

Terrestrial Laser Scanning



RIEGL VZ[®]-600i

Exceeding your expectations



www.riegl.com

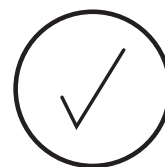
RIEGL VZ[®]-600i

RIEGL's latest generation of professional Terrestrial Laser Scanners stands for extreme versatility, high productivity, ultimate performance, and additional mobility – providing an excellent return on investment.



High Productivity

- 60 scan positions per hour (with image acquisition)
- One-Touch button operation
- RIEGL VZ-i Project Map App for scan project monitoring
- simultaneous scan and image data acquisition
- Real-Time on-board automatic registration
- One-Touch Processing Wizard in RiSCAN PRO for automatic production of detailed PDF-report



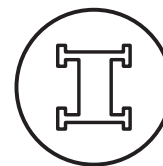
Ultimate Performance

- broad range capability (0.5 m up to 1000 m)
- 5 sec scan time for low resolution overview scans
- 30 sec scan time for 6 mm resolution @ 10 m distance
- pulse repetition rate up to 2.2 MHz
- 3D position accuracy up to 3 mm @ 50 m
- scan speed up to 420 lines/sec
- high speed data download of up to 500 MB/sec



Extreme Versatility

- for various applications
- indoor and outdoor 3D mapping
- internal cameras and GNSS receiver
- lightweight (approx. 6 kg / 13 lbs)
- prepared for user-specific Python apps



Additional Mobility

- prepared for robotic operation (ROS driver available)
- option for mobile mapping
- can be used with the RIEGL VMR Robotic Rail Scanning System
- flexible mounting platforms

Extreme Versatility – Key Applications

The *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.



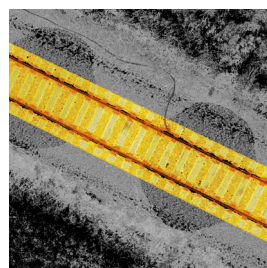
Forestry and Vegetation

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



Surveying and Mapping

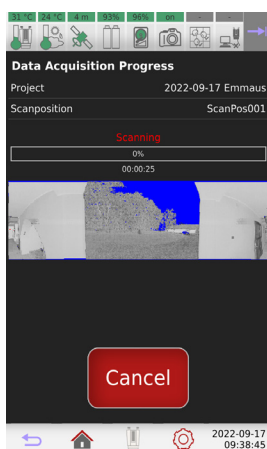
Precise and accurate mapping of any environment for planning, design, and traditional survey. Streamline registration to survey control with full reporting in PDF format.

High Productivity – Rapid Data Acquisition

Start

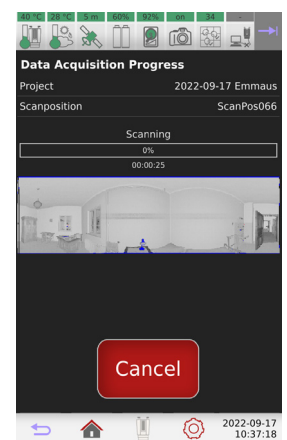
1 hour scanning in the field

1st Scan Position



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

66th Scan Position

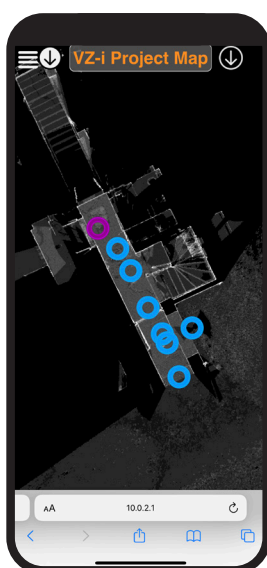


RIEGL VZ-600i Screen
or VZ-i Series App

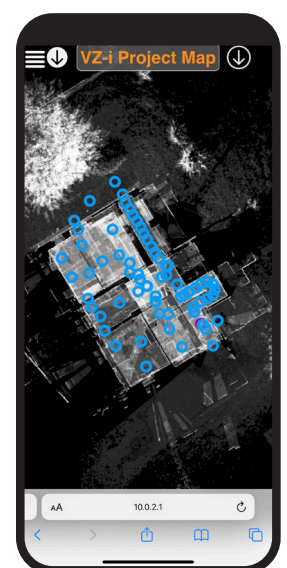


Key Features of rapid data acquisition with the RIEGL VZ-600i:

- 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)



