning agent residues.
- ▶ Do not carry out your own conversions or modifications on the unit.
- ▶ Observe the unit protection class prior to installation or operation in other environments.

2.4 Limits of use of product

| | |
|---|---|
| Installation location | Weatherproof (internal space) |
| Air pressure | 530 hPa to 1060 hPa |
| Installation altitude | Max. 5000 m |
| Rel. air humidity | max. 80%, at $T < 31^{\circ}\text{C}$, up to max. 50% at $T < 40^{\circ}\text{C}$ |
| Protection class | III |
| Overvoltage category | II |
| Permissible protection degree | IP54, Type 12 according to UL 50E |
| Degree of pollution | 2 |
| Ambient temperature | 5°C to 30°C with convection cooling without gas throughput 5°C to 35°C with air cooling 5°C to 40°C with water cooling |
| Permissible surrounding magnetic field for air cooling | 3.1 mT |
| Permissible surrounding magnetic field for water cooling | 3.7 mT |
| Maximum irradiated thermal output for air cooling | 0.9 W |
| Maximum irradiated thermal output for water cooling | 1.2 W |
| Maximum permissible rotor temperature of the turbopump | 90°C |
| Maximum permissible bakeout temperature at the high vacuum flange | 120°C |

Tbl. 3: Permissible ambient conditions



Notes on ambient conditions

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

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

2.5 Proper use

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

2.6 Foreseeable improper use

Improper use of the product invalidates all warranty and liability claims. Any use that is counter to the purpose of the product, whether intentional or unintentional, is regarded as 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 fore-vacuum pressure
- Operation 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 these instructions

2.7 Personnel qualification

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

Training people

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

2.7.1 Ensuring personnel qualification

Specialist for mechanical work

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

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

Specialist for electrotechnical work

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

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

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

Trained individuals

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

2.7.2 Personnel qualification for maintenance and repair**Advanced training courses**

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

Adequately trained individuals are:

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

2.7.3 Advanced training with Pfeiffer Vacuum

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

For more information, please contact [Pfeiffer Vacuum technical training](#).

3 Product description

3.1 Function

The turbopump forms a compact unit with the electronic drive unit. Pfeiffer Vacuum power supply packs provide the voltage supply. Integrated temperature monitoring for the rotor reduces the power consumption of the turbopump if the rotor temperature exceeds the limit value. In addition to the multi-function connection of the electronic drive unit, the turbopump has two AccessLink sockets for connecting Pfeiffer Vacuum accessories directly. Depending on the version, the turbopump may have a sealing gas connection.



Scan this qr code or [click here](#) and see how Pfeiffer Vacuum turbopumps work.

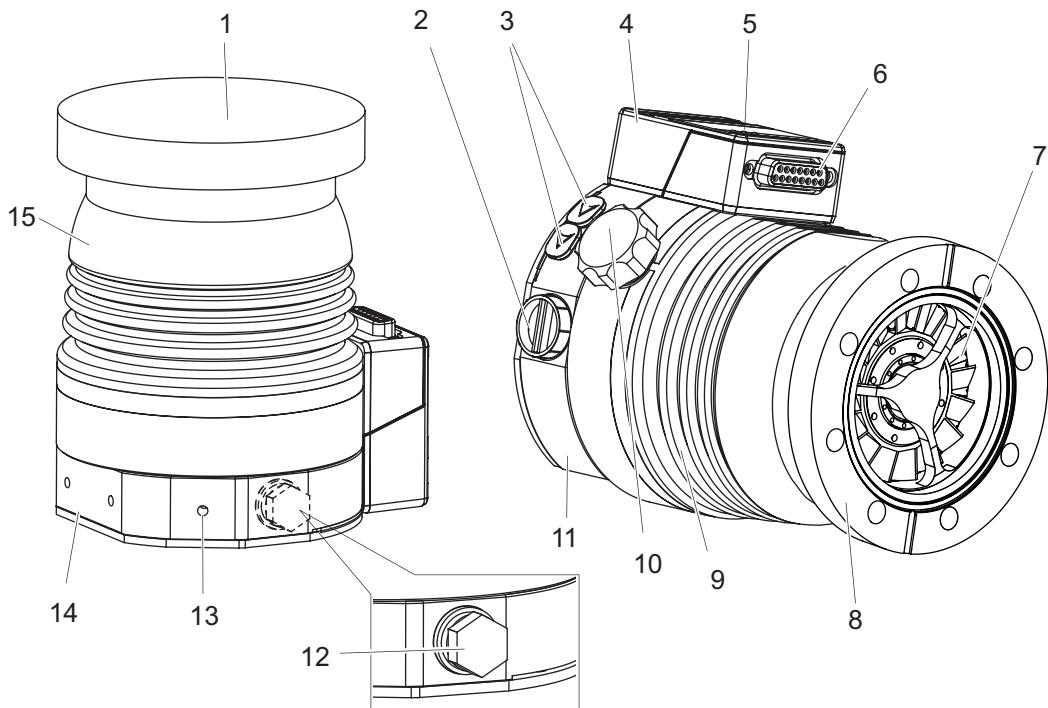


Fig. 2: Design of HiPace 80 Neo

- | | |
|---|-------------------------------------|
| 1 Protective cap for the high vacuum connection | 9 Pump housing, stainless steel |
| 2 Fore-vacuum connection, 1/4" thread with sealing plug | 10 Venting screw |
| 3 AccessLink sockets with sealing plugs | 11 Pump bottom part |
| 4 Electronic drive unit | 12 Sealing gas connection (option) |
| 5 LED operating mode display | 13 Ground terminal |
| 6 Multifunction connection "X3" | 14 Mounting surface for air cooling |
| 7 Turbo rotor | 15 Pump housing, aluminum |
| 8 High vacuum connection, DN 63 CF-F | |

3.1.1 Cooling

- Convection cooling
- Air cooling (optional)
- Water 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 turbopump

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

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

3.1.3 Drive

- Electronic drive unit TC 80

3.1.4 Sealing gas connection

The turbopump version with sealing gas has an integrated sealing gas throttle with a sinter filter. The sealing gas is supplied either directly or externally via a push-in fitting. The option cannot be retrofitted.

3.2 Identifying the product

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

3.2.1 Product types

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

| Family | Size/model | Attribute |
|--------|------------|---|
| HiPace | 10 to 3400 | 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 |

Tbl. 4: Product designation of Pfeiffer Vacuum HiPace turbopumps

3.2.2 Product features

| Feature | Version | | |
|-----------------|-------------|-----------------|--------------|
| | DN 63 ISO-K | DN 63 CF-F | DN 40 ISO-KF |
| HV flange | Aluminium | Stainless steel | Aluminium |
| Flange material | | | |

Tbl. 5: Turbopump features

3.3 Scope of delivery

- Turbopump with electronic drive unit
- Protective cap for the high vacuum connection
- Protective cap for the fore vacuum connection

Product description

- Sealing plug for AccessLink sockets
- Operating instructions

4 Transportation and Storage

4.1 Transport

WARNING

Danger of serious injury due to falling objects

Due to falling objects there is a 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 protective equipment, e.g. safety shoes.



Recommendation

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

Safe transport of the product

- ▶ Transport the turbopump only within the permissible temperature limits.
- ▶ Observe weight specified on the rating plate.
- ▶ Where possible, always transport or ship the turbopump in its original packaging.
- ▶ Always carry the turbopump with both hands.
- ▶ Remove the protective cap only immediately prior to installation.

4.2 Storage



We recommend

Pfeiffer Vacuum recommends storing the products in their original transport packaging.

Storing the turbopump

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

5 Installation

The installation of the turbopump and its fastening is of outstanding importance. The rotor of the turbopump 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 turbopump within fractions of a second.

Comprehensive tests and calculations conforming to ISO 27892 confirm the safety of the turbopump 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 turbopump.

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 turbopump 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 turbopump with open vacuum connections.
- ▶ Always carry out the mechanical installation before electrical connection.
- ▶ Prevent access to the high vacuum connection of the turbopump from the operator side (e.g. open vacuum chamber).

CAUTION

Danger of burns on hot surfaces

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

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

General notes for the installation of vacuum components

- ▶ 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.

Select installation location

1. Observe the instructions for transport to the installation location.
2. Make sure that there are sufficient cooling options for the turbopump.
3. Install suitable shielding if the surrounding magnetic fields exceed the permissible levels.
4. Install suitable shielding so that the irradiated thermal output does not exceed the permissible values when high temperatures occur due to the process.
5. Observe the permissible temperatures for the vacuum connection.

5.2 Fastening turbopump to bottom part

NOTICE

Damage to the 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 turbopump. This can produce mechanical loads up to and including destruction of the turbopump.

- ▶ Create a flexible connection to the high vacuum flange.
- ▶ Observe the requirements for fastening the turbopump 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 turbopump
- 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

- Allen key, **WAF 4**
- Wrench, alternatively, for DIN 933 hexagon head screws
- Calibrated torque wrench (tightening factor ≤ 1.6)

Fastening turbopump to bottom part

1. Remove any anti-vibration buffers from the pump bottom part.
2. Place the turbopump upright on the mounting plate.
3. Bolt the pump bottom part to the mounting plate with the required number of permissible fixing screws and washers.
 - Observe the specified engagement depth.
 - Observe the permissible tightening torque.

| Turbopump | Mounting plate Minimum thickness Tensile strength | Thread size | Quantity | Screw in depth | Tightening tor- que |
|---|---|----------------|----------|---------------------|------------------------|
| HiPace 30 HiPace 30 Neo HiPace 30 Neo H HiPace 60 HiPace 80 HiPace 80 Neo HiPace 80 Neo H SplitFlow 50 SplitFlow 80 SplitFlow 80 Neo | 2 mm > 270 MPa | M5 | 4 | $\geq 1.3 \times d$ | 6 Nm \pm 10 % |

Tbl. 6: Requirements for fastening the turbopumps to the bottom part

5.3 Connecting the high vacuum side

5.3.1 Requirements for the dimensioning of a counter flange

| NOTICE | |
|--|--|
| Risk of damage due to incorrect counter flange design | |
| Unevenness on the operator-side counter flange results in stresses in the vacuum pump housing, even when properly attached. This can produce leakage or negative changes in running characteristics. | |
| <ul style="list-style-type: none"> ▶ Adhere to the shape tolerances for the counter flange. ▶ Observe the maximum flatness deviations over the entire surface. | |

| | |
|----------|---|
| i | <p>Superstructural parts and fittings on the high vacuum connection</p> <p>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 turbopump used.</p> <ul style="list-style-type: none"> • 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 for the high vacuum connection of the turbopump. |
|----------|---|

| Parameter | HiPace 80 Neo |
|--|--|
| Maximum torque occurring in the event of a burst ¹⁾ | 620 Nm |
| Maximum permissible axial load on the high vacuum flange ²⁾ | 200 N (equivalent to 20 kg) |
| Flatness | ± 0.05 mm |
| Minimum tensile strength of the flange material in all operating states in relation to the engagement depth of the fixing screws | 170 N/mm ² at 2.5 x d 270 N/mm ² at 1.5 x d |
| Maximum permissible rotor temperature | 90 °C |

Tbl. 7: Requirements for the dimensioning of high vacuum connection supplied by the customer

Important information for correct installation

- ▶ Only use the approved mounting kits of Pfeiffer Vacuum for the high vacuum connection of the turbopump.

