



# Multi-channel $tcpO_2/pCO_2$ and Blood Perfusion monitor

System 5000 is unique in permitting up to four channels of  $tcpO_2/pCO_2$  and laser Doppler in any combination.

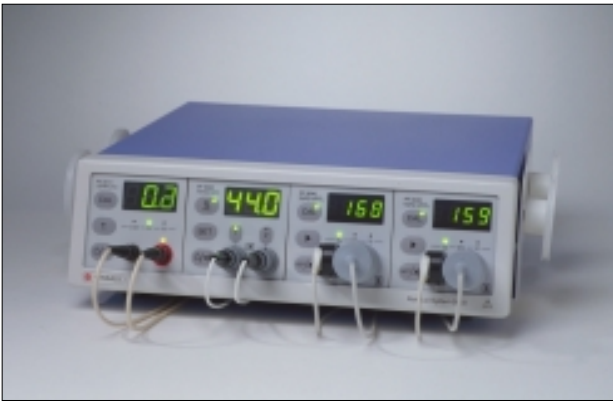


The microvascular status of a leg is being monitored by a four channel laser Doppler and Transcutaneous Oxygen monitor



# Blood perfusion measurements with laser Doppler

The PeriFlux System 5000 is the fifth generation of the Perimed PeriFlux instrument range for microvascular assessment. It is a compact, easy to use, multi-functional system that can incorporate up to four Function Units. The combination of  $tcpO_2$  /  $pCO_2$  and laser Doppler Function Units provides more information about tissue perfusion, oxygenation and metabolic function than the two methods individually.



PF 5001 Main Unit with one LDPM Unit, one Temp Unit and two  $tcpO_2$  Units.

## Laser Doppler perfusion measurements

Low power laser light is transmitted to the tissue via a fibre optic probe. The returning light is processed and the relative number and velocity of the blood cells in the tissue are calculated and presented as **blood perfusion**. Laser Doppler has been extensively used for tissue evaluation on skin and most other organs (see Perimed Literature Reference List containing more than 1300 research articles).

The technique has recently grown in importance in the diagnosis and treatment of hypoxia and ischaemia-related tissue disorders. Valuable information is provided for:

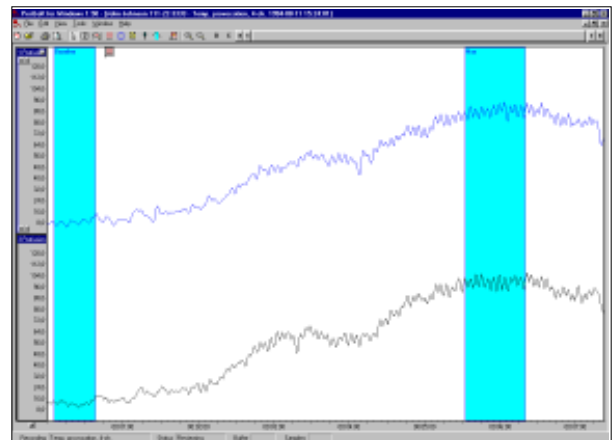
- Management of peripheral vascular disease
- Diabetes treatment
- Amputation level determination
- Monitoring therapy
- Plastic surgery (evaluation of flaps)
- Treatment of burns

## Wound healing

An excellent technique to assess the wound healing process is provided by the combination of  $tcpO_2$  /  $pCO_2$  and laser Doppler. The laser Doppler measures perfusion while the  $tcpO_2$  /  $pCO_2$  measures oxygenation and metabolic function of the tissue.

## Tissue perfusion capacity

To find the maximum perfusion capacity of a tissue, a combined laser Doppler and heat probe is used and the tissue is heated (e.g. 44°C). The perfusion change before and after the local heating is a measure of the tissue reserve capacity.



Wound healing assessment using a two channel laser Doppler and local heating of tissue to detect maximum dilatation.

## Accurate and reliable

The unique linearization function prevents underestimation in well-perfused tissue. Two-point calibration (using automatic zeroing and a special motility standard) ensures that all probes will provide accurate and reliable results for the best patient care.

