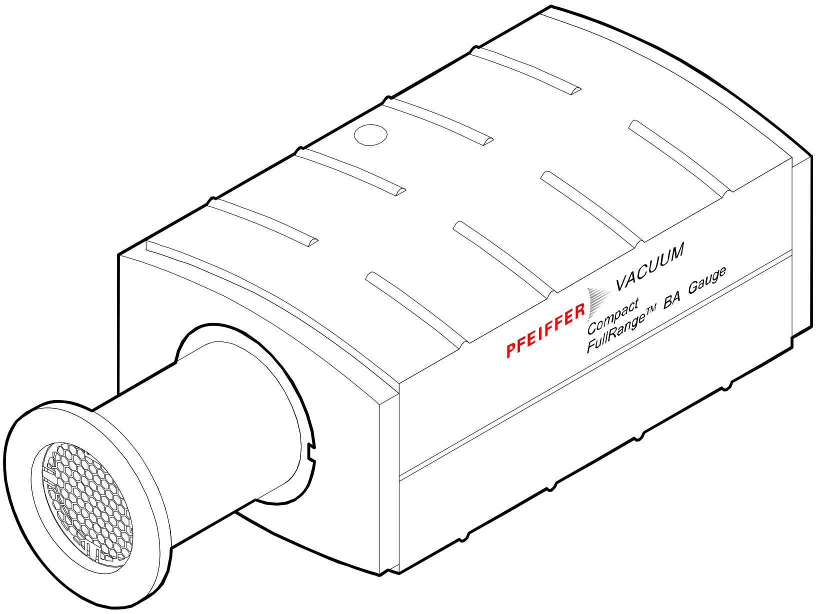


OPERATING INSTRUCTIONS

EN

Translation of the original instructions

PBR 260

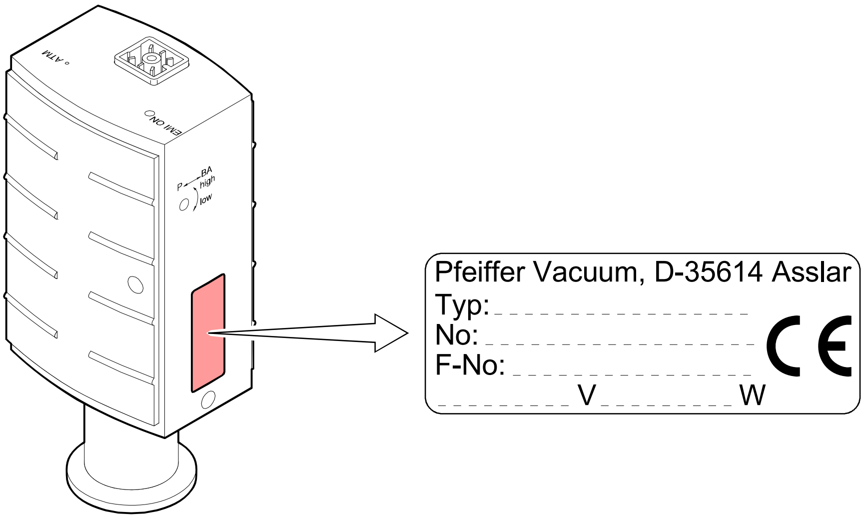
Compact FullRange® BA Gauge

BG 5171 BEN / B (2017-02)

PFEIFFER VACUUM

Product Identification

In all communications with Pfeiffer Vacuum, please specify the information given on the product nameplate. For convenient reference copy that information into the space provided below.



Validity

This document applies to products with part number

PT R27 000 (Flange DN 25 ISO-KF)
PT R27 001 (Flange DN 40 ISO-KF)
PT R27 002 (Flange DN 40 CF-R)

The part number (No) can be taken from the product nameplate.

If not indicated otherwise in the legends, the illustrations in this document correspond to the gauge with the vacuum connection DN 25 ISO-KF. They apply to gauges with other vacuum connections by analogy.

We reserve the right to make technical changes without prior notice.

Intended Use

The PBR 260 Compact FullRange® BA Gauge has been designed for vacuum measurement of non-flammable gases and gas mixtures in the pressure range of 5×10^{-10} ... 1000 hPa.

It must not be used for measuring flammable or combustible gases in mixtures containing oxidants (e.g. atmospheric oxygen) within the explosion range.

The PBR 260 is part of the Pfeiffer Vacuum Compact Gauges family and can be operated in connection with the MaxiGauge™ measurement and control unit TPG 256 A or with another evaluation unit.

Functional Principle

Over the whole measurement range, the Compact FullRange® BA Gauge has a continuous characteristic curve and its measuring signal is output as a logarithm of the pressure.

The gauge functions with a Bayard Alpert hot cathode ionization and a Pirani measurement system. In a defined overlapping pressure range, a mixed signal of the two measurement systems is output. Above that range, a Pirani signal, below that range, a hot cathode signal is output. The Pirani signal switches the hot cathode measurement system on and off to prevent filament burn-out and excessive contamination. The user can select among two switching on/off thresholds.

Trademarks

MaxiGauge™	INFICON GmbH
FullRange®	Pfeiffer Vacuum GmbH

Contents

For cross-references within this document, the symbol (→ 🗎 XY) is used, for cross-references to other documents, the symbol (→ 🕮 [Z]).

1 Safety

1.1 Symbols Used

DANGER

Information on preventing any kind of physical injury.

WARNING

Information on preventing extensive equipment and environmental damage.

Caution

Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

1.2 Personnel Qualifications

Skilled personnel

All work described in this document may only be carried out by persons who have suitable technical training and the necessary experience or who have been instructed by the end-user of the product.

1.3 General Safety Instructions

- Adhere to the applicable regulations and take the necessary precautions for the process media used.

  Consider possible reactions between the materials (→ 🗎 6) and the process media.

  Consider possible reactions (e.g. explosion) of the process media due to heat generated by the product.
- Adhere to the applicable regulations and take the necessary precautions for all work you are going to do and consider the safety instructions in this document.
- Before beginning to work, find out whether any vacuum components are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Communicate the safety instructions to other users.

1.4 Liability and Warranty

Pfeiffer Vacuum assumes no liability and the warranty becomes null and void if the end-user or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of changes (modifications, alterations etc.) to the product
- use the product with accessories not listed in the corresponding product documentation.

The end-user assumes the responsibility in conjunction with the process media used.

Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. filament), are not covered by the warranty.

