Hansatech Instruments

M-PEA

Multi-Function Plant Efficiency Analyser

- Advanced lab-based system for investigation of plant photosynthetic efficiency
- The only commercially available system for measurements of delayed chlorophyll fluorescence
- M-PEA-1 variant for prompt fluorescence & P700+ modulated absorbance measurements
- M-PEA-2 variant as M-PEA-1 with additional measurements of delayed fluorescence & leaf absorbtivity
- Sophisticated sensor unit with all optical emitters & detectors in a robust, enclosed housing
- USB2.0 communications via connection to a Windows® PC Comprehensive
- Windows® experimental design, data transfer & analysis software

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 M-PEA (Multi-Function Plant Efficiency Analyser) combines high quality fast fluorescence kinetic and P700+ absorbance studies with ground-breaking Delayed Fluorescence (DF) measurements providing one of the most comprehensive systems for the investigation of plant photosynthetic efficiency available.

The M-PEA is a laboratory-based measurement system consisting of a control unit and sophisticated, robust sensor unit housing all optical emitters and detectors for all measurement elements.

The system is controlled from a comprehensive Windows® software package (M-PEA+) which allows complex experiments to be designed, uploaded and executed by the M-PEA hardware. Recorded data is quickly downloaded to the software via a USB2.0 connection.

The control unit is of convenient size with minimal footprint allowing measurements to be made in a busy lab environment where bench space is critical. The front panel consists of a power switch and indicator LED, optical sensor connection and a 4 line LCD display. The rear panel provides input for a 12V DC power supply and a USB2.0 connection socket for interface to the M-PEA+ software running on a Windows® PC.

The optical sensor unit is a robust enclosure designed to incorporate sophisticated electronics which effectively controls all of the light sources and detectors. The M-PEA-1 sensor unit includes a high intensity red actinic source, a far-red light source, the prompt fluorescence detector and the modulated emitter/detector pair for P700+ absorbance measurements. M-PEA-2 additionally includes a high sensitivity delayed fluorescence detector and a detector to measure leaf absorptivity.

All the optics are located behind a quartz window which seals the sensor unit providing effective protection for the optical assemblies against dust, dirt and moisture.

M-PEA Variants

Capability	M-PEA-1	M-PEA-2
Prompt Fluorescence	✔	✔
P700+ Absorbance	✔	✔
Delayed Fluorescence	✘	✔
Relative Absorptivity	✘	✔

Technical Specifications

M-PEA Control Unit

Electronics:	1 x high performance 16 bit microcontroller, 1 x enhanced flash 8 bit controller, Dual channels: 1 x modulated, 1 x non-modulated, 16bit resolution A/D 10µs acquisition rate Dual 16 bit D/A light source, controller
Memory:	32 Mb internal memory storage
Display:	4 line x 20 character LCD
Recording:	Duration 0.001 - 300 seconds (repeatable up to 100 x per protocol)
Communications:	USB2.0 full speed (12 Mb/s)
Power:	12V @ 1A DC
Operating Conditions:	0 - 40°C
Dimensions:	230 (w) x 190 (d) x 85mm (h). Weight 1.4kg

M-PEA-1 Optical Sensor Unit

Illumination:	Sources Actinic: Focused ultra-bright LED with NIR short pass cut-off filter. Dominant λ 625nm. Spectral half-width 20nm. Max. intensity 5000 µmols m^{-2} s^{-1}. Far-red: Focused ultra-bright LED with long pass filter. Max. intensity > 1000 µmols m^{-2} s^{-1} P700+: Optically filtered pulse modulated 820nm LED. Intensity 0 - 100% in 1% steps.
Detectors:	PF: Low noise, fast response PIN photodiode with 730nm (± 15nm) bandpass filter. P700+: Low noise, fast response PIN photodiode with optical bandpass filter.

M-PEA-2 Optical Sensor Unit

Illumination:	Sources As in M-PEA-1 sensor unit
Detectors:	As in M-PEA-1 but with the additional: Delayed fluorescence: High sensitivity wideband avalanche photodiode with 730nm (± 15nm) bandpass filter. Leaf aborptivity: Low noise, fast response PIN photodiode