Bayard-Alpert Pirani Gauge

**BPG400**

**BPG400-SD**

**BPG400-SP**

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**Product Identification**

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

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**Safety**

**Symbols Used**

Information on preventing any kind of physical injury.

**General Safety Instructions**

- Adhere to the applicable regulations and take the necessary precautions for the process media used.
- Consider possible reactions (e.g., decomposition) 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 doing and follow the safety instructions in the documentation.
- 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.

**Personnel Qualifications**

**Skilled personnel**

All work described in this document may only be carried out by personnel who have suitable technical training in the area of vacuum engineering or experience working with the necessary equipment or who have been instructed by the end-user of the product.

**Validity**

This document applies to products with the following part numbers (PN): BPG400 (without display), 353-503 (DN 25 ISO-KF), 353-502 (DN 40 CF-R).

BPG400 (with display), 353-502 (DN 25 ISO-KF), 353-503 (DN 40 CF-R).

BPG400-SD (with Deutch interface and switching functions), 353-507 (DN 25 ISO-KF), 353-503 (DN 40 CF-R).

BPG400-SP (with Profibus interface and switching functions), 353-503, 353-505 (DN 25 ISO-KF), 353-505 (DN 40 CF-R).

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

If not indicated otherwise in the legends, the illustrations in this document correspond to the gauge with part number 353-503. They apply to the other gauges by analogy. We reserve the right to make technical changes without prior notice. All dimensions in mm.

**Intended Use**

The BPG400-SD and BPG400-SP gauges have been designed for vacuum measurement of gases in the pressure range of 5×10⁻¹⁰ ... 10⁻⁶ mbar. They must not be used for measuring flammable or combustible gases in mixtures containing oxides (e.g., atmospheric oxygen) with the exception of helium.

The gauges can be operated in connection with the VGC103 or VGC405 Vacuum Gauge Controller or with another instrument or control device.

**Functional Principle**

Over the complete measuring range, the gauge has a continuous characteristic curve and its measuring signal is output directly as a function of the pressure.

The gauge functions with a Bayard-Alpert hot-cathode ionization measurement system (for p ≤ 5×10⁻³ mbar) and a Pirani measurement system (for p > 5×10⁻³ mbar). The output signal of the two measurement systems is output. The hot-cathode is switched on by the Pirani measurement system only below the switching threshold of 2×10⁻⁴ mbar (to prevent filament burn-out). It is switched off when the pressure exceeds 2×10⁻³ mbar.

**Trademark**

Device® Open DeviceNet Vendor Association, Inc.

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**Technical Data**

- **Measuring range**
  - (air, CO₂, N₂) 5×10⁻¹⁰ ... 1 000 mbar (at 20 °C and 1 bar)
  - Repetitiveness 5% of reading in the range of 1×10⁻⁸ ... 10⁻⁵ mbar (after 5 min. stabilization)

- **Emission**
  - Switching on threshold 2.4×10⁻⁴ mbar
  - Switching off threshold 3.2×10⁻⁵ mbar
  - Emission current p > 1×10⁻⁵ mbar 5 mA
  - Emission current switching 25 µA ≤ p ≤ 5.9×10⁻⁸ mbar
  - 2.4×10⁻⁴ mbar
  - 1×10⁻⁴ mbar
  - 1×10⁻³ mbar

- **Emission Current**
  - Switching on threshold 2.4×10⁻⁴ mbar
  - Switching off threshold 3.2×10⁻⁵ mbar
  - Emission current p > 1×10⁻⁵ mbar 5 mA
  - Emission current switching 25 µA ≤ p ≤ 5.9×10⁻⁸ mbar
  - 2.4×10⁻⁴ mbar
  - 1×10⁻⁴ mbar
  - 1×10⁻³ mbar

- **Degas**
  - Current (p > 7×10⁻⁶ mbar) -16 mA (Pgas = -4 V).

- **Control input signal**
  - Output signal (measuring signal) 0 / 10 V (open collector, high active)
  - Duration ≥ 3 s, followed by automatic stop. In degas mode, the BPG400 teaves supplying pressure readings, the tolerances of which can be higher than normal operation.

- **Measuring range**
  - Measuring range 0.774 ... 10 V
  - Measuring signal U[V] = 0.000 774 · p [mbar] + 1.2.

