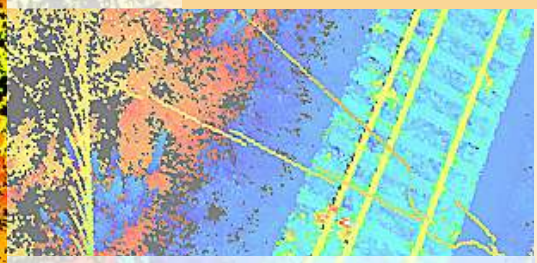
2D Laser Scanner with Online Waveform Processing

# RIEGL VQ®-250



***high-accuracy ranging based on echo digitization and online waveform processing***

***high laser repetition rate - fast data acquisition***

***multiple target capability - unlimited number of targets***

***perfectly linear scan lines***

***compact, rugged and lightweight design***

***electrical interfaces for GPS data string and Sync Pulse (1PPS)***

***mechanical interface for IMU mounting***

***integrated LAN-TCP/IP interface***




**The V-Line® "Full Circle" laser scanner *RIEGL* VQ-250 is a very high speed, non-contact profile measuring system using a narrow infrared laser beam and a fast line scanning mechanism, enabling full 360 degree beam deflection without any gaps.**

High-performance pulsed laser ranging, based on *RIEGL*'s well-proven echo signal digitization technology with subsequent online waveform processing results in superior measurement capabilities even under adverse atmospheric conditions and in excellent multiple target echo discrimination.

The *RIEGL* VQ-250 is a compact and lightweight scanner, mountable in any orientation and even under limited space conditions on land based vehicles, tunnel measuring devices, watercrafts, etc. The instrument needs only one power supply and provides line scan data via the integrated LAN-TCP/IP interface. The binary data stream can easily be decoded by user-designed software making use of the available software library RiVLib.

**The applications are**

***Mobile Mapping***

***Tunnel Profile Measurement***

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RIEGL®
LASER MEASUREMENT SYSTEMS

Mobile Laser Scanning

# Technical Data *RIEGL* VQ®-250

| | |
|---|---|
| Laser Product Classification | Class 1 Laser Product according to IEC60825-1:2007<br>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 Measurement Performance

Measuring Principle

- time-of-flight measurement
- echo signal digitization
- online waveform processing

| Effective Measurement Rate[1] | 50 kHz | 100 kHz | 150 kHz | 200 kHz | 300 kHz |
|---|---|---|---|---|---|
| Max. Unambiguous Measuring Range [2]<br>natural targets ρ ≥ 10%<br>natural targets ρ ≥ 80% | <br>180 m<br>500 m | <br>130 m<br>380 m | <br>110 m<br>340 m | <br>100 m<br>300 m | <br>75 m<br>200 m |
| Max. Number of Targets per Pulse | practically unlimited (details on request) | | | | |

| | |
|---|---|
| Minimum Range | 1.5 m |
| Accuracy [3] [5] | 10 mm |
| Precision [4] [5] | 5 mm |
| Laser Pulse Repetition Rate PRR [1] [6] | up to 300 kHz |
| Max. Effective Measurement Rate [1] | up to 300 000 measurements/sec<br>(@ 300 kHz PRR & 360° FOV) |
| Echo Signal Intensity | for each echo signal, high-resolution 16 bit intensity information is provided |
| Laser Wavelength | near infrared |
| Beam Divergence | 0.3 mrad |
| Laser Beam Footprint (Gaussian Beam Definition) | 7 mm @ exit aperture<br>17 mm @ 50 m<br>31 mm @ 100 m |

1) Rounded values.
2) The following conditions are assumed: target larger than the footprint of the laser beam, perpendicular angle of incidence, visibility 23 km, average ambient brightness.
3) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.
4) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.
5) One sigma @ 150 m range under *RIEGL* test conditions.
6) User selectable.

## Scanner Performance

| | |
|---|---|
| Scanning Mechanism | rotating mirror |
| Field of View (selectable) | up to 360° „full circle", without gaps |
| Scan Speed (selectable) | up to 100 scans/sec |
| Angular Step Width Δϑ (selectable) between consecutive laser shots | 0.018° ≤ Δϑ ≤ 0.72° |
| Angle Measurement Resolution | 0.001° |
| Internal Sync Timer | real-time synchronized time stamping of scan data |
| Scan Sync (optional) | scanner rotation synchronization |

## Data Interfaces

| | |
|---|---|
| Configuration | LAN 10/100/1000 Mbit/sec |
| Scan Data Output | LAN 10/100/1000 Mbit/sec |
| GPS-System | Serial RS232 Interface for data string with GPS-time information,<br>TTL input for 1 PPS synchronization pulse |

