OPERATING INSTRUCTIONS

EN

Translation of the Original

MPT 200

Digital Pirani/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

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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
Operating instructions for “Control unit” OmniControl	PT 0670
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	Designation
PT R40 140	MPT 200, DN 25 ISO-KF
PT R40 150	MPT 200, DN 40 ISO-KF
PT R40 350	MPT 200, DN 40 CF-F

Tbl. 2: Variants

The part number is found 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.

Graphics without a caption reflect the product featuring a DN 25 ISO-KF vacuum connection, however, they also apply for the other vacuum connection accordingly.

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

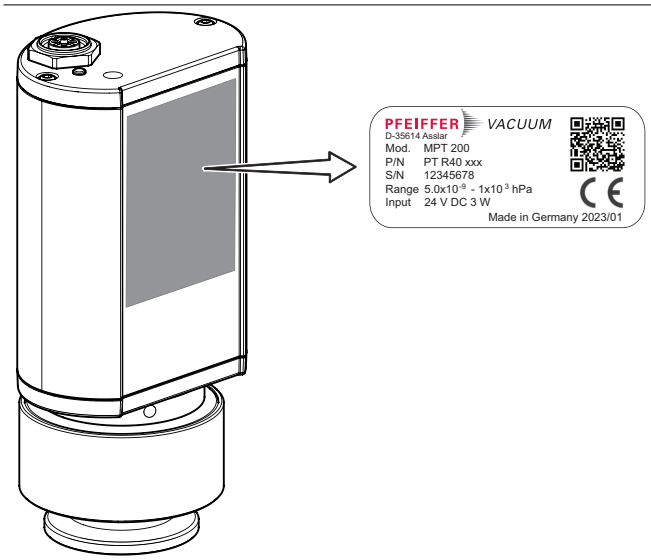
Tip

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 located on the back of the device.

1.3.4 Abbreviations

Abbreviation	Explanation
ATM	Atmosphere
C	Correction factor for calculating the pressure of gases other than air Sensitivity of the Bayard-Alpert measurement system for nitrogen
EC	Electron collector
F	Filament
HV	High vacuum
IC	Ion collector
CC	Cold cathode
LED	Light emitting diode
LPS	Limited power source
MSL	Mean sea level
p	Pressure
P	Pirani
PELV	Protective extra low voltage
U	Measuring signal [V] (output voltage)

Tbl. 3: Abbreviations used

1.4 Trademark proof

- Binder® is a trademark of Franz Binder GmbH + Co. Elektrische Bauelemente 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

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

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

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

Danger to life from electric shock

When establishing the voltages that exceed the specified safety extra-low voltage (according to IEC 60449 and VDE 0100), the insulating measures will be destroyed. There is a danger to life from electric shock at the communication interfaces.

- ► Connect only suitable devices to the bus system.

⚠ 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.

Risks during operation

⚠ 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

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

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

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 notices for safe shipment.

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 the product

Parameter	Value
Air pressure	800 to 1060 hPa
Relative humidity of air	At temperatures up to +30°C max. 80% At temperatures up to +40°C max. 50% non-condensing
Mounting orientation	Arbitrary
Usage	Only in indoor areas

Parameter	Value
Installation altitude max.	2000 m NN
Protection degree	IP54

Tbl. 4: Permissible ambient conditions

2.5 Proper use

The MPT 200 gauge is used for vacuum measurement of air, gases and gauges outside their explosion limits, within the range of **5×10^{-9} to 1000 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 of the product in a way not specified by Pfeiffer Vacuum affects the protection provided by the product.

- 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

3 Product description

3.1 Function

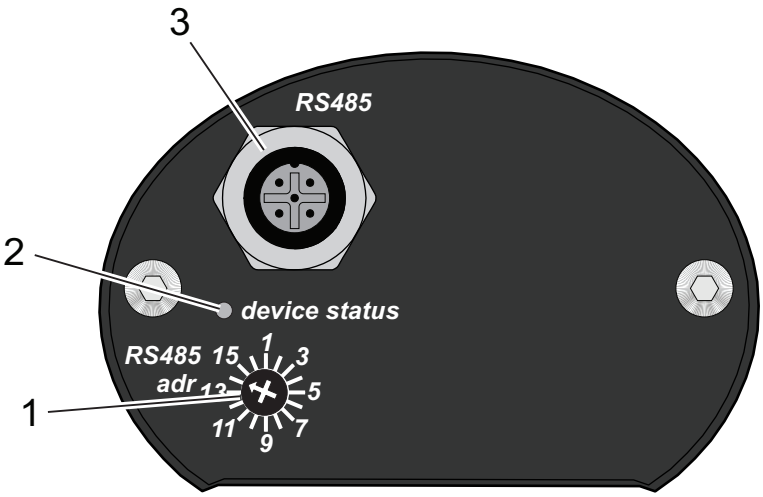


Fig. 1: Structure of the MPT gauge

1 RS-485 address selector switch
2 Status LED for the gauge
3 "RS-485" connector

3.1.1 Gauge mode of operation

The gauge consists of a cold cathode sensor (inverted magnetron) and a Pirani sensor whose measuring principle makes use of the pressure-dependent heat conductivity of gases.

3.1.2 Measuring range

The gauge covers the measuring range from **5 × 10^{-9} to 1000 hPa**.

The gauge has a continuous characteristic throughout the entire range. The measuring signal is logarithmically dependent on the pressure across the entire range. In a defined overlapping range, the gauge outputs a mixed signal of the two measurement systems. Above this range, the gauge outputs the Pirani signal only, below it the cold cathode signal only. The gauge applies the optimum measuring configuration to the respective pressure range.

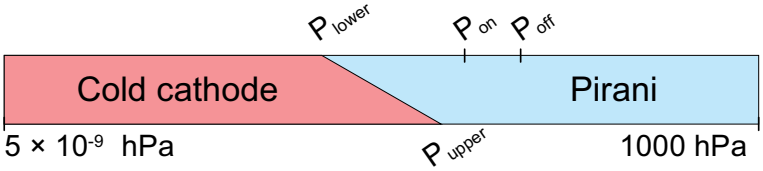


Fig. 2: Measuring configuration

The switching point P_{on} is the point at which the cold cathode measuring system switches on when the pressure decreases. The switching point P_{off} is the point at which the cold cathode measuring system switches off when the pressure increases. The transition area between P_{upper} and P_{lower} is the pressure area in which the gauge proportionally uses both the Pirani measurement system and the cold cathode measuring system to determine the pressure. The Pirani proportion decreases as the pressure decreases. In the "hard" switch position, the switchover between Pirani and cold cathode measuring system is immediate, without a transition.

3.1.3 Measurement systems

The gauge has two measurement systems:

- Pirani measurement system (control area)
- Cold cathode measuring system

The Pirani measurement system is always switched on. The Pirani measurement signal is for switching the cold cathode measuring system on and off, thus protecting the cold cathode measurement system from excessive contamination.

You can select from 2 different switch-on/off thresholds. If the measured pressure is higher than the switch-on threshold, the cold cathode measuring system remains switched off and the Pirani measured value appears as an output signal.

