SUPPLEMENTARY INFORMATION

EN

Translation of the Original

XPT 20X AR | CCT 36X AR | CCT 37X AR

DigiLine gauge with analog/relay connector

PFEIFFER VACUUM

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new gauge is designed to support you in your individual application with maximum performance and without malfunctions. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. From this extensive, practical experience we have gained a large volume of information that can contribute to efficient deployment and to your personal safety.

In the knowledge that our product must avoid consuming work output, we trust that our product can offer you a solution that supports you in the effective and trouble-free implementation of your individual application.

Please read these operating instructions before putting your product into operation for the first time. If you have any questions or suggestions, please feel free to contact info@pfeiffer-vacuum.de.

Further operating instructions from Pfeiffer Vacuum can be found in the Download Center on our website.

Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

Copyright

Table of contents

1 About this manual

IMPORTANT
Read carefully before use.
Keep the manual for future consultation.

1.1 Validity

This supplementary information describes important deviations from the standard product and is valid only in conjunction with the valid operating instructions.

1.1.1 Applicable documents

Designation	Document
Operating instructions for "Digital capacitive gauge" CCT 36x	BG 6011
Operating instructions for "Digital capacitive gauge" CCT 37x	BG 6012
Operating instructions for "Digital piezo-resistive gauge" CPT 200	PG 0021
Operating instructions for "Digital Pirani gauge" PPT 200	PG 0022
Operating instructions for "Digital piezo/Pirani gauge" RPT 200	PG 0023
Operating instructions for "Digital Pirani/Bayard Alpert gauge" HPT 200	PG 0024
Operating instructions for "Digital Pirani/cold cathode gauge" MPT 200	PG 0025
Operating instructions for “Control unit” OmniControl	PT 0670
Declaration of conformity	A component of these instructions

Tbl. 1: Applicable documents

You can find these documents in the Pfeiffer Vacuum Download Center.

1.1.2 Variants

This document applies to the following products:

- **DigiLine gauge with analog/relay connector**

The part number is found on the rating plate of the product.

Pfeiffer Vacuum reserves the right to make technical changes without prior notification.

Information that relates to only one of the products is indicated accordingly.

The figures in this document are not to scale.

The figures show the product with a DN 16 ISO-KF vacuum connection, however, they also apply to the other vacuum connections where applicable.

Dimensions are in mm unless stated otherwise.

1.2 Conventions

1.2.1 Abbreviations

Abbreviation	Explanation
AGND	Analog ground
AO	Analog output
AR	Analog/Relay
c	Constant for converting pressure and output voltage
d	Constant for converting pressure and output voltage
DEC	Decade
FS	Full Scale

Abbreviation	Explanation
GND	Ground
ID	Identification
KK	Cold cathode
N/A	Not connected (not assigned)
OR	Overrange
UR	Underrange

Tbl. 2: Abbreviations used

2 Product description

2.1 Function

The analog/relay version of the DigiLine gauge allows digital reading of pressure measurement values and provides various options for using the AR interface:

- Connecting an ActiveLine total pressure measuring and control unit to the "analog/relay" connection of the gauge
- Local pressure display with a 1-channel total pressure measuring and control unit from the Pfeiffer Vacuum ActiveLine
- Mixed use of digital and analog gauges with a 2 or 6-channel total pressure measuring and control unit from the Pfeiffer Vacuum ActiveLine
- Pressure regulation with an RVC 300 control unit in combination with a regulating valve
- Switching and safety functions through direct evaluation of switching contacts

The "RS-485" or "analog/relay" connections can optionally be used as a voltage supply.

The analog signal and dry contacts can also be evaluated using customer-specific switches.

