Betriebsanleitung • Operating Instructions

Translation of the Original Operating Instructions

Turbo Pumping Station

HiCUBE

HiCube Pro

PT 0265 BE/A (0901)

PFEIFFER VACUUM

Table of contents

1 About this manual

1.1 Validity

This operating manual is for customers of Pfeiffer Vacuum. It describes the functioning of the designated product and provides the most important information for safe use of the unit. The description follows applicable EU guidelines. All information provided in this operating manual refer to the current state of the product's development. The documentation remains valid as long as the customer does not make any changes to the product.

Up-to-date operating instructions can also be downloaded from www.pfeiffer-vacuum.net.

Applicable documents

HiCube Pro	Operating instructions
Safety information for vacuum pumps "Safety Guide"	PT 0300 BN*
Declaration of Conformity	Part of this document
Operating instructions for components	see product description*
Operating instructions for accessories	see section "Accessories"*

*also available via www.pfeiffer-vacuum.net

For information about other certifications, if applicable, please see the signet on the product or:

- www.tuvdotcom.com
- TUVdotCOM-ID 0000021320

1.2 Conventions

Safety instructions

The safety instructions in Pfeiffer Vacuum operating manuals are the result of risk evaluations and hazard analyses and are oriented on international certification standards as specified by UL, CSA, ANSI Z-535, Semi-S1, ISO 3864 and DIN 4844. In this document, the following hazard levels and information are considered:

DANGER

Immediate danger

Death or very severe injuries occur.

WARNING

Possible danger

Death or injuries may occur.

CAUTION

Possible danger

Medium to slight injuries may occur.

NOTE

Command or note

Command to perform an action or information about properties, the disregarding of which may result in damage to the product.

Pictograph definitions

Prohibition of an action or activity in connection with a source of danger, the disregarding of which may result in serious accidents.

Warning of a displayed source of danger in connection with operation of the unit or equipment.

Command to perform an action or task associated with a source of danger, the disregarding of which may result in serious accidents.

Instructions in the text

➔ Work instruction: here you have to do something.

Abbreviations used

DCU: Display and operating unit
HPU: Handheld programming unit
TC: Electronic drive unit for turbopump
TPS: Mains pack

Symbols used

The following symbels are used consistently throughout the diagrams:

- Ⓗ High vacuum flange
- Ⓦ Fore-vacuum connection
- Electric connection
- Air cooling unit
- Ⓕ Venting connection
- Ⓢ Sealing gas connection
- Exhaust connection

2 Safety

2.1 Safety precautions

NOTE

Duty to inform

Each person involved in the installation, operation or maintenance of the pumping station must read and observe the safety-related parts of these operating instuctions and the components instructions.

➔ Absolute observe the safety information for vacuum pumps (PT 0300 BN) !

➔ The operator is obligated to make operating personnel aware of dangers originating from the vacuum pump, the pumped medium or the entire system.

- Do not loosen any plug connection during operations.
- Wait for the rotor to reach standstill before peforming work on the high vacuum flange.

- Keep leads and cables well away from hot surfaces (> 70 °C).
- Never fill or operate turbopump with cleaning agent.
- Do not carry out any unauthorised modifications or conversions to the pumps.
- The unit has been accredited with protection class IP 20. When installing into ambient conditions, which afford higher protection classes, the necessary measures must be taken.

2.2 Proper use

NOTE

CE conformity

The manufacturer's declaration of conformity becomes invalid if the operator modifies the original product or installs additional components.

➔ Following installation into a plant and before commissioning, the operator must check the entire system for compliance with the valid EU directives and reassess it accordingly.

- Only use the pumping station for creating vacuum.
- Only operate the pumping station as an entire unit.
- Only use the pumping station for evacuation of dry and inert gases; other applications only after consultation with Pfeiffer Vacuum.

2.3 Improper use

Improper use will cause all claims for liability and guarantees to be forfeited. Improper use is deemed to be all use for purposes deviating from those mentioned above, especially:

- Pumping of corrosive or explosive media.
- Pumping of condensing vapors.
- Operation with improper high levels of gas loads.
- Operation with improper high fore-vacuum pressures.
- Operation with improper gas mode.
- Operation with improper high levels of insulated heat input.
- Venting with improper high venting rates.
- The operation of the devices in potentially radioactive areas.
- The operation of the devices in systems where the turbopumps are subjected to impact-like stress and vibrations or the effect of periodically occurring forces.
- The connection to a power supply with earthing of a direct voltage pole.
- The use of accessories, which are not named in this manual.

NOTE

Warranty seal

The product is sealed at the factory. Damaging or removal of the seal leads to the loss of liability and warranty entitlements.

➔ Do not open the product within its warranty period!

➔ For process-related shorter maintenance intervals please contact the Pfeiffer Vacuum Service.

3 Transport and storage

3.1 Transport

WARNING

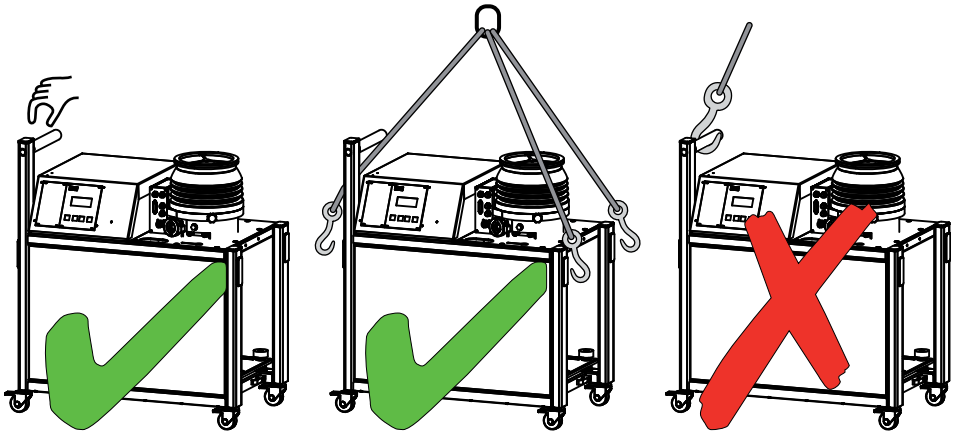
Danger from falling and swinging loads!

When lifting the pumping station there is a danger of falling parts.

➔ Only fix a lifting device for transport on all provided points of the frame of the pumping station (first remove the rubber caps).

➔ Make sure that there are no persons under the suspended load.

➔ Do not lift the pumping station on the handle.



➔ Always transport the pumping station uprightly and as even as possible.

➔ Keep the original protective covers.

Transportation lock

The backing pump of the pumping station HiCube Pro is secured against damage during transport.

➔ Follow instructions concerning the installation location!

