

Terrestrial Laser Scanning

NEW

**World Premiere
INTERGEO 2024**



RIEGL VZ[®]-4000i²⁵

The Ultimate Long Range Laser Scanner



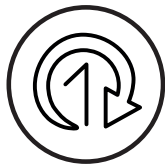
www.riegl.com

Preliminary
Data Sheet

RIEGL VZ[®]-4000i²⁵

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

Benefit from RIEGL's latest Long Range Laser Scanner:



Increase Productivity

- on-board processing / computing
- One-Touch button operation
- customized workflows and pre-settings
- efficient workflow from survey to data
- real-time registration enabled by IMU/GNSS



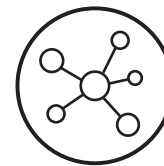
Rely on Performance

- superior long range scanning performance – up to 4600 m
- eye safe operation (Laser Class 1)
- IP64 certified especially for harsh environments
- multiple target capability
- additional data attributes



Experience Versatility

- various applications and survey routines
- internal camera
- internal IMU for pose estimation
- optional external GNSS RTK receiver
- prepared for user specific Python apps
- pre-installed RIEGL apps

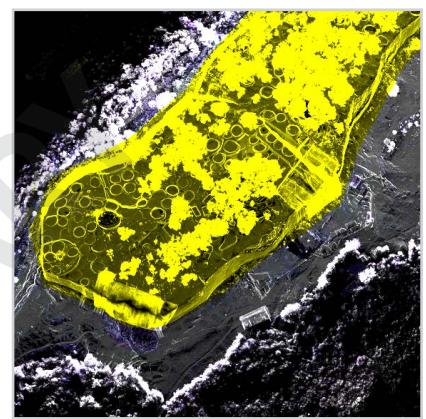
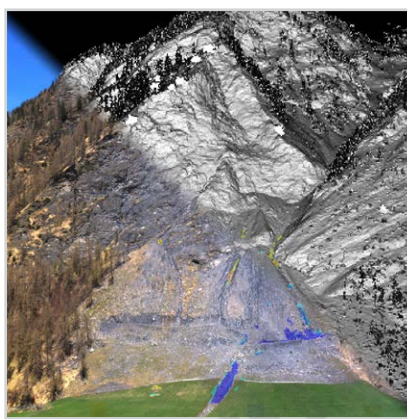


Enable Connectivity

- Integrated WiFi
- high speed data download of up to 500 MB/sec via TCP/IP
- automatic and fast data transfer with CF-express card
- cloud data synchronization via internet
- exchange formats for further analysis

Extreme Versatility – Key Applications

The new RIEGL VZ-4000i²⁵ is operable in a wide variety of applications, featuring reliable and robust automatic real-time on-board registration.



Mining

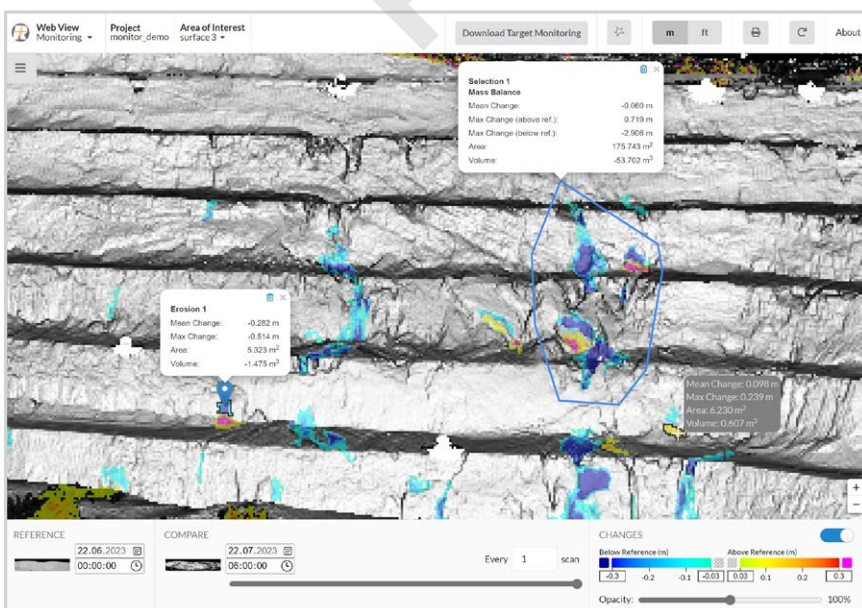
- surveying
- monitoring
- planning
- surveillance

