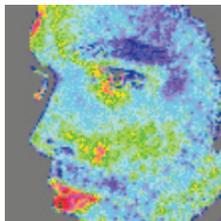
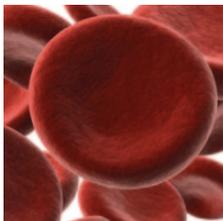
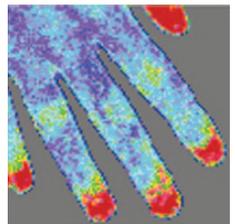
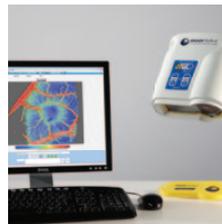


Full-field, video frame rate blood flow imaging with moorFLPI-2™



moor instruments
innovation in microvascular assessment

moorFLPI-2 – Capturing high resolution blood flow images in real time

The moorFLPI-2 blood flow imager uses the laser speckle contrast technique to deliver real-time, high-resolution blood flow images, providing outstanding performance in a wide range of pre-clinical and clinical research applications.

User-friendly features promote smooth workflow and enable the high through-put required to scan cohorts quickly and accurately. Advanced analysis functions help you to draw sound conclusions from your blood flow images. Product highlights include;

- Non contact imaging technique.
- Blood flow videos of any exposed tissue (skin or surgically exposed tissues).
- Best spatial resolution of 10 microns per pixel to reveal detailed morphology.
- Real-time video frames rates to capture dynamic changes in flow.
- Add multiple “regions of interest” to assess and quantify blood flow changes in real time and post measurement. Area of ROIs calculated automatically.
- Image areas range from 5.6mm x 7.5mm to 15cm x 20cm with motorised zoom and auto focus, offering flexible and convenient imaging.
- Colour photo image matches blood flow images precisely to aid identification of features.
- Compact design with flexible stand options for clinic or laboratory for convenient use in various experimental and clinical research settings.



moorFLPI-2 – desktop setup.

The laser speckle technique

The full-field laser perfusion technique, also known as laser speckle contrast imaging, exploits the random speckle pattern that is generated when tissue is illuminated by laser light and changes when blood cells move in the sampled tissue. When blood flow is high, the changing pattern becomes more blurred and the contrast in that region is reduced. Therefore high flow is related to low contrast and conversely low flow is associated with high contrast.

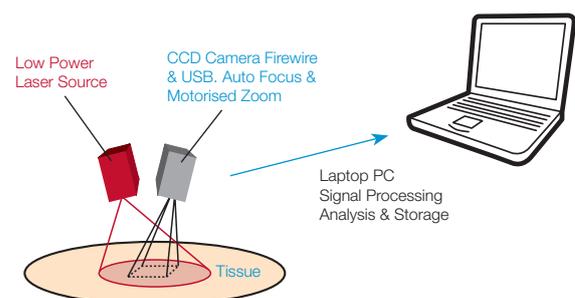
The contrast image is processed to produce flux values that are colour-coded to correlate with blood flow in the tissue.

The strength of the technique is two fold; video frame rate blood flow images enables the tracking of fast transients coupled with very high spatial resolution. It is possible to view pulsation in finger tips and spatial variations due to deep breath, occlusion, reactive hyperaemia and other stimuli.

Technical advantages of Moor laser speckle are clear and include the use of motorised zoom and auto focus enabling the flexibility to image both small and large areas.

Provision of spatial and temporal measurement modes allow optimum selection between image frame rate and spatial resolution. Colour photo provided by the measurement camera simplifies identification of key features.

Triggering function enables control and synchronisation of the moorFLPI-2 with other systems.



Applications and software

Established pre-clinical and clinical research applications are wide-ranging; examples include;

- Neuroscience – spreading cortical depression, stroke model assessment.
- Dermatology – inflammation and irritancy research.
- Oncology – experimental tumour growth, angiogenesis.
- Pharmacology – local and systemic responses.
- Plastic surgery – research into flap perfusion during surgery and post operatively.
- Chemical toxicology – inflammation and irritancy (e.g. response to intradermal capsaicin).
- Intraoperative measurements – limb and visceral ischaemia and reperfusion.
- Cardiovascular research – e.g. endothelial function assessed with iontophoresis.

Dedicated software for measurement and analysis is provided to take advantage of the high acquisition speeds and spatial resolution provided by moorFLPI-2.

moorFLPI-2 software has been refined over a number of years in response to our customer feedback and is fully featured for setup, measurement, analysis, reporting and exporting.

Setup offers full flexibility to choose scan size and temporal resolution, enabling you to collect data that is appropriate to your measurement, be it just a single image or a longer blood flow video. Zoom and auto focus is set easily using either the front panel buttons or via software control.

Measurement starts with a simple click. Mark events on the blood flow video and see changes in flow at pre-defined regions of interest (ROIs) that update graphically and histographically. Scan and ROI areas calculated automatically.

Analysis post measurement includes the ability to replay and re-analyse data offline by re-positioning regions of interest. This allows maximum utilisation of the data set. Five different colour palettes, and optional functions such as smoothing, image XY shift (to counteract movement mid measurement) and variable speed playback of blood flow videos enable you to present your data clearly.