The gauge activates the cold cathode measuring system controlled by the Pirani measurement system only when the value falls below the switch-on threshold p_{on}. The cold cathode is ready for operation after a few seconds start-up time. The "device status" LED is lit continuously and the cold cathode measured value is present at the output. If the pressure increases above the switch-off threshold p_{off}, the gauge switches off the cold cathode measuring system and the "device status" LED goes out. The Pirani measured value appears again at the output.

3.1.4 Cold cathode measuring system

The cold cathode sensor, of the inverted magnetron type, generates ionized gas molecules in a gas discharge. The measured ion current is a measure of the number of gas molecules present and thus for the absolute pressure.

3.1.5 Pirani measurement system

The heat conductivity of gases is pressure-dependent within certain limits. This physical phenomenon is utilized in the Pirani thermal conductivity vacuum gauge to measure the pressure. A self-correcting bridge circuit is used as the measuring circuit. A thin tungsten wire is the actual measuring element. With a suitable control circuit, the resistance of the wire and thus its temperature are kept constant. The electrical power that is fed to the wire is a measure for the power dissipated in the gas through heat conduction and therefore a measure for the gas pressure. As the pressure increases, convection and other effects are increasingly superimposed on the heat transmission. This means that, in the range of >100 hPa, accurate pressure measurements can no longer be performed with the Pirani measurement system.

3.2 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.

3.3 Scope of delivery

- Gauge
- 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 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.

Safe transport of the product

- ► 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 cap and transport protections only immediately prior to installation.
- ► Reattach transport locks and transport protections prior to each transport.

4.2 Storing 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.

Safe storage of the product

- ► 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.

⚠ 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 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

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

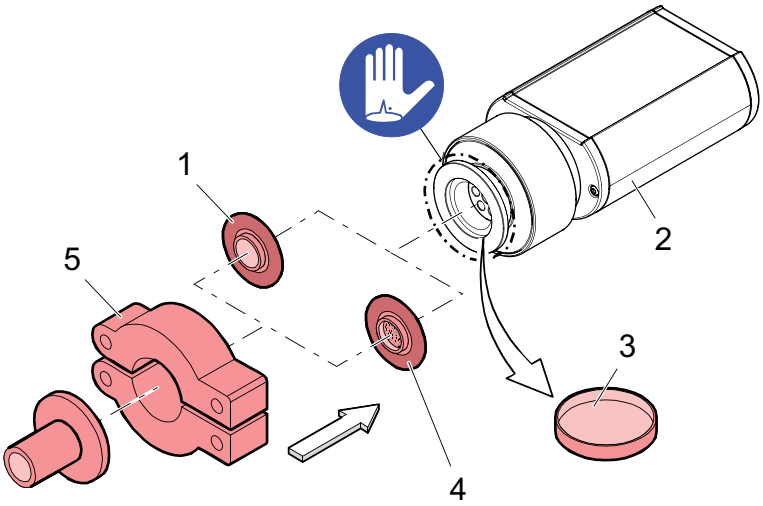


Fig. 3: Establishing vacuum connection

1 Seal with centering ring
2 Gauge
3 Protective cap
4 Seal with centering ring and filter
5 Tensioning piece

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.
- ► Fit a seal with centering ring and filter for applications susceptible to pollution and to protect the measuring 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 Creating "RS-485" 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

Property damage due to ground contact of electronics

Disconnecting or connecting the "RS-485" plug-and-socket connection with the voltage supply switched leads to the destruction of electronic components.

- ► Always interrupt the voltage supply before you plug in or unplug the “RS-485” power supply plug.
- ► Switch off the power supply pack.
- ► After switching off the power supply pack, wait until the residual load has dispersed completely before disconnecting or connecting the plug-and-socket connection.

The interface designated "RS-485" is used to connect an external power supply pack (TPS), a control unit or a PC.

Required tools

- Slot screwdriver

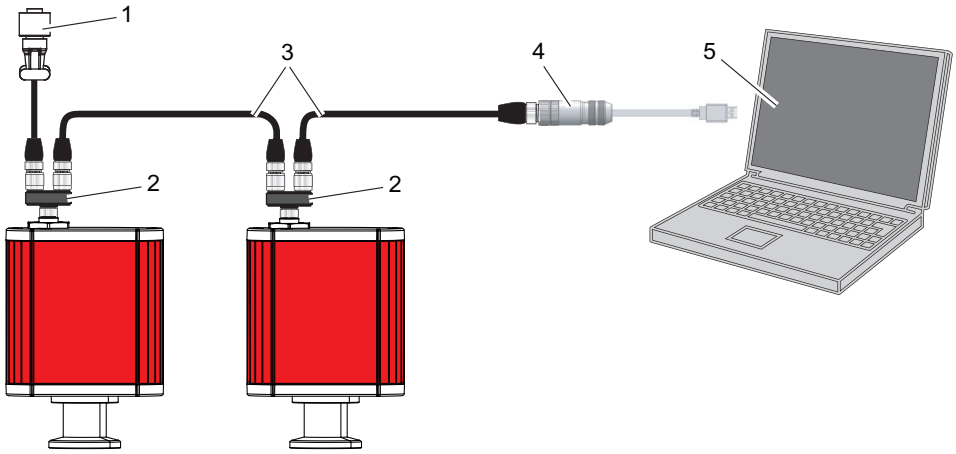


Fig. 4: Cross-link via connection RS-485 using connection cables and accessories

1 Supply cable for power supply pack
2 Y-connector for RS-485
3 Interface cable M12
4 USB/RS-485 converter
5 PC

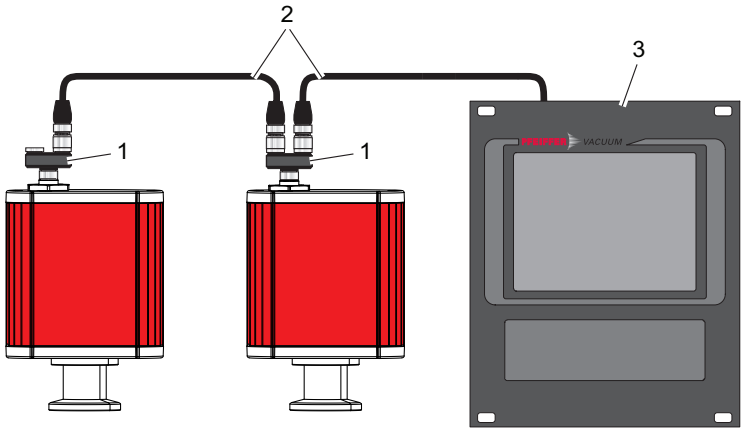


Fig. 5: Cross-link via RS-485 connection using OmniControl

1 Y-connector for RS-485
2 Interface cable M12
3 OmniControl control unit

Set RS-485 address

1. Remove the rubber plug from the RS-485 address selector switch.
2. Set the RS-485 address with the RS-485 address selector switch on the gauge.
3. Place the rubber plug back on the RS-485 address selector switch.

