



PSP32

Monitoring Chlorophyll Fluorometer System



The next generation of plant stress probe, for monitoring large populations, automatically and remotely, over long time periods.



Automated, remote monitoring in the field, greenhouse or lab. Solar power option.

Measure large populations of plants using up to 32 measuring probes.

Access live data via WiFi user interface.

'Daylight dark adaption' probe with automated shutter, to allow quenching relaxation.

Blue and/or red actinic light for use with all quenching parameters and protocols.

Chlorophyll content measuring probes.



This system uses innovative design to allow measurement of the **full range of the latest and most utilised fluorescence parameters** (both light and dark-adapted tests), **quenching and quenching relaxation protocols**.

Daylight dark adaption module to measure:

- Fast reacting xanthophyll cycle/Exciton quenching (qE)
- Chloroplast Migration (qM)
- State Transitions (qT)
- Photoinhibition (qI)

10,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ square topped saturation flash or FM' correction option (Loriaux 2013)



Monitoring Fluorometer System Technical Specification

Light Adapted Parameters:

Y(II):	Quantum Yield of PSII (or $\Delta F/F_M'$ or Y)
Options for Y(II):	During daylight hours: Loriaux 2013 correction of ETR and FM' may be turned on/off
ETR:	Electron Transport Rate
PAR:	Photosynthetically Active Radiation Value
T:	Leaf Temperature
F _{MS} (or F _{M'}):	Maximal Fluorescence with actinic illumination using a saturation pulse
F:	Fluorescence under actinic light (prior to saturation pulse)

Dark Adapted Parameters:

F _v /F _{M'} :	Maximum Photochemical Efficiency of PSII
F _v /F ₀ :	More sensitive detector of stress than F _v /F _{M'} does not measure plant efficiency
F ₀ :	Minimum fluorescence
F _M :	Maximal fluorescence
F _V :	Variable fluorescence
F _{0'} :	Minimum fluorescence after exposure to far red light (with dark adaption module)

Quenching Parameters: Kramer fast quenching parameters **NPQ(T), q_E(T) & q_I(T)**
With red light measuring head only

Standard Quenching Protocols: **Hendrickson Quenching with NPQ**
Y(NPQ), Y(NO), Y(II), NPQ, F_v/F_M
Kramer Quenching
q_L, Y(NPQ), Y(NO), Y(II), F_v/F_M
Puddle Model Parameters
NPQ, q_N, q_P, Y(II), F_v/F_M

Quenching Relaxation Protocol: Optional, requires dark adaption module
q_E, q_M, q_T, q_Z & q_I

Rapid Light Curves: **rETR_{MAX}** - (Eilers and Peeters) a measure of a leaf's photosynthetic capacity or maximum ETR.

Light Sources:

Saturation Pulse Blue AND Red LED with: 7,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ with FM' correction option
10,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ with square topped flash

Modulated Light: Blue 455nm and with optional red LED 640nm - half band width 18nm
Actinic Light Source: Blue and with optional red light: up to 1,800 μmol .

Far-red Light Source: Optional, included with the daylight dark adaption option. Measures F_{0'}, or for pre-illumination of samples in the dark adapted mode.

Detection Method: Pulse modulation method

Detectors and Filters: A PIN photodiode with a 700 ~ 750nm bandpass filter.

Sampling Rate: Auto-switching from 1 to 10,000 points per sec., depending on test type and phase.

Test Duration: Indefinite; with solar power, battery power or mains current options.

Storage Capacity: 2Gb over 500,000 data sets

Special Algorithms: 8 point rolling 25ms average to determine FM, FM', F₀ & FS. Eliminates saturation pulse NPQ and electronic 'noise'.

Output: Comma delineated files may be opened in Excel. Data may be retrieved by WiFi, mobile phone, SD card, ethernet, USB stick, radio point-to-point or satellite phone (additional pricing for some options).

User Interface: Graphic, B&W, touch screen display, menu driven. Control box may be locked and pole-mounted.

Power Supply: External 12V batteries available upon request.
Solar and mains power options also.

Operating Temperature Range: -10°C to 50°C