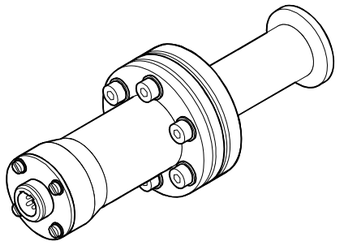
Pirani Gauge
TPR018

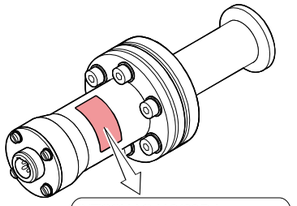


Operating Manual
Incl. EU Declaration of Conformity

IG9976BEN (2017-09)

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.



Validity

This document applies to products with the following part numbers:

IOG15020	(DN 16 ISO-KF)
IOG15024	(DN 40 CF-F)

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

Intended Use

The Pirani Gauge TPR018 has been designed for vacuum measurement of gases in the display range of 5×10^{-4} … 1000 mbar.

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

The gauge can be operated in connection with an INFICON TPG300 total pressure gauge controller.

Safety

Symbols Used

STOP 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

INFICON 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.

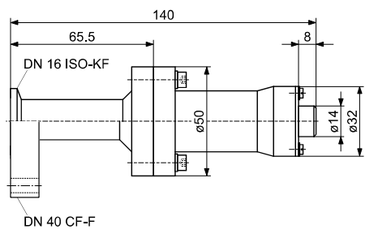
The end-user assumes the responsibility in conjunction with the process media used.

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

Technical Data

Measurement principle	thermal conductance according to Pirani
Display range (air, O_2, CO, N_2)	5×10^{-4} … 1000 mbar
Measurement range (air, O_2, CO, N_2)	1×10^{-2} … 100 mbar
Accuracy	
At room temperature and cable length <20 m	≈±10% of reading in the range of 1×10^{-2} … 100 mbar
At 0 … +70 °C and within the entire range of specified cable length	≈±20% of reading in the range of 1×10^{-2} … 100 mbar
Within the entire specified range of temperatures and cable length	≈±35% of reading in the range of 1×10^{-2} … 100 mbar
Repeatability with air	≈±5% of reading in the range of 1×10^{-2} … 100 mbar
Materials	
Internal seal	Al, Ni90
Insulator	Al_2O_3, NiFeCo
Filament / filament holder	W / Ni
Chamber wall, housing feedthrough	1.4435, 1.4306
Radiation resistance	1×10^{4} Gy
Pressure deviation due to external magnetic field	
10^{-2} mbar	up to 480 mT: <5%
1 mbar	up to 300 mT: <2.5%
10^{2} mbar	always positive
Overpressure	≤9 bar (limited to inert gases)
Cable length	
Gauge - controller	depending on the measurement unit
Admissible Temperatures	
Operation with high-temperature sensor cable	0 … +120 °C (with TPG300)
with standard sensor cable	0 … +80 °C (with TPG300)
Bakeout	+250 °C [1]
Filament	ambient temperature +130 °C
Storage	–40 … +80 °C
Relative humidity	≤80% at temperatures ≤+31 °C, decreasing to 50% at +40 °C
Mounting orientation (recommendation)	aligned with the magnetic field
Use	indoors only altitudes up to 2000 m NN
Protection category	IP 40

Dimensions [mm]

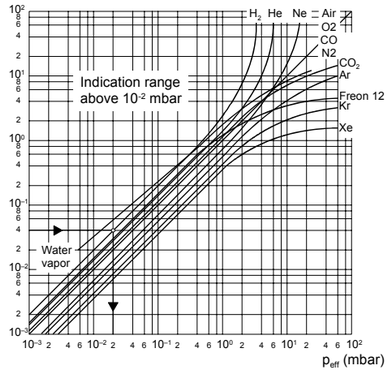


Weight	
DN 16 ISO-KF	0.6 kg
DN 40 CF-F	0.85 kg

[1] With high-temperature cable or without cable

Gas Type Dependence

Indicated pressure (gauge calibrated for air)
p (mbar)



Calibration factors for pressure range below 1 mbar

$p_{eff} = C \times$ 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

STOP DANGER

DANGER: overpressure in the vacuum system >1 bar

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.

