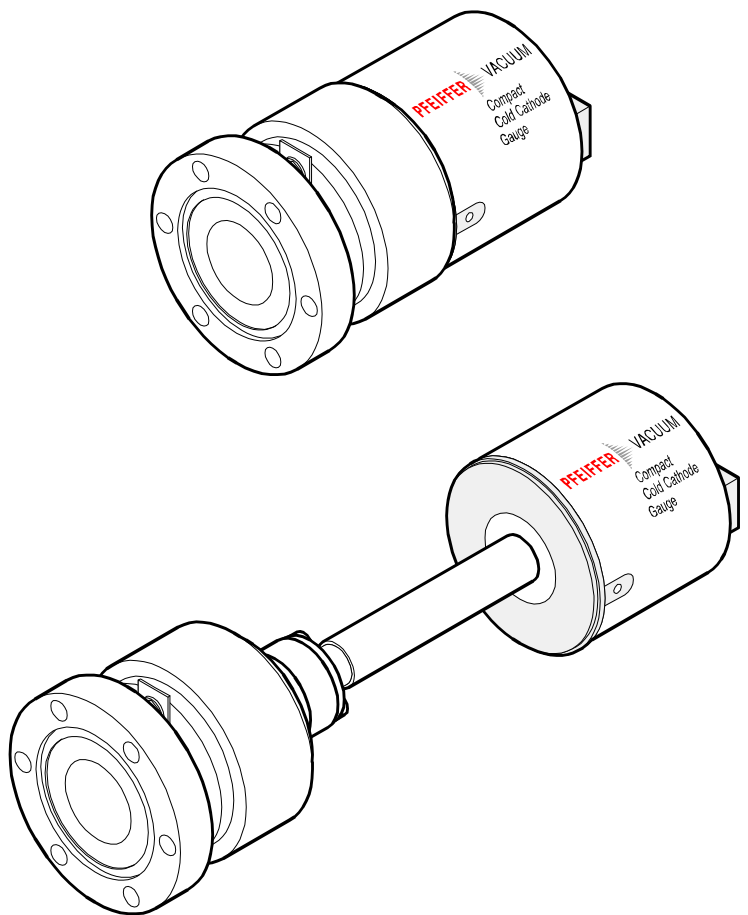


# Compact Cold Cathode Gauge



All-metal

IKR 270



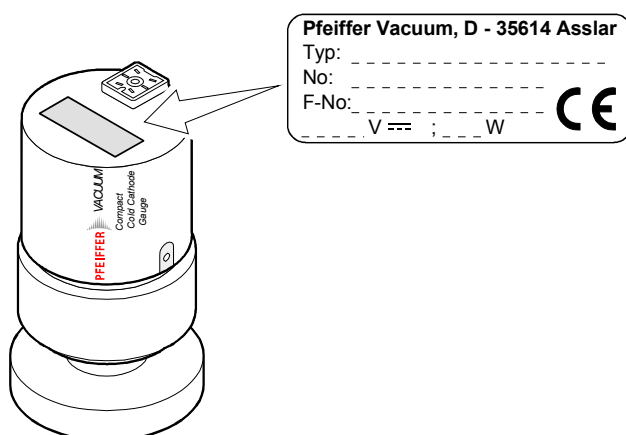
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For cross references to pages within this manual, the symbol (→  XY) is used, for references to other documents, the symbol (→  [Z]).

## Product identification

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



## Validity

This manual applies to products with the following part numbers

|            |                    |             |
|------------|--------------------|-------------|
| PT R21 251 | (DN 40 CF-F flange | short type) |
| PT R21 261 | (DN 40 CF-F flange | short type) |

The part number can be taken from the nameplate.

We reserve the right to make engineering changes without notice.

## Intended use

The Compact Cold Cathode Gauge IKR 270 has been designed for vacuum measurement in a pressure range of  $5 \times 10^{-11}$  ...  $1 \times 10^{-2}$  mbar.

The gauge can be used with a Pfeiffer Vacuum measurement unit for Compact Gauges or with another evaluation unit.

## Functional principle

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

The Compact Cold Cathode Gauge IKR 270 functions with a cold cathode ionization measurement circuit (according to the inverted magnetron principle).

# 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 custodian of the product.

## 1.3 Safety information

- 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 the 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 information in 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.

Pass on the safety information to other users.

## 1.4 Liability and warranty

Pfeiffer Vacuum assumes no liability and the warranty becomes null and void if the custodian 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 custodian assumes the responsibility in conjunction with the process media used.

## 2 Technical data

|  |  |
|--|--|
| Admissible temperature                   |  |
| Storage                                  | -40 °C ... +65 °C  |
| Operation                                |  |
| all types                                | + 5 °C ... +55 °C  |
| long type                                | 250 °C in bakeout area, see dimension drawing (without magnetic shielding)           |
| Bakeout                                  |  |
| short type                               | +250 °C (without electronics and magnetic shielding)                                 |
| long type                                | +250 °C in bakeout area, see dimension drawing (without magnetic shielding)          |
| Relative humidity                        | max. 80% at temperatures up to +31 °C decreasing to 50 % at +40 °C                   |
| Use                                      | indoors only<br>altitude up to 2000 m (6600 ft.)                                     |
| Measurement range (air, N <sub>2</sub> ) | $5 \times 10^{-11} \dots 1 \times 10^{-2}$ mbar                                      |
| Accuracy                                 | $\approx \pm 30\%$<br>in the range of $1 \times 10^{-9} \dots 1 \times 10^{-3}$ mbar |
| Reproducibility                          | $\approx \pm 5\%$<br>in the range of $1 \times 10^{-9} \dots 1 \times 10^{-3}$ mbar  |
| Gas type dependence                      | → Appendix B   |
| Type of protection                       | IP 40  |
| Overpressure                             | $\leq 9$ bar<br>only for inert gases < 100 °C  |

