Near infrared spectroscopy
with moorVMS-NIRS
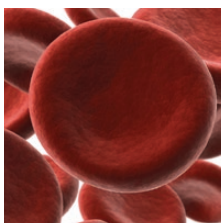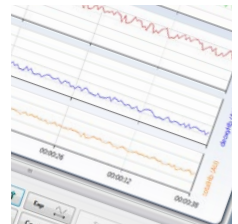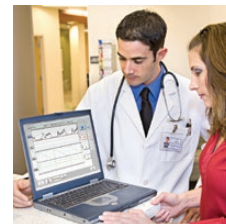
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moorVMS-NIRS – Near infrared spectroscopy

The moorVMS-NIRS near infrared spectroscopy monitor is designed to assess oxygenation status in deeper tissues non-invasively; muscle and brain for example. The features include;

- **Dual channel module:** allowing you to assess and compare two sites simultaneously.
- **Compatibility with existing moorVMS family products and software:** combine modules for a multichannel system to your own specification.
- **Three probe holders:** 30, 40 and 50mm separation offering sampling from three different tissue beds.
- **Add laser Doppler flowmetry (moorVMS-LDF) or white light spectroscopy (moorVMS-OXY) measurements:** with provision for probes within the NIRS probe holders.
- **Easy viewing:** High contrast, ice white, backlit display.
- **Advanced PC software:** with extensive analytical features, batch processing and report templates.
- **Highly connectable:** As well as the visual output, all monitors feature analogue outputs (0-5V) and digital (USB) real time data transfer.
- **Factory calibrated:** no need for probe pre-calibration.
- **Medical grade design:** for clinical research applications.
- **Multi-lingual training DVD:** for continual reference.
- **Reliability:** 3 year manufacturers warranty as standard.

moorVMS-NIRS – dual channel module with probe.

Theory

The moorVMS-NIRS uses the established spatially resolved spectroscopy technique (Matcher et al. 1995 and Suzuki et al. 1999) to measure absolute concentrations of oxygenated haemoglobin (oxyHb) and deoxygenated haemoglobin (deoxyHb) in human tissue. The system measures oxygenation using a probe which is placed in contact with the skin. Each probe consists of a detector head which contains two identical photodiodes and an emitter head which contains two near infrared LEDs emitting light at approximately 750nm and 850nm.

Detector Head   Emitter Head
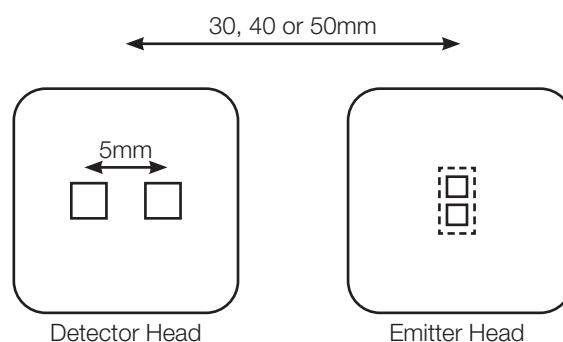
Light from the emitter head enters the tissue where it is subject to scattering and absorption. A small proportion of the incident light passes through the tissue to the photodiodes. The resulting photocurrents are amplified and acquired by the instrument. The orientation of the photodetectors allows the change of attenuation with respect to emitter to detector distance to be measured. Absolute concentrations of oxyHb and deoxyHb can then be estimated using known optical characteristics of haemoglobin (Prahl 1999), known probe geometry and assumptions about typical tissue scattering characteristics. Tissue oxygen saturation (SO_2) can be calculated from oxyHb and deoxyHb concentrations and expressed as a percentage.

Re-Usable Probes

Just plug in to start monitoring! Three probe holders are available with dedicated double sided adhesive pads offering separation of 30, 40 and 50mm between emitting and detecting heads. This alters the measurement depth with a wider separation offering deeper penetration.

Access ports are also provided enabling you to add laser Doppler (moorVMS-LDF) or white light spectroscopy probes (moorVMS-OXY) for simultaneous tissue blood flow and superficial tissue oxygenation.

*moorVMS-NIRS Probe Heads – emitter and detector.*

moorVMS-NIRS – dual channel module with probe.