2 Technical Data

Measurement

Measurement range (air, N_2)	5×10^{-10} … 1000 hPa
Overlapping range hot cathode – Pirani	
high (default)	5.5×10^{-3} … 2.0×10^{-2} hPa
low	2.0×10^{-3} … 8.0×10^{-3} hPa
Accuracy (10^{-8} ... 10^{-2} hPa)	≈15 % reading (after 5 min. stabilization)
Repeatability (10^{-8} ... 10^{-2} hPa)	≈5 % reading (after 5 min. stabilization)
Gas type dependence	→ Appendix C

Emission

Switching on threshold (high) (default)	2.4×10^{-2} hPa
Switching off threshold (high) (default)	3.2×10^{-2} hPa
Switching on threshold (low)	9.9×10^{-3} hPa
Switching off threshold (low)	1.3×10^{-2} hPa
Emission current (with decreasing pressure)	
7.2×10^{-6} hPa < p < 2.4×10^{-2} hPa	25 µA
p ≤ 7.2×10^{-6} hPa	5 mA
Emission current switching	
25 µA ⇒ 5 mA (with decreasing pressure)	7.2×10^{-6} hPa
5 mA ⇒ 25 µA (with increasing pressure)	3.2×10^{-5} hPa

Degas (only if p < 7.2×10^{-6} hPa)

Current	ca. 16 mA / ca. 4.0 W
Control input signal	0 V / 24 V, PLC level, high active
Duration	max. 3 min., followed by automatic stop

In degas mode, the PBR 260 keeps supplying measurement values the tolerances of which can be higher than during normal operation.

Output signal

Output signal	0 … 10.2 V
Measurement range	0.774 V … 10 V (5×10^{-10} hPa … 1000 hPa)
Relationship voltage-pressure	logarithmic, 0.75 V / decade
Error signals	→ 🗎 23
0.3 V	• hot cathode error
0.5 V	• Pirani error • electronics unit not correctly mounted on sensor
Underrange	0.5 V < U < 0.774 V
Overrange	10 V < U ≤ 10.2 V (measuring signal limited to 10.2 V by software)
Minimum load	10 kΩ

Gauge identification

Resistor (pin 1, U_{max} = 4.25 V)	17.2 kΩ referenced to supply common

Adjustment

Pirani	
HV	automatic adjustment by hot cathode system at p = 1 … 3×10^{-3} hPa
ATM (<ATM> button)	adjustment via <ATM> button (keep button depressed for at least 5 seconds) at atmospheric pressure
Zero point adjustment (<ATM> button)	adjustment via <ATM> button (keep button depressed for at least 2 seconds) at ≤1×10^{-4} hPa
Hot cathode	factory calibrated, readjustment not required

Supply

DANGER

The gauge may only be connected to supply and evaluation units which conform to the requirements of a grounded protective extra-low voltage (PELV). The connection to the gauge has to be fused. [1)]

Voltage at gauge	20 … 30 V= [2)] max. ripple 2 V_{pp}
Power consumption	
standard	≤ 0.5 A
degas	≤ 0.8 A
emission start (< 200 ms)	≤ 1.4 A
Power consumption	≤ 16 W
Fuse necessary [1)]	≤ 1.25 AT
Voltage at the supply unit with maximum cable length	21 … 30 V max. ripple 2 V_{pp}

Sensor cable

Electrical connection	Hirschmann compact connector type GO 6, 6 poles, male
Tightening torque	≤ 0.2 Nm
Cable	5 poles plus shielding
Cable length max.	35 m (0.25 mm² conductor) 50 m (0.34 mm² conductor) 100 m (1.0 mm² conductor)

Grounding concept

Vacuum flange-supply common	conductively connected
Signal common-supply common	conducted separately; only differential measurement admissible due to high current consumption

Vacuum

Materials on the vacuum side	
housing, supports, screens	stainless steel
feedthrough	NiFe nickel plated
isolator	glass
cathode	iridium, yttrium oxide
cathode holder	molybdenum
Pirani element	tungsten, copper
Internal volume	
DN 25 ISO-KF	≤ 24 cm^3
DN 40 ISO-KF	≤ 24 cm^3
DN 40 CF-R	≤ 34 cm^3
Pressure max.	200 kPa (absolute)

1) The MaxiGauge™ fulfills these requirements.

2) The minimum voltage of the power supply must be increased proportionally to the length of the sensor cable.

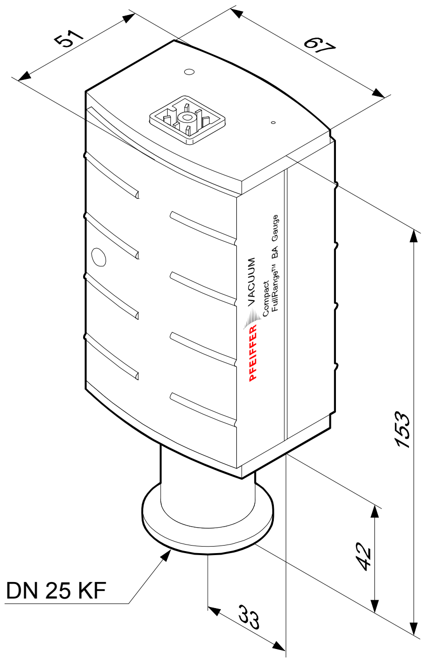
Ambiance

Admissible temperatures	
storage	-20 °C … 70 °C
operation	0 °C … 50 °C
bakeout	+150 °C (without electronics unit or with extension → 🗎 26)
Relative humidity	
year's mean	≤ 65 % (no condensation)
during 60 days	≤ 85 % (no condensation)
Use	indoors only altitude up to 2000 m NN
Degree of protection	IP 30

Dimensions

Flange DN 25 ISO-KF

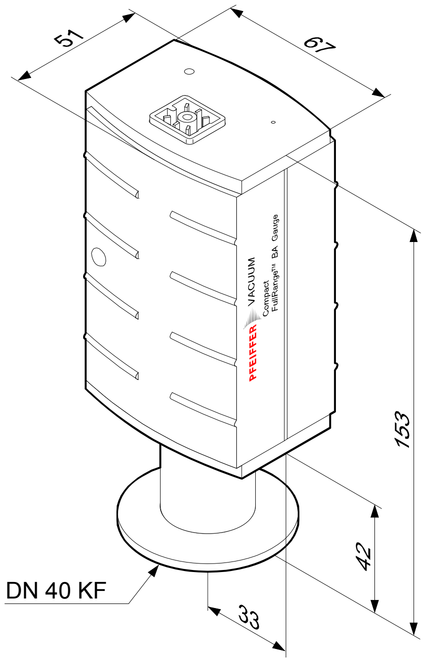
Dimensions [mm]



Weight 285 g

Flange DN 40 ISO-KF

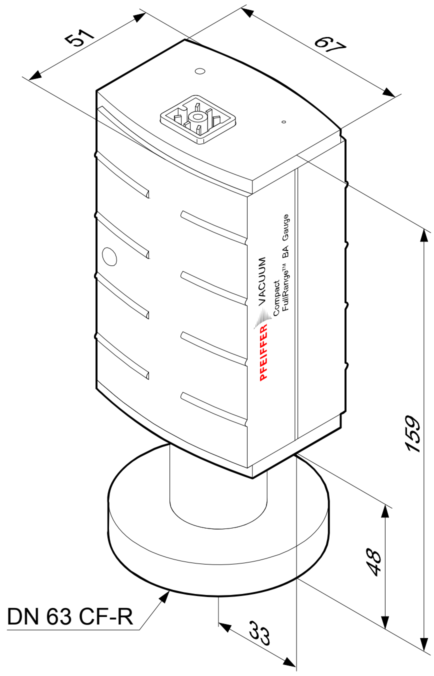
Dimensions [mm]



Weight 315 g

Flange DN 40 CF-R

Dimensions [mm]



Weight	550 g

3 Installation

3.1 Vacuum Connection

DANGER

DANGER: overpressure in the vacuum system > 100 kPa

If clamps are opened incorrectly or inadvertently, injury can be caused by catapulted parts and your health can get damaged by leaking process media.

