



OPERATING INSTRUCTIONS

EN

Translation of the Original

HICUBE NEO

Turbo pumping station

PFEIFFER  **VACUUM**

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new turbo pumping station is designed to support you in your individual application with full performance and without malfunctions. The name Pfeiffer Vacuum represents 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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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

HiCube Eco	Operating instructions
Operating instructions for the individual components	see product description
Declarations of conformity	A component of these instructions

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

1.1.2 Variants

These instructions apply to HiCube Neo line turbo pumping stations:

- HiCube 80 Neo
- HiCube 300 Neo
- HiCube 300 H Neo
- HiCube 350 Neo
- HiCube 400 Neo
- HiCube 450 Neo
- HiCube 700 Neo
- HiCube 700 H Neo
- HiCube 800 Neo
- HiCube 800 H Neo

1.2 Target group

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

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

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

1.3 Conventions

1.3.1 Instructions in the text

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

Individual action step

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

- ▶ This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

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

1.3.2 Pictographs

Pictographs used in the document indicate useful information.



Note



Tip

1.3.3 Stickers on product

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

	<p>Rating plate</p> <p>The rating plate is located on the back of the pumping station housing.</p>
	<p>Protection class</p> <p>The sticker describes protection class 1 for the product. The positioning indicates the position for the ground connection.</p>
	<p>Electrical voltage warning</p> <p>The sticker warns of the risk of electric shock when working with the housing open.</p>
	<p>Operating instructions note</p> <p>This sticker indicates that this operating instructions must be read before performing any tasks.</p>
	<p>Warranty seal</p> <p>The product is sealed ex factory. Damaging or removing a warranty seal results in loss of the warranty.</p>

Tbl. 1: Stickers on product

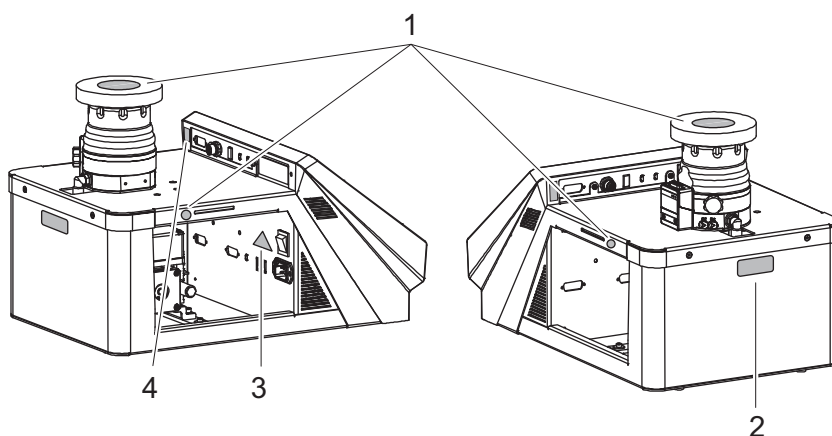


Fig. 1: Position of the stickers on the product – desktop model

- 1 Note: Read the operating instructions
- 2 Rating plate
- 3 Electrical voltage (power supply pack) warning sign
- 4 Warranty seal

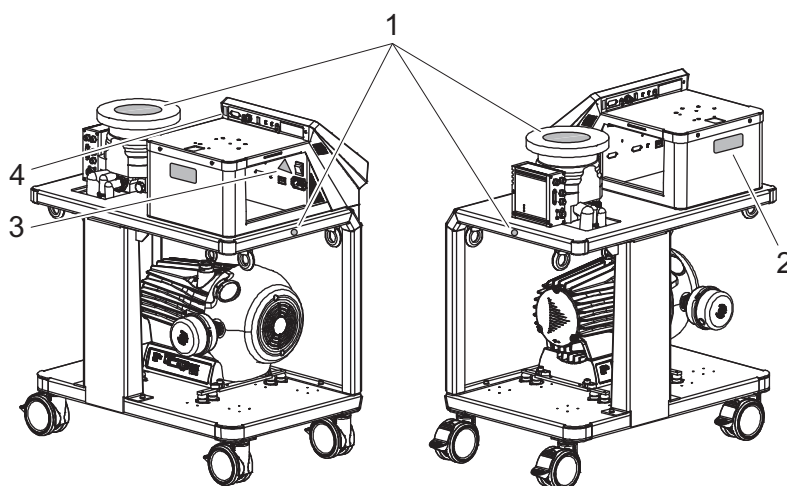


Fig. 2: Position of the stickers on the product – free-standing model

- 1 Note: Read the operating instructions
- 2 Rating plate
- 3 Electrical voltage (power supply pack) warning sign
- 4 Warranty seal

1.3.4 Abbreviations

Abbreviation	Meaning in this document
BA	Operating instructions, or the number of the operating instructions
CF	Flange: Metal-sealed connector in accordance with ISO 3669
DHCP	Dynamic Host Configuration Protocol (Ethernet)
DN	Nominal diameter as size description
f	Rotation speed value of a vacuum pump (frequency, in rpm or Hz)
H	High compression
HV	High vacuum flange, high vacuum side
ISO	Flange: Connection in accordance with ISO 1609 and ISO 2861
LAN	Local area network
LED	Light emitting diode
MVP	Diaphragm vacuum pump
PE	Protective earth (earthed conductor)
RJ-45	Standardized plug-and-socket connection for telecommunication cabling (registered jack)

Abbreviation	Meaning in this document
RS-485	Standard for a physical interface for asynchronous serial data transmission (Recommended Standard)
T	Temperature (in °C)
TC	Turbopump electronic drive unit (turbo controller)
USB	Universal Serial Bus

Tbl. 2: Abbreviations used in this document

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.

CAUTION

Danger of injury due to the pumping station tipping or rolling away

Superstructural parts change the center of gravity. There is a danger of crushing due to rolling away or tipping.

- ▶ Place the pumping station on a flat installation surface.
- ▶ Anchor the pumping station at the installation location.
- ▶ Wear personal protective equipment.

Risks during installation

⚠ 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

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

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

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

⚠ WARNING

Risk of injury caused by the turbopump breaking away with the vibration compensator in the event of a malfunction

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

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

⚠ WARNING

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

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

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

⚠ CAUTION

Danger of injury due to the pumping station tipping or rolling away

Superstructural parts change the center of gravity. There is a danger of crushing due to rolling away or tipping.

- ▶ Place the pumping station on a flat installation surface.
- ▶ Anchor the pumping station at the installation location.
- ▶ Wear personal protective equipment.

Risks due to interfaces and connections

DANGER

Electric shock due to missing internal earthed conductor

The internal earthed conductor is fastened to the housing. A unit without an internal earthed conductor attached can be life-threatening in the event of a malfunction.

- ▶ Do not rotate or release the internal earthed conductor.

DANGER

Danger to life from electric shock

When establishing the voltages that exceed the specified safety extra-low voltage (according to IEC 60449 and VDE 0100), the insulating measures will be destroyed. There is a danger to life from electric shock at the communication interfaces.

- ▶ Connect only suitable devices to the bus system.

Risks in the event of malfunctions

WARNING

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

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

- ▶ Follow the installation instructions for this turbopump.
- ▶ Observe the requirements regarding stability and design of the counter flange.
- ▶ Use only original accessories or fixing material approved by Pfeiffer Vacuum for the installation.

WARNING

Risk of injury caused by the turbopump breaking away with the vibration compensator in the event of a malfunction

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

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

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 product



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.

Parameter	Limit value
Installation location	Weatherproof (internal space)
Air pressure	750 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 $T < 40^{\circ}\text{C}$
Installation surface flatness	$\leq 5^{\circ}$
Protection class	III
Overvoltage category	II
Permissible protection degree	IP20
Housing type (according to UL 50E)	Type 1
Degree of pollution	2
Ambient temperature	5 °C to 30 °C with convection cooling without gas throughput 5°C to 35°C with air cooling 5°C to 40°C with water cooling
Max. permissible ambient magnetic field	See the technical data for the turbopump
Maximum irradiated thermal input	See the technical data for the turbopump
Maximum permissible rotor temperature of the turbopump	90 °C
Maximum permissible bakeout temperature on HV flange	120 °C

Tbl. 3: Limits of use of HiCube Neo

2.5 Proper use

- Utilize the turbo pumping station exclusively for generating a high vacuum.
- Utilize the turbo pumping station only in closed indoor areas.
- Operate the as-delivered variant of the turbo pumping station only with the accessories approved for it.

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
- Starting up without correct installation (including a trial run)
- Pumping toxic media
- Pumping radioactive media
- Pumping biologically contaminated media
- 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
- Operating with excessive irradiated heat output
- Operating in impermissible high magnetic fields
- Operating in an incorrect gas mode
- Venting with impermissible high venting rates
- Using for pressure generation
- Using in areas with ionizing radiation
- Operation 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
- Use as a transport tool

3 Product description

3.1 Function

HiCube Neo model series turbo pumping stations are ready-to-connect, fully automatic pump units. The turbo pumping station is designed as a portable desktop model, or mobile free-standing model; it consists of a turbopump and a backing pump specially matched to it.

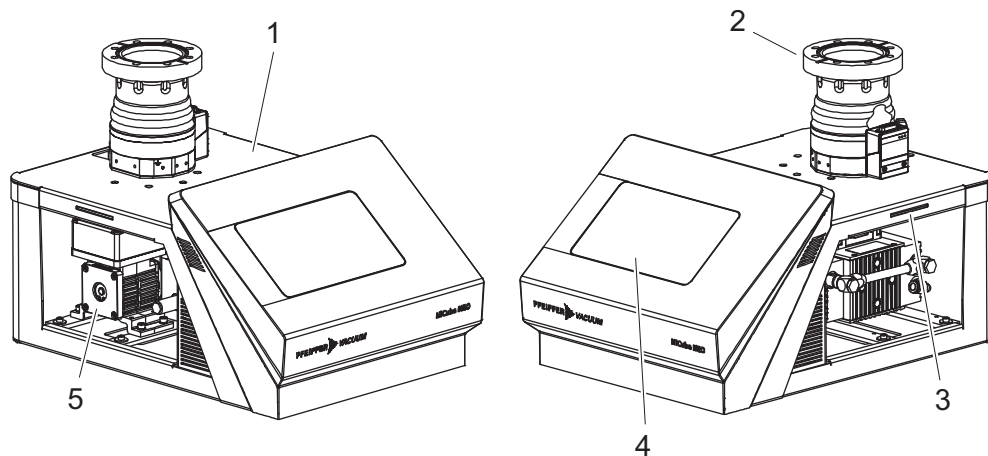


Fig. 3: Product overview with combination examples – desktop model

- | | |
|----------------------|--------------------|
| 1 Housing | 4 7" touch display |
| 2 Turbopump | 5 Backing pump |
| 3 Anchoring slot, 2x | |

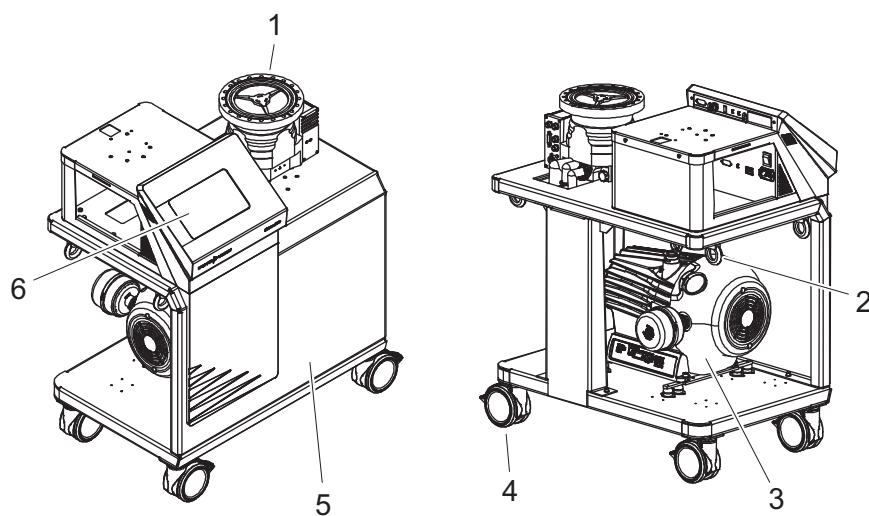


Fig. 4: Product overview with combination examples – free-standing model

- | | |
|----------------|--------------------|
| 1 Turbopump | 4 Castors, 4x |
| 2 Eye bolt, 4x | 5 Chassis |
| 3 Backing pump | 6 7" touch display |

3.1.1 Operating interface

The integrated operating interface is used to control and monitor the entire turbo pumping station. The 7" touch display is located on the front side of the unit. The operator fields are context-sensitive and change to reflect the display.

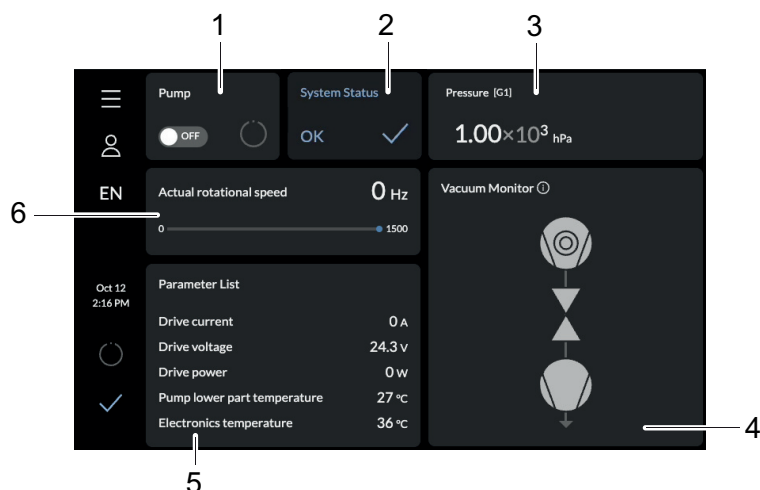


Fig. 5: Dashboard HiCube Neo

- | | |
|--------------------------------------|-----------------------------------|
| 1 Display for pumping station (pump) | 4 Vacuum diagram (vacuum monitor) |
| 2 System status | 5 Parameter list |
| 3 Pressure display (pressure) | 6 Actual rotation speed |

Symbol		Meaning
Color	light green	activated, operating status reached
	dark green	activated, operating status not yet reached
	light gray	not activated
	dark gray	switched off, switched off status not yet reached
Checkmark on status icon		stable state, final status on or off reached
Revolving arc in status icon		Function started or stopped, final status not yet reached

Tbl. 4: Symbols and colors of the status and components icons

3.1.2 Drive

- Electronic drive unit of the turbopump
- Electronic drive unit of the backing pump

3.1.3 Cooling

- Air cooling
- Water cooling (optional)

At excessively high temperatures, the electronic drive unit automatically reduces the drive power.

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](http://www.certipedia.com).

3.3 Product features

3.3.1 HiCube Neo desktop model combination options

Feature	HiCube Neo desktop model		BA
HV flange	DN 40 ISO-KF DN63 ISO-K DN 63 CF-F	DN 100 ISO-K DN 100 CF-F	
Turbopump	HiPace 80 Neo		PT 0660 BN
		HiPace 300	PT 0735 BN
		HiPace 300 H	PT 0692 BN
Electronic drive unit	TC 80		PT 0659 BN
		TC 110	PT 0204 BN
Air cooling	yes		PT 0500 BN ¹⁾ PT 0739 BN ²⁾
Diaphragm pump	MVP 015-2 DC		PU 0106 BN
	MVP 030-3 DC		PU 0076 BN
Current supply	Integrated power supply pack		
Control unit	7" touch display		

Tbl. 5: HiCube Neo desktop model | Component combinations

Feature	HiCube Neo desktop model	BA
Water cooling	optional	PT 0747 BN ³⁾ PT 0744 BN ⁴⁾
Gauge I/O	optional	PT 0687 BN
Venting valve	optional	PT 0771 BN ⁵⁾ PT 0228 BN
Housing heater ⁶⁾	Optional, with CF flange only	PT 0233 BN

Tbl. 6: HiCube Neo desktop model | Accessories

- 1) HiPace 300
- 2) HiPace 80 Neo
- 3) HiPace 80 Neo
- 4) HiPace 300
- 5) HiPace 80 Neo
- 6) Water cooling required

3.3.2 HiCube Neo free-standing model combination options

Feature	HiCube Neo free-standing model				BA
HV flange	DN 40 ISO-KF DN63 ISO-K DN 63 CF-F	DN 100 ISO-K DN 100 CF-F	DN 160 ISO-K DN 160 CF-F	DN 200 ISO-K DN 200 CF-F	
Turbopump	HiPace 80 Neo				PT 0660 BN
		HiPace 300			PT 0749 BN
		HiPace 300 H			PT 0702 BN
		HiPace 350			PT 0667 BN
		HiPace 400			PT 0210 BN
			HiPace 450		PT 0647 BN
			HiPace 700		PT 0209 BN
			HiPace 700 H		PT 0621 BN
				HiPace 800	PT 0273 BN
			HiPace 800 H	PT 0693 BN	
Electronic drive unit	TC 80				PT 0659 BN
		TC 400			PT 0203 BN
Air cooling	yes				PT 0500 BN ⁷⁾ PT 0739 BN ⁸⁾
Backing Pump: Rotary vane pump	SmartVane 55 SmartVane 70				PD 0114 BN
	Duo 6 M				PD 0062 BN
	Duo 11 M				PD 0070 BN
	Duo 20 M				PK 0203 BN
Backing Pump: Scroll pump	HiScroll 6 ATEX HiScroll 12 ATEX HiScroll 18 ATEX				PU 0097 BN
Current supply	Integrated power supply pack				
Control unit	7" touch display				

Tbl. 7: HiCube Neo free-standing model | Component combinations

Feature	HiCube Neo free-standing model				BA
HV flange	DN 40 ISO-KF DN63 ISO-K DN 63 CF-F	DN 100 ISO-K DN 100 CF-F	DN 160 ISO-K DN 160 CF-F	DN 200 ISO-K DN 200 CF-F	
Water cooling	optional	Connector exists			PT 0747 BN ⁹⁾ PT 0745 BN ¹⁰⁾
Gauge I/O	optional				PT 0687 BN
Venting valve	optional				PT 0771 BN ¹¹⁾ PT 0228 BN ¹²⁾

7) HiPace 300 - 800

8) HiPace 80 Neo

9) HiPace 80 Neo

10) HiPace 350 | HiPace 450

11) HiPace 80 Neo

12) HiPace 300 - 800

Feature	HiCube Neo free-standing model	BA
Fore-vacuum safety valve	optional	PM 0263 BN
Housing heater ¹³⁾	Optional, with CF flange only	PT 0233 BN

Tbl. 8: HiCube Neo free-standing model | Accessories

3.4 Scope of delivery

- HiCube Neo turbo pumping station
- Protective cap for the high vacuum flange
- Power supply cable, country-specific
- operating fluid and filler screw ¹⁴⁾
- Operating instructions for turbo pumping station

13) Water cooling required

14) Only with rotary vane pumps as backing pump

4 Transportation and Storage

4.1 Transporting the pumping station

⚠ 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.

