

OPERATING INSTRUCTIONS

Translation of the original instructions

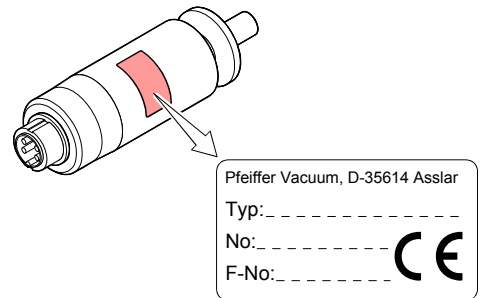
TPR 010 ... 018 Pirani Gauge



BG 5976 BEN / A (2016-06)

Product Identification

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



Validity

This document applies to products with the following part numbers:

TPR 010 (W filament)		
PT R02 270	standard type	(DN 10 ISO-KF)
PT R02 250	old type ¹⁾	(DN 10 ISO-KF)
PT R02 251	old type ¹⁾	(DN 10 ISO-KF)
PT R02 271	old type ¹⁾	(DN 10 ISO-KF)

TPR 017 (Ni filament)	TPR 018 (W filament)	
PT R13 270	PT R15 010	(DN 16 ISO-KF)
PT R13 271	PT R15 011	(DN 16 CF-F)
	PT R15 014	(DN 40 CF-F)

The part number (No) can be taken from the product nameplate.

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

All dimensions are indicated in mm.

Intended Use

The Pirani Gauges TPR 010, TPR 017 and TPR 018 have been designed for vacuum measurement of gases in the pressure range of 8x10⁻⁴ ... 1000 hPa.

They must not be used for measuring flammable or combustible gases in mixtures containing oxidants (e.g. atmospheric oxygen) within the explosion range.

The gauges can be operated in connection with the Pfeiffer Vacuum TPG 300 total pressure gauge controller.

¹⁾ The old types are only delivered as spare parts of measurement units that are no longer available.

Old types

	Controller	
	new	old
PT R02 270	TPG 300	IMG 300
PT R02 250	TPG 300	TPG 035
PT R13 xxx		TPG 060
PT R15 xxx		TPG 070
		TPG 100
		PKG 020
	PKG 100	
PT R02 250	TPG 300	VWS 120
PT R02 251	-	TPG 010
		TPG 031
PT R02 271	-	TPG 010 A
		TPG 031 A

With self-compensating bridge circuit

With simple bridge circuit

Scope of Delivery

- 1x Pirani Gauge
- 1x Operating Instructions German
- 1x Operating Instructions English
- 1x Operating Instructions French
- 1x Test Certificate (PT R15 014 only)

Safety

Symbols Used

DANGER
Information on preventing any kind of physical injury.

WARNING
Information on preventing extensive equipment and environmental damage.

Caution
Information on correct handling or use. Disregard can lead to malfunctions or minor equipment damage.

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.

General Safety Instructions

- Adhere to the applicable regulations and take the necessary precautions for the process media used. Consider possible reactions with the product materials. Consider possible reactions (e.g. explosion) 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 instructions in this document.
- 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.

Communicate the safety instructions to all other users.

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 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. filament), are not covered by the warranty.

Technical Data

Measurement principle	thermal conductance according to Pirani
Measurement range (air, O ₂ , CO, N ₂)	8x10 ⁻⁴ ... 1500 hPa
Accuracy TPR 010	up to factor 2 of reading in the range of ≥100 hPa ±20% of reading in the range of 1x10 ⁻¹ ... 10 hPa up to factor 2 of reading in the range of ≤10 ⁻² hPa
Accuracy TPR 018	At room temperature and cable length <20m At 0 ... +70°C and within the entire range of specified cable length Within the entire specified range of temperatures and cable length
Repeatability with air	TPR 010, TPR 017 TPR 018
	±10% of reading in the range of 1x10 ⁻² ... 100 hPa ±20% of reading in the range of 1x10 ⁻² ... 100 hPa ±35% of reading in the range of 1x10 ⁻² ... 100 hPa ±2% of reading in the range of 1x10 ⁻² ... 100 hPa ±5% of reading in the range of 1x10 ⁻² ... 100 hPa

