VACUUM SOLUTIONS

Part of the BUSCH GROUP

Analog Transmitter

Vacuum Measurement Equipment
VACTEST GTP 100-200,
VACTEST GTP 100 C

Instruction Manual

SERVICE
AND SPARE PARTS, INSTRUCTION MANUALS ...
WWW.BUSCHVACUUM.COM/SERVICE-CONTACT
VACUUM APP

CE UK CA

0870205302 | -0003_en-US | Original instructions

2025/05/02

Table of Contents

1 Safety

- Read and follow the instructions of this manual.
- Inform yourself regarding hazards, which can be caused by the product or arise in your system.
- Comply with all safety instructions and regulations for accident prevention.
- Check regularly that all safety requirements are being complied with.
- Take account of the ambient conditions when installing your gauge. The protection class is IP 40 for GTP 100/100 C and IP 54 for GTP 200.
- Adhere to the applicable regulations and take the necessary precautions for the process media used.
- Consider possible reactions between materials and process media, e.g. due to the heat generated by the product.
- Before you start working, find out whether any of the vacuum components are contaminated.
- Do not carry out any unauthorized conversions or modifications on the unit.
- Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.
- When returning the unit to us, please enclose a declaration of contamination.
- Communicate the safety instructions to other users.

This instruction manual highlights potential hazards where appropriate. Safety notes and warning messages are tagged with one of the keywords DANGER, WARNING, CAUTION, NOTICE and NOTE as follows:

DANGER

... indicates an imminent dangerous situation that will result in death or serious injuries if not prevented.

WARNING

... indicates a potentially dangerous situation that could result in death or serious injuries.

CAUTION

... indicates a potentially dangerous situation that could result in minor injuries.

NOTICE

... indicates a potentially dangerous situation that could result in damage to property.

NOTE

... indicates helpful tips and recommendations, as well as information for efficient and trouble-free operation.

2 VACTEST GTP 100-200 or GTP 100 C

2.1 For Orientation

These operating instructions describe installation and operation of the GTP 100, GTP 200 or GTP 100 C.

The part number can be found on the product's type label. Technical modifications are reserved without prior notification.

2.2 Delivery Content

Included in the delivery consignment are:

- Analog Transmitter GTP 100, GTP 200 or GTP 100 C
- Protective flange cover
- Instruction manual

2.3 Product Description

The Analog Transmitter GTP 100 or GTP 200 is measuring total gas pressure in the range of 1000 – 1 x 10^{-4} mbar. The Analog Transmitter GTP 100 C is equipped with Platinum / Rhodium filament for applications with corrosive gases in the range 1000 - 5 x 10^{-4} mbar. The transmitter can be connected to customer related power supply and evaluation units in compliance with pin assignment.

The analog output signal for GTP 100 or GTP 100 C is 0 – 10 V, while for GTP 200, it is 4 - 20 mA. These analog transmitters have a logarithmic dependence on pressure over the whole range.

The Analog Transmitter GTP 100 or GTP 200 is equipped with a metal-sealed sensor type pirani and temperature compensated. It can be mounted to suitable flange connectors.

2.4 Proper Use

NOTE

Sensor performance issue and malfunction!

Dust, oil or condensing vapors will affect sensor performance and may cause malfunction!

NOTE

The device is not designed for use in a corrosive atmosphere!

For GTP 100 and GTP 200 the aggressive media such as halogenides, carbon or oxygen plasma can reduce the device lifetime!

For GTP 100 C the aggressive media such as fluorides can reduce device lifetime!

The GTP 100, GTP 200 or GTP 100 C serves exclusively to provide absolute pressure measurements in gaseous media in the range of 1000 - 1 x 10^{-4} (GTP 100, GTP 200) and for GTP 100 C 1000 - 5 x 10^{-4} mbar. It may only be connected to components specifically provided for such purpose.

The gauge is classified in electromagnetic interference class A and therefore can cause radio interference in living quarters.

2.5 Improper Use

The use for purposes not mentioned above is regarded as improper, in particular:

- Connection to pumps or units which are not suitable for this purpose according to their operating instructions.
- Connection to components containing touchable, voltage carrying parts.

No liability or warranty will be accepted for claims arising from improper use.

The user bears the responsibility with respect to the used process media.

