



# OPERATING INSTRUCTIONS

EN

Translation of the Original

## HICUBE NEO

Turbo pumping station

---

## 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](mailto:info@pfeiffer-vacuum.de).

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

## Disclaimer of liability

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

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

## Copyright

This document is the intellectual property of Pfeiffer Vacuum and all contents of this document are protected by copyright. They may not be copied, altered, reproduced or published without the prior written permission of Pfeiffer Vacuum.

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

# Table of contents

<b>1</b>	<b>About this manual</b>	<b>9</b>
1.1	Validity	9
1.1.1	Applicable documents	9
1.1.2	Variants	9
1.2	Target group	9
1.3	Conventions	9
1.3.1	Instructions in the text	9
1.3.2	Pictographs	10
1.3.3	Labels on product	10
1.3.4	Abbreviations	11
<b>2</b>	<b>Safety</b>	<b>13</b>
2.1	General safety information	13
2.2	Safety instructions	13
2.3	Safety precautions	15
2.4	Limits of use of product	16
2.5	Proper use	17
2.6	Foreseeable improper use	17
<b>3</b>	<b>Product description</b>	<b>18</b>
3.1	Function	18
3.1.1	Operating interface	18
3.1.2	Actuator	19
3.1.3	Cooling	19
3.2	Identifying the product	19
3.3	Product features	20
3.3.1	HiCube Neo desktop model combination options	20
3.3.2	HiCube Neo free-standing model combination options	21
3.4	Scope of delivery	22
<b>4</b>	<b>Transportation and Storage</b>	<b>23</b>
4.1	Transporting the pumping station	23
4.2	Store pumping station	24
<b>5</b>	<b>Installation</b>	<b>25</b>
5.1	Preparing for set-up	25
5.2	Setting up the pumping station	25
5.3	Anchor pumping station	26
5.4	Connecting the high vacuum side	27
5.4.1	Designing counter flange	27
5.4.2	Using splinter shield or protective screen	28
5.4.3	Using the vibration compensator	29
5.4.4	Connecting the turbopump externally	29
5.4.5	Installation of ISO-KF flange	29
5.4.6	Attaching ISO-K flange onto ISO-K	30
5.4.7	Attaching ISO-K flange to ISO-F	30
5.4.8	Attaching CF flange to CF-F	32
5.5	Connecting exhaust side	33
5.6	Filling up operating fluid	35
5.7	Connecting accessories	36
5.8	Connecting to mains power supply	38
<b>6</b>	<b>Interfaces and connections</b>	<b>39</b>
6.1	"Ethernet" (LAN) connector	39
6.2	Interface RS-485	40
6.3	Gauge/IO option	40
6.4	Connect to web interface	41

6.4.1	Connecting web interface via factory pre-set DHCP network configuration	41
6.4.2	Connecting web interface via factory pre-set static IP address	41
6.4.3	Connect web interface via user-defined IP address	42
6.5	Connecting to OPC UA Server	42
6.5.1	Connecting to OPC UA Server	42
6.5.2	Discovering IP address of HiCube Neo	42
6.5.3	Accessing HiCube Neo OPC UA server	42
<b>7</b>	<b>Operation</b>	<b>43</b>
7.1	Dashboard	43
7.2	Main menu	44
7.3	Submenus	45
7.4	Vacuum monitor	45
7.5	Switching pumping station on/off	47
7.6	Trends	48
7.6.1	Adding and editing trends	49
7.6.2	Viewing details of a trend	50
7.7	Device management	51
7.7.1	Adding new device	52
7.7.2	Editing and filtering detailed information	52
7.8	Help page	53
7.9	Messages	54
7.10	Settings	55
7.10.1	General settings	55
7.10.2	Network settings	56
7.10.3	Converting units	56
7.11	Updating firmware via the cloud	56
7.11.1	Uploading firmware to device	57
7.11.2	Update procedure	57
7.11.3	Finishing an update	57
<b>8</b>	<b>Maintenance</b>	<b>59</b>
8.1	General maintenance information	59
8.2	Maintenance intervals and responsibilities	59
8.3	Removing components for maintenance	59
8.4	Removing electrical connections	60
8.5	Installing/removing turbopump	61
8.5.1	Removing turbopump from desktop model	61
8.5.2	Removing turbopump from free-standing model	62
8.5.3	Installing turbopump in desktop model	63
8.5.4	Installing turbopump pump in free-standing model	64
8.6	Installing/removing backing pump	64
8.6.1	Removing backing pump from desktop model	64
8.6.2	Removing backing pump from free-standing model	65
8.6.3	Installing backing pump in desktop model	66
8.6.4	Installing backing pump in free-standing model	66
<b>9</b>	<b>Decommissioning</b>	<b>68</b>
9.1	Shut down for longer periods	68
9.2	Recommissioning	68
<b>10</b>	<b>Recycling and disposal</b>	<b>69</b>
10.1	General disposal information	69
10.2	Dispose of turbopumps	69
10.3	Disposing of rotary vane pump	69
10.4	Dispose of multi-stage roots pumps	69
10.5	Disposing of the scroll pump	70
10.6	Dispose of diaphragm pumps	70



<b>11</b>	<b>Malfunctions</b>	<b>71</b>
11.1	General	71
11.2	Troubleshooting	71
11.3	Malfunction messages	72
<b>12</b>	<b>Service solutions by Pfeiffer Vacuum</b>	<b>73</b>
<b>13</b>	<b>Accessories</b>	<b>75</b>
<b>14</b>	<b>Technical data and dimensions</b>	<b>76</b>
14.1	General	76
14.2	Technical data	76
	14.2.1 Technical data desktop unit	76
	14.2.2 Technical data free-standing model	77
14.3	Substances in contact with media	79
14.4	Dimensions	79
	<b>EC Declaration of Conformity</b>	<b>82</b>
	<b>UK Declaration of Conformity</b>	<b>83</b>

## List of tables

Tbl. 1:	Labels on product	10
Tbl. 2:	Abbreviations used in this document	12
Tbl. 3:	Limits of use of HiCube Neo	16
Tbl. 4:	Symbols and colors of the status and components icons	19
Tbl. 5:	HiCube Neo desktop model   Component combinations	20
Tbl. 6:	HiCube Neo desktop model   Accessories	20
Tbl. 7:	HiCube Neo free-standing model   Component combinations	21
Tbl. 8:	HiCube Neo free-standing model   Accessories	22
Tbl. 9:	Requirements for on-site high vacuum connection	28
Tbl. 10:	Requirements for on-site high vacuum connection	28
Tbl. 11:	Reduction of the pumping speed when using a splinter shield or protective screen	28
Tbl. 12:	Pre-set accessory connections to electronic drive unit TC 80 and TC 110	37
Tbl. 13:	Pre-set accessory connections to electronic drive unit TC 400	37
Tbl. 14:	Status of the Ethernet connection	40
Tbl. 15:	Features of the RS-485 interface	40
Tbl. 16:	Terminal layout of the RS-485 connecting socket M12	40
Tbl. 17:	Overview of all users	44
Tbl. 18:	Status information	46
Tbl. 19:	Pre-set accessory connections for TC 80 and TC 110	60
Tbl. 20:	Pre-set accessory connections for TC 400	60
Tbl. 21:	Tightening torque for fixation of turbopumps	61
Tbl. 22:	Troubleshooting	71
Tbl. 23:	Conversion table: Pressure units	76
Tbl. 24:	Conversion table: Units for gas throughput	76
Tbl. 25:	Technical data HiCube 80 Neo	77
Tbl. 26:	Technical data HiCube 300 Neo	77
Tbl. 27:	Technical data HiCube 80 Neo	78
Tbl. 28:	Technical data HiCube 300 Neo	78
Tbl. 29:	Technical data HiCube 450 Neo	78
Tbl. 30:	Technical data HiCube 800 Neo	79
Tbl. 31:	Materials that make contact with the process media	79
Tbl. 32:	Dimensions HiCube 80 Neo	79
Tbl. 33:	Dimensions HiCube 300 Neo	80
Tbl. 34:	Dimensions HiCube 80 Neo	80
Tbl. 35:	Dimensions HiCube 300 Neo	80
Tbl. 36:	Dimensions HiCube 350 Neo	80
Tbl. 37:	Dimensions HiCube 450 Neo	81
Tbl. 38:	Dimensions HiCube 700 Neo	81

# List of figures

Fig. 1:	Position of the stickers on the product – desktop model	11
Fig. 2:	Position of the stickers on the product – free-standing model	11
Fig. 3:	Product overview with combination examples – desktop model	18
Fig. 4:	Product overview with combination examples – free-standing model	18
Fig. 5:	Dashboard HiCube Neo	19
Fig. 6:	Transporting the pumping station without packaging – desktop model	23
Fig. 7:	Transporting the pumping station without packaging – free-standing model	24
Fig. 8:	Anchoring the desktop model	26
Fig. 9:	Anchoring the free-standing model	27
Fig. 10:	Flange connection ISO-KF to ISO-KF	29
Fig. 11:	Flange connection ISO-K to ISO-F, bracket screws	30
Fig. 12:	Flange connection ISO-K with ISO-F, hexagon head screw and tapped hole	30
Fig. 13:	Flange connection ISO-K with ISO-F, stud screw and tapped hole	31
Fig. 14:	Flange connection ISO-K with ISO-F, stud screw and through hole	31
Fig. 15:	Flange connection CF-F, hexagon head screw and through hole	32
Fig. 16:	Flange connection CF-F, stud screw and tapped hole	32
Fig. 17:	Flange connection CF-F, stud screw and through hole	33
Fig. 18:	Example of an MVP exhaust connection	34
Fig. 19:	Example of a HiScroll exhaust connection	34
Fig. 20:	Filling up with operating fluid – example SmartVane	36
Fig. 21:	Connecting accessory devices for TC 80 and TC 110	37
Fig. 22:	Connecting accessory devices for TC 400	37
Fig. 23:	Connecting to mains power supply	38
Fig. 24:	Overview of all interfaces and connectors	39
Fig. 25:	"Ethernet" (LAN) connector	39
Fig. 26:	Gauge/IO option	41
Fig. 27:	Dashboard HiCube Neo	43
Fig. 28:	Overview of all users	44
Fig. 29:	Main menu for HiCube Neo	44
Fig. 30:	Submenu HiCube Neo settings	45
Fig. 31:	Calling up the Info panel	45
Fig. 32:	Vacuum monitor Info panel	46
Fig. 33:	Parameters in the vacuum monitor	46
Fig. 34:	Start pumping station	47
Fig. 35:	Stop pumping station	48
Fig. 36:	Trend overview page HiCube Neo	48
Fig. 37:	Adding new trends	49
Fig. 38:	Deleting trends	49
Fig. 39:	Viewing details of a trend	50
Fig. 40:	Viewing detailed value	50
Fig. 41:	Device overview screen	51
Fig. 42:	Tile overview	51
Fig. 43:	Entering information	52
Fig. 44:	Adding new device	52
Fig. 45:	Parameter list of a device	52
Fig. 46:	Viewing and editing detailed information	53
Fig. 47:	Filtering parameter list by Pfeiffer Vacuum code/name	53
Fig. 48:	HiCube Neo help page	54
Fig. 49:	HiCube Neo logs	54
Fig. 50:	Overview of all messages	54
Fig. 51:	View detailed information of a message	55
Fig. 52:	General settings	55
Fig. 53:	Change IP address	56
Fig. 54:	Overview of units	56
Fig. 55:	Uploading firmware to device	57
Fig. 56:	Update procedure	57

Fig. 57:	Finishing an update	57
Fig. 58:	Removing electrical connections	60
Fig. 59:	Detaching upper casing – desktop model	61
Fig. 60:	Removing turbopump – desktop model	62
Fig. 61:	Removing turbopump – free-standing model	62
Fig. 62:	Installing turbopump – desktop model	63
Fig. 63:	Installing upper casing – desktop model	63
Fig. 64:	Installing turbopump – free-standing model	64
Fig. 65:	Removing backing pump – desktop model	65
Fig. 66:	Removing backing pump example – HiScroll	65
Fig. 67:	Installing backing pump – desktop model	66
Fig. 68:	Installing backing pump example – HiScroll	67
Fig. 69:	Example of an error message on the dashboard	72
Fig. 70:	Example of an error message in the Messages menu	72
Fig. 71:	Dimensions HiCube Neo – desktop model	79
Fig. 72:	Dimensions HiCube Neo – free-standing model	80

# 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 Neo	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 350 Neo
- HiCube 400 Neo
- HiCube 450 Neo
- HiCube 700 Neo
- HiCube 800 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.