⚠ CAUTION

Danger of injury due to the pumping station tipping or rolling away

Superstructural parts change the center of gravity. There is a danger of crushing due to rolling away or tipping.

- ▶ Place the pumping station on a flat installation surface.
- ▶ Anchor the pumping station at the installation location.
- ▶ Wear personal protective equipment.



Packing

We recommend keeping the transport packaging and original protective cover.

General information regarding safe transport

- ▶ Observe the weight specified on the packaging.
 - Use a transport aid if necessary (trolley, lift truck).
- ▶ Where possible, always transport or ship the pumping station in the original packaging.
- ▶ Always move the product upright, and over the flattest possible surface.
- ▶ Always place the product on an adequately sized, level surface.
- ▶ Remove the protective cap only immediately prior to installation.

HiCube Neo – desktop model

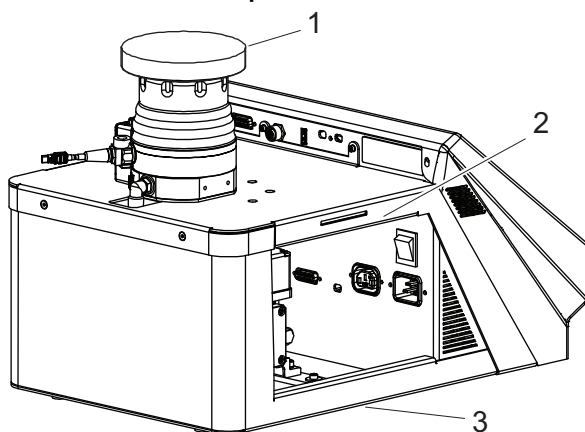


Fig. 6: Transporting the pumping station without packaging – desktop model

- | | |
|------------------|--------|
| 1 Protective cap | 3 Base |
| 2 Handle area | |

Transporting the pumping station without packaging – desktop model

For transport without packaging, HiCube Neo turbopump stations are equipped with handle areas on the side of the housing frame.

1. Observe weight specified on the rating plate.
2. Lift the turbo pumping station with your hands on both handle areas.

3. Always transport the turbo pumping station upright, with its base downwards.
4. Always place turbo pumping station securely on an adequately sized, level surface.

HiCube Neo – free-standing model

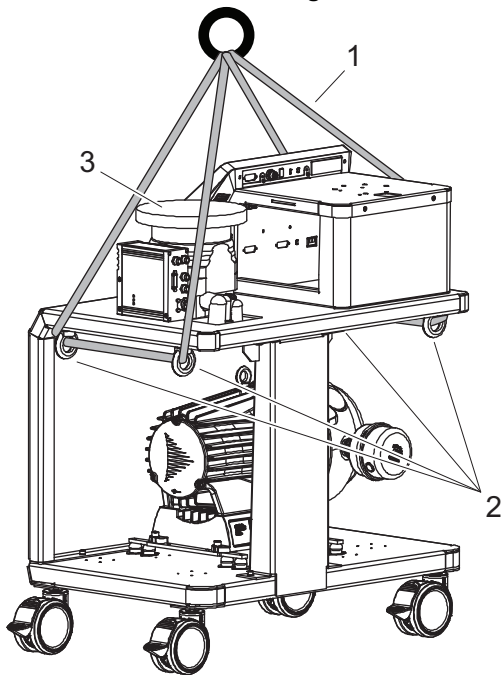


Fig. 7: Transporting the pumping station without packaging – free-standing model

- | | |
|---------------------|------------------|
| 1 Lifting equipment | 3 Protective cap |
| 2 Eye bolt, 4x | |

Transporting the pumping station without packaging – free-standing model

For transport without packaging, HiCube Neo turbopump stations are equipped with attachment points on the housing frame.

1. Secure a suitable lifting device onto the eye bolt.
2. Pay attention to the correct use and fastening of the lifting equipment.
3. Lift the pumping station vertically (e.g., out of packaging).
4. Place the pumping station securely on an adequately sized, level surface.

4.2 Store pumping station



Packing

We recommend storing the product in its original packaging.

Store pumping station

1. Seal the flange opening with the original protective cover.
2. Seal all other connections (e.g., exhaust) with the corresponding protective caps.
3. Store the vacuum pump only in dry, dust-free rooms, within the specified ambient conditions.
4. In rooms with humid or aggressive atmospheres: Hermetically seal the turbo pumping station, 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 Preparing for set-up

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.

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.

5.2 Setting up the pumping station

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).

Procedure

1. Maintain a minimum distance of 50 cm to lateral boundaries or adjacent devices.
2. Maintain a minimum distance of 10 cm to exposed table edges.
3. Make sure that there are sufficient cooling options for the pumping station.
4. Install suitable shielding if the surrounding magnetic fields exceed the permissible levels.
5. If you use housing heating and water cooling, make sure that the temperature at the vacuum chamber connection flange does not exceed 120 °C.
6. Install suitable shielding so that the irradiated thermal output does not exceed the permissible values when high temperatures occur due to the process.

5.3 Anchor pumping station

⚠ CAUTION

Danger of injury due to the pumping station tipping or rolling away

Superstructural parts change the center of gravity. There is a danger of crushing due to rolling away or tipping.

- ▶ Place the pumping station on a flat installation surface.
- ▶ Anchor the pumping station at the installation location.
- ▶ Wear personal protective equipment.

i **Anchor pumping station**

The operator is responsible for anchoring.

- Make sure that the operator-installed pumping station housing fixation absorbs the torque that occurs in case the turbopump rotor blocks suddenly.

In the case of a sudden jam of the turbopump rotor, the resulting torque must be taken up via the pumping station frame by the fixture provided by customer. Anchoring is absolutely essential to secure the pumping station.

HiCube Neo – desktop model

Required aids

- 2 lashing straps of sufficient length and load capacity; width approximately 3 cm
- On-site attachment points to retain the lashing straps

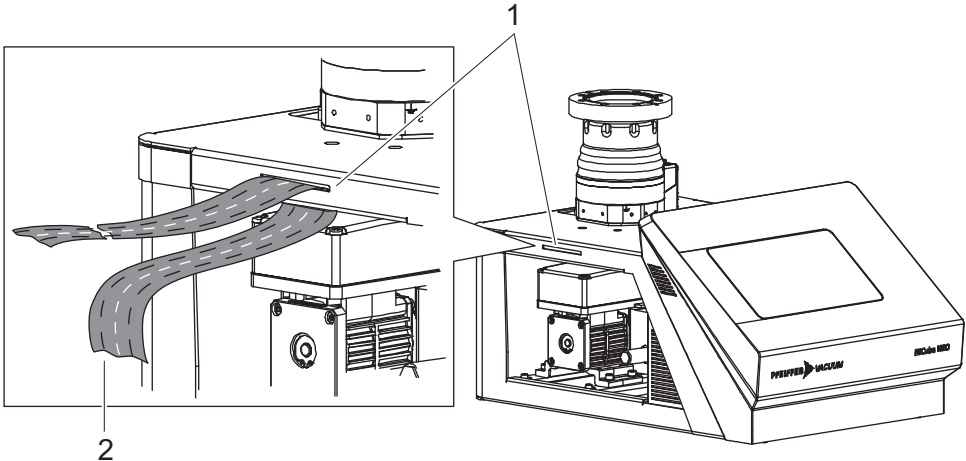


Fig. 8: Anchoring the desktop model

- 1 Anchoring slot
- 2 Lashing strap

Anchoring the desktop model

1. Always use lashing straps to fasten the pumping station to both anchoring slots.
2. Make sure that the belts are fitted and tensioned correctly.
3. Fasten the lashing straps to the customer's equipment so that they can absorb loads of up to 2000 N per attachment point.

HiCube Neo – free-standing model

Required aids

- 2 lashing straps of sufficient length and load capacity; width approximately 3 cm
- On-site attachment points to retain the lashing straps

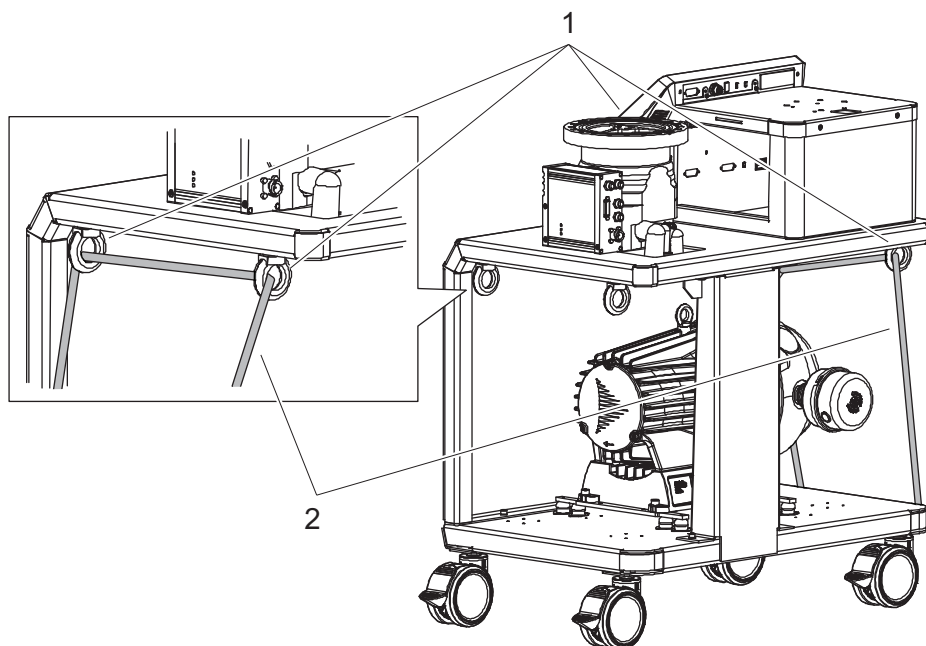


Fig. 9: Anchoring the free-standing model

- 1 Eye bolt, 4× 2 Lashing strap, 2×

Anchoring the free-standing model

1. Always fasten the pumping station with lashing straps on all four eye bolts.
2. Make sure that the belts are fitted and tensioned correctly.
3. Fasten the lashing straps to the customer's equipment so that they can absorb loads of up to 2000 N per attachment point.

5.4 Connecting the high vacuum side

5.4.1 Designing 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.



Superstructural parts and fittings on the high vacuum connection

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

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

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.

Designing counter flange

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

Turbo pumping station	Applied torque ¹⁵⁾	Super-structural parts ¹⁶⁾	Flatness	Tensile strength ¹⁷⁾	Screw in depth ¹⁸⁾	Magnetic field ¹⁹⁾	Heat input ²⁰⁾
HiCube 80 Neo	620 Nm	50 kg	± 0.05 mm	170 N/mm ²	2.5 x d	3.1 mT with air cooling	0.9 W with air cooling
						3.7 mT with water cooling	1.2 W with water cooling
HiCube 300 Neo	2000 Nm					5.5 mT	2.4 W
HiCube 300 H Neo	2000 Nm					5.5 mT	2.4 W
HiCube 350 Neo	3500 Nm					4.5 mT	2.4 W
HiCube 400 Neo	4200 Nm					6 mT	4.2 W
HiCube 450 Neo	3500 Nm					4.5 mT	2.4 W
HiCube 700 Neo	4200 Nm					6 mT	4.2 W
HiCube 700 H Neo	4200 Nm					6 mT	4.2 W
HiCube 800 Neo	4200 Nm					6 mT	4.2 W
HiCube 800 H Neo	4200 Nm	6 mT	4.2 W				

Tbl. 9: Requirements for on-site high vacuum connection

5.4.2 Using splinter shield or protective screen

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

Flange size	Reduced pumping speed in % for the gas type			
	H ₂	He	N ₂	Ar
Splinter shield DN 40	6	9	17	18
Splinter shield DN 63	3	6	15	16
Protective screen DN 63	1	1	4	4
Splinter shield DN 100	5	7	24	24
Protective screen DN 100	2	2	10	8
Splinter shield DN 160	6	9	20	23
Protective screen DN 160	1	2	6	7

Tbl. 10: Reduction of the pumping speed when using a splinter shield or protective screen

Using splinter shield or protective screen

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

15) Maximum torque applied in the event of a burst: The theoretically calculated torque in the event of a burst (rotor shaft breakage) according to ISO 27892 was not reached in any experimental test.
 16) Permissible total weight of superstructural parts on the pumping station
 17) Tensile strength of counter flange material in all operating conditions, according to screw in depth
 18) Screw in depth of fixing screws in counter flange
 19) Maximum permissible magnetic field surrounding pumping station
 20) Maximum permissible heat absorption in pumping station

5.4.3 Using the vibration compensator

⚠ WARNING

Risk of injury caused by the turbopump breaking away with the vibration compensator in the event of a malfunction

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

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

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

Installing the vibration compensator

1. Install the vibration compensator only with vertical passage.
2. Consider the flow resistance.
3. Secure the turbopump additionally to the high vacuum flange.
4. Observe the fastening of the ISO flanges.

5.4.4 Connecting the turbopump externally

Depending on the configuration, the turbopump can be operated independently from the pumping station.



Dismantling the turbopump

Please observe the descriptions for removing a turbopump from the pumping station.

Connecting the turbopump externally

1. Follow the installation instructions for the turbopump in the associated operating instructions for the individual components.
2. Use the appropriate cable set from the accessories.
 - Other lengths available on request.
3. Extend the fore-vacuum line or utilize a line of the required length.

5.4.5 Installation of ISO-KF flange



ISO flange connections

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

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

Required tools

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

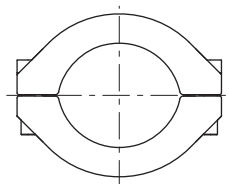


Fig. 10: Flange connection ISO-KF to ISO-KF

Using of clamping ring

1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Fasten the high vacuum connection on the turbopump and the clamping ring to the counter flange.

3. Utilize all prescribed components for the turbopump.
4. Tighten the clamping ring screws evenly.
 - Tightening torque: **3,7 Nm**.

5.4.6 Attaching ISO-K flange onto ISO-K



ISO flange connections

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

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

Required tools

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

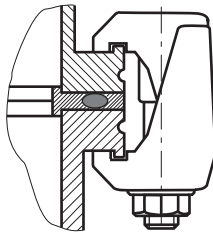


Fig. 11: Flange connection ISO-K to ISO-F, bracket screws

Connection with bracket screw

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

5.4.7 Installation of ISO-K flange onto ISO-F

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

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

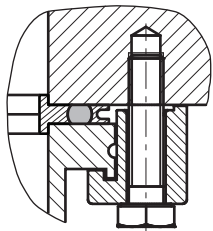


ISO flange connections

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

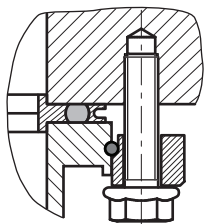
- Leak-tightness of the flange connection, however, is not jeopardized in this regard.