3 Installation

CAUTION

Unauthorized modifications.

Risk of injury!

- Unauthorized modifications or conversions of the gauge are not allowed.

3.1 Notes for Installation

Installation location: Indoor

Temperature: +5 °C ... +60 °C

Rel. humidity: max. 80% up to 30 °C, max. 50% at 40 °C, non-condensing

Air pressure: 860 - 1060 hPa (mbar)

3.2 Vacuum Connection

CAUTION

Unintended opening of clamp with an overpressure in the vacuum system over 1000 mbar.

Risk of injury!

Damage to your health!

- Parts may fly around.
- Unsecured hose connections can release process media.

CAUTION

Overpressure in the vacuum system over 1500 to 4000 mbar

Damage to your health!

The elastomer washers cannot withstand the pressure and can release process media.

- Use sealing rings with an outer centering ring.

NOTE

When mounting the VACTEST avoid forced twisting or violent opening. This can damage the device.

NOTICE

Dirt and damage at the vacuum flange and/or thread connection.

Impairs the function of the gauge!

- Make sure that the flange and/or thread connection is/are clean, dry and free of grease.
- When handling the instrument, make sure that the flange and/or thread connection is/are protected against dirt and damage.

- Remove the protective cover (is required again during maintenance work!).
- Make vacuum connection via ISO KF small flange.
- For small flange connection use clamps that can be opened and closed with appropriate tools only, use sealing rings with a centering ring.
- Make sure that the sensor flange is connected to ground, e.g. by having electrical contact to grounded vacuum chamber (use metallic clamps).

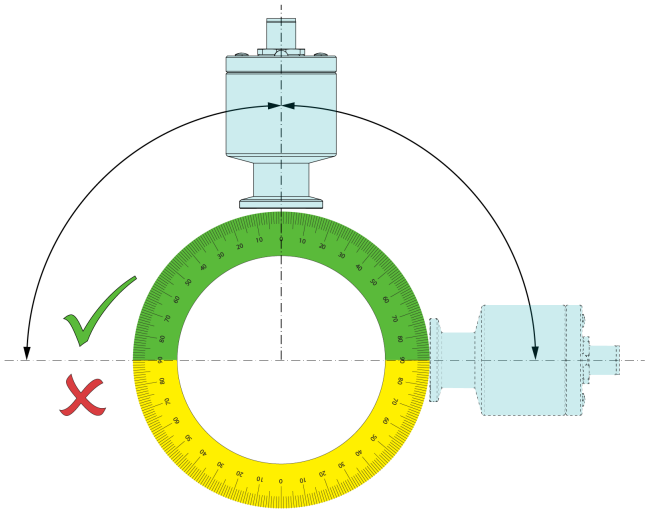
3.2.1 Gauge Mounting Orientation

You can mount the device in any orientation. However, mounting the device from below with the flange facing upwards, can lead to premature contamination and failure of the device. It is recommended to mount the device from upright position with the flange facing downwards to prevent dust and condensate from accumulating in the sensor cell.

When device is installed in different orientation without readjustment, this action will lead to reduced accuracy at pressures above 20 mbar.

NOTE

The device is adjusted ex-factory with the flange facing downwards position.



3.3 Electrical Connection

DANGER

Live wires.

Risk of electrical shock!

- Electrical installation work must only be executed by qualified personnel.

NOTICE

Establish a connection using a live cable.

Risk of damage to the device!

- Only connect cables when de-energized.

3.3.1 Connecting to the Active Sensor Controller

DANGER

Live wires!