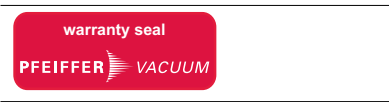
Note



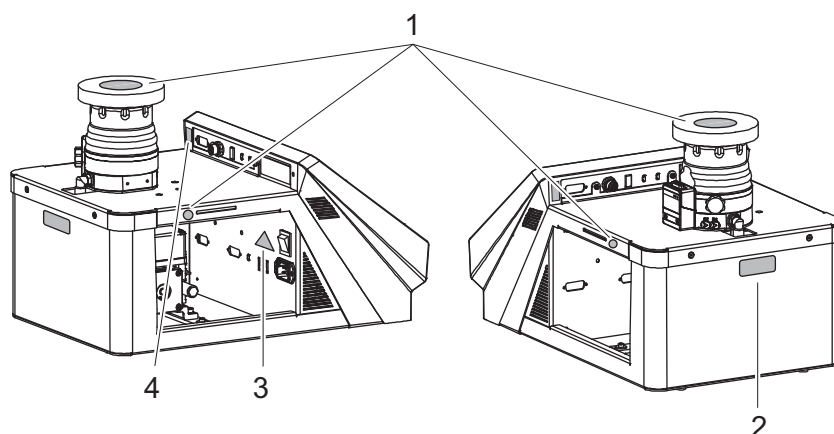
Tip

1.3.3 Labels on product

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

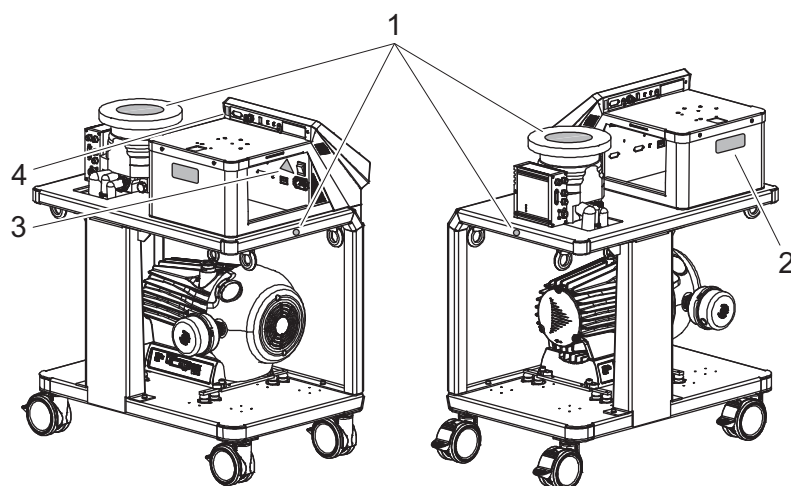
	<p><b>Rating plate (example)</b></p> <p>The rating plate is located on the back of the pumping station housing.</p>
	<p><b>Protection class</b></p> <p>The sticker describes protection class 1 for the product. The positioning indicates the position for the ground connection.</p>
	<p><b>Electrical voltage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

Tbl. 1: Labels on product



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

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



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

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

### 1.3.4 Abbreviations

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

Abbreviation	Meaning in this document
<b>RS-485</b>	Standard for a physical interface for asynchronous serial data transmission (Recommended Standard)
<b>T</b>	Temperature (in °C)
<b>TC</b>	Turbopump electronic drive unit (turbo controller)
<b>USB</b>	Universal Serial Bus
<b>VV</b>	Fore-vacuum flange, fore-vacuum connection

**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

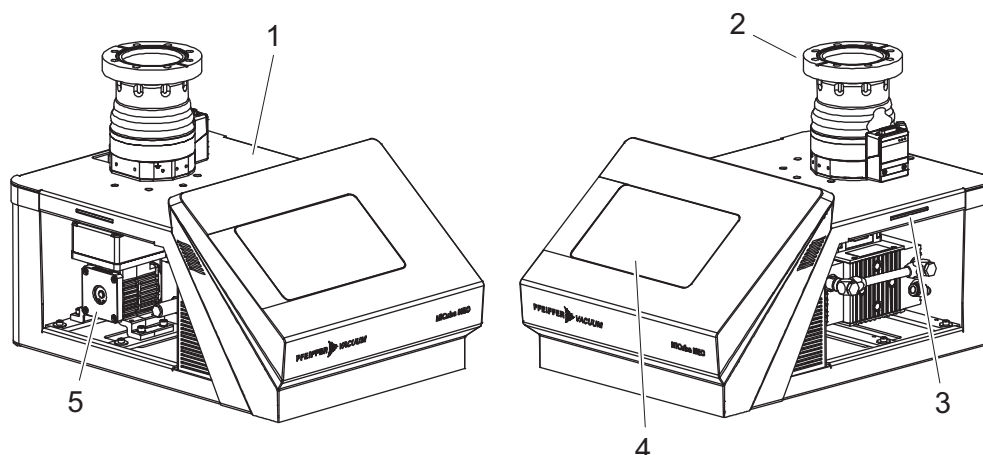
Improper use of the product invalidates all warranty and liability claims. Any use that is counter to the purpose of the product, whether intentional or unintentional, is regarded as improper use; in particular:

- 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

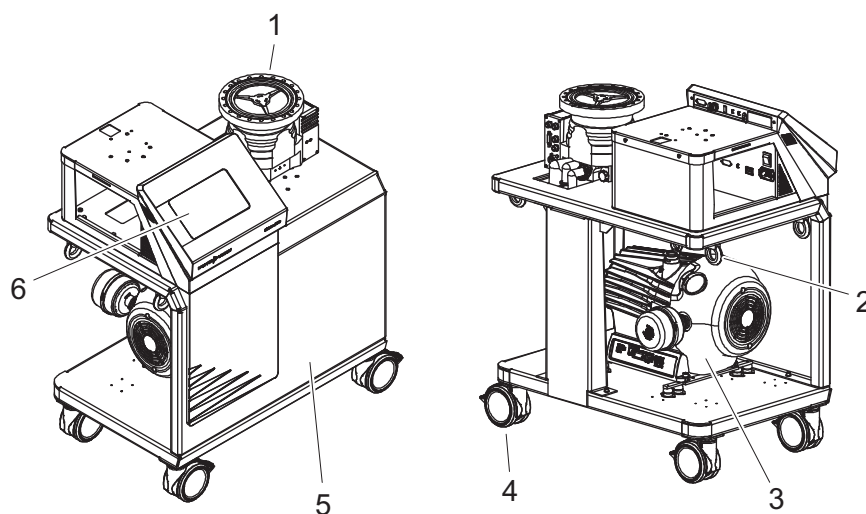
### 3.1 Function

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, 2× |                    |



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

- |                |                    |
|----------------|--------------------|
| 1 Turbopump    | 4 Castors, 4×      |
| 2 Eye bolt, 4× | 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.

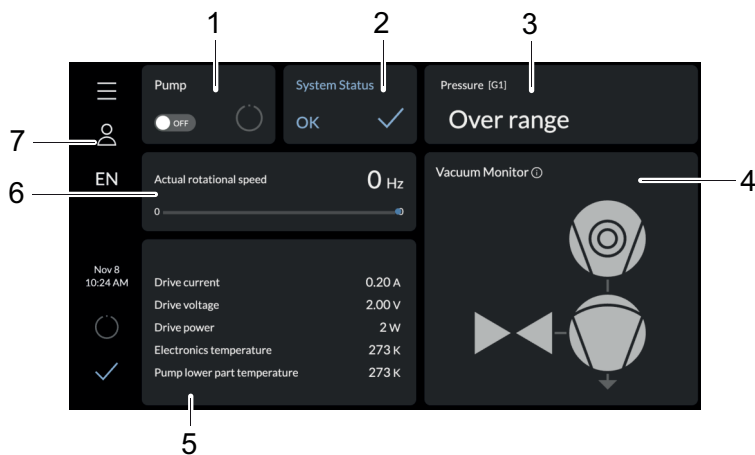


Fig. 5: Dashboard HiCube Neo

- |                                      |                                   |
|--------------------------------------|-----------------------------------|
| 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	green	Operating status reached
	dark green	Operating status not yet reached
	gray	Operating status reached
	dark gray	Operating status not yet reached
	violet	Operating status reached
	dark violet	Operating status not yet reached
	turquoise	Operating status reached
	dark turquoise	Operating status not yet reached
Checkmark on status icon		Stable status, no warnings or errors present
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 Actuator

- Turbopump electronic drive unit
- Backing pump electronic drive unit

Please refer to the applicable operating instructions for the specifications of the individual components (see chapter “Product features”, page 20).

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](http://www.certipedia.com) with company ID no. 000021320.

### 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 <sup>1)</sup> PT 0739 BN <sup>2)</sup>
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 <sup>3)</sup> PT 0744 BN <sup>4)</sup>
Gauge I/O	optional	PT 0687 BN
Venting valve	optional	PT 0771 BN <sup>5)</sup> PT 0228 BN
Housing heater <sup>6)</sup>	Optional, with CF flange only	PT 0233 BN

**Tbl. 6: HiCube Neo desktop model | Accessories**

- 1) For HiPace 300
- 2) For HiPace 80 Neo
- 3) For HiPace 80 Neo
- 4) For HiPace 300
- 5) For 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 <sup>7)</sup> PT 0739 BN <sup>8)</sup>
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: Multi-stage roots pump	ACP 15				128853 BN
	ACP 28 ACP 40				128852 BN
	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 <sup>9)</sup> PT 0745 BN <sup>10)</sup>
Gauge I/O	optional				PT 0687 BN
Venting valve	optional				PT 0771 BN <sup>11)</sup> PT 0228 BN <sup>12)</sup>

7) For HiPace 300 - 800

8) For HiPace 80 Neo

9) For HiPace 80 Neo

10) For HiPace 350 | HiPace 450

11) For HiPace 80 Neo

12) For HiPace 300 - 800

Feature	HiCube Neo free-standing model	BA
Fore-vacuum safety valve	optional	PM 0263 BN
Housing heater <sup>13)</sup>	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 filling hose <sup>14)</sup>
- Operating instructions for turbo pumping station
- Operating instructions for vacuum pump

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.



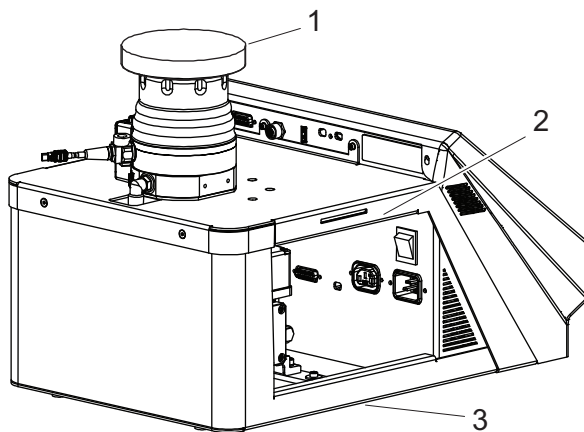
#### **Packing**

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    |        |

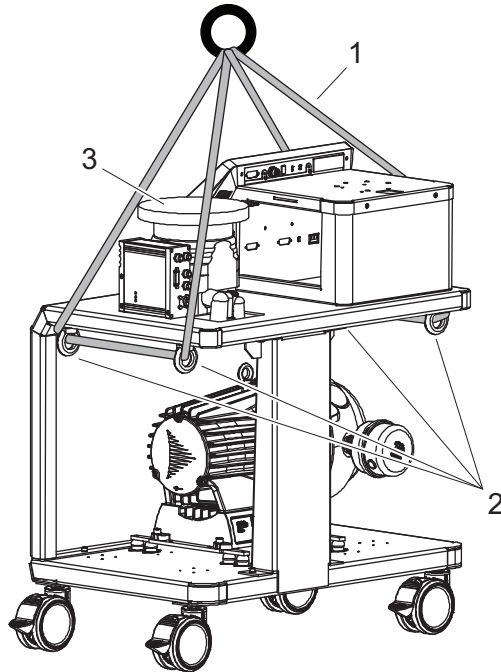
#### **Transporting the pumping station without packaging – desktop model**

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.



#### **Anchor pumping station**

The operator is responsible for anchoring.

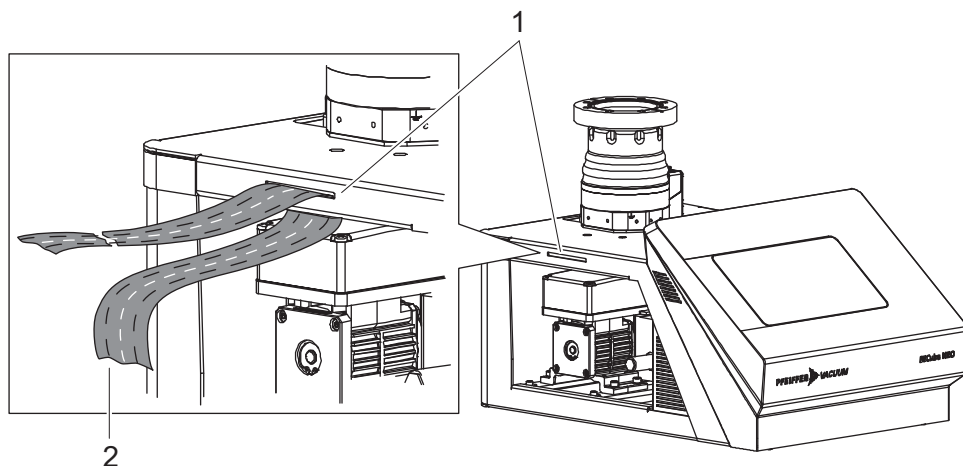
- Make sure that the operator-installed pumping station housing fixation absorbs the torque that occurs in case the turbopump rotor blocks suddenly.

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

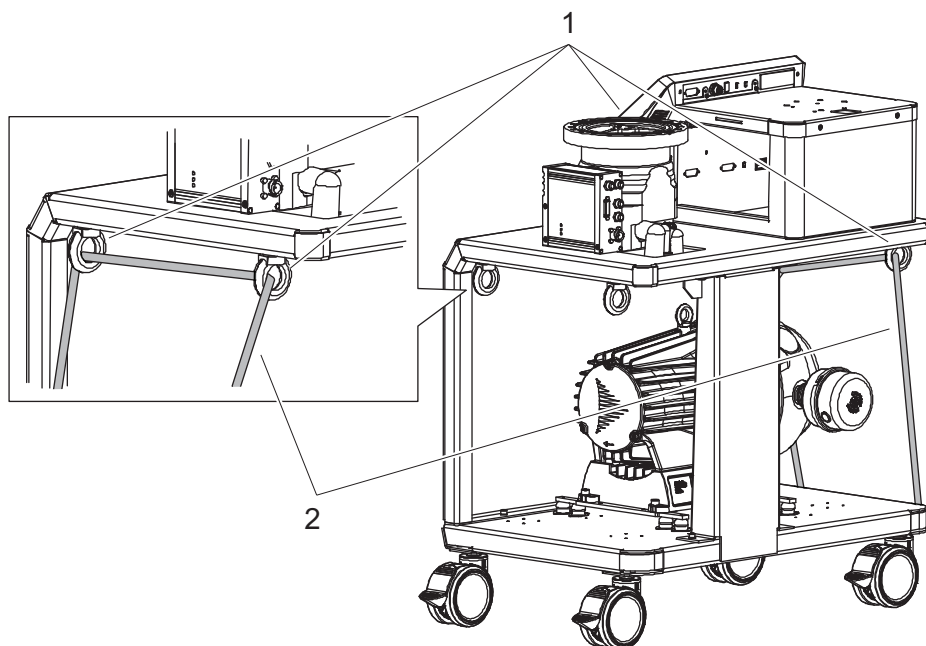
##### **Anchoring the desktop model**

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 <sup>15)</sup>	Magnetic field <sup>16)</sup>	Heat input <sup>17)</sup>
HiCube 80 Neo	620 Nm	3.1 mT	0.9 W
HiCube 300 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 800 Neo	4200 Nm	6 mT	4.2 W

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

Turbo pumping station	Superstructural parts <sup>18)</sup>	Flatness	Tensile strength <sup>19)</sup>	Screw in depth <sup>20)</sup>
HiCube Neo <sup>21)</sup>	50 kg	± 0.05 mm	170 N/mm <sup>2</sup>	2.5 x d

**Tbl. 10: 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 <sub>2</sub>	He	N <sub>2</sub>	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. 11: 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) Maximum permissible magnetic field surrounding pumping station