Applications

NIRS is a well-established technique, with the first commercial systems available more than 35 years ago. Research applications emerged in the last few decades and have continued mainly to focus on oxygen measurements in muscle and the brain.

Technique references are available for the following areas;

- **Activation of the visual cortex during stimulation**
- **Activation of the motor cortex in response to finger tapping**
- **Cerebral Oxygen research monitoring**
- **Studies of muscle oxygenation for sports medicine and rehabilitation.**
- **Altitude Physiology**
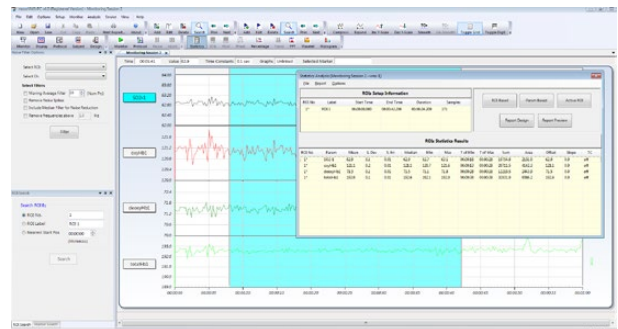
moorVMS-PC screen shot – please refer to the moorVMS-PC software brochure for further details.

About Moor Instruments

Moor Instruments, established in 1987, is a world leader in the design, manufacture and distribution of monitoring and imaging systems for micro-vascular assessments. We are proud now to include tissue oxygenation assessments within this portfolio.

Firsthand experience of laser Doppler research and development within Moor dates back to 1978 and with this we have the breadth of knowledge to help with your application and the enthusiasm to try and find answers to any of your questions.

By giving priority to performance, quality and service, we strive to ensure the highest levels of customer satisfaction.

Our dedicated design team is involved with a number of development projects for other partners and manufacturers. Whatever your needs, as a researcher, clinician or manufacturer, Moor will work harder for you.

moorVMS-NIRS with optional moorVMS-OXY and moorVMS-LDF.

Specifications:

Quality Control
Moor Instruments is certified to ISO 13485: 2016.

Measurement Parameters
SO_2 (tissue oxygen saturation)
Range: 0-99%
Accuracy: ± 2 SO_2 units
Precision: ± 3% of measured value
Resolution: 1 SO_2 unit

oxyHb (relative oxygenated haemoglobin concentration)
Range: 0-1000 AU
Accuracy: ±10% or ±10 AU whichever is greater
Precision: ± 3% of measured value
Resolution: 1 AU

deoxyHb (relative deoxygenated haemoglobin concentration)
Range: 0-1000 AU
Accuracy: ±10% or ±10 AU whichever is greater
Precision: ± 3% of measured value
Resolution: 1 AU

Sampling rate (all parameters)   5 Hz
Output data rate to PC   40 Hz

Reliability
3 year manufacturers warranty as standard.

Measurement Channels
moorVMS-NIRS Dual channel. 2 Photodetectors per channel.

Measurement Principle
Spatially Resolved Spectroscopy (SRS)

Infrared Emitters
750nm, 850nm
IEC62471 Risk group: Exempt group

Outputs
LCD screen providing display of oxygen saturation SO_2, oxyHb concentration and deoxyHb concentration.
USB interface for connection to PC.
Analogue outputs: BNC sockets, 0-5V.
2 x SO_2, 2 x AUX

General
Power source: Universal voltage, 100-230V AC, 15VA, 50 to 60Hz.
Dimensions: W x H x D mm, Weight: kg
moorVMS-NIRS: 235 x 80 x 200, 1.3kg.
Operating environment: Clinic or laboratory, excluding domestic.
Operating temperature: 15-30ºC.

Classification
Type of protection against electric shock: Class I.
Degree of protection against electric shock: Type BF applied parts.
Not suitable for use in an oxygen rich atmosphere.
Not suitable for use in the presence of flammable anaesthetics.

Safety Standards
Complies with:
IEC 60601-1:2005+A1:2012, IEC 60601-1-2:2014, IEC 62471:2008.

Moor Instruments reserves the right to change specifications without notice.

This product and its accessories are not for sale for use within the EU and UK.

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