Connection of claw and tapped hole



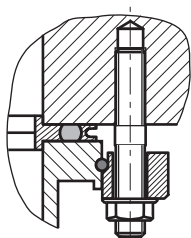
1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Connect the flange according to the diagram using the components in the mounting kit.
3. Utilize all prescribed components for the turbopump.
4. Tighten the claws in 3 stages in opposite pairs.
 - Tightening torque: **5,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

Connection of hexagon head set screw and tapped hole



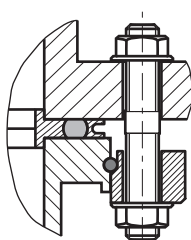
1. Only use the approved mounting kits from Pfeiffer Vacuum for the connection.
2. Place the collar flange over the high vacuum flange on the turbopump.
3. Insert the snap ring into the side groove on the high vacuum flange of the turbopump.
4. Fasten the turbopump onto the counter flange in accordance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

Connection of stud screw and tapped hole



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

Connection of stud screw and through-bore



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

5.4.8 Attaching CF flange to CF-F

The connection types for CF installation with CF flange are:

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

NOTICE

Leaks may occur due to the incorrect installation of CF flanges

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

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

Required tools

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

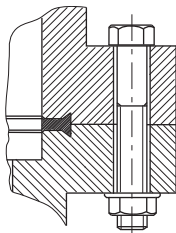


Fig. 12: Flange connection CF-F, hexagon head screw and through hole

Connection of the hexagon head screw and through holes

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

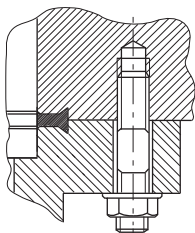


Fig. 13: Flange connection CF-F, stud screw and tapped hole

Connection of the stud screw and tapped hole

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

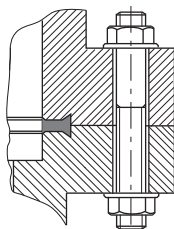


Fig. 14: Flange connection CF-F, stud screw and through hole

Connection of the stud screw and through hole

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

5.5 Connecting exhaust side

WARNING

Danger of death from poisoning due to toxic gases being expelled without an exhaust line

Exhaust gases and vapors are released from the turbo pumping station unhindered during normal usage. In the case of processes with toxic media, there is a risk of injury and danger of death due to poisoning.

- ▶ Note the corresponding regulations for handling toxic substances.
- ▶ Toxic process gases should be safely conveyed away via an exhaust line.

CAUTION

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

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

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.



Condensate separator

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

HiCube Neo – desktop model

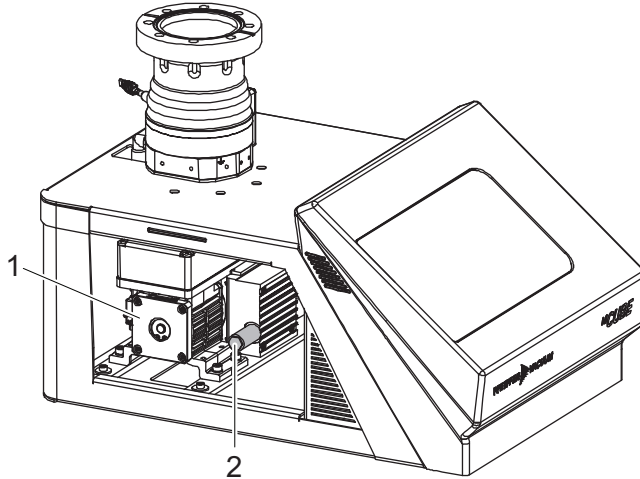


Fig. 15: Example of exhaust connection of MVP

- 1 Diaphragm pump
- 2 Exhaust silencer (included in shipment)

Connecting exhaust side – desktop model

1. Choose a minimum exhaust line cross section equal to the size of the exhaust connection.
2. Unscrew the exhaust silencer from the backing pump.
3. Route the piping downwards from the pump, to prevent condensate return.

HiCube Neo – free-standing model

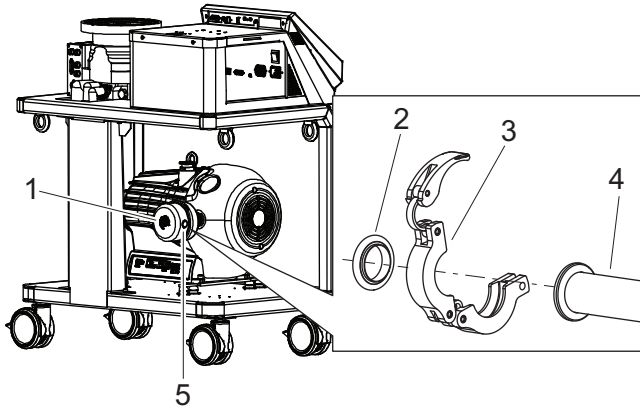


Fig. 16: Example of HiScroll exhaust connection

- 1 Silencer
- 2 Centering ring
- 3 Clamping ring
- 4 Vacuum components DN 25 ISO-KF
- 5 Silencer exhaust connection

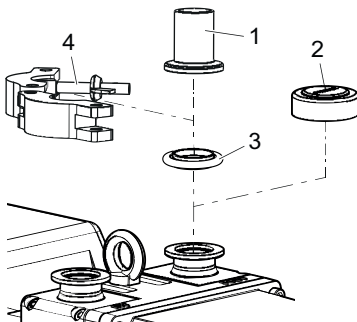


Fig. 17: Example of Duo exhaust connection

- 1 Exhaust line
- 2 Protective cap
- 3 Centering ring with O-ring
- 4 Clamping ring

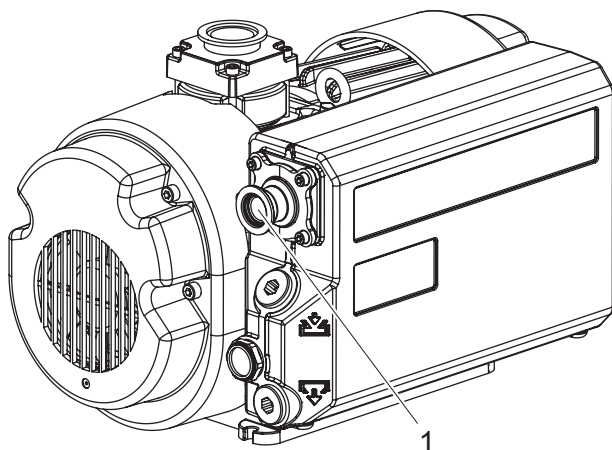


Fig. 18: Example of SmartVane exhaust connection

1 Exhaust connection

Connecting exhaust side – free-standing model

1. Remove the protective cap from the exhaust connection.
2. Make sure that the centering ring and o-ring are seated correctly in the exhaust flange.
3. Choose a minimum exhaust line cross section equal to the nominal diameter of the connection flange.
4. Install a vacuum connection with small flange components, e.g. screw-in flange DN 16 ISO-KF from the [Pfeiffer Vacuum Components Shop](#).
5. Route the piping downwards from the vacuum pump, to prevent condensate return.
6. Support or suspend the piping to the vacuum pump so that no piping system forces act on the vacuum pump.
7. Connect both flanges with a circlip.

5.6 Filling up operating fluid

NOTICE

Risk of damage due to the use of non-approved operating fluid

Product-specific performance data are not achieved. All liability and warranty claims against Pfeiffer Vacuum are also excluded.

- ▶ Only use approved operating fluids.
- ▶ Only use other application-specific operating fluids after consultation with Pfeiffer Vacuum.



Use of operating fluids

Only applies to HiCube Neo free-standing models with a rotary vane pump as the backing pump.

- The operating fluid for rotary vane pumps is included in the scope of delivery.
- The operating fluid reservoir on the turbopump is already filled and installed.
- The dry-compressing scroll pump does not need operating fluid.

Approved operating fluid

- P3 (Duo 6 M | Duo 11 M | Duo 20 M)
- H1 (SmartVane 55 | SmartVane 70 standard operating fluid)
- F4 (SmartVane 55 | SmartVane 70)

Reading the operating fluid type on the rating plate

- ▶ Refer to the rating plate of the vacuum pump for type and quantity of intended operating fluid.

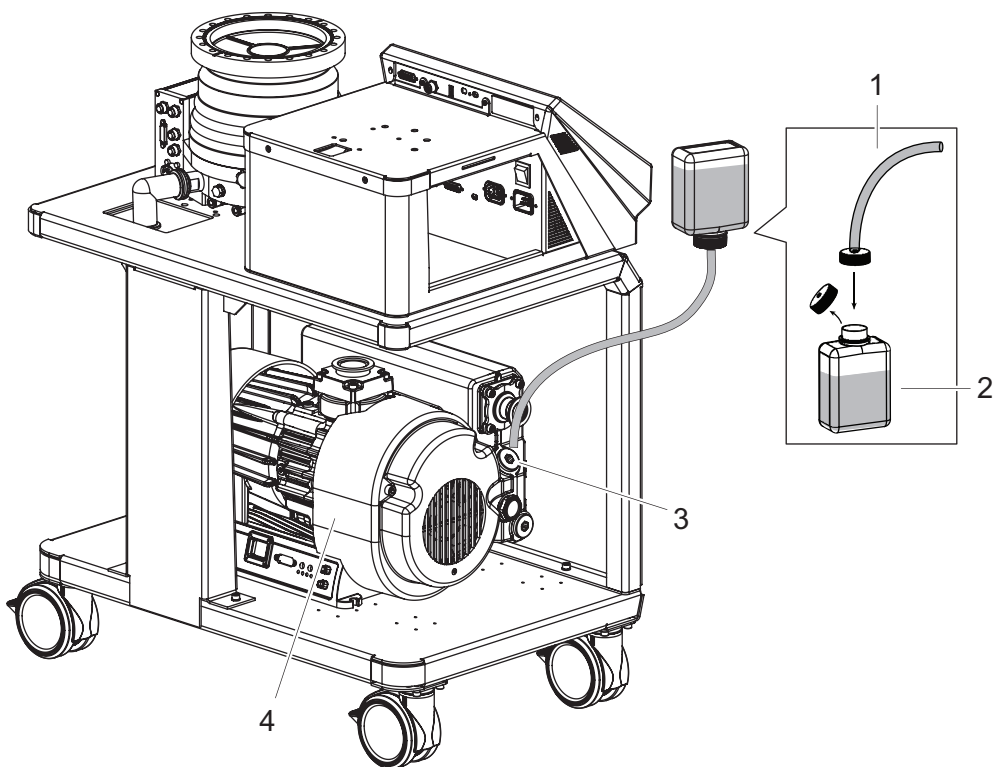


Fig. 19: Filling up with operating fluid – SmartVane

- 1 Filler Tube
- 2 Operating Fluid Bottle
- 3 Filler screw with seal
- 4 Rotary vane pump

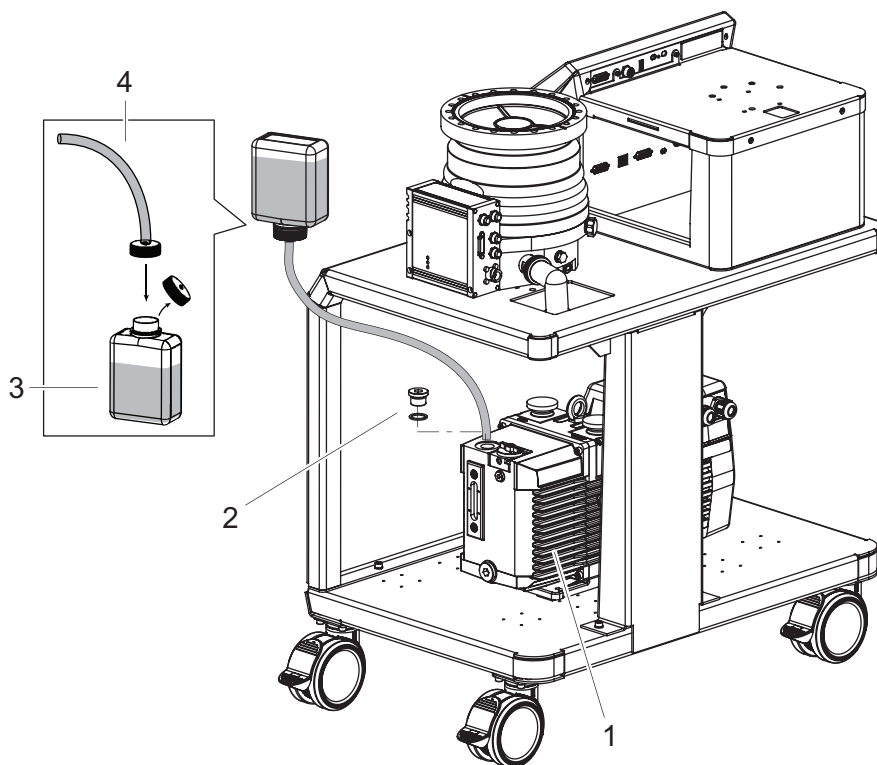


Fig. 20: Filling up with operating fluid – Duo

- 1 Rotary vane pump
- 2 Filler screw with seal
- 3 Operating Fluid Bottle
- 4 Filler Tube

Required consumables

- Operating fluid

Required tools

- Allen key
- Hexagon socket torque wrench

Required aids

- Filler Tube

Filling up operating fluid

1. Unscrew and remove the locking screw on the operating fluid bottle.
2. Screw the filling hose onto the operating fluid bottle.
3. Remove the filler screw with seal from the rotary vane pump.
4. Fill operating fluid according to the rotary vane pump operating instructions.
5. Screw the filler screw with seal into the rotary vane pump.
 - Tightening torque: as specified in the operating instructions of the rotary vane pump.

5.7 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.

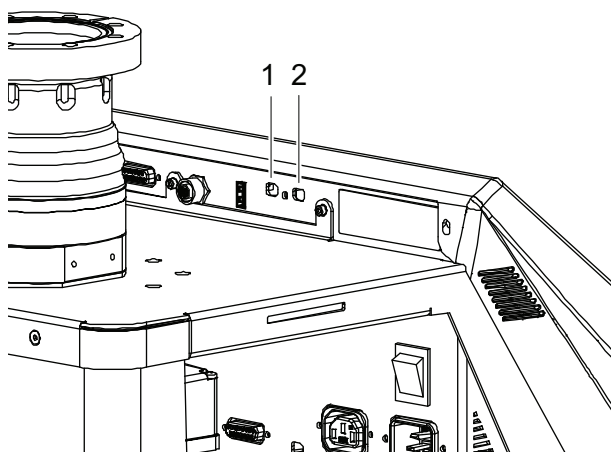


Fig. 21: Connecting accessory devices for TC 80 and TC 110

- 1 AccessLink socket "accessory B1" 2 AccessLink socket "accessory A1"

Connecting accessory devices for TC 80 and TC 110

- ▶ Use Pfeiffer Vacuum accessories on the AccessLink sockets on the pumping station with corresponding connection cables or adapters.
- ▶ Configure the desired accessory output via RS-485 using the operating interface or PC.

Electronic drive unit	Electronic drive unit connection	Pre-set configuration
TC 80 TC 110	accessory A1	Fan (temperature controlled) or Heating
	accessory B1	Venting valve

Tbl. 11: Pre-set accessory connections to electronic drive unit TC 80 and TC 110

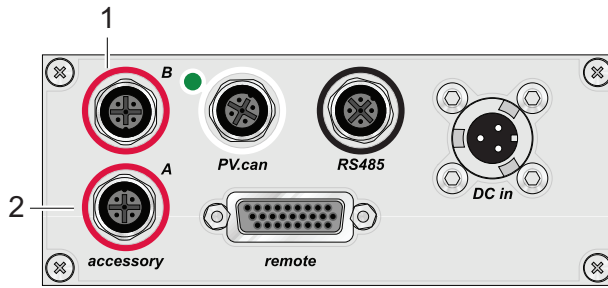


Fig. 22: Connecting accessory devices for TC 400

- 1 Accessory connection "accessory B"
- 2 Accessory connection "accessory A"

Connecting accessory devices for TC 400

- ▶ Utilize Pfeiffer Vacuum accessories on the accessory connections of the electronic drive unit with corresponding connection cables or adapters.
- ▶ Configure the desired accessory output via RS-485 using the operating interface or PC.

Electronic drive unit connection	Pre-set configuration
accessory A	Fan (temperature controlled) or Heating
accessory B	Venting valve

Tbl. 12: Pre-set accessory connections to electronic drive unit TC 400

5.8 Connecting to mains power supply

⚠ WARNING

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

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

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

⚠ WARNING

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.

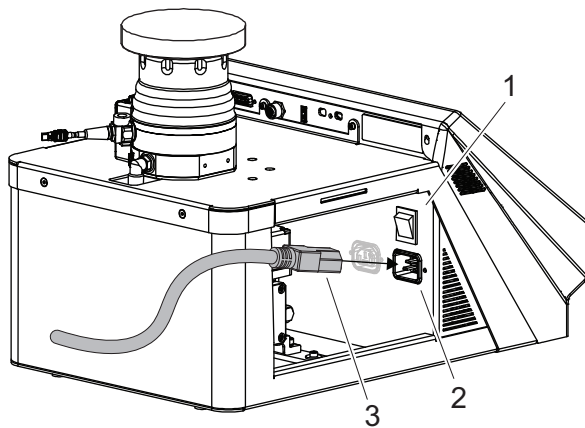


Fig. 23: Connecting to mains power supply

- | | |
|---------------------|----------------------|
| 1 Main switch | 3 Power supply cable |
| 2 Power supply plug | |

Connecting to mains power supply

1. Make sure that the main switch is off before connecting.
2. Always ensure a secure connection to the earthed conductor (PE).
3. Plug the power supply cable supplied in the scope of delivery into the power supply plug in the pumping station.
4. Connect the power supply cable to the on-site mains power supply.

