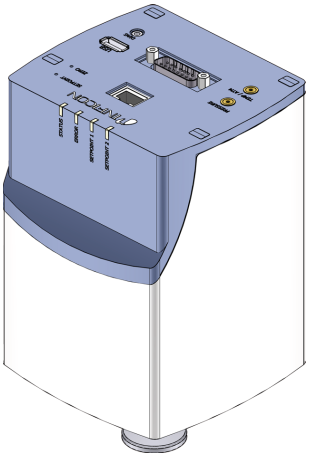
Capacitance Diaphragm Gauge

Cube® CDGsci

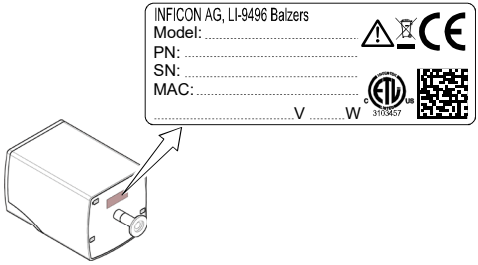


Operating Manual

Incl. EU Declaration of Conformity

Product Identification

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



Validity

This document applies to products of the CDGsci series.

3 C S 1 - 3 1 1 - 2 3 0 0

Flange

1	DN 16 ISO-KF
3	DN 16 CF-R
E	8VCR female

Measurement range (F.S.)

3	0.1
6	1
9	10
C	100
F	1000

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 gauges with DN 16 ISO-KF vacuum connection. They apply to the other gauges by analogy.

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

Intended Use

The temperature compensated Capacitance Diaphragm Gauges of the CDGsci series are intended for absolute pressure measurement of gases in their respective pressure ranges.

Functional Principle

A ceramic diaphragm is deflected by pressure. The deflection is measured capacitively and converted into an analog linear output signal by the digital electronics.

The output signal is independent of the gas type.

Very accurate pressure measurement is achieved by heating the sensor to a constant temperature which results in a compensation of changes in the ambient conditions.

Open Source Software

This product uses copyright-protected software licensed under GPL (General Public License). The corresponding source code is available from us for a period of three years after the last delivery of this product:

INFICON AG
Alte Landstrasse 6
LI-9496 Balzers
Principality of Liechtenstein
cdg.application@inficon.com

Trademarks

SKY®	INFICON Holding AG
VCR®	Swagelok Marketing Co.
Cube®	INFICON Holding AG

Patents

EP 1070239 B1, 1040333 B1

US Patents 6528008, 6591687, 7107855, 7140085

Scope of Delivery

1× gauge CDGsci
1× pin for adjusting settings via buttons
1× Calibration Test Report
1× Operating Manual
1× Damping unit
2× LEMO connector
1× WLAN USB adapter IEEE802.11g
1× Swagelok 8VCR adapter (gauge with VCR connection only)
1× Swagelok 8VCR seal (gauge with VCR connection only)
1× Swagelok 4VCR seal (gauge with VCR connection only)

Contents

For cross-references within this document, the symbol (→ 🗎 XY) is used, for cross-references to further documents, listed under "Further Information", the symbol (→ 🕮 [Z]).

1 Safety

1.1 Symbols Used

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

<…> Labeling

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.
- 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.
- The device must not be connected to the Internet.

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 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 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

Measurement range	→ 🗎 2, "Validity"
Accuracy [1]	
0.1 F.S.	0.05% of reading
1 … 1000 F.S.	0.025% of reading
Temperature effect on zero	
0.1 F.S.	10 ppm F.S./ °C
1 … 1000 F.S.	5 ppm F.S./ °C
Temperature effect on span	
0.1 F.S.	10 ppm of reading / °C
1 … 1000 F.S.	5 ppm of reading / °C
Resolution, nominal	0.95 ppm F.S.
Gas type dependence	none

Output signal analog (measurement signal)	
Measurement range	0 … +10 V
Voltage range	–2 … +10.24 V (limited to +10.20 V)
Relationship voltage-pressure	linear
Output impedance	0 Ω (short-circuit proof)
Loaded impedance	>10 kΩ
Response time [2]	350 ms

Pressure unit	Torr (default), mbar, Pa (→ 🗎 16)

[1] Non-linearity, hysteresis, repeatability in the calibrated range at 25 °C ambient operating temperature without temperature effects after operation of 2 h.

[2] Increase 10 … 90 % F.S.R.