➔ Before putting into operation loosen the backing pump's transportation lock device at the installation location.

3.2 Storage

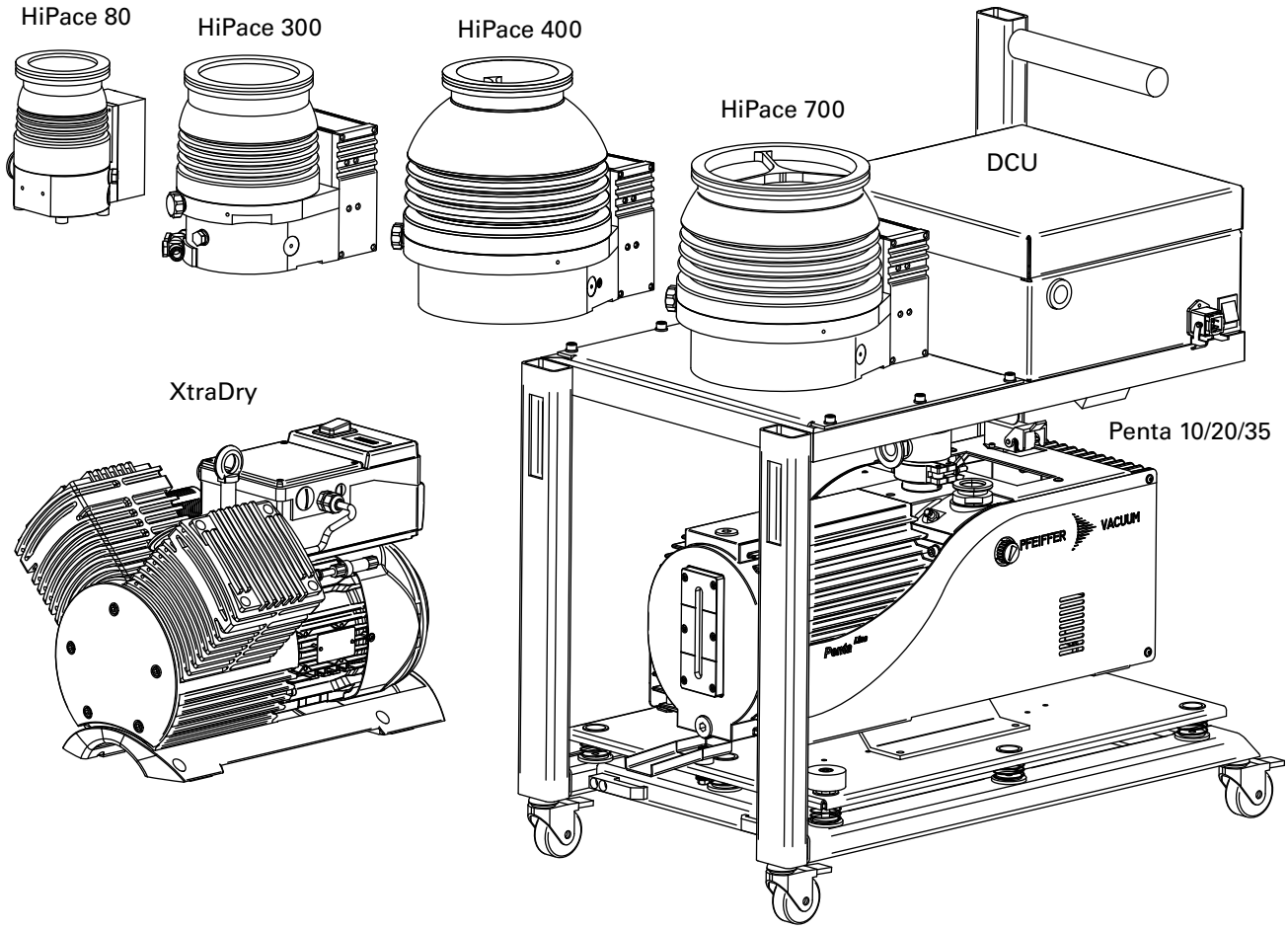
➔ Close the flange openings by using the original protective covers.

➔ Close further connection ports by using the corresponding protective covers.

➔ Only store the pumping station indoors at an ambient temperature between -25 °C and +55 °C.

➔ In rooms with moist or aggressive atmospheres, the pumping station must be airproof shrink-wrapped in a plastic bag together with a bag of dessicant.

4 Product description



Feature	HiCube Pro				Operating Instructions
HV Flange	DN 40 / DN 63	DN 100		DN 160	
Turbopump	HiPace 80	HiPace 300	HiPace 400	HiPace 700	PT 0208 BN PT 0200 BN PT 0209 BN PT 0210 BN
Electronic Drive Unit	TC 110	TC 110 TC 400	TC 400	TC 400	PT 0204 BN PT 0203 BN
Air Cooling Unit	ja	ja	ja	ja	PT 0231 BN
Backing Pump: Piston Pump	XtraDry 150-2	XtraDry 150-2	XtraDry 150-2	XtraDry 150-2	PU 0044 BN
Backing Pump: Rotary Vane Pump	Penta 10	Penta 20	Penta 35	Penta 35	PD 0033 BN
Power Supply with Display And Control Unit	DCU 110	DCU 310	DCU 400	DCU 400	PT 0250 BN
Venting Valve	optional	optional	optional	optional	PT 0228 BN
Housing Heating (water cooling required)	optional, only with CF flange	optional, only with CF flange	optional, only with CF flange	optional, only with CF flange	PT 0233 BN

Fig. 1: Selection of Turbopumps and Backing Pumps for HiCube Pro

4.1 Product identification

Product features

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available.

Fig. 2: Example for a rating plate

Scope of delivery

- HiCube Pro
- Only with rotary vane pump as backing pump: operating fluid and filler tube
- Mains cable
- Protective cover for the high vacuum flange
- Operating manuals for pumping station and individual components

4.2 Function

The turbo pumping stations in the HiCube range are fully automatic pump units which are ready for connection. The turbo pumping station consists of a portable or mobile vacuum pumping unit with a turbopump and a specially matched backing pump.

The display and control unit DCU serves to control and monitor the pumping station.

