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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 refers 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.com.

Applicable documents

<table>
<thead>
<tr>
<th>HiPace 1800</th>
<th>Operating instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating instructions &quot;Electronic drive unit TC 1200*&quot;</td>
<td>PT 0239 BN*</td>
</tr>
<tr>
<td>Declaration of conformity</td>
<td>Part of this document</td>
</tr>
</tbody>
</table>

*also available via www.pfeiffer-vacuum.com

1.2 Conventions

Safety instructions

The safety instructions in Pfeiffer Vacuum operating instructions 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:

<table>
<thead>
<tr>
<th>Hazard Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER</td>
<td>Imminent danger</td>
</tr>
<tr>
<td></td>
<td>Indicates an imminent hazardous situation that will result in death or serious injury.</td>
</tr>
<tr>
<td>WARNING</td>
<td>Possibly imminent danger</td>
</tr>
<tr>
<td></td>
<td>Indicates an imminent hazardous situation that can result in death or serious injury.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>Possibly imminent danger</td>
</tr>
<tr>
<td></td>
<td>Indicates an imminent hazardous situation that can result in minor or moderate injury.</td>
</tr>
<tr>
<td>NOTICE</td>
<td>Command or note</td>
</tr>
<tr>
<td></td>
<td>Command to perform an action or information about properties, the disregarding of which may result in damage to the product.</td>
</tr>
</tbody>
</table>
About this manual

Pictographs

Prohibition of an action to avoid any risk of accidents, 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

Important information about the product or this document

Instructions in the text

>>> Work instruction: here you have to do something.

Abbreviations

DCU: Display Control Unit
HPU: Handheld Programming Unit
TC: Electronic drive unit for turbopump
PB: Profibus version
DN: DeviceNet version

Symbols used

The following symbols are used consistently throughout the diagrams:

High vacuum flange
Fore-vacuum flange
Electric connection
Cooling water connection
Venting connection
Sealing gas connection
2 Safety

2.1 Safety precautions

Duty to inform
Each person involved in the installation, operation or maintenance of the vacuum pump must read and observe the safety-related parts of these operating instructions.

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

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 order numbers of components, see “Accessories”.
⇒ Use original accessory parts only.

NOTICE

Checking the safety system against excess rotation speed
To provide the functioning of the integrated safety system for avoiding excess rotation speed, the pump must run-up from the standstill at least once a year.

⇒ Switch off the pump and await the complete standstill (rotation speed = 0 Hz).
⇒ Run-up the pump according to this operating instructions.

WARNING

Danger of unsafe 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.
⇒ Consult Pfeiffer Vacuum for special requirements.

WARNING

Danger due to lack of power disconnection device
Pump and electronic drive unit are not equipped with a power disconnection device. Installation of a user-supplied power disconnection device in accordance with SEMI-S2.

⇒ Fit a circuit breaker with an interruption rating of min. 10,000 A.

WARNING

Danger of electric shock
In case of defect, the parts connected to the mains supply are under voltage.

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

⇒ Do not expose any body parts to the vacuum.
⇒ Observe all safety and accident prevention regulations.
⇒ Regularly check the proper observance of all safety measures.
⇒ Always ensure a safe connection to the protective earthing conductor (PE, protection class I).
⇒ Do not loosen any plug connection during operations.
⇒ Wait for the rotor to reach standstill before performing 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 operate the turbopump with open high vacuum flange.
Do not carry out any unauthorized modifications or conversions to the pump.
When returning the turbopump observe the shipping instructions.

2.2 Protective equipment

Determined situations concerning the handling of vacuum pumps require wearing of personal protective equipment. The owner, respectively the employer are obligated to provide an adequate equipment to any operating persons.

DANGER

Danger to health by hazardous substances during maintenance or installation
Depending on the process vacuum pumps, components or operating fluids can be contaminated by toxic, reactive or radioactive substances.

→ Wear adequate protective equipment during maintenance and repairs or in case of reinstallation.

WARNING

Risk of injury through falling objects
When transporting vacuum pumps by hand, there is a danger through loads slipping and falling down.

→ Carry small and mid-size vacuum pumps two-handed.
→ Carry vacuum pumps > 20 kg by a suitable lifting device.
→ Wear safety shoes with steel toe cap according to directive EN 347.

CAUTION

Risk of injury through hot surfaces
Vacuum pumps can become hot during operation.

→ Allow the pump to cool before maintenance and repairs.
→ If necessary wear protective gloves according to EN 420.

CAUTION

Risk of injury through sharp edges
Rotor and stator disks of turbopumps have very sharp edges.

→ Before any working wait for the complete standstill of the pump.
→ Do not reach in the high vacuum flange.
→ If necessary wear protective gloves according to EN 420.

NOTICE

EC 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.

→ The vacuum pump may only be used to generate a vacuum.
→ Only operate the turbopump with an approved backing pump.
2.4 Improper use

Improper use will cause all claims for liability and warranties to be forfeited. Improper use is defined as usage for purposes deviating from those mentioned above, especially:

- transport, installation or operation of the pump in invalid orientation
- pumping of corrosive gases (exception: pumps in C version)
- pumping of corrosive gases without sealing gas (only pumps in C version)
- pumping of explosive media
- pumping of condensing vapors
- operation with improper high gas throughput
- 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
- operation of the devices in areas with ionizing radiation
- operation in potentially explosive areas
- use of the devices in systems in which impact-like stress and vibrations or periodic forces affect the devices
- use of accessories or spare parts, which are not named in this manual
- fixing the pump at its bottom part

**Closure seal**

The product is sealed at the factory. Damaging or removal of a closure 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

Two pieces of eye bolts are screwed with the pump on delivery.

![Notice]

**NOTICE**

Observe type-specific mounting orientations!
Incorrect mounting orientations result in contamination of the process vacuum or damage to the pump.
- Pay attention to the properties after the model designation on the name plate!
- Observe the pictographs on the pump housing!
- Do not transport or tilt the pump filled with operating fluid!

---

![Fig. 1: Transport of HiPace 1800](#)

![Fig. 2: Transport of HiPace 1800 U](#)

---

**WARNING**

Danger from falling and swinging loads!
When lifting the pump there is a danger of falling parts.
- Make sure that there are no persons under the suspended load.
- Close off and supervise the area under the pump.
- Only transport the turbopump in the valid orientation and with vertical rotor axis.
- Fix a suitable lifting device on both eye bolts.
  - Observe the approved fixing (e.g. maximum opening angle towards the longitudinal axis of the pump).
  - Do not lift any additional weights (e.g. vacuum chamber).
- Lift the pump perpendicularly out of the packing.
- Reuse the transport container of the vacuum pump.
  - Transport or ship vacuum pumps in the original packing preferably.
- Only remove the protective covers from the high vacuum and the fore-vacuum side immediately before connection.
- Keep the original protective covers.
- After the transport the eye bolts can be removed.

3.2 Storage

- Close the flange openings by using the original protective covers.
- Close further connection ports by using the corresponding protective covers.
- Store the pump only indoors at temperatures between -25 °C and +55 °C.
- In rooms with moist or aggressive atmospheres, the pump must be airproof shrink-wrapped in a plastic bag together with a bag of desiccant.
4 Product description

4.1 Product identification

Pump types

The product designation consists of a family designation (1), the size (2), which is oriented on the pumping speed, and if applicable the additional properties (3) of the pump.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HiPace</td>
<td>1800</td>
<td>none = Standard version</td>
</tr>
</tbody>
</table>

HiPace (1) 1800 (2) U C (3)

Pump features

This product has been tested to the requirements of CAN/CSA-C22.2 No. 61010-1, second edition, including Amendment 1, or a later version of the same standard incorporating the same level of testing requirements.

