This 3D VZ-Line Laser Scanner offers superior and unrivaled long range reflectorless measurement performance of more than 6,000 m. RIEGL’s unique V-Line technology is based on echo digitization and online waveform processing, which means that the VZ-6000 operates even in poor visibility and demanding multi-target situations caused by dust, haze, rain, snow. Due to its laser wavelength the instrument is exceptionally well-suited for measuring snowy and icy terrain.

**Typical applications include**
- Topography & Mining
- Glacier Mapping
- Snow Field Monitoring
- Long Range Monitoring
- Civil Engineering
- Archaeology

**Modes of Operation:**
- stand-alone operation with integrated graphical user interface via 7” touchscreen
- remote control via VNC Viewer with any standard tablet PC or other mobile device via WiFi
- remote operation with RiSCAN PRO installed on a notebook via LAN or WiFi connection
- customized operation by third party tools/applications based on RIEGL’s well documented interfaces and scanner libraries (e.g., RiVLib).
Ultra Long Range Performance

The High-Speed, High-Resolution 3D Laser Scanner RIEGL VZ-6000 offers an ultra long range of more than 6,000 m and a wide field of view of 60° vertical and 360° horizontal.

The high accuracy and reliability of range measurement performance is based on RIEGL’s unique V-Line technology of echo digitization and online waveform processing. Extreme long range measurements can be achieved even with poor visibility and demanding multi target situations caused by dust, haze, rain, snow, etc.

Built-in Camera

A built-in calibrated 5-Megapixel camera capturing images deflected by the laser mirror enables coverage of the entire field of view with an appropriate number of high resolution images automatically stitched together to create a high resolution panorama image. This panorama image, in combination with precise 3D measurements produced by the VZ-6000, enables the creation of photorealistic virtual models for geological and geotechnical investigations, avalanche research, geomorphology, and geological features.

Waveform Data Output Option

The digitized echo signals, also known as waveform data, acquired by the RIEGL VZ-6000 are the basis for waveform analysis. This data is provided via the optionally available waveform data output and accessible with the associated RIEGL software library RiWAVELib for investigations and research on multi target situations based on the digital waveform data samples of the target echoes.

Compatible Software Packages

The RIEGL VZ-6000 is compatible with the RIEGL software package RiSCAN PRO for terrestrial laser scanning, RIEGL’s interface library RiVLib, as well as the workflow-optimizing software packages, e.g., RiMINING.

Supported Registration Methods

Full Automatic Registration including detailed statistical report based on

- integrated GNSS or connected external high-end RTK GNSS receiver
- integrated compass, accuracy typically 1° (one sigma value, available for vertical scanner setup position)
- on-board inclination sensors (tilt range ±10°, accuracy typ. ±0.008°)
- automatic voxel and plane extraction for alignment of overlapping areas
- optionally usage of retro-reflector targets as control-points

Standard Registration methods

- **GNSS Traversing**
  - GNSS position (RTK or autonomous)
  - on-board inclination sensors
  - automatic acquisition of well known remote target (reflector)

- **Free Stationing**
  - fast fine scanning of reflectors for precise determination of scanner position using control points

- **Backsighting**
  - setup on well known point
  - on-board inclination sensors
  - precise fine scanning of well known remote target (reflector)
Communication and Interfaces

• LAN port 10/100/1000 MBit/sec within base
• integrated WLAN interface with high-gain antenna
• USB 2.0 for connecting an external digital camera
• connector for GNSS antenna
• two external power supply ports
• connector for external GNSS synchronization pulse (1PPS)
• connector for external GNSS receiver

Scan Data Storage

• internal 1 TB SSD (Solid State Disc) (2 GBytes reserved for the operating system)
• external storage devices (USB flash drives or external hard drives) via USB 2.0 interface
Max. Measurement Range  RIEGL VZ®-6000

The following conditions are assumed:

- flat target larger than footprint of the laser beam
- perpendicular angle of incidence
- average brightness
- ambiguity resolved by post processing within RiSCAN PRO / RiMINING

MTA zones:

- MTA 1: no ambiguity / 1 pulse „in the air”
- MTA 2: 2 pulses „in the air”
- MTA x: x pulses „in the air”
User-Friendly and Efficient Operation and Acquisition Workflow

Operation is easy with the integrated graphical user interface via 7” touchscreen, or by remote control of the scanner via VNC Viewer with any tablet PC or mobile device via WiFi connection. Highly efficient scan data acquisition and global registration is supported by on-board inclination sensors, integrated L1 GNSS receiver, an interface for a high-end external GNSS receiver on top of the scanner, a digital compass and built-in SSD data storage media. With a visual project overview of acquired scan data, it is possible to ensure complete data coverage or check the progress of a project as it is acquired.

The system provides a number of useful features that help to make the user experience better overall. One of these features is the ability to schedule scans to be acquired fully automatically on a regularly defined time interval which is useful for capturing 4D (3D time-lapse) datasets without direct supervision of the system.