Output signal analog (temperature / atmosphere)	
Measurement range	0 … +10 V
Voltage range	–2 … +10.24 V
Relationship voltage-pressure	linear
Switchable between temperature and atmosphere via RS232 ASCII, REST services and web interface (→ 🕮 [1], [2], [4]).	
Identification	
Resistance R_{Ident}	13.2 kΩ referenced to supply common
Voltage	≤5 V
Remote Zero Adjust	digital input for zero adjustment with external switching contact (→ 🗎 33)
External switching contact	30 V (dc) / <5 mA (dc)
Pulse	>1 s … <5 s
Switching functions	SETPOINT 1, 2
Setting range	0 … 99% F.S. (0 … 9.9 V)
Hysteresis	1% F.S.
Relay contact	30 V (dc) / ≤0.5 A (dc) floating (NO)
closed	$p \leq p_{SP}$ (LED on)
open	$p \geq p_{SP}$ (LED off)
Switching time	≤50 ms
Status relay	
Relay contact	30 V (dc) / ≤0.5 A (dc) connected to supply common (pin 5)
closed	measurement mode warning
open	no supply voltage warming up error

RS232 ASCII interface

Transmission rate	9600 baud
Data format	binary 8 data bits one stop bit no parity bit no handshake → 🗎 26

For further information on the RS232 ASCII interface → 🕮 [2].

RS232C interface

Transmission rate	9600 baud
Data format	binary 8 data bits one stop bit no parity bit no handshake → 🗎 26

For further information on the RS232C interface → 🕮 [3].

Ethernet interface

IP address	192.168.0.248 (default)
Architecture	REST services web interface

For further information on the REST services and web interface → 🕮 [1] and [4].

Wireless interface

IP address	192.168.0.240 (default)
Architecture	REST services, web interface,
DHCP	DHCP capable, no server

The wireless network is factory deactivated. To activate the network → 🗎 29).

For further information on the REST services and web interface → 🕮 [1] and [4].

Supply

DANGER

The gauge may only be connected to power supplies, instruments or control devices that conform to the requirements of a protective extra-low voltage (PELV). The connection to the gauge has to be fused. Grounding concept → 🗎 26.

Supply voltage	
at the gauge	+14 … +30 V (dc) or ±15 V (±5%)
Ripple	≤1 V_{pp}
Power consumption	
while being heated	≤20 W
at operating temperature	≤17 W
Fuse to be connected	1.6 AT

The gauge is protected against reverse polarity of the supply voltage and overload.

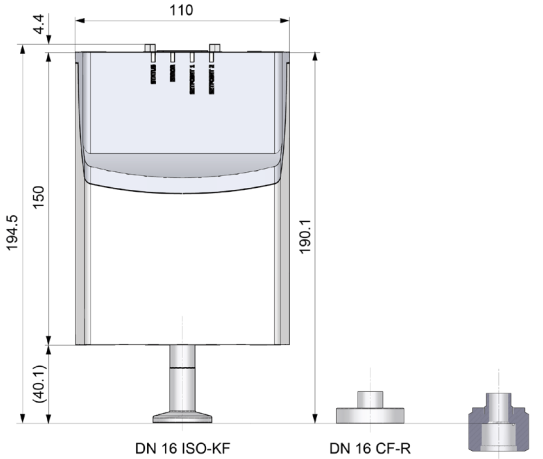
Electrical connection	15-pin D-sub, male
Sensor cable	15-pin plus shielding
Cable length	
Supply voltage 15 V	≤ 4 m (0.14 mm²/conductor) ≤ 7 m (0.25 mm²/conductor)
Supply voltage 24 V	≤20 m (0.14 mm²/conductor) ≤35 m (0.25 mm²/conductor)
Supply voltage 30 V	≤40 m (0.14 mm²/conductor) ≤70 m (0.25 mm²/conductor)

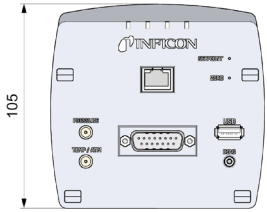
For longer cables, larger conductor cross-sections are required (R_{cable} ≤1.0 Ω).

Ethernet connection	1×RJ45, 8-pin, socket
Cable	shielded Ethernet cable, CAT5e quality or higher
Cable length	≤15 m

Diagnostic port connection	Jack connector, 3-pin
Cable length	≤2.5 m
Analog output connection	LEMO plug, 2-pin, with shielding coaxial
Cable	2-pin plus shielding
Cable length	≤1 m (0.05 mm²/conductor)
Grounding concept	→ 🗎 26
Materials exposed to vacuum	ceramics (Al_2O_3 ≥99.5%), stainless steel AISI 316L
Temperature sensor cell	+48 °C
Internal volume	
DN 16 ISO-KF	5.9 cm^3
DN 16 CF-R	5.4 cm^3
8VCR	7.1 cm^3
Admissible pressure (absolute)	
100 / 1000 F.S.	3 bar
1 / 10 F.S.	2 bar
0.1 F.S.	1.3 bar
Bursting pressure (absolute)	6 bar
Admissible temperatures	
Storage	–10 °C … +50 °C
Operation	+0 °C … +40 °C
Relative humidity	≤80% at temperatures ≤+31 °C, decreasing to 50% at +40°C
Use	indoors only, altitude up to 2000 m NN
Pollution degree	2
Degree of protection	IP40

