



OPERATING INSTRUCTIONS

EN

Translation of the Original

CCR 371 | 372 | 373 | 374 | 375

Capacitive 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.

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

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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
CenterOne CenterTwo CenterThree "Total Pressure Measuring and Control Unit"	BG 5044
Declaration of conformity	A component of these instructions

Tbl. 1: Applicable documents

You can find this document in the [Pfeiffer Vacuum Download Center](#).

1.1.2 Variants

This document applies to products with the following article numbers:

Article number	Type	Connection	Measuring range min/max.
PT R28 100	CCR 371	1/2" tube	1×10^{-1} Torr/1000 Torr (FS)
PT R28 101		DN 16 ISO-KF	1.33×10^1 Pa/133322 Pa (FS)
PT R28 102		DN 16 CF-R	1.33×10^{-1} hPa/1333 hPa (FS)
PT R28 103		8 VCR	
PT R28 110	CCR 372	1/2" tube	1×10^{-2} Torr/100 Torr (FS)
PT R28 111		DN 16 ISO-KF	1.33×10^0 Pa/13332.2 Pa (FS)
PT R28 112		DN 16 CF-R	1.33×10^{-2} hPa/133.3 hPa (FS)
PT R28 113		8 VCR	
PT R28 120	CCR 373	1/2" tube	1×10^{-3} Torr/10 Torr (FS)
PT R28 121		DN 16 ISO-KF	1.33×10^{-1} Pa/1333.22 Pa (FS)
PT R28 122		DN 16 CF-R	1.33×10^{-3} hPa/13.3 hPa (FS)
PT R28 123		8 VCR	
PT R28 130	CCR 374	1/2" tube	1×10^{-4} Torr/1 Torr (FS)
PT R28 131		DN 16 ISO-KF	1.33×10^{-2} Pa/133.322 Pa (FS)
PT R28 132		DN 16 CF-R	1.33×10^{-4} hPa/1.33 hPa (FS)
PT R28 133		8 VCR	
PT R28 140	CCR 375	1/2" tube	1×10^{-5} Torr/0.1 Torr (FS)
PT R28 141		DN 16 ISO-KF	1.33×10^{-3} Pa/13.3322 Pa (FS)
PT R28 142		DN 16 CF-R	1.33×10^{-5} hPa/0.133 hPa (FS)
PT R28 143		8 VCR	

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.

Information that relates to only one of the products is indicated accordingly.

The figures in this document are not to scale.

The figures show the product with a DN 16 ISO-KF vacuum connection, however, they also apply to the other vacuum connections where applicable.

Dimensions are provided in mm, unless specified 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



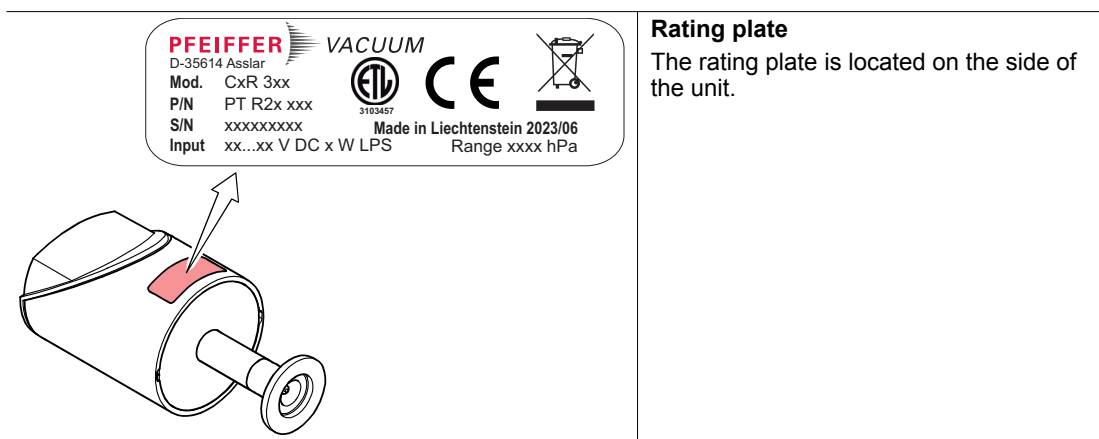
Wear laboratory gloves



Perform a visual inspection

1.3.3 Stickers on product

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



1.3.4 Abbreviations

Abbreviation	Explanation
AC	Alternating current (AC)
ATM	Atmosphere
c	Constant for converting measuring signal and pressure
DC	Direct current
EMC	Electromagnetic compatibility
FKM	Fluorinated rubber
FS	Measuring range max. (full scale)
GND	Ground
HV	High vacuum
LPS	Limited power source
MSL	Mean sea level
n.o.	Normally open
p	Pressure
PE	Protective earth (earthed conductor)
PELV	Protective extra low voltage
U	Measuring signal [V] (output voltage)
V	Volt

Tbl. 3: Abbreviations used

1.4 Trademark proof

- VCR® is a trademark of the Swagelok Company.
- Vacon 70 is a trademark of Vacuumschmelze GmbH & Co. KG.