### Supply


**DANGER**

The gauge may only be connected to supply or measurement 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.<sup>1)</sup>

|                      |   |
|----------------------|---|
| Voltage at the gauge | 14.5 ... 30.0 V= (ripple max. 1 V <sub>pp</sub> ) |
| Power consumption    | $\leq 2$ W  |
| Fuse <sup>1)</sup>   | $\leq 1$ AT                                       |

The minimum voltage of the power supply must be increased proportionally to the length of the measuring cable.

|  |   |
|--|---|
| Voltage of the supply unit at maximum cable length | 16.0 ... 30.0 V= (ripple max. 1 V <sub>pp</sub> ) |
|--|---|

|  |   |
|--|---|
| Electrical connection                        | Compact connector Hirschmann type GO 6, 6 poles, male   |
| Cable  | 5 poles plus screen   |
| Maximum cable length                         | 100 m (0.25 mm <sup>2</sup> conductor)<br>150 m (0.34 mm <sup>2</sup> conductor)<br>500 m (1.0 mm <sup>2</sup> conductor) |
| Operating voltage (in the measuring chamber) | $\leq 3.3$ kV   |
| Operating current (in the measuring chamber) | $\leq 100$ $\mu$ A  |

<sup>1)</sup> Pfeiffer Vacuum measurement and control units for Compact Gauges fulfill these requirements.

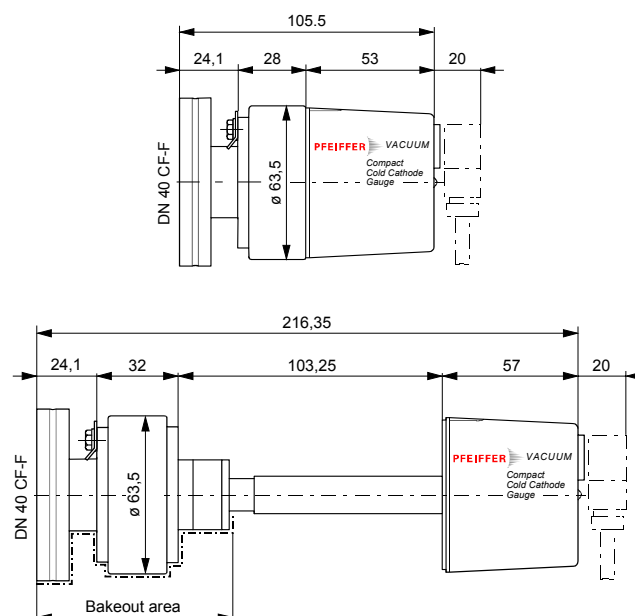
|                                  |   |
|----------------------------------|---|
| Output signal (measuring signal) |   |
| Voltage range                    | $\approx 0 \text{ V} \dots \approx +10.5 \text{ V}$                     |
| Voltage/pressure relationship    | logarithmic, increase $0.8 \text{ V} / \text{decade}$<br>(→ Appendix A) |
| Error signal                     | $< 0.5 \text{ V}$ (no supply)   |
| Output impedance                 | $2 \times 10 \text{ } \Omega$   |
| Normal load                      | $100 \text{ k}\Omega$   |
| Minimum load                     | $10 \text{ k}\Omega$ , short-circuit proof                              |
| Response time                    | pressure dependent  |
| $p > 10^{-6} \text{ mbar}$       | $< 10 \text{ ms}$   |
| $p = 10^{-8} \text{ mbar}$       | $\approx 1 \text{ s}$   |

|                      |   |
|----------------------|---|
| Gauge identification | $7.15 \text{ k}\Omega$ resistance referenced to supply common |
|----------------------|---|

|                             |   |
|-----------------------------|---|
| Grounding concept           | → Figure 1  |
| Vacuum flange-signal common | connected via $10 \text{ k}\Omega$<br>(max. voltage differential with respect to safety $\pm 50 \text{ V}$<br>with respect to accuracy $\pm 10 \text{ V}$ ) |
| Supply common-signal common | conducted separately; differential measurement recommended for cable lengths $\geq 10 \text{ m}$  |

|                                 |   |
|---------------------------------|---|
| Materials exposed to the vacuum |   |
| Feedthrough isolation           | ceramic ( $\text{Al}_2\text{O}_3$ )     |
| Internal seal                   | Ag                                      |
| Flange                          | stainless steel<br>(1.4306 / AISI 304L) |
| Anode                           | Mo                                      |
| Ignition aid                    | stainless steel (1.4310 / AISI 301)     |
| Internal volume                 | $\approx 20 \text{ cm}^3$               |

#### Dimensions



|        |  |
|--------|--|
| Weight | 950 g (DN 40 CF-F short type)<br>1100 g (DN 40 CF-F long type) |
|--------|--|

## 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 can be mounted in any orientation. However, it should be mounted so that any particles present cannot enter the measuring chamber (→ 12).

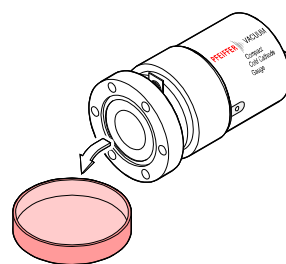
See dimension drawing for space requirements (→ 6).

1

Remove the protective cap.



