OPERATING INSTRUCTIONS

MPT 200
Digital Pirani/Cold Cathode gauge

PFEIFFER *VACUUM*

EN

Table of contents

PFEIFFER *VACUUM*

1 About this manual

1.1 Validity

This operating manual is for customers of Pfeiffer Vacuum. It describes the functioning of the designated product and provides the most important information for safe use of the unit. The description follows applicable EU guidelines. All information provided in this operating manual refers to the current state of the product's development. The documentation remains valid as long as the customer does not make any changes to the product.

Up-to-date operating instructions can also be downloaded from www.pfeiffer-vacuum.com.

Applicable documents

MPT 200	Operating instructions
Declaration of Conformity	Part of this document
Operating instructions for accessories (order-specifically)	see section "accessories"*

*also available via www.pfeiffer-vacuum.com

1.2 Conventions

Safety instructions

The safety instructions in Pfeiffer Vacuum operating instructions are the result of risk evaluations and hazard analyses and are oriented on international certification standards as specified by UL, CSA, ANSI Z-535, SEMI S1, ISO 3864 and DIN 4844. In this document, the following hazard levels and information are considered:

DANGER
Imminent danger
Indicates an imminent hazardous situation that will result in death or serious injury.

WARNING
Possibly imminent danger
Indicates an imminent hazardous situation that can result in death or serious injury.

CAUTION
Possibly imminent danger
Indicates an imminent hazardous situation that can result in minor or moderate injury.

| *NOTICE* |
|---|
| **Command or note** |
| Command to perform an action or information about properties, the disregarding of which may result in damage to the product. |

Pictographs

Prohibition of an action or activity in connection with a source of danger, the disregarding of which may result in serious accidents

Warning of a displayed source of danger in connection with operation of the unit or equipment
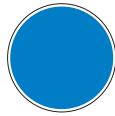
Command to perform an action or task associated with a source of danger, the disregarding of which may result in serious accidents

Important information about the product or this document

Instructions in the text

➔ Work instruction: here you have to do something.

Abbreviations

MPT: Digital Pirani/Cold Cathode gauge
CC sensor: Cold cathode sensor

2   Safety

2.1   Safety precautions

DANGER
Strong magnetic field in the vicinity of the sensor head!
Danger of death for persons with cardiac pacemakers when the magnetic unit is disassembled.
➔ Maintenance personnel with active body aids (e.g. cardiac pacemakers) should maintain a safe distance of at least 10 cm from the magnetic unit of the transmitter.
➔ Disassembled magnetic unit must be kept away from computers, data storage media and other electronic components.

NOTICE
EC conformity
The manufacturer's declaration of conformity becomes invalid if the operator modifies the original product or installs additional components.
➔ Following installation into a plant and before commissioning, the operator must check the entire system for compliance with the valid EU directives and reassess it accordingly.

Duty to inform
Each person involved in the installation or operation of the unit must read and observe the safety-related parts of these operating instuctions.
➔ The operator is obligated to make operating personnel aware of dangers originating from the unit or the entire system.

The gauge MPT 200 has been tested and accepted in compliance with EN 61010/VDE 0411 "Safety Equipment for Electrical Components".

- Observe the safety and accident prevention regulations.
- Check regularly that all safety precautions are being complied with.
- The unit has been accredited with protection class IP 54. Take necessary measures when installing into ambient conditions, which afford other protection classes.
- Consider possible reactions between the materials and the process media.

- Consider possible reactions of the process media due to the heat generated by the product.
- Do not modify or alter the unit yourself.
- Note the shipping instructions, when returning the unit.
- Inform yourself about a possible contamination before starting work.
- Adhere to the relevant regulations and take the necessary precautions, when handling contaminated parts.
- Communicate the safety instructions to other users.

2.2　Proper use

- Only use the MPT 200 digital gauge for measuring total pressures in the 5×10^{-9} ... 1000 hPa range.
- Only use the gauge for air, inert gases and gas mixtures outside their explosion limits.

2.3　Improper use

Improper use will cause all claims for liability and warranties to be forfeited. Improper use is defined as usage for purposes deviating from those mentioned above, 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

3 Product description

The digital transmitter MPT 200 consists of a cold cathode sensor and a Pirani sensor, whose measurement principle is based on the pressure-dependent thermal conductivity of gases. Sensor head and associated electronics are installed in a compact housing.

3.1 Product identification

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available.
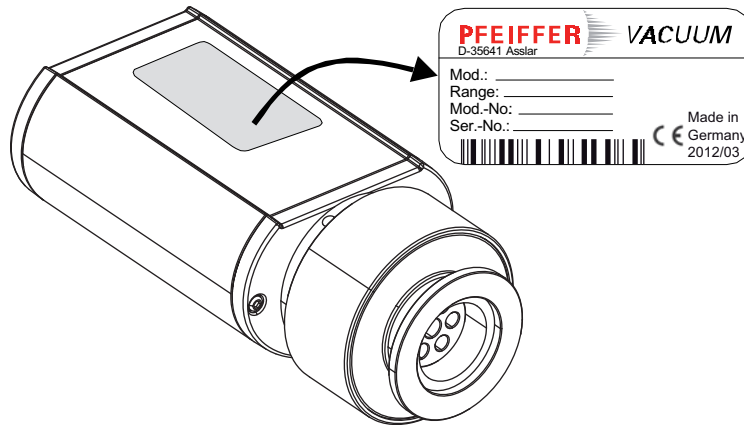
Fig. 1: Product identification on the rating plate

Scope of delivery

The following positions are included in the delivery consignment:

– MPT 200
– Protective cover
– Operating instructions

3.2 Function

The gauge can be operated in conjunction with the DigiLine Controller and the measuring software DokuStar (please see "Accessories") on a PC or with customized, digital signal evaluation.

The gauge responds to measurement value queries, type queries and setting commands.

