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Find the *Walz XE-PAM* at our website: ***Click HERE***

XE-PAM Fluorescence Measuring System

a multi-purpose fluorometer with extreme sensitivity



The The XE-PAM Fluorometer is characterized by an extremely high measuring sensitivity and a broad range of possible applications. Like all PAM Fluorometers, its measuring principle relies on selective amplification of a fluorescence signal which is excited by very short, but intensive pulses of measuring light (Pulse-Amplitude-Modulation). By application of a xenon discharge lamp excitation wavelengths between UV and near-infrared are available which can be deliberately narrowed down with the help of suitable filters.

The XE-PAM Fluorometer consists of the following parts:

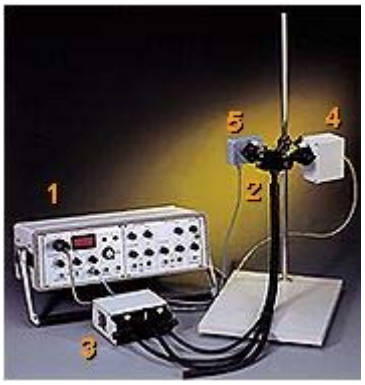
1) Main Control Unit, with the drivers for the measuring flash lamp and for three different actinic light sources, featuring a selective-window-amplifier (patented).

2) Optical Unit, with excitation and emission pathways arranged at right angle, based on 10x10 mm perspex (or quartz) light guiding rods.

3) Actinic Light Unit, featuring two miniature halogen lamps (for actinic illumination and saturation pulses) and a LED array cone (peak wavelength 660 nm). This unit connects to the Optical Unit via 4- or 5-armed fiberoptics.

4) Xe-Flash Lamp for measuring light, featuring a filter holder, which is directly mounted on the Optical Unit.

5) PIN-Photodiode Detector with pulse preamplifier, equipped with a filter holder, mounting on the Optical Unit.



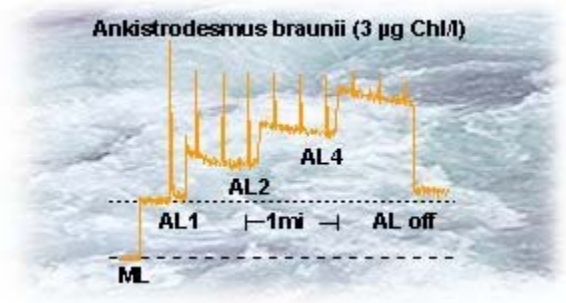
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Although the XE-PAM Fluorometer primarily has been developed for chlorophyll fluorescence measurements and assessment of photosynthesis in highly diluted suspensions, its range of applications extends to all investigations which require the assessment of small fluorescence signals with high selectivity, as e.g.:

- NAD(P)H fluorescence in isolated chloroplasts, intact cells and biochemical *in vitro* reactions;
- 9-aminoacridine fluorescence in isolated chloroplasts, for assessment of transmembrane proton gradient.

The XE-PAM Fluorometer is particularly well suited for the determination of phytoplankton in natural surface waters, as it allows to distinguish the fluorescence of active chlorophyll from irrelevant background signals. The effective quantum yield of the phytoplankton is determined with the help of a saturating light pulse (saturation pulse method). By varying the actinic background light intensity the light saturation properties can be assessed (see example of original recording beside).



The detection limit of active chlorophyll is below 0.1 µg/l, such that even low nutrient sea water can be reliably analyzed. The XE-PAM Fluorometer displays high flexibility with respect to the triggering of measuring flashes. These may be "free running" at 2, 4, 8, 16, 32 and 64 Hz or externally triggered as single pulses. Hence, a measuring flash may also be triggered at a defined dark-time following a saturating single-turnover flash or following onset of continuous illumination (pump-and-probe method). In this way, very rapid relaxation or induction kinetics in the µs-range can be resolved.

Based on these outstanding properties, the XE-PAM Fluorometer opens new ways not only in basic photosynthesis research, but also in numerous practical applications in plant physiology, limnology and oceanography.

