Instruction Manual

VacTest

Vacuum Measurement Equipment

Analog Transmitter GTP 100-200
Analog Transmitter GTP 100 C

Busch Produktions GmbH
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0870205302/-0001_en / Original instructions / Modifications reserved 10/04/2018

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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 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.
- Consider possible reactions of the process media due to the heat generated by the product.
- Before you start working, find out whether any of the 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.

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 Product Description

The analog transmitters GTP 100 and GTP 200 are spiral coil filament Pirani sensors whose measurement principle are based on the thermal conductivity of gases.

This sensor type provides indirect pressure measurements which are dependent on the gas nature.

The GTP 100 C is equipped with a Platinum / Rhodium filament for better resistance to corrosion.

2.1 Product Identification

The product model can be found on the product's nameplate. 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 cover
- Instruction manual

Available accessories, consult the chapter Spare Parts and Accessories.

2.3 Proper Use

The GTP 100, GTP 200 or GTP 100 C serves exclusively to measure total pressure in a range of:

- 1000 … 1 x 10^{-4} mbar for GTP 100 and GTP 200
- 1000 … 5 x 10^{-4} mbar for GTP 100 C

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

2.4 Improper Use

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

- Connection to pumps or units which are not suitable for this purpose according to their operating instructions.
- Connection to units which have exposed voltage-carrying parts.
- Operation of the devices in areas with ionizing radiation.

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

3 Transport and Storage

- Check the device for transport damage.

NOTICE

Devices without external protection.

Risk of damage to the device!

- The device must not come into contact with electrostatically chargeable materials and must not be moved within electrical or high magnetic fields.

If a storage is planned:

- Seal the vacuum flange with the protective cover.
- Comply with the storage temperatures, see technical data.
- In rooms with moist or aggressive atmospheres, the device must be airproof shrink-wrapped in a plastic bag together with a bag a desiccant.

4 Installation

⚠ CAUTION

Unauthorized modifications.

Risk to injury!

- Modifications or conversions of the gauge are not allowed.

4.1 Installation Conditions

- Make sure that the environment of the device is not potentially explosive.
- Make sure that the ambient conditions comply with the Technical Data [▶ 13].

4.2 Vacuum Connection

⚠ CAUTION

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

Risk to injury!

Damage to your health!

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

⚠ CAUTION

Overpressure in the vacuum system over 1500 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.

NOTICE

Dirt and damage at the vacuum flange.

Impair the function of the gauge!

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

- Remove the protective cover (is required again during maintenance work!).
- Connect the flange to the system.

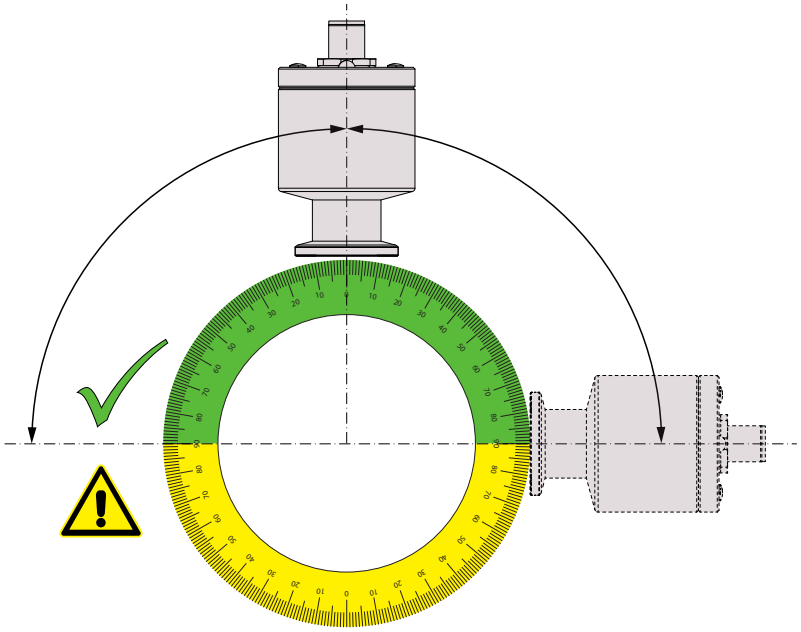
Connection size:

– ISO KF 16

• Make sure that the sensor flange is connected to the ground.