5.3.2 Consider earthquake protection

| NOTICE | |
|--|--|
| 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 wall touching the turbopump. This can produce mechanical loads up to and including destruction of the turbopump. | |
| <ul style="list-style-type: none"> ▶ Make sure that all flange and safety connections absorb the resulting forces. ▶ Secure the vacuum chamber against displacement or tipping. | |

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.

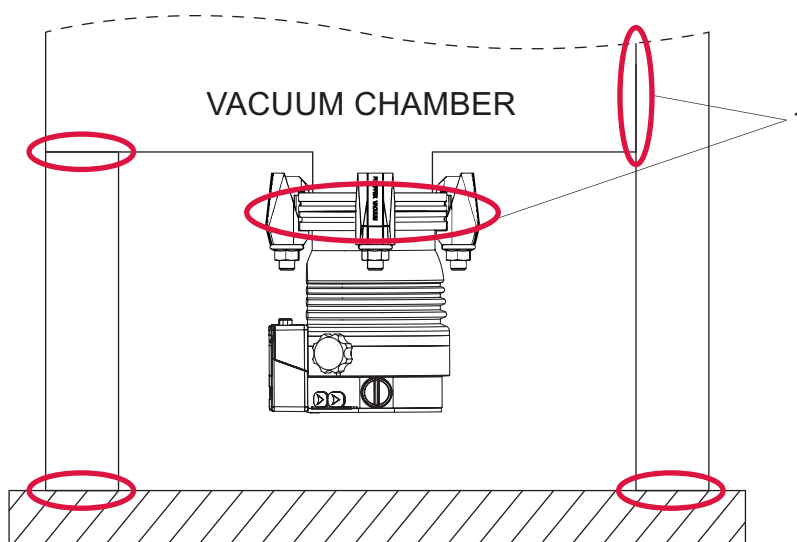


Fig. 3: Example: Safety connections

1  Safety connections, customer-side

5.3.3 Using a splinter shield or protective screen

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

| Flange size | Reduced pumping speed in % for the gas type | | | |
|-------------------------|---|----|----------------|----|
| | H ₂ | He | N ₂ | Ar |
| Splinter shield DN 40 | 6 | 9 | 17 | 18 |
| Splinter shield DN 63 | 3 | 6 | 15 | 16 |
| Protective screen DN 63 | 1 | 1 | 4 | 4 |

Tbl. 8: Effect of splinter shield or protective screen on pumping speed

Procedure

1. With ISO flanges, use centering rings with protective screen or splinter shield.
2. For CF flanges, always insert protective screen or splinter shield with the clamping lugs pointing towards the rotor in the high vacuum flange.

5.3.4 Using the vibration compensator

WARNING

Risk of injury caused by the turbopump 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 turbopump being sheared off in use. The energy that this would release could throw the entire turbopump 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.

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

Installing the vibration compensator

1. Install the vibration compensator only with vertical passage.
2. Consider the flow resistance.

3. Secure the turbopump additionally to the high vacuum flange.
4. Observe the fastening of the ISO flanges.

5.3.5 Taking mounting orientations into account

Pfeiffer Vacuum turbopumps of the HiPace Neo 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 fore-vacuum range.

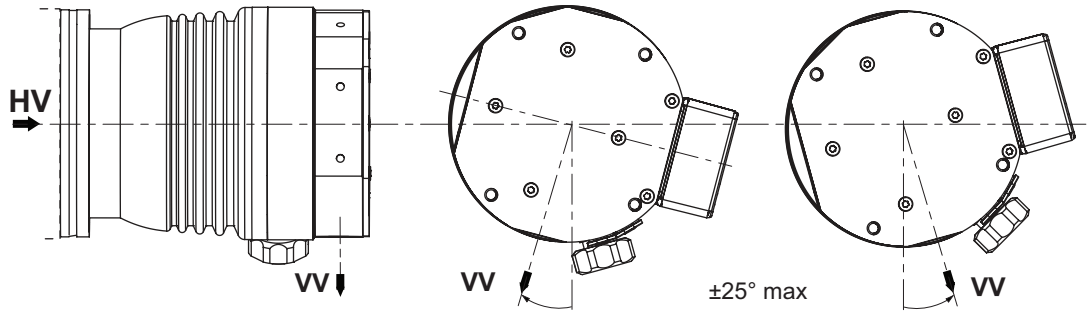


Fig. 4: Recommended alignment when using oil-sealed backing pumps

Specify a horizontal mounting orientation for oil-sealed backing pumps

1. Always align the fore-vacuum connection downwards vertically.
 - Permissible deviation $\pm 25^\circ$
2. Support the tube connections in front of the turbopump.
3. Do not allow any forces from the piping system to act on the turbopump.
4. Do not load the high vacuum flange of the turbopump on one side.

5.3.6 Installation of ISO-KF flange



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

- Allen key
- Calibrated torque wrench (Tightening factor ≤ 1.6)

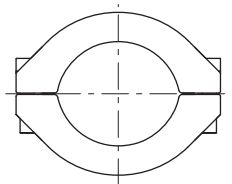


Fig. 5: Flange connection ISO-KF to ISO-KF

Using of clamping ring

1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Fasten the high vacuum connection on the turbopump and the clamping ring to the counter flange.
3. Utilize all prescribed components for the turbopump.
4. Tighten the clamping ring screws evenly.
 - Tightening torque: **3,7 Nm**.

5.3.7 Attaching ISO-K flange onto ISO-K



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)

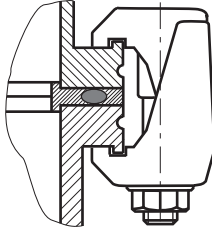


Fig. 6: Flange connection ISO-K to ISO-F, bracket screws

Connection with bracket screw

1. For the connection of the turbopump, use only the approved mounting kits from Pfeiffer Vacuum.
2. Connect the flange with the components of the mounting kit according to the figure.
3. Use for all prescribed components for the turbopump.
4. Tighten the bracket screws cross-wise in 3 steps.
 - Tightening torque: **5, 15, 25 \pm 2 Nm**

5.3.8 Installation of ISO-K flange onto ISO-F

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

- "Claw and tapped hole"
- "Hexagon head set screw and tapped hole"
- "Stud screw and tapped hole"
- "Stud screw and through-bore"

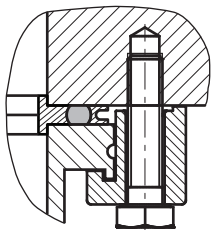


ISO flange connections

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.

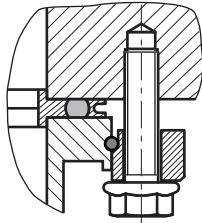
- Leak-tightness of the flange connection, however, is not jeopardized in this regard.

Connection of claw and tapped hole



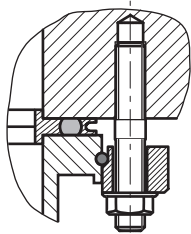
1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Connect the flange according to the diagram using the components in the mounting kit.
3. Utilize all prescribed components for the turbopump.
4. Tighten the claws in 3 stages in opposite pairs.
 - Tightening torque: **5, 10, 16 \pm 1 Nm**

Connection of hexagon head set screw and tapped hole



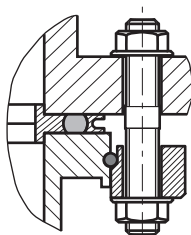
1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Place the collar flange over the high vacuum flange on the turbopump.
3. Insert the snap ring into the side groove on the high vacuum flange of the turbopump.
4. Fasten the turbopump onto the counter flange in accordance with the diagram using the collar flange, snap ring and centering ring.
5. Utilize all prescribed components for the turbopump.
6. Screw the hexagon head set screws into the tapped holes.
 - Observe the minimum tensile strength of the flange material and the screw-in depth.
7. Tighten the hexagon head set screws in 3 stages in opposite pairs.
 - Tightening torque: **5, 10, 16 ± 1 Nm**

Connection of stud screw and tapped hole



1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Screw the required number of stud screws with the shorter screw-in end into the holes in the counter flange.
 - Observe the minimum tensile strength of the flange material and the screw-in depth.
3. Place the collar flange over the high vacuum flange on the turbopump.
4. Insert the snap ring into the side groove on the high vacuum flange of the turbopump.
5. Fasten the turbopump onto the counter flange in accordance with the diagram using the collar flange, snap ring and centering ring.
6. Utilize all prescribed components for the turbopump.
7. Tighten the nuts in 3 stages in opposite pairs.
 - Tightening torque: **5, 10, 16 ± 1 Nm**

Connection of stud screw and through-bore



1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Place the collar flange over the high vacuum flange on the turbopump.
3. Insert the snap ring into the side groove on the high vacuum flange of the turbopump.
4. Fasten the turbopump onto the counter flange in accordance with the diagram using the collar flange, snap ring and centering ring.
5. Utilize all prescribed components for the turbopump.
6. Tighten the nuts in 3 stages in opposite pairs.
7. Tightening torque: **5, 10, 16 ± 1 Nm**

5.3.9 Attaching CF flange to CF-F

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"

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.

Required tools

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

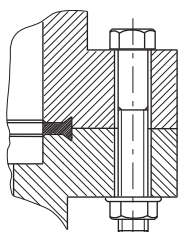


Fig. 7: Flange connection CF-F, hexagon head screw and through hole

Connection of the hexagon head screw and through holes

1. For the connection of the turbopump, use only the approved mounting kits from Pfeiffer Vacuum.
2. If used: Insert the protective screen or splinter shield with clamping lugs downwards in the turbopump high vacuum flange.
3. Place the seal exactly in the hollow.
4. Connect the flange with the components of the mounting kit according to the figure.
5. Tighten the screw couplings all the way around.
 - Tightening torque: **22 ± 2 Nm**
6. Then check the torque, since flowing of the sealing material may make it necessary to re-tighten the screws.

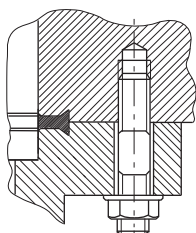


Fig. 8: Flange connection CF-F, stud screw and tapped hole

Connection of the stud screw and tapped hole

1. For the connection of the turbopump, use only the approved mounting kits from Pfeiffer Vacuum.
2. Screw in the required number of stud screws with the shorter end in the holes on the counter flange.
3. If used: Insert the protective screen or splinter shield with clamping lugs downwards in the turbopump high vacuum flange.
4. Place the seal exactly in the hollow.
5. Connect the flange with the components of the mounting kit according to the figure.
6. Tighten the screw couplings all the way around.
 - Tightening torque: **22 ± 2 Nm**
7. Then check the torque, since flowing of the sealing material may make it necessary to re-tighten the screws.

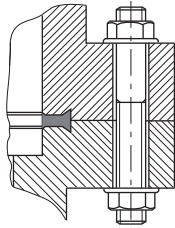


Fig. 9: Flange connection CF-F, stud screw and through hole

Connection of the stud screw and through hole

1. For the connection of the turbopump, use only the approved mounting kits from Pfeiffer Vacuum.
2. If used: Insert the protective screen or splinter shield with clamping lugs downwards in the turbopump high vacuum flange.
3. Place the seal exactly in the hollow.
4. Connect the flange with the components of the mounting kit according to the figure.
5. Tighten the screw couplings all the way around.
 - Tightening torque: **22 ± 2 Nm**
6. Then check the torque, since flowing of the sealing material may make it necessary to re-tighten the screws.

5.4 Connecting fore-vacuum side

⚠ WARNING

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

Sudden twisting of the turbopump in the event of a fault causes fittings to accelerate. There is the risk of damaging on-site connections (e.g., fore-vacuum 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 turbopump as low as possible.
- ▶ Use flexible lines to connect to the turbopump where necessary.



