

# RIEGL VZ-1000

**very long range up to 1400 m**  
**very high speed data acquisition**  
**wide field-of-view, controllable while scanning**  
**high-accuracy, high-precision ranging based on echo digitization and online waveform processing**  
**multiple target capability**  
**superior measurement capability in adverse atmospheric conditions**  
**high-precision mounting pads for optional digital camera**  
**integrated inclination sensors and laser plummet**  
**integrated GPS receiver with antenna**  
**various interfaces (LAN, WLAN, USB 2.0)**  
**internal data storage capability**

The V-Line® 3D Terrestrial Laser Scanner **RIEGL VZ-1000** 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 allows achieving superior measurement capability even under adverse atmospheric conditions and the evaluation of multiple target echoes.

The line scanning mechanism is based upon a fast rotating multi-facet polygonal mirror, which provides fully linear, unidirectional and parallel scan lines. The **RIEGL VZ-1000** is a very compact and lightweight surveying instrument, mountable in any orientation and even under limited space conditions.

## Modes of Operation

*stand-alone data acquisition without the need of a notebook, basic configuration and commanding 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 computer*

*high-resolution 3,5" TFT color display, 320 x 240 pixel, scratch resistant cover glass with anti-reflection coating and multi-lingual menu*

*water and dirt resistant key pad with large buttons for instrument control*

*loudspeaker for audible signaling of messages by voice*

## Topography & Mining

### As-Built Surveying

### Architecture & Facade Measurement

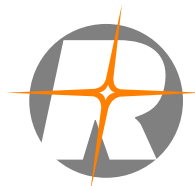
### Archaeology & Cultural Heritage Documentation

### City Modelling

### Civil Engineering



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[www.riegl.com](http://www.riegl.com)



**RIEGL**®  
LASER MEASUREMENT SYSTEMS

## System Configuration



### Scanner Hardware **RIEGL VZ-1000**

allows 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*

### Software **RiSCAN PRO**

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 D700, NIKON D300(s)*

*- D700: 12.1 Megapixel, Nikon FX format*

*- D300(s): 12.3 Megapixel*

*- 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  $\pm 10^\circ$ , accuracy typ.  $\pm 0.008^\circ$ )*

*RiSCAN PRO Processing and Multistation Adjustment Module (MSA)*

### Registration via control points

*precise and fast fine scanning of retro-reflectors*

*RiSCAN PRO Processing*

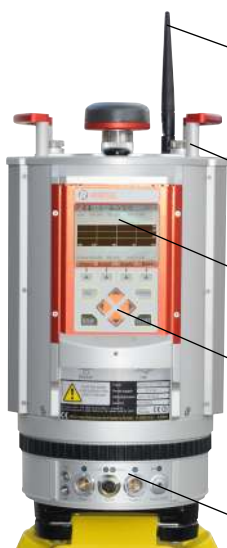
### Totalstation-like-Registration

*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*



WLAN antenna

Carrying handles

High-resolution color TFT display

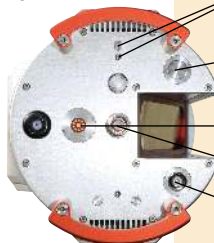
Key pad for instrument control

Connectors for power supply and LAN interface 10/100 MBit/sec, power off/on button

## Communication and Interfaces

LAN interface 10/100/1000 MBit/sec within rotating head  
 LAN interface 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 connectors for external power supply  
 connector for external GPS synchronization pulse (1PPS)  
 connector for optional GNSS receiver

TOP VIEW



Mounting points (3x) and mounting threads inserts (2x) for digital camera

Connector for GNSS receiver (optional)

USB and DC power connector for digital camera

Connector for GPS antenna

Connector for WLAN antenna

USB 2.0 slot for external memory devices

## 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



LAN 10/100/1000 MBit/sec, for rapid download of scan data

## Power Supply

### Add-on rechargeable battery

optional add-on rechargeable battery pack (high power, high capacity NIMH cells)  
 compact disc design, short-circuit-proof and protected connection pins  
 rechargeable during standard scan operation via external power supply  
 integrated micro-controller based charging electronics  
 easily pluggable to base of the laser scanner by central locking screw  
 DC voltage source (11-32 V DC) sufficient for recharging



### External power supply

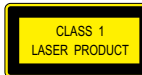
Intelligent power supply management, up to three independent external power sources can be connected simultaneously for uninterrupted operation  
 Reliable under- and over voltage protection  
 Wide external voltage supply range 11-32 V DC  
 Power consumption typ. 82 W  
 LED indicators for power status

