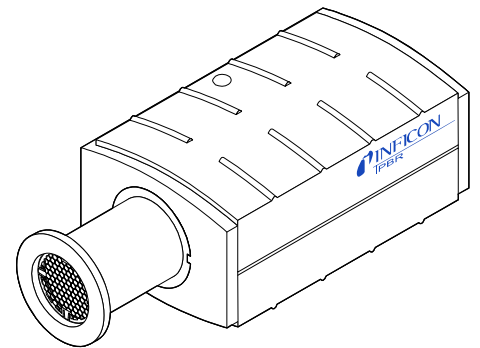


# Compact FullRange™ BA Gauge

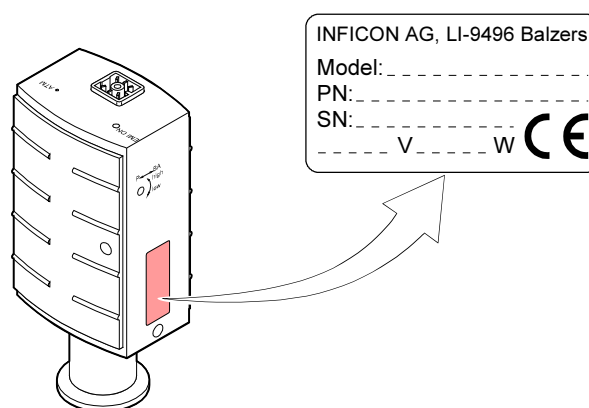
PBR260



CE

## Product identification

In all communications with Inficon, please specify the information given on the product nameplate. Copy that information into the nameplate replica below.



## Validity

This document applies to products with part number

IG G27 000 (Flange DN 25 ISO-KF)

IG G27 001 (Flange DN 40 ISO-KF)

IG G27 002 (Flange DN 40 CF-R)

The part number (PN) can be taken from the product nameplate.

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

## Intended use

The PBR260 Compact FullRange™ BA Gauge has been designed for vacuum measurement of non-flammable gases and gas mixtures in the pressure range of  $5 \times 10^{-10}$  ... 1000 mbar.

The PBR260 is part of the Inficon Compact Gauge family and can be operated in connection with the SingleGauge, DualGauge or MaxiGauge™ measurement and control unit or with another evaluation unit.

## Functional principle

Over the whole measurement range, the Compact FullRange™ BA Gauge has a continuous characteristic curve and its measurement 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

SingleGauge™	Inficon
DualGauge™	Inficon
MaxiGauge™	Inficon
FullRange™	Inficon


# Contents

Product identification	2
Validity	2
Intended use	2
Functional principle	2
Trademarks	2
<b>1 Safety</b>	<b>4</b>
1.1 Symbols used	4
1.2 Personnel qualifications	4
1.3 General safety instructions	4
1.4 Liability and warranty	5
<b>2 Technical data</b>	<b>6</b>
<b>3 Installation</b>	<b>10</b>
3.1 Vacuum connection	10
3.1.1 Removing and installing the electronics unit	12
3.1.2 Mounting the extension	13
3.2 Power connection	14
3.2.1 Use with Single-, Dual- or MaxiGauge™	14
3.2.2 Use with other evaluation units	14
<b>4 Operation</b>	<b>16</b>
4.1 Measuring principle, measuring behavior	16
4.2 Operational principle of the gauge	19
4.3 Degas	19
<b>5 Maintenance</b>	<b>20</b>
5.1 Maintenance	20
5.2 Adjusting the gauge	20
5.3 Cleaning the gauge	21
5.4 Installing the baffle	21
5.5 Replacing the baffle	23
5.6 Replacing the sensor	24
5.7 What to do in case of problems	24
<b>6 Deinstallation</b>	<b>25</b>
<b>7 Returning the product</b>	<b>27</b>
<b>8 Options</b>	<b>27</b>
<b>9 Spare parts</b>	<b>27</b>
<b>10 Disposal</b>	<b>28</b>
<b>Appendix</b>	<b>29</b>
A: Relationship measuring signal – pressure	29
B: Gas type dependence	30
<b>Declaration of contamination</b>	<b>31</b>


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.

 **Note**

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

 Tip, recommendation

## 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 (→ 7) and the process media.  
Consider possible reactions 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

Inficon 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.