17) Maximum permissible heat absorption in pumping station

18) Permissible total weight of superstructural parts on the pumping station

19) Tensile strength of counter flange material in all operating conditions, according to screw in depth

20) Screw in depth of fixing screws in counter flange

21) All sizes



### 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



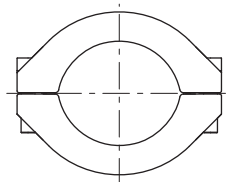
#### **ISO flange connections**

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  $\leq 1.6$ )



**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  $\leq 1.6$ )

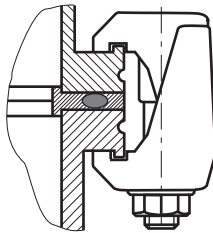


Fig. 11: Flange connection ISO-K to ISO-F, bracket screws

##### 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  $\pm$  2 Nm**

#### 5.4.7 Attaching ISO-K flange to ISO-F

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

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



##### 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

- Hexagon wrench (13 WAF)
- Calibrated torque wrench (tightening factor  $\leq 1.6$ )

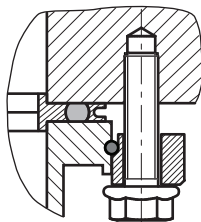
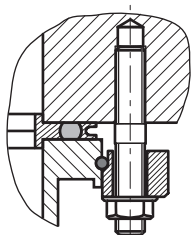


Fig. 12: Flange connection ISO-K with ISO-F, hexagon head screw and tapped hole

### Connection of the hexagon head screw and tapped hole

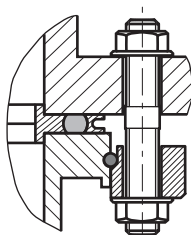
1. Only use approved mounting kits by Pfeiffer Vacuum for the connection.
2. Place the collar flange over the high vacuum flange of the turbopump.
3. Insert the snap ring in the side groove on the high vacuum flange of the turbopump.
4. Attach the turbopump with collar flange, snap ring and centering ring to the counter flange according to the figure.
5. Use all prescribed components for the turbopump.
6. Screw the hexagon head screws into the tapped holes.
  - Observe the minimum tensile strength of the flange material and the screw depth.
7. Fasten the hexagon head screws cross-wise in 3 steps.
  - Tightening torque:
    - HiPace 80 - 300 (H): **5, 10, 16 Nm**
    - Starting with HiPace 350: **5, 15, 25 Nm**



**Fig. 13: Flange connection ISO-K with ISO-F, stud screw and tapped hole**

### Connection of the stud screw and tapped hole

1. Only use approved mounting kits by Pfeiffer Vacuum for the connection.
2. Screw in the required number of stud screws with the shorter end in the holes on the counter flange.
  - Observe the minimum tensile strength of the flange material and the screw depth.
3. Place the collar flange over the high vacuum flange of the turbopump.
4. Insert the snap ring in the side groove on the high vacuum flange of the turbopump.
5. Attach the turbopump with collar flange, snap ring and centering ring to the counter flange according to the figure.
6. Use all prescribed components for the turbopump.
7. Secure the nuts cross-wise in 3 steps.
  - Tightening torque:
    - HiPace 80 - 300 (H): **5, 10, 16 Nm**
    - Starting with HiPace 350: **5, 15, 25 Nm**



**Fig. 14: Flange connection ISO-K with ISO-F, stud screw and through hole**

### Connection of the stud screw and through hole

1. Only use approved mounting kits by Pfeiffer Vacuum for the connection.
2. Place the collar flange over the high vacuum flange of the turbopump.
3. Insert the snap ring in the side groove on the high vacuum flange of the turbopump.
4. Attach the turbopump with collar flange, snap ring and centering ring to the counter flange according to the figure.
5. Use all prescribed components for the turbopump.
6. Tighten the nuts cross-wise in 3 steps.
7. Tightening torque:
  - HiPace 80 - 300 (H): **5, 10, 16 Nm**
  - Starting with HiPace 350: **5, 15, 25 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  $\leq 1.6$ )

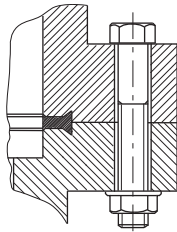


Fig. 15: Flange connection CF-F, hexagon head screw and through hole

#### 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:  **$22 \pm 2 \text{ Nm}$**
6. Then check the torque, since flowing of the sealing material may make it necessary to re-tighten the screws.

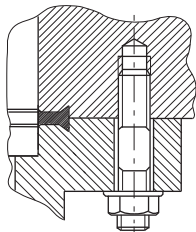
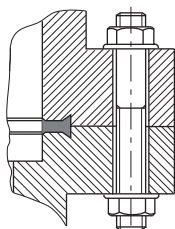


Fig. 16: Flange connection CF-F, stud screw and tapped hole

#### 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:  **$22 \pm 2 \text{ Nm}$**
7. Then check the torque, since flowing of the sealing material may make it necessary to re-tighten the screws.



**Fig. 17: 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:  **$22 \pm 2 \text{ Nm}$**
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.

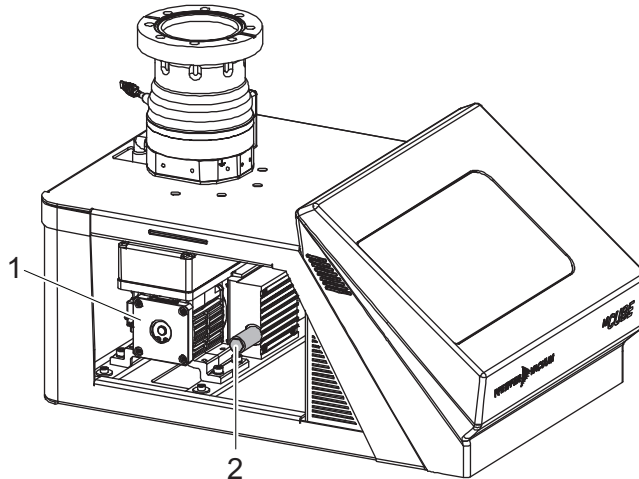
- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.



#### **Condensate separator**

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

### HiCube Neo – desktop model



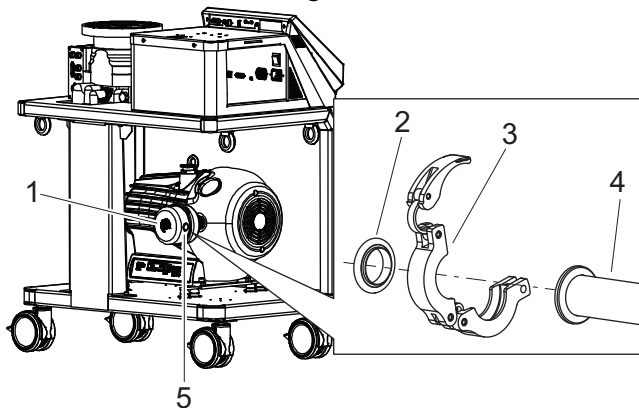
**Fig. 18: Example of an MVP exhaust connection**

- |                  |   |
|------------------|---|
| 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. If needed, unscrew the exhaust silencer from the backing pump.
3. Route the piping downwards from the vacuum pump, to prevent condensate return.

### HiCube Neo – free-standing model



**Fig. 19: Example of a HiScroll exhaust connection**

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

### 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



### Use of operating fluids

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

### 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.

- 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.
- The dry-compressing diaphragm 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 operating fluid type on rating plate

- ▶ Please refer to rating plate of the backing pump for the type and quantity of the intended operating fluid.

#### Required consumables

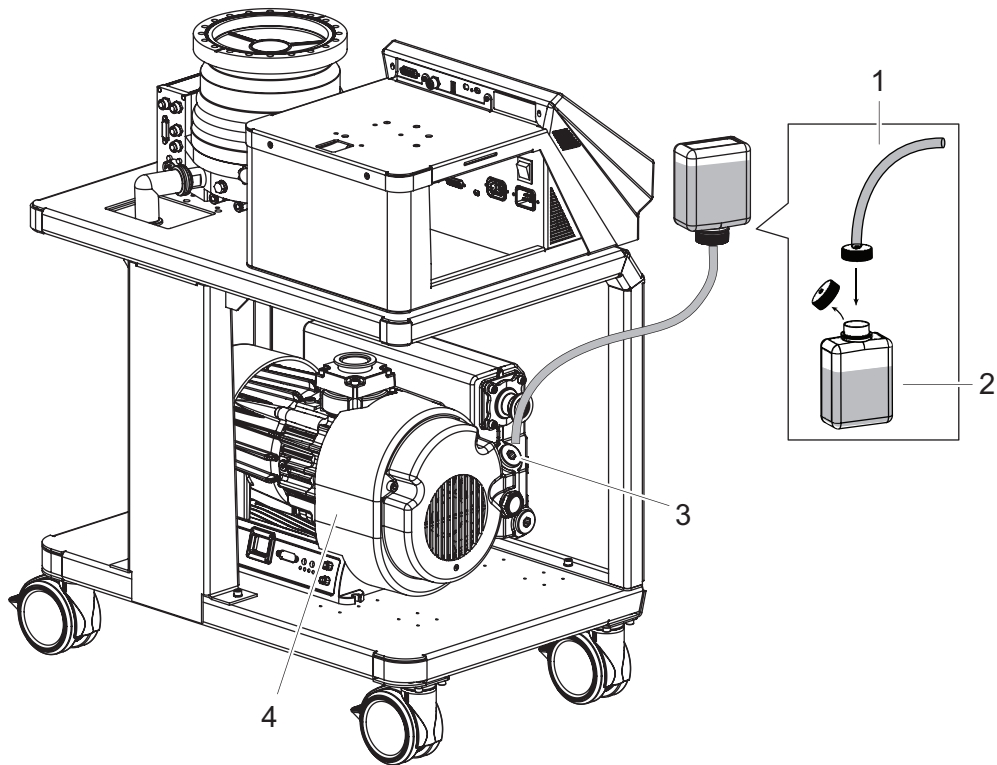
- Operating fluid

#### Required tools

- Allen key
- Hexagon socket torque wrench

#### Required aids

- Filling hose



**Fig. 20: Filling up with operating fluid – example SmartVane**

- |                          |                          |
|--------------------------|--------------------------|
| 1 Filling Hose           | 3 Filler screw with seal |
| 2 Operating Fluid Bottle | 4 Rotary vane pump       |

#### 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

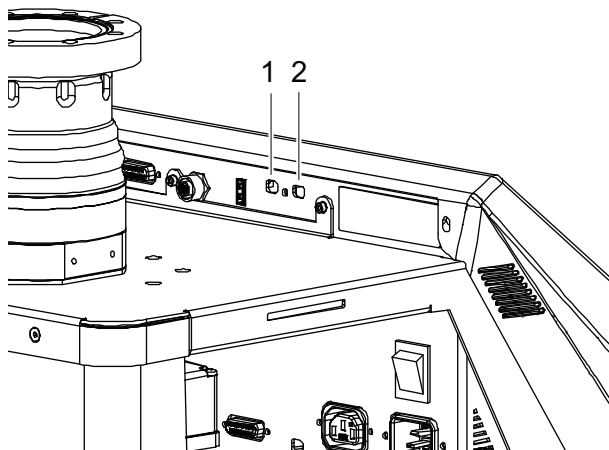


#### Installation and operation of accessories

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**

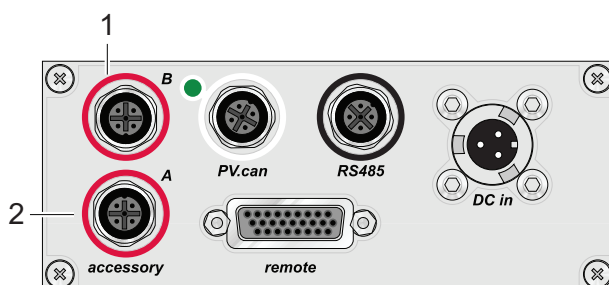
- 1 AccessLink socket "accessory B1"      2 AccessLink socket "accessory A1"

#### 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. 12: 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. 13: 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.

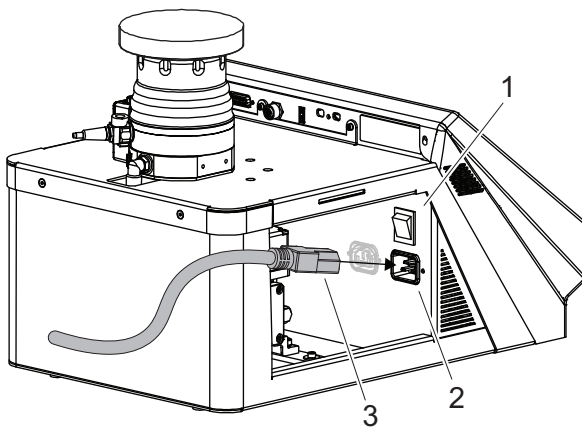
- ▶ Ensure safe integration into an emergency off safety circuit.
- ▶ Do not carry out your own conversions or modifications on the unit.

