

PHOTO RESEARCH[®]

PR[®]-1500/PR[®]-1600 SpotMeters[®]

Spectra[®]

Pritchard[®]

SpectraScan[®]



Photo Research SpotMeters are the standard of the industry... select the model best suited to your needs.

Over four decades ago, Photo Research invented "Spot" photometry when it introduced the Spectra Screen Brightness Meter for the motion picture industry. A few years later, a military customer inquired about measuring aircraft instrument panels and Photo Research produced the first Spectra SpotMeter microphotometer.

The PR-1500 SpotMeter is a sensitive, versatile photomultiplier-tube photometer that can measure luminance (photometric brightness) at any distance from 1¼ inches (44 mm) to infinity without the need for accessory lenses or changes in calibration. The PR-1600 SpectraSpot,* a silicon-cell photometer/radiometer, is designed for applications requiring the inherent stability and near-infrared response of the silicon cell, without requiring the higher sensitivity of photomultiplier tubes.

PR-1500 SpotMeter



Features

Simplicity: Direct-reading measurement of luminance from close-up or distant objects, without changing lenses or calibrations.

Versatility: Measure luminance, illuminance, luminous intensity ("candlepower"), color temperature, relative tristimulus values, light polarization, radiance and irradiance. (Options and accessories may be required.)

High Sensitivity: Full-scale sensitivity down to 0.01 footLamberts or 0.1 $\text{cd} \cdot \text{m}^{-2}$. (0.001 fL or 0.01 $\text{cd} \cdot \text{m}^{-2}$ with 3° circular aperture, Opt. 7.)

Narrow Measuring Field: Choice of measuring field angles down to 1/8°; measures areas as small as 0.005 in. (0.12 mm) diameter with MS-55 MacroSpectar* Lens.

High Accuracy: Unique see-through optical system provides 100% alignment accuracy and zero polarization error. Advanced electronic system provides maximum stability and linearity.

Convenience: Controls and indicators "human engineered" for maximum operator convenience. "Hold" button retains transient meter readings.

Compactness: Optics, solid-state circuitry and readout are contained in a single light-weight package.

Typical Applications

- Display Measurements
- Cathode Ray Tube Luminance
- MIL-SPEC Lighting Compliance
- Street and Roadway Lighting
- Aircraft Panel Checkout
- Material Reflectance Studies
- Automotive Lighting
- Color Temperature Determination
- Airport Lighting
- Air Pollution Monitoring
- Lamp Quality Control

Photomultiplier Tubes

The standard photomultiplier phototube supplied has an S-20 response. These are specially selected and seasoned low-noise photo detectors.

Filter Turret

A 6-position filter turret is located between the aperture mirror and the photomultiplier detector. This turret contains the "photopic" filter which modifies the spectral response of the instrument to precisely match CIE or "human eye" response. This photopic filter is individually trimmed and calibrated for each SpotMeter. With this filter in position, the SpotMeter functions as a precision luminance photometer (photometric brightness meter).

Red and blue filters are included in standard instruments for relative tristimulus and color temperature measurements. (If special filters, such as red LED or scotopic response filters are installed, tristimulus and/or color temperature measurement capability is not available.) Option 32 provides three individually trimmed colorimetric filters for red, blue and photopic, making the PR-1500 a more accurate relative colorimeter. The filter turret has an OPEN position for use in making relative radiometric measurements. An internal calibration-reference source is mounted in the CAL position of the turret for quickly checking the instrument calibration prior to making a measurement.

Specifications

Measuring Field Apertures: Specify one (see Table I).

Sensitivity Range: See Table II.

Field Coverage: See Table I.

Viewing Field: Bright, erect 9.2° viewing field with 6X viewing magnification. (16.6° with optional 3° circular aperture.)

Eyepiece: Large (22 mm) diameter focusing eyepiece with rubber eyecup.

Standard Objective Lens: MS-55 (55 mm, f/2.8) MacroSpectar lens. Focuses from 1¼ in. (44 mm) to infinity.