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

- www.tuvdotcom.com
- TUVdotCOM-ID 0000021320

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

Fig. 3: Example for a rating plate

Variants

- HiPace 1800
- HiPace 1800 C, corrosive gas version
- HiPace 1800 U, for upside-down installation orientation
- HiPace 1800 U C, for upside-down installation orientation and corrosive gases

Scope of delivery

- Turbopump with electronic drive unit and integrated power supply
- Protective cover for the high vacuum flange and the fore-vacuum flange
- Mating plug for the connection "remote" on the TC 1200 (type dependent)
- Mating plug for the connection "E74" on the TC 1200 (type dependent)
- HAN3A socket for mains power supply
- Sealing gas valve
- Operating fluid (50 ml) with filling syringe
- Screw-in nozzle (2x) with seal ring for cooling water connection

Characteristics HiPace 1800

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HiPace 1800</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV flange</td>
<td>DN 200 ISO-K, DN 200 ISO-F</td>
</tr>
<tr>
<td>Flange material</td>
<td>Aluminium, Aluminium</td>
</tr>
</tbody>
</table>

Made in Germany

D-35614 Asslar
Product description

- Eye bolts
- Operating instructions
4.2 Function

The turbopumps HiPace 1800 form a complete unit together with the electronic drive unit. The voltage is supplied via the integrated power supply pack.

**Cooling**
- Water cooling

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

**Rotor bearing**
- Hybrid bearing turbopump
  - High vacuum side: maintenance-free permanent magnetic bearing
  - Fore-vacuum side: ceramic ball bearing

**Drive**
- Electronic drive unit TC 1200
### 4.3 Range of application

The pump HiPace 1800 must be installed and operated under the following ambient conditions:

<table>
<thead>
<tr>
<th>Installation location</th>
<th>weather protected (indoors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection class</td>
<td>IP 54</td>
</tr>
<tr>
<td>Temperature</td>
<td>+5 °C to +40 °C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>max. 80 %, at T ≤ 31 °C, to max. 50 % at T ≤ 40 °C</td>
</tr>
<tr>
<td>Atmospheric pressure</td>
<td>750 hPa - 1060 hPa</td>
</tr>
<tr>
<td>Installation altitude</td>
<td>2000 m max.</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>2</td>
</tr>
<tr>
<td>Permissible surrounding magnetic field</td>
<td>≤ 7 mT</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>II</td>
</tr>
<tr>
<td>Connection voltage</td>
<td>100-120/200-240 (± 10%) V AC</td>
</tr>
</tbody>
</table>

**Remarks to ambient conditions**

The specified permissible ambient temperatures apply to operation of the turbopump at maximum permissible fore-vacuum pressure or at maximum gas throughput depending on the cooling method. The turbopump is intrinsically safe by a redundant temperature monitoring.

- By reducing the fore-vacuum pressure or gas throughput, the turbopump can be operated at higher ambient temperatures.
- If the maximum permissible operating temperature of the turbopump is exceeded, the electronic drive unit reduces drive power first and switches off then, if necessary.
5 Installation

5.1 Set-up

When installing the pump, observe the following conditions:

- the ambient conditions specified for the range of application
- The attachment of the pump at its bottom part is not permitted.
- 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 turbopump.
- Where magnetic fields > 7 mT are involved, a suitable shielding must be used. Check installation location and consult Pfeiffer Vacuum if needed!
- The maximum permissible rotor temperature for the turbopump is 120 °C. If high temperatures arise for process reasons, the radiated heat input must not exceed 24 W. Install suitable screening sheets, if necessary (design information on request).

5.3 Assembly

- Ensure the greatest possible cleanliness when installing any high vacuum parts. Unclean components prolong the pump-down time.
- All flange components must be grease-free, dust-free and dry at installation.
Earthquake safety

An earthquake can result in contact with the safety bearings. All forces occurring hereby are safely absorbed by the properly installed flange connections.

→ Secure the vacuum chamber against shifting and tipping on customers side.

![Diagram of vacuum chamber with safety bearings highlighted.](image)

Fig. 5: Example: How to secure against shifting and tipping by external tremors

Use of a splinter shield or protection screen

Pfeiffer Vacuum centering rings with splinter shield or protection screen in the high vacuum flange protect the turbopump against foreign bodies coming from the chamber. Thus, the pumping speed of the pump is reduced.

<table>
<thead>
<tr>
<th></th>
<th>Volume flow rate reduction in %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H₂</td>
</tr>
<tr>
<td>Splinter shield DN 200</td>
<td>10</td>
</tr>
<tr>
<td>Protection screen DN 200</td>
<td>3</td>
</tr>
</tbody>
</table>

Vibration damper

**WARNING**

Danger from the turbopump and vibration damper being torn-off

In case of sudden blocking of the rotor, an applied vibration damper cannot compensate any of the occurring forces. There is a danger of the turbopump being torn-off and thereby resulting severest injuries and property damages. Applicable safeguards must be taken to compensate possible occurring torques.

→ Definitely consult with Pfeiffer Vacuum.

→ Do not exceed the max. permissible temperature at the vibration damper (100 °C).

Mounting orientation

**NOTICE**

Observe type-specific mounting orientations!

Incorrect mounting orientations result in contamination of the process vacuum or damage to the pump.

→ Pay attention to the properties after the model designation on the name plate!

→ Observe the pictographs on the pump housing!

→ Do not transport or tilt the pump filled with operating fluid!
Horizontal mounting orientation

For horizontal installation, the fore-vacuum flange must point vertically downward (± 25°), since otherwise the turbopump can be contaminated.

Support pipes in front of the vacuum pump or remove them. No force from the pipe system may be exerted on the fixed pump.

The maximum axial loading capacity of the high vacuum flange is 2000 N (equals 200 kg). A one-sided load on the high vacuum flange is not permitted.

Installing the high vacuum flange

If the rotor is suddenly blocked, the torques arising from the system and the high vacuum flange must be absorbed. Only the components listed in the following can be used to fasten the turbopumps to the high vacuum flange. The installation elements for turbopumps are special designs by Pfeiffer Vacuum. In all operating conditions, the tensile strength of the flange material must be at least 170 N/mm².

DANGER

Danger to life - impermissible fastening

Twisting or tearing-off is possible in case the rotor is suddenly blocked due to the fastening of pumps on a vacuum chamber with different flange variants.

Use only the correct mounting kit from Pfeiffer Vacuum.

Pfeiffer Vacuum will not accept any liability for all damages resulting from impermissible fastening.
Installation

NOTICE

Observe shape tolerances for the counter flange
Unevennesses of the customer supplied counter flange can lead to warping of the pump casing despite proper fastening. Leakiness and negative running characteristics can be the result.

Do not exceed an evenness of max. 0.05 mm for the whole surface.

Mounting of ISO flanges
If the rotor suddenly blocks the connection of high vacuum flanges of types ISO-KF or ISO-K can lead to twisting despite proper installation.

The tightness of the high vacuum flange is not at risk thereby.

Installation of ISO-K flange with ISO-K flange

For the installation the following components are exclusively authorized:

- the valid mounting kit of the Pfeiffer Vacuum accessories programme
- protection screen or splinter shield are optionally

Mind that the sealing surfaces are not damaged.

Connect the flanges according to the drawing and with the component parts of the mounting kit.

Use the required number of 24 claw clamps.

Tighten the claw clamps crosswise in three steps.

Tightening torque: 5, 15, 25 ± 2 Nm

Installation of ISO-F with ISO-F flange

The connection types for installation of ISO-F to ISO-F flange are "hex screw and threaded hole," "stud screw and threaded hole," and "stud screw and through hole".

- the valid mounting kit of the Pfeiffer Vacuum accessories programme
- protection screen or splinter shield are optionally

Hexagon screw and threaded hole

Mind that the sealing surfaces are not damaged.

Connect the flanges according to the drawing and with the component parts of the mounting kit.

Use the required number of 12 hex screws with washer.

Screw hex screws 1.5 x d into the threaded holes.

- The tensile strength of the flange material must be at least 270 N/mm² in all operating conditions.

Tighten the hex screws crosswise in three steps.

Tightening torque DN 200: 10, 20, 38 ± 3 Nm

Stud screw and threaded hole

Mind that the sealing surfaces are not damaged.

Connect the flanges according to the drawing and with the component parts of the mounting kit.

Use the required number of 12 stud screws and nuts.