Suitable backing pump

Use the turbopump only in combination with a suitable backing pump that can deliver up to the required maximum fore-vacuum pressure. To achieve the fore-vacuum pressure, use a suitable vacuum pump or a pumping station from the Pfeiffer Vacuum range.

In this case, the backing pump is also controlled directly via the turbopump electronic drive unit interfaces (e.g., relay box or connection cable).

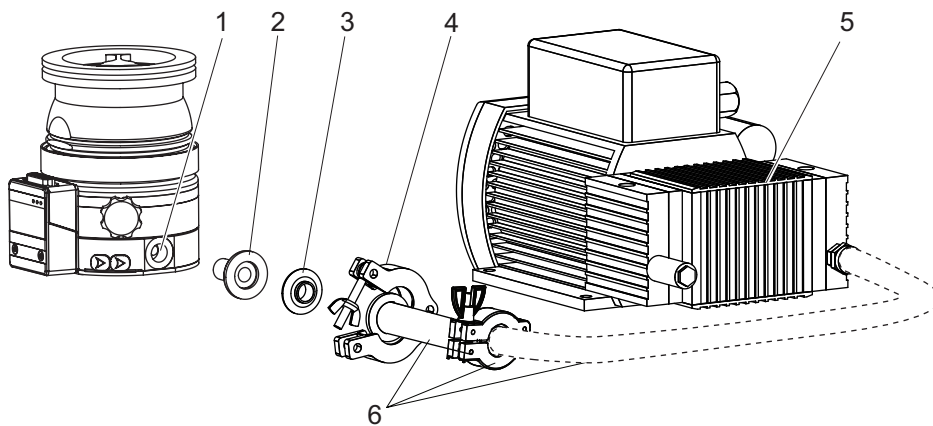


Fig. 10: Example of fore-vacuum connection on MVP

- | | |
|------------------------------------|---------------------------------------|
| 1 Turbopump fore-vacuum connection | 4 Circlip |
| 2 Screw-in flange, 1/4" thread | 5 Backing pump (e.g., diaphragm pump) |
| 3 Centering ring | 6 Vacuum components |

Establish the fore-vacuum connection

1. With rigid pipe connections, include bellows to attenuate external vibrations.
2. Install a fore-vacuum connection with components according to the nominal diameter of the fore-vacuum connection, e.g. DN 16 ISO-KF fasteners and pipe components from the [Pfeiffer Vacuum component shop](#).
3. Implement measures to counteract the backflow of operating fluids or condensate from the fore-vacuum area.
4. Observe the information in the operating instructions of the backup pump or pumping station when connecting and operating it.

5.5 Connecting accessories



Installation and operation of accessories

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

- Information and ordering options for approved [accessories for hybrid bearing turbo-pumps](#) can be found online.



Connecting accessory devices

- Use Pfeiffer Vacuum accessories via the AccessLink sockets or at the "X3" multi-function connection of the electronic drive unit with corresponding connection cables or adapters.
- Configure the desired accessory output via RS-485 using the control unit or PC.

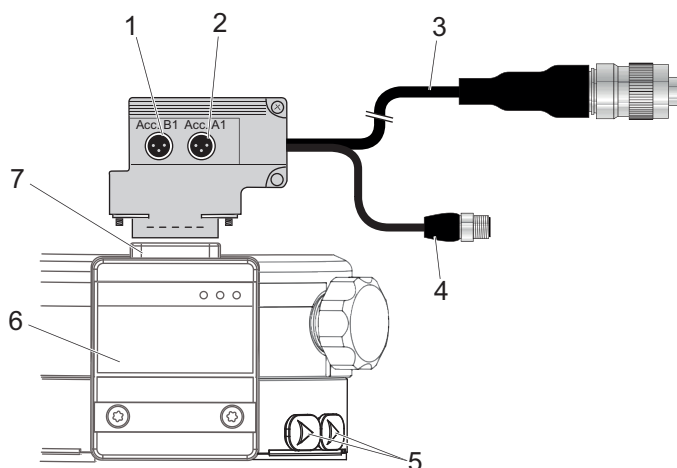


Fig. 11: Accessory connection via connection cable

- | | |
|-------------------------------|---|
| 1 Accessory connection B1 | 5 AccessLink sockets with sealing plugs |
| 2 Accessory connection A1 | 6 Turbopump electronic drive unit |
| 3 Connection cable | 7 Multifunction connection "X3" |
| 4 RS-485 connector (optional) | |

Connect pre-configured accessories

- ▶ Observe the installation instructions in the operating instructions for the relevant accessory.
- ▶ Note the existing configuration of existing connections and control lines.
- ▶ Connect only matching accessory devices to the electronic drive unit.

Using additional accessories

- ▶ Observe the installation instructions in the operating instructions for the relevant accessory.
- ▶ Note the existing configuration of existing connections and control lines.
- ▶ Use a Pfeiffer Vacuum control unit with an integrated power supply pack.

5.6 Connecting sealing gas (option)

The use of sealing gas serves to protect the turbopump in dusty processes or with excessive gas throughputs. Sealing gas prevents the ingress of damaging substances into the motor and bearing area.

If dry room air is used as the sealing gas, the sealing gas connection is ready for operation immediately. If you wish to use another inert gas (e.g., nitrogen N₂) as the sealing gas, use a G 1/8" push-in fitting with hose connection from the Pfeiffer Vacuum accessories range.

- Pfeiffer Vacuum recommends the use of sealing gas from 50 % of the maximum gas throughput.
- The permissible inlet pressure for sealing gas is 1,500 hPa absolute.
- The flow rate for sealing gas is 8 to 11 sccm.

5.6.1 Directly establishing sealing gas connection

Required tools

- Hexagon wrench, WAF 13

Accessories required

- Filter element for filtering ambient air
- Push-in fitting for admission of inert gases

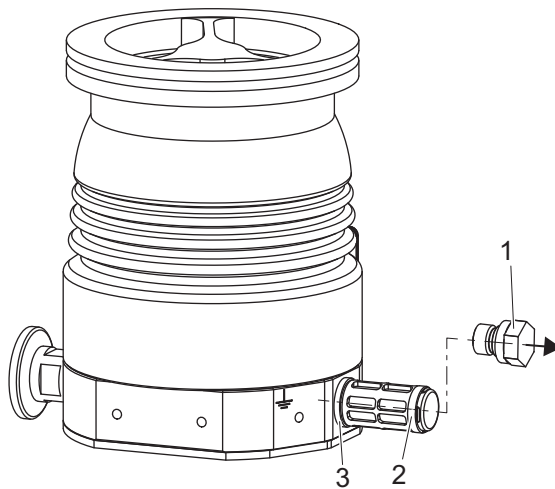


Fig. 12: Directly utilizing sealing gas connection

- | | |
|------------------|----------------|
| 1 Locking screw | 3 Sealing ring |
| 2 Filter element | |

Utilizing sealing gas connection

1. Unscrew the locking screw on the sealing gas connection.
 - Be careful with the sealing ring.
2. Screw in the filter element hand-tight.
 - Be careful with the sealing ring.
3. **Alternatively:** Connect an external inert gas supply using a push-in fitting from the Pfeiffer Vacuum accessories range.

5.6.2 Preparing connection for external sealing gas valve or throttle

NOTICE

Damage to the turbopump due to unrestricted air supply at the sealing gas connection

After the internal throttle has been removed from the sealing gas connection, room air or inert gas can enter the interior of the turbopump unhindered. Depending on the operating status, this may damage or even destroy the turbopump.

- ▶ At all times, ensure that room air or inert gas only enters the interior of the turbopump via the sealing gas connection in a restricted manner.
 - Use a sealing gas valve with integrated throttle or a sealing gas throttle without monitoring if you wish to introduce a different sealing gas amount.
 - Use a Pfeiffer Vacuum sealing gas valve with AccessLink only in conjunction with the factory-installed throttle.

If required, install the sealing gas supply either via a sealing gas valve with integrated throttle or a sealing gas throttle without monitoring. To do this, remove the factory-installed sealing gas throttle from the connection bore to maintain the protective effect.

Required tools

- Hexagon wrench, WAF 13
- Screwdriver

Accessories required

- Push-in fitting for admission of inert gases

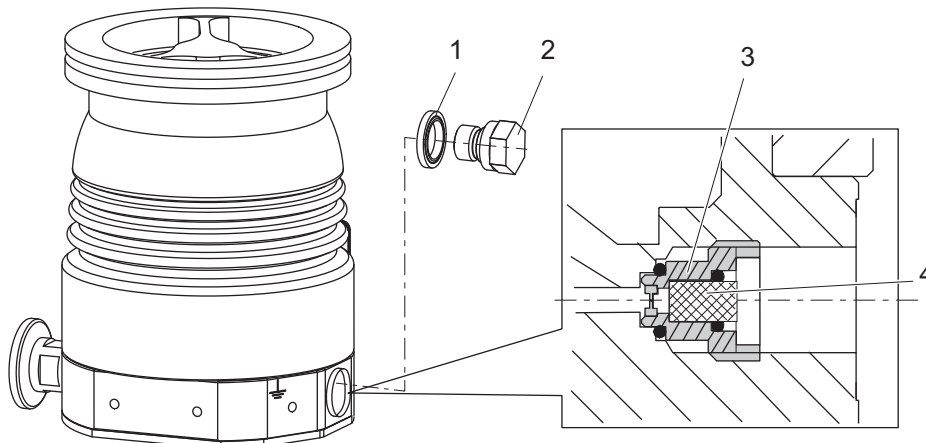


Fig. 13: Internal sealing gas throttle (option)

- | | |
|-----------------|------------------------|
| 1 Sealing ring | 3 Sealing gas throttle |
| 2 Locking screw | 4 Sinter filter |

Removing internal sealing gas throttle

1. Unscrew the locking screw on the sealing gas connection.
 - Be careful with the sealing ring.
2. Unscrew the sealing gas throttle using a suitable screwdriver.
3. Screw in your own sealing gas throttle or use a sealing gas valve with integrated throttle.
 - Be careful with the sealing ring.
4. **When using a sealing gas valve:** Check the configuration of the accessory output for sealing gas via the interface of the electronic drive unit.

5.7 Connecting the electrical supply

⚠ WARNING

Risk of danger to life through missing mains disconnection device

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

- ▶ Install a mains disconnection device 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 Ground turbopump

Pfeiffer Vacuum recommends connecting a suitable grounding cable to discharge applicative interferences.

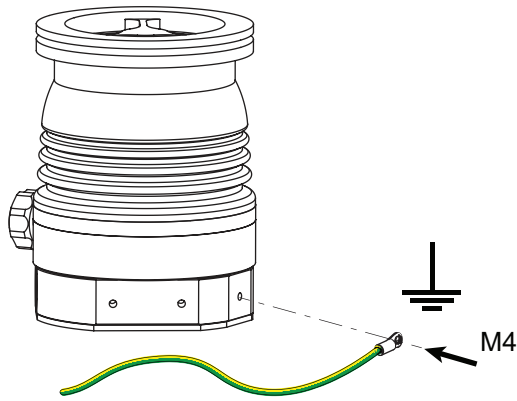


Fig. 14: Example: Connect the grounding cable

Procedure

1. Use the turbopump ground terminal (M4 female thread).
2. Route the connection in accordance with locally applicable provisions.

5.7.2 Establishing electric connection

⚠ DANGER

Danger to life from electric shock

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

- ▶ Make sure that the power supply pack meets the requirements for double isolation between mains input voltage and output voltage, in accordance with IEC 61010-1 IEC 60950-1 and IEC 62368-1.
- ▶ Make sure that the power supply pack meets the requirements 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 vacuum pump as soon as 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 vacuum pump immediately prior to operation.