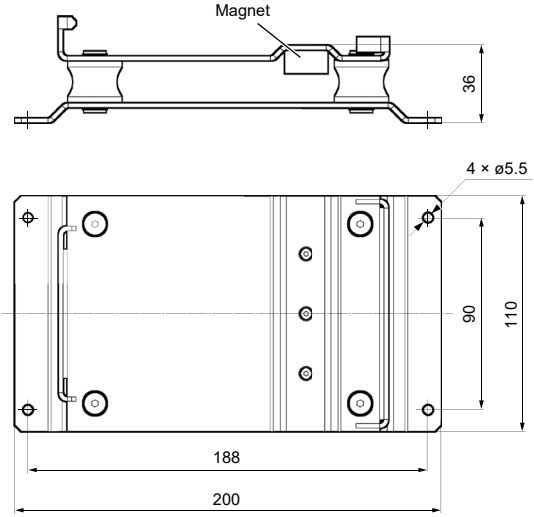
Dimensions [mm]





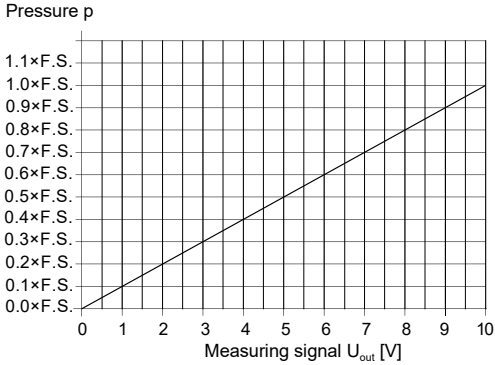
View rotated by 180°

Damping unit [mm]



Weight (without damping unit) <1.7 kg

Analog measurement signal vs. pressure



$$p = (U_{out} / 10\ V) \times p\ (F.S.)$$

Conversion Torr ↔ Pascal [3]

	Torr	mbar [4]	Pa [4]
c	1.00	1013.25 / 760 = 1.3332…	101325 / 760 = 133.3224…

Example: Gauge with 10 Torr F.S.
Measurement signal U_{out} = 6 V

$$p = (6\ V / 10\ V) \times 10\ Torr$$
$$= 0.6 \times 10\ Torr = \mathbf{6\ Torr}$$

[3] The pressure unit can be set via RS232C/ASCII, REST services and web interface.

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

Measuring signal analog vs Temperature

Scaling sensor temperature 10 °C – 0.00 V
60 °C – 10.00 V

$$\vartheta = V_{out} \times 5 + 10 \quad [°C]$$

where: ϑ Temperature sensor cell
V_{out} Voltage analog output <TEMP / ATM>

Measuring analog vs. ATM pressure

Scaling atmosphere 1 mbar – 0.005 V
1000 mbar – 5.00 V

$$p = V_{out} / 5 \times 1000 / 1.33322 \quad [Torr]$$

where: p ATM pressure
V_{out} Voltage analog output <TEMP / ATM>

3 Installation

WARNING

Fragile components

The ceramic sensor may be damaged by impacts.

Do not drop the product and prevent shocks and impacts.

DANGER

Leaking process media

High-intensity mechanical, chemical or thermal impacts can cause leaks in the measuring sensor. Process media can thus leak and possibly cause hazards, if overpressure is in the vacuum system.

- Avoid high-intensity mechanical, chemical or thermal impacts and overpressure in the vacuum system.
- Take appropriate measures (e.g. shut off gas supply, extraction, leak test) to avoid hazards or damage due to leaking process media.

3.1 Vacuum Connection

DANGER

Overpressure in the vacuum system >1 bar

Injury caused by released parts and harm caused by escaping process gases can result if clamps are opened while the vacuum system is pressurized.

Do not open any clamps while the vacuum system is pressurized. Use the type clamps which are suited to overpressure.

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.

DANGER

Protective ground

Products that are not correctly connected to ground can be extremely hazardous in the event of a fault.

Electrically connect the gauge to the grounded vacuum chamber. This connection must conform to the requirements of a protective connection according to EN 61010:

- CF and VCR flanges fulfill this requirement.
- For gauges with a KF flange, use a conductive metallic clamping ring.

Caution

Vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Caution

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. To keep condensates and particles from getting into the measuring chamber preferably choose a upright position. Install the gauge with the damping unit in case of a horizontal mounting orientation (→ 🗎 21).
The gauge may not be installed in a suspended mounting orientation.

In case of severe vibrations at the vacuum system the gauge should be installed with the damping unit.

If adjustment should be possible after the gauge has been installed, be sure to install it so that the buttons can be accessed with a pin (→ 🗎 33).