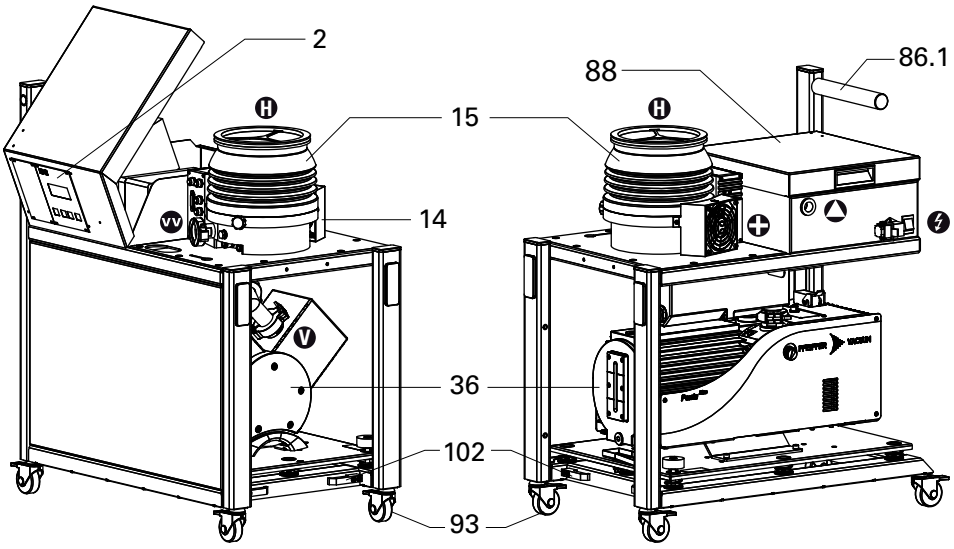


Fig. 3: Views of HiCube Pro

2	Display and control unit DCU	36	Backing pump	93	Transport rollers
14	Air cooling	84	Handle	102	Safety hook
15	Turbopump HiPace	88	Casing for electronics		

Drive

Electronic drive unit of the turbopump

Cooling

- Air cooling
- Water cooling (optional)

In the case of excess temperature the electronic drive unit reduces the drive power automatically.

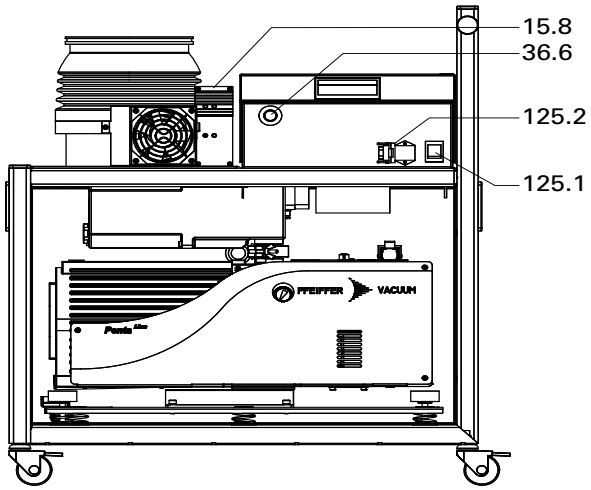
4.3 Range of application

The pumping station HiCube Pro must be installed and operated in the following ambient conditions.

Installation location	weather protected (indoors)
Temperature	+5 °C to +40 °C (up to +35 °C with air cooling)
Protection category	IP 20
Protection class	I
Relative humidity	max. 80 %, at T ≤ 31 °C, up to max. 50% at T ≤ 40 °C
Atmospheric pressure:	77 kPa - 106 kPa
Installation altitude	2000 m max.
Degree of pollution	2
Overvoltage category	II
Connection voltage TC	24 or 48 VDC ±5%

Limit value for	HiPace 80	HiPace 300	HiPace 400	HiPace 700
Permissible magnetic field max.	3.3 mT	5.5 mT	6 mT	6 mT
Permissible irradiated heat input	3 W	8 W	14 W	14 W

5 Installation



15.8 Electronic drive unit
36.6 Exhaust connection
125.1 Main switch
125.2 Mains connection

Fig. 4: HiCube Pro, connections

5.1 Set-up

The installation location is to be chosen so that components that need servicing are freely accessible at all times. No special foundations or base are necessary for installation. The unit must not be used outdoors. Conditions are:

- The ambient conditions specified for the area of use.
- a level, vibration-free surface.
- Distance to side walls or adjacent devices: at least 50 cm.
- When using a casing heating and a water cooling unit the temperature of the connected flange of the vacuum chamber must not exceed 120 °C.
- It is not allowed to operate the device in systems where impact-like stresses and vibrations or periodically forces occur.

5.2 Preparatory work

➔ Ensure sufficient cooling for the pumping station.

➔ When magnetic fields exceeding the approved values a suitable shielding must be used. Check installation location and consult Pfeiffer Vacuum if needed!

➔ The maximum permissible rotor temperature for the turbopump is 90 °C. If high temperatures arise for process reasons, the radiated heat input must not exceed the permissible values. Install suitable screening sheets, if necessary (design information on request).

Anchoring the pumping station

In the case the rotor of the turbopump suddenly blocs, the resulting torque must be absorbed via the pumping station frame by the fixture provided by customer. Anchoring the pumping station is mandatory in order to secure the pumping station and the vacuum system. For this purpose, there are 3 securing hooks at the corners of the pumping station frame.

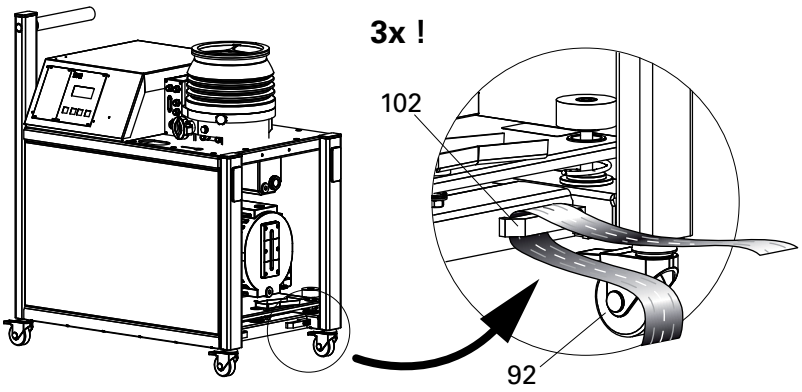


Fig. 5: Anchoring the pumping station

102Securing hooks 92Roller

➔ Lock all pumping station roller brakes.

➔ Fasten the pumping station with lashing straps at all 3 securing hooks.

– Pay attention to the fit and the stress of the straps; the strap loop has to be in the recess of the securing hook.

– Fasten securely the lashing straps provided by customer in order to be able to hold loads up to 2000 N per anchorage point.

5.3 Connecting the high vacuum side

The assembly of superstructure on the pumping station HiCube Pro is in the operator's responsibility. The load capacity of the high vacuum flange is specific for the used turbopump. The gross weight of superstructure on the pumping station HiCube Pro may **not** exceed 100 kg!

➔ Observe barycentric shifting by using high or lateral protruding superstructure (e.g. vacuum chamber). **Danger of tilting!**

➔ Install the high vacuum flange in accordance with the instructions in the operating manual of the turbopump.

➔ Ensure the greatest possible cleanliness when installing any high vacuum parts. Unclean components prolong the pump-down time.

