

# GON 360

## Goniometer for angle-dependent transmission and reflection measurements

### Product highlights

- Manual and motorized version
- Illumination and measuring optics are variable and independently adjustable over an angular range of 360°
- Digital angle display with 0.1° accuracy and 0.01° resolution
- Easy reconfiguration between transmission and reflection mode

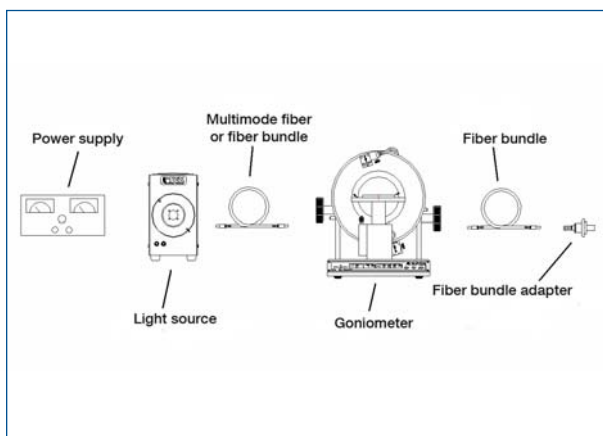


A large number of materials demonstrate reflection or transmission properties that have a significant angle-dependence. These characteristics are either intentional, e.g. metallic or pearl-effect paint finishes, or they occur as undesired effects, as in the manufacture of optical filters. The coating process used here can result in angle-dependent reflection and transmission properties that need to be tested.

Instrument Systems supplies a complete goniospectrophotometer based on the GON 360. This instrument comprises the goniometer itself, an appropriate light source for the application and a suitable spectrometer. An optical fiber connects the light source and the spectrometer to the GON 360.

The angle for the illumination and measurement arm can be adjusted variably and independently over the entire range of 360°. A choice of two lenses is available for the illumination and measurement arm to vary the size of the measuring spot on the sample. The spot size is 10 mm for the standard version of the GON 360 and there is an option of reducing this to 2 mm.

## The complete system



GON 360 Goniospectrophotometer measuring system

All spectrometers from Instrument Systems can be used for the GON 360 measuring system to match the measuring task.

## Applications

- Remission behavior of metallic and pearl-effect paint finishes
- Reflectance of solar cells
- Angle-dependent transmission and reflection of optical coatings and filters
- Color analysis with CIELAB evaluation for different angles
- Determination of anisotropic light scattering

## Manual and motorized version

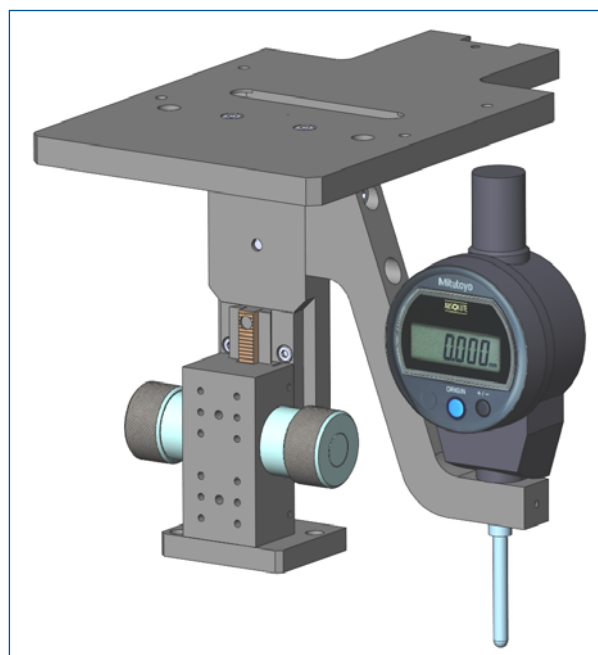
The GON 360 is supplied as a motorized and manual version. A digital angular display guarantees precise and simple adjustment of the angle with a precision of  $\pm 0.1^\circ$  and a resolution of  $\pm 0.01^\circ$  even where the manual version is being used.

The motorized model is software controlled. It permits automated measuring sequences and a complete angle analysis with color evaluation. This facilitates multi-geometry measurements of special-effect paint finishes.

## The sample table

The standard sample table is generally ideal for transmission measurements and for determining reflection from samples in the top-down configuration. The side of the sample being measured is placed on the measuring table and different sample thicknesses exert no effect on the measurements.

