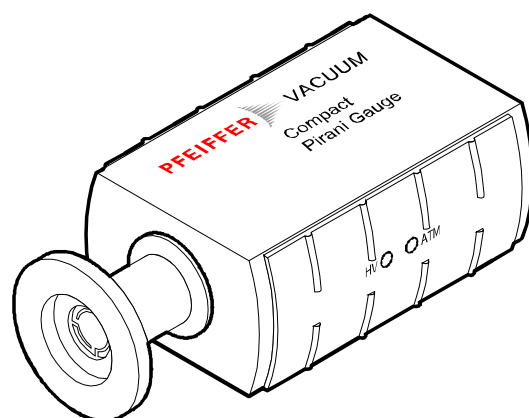
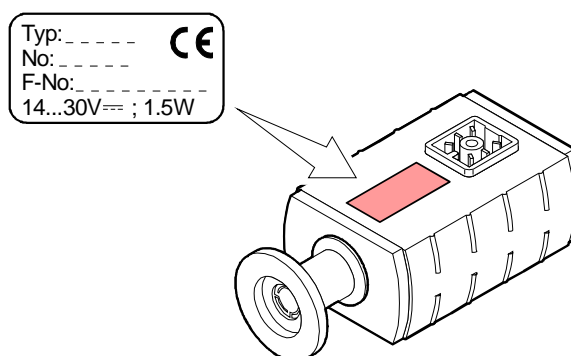


Compact Pirani Gauge TPR 265



Product identification

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



Validity

This document applies to products with ordering number

PT R26 750 (DN 16 ISO-KF short)
 PT R26 751 (DN 16 CF-R short)
 PT R26 752 (1/8" NPT short)
 PT R26 760 (DN 16 ISO-KF long)
 PT R26 761 (DN 16 CF-R long)

The ordering number can be taken from the nameplate.

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

Intended use

The Compact Pirani Gauge TPR 265 has been designed for vacuum measurement of gases in the pressure range of 5×10^{-4} ... 1000 mbar.



The gauge can be operated in connection with a Pfeiffer Vacuum controller for compact gauges or with another evaluation unit.

Functional principle

Over the whole measurement range, the measuring signal is output as a logarithm of the pressure.

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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.

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 of the process media due to heat generated by the product.
- All work may only be carried out in adherence to the applicable regulations and with the necessary precautions. Consider the safety remarks within this document.
- Before you begin 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.

2 Technical data

Measuring	Measurement principle	thermal conductance Pirani	
	Measurement range (Air, N ₂ , O ₂ , CO)	5×10 ⁻⁴ ... 1000 mbar	
	Accuracy	≈ 10 % of reading in the range of 1×10 ⁻³ ... 100 mbar (outside of this range up to factor 2)	
	Repeatability	≈ 2 % of reading in the range of 1×10 ⁻³ ... 100 mbar	
	Gas type dependency	→ Appendix B	
Output signal	Voltage range	≈ 0 V ... ≈ +10.3 V	
	Measurement range	2.2 V ... 8.5 V	
	Relationship voltage-pressure	logarithmic, increase 1.0 V / decade (→ Appendix A)	
	Error signal	< 0.5 V (filament rupture)	
	Output impedance	2×10 Ω	
	Minimum load	10 kΩ, short circuit-proof	
	Rise time	≈ 10 ms	
	Gauge identification	3.0 kΩ resistance referenced to supply common	
	Adjustment	Trimming potentiometer <HV>	adjustment at 5×10 ⁻⁴ mbar
		Trimming potentiometer <ATM>	adjustment at atmospheric pressure
Supply	<div><div></div><div><div> DANGER</div><div>The gauge may only be connected to supply and evaluation units that 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. ¹⁾</div></div></div>		
	Voltage at gauge	14.0 ... 30.0 V= (max. ripple 1 V _{pp})	
	Power consumption	≤ 1.5 W	
	Fuse ¹⁾	≤ 1 AT	
	Electrical connection	Hirschmann compact connector type GO 6, 6 poles, male	
	Cable	5 poles plus screening	
	Cable length max.	150 m (0.25 mm ² conductor) 200 m (0.34 mm ² conductor)	
	Grounding concept	→ Figure 1	
	Vacuum flange – measuring common	connected by 10 kΩ (max. voltage differential ±50 V)	
	Supply common – signal common	conducted separately; for great cable lengths (≥10 m) differential measuring is recommended	

¹⁾ Pfeiffer Vacuum controllers for compact gauges fulfill this requirement.