2.1.1 Function of the CCT gauge

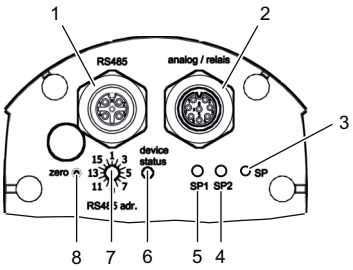


Fig. 1: Structure of the CCT gauge

1 "RS-485" connector
2 "Analog/relay" connector
3 "SP" button (switch-points)
4 Status LED for switch-point SP2
5 Status LED for switch-point SP1
6 Status LED for the gauge
7 RS-485 address selector switch
8 "Zero" button (calibration)

Parameter	CCT 36x AR	CCT 37x AR
Analog	Linear	
p(U) [1]	(U-1) × c × FS	
U(p) [2]	1 + p / (c × FS)	
kPa	c = 0.0125	
Pa	c = 12.5	
hPa (mbar)	c = 0.125	
µbar	c = 125	
Torr	c = 0.094	
mTorr (µ)	c = 94	
U_{max} [3]	9.8 V	
U_{min} [4]	1.0 V	
OR	9.8 – 13.5 V	

1) Pressure as a function of the output voltage
2) Output voltage as a function of the pressure
3) Output voltage in volt
4) Output voltage in volt

Parameter	CCT 36x AR	CCT 37x AR
UR	0.4 – 0.6 V	
Error	< 0.4 V	

Tbl. 3: Output characteristic of the analog signal

2.1.2 Function of the xPT gauge

The xPT 200 AR gauges are available in variants with and without a display. The display is located on the side of the gauge. The current pressure is shown on the display in hPa (standard). The background lighting of the display changes to red if an error is present.

Correction factor for gas type dependent gauges

You can write the correction factors into the memory of the gauge via the serial interface. Information can be found in the corresponding operating instructions of the gauge standard version.

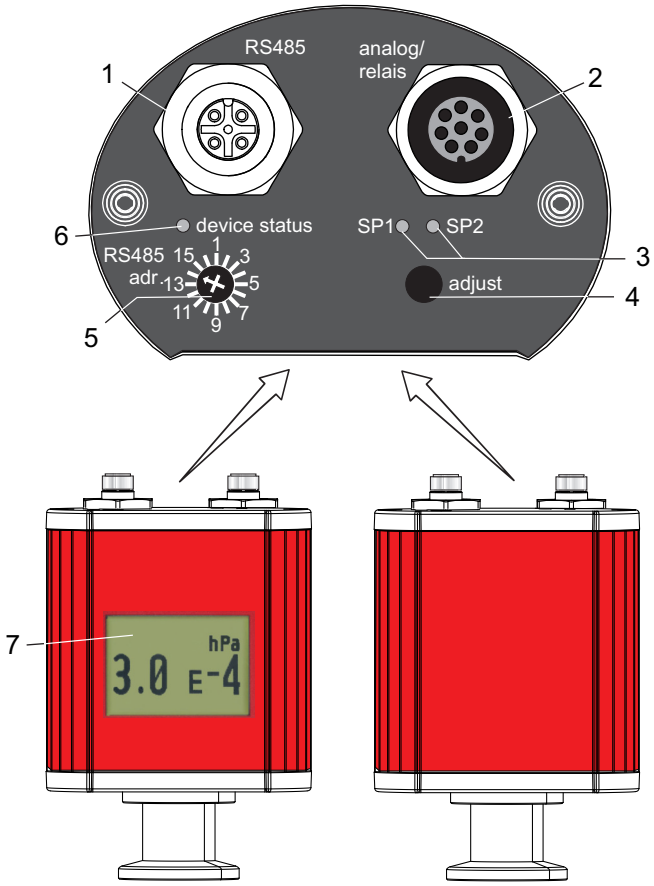


Fig. 2: Structure of the xPT gauge

1 "RS-485" connector
2 "Analog/relay" connector
3 Status LED for switch-points SP1 and SP2
4 "Adjust" (calibration) button
5 RS-485 address selector switch
6 Status LED for the gauge
7 Display

Parame-ter	CPT 200 AR	PPT 200 AR	RPT 200 AR	RPT 201 AR	HPT 200 AR	MPT 200 AR
Analog	Linear	log 1 V/dec			log 0.75 V/dec	log 0.6 V/dec
p(U) [5]	(U-1) × FS / 8	$10^{(U-c)}$			$10^{(U - 7.75) / 0.75 + c}$	$10^{1.667 \times U - d}$

