Dräger


D-35607-2009

# The specialist for every environment

DRÄGER
FABIUS® TIRO

Dräger. Technology for Life®

# It’s all about time and space


D-35508-2009

Is there an anesthesia workstation out there that’s compact yet fully featured? One that can fit into our small ORs and still leaves enough space to work? What about our outpatient surgery center? Can a specialized workstation still be flexible enough to suit all our needs?

# Take a closer look at the Dräger Fabius® Tiro

In the modern hospital environment, time is always precious. But there are also many places in a hospital where space comes at premium. Places like induction rooms, emergency departments or smaller operating rooms. Spaces like these present particular challenges – such as how to maintain the best possible patient access and still provide high-quality care. It was for environments like these that we designed the Dräger Fabius® Tiro.

The Dräger Fabius Tiro combines everything you need to provide high-quality ventilation in small spaces. Its compact design makes it a natural choice for applications where you need to get the most of the available room without having to compromise on features or flexibility. With a wide array of options to choose from, the Fabius Tiro can be customized to suit your needs and even be upgraded when those needs change.



**PERFORMANCE FEATURES:**

- Compact, space-saving design
- Highly maneuverable cart
- Optional wall mount
- Standardized Dräger user interface for easy and intuitive operation
- All major ventilation modes
- High-contrast display
- Intelligent safety features for enhanced patient protection
- CLIC absorber compatible

## HIGH-PERFORMANCE VENTILATION

At its core, the Fabius Tiro features our powerful and accurate E-vent piston ventilator, which requires no drive gas and delivers ICU-like ventilation performance. This gives you the ability to handle a wide range of acuity levels. The accuracy of the electrically driven E-vent piston ventilator means that you can also treat pediatric patients with confidence. Optional pressure controlled and pressure support (PS) modes, including SIMV/PS, can expand your ventilation therapy repertoire even further. The combination of its high-precision ventilator and compact, heated breathing system makes the Fabius Tiro a natural choice for low-flow anesthesia.

In spite of its compact size, the Fabius Tiro comes complete with advanced features such as fresh gas decoupling, which maintains constant tidal volumes regardless of fresh gas flow changes. Dynamic compliance compensation and backup ventilation for PS modes let you ventilate with enhanced safety, confidence, and control. In emergency situations, the quick-start feature allows manual ventilation when the device is off, on, or in standby mode for rapid support. Even in the unlikely event of a gas supply failure, automatic ventilation can be temporarily continued.

## KEEPING YOU INFORMED

The Fabius Tiro features an integrated, high-contrast monitor which displays relevant ventilation information as parameters and a pressure curve. Fresh gas flow is monitored via high-visibility digital displays as well as a single mechanical flow tube which shows total gas flow. It is also possible to export all parameters as data, e.g. for enhanced ventilation monitoring or further analysis.

If you've used a Dräger workstation before, then you're familiar with Dräger's standard user interface, which features our established select-adjust-confirm concept. This means you'll be up and running on the Fabius Tiro in just a short time.

## ENHANCED ERGONOMICS AND ECONOMICS

The Fabius Tiro was specifically designed for use in confined conditions. For example, you can choose from a wall-mounted version or a cart version which makes positioning both safe and simple. Up to three drawers provide storage space for additional equipment and consumables, and a stowaway table provides extra space for other instruments or documentation.


