

Terrestrial Laser Scanning

NEW

World Premiere
INTERGEO 2022



RIEGL VZ-600i

Exceeding your expectations



www.riegl.com

Extreme Versatility – Key Applications

Key Applications



The new RIEGL VZ-600i is operable in a wide variety of applications, featuring reliable and robust automatic real-time on-board registration.



BIM (Building Information Modeling)

High speed data acquisition, verifiably precise scan data, large projects (100s of scan positions), accuracy better than 10 mm for digital twins.



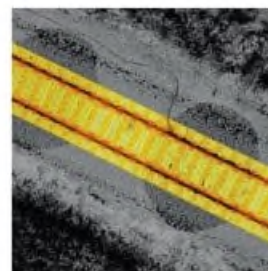
Forestry and Vegetation

ToF (Time of Flight) measurement with multi-target responses, minimize occlusion, vegetation penetration, waveform.



Public Safety and Forensics

Fast data capture to release scenes earlier, lightweight scanner for all staff, proven data for court presentation.



Railroad Surveying

Robotic operation - use of onboard sensors and ROS for fast and repeatable data acquisition, railway applications with the RIEGL VMR Robotic Rail Laser Scanning System.

Construction

Inspection and varification for design build tilt wall/panel construction, blockouts & sleeves locations, and vertical wall plumbness. Ideal for preconstruction and large-scale ground grading and post roadway construction.

Surveying and Mapping

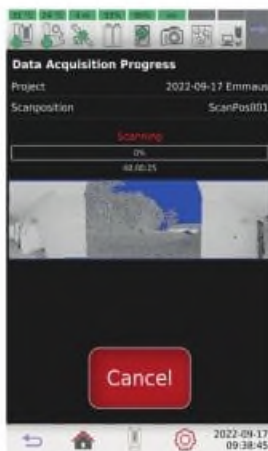
Precise and accurate mapping of any environment for planning, design, and traditional survey. Steamline registration to survey control with full reporting in PDF format.

High Productivity – Rapid Data Acquisition

Start

1 hour scanning in the field

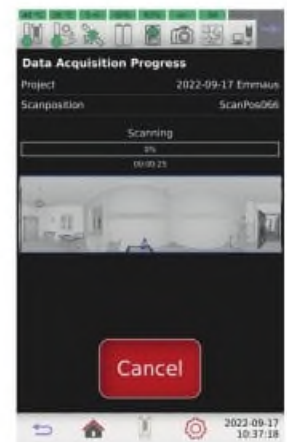
1st Scan Position



RIEGL VZ-600i Screen
or VZ-i Series App



66th Scan Position



RIEGL VZ-600i Screen
or VZ-i Series App



VZ-i Project Map App

Key Features of rapid data acquisition with the RIEGL VZ-600i:

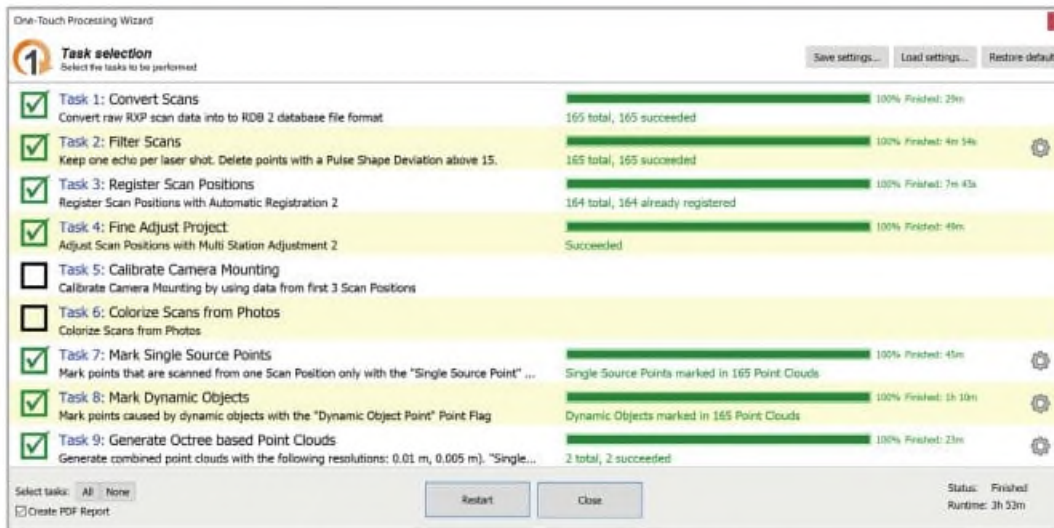
- up to 60 scan positions per hour
- 6 mm resolution @ 10 m distance
- simultaneous image acquisition
- real-time on-board automatic registration, no tablet required
- no tie points necessary for robust registration
- remote control by the use of the RIEGL VZ-i Series App (for iOS and Android)
- monitor registration with the VZ-i Project Map App (direct from the scanner)



