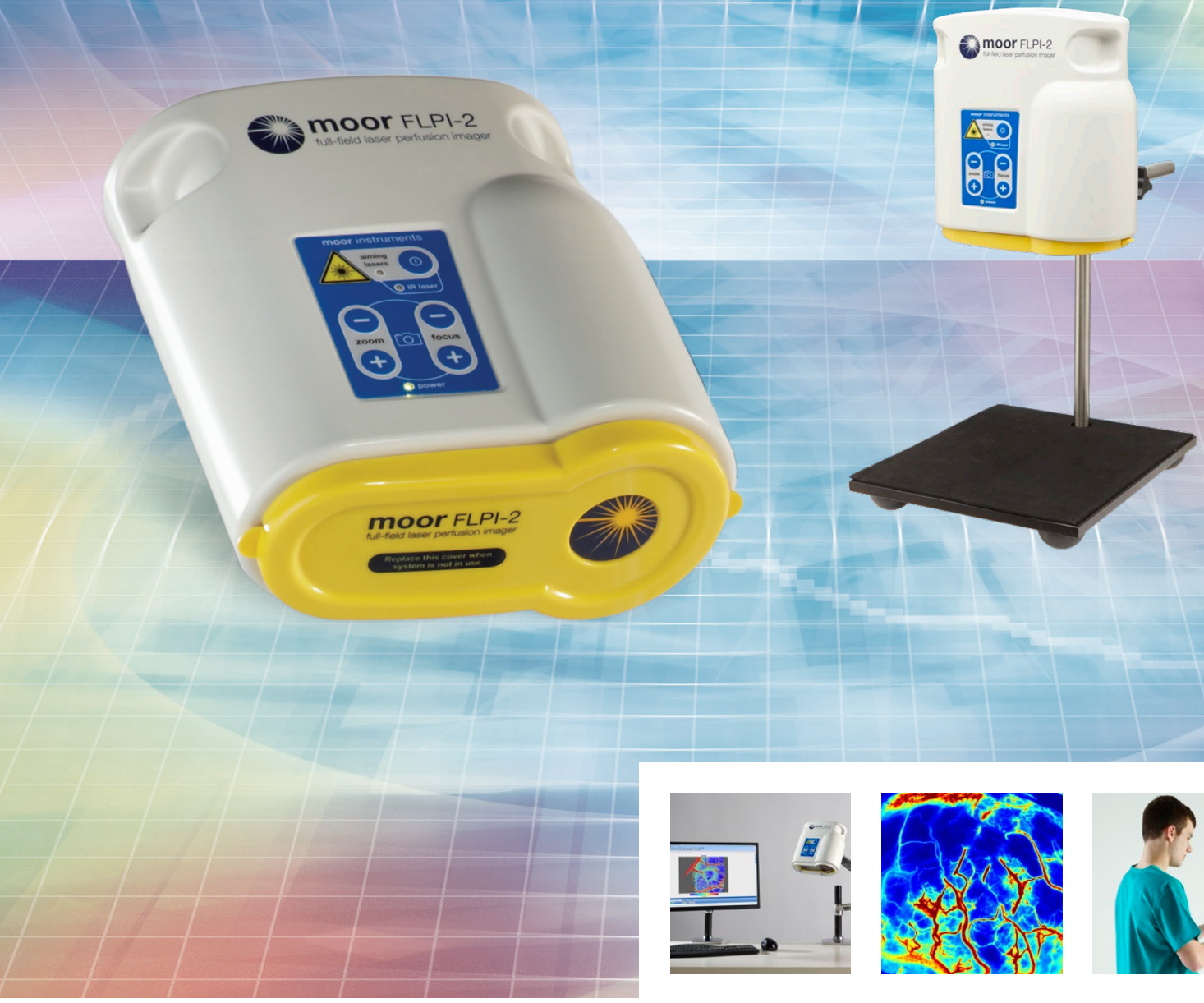
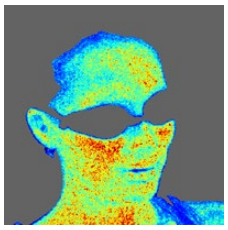
Full-field, video frame rate blood flow imaging

with moorFLPI-2









moor instruments

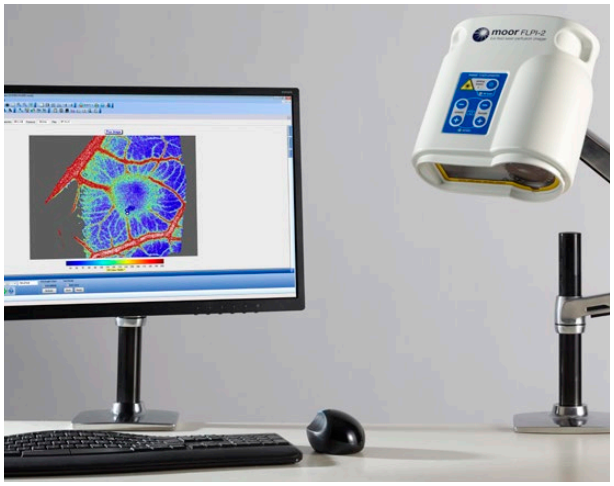
innovation in microvascular assessment

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 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 3.9 microns per pixel** to reveal detailed morphology.
- **Real-time video frame rates (up to 100 frames per second)** 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 6mm x 8mm to 225mm x 300mm with motorised x10 optical zoom and auto focus**, offering flexible imaging of any subject.
- **Colour photo image matches blood flow images precisely** to aid identification of features.
- **Triggering function** enables control and synchronisation of the moorFLPI-2 with other systems.
- **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