1   RS-485 interface
2   Status LED
S   Address selector switch (pos. 1-16), address 1 --> default
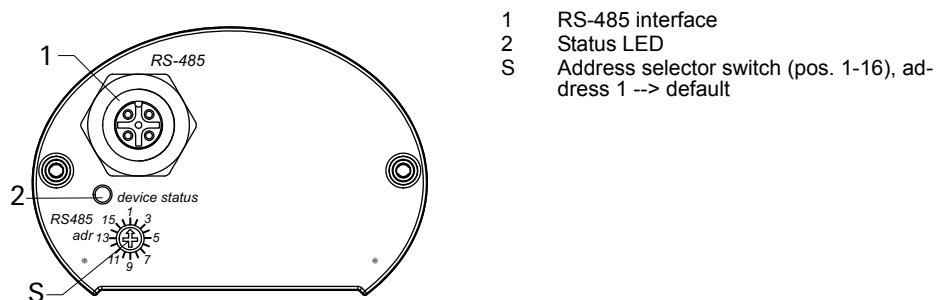
Fig. 2: DigiLine MPT 200 in standard version

3.3 Range of application

The unit MPT 200 must be installed and operated in the following ambient conditions:

Installation location	weather protected (indoor)
Protection class	IP 54
Installation altitude	max. 2000 m
Ambient temperature	+5°C to +60°C
Relative humidity	5 ... 85 %, non-condensing
Atmospheric pressure	860 hPa - 1060 hPa

4 Transport and storage

Units without external protection must not come into contact with electrostatically charge-able materials and must not be moved within electrical or magnetic fields.

➔ In rooms with moist or aggressive atmospheres, the unit must be airproof shrink-wrapped in a plastic bag together with a bag of desiccant.

➔ Keep the original protective covers.

5 Installation

5.1 Vacuum connection

NOTICE
Vacuum component
Dirt and damage impair the function of the vacuum component.
➔ When handling vacuum components, ensure that they are kept clean and are protected against damage.
➔ Ensure that the connection flange is clean, dry and free of grease.

CAUTION
Excess pressure in the vacuum system 1500 to 4000 hPa
Damage to health through emission of process media, because elastomer washers cannot withstand the pressure.
➔ Use sealing rings with an outer centering ring.

Mounting orientation

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.

Connecting the gauge

CAUTION
Excess pressure in the vacuum system > 1000 hPa
Danger of injuries by inadvertent opening of elements under stress due to parts flying around.
➔ Only use stressed elements, which can be opened and closed with appropriate tools (e.g. strap retainer-tension ring).

➔ Remove the protective cover, which is required during maintenance work.
➔ Make the flange connection.
  – When making a CF flange connection, it can be advantageous to temporarily remove the magnet unit.

5.2   Electrical connection

NOTICE
Damage to the product
Only connect cables when de-energized.
➔ Never establish a connection using a live cable.

Communication is effected, depending on the position of the address selector switch at the gauge (address settable from 1–16), via Serial Interface RS-485.

Setting the address selection switch
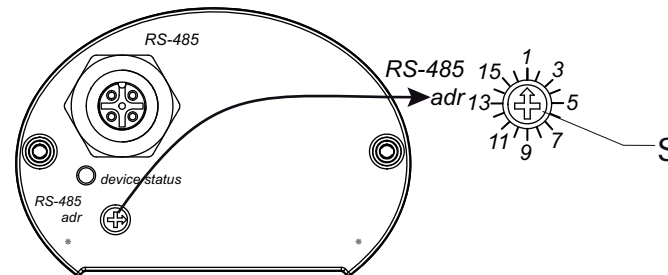
Fig. 3:   Setting the address selection switch

➔ Remove the rubber plug (not shown in the illustration) from the address selector switch, and set the required address according to the relevant connection situation.
➔ Reinsert the rubber plug.

RS-485
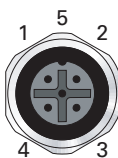
M12 socket with screw coupling for the connection of a Pfeiffer Vacuum control unit or a PC. The use of a Y-connector enables the series connection in a bus system.

Pin	Assignment
1	RS-485: D+
2	+24 V
3	GND
4	RS-485: D-
5	not connected

Connecting the gauge to the DPG 202 controller

Up to 2 gauges can be connected to the DPG 202 controller.
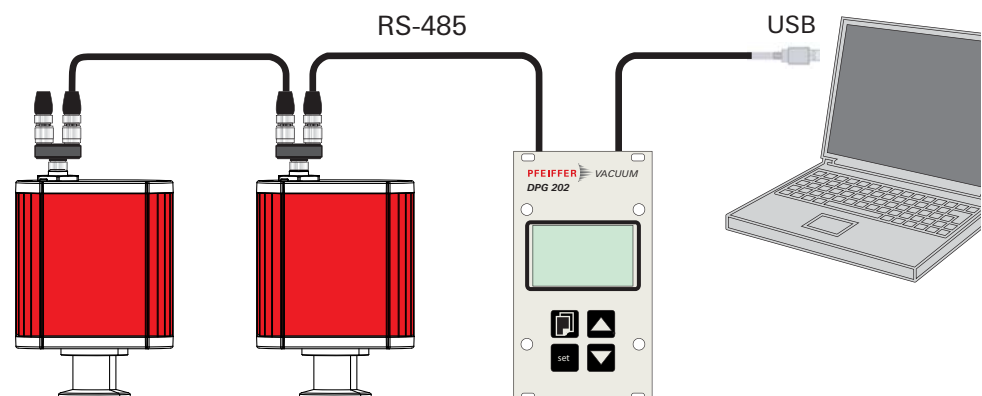
Fig. 4:   Connections diagram gauge/DPG 202

➔ Set the relevant address at the address selector switch S.
➔ Connect the gauge to the control unit using the connection cable.
➔ Switch on the control unit.

Connecting the gauge to the USB/RS-485 converter

24 V DC

USB/RS-485 Converter
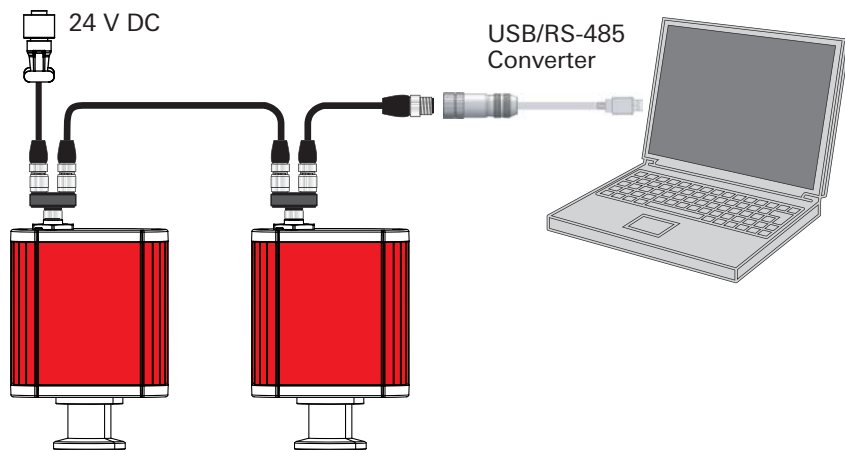
Fig. 5:   Connections diagram gauge - USB/RS-485 converter

➔ Set the relevant address at the address selector switch S.