➔ Observe the minimum strengh of 170 N/mm^2 for the flange material.

5.4 Connecting the exhaust side

CAUTION

High pressure in the exhaust line!

Danger of damage to the seals and danger of the pump bursting.

➔ Install the line without shut-off valves on the exhaust side.

➔ Pumpe nicht mit Überdruck am Einlass betreiben; max. zulässige Drücke und Druckdifferenzen beachten.

➔ Prepare the exhaust line provided by customer starting from the pumping station's casing.

➔ Choose the cross-section of the exhaust line to be at least the size of the nominal connection diameter of the vacuum pump's exhaust connection.

➔ Piping to the pump must be suspended or supported.

– Physical forces from the piping system must not be allowed to act on vacuum pumps.

➔ Lay piping from the pump sloping downward so that no condensate can flow back into the pump; otherwise fit a condensate separator.

– If an air trap is created in the system, then a device for draining condensation water must be provided at the lowest point.

5.5 Connecting to the mains power supply

WARNING

Ensure safe electrical installation

Safe operation after installation is the responsibility of the operator.

➔ Do not independently modify or change the pump and electrical equipment.

➔ Make sure that the system is integrated in an emergency off safety circuit.

➔ Always ensure a safe connection to the protective earthing conductor (PE, protection class I).

➔ Consult Pfeiffer Vacuum for special requirements.

➔ Plug the mains cable into the the mains connection on the rear side of the pumping station and fix it with the clip.

➔ Connect the mains cable to the mains.

5.6 Connecting accessories

NOTE

Installation and operation of accessories

Pfeiffer Vacuum pumps can be equipped with a series of adapted accessories. The installation, operation and maintenance of connected devices are described in detail in the operating instructions of the individual components.

➔ For information on the operating instructions of components, see "Accessories".

➔ Use original accessory parts only.

CAUTION

Dangerous excess temperatures

Process-related high temperatures can result in impermissible excess temperatures and thus damage to the turbopump.

➔ Always use water cooling when a casing heating unit is used or when the pump is connected to a heated vacuum chamber.

- The air cooling serves to the cooling of Pfeiffer Vacuum turbopumps at ambient temperatures of max. + 35 °C.
- A venting valve is installed and connected to the turbopump.

➔ Generally use water cooling if the ambient temperature is > +35 °C.

➔ Connect additional accessories according to the operating manual of the turbopump.

Connecting a measuring device

The connection of a measuring gauge (e.g. Pfeiffer Vacuum ActiveLine) is possible to the display and control unit DCU.

➔ Open the cover of the casing for electronics.

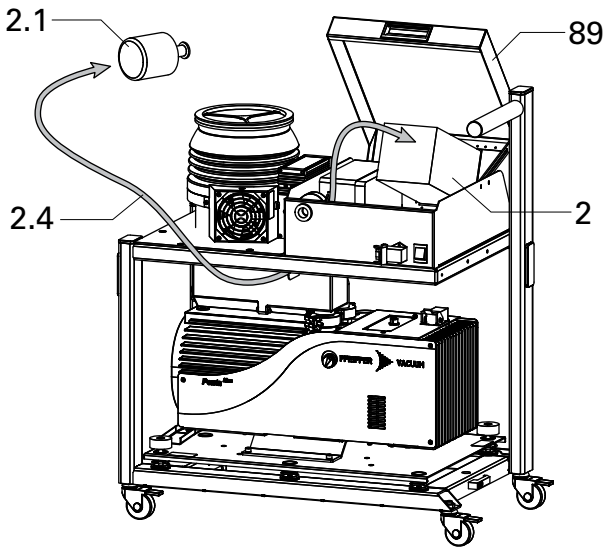


Fig. 6: HiCube Pro, Running a measuring cable

2	Display and control unit	2.4	Measuring cable
2.1	Measuring gauge	89	Cover of casing for electronics

➔ Run the measuring cable into the casing for electronics from below.

➔ Plug the measuring cable in the connection X3 of the DCU.

➔ Settings are possible with the extended parameter set at the DCU.

5.7 Connecting an external turbopump

Depending on the configuration the turbopump can be operated seperately from the pumping station. Please observe the following information!

➔ Install the turbopump according to its operating instructions.

➔ Open the casing of the pumping station if necessary.

➔ Extend necessary control leads for the electronic drive unit of the turbopump using Pfeiffer Vacuum accessories.

➔ Connect the control leads to the electronic drive unit.

NOTE
Operation of the turbopump with the electronic drive unit separatet The operation of the turbopump with a separated electronic drive unit is only possible with by using the respective Pfeiffer Vacuum accessories.

Installing the high vacuum flange

WARNING

Danger of the turbopump being torn-off.

If the rotor is suddenly blocked, torques of up to 620 Nm can occur; if the turbopump is not properly fastened, it can tear-off.

➔ Precisely follow installation instructions.

➔ Only use original components for the installation.

➔ Install the high vacuum flange in accordance with the instructions in the operating manual of the turbopump.

➔ Ensure the greatest possible cleanliness when installing any high vacuum parts. Unclean components prolong the pump-down time.

➔ Observe the minimum strengh of 170 N/mm^2 for the flange material.

Connecting the fore-vacuum side

➔ Extend the fore-vacuum line between turbopump and backing pump.

➔ Connect the fore-vacuum line with small-flange components or threaded hose couplings. Do not narrow the free cross section of the fore-vacuum flange!

➔ With rigid pipe connections: Install bellows for attenuation of vibrations in the connection line.

6 Operation

6.1 Commissioning

The following important settings are programmed in the electronic drive unit ex factory.

- Control max. run-up time: 8 min
- Gas mode: 0 = heavy gases
- Rotation speed switchpoint: 80% of the nominal roation speed
- Venting rotation speed at delayed venting: 50% of the nominal rotation speed
- Venting time: 3600 s

➔ Loosen the transportation lock before first-time starting.

➔ When water cooling is used: Open cooling water supply and check the flow.

➔ When sealing gas is used: Open the sealing gas supply and check the flow.

CAUTION

Danger of the pump being destroyed

Pumping of gases with the molecular mass> 39 in the wrong gas mode can lead to destruction of the pump.

➔ Ensure the gas mode is correctly set.

➔ Contact Pfeiffer Vacuum before using gases with a greater molecular mass (> 80).

Transportation lock

Turbo pumping stations of the HiCube Pro line are equipped with transportation lock for the backing pumps (see label). The transportation lock consists of two opposing knurled screws with spring suspension which fasten the backing pump's bottom plate.