### **⚠ 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**

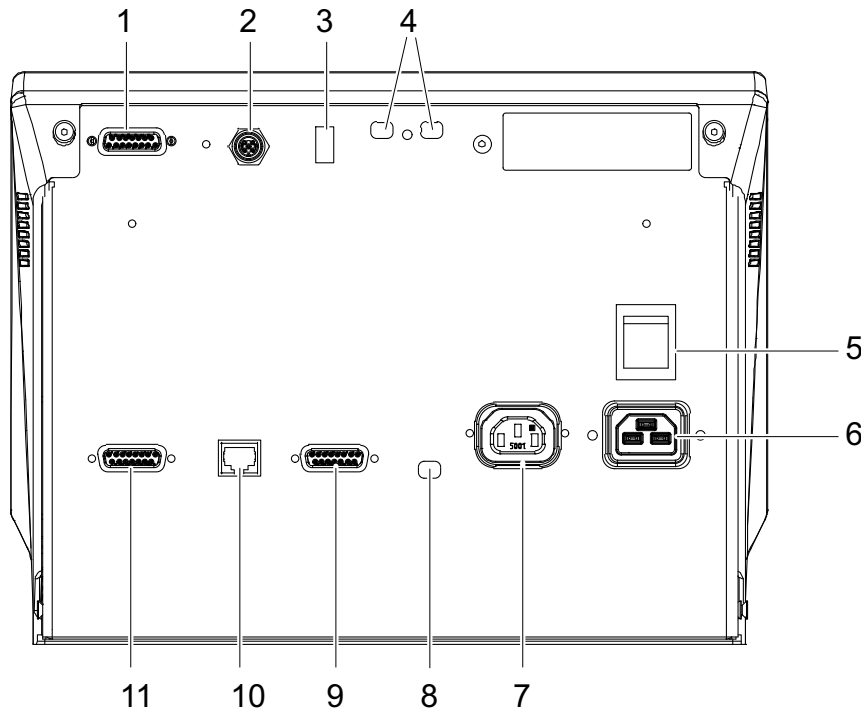
- |                     |                      |
|---------------------|----------------------|
| 1 Main switch       | 3 Power supply cable |
| 2 Power supply plug |                      |

#### **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.

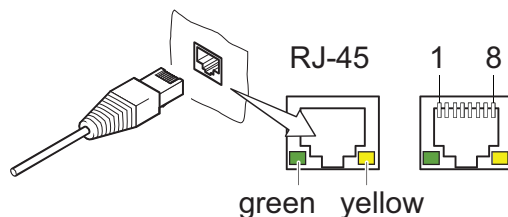


**Fig. 24: Overview of all interfaces and connectors**

- |   |  |
|---|--|
| 1 <b>Desktop model:</b> 15-pin D-Sub socket (IO, voltage supply, control signals for the turbopump) | 7 AC backing pump supply   |
| 2 RS-485 (DigiLine/pressure load cell connector)  | 8 VV safety valve  |
| 3 USB (type A) for service purposes   | 9 <b>Desktop model:</b> 15-pin D-Sub socket (IO, voltage supply DC, control signals for the backing pump)        |
| 4 AccessLink for fan and/or venting valve, turbopump  | <b>Free-standing model:</b> 15-pin D-Sub socket (IO, voltage supply, control signals for the turbopump)          |
| 5 Main switch   | 10 Ethernet (LAN)  |
| 6 Mains connection (IEC 60320 C20)  | 11 <b>Free-standing model:</b> 15-pin D-Sub socket (IO, voltage supply DC, control signals for the backing pump) |

### 6.1 "Ethernet" (LAN) connector

The "Ethernet" connector enables direct communication with the unit via a computer in addition to standard control via the display.



**Fig. 25: "Ethernet" (LAN) connector**

- |                   |                   |
|-------------------|-------------------|
| 1 Data line (D1+) | 5 Data line (D3+) |
| 2 Data line (D1-) | 6 Data line (D3-) |
| 3 Data line (D2+) | 7 Data line (D4+) |
| 4 Data line (D2-) | 8 Data line (D4-) |

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. 14: Status of the Ethernet connection

## 6.2 Interface RS-485

### DANGER

#### Danger to life from electric shock

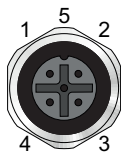
When establishing the voltages that exceed the specified safety extra-low voltage (according to IEC 60449 and VDE 0100), the insulating measures will be destroyed. There is a danger to life from electric shock at the communication interfaces.

- 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. 15: Features of the RS-485 interface

	Pin	Assignment
	1	RS-485 D+
	2	+24 V output, ≤ 350 mA loading capacity
	3	GND
	4	RS-485 D-
	5	not connected

Tbl. 16: Terminal layout of the RS-485 connecting socket M12

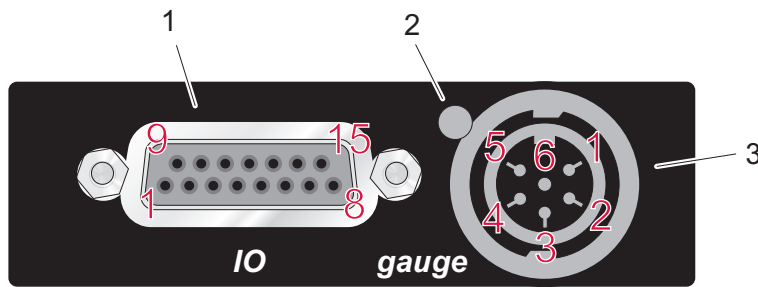
## 6.3 Gauge/IO option



### Pressure measurement with the HiCube Neo

The HiCube Neo offers a precise pressure display for an existing gauge/IO function.

The option designated "gauge/IO" on the HiCube Neo is intended for connecting a Pfeiffer Vacuum pressure gauge. The connections of the HiCube Neo integrated power supply pack possess galvanically safe isolation from the maximum supply voltage occurring for the HiCube Neo.



**Fig. 26: Gauge/IO option**

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

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

## 6.4 Connect to web interface

### Connecting operating unit with web interface

- ▶ Connect the operating unit (e.g., laptop or PC) to the same network as the HiCube Neo.
- ▶ If needed, open a connection to a computer using Remote Desktop to access the same network as the HiCube Neo.
  - The web interface runs on the Remote Desktop computer.

### Default network settings for the HiCube Neo

- DHCP
- DHCP fallback
- The HiCube Neo falls back to its static IP address if the connected network does not have a DHCP server (router).
- Default IP address: 192.168.1.100
- You can configure the static IP address for static network operation and/or for DHCP fallback.

### 6.4.1 Connecting web interface via factory pre-set DHCP network configuration

#### Prerequisites

- Operating unit and HiCube Neo connected to the same network
- Network has a router or DHCP server
- DHCP server on the network has automatically assigned IP addresses to the operating unit and HiCube Neo

#### Options for discovering the IP address assigned to the HiCube Neo

- Read off the IP address from the Help page on the display.
- View the network devices on the router.
- Perform a network scan with the operating unit.

#### Procedure

1. Type the IP address determined for the HiCube Neo into the browser address bar.
2. Press Enter.
  - The browser connects to the HiCube Neo and the Dashboard appears.

### 6.4.2 Connecting web interface via factory pre-set static IP address



#### DHCP server not found on the network

- The HiCube Neo falls back to its pre-set IP address if DHCP is enabled there, but the HiCube Neo cannot find a DHCP server on the network.
- Default IP address: 192.168.1.100

#### Prerequisites

- Operating unit and HiCube Neo connected to the same network, e.g., via a direct connection
- Network does not have a router or DHCP server
- Operating unit configured with an IP address on the same network as the HiCube Neo (e.g., 192.168.1.101)

#### Procedure

- ▶ Type the default IP address of the HiCube Neo in the browser address bar.
- ▶ Press Enter.
  - The browser connects to the HiCube Neo and the Dashboard appears.

### 6.4.3 Connect web interface via user-defined IP address



#### Unknown IP address

If you have changed the IP address and lost the new IP address, please contact Pfeiffer Vacuum.

#### Procedure

1. Type the user-defined IP address of the HiCube Neo into the browser address bar.
2. Press Enter.
  - The browser connects to the HiCube Neo and the Dashboard appears.

## 6.5 Connecting to OPC UA Server



#### Access to OPC UA server not protected

The HiCube Neo OPC UA server is freely accessible on the network. Access to the HiCube Neo OPC UA server is not protected by a password or similar authentication procedure.

The HiCube Neo has an OPC UA interface for calling up and managing system parameters. The OPC UA Server is accessible on the IP address of the HiCube Neo and the OPC UA default port 4840.

### 6.5.1 Connecting to OPC UA Server

#### Procedure

- ▶ Open a connection to the OPC UA server using the following connection URL: `opc.tcp://<ip>:<port>`

### 6.5.2 Discovering IP address of HiCube Neo

#### Procedure

- ▶ Read off the IP address from the Help page on the display.
  - Note the network settings, DHCP or static IP address.

If you are using the static default IP address, **192.168.1.100**, the URL for the connection is as follows:

`opc.tcp://192.168.1.100:4840`

### 6.5.3 Accessing HiCube Neo OPC UA server

#### Procedure

- ▶ Use an OPC UA client to access the HiCube Neo OPC UA server.
  - Alternatively, use a unit with OPC UA functionality, e.g., a programmable logic controller.

## 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:

- Operating status of the connected vacuum pump
- System status
- Pressure (if the gauge is connected)
- Status of the components in operation/during shutdown
- Parameter list
- Actual rotation speed

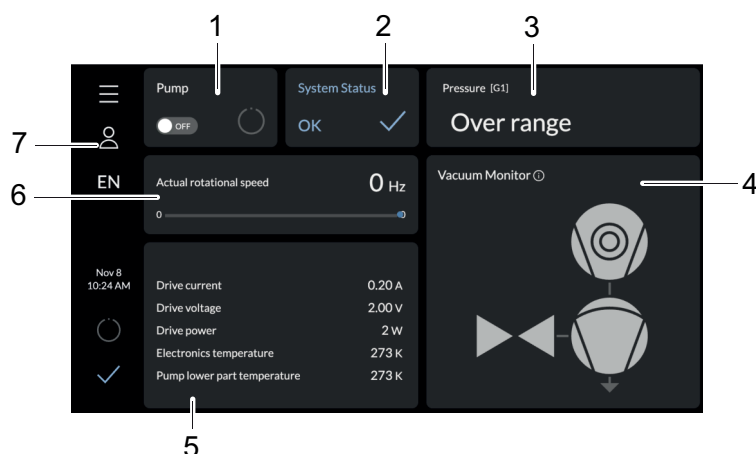


Fig. 27: Dashboard HiCube Neo

- |                                      |                         |
|--------------------------------------|-------------------------|
| 1 Display for pumping station (pump) | 5 Parameter list        |
| 2 System status                      | 6 Actual rotation speed |
| 3 Pressure display (pressure)        | 7 User maintenance      |
| 4 Vacuum diagram (vacuum monitor)    |                         |

#### User maintenance

To log in as a *User*, enter the **password 1255**.

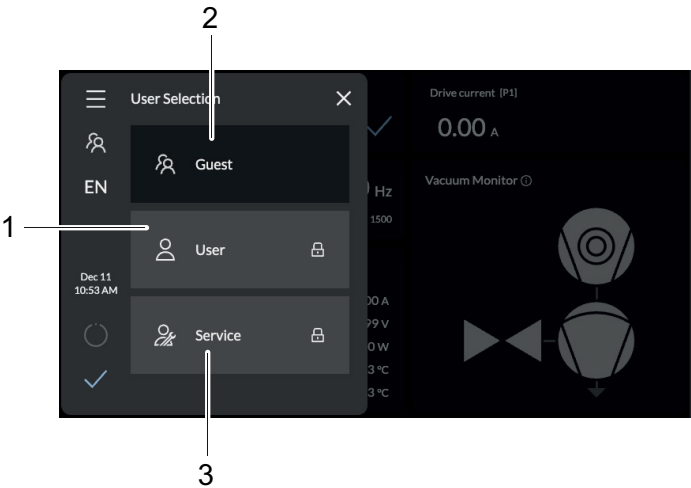


Fig. 28: Overview of all users

- 1 User
- 2 Guest
- 3 Service user

	Operation via screen		Operation via Webinterface	
	read only	write data	read only	write data
Guest	x	- on/off the pumping station only	x	-
User (password: 1255)	x	x	x	x
Service	Pfeiffer Service only			

Tbl. 17: Overview of all users

7.2 Main menu

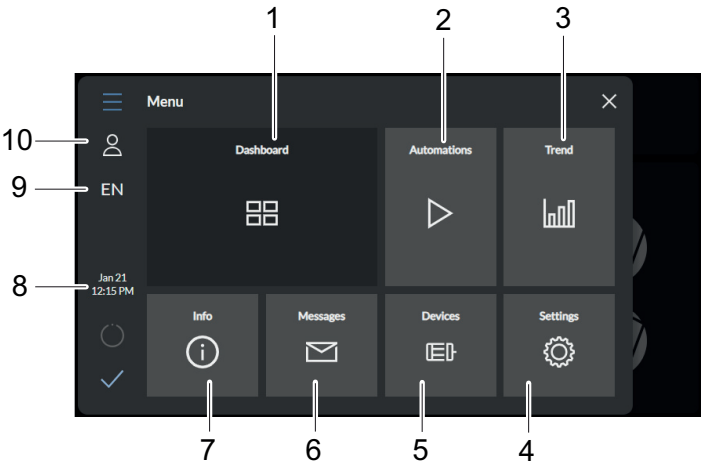


Fig. 29: Main menu for HiCube Neo

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

Navigating to other items from main menu

- Navigate from the main menu to:
- Dashboard
  - Automations menu
  - Trend menu



- Info page
- Messages overview
- Device management
- Settings.

## 7.3 Submenus



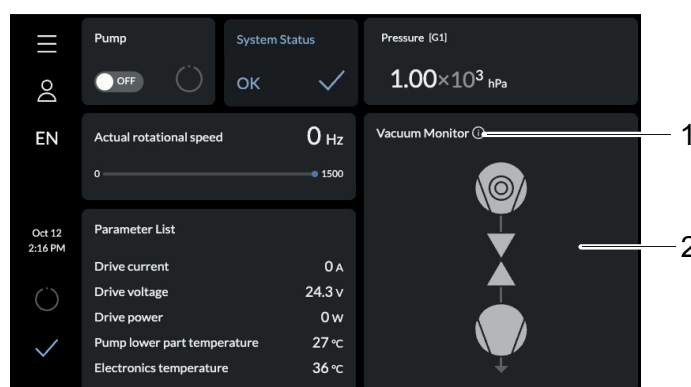
**Fig. 30: Submenu HiCube Neo settings**

1 General                      2 Update

### Calling up submenu

- Tap on the desired submenu to call up the matching menu item.

## 7.4 Vacuum monitor



**Fig. 31: Calling up the Info panel**

1 Calling up the Info panel                      2 Vacuum monitor

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

### Calling up the Info panel

- Tap **i** to call up the Info panel of the vacuum monitor.

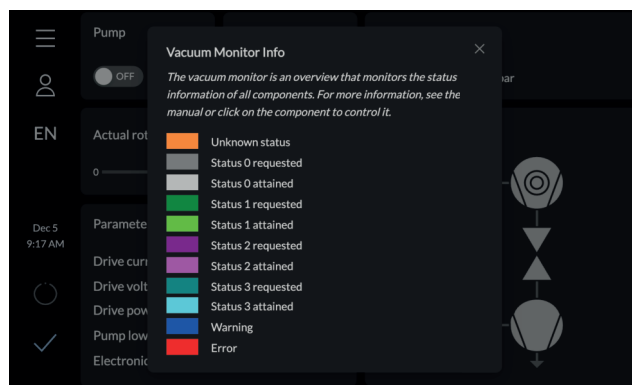


Fig. 32: Vacuum monitor Info panel

### Accessing individual components

- Access the individual components directly by tapping on the components in the vacuum monitor.

