

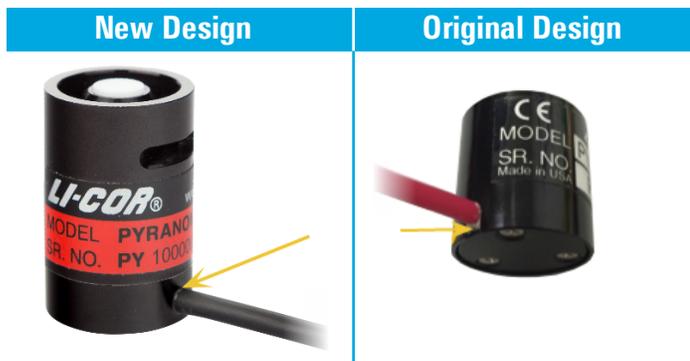
# Why Upgrade to the "R" Light and Radiation Sensors?

Redesigned light and radiation sensors, including the LI-190R, LI-200R, and LI-210R, provide many improvements over the models they replace. This document describes a number of physical and performance improvements.

## Housing and Cable Improvements

Changes to the housing and cable provide greater weather resistance, more durable cables, and easier deployment.

### More Robust Housing



New sensors feature an improved housing design that is more robust than the original design.

- Improved sealing prevents water and water vapor from entering the housing.
- The cable is potted where it enters the housing, to prevent water ingress.
- Holes for assembly fixtures are eliminated.

### Improved Drain



New sensors provide improved water shedding and drainage than the original design.

### Improved Connector



New sensors feature a BNC connector with strain relief to improve durability.

### Improved Cable



New sensors feature a shielded twisted pair of wires and thicker insulation for improved durability.

### Removable Cable and Base Assembly

New sensors can easily be removed from the cable and base—in the field—without returning the sensor to the factory.

- Simplifies replacement of the head or cable if either part is damaged.
- Simplifies removal of sensors for recalibration.
- Cables can be left in place when sensors are removed.



## Interchangeable Sensor Heads

Any sensor head can be used on any cable and base.



## Cable and Base Cap

A base cap protects cables that are left in the field when the sensors are removed.

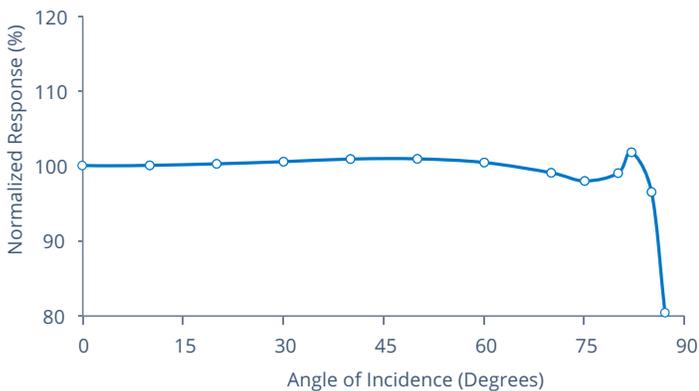


## Performance Improvements

Changes to internal components improved performance of the sensors, including cosine response, azimuth error, and quantum response.

### Improved Cosine Response

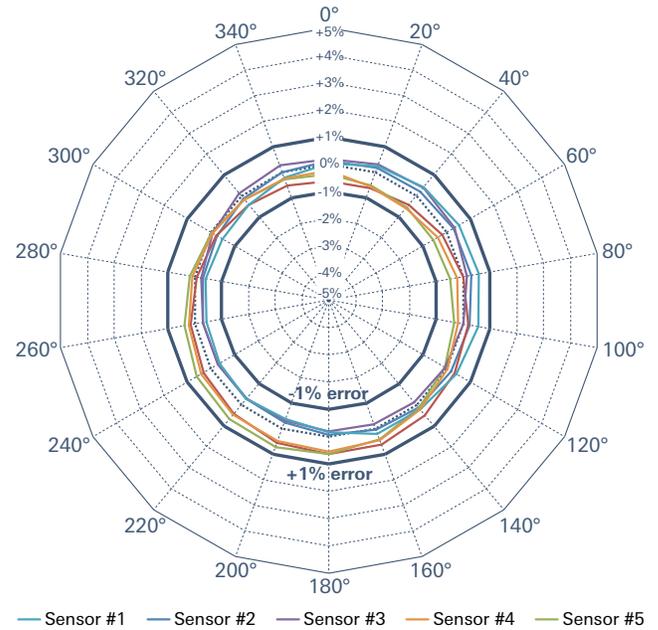
The new design maintains sensitivity at higher angles of incidence—to provide accurate measurements when the sun is rising and setting, and when an artificial light source is not directly overhead.