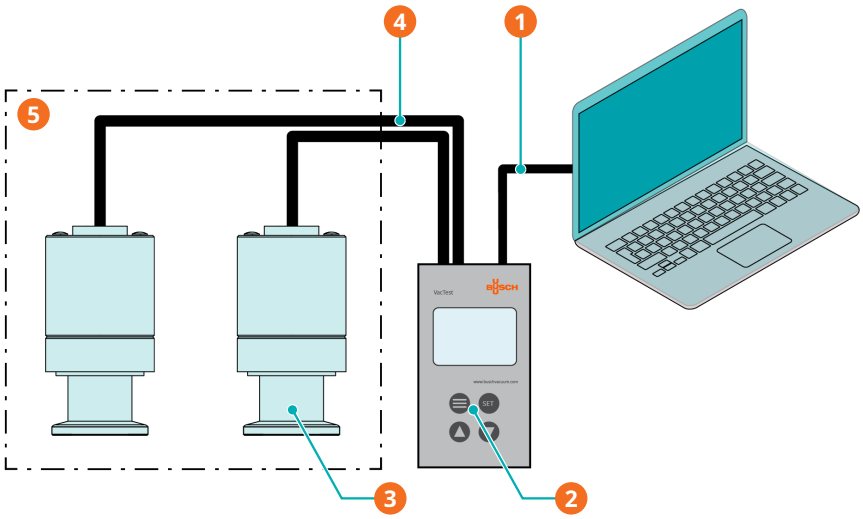
Risk of electrical shock!

- Do not connect or disconnect the transmitter when the cable is on circuit!

To operate the gauge with the controller, a suitable measurement connection cable must be used. In this case, contact your BUSCH representative or the responsible company of the controller to determine the appropriate connection cable.

NOTE

Connection to the controller can only be done with 0 ... 10 V analog transmitters.



Description			
1	USB	2	Active sensor controller
3	Transmitter	4	Cable
5	With the controller CTR 002: up to 2 gauges can be connected.		

- Connect the cable from the controller to the gauge.
- Connect the cable plug to the transmitter and secure with screw.
- Connect the other end of the cable to the display unit and secure the plug.
- Now connect the display unit to mains power or switch it on respectively.

3.3.2 I/O and Communication Port Schematic

NOTICE

Incorrect supply voltage.

Risk of damage to the device!

- Make sure to supply a correct and admissible voltage.

The transmitter can also be operated with other customer related display units or voltage supplies.

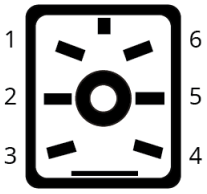
The electrical connection is to be made by means of suitable cables considering EMI demands and according to the pin description shown below:

Connector and Schematic of GTP 100 or GTP 100 C:

NOTE

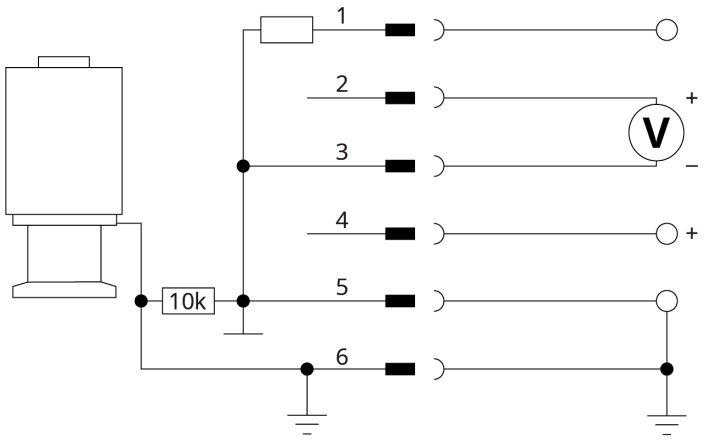
"Ground" (Pin 6) and supply common (Pin 5) must always be grounded.

Connector Type: Hirschmann, 6-pin, male



Pin No.	Description	Pin No.	Description
Pin 1	Identification: 3.0 kΩ	Pin 4	Voltage supply 15 ... 30 VDC
Pin 2	Signal output 0 - 10 VDC	Pin 5	Supply GND
Pin 3	AGND	Pin 6	Ground

Schematic diagram of electrical connection:



Pin No.	Description	Pin No.	Description
Pin 1	Identification: 3.0 kΩ	Pin 4	Voltage supply 15 ... 30 VDC
Pin 2	Signal output 0 - 10 VDC	Pin 5	Supply GND
Pin 3	AGND	Pin 6	Ground

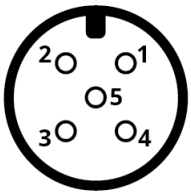
Connector and Schematic of GTP 200:

NOTE

Maximum admissible load resistor in Ω :