2 Safety

2.1 General safety information

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

⚠ DANGER
<p>Immediately pending danger</p> <p>Indicates an immediately pending danger that will result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation

⚠ WARNING
<p>Potential pending danger</p> <p>Indicates a pending danger that could result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation

⚠ CAUTION
<p>Potential pending danger</p> <p>Indicates a pending danger that could result in minor injuries if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation

NOTICE
<p>Danger of damage to property</p> <p>Is used to highlight actions that are not associated with personal injury.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid damage to property

i	<p>Notes, tips or examples indicate important information about the product or about this document.</p>
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2.2 Safety instructions

i	<p>Safety instructions according to product life stages</p> <p>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.</p>
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Risks during installation

⚠ DANGER
<p>Danger to life due to dangerous contact voltage</p> <p>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.</p> <ul style="list-style-type: none"> ▶ Only connect the product to devices which meet the following criteria: <ul style="list-style-type: none"> • Requirements of the earthed protective extra-low voltage (PELV) • Limited power source (LPS) Class 2 ▶ Secure the line to the product. <ul style="list-style-type: none"> – 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.
- ▶ Use electrically conductive centering rings and circlips for KF connections.
- ▶ In case of a 1/2" tube connector, take appropriate action to meet the requirements.

⚠ 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 operation**⚠ 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.

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.

i

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.

i

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.	2000 m MSL
Degree of pollution	2
Protection degree	IP40

Tbl. 4: Permissible ambient conditions

2.5 Proper use

The gauge is used for vacuum measurement of gases within its defined measuring range.

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 for the measurement of highly flammable or combustible gases mixed with an oxidizing agent (e.g. atmospheric oxygen) within the explosion limits
- 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

The gauge has a capacitive measuring element with a ceramic diaphragm. The gauge heats the sensor to a constant 48 °C. The pressure deflects the ceramic diaphragm. The gauge detects the deflection of the diaphragm as a change in the capacitance. The electronics convert the capacitance change to an output signal (DC). The output signal is linear with the pressure to be measured. The output pressure value is independent of the gas type to be measured.

Benefits of temperature control

- very precise pressure measurements
- avoids environmental influences to a great extent
- reduction of process product and process by-product depositing

3.2 Button and status display

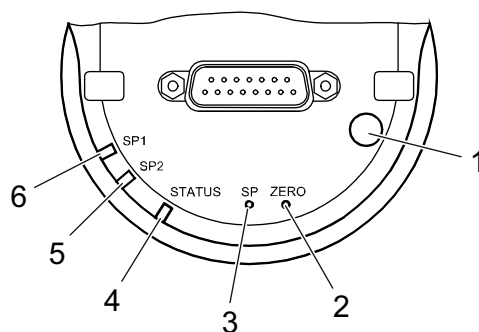


Fig. 1: Button and LED

- | | |
|--|-------------------------------|
| 1 For factory setting only | 4 "STATUS" LED (gauge status) |
| 2 "zero" button for zero point calibration | 5 LED "SP2" (switch-point 2) |
| 3 "SP" button for switching functions | 6 LED "SP1" (switch-point 1) |

3.3 Switching functions

Both switch-points SP1 and SP2 can be adjusted to any pressure in the entire measuring range of the gauge. A potential-free relay contact is available for each switch-point. Both switch-points are set to the lower measurement range limit ex-factory, so that they do not switch.

If the pressure in the vacuum system drops below the set threshold value, the corresponding LED lights up and the relay closes.

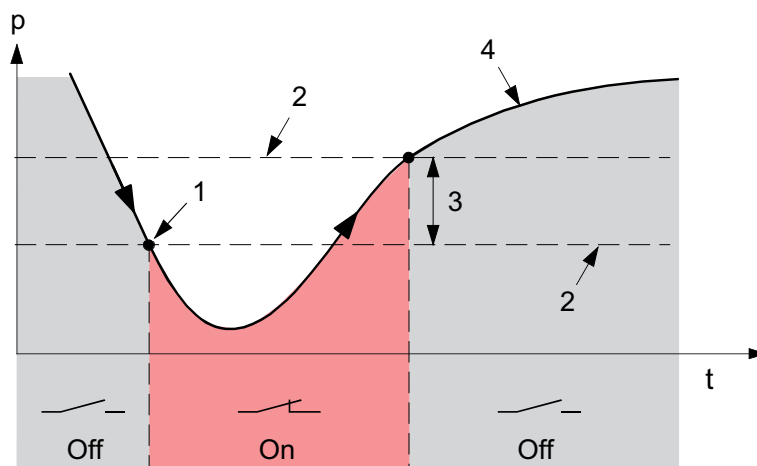


Fig. 2: Relay contacts dependent upon the switch-points

p	Pressure	2	Limit, threshold value
t	Time	3	Hysteresis
1	Switch-point	4	Measured value

3.4 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.

3.5 Scope of delivery

The scope of delivery includes the following parts:

- Gauge (in clean room packaging)
- Stylus (Ø 1.1 mm)
- Calibration certificate
- 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 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.
- ▶ Use electrically conductive centering rings and circlips for KF connections.
- ▶ In case of a 1/2" tube connector, take appropriate action to meet the requirements.

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.

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

Damage caused by vibrations

Vibrations and strikes destroy the ceramic sensor, which is sensitive to shocks.

- ▶ Treat the gauge carefully.
- ▶ Avoid vibrations and strikes.
- ▶ Do not drop the gauge.

