

Light Spectrum Sensor with Holder



This 11-channel sensor measures light spectral distribution and calculates five color-derived metrics, PAR and PAR plus far-red values. Sensor is designed to deliver the data crucial for optimizing horticultural lighting, including LED fixture health monitoring and closed-loop plant illumination control. This device, belonging to the PRO sensor series, includes Aranet Sub-GHz ISM band radio which wirelessly transmits sensor measurements to the Aranet PRO base station.

Product numbers

Product number	Radio band	To be used in
TDSKSP01	EU868	European Union
TDSKSPU1	US920	United States of America, Canada, South America, Australia, New Zealand
TDSKSPU1	AS923	BRN, KHM, HKG, IDN, LAO, TWN, THA, VNM, MYS, SGP
Not available	JP923	Japan
Not available	KR923	South Korea

Metrics

Following derived metrics are calculated from spectral data obtained by an 11-channel sensor. Measurement data are subject to the relative spectral sensitivity, irradiance measurement accuracy, cosine response, and other characteristics of the spectral channels. Data are available in photon flux density units of $\mu\text{mol m}^{-2} \text{s}^{-1}$.

Colors

Color	Blue	Green	Red	Far-red	Near-infrared
Spectral range (nm)	400–500	500–600	600–700	700-800	800–900
Range ($\mu\text{mol m}^{-2} \text{s}^{-1}$)	0–1000	0–1000	0–1000	0-1000	0–1000
Resolution ($\mu\text{mol m}^{-2} \text{s}^{-1}$)	1	1	1	1	1

Photosynthetically active radiation (PAR)

Spectral range	400–700 nm
Range	0–4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Resolution	1 $\mu\text{mol m}^{-2} \text{s}^{-1}$

- PAR value may differ by up to $1 \mu\text{mol m}^{-2} \text{s}^{-1}$ from the sum of the blue, green, and red color values due to rounding of each spectral band to integer values.

Photosynthetically active radiation plus far-red (PAR+FR)

Spectral range	400–800 nm
Range	0–5000 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Resolution	1 $\mu\text{mol m}^{-2} \text{s}^{-1}$

- PAR+FR value may differ by up to 2 $\mu\text{mol m}^{-2} \text{s}^{-1}$ from the sum of the blue, green, red and far-red color values due to rounding of each spectral band to integer values.

Accuracy

- Sensor accuracy depends on the spectral distribution and intensity of the light source. Ratio measurements, such as color/PAR and color/(PAR+FR), provide the most consistent accuracy. Absolute values may vary depending on the light source, particularly when parts of the spectrum have low intensity, sharp spectral peaks, or other characteristics that cannot be fully resolved by the sensor measurement channels. The specified accuracy values are representative for most typical plant growing applications.
- The measurement accuracy applies for the light intensity above 30 $\mu\text{mol}/\text{m}^2/\text{s}$ for spectrum range.
- Accuracy ranges were determined using nine channel Heliospectra Dyna C9 LED fixture and natural sunlight.

Accuracy	Ratio of color/PAR	Ratio of color/(PAR+FR)	Absolute values
Blue	±5 %pt	±5 %pt	±10 %
Green	±5 %pt	±5 %pt	±10 %
Red	±5 %pt	±5 %pt	±10 %
Far-red	-	±5 %pt	±10 %
Near infrared	-	-	±20 %
PAR	-	-	±10 %
PAR plus far-red	-	-	±10 %

General specifications

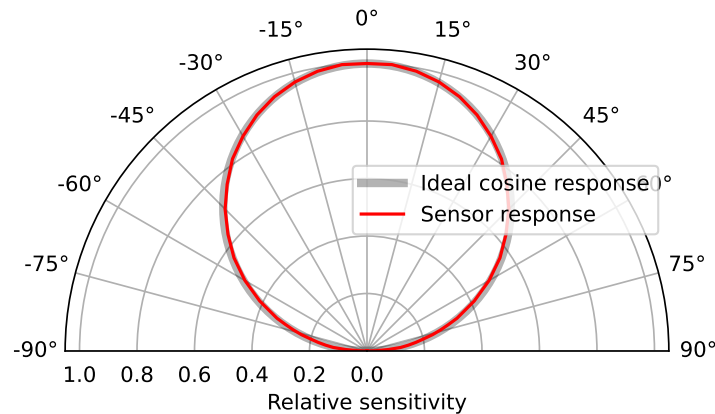
Ingress protection rating	IP68	
Operating temperature range	-30–60 °C	-22–140 °F
Operating relative humidity range	0–100 %	
Dimensions	∅35×117 mm	∅1.38×4.60 in
Weight (incl. battery)	80 g	2.8 oz
Enclosure material	ASA plastic, aluminium	
Power supply	1 pc AA battery	
Packaging includes	1 pc AA alkaline battery, holder w. mounting and leveling function	

Spectral measurement performance

Spectral channel response is factory-calibrated for accurate irradiance measurements, requiring no additional calibration or data processing by the user. The following data is provided for completeness, representing the spectral channel

and overall measurement capabilities of the sensor.

Spectral sensitivity range	350–950 nm	
Spectral channel count	11	(Channels listed bellow)
Spectral channel position accuracy	±10 nm	
Irradiance range and accuracy	10–1000 W/m ²	±10 %
Cosine error	<2 % at 45°	<5 % at 75°



Spectral channels

Channel	1	2	3	4	5	6	7	8	9	10	11
Center wavelength (nm)	400	424	450	473	514	547	595	635	685	745	855
Sensitivity response FWHM (nm)	30	22	55	30	40	35	80	50	55	60	54

Important notes

- Sensor measurement data are not available on the base station. Measurement data are processed and converted into five color metrics exclusively on the Aranet Cloud platform. A Cloud Light Spectrum Sensor license is required for each Light Spectrum Sensor.

