



# MICROSCOPY-PAM: For probing of microscopic objects down to the single chloroplast

## DESCRIPTION

- The MICROSCOPY-PAM is an extremely sensitive non-imaging chlorophyll fluorometer specialized to measure smallest spots in microscopic specimen like tissue preparations or suspensions.
- Essentially, the fluorometer consists of a modified epifluorescence microscope equipped with a modulated LED light source and a photomultiplier for detection of modulated chlorophyll fluorescence.
- The MICROSCOPY-PAM system uses a Zeiss AxioScope.A1 epifluorescence microscope. By default, the microscope is equipped with a wide-aperture Zeiss Fluor objective with 20-fold magnification. Standard light source for fluorescence excitation is the blue Zeiss LED-Modul 470 nm.



## MICROSCOPY-PAM

### General Features

A special pulse modulation regime permits the use of the same LED module as source for measuring and actinic light as well as for saturation pulses. The use of other Zeiss LED modules emitting at different wavelengths in the UV-A and visible spectral range will be considered on customer request.

Chlorophyll fluorescence is detected by a photomultiplier mounted on a special detector-ocular of the microscope. The ocular is equipped with an iris diaphragm with which the field of view can be narrowed down. A special dichroic beamsplitter filter set serves for effective separation of broadband fluorescence emission ( $\lambda > 650$  nm).

Fluorescence excitation and detection are controlled by the PAM-CONTROL unit which allows stand-alone operation of the MICROSCOPY-PAM but can also function as a physical interface for computer-controlled operation of the system.

The PAM-CONTROL unit is delivered with WinControl V.2-Software for operation by Windows computers, an RS 232 cable, a USB-RS 232 adapter (in case that an RS-232 port is not available), a charger MINI-PAM/L, a cable to connect a chart recorder and a transport box.

# MICROSCOPY-PAM

## ACCESSORIES

### Micro Quantum Sensor MC-MQS

The MC-MQS is a pin-hole quantum sensor for assessment of quantum flux density of the blue excitation light in the object plane. This sensor has the dimensions of a specimen slide. It features a 0.2 mm pin-hole with a fluorescing diffuser and a blue-enhanced photodiode. A separate preamplifier is provided, from which the signal is transferred to the PAM-CONTROL unit. In this way, the effective PAR-values in the object plane at different settings of measuring light and actinic light intensities can be measured, stored and applied for calculation of relative electron transport rates (ETR).

### PAM-CONTROL

#### Universal Control Unit

- The PAM-CONTROL unit can conduct independently PAM fluorescence measurements but it can also act as physical interface between fluorometer and computer using WinControl V. 2 software.
- The PAM-CONTROL unit is specialized to operate various extremely sensitive setups for chlorophyll fluorescence measurements: the MICROSCOPY-PAM, the MICROFIBER-PAM and the WATER-PAM.
- Common to these three setups is the use of the same light-emitting-diodes (LED) as sources of measuring and actinic light, as well as for saturation pulses. Also, all setups use ultrasensitive photomultipliers: as a consequence, they are not suited for operation in the presence of non-modulated background light which would interfere with chlorophyll yield determinations.
- The capacity of data storage comprises 4000 data sets. An extensive menu provides full control of instrumental settings and a variety of measuring protocols.

## Contact info



### Monitoring MENA

Insight into instrumentations

**(962) 5353-2091**

PO Box 1100 Salt

Post Code 19110 JORDAN

[sales@monitoring-mena.com](mailto:sales@monitoring-mena.com)

[www.monitoring-mena.com](http://www.monitoring-mena.com)

## WinControl-3 Software : General Features and Graphical User Interface

- The WinControl-3 software represents the latest version of the WinControl software family. Presently, WinControl-3 operates the MONITORING-PAM, MINI-PAM-II, DIVING-PAM-II and JUNIOR-PAM fluorometers, PAM-CONTROL operated instruments (WATER-PAM, MICROSCOPY-PAM and MICROFIBER-PAM) as well as the Universal Light Meter ULM-500.
- Different from its predecessors, WinControl-3 can handle very long periods of data acquisition.

This Instrument is manufactured by our principle company

**WALZ - Germany**