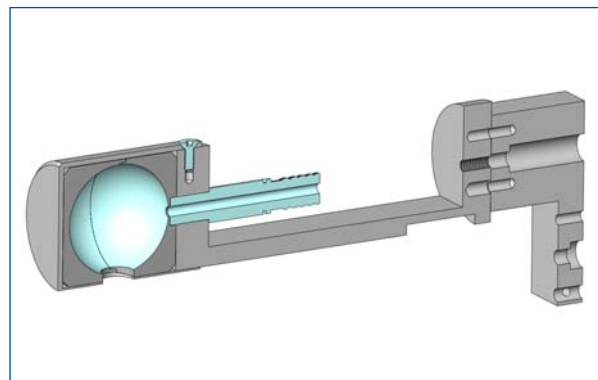
Alternatively, a height-adjustable sample table equipped with a precise dial gage can be supplied for the GON 360. This permits measurement of reflection in the bottom-up configuration, i.e. the sample side being measured is facing upward. Height adjustment compensates for different sample thicknesses.



Height-adjustable sample table with dial gage

## Accessories

A small integrating sphere is also supplied as alternative measurement optics for samples with curved surfaces and samples with an irregular structure, including for example polycrystalline solar cells. This option also permits absolute reflection measurements to be carried out without using a reference mirror.



Cross-section through the integrating sphere

Crystal polarizers with a wavelength range of 320 – 2300 nm are supplied as an additional accessory for the illumination and measuring arm. They allow measurements of the reflectance and transmittance angle to be carried out as a function of polarization.

A beam displacement compensator is available as an option and this allows precise angle-dependent transmission measurements to be performed even for thick samples.

## Technical Specifications

Technical data	
<b>Spectral range</b>	
Standard	190 to 2500 nm
With achromats (GON360-101)	380 to 780 nm
<b>Illumination optics</b>	
Adjustment range of illumination angle	360°
Adjustment accuracy	0.1°
Adjustment resolution (max.)	0.01°
Diameter of the illuminated area for OFG-414 and normal incidence with standard aperture	10 mm
Divergence of the illumination beam	1.5°
Diameter of the illuminated area for optional GON360-102 and OFG-312/322	2 mm
<b>Measurement optics</b>	
Adjustment range of measurement angle	180°
Smallest measurement angle in reflection	6°
Adjustment accuracy	0.1°
Adjustment resolution	0.01°
<b>Crystal polarizers (optional for illumination and measurement optics)</b>	
Extinction ratio	< 10E-5
Adjustment range	180°
Reproducibility for 0°, 45°, 90° positions	± 0.5°
Wavelength range	320 to 2300 nm
<b>Other</b>	
Interface	RS-232C for angle display
Height x width x depth [mm <sup>3</sup> ]	approx. 340 x 310 x 580
Weight (motorized GON 360 with standard sample table)	approx. 18 kg
Operating temperature range	+ 10°C to +40°C
Relative humidity	< 70 %
Power supply	230 V ± 10 %, 50 Hz; 110 V ± 10 %, 60 Hz
Power consumption	approx. 12.5 W
<b>Stepper motor controller for motorized version</b>	
Interface	2 x RS-232 for both stepper motors
Width x height x depth [mm <sup>3</sup> ]	395 x 82 x 235
Weight	5 kg
Power supply	100 – 260 V, 50 / 60 Hz
Power consumption	max. 200 W

## Order information

Order No.	Description
GON360-100	GON 360 Goniometer; manual angle adjustment, with digital angle read-out; spectral range 190 to 2500 nm
GON360-101	Modification with achromatic lens; spectral range 380 to 780 nm
GON360-102	Modification for a small spot size of 2 mm (requires OFG-312 /-322 fiber); spectral range 190 to 2500 nm
GON360-103	Integrating sphere for measuring curved optics; 30 mm diameter, 10 mm aperture, fiber bundle connector; BaSO4 coating; 300 to 2500 nm
GON360-104	Integrating sphere for measuring curved optics; 30 mm diameter, 10 mm aperture, fiber bundle connector; spectralon; 200 to 2500 nm
GON360-105	GON 360 motorized goniometer with digital angle read-out and RS-232 interface; includes ISEL-control DLL; spectral range 190 to 2500 nm
<b>Accessory</b>	
GON360-110	Beam-displacement compensator for transmission measurements
GON360-300	Standard sample holder
GON360-310	Height-adjustable sample holder with dial gauge
GON360-500	Eyepiece for measurement optics
GON360-510	Polarizer for illumination optics, 320 to 2300 nm
GON360-511	Polarizer for measurement optics, 320 to 2300 nm



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