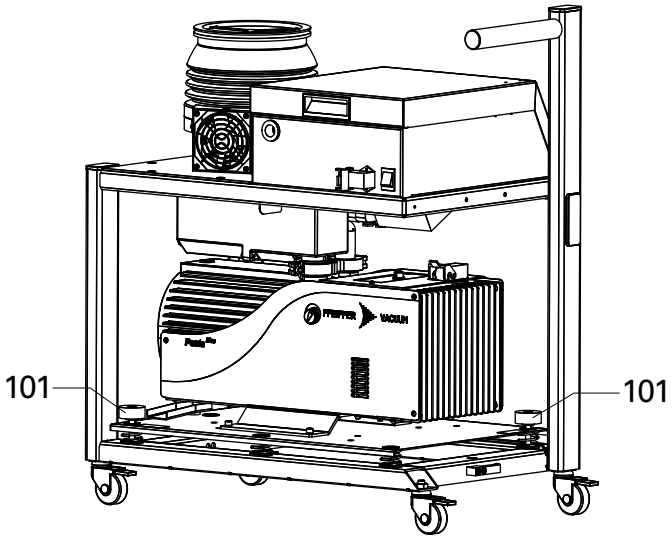


Fig. 7: Transport protection for HiCube Pro

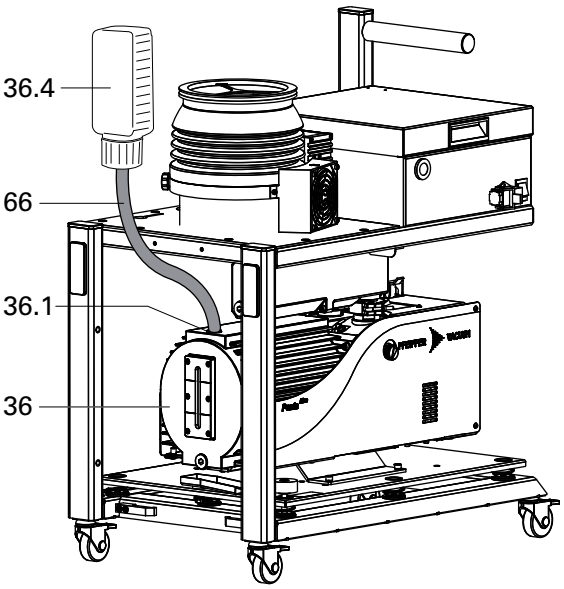
101 Transport protection

➔ Loosen the knurled screw of the transportation lock.
➔ Similarly loosen the transportation lock on the opposite side.

Filling up the operating fluid

Only applies to HiCube with rotary vane pump as backing pump!

- The operating fluid reservoir is already filled and installed for the turbopump.
- The operating fluid for the rotary vane pump is enclosed with the delivery.



36 Backing pump: Rotary vane pump
36.1 Filler opening / Filler screw
36.4 Operating fluid bottle
66 Filler tube

Fig. 8: Filling the backing pump with operating fluid

➔ Unscrew operating fluid filler screw 36.1.
➔ Unscrew the operating fluid bottle's screw plug and screw the filler tube (both included in the equipment pack).
➔ Insert the filler tube into the rotary vane pump's filler opening.
➔ Fill operating fluid according to rotary vane pump operating instructions.
➔ Screw in operating fluid filler screw 36.1.
➔ Check fill level: The correct fill level is between the markings on the sight glass.
– If the fill level has dropped below the "Min" marking, add operating fluid.

6.2 Operation modes

The following operation modes are available:

- Operation via RS485 and Pfeiffer Vacuum display and control units or PC

6.3 Function description

WARNING

Danger due to open high vacuum flange

The rotor of the turbopump turns at high speed. If the high vacuum flange is open, there is a danger of cut injuries and that the pump can be destroyed by objects falling into it.

➔ Never operate the pump with an open high vacuum flange.

Operation with DCU

➔ Consider the following manuals for the operation via Pfeiffer Vacuum display and control units:
- Operating instructions "DCU"
- Operating instructions "Electronic drive unit"

➔ Switch on the mains supply via the main switch.

➔ Switch on the pumping station via button "ON/OFF" on the DCU 002.

➔ Settings are possible with the extended parameter set at the DCU.

6.4 Saving energy

Depending on the power consumption of the turbopump the electronic drive unit controls the backing pump operation (type dependant). A relation to the supplied fore-vacuum pressure is derived from the power consumption. Control of the backing pump can reduce the overall power consumption of the pumping station and the operating temperature of the backing pump as well.

- Standby mode with the XtraDry (preset)
- Standby mode with the PentaLine (configurable)

Standby mode with the XtraDry

Switching thresholds for the standby mode of the XtraDry are preset.

HiCube with turbopump and XtraDry	Switching Off threshold backing pump [P:710]	Switching On threshold backing pump [P:711]
HiPace 80 / TC 110	10 W	20 W
HiPace 300 / TC 400	50 W	70 W
HiPace 400 / TC 400	65 W	110 W
HiPace 700 / TC 400	65 W	110 W

Standby mode with the PentaLine

The switching thresholds for the PentaLine are adjustable via the DCU. Fluctuations in the power consumption of idling turbopumps and type-dependent varying fore-vacuum pressures of the backing pumps require the switching thresholds to be set separately for the standby mode.

➔ Determine the switching thresholds for standby operation with the PentaLine on customer side.

➔ Parameter **[P:794]** = 1 (Displaying the extended parameter set at the DCU)

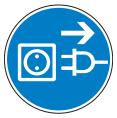
➔ Parameter **[P:025]** = 1

➔ Configure thresholds **[P:710]** and **[P:711]** according to the operating instructions "Electronic Drive Unit".

6.5 Switching off and venting

Switching off

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



WARNING

Risk of electric shock

The pumping station is only free of voltages when the mains plug has been disconnected.

➔ Switch off the master switch and disconnect the mains plug before all work.

➔ Switch off the pumping station via the "ON/OFF" button on the DCU.
➔ Venting.
➔ Switch off the pumping station at the master switch.
➔ For water cooling: Shut off the water supply.

Venting

Venting with Pfeiffer Vacuum Venting Valve

➔ Enable venting via the functions of the electronic drive unit.
➔ Settings are possible via the RS485 by using DCU, HPU or PC.

Venting rotation speed	Switch off the pumping station	Mains power failure[1)]
50% of the nominal rotation speed	Venting valve opens for 3600 s (1 h, works setting)	Venting valve opens for 3600 s (1 h, works setting)

[1)] When mains power is restored the venting procedure is aborted.

Basic information for the rapid venting

Venting of the vacuum chamber in two steps. Ask for details on individual solutions from Pfeiffer Vacuum.

➔ Vent for 20 seconds at a rate of pressure rise of max. 15 mbar/s.
  – The valve cross section for the venting rate of 15 mbar/s must be adapted to the size of the vacuum chamber.
  – For small vacuum chambers, use the Pfeiffer Vacuum venting valve.
➔ Then vent with an additional venting valve of any desired size.

