During expiration, CO₂ is one of the most important parameters for analysing ventilation efficiency¹. This is why precise and reliable monitoring of CO₂ concentrations of patients is so crucial.
"Within the expiration phase, CO₂ is one of the most important parameters, providing valuable information on the efficacy of ventilation, gas exchange and metabolism."²

**Stabilize the patient and protect the lung as second step of the Respiration Pathway**

**MECHANICAL VENTILATION**

As non-invasive as possible, as invasive as necessary. Along the Respiration Pathway a variance and diversity of treatment tools clearly improve the clinical decision-making.

Continuous monitoring of CO₂ concentrations can serve as an early warning system with regard to changes in the acuity level of critically ill patients.¹ The mainstream infrared absorption measurement (real time method) of CO₂ directly at the Y-piece provides reliable data which are displayed in real time on the ventilator screen.

The CO₂ production VCO₂ is a measure of the physical stress on a patient.

**WHY CO₂ MEASUREMENT?**

- Rapidly verify patient CO₂ values with direct sensor control via the reference filter
- Perform zero calibration without disconnecting the patient from the ventilator
- Combine the CO₂ option with optional mask ventilation (NIV/NIVplus) for real time CO₂ monitoring even during NIV
- Take full advantage of the automated weaning protocol SmartCare®/PS

**THE PHYSIOLOGICAL CAPNOGRAM**

A – B: Emptying of the upper dead space of the airways

The CO₂ concentration in this section of the curve equals zero, as this is the first phase of expiration during which air from the upper airways, which has not been involved in the process of gas exchange, is analysed.

B – C: Gas from the lower dead space and alveoli

The CO₂ concentration increases continuously, as the air being analysed comes partly from the upper airways and partly from the alveoli which are rich in CO₂.

C – D: Alveolar gas

This phase is described as the "alveolar plateau". The curve rises very slowly. The air being analysed comes mainly from the alveolar area.

D – E: Inspiration

The CO₂ concentration falls rapidly, as fresh gas not containing CO₂ forces its way into the airways at the beginning of inspiration.
Monitoring the dead space Vds reflects the current patient situation and indicates respiratory insufficiency.

- In intensive care, capnography is applied as a non-invasive way for evaluating a patient’s ventilator status.
- It can be used to assess changes in ventilation, pulmonary perfusion and metabolism to support optimization of ventilation settings.
- Observing the arterial and eTCO₂ difference respective gradient over a period of time can provide important information, related to either improved or worsening patient clinical status and thus support increased patient safety.
- Capnography monitoring has been increasingly used in operating rooms, intensive care units and emergency departments to indicate incorrect intubation and to monitor cardio-pulmonary resuscitation effectiveness.
- CO₂ measurement can provide also ongoing measurement of dead space values and CO₂ production.

"A volumetric capnogram contains extensive physiological information about metabolic production, circulatory transport and CO₂ elimination within the lungs. VCap* is also the best clinical tool to measure dead spaces allowing a detailed analysis of the functional components of each tidal volume, thereby providing clinically useful hints about the lung’s efficiency of gas exchange.

Recent advances in VCap and our improved understanding of its clinical implications may help in overcoming the known limitations and reluctances to include expired CO₂ kinetics and dead space analysis in routine bedside monitoring. It is about time to start using this powerful monitoring tool to support decision making in the intensive care environment”.


*VCap: Volumetric capnography

YOUR BENEFITS WITH CO₂ MAINSTREAM MEASUREMENT:
- quick and easy non-invasive CO₂ measurement
- display of CO₂ values as end tidal CO₂ concentration and continuous CO₂ curves
- values such as VCO₂, Vds, Vds/Vte, VTCO₂ and Slope phase III are also available*

*depending on the device used

© Drägerwerk AG & Co. KGaA
**ACCESSORIES**

- Mainstream CO$_2$ sensor that measures continuously
- Reusable and disposable CO$_2$ cuvettes for adult and pediatric patients
- The patented design of the disposable CO$_2$ cuvette delivers the same performance as the reusable type, but without the additional cost of time consuming sterilization procedures and protocols