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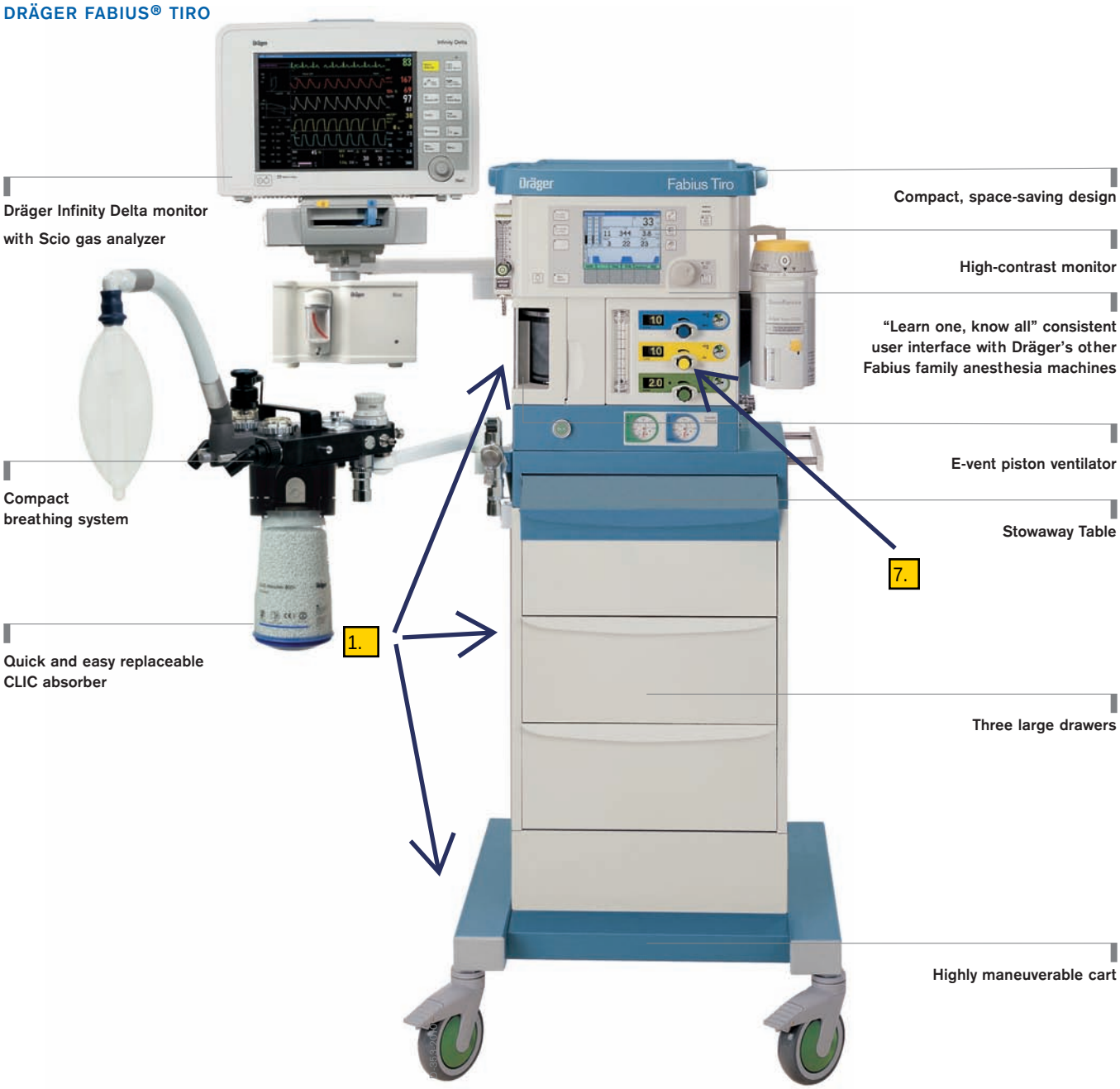
## DRÄGER FABIUS® TIRO




The external compact breathing system (COSY) features a simple design for easy disassembly and cleaning. Because the piston-driven E-Vent ventilator requires no drive gas, no additional medical-grade gases are required for operating/driving the ventilator.

The Fabius Tiro is compatible with our CLIC absorber which effectively prevents skin contact with soda lime. In addition, the CLIC absorber feature enables the clinician to quickly exchange soda lime during the operation, enabling you to get the most out of every soda lime canister. Overall consumption of sodalime can be reduced by nearly 60% versus conventional sodalime absorbent systems.

### MODULAR AND UPGRADABLE

Your Fabius Tiro can be equipped with hemodynamic monitoring. In conjunction with Dräger Infinity patient monitors and the SCIO patient gas module, the Fabius workstation provides integrated gas monitoring as well as enhanced ventilation monitoring including spirometry of hemodynamic monitors. Due to its open interface architecture, the Fabius Tiro is ready for integration into your hospital information system (HIS) or Anesthesia Information Management System (AIMS). You'll always have the option to customize the Fabius Tiro to suit your individual needs. Your Dräger representative will be glad to assist you in choosing the options that are right for you.