7 Maintenance / replacement

WARNING

Contamination of parts and operating fluid by pumped media is possible.

Poisoning hazard through contact with materials that damage health.

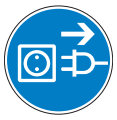
➔ In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.

➔ Decontaminate affected parts before carrying out maintenance work.

NOTE

Disclaimer of liability

Pfeiffer Vacuum accepts no liability for personal injury or material damage, losses or operating malfunctions due to improperly performed maintenance. The liability and warranty entitlement expires.



WARNING

Risk of electric shock

The pumping station is only free of voltages when the mains plug has been disconnected.

➔ Switch off the master switch and disconnect the mains plug before all work.

7.1 Maintenance intervals and responsibilities

- Clean the pumping station externally with a lint-free cloth and little industrial alcohol.
- Carry out the required maintenance on the components of the pumping station in accordance with the instructions in the individual operating manuals.
- Clarify shorter change intervals for extreme loads or impure processes with Pfeiffer Vacuum Service.
- For all other cleaning, maintenance or repair work, please contact your Pfeiffer Vacuum service location.

7.2 Removal of components for their maintenance

In some cases, components may need to be dismantled from the pumping station so that customers can carry out necessary maintenance work on them (they should then be reassembled in reverse order).

Dismantling connections

➔ Switch off the pumping station at the master switch.

➔ Disconnect the mains plug.

➔ Remove the connector plug from the electronic drive unit.

NOTE

Note the factory settings.

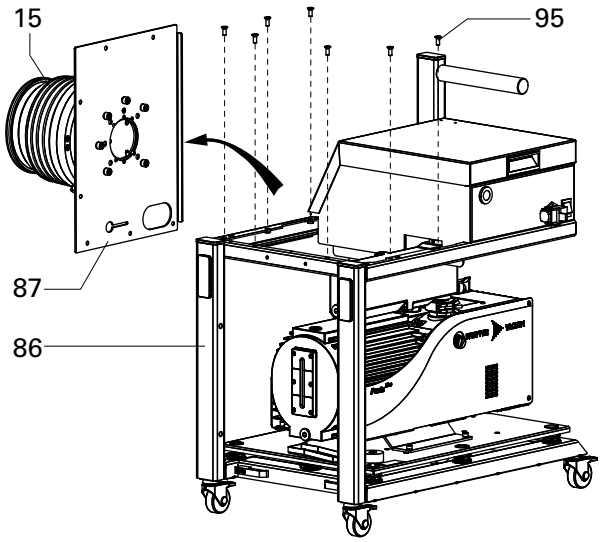
The accessory connections on the turbopump have been preconfigured at the factory. If the control lines on the connector are mixed up, this can cause the pumping station to malfunction or fail.

➔ Do not mix up the control lines.

➔ Accessory connections can be configured for operation with the DCU.

– For more information refer to the operating instructions for the electronic drive unit of the turbopump.

Dismantling of the turbopump



15 Turbopump
86 Frame
87 Mounting plate
95 Allen head screw

Fig. 9: Dismantling of the turbopump

➔ Detach the fore-vacuum line from the turbopump and take it off.
  – Do not kink or damage the fore-vacuum hose.
➔ Unscrew and remove all Allen head screws 95 (7x) from the mounting plate.
  – Tightening torque for the fixing screws when mounted: 33 Nm
➔ Take off the turbopump with the mounting plate from the casing.

The opening in the mounting plate makes it easy for customers to perform maintenance work on the turbopumpturbopump (e.g. change the lubricant reservoir).

7.3 Changing the operating fluid

Only applies to HiCube with rotary vane pump as backing pump!

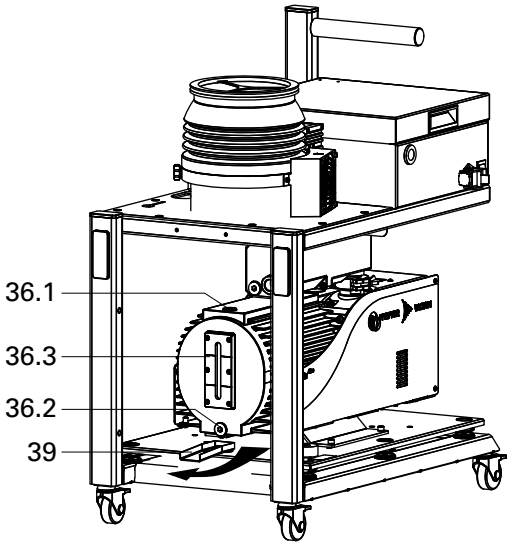
WARNING

Operating fluid may contain toxic substances from the pumped media!

Danger of poisoning from the emission of harmful substances from the operating fluid.

➔ Wear suitable protective clothing and respirators.

➔ Dispose of operating fluid according to the local regulations



36.1 Filling screw
36.2 Drain screw
36.3 Sight glass
39 Operating fluid duct

Fig. 10: Changing the operating fluid for HiCube Pro with rotary vane pum

➔ Swivel out the operating fluid duct from the pumping station frame.

➔ Put a suitable container under the operating fluid duct.

➔ Changing the operating fluid according to the operating instructions of the rotay vane pump.

8 Decommissioning

8.1 Shutting down for longer periods

WARNING

Contamination of parts and operating fluid by pumped media is possible.

Poisoning hazard through contact with materials that damage health.

➔ In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.

➔ Decontaminate affected parts before carrying out maintenance work.

If the pumping station should be shut down for longer than a year:

➔ Remove the pumping station from the system, if necessary.

➔ Change the operating fluid reservoir of the turbopump.

➔ Only store the pumping station indoors at an ambient temperature between -25 °C and +55 °C.

➔ In rooms with moist or aggressive atmospheres, the pumping station must be airproof shrink-wrapped in a plastic bag together with a bag of dessicant.

8.2 Re-starting

CAUTION

Re-starting

The serviceability of the operating fluid of the turbopump without operation is a maximum of 4 years. Before restarting after a shut-down of **4 years or longer**, carry out the following work.

➔ Replace the operating fluid reservoir.

➔ Replace bearings.

➔ Follow the maintenance instructions and inform Pfeiffer Vacuum.

➔ Check pumping station for contamination and moisture.

➔ Clean the pumping station externally with a lint-free cloth and little industrial alcohol.

➔ If necessary, have Pfeiffer Vacuum Service clean the pumping station completely.

➔ Installation and commissioning in accordance with the operating instructions.

8.3 Disposal

Products or parts thereof (mechanical and electrical components, operating fluids, etc.) may cause environmental burden.

➔ Safely dispose of the materials according to the locally applicable regulations.

