



ALTA® Wireless PAR Light Meter

General Description

The ALTA® [Wireless PAR \(Photosynthetically Active Radiation\) Light Meter](#) monitors the ideal light wavelength plants need for photosynthesis. It monitors light presence or absence, measures light intensity, and records daily saturation levels that affect plant health and growth.

Key Features

- ▶ Measures Photosynthetic Photon Flux Density (PPFD) in $\mu\text{mol}/\text{m}^2/\text{s}$
- ▶ Range: 0 to 4000 $\mu\text{mol}/\text{m}^2/\text{s}$
- ▶ Resolution: 0.1 $\mu\text{mol}/\text{m}^2/\text{s}$
- ▶ Accuracy: +/- 6 %
- ▶ Produces a Daily Light Integral (DLI)
- ▶ Configurable thresholds for critical condition monitoring

Principles of Operation

The ALTA Wireless PAR Light Meter uses a blue-enhanced silicon photodiode to measure the specific wavelengths of light that plants need for photosynthesis based on a user-configurable time interval or Heartbeat.

The PAR Light Meter measures Photosynthetic Photon Flux Density (PPFD) in $\mu\text{mol}/\text{m}^2/\text{s}$. PPFD is the amount of PAR light (photons) that arrive at the plant's surface each second. The PPFD measurement is integrated throughout the day to produce the Daily Light Integral (DLI) in $\text{mol}/\text{m}^2/\text{day}$.

The PAR Light Meter resets the DLI accumulation at a customer-configurable time of day. On every Heartbeat, the meter's measurements are sent to the gateway, making the data available in iMonnit or another approved data service.

Example Applications

- ▶ Grow houses
- ▶ Greenhouses
- ▶ Growth chambers
- ▶ Outdoor growing environments
- ▶ Aquaculture
- ▶ Aquariums
- ▶ [Additional applications](#)

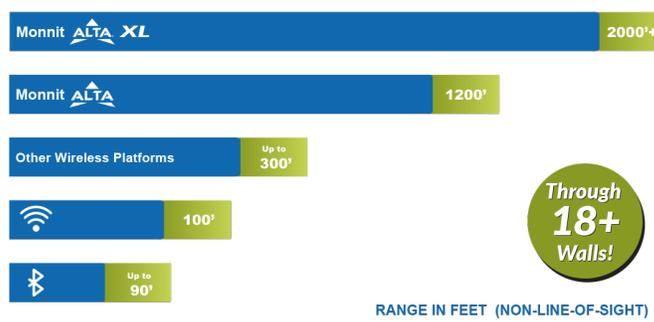
Features of Monnit ALTA Sensors

- Wireless range of 2,000+ feet through 18+ walls¹
- Frequency-Hopping Spread Spectrum (FHSS)
- Best-in-class interference immunity
- Best-in-class power management for longer battery life²
- Encrypt-RF® Security (Diffie-Hellman Key Exchange + Advanced Encryption Standard (AES)-128 Cipher Block Chaining (CBC) for sensor data messages)
- Sensor logs 2000 to 4000 readings if the gateway connection is lost (non-volatile flash, persists through power cycling):
 - 10-minute Heartbeats = ~ 22 days
 - 2-hour Heartbeats = ~ 266 days
- Automatic over-the-air updates to sensor firmware (future-proof)
- Free iMonnit Basic Online Wireless Sensor Monitoring and Notification System to configure sensors, view data, and send alerts via SMS text, email, and voice call

1 Actual range may vary depending on the environment and gateway.

2 Battery life is determined by the sensor reporting frequency and other variables. Other power options are also available.

