



# The RetroSign GRX retroreflectometer features

*The professional choice for measuring all types of retroreflective sheeting on road traffic signs, high visibility clothing, license plates and conspicuity tapes*

## The RetroSign instrument

RetroSign GRX is the most advanced retroreflectometer available on the market currently for measuring retroreflection of road traffic signs, high visibility clothing, license plates and conspicuity tapes. RetroSign GRX is built in accordance with existing standards to allow for retroreflection measurement of various colours and all type of retroreflective materials including fluorescence types. RetroSign GRX uses a LED light source and meets the sensor response as stated in ASTM E 1709 for combining the CIE eye response and CIE illuminant 'A'.

RetroSign GRX has a rugged design and is built for long-lasting field work even if it can also be used in the laboratory. The software is simple and intuitive and guides the user through the different steps of a measurement program. RetroSign GRX allows the user to create templates with almost unlimited measurement related information (pre-defined or specific entries) of series of measurements with the same basic data. An ID for the user can be entered.

## Standard compliance

RetroSign GRX complies with the following standards: EN 12899 (road traffic signs), EN 20471 (high visibility clothing), ASTM E 1709 & ASTM E 2540 (road traffic signs), ASTM E 1809 (high visibility clothing) and ECE 104 (conspicuity tapes).

## Technology

RetroSign GRX is based on point aperture geometry comparable to laboratory readings reflecting real-world driving conditions and allows detection of incorrect application of direction sensitive microprismatic sheeting.

RetroSign GRX uses advanced sensor technology to allow for measurement of up to seven observation angles in addition to automatic colour recognition. The angles available to the user are:

0.2°; 0.33°, 0.5°, 0.7°, 1.0°, 1.5° and 2.0°. A built-in digital camera makes it possible to take pictures of signs as well as scan barcodes and QR codes for asset management purpose.

The man-machine user interface is through a large 5" WVGA colour touch display clearly visible even in bright sunshine. The instrument automatically detects and compensates for ambient light present which could affect the measurement result.



The working range of the instrument is 0 – 2.000 cd x lx<sup>-1</sup> x m<sup>-2</sup>.

## Scalability

GRX scalability - also after purchase - is an extremely powerful feature. Users can upgrade their system in the field as their needs change. The GRX comes with all features but just those paid for are made available.

## Instrument types

RetroSign GRX is offered in three base models where the figure tells the number of observation angles offered

- **GRX-1** (1 entrance and 1 main observation angle)
- **GRX-3** (1 entrance and 3 observation angles)
- **GRX-7** (1 entrance and 7 observation angles)

The entrance angle is provided as a front adapter with one of the two standard angles of -4° (ASTM) or +5° (CEN) supplied with the instrument. Further entrance angles of +10°, +15°, +20°, +30°, +40° and +45° are offered for special measurement purposes. In





# Retrosign GRX

## Specifications

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

Conspicuity tape: ECE 104

### GRX-1

- Entrance / illumination angle:  $-4^\circ$  or  $+5^\circ$
- Observation angle:  $0.2^\circ$  or  $0.33^\circ$

### GRX-3

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

### GRX-7

Geometry:

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

Further entrance angles are offered as easy changeable front adapters for special measurement purposes:  $10^\circ$ ,  $15^\circ$ ,  $20^\circ$ ,  $30^\circ$ ,  $40^\circ$  &  $45^\circ$ .

For ECE 104 a multi-angle entrance angle adapter with  $\pm 5^\circ$ ,  $20^\circ$ ,  $30^\circ$ ,  $40^\circ$  and  $60^\circ$  angles is offered.

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:  $\pm 2\%$
- Reproducibility:  $\pm 5\%$

### Measurement specifications

$R_A$  and color recognition measured by sensors

Barcodes and QR codes measured by digital camera

Field of measurement,  $\varnothing$ : 25 mm / 1.0 inch

Spectral responsivity: According to ASTM E-1709 & E-2540

Range ( $\text{cd}\cdot\text{lx}^{-1}\cdot\text{m}^{-2}$ ): 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 Council. The radio equipment directive (RED) (2014/53/EU)

Safety – article 3 (1) (a):

- Electrical safety: EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + AC2011 + A2:2013
- EMF: EN 62311:2008
- Photobiological safety: EN 62471:2008

EMC – article 3 (1) (b) EN 301 489-1 V2.1.1:2011

Radio – article 3 (2) and 3 (3):

- EN 300 328 V2.1.1:2016
- EN 303 413 V1.1.1:2017

#### US

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

- 47 CFR Part 15B, subpart 15.107 (class B)
- 47 CFR Part 15B, subpart 15.109 (class B)

The equipment is accredited safety test with the internationally harmonized safety standard:

- IEC 60950-1:2005 (Second Edition) + Am 1:2009 + Am 2:2013

#### CANADA

- ICES-003:2016 (Class B)

## 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).

## 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 delivery

- RetroSign GRX instrument
- One angle adapter (-4° ASTM, +5° CEN)
- Carrying case
- Calibration reference with DANAK calibration certificate
- Two batteries
- Battery charger (110 or 230 V)
- Quick guide
- User manual is available on [www.roadsensors.com](http://www.roadsensors.com)
- USB memory stick for data transfer

## 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°, 15°, 20°, 30°, 40° & 45°
- ECE 104 multi-angle adapter
- Extension Pole Kit, 1.5-2.7 m / 4.9-8.9 feet

## 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](http://roadsensors.madebydelta.com/technical-background/certification)*