5) Pressure as a function of the output voltage

Parame-ter	CPT 200 AR	PPT 200 AR	RPT 200 AR	RPT 201 AR	HPT 200 AR	MPT 200 AR
U(p) [6]	1 + 8 × p / FS	c + $\log_{10}$ × p			7.75 + 0.75 × ($\log_{10}$ × p - c)	c + 0.6 × $\log_{10}$ × p
kPa	-	c = 2.5			c = -1.0	c = 7.4 d = 12.33
Pa	-	c = 3.5			c = 2.0	c = 5.6 d = 9.333
hPa (mbar)	-	c = 5.5			c = 0	c = 6.8 d = 11.33
µbar	-	c = 2.5			c = -3.0	c = 5.0 d = 8.333
Torr	-	c = 5.625			c = -0.125	c = 6.875 d = 11.46
mTorr (µ)	-	c = 2.625			c = 2.875	c = 5.075 d = 8.458
U_{max} [7]	9.8 V	8.5 V	8.58 V		10.0 V	8.6 V
U_{min} [8]	1.0 V	1.5 V		2.2 V	0.774 V	1.82 V
OR	9.8 – 13.5 V	-	8.6 – 13.5 V		-	
UR	0.5 – 0.9 V	0.5 – 1.5 V			0.5 – 0.774 V	0.5 – 1.82 V
Error	-					9.5 – 10.5 V
Error	< 0.5 V					

Tbl. 4: Output characteristic of the analog signal

2.2 Connection "analog / relay"

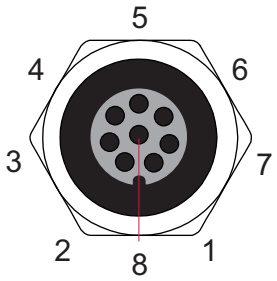


Fig. 3: Connection "analog / relay"

1 Analog ground (AGND)
2 Analog output (AO)
3 Identification (ID)
4 Relay K1
5 Relay K2
6 Relay Common
7 Supply voltage (24 V DC)
8 Ground (GND)

6) Output voltage as a function of the pressure
7) Output voltage in volt
8) Output voltage in volt

3 Installation

⚠ DANGER

Danger to life due to dangerous contact voltage

Voltages above 30 V (AC) or 60 V (DC) are considered dangerous in accordance with IEC 61010. If you come into contact with dangerous contact voltage, this can result in injury through electric shocks or even death.

► Only apply protected extra-low voltage (PELV).

⚠ DANGER

Danger to life from electric shock

Power supply packs that are not specified or are not approved will lead to severe injury or death.

► Make sure that the power supply pack meets the requirements for double isolation between mains input voltage and output voltage, in accordance with IEC 61010-1, IEC 60950-1 and IEC 62368-1.
  – Relay connection: max. 49 V AC or 30 V DC max., 2 A max. 30 VA
► Use original power supply packs or power supply packs that correspond with the applicable safety regulations.
► Make sure that the permissible ambient conditions for the power supply pack are maintained.
► If the ambient temperature is between 40°C and 60°C, use a power supply pack that is suitable for this temperature range.

NOTICE

Damage from connecting while energized

You will damage the gauge if you connect it while energized.

► Disconnect the voltage supply before installing the gauge.
► Attach the connection cable only when in zero potential state.

Vacuum connection

You can obtain information on the vacuum connection in the corresponding operating instructions of the standard version of the gauge.