Wireless Range Comparison



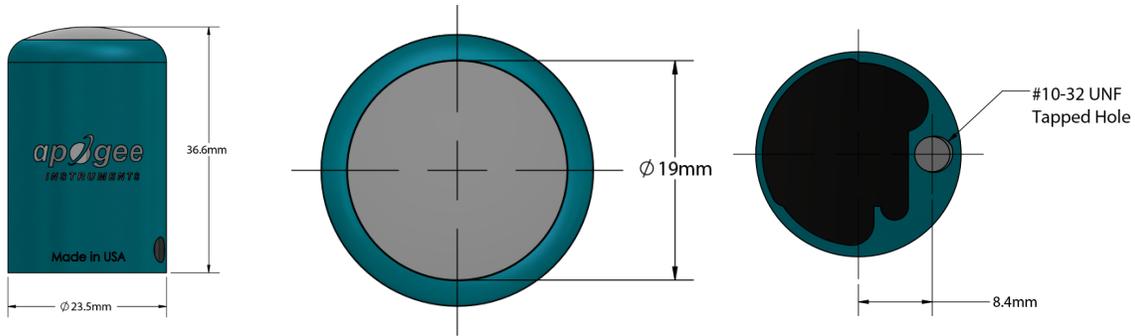
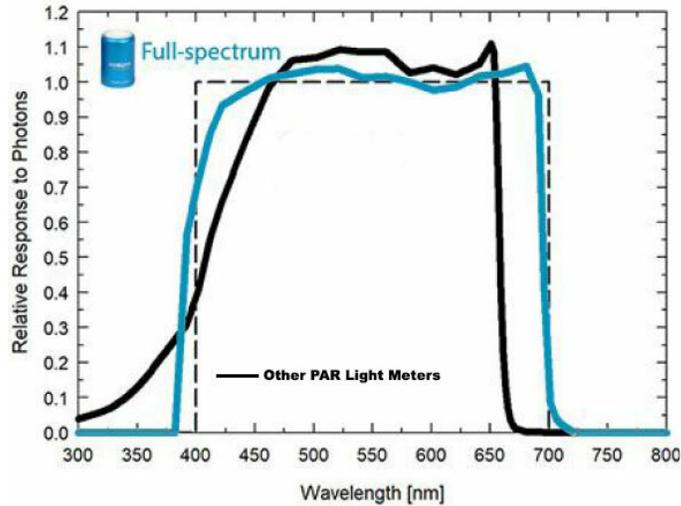
Technical Specification | ALTA® Wireless PAR Light Meter

Light Element	Element Type	SQ-500-SS from Apogee Instruments®
	Range	0.0 to 4000.0 $\mu\text{mol}/\text{m}^2/\text{s}$
	Resolution	0.1 $\mu\text{mol}/\text{m}^2/\text{s}$
	Dimensions	Diameter: 0.944 in. (24 mm) Height: 1.457 in. (37 mm)
	Response Time	Less than 1 ms ¹
	Repeatability	0.5 %
	Overall Accuracy	+/- 6% ²
	Long-term Drift	Less than 2% per year
	Field of View	180°
	Spectral Range	389 to 692 nm +/- 5 nm
	Azimuth and Tilt Error	Less than 0.5% each
	Temperature Response	-0.11 +/- 0.04% per °C ³
	Operating Environment	-40°C to 70°C (-40°F to 158°F); 0 to 100% relative humidity (RH); can be submerged in water up to depths of 30 m (Cable and Sensor Element)
	Cable General Composition	5 m of shielded, twisted-pair wire with TPR jacket (high water resistance, high UV stability, flexibility in cold conditions)
	Connector	IP-68 marine-grade stainless-steel keyed M8 6-pin connector ⁴
ALTA Wireless	Data logging	Sensor logs 2000 to 4000 readings if gateway connection is lost (non-volatile flash, persists through power cycling): 10-minute Heartbeats = ~22 days - 2-hour Heartbeats = ~266 days
	Wireless protocol	ALTA Proprietary Frequency-Hopping Spread Spectrum (FHSS)
	Wireless transmission power (EIRP)	50 mW (900MHz), 25 mW (868 MHz), 10 mW (433 MHz)
	Wireless range	2,000+ ft. through 18+ walls with the ALTA XL® Gateway
	Security	Encrypt-RF® (256-bit key exchange and AES-128 CTR)
General	Battery voltage range	2.0 to 3.8 VDC
	Operating altitude (non-pressurized environments)	-15.2 to 1,982 m (-50 to 6,500 ft) ⁵
	Storage altitude (non-pressurized environments)	-15.2 to 3,048 m (-50 to 10,000 ft) ⁵
	Operating humidity	5 to 85% RH (non-condensing)
	Certifications	900 MHz sensors: FCC ID: ZTL-G2SC1 and IC: 9794A-G2SC1 . 868 and 433 MHz sensors tested and comply with: EN 55032: 2015/A11:2020 ; EN 55035:2017/A11:2020 ; ETSI EN 300 220 V3.2.1 (2018-06) ; ETSI EN 301 489-3 V2.2.0. (2021-11) ; and ETSI EN 303 645 . All sensors tested and comply with: EN 61010-1 and EN 60950 and meet RoHS 2015/863 and REACH 224 (June 2022) , according to IEC 63000:2016/AMD1:2022 .



