The RIEGL VMQ-1HA is a compact, economically priced High-Speed Single Scanner Mapping System, well suited for a variety of mobile mapping applications.

The system consists of a measuring head, a compact control unit for system operation, and a special roof mount for convenient mounting.

The optional integration of up to four cameras allows simultaneous acquisition of imagery to complement the captured LiDAR data.

The central part of the system is the fully integrated RIEGL VUX-1HA LiDAR sensor providing 1 million measurements and up to 250 scan lines per second for an outstanding performance in mobile applications.

High Speed Single Scanner Mobile Mapping System

Typical Applications
- Transportation Infrastructure Mapping
- Road Surface Measurement
- City Modeling
- Rapid Capture of Construction Sites and Bulk Material
- Open-Pit Mine Surveying
- GIS Mapping and Asset Management
- As-Built Surveying

Scan this QR code to watch the new RIEGL VMQ-1HA video.
Key Features

• **RIEGL High-Performance LiDAR Sensor for Mobile Mapping**

Core component of the RIEGL VMQ-1HA is the **kinematic LiDAR Sensor VUX-1HA**. Especially developed for mobile applications, the high-accuracy, high-speed laser scanner offers a maximum effective measurement rate of up to 1 MHz, 5 mm accuracy, 250 scan lines/sec, and a 360 degree “full circle” field of view.

Fully integrated into the measuring head of the VMQ-1HA, the sensor enables acquisition of dense point cloud patterns even with single passes at common traffic speeds. At 80 km/h acquisition speed the typical average point density is about 9 cm line spacing and 6 mm point spacing on the road surface.

• **Camera Interface**

A wide range of cameras can be used with the system including 5-megapixel and 9-megapixel cameras with GigE vision interface for seamless integration into the entire acquisition and processing workflow. Further cameras such as high resolution DSLR cameras up to 36-megapixel or the POINT GREY Ladybug5® spherical imaging system can also be integrated to the seamless RIEGL workflow.

• **Multiple Swivel Positions**

By means of the swivel plate the measuring head can be set to seven different predefined mounting angles (-45° to +45° in 15° increments). This flexible system configuration allows the generation of different point cloud patterns meeting diverse project requirements. The possibility of scan data acquisition with different horizontal orientation of the measuring head improves the scan pattern especially for multi-pass applications.

• **Seamless RIEGL Workflow**

Seamless RIEGL workflow for MLS data acquisition, processing and adjustment is provided by RIEGL’s proven software suite.

**RIEGL VMQ-1HA System Block Diagram**

RIEGL VMQ-1HA System Components:

- RIEGL VMQ-MH Measuring Head
- RIEGL VMQ-CU Control Unit
- VMQ-DMI Distance Measurement Indicator
- up to 4 cameras (optional)
- sustainable power supply with back-up battery
- connecting cables

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optional camera, e.g. POINT GREY Ladybug5®

mounting plate for Ladybug camera

optional GPS azimuth measurement subsystem

RIEGL VMQ-1HA Setup and Components

### VMQ-MH Measuring Head
- Protective cover with GNSS antenna
- VUX-1HA laser scanner with IMU/GNSS unit
- VMQ mounting platform

### VMQ-RM Roof Mount
- Swivel plate with dovetail-mount for VMQ-MH
- Mounting frame

### Physical Data

<table>
<thead>
<tr>
<th>Component</th>
<th>Main Dimensions (L x W x H)</th>
<th>Weight (approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMQ-MH Measuring Head</td>
<td>496 x 387 x 507 mm</td>
<td>18 kg</td>
</tr>
<tr>
<td>VMQ-MH Measuring Head</td>
<td>1149 x 440 x 110 mm</td>
<td>9 kg</td>
</tr>
<tr>
<td>VMQ-MH Measuring Head</td>
<td>568 x 514 x 70 mm</td>
<td>13 kg</td>
</tr>
<tr>
<td>VMQ-CU Control Unit</td>
<td>560 x 455 x 265 mm</td>
<td>26 kg</td>
</tr>
<tr>
<td>VMQ-MC Main Cable</td>
<td>standard length 5 m</td>
<td>8 kg</td>
</tr>
</tbody>
</table>
### RIEGL VMQ-1HA Technical Data