Do not open any clamps while the vacuum system is pressurized. Use the type of clamps which cannot be opened inadvertently (e.g. hose clip clamping rings).

DANGER

DANGER: hazardous voltages

Incorrectly grounded products can be extremely hazardous in the event of a fault.

The gauge must be electrically connected to the grounded vacuum chamber. This connection must conform to the requirements of a protective connection according to EN 61010:

- CF flanges fulfill this requirement.
- For gauges with a KF flange, use a conductive metallic clamping ring.

Caution

Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

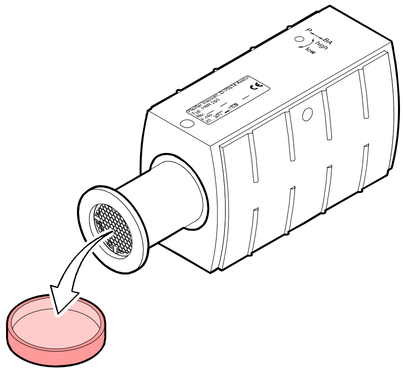
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

- The gauge should be mounted so that no vibrations occur.
- The gauge may be mounted in any direction. However, no particles and condensates should penetrate into the measuring chamber.
- Take appropriate measures to prevent overheating (→ Technical data for admissible operating temperature).
- The sensor can be baked out at up to 150 °C. For temperatures above 50 °C the electronics unit must be removed (→ 🗎 10) or an extension (Option → 🗎 26) must be mounted (→ 🗎 12).
- See dimensional drawings (🗎 7) for space requirements.
- If the flange connection can only be made without the electronics unit, remove the electronics unit (→ 🗎 10).
- We recommend using a metal sealing (ultra sealing ring → 🗎 26) as vacuum flange sealing because elastomer seals (Vitilan, FPM) can impair the measurement accuracy already in the 10^{-6} hPa range through gas desorption.
- The gauge is supplied with a built in grid. For potentially severely contaminating applications and to protect the electrodes against light and fast particles installation of the optional baffle (→ 🗎 26) is recommended (→ 🗎 22).

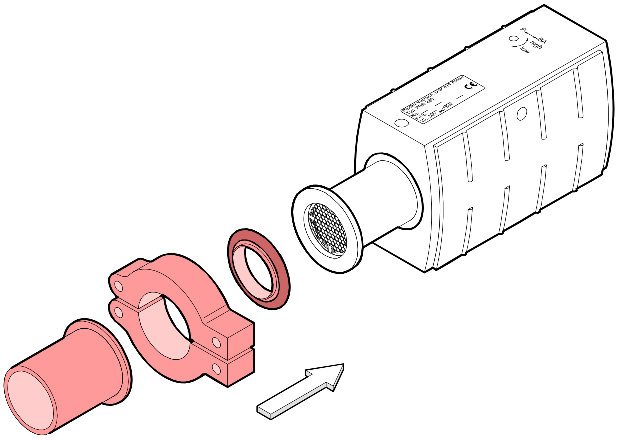
Procedure

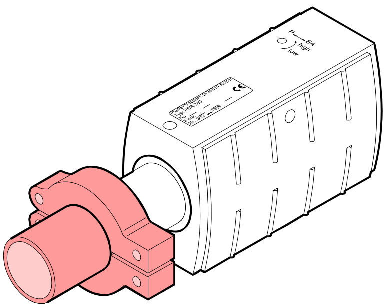
❶ Remove the protective cap.

The protective cap will be needed for maintenance.



❷ Make the flange connection.





Install the gauge in such a way that it need not be removed for adjustment (→ 🗎 17, 19).

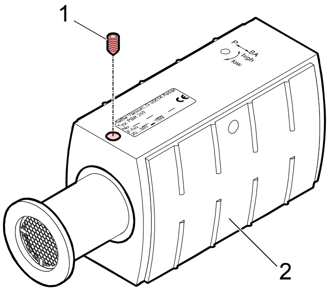
3.1.1 Removing and Installing the Electronics Unit

Tools / material required

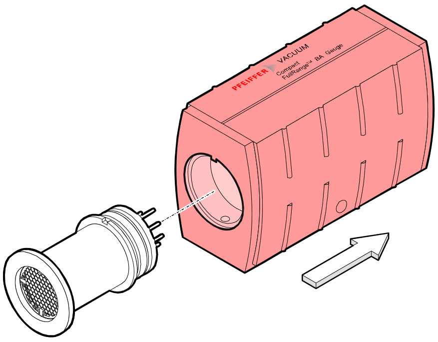
- Allen wrench 2.5 mm

Removal

a) Unscrew the hexagon socket screw (1) on the side of the electronics unit (2). Be careful not to lose the hexagon socket screw.

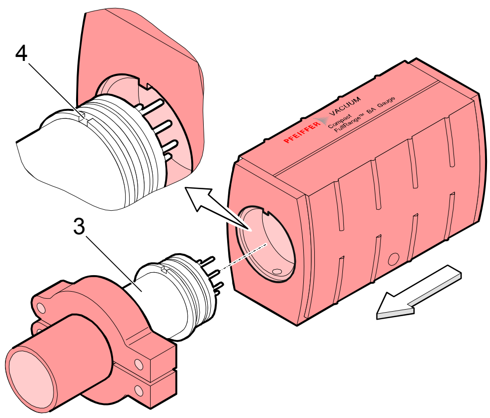


b) Remove the electronics unit **without twisting it.**



Mounting

a) Place the electronics unit on the sensor (3) (be careful to correctly position the pins and the guide notch (4)).



b) Slide the electronics unit up to the mechanical stop and lock it with the hexagon socket screw (1).

3.1.2 Mounting the Extension

With the optional extension (→ 🗎 26) the sensor can also be baked during operation at temperatures up to 150 °C (only at p<10^{-2} hPa, since the Pirani sensor furnishes inexact readings at higher temperatures).