- Response time is less than 1 ms on the SQ-500-SS itself, but the response time is also limited by the configurable measurement interval on the sensor, which is as low as one second and is one minute by default.
- Accuracy is a combination of raw element accuracy, non-linearity, and voltage measurement accuracy by the Monnit sensor base. The sensor must be level to achieve this accuracy level.
- The temperature response is adjusted out when the temperature compensation configuration is turned on in iMonnit.
- The cable is only waterproof when connector ends are fully seated, and connector nut is completely hand tightened to engage o-ring seal in the connector.
- Operating and storage altitude without DC power supply is -30.48 to 9144 m (-100 to 30000 ft).

Light Element

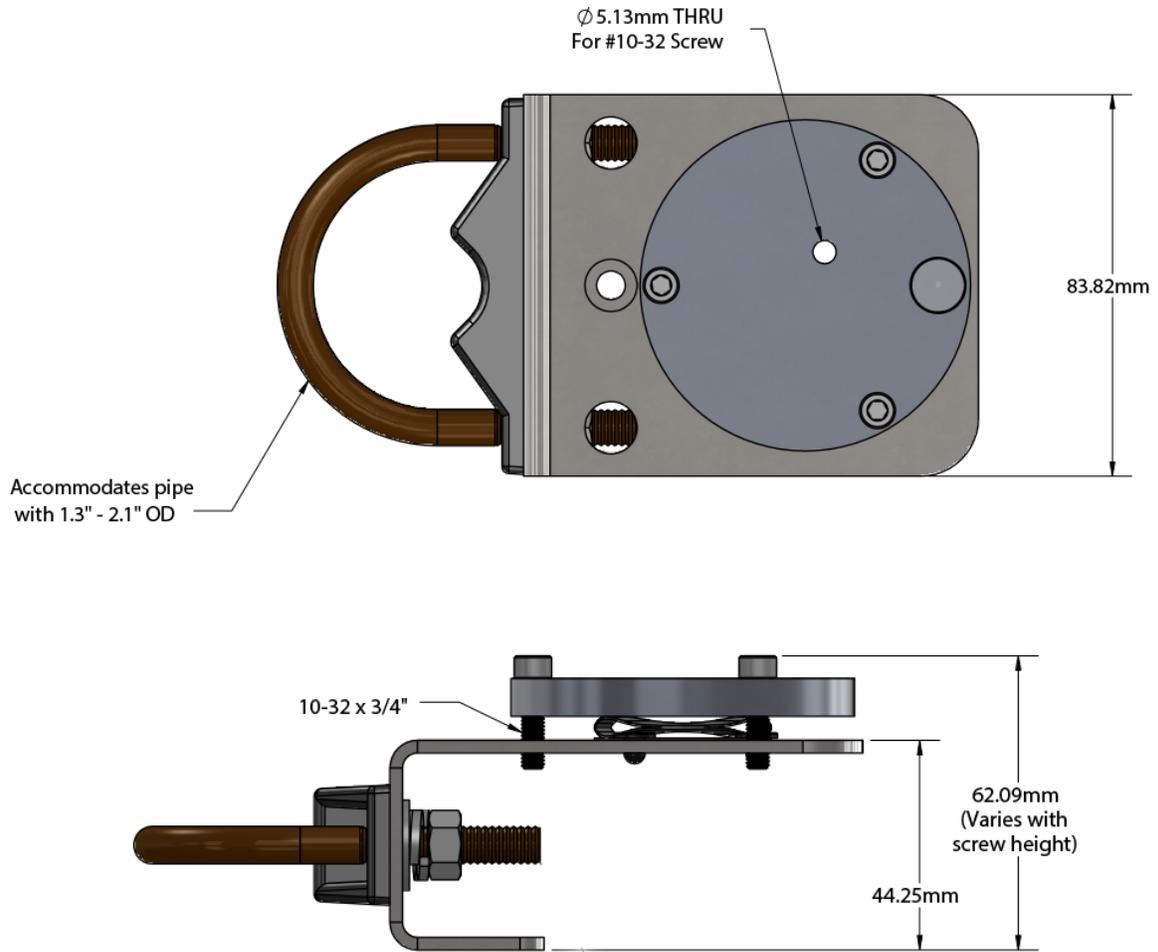


Sensor Data

<p>User Interface: PPFD: xxxx.x $\mu\text{mol}/\text{m}^2/\text{s}$ Light State: No Light, Light, Saturated DLI: xxxxxxx.xxx $\text{mol}/\text{m}^2/\text{day}$</p>	<p>Raw Data: (data type, conversion, units)¹ PPFD: unsigned int, raw / 10, $\mu\text{mol}/\text{m}^2/\text{s}$ Light State: unsigned char, 0 = No Light, 1 = Light, 2 = Saturated Temperature: signed int, raw / 10 (no UI), Celsius^{2,3} Raw Voltage: signed long, no conversion needed (no UI), μVolts^2 DLI: unsigned long, raw / 1000, $\text{mol}/\text{m}^2/\text{day}$</p>
PPFD Accuracy, Range, Resolution, Response Time	+/- 6 %, 0.0 to 4000.0 $\mu\text{mol}/\text{m}^2/\text{day}$, 0.1 $\mu\text{mol}/\text{m}^2/\text{day}$, Less than 1 ms
DLI PAR Accuracy, Range, Resolution	+/- 6 %, 0.000 to 10000.000 $\text{mol}/\text{m}^2/\text{day}$, 0.001 $\text{mol}/\text{m}^2/\text{day}$ ^{4,5}