Ensure protection degree of the gauge

► After setting the RS-485 address, place the rubber plug back on the RS-485 address selector switch to establish the specified protection degree.

Cross-linked via the RS-485 connection

1. Install the devices according to the specification for RS-485 interfaces.
2. Make sure that all devices connected to the bus have different RS-485 device addresses.
3. Connect all devices with RS-485 D+ and RS-485 D- to the bus.

Connect Pfeiffer Vacuum display and control units or a PC

► Use a connecting cable from the DigiLine accessories range.
► Connect only one external control unit to the RS-485 interface at a time.
► If needed, connect a PC via the USB/RS-485 converter.

6 Interfaces

6.1 Interface RS-485

DANGER

Danger to life from electric shock

When establishing the voltages that exceed the specified safety extra-low voltage (according to IEC 60449 and VDE 0100), the insulating measures will be destroyed. There is a danger to life from electric shock at the communication interfaces.

► Connect only suitable devices to the bus system.

The gauge communicates via the "RS-485" interface. The gauge has the addresses 1 through 16.

Designation	Value
Serial interface	RS-485
Baud rate	9600 Baud
Data word length	8 bit
Parity	none (no parity)
Stop bits	1

Tbl. 5: Features of the RS-485 interface

Fig. 6: Connection assignment of RS-485 connecting socket

1 RS-485 D+
2 +24 V DC
3 GND
4 RS-485 D-
5 not connected

6.2 Pfeiffer Vacuum protocol for RS-485 interface

6.2.1 Telegram frame

The telegram frame of the Pfeiffer Vacuum protocol contains only ASCII code characters [32; 127], the exception being the end character of the telegram C_R. Basically, a host (e.g. a PC) sends a telegram, which a device ○ (e.g. electronic drive unit or gauge) responds to.

a2	a1	a0	*	0	n2	n1	n0	l1	l0	dn	...	d0	c2	c1	c0	C_R

a2 – a0	Unit address for device ○ • Individual address of the unit ["001";"016"]
*	Action according to telegram description
n2 – n0	Pfeiffer Vacuum parameter numbers
l1 – l0	Data length dn to d0
dn – d0	Data in the respective data type (see chapter “Data types”, page 23).
c2 – c0	Checksum (sum of ASCII values of cells a2 to d0) modulo 256
C_R	carriage return (ASCII 13)

6.2.2 Telegram description

Data query 💻 --> ○ ?

a2	a1	a0	0	0	n2	n1	n0	0	2	=	?	c2	c1	c0	c_R

Control command 💻 --> ○ !

a2	a1	a0	1	0	n2	n1	n0	l1	l0	dn	...	d0	c2	c1	c0	c_R

Data response / Control command understood ○ --> 💻

a2	a1	a0	1	0	n2	n1	n0	l1	l0	dn	...	d0	c2	c1	c0	c_R

Error message ○ --> 💻

a2	a1	a0	1	0	n2	n1	n0	0	6	N	O	_	D	E	F	c2	c1	c0	c_R
										_	R	A	N	G	E				
										_	L	O	G	I	C				

NO_DEF	Parameter number n2–n0 no longer exists
_RANGE	Data dn–d0 outside the permissible range
_LOGIC	Logical access error

6.2.3 Telegram example 1

Query pressure value
Current measured pressure (parameter **[P:740]**, device address: "001")

💻 --> ○ ?	0	0	1	0	0	7	4	0	0	2	=	?	1	0	6	c_R
ASCII	48	48	49	48	48	55	52	48	48	50	61	63	49	48	54	13

Data response: measured pressure 1 × 10^{+3} hPa as exponent 1E+3
Current measured pressure (parameter **[P:740]**, device address: "001")

○ --> 💻	0	0	1	1	0	7	4	0	0	6	1	0	0	0	2	3	0	2	5	c_R
ASCII	48	48	49	49	48	55	52	48	48	54	49	48	48	48	50	51	48	50	53	13

6.2.4 Telegram example 2

Incorrect command
Incorrect command (parameter **[P:888]**, device address: "005"

💻 --> ○ !	0	0	5	1	0	8	8	8	0	3	1	3	0	c2	c1	c0	c_R
ASCII	48	48	53	49	48	56	56	56	48	51	49	51	48				13

Unknown command
Incorrect command (parameter **[P:888]**, device address: "005"

○ --> 💻	0	0	5	1	0	8	8	8	0	6	N	O	_	D	E	F	c2	c1	c0	c_R
ASCII	48	48	53	49	48	56	56	56	48	54	78	79	95	68	69	70				13

6.2.5 Data types

No.	Data type	Description	Length l1 – l0	Example
0	boolean_old	Logical value (false/true)	06	000000 is equivalent to false 111111 is equivalent to true
1	u_integer	Positive whole number	06	000000 to 999999
2	u_real	Fixed point number (unsigned)	06	001571 corresponds with 15.71
4	string	Any character string with 6 characters. ASCII codes between 32 and 127	06	TC_110, TM_700
6	boolean_new	Logical value (false/true)	01	0 is equivalent to false 1 is equivalent to true
7	u_short_int	Positive whole number	03	000 to 999
10	u_expo_new	Positive exponential number. The last of both digits are the exponent with a deduction of 20.	06	100023 is equivalent to $1{,}0 \cdot 10^{3}$ 100000 is equivalent to $1{,}0 \cdot 10^{-20}$
11	string16	Any character string with 16 characters. ASCII codes between 32 and 127	16	BrezelBier&Wurst
12	string8	Any character string with 8 characters. ASCII codes between 32 and 127	08	Example

7 Parameter set

7.1 General

All variables relevant for the function are stored as parameters in the gauge. Each parameter has a three-digit number and a description. The parameter can be applied using Pfeiffer Vacuum control units or externally via RS-485 using the Pfeiffer Vacuum protocol.

Factory settings
The gauge is pre-programmed ex factory. The gauge is ready for safe operation without additional configuration.

#	Three digit number of the parameter
Description	Brief description of the parameters
Functions	Function description of the parameters
Data type	Type of formatting of the parameter for the use with the Pfeiffer Vacuum protocol
Access type	R (read): Read access; W (write): Write access
Unit	Physical unit of the described variable
min. / max.	Permissible limit values for the entry of a value
default	Factory default setting (partially gauge-specific)
	The parameter can be stored to the non-volatile memory of the gauge

Tbl. 6: Explanation and meaning of the parameters

7.2 Overview of parameters of MPT gauge

#	Description
041	Sensor on/off
049	Switching ranges
303	Current error code
312	Software version
349	Device name
354	Hardware version
355	Serial number
388	Order number
730	Pressure switch point 1 [1)]
732	Pressure switch point 2 [2)]
740	Pressure value [hPa]
741	Pressure adjustment point
742	Correction factor (Pirani)
743	Correction factor (cold cathode)

Tbl. 7: Overview of parameters of MPT gauge

1) Only AR version
2) Only AR version

7.3 Control commands

#	Description	Functions	Data type	Access type	Unit	min.	max.	default	
041	Sensor on/off	0 = off 1 = on	6	RW		0	1	1	✓
049	Switching ranges	0 = switch 1 = trans_LO	7	RW		0	1	1	✓