Power Supply

- intelligent power supply management, up to three independent external power sources can be connected simultaneously for uninterrupted operation
- reliable under voltage and over voltage protection
- wide external voltage supply range 11-32 V DC
- power consumption typ. 75 W (max. 90 W)
- LED indicators for power status

Camera Capabilities

Advanced Camera Support Capability

The VZ-Line of scanners has been updated with advanced camera support capability. Utilizing a specialized interface and a universal mount system, RIEGL is able to provide support for a wide variety of industrial cameras in standalone operation. This development enables the VZ-6000 to directly control, operate and acquire images from RGB, Thermal, Industrial and a number of other camera systems and types without complex cabling, connections or the need of an external laptop. With simplified mount integrations, it is now possible to acquire advanced images from state-of-the-art camera technologies simply using RIEGL Terrestrial Laser Scanners.
Technical Data RIEGL VZ®-6000

Laser Product Classification
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 1)

Measuring Principle
Mode of operation

| Laser Pulse Repetition Rate PRR (peak) 2) | Effective Measurement Rate (meas./sec) 2) | Max. Measurement Range 3)
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>30 kHz</td>
<td>23,000</td>
<td>6,000 m</td>
</tr>
<tr>
<td>50 kHz</td>
<td>37,000</td>
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<tr>
<td>150 kHz</td>
<td>113,000</td>
<td>4,200 m</td>
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<tr>
<td>300 kHz</td>
<td>222,000</td>
<td>2,400 m</td>
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<tr>
<td></td>
<td></td>
<td>3,300 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,800 m</td>
</tr>
</tbody>
</table>

Max. Number of Targets per Pulse 4)

<table>
<thead>
<tr>
<th>NOHD (Nominal Ocular Hazard Distance) 5)</th>
<th>ENOHD (Extended Nominal Ocular Hazard Distance) 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>295 m</td>
<td>2,270 m</td>
</tr>
<tr>
<td>220 m</td>
<td>1,790 m</td>
</tr>
<tr>
<td>80 m</td>
<td>1,010 m</td>
</tr>
<tr>
<td>40 m</td>
<td>690 m</td>
</tr>
</tbody>
</table>

Accuracy 6) 8) 15 mm

Precision 7) 8) 10 mm

Minimum Range

Laser Wavelength near infrared

Laser Footprint (Gaussian Beam Definition)

- Laser Beam Divergence: 0.12 mrad 9)
- Laser Beam Footprint:
  - 15 mm @ exit, 60 mm @ 500 m, 120 mm @ 1000 m, 240 mm @ 2000 m

- Laser Beam Divergence: 0.12 mrad 9)
- Laser Beam Footprint:
  - 15 mm @ exit, 60 mm @ 500 m, 120 mm @ 1000 m, 240 mm @ 2000 m

Scanning Mechanism

Field of View

Scan Speed:

Angular Step Width Δ θ (vertical), Δ ϕ (horizontal)

Angle Measurement Resolution

Inclination Sensors

GNSS Receiver

Compass

Laser Plummets

Internal Sync Timer

Scan Sync (optional)

Waveform Data Output (optional)

- Vertical (Line) Scan
- Horizontal (Frame) Scan

- Rotating / oscillating / step-by-step
- Rotating head

- Accuracy: better 0.0005° (1.8 arcsec) between consecutive laser shots
- Vertical (Line) Scan
- Accuracy: better 0.0005° (1.8 arcsec) between consecutive scan lines
- Horizontal (Frame) Scan

- Integrated, for real-time synchronized time stamping of scan data
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General Technical Data

Power Supply Input Voltage / Power Consumption

- 11 - 32 V DC / typ. 75 W (max. 90 W)
- 248 x 226 x 450 mm (length x width x height), approx. 14.5 kg
- max. 80 % non condensing @ +31°C / IP64, dust- and splash-proof

- -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

- Field of view 7.2°x5.5° (v x h)
- Resolution 2560 x 1920 pixels (5 Mpixel), automatic exposure control
- 7” WVGA (800 x 480) color capacitive touchscreen, full operation control for stand alone usage

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 operational range may be considerably shorter than under an overcast sky.
4) If the laser beam hits, in part, more than one target, the laser’s pulse power is split accordingly. Thus, the achievable range is reduced.
5) (ENOHD) values only applicable for 3D scan patterns with minimum angular stepwidths ≥ 0.01 degree. Rectangular scan patterns with angular stepwidths < 0.01 degree and/or line scans (2D scans) have higher (ENOHD) values.
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 @ 150 m range under RIEGL test conditions.
9) Measured at the 1/e 2 points. 0.12 mrad corresponds to an increase of 12 mm of beam diameter per 100 m distance.
10) Frame scan can be disabled, providing 2D scanner operation.
11) Selectable.
12) Insulating the scanner with appropriate material will enable operation at even lower temperatures.