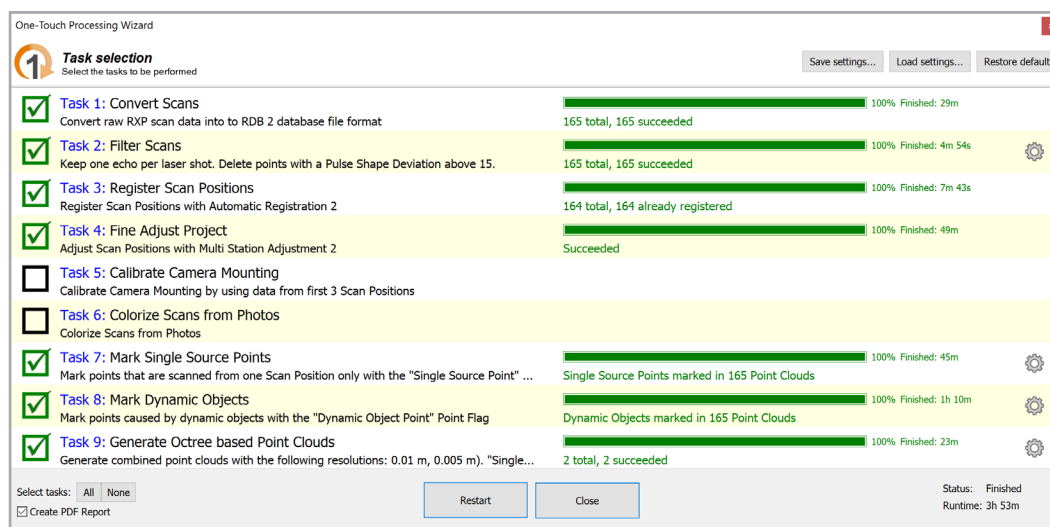
VZ-i Project Map App



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.



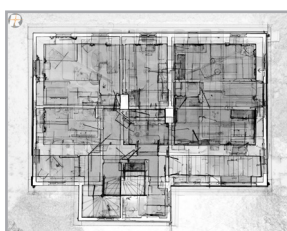
RiSCAN PRO – One-Touch Processing Wizard

Key Features of the Data Processing Software RiSCAN PRO:

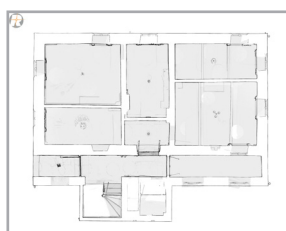
- One-Touch Processing Wizard
- fast download from the CF-Express Card (up to 500 MB/sec)
- automatic filtering (e.g. dynamic objects, deviation, reflectance, multiple targets, etc.)
- optimization of the camera mounting calibration
- automatic colorization of the point cloud
- generation of ortho plots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



GNSS RTK antenna

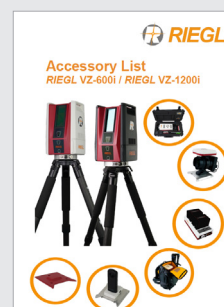
With an attached GNSS RTK antenna, the absolute positioning accuracy can be improved to 1-2 cm. The correction data is then received via WLAN. The GNSS RTK antenna is available in versions with and without an external camera.



Charger for 2 or 6 batteries

The chargers are designed for 2 or 6 batteries. They can be supplied from the 12 V DC voltage of a vehicle (additional cable necessary) as well as from a corresponding 110/230 V AC power supply module. 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



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.

**CLASS 1
LASER PRODUCT**

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	140 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	15	15
Precision ^{5) 6)}	3 mm	3 mm	3 mm	3 mm
Ranging Accuracy ^{6) 7)}	5 mm			
3D Position Accuracy ⁸⁾	3 mm @ 50 m, 5 mm @ 100 m			
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 25 deg to 130 deg, resp. 105° 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) Precision, also called reproducibility or repeatability, is the degree to which repeated measurements show the same result.

6) 1-sigma value @ 100 m range under RIEGL test conditions.

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

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 on-board registration)	
Angular Step Width ¹²⁾ $\Delta\theta$ (vertical), $\Delta\phi$ (horizontal) User defineable Resolution	$0.0007^\circ \leq \Delta\theta \leq 0.54^\circ$ between consecutive laser shots	$0.0015^\circ \leq \Delta\phi \leq 0.86^\circ$ 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 modelling, 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 (L1/L2)
Waveform Data Output (optional hardware configuration)	providing digitized echo signal information for specific target echoes hardware option to be selected in the course of the ordering process
Data Storage	integrated SSD 2 TByte, removable CF-Express card 512 GByte (1 TByte optionally available), 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 Anonymization of Image Data ¹⁾	3 x 12 MPix CMOS color cameras, FOV 115° x 40° (v x h) resolution of panoramic image 199 MPixel optional on-board face and license plate detection and automatic blurring in real time before image storage
External Camera (optional)	detachable SONY ILX-LR1 & SONY SEL14F18GM lens resolution of panoramic image 137 MPixel
Panorama Camera (optional)	detachable RICOH Theta Z1 resolution of panoramic image 23 MPixel

¹⁾ To comply with the requirements of the European General Data Protection Regulation (GDPR), among others.

General Technical Data

Internal Power Supply	2 x Li-Ion hot-swap rechargeable batteries 99 Wh ²⁾ , 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. 72W, max. 85 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-tight and splash-proof
Temperature Range Storage / Operation Low Temperature Operation ³⁾	-10 °C up to +50 °C / 0 °C up to +40 °C: standard operation -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

²⁾ The capacity of the battery according to the cell manufacturer's specifications, the capacity available in the application is lower.

³⁾ Insulating the scanner with appropriate material will enable operation at even lower temperatures.

Contact us



RIEGL Laser Measurement Systems GmbH, Headquarters

RIEGL USA Inc., Headquarters North America

RIEGL Japan Ltd. | RIEGL China Ltd. | RIEGL Australia Pty Ltd. | RIEGL Canada Inc. | RIEGL UK Ltd.

RIEGL Asia Pacific Ltd. | RIEGL South America SpA | RIEGL Deutschland Vertriebsgesellschaft mbH

RIEGL France SAS