Tbl. 8: Parameter set | Control commands

7.4 Status requests

#	Description	Functions	Data type	Access type	Unit	min.	max.	de-fault	
303	Error code	000000 = No error Err001 = Sensor defective Err002 = Memory defective	4	R					
312	Gauge firmware version	Example of first firmware version: 010100	4	R					
349	Device name	MPT200	4	R					
354	Hardware version	Example for first hardware version: 010100	4	R					
355	Serial number	Example: 42501199	11	R					
388	Order number	Example: PT R40 140	11	R					

Tbl. 9: Parameter set | Status requests

7.5 Pressure values and correction factors

#	Description	Functions	Data type	Access type	Unit	min.	max.	de-fault	
730 [3)]	Pressure switch point 1	Read and set pressure value for switch-point 1	10	RW	hPa				✓
732 [4)]	Pressure switch point 2	Read and set pressure value for switch-point 2	10	RW	hPa				✓
740	Pressure value	Read and set current pressure value (during adjustment)	10	RW (can be written condition-ally)	hPa				✓
741	Pressure adjust-ment point	000= HV adjustment 001= ATM adjustment	7	W		000	001		✓
742	Correction factor (Pirani)	Reading and setting correction factors	2	RW		0.2	8.0	1.00	✓
743	Correction factor (cold cathode)	Reading and setting correction factors	2	RW		0.2	8.0	1.00	✓

Tbl. 10: Parameter set | Pressure values and correction factors

3) Only AR version

4) Only AR version

8 Operation

Once the supply voltage has been established, the measurement signal is available at the electrical connection.

LED	Meaning
Off	No power supply
Lights up green	Supply voltage OK, measuring mode, valid pressure values, sensor for low pressure range active
Green flashing (1 Hz)	Sensor for high pressure range active
Lights up yellow	Device function OK, but due to internal operations (e.g. adjustment), there are temporarily no valid measuring values Measuring range exceeded/undershot
Lights up red	Software or gauge error
Lit for 1 s green, yellow and red	LED test after commissioning or reset
Flashing red/green(1 Hz)	Software update in progress

Tbl. 11: Operating mode display via "device status" LED

Recommendations

- ► Respect the minimum stabilization period of 10 minutes.
- ► Leave the gauge switched on at all times, regardless of the applied pressure.

Read current pressure value [P:740]

Pressure values are transferred in the "aaaabb" format. The "aaaa" string is the mantissa of an exponential number and "bb" is the exponent with an offset of 20. "aaaa" lies in the range "1000" (for 1.000) to "9999" (for 9.999). The individual characters in the string are the numbers "0" (ASCII 48) to "9" (ASCII 57).

Depending on the gauge and its accuracy, the number of significant figures in the mantissa can vary.

- ► Read the current pressure value via parameter **[P:740]**.

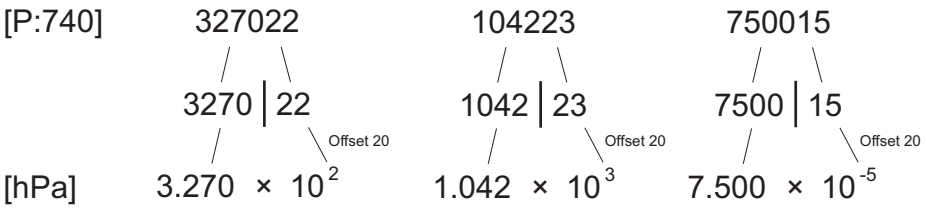


Fig. 7: Examples of reading current pressure values via [P:740]

Read error code [P:303]

- ► Read the error code via parameter **[P:303]**.
  - 000000 = No error
  - Err001 = Sensor defective
  - Err002 = Memory defective

Read firmware version [P:312]

- ► Read the firmware version via parameter **[P:312]**.
  - Example of first firmware version: 010100

Read device name [P:349]

- ► Read the device name via parameter **[P:349]**.

Read hardware version [P:354]

- ► Read the hardware version via parameter **[P:354]**.

Read serial number [P:355]

- ► Read the serial number via parameter **[P:355]**.

Read order number [P:388]

► Read the order number via parameter **[P:388]**.

8.1 Selecting switching ranges

The gauge offers the option of adapting the switchover range between the Pirani sensor and the cold cathode sensor as a function of the application. In this way it is possible to prevent:

- The setpoint being in the switch over range when pressure regulation takes place
- In coating applications: the cold cathode being switched on and contaminated prematurely by the self-sputter effect.

Switching range	Switching on the CC	Switch off the CC
trans_LO	2.1 × 10^{-3} hPa	3.1 × 10^{-3} hPa
switch	1.2 × 10^{-3} hPa	2.0 × 10^{-3} hPa

Tbl. 12: Switch-on and switch-off pressure of the cold cathode

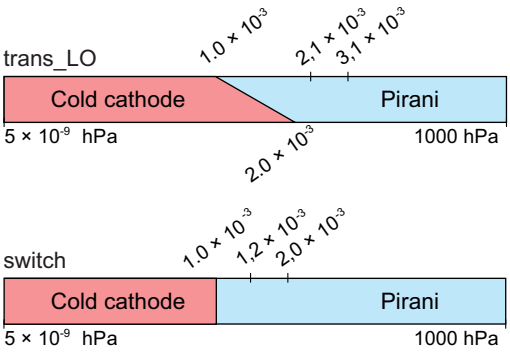


Fig. 8: Selecting switching ranges

Procedure

► Select the switching range according to the operating instructions for the display and control unit.
► Set parameter **[P:049]** to "0" (switch) for direct switching at 1 × 10^{-3} hPa.
► Set parameter **[P:049]** to "1" (trans_LO) for a continuous transition between Pirani and cold cathode pressure measurement.

8.2 Determining effective pressure with correction factors

The measuring signal is gas type-dependent.

Pressure range > 10^{-4} hPa (Pirani operation only)

