

OPERATING INSTRUCTIONS

EN

Translation of the Original

HIPACE 10 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

- HiPace 10 Neo, DN 40 ISO-KF, TC 80

1.2 Target group

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

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

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

1.3 Conventions

1.3.1 Pictographs

Pictographs used in the document indicate useful information.



Note



Tip

1.3.2 Stickers on the product

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

	<p>Rating plate (example) The rating plate is located beneath the high vacuum connection and to the left of the TC adapter.</p> <p>Rating plate of the electronic drive unit The electronic drive unit rating plate is located on the top</p>
	<p>Warranty seal The product is sealed ex factory. Damaging or removing a warranty seal results in loss of the warranty.</p>
	<p>Operating instructions note This sticker indicates that this operating instructions must be read before performing any tasks.</p>
	<p>Protection class The sticker describes protection class III for the product. Its placement indicates the position for the functional earth ground connection.</p>
	<p>Warning This sticker warns against risk of injury with the high vacuum connection open.</p>

Tbl. 1: Stickers on the product

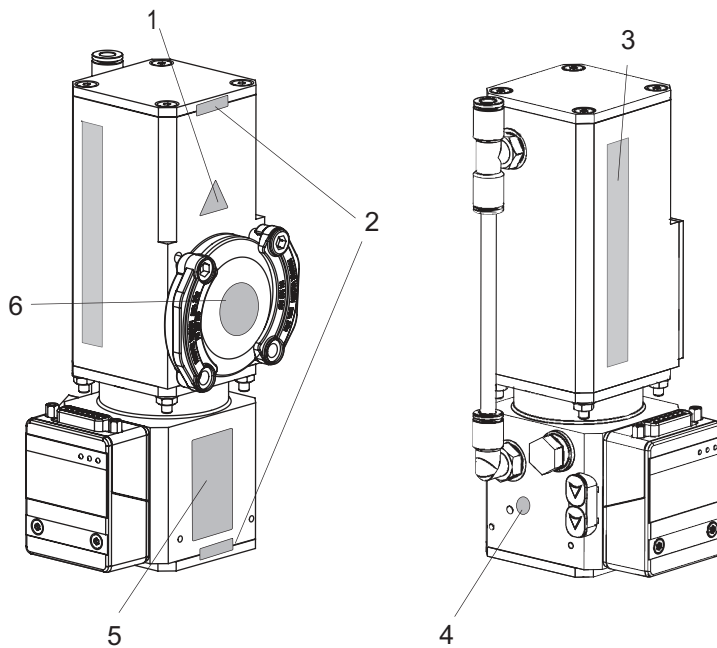


Fig. 1: Position of the stickers on the product

- | | |
|--|---|
| 1 Warning sign "Risk of injury with high vacuum connection open" | 4 Information regarding ground connection |
| 2 Warranty seal | 5 Rating plate |
| 3 Banner with Pfeiffer Vacuum logo | 6 Operating instructions note |

1.3.3 Abbreviations

Abbreviation	Meaning in this document
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)

Abbreviation	Meaning in this document
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
T	Temperature (in °C)
TC	Turbopump electronic drive unit (turbo controller)
TCS	Interface adapter
RS-485	Communications interface
TPS	Voltage supply (turbo power supply)
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**

1.3.4 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. ...

1.4 Trademark proof

- Torx® is a registered trademark of ACUMENT INTELLECTUAL PROPERTIES, LLC.

2 Safety

2.1 General safety information

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

DANGER

Immediately pending danger

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

- ▶ Instructions to avoid the danger situation

WARNING

Potential pending danger

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

- ▶ Instructions to avoid the danger situation

CAUTION

Potential pending danger

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

- ▶ Instructions to avoid the danger situation

NOTICE

Danger of damage to property

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

- ▶ Instructions to avoid damage to property



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

2.2 Safety instructions

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

Risks during transport

WARNING

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.

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**
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.

Risks during operation

WARNING

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

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

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

WARNING

Danger 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 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.

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.

Risks during maintenance and decommissioning

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 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
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


Duty to provide information on potential dangers

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

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


Infringement of conformity due to modifications to the product

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

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

General safety precautions when handling the product

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

Installation location	weatherproof (internal space)
Air pressure	770 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	IP20
Degree of pollution	2
Ambient temperature	5°C to 35°C
Permissible surrounding magnetic field	3 mT
Maximum irradiated thermal output	0.6 W
Maximum permissible rotor temperature of the turbopump	110°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 TC 80. The Pfeiffer Vacuum power supply packs are used for voltage supply.

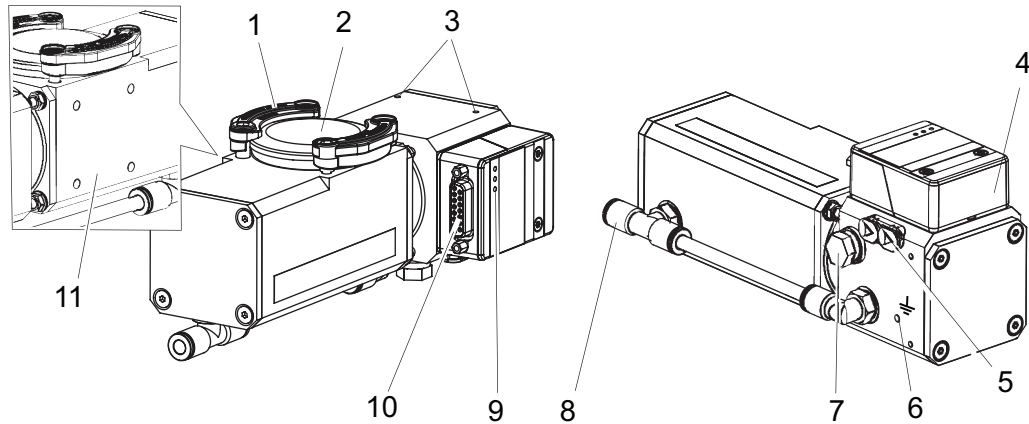


Fig. 2: Design of HiPace 10 Neo

- | | |
|---|----------------------------------|
| 1 C-clamp, DN 40 | 7 Venting screw |
| 2 High vacuum connection with blank flange, DN 40 | 8 Fore-vacuum connection |
| 3 Fixing hole for air cooling | 9 LEDs |
| 4 Electronic drive unit TC 80 | 10 Multifunction connection "X3" |
| 5 AccessLink bushings with sealing plugs | 11 Fixing holes, 4 x M5 |
| 6 Functional earth ground connection | |

3.1.1 Cooling

- Convection cooling
- Air cooling (optional)

The electronic drive unit automatically regulates the drive power downward at excess temperatures.

