# OPERATING INSTRUCTIONS

EN

Translation of the Original

# RPT 010

**Sensor for integrated pressure measurement**

PFEIFFER VACUUM

## Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new sensor is designed to support you in your individual application with full performance and without malfunctions. The name Pfeiffer Vacuum represents high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. From this extensive, practical experience we have gained a large volume of information that can contribute to efficient deployment and to your personal safety.

In the knowledge that our product must avoid consuming work output, we trust that our product can offer you a solution that supports you in the effective and trouble-free implementation of your individual application.

Please read these operating instructions before putting your product into operation for the first time. If you have any questions or suggestions, please feel free to contact info@pfeiffer-vacuum.de.

Further operating instructions from Pfeiffer Vacuum can be found in the Download Center on our website.

## Disclaimer of liability

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

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

## Copyright

# Table of contents

# 1 About this manual

**IMPORTANT**
Read carefully before use.
Keep the manual for future consultation.

## 1.1 Validity

This document describes the function of the products listed in the following and provides the most important information for safe use. The description is written in accordance with the valid directives. The information in this document refers to the current development status of the products. The document retains its validity assuming that the customer does not make any changes to the product.

### 1.1.1 Applicable documents

| Designation | Document |
|---|---|
| TC “electronic drive unit” operating instructions | (depending on the device used) |
| HiPace "turbopump" operating instructions | (depending on the device used) |
| HiScroll “scroll pump” operating instructions | (depending on the device used) |
| Declaration of conformity | (part of these instructions) |

**Tbl. 1: Applicable documents**

You can find these documents in the Pfeiffer Vacuum Download Center.

### 1.1.2 Variants

This document applies to products with the following article numbers:

| Article number | Designation | Connection |
|---|---|---|
| PT R71 550 | RPT 010, G1/8", 0.5 m cable | AccessLink |
| PD 100 100 AT [1)] | | |

**Tbl. 2: Variants**

## 1.2 Target group

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

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

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

## 1.3 Conventions

### 1.3.1 Instructions in the text

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

1) Comprises a PT R71 550, two plastic clamps and two hexagon socket screws

**Individual action step**

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

► This is an individual action step.

**Sequence of multi-part action steps**

The numerical list indicates an action with multiple necessary steps.

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

## 1.3.2 Pictographs

The pictographs used in the document indicate useful information.


Note

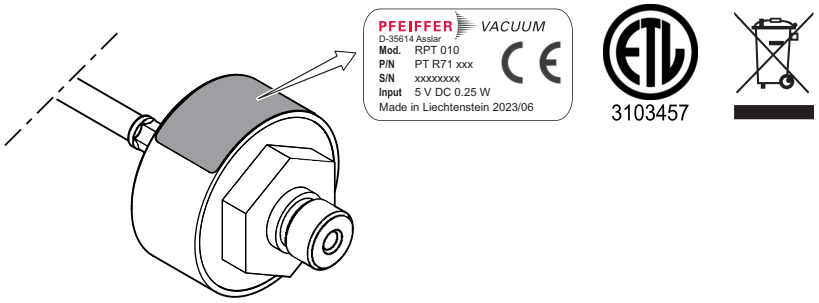

Tip


Wear laboratory gloves


Perform a visual inspection

## 1.3.3 Stickers on the product

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




**Rating plate**

The rating plate is located on the side of the sensor.

## 1.3.4 Abbreviations

| Abbreviation | Explanation |
|---|---|
| ATM | Atmosphere |
| c | Constant for converting measuring signal and pressure |
| C | Correction factor for calculating the pressure of gases other than air |
| HV | High vacuum |
| LPS | Limited power source |
| MSL | Mean sea level |
| OR | Overrange |
| [P:000] | Electronic drive unit parameter with number |
| p | Pressure |
| PLC | Programmable logical controller |
| WAF | Width Across Flats |
| TC | Turbopump electronic drive unit (turbo controller) |

| Abbreviation | Explanation |
|---|---|
| U | Measuring signal [V] (output voltage) |
| UR | Underrange |

**Tbl. 3: Abbreviations used**

## 1.4 Trademark proof

- HiPace® is a registered trademark of Pfeiffer Vacuum GmbH.
- Molex® is a registered trademark of Molex Incorporated, Lisle, Illinois, USA.

# 2 Safety

## 2.1 General safety information

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

**⚠ DANGER**

**Immediately pending danger**

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

► Instructions to avoid the danger situation

**⚠ WARNING**

**Potential pending danger**

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

► Instructions to avoid the danger situation

**⚠ CAUTION**

**Potential pending danger**

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

► Instructions to avoid the danger situation

***NOTICE***

**Danger of damage to property**

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

► Instructions to avoid damage to property

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

## 2.2 Safety instructions

**Safety instructions according to product life stages**

All safety instructions in this document are based on the results of a risk assessment. Pfeiffer Vacuum has taken into account all the relevant life stages of the product.

**Risks during maintenance**

**⚠ DANGER**

**Danger to life from electric shock caused by moisture ingress**

Water that has entered the unit will result in personal injury through electric shocks.

► Only operate the unit in a dry environment.
► Operate the unit away from fluids and sources of moisture.
► Do not switch on the unit if fluid has entered it. Instead contact Pfeiffer Vacuum Service.
► Always disconnect the power supply before cleaning the unit.

**⚠ WARNING**

**Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

**⚠ WARNING**

**Health hazards due to cleaning agent**

The cleaning agent being used causes health hazards which could include, for example, poisoning, allergies, skin irritations, chemical burns or damage to the airways.