Mounting the damping unit

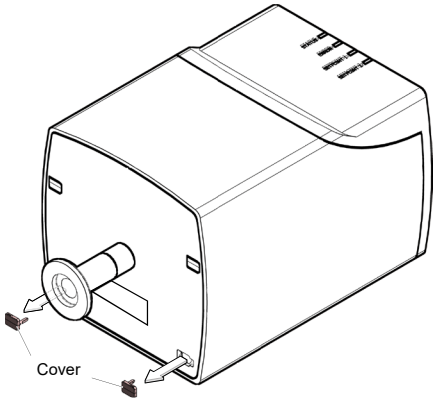
DANGER

Magnetic fields

Strong magnetic fields can disturb electronic devices like heart pacemakers or impair their function.

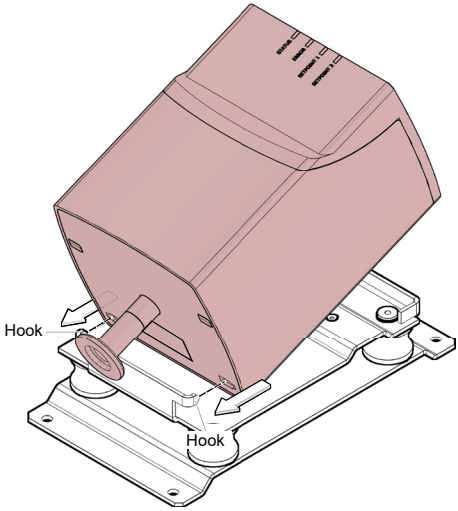
Maintain a safety distance of >5 cm between the magnet and the heart pacemaker or prevent the influence of strong magnetic fields by antimagnetic shielding.

1. Mount the damping unit (dimensions → 15).
2. Carefully remove two covers with e.g. a small screwdriver.

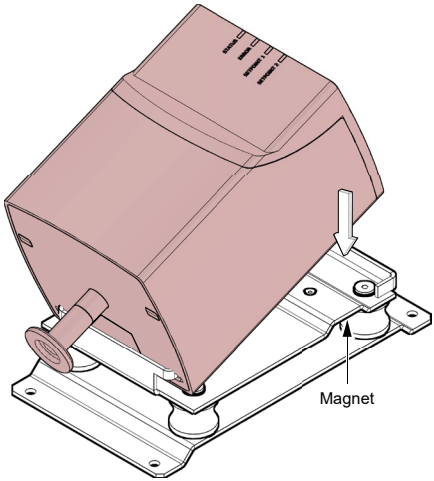


Keep the covers.

❸ Carefully slide the gauge with both openings onto the retaining hooks until the mechanical stop is reached …

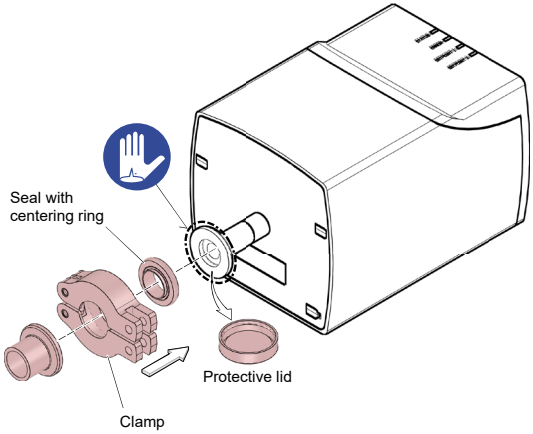


… and place it on the magnet.



Vacuum connection

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



Keep the protective lid.

3.2 Power Connection

Make sure the vacuum connection is properly made (→ 🗎 18).

DANGER

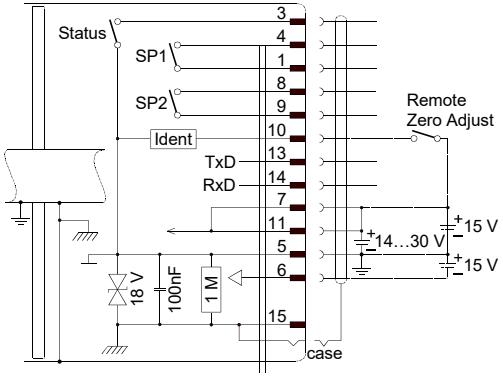
The gauge may only be connected to power supplies, instruments or control devices that conform to the requirements of a protective extra-low voltage (PELV). The connection to the gauge has to be fused. Grounding concept → 🗎 26.

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

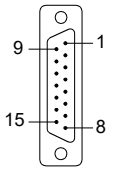
- Use an overall metal braided shielded cable. The connector must have a metal case.
- Connect the cable shield to ground at one side via the connector case. Make sure the connector case has direct contact to the cable's shield on its whole circumference. Do not connect the other side of the shield.
- Connect the supply common with protective ground directly at the power.
- Use differential measurement input (signal common and supply common conducted separately).
- Potential difference between supply common and housing ≤18 V (overvoltage protection).

3.2.1 D-sub, 15-pin Connector

If no sensor cable is available, make one according to the following diagram (cable length and conductor cross-sections → 🗎 12).