Landscapes

- DEM / DTM
- risk assessment
- spatial analysis

Cultural and Natural Heritage

- documentation
- preservation
- modelling / animation
- digital twin



web viewer Monitor+ App

Customized Apps

- design and implementation of elaborated workflows
- automatic on-board data processing
- visualization of results via web viewer

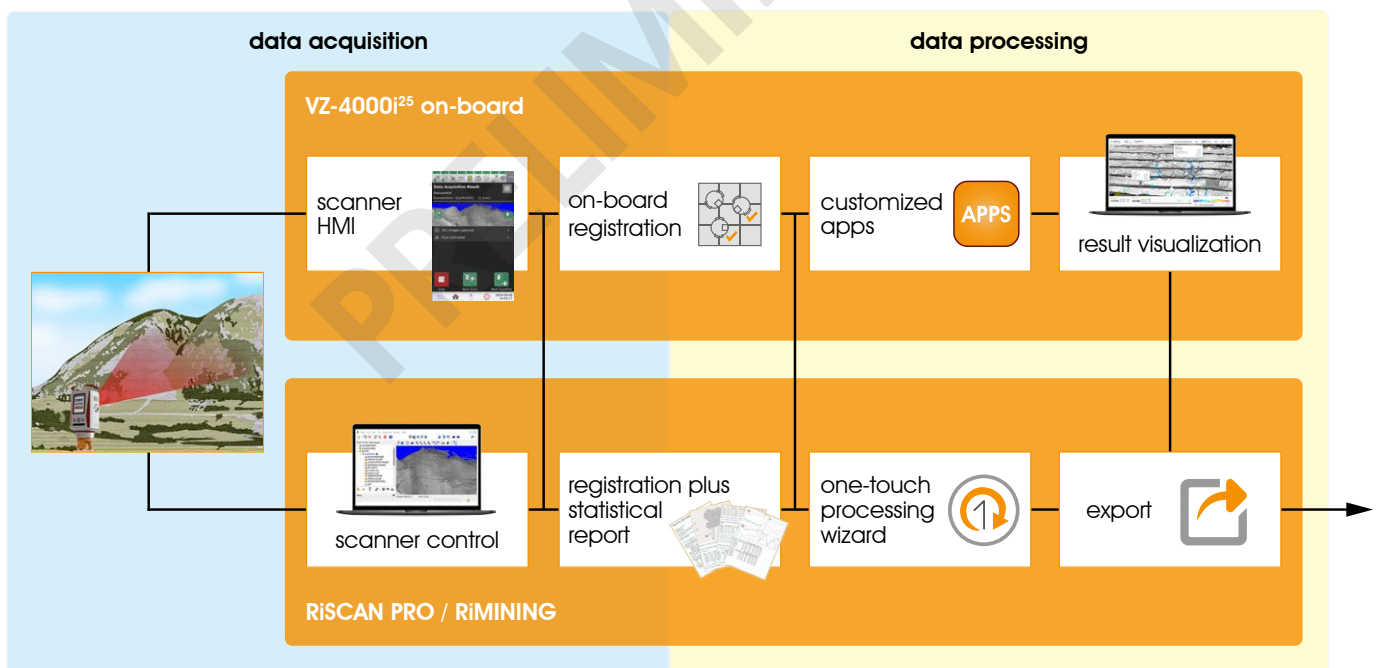
RIEGL Monitoring Apps



High Productivity – Rapid Data Acquisition

A wide variety of data acquisition scenarios require tailored data collection and processing strategies. The subsequent analysis is supported by the use of onboard customized apps and offboard software (RiSCAN PRO and RiMINING).

