

# Gauge Head

DI200

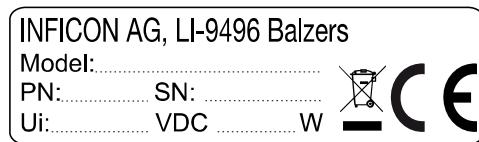
DI2000



CE

## 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.



## Validity

This document applies to products with part numbers

390-354 DI200  
 390-226 DI2000

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

We reserve the right to make technical changes without prior notice.

All dimensions in mm.

## Indented Use

The gauge heads are intended for the measurement of absolute or relative pressures according to the technical data. The gauge heads may be used either in connection with the supply and display units from INFICON (VGC50x series) or in connection with dc sources up to 30 V max. and separate tap for the measured values.

## Design and Function

The gauge heads contain a ceramics diaphragm as the sensing element. The flexure of this diaphragm is a measure for the pressure.

The diaphragm itself is part of a capacitance cell. The flexure of the diaphragm caused by process pressure variations is converted by the temperature compensated electronics in the gauge in to a standard measurement signal of 4 to 20 mA.

A 5 m long cable is attached to the gauge head.

The gauge head is equipped with a Viton (FPM) seal between the ceramics sensor and the stainless steel housing.

"Zero" and "FS (full scale)" have been pre-adjusted at the factory so that the output signal is 4 mA for  $p = 0$  and 20 mA for the end of the gauge's range.

## Scope of Delivery

1 x Gauge Head (incl. 5 m long gauge head cable)

1 x Operating Manual German

1 x Operating Manual English

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For cross-references within this document, the symbol (→ XY) is used.

# 1 Safety

## 1.1 Symbols Used

Symbols for residual risks



**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.



Notice

## 1.2 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.

## 1.3 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 (→ 5).
- 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 is rendered 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 interventions (modifications, alterations etc.) on the product
- use the product with accessories not listed in the corresponding product documentation.

## 2 Technical Data

Measurement range		
DI200	0.1 ... 200 hPa	mbar
DI2000	1 ... 2000 hPa	mbar
Overload range, max. (abs)		
DI200	0.5 MPa	5 bar
DI2000	1 MPa	10 bar
Operating temperature range		0 ... 60 °C
Measurement uncertainty <sup>1)</sup> (± temperature error)		0.20 % FS <sup>*)</sup>
Temperature error in % FS <sup>*)</sup> / 10 K		
Zero drift	0.10	
Sensitivity drift	0.15	
Principle of measurement	capacitive	
Gauge head supply	Two-wire system	
	4 ... 20 mA	
Supply voltage	+24 V (dc) typ. operating range 12 ... 30 V	
Dead volume	3 cm <sup>3</sup>	
Vacuum connection	DN 16 ISO- KF	
Leak rate	<1×10 <sup>-6</sup> mbar·l·s <sup>-1</sup>	
Weight	≈0.55 kg	
Type of protection	IP 44	
Materials in contact with the medium	stainless steel 1.4305, Al <sub>2</sub> O <sub>3</sub> (96%) ceramics, FPM	

<sup>1)</sup> Sum of linearity, hysteresis and reproducibility

<sup>\*)</sup> FS = Full scale

Dimensions [mm]

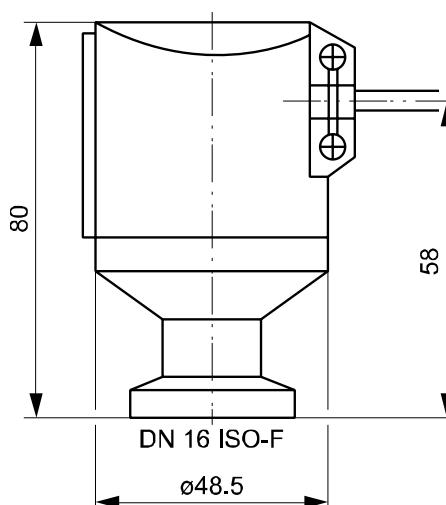


Fig. 1 Dimensional drawing; dimensions in mm

### 3 Installation

Please unpack the gauge head immediately even if it is to be taken into operation at a later date.

Check that the gauge head is complete and carefully examine it visually to ensure that no damage has occurred during transport.