3 Installation

3.1 Vacuum connection

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.

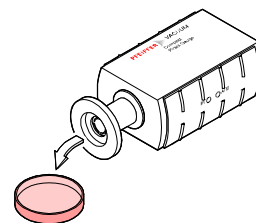
The gauge may be mounted in any orientation. A horizontal to upright orientation is to be preferred, to keep condensates and particles from getting into the measuring chamber.

Procedure

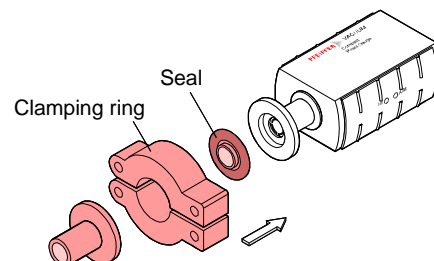
- 1 Remove the protective cap.



The protective cap will be needed for maintenance.



- 2 Make the flange connection.



If adjustment must be possible after the gauge has been installed, be sure to install it so that trimmer potentiometers <HV> and <ATM> can be accessed with a screwdriver.

The space necessary can be gathered from the diagram (→ 6).



DANGER



Caution: overpressure in the vacuum system > 4 bar

KF flange connections with elastomer seals (e.g. O-rings) cannot withstand such pressures. Process media can thus leak and possibly damage your health.

Use O-rings provided with an outer centering ring.



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 gases.

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).

STOP DANGER



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:

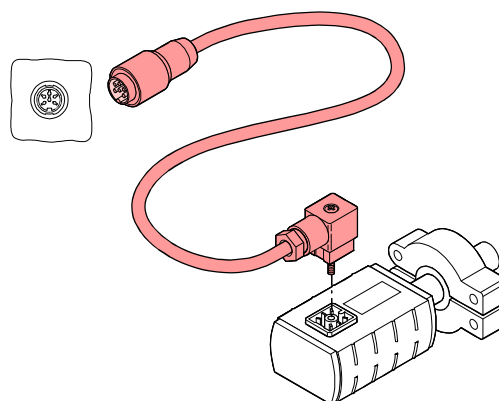
- CF and NPT flanges fulfill this requirement
- For gauges with a KF flange, use a conductive metallic clamping ring.

3.2 Electrical connection

3.2.1 Use with Pfeiffer Vacuum controller for compact gauges

If the gauge is used with a Pfeiffer Vacuum controller for compact gauges, a corresponding sensor cable is required (→ 15).

- Plug the cable in at the gauge and at the controller. Secure the plug at the gauge with the screw.



3.2.2 Use with other supply and evaluation units

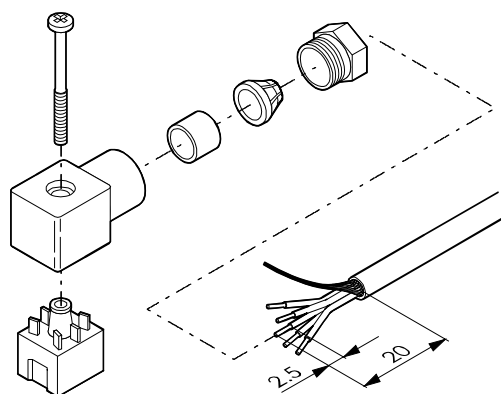
The gauge can also be operated with other supply and evaluation units. In this case a sensor cable must be made by the user.

For cable lengths up to 10 m (with 0.25 mm² conductor cross section), the measuring signal can be read directly between positive signal (pin 2) and supply common (pin 5). For longer sensor cable lengths, we recommend a differential measurement between signal and signal common (Pin 3) (as a result of the voltage drop along the supply cable grounding lead, the common mode signal is approx. 0.5 V at the max. permissible cable length).

Procedure



- 1 Prepare the cable box (ordering number → 15).



