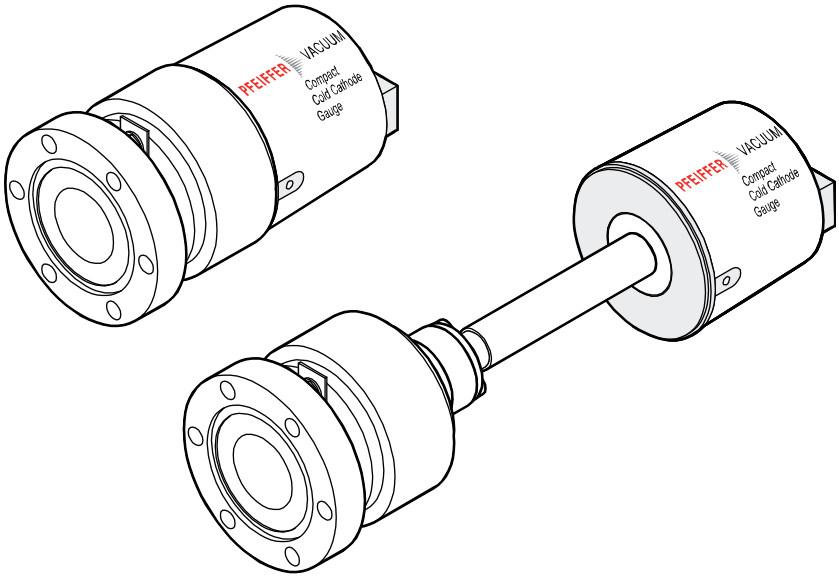


OPERATING INSTRUCTIONS

EN

Translation of the Original

IKR 270

Cold cathode gauge

PFEIFFER VACUUM

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new gauge is designed to support you in your individual application with maximum performance and without malfunctions. The name Pfeiffer Vacuum stands for 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
Brief guide “Cold cathode gauge“ IKR 270	BG 5115
OmniControl “Control unit” operating instructions	PT 0670
Operating instructions “Total Pressure Measuring and Control Unit“ TPG 366	BG 5501
Declaration of conformity	A component of these instructions

Tbl. 1: Applicable documents

The brief instruction for the gauge is included in the scope of delivery.

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
PT R21 251	IKR 270, DN 40 CF-F, short version
PT R21 261	IKR 270, DN 40 CF-F, long version

Tbl. 2: Variants

You can find the part number on the rating plate of the product.

Pfeiffer Vacuum reserves the right to make technical changes without prior notification.

The figures in this document are not to scale.

Dimensions are in mm unless stated otherwise.

1.2 Target group

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

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

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

1.3 Conventions

1.3.1 Instructions in the text

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

Individual action step

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

► This is an individual action step.

Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

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

1.3.2 Pictographs

The pictographs used in the document indicate useful information.

Note

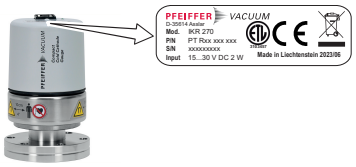
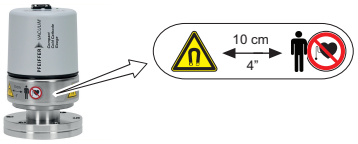
Tip

Wear laboratory gloves

Perform a visual inspection

1.3.3 Stickers on product

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

	**Rating plate** The rating plate is on the top of the unit.
	**Warning against magnetic fields** The sticker displays a warning that the magnetic field of the gauge can interfere with the functioning of pacemakers, and specifies the minimum distance to the gauge which must be maintained by persons with pacemaker implants.

1.3.4 Abbreviations

Abbreviation	Explanation
AC	Alternating current (AC)
c	Constant for converting measuring signal and pressure
C	Correction factor for calculating the pressure of gases other than air
d	Constant for converting measuring signal and pressure
DC	Direct current
FKM	Fluorinated rubber
GND	Ground

Abbreviation	Explanation
LPS	Limited power source
MSL	Mean sea level
p	Pressure
PE	Protective earth (earthed conductor)
PELV	Protective extra low voltage
WAF	Width Across Flats
U	Measuring signal [V] (output voltage)

Tbl. 3: Abbreviations used

1.4 Trademark proof

- Hirschmann® is a registered trademark of Hirschmann Electronics GmbH.
- Scotch-Brite® is a registered trademark of the 3M Company.

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 installation

⚠ DANGER

Danger to life due to dangerous contact voltage

Voltages above 30 V (AC) or 60 V (DC) are considered dangerous in accordance with EN 61010. If you come into contact with dangerous contact voltage, this can result in injury through electric shocks or even death.

► Only connect the product to devices which meet the following criteria:
- Requirements of the earthed protective extra-low voltage (PELV)
- Limited power source (LPS) Class 2

► Secure the line to the product.
– Pfeiffer Vacuum measuring and control equipment complies with this requirement.

⚠ DANGER

Risk to life due to electric shock

An improperly earthed product is potentially fatal in the event of a fault.

- ► Connect the product galvanically with the earthed vacuum chamber.
- ► Ensure that the connection complies with the requirements of a protective bonding according to EN 61010. (CF and VCR connections comply with this requirement.)
- ► Use electrically conductive centering rings and circlips for KF connections.

⚠ WARNING

Danger from magnetic fields

The product has a magnetic field that disturbs or impairs the function of electronic devices (e.g. pacemakers).

- ► Maintain the distances specified by the manufacturer of the pacemakers.
  - – Pfeiffer Vacuum recommends a safety distance of **at least 130 mm** between the pacemaker and the product.
- ► Avoid the influence of strong magnetic fields by means of magnetic field shielding.

⚠ WARNING

Risk of poisoning from toxic process gases escaping

High mechanical, chemical, or thermal stress causes leaks in the sensor. In processes involving toxic process media, there is a risk of injury and danger to life from poisoning by escaping gas in the event of overpressure in the vacuum system.

- ► Prevent high mechanical, chemical, or thermal stress from occurring.
- ► Prevent overpressure from occurring in the vacuum system.
- ► Take appropriate measures to prevent hazards or damage caused by the release of process media, such as gas supply interruption, extraction, or leak testing.

Risks during maintenance

⚠ DANGER

Risk to life due to electric shock

If no earth connection is established, voltage flows become hazardous to the touch and could lead to electronic components sustaining damage.

- ► Always tighten the electronic unit with the grub screw.
- ► Ensure that the grub screw of the electronic unit has been tightened correctly.

⚠ 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	At temperatures up to +31°C max. 80% At temperatures up to +40°C max. 50%
Mounting orientation	Arbitrary
Usage	Only in indoor areas
Installation altitude max.	3000 m MSL
Degree of pollution	2
Protection degree	IP40

Tbl. 4: Permissible ambient conditions

2.5 Proper use

The gauge provides a vacuum measurement of gases within the range of **5×10^{-11} to 1×10^{-2} hPa**.

Use the product according to its intended purpose

- ► Operate the gauge with a Pfeiffer Vacuum total pressure measuring and control unit or with an evaluation unit provided by the customer.
- ► Install, operate and maintain the gauge exclusively as prescribed in these operating instructions.
- ► Observe the limits of use according to the technical data.
- ► 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 Responsibilities and warranty

Pfeiffer Vacuum shall assume no responsibilities and warranty if the operating company or a third party:

- disregards this document
- does not use the product for its intended purpose
- carries out any modifications to the product (conversions, changes, etc.) that are not listed in the corresponding product documentation
- operates the product with accessories that are not listed in the corresponding product documentation

The operator is responsible for the process media used.

2.8 Owner requirements

Safety-conscious working

1. Only operate the product in a technically flawless state.
2. Operate the product in line with its intended purpose, safety and hazard-conscious and only in compliance with these operating instructions.

3. Fulfill the following instructions and monitor the observation of the following instructions:
   – Proper use
   – Generally applicable safety instructions and accident prevention regulations
   – International, national and locally applicable standards and guidelines
   – Additional product-related guidelines and regulations
4. Only use original parts or parts approved by Pfeiffer Vacuum.
5. Keep the operating instructions available at the place of installation.
6. Ensure personnel qualification.