Pin 1, 4	Relay SETPOINT 1, closing contact
Pin 3	Status
Pin 5	Supply common
Pin 6	Supply (-15 V)
Pin 7, 11	Supply (+14…+30 V or +15 V)
Pin 8, 9	Relay SETPOINT 2, closing contact
Pin 10	Gauge identification or Remote Zero Adjust
Pin 13	RS232, TxD
Pin 14	RS232, RxD
Pin 15	Housing (Chassis Ground)
case	Connector case



D-sub, 15-pin female soldering side

3.2.2 RJ45, 8-pin Connector

If no Ethernet cable is available, make one according to the following diagram (cable length and conductor cross-sections → 🗎 12).

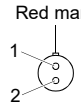
Pin 1	TD+	(Transmitted data +)
Pin 2	TD-	(Transmitted data -)
Pin 3	CT_T	()
Pin 4	RD+	(Received data +)
Pin 5	RD-	(Received data -)
Pin 6	CT_R	()
Pin 7	NC	
Pin 8	NC	

RJ45, 8-pin plug soldering side

3.2.3 LEMO, 2-pin Connector

If no sensor cable is available, make one according to the following diagram (cable length and conductor cross-sections → 🗎 13).

Pin 1	Signal
Pin 2	Signal common



LEMO, 2-pin plug soldering side

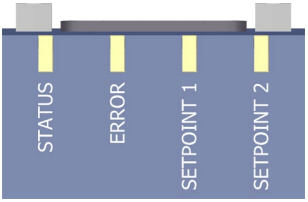
3.2.4 USB, Typ A Connector

For WLAN USB adapter only (enclosed in the scope of delivery).

4 Operation

Put the gauge into operation. A warm-up time of at least 90 minutes should be allowed; for precise pressure measurements a warm-up time of at least 4 hours is required.

4.1 Status Indication



LED	LED status	Meaning
<STATUS>	off	no supply voltage
	lit solid green	measurement mode
	blinking green	
	short blinks	over/underrange
	long blinks	warming up
<ERROR>	lit solid red	main CPU error temperature PCB >90 °C temperature sensor defective
	blinking red	while zero adjust (<8 s) heating temperature too high end of life (EOL) initialization of the gauge
<SETPOINT 1>	lit green green	p ≤ setpoint 1
	blinking green	waiting for setpoint 1 input
	off	p > setpoint 1
<SETPOINT 2>	lit solid green	p ≤ setpoint 2
	blinking green	waiting for setpoint 2 input
	off	p > setpoint 2

4.2 Configuring the network interface

The network interface can be configured via the wired or the wireless network.

4.2.1 Changing IP Address of the Wired Network

The standard IP address of the wired network (default 192.168.0.248 [5]) can be changed via

- Web interface "Configuration" (→ 🕮 [4])
- RS232 ASCII interface with command `IPL [IP address]|[Subnet mask]` (→ 🕮 [2]):
  e.g. IPL 10.0.0.200|255.255.255.0
- Ethernet interface with REST services
  - connect Cube with a computer via Ethernet cable (→ 🗎 12)
  - set the Ethernet interface of the computer to any IP address in the subnet 192.168.0.248|255.255.255.0 (e.g. 192.168.0.247)
  - open a web browser (e.g. Mozilla Firefox, version >20, or Windows Internet Explorer, version ≥10.0)
  - set the new IP address with the REST services command `http://192.168.0.248:8087/1/cmd/IPL%20[IP address]|[Subnet mask]`

☞ An automatic reset of the gauge is performed, if the IP address is successfully changed.

4.2.2 Activating the Wireless Network

The wireless network is factory deactivated.

[5] MAC address of the wired network → nameplate.

Precondition

WLAN USB adapter is plugged in (the adapter is enclosed in the scope of delivery). The initialization of the USB adapter takes appr. 30 s. Thereafter the blue LED on the adapter lit solid or is blinking.

The wireless network can be activated via

- RS232 ASCII interface with command *WLA on*:

```
SL> WLA on
W wla 1
SL>
```

- Ethernet interface with REST services
  - connect Cube with a computer via Ethernet cable
  - set the Ethernet interface of the computer to any IP address in the subnet 192.168.0.248|255.255.255.0 (e.g. 192.168.0.247)
  - open a web browser (e.g. Mozilla Firefox, version >20, or Windows Internet Explorer, version ≥10.0)
  - search for wireless networks by using command *http://192.168.0.248:8087/1/cmd/WLA%20on*

After the wireless network has been successfully activated, the gauge is rebooted automatically. Using the RS232 ASCII command *WLA* or the REST services command *http://192.168.0.248:8087/1/cmd/WLA* Cube will send the answer *on*.

4.2.3 Changing IP Address of the Wireless Network

Precondition

Wireless network is activated and the WLAN USB adapter is plugged in (the adapter is enclosed in the scope of delivery).