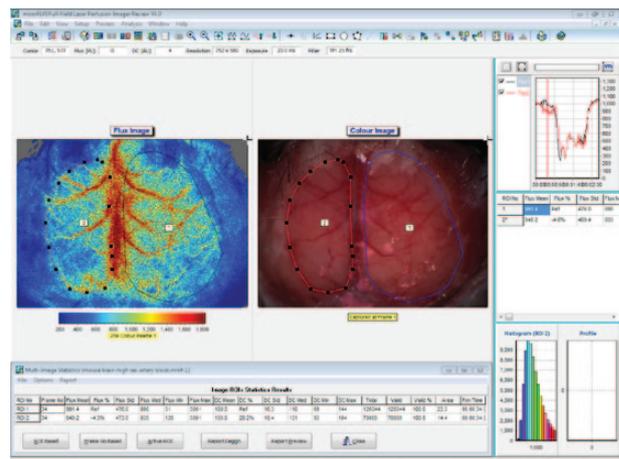
Report templates can be custom defined to produce the analysis and reporting that is needed from your studies from standard statistical routines to FFT analysis.

Export data to AVI, Matlab and graphical forms to extend the use of data for further analysis or presentations.

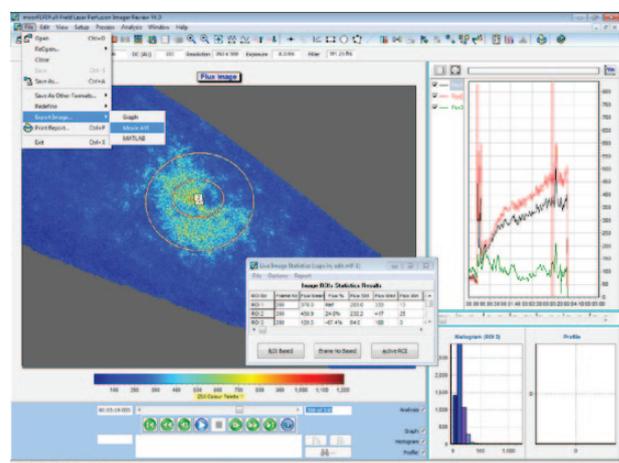
Your research

Please contact Moor or your nearest approved distributor to discuss your specific application. Ask to see the new system in action and evaluate it at your own facility.

Current publications using Moor laser speckle are wide ranging and updated online at www.moor.co.uk.



Cerebral blood flow imaging – MCAO model showing baseline blood flow image. 10 micron resolution, intact skull. ROI analysis shows flow reduction.



Forearm – wheel, flare and axon reflex due to capsaicin injection. Scan area approximately 15 x 20cm.

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.

Specifications:

Quality Control

Moor Instruments is certified to ISO 13485: 2003. The moorFLPI-2™ is CE certified.

Measured Parameter

Flux (tissue perfusion).

Range 0 – 5000PU.

Accuracy $\pm 10\%$ compared to a standard LDI measured from motility standard.

Precision $\pm 3\%$ of measured value.

Image size measurement accuracy $\pm 0.5\text{mm}$ or $\pm 5\%$, whichever is greater.

Distance measurement accuracy $\pm 5\%$.

Laser Sources

Near Infra-Red laser diode: 785nm.

Aiming beams red laser diodes: 650nm.

Class 1 per IEC 60825-1:2007.

(Safe to use without eye protection).



Scan Area

Variable zoom: 5.6mm x 7.5mm to 15cm x 20cm.

Working Distance

10cm to 38cm, between scan head and measurement site.

Image Resolution

Standard mode: 116 x 150 pixels, 50 μm minimum pixel size.

High resolution mode: 580 x 752 pixels, 10 μm minimum pixel size.

Colour image: 580 x 752 pixels.

Image Acquisition Rate

Up to 25 images per second.

Acquisition Modes

Single point and imaging, both modes are available simultaneously.

Lighting Conditions

Normal, ambient room lighting.



moorFLPI-2™ with optional panel PC and MS3b mobile stand.

Software

Windows™ based control, image processing and analysis.

External Trigger Input / Output

1 x trigger input, 1 x trigger output, 0-5v (TTL) level transition range. All outputs / inputs have independent user selectable scaling.

Zoom and Auto Focus

Controlled by motorised actuators via PC software or push buttons on scan head.

Aiming Beam

Alignment of aiming beams at 25cm.

Safety Standards

EN60601-1:2005 Safety of medical electrical equipment.

EN60601-1-2:2007 Electromagnetic compatibility.

IEC 60825-1:2007 Laser safety.

IEC 62471:2006 Photobiological safety of lamps.

Complies with CFR 1040.10 and 1040.11 except for deviations.

pursuant to Laser Notice No. 50 dated June 24, 2007.

EU Medical devices directive classification: Class IIa.

Stand Options

There are three stands available for the moorFLPI-2 which include the microstand, desktop stand and MS3b mobile stand.

Minimum Computer Requirements

Dual core Pentium™ 4 2GHz or higher compatible CPU.

2GB RAM.

Super VGA monitor (1024 x 768 resolution or higher).

100GB of available hard disk space.

Windows™ XP or higher.

1 USB port and 1 Firewire (IEEE1394) port.

General

Scan Head Dimensions: W H D cm 23 x 12 x 25, Weight 2.3Kgs.

Power Supply Dimensions: W H D cm 10 x 5.3 x 16, Weight 0.7Kgs.

Universal voltage switch mode power supply.

Range 100 to 230V AC 50 to 60Hz.

Operating Temperature: 15-30°C.

Storage Temperature: 5-50°C.

Moor Instruments reserves the right to change specifications without notice.

