Terrestrial Laser Scanning

RIEGL®

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

- 66 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



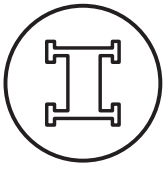
Ultimate Performance

- 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



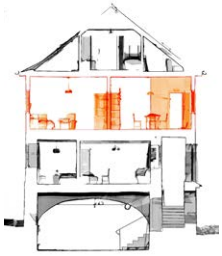
Additional Mobility

- prepared for mobile mapping
- prepared for robotic operation (ROS driver available)
- flexible mounting platforms

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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.



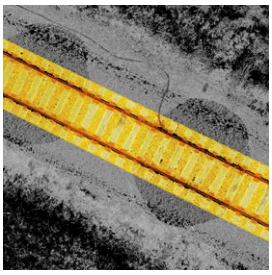
Forestry and Vegetation

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

Highly accurate scanning of railway infrastructure, such as tracks and stations, in static mode and optionally in combination with kinematic mode.



Construction

Inspection and varification 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.

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High Productivity – *Rapid Data Acquisition*

Start → **1 hour scanning in the field**

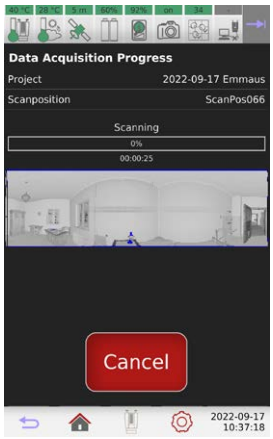
1st Scan Position



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



66th Scan Position



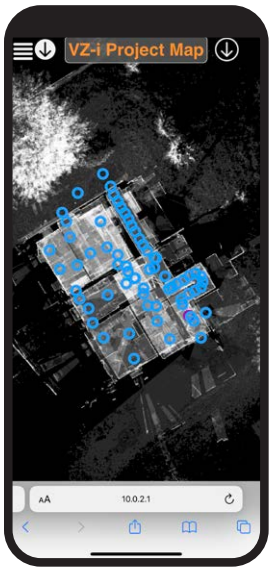
RIEGL VZ-600i Screen or VZ-i Series App



VZ-i Project Map App

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

- up to 66 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)

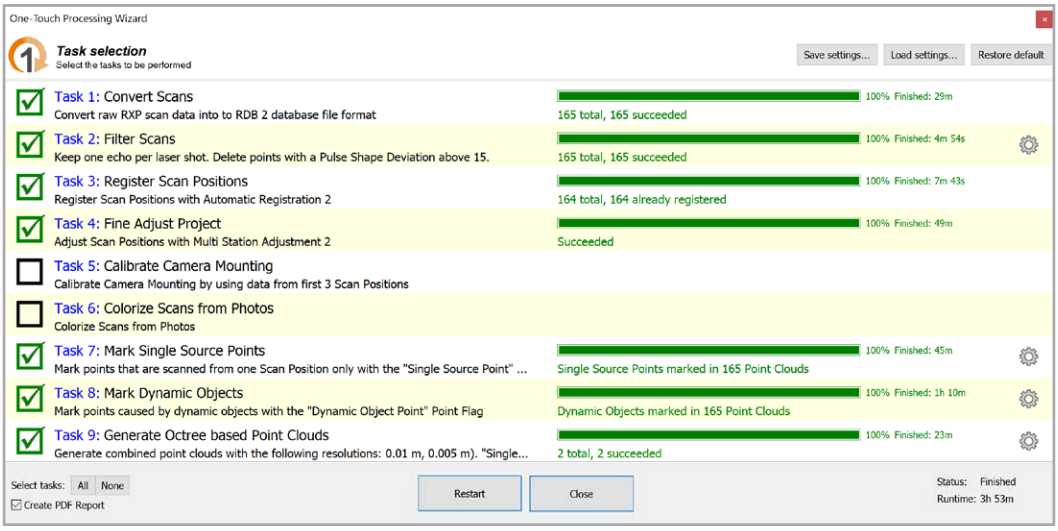


VZ-i Project Map App

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High Productivity –
Swift Data Processing

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



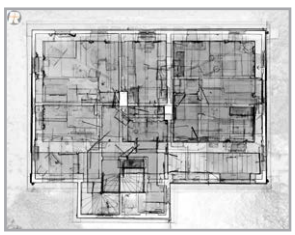
RiSCAN PRO – One-Touch Processing Wizard

Key Features of the Data Processing Software RiSCAN PRO:

