

Data Sheet – Skin Instruments

Dermal Torque Meter.

Proven method for evaluating stratum corneum elasticity, hydration and friction.

Easily adjustable for study of different skin layers.

PC controlled for simple operation.

Support for a range of methods using both constant and ramped torque protocols.

Windows application software featuring automated data analysis

Lightweight design for hand held or bench mounted operation.

Specifications.

The Dermal Torque Meter consists of a mechanical probe, a control unit that connects to a PC via RS232 serial line and a Windows application package, DTMWIN. The probe mass has been minimised for easy use in hand held operation and a counter balanced parallel arm is available as an accessory for bench mounted use and for maintaining a consistent downward force.

The torsional measurement of skin requires a central disk to be attached to the skin with adhesive tape. A concentric outer stationary ring is also attached with adhesive, so defining an annulus of skin under measurement. The mechanical properties of skin are determined by application of torque to the central disk and accurately measuring the degree of rotation using a RVDT device.

The gap between the central disk and the concentric stationary ring is of critical importance as this determines the depth of measurement in the skin. When measuring the upper layer of skin, maximum sensitivity is achieved by restricting the gap to 1mm and for studies of full skin thickness, this gap is increased to 5mm allowing the torsional forces to be applied to the deeper layers.

The instrument is operated by the DTMWIN PC applications program. This permits the user to specify torque protocols using either constant or ramped torque methods. Each protocol may be repeated for up to 20 cycles without removing the probe from the test site. The software displays and records data on the PC, and incorporates automated analysis.

Programmable Features

Torque Range: 1-30 mNm
 Protocol: Constant/ramp
 Ramp Resolution: 0.1mNm
 Protocol Duration: 1- 99 Sec
 Cycle repeats: 1 to 20

General Specifications

Torque Resolution: 0.1mNm
 Angular Sensor: 0-20 deg.
 Linearity 0.5%
 Angular Resolution: 0.02 deg.
 Central Disk: 20mm
 Ring Gaps 1,3,5 mm
 Data Acquisition: 300Hz

Erythema & Melanin Meter.

Unrivalled sensity and colour discrimination through a combination of a high intensity light source and narrow pass interference filters.

Pressure blanching avoided by use of a light weight fibre optic probe assembly.

Repeatable and consistent values by use of foot pedal when making measurements.

Surface reflection artefacts (shine) reduced due to superior optics in the probe design.

Description

The Erythema/Melanin Meter is designed to give an objective measure of changes in the two main chromophores of skin, namely haemoglobin & melanin. The original method for the erythema index measurement was published by Diffey *et al* ⁽¹⁾⁽²⁾ and subsequently this principle has been applied to the measurement of melanin.

Using a fibre optic assembly, the skin is illuminated with a powerful tungsten halogen source and the reflected and back-scattered light measured at several wavelengths by use of narrow pass interference filters. The selection of the wavelengths is specific for each chromophore, and for erythema, the wavelengths are in the red and green regions of the spectrum, with the red acting as a reference channel and green for measurement of the haemoglobin. For measurement of melanin, the reference channel uses light from the near infrared region and the measurement channel in the red part of the spectrum.

The results are expressed as an index calculated as a log based ratio given below:

$$\text{Erythema Index.} = \text{Log}_{10}\left(\frac{\text{reflected red light}}{\text{reflected green light}}\right)$$

$$\text{Melanin Index.} = \text{Log}_{10}\left(\frac{\text{reflected infra red}}{\text{reflected red light}}\right)$$

The use of the ratio as a measure of colour allows automatic compensation for changes in the specular reflection of the skin due to changes in the optical properties of the stratum corneum.

General Specifications.

Light Source: Tungsten halogen broad band.

Filters: Narrow pass interference (FWHM<9nm)

Erythema 546 & 632nm

Melanin 632 & 905nm

Probe: Remote fibre optic assembly with sensing diameter 5mm.

Display: LCD graphics display. Option of indices in real time or as averaged values .

Output: Serial data port.

Performance: Dynamic range -999 to +999. Threshold sensitivity x10 visual assessment.

Coefficient of variability 3%.

Power: 220/110v, 50/60Hz, 100W

Dimensions: Weight 3Kg Size 290 X 270 X 125mm.

Torsional Ballistometer

Hand held instrument for the determination of skin firmness and dynamic resilience

Small “foot print” to access difficult test sites.

Familiar Windows™ software and automated data analysis.

Description.

The Torsional Ballistometer consists of a slim line probe approximately 25 cm long and connected to a small control unit. The control unit has a serial output for connection to a PC. The instrument is supplied with PC application software, which is used to display data curves, manage files and carry out data analysis.

Probe Design.

The probe contains a rigid low mass arm suspended at its balance point on a torsion wire. A ruby tipped measurement stylus is fixed to one end, and the arm is activated by a solenoid that elevates the probe tip from the test surface. On release, the arm oscillates around its balance position and the stylus bounces repeatedly on the test site before coming to rest. An optical sensor monitors the position of the arm, and the positional data transmitted to the PC via the control unit.

The two main factors that influence the data are the energy of the impact force and the mechanical properties of the test site. The energy at impact is user selected by adjustment of the amount of torsion in the steel wire. This permits the instrument to be set for more superficial measurements such as for stratum corneum, or with higher energy levels for deeper structures. At any one setting the elevation and release of the arm generates a constant amount of kinetic energy so that the data is influenced only by the nature of the test site.

The probe maybe hand held, and may be used in any aspect because the energy required for the measurement is not generated from gravity, unlike most ballistometry measurements. In addition to being hand held, the probe may also be used in a bench mounted counter balanced arm accessory.

Control Unit.

There is a small control unit with input from the probe unit and a serial output for the PC. There is also a connector for a foot pedal to activate the measurement.

PC Software.

The instrument is supplied with PC applications software for Windows™. The user can view the graphical display and the numerical parameters, which are calculated automatically and displayed on the screen. The numerical values and all data points can be exported into .TXT files and transferred into industry standard spreadsheets such as Excel.

Numerical values for the following parameters are automatically calculated and displayed.

Indentation: The peak indentation depth of the probe tip below the skin level (skin datum).

K: The start height of the probe tip above the skin surface, which directly related to the energy stored in the torsion wire.

Alpha: The rate of energy damping.

CoR: Coefficient of Restitution

Area: The area under the curve above the skin zero datum.

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