



## APOGEE ePAR SERIES

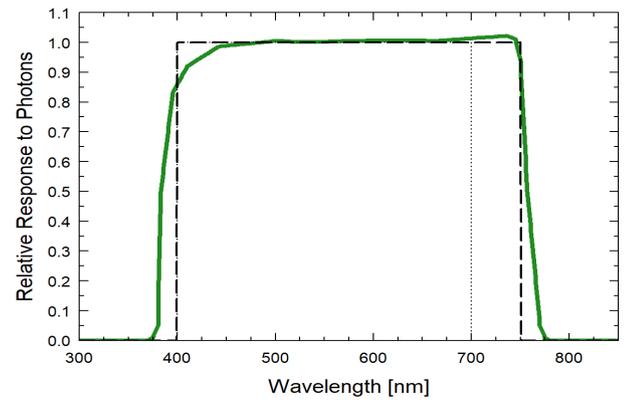
### MQ-610 & SQ-610 Series

SQ-610  
(sensor only)



MQ-610  
(meter and  
sensor)

### Spectral Response



Spectral response of the ePAR sensor (green) compared to the "ePAR" target response (dashed) and the traditional PAR response (dotted).

## Product Specifications

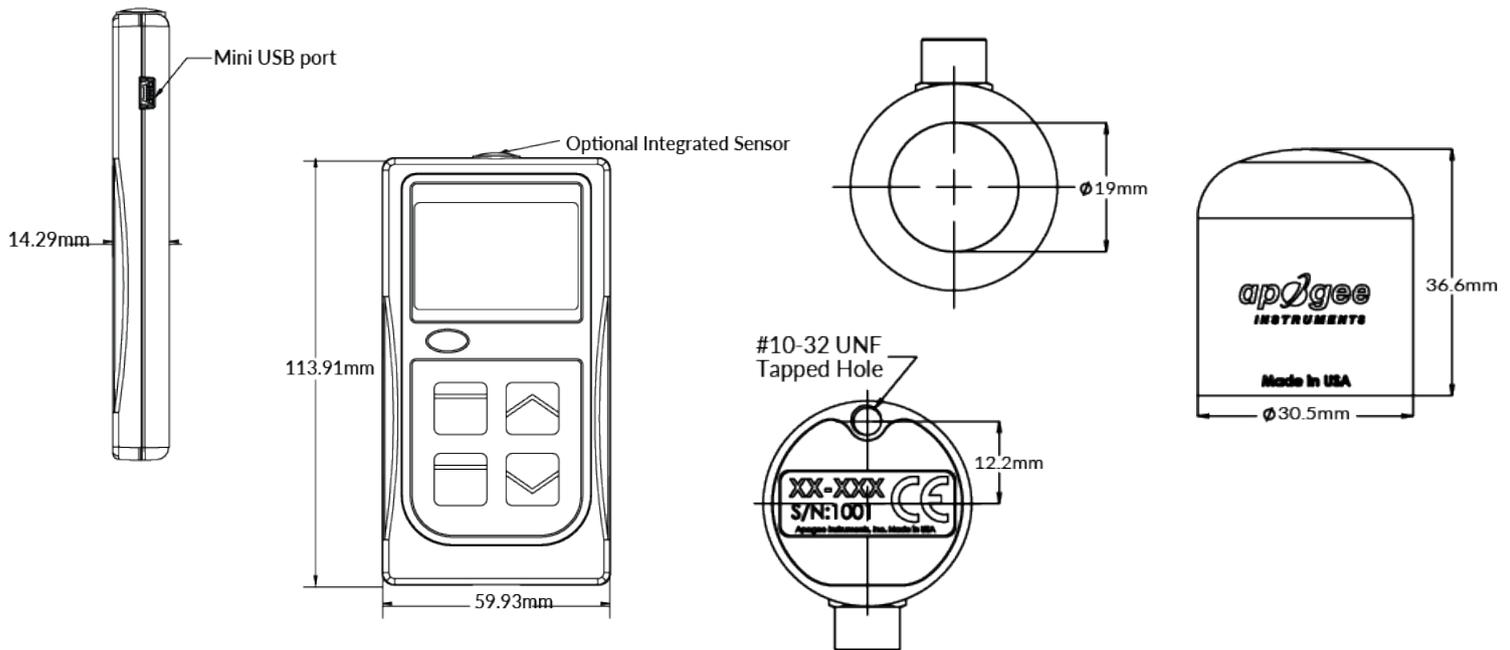
	MQ-610	SQ-610-SS	SQ-612-SS	SQ-614-SS	SQ-615-SS	SQ-616	SQ-617-SS	SQ-618-SS	
Power Supply	—	Self-powered	5 to 24 V DC	12 to 24 V DC	5.5 to 24 V DC	5 V USB	5.5 to 24 V DC		
Current Draw	—	—	at 12 V is 57 $\mu$ A	Maximum of 20 mA	at 12 V is 57 $\mu$ A	61 mA when logging	1.4 mA (quiescent), 1.8 mA (active)	RS-232 37 mA; RS-485 quiescent 37 mA, active 42 mA	
Sensitivity	—	0.01 mV per $\mu$ mol $m^{-2} s^{-1}$	0.625 mV per $\mu$ mol $m^{-2} s^{-1}$	0.004 mA per $\mu$ mol $m^{-2} s^{-1}$	1.25 mV per $\mu$ mol $m^{-2} s^{-1}$	—			
Output Type	—	0 to 40 mV	0 to 2.5 V	4 to 20 mA	0 to 5 V	USB	SDI-12	Modbus	
Resolution	—	—				0.1 $\mu$ mol $m^{-2}$ $s^{-1}$	—		
Calibration Factor	—	100 $\mu$ mol $m^{-2}$ $s^{-1}$ per mV	1.6 $\mu$ mol $m^{-2} s^{-1}$ per mA	250 $\mu$ mol $m^{-2} s^{-1}$ per mA	0.8 $\mu$ mol $m^{-2} s^{-1}$ per mV	Custom for each sensor and stored in the firmware			
Calibration Uncertainty	± 5 %								
Measurement Range	0 to 4000 $\mu$ mol $m^{-2} s^{-1}$								
Measurement Repeatability	Less than 0.5 %								
Long-term Drift	Less than 2 % per year								
Non-linearity	Less than 1 % (up to 4000 $\mu$ mol $m^{-2} s^{-1}$ )								
Response Time	Less than 1 ms						0.6 s	—	
Field of View	180°								
Spectral Range	383 to 757 nm ± 5 nm (wavelengths where response is greater than 50 % of maximum)								
Directional (Cosine) Response	± 2 % at 45° zenith angle, ± 5 % at 75° zenith angle								
Azimuth & Tilt Error	Less than 0.5 %	—						—	
Temperature Response	-0.11 ± 0.04 % per C								
Uncertainty in Daily Total	Less than 5 %	—						—	
Operating Environment	-40 to 70 C; 0 to 100 % relative humidity; sensor head can be submerged in water up to depths of 30 m; meter is not waterproof								
Dimensions	126 mm L, 70 mm W, 24 mm H	30.5 mm diameter, 37 mm height						—	



