



# OS5p



## Portable pulse modulated chlorophyll fluorometer

A compact, field portable, pulse modulated fluorometer offering exceptional experimental capabilities

- Robust field portable
- Widest range of testing protocols
- Reliable fluorescence data
- Large backlit colour display
- User-friendly
- 20 hours battery life



### Powerful research tool

The OS5p is a fourth generation OS portable Chlorophyll Fluorometer. It is the most powerful portable research fluorometer yet.

The OS5p employs the proven pulse modulation fluorescence technique, where a rapidly pulsing excitation light is used to induce a corresponding pulsed fluorescence emission. This fluorescence is measured by the OS5p at a longer wavelength than the

excitation light. The fluorescence intensity is measured and plotted against time. The sophisticated detection system distinguishes between the pulsed response and the non-pulsed response allowing both ambient light and dark adapted experiments to be performed.

Chlorophyll fluorescence can be used to measure most types of plant stress and also enables the detailed analysis of the photosynthetic process. The OS5p offers more testing protocols than any other portable chlorophyll fluorometer.

These experiments include fast tests such as Quantum Photosynthetic Yield  $Y(II)$  and  $F_v/F_m$  and longer analysis tests including both Puddle and Lake kinetic protocols.

### Changing the perception of modulated fluorometers

If you have a perception that sophisticated pulse modulated fluorometers always have to be bulky, heavy and complex to use, ADC BioScientific Ltd. would like to introduce to you the compact OS5p Field Portable Fluorometer.



## Truly field portable

The OS5p sets new levels in portability and performance for a modulated fluorometer.

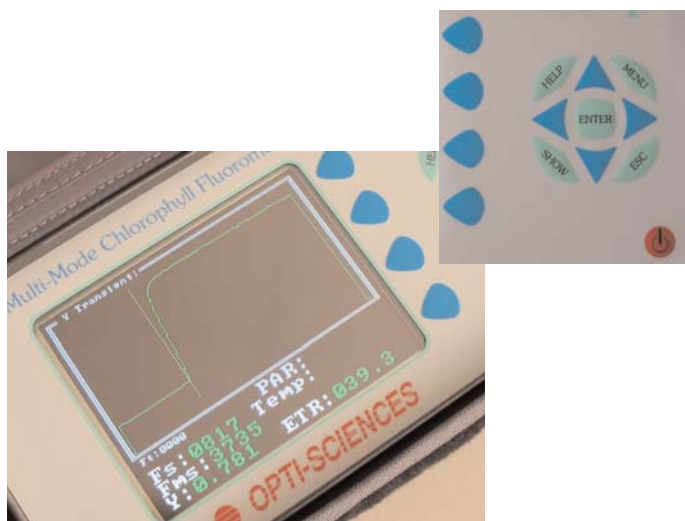
Weighing just 2.3kg, this robust battery portable system, offers up to 20 hours of continuous operation from a single charge.

The OS5p is supplied with a carry case and shoulder strap.

## User-friendly

Plant stress measurements are quick and easy to perform.

The OS5p has been designed to be very user-friendly. Full programming and operation is achieved by a series of multi-use soft keys presented on a large backlit touch screen. No separate PC is required. Calculated parameters and real time fluorescence transient curves are displayed on a daylight variable colour graphic display.



Data can either be stored in the large 1Gb internal memory, capable of storing thousands of test data sets and traces, or on removable SD memory cards.

The OS5p features USB and RS232 connectivity.

The OS5p is supplied as standard with an open body cuvette and 10 dark adaption cuvettes.



For simultaneous gas exchange and chlorophyll fluorescence the OS5p may be combined with the ADC LCi-SD or LCpro-SD portable photosynthesis systems.

## Innovative PAR Clip design

Both a Standard PAR Clip and a Universal PAR Clip are available as optional accessories.

### Standard PAR Clip

Recommended for accurate Yield Y(II) measurements



The Standard PAR Clip is designed for one hand operation. The underside opening mechanism prevents the weight of the fibre optic cable opening the PAR clip unexpectedly.

The clip features a miniaturised cosine corrected silicon PAR sensor and an accurate, non-damaging, long-life solid state leaf temperature thermistor.

An internal stable actinic light source is provided, as standard, to supply constant light levels (0-3000uE) .

As Yield Y(II) measurements can vary significantly with light level and temperature, it is recommended that the Standard PAR Clip be used when making Y(II) measurements in the field. This clip is also required in the determination of electron transport rate (ETR).

### Universal PAR Clip



The Universal PAR Clip features a removable shroud with additional far red and blue photo diodes for the fluorescence identification of stress induced flavanoids. This technique enables UVA and UVB screening and Nitrogen Deficiency Testing (FRFex360/FRFex440).

For convenience, the Universal PAR Clip features pistol grip and trigger.

Both the Standard and Universal PAR Clips are lightweight and constructed of anodised aluminum.

# Widest range of testing protocols More than any other portable fluorometer

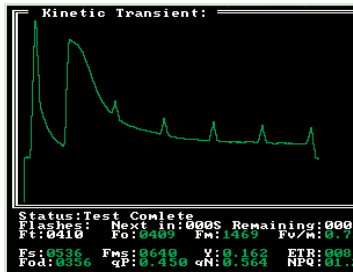
## Fast Tests

**Fv/Fm:** Photochemical efficiency or Maximum Quantum Yield. Robust and popular fast dark adapted measurement. Reduces with stress.