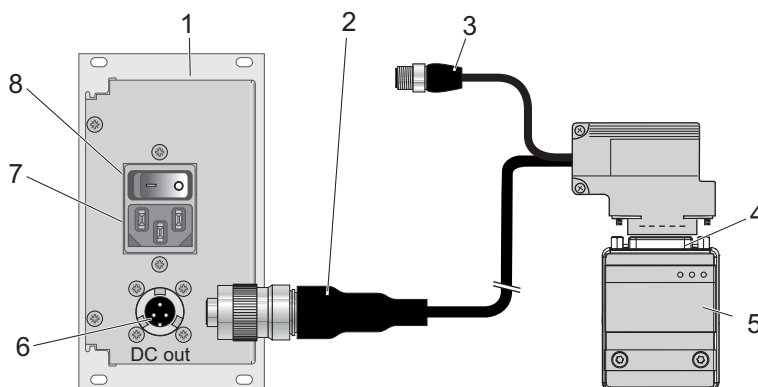


Fig. 15: Connecting electronic drive unit to power supply pack

- | | |
|---|-----------------------------------|
| 1 Power supply pack Control unit with power supply pack | 5 Turbopump electronic drive unit |
| 2 Connection cable | 6 DCout connector |
| 3 RS-485 connector (optional) | 7 Mains connection ACin |
| 4 Multifunction connection X3 | 8 Main switch |

Original power supply packs (e.g., TPS) or control units and connection cables are available for the electronic drive unit supply voltage. A connection cable with a blocking diode prevents power from being fed back into the voltage supply after switching off the turbopump.

| Connection cable type | Function |
|--|--|
| Connection cable with RS-485 interface and bridges from TC 80 to power supply pack | <ul style="list-style-type: none"> • Voltage supply via power supply pack • Automatic ramp-up with bridges on pins 2, 5, 7 • Connection to control unit via RS-485 |
| Connection cable with RS-485 interface, accessory connections and blocking diode from TC 80 to power supply pack | <ul style="list-style-type: none"> • Voltage supply via power supply pack • Connector for accessory units with M8 plug • Connection to control unit via RS-485 |
| Connection cable with bridges from TC 80 to power supply pack | <ul style="list-style-type: none"> • Voltage supply via power supply pack • Automatic ramp-up with bridges on pins 2, 5, 7 |
| Connection cable with bridges and accessory connectors from TC 80 to power supply pack | <ul style="list-style-type: none"> • Voltage supply via power supply pack • Automatic ramp-up with bridges on pins 2, 5, 7 • Connector for accessory units with M8 plug |

Connecting electronic drive unit

1. Ensure the correct supply voltage.
2. Make sure that the power supply pack main switch is off prior to connection.
3. Use a suitable connection cable from the Pfeiffer Vacuum accessories range.
4. Plug the 15-pole connection cable plug into the "X3" connection on the electronic drive unit and secure it.
5. Insert the connecting cable into the connection "DCout" on the power supply pack and close the bayonet lock.
6. **If you are using a Pfeiffer Vacuum control unit:** Connect the "RS-485" connector to the control unit using a suitable connection cable.

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 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 vacuum pump immediately prior to operation.

⚠ CAUTION

Danger of burns on hot surfaces

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

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

NOTICE

Vacuum pump destruction due to excessive energy input during operation

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

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

NOTICE

Turbopump destruction due to gases with too high molecular masses

The pumping of gases with impermissible high molecular masses leads to the destruction of the turbopump.

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

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

| Parameter | Name | Designation | Setting |
|-----------|------------|--------------------------------------|--------------------------------------|
| [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:058] | TmpMgtMode | Temperature management configuration | 0 = pump housing temperature ≤ 60 °C |
| [P:700] | RUTimeSVal | Set value run-up time | 8 min. |
| [P:701] | SpdSwPt1 | Rotation speed switch point 1 | 80 % |
| [P:707] | SpdSVal | Setpoint rotation speed setting mode | 65 % |
| [P:708] | PwrSVal | Set value power consumption | 100 % |

| Parameter | Name | Designation | Setting |
|-----------|----------|--|---------|
| [P:720] | VentSpd | Venting at rotation speed, delayed venting | 50 % |
| [P:721] | VentTime | Venting time, delayed venting | 3600 s |

Tbl. 9: Factory setting of the electronic drive unit for turbopumps when delivered



Operation with TPS 110 power supply pack

Pfeiffer Vacuum recommends using TPS 110 power supply packs for the power supply:

- Reduce the power consumption [P:708] = 70%.

Notes for turbopump commissioning

1. When using water cooling, observe the cooling water flow and throughput.
2. When using sealing gas, observe the sealing gas flow and throughput.
3. Provide the current supply for the power supply pack.
4. Ensure suitable touch protection during configuration of the temperature management ([P:058] = "1") if the vacuum pump is freely accessible.

6.2 Operating modes

The turbopump can be operated in different modes.

- Operating without control unit
- Operation via connection "X3"
- Operating via RS-485 interface and Pfeiffer Vacuum control unit or PC

6.2.1 Operation without operating unit



Automatic start

After bypassing the contacts at pins 2, 5 and 7 on the "X3" connection or when using a connection cable with bridges and applying the supply voltage, the turbopump starts up immediately.

Notes on operation without control unit

1. Only use the approved Pfeiffer Vacuum connection cables with bridges on the "X3" connection on the electronic drive unit.
2. Only switch on the power supply of the turbopump 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 turbopump starts and activates connected additional equipment according to the configuration.

6.2.2 Operation via multi-function connection "X3"

Remote control is available via the 15 Pole D-Sub connection with the "X3" designation on the electronic drive unit. The accessible individual functions are mapped to "PLC levels".

Instructions for remote control operation

- ▶ See the electronic drive unit operating instructions.

6.2.3 Operation via Pfeiffer Vacuum control unit

Connecting a Pfeiffer Vacuum control unit allows the turbopump to be controlled via static parameters stored in the electronic drive unit.

Using control unit

1. Observe the appropriate operating instructions for handling Pfeiffer Vacuum control units:
 - Operating instructions available from the [Download Center](#).
2. Observe the electronic drive unit operating instructions from the scope of delivery of the vacuum pump.

3. Connect the control unit to the “X3” multi-function connection of the electronic drive unit.
 - Use a suitable connection cable with “RS-485” connection or an adapter for “X3”.
4. Switch on the turbopump power supply via the external power supply pack or the control unit with integrated power supply pack.

6.3 Switching on the turbopump

⚠ 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 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 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 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 guard.
- ▶ If necessary, apply the warning stickers provided for this at the danger points.
- ▶ Ensure adequate cooling down before working on the vacuum pump or in its vicinity.
- ▶ Wear protective equipment, e.g., gloves.

⚠ WARNING

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

Gas entry with very high over pressure results in destruction of the 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 sealing gas connection.
- ▶ Make sure that high, process-related over pressures cannot directly enter the vacuum pump.







Switching on the turbopump




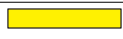




- ▶ Connect the power supply pack to the mains power supply on the customer-side.
- ▶ Switch on the power supply pack.

6.4 Operation monitoring

6.4.1 Operating mode display via LED

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

| LED | Symbol | LED status | Display | Meaning |
|--|---|----------------------|---|--|
| Green  |  | Off | _____ | Currentless |
| | | On, flashing |  | "pumping station OFF", rotation speed ≤ 60 rpm |
| | | 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 rpm |

| LED | Symbol | LED status | Display | Meaning |
|---|---|--------------|---|----------------------|
| Yellow  |  | Off |  | No warning |
| | | On, constant |  | Warning |
| Red  |  | Off |  | No error, no warning |
| | | On, constant |  | Error, malfunction |

Tbl. 10: 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 turbopump 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 turbopump, 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 turbopump switches off.
- Exceeding the temperature threshold for error messages switches off the turbopump immediately.

6.5 Switching off and venting



We recommend

Vent the turbopump after shutdown. By doing so, you prevent particles flowing back into the vacuum system from the fore-vacuum area.

6.5.1 Switching off

NOTICE

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

Even after the power supply has been switched off, the vacuum pump continues to deliver electrical energy during its run-down period. If the 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 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 vacuum pump comes to a standstill (rotation speed $f = 0$).

Notes for switching off the turbopump

1. Shut down the turbopump via the control unit or remote control.
2. Close the fore-vacuum line.
3. Switch off the backing pump, if necessary.
4. Vent the turbopump (options see below).
5. Wait until the turbopump comes to a complete standstill.
6. Disconnect the power supply according to the operating instructions for the power supply pack.

Disconnecting from the mains

- ▶ Disconnect the power supply pack from the mains to disconnect the current supply completely.



Unplugging the mains plug

Unplugging the mains plug during running operation immediately de-energizes the power supply pack and the devices that are connected to it.

6.5.2 Venting

⚠ CAUTION

Risk of injuries due to contact with vacuum when venting

While venting the 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 turbopump due to non-permissibly fast pressure rise during venting

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

- ▶ Observe the prescribed maximum pressure rise speed of **15 hPa/s**.
- ▶ Avoid manual and uncontrolled venting of very low volumes.
- ▶ Where necessary, use a venting valve from the Pfeiffer Vacuum range of accessories.

Manual venting

Manual venting describes the standard process for venting the turbo pumping station.

1. Ensure that the vacuum system is shut down.
2. Open the black venting screw on the turbopump by one revolution maximum.
3. Wait for pressure equalization to atmospheric pressure in the vacuum system.
4. Close the venting screw again.

Use a Pfeiffer Vacuum venting valve

The Pfeiffer Vacuum venting valve is an optional accessory for installation on the turbopump.

The venting valve is normally closed. Control is via the turbopump electronic drive unit, and configuration of parameters **[P:012]** and **[P:030]**. In the event of a power failure, the turbopump 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 turbopump.
 - The venting process starts automatically.

| Venting speed [P:720] | Venting duration [P:721] | Venting duration in the event of a power failure |
|-----------------------|--------------------------|--|
| 50 % of rated speed | 3600 s | 3600 s |

Tbl. 11: Factory settings for delayed venting in turbopumps

General information for fast venting

We recommend fast venting of larger volumes in 4 steps.

1. Use a Pfeiffer Vacuum venting valve for the turbopump, or match the valve cross-section to the size of the recipient and maximum venting rate.
2. Vent the vacuum system with a maximum rate of pressure rise of **15 hPa/s** for a duration of 20 seconds.
3. Then vent the system with a second venting valve of any size; for example, directly at the vacuum chamber.
4. 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 work

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

- ▶ Before performing all work, switch off the main switch.
- ▶ Wait until the turbopump comes to a standstill (rotation speed $f = 0$).
- ▶ Remove the mains plug from the device.
- ▶ Secure the device against unintentional restarting.

WARNING

Health hazard through poisoning from toxic contaminated components or devices

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

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

WARNING

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

Incorrect handling of the turbopump 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 the turbopump.