Mounting position:

The installation position can be freely selected. The preferred position is a horizontal to vertical position so that condensate and particles do not penetrate the measurement chamber.



4.3 Electrical Connection

NOTICE

Establish a connection using a live cable.

Risk of damage to the device!

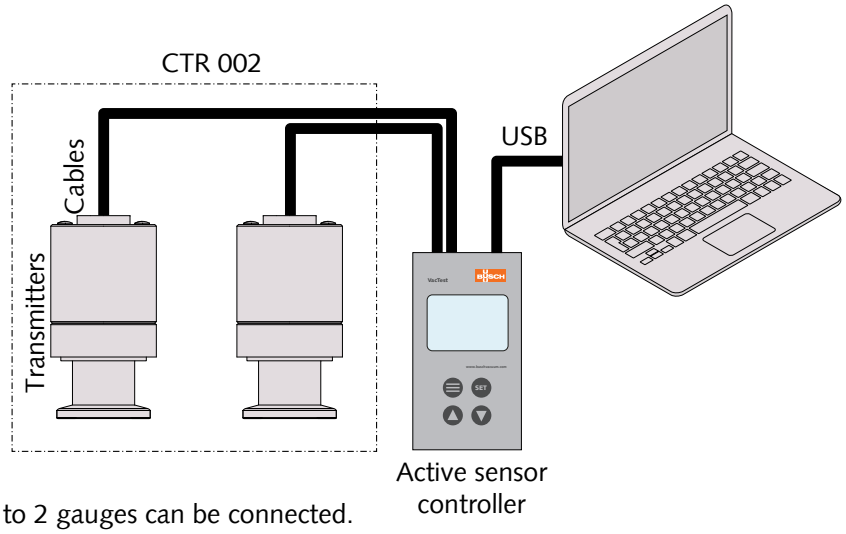
- Only connect cables when de-energized.

4.3.1 Connecting to the Active Sensor Controller

For operation of the gauge with controller, a suitable measurement connection cable must be used (see accessories).

NOTE

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



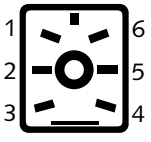
With the controller CTR 002: up to 2 gauges can be connected.

- Connect the cable from the controller to the gauge.
- Switch on the controller.

4.3.2 I/O and Communication Port Schematic

For GTP 100 and GTP 100 C:

Connector:
Hirschmann, 6-pin, male



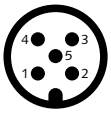
Pin no.	Description	Pin no.	Description
1	Line-Terminating Resistor	2	Signal Output: 0 … 10 V
3	Signal Ground: AGND	4	Power Supply VCC: 15 … 30 VDC
5	Power Supply Common: GND	6	Ground

NOTE

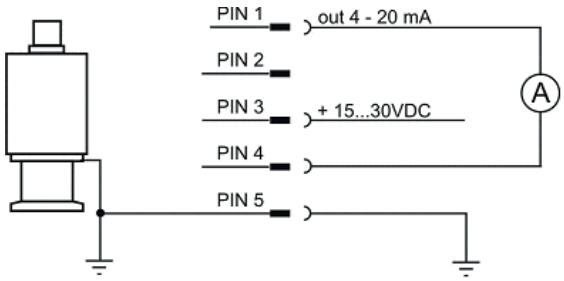
"Ground" (Pin 6) and supply common (Pin 5) must always be grounded.

For GTP 200:

Connector:
Type M12 A, 5-pin, male



Pin no.	Description	Pin no.	Description
1	Output 4 … 20 mA	2	N/A (do not connect)
3	Power Supply: +15 to +30 VDC	4	Supply GND
5	Ground		



NOTICE

Incorrect supply voltage.

Risk of damage to the device!

- Make sure to supply a correct and admissible voltage.

NOTE

Maximum admissible load resistor in Ω :

(supply voltage (V) – 4 V) / 0.02 A

5 Operation

For GTP 100 C (version for corrosive application):

NOTICE

Aggressive media such as fluorides.

Reduce sensor life-time!