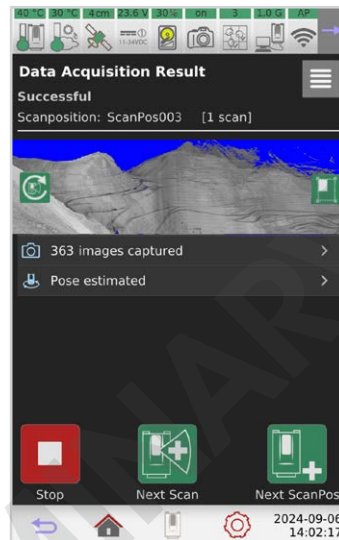
Define your specific scan routines and processing sequences and start data acquisition, processing, and analysis with a single click!



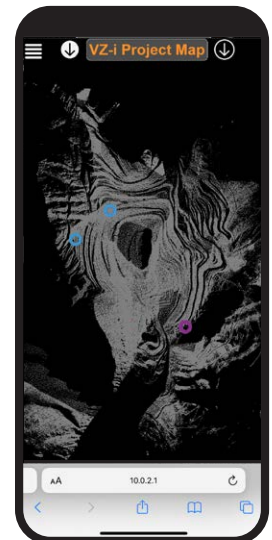
Depending on different survey scenarios, single workflow components of the VZ-4000i²⁵ and RiSCAN PRO / RiMINING can be combined to optimize data acquisition and processing.

High Productivity – Smart Data Processing

Your RIEGL VZ-4000i²⁵ optimizes the entire workflow of data acquisition and processing: Its internal dual processing platforms enable data and image acquisition as well as registration, geo-referencing, and analysis in parallel. Benefit from automatic visualization and control options via the project map app!



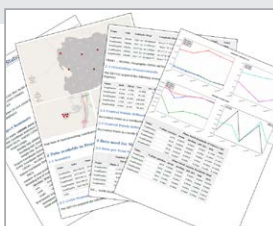
RIEGL VZ-4000i²⁵ Screen or VZ-i Series App



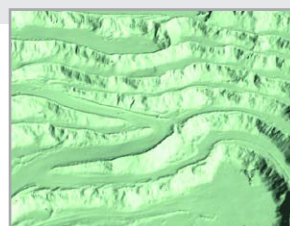
VZ-i Project Map App

Key Features of the Data Processing Software RiSCAN PRO / RiMINING:

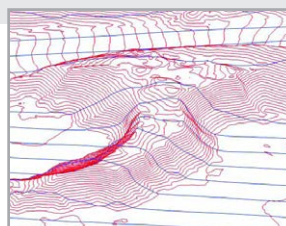
- One-Touch Processing Wizard
- fast download from the CF-Express Card (up to 500 MB/sec)
- automatic filtering (vegetation and objects, deviation, reflectance, multiple targets, etc.)
- automatic colorization of the point cloud
- generation of DEM (Digital Elevation Model)
- extraction of contour lines, break lines, and cross sections
- volume calculation, surface comparison
- export as RiPANO project
- export in data format e57, LAS, etc.
- automatic generation of PDF reports



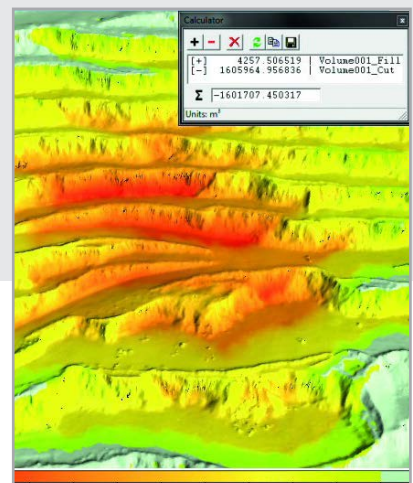
PDF reports



DEM (Digital Elevation Model)



contour lines, break lines, cross sections



volume calculation, surface comparison

Key Components

Front View



beam exit window

integrated camera for high resolution panorama images

Rear View



7 inch touch screen (1280 x 800 pixel)

single button for convenient handling

2 independent power supply connections

Optional Equipment

RIEGL GNSS RTK Receiver, Ri-RTKM-46



By attaching the optional GNSS RTK receiver, absolute positioning accuracy can be improved to 1-2 cm. The correction data is received via WiFi.