3.1 Establishing electric connection

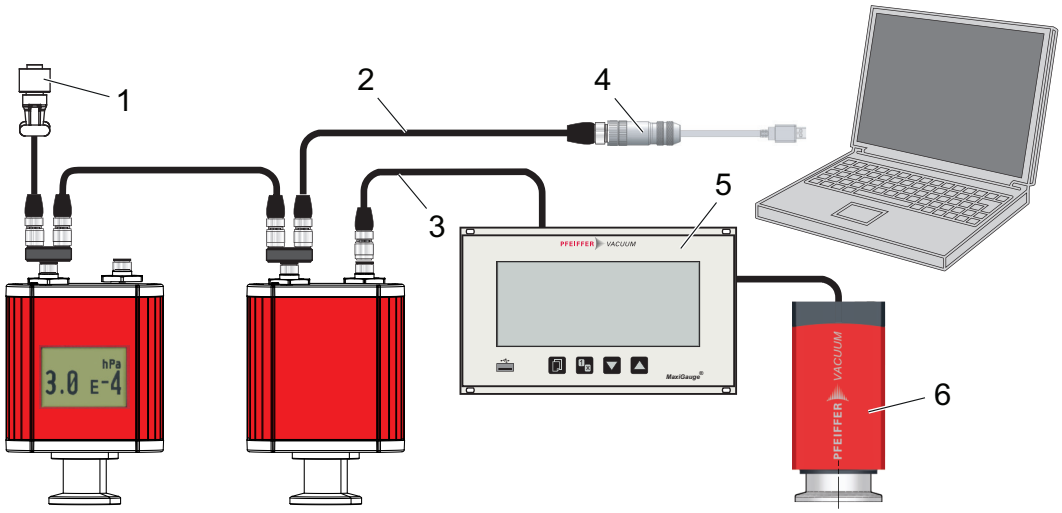


Fig. 4: Connection to TPG and PC

1 Voltage source 24 V DC
2 Digital connection
3 Analog connection
4 USB/RS-485 converter
5 TPG 366
6 ActiveLine transmitter

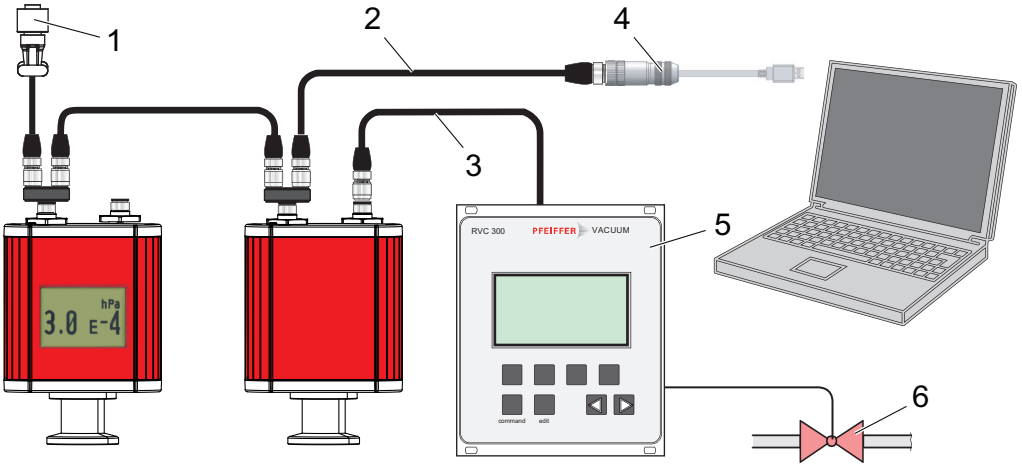


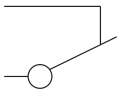
Fig. 5: Connection to RVC 300 and PC

1 Voltage source 24 V DC
2 Digital connection
3 Analog connection
4 USB/RS-485 converter
5 RVC 300
6 RME 005 A

Connecting Pfeiffer Vacuum display and control units or a PC

- ► Use a connecting cable from the DigiLine accessories program.
- ► In each case, connect only one external Control unit to the RS-485 interface.
- ► If needed, connect a PC via the USB/RS-485 converter.

3.2 Connecting the relay

Pins	Switching function	Description	Switching function	Description
4 5 6		Pressure lower than threshold value		Pressure higher than threshold value or device switched off

Tbl. 5: Switching functions

Procedure

1. Use a self-made screened connection cable.
2. Use the zero-potential state of the switching functions for an external control.

4 Operation

4.1 Adjusting relay and switch-points

The AR versions of the DigiLine gauges feature two pressure-controlled relay contacts that can be configured via the RS-485 interface using an external controller. Alternatively, you can set the switch-points of the xPT gauge with a control unit and the switch-points of the CCT gauge with the “SP” button on the gauge. The pre-settable switch-points SP1 and SP2 control the relay.

