

## Software Enhancements for the Primus® / Primus IE

The Primus® Software enhancements are the result of feedback received from experienced users. More than 30,000 Primus products have been installed worldwide. The innovative changes to the software contribute to even more improvements in patient care – and at the same time increase efficiency and productivity.



### FUNCTIONALITY OF THE BASIC SOFTWARE 4.5

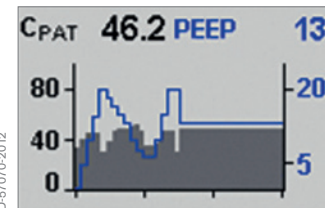
- Synchronization in pressure- and volume-controlled ventilation modes supports spontaneous breathing.
- NEW!** - Availability of the new Dräger Communication Protocol Medibus X. The user can switch between Medibus Protocol variants in the standby configuration menu.
- Individually configurable screen layout.
- Automatic MAC monitoring.
- Improved sensitivity of the flow measurement of smaller tidal volumes.
- Intelligent alarm management.

- NEW!** - Advanced apnea alarm management enables better controlling of apnea situations.

- NEW!** - Automatic suspension of MV low alarm in HLM mode is configurable together with the flow apnea alarm to reduce nuisance alarms.
- Fully automatic, comprehensive self-test of all important system components.
- Optional operation without nitrous oxide.
- Breathing frequency up to 100 bpm.

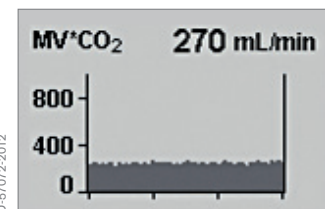
### ADVANCED VIEW OPTION

This option includes a new trend display for new parameters: 15 min. mini trends for PEEP/C<sub>PAT</sub>, MV\*CO<sub>2</sub> and O<sub>2</sub> uptake. These mini trends can be displayed in the parameter box. Additionally, they will be displayed in the trend screen page. This option also includes the new parameter box, which displays the spontaneous expiratory minute volume (MV<sub>spont</sub>) and the minute volume breathed by mandatory ventilation strokes (MV<sub>mand</sub>).



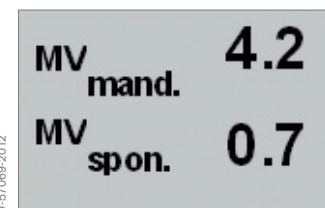
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PEEP/C<sub>PAT</sub> PEEP combined with patient compliance.



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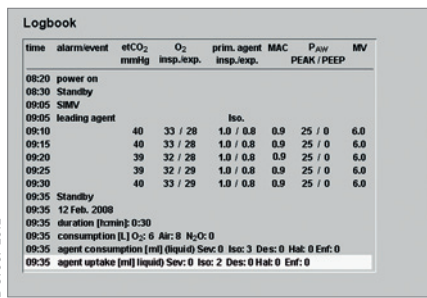
MV\*CO<sub>2</sub> expiratory minute volume combined with measured end-tidal CO<sub>2</sub>.



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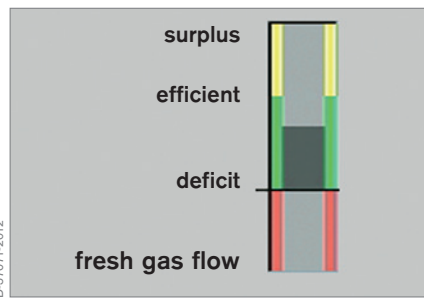
Optional configurable parameter box, separating the total minute volume into two parts: the spontaneous expiratory minute volume, and the minute volume breathed by mandatory ventilation strokes.

**ADVANCED MONITORING OPTION**



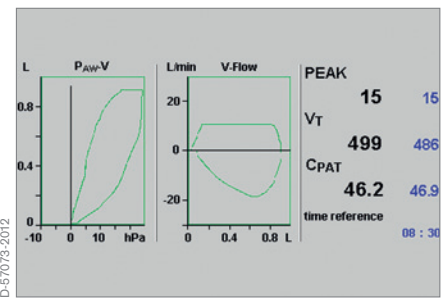
**Advanced monitoring:**  
Logbook with consumption data for fresh gas and anesthetic gas per case

- Patient- or case-specific standard calculation of consumption and uptake of volatile anesthetic agents.
- Case-by-case display of fresh gas consumption in the device logbook.



