 CALIFIA®

 BIOMED SIMULATION INC

CALIFIA® Lung Simulator Technical Specification Sheet

Biomed Simulation, Inc. | Rev. 2025-02

Product Overview-Prototype only

The CALIFIA® Lung Simulator is a programmable, high-fidelity respiratory simulation platform designed to replicate pulmonary physiology for ECMO, CPB, and mechanical ventilation training. It operates independently or integrates with CALIFIA® systems, offering dynamic compliance/resistance modeling and real-time ventilator interaction.

Key Features

1. Respiratory Physiology Modeling

- Adjustable pulmonary compliance (5–200 mL/cm H_2O) and airway resistance (10–200 cm H_2O/LPS).

- Simulates spontaneous breathing, ventilator-assisted respiration, and pathological conditions (e.g., restrictive/obstructive lung disease).

2. Operational Modes

- Interactive Mode: Manual parameter control (FiO$_2$ 21–100%, tidal volume 0–1000 mL).

- Spontaneous Mode: Autonomous breathing with adjustable frequency (0–20 bpm) and I/E ratio (0–100%).

- CMV Mode: Controlled mechanical ventilation via external devices.

3. Monitoring & Calibration

- Real-time metrics: Tidal volume, PEEP, PIP, alveolar ventilation.

- Calibration tools for volume, pressure, and motor position.

4. Compatibility

- Standard 15 mm connectors for ventilators, anesthesia machines, or ECMO circuits

- Integrates with patient monitors for multi-modal analytics (e.g., blood gases, NIRS).

Technical Specifications

Performance

- FiO_2 range: 21 – 100 %
- Breath frequency: 0 – 20 bpm
- I/E ratio: 0 – 100 %
- Airway resistance: 10 – 200 cm H_2O/LPS
- Pulmonary compliance: 5 – 200 mL/cm H_2O
- Tidal volume: 0 – 1000 mL

Operation

- Temperature: 0 to 40° C (32 to 104° F)
- Connector: Standard 15 mm nozzle

Electrical

- Operating Voltage: 24 V DC
- Power consumption < 180 W

Physical

- Weight: 10.9 kg (24 lbs)
- Size: 18 H x 11.4 W x 5.8 D (in) / 4.7 H x 29 W x 14.7 D (cm)

Connectivity

- Ethernet connection to included laptop.
- Power connection of 24 V DC with power switch.

Safety

- EN 610010-1:2010 and EN 61326-1:2013. Safety requirements for electrical equipment for measurement, control and laboratory use.
- ICES-003 Issue 6. Standard for information technology equipment.

Use Cases

- **Ventilator Training:** Test CPAP/BIPAP systems, HFOV, and manual resuscitators.
- **ECMO/CPB Integration:** Simulate mixed venous oxygenation dynamics during extracorporeal life support.
- **Research:** Study gas exchange efficiency or pharmacological impacts on lung mechanics.

Integration & Accessories

- **Standalone Operation:** Simulates ventilator-dependent patients without external hardware.
- **CALIFIA® Ecosystem:** Paired with the CALIFIA® Patient Module for full ECMO/CPB scenarios.
- **Upgradable Features:** Exhaled CO_2 simulation, heated bellows, coughing functionality.

Warranty & Support

- 2-year hardware warranty | 1-year software updates.
- Remote/onsite training options.

- **Standalone or Integrated Use:** Operates independently or seamlessly connects to CALIFIA® Simulator systems and ventilators, with 15 mm standard connection for full compatibility with any device.

- **Real-time Measurements:** Displays tidal volume, respiratory rate, pressure (PEEP, PIP, instantaneous), and alveolar ventilation.

- **Calibration Options:** Includes volume, pressure, and motor position adjustments for precise simulation.

- **Breathing Modes:**
  - **Interactive Mode:** Manual testing and precise parameter control.
  - **Spontaneous Mode:** Autonomous breathing with ventilator assistance, adjustable for FiO_2, frequency, I/E ratio, and compliance.
  - **CMV Mode:** Controlled ventilation with parameters dictated by the connected ventilator.

- **Customizable Parameters:** Pulmonary compliance, breath frequency, FiO_2 range and airway resistance, among others, can be adjusted for scenario-based training.

Simple Setup and Maintenance

CALIFIA® Lung simulator meets international safety standards and is designed for minimal maintenance, ensuring consistent performance over time.

CE Marked.

Warranty

- 2 years for the device.
- 1 year of Software updates.