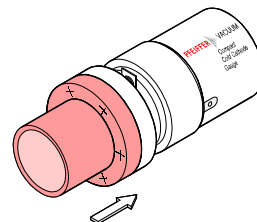
The protective cap will be needed for maintenance.



2

Make the flange connection.

When making CF flange connections, it can be advantageous to temporarily remove the magnet (→ section 3.1.1).



#### DANGER



Caution: overpressure in the vacuum system > 4 bar  
KF flange connections with elastomer sealing rings (e.g. O-rings) cannot withstand such pressures. Process media can thus leak and possibly damage your health.

Use sealing rings provided with an outer centering ring.



#### DANGER



Caution: overpressure in the vacuum system > 1 bar  
If clamps are opened unintentionally injury can be caused by catapulted parts.

Use the type of clamps which can only be opened and closed by means of a tool (e.g. hose clip clamping ring).

**DANGER**

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

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

### 3.1.1 Removing the magnet unit

#### Tools required

- Allen wrench 1.5 mm
- Open-end wrench 7.0 mm

#### Procedure

- Unfasten the socket head set screw (1) on the side of the electronics unit (2).
- Remove the electronics unit.

**Note**

For reasons of tolerance, the same magnet and electronics unit have to be used when reassembling the gauge.

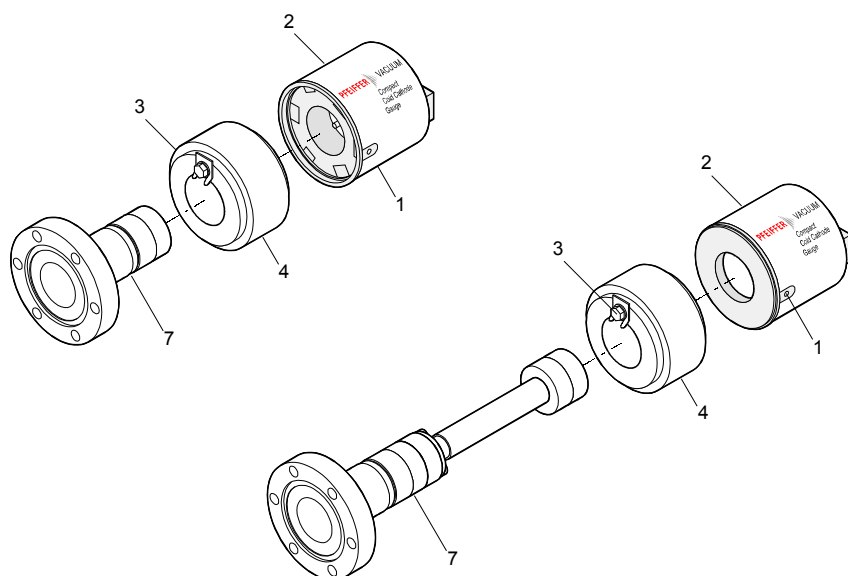
- Unfasten the hexagon head screw (3) on the magnet unit (4) and remove the magnet unit.

**Note**

The magnetic force and the tendency to tilt make it more difficult to separate the magnet unit and the measuring chamber (7).

- Make the flange connection between the gauge and the vacuum system.
- Remount the magnet unit and lock it with the hexagon head screw (3).
- Carefully mount the electronics unit (2).
- Push the electronics unit until the mechanical stop is reached and lock it with the socket head set screw (1).



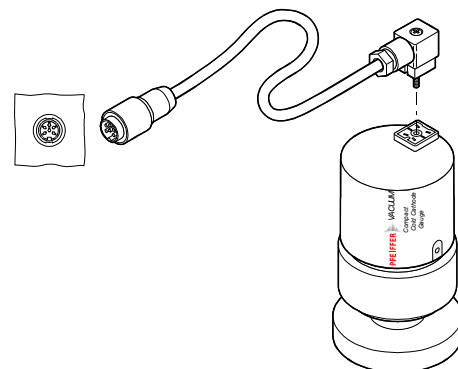


## 3.2 Power connection

### 3.2.1 Use with a Pfeiffer Vacuum measurement unit

If the gauge is used with a Pfeiffer Vacuum measurement unit for Compact Gauges, a corresponding connection cable is required (→ 19).

- Secure the connection socket on the gauge with the screw.



### 3.2.2 Use with another evaluation unit

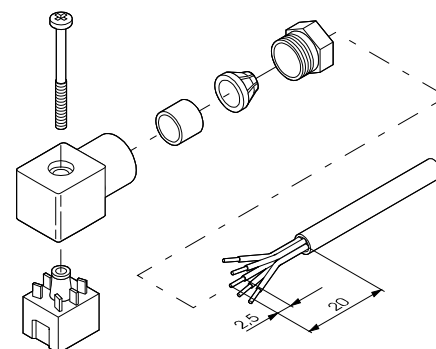
The gauge can also be operated with other evaluation units. In this case, an individual connection cable must be made.

For cable lengths up to 10 m (0.34 mm<sup>2</sup> conductor cross-section), the measuring signal can be read directly between the positive signal output (pin 2) and the supply common (pin 5) without the degree of accuracy being reduced. For longer measuring cable lengths, we recommend a differential measurement between the signal output and signal common (pin 3) (as a result of the voltage drop along the supply cable ground lead, the common mode signal is approx. 1.0 V at the max. permissible cable length).

#### Procedure



- 1 Prepare the connection socket (ordering number → 19).