## Simple to operate/Fast results

The probes are applied in seconds and results are obtained in minutes.

# Oxygenation and tissue metabolism

with  $tcpO_2$  /  $pCO_2$

Transcutaneous monitoring of oxygen and carbon dioxide, originally developed for neonatal use, is now used in a number of different applications, including vascular and wound care, plastic surgery, hyperbaric medicine and orthopaedic surgery.

## $tcpO_2$ / $pCO_2$ measurements

The technique is very easy to use and gives accurate, reliable measurements for tissue evaluation. It has now become a routine measurement in several clinical areas:

- Determination of peripheral vascular oxygenation.
- Quantification of the degree of peripheral vascular disease.
- Determination of the optimum level of amputation.
- Establishing the level of tissue hypoxia in venous disease.

## Multichannel system

$tcpO_2$  measurements usually require at least two or three sites to provide a good picture. The more sites that are assessed, the better the oxygenation picture.

The PeriFlux 5000 now offers the capability of measuring up to four sites on a patient from one instrument. This has several advantages over using individual single channel monitors, for example:

- Greater portability.
- Saves space.
- Easier identification of measurement sites.
- Less risk of damage to electrodes and monitors.
- Patient data from multiple sites easily downloads to a PC for storage, editing and print out of reports.



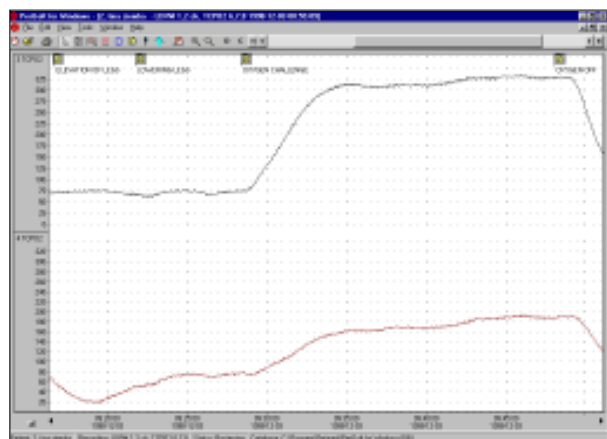
A four channel  $tcpO_2$  system

## Ease of use

The single point calibration is typically completed in less than three minutes, making it possible to save time and costs. Attachment of the electrode takes a few seconds using rings specially designed for patient safety and reliability of measurement.

## Superior sensor technology

The multichannel monitor utilizes Radiometer electrodes – well known for superior durability and reliability. The electrodes are safe for use in 100% oxygen at pressures of up to 4 atm.



Recording of a two channel  $tcpO_2$  system. Result of leg elevation and oxygen challenge. The upper trace shows the response from a healthy leg, while the lower trace shows a leg with vascular problems.

# Specifications

## PeriFlux 5001 Main Unit and 5002 Basic Main Unit

The **PeriFlux 5001 Main Unit** is provided with a solid state diode laser and can host up to four Function Units of different types. More channels are added using another Main Unit. The Main Unit has a digital output for connection to Perimed's PeriSoft software or a dedicated printer. It also has an analog output for connection to pen recorders or computer systems. Alternatively it can be used stand-alone, without external data acquisition systems.

The **PeriFlux 5002 Basic Main Unit** is equivalent to 5001, but is not provided with laser diode and can only host the Function Units PF 5020 Temp Unit and PF 5040  $tcpO_2$  /  $pCO_2$  Unit.

### Function Units

The Function Units are designed to meet specific needs in different applications. To optimize the system, the customer can choose the appropriate unit to meet particular requirements. Additional Function Units can easily be subsequently installed by the user.

#### PF 5010 LDPM Unit (Laser Doppler Perfusion Monitor)

For real-time microvascular perfusion measurements. The system uses the extensive PeriFlux System 4000 range of laser Doppler probes to allow measurements in virtually all tissues, invasive or non-invasive.

