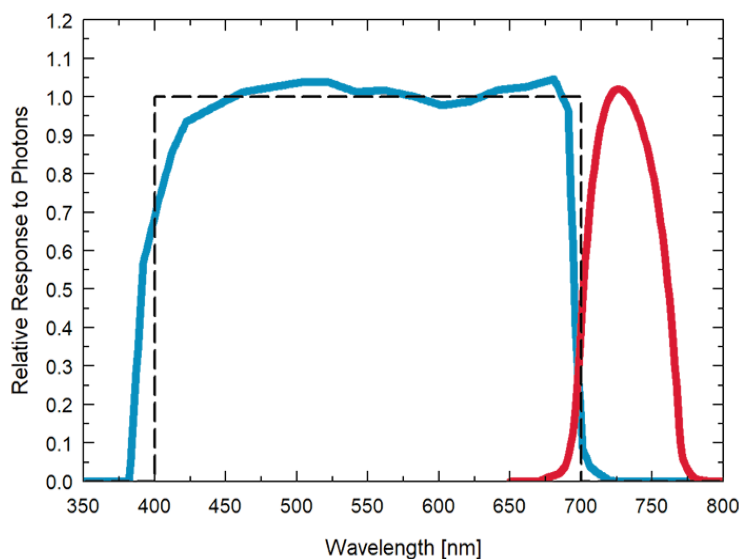


### Spectral Response



Spectral response of PAR detector (blue) and Far-red detector (red) compared to defined response of plants to radiation (dashed).