9 Malfunctions

Malfunctions on the pumping station are usually caused by faults on individual components. Faults are indicated by the LEDs at the electronic drive unit of the turbopump. Alternatively, a fault code can also be output at the display and control unit DCU.

9.1 Rectifying malfunctions

Problem	Possible causes	Remedy
Pumping station will not start; none of the integrated LEDs on the electronic drive unit of the turbopump light up	• Electrical supply interrupted	⇨ Check the plug contacts at the relay box and the power supply unit. ⇨ Check the supply lines of the pumping station. ⇨ Check the output voltage (24 VDC) at the "DC out" terminal of the power supply unit ⇨ Check the plug contacts on the power supply unit
	• Incorrect operating voltage	⇨ Apply correct operating voltage ⇨ Observe the ratings on the type plate.
	• No operating voltage applied	⇨ Apply the correct operating voltage.
	• Electronic drive unit defective	⇨ Replace the electronic drive unit. ⇨ Contact Pfeiffer Vacuum Service.
Pump not achieving the required final pressure	• Condensate in the backing pump	⇨ Open the gas ballast valve at the backing pump.
	• Gas ballast valve open	⇨ Close the gas ballast valve at the backing pump.

- Please refer to the relevant operating manual for information about troubleshooting individual pump components.
- For additional queries, contact Pfeiffer Vacuum Service.

10 Service

Pfeiffer Vacuum offers first-class service!

- Operating fluid and bearing change on the spot by Pfeiffer Vacuum FieldService
- Maintenance / repair in the nearby ServiceCenter or ServicePoint
- Fast replacement with exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information, addresses and forms at: **www.pfeiffer-vacuum.net (Service)**.

Maintenance and repair in the Pfeiffer Vacuum ServiceCenter

The following steps are necessary to ensure a fast, smooth servicing process:

➔ Download the forms "Service Request" and "Declaration on Contamination".[1)]
➔ Fill in the "Service Request" form and send it by fax or e-mail to your service address.
➔ Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.
➔ Fill in the declaration on contamination and include it in the shipment (required!).
➔ Dismantle all accessories.
➔ Drain the operating fluid (applies for turbopumps with pumping speed > 700 l/s).
➔ Leave electronic drive on the pump.
➔ Close the flange openings by using the original protective covers.
➔ If possible, send pump or unit in the original packaging.

Sending of contaminated pumps or devices

No units will be accepted if they are contaminated with micro-biological, explosive or radioactive substances. “Hazardous substances” are substances and compounds in accordance with the hazardous goods directive (current version). If pumps are contaminated or the declaration on contamination is missing, Pfeiffer Vacuum performs decontamination at the shipper's expense.

➔ Neutralise the pump by flushing it with nitrogen or dry air.
➔ Close all openings airtight.
➔ Seal the pump or unit in suitable protective film.
➔ Return the pump/unit only in a suitable and sturdy transport container and send it in while following applicable transport conditions.

Exchange unit

The factory operating parameters are always preset with exchange units. If you use changed parameters for your application, you have to set these again.

Service orders

All service orders are carried out exclusively according to our repair conditions for vacuum units and components.

1) Forms under www.pfeiffer-vacuum.net

11 Spare parts HiCube Pro

Please also specify model number of the the rating plate when ordering accessories or spare parts.

Refer to the operating manuals for the individual components.

12 Technical data

12.1 HiCube 80 Pro

Parameter	HiCube 80 Pro, DN 40 ISO-KF, XtraDry 150	HiCube 80 Pro, DN 63 ISO-K, XtraDry 150	HiCube 80 Pro, DN 63 CF-F, XtraDry 150
Flange (in)	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Flange (out)	G 1/2"	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air	Air
Power consumption max.	660 W	660 W	660 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %	5-85, non condensing %
Weight	69.2 kg	69.2 kg	70.6 kg

Parameter	HiCube 80 Pro, DN 40 ISO-KF, PentaLine 10	HiCube 80 Pro, DN 63 ISO-K, PentaLine 10	HiCube 80 Pro, DN 63 CF-F, PentaLine 10
Flange (in)	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Flange (out)	G 1/2"	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air	Air
Power consumption max.	665 W	665 W	665 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %	5-85, non condensing %
Weight	81.2 kg	81.2 kg	82.6 kg

Parameter	HiCube 80 Pro, DN 40 ISO-KF, PentaLine 20	HiCube 80 Pro, DN 63 ISO-K, PentaLine 20	HiCube 80 Pro, DN 63 CF-F, PentaLine 20
Flange (in)	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Flange (out)	G 1/2"	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air	Air
Power consumption max.	1100 W	1100 W	1100 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %	5-85, non condensing %
Weight	82.2 kg	82.2 kg	83.6 kg

Parameter	HiCube 80 Pro, DN 40 ISO-KF, PentaLine 35	HiCube 80 Pro, DN 63 ISO-K, PentaLine 35	HiCube 80 Pro, DN 63 CF-F, PentaLine 35
Flange (in)	DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Flange (out)	G 1/2"	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air	Air
Power consumption max.	1585 W	1585 W	1585 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %	5-85, non condensing %
Weight	84.2 kg	84.2 kg	85.6 kg

12.2 HiCube 300 Pro

Parameter	HiCube 300 Pro, DN 100 ISO-K, XtraDry 150	HiCube 300 Pro, DN 100 CF-F, XtraDry 150
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	850 W	850 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	74 kg	76 kg

Parameter	HiCube 300 Pro, DN 100 ISO-K, PentaLine 10	HiCube 300 Pro, DN 100 CF-F, PentaLine 10
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	855 W	855 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	86 kg	88 kg

Parameter	HiCube 300 Pro, DN 100 ISO-K, PentaLine 20	HiCube 300 Pro, DN 100 CF-F, PentaLine 20
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	1290 W	1290 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	87 kg	89 kg

Parameter	HiCube 300 Pro, DN 100 ISO-K, PentaLine 35	HiCube 300 Pro, DN 100 CF-F, PentaLine 35
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	1775 W	1775 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	89 kg	91 kg

12.3 HiCube 400 Pro

Parameter	HiCube 400 Pro, DN 100 ISO-K, XtraDry 150	HiCube 400 Pro, DN 100 CF-F, XtraDry 150
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	970 W	970 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	79.4 kg	85.3 kg

Parameter	HiCube 400 Pro, DN 100 ISO-K, PentaLine 10	HiCube 400 Pro, DN 100 CF-F, PentaLine 10
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	975 W	975 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	91.4 kg	97.3 kg

Parameter	HiCube 400 Pro, DN 100 ISO-K, PentaLine 20	HiCube 400 Pro, DN 100 CF-F, PentaLine 20
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	1410 W	1410 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	92.4 kg	98.3 kg

