

# PMR-5 Steady State Porometer



***Built-in CO<sub>2</sub> analyzer and steady state porometer in one system***

The PMR-5 is a steady-state, continuous flow porometer designed to be used with our popular EGM-4 CO<sub>2</sub> analyzer. The EGM-4 supplies the power (internal, rechargeable 12V battery), measures the outputs from the porometer sensors, processes the results and then displays and records the data. The PMR-5 is a hand-held unit using an "open system" measurement of leaf transpiration. There is a mass-flow controlled air supply integrated into the cuvette with manual control of humidity up to ambient. The lightweight cuvette is designed to couple the leaf to the ambient temperature using a fan, heat sink and radiation shield. There is a stirring fan in the chamber to minimize the boundary layer resistance. Digital humidity and temperature sensors accurately monitor the air entering and leaving the cuvette. These are closely situated in the chamber with tortuous air paths to minimize the temperature difference between sensors. A sensor matching process eliminates errors due to sensor imbalance.



## Features

- Lightweight & field portable
- Steady state system
- Ergonomic leaf cuvette
- Built-in CO<sub>2</sub> analyzer
- Full datalogging & storage capability
- User friendly



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*Data Sheet*

## Technical Specifications

There is continuous calculation and display of the reference and chamber humidity, leaf temperature (energy balance), airflow rate, incident PAR (Photosynthetically Active Radiation) and stomatal conductance. The transpiration rate is also recorded.

Software is supplied to allow the transfer of data (ASCII) from the instrument to your PC.

All EGM-4 customers can easily and affordably add porometry to their research program by adding the PMR-5 leaf cuvette.

Contact PP Systems for details.

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### EGM-4 Environmental Gas Monitor

#### Analysis Method

Non-dispersive infrared, configured as an absolute absorptiometer with microprocessor control of linearization.

#### Measurement Range

CO<sub>2</sub>: 0-1,000 ppm ( $\mu\text{mol mol}^{-1}$ )  
0-2,000 ppm ( $\mu\text{mol mol}^{-1}$ )  
0-5,000 ppm ( $\mu\text{mol mol}^{-1}$ )  
0-10,000 ppm ( $\mu\text{mol mol}^{-1}$ )  
0-20,000 ppm ( $\mu\text{mol mol}^{-1}$ )

Custom ranges up to 100,000 ppm upon request.

Measurements are automatically corrected for temperature and pressure.

#### Accuracy

Better than 1% of span concentration over the calibrated range, but limited by the accuracy of the calibration gas mixture.

#### Linearity

Better than 1.0% throughout the range.

#### Stability

Automatic Zero at regular intervals, corrects for sample cell contamination, source and detector ageing and pre-amplifier gain changes.

#### Sampling Pump

Integral DC pump.

#### Air Filter

Filtered sample line (hydrophobic).

#### Calibration

Default value preset in factory (built-in initialization). Automatic calibration by keypad if required.

#### CO<sub>2</sub> Control

High and low set points.

#### Alarm

Audio alarm

#### Real Time Clock

Accuracy > 1 minute per month at 25<sup>o</sup> C, operating temperature 0-70<sup>o</sup> C. Automatic correction for month end and leap years.

#### Recording

Manual (by keypress) or automatic at user selected intervals between 1 and 250 minutes.

#### Data Storage

512K Battery backed RAM (1,000 records).

#### Response Time

Display/Analog Output: 1.6 seconds

#### Environmental Sensor Interface

Input available for use with external sensors (%RH, Temperature, PAR, etc.).

#### Analog Output

4-20 mA, 0-1V, 0-2V, 0-3V, 0-4V, 0-5V (Linear).

#### Digital (RS232) Output

9600 baud/8 data bits, 1 start bit/2 stop bits/ no parity. ASCII format.

#### Display

High contrast 2 x 16 character LCD.

#### Power Supply

12V, 2.0 Ah rechargeable lead acid battery. Up to 4 hours continuous operation. Longer times possible with external 12V battery.

#### Gas Connections

Two gas ports (inlet and exhaust) for use with 1/8" (.125) ID tubing.

#### Housing

High impact, aluminum enclosure.

#### Dimensions

18 cm (W) x 21.5 cm (H) x 6.3 cm (D)

#### Weight

1.5 kg. (including battery).

### PMR-5 Leaf Cuvette

#### Housing

Aluminum alloy.

#### Cuvette Head

Aluminum alloy with perspex/plexiglass radiation shield (minimize heat). A fan ventilated heat sink is fitted.

#### Cuvette Window

Coated glass interference filter that transmits largely below 0.7 microns (<50% transmission at 0.71 microns) to further decrease IR radiation on the leaf.

#### Humidity/Temperature Sensors

2 Digital CMOS sensors.

#### Calibration Accuracy

%RH: 2% (differential better than 1% by programmable sensor matching).

Temp: 0.5<sup>o</sup> C.

#### PAR Sensor

Fully cosine corrected PAR sensor (400-700nm).

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

Precision: 10  $\mu\text{mol m}^{-2} \text{s}^{-1}$

#### Air Supply

Miniature 6V rotary air pump (0-200 ml min<sup>-1</sup>)

#### Flow Control & Measurement

Mass-flow meter accurate to  $\pm 2\%$  FSD.

#### Input Humidity Control

From dry to ambient humidity by proportional diversion of the input air through a drying column.

#### Stomatal Conductance Measurement Range

0-9,999 mmol m<sup>-2</sup> s<sup>-1</sup>

#### Dimensions

Overall: 28.5 cm (L) x 2.3 cm (D)

Window: 5 mm (L) x 25mm (D)

#### Weight

0.44 kg.

*PP Systems is continuously updating its products and reserves the right to amend product specifications without notice.*