The RIEGL VZ-1000 V-Line® 3D Terrestrial Laser Scanner provides high speed, non-contact data acquisition using a narrow infrared laser beam and a fast scanning mechanism. High-accuracy laser ranging is based upon RIEGL’s unique echo digitization and online waveform processing, which enables superior measurement performance even during adverse environmental conditions and provides multiple return capability.

The RIEGL VZ-1000 is a very compact and lightweight surveying instrument, mountable in any orientation and able to perform in limited space conditions.

**Modes of Operation**
- stand-alone data acquisition without the need of a computer
- basic configuration and control via the built-in user interface
- remote operation via RiSCAN PRO on a notebook, connected either via LAN interface or integrated WLAN
- well-documented command interface for smooth integration into mobile laser scanning systems
- interfacing to post processing software

**User Interfaces**
- integrated Human-Machine Interface (HMI) for stand-alone operation without a computer
- high-resolution 3.5” TFT color display, 320 x 240 pixel, scratch resistant glass with anti-reflection coating and multi-lingual menu
- water and dirt resistant key pad with large buttons for instrument control
- speaker for audible status and operation communications

**Topography & Mining**
**As-Built Surveying**
**Architecture & Facade Measurement**
**Archaeology & Cultural Heritage Documentation**
**City Modelling**
**Civil Engineering**
**Forestry**
**Research**
Scanner Hardware **RIEGL VZ-1000**

- high-speed, high resolution and accurate 3D measurements
- Range up to 1400 m @ Laser Class 1
- Repeatability 5 mm
- Measurement rate up to 122,000 measurements/sec
- Field of View up to 100° x 360°
- LAN/WLAN data interface, easily allowing wireless data transmission
- Operated by any standard PC or Notebook or cable less
- Fully portable, rugged & robust

**RiSCAN PRO Software**

RIEGL software package for scanner operation and data processing

- Data archiving using a well-documented tree structure in XML file format
- Object VIEW / INSPECTOR for intelligent data viewing and feature extraction
- Straightforward Global Registration
- Interfacing to Post Processing Software

**Digital Camera (optional)**

provides high resolution calibrated color images

- NIKON D800, D600
  - D800: 36.3 Megapixel, Nikon FX format
  - D600: 24.3 Megapixel, Nikon FX format
  - USB interface

Mounting device with digital camera can be easily fixed by means of two knurled head screws. Precise position and orientation is provided by three supporting points. Power supply and USB 2.0 interface is provided by the scanner directly.

The combination of the key components **Scanner, Software and Camera** results in

- Automatic generation of high resolution textured meshes
- Photorealistic 3D reconstruction
- Exact identification of details
- Online position and distance measurements
- Online setting of any virtual point of view

**Global Scan Position Registration**

**Stand-alone Registration**

- integrated GPS receiver (L1)
- integrated biaxial inclination sensors (tilt range ±10°, accuracy typ. ±0.008°)
- integrated compass, accuracy typ. 1° (one sigma value, available for vertical scanner setup position)
- RiSCAN PRO Processing and Multistation Adjustment Module (MSA)

**Registration via control points**

- precise and fast fine scanning of retro-reflectors
- RiSCAN PRO Processing

**Totalstation-like-Registration**

- setup above well known point (integrated laser plummet)
- integrated inclination sensors
- precise fine scanning of well known remote target (reflector)
- RiSCAN PRO Processing Backsighting function
Operating Elements and Connectors

**Communication and Interfaces**
- LAN port 10/100/1000 MBit/sec within rotating head
- LAN port 10/100 MBit/sec within base
- Integrated WLAN interface with rod antenna
- USB 2.0 for external storage devices (USB flash drives, external HDD)
- USB 2.0 for connecting the optional digital camera
- Connector for GPS antenna
- Two ports for external power supply
- Connector for external GPS synchronization pulse (1PPS)
- Connector for external GNSS receiver
- Connector for optional add-on battery

**Scan Data Storage**
- Internal 32 GByte flash memory (1 GByte reserved for the operating system)
- External storage devices (USB flash drives or external hard drives) via USB 2.0 interface

**Max. Measurement Range**

The following conditions are assumed:
- Flat target larger than footprint of laser beam, perpendicular angle of incidence, average brightness

![Graph showing maximum measurement range for different target reflectivities and frequencies.](image.png)
Technical Data 3D Scanner Hardware RIEGL VZ® - 1000

Laser Product Classification

Class 1 Laser Product according to IEC60825-1:2007
The following clause applies for instruments delivered into the United States:
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

Range Performance

| Laser PRR (Peak)  
<table>
<thead>
<tr>
<th>70 kHz</th>
<th>100 kHz</th>
<th>150 kHz</th>
<th>300 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective Measurement Rate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 000 meas./sec.</td>
<td>42 000 meas./sec.</td>
<td>62 000 meas./sec.</td>
<td>122 000 meas./sec.</td>
</tr>
</tbody>
</table>
| Max. Measurement Rate  
| for natural targets ρ ≥ 90%  | 1400 m  | 1200 m  | 950 m  | 450 m  |
| for natural targets ρ ≥ 20%  | 700 m  | 600 m  | 500 m  | 350 m  |
| Max. Number of Targets per Pulse |
| practically unlimited  |
| Accuracy  
| 8 mm  |
| Precision  
| 5 mm  |

Minimum Range 2.5 m
Laser Wavelength near infrared
Beam Divergence 0.3 mrad

Scan Performance

Scan Angle Range
Scanning Mechanism
Scan Speed
Angular Stepwidth \( \Delta \theta \) (vertical), \( \Delta \varphi \) (horizontal)
Angle Measurement Resolution
Inclination Sensors
GPS receiver
Compass
Internal Sync Timer
Scan Sync (optional)

Vertical (Line) Scan
- total 100° (+60° / -40°)
- rotating multi-facet mirror
- 3 lines/sec to 120 lines/sec
- 0.0024° ≤ \( \Delta \theta \) ≤ 0.288°  
- between consecutive laser shots
- better 0.0005° (1.8 arcsec)

Horizontal (Frame) Scan
- max. 360°
- rotating head
- 0°/sec to 60°/sec  
- 0.0024° ≤ \( \Delta \varphi \) ≤ 0.5°  
- between consecutive scan lines
- better 0.0005° (1.8 arcsec)

Integrated, for vertical scanner setup position, details see page 2
Integrated, L1 antenna
Integrated, for vertical scanner setup position, details see page 2
Integrated real-time synchronized time stamping of scan data
Scanner rotation synchronization

General Technical Data

Power Supply Input Voltage 11 - 32 V DC
Power Consumption Scanning, typ. 82 W (max. 90 W)
up to three independent external power sources can be connected for uninterrupted operation
Main Dimensions ø 200 mm x 308 mm (diameter x length)
Weight approx. 9.8 kg
Max. 80 % non condensing @ +31°C
Protection Class IP 64 (dust and splash-proof)
-10°C to +50°C
-0°C 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

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