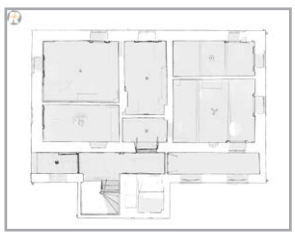
- One-Touch Processing Wizard
- fast download from the CF-Express Card (up to 500 MB/sec)
- automatic filtering (e.g. dynamic objects, deviation, reflectance, multiple targets, etc.)
- optimization of the camera mounting calibration
- automatic colorization of the point cloud
- generation of ortho plots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



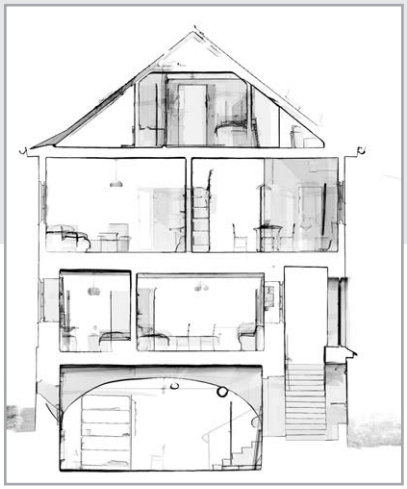
PDF report



Floor plan, all floors



Floor plan, one floor



3D Point Cloud

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Key Components

Front View



Rear View



Optional Equipment



GNSS RTK antenna

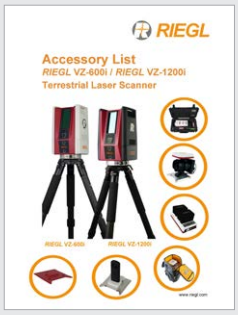
With an attached GNSS RTK antenna, the absolute positioning accuracy can be improved to 1-2 cm. The correction data is then received via WLAN. The GNSS RTK antenna is available in versions with and without an external camera.

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



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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 ρ ≥ 90 % natural targets ρ ≥ 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]	**1.5 mm @ 25 m range,** 2.0 mm @ 100 m range			
Ranging Accuracy [6] [7] [8]	**3 mm for ranges ≤ 50 m,** 5 mm for ranges > 50 m			
3D Position Accuracy [9]	**3 mm @ 50 m,** 5 mm @ 100 m			
Laser Wavelength	near infrared, invisible			
Laser Beam Divergence	0.35 mrad [10] / 0.25 mrad [11]			

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 achieveable 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 under *RIEGL* test conditions.
7) Accuracy is the degree of conformity of a measured quantity to its actual (true) value. Accuracy of time-of-flight measurement: 2 ppm
8) It is strongly recommended to verify accuracy for each project by using control points in combination with the MSA2.
9) 1-sigma value, based on target modelling, under *RIEGL* test conditions.
10) Measured at the 1/e2 points. 0.35 mrad corresponds to an increase of 35 mm of beam diameter per 100 m distance.
11) 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 [12]
Performance	**scan time less than 30 seconds for "Panorama_6mm"** (approx. 30 Mio measurements) 6 mm resolution @ 10 m distance, **up to 66 scan positions per hour** (including scan and image acquisition with real-time on-board registration)	
Angular Step Width [13] **Δϑ (vertical), Δφ (horizontal)** **User defineable Resolution**	0.0007° ≤ Δϑ ≤ 0.54° between consecutive laser shots	0.0015° ≤ Δφ ≤ 0.86° between consecutive scan lines
Angular Accuracy [14]	0.0028° (10 arcsec)	0.0028° (10 arcsec)
Angle Measurement Resolution	better 0.0007° (2.5 arcsec)	better 0.0005° (1.8 arcsec)

12) Frame scan can be disabled, providing 2D scanner operation.
13) Selectable.
14) 1-sigma value, based on target modeling, under *RIEGL* test conditions

Technical Data to be continued at page 8

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Scanner Performance (continued)

Orientation Sensors	integrated 3-axis accelerometer, 3-axis gyroscope, 3-axis magnetometer (compass), barometer
Accuracy of the Tilt Measurement	± 0.008° [1]
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

1) 1-sigma value, for vertical scanner setup position (tilt range of ± 5°), under *RIEGL* test conditions.

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 [2]	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

2) 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 [3], 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 [4]	-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

3) The capacity of the battery according to the cell manufacturer's specifications, the capacity available in the application is lower.
4) Insulating the scanner with appropriate material will enable operation at even lower temperatures.

Contact us

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