What Is an Optical Heart Rate Sensor (PPG)?

Inas B. - 2026-11-27 - Health & Activity Tracking

An optical heart rate sensor uses a technology called photoplethysmography (PPG) to estimate heart rate.

PPG works by shining light into the skin and measuring changes in the amount of light reflected or absorbed by blood vessels. As the heart beats, blood volume in the small blood vessels changes. These changes affect the optical signal detected by the sensor.

The smartwatch processes these signals to estimate heart rate, which is displayed in beats per minute (BPM).

Optical heart rate sensors are commonly used in wearable devices because they can measure heart rate without requiring a traditional chest strap.

What is PPG used for?

PPG measurements can support:

- Current heart rate readings.
- Resting heart rate estimates.
- Heart rate tracking during exercise.
- Long-term heart rate trends.
- Other features that use heart rate information, such as stress monitoring.

What can affect PPG readings?

The quality of an optical measurement can be affected by movement, sensor contact, skin characteristics, temperature and other environmental factors. Tattoos, scars and differences in skin pigmentation may also affect the optical signal, depending on the sensor and its design.

PPG measurements from a smartwatch are estimates and are not intended to replace medical heart rate monitoring equipment.