6 Interfaces and connections

The HiCube Neo pumping station has an Ethernet interface for communication and a USB interface, an interface labeled "RS-485," and a "gauge/IO" option module, which enable an exchange of information between the HiCube Neo and peripherals provided by the customer.

6.1 Ground terminal

⚠ DANGER

Electric shock due to missing internal earthed conductor

The internal earthed conductor is fastened to the housing. A unit without an internal earthed conductor attached can be life-threatening in the event of a malfunction.

- ▶ Do not rotate or release the internal earthed conductor.

The unit has 2 earthed conductor connections:

- The internal earthed conductor is located below the power supply pack.
- The connection to the functional earth is located in the unit's connection panel.

6.2 Mains connection

The mains connection socket with the main switch is located in the device's connection panel. The required mains cable is included in the scope of delivery.

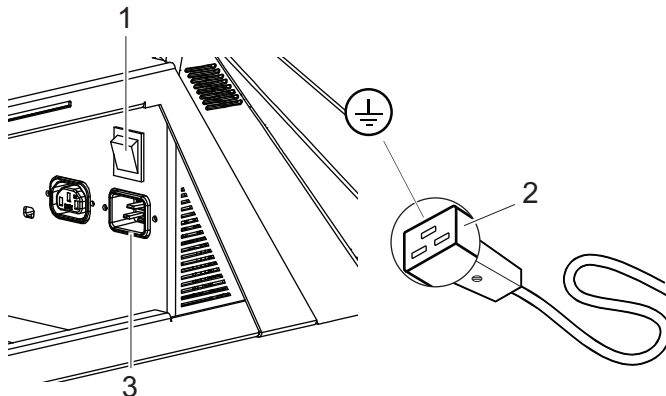


Fig. 24: Mains connection with power switch

- | | |
|--|---|
| 1 Main switch | 3 Mains connection socket (IEC 60320 C20) |
| 2 Mains connection with IEC 60320 C19 plug | |

6.3 "Ethernet" (LAN) connection

The "Ethernet" connection enables direct communication with the device via a computer.

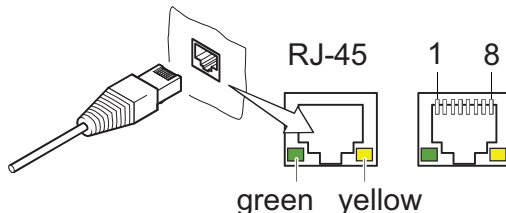


Fig. 25: "Ethernet" (LAN) connection

- | | |
|---------------------------|------------------------|
| 1 Transmission data (TD+) | 6 Reception data (RD-) |
| 2 Transmission data (TD-) | 4, 5, 7, 8 Not used |
| 3 Reception data (RD+) | |

LED	Status	Meaning
Green (link)	lights up	Hardware connection exists
	dark	No hardware connection
Yellow (activity)	lit up (flickering)	Data transmission runs
	dark	no data transmission / no connection

Tbl. 13: Status of the Ethernet connection

6.4 "USB" connection

The "USB" connection (type A) is located on the rear side of the electronics unit; it is used to connect a USB storage medium (e.g., firmware update, parameter storage (reading/writing), data logger) or for a WiFi network connection.

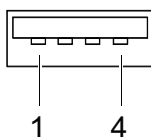


Fig. 26: "USB" connection (type A)

- | | | | |
|---|------------|---|--------------|
| 1 | VBUS (5 V) | 3 | D+ |
| 2 | D- | 4 | Ground (GND) |

6.5 Interface RS-485

⚠ DANGER

Danger to life from electric shock

When establishing the voltages that exceed the specified safety extra-low voltage (according to IEC 60449 and VDE 0100), the insulating measures will be destroyed. There is a danger to life from electric shock at the communication interfaces.

- Connect only suitable devices to the bus system.

The interface designated "RS-485" is intended for connecting a Pfeiffer Vacuum control unit or an external PC. The connections are galvanically safe and are isolated from the maximum supply voltage for the electronic drive unit. The electrical connections are optically decoupled internally.

Designation	Value
Serial interface	RS-485
Baud rate	9600 Baud
Data word length	8 bit
Parity	none (no parity)
Start bits	1
Stop bits	1

Tbl. 14: Features of the RS-485 interface

	Pin	Assignment
	1	RS-485 D+
	2	+24 V output, ≤ 210 mA loading capacity
	3	GND
	4	RS-485 D-
	5	not connected

Tbl. 15: Terminal layout of the RS-485 connecting socket M12

6.6 Gauge/IO option



Pressure measurement with the OmniControl

The OmniControl offers a precise pressure display with existing gauge/IO function.

The option designated “gauge/IO” in the OmniControl enables the connection of a Pfeiffer Vacuum pressure gauge. The connections in the OmniControl with integrated power supply pack are galvanically safe and are isolated from the maximum supply voltage for the OmniControl.

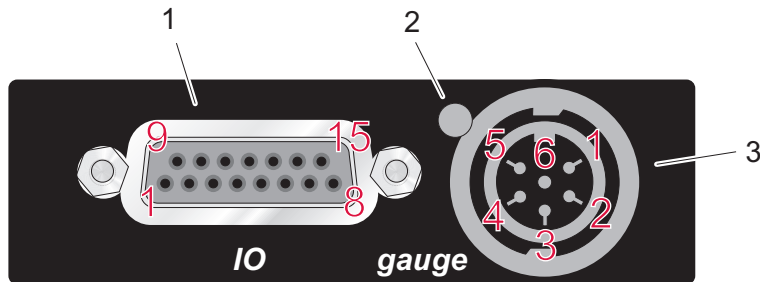


Fig. 27: Gauge/IO option

- 1 15-pin D-sub connector (IO)
- 2 LED at gauge socket
- 3 Gauge socket

You can find more information in the corresponding operating instructions at the [Pfeiffer Vacuum Download Center](#).

7 Operation

NOTICE

Damage to the device due to unintended operation

Unintended operation can result in damage to the device.

- ▶ To ensure correct settings, ensure that the operating instructions are available to qualified personnel and operators.

7.1 Dashboard

The dashboard appears automatically when you switch on the HiCube Neo pumping station. The dashboard provides information about the operating status of the connected pump, the system status, the pressure (if the gauge is connected), the status of the components in operation/during shutdown, the parameter list, and the actual rotation speed.

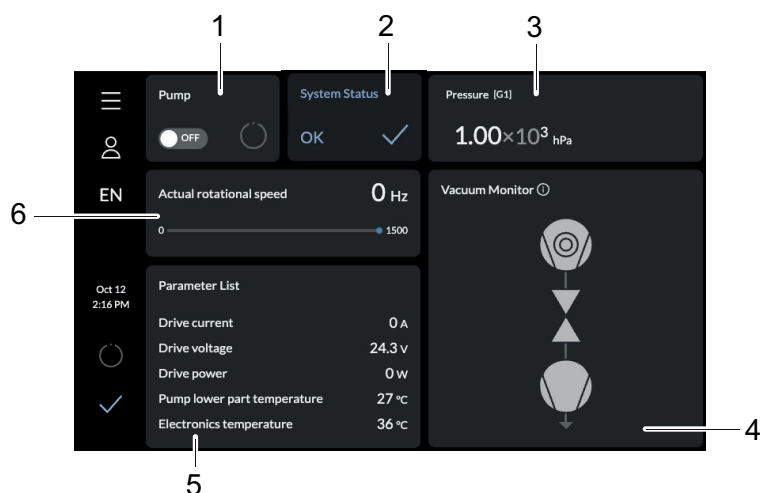


Fig. 28: Dashboard HiCube Neo

- | | |
|--------------------------------------|-----------------------------------|
| 1 Display for pumping station (pump) | 4 Vacuum diagram (vacuum monitor) |
| 2 System status | 5 Parameter list |
| 3 Pressure display (pressure) | 6 Actual rotation speed |

7.2 Main menu

From the main menu, you can navigate to the dashboard, trend menu, help page, messages overview, device management, and settings.

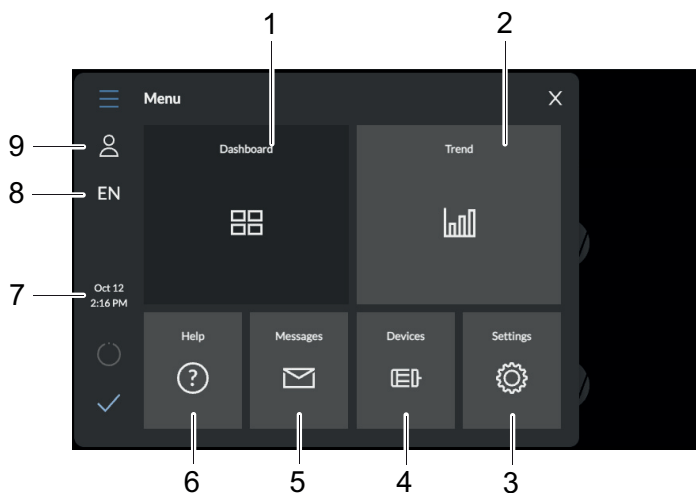



Fig. 29: Main menu for HiCube Neo

- | | |
|--------------|------------------------------|
| 1 Dashboard | 6 Help |
| 2 Trend menu | 7 Date and time |
| 3 Settings | 8 Language selection (DE/EN) |
| 4 Devices | 9 Profile |
| 5 Messages | |

7.3 Submenu

The submenu appears after you tap  in the main menu. You can navigate to the general settings, the network, the units, and device updates from this menu.

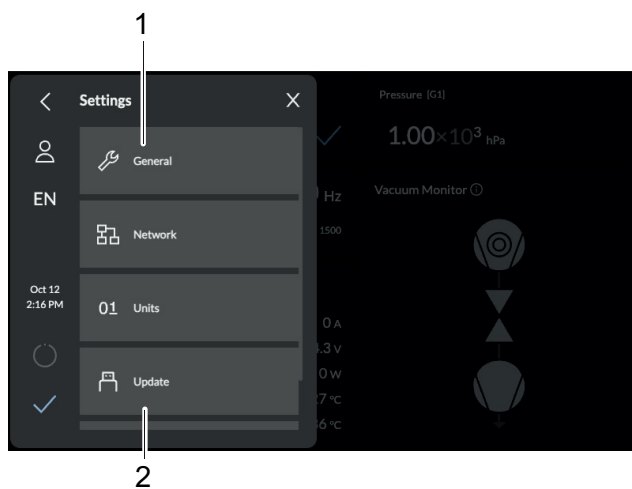


Fig. 30: HiCube Neo submenu

- | | |
|-----------|----------|
| 1 General | 2 Update |
|-----------|----------|

7.4 Vacuum diagram

The vacuum diagram shows the status information of the individual components as a graphical display.

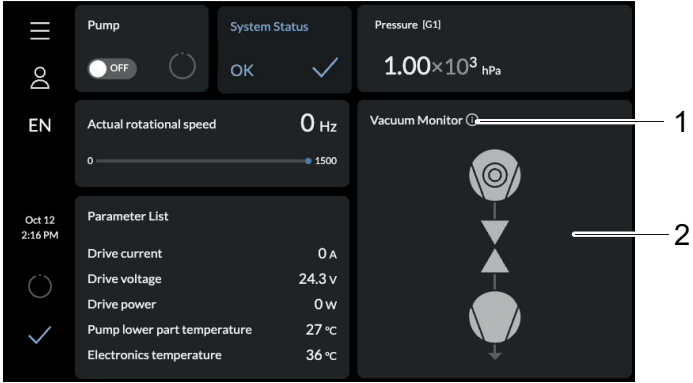


Fig. 31: Calling up the Info panel

- 1 Calling up the Info panel
- 2 Vacuum diagram

Calling up the Info panel

▶ Tap **i** to call up the Info panel of the vacuum diagram.

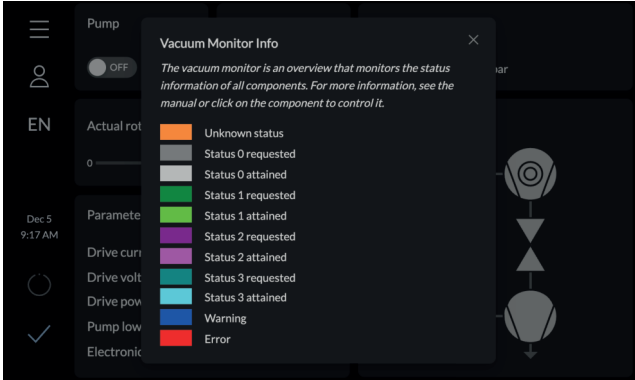


Fig. 32: Vacuum diagram Info panel

You can access the individual components directly by tapping on the components in the vacuum diagram.

	Designations	Status 0	Status 1	Status 2	Status 3
Turbopump	P1	Off	On	Rotation speed setting mode	Stand-by
Venting valve	P1VB1	Closed	Open	reserved	reserved
Backing pump	P2	Off	On	Rotation speed setting mode	Stand-by
Gas ballast valve	P2GBV1	Closed	Open	Auto	reserved
Fore-vacuum safety valve	FVSV	Closed	Open	reserved	reserved

Tbl. 16: Status information

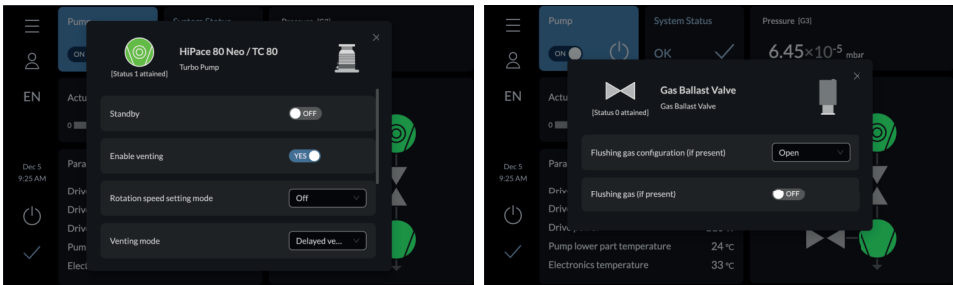


Fig. 33: Parameters in the vacuum diagram

You can navigate directly from the dashboard to the parameters of a device by tapping on the individual component in the vacuum diagram.

7.5 Switching pumping station on/off

⚠ WARNING

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

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

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

⚠ CAUTION

Danger of injury due to the pumping station tipping or rolling away

Superstructural parts change the center of gravity. There is a danger of crushing due to rolling away or tipping.

- ▶ Place the pumping station on a flat installation surface.
- ▶ Anchor the pumping station at the installation location.
- ▶ Wear personal protective equipment.

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.

Prerequisite

- Chamber connected on the HV side

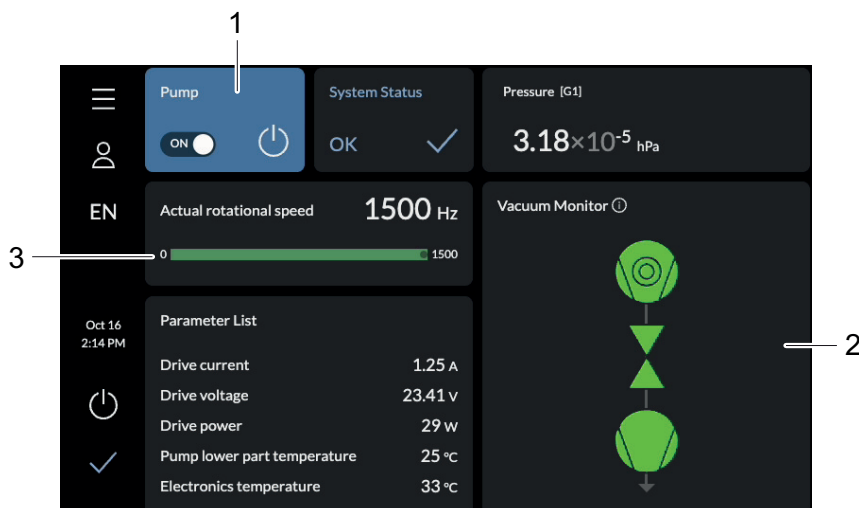


Fig. 34: Start pumping station

- 1 Display indicating pumping station in operation
- 2 Status of the components during operation
- 3 Actual rotation speed

Start pumping station

1. Tap the **Dashboard** button in the main menu.
2. Tap the **ON/OFF** switch to start the pumping station.

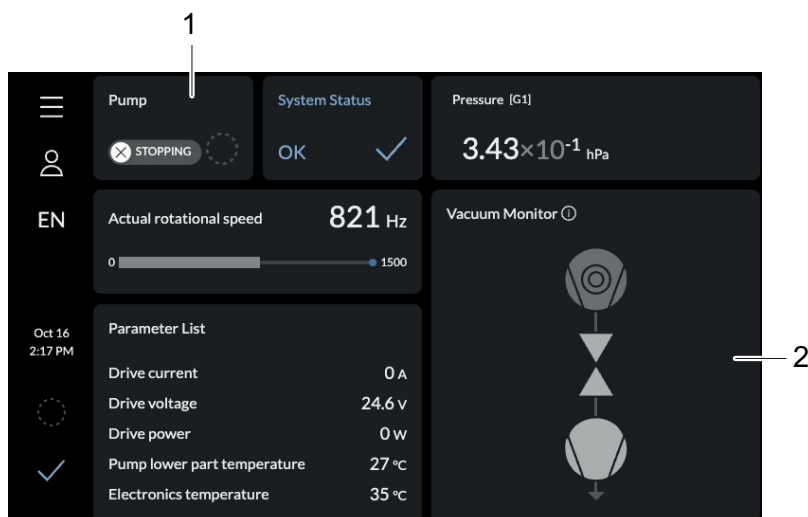


Fig. 35: Stop pumping station

- 1 Display for pumping station shutting down
- 2 Status of the components during shutdown

Stop pumping station

- ▶ Tap the **ON/OFF** switch to stop the pumping station.