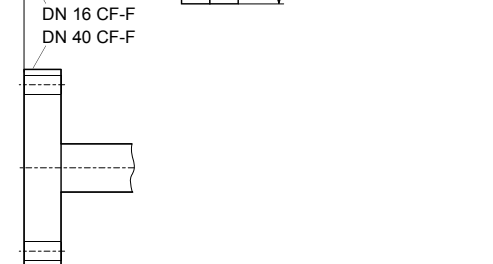
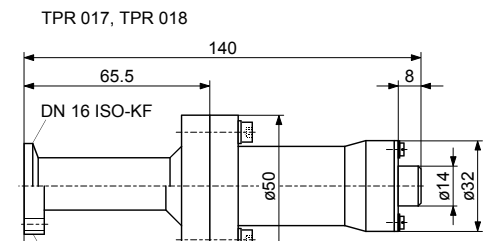
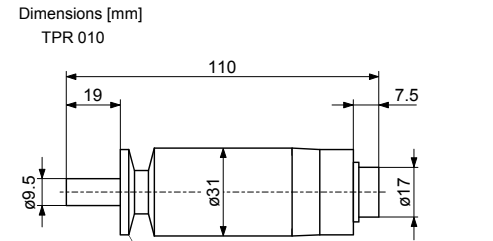
Materials TPR 010	Inside wall of measurement chamber, flange Electrical feedthrough Filter Filament / filament holder	AlMgSi FPM sintered bronze W / Ni
Materials TPR 017	Inside wall of measurement chamber, flange, diaphragm Electrical feedthrough Filament / filament holder	stainless steel Al ₂ O ₃ Ni / Ni
Materials TPR 018	Inside wall of measurement chamber, flange, diaphragm Electrical feedthrough Filament / filament holder	stainless steel Al ₂ O ₃ W / Ni

Radiation resistance	TPR 010 TPR 017, TPR 018	- 1x10 ⁴ Gy
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Overpressure	≤900 kPa (limited to inert gases)	
Cable length	Gauge - controller	depending on the measurement unit

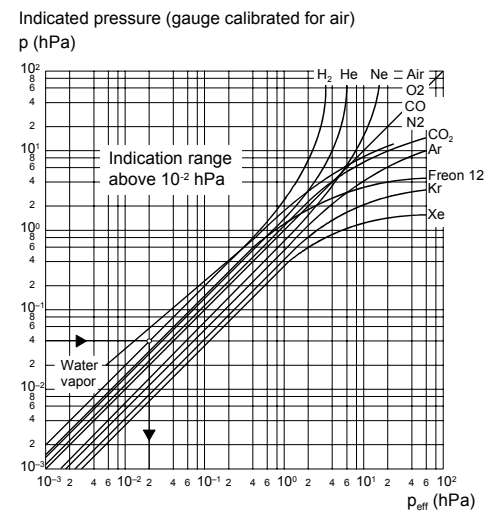
Admissible Temperatures	Operation	TPR 010 TPR 017 TPR 018	0 ... +70 °C ²⁾ 0 ... +80 °C ³⁾ 0 ... +120 °C ⁴⁾ (with TPG 300)
	Bakeout	TPR 010 TPR 017, TPR 018	+100 °C +250 °C ⁵⁾
	Filament	TPR 010 ⁶⁾ , TPR 018 TPR 017	ambient temperature +130 °C ambient temperature +70 °C
	Storage		-40 ... +80 °C

Relative humidity	≤80% at temperatures ≤+31 °C, decreasing to 50% at +40 °C
Mounting orientation	any
Use	indoors only altitudes up to 2000 m NN IP 40
Protection category	IP 40



Weight	DN 16 ISO-KF TPR 017, TPR 018	=0.14 kg ≤1.2 kg
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Gas Type Dependence



Calibration factors for pressure range below 1 hPa

p _{eff} = C × indicated pressure			
Gas type	Calibration factor C	Gas type	Calibration factor C
He	0.8	H ₂	0.5
Ne	1.4	air, O ₂ , CO, N ₂	1.0
Ar	1.7	CO ₂	0.9
Kr	2.4	water vapour	0.5
Xe	3.0	Freon 12	0.7

Installation

Vacuum Connection

DANGER

DANGER: overpressure in the vacuum system >100 kPa
Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized.
Do not open any clamps while the vacuum system is pressurized. Use the type clamps which are suited to overpressure.

DANGER

DANGER: overpressure in the vacuum system >250 kPa
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

DANGER: protective ground
Incorrectly grounded products can be extremely hazardous in the event of a fault.
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 connection fulfill this requirement
• For gauges with a KF flange, use a conductive metallic clamping ring

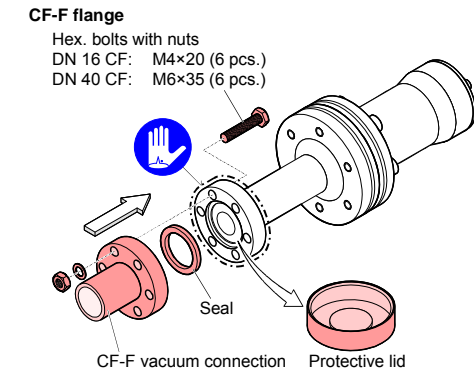
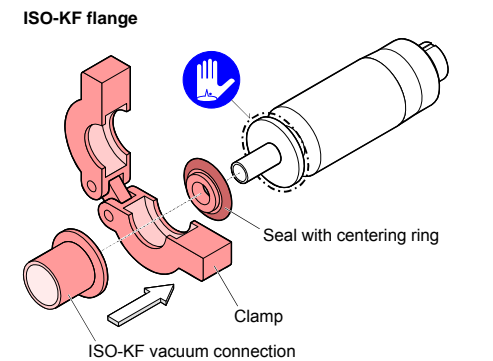
Caution

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.