Spectral Response (Unfiltered): 350-820 nm with standard S-20 response photomultiplier tube. (May be increased to 930 nm with optional gallium arsenide PMT—Option 25.)

Table II: PR-1500 Full-Scale Sensitivity Chart

ACCESSORY	UNITS	APERTURE						
		3"	1"	1/2"	1/4"	1/8"	1/2" X 1/4"	1/4" X 1/8"
MS-55 MS-1X MS-165 MS-2.5X MS-77 MS-5X MS-7X MS-10X WL-15 ZL-15	footLamberts = fL Option 52-0 (candelas per square meter) (cd • m ⁻²) (Option 52-1)	10 ⁻⁴ to 10 ⁺²	10 ⁻³ to 10 ⁺³	10 ⁻² to 10 ⁺⁴	10 ⁻¹ to 10 ⁺⁵	10 ⁰ to 10 ⁺⁶	10 ⁻³ to 10 ⁺³	10 ⁻² to 10 ⁺⁴
MS-25X MS-50X	fL (cd • m ⁻²)	10 ⁻⁸ to 10 ⁺³ (10 ⁻² to 10 ⁺⁴)	10 ⁻² to 10 ⁺⁴ (10 ⁻¹ to 10 ⁺⁵)	10 ⁻¹ to 10 ⁺⁵ (10 ⁰ to 10 ⁺⁶)	10 ⁰ to 10 ⁺⁶ (10 ⁺¹ to 10 ⁺⁷)	10 ⁺¹ to 10 ⁺⁷ (10 ⁺² to 10 ⁺⁸)	10 ⁻² to 10 ⁺⁴ (10 ⁻¹ to 10 ⁺⁵)	10 ⁻¹ to 10 ⁺⁵ (10 ⁰ to 10 ⁺⁶)
MS-55 and all EX-15 Extension Tubes	fL (cd • m ⁻²)	10 ⁻⁴ to 10 ⁺² (10 ⁻³ to 10 ⁺³)	10 ⁻³ to 10 ⁺³ (10 ⁻² to 10 ⁺⁴)	10 ⁻² to 10 ⁺⁴ (10 ⁻¹ to 10 ⁺⁵)	10 ⁻¹ to 10 ⁺⁵ (10 ⁰ to 10 ⁺⁶)	10 ⁰ to 10 ⁺⁶ (10 ⁺¹ to 10 ⁺⁷)	10 ⁻³ to 10 ⁺³ (10 ⁻² to 10 ⁺⁴)	10 ⁻² to 10 ⁺⁴ (10 ⁻¹ to 10 ⁺⁵)
FP-15- Fiber Probe	fL (cd • m ⁻²)	10 ⁻³ to 10 ⁺³ (10 ⁻² to 10 ⁺⁴)	10 ⁻² to 10 ⁺⁴ (10 ⁻¹ to 10 ⁺⁵)	10 ⁻¹ to 10 ⁺⁵ (10 ⁰ to 10 ⁺⁶)	10 ⁰ to 10 ⁺⁶ (10 ⁺¹ to 10 ⁺⁷)	10 ⁺¹ to 10 ⁺⁷ (10 ⁺² to 10 ⁺⁸)	10 ⁻² to 10 ⁺⁴ (10 ⁻¹ to 10 ⁺⁵)	10 ⁻¹ to 10 ⁺⁵ (10 ⁰ to 10 ⁺⁶)
CR-100- Cosine Receptor	footcandles = fc Opt. 52-0 (lux = lx) (Opt. 52-1)	10 ⁻³ to 10 ⁺¹ (10 ⁻¹ to 10 ⁺³)	10 ⁻² to 10 ⁺² (10 ⁰ to 10 ⁺⁴)	10 ⁻¹ to 10 ⁺³ (10 ⁺¹ to 10 ⁺⁵)	10 ⁰ to 10 ⁺⁴ (10 ⁺² to 10 ⁺⁶)	10 ⁺¹ to 10 ⁺⁵ (10 ⁺³ to 10 ⁺⁷)	10 ⁻² to 10 ⁺² (10 ⁰ to 10 ⁺⁴)	10 ⁻¹ to 10 ⁺³ (10 ⁺¹ to 10 ⁺³)
IB-15- Incidence Baffle	fc - Opt. 52-0 (lx - Opt. 52-1)	10 ⁻⁵ to 10 ⁻² (10 ⁻⁶ to 10 ⁰)	10 ⁻⁷ to 10 ⁻¹ (10 ⁻⁵ to 10 ⁺¹)	10 ⁻⁶ to 10 ⁰ (10 ⁻⁴ to 10 ⁺²)	10 ⁻⁵ to 10 ⁺¹ (10 ⁻³ to 10 ⁺³)	10 ⁻⁴ to 10 ⁺² (10 ⁻² to 10 ⁺⁴)	10 ⁻⁷ to 10 ⁻¹ (10 ⁻⁵ to 10 ⁺¹)	10 ⁻⁴ to 10 ⁰ (10 ⁻⁴ to 10 ⁺²)
LR-15 LED Receptor	millicandelas (Opt. 52-1)	10 ⁻¹ to 10 ⁺⁵ (10 ⁰ to 10 ⁺⁶)	10 ⁰ to 10 ⁺⁶ (10 ⁺¹ to 10 ⁺⁷)	10 ⁺¹ to 10 ⁺⁷ (10 ⁺² to 10 ⁺⁸)	10 ⁺² to 10 ⁺⁸ (10 ⁺³ to 10 ⁺⁹)	10 ⁺³ to 10 ⁺⁹ (10 ⁺⁴ to 10 ⁺¹⁰)	10 ⁰ to 10 ⁺⁶ (10 ⁺¹ to 10 ⁺⁷)	10 ⁺¹ to 10 ⁺⁷ (10 ⁺² to 10 ⁺⁸)