➔ Connect the gauge to the USB/RS-485 converter using the connection cable.

➔ Connect the gauge to the power supply.

6 Operation

6.1 Before switching on

After switching on the power supply, the connected gauge is ready for operation. It is advisable to wait for a stabilization period of 5-10 minutes before measurement. Operate the gauge during the measurement continuously independent of the applied pressure.

The measured pressure will depend on the type of gas. A suitable gas-type correction factor for Pirani or cold cathode components can be set in the transmitter for the pressure range below 0.1 hPa to adjust to different gases. The gas-type correction factor is factory set for air and N_2 at 1.00.

Operation display via LED

Status within 1s	Meaning
off	no or insufficient power supply
green on	valid measurement at two-component gauges, sensor component for low pressure range is activ)
green flashing, (1 Hz)	Sensor component for high pressure range is activ. Only valid for two-component gauges
yellow on	Unit function is O.K., but due to internal operations (e. g. during adjustment or Degas operation) no valid measuring values will be displayed temporarily
	Measuring range: overrange / underrange
	after automatic switching from filament 1 to filament 2
red on	Software or unit malfunction
green/yellow/red off (1 s)	one-off: LED test after reset
red/green flashing, (1 Hz)	Software update in process

6.2 Bakeout

CAUTION

Excessive bakeout temperature!

Danger of damage to the electronics and the magnetic unit if applicable!

➔ For baking temperatures > 60°C, always remove the electronics and magnetic unit from sensor head 5 and only bake out flange.

➔ The housing flange 5a must not be thermally isolated. During baking it needs to be cooled by natural convection of ambient air.

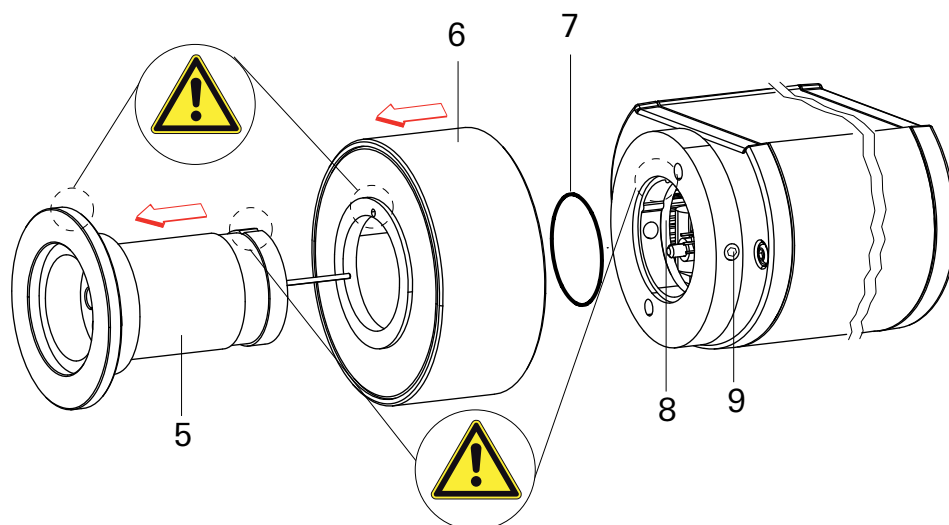➔ Pay attention to the the component assignments, do not interchange.

Fig. 6: Disassembling sensor head and magnet unit

➔ Loosen both set screws 9.

➔ Pull off sensor head 5 and magnet unit 6 from the electronic 8.

➔ Remove the magnet unit 6 from the sensor head 5, pay attention to O-ring 7.

➔ Bake out sensor head 5, pay attention to max. bakeout temperatur (**180 °C**) at the flange.

➔ Adjust the gauge.

6.3   Switching on/off the cold cathode sensor

With this transmitter the CC sensor can be switched on/off to suit process requirements.This is achieved using measuring devices via the PC software Dokustar (≥ V 4.00) or can be customized in accordance with the communication instructions.

When the power supply is switched on, the "sensor" variable is set to "On", (default setting), i.e. the MPT 100 is operating in normal mode. Status changes of this variable during operation are stored only temporarily. The status of the "sensor" variable can be altered at any time and remains stored until the power supply is switched off.

Switch on/off conditions

Status of the CC sensor	Control command with [P: 041]	Pirani pressure P_p actual[1]	Effect on CC sensor
Switched on	"On"	-	no effect
Switched off	"On"	$\geq P_x$	is switched on when $P_p < P_x$
Switched off	"Off"	$\geq P_x$	remains switched off when $P_p < P_x$
Switched on	"Off"	-	is switched off
Switched off	"On"	$< P_x$	is switched on and the "Switching on timer" is started.[2]

[1]   The threshold values P_x depend on the selected SwMode and amount $2.1 \cdot 10^{-3}$ and respectively $1.0 \cdot 10^{-3}$ hPa (see also "Selecting switching ranges").

[2]   The Pirani pressure value is displayed until this timer expires. If "ur" is output as the Pirani value prior to the "On" command, output $< 1 \cdot 10^{-4}$ hPa is set during the timer runtime (otherwise, the "ur" display could be interpreted as CC under range during the timer runtime). Once "Switching on Timer" has expired, the combined value from Pirani and the CC sensor is output again.

Switching on/off the CC sensor using controller

➔ See Operating Instructions for the respective control unit for switching on/off the sensor components.

Switching on/off the CC sensor for communication via RS-485-interface

➔ Switch on CC sensor by sending **[P:041]** with value "1".

➔ Switch off CC sensor by sending **[P:041]** with value "0".

6.4 Selecting switching range

Depending on the application the MPT 200 transmitter enables to adjust the switching range between Pirani and cold cathode (CC) sensors to avoid

– the set value for pressure control is in the switching range or,

– in coating applications, the cold cathode being switched on and contaminated prematurely by the self-sputter effect.

