

# 410-Solar

## Visible/NIR Hand-Held Reflectometer

### Field Reflectance Measurements

Solar Absorptance  
Measurements

Solar Power  
Generation

Inspection of  
Telescope Mirrors



#### FEATURES

- Measures total, diffuse and specular reflectance
- Battery operated
- Fast and portable
- Tool-like feel and operation

#### BENEFITS

- Solar Absorptance predictions
- No alignment problems
- Measures reflectance of large objects
- Works in the field

The **410-Solar** measures absolute reflectance for large objects or objects in the field

### 410-SOLAR:

- Portable & accurate
- Based on a modified integrating sphere
- Measures total reflectance at 7 sub-bands (330 to 2500 nm spectral band)
- Signal intensity normalized against an internal standard
- Total diffuse & specular reflectance reported for the data at 20° incidence
- 21 data points produced during each acquisition cycle
- User-friendly software operates like a smart calculator
- Powerful control, measurement & data processing functions executed via PDA screen
- Uses:
  - Inspection of mirrors & diffuse materials
  - Solar absorptance measurements
  - Solar power generation
  - Inspection of telescope mirrors

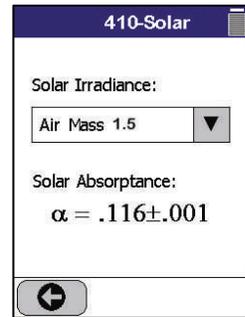
[www.surfaceoptics.com](http://www.surfaceoptics.com)

## Operation

The **410-Solar** measures the diffuse portion of the total reflectance at 20° using the fully automated specular diffuse port plug. The port plug is lifted away from the sphere allowing the 20° specular beam to escape, leaving the diffuse portion of the total reflectance left to measure. The specular beam portion is obtained by subtracting the diffuse reflectance from the total reflectance. For maximum accuracy it is calibrated with a specular calibration coupon and with a diffuse calibration coupon.

## Software & Data

The **410-Solar** is controlled by soft keys on the PDA computer screen. To perform measurements just press the device against the surface to be tested pull the trigger. The data are recorded and can be displayed in a graphical or numerical form. The data can also be annotated with sample names or measurement point identifications.



*Solar absorptance calculation*

## Specifications

### MEASURED PARAMETER

Directional Hemispherical Reflectance

### METHOD

Integrated Total Reflectance in a band for 20° angle of incidence

### MEASURED VALUE

Total reflectance, Diffuse Reflectance, and Specular Reflectance at 20° (8 measurements simultaneously)

### WAVELENGTH BANDS

Seven bands in the 330 to 2500 nm spectral range

### ANGLE OF INCIDENCE

20° from normal incidence

### SURFACE CURVATURE

Any surface; convex 6" radius; concave 12" radius

### BEAM SPOT SIZE

0.250" diameter at 20°

### BEAM ANGLE

3° half cone angle

### MEASUREMENT TIME

10 sec./measurement, user controlled  
(7bands)

### WARM UP TIME

90 seconds

### RUN TIME

Two hours on one battery. Battery easily replaced, with continuous operation after battery replacement.

### POWER SOURCE

Rechargeable batter (standard environmentally friendly NiMH)

### RECHARGE TIME

1 hour

### WEIGHT

4.7 lbs. with battery

### VIS-NIR SOURCE

Tungsten filament, temperature controlled by user

### FORM FACTOR/SIZE

Hand held, balanced at the trigger, approx. the size of a power drill (H 11.54", L 9.04", W 3.72")

### MODULARITY

Modular construction, interchangeable measurement heads

### OPERATOR INTERFACE

LCD graphics screen, ¼ VGA, touch screen, software buttons; trigger switch in the handle.

### DIAGNOSTICS

On screen status and signals monitor. Signal values stored with data. Raw data collection and display.

### INTERNAL DATA STORAGE & TRANSFER

265MB removable CompactFlash™ card  
No data on PDA after power down

### DATA FORMAT

Standard spreadsheet; data files can be opened & post processed with Excel or a text processor.

### ENVIRONMENTAL

Storage: -25 to 70°C;  
Operating 0 to 40°C, non-condensing

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