- ► When handling cleaning agents, observe the applicable regulations.
- ► Adhere to safety measures regarding handling and disposal of cleaning agents.
- ► Be aware of potential reactions with product materials.

**Risks when shipping**

**⚠ WARNING**

**Risk of poisoning from contaminated products**

Where products that contain harmful substances are shipped for maintenance or repair purposes, the health and safety of service personnel is at risk.

- ► Comply with the instructions for safe distribution.

**Risks during disposal**

**⚠ WARNING**

**Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

## 2.3 Safety precautions

The product is designed according to the latest technology and recognized safety engineering rules. Nevertheless, improper use can result in danger to operator all third party life and limb, and product damage and additional property damage.

**Duty to provide information on potential dangers**

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

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

**Infringement of conformity due to modifications to the product**

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

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

**General safety precautions when handling the product**

- ► Observe all applicable safety and accident prevention regulations.
- ► Check that all safety measures are observed at regular intervals.
- ► Pass on safety instructions to all other users.
- ► Do not expose body parts to the vacuum.
- ► Always ensure a secure connection to the earthed conductor (PE).
- ► Never disconnect plug connections during operation.
- ► Observe the above shutdown procedures.
- ► Keep lines and cables away from hot surfaces (> 70 °C).
- ► Do not carry out your own conversions or modifications on the device.
- ► Observe the unit protection degree prior to installation or operation in other environments.
- ► Provide suitable touch protection, if the surface temperature exceeds 70 °C.
- ► Inform yourself about any contamination before starting work.

## 2.4 Limits of use of product

| Parameter | Value |
|---|---|
| Relative humidity of air | 5 % – 85 %, non-condensing |
| Mounting orientation | Arbitrary |
| Usage | Only in indoor areas |
| Air pressure | 790 – 1 060 hPa |
| Installation altitude max. | 2000 m |
| Degree of pollution | 2 |
| Protection degree | IP40 |

**Tbl. 4: Permissible ambient conditions**

## 2.5 Proper use

The sensor is used for the integrated pressure measurement at the Pfeiffer Vacuum HiPace or HiScroll within the permissible total pressure range.

**Use the product according to its intended purpose**

1. Install, operate and maintain the sensor only as prescribed in these operating instructions.
2. Use the sensor only for the pressure measurement of air, inert gases and gas mixtures outside their explosion limits.
3. Connect the sensor with the corresponding connector.
4. Comply with the application limits.
5. Observe the technical data.

## 2.6 Foreseeable improper use

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

- Use outside the mechanical and electrical limits of use
- Use with corrosive or explosive media, if this is not explicitly permitted
- Use outdoors
- Use after technical changes (inside or outside on the product)
- Use with replacement or accessory parts that are not suitable or not approved

## 2.7 Personnel qualification

The work described in this document may only be carried out by persons who have appropriate professional qualifications and the necessary experience or who have completed the necessary training as provided by Pfeiffer Vacuum.

**Training people**

1. Train the technical personnel on the product.
2. Only let personnel to be trained work with and on the product when under the supervision of trained personnel.
3. Only allow trained technical personnel to work with the product.
4. Before starting work, make sure that the commissioned personnel have read and understood these operating instructions and all applicable documents, in particular the safety, maintenance and repair information.

# 3 Product description

## 3.1 Function

The sensor has two measurement systems:

- Pirani measurement system
- Piezo-resistive measurement system

The sensor responds to measured value requests, type requests and adjustment commands. Signals are evaluated via the interfaces of the electronic drive unit using a Pfeiffer Vacuum control unit or external units (e.g. PLC or PC).

## 3.2 Status display

Information on the operating status of the sensor is provided via a Pfeiffer Vacuum control unit.

Further details can be obtained in the Pfeiffer Vacuum control unit operating instructions.

## 3.3 Identifying the product

You will need all the data from the rating plate to safely identify the product when communicating with Pfeiffer Vacuum.

► To ensure clear identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the rating plate to hand.

## 3.4 Scope of delivery

The scope of delivery includes the following parts:

- Sensor with cable and power supply plug
- Operating instructions

**Unpacking the product and checking completeness of the shipment**

1. Unpack the product.
2. Remove the transport fasteners, transport protection etc.
3. Store the transport fasteners, transport protection etc. in a safe place.
4. Check that the shipment is complete.
5. Ensure that no parts are damaged.

# 4 Transport and storage

## 4.1 Transporting the product

**NOTICE**

**Damage caused by incorrect transport**

Transport in unsuitable packaging or failure to install all transport locks can result in damage to the product.

► Comply with the instructions for safe transport.

**Packing**

We recommend keeping the transport packaging and original protective cover.

**Transport product safely**

- ► Observe the weight specified on the transport packaging.
- ► Where possible, always transport or ship the product in the original transport packaging.
- ► Always use dense and impact-proof transport packaging for the product.
- ► Remove the existing protective cover and transport protections only immediately prior to installation.
- ► Reattach transport locks and transport protections prior to each transport.

## 4.2 Storing the product

**NOTICE**

**Damage caused by improper storage**

Improper storage will lead to damage to the product.

Static charging, moisture, etc. will lead to defects on the electronic components.

► Comply with the instructions for safe storage.

**Packing**

We recommend storing the product in its original packaging.

**Store product safely**

- ► Store the product in a cool, dry, dust-free place, where it is protected against impacts and mechanical vibration.
- ► Always use dense and impact-proof packaging for the product.
- ► Where possible, store the product in its original packaging.
- ► Store electronic components in antistatic packaging.
- ► Maintain the permissible storage temperature.
- ► Avoid extreme fluctuations of the ambient temperature.
- ► Avoid high air humidity.
- ► Seal connections with the original protective caps.
- ► Protect the product with the original transport protection (where available).

