

PORTABLE SPECULAR REFLECTOMETER 15R-USB



- **BATTERY OPERATED**
- **REPEATABLE TO +/- .002 REFLECTANCE UNITS**
- **IDEAL FOR QUALITY CONTROL AND FOR MONITORING SOILING AND DEGRADATION IN THE FIELD**

The D&S Portable Specular Reflectometer Model 15R-USB is designed for field and laboratory measurements of flat or curved reflectors. It is powered by internal rechargeable Nicad batteries that operate for over 15 hours on a charge. The Reflectometer is six inches high and weighs just two and a quarter pounds. A single operator can easily take reflectance readings at the rate of 2 to 6 per minute and record the readings to data sets stored in the instrument. A USB port is provided for maintaining and downloading data sets and upgrading the firmware. These features make the Model 15R-USB ideal for monitoring soiling of solar reflectors in the field or for quality control in the manufacture and maintenance of reflectors and thermal control surfaces.

INSTRUMENT DESCRIPTION

The instrument uses a 660 nanometer LED and collimating optics to produce a 10 mm. diameter source beam. The reflected beam is focused through one of three thumbwheel selectable apertures. Standard acceptance angles are 15, 25 and 46 milliradians. The 15R-USB can be supplied with an optional 7 mrad aperture. Two adjustable support points on the base of the instrument are used to align the reflected beam with the receiver optics.

A third, central support has a stop position for measuring first surface reflectors and is adjusted according to thickness for second surface reflectors. To aid in the alignment procedure, the detector can be rotated out of the optical path and the reflected beam viewed through an eyepiece located on the top of the 15R-USB. The LED light source is electrically chopped and the reflected beam is measured synchronously to eliminate errors due to stray light. In addition, the light source is monitored with a reference detector to minimize thermal drift. A gain adjustment allows direct readout of reflectance to three digits. A calibration standard is provided in a protective housing that installs in the base of the instrument.

To measure reflectance, the operator simply positions the 15R-USB on the reflector surface and adjusts the supports for the maximum reading on the liquid crystal display.

Included with the 15R: 15R-USB Control software, USB cable, reflectance calibration standard; Nicad batteries; battery charger; operating instructions, maintenance manual, technical notes and carrying case.



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SPECIFICATIONS

MEASUREMENT DESCRIPTION: The reflectometer measures specular reflectance at 15 degrees incidence with a beam diameter of ten millimeters. Beam divergence in the standard instrument is 2.5 mrad. Three apertures rotate into place to provide a variable collection divergence, ranging from 15 to 46 mrad. An optional 7 mrad aperture is available in place of the standard 46 mrad aperture.

LIGHT SOURCE: High intensity red light emitting diode (660 nm). This source is chopped at 90 Hz, eliminating stray light problems. Also available is a green light emitting diode source (570 nm).

OPTICS: The LED source is mounted behind a small aperture which provides a near point source. This is collimated into a beam by a converging lens. An identical lens focuses the reflected beam into the collection aperture. An anti-reflection coated port window is provided to prevent dust build up on the internal optics.

VIEWING OPTICS: The detector can be rotated out of the reflected beam and the reflected image viewed through an eyepiece in the top of the instrument.

ALIGNMENT SYSTEM: Three threaded supports provide for adjustment to bring the reflected beam into alignment with the receiving optics and to compensate for different thicknesses of second surface reflectors.

CALIBRATION STANDARD: A quick connect mirror reflectance standard is provided in a protective housing that attaches to the base of the instrument.

EXTERNAL REFERENCE MIRROR: The 15R-ERM mirror is used for verification of the working standard provided with the instrument and for backup. The second surface aluminum reference mirror is mounted in a base piece fitting the 15R-

USB reflectometer support screws for easy alignment.

EXTERNAL PRECISION REFERENCE: For measurements using the 7 milliradian aperture a precision external mirror is required for calibration. The model 15R-EPS provides a highly specular first surface reference mirror with a magnetically mounted cover to protect the mirror when it is not in use. For calibration of the 15R reflectometer the supports for the instrument fit in detents near the corners of the mirror mount.

REPEATABILITY: +/- 0.002 reflectance units.

RESOLUTION: A 3 1/2 digit LCD display indicates reflectance directly to 0.1 percent. A gain adjust knob allows the user to calibrate the instrument against the mirror reflectance standard provided.

OPERATING TEMPERATURE: 32 to 122 F (0 to 50 C).

POWER: Rechargeable batteries provide 15 hours of continuous operation. A universal smart battery charger is provided; input power, 100-240 VAC, 50-60 Hz.

WEIGHT: 2 1/4 pounds (1.0 kg.)

PHYSICAL DIMENSIONS