---

**Mainstream CO$_2$ measurement**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-tidal CO$_2$ concentration</td>
<td>etCO$_2$</td>
</tr>
<tr>
<td>Range</td>
<td>0 to 100 mmHg or 0 to 13.2 Vol% (at 1013 mbar (or cmH$_2$O)) or 0 to 13.3 kPa</td>
</tr>
<tr>
<td>Accuracy</td>
<td>According to ISO 80601-2-55</td>
</tr>
<tr>
<td></td>
<td>±(3.3 mmHg + 8 % of the measured value)</td>
</tr>
<tr>
<td></td>
<td>±(0.44 kPa + 8 % of the measured value)</td>
</tr>
<tr>
<td></td>
<td>±(0.43 Vol% + 8 % of the measured value)</td>
</tr>
<tr>
<td>Measurement conditions</td>
<td>Respiratory rate: 6 to 100 /min</td>
</tr>
<tr>
<td></td>
<td>Inspiratory time: &gt;250 ms</td>
</tr>
<tr>
<td></td>
<td>Expiratory time: &gt;250 ms</td>
</tr>
<tr>
<td>Drift of measurement accuracy</td>
<td>According to ISO 80601-2-55</td>
</tr>
<tr>
<td></td>
<td>∆&lt;0.2 kPa (at 5.00 kPa) over 6 h</td>
</tr>
<tr>
<td>Time until specified accuracy is reached</td>
<td>&lt;120 s (at 23 ±2 °C)</td>
</tr>
</tbody>
</table>

The measured values of the CO$_2$ measurement are barometrically pressure-compensated.

**Drift of measurement accuracy**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO$_2$ cuvette, adults (6870279, MP01062)</td>
<td>4.3 mL</td>
</tr>
<tr>
<td>CO$_2$ cuvette, pediatric patients (6870280, MP01063)</td>
<td>1.9 mL</td>
</tr>
<tr>
<td>Neonatal flow sensor ISO 15 (8411130)</td>
<td>0.9 mL</td>
</tr>
<tr>
<td>Neonatal flow sensor Y-piece (8410185)</td>
<td>1.7 mL</td>
</tr>
</tbody>
</table>

---

**CORPORATE HEADQUARTERS**

Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck, Germany

www.draeger.com

**Manufacturer:**

Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23542 Lübeck, Germany

---

**REGION DACH**

Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck, Germany
Tel +49 451 882 0
Fax +49 451 882 2080
info@draeger.com

**REGION EUROPE**

Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck, Germany
Tel +49 451 882 0
Fax +49 451 882 2080
info@draeger.com

**REGION MIDDLE EAST, AFRICA**

Drägerwerk AG & Co. KGaA
Branch Office
P.O. Box 505108
Dubai, United Arab Emirates
Tel +971 4 4294 600
Fax +971 4 4294 699
contactuae@draeger.com

**REGION ASIA PACIFIC**

Draeger Singapore Pte. Ltd.
25 International Business Park
#04-20/21 German Centre
Singapore 609916
Tel +65 6308 9400
Fax +65 6308 9401
asia.pacific@draeger.com

**REGION NORTH AMERICA**

Draeger, Inc.
3135 Quarry Road
Telford, PA 18969-1042, USA
Tel +1 800 4DRAGER
(+1 800 437 2437)
Fax +1 215 723 5935
info.usa@draeger.com

**REGION CENTRAL AND SOUTH AMERICA**

Dräger Panama S. de R.L.
59 East Street, Nuevo Paillla,
House 30, San Francisco Town
Panama City, Panama
Tel +507 377 9100
Fax +507 377 9130
servicioalcliente@draeger.com

---

**Locate your Regional Sales Representative at:**

www.draeger.com/contact

---

91 07 782 | 19.11-1 | CR | LE | Subject to modifications | © 2019 Drägerwerk AG & Co. KGaA