The standard IP address of the wireless network (default 192.168.0.240) can be changed via

- web interface "Configuration" (→ 🕮 [4])
- RS232 ASCII interface with the commands *FAP* and *CAP* (→ 🕮 [2]):

  ```
  SL> FAP
  <list of networks> e.g. INFICON - INFICON
  Mobile
  SL>CAP [SSID][|password]
  e.g. CAP INFICON|mypassword
  ```

  FAP command: Cube will scan available wireless networks. The output is a list of SSIDs (network names).

  CAP command: Cube will be connected to the wireless network (state SSID and the network password). For networks without a password only the SSID needs to be stated.

- Ethernet interface with REST services
  - connect Cube with a computer via Ethernet cable (→ 🗎 12)
  - set the Ethernet interface of the computer to any IP address in the subnet 192.168.0.248|255.255.255.0 (e.g. 192.168.0.247)
  - open a web browser (e.g. Mozilla Firefox, version >20, or Windows Internet Explorer, version ≥10.0)
  - search for wireless networks with command *http://192.168.0.248:8087/1/cmd/FAP*

    The output is a list of SSIDs (network names), e.g. INFICON.
  - connect Cube with the choosen network with command: *http://192.168.0.248:8087/1/cmd/CAP%20[SSID|password]*

    For networks without a password only the SSID needs to be stated.

An existing wireless network can be displayed by using

- the RS232 ASCII command *IPW*, or
- the REST services command
  http://192.168.0.248:8087/1/cmd/IPW

The output is the current IP address and the current network mask (e.g. 10.0.1.6|255.255.255.0).

4.3 Web Interface

The gauge is equipped with a web server. Via its web interface user can

- poll the status of the gauge,
- query gauge errors,
- set setpoints, or
- change communication parameters (e.g. IP address)

URL of the web interface: `http://[IP address]:8087`
(e.g. 192.168.0.248:8087)

Internet browser, e.g.

- Mozilla Firefox, version >20, or
- Windows Internet Explorer, version >10.0.

IP addresses (default) → 🗎 11.

Changing IP addresses → 🗎 29.

4.4 Zeroing the Gauge

The gauge is factory calibrated while "standing upright" (→ "Calibration Test Report").

We recommend performing a zero adjustment, when the gauge is operated for the first time.

Due to 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.

4.4.1 <ZERO> Adjustment

The zero can be adjusted via

- the <ZERO> button on the gauge,
- the diagnostic port (→ 🕮 [3]),
- briefly apply the supply voltage to the digital input "Remote Zero" (pin 10, pulse >1 s … <5 s),
- the RS232 interface (→ 🕮 [2], [3]),
- the Ethernet interface (→ 🕮 [1], [4]),
- the wireless network (→ 🕮 [1], [4]).

While the gauge is being heated and/or under atmospheric pressure, the zeroing function is locked in order for operating errors to be prevented.

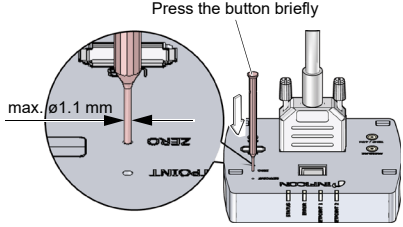
❶ Evacuate the gauge to a pressure according to the table below:

F.S.	Recommended final pressure for zero adjustment		
1000 Torr/mbar	<5×10^{-2} Torr	<6.65×10^{0} Pa	<6.65×10^{-2} mbar
100 Torr/mbar	<5×10^{-3} Torr	<6.65×10^{-1} Pa	<6.65×10^{-3} mbar
10 Torr/mbar	<5×10^{-4} Torr	<6.65×10^{-2} Pa	<6.65×10^{-4} mbar
1 Torr/mbar	<5×10^{-5} Torr	<6.65×10^{-3} Pa	<6.65×10^{-5} mbar
0.1 Torr/mbar	<5×10^{-6} Torr	<6.65×10^{-4} Pa	<6.65×10^{-6} mbar

If the final pressure is too high for zero adjustment (>25% of the F.S.), the zero cannot be reached and the <STATUS> LED blinks green. If this is the case, activate the factory setting and adjust the zero again (→ 🗎 40).

❷ Operate the gauge for at least 90 minutes under constant ambient conditions (until the signal is stable).

❸ Briefly press the <ZERO> button with a pin. The zero adjustment runs automatically. The <ERROR> LED blinks red until the adjustment (duration ≤8 s) is completed.



After zero adjustment, the gauge automatically returns to the measurement mode.

The <ERROR> LED will continue blinking red after 8 s if

- the signal output is negative (< -20 mV) when the final pressure has been attained
- the zero adjustment has failed.

4.4.2 <ZERO> Adjustment with Ramp Function

The ramp function allows to adjust the zero at a known reference pressure within the measurement range of the gauge.