SwMode

trans_LO: Overlapping at $1–2 \cdot 10^{-3}$ hPa (CC "On" at $p \leq 2.1 \cdot 10^{-3}$ hPa/ CC "Off" at $p > 3.1 \cdot 10^{-3}$ hPa, standard design)

switch: Direct switching at $1 \cdot 10^{-3}$ hPa (CC "On" at $p \leq 1 \cdot 10^{-3}$ hPa)
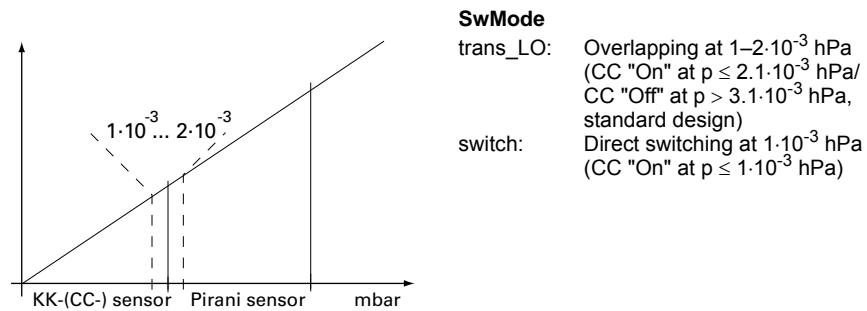
Fig. 7:   Switching ranges MPT 200

Communication with controller DPG 202

➜ Select switching ranges of the sensor components according to the operating manual for the control unit.

Communication via serial interface

➜ Select switching range:

– trans_LO: Send **[P:049]** with value "1"

– switch: Send **[P:049]** with value "0"

6.5 Configuring the data exchange

Communication is effected, depending on the position of the address selector switch at the gauge (address settable from 1–16), via Serial Interface RS-485.

- 9600 baud
- 8 data bits
- 1 stop bit
- no parity

Parameter overview

#	Name	Data type	Handling	CPT 200	PPT 200	RPT 200	HPT 200	MPT 200
022	Filament selection	7 - u_short_int	readable, writable				X	
040	Degas	6 - boolean_new	readable, writable				X	
041	Sensor on/off	6 - boolean_new	readable, writable				X	X
049	Switch mode	7 - u_short_int	readable, writable			X	X	X
303	Actual error code	4 - string	read-only	X	X	X	X	X
312	Software version	4 - string	read-only	X	X	X	X	X
349	Component name	4 - string	read-only	X	X	X	X	X
730	Pressure switch-point 1	10 - u_expo_new	readable, writable	only analog/relay version				
732	Pressure switch-point 2	10 - u_expo_new	readable, writable	only analog/relay version				
740	Pressure in [hPa]	10 - u_expo_new	readable, conditionally writable	X	X	X	X	X
741	Pressure set point	7 - u_short_int	only writable	X	X	X	X	X
742	Correction value (Pirani)	2 - u_real	readable, writable		X	X	X	X
743	Correction value (Bayard-Alpert)	2 - u_real	readable, writable				X	
743	Correction value (Cold cathode)	2 - u_real	readable, writable					X

Parameters are displayed in square brackets as a three-digit number in bold font. The designation may also be stated if necessary.

Example: **[P:312] Software version**

Applied data types

Data type	Description	Size l1 - l0	Example
0 - boolean_old	Boolean value (false / true)	06	000000 / 111111
1 - u_integer	Positive integer number	06	000000 to 999999
2 - u_real	Positive fixed point number	06	001571 equal to 15.71
4 - string	String	06	TC_400
6 - boolean_new	Boolean value (false / true)	01	0 / 1
7 - u_short_int	Positive integer number	03	000 to 999
10 - u_expo_new	Positive exponential number	06	100023
11 - string	String	16	BrezelBier&Wurst

Reading the actual pressure value [P:740]

Pressure value as the value to be queried and also as equalization (see below) are transmitted by means of a string in the format "aaaabb", whereby "aaaa" is the mantissa and "bb" the exponent with offset 20 of an exponential number. "aaaa" is therefore in the range "1000" (for 1.000) to "9999" (for 9.999). The individual characters of the string are the numbers "0" (ASCII 48) to "9" (ASCII 57).

Example: "104223" represents $1.042 \times 10^{+3}$ hPa, "750015" represents 7.500×10^{-5} hPa (Depending on the gauge and its accuracy the number of significant digits in the mantissa can vary).

Reading error codes [P:303]

Parameter 303 transfers the actual error code of the unit. The following error codes can occur:

Value	CPT 200	PPT 200	RPT 200	HPT 200	MPT 200	Meaning
000000	X	X	X	X	X	No error
Wrn001				X		Filament 1 defectve in auto-mode
Err001	X	X	X	X	X	Defective gauge
Err002	X	X	X	X	X	Defective memory
Err003				X		Filament 1 defective
Err004				X		Filament 2 defective
Err005				X		Both filaments defective

Reading the component names [P:349]

Parameter 349 contains a token of the component name:

"CPT 200"
"RPT 200"
"PPT 200"
"HPT 200"
"MPT 200"

Reading the software version [P:312]

The software version can be read from the connected device using parameter 312:

● Example: 010102

Reading/writing the gas correction factor [P:742]

The correction factor can be set to values in the range 0.2–8.0 :

● Example: 1,00 (written as 000100)

Reading/writing the gas correction factor for cold cathode [P:743]

The correction factor can be set to values in the range 0.2–8.0 :

● Example: 1,00 (written as 000100)

6.6 Pfeiffer Vacuum Protocol for "RS-485"

Telegram frame

The telegram frame of the Pfeiffer Vacuum protocol contains only ASCII code characters [32; 127], the exception being the end character of the message C_R. Basically, a master 🖥 (e.g. a PC) sends a telegram, which is answered by a slave ○ (e.g. electronic drive unit or gauge).

a2	a1	a0	*	0	n2	n1	n0	l1	l0	dn	...	d0	c2	c1	c0	C_R

a2 - a0	Unit address for slave ○ – Individual address of the unit ["001";"015"]
*	Action
n2 - n0	Pfeiffer Vacuum parameter numbers
l1 - l0	Data length dn ... d0
dn - d0	Data in data type concerned
c2 - c0	Checksum (sum of ASCII values of cells a2 to d0) modulo 256
C_R	Carriage return (ASCII 13)

Telegrams

Data request 🖥⇨○**?**

a2	a1	a0	0	0	n2	n1	n0	0	2	=	?	c2	c1	c0	C_R

Control command 🖥⇨○**!**

a2	a1	a0	1	0	n2	n1	n0	l1	l0	dn	...	d0	c2	c1	c0	C_R

Data response / control command understood ○⇨🖥✓

a2	a1	a0	1	0	n2	n1	n0	l1	l0	dn	...	d0	c2	c1	c0	C_R

Error message ○⇨🖥✗

a2	a1	a0	1	0	n2	n1	n0	0	6	N	O	_	D	E	F	c2	c1	c0	C_R
										_	R	A	N	G	E				
										_	L	O	G	I	C				

