PRODUCT INFORMATION

# FluoreSens.10

Sun-Induced Chlorophyll Fluorescence (SIF) System


## Direct SIF Measurements for Accurate Ecosystem Insights

## Overview

The FluoreSens™10 offers a direct sun-induced chlorophyll fluorescence (SIF) measurement that can provide accurate estimates of gross primary production (GPP) and ecosystem respiration (RECO)—the two largest biospheric carbon sources. This system can be used on its own, or it can be paired with an eddy-covariance (EC) station. Additional applications include ground truth for satellite SIF measurements, crop and vegetative early stress detection and warning, and drought or fire risk monitoring.

Designed with the customer in mind, the FluoreSens 10 is a complete, ready-to-use system that provides excellent reliability and repeatability. By providing the highest-quality measurements, users can concentrate on this emerging area of science rather than worry about prototype units or if the measurements are valid. The FluoreSens 10 system comes with a high-resolution spectrometer covering the atmospheric O2A and O2B oxygen absorption bands, with an option of adding a second spectrometer that can be used for measuring vegetation indices. The measurement and operation of the FluoreSens 10 are controlled by a data logger program. As most flux sites employ data loggers for environmental and flux measurements, FluoreSens 10 measurements can be easily integrated with measurements from a suite of sensors and an EC system.

The Fluoresens 10 ships ready to mount to your existing infrastructure (such as a mast). Alternatively, you can use a tripod for mounting. The rugged environmental enclosure includes the proven CR1000X Measurement and Control Datalogger as the basis of the data-collection system, together with a thermoelectric cooler (TEC), spectrometer(s), and a power supply. You can mount the fiber-optic cable and rotating optical guide assembly on an existing or purchased outrigger arm as needed.

## Benefits and Features

- **Accurate net ecosystem exchange (NEE) partitioning with better GPP and RECO estimates**
- **Fiber-optic-rotating approach (critical for SIF signal retrieval) provides greater light path integrity**
- **Use of cosine corrector for vegetation observation to ensure optimum integration with EC measurement (i.e., greater SIF and EC flux footprint match)**

# Benefits and Features

- Data acquisition and operation based on data logger program that can be easily integrated with existing EC system
- Based on proven earlier work by Dr. Gu and ORNL[1,2,3]
- High-resolution spectrometer for SIF with option to add second spectrometer for vegetation indices measurement
- Complete system that is easy to install, calibrate, and operate
- Durable and protected for harsh environmental conditions
- Temperature-controlled housing for guaranteed stable operation

## Specifications

| | |
|---|---|
| System Description | SIF measurement |
| Operating Temperature Range | 0° to 50°C |
| 02A/02B Band Spectrometer | 650 to 800 nm (at resolution of 0.41 nm) |
| Optional Flame Spectrometer | 350 to 1,000 nm (at resolution of 1.3 nm) |
| Field of View (FOV) | 180° |
| Power Requirement | Mains powered 120 or 230 Vac, 150 W nominally |
| Enclosure Dimensions | 60.96 x 50.8 x 25.4 cm (24 x 20 x 10 in.) |
| Enclosure Weight | 22 kg (50 lb) |
| Weight of Fiber Optic Guide and Cable | 5 kg (10 lb) |

## Compatibility

Note: The following shows notable compatibility information. It is not a comprehensive list of all compatible or incompatible products.

### Sensors

- ✓ EC150
- ✓ EC155
- ✓ IRGASON

### Miscellaneous

- ✓ CPEC300 (retired)
- ✓ CPEC306
- ✓ CPEC310

## Detailed Description

### References


[1]Gu, L., Wood, J. D., Chang, C. Y., Sun, Y., & Riggs, J. S. (2019). Advancing terrestrial ecosystem science with a novel automated measurement system for sun-induced chlorophyll fluorescence for integration with eddy covariance flux networks. Journal of Geophysical Research: Biogeosciences, 124(1), 127-146.

[2]Chang, C. Y., Wen, J., Han, J., Kira, O., LeVonne, J., Melkonian, J., ... & Sun, Y. (2021). Unpacking the drivers of diurnal dynamics of sun-induced chlorophyll fluorescence (SIF): Canopy structure, plant physiology, instrument configuration and retrieval methods. Remote Sensing of Environment, 265, 112672.

[3]Chang, C. Y., Guanter, L., Frankenberg, C., Köhler, P., Gu, L., Magney, T. S., Grossmann, K., Sun, Y. (2020). Systematic assessment of retrieval methods for canopy far-red solar-induced chlorophyll fluorescence using high-frequency automated field spectroscopy. JGR Biogeosciences, 125, e2019JG005533.



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