Prerequisites

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

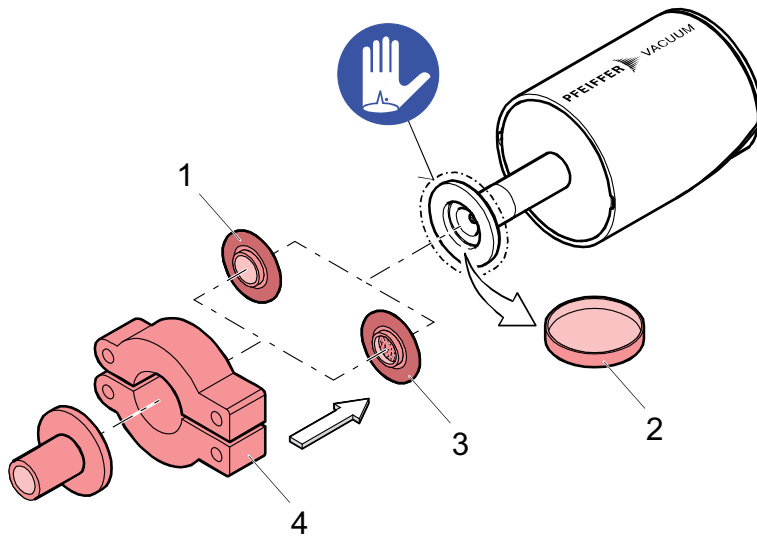


Fig. 3: Establishing vacuum connection

- | | |
|----------------------------|---------------------------------------|
| 1 Seal with centering ring | 3 Seal with centering ring and filter |
| 2 Protective cap | 4 Tensioning piece |

Recommendations

- ▶ If possible, make sure that the gauge is not exposed to any vibrations during operation, as vibrations 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.
- ▶ Ensure that the button of the gauge can be easily accessed with the stylus once fitted.
- ▶ Fit a seal with centering ring and filter for applications with pollution and to protect the measurement system against contamination.

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.

5.2 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 15) with the earth for the supply unit.

Required tool

- Torque wrench (≤ 0.4 Nm)

Required materials

- Measurement cable for a Pfeiffer Vacuum total pressure measuring and control unit from the CenterLine accessories range
- Self-fabricated measurement cable for an evaluation unit provided by the customer
- D-sub cable socket (15-pin, bushings)

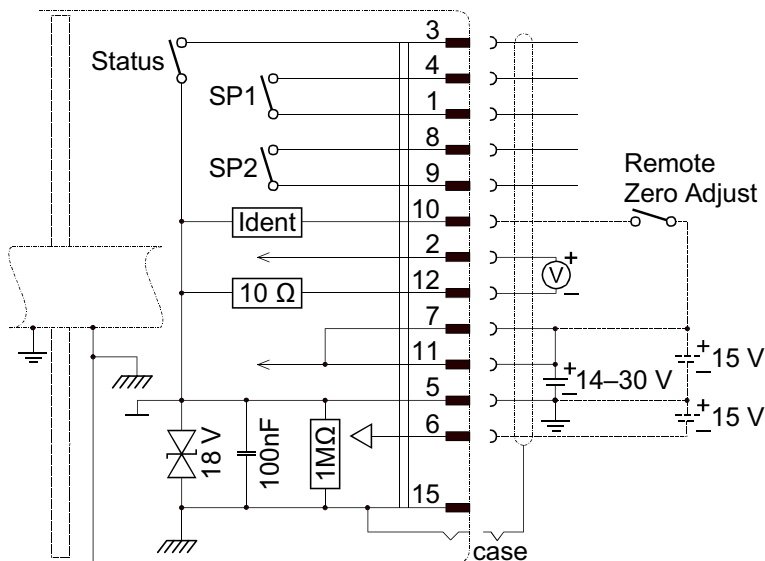


Fig. 4: Connection diagram

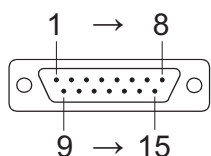


Fig. 5: D-sub cable socket

- | | |
|--|---|
| 1 Relay SP1 (n.o. contact) | 8 Relay SP2 (n.o. contact) |
| 2 Measuring signal or threshold values SP1/SP2 | 9 Relay SP2 (n.o. contact) |
| 3 Status | 10 Identification or remote zero adjust |
| 4 Relay SP1 (n.o. contact) | 11 Supply voltage (+14 to +30 V or +15 V) |
| 5 Supply ground (GND) | 12 Signal ground |
| 6 Supply (-15 V) | 15 Screening/housing |
| 7 Supply voltage (+14 to +30 V or +15 V) | 13, 14 Do not connect |

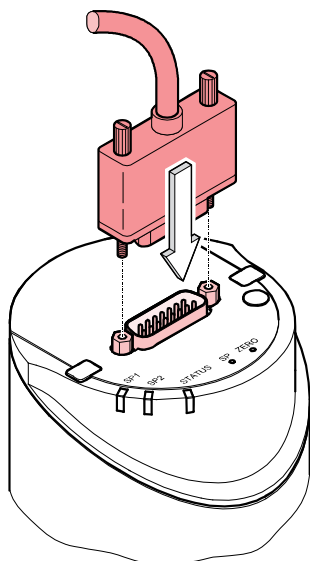


Fig. 6: Measurement cable

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 and metallic connector housing.
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 $\leq 18\text{ V}$.
6. Install the D-sub cable socket.

Installing D-sub cable socket

1. Prepare the D-sub cable socket.
2. Solder in the connection cable according to the connection diagram.
3. Install the D-sub cable socket.

Establishing electric connection

1. Connect the measurement cable to the gauge.
2. Tighten the locking screw on the D-sub cable socket.
 - Tightening torque: $\leq 0.4\text{ Nm}$
3. Connect the gauge to a Pfeiffer Vacuum total pressure measuring and control unit or an evaluation unit provided by the customer.

