

# Gas Module SE™

## GENERAL DESCRIPTION

The Gas Module SE delivers state-of-the-art gas monitoring and analysis capabilities: identification and quantification of inspired and expired Fast O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>O, and 5 anesthetic agents – Halothane, Isoflurane, Sevoflurane, Desflurane, and Enflurane. Providing impressive capabilities and highly reliable performance, this leading-edge breath-by-breath gas analyzer was designed to meet the comprehensive anesthesia monitoring requirements of virtually every hospital and free-standing surgical center – whatever its size, specialty, or patient base.

## SUMMARY OF FEATURES AND BENEFITS

- Unique, straight-forward user interface – a hallmark of the Passport 2™ and Spectrum™ – easily configured to meet specific requirements. Ideal for multiple users. Requires no extensive training.
- Bright, easy-to-read, user-selectable real-time Fast O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>O, and Agent waveform and numerics display, status messages, and alarms greatly simplify procedural monitoring – even at a distance
- Breath-by-breath Fast O<sub>2</sub>, CO<sub>2</sub>, and N<sub>2</sub>O monitoring with automatic or manually-controlled 5-agent anesthetic measurement for real-time assessment of all critical patient parameters
- Compact, light-weight design ensures convenient use in all clinical environments
- Passport 2 and Spectrum provide comprehensive vital signs monitoring capability and trending. Quick-action keys offer one-touch operation.



### Agency Compliances

The Gas Module SE complies with the following industry standards:

Safety: EN 60601-1:1990, +A1:1992, +A2:1995, +A13:1995 / IEC 601-1:1998, +A1:1991, +A2:1995, UL 2601-1:1997, CSA Standard C22.2 No. 60601.1 M90, EN 60601-1-1:1993, +A1:1995 / IEC 601-1-1:1992, +A1:1995, EN 60601-1-4:1996 / IEC 601-1-4:1996, EN 1441:1997

Performance: ISO / DIA 11196(1996), ISO / DIS 7767 (1995), EN865:1997, EN864:1996

EMC & Environment: EN 60601-1-2:1993, EN 55011 (CISPR 11), IEC 61000-4-X, MIL\_STD-462D, RS101, RE101, IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-6:1982, IEC 60068-2-14, IEC 60068-2-29, IEC 60068-2-30, IEC 60068-2-32, IEC 60068-2-64, IEC 60068-2-56, ISO 2244 / EN 22244

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# TECHNICAL SPECIFICATIONS

## Gas Module

This device communicates with the Passport<sup>®</sup> XG, Passport 2<sup>®</sup>, Expert<sup>™</sup> and Spectrum<sup>™</sup> at 19,200 Baud via the RS232.

Sampling Rate: 200 ml/min  $\pm$  20 ml/min with sampling line  $\leq$  6 m, under normal conditions  
Sampling Delay: 2.5 sec typical with a 3 m sampling line  
Total System  
Response Time: 2.9 sec typical with a 3 m sampling line; includes sampling delay and rise time  
Display Update Rate: Breath-by-Breath  
Compensation: Automatic for pressure, CO<sub>2</sub>-N<sub>2</sub>O, and CO<sub>2</sub>-O<sub>2</sub> collision broadening effect  
Warm-Up Time: For CO<sub>2</sub>, O<sub>2</sub>, and N<sub>2</sub>O: 2 min to operation, for anesthetic agents: 5 min; for full accuracy specifications: 30 min  
Auto-Zeroing Interval: At start-up and at 5, 10, 15, 30, and 60 min of operation; thereafter, every 60 min  
Normal Operating Conditions (after 30 min warm-up): Temperature, 18 - 28°C, within  $\pm$ 5°C of calibration; Pressure, 500 - 800 mmHg, within  $\pm$  50 mmHg of calibration; Humidity, 20 - 80% RH,  $\pm$  20% RH of calibration