Screw in the stud screws with the shorter threaded end 2.5 x d in the bore holes on the counter flange.

Tighten the nuts crosswise in three steps.

Tightening torque DN 200: 10, 20, 38 ± 3 Nm
Stud screw and through hole

- Mind that the sealing surfaces are not damaged.
- Connect the flanges according to the drawing and with the component parts of the mounting kit.
- Use the required number of 12 stud screws and nuts.
- Tighten the nuts crosswise in three steps.
- Tightening torque DN 200: 10, 20, 38 ± 3 Nm

5.4 Filling up the operating fluid

### WARNING

**Toxic vapours!**
Danger of poisoning when igniting and heating synthetic operating fluids (e.g. F3) above 300 °C.

- Observe the application instructions.
- Do not allow operating fluid to make contact with tobacco products; observe safety precautions when handling chemicals.

### NOTICE

**Danger of the pump being destroyed**
The pump can be destroyed by missing or deficient operating fluid supply.

- Fill the pump with the adequate amount of operating fluid, before starting up for the first time after each transport.
- Do not mix-up filler and draining screws!
- For type and amount of the operating fluid please refer to the rating plate.

### NOTICE

**Danger of the pump being destroyed**
The filling capacity of operating fluid depends on the orientation of the mounted vacuum pump.

- Only fill in the operating fluid, when the vacuum pump is mounted.
- The operating fluid capacity for a vertically mounted pump is 40 ml.
- The operating fluid capacity for a horizontally mounted pump must be 50 ml!

---

Fig. 8: Removing the protective cover of the operating fluid pump at standard and U-versions

- Turn off the vacuum pump, vent to atmospheric pressure and allow to cool.
- Screw out the allen head screws (2x) of the operating fluid pump and remove the protective cover.
Installation

Design of the operating fluid pump

The operating fluid pump is largely mirror symmetrical. The screws for filling the operating fluid are located at the sides of the operating fluid pump. The screws for draining the operating fluid are located at the front of the operating fluid pump.

- Always use the higher positioned screw for filling.
- Always use the lower positioned screw for draining.
- Never fill via the draining screws.

Fig. 9: Filling the operating fluid with vertical and horizontal installation orientation

8.23a Filler screw
8.23b Drain screw (do not use for filling!)

- Unscrew the respectively higher positioned filler screw 8.23a of the operating fluid pump.
- Fill in the operating fluid (max. 50 ml) into the operating fluid pump by using the filling syringe.
- Lock the filler screw 8.23a again.
  - Observe the O-ring 8.35!

5.5 Connections to the turbopump

Electronic drive unit

Turbopumps with integrated electronic drive unit are designed for various applications. Therefore different connection panels are available.

- TC 1200 in standard version
- TC 1200 PB for Profinet linking
- TC 1200 E74 in dependence on specification SEMI E74
- TC 1200 DN for DeviceNet linking

Detailed description for function, configuration and operation with the respective connection panel are given in the specific operating instructions for the electronic drive unit.

Electrical connection

WARNING

Danger of unsafe 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.
- Consult Pfeiffer Vacuum for special requirements.

Fig. 10: Pin assignment of the mains connection plug

1 Phase L
2 Neutral conductor
3 n.c.
PE Protective earth

- Order the mains cable separately (see "accessories").
Remote plug

The shipment includes a mating plug for the 26-pin connection with the designation "remote" on the TC 1200. The mating plug bridges the following connections with the supply voltage (Pin 1), allowing the turbopump to operate without an additional operating unit or remote control:

- Pin 2, Enable venting "on"
- Pin 3, Motor pump "on"
- Pin 4, Pumping station "on"
- Pin 14, Remote access request

Place and fix the mating plug on the connection "remote" on the TC 1200.

CAUTION

Automatic start
After bridging the contacts Pin 1, 3, 4, 14 on the connection "remote" or using the mating plug supplied and setting up the supply voltage, the turbopump will run up immediately.

Switch on the mains supply on the turbopump immediately before operation.

Accessory connection

Up to 4 accessories can be connected to the electronic drive unit TC 1200. M12 sockets with the designation "accessory" are available for this purpose. The accessory connections have been preconfigured at the factory. If the units listed below are connected with the preconfigured connection, they are immediately ready for operation according to the factory settings. It is possible to connect other accessories; to do so, settings must be made on the electronic drive unit.

To connect two units to one accessory connection, use the appropriate Y-Connector from the Pfeiffer Vacuum range of accessories.

Connect the adapter to the appropriate red-coded connection on the TC 1200.

Settings can be made via the interfaces of the TC 1200 (remote, RS-485, Profibus or DeviceNet).

<table>
<thead>
<tr>
<th>Accessory connection</th>
<th>Connection with Y-connector</th>
<th>Preset accessory unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory A1</td>
<td>Acc. A to Y-1</td>
<td>Sealing gas valve</td>
</tr>
<tr>
<td>Accessory A2</td>
<td>Acc. A to Y-2</td>
<td>Backing pump</td>
</tr>
<tr>
<td>Accessory B1</td>
<td>Acc. B to Y-1</td>
<td>Venting valve</td>
</tr>
<tr>
<td>Accessory B2</td>
<td>Acc. B to Y-2</td>
<td>Casing heating unit</td>
</tr>
</tbody>
</table>

Table 1: Overview of factory preset accessory connections on the TC 1200
Connecting the fore-vacuum side

**Recommendation:** As backing pump, use a suitable vacuum pump from the Pfeiffer Vacuum programme.

---

**WARNING**

**Damage to health due to poisonous gases**

Process gases can damage health and contaminate the environment.

- Safely lead away the gas emission from the backing pump!
- Observe all safety recommendations of the gas producer.

---

**NOTICE**

**Design of the fore-vacuum connection regarding sudden twisting of the pump**

If the rotor suddenly blocks the connection of high vacuum flanges of types ISO-KF or ISO-K can lead to twisting despite proper installation.

- Keep masses small, which can be installed directly to the pump.
- Connect flexible line elements directly to the turbopump, if necessary.

- With rigid pipe connections: Install bellows for attenuation of vibrations in the connection line.
- 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!
- The backing pump is connected electrically via a relay box.
- Plug in and fix the accessory’s control lead to the corresponding accessory connection port on the electronic drive unit.
- Default for the backing pump is "accessory A2".
- Establish the mains supply for the relay box according to the accessory operating instructions.
  - Make sure the supply voltage for the backing pump is valid.
- Make the settings and control via the interfaces of the electronic drive unit.

---

Fig. 11: Connecting the backing pump

415 Fore-vacuum connection 415b Backing pump relay box 415.1 Centering ring
415a Backing pump 415.2 Clamping ring

---
**Venting valve**

The Pfeiffer Vacuum venting valve is used for automatic venting in case of shut-down or power failure. The permissible connection pressure is max. 1500 hPa absolute.

Fig. 12: Connecting the venting valve

- Unscrew the venting screw with seal ring from the venting connection.
- Screw in the venting valve with seal ring.
- Plug in and fix the accessory’s control lead to the corresponding accessory connection port on the electronic drive unit.
- Default for the venting valve is "accessory B1".
- If necessary install a venting gas supply (e.g. inert gas) to the intake (G 1/8") of the solenoid valve.

**Sealing gas connection**

The turbopump must be operated with sealing gas to protect it, such as in the case of unclean processes or high gas throughput. The supply is made via a sealing gas valve or alternatively via a sealing gas throttle without control. The activation of the control valve for the sealing gas connection is pre-installed in the electronic drive unit. The sealing gas valve is already part of the delivery consignment. The permissible connection pressure is max. 1500 hPa absolute.

- When operating the pump with more than 50 % of the maximum gas throughput, sealing gas must be used to ensure rotor cooling.
- The sealing gas flow rate amounts 17.5-20 sccm for the HiPace 1800.