# 5 Installation

## 5.1 Establishing the vacuum connection

**NOTICE**

**Impairment from contamination and damage**

Touching the devices or components with bare hands increases the desorption rate and leads to incorrect measurements. Dirt (e.g. dust, fingerprints, etc.) and damage impair the function.

- ► When working on high or ultra high vacuum systems, always wear clean, lint-free and powder-free laboratory gloves.
- ► Only use clean tools.
- ► Make sure that the connection flanges are free of grease.
- ► Remove protective caps and protective covers from flanges and connections only when necessary.
- ► Carry out all work in a well lit area.

**NOTICE**

**Damage to housing or cable connection**

Any improper use of force will damage the sensor.

- ► Do not apply any force with a tool to the housing or cable connection.

**Vacuum pump operating instructions**

Observe the information on the connection in the operating instructions for the vacuum pump.

### 5.1.1 Connecting the sensor to HiPace

**Required tools**

- Open-end wrench, **WAF 19, ≤ 4 mm flat**
- Calibrated torque wrench (tightening factor ≤ 2.5)

**Prerequisites**

- Vacuum pump switched off and vented
- Sealing gas connection or fore-vacuum connection with intermediate piece for the sensor selected
- Appropriate ambient conditions
- Sufficient space for electrical connection (e.g. permissible bending radii of cables)

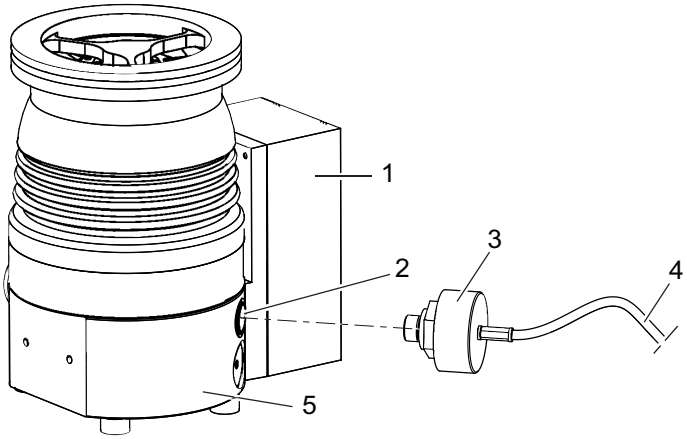



**Fig. 1: Example: Connect the sensor to HiPace**

1 Electronic drive unit
2 1/8” connector (here: sealing gas connection)
3 Sensor
4 Sensor cable
5 Pump bottom part

**Procedure**

1. Remove the protective cap from the sensor and store it in a safe place.
2. Remove the locking screw from the desired connector of the turbopump.
3. Mount the sensor on the vacuum side on the desired G 1/8" connector of the turbopump.
   – Tightening torque: **max. 3 Nm**

## 5.1.2 Connecting the sensor to HiScroll

**Required tools**

- Open-end wrench, **WAF 19, ≤ 4 mm flat**
- Allen key, **WAF 3**
- Allen key, **WAF 4**
- Calibrated torque wrench (tightening factor ≤ 2.5)

**Prerequisites**

- Vacuum pump switched off and vented
- Appropriate ambient conditions
- Sufficient space for electrical connection (e.g. permissible bending radii of cables)
- Fan cover of HiScroll removed according to operating instructions

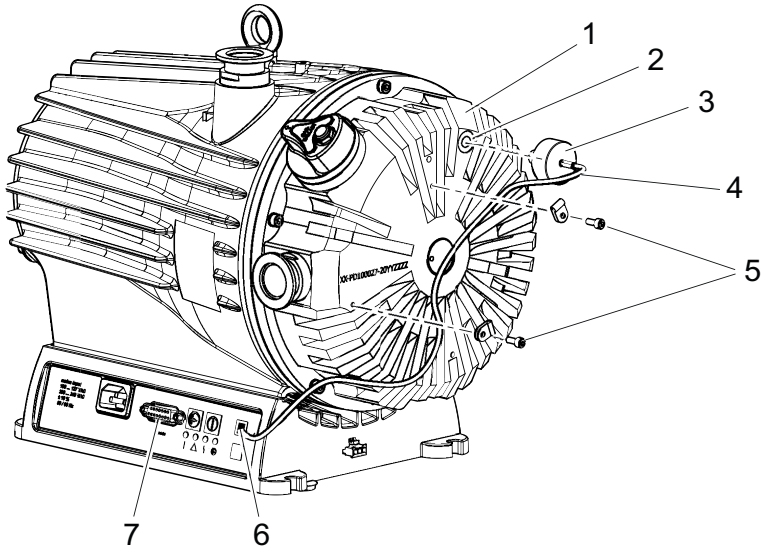



**Fig. 2: Example: Connecting the sensor to HiScroll**

1 Spiral housing
2 Pressure sensor connection
3 Sensor
4 Sensor cable
5 Plastic clamps and hexagon socket screws
6 AccessLink accessory connectors
7 Remote connection

**Procedure**

1. Remove the protective cap from the sensor and store it in a safe place.
2. Remove the locking screw from the pressure sensor connector of the HiScroll.
3. Mount the sensor on the vacuum side on the pressure sensor connector of the HiScroll.
4. Tighten the sensor at the hexagon socket (WAF 19) on the HiScroll.
   – Tightening torque: **max. 2.5 Nm**
5. Route the sensor cable on the spiral housing.
6. Fasten the sensor cable to the spiral housing with two plastic clamps and interior hexagon socket screws.
   – Tightening torque: **max. 1.25 Nm**

## 5.2 Establishing electric connection

**NOTICE**

**Property damage to the electronics or the sensor**

Disconnecting the plug-and-socket connection with the voltage supply switched on may lead to the destruction of electronic components.

