NEW RIEGL
VMY®-2

280m	400kHz			optional	

The *RIEGL* VMY-2 is a compact, economically priced Dual Scanner Mapping System, that is well suited for a variety of mobile mapping applications.

The measuring head is equipped with two *RIEGL* miniVUX-Series LiDAR sensors and mounted in the well proven angled orientation as known from the *RIEGL* VMX Mobile Mapping Systems.

The system enables data acquisition with up to 200 scan lines/second and up to 400 kHz Pulse Repetition Rate.

To further increase efficiency of the mobile mapping system, the optional integration of up to four cameras allows simultaneous acquisition of imagery to complement the captured LiDAR data.

Compact
Dual Scanner Mobile Mapping System

Typical Applications

• GIS Mapping & Asset Management • Transportation Infrastructure Mapping • HD Mapping for Autonomous Vehicles •
City Modeling • Rapid Capture of Construction Sites and Bulk Material • Open-Pit Mine Surveying • As-Built Surveying
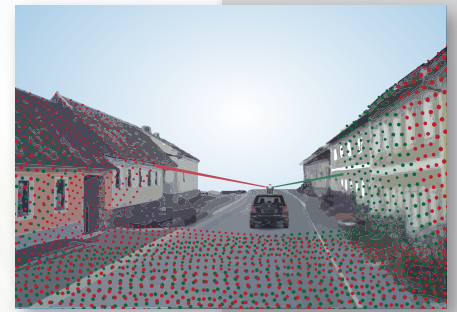
RIEGL®

Key Features

• Compact *RIEGL* Dual Scanner Mobile Mapping System

Core components of the *RIEGL* VMY-2 are two kinematic *RIEGL* miniVUX-Series LiDAR sensors, mounted in a well-proven angled orientation which enables simultaneous forward and backward looking to reduce scan shadows.

The LiDAR sensor stands out with a pulse repetition rate of up to 200 kHz at a 360 degree "full circle" field of view as well as a range accuracy of 15 mm.

Fully integrated into the measuring head of the VMY-2, the sensors enable 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 at 5 meters range operating with 400 kHz is approx. 560 points per m^2.

The innovative design of the system enables folding and thus a convenient transport and space-saving storage.

360° vertical field of view @ up to 400 kHz PRR

convenient transportation

ready for acquisition

foldable

• System Operation

The VMY-2 is powered via the VM Power Supply Box. It provides power for the VMY-MH Measuring Head, the DMI, and either for the VM-IU Interface Unit, or a data acquisition laptop. The VM Power Supply Box enables failsafe operation via a redundant power input from the vehicle's on-board power supply and a backup battery.

The VM-IU is a compact data acquisition unit for convenient system operation. It provides extended disk space to store scan data as well as camera data from the *RIEGL* industrial cameras (GigE-vision cameras) and the FLIR Ladybug®5+.
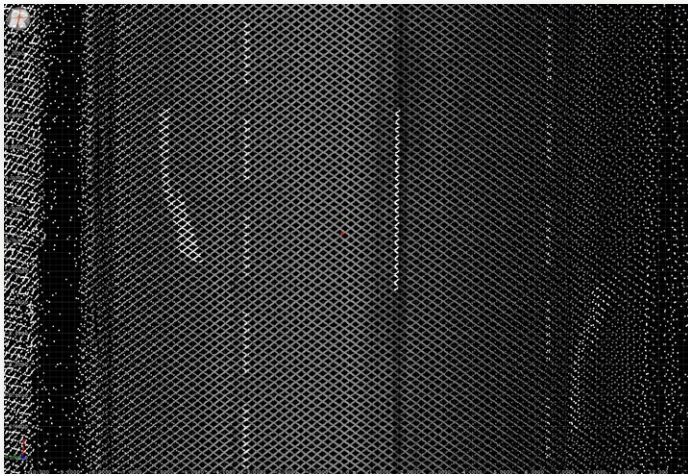
In case there is no need for GigE-vision cameras, the system can also be operated with a laptop instead of the VM-IU.

• Seamless *RIEGL* Workflow

A handy touch-screen and the *RIEGL* data acquisition software facilitate the operator's task in the field by providing real-time visualization of acquired scan data and imagery. The *RIEGL* software packages also offer comprehensive features in data processing. This covers enhanced scan data adjustment to merge overlapping mobile scan data. Furthermore it enables the scan data to be fitted to specific control objects which results in a consistent point cloud of enhanced precision and increased geo-referenced accuracy. Finally, the precise geo-referenced scan data and high resolution (panorama) images can be exported to well-known file formats, or interfaced directly with third-party software.