**Sealing gas supply without control valve**

Fig. 13: Connecting the sealing gas throttle

- Unscrew the locking screw with seal ring out of the sealing gas connection.
- Screw the sealing gas throttle with sealing ring into the sealing gas connection.
Sealing gas supply with control valve

![Diagram of sealing gas supply with control valve]

**Fig. 14: Connecting the sealing gas valve**

17 Seal ring  
18 Locking screw  
145 Sealing gas valve

- Unscrew the locking screw with seal ring out of the sealing gas connection.
- Screw the sealing gas valve with seal ring into the sealing gas connection.
- Insert the control cable of the accessory into a free accesso connector on the TC 1200 and tighten.
- Make the settings and control via the interfaces of the electronic drive unit.
- Install the sealing gas supply (e.g. inert gas) via a connection adapter or on the inlet side (G 1/8") of the control valve.
**Water cooling**

The turbopumps HiPace 1800 with TC 1200 have water cooling as standard equipment.

### Cooling water requirements

<table>
<thead>
<tr>
<th>Cooling water connection</th>
<th>Hose nozzles G 1/4”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hose lines</td>
<td>Internal diameter 7-8 mm with hose clamp</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cooling water quality</th>
<th>filtrated, mechanically clean, optically clear, no turbidity, no sediments, chemically neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen content max.</td>
<td>4 mg/kg</td>
</tr>
<tr>
<td>Chloride content max.</td>
<td>100 mg/kg</td>
</tr>
<tr>
<td>Water hardness max.</td>
<td>10 °dH 12.53 °e 17.8 °fH 178 ppm CaC0₃</td>
</tr>
</tbody>
</table>

| Consumption of potassium permanganate max. | 10 mg/kg |
| Carbon dioxide content max. | undetectable |
| Ammonia content max. | undetectable |
| pH-value | 7 - 9 |
| Fore-line overpressure max. | 6000 hPa |
| Cooling water temperature | refer to “Technical Data” |
| Cooling water consumption at max. gas throughput | refer to “Technical Data” |

### Connecting to a cooling water system

1. **Connect the cooling water connection alternatively:**
   - Direct connection on the pump with G1/4” internal thread.
   - Using screw-in nozzles with seal ring (2 pcs. each in the scope of delivery) for hose internal diameters of 7 - 8 mm.
   - Tightening torque: max. 15 Nm.

2. **Recommendation:** install dirt trap in the fore-line.
3. Connect the cooling water fore-line to the designated connector.
4. Connect the cooling water return-line to the designated connector.

![Fig. 15: Connecting the cooling water](image-url)
6  Operation

6.1  Commissioning

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

- Parameter [P:027] Gas mode: 0 = heavy gases
- Parameter [P:700] Set value max. run-up time monitoring: 8 min
- Parameter [P:701] Rotation speed switchpoint: 80% of the nominal rotation speed
- Parameter [P:707] Set value in rotation speed setting mode: 65 % of the nominal rotation speed
- Parameter [P:708] Set value power consumption: 100 %
- Parameter [P:720] Venting rotation speed at delayed venting: 50 % of the nominal rotation speed
- Parameter [P:721] Venting time: 3600 s

⇒ 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.
⇒ Switch on the pump by connecting the mains cable with the mains supply.

Connecting to the mains power supply

NOTICE

Danger of the pump being destroyed
Pumping of gases with a higher molecular mass 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).

CAUTION

Automatic start
After bridging the contacts Pin 1, 3, 4, 14 on the connection "remote" or using the mating plug supplied and setting up the supply voltage, the turbopump will run up immediately.
⇒ Switch on the mains supply on the turbopump immediately before operation.

WARNING

Danger of electric shock
In case of defect, the parts connected to the mains supply are under voltage.
⇒ Always keep the mains connection freely accessible so you can disconnect it at any time.

⇒ Insert the mains cable into the mains connection AC in.
⇒ Lock the mains cable with the mounting bracket.
⇒ Connect the mains cable to the mains.
⇒ Always ensure a safe connection to the protective earthing conductor (PE, protection class I).

After the mains voltage is applied, the electronic drive unit performs a self-test to check the supply voltage. The turbopump is set into operation.

Drive power reduction depending on the mains connection voltage

<table>
<thead>
<tr>
<th>Mains connection voltage</th>
<th>Drive power</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 - 120 V AC</td>
<td>700 - 930 W</td>
</tr>
<tr>
<td>200 - 240 V AC</td>
<td>1200 W</td>
</tr>
</tbody>
</table>
The power of the electronic drive unit depends on the provided mains voltage.

### 6.2 Operation modes

The following operation modes are available:

- Operation without operating unit
- Operation via "remote" connection
- Operation via RS-485 and Pfeiffer Vacuum display and control units or PC
- Operation via field bus

### 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 without operating unit**

→ For operation without the control unit, the 26-pole D-Sub plug must be in the "remote" connection on the TC 1200.

After operating voltage is applied, the TC 1200 performs a self-test to check the supply voltage. Once the self-test has been successfully completed on the TC 1200, the turbopump and the backing pump - if connected - begin to operate.

**Operation via "remote" connection**

Remote control is possible via the 26-pin D-sub connector labelled "remote" on the electronic drive unit. The accessible individual functions are mapped to "PLC levels".

→ Consider the following manuals for the operation via remote control:
  - Operating instructions "Electronic drive unit TC 1200"

**Operation with DCU or HPU**

→ Consider the following manuals for the operation via Pfeiffer Vacuum display and control units:
  - Operating instructions "DCU"
  - Operating instructions "HPU"
  - Operating instructions "Electronic drive unit TC 1200"

→ Switch on the pump by connecting the mains cable with the mains supply.
→ Settings are possible via interface RS-485 by using DCU, HPU or PC.

**Operation via field-bus**

Integrating and operating Pfeiffer Vacuum turbopumps in the customer's field bus system is possible for electronic drive units with a corresponding field bus panel.

→ Consider the following manuals for the operation via field bus:
  - Operating instructions for the electronic drive unit with the respective connection panel
6.4 Monitoring of the operation conditions

Operation display via LED

LEDs in the front panel of the electronic drive unit show basic operating conditions of the turbopump. A differentiated malfunction and warning display is possible only for operation with DCU or HPU.

<table>
<thead>
<tr>
<th>LED</th>
<th>Symbol</th>
<th>LED status</th>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>[ ]</td>
<td>Off</td>
<td>—</td>
<td>currentless</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On, flashing</td>
<td>[ ]</td>
<td>&quot;Pumping Station OFF&quot;, rotation speed ≤ 60 min⁻¹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On, invers flashing</td>
<td>[ ]</td>
<td>&quot;Pumping Station ON&quot;, set rotation speed not attained</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On, constantly</td>
<td>[ ]</td>
<td>&quot;Pumping Station ON&quot;, set rotation speed attained</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On, blinking</td>
<td>[ ]</td>
<td>&quot;Pumping Station OFF&quot;, rotation speed &gt; 60 min⁻¹</td>
</tr>
<tr>
<td>Yellow</td>
<td>[ ]</td>
<td>Off</td>
<td>—</td>
<td>no warning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On, constantly</td>
<td>[ ]</td>
<td>Warning</td>
</tr>
<tr>
<td>Red</td>
<td>[ ]</td>
<td>Off</td>
<td>—</td>
<td>no malfunction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On, constantly</td>
<td>[ ]</td>
<td>Malfunction</td>
</tr>
</tbody>
</table>

Fig. 16: Behaviour and meaning of LEDs on the electronic drive unit

Temperature monitoring

The drive power is reduced in case of impermissible motor temperature or impermissibly high housing temperature. This can cause falling below the rotation speed switchpoint and so result in turning off the turbopump.

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.

- Close the fore-vacuum: Switch off the backing pump or close a fore-vacuum valve.
- Switch off the turbopump on the control unit or via remote control.
- Venting (possibilities see below)
- Leave open the cooling water supply until the halt of the rotor (rotation speed < 1 Hz).

Venting

Manually venting

- Open the venting screw (included) in the venting connection of the turbopump about one turn.

Venting with Pfeiffer Vacuum Venting Valve

- Enable venting via the functions of the electronic drive unit.
- Settings are possible via interface RS-485 by using DCU, HPU or PC.