It also permits to adjust an offset of the characteristic curve in order to

- compensate for the offset of the measuring system or
- obtain a slightly positive zero for a 0 … 10 V AD converter.

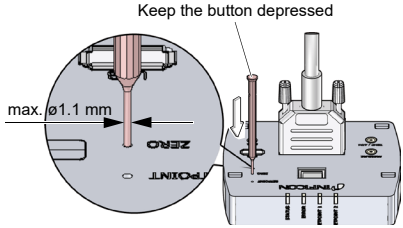
The offset should not exceed 2% of the F.S. (+200 mV). At a higher positive offset, the upper limit of the measurement range is exceeded.

Zero adjustment using the ramp function can be performed via

- the <ZERO> button on the gauge,
- the diagnostic port (→ 🕮 [3]),
- the RS232 interface (→ 🕮 [2], [3]),
- the Ethernet interface (→ 🕮 [1], [4]),
- the wireless network (→ 🕮 [1], [4]).

❶ Operate the gauge for at least 90 minutes under constant ambient conditions (until the signal is stable).

❷ Push the <ZERO> button with a pin (max. ø1.1 mm) and keep it depressed. The <ERROR> LED starts blinking. After 5 s, the zero adjustment value, starting at the current output value, keeps continually changing (ramp) until the button is released or until the setting limit (max. 25% F.S.) is reached. The corresponding output signal is delayed by about 1 s.



❸ Push the <ZERO> button again:

Fine adjustment within 0...3 s:	the zero adjustment value changes by one unit (push <ZERO> button in intervals of 1 s)
Change of direction within 3...5 s:	the zero adjustment changes its direction (the blinking frequency of the <ERROR> LED changes briefly)

If the <ZERO> button is released for more than 5 s, the gauge returns to the measurement mode.

The <ERROR> LED will continue blinking red if the signal output is negative (< -20 mV).

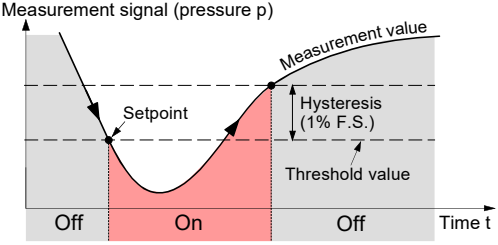
4.5 Switching Functions

The two switching functions can be set to any pressure within the measurement range of the gauge (→ 🗎 16).

The current setpoint setting

- is output at the analog port <TEMP / ATM> instead of the measurement signal (→ 🗎 26) and can be measured with a voltmeter after the <SETPOINT> button is pressed, or
- can be read/written via the RS232, Ethernet or wireless interface.
- can be read/written via the diagnostic port,

If the pressure is lower than the setpoint, the corresponding LED (<SETPOINT 1> or <SETPOINT 2>) is lit solid and the corresponding relay (→ 🗎 26) is energized.



4.5.1 Adjusting the Setpoints

The setpoints can be adjusted via

- the buttons on the gauge,
- the diagnostic port (→ 🕮 [3]),
- the RS232 interface (→ 🕮 [2], [3]),
- the Ethernet interface (→ 🕮 [1], [4]),
- the wireless network (→ 🕮 [1], [4]).

DANGER

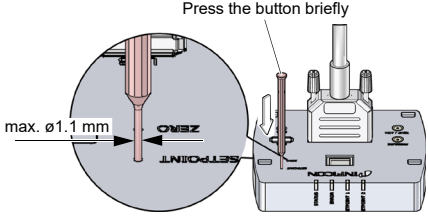
Malfunction

If processes are controlled via the signal output, keep in mind that by pushing the <SETPOINT> button the measurement signal is suppressed and the corresponding threshold value is output instead. This can cause malfunctions.

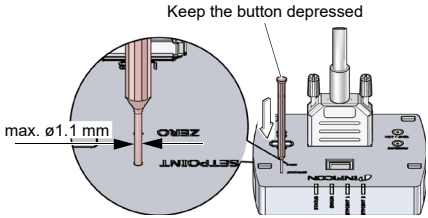
Push the <SETPOINT> button only if you are sure that no malfunction will cause.

Adjusting <SETPOINT 1>

❶ Push the <SETPOINT> button with a pin (max. ø1.1 mm). The gauge changes to the switching function mode and outputs the current threshold value at the measurement value output for about 10 s (LED <SETPOINT 1> blinks).



❷ For changing the threshold value, push the <ZERO> button and keep it depressed. The threshold keeps changing from the current value (ramp) until the button is released or until the limit of the setting range is reached.



❸ Push the <ZERO> button again:

Fine adjustment within 0...3 s:	the zero adjustment value changes by one unit
Change of direction within 3...5 s:	the zero adjustment changes its direction (the blinking frequency of the <STATUS> LED changes briefly)

If the <ZERO> button is released for more than 5 s, the gauge returns the measurement mode.

The upper threshold is automatically set 1% F.S. above the lower one (hysteresis).