2.9 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.

2.9.1 Ensuring personnel qualification

Specialist for mechanical work

Only a trained specialist may carry out mechanical work. Within the meaning of this document, specialists are people responsible for construction, mechanical installation, troubleshooting and maintenance of the product, and who have the following qualifications:

- Qualification in the mechanical field in accordance with nationally applicable regulations
- Knowledge of this documentation

Specialist for electrotechnical work

Only a trained electrician may carry out electrical engineering work. Within the meaning of this document, electricians are people responsible for electrical installation, commissioning, troubleshooting, and maintenance of the product, and who have the following qualifications:

- Qualification in the electrical engineering field in accordance with nationally applicable regulations
- Knowledge of this documentation

In addition, these individuals must be familiar with applicable safety regulations and laws, as well as the other standards, guidelines, and laws referred to in this documentation. The above individuals must have an explicitly granted operational authorization to commission, program, configure, mark, and earth devices, systems, and circuits in accordance with safety technology standards.

Trained individuals

Only adequately trained individuals may carry out all works in other transport, storage, operation and disposal fields. Such training must ensure that individuals are capable of carrying out the required activities and work steps safely and properly.

2.9.2 Personnel qualification for maintenance and repair

Advanced training courses

Pfeiffer Vacuum offers advanced training courses to maintenance levels 2 and 3.

Adequately trained individuals are:

- **Maintenance level 1**
  - Customer (trained specialist)
- **Maintenance level 2**
  - Customer with technical education
  - Pfeiffer Vacuum service technician
- **Maintenance level 3**
  - Customer with Pfeiffer Vacuum service training
  - Pfeiffer Vacuum service technician

2.9.3 Advanced training with Pfeiffer Vacuum

For optimal and trouble-free use of this product, Pfeiffer Vacuum offers a comprehensive range of courses and technical trainings.

For more information, please contact Pfeiffer Vacuum technical training.

2.10 Operator requirements

Observing relevant documents and data

1. Read, observe and follow this operating instruction and the work instructions prepared by the operating company, in particular the safety and warning instructions.
2. Install, operate and maintain the product only in accordance with these operating instructions.
3. Carry out all work only on the basis of the complete operating instructions and applicable documents.
4. Comply with the limits of use.
5. Observe the technical data.
6. Please contact the Pfeiffer Vacuum Service Center if your questions on operation or maintenance of the product are not answered in these operating instructions.
   - You can find information in the Pfeiffer Vacuum service area.

3 Product description

3.1 Function

⚠ WARNING

Danger from magnetic fields

The product has a magnetic field that disturbs or impairs the function of electronic devices (e.g. pacemakers).

- ► Maintain the distances specified by the manufacturer of the pacemakers.
  - – Pfeiffer Vacuum recommends a safety distance of **at least 130 mm** between the pacemaker and the product.
- ► Avoid the influence of strong magnetic fields by means of magnetic field shielding.

The gauge has a cold cathode measuring system functioning to the principle of the inverted magnetron. The measuring signal is logarithmically dependent on the pressure across the entire measuring range.

3.2 Status display

The LED on the top of the gauge indicates the operating status of the gauge.

Fig. 1: Light emitting diode

1 Green LED

LED	Operation status
lights up	Supply voltage available
Off	No supply voltage available

Tbl. 5: Operation status

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:

- Gauge
- Brief 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 vacuum connection

⚠ DANGER

Risk to life due to electric shock

An improperly earthed product is potentially fatal in the event of a fault.

- ► Connect the product galvanically with the earthed vacuum chamber.
- ► Ensure that the connection complies with the requirements of a protective bonding according to EN 61010. (CF and VCR connections comply with this requirement.)
- ► Use electrically conductive centering rings and circlips for KF connections.

⚠ DANGER

Risk to life due to electric shock

If no earth connection is established, voltage flows become hazardous to the touch and could lead to electronic components sustaining damage.

- ► Always tighten the electronic unit with the grub screw.
- ► Ensure that the grub screw of the electronic unit has been tightened correctly.

⚠ WARNING

Risk of poisoning from toxic process gases escaping

High mechanical, chemical, or thermal stress causes leaks in the sensor. In processes involving toxic process media, there is a risk of injury and danger to life from poisoning by escaping gas in the event of overpressure in the vacuum system.

- ► Prevent high mechanical, chemical, or thermal stress from occurring.
- ► Prevent overpressure from occurring in the vacuum system.
- ► Take appropriate measures to prevent hazards or damage caused by the release of process media, such as gas supply interruption, extraction, or leak testing.

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

Electric flashover from helium

Helium can cause electric flashovers in the unit's electronics which will destroy the electronics.

- ► Switch off the unit before carrying out a leak test.
- ► Dismantle the electronic unit before carrying out a leak test.

Prerequisites

- Appropriate ambient conditions
- Operating temperature within permissible range
- Adequate room available for electrical connection (e.g. permissible bending radii for cables)

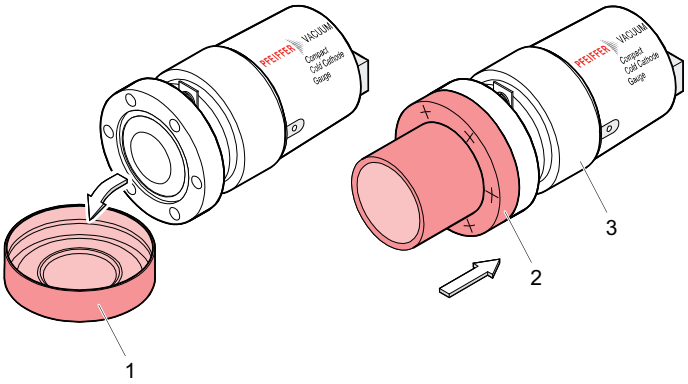


Fig. 2: Establishing vacuum connection

1 Protective cap
2 CF flange connection
3 Magnetic unit

Recommendations

- ► Ensure where possible that the gauge is not exposed to any vibrations during operation, as vibrations in general will lead to deviations in the measured values.
- ► Mount the gauge in a horizontal to upright mounting orientation (flange facing downwards).
  - – This prevents condensate and particles from accumulating in the measurement chamber.
- ► Remove the magnetic unit of the gauge temporarily wherever installation is only possible with the magnetic unit removed.
  - – This will facilitate assembly of the CF flange connection.

Procedure

1. Remove the protective cap and store in a safe place.
2. Assemble the gauge with vacuum components from the Pfeiffer Vacuum Components Shop on the vacuum system.
3. If you previously removed the magnetic unit of the gauge, assemble the magnetic unit again.

5.2 Removing/installing magnetic unit

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.

Removal of the magnetic unit should facilitate fitting of the gauge.

Required tools

- Allen key, **WAF 1.5**
- Open-end wrench, **WAF 7**

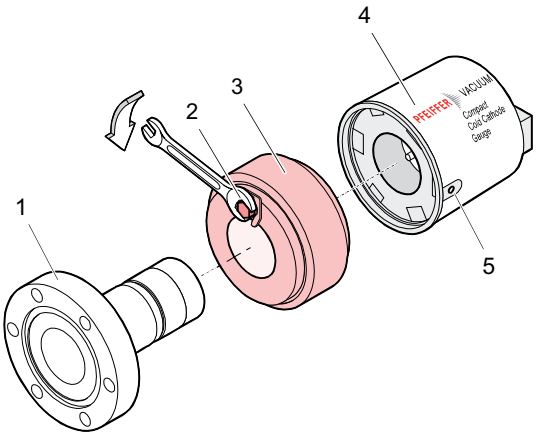


Fig. 3: Magnetic unit

1 Measurement chamber
2 Hexagon head set screw
3 Magnetic unit
4 Electronic unit
5 Grub screw

Removing the magnetic unit

1. Loosen the grub screw on the side of the electronic unit.
2. Remove the electronic unit without exerting any rotary movement.
3. Loosen the hexagon head screw on the magnetic unit.
4. Remove the magnetic unit.
   – Separation of the magnetic unit and measurement chamber is made more difficult due to the effect of magnetic force and the tendency for them to tilt easily.

