



Operating Manual Incl. EU Declaration of Conformity

# CDG015D 4-20 mA Current Loop

Ceramic Diaphragm Gauge

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For cross-references within this document, the symbol ( $\rightarrow \square$  XY) is used, for cross-references to further documents and data sources, the symbol ( $\rightarrow \square$  [Z]).



**Product Identification** 

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

(INFICON AG	6, LI-9496 Balzers	Ì
Model:		
PN:		して企
SN:		
Supply:	Output:	J

Validity

This document applies to products with the following part numbers:



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

If not indicated otherwise in the legends, the illustrations in this document correspond to a gauge with part number 3CL1-F51-0BE0. They apply to the other gauges by analogy.



### **Intended Use**

The Ceramic Diaphragm Gauges of the CDG015D 4-20 mA Current Loop series are intended for absolute pressure measurement of gases in their respective pressure ranges.

The gauges can be operated in connection with an appropriate 4  $\ldots$  20 mA measuring unit.

### **Functional Principle**

The Diaphragm Gauge consists of a piezo resistive diaphragm sensor element made of aluminum oxide ceramics and electronics which convert the diaphragm bending into a 4 ... 20 mA current output signal.

The output signal is linear to the measured pressure and independent of the gas type.



### Safety

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### 1.1 Symbols Used

STOP DANGER

Information on preventing any kind of physical injury.

#### 

Information on preventing extensive equipment and environmental damage.

### · Caution

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



Notice

**Skilled personnel** 

instructed by the end-user of the product.

### 1.2 Personnel Qualifications

# 1.3 General Safety

Instructions

 Adhere to the applicable regulations and take the necessary precautions for the process media used.

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

Consider possible reactions between the materials (  $\rightarrow$   $\blacksquare$  7) and the process media.

- 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.

### 1.4 Liability and Warranty

INFICON assumes no liability and the warranty becomes null and void if the enduser or third parties

- disregard the information in this document
- use the product in a non-conforming manner
- make any kind of interventions (modifications, alterations etc.) on the product
- use the product with accessories not listed in the corresponding product documentation.

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

Gauge failures due to contamination are not covered by the warranty.



### 2 Technical Data

Full scales (FS)	Full scales (FS)	200 mbar / Torr 500 mbar / Torr 1000 Torr 1100 mbar 2000 mbar
Accuracy	Accuracy <sup>1)</sup> 2000 mbar (FS), 1100 mbar (FS) 1000 Torr (FS) 500 mbar / Torr (FS) 200 mbar / Torr (FS)	±0.75% of reading ±0.75% of reading ±1% of reading or ±0.15% of FS, whichever is greater ±1% of reading or ±0.35% of FS, whichever is greater
Temperature effect	Temperature effect on zero Temperature effect on span Resolution Response time <sup>2)</sup> Gas type dependence	0.01% FS/ °C 0.01% FS/ °C 0.05% FS ≤20 ms none
Output signal analog (measurement signal)	Measurement signal Signal range Measuring range (zero … FS) Relationship current-pressure Error signal (diaphragm broken)	2-wire, current loop 3.8 20.2 mA 4.0 20.0 mA linear 3.2 3.6 mA
Power supply	Image: Decision of the second secon	nected to power supplies, instruments or n to the requirements of a grounded extra- ng to EN 60204-1. +12 +30 V (dc) ≤1 V <sub>pp</sub> ≤600 mW 100 mA (thermal recoverable) yes
Sensor cable connection	Electrical connection 3CL1-xxx-x <b>B</b> xx 3CL1-xxx-xLxx Sensor cable	M12, 4-pin cable 3 m, open leads shielded, 0.25 mm² / conductor

<sup>&</sup>lt;sup>1)</sup> Non-linearity, hysteresis, repeatability in the calibrated range +10 °C... +50 °C without temperature effects.

<sup>&</sup>lt;sup>2)</sup> Increase 10 ... 90% FS.