3.1.2 Rotor bearing

Ball bearing-mounted turbopump

- One ball bearing is fitted at each shaft end in the fore-vacuum area respectively.

Permanent lubrication and performance of the ball bearings is ensured by two operating fluid reservoirs.

3.1.3 Drive

- Electronic drive unit TC 80

3.2 Identifying the product

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

3.3 Product features

Feature	Version
HV flange	DN 40 ISO-KF
Flange material	Aluminium

Tbl. 4: Turbopump features

3.4 Scope of delivery

- Turbopump with electronic drive unit
- Blank flange for high vacuum connection
- C-clamp DN 40 ISO-KF, 2×
- Sealing plug for the fore-vacuum connection
- 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).

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 the 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 Connecting the high vacuum side

5.2.1 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.

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



The assembly of vertical superstructural parts on 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. The total weight of superstructural parts must not exceed the maximum values specified.

If the rotor is suddenly blocked, the torques arising from the system and the high vacuum flange must be absorbed. The installation elements for turbo pumps are special designs by Pfeiffer Vacuum.

Maximum torque occurring in the event of a burst ¹⁾	Maximum permissible axial load on the high vacuum flange ²⁾	Flatness	Minimum tensile strength of the flange material in all operating conditions	Engagement depth of the fixing screws	Maximum permissible surrounding magnetic field	Maximum permissible irradiated thermal output
80 Nm	200 N (equivalent to 20 kg)	± 0.05 mm	170 N/mm ²	2.5 x d	3.0 mT	0.6 W
			270 N/mm ²	1.5 x d		

Tbl. 5: Requirements for the dimensioning of customer-specific high vacuum connection

5.2.2 Considering the 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.

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

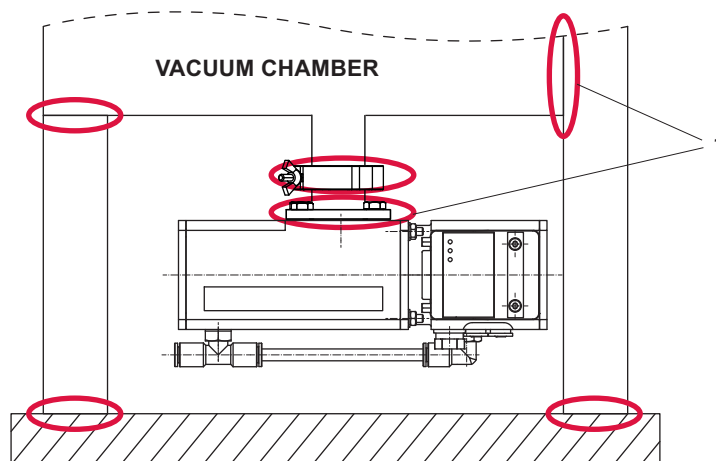


Fig. 3: Example: Securing against displacement and tipping caused by external vibrations

1 Safety connection, customer-side

5.2.3 Using a mesh screen

Pfeiffer Vacuum centering rings with mesh screen in the high vacuum flange protect the turbopump against foreign matter from the chambers. The pumping speed of the turbopump decreases according to the conductivity and the size of the high vacuum flange.

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.

Flange size	Reduced pumping speed in % for the gas type			
	H ₂	He	N ₂	Ar
Mesh screen DN 40	6	9	17	18

Tbl. 6: Behavior of the pumping speed using a mesh screen

Procedure

- ▶ Use centering rings with integrated mesh screen for ISO flanges.

5.2.4 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.

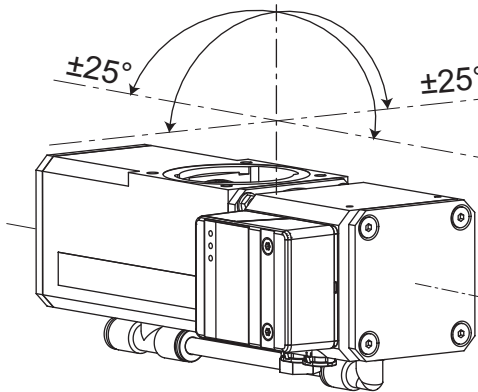


Fig. 4: Recommended alignment of the fore-vacuum connection when using oil-sealed backing pumps

Determine a horizontal mounting orientation of the turbopump with 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.

5.2.5 Attaching ISO-KF flange to DN 40



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, **WAF 5**
- Calibrated torque wrench (tightening factor ≤ 1.6)

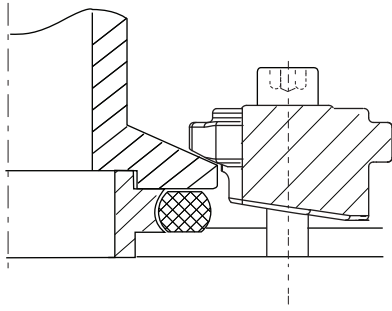


Fig. 5: Flange connection for DN 40 onto DN 40 ISO-KF with C-clamp

Establishing the high vacuum connection

1. Use only the approved mounting kit from Pfeiffer Vacuum for connection.
2. Ensure that the sealing surfaces are clean and undamaged.
3. Connect flange with mounting kit components according to figure.
 - Centering ring with mesh screen is optional.
4. Evenly tighten the hexagon socket screws of the C-clamps from the scope of delivery.
 - Tightening torque: **2 Nm**

5.3 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).