STOP DANGER

DANGER: overpressure in the vacuum system >2.5 bar

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.

STOP 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

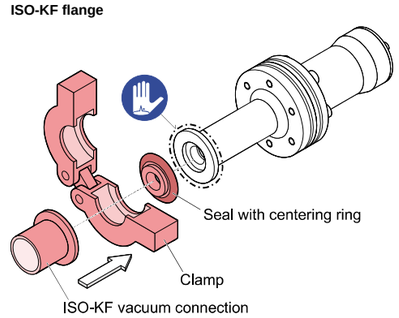
Touching the product or parts thereof with bare hands increases the desorption rate.

Always wear clean, lint-free gloves and use clean tools when working in this area.

To keep condensates and particles from getting into the measuring chamber preferably choose a horizontal to upright position.

We recommend mounting the gauge aligned with the magnetic field.

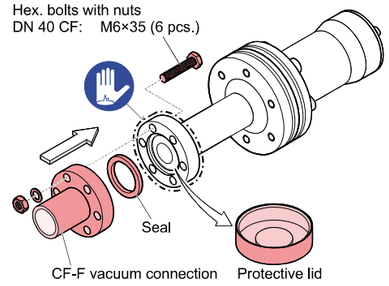
ISO-KF flange



Keep the protective lid.

CF-F flange

Hex. bolts with nuts
DN 40 CF: M6×35 (6 pcs.)



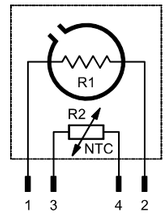
Keep the protective lid.

Electrical Connection

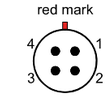
Make sure the vacuum connection is properly made.

- The TPG300 control unit must be turned off before any work is performed on the gauge or sensor cable.
- Wait at least 15 seconds after turning off, before connecting cable.

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



Connections viewed from the outside



R1: Filament
R2: Temp. compensator

IG9976Eben (2017-09)
Original: English

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.

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

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, N_2, O_2 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 mbar this can be done by entering the corresponding calibration factor on the controller(→ Operating Manual of the corresponding controller).

Deinstallation

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.

1. Turn off the TPG300 control unit.

   Wait at least 15 seconds after turning off, before disconnecting cable.

2. Vent the vacuum system and disconnect the sensor cable from the gauge.

3. Remove gauge from the vacuum system and install the protective lid.

Maintenance, Troubleshooting

Gauge failures due to contamination or wear and tear, as well as expendable parts (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

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

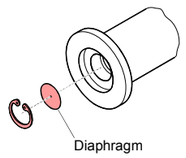
Caution: dirt sensitive area

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.

Precondition: Gauge deinstalled

1. Clean or replace the diaphragm.



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

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.

3. Insert the diaphragm.

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
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

Accessories

	Ordering No.
Standard sensor cable, 80 °C	
3 m	ITC548308
10 m	ITC548456
15 m	ITC548457
20 m	ITC548458
25 m	ITC548459
30 m	ITC548460
35 m	ITC548461
40 m	ITC548462
45 m	ITC548463
50 m	ITC548464

	Ordering No.
High-temperature sensor cable, 250 °C	
3 m	ITC548414
5 m	ITC548465
10 m	ITC448047
15 m	ITC448043
20 m	ITC448044
25 m	ITC120025
30 m	ITC120030
35 m	ITC120035
40 m	ITC120040
45 m	ITC120045
50 m	ITC120050

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 INFICON 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.inficon.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

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.

EU Declaration of Conformity

We, INFICON, hereby declare that the equipment mentioned below complies with the provisions of the following directive:

- 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)

Product

TPR018

(Operation with TPG300)

Standards

Harmonized and international/national standards and specifications:

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

Manufacturer / Signatures

INFICON AG, Alte Landstraße 6, LI-9496 Balzers

31 August 2017

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31 August 2017

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