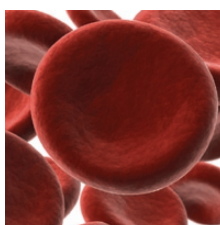
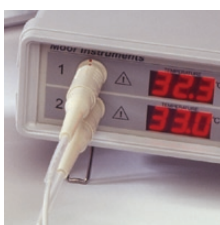
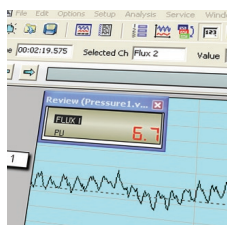
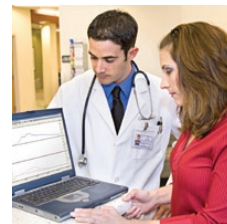
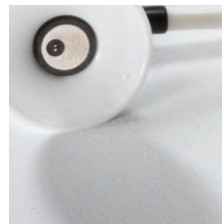


Skin responses to heating assessed by laser Doppler with SH02™

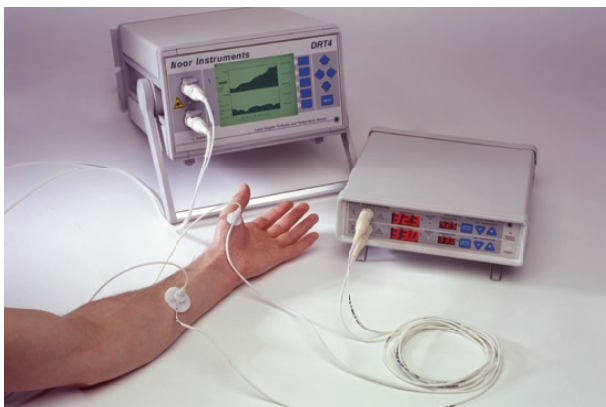


moor instruments
laser Doppler blood flow assessment

SH02™ - Skin Heater Unit

The programmable SH02™ Skin Heater Unit provides reproducible heating of skin tissue to be used with any laser Doppler blood flow monitor or imager. It can also be used as a skin temperature monitor and recorder. The features include;

- **Stand-alone:** manual control enables operation without a separate control unit or computer.
- **Protocol control:** to enable fully reproducible procedures in your trials supported by moorVMS-PC PC software and DRT4 laser Doppler monitor.
- **Measurement and analysis software package:** automated to aid generation and processing of results.
- **Dual channel:** enables independent simultaneous heating and monitoring of two separate areas.
- **Factory calibrated probes:** no calibration necessary for the life time of the probes.
- **Accurate and reproducible:** heater range between 20°C and 45°C with 0.1°C increments and a measurement range between 0°C and 50°C.
- **Multi-channel:** combine modules for a multi-channel system with software support for your ideal configuration.
- **Easily connectable:** analogue output (0-5V, BNC) real time data transfer included as standard for connection to data acquisition systems.
- **Reliable:** 2 year warranty.



SH02 and DRT4 – setup showing skin heater and laser Doppler monitor.

Heater Probes

A range of heating and temperature probes are available, including probes for temperature sensing only.

SHP1



The large area heater has a 10mm active diameter that can be rotated within a special holder to allow eight perfusion measurements (indexes at 45° intervals) to be made within the heated region of skin. These can be averaged to reduce variance of the flux, resulting from the spatial heterogeneity of the skin.

SHP2



Small digit heating probe. Used with flexible probe holder to closely fit fingertip. The small digit probe, 6mm active diameter is ideal for fingertip measurements or for use in conjunction with Moor Iontophoresis equipment.

SHP3



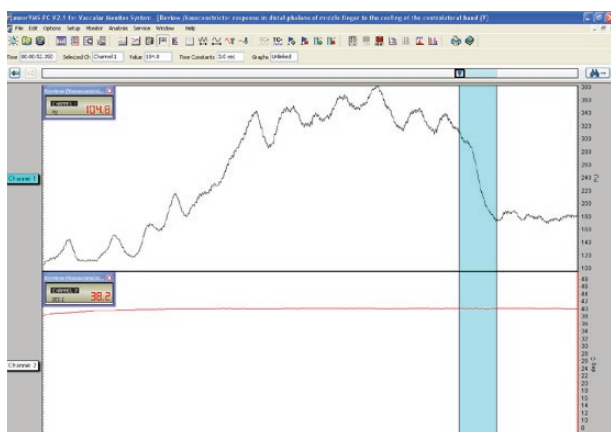
Clear heating probe to allow laser Doppler imaging of simultaneous heating and response imaging.

Applications

The SH02™ can be used both to regulate temperature for normal laser Doppler measurements and to study vascular responses to temperature changes. In addition higher target temperatures provide thermal challenge to investigate the reserve capacity of the vascular bed.

Contra-lateral Cold Challenge

Can be used to compare the sympathetic nerve response in normal and diabetic groups (Rayman G et al). The protocol combines warming of the subjects finger with cooling of the contra-lateral hand in chilled water. A healthy subject will exhibit a marked vaso-constriction, see graph below. Chilled water produces an extended vaso-constriction. The test can be used to assess the effect of sympathectomy.