Rechargeable Batteries



RIEGL RBLI 2900



NiMH Battery

The RIEGL VZ-4000i²⁵ can be connected to the following optionally available rechargeable batteries:

- RIEGL Add-On Rechargeable Li-Ion Battery RBLI 2900 (3 x 99 Wh)
- NiMH Battery (235 Wh)

For information on further optionally available equipment please contact sales@riegl.com.

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⁾	70 kHz	150 kHz	300 kHz	500 kHz
Max. Measuring Range²⁾ natural targets $\rho \geq 90\%$ natural targets $\rho \geq 60\%$ natural targets $\rho \geq 20\%$	4600 m 4000 m 2550 m	3100 m 2700 m 1700 m	2350 m 2000 m 1250 m	2000 m 1700 m 1000 m
Minimum Range³⁾	5 m	5 m	5 m	5 m
Max. Number of Targets per Pulse⁴⁾	15	15	15	15
Ranging Accuracy^{5) 7)}	15 mm			
3D Position Accuracy⁸⁾	10 mm @ 100 m			
Precision^{6) 7)}	10 mm			
Laser Wavelength	near infrared, invisible			
Laser Beam Divergence	0.15 mrad ⁹⁾ / 0.10 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 60 deg to 120 deg, resp. 60° 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 @ 1000 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. 0.15 mrad corresponds to an increase of 15 mm of beam diameter per 100 m distance.

10) Measured at the 1/e points. 0.10 mrad corresponds to an increase of 10 mm of beam diameter per 100 m distance.

Scanner Performance

	Vertical (Line) Scan	Horizontal (Frame) Scan
Scan Angle Range	total 60° (+30° / -30°)	max. 360°
Scanning Mechanism	rotating / oscillating lightweight mirror	rotating head
Scan Speed	100°/sec to 14400°/sec (max. 20 rev/sec)	0°/sec to 60°/sec ¹¹⁾
Angular Step Width¹²⁾ $\Delta\theta$ (vertical), $\Delta\phi$ (horizontal) User definable Resolution	$0.0002^\circ \leq \Delta\theta \leq 0.28^\circ$ between consecutive laser shots	$0.002^\circ \leq \Delta\phi \leq 3^\circ$ between consecutive scan lines
Angular Accuracy¹³⁾	0.0028° (10 arcsec)	0.0028° (10 arcsec)
Angle Measurement Resolution	better 0.0005° (1.8 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	optional external RIEGL GNSS RTK receiver
Waveform Data Output (optional)	providing digitized echo signal information for specific target echoes
Data Storage	integrated SSD 2 TByte, removable CF-Express card 512 GByte (1 TByte optionally available), automatic sync while scanning
Cloud Storage	NAS, FTP-Server, Amazon S3, 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 TCP/IP	RIEGL software packages RiSCAN PRO and RiMINING
via ROS	ROS (Robot Operation System) driver available

Camera

Internal Camera	12 MPix CMOS color camera, FOV 8.1° x 6.4° (v x h) The camera field of view is dynamically deflected via the scan mirror. This allows a 60° x 360° panoramic image to be captured with total resolution of ~ 5000 MPixel. This corresponds to a pixel resolution of 3.7 cm in 1000 m range.
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General Technical Data

External Power Supply	input voltage 11 - 34 V DC up to 3 independent external power sources can be connected simultaneously for uninterrupted operation
Power Consumption	typ. 75 W, max. 90 W (without external devices)
Main Dimensions (width x height x depth)	244 mm x 456 mm x 213 mm
Weight	13 kg / 28.7 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.

Contact us



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