## 2 Technical data

Measurement	Measurement range (air, N <sub>2</sub> )	5×10 <sup>-10</sup> ... 1000 mbar
	Overlapping range hot cathode – Pirani	
	high	5.5×10 <sup>-3</sup> ... 2.0×10 <sup>-2</sup> mbar
	low	2.0×10 <sup>-3</sup> ... 8.0×10 <sup>-3</sup> mbar
	Accuracy (10 <sup>-8</sup> ... 10 <sup>-2</sup> mbar)	≈15% reading (after 5 min. stabilization)
	Repeatability (10 <sup>-8</sup> ... 10 <sup>-2</sup> mbar)	≈5% reading (after 5 min. stabilization)
	Gas type dependence	→ Appendix B
Emission	Switching on threshold (high)	2.4×10 <sup>-2</sup> mbar
	Switching off threshold (high)	3.2×10 <sup>-2</sup> mbar
	Switching on threshold (low)	9.9×10 <sup>-3</sup> mbar
	Switching off threshold (low)	1.3×10 <sup>-2</sup> mbar
	Emission current (with decreasing pressure)	
	7.2×10 <sup>-6</sup> mbar < p < 2.4×10 <sup>-2</sup> mbar	25 μA
	p ≤ 7.2×10 <sup>-6</sup> mbar	5 mA
	Emission current switching	
	25 μA ⇒ 5 mA (with decreasing pressure)	7.2×10 <sup>-6</sup> mbar
	5 mA ⇒ 25 μA (with increasing pressure)	3.2×10 <sup>-5</sup> mbar
Degas (only if p < 7.2×10 <sup>-6</sup> mbar)	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 PBR260 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 <sup>-10</sup> mbar ... 1000 mbar
	Relationship voltage-pressure	logarithmic, 0.75 V / decade
	Error signals	→ 24
	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 <sub>max</sub> = 4.25 V)	17.2 kΩ referenced to supply common

## Adjustment

Pirani HV	automatic adjustment by hot cathode system at $p = 1 \dots 3 \times 10^{-3}$ mbar
ATM (<ATM> button)	adjustment via <ATM> button (keep button depressed for at least 5 seconds) at atmospheric pressure
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 (SELV-E according to EN 61010). The connection to the gauge has to be fused. <sup>1)</sup>

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

## Sensor cable

Electrical connection	Hirschmann compact connector type GO 6, 6 poles, male
Cable	5 poles plus shielding
Cable length max.	35 m (0.25 mm <sup>2</sup> conductor) 50 m (0.34 mm <sup>2</sup> conductor) 100 m (1.0 mm <sup>2</sup> 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 <sup>3</sup>
DN 40 ISO-KF	≤24 cm <sup>3</sup>
DN 40 CF-R	≤34 cm <sup>3</sup>
Pressure max.	2 bar (absolute)

<sup>1)</sup> Inficon controllers fulfills these requirements.

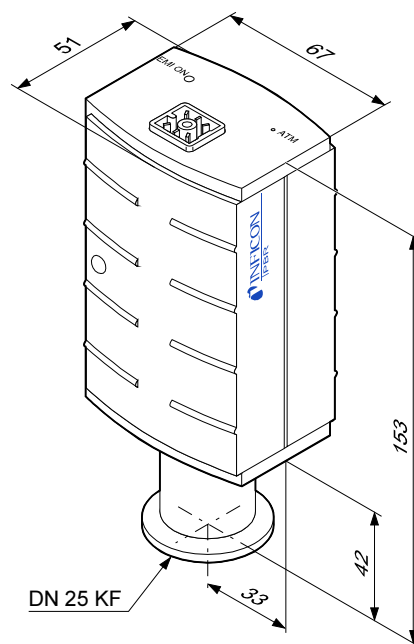
<sup>2)</sup> The minimum voltage of the power supply must be increased proportionally to the length of the sensor cable.

### Ambiance

Admissible temperatures	
storage	-20 °C ... 70 °C
operation	0 °C ... 50 °C
bakeout	+150 °C (without electronics unit or with extension → 27)
Relative humidity	
year's mean	≤65% (no condensation)
during 60 days	≤85% (no condensation)
Use	indoors only altitude up to 2000 m NN
Type of protection	IP 30

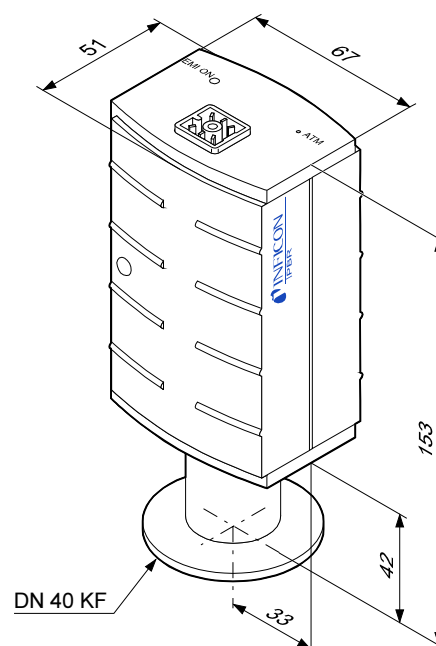
### Dimensions

Flange DN 25 ISO-KF  
Dimensions [mm]



Weight 285 g

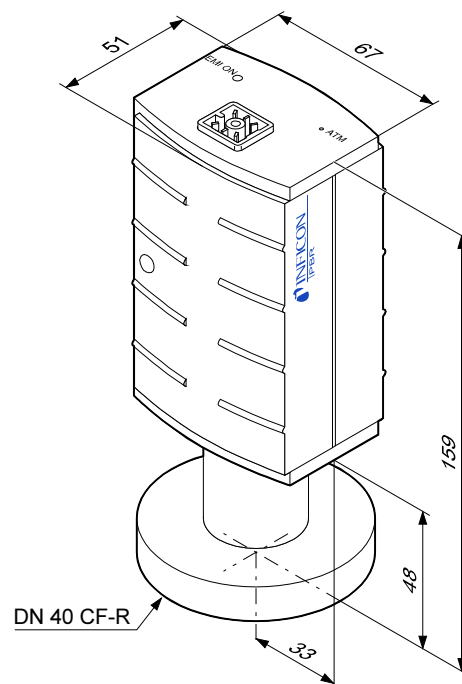
Flange DN 40 ISO-KF  
Dimensions [mm]



Weight 315 g



Flange DN 40 CF-R  
 Dimensions [mm]



Weight

550 g

## 3 Installation

### 3.1 Vacuum connection

#### DANGER



Caution: overpressure in the vacuum system >1 bar

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



Caution: 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.