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

7.2 Checklist for inspection and maintenance



Maintenance frequency and service lives

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

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



Maintenance Level 2 and Level 3

We recommend Pfeiffer Vacuum Service (PV) 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. 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 Service location.

| Action | Inspection | Maintenance level 1 | Maintenance level 2 | Maintenance level 3 | Required material |
|---|-------------|---------------------|---------------------|---------------------|---|
| Described in document | OI | OI/MM | MM | SI | |
| Interval | If required | ≤ 5 years | ≤ 5 years | ≤ 5 years | |
| Inspection | ■ | | | | |
| Visual and acoustic check | ■ | | | | |
| Read out and analyze pump data ³⁾ | ■ | | | | |
| Optional software update ⁴⁾ | ■ | | | | |
| Prepare a recommendation for action ⁵⁾ | ■ | | | | |
| 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 housing, 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 |

Tbl. 12: Maintenance intervals

7.3 Replace operating fluid reservoir

⚠ WARNING

Risk of poisoning from contact with harmful substances

The operating fluid reservoir and parts of the turbopump 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.

3) For maintenance by Pfeiffer Vacuum Service.
 4) For maintenance by Pfeiffer Vacuum Service.
 5) For maintenance by Pfeiffer Vacuum Service.

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 vacuum pump leakage.

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

**Replacing the operating fluid reservoir**

Depending on its design, the turbopump's operating fluid reservoir may feature capillary rods.

- When ordering spare parts, make sure you use the correct pump article number and the operating fluid reservoir.
- This information can be found on the pump rating plate.

You can find the safety data sheet in the [Pfeiffer Vacuum Download Center](#).

Prerequisites

- Turbopump 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 operating fluid reservoir**Required consumables**

- Clean, lint-free cloth
- Laboratory gloves

Required tools

- Torx screwdriver TX 10
- Tweezers
- O-ring picker

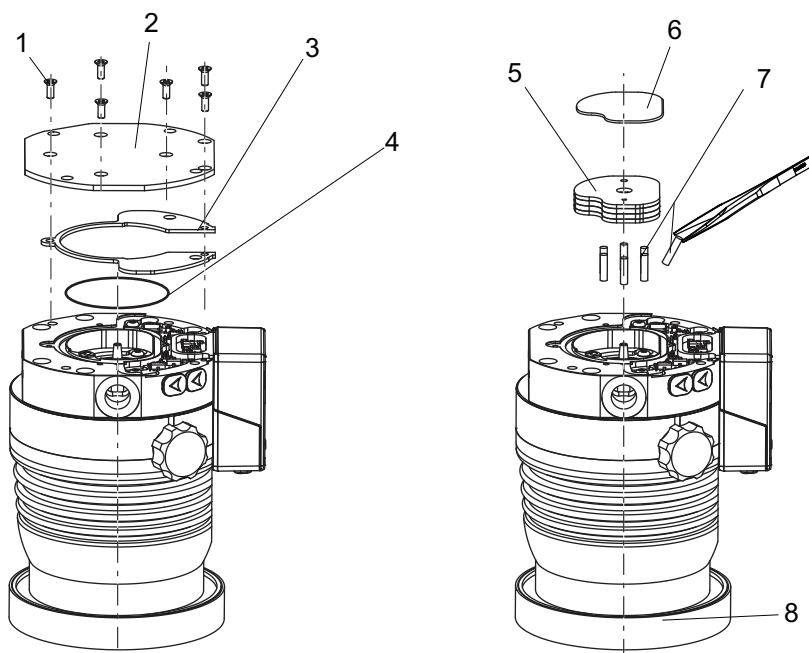


Fig. 16: Removing operating fluid reservoir

- | | |
|---------------|-----------------------------|
| 1 Torx screws | 5 Operating fluid reservoir |
| 2 Closing cap | 6 Edge protection ring |
| 3 Seal | 7 Capillary rod (8×) |
| 4 O-ring | 8 Protective cap |

Removing operating fluid reservoir

1. Wear laboratory gloves to avoid skin contact.
2. Place the turbopump on the closed high vacuum flange.
3. Unscrew the Torx screws from the closing cap.
4. Lift the closing cap off the pump bottom part.
5. Remove the seal and O-ring.
 - Use an O-ring picker.
6. Remove the edge protection ring.
7. Use tweezers to lever the operating fluid reservoir out of the bearing housing.
8. Use tweezers to pull old capillary rods (8×) out of the bearing housing.
9. Clean the closing cap with a clean, lint-free cloth.
 - Do not use cleaning agents.

7.3.2 Assembling operating fluid reservoir

Required consumables

- Laboratory gloves
- Operating fluid reservoir

Required tools

- Torx screwdriver TX 10
- Tweezers
- Screwdriver
- Calibrated torque wrench (tightening factor ≤ 1.6)

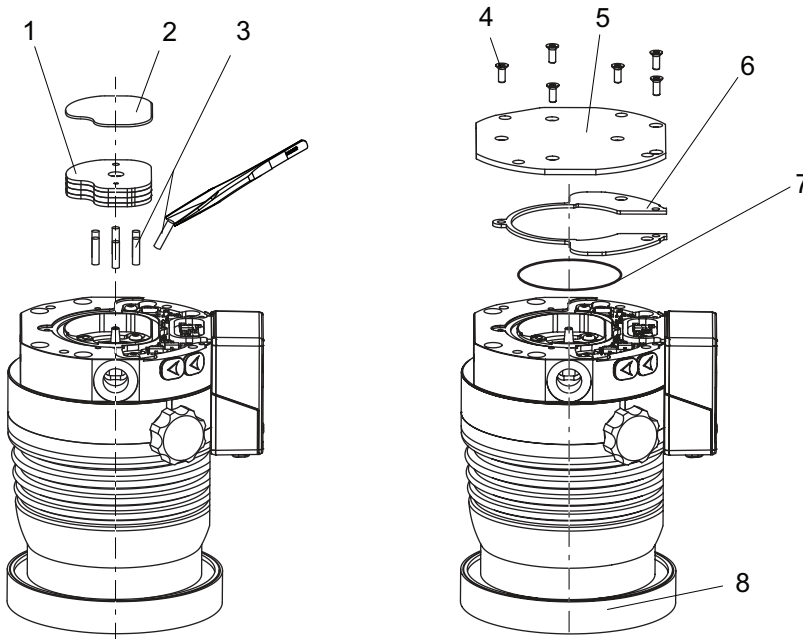


Fig. 17: Assembling operating fluid reservoir

- | | |
|-----------------------------|------------------|
| 1 Operating fluid reservoir | 5 Closing cap |
| 2 Edge protection ring | 6 Seal |
| 3 Capillary rod (8×) | 7 O-ring |
| 4 Torx screws | 8 Protective cap |

Assembling operating fluid reservoir

1. Insert all the new capillary rods with the tweezers.
2. Insert the new operating fluid reservoir into the bearing housing.
 - When doing so, do **not** exert pressure on the operating fluid reservoir.
3. Insert the new edge protection ring suitable for the operating fluid reservoir.
4. Insert the O-ring and the seal in the pump bottom part.
5. Fit closing cap.
6. Tighten the closing cap.
 - Tightening torque: **1.4 Nm**.

7.4 Replace electronic drive unit

NOTICE

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

Even after the power supply has been switched off, the vacuum pump continues to deliver electrical energy during its run-down period. If the 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 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 vacuum pump comes to a standstill (rotation speed $f = 0$).

NOTICE

Property damage from electrostatic discharge

Failure to observe the electrostatic hazard to 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".



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:

1. Back up all your settings as a parameter set in an HPU.
2. Load a backup parameter set by means of HPU into the new electronic drive unit.
3. Program the individual settings into the new electronic drive unit by hand.
4. See the operating instructions of the electronic drive unit and the HPU.

The electronic drive unit of the turbopump cannot be repaired. In the event of a defect, replace the entire electronic drive unit with a replacement part.

Prerequisites

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

Required tools

- Torx screwdriver TX 10
- Calibrated torque wrench (tightening factor ≤ 1.6)

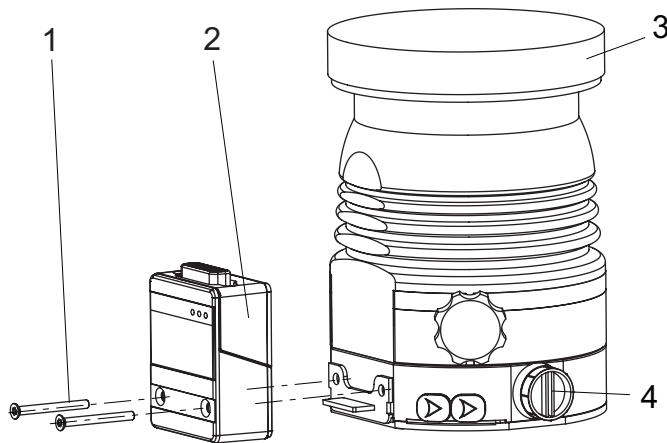


Fig. 18: Electronic drive unit installation and removal

- | | |
|---|---------------------------------------|
| 1 Torx screw | 4 Fore-vacuum connection sealing plug |
| 2 Electronic drive unit | 5 Adapter plate |
| 3 High vacuum connection protective cover | |

Procedure

1. Install the turbopump upright if required.
2. Unscrew both Torx screws from the electronic drive unit.
3. Pull the old electronic drive unit off the turbopump, taking care to keep it straight.
4. Place a new electronic drive unit straight onto the adapter plate connection of the turbopump.
5. Bolt the electronic drive unit onto the turbopump with both Torx screws.
 - Tightening torque: **0.8 Nm**

7.5 Confirming speed specification

The typical nominal rotation speed of a turbopump 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 HiPace 80 Neo has a characteristic nominal rotation speed of **1500 Hz**.

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

Adjusting nominal rotation speed confirmation

1. Observe the operating instructions of the control unit.
2. See the electronic drive unit operating instructions.
3. Set the parameter **[P:794]** to "1" and activate the expanded parameter set.
4. Open and edit the parameter **[P:777]**.
5. Set the parameter **[P:777]** to the required value of the nominal rotation speed in Hertz.

8 Decommissioning

8.1 Shutting down for longer periods

WARNING

Health hazard through poisoning from toxic contaminated components or devices

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

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

Procedure for a longer downtime of the turbopump (> 1 year)

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

8.2 Recommissioning

NOTICE

Risk of damage to the turbopump as a result of operating fluid aging after recommissioning

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

- ▶ 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 instructions and inform Pfeiffer Vacuum Service.

Procedures for recommissioning the turbopump

1. Check the turbopump for pollution and moisture.
2. Clean the turbopump exterior with a lint-free cloth and a little isopropanol.
3. If necessary, arrange for Pfeiffer Vacuum Service to completely clean the turbopump.
4. Observe the total running time of the turbopump and if necessary, arrange for Pfeiffer Vacuum Service to replace the bearing.
5. Change the operating fluid reservoir of the turbopump.
6. Install the turbopump according to these instructions ([see chapter "Installation", page 22](#)).
7. Recommission the turbopump according to these instructions .

9 Recycling and disposal

WARNING

Health hazard through poisoning from toxic contaminated components or devices

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

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



Environmental protection

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

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

9.1 General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

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

9.2 Dispose of turbopumps

Pfeiffer Vacuum turbopumps contain materials that you must recycle.

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

10 Malfunctions

⚠ WARNING

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

Sudden twisting of the turbopump in the event of a fault causes fittings to accelerate. There is the risk of damaging on-site connections (e.g., fore-vacuum 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 turbopump as low as possible.
- ▶ Use flexible lines to connect to the turbopump where necessary.

⚠ WARNING

Danger to life from the turbopump breaking away in the event of a fault

Sudden jamming of the rotor generates high destructive torques in accordance with ISO 27892. If the turbopump is **not** properly secured, it can shear off. The energy that this would release could throw the entire turbopump 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 instructions for this turbopump.
- ▶ Observe the requirements regarding stability and design of the counter flange.
- ▶ Use only original accessories or fixing material approved by Pfeiffer Vacuum for the installation.