(supply voltage (V) – 4 V) / 0.02 A

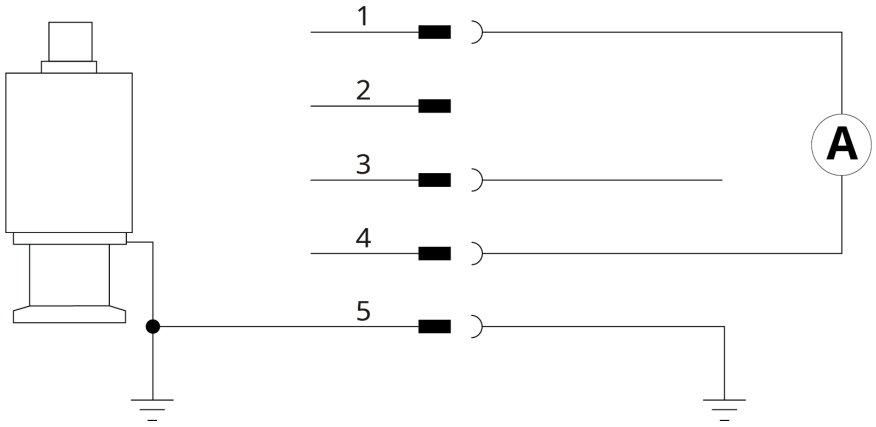
Connector Type: M12, A-coded, 5-pin, male



Pin No.	Description	Pin No.	Description
Pin 1	Signal output 4 - 20 mA	Pin 4	Supply GND
Pin 2	Do not connect	Pin 5	Ground

Pin No.	Description	Pin No.	Description
Pin 3	Voltage supply 15 ... 30 VDC		

Schematic diagram of electrical connection:



Pin No.	Description	Pin No.	Description
Pin 1	Signal output 4 - 20 mA	Pin 4	Supply GND
Pin 2	Do not connect	Pin 5	Ground
Pin 3	Voltage supply 15 ... 30 VDC		

4 Operation

4.1 General

The Analog Transmitter is equipped with an internal Pirani sensor. The sensor filament is heated to a certain temperature threshold in pulsed mode, the time required for heating is a measure for total gas pressure.

Output Signal for GTP 100 and GTP 100 C

The output signal for the GTP 100 and GTP 100 C is 0–10 V, and both have a logarithmic dependence on pressure over their entire measurement ranges: 1000 - 1×10^{-4} mbar for the GTP 100, and 1000 - 5×10^{-4} mbar for the GTP 100 C. Conversion of voltage signal and pressure is done according to the following formula:

$V_{out}(V) = \text{Log}\,(p(\text{mbar})) + 5.5$

$p(\text{mbar}) = 10^{(Vout(V) - 5.5)}$

Output Signal for GTP 200

The output signal 4.0 – 20 mA of the Analog Transmitter has a logarithmic dependence on pressure over the whole measurement range 1000 – 1×10^{-4} mbar. Conversion of output signal and pressure is done according to the following formula:

$I_{out}(mA) = 16/7 \times \log(p(\text{mbar})) + 92/7$

$p(\text{mbar}) = 10^{(7/16 \times (Iout(mA) - 92/7))}$

Warm-Up Time

The signal output is available approx. 2 seconds after the device is switched on. To take advantage of the maximum accuracy of the unit it is appropriate to allow for a stabilization time of 5 minutes, especially when extreme pressure changes have occurred.

Accuracy

The gauge is adjusted ex-factory in upright position with a supply voltage of 24 VDC. Through contamination, aging, extreme climatic conditions, or other installation orientations may require readjustment.

Accuracy is reduced in the range above 20 mbar.

4.1.1 Gas Correction Factor

The output signal of the Pirani sensor depends on composition and type of the gas being measured. The unit is adjusted for N2 and dry air. For other gases the pressure reading can be corrected below 0.1 mbar by means of gas type factors.

Correction factor for pirani sensor

Gas Name	Value	Gas Name	Value	Gas Name	Value	Gas Name	Value
Ar	1.6	CO_2	0.89	He	1.0	Ne	1.4
CO	1.0	H_2	0.57	N_2	1.0	Kr	2.4

4.2 Readjustment

The gauge is adjusted ex-factory in upright position with a supply voltage of 24 V with the flange facing down. Other orientations, different climatic conditions, extreme temperature changes, ageing or contamination may necessitate readjustment.