<table>
<thead>
<tr>
<th>Venting rotation speed</th>
<th>Switch off the pumping station</th>
<th>Mains power failure 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 % of the nominal rotation speed</td>
<td>Venting valve opens for 3600 s (1 h, works setting)</td>
<td>Venting valve opens for 3600 s (1 h, works setting)</td>
</tr>
</tbody>
</table>

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 hPa/s.
  - The valve cross section for the venting rate of 15 hPa/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.

**WARNING**
Toxic vapours!
Danger of poisoning when igniting and heating synthetic operating fluids (e.g. F3) above 300 °C.
⇒ Observe the application instructions.
⇒ Do not allow operating fluid to make contact with tobacco products; observe safety precautions when handling chemicals.

**NOTICE**
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.

7.1 Maintenance intervals and responsibilities
- Clean the turbopump externally with a lint-free cloth and little industrial alcohol.
- Replace the electronic drive unit yourself.
- Change the operating fluid yourself.
- Change the operating fluid at least every 4 years.
- Change the turbopump bearing at least every 4 years.
  - Contact Pfeiffer Vacuum Service.
- Clarify shorter maintenance 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 Changing the operating fluid

**WARNING**
Poisoning hazard through contact with materials that damage health.
Operating fluid and parts of the pump may contain toxic substances from the pumped media.
⇒ Dispose of operating fluid in accordance with the applicable regulations. Safety data sheet on request or under www.pfeiffer-vacuum.com
⇒ Prevent health hazards or environmental damage due to contamination by means of appropriate safety precautions.
⇒ Decontaminate affected parts before carrying out maintenance work.
Turn off the vacuum pump, vent to atmospheric pressure and allow to cool.

Screw out the allen head screws (2x) of the operating fluid pump and remove the protective cover.

Unscrew the respectively lower positioned drain screw 8.23b of the operating fluid pump.
– Observe the O-ring 8.35!

Drain the operating fluid in a suitable tank.
– Observe the O-ring 8.35!

Lock the drain screw 8.23b again.
– Observe the O-ring 8.35!

Always use the higher positioned screw for filling.
Always use the lower positioned screw for draining.
Never fill via the draining screws.

The operating fluid pump is largely mirror symmetrical. The screws for filling the operating fluid are located at the sides of the operating fluid pump. The screws for draining the operating fluid are located at the front of the operating fluid pump.

Unscrew the respectively higher positioned filler screw 8.23a of the operating fluid pump.

Always use the higher positioned screw for filling.
Always use the lower positioned screw for draining.
Never fill via the draining screws.
Fill in the operating fluid (max. 50 ml) into the operating fluid pump by using the filling syringe.

Lock the filler screw 8.23a again.

– Observe the O-ring 8.35!

### 7.3 Replacing the electronic drive unit

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observe mounting orientations when replacing the electronic drive unit!</strong></td>
</tr>
<tr>
<td>Electronic drive unit replacement can be carried out at the installed pump. When dismounting the pump from the system, observe:</td>
</tr>
</tbody>
</table>

→ Drain pump operating fluid before dismounting from the system.

→ Pay attention to the properties after the model designation on the name plate!

→ Observe the pictographs on the pump housing!

→ Replace the electronic drive unit at the horizontally oriented pump with the fore-vacuum connection pointing downward (± 25°).

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Damages to the pump and drive</strong></td>
</tr>
<tr>
<td>Even after the mains power is switched off, the subsequently running pump delivers electric power to the electronic drive unit. There is a danger of electric body contact by premature separating the pump from the electronic drive unit.</td>
</tr>
</tbody>
</table>

→ Never separate the electronic drive unit from the pump when the mains power is connected or the rotor is running.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating parameters of the electronic drive unit</strong></td>
</tr>
<tr>
<td>The factory operating parameters are always preset with replacement shipments.</td>
</tr>
</tbody>
</table>

→ The use of a HPU enables the storing and the reuse of an existing parameter record.

→ Reset any individually changed application parameters.

→ Refer to the manual "Electronic drive unit".

→ Do not exercise any mechanical load on the electronic drive unit.

→ Turn off the vacuum pump, vent to atmospheric pressure and allow to cool.

→ Only separate the pump and the electronic drive unit from each other after disconnecting the supply voltage and the complete standstill of the pump.

→ Remove the vacuum pump from the system, if necessary.

→ Unscrew Allen head screws (7x) from the electronic drive unit.

→ Pull the electronic drive unit straight off the pump.

→ Observe the plug connection!

→ Observe O-ring 87!
Don’t touch any electrostatic sensitive devices.

Fix the O-ring 87 in the groove of the pump bottom part, if necessary. Ensure correct seating!

Set the new electronic drive unit 13 with the straight edge at the height of the operating fluid pump and fold carefully to the pump bottom part.
- Observe the plug connection!

Tighten the electronic drive unit 13 with allen head screws 94 (5x) and 96 (2x).
- Tightening torque 2.5 Nm.

**NOTICE**

Visual inspection - avoid malfunction!
Incorrect assembling of the electronic drive unit may lead to malfunctions!
- The base plate of the electronic drive unit must be seated planar on the cooling plate of the pump.
- If necessary loosen and reassemble the electronic drive unit. Observe the O-ring!

**Rotation speed set value**

The typical nominal rotation speed of a turbopump is factory-set in the electronic drive unit. If the electronic drive unit is replaced or a different pump type is used, the reference set value of the nominal rotation speed must be confirmed. This procedure is part of a redundant safety system for avoiding excess rotation speeds.

<table>
<thead>
<tr>
<th>HiPace</th>
<th>Nominal rotation speed confirmation [P:777]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 / 1500</td>
<td>630 Hz</td>
</tr>
<tr>
<td>1800 / 2300</td>
<td>525 Hz</td>
</tr>
</tbody>
</table>

Adjust the parameter [P:777] according to the pump type.

Alternatively: If no display and control unit is available, please use the "SpeedConfigurator" of the spare parts delivery.
8 Decommissioning

8.1 Shutting down for longer periods

**WARNING**

Contamination of parts and operating fluid by pumped media is possible. Poisons by 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 turbopump should be shut down for longer than a year:

- Remove the vacuum pump from the system, if necessary.
- Drain the operating fluid.
- Close the high vacuum flange of the turbopump.
- Evacuate turbopump via the fore-vacuum flange.
- Vent turbopump via the venting connection with oil-free, dry air or inert gas.
- Close the flange openings by using the original protective covers.
- Close further connection ports by using the corresponding protective covers.
- Store the pump only indoors at temperatures between -25 °C and +55 °C.
- In rooms with moist or aggressive atmospheres, the pump must be airproof shrink-wrapped in a plastic bag together with a bag of desiccant.

8.2 Re-starting

**NOTICE**

Risk of damage to the pump following recommissioning

The operating fluid in the turbo pump has a limited shelf life. The length of its shelf life is as follows:

- max. 2 years without operation or
- a total of max. 4 years following periods of operation and nonoperation.

- Follow the maintenance instructions and inform Pfeiffer Vacuum.

- Check turbopump for contamination and moisture.
- Clean the turbopump externally with a lint-free cloth and little industrial alcohol.
- If necessary, have Pfeiffer Vacuum Service clean the turbopump completely.
- If necessary, have the bearings replaced. Take into account the total running time.
- 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

If malfunctions on the pump occur, you will find possible causes and instructions for repair in the following table.