► Always interrupt the voltage supply before you plug in or unplug the sensor connection cable.

### 5.2.1 Connecting sensor with AccessLink

**Vacuum pump operating instructions**

Observe the information on the connection in the operating instructions for the vacuum pump.

**Prerequisite**

- All connectors are de-energized

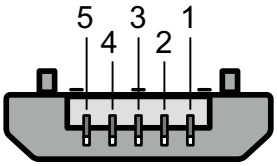



**Fig. 3: AccessLink connector (micro USB, type B)**

1 + 5 V (blue)
2 Sensor RxD / host TxD (white)
3 Sensor TxD / host RxD (green)
4 Not connected (red)
5 GND (black)

**Procedure**

1. Connect the cable to a free AccessLink of the vacuum pump.
2. Make the settings and perform the control via the interfaces of the electronic drive unit.

### 5.2.2 Connecting the sensor with TIC 010 to HiPace

**Electronic drive unit operating instructions**

Observe the information on the connection in the operating instructions for the electronic drive unit.

**Assembly instructions for the TIC 010**

Observe the information on assembly in the assembly instructions for the TIC 010.

The plug-in contacts of the adapter TIC 010 are numbered on its circuit board and correspond to parameters and output values in the further course. You can select the plug-in position of the sensor as desired.

| Electronic drive unit | Firmware version (or higher) |
|---|---|
| TC 110 | 012500 |
| TC 120 | 010300 |
| TC 400 | 012400 |
| TC 1200 | 012400 |
| TM 700 | 010600 |

**Tbl. 5: Electronic drive units and required firmware versions**

**Prerequisites**

- Required firmware versions of the electronic drive unit are available
- All connectors are de-energized

**Accessories required**

- TIC 010, adapter for two sensors

**Procedure**

1. Connect the cable to the TIC 010 at the "PV.can" connector of the electronic drive unit.
2. Make the settings and perform the control via the interfaces of the electronic drive unit.

## 5.2.3 Connecting the sensor with a D-Sub adapter to HiScroll

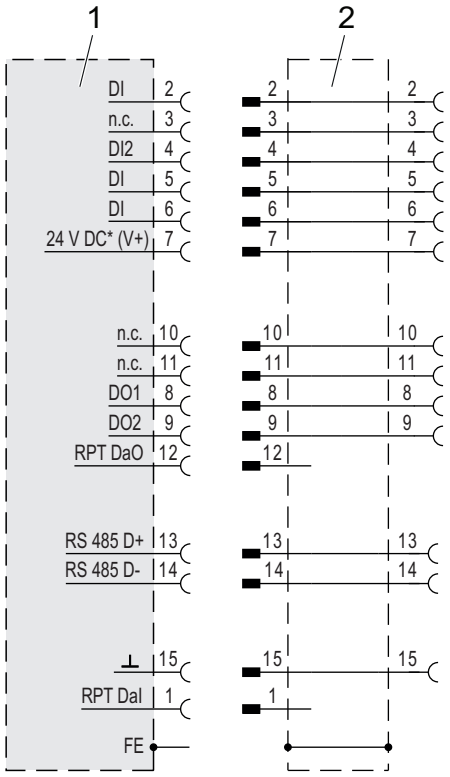



**Fig. 4: D-Sub adapter connection diagram**

1 Vacuum pump 2 D-Sub adapter

The D-Sub adapter of the sensor guides contacts 2 to 11 and 13 to 15 of the remote interface to the D-Sub socket on the rear, provides the voltage supply of 5 V DC for the RPT sensor and guides contacts RPT DaO and RPT DaI for communication to the sensor.

**Prerequisite**

- All connectors are de-energized

**Procedure**

1. Connect the cable to the "remote" connector of the electronic drive unit.
2. Make the settings and perform the control via the interfaces of the electronic drive unit.

# 6 Operation

The connected sensor unit is ready for operation as soon as the supply voltage is supplied to the electronic drive unit.

The pressure measured in the Pirani range depends on the gas type.

**Recommendations**

- ► Observe a minimum stabilization period of 5 to 10 minutes.
- ► Note the relationship between measuring signal and pressure.

## 6.1 Evaluating the measurement signal

**Signal evaluation via output interfaces**

The output interfaces of the electronic drive unit with the applicable Pfeiffer Vacuum protocol and the Pfeiffer Vacuum parameter set are used to operate the connected accessory devices on a Pfeiffer Vacuum vacuum pump.

See the valid operating instructions for the electronic drive unit used.

## 6.2 Determining effective pressure with correction factors

**Gas and vapor mixtures**

Process gases are mostly mixtures of gas and vapor. Precise measuring of gas and vapor mixtures is only possible using partial pressure measurement instruments, for example a quadrupole mass spectrometer.