Light State	Produces No Light, Light, or Saturated readings based on customer configurable light levels.
Temperature Accuracy, Range, Resolution, Response Time	+/- 1°C(1.8°F) , -40.0°C to 125.0°C (-40.0°F to 257°F), 0.1°C (0.18°F), 5+ minutes ⁶
Raw Voltage	Voltage directly from PAR sensor element in μVolts , not meant for direct use

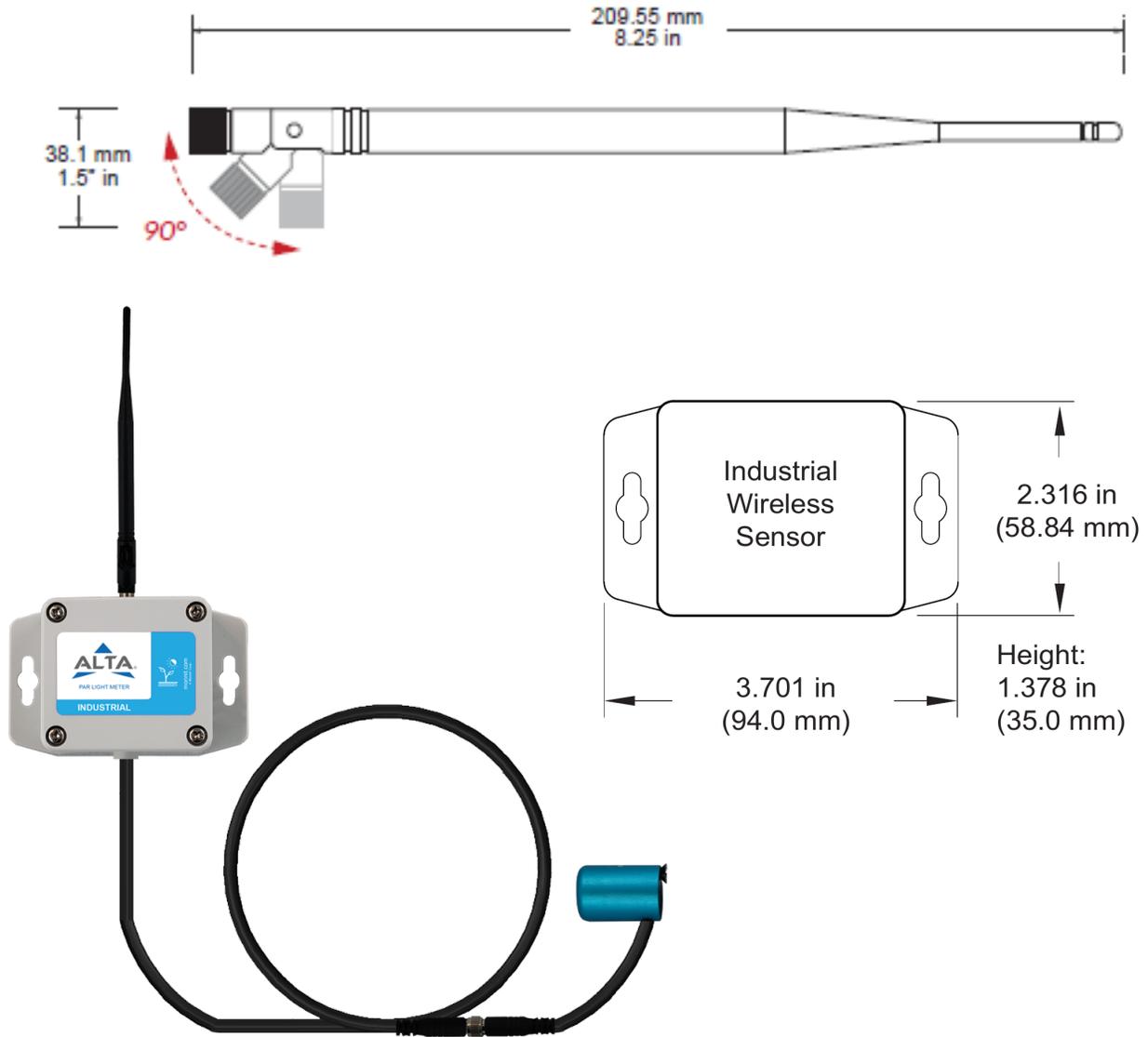
- Raw data refers to data as it comes directly from the Monnit sensor itself, not how it is represented in raw data exports from iMonnit. Raw data in iMonnit is already converted as indicated by "conversion."
- Data is not shown in the UI.
- The temperature element is housed inside a sealed sensor base, so it may not read the same temperature the sensor element is exposed to, or the temperature response time may be very long. Keep this in mind when using the temperature compensation configuration on the sensor.
- DLI range is numerically capable of exceeding 10000.0 $\text{mol}/\text{m}^2/\text{day}$ but is limited by the max PPFD readings, so only ~345.6 $\text{mol}/\text{m}^2/\text{day}$ is possible under normal conditions. $\text{DLI} = \text{PPFD} * \text{seconds in a day (86400)}$.
- DLI accuracy generally follows the accuracy of the PAR element. DLI accuracy will also vary based on measurement interval. The PAR Light Meter measures at a single instant in time and assumes that the value was present during the entire measurement interval. Closer to true DLI will be approached, the lower the measurement interval is set. Even with this approach, the DLI estimation can still be very close to true DLI.
- Temperature response time is very long because the temperature element is stored in a sealed sensor base, not the sensor element.