7.6 Trends

In the Trend view, you can view various items of process data, add new trends, and edit and delete existing trends.

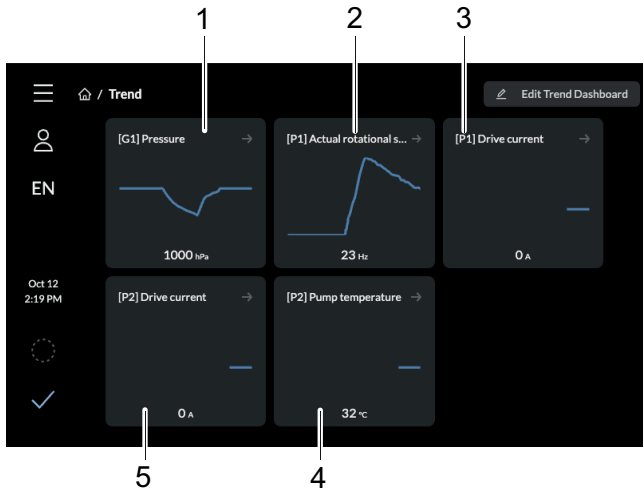


Fig. 36: Trend overview page HiCube Neo

- | | |
|---|---|
| 1 Pressure value display (pressure) | 4 Pump temperature display (pump temperature) |
| 2 Actual rotation speed display (actual rotation speed) | 5 [P2] Drive current display (drive current) |
| 3 [P1] Drive current display (drive current) | |

Device overview

- | | |
|-----------------|-----------|
| P1 Turbopump | G1 Gauges |
| P2 Backing pump | |

7.6.1 Adding and editing trends

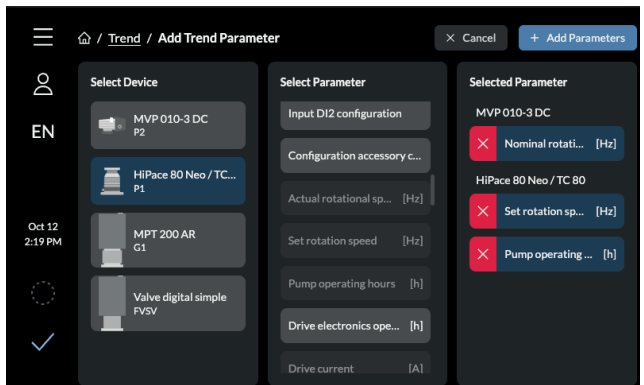


Fig. 37: Adding new trends

Adding new trends

- ▶ Tap the **Edit Trend Dashboard** button.
- ▶ Tap **[Add]** to add the new trend parameter.
- ▶ Select the device.
 - You can add the parameters for multiple devices.
- ▶ Select the parameter or parameters.
 - The **Selected Parameter** column shows you an overview of the parameters you have selected.
- ▶ Tap **[Add Parameter]** to finish the procedure.
- ▶ Tap **[Cancel]** to cancel the procedure.

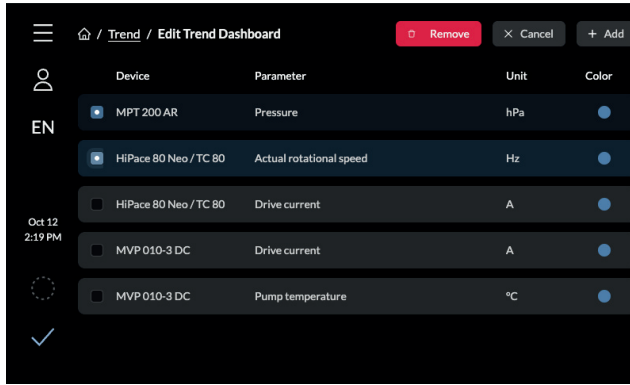


Fig. 38: Deleting trends

Deleting trends

1. Tap the **Edit Trend Dashboard** button to edit the dashboard.
 - You see an overview of all the added trends.
2. Select the parameters that you want to delete.
3. Tap **[Remove]** to delete the selected parameters.

7.6.2 Viewing trend details

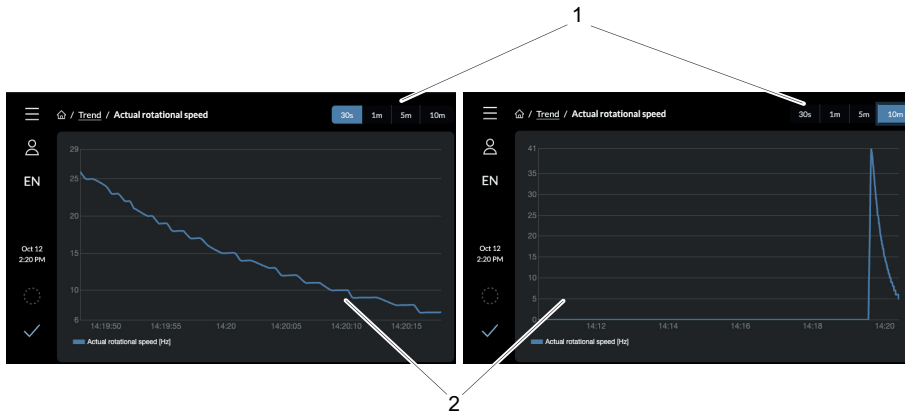


Fig. 39: Viewing trend details

- 1 Time interval display
- 2 Trend display

Viewing trend details

1. Select a trend.
2. Select a pre-set time interval.
 - You can select a time interval of 30 seconds, 1 minute, 5 minutes, or 10 minutes.

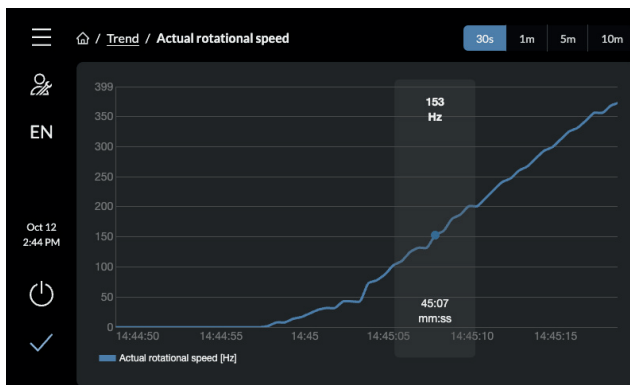


Fig. 40: Viewing detailed value

Viewing detailed value

- ▶ Tap on the required time in the trend overview to view the exact value for this time.

7.7 Device management

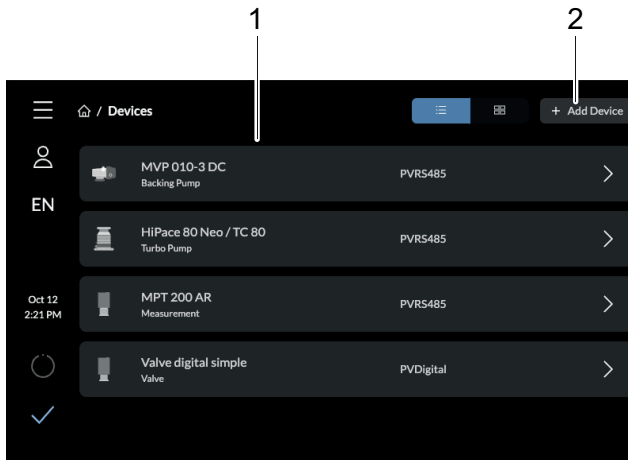


Fig. 41: Device overview screen

- 1 Component displays
- 2 Add device

The overview screen showing all the added devices appears when you tap the **Devices** button in the main menu. You can change the display layout, view and filter the parameter list of a device, add a new device, and edit an existing device.

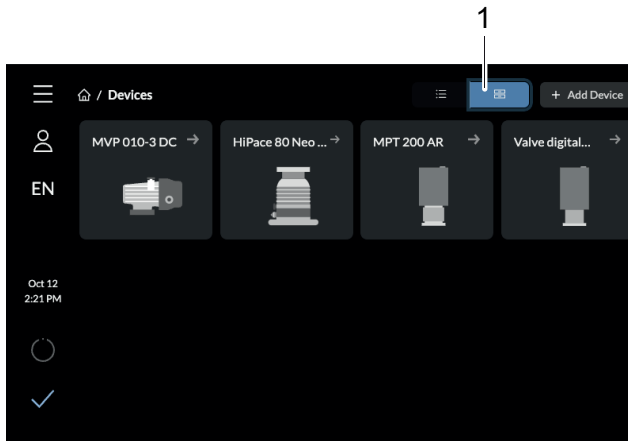



Fig. 42: Tile overview

- 1 Change to tile overview

Change to tile overview

- ▶ Tap  to change from the list overview to the tile overview.

7.7.1 Adding new device

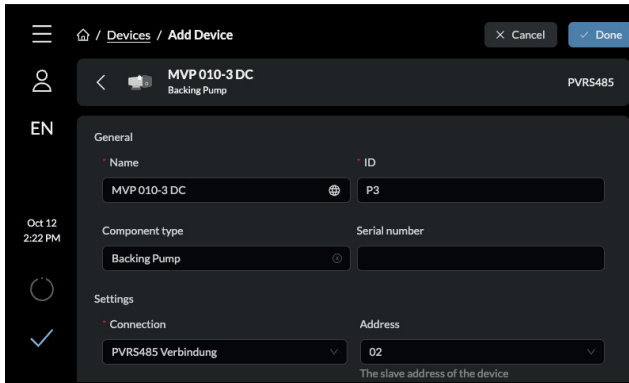


Fig. 43: Entering information

Entering information

1. To add information about a new device, tap **[Add Device]** on the device overview screen.
2. Enter the name, ID, and connection of the device in the corresponding fields.
 - You can also add the component type, serial number, and address of the device.

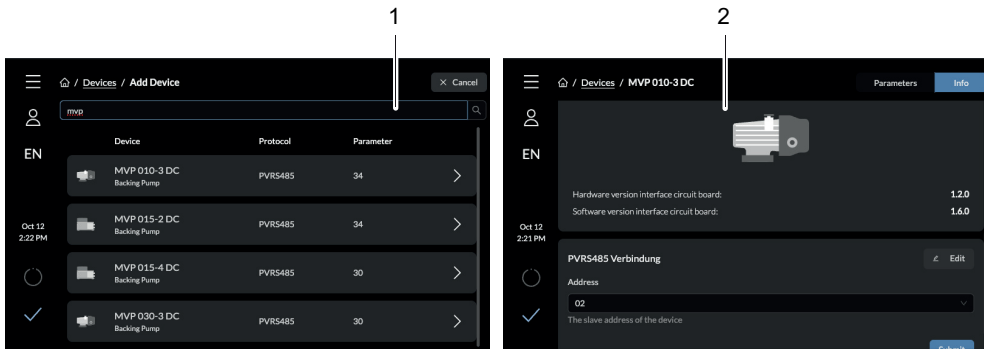


Fig. 44: Adding new device

- 1 Searching by device name
- 2 Displaying device information

Adding new device

1. Enter the name of the device in the search box.
2. Select the desired device.
3. Click **[Submit]**.

7.7.2 Editing and filtering detailed information

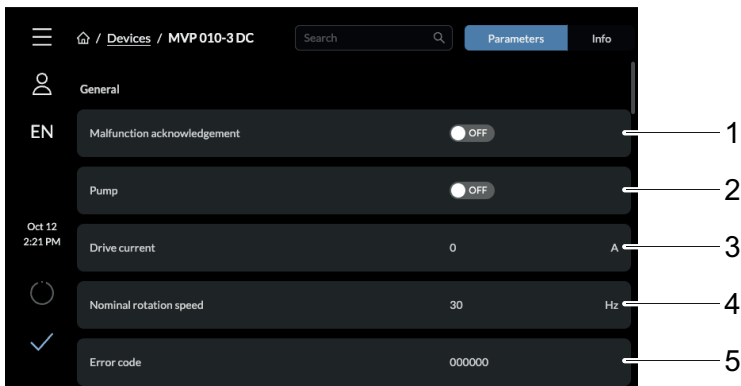


Fig. 45: Parameter list of a device

- 1 Malfunction acknowledgement
- 2 Pump
- 3 Drive current
- 4 Nominal rotation speed
- 5 Error code

In the parameter list, you can view the parameters of a device, filter the search by certain parameters, and view and edit detailed information for a certain parameter.



Fig. 46: Viewing and editing detailed information

- 1 Display of detailed information for a device

Viewing and editing detailed information

- 1. Tap the name of the desired device to view its detailed information.
- 2. Edit the desired parameter or parameters.
- 3. Tap **[Submit]** to apply the changes.

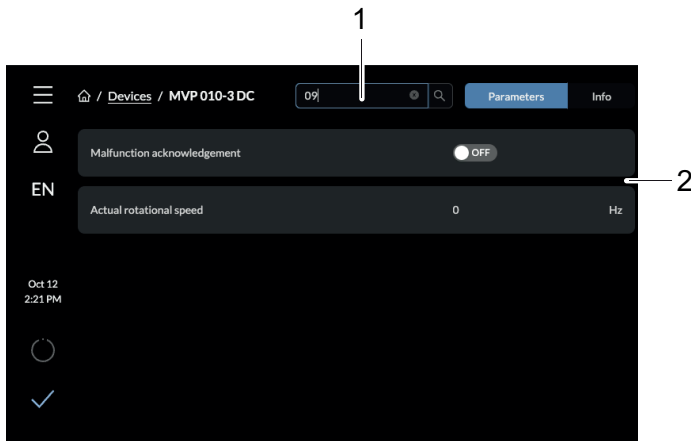


Fig. 47: Filtering parameter list by Pfeiffer Vacuum code/name

- 1 Input field for PV code/name for parameters
- 2 Search results

Filtering parameter list by Pfeiffer Vacuum code/name

- ▶ To filter the parameters, enter the desired name/code in the search box.
 - You can find Pfeiffer Vacuum codes and names in the operating instructions for backing pumps and the electric drive unit (see the list of operating instructions under "Product description").

7.8 Help page

The Help page appears when you tap the **Help** button in the main menu. The Help page provides information about the software and hardware versions of the device. The Help page also provides the digital rating plate.

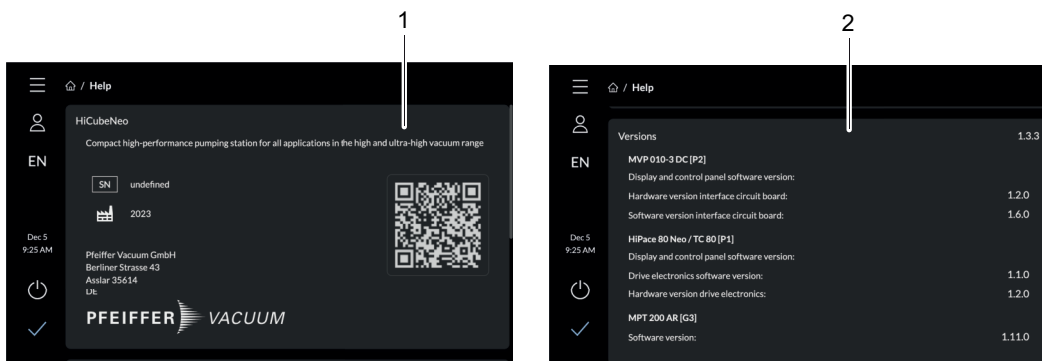


Fig. 48: HiCube Neo help page

- 1 Display of the digital rating plate
- 2 Display of the software and hardware versions of a device

The log overview shows you information about the level, origin, and time of a log. In the **Message** column, you can view detailed information about a log. Note that the log overview is visible only for service users.