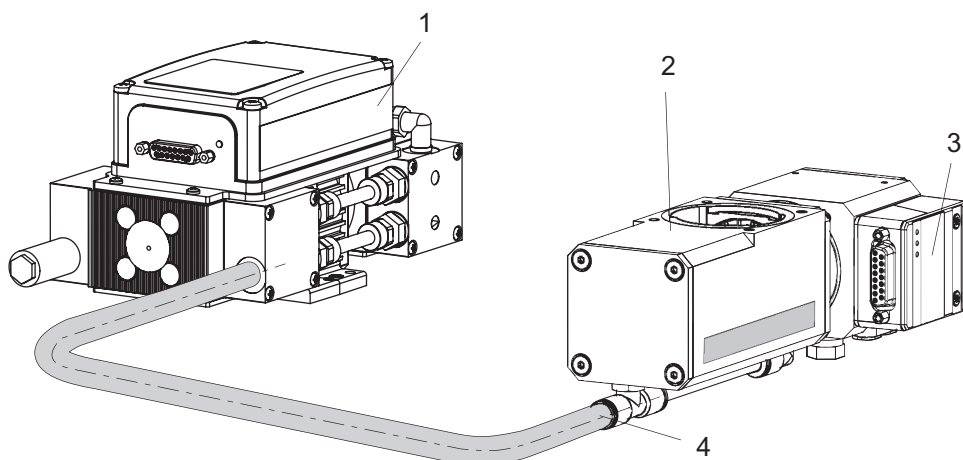


Fig. 6: Example of fore-vacuum connection on HiPace 10 Neo

- | | |
|----------------------|---|
| 1 Backing pump (MVP) | 3 TC 80 |
| 2 Turbopump | 4 Hose connection of the fore-vacuum line |

Connecting fore-vacuum side

1. Install a hose on the quick fitting coupling of the fore-vacuum connection.
2. Choose a minimum fore-vacuum line cross section equal to the nominal diameter of the fore-vacuum connection.
3. Implement measures to counteract the backflow of operating fluids or condensate from the fore-vacuum area.
4. Observe the information in the backing pump operating instructions when connecting and operating it.

5.4 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.

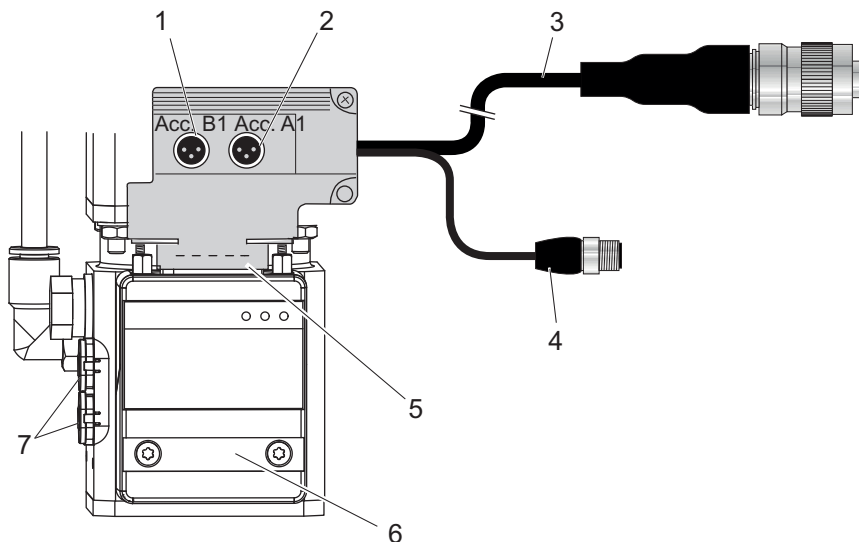


Fig. 7: Accessory connection via connection cable

- | | |
|-------------------------------|---|
| 1 Accessory connection B1 | 5 Multifunction connection "X3" |
| 2 Accessory connection A1 | 6 Turbopump electronic drive unit |
| 3 Connection cable | 7 AccessLink sockets with sealing plugs |
| 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 display and control unit with an integrated power supply pack.

5.5 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.

5.5.1 Ground the vacuum pump

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

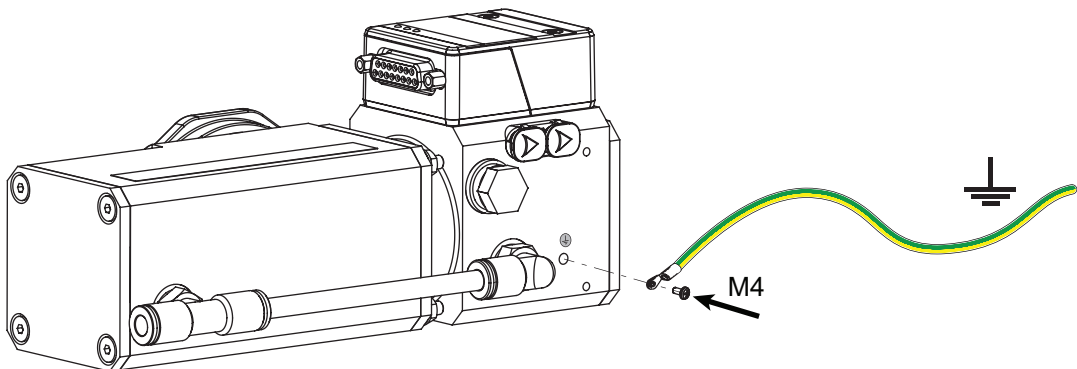


Fig. 8: Example: Connecting the grounding cable

1. Use the functional earth connection of the turbopump (M4 internal thread).
2. Route the connection in accordance with locally applicable provisions.

5.5.2 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 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.

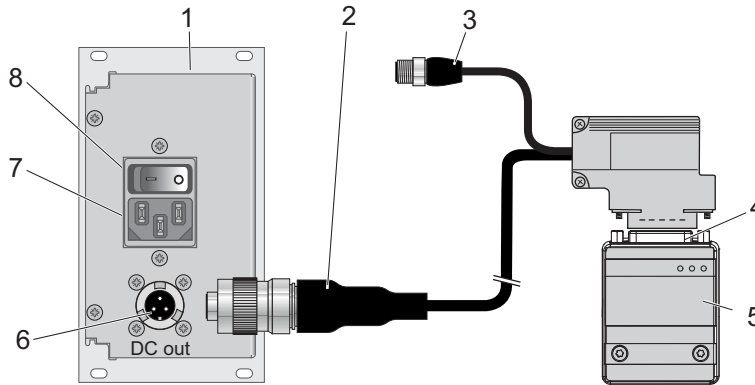


Fig. 9: Connecting electronic drive unit to power supply pack

- | | |
|---|-----------------------------------|
| 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

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 Pfeiffer Vacuum displays and control units, or externally via RS-485 using Pfeiffer Vacuum protocol.

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

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

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

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

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).

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: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 %
[P:720]	VentSpd	Venting at rotation speed, delayed venting	50 %
[P:721]	VentTime	Venting time, delayed venting	3600 s

Tbl. 7: Factory setting of the electronic drive unit for turbopumps when delivered

Put turbopump into operation

- ▶ Provide the current supply for the power supply pack.

