

# RIEGL VMQ-1HA



Use the latest advancements in *RIEGL* LiDAR Technology for your mobile applications:  
**1 MHz effective measurement rate**  
**250 scan lines/sec**



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
- HD mapping for autonomous vehicles
- 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.

[www.riegl.com](http://www.riegl.com)



## 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. Cameras such as high resolution DSLR cameras up to 36-megapixel or the FLIR Ladybug®5+ 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 pre-defined 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

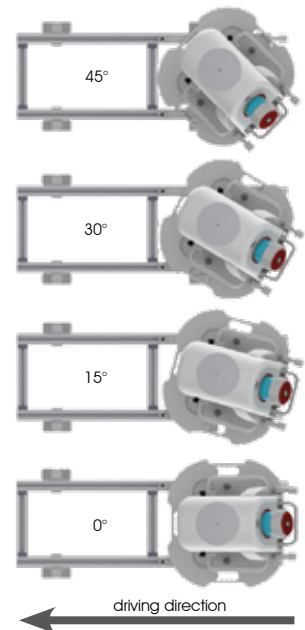
Seamless *RIEGL* workflow for MLS data acquisition, processing and adjustment is provided by *RIEGL*'s proven software suite.



**RIEGL VUX-1HA**  
high-accuracy kinematic LiDAR sensor

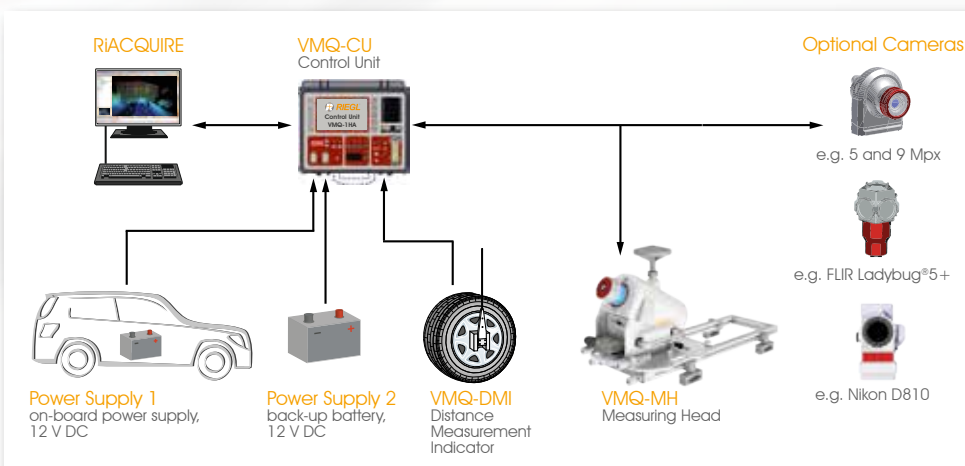


360° vertical field of view  
in a single pass



multiple swivel positions

## RIEGL VMQ-1HA System Block Diagram

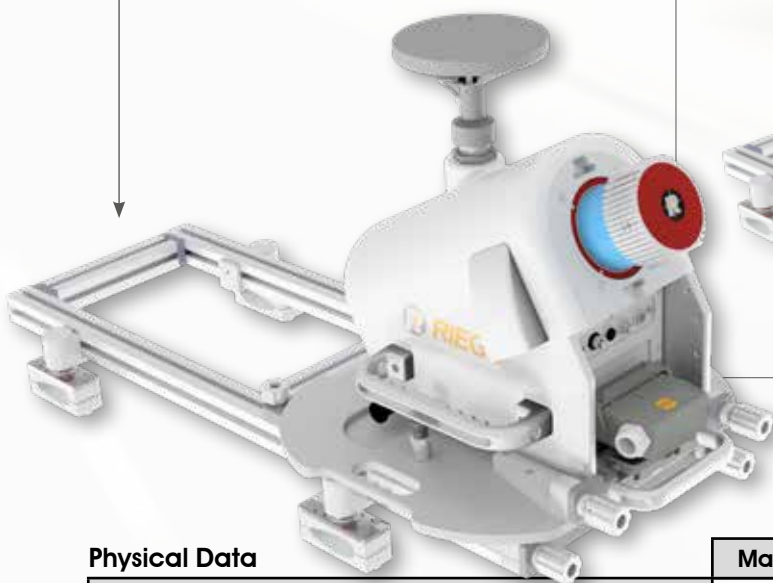
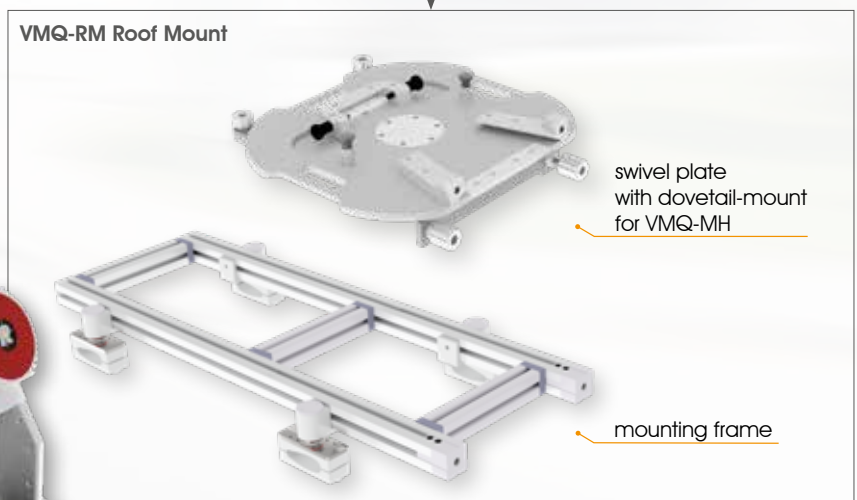