NO_DEF	The parameter n2 - n0 does not exist
_RANGE	Data dn - d0 are outside the permitted range
_LOGIC	Logic access violation

Telegram examples

Read actual pressure value (data query)

(Parameter **[P:740]**, Slave device address: "001")

🖥⇨○**?**	0	0	1	0	0	7	4	0	0	2	=	?	1	0	6	C_R
ASCII	48	48	49	48	48	55	52	48	48	50	61	63	49	48	54	13

○⇨🖥✓	0	0	1	1	0	7	4	0	0	6	1	0	0	0	2	3	0	2	5	C_R
ASCII	48	48	49	49	48	55	52	48	48	54	49	48	48	48	50	51	48	50	53	13

Activate/send parameter for atmospheric pressure (high pressure) (control command)

Atmospheric pressure adjustment (Parameter **[P:741/740]**, Slave device address: "001")

🖥⇨○**?**	0	0	1	1	0	7	4	1	0	3	0	0	1	1	3	0	C_R
ASCII	48	48	49	49	48	55	52	49	48	51	48	48	49	49	51	48	13

○⇨🖥✓	0	0	1	1	0	7	4	1	0	3	0	0	1	1	3	0	C_R
ASCII	48	48	49	49	48	55	52	49	48	51	48	48	49	49	51	48	13

Activate/send parameter for low pressure (control command)

Low pressure adjustment (Parameter **[P:741/740]**, Slave device address: "001")

$\square\Rightarrow\bigcirc$ **?**	0	0	1	1	0	7	4	1	0	3	0	0	0	1	2	9	C_R
ASCII	48	48	49	49	48	55	52	49	48	51	48	48	48	49	50	57	13

$\bigcirc\Rightarrow\square$ ✓	0	0	1	1	0	7	4	1	0	3	0	0	0	1	2	9	C_R
ASCII	48	48	49	49	48	55	52	49	48	51	48	48	48	49	50	57	13

6.7 Adjusting the gauge

The gauge is factory-adjusted. It may be necessary to adjust the Pirani sensor in the event of contamination, other installation positions, extreme temperature fluctuations, ageing, etc. This is carried out using the "DokuStar" PC software via a connected control unit or according to customer requirements following the communication instructions.

A Pirani equalization in the "ur" range (under range) will occur automatically under the following, simultaneously applicable conditions:

– the measuring value of the **CC** sensor is $< 5 \cdot 10^{-5}$ hPa.
– the measuring value of the Pirani sensor will remain constant for 1 minute and will not deviate too much from the last calibrated value.

Before adjustment, the gauge should be operated at the relevant pressure for approx. 5–10 minutes (warm-up time).

For correct zero point adjustment, the pressure in the vacuum chamber must be $p \leq 1 \cdot 10^{-5}$ hPa.

With controller DPG 202:

➔ Adjust the gauge as described in the instruction for the control unit.

RS-485

➔ Evacuate the vacuum chamber to the pressure $p \leq 1 \cdot 10^{-5}$ hPa.

➔ Set the pressure adjusting point [P:741] to "000" for low pressure and transmit.

➔ Send actual pressure value [P:740] with value "000000" for low pressure (corresponds to $p < 1 \cdot 10^{-1}$); ==> "ur" (under range).

➔ Vent vacuum chamber to atmospheric pressure with air or N_2; afterwards wait about 10 minutes.

➔ Set the pressure adjusting point [P:741] to "001" for high pressure and transmit.

➔ Set the actual pressure value to the atmospheric pressure ("100023" for 1000 hPa).

7 Maintenance

DANGER
Strong magnetic field in the vicinity of the sensor head!
Danger of death for persons with cardiac pacemakers when the magnetic unit is disassembled.
➜ Maintenance personnel with active body aids (e.g. cardiac pacemakers) should maintain a safe distance of at least 10 cm from the magnetic unit of the transmitter.
➜ Disassembled magnetic unit must be kept away from computers, data storage media and other electronic components.

NOTICE
Vacuum component
Dirt and damage impair the function of the vacuum component.
➜ When handling vacuum components, ensure that they are kept clean and are protected against damage.
➜ Ensure that the connection flange is clean, dry and free of grease.

WARNING
Contamination of gauge parts possible due to the media measured!
Poisoning hazard through contact with harmful substances.
➜ In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.
➜ Decontaminate affected parts before carrying out maintenance work.

7.1 Replacing the sensor head

In case of a defective sensor or if the gauge cannot be adjusted after cleaning, the sensor assembly 5 must be replaced.
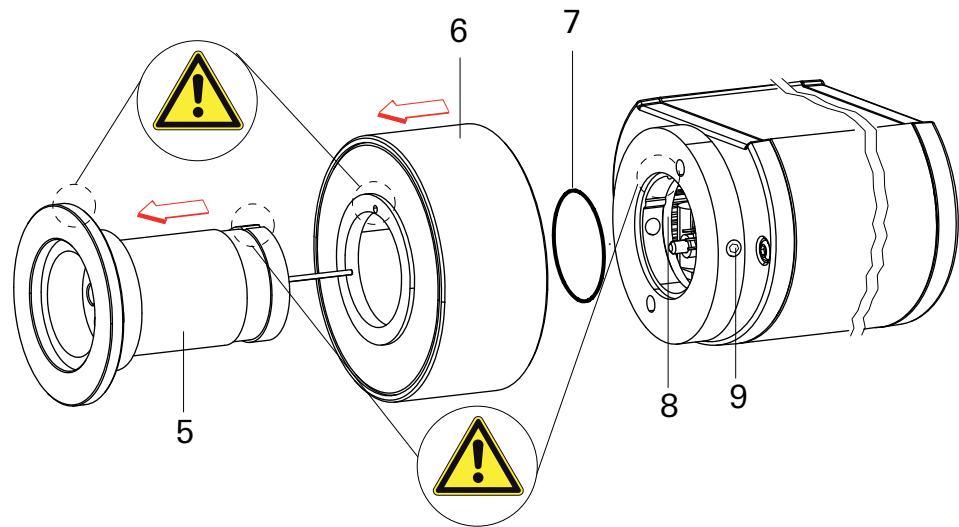

Fig. 8:   Replacing the sensor assembly

Dismantling

➜ Turn off the vacuum pump, vent to atmospheric pressure and allow to cool, if necessary.

