



## LTL3500 retroreflectometer features

LTL3500 is part of a new generation of DELTA retroreflectometer instruments for measuring retroreflection of road markings. The instrument is based on the latest technological developments and with modern design and materials. LTL3500 is, like all other DELTA instruments, very easy to calibrate and operate, we like to say "very user-friendly". And the instrument is of course robust and long lasting – like our earlier generations of road marking retroreflectometers. On top of this it is small in size (470 x 280 x 150 mm / 18.0 x 11.0 x 5.9 inch) and light in weight (5.6 kg / 12.3 lbs).

LTL3500 is especially suitable for persons, who carry out measurement programs with many measurements – the instrument software can assist in structuring the measurements for easy overview when reviewing results. LTL3500 offer a number of features, which allow for collection of additional information linked to the measurements than just retroreflection information, this includes photo documentation. The extendable handle ensures an ergonomic correct working position. Still, the instrument is small and lightweight making transport of the instrument easy.

The instrument complies with international standards like: EN 1436, ASTM E 1710, ASTM E 2177, ASTM E 2302, ASTM E 2367 and ASTM E 2832.

### General features

- Simultaneous  $R_L$  and Qd for dry & wet markings
- $R_L$  for continuous wetting
- Measurement time less than 1 sec for both  $R_L$  and Qd
- Measures  $R_L$  on profiled markings up to 15 mm / 0.6 inch
- Ambient temperature and humidity
- Memory capacity 8GB
- Multi-lingual
- Average calculation
- Easy-readable color touch LED display with 3 buttons
- Long-life illumination system
- USB memory stick
- Wi-Fi prepared

- Power supply, standard Bosch professional battery
- Shows and stores date, time, air temperature, and humidity
- Facility for entering and storing road ID, user ID and other measurement related data
- Data presentation in Excel
- Stray light compensated
- Single handed operation, user-friendly
- "Time for Service" indicator
- Calibration reminder
- Wet timer
- Pass-fail Indicator

### Optional features

- Qd
- Daylight contrast (requires Qd)
- Marking temperature
- Road Icon references
- GNSS positioning
  - Latitude / Longitude format: Decimal degrees
  - Datum: WGS 84
- Data presentation in Google Earth
- Nighttime color (x,y) for  $R_L$  measurements (white & yellow)
- Color Box reading
- Macro and overview cameras
- Orientation (compass, instrument tilt)
- Wi-Fi API & Web App (SW feature under development)
- User defined data linked to measurement (3rd party equipment)
- Add note to measurement
- Add roadmaking Icon to measurement
- External printer

### Performance

LTL3500 measure all types of road markings at a simulated distance of 30 m with a high accuracy. The instrument operates with a reproducibility of +/- 5 % and a repeatability of +/- 2 %. LTL3500 has 15 mm / 0.6 inch profile depth capacity for  $R_L$ .

LTL3500 measures  $R_L$  (nighttime visibility) and Qd (daytime visibility) under dry and wet conditions as well as under continuous wetting (only  $R_L$ ). LTL3500 measures  $R_L$  from 0 to 4.000 mcd/lx/sqm and Qd from 0 to 318 mcd/lx/sqm. The instrument can in addition measure nighttime chromaticity coordinates (x,y) according to ASTM E 2367 and CIE 1931.

LTL3500 has automatic stray light compensation. Daylight and other outside light sources will not affect the accuracy of the measurements.

LTL3500 measurement data can be exported to commonly available software like Excel and Google Earth.

### **Calibration standards**

LTL3500 instruments comes with a  $R_L$  calibration reference calibrated by DELTA in our DANAK-accredited laboratory in accordance with ISO 17025 and assuring traceability to PTB (Physikalisch-Technische Bundesanstalt, Germany) and NIST (National Institute of Standards and Technology, USA).

LTL3500 is factory calibrated for the Qd value and thus Qd should only be re-calibrated when needed. instruments with Qd comes with a Qd calibration marking which can be used for verification and, if necessary, for calibration. The Qd calibration reference is not DANAK accredited but a laboratory transfer of a DANAK accredited calibration reference.

The recommended daily calibration of the instruments is fast and easy to carry out.

### **Color coordinates (x,y)**

LTL3500 measures nighttime retroreflected color – CIE chromaticity - for white and yellow markings according to EN1436, ASTM D6628 and ASTM E2367.

### **Certification**

All DELTA's instruments are meeting regulatory compliance according to European and US standards for radio and EMC emission as well as workers safety. Documentation on regulatory compliance can be requested from DELTA.

#### **DELTA - a part of FORCE Technology**

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