NOTE

Conduct adjustment at the same ambient temperature at which the device is typically operated.

NOTE

To achieve optimum results of the adjustment we recommend to consider a warm-up of at least 15 minutes at the appropriate calibration pressure before any adjustment.

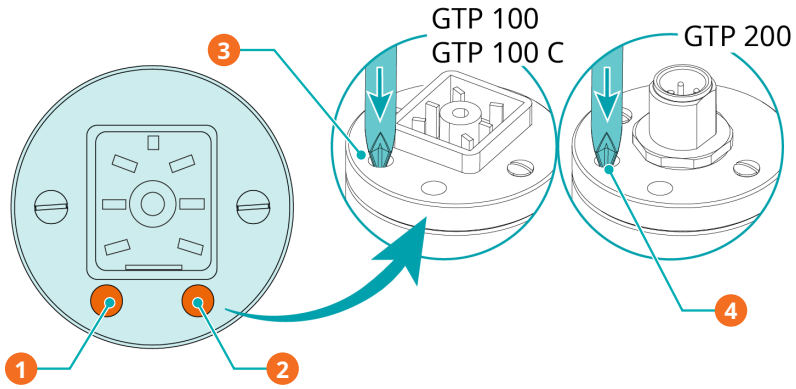
4.2.1 Readjustment at Zero or Atmospheric Pressure

Digital readjustment at zero or atmosphere pressure can be done by means of the »Adj« pushbuttons. The transmitter will notice automatically which adjustment point is relevant.

NOTE

For zero adjustment the actual pressure must be less than 5 x 10^{-5} mbar. Alternatively, the transmitter can also be adjusted on a variable zero reference pressure. Refer the adjustment process below.

When atmospheric pressure is applied, the output signal is set to a value according to the formula in *General* [➔ 13], depending on the actual applied pressure.



Description			
1	"Adj" Pushbutton	2	"Set" Pushbutton
3	Pressure adjustment with screwdriver (GTP 100 or GTP 100 C)	4	Pressure adjustment with screwdriver (GTP 200)

Adjust the gauge pressure as follows:

- Remove the rubber cap from the »Adj« pushbutton.
- Press the button “Adj” to adjust the signal.

When successfully adjusted, the transmitter’s output signal correspond to a value of 1000 mbar atmospheric pressure or measurement under range »ur« respectively.

- Insert the rubber cap again to its initial position.

4.2.2 Readjustment at User-Defined Zero Reference Pressure

The Pirani sensor can alternatively be adjusted on user-defined zero reference pressure below 1 x 10^{-2} mbar.

- Remove the rubber caps above the “Adj” and “Set” pushbuttons.
- Press the button “Set” by means of a small screwdriver or similar tool.

Now a voltage is provided at the signal output for 5 seconds which corresponds to the actual zero reference pressure (Ex-factory setting: signal for »ur« pressure under-range).

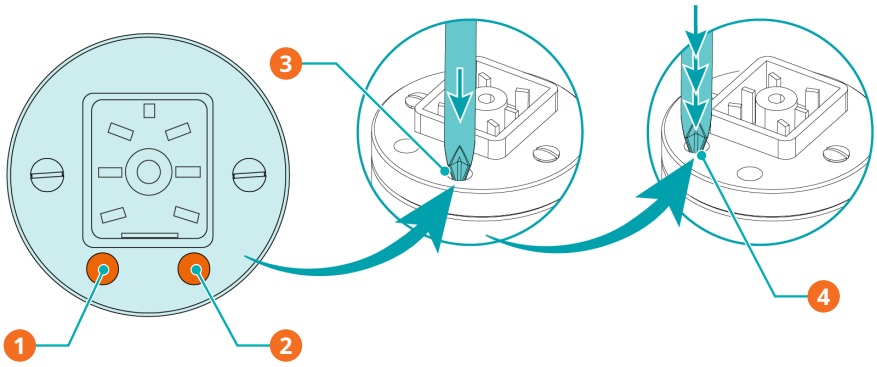
- Press the “Adj” button several times to increment this value to maximum 1 x 10^{-2} mbar according to the pressure and output signal value described in *General* [➔ 13]. After reaching the maximum value, the voltage will again restart at the signal level for »ur« under-range.