**2** Solder the connection cable according to the diagram.

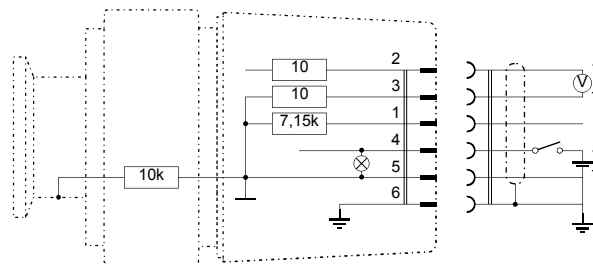
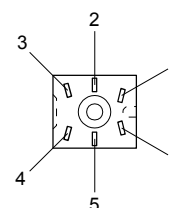


Figure 1: Electrical connection

- Pin 1 identification
- Pin 2 signal output (measuring signal)
- Pin 3 signal common
- Pin 4 supply
- Pin 5 supply common
- Pin 6 screen

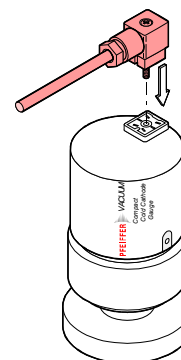


**WARNING**

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

**3** Reassemble the connection socket.

**4** Plug in the connection socket.  
Secure the connection socket on the gauge with the screw.



## 4 Operation

As soon as the required voltage is applied, the measurement signal is available between pins 2 and 3 (→ Appendix A for the relationship between the measuring signal and the pressure)).

The green lamp on the gauge indicates the operating state:



Supply voltage present.



No supply voltage.



### Note



Turn on the gauge only at pressures  $<10^{-2}$  mbar to prevent excessive contamination.

If you are using a Pfeiffer Vacuum measurement unit for Compact Gauges with at least two gauge connections, the cold cathode gauge can be controlled, for example, by a Pirani gauge.

### Gas type dependence

The measuring signal depends on the type of gas being measured. The curves are accurate for dry air,  $N_2$ ,  $O_2$ , and CO. They can be mathematically converted for other gases (→ Appendix B).

If you are using a Pfeiffer Vacuum measurement unit for Pfeiffer Vacuum Compact Gauges, you can enter a calibration factor to correct the measurement value displayed (→ of that measurement unit).

### Ignition delay

An ignition delay occurs when cold cathode gauges are switched on. The delay time increases at low pressures and is typically:

|                          |              |
|--------------------------|--------------|
| $10^{-7}$ mbar           | ≈ 0.1 minute |
| $10^{-8}$ mbar           | ≈ 1 minute   |
| $10^{-9}$ mbar           | ≈ 5 minutes  |
| $10^{-10}$ mbar          | ≈ 20 minutes |
| $5 \times 10^{-11}$ mbar | ≈ 30 minutes |

### Contamination

Gauge contamination is influenced by the process media used as well as any existing or new contaminants and their respective partial pressures. With constantly low pressures ( $< 1 \times 10^{-6}$  mbar), the gauge can be operated for more than one year without cleaning (cleaning the gauge → 12).

Contamination can to a certain extent be reduced by:

- geometric protections (e.g. screenings, elbows) against particles that spread rectilinearly
- mounting the flange of the gauge at a place where the partial pressure of the pollutants is particularly low.

Special precautions are required for vapors deposited under plasma (e.g. of the cold cathode measuring system). It may even be necessary to temporarily switch off the gauge while vapors occur.

## 5 Maintenance

**DANGER**

**Caution: contaminated parts**

Contaminated parts can be detrimental to 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 Cleaning the gauge / changing parts

**DANGER**

**Caution: cleaning agents**

Cleaning agents can be detrimental to health and environment.

Adhere to the relevant regulations and take the necessary precautions when handling and disposing of cleaning agents.

#### Tools / material required

- Allen wrench 1.5 mm
- Allen wrench 3.0 mm
- Open-end wrench 7.0 mm
- Pliers for circlips
- Polishing cloth (400 grain) or Scotch-Brite
- Tweezers
- Cleaning alcohol
- Mounting tool for ignition aid
- Ignition aid
- Metal seal (11) for anode feedthrough

#### 5.1.1 Disassembling the gauge

##### Procedure for short type

- a) Remove the gauge from the vacuum system (→ 18).
- b) Unfasten the socket head set screw (1) on the side of the electronics unit (2) (→ Figure 2).
- c) Remove the electronics unit.

**Note**

For reasons of tolerance, the same magnet and electronics unit have to be used when reassembling the gauge.

- d) Unfasten the hexagon head screw (3) on the magnet unit (4) and remove the magnet unit.

**Note**

The magnetic force and the tendency to tilt make it more difficult to separate the magnet unit and the measuring chamber (7).

- e) Remove the circlip (5) as well as the polarity insert (6) from the measuring chamber.
  - f) Remove the four hexagon socket screws (8) incl. the lock washers (8a) on the back of the measuring chamber.
  - g) Carefully remove the following items in this order: pressure piece (9), washer (9a), complete anode (10), metal seal (11) incl. centering ring (12).
- The parts can now be cleaned or replaced.

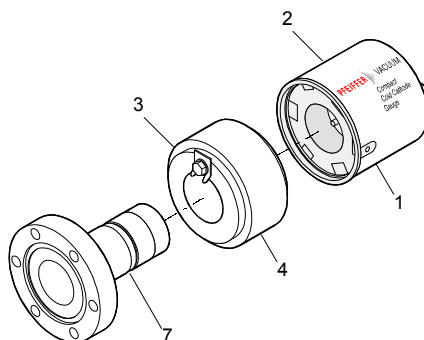


Figure 2a

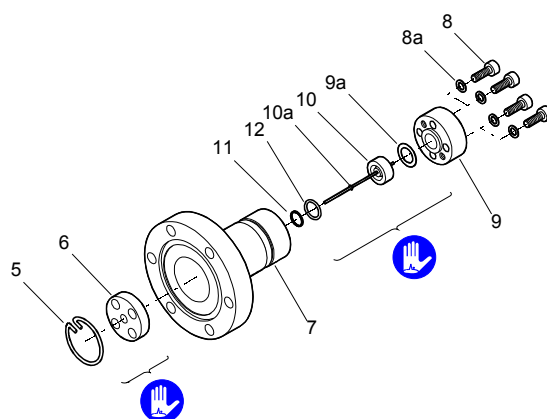


Figure 2b

### Procedure for long type

- a) Remove the gauge from the vacuum system (→ 18).
- b) Unfasten the socket head set screw (1) on the side of the electronics unit (2) (→ Figure 3).
- c) Remove the electronics unit.