6.2 Operating modes

The turbopump can be operated in different modes.

- Operation without control unit
- Operation via connection "X3"
- Operating via RS-485 interface from Pfeiffer Vacuum control unit or PC
- Operation via connection "E74"
- Operation via field bus

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

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
Yellow 	△	Off	—	No warning
		On, constant		Warning
Red 	⚡	Off	—	No error, no warning
		On, constant		Error, malfunction

Tbl. 8: 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

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.

External venting

After the turbo pump is switched off, it must be vented to avoid contamination due to particles streaming back from the fore-vacuum area.

1. Ensure that the vacuum system is shut down.
2. Vent the turbopump to atmospheric pressure on the high vacuum side.
3. Wait for pressure equalization to atmospheric pressure in the vacuum system.

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. It is controlled via the electronic drive unit on the turbopump. 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. 9: 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 Maintenance intervals and responsibilities

Recommendations for performing maintenance measures

1. Clean the turbopump exterior with a lint-free cloth and a little isopropanol.
2. Replace the electronic drive unit as an independent unit.
3. Replace the operating fluid reservoir as an independent unit.
4. Pay attention to when the operating fluid must be changed.
5. Change the operating fluid reservoir at least every 4 years.
6. Have Pfeiffer Vacuum Service replace the rotor bearing of the turbopump at least every 4 years.
7. Consult with Pfeiffer Vacuum Service about shorter maintenance intervals for extreme loads or impure processes.
8. For all other cleaning, maintenance or repair work, contact the appropriate Pfeiffer Vacuum Service location.

7.3 Replacing the 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.

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.



The turbopump 2 is equipped with operating fluid reservoirs for lubricating the ball bearings on both ends of the rotor shaft.

- When exchanging the operating fluid reservoir, pay attention to the correct assignment of pump article number and operating fluid reservoir.

You will 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 caps and any sealing plugs

7.3.1 Changing operating fluid reservoir on bearing side 1

Required tools

- Torx screwdriver TX 20
- Tweezers
- O-ring picker
- Calibrated torque wrench (tightening factor ≤ 1.6)

Required consumables

- Clean, lint-free cloth
- Laboratory gloves

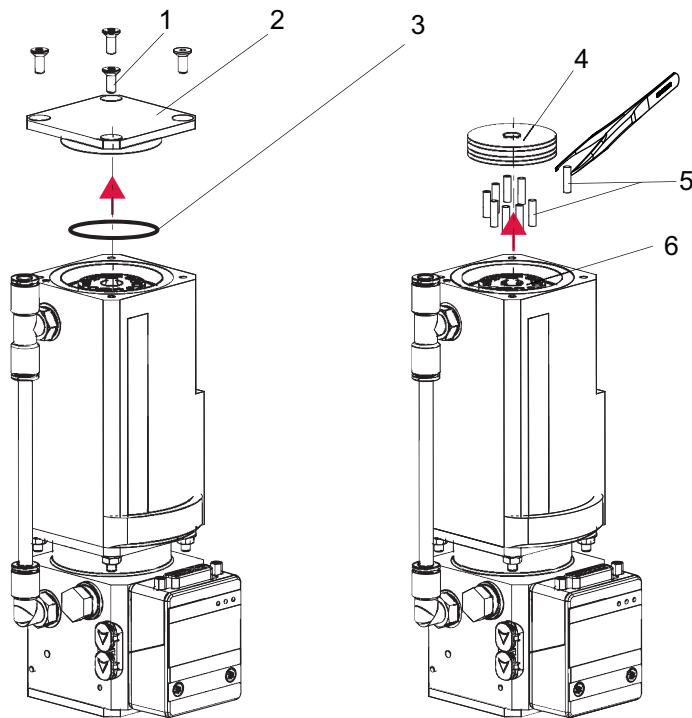


Fig. 10: Removing operating fluid reservoir

- | | |
|---------------|-----------------------------|
| 1 Torx screws | 4 Operating fluid reservoir |
| 2 Closing cap | 5 Capillary rods (9×) |
| 3 O-ring | 6 Bearing housing |

Removing operating fluid reservoir

1. Wear laboratory gloves to avoid skin contact.
2. Remove any external impurities from the turbopump using a clean, lint-free cloth.
3. Place the turbopump upright.
4. Unscrew all 4 Torx screws from the closing cap on this bearing side.
5. Remove closing cap.
6. Remove o-ring from groove using an o-ring picker.
 - Avoid damage caused by scratches.
7. Use tweezers to remove operating fluid reservoir from bearing housing.
8. Use tweezers to pull old capillary rods out of bearing housing.
9. Clean the closing cap with a clean, lint-free cloth.
 - **Do not use cleaning agents.**

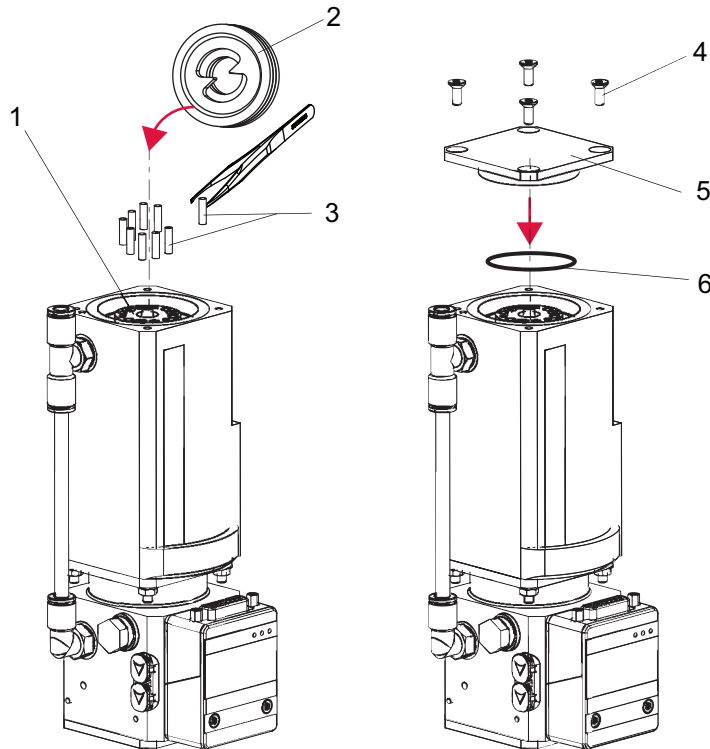


Fig. 11: Assembling operating fluid reservoir

- | | |
|-----------------------------|---------------|
| 1 Bearing housing | 4 Torx screws |
| 2 Operating fluid reservoir | 5 Closing cap |
| 3 Capillary rods (9×) | 6 O-ring |



Ensure correct installation orientation of operating fluid reservoir.



