

RMS 1200 Retroreflectometer

Application

Retroreflection measurement in mcd/lx. Absolute measurement method simulating nighttime conditions with a light source that is accurately regulated to standard illuminant A (2856 K). Applicable standards and regulations:

- CIE Publication No. 54.2-2001
- DIN 67520
- EN 471 High-visibility clothing
- ECE Regulations R 3, R 27, R 69, R 70, R 104 (at 10 m or 30.5 m measuring distance)
- SAE regulations J 594, J 774, J 943, J 2041 and similar regulations at 30.5 m distance
- DIN 5032-7, class A

Retroreflectometer measures automotive and traffic (pavement markers) retroreflectors

The RMS 1200 offers a hardware and software solution for absolute retroreflection measurement. The LightCon software provides graphical interface with menu driven controls for data acquisition, display, and analysis. The light source is temperature regulated to standard illuminant A, making it ready for use without long burn-in procedures. The unit can be positioned at distances of 10 m (ECE) or 100 ft (SAE). Both ECE/SAE tests can also be performed at 100 ft if desired. The motor driven detector can be controlled via PC or from front panel keypad and the remote control panel in the main control rack.

RMS 1200 offers a complete hardware and software solution for absolute retroreflection measurement, including the LightCon software, which provides a graphical interface with menu driven controls for data acquisition, display, and analysis.

In combination with the AMS goniophotometers, the RMS 1200 provides accurate measurement of the photometric properties of a variety of retroreflectors.

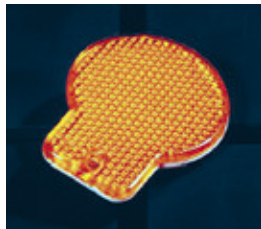


Projector

- Projector with color temperature acc. to standard illuminant A
- Measuring distance 100 ft (30.5 m) or 100 ft and 10 m
- Projector aperture: 50 mm diameter (SAE); 29 mm diameter (200 mm)
- Measuring field in 10 m: Ø 175 mm or 250 mm
- Measuring field in 100 ft: > Ø 250 mm (up to approx. 700 mm for measuring complete warning triangles according to ECE R27)
- Uniformity of illuminance < 5%
- Pre-adjusted lamp socket assembly for repeatable positioning of lamp
- Color temperature regulation to standard illuminant A (color temperature is measured and automatically adjusted; projector ready for operation after a few seconds) color temperature adjustable 2500 - 3200 K
- Housing with adjusting screws to direct the illuminant axis to the reference point of the measuring object
- Built-in power supply for 230 V, 50 - 60 Hz
- Halogen bulb, 250 W
- Illuminance on sample plane 10...65 lx (depending on measurement distance selected)
- Dimension (W x H x D): 600 x 2450 x 600 mm
- Weight approx. 75 kg

Photometer Head

- Photometer head with Si-photo element, superior approximation to the $V(\lambda)$ function
- Photopic receiver: 29 mm (ECE); 1 x 1/2 inch (25 x 12.6 mm) (SAE) (automatic diaphragm recognition)
- $V(\lambda)$ approximation ($f_1 < 2.0\%$) according to DIN 5032 section 7 CIE 54.7 and CIE Publ. No. 53 (1982)
- Individual measuring report of the photometer head
- Optical lens system for stray light reduction
- Angular resolution of detector movement: 0.001°
- Automatic tilting mechanism for detector for accurate targeting
- Auto-calibration function: Periodically, the detector will be locked against light incidence to auto-calibrate the unit, removing all influences resulting from dark currents (no check of illuminance on sample plane required as for conventional retroreflectometers)
- Precision operational amplifier with additional voltage/current converter
- Projector and photometer head are built into one housing and adjusted within the observation plane



