

Precision level of optical multimeter



Article Overview

Optical multimeters achieve high precision, often at sub-wavelength or sub-nanometer levels, depending on the measurement technique and system configuration.

Understanding Precision in Optical Multimeters

Precision in optical multimeters refers to the instrument's ability to consistently reproduce the same measurement under identical conditions. This is analogous to the concept of precision in digital multimeters, where repeatability is key even if the absolute accuracy may vary slightly. In optical systems, precision is influenced by factors such as light source stability, detector sensitivity, environmental conditions, and the optical path design.

Optical Metrology Techniques and Their Precision

Optical multimeters often rely on interferometry, white light interferometry (WLI), or spectroscopic methods to measure parameters like displacement, surface roughness, or wavelength. Key points include:

- Interferometry: Uses interference patterns of coherent light to measure distances or surface profiles. Precision can reach sub-nanometer levels, as the system detects minute changes in optical path length.
- White Light Interferometry (WLI): Employs broadband light to reconstruct 3D surface profiles. Modern WLI systems can achieve sub-micrometer vertical resolution and high repeatability due to precise peak detection of interference fringes

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