#### Note



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.

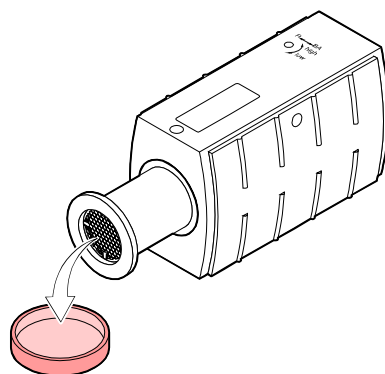
- The gauge should be mounted so that no vibrations occur.
- The gauge may be mounted in any direction. However, no particles and condensates should penetrate into the measuring chamber.
- Take appropriate measures to prevent overheating (→ Technical data for admissible operating temperature).
- The sensor can be baked out at up to 150°C. For temperatures above 50 °C the electronics unit must be removed (→ 12) or an extension (Option → 27) must be mounted (→ 13).
- See dimensional drawings (8) for space requirements.
- If the flange connection can only be made without the electronics unit, remove the electronics unit (→ 12).
- We recommend using a metal sealing (ultra sealing ring → 27) as vacuum flange sealing because elastomer seals (Vitalan, Viton) can impair the measurement accuracy already in the  $10^{-6}$  mbar 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 (→ 27) is recommended (→ 23).

Procedure

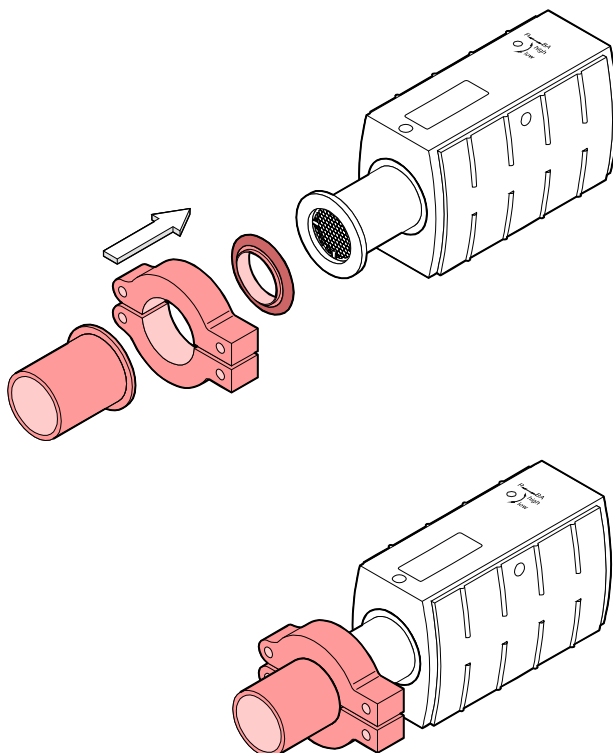
- 1 Remove the protective cap.



The protective cap will be needed for maintenance.



- 2 Make the flange connection.



Install the gauge in such a way that it need not be removed for adjustment (→ 18, 20).

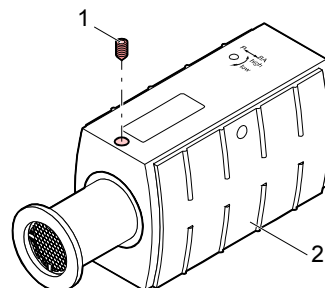
### 3.1.1 Removing and installing the electronics unit

Tools / material required

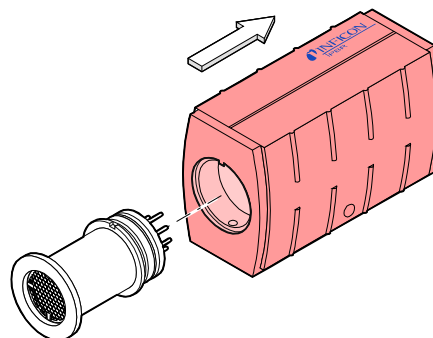
- Allen wrench 2.5 mm

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.

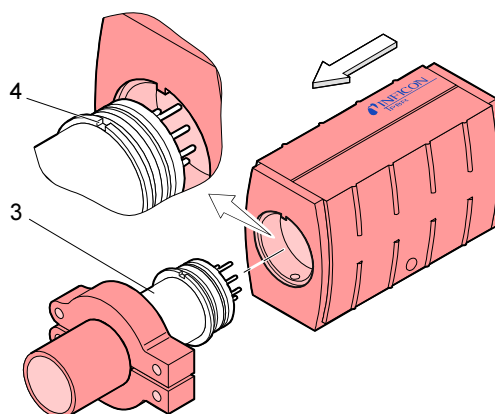


- b) Remove the electronics unit **without twisting it**.