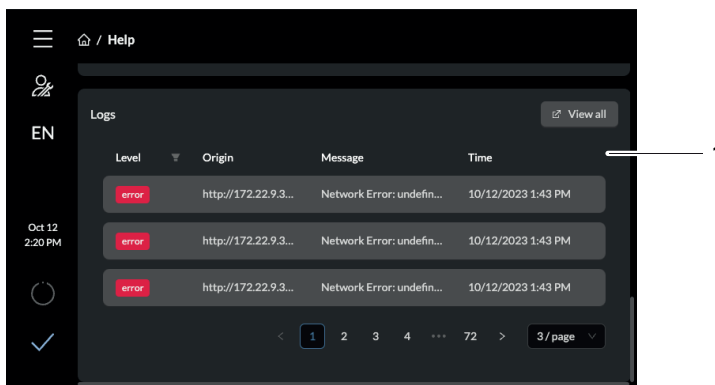


Fig. 49: HiCube Neo logs

- 1 Display of the log

7.9 Messages

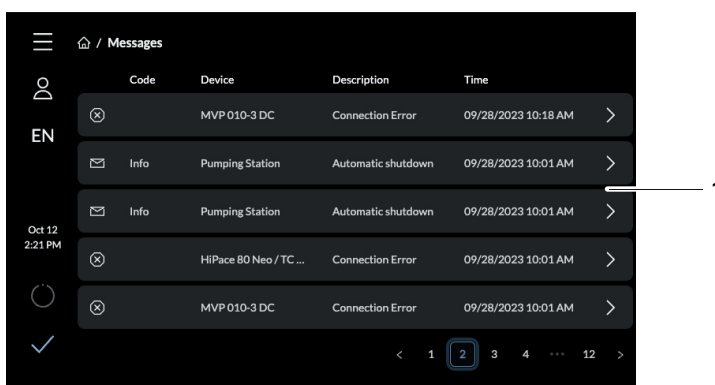


Fig. 50: Overview of all messages

- 1 Overview of all messages

The Messages page is displayed after tapping on the **Messages** button in the main menu. The message overview gives you information on the message code, the device name, the description, and the message publication time.

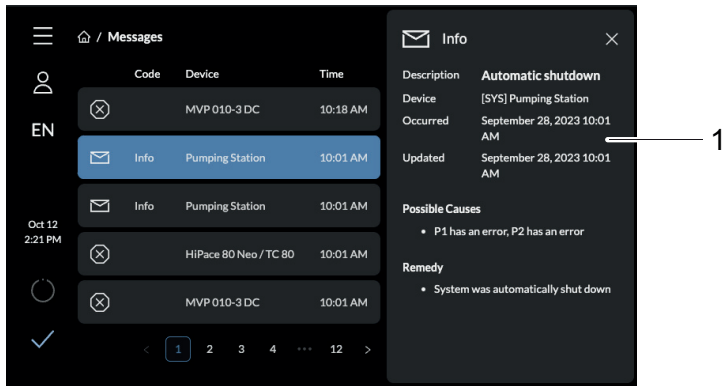


Fig. 51: View detailed information of a message

1 Display with detailed information of a message

View detailed information of a message

► Tap on the desired message to call up the detailed view of this message.

The detailed view of a message gives you the following information:

- Message description
- Device name
- Message publication date
- Message update date
- Possible causes of an error
- Remedy

7.10 Settings

7.10.1 General settings

In the General settings, you can set the system time and reset the device to its factory settings.

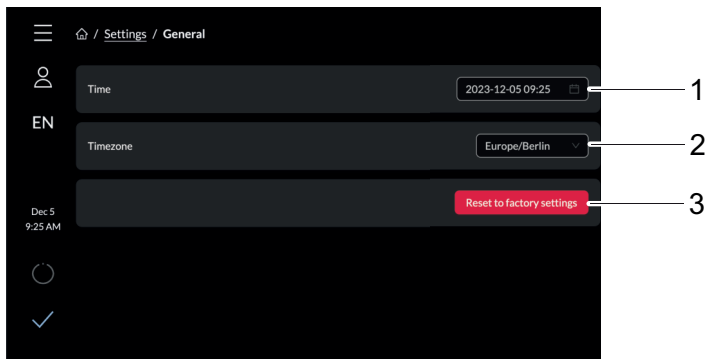


Fig. 52: General settings

- 1 Time display
- 2 Tmezone display
- 3 Reset to factory settings

Updating system time

- Tap **[Time]** to set the time and date.
- Tap **[Timezone]** to set the timezone.
 - You can filter the timezones by name.

Setting HiCube Neo to factory settings

- Tap **[Reset to factory settings]**, to reset the HiCube Neo to its factory settings.
 - All added devices except the two standard pumps (HiPace and backing pump) are removed from the list of available devices.

7.10.2 Network settings

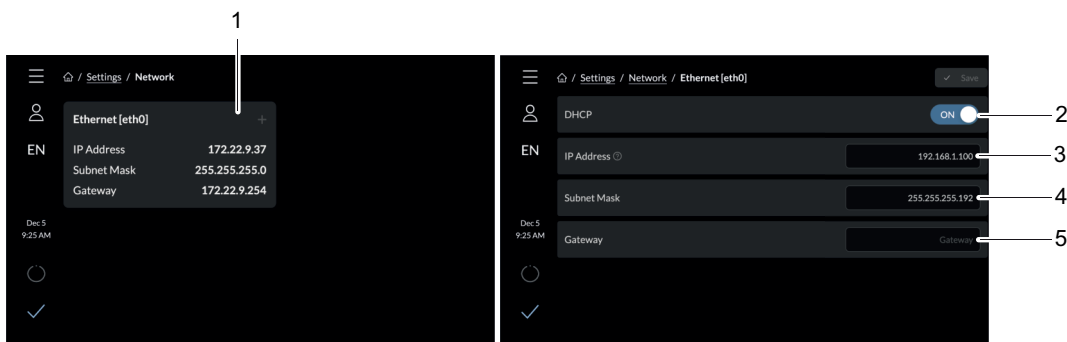


Fig. 53: Change IP address

- | | |
|---------------------------|---------------|
| 1 Ethernet [eth0] | 4 Subnet mask |
| 2 DHCP | 5 Gateway |
| 3 IP Address (IP address) | |

Change IP address

- ▶ Tap the **Settings** button in the main menu.
- ▶ Tap **[Network]**.
- ▶ Tap **[Ethernet (eth0)]** to change the IP address.
 - If you enable DHCP, the static IP address is kept.

7.10.3 Converting units

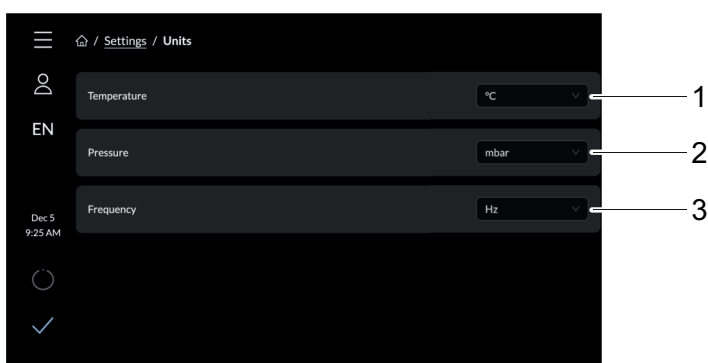


Fig. 54: Overview of units

- | | |
|---------------|-------------|
| 1 Temperature | 3 Frequency |
| 2 Pressure | |

Converting units

1. Tap the **Settings** button in the main menu.
2. Tap **[Units]**.
3. Select a suitable unit in the drop-down menu.

7.11 Updating firmware via the cloud

Prerequisite

- HiCube Neo switched on
- Internet connection available
- approx. 1.5 GB RAM available

7.11.1 Uploading firmware to device

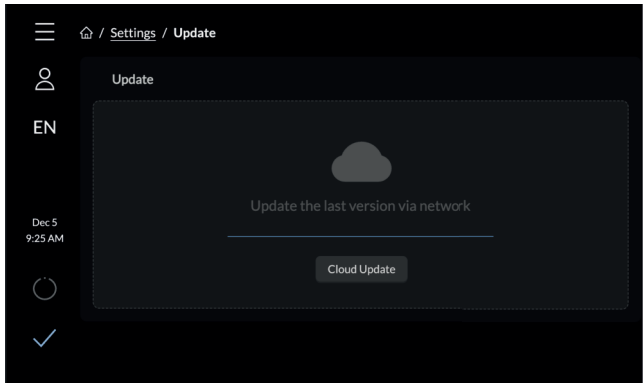


Fig. 55: Uploading firmware to device

Uploading firmware to device

1. Tap on [Cloud update].
 - You can only update the firmware via the web or the cloud. It is not possible to use a USB stick to update the firmware.
2. The update starts automatically.
 - The update window shows the transfer action.

7.11.2 Update procedure

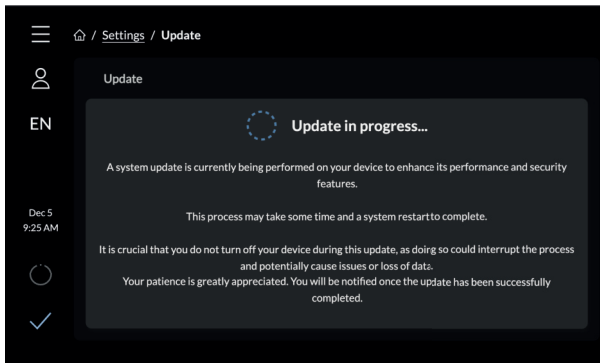


Fig. 56: Update procedure

The update starts automatically after uploading the firmware. Note that the device must remain switched on during the update. Switching the device off during the update can lead to loss of data or to the update action being canceled. You will see a message once the update is complete.

7.11.3 Finishing an update

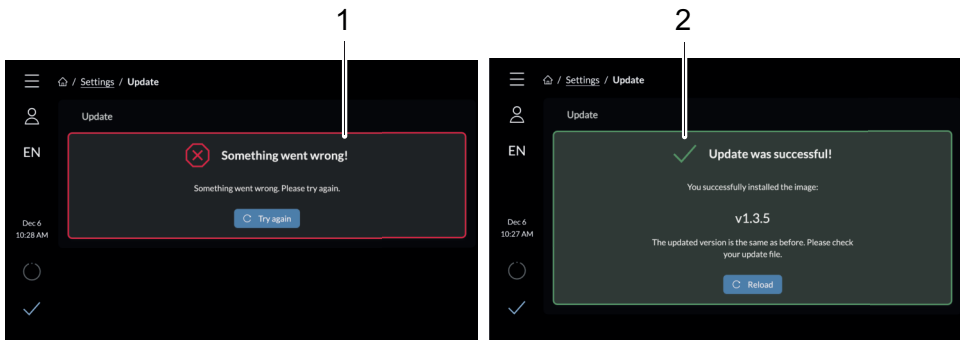


Fig. 57: Finishing an update

- 1 Message: update failed
- 2 Message: update successful

Finishing an update

- ▶ If errors occurred, restart the update procedure.
- ▶ If the internet connection was interrupted during the update procedure, you see a "Connection interrupted" message.
 - The update procedure is resumed automatically as soon as an internet connection is reestablished.
- ▶ The system then restarts in order to finish the update procedure.

7.12 Users

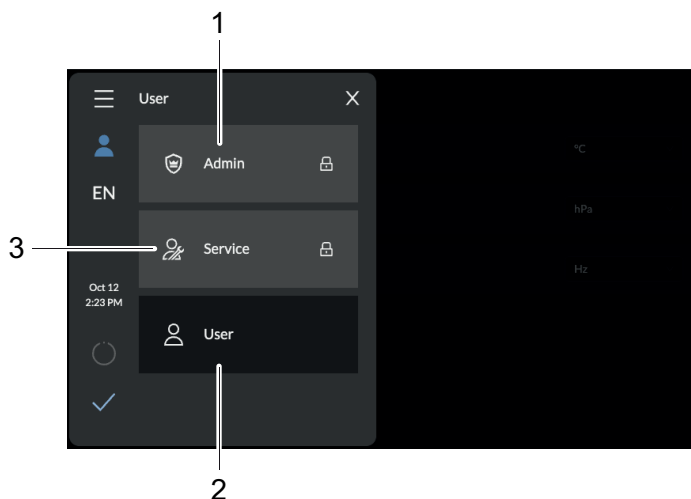


Fig. 58: Overview of all users

- 1 Admin
- 2 User
- 3 Service user

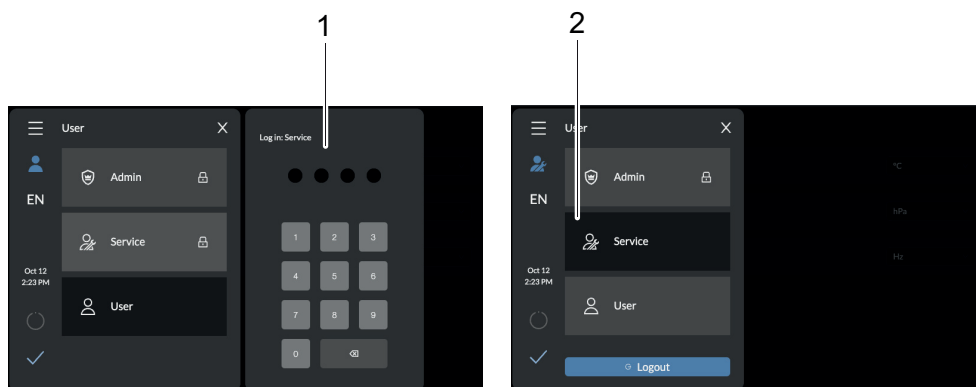


Fig. 59: Log in as a service user

- 1 Enter the password
- 2 Logged in service user

Log in as a service user

1. Tap the **Service** button.
2. Enter the password.
 - A specific area for service is displayed after logging in.

8 Maintenance

8.1 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.

8.2 Maintenance intervals and responsibilities

Instructions for carrying out maintenance

1. Carry out the required maintenance on the pumping station components, in accordance with the instructions in the individual operating instructions.
2. Clean the turbopump station exterior with a lint-free cloth and a little isopropanol.
3. Consult Pfeiffer Vacuum Service about shorter maintenance intervals for extreme loads or impure processes.
4. For all other cleaning, maintenance or repair work, contact the appropriate Pfeiffer Vacuum Service location.

8.3 Removing components for maintenance

NOTICE	
Malfunction due to changing the connection configuration	
The pumping station connections are pre-configured at the factory. If the control lines on the connector are mixed up, this causes the pumping station to malfunction or fail.	
<ul style="list-style-type: none"> ▶ When removing components, note their original layout for subsequent re-assembly. ▶ Make a note of the accessories configuration and important setting values from the DCU before disassembly of the pumping station or components. 	

To maintain the components of the pumping station, you may need to remove the components from the pumping station frame.

Electronic drive unit	Acc. A1	Acc. B1
TC 80	Fan (temperature controlled) or Heating	Venting valve
TC 110		

Tbl. 17: Pre-set accessory connections for TC 80 and TC 110

Electronic drive unit	Acc. A	Acc. B
TC 400	Fan (temperature controlled) or Heating	Venting valve

Tbl. 18: Pre-set accessory connections for TC 400

8.3.1 Removing electrical connections

i	<p>Before carrying out any work, safely disconnect device from mains</p> <ol style="list-style-type: none"> 1. Shut down the device. 2. Wait until all components are at a complete standstill. 3. Switch off the master switch. 4. Disconnect the mains cable from the device.
----------	--

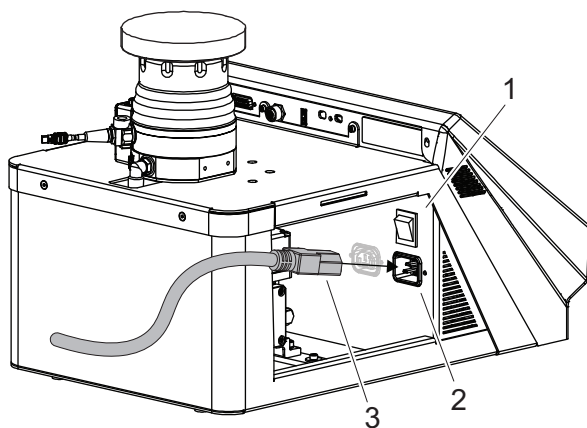


Fig. 60: Removing electrical connections

- 1 Main switch
- 2 Power supply plug
- 3 Power supply cable

Removing electrical connections

1. For water cooling: Shut off the cooling water feed.
2. Pull the power supply cable out of the pumping station.
3. Disconnect and remove the accessory control lines.

8.3.2 Removing turbopump



Factory settings

All turbopump accessory connections are preconfigured at the factory. Any confusion will cause malfunctions or operational failure.

1. Please note the initial product configuration.
2. Note the cable connections and parameter settings, before making changes.



Number of fixing screws

The number of fixing screws varies depending on the turbopump version.