**Advanced monitoring:**  
Integrated electronic econometer

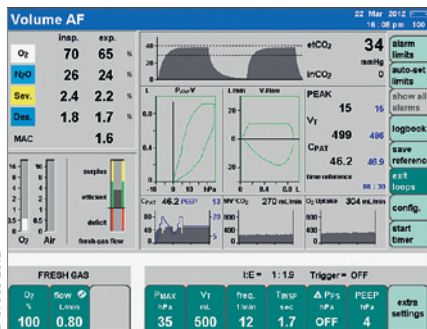
- Electronic econometer to display the efficiency of fresh gas consumption. The integrated “low flow trainer” helps to reduce cost.
- Automatic standard calculation and presetting of patient-specific ventilation parameters by entering the ideal body weight.



**Advanced monitoring:**  
P/V loop and V/flow loop display

- P/V and V/flow loops: fast analysis of changes in the lung mechanics through the simultaneous display of reference and real-time loops. Additionally, the relevant numeric data of the reference loop will be displayed together with the real-time loop numeric data.

**ADVANCED VENTILATION OPTION**

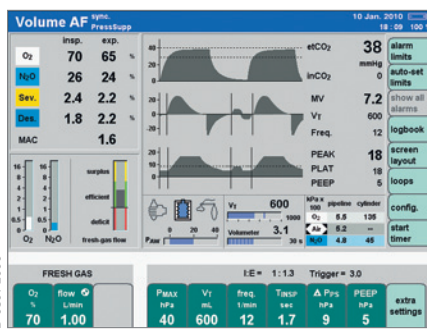


**Advanced monitoring:**  
Pressure support (PS) is the primary feature of this upgrade option. PS can be used both in stand-alone mode and in combination with all synchronized volume- and pressure-controlled types of mechanical ventilation. All PS parameters for mechanical ventilation, such as  $\Delta P_{PS}$ , PEEP, T<sub>Slope</sub>, Freq<sub>MIN</sub> and Trigger, can be directly selected and adapted. The PS option includes apnea ventilation, which can be activated by setting a minimum breathing frequency.

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- The PS option includes apnea ventilation, which can be activated by setting a minimum breathing frequency.

- For volume-controlled mechanical ventilation, the tidal volumes can be reduced to 5 ml.
  - With CPAP pressure support, the patient can be held at a constant PEEP level.
- Ventilation modes**
- Pressure support
  - Pressure support <sub>CPAP</sub>
  - Volume <sub>sync PressSupp</sub>
  - Pressure <sub>sync PressSupp</sub>

**VOLUME MODE AUTOFLOW OPTION**



**Advanced monitoring:**  
Volume AutoFlow (AF) mode combines the advantages of pressure- and volume-controlled ventilation. This mode uses a decelerated inspiratory flow in order to ensure the lowest possible pressure without pressure peaks. Guaranteed tidal volume. Automatic adaption of inspiratory pressure to changed lung conditions. Lung-protective ventilation used consistently – even in volume controlled mode.

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- Volume Mode AutoFlow can be used with synchronization and optional pressure support.
- Ventilation modes**
- Volume AF
  - Volume AF <sub>sync</sub>
  - Volume AF <sub>sync PressSupp</sub>

**TECHNICAL DATA PRIMUS® / PRIMUS® IE WITH SOFTWARE VERSION 4.5****BASE UNIT**

Weight (without vaporizer and gas cylinders)	147 kg
Dimensions (H x W x D)	138 x 80 x 80 cm

**Power and battery backup**

Power consumption	200 W/typical
Operating voltage	100 – 240 V~, 50 – 60 Hz
Integrated emergency power supply	for at least 30 minutes, up to 90 minutes, depending on set ventilation parameters.

