Measurement of the Coefficient of retroreflected luminance $R_a$ (nighttime retroreflection) of road traffic signs, high visibility clothing, license plates and reflective tapes.

**Geometry**

Road traffic signs: EN 12899, ASTM E-1709 & ASTM E-2540

High visibility clothing: EN 20471 & ASTM E-1809

**GRX-1**

- Entrance / illumination angle: -4° or +5°
- Observation angle: 0.2° or 0.33°

**GRX-3**

- Entrance / illumination angle: -4° or +5°
- Observation angles: Three angles of 0.2° 0.33°, 0.5°, 0.7° 1.0°, 1.5°, 2.0°

**GRX-7**

- Entrance / illumination angle: -4° or +5°
- Observation angles: 0.2° 0.33°, 0.5°, 0.7° 1.0°, 1.5°, 2.0°

Further entrance angles are offered as easy changeable front adapters for special measurement purposes: 10°, 20°, 30°, 40° & 45°.

The instrument uses point aperture geometry which enables the user to determine if direction sensitive microprismatic sheeting is correctly positioned on a sign.

**Typical accuracy**

- Repeatability: +/- 2%
- Reproducibility: +/-5%

**Measurement specifications**

- $R_a$ and color recognition measured by sensors
- Barcodes and QR codes measured by digital camera
- Field of measurement: Ø: 25 mm / 1.0 inch
- Spectral responsitivity: According to ASTM E-1709 & E-2540
- Range (cd lx⁻¹ m⁻²): 0 - 2000
- The instrument automatically detects and compensates for ambient light.

**Instrument dimensions & material**

- Length: 270 mm / 10.6 in
- Width: 110 mm / 4.3 in
- Height: 285 mm / 11.2 in
- Weight: 1.9 kg / 4.2 lbs
- Housing: ABS polymer

**Regulatory compliance**

**EU**

The equipment complies with the following directives of the European Parliament and of the Council:

- Directive 2011/65/EU of 8 June 2011 on restriction of the use of certain hazardous substances (RoHS).

The equipment is tested to the following standards:

- R&TTE article 3.1a (health & safety):
- R&TTE article 3.1b (electromagnetic compatibility):
  - EN 301489-1 V1.8.1:2008
  - EN 301489-3 V1.4.1:2002
- R&TTE article 3.2 (radio parameters):
  - EN 300440-2 V1.4.1:2010

**USA**

The equipment complies with the following rule part of the Federal Communications Committee:

- FCC CFR 47 Part 15 Subpart B, Class A.

The equipment complies with the following safety specification:

- IEC 60950-1:2005 (2nd Edition); Am 1:2009

**Electrical characteristics**

- Power supply:
  - Rechargeable and replaceable Li-Ion 10.8 V 2.0 Ah
- External chargers:
  - 230 V / 50 Hz
  - 110 V / 60 Hz
- Charge time: approx. 45 min
Data
Data memory: > 2 mio. measurements without pictures
> 2.000 measurements with pictures
Interface: USB memory stick (standard, to PC), WiFi (optional, to iPad).

Location Positioning System (GNSS)
Latitude/longitude format: Decimal degrees
Datum: WGS 84

WiFi and wireless radios
Frequency band: 2400 to 2480 MHz
Maximum transmitted radio-frequency power: Below 93mW

Environmental specification
Temperature:
· Operating: 0°C to +60°C / +32°F to +140°F
· Storage: -10°C to +60°C / +14°F to +140°F
· Recommended storage: 0 to +30°C / +32 to 86°F
· Humidity: 85%, non-condensing

Timing
Measurement time: 1 sec.

Standard features
· Fast and simple calibration by scanning QR code
· Use of templates for uniform measurement series
· Automatic average calculation for 2 – 10 measurements
· Automatic pass/fail on colors and/or color contrast
· Sign background and legend contrast
· User ID
· Sign ID with multiple sign data entry options
· Data processing and mapping in existing software

Scalability
RetroSign GRX may be upgraded with additional features after initial purchase. The upgrade comes with a price tag, is done by scanning a QR code, and will work instantly.

Warranty
2 years

R&TTE Declaration of Conformity (DoC) and US Attestation of Conformity (AoC) can be supplied by DELTA upon request or viewed on: roadsensors.madebydelta.com/technical-background/certification

Add-ons
· Built-in camera for picture of sign
· Built-in barcode and QR code reader
· Built-in GPS
· Built-in wireless communication
· Instrument rotation and tilt
· Sign face direction (compass)
· MUTCD library
· Additional entrance angles of 10°, 20°, 30°, 40° & 45°
· Extension Pole Kit, 1.5-2.7 m / 4.9-8.9 feet
· App for data back-up, processing and mapping on tablet

DELTA
Venlighedsvej 4
2970 Hørsholm
Denmark
Tel. +45 72 19 40 00
roadsensors@delta.dk
roadsensors.com