LIGHTMAN® - SpO₂ Sensor Tester - micro spectrometer

accurate data for clinical decisions

Lightman

Standard Accessories
- Sensor adapter - Customer preference
- Battery charger
- Carrying case
- Instructions for use
- Calibration certificate

Optional Accessories
Adapters:
- BCI
- Criticare
- Critikon Sensormedics
- Datascope
- Datex
- Masimo
- Nellcor
- Novametrix
- Ohmeda
- Spacelabs
- Others available on request

Power
- Batteries - 7.2v - 1500mAh - Ni-MH
- Performance - 16 hrs continuous use
- Charger - Universal

Display
- 1/4 VGA Graphics Display
- 320 * 240 dot matrix FSTN LCD
- Viewable area = 77 * 58mm (3.03") * (2.28")

Dimensions
Main body:
- W = 289mm (11.37")
- H = 180mm (7.08")
- D = 88mm (3.46")

Adapter unit:
- W = 120mm (4.72")
- H = 65mm (2.55")
- D = 45mm (1.77")

Weight
Main body = 900 grm (31.75 oz)
Adapter unit = 200grm (7.05 oz)

specifications are subject to change without notification
Use the LIGHTMAN® for:
• pre-purchase sensor evaluation
• checking the accuracy of generic sensors
• on-ward preventive maintenance
• sensor performance in extreme conditions
• pre-delivery checks by manufacturers
• incoming inspection and repair...

What the LIGHTMAN® does:
The LIGHTMAN® SpO2 Sensor Tester micro spectrometer is the only device on the market today which can test pulse oximeter sensors in isolation from the monitor, pinpointing LED or cable problems instantly, on the spot, and without taking the whole system out of circulation.

The LIGHTMAN® SpO2 Sensor Tester focuses on the most vulnerable part of the oximeter system – the LEDs. It tests for LED accuracy, intensity, incipient failure, and any wavelength drift; that means the LIGHTMAN® does a job that no other tester or simulator available today can do. The LIGHTMAN® also tests photodiode sensitivity and for intermittent cable breaks.

Most LED faults are found in brand new sensors
Inaccuracy should never be an issue in new pulse oximeter sensors. But many are faulty right from the start: an area of particular concern is cheap foreign imports reaching the market in increasing numbers.

LEDs are the heart of the problem. Correct LED selection and matching is crucial to the accuracy of a new sensor. Sensors are particularly sensitive to errors in red wavelengths. Inappropriate handling during sensor manufacture and poor mounting of LEDs causes mechanical distortion and internal stresses which precipitate premature ageing and failure. This compounds any errors introduced during the selection process.

The example (left) shows why it’s crucial that the LIGHTMAN® should be used to evaluate every single sensor prior to purchase, as well as routinely throughout its life.

The above example LED wavelength error, present in a newly manufactured sensor, can give SpO2 data with the following discrepancy:

<table>
<thead>
<tr>
<th>SpO2 (%)</th>
<th>Discrepancy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>97%</td>
<td>+1.28%</td>
</tr>
<tr>
<td>90%</td>
<td>+3.23%</td>
</tr>
<tr>
<td>80%</td>
<td>+5.26%</td>
</tr>
<tr>
<td>70%</td>
<td>+7.27%</td>
</tr>
</tbody>
</table>

Reliable Data through Self-Calibration
The LIGHTMAN® is self-calibrating using fundamental principles of physics. Automatically, prior to each sensor test, the micro-spectrometer aligns itself with three Neon/Argon spectra beamed at it from within The LIGHTMAN®. (see fig right)
Clinical decisions depend on accurate input data. Yet sensor LEDs are a major source of errors in pulse oximetry systems. The problem is that a significant proportion of LED errors arise during the manufacturing process. In addition to this, LEDs are prone to ageing faults. But these problems are often masked by the pulse oximeter system itself. Result – every clinical decision is based on inaccurate data, patients’ health or lives are put at risk and users can’t give the best care.

Pulse oximetry works by shining light from two LEDs – one red, one infrared – through the blood. The absorption of these two wavelengths shows the degree of blood oxygen saturation, or SpO2. Any error in the wavelength emitted by the LEDs in the sensor will give an error in the SpO2 reading.

But wavelength error has a serious knock-on effect. A sensor error range of, for example, 2% at normal blood oxygen saturation of 97% can rise to 4% at 90%, 7% at 80%, and 9% at 70% saturation (see fig. below), so it’s crucial to use the most accurate equipment possible. This can only be guaranteed by regular, frequent testing. The LIGHTMAN® SpO2 Sensor Tester is the most reliable way to do this, and it’s so quick and simple to use that sensors can be tested in seconds, on the spot, even by non-technical staff.

Why the LIGHTMAN® is important

This degree of decay in IR LEDs will be masked by the Pulse Oximeter system. The result is seriously compromised data.

Age related decay of Infrared LEDs

1. Red & Infra Red spectra are showing no evidence of faults.
2. Early signs of IR LED failure. The IR spectrum has shifted 10nm. Accuracy on safe limit ± 1.0%. Sensor is not compromising patient data.
3. Increased signs of IR LED ageing. The IR spectrum has shifted 25nm. Accuracy is down to ± 2.5%. Sensor is now compromising patient data.
4. The IR LED is in the terminal stage. The IR spectrum has shifted 35nm. Accuracy is now down to ± 3.5%. Sensor may be seriously compromising patient data.

The Lightman® - accurate data for clinical decisions
The LIGHTMAN®:

- Tests the most vulnerable components in the oximeter system - Sensor LEDs and Photodiode.
- Tests the condition of LEDs quickly and on the spot and avoids taking complete oximeter system out of commission.
- Tests sensor accuracy in isolation from the monitor.
- Tests LED accuracy - wavelength drift, intensity and for incipient failure.
- Tests photodiode sensitivity.
- Tests for intermittent cable breaks.
- Tests 50 sensors per full charge.
- The LIGHTMAN® is self-calibrating to fundamental principles of physics.
- Portable - Compact - Hand-held.
- Easily operated by non-technicians.
- Designed for speed and ease of use.
- Sensor positioning does not require mathematical precision for accurate results.
- Latex free.

more data at:
www.electro.co.uk