9.1 Rectifying malfunctions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible causes</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| Pump will not start; none of the built-in LEDs on the TC 1200 lights up | ● Electrical supply interrupted  
  ● Operating voltage incorrect  
  ● No operating voltage applied  
  ● TC 1200 defective          | ☐ Check plug contacts on the power supply  
  ☐ Check supply lines on the power supply  
  ☐ Apply correct operating voltage  
  ☐ Apply operating voltage  
  ☐ Request an exchange of the TC 1200  
  ☐ Contact the Pfeiffer Vacuum Service                                   |
| Pump will not start; green LED on the TC 1200 is flashing              | ● At operation without control panel: Pins 1-3, 1-4 or 1-14 are not connected on the "remote" connection  
  ● At operation via RS-485: Bridge at Pin 1-14 prevents control commands  
  ● At operation via RS-485 (without counter plug): Parameters of the electronic drive unit not set | ☐ Connect the pins 1-3, 1-4 or 1-14 on the "remote" connection  
  ☐ Install the mating plug (scope of delivery) to the "remote" connection.  
  ☐ Remove the bridge at the "remote" connection  
  ☐ Remove the mating plug from the "remote" connection.  
  ☐ Set parameters [P: 010] and [P: 023] "ON" via interface RS-485.  
  ☐ Please refer to operating instructions of the electronic drive unit. |
| Pump does not attain the final rotational speed within the specified run-up time | ● Fore-vacuum pressure too high  
  ● Leak  
  ● Gas load too high  
  ● Rotor runs hard, bearing defective  
  ● Setpoint for run-up time to low  
  ● Thermal overload:  
    – Lack of air ventilation  
    – Water flow too low  
    – Fore-vacuum pressure too high  
    – Ambient temperature too high | ☐ Ensure function and suitability of the backing pump  
  ☐ Perform leak detection  
  ☐ Check sealings and flange fastenings  
  ☐ Eliminate leaks  
  ☐ Reduce process gas supply  
  ☐ Check the bearing for noises  
  ☐ Contact the Pfeiffer Vacuum Service  
  ☐ Extend the run-up time via DCU, HPU or PC  
  ☐ Reduce thermal loads  
  ☐ Ensure adequate cooling  
  ☐ Ensure the cooling water flow  
  ☐ Lower the fore-vacuum pressure  
  ☐ Adjust ambient conditions |
| Pump does not attain the ultimate pressure                              | ● Pump is dirty  
  ● Vacuum chamber, pipes or pump are leaky                               | ☐ Bake out the pump  
  ☐ Cleaning in case of heavy contamination  
  ☐ Contact the Pfeiffer Vacuum Service  
  ☐ Leak detection starting from the vacuum chamber  
  ☐ Eliminate leaks                                                       |
| Unusual noises during operation                                         | ● Bearing damage  
  ● Rotor damage  
  ● Splinter shield or protective screen are loose                         | ☐ Contact the Pfeiffer Vacuum Service  
  ☐ Contact the Pfeiffer Vacuum Service  
  ☐ Correct the seat of the splinter shield or the protective screen  
  ☐ Observe the installation notes                                        |
| Red LED on the TC 1200 is on                                            | ● Collective fault                                                            | ☐ Reset by switching the mains OFF/ON  
  ☐ Reset via pin 13 on the "REMOTE" connection  
  ☐ Differentiated malfunction display is possible via "RS 485"  
  ☐ Contact the Pfeiffer Vacuum Service                                    |

1) If no Pfeiffer Vacuum display and control unit is available, please contact the 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.com (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".  
- Fill out the "Service Request" form and send it by fax or e-mail to your Pfeiffer Vacuum service address.
- Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.
- Fill out 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.com
### 11 Spare parts HiPace 1800

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Size</th>
<th>Order number</th>
<th>Notes</th>
<th>Pieces</th>
<th>Order qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Electronic drive unit TC 1200</td>
<td></td>
<td>according to the rating plate</td>
<td>depends on the connection panel</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>142</td>
<td>Syringe</td>
<td>50 ml</td>
<td>PM 006 915 -U</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>143</td>
<td>Operating fluid F3</td>
<td>50 ml</td>
<td>PM 006 336 -T</td>
<td>other quantities on request</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mating plug &quot;remote&quot;</td>
<td></td>
<td>PM 061 378 -X</td>
<td>with bridges</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>145</td>
<td>Sealing gas valve</td>
<td>17.5 - 20 sccm</td>
<td>PM Z01 313</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>146</td>
<td>Mains connection socket</td>
<td>HAN 3</td>
<td>PM 061 200 -T</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>Screw-in nozzle</td>
<td>G 1/4&quot;</td>
<td>P 0988 067</td>
<td>for hose internal Ø of 7-8 mm</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>155</td>
<td>Seal ring</td>
<td></td>
<td>P 3529 145 -A</td>
<td>for screw-in nozzle</td>
<td>2</td>
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</table>