6 Operation

Once the supply voltage has been established, the measuring signal is available at the electrical connection between pins 2 and 12. The measuring signal is independent of the gas type.

Recommendations

- ▶ On initial operation, perform zero point calibration.
- ▶ Allow a start-up time of at least 30 minutes for general pressure measurements within the specifications.
- ▶ Allow a start-up time of at least 2 hours for precision measurements.
- ▶ In case of fast downstream pressure regulation, set the gauge's signal filter to "Fast".

6.1 Operating modes

Condition	Meaning
Off	No power supply
Lights up green	Supply voltage OK, measuring mode
Flashes green (short flash)	Warning, outside of measuring range
Flashes green (long flash)	Start-up
Lights up red	Error

Tbl. 5: "STATUS" light emitting diode

Condition	Meaning
Off	$p > \text{switch-point}$
Flashes green	Setting the switch-point
Lights up green	$p \leq \text{switch-point}$

Tbl. 6: Light-emitting diodes "SP1" and "SP2"

6.2 Converting measuring signal and pressure

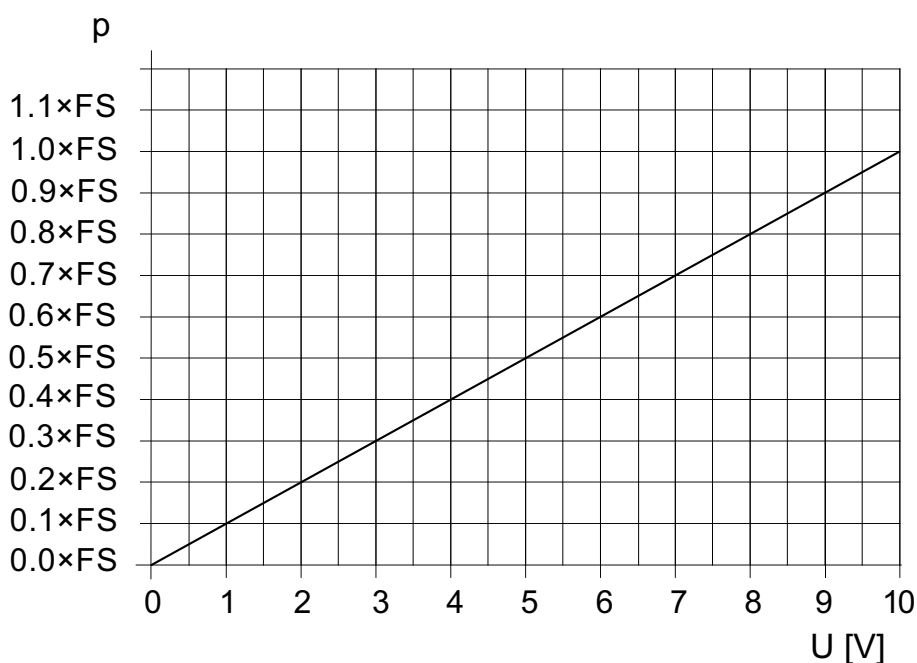


Fig. 7: Relation between measuring signal and pressure

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

Measuring signal (U)	Pressure (p)	Constant (c) ¹⁾
[V]	[Torr]	1.00
	[hPa]	1013.25/760 = 1.3332
	[mbar]	
	[Pa]	101325/760 = 133.3224

Tbl. 7: Constants for converting measuring signal and pressure

Converting measuring signal and pressure

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

$$p = (U/10 V) \times c \text{ (FS)}$$
- ▶ Convert the pressure into the measuring signal:

$$U = (p \times 10 V)/c \text{ (FS)}$$

Example: Gauge with 10 Torr FS and 6 V measuring signal

$$p = (6 V/10 V) \times 10 \text{ Torr} = 0.6 \times 10 \text{ Torr} = \mathbf{6 \text{ Torr}}$$

6.3 Setting threshold values

NOTICE

Malfunction due to measuring signal interruption

You can press the button (SP) to interrupt the measuring signal. The gauge then issues the corresponding threshold value instead at the measuring signal output. This can lead to malfunctions if you control the processes with the signal output.

- ▶ Only press the buttons if you are sure that no malfunctions will be caused as a result, or that potential malfunctions will not result in the occurrence of damage.

i

Condition of relay and LED

The condition of the relay and LED remains unchanged, even when the button is pressed.

i

Upper threshold value (hysteresis)

The factory setting for the upper threshold value is 1 % higher (hysteresis).

Required tool

- Stylus (max. Ø 1.1 mm)

Required aids

- Voltmeter

1) Source: NPL (National Physical Laboratory) Guide to the Measurement of Pressure and Vacuum, ISBN 0904457x/1998