VZ-i Project Map App

High Productivity – Swift Data Processing

Produce end deliverables with the Data Processing Software RISCAN PRO and its One-Touch Processing Wizard.



RISCAN PRO – One-Touch Processing Wizard

Key Features of the Data Processing Software RISCAN PRO:

- One-Touch Processing Wizard
- fast download from the CF-Express Card (up to 500 MB/sec)
- automatic filtering (e.g. dynamic objects, deviation, reflectance, multiple targets, etc.)
- optimization of the camera mounting calibration
- automatic colorization of the point cloud
- generation of ortho plots (e.g. GeoTIFF)
- export as RiPANO project, e57 project, LAS, etc.
- automatic generation of PDF report



PDF report



Floor plan, all floors



Floor plan, one floor



3D Point Cloud

Key Components

Front View

Rear View



Optional Equipment



RTK GNSS antenna and/or external camera

With an attached RTK-GNSS antenna, the absolute positioning accuracy can be improved to 1-2 cm. The correction data is then received via WLAN.



Charger for 2 or 6 batteries

The chargers are designed for 2 or 6 batteries. They can be supplied from the 12V DC voltage of a vehicle as well as from the 110/230V AC voltage. The advantage of the 2-fold charger lies in the size and weight, that of the 6-fold charger in the possibility of continuous scanning over 24 hours (with simultaneous charging of the empty batteries).

Optional Equipment




Accessory List
RIEGL VZ-I Series



Ultimate Performance – Technical Data

Laser Product Classification

| | | |
|--|--|---|
| Class 1 Laser Product according to IEC 60825-1:2014 | The following clause applies for instruments delivered into the United States: Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed.3., as described in Laser Notice No. 56, dated May 8, 2019. |  |
|--|--|---|

Range Measurement Performance

| | | | | |
|---|--|----------------|----------------|-----------------|
| Measuring Principle / Mode of Operation | time of flight measurement, echo signal digitization, online waveform processing | | | |
| Laser Pulse Repetition Rate (PRR) – (peak) ¹⁾ | 2200 kHz | 1200 kHz | 600 kHz | 150 kHz |
| Max. Measuring Range ²⁾ natural targets $\rho \geq 90\%$ natural targets $\rho \geq 20\%$ | 220 m 100 m | 320 m 150 m | 420 m 200 m | 1000 m 450 m |
| Minimum Range ³⁾ | 0.5 m | 0.5 m | 0.5 m | 1 m |
| Max. Number of Targets per Pulse ⁴⁾ | 5 | 10 | 10 | 10 |
| Ranging Accuracy ^{5) 7)} | 5 mm | | | |
| 3D Position Accuracy ⁶⁾ | 3 mm @ 50 m, 5 mm @ 100 m | | | |
| Precision ^{6) 7)} | 3 mm (1 mm with extended scan time) | | | |
| Laser Wavelength | near infrared, invisible | | | |
| Laser Beam Divergence | 0.35 mrad ⁹⁾ / 0.25 mrad ¹⁰⁾ | | | |

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) Minimum range specified for vertical zenith angles from 30 deg to 120 deg, resp. 90° vertical field of view.

4) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achievable range is reduced.

