



# PHYTO-PAM-II, Multiple Excitation Wavelength Phytoplankton & Photosynthesis Analyzer

## DESCRIPTION

PHYTO-PAM instruments facilitate measurements of mixed algae populations for analysis of chlorophyll content and photosynthetic performance of variously pigmented phytoplankton.

Deconvolution of the fluorescence responses of these phytoplankton groups is based on differences upon excitation with multiple excitation wavelengths. In contrast to the MULTI-COLOR-PAM fluorometer, where one of five colors can be applied at the time, with PHYTO-PAM devices different excitation wavelengths are applied quasi-simultaneously in form of  $\mu$ sec measuring light pulses with rapidly alternating colors.



## PHYTO-PAM-II

Miniature photomultiplier detectors enable extremely sensitive fluorescence detection down to a concentration of 0.1  $\mu$ g Chl/l as it can be found in natural surface waters or coastal seawater for standard PAM measurements like saturation pulse quenching analysis, determination of effective PS II quantum yield, light response curves and induction curves.

The PHYTO-PAM-II additionally features a fast kinetics mode for assessment of the wavelength-dependent absorption cross section of PS II,  $\sigma_{II}(\lambda)$ , from evaluation of the O-I1 kinetics and consequent estimation of wavelength-dependent absolute electron transport rates,  $ETR_{II}(\lambda)$ .

PHYTO-PAM-II chlorophyll fluorometers feature five measuring light wavelengths (440, 480, 540, 590 and 625 nm) for simultaneous excitation of four pigment groups of phytoplankton. The same five colors plus white are provided for actinic illumination and determination of wavelength-dependent absorption cross-section and wavelength-dependent electron transport rate.

# PHYTO-PAM-II

## ACCESSORIES

### Accessories for Add-on:

#### COMPACT Version

- Flow-Through Cuvette PHYTO-II/FT
- Stirring Device WATER-S
- Quartz Glass Cuvette WATER-K
- Universal Pump Control PHYTO-II/FT/I
- Stirring Paddles WATER-R

#### MODULAR Version

- Miniature Magnetic Stirrer PHYTO-MS
- Temperature Control Unit US-T

#### FIBER Version

- Quartz Glass Mixing Rod EDF-Q
- Mini Quantum Sensor US-MQS/B
- Perspex Mixing Rod EDF-P

### Two versions presently are available:

- COMPACT version: The complete measuring system contained in a single compact housing. Including Spherical Micro Quantum Sensor US-SQS/WB, which is prerequisite for calibration of the multi-color photosynthetically active radiation (PAR) and reliable quantification of electron transport parameters from fluorescence measurements. Can be equipped with a Flow-Through Cuvette.  
Accessory: Stirring Device WATER-S.  
Add-on: Flow-Through Cuvette PHYTO-II-FT,  
0-10 V Universal Pump Control PHYTO-II/FT/I
- MODULAR version: Emitter- and detector-units mounted on a separate optical unit with the possibility of exchanging detector filters.  
Requires Spherical Micro Quantum Sensor US-SQS/WB.  
Accessories : Miniature Magnetic Stirrer PHYTO-MS and the Temperature Control Unit US-T
- A FIBER version of the PHYTO-PAM is available with four wavelengths of excitation (470, 520, 645 and 665 nm) and one actinic light source (655 nm)
- FIBER version Control unit and compact emitter-detector box with a special fiberoptics forming the link to the sample. For periphyton and microphytobenthos measurements.
- A cosine corrected Mini Quantum Sensor US-MQS is available to measure photosynthetically active radiation (PAR) at the fiberoptics exit to calibrate the light list of the PHYTO-PAM

## Contact info



### Monitoring MENA

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## Application

### PHYTO-PAM-II

Multiple Excitation Wavelength Phytoplankton & Photosynthesis

### Analyzer

- PHYTO-PAM-II COMPACT version for the simultaneous assessment of photosynthetic performance of up to four differently pigmented algae groups in natural surface water

This Instrument is manufactured by our principle company

**WALZ - Germany**