- 2 Solder the sensor cable according to the diagram.

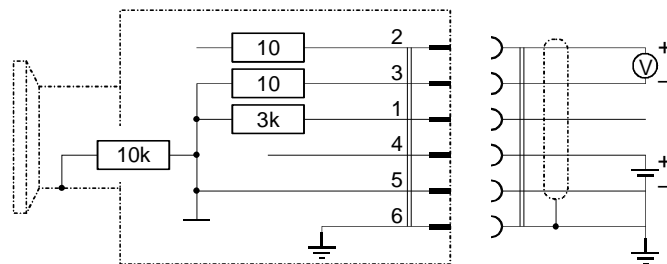
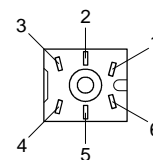


Figure 1: Electrical connection

- Pin 1 identification
- Pin 2 signal output (measuring signal)
- Pin 3 signal common
- Pin 4 supply (14 ... 30 V=)
- Pin 5 supply common
- Pin 6 screening



Cable box solder side



WARNING



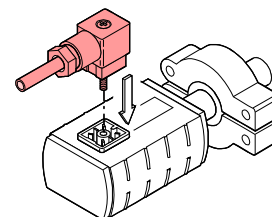
Supply common (pin 5) and screen (pin 6) must always be grounded to the supply unit.

Incorrect connection, incorrect polarity or inadmissible supply voltages can damage the gauge.

- 3 Assemble the cable box.

- 4 Equip the other end of the sensor cable with the appropriate connection for the supply and evaluation unit.

- 5 Connect the cable box to the gauge and secure it with the screw. Connect the other end of the cable to the supply and evaluation unit.



4 Operation

Measurement principle

This gauge uses the thermal conductivity of gases for vacuum measurements (Pirani).


Two thin tungsten wires are heated up to two different, constant temperatures (ca. 65 °C and 120 °C). The difference between the required thermal inputs for this is a measure for the pressure (independent of the ambient temperature). After logarithmization the output signal is generated from this value (→ Appendix A).

Stabilizing time

When voltage is being supplied to the gauge, the measuring signal is available between pins 2 and 3 (relationship between measuring signal and pressure → Appendix A).

Allow for a stabilization time of approx. 2 minutes. It is advisable to operate the gauge continuously.


Accuracy

The gauge is factory-calibrated. Adjustment may become necessary because of the use in different climatic conditions, extreme temperatures, contamination or ageing (→  11).

Measurement accuracy is reduced in the pressure range above 100 mbar and below 1×10^{-3} mbar.

Gas type dependency

The measuring signal depends on the type of gas being measured. The relationship between measuring signal and pressure is accurate for N₂, O₂, dry air and CO (→ Appendix A). They can be mathematically converted for other gases (→ Appendix B).

Is the gauge being operated with a Pfeiffer Vacuum controller for compact gauges, a calibration factor can be applied for correction of the reading (→  of the appropriate controller).

5 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.

5.1 Adjusting the gauge

The gauge is factory calibrated. Through the use in different climatic conditions, through extreme temperatures, contamination or ageing a shifting of the characteristic curve can occur and readjustment can become necessary. Otherwise the gauge requires no maintenance.

During adjustment, the effect on the pressure range between approx. 10^{-2} mbar and 10^2 mbar is negligible.



Note



Malfunctions of the gauge, that are caused by contamination are not covered by warranty.

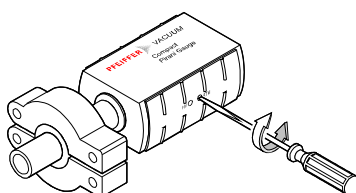
Tools required

- Screw driver 1.5 mm

Procedure

- 1 Activate the gauge.
- 2 Evacuate to $p \ll 10^{-4}$ mbar, and wait ≥ 2 min.

3

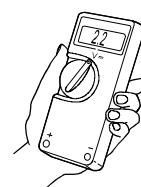
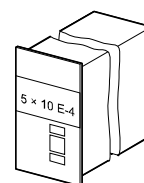


Adjust the potentiometer <HV> to ...