Caution

Caution: dirt sensitive area
Touching the product or parts thereof with bare hands increases the desorption rate.
Always wear clean, lint-free gloves and use clean tools when working in this area.

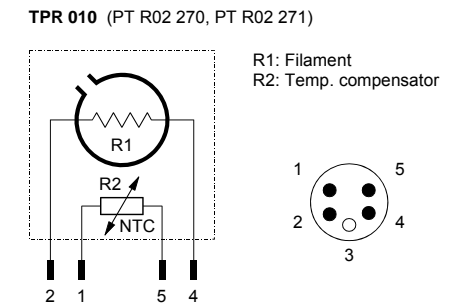
The gauge may be mounted in any orientation. To keep condensates and particles from getting into the measuring chamber preferably choose a horizontal to upright position.



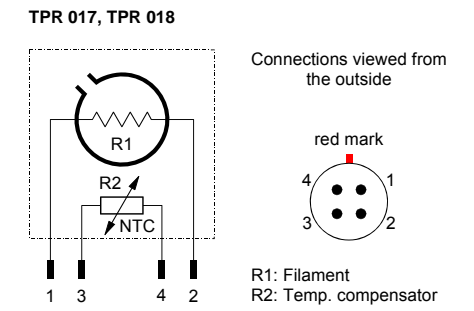
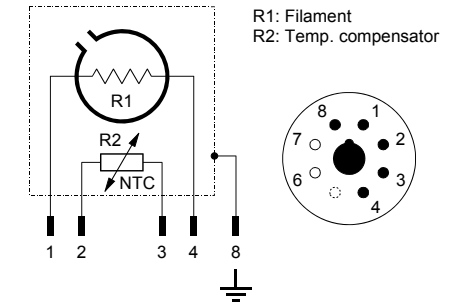
Power Connection

Before connecting or disconnecting the product, turn off the control system.

The gauge is connected to the controller via a measurement cable (→ "Accessories").



TPR 010 (PT R02 250, PT R02 251)
The gauge housing is grounded via the measurement cable at the control unit.



Operation

After connection the gauge is ready for operation.

When the gauge is operated for the first time, a zero adjustment should be performed.

It is advisable to operate the gauge continuously, irrespective of the pressure.

TPR 017 and TPR 018: If the diaphragm is removed in order to achieve shorter response times, sudden pressure changes should be avoided in order to protect the filament.

The sensitivity of the nickel filament of the TPR 017 gauge is not the same as the sensitivity of the tungsten filament of the TPR 010 and TPR 018 gauges. Control units designed for gauge heads with a tungsten filament must be modified at the factory before they can be operated with the TPR 017.

Measurement cables influence the accuracy of measurement. If cables with lengths over 20 m are used, we strongly recommend adjusting the gauge together with the cable. For details refer to the operating instructions of the corresponding controller.

Adjustment

The gauge is factory calibrated. For most applications, it needs to be realigned. This allows to correct measurement errors caused by spread between units, temperature and the influence of the cable length. The gauge is aligned according to the operating instructions of the measurement unit used.

For adjusting the gauge, operate the gauge under the same ambient conditions and in the same mounting orientation as normally.

Gas Type Dependence

The measurement value is gas dependent. The reading applies to dry air, N₂, O₂ and CO. For other gases, it has to be converted (→ Technical Data and operating instructions of the corresponding controller).

In the pressure range below 1 hPa this can be done by entering the corresponding calibration factor on the controller (→ Operating instructions of the corresponding controller).

Deinstallation

STOP DANGER

DANGER: contaminated parts
Contaminated parts can be detrimental to health and environment.
Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Caution

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.

Caution

Caution: dirt sensitive area
Touching the product or parts thereof with bare hands increases the desorption rate.
Always wear clean, lint-free gloves and use clean tools when working in this area.

- Vent the vacuum system.
- Put the gauge out of operation.
- Unplug the sensor cable.
Before connecting or disconnecting the product, turn off the control system.
- Remove the gauge from the vacuum system and cover the vacuum connection with the protective lid.

Maintenance, Troubleshooting

Gauge failures due to contamination or wear and tear, as well as expendable parts (e.g. filament), are not covered by the warranty.

