The **RIEGL** miniVUX-1UAV is an extremely lightweight airborne laser scanner, designed specifically for integration with UAS/UAV/RPAS.

The small and sophisticated design of the stable aluminum housing offers various integration possibilities with platforms that offer restricted space or payload capabilities. The 360° field of view allows complete acquisition of the environment.

An easy-to-remove SD card for data storage, and/or the option for streaming the scan data via LAN-TCP/IP interface, in combination with the modest power consumption of the scanner, enable straightforward integration with most UAS/UAV/RPAS types.

The **RIEGL** miniVUX-1UAV makes use of **RIEGL**’s unique Waveform-LiDAR technology, allowing echo digitization and online waveform processing. Multi-target resolution is the basis for penetrating even dense foliage. As a further special feature, the wavelength is optimized for the measurement of snowy and icy terrain.

In addition to the stand-alone version of the miniVUX-1UAV, **RIEGL** also offers fully-integrated system solutions.

**Typical applications include**

- Agriculture & Forestry
- Glacier and Snowfield Mapping
- Archeology and Cultural Heritage Documentation
- Construction-Site Monitoring
- Landslide Monitoring
The following conditions are assumed for the Operating Flight Altitude AGL:

- Target size ≥ laser footprint
- Average ambient brightness
- Operating flight altitude given at a FOV of +/-45°

Please contact sales@riegl.com to get more detailed information.

RIEGL miniVUX-SYS System Integration Options

Besides of the stand-alone miniVUX-1UAV LiDAR engine, RIEGL offers also system solutions, combining the miniVUX-1UAV with IMU/GNSS systems of different performance and of different form factors as well as optional RGB camera systems. Additionally, a special add-on to the miniVUX-SYS allows for straight forward integration with your multi-rotor UAV, e.g. a DJI Matrice M600.

RIEGL miniVUX-1UAV 
with APX-15 UAV

- IMU/GNSS unit integrated with LiDAR engine
- Total weight approx. 2 kg
- Interfaces for up to 2 cameras
- Suited for integration into fixed-wing UAVs

RIEGL miniVUX-1UAV
with APX-20 UAV

- Higher-grade IMU/GNSS unit partly integrated with LiDAR engine
- Total weight approx. 2.5 kg
- Interfaces for up to 2 cameras
- Suited for integration into all types of UAVs

RIEGL Integration Kit 600

- Add-on to the miniVUX-SYS coming with shock-absorbing mounting-kit, power supply module and cabling
- Total weight approx. 0.7 kg (without sensor and camera)
- Suited for integration into multi-rotor UAVs

Please contact sales@riegl.com to get more detailed information.

1) See technical details in the corresponding Applanix datasheet
RIEGL miniVUX®-1UAV LiDAR Sensor equipped with APX-15 UAV

RIEGL miniVUX®-1UAV LiDAR Sensor equipped with APX-20 UAV

RIEGL miniVUX-1UAV LiDAR Sensor

1) See technical details in the corresponding Applanix datasheet
Technical Data RIEGL miniVUX-1UAV

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

Laser Product Classification Class 1 Laser Product according to IEC 60825-1:2014

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

<table>
<thead>
<tr>
<th>Laser Pulse Repetition Rate PRR</th>
<th>100 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Measuring Range</td>
<td>1)</td>
</tr>
<tr>
<td>natural targets ρ ≥ 20 %</td>
<td>170 m</td>
</tr>
<tr>
<td>natural targets ρ ≥ 60 %</td>
<td>290 m</td>
</tr>
<tr>
<td>natural targets ρ ≥ 80 %</td>
<td>330 m</td>
</tr>
<tr>
<td>Typ. Operating Flight Altitude AGL 1</td>
<td>100 m (330 ft)</td>
</tr>
<tr>
<td>natural targets ρ ≥ 20 %</td>
<td>160 m (525 ft)</td>
</tr>
<tr>
<td>natural targets ρ ≥ 60 %</td>
<td></td>
</tr>
<tr>
<td>Max. Number of Targets per Pulse 4</td>
<td>5</td>
</tr>
</tbody>
</table>

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) Flat terrain assumed, scan angle ±45° FOV
4) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achievable range is reduced.

Minimum Range | 3 m |
| Accuracy | 5) 15 mm |
| Precision | 6) 10 mm |
| Laser Pulse Repetition Rate | 1 | 100 kHz |
| Max. Effective Measurement Rate | 1 | 100 000 meas./sec. (@ 100 kHz PRR & 360° FOV) |
| Echo Signal Intensity | for each echo signal, high-resolution 16 bit intensity information is provided near infrared |
| Laser Wavelength | near infrared |
| Laser Beam Divergence 8 | 1.6 x 0.5 mrad |
| Laser Beam Footprint | 160 mm x 50 mm @ 100 m |

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) One sigma @ 50 m range under RIEGL test conditions.
8) Measured at 50% peak intensity, 1.6 mrad corresponds to an increase of 160 mm of beam diameter per 100 m distance.

Scanning Mechanism

- rotating mirror
- up to 360°
- 10 - 100 revolutions per second, equivalent to 10 - 100 scans/sec
- 0.036° ≤ Δ ϕ ≤ 0.36°
- 0.001°

Interfaces

- Configuration, Scan Data Output & Communication with External Devices
- GNSS Interface 9
- General IO & Control 10
- Camera Interface
- Memory Card Slot

9) internally available (not available with standard interface box)
10) 1x externally available with standard interface box

General Technical Data

Power Supply Input Voltage / Consumption

- 11 - 34 V DC / typ. 18 W @ 100 scans/sec
- 243 x 111 x 85 mm / approx. 1.6 kg
- 243 x 99 x 85 mm / approx. 1.55 kg
- max. 80 % non condensing @ 31°C
- IP64, dust and splash-proof
- -10°C up to +40°C (operation) / -20°C up to +50°C (storage)

11) Continuous operation at ambient temperature of ≥ 30°C (≥ 86°F) requires a minimum amount of air flow at approx. 3 m/s. For applications where a 3 m/s air flow along the cooling fins cannot be guaranteed, the cooling fan has to be used.