Parameter	HiCube 400 Pro, DN 100 ISO-K, PentaLine 35	HiCube 400 Pro, DN 100 CF-F, PentaLine 35
Flange (in)	DN 100 ISO-K	DN 100 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	1895 W	1895 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	94.4 kg	100.3 kg

12.4 HiCube 700 Pro

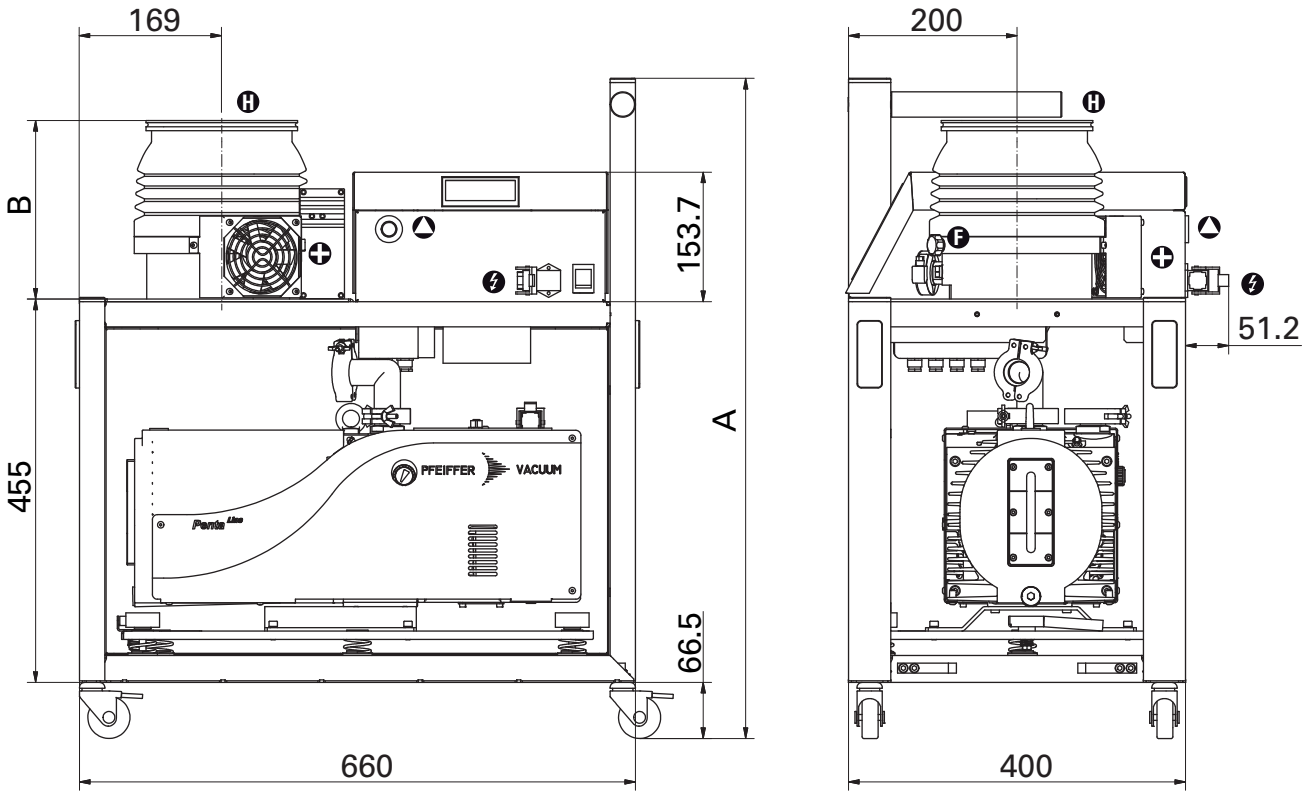
Parameter	HiCube 700 Pro, DN 160 ISO-K, XtraDry 150	HiCube 700 Pro, DN 160 CF-F, XtraDry 150
Flange (in)	DN 160 ISO-K	DN 160 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	970 W	970 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	79.8 kg	85.7 kg

Parameter	HiCube 700 Pro, DN 160 ISO-K, PentaLine 10	HiCube 700 Pro, DN 160 CF-F, PentaLine 10
Flange (in)	DN 160 ISO-K	DN 160 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	975 W	975 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	91.8 kg	97.7 kg

Parameter	HiCube 700 Pro, DN 160 ISO-K, PentaLine 20	HiCube 700 Pro, DN 160 CF-F, PentaLine 20
Flange (in)	DN 160 ISO-K	DN 160 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	1410 W	1410 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	92.8 kg	98.7 kg

Parameter	HiCube 700 Pro, DN 160 ISO-K, PentaLine 35	HiCube 700 Pro, DN 160 CF-F, PentaLine 35
Flange (in)	DN 160 ISO-K	DN 160 CF-F
Flange (out)	G 1/2"	G 1/2"
Ultimate pressure	$1 \cdot 10^{-7}$ mbar	$5 \cdot 10^{-10}$ mbar
Cooling method, standard	Air	Air
Power consumption max.	1895 W	1895 W
Relative humidity of air	5-85, non condensing %	5-85, non condensing %
Weight	94.8 kg	100.7 kg

13 Dimensions



Maße	HiCube 80 Pro, DN 40 ISO-KF	HiCube 80 Pro, DN 63 ISO-K	HiCube 80 Pro, DN 63 CF-F
A	679.5 mm	670.5 mm	676.5 mm
B	158 mm	149 mm	155 mm

Maße	HiCube 300 Pro	HiCube 400 Pro	HiCube 700 Pro
A	716.5 mm	760.5 mm	733.5 mm
B	195 mm	239 mm	212 mm

Declaration of conformity

according to the EC directive:

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

We hereby declare that the product cited below satisfies all relevant provisions of EC directive "Machinery" **2006/42/EC**.

In addition, the product cited below satisfies all relevant provisions of EC directive "Electromagnetic Compatibility" **2004/108/EC** .

The agent responsible for compiling the technical documentation is Mr. Jörg Stanzel, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Aßlar.

HiCube Pro

Guidelines, harmonised standards and national standards and specifications which have been applied:

DIN EN ISO 12100-1 : 2004	DIN EN 61000-3-2 : 2008
DIN EN ISO 12100-2 : 2004	DIN EN 61000-3-3 : 2006
DIN EN ISO 14121-1 : 2007	DIN EN 61326-1 : 2006
DIN EN 1012-2 : 1996	DIN EN 62061 : 2005
DIN EN 61010-1 : 2002	

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CE/2010

PFEIFFER VACUUM

Vacuum is nothing, but everything to us!

Turbopumps

Rotary vane pumps

Roots pumps

Dry compressing pumps

Leak detectors

Valves

Components and feedthroughs

Vacuum measurement

Gas analysis

System engineering

Service

PFEIFFER VACUUM

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