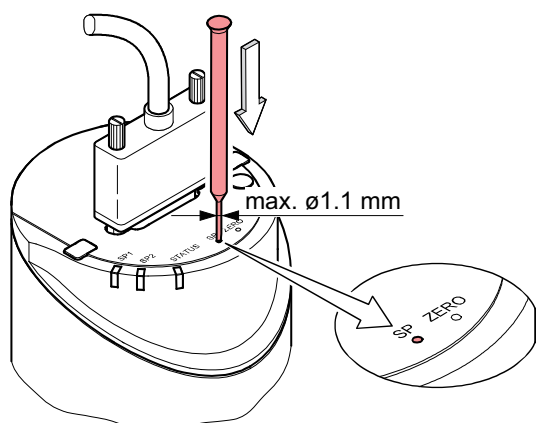


Fig. 8: Use the "SP" button to select switching function mode

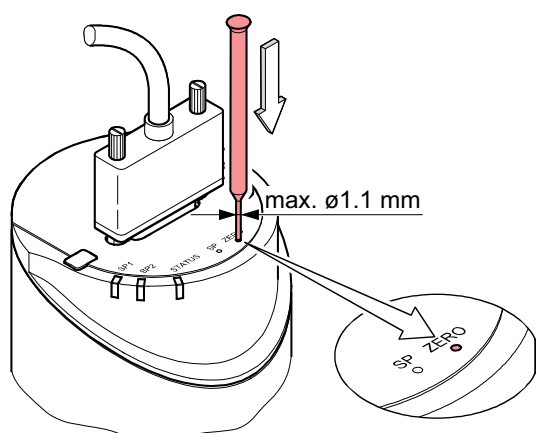


Fig. 9: Use the "zero" button to set the threshold value

Setting threshold value SP1

1. Using a stylus, press and hold down the "SP" button.
 - The gauge changes to switching function mode and displays the current threshold value for 10 seconds at the measuring signal output. The corresponding LED flashes.
2. Press and hold the "zero" button to change the threshold value.
 - The gauge continuously changes the threshold value from the current value (ramp) until you release the button or as soon as the setting limit is reached.
3. Release the "zero" button and press it again within 3 to 5 s to change direction (inverse ramp).
 - The flash frequency of the gauge's status LED briefly changes.
4. Release the "zero" button and press it again within 3 s to perform fine adjustment of the threshold value.
 - The gauge changes the threshold value in single steps.
5. Let go of the "zero" button for 5 s.
 - The gauge returns to measuring mode.

The gauge saves the threshold value and switches back into measuring mode. The connected measuring instrument displays the current measured pressure value once again.

Setting threshold value SP2

1. Press the "SP" button twice using a stylus.
 - The gauge changes to switching function mode and displays the current threshold value for 10 seconds at the measuring signal output. The corresponding LED flashes.
2. Press and hold the "zero" button to change the threshold value.
 - The gauge continuously changes the threshold value from the current value (ramp) until you release the button or as soon as the setting limit is reached.
3. Release the "zero" button and press it again within 3 to 5 s to change direction (inverse ramp).
 - The flash frequency of the gauge's status LED briefly changes.

4. Release the "zero" button and press it again within 3 s to perform fine adjustment of the threshold value.
 - The gauge changes the threshold value in single steps.
5. Let go of the "zero" button for 5 s.
 - The gauge returns to measuring mode.

The gauge saves the threshold value and switches back into measuring mode. The connected measuring instrument displays the current measured pressure value once again.

7 Dismantling

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.
- ▶ Use electrically conductive centering rings and circlips for KF connections.
- ▶ In case of a 1/2" tube connector, take appropriate action to meet the requirements.

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.

NOTICE

Damage caused by vibrations

Vibrations and strikes destroy the ceramic sensor, which is sensitive to shocks.

- ▶ Treat the gauge carefully.
- ▶ Avoid vibrations and strikes.
- ▶ Do not drop the gauge.

Prerequisites

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

Disassembling the gauge

1. Disconnect the measurement cable from the gauge.
2. Disassemble the gauge from the vacuum system.
3. Fit the protective cap onto 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.



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.



Warranty

Malfunctioning of the equipment as a direct result of contamination or wear, as well as wear parts, is not covered by the warranty.



First read through the sections completely

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

The gauge is maintenance-free in clean operating conditions. Long-term operation or contamination can lead to a zero point shift. A zero point shift necessitates recalibration.

8.1 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.

8.2 Calibrating gauge

Pfeiffer Vacuum calibrated the gauge ex factory in vertical upright position. The output signal is dependent upon the installation position.

You can use the following to calibrate the zero point:

- the <zero> button on the gauge
- the "Remote Zero Adjust" digital input (pin 10)
- a Pfeiffer Vacuum measurement instrument

FS	$\Delta U/90^\circ$ (horizontal)
1000 Torr	approx. 2 mV
100 Torr	approx. 10 mV
10 Torr	approx. 50 mV
1 Torr	approx. 300 mV
0.1 Torr	approx. 1.8 V

Tbl. 8: Deviation of output signal between vertical upright and horizontal mounting orientation

FS	Recommended final pressure
CCR 371	< 5×10^{-2} torr < 7×10^{-2} hPa
CCR 372	< 5×10^{-3} torr < 7×10^{-3} hPa
CCR 373	< 5×10^{-4} torr < 7×10^{-4} hPa
CCR 374	< 5×10^{-5} torr < 7×10^{-5} hPa
CCR 375	< 1×10^{-6} torr < 1×10^{-6} hPa

Tbl. 9: Recommended final pressure for zero point calibration



Operation with a measurement instrument

If you operate the gauge with a measurement instrument, zero adjustment must be carried out at the measurement instrument for the entire measuring system:

Calibrate the gauge first and then the measurement instrument.



Zero point calibration in case of excessive final pressure

Zero point calibration at an excessive final pressure (> 25% of FS) means that you will not reach zero. The "STATUS" LED flashes. First activate the factory settings, then repeat zero point calibration.



