

What is a Photoresistor?

A **photoresistor**, also known as a **light-dependent resistor (LDR)**, is an electronic component whose resistance decreases as the intensity of light shining on it increases. It is a passive device commonly used in light-sensing circuits, such as automatic night lights or light meters.

How Does a Photoresistor Work?

1. **Material Properties:**
 - Photoresistors are made from semiconductive materials like cadmium sulfide (CdS). These materials change their electrical resistance based on the amount of light energy (photons) they absorb.
2. **Light Sensitivity:**
 - In darkness or low light, the resistance of the photoresistor is very high (in the megaohms range), effectively blocking current flow.
 - In bright light, its resistance drops significantly (to a few hundred ohms or less), allowing more current to flow through.
3. **Behavior:**
 - This change in resistance can be measured and used as a signal in a circuit to indicate light intensity.

Why Do You Need a 10k Ohm Resistor?

The **10k ohm resistor** is used in a voltage divider circuit, which is necessary for reading the photoresistor's output. Here's why:

1. **Voltage Divider:**
 - The photoresistor and the 10k ohm resistor are connected in series. Together, they form a **voltage divider** circuit.
 - The junction between the photoresistor and the fixed resistor provides a variable voltage that depends on the photoresistor's resistance (and hence the light intensity).
2. **Analog Input:**
 - Microcontrollers like Arduino can't directly measure resistance but can read a voltage. The voltage divider converts the changing resistance of the photoresistor into a corresponding voltage.
3. **Optimal Range:**
 - The **10k ohm value** is chosen because it provides a good balance between sensitivity and range in typical light conditions. If the value of the resistor is too low or too high, the voltage change may not be significant enough to measure effectively.

How the Circuit Works with a Photoresistor and a 10k Ohm Resistor:

1. Circuit Setup:

- One end of the photoresistor is connected to **VCC** (e.g., 5V).
- The other end of the photoresistor is connected to one side of the 10k ohm resistor.
- The other side of the 10k ohm resistor is connected to **GND**.
- The junction between the photoresistor and the 10k ohm resistor is connected to an analog pin on the microcontroller.

2. Operation:

- When light falls on the photoresistor:
 - Its resistance decreases.
 - The voltage at the analog pin increases.
- When it's dark:
 - The resistance increases.
 - The voltage at the analog pin decreases.

Applications of a Photoresistor:

- **Automatic streetlights:** Turns lights on/off based on ambient light.
- **Light meters:** Measures light intensity.
- **Security systems:** Detects changes in light due to movement.
- **Electronic toys and displays:** Respond to changing light conditions.

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[Light-Dependent Resistor Camera](#)

[How does a photoresistor work](#)

[Introduction to LDR or photoresistor and how to Turn ON something with light](#)