Felt washer with the two cams aligned in installation orientation.

Assembling operating fluid reservoir

1. Wear laboratory gloves to avoid skin contact.
2. Insert all the new capillary rods with the tweezers.
3. Use tweezers to insert new operating fluid reservoir into bearing housing.
4. Push operating fluid reservoir into bearing housing up to the stop.
5. Insert new o-ring in groove of bearing housing.
6. Fit closing cap.
7. Tighten all 4 Torx screws evenly.
 - Tightening torque: **2.5 Nm**.

7.3.2 Changing operating fluid reservoir on bearing side 2

Required tools

- Torx screwdriver, TX 20
- Tweezers
- O-ring picker
- Calibrated torque wrench (tightening factor ≤ 1.6)

Required consumables

- Clean, lint-free cloth
- Laboratory gloves

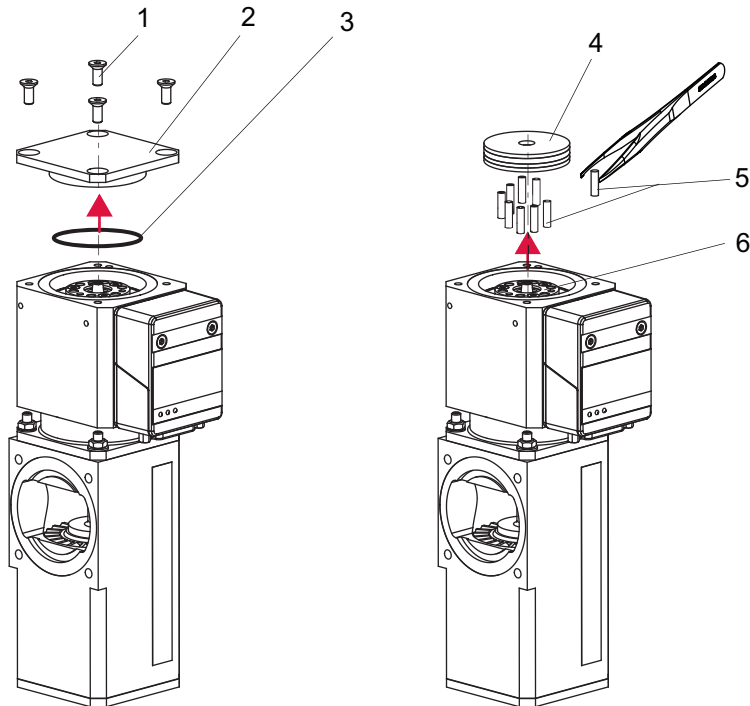


Fig. 12: Removing operating fluid reservoir

- | | |
|---------------|-----------------------------|
| 1 Torx screws | 4 Operating fluid reservoir |
| 2 Closing cap | 5 Capillary rods (9×) |
| 3 O-ring | 6 Bearing housing |

Removing operating fluid reservoir

1. Wear laboratory gloves to avoid skin contact.
2. Remove any external impurities from the turbopump using a clean, lint-free cloth.
3. Place the turbopump upright.
4. Unscrew all 4 Torx screws from the closing cap on this bearing side.
5. Remove closing cap.
6. Remove o-ring from groove using an o-ring picker.
 - Avoid damage caused by scratches.
7. Use tweezers to remove operating fluid reservoir from bearing housing.
8. Use tweezers to pull old capillary rods out of bearing housing.
9. Clean the closing cap with a clean, lint-free cloth.
 - **Do not use cleaning agents.**

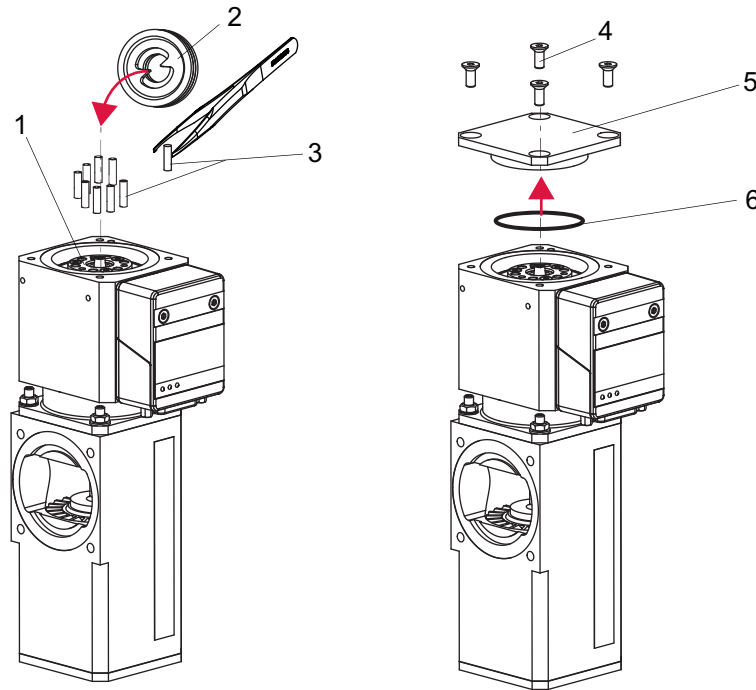


Fig. 13: Assembling operating fluid reservoir

- | | |
|-----------------------------|---------------|
| 1 Bearing housing | 4 Torx screws |
| 2 Operating fluid reservoir | 5 Closing cap |
| 3 Capillary rods (9x) | 6 O-ring |



Ensure correct installation orientation of operating fluid reservoir.

- Felt washer with the two cams aligned in installation orientation.

Assembling operating fluid reservoir

1. Insert all new capillary rods with the tweezers.
2. Use tweezers to insert new operating fluid reservoir into bearing housing.
3. Push operating fluid reservoir into bearing housing up to the stop.
4. Insert new o-ring in groove of bearing housing.
5. Fit closing cap.
6. Tighten all 4 Torx screws evenly.
 - Tightening torque: **2.5 Nm**.