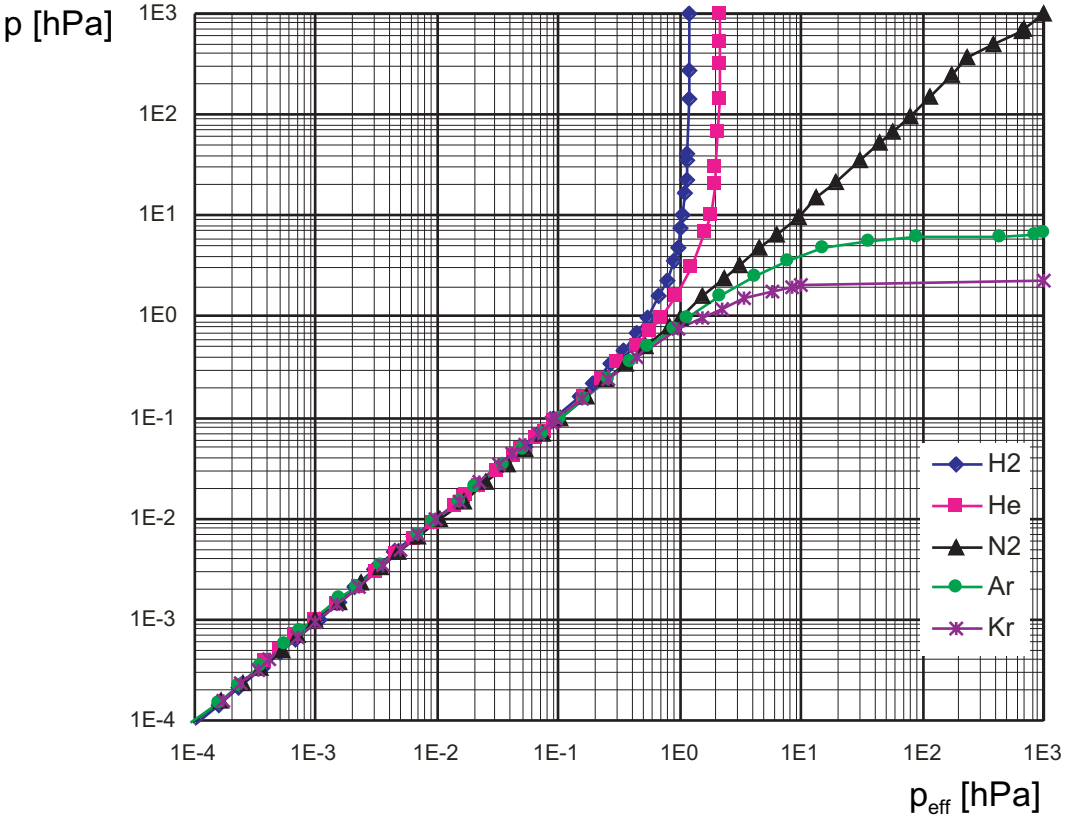


Fig. 9: Measurement curve for Pirani-only operation and when using the correction factors

Gas type	Correction factor (C)
Nitrogen (N_2)	1.0
Air	1.0
Hydrogen (H_2)	0.58
Helium (He)	1.02
Argon (Ar)	1.59
Carbon dioxide (CO_2)	0.89
Tetrafluoromethane (CF_4, R14)	0.95

Tbl. 13: Correction factor for Pirani-only operation

Pressure range < 10^{-3}

In the pressure range < 10^{-3} 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)
Helium (He)	5.93
Hydrogen (H_2)	2.39
Argon (Ar)	0.80
Carbon dioxide (CO_2)	0.74
Propane (C_3H_8)	0.32
Neon (Ne)	3.50

Gas type	Correction factor (C)
Krypton (Kr)	0.60
Xenon (Xe)	0.41
Dichlorodifluoromethane (CCl_2F_2, R12)	0.28
Tetrafluoromethane (CF_4, R14)	0.44

Tbl. 14: Correction factors for cold cathode

Using correction factors

Reading and setting Pirani correction factor [P:742]

- ► Read the current correction factor via parameter **[P:742]**.
- ► Via parameter **[P:742]**, set the correction factor to a value between 0.2 and 8.0 with 2 decimal places.
  - – Example: Correction factor 0.20 = 000020
  - – Example: Correction factor 1.00 = 000100
  - – Example: Correction factor 8.00 = 000800

Reading and setting cold cathode correction factor [P:743]

- ► Read the current correction factor via parameter **[P:743]**.
- ► Via parameter **[P:743]**, set the correction factor to a value between 0.2 and 8.0 with 2 decimal places.
  - – Example: Correction factor 0.20 = 000020
  - – Example: Correction factor 1.00 = 000100
  - – Example: Correction factor 8.00 = 000800

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 adjusted for air)

8.3 Switching cold cathode sensor on/off

The gauge makes it possible to switch the cold cathode sensor on and off depending on the process. When the supply voltage is switched on, the [P:041] parameter is preset to "1", i.e. the gauge is providing normal operation. Changes to this parameter are only saved temporarily by the gauge, until the supply voltage is switched off. Status changes of this parameter are possible at any time during operation.

Required optional device

- Display and control unit

Status of the CC sensor	Control command via [P:041]	Current Pirani pressure (P_P)	Effect on CC sensor
on	"1" (on)	-	None
Off	"1" (on)	≥P_x hPa	is switched on at $P_P < P_x$ hPa
Off	"0" (off)	≥P_x hPa	stays switched off at $P_P < P_x$ hPa
on	"0" (off)	-	is switched off
Off	"1" (on)	<P_x hPa	is switched on and the "Switch-on timer" starts

Tbl. 15: Switch-on/-off condition

The threshold values P_x depend on the selected switchover range and are 2.1×10^{-3} or 1.2×10^{-3} hPa.

The Pirani display will continue until the switch-on timer expires. If output "ur" occurs as the Pirani value before the "On" command, output <1×10^{-4} hPa mbar will remain set during the timer run time. Else it is possible that "ur" might be interpreted as CC underrange during the timer runtime. Output of the combination value from the Pirani and CC sensors will occur upon expiry of the "Switch-on timer".

Switching CC sensor with display and control unit on/off

► Switch the CC sensor on or off as described in the operating instructions of the display and control unit.

Switching CC sensor on/off [P:041]

► Set parameter **[P:041]** to "1" to switch on the CC sensor.
► Set parameter **[P:041]** to "0" to switch off the CC sensor.

8.4 Reading and setting relay and switch-points

The analog relay versions (AR) of the DigiLine gauges have 2 pressure-controlled relay contacts that can be configured via the RS-485 interface using an external controller. The data format is identical to parameter **[P:740]**.

Read switch-points via RS-485

1. Read the pressure value for switch-point 1 via parameter **[P:730]**.
2. Read the pressure value for switch-point 2 via parameter **[P:732]**.

Set switch-points via RS-485

1. Use parameter **[P:730]** to set the pressure value for switch-point 1.
2. Use parameter **[P:732]** to set the pressure value for switch-point 2.

8.5 Baking out gauge

NOTICE

Damage from excessive bakeout temperature

If the gauge is installed upright (flange facing down), rising heat during baking out will cause damage to the electronic unit and magnetic unit.

► Remove the electronic unit, and the magnetic unit if applicable, from the measuring system before baking out at temperatures >60 °C.
► Bake out the flange only.
► Do not thermally insulate the cover of the measurement system.
  – The cover requires convection cooling with room air during bake-out.
► Pay attention to the component assignments, do not interchange.