MT-5527-2005

**Now make the right choice for service: DrägerService®**
DrägerService offers a wide range of flexible service options which you can select and combine to meet your individual needs – from technical support to complete, fixed-budget service contracts. Remote Service solutions offer additional potential to improve the uptime of devices.

# Options and accessories

A wide array of options and accessories are available to choose from, giving you the possibility to tailor the Fabius® Tiro to create exactly the anesthesia solution you need:

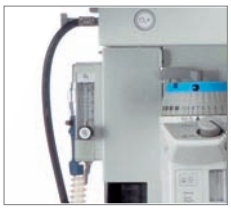

D-353-2010
Color monitor option


MT-1346-2008
Vaporizer standby holder


MT-1353-2008
Breathing system with integrated heater


D-354-2010
Dräger Infinity patient monitors and mounting solutions


D-34358-2009
Dräger Scio gas monitor for volatile agents, $CO_2$ and $O_2$ options


D-354-2010
Auxiliary $O_2$ flow meter


MT-3876-2008
Flip-up side tray


D-9360-2009
Medical-grade power strip


MT-1328-2008
Side basket


MT-6529-2008
Dräger Remote Service Link

**Ask your Dräger representative about other members of the Fabius family:**


D-22403-2010
Fabius® GS Premium – the high-performance flagship of the Fabius family


MT-0591-2008
Fabius® MRI – the Fabius built especially for the MRI suite

## TECHNICAL DATA FABIUS® TIRO

### BASE UNIT

| | |
|---|---|
| **Dimensions** | |
| Cart version without COSY | Approx. 22.8 × 53.6 × 24.7 in (57.9 × 136.1 × 62.7 cm) |
| Cart version (incl. COSY) | Approx. 30.5 × 53.6 × 33.0 in (77.2 × 136.1 × 83.8 cm) |
| Wall version (incl. mounting bracket and COSY) | Approx. 28.4 × 21.9 × 30.5 in (72.1 × 55.6 × 77.5 cm) |
| **Weight and load** | |
| Fabius Tiro Cart (incl. COSY) without supplementary cylinders and vaporizers | 256 lb (116 kg) |
| Wall mount (incl. mounting bracket) | 105.5 lb (47.8 kg) |
| **Power and battery backup** | |
| Power input | 100 to 240 VAC, 50/60 Hz, 70 VA |
| Operation time with fully charged batteries 24. | Minimum 45 minutes (up to 120 minutes) |

### ANESTHESIA GAS SUPPLY MODULE

| | |
|---|---|
| Range of fresh gas flow indicators 3. | 0.00 to 12.0 l/min |
| Total fresh gas flow meter | 0 to 10 l/min, calibrated with 50% $O_2$ and 50% $N_2O$ mixture |
| 6. $O_2$ flush | At 87 psi (6 bar): max. 75 l/min; at 41 psi (2.8 bar): min. 25 l/min 10. |
| Vaporizer mount 4. | Single Dräger or Selectatec®; optional standby vaporizer parking holder |

### VENTILATOR OPERATING SPECIFICATIONS

| | |
|---|---|
| Ventilator E-vent® 12. | Electronically controlled, electrically driven |
| Operating modes | Standard:<br>14. Manual/spontaneous<br>Volume control (VC)<br>Option: pressure control (PC)<br>Option: pressure support (PS)<br>Option: synchronized volume control<br>Ventilation with PS (SIMV/PS) |
| **Control input ranges** | |
| Breathing frequency (rate) 20. | 4 to 60 bpm |
| Positive end expiratory pressure (PEEP) | 0 to 20 cm $H_2O$ 21. |
| Inspiration/expiration ratio (Ti:Te) 17. | 4:1 to 1:4 |
| 13. Pressure limit (Pmax) | 15 to 70 cm $H_2O$ |
| Tidal volume (Vt) 19. | 20 to 1,400 ml in volume control; 20 to 1,100 ml in SIMV/PS |
| Inspiration pause (Tip:Ti) 18. | 0 to 50% |
| SIMV inspiratory time | 0.3 to 4.0 sec |
| Inspiratory pressure (Pinsp) 22. | PEEP +5 to 65 cm $H_2O$ |
| Inspiratory flow (InspFlow) | 10 to 75 l/min in volume and pressure control; 10 to 85 l/min in pressure support |
| Pressure support level (PPS) | PEEP +3 to 20 cm $H_2O$ |
| Min. frequency for apnea ventilation (freq. in min.) | 3 to 20 bpm and “OFF” |
| Trigger level | 2 to 15 l/min |