## CO<sub>2</sub>

Measurement Range: 0-15 vol%; 0-15 kPa; 0-113 mmHg  
Measurement Rise  
Time: <400 ms  
Accuracy:  $\pm$ (0.2 vol% + 2% of reading)  
Cross Effects: <0.2 vol% for O<sub>2</sub>, N<sub>2</sub>O, and anesthetic agents  
Threshold: 0.1 vol%; 0.0 is displayed if value <0.1%  
Respiration Rate: Breath detection: 0.7% change in CO<sub>2</sub> level; measurement range: 4 to 60 bpm; accuracy:  $\pm$ 2 bpm

## O<sub>2</sub>

Measurement Range: 0 - 100 vol%  
Measurement Rise  
Time: <400 ms  
Accuracy:  $\pm$ (1 vol% + 2% of reading)  
Cross Effects: <2 vol% for N<sub>2</sub>O; <1 vol% for anesthetic agents

## N<sub>2</sub>O

Measurement Range: 0-100% N<sub>2</sub>O  
Measurement Rise  
Time: <450 ms  
Accuracy:  $\pm$ (2 vol% + 2% of reading)  
Gas Cross Effects: <2 vol% anesthetic agents

## Anesthetic

Measurement Range: Halothane: 0 - 6 vol%; Isoflurane: 0 - 6 vol%; Enflurane: 0 - 6 vol%; Desflurane: 0 - 20 vol%; Sevoflurane: 0 - 8 vol%  
Measurement Rise  
Time: <400 ms  
Accuracy:  $\pm$ (0.15 vol% + 5% of reading)  
Gas Cross Effects: <0.15 vol% N<sub>2</sub>O  
Resolution: Two digits for Anesthetic Agent concentrations <1.0 vol%; 0.0 is displayed if value <0.1%  
Threshold: 0.15 vol%  
Identification Time: <20 sec for single agents  
Mixture Identification  
Threshold for  
Second Agent: 0.2 vol% + 10% of total concentration

## Mechanical

Size (maximum): 11.9"(W) x 4.4"(H) x 10.9"(D)/30.3 cm(W) x 11.3 cm(H) x 27.7 cm(D)  
Weight (maximum): 9.6 lbs (4.35 kg)

## Power Requirements

AC Voltage Input: 100 VAC to 240 VAC, 50/60 HZ, with an operating range of  $\pm$ 10% (90 to 264 VAC)  
Power Consumption: < 15 watts

## Environmental

Humidity: 10 to 95% RH, noncondensing; in airway: 0 - 100% RH, condensing  
Operating  
Temperature: 50° to 104° F / +10° to +40°C  
Storage  
Temperature: -13° to 158° F / -25° to +70° C  
Atmospheric Pressure: 67 - 106 kPa; 500 - 800 mmHg; 666 - 1060 mbar

## Alarms: Anesthetic Gas Monitor-Specific

|                           |             |           |
|---------------------------|-------------|-----------|
| Expired CO <sub>2</sub>   | High / Low: | Yes / Yes |
| Inspired CO <sub>2</sub>  | High:       | Yes       |
| Expired O <sub>2</sub>    | High / Low: | Yes / Yes |
| Inspired O <sub>2</sub>   | High / Low: | Yes / Yes |
| Expired N <sub>2</sub> O  | High / Low: | Yes / Yes |
| Inspired N <sub>2</sub> O | High / Low: | Yes / Yes |
| Expired Halothane         | High / Low: | Yes / Yes |
| Inspired Halothane        | High / Low: | Yes / Yes |
| Expired Isoflurane        | High / Low: | Yes / Yes |
| Inspired Isoflurane       | High / Low: | Yes / Yes |
| Expired Sevoflurane       | High / Low: | Yes / Yes |
| Inspired Sevoflurane      | High / Low: | Yes / Yes |
| Expired Enflurane         | High / Low: | Yes / Yes |
| Inspired Enflurane        | High / Low: | Yes / Yes |
| Expired Desflurane        | High / Low: | Yes / Yes |
| Inspired Desflurane       | High / Low: | Yes / Yes |

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