7.4 Replacing 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 spare part.

Prerequisites

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

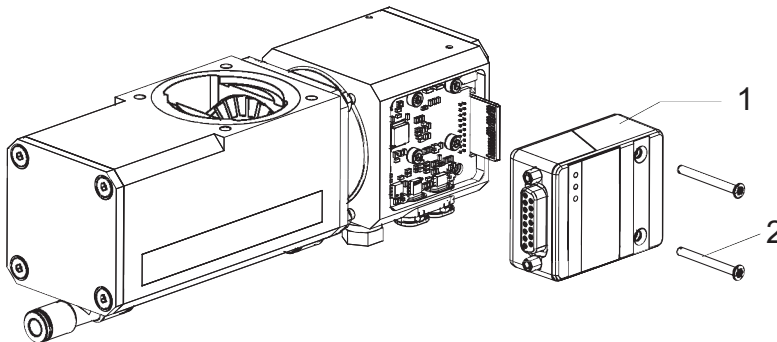


Fig. 14: Installing and removing the electronic drive unit TC 80

- 1 Electronic drive unit 2 Torx screw

Required tools

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

Replacing electronic drive unit

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

HiPace Neo	Nominal rotation speed
10	1500 Hz
30	1500 Hz
80	1500 Hz

Tbl. 10: Characteristic nominal rotation speeds of the turbopumps

Required aids

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

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.



Alternative to adjusting nominal rotation speed confirmation

For the configuration of exchange units, order the Pfeiffer Vacuum SpeedConfigurator (PM 061 812 -X) for the one-time immediate setting of parameter **[P:777]**.

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. Replace the operating fluid reservoir of the turbopump as necessary.
3. Close the high vacuum connection of the turbopump.
4. Evacuate the turbopump via the fore-vacuum connection.
5. Vent the turbopump with dry, oil-free air or inert gas.
6. Close all flange openings with the original protective caps.
7. Store the turbopump with the high vacuum flange pointing 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 4 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 reservoirs of the turbopump.
6. Install the turbopump according to these instructions ([see chapter "Installation", page 20](#)).
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.

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 	<ol style="list-style-type: none"> 1. Check the plug contacts on the power supply pack. 2. Check the current supply lines. 3. Check the output voltage at the power supply pack "DC out" connection: – 24 V DC!
	<ul style="list-style-type: none"> • Incorrect operating voltage 	<ol style="list-style-type: none"> 1. Observe the electronic drive unit rating plate. 2. Supply the correct operating voltage.
	<ul style="list-style-type: none"> • No operating voltage present 	<ol style="list-style-type: none"> 1. Supply the correct operating voltage. 2. Switch on the power supply pack.
	<ul style="list-style-type: none"> • Electronic drive unit defective 	<ol style="list-style-type: none"> 1. Replace the electronic drive unit. 2. 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 	<ol style="list-style-type: none"> 1. Connect the connections according to the electronic drive unit connection diagram. 2. 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 	<ol style="list-style-type: none"> 1. Remove the bridge from the "X3" connection. 2. Check the connection cable.
	<ul style="list-style-type: none"> • For operation via RS-485: Parameters not set in the electronic drive unit 	<ol style="list-style-type: none"> 1. Set parameters [P:010] and [P:023] via the RS-485 interface to 1 = "ON".
	<ul style="list-style-type: none"> • Voltage drop in the cable is too high 	<ol style="list-style-type: none"> 1. Check the connection cable. 2. 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 	<ol style="list-style-type: none"> 1. Check backing pump compatibility (see technical data). 2. Check that the backing pump is working.
	<ul style="list-style-type: none"> • Leakage on the turbopump 	<ol style="list-style-type: none"> 1. Carry out leak detection. 2. Check seals and flange connections. 3. Eliminate leaks.
	<ul style="list-style-type: none"> • Gas throughput too high 	<ol style="list-style-type: none"> 1. Reduce the process gas load.
	<ul style="list-style-type: none"> • Rotor not running smoothly, defective bearing 	<ol style="list-style-type: none"> 1. Check the turbopump for noise development 2. Contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Run-up time setpoint adjusted too low 	<ol style="list-style-type: none"> 1. Extend the run-up time setpoint [P:700] via a display and control unit.
	<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 	<ol style="list-style-type: none"> 1. 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 	<ol style="list-style-type: none"> 1. Heat the turbopump if required. 2. Have it cleaned. 3. Contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Vacuum chamber, pipes or turbopump leaking 	<ol style="list-style-type: none"> 1. Carry out leak detection starting from the vacuum chamber. 2. Check seals and flange connections. 3. Eliminate leaks in the vacuum system.
Unusual noises during operation	<ul style="list-style-type: none"> • Rotor bearing damaged 	<ol style="list-style-type: none"> 1. Contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Rotor damaged 	<ol style="list-style-type: none"> 1. Contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Splinter shield or protective screen loose 	<ol style="list-style-type: none"> 1. Check and correct the seat of the splinter shield or protective screen in the high vacuum flange. 2. Follow the installation instructions.
Red LED on the electronic drive unit illuminates	<ul style="list-style-type: none"> • Group error 	<ol style="list-style-type: none"> 1. Reset the malfunction by switching the current supply off and on. 2. Reset the malfunction with V+ on pin 6 on the "X3" connection. 3. Set parameter [P:009] to 1 = malfunction acknowledgment via the RS-485 interface. 4. Set parameter [P:010] to 0 = off and then 1 = on and malfunction acknowledgment via the RS-485 interface. 5. Carry out a differentiated malfunction analysis with a display and control unit. 6. Contact Pfeiffer Vacuum Service.

Tbl. 11: 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 Pfeiffer Vacuum Service 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:



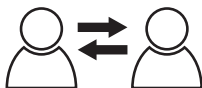
1. Download the up-to-date form templates.
 - [Explanations of service requests](#)
 - [Service requests](#)
 - [Contamination declaration](#)



- 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.