The hysteresis H is fixed at

- 15 % of the switching threshold with xPT gauges
- 1 % of the measuring range with CCT gauges

Switch-point	Status LED	Indicator	Meaning	Relay
SP1	Off	———	Switching threshold 1 exceeded	Inactive
	On (green)	■	Switching threshold 1 not reached	Active
SP2	Off	———	Switching threshold 2 exceeded	Inactive
	On (green)	■	Switching threshold 2 not reached	Active

Tbl. 6: Status LED

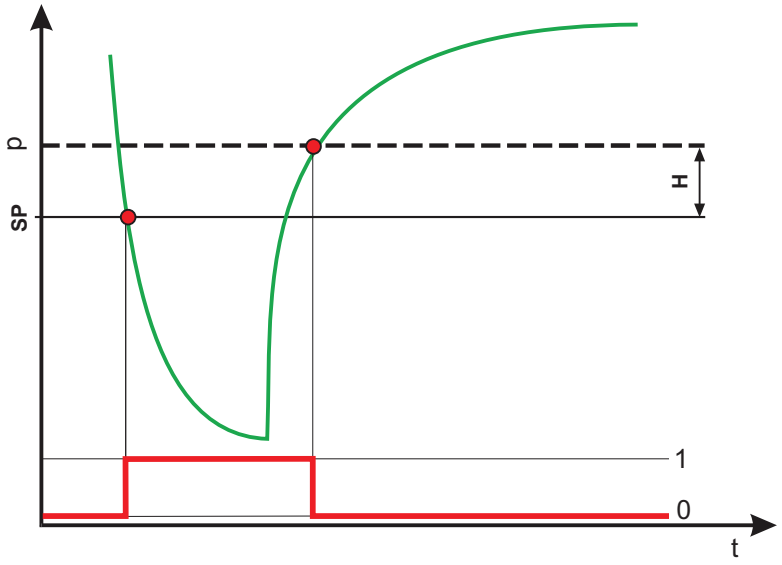


Fig. 6: Pressure curve and switch-points

t	Time	H	Hysteresis
p	Pressure	0	Relay inactive
SP	Switch-point	1	Relay active

Adjusting and reading out switching points via RS-485

You can find additional information in the corresponding operating instructions of the gauge standard version.

1. Use parameter **[P:730]** to set the pressure value for switch-point 1.
2. Use parameter **[P:732]** to set the pressure value for switch-point 2.

4.1.1 Adjusting switch-points of xPT gauges with control unit

Required unit (optional)

- OmniControl control unit

Procedure

Information can be found in the corresponding operating instructions for the control unit.

1. Assign parameter **[P:730]** for switch-point 1 to a tile of the OmniControl.
2. Assign parameter **[P:732]** for switch-point 2 to a tile of the OmniControl.
3. Assign a value to the respective switch-point as desired.

4.1.2 Adjusting the switch-points of CCT gauges with the "SP" button

Required tool

- Stylus (max. Ø 1.1 mm)

Adjusting switch-point 1

► Press the "SP" button **once** using a stylus.
  – The gauge changes to switching function mode and displays the current threshold value for 10 s at the measuring signal output. Status LED "SP" flashes.

Adjusting switch-point 2

► Press the "SP" button **twice** using a stylus.
  – The gauge changes to switching function mode and displays the current threshold value for 10 s at the measuring signal output. Status LED "SP" flashes.

Changing threshold value

1. Press and hold the "zero" button to change the threshold value.
   – The gauge continuously changes the threshold value from the current value (ramp) until you release the button or as soon as the setting limit is reached.
2. Release the "zero" button and press it again within 3 to 5 s to change direction (inverse ramp).
   – The flash frequency of the gauge's status LED briefly changes.
3. Release the "zero" button and press it again within 3 s to perform fine adjustment of the threshold value.
   – The gauge changes the threshold value in single steps.
4. Let go of the "zero" button for 5 s.
   – The gauge returns to measuring mode.