#### PF 5020 Temp Unit

For local heat provocation and/or temperature measurements. During a heat provocation the microvascular response is measured with the laser Doppler. This response indicates the maximum dilatation capacity of the tissue.

#### PF 5040 $tcpO_2$ / $pCO_2$ Unit

For measurement of transcutaneous oxygen and transcutaneous carbon dioxide.  $tcpO_2$  /  $pCO_2$  is measured from a combined electrode and  $tcpO_2$  from a single electrode. Calibration of the  $O_2$  electrode can be performed using atmospheric air. The  $CO_2$  electrode requires the use of a calibration unit.

#### Perisoft for Windows (95/98/NT)

Dedicated software for data collection, storage, analysis and printing. (See pamphlet)

#### Local Printer

For hard-copy documentation a printer can be connected.

### PeriFlux 5001 and 5002

Laser (only 5001)	Solid-state diode laser: 780 nm. Maximum power output at probe tip is 1 mW.
Classification	CE approved according to MDD 93/42/EEC, Electrical Safety Standard EN 60601-1, Class I EMC Standard EN 60601-1-2. Laser: EN 60825-1 Class 1 (CFR 1040.10 Class I).
<b>Output</b>	
Digital	RS-232 output to computer or directly to printer.
Analog	-10 to +10 V.
Mains	Selectable - 115 or 230 V. 50 or 60 Hz.
Power cons.	60 VA with four modules.
Dimensions	300 (W) x 320 (D) x 105 (H) mm.
Weight	8.6 kg with four modules.
Local Printer	DPU-3445, Thermal Printer, Seiko

### Function Units

<b>PF 5010</b>	<b>LDPM Unit</b>
	For one laser Doppler perfusion probe per unit.
Outputs	Perfusion and TB (Total Backscattered light).
Classification	Type CF.
Display	3 digit LED display.

<b>PF 5020</b>	<b>Temp Unit</b>
	For one or two Thermostatic Probes/Probe Holders/Measurement Sensors per unit.
Output	Measured Temperature at Probe/Sensor.
Heating Range	26-44°C; increments of 1°C. Accuracy $\pm 0.5^\circ C$ .
Sensor Range	30-40°C. Accuracy $\pm 0.3^\circ C$ , Repeatability $\pm 0.1^\circ C$ . 0-30°C and 40-50°C. Accuracy $\pm 0.5^\circ C$ , Repeatability $\pm 0.1^\circ C$ .
Classification	Type BF.
Display	3 digit LED display.

<b>PF 5040</b>	<b><math>tcpO_2</math> / <math>pCO_2</math> Unit</b>
	For measurement with one electrode per unit.
Output range	$tcpO_2$ : 0-1999 mmHg (0-267 kPa). $tcpCO_2$ : 0-200 mmHg (0-26.7 kPa).
Temp. settings	37-45°C in increments of 0.5°C.
Temp. accuracy	$\pm 0.1^\circ C$ .
Classification	Type BF.
Display	3.5 digit LED display.

### Accessories

<b>E5280</b>	Combination electrode $tcpO_2$ / $pCO_2$ solid state.
Response time	Typical $tcpO_2$ : 20 sec, $tcpCO_2$ : 50 sec.
Stability	Typically better than 1 mmHg/h.
<b>E5250</b>	Electrode $tcpO_2$ solid state.
Response time	Typical 20 sec.
Stability	Typically better than 1 mmHg/h.
<b>D280</b>	Membraning kit for $tcpO_2$ / $pCO_2$ electrode.
<b>D826</b>	Membraning kit for $tcpO_2$ electrode.
<b>D282</b>	Fixation kit for E5280/E5250 electrodes.
<b>TCC3</b>	Calibration Unit for $tcpO_2$ / $pCO_2$ .
<b>TC 510</b>	Calibration gas 20.9% $O_2$ and 5% $CO_2$ .
<b>TC 100</b>	Extension cable 6m for electrode E5280/E5250.
<b>PF 5840</b>	Remote Panel for $tcpO_2$ / $pCO_2$ including cable.
<b>PF 5810</b>	Remote Panel for LDPM and Heat incl. cable.