When the voltage output is correctly adjusted to the actual reference pressure, the adjustment procedure is carried out automatically if no further button is pressed after 5 seconds.

- Insert the rubber caps again to their initial positions.

NOTE

Transmitter’s readjustment with using a single stroke on the »Adj« button as described in the *Readjustment at Zero or Atmospheric Pressure* [➔ 14] will from now on adjust the output signal to the set zero reference value.



Description			
1	"Adj" Pushbutton	2	"Set" Pushbutton
3	Pressure adjustment using a screwdriver by pressing "Set" pushbutton	4	Pressure adjustment using a screwdriver by pressing the 'Adj' pushbutton

5 Maintenance and Service

DANGER

Danger of possibly contaminated parts!

Contaminated parts can cause personal injuries.

- Inform yourself regarding possible contamination before you start working.
- Be sure to follow the relevant instructions and take care of necessary protective measures.

CAUTION

The unit is not prepared for customer repair!

NOTE

Malfunction of the unit which is caused by contamination or wear and tear is not covered by warranty.

The unit requires no maintenance. External dirt and soiling can be removed by a damp cloth.

When returning the gauge for service please fill out a declaration of contamination form and include it in the shipment. This document is mandatory to protect our service staff.

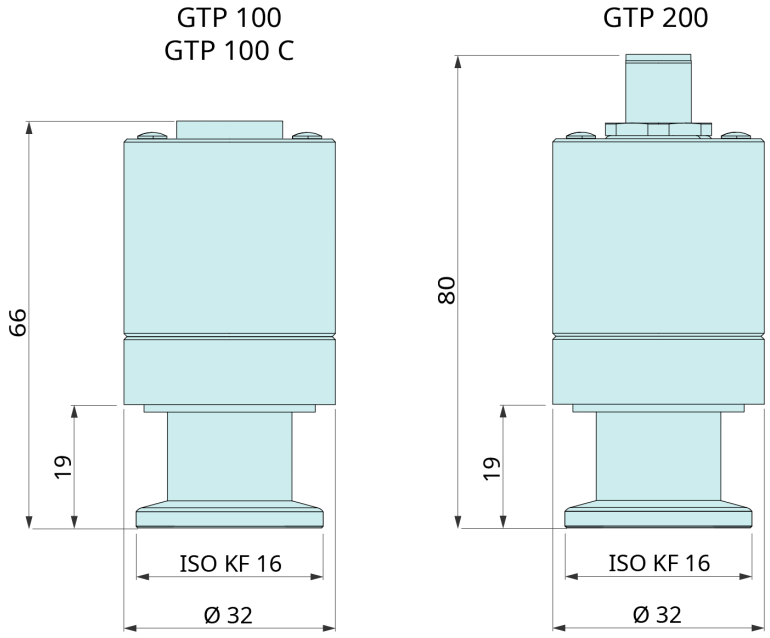
For downloading the declaration of contamination form, *click here*.

5.1 Errors and Malfunctions

The device will show error messages as plain text on the display. Additionally, the following typical issues can appear:

Problem	Possible Cause	Correction
High measurement error	Contamination, ageing, extreme temperature, maladjustment	Readjustment
GTP 100 or GTP100 C: Output signal < 1.4 V or, **GTP 200:** Output signal < 3.8 mA	Pressure under range	Pressure is below range limit
GTP 100 or GTP 100 C: Output signal < 0.5 V or, **GTP 200:** Output signal < 3.6 mA or > 21 mA	Defective electronics or sensor	Send unit for repair
Adjustment not possible	Measurement error exceeds possible range of readjustment	Send unit for repair