Realignment at the measurement unit can become necessary in the following events:

- Altering
- Contamination
- After cleaning

Cleaning

STOP DANGER

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Contaminated parts can be detrimental to health and environment.
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Caution

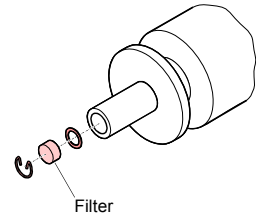
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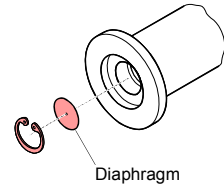
Caution: dirt sensitive area
Touching the product or parts thereof with bare hands increases the desorption rate.
Always wear clean, lint-free gloves and use clean tools when working in this area.

Precondition: Gauge deinstalled

- Clean or replace the filter (TPR 010) ...



... or clean or replace the diaphragm (TPR 017, TPR 018) (→ "Spare Parts").



- Clean the gauge / replace parts (→ "Spare Parts").

STOP DANGER

DANGER: 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. Consider possible reactions with the product materials (see "Technical data").

- Fill the measurement chamber with a solvent and allow it to work for some time. Repeat this procedure if necessary.
- Pour the solvent out.
- Rinse the vacuum chamber and the filter with alcohol for several times in order to remove all solvent residues.
- Dry at =70 °C.

- Insert the filter (TPR 010), resp. diaphragm (TPR 017, TPR 018).

Troubleshooting

Fault	Possible cause	Remedy
Pressure readings supplied by gauge too high	Gauge contaminated	Minor deviations can be compensated by realignment at the measurement unit Clean the gauge
	Filter contaminated (TPR 010)	Clean or replace it
No useful indication	Filament broken (an unbroken filament has a resistance of =100 Ω)	Replace the gauge
	Gauge cable defective, interrupted, or short-circuit	Repair or replace the cable

Spare Parts

	Ordering No.
Filter	B 4161 2003 G

Accessories

	Ordering No.
Measurement cable	
TPR 010, 3 m 80 °C	PT 548 402-T
TPR 010, 6 m 80 °C	PT 548 403-T
TPR 017, 3 m 80 °C	PT 548 308-T
TPR 017, 6 m 80 °C	PT 548 309-T
TPR 018, 3 m 80 °C	PT 548 308-T
TPR 018, 6 m 80 °C	PT 548 309-T

Storage

Caution

Caution: vacuum component
Inappropriate storage leads to an increase of the desorption rate and/or may result in mechanical damage of the product.
Cover the vacuum ports of the product with protective lids or grease free aluminum foil. Do not exceed the admissible storage temperature range (→ "Technical Data")

Returning the Product

WARNING

WARNING: forwarding contaminated products
Contaminated products (e.g. radioactive, toxic, caustic or microbiological hazard) can be detrimental to health and environment.
Products returned to Pfeiffer Vacuum should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a duly completed declaration of contamination¹⁾.

¹⁾ Form under www.pfeiffer-vacuum.com

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

Products not accompanied by a duly completed declaration of contamination are returned to the sender at his own expense.

Disposal

STOP DANGER

DANGER: contaminated parts
Contaminated parts can be detrimental to health and environment.
Before beginning to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

WARNING

WARNING: substances detrimental to the environment
Products or parts thereof (mechanical and electric components, operating fluids etc.) can be detrimental to the environment.
Dispose of such substances 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.

Conversion Table

	mbar	bar	Pa	hPa	kPa	Torr mm HG
mbar	1	1×10 ⁻³	100	1	0.1	0.75
bar	1×10 ³	1	1×10 ⁵	1×10 ³	100	750
Pa	0.01	1×10 ⁻⁵	1	0.01	1×10 ⁻³	7.5×10 ⁻³
hPa	1	1×10 ⁻³	100	1	0.1	0.75
kPa	10	0.01	1×10 ³	10	1	7.5
Torr mm HG	1.332	1.332×10 ⁻³	133.32	1.3332	0.1332	1

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

EU Declaration of Conformity

CE We, Pfeiffer Vacuum, hereby declare that the equipment mentioned below complies with the provisions of the Directive relating to electrical equipment designed for use within certain voltage limits 2014/35/EU, the Directive relating to electromagnetic compatibility 2014/30/EU and the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2011/65/EU.

Product

TPR 010 ... 018

(Operation with TPG 300)

Standards

Harmonized and international/national standards and specifications:

- EN 61000-6-2:2005 (EMC: generic emission standard)
- EN 61000-6-3:2007 + A1:2011 (EMC: generic immunity standard)
- EN 61010-1:2010 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326-1:2013 (EMC requirements for electrical equipment for measurement, control and laboratory use)

Manufacturer / Signatures

Pfeiffer Vacuum GmbH, Berliner Straße 43, D-35614 Asslar

21 April 2016

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