The measurement signal of the pressure sensor depends on the type of gas in the Pirani range. The pre-set correction factor = 1 applies for nitrogen ($N_2$), oxygen ($O_2$), dry air, and carbon monoxide (CO).

| Gas type | Correction factor (C) |
|---|---|
| Air, oxygen ($O_2$), carbon monoxide (CO), nitrogen ($N_2$) | 1.0 |
| Hydrogen ($H_2$) | 0.5 |
| Carbon dioxide ($CO_2$) | 0.9 |
| Water vapor | 0.5 |
| Helium (He) | 0.8 |
| Neon (Ne) | 1.4 |
| Argon (Ar) | 1.7 |
| Krypton (Kr) | 2.4 |
| Xenon (Xe) | 3.0 |
| Dichlorodifluoromethane ($CCl_2F_2$, R12) | 0.7 |
| The correction factors provided are mean values. | |

**Tbl. 6: Correction factor for pressure range < 1 hPa**

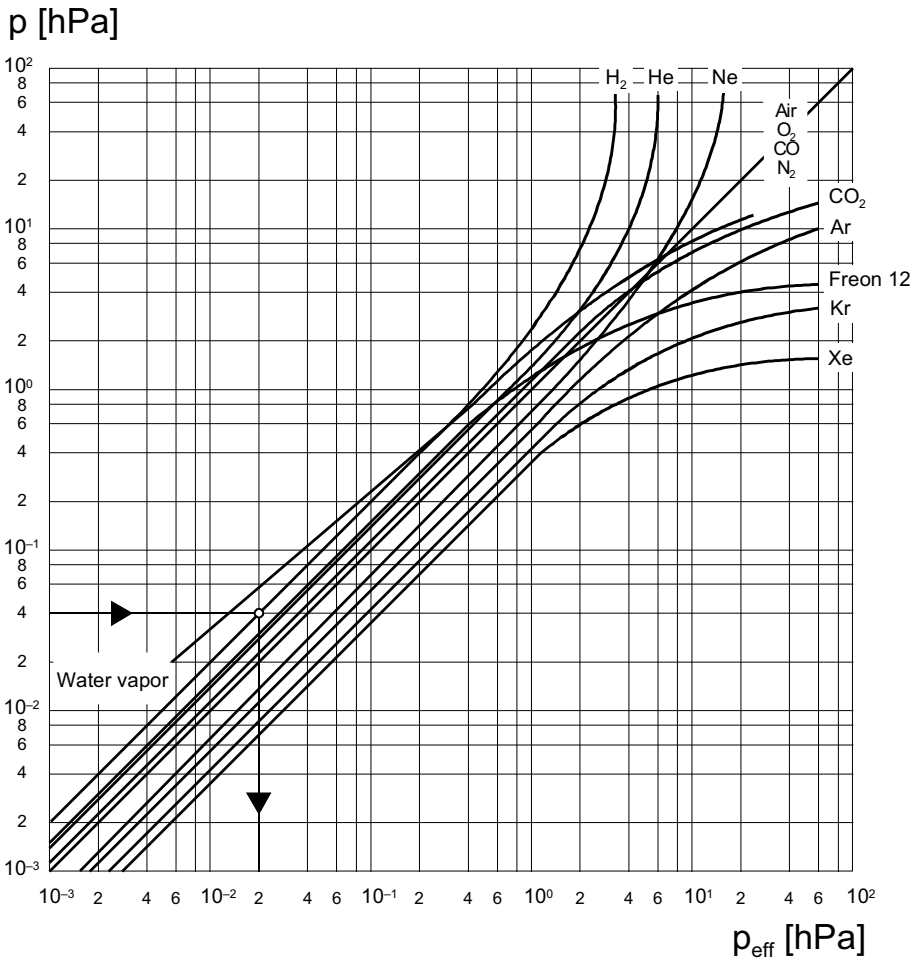



**Fig. 5: Displayed pressure**

Within the pressure range < 1 hPa, the display is linear.

**Set correction factor at electronic drive unit**

► Use **[P:742]** to enter correction factor and correct displayed measured value.

**Alternatively: Calculating pressure for gases other than air**

1. Set the correction factor in the electronic drive unit to 1
2. Calculate the effective pressure using the following formula:

   **$P_{eff}$ = C × p**

   - **$P_{eff}$** = Effective pressure
   - **C** = Correction factor of the gas to be measured
   - **p** = Displayed pressure (gauge calibrated for air)

# 7 Maintenance

**⚠ WARNING**

**Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

**Maintenance in the Pfeiffer Vacuum Service Center**

Pfeiffer Vacuum offers a complete maintenance service for all products.

Pfeiffer Vacuum recommends: Contact your Pfeiffer Vacuum Service Center to arrange the maintenance of defective products and components.

**Cleaning in the Pfeiffer Vacuum Service Center**

Pfeiffer Vacuum recommends: Contact your nearest Pfeiffer Vacuum Service Center to arrange the cleaning of heavily-soiled products and components.

**Warranty claim**

Opening the device during the warranty period or damaging/removing the warranty seal will void the warranty.

Contact the Pfeiffer Vacuum Service Center in the event of process-related shorter maintenance intervals.

**First read through the sections completely**

Read the section with the work instructions through completely first before you commence with work.

Other climatic conditions, long-term operation, extreme temperatures, a different mounting orientation, and aging or contamination can lead to a zero point shift in the Pirani measurement system. A zero point shift will necessitate recalibration or cleaning.

## 7.1 Removing components

***NOTICE***

**Impairment from contamination and damage**

Touching the devices or components with bare hands increases the desorption rate and leads to incorrect measurements. Dirt (e.g. dust, fingerprints, etc.) and damage impair the function.

- ► When working on high or ultra high vacuum systems, always wear clean, lint-free and powder-free laboratory gloves.
- ► Only use clean tools.
- ► Make sure that the connection flanges are free of grease.
- ► Remove protective caps and protective covers from flanges and connections only when necessary.
- ► Carry out all work in a well lit area.

**Prerequisites**

- Vacuum system vented to atmospheric pressure
- Supply voltage switched off

**Removing the sensor**

1. Disconnect the sensor cable from the connected electronic drive unit.
2. Remove the sensor from the vacuum pump.
3. Fit the protective cap on the connection flange.