Zero point calibration interlocked

During the start-up phase and at atmospheric pressure, zero point calibration is interlocked to prevent incorrect operation.

Preparing for calibration

1. Ensure the same installation and ambient conditions as those applicable for normal use.
2. Check the filter for contamination as required.
3. Replace the filter if the filter is contaminated or damaged.
4. Put the gauge into operation.

8.2.1 Carrying out zero point calibration with "zero" button

Required tool

- Stylus (max. \varnothing 1.1 mm)

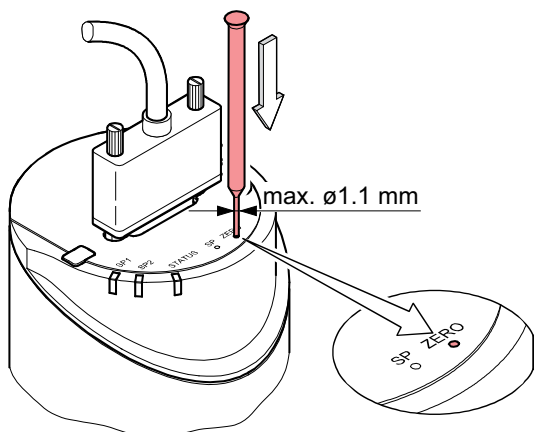


Fig. 10: Zero point calibration with "zero" button

Procedure

1. If possible, commission the gauge in the subsequent mounting orientation.
2. Evacuate the gauge to the recommended final pressure.
3. Operate the gauge for at least 1 hour until the measured value is stable.
4. Using a stylus, briefly press the "zero" button.

Alternatively: Briefly apply the supply voltage +14 to +30 V to pin 10.
 – Zero point calibration occurs automatically.

The "STATUS" LED flashes until zero point calibration is complete (duration ≤ 8 s). The "STATUS" LED flashes if zero point calibration fails, or if the gauge has a negative output signal (< -20 mV) at the final pressure. Following zero point calibration, the gauge automatically returns to measuring mode. The "STATUS" LED lights up.

8.2.2 Carrying out zero point calibration with "zero" button and ramp function

You can use the ramp function to:

- adjust the zero point in case of a known reference pressure that lies within the gauge's measuring range
- set an offset of the characteristic curve to compensate for an offset of the measuring system or to create a slightly positive zero point for a 0 to 10 V AD converter.

Required tool

- Stylus (max. Ø 1.1 mm)

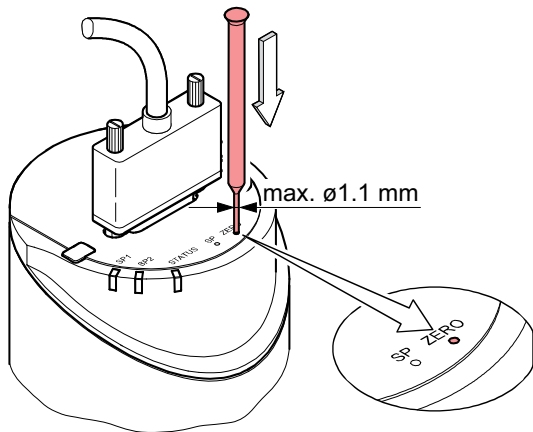


Fig. 11: Zero point calibration with "zero" button



Offset < 2% of FS

The offset should not be greater than 2% of the FS. In case of a larger positive offset, you will exceed the upper measuring range limit.

Procedure

1. If possible, commission the gauge in the subsequent mounting orientation.
2. Operate the gauge for at least 1 hour until the measured value is stable.
3. Using a stylus, press and hold down the "zero" button.

Alternatively: Briefly apply the supply voltage +14 to +30 V to pin 10.

- The "STATUS" LED starts to flash. After 5 s, the zero-adjust value changes continuously (ramp) from the current output value until you release the button or the setting limit (max. 25 % FS) is reached. The signal is output with a delay of approx. 1 s.
- 4. Release the "zero" button and hold it down again within 3 to 5 s to change direction (inverse ramp).
 - The "STATUS" LED is briefly unlit and then flashes again.
- 5. Release the "zero" button and press it again within 3 seconds (approx. 1× per second) to perform fine adjustment of the zero-adjust value.
- 6. Release the "zero" button for a minimum of at least 5 seconds.
 - The gauge returns to measuring mode.

The "STATUS" LED starts to flash if the gauge shows a negative output signal.

8.3 Loading factory settings



Modified settings are lost

This function allows you to reset all parameters set/changed by the user to the default values (factory settings). All modified settings are lost on resetting to the factory settings. You cannot undo this function.

Required tool

- Stylus (max. \varnothing 1.1 mm)

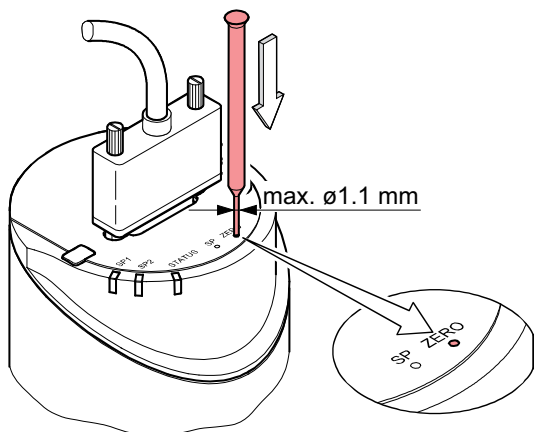


Fig. 12: Use the "zero" button to load the factory settings

Procedure

1. Decommission the gauge.
2. Commission the gauge and at same time hold down the "zero" button with a stylus for longer than 5 seconds.
 - The gauge loads the factory settings.