Prerequisites

- Electronic unit removed
- Magnetic unit removed

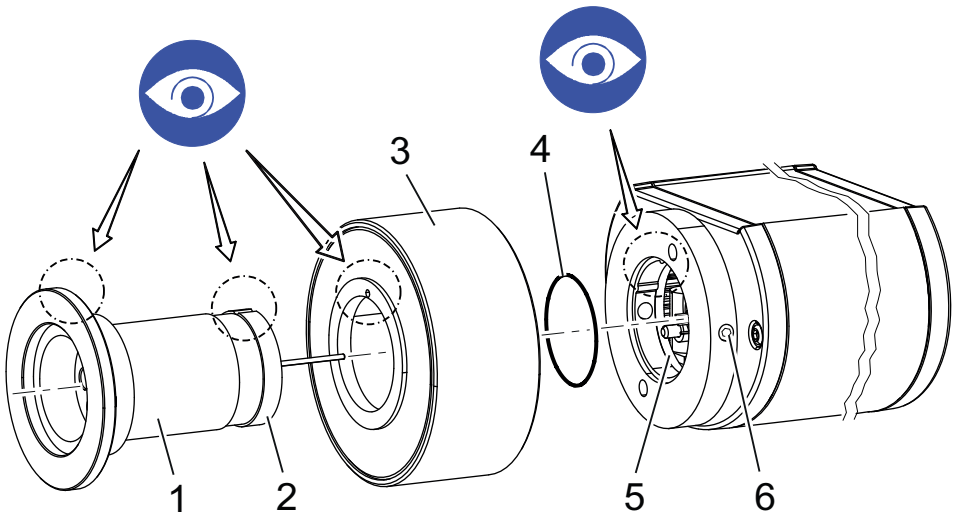


Fig. 10: Components of the gauge

1 Measurement system
2 Cover of measurement system
3 Magnetic unit
4 Seal
5 Electronic unit
6 Grub screw, 2×

Procedure

1. Bake out the gauge up to **max. 160 °C** at the flange.
2. Make sure that the pressure is **< 10 hPa** when baking out, because the Pirani sensor will give inaccurate measured values under the influence of the increased temperature.
3. Allow the gauge to cool down.
4. Install the electronic unit and magnetic unit.
5. Adjust the gauge.

9 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.

⚠ 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.

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

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.

10 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.

First read through the sections completely

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

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

10.1 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.

10.2 Adjusting gauge

Pfeiffer Vacuum has adjusted the gauge to default values at the factory. You can adjust the Pirani measurement system yourself, if required. The gauge automatically detects which adjustment point (ATM or HV) applies.

HV adjustment will occur automatically under the following, simultaneously applicable conditions:

- The measuring value of the CC sensor is <5 × 10^{-5} hPa.
- The measuring value of the Pirani sensor remains constant for more than 1 minute and does not deviate too much from the last adjusted value.

Preparing for adjustment

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.

Performing adjustment with display and control unit

- ► Adjust the gauge according to the operating instructions for the display and control unit.

HV adjusting

1. Put the gauge into operation.
2. Evacuate the vacuum system to a pressure in the underrange, e.g., << 1×10^{-5} hPa.
3. Wait for at least 10 minutes.
4. Via parameter **[P:741]**, set the pressure adjustment point to "000" for low pressure.
5. Via parameter **[P:740]**, set the pressure value to "000000" for low pressure.
   - This is equivalent to, e.g., p < 1 ×10^{-5} (underrange).

ATM adjusting

1. Put the gauge into operation.
2. Operate the gauge for at least 10 minutes at atmospheric pressure.
3. Via parameter **[P:741]**, set the pressure adjustment point to "001" for high pressure.
4. Via parameter **[P:740]**, set the pressure value to atmospheric pressure.
   – Example: 1000 hPa = **[P:740]** with value "100023"

10.3 Replacing measurement system

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

- Measurement system severely contaminated,
- Measurement system visibly damaged or
- Gauge defective (e.g. broken anode)

Spare part required

- Replacement measurement system

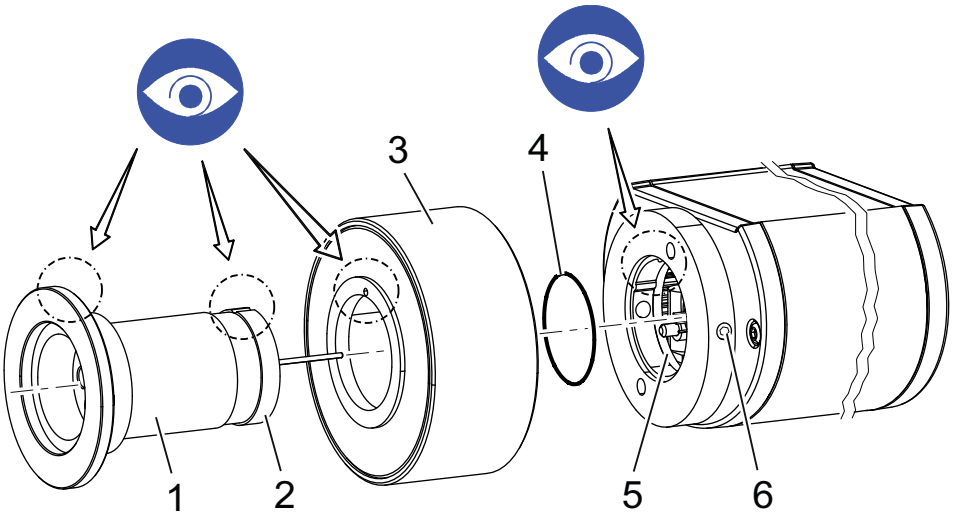


Fig. 11: Replacing measurement system

1	Measurement system	4	Seal
2	Cover of measurement system	5	Electronic unit
3	Magnetic unit	6	Grub screw, 2×

Procedure

1. Remove the gauge from the vacuum system.
2. Disconnect the supply cable from the gauge.
3. Unfasten the two grub screws.
4. Dismount the measurement system with cover and the magnetic unit from the electronic unit.
5. Remove the magnetic unit and seal from the measurement system.
6. Place the magnetic unit on the replacement measurement system.
   – Make sure the components are oriented correctly.

7. Place the seal in the groove of the replacement measurement system.
8. Push the replacement measurement system with cover into the electronic unit.
   – Make sure the components are oriented correctly and make sure the seal is correctly fitted.
9. Fasten the two grub screws.
10. Connect the gauge to the vacuum system.
11. Establish the electric connection.
12. Adjust the new measurement system.

11 Malfunctions

Warranty

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

Malfunction	Possible cause	Remedy
Communication error: Gauge	No power supply	Connect a data cable or power supply pack.
	Wrong RS-485 address set	Set the RS-485 address selector switch correctly.
	Gauge faulty	Replace the gauge.
Measured value in high vacuum too high	Adjustment required	Adjust the gauge.
	Gauge faulty	Replace the measurement system.
		Replace the gauge.
Permanently "ur" in high vacuum, although pressure >1 × 10^{-8} hPa.	uses starting aid	Replace the measurement system.

Tbl. 16: Malfunctions

12 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 notices for safe shipment.

Decontamination subject to charge

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

Safe shipping of the product

► 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.

13 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.

13.1 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

13.2 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.