4.2 Adjusting display

Adjusting the display via RS-485

► Use parameter **[P:087]** to configure the settings for the display position and unit of pressure.

The values for the display position and unit of pressure are loadable and readable at the same time.

Example: Value 22

- 16 = unit of pressure mbar
- 6 = display position 180°

#	Indicator	Designations	Functions	Data type	Access type	Unit	min.	max.	default	💾
087	Display	Display settings	4 = Display 0° 6 = Display 180° 8 = Pressure in hPa 12 = 0° / hPa 14 = 180° / hPa 16 = Pressure in mbar 20 = 0° / mbar 22 = 180° / mbar 24 = Pressure in Torr 28 = 0° / Torr 30 = 180° / Torr 32 = Pressure in Pa 36 = 0° / Pa 38 = 180° / Pa 40 = Pressure in mTorr 44 = 0° / mTorr 46 = 180° / mTorr	1	RW		4	46	12	✓

Tbl. 7: Parameter set | Control commands

5 Gauge calibration

Prerequisites for calibration

Information on performing calibration using the RS-485 interface and the prerequisites for calibration can be found in the operating instructions for the standard version of the gauge.

Calibrating the CCT capacitive gauge

Information on performing calibration can be found in the operating instructions for the standard version of the gauge.

Calibrating combination gauges with the Pirani sensor

For the RPT 200, HPT 200 and MPT 200 combination gauges, calibration at atmospheric pressure only acts on the Pirani sensor.

Calibrating the CPT 200 piezo-resistive gauge

With the zero point setting at a pressure of $p \leq 1 \times 10^{-1}$ hPa, the gauge produces an output signal of 0.9 V. When using ActiveLine total pressure measuring and control units (TPG), this leads to a display of approx. -25 hPa (-19 Torr). Calibration at atmospheric pressure is not possible with the CPT 200.

Required tool

- Stylus (max. Ø 1.1 mm)

Calibrating the combination gauge with Pirani sensor

1. Remove the rubber plug from the "adjust" button.
2. Evacuate the recipient to a pressure of $\leq 1 \times 10^{-5}$ hPa.
3. Briefly press the "adjust" button.
4. Flood the recipient with air or nitrogen (N_2) at atmospheric pressure.
5. Wait 10 minutes.
6. Briefly press the "adjust" button.
7. Reinsert the rubber plug of the "adjust" button.

Calibrating the CPT 200 piezo resistive gauge

1. Remove the rubber plug from the "adjust" button.
2. Evacuate the recipient to a pressure of $\leq 1 \times 10^{-1}$ hPa.
3. Briefly press the "adjust" button.
4. Flood the recipient with air or nitrogen (N_2) at atmospheric pressure.
5. Wait 10 minutes.
6. Briefly press the "adjust" button.
7. Reinsert the rubber plug of the "adjust" button.

6 Accessories

View the range of DigiLine accessories on our website.

Description	Part number
M12 m, 8-pin plug with screw clamps, DigiLine AR version	PT 348 107 -T
Measurement cable DigiLine xPT 200 AR/CCT 3xx AR to TPG 3xx, 3 m	PT 348 250 -T
Measurement cable DigiLine AR version, 5 m	PT 348 251 -T
Measurement cable for DigiLine AR version, 10 m	PT 348 252 -T
Measurement cable DigiLine AR version, 20 m	PT 348 253 -T

7 Technical data

Parameter	CCT 36x AR	CCT 37x AR	CPT 200 AR	PPT 200 R	RPT 20x AR	HPT 200 AR	MPT 200 AR
"Analog/relay" interface, device side	Analog, Binder M12 connector, 8-pin, A-coded						
Switch-points	2						
Switching point:: Voltage	49 V AC / 30 V DC						
Switching point:: Current	1.2 A (AC) / 2 A (DC)						
Supply: Power consumption [9)]	2 W	12 W	2.2 W	3.2 W	3.2 W	9.7 W	3.7 W
Identification resistor	13.2 kΩ	13.2 kΩ	13.2 kΩ	3.0 kΩ	3.0 kΩ	17.2 kΩ	11.1 kΩ (Pirani) 9.1 kΩ (KK and Pirani)
Max. measurement cable length [10)]	50 m						