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

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

7) 1 sigma @ 100 m range under RIEGL test conditions.

8) 1-sigma value, based on target modelling, under RIEGL test conditions.

9) Measured at the 1/e2 points. 0.35 mrad corresponds to an increase of 35 mm of beam diameter per 100 m distance.

10) Measured at the 1/e points. 0.25 mrad corresponds to an increase of 25 mm of beam diameter per 100 m distance.

Scanner Performance

| | Vertical (Line) Scan | Horizontal (Frame) Scan |
|---|--|--|
| Scan Angle Range | total 105° (+65° / -40°) | max. 360° |
| Scanning Mechanism | rotating multi-facet mirror | rotating head |
| Scan Speed | 4 lines/sec to 420 lines/sec | 0°/sec to 360°/sec ¹¹⁾ |
| Performance | scan time less than 30 seconds for "Panorama_6mm" (approx. 30 Mio measurements) 6 mm resolution @ 10 m distance, up to 60 scan positions per hour (including scan and image acquisition with real-time onboard registration) | |
| Angular Step Width ¹²⁾ $\Delta\theta$ (vertical), $\Delta\phi$ (horizontal) User defineable Resolution | 0.0007° ≤ $\Delta\theta$ ≤ 0.5° between consecutive laser shots | 0.0015° ≤ $\Delta\phi$ ≤ 0.86° between consecutive scan lines |
| Angular Accuracy ¹³⁾ | 0.0028° (10 arcsec) | 0.0028° (10 arcsec) |
| Angle Measurement Resolution | better 0.0007° (2.5 arcsec) | better 0.0005° (1.8 arcsec) |

11) Frame scan can be disabled, providing 2D scanner operation.

12) Selectable.

13) 1-sigma value, based on target modeling, under RIEGL test conditions

Technical Data to be continued at page 8

Scanner Performance (continued)

| | |
|---------------------------------|---|
| Orientation Sensors | integrated 3-axis accelerometer, 3-axis gyroscope, 3-axis magnetometer (compass), barometer |
| GNSS Receiver | integrated L1 GNSS receiver, optional external RIEGL GNSS RTK receiver |
| Waveform Data Output (optional) | providing digitized echo signal information for specific target echoes |
| Data Storage | integrated SSD 1 TByte, removable CF-Express card 480 GByte, automatic sync while scanning |
| Cloud Storage | Amazon S3, FTP-Server, Microsoft Azure |
| On-board Registration | automatic scan data registration as background process while scanning |

Scanner Control

| | |
|-------------------------|---|
| via Laser Scanner | 7 inch touch screen, 1280 pixel x 800 pixel |
| via Mobile Device(WiFi) | „RIEGL VZi-Series“-App, available for iOS and Android |
| via ROS | ROS (Robot Operation System) driver available |

Camera

| | |
|----------------------------|--|
| Internal Camera | 3 x 12 MPix CMOS color cameras, FOV 115° x 40° (v x h) |
| External Camera (optional) | e.g. detachable SONY α 7R IV |

General Technical Data

| | |
|---|---|
| Internal Power Supply | 2 x Li-Ion hot-swap rechargeable batteries 99 Wh, up to 90 minutes operating time, each <0.5 kg / 1.1 lbs each |
| External Power Supply | input voltage 11 - 34 V DC |
| Power Consumption | typ. 50 W, max. 65 W (without external devices) |
| Main Dimensions (width x height x depth) | 173 mm x 305 mm x 184 mm |
| Weight | Scanner without battery <6 kg / 13 lbs |
| Humidity | max. 80 % non condensing @ +31°C |
| Protection Class | IP64, dust- and splash-proof |
| Temperature Range Storage / Operation | -10°C up to +50°C / 0°C up to +40°C: standard operation |
| Low Temperature Operation ¹⁾ | -20°C: continuous scanning operation if instrument is powered on while internal temperature is at or above 0°C and still air -40°C: scanning operation for about 20 minutes if instrument is powered on while internal temperature is at or above 15°C and still air |

1) Insulating the scanner with appropriate material will enable operation at even lower temperatures.



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