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

<table>
<thead>
<tr>
<th>Designation</th>
<th>DN 200 ISO-K</th>
<th>DN 200 ISO-F</th>
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</thead>
<tbody>
<tr>
<td>DCU 002, Display Control Unit</td>
<td>PM 061 348 -T</td>
<td>PM 061 348 -T</td>
</tr>
<tr>
<td>HPU 001, Handheld Programming Unit</td>
<td>PM 051 510 -T</td>
<td>PM 051 510 -T</td>
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<tr>
<td>Accessories package for HPU 001/PC</td>
<td>PM 061 005 -T</td>
<td>PM 061 005 -T</td>
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<tr>
<td>Mains cable 230 V AC, CEE 7/7 to HAN 3A, 3 m</td>
<td>P 4564 309 HA</td>
<td>P 4564 309 HA</td>
</tr>
<tr>
<td>Mains cable 115 V AC, NEMA 5-15 to HAN 3A, 3 m</td>
<td>PM 061 187 -X</td>
<td>PM 061 187 -X</td>
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<tr>
<td>Mains cable 208 V AC, NEMA 6-15 to HAN 3A, 3 m</td>
<td>P 4564 309 HB</td>
<td>P 4564 309 HB</td>
</tr>
<tr>
<td>Venting valve, shielded, 24 V DC, G 1/8&quot;, for connection to TC 400/1200 and TM 700</td>
<td>PM Z01 291</td>
<td>PM Z01 291</td>
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<tr>
<td>TVV 001, dryer for venting turbopumps</td>
<td>PM Z00 121</td>
<td>PM Z00 121</td>
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<tr>
<td>TVV 001 fore-vacuum safety valve, 230 V AC</td>
<td>PM Z01 205</td>
<td>PM Z01 205</td>
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<tr>
<td>TVV 001 fore-vacuum safety valve, 115 V AC</td>
<td>PM Z01 206</td>
<td>PM Z01 206</td>
</tr>
<tr>
<td>Sealing gas valve, shielded, HiPace 400/700/800 P with TC 400 and HiPace 1200 - 2300 with TC 1200</td>
<td>PM Z01 313</td>
<td>PM Z01 313</td>
</tr>
<tr>
<td>Sealing gas valve, shielded, HiPace 400/700/800 P version and HiPace 1200 - 2300</td>
<td>PM Z01 318</td>
<td>PM Z01 318</td>
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<tr>
<td>Centering ring with multifunction coating, DN 200 ISO-K/F</td>
<td>PM 016 220 -U</td>
<td>PM 016 220 -U</td>
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<tr>
<td>Centering ring with multifunction coating and integrated protection screen, DN 200 ISO-K/F</td>
<td>PM 016 222 -U</td>
<td>PM 016 222 -U</td>
</tr>
<tr>
<td>Centering ring with multifunction coating and integrated splinter shield, DN 200 ISO-K/-F</td>
<td>PM 016 221 -U</td>
<td>PM 016 221 -U</td>
</tr>
<tr>
<td>Vibration damper for HiPace 800/1200/1800, DN 200 ISO-K/F</td>
<td>PM 096 668 -X</td>
<td>PM 096 668 -X</td>
</tr>
<tr>
<td>USB converter to RS-485 interface</td>
<td>PM 061 207 -T</td>
<td>PM 061 207 -T</td>
</tr>
<tr>
<td>Interface cable, M12 m straight/M12 m straight, 3 m</td>
<td>PM 061 283 -T</td>
<td>PM 061 283 -T</td>
</tr>
<tr>
<td>Interface cable, M12 m straight/ M12 m angled 0.7 m</td>
<td>PM 061 791 -T</td>
<td>PM 061 791 -T</td>
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<tr>
<td>Y-Connector M12 to RS-485</td>
<td>P 4723 010</td>
<td>P 4723 010</td>
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<tr>
<td>Remote mating plug, HD26-pole with bridges</td>
<td>PM 061 378 -X</td>
<td>PM 061 378 -X</td>
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<tr>
<td>Mains supply socket</td>
<td>PM 061 200 -T</td>
<td>PM 061 200 -T</td>
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<tr>
<td>RJ 45 interface cable on M12 for HiPace</td>
<td>PM 051 726 -T</td>
<td>PM 051 726 -T</td>
</tr>
<tr>
<td>Venting valve, 24 V DC, G 1/8&quot; without cable</td>
<td>PM Z01 293</td>
<td>PM Z01 293</td>
</tr>
<tr>
<td>Power failure venting valve, shielded, 24 V DC, G 1/8&quot; for connection to TC 400, TM 700 and TCP 350, M12</td>
<td>PM Z01 331</td>
<td>PM Z01 331</td>
</tr>
<tr>
<td>Banjo fitting</td>
<td>PM 016 787 -T</td>
<td>PM 016 787 -T</td>
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<tr>
<td>Banjo fitting, small</td>
<td>PM 143 877 -T</td>
<td>PM 143 877 -T</td>
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<tr>
<td>Screw-on flange, DN 16 ISO-KF, G 1/8&quot;</td>
<td>PM 016 780 -T</td>
<td>PM 016 780 -T</td>
</tr>
<tr>
<td>Push-in fitting for 6 mm hose, G 1/8&quot;</td>
<td>PM 016 781 -T</td>
<td>PM 016 781 -T</td>
</tr>
<tr>
<td>Push-in fitting for 8 mm hose, G 1/8&quot;</td>
<td>PM 016 782 -T</td>
<td>PM 016 782 -T</td>
</tr>
<tr>
<td>Hose nozzle for 9 mm hose, G 1/8&quot;</td>
<td>PM 016 783 -T</td>
<td>PM 016 783 -T</td>
</tr>
<tr>
<td>Relay box, shielded, for backing pumps, 1-phase 7 A for TC 400/1200, TM 700 and TCP 350, M12</td>
<td>PM 071 284 -X</td>
<td>PM 071 284 -X</td>
</tr>
<tr>
<td>Relay box, shielded, for backing pumps, 1-phase 20 A for TC 400/1200, TM 700 and TCP 350, M12</td>
<td>PM 071 285 -X</td>
<td>PM 071 285 -X</td>
</tr>
<tr>
<td>HiPace - ACP connection cable</td>
<td>PM 071 142 -X</td>
<td>PM 071 142 -X</td>
</tr>
<tr>
<td>Y-connector, shielded, M12 for accessories</td>
<td>P 4723 013</td>
<td>P 4723 013</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-K, including coated centering ring, bracket screws</td>
<td>PM 016 410 -T</td>
<td>PM 016 410 -T</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-K, including coated centering ring, protection screen, bracket screws</td>
<td>PM 016 412 -T</td>
<td>PM 016 412 -T</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-K, including coated centering ring, splinter shield, bracket screws</td>
<td>PM 016 411 -T</td>
<td>PM 016 411 -T</td>
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<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-F, including coated centering ring, hexagon screws</td>
<td>PM 016 470 -T</td>
<td>PM 016 470 -T</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-F, including coated centering ring, protective screen, hexagon screws</td>
<td>PM 016 472 -T</td>
<td>PM 016 472 -T</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-F, including coated centering ring, splinter shield, hexagon screws</td>
<td>PM 016 471 -T</td>
<td>PM 016 471 -T</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-F, including coated centering ring, stud screws</td>
<td>PM 016 475 -T</td>
<td>PM 016 475 -T</td>
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<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-F, including coated centering ring, protective screen, stud screws</td>
<td>PM 016 477 -T</td>
<td>PM 016 477 -T</td>
</tr>
<tr>
<td>Mounting kit for HiPace 1800, DN 200 ISO-F, including coated centering ring, stud screws</td>
<td>PM 016 479 -T</td>
<td>PM 016 479 -T</td>
</tr>
</tbody>
</table>
13 Technical data and dimensions

13.1 General

Basic principles for the Technical Data of Pfeiffer Vacuum Turbopumps:

- Recommendations of PNEUROP committee PN5
- ISO 5302; 2003: "Vacuum technology - Turbomolecular pumps - Measurement of performance characteristics"
- Ultimate pressure: using a test dome and a 48 hrs. period of baking out
- Gas throughput: water cooling; backing pump = rotary vane pump (120 m³/h)
- Cooling water consumption: at max. gas throughput, cooling water temp. 25 °C
- Integral leak rate: using a Helium concentration of 100 %, period 10 s
- Sound pressure level: Distance 1 m to the pump

13.2 HiPace 1800 / HiPace 1800 U

<table>
<thead>
<tr>
<th>Parameter</th>
<th>HiPace™ 1800 / U</th>
<th>HiPace™ 1800 / U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange (in)</td>
<td>DN 200 ISO-K</td>
<td>DN 200 ISO-F</td>
</tr>
<tr>
<td>Flange (out)</td>
<td>DN 40 ISO-KF</td>
<td>DN 40 ISO-KF</td>
</tr>
<tr>
<td>Pumping speed for Ar</td>
<td>1370 l/s</td>
<td>1370 l/s</td>
</tr>
<tr>
<td>Pumping speed for H₂</td>
<td>1700 l/s</td>
<td>1700 l/s</td>
</tr>
<tr>
<td>Pumping speed for He</td>
<td>1650 l/s</td>
<td>1650 l/s</td>
</tr>
<tr>
<td>Pumping speed for N₂</td>
<td>1450 l/s</td>
<td>1450 l/s</td>
</tr>
<tr>
<td>Compression ratio for Ar</td>
<td>&gt; 1 · 10⁸</td>
<td>&gt; 1 · 10⁸</td>
</tr>
<tr>
<td>Compression ratio for H₂</td>
<td>2 · 10⁴</td>
<td>2 · 10⁴</td>
</tr>
<tr>
<td>Compression ratio for He</td>
<td>3 · 10⁵</td>
<td>3 · 10⁵</td>
</tr>
<tr>
<td>Compression ratio for N₂</td>
<td>&gt; 1 · 10⁸</td>
<td>&gt; 1 · 10⁸</td>
</tr>
<tr>
<td>Gas throughput at full rotational speed for Ar</td>
<td>16 hPa l/s</td>
<td>16 hPa l/s</td>
</tr>
<tr>
<td>Gas throughput at full rotational speed for H₂</td>
<td>20 hPa l/s</td>
<td>20 hPa l/s</td>
</tr>
<tr>
<td>Gas throughput at full rotational speed for He</td>
<td>&gt; 30 hPa l/s</td>
<td>&gt; 30 hPa l/s</td>
</tr>
<tr>
<td>Gas throughput at full rotational speed for N₂</td>
<td>20 hPa l/s</td>
<td>20 hPa l/s</td>
</tr>
<tr>
<td>Fore-vacuum max. for Ar</td>
<td>2.4 hPa</td>
<td>2.4 hPa</td>
</tr>
<tr>
<td>Fore-vacuum max. for H₂</td>
<td>0.55 hPa</td>
<td>0.55 hPa</td>
</tr>
<tr>
<td>Fore-vacuum max. for He</td>
<td>1 hPa</td>
<td>1 hPa</td>
</tr>
<tr>
<td>Fore-vacuum max. for N₂</td>
<td>1.8 hPa</td>
<td>1.8 hPa</td>
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<tr>
<td>Run-up time</td>
<td>4 min</td>
<td>4 min</td>
</tr>
<tr>
<td>Ultimate pressure according to PNEUROP</td>
<td>&lt; 1 · 10⁻⁷ hPa</td>
<td>&lt; 1 · 10⁻⁷ hPa</td>
</tr>
<tr>
<td>Rotation speed ± 2 %</td>
<td>31500 min⁻¹</td>
<td>31500 min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 1, vertex A</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 1, vertex B</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 0, vertex C</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 0, vertex D</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Sound pressure level</td>
<td>≤ 50 dB (A)</td>
<td>≤ 50 dB (A)</td>
</tr>
<tr>
<td>Relative humidity of air</td>
<td>5-85, non-condensing %</td>
<td>5-85, non-condensing %</td>
</tr>
<tr>
<td>Protection category</td>
<td>IP54</td>
<td>IP54</td>
</tr>
<tr>
<td>Integral leak rate</td>
<td>&lt; 1 · 10⁻⁶ Pa m³/s</td>
<td>&lt; 1 · 10⁻⁶ Pa m³/s</td>
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<tr>
<td>Power consumption max.</td>
<td>1350 VA</td>
<td>1350 VA</td>
</tr>
<tr>
<td>Mains requirement: frequency (range)</td>
<td>50/60 Hz</td>
<td>50/60 Hz</td>
</tr>
<tr>
<td>Mains requirement: voltage (range)</td>
<td>100-120/200-240 V AC</td>
<td>100-120/200-240 V AC</td>
</tr>
<tr>
<td>Current consumption max.</td>
<td>10 A</td>
<td>10 A</td>
</tr>
<tr>
<td>Mounting orientation</td>
<td>Standard (0°-90°)</td>
<td>Standard (0°-90°)</td>
</tr>
<tr>
<td>Venting connection</td>
<td>G 1/8&quot;</td>
<td>G 1/8&quot;</td>
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<tr>
<td>Weight</td>
<td>33 kg</td>
<td>34 kg</td>
</tr>
<tr>
<td>Cooling method, standard</td>
<td>Water</td>
<td>Water</td>
</tr>
<tr>
<td>Cooling water temperature</td>
<td>15-35 °C</td>
<td>15-35 °C</td>
</tr>
<tr>
<td>Cooling water consumption</td>
<td>100 l/h</td>
<td>100 l/h</td>
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</table>
### Technical data and dimensions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>HiPace™ 1800 / U</th>
<th>HiPace™ 1800 / U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible magnetic field max.</td>
<td>7 mT</td>
<td>7 mT</td>
</tr>
<tr>
<td>Interfaces</td>
<td>RS-485, Remote</td>
<td>RS-485, Remote</td>
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</table>