If any damage is discovered, report it immediately to the forwarding agent and insurer. If the damaged part has to be replaced, please get in touch with the orders department.

#### 3.1 Connecting the Gauge Heads

The gauge head should preferably be installed standing on its flange. Inclined installation (max. horizontally) is possible. However, this affects the Zero, and the zero adjustment may have to be corrected.

Suspended installation is not permissible because then condensate may collect in the head. This affects the measurements and may damage the head.

In order to improve interference rejection the shield of the connection cable has been made accessible through a black cable with a ring at the plug on the equipment side. This additional cable is connected to the ground screw on the operating unit.

For connection to operating units VGC50x use the DI signal converter.

##### Pin assignment

- Pin 1 –
- Pin 2 Measurement signal 4 ... 20 mA (-)
- Pin 3 Measurement range coding
- Pin 4 –
- Pin 5 Sensor type coding
- Pin 6 Supply 12 ... 30 V (dc)
- Pin 7 Shield

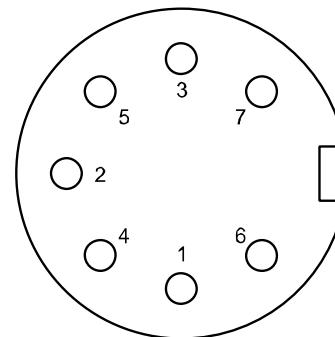


Fig. 2 Gauge head connector (view on to the soldered side)

##### View on to the gauge head

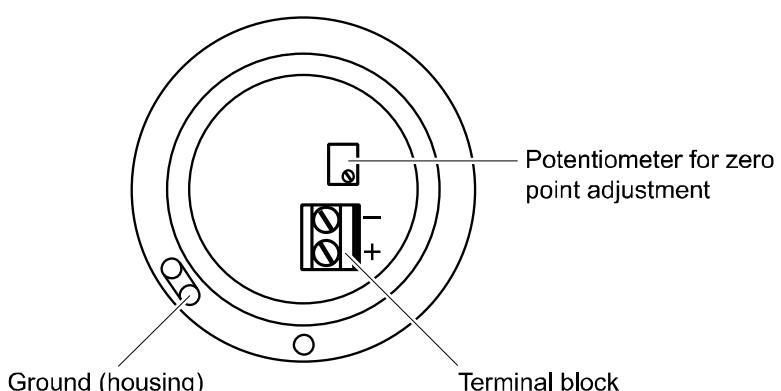


Fig. 3 View on to the gauge head with removed plastic housing

View

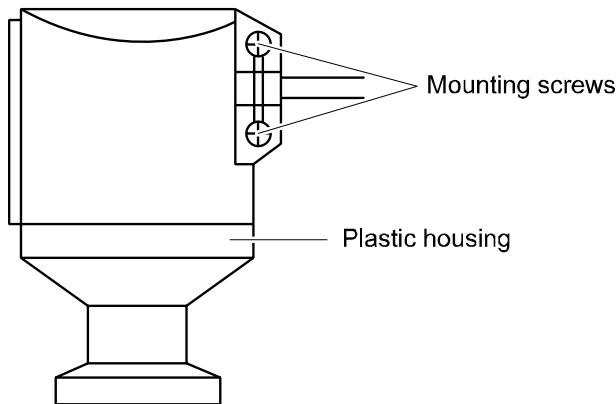


Abb. 4 View

When wanting to extend the gauge head cable and when wanting to connect the gauge heads to other operating units, the gauge head cable may be replaced. For this unscrew the two mounting screws and detach the plastic housing, see Fig. 4.

The signal lines of the sensor cable are connected via a terminal block (see Fig. 3) to the electronics unit.

The shield of the sensor cable is connected via a RC element to a solder lug on the housing.

The connected sensor cable can be removed by loosening the screws on the terminal block and by separating the shield connection from the RC element so that a new self-made sensor cable may be connected.



When connecting the new gauge head cable correct polarity must be observed. For this also refer to Fig. 3. The + supply (12 V to 30 V) and – (4 to 20 mA signal) are marked accordingly on the terminal block.

### 3.2 Maximum Length of Cable and max. Permissible Load Resistance

The maximum supply voltage for the gauge heads lies in the range between 12 V and 30 V. It is recommended to use a supply voltage of 24 V.

