



The LTL-M mobile retroreflectometer features



Video overlay

The software supplied with the instrument generates an easy-to-read txt.file and/or Excel file, a graph and a google earth map for measurement evaluation and presentation. LTL-M lends itself to remote service and easy software upgrades through internet link-up when new advanced road marking analysis is offered.

The LTL-M calibration reference is calibrated at DELTA's DANAK-accredited laboratory and is traceable to standards issued by PTB (Physikalisch-Technische Bundesanstalt, Germany) and NIST (National Institute of Standards and Technology, USA). The instrument itself does not need re-calibration unless damaged – except for a recommended calibration of the LTL-M calibration reference every 2 years. The recommended once-daily field calibration of the instrument is simple and fast to carry out.

DELTA offers service of the instrument at its factory and re-calibration of the calibration unit at its DANAK-accredited laboratory.



LTL-M GUI tablet PC

The LTL-M features in brief

- Provides continuous measurements of full width and length of markings at traffic speed
- Digital camera and real-time image processing
- Measures RL under dry conditions
- Measures 1x1 m/3x3 feet pr picture, 25 picture per sec.
- Accuracy in line with hand-held retroreflectometers
- Measures daylight contrast
- Measures plane and profiled markings up to 25 mm/1 inch
- Shows and stores day and time
- Records road studs (RRPMs)
- Records line width
- Provides average values between 1 m/3 feet and indefinite

Straus Zert certification

Test Certificate No. 0913-2011-02 on the suitability of the LTL-M dynamic retroreflectometer for the dynamic measurement of the coefficient of retroreflected luminance RL of road marking.

Overall assessment:

The LTL-M retroreflectometer is suitable for the dynamic measurement regardless of speed, of the coefficient of retroreflected luminance RL of road markings, and delivers the same results as a static retroreflectometer

StrausZert, Germany, December 6, 2011

LTL-M complies with the following standards

EN 1436 (R_L), ASTM E 1710 and EN 1463-1.
US patent no.: US 9,176,057 B2

Contact and further information

For further information about DELTA's LTL-M mobile retroreflectometer please contact:



Kjeld Aabye
Market Manager

Phone +45 72 19 46 30
kaa@delta.dk
roadsensors.com

DELTA - a part of FORCE Technology

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





LTL-M

Specifications



System overview

The LTL-M system consists of:

Sensor: 500 x 180 x 200 mm/19.7 x 7.1 x 8.0 in

12.5 kg/28 lbs

Processor: 400 x 170 x 200 mm/ 16.0 x 6.8 x 8.0 in

8 kg/18 lbs

Tablet PC: 256 x 175 x 10 mm/10.0 x 6.9 x 0.4 in

0.6 kg/1.3 lbs

The LTL-M light source is a flash system. The LTL-M measurement system consists of a digital camera and proprietary software.

Optical specifications

Field of measurement: 1000 x 1000 mm / 39.4 x 39.4 in

Illumination angle R_L : According to EN 1436 and ASTM E 1710

Observation angle R_L : According to EN 1436 and ASTM E 1710

LTL-M works based on reversed geometry, this is according to ASTM E 1767.

Illumination angular spread:

- Horizontal: 0.33°
- Vertical: 0.17°

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

Equivalent observation distance: 30 m

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

RRPMs/Road studs: 2 % level for new (white), 0.14 CIL value

Regulatory compliance

EU

The LTL-M system without GPS unit complies with the following directives of the European Parliament and of the Council:

- Directive 2004/104/EC of 14 October 2004 relating to the radio interference (electromagnetic compatibility) of vehicles and amending Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers.
- Directive 2011/65/EU of 8 June 2011 on restriction of the use of certain hazardous substances (RoHS).
- Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

The LTL-M system without GPS unit complies with Regulation No. 10 of the Economic Commission for Europe of the United Nations (UN/ECE) - Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility:

- UN ECE R10 revision 3

The equipment is tested to the following standards:

Automotive Directive:

- CISPR 25:2008
- ISO 7637-2:2004+A1
- ISO 11452-2:2004
- ISO 11452-4:2011
- ISO 10605:2008

The LTL-M GPS unit complies with the following directives of the European Parliament and of the Council:

- Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment.
- Directive 2011/65/EU of 8 June 2011 on restriction of the use of certain hazardous substances (RoHS).
- Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

The equipment is tested to the following standards:

R&TTE article 3.1a (health & safety):

- EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011

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 LTL-M system including GPS unit complies with the following rule part of the Federal Communications Committee:

- FCC CFR 47 Part 15, Subpart B, specific rule parts §15.5 & §15.29.

The incorporated GPS module is not an intentional transmitter in FCC definitions, and the LTL-M system is exempted from other rule parts that the specifically mentioned pursuant to §15.103.

As automotive equipment, the LTL-M system is exempted from safety testing under authority of OSHA.

Electrical characteristics

Power supply: 12 V vehicle power/15 A

Environmental specification

Temperature:

- Operating: 0°C to +45°C / 32°F to 113°F
- Storage: -15°C to +55°C / 5°F to 131°F
- Humidity: 85%, non condensing

Data

Typical repeatability: +/- 3%

Typical reproducibility: +/- 5%

Standards

EN 1436 and ASTM E-1710 for pavement markings

EN 1463-1: 1997 for RRPMS

Features

- Continuous measurement of night time visibility (R_L) of road markings at driving speed
- Automatic compensation for vehicle movements (Patented)
- Measures daylight contrast and line geometry
- Measures presence of road studs (RRPMs)
- Measures all types of plain and profiled markings
- Measures retroreflection of white and yellow markings
- Measures dry markings
- Measures profiles up to 25 mm / 1 in
- Stop and mark function during operation
- Measured data are automatically stored
- Multilingual menu
- Can be operated by one person
- Software for reporting and transfer of data to MS-Excel
- Data presentation on Google Earth
- Future software upgrades can easily be integrated

Standard delivery

- LTL-M retroreflectometer system (sensor, processor, user interface tablet PC with hybrid cable)
- GPS
- Transportation boxes on wheels
- Software for data presentation
- Calibration standard with DANAK certificate and alignment board
- Vehicle fixture (2 sets)
- User manual and quick guide
- Spare window glasses and gaskets

- Tablet PC windscreen holder
- USB ethernet adapter for remote service
- 8 m measurement tape

Options

- Overhead video camera
- DMI (Distance Measurement Instrument)

Approval

StrausZert, Test no.: 0913-2011-02

US patent no.: US 9,176,057 B2

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

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