⚠ WARNING

Risk of injury caused by the turbopump 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 turbopump being sheared off in use. The energy that this would release could throw the entire turbopump 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.

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

| Problem | Possible causes | Remedy |
|--|---|--|
| Turbopump will not start up; none of the built-in LEDs on the electronic drive unit light up | <ul style="list-style-type: none"> ● Current supply interrupted | <ul style="list-style-type: none"> ● 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. <ul style="list-style-type: none"> – Depending on the version of the power supply pack, 24 V DC or 48 V DC are present. |
| | <ul style="list-style-type: none"> ● Incorrect operating voltage | <ul style="list-style-type: none"> ● Observe the electronic drive unit rating plate. ● Supply the correct operating voltage. |
| | <ul style="list-style-type: none"> ● No operating voltage present | <ul style="list-style-type: none"> ● Supply the correct operating voltage. ● Switch on the power supply pack. |
| | <ul style="list-style-type: none"> ● Electronic drive unit defective | <ul style="list-style-type: none"> ● Replace the electronic drive unit. ● Contact Pfeiffer Vacuum Service. |

| | | |
|---|---|---|
| Turbopump will not start up; green LED on the electronic drive unit is flashing | <ul style="list-style-type: none"> ● For operation without control unit: Pins 2-7 and 5-7 on the "X3" connection are not connected | <ul style="list-style-type: none"> ● Connect the connections according to the electronic drive unit connection diagram. ● Check the bridges on the connection cable. |
| | <ul style="list-style-type: none"> ● For operation via RS-485: The bridge between pins 5 and 7 inhibits control commands | <ul style="list-style-type: none"> ● Remove the bridge from the "X3" connection. ● Check the connection cable. |
| | <ul style="list-style-type: none"> ● For operation via RS-485: Parameters not set in the electronic drive unit | <ul style="list-style-type: none"> ● Set the parameters [P: 010] and [P: 023] via the interface RS-485 to 1 = "ON". |
| | <ul style="list-style-type: none"> ● Voltage drop in the cable is too high | <ul style="list-style-type: none"> ● Check the connection cable. ● Use a suitable connection cable. |
| Turbopump fails to reach the nominal rotation speed within the set run-up time | <ul style="list-style-type: none"> ● Fore-vacuum pressure too high | <ul style="list-style-type: none"> ● Check backup pump compatibility (see technical data). ● Check that the backup pump is working. |
| | <ul style="list-style-type: none"> ● Leakage on the turbopump | <ul style="list-style-type: none"> ● Carry out leak detection. ● Check seals and flange connections. ● Eliminate leaks. |
| | <ul style="list-style-type: none"> ● Gas throughput too high | <ul style="list-style-type: none"> ● Reduce the process gas load. |
| | <ul style="list-style-type: none"> ● Rotor not running smoothly, defective bearing | <ul style="list-style-type: none"> ● Check the turbopump for noise development ● Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> ● Run-up time setpoint adjusted too low | <ul style="list-style-type: none"> ● Use a control unit to extend the set value run-up time [P:700]. |
| | <p>Thermal load due to:</p> <ul style="list-style-type: none"> ● lack of ventilation ● water flow too low ● Fore-vacuum pressure too high ● ambient temperature too high | <ul style="list-style-type: none"> ● Reduce the thermal load. <ul style="list-style-type: none"> – Ensure adequate air supply. – Adjust the cooling water flow. – Reduce the fore-vacuum pressure. – Adapt the ambient conditions. |
| Turbopump not achieving the ultimate pressure | <ul style="list-style-type: none"> ● Turbopump is polluted | <ul style="list-style-type: none"> ● Heat the turbopump if required. ● Have it cleaned. ● Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> ● Vacuum chamber, pipes or turbopump leaking | <ul style="list-style-type: none"> ● Carry out leak detection starting from the vacuum chamber. ● Check seals and flange connections. ● Eliminate leaks in the vacuum system. |
| Unusual noises during operation | <ul style="list-style-type: none"> ● Rotor bearing damaged | <ul style="list-style-type: none"> ● Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> ● Rotor damaged | <ul style="list-style-type: none"> ● Contact Pfeiffer Vacuum Service. |
| | <ul style="list-style-type: none"> ● Splinter shield or protective screen loose | <ul style="list-style-type: none"> ● Check and correct the seat of the splinter shield or protective screen in the high vacuum flange. ● Follow the installation instructions. |
| Red LED on the electronic drive unit illuminates | <ul style="list-style-type: none"> ● Group error | <ul style="list-style-type: none"> ● Reset the malfunction by switching the current supply off and on. ● Reset the malfunction with V+ on pin 6 on the "X3" connection. ● Set the parameter [P: 009] via the interface RS-485 to 1 = Malfunction acknowledgment. ● Set the parameter [P: 010] via the interface RS-485 to 0 = off and then 1 = On and Malfunction acknowledgment. ● Carry out a differentiated malfunction analysis with a control unit. ● Contact Pfeiffer Vacuum Service. |

Tbl. 13: Troubleshooting turbopumps

11 Service solutions by Pfeiffer Vacuum

We offer first-class service

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

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

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

Make use of Pfeiffer Vacuum service

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

You can obtain advice on the optimal solution for you, from your [Pfeiffer Vacuum representative](#).

For fast and smooth service process handling, we recommend the following:



1. Download the up-to-date form templates.
 - [Explanations of service requests](#)
 - [Service requests](#)
 - [Contamination declaration](#)



- a) Remove and store all accessories (all external parts, such as valves, protective screens, etc.).
 - b) If necessary, drain operating fluid/lubricant.
 - c) If necessary, drain coolant.
2. Complete the service request and contamination declaration.



3. Send the forms by email, fax, or post to your local [Service Center](#).

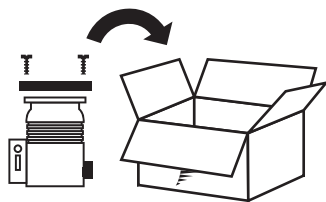


4. You will receive an acknowledgment from Pfeiffer Vacuum.

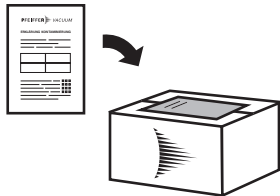
PFEIFFER VACUUM

Submission of contaminated products

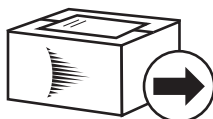
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



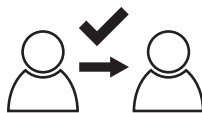
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package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



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



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



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

PFEIFFER VACUUM

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

12 Spare parts, HiPace 80 Neo

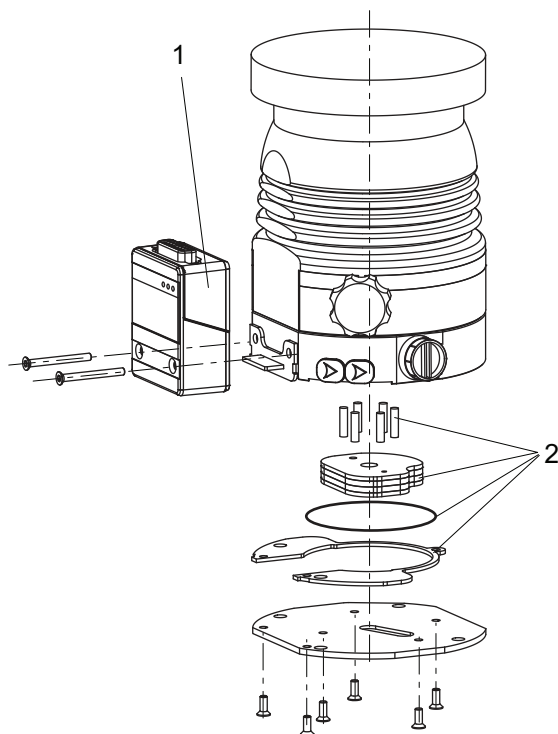


Fig. 19: Spare parts, HiPace 80 Neo

| Position | Designation | Order number | Remark | Pieces |
|----------|-----------------------------|---------------------------|---------------------------------------|--------|
| 1 | Electronic drive unit TC 80 | refer to the rating plate | | 1 |
| 2 | Operating fluid reservoir | refer to the rating plate | incl. capillary rods, O-ring and seal | 1 |

Tbl. 14: Overview of available spare parts

13 Accessories



View the [range of accessories for hybrid bearing turbopumps](#) 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 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 venting valve offers maximum operating and process security. Automatic control through the integrated electronic drive unit of the turbopump.

Sealing gas supply

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

Air cooling

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

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 turbopump.

Backing pump control

The electronic drive unit of the turbopump 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

| Selection field | Part number |
|---|---------------|
| Centering ring, FPM/aluminum, DN 40 ISO-KF | PF 110 140 -T |
| Centering ring with integrated mesh screen, DN 40 ISO-KF | PF 113 240 -T |
| Centering ring with integrated splinter shield, DN 40 ISO-KF | PM 006 375 -X |
| Centering ring with multifunction coating, DN 63 ISO-K/-F | PM 016 206 |
| Centering ring with multi-functional coating and integrated splinter shield, DN 63 ISO-K/-F | PM 016 207 |
| Centering ring with multi-functional coating and integrated protection screen, DN 63 ISO-K/-F | PM 016 208 |
| Elastomer seal, FKM, DN 63 CF | 402DFL063-S2 |
| Elastomer seal, FKM, DN 63 CF | 402DFL063-Z |

| Selection field | Part number |
|--|------------------|
| Copper gasket, vacuum-annealed, DN 63 CF | 490DFL063-G-S5 |
| Copper gasket, OFHC copper, DN 63 CF | 490DFL063-S10 |
| Copper gasket, silver-plated, vacuum-annealed, DN 63 CF | 490DFL063-S-G-S5 |
| Copper gasket, silver-plated, DN 63 CF | 490DFL063-S-S5 |
| Vibration damper for HiPace 60/80, DN 40 ISO-KF | PM 006 799 -X |
| Vibration damper for HiPace 60/80, DN 63 ISO-K | PM 006 800 -X |
| Vibration damper for HiPace 60/80, DN 63 CF-F | PM 006 801 -X |
| Splinter shield for Pfeiffer Vacuum turbopumps | PM 016 312 |
| Protection screen for DN 63 CF-F | PM 016 333 |
| Mounting kit for HiPace 60/80, DN 40 ISO-KF, including centering ring and clamping ring | PM 016 625 -T |
| Mounting kit for HiPace 60/80, DN 40 ISO-KF, splinter shield, clamping ring | PM 016 626 -T |
| Mounting kit for DN 63 ISO-K to ISO-F, with collar flange, coated centering ring with splinter shield, hexagon bolts | PM 016 931 -T |
| Mounting kit for DN 63 ISO-K to ISO-F, with collar flange, coated centering ring, hexagon bolts | PM 016 930 -T |
| Mounting kit for DN 63 ISO-K to ISO-F, with collar flange, coated centering ring with protection screen, hexagon bolts | PM 016 932 -T |
| Mounting kit for DN 63 ISO-K to ISO-F, with collar flange, coated centering ring, stud screws | PM 016 935 -T |
| Mounting kit for DN 63 ISO-K to ISO-F, with collar flange, coated centering ring with splinter shield, stud screws | PM 016 936 -T |
| Mounting kit for DN 63 ISO-K to ISO-F, with collar flange, coated centering ring with protection screen, stud screws | PM 016 937 -T |
| Mounting kit for HiPace 60/80, DN 63 ISO-K, including coated centering ring and bracket screws | PM 016 360 -T |
| Mounting kit for HiPace 60/80, DN 63 ISO-K, including coated centering ring, splinter shield and bracket screws | PM 016 361 -T |
| Mounting kit for HiPace 60/80, DN 63 ISO-K, including coated centering ring, integrated protective screen, bracket screws | PM 016 362 -T |
| Mounting kit for HiPace 60/80, DN 63 ISO-K, including coated centering ring and claws | PM 016 510 -T |
| Mounting kit for HiPace 60/80, DN 63 ISO-K, including coated centering ring, splinter and claw grips | PM 016 511 -T |
| Mounting kit for HiPace 60/80, DN 63 ISO-K, including coated centering ring with integrated protection screen and claw grips | PM 016 512 -T |
| Hexagon screw set for flanges with through holes, DN 63 CF-F | PM 016 683 -T |
| Set of stud screws for flanges with a threaded hole, DN 63 CF-F | PM 016 684 -T |
| Set of stud screws for flanges with through-hole, DN 63 CF-F | PM 016 733 -T |
| Wall rail fitting for TPS 110/180/310/400 | PM 061 392 -T |
| Flange with pipe thread, DN 16 ISO-KF, G 1/8" | PM 016 780 -T |
| Push-in fitting for 6 mm tube, G 1/8" | PM 016 781 -T |
| Push-in fitting for 8 mm tube, G 1/8" | PM 016 782 -T |
| Hose nozzle for 9 mm hose, G 1/8" | PM 016 783 -T |
| Banjo fitting | PM 016 787 -T |
| Banjo fitting, small | PM 143 877 -T |
| 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 |
| Connection cable MVP-TC-TPS, 3 m | PE 100 013 -T |
| OmniControl 200, rack unit with integrated power supply pack | PE D50 000 0 |
| OmniControl 200, table unit with integrated power supply pack | PE E50 000 0 |
| USB RS-485 converter | PM 061 207 -T |