Installing the magnetic unit

Electronic unit
Due to the tolerances, you must fit the same electronic unit when re-assembling.

1. Fit the magnetic unit.
   – Fitting of the magnetic unit is made more difficult due to the effect of magnetic force and the tendency for it to tilt easily.
2. Fasten the hexagon head screw on the magnetic unit.
3. Carefully fit the electronic unit.
4. Push the electronic unit as far as the stop.
5. Secure the grub screw on the side of the electronic unit.

5.3 Establishing electric connection

DANGER

Danger to life due to dangerous contact voltage

Voltages above 30 V (AC) or 60 V (DC) are considered dangerous in accordance with EN 61010. If you come into contact with dangerous contact voltage, this can result in injury through electric shocks or even death.

► Only connect the product to devices which meet the following criteria:
  • Requirements of the earthed protective extra-low voltage (PELV)
  • Limited power source (LPS) Class 2
► Secure the line to the product.
  – Pfeiffer Vacuum measuring and control equipment complies with this requirement.

NOTICE

Damage sustained as a result of improper connection

Improper connection, incorrect polarity or impermissible supply voltage will damage the gauge.

- ► Always connect the supply earth (Pin 5) with the earth for the supply unit.
- ► Always connect the shielding (Pin 6) with the earth for the supply unit.

Required tools

- Crosshead screwdriver
- Torque wrench (≤ 0.2 Nm)

Required materials

- Measurement cable for a Pfeiffer vacuum total pressure measuring and control unit from the ActiveLine accessories
- Self-fabricated measurement cable for an evaluation unit provided by the customer
- Hirschmann cable socket

Establishing electric connection

1. Connect the measurement cable to the gauge.
2. Tighten the locking screw on the Hirschmann cable socket.
   – Tightening torque: **≤ 0.2 Nm**
3. Connect the gauge to a Pfeiffer Vacuum total pressure measuring and control unit or an evaluation unit provided by the customer.

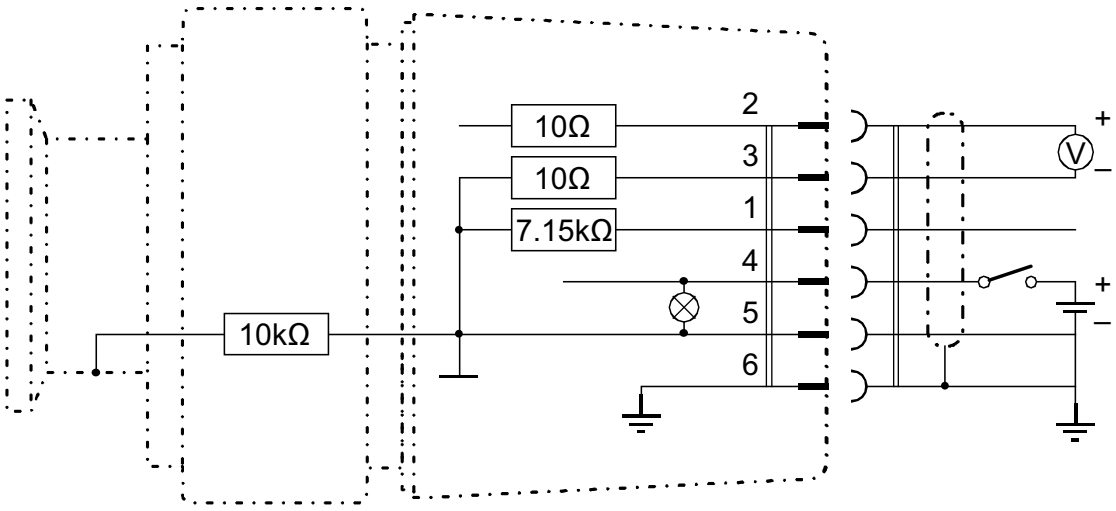


Fig. 4: Connection diagram

1	Identification	4	Supply
2	Measuring signal	5	Supply ground (GND)
3	Signal ground	6	Shielding

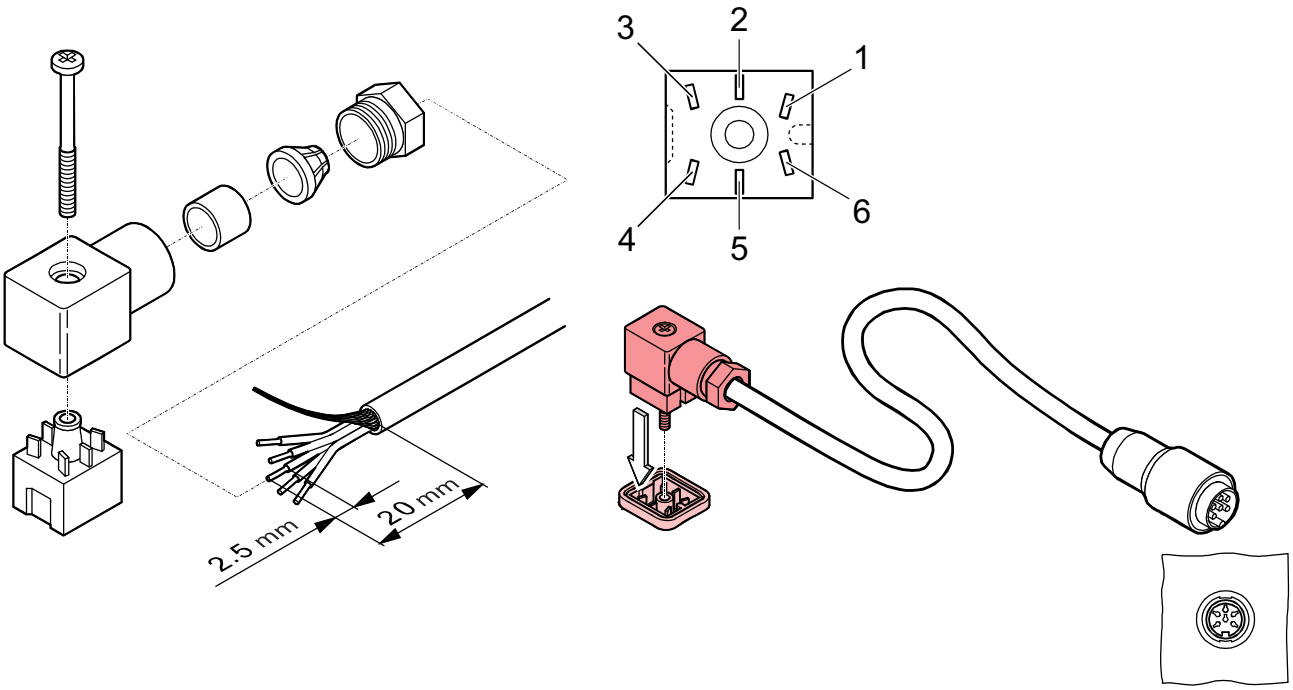


Fig. 5: Measurement cable and Hirschmann cable socket

Manufacturing measurement cable

Additional information regarding the measurement cable type and conductor cross-sections can be obtained from the technical data.

1. Observe the following steps to ensure optimum signal quality, whereby ground loops, differences in potential or EMC will influence the measuring signal.
2. Use a cable with braided shield.
3. Connect the supply earth directly with the protective earth for power supply pack.
4. Use a differential measuring input with separate signal earth and supply earth.
5. Ensure that the potential difference for surge protection between the supply earth and the housing is ≤ 6 V.
6. Assemble the Hirschmann cable socket.

Assembling the Hirschmann cable socket

1. Prepare the Hirschmann cable socket as shown in the "Measurement cable and Hirschmann cable socket" diagram.
2. Solder in the connection cable according to the connection diagram.
3. Assemble the Hirschmann cable socket.