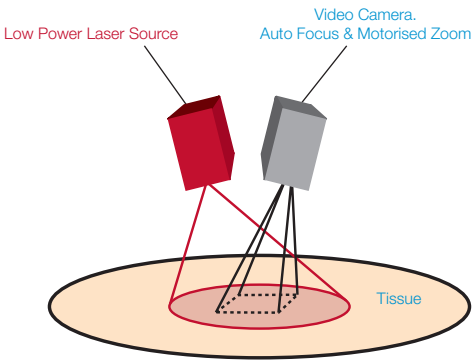
The full-field laser perfusion technique, also known as laser speckle contrast imaging, exploits the random speckle pattern that is generated when tissue is illuminated by laser light and changes when blood cells move in the sampled tissue. When blood flow is high, the changing pattern becomes more blurred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



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. Our software has been refined in response to our customer feedback and is fully featured for setup, measurement, protocol control, 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.

Protocol Control functions enable precise and reproducible operation of Pressure Cuff, Skin Heating and Iontophoresis transdermal drug delivery protocols

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.

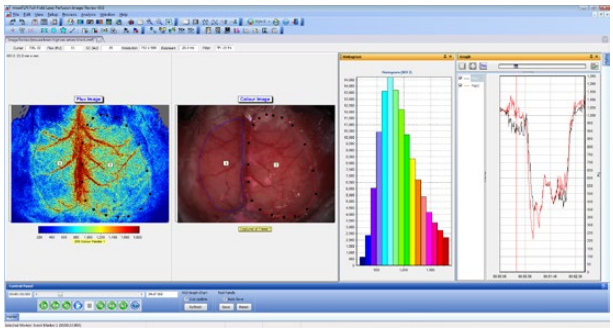
Report templates can be custom defined to produce the analysis and reporting that is needed from your studies from standard statistical and protocol reports (pressure cuff, skin heating and iontophoresis) to FFT/ wavelet analysis.

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

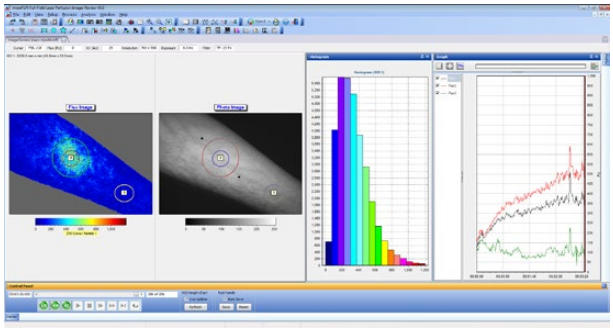
Your research

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.



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

Specifications:

Quality Control
Moor Instruments is certified to ISO 13485: 2016. The moorFLPI-2 has FDA 510(k) Clearance (K122943).

Measurement Principle
Laser speckle contrast analysis (also known as LASCA).

Laser Safety Classification
Near Infra-Red laser diode: 785nm.
Aiming beams red laser diodes: 650nm.
Class 1 per IEC 60825-1:2014.
(Safe to use without eye protection).



Calibration
Factory Calibrated.

Image size
6mm x 8mm up to 225mm x 300mm (continuously variable with zoom lens).

Camera/Image Resolution
2064 x 1544 maximum.

Image Acquisition Rate
100 images per second to 1 image every 12 hours.

Acquisition Modes
Single Point (16 channel), Single Image and Video mode.

Optical Design
Motorised 10 x optical zoom and auto focus. Single camera / RGB illumination to match colour photo and blood flow images.

Measurement Algorithms
Temporal and Spatial processing (including fixed and sliding window algorithms).

Pixel Resolution
Highest resolution of 6,600,000 pixels per cm^2.

Software
Refined over 20 years according to customer demands including advanced image acquisition, processing, editing, functionality and analysis.

Stand Options
Scan head has standard VESA mount for desktop stand, Microstand and Clinical Mobile stand. Photographic fitting for use with tripods, etc.

PC Connections
1 x USB 3.0 port.

External Connections
Programmable trigger in / out function with BNC connections.

Warranty
2 years, parts & labour, enhanced service contracts available.

Weights/ Dimensions
Scan head 23cm x 12cm x 25cm, Scan head 2.3kg.

Power Supply
Universal Voltage, 100V-230V. Note acquisition rate is unaffected by frequency of local electrical supply.

Moor Instruments reserves the right to change specifications without notice.

No specific diagnostic claims are made for the moorFLPI-2 so the performance analysis is intended to demonstrate that it represents a useful and effective clinical research tool, either in isolation or when combined with other measurement techniques.

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innovation in microvascular assessment

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