#### 13.3 HiPace 1800 C / HiPace 1800 U C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>HiPace™ 1800 C / U C</th>
<th>HiPace™ 1800 C / U C</th>
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<tbody>
<tr>
<td>Flange (in)</td>
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<td>DN 200 ISO-F</td>
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<tr>
<td>Flange (out)</td>
<td>DN 40 ISO-KF</td>
<td>DN 40 ISO-KF</td>
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<tr>
<td>Pumping speed for Ar</td>
<td>1370 l/s</td>
<td>1370 l/s</td>
</tr>
<tr>
<td>Pumping speed for H₂</td>
<td>1700 l/s</td>
<td>1700 l/s</td>
</tr>
<tr>
<td>Pumping speed for He</td>
<td>1650 l/s</td>
<td>1650 l/s</td>
</tr>
<tr>
<td>Pumping speed for N₂</td>
<td>1450 l/s</td>
<td>1450 l/s</td>
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<tr>
<td>Compression ratio for Ar</td>
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<td>&gt; 1 · 10⁸</td>
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<tr>
<td>Compression ratio for H₂</td>
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<td>2 · 10⁴</td>
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<tr>
<td>Compression ratio for He</td>
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<td>3 · 10⁵</td>
</tr>
<tr>
<td>Compression ratio for N₂</td>
<td>&gt; 1 · 10⁸</td>
<td>&gt; 1 · 10⁸</td>
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<td>Gas throughput at full rotational speed for Ar</td>
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<td>16 hPa l/s</td>
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<td>Gas throughput at full rotational speed for H₂</td>
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<td>20 hPa l/s</td>
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<tr>
<td>Gas throughput at full rotational speed for He</td>
<td>&gt; 30 hPa l/s</td>
<td>&gt; 30 hPa l/s</td>
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<td>Gas throughput at full rotational speed for N₂</td>
<td>20 hPa l/s</td>
<td>20 hPa l/s</td>
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<tr>
<td>Fore-vacuum max. for Ar</td>
<td>2.4 hPa</td>
<td>2.4 hPa</td>
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<tr>
<td>Fore-vacuum max. for H₂</td>
<td>0.55 hPa</td>
<td>0.55 hPa</td>
</tr>
<tr>
<td>Fore-vacuum max. for He</td>
<td>1 hPa</td>
<td>1 hPa</td>
</tr>
<tr>
<td>Run-up time</td>
<td>4 min</td>
<td>4 min</td>
</tr>
<tr>
<td>Ultimate pressure according to PNEUROP</td>
<td>&lt; 1 · 10⁻⁷ hPa</td>
<td>&lt; 1 · 10⁻⁷ hPa</td>
</tr>
<tr>
<td>Rotation speed ± 2 %</td>
<td>31500 min⁻¹</td>
<td>31500 min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 1, vertex A</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 1, vertex B</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Power characteristic line in gas mode 0, vertex C</td>
<td>750/31500 W/min⁻¹</td>
<td>750/31500 W/min⁻¹</td>
</tr>
<tr>
<td>Sound pressure level</td>
<td>≤ 50 dB (A)</td>
<td>≤ 50 dB (A)</td>
</tr>
<tr>
<td>Relative humidity of air</td>
<td>5-85, non-condensing %</td>
<td>5-85, non-condensing %</td>
</tr>
<tr>
<td>Protection category</td>
<td>IP54</td>
<td>IP54</td>
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<tr>
<td>Connection pressure max. for venting/sealing gas valve</td>
<td>1500 hPa</td>
<td>1500 hPa</td>
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<tr>
<td>Integral leak rate</td>
<td>&lt; 1 · 10⁻⁸ Pa m³/s</td>
<td>&lt; 1 · 10⁻⁸ Pa m³/s</td>
</tr>
<tr>
<td>Power consumption max.</td>
<td>1350 VA</td>
<td>1350 VA</td>
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<tr>
<td>Mains requirement: frequency (range)</td>
<td>50-60 Hz</td>
<td>50-60 Hz</td>
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<tr>
<td>Mains requirement: voltage (range)</td>
<td>100-120/200-240 V AC</td>
<td>100-120/200-240 V AC</td>
</tr>
<tr>
<td>Current consumption max.</td>
<td>10 A</td>
<td>10 A</td>
</tr>
<tr>
<td>Mounting orientation</td>
<td>Standard (0°-90°)</td>
<td>Standard (0°-90°)</td>
</tr>
<tr>
<td>Venting connection</td>
<td>G 1/8”</td>
<td>G 1/8”</td>
</tr>
<tr>
<td>Weight</td>
<td>33 kg</td>
<td>34 kg</td>
</tr>
<tr>
<td>Cooling method, standard</td>
<td>Water</td>
<td>Water</td>
</tr>
<tr>
<td>Cooling water temperature</td>
<td>15-35 °C</td>
<td>15-35 °C</td>
</tr>
<tr>
<td>Cooling water consumption</td>
<td>100 l/h</td>
<td>100 l/h</td>
</tr>
<tr>
<td>Permissible magnetic field max.</td>
<td>7 mT</td>
<td>7 mT</td>
</tr>
<tr>
<td>Interfaces</td>
<td>RS-485, Remote</td>
<td>RS-485, Remote</td>
</tr>
</tbody>
</table>
13.4 Dimensions

![HiPace 1800, DN 200 ISO-K](image1)

![HiPace 1800, DN 200 ISO-F](image2)
Declaration of conformity

We hereby declare that the product cited below satisfies all relevant provisions according to the following EC directives:

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

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

HiPace 1800

Harmonised standards and national standards and specifications which have been applied:

- DIN EN ISO 12100 : 2011-03
- DIN EN 1012-2 : 1996
- DIN EN 61000-3-2 : 2010
- DIN EN 61000-3-3 : 2009
- DIN EN 61010-1 : 2010
- DIN EN 61326-1 : 2013
- DIN EN 62061 : 2013

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Aßlar
Germany

(Dr. Ulrich von Hülsen) 2016-03-22
Managing Director
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.

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

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