6 Operation

Once the supply voltage has been established, the measuring signal is available at the electrical connection between pins 2 and 3.

Controlling the IKR gauge with a Pirani gauge

For Pfeiffer Vacuum total pressure measuring and control units with at least 2 gauge connections, the IKR gauge can be controlled with a Pirani gauge, for example.

Recommendations

- ► Respect the relation between measuring signal and pressure.
- ► Only switch the gauge on at pressures **< 10^{-2} hPa** to avoid excessive contamination.

6.1 Converting measuring signal and pressure

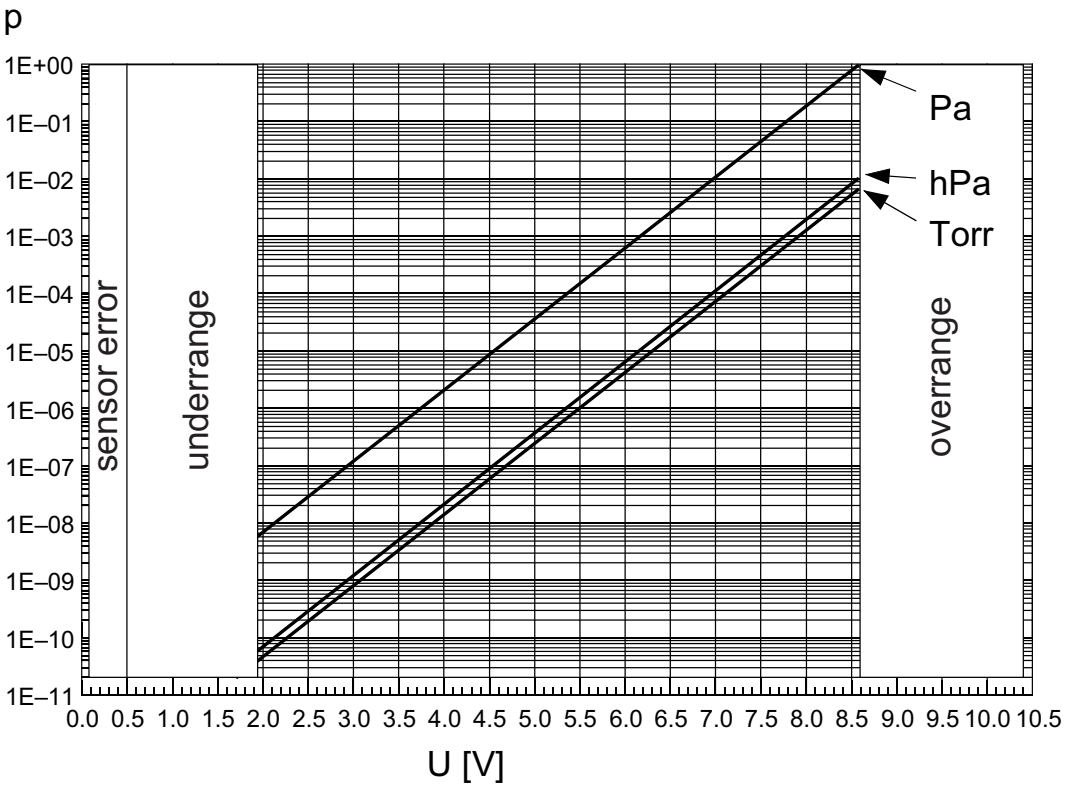


Fig. 6: Relation between measuring signal and pressure

p Pressure U Measuring signal [V] (output voltage)

Measuring signal (U)	Pressure (p)	Constant (c) [1]	Constant (d) [2]
[V]	[hPa]	10.2	12.75
	[mbar]		
	[Torr]	10.3	12.875
	[micron]	7.9	9.875
	[Pa]	8.6	10.75

Tbl. 6: Constants for converting measuring signal and pressure

1) Dependent upon unit of pressure
2) Dependent upon unit of pressure

Measuring signal (U)	Pressure (p)		
[V]	[hPa]	[Torr]	[Pa]
< 0.5	Sensor error		
0.5 – 1.96	Underrange		
1.96	5.0×10^{-11}	3.75×10^{-11}	5.0×10^{-9}
2.2	1.0×10^{-10}	7.5×10^{-11}	1.0×10^{-8}
3.0	1.0×10^{-9}	7.5×10^{-10}	1.0×10^{-7}
3.8	1.0×10^{-8}	7.5×10^{-9}	1.0×10^{-6}
4.6	1.0×10^{-7}	7.5×10^{-8}	1.0×10^{-5}
5.4	1.0×10^{-6}	7.5×10^{-7}	1.0×10^{-4}
6.2	1.0×10^{-5}	7.5×10^{-6}	1.0×10^{-3}
7.0	1.0×10^{-4}	7.5×10^{-5}	1.0×10^{-2}
7.8	1.0×10^{-3}	7.5×10^{-4}	0.1
8.6	1.0×10^{-2}	7.5×10^{-3}	1.0
8.6 – 10.5	Overrange		

Tbl. 7: Conversion table

Converting measuring signal and pressure

Validity range

- 1×10^{-11} hPa < p < 1×10^{-2} hPa
- 7.5×10^{-12} Torr < p < 7.5×10^{-3} Torr
- 1×10^{-9} Pa < p < 1 Pa

► Observe the constants for converting measuring signal and pressure.
► Convert measuring signal into pressure:

$$\mathbf{p = 10^{1.25 \times U - d}}$$

► Convert pressure into measuring signal:

$$\mathbf{U = c + 0.8 \times \log_{10} p}$$

6.2 Determining effective pressure with correction factors

The measuring signal is gas type-dependent. The characteristics apply for nitrogen (N_2), oxygen (O_2), dry air and carbon monoxide (CO).

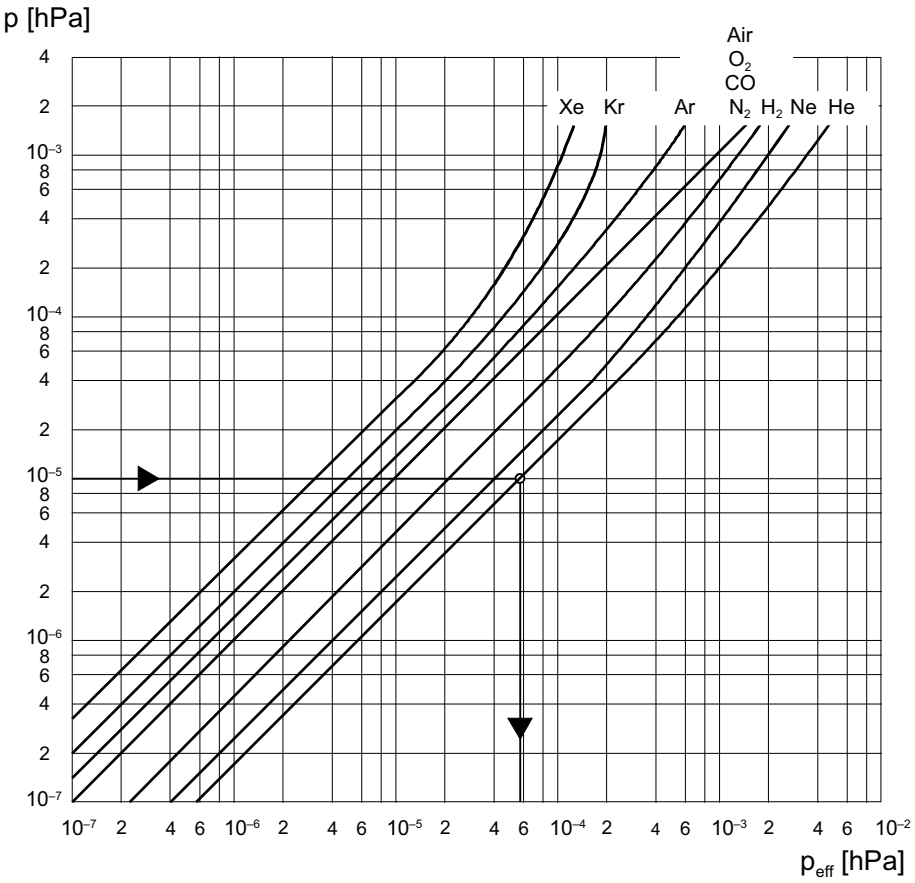


Fig. 7: Displayed pressure

In the pressure range < 10^{-5} hPa, the display is linear.