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 (→ 27) the sensor can also be baked during operation at temperatures up to 150 °C (only at  $p < 10^{-2}$  mbar, since the Pirani sensor furnishes inexact readings at higher temperatures).

#### Note

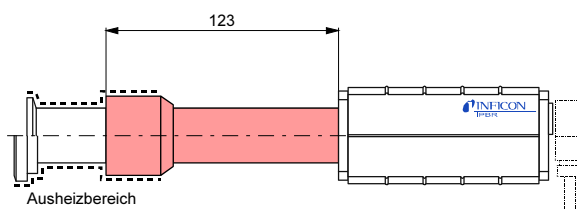


**Caution: rising heat**

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

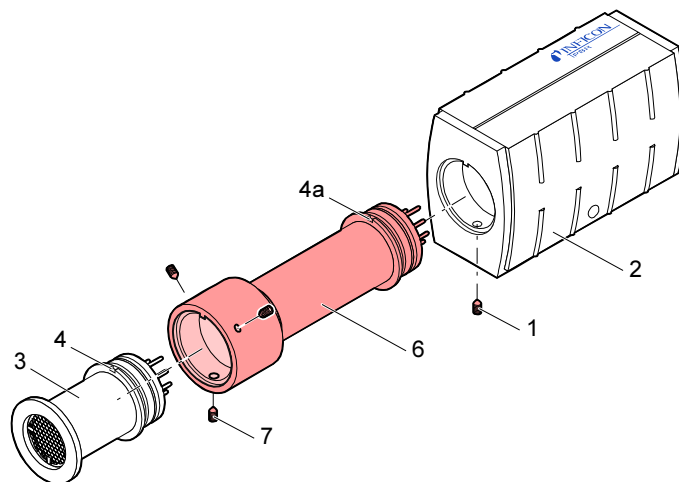
Mount the gauge horizontally.

Bakeout area



Procedure

- Remove the electronics unit (2) (→ 12).
- Slide the sensor (3) into the extension (6) to the mechanical stop (be careful to correctly position the pins and the guide notch (4)).
- Secure the sensor with the hexagon socket screws (7).

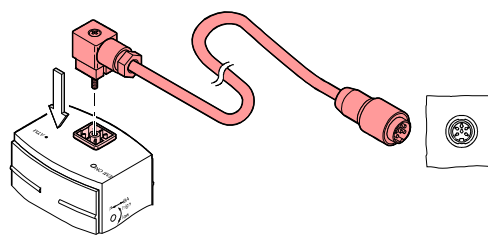


- Slide the electronics unit (2) onto the extension until the mechanical stop is reached (be careful to correctly position the pins and the guide notch (4a)).
- Secure the electronics unit (2) with the hexagon socket screw (1).

## 3.2 Power connection

### 3.2.1 Use with Single-, Dual- or MaxiGauge™

If the gauge is used with a Single-, Dual- or MaxiGauge™ measurement and control unit, a corresponding sensor cable is required (→ 27).



- Plug the connector into the gauge and secure it with the screw.
- Connect the other end of the cable to the Single-, Dual- or MaxiGauge™ and secure it.

### 3.2.2 Use with other evaluation units

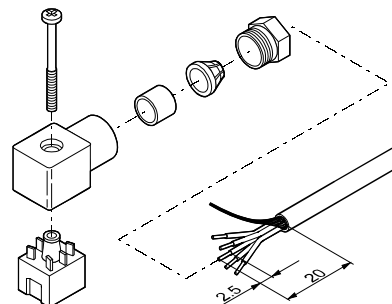
The gauge can also be used with other evaluation units. In such a case, an individual sensor cable can be made (preconfigured cables → 27).

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

#### Procedure



- 1 Prepare the connector (ordering number → 27).



- 2 Prepare the cable.

- 3 Solder the sensor cable according to the diagram.

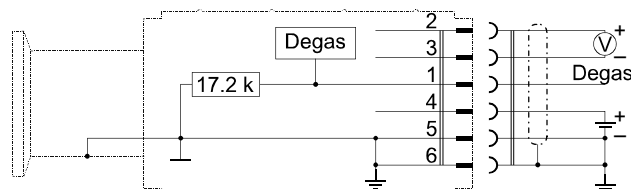
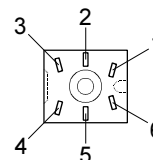


Figure 1: Electrical connection

- Pin 1 a) degas  
b) identification  
( $U \leq 4.25 \text{ V}$ )
- 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

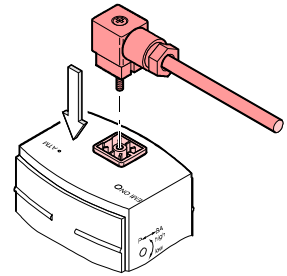


#### WARNING

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.