6 Technical Data



	VACTEST GTP 100	VACTEST GTP 100 C	VACTEST GTP 200
Measurement principle	Heat conduction impulse Pirani, depending on gas type		
Measuring range	1000 - 1.0 x 10^{-4} mbar (750 - 1.0 x 10^{-4} Torr)	1000 - 5.0 x 10^{-4} mbar (750 - 5.0 x 10^{-4} Torr)	1000 - 1.0 x 10^{-4} mbar (750 - 1.0 x 10^{-4} Torr)
Max. overload	10 bar abs.		
Accuracy	1000 ... 20 mbar: approx. 30% of reading 20 ... 2.0 x 10^{-3} mbar: 10% of reading	1000 ... 10 mbar: approx. 30% of reading 10 ... 1.0 x 10^{-2} mbar: 10% of reading	1000 ... 20 mbar: approx. 30% of reading 20 ... 2.0 x 10^{-3} mbar: 10% of reading
Repeatability	20 ... 2.0 x 10^{-3} mbar: 2% of reading	10 ... 1.0 x 10^{-2} mbar: 5% of reading	20 ... 2.0 x 10^{-3} mbar: 2% of reading
Materials in contact with vacuum	stainl. steel 1.4307, tungsten, nickel, glass	stainl. steel 1.4307, platinum/rhodium, nickel, glass	stainl. steel 1.4307, tungsten, nickel, glass
Reaction time	< 200 ms		
Operating temperature	5 ... 60 °C		
Storage temperature	-20 ... +70 °C		
Bake-out temperature	max. 150 ◦C at the flange (voltage supply switched-off)		
Voltage supply	15 – 30 VDC		
Power consumption	max. 1.0 W at 24 VDC	max. 1.5 W at 24 VDC	
Output signal	0 – 10 VDC, logarithmic, min. 10 kΩ		4 - 20 mA, logarithmic
Electrical connection	Type Hirschmann, 6-pin, male, lockable		M12 round type A-coded, 5-pin, male, lockable

	VACTEST GTP 100	VACTEST GTP 100 C	VACTEST GTP 200
Vacuum connection	Small flange DN16 ISO KF		
Protection class	IP 40		IP 54
Weight	Approx. 120 g		

7 EU Declaration of Conformity

This Declaration of Conformity and the CE-markings affixed to the nameplate are valid for the gauge within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer

Busch Produktions GmbH
Schauinslandstr. 1
DE-79689 Maulburg

declares that the gauge: VACTEST GTP 100; VACTEST GTP 200; VACTEST GTP 100 C

fulfill(s) all the relevant provisions from EU directives:

– 'Electromagnetic Compatibility' (EMC) 2014/30/EU
– 'RoHS' 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (incl. all related applicable amendments)

and comply(-ies) with the following harmonized standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN 61326-1 : 2013 Group 1 / Class B	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN IEC 63000 : 2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Legal person authorized to compile the technical file and authorized representative in the EU (if the manufacturer is not located in the EU):

Busch Dienste GmbH
Schauinslandstr. 1
DE-79689 Maulburg

Maulburg, 2025.01.02

Dr. Martin Gutmann

General Manager

Busch Produktions GmbH

8 UK Declaration of Conformity

This Declaration of Conformity and the UKCA-markings affixed to the nameplate are valid for the gauge within the Busch scope of delivery. This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer

Busch Produktions GmbH
Schauinslandstr. 1
DE-79689 Maulburg

declares that the gauge: VACTEST GTP 100; VACTEST GTP 200; VACTEST GTP 100 C

fulfill(s) all the relevant provisions from UK legislations:

– Electromagnetic Compatibility Regulations 2016

– Restriction of the use of certain hazardous substances in Electrical and Electronic Equipment Regulations 2012

and comply(-ies) with the following designated standards that have been used to fulfill those provisions:

Standard	Title of the Standard
EN 61326-1 : 2013 Group 1 / Class B	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements
EN IEC 63000 : 2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Legal person authorized to compile the technical file and importer in the UK (if the manufacturer is not located in the UK):

Busch (UK) Ltd
30 Hortonwood
Telford – UK

Maulburg, 2025.01.02

Dr. Martin Gutmann

General Manager

Busch Produktions GmbH

Notes

BUSCH GROUP

The Busch Group is one of the world's largest manufacturers of vacuum pumps, vacuum systems, blowers, compressors and gas abatement systems. Under its umbrella, the group houses two well-known brands: Busch Vacuum Solutions and Pfeiffer Vacuum+Fab Solutions. Together, they offer solutions to a wide range of industries. A global network of highly competent local teams in 44 countries ensures that expert, tailor-made support is always available near you. Wherever you are. Whatever your business.

- Busch Group companies
- Busch Group production sites
- Busch Group service centers
- Busch Group local representatives

www.buschvacuum.com

www.pfeiffer-vacuum.com

0870205302 | -0003_en-US