



# The LTL-XL & LTL-X Mark II retroreflectometer features

*The professional choice for measuring the retroreflection of road markings*

## LTL-XL & LTL-X Mark II instruments

LTL-XL and LTL-X Mark II are robust, long lasting and advanced instruments, designed for professionals using the latest developments in light and sensor technology. Using DELTA's gradient index technology and patented optical system, the instruments can measure all types of flat and profiled markings. The sensor response, combining the CIE eye response and the CIE illuminant A, meets both CEN and ASTM requirements for profile capacity and colour.

LTL-XL and LTL-X Mark II comply with the following standards: EN 1436, ASTM E 1710, ASTM E 2177, ASTM E 2302, ASTM E 2832

## General features

- Memory capacity for 200.000 measurements
- Multiple language menu
- Easy readable colour LED display
- GPS positioning
- Data presentation on Goggle Earth
- USB interface
- Stray light compensation
- Shows and stores day, time, humidity and temperature
- Facility for entering and storing of road ID, marking type and user ID
- Facility for averaging measurements
- Wet timer to facilitate measuring wet road markings
- Comes with maintenance free LED light
- Single handed operation, user-friendly



## The LTL-XL specific features

- $R_L$  and  $Q_d$  under dry and wet conditions
- Short measurement time of 1-3 seconds
- Measures plain and profiled markings up to 5 mm/0.2 inch



## The LTL-X Mark II specific features

- $R_L$  under dry, wet and continuous wetting
- Short measurement time of less than 1 second
- Measures plain and profiled markings up to 15 mm/0.6 inch

## Performance

LTL-XL and LTL-X Mark II measure all types of road markings at a simulated distance of 30 m with the highest level of accuracy. The instruments operate with a reproducibility of  $\pm 5\%$  and a repeatability of  $\pm 2\%$ .

LTL-XL and LTL-X Mark II measure, depending on the model chosen,  $R_L$  (nighttime visibility),  $Q_d$  (daytime visibility), visibility under dry, wet and continuous wetting.

LTL-XL and LTL-X Mark II measure white and yellow markings with no adjustment.

LTL-XL and LTL-X Mark II have automatic stray light compensation, so daylight and other outside light sources will not affect the accuracy of the measurements.

The Road Sensor Control (RSC) software supplied with the instrument, combined with the USB interface, makes it easy to download data and generate reports like MS-Excel reports. GPS data can easily be transferred to a GPS program like Goggle Earth for visual overview showing the results and where measurements have been taken.

## Add-ons

LTL-XL and LTL-X Mark II can be fitted with telescopic handle and wheels to make the handling of the instrument ergonomic and easy. The adjustable handle will allow the operator to work in upright position, and the wheels make it easy to move the instrument to a new measurement location. All operations can be carried out single-handed with single-touch securing easy and safe use in traffic.

LTL-XL and LTL-X Mark II can be fitted with built-in precision GPS and printer. GPS makes it possible to determine exactly where any specific measurement has been carried out. The printer can provide you with immediate written proof of a measurement. The internal

memory automatically stores the measurements with relevant support data.

## Calibration standards

LTL-XL and LTL-X Mark II instruments are calibrated at DELTA's DANAK-accredited laboratory and assuring traceability to PTB (Physikalisch-Technische Bundesanstalt, Germany) and NIST (National Institute of Standards and Technology, USA). The recommended daily calibration of the instruments is simple and easy to carry out.

## Contact and further information

For further information about DELTA's LTL-XL and LTL-X Mark II, please contact:



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Telescopic handle



Wheels



Printer



GPS

## DELTA

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# LTL-XL

## Specifications



### Optical specifications

Field of measurement:

- Width: 50 mm / 1.97 in
- Height: 185 mm / 7.28 in

Illumination angle  $R_L$  EN 1436: 1.24°

Illumination angle  $R_L$  ASTM E 1710: 88.76°

Observation angle  $R_L$  EN 1436: 2.29°

Observation angle  $R_L$  ASTM E 1710: 1.05°

Illumination angle Qd: Diffuse

Illumination angular spread:

- Horizontal: / Vertical: 0.33 / 0.17°

Observation angular spread:  $\pm 0.17^\circ$

Equivalent observations distance: 30 m

$R_L$  range ( $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$ ) 0 - 2000

Qd range ( $\text{mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$ ) 0 - 318

### Instrument dimensions

Length: 573 mm / 22.56 inch

Width: 222 mm / 8.74 inch

Height: 538 mm / 21.18 inch

Weight: 7 Kg / 15.5 lbs

### Construction:

Structural parts: Aluminum

Housing: Polymer

Keyboard: Silicone rubber

Circuit boards: Epoxy glass

### Regulatory compliance

Radio: EN 300440-1 V1.6.1:2010

EMC: EN 301489-1 V1.8.1:2008, EN 301489-3 V1.4.1:2002

Safety: EN/IEC 60950-1 :2006, EN/IEC 60950-22 :2006

FCC: 47 CFR, FCC Part 15B, Class A

### Electrical characteristics

Power supply:

Battery: Built in 12 volt / 2.1 Ah NiMH or 12 volt / 4.5 Ah NiMH

High Power

Charging time: Approx. 1 hour 30 min / 3 hour 30 min

External charger power supply: Friwo FW7530/15

(100-240 VAC / 15VDC )

Charger fuse (5\*20 mm): T3.15A

Power supply fuse (5\*20 mm): T3.15A

### Data

Data memory: >200.000 measurements

Data transfer: USB 2.0

Typical repeatability: +/- 2%

Typical reproducibility: +/- 5%

### Environmental specification

Temperature:

- Operating: 0°C to +60°C / 32°F to 140°F
- Storage: -15°C to +60°C / 5°F to 140°F
- Humidity: <85%, non condensing

### Timing

Measurement time: Qd or  $R_L$  1 sec. /  $R_L$  + Qd : 3 sec.

### Standards

EN 1436 ( $R_L$  & Qd), ASTM E-1710 ( $R_L$ ), ASTM E-2177 ( $R_L$  wet), ASTM E-2302 (Qd)

### Features

- Night time ( $R_L$ ) and daytime (Qd) visibility measurement
- Ergonomic and easy-to-use lightweight design.
- Single handed operated and user-friendly
- Air humidity and temperature recorded
- Safeguarded for the future with seamless connection to any system, such as PCs and PDAs
- Measures plain and profiled markings up to 5 mm / 0.2 inch
- Measures dry and wet markings
- Measurement statistics
- ID functions (road, operator, line type, colour)
- Multilingual menu
- Data storage and communication
- Software for PC downloads
- Stray light compensated

### Standard delivery

- LTL-XL Retroreflectometer
- Transportation box on wheels
- Calibration standard with DANAK certificate
- Battery charger
- Quick guide

## Downloads

To be downloaded from [www.roadsensors.com](http://www.roadsensors.com) under 'Products':

- LTL-XL user and PC software manuals
- LTL software pack. Provide automatic download of driver and RSC software

## Options

- Built-in GPS
- Adjustable telescopic handle
- Wheels
- Built-in printer

## Approval

StrausZert, Test no 0913-2010-07

## 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)*