## FABIUS® TIRO TECHNICAL DATA

| | | |
|---|---|---|
| Integrated safety functions | 8.<br>9. | Sensitive oxygen ratio controller (S-ORC) guarantees a minimum $O_2$ concentration of 23% in an $O_2/N_2O$ mixture. $N_2O$ is cut off if the $O_2$ fresh gas valve is closed or if $O_2$ flow is less than 0.2 l/min. Audible and visual (flashing red LED) indications turn on in the event $O_2$ pressure drops below 20 psi (1.38 bar) ±4 psi (0.27 bar). In the event of electricity and battery failure, manual ventilation, gas delivery, and agent delivery are possible. Positive pressure relief valve opens at 75 ±5 cm $H_2O$. Negative pressure relief valve opens at −8 ±2 cm $H_2O$. |
| **Ventilator monitoring** | | |
| Monitoring | 16. | Continuous monitoring of inspiratory $O_2$ concentration, breathing frequency, tidal volume expiratory, expiration, minute volume, peak airway pressure, PEEP, and selection of mean or plateau pressure. In addition, all fresh gas flow information is displayed as virtual flow tubes. |
| Expiratory minute volume range | | 0 to 99 l/min |
| Control screen | | 6.5 in (16.5 cm); black/amber (color mode option) |

### BREATHING SYSTEM

| | | |
|---|---|---|
| Volume of entire compact breathing system | | 1.7 l plus bag |
| Volume of $CO_2$ absorber | 11. | 1.5 l (standard) [option: prefilled Dräger Sorb CLIC absorber with 1.2 l volume] |

### GAS SUPPLY AND CONNECTION

| | |
|---|---|
| Gas supply | $O_2$, $N_2O$, and air |
| Cylinder yokes | $O_2$ and $N_2O$ pin-indexed hanger yokes |

### OTHER

| | | |
|---|---|---|
| Communication interface | | 1 × RS232 (standard) [additional RS232 optional] |
| Protocols | | Vitalink and Medibus |
| Data available for export | | All alarms, pressure, $O_2$, volume and fresh gas flow data, ventilations settings, flow curve, and pressure curve |
| Writing surfaces | | Pull-out tray (standard) |
| Additional accessories | 26. | Anesthetic gas scavenging system (AGSS), endotracheal suction unit, and integrated $O_2$ flow tube |

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90 49 996 | 06.11 | Marketing Communications | LL | JBK | Printed in USA | Chlorine-free – environmentally compatible | Subject to modifications | 

Instructions for Use

# Fabius Tiro

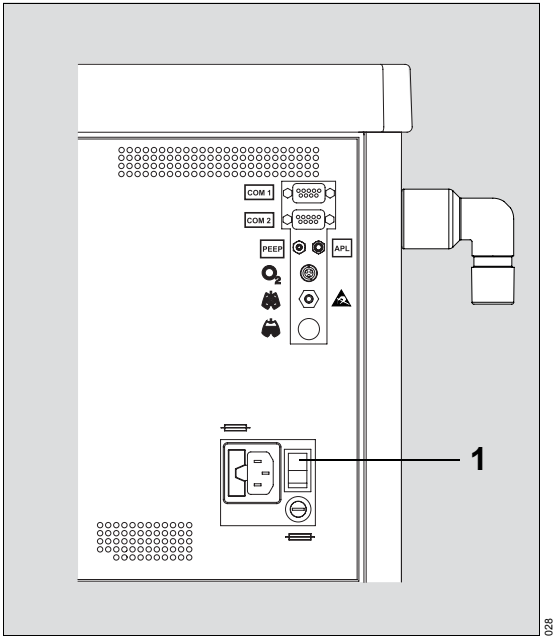
**WARNING**
**For a full understanding of the performance characteristics of this medical device, the user should carefully read these Instructions for Use before use of the medical device.**

## Anesthesia Workstation Software 3.n

## Powering-Up the Machine

1 Turn the ON/OFF switch to the ON position. When the ON/OFF switch is turned to the ON position, the Fabius Tiro performs extensive self-tests on its internal hardware. As these diagnostics are performed, each test and its result appear on the screen. The result, Pass or Fail, indicates the status of the tested component.