Reflex reflector

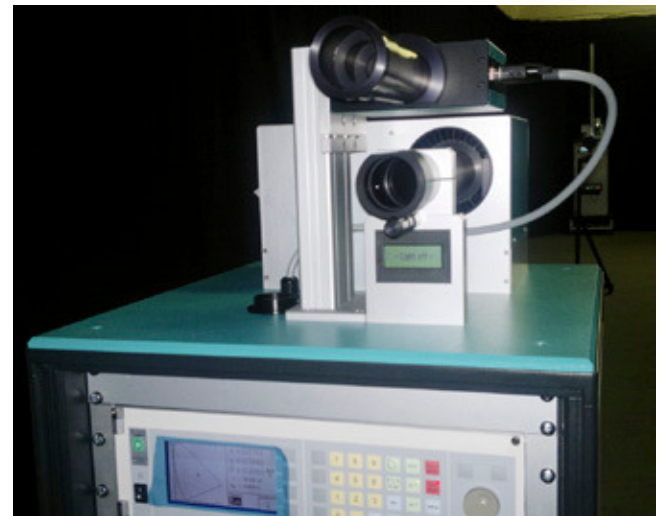
RMS Versions

Measurement distance	Minimal observation angle	Maximal observation angle
10 m	0.2°	4.5°
10 m	0.333°	4.5°
10 m	0.333°	2.0°
15 m	0.2°	2.0°
15 m	0.1°	2.0°
30,5 m (100 ft)	0.2°	1.5°
30,5 m (100 ft)	0.2°	2.0°
30,5 m (100 ft)	0.1°	2.0°

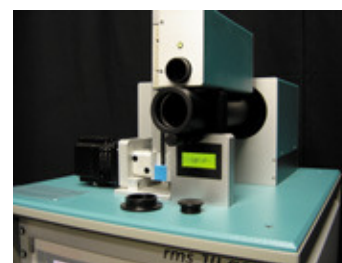
Other versions on request

Electronic display and control unit

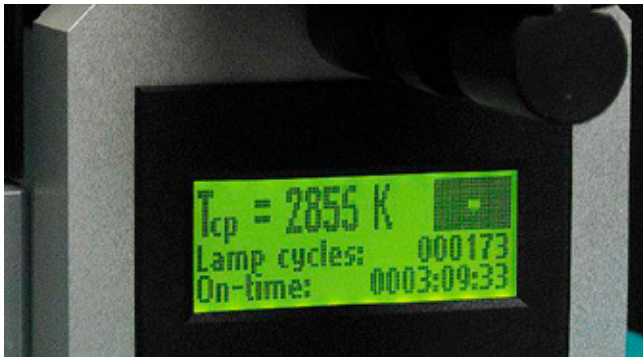
- 2 display and control units, one in the instrument, another in the main control rack of the goniometer (option)
- Five-digit display of measuring values
- Display range 0.1 mcd/lx (last digit) to $199\,900 \text{ mcd/lx}$ (maximum)
- For samples with a size of $10 \times 10 \text{ cm}$, the corresponding range of the coefficient of retroreflection is $R' = 0.01 - 19990 \text{ cd/lx/m}^2$
- Range selection automatically
- Resolution 0.025% of maximum in the selected range
- Absolute measuring error $< \pm 1.5\% \pm 1$ digit against PTB standard
- Graphic LC display, background illuminated with information on lamp cycles, total burning time, projector temperature, illuminance on sample plane in lux, auto-calibration function if in progress, mode of operation (ECE/SAE) angular position with 0.001° resolution
- Repeatability error $< \pm 0.2\% \pm 1$ digit
- Linearity error $< \pm 0.15\% \pm 1$ digit
- Digital display for observation angles with resolution of 0.001°
- Selection of observation angles manually or automatically via RS232 bus interface
- Switch for projector lamp for zero-setting
- Built-in power supply for 230 V, 50 - 60 Hz
- Calibration of RMS traceable to PTB standard, with calibration certificate.



RMS 1200 Color for measuring color of reflex reflectors

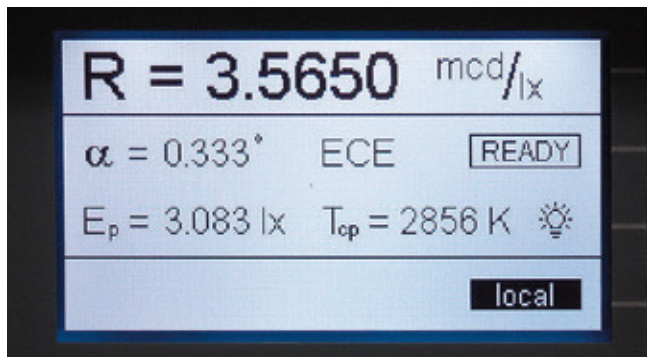


Color temperature regulated projector



Projector display indicating:

- Color temperature
- Lamp cycles
- Burning time of bulb



Graphic LC display indicating:

- Retroreflectance value in mcd/lx
- Mode of operation (local or remote operation, ECE, SAE, autocalibration in progress)
- Color temperature in K
- Illuminance on sample surface
- Observation angle