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XE-PAM
Technical Specifications

Basic System

Main Control Unit XE-PAM

Measuring flash control: Modulation frequency 2, 4, 8, 16, 32 and 64 Hz or pump & probe; trigger output provided
Pump & Probe control: Delay times 0.05 ms, 30 ms and 500 ms; external trigger input provided
Signal control: 12 gain settings, 12 damping settings
Actinic light control: 12 intensity settings for red LED-array as well as for halogen lamp; illumination times adjustable from 0.1 s to 10 min in 4 x 10 steps, and continuous light; external trigger input and trigger outputs provided; Auto 64 Hz function
Saturation pulse control: 12 intensity settings; illumination times adjustable between 1 ms and 10 s in 4 x 10 steps, and continuous light; external trigger input and trigger outputs provided; Auto 64 Hz function
Actinic light/saturation pulse timer control: Select switch for actinic light/saturation pulses; timer intervals adjustable between 1 s and 10 h in 5 x 10 steps
Display: LED-display (red), 3 1/2 digits, character size 14 mm
Analog output: 0 to 10 V
Mains supply: Selectable 115/230 V AC, 50/60 Hz
Dimensions (with carrying-handle): 53 cm x 15 cm x 28 cm (W x H x D)
Weight: 7.9 kg

Xenon-Measuring Flash Lamp XE-MF

Flash Lamp: Type Hamamatsu L4641
Filter holder: For optical filters (standard 30 x 30 mm), up to 15 mm thick
Dimensions: 14 cm x 10.5 cm x 6.5 cm (L x W x H)
Weight: 750 g

Photodiode Detector XE-PD

Signal detection: PIN-photodiode 10 x 10 mm
Filter holder: For optical filters (standard 30 x 30 mm), up to 15 mm thick
Dimensions: 9.7 cm x 7.1 cm x 7.8 cm (L x W x H)
Weight: 350 g

Optical Unit ED-101US/M

Design: Black-anodized aluminum body with central 10x10 mm standard glass cuvette; for attachment of Xenon-Measuring Flash Lamp and Photodiode Detector at right angle; featuring quartz-glass-light-guide between Measuring Flash Lamp and cuvette; perspex-light-guide between cuvette and Detector Filter Box; three additional optical ports to attach Fiberoptics (101-F or 101-F5) and Miniature Magnetic Stirrer (optional); light-tight hood with injection hole
Mounting: On special Stand with Base Plate ST-101

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Weight: 1 kg

Major Accessories (optional)

Actinic-/Saturation Light Unit XE-AL

Design: Compact unit featuring two separate halogen lamps (for actinic light and saturation pulses) and a red LED-array
Halogen lamps: 8 V/20 W, blue-enriched, ranging from UV-A to NIR, max. 8500 µmol $m^{-2}s^{-1}$ PAR*) without filter, max. 6500 µmol $m^{-2}s^{-1}$ PAR*) with SP695 filter; IR-blocking filter permanently installed; filter holder for additional optical filters (standard 50 x 50 mm)
Red LED-array: 7 LEDs, 665 nm, max. 180 µmol $m^{-2}s^{-1}$ PAR*)
Dimensions: 18 cm x 8 cm x 16 cm (W x H x D)
Weight: 1.35 kg

*) Light intensity at fiberoptics exit

Four Armed Fiberoptics 101-F and Five Armed Fiberoptics 101-F5

Design: Flexible, plastic-covered special fiberoptics featuring four (five) single arms, the fibers of which are thoroughly randomized at the joint end facing the measuring site
Single fiber arms: 1 x 350 mm, active diameter 4.5 mm, outer diameter 10 mm; 1 x 350 mm, active diameter 8.5 (7.5) mm, outer diameter 15 mm; 1 x 500 mm, active diameter 4.0 mm, outer diameter 10 mm (101-F5 only); 1 x 500 mm, active diameter 4.5 mm, outer diameter 10 mm; 1 x 500 mm, active diameter 5.5 mm, outer diameter 10 mm
Measuring site: Active diameter 12 mm, outer diameter 14 mm
Mixing length: 400 mm
Total length: 930 mm
Weight: 580 (660) g

Specifications 101-F5 in brackets, if different from 101-F

Single Turnover Flash Unit XE-ST

Design: Xe-Pump Flash Control Unit XE-STC with separate Xe-Pump Flash Lamp XE-STL
Flash control: 10 intensity settings; max. flash frequency 1 Hz; flash width 1.5 µs at half-maximal intensity; external trigger input provided; trigger output with adjustable delay times between 10 µs and 10 s in 6 x 10 steps
Flash lamp: Type Hamamatsu L4633; filter holder for optical filters (standard 30 x 30 mm), max. 15 mm thick
Mains supply: Selectable 115/230 V AC, 50/60 Hz
Dimensions (W x H x D): XE-STC: 24 cm x 15 cm x 28 cm (with carrying-handle); XE-STL: 6.5 cm x 10.5 cm x 18.2 cm
Weight: XE-STC: 3.7 kg; XE-STL: 1 kg

Technical specifications are subject to change without prior notice

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