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

Tbl. 18: Status information

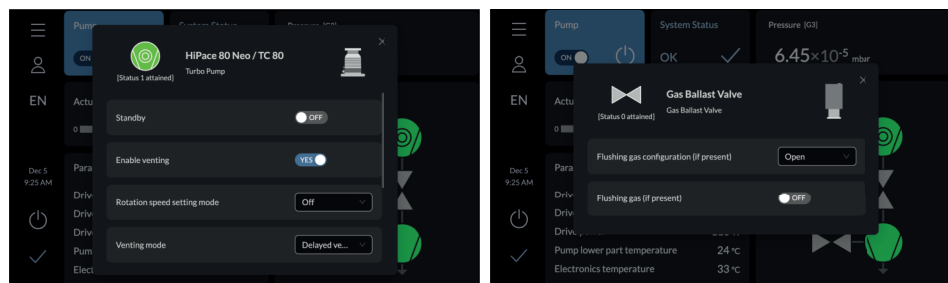


Fig. 33: Parameters in the vacuum monitor

### Navigating to parameters

- Tap on the individual components in the vacuum monitor to navigate to the parameters of a unit on the dashboard.

## 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**

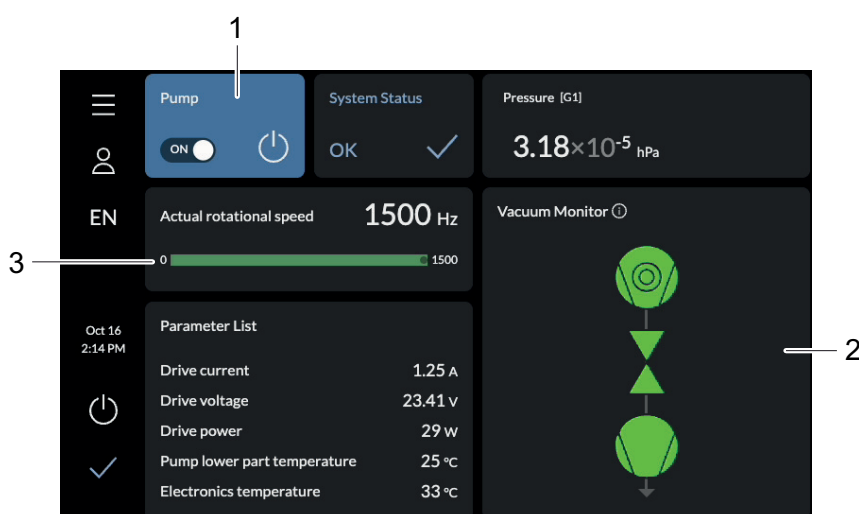
#### **Risk of damage due to incorrect counter flange design**

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**

- Vacuum chamber connected on the HV side

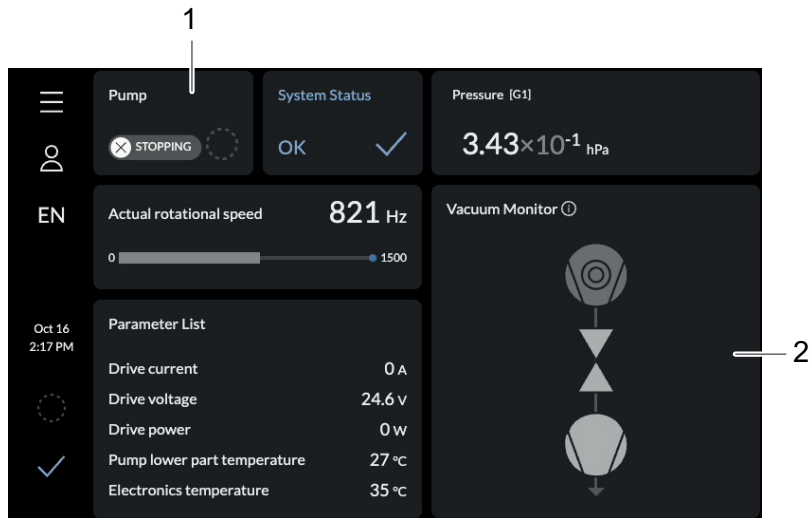


**Fig. 34: Start pumping station**

- 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.



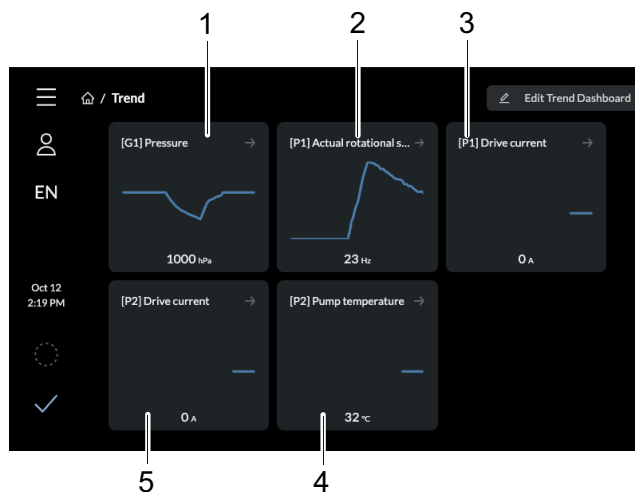
**Fig. 35: Stop pumping station**

- 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



**Fig. 36: Trend overview page HiCube Neo**

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

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

### Trend overview

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

## Device overview

P1	Turbopump	G1	Gauges
P2	Backing pump		

### 7.6.1 Adding and editing trends

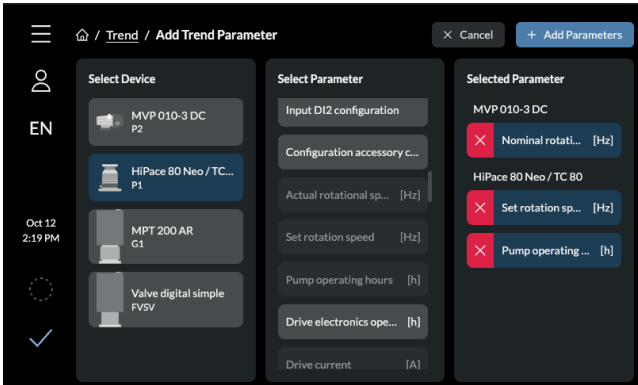


Fig. 37: Adding new trends

#### Adding new trends

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

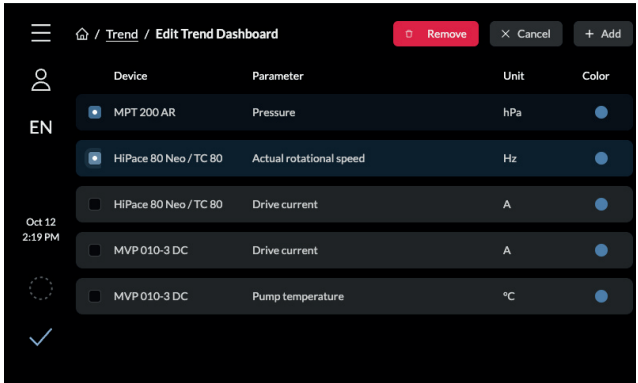
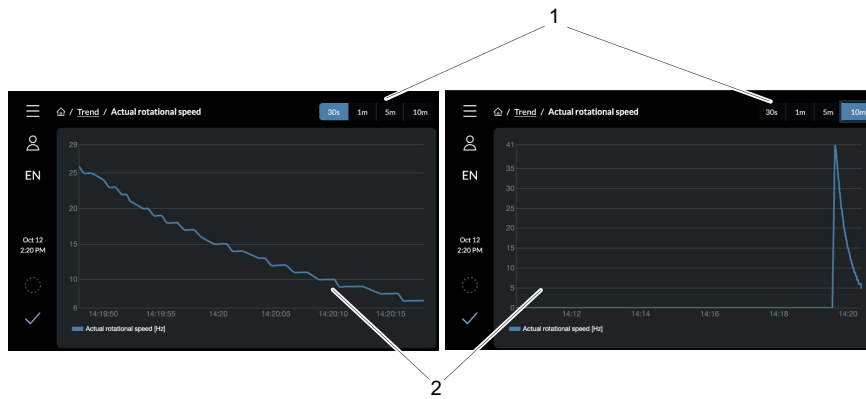


Fig. 38: Deleting trends

#### 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 details of a trend

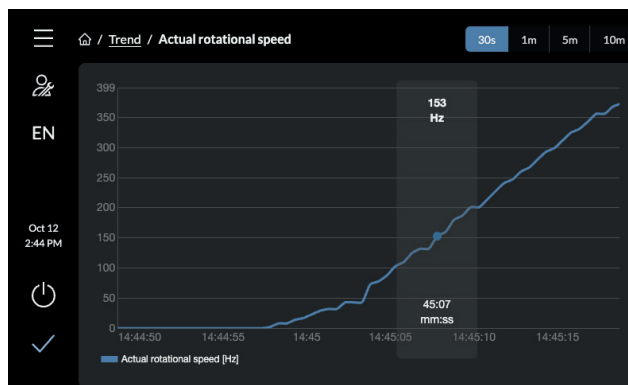


**Fig. 39: Viewing details of a trend**

- 1 Time interval display
- 2 Trend display

### Viewing details of a trend

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

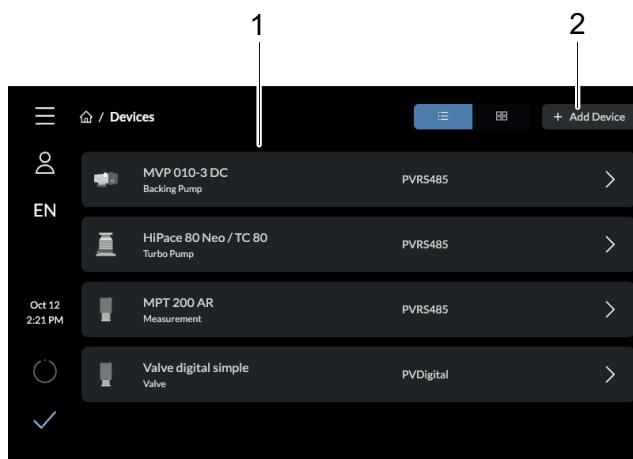


Fig. 41: Device overview screen

- 1 Component displays      2 Add device

### Calling up overview page

- ▶ Tap on the **Devices** button in the main menu to access the overview page for all the added devices.
  - You can change the display layout, view and filter the parameter list of a device, add a new device, and edit an existing device.

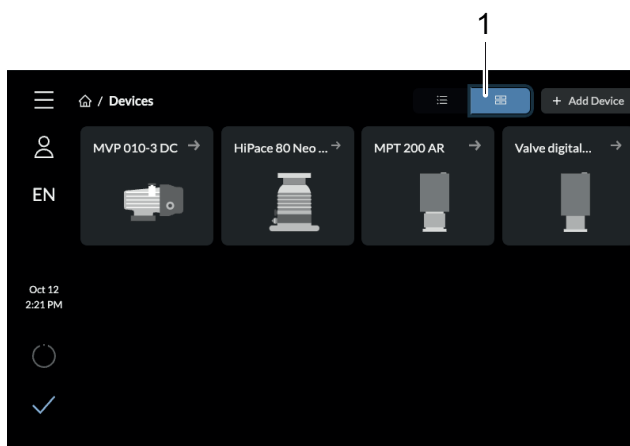



Fig. 42: Tile overview

- 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 acknowledgment
- 2 Vacuum pump (pump)
- 3 Drive current
- 4 Nominal rotation speed
- 5 Error code



### Parameter list of a device

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

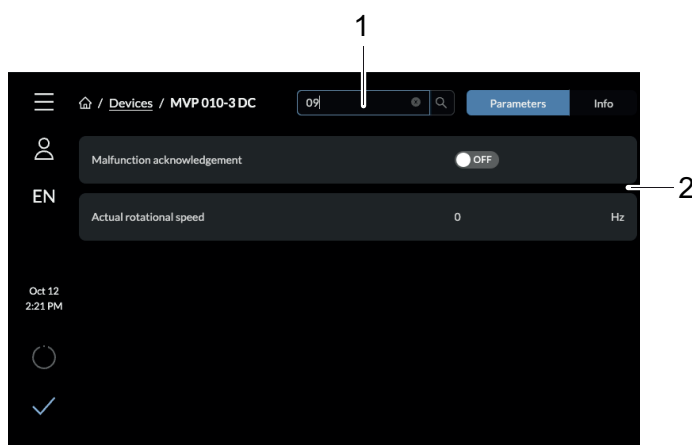


**Fig. 46: Viewing and editing detailed information**

- 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 will find Pfeiffer Vacuum codes and names in the operating instructions for backing pumps and the electronic drive unit ([see chapter “Product features”, page 20](#)).

## 7.8 Help page

The Help page provides information about the software and hardware versions of the device. The Help page also provides the digital rating plate.

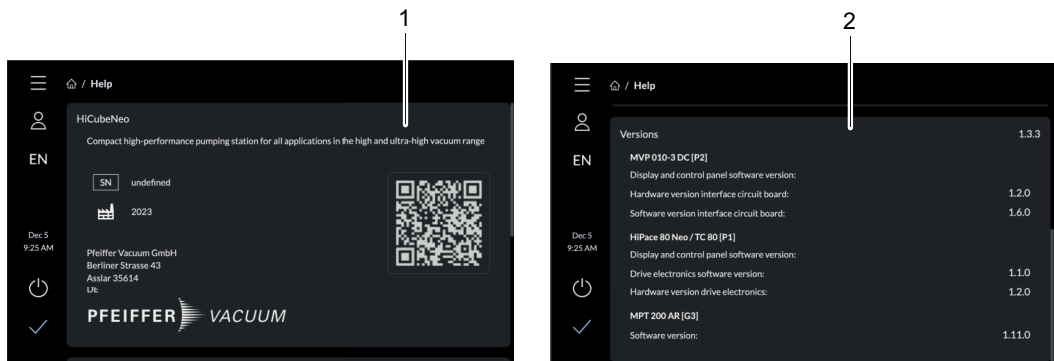


Fig. 48: HiCube Neo help page

1 Display of the digital rating plate

2 Display of the software and hardware versions of a device

### Calling up Help page

- Tap on the **Help** button in the main menu to access the Help page.

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.

