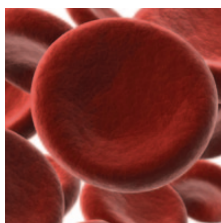
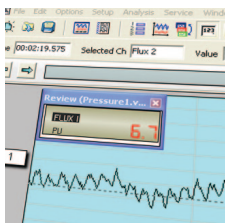
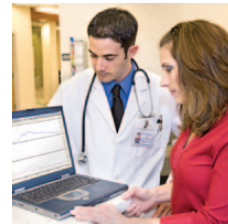


Tissue blood flow and temperature monitoring with moorVMS-LDF™



moor instruments
innovation in microvascular assessment

moorVMS™ - Vascular Monitoring System

The moorVMS-LDF laser Doppler blood flow monitor is a high performance, medical grade module for clinic or laboratory. Use of DSP technology brings you a portable, lightweight module featuring uncompromised specifications and reliability at a breakthrough price. The features include;

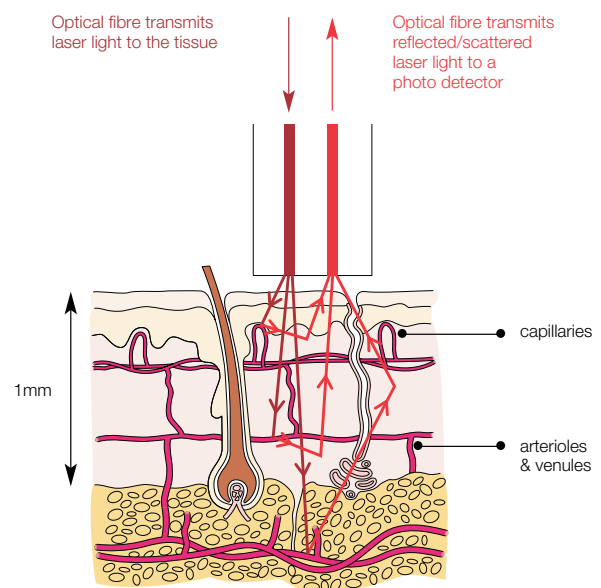
- **Single and dual** channel options.
- **Multi-channel:** combine modules for a multi-channel system with software support for your ideal configuration. Stacking case design offers a compact footprint for multi-channel users.
- **'MemoryChip' probes:** for a wide range of applications. Calibration constants are stored within the probe itself with timed re-calibration reminders.
- **Easy viewing:** high contrast, ice white, backlit LCD display.
- **Advanced Windows™ PC software:** with extensive analytical features and automatic report generation.
- **Easily connectable:** analogue output (0-5V, BNC) and digital (USB) real time data transfer included as standard for connection to data acquisition systems.
- **Medical grade design:** for both clinical and research applications.
- **Multilingual training DVD:** for continual reference.
- **Reliable assured:** industry leading 5 year manufacturers warranty.



moorVMS-LDF – single and dual channel modules with MemoryChip probes.

The laser Doppler technique

Laser Doppler has become a gold standard for dynamic microvascular blood flow assessments. Optic probes are used to monitor blood flow in capillaries, venules and arterioles; vessels responsible for nutrition of the skin and thermoregulation. The sampling depth depends on probe design and tissue characteristics but is typically around 1mm.



Low power laser light is transmitted via an optic fibre to the tissue. The light is scattered by tissue and moving blood cells and its frequency is Doppler broadened.

Some of the scattered light is collected by one or more optic fibres and transmitted to a photo detector. The resulting photo current is electronically processed to produce the laser Doppler flux (blood flow) signal. The average Doppler frequency shift is directly proportional to the average speed of the blood cells.

Changes in blood flow can be stimulated by a number of provocations including occlusion with a pressure cuff, heating, the iontophoresis of vasoactive drugs, changes in the position of limbs etc.

MemoryChip Probes

Just plug in and monitor - calibration constants are stored within the robust, medical grade probe connector and are read by the monitor as soon as they are connected. Skin probes combine laser Doppler and temperature measurement all within the same probe head for convenience.

The moorVMS-LDF will even remind you when you need to re-calibrate or if a service is due. Bio-compatible materials that can be sterilised are used throughout to ensure safety for surgically invasive applications.



Skin probes are available with twin or multi fibre configurations. Multi fibre designs usually employ a ring of collecting fibres around a central delivery fibre to provide an averaged signal from a larger volume than the conventional twin fibre design. Both include temperature measurement as standard.

Endoscopic probes enable investigations of internal tissues such as colon, stomach, bronchus and urethra.

Needle probes can be used for surface measurements where access is impaired (e.g. nasal, oral), inserted into tissue bulk (e.g. muscle, cerebral, adipose) or used for direct single vessel measurements.

Disposable probes are available for many experimental and clinical applications including post-operative flap monitoring (e.g. buried and oral flaps) and measurement of cerebral perfusion. Disposable single fibre implantable probes are also available.

Low profile designs are either used when access is difficult (e.g. oral flaps) or to reduce application pressure when the probe is covered by bandages.

