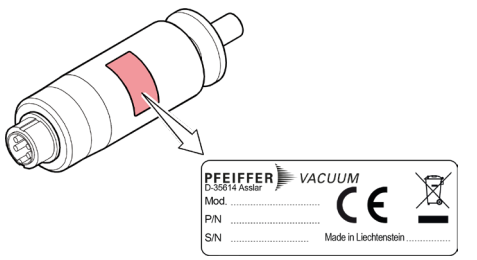


TPR 010 ... 018
Pirani Gauge

BG 5976 BEN / B (2024-04)

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 270A	PT R15 010A	(DN 16 ISO-KF)
PT R13 271A	PT R15 011A	(DN 16 CF-F)
	PT R15 014A	(DN 40 CF-F)

The part number (P/N) 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 8×10^{-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 total pressure gauge controller (TPG 300, TPG 500).

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

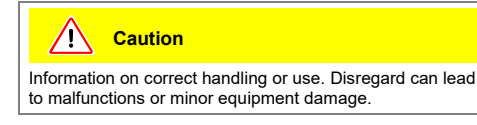
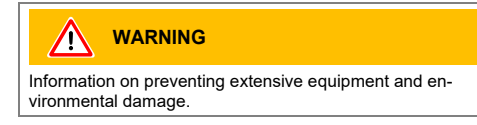
Old types

	Controller		
	new	old	
PT R02 270	TPG 300 TPG 500	IMG 300	
PT R02 250 PT R13 xxx PT R15 xxx	TPG 300 TPG 500	TPG 035 TPG 060 TPG 070 TPG 100 PKG 020 PKG 100	
PT R02 250	TPG 300 TPG 500	VVS 120	
PT R02 251	-	TPG 010 TPG 031	With simple bridge circuit
PT R02 271	-	TPG 010 A TPG 031 A	

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



Personnel Qualifications

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)	8 × 10 ⁻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 1 × 10 ⁻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
	± 2% of reading in the range of 1 × 10 ⁻² ... 100 hPa ± 5% of reading in the range of 1 × 10 ⁻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

-
1 × 10⁶ Gy

Overpressure ≤ 900 kPa (limited to inert gases)

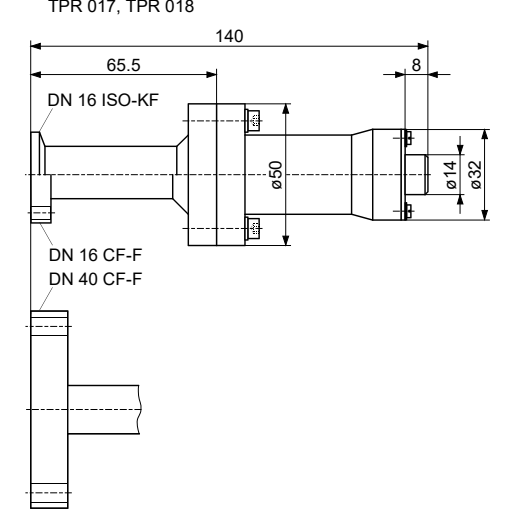
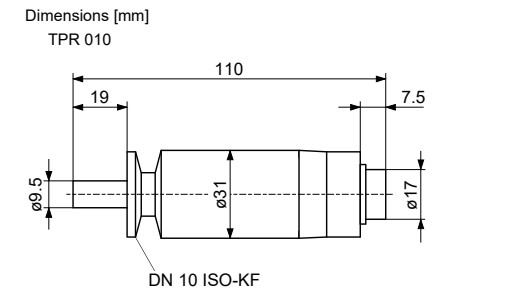
Cable length
Gauge - controller depending on the measurement unit

Admissible Temperatures

Operation	TPR 010 TPR 017 TPR 018	0 ... +70 °C ²⁾ 0 ... +80 °C ³⁾ 0 ... +120 °C ⁴⁾ (with TPG 300, TPG 500)
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

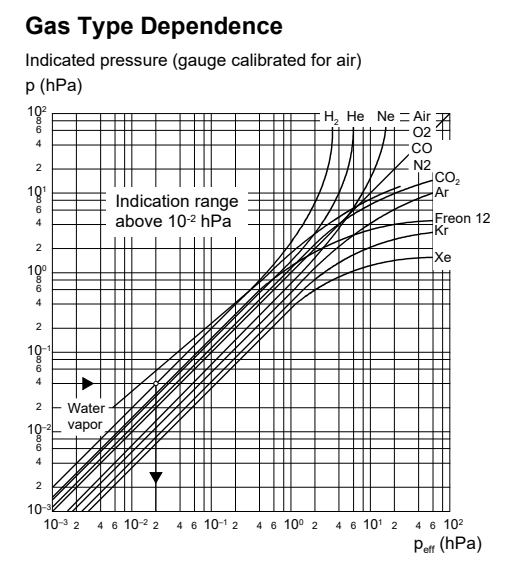
²⁾ PT R02 250, PT R02 251, PT R02 271: +10 ... +50 °C
³⁾ With high-temperature cable: 0 ... +120 °C
⁴⁾ With PKG 100, TPG 100: +10 ... +50 °C
⁵⁾ With high-temperature cable or without cable
⁶⁾ PT R02 251, PT R02 271: +300 °C