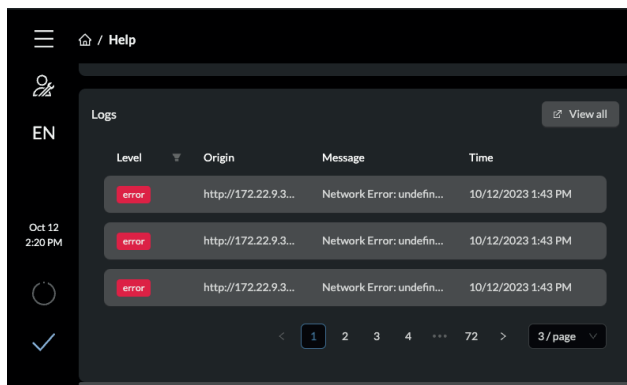


Fig. 49: HiCube Neo logs

## 7.9 Messages

The Messages overview displays information on the message code, the unit name, the description, and the message publication time.

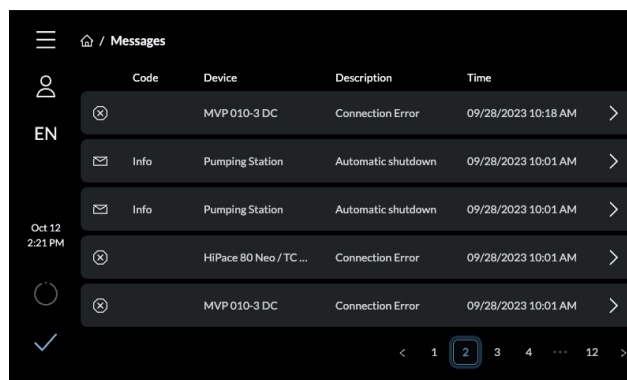
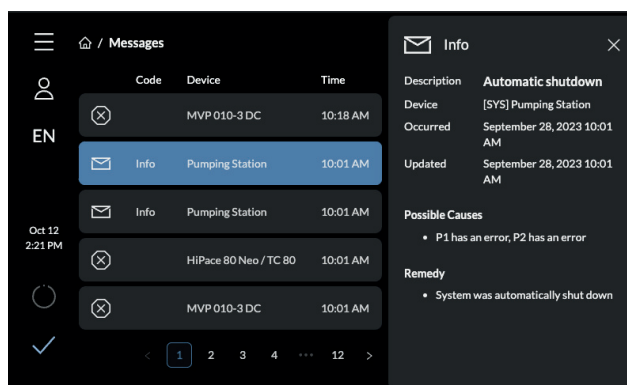


Fig. 50: Overview of all messages

### Calling up Messages page

1. Tap on the **Messages** button in the main menu to access the Messages page.



**Fig. 51: View detailed information of a message**

#### View detailed information of a message

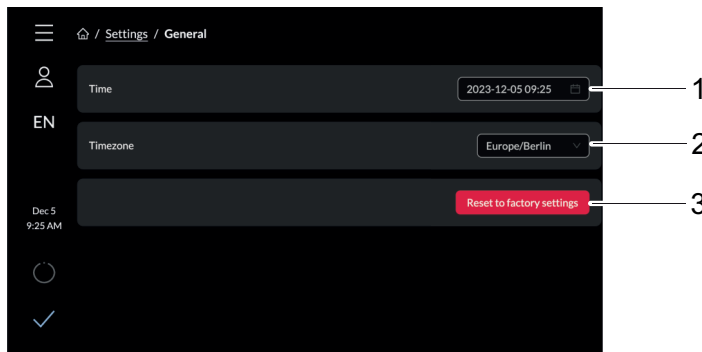
- ▶ Tap on the desired message to call up the detailed view of this message.

#### Detailed 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



**Fig. 52: General settings**

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

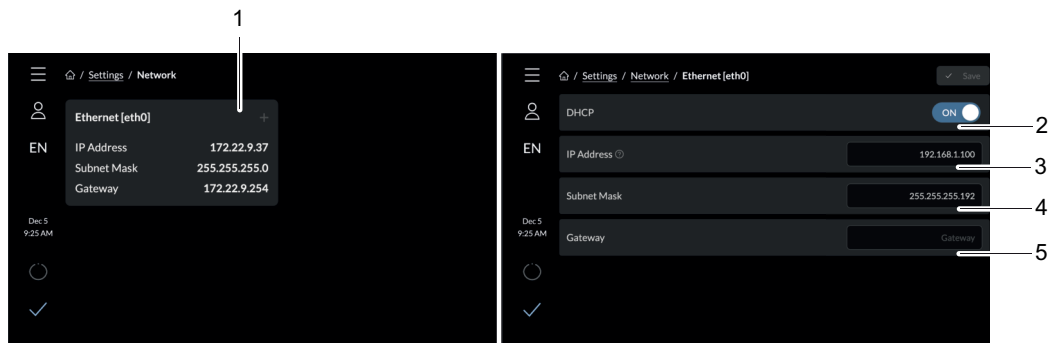
#### Updating system time

- ▶ 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



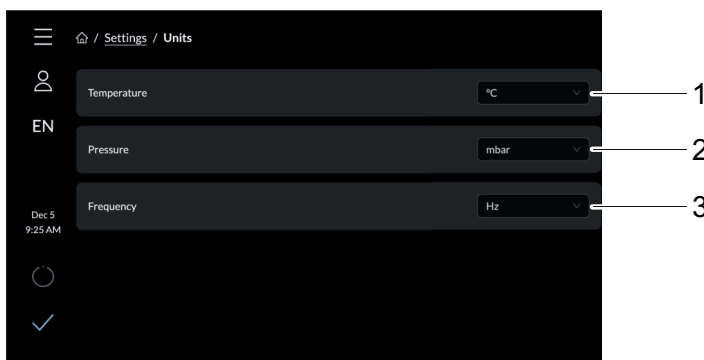
**Fig. 53: Change IP address**

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

### Change IP address

1. Tap the **Settings** button in the main menu.
2. Tap **[Network]**.
3. 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

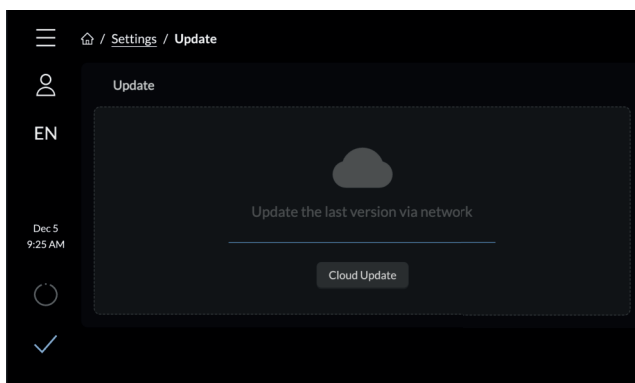
1. Tap the **Settings** button in the main menu.
2. Tap **[Units]**.
3. Select a suitable unit in the drop-down menu.

## 7.11 Updating firmware via the cloud

### Prerequisites

- HiCube Neo switched on
- Internet connection available

### 7.11.1 Uploading firmware to device

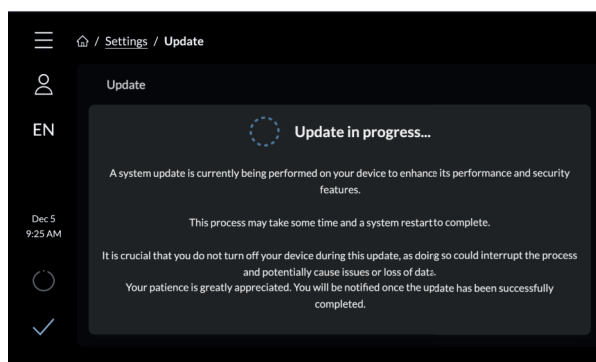


**Fig. 55: Uploading firmware to device**

#### 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.

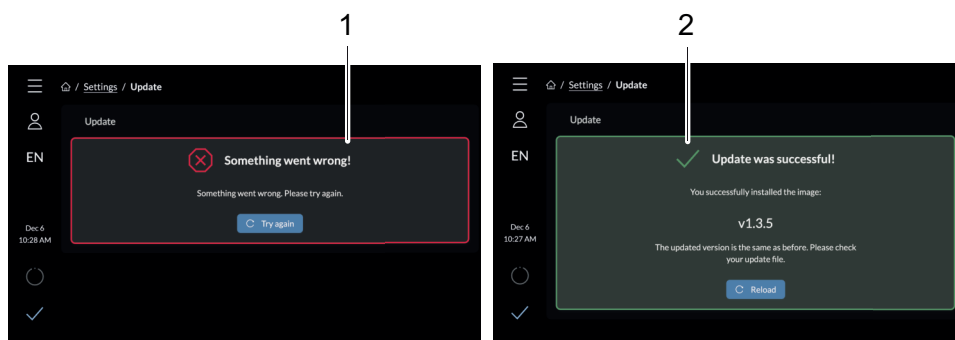
### 7.11.2 Update procedure



**Fig. 56: Update procedure**

The update starts automatically after uploading the firmware. 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 is interrupted during the update procedure, an "Connection interrupted" message is displayed.

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.

## 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**

##### **Risk of malfunction as a result of changing the connection configuration**

The pumping station connections are pre-configured at the factory. If the control lines on the connecting plug are mixed up, this can cause the pumping station to malfunction or fail.

- ▶ When removing components, note their original configuration for subsequent reassembly.

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

#### Removing components

- If needed, remove the components from the pumping station frame to maintain them.

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

**Tbl. 19: 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

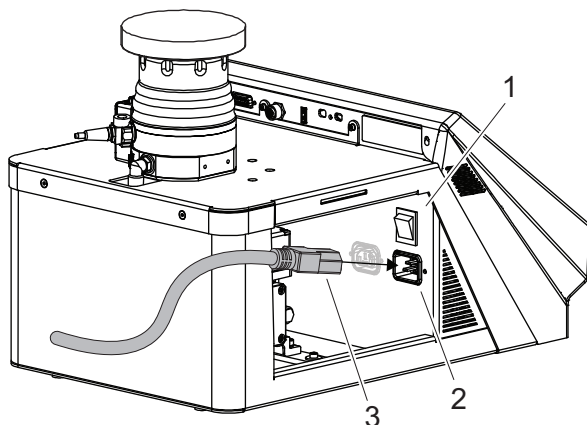
**Tbl. 20: Pre-set accessory connections for TC 400**

## 8.4 Removing electrical connections



#### Before carrying out any work, safely disconnect device from mains

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. 58: Removing electrical connections**

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

#### Removing electrical connections

1. For water cooling: Shut off the cooling water feed.
2. Disconnect and remove the accessory control lines.



## 8.5 Installing/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 size of the turbopump.

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

Tbl. 21: Tightening torque for fixation of turbopumps

### 8.5.1 Removing turbopump from desktop model

#### Prerequisite

- Turbo pumping station switched off

#### 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)

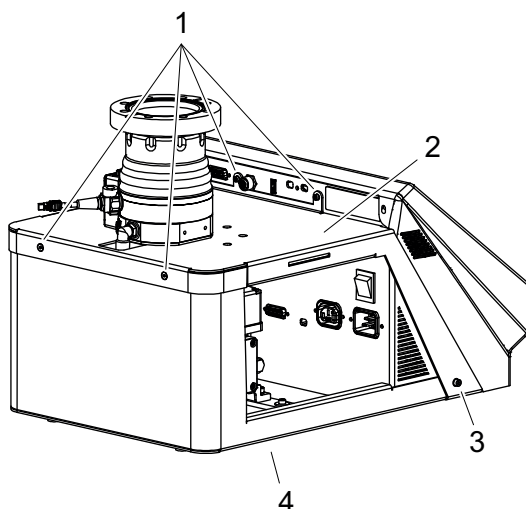
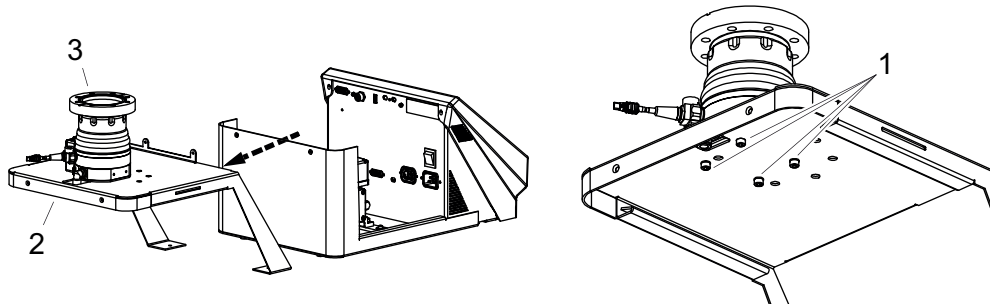


Fig. 59: Detaching upper casing – desktop model

- |                            |                            |
|----------------------------|----------------------------|
| 1 Hexagon socket screw, 4× | 3 Hexagon socket screw, 2× |
| 2 Upper casing             | 4 Bottom part casing       |

#### Detaching upper casing – desktop model

1. Disconnect all the power supply 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 upper casing.
4. Remove the 2 screws from the bottom part casing.