NOTES: All values based on tungsten standards operating at 2856 Kelvins (Illuminant A).

Calibration: Traceable to National Institute for Standards and Technology (NIST). Standard calibration units in footLamberts, but calibration in "candelas per square meter" is available upon request at no extra charge. The PR-1500 has a highly stable, built-in internal calibration check source for periodic checks.

Accuracy: ±4% of full-scale on any range (for luminance of blackbody source).

Operator Controls: Power, Sensitivity and Response Speed switches—plus potentiometers for zeroing the amplifier, dark current and adjusting the sensitivity—are located on the back control panel. Two knobs on the side control panel are for: (1) filter position selection, and (2) insertion of a 100X optical attenuator and/or viewing shutter.

Meter Hold: Pushbutton on back panel allows transient meter readings to be retained for inspection.

Readout Indicators: 3½ digit, non-blinking digital readout has illuminated "Multiplier" indicator.

Output Signals: All models have a 0-2 volt analog output jack, capable of driving any analog device whose impedance is greater than 10,000 ohms. In addition, all models can be provided with a BCD output jack (Option 54).

Power Requirements: 117 volts, ±13 volts, 50 to 400 Hz, 5 watts maximum; 100 or 230 volts available on special order at no extra charge.

Operating Temperature Range: 32°F to 110°F (0°C to 43°C).

Size and Weight: 12½ in. (31.3 cm) X 6¼ in. (15.9 cm) X 5¾ in. (14.6 cm). Weight is 8½ pounds (3.9 kg).

PR-1600 SpectraSpot Photometer/Radiometer



Features

Simplicity: Direct-reading measurement of luminance/radiance from close-up or distant objects, without changing lenses or calibrations.

Versatility: Measure luminance, radiance, illuminance, irradiance, color temperature, relative tristimulus values and light polarization. (Options and accessories may be required.)

High Sensitivity: Full-scale sensitivity down to 0.1 footLamberts or 1.0 cd • m⁻² for luminance, 0.1 microwatts/steradian/cm² for radiance. Sensitive from 375 to 1,100 nm (ultraviolet to near-infrared).