**ANESTHESIA GAS SUPPLY MODULE**

Fresh gas flow	0 and 0.2 – 18 L/min
O <sub>2</sub> flush	> 35 L/min
O <sub>2</sub> safety flow	0 – 12 L/min
External fresh gas outlet	Optional
Vaporizer	Up to two Dräger or Selectatec®, optional vaporizer standby holder Dräger or Selectatec®

**VENTILATOR OPERATING SPECIFICATIONS**

Ventilator E-Vent® plus	Electrically operated and electronically controlled
Operating modes	Manual, spontaneous, Volume mode (IPPV), Pressure mode (PCV), Optional: pressure support (PS) Optional: Volume Auto Flow Synchronized volume-controlled ventilation (SIMV), optionally with PS Synchronized volume-guaranteed ventilation volume AF, optionally with PS

**Control input changes**

Pressure limitation P <sub>MAX</sub> (in volume mode)	(PEEP+10) up to 70 hPa
Pressure limitation P <sub>INSP</sub> (in pressure mode)	(PEEP+5) up to 70 hPa
PEEP in volume mode	0 – 20 hPa (max. P <sub>MAX</sub> -10 hPa)
PEEP in pressure mode	0 – 20 hPa (max. P <sub>INSP</sub> -5 hPa)
Tidal volume (in volume mode)	20 – 1400 mL 5 – 1400 mL (with advanced ventilation option)
Tidal volume (in pressure mode)	5 – 1400 mL (deliverable with advanced ventilation option)
Trigger	0.3 – 15 L/min
Breathing frequency	3 – 100 per minute
Minimum frequency for apnea ventilation in PS mode	Off, 3 – 20 per minute (with advanced ventilation option)
Breathing time ratio (I:E)	max. 5:1
Inspiratory time (T <sub>INSP</sub> )	0.2 – 6.7 s
Inspiratory pause (T <sub>IP</sub> :T <sub>INSP</sub> )	0 – 60 %
Inspiratory flow	max. 150 L/min
Inspiratory ramp T <sub>SLOPE</sub>	0.0 – 2 s (in pressure mode and pressure support)
System leak tightness	< 150 ml/min at 30 hPa (automatic leakage test)
Integrated safety functions	Sensitive ORC function: minimum oxygen supply of 25 vol.% O <sub>2</sub> or 200 ml/min in mixtures with nitrous oxide (N <sub>2</sub> O)

**Ventilator Monitoring**

Monitoring	Minute volume (M <sub>V</sub> ) and tidal volume (V <sub>T</sub> ); breathing frequency, peak pressure, plateau pressure, mean airway pressure, PEEP; patient compliance C <sub>PAT</sub> ; the following measurement variables/parameters can be displayed as a graph: airway pressure, inspiratory and expiratory flow; bar graph for expiratory minute volume and tidal volume; display of graphic trends; numerical list of measurement values; auto-set for alarm limits
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**Gas Monitoring**

Monitoring	Inspiratory and expiratory concentration of O <sub>2</sub> , N <sub>2</sub> O, CO <sub>2</sub> and volatile anesthetics (Halothane, Enflurane, Isoflurane, Sevoflurane, Desflurane); the following measurement variables/parameters can be displayed as a graph: concentration of CO <sub>2</sub> , O <sub>2</sub> , and volatile anesthetic agents, virtual flow tubes for fresh gas flow
Control screen	12,1" full color TFT display

## BREATHING SYSTEM

Heated breathing system	yes
Filling Volume Absorber	1.5 L with reusable absorber canister 1.3 L with CLIC Absorber 800+ 1.2 L CLIC Absorber Drägerorb CLIC Free

## GAS SUPPLY CONNECTION

Gas supply	O <sub>2</sub> , N <sub>2</sub> O, air / optional: O <sub>2</sub> , air
Cylinder supply	O <sub>2</sub> , N <sub>2</sub> O

## OTHER

Communication interface	2 x RS 232
Protocol	Medibus, Medibus X
Data available for export	All alarms, pressures, O <sub>2</sub> , CO <sub>2</sub> , volume and fresh gas flow data, ventilation settings, flow and pressure curve, anesthesia gases
Writing surfaces	Pull-out tray
Additional accessories	Anesthetic gas scavenging system (AGSS), endotracheal suction unit, writing plate

## ORDER INFORMATION

### Software 4.n

Basic software version 4.50	8608515 (8608512 for USA, 8608511 for Japan)
Advanced Monitoring option package	8605290
Advanced Ventilation option package	8605290
Volume Mode AutoFlow option package	8605290
Advanced Views option package	8605290



### CORPORATE HEADQUARTERS

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The quality management system at  
Dräger Medical GmbH is certified  
according to ISO 13485, ISO 9001  
and Annex II.3 of Directive 93/42/EEC  
(Medical devices).