#### Note



For reasons of tolerance, the same magnet and electronics unit have to be used when reassembling the gauge.

- d) Unfasten the hexagon head screw (3) on the magnet unit (4) and remove the magnet unit.



#### Note



The magnetic force and the tendency to tilt make it more difficult to separate the magnet unit and the measuring chamber (7).

- e) Remove the circlip (5) as well as the polarity insert (6) from the measuring chamber.

- f) Remove the two hexagon socket screws (20) incl. lock washers (19) from the extension piece.
- g) Carefully remove the following items in this order: pressure piece (18), insulator (17), anode extension (13).
- h) Remove the two hexagon socket screws (16) incl. lock washers (15) and the tube (14).
- i) Remove the four hexagon socket screws (8) incl. the lock washers (8a) on the back of the measuring chamber.
- j) Carefully remove the following items in this order: pressure piece (9), washer (9a), complete anode (10), metal seal (11) incl. centering ring (12).

The parts can now be cleaned or replaced.

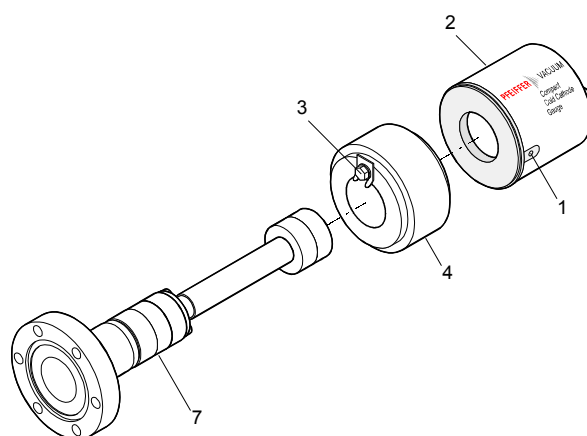


Figure 3a

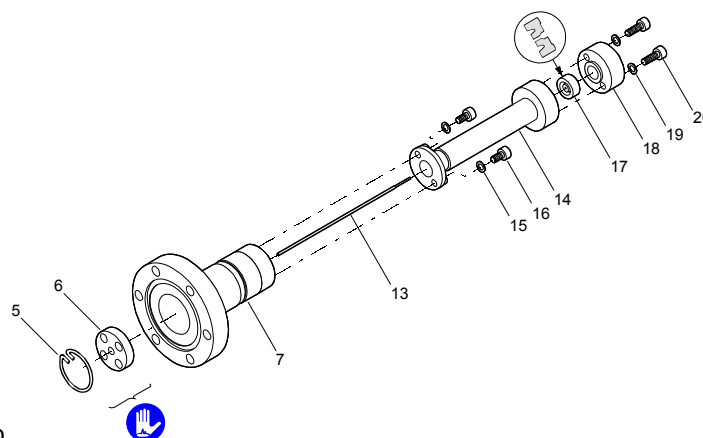


Figure 3b

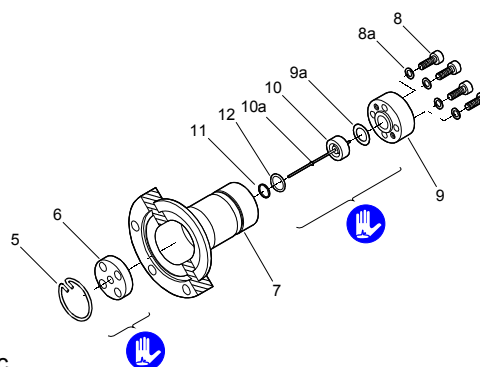


Figure 3c

## 5.1.2 Cleaning the gauge

### Procedure

- a) Using a polishing cloth rub the inside walls of the measuring chamber and the polarity insert to a bright finish.

**Note**

The sealing surfaces must only be worked concentrically.

- b) Rinse the measuring chamber and the polarity insert with alcohol.
- c) Allow both to dry.

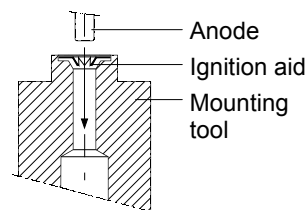
Cleaning or replacing the anode:

- a) Remove the old ignition aid (10a), for example with tweezers (→ Figure 2).
- b) Using a polishing cloth rub the anode pin to a bright finish.

**Note**

Do not bend the anode. Do not carry out mechanical work on the ceramic part.

- c) Rinse the anode with cleaning alcohol.
- d) Allow the anode to dry.
- e) Insert the new ignition aid (10a) into the mounting tool.
- f) Carefully press the anode (clean or new) centered and parallel to the tool axis into the ignition aid and insert it to a depth of approx. 15 mm. The final position is established after the anode is installed.





