



Pocket PEA

Rapid Screening Continuous Excitation Chlorophyll Fluorimeter

- ✔ Ultra-portable chlorophyll fluorescence measurement system
- ✔ Rapid screening capability with single button operation & storage of up to 200 full data sets
- ✔ Automatic calculation of parameters including Fv/Fm & OJIP analysis
- ✔ Robust enclosure with sealed, high intensity optics
- ✔ 100kHz sampling frequency with 16bit resolution
- ✔ Bluetooth wireless data transfer as standard
- ✔ Powerful Windows® data transfer & analysis software included



Hansatech Instruments

Hansatech Instruments is a small, British, scientific instrument company located in the heart of rural Norfolk. For over 40 years, our efforts have been concentrated towards the design & manufacture of high quality instrumentation for teaching and research in the fields of cellular respiration and photosynthesis. Our instruments are now in use in a wide range of programs in more than 100 countries throughout the world and have gained an enviable reputation for quality, reliability and excellent price/performance.

Overview

The Pocket PEA chlorophyll fluorimeter is suitable for teaching, research and a wide variety of commercial applications. The robust yet compact hand-held design provides ease of use and reliable operation.

Samples are conveniently dark adapted prior to measurement using the leafclips supplied. Easy single key operation fully automates the complete measurement process from data capture through to calculation and display of the key Fv/Fm and Performance Index (PI) chlorophyll fluorescence parameters. The rapid 1 second measurement capability and 200 measurement memory capacity make the Pocket PEA chlorophyll fluorimeter an invaluable tool in large plant screening programs.

The chlorophyll fluorescence signal received by the sensor during recording is digitised in the control unit using a fast 16 bit Analogue/Digital converter ensuring excellent precision and repeatability of results. The fluorescence signal is digitised at different rates dependent upon the different phases of the induction kinetic. Initially, data is sampled at 10µs intervals for the first 300 µseconds. This provides excellent time resolution of Fo and the initial rise kinetics. The time resolution of digitisation is then switched to slower acquisition rates as the kinetics of the chlorophyll fluorescence signal slow. This process provides excellent time resolution of the overall measurement whilst minimising the size of the data set and thus maximising memory capacity.

Bluetooth wireless transfer conveniently allows records to be transferred in the field from the Pocket PEA chlorophyll fluorimeter to a suitable PDA/IPAQ or PC for detailed review and analysis using our custom Windows® Mobile and Windows PC software.

The Pocket PEA optical interface is mounted directly on to the front of the Pocket PEA control unit. It consists of a single high intensity focused LED which is positioned vertically above the sample and provides up to 3500 µmol m⁻²s⁻¹ intensity with a peak wavelength of 627nm at the sample surface. The light emitted from the LED is filtered using an NIR filter to block any infra red content which could be seen by the detector (known as optical breakthrough). An optical feedback circuit monitors and corrects changes in the output intensity of the LED which are caused by internal heat build up in the LED itself. The circuit also compensates for intensity changes caused by variation in ambient temperature. The detector is a highly sensitive PIN photodiode and associated amplifier circuit. The optical design and filtering ensure that it responds maximally to the longer wavelength fluorescence signal and blocks the reflected shorter wavelength LED light used as the source of illumination. The entire optical assembly is sealed behind a clear glass window which creates a barrier against moisture and dirt which are inherent problems for field based instruments.

The latest Lithium Polymer battery technology ensures a full day of field usage and the convenience of rapid (<4hrs) recharge to full capacity using either the mains charger provided or an optional 12V DC vehicle charger.

Leafclips and Sample Dark Adaptation

The first step in the measurement process is to dark adapt the leaf with a small, lightweight leafclip. The clip has a small shutter plate which should be closed over the leaf when the clip is attached so that light is excluded and dark adaptation takes place.

During dark adaptation, all the reaction centres are fully oxidised and available for photochemistry and any chlorophyll fluorescence yield is quenched. This process takes a variable amount of time and depends upon plant species, light history prior to the dark transition and whether or not the plant is stressed. Typically, 15 – 20 minutes may be required to dark adapt effectively. In order to reduce waiting time before measurement, a number of leaves may be dark adapted simultaneously using several leafclips. Some users even make measurements at night, thus ensuring an adequate supply of readily dark adapted samples and zero waiting time!

Technical Specifications

Dimensions:	175 (l) x 75 (w) x 35mm (d). Weight: 250g
Communications:	Bluetooth wireless communications
Operating Conditions:	0 - 40°C. Non-condensing humidity
Battery:	Environmentally friendly (0% lead, cadmium mercury) lithium polymer 3.7V, 570 mAHr
Battery Charger:	Integral switch mode charger 8-13.5V input (nominal 12V input)
Display:	2 line x 12 character LCD display
Illumination:	Optically stabilised, focused, ultra-bright red LED with NIR short pass cut-off filters. Peak wavelength 627nm. Up to 3500 µmol m ⁻² s ⁻¹
Max. intensity: at leaf surface	
Detector:	Fast response PIN photodiode with RG9 long pass filter
Electronics:	High performance 16 bit microcontroller, 16 bit resolution A/D 10 µsec acquisition rate, 8 bit DAC for light source control, real time clock
Record Length:	1, 3 or 10 seconds
Memory:	512Kbits non-volatile memory. Sufficient for up to 200, 10 second duration recordings with full trace data

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