- ④ Reassemble the connector.
- ⑤ At the other end of the cable, mount a connector which is compatible with your evaluation unit.

- ⑥ Plug in the connector.  
Secure the connector on the gauge with the screw.



- ⑦ 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 A).

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

#### Bayard Alpert

The PBR260 consists of two separate measuring systems (hot cathode Bayard Alpert (BA) and Pirani).

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  $5 \times 10^{-10}$  mbar (metal sealed).

For the whole range of  $5 \times 10^{-10}$  mbar ...  $10^{-2}$  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.  $7.2 \times 10^{-6}$  mbar, at increasing pressure at approx.  $3.2 \times 10^{-5}$  mbar. At the switching threshold the PBR260 can temporarily (< 2 s) deviate from the specified accuracy.

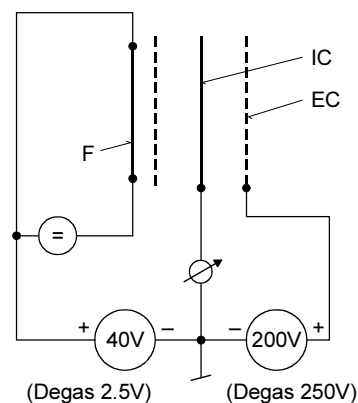
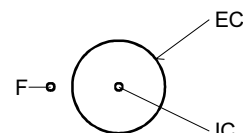


Fig. 1

Diagram of the BA measuring system

- F hot cathode (filament)
- IC ion collector
- EC electron collector (grid)





## Pirani

Within certain limits the thermal conductivity 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.

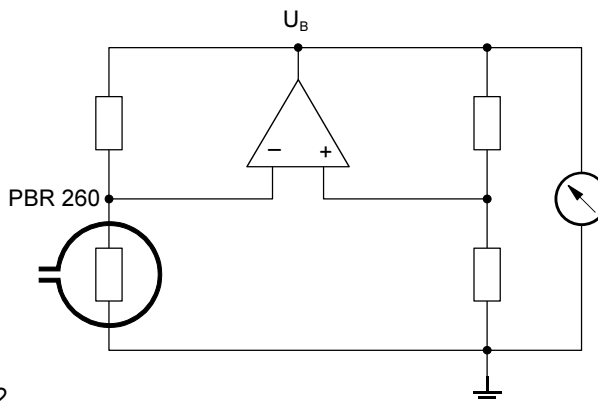


Fig. 2

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

## Measurement range

The PBR260 covers the measurement range  $5 \times 10^{-10}$  mbar ... 1000 mbar.

- 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 ( $p_{lower} \dots p_{upper}$ ), a combined signal of the two measuring systems is supplied ( $\rightarrow$  Fig. 3).

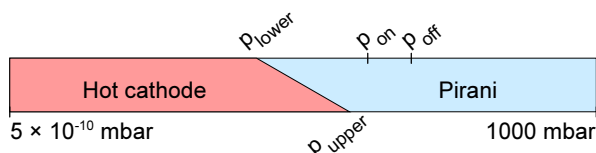


Fig. 3

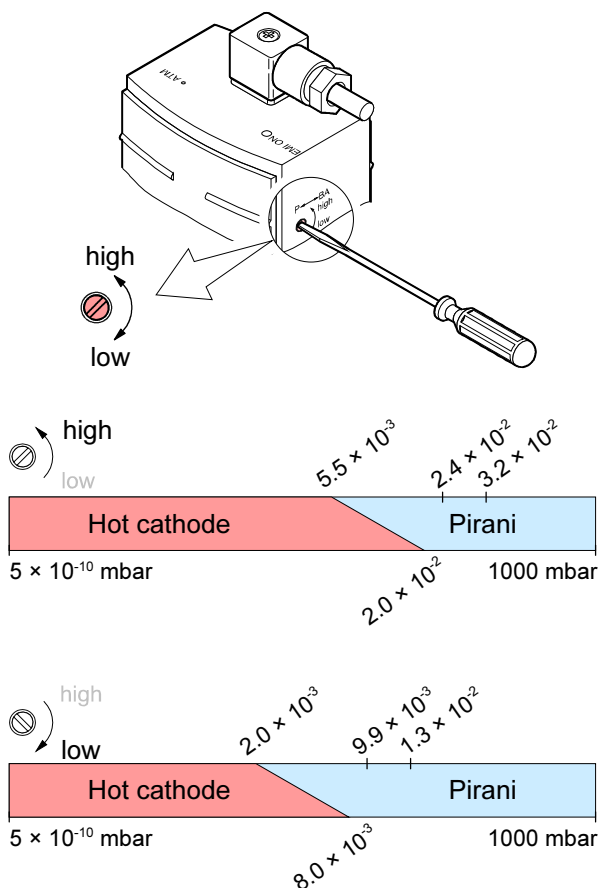
## Defining the switching on/off range

The PBR260 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" and "low" are available. Preferably, "low" should be selected as contamination of the hot cathode system is reduced at a lower pressure.