Mounting Bracket



Bracket Data	
Weight	14.8 ounces (420 g)
Features	Integrated bubble-level #10-32 threaded hole for mounting sensor

The meter reports Photosynthetic Photon Flux Density (PPFD) on the Heartbeat and the Daily Light Integral (DLI).



Technical Specifications | ALTA® Industrial PAR Light Meter

Battery	1x 3.6V AA Lithium Thionyl Chloride, 1500mAh, pre-installed
Battery Life	10+ years expected
Operating temperature range ¹	-25°C to 80°C (-13°F to 176°F)
Wireless antenna type	1/2-wave waterproof dipole with RP-SMA connector and swivel neck; dBi of 3.0 (900/868MHz) or 2.5 (433 MHz); length of 8.27" (210mm) (900/868MHz) or 7.68" (195mm) (433 MHz); diameter at thickest point of 0.55" (14mm)
Weight	9.4 ounces (266g)
Enclosure rating	NEMA 1, 2, 4, 4x, 12, and 13 rated, sealed, and weatherproof
UL rating	UL Listed to UL508-4x specifications (File E194432)

1. Operating below 0°C (32°F) degrees will reduce battery life.

Commercial-Grade Sensors

Monnit commercial-grade sensors are designed for applications in ordinary environments (normal room temperature, humidity, and atmospheric pressure). Do not use these sensors under the following conditions as these factors can deteriorate the product characteristics and cause failures and burnout.

- Corrosive gas or deoxidizing gas: chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas, nitric oxide gas, etc.
- Volatile or flammable gas
- Dusty conditions
- Low-pressure or high-pressure environments
- Wet or excessively humid locations
- Places with salt water, oils, chemical liquids, or organic solvents
- Where there are excessively strong vibrations
- Other places where similar hazardous conditions exist

Use these products within the specified temperature range. Higher temperatures may cause deterioration of the characteristics or the material quality.

Industrial-Grade Sensors | Type 1, 2, 4, 4X, 12, and 13 NEMA-Rated Enclosure

Monnit's industrial sensors are enclosed in reliable, weatherproof NEMA-rated enclosures. Our NEMA-rated enclosures are constructed for both indoor or outdoor use and protect the sensor circuitry against the ingress of solid foreign objects like dust and the damaging effects of water.

- Safe from falling dirt
- Protects against wind-blown dust
- Protects against rain, sleet, snow, splashing water, and hose-directed water
- Increased level of corrosion resistance
- Will remain undamaged by ice formation on the enclosure



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