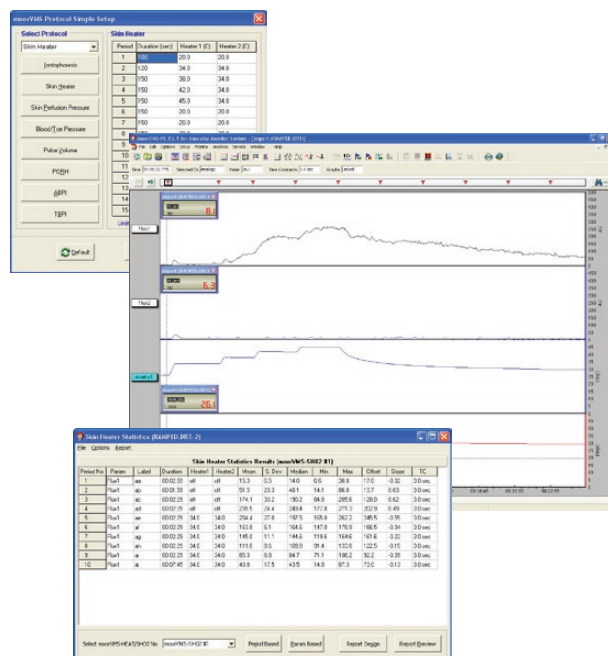


moorVMS-PC screen shot – laser Doppler response to local heating / contra-lateral cooling.

Maximum Vasodilation

MoorVMS-PC PC software allows the user to set a repeatable, multi-period challenge allowing temperature to be ramped gently to the maximum temperature point, thus avoiding discomfort for the patient. Analysis of the trace is provided via a single mouse click. In the example below, blood flow is measured at two adjacent sites – one heated in steps to 45°C, the other held at 34°C. A marked vasodilation is observed at the first site, with no response at the second. This type of challenge has found application in the assessment of peripheral arterial occlusive disease (PAOD), lower limb ischaemia as well as in defining aa level of amputation (Gebuhr P et al, Hvidovre and Bispebjerg Hospitals, Denmark).

SH02™ with moorVMS-PC



The moorVMS-PC PC software makes protocol setup and execution simple and reproducible. The skin heating protocol can be fully customisable offering control of both the SH02 and moorVMS-LDF. Analysis reports can be produced with a single click of a button and exported as a Adobe® PDF if required.

References

Gebuhr P, Jorgensen J P, Vollmer-Larsen B, Nielsen S L, Alsbjorn B. Estimation of Amputation Level With a Laser Doppler Flowmeter. J Bone Joint Surg (Br) 71-B; 514-7, 1989.

Rayman G, Williams SA, Spencer PD, Smaje LH, Wise PH and Tooke JE Impaired microvascular hyperaemic response to minor skin trauma in Type I diabetes. British Medical Journal 292, 1295-1298, May 1986.

Sandeman DD, Pym CA, Green EM, Seamark C, Shore AC, Tooke JE Microvascular vasodilation in feet of newly diagnosed non-insulin dependent diabetic patients. British Medical Journal 302, 1122-1123, May 1991.

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 SH02 is CE certified.

Temperature measurement

Range: 0 – 50°C.

Accuracy: SHP1 and SHP2 +/- 0.3°C (10°C - 45°C), +/- 0.5°C (outside), SHP3 +/- 0.5°C (0°C - 50°C).

Resolution: 0.1°C.

Temperature control

Range: 20°C (or ambient) - 45°C.

Resolution: 0.1°C (front panel and serial control), 0.5°C (analogue remote control).

Reliability

Assured by our two year warranty on all electronic products manufactured by Moor Instruments.

Outputs

7 Segment display providing display of temperature.

RS232 Interface for connection to PC.

Analogue outputs: BNC sockets, 0-5V.

General

Power source: Universal voltage, 100-230V AC, 55VA, 50 to 60Hz.

Dimensions W x H x D: 250mm x 265mm x 70mm.

Weight: 2.7kg.

Operating environment: Clinic or laboratory, excluding domestic.

Operating temperature: 15-30°C.



SH02 – front and back panels.

Classification

Medical devices directive 93/42/EEC: Class IIa, Active device for diagnosis. Type of protection against electric shock: Class I.

Degree of protection against electric shock: Type BF applied parts.

Protection against harmful ingress of water: SHP1 and SHP2 IPX0 (not protected), SHP3 probe head IPX7.

Not suitable for use in an oxygen rich atmosphere.

Not suitable for use in the presence of flammable anaesthetics.

Safety Standards

Complies with:

IEC 60601-1:1988 including Amendment 1, 1990 and Amendment 2, 1995
IEC 60601-1-2:1998.

SHP1

Height: 11.5mm.

Diameter (including rotating disc): 35mm.

Heating element diameter: 11mm.

Holder fixes to tissue with double sided adhesive discs (SHAD).

SHP2

Height: 11.5mm.

Diameter: 8mm to 10mm taper.

Heating element diameter: 6.5mm.

Fixes to tissue with flexible probe holder (PH1-V2) and double sided adhesive disc (PAD).

SHP1 & SHP2 lead length 2 metres. Both require VP12 type needle probe for laser Doppler measurement (not included).

SHP3

Height: 8mm.

Diameter: 36mm.

Imaging window: 20mm.

Fixes to tissue with double sided adhesive discs (IAD).

Moor Instruments reserves the right to change specifications without notice.



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