## 5.1.3 Assembling the gauge

### Procedure for short type

- a) Insert the new metal seal (11) with the centering ring (12) centered into the measuring chamber. The sealing surfaces, seal and ceramic part must be clean (→ Figure 2b).
- b) Carefully insert the anode (10) incl. ignition aid (10a) into the measuring chamber.
- c) Carefully place the washer (9a) and the pressure piece (9) on the measuring chamber and tighten them **uniformly** with the four hexagon socket screws (8) incl. the lock washers (8a) until the stop position is reached.
- d) Position the ignition aid (10a) by pushing the mounting tool over the anode pin until the mechanical stop is reached.
- e) Remove the particles in the measuring chamber with dry nitrogen (be careful to hold the measuring chamber with the flange pointing downwards).
- f) Slide the polarity insert (6) into the measuring chamber up to the mechanical stop.

- g) Place the circlip (5) snugly fitting on the polarity insert.

 **Note**





Visually check that the anode pin is centered over the middle hole of the polarity insert (max. eccentricity = 0.5 mm).

- h) If possible perform a leak test (leak rate  $<10^{-9}$  mbar l/s).
- i) Mount the magnet unit (4) and lock it with the hexagon head screw (3).
- j) Mount the electronics unit (2) and secure it with the socket head set screw (1).

## Procedure long version


- a) Insert the new metal seal (11) with the centering ring (12) centered into the measuring chamber. The sealing surfaces, seal and ceramic part must be clean (→ Figure 3c).
- b) Carefully insert the anode (10) incl. ignition aid (10a) into the measuring chamber.
- c) Carefully place the washer (9a) and the pressure piece (9) on the measuring chamber and tighten them **uniformly** with the four hexagon socket screws (8) incl. the lock washers (8a) until the stop position is reached.
- d) Position the ignition aid (10a) by pushing the mounting tool over the anode pin until the mechanical stop is reached.
- e) Remove the particles in the measuring chamber with dry nitrogen.
- f) Slide the polarity insert (6) into the measuring chamber up to the mechanical stop.
- g) Place the circlip (5) snugly fitting on the polarity insert.


 **Note**



Visually check that the anode pin is centered over the middle hole of the polarity insert (max. eccentricity = 0.5 mm).

- h) If possible perform a leak test (leak rate  $<10^{-9}$  mbar l/s).
- i) Put the complete measuring chamber on the table with the flange pointing downwards and carefully slide the extension piece (13) over the anode pin (→ Figure 4).
- j) Carefully slide the tube (14) over the extension piece and secure it with the two screws (16) and the lock washers (15).
- k) Slide the insulator (17) over the extension piece (13) as shown in Figure 4 and secure the pressure piece (18) with the two screws (20) and the lock washers (19).

 **Note**



The inside of the tube and the insulator must be completely clean and lint-free.

- l) Mount the magnet unit (4) and lock it with the hexagon head screw (3).
- m) Mount the electronics unit (2) and secure it with the socket head set screw (1).



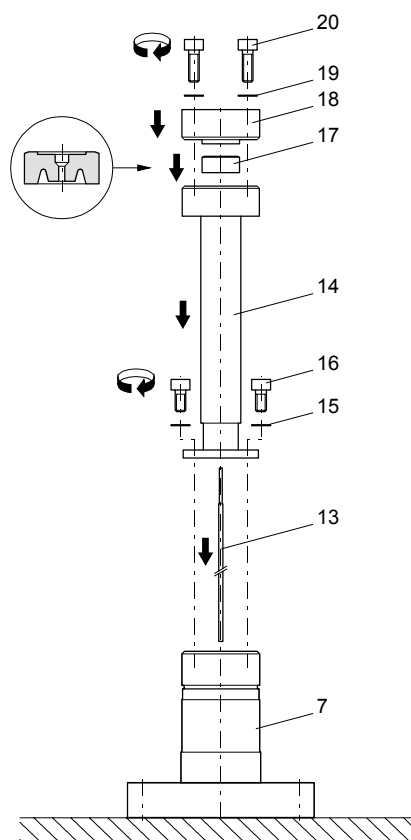


Figure 4

## 5.2 What to do in case of problems

| Problem   | Possible cause   | Correction  |
|---|--|---|
| Measuring signal continually < 0.5 V and green lamp is OFF.               | No supply voltage.   | Turn on the power supply.   |
| Measuring signal continually < 0.5 V and green lamp is ON.                | Supply voltage too low.                                    | Increase the supply voltage (→ 5).  |
|   | Electronics unit defective.                                | Replace the electronics unit (→ 12).  |
| Measuring signal continually in the range of 0.5 ... 1.96 V (underrange). | Pressure in the vacuum chamber < $5 \times 10^{-11}$ mbar. | –   |
|   | Gas discharge has not ignited.                             | Wait until the gas discharge ignites (≈ 20 minutes at a pressure of $10^{-10}$ mbar). |

## 6 Removing the gauge from the system



### DANGER



Caution: contaminated parts

Contaminated parts can be detrimental to 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



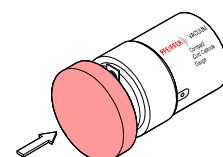
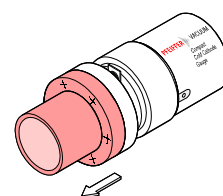
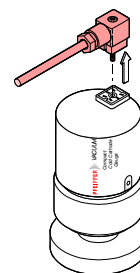
Caution: vacuum component

Dirt and damages impair the function of the vacuum component.

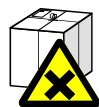
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

### Procedure

- 1 Deactivate the gauge.
- 2 Unplug the connection socket.
- 3 Detach the gauge from the vacuum apparatus.
- 4 Place the protective cap.