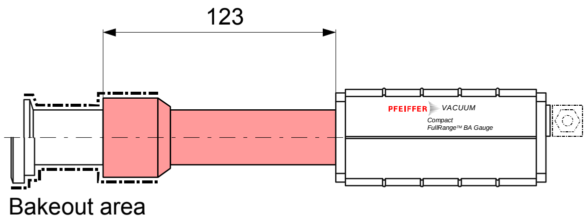
Caution

Caution: rising heat

If your gauge is installed vertically, heat can rise even through the extension and possibly damage the electronics unit.

Mount the gauge horizontally.

Bakeout area

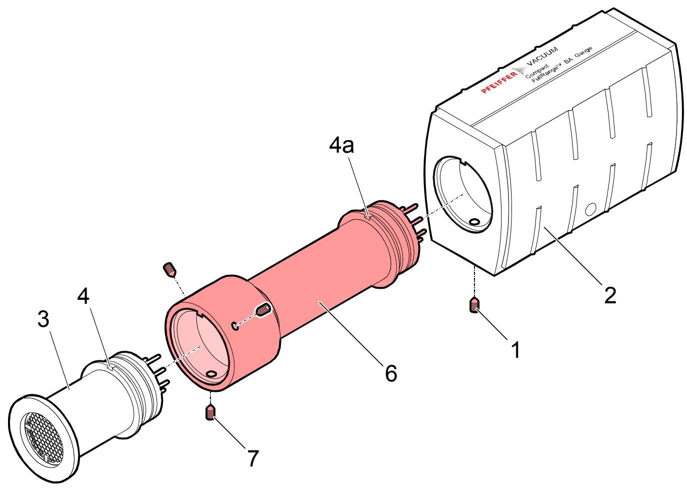


Procedure

a) Remove the electronics unit (2) (→ 🗎 10).

b) Slide the sensor (3) into the extension (6) to the mechanical stop (be careful to correctly position the pins and the guide notch (4)).

c) Secure the sensor with the hexagon socket screws (7).



d) Slide the electronics unit (2) onto the extension until the mechanical stop is reached (be careful to correctly position the pins and the guide notch (4a)).

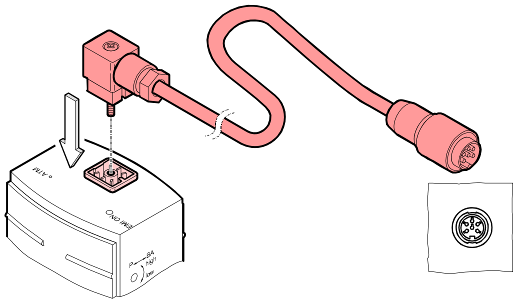
e) Secure the electronics unit (2) with the hexagon socket screw (1).

3.2 Power Connection

3.2.1 Use With MaxiGauge™

If the gauge is used with a MaxiGauge™ measurement and control unit, a corresponding sensor cable is required (→ 🗎 26).

- Plug the connector into the gauge and secure it with the screw (tightening torque ≤ 0.2 Nm).
- Connect the other end of the cable to the MaxiGauge™ and secure it.



3.2.2 Use With Other Evaluation Units

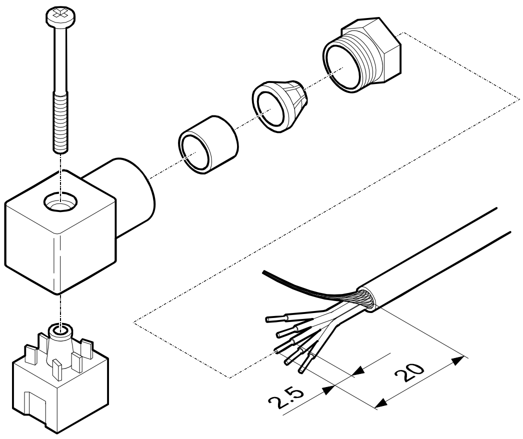
The gauge can also be used with other evaluation units. In such a case, an individual sensor cable can be made (preconfigured cables → 🗎 26).

Due to the high current consumption, only differential measurement between the signal output (pin 2) and signal common (pin 3) is admissible.

Procedure

❶ Prepare the connector (ordering number → 🗎 26).

❷ Prepare the cable.



❸ Solder the sensor cable according to the diagram.

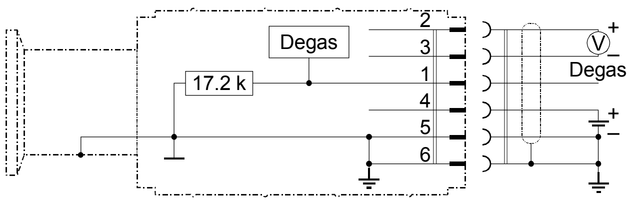
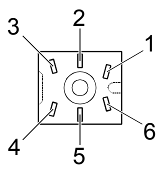


Figure 1: Electrical connection

Pin 1 a) degas
b) identification
(U ≤ 4.25 V)
Pin 2 signal output
(measuring signal)
Pin 3 signal common GND
Pin 4 supply
Pin 5 supply common GND
Pin 6 shielding



Connector, soldering side

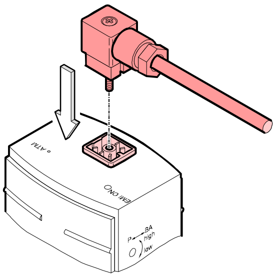
> **WARNING**
>
> The supply common (pin 5) and the shield (pin 6) must be connected at the supply unit with protective ground.
>
> Incorrect connection, incorrect polarity or inadmissible supply voltages can damage the gauge.

❹ Reassemble the connector.

❺ At the other end of the cable, mount a connector which is compatible with your evaluation unit.

❻ Plug in the connector.

Secure the connector on the gauge with the screw (tightening torque ≤ 0.2 Nm).



❼ Connect the other end of the cable to your evaluation unit.

4 Operation

When the voltage is supplied, the measuring signal is available between pins 2 and 3. Over the whole measurement range, the measuring signal is output as a logarithm of the pressure (relationship between measuring signal and pressure → Appendix B).

Allow for a stabilizing time of approx. 10 min. Once the gauge has been switched on, permanently leave it on irrespective of the pressure.

4.1 Measuring Principle, Measuring Behavior

The PBR 260 consists of two separate measuring systems (hot cathode Bayard Alpert (BA) and Pirani).

Bayard Alpert

The BA measuring system uses an electrode system according to Bayard Alpert which is designed for a low x-ray limit.

The measuring principle of this system is based on gas ionization. Electrons emitted by the hot cathode (F) ionize a number of molecules proportional to the pressure in the measuring chamber. The ion collector (IC) collects the thus generated ion current I_+ and feeds it to the electrometer amplifier of the measurement instrument. The ion current is dependent upon the emission current I_e, the gas type, and the gas pressure p according to the following relationship:

$$I_+ = I_e \times p \times C$$

Factor C represents the sensitivity of the gauge. It is generally specified for N_2.