... 5×10^{-4} mbar

or

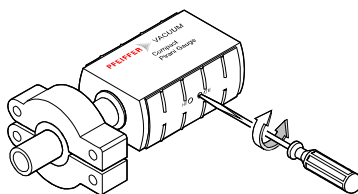
... 2.2 V



... and then turn it approx. 45° counter-clockwise.

- 4 Vent with air at atmospheric pressure, and wait ≥ 2 min.

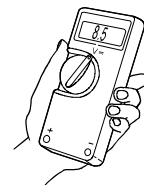
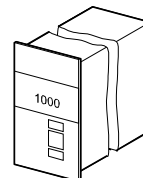
5



Adjust the potentiometer <ATM> to ...

... 1000 mbar

or ... 8.5 V



5.2 Cleaning the sensor



DANGER



Caution: cleaning agents

Cleaning agents can be detrimental to your health and the environment.

Adhere to the relevant regulations and take the necessary precautions when handling and disposing of cleaning agents. Consider possible reactions with the product materials (→ 6).

Tools / materials required

- Screw driver Nr. 1
- Industrial alcohol

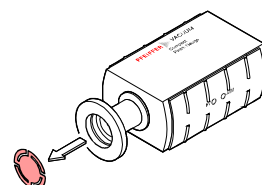
Procedure

1

Remove the gauge from the system (→ 14).

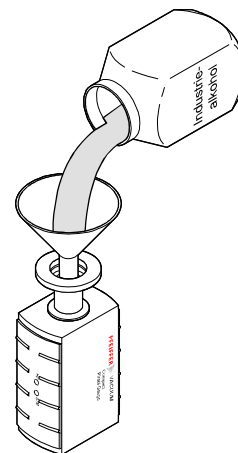
2

Remove the baffle carefully with the screw driver (only gauges with flange DN 16 ISO-KF).

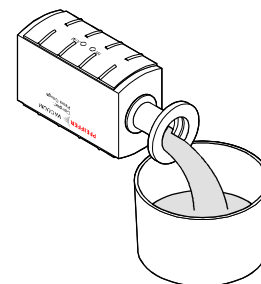


3

- Fill with industrial alcohol.
- Allow it to soak for 5 min.

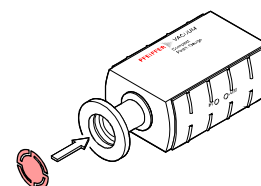


- 4 Pour out the industrial alcohol and dispose of it.



- 5 Allow the measurement chamber to dry for at least 10 min.

- 6 Insert the cleaned or a new baffle (only gauges with flange DN 16 ISO-KF).



- 7 Make the flange connection (→ 7).

- 8 Evacuate the gauge.

Note

During evacuation, remaining cleaning agents will evaporate.

- 9 Make the electrical connection.

- 10 Adjust the gauge (→ 11).

5.3 What to do in case of problems

Problem	Possible cause	Correction
Measuring signal continually < 0.5 V. Pfeiffer Vacuum controller: "Er-4" or "Sensor Error"	Supply missing.	Turn on the supply voltage.
	Sensor defective (filament rupture).	Replace the gauge.
	Gauge maladjusted	Adjust the gauge (→ 11).
Readout is too high at low pressures.	Sensor contaminated.	Adjust the gauge (→ 11). Clean the sensor (→ 12). Replace the gauge.

6 Removal



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.



Note



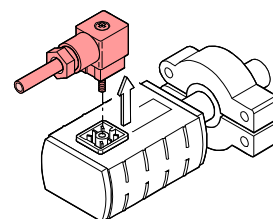
Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

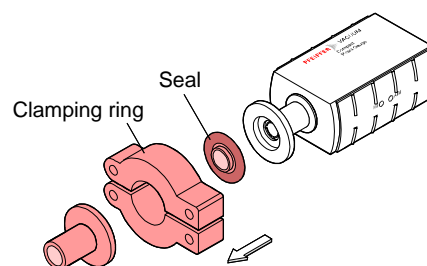
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Procedure

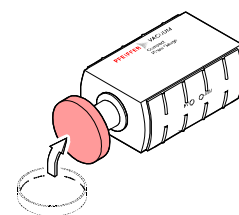
- 1 Vent the vacuum system.
- 2 Take the gauge out of operation.
- 3 Unplug the sensor cable.