The length of the standard gauge head cable is 5 m. In case of longer lengths the total cable resistance must be observed. The total resistance depends on the supply voltage. See Fig. 5.

The total resistance is given by:

$$R_{\text{ges}} [\Omega] = R_B [\Omega] + R_L [\Omega] = \frac{U_S - 12 \text{ V}}{0.02 \text{ A}}$$

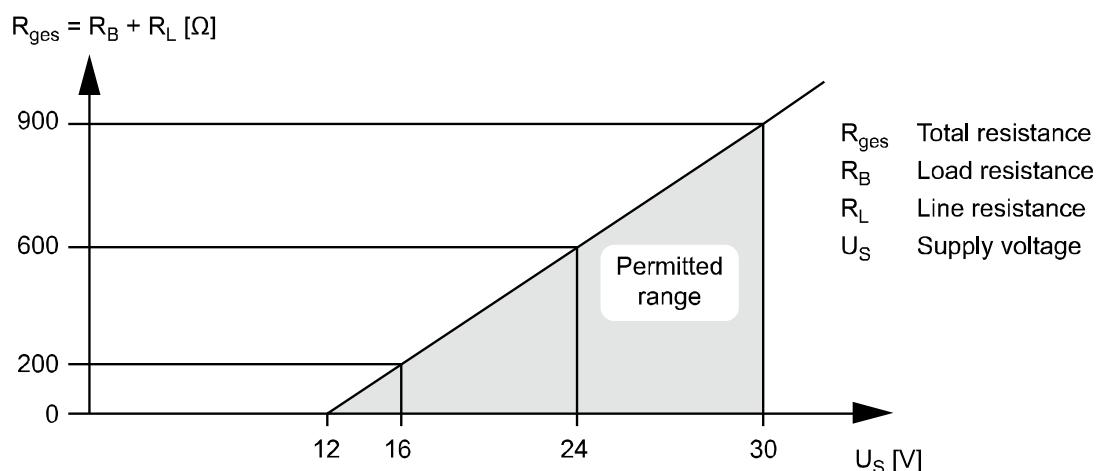


Fig. 5 Total resistance as a function of the supply voltage

The total resistance ( $R_{ges}$ ) is defined by the maximum permissible resistance from displays, line resistances and recorders in series with the signal line (4-20 mA).

The load resistor is the resistor across which the voltage appears which is proportional to the measurement signal.

The internal resistance ( $R_i$ ) of the voltage source is very small compared to the total resistance ( $R_{ges}$ ) and can therefore be neglected.

Example for the calculation of the maximum permissible total resistance

Max. measurement current (nominal range) 0.020 A  
Min. permissible voltage at the gauge head 12.0 V

Headroom for mains voltage variations, hum amplitudes, source resistance etc. is not taken into account.

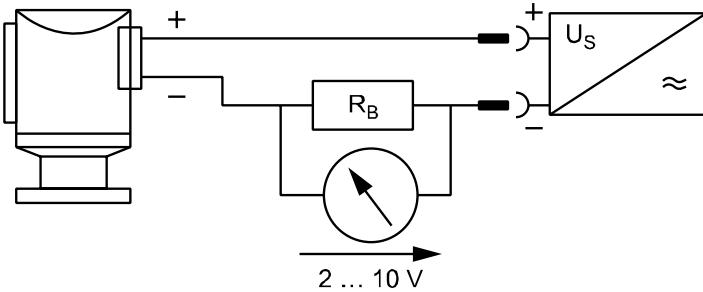


Fig. 6 Application example

$R_B$ (load) [ $\Omega$ ]	$R_L$ (line.) [ $\Omega$ ]	$U_S$ (supply.) [V] min.
50	1	13.02
50	2	13.04
50	5	13.10
50	10	13.20
50	20	13.40
50	50	14.00
50	100	15.00
50	200	17.00
500	1	22.02
500	2	22.04
500	5	22.10
500	10	22.20
500	20	22.40
500	50	23.00
500	100	24.00
500	200	26.00

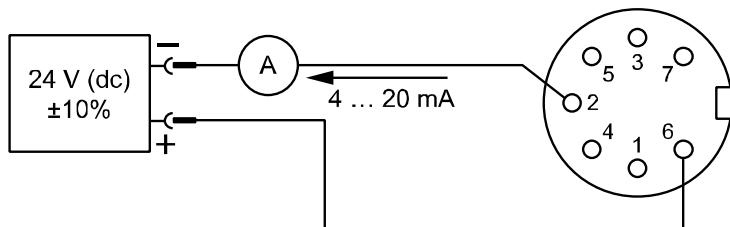


Fig. 7 Test assembly

### 3.3 Zero Adjustment

#### 3.3.1 Preparations

Zero output of the gauge heads is aligned in the factory and remains stable over long periods of time.