The lower measurement limit is 5×10^{-10} hPa (metal sealed).

For the whole range of $5x10^{-10}$ hPa ... 10^{-2} hPa to be sensibly covered, a low emission current is used in the high pressure range (fine vacuum) and a high emission current is used in the low pressure range (high vacuum). The switching of the emission current takes place at decreasing pressure at approx. 7.2×10^{-6} hPa, at increasing pressure at approx. 3.2×10^{-5} hPa. At the switching threshold the PBR 260 can temporarily (< 2 s) deviate from the specified accuracy.

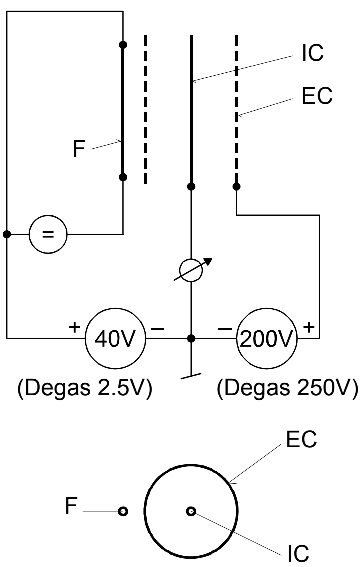


Fig. 1

Diagram of the BA measuring system
- F hot cathode (filament)
- IC ion collector
- EC electron collector (grid)

Pirani

Within certain limits the thermal conductibility of gases is pressure dependent. This physical phenomenon is used for pressure measurement in the thermal conductance vacuum meter according to Pirani. A self adjusting bridge is used as measurement circuit (see Fig. 2). A thin tungsten wire is used as sensor element. Wire resistance and thus temperature are kept constant through a suitable control circuit. The electric power supplied to the wire is a measure for the thermal conductance and thus the gas pressure. The basic principle of the self adjusting bridge circuit is shown in Fig. 2.

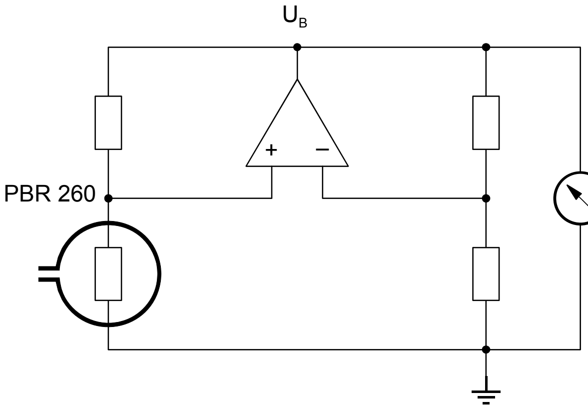


Fig. 2

The bridge voltage U_B is a measure for the gas pressure and is further processed electronically (linearization, digitizing).

Measurement range

The PBR 260 covers the measurement range 5×10^{-10} hPa … 1000 hPa.

- The Pirani constantly monitors the pressure.
- The hot cathode system (controlled by the Pirani) is only switched on when the pressure drops below the set threshold (p_{on}). The hot cathode will be ready for operation after a few seconds' heating time, when the <EMI ON> lamp is lit.
- When the pressure rises above the setpoint (p_{off}) the hot cathode is switched off and the <EMI ON> lamp turns off.

In the upper pressure range, the Pirani reading and in the lower pressure range, the hot cathode reading is output. In the overlapping range (p_{lower} … p_{upper}), a combined signal of the two measuring systems is supplied (→ Fig. 3).

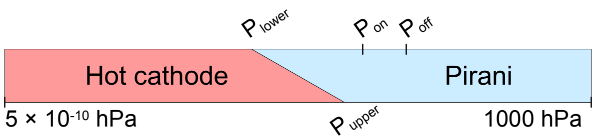


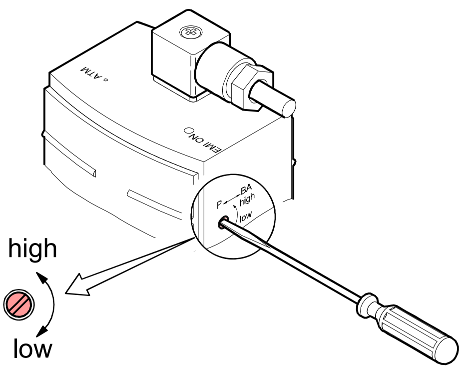
Fig. 3

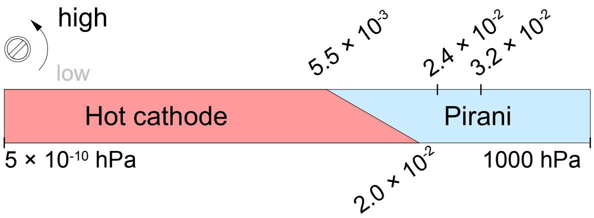
Defining the switching on/off range

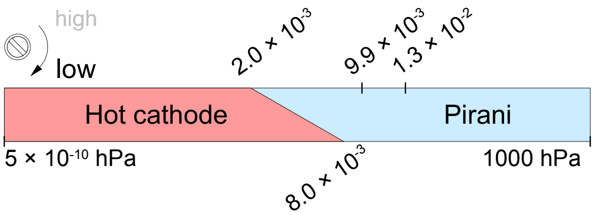
The PBR 260 has two definable switching on/off ranges with their corresponding overlapping ranges. The switching on/off range is selected with the <P ↔ BA> switch and should be chosen in such a way that it is situated outside the process pressure range. The positions "high" (default) and "low" are available. Preferably, "low" should be selected as contamination of the hot cathode system is reduced at a lower pressure.

Caution

Since the switch position is polled only upon activation of the gauge, the switching on/off range must be selected before the gauge is turned on.







Switching on/off thresholds of the hot cathode system

Switch position	p_{on} [hPa]	p_{off} [hPa]
high	2.4×10^{-2}	3.2×10^{-2}
low	9.9×10^{-3}	1.33×10^{-2}

Overlapping ranges

Switch position	p_{lower} [hPa]	p_{upper} [hPa]
high	5.5×10^{-3}	2.0×10^{-2}
low	2.0×10^{-3}	8.0×10^{-3}

Accuracy

The gauge is factory-calibrated. Adjustment may become necessary due to use under different climatic conditions, extreme temperatures, contamination or aging (→ 🗎 19).

The measurement accuracy is reduced in the pressure range above 1×10^{-2} hPa and below 1×10^{-8} hPa.

Gas type dependence

The measuring signal is gas type dependent. The relationship between the measuring signal and the pressure is accurate for N_2, O_2, dry air and CO (→ Appendix B). They can be mathematically converted for other gases (→ Appendix C).

