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 RL: According to EN 1436 and ASTM E 1710
Observation angle RL: 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: ±0.17°
Equivalent observation distance: 30 m
R1 range (mcd·m⁻²·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 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:
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 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 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.

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**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 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)
- 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
- Remote service dongle (D-Link)

**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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