Materials used Internal volume	Materials exposed to vacuum Flange DN 16 ISO-KF 4 VCR female, 8 VCR female Sensor and diaphragm Sealing Internal volume DN 16 ISO-KF 4 VCR female 8 VCR female Leak rate	SS 1.4404, AISI 316 SS 1.4404, AISI 316L ceramics (Al <sub>2</sub> O <sub>3</sub> 96%) FKM 3.2 cm <sup>3</sup> 0.6 cm <sup>3</sup> 2.4 cm <sup>3</sup> <1×10 <sup>-9</sup> mbar I/s
Admissible / bursting pressure	Admissible pressure (absolute) 200 mbar / Torr (FS) 500 mbar / Torr (FS) 1100 mbar (FS), 1000 Torr (FS) 2000 mbar (FS) Bursting pressure (absolute) 200 mbar / Torr (FS) 500 mbar / Torr (FS) 1100 mbar (FS), 1000 Torr (FS) 2000 mbar (FS)	2 bar 2 bar 2 bar 4 bar 3 bar 3 bar 3 bar 6 bar
Ambiance	Admissible temperatures Storage Operation Bakeout at flange <sup>3)</sup> Relative humidity Use Mounting orientation Degree of protection	-20 +65 °C -40 +100 °C ≤100 °C ≤98%, non-condensing indoors only altitude up to 2000 m any IP65
Weight	Electrical connection M12 DN 16 ISO-KF 4 VCR female 8 VCR female Electrical connection cable 3 m DN 16 ISO-KF 4 VCR female 8 VCR female	≈128 g ≈161 g ≈179 g ≈161 g ≈180 g ≈212 g

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<sup>3)</sup> Non-operation.

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Dimensions [mm]









Example

Gauge with 1000 Torr FS Measurement signal Iout = 12 mA

p = [(12 mA - 4 mA) / 16 mA] × 1000 Torr = 0.5 × 1000 Torr = 500 Torr

4) Source: NPL (National Physical Laboratory) Guide to the Measurement of Pressure and Vacuum, ISBN 0904457x / 1998



### 3 Installation

### 3.1 Vacuum Connection



### STOP 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 of clamps which are suited to overpressure.

### STOP 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

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:

- VCR connections fulfill this requirement
- For gauges with a KF vacuum connection, use a conductive metallic clamping ring.

### Caution

Vacuum component

cuuin 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.



Mount the gauge so that no vibrations occur. 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 and consider using a seal with centering ring and filter. If adjustment should be possible after the gauge has been installed, be sure to install it so that the button can be accessed with a pin.



#### Procedure

Remove the protective lid and connect the product to the vacuum system.



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Keep the protective lid.

### 3.2 Power Connection

Make sure the vacuum connection is properly made.



### (STOP) DANGER

The gauge may only be connected to power supplies, instruments or control devices that conform to the requirements of a grounded extralow voltage (PELV) according to EN 60204-1.

The 2-wire 4-20 mA current loop combines the transmitter output signal and supply voltage in one cable where the current consumption represents the measurement signal. The 4-20 mA signal complies with the NAMUR NE 43 standard.

A current loop resistor (r) value of 250 ohms is commonly used and will provide a  $1 \dots 5 V$  (dc) across the resistor. The current loop resistor value can be chosen freely up to a maximum of 800 Ohm, provided that the minimum and maximum supply voltage range is respected.



The loop current resistor should have a low temperature drift coefficient to ensure best measurement performance.



Ground loops, differences of potential, or EMC problems may affect the measurement signal. For optimum signal quality, please do observe the following notes:

- Typically connect the cable shield to ground on gauge side via the chassis ground.
- Depending on the situation, following measures can cause better signal quality:
  - connect the cable shield to ground on power supply side, or
  - connect the cable shield to ground on both sides.

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### Electrical diagram



M12 – pir	n assignment
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Pin	Symbol	Description	4
1	V+	Supply voltage V+	
3	GND	Supply voltage return	
-	SH	Shield	
2		n.c.	
4		n.c.	



M12, 4-pin receptacle

Color	Symbol	Description
Brown	V+	Supply voltage V+
White	GND	Supply voltage return



### 4 Operation

When the supply voltage is applied, the measurement signal is available at the connector.