➜ Switch off the power supply on the control unit/power supply or disconnect the equipment from the mains supply.

➜ Loosen any connection cables.

➜ Detach the gauge from the vacuum apparatus.

➜ Loosen both set screws 9.

➜ Pull off sensor head 5 and magnet unit 6 from the electronic 8.

➜ Remove the magnet unit 6 from the sensor head 5, pay attention to O-ring 7.

Assembly

➜ **Assembling** is carried out in reverse order.

➜ Install the replacement sensor assembly 5 into magnet unit 6, ensure correct orientation.

➜ Insert O-ring 7 in groove of sensor head 5.

➜ Insert the sensor assembly 5 into the pin pitch of the electronics 8;
  – ensure correct orientation and
  – ensure the O-ring 7 fits correctly 7.

➜ Tighten both set screws 9.

➜ Install the transmitter.

➜ Adjust the gauge.

8   Disposal

Products or parts thereof (mechanical and electrical components, operating fluids, etc.) may cause environmental burden.

➜ Safely dispose of the materials according to the locally applicable regulations.

9 Malfunctions

9.1 Rectifying malfunctions

Errors	Possible cause:	Remedy
Communication error: Transmitters	• No power supply • Incorrect address preset • Transmitter faulty	⇨ Connect data cable or power-pack. ⇨ Set address selector switch correctly. ⇨ Change transmitter
A too large measuring value is emitted continuously in high vacuum.	• Adjustment required • Transmitter faulty	⇨ Adjust transmitter. ⇨ Change sensor/gauge.
"ur" is emitted continuously in high vacuum, although the pressure > $1 \cdot 10^{-8}$ hPa	• uses starting aid	⇨ Change sensor.

10 Service

Malfunctions of the gauge, caused by contamination or wear, as well as wear parts (e.g. heating filament) are not covered by warranty.

- If the sensor head is defective, it can be exchanged by the customer as described in section maintenance
- If the electronic is defective, a repair is uneconomical and therefore not intended in case of damage.
  - Send the unit and have it replaced with a new unit

Sending of units (under warranty)

For a quick and smooth handling of the service process, Pfeiffer Vacuum recommends the following steps:

➔ Download the forms "Service Request" and Declaration on Contamination.[1]

➔ Fill out the "Service Request" form and send it by fax or e-mail to your local Pfeiffer Vacuum service contact.

➔ Include the confirmation on the "Service Request" from Pfeiffer Vacuum with your shipment.

➔ Fill out the Declaration of Contamination and include it in the shipment. This document is mandatory to protect our service engineers.
  - Fill out and send one declaration for each device.

➔ If possible, send unit in the original packaging.

In the absence or incompleteness of the "Declaration on Contamination" and/or the use of unsuitable transport packaging, Pfeiffer Vacuum reserves the right to make a decontamination and/or to send the product back at the shipper's expense.

Service orders

All service orders are carried out exclusively according to our repair conditions for vacuum units and components. Detailed information, addresses and forms at:

http://**www.pfeiffer-vacuum.com/service/repair-services/container.action**.

[1] Forms under www.pfeiffer-vacuum.com

11 Accessories

Designation	MPT 200
Termination resistor for RS-485	PT 348 105 -T
M12 m plug 4-pole with screw terminals RS-485	PT 348 106 -T
Power separator for RS-485	PT 348 132 -T
Adapter RS-485, M12, 4-pole - D-sub socket, 9-pole, 0.2 m	PT 348 133 -T
Supply cable DigiLine, M12, 4-pole to TPS, 3 m	PT 348 163 -T
Connection cable, RS-485, M12/D-sub 9-pole, 3 m	PT 348 223 -T
Interface cable, M12 m straight / M12 m straight, 3 m	PM 061 283 -T
Connector M12 to RS-485	PM 061 270 -X
DPG 202, Controller and power supply unit for up to 2 gauges	PT G12 020
TPS 110, mains pack for wall/standard rail fitting	PM 061 340 -T
TPS 111, mains pack 19" rack module 3HU	PM 061 344 -T
USB converter to RS-485 interface	PM 061 207 -T
DokuStar Plus software, 16 channels	PT 882 501
PV TurboControl - Software for Pfeiffer Vacuum products with PV protocol	PM 061 741
Centering ring, with poral filter, FPM/stainless steel, DN 25 ISO-KF	PF 117 225 -T
Centering ring, with poral filter, FPM/stainless steel, DN 40 ISO-KF	PF 117 240-T
Y-Connector M12 to RS-485	P 4723 010

12 Spare parts

Pos.	Description	Flange	No.
5	Sensor assembly	DN 25 ISO-KF	PT 120 210-T
5	Sensor assembly	DN 40 ISO-KF	PT 120 211-T
5	Sensor assembly	DN 40 CF-F	PT 120 212-T

13 Technical data and dimensions

13.1 General

Conversion table: pressure units

	mbar	bar	Pa	hPa	kPa	Torr mm Hg
mbar	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
bar	1000	1	$1 \cdot 10^{5}$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	1	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	1