| Selection field | Part number |
|---|---------------|
| Coupling M12 for RS-485 | PM 061 270 -X |
| Interface cable, M12 m straight / M12 m straight, 3 m | PM 061 283 -T |
| TPS 180, power supply pack for wall/standard rail installation | PM 061 341 -T |
| TPS 181, power supply pack 19" plug-in unit 3HU | PM 061 345 -T |
| Front panel kit for TPS 181 | PM 061 394 -T |
| Extension cable M8 on M8 | PM 061 783 -T |
| Interface cable, M12 m straight / M12 m angled, 0.7 m | PM 061 791 -T |
| HiPace – ACP connection cable | PM 071 142 -X |
| Connection cable, angled, with RS-485 interface and two accessory ports from TC 80/110/120 to power supply pack, 1 m | PM 071 655 -T |
| Connection cable, angled, with RS-485 interface and two accessory ports from TC 80/110/120 to power supply pack, 3 m | PM 071 656 -T |
| Connection cable, angled, with RS-485 interface and two accessory ports from TC 80/110/120 to power supply pack, 5 m | PM 071 657 -T |
| Connection cable, angled, with RS-485 interface and two accessory ports from TC 80/110/120 to power supply pack, 10 m | PM 071 658 -T |
| Connection cable, angled, with RS-485 interface and two accessory ports from TC 80/110/120 to power supply pack, diode, 1 m | PM 071 760 -T |
| Connection cable, angled, with RS-485 interface and two accessory ports from TC 80/110/120 to power supply pack, diode, 3 m | PM 071 761 -T |
| Connection cable TPS-MVP-TC80, 0.5 m | PM 071 775 -T |
| Connection cable TPS-MVP-TC80, 1 m | PM 071 776 -T |
| Connection cable TPS-MVP-TC80, 3 m | PM 071 778 -T |
| Connection cable TPS-HiScroll-TC80, 3 m | PM 071 780 -T |
| Terminal resistor for RS-485 | PT 348 105 -T |
| Power separator for RS-485 | PT 348 132 -T |
| TTV 001, Drier for venting turbopumps | PM Z00 121 |
| TVV 001, fore-vacuum safety valve, 230 V AC | PM Z01 205 |
| TVV 001, fore-vacuum safety valve, 115 V AC | PM Z01 206 |
| Venting valve, shielded, 24 V DC, G 1/8", for connection to TC 110/120 | PM Z01 290 |
| Venting valve, 24 V DC, G 1/8" without cable | PM Z01 293 |
| Shielded venting valve, AccessLink, 24 V DC, 1/8" thread for HiPace 80 Neo | PM Z01 295 |
| Filter element silencer 1/8" thread | P 0988 060 |
| Power failure venting unit shielded, 24 V DC, G 1/8" for connection to TC 110/120 | PM Z01 330 |
| Air cooling for HiPace 60/80, SplitFlow 50/80, 230 V | PM Z01 343 |
| Air cooling for HiPace 60 P and 80, SplitFlow 50/80, 115 V | PM Z01 344 |
| Air cooling for HiPace, unshielded, with connection to M8 | PM Z01 348 |
| Air cooling, shielded, USB, for HiPace 80 Neo | PM Z01 367 |
| Air cooling, shielded | PM Z01 369 |
| Pin heatsink for air or convection cooling | PM 223 000 -T |
| Water cooling for HiPace 80 Neo HiPace 30 Neo | PM 026 100 -T |
| Heating sleeve for HiPace® 80 with TC 110, 230 V AC, safety plug | PM 061 360 -T |
| Heating sleeve for HiPace® 80 with TC 110, 208 V AC, ul plug | PM 061 361 -T |
| Heating sleeve for HiPace® 80 with TC 110, 115 V AC, ul plug | PM 061 362 -T |
| Relay box for backing pumps, 1-phase motor 20 A for TC 110/120 and TCP 350, plug M8 | PM 061 373 -T |
| Control cable for valve | PM 061 687 -T |
| Relay box, shielded, for backing pumps, 1-phase motor 7A for TC 110/120 and TCP 350, plug M8 | PM 071 282 -X |
| RPT 010, digital Piezo/Pirani sensor | PT R71 550 |

| Selection field | Part number |
|--|--------------------|
| IKT 010, digital cold cathode sensor, low current | PT R72 550 |
| IKT 011, digital cold cathode sensor, high current | PT R73 550 |

Tbl. 15: Accessories

14 Technical data and dimensions

14.1 General

This section describes the basis for the technical data of Pfeiffer Vacuum turbopumps.

| | |
|----------|--|
| i | Technical data Maximum values refer exclusively to the input as a single load. |
|----------|--|

- Specifications according to PNEUROP committee PN5
- ISO 27892 2010: "Vacuum technology - Turbomolecular pumps - Measurement of rapid 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"
- Ultimate pressure with test dome after 48 h bake out duration
- Gas throughput with water cooling; backing pump = rotary vane pump (10 m³/h)
- Cooling water consumption at maximum gas throughput, cooling water temperature 25 °C
- Integral leakage rate with 100 % helium concentration, 10 s measurement duration
- Sound pressure level at distance to vacuum pump = 1 m

| | mbar | bar | Pa | hPa | kPa | Torr mm Hg |
|--------------|------|-------------------------|---------------------|------|----------------------|------------------------|
| mbar | 1 | 1 · 10 ⁻³ | 100 | 1 | 0.1 | 0.75 |
| bar | 1000 | 1 | 1 · 10 ⁵ | 1000 | 100 | 750 |
| Pa | 0.01 | 1 · 10 ⁻⁵ | 1 | 0.01 | 1 · 10 ⁻³ | 7.5 · 10 ⁻³ |
| hPa | 1 | 1 · 10 ⁻³ | 100 | 1 | 0.1 | 0.75 |
| kPa | 10 | 0.01 | 1000 | 10 | 1 | 7.5 |
| Torr mm Hg | 1.33 | 1.33 · 10 ⁻³ | 133.32 | 1.33 | 0.133 | 1 |

1 Pa = 1 N/m²

Tbl. 16: Conversion table: Pressure units

| | mbar l/s | Pa m ³ /s | sccm | Torr l/s | atm cm ³ /s |
|------------------------|-------------------------|-------------------------|------|-------------------------|-------------------------|
| mbar l/s | 1 | 0.1 | 59.2 | 0.75 | 0.987 |
| Pa m ³ /s | 10 | 1 | 592 | 7.5 | 9.87 |
| sccm | 1.69 · 10 ⁻² | 1.69 · 10 ⁻³ | 1 | 1.27 · 10 ⁻² | 1.67 · 10 ⁻² |
| Torr l/s | 1.33 | 0.133 | 78.9 | 1 | 1.32 |
| atm cm ³ /s | 1.01 | 0.101 | 59.8 | 0.76 | 1 |

Tbl. 17: Conversion table: Units for gas throughput

14.2 Technical data

| Type designation extended | HiPace® 80 Neo with TC 80 | HiPace® 80 Neo with TC 80 | HiPace® 80 Neo with TC 80 |
|--------------------------------------|---------------------------|---------------------------|---------------------------|
| Connection flange (in) | DN 40 ISO-KF | DN 63 ISO-K | DN 63 CF-F |
| Connection flange (out) | G ¼" | G ¼" | G ¼" |
| Final pressure | 1 · 10 ⁻⁷ hPa | 1 · 10 ⁻⁷ hPa | 5 · 10 ⁻¹⁰ hPa |
| Compression ratio for Ar | 1 · 10 ¹¹ | 1 · 10 ¹¹ | 1 · 10 ¹¹ |
| Compression ratio for H ₂ | 1.4 · 10 ⁵ | 1.4 · 10 ⁵ | 1.4 · 10 ⁵ |
| Compression ratio for He | 1.3 · 10 ⁷ | 1.3 · 10 ⁷ | 1.3 · 10 ⁷ |
| Compression ratio for N ₂ | 1 · 10 ¹¹ | 1 · 10 ¹¹ | 1 · 10 ¹¹ |

