The RIEGL LMS-Q240i 2D laser scanner makes use of the pulsed time-of-flight range measurement principle and beam scanning by means of an opto-mechanical scan mechanism, providing fully linear, unidirectional and parallel scan lines.

The instrument is extremely rugged, therefore ideally suited for the installation on board of an aircraft, and also compact and lightweight enough to be used under limited space conditions (e.g. in small single-engine planes, helicopters or other vehicles). The instrument needs only one power supply and provides the scan data via an integrated TCP/IP Ethernet interface. The binary data stream can easily be post-processed by the user’s software using the available software library. The laser scanner LMS-Q240i offers an unique combination of wide scanning angle, high maximum range, high measurement accuracy, narrow laser beam; all within a compact and robust housing.

- **Maximum range** 650 m @ 80 % target
- **Ranging accuracy** 20 mm
- **Data rate** 10 000 meas. / sec
- **Scanning rates up to** 80 scans / sec
- **Scanning ranges up to 80°**
- **Perfectly linear scan**
- **Rugged IP64 housing**
- **Integrated TCP/IP Ethernet interface**
- **Input for GPS time synchronization**

**Typical applications include**

- **Airborne laser scanning**
- **Long-range guidance of autonomous vehicles**
The range finder electronics (1) of the 2D laser scanner LMS-Q240i are optimized in order to meet the requirements of high speed scanning (high laser repetition rate, fast signal processing and high speed data interface).

The angular deflection of the laser beam (2) is realized by a rotating polygon (3) with a number of reflective surfaces. It continuously rotates at an adjustable speed to provide unidirectional scans within an angular range of $\theta = 60^\circ$ (LMS-Q240i-60) or $\theta = 80^\circ$ (LMS-Q240i-80).

For every measurement RANGE, SCAN ANGLE, SIGNAL AMPLITUDE, and optionally a TIMESTAMP are provided via a TCP/IP Ethernet interface (4). The LMS-Q240i is designed to accept a TTL-signal (i.e., 1 pulse per second) from, e.g., a GPS receiver, to reset an internal timer, which is used to timestamp every measurement.

Target larger than foot print of laser beam, perpendicular angle of incidence, visibility 10 km, average ambient brightness
Dimensional drawings of RIEGL LMS-Q240i

Front view:
- 3 x M6 threads, depth 10 mm
- Hole circle dia. 154 mm
- Connectors for power supply & data interface
- Receiver aperture
- Beam exit aperture
- Fitting for nitrogen purging
- Desiccant cartridge
- Hole circle dia. 130 mm

Side view:
- +/- 30° LMS-Q240i-60
- +/- 40° LMS-Q240i-80

Top view:
- 6 x M8 threads, depth 10 mm
- 80 x 80
- 35

All dimensions in mm
## Technical data of RIEGL LMS-Q240i

### Laser Product Classification
Class 1 Laser Product according to IEC60825-1:2007
The following clause applies for instruments delivered into the United States:
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant

### Rangefinder Performance

<table>
<thead>
<tr>
<th></th>
<th>LMS-Q240i-60</th>
<th>LMS-Q240i-80</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>max. Measurement Range</strong>&lt;sup&gt;1)&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for natural target (p \geq 20%)</td>
<td>320 m</td>
<td>320 m</td>
</tr>
<tr>
<td>for natural target (p \geq 80%)</td>
<td>650 m</td>
<td>650 m</td>
</tr>
<tr>
<td><strong>max. Operating Flight Altitude AGL</strong>&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>260 m</td>
<td>230 m</td>
</tr>
<tr>
<td></td>
<td>850 ft</td>
<td>750 ft</td>
</tr>
</tbody>
</table>

1) The following conditions are assumed: \(p\): target is larger than the footprint of the laser beam; \(\beta\): perpendicular angle of incidence of the laser beam; \(\alpha\): average ambient brightness; \(\theta_{\text{vis}}\): visibility 10 km
2) Reflectivity \(p > 20\%\), max. scan angle, additional roll angle \(+/- 5\)°

| **Minimum range** | 2 m |
| **Accuracy**<sup>3)</sup>,<sup>5)</sup> | 20 mm |
| **Precision**<sup>4)</sup>,<sup>5)</sup> | 15 mm |
| **Laser PRR** | 30 000 Hz |
| **Effective measurement rate** | 10 000 Hz |
| **Laser wavelength** | near infrared |
| **Beam divergence**<sup>6)</sup> | 2.7 mrad |
| **Target detection modes**<sup>7)</sup> | First target, last target<sup>6)</sup>, or alternating |

3) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.
4) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.
5) One sigma @ 50 m range under RIEGL test conditions.
6) Foot print of laser beam: 26.5 cm at 100 m, 52.5 cm at 200 m, 105 cm at 400 m, 157 cm at 600 m
7) Only one target distance can be provided per measurement.
8) For last target measurement, the last echo of up to 4 echoes is provided.
For \(n\) echoes with \(n > 4\), always echo number 4 is supplied as last pulse target distance.

### Scanner performance

<table>
<thead>
<tr>
<th><strong>LMS-Q240i-60</strong></th>
<th><strong>LMS-Q240i-80</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scan angle range</strong>&lt;sup&gt;6)&lt;/sup&gt;</td>
<td>(\pm 30^\circ = 60^\circ) total</td>
</tr>
<tr>
<td><strong>Scanning mechanism</strong></td>
<td>Rotating polygon mirror</td>
</tr>
<tr>
<td><strong>Scan speed</strong></td>
<td>6 to 80 scans/sec</td>
</tr>
<tr>
<td><strong>Angular step width (\Delta \vartheta)</strong>&lt;sup&gt;9)&lt;/sup&gt;</td>
<td>(\Delta \vartheta \geq 0.04^\circ)</td>
</tr>
<tr>
<td><strong>between consecutive laser shots</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Angle measurement resolution</strong></td>
<td>0.005°</td>
</tr>
<tr>
<td><strong>Internal Sync Timer</strong></td>
<td>Option for real-time synchronized time stamping of scan data</td>
</tr>
<tr>
<td><strong>Scan Sync</strong></td>
<td>Option for synchronizing scan lines to external timing signal</td>
</tr>
</tbody>
</table>

9) Scanning parameters can be set via RS232 or TCP/IP configuration interface.

### General technical data

<table>
<thead>
<tr>
<th><strong>Interface:</strong></th>
<th>for configuration &amp; data output TCP/IP Ethernet, 10/100 MBit/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>for configuration ECP standard (enhanced capability port) parallel</td>
</tr>
<tr>
<td></td>
<td>for data output</td>
</tr>
<tr>
<td><strong>Input voltage range</strong></td>
<td>18 - 32 V DC</td>
</tr>
<tr>
<td><strong>Current consumption</strong></td>
<td>approx. 1.8 A @ 24 V DC</td>
</tr>
<tr>
<td><strong>Main dimensions</strong></td>
<td>180 x 374 mm (diameter x length)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>approx. 7 kg</td>
</tr>
<tr>
<td><strong>Temperature range</strong></td>
<td>-10°C up to +50°C (operation), -20°C up to +60°C (storage)</td>
</tr>
<tr>
<td><strong>Protection class</strong></td>
<td>IP64, dust and splash-proof</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>M6 and M8 steel thread inserts</td>
</tr>
</tbody>
</table>

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