**max. measurement range** 420m  
**optional digital camera**  
**pulse repetition rate (peak)** 1 MHz  
**multiple target capability**  
**online waveform processing**  
**eye safe operation** at Laser Class 1

#### VMQ-1HA Scanner Performance

<table>
<thead>
<tr>
<th>Eye Safety Class</th>
<th>Laser Class 1 (Class 1 Laser Product according to IEC60825-1:2007)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Measurement Rate</td>
<td>300 kHz 500 kHz 750 kHz full power 750 kHz reduced power 1000 kHz full power 1000 kHz reduced power</td>
</tr>
<tr>
<td>Max. Range, Target Reflectivity $p \geq 80%$</td>
<td>420 m 330 m 270 m 135 m 235 m 120 m</td>
</tr>
<tr>
<td>Max. Range, Target Reflectivity $p \geq 10%$</td>
<td>150 m 120 m 100 m 50 m 85 m 40 m</td>
</tr>
<tr>
<td>Max. Number of Targets per Pulse</td>
<td>practically unlimited (details on request)</td>
</tr>
<tr>
<td>Minimum Range</td>
<td>1.2 m</td>
</tr>
<tr>
<td>Accuracy / Precision</td>
<td>5 mm / 3 mm</td>
</tr>
<tr>
<td>Field of View</td>
<td>360° “full circle”</td>
</tr>
<tr>
<td>Scan Speed (selectable)</td>
<td>up to 250 scans/sec</td>
</tr>
</tbody>
</table>

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#### IMU/GNSS Performance

<table>
<thead>
<tr>
<th>Position Accuracy (absolute)</th>
<th>IMU (Option A)</th>
<th>IMU (Option B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>typ. 20 - 50 mm</td>
<td>typ. 20 - 50 mm</td>
<td></td>
</tr>
<tr>
<td>Roll &amp; Pitch Accuracy</td>
<td>0.015°</td>
<td>0.005°</td>
</tr>
<tr>
<td>Heading Accuracy</td>
<td>0.05° / 0.025°</td>
<td>0.015°</td>
</tr>
</tbody>
</table>

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#### Electrical Data

- **Power Supply Input Voltage**: 11 - 15 V DC  
- **Power Consumption**: typ. 200 W (max. 260 W)

#### Interfaces

- **Interfaces Measuring Head (VMQ-MH)**  
  - 4 x trigger pulse, exposure pulse, NMEA data  
  - (e.g. for optional cameras or additional devices)  
  - 1 x PPS out pulse for synchronization of additional device  
  - 2 x LAN, 1000 Mbit/sec for data transfer to control unit of external devices (e.g. image data acquisition)  
  - 1 x secondary antenna connector for GPS azimuth measurement subsystem

- **Interfaces Control Unit (VMQ-CU)**  
  - 1 x DMI input (for distance measuring indicator; odometer)  
  - 1 x synchronization output NMEA + PPS (for synchronization of additional device)  
  - 1 x NAV RS232 (COM port for IMU/GNSS for RTK, SBAS)  
  - 1 x LAN, 1000 Mbit/sec (e.g. connect additional computer)  
  - 2 x USB 3.0 (e.g. image data transfer from Point Grey Ladybug5®)  
  - 1 x touch screen incl. USB (for system operation)  
  - 1 x DVI (additional video output of main system PC)

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#### Further Information

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Further Information

- RIEGL VUX-1HA Data Sheet  
- RIAQUIRE Data Sheet  
- RIPROCESS Data Sheet  
- RIANORLD Data Sheet  
- RIPRECISION MLS Brochure