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

13.2 Technical data

| Parameter	MPT 200	MPT 200	MPT 200
Nominal diameter	DN 25 ISO-KF	DN 40 ISO-KF	DN 40 ISO-KF
Protection category	IP 54	IP 54	IP 54
Seal	Metal	Metal	Metal
Pressure max.	4000 hPa	4000 hPa	4000 hPa
Accuracy: % of measurement	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: ± 25 %, $2 \cdot 10^{-3} - 10$ hPa: ± 10 %, 10 – 100 hPa: ± 30 %; 100 – 1000 hPa: ± 50 %	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: ± 25 %, $2 \cdot 10^{-3} - 10$ hPa: ± 10 %, 10 – 100 hPa: ± 30 %; 100 – 1000 hPa: ± 50 %	$1 \cdot 10^{-8} - 2 \cdot 10^{-3}$ hPa: ± 25 %, $2 \cdot 10^{-3} - 10$ hPa: ± 10 %, 10 – 100 hPa: ± 30 %; 100 – 1000 hPa: ± 50 %
Weight	555 g	580 g	850 g
Materials in contact with media	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass	Tungsten, stainless steel, nickel, molybdenum, glass
Measurement range max.	1000 hPa	1000 hPa	1000 hPa
Measurement range min.	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa	$5 \cdot 10^{-9}$ hPa
Sensor cable length max.	100 m	100 m	100 m
Method of measurement	Pirani/Cold Cathode	Pirani/Cold Cathode	Pirani/Cold Cathode
Measuring cycle	10 ms	10 ms	10 ms
Interface: Connection	Digital RS-485; M12 f, 5-pole	Digital RS-485; M12 f, 5-pole	Digital RS-485; M12 f, 5-pole
Cold cathode sensor control	Cold Cathode sensor can be switched on and off via interface	Cold Cathode sensor can be switched on and off via interface	Cold Cathode sensor can be switched on and off via interface
Temperature: Operating	+5-+60 °C	+5-+60 °C	+5-+60 °C
Temperature: Storage	-40-+65 °C	-40-+65 °C	-40-+65 °C
Bakeout temperature max. at the flange	180 °C	180 °C	180 °C
Supply: Voltage	24 V DC	24 V DC	24 V DC
Supply: power consumption	3 W	3 W	3 W
Repeatability: % of measurement	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: ± 7 %; $1 \cdot 10^{-2} - 10$ hPa: ± 2 %	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: ± 7 %; $1 \cdot 10^{-2} - 10$ hPa: ± 2 %	$1 \cdot 10^{-8} - 1 \cdot 10^{-2}$ hPa: ± 7 %; $1 \cdot 10^{-2} - 10$ hPa: ± 2 %

13.3 Dimensions
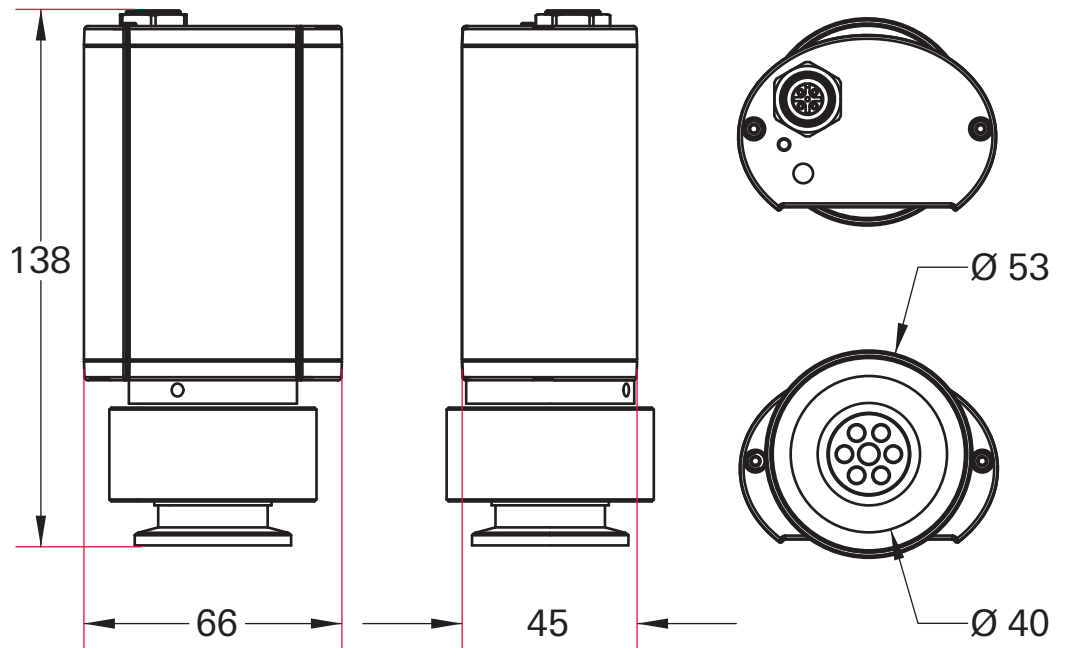
Fig. 9:   MPT 200, DN 25 ISO-KF

Ø 53

Ø 40

138

66

45
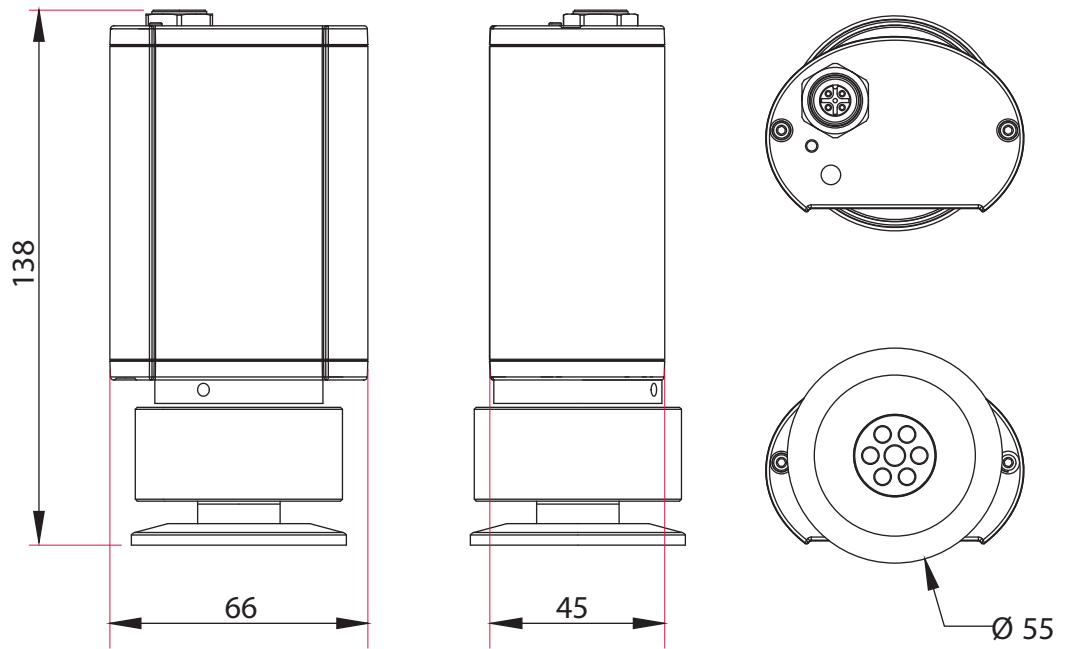
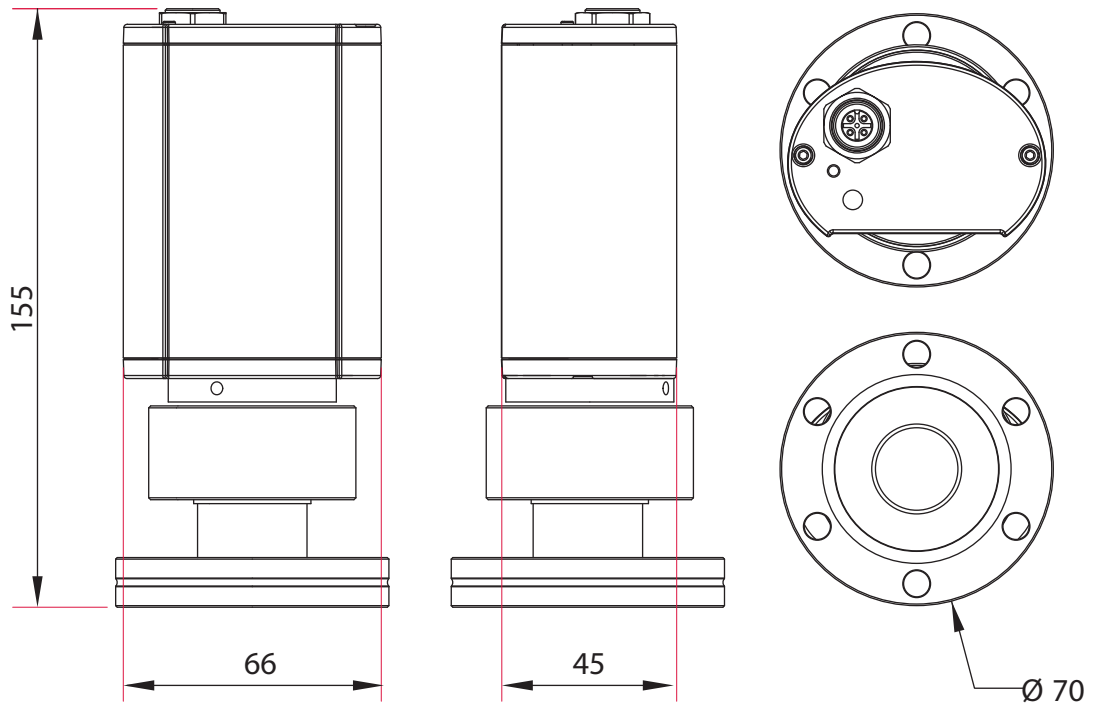**Fig. 10:   MPT 200, DN 40 ISO-KF**