### Note



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	$p_{on}$ [mbar]	$p_{off}$ [mbar]
high	$2.4 \times 10^{-2}$	$3.2 \times 10^{-2}$
low	$9.9 \times 10^{-3}$	$1.33 \times 10^{-2}$

### Overlapping ranges

Switch position	$p_{lower}$ [mbar]	$p_{upper}$ [mbar]
high	$5.5 \times 10^{-3}$	$2.0 \times 10^{-2}$
low	$2.0 \times 10^{-3}$	$8.0 \times 10^{-3}$


## Accuracy

The gauge is factory-calibrated. Adjustment may become necessary due to use under different climatic conditions, extreme temperatures, contamination or aging (→ 20).

The measurement accuracy is reduced in the pressure range above  $1 \times 10^{-2}$  mbar and below  $1 \times 10^{-8}$  mbar.

## Gas type dependence

The measuring signal is gas type dependent. The relationship between the measuring signal and the pressure is accurate for N<sub>2</sub>, O<sub>2</sub>, dry air and CO (→ Appendix A). They can be mathematically converted for other gases (→ Appendix B).

If the gauge is being operated with Single-, Dual- or MaxiGauge™ measurement and control unit, a calibration factor can be applied for correction of the reading (→  Single-,Dual- or MaxiGauge™).

## 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



#### Note



Gauge failures due to contamination are not covered by 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  $7.2 \times 10^{-6}$  mbar (5 mA emission current). Depending on the application, this function can be activated via a Single-, Dual- or MaxiGauge™ measurement and control unit, manually or automatically by the control system (e.g. PLC). The PBR260 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**

Caution: 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 (→ 19), and after exchanging the sensor (→ 24), 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  $1 \dots 3 \times 10^{-3}$  mbar is reached).

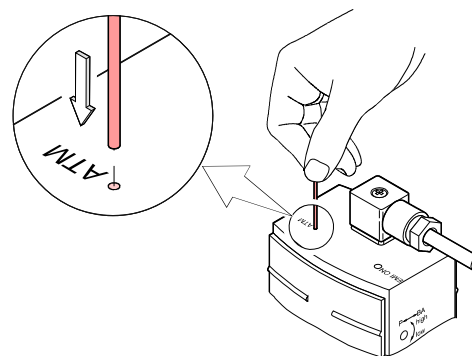
Adjustment at atmospheric pressure

Required tools

- Pin approx.  $\varnothing 1.3 \times 50$  mm (e.g. a bent open paper clip)

Procedure

- 1 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).
- 2 Insert a pin through the opening marked <ATM> and push the button inside for at least 5 s.



### 5.3 Cleaning the gauge

Small deposits on the electrode system can be removed by baking the anode (Degas → 19). In the case of severe contamination the baffle can be exchanged (→ 23). The sensor cannot be cleaned and must be replaced if it is severely contaminated (→ 24).

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

**Note**



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 (→ 27).

**Note**



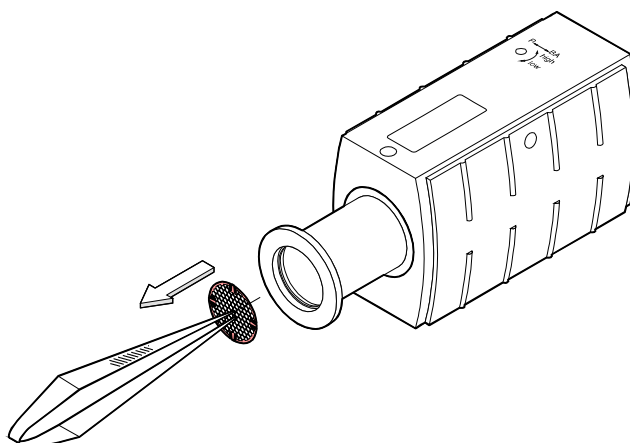
Caution: dirt sensitive area  
Dirt prolongs the pumpdown process.  
Always wear clean, lint-free gloves and use clean tools when working in this area.

#### Tools / material required

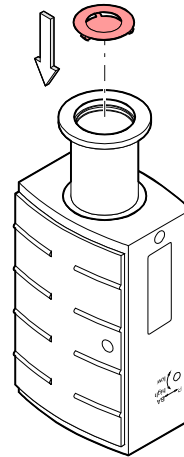
- Baffle (→ 27)
- Tweezers
- Stick (e.g. pencil)

#### Procedure

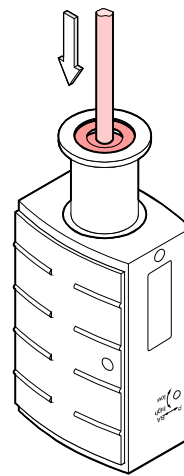
- a) Carefully remove the grid with pointed tweezers.



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.

**Note**



Caution: dirt sensitive area

Dirt prolongs the pumpdown process.

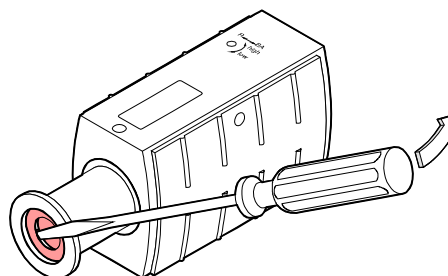
Always wear clean, lint-free gloves and use clean tools when working in this area.