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.

Gas type	Correction factor (C)
Air, oxygen (O_2), carbon monoxide (CO), nitrogen (N_2)	1.0
Hydrogen (H_2)	2.4
Helium (He)	5.9
Neon (Ne)	4.1
Argon (Ar)	0.8
Krypton (Kr)	0.5
Xenon (Xe)	0.4
The correction factors provided are mean values.	

Tbl. 8: Correction factor for pressure range < 10^{-5} hPa

Entering correction factor in total pressure measuring and control unit

► Enter the correction factor to correct the displayed measured value.

Calculating pressure for gases other than air

► Calculate the effective pressure using the following formula:

$P_{eff} = C \times p$

- P_{eff} = Effective pressure
- **C** = Correction factor
- **p** = Displayed pressure (gauge calibrated for air)

6.3 Ignition delay

Cold cathode measuring systems have an ignition delay upon activation. This ignition delay is longer for lower pressures and is typically in clean, degassed units:

- 10^{-7} hPa approx. 6 seconds
- 10^{-8} hPa approx. 1 minute
- 10^{-9} hPa approx. 5 minutes
- 10^{-10} hPa approx. 20 minutes
- 5×10^{-11} hPa approx. 30 minutes

The ignition is a static process, for which even minimal depositions can have a major influence on the inner surfaces.

6.4 Pollution

Warranty

Malfunctions of the unit as a direct result of contamination or wear, and also wear parts (e.g., ignition aid) are not covered by the warranty.

Contamination of the gauge is dependent upon

- pressure in the vacuum chambers
- the type of process media
- potentially existing or newly accumulated contamination or its partial pressure (e.g. vapors, process particles etc.)
- the operating time

Continuous operation in the range between 10^{-4} hPa and 10^{-2} hPa can lead to major contamination, and thus to reduced service life and shorter maintenance intervals. With permanent low pressures ($p < 1 \times 10^{-6}$ hPa), downtimes of > 1 year are achievable before cleaning is required again.

Contamination of the gauge generally leads to deviations in the measured values:

- In the **low pressure range** ($< 1 \times 10^{-3}$ hPa), the pressure displayed is generally too low (contamination of the cold cathode system). Excessive contamination will cause instabilities (separation of layers in the measurement chamber). This can lead to short circuiting. Complete quenching of the gas discharge is also possible in the event of contamination resulting from insulating layers.

Influencing the degree of pollution

It is possible to influence the level of contamination to a certain extent. Particular care should be taken in the case of vapors that deposit in the plasma (e.g. of the cold cathode measuring system).

► Implement geometric safety measures (screening sheets, bends) for particles propagated in a straight line.
► Choose a flange position in which the partial pressure of the contamination is at a minimum.
► Switch off the gauge when depositing vapors are present.
► Protect the sensor during the process-related occurrence of separating vapors by shut-off devices (e.g. valve).

7 Disassembly

⚠ DANGER

Risk to life due to electric shock

An improperly earthed product is potentially fatal in the event of a fault.

- ► Connect the product galvanically with the earthed vacuum chamber.
- ► Ensure that the connection complies with the requirements of a protective bonding according to EN 61010. (CF and VCR connections comply with this requirement.)
- ► Use electrically conductive centering rings and circlips for KF connections.

⚠ WARNING

Health hazard through poisoning from toxic contaminated components or devices

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

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

⚠ WARNING

Risk of injury resulting from overpressure in the vacuum system

Opening tensioning pieces with an overpressure **> 1000 hPa** in the vacuum system can lead to injuries as a result of flying parts, and escaping process medium could prove harmful to health.

Elastomer seals in KF connections (e.g. O-rings) are not resistant to pressures **> 2500 hPa**. This could prove harmful to health due to escaping process medium.

- ► Do not open any tensioning pieces when overpressure is prevalent in the vacuum system.
- ► Use suitable tensioning pieces for overpressure.
- ► Use tensioning pieces which can only be opened and closed using a tool (e.g. tightening strap-circlip).
- ► Use sealing rings with an outer centering ring.

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

Required tool

- Crosshead screwdriver

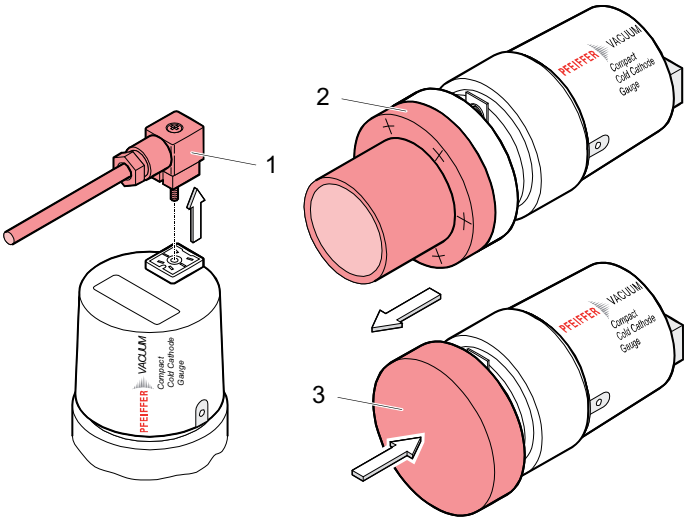


Fig. 8: Disassembling the gauge

1 Measurement cable
2 CF flange connection
3 Protective cap

Removing gauge

1. Loosen the locking screw of the Hirschmann cable socket on the gauge.
2. Disconnect the measurement cable from the gauge.
3. Recommendation: Dismantle the magnetic unit of the gauge temporarily if disassembly is only possible with the magnetic unit removed.
   – This will facilitate disassembling of the CF flange connection.
4. Remove the gauge from the vacuum system.
5. Fit the protective cap on the connection flange.

8 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.

⚠ WARNING

Danger from magnetic fields

The product has a magnetic field that disturbs or impairs the function of electronic devices (e.g. pacemakers).

- ► Maintain the distances specified by the manufacturer of the pacemakers.
  - – Pfeiffer Vacuum recommends a safety distance of **at least 130 mm** between the pacemaker and the product.
- ► Avoid the influence of strong magnetic fields by means of magnetic field shielding.

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.

8.1 Maintaining the gauge

Pfeiffer Vacuum has calibrated the gauge to standard values at the factory. The gauge is maintenance-free.

Replacing a faulty gauge

- ► If the gauge is defective, you must replace the entire gauge.

8.2 Disassembling the gauge

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.