VMY-2 Scan Data Examples

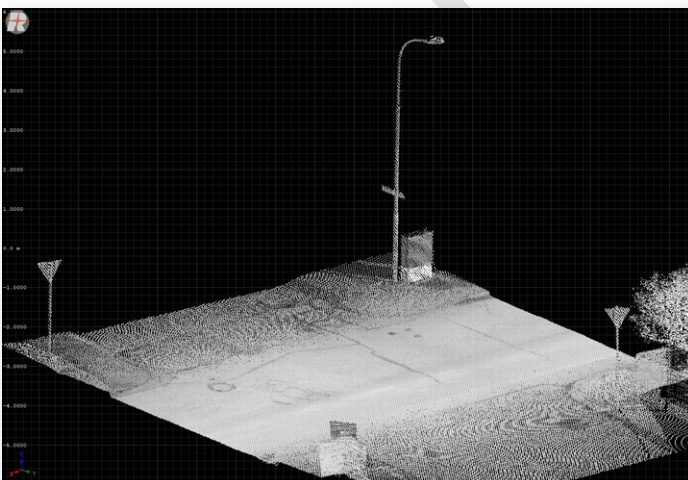### scan data cross-country (acquired at 90 km/h platform speed)

top view, reflectance scaled

perspective view, reflectance scaled

scan data urban environment (acquired at 30 km/h platform speed)