- Furthermore, dust, oil or condensing vapours will affect sensor performance and may cause malfunction.

For GTP 100 and GTP 200 (standard version):

NOTICE

Aggressive media such as fluorides, halogenides, carbon, oxygen plasma and all other corrosive media.

Reduce sensor life-time!

- Furthermore, dust, oil or condensing vapours will affect sensor performance and may cause malfunction.

5.1 Before Operation

Warm-Up Time

The signal output of the gauge is available immediately after the is switched on.

To take advantage of the maximum accuracy of the unit it is advisable to wait 2 ... 5 minutes for stabilization before measurement.

Dependence On Gas Type

The measured pressure will depend on composition and type of gas. The gauge is factory calibrated for N_2 and dry air.

To adjust to other gases, a suitable correction factor for Pirani sensor can be set in the gauge for the pressure range below 0.5 mbar, see Gas Correction Factor [▶ 14].

5.2 Readjustment

The gauge is factory calibrated in upright position. Other orientations, different climatic conditions, extreme temperature changes, ageing or contamination may necessitate re-adjustment.

NOTE

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

NOTE

For zero adjustment actual pressure should be less than 5×10^{-5} mbar.

NOTE

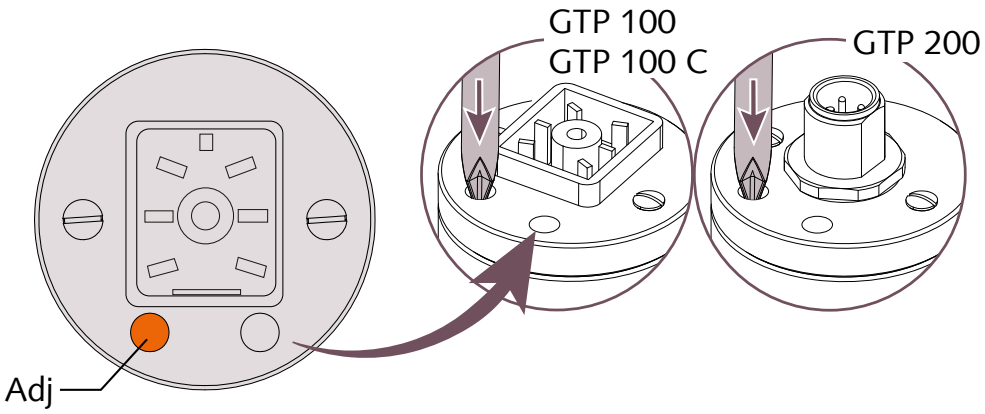
To achieve optimum results of the adjustment we recommend to consider a warm-up of at least 5 minutes at the appropriate calibration pressure before any adjustment.

5.2.1 Readjustment by Pushbutton

- Refer to the Technical Data [▶ 13] to know the output function of the gauge.

Readjustment on atmosphere or zero pressure can be done by means of the “Adj” pushbutton of the gauge. The gauge will notice automatically which adjustment point is relevant.

Alternatively, the unit can be adjusted on a variable zero pressure reference (see below).



- Remove the rubber cap above the “Adj” pushbutton.
- Press the button “Adj” to adjust the signal.

When successfully adjusted the GTP 100 or GTP 100 C signal output is 8.8V for atmosphere pressure "1000mbar" or 1.4V for under-range "ur" respectively.

When successfully adjusted the GTP 200 signal output is 20 mA for atmosphere pressure "1000mbar" or 3.8 mA for under-range "ur" respectively.

If no further button is pressed after 5 s, the adjusted voltage or current is set.

- Reinsert the rubber cap.

5.2.2 Adjustment on Variable Zero Reference Pressure

For this adjustment a pressure below 1 x 10^{-2} mbar has to be applied.

- 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 or current is provided at the signal output which corresponds to the actual zero reference pressure (Ex work: 1.4 V or 3.8 mA for "ur" pressure under-range).

- Press the “Adj” button several times to increment this value to maximal 1 x 10^{-2} mbar according to the output function in the technical data.