- **Voltage vs. pressure logarithmic**
  - Error signal (ripple 2 Vpp) ≤ 1.4 A

- **Switching on threshold**
  - Switching on threshold 2.4×10⁻⁴ mbar
  - Switching off threshold 3.2×10⁻⁵ mbar
  - Emission current p > 1×10⁻⁵ mbar 5 mA
  - Emission current switching 25 µA ≤ p ≤ 5.9×10⁻⁸ mbar
  - 2.4×10⁻⁴ mbar
  - 1×10⁻⁴ mbar
  - 1×10⁻³ mbar

  - 1E+00
  - 1E–02
  - 1E–04
  - 1E–06
  - 1E–08

- **Measuring Signal vs. Pressure**
  - Measuring signal U[V] = 0.000 774 · p [mbar] + 1.2

- **Electrical connection**
  - Power consumption 16 W
  - Fuse required 3A
  - Power connection 2×40 UNC 2B
  - Power consumption 15 W
  - Power connection 4×40 UNC 2B

- **Dimension (mm)**
  - 4-40UNC 2B
  - 4-40UNC 2B

- **Pressure p [mbar]**
  - 1E+00
  - 1E–02
  - 1E–04
  - 1E–06
  - 1E–08

- **Gas Pressure**
  - Gas pressure p [mbar]
  - Gas pressure p [Torr]

- **Gas Type**
  - Gas type Calibration factor C Gas type Calibration factor C
  - He 5.9 1.0
  - Ar 4.1 2.4
  - Kr 0.5 0.4
  - Xe 0.8

- **Operation**
  - Maximum admissible pressure 2 bar (absolute)
  - Limited admissible pressures
  - Atmosphere ≤ 2 mbar
  - ≤ 2 mbar (to ≤ 50 m (4/5/7x0.34 mm²))

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**Installation**

**Vacuum Connection**

- 2D-Sub, 15-pin, male
- 4 conductors, shielded
- 5 conductors, shielded
- Cable length (20 Vdc)
- 353-502 (DN 40 CF-R)
- 353-503 (DN 40 CF-R)
- 353-505 (DN 25 ISO-KF)
- 353-507 (DN 25 ISO-KF)

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**Power Connection (BPG400)**

- The following information on the electrical connection as well as the wiring diagram applies to BPG400-SD and -SP.

- If no connection cable is available, make one according to the following diagram.

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**Liability and Warranty**

INFICON assumes no liability and the warranty becomes null and void if the end user or third parties:

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

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

Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g., flares), are not covered by the warranty.
1. Connect the sensor cable to the gauge.

2. Adjusting the gauge
   - BPG400 with display 353-500
   - BPG400 with display 353-501
   - BPG400 with display 353-502
   - BPG400 with display 353-503
   - Insert a pin (e.g. 3x5mm) through the opening marked «PUSH SCALE» and push the button inside for at least 5 seconds.

3. Secure the cable connector with the lock screws.

4. Connect the sensor cable to the controller.

Deinstallation

- DANGER: contaminated parts
- Contaminated parts can be detrimental to health and environment.
- Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Return the Product

- WARNING: forwarding contaminated products
- Contaminated products (e.g. radioactive, toxic, caustic or microbiological hazards) can be detrimental to health and environment.
- Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Gas Type Dependence (BPG400)

The measurement value is gas dependent. The displayed reading applies to dry air, O₂, CO, and N₂. For other gases, it has to be converted (→ "Technical Data" and [1]).

Adjusting the Gauge

- The adjustment of BPG400 with display 353-501 and 353-503 (→ [1]) is slightly different from the procedure for BPG400, which is described below.

The gauge is factory calibrated. If used under different climatic conditions, at extreme temperatures, through aging or contamination and after exchanging the sensor, the measurement value can be offset and readjustment can become necessary. Only the Pirani element can be adjusted and only at atmosphere.

Readjustment becomes necessary if:

- a) atmosphere the output voltage is <10 V or the display reading is "atmosphere"
- the vacuum system, the output voltage reaches 10 V before the measured pressure has reached atmosphere (Gauges with display will show the error "5" at atmosphere [Pirani sensor warning]).

Activate the gauge.

- Operate the gauge for >10 minutes at atmospheric pressure. If the gauge was operated within the BA range, a cooling-down time of >10 minutes is to be expected (gauge temperature = environmental temperature).

Vent the vacuum system.

- Put the gauge out of operation.

Unfasten the lock screws and unplugging the sensor cable. (If you are using BPG400-SD or -SP, unfasten and unplug the interface cable too (→ [1] and [2]).

Remove the gauge from the vacuum system.

Display (BPG400 with part numbers 353-501 and 353-503)

- Pressure reading
  - Pressure unit
- Function display
  - Pirani operation
  - Emission 25 μA
  - Emission 5 mA
  - Degree
  - 1000 mbar adjustment (Pirani)
- Error display
  - "no error" (green background illumination)
  - Pirani sensor warning
  - Pirani sensor error
  - BA sensor error (red background illumination)

Disposal

- DANGER: contaminated parts
- Contaminated parts can be detrimental to health and environment.
- Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Separating the components

- After disassembling the product, separate its components according to the following criteria:
  - Contaminated components
  - Other components
- Such components must be separated according to their materials and recycled.