Table I: PR-1500/1600 SpotMeter Lens Selection and Field Coverage Chart

OBJECTIVE LENS	FOCUSING RANGE	WORKING DISTANCE	APERTURE SIZE (FIELD COVERAGE)						
			3°	1°	1/2°	1/4°	1/8°	1/8° X 1/4°	1/8° X 1/8°
MS-55*	1.75 in. to infinity (44 mm to infinity)	10 ft. (3.05 m)	6.30 in. (160 mm)	2.10 in. (53.3 mm)	1.05 in. (26.7 mm)	0.53 in. (13.5 mm)	0.26 in. (6.6 mm)	1.05 in. x 3.15 in. (26.7 mm x 80 mm)	0.26 in. x 3.15 in. (6.6 mm x 80 mm)
MS-1X	FIXED	3.80 in. (96.5 mm)	0.114 in. (2.90 mm)	0.038 in. (0.97 mm)	0.019 in. (0.48 mm)	0.010 in. (0.24 mm)	0.005 in. (0.12 mm)	0.019 in. x 0.057 in. (0.48 mm x 1.44 mm)	0.005 in. x 0.057 in. (0.127 mm x 1.44 mm)
MS-165	FIXED	6.5 in. (165 mm)	0.114 in. (2.9 mm)	0.038 in. (0.97 mm)	0.019 in. (0.48 mm)	0.010 in. (0.25 mm)	0.005 in. (0.12 mm)	0.019 in. x 0.057 in. (0.48 mm x 1.44 mm)	0.005 in. x 0.057 in. (0.127 mm x 1.44 mm)
MS-2.5X	FIXED	1.76 in. (44.7 mm)	0.046 in. (1.16 mm)	0.015 in. (0.38 mm)	0.008 in. (0.19 mm)	0.004 in. (0.10 mm)	0.002 in. (0.048 mm)	0.008 in. x 0.023 in. (0.203 mm x 0.584 mm)	0.002 in. x 0.023 in. (0.048 mm x 0.58 mm)
MS-77	FIXED	4.25 in. (108 mm)	0.038 in. (0.97 mm)	0.013 in. (0.32 mm)	0.006 in. (0.16 mm)	0.003 in. (0.080 mm)	0.002 in. (0.04 mm)	0.006 in. x 0.02 in. (0.16 mm x 0.48 mm)	0.002 in. x 0.019 in. (0.04 mm x 0.48 mm)
MS-5X	FIXED	1.11 in. (28.2 mm)	0.024 in. (0.58 mm)	0.008 in. (0.19 mm)	0.004 in. (0.10 mm)	0.002 in. (0.048 mm)	0.001 in. (0.024 mm)	0.004 in. x 0.012 in. (0.10 mm x 0.30 mm)	0.001 in. x 0.012 in. (0.024 mm x 0.30 mm)
MS-7X	FIXED	0.7 in. (17.8 mm)	0.015 in. (0.41 mm)	0.005 in. (0.14 mm)	0.003 in. (0.069 mm)	0.001 in. (0.034 mm)	0.0007 in. (0.017 mm)	0.003 in. x 0.008 in. (0.069 mm x 0.21 mm)	0.0007 in. x 0.008 in. (0.015 mm x 0.21 mm)
MS-10X	FIXED	0.6 in. (15.2 mm)	0.011 in. (0.28 mm)	0.004 in. (0.10 mm)	0.002 in. (0.048 mm)	0.001 in. (0.024 mm)	0.0005 in. (0.012 mm)	0.002 in. x 0.006 in. (0.048 mm x 0.14 mm)	0.0005 in. x 0.006 in. (0.013 mm x 0.14 mm)
MS-25X	FIXED	0.6 in. (15.2 mm)	0.0045 in. (0.12 mm)	0.0015 in. (0.039 mm)	0.0008 in. (0.020 mm)	0.0004 in. (0.010 mm)	0.0002 in. (0.005 mm)	0.0008 in. x 0.002 in. (0.020 mm x 0.058 mm)	0.0002 in. x 0.002 in. (0.005 mm x 0.058 mm)