**Fig. 60: Removing turbopump – desktop model**

- |                             |             |
|-----------------------------|-------------|
| 1 Fixing screws with washer | 3 Turbopump |
| 2 Upper casing              |             |

#### Removing turbopump – desktop model

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

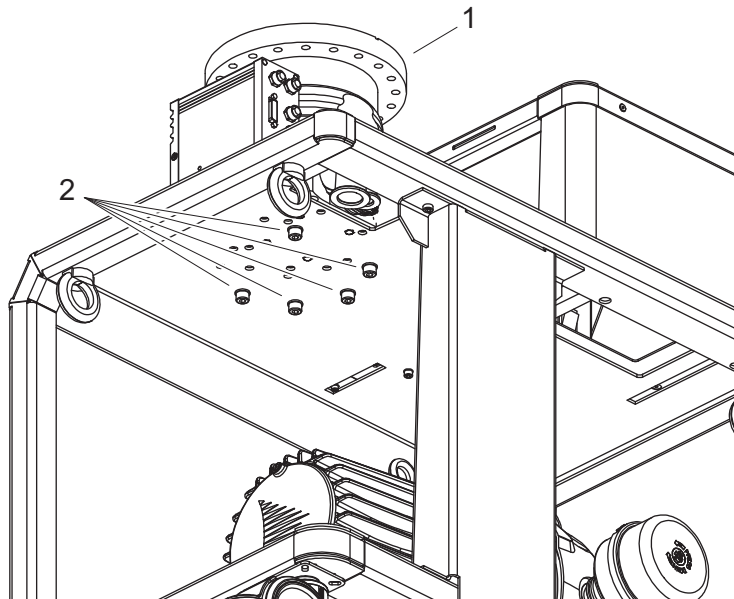
### 8.5.2 Removing turbopump from free-standing model

#### Prerequisite

- Turbo pumping station switched off

#### Required tools

- Allen key, **WAF 4** (for HiPace 80 Neo)
- Allen key, **WAF 6** (starting with HiPace 300)



**Fig. 61: Removing turbopump – free-standing model**

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

#### Removing turbopump – free-standing model

1. Disconnect all the power supply 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.

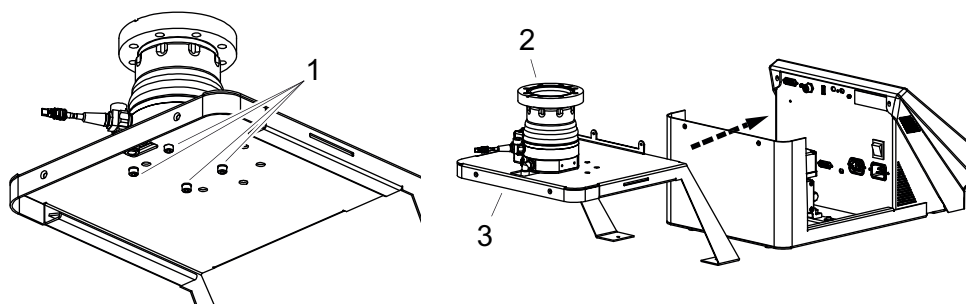
### 8.5.3 Installing turbopump in desktop model

#### Prerequisite

- Backing pump installed in 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)

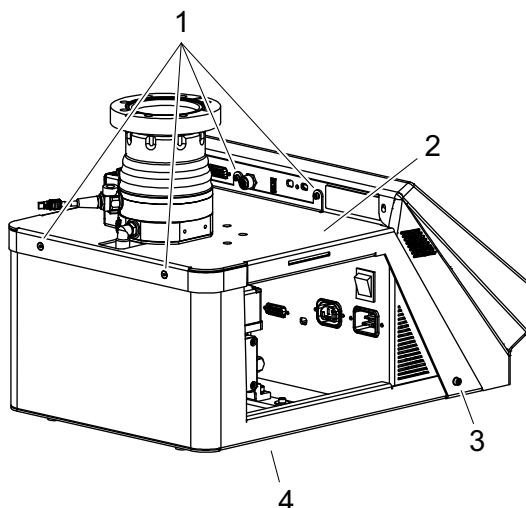


**Fig. 62: Installing turbopump – desktop model**

- |                             |                |
|-----------------------------|----------------|
| 1 Fixing screws with washer | 3 Upper casing |
| 2 Turbopump                 |                |

#### Installing turbopump – desktop model

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



**Fig. 63: Installing upper casing – desktop model**

- |                            |                            |
|----------------------------|----------------------------|
| 1 Hexagon socket screw, 4× | 3 Hexagon socket screw, 2× |
| 2 Upper casing             | 4 Bottom part casing       |

#### Installing upper casing – desktop model

1. Screw the 4 screws into the upper casing.
  - Tightening torque: **1.4 Nm**
2. Screw the 2 screws into the bottom part casing.
  - Tightening torque: **3 Nm**

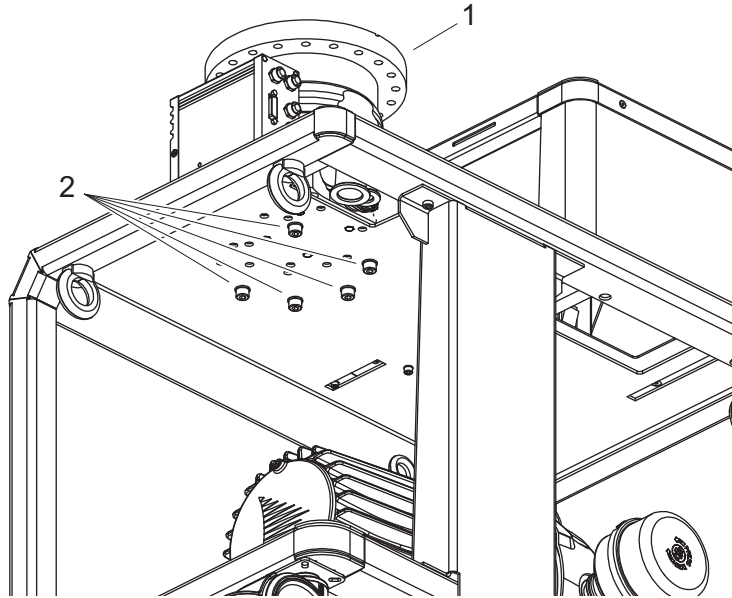
## 8.5.4 Installing turbopump pump in free-standing model

### Prerequisite

- Backing pump installed in pumping station

### 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. 64: 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

## 8.6 Installing/removing backing pump

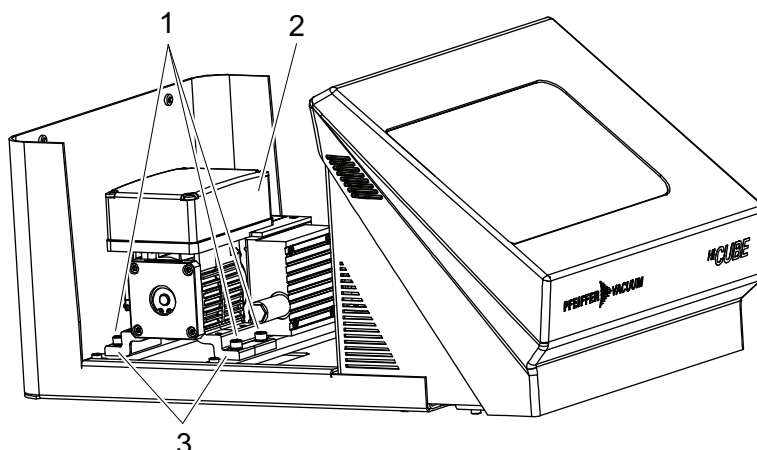
### 8.6.1 Removing backing pump from desktop model

#### Prerequisite

- Upper casing with turbopump removed from pumping station

#### Required tools

- Allen key, **WAF 4**



**Fig. 65: Removing backing pump – desktop model**

- |                                |                   |
|--------------------------------|-------------------|
| 1 Fixing screw with washer, 4× | 3 Fixing 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.

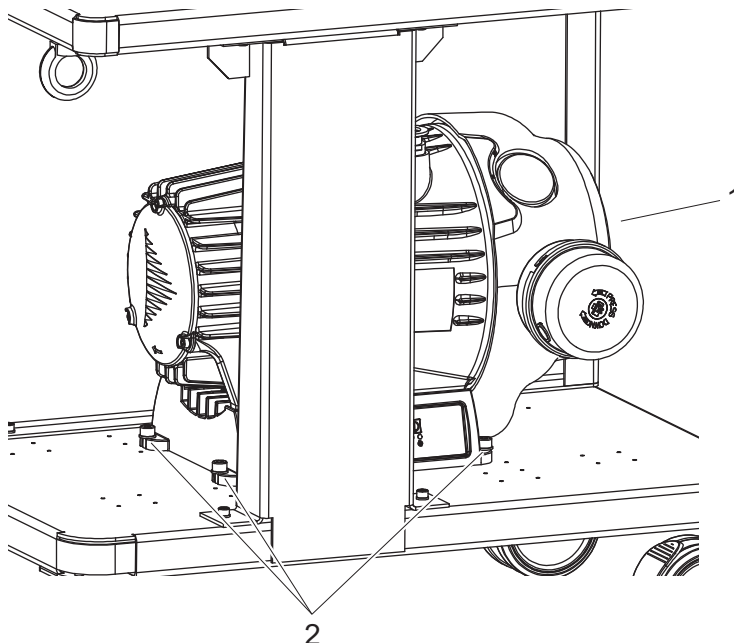
### 8.6.2 Removing backing pump from free-standing model

#### Prerequisite

- Upper casing with turbopump removed from pumping station

#### Required tools

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



**Fig. 66: Removing backing pump example – HiScroll**

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

#### Removing backing pump – HiScroll

1. Disconnect all the power supply 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.

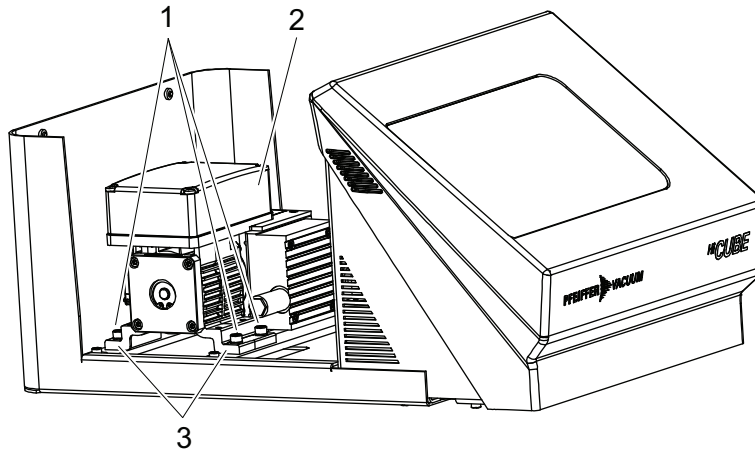
#### Removing backing pump – SmartVane Duo and ACP

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.

### 8.6.3 Installing backing pump in desktop model

#### Required tools

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



**Fig. 67: Installing backing pump – desktop model**

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

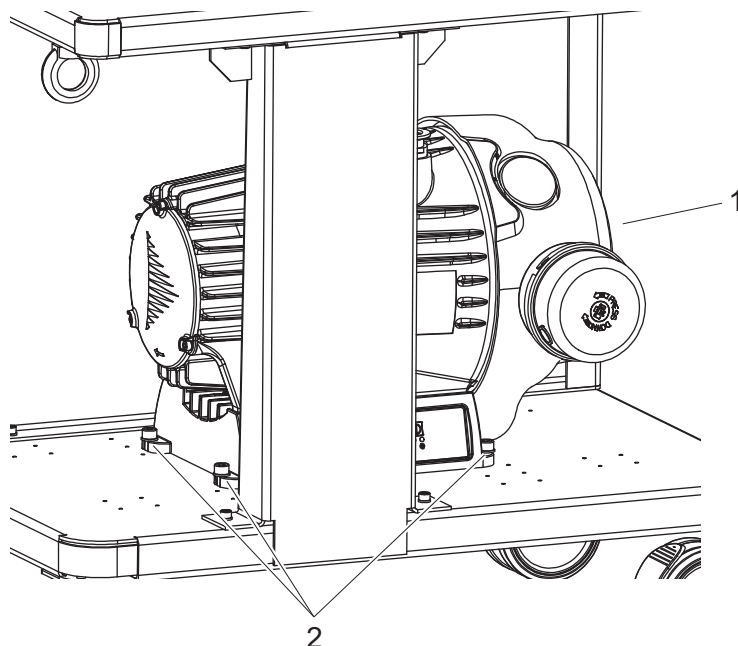
#### Installing backing pump – desktop model

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: **2.5 Nm**

### 8.6.4 Installing backing pump in free-standing model

#### Required tools

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



**Fig. 68: Installing backing pump example – 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. Connect all power supply plugs to 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 **DuoLine**: 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 safely 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"> <li>• No operating voltage present</li> </ul>	<ul style="list-style-type: none"> <li>• Check the operating voltage.</li> <li>• Check the power cable connection.</li> <li>• Switch on the mains switch.</li> </ul>
	<ul style="list-style-type: none"> <li>• Incorrect operating voltage</li> </ul>	<ul style="list-style-type: none"> <li>• Note rating plate specifications.</li> <li>• Supply the correct operating voltage.</li> </ul>
	<ul style="list-style-type: none"> <li>• Control electronics defective</li> </ul>	<ul style="list-style-type: none"> <li>• Contact Pfeiffer Vacuum Service.</li> </ul>
Pumping station not reaching final pressure.	<ul style="list-style-type: none"> <li>• Condensate in the backing pump</li> </ul>	<ul style="list-style-type: none"> <li>• Open the backing pump gas ballast valve.</li> </ul>
	<ul style="list-style-type: none"> <li>• Gas ballast valve open</li> </ul>	<ul style="list-style-type: none"> <li>• Close the backing pump gas ballast valve.</li> </ul>
Venting valve fails to open directly after switching off.	<ul style="list-style-type: none"> <li>• Delayed venting enabled</li> </ul>	<ul style="list-style-type: none"> <li>• Check the settings for delayed venting.</li> </ul> <p>Delayed venting opens the venting valve after a preset time. Opening is indicated immediately.</p>

Tbl. 22: 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.

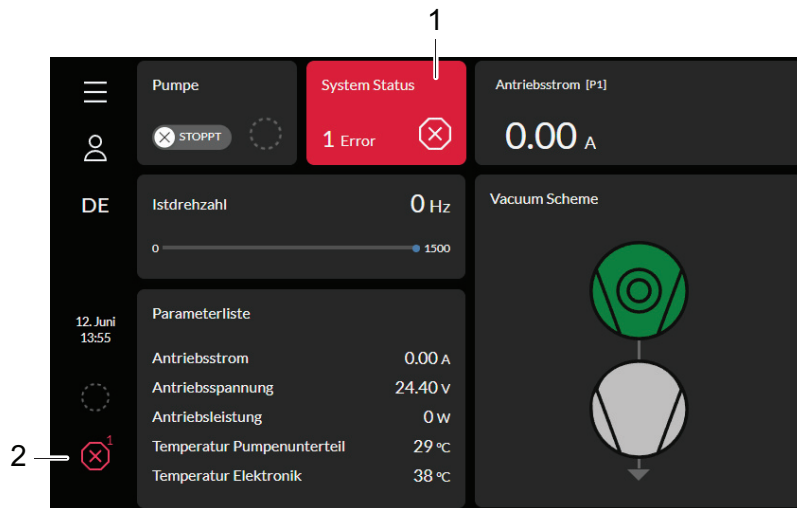


Fig. 69: Example of an error message on the dashboard

1 System status error message

2 Navigation bar error message

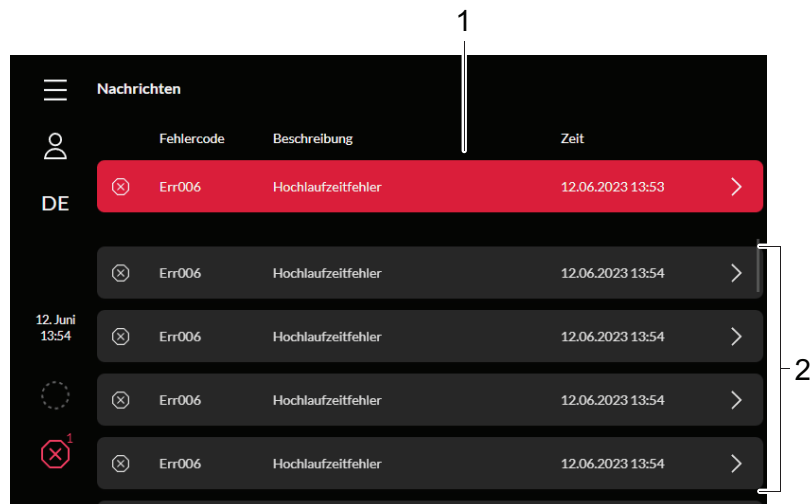


Fig. 70: Example of an error message in the Messages menu

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 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.

