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 storage 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 solutions.

Typical applications include
- Agriculture & Forestry
- Glacier and Snowfield Mapping
- Archeology and Cultural Heritage Documentation
- Construction-Site Monitoring
- Landslide Monitoring

• very compact & lightweight (1.55 kg / 3.4 lbs)
• 360° field-of-view
• robust aluminum housing, ready to be mounted on multi-rotor, rotary-wing, and fixed-wing UAVs
• makes use of RIEGL's unique echo signal digitization and online waveform processing
• multiple target capability – up to 5 target echoes per laser shot
• scan speed up to 100 scans/sec
• measurement rate up to 100,000 measurements/sec
• mechanical and electrical interface for IMU mounting
• exceptionally well suited to measure in snowy and icy terrains
• user-friendly, application- and installation-oriented solutions for integration

visit our website
www.riegl.com
Maximum Measurement Range vs. Target Reflectance RIEGL miniVUX®-1UAV

PRR = 100 kHz

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.

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. With regards to the IMU/GNSS system, three options are available, depending on customer’s requirements and the integration environment:

RIEGL miniVUX-SYS 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-SYS with APX-20
- higher-grade IMU/GNSS unit 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 miniVUX-SYS with AP20 and control unit
- higher-grade IMU/GNSS unit with separate control unit
- total weight approx. 3.6 kg
- interfaces for up to 4 cameras via control unit
- suited for integration into all types of UAVs with higher payload capacity

1) See technical details in the corresponding Applanix datasheet
**Cooling Fan**

The RIEGL miniVUX-1UAV is equipped with a cooling fan; a lightweight structure with an axial fan providing forced air convection. It takes care that the sensor can be operated even under conditions where sufficient natural air flow cannot be guaranteed. Power supply is provided via integrated contact pins.

The cooling fan is easy to demount by the customer when it might be necessary due to restricted space conditions. In that case, please note, that continuous operation of the sensor requires forced air convection. Thus, the scanner will turn off, if the environmental conditions/temperatures exceed the temperature range given for the sensor.

**Protective Cap**

To shield the glass window of the RIEGL miniVUX-1UAV from mechanical damage and soiling, a protective cap is provided to cover the upper part of the instrument during transport and storage.
**Technical Data RIEGL miniVUX®-1UAV**

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

**Range Measurement Performance**
- Measuring Principle: 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>150 m</td>
</tr>
<tr>
<td>Natural targets p ≥ 20 %</td>
<td></td>
</tr>
<tr>
<td>Natural targets p ≥ 60 %</td>
<td>250 m</td>
</tr>
<tr>
<td>Typ. Operating Flight Altitude AGL</td>
<td>80 m (260 ft)</td>
</tr>
<tr>
<td>Max. Number of Targets per Pulse</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) Reflectance p ≥ 20%, flat terrain assumed, scan angle ≤ 45° FOV, additional roll angle ≤ 5°.
4) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achievable 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) 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.

**Scanner Performance**
- Scanning Mechanism: rotating mirror
- Field of View (selectable): up to 360°
- Scan Speed (selectable): 10 - 100 revolutions per second, equivalent to 10 - 100 scans/sec
- Angular Step Width Δ & θ (selectable): 0.05° ≤ Δ θ ≤ 0.5°
- Angle Measurement Resolution: 0.001°

**Interfaces**
- Configuration, Scan Data Output & Communication with External Devices
- GNSS Interface
- General IO & Control
- Camera Interface
- Memory Card Holder
- Serial Interface to External Devices

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. 16 W @ 100 scans/sec
- Main Dimensions (L x W x H): 243 x 111 x 85 mm / approx. 1.6 kg
- Weight with Cooling Fan: 243 x 99 x 85 mm / approx. 1.55 kg
- Humidity: max. 80 % non condensing @ 31°C
- Protection Class: IP64, dust and splash-proof
- Temperature Range: -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.

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Data Sheet, RIEGL miniVUX-1UAV, 2017-09-06