MS-50X	FIXED	0.3 in. (7.6 mm)	0.002 in. (0.051 mm)	0.0008 in. (0.019 mm)	0.0004 in. (0.010 mm)	0.0002 in. (0.005 mm)	0.0001 in. (0.002 mm)	0.0004 in. x 0.001 in. (0.010 mm x 0.029 mm)	0.0001 in. x 0.0001 in. (0.002 mm x 0.029 mm)
MS-55 with 12 mm extension	FIXED	1.34 in. (34.0 mm)	0.093 in. (2.36 mm)	0.031 in. (0.79 mm)	0.016 in. (0.41 mm)	0.008 in. (0.20 mm)	0.004 in. (0.10 mm)	0.016 in. x 0.047 in. (0.41 mm x 1.19 mm)	0.004 in. x 0.047 in. (0.10 mm x 1.19 mm)
MS-55 with 20 mm extension	FIXED	1.15 in. (29.2 mm)	0.084 in. (2.13 mm)	0.028 in. (0.71 mm)	0.014 in. (0.36 mm)	0.007 in. (0.18 mm)	0.004 in. (0.10 mm)	0.014 in. x 0.042 in. (0.36 mm x 1.07 mm)	0.004 in. x 0.042 in. (0.10 mm x 1.07 mm)
MS-55 with 36 mm extension	FIXED	0.88 in. (22.4 mm)	0.069 in. (1.75 mm)	0.023 in. (0.58 mm)	0.012 in. (0.30 mm)	0.006 in. (0.15 mm)	0.003 in. (0.076 mm)	0.012 in. x 0.034 in. (0.30 mm x 0.86 mm)	0.003 in. x 0.035 in. (0.076 mm x 0.86 mm)
MS-55 with 68 mm extension	FIXED	0.54 in. (13.7 mm)	0.051 in. (1.30 mm)	0.017 in. (0.43 mm)	0.008 in. (0.20 mm)	0.004 in. (0.10 mm)	0.002 in. (0.051 mm)	0.008 in. x 0.026 in. (0.20 mm x 0.66 mm)	0.002 in. x 0.026 in. (0.051 mm x 0.66 mm)
WL-15	6.6 in. to infinity	6.6 in. (168 mm)	0.84 in. (21.3 mm)	0.28 in. (7.1 mm)	0.14 in. (3.6 mm)	0.07 in. (1.8 mm)	0.035 in. (0.89 mm)	0.14 in. x 0.42 in. (3.6 mm x 10.7 mm)	0.035 in. x 0.420 in. (0.89 mm x 10.7 mm)
		10 ft. (3.05 m)	14.4 in. (366 mm)	4.81 in. (122 mm)	2.41 in. (61.2 mm)	1.20 in. (30.5 mm)	0.60 in. (15.2 mm)	2.41 in. x 7.21 in. (61.2 mm x 183 mm)	0.60 in. x 7.20 in. (15.2 mm x 183 mm)
ZL-15 75-205 mm	78 in. to infinity	100 ft. @ 75 mm (30.5 m)	48.2 in. (1.2 m)	15.4 in. (391 mm)	7.7 in. (196 mm)	3.85 in. (97.8 mm)	1.93 in. (49.0 mm)	7.7 in. x 23.1 in. (196 mm x 587 mm)	1.93 in. x 23.1 in. (49.0 mm x 587 mm)
		100 ft. @ 205 mm (30.5 m)	18.8 in. (427 mm)	5.6 in. (142 mm)	2.8 in. (71.1 mm)	1.4 in. (35.8 mm)	0.7 in. (17.8 mm)	2.8 in. x 8.4 in. (71.1 mm x 213 mm)	0.70 in. x 8.4 in. (17.8 mm x 213 mm)