# Technical Data 3D Scanner Hardware RIEGL VZ<sup>®</sup>-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.



## Physical Data

temperature range 0°C to +40°C (operation), -10°C to +50°C (storage)  
 protection class IP64 (dust and splash-proof)  
 weight approx. 9.8 kg

## Range Performance<sup>1)</sup>

Laser PRR (Peak) <sup>2)</sup>	70 kHz	100 kHz	150 kHz	300 kHz
Effective Measurement Rate <sup>2)</sup>	29 000 meas./sec.	42 000 meas./sec.	62 000 meas./sec.	122 000 meas./sec.
Max. Measurement Range <sup>3)</sup> for natural targets 90% for natural targets 20%	1400 m 700 m	1200 m 600 m	950 m <sup>4)</sup> 500 m	450 m <sup>4)</sup> 350 m
Max. Number of Targets per Pulse	practically unlimited <sup>5)</sup>			
Accuracy <sup>6) 8)</sup>	8 mm			
Precision <sup>7) 8)</sup>	5 mm			

## Minimum Range

2.5 m

## Laser Wavelength

near infrared

## Beam Divergence<sup>9)</sup>

0.3 mrad

- 1) with online waveform processing
- 2) rounded values, selectable by measurement program
- 3) 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 an overcast sky.

- 4) limited by PRR
- 5) details on request
- 6) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.
- 7) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.
- 8) One sigma @ 100 m range under RIEGL test conditions.
- 9) 0.3 mrad correspond to 30 mm increase of beamwidth per 100 m of range.

## Scan Performance

Scan Angle Range  
 Scanning Mechanism  
 Scan Speed  
 Angular Stepwidth (vertical), (horizontal)  
 Angle Measurement Resolution

Vertical (Line) Scan  
 total 100° (+60° / -40°)  
 rotating multi-facet mirror  
 3 lines/sec to 120 lines/sec  
 0.0024° 0.288°<sup>11)</sup>  
 between consecutive laser shots  
 better 0.0005° (1.8 arcsec)

Horizontal (Frame) Scan  
 max. 360°  
 rotating head  
 0°/sec to 60°/sec<sup>10)</sup>  
 0.0024° 0.5°<sup>11)</sup>  
 between consecutive scan lines  
 better 0.0005° (1.8 arcsec)

Inclination Sensors  
 GPS receiver  
 Compass  
 Internal Sync Timer  
 Scan Sync (optional)

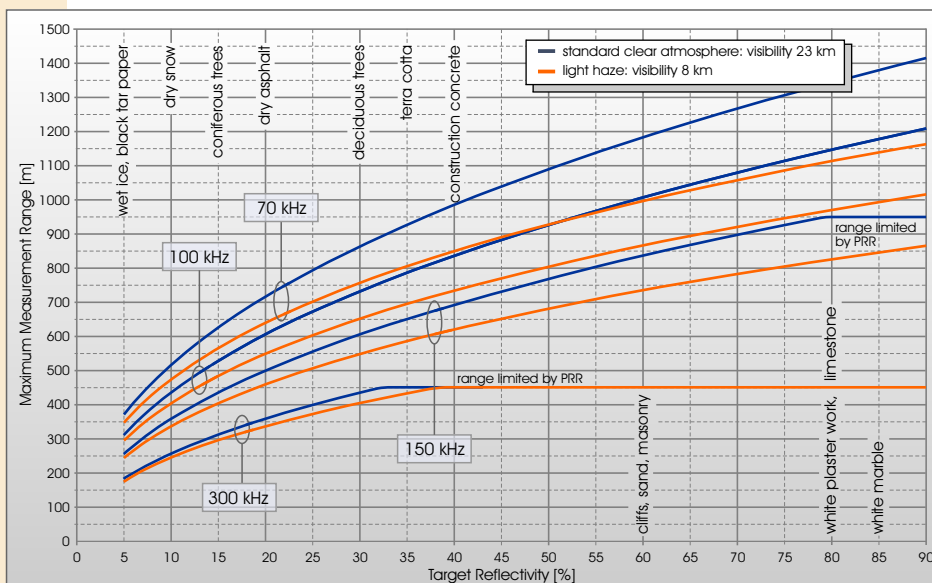
integrated, for vertical scanner setup position  
 integrated, L1 antenna  
 integrated, for vertical scanner setup position  
 integrated real-time synchronized time stamping of scan data  
 scanner rotation synchronization

10) frame scan can be disabled, providing 2D operation

11) selectable, minimum stepwidth increasing to 0.004° @ 70 kHz PRR

## Max. Measurement Range

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



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