## 7.2 Cleaning of components

**⚠ DANGER**

**Danger to life from electric shock caused by moisture ingress**

Water that has entered the unit will result in personal injury through electric shocks.

- ► Only operate the unit in a dry environment.
- ► Operate the unit away from fluids and sources of moisture.
- ► Do not switch on the unit if fluid has entered it. Instead contact Pfeiffer Vacuum Service.
- ► Always disconnect the power supply before cleaning the unit.

**⚠ WARNING**

**Health hazards due to cleaning agent**

The cleaning agent being used causes health hazards which could include, for example, poisoning, allergies, skin irritations, chemical burns or damage to the airways.

- ► When handling cleaning agents, observe the applicable regulations.
- ► Adhere to safety measures regarding handling and disposal of cleaning agents.
- ► Be aware of potential reactions with product materials.

***NOTICE***

**Damage caused by penetrating moisture**

Penetrating moisture, e.g. through condensation or dripping water, damages the unit.

- ► Protect the unit against penetration of moisture.
- ► Only operate the unit in a clean and dry environment.
- ► Operate the unit away from fluids and sources of moisture.
- ► Take special precautions if there is a risk of dripping water.
- ► Do not switch on the unit if fluid has penetrated into it, instead contact the Pfeiffer Vacuum Service Center.

***NOTICE***

**Damage caused by unsuitable cleaning agents**

Unsuitable cleaning agents damage the product.

- ► Do not use solvents as they attack the surface.
- ► Do not use any aggressive or abrasive cleaning agents.

**Required consumables**

- Industrial alcohol
- Cloth (soft, lint-free)

**External cleaning of the device**

1. Always use a cloth soaked in industrial alcohol for external cleaning.
2. Allow the surfaces to dry thoroughly after cleaning.

## 7.3 Calibrating the pressure sensor

Pfeiffer Vacuum calibrated the pressure sensor at the factory.

**Required aids**

- Vacuum gauge for reference measurement on the vacuum system
- Pfeiffer Vacuum display and control unit or PC

**Perform HV calibration**

1. Operate vacuum system at final pressure.
2. Wait for stabilization period of at least 10 minutes.
3. Read off actual pressure value of reference measurement.
4. Use **[P:740]** to set actual pressure value to reference value.
5. Enter "000000" for $p \leq 1 \times 10^{-4}$ hPa.

**Perform ATM calibration**

1. Vent vacuum system to atmospheric pressure.
2. Wait for stabilization period of at least 10 minutes.
3. Use **[P:740]** to precisely set actual pressure value to daily pressure.

# 8 Shipping

**⚠ WARNING**

**Risk of poisoning from contaminated products**

Where products that contain harmful substances are shipped for maintenance or repair purposes, the health and safety of service personnel is at risk.

► Comply with the instructions for safe distribution.

**Decontamination subject to charge**

Pfeiffer Vacuum decontaminates products not clearly declared "Free of contamination" at your expense.

**Ship product safely**

► Do not ship microbiological, explosive or radioactively contaminated products.
► Observe the shipping guidelines for the participating countries and transport companies.
► Highlight any potential dangers on the outside of the packaging.
► Download the explanation for contamination at Pfeiffer Vacuum Service.
► Always enclose a completed declaration of contamination.

# 9 Recycling and disposal

**⚠ WARNING**

**Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ► Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ► Decontaminate affected parts before carrying out maintenance work.
- ► Wear protective equipment.

**Environmental protection**

You **must** dispose of the product and its components in accordance with all applicable regulations for protecting people, the environment and nature.

- Help to reduce the wastage of natural resources.
- Prevent contamination.

## 9.1 General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

- ► Dispose of our products according to the following:
  - – Iron
  - – Aluminium
  - – Copper
  - – Synthetic
  - – Electronic components
  - – Oil and fat, solvent-free
- ► Observe the special precautionary measures when disposing of:
  - – Fluoroelastomers (FKM)
  - – Potentially contaminated components that come into contact with media

## 9.2 Disposal of sensors

Pfeiffer Vacuum sensors contain materials that you must recycle.

1. Decontaminate the components that come into contact with process gases.
2. Separate the components into recyclable materials.
3. Recycle the non-contaminated components.
4. Dispose of the product or components safely according to locally applicable regulations.

# 10 Service solutions by Pfeiffer Vacuum

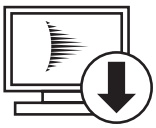
**We offer first-class service**
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

We are always focused on perfecting our core competence – servicing of vacuum components. Once you have purchased a product from Pfeiffer Vacuum, our service is far from over. This is often exactly where service begins. Obviously, in proven Pfeiffer Vacuum quality.

Our professional sales and service employees are available to provide you with reliable assistance, worldwide. Pfeiffer Vacuum offers an entire range of services, from original replacement parts to service contracts.

**Make use of Pfeiffer Vacuum service**
Whether preventive, on-site service carried out by our field service, fast replacement with mint condition replacement products, or repair carried out in a Service Center near you – you have various options for maintaining your equipment availability. You can find more detailed information and addresses on our homepage, in the section.

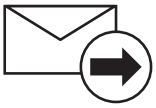
**You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.**
**For fast and smooth service process handling, we recommend the following:**



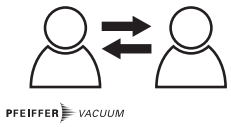
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

a) Remove and store all accessories (all external parts, such as valves, protective screens, etc.).
b) If necessary, drain operating fluid/lubricant.
c) If necessary, drain coolant.