*Field coverage is proportional to distance at distances greater than 5 ft. At 1.75 inches, field coverage equals MS-1X field coverage. The PR-1600 utilizes only the 1° and 1/2° apertures.

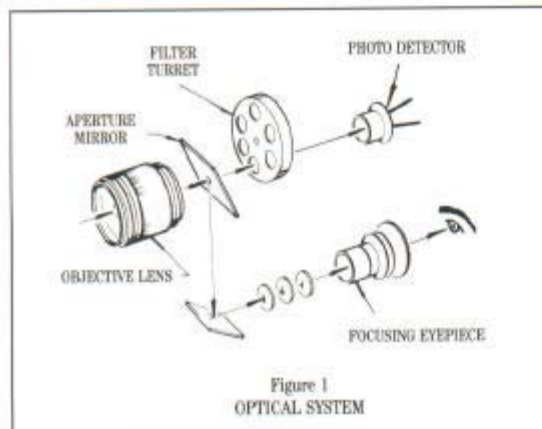


Figure 1
The Photo Research SpotMeter Optical System

The unique optical system of SpotMeters is shown in Figure 1. The objective lens forms a real image at the aperture of a metallic mirror. The photons being measured pass through the aperture to the detector, while the mirror surface reflects the balance of the incoming light to the viewing system. Thus, the operator sees a bright, erect, magnified image with a small black spot in the center; this spot clearly and accurately defines the measuring field. This optical system provides a bright, unambiguous viewing field with precise location of the measuring field indicated within the viewing field. Furthermore, because photons in the measuring path encounter no mirrors, beamsplitters or fiber optics, this optical system is completely free of polarization error.

Options and Accessories

BCD Output, Opt. 54*. Connector mounted on all model instruments to provide BCD output to an external device.

Carrying Case, CC-15/CC-16. A sturdy, foam-lined, impact-resistant case that will protect your valuable instrument and several accessories from damage during shipping, handling, and storage.

Chromaticity Reference Filters, CRF-35. A set of 20 2 in. X 2 in. (50 mm X 50 mm) colored filters used for chromaticity and photometric transmission checks. Supplied with spectral distribution curves, chromaticity coordinates and photometric transmission data for each filter.

Color Temperature, Opt. 66* and 67*. A color temperature calibration to determine the blackbody color temperature from 2000K to 10,000K using the built-in blue and red filters to derive the color temperature curves. Opt. 66 is for the PR-1500 in open position. Opt. 67 is for the PR-1500 in open position and X100 position. (Not available with the PR-1600.)

Cosine Receptor, CR-100*. An accessory which mounts on the front of the objective lens to measure the integrated illuminance from all sources in the hemisphere above it. It is accurately cosine-corrected; i.e., the correct illuminance reading will be obtained from a source, regardless of where it is located in the forward hemisphere. (Requires MS-55 Lens.)

Extension Set, EX-15*. Adapter for use with MS-55 lens to decrease spot size. See Table II. (Not available with the PR-1600.)

Filter Holder, FH-15/FH-16. An adapter which screws into the front of the MS-55 objective lens to hold two external 2 in. X 2 in. (50 mm X 50 mm) filters for special measurements.

Flexible Probe, FP-15*/FP-16*. A convenient accessory for making photometric measurements in cramped and/or inaccessible locations. The 48 in. (1.2 m) probe measures luminance only in a fixed, 0.12 in. (3 mm) diameter, circular area. (Requires MS-55 lens.)

Incidence Baffle, IB-15*/IB-16*. A fixed baffle that mounts on the front of the objective lens, thereby converting the photometer into an ultra-sensitive illuminance meter for single ("point") light sources. This baffle is used for incidence measurements of extremely dim, single light sources. The IB-15 can also be used to measure the directional luminous intensity ("candlepower") of single light sources. (Requires MS-55 lens.)

Iris Diaphragm, CTD-15. A continuously-adjustable iris diaphragm which screws into the objective lens to facilitate transmittance, reflectance and other relative measurements. Not available with the PR-1600. (Requires MS-55 lens.)

LED Measuring Filters, Opt. 33-0*, 33-1*, 33-2*. Provide the closest possible photopic match over a limited spectral range, for measuring red LEDs and other narrow band red sources. LED-630 and LED-670 for red LEDs with the PR-1500 SpotMeter, and LED 600-700 for red LEDs with the PR-1600 SpotMeter. The standard photopic filter in the PR-1500 and PR-1600 is the filter of choice for green and amber LEDs. **LED Receptor, LR-15*/LR-16*.** An adapter designed to put the LED under test a fixed distance from the detector in the SpotMeter, for luminous intensity or radiant intensity measurements. (Requires MS-55 lens.)