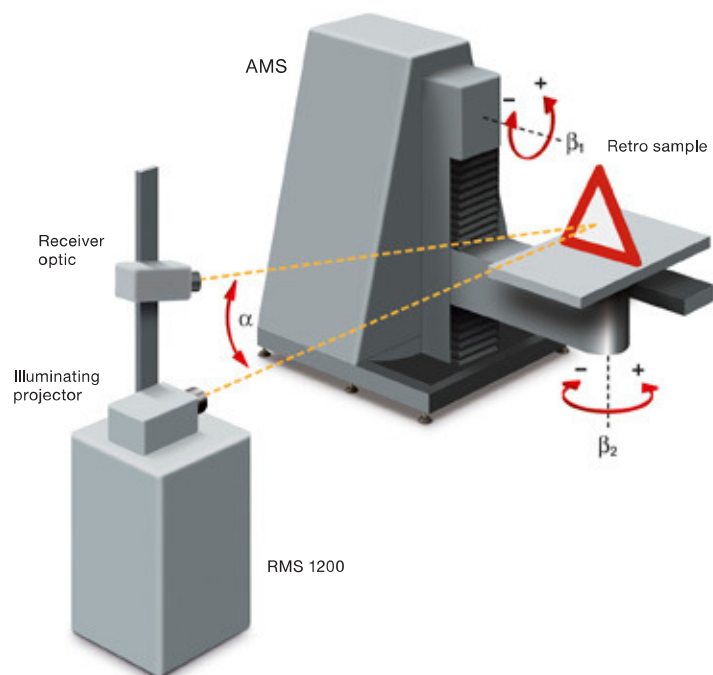
Feature

- Time and cost saving operation due to color temperature regulation (ready for use after a few seconds – no burn-in time required as for conventional retroreflectometers)
- Auto-calibration function; no additional luxmeter required to check the illuminance on the sample plane.
- Moveable detector enables the system to record complete retro slices and grids to get information about the complete light distribution, not just at a few points
- All functions can be controlled at the instrument itself, from the main control rack (remote display), and by PC command

Options

- Docking stations for repeatable positioning if used at both 100 ft and 10 m
- Different goniometer types for sample rotation
- RMS10 color ECE to measure both retroreflection and color of retroreflectors according to ECE regulations
- Observation angle down to 0.1°
- LightCon Retro software module for automatic and PC controlled operation with goniometer
- EN 471 software
- EPS 10 epsilon rotation unit for traffic reflex reflectors
- Single axis goniometer for measurement EN 471
- TÜV conformity certificate.

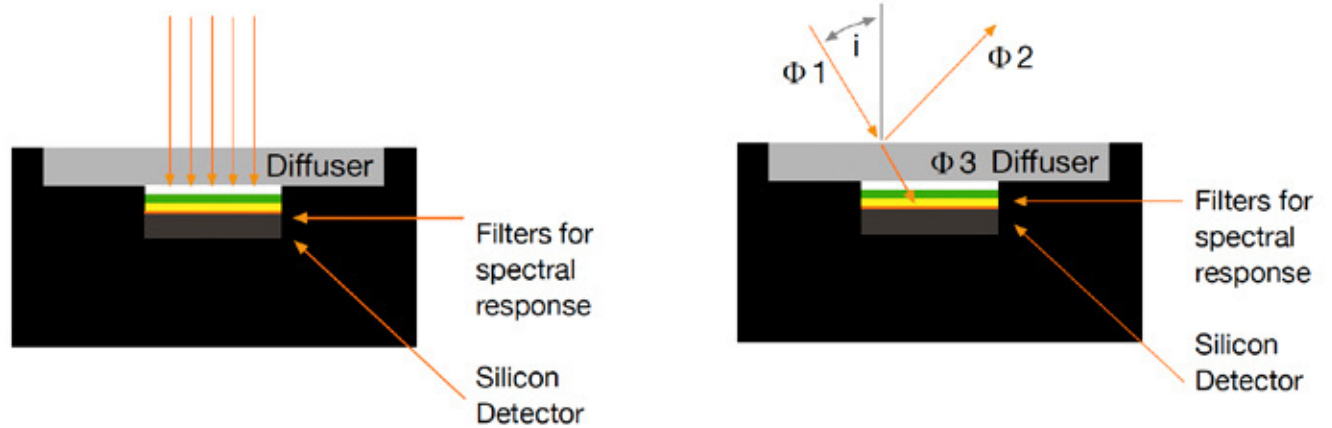
Measurement method



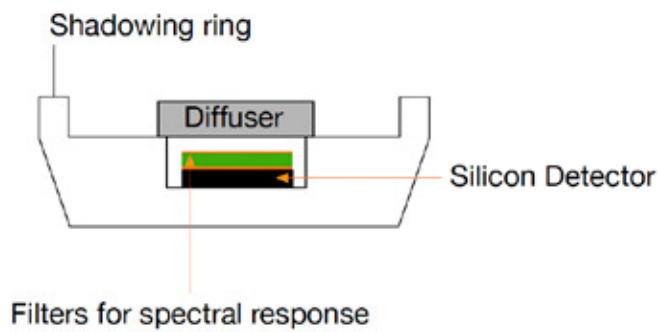


The quality of our photometer heads represents the highest level of technology according to DIN 5032-7, CIE Publication No.69, DIN-EN 13032-1