Aranet radio parameters

Line of sight range	3 km	1.9 mi
Transmitter power	14 dBm	25 mW
Data transmission interval	1, 2, 5 or 10 min	
Data protection	XXTEA encryption	

- Specifically for JP923 radio band, reduced transmitter power of 13 dBm (20 mW) is used.

Battery lifetime

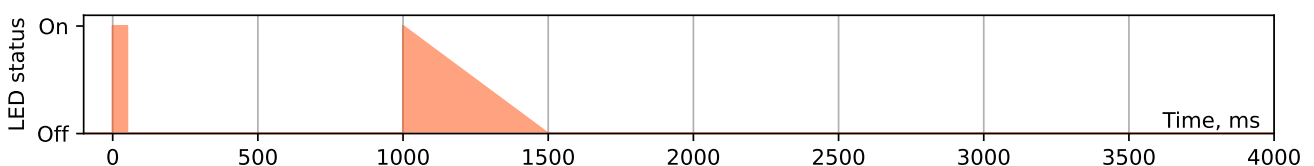
Measurement interval	Alkaline battery lifetime	Lithium battery lifetime
1 min	1.3 years	1.7 years
2 min	2.5 years	3.3 years
5 min	5.5 years	7.8 years
10 min	9.2 years	13.9 years

- Battery lifetime data has been obtained by mathematical extrapolation and is provided for descriptive purposes only and is not intended to make or imply any guarantee or warranty.
- Battery lifetime tests and calculations performed assuming device is at 20 °C (68 °F) and using *Fujitsu Premium LR6G07* (alkaline) and *Energizer Ultimate Lithium L91* (lithium) AA batteries as reference.
- The operating temperature range may vary based on the battery type used. Generally, the range for alkaline batteries is between -20–50 °C (-4–122 °F), whereas for lithium batteries, it is -40–60 °C (-40–140 °F).

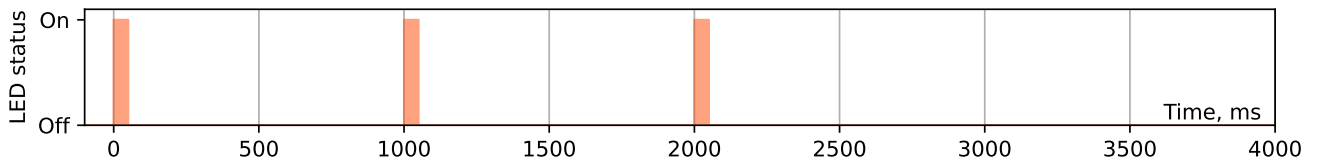
Pairing process description

As part of the Aranet PRO product series, this device enables wireless sensor reading transmission to the Aranet PRO and PRO Plus base station. Here's how to pair the sensor with the base station:

- **Preparing for pairing:** Place the sensor within 20 m (60 ft) of the base station during pairing. Once paired, it can communicate over a much greater distance (up to 3 km / 1.9 mi line of sight).
- **Power off the sensor:** If the sensor comes with a battery-disconnect pull tab, leave it in place for now. For battery-powered sensors that are already on, open the casing and remove the battery for at least 20 seconds. If the sensor uses a power supply, unplug it. For newer hardware versions, locate the PAIRING button on the sensor PCB which can be used to initiate pairing without the removal of battery.
- **Start the pairing process:** Access the SENSORS menu in the base station Web GUI. Set the measurement interval and select PAIR SENSOR to start the pairing process.
- **Power on the sensor:** Within 2 minutes, pull the battery tab, reinsert the battery, connect the power supply, or press the PAIRING button to initiate pairing.
- **Confirm successful pairing:** A successful pairing is indicated by the sensor appearing in the Web GUI and a specific LED blink sequence on the sensor PCB (one to three short blinks followed by a longer fade-out blink of the LED):



- **Troubleshooting:** If pairing fails, the sensor won't appear in the Web GUI, and the LED blink sequence will consist only of three short blinks. In this case, repeat the process closer to the base station.



- **Final setup:** After successful pairing, customize parameters like name and tags in the Web GUI. Close the sensor casing and install it in the desired location.

Bracket installation

- Choose an installation site with illumination characteristics representative of the crop being grown. Place the sensor as close to plant level as possible, ensuring it is above any obstructions from vegetation.
- Avoid installing the sensor in areas where illumination is obstructed, especially in the sensor's main field of view (refer to the angular sensitivity dependence in the section *Spectral measurement performance*). Examples include locations near walls or under construction elements.
- Secure the holder bracket to the chosen surface using screws, bolts, or zip-ties, ensuring a sturdy fixture to prevent changes in orientation during operation.
- To maintain repeatability of measurements across devices and installation sites over time, ensure the sensor is vertically oriented using the built-in bubble level: Loosen the bronze screw that holds the ball joint, orient the fixture until the bubble in the level is centered, then tighten the ball joint screw.
- Pair the sensor with a base station and insert it into the bracket with the sensing element facing upward (see image to the right).



Compliance information

- CE Conformité Européenne
- FC Federal Communications Commission (USA)
- IC Innovation, Science and Economic Development Canada