### Health problem addressed

Oxygen monitors are generally used to continuously measure and display the concentration of oxygen in the inspiratory line of a patient breathing circuit (i.e., during administration of anesthetic gases), hospital supply lines, and compressed-gas cylinders; they are also used with critical care ventilators and other oxygen administration equipment. Most units have alarms to alert clinical personnel when the oxygen concentration reaches a dangerous level. Oxygen monitors also check the accuracy of ventilator settings and the purity of compressed oxygen and air.

### Product description

These monitors may consist either of a galvanic cell whose voltage changes with the concentration of oxygen or a polarographic cell whose current varies with the oxygen concentration, electronic circuitry, and a display that shows the changes in voltage or current as percent of oxygen concentration. Most of these monitors include alarms for dangerous levels of oxygen concentrations.

### Principles of operation

Oxygen monitors use galvanic or polarographic cells to measure the oxygen concentration in a gas mixture. A galvanic cell is a self-energizing, oxygen-powered battery in which the electrical potential (voltage) changes with the concentration of oxygen. The cell’s sensor consists of an anode and cathode surrounded by an electrolyte and has a semipermeable membrane that permits oxygen to enter but prevents electrolyte from escaping. The oxygen diffuses into the cell through the membrane and electrolyte to the cathode, where it reacts to form hydroxide ions. These ions diffuse to the anode, where they give up electrons, generating voltage. An electrical cable connects the sensor to the analyzer, which measures the voltage and displays it in percentage of oxygen. A polarographic cell operates on the same principle, except that it conducts current from an external electrical source in varying amounts, depending on the oxygen concentration.

### Operating steps

- Calibrate unit daily.
- Attach to breathing circuit, gas cylinder, or ventilator.

### Reported problems

Some gases, such as nitrous oxide (N₂O) and carbon dioxide (CO₂), interfere with the device’s proper sensing of oxygen concentration unless the sensor is calibrated properly. Also, cleaning and disinfecting solutions may contain chemicals that could affect the sensor. Cables have also separated from plugs on some manufacturers’ monitors. Sensing cells and batteries must be checked daily.

### Use and maintenance

**User(s):** Anesthesiologist; respiratory therapist  
**Maintenance:** Biomedical engineering staff and/or service contract with the manufacturer or third-party organization; OEM servicers  
**Training:** Supervised training with experienced users and operator’s manuals

### Environment of use

**Settings of use:** Hospital  
**Requirements:** Adequate battery and sensing cell power

### Product specifications

- **Approx. dimensions (mm):** 142 x 91 x 38  
- **Approx. weight (kg):** 0.22  
- **Consumables:** Batteries; Galvanic cells  
- **Price range (USD):** 245-2,395 (960 typical); price covers all types and variations  
- **Typical product life time:** 8 years  
- **Shelf life (consumables):** NA

### Types and variations

- Galvanic cell  
- Polarographic cell