

Online Thickness Gauge Infrared Sensor WG51S2

WEBFREX_{NV}

As a solution in the OpreX Quality Control System family, the WG51S2 infrared (IR) thickness gauge measures the thickness of films and sheets using IR transmission. The WG51S2 is used with the WEBFREX NV online thickness gauge to control uniform film thickness with higher measurement accuracy than the previous models, regardless of film thickness.

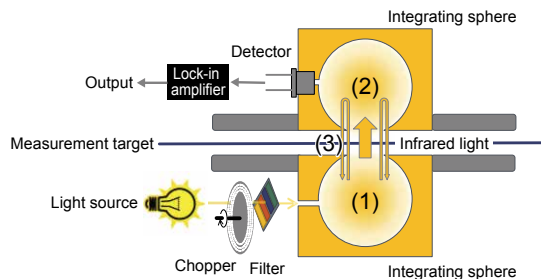
MAJOR FEATURES

■ Maximum accuracy of $\pm 0.1 \mu\text{m}$

With its unique optical system consisting of a frequency-modulated light source and dual-integrating spheres and its digital lock-in amplifier circuit for weak-signal detection, the WG51S2 IR transmission sensor offers significantly improved accuracy and measurement stability.

■ Optical system with dual-integrating spheres

A pair of integrating spheres is positioned on opposing sides of a target film. The incident infrared light passes through the film from the first integrating sphere (1) into the second integrating sphere (2). Then the integrating sphere (2) serves as the secondary light source and sends the light back to the first integrating sphere (1) through the film. In this way, the third transmission (3), the fourth transmission, and so on, occur repeatedly, enabling exceptionally accurate measurement of the thickness of thin films of low absorption.



■ Digital lock-in amplifier

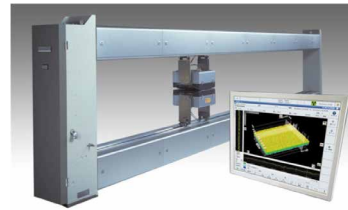
Frequency discrimination using a digital lock-in amplifier enables simultaneous analysis of multiple signals with different frequencies, even though the raw signal contains electrical noises and disturbances caused by thermal radiation from the film itself.

■ Frequency-modulated light source

Multiple infrared light sources with different wavelengths illuminate the same area of the film simultaneously, after being modulated at different frequencies, to improve the measurement accuracy.

■ Reduced thin film interference

Interference of light reflected by the front and the back surfaces of a thin film disturbs the measurement of light intensity and impacts the measurement accuracy. In the WG51S2, the input light is diffused in the integration sphere and transmits the film with various angles of incidence. Therefore, the interference fringes are cancelled out and have little effect on the measurement.



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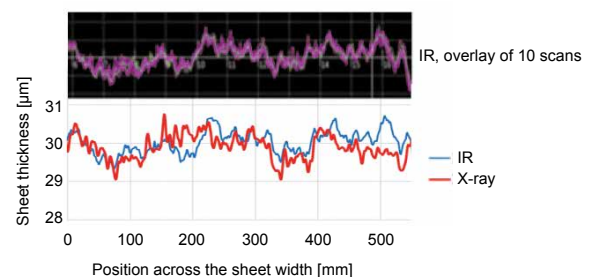
WG51S2

MAJOR SPECIFICATIONS

Measuring object	: Thickness of films such as PET, PP, PE, PA, and cellophane
Measurement range	: 10 to 2,000 μm
Measurement principle	: Near-infrared absorption
Detection method	: Frequency discrimination (simultaneous measurement of different frequencies at the same area)
Sampling	: 0.25 ms (simultaneous measurement of different frequencies at the same area)
Average value repeatability	: Within $\pm 0.2 \mu\text{m}$ or $\pm 0.2\%$
Measurement light	: Diffused light, $\phi 25 \text{ mm}$
Prevention of thin film interference	: Angle averaging method
Elimination of disturbance light and thermal radiation	: Lock-in amplifier
Allowable pass-line fluctuation	: Within $\pm 10 \text{ mm}$
Weight	: 3 kg (detector side), 4.5 kg (light source side)

APPLICATION EXAMPLE

The figure below shows an example of measuring the thickness of a polypropylene film. The upper half of the figure shows an overlay of 10 IR sensor scans, while the lower half compares the results of thickness measurement by the WG21S2 (IR) and an X-ray sensor. Profiles of both data show good correlation.



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