perspective view showing details of the infrastructure, reflectance scaled

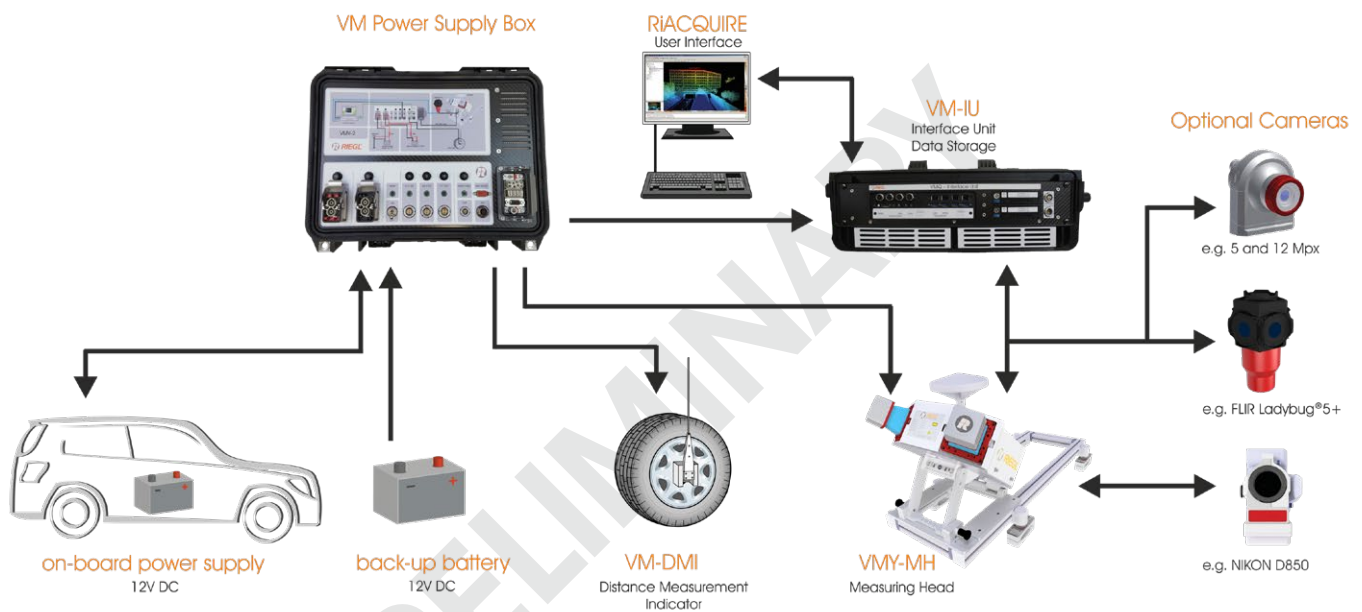
perspective view, reflectance scaled

RIEGL VMY-2 System Block Diagram

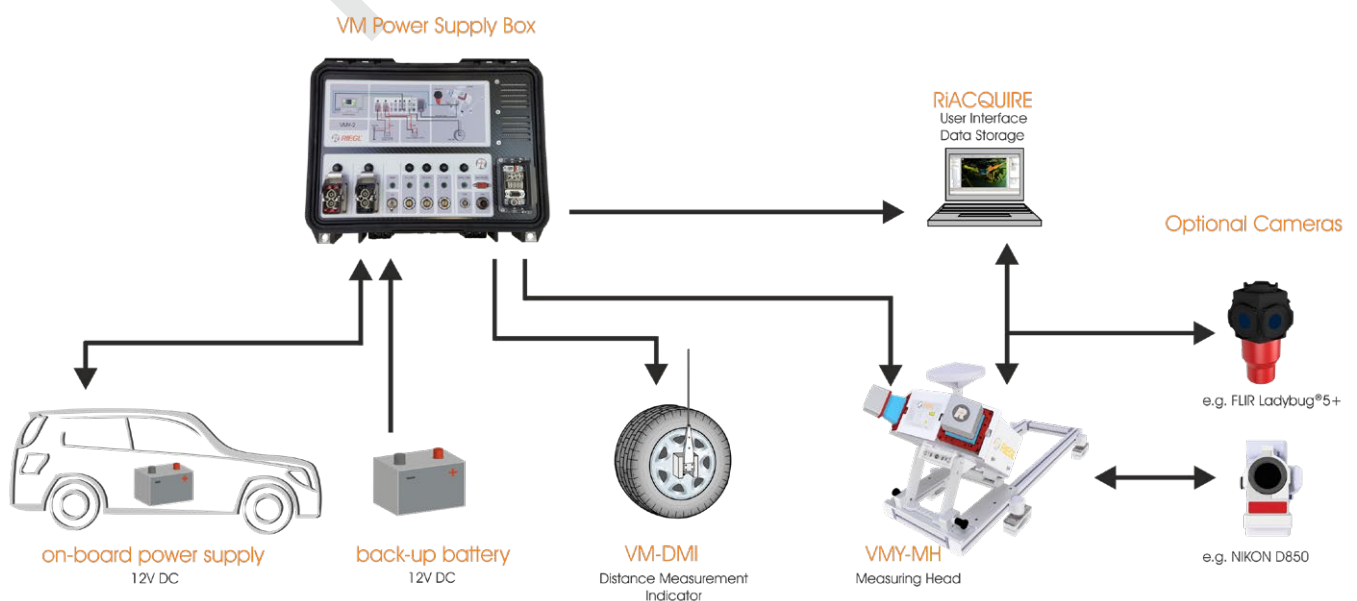### RIEGL VMY-2 System Components

- *RIEGL* VMY-MH
  Measuring Head

- *RIEGL* VM-IU
  Interface Unit

- *RIEGL* VM Power Supply Box

- VM-DMI
  Distance Measurement Indicator

- sustainable power supply
  with back-up battery

- connecting cables

RIEGL VMY-2 with VM-IU and *RIEGL* industrial cameras

VM Power Supply Box — RiACQUIRE User Interface — VM-IU Interface Unit Data Storage — Optional Cameras (e.g. 5 and 12 Mpx; e.g. FLIR Ladybug®5+; e.g. NIKON D850)

on-board power supply 12V DC — back-up battery 12V DC — VM-DMI Distance Measurement Indicator — VMY-MH Measuring Head

RIEGL VMY-2 with data acquisition laptop and FLIR Ladybug®5+

VM Power Supply Box — RiACQUIRE User Interface Data Storage — Optional Cameras (e.g. FLIR Ladybug®5+; e.g. NIKON D850)

on-board power supply 12V DC — back-up battery 12V DC — VM-DMI Distance Measurement Indicator — VMY-MH Measuring Head

RIEGL VMY-2 Setup and Components

optional components

optional GPS azimuth measurement subsystem

VMY-MH Measuring Head

protective cover with GNSS antenna

2x miniVUX-Series LiDAR sensor with IMU/GNSS unit

tilt mount for VMY-MH

VMY-RM Roof Mount

mounting frame

Physical Data	Main Dimensions (L x W x H)	Weight (approx.)
VMY-MH Measuring Head	416 x 435 x 437 mm	14 kg
VMY-RM Roof Mount Mounting Frame	1003 x 441 x 171 mm	8 kg
VM Power Supply Box	415 x 330 x 175 mm	7.8 kg
VM-IU Interface Unit	550 x 353 x 230 mm	14.8 kg
VMY-MC Main Cable	standard length 5 m	0.6 kg

RIEGL VMY-2 Camera Options

Cameras such as 5-megapixel and 12-megapixel *RIEGL* industrial cameras with GigE vision interface, high resolution DSLR cameras up to 45-megapixel, or the FLIR Ladybug®5+ spherical imaging system can be seamlessly integrated into the entire acquisition and processing workflow.