Depending on the operating conditions and the required precision (especially when the gauge head is used in the lowest range) it is recommended to check the Zero point from time to time and correct it, if necessary.

##### Tools

- Screwdriver, 2 mm
- Voltage source, 24 V (dc)  $\pm$  10 % or corresponding operating unit
- Multirange meter with corresponding current range or operating unit
- Vacuum pump with connection fittings or vacuum system
- Vacuum gauge e.g. Pirani Standard Gauge

##### Alignment preparations

Connect the gauge head correctly to the vacuum pump or the vacuum system and evacuate to:

- $<10^{-2}$  hPa | mbar for DI200
- $<10^{-1}$  hPa | mbar for DI2000

(check for example with a Pirani Standard Gauge)

Unscrew the two mounting screws and detach the plastic housing from the gauge head (see Fig. 4).

#### 3.3.2 Alignment with a Multirange Meter

Connect the gauge head to the voltage source and the multirange meter according to Fig. 7.

Wait until the system is stable (5 minutes approx.) The measurement current should be  $4\text{ mA} \pm 8\text{ }\mu\text{A}$  under vacuum.

Turn potentiometer until the required measurement current is obtained.

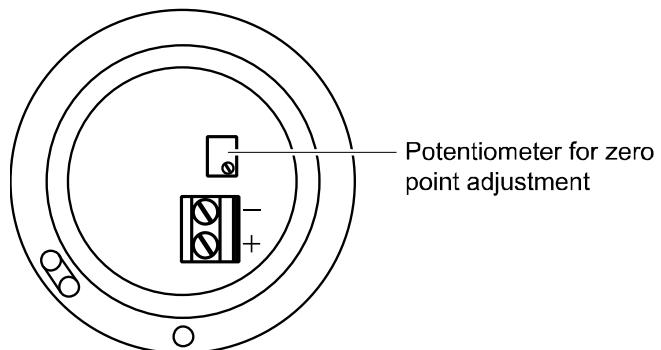


Fig. 8 View on to the gauge head with removed plastic housing

Install the plastic housing again.

If required remove the gauge head from the test assembly.

Table  
Output voltage – Pressure

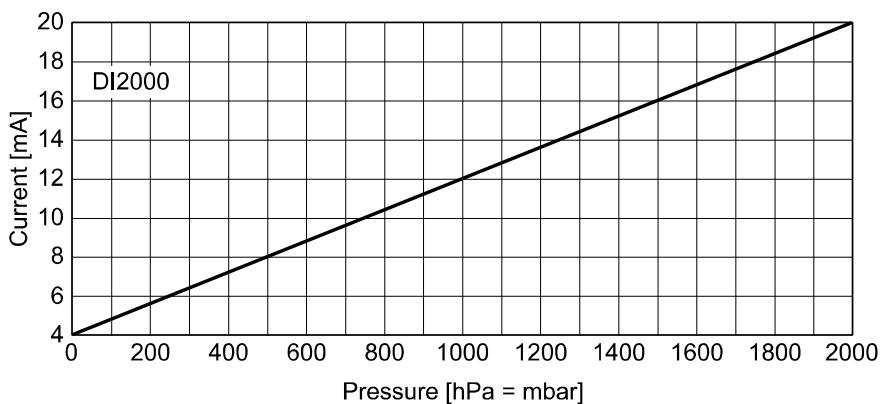
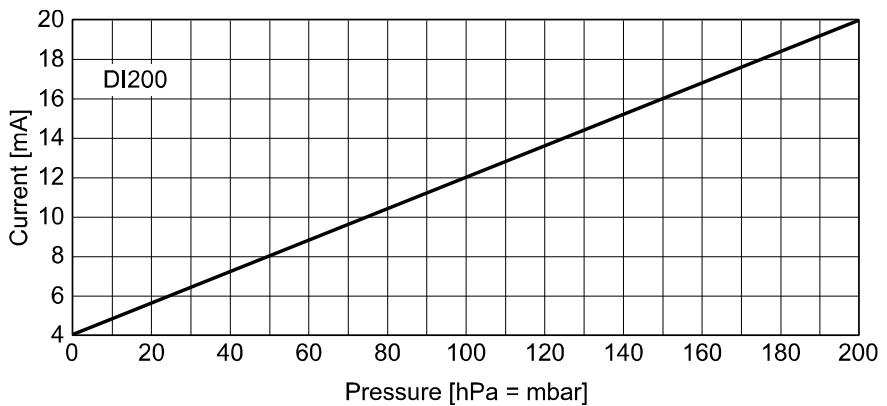
Signal output [mA]	DI200 [hPa] [mbar]	DI2000 [hPa] [mbar]
4.00	0	0
4.80	10	100
5.60	20	200
6.40	30	300
7.20	40	400
8.00	50	500
8.80	60	600
9.60	70	700
10.40	80	800
11.20	90	900
12.00	100	1000