2. Complete the service request and contamination declaration.

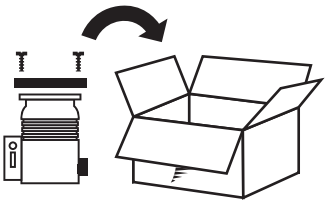


3. Send the forms by email, fax, or post to your local Service Center.

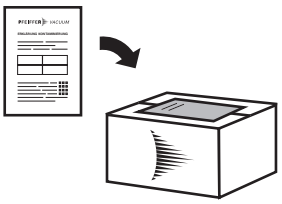



4. You will receive an acknowledgment from Pfeiffer Vacuum.

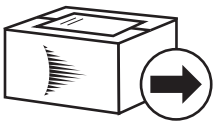
**Submission of contaminated products**
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



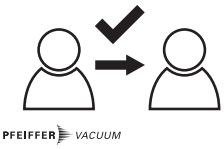
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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



6. Attach the contamination declaration to the **outside** of the packaging.



7. Now send your product to your local Service Center.



8. You will receive an acknowledgment/quotation, from Pfeiffer Vacuum.

Our sales and delivery conditions and repair and maintenance conditions for vacuum devices and components apply to all service orders.

# 11 Spare parts

**Ordering spare parts**

- ► Have the part number to hand, along with other details from the rating plate as required.
- ► Install original spare parts only.

| Description | Order number |
|---|---|
| U sealing ring U 10.4/16 x 2 | P 3529 133 -P |

**Tbl. 7: Spare parts**

# 12 Technical data and dimensions

## 12.1 General

| | mbar | bar | Pa | hPa | kPa | Torr \| mm Hg |
|---|---|---|---|---|---|---|
| mbar | 1 | $1 \cdot 10^{-3}$ | 100 | 1 | 0.1 | 0.75 |
| bar | 1000 | 1 | $1 \cdot 10^{5}$ | 1000 | 100 | 750 |
| Pa | 0.01 | $1 \cdot 10^{-5}$ | 1 | 0.01 | $1 \cdot 10^{-3}$ | $7.5 \cdot 10^{-3}$ |
| hPa | 1 | $1 \cdot 10^{-3}$ | 100 | 1 | 0.1 | 0.75 |
| kPa | 10 | 0.01 | 1000 | 10 | 1 | 7.5 |
| Torr \| mm Hg | 1.33 | $1.33 \cdot 10^{-3}$ | 133.32 | 1.33 | 0.133 | 1 |
| 1 Pa = 1 $N/m^2$ | | | | | | |

**Tbl. 8: Conversion table: Pressure units**

| | mbar l/s | Pa $m^3/s$ | sccm | Torr l/s | atm $cm^3/s$ |
|---|---|---|---|---|---|
| mbar l/s | 1 | 0.1 | 59.2 | 0.75 | 0.987 |
| Pa $m^3/s$ | 10 | 1 | 592 | 7.5 | 9.87 |
| sccm | $1.69 \cdot 10^{-2}$ | $1.69 \cdot 10^{-3}$ | 1 | $1.27 \cdot 10^{-2}$ | $1.67 \cdot 10^{-2}$ |
| Torr l/s | 1.33 | 0.133 | 78.9 | 1 | 1.32 |
| atm $cm^3/s$ | 1.01 | 0.101 | 59.8 | 0.76 | 1 |

**Tbl. 9: Conversion table: Units for gas throughput**

## 12.2 Technical data

| Part number | PT R71 100 | PT R71 550 | PD 100 100 -T | PD 100 100 AT |
|---|---|---|---|---|
| Selection field | RPT 010, digital Piezo/Pirani sensor | RPT 010, digital Piezo/Pirani sensor | RPT 010, digital Piezo/Pirani sensor | RPT 010, digital Piezo/Pirani sensor |
| Interface: Connection, device side | Cable with Molex connector for TIC 010 | Cable with (micro USB plug) | Cable with D-Sub adapter plug, 15-pole, male/female | Cable with (micro USB plug) |
| Connection flange (in) | G 1/8" | G 1/8" | G 1/8" | G 1/8" |
| Measuring method | Piezo, Pirani | Piezo, Pirani | Piezo, Pirani | Piezo, Pirani |
| Measuring range | 5E-4 – 1.2E3 hPa | 5E-4 – 1.2E3 hPa | 5E-4 – 1.2E3 hPa | 5E-4 – 1.2E3 hPa |
| Pressure max. | 2000 hPa | 2000 hPa | 2000 hPa | 2000 hPa |
| Accuracy of measurement in range 1 | 50 % (5E-4 hPa – 1E-3 hPa) | 50 % (5E-4 hPa – 1E-3 hPa) | 50 % (5E-4 hPa – 1E-3 hPa) | 50 % (5E-4 hPa – 1E-3 hPa) |
| Precision (Full Scale): 100 – 1200 hPa | ± 1.25 % | ± 1.25 % | ± 1.25 % | ± 1.25 % |
| Repeatability in range 1 | 3 % (1E-3 hPa – 1E2 hPa) | 3 % (1E-3 hPa – 1E2 hPa) | 3 % (1E-3 hPa – 1E2 hPa) | 3 % (1E-3 hPa – 1E2 hPa) |
| Repeatability in range 2 | 3 % (full scale) (1E1 hPa – 1 200 hPa) | 3 % (full scale) (1E1 hPa – 1 200 hPa) | 3 % (full scale) (1E1 hPa – 1 200 hPa) | 3 % (full scale) (1E1 hPa – 1 200 hPa) |
| Measuring cycle | 100 ms | 100 ms | 100 ms | 100 ms |
| Input voltage(s) | 5 V DC | 5 V DC | 5 V DC | 5 V DC (±5 %) |
| Input voltage: tolerance | ±5 % | ±5 % | ±5 % | ±5 % |