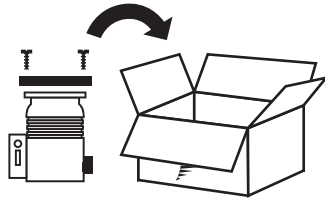


4. You will receive an acknowledgment from Pfeiffer Vacuum.

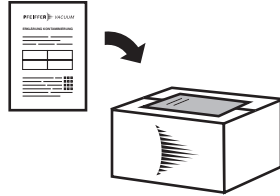
PFEIFFER VACUUM

Submission of contaminated products

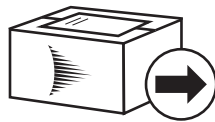
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



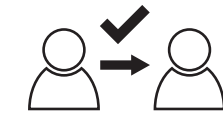
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package 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 10 Neo

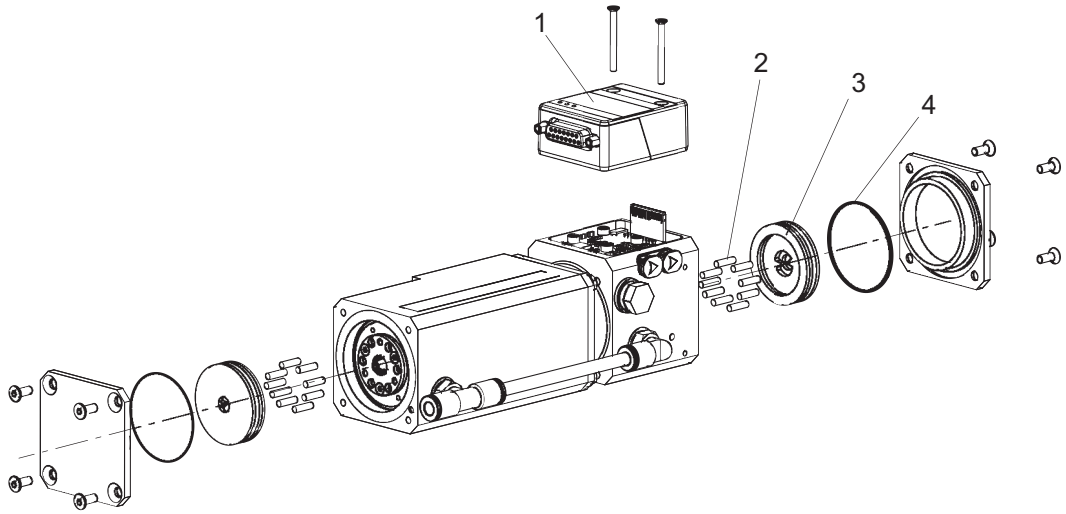


Fig. 15: Spare parts, HiPace 10 Neo

- 1 Electronic drive unit TC 80
- 2 Capillary rods
- 3 Operating fluid reservoir
- 4 O-ring

Position	Designation	Order number	Remark
1	Electronic drive unit TC 80	refer to the rating plate	
2, 3, 4	Operating fluid reservoir	refer to the rating plate	2× each

Tbl. 12: 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.

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.

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, aluminum EN AW-6061, DN 40 ISO-KF	112ZRG040
Centering ring with screen, stainless steel 304/1.4301, DN 40 ISO-KF	122ZRD040
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
D-Sub mains power plug, 15-pin, straight outgoing cable	P 4723 110
D-Sub mains power plug, 15-pin, angled outgoing cable	P 4723 111
Package Converter EtherCAT (RJ45) for HiPace 80 NEO (TC 80)	PE 300 312 -T
OmniControl 001 Mobile, control units	PE D20 000 0
OmniControl 001, rack unit without integrated power supply pack	PE D40 000 0
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
OmniControl 200 with TPR 270	PT 440 950 -T
Mounting kit for HiPace 10 Neo, DN 40 ISO-K with screws and claws	PM 026 084 -T
HPU 001, handheld programming unit	PM 051 510 -T
RJ 45 interface cable on M12 for HiPace	PM 051 726 -T

Selection field	Part number
Accessories package for HPU 001/PC	PM 061 005 -T
USB RS-485 converter	PM 061 207 -T
Coupling M12 for RS-485	PM 061 270 -X
Interface cable, M12 m straight / M12 m straight, 3 m	PM 061 283 -T
TPS 110, power supply pack for wall/standard rail installation	PM 061 340 -T
TPS 111, power supply pack 19" plug-in unit 3HU	PM 061 344 -T
Connecting cable from 24V/48V power supply pack to electronic drive unit. With RS-485 interface	PM 061 350 -T
Connection cable with RS-485 interface and 2 accessory ports for TC110/120 to power supply pack	PM 061 351 -T
Relay box for backing pumps, 1-phase motor 20 A for TC 110/120 and TCP 350, plug M8	PM 061 373 -T
Wall rail fitting for TPS 110/180/310/400	PM 061 392 -T
Front panel kit for TPS 111	PM 061 393 -T
Connection cable TPS 180 - MVP 006-4 with HiPace 80/HiPace 10, 2 x 0.5 m	PM 061 399 -T
Connection cable for HiPace with TC 110/120	PM 061 543 -T
Connection cable incl. 2 accessory ports for TC 110/120 to power supply pack	PM 061 552 -T
TCS 11, adapter for TC 110/120 with RS-485 interface	PM 061 636
TCS 12, adapter for TC 110/120 with interface RS-485, 4 accessory ports and coupling set	PM 061 638
Control cable for valve	PM 061 687 -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
TCS 13, adapter for TC 110/120 with interface RS-485, 2 accessory ports and coupling set	PM 061 856
HiPace – ACP connection cable	PM 071 142 -X
Relay box, shielded, for backing pumps, 1-phase motor 7A for TC 110/120 and TCP 350, plug M8	PM 071 282 -X
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
TVV 001, fore-vacuum safety valve, 230 V AC	PM Z01 205
TVV 001, fore-vacuum safety valve, 115 V AC	PM Z01 206
Shielded venting valve, AccessLink, 24 V DC, 1/8" thread for HiPace 80 Neo	PM Z01 295
Air cooling, shielded, for HiPace 10 Neo	PM Z01 368
Terminal resistor for RS-485	PT 348 105 -T
Power separator for RS-485	PT 348 132 -T
RPT 010, digital Piezo/Pirani sensor	PT R71 550
IKT 010, digital cold cathode sensor, low current	PT R72 550
IKT 011, digital cold cathode sensor, high current	PT R73 550

Tbl. 13: Accessories

14 Technical data and dimensions

14.1 General

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



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

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

Tbl. 14: 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	$1.69 \cdot 10^{-2}$	$1.69 \cdot 10^{-3}$	1	$1.27 \cdot 10^{-2}$	$1.67 \cdot 10^{-2}$
Torr l/s	1.33	0.133	78.9	1	1.32
atm cm ³ /s	1.01	0.101	59.8	0.76	1