**Figure 1.** Cosine response of a typical LI-190R, LI-200R, or LI-210R.

## Low Azimuth Error

The sensors exhibit very low azimuth error (within 1%), showing that sensor orientation does not affect the measurement.

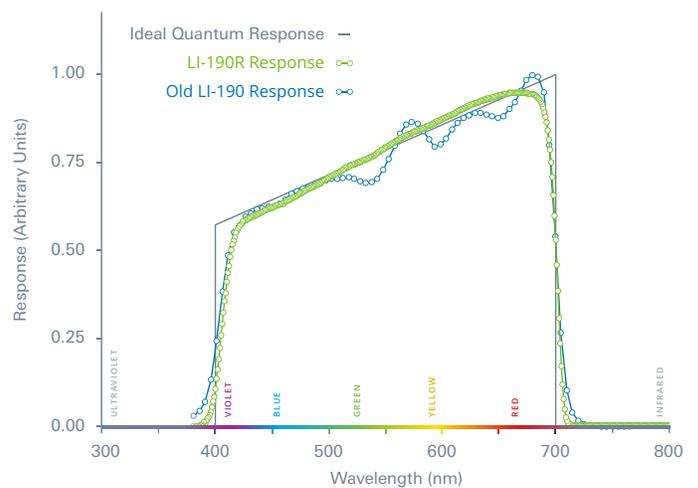


**Figure 2.** Azimuth error is less than 1% for all sensors tested.

## Improved Quantum Response of the LI-190R

The new LI-190R uses a different photodiode and optical filter to provide higher stability and more uniform sensitivity than the previous photodiode and optical filters.

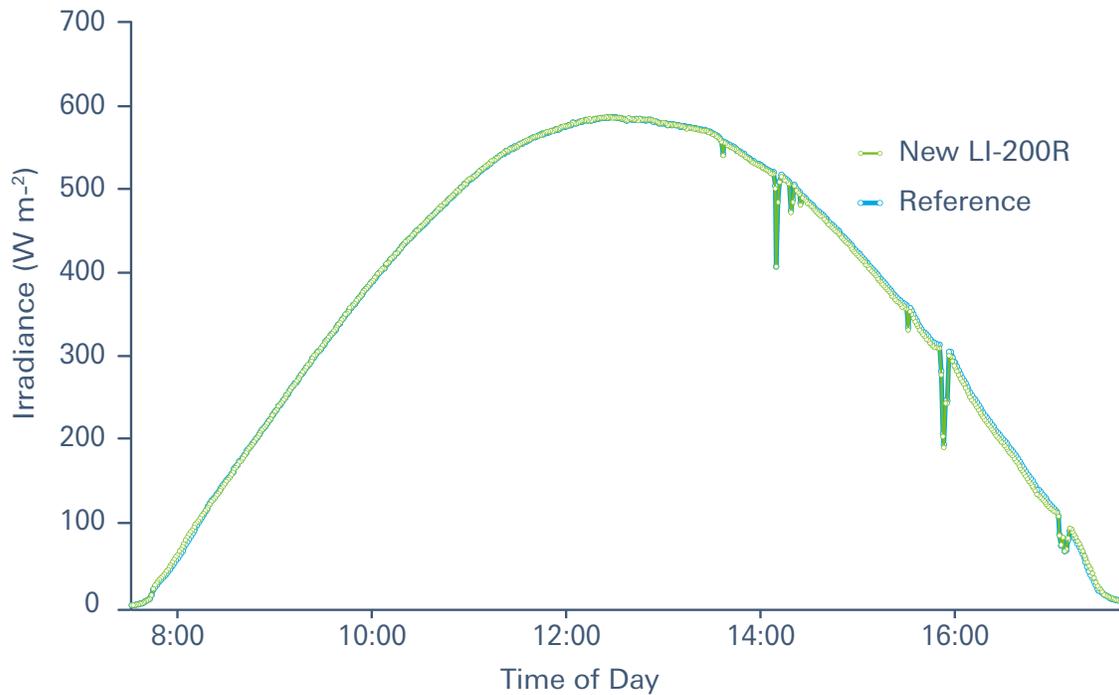
- Improved response across all the wavelengths.
- Optical filter is more resistant to the effects of heat and humidity than the earlier model, which will improve the long-term stability of the sensor.