HiCube Neo – desktop model

Required tools

- Allen key, **WAF 2.5**
- Allen key, **WAF 3**
- Allen key, **WAF 4** (for HiPace 80 Neo)
- Allen key, **WAF 6** (for HiPace 300/300 H)

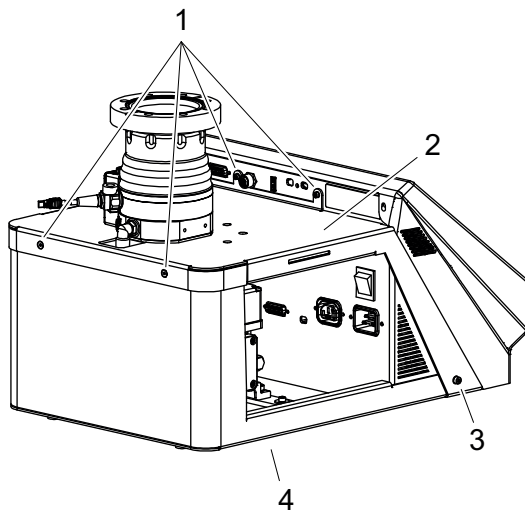


Fig. 61: Unscrewing top shell – desktop model

- | | |
|-------------|-------------|
| 1 Screw, 4× | 3 Screw, 2× |
| 2 Top shell | 4 Underside |

Unscrewing top shell – desktop model

1. Detach all the connector plugs from the electronic drive unit and the AccessLink sockets.
2. Remove the fore-vacuum connection from the backing pump.
 - Avoid damage to the fore-vacuum hose.
3. Remove the 4 screws from the top shell.
4. Remove the 2 screws from the bottom shell.

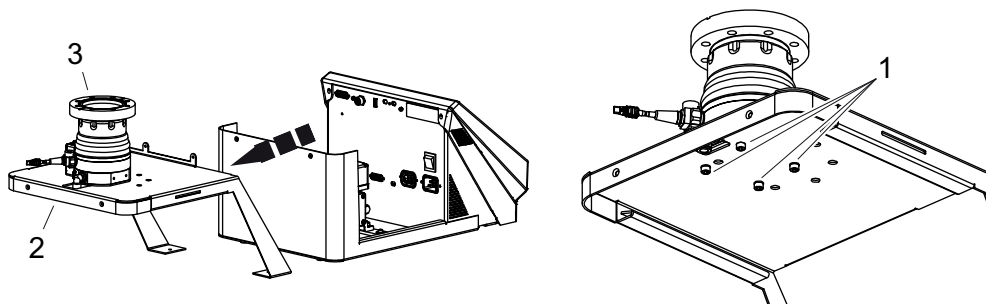


Fig. 62: Removing turbopump – desktop model

- | | | | |
|---|---------------------------|----|-----------|
| 1 | Fixing screws with washer | 3s | Turbopump |
| 2 | Top shell | | |

Removing turbopump – desktop model

1. Push the top shell with turbopump to the rear and off the pumping station.
 - Avoid bending the legs of the top shell.
2. Remove the fixing screws with washers from the top shell.
3. Remove the turbopump from the top shell.

HiCube Neo – free-standing model

Required tools

- Allen key, **WAF 4** (for HiPace 80 Neo)
- Allen key, **WAF 6** (for HiPace 300/300 H/350/400/450/700/700 H/800/800 H)

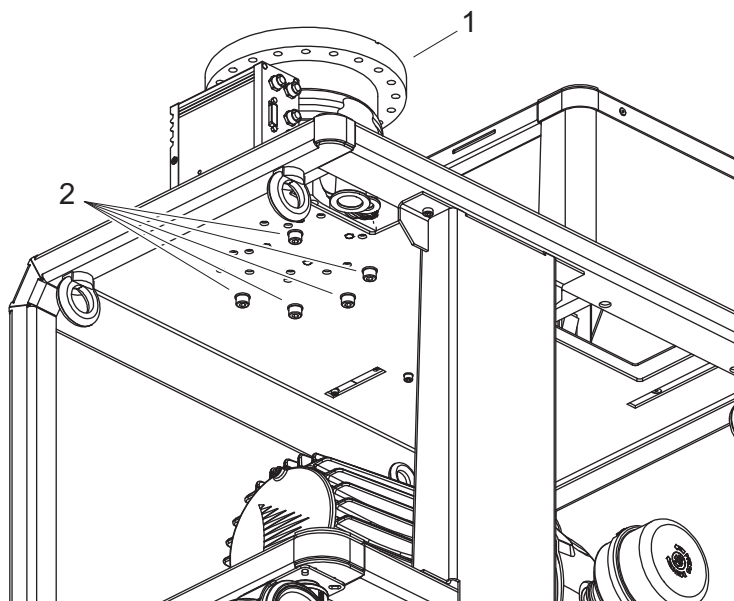


Fig. 63: Removing turbopump – free-standing model

- | | | | |
|---|-----------|---|---------------------------|
| 1 | Turbopump | 2 | Fixing screws with washer |
|---|-----------|---|---------------------------|

Removing turbopump – free-standing model

1. Detach all the connector plugs from the electronic drive unit and the AccessLink sockets.
2. Detach the fore-vacuum connection from the turbopump.
 - Avoid damage to the fore-vacuum hose.
3. Remove the fixing screws with washers from the housing of the pumping station.
4. Remove the turbopump from the pumping station.

8.3.3 Removing the backing pump

HiCube Neo – desktop model



Removing backing pump from desktop model

To remove the backing pump from the pumping station, you must first remove the top shell with the turbopump from the pumping station.

Required tools

- Allen key, **WAF 4**

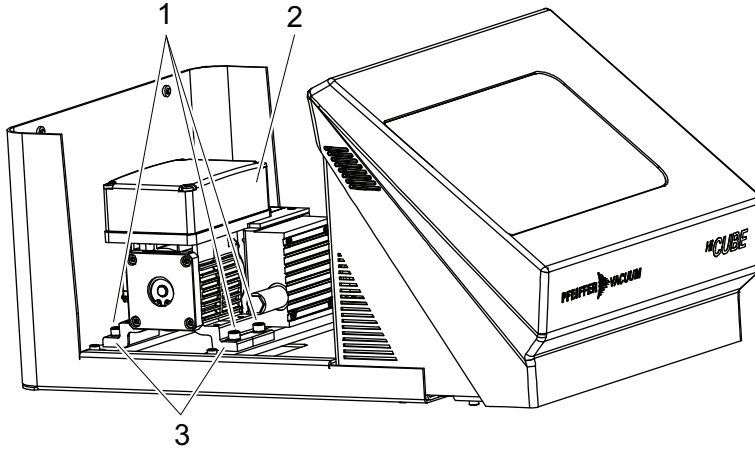


Fig. 64: Removing backing pump – desktop model

- | | |
|--------------------------------|------------|
| 1 Fixing screw with washer, 4× | 3 Rail, 2× |
| 2 Backing pump | |

Removing backing pump – desktop model

1. Remove the 4 fixing screws with washers from the rails.
2. Remove the backing pump from the pumping station.

HiCube Neo – free-standing model

Required tools

- Allen key, **WAF 6** (for HiScroll)

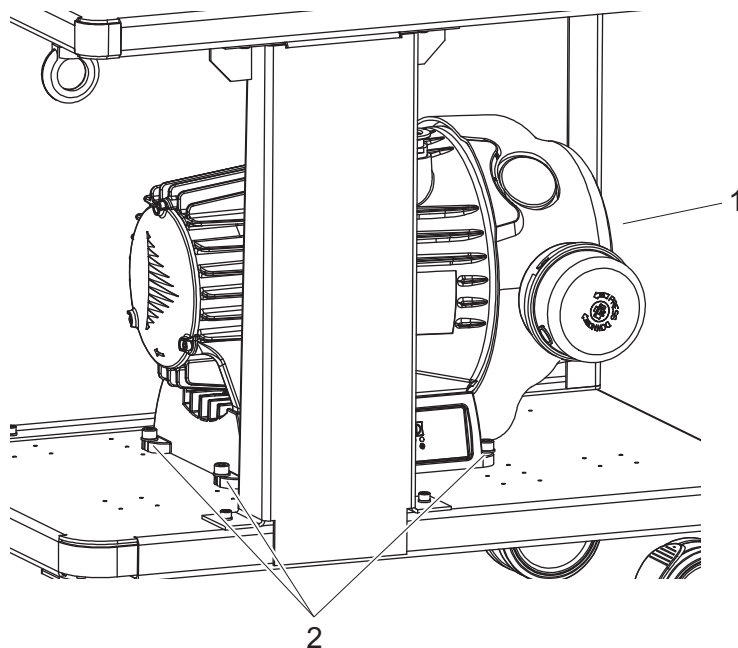


Fig. 65: Removing backing pump – HiScroll

- 1 HiScroll 2 Fixing screw with washer, 4×

Removing backing pump – HiScroll

1. Detach all the connector plugs from the electronic drive unit and the AccessLink sockets.
2. Detach the fore-vacuum connection from the HiScroll.
 - Avoid damage to the fore-vacuum hose.
3. Remove the 4 fixing screws with washers from the HiScroll.
4. Remove the HiScroll from the pumping station.

Removing backing pump – SmartVane and Duo

1. Detach all the connector plugs from the electronic drive unit and the AccessLink sockets.
2. Detach the fore-vacuum connection from the SmartVane or Duo.
 - Avoid damage to the fore-vacuum hose.
3. Remove the 4 fixing screws with washers from the rails.
4. Remove the SmartVane or Duo from the pumping station.

8.3.4 Installing backing pump

HiCube Neo – desktop model

Required tools

- Hexagon socket torque wrench, **WAF 4**

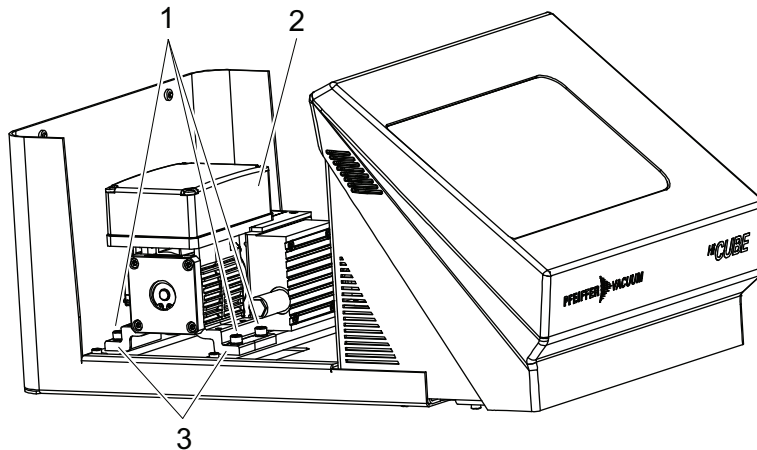


Fig. 66: Installing backing pump – desktop model

- | | |
|--------------------------------|------------|
| 1 Fixing screw with washer, 4× | 3 Rail, 2× |
| 2 Backing pump | |

Installing backing pump – desktop model

1. Position the backing pump on the rails in the pumping station.
2. Screw the 4 fixing screws with washers into the rails.
 - Tightening torque: ?? Nm

HiCube Neo – free-standing model

Required tools

- Hexagon socket torque wrench, **WAF 6** (for HiScroll)

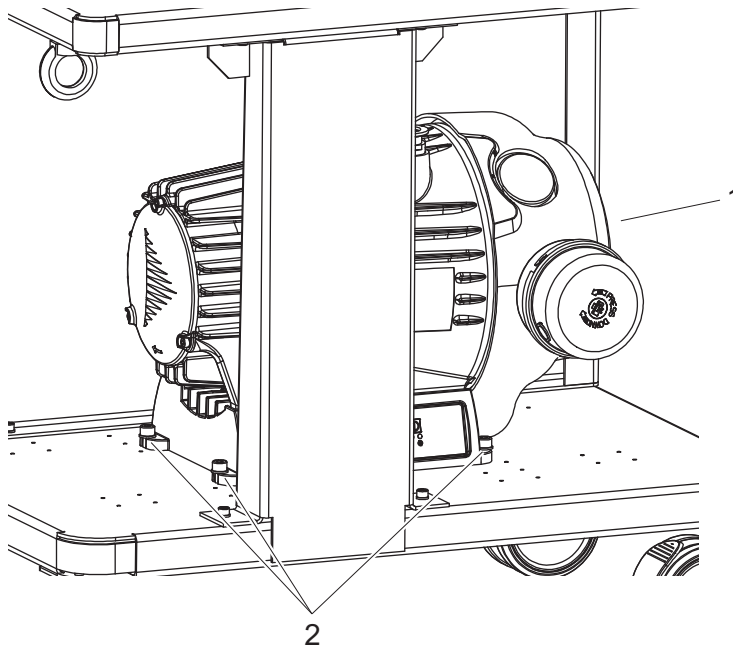


Fig. 67: Removing backing pump – HiScroll

- | | |
|------------|--------------------------------|
| 1 HiScroll | 2 Fixing screw with washer, 4× |
|------------|--------------------------------|

Installing backing pump – HiScroll

1. Position the HiScroll in the pumping station.
2. Screw the 4 fixing screws with washers into the rails.
 - Tightening torque: **19 Nm**

Installing backing pump – SmartVane and Duo

1. Position the SmartVane or Duo on the rails in the pumping station.
2. Screw the 4 fixing screws with washers into the rails.
 - Tightening torque: **19 Nm**
3. Install the fore-vacuum connection.
 - Avoid damage to the fore-vacuum hose.
4. Insert all the connector plugs in the electronic drive unit and the AccessLink sockets.
 - Observe the information regarding the pre-set accessory connections.

8.3.5 Install turbopump

Turbopump	Fixing screw	Quantity	Tightening torque
HiPace 80 Neo	Hexagon socket M5 × 12	4 pieces	6 Nm
HiPace 300 300 H	Hexagon socket M8 × 20	5 pieces	25 Nm
HiPace 350 450 700 700 H	Hexagon socket M8 × 20	6 pieces	25 Nm

Tbl. 19: Tightening torque for fixation of turbopumps

HiCube Neo – desktop model



Installing turbopump in desktop model

To install the turbopump in the pumping station, you must first install the backing pump in the pumping station.

Required tools

- Hexagon socket torque wrench, **WAF 2.5**
- Hexagon socket torque wrench, **WAF 3**
- Hexagon socket torque wrench, **WAF 4** (for HiPace 80 Neo)
- Hexagon socket torque wrench, **WAF 6** (for HiPace 300/ 300 H)

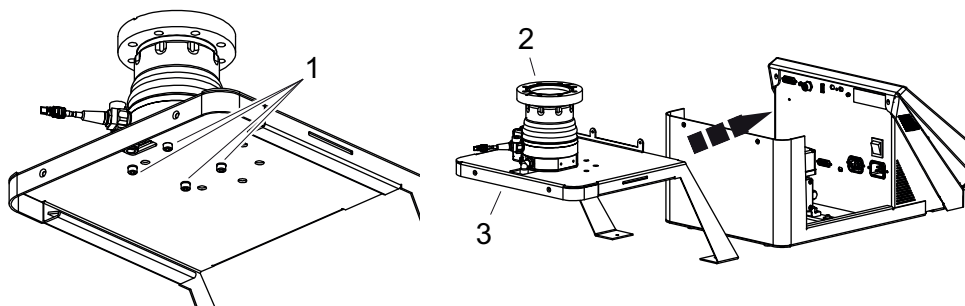


Fig. 68: Installing turbopump – desktop model

- | | |
|-----------------------------|-------------|
| 1 Fixing screws with washer | 3 Top shell |
| 2 Turbopump | |

Installing turbopump – desktop model

1. Position the turbopump on the top shell.
2. Screw the fixing screws with washers into the top shell.
 - Tightening torque: varies depending on the turbopump version
3. Push the top shell with turbopump onto the pumping station from the rear.
 - Avoid bending the legs of the top shell.

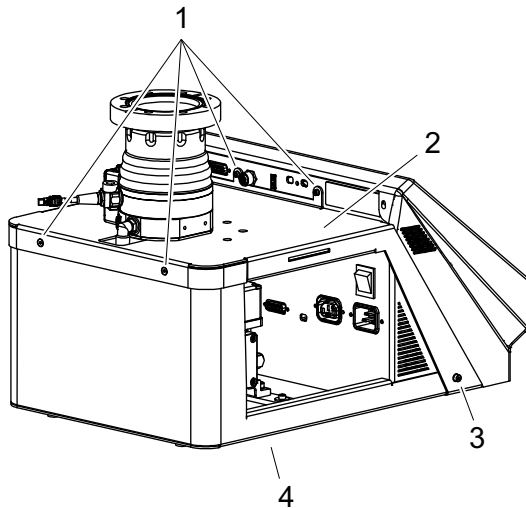


Fig. 69: Installing top shell – desktop model

- | | |
|-------------|-------------|
| 1 Screw, 4× | 3 Screw, 2× |
| 2 Top shell | 4 Underside |

Installing top shell – desktop model

1. Screw the 4 screws into the top shell.
 - Tightening torque: **1.4 Nm**
2. Screw the 2 screws into the bottom shell.
 - Tightening torque: **3 Nm**
3. Install the fore-vacuum connection.
 - Avoid damage to the fore-vacuum hose.
4. Insert all the connector plugs in the electronic drive unit and the AccessLink sockets.
 - Observe the information regarding the pre-set accessory connections.