MacroSpectar Lenses*

MS-55. The MS-55, the standard objective lens on all PR-1500 and PR-1600 instruments, is a variable focus lens with a working distance of from 1.75 in. (44.5 mm) to infinity. At 1.75 in., it has a magnification coefficient of 1:1.

The following lenses reduce the measuring field size proportionally with respect to the magnification factor. For example, the MS-10X lens reduces the measuring 10 times with respect to the MS-1X. The working distances are calculated from the front of the lens to the subject.

MS-1X. The MS-1X lens is a fixed focus lens with 1:1 magnification with a working distance of 3.8 in. (96.5 mm).

MS-165. A fixed focus lens with a magnification factor of 1:1 and a working distance of 6.5 in. (165 mm).

MicroSpectar Lenses*

MS-2.5X. Fixed focus objective with a magnification factor of 2.5:1 and working distance of 1.76 in. (45 mm).

MS-77. Fixed focus lens with a magnification coefficient of 3:1 and working distance of 4.25 in. (108 mm). Includes a built-in filter holder that accepts 2 in. by 2 in. filters (50 mm X 50 mm).

MS-5X. Fixed focus objective with a magnification factor of 5:1 and working distance of 1.11 in. (28 mm).

MS-10X. 10:1 magnification objective with a working distance of 0.6 in. (15.2 mm).

MS-25X. 25:1 magnification with a working distance of 0.6 in. (15.2 mm).

MS-50X. High power, 50:1 magnification objective with a working distance of 0.3 in. (7.6 mm).

Polarizing Filter, PF-15/PF-16. A linear polarizing filter that mounts on the front of the objective lens. The filter's axis of polarization can be rotated over 360° in order to measure relative polarization of light. (Requires MS-55 lens.)

Portable Power Supply, PS-15/PS-16. AC Power Supply for the PR-1500 and PR-1600.

Radiometric Calibration, Opt. 65*. Available for the PR-1500, this calibration is supplied with a detector response curve, absolute calibration at 576 nm (alternate wavelengths may be specified), and correction factors normalized to the calibration point (576 nm).

Reflectance Standard, RS-1. A pre-calibrated barium sulfate plaque which has a diffuse reflectance of nearly 100%. Focusing the photometer on the plaque allows the luminance reading (in footLamberts) to be converted directly into illuminance (in footcandles).

Scotopic Response Filter, Opt. 31*. Allows the PR-1500 SpotMeter to measure as the dark adapted eye, as defined by the CIE scotopic response function, for low light level measurements.

Tripod, TR-15/TR-16. A sturdy 3-section elevator Tripod with pan/tilt friction head.

Tristimulus Filters, Opt. 32*. Three individually trimmed colorimetric response filters, making the PR-1500 SpotMeter an accurate colorimeter. (Not available with the PR-1600.)

Wide Angle Lens, WL-15*/WL-16*. A 24 mm lens to increase the measuring field coverage of the SpotMeter by 2.3X; e.g. 2.3° coverage with 1° SpotMeter.

Zoom Lens, ZL-15*/ZL-16*. A 75-205 mm zoom lens which replaces the standard objective lens to enable the user to change the size of the measuring field size over a range from approximately 0.3X to 0.75X, the normal measuring field angle. For example, the field can be varied from about 0.27° to 0.73° on all 1° SpotMeters. Focusing range with this lens is from 6.5 feet to infinity.

Notes: Dual numbers for accessories indicate that an accessory is usable on both the PR-1500 and PR-1600. When ordering accessories, select either -15 or -16 to correspond to the instrument being ordered, either the PR-1500 or PR-1600.

Items marked with an asterisk () next to their code number either require calibration with the instrument, or are internal, and therefore should be ordered simultaneously with the instrument.

All specifications subject to change without notice.
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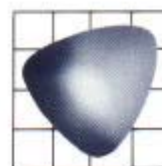


PHOTO RESEARCH®

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