Adjusting <SETPOINT 2>

Push the <SETPOINT> button twice (the LED <SETPOINT 2> blinks). The adjustment procedure is the same as for setpoint 1.

4.6 Activating the Factory Setting (Factory Reset)

All user defined parameters (e.g. zero, filter) are restored to their default values.

Loading of the default parameters is irreversible.

Loading the default parameters:

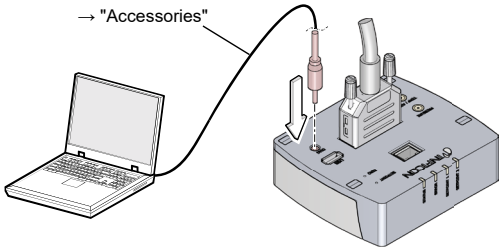
❶ Put the gauge out of operation.

❷ Keep the <ZERO> button depressed for at least 5 s while the gauge is being put into operation (Power ON).

4.7 Diagnostic Port (RS232C Interface)

The diagnostic port <DIAG> permits to output the pressure reading and all status information and to enter all settings at the same time (→ 🕮 [3]).

When a cable is attached to the diagnostic port all other interfaces except the analogue outputs are automatically deactivated. To return to normal operation after using the diagnostic port the gauge must be power cycled.



5 Deinstallation

WARNING

Fragile components

The ceramic sensor may be damaged by impacts.

Do not drop the product and prevent shocks and impacts.

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

Vacuum component

Dirt and damages impair the function of the vacuum component.

When handling vacuum components, take appropriate measures to ensure cleanliness and prevent damages.

Caution

Dirt sensitive area

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

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

1. Vent the vacuum system.
2. Put the gauge out of operation.
3. Unfasten the lock screws and disconnect the sensor cable.
4. Remove the gauge from the vacuum system and install the protective lid.

6 Maintenance, Repair

Under clean operating conditions, the product requires no maintenance.

Gauge failures due to contamination are not covered by the warranty.
We recommend checking the zero at regular intervals (→ 33).

The product is equipped with a battery to maintain data integrity of the real-time clock (battery lifetime appr. 10 years). A battery change is necessary, when the real-time clock shows a wrong date.

Reading the system data via:

- RS232 ASCII interface with the command *SDT*
- REST Services with the command *http:///[IP address]:8087/1/cmd/SDT*

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 Returning the Product

WARNING

Forwarding contaminated products

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

Products returned to INFICON should preferably be free of harmful substances. Adhere to the forwarding regulations of all involved countries and forwarding companies and enclose a duly completed declaration of contamination *).

*) Form under www.inficon.com

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer.

Products not accompanied by a duly completed declaration of contamination are returned to the sender at his own expense.

8 Disposal

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 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.

9 Accessories

	Ordering number
Communication adapter (2 m) [6]	303-333
Calibration against Level A Standard (PTB Germany)	on request

Further Information

📖 [1] www.inficon.com
Communication Protocol
REST Services
tira88e1 (English only)
INFICON AG, LI–9496 Balzers, Liechtenstein

📖 [2] www.inficon.com
Communication Protocol
RS232 ASCII Interface
tira89e1 (English only)
INFICON AG, LI–9496 Balzers, Liechtenstein

📖 [3] www.inficon.com
Communication Protocol
RS232C Interface
tira90e1 (English only)
INFICON AG, LI–9496 Balzers, Liechtenstein

📖 [4] www.inficon.com
Communication Protocol
Web Interface
tira92e1 (English only)
INFICON AG, LI–9496 Balzers, Liechtenstein

[6] The diagnostic software can be downloaded from our website.

ETL Certification

ETL LISTED

The product Cube CDGsci

- conforms to the UL Standard UL 61010-1
- is certified to the CSA Standard C22.2 # 61010-1

EU Declaration of Conformity

CE

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

- 2014/30/EU, Abl. L 96/79, 29.3.2014
  (EMC Directive; Directive relating to electromagnetic compatibility)
- 2011/65/EU, Abl. 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

Capacitance Diaphragm Gauge

Cube® CDGsci

Standards

Harmonized and international/national standards and specifications:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC2019
  (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

9 January 2023	9 January 2023
	
Dr. Christian Riesch Head of Development	Torsten Aumann Product Manager

UKCA Declaration of Conformity

CE

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

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

Product

Capacitance Diaphragm Gauge

Cube® CDGsci

Standards

Harmonized and international/national standards and specifications:

- EN 61010-1:2010 + A1:2019 + A1:2019/AC2019
  (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

9 January 2023	9 January 2023
	
Dr. Christian Riesch Head of Development	Torsten Aumann Product Manager

Notes

Notes

Original: German tina88d1-c (2023-01)

TINA88E1-C

INFICON
LI–9496 Balzers
Liechtenstein
Tel +423 / 388 3111
Fax +423 / 388 3700
reachus@inficon.com

www.inficon.com