## General Technical Data

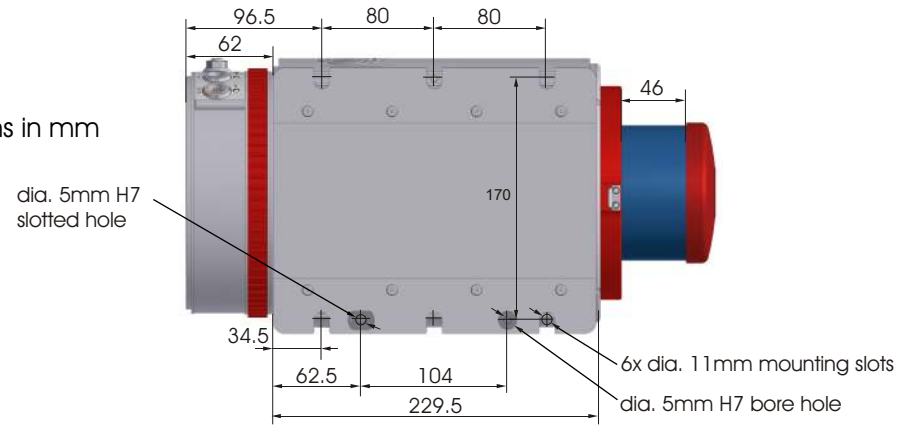
| | |
|---|---|
| Power Supply Input Voltage | 18 - 32 V DC |
| Power Consumption | typ. 65 W, max. 170 W [7] |
| Main Dimensions (L x W x H) | 376 x 192 x 218 mm |
| Weight | approx. 11 kg (without protective cap) |
| Humidity | max. 80% non condensing @ + 31°C |
| Protection Class | IP64, dust and splash-proof |
| Temperature Range | -10 °C to +40 °C (operation) / -20 °C to +50 °C (storage) |

7) At the maximum scanning rate of 100 scans/sec and ambient temperature < +10°C.

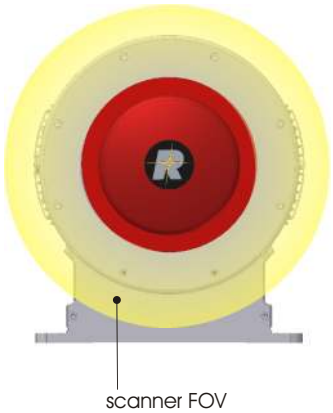
**Note:** In Germany and in the U.S.A. only, use of the VQ-250 for other applications than Mobile Mapping and Tunnel Profile Measurement is not permitted.

all dimensions in mm

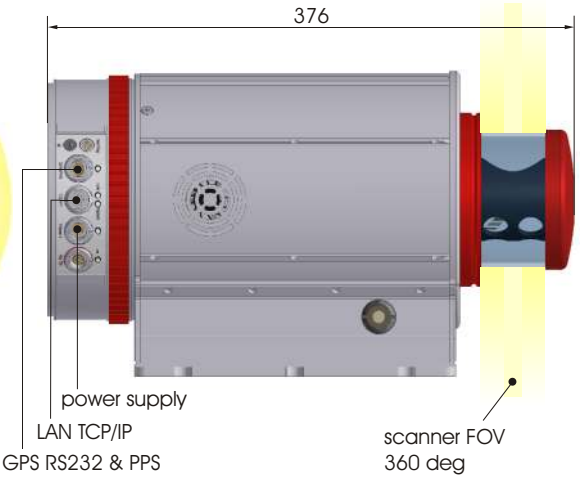
**rear view**



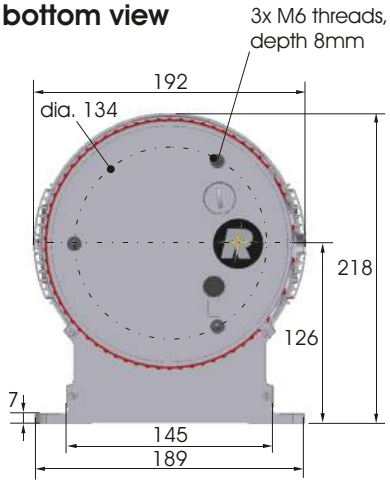

**top view**



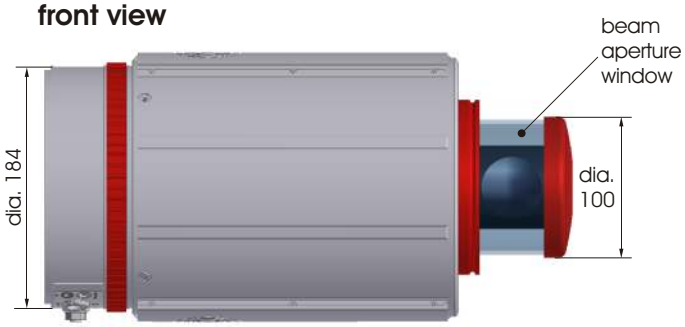

**side view**




**bottom view**




**front view**




**Protective Cap:**

When not in operation, a protective cap is to be attached to shield the high precision optical front end from mechanical damage and soiling.

RIEGL®
LASER MEASUREMENT SYSTEMS

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