Carbo 5100 — CO_2 Sensor

Anton Paar GmbH has a CO_2 analyzer to suit all requirements. For inline CO_2 monitoring, choose one of the Carbo 5100 sensor versions. For online CO_2 monitoring of beverages containing a high amount of other gases such as N_2 or O_2, choose Carbo 6100 or Carbo 6300.

The Carbo 5100 is available as:

- Carbo 5100 + Pico 3000
- Carbo 5100 + Pico 3000 + HMI
- Carbo 5100 + Pico 3000 RC
- Carbo 5100 + mPDS 5

Measuring principle of the CO_2 Sensor

The Carbo 5100 sensor uses a measuring principle based on Henry's law. Henry's law documents that the volume of gas dissolved in a liquid is proportional to the partial pressure of that gas at a given temperature. Sample flows through the measuring chamber of the Carbo 5100, which is then tightly sealed and expanded. This volume expansion generates a vacuum in the measuring chamber. The impeller spin causes pressure equilibrium between liquid and gas phase in seconds. The CO_2 content is determined from the measured equilibrium pressure and temperature. As there are no aging affects on system components the measurement is drift-free. The sensor is already adjusted at the factory and delivers almost correct values immediately after installation. Only small product specific adjustments are necessary.

Technical specifications

Operating Conditions	
CO_2	
Measuring Range	0 to 20 g/L (0 to 10 vol)
Accuracy	0.05 g/L (0.025 vol)
Repeatability	0.025 g/L (0.010 vol)
Resolution	0.01 g/L (0.005 vol)
Line Pressure	max. 10 bar rel. (145 psi)
Temperature	
Sample temperature	- 5 to + 40 °C, non-freezing
Repeatability	0.03 °C
CIP/SIP	+ 121 °C (max. 30 min)
Measuring interval	min. 15 sec
Flow rate Internal Pump	0.8 L/min (without cut-off valve adapter)

Ambient Conditions	
Ambient Temperature Range	0 to + 50 °C
Degree of Protection	IP 65 and IP 67
Humidity	0 to 90% rH (non-condensing)

Other	
Self-diagnosis	Compliant with NAMUR NE 107 (self-monitoring and diagnosis)
Wetted materials	WC, SSiC, Stainless steel 1.4404 O-Rings, diaphragms: EPDM
Weight	approx. 8 kg
Process Connection	Tuchenhagen VARIVENT® N

Compressed air supply	
	4 - 10 bar (58 - 145 psi) with pressure regulator 4 - 7 bar (58 - 102 psi) without pressure regulator
Required air quality	Class 5 acc. to DIN ISO 8573-1 - Max particle size 40 µm - Max. particle density 10 mg/m^3 - Max. pressure dew point +7 °C - Max. oil content 25 mg/m^3
Compressed air hose dimensions	Outer diameter: 6 mm Inner diameter: 4 mm

Cut-off valve adapter	
Benefit	The Carbo 5100 can be removed for maintenance without emptying the main product line.
Pressure	max. 10 bar rel. (145 psi)
Wetted materials	Stainless steel 1.4404, EPDM
Process connection	Nominal diameter > DN65, 3" OD, 3" IPS

Electrical connections	
Power Supply	SELV DC 24 V ± 20%
Power Consumption	max. 40 W
Cable Gland	max. 6 pcs. M16x1.5 EMC, earthing cones acc. to DIN 89345, brass nickel-plated for cable OD 4.5 to 10 mm
Connection Terminals	Push-in spring connection, 0.2 to 1.5 mm² / AWG 24 to 16

Cables
Cables must comply with the intended area of use, the cable gland type and the relevant national regulations and requirements.

Power Supply	Suggested cable type: LiYCY, shielded 2 pole cable Conductor cross section: max. 1.5 mm² Wire cross section: min. 0.34 mm², max. 1.5 mm² without wire en ferrule; max. 0.75 mm² with wire end ferrule Diameter of cables: 4.5 to 10 mm to ensure optimal sealing against the cable gland
CANopen	Cable type: CANopen/DeviceNet cable 120 Ω shielded twisted pair Wire cross section: Min. 0.20 mm^2, max. 1.5 mm^2 without wire end ferrule; max. 0.75 mm^2 with wire end ferrule Diameter of cables: 4.5 to 10 mm to ensure optimal sealing against the cable gland Max. length: 250 m

Communication
Several fieldbuses and analog interfaces are available depending on the used version/mPDS 5 board (please see mPDS 5 and Pico 3000 instruction manuals).

All inputs and outputs (including relay outputs) connected to mPDS 5 or Pico 3000 RC have to be in accordance with PELV (Protective Extra Low Voltage) or with SELV (Safety Extra Low Voltage).

Dimensions of Carbo 5100