Industrial Laser Scanning

RIEGL®

NEW

RIEGL miniVZ®-500

Compact, Lightweight and Versatile High-Performance 3D LiDAR Sensor



Use the miniVZ-500 and its special features to optimize data capture and quality, reduce scanning times and benefit from cost-effective solutions, for example in

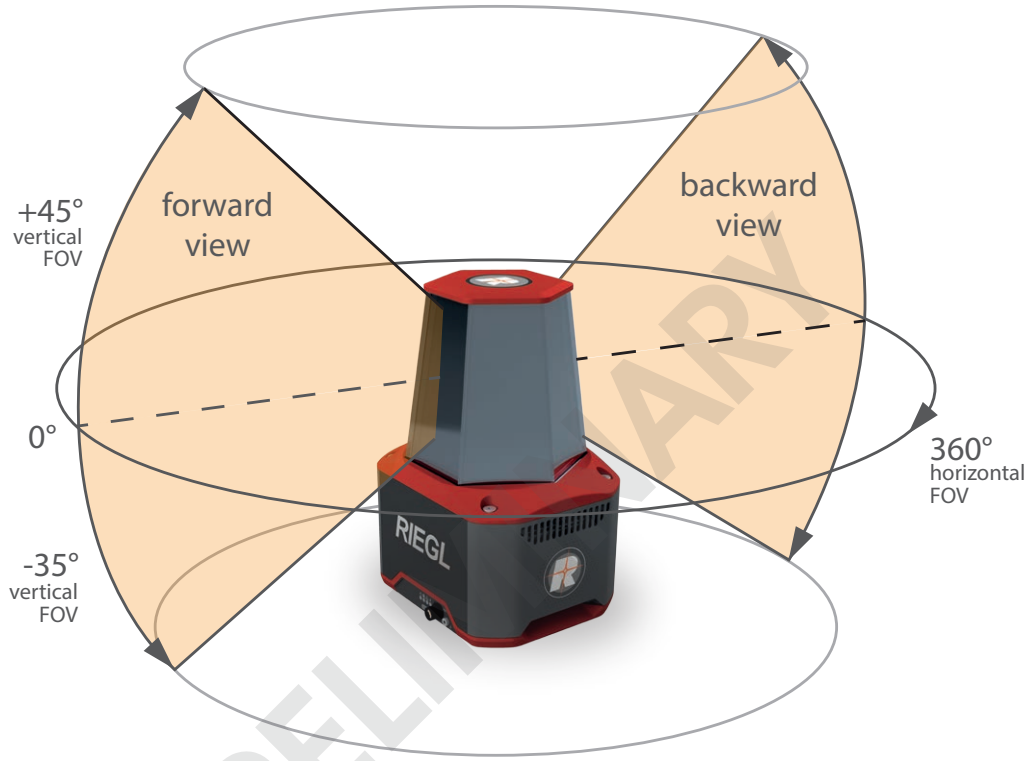
- **stockpile & bulk material measurements**
- **container handling & management**
- **monitoring in complex industrial environments**
- **quality assurance in industrial applications**
- **process automation**