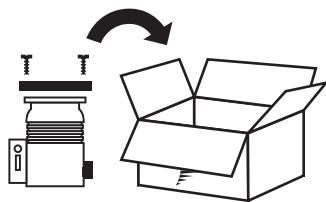


4. You will receive an acknowledgment from Pfeiffer Vacuum.

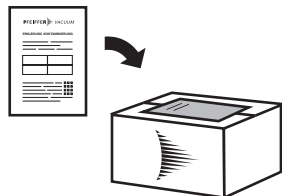
PFEIFFER VACUUM

### Submission of contaminated products

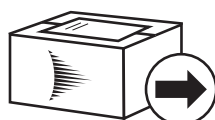
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



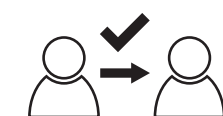
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
  - a) Neutralize the product with nitrogen or dry air.
  - b) Seal all openings with blind flanges, so that they are airtight.
  - c) Shrink-wrap the product in suitable protective foil.
  - d) Package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



### Technical data

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

- Specifications according to PNEUROP committee PN5
- ISO 27892 2010: "Vacuum technology - Turbomolecular pumps - Measurement of rapid shutdown torque"
- ISO 21360 2012: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- ISO 21360 2018: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 4: Turbomolecular vacuum pumps"
- Ultimate pressure with test dome after 48 h bake out duration
- Gas throughput with water cooling; backing pump = rotary vane pump (10 m<sup>3</sup>/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 <sup>-3</sup>	100	1	0.1	0.75
bar	1000	1	1 · 10 <sup>5</sup>	1000	100	750
Pa	0.01	1 · 10 <sup>-5</sup>	1	0.01	1 · 10 <sup>-3</sup>	7.5 · 10 <sup>-3</sup>
hPa	1	1 · 10 <sup>-3</sup>	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr   mm Hg	1.33	1.33 · 10 <sup>-3</sup>	133.32	1.33	0.133	1

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

**Tbl. 23: Conversion table: Pressure units**

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

**Tbl. 24: Conversion table: Units for gas throughput**

## 14.2 Technical data

You will find the technical data for further HiCube Neo models on the [HiCube Neo product page](#).

### 14.2.1 Technical data desktop unit

Type designation	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Main flange size	DN 40	DN 63	DN 63
Main flange type	ISO-KF	ISO-K	CF-F
Secondary flange size	G 1/8"	G 1/8"	G 1/8"
Turbopump	HiPace 80 Neo	HiPace 80 Neo	HiPace 80 Neo
Backing pump	MVP 015-2	MVP 015-2	MVP 015-2



Type designation	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Ultimate pressure	$1 \cdot 10^{-7}$ hPa	$1 \cdot 10^{-7}$ hPa	$1 \cdot 10^{-8}$ hPa
Pumping speed for N <sub>2</sub>	35 l/s	67 l/s	67 l/s
Input voltage(s)	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz	50 Hz, 60 Hz
Cooling method	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)
Weight	14.5 kg	14.5 kg	15.5 kg
Pumping speed backing pump	50 Hz: 1 m <sup>3</sup> /h	50 Hz: 1 m <sup>3</sup> /h	50 Hz: 1 m <sup>3</sup> /h

TbI. 25: Technical data HiCube 80 Neo

Type designation	HiCube 300 Neo	HiCube 300 Neo
Main flange size	DN 100	DN 100
Main flange type	ISO-K	CF-F
Secondary flange size	G 1/8"	G 1/8"
Turbopump	HiPace 300	HiPace 300
Backing pump	MVP 015-2	MVP 015-2
Ultimate pressure	$1 \cdot 10^{-7}$ hPa	$1 \cdot 10^{-8}$ hPa
Pumping speed for N <sub>2</sub>	260 l/s	260 l/s
Input voltage(s)	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz
Cooling method	Air (Forced convection)	Air (Forced convection)
Weight	19 kg	21 kg
Pumping speed backing pump	50 Hz: 1 m <sup>3</sup> /h	50 Hz: 1 m <sup>3</sup> /h

TbI. 26: Technical data HiCube 300 Neo

## 14.2.2 Technical data free-standing model

Type designation	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Main flange size	DN 40	DN 63	DN 63
Main flange type	ISO-KF	ISO-K	CF-F
Secondary flange size	DN 25	DN 25	DN 25
Turbopump	HiPace 80 Neo	HiPace 80 Neo	HiPace 80 Neo
Backing pump	HiScroll 12	HiScroll 12	HiScroll 12
Ultimate pressure	$1 \cdot 10^{-7}$ hPa	$1 \cdot 10^{-7}$ hPa	$5 \cdot 10^{-10}$ hPa
Pumping speed for N <sub>2</sub>	35 l/s	67 l/s	67 l/s
Input voltage(s)	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz	100 – 120 / 200 – 240 V AC ( $\pm 10$ %), 50/60 Hz
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz	50 Hz, 60 Hz
Cooling method	Air (Forced convection)	Air (Forced convection)	Air (Forced convection)

Type designation	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Weight	75 kg	75 kg	76 kg
Pumping speed backing pump	50 Hz: 12.1 m³/h	50 Hz: 12.1 m³/h	50 Hz: 12.1 m³/h

**Tbl. 27: Technical data HiCube 80 Neo**

Type designation	HiCube 300 Neo	HiCube 300 Neo
Main flange size	DN 100	DN 100
Main flange type	CF-F	ISO-K
Secondary flange size	DN 25	DN 25
Turbopump	HiPace 300	HiPace 300
Backing pump	HiScroll 12	SmartVane 55
Ultimate pressure	$5 \cdot 10^{-10}$ hPa	$1 \cdot 10^{-7}$ hPa
Pumping speed for N <sub>2</sub>	260 l/s	260 l/s
Input voltage(s)	100 – 120 / 200 – 240 V AC (±10 %), 50/60 Hz	100 – 120 / 200 – 240 V AC (±10 %), 50/60 Hz
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz
Cooling method	Air (Forced convection)	Air (Forced convection)
Weight	82 kg	90.5 kg
Pumping speed backing pump	50 Hz: 12.1 m³/h	50 Hz: 50 m³/h

**Tbl. 28: Technical data HiCube 300 Neo**

Type designation	HiCube 450 Neo	HiCube 450 Neo
Main flange size	DN 160	DN 160
Main flange type	ISO-K	CF-F
Secondary flange size	DN 25	DN 25
Turbopump	HiPace 450	HiPace 450
Backing pump	HiScroll 12	HiScroll 12
Ultimate pressure	$1 \cdot 10^{-7}$ hPa	$5 \cdot 10^{-10}$ hPa
Pumping speed for N <sub>2</sub>	380 l/s	380 l/s
Input voltage(s)	100 – 120 / 200 – 240 V AC (±10 %), 50/60 Hz	100 – 120 / 200 – 240 V AC (±10 %), 50/60 Hz
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz
Cooling method	Air (Forced convection)	Air (Forced convection)
Weight	80.5 kg	84 kg
Pumping speed backing pump	50 Hz: 12.1 m³/h	50 Hz: 12.1 m³/h

**Tbl. 29: Technical data HiCube 450 Neo**

Type designation	HiCube 800 Neo	HiCube 800 Neo
Main flange size	DN 200	DN 200
Main flange type	ISO-K	CF-F
Secondary flange size	DN 25	DN 25
Turbopump	HiPace 800	HiPace 800
Backing pump	HiScroll 12	HiScroll 12
Ultimate pressure	$1 \cdot 10^{-7}$ hPa	$5 \cdot 10^{-10}$ hPa
Pumping speed for N <sub>2</sub>	790 l/s	790 l/s
Input voltage(s)	100 – 120 / 200 – 240 V AC (±10 %), 50/60 Hz	100 – 120 / 200 – 240 V AC (±10 %), 50/60 Hz
Mains frequency compatibility	50 Hz, 60 Hz	50 Hz, 60 Hz

Type designation	HiCube 800 Neo	HiCube 800 Neo
Cooling method	Air (Forced convection)	Air (Forced convection)
Weight	86 kg	92 kg
Pumping speed backing pump	50 Hz: 12.1 m³/h	50 Hz: 12.1 m³/h

Tbl. 30: Technical data HiCube 800 Neo

## 14.3 Substances in contact with media

Substances in contact with media	
Aluminum	carbon-fiber-reinforced plastic
Anodized aluminum, PTFE compound	Artificial resin compound
Aluminum alloy	Solder
Nickel-plated aluminum	Nickel
Araldite	Oxide ceramic, as required
Bronze/brass	Polyurethane
Stainless steel	rare-earth magnet
Epoxy resin	Silver
FKM	Silicon dioxide
Float glass	Steel
Cast iron	Galvanized steel
Cast iron (nodular graphite cast iron)	Composite material
Ceramic	Tungsten

Tbl. 31: Materials that make contact with the process media

## 14.4 Dimensions

### HiCube Neo – desktop model

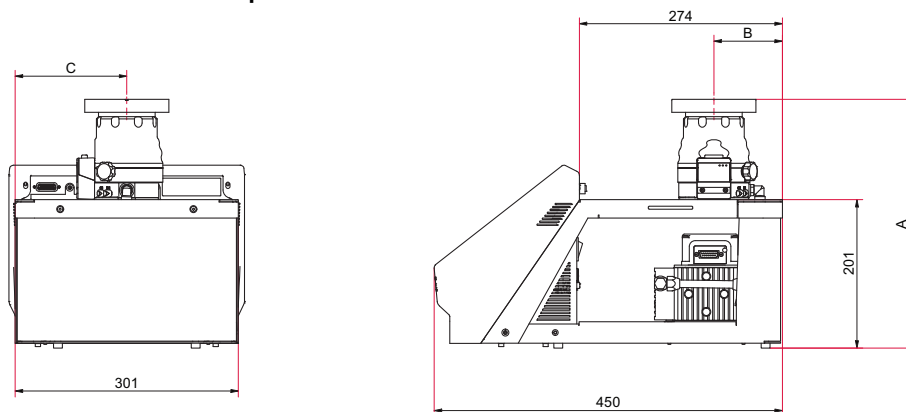


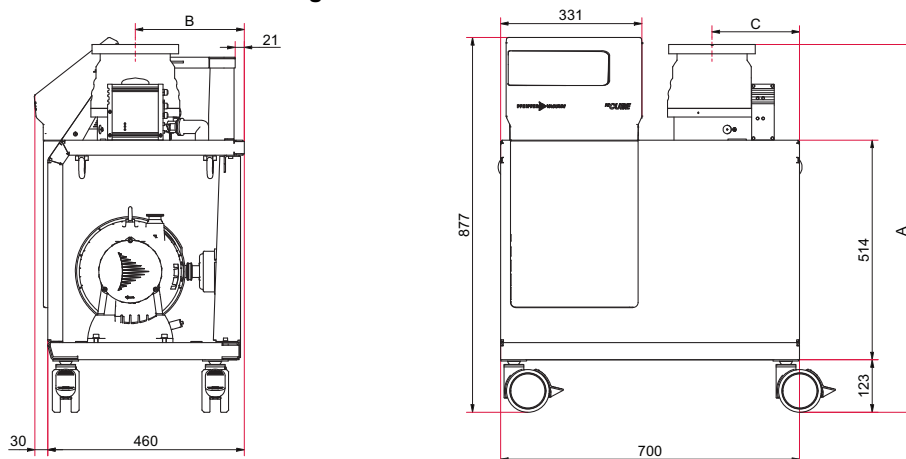
Fig. 71: Dimensions HiCube Neo – desktop model

Dimensions in mm

Type designation	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Main flange type	ISO-KF	ISO-K	CF-F
A	339 mm	330 mm	336 mm
B	93 mm	93 mm	93 mm
C	151 mm	151 mm	151 mm

Tbl. 32: Dimensions HiCube 80 Neo

Type designation	HiCube 300 Neo	HiCube 300 Neo
Main flange type	ISO-K	CF-F
A	396 mm	408 mm
B	108 mm	108 mm
C	171 mm	171 mm

**Tbl. 33: Dimensions HiCube 300 Neo**
**HiCube Neo – free-standing model**

**Fig. 72: Dimensions HiCube Neo – free-standing model**  
Dimensions in mm

Type designation	HiCube 80 Neo	HiCube 80 Neo	HiCube 80 Neo
Main flange type	ISO-KF	ISO-K	CF-F
A	775 mm	766 mm	772 mm
B	204 mm	204 mm	204 mm
C	172 mm	172 mm	172 mm

**Tbl. 34: Dimensions HiCube 80 Neo**

Type designation	HiCube 300 Neo	HiCube 300 Neo
Main flange type	ISO-K	CF-F
A	832 mm	844 mm
B	235 mm	235 mm
C	175 mm	175 mm

**Tbl. 35: Dimensions HiCube 300 Neo**

Type designation	HiCube 350 Neo	HiCube 350 Neo
Main flange type	ISO-K	CF-F
A	865 mm	865 mm
B	210 mm	210 mm
C	175 mm	175 mm

**Tbl. 36: Dimensions HiCube 350 Neo**

Type designation	HiCube 450 Neo	HiCube 450 Neo
Main flange type	ISO-K	CF-F
A	824 mm	826 mm

Type designation	HiCube 450 Neo	HiCube 450 Neo
B	210 mm	210 mm
C	175 mm	175 mm

**Tbl. 37: Dimensions HiCube 450 Neo**

Type designation	HiCube 700 Neo	HiCube 700 Neo
Main flange type	ISO-K	CF-F
A	849 mm	861 mm
B	255 mm	255 mm
C	205 mm	205 mm

**Tbl. 38: Dimensions HiCube 700 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:



(Daniel Sälzer)  
Managing Director

Pfeiffer Vacuum GmbH  
Berliner Straße 43  
35614 Asslar  
Germany

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.

ed. C - Date 2501 - P/N:PT0785BEN



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

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

[www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com)