9 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.

10 Recycling and disposal

WARNING

Health hazard through poisoning from toxic contaminated components or devices

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

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



Environmental protection

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

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

10.1 General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

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

10.2 Dispose of 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.

11 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](#).

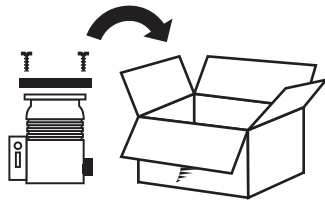


4. You will receive an acknowledgment from Pfeiffer Vacuum.

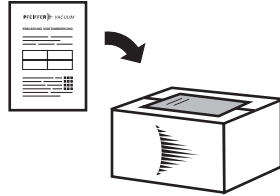
PFEIFFER VACUUM

Submission of contaminated products

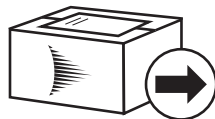
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



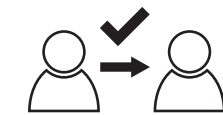
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package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



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



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



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

PFEIFFER VACUUM

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

12 Accessories



View the [range of accessories for CenterLine](#) on our website.

12.1 Accessory information

Seals with centering ring and filter

Filter available in different pore sizes to protect the measuring system against contamination in the event of potential contaminating applications

12.2 Ordering accessories

Description	Order number
Centering ring with sintered metal filter, 0,02 mm pore size, FKM/stainless steel, DN 16 ISO-KF	PF 117 216 -T
Centering ring with fine filter, 0,004 mm pore size, FKM/stainless steel, DN 16 ISO-KF	PT 120 132 -T

13 Technical data and dimensions

13.1 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

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

Tbl. 10: 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. 11: Conversion table: Units for gas throughput

13.2 Technical data

Parameter		Value
Measuring range	CCR 371	1×10^{-1} Torr/1000 Torr (FS) 1.33×10^1 Pa/133322 Pa (FS) 1.33×10^{-1} hPa/1333 hPa (FS)
	CCR 372	1×10^{-2} Torr/100 Torr (FS) 1.33×10^0 Pa/13332.2 Pa (FS) 1.33×10^{-2} hPa/133.3 hPa (FS)
	CCR 373	1×10^{-3} Torr/10 Torr (FS) 1.33×10^{-1} Pa/1333.22 Pa (FS) 1.33×10^{-3} hPa/13.3 hPa (FS)
	CCR 374	1×10^{-4} Torr/1 Torr (FS) 1.33×10^{-2} Pa/133.322 Pa (FS) 1.33×10^{-4} hPa/1.33 hPa (FS)
	CCR 375	1×10^{-5} Torr/0.1 Torr (FS) 1.33×10^{-3} Pa/13.3322 Pa (FS) 1.33×10^{-5} hPa/0.133 hPa (FS)
Maximum pressure (absolute)	CCR 371	300 kPa
	CCR 372	200 kPa
	CCR 373	
	CCR 374	
	CCR 375	130 kPa
Burst pressure (absolute)		600 kPa
Gas type dependence		None
Accuracy ²⁾		0.15 % of the measured value

Parameter		Value
Temperature influence on zero point	CCR 371	0.0025% FS/ °C
	CCR 372	
	CCR 373	
	CCR 374	
	CCR 375	0.0050% FS/ °C
Temperature influence on range		0.01% of measured value/ °C
Resolution		0.003% FS
Gauge calibration		Button for zero point calibration

Tbl. 12: Measured and pressure values

Parameter		Value
Output signal analog (measuring signal)	Voltage range	-5 – +10.24 V ³⁾
	Measuring range	0 – +10 V
	Relation voltage-pressure	Linear
Output impedance		0 Ω (short-circuit proof)
Load impedance		> 10 kΩ
Identification	Resistance R _{ident}	Resistance 13.2 kΩ against supply earth
	Voltage	≤ 5 V
Response time ⁴⁾	CCR 371	30 ms
	CCR 372	
	CCR 373	
	CCR 374	
	CCR 375	130 ms
Supply voltage	At gauge	+14 – +30 V DC or ± 15 V (± 5%), class 2/LPS ⁵⁾
	Ripple	≤ 1 V _{pp}
Power consumption	Heat-up phase	≤ 12 W
	Operation	≤ 8 W
Fuse (to be connected in series) ⁶⁾		1.25 AT
Connection (electrical)		D-sub socket, 15-pin, pins
Measurement cable		15-pin, including shielding
Cable length ⁷⁾	Supply voltage 15 V	≤ 8 m (0.14 mm ² /conductor)
		≤ 15 m (0.25 mm ² /conductor)
	Supply voltage 24 V	≤ 43 m (0.14 mm ² /conductor)
≤ 75 m (0.25 mm ² /conductor)		
Supply voltage 30 V	≤ 88 m (0.14 mm ² /conductor)	
	≤ 135 m (0.25 mm ² /conductor)	

- 2) Non-linearity, hysteresis, repeatable accuracy within calibrated range at 25 °C ambient temperature without influence of temperature after 2 hours of operation.
- 3) Limited to +10.24 V
- 4) Rise 10 – 90 % FS
- 5) The gauge is protected against reverse polarity of the supply voltage and overload.
- 6) Pfeiffer Vacuum measuring and control units comply with this requirement.
- 7) Larger conductor cross sections are required for longer cables ($R_{\text{conductor}} \leq 1.0 \Omega$).