HiCube Neo – free-standing model

Required tools

- Hexagon socket torque wrench, **WAF 4** (for HiPace 80 Neo)
- Hexagon socket torque wrench, **WAF 6** (for HiPace 300/300 H/350/400/450/700/700 H/800/800 H)

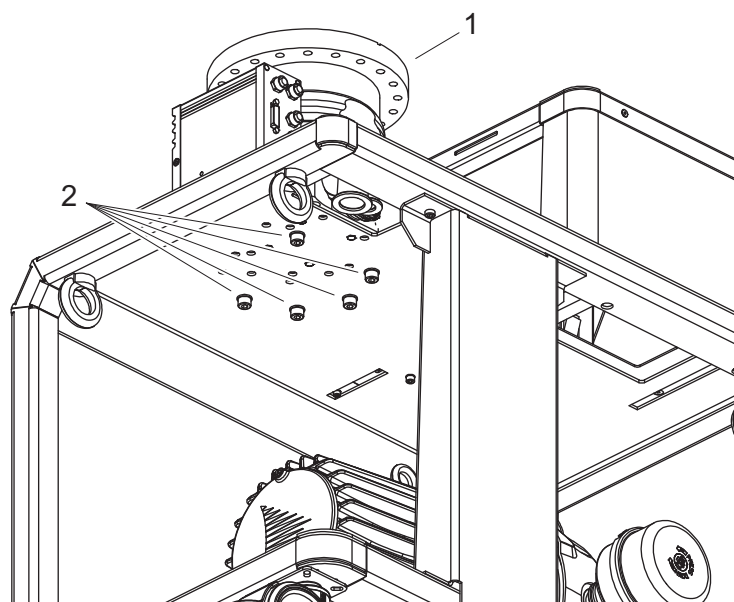


Fig. 70: Installing turbopump – free-standing model

- | | |
|-------------|-----------------------------|
| 1 Turbopump | 2 Fixing screws with washer |
|-------------|-----------------------------|

Installing turbopump – free-standing model

1. Position the turbopump on the pumping station.
2. Screw the fixing screws with washers into the housing of the pumping station.
 - Tightening torque: varies depending on the turbopump version
3. Install the fore-vacuum connection.
 - Avoid damage to the fore-vacuum hose.
4. Insert all the connector plugs in the electronic drive unit and the AccessLink sockets.
 - Observe the information regarding the pre-set accessory connections.

9 Decommissioning

9.1 Shut down for longer periods

Procedure

1. Remove the pumping station from the vacuum system if necessary.
2. Change the operating fluid reservoir of the turbopump if necessary.
3. Seal all flange openings with the original protective caps.
4. Store the pumping station indoors only, at temperatures between -10 °C and +40 °C.
5. In rooms with humid or aggressive atmospheres: Hermetically seal the pumping station together with a drying agent in a plastic bag.

9.2 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.

NOTICE

Risk of damage to vacuum pump as a result of operating fluid aging

The operating fluid usability is limited (max. 2 years). Prior to recommissioning, following a shutdown of **2 years or more**, carry out the following work.

- ▶ Change the operating fluid.
- ▶ Change the radial shaft seal rings and other elastomer parts if required.
- ▶ Observe the maintenance instructions – consult Pfeiffer Vacuum if necessary.

Procedure for recommissioning the pumping station

1. Check the pumping station for impurities and moisture.
2. Clean the turbopump station exterior with a lint-free cloth and a little isopropanol.
3. If necessary, arrange for Pfeiffer Vacuum Service to fully clean the pumping station.
4. If necessary, arrange for Pfeiffer Vacuum Service to fully clean the pumping station components.
5. Install the pumping station according to these instructions ([see chapter "Installation", page 25](#)).
6. Recommission the pumping station according to these instructions .

10 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.

10.1 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

10.2 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.

10.3 Disposing of rotary vane pump

Pfeiffer Vacuum rotary vane pump systems contain materials which must be recycled.

1. Fully drain the operating fluid.
2. Only for **Duo**: Dismantle the motor.
3. Decontaminate the components that come into contact with process gases.
4. Separate the components into recyclable materials.
5. Recycle the non-contaminated components.
6. Dispose of the product or components safely according to locally applicable regulations.

10.4 Dispose of multi-stage roots pumps

Pfeiffer Vacuum roots pumps from the ACP series contain materials that you must recycle.

1. Fully drain the lubricant.
2. Decontaminate the components that come into contact with process gases.
3. Separate the components into recyclable materials.
4. Recycle the non-contaminated components.
5. Dispose of the product or components in a safe manner according to locally applicable regulations.

10.5 Disposing of the scroll pump

Pfeiffer Vacuum scroll pumps contain materials which must be recycled.

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

10.6 Dispose of diaphragm pumps

Pfeiffer Vacuum diaphragm pumps contain materials that you must recycle.

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

11 Malfunctions

11.1 General

WARNING

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

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

- ▶ Follow the installation instructions for this turbopump.
- ▶ Observe the requirements regarding stability and design of the counter flange.
- ▶ Use only original accessories or fixing material approved by Pfeiffer Vacuum for the installation.

WARNING

Risk of injury caused by the turbopump breaking away with the vibration compensator in the event of a malfunction

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

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

Malfunctions on the pumping station are usually caused by faults on individual components. LEDs on the turbopump and backing pump indicate the operation statuses for the respective device.

- The display shows the basic operating states of the pumping station.
- The display shows malfunctions.

11.2 Troubleshooting

Problem	Possible causes	Remedy
Display not showing any information.	<ul style="list-style-type: none"> • No operating voltage present 	<ul style="list-style-type: none"> • Check the operating voltage. • Check the power cable connection. • Switch on the mains switch.
	<ul style="list-style-type: none"> • Incorrect operating voltage 	<ul style="list-style-type: none"> • Note rating plate specifications. • Supply the correct operating voltage.
	<ul style="list-style-type: none"> • Control electronics defective 	<ul style="list-style-type: none"> • Contact Pfeiffer Vacuum Service.
Pumping station not reaching final pressure.	<ul style="list-style-type: none"> • Condensate in the backing pump 	<ul style="list-style-type: none"> • Open the backing pump gas ballast valve.
	<ul style="list-style-type: none"> • Gas ballast valve open 	<ul style="list-style-type: none"> • Close the backing pump gas ballast valve.
Venting valve fails to open directly after switching off.	<ul style="list-style-type: none"> • Delayed venting enabled 	<ul style="list-style-type: none"> • Check the settings for delayed venting. <p>Delayed venting opens the venting valve after a preset time. Opening is indicated immediately.</p>

Tbl. 20: Troubleshooting

11.3 Malfunction messages

Error messages are displayed on the dashboard and in the navigation bar. You will additionally find an error message history in the Messages menu. A more detailed explanation of the error messages can be found in the operating instructions for the individual components.



Malfunction messages

For error messages, a warning icon appears on the left side of the navigation bar and in the "System Status" panel on the dashboard. Pressing the warning icon or the "System status" button displays the error message overview.

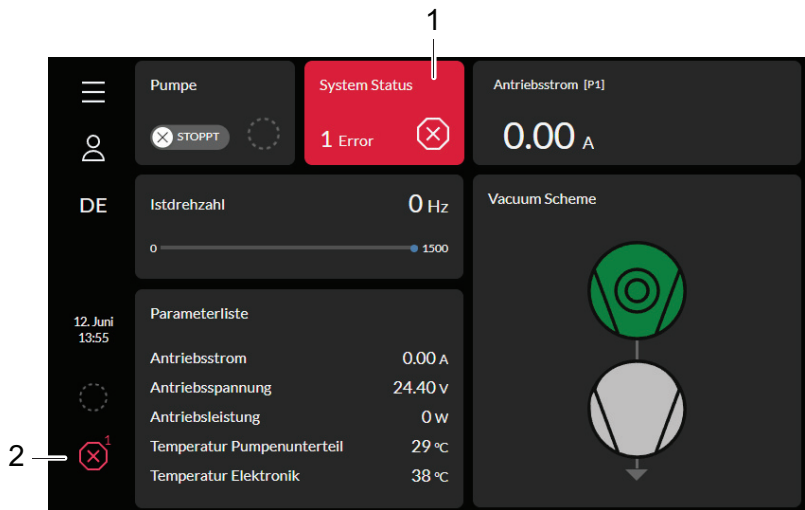


Fig. 71: Example of an error message on the dashboard

- 1 System status error message
- 2 Navigation bar error message

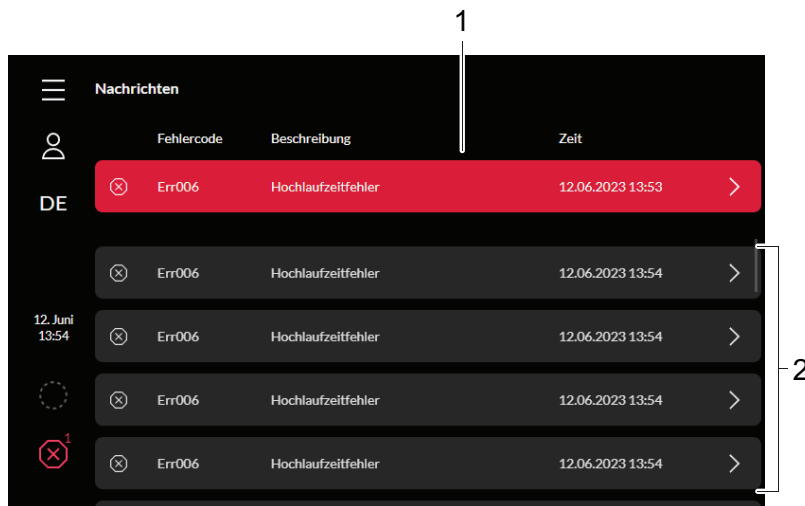


Fig. 72: Example of an error message in the Messages menu

- 1 Current error message
- 2 Error message history

12 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](#).

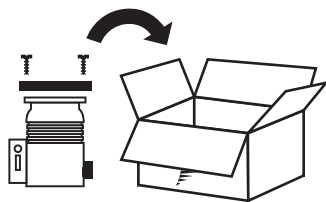


4. You will receive an acknowledgment from Pfeiffer Vacuum.

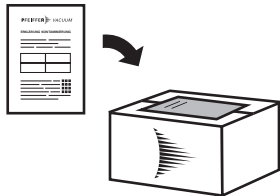
PFEIFFER VACUUM

Submission of contaminated products

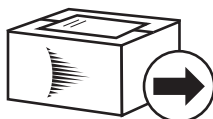
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



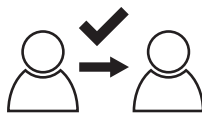
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package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

13 Accessories

**We recommend**

Please refer to the accessories list for the individual components in their respective operating instructions or online at [Accessories portfolio for hybrid bearing turbopumps](#).

14 Technical data and dimensions

14.1 General

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

i	Technical data Maximum values refer exclusively to the input as a single load.
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- Specifications according to PNEUROP committee PN5
- ISO 27892 2010: "Vacuum technology - Turbomolecular pumps - Measurement of rapid shutdown torque"
- ISO 21360 2012: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- ISO 21360 2018: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 4: Turbomolecular vacuum pumps"
- Ultimate pressure with test dome after 48 h bake out duration
- Gas throughput with water cooling; backing pump = rotary vane pump (10 m³/h)
- Cooling water consumption at maximum gas throughput, cooling water temperature 25 °C
- Integral leakage rate with 100 % helium concentration, 10 s measurement duration
- Sound pressure level at distance to vacuum pump = 1 m

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

1 Pa = 1 N/m²

Tbl. 21: Conversion table: Pressure units

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

Tbl. 22: Conversion table: Units for gas throughput

14.2 Technical data

14.3 Dimension drawings

HiCube Neo – desktop model

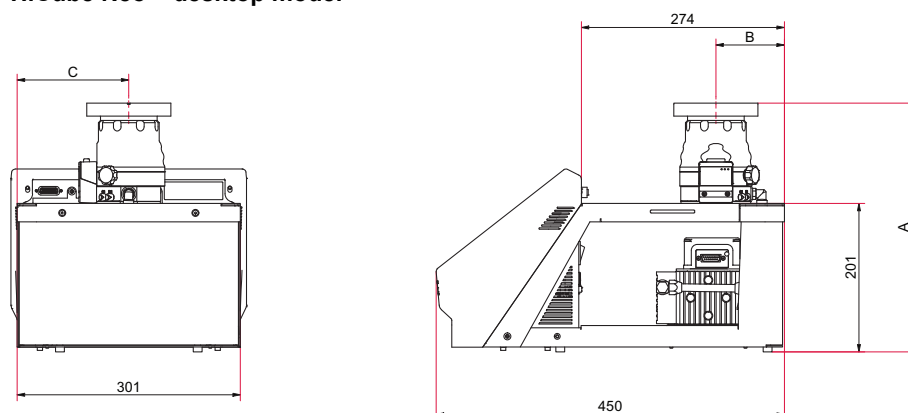


Fig. 73: Dimensions HiCube Neo – desktop model

Dimensions in mm

Dimensions	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Flange	ISO-KF	ISO-K	CF-F
A	775 millimeters	766 millimeters	772 millimeters
B	204 millimeters	204 millimeters	204 millimeters
C	172 millimeters	172 millimeters	172 millimeters

Tbl. 23: Dimensions HiCube 80 Neo

Dimensions	HiCube 300 Neo	HiCube 300 Neo
Flange	ISO-K	CF-F
A	832 millimeters	844 millimeters
B	235 millimeters	235 millimeters
C	175 millimeters	175 millimeters

Tbl. 24: Dimensions HiCube 300 Neo

Dimensions	HiCube 350 Neo	HiCube 350 Neo
Flange	ISO-K	CF-F
A	865 millimeters	865 millimeters
B	210 millimeters	210 millimeters
C	175 millimeters	175 millimeters

Tbl. 25: Dimensions HiCube 350 Neo

Dimensions	HiCube 450 Neo	HiCube 450 Neo
Flange	ISO-K	CF-F
A	624 millimeters	626 millimeters
B	210 millimeters	210 millimeters
C	175 millimeters	175 millimeters

Tbl. 26: Dimensions HiCube 450 Neo

Dimensions	HiCube 700 Neo	HiCube 700 Neo
Flange	ISO-K	CF-F
A	649 millimeters	661 millimeters
B	255 millimeters	255 millimeters
C	205 millimeters	205 millimeters

Tbl. 27: Dimensions HiCube 700 Neo

HiCube Neo – free-standing model

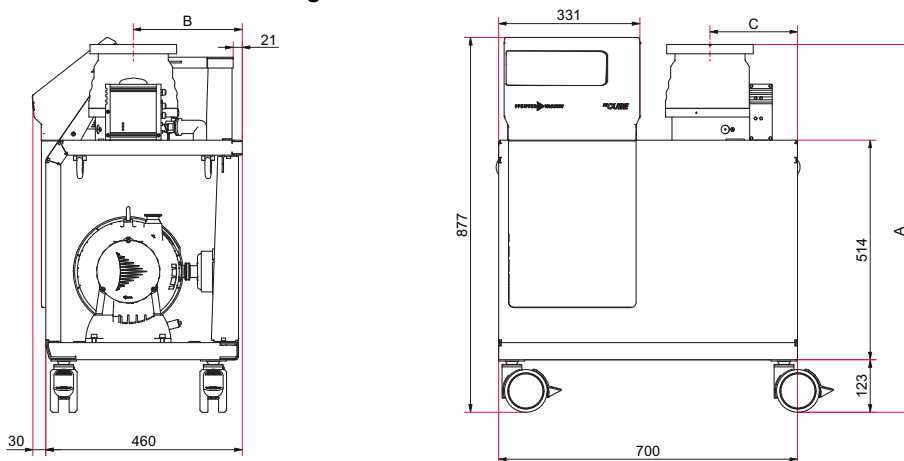


Fig. 74: Dimensions HiCube Neo – free-standing model

Dimensions in mm

Dimensions	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Flange	ISO-KF	ISO-K	CF-F
A	339 millimeters	330 millimeters	336 millimeters
B	93 millimeters	93 millimeters	93 millimeters
C	151 millimeters	151 millimeters	151 millimeters

Tbl. 28: Dimensions HiCube 80 Neo

Dimensions	HiCube 300 Neo	HiCube 300 Neo
Flange	ISO-K	CF-F
A	396 millimeters	408 millimeters
B	108 millimeters	108 millimeters
C	171 millimeters	171 millimeters

Tbl. 29: Dimensions HiCube 300 Neo

EC Declaration of Conformity

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

Declaration for product(s) of the type:

Turbo pumping station

HiCube 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 61010-1: 2011

DIN EN IEC 63000: 2019

DIN EN 62061: 2013

DIN EN 61326-1: 2013

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, 2023-06-16



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:

Turbo pumping station

HiCube 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:

EN ISO 12100:2010

EN 61010-1:2010

EN IEC 63000:2018

EN 62061:2005 + A1:2013

EN 61326-1:2013

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
35614 Asslar
Germany

Asslar, 2023-06-16

**UK
CA**



VACUUM SOLUTIONS FROM A SINGLE SOURCE

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

COMPLETE RANGE OF PRODUCTS

From a single component to complex systems:

We are the only supplier of vacuum technology that provides a complete product portfolio.

COMPETENCE IN THEORY AND PRACTICE

Benefit from our know-how and our portfolio of training opportunities!

We support you with your plant layout and provide first-class on-site service worldwide.

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

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