Construction scheme detectors



Detector without cosine correction



Detector with cosine correction

Light-sensitive detectors

- Si-photoelements of excellent quality and longtime stability
- Classified and selected for specific applications
- Illuminance and photocurrent absolutely proportional

Relative spectral responsiveness

- Approximated to the spectral luminous efficiency $V(\lambda)$ of the human eye (according to CIE, DIN)
- Excellent $V(\lambda)$ approximation by full filtering, error f_1^f (CIE) resp. f_1^f (DIN) < 1.5 %.
- Superior $V(\lambda)$ approximation by full filtering, error f_1^f (CIE) resp. f_1^f (DIN) < 2.5 %
- UV and IR response < 0.1 %

Influence of non-uniform illumination

- Due to full filtering excellent repeatability even for non-uniform illumination of the detector surface error f_9

Directional response

- Photometer heads for perpendicular light incidence
- Cosine correction for measurement of illuminance by light incidence from different directions, error f_2 (CIE, DIN) < 1.5 %

Temperature independence

- Without thermostatic stabilization $\alpha_0 < 0.1$ %/K
- With thermostatic stabilization $\alpha_0 < 0.01$ %/K

Sensitivity

- Measurement down to 0.01 mlx in conjunction with high precise photocurrent amplifiers

Light sensitive surface

- Light sensitive surfaces 6, 10, 12, 30 mm Ø, 10 x 10 mm, and user specified diameters

Special detectors

- Photometer heads in rain-proof housing and with heating device for outdoor installation
- Special detectors for integrating sphere applications (ITS, KMS 500)

Technical data and calibration

- Individual test report for relative spectral responsiveness
- Individual test report for directional response
- Specified errors acc. to DIN 5032 Section 7, EN-DIN 13032-1 and CIE Publ. No. 69 (1987)
- Inhouse certificate for calibration against luminous intensity standard lamp with calibration certificate from PTB (Physikalisch- Technische Bundesanstalt, Germany), uncertainty of calibration standard ± 0.6 %, NIST traceable calibration on request

Photopic detectors overview

Customized detectors available on request

Version	Light sensitive surface	V(λ) re- sponse	Cos. correction	Thermostatic stabilization	Classification DIN 5032	Display unit	Maximal display resolutions	Highest value	Accessories	Weight dimensions
FE10-6A	6 mm	< 2.5 %	Yes	No	A	Digilux	0,1 mlx	2 mlx	Connecting cable with Lemos a plug, individual detector report	21,5 Ø x 28,5 mm 35 g
FE10-6AEX	6 mm	< 2.5 %	Yes	Housing for outdoor installation with heating system for temps down to -20°... +35°	A	Digilux	0,1 mlx	2 mlx	Connecting cable with Lemos a plug, individual detector report	21,5 Ø x 28,5 mm 35 g (without housing)
FE10-10A	10 mm	< 2.5 %	Yes	Yes	A	Digilux	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-12A	12 mm	< 2.5 %	Yes	Yes	A	Digilux	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-10A	10 mm	< 1.5 %	Yes	Yes	L	Digilux	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-12A	12 mm	< 1.5 %	Yes	Yes	L	Digilux	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-30A	30 mm	< 2.5 %	No	Yes	A	Digilux AMS DSP 10	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-30L	30 mm	< 1.5 %	No	Yes	L	Digilux AMS DSP 10	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-10A	10 x 10 mm	< 2.5 %	No	Yes	A	AMS DSP 10	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
FE10-10L	10 x 10 mm	< 1.5 %	No	Yes	L	AMS DSP 10	0,1 mlx 0,01 mlx (option)	200 klx	Connecting cable with Lemos a plug, individual detector report	50 Ø x 50 mm 150 g
CE10-14	14 mm	< 1.5 %	No	Yes	L (Y channel)	CM 10	0,1 mlx	600 klx	Connecting cable with Lemos a plug, individual detector report	-

Options: 4-pin plug | 4-pin connector | Cable extensions: 5, 10, 15, 20, 25 m | PTB certificate

We bring quality to light.



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