RIEGL industrial cameras

The cameras are available with different resolutions and lens types. For further details please refer to the table below.

Nikon D850

Nikon D850 with *RIEGL* camera mount

extended mounting plate for up to 4 cameras

FLIR Ladybug®5+

compact mounting plate for Ladybug camera

RIEGL VMY-2 system
with 2x *RIEGL* industrial camera, 1x Nikon D850 and 1x FLIR Ladybug®5+

Camera Options [1]	max. numbers of cameras	max. frames[2] per second	resolution [px (H) x px (V)]	pixel size [µm]	lens focal length [mm]	Field of View (FOV)
5 MP CMOS [3] [4]	2	20	2464 x 2056	3.45	5	80.7° x 70.7°
12 MP CMOS [3] [4]	2	8	4112 x 3008	3.45	8 / 16	83.1° x 65.9° / 47.8° x 35.9°
FLIR Ladybug®5+ [5]	1 unit / 6 lens	19	6 x [2048x2448]	3.45	4.4	90% of full sphere
Nikon® D850 [5]	4	1	8256 x 5504	4.34	14 / 20	104° x 81° / 83° x 61°

1) The combination of different cameras is possible. A maximum of 4 cameras can be integrated with the system.
2) Maximum frame rate of a single camera operated in 8-bit mode. The use of multiple cameras may reduce maximum frame rates.
3) A user defined "Region of Interest" can be defined during data acquisition, resulting in a reduction of the FOV and the resolution. This may help to reduce image file sizes on the one hand and to further increase frame rates on the other hand.
4) The *RIEGL* industrial cameras require the usage of the VM-IU Interface Unit.
5) This camera can also be used with a data acquisition laptop instead of the VM-IU Interface Unit.

RIEGL VMY-2 Technical Data

- **280m** max. measurement range
- **400kHz** pulse repetition rate (peak)
- online waveform processing
- optional digital camera
- multiple target capability
- eye safe operation at Laser Class 1

VMY-2 Scanner Performance

Laser Class	Laser Class 1 (Class 1 Laser Product according to IEC 60825-1:2014)
Effective Measurement Rate [1]	400 kHz
Max. Range, Target Reflectivity ρ ≥ 80% [2]	280 m
Max. Range, Target Reflectivity ρ ≥ 60% [2]	250 m
Max. Range, Target Reflectivity ρ ≥ 20% [2]	150 m
Max. Number of Targets per Pulse [3]	5
Minimum Range	2 m
Accuracy [4] [6] **/ Precision** [5] [6]	15 mm / 10 mm
Field of View (selectable)	360°
Scan Speed (selectable)	up to 200 scans/sec

1) Rounded values.
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) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achieveable range is reduced.
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 @ 50 m range under *RIEGL* test conditions.

IMU/GNSS Performance [7]	IMU
Position Accuracy	typ. 20 - 50 mm
Roll & Pitch Accuracy	0.015°
Heading Accuracy	0.05° / 0.025° [8]

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 base line.

Electrical Data

Power Supply Input Voltage	11 - 15 V DC
Power Consumption	typ. 77 W (max. 143 W) [9]

9) with 2 x 12 MP *RIEGL* industrial camera

Interfaces

Interfaces Measuring Head (VMY-MH)	VM Power Supply Box	Interface Unit (VM-IU)
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 1 x secondary antenna connector for GPS azimuth measurement subsystem	1x DMI input (for distance measuring indicator; odometer) 3x power supply socket (2x 24V / 1x 12V)	4x LAN 1Gbit/sec M12 sockets, 3 ports pre-configured 4x LAN 1Gbit/sec RJ45 sockets, 2 ports pre-configured 4x USB 3.0 (e.g. image data transfer from FLIR Ladybug®5+) 1x display port 1x WLAN (integrated antenna) 1x Bluetooth (integrated antenna) 2x slot for removable hard disk 1x power supply input (+24V DC) 1x power supply output (+24V DC) for display (touch screen)

PRELIMINARY

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