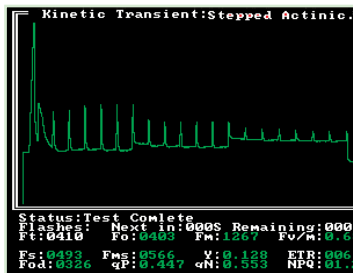
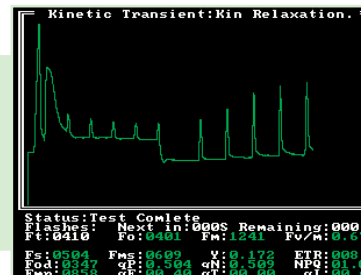
**Quantum Photosynthetic Yield Y(II):** Light adapted test allowing the measurement of PSII during photosynthesis. Sensitive for most types of plant stress. Reduces with stress. Improved accuracy of Y(II) using Fm' correction option for samples measured under high actinic light.

## Analysis Tests



**Kinetic test:** Advanced quenching analysis using Puddle and Lake measuring parameters. Ultra stable light source ensures accurate measurements. NPQ, qP, qN and Y(II). Kramer lake model Y(II), Y(NPQ), Y(NO), and qL Hendrickson lake model Y(II), Y(NPQ) Y(NO) and NPQ.

**Quenching relaxation test:** For light stress investigations and for studying plant photo-mechanisms. Photochemical and non-photochemical quenching. Both Puddle and Lake model parameters. qP, qN, NPQ, qE, qT & qL, Y(II). Kramer lake model Y(II), Y(NPQ), Y(NO), and qL, Hendrickson lake model Y(II), Y(NPQ) Y(NO) and NPQ.



**Light curves:** Steady state photosynthesis at different levels of light intensity. Generation of light response curves using ultra stable actinic light source.

**FRFex360/FRFex440:** Identification of stress induced flavanoids for Nitrogen deficiency testing. Fluorescence ratio distinguishes between nitrogen and sulphur stress.





For over 40 years ADC's name has been synonymous with plant physiology research, with an outstanding reputation for the manufacture and supply of truly field portable instrumentation.

The OS range of portable Chlorophyll fluorometers are proven to be reliable and innovative research tools.

The introduction of the OS5p maintains our "leaders in portability and ease of use" status.

ADC is committed to quality: "Quality of product and quality of service".

From design to delivery, ensuring optimal performance and reliability is of paramount importance to our team of experienced engineers. Once in the field you are supported by our network of over 30 customer support centres worldwide.

## Plant Stress Guide

Fluorescent measurement experiments exist to measure many types of plant stress, although some tests are more suited for a specific stress than others. To assist researchers, a Plant Stress Guide is available which lists the value and limitations of different types of measurement for different kinds of plant stress.

This very informative document has been compiled from worldwide published research independent of fluorometer brand.

**Plant stresses include:** Light, drought, heat, nutrient (including nitrogen), cold, over watering, herbicide, heavy metal and CO<sub>2</sub>.

Contact ADC BioScientific if you would like to receive a complementary copy of the Plant Stress Guide.



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## Parameters include:

**Y(II):** Quantum photosynthetic yield ( $F/F_m'$ )  
**F<sub>o</sub>:** Minimum fluorescence  
**F<sub>m</sub>:** Maximal fluorescence  
**F<sub>v</sub>:** Variable fluorescence  
**F<sub>v</sub>/F<sub>m</sub>:** Maximum photochemical efficiency  
**F<sub>od</sub>:** F<sub>o</sub> in light adapted state (F<sub>o</sub>')  
**F<sub>ms</sub> (F<sub>m</sub>'):** Maximal fluorescence under steady state conditions (F<sub>m</sub>')  
**F<sub>s</sub>:** Fluorescence signal prior to saturation pulse (F')  
**qP:** Photochemical quenching  
**qN:** Non-photochemical quenching  
**qL:** Photochemical quenching  
**NPQ:** Non-photochemical quenching  
**Y(NPQ):** Photoprotective heat dissipation  
**Y(NO):** Non-photoprotective heat dissipation  
**F<sub>t</sub>:** Current fluorescence readout  
**ETR:** Electron transport rate (with optional PAR sensor)  
**PAR:** Photosynthetic Active Radiation (with optional PAR sensor)  
**T:** Leaf temperature (with optional PAR sensor)  
**qE, qT, qI:** Quenching relaxation parameters  
**FRFex360/FRFex440:** Fluorescence ratio detecting nitrogen stress separately from sulphur stress (with optional Universal PAR Clip)

## Specifications

### Excitation sources:

**Saturation pulse:** Two adjustable sources both with 690nm filter.

Halogen 0-15,000  $\mu\text{mol m}^{-2} \text{s}^{-1}$ ,

**Modulating light:** Two channel 660nm and 450nm LED.

**Actinic light:** Adjustable sources.

LED 0-3,000  $\mu\text{mol m}^{-2} \text{s}^{-1}$ .

Halogen 0-6,000  $\mu\text{mol m}^{-2} \text{s}^{-1}$ .

**Far red:** Intensity adjustable 735nm LED.

**Detection method:** Pulse modulation.

**Detector:** PIN photodiode with 700-750nm filter.

**Modulation frequency:** 25 Hz to 1 MHz auto switched with phase of test and up to 1 million/second for OJIP determination.

**Test duration:** Adjustable 2 seconds - 16 hours.

**Data storage:** 1Gb internal memory for thousands of data sets and traces. Removable SD cards.

**Digital output:** Smart cards, USB & RS232.

**Display:** 320 x 240 super-twist LCD, with back light.

**Keyboard:** 4 software defined soft keys.

**Battery:** Rechargeable 71 Watt-hour Lithium-Ion cell providing up to 20 hours of continuous operation. Nickel metal hydride option also available.

**Dimensions:** 13cm x 23cm x 14cm

**Weight:** 2.3kg