## 7 Returning the product



### WARNING

Caution: forwarding contaminated products

Products returned to Pfeiffer Vacuum for service or repair should, if possible, be free of harmful substances (e.g. radioactive, toxic, caustic or microbiological). Otherwise, the type of contamination must be declared.

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

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

## 8 Accessories

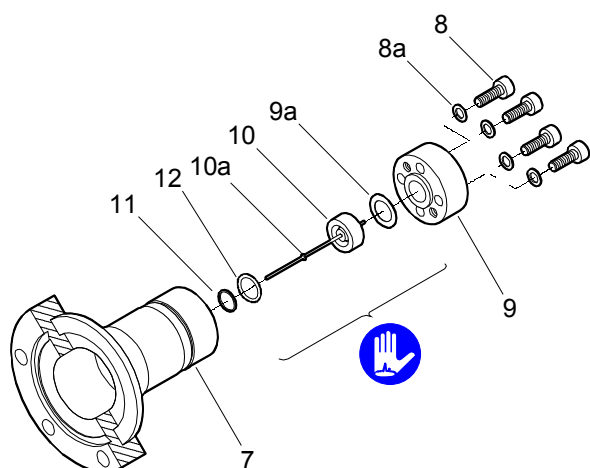
|   | Ordering number |
|---|-----------------|
| Cable for connection to Pfeiffer Vacuum measurement unit for Compact Gauges |                 |
| 3 m   | BG 448 250 -T   |
| 6 m   | BG 448 251 -T   |
| 10 m  | BG 448 252 -T   |
| Connection socket, Hirschmann   | B 4707 283 MA   |
| GO 6 WF, 6 poles, angled, female  |                 |
| Magnetic shielding  | PT 443 155 -X   |

## 9 Spare parts

Always include the following information with your spare parts order:

- Type of product
- Manufacturing number according to nameplate
- Position, description, and ordering number according to spare parts list

The following parts are available as spare parts sets:



| Pos. | Description  | Ordering number |
|------|--|-----------------|
|      | Maintenance set, consisting of:                                  | BN 846 241 -T   |
| 10a  | 3× ignition aid  |                 |
| 11   | 1× seal HNV 100 (9×1.6)  |                 |
| 12   | 1× centering ring  |                 |
| 9a   | 1× washer  |                 |
|      | Repair set, consisting of:                                       | BN 846 240 -T   |
| 10   | 1× anode, complete   |                 |
| 10a  | 3× ignition aid  |                 |
| 11   | 1× seal HNV 100 (9×1.6)  |                 |
| 12   | 1× centering ring  |                 |
| 9a   | 1× washer  |                 |
| 10a  | Set of ignition aids, consisting of:<br>10× ignition aid         | BN 845 995 -T   |
|      | Mounting tool for ignition aid                                   | BG 510 600      |
|      | Exchange gauge<br>(return defective gauge to<br>Pfeiffer Vacuum) | BG G21 251 A    |
|      | DN 40 CF-F flange, short type                                    | BG G21 261 A    |
|      | DN 40 CF-F flange, long type                                     |                 |

## 10 Disposal



### WARNING



Caution: substances detrimental to the environment

Products, operating materials etc. may have to be specially disposed of.

For environmentally compatible disposal, please contact your nearest Pfeiffer Vacuum Service Center.

## Appendix

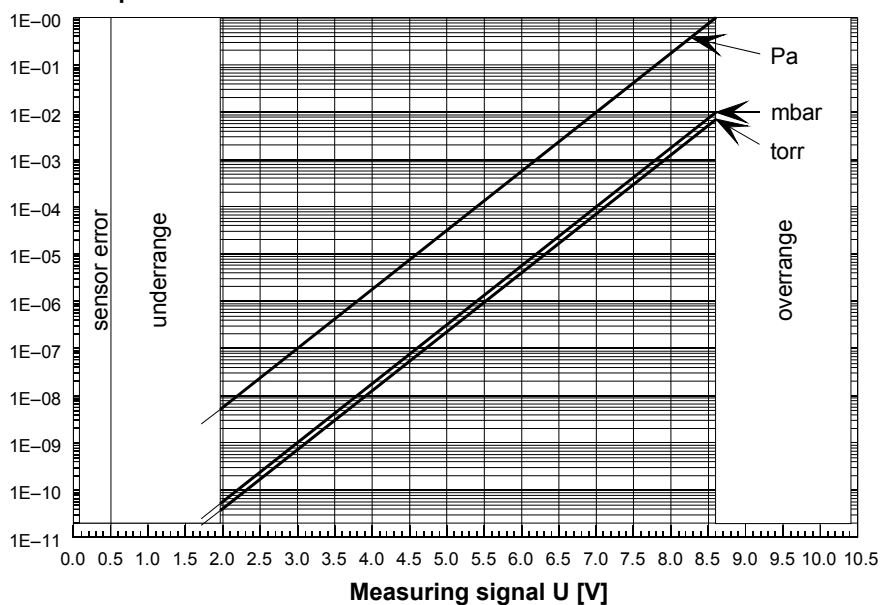
### A: Relationship between measuring signal and pressure