## Overview

The new Apogee ePAR (extended photosynthetically active radiation) sensor was created to measure the wider 400-750 nm radiation range that cutting-edge research is showing to be photosynthetically active, beyond the traditional 400-700 nm range defined by McCree. Most of this transformative work to refine and define the ePAR range is being conducted by Dr. Shuyang Zhen and Dr. Bruce Bugbee at Utah State University.

## Dimensions



## Features

### TYPICAL APPLICATIONS

- Total ePAR intensity measurements over plant canopies in all growing environments
- Monitor and adjust grow lights
- Research plant morphogenic activity
- Photobiology studies

### MULTIPLE OUTPUT OPTIONS

- 0 to 40 mV
- 0 to 5 V
- USB
- Modbus
- 0 to 2.5 V
- 4 to 20 mA
- SDI-12
- or hand-held meter

### ACCURATE, STABLE MEASUREMENTS

Cosine-corrected with directional errors less than  $\pm 5\%$  at a solar zenith angle of  $75^\circ$ . Long-term non-stability less than 2% per year.

### HIGH QUALITY CABLE

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

### CALIBRATION TRACEABILITY

Apogee Instruments SQ-600 series ePAR sensors are calibrated through side-by-side comparison to the mean of four transfer standard sensors under a reference lamp. The transfer standard sensors are recalibrated with a quartz halogen lamp traceable to the National Institute of Standards and Technology (NIST).