14 Service solutions by Pfeiffer Vacuum

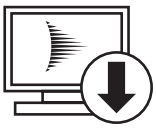
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

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

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

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

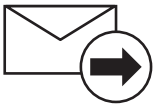
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



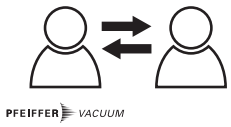
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

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

2. Complete the service request and contamination declaration.

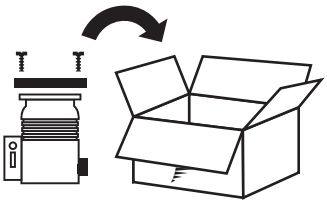


3. Send the forms by email, fax, or post to your local Service Center.

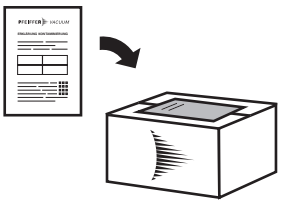


4. You will receive an acknowledgment from Pfeiffer Vacuum.

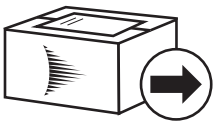
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



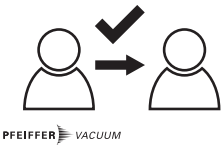
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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



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



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



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

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

15 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.

Designation	Replacement measurement system
MPT 200, DN 25 ISO-KF	PT 120 210 -T
MPT 200, DN 40 ISO-KF	PT 120 211 -T
MPT 200, DN 40 CF-F	PT 120 212 -T

Tbl. 17: Spare parts

16 Accessories

View the range of accessories for DigiLine on our website.

16.1 Accessory information

Power supply packs
Power supply packs for wall- and standard rail mounting to supply power to DigiLine gauges

OmniControl control unit
Universal control unit for all products with Pfeiffer Vacuum RS-485 protocol. It supplies up to two gauges and is equipped with a display for displaying the pressure of up to 16 measuring channels.

DokuStar Plus software
Evaluation software for representation and for data backup for up to 16 DigiLine gauges

Accessories for RS-485
Cables and fasteners for creating an RS-485 field bus

Supply and interface cable
Cable in various lengths, for connecting to a Pfeiffer Vacuum power supply unit or a PC

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

16.2 Ordering accessories

OmniControl variants
You can find additional OmniControl variants on the Pfeiffer Vacuum website.

Part number	Selection field
PT 348 105 -T	Terminal resistor for RS-485
PM 061 270 -X	Coupling M12 for RS-485
PT 348 132 -T	Power separator for RS-485
P 4723 010	Y-connector M12 for RS-485
PT 348 133 -T	Adapter RS-485, M12, 4-pin - D-sub socket, 9-pin, 0.2 m
PT 348 106 -T	Plug M12 m 4-pin with screw clamps for DigiLine RS-485, for customer-specific cables
PM 061 207 -T	USB RS-485 converter
PT 348 163 -T	Mains power supply DigiLine, M12, 4-pin to TPS, 3 m
PT 348 223 -T	Connection cable, RS-485, M12/D-sub 9-pin, 3 m
PM 061 283 -T	Interface cable, M12 m straight / M12 m straight, 3 m
PF 117 225 -T	Centering ring with sintered metal filter, 0,02 mm pore size, stainless steel, FKM, DN 25 ISO-KF
PF 117 240 -T	Centering ring with sintered metal filter, 0,02 mm pore size, stainless steel, FKM, DN 40 ISO-KF
PT 120 036 -T	Centering ring with fine filter, 0,004 mm pore size, stainless steel, FKM, DN 25 ISO-KF
PT 120 037 -T	Centering ring with fine filter, 0,004 mm pore size, stainless steel, FKM, DN 40 ISO-KF
PT 882 501	DokuStar Plus software, 16 channels
PM 061 340 -T	TPS 110, power supply pack for wall/standard rail installation
PM 061 344 -T	TPS 111, power supply pack 19" plug-in unit 3HU

Part number	Selection field
PE D50 000 0	OmniControl 200, rack unit with integrated power supply pack , No Data, No Gauge/IO Option
PE E50 000 0	OmniControl 200, table unit with integrated power supply pack , No Data, No Gauge/IO Option

Tbl. 18: Accessories

17 Technical data and dimensions

17.1 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. 19: 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. 20: Conversion table: Units for gas throughput

17.2 Technical data

Parameter	Value	
Measuring range (air, O_2, CO, N_2)	5×10^{-9} – 1000 hPa	
Maximum pressure (absolute)	4000 hPa	
Measuring principle	Heat conduction according to Pirani and cold cathode	
Measuring cycle	10 ms	
Accuracy (N_2)	1×10^{-8} – 2×10^{-3} hPa	±25% of the measured value
	2×10^{-3} – 10 hPa	±10% of the measured value
	10 – 1000 hPa	±30% of the measured value
Repeatability	1×10^{-8} – 1×10^{-2} hPa	±7% of the measured value
	1×10^{-2} – 10 hPa	±2% of the measured value
Gauge adjustment	via RS-485 interface	

Tbl. 21: Measured and pressure values

Parameter	Value
Supply voltage	24 V DC
Power consumption	3 W
Connection (electrical)	Binder M12 connector, 5-pole, A-coded
Cable length	≤100 m

Tbl. 22: Electrical data

Parameter	Value
Protocol	ASCII, addressable (RS-485), Pfeiffer Vacuum protocol
Data format	Bidirectional data traffic, data word length 8 bits, 1 stop bit, no parity bit
Baud rate	9600
Connection	Binder M12 connector, 5-pole, A-coded

Tbl. 23: RS-485 interface

Parameter		Value
Weight	DN 25 ISO-KF	555 g
	DN 40 ISO-KF	580 g
	DN 40 CF-F	850 g

Tbl. 24: Connection flanges and weight

Parameter	Value
Air pressure	800 – 1060 hPa
Relative humidity of air	At temperatures up to +30°C max. 80% At temperatures up to +40°C max. 50% non-condensing
Mounting orientation	Arbitrary
Usage	Only in indoor areas
Installation altitude max.	2000 m MSL
Protection degree	IP54

Tbl. 25: Ambient conditions

Parameter	Value
Operation	+5 – +60 °C
Bake out (vacuum connection)	160 °C
Storage	-40 – +65 °C