### Tools / material required

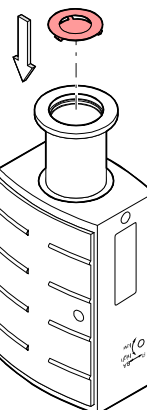
- New baffle (→ 27)
- Screw driver No. 1
- Stick (e.g. pencil)

### Procedure

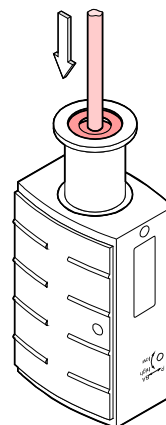
- a) Carefully remove the baffle with the screw driver.



- 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.

Tools / material required

- Allen wrench 2.5 mm
- Spare sensor (→ [27](#))

Procedure

- Deinstall the gauge (→ [25](#)).
- Remove the electronics unit from the faulty sensor and mount it on the new sensor (→ [12](#)).
- Mount the gauge (→ [10](#)).
- Adjust the gauge (→ [20](#)).

## 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 (→ <a href="#">24</a> )
Measuring signal 0.5 V	Pirani error (sensor faulty)	Replace sensor (→ <a href="#">24</a> )
	Electronics unit not correctly mounted on sensor	Check connection



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



Caution: 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.

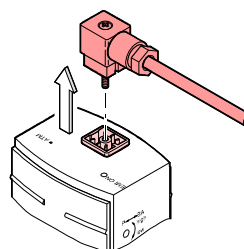
### Note



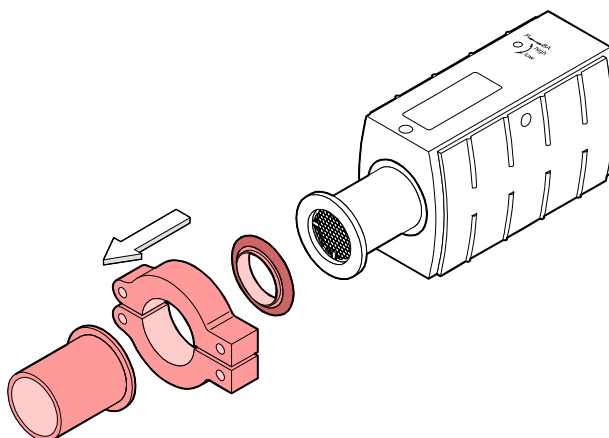
Caution: vacuum component  
Dirt and damages impair the function of the vacuum component.  
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

### Procedure

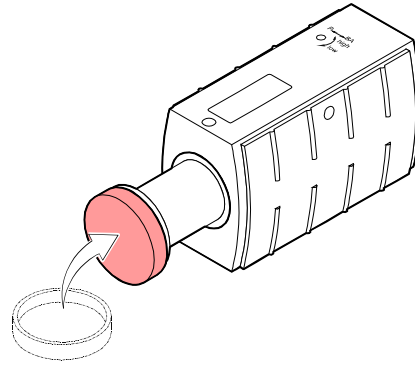
- ❶ Vent the vacuum system.
- ❷ Put the gauge out of operation.
- ❸ Unplug the connection cable.



- ❹ Remove the gauge from the vacuum system.



- 5** Place the protective cap.



## 7 Returning the product

**WARNING**

Caution: forwarding contaminated products

Products returned to Inficon 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 (→ [31](#)).

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

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

## 8 Options

	Ordering number
Sensor cable for connection to Single-, Dual- or MaxiGauge™ measurement and control unit	
3 m	BG 448 250 -T
6 m	BG 448 251 -T
10 m	BG 448 252 -T
Hirschmann connection socket GO 6 WF, 6 poles, angled, female	B 4707 283 MA

## 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 PBR260, flange DN 25 ISO-KF (Allen wrench included)	IN 846 517 -T
Sensor PBR260, flange DN 40 ISO-KF (Allen wrench included)	IN 846 518 -T
Sensor PBR260, flange DN 40 CF-R (Allen wrench included)	IN 846 519 -T
Electronics unit PBR260 (Allen wrench included)	IN 846 520 -T