- 4 Remove the gauge from the vacuum system.



- 5 Put the protective cap on.



7 Accessories

	Ordering number
Sensor cable for Pfeiffer Vacuum controller for compact gauges	
3 m	BG 448 250 -T
6 m	BG 448 251 -T
10 m	BG 448 252 -T
Cable box, Hirschmann GO 6 WF, 6 poles, angled, socket	B 4707 283 MA

8 Returning the product



WARNING

Caution: 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 (→ 19).

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

When returning a product for service, put it in a tight and impact resistant package.

9 Disposal




STOP 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.



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 between measuring signal and pressure

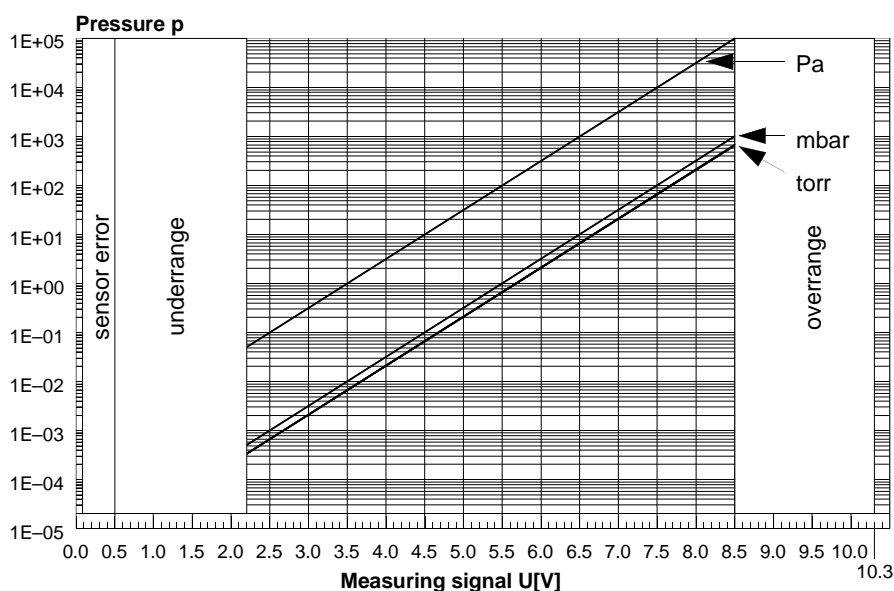
Conversion formula

$$p = 10^{(U-c)} \Leftrightarrow U = c + \log_{10} p$$

U	p	c	U	p	c	U	p	c
[V]	[mbar]	5.5	[V]	[Torr]	5.625	[V]	[Pa]	3.5
[V]	[μbar]	2.5	[V]	[mTorr]	2.625	[V]	[kPa]	6.5
			[V]	[micron]	2.625			

where p pressure valid in the range 5×10^{-4} mbar < p < 1000 mbar
 U measuring signal 3.75×10^{-4} Torr < p < 750 Torr
 c constant (pressure unit dependent) 5×10^{-2} Pa < p < 1×10^5 Pa