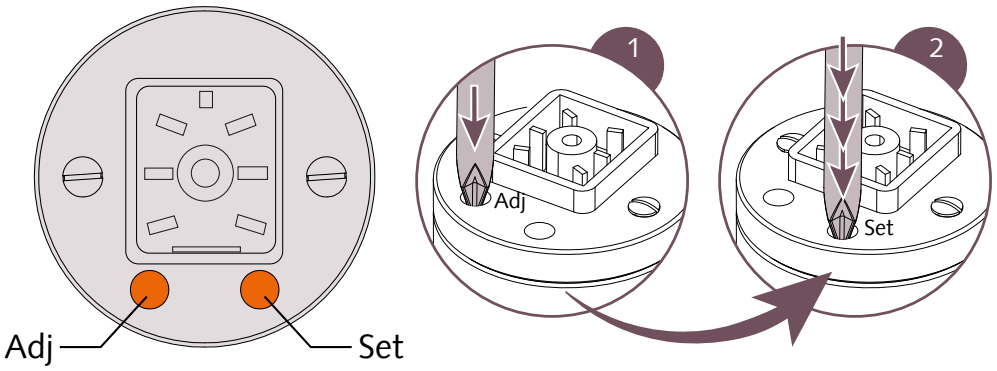
When adjusted, the output signal will start at the “ur” voltage or current.

If no further button is pressed after 5 s, the adjusted voltage or current is set.

From now on, zero adjustment as described in Readjustment by Pushbutton [► 10] will result in an adjustment at the saved zero reference pressure.

NOTE

When the "Set" button is pressed without further action you can check the currently saved zero reference pressure. The transmitter then outputs the corresponding signal for 5s, no adjustment is carried out.



6 Maintenance and Service

WARNING

Units contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the unit is contaminated with hazardous material:

- Wear appropriate personal protective equipment.

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

Should a defect or damage occur on the device, please send the unit to us for repair and fulfil the declaration of decontamination downloadable from www.buschvacuum.com.

NOTE

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

7 Troubleshooting

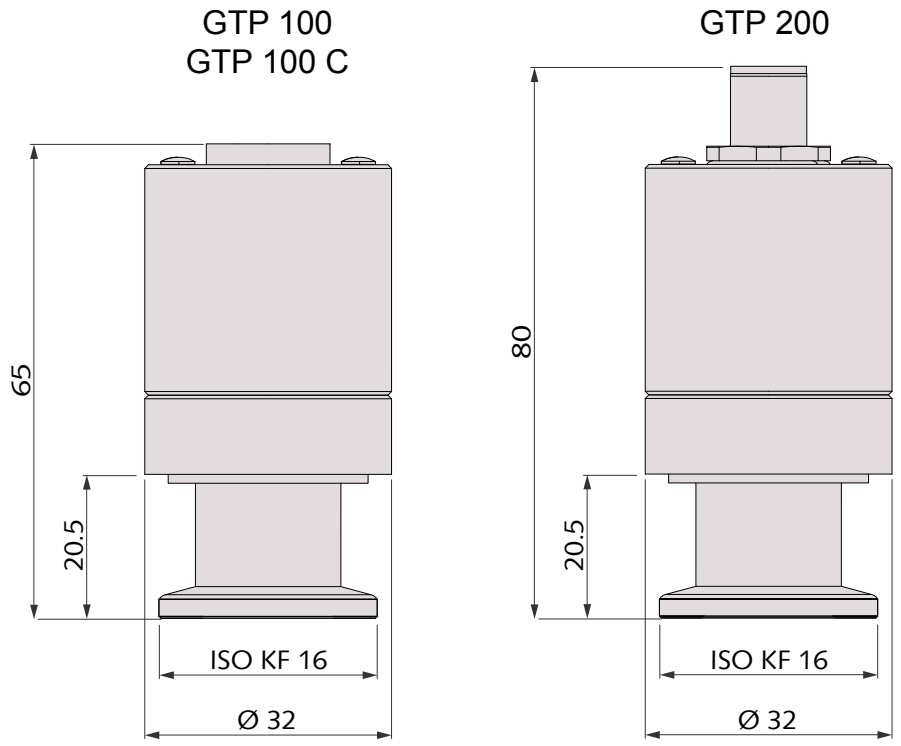
Problem	Possible Cause	Remedy
High measurement error.	Contamination, ageing, extreme temperature, maladjustment.	• Readjustment.
Pirani zero adjustment not possible.	Measurement error exceeds possible range of readjustment.	• Replace sensor or send unit for repair.
Output signal 3.8 mA or Output signal 1.4 V	Pressure under range.	• Pressure < 1 x 10^{-4}mbar for GTP 100 and 200
		• Pressure < 5 x 10^{-4}mbar for GTP 100 C
Output signal < 3.6 mA, Output signal > 21 mA or Output signal < 0.5 V	Defective unit or sensor.	• Send unit for repair.