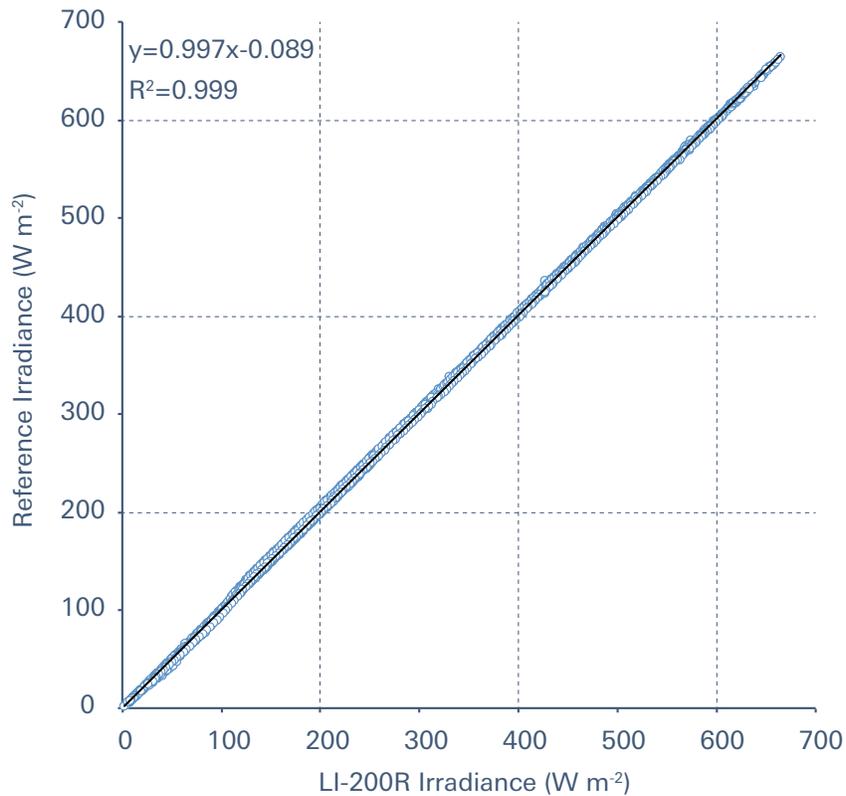
**Figure 3.** Quantum response of the LI-190R is very close to the ideal quantum. The new sensors match the ideal quantum more closely than the earlier model.

## Uncompromised Sensitivity of the LI-200R

Measurements from the new LI-200R are nearly identical to measurements from an old LI-200 over the course of a clear day (Figure 4). Measurements of five sensors are nearly identical to those of a reference LI-200 (Figure 5).



**Figure 4.** Sensitivity of the LI-200R Pyranometer over the course of a day. The new and old sensors provided nearly identical data.



**Figure 5.** Sensitivity of five new LI-200R sensors shows nearly identical readings to a reference LI-200. Data are 3615 data points per each of five sensors.



**LI-COR Biosciences  
Global Headquarters**

4647 Superior Street  
Lincoln, Nebraska 68504  
Phone: +1-402-467-3576 • Toll free: 800-447-3576 • Fax: +1-402-467-2819  
envsales@licor.com • envsupport@licor.com • www.licor.com/env

**Regional Offices**

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LI-COR Biosciences GmbH  
Siemensstraße 25A  
61352 Bad Homburg  
Germany  
Phone: +49 (0) 6172 17 17 771 • Fax: +49 (0) 6172 17 17 799  
envsales-gmbh@licor.com • envsupport-gmbh@licor.com

**LI-COR Ltd., United Kingdom**

*Serving Denmark, Finland, Ireland, Norway, Sweden, and UK.*

LI-COR Biosciences UK Ltd.  
St. John's Innovation Centre  
Cowley Road  
Cambridge  
CB4 0WS  
United Kingdom  
Phone: +44 (0) 1223 422102 • Fax: +44 (0) 1223 422105  
envsales-UK@licor.com • envsupport-UK@licor.com

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