| Type designation extended | HiPace® 80 Neo with TC 80 | HiPace® 80 Neo with TC 80 | HiPace® 80 Neo with TC 80 |
|---|--------------------------------|--------------------------------|--------------------------------|
| Pumping speed for Ar | 30 l/s | 66 l/s | 66 l/s |
| Pumping speed for H ₂ | 38 l/s | 48 l/s | 48 l/s |
| Pumping speed for He | 41 l/s | 58 l/s | 58 l/s |
| Pumping speed for N ₂ | 35 l/s | 67 l/s | 67 l/s |
| Gas throughput at full rotational speed, short term, for Ar | 2 hPa·l/s | 2 hPa·l/s | 2 hPa·l/s |
| Gas throughput at full rotational speed, short term, for H ₂ | 30 hPa·l/s | 30 hPa·l/s | 30 hPa·l/s |
| Gas throughput at full rotational speed, short term, for He | 8 hPa·l/s | 8 hPa·l/s | 8 hPa·l/s |
| Gas throughput at full rotational speed, short term, for N ₂ | 4 hPa·l/s | 4 hPa·l/s | 4 hPa·l/s |
| Gas throughput at final rotation speed for Ar | 0.54 hPa·l/s | 0.54 hPa·l/s | 0.54 hPa·l/s |
| Gas throughput at final rotation speed for H ₂ | 15.3 hPa·l/s | 15.3 hPa·l/s | 15.3 hPa·l/s |
| Gas throughput at final rotation speed for He | 2.7 hPa·l/s | 2.7 hPa·l/s | 2.7 hPa·l/s |
| Gas throughput at final rotation speed for N ₂ | 1.3 hPa·l/s | 1.3 hPa·l/s | 1.3 hPa·l/s |
| Fore-vacuum max. for N ₂ | 22 hPa | 22 hPa | 22 hPa |
| Fore-vacuum max. for Ar | 23 hPa | 23 hPa | 23 hPa |
| Fore-vacuum max. for H ₂ | 14 hPa | 14 hPa | 14 hPa |
| Fore-vacuum max. for He | 22 hPa | 22 hPa | 22 hPa |
| Rotation speed ±2 % | 90000 rpm | 90000 rpm | 90000 rpm |
| Rotation speed variable | 50 – 100 % | 50 – 100 % | 50 – 100 % |
| Performance curve in gas mode 0, vertex C | 56/90000 W/min ⁻¹ | 56/90000 W/min ⁻¹ | 56/90000 W/min ⁻¹ |
| Performance curve in gas mode 0, vertex D | 65/81000 W/min ⁻¹ | 65/81000 W/min ⁻¹ | 65/81000 W/min ⁻¹ |
| Performance curve in gas mode 1, vertex A | 80/90000 W/min ⁻¹ | 80/90000 W/min ⁻¹ | 80/90000 W/min ⁻¹ |
| Performance curve in gas mode 1, vertex B | 80/84000 W/min ⁻¹ | 80/84000 W/min ⁻¹ | 80/84000 W/min ⁻¹ |
| Performance curve in gas mode 2, vertex E | 110/90000 W/min ⁻¹ | 110/90000 W/min ⁻¹ | 110/90000 W/min ⁻¹ |
| Performance curve in gas mode 2, vertex F | 110/84000 W/min ⁻¹ | 110/84000 W/min ⁻¹ | 110/84000 W/min ⁻¹ |
| Electronic drive unit | TC 80 | TC 80 | TC 80 |
| Operating voltage: DC | 24 V | 24 V | 24 V |
| Input voltage: tolerance | ±10 % | ±10 % | ±10 % |
| Power consumption TC | 120 W | 120 W | 120 W |
| Current, max. | 5.6 A | 5.6 A | 5.6 A |
| Rated current consumption | 5 A | 5 A | 5 A |
| Run-up time | 75 s | 75 s | 75 s |
| I/O interfaces | RS485, Remote | RS485, Remote | RS485, Remote |
| Mounting orientation | Arbitrary | Arbitrary | Arbitrary |
| Bearing | Hybrid | Hybrid | Hybrid |
| Cooling method | Natural convection | Natural convection | Natural convection |
| Cooling water flow | 75 l/h | 75 l/h | 75 l/h |
| Cooling water temperature | 5 – 25 °C | 5 – 25 °C | 5 – 25 °C |
| Cooling method, optional | Air (forced convection), Water | Air (forced convection), Water | Air (forced convection), Water |

| Type designation extended | HiPace® 80 Neo with TC 80 | HiPace® 80 Neo with TC 80 | HiPace® 80 Neo with TC 80 |
|---|---|---|---|
| Sound pressure level | ≤48 dB(A) | ≤48 dB(A) | ≤48 dB(A) |
| Venting connection | G 1/8" | G 1/8" | G 1/8" |
| Max. connection pressure (abs.) for venting/sealing gas valve | 1500 hPa | 1500 hPa | 1500 hPa |
| Integral leak rate | 1 · 10 ⁻⁸ Pa m ³ /s | 1 · 10 ⁻⁸ Pa m ³ /s | 1 · 10 ⁻⁸ Pa m ³ /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. | 3.7 mT | 3.7 mT | 3.7 mT |
| Permissible axial magnetic field max. | 23 mT | 23 mT | 23 mT |
| Permissible irradiated thermal output max. | 1.2 W | 1.2 W | 1.2 W |
| Temperature: Shipping | -25 – 55 °C | -25 – 55 °C | -25 – 55 °C |
| Weight | 1.7 kg | 1.7 kg | 3.1 kg |

Tbl. 18: Technical data for HiPace 80 Neo, other connection flanges for the output are optional

14.3 Substances in contact with the 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 |

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

14.4 Dimensions

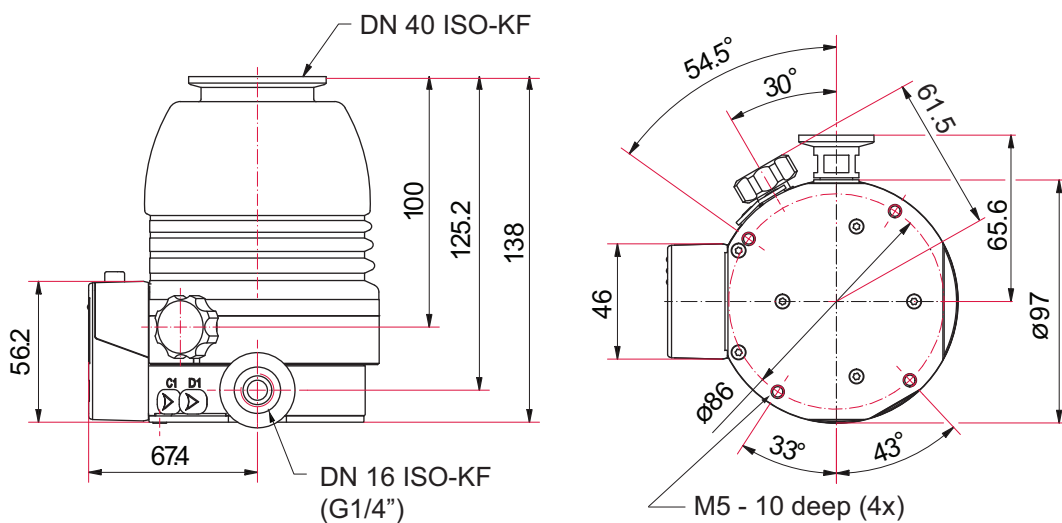


Fig. 20: HiPace 80 Neo | DN 40 ISO-KF
Dimensions in mm

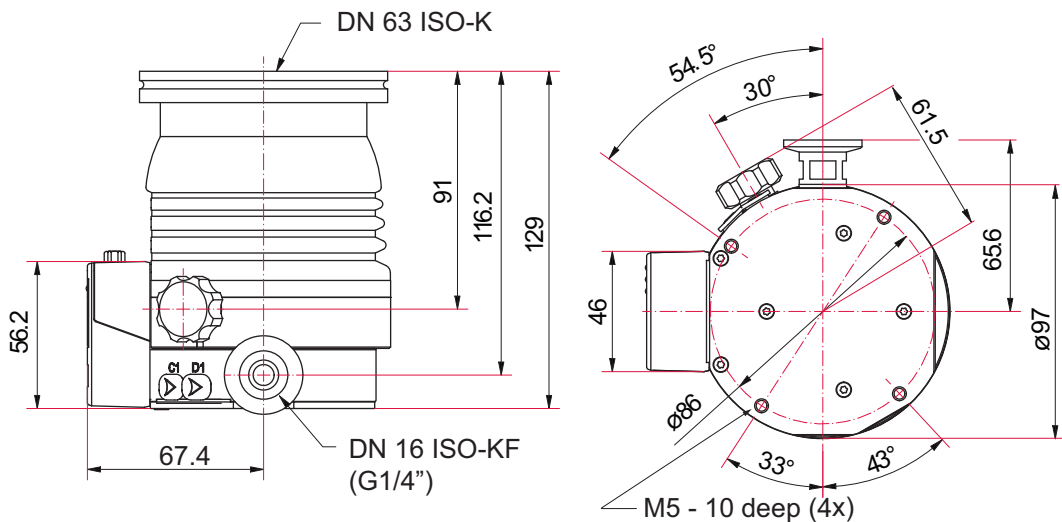


Fig. 21: HiPace 80 Neo | DN 63 ISO-K
Dimensions in mm

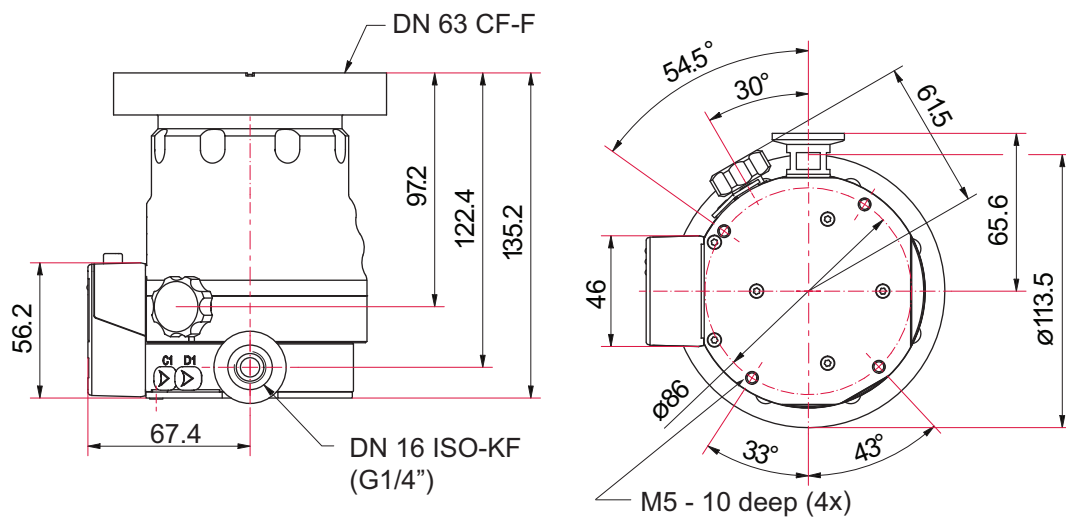


Fig. 22: HiPace 80 Neo | DN 63 CF-F
Dimensions in mm

EC Declaration of Conformity

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

Declaration for product(s) of the type:

Turbopump

HiPace 80 Neo

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

Machinery 2006/42/EC (Annex II, no. 1 A)

Electromagnetic compatibility 2014/30/EU

Restriction of the use of certain hazardous substances 2011/65/EU

Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU

Harmonized standards and applied national standards and specifications:

DIN EN ISO 12100 : 2011

DIN EN 61326-1 : 2013

DIN EN 1012-2 : 2011

DIN EN 62061 : 2016

DIN EN IEC 61000-3-2 : 2019

DIN ISO 21360-1 : 2020

DIN EN 61000-3-3 : 2020

ISO 21360-4 : 2018

DIN EN 61010-1 : 2020

DIN EN IEC 63000 : 2019

The authorized representative for the compilation of technical documents is Mr. Tobias Stoll, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Asslar, Germany.

Signature:



Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2022-18-07



UK Declaration of Conformity

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

Declaration for product(s) of the type:

Turbopump

HiPace 80 Neo

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

Supply of Machinery (Safety) Regulations 2008

Electromagnetic Compatibility Regulations 2016

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Applied standards and specifications:

| | |
|-----------------------|------------------|
| ISO 12100:2010 | IEC 61326-1:2012 |
| EN 1012-2+A1:1996 | IEC 62061:2005 |
| IEC 61000-3-2:2018 | ISO 21360-1:2020 |
| IEC 61000-3-3+A1:2013 | ISO 21360-4:2018 |
| IEC 61010-1+A1:2010 | IEC 63000:2018 |

The manufacturer's authorized representative in the United Kingdom and the authorized agent for compiling the technical documentation is Pfeiffer Vacuum Ltd, 16 Plover Close, Interchange Park, MK169PS Newport Pagnell.

Signature:



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Managing Director

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Asslar, 2022-11-18

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