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
TPR 010
TPR 017, TPR 018

≈ 0.14 kg
≤ 1.2 kg



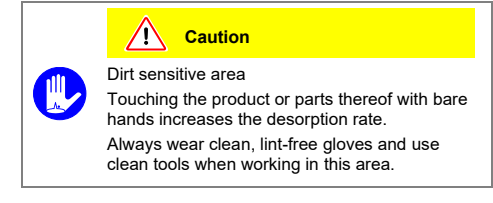
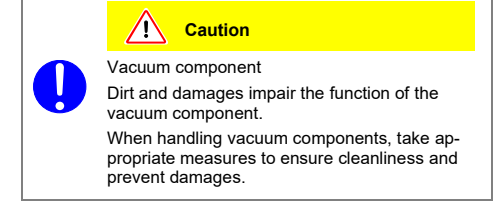
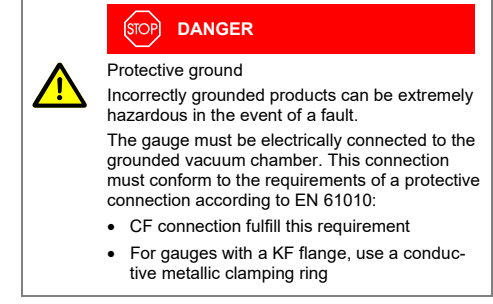
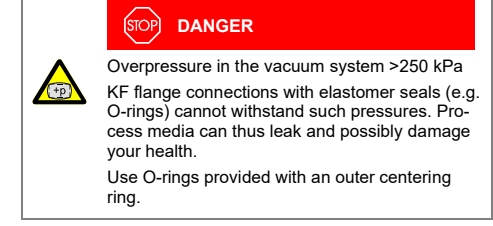
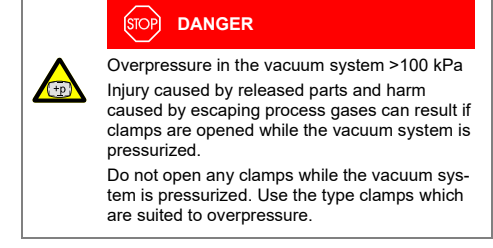
Calibration factors for pressure range below 1 hPa

$$p_{\text{eff}} = C \times \text{indicated pressure}$$

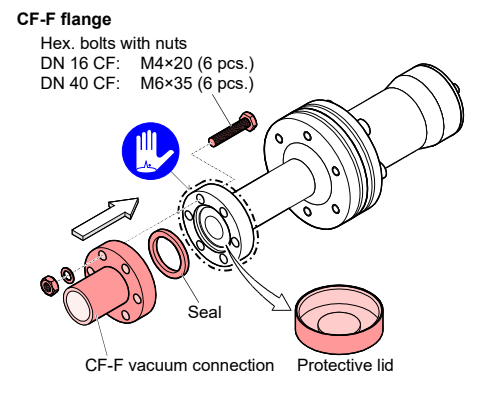
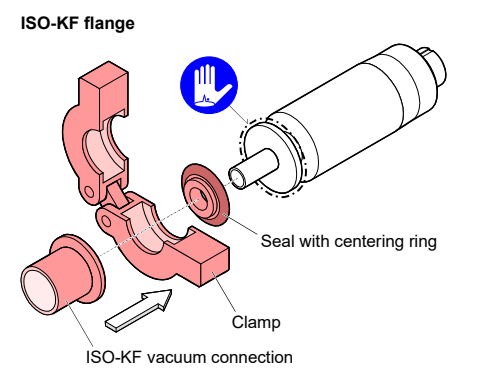
Gas type	Calibration factor C	Gas type	Calibration factor C
He	0.8	H ₂	0.5
Ne	1.4	air, O ₂ , CO, N ₂	1.0
Ar	1.7	CO ₂	0.9
Kr	2.4	water vapour	0.5
Xe	3.0	Freon 12	0.7

Installation

Vacuum Connection



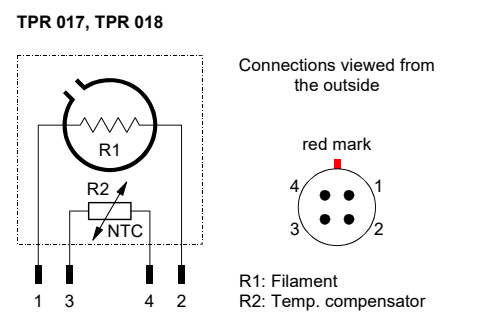
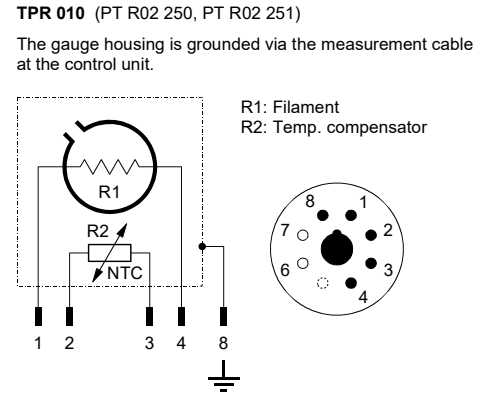
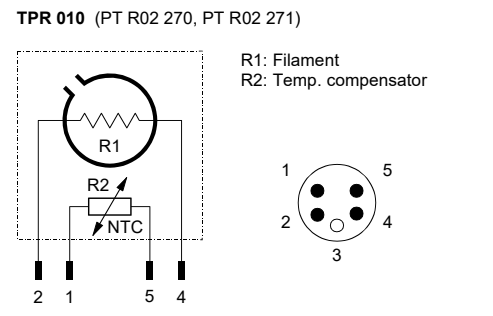
The gauge may be mounted in any orientation. To keep condensates and particles from getting into the measuring chamber preferably choose a horizontal to upright position.