Signal output [mA]	DI200 [hPa] [mbar]	DI2000 [hPa] [mbar]
12.80	110	1100
13.60	120	1200
14.40	130	1300
15.20	140	1400
16.00	150	1500
16.80	160	1600
17.60	170	1700
18.40	180	1800
19.20	190	1900
20.00	200	2000

$$\text{DI200: } I = (p \times 8/100) + 4$$

$$\text{DI2000: } I = (p \times 8/1000) + 4$$



## 4 Options

DI Signal Converter  
(for operating the Gauge Head with a Vacuum Gauge Controller of the VGC50x series)

Ordering No.  
398-470

## 5 Returning the Product

### WARNING



#### Forwarding contaminated products

Products returned to INFICON for service or repair should, if possible, be free of harmful substances (e.g. radioactive, toxic, caustic or microbial). Otherwise, the type of contamination must be declared.

Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a completed contamination declaration (Form under [www.inficon.com](http://www.inficon.com)).

Products that are not clearly declared as "free of harmful substances" are de-contaminated 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.

## 6 Disposal

 <b>DANGER</b>
<p> <b>Contaminated parts</b>  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.</p>
<p> <b>WARNING</b>  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.</p>

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 disposed of.

Other components

Such components must be separated according to their materials and recycled.

## Appendix

### A: Conversion Table

Pressure units  
(vacuum technology)

	<b>mbar</b>	<b>Bar</b>	<b>Pa</b>	<b>hPa</b>	<b>kPa</b>	<b>Torr mm HG</b>
<b>mbar</b>	1	$1 \times 10^{-3}$	100	1	0.1	0.75
<b>Bar</b>	$1 \times 10^3$	1	$1 \times 10^5$	$1 \times 10^3$	100	750
<b>Pa</b>	0.01	$1 \times 10^{-5}$	1	0.01	$1 \times 10^{-3}$	$7.5 \times 10^{-3}$
<b>hPa</b>	1	$1 \times 10^{-3}$	100	1	0.1	0.75
<b>kPa</b>	10	0.01	$1 \times 10^3$	10	1	7.5
<b>Torr mm HG</b>	1.332	$1.332 \times 10^{-3}$	133.32	1.3332	0.1332	1

1 Pa = 1 N/m<sup>2</sup>

## EU Declaration of Conformity



We, INFICON, hereby declare that the equipment mentioned below comply with the provisions of the following Directives:

- 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

Gauge Head  
DI200  
DI2000

### Standards

Harmonized and international/national standards and specifications:

- EN 61000-6-2:2005  
(EMC: generic immunity standard for industrial environments)
- EN 61000-6-4:2007 + A1:2011  
(EMC: generic emission standard for industrial environments)
- EN 61010-1:2010  
(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

26 March 2018

26 March 2018

Dr. Bernhard Andreaus  
Director Product Evolution

Alex Nef  
Product Manager

## Notes

## Notes



LI-9496 Balzers  
Liechtenstein  
Tel +423 / 388 3111  
Fax +423 / 388 3700  
[reachus@inficon.com](mailto:reachus@inficon.com)

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