25.




We recommend the user to remain close to the device within a range of up to four meters (13 feet), to ascertain the verification by the acoustic tones of the speakers.

During this self-test, two test tones are emitted to show speakers functionality.

**CAUTION**

The user must verify the acoustic tones are emitted as the device can only verify the presence of the speakers.
If no or only one tone is sounded, the device is conditionally functional.
The complete loss of ventilation and monitoring functionality might not be noticed.
Contact DrägerService.

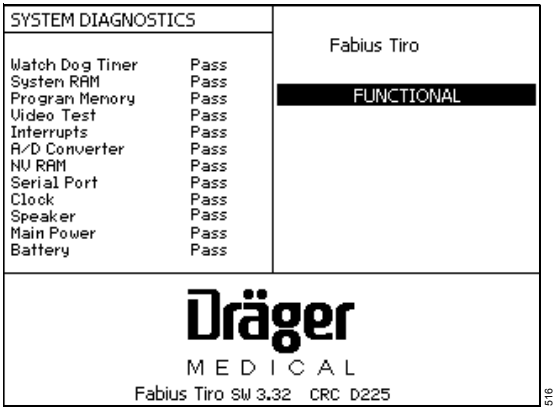
At the end of the self-diagnostics, one of three possible conclusions to the self-tests is posted on the screen:

**FUNCTIONAL**

Every component of the monitoring system is in satisfactory operational order. After a brief delay, the Standby screen appears.

**CONDITIONALLY FUNCTIONAL**

A noncritical fault was detected. The Fabius Tiro may be used, but call DrägerService or your local authorized service organization.
Press the rotary knob to continue operation.



**Gas supply from supplementary $O_2$, $O_2$ and $N_2O$ or $O_2$ and AIR cylinders** (with pin-index connections)

| | |
|---|---|
| Cylinder Connections | Pin-indexed hanger yokes (CGA V-1-1994) |
| Cylinder Gas Pressure (typical full loads at 70 °F, 21 °C) | $O_2$, AIR 1900 psi (131 kPa x 100)<br>$N_2O$ 745 psi (51.3 kPa x 100) |
| Cylinder Gauges | Conform to ASME B40.1 Grade B |
| Cylinder Gauge Range | $O_2$ 0 to 3000 psi (206.8 kPa x 100)<br>$N_2O$ 0 to 3000 psi (206.8 kPa x 100)<br>AIR 0 to 3000 psi (206.8 kPa x 100) |

**Compressed gas supply at workstation inlet**

| | |
|---|---|
| Dew point | >41 °F (5 °C) at ambient temperature |
| Oil content | <0.1 mg/m$^3$ |
| Particles | dust-free air (filtered with pores <1 µm) |