Tbl. 8: Technical data

9) Power consumption of the variants with display: + 0.2 W

10) for analog/relay connection

The products CPT 200 AR, PPT 200 AR, RPT 200 AR and MPT 200 AR

- conform to the UL standards

  UL 61010-1, 3rd edition (2016), R:2019
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements

- are certified to the CSA standards

  CSA C22.2 No. 61010-1-12, 3rd edition (2012), U1, U2, A1
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements

The products CCT 36x AR and CCT 37x AR

- conform to the UL standards

  UL 61010-1, 3rd edition (2016), R:2019
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements

- are certified to the CSA standards

  CSA C22.2 No. 61010-1-12, 3rd edition (2012), U1, U2, A1
  Safety requirements for electrical equipment for measurement, control and laboratory use
  Part 1: General requirements

EC Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

DigiLine gauge with analog/relay

CCT 361 AR	CCT 371 AR
CCT 362 AR	CCT 372 AR
CCT 363 AR	CCT 373 AR
CCT 364 AR	CCT 374 AR
CCT 365 AR	CCT 375 AR

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

Electromagnetic compatibility 2014/30/EU

Restriction of the use of certain hazardous substances 2011/65/EU

Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU

Harmonized standards and applied national standards and specifications:

DIN EN IEC 61000-6-2:2019
DIN EN IEC 61000-6-3:2022
DIN EN 61010-1:2020
DIN EN IEC 61326-1:2022
DIN EN IEC 63000:2019

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Daniel Sälzer)
Managing Director

Asslar, 2023-01-24

CE

PFEIFFER VACUUM

EC Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

DigiLine gauge with analog/relay

CPT 200 AR

PPT 200 AR

RPT 200 AR, RPT 201 AR

MPT 200 AR

HPT 200 AR

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

Electromagnetic compatibility 2014/30/EU

Restriction of the use of certain hazardous substances 2011/65/EU

Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU

Harmonized standards and applied national standards and specifications:

DIN EN IEC 61326-1:2022

DIN EN IEC 63000:2019

Signature:

Pfeiffer Vacuum GmbH
Berliner Straße 43
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(Daniel Sälzer)
Managing Director

Asslar, 2023-01-24

CE

PFEIFFER VACUUM

UK Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

DigiLine gauge with analog/relay

CCT 361 AR	CCT 371 AR
CCT 362 AR	CCT 372 AR
CCT 363 AR	CCT 373 AR
CCT 364 AR	CCT 374 AR
CCT 365 AR	CCT 375 AR

We hereby declare that the listed product satisfies all relevant provisions of the following **British Directives**.

Electromagnetic Compatibility Regulations 2016

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Applied standards and specifications:

EN IEC 61000-6-2:2019

EN IEC 61000-6-3:2021

EN 61010-1:2010 + A1:2019 + A1:2019/AC:2019

EN IEC 61326-1:2021

EN IEC 63000:2018

The manufacturer's authorized representative in the United Kingdom and the authorized agent for compiling the technical documentation is Pfeiffer Vacuum Ltd, 16 Plover Close, Interchange Park, MK169PS Newport Pagnell.

Signature:

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Managing Director

Asslar, 2023-01-23

UK CA

PFEIFFER VACUUM

UK Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

DigiLine gauge with analog/relay

CPT 200 AR

PPT 200 AR

RPT 200 AR, RPT 201 AR

MPT 200 AR

HPT 200 AR

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Managing Director

Asslar, 2023-01-23

UK CA

PFEIFFER VACUUM

VACUUM SOLUTIONS FROM A SINGLE SOURCE

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.

COMPLETE RANGE OF PRODUCTS

**From a single component to complex systems:
We are the only supplier of vacuum technology that provides a complete product portfolio.**

COMPETENCE IN THEORY AND PRACTICE

**Benefit from our know-how and our portfolio of training opportunities!
We support you with your plant layout and provide first-class on-site service worldwide.**

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