If the gauge is being operated with MaxiGauge™ measurement and control unit, a calibration factor can be applied for correction of the reading (→ 🕮 MaxiGauge™ TPG 256 A).

4.2 Operational Principle of the Gauge

The measurement currents output by the Bayard Alpert and Pirani sensors are converted into a pressure dependent frequency. A micro-controller converts that frequency signal into a digital value of the measured total pressure. This value is then supplied as analog signal from 0 to 10.20 V (pin 2 / pin 3), the valid measurement range being situated between 0.774 V and 10.00 V (atmospheric pressure). The output signal is limited to 10.20 V by the software.

In addition to converting the measuring signal, the micro controller's functions include the monitoring of the emission and the calculation of the total pressure based on the measurements from the two sensors.

4.3 Degas

Contamination

☞ Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. filament), are not covered by the warranty.

Caution

Gauge failures due to contamination, as well as expendable parts (filament), are not covered by the warranty.

Deposits on the electrode system of the hot cathode ionization gauge can lead to unstable measurement readings.

Thus it is advisable to start the degas process of the anode at a pressure below 7.2×10^{-6} hPa (5 mA emission current). Depending on the application, this function can be activated via a MaxiGauge™ measurement and control unit, manually or automatically by the control system (e.g. PLC). The PBR 260 automatically turns the bakeout off after 3 minutes, if the bakeout has not been stopped before.

The degas process is activated when the control signal (pin 1) switches from OFF (0 V) to ON (24 V). It is deactivated when the control signal switches from ON (24 V) to OFF (0 V), or after a maximum of 3 minutes.

For a repeated degas process, the control signal first has to switch from ON (24 V) to OFF (0 V), to then start degas again with ON (24 V). It is recommended that the degas signal be set to OFF again through the systems control after 3 minutes of bakeout, to achieve an unambiguous operating status.

The degas process is used for heating the electron collector grid to approx. 700 °C through electron bombardment and thus cleaning the measuring element.

5 Maintenance

5.1 Maintenance

DANGER

DANGER: contaminated parts

Contaminated parts can be detrimental to your health.

Before you begin to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

5.2 Adjusting the Gauge

The gauge is factory calibrated. If used under different climatic conditions or in a different position, through aging or contamination (→ 🗎 18), and after exchanging the sensor (→ 🗎 23), the characteristic curve can be offset and readjustment may be necessary. Only the Pirani system can be readjusted.

Adjustment under high vacuum conditions

The Pirani system is automatically adjusted by the hot cathode system when the gauge is activated (i.e. as soon as the pressure range 1 … 3×10^{-3} hPa is reached).

Adjustment at atmospheric pressure

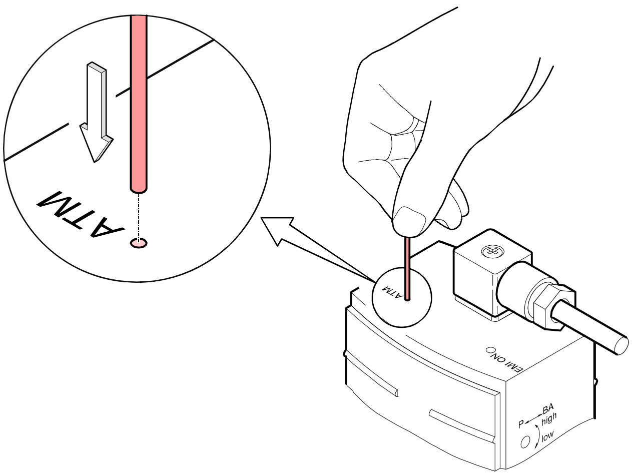
Required tools

- Pin approx. ø1.3 × 50 mm (e.g. a bent open paper clip)

Procedure

❶ Operate the gauge for approx. 10 minutes at atmospheric pressure. If the gauge was operated before in the hot cathode range, a cooling-down time of approx. 30 minutes is to be expected (gauge temperature = ambient temperature)..

❷ Insert a pin through the opening marked <ATM> and push the button inside for at least 5 s.



Zero Point Adjustment

A zero point adjustment is recommended

- after the sensor has been exchanged
- as part of the usual maintenance work for quality assurance

Required tools

- Pin approx. ø1.3 × 50 mm (e.g. a bent open paper clip)

Procedure

The push button used for the adjustment at atmospheric pressure is also used for the zero point adjustment (→ above).

❶ Operate gauge for approx. 10 minutes at a pressure of $\leq 1\times10^{-4}$ hPa.

❷ Insert the pin through the opening marked <ATM> and push the button inside for at least 2 s.

The adjustment is done automatically and ends after 2 minutes.

5.3 Cleaning the Gauge

Small deposits on the electrode system can be removed by baking the anode (Degas → 🗎 18). In the case of severe contamination the baffle can be exchanged (→ 🗎 22). The sensor cannot be cleaned and must be replaced if it is severely contaminated (→ 🗎 23).

For cleaning the outside, a moist cloth is usually sufficient. Do not use any aggressive or abrasive cleaning agents.

> ⚠ **Caution**
>
> Make sure that no liquids get inside the product. Allow the gauge to dry thoroughly before putting it into operation again.

5.4 Installing the Baffle

In severely contaminating processes and to optically protect the measurement electrodes against light and fast particles, replacement of the built-in grid by the optional baffle is recommended (→ 🗎 26).

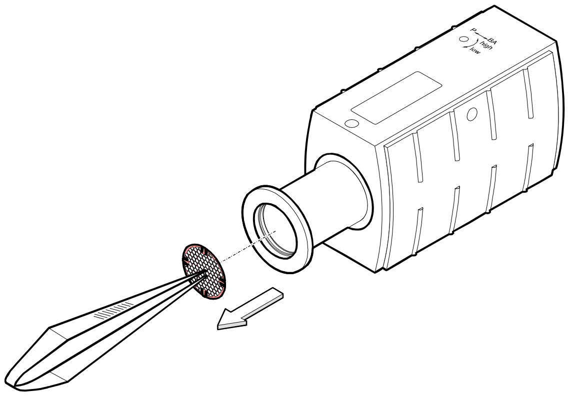
> ⚠ **Caution**
>
> Caution: dirt sensitive area
>
> Dirt prolongs the pumpdown process.
>
> Always wear clean, lint-free gloves and use clean tools when working in this area.