Required tools

- Allen key, **WAF 1.5**
- Allen key, **WAF 3**
- Open-end wrench, **WAF 7**
- Pincers for circlip
- Tweezers

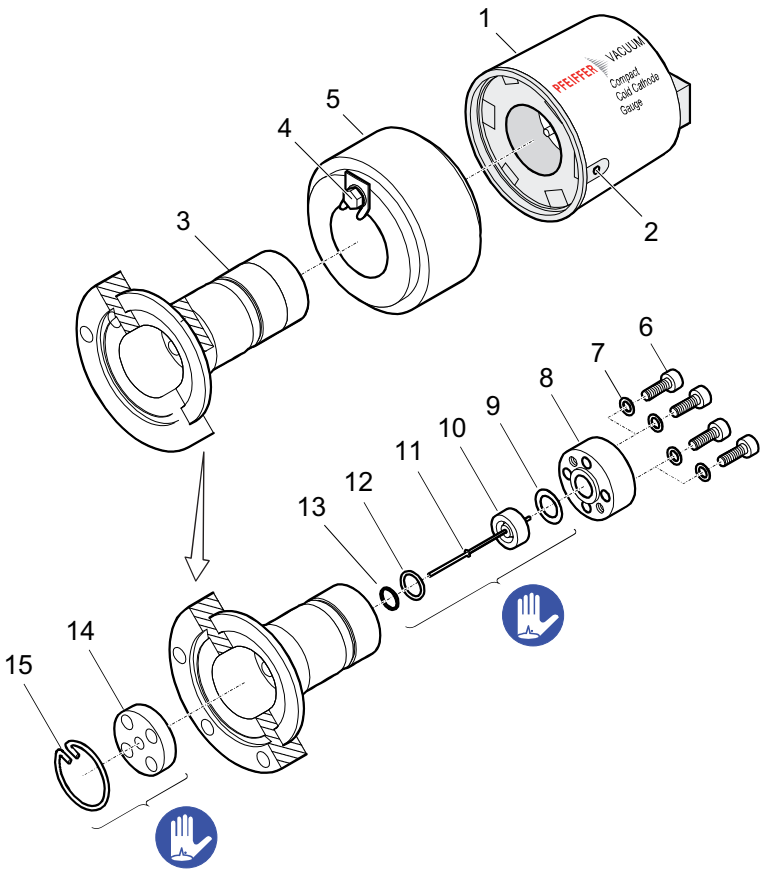


Fig. 9: Individual parts (short version)

1 Electronic unit
2 Grub screw
3 Measurement chamber
4 Hexagon head set screw
5 Magnetic unit
6 Interior hexagon socket screw (4×)
7 Lock washer (4×)
8 Compression piece
9 Washer
10 Anode
11 Ignition aid
12 Centering ring
13 Metal seal (anode extension)
14 Polarity insert
15 Circlip

Disassembling the gauge (short version)

1. Disassemble the gauge from the vacuum system.
2. Loosen the grub screw on the side of the electronic unit.
3. Remove the electronic unit without exerting any rotary movement.
   – The hood of the electronic unit cannot be removed.
4. Loosen the hexagon head set screw on the magnetic unit.
5. Remove the magnetic unit.
   – Separation of the magnetic unit and measurement chamber is made more difficult due to the effect of magnetic force and the tendency for them to tilt easily.
6. Remove the circlip and the polarity insert from the measurement chamber.
7. Remove the interior hexagon socket screws and the lock washers from the rear of the measurement chamber.
8. Remove one after the other taking due care
   - Compression piece
   - Washer
   - Complete anode
   - Metal seal together with centering ring

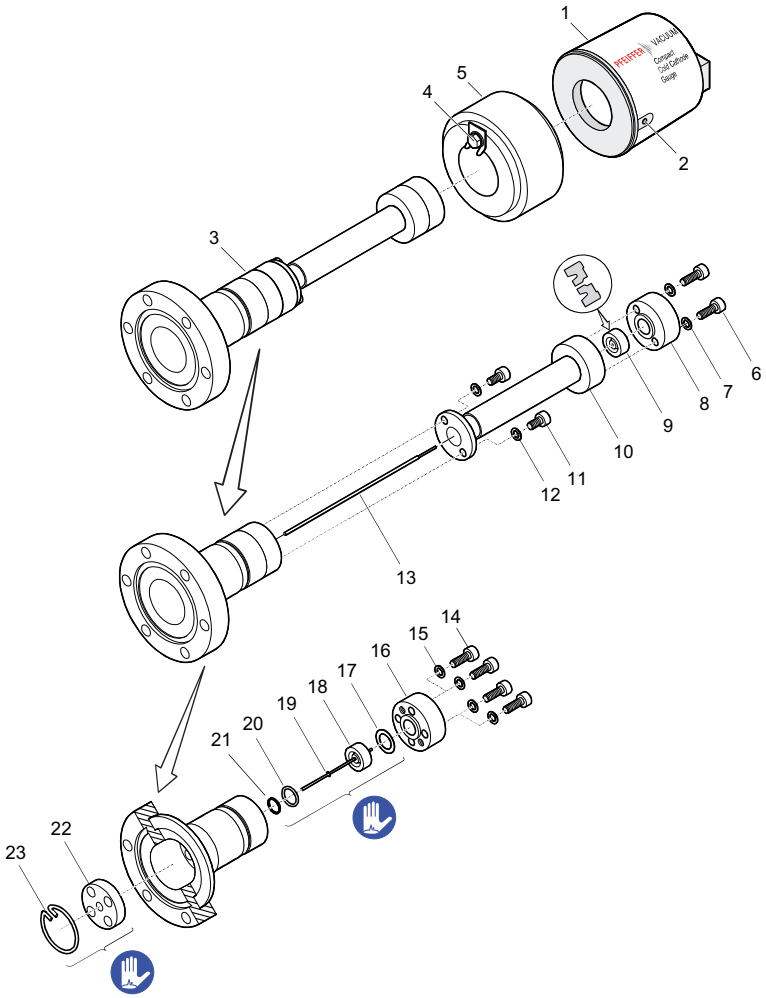


Fig. 10: Individual parts (long version)

1	Electronic unit	13	Anode extension
2	Grub screw	14	Interior hexagon socket screw (4×)
3	Measurement chamber	15	Lock washer (4×)
4	Hexagon head set screw	16	Compression piece
5	Magnetic unit	17	Washer
6	Interior hexagon socket screw (extension) (2×)	18	Anode
7	Lock washer (extension) (2×)	19	Ignition aid
8	Compression piece (extension)	20	Centering ring
9	Insulator	21	Metal seal (anode extension)
10	Tube	22	Polarity insert
11	Interior hexagon socket screw (tube) (2×)	23	Circlip
12	Lock washer (tube) (2×)		

Disassembling the gauge (long version)

1. Disassemble the gauge from the vacuum system.
2. Loosen the grub screw on the side of the electronic unit.
3. Remove the electronic unit without exerting any rotary movement.
   – The hood of the electronic unit cannot be removed.
4. Loosen the hexagon head set screw on the magnetic unit.
5. Remove the magnetic unit.
   – Separation of the magnetic unit and measurement chamber is made more difficult due to the effect of magnetic force and the tendency for them to tilt easily.
6. Remove the circlip and the polarity insert from the measurement chamber.
7. Remove the interior hexagon socket screws and the lock washers on the extension.
8. Remove one after the other taking due care
   - Compression piece
   - Insulator
   - Anode extension
9. Remove the interior hexagon socket screws, the lock washers and the tube.
10. Remove the interior hexagon socket screws and the lock washers from the rear of the measurement chamber.
11. Remove one after the other taking due care
    - Compression piece
    - Washer
    - Complete anode
    - Metal seal together with centering ring

8.3 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 tool

- Tweezers

Required consumable material

- Polishing cloth (400 grade or Scotch-Brite)
- Industrial alcohol
- Cloth (clean, 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.

Cleaning the measurement chamber and polarity insert

1. Disassemble the gauge to the degree required.
2. Ensure that all work on the sealing surfaces is performed concentrically.
3. Rub the inside walls of the measurement chamber and polarity insert with the polishing cloth until shiny.
4. Rinse the measurement chamber and polarity insert with industrial alcohol.
5. Allow parts to dry well.
6. Re-assemble the gauge.

Cleaning the anode

1. Dismantle the gauge to the degree required.
2. Remove the old ignition aid with tweezers.
3. Rub the anode pin with a polishing cloth until shiny, taking care not to bend the anode.
   - – Do not treat the ceramic with mechanical means.
4. Rinse the anode with industrial alcohol.
5. Allow the anode to dry well.
6. Replace the ignition aid.

8.4 Assembling the gauge

⚠ DANGER

Risk to life due to electric shock

If no earth connection is established, voltage flows become hazardous to the touch and could lead to electronic components sustaining damage.