Parameter		Value
Grounding concept	Vacuum connection and signal earth	Connected via 1 M Ω (voltage difference < 18 V)
	Supply earth and signal earth	routed separately for differential measurement (10 Ω)

Tbl. 13: Electrical data

Parameter		Value
Switching function		SP1 and SP2
Setting range		0 – 99 % FS (0 – 9.9 V)
Hysteresis		1% FS
Relay contact	30 V DC / \leq 0.5 A DC, zero potential (n.o.)	
	closed	$p \leq p_{SP}$ (LED on)
	open	$p \geq p_{SP}$ (LED off)
Relay status	closed	Measuring mode, warning
	open	No supply voltage, start-up, error
Switching time		\leq 50 ms

Tbl. 14: Switching functions

Parameter	Value
Internal volume	\leq 4.2 cm ³
Weight	837 – 897 g

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.	2000 m MSL
Degree of pollution	2
Protection degree	IP40

Tbl. 16: Ambient conditions

Parameter	Value
Operation	+10 – +40 °C
Sensor cell	48 °C
Bake out (not operational)	\leq 110 °C at flange
Storage	-40 – +65 °C

Tbl. 17: Temperatures

Parameter	Value
Flange, tube	Stainless steel AISI 316L
Sensor, diaphragm	Aluminum oxide ceramic (Al ₂ O ₃ \geq 99.5%)

Tbl. 18: Substances in contact with media

13.3 Dimensions

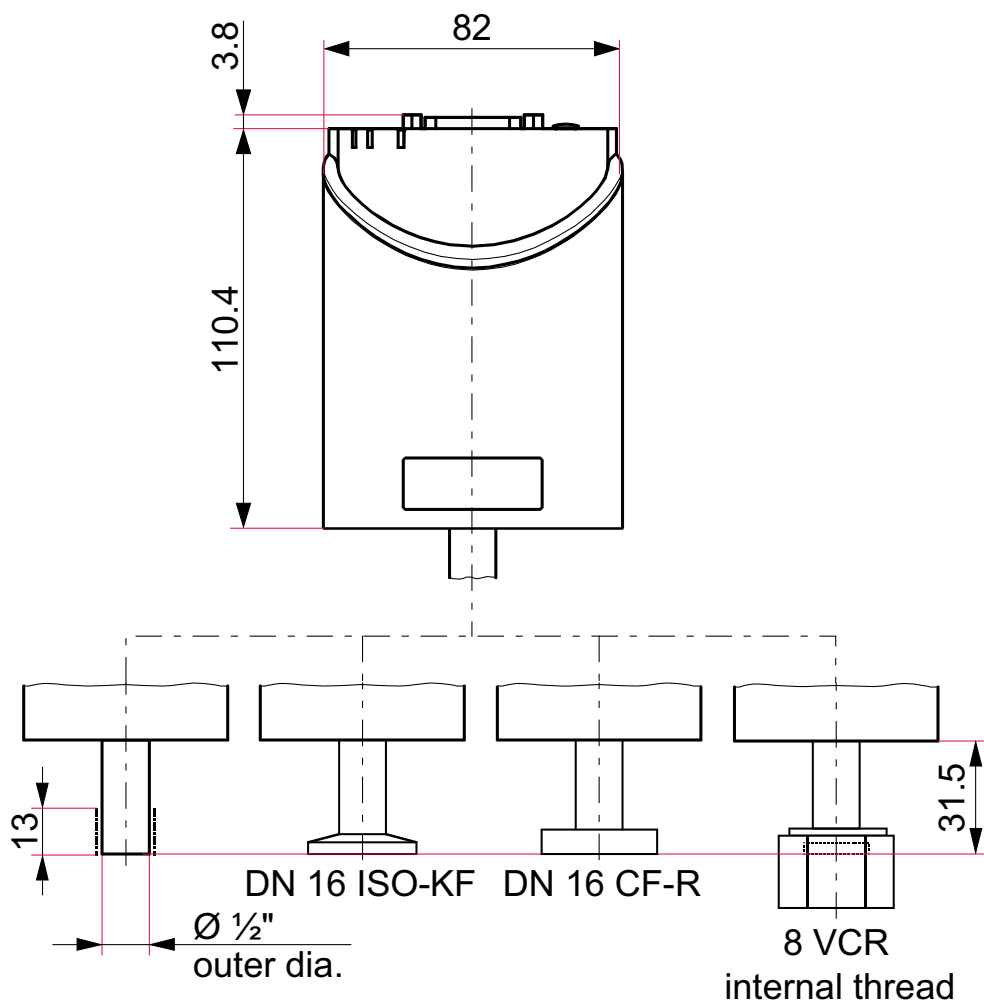


Fig. 13: Dimensions
Dimensions in mm



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The products CCR 371 – CCR 375

- conform to the UL standard
UL 61010-1.

- are certified to the CAN/CSA standard
CAN/CSA C22.2 No. 61010-1.

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:

Capacitive gauge

CCR 371

CCR 372

CCR 373

CCR 374

CCR 375

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:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

Asslar, 2023-04-13



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:

Capacitive gauge

CCR 371
CCR 372
CCR 373
CCR 374
CCR 375

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:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

Asslar, 2023-04-13

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CA**

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