## 10 Disposal

**DANGER**

**Caution: 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**

**Caution: 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: Relationship measuring signal – pressure

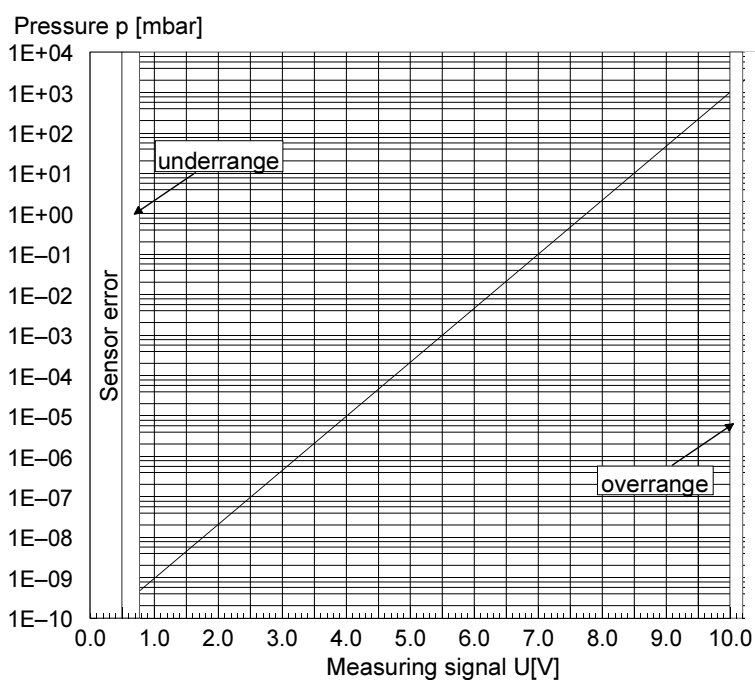
Conversion formula

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

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

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

Conversion curves



Conversion table

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

## B: Gas type dependence

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

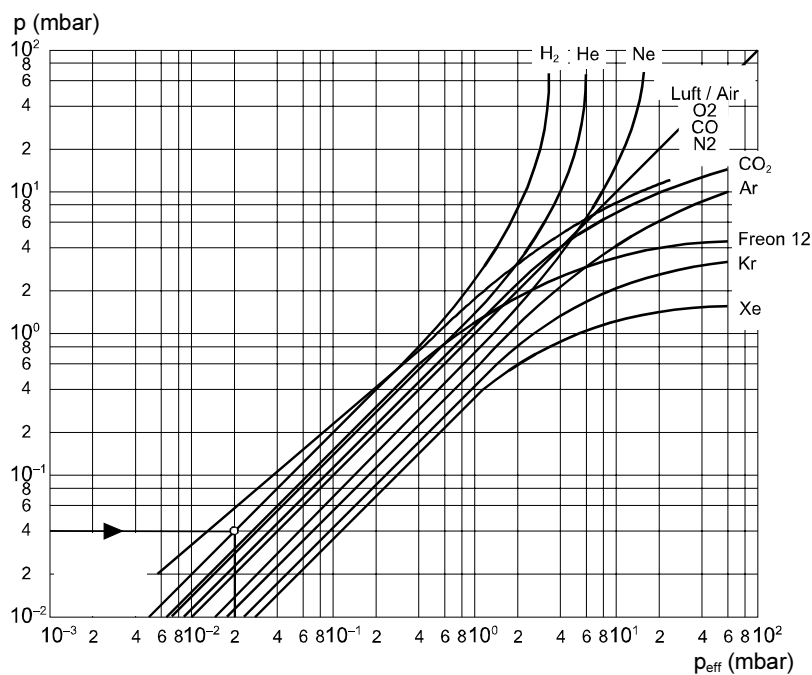
For gases other than air the pressure can be determined by means of a simple conversion formula:

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

where	Gas type	K
	Air (N <sub>2</sub> , O <sub>2</sub> )	1.0
	Xe	0.4
	Kr	0.5
	Ar	0.8
	H <sub>2</sub>	2.4
	Ne	4.1
	He	5.9

These conversion factors are mean values.

Above  $10^{-2}$  mbar  
(Pirani range)



### Note



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

## Declaration of contamination

The service, repair, and/or disposal of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.  
This declaration may only be completed (in block letters) and signed by authorized and qualified staff.

**1 Description of product**

Type \_\_\_\_\_

Part number \_\_\_\_\_

Serial number \_\_\_\_\_

**2 Reason for return**

\_\_\_\_\_

\_\_\_\_\_

**3 Operating fluid(s) used (Must be drained before shipping.)**

\_\_\_\_\_

\_\_\_\_\_

**4 Process related contamination of product:**

toxic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	<p>2) Products thus contaminated will not be accepted without written evidence of decontamination!</p>
caustic	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	
biological hazard	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
explosive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
radioactive	no <input type="checkbox"/>	yes <input type="checkbox"/> 2)	
other harmful substances	no <input type="checkbox"/> 1)	yes <input type="checkbox"/>	

The product is free of any substances which are damaging to health  
yes

1) or not containing any amount of hazardous residues that exceed the permissible exposure limits

**5 Harmful substances, gases and/or by-products**

Please list all substances, gases, and by-products which the product may have come into contact with:

Trade/product name	Chemical name (or symbol)	Precautions associated with substance	Action if human contact

**6 Legally binding declaration:**

I/we hereby declare that the information on this form is complete and accurate and that I/we will assume any further costs that may arise. The contaminated product will be dispatched in accordance with the applicable regulations.

Organization/company \_\_\_\_\_

Address \_\_\_\_\_ Post code, place \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Email \_\_\_\_\_

Name \_\_\_\_\_

Date and legally binding signature \_\_\_\_\_ Company stamp \_\_\_\_\_

Original: German IG 803 171 BD (0109)



ig803171be



*LI-9496 Balzers  
Liechtenstein  
Tel +423 / 388 3111  
Fax +423 / 388 3700  
reach.liechtenstein@inficon.com*

*www.inficon.com*