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").



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


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

 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

 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.

1 Vent the vacuum system.


2 Put the gauge out of operation.

3 Unplug the sensor cable.

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

4 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


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

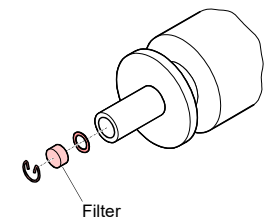
 Vacuum component
Dirt and damages impair the function of the vacuum component.
When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Caution

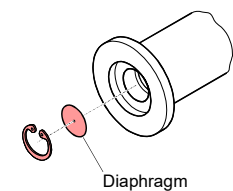
 Dirt sensitive area
Touching the product or parts thereof with bare hands increases the desorption rate.
Always wear clean, lint-free gloves and use clean tools when working in this area.

Precondition: Gauge deinstalled

1 Clean or replace the filter (TPR 010, → "Spare Parts") ...




... or clean the diaphragm (TPR 017, TPR 018).



2 Clean the gauge.

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 $\approx 70 \text{ }^{\circ}\text{C}$.

3 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 $\approx 100 \text{ } \Omega$)	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	PT 548 402-T
TPR 010, 3 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

 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

 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 contamination^{*)}.


^{*)} 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

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

 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	1.332	0.1332	1

1 Pa = 1 N/m²

EU Declaration of Conformity

We, Pfeiffer Vacuum, hereby declare that the equipment mentioned below complies with the provisions of the following directives:

- 2014/35/EU, OJ L 96/357, 29.3.2014 (LV Directive; directive relating to electrical equipment designed for use within certain voltage limit)
- 2014/30/EU, OJ L 96/79, 29.3.2014 (EMC Directive; Directive relating to electromagnetic compatibility)
- 2011/65/EU, OJ L 174/88, 1.7.2011 (RoHS Directive; Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment)

Products

TPR 010 ... 018

(Operation with TPG 300, TPG 500)

Standards

Harmonized and international/national standards and specifications:

- EN 61000-3-2:2014, Class A (EMC: limits for harmonic current emissions)
- EN 61000-3-3:2013 (EMC: limitation of voltage changes, voltage fluctuations and flicker)
- EN 61000-6-1:2007 (EMC: generic immunity standard for residential, commercial and light-industrial environments)
- EN 61000-6-2:2005 (EMC: generic immunity standard for industrial environments)
- EN 61000-6-4:2007 + A1:2011 (EMC: generic emission standard for industrial environments)
- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61010-2-030:2010 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326-1:2013, Group 1, Class A (EMC requirements for electrical equipment for measurement, control and laboratory use)

Manufacturer / Signatures

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

Asslar, 2024-04-10

Daniel Sälzer
Managing director

UKCA Declaration of Conformity

We, Pfeiffer Vacuum, hereby declare that the equipment mentioned below complies with the provisions of the following regulations:

- S.I. 2016/1101, 11.2016 (The electrical equipment (safety) regulations 2016)
- S.I. 2016/1091, 11.2016 (Regulation relating to electromagnetic compatibility 20016)
- S.I. 2012/3032, 12.2012 (Regulation on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2012)

Products

TPR 010 ... 018

(Operation with TPG 300, TPG 500)

Standards

Harmonized and international/national standards and specifications:

- EN 61000-3-2:2014, Klasse A (EMC: limits for harmonic current emissions)
- EN 61000-3-3:2013 (EMC: limitation of voltage changes, voltage fluctuations and flicker)
- EN 61000-6-1:2007 (EMC: generic immunity standard for residential, commercial and light-industrial environments)
- EN 61000-6-2:2005 (EMC: generic immunity standard for industrial environments)
- EN 61000-6-4:2007 + A1:2011 (EMC: generic emission standard for industrial environments)
- EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61010-2-030:2010 (Safety requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326-1:2013, Group 1, Class A (EMC requirements for electrical equipment for measurement, control and laboratory use)

Manufacturer / Signatures

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

Asslar, 2024-04-10

Daniel Sälzer
Managing director

PFEIFFER VACUUM

Berliner Straße 43

D-35614 Asslar

Germany

Tel +49 (0) 6441 802-0

Fax +49 (0) 6441 802-1202

info@pfeiffer-vacuum.de

www.pfeiffer-vacuum.com