

MINI-PAM-II/POROMETER

Porometer

The MINI-PAM-II/Porometer is a new leaf-clip for the MINI-PAM-II. It combines measurements of stomatal conductance and chlorophyll *a* fluorescence for the assessment of PS II. As a lightweight, compact device, it is ideally suited for use in the field as well as in greenhouses and laboratories. Whether for rapid screenings, high-throughput stress evaluations, or detailed plant analysis with well-established protocols like induction-curves or light-curves, the MINI-PAM-II/POROMETER provides precise information about water evaporation and stomatal conductance of the sample. Together with chlorophyll-a fluorescence, these are two important aspects for describing the photosynthetic activity.



The porometer is equipped with:

- humidity sensors for the determination of H₂O evaporation of the leaf and ambient humidity
- leaf temperature sensor
- pressure sensors
- flow sensors and a very silent pump
- adjustable pressure of the closing mechanism
- a GPS-module for tracking the sample and sun position in field applications and determination of angle of sun-incidence on the leaf
- a sensor to measure photosynthetically active radiation (PAR) at leaf level with high accuracy, providing reliable light intensity data for electron transport rate (ETR) calculations
- a dark shield for easy determination of F₀/F_M and measurements with controlled actinic light intensities
- ambient CO₂-sensor to monitor ambient CO₂ levels which are of high interest in laboratory or greenhouse conditions

Specifications

Design: very compact leaf chamber with a circular 1 cm diameter sample area. One side is ventilated with air at adjustable flow velocity. The amount of water vapor released to the air flow is determined with high precision humidity sensors. The leaf temperature is measured by an IR-sensor located in the chamber bottom. GPS information is tracked by a build-in GPS receiver. A mini quantum sensor is positioned on the sample plane. Ambient CO₂ values are monitored by a CO₂ sensor facing the outside, at the lower left side of the porometer. For chlorophyll *a* fluorescence measurements a fiberoptics port aligns the MINI-PAM/F Fiberoptics at an angle of 60° relative to the measuring plane. Including tripod-mount.

Power supply: MINI-PAM-II leaf clip socket; The MINI-PAM-II: the 6 AA (Mignon) rechargeable batteries (Eneloop 1.2 V/2 Ah) provide power for more than 6 hours for typical experiments. The porometer alone can be operated for more than 9 hours at maximum flow. Easy battery swap possible.

Sample area: 1 cm diameter

Flow rates: 50; 75; 100; 125; 150; 175, or 200 $\mu\text{mol s}^{-1}$

RH sensor accuracy: typ. 20-70 %RH ± 1.0 %RH; <20 %RH and >70 %RH ± 1.5 %RH; $\Delta T = \pm 0.1$ °C

Pressure sensor accuracy: ± 0.1 kPa

Leaf temp. sensor accuracy: ± 0.3 °C, emissivity adjustable 0.1-1.0

Ambient CO₂ sensor accuracy: $\pm (30$ ppm, + 3 % of reading)

Flowmeter accuracy: $\pm (1.5$ % RD + 0.15 % FS)

GPS receiver accuracy: 2.0 m CEP (circular error probable)

Micro quantum sensor: LS-C sensor for selective PAR measurement, range 0 to 7000 $\mu\text{mol m}^{-2} \text{s}^{-1}$, cosine corrected for light incident at an angle between -30° to +30° from surface normal, internal preamplifier

Parameter: $g_{\text{H}_2\text{O}}$ $\text{mmol m}^{-2} \text{s}^{-1}$; $g_{\text{T}} \text{H}_2\text{O}$ $\text{mmol m}^{-2} \text{s}^{-1}$; $g_{\text{B}} \text{H}_2\text{O}$ $\text{mol m}^{-2} \text{s}^{-1}$; ambient H₂O ppm; dH₂O ppm; chamber pressure kPa, T_{Leaf} °C; Flow in/out $\mu\text{mol s}^{-1}$; VPD Pa/kPa; E $\text{mmol m}^{-2} \text{s}^{-1}$; PAR $\mu\text{mol m}^{-2} \text{s}^{-1}$; GPS-location; GPS-orientation; sun-inclination

Operating conditions: -5 to +45 °C; 0-90 %RH (non-condensing); 30-110 kPa

Cable length: 75 cm

Dimensions: 24 cm x 7.5 cm x 14 cm (max L x W x H)

Weight: 450 g (excluding cable)