| Part number | PT R71 100 | PT R71 550 | PD 100 100 -T | PD 100 100 AT |
|---|---|---|---|---|
| Power consumption max. | 0.25 W | 0.25 W | 0.25 W | 0.25 W |
| Measurement cable length | 1 m | 0.5 m | 0.5 m | 0.5 m |
| Ambient temperature | 5 – 60 °C | 5 – 60 °C | 5 – 60 °C | 5 – 60 °C |
| Temperature: Storage | -40 – 70 °C | -40 – 70 °C | -40 – 70 °C | -40 – 70 °C |
| Materials in contact with media | Ceramic, Stainless steel, Tungsten, Nickel, Silicon oxide, Glass, Araldite, Solder | Ceramic, Stainless steel, Tungsten, Nickel, Silicon oxide, Glass, Araldite, Solder | Ceramic, Stainless steel, Tungsten, Nickel, Silicon oxide, Glass, Araldite, Solder | Ceramic, Stainless steel, Tungsten, Nickel, Silicon oxide, Glass, Araldite, Solder |
| Volume | 0.4 cm³ | 0.4 cm³ | 0.4 cm³ | 0.4 cm³ |
| Weight | 92 g | 92 g | 0.13 kg | 90 g |
| Relative humidity of air | 5 % – 85 %, non-condensing | 5 % – 85 %, non-condensing | 5 % – 85 %, non-condensing | 5 % – 85 %, non-condensing |
| Mounting orientation | Arbitrary | Arbitrary | Arbitrary | Arbitrary |
| Usage | Only in indoor areas | Only in indoor areas | Only in indoor areas | Only in indoor areas |
| Ambient pressure | 790 – 1 060 hPa | 790 – 1 060 hPa | 790 – 1 060 hPa | 790 – 1 060 hPa |
| Installation altitude, max. | 2000 m | 2000 m | 2000 m | 2000 m |
| Degree of pollution | 2 | 2 | 2 | 2 |
| Protection degree | IP40 | IP40 | IP20 | IP40 |

**Tbl. 10: Technical data, RPT 010**

## 12.3 Dimensions

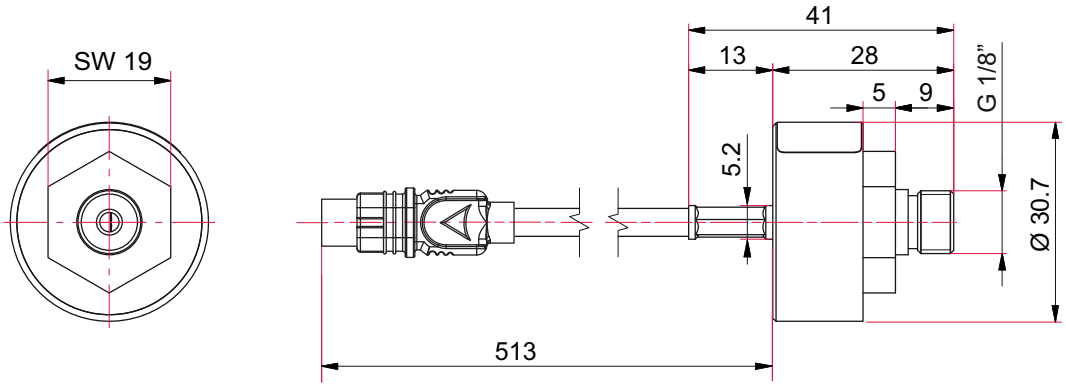



**Fig. 6: Dimensions with AccessLink connector**

**Dimensions in mm**

3103457

The product RPT 010 with AccessLink connector

- conforms to the UL standard
  UL 61010-1:2012.
- is certified to the CAN/CSA standard
  CAN/CSA C22.2 No. 61010-1-12.

PFEIFFER VACUUM

# EU Declaration of conformity

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

Declaration for product(s) of the type:

**Piezo/Pirani sensor**

RPT 010

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

**Electromagnetic compatibility 2014/30/EU**

**Restriction of the use of certain hazardous substances 2011/65/EU**

**Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU**

**Harmonized standards and applied national standards and specifications:**

DIN EN 61326-1:2013, group 1, class B

DIN EN IEC 63000: 2019

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2023-04-12

CE

PFEIFFER VACUUM

# UK Declaration of Conformity

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

Declaration for product(s) of the type:

**Piezo/Pirani sensor**

RPT 010

We hereby declare that the listed product satisfies all relevant provisions of the following **British Directives**.

**Electromagnetic Compatibility Regulations 2016**

**The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012**

**Applied standards and specifications:**

EN IEC 61326-1:2021

EN IEC 63000:2018

The manufacturer's authorized representative in the United Kingdom and the authorized agent for compiling the technical documentation is Pfeiffer Vacuum Ltd, 16 Plover Close, Interchange Park, MK169PS Newport Pagnell.

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2023-04-12

UK CA

PFEIFFER VACUUM

## VACUUM SOLUTIONS FROM A SINGLE SOURCE

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

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**From a single component to complex systems:
We are the only supplier of vacuum technology that provides a complete product portfolio.**

## COMPETENCE IN THEORY AND PRACTICE

**Benefit from our know-how and our portfolio of training opportunities!
We support you with your plant layout and provide first-class on-site service worldwide.**

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

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info@pfeiffer-vacuum.de

**www.pfeiffer-vacuum.com**

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