- ► Always tighten the electronic unit with the grub screw.
- ► Ensure that the grub screw of the electronic unit has been tightened correctly.

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

Electric flashover from helium

Helium can cause electric flashovers in the unit's electronics which will destroy the electronics.

► Switch off the unit before carrying out a leak test.
► Dismantle the electronic unit before carrying out a leak test.

Positioning the anode

Definitive positioning of the anode is only achieved following installation of the anode.

Electronic unit

Due to the tolerances, you must fit the same electronic unit when re-assembling.

Required tools

- Allen key, **WAF 1.5**
- Allen key, **WAF 3.0**
- Open-end wrench, **WAF 7**
- Pincers for circlip
- Mounting tool for the ignition aid
- Tweezers

Spare parts required

- Repair kit BN 846 240 -T

Required consumable material

- Dry nitrogen for blowing out

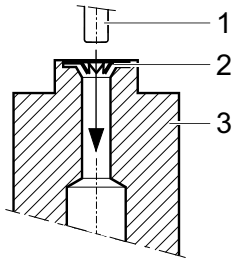


Fig. 11: Mounting tool for the ignition aid

1 Anode
2 Ignition aid
3 Mounting tool

Replacing the ignition aid

1. Insert the new ignition aid in the mounting tool.
2. Carefully push the anode (either new or cleaned) into the ignition aid, in the center, and parallel to the tool axis.
3. Insert the anode approx. 15 mm.

Assembling the gauge (short version)

1. Ensure that sealing surfaces, seals and the ceramic (anode) are clean.
2. Insert the metal seal (anode bushing) with the centering ring so that it is centric in the measurement chamber.
3. Carefully insert the anode together with the ignition aid into the measurement chamber.
4. Carefully fit the compression piece and the washer onto the measurement chamber and tighten the interior hexagon socket screws and the lock washers evenly up to the stop.
5. Push the measurement chamber with anode carefully into the mounting tool, in the center and parallel to the tool axis, up to the stop.
   – By doing so, you are positioning the ignition aid.
6. Hold the measurement chamber with flange facing downward and blow out the particles in the measurement chamber with dry nitrogen.
7. Push the polarity insert into the measurement chamber up to the mechanical stop.
8. Insert the circlip correctly in the polarity insert.

9. Carry out a visual inspection to ensure that the anode pin is central to the middle borehole of the polarity insert.
   – Max. permissible eccentricity = 0.5 mm
10. Perform a leak test where possible.
   – Leakage rate < 10^{-9} hPa l/s
11. Fit the magnetic unit.
   – Fitting of the magnetic unit is made more difficult due to the effect of magnetic force and the tendency for it to tilt easily.
12. Fasten the hexagon head set screw on the magnetic unit.
13. Carefully fit the electronic unit.
14. Push the electronic unit as far as the stop.
15. Secure the grub screw on the side of the electronic unit.

Assembling the gauge (long version)

1. Ensure that sealing surfaces, seals and the ceramic (anode) are clean.
2. Insert the metal seal (anode bushing) with the centering ring so that it is centric in the measurement chamber.
3. Carefully insert the anode together with the ignition aid into the measurement chamber.
4. Carefully fit the compression piece and the washer onto the measurement chamber and tighten the interior hexagon socket screws and the lock washers evenly up to the stop.
5. Push the measurement chamber with anode carefully into the mounting tool, in the center and parallel to the tool axis, up to the stop.
   – By doing so, you are positioning the ignition aid.
6. Hold the measurement chamber with flange facing downward and blow out the particles in the measurement chamber with dry nitrogen.
7. Push the polarity insert into the measurement chamber up to the mechanical stop.
8. Insert the circlip correctly in the polarity insert.
9. Carry out a visual inspection to ensure that the anode pin is central to the middle borehole of the polarity insert.
   – Max. permissible eccentricity = 0.5 mm
10. Perform a leak test where possible.
   – Leakage rate < 10^{-9} hPa l/s
11. Place the complete measurement chamber on the work surface with the flange facing downwards.
12. Fit the extension carefully on the anode pin.
13. Carefully slide on the tube.
14. Tighten the interior hexagon socket screws and lock washers evenly.
15. Ensure that the interior of the tube and the interior of the isolator are completely clean and lint-free.
16. Feed the isolator onto the extension as shown in the drawing.
17. Tighten the compression piece evenly with the interior hexagon socket screws and the lock washers.
18. Fit the magnetic unit.
   – Fitting of the magnetic unit is made more difficult due to the effect of magnetic force and the tendency for it to tilt easily.
19. Fasten the hexagon head set screw on the magnetic unit.
20. Carefully fit the electronic unit.
21. Push the electronic unit as far as the stop.
22. Secure the grub screw on the side of the electronic unit.

9 Malfunctions

Warranty

Malfunctions of the unit as a direct result of contamination or wear, and also wear parts (e.g., ignition aid) are not covered by the warranty.

Disturbance	Possible cause	Remedy
Continuous measuring signal < 0.5 V and green LED not lit	No supply	Switch the supply on.
Continuous measuring signal < 0.5 V and green LED lit	Supply voltage too low	Increase the supply voltage.
	Electronic unit defective	Replace the electronic unit.
Continuous measuring signal within the range 0.5 to 1.96 V (underrange)	Pressure in vacuum chamber < 5×10^{-11} hPa	-
	Gas discharge has not ignited.	Wait until the gas discharge ignites (approx. 20 minutes with a pressure of 10^{-10} hPa).
Measuring signal unstable	Gauge contaminated	Clean the gauge.

Tbl. 9: Malfunctions

10 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.

11 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.

11.1 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

11.2 Dispose of gauges

Pfeiffer Vacuum gauges contain materials that you must recycle.

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

12 Service solutions by Pfeiffer Vacuum

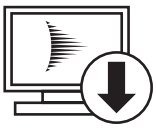
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

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

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

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

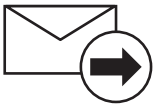
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



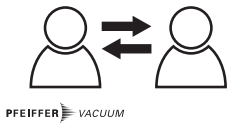
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

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

2. Complete the service request and contamination declaration.

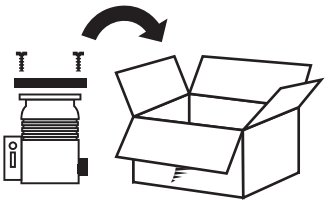


3. Send the forms by email, fax, or post to your local Service Center.

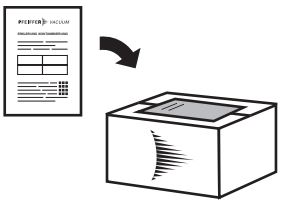


4. You will receive an acknowledgment from Pfeiffer Vacuum.

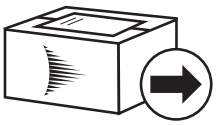
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



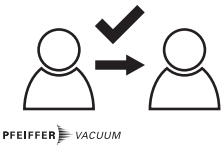
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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

13 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.