Tbl. 15: Conversion table: Units for gas throughput

14.2 Technical data

Selection field	HiPace® 10 Neo with TC 80, DN 40
Connection flange (in)	DN 40
Connection flange (out)	Hose connection, 6 mm
Venting connection	G 1/8"
Gas throughput at final rotation speed for N ₂	0.84 hPa·l/s
Gas throughput at final rotation speed for Ar	0.76 hPa·l/s
Run-up time	45 s
Final pressure	$5 \cdot 10^{-5}$ hPa
Fore-vacuum max. for Ar	25 hPa

Selection field	HiPace® 10 Neo with TC 80, DN 40
Fore-vacuum max. for H ₂	15 hPa
Fore-vacuum max. for He	22 hPa
Fore-vacuum max. for N ₂	25 hPa
Pumping speed for Ar	13 l/s
Pumping speed for H ₂	4 l/s
Pumping speed for He	6.5 l/s
Pumping speed for N ₂	12 l/s
Compression ratio for Ar	2.5 · 10 ⁷
Compression ratio for H ₂	3 · 10 ²
Compression ratio for He	3 · 10 ³
Compression ratio for N ₂	3 · 10 ⁶
Integral leak rate	2 · 10 ⁻⁸ Pa m ³ /s
Rotation speed ± 2 %	90000 rpm
Rotation speed variable	50 – 100 %
Performance curve in gas mode 0, vertex C	40/90000 W/min ⁻¹
Performance curve in gas mode 0, vertex D	40/90000 W/min ⁻¹
Performance curve in gas mode 1, vertex A	40/90000 W/min ⁻¹
Performance curve in gas mode 1, vertex B	40/90000 W/min ⁻¹
Performance curve in gas mode 2, vertex E	40/90000 W/min ⁻¹
Performance curve in gas mode 2, vertex F	40/90000 W/min ⁻¹
Cooling method	Air (Forced convection)
Mounting orientation	Arbitrary
Sound pressure level	<50 dB(A)
Electronic drive unit	TC 80
I/O interfaces	RS485, Remote
Protection degree	IP20, Type 1
Input voltage(s)	24 V DC (±10 %)
Permissible irradiated thermal output max.	0.6 W
Power consumption max.	40 W
Current, max.	1.7 A
Permissible radial magnetic field max.	3 mT
Relative humidity of air	5 – 85 %, non-condensing
Position of power supply pack	External power supply pack
Temperature: Storage	-25 – 55 °C
Temperature: Shipping	-25 – 55 °C
Weight	1.3 kg

Tbl. 16: HiPace 10 Neo

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

Substances in contact with the media
Felt
Operating fluid (ester oil)
Oxide ceramic, as required

Tbl. 17: Materials that make contact with the process media

14.4 Dimensions

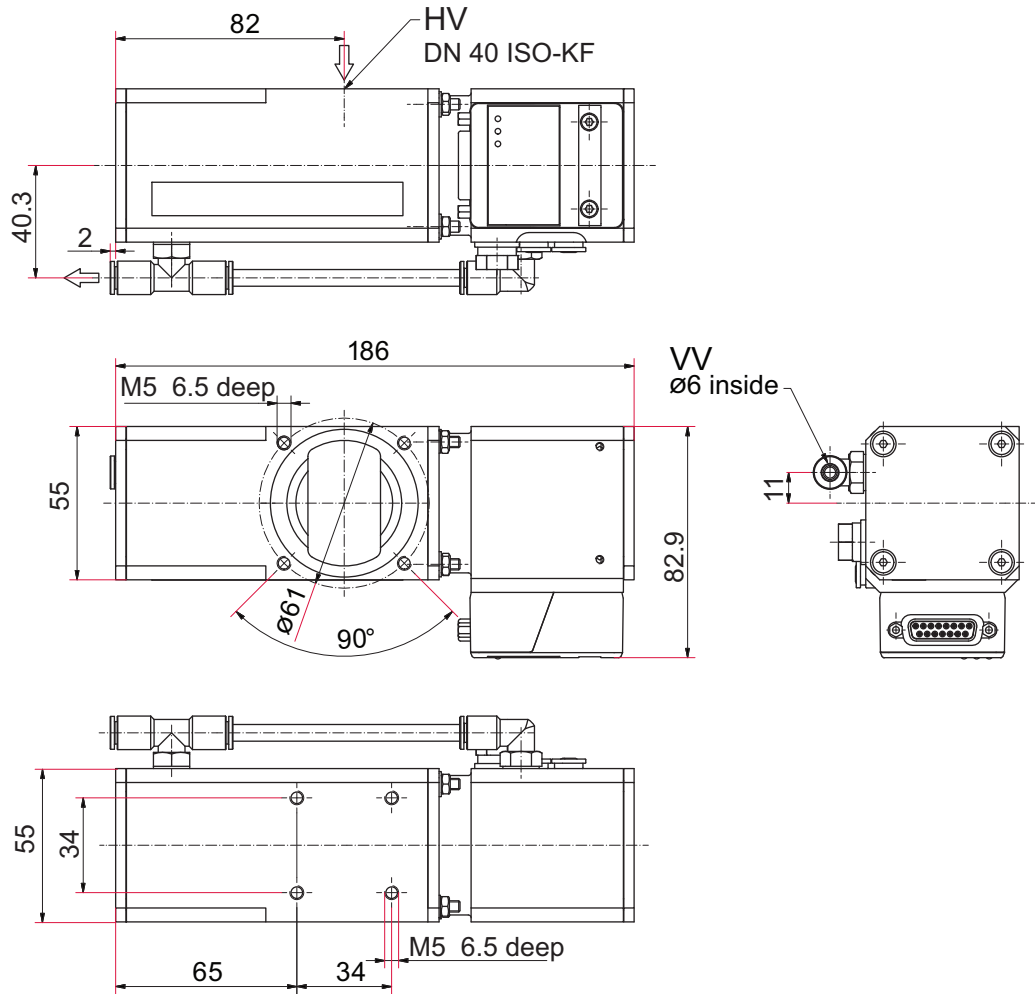


Fig. 16: HiPace 10 Neo | TC 80 | DN 40 ISO-K
Dimensions in mm

EC Declaration of Conformity

Declaration for product(s) of the type:

Turbopump

HiPace 10 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, 2024-02-29



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 10 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:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
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Asslar, 2024-02-14

**UK
CA**



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