

Pulse Oximeter

Brief Description

A Pulse Oximeter is a portable, non-invasive monitor of Pulse Rate and oxygen saturation that enables prompt recognition of hypoxemia.

Oxymetry works by transilluminating the tissue containing an arterial bed & evaluating absorption of red & infrared light. The Pulse Oximeter is based on two physical principles. First, the light absorbance of oxygenated hemoglobin is different from that of reduced hemoglobin at the oximeter's two wavelengths.



Second, the absorbance at both wavelengths have pulsatile component, resulting from the fluctuating volume of arterial blood between the source & the detector. The output light at each wavelength consists of two components. The first component varies with pulsation of the blood. The second is large constant high output level; this is the light that passed through the tissues without being absorbed or scattered. These are referred to as the AC & DC components respectively.

Mendelson & Kent have stated the following relationship between SaO_2 & R/IR ratio:

$$SaO_2 = \frac{\epsilon_{IR}(Hb) (R/IR) - \epsilon_R(Hb)}{[\epsilon_{IR}(Hb) - \epsilon_{IR}(HbO_2)] (R/IR) + [\epsilon_R(HbO_2) - \epsilon_R(Hb)]} \quad -(1)$$

Where

$$R/IR = \text{Abs at } 660\text{nm} / \text{Abs at } 940\text{nm} = (AC_R/DC_R)/(AC_{IR}/DC_{IR})$$

and $\epsilon(Hb)$ & $\epsilon(HbO_2)$ are the mill molar extinction coefficients of reduced & oxyhemoglobin respectively. We have used this equation for oxygen saturation calculation in our design.

Specifications

- Oxygen Saturation (SaO_2)
 - Range : 40-100 %
 - Accuracy : ± 3 digit at 70-100 %
 - Resolution : 1 %
- Pulse Rate
 - Range : 30-250 BPM
 - Accuracy : ± 3 BPM
 - Resolution : 1 BPM
- Display
 - Bar Form : 10 segments LED
 - Numeric data display: Current Pulse rate and SaO_2
- Alarms : Audible and visual
- Trending facility : For at least 24/48 hours for pulse, SaO_2 and alarms
- System output : COM Port - RS-232 compatible for PC
- Battery : Inbuilt rechargeable battery with 12 hrs capacity at full charge with low battery indicator.
- Power : 220/240V, 50Hz

Features

- Non invasive real time display of SaO₂ and Pulse rate
- Alarm indications for :
 - probe not connected
 - Finger slip indication
 - Low battery indication
 - High and low SaO₂ alarm
 - High and low pulse rate alarm
- Audio beep on each pulse
- Mains and battery operated with back up time of 12 hours
- Trend facility

Applications

Non invasive real time monitoring of arterial oxygenation in neonatal units, operation theatres, post recovery wards, emergency wards etc. Pulse oxymetry has been recommended as a standard for care of every general anaesthetic.

Possible Use

All Govt. hospitals, Nursing Homes, District hospitals, Private hospitals

Technology transferred to



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