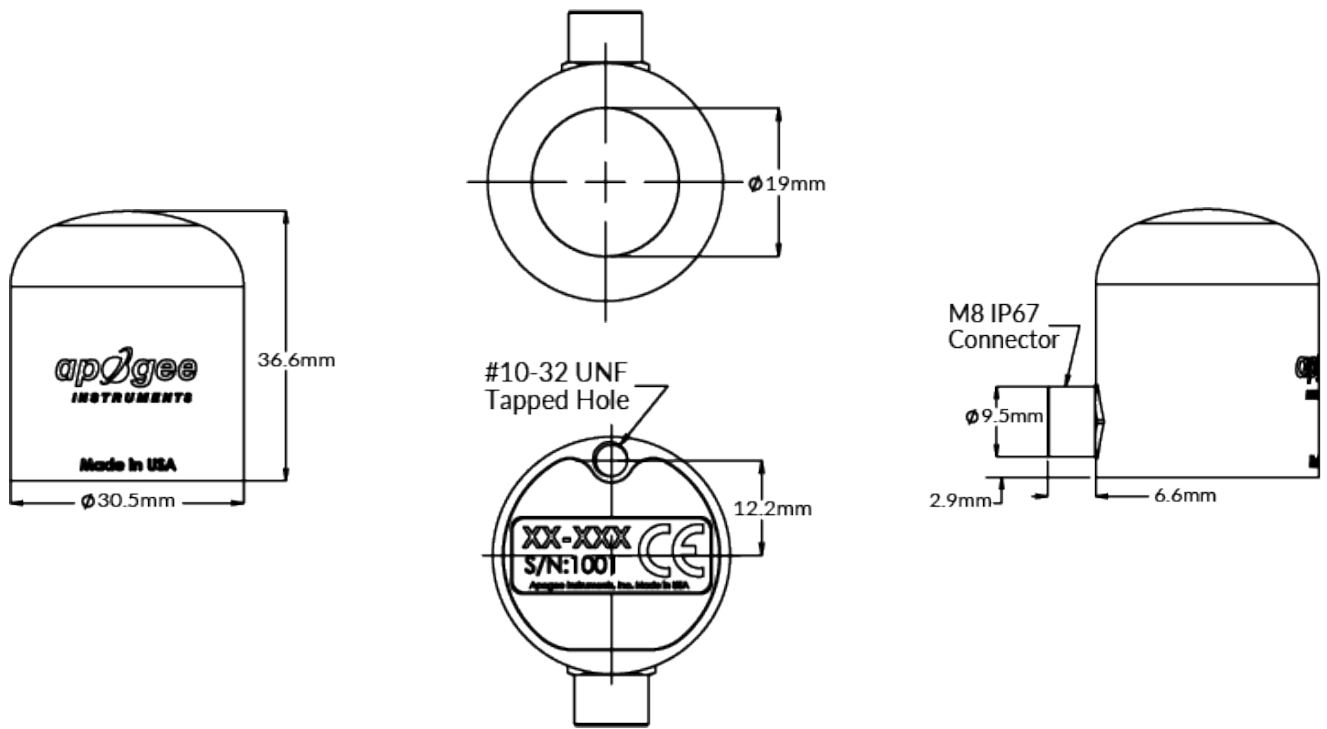
### Product Specifications

|  | S2-141-SS  | S2-441-SS                                     | S2-442-SS   |
|--|--|---|---|
| Power Supply                                   | Self-powered   | 5.5 to 24 V DC                                |   |
| Current Draw                                   | —  | 1.4 mA (quiescent),<br>1.8 mA (active)        | RS-232 37 mA;<br>RS-485 quiescent 37 mA, active 42 mA |
| Output (sensitivity)                           | 0.01 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$ (PAR)<br>0.03 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$ (Far-red)<br>[typical values, variable from sensor to sensor] | —   |   |
| Calibration Factor (reciprocal of sensitivity) | 60 $\mu\text{mol m}^{-2} \text{s}^{-1}$ per mV (PAR)<br>40 $\mu\text{mol m}^{-2} \text{s}^{-1}$ per mV (Far-red)<br>[typical values, variable from sensor to sensor]     | Custom for each sensor and stored in firmware |   |
| Calibration Uncertainty                        | ± 5 %  |   |   |
| Output Range                                   | 0 to 67 mV (PAR)<br>0 to 25 mV (Far-red)   | SDI-12  | Modbus  |
| Measurement Repeatability                      | Less than 1 %  |   |   |
| Long-term Drift                                | Less than 2 % per year   |   |   |
| Non-linearity                                  | Less than 1 % (up to 4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ ) (PAR)<br>Less than 1 % (up to 1000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ ) (Far-red)                     |   |   |
| Response Time                                  | Less than 1 ms   | Less than 0.6 s                               | —   |
| Field of View                                  | 180°   |   |   |
| Spectral Ranges (see graph)                    | 389 to 692 nm ± 5 nm (PAR)<br>700 to 750 nm ± 5 nm (Far-red)   |   |   |
| Directional (Cosine) Response                  | ± 2 % at 45°; ± 5 % at 75° zenith angle  |   |   |
| Temperature Response                           | Less than 0.1 % per C  |   |   |
| Housing  | Anodized aluminum body with acrylic diffuser   |   |   |
| IP Rating                                      | IP68   |   |   |
| Operating Environment                          | -40 to 70 C; 0 to 100 % relative humidity  |   |   |
| Dimensions                                     | 30.5 mm diameter, 37 mm height   |   |   |
| Mass (with 5 m of cable)                       | 140 g  |   |   |
| Warranty                                       | 4 years against defects in materials and workmanship   |   |   |

# Overview

The new Apogee PAR-FAR sensor is a research-grade tool for measuring both the traditional PPFD photosynthetic photon flux and separately quantifying the photon flux of far-red photons (700-760 nm). The outputs include the traditional quantum flux, the far-red photon flux, and the far-red fraction (far-red photon flux density / sum of PPFD and far-red photon flux density). This sensor quantifies far-red photons, and for many applications it reduces the need for a more complex measurement with a spectroradiometer.

## Dimensions



## Features

### TYPICAL APPLICATIONS

- Monitoring plant light environments
- Research plant morphogenic activity
- Photobiology studies

### KEY FEATURES

Digital SDI-12 output is standard with analog and Modbus options available. A domed diffuser promotes self-cleaning to minimize errors from dust and debris.

### HIGH QUALITY CABLE

Pigtail-lead sensors feature IP68, marine-grade stainless-steel cable connectors attached directly to the sensor head to simplify sensor removal for maintenance and recalibration.