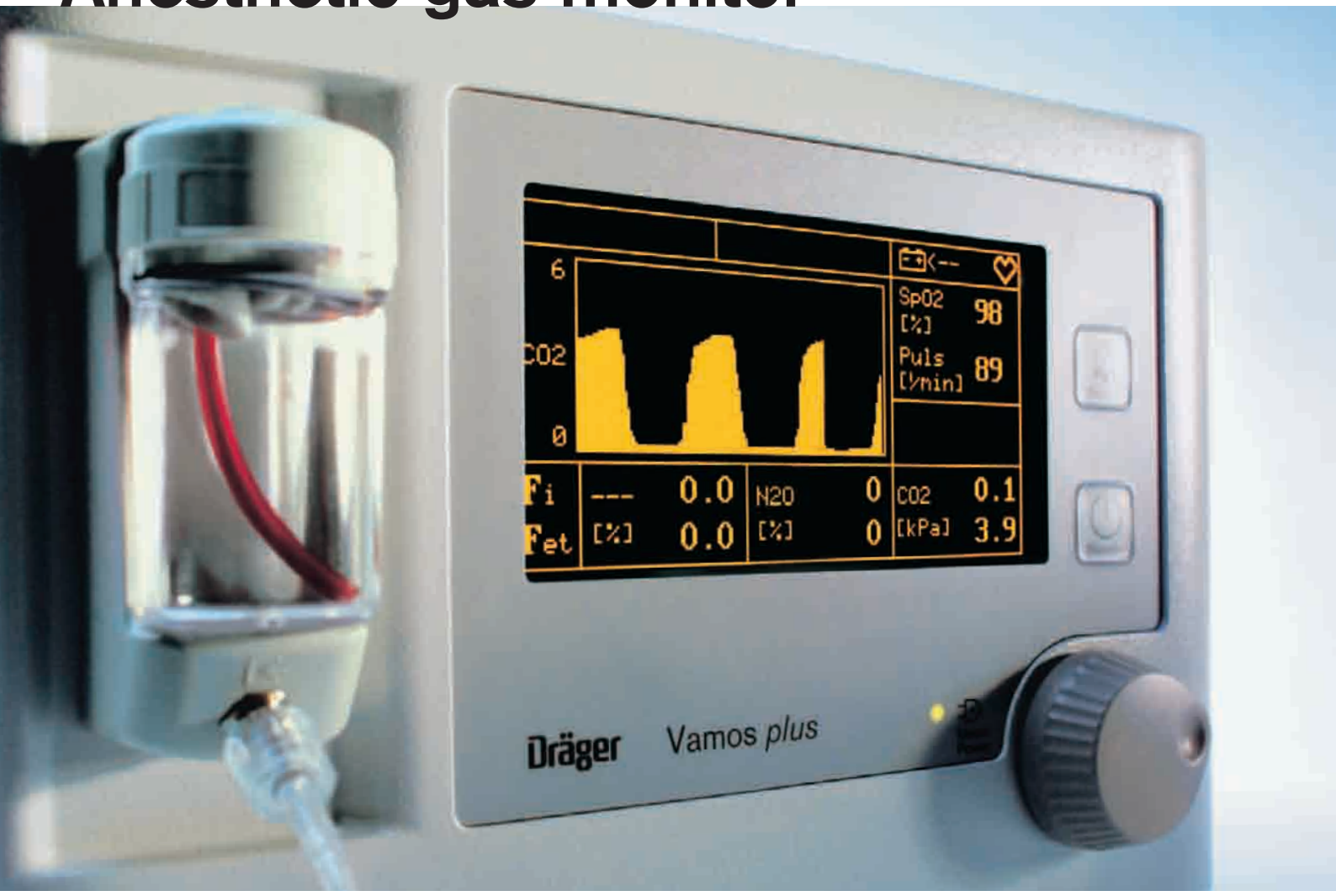
| | |
|---|---|
| **Internal Regulator Safety Relief Valve Pressure** | 70 psi (4.8 kPa x 100) opening pressure |
| **Fresh-gas outlet for non-rebraething system** | Male cone 22 ISO, Female cone 15 ISO, (with thread to secure) |
| Pressure limitation | Max. 80 hPa ($cmH_2O$) at 18 L/min |
| Fresh-gas flow alarm 23. | 0.2 to 18 L per minute volume flow |
| **Protection Class** | I, in accordance with IEC 60601-1 |
| Applied parts: | |
| Breathing system (nozzles, breathing hoses) | Type BF  |
| **Ingress of Fluids** | IPX0 |
| **Power supply**, Rating Non-configurable | 100 to 240 VAC, 50/60 Hz, 70 VA |

**Rechargeable batteries**

| | |
|---|---|
| Rating: | 24 V; 3.5 Ah |
| Type: | sealed, gelled lead-acid |
| Recharging time: | ≤16 hours on the mains or full operation time |
| Operation time with fully charged batteries: | 45 minutes, minimum |

Dräger medical
A Dräger and Siemens Company

# Vamos/Vamos *plus*
# Anesthetic gas monitor




## Scalable monitoring solution

# Technologically advanced

**Designed to grow with your needs**
Vamos has the flexibility to meet your requirements both now and in the future. The Vamos can be configured with $CO_2$ and $SpO_2$ monitoring and upgraded in the future to include monitoring for all 5 anesthetic agents and $N_2O$. The upgrade option can easily be installed on site to minimize any disruption. The Vamos can be configured to meet the following three specifications:
- $CO_2$ and $SpO_2$
- Anesthetic agents, $CO_2$ and $N_2O$
- Anesthetic agents, $CO_2$, $N_2O$ and $SpO_2$

Vamos *plus* offers automatic identification of the anesthetic agent and dual agent display when two agents are used. Vamos *plus* can be configured to meet the following two specifications:
- Anesthetic agents, $CO_2$ and $N_2O$
- Anesthetic agents, $CO_2$, $N_2O$ and $SpO_2$

**Flexibility**
The $SpO_2$ option for the Vamos uses proven Nellcor® technology. This ensures compatibility with a wide range of pulse oximetry sensors and accessories. An optional battery backup is available for the Vamos, enabling the monitor to operate independently of the main power supply for at least an hour.