138

66

45

Ø 55

Fig. 11: MPT 200, DN 40 CF-F

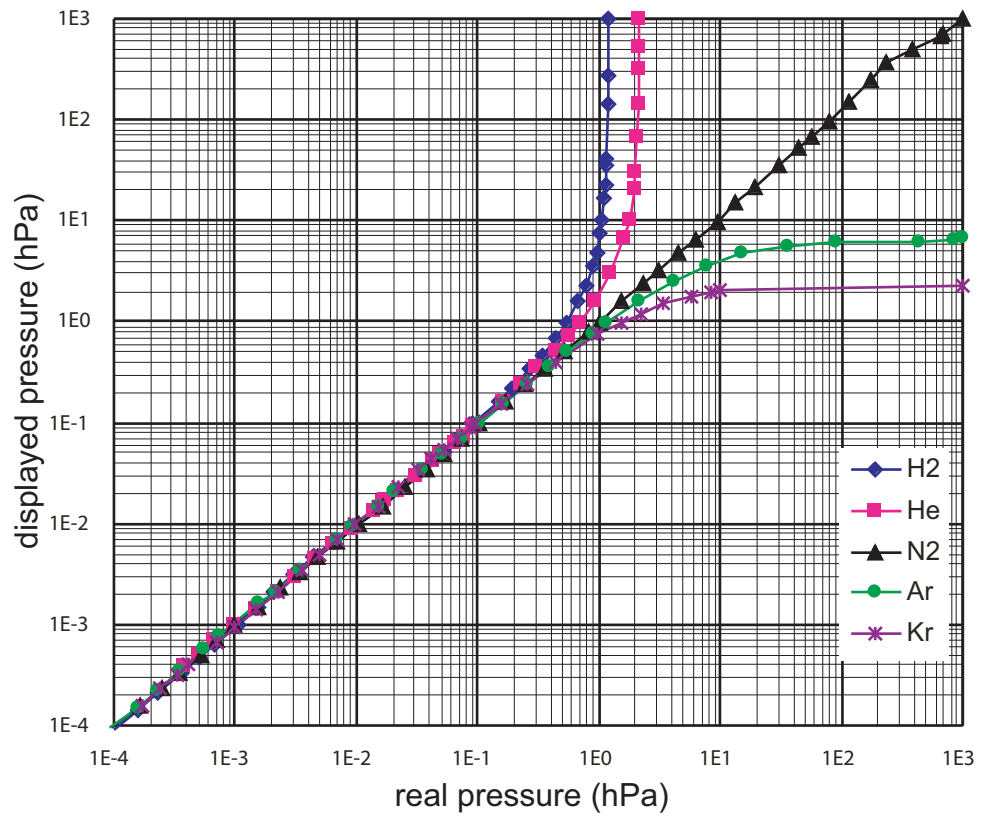## 13.4 Gas correction factor

Fig. 12: Measurement curve MPT 200 (Pirani)

Pirani correction factor:

N_2 1.00
Air   1.00
H_2 0.58
He   1.02
Ar   1.59
CO_2 0.89
CF_4 0.93

Cold cathode correction factor:

He   5.93
H_2 2.39
Ar   0.80
CO_2 0.74
C_3H_8 0.32
Ne   3.50
Kr   0.60
Xe   0.41
R_{12} 0.28
CF_4 0.44

Relative sensitivity in molecular range $<1 \cdot 10^{-1}$ mbar

CE Declaration of conformity

We hereby declare that the product cited below satisfies all relevant provisions according to the following **EC directives**:

- **Electromagnetic Compatibility 2004/108/EC**
- **Low Voltage 2006/95/EEC**

DigiLine
MPT 200

Harmonised standards and national standards and specifications which have been applied:

DIN EN 61010-1: 2010
DIN EN 61326-1: 2006-10

Signatures:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

| (M.Bender) | (Dr. M. Wiemer) | 2015-08-25 |
| Managing Director | Managing Director | |

PFEIFFER VACUUM

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