Tbl. 26: Temperatures

Parameter	Value
Materials	Stainless steel Tungsten Nickel Molybdenum Glass

Tbl. 27: Substances in contact with media

17.3 Dimensions

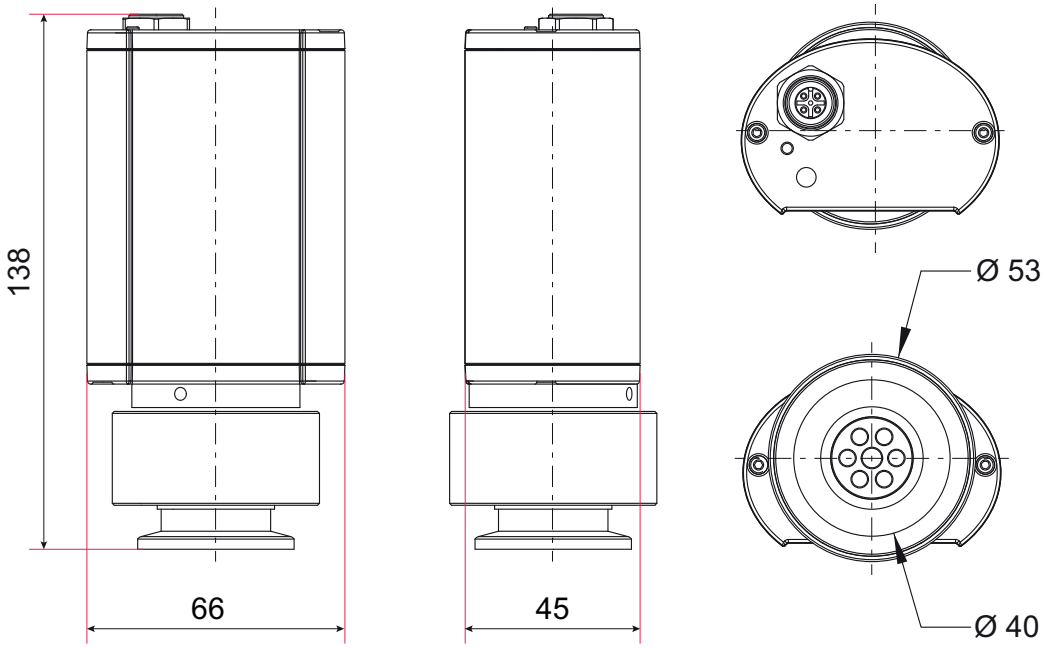


Fig. 12: MPT 200 with DN 25 ISO-KF
Dimensions in mm

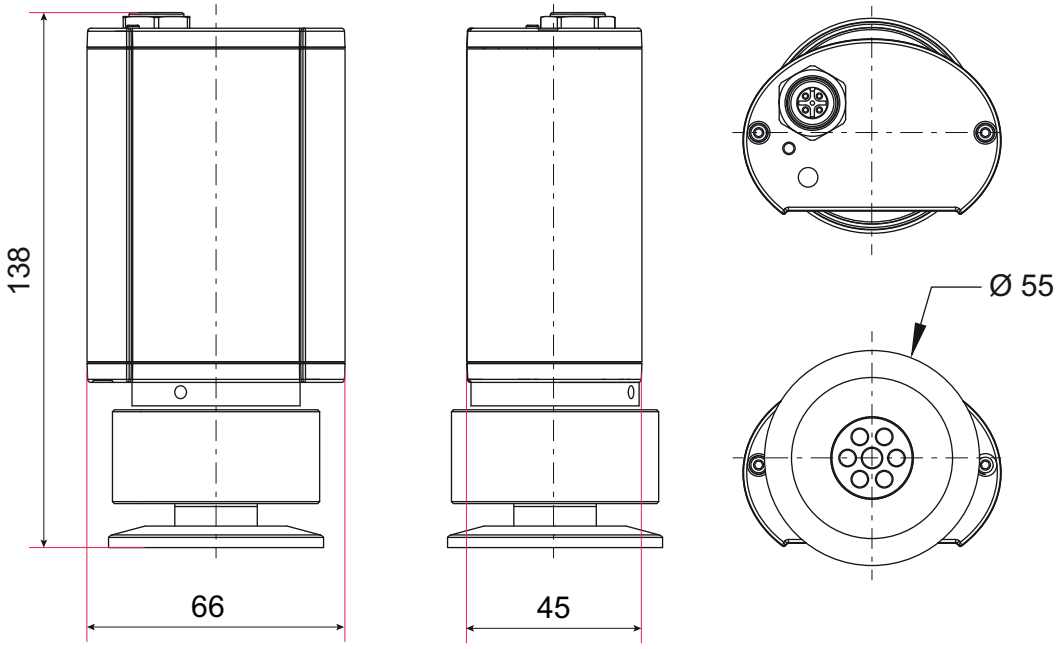


Fig. 13: MPT 200 with DN 40 ISO-KF
Dimensions in mm

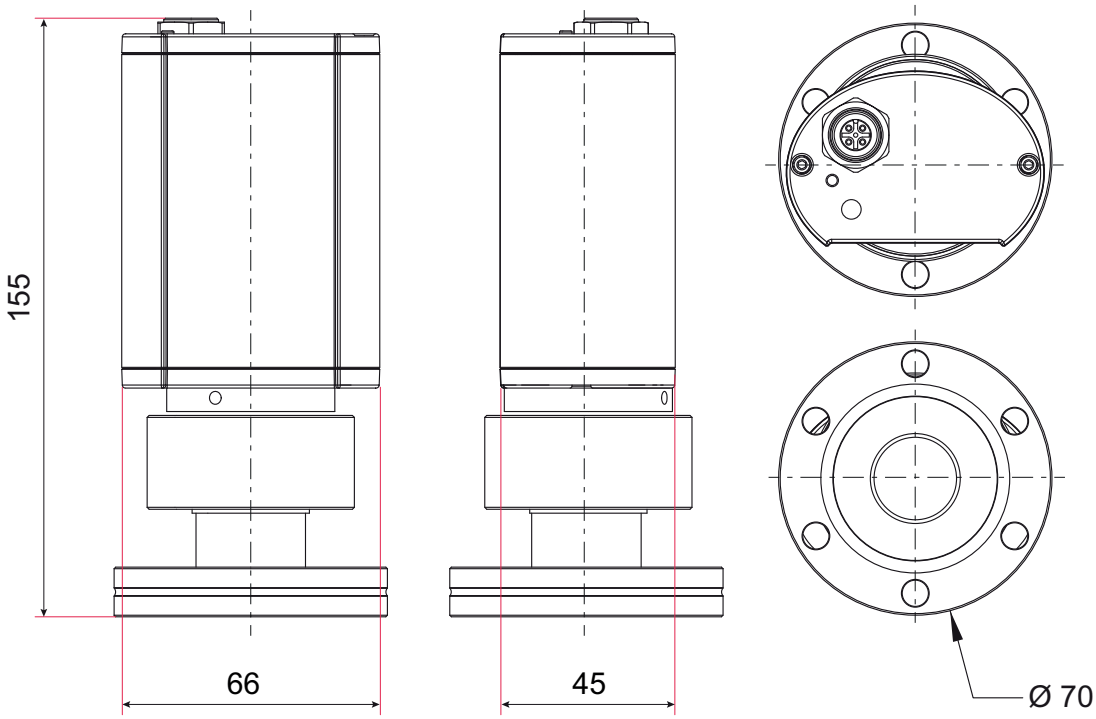


Fig. 14: MPT 200 with DN 40 CF-F
Dimensions in mm

The product MPT 200

- conforms to the UL standards

  UL 61010-1, 3rd edition (2016)
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements

- is certified to the CSA standards

  CSA C22.2 No. 61010-1-12, UPD1:2015, UPD2:2016
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements

PFEIFFER VACUUM

EU Declaration of conformity

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

Declaration for product(s) of the type:

Digital Pirani/cold cathode gauge

MPT 200

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 61326-1:2022

DIN EN IEC 63000:2019

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2023-07-19

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:

Digital Pirani/cold cathode gauge

MPT 200

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

Electromagnetic Compatibility Regulations 2016

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

Applied standards and specifications:

EN IEC 61326-1:2021

EN IEC 63000:2018

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

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2023-02-03

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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