**Innovation**
At the heart of the Vamos is a new gas sensor developed by Dräger which incorporates the very latest in innovative micro-optic technology. Because this sensor has no moving parts, it is particularly robust and reliable with just a small pump to maintain a constant flow of 200 mL/min for the sample gas. The sensor's performance reflects Dräger's core competence in infrared gas-detection technology with a design commitment to long-life components and quality.
The latest innovation in gas measurement technology has been integrated in Vamos *plus*. Anesthetic agent measurement and dual agent gas measurement is now possible with Vamos *plus*.

The Vamos anesthetic gas monitor is a compact, flexible solution to meet your respiratory gas monitoring needs. As your monitoring requirements change, the Vamos can be reconfigured to meet them, thereby reducing the risk of premature obsolescence. In addition to flexible design, the Vamos provides excellent long-term value through the use of the latest solid-state optical technology.


# ... in design, price and performance

**Ergonomics**
Vamos is much more than just a flexible, affordable monitor. Its design fits into the current working environment.
A critical element of good monitoring is having the right information in the right place. The compact dimensions of the Vamos allow the monitor to be optimally positioned within the working field.

- A variety of attachment options including specially designed GCX arms and brackets, as well as a specially designed solution for Dräger's Fabius family of anaesthesia devices, help to optimize your workplace design. The GCX arm can also be attached to a wall mounted standard rail.
- A high-contrast electroluminescent display ensures that the monitored data is clearly visible even from acute angles
- To further enhance ease of use, the Vamos features Dräger's proven user interface with a self-explanatory menu-guided operation. This intuitive system eliminates the need for time-consuming training while the rotary knob and function keys enable users to quickly familiarize themselves with the operation of the Vamos.

**A safe investment**
The Vamos provides a clear financial advantage.
By empowering the customer to configure the monitor with just those monitoring parameters that are needed, Vamos reduces the initial cost while providing a secure investment due to the ability to upgrade the platform in the future.

Versatility

| Technical data | | |
|---|---|---|
| **General specifications** | | |
| Measured parameters | 27. | $CO_2$, $N_2O$, 5 anesthetic agents<br>$SpO_2$ (Nellcor) |
| Gas measurement | | breath to breath resolution |
| Rise time | | < 500 ms (agents), < 350 ms ($CO_2$) |
| Principle of measurement | | advanced infrared technology,<br>sidestream sample principle |
| Accuracy | | as per ISO 21647 |
| Sample flow rate | | 200 mL/min |
| **Display** | | |
| High-contrast amber electroluminescent display with excellent vertical and horizontal viewing angles. | | |
| Display size | | 5" diagonal 4.25" x 2.28"<br>(127 mm diagonal 108 x 58 mm) |
| Graphic display of $CO_2$ waveform | | |
| Numeric display | | Fractional inspiratory concentration (Fi) of $CO_2$, $N_2O$ and of selected agent (Vamos)<br>or identified agent (Vamos *plus*)<br><br>End-tidal concentration (Fet) of $CO_2$, $N_2O$<br>and selected agent (Vamos)<br>or identified agent (Vamos *plus*) |
| Oxygen saturation ($SpO_2$) | | ISO 9919 |
| Pulse rate | | |
| **Technical features and performance data** | | |
| Dimensions WxHxD | | 9.4" x 6.5" x 6.5" (240 x 166 x 165 mm) |
| Weight | | 2.4 kg including the internal battery |
| Power consumption | | peak consumption in the warm-up phase < 55 W<br>during operation < 45 W |
| Operating voltage | | 100 - 240 V, 50/60 Hz<br>external power pack with country-specific connections |
| Battery backup operation (optional) | 27. | > 1 hour |
| Outputs | | RS 232 Medibus<br>RS 232 (only for service)<br>Sample gas outlet (for sample gas supply to anesthetic gas scavenging system) |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