### 4.1 Zeroing the Gauge

The gauge is factory calibrated while "standing upright". It requires no maintenance.

Due to mounting orientation, long time operation or contamination, a zero drift could occur and zero adjustment may become necessary.

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



If the gauge is operated via a controller, the zero of the whole measuring system has to be adjusted on the controller: first, adjust the zero of the gauge and then, the zero of the controller.

#### 4.1.1 Zero Adjustment

The zero can be adjusted via the button on the gauge.



Evacuate the gauge to a pressure according to the table below:

	FS	Recom	nmended final pres zero adjustment	ssure for
2000	mbar	_	<2×10 <sup>0</sup> Pa	<2×10 <sup>-2</sup> mbar
1100	mbar	-	<7×10º Pa	<7×10 <sup>-2</sup> mbar
1000	Torr	<5×10 <sup>-2</sup> Torr	<7×10º Pa	_
500	mbar / Torr	<3×10 <sup>-2</sup> Torr	<4×10º Pa	<4×10 <sup>-2</sup> mbar
200	mbar / Torr	<1×10 <sup>-2</sup> Torr	<2×10º Pa	<2×10 <sup>-2</sup> mbar

If the final pressure in the gauge is too high for zero adjustment (>25% of the FS), the zero cannot be reached.



Remove the rubber plug (1) and press the button between 1 ... 5 s with a pin (2) (max. ø1.1 mm). The button is  $\approx$ 11 mm down.



The zero adjustment runs automatically.



Place the rubber plug.



After successful zero adjustment the output signal will drop to 3.7 mA for 3 s. And then the gauge returns automatically to the measurement mode.



### 5 Deinstallation



### STOP 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



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.





Vent the vacuum system.



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Put the gauge out of operation.



Disconnect the sensor cable.

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



### 6 Maintenance, Repair

The product requires no maintenance.

Gauge failures due to contamination are not covered by the warranty. We recommend checking the zero at regular intervals.

INFICON assumes no liability and the warranty becomes null and void if any repair work is carried out by the end-user or third parties.

### 7 Accessories

Communication adapter CDG015D, M12-USB

Ordering number 399-649

### 8 Returning the Product



#### WARNING

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Forwarding contaminated products

Contaminated products (e.g. radioactive, toxic, caustic or biological hazard) can be detrimental to health and environment.

Products returned 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.



### 9 Disposal



### STOP 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 follow- ing 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 disposed of.
Other components	Such components must be separated according to their materials and recycled.



### **EU Declaration of Conformity**



Manufacturer: INFICON AG, Alte Landstraße 6, LI-9496 Balzers

This declaration of conformity is issued under the sole responsibility of the manufacturer.

#### Product: CDG015D 4-20 mA Current Loop

The product of the declaration described above is in conformity with following Union harmonization legislation:

- 2014/30/EU, Abl. 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)

Harmonized and international/national standards and specifications:

- EN 61326-1:2013; Group 1, Class B (EMC requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326-2-3:2013 (EMC: test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning)
- EN IEC 63000:2018
   (RoHS: technical documentation)

# Signed for and on behalf of:

INFICON AG, Alte Landstraße 6, LI-9496 Balzers

Balzers, 2025-04-11

Balzers, 2025-04-11

William Opie Managing Director

Michael Wildi Director Marketing



### **UKCA Declaration of Conformity**



#### Manufacturer: INFICON AG, Alte Landstraße 6, LI-9496 Balzers

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product: CDG015D 4-20 mA Current Loop

The product of the declaration described above is in conformity with the relevant UK Statutory Instruments:

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

Harmonized and international/national standards and specifications:

- EN 61326-1:2013; Group 1, Class B (EMC requirements for electrical equipment for measurement, control and laboratory use)
- EN 61326-2-3:2013 (EMC: test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning)
- EN IEC 63000:2018 (RoHS: technical documentation)

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William Opie Managing Director

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Michael Wildi Director Marketing



Notes





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