Conversion table

| Measuring signal U [V] | [mbar]                | Pressure p [Torr]      | [Pa]                 |
|------------------------|-----------------------|------------------------|----------------------|
| < 0.5                  | Sensor error          |                        |                      |
| 0.5...1.96             | Underrange            |                        |                      |
| 1.96                   | $5.0 \times 10^{-11}$ | $3.75 \times 10^{-11}$ | $5.0 \times 10^{-9}$ |
| 2.2                    | $1.0 \times 10^{-10}$ | $7.5 \times 10^{-11}$  | $1.0 \times 10^{-8}$ |
| 3.0                    | $1.0 \times 10^{-9}$  | $7.5 \times 10^{-10}$  | $1.0 \times 10^{-7}$ |
| 3.8                    | $1.0 \times 10^{-8}$  | $7.5 \times 10^{-9}$   | $1.0 \times 10^{-6}$ |
| 4.6                    | $1.0 \times 10^{-7}$  | $7.5 \times 10^{-8}$   | $1.0 \times 10^{-5}$ |
| 5.4                    | $1.0 \times 10^{-6}$  | $7.5 \times 10^{-7}$   | $1.0 \times 10^{-4}$ |
| 6.2                    | $1.0 \times 10^{-5}$  | $7.5 \times 10^{-6}$   | $1.0 \times 10^{-3}$ |
| 7.0                    | $1.0 \times 10^{-4}$  | $7.5 \times 10^{-5}$   | $1.0 \times 10^{-2}$ |
| 7.8                    | $1.0 \times 10^{-3}$  | $7.5 \times 10^{-4}$   | 0.1                  |
| 8.6                    | $1.0 \times 10^{-2}$  | $7.5 \times 10^{-3}$   | 1.0                  |
| 8.6...10.5             | Overrange             |                        |                      |

Conversion curves

Pressure p



Conversion formulae

$$U = c + 0.8 \times \log_{10} p \quad \Leftrightarrow \quad p = 10^{1.25 \times U - d}$$

| U   | p       | c    | d      |
|-----|---------|------|--------|
| [V] | [mbar]  | 10.2 | 12.75  |
| [V] | [μbar]  | 7.8  | 9.75   |
| [V] | [Torr]  | 10.3 | 12.875 |
| [V] | [mTorr] | 7.9  | 9.875  |

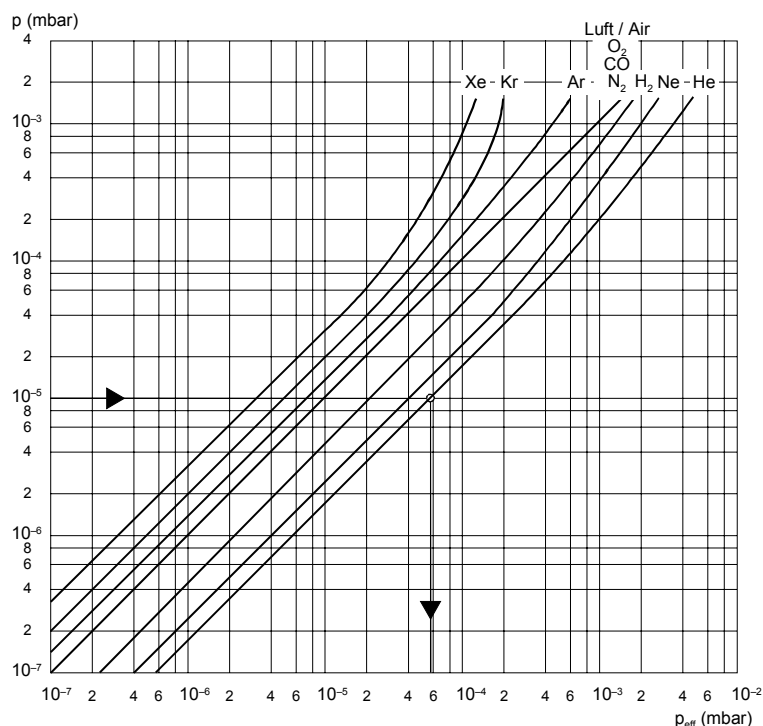
| U   | p        | c    | d     |
|-----|----------|------|-------|
| [V] | [micron] | 7.9  | 9.875 |
| [V] | [Pa]     | 8.6  | 10.75 |
| [V] | [kPa]    | 11.0 | 13.75 |

where U measuring signal  
p pressure  
c, d constants (dependent on pressure unit)

valid in the range:  
 $1 \times 10^{-11} \text{ mbar} < p < 1 \times 10^{-2} \text{ mbar}$   
 $7.5 \times 10^{-12} \text{ Torr} < p < 7.5 \times 10^{-3} \text{ Torr}$   
 $1 \times 10^{-9} \text{ Pa} < p < 1 \text{ Pa}$

## B: Gas type dependence

Indicated pressure  
(Gauge calibrated for air)



Indication range below  
 $10^{-5}$  mbar

In the range below  $10^{-5}$  mbar the pressure indication is linear. 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> , CO) | 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 average values.



### Note



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

## 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 authorised 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"/>    |



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

### 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<br>Manufacturer | Chemical name<br>(or symbol) | Dangerous<br>material class | Measures if spillage | First aid in case of<br>human contact |
|------------------------------------|------------------------------|-----------------------------|----------------------|---------------------------------------|
|                                    |                              |                             |                      |                                       |
|                                    |                              |                             |                      |                                       |
|                                    |                              |                             |                      |                                       |
|                                    |                              |                             |                      |                                       |
|                                    |                              |                             |                      |                                       |

### 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 organisation or company \_\_\_\_\_

Address \_\_\_\_\_ Post code \_\_\_\_\_

Phone \_\_\_\_\_ Telex \_\_\_\_\_

E-Mail \_\_\_\_\_

Name \_\_\_\_\_

Date and legally binding signature \_\_\_\_\_

Company stamp \_\_\_\_\_

Copies: Original to manufacturer or representative - 1 copy attach to consignment packaging - 1 copy for file of sender

Original: German BG 805 008 BD / A (0206)



bg805008be/ a

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