www.riegl.com

High-Precision 3D Sensor

for Static Applications



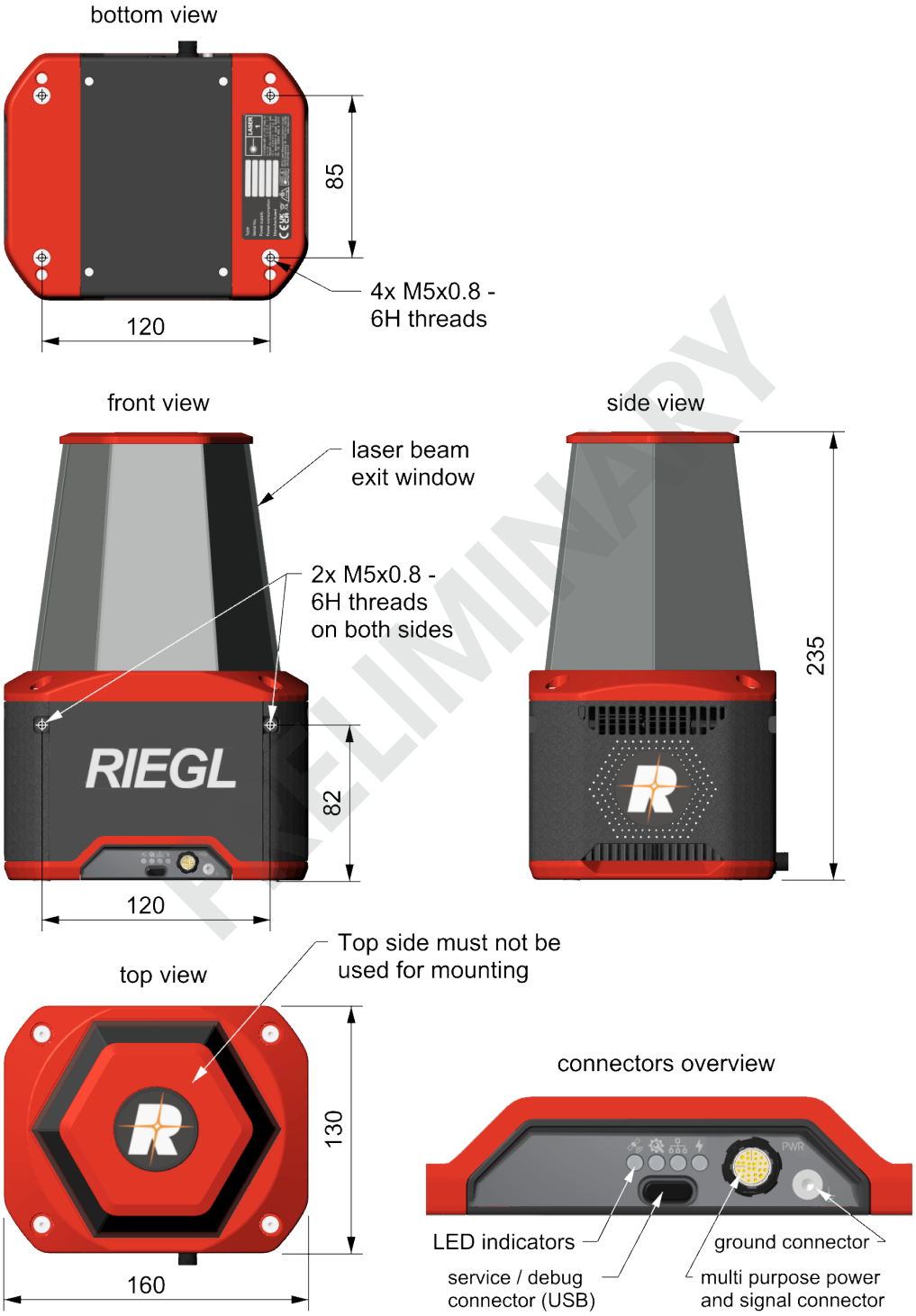
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Key Features

- fixed mounting (in any orientation) for temporary or permanent installation – indoor & outdoor
- IP67 / IP66 – for harsh environments
- Field of Regard (FoR) 80° vertical x 360° horizontal
- Field of View (FoV) selectable within FoR in a range of up to 80° vertical and up to 360° horizontal
- forward / backward scanning mechanism
- versatile interfaces and libraries for integration into customer-specific systems
- real-time adjustment of scanning parameters to optimize data acquisition

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Dimensional Drawings



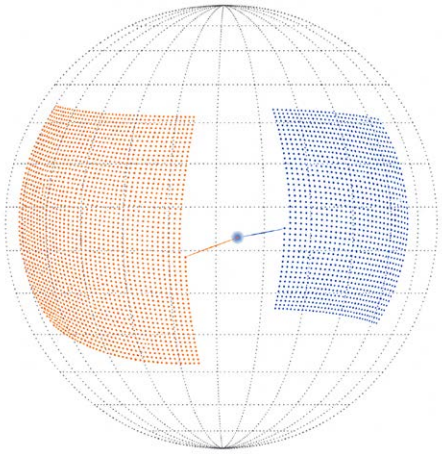
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dimensions in mm