Applications

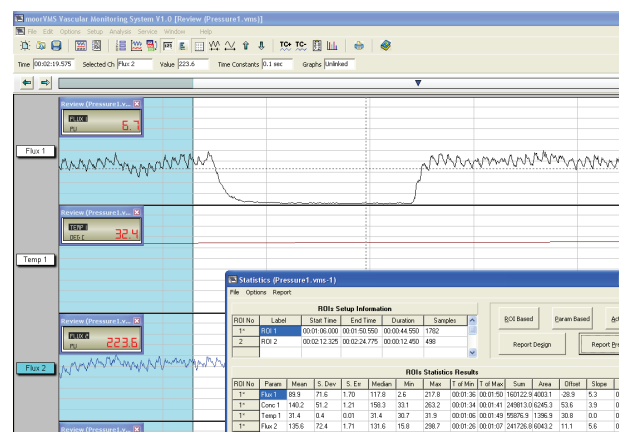
The flexibility of the laser Doppler technique and the range of probes has lead to many thousands of publications covering almost all tissue types, research areas and medical disciplines. This means that we can usually draw on published work and our own experience to advise on a suitable system configuration and protocol with confidence. Applications are often non-invasive and may involve tests of microvascular function stimulated by changes in posture, vasoactive drug delivery by iontophoresis, heating and pressure; tracking changes in flow with time or comparing flows from different measurement sites.

Routine clinical uses are increasing and take advantage of the wide dynamic range to capture the cardiac cycle, vasomotion effects or trends over hours, days or weeks.

Assessments include;

- **Post operative flap monitoring**
- **Prediction of amputation levels**
- **Tooth pulp vitality testing**
- **Endothelial function/dysfunction**
- **Toe pressure assessment**
- **Pulse volume recording**
- **Skin perfusion pressure**
- **Cerebral perfusion following injury**
- **Post-occlusive reactive hyperaemia (see below)**

Please contact us for no-obligation advice about your application and requirements.



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 laser Doppler systems, used for the monitoring and imaging of blood flow in the microvasculature.

First hand 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 to find answers to any of your questions.

By giving priority to performance, quality and service we strive to be our customers number one choice.

Our dedicated design team are 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.

Specifications:

Quality Control

Moor Instruments is certified to ISO 13485: 2003.
The moorVMS-LDF is CE certified.

Measurement Parameters

Flux (tissue perfusion).
Conc* (blood cell concentration).
DC (mean intensity).
Temperature.

Measurement Channels

moorVMS-LDF1 Single channel.
moorVMS-LDF2 Dual channel.

Reliability

Assured by our industry leading 5 year manufacturers warranty for all the moorVMS-LDF modules.

Optics

Temperature stabilised output laser diode; 785nm.
Maximum output power 2.5mW.

Laser Safety Classification

Class 1 per IEC 60825-1:2007.
Class 1 per 21 CFR 1040.10 and 1040.11.

Laser Doppler Signal Processing

Bandwidth:
High pass 20Hz.
Low pass 3kHz*, 15kHz, 22kHz*.
Flux smoothing time constants: 0.1s*, 0.5s*, 1.0s, 3.0s* and unfiltered*.
Automatic gain control and zeroing.

Temperature Measurement

Range: 5°C to 50°C.
Resolution: 0.1°C, accuracy +/- 0.3°C.



moorVMS-LDF2 with optional moorVMS-LDF1 single channel module.

Outputs

LCD screen providing display of flux, DC and temperature.
USB Interface for connection to PC.
Analogue outputs: BNC sockets, 0-5V.
moorVMS-LDF1 1x flux, 1x temperature/DC (selectable).
moorVMS-LDF2 2x flux, 2x temperature/DC (selectable).
All outputs have independent user selectable scaling.

General

Power source: Universal voltage, 100-230V AC, 30VA, 50 to 60Hz.
Dimensions: W x H x D mm, Weight: kg
moorVMS-LDF1: 235 x 60 x 200, 1.4kg.
moorVMS-LDF2: 235 x 80 x 200, 1.5kg.
Operating environment: Clinic or laboratory, excluding domestic.
Operating temperature: 15-30°C.

Classification

Medical devices directive 93/42/EEC; Class IIa, Active device for diagnosis.
Laser classification: Class 1 per IEC 60825-1:2007.
Type of protection against electric shock: Class I.
Degree of protection against electric shock: Type BF applied parts.
Protection against harmful ingress of water: IPX0 (not protected).
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, IEC 60601-1-2:2007, IEC 60825-1:2007.
ISO 10993-1:2003, Medical devices directive 93/42/EEC.
FDA Laser Notice No. 50; dated July 26, 2001.

References

A.P. Shepherd, P. Å. Öberg, Laser-Doppler Blood Flowmetry, 1990,
ISBN 0-7923-0508-6, Kluwer Academic Publishers.

Moor Instruments reserves the right to change specifications without notice.

*Feature only available whilst using the PC Windows software, please contact us for a demo version.



Moor Instruments Ltd Millwey Axminster Devon EX13 5HU UK tel +44 (0)1297 35715 fax +44 (0)1297 35716 email sales@moor.co.uk website www.moor.co.uk
Moor Instruments Inc 501 Silverside Road Suite # 66 Wilmington DE 19809 USA tel (302) 798 7470 fax (302) 798 7299 email sales@moorinc.com