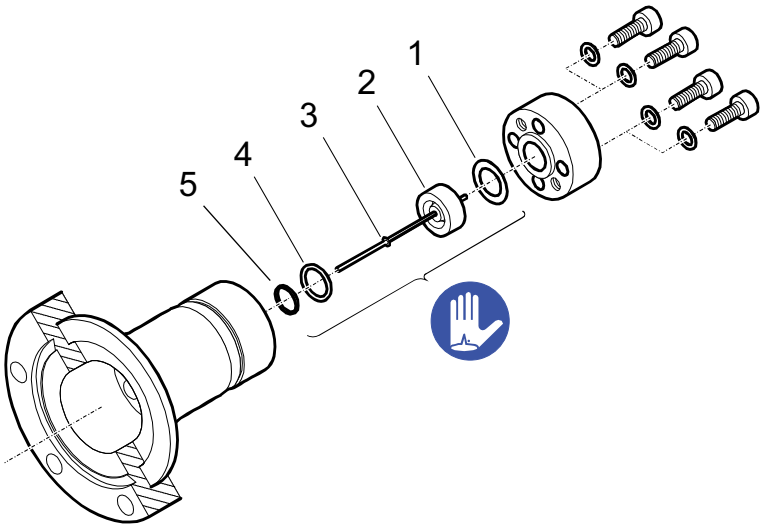


Fig. 12: Spare parts

1 Washer
2 Anode, complete
3 Ignition aid
4 Centering ring
5 Metal seal (HNV 100, 9×1.6 mm)

Description	Order number
Maintenance kit Item 1 (1×), item 3 (3×), item 4 (1×), item 5 (1×)	BN 846 241 -T
Repair kit Item 1 (1×), item 2 (1×), item 3 (3×), item 4 (1×), item 5 (1×)	BN 846 240 -T
Ignition aid kit Item 3 (10×)	BN 845 995 -T
Mounting tool for ignition aid	BG 510 600
Replacement gauge (DN 40 CF-F, short version) [3)]	BG G21 251 A
Replacement gauge (DN 40 CF-F, long version) [4)]	BG G21 261 A

Tbl. 10: Spare parts

3) Return the defective gauge to Pfeiffer Vacuum.
4) Return the defective gauge to Pfeiffer Vacuum.

14 Accessories

View the range of accessories for ActiveLine on our website.

14.1 Accessory information

Measurement cable
Measurement cable in different lengths, for connecting to a Pfeiffer Vacuum total pressure measuring and control unit

Mating connector
Cable socket for fabrication of the application-specific connecting cable

Magnetic shielding
For shielding of the permanent magnet in the gauge, to protect people against magnetic radiation, for example

14.2 Ordering accessories

Description	Order number
Measurement cable, 3 m	PT 448 250 -T
Measurement cable, 6 m	PT 448 251 -T
Measurement cable, 10 m	PT 448 252 -T
Mating connector, 6 pole	B4707283MA
Magnetic shielding	PT 443 155 -X

15 Technical data and dimensions

15.1 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. 11: 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. 12: Conversion table: Units for gas throughput

15.2 Technical data

Parameter	Value
Measuring range (air, N_2)	5×10^{-11} – 1×10^{-2} hPa
Maximum pressure (absolute)	9 000 hPa, limited to inert gases and temperatures < 100 °C
Measuring principle	Cold cathode
Accuracy	approx. ±30% in the range 1×10^{-9} – 1×10^{-3} hPa
Repeatability	approx. ±5% in the range 1×10^{-9} – 1×10^{-3} hPa

Tbl. 13: Measured and pressure values

Parameter		Value
Output signal (measuring signal)	Voltage range	approx. 0 V – approx. +10,5 V
	Error signal	< 0.5 V (no supply)
	Relation voltage-pressure	logarithmic, rise 0.8 V/decade
Output impedance		2 × 10 Ω
Standard load		100 kΩ
Load impedance (minimum load)		10 kΩ, short-circuit proof
Response time		pressure-dependent
	p > 10^{-6} hPa	< 10 ms
	p = 10^{-8} hPa	approx. 1 s
Gauge identification		Resistance 7.15 kΩ against supply earth

Parameter		Value
Supply voltage	At gauge	14.5 – 30.0 V DC
	on the supply unit with max. cable length [5]	16.0 – 30.0 V DC
	Ripple	max. 1 V_{pp}
Operating voltage (in the measurement chamber)		≤ 3.3 kV
Operating current (in the measurement chamber)		≤ 100 µA
Power consumption		≤ 2 W
Fuse (to be connected in series)[6]		≤ 1 AT
Connection (electrical)		Hirschmann GO 6 (6-pin, pins)
Measurement cable		5-pin, including shielding
Cable length		max. 100 m (0.25 mm^2/conductor) max. 150 m (0.34 mm^2/conductor) max. 500 m (1.0 mm^2/conductor)
Grounding concept	(see chapter “Establishing electric connection”, page 19)	
	Vacuum connection and signal ground	Connected with 10 kΩ (max. differential voltage with regard to safety ± 50 V, with regard to accuracy ± 10 V)
	Supply earth and signal earth	Routed separately; differential measurement recommended for longer cable lengths (≥ 10 m)

Tbl. 14: Electrical data

Parameter	Value
Internal volume	approx. 20 cm^3
Weight	950 g, short version
	1100 g, long version

Tbl. 15: Internal volume and weight

Parameter	Value
Relative humidity of air	At temperatures up to +31°C max. 80% At temperatures up to +40°C max. 50%
Mounting orientation	Arbitrary
Usage	Only in indoor areas
Installation altitude max.	3000 m MSL
Degree of pollution	2
Protection degree	IP40

Tbl. 16: Ambient conditions

5) The minimum voltage for the supply unit must be increased proportionally with the cable length.

6) Pfeiffer Vacuum measuring and control units comply with this requirement.

Parameter	Value
Operation	5 – 55 °C 250 °C, long version [7)]
Storage	-40 – +65 °C
Bake out	≤ 250 °C, short version [8)] ≤ 250 °C, long version [9)]

Tbl. 17: Temperatures

Parameter	Value
Flange	Stainless steel (1.4306)
Measurement chamber	Stainless steel (1.4306)
Insulating bushing	Ceramic (Al_2O_3)
Internal seals	Silver (Ag)
Anode	Molybdenum (Mo)
Ignition aid	Stainless steel (1.4310)

Tbl. 18: Substances in contact with media

15.3 Dimensions

Dimensions in mm.

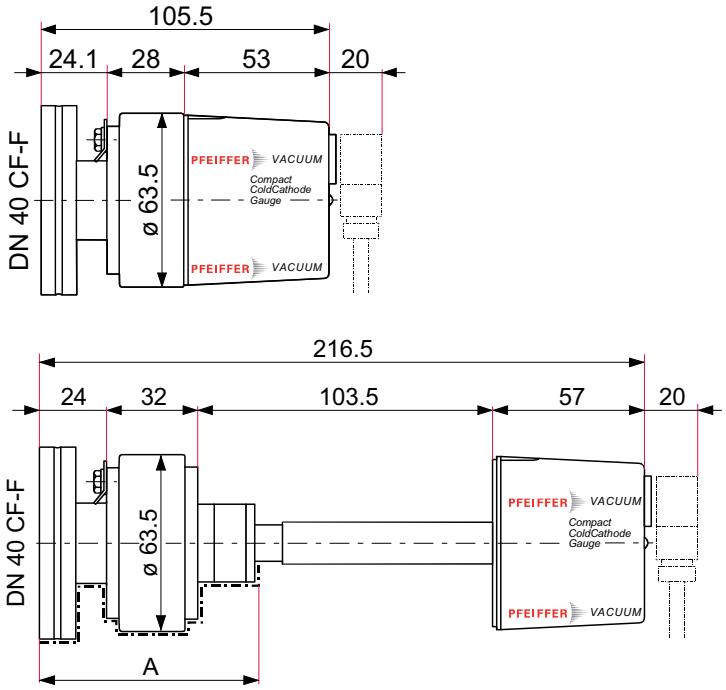


Fig. 13: Dimensions

A Baking out area

7) In the baking out area according to the dimensional drawing (without magnetic shielding)
8) Without electronic unit and magnetic shielding
9) In the baking out area according to the dimensional drawing (without magnetic shielding)

ETL LISTED

The product IKR 270

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

PFEIFFER VACUUM

EC Declaration of Conformity

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

Declaration for product(s) of the type:

Cold cathode gauge

IKR 270

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 IEC 61000-6-2:2019

DIN EN IEC 61000-6-3:2022

DIN EN 61010-1:2020

DIN EN IEC 61326-1:2022

DIN EN IEC 63000:2019

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2023-02-20

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:

Cold cathode gauge

IKR 270

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 61000-6-2:2019

EN IEC 61000-6-3:2021

EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019

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, 2023-02-20

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.

COMPLETE RANGE OF PRODUCTS

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

COMPETENCE IN THEORY AND PRACTICE

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

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

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