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Scan Mode Examples

e.g. Panorama Scan:
spherical coverage, with forward & backward view



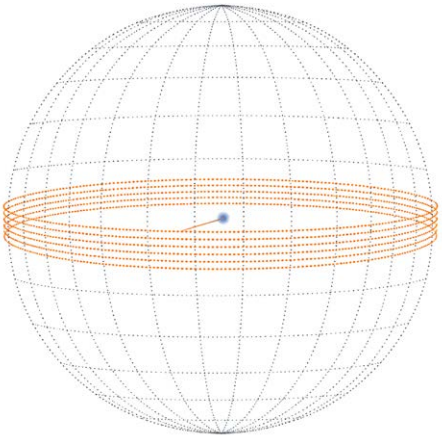
The entire surrounding area within the scanner's 80°×360° field of regard is scanned with high speed and moderate resolution. The resulting overview scan can be used to define specific areas of interest. The selected section of the entire scene can then be scanned at a higher resolution or tracked using other available scan modes, e.g. to detect movements or changes.
In general, the Panorama Scan enables objects and scenes within the entire scanning area to be captured using different angular resolutions and point densities.

Typical applications:

- general-purpose 3D site mapping and documentation
- 3D site mapping for change detection, documentation, and process automation
- bulk material handling and volume measurement (stockpiles, dump cones)
- overview scanning of container terminals and industrial yards

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e.g. Belt Scan:
high-speed, evenly spaced band scan around 360°



The scanner performs continuous high-speed horizontal rotations, while rotating or oscillating the respective other axis within a defined horizontal or vertical sector, generating, e.g., a dense scan belt on the vertical axis, that covers the full 360° horizontal field of view with high update rates of successive scans.

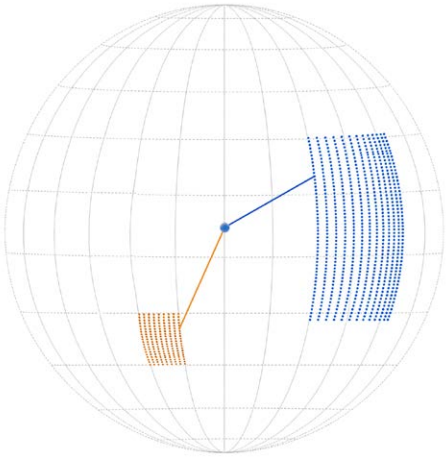
Typical applications:

- real-time monitoring of moving objects or industrial equipment (like cranes, loaders, bridges, containers, stacker/reclaimers, vehicles)
- anti-collision and safety-zone monitoring
- monitoring in harsh indoor and outdoor environments requiring continuous, high-frequency updates

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Scan Mode Examples

e.g. Sector Scan:
maximum point density within a defined area of interest



Based on the overview generated in Panorama Scan mode, Sector Scan mode allows you to define sector scans of specific areas of interest within the entire field of view.
In this mode, the entire laser measurement power is concentrated on the selected sector, for example to enable reliable detection of target objects through high-resolution measurements, whilst simultaneously skipping areas of no interest.

Typical applications:

- container handling and management
- detailed inspection and quality assurance of individual objects or structures
- high-resolution measurement of a specific stockpile or process area
- focused, resource-efficient monitoring where only part of the surroundings is relevant

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Explore the miniVZ-500 scan modes!

This short animation visualizes the scanning modes to provide a first insight in the scanner's principle.

The *RIEGL* miniVZ-500 – the game changer

By means of RiVLib, *RIEGL's* library for developing custom software to acquire and process *RIEGL* RXP data streams, the sensor is ready for integration into customer specific measurement systems.

Discover the new possibilities to boost your measuring workflow and to solve even challenging tasks!

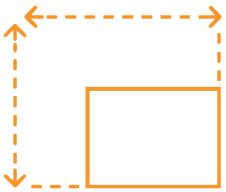
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Scan Modes
– Optimized for Every Application

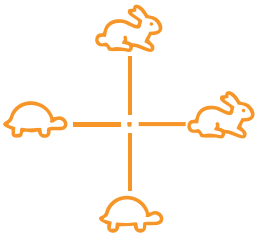
The *RIEGL* miniVZ-500 provides various scan modes to match the requirements of the respective application – balancing the specific area of interest, the point density needed, and the optimum scan time for best results.