Conversion curves



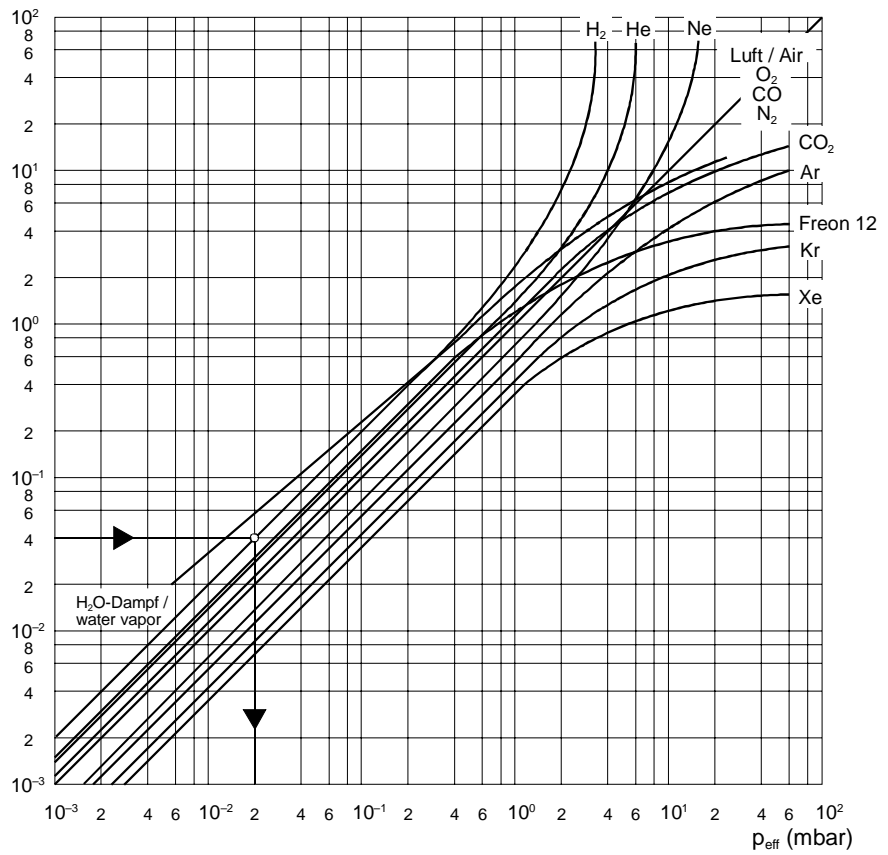
Conversion table

Measuring signal U [V]	[mbar]	Pressure p [Torr]	[Pa]
< 0.5	Sensor error		
0.5...2.2	Underrange		
2.2	5.0×10^{-4}	3.8×10^{-4}	5.0×10^{-2}
2.5	1.0×10^{-3}	7.5×10^{-4}	0.1
3.5	1.0×10^{-2}	7.5×10^{-3}	1.0
4.5	0.1	7.5×10^{-2}	10
5.5	1.0	0.75	100
6.5	10	7.5	1000
7.5	100	75	1.0×10^4
8.5	1000	750	1.0×10^5
8.5 ... 10.3	Overrange		

B: Gas type dependency

Indicated pressure
(Gauge calibrated for air)

p (mbar)



Note



A mixture of gases is often involved. In this case, accurate determination is only possible with a partial pressure measurement instrument, e.g. a quadrupole mass spectrometer.

Calibration factors for the pressure range below 1 mbar

Gas type	Calibration factor K	Gas type	Calibration factor K
He	0.8	H_2	0.5
Ne	1.4	$\text{N}_2, \text{O}_2, \text{CO}, \text{air}$	1.0
Ar	1.7	CO_2	0.9
Kr	2.4	water vapor	0.5
Xe	3.0	Freon 12	0.7

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

Declaration of contamination

The repair and/or service 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 can only be completed and signed by authorized and qualified staff.

1 Description of product

Type _____

Article No. _____

Serial No. _____

2 Reason for return

3 Operating fluid(s) used

4 Process related contamination of product:

toxic	no <input type="checkbox"/>	yes <input type="checkbox"/>	
corrosive	no <input type="checkbox"/>	yes <input type="checkbox"/>	
biological hazard	no <input type="checkbox"/>	yes <input type="checkbox"/> *)	
explosive	no <input type="checkbox"/>	yes <input type="checkbox"/> *)	
radioactive	no <input type="checkbox"/>	yes <input type="checkbox"/> *)	
other harmful substances	no <input type="checkbox"/>	yes <input type="checkbox"/>	

5 Harmful substances, gases and/or by-products

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

Trade/product name manufacturer	Chemical name (or symbol)	Dangerous material class	Measures if spillage	First aid in case of contact

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

6 Legally binding declaration:

I hereby declare that the information supplied on this form is complete and accurate. The dispatch of the contaminated product will be in accordance with the appropriate regulations covering packaging, transportation and labelling of dangerous substances.

Name of organization or company _____

Address _____

Phone _____

E-Mail _____

Name _____

Date and legally binding signature _____

Post code, place _____

Fax _____

Company stamp _____

*) Products thus contaminated will not be accepted without written evidence of decontamination!