### RIEGL VMQ-1HA System Components:

- 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




## RIEGL VMQ-1HA Setup and Components




### Physical Data

	Main Dimensions (L x W x H)	Weight (approx.)
<b>VMQ-MH Measuring Head</b>	496 x 387 x 507 mm	18 kg
<b>VMQ-RM Roof Mount</b>		
Mounting Frame	1149 x 440 x 110 mm	9 kg
Swivel Plate	568 x 514 x 70 mm	13 kg
<b>VMQ-CU Control Unit</b>	560 x 455 x 265 mm	26 kg
<b>VMQ-MC Main Cable</b>	standard length 5 m	8 kg


**RIEGL VMQ-1HA Technical Data**
 max.  
measurement range

 pulse repetition  
rate (peak)

 online waveform  
processing

 optional  
digital camera

 multiple  
target capability

 eye safe operation  
at Laser Class 1
**VMQ-1HA Scanner Performance**

Laser Class	Laser Class 1 (Class 1 Laser Product according to IEC 60825-1:2014)			
Effective Measurement Rate <sup>1)</sup>	300 kHz	500 kHz	750 kHz	1000 kHz
Max. Range, Target Reflectivity $\rho \geq 80\%$ <sup>2) 3)</sup>	420 m	330 m	270 m	235 m
Max. Range, Target Reflectivity $\rho \geq 10\%$ <sup>2) 3)</sup>	150 m	120 m	100 m	85 m
Max. Number of Targets per Pulse	practically unlimited (details on request)			
Minimum Range	1.2 m			
Accuracy <sup>4) 6)</sup> / Precision <sup>5) 6)</sup>	5 mm / 3 mm			
Field of View	360° "full circle"			
Scan Speed (selectable)	up to 250 scans/sec			

1) Rounded values, selectable by measurement program.

2) Typical values for average conditions. Maximum range is specified for flat targets with size in excess of the laser beam diameter, perpendicular angle of incidence, and for atmospheric visibility of 23 km. In bright sunlight, the max. range is shorter than under overcast sky.

3) Ambiguity to be resolved by post-processing with RIMTA software.

4) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.

5) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.

6) One sigma @ 30 m range under RIEGL test conditions.

**IMU/GNSS Performance <sup>7)</sup>**

	IMU (Option A)	IMU (Option B)
Position Accuracy (absolute)	typ. 20 - 50 mm	typ. 20 - 50 mm
Roll & Pitch Accuracy	0.015°	0.005°
Heading Accuracy	0.05° / 0.025° <sup>8)</sup>	0.015°

7) One sigma values, no GNSS outage, with DMI option, post-processed using base station data.

8) Improved heading accuracy with dual antenna option @ 2 m baseline.

**Electrical Data**

Power Supply Input Voltage	11 - 15 V DC
Power Consumption	typ. 200 W (max. 260 W) <sup>9)</sup>

9) with 2 x 9 MPx Camera

**Interfaces**

Interfaces Measuring Head (VMQ-MH)	Interfaces Control Unit (VMQ-CU)
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	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 FLIR Ladybug®5) 1 x touch screen incl. USB (for system operation) 1 x DVI (additional video output of main system PC)
VMQ-MC Main Cable (single cable connection between VMQ-MH and VMQ-CU)	

**Further Information**RIEGL VUX-1HA  
Data SheetRIACQUIRE  
Data SheetRIPROCESS  
Data SheetRIWORLD  
Data SheetRIPRECISION MLS  
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