To meet the requirements of complex applications, it is possible to dynamically adapt the scan parameters during operation. This enables, for example, "TWS" (Track While Scanning) applications.

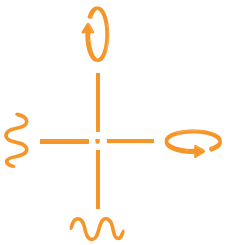
Explore the full potential of scan modes and options!
Combine operational features for an optimum parameter setting



define sectors for horizontal and vertical axis within the field of regard



choose scanning speed for both axes independently
combine slow vertical scans with fast horizontal scans and vice versa



combine rotating or oscillating modes for each axis to achieve maximum efficiency in data acquisition for the specific application

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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]	300 kHz	900 kHz	2200 kHz
Max. Measuring Range [2] natural targets ρ ≥ 90 % natural targets ρ ≥ 20 %	 690 m 340 m	 410 m 200 m	 270 m 130 m
Minimum Range [3]	1 m	1 m	1 m
Max. Number of Targets per Pulse [4]	15	10	5
Ranging Accuracy [5] [7]	5 mm		
Precision [6] [7]	3 mm		
Max. Effective Measurement Rate @ 2200 kHz PRR & 80° vertical FOV, 360° horizontal FOV	up to 968,000 meas./sec		
Laser Wavelength	near infrared, invisible		
Laser Beam Divergence	0.45 mrad [8] / 0.32 mrad [9]		

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 flat targets aligned parallel to the vertical z-axis of the device.
4) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achieveable 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 @ 100 m range under *RIEGL* test conditions
8) Measured at the $1/e^2$ points. 0.45 mrad corresponds to an increase of 45 mm of beam diameter per 100 m distance.
9) Measured at the 1/e points. 0.32 mrad corresponds to an increase of 32 mm of beam diameter per 100 m distance.

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Scanner Performance

	Vertical (Line) Scan	Horizontal (Frame) Scan
Field of Regard (FoR)	80° (+45° / -35°)	360°
Field of View (FoV) [10]	up to 80° (+45° / -35°)	up to 360°
Scanning Mechanism	rotating mirror	inside rotating mechanism
Scan Speed (adjustable) [11]	20 lines/sec up to 500 lines/sec [12]	0°/sec up to 1800°/sec (5 Hz)
Angular Step Width (adjustable) **Δϑ (vertical), Δφ (horizontal)**	 0.0017° ≤ Δϑ ≤ 0.3° between consecutive laser shots	 0° ≤ Δφ ≤ 180° between consecutive scan lines
Angle Measurement Resolution	≥ 0.00017°	≥ 0.000085°
Orientation Sensors	integrated Inertial Measurement Unit (IMU)	

10) selectable
11) Properly mounted for maximum vertical (line) and horizontal (frame) scan speeds.
12) Including forward and backward view, meaning that a 180 deg horizontal scan already covers the full 360 deg scan angle range.

Technical Data to be continued at page 8

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Scanner Control

via Mobile Device (WiFi)	*RIEGL* Web-Interface
via Robot Operating System (ROS) (optional)	ROS driver available

Data Interfaces

Configuration, Scan Data Output & Communication with External Devices	LAN 100/1000/2500 MBit/sec
GNSS Interface	serial interface for data string with GNSS-time information, TTL input for 1PPS synchronization pulse
Data Storage	integrated SSD 1 TByte

General Technical Data

External Power Supply / Power Consumption	input voltage 11 - 34 V DC / typ. 35 W (1.45 A @ 24 V); max. 45 W (1.9 A @ 24 V)
Main Dimensions (width x depth x height)	approx. 130 x 160 x 235 mm
Weight	approx. 3.3 kg
Humidity	max. 80% non condensing @ +31°C
Protection Class	IP66 [5], IP67 [6]
Temperature Range	-25 °C up to +50 °C (operation) / -40 °C up to +65 °C (storage)

5) dust-tight, protected against powerful waterjets

6) dust-tight, protected against temporary immersion in water

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Contact us

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