8 Accessories

Controller	Description	Part no.
Active Sensor Controller (0 ... 10 V sensors only)	CTR 002, 2 channels	0656 202 928
Accessory	**Description**	**Part no.**
Connecting cable	0 ... 10 V cable for CTR 002 – 2 meters	0671 204 566
Connecting cable	0 ... 10 V cable for CTR 002 – 6 meters	0671 204 567
Connecting cable	0 ... 10 V cable for CTR 002 – 10 meters	0671 204 568
Connecting cable	0 ... 10 V cable for CTR 002 – 20 meters	0671 204 569
Connecting cable	0 ... 10 V cable with open ends – 2 meters	0671 204 570
Connecting cable	0 ... 10 V cable with open ends – 6 meters	0671 204 571
Connecting cable	0 ... 10 V cable with open ends – 10 meters	0671 204 572
Mating plug	0 ... 10 V	0680 204 574
Mating plug	4 ... 20 mA	0680 204 573

9 Technical Data

		VacTest GTP 100	VacTest GTP 200	VacTest GTP 100 C
Measurement principle		Pirani		
Materials exposed to vacuum		Stainless steel 1.4307, nickel, tungsten, glass		Stainless steel 1.4307, nickel,platinum / rhodium, glass
Filament material		Tungsten		Platinum / Rhodium
Measuring range	mbar	1000 … 1 x 10^{-4}		1000 … 5 x 10^{-4}
	torr	750 … 0.75 x 10^{-5}		750 … 3.75 x 10^{-4}
Overpressure limit	bar abs.	10		
Measurement uncertainty	% of reading	1000 … 20 mbar: ±30 % 1000 … 20 mbar: ±10 % < 2 x 10^{-3} mbar: < factor 2		1000 … 10 mbar: ±30 % 10 … 1 x 10^{-2} mbar: ±10 % < 1 x 10^{-2} mbar: < factor 2
Repeatability of measurement	% of reading	20 … 2 x 10^{-3} mbar: ±2 %		10 … 1 x 10^{-2} mbar: ±5 %
Leakage rate	mbar l/s	< 5 x 10^{-10}		
Reaction time	ms	< 200		
Electrical Connection		Hirschmann, 6-pin	M12 A, 5-pin	Hirschmann, 6-pin
Supply voltage	V	15 … 30		
Max. power consumption	W	1		1.5
Output signal		0 … 10 V	4 … 20 mA	0 … 10 V
Under-range		1.4 V	3.8 mA	1.4 V
Output function		Log(p_{mbar}) + 5.8 = out (V)	16/7 x log(p_{mbar}) + 92/7 = out (mA)	Log(p_{mbar}) + 5.8 = out (V)
Error		< 0.5 V	< 3.6 mA	0.5 V
Operating Temperature	°C	+5 ... +60		
Storage Temperature	°C	-20 ... +70		
Relative Humidity:		5 … 85%, not condensing		
Protection Class		IP 40	IP 54	IP 40
Weight	g	120		



9.1 Gas Correction Factor

Correction factor for Pirani sensor:

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

10 EU Declaration of Conformity

This Declaration of Conformity and the CE-mark 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

declare that the gauge VacTest GTP 100, GTP 200 or GTP 100 C

has been manufactured in accordance with the European Directives:

- 'Electromagnetic Compatibility (EMS) ' 2014/30/EU
- 'RoHS' 2011/65/EU, restriction of the use of certain hazardous substances in electrical and electronic equipment

and following the standards.

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 50581:2012	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Person authorised to compile the technical file:

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Maulburg, 24.08.2017

Martin Gutmann, General director

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