Tools / material required

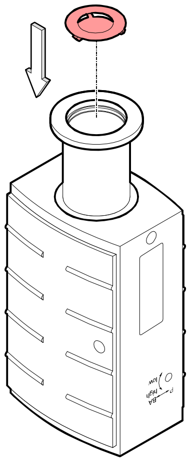
- Baffle (→ 🗎 26)
- Tweezers
- Stick (e.g. pencil)

Procedure

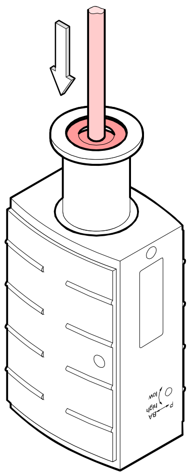
a) Carefully remove the grid with pointed tweezers.



b) Carefully place the baffle onto the sensor opening.



c) With a stick carefully press the baffle down in the middle until it catches in the sensor opening.



5.5 Replacing the Baffle

In case of severe contamination the baffle can be replaced.

Caution

Caution: dirt sensitive area

Dirt prolongs the pumpdown process.

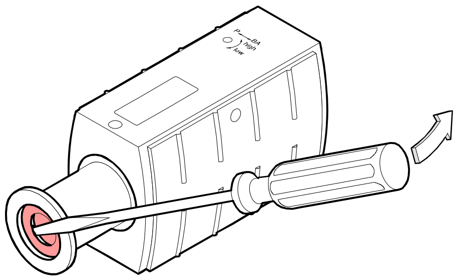
Always wear clean, lint-free gloves and use clean tools when working in this area.

Tools / material required

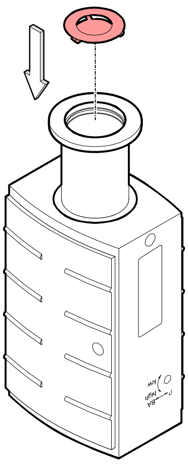
- New baffle (→ 🗎 26)
- Screw driver No. 1
- Stick (e.g. pencil)

Procedure

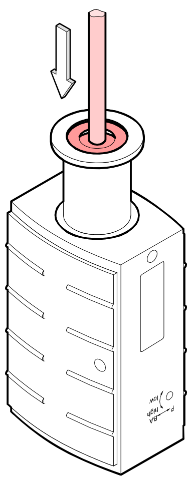
a) Carefully remove the baffle with the screw driver.



b) Carefully place new baffle onto the sensor opening.



c) With a stick carefully press the baffle down in the middle until it catches in the sensor opening.



5.6 Replacing the Sensor

Replacement is necessary, when

- the sensor is severely contaminated
- the sensor is faulty, e.g. filament broken.

Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. filament), are not covered by the warranty.

Tools / material required

- Allen wrench AF 2.5
- Spare sensor (→ 🗎 26)

Procedure

a) Deinstall the gauge (→ 🗎 24).
b) Remove the electronics unit from the faulty sensor and mount it on the new sensor (→ 🗎 10).
c) Mount the gauge (→ 🗎 9).
d) Adjust the gauge (→ 🗎 19).

5.7 What to Do in Case of Problems

Problem	Possible cause	Correction
No measuring signal	No supply voltage	Turn on the power supply
	Connection cable defective or not correctly plugged in	Check connection cable
	Gauge in an undefined condition	Turn gauge off and on again (reset)
Measuring signal 0.3 V	Hot cathode error (sensor faulty)	Replace sensor (→ 🗎 23)
Measuring signal 0.5 V	Pirani error (sensor faulty)	Replace sensor (→ 🗎 23)
	Electronics unit not correctly mounted on sensor	Check connection
Gauge does not switch over to BA at low pressures	Pirani zero point out of tolerance	Carry out a zero point adjustment (→ 🗎 19)

In case of an error, it may be helpful to first turn the voltage supply off and on again after 5 s.

6 Deinstallation

DANGER

DANGER: contaminated parts

Contaminated parts can be detrimental to health.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Caution

Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

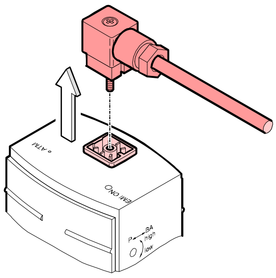
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Procedure

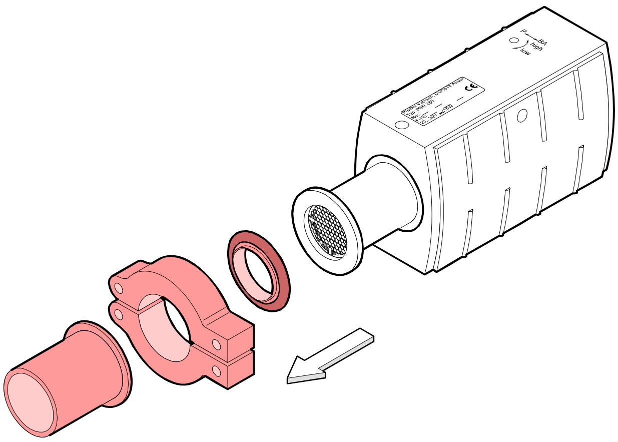
1. Vent the vacuum system.

2. Put the gauge out of operation.

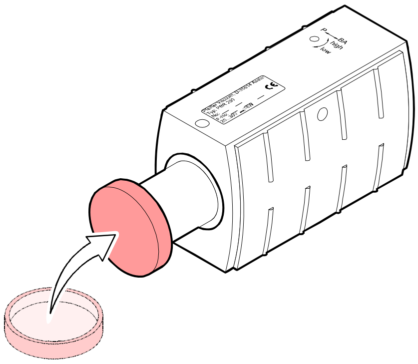
3. Unplug the connection cable.



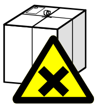
4. Remove the gauge from the vacuum system.



❺ Place the protective cap.



7 Returning the Product



WARNING

WARNING: forwarding contaminated products

Products returned to Pfeiffer Vacuum for service or repair should preferably be free of harmful substances (e.g. radioactive, toxic, caustic or microbiological).

Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a completed declaration of contamination *).

*) Form under www.pfeiffer-vacuum.com

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer.

When returning a product to Pfeiffer Vacuum, put it in a tight and impact resistant package.

8 Options

	Ordering number
Sensor cable for connection to MaxiGauge™ measurement and control unit	
3 m	PT 448 250-T
6 m	PT 448 251-T
10 m	PT 448 252-T
Hirschmann connection socket GO 6 WF, 6 poles, angled, female	B 4707 283 MA
Extension, 100 mm	PT 590 300-T
Baffle	PT 120 125-T

9 Spare Parts

When ordering spare parts, always indicate:

- all information according to the product nameplate
- description and ordering number according to the spare parts list

	Ordering number
Sensor PBR 260, flange DN 25 ISO-KF (Allen wrench included)	PT 120 121-T
Sensor PBR 260, flange DN 40 ISO-KF (Allen wrench included)	PT 120 122-T
Sensor PBR 260, flange DN 40 CF-R (Allen wrench included)	PT 120 123-T
Electronics unit PBR 260 (Allen wrench included)	PT 120 120-T

10 Disposal

DANGER

DANGER: contaminated parts

Contaminated parts can be detrimental to health.

Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

WARNING

WARNING: substances detrimental to the environment

Electronic components must be disposed of in accordance with special regulations.

Dispose of such products in accordance with the relevant local regulations.

Separating the components

After disassembling the product, separate its components according to the following criteria:

Contaminated components

Contaminated components (radioactive, toxic, caustic, or biological hazard etc.) must be decontaminated in accordance with the relevant national regulations, separated according to their materials, and recycled.

Other components

Such components must be separated according to their materials and recycled.

Appendix

A: Conversion Table for Pressure Units

	mbar	bar	Pa	hPa	kPa	Torr mm HG
mbar	1	1×10^{-3}	100	1	0.1	0.75
bar	1×10^{3}	1	1×10^{5}	1×10^{3}	100	750
Pa	0.01	1×10^{-5}	1	0.01	1×10^{-3}	7.5×10^{-3}
hPa	1	1×10^{-3}	100	1	0.1	0.75
kPa	10	0.01	1×10^{3}	10	1	7.5
Torr mm HG	1.332	1.332×10^{-3}	133.32	1.3332	0.1332	1

1 Pa = 1 N/m^2

B: Relationship Measuring Signal – Pessure

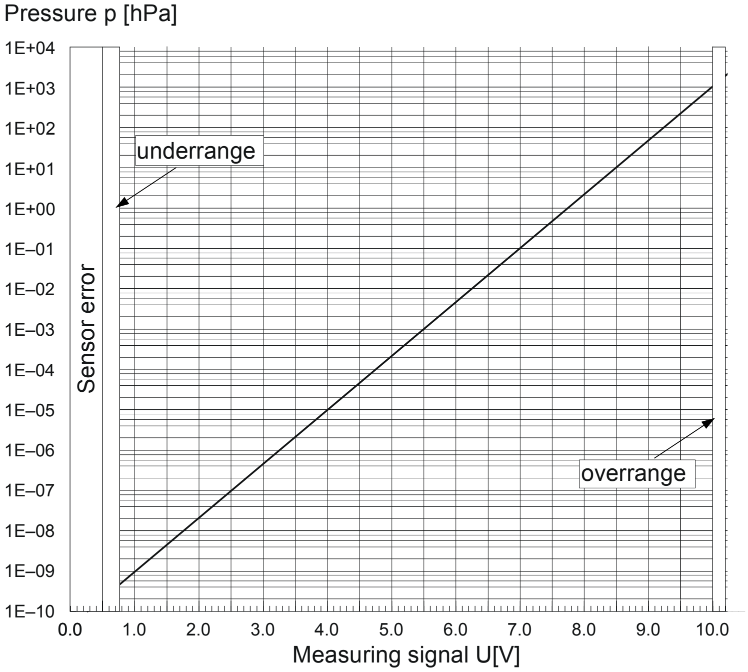
Conversion formula

$$p = 10^{(U-7.75)/0.75+c}$$

$$U = 0.75\times(\log p-c)+7.75$$

U	p	c
[V]	[hPa]	0
[V]	[Pa]	2
[V]	[Torr]	-0.125

Conversion curves



Conversion table

Measuring signal U [V]	Pressure p [hPa]	[Torr]	[Pa]
<0.5		Sensor error	
>0.50 … <0.774		underrange	
0.774	5×10^{-10}	3.75×10^{-10}	5×10^{-8}
1.00	1×10^{-9}	7.5×10^{-10}	1×10^{-7}
1.75	1×10^{-8}	7.5×10^{-9}	1×10^{-6}
2.5	1×10^{-7}	7.5×10^{-8}	1×10^{-5}
3.25	1×10^{-6}	7.5×10^{-7}	1×10^{-4}
4.00	1×10^{-5}	7.5×10^{-6}	1×10^{-3}
4.75	1×10^{-4}	7.5×10^{-5}	1×10^{-2}
5.50	1×10^{-3}	7.5×10^{-4}	1×10^{-1}
6.25	1×10^{-2}	7.5×10^{-3}	1×10^{0}
7.00	1×10^{-1}	7.5×10^{-2}	1×10^{1}
7.75	1×10^{0}	7.5×10^{-1}	1×10^{2}
8.50	1×10^{1}	7.5×10^{0}	1×10^{3}
9.25	1×10^{2}	7.5×10^{1}	1×10^{4}
10.00	1×10^{3}	7.5×10^{2}	1×10^{5}
>10.00 … 10.20 V		overrange	

C: Gas Type Dependence

Below 10^{-3} hPa
(Hot cathode range)

For gases other than air the pressure can be determined by means of a simple conversion formula:

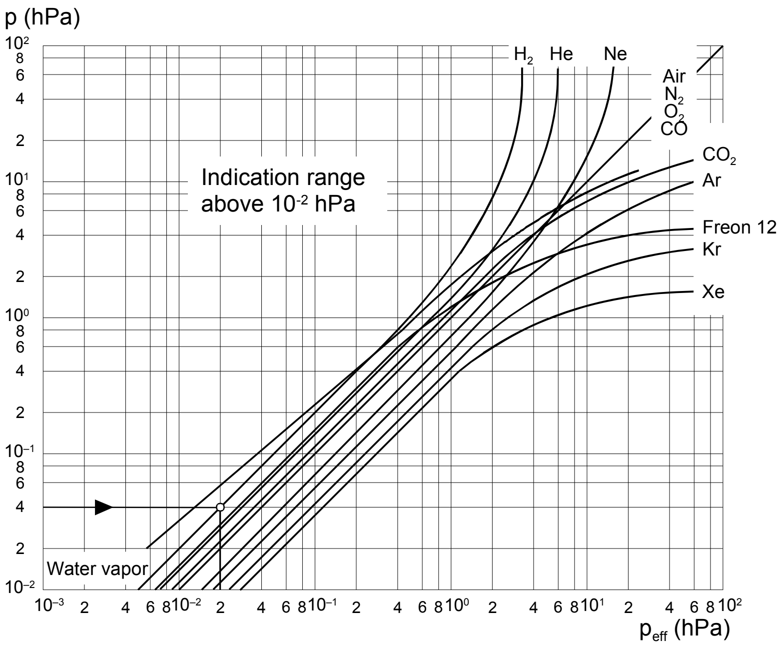
$$\boxed{p_{eff} = K \times \text{indicated pressure}}$$

where

Gas type	K
Air (N_2, O_2)	1.0
Xe	0.4
Kr	0.5
Ar	0.8
H_2	2.4
Ne	4.1
He	5.9

These conversion factors are mean values.

Above 10^{-2} hPa
(Pirani range)



Caution

A mixture of gases and vapors is often involved. In this case, accurate determination is only possible with a partial-pressure measuring instrument.

Notes

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