The RIEGL miniVUX-SYS is a complete laser scanning system of low weight and compact size for flexible use in UAV-based applications on a variety of UAV/UAS/RPAS.

The system comprises a RIEGL miniVUX-series LiDAR sensor (RIEGL miniVUX-3UAV, RIEGL miniVUX-2UAV, RIEGL miniVUX-1UAV or RIEGL miniVUX-1DL), an IMU/GNSS system (different versions available), and an optional RGB camera system.

The measurement performance of RIEGL’s UAV LiDAR sensors in combination with the Inertial Measurement Unit and the associated GNSS receiver results in survey-grade measurement accuracy.

The miniVUX-SYS is delivered with the necessary software tools for processing and geo-referencing of the acquired scan data, and processing of the IMU/GNSS data.

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

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www.riegl.com
RIEGL miniVUX®-SYS with APX-15 UAV
(e.g. for fixed-wing UAVs)

For this miniVUX-SYS solution, the APX-15 UAV\(^1\) IMU/GNSS unit is integrated in a small interface box which is attached to the rear part of the LiDAR sensor. Due to its compact and lightweight design and the total weight of approx. 2 - 2.8 kg (depending on scanner type, without camera(s)), the RIEGL miniVUX-SYS with APX-15 UAV is very well suited for an integration with UAV platforms offering limited/restricted weight and space conditions. Optionally, a single or a dual RGB camera system is available.

RIEGL miniVUX-3UAV / RIEGL miniVUX-2UAV / RIEGL miniVUX-1UAV equipped with APX-15 UAV

with two Sony Alpha 6000 cameras (oblique mount)

RIEGL miniVUX-1DL equipped with APX-15 UAV

with nadir-looking camera

e.g. Sony Alpha 6000 camera or Sony Alpha 7R III or Sony A7R IV

other 3rd party cameras integrated\(^2\)

RIEGL miniVUX®-SYS with APX-20 UAV
(e.g. for fixed-wing, single-rotor or multi-rotor UAVs)

For this miniVUX-SYS solution, the new, higher-grade APX-20 UAV\(^1\) IMU/GNSS system is used. The LiDAR sensor is equipped with a specifically designed interface box accommodating the GNSS board stack as well as the camera trigger electronics. The IMU sensor is tightly coupled with the LiDAR sensor. With its weight of approx. 2.5 - 3.3 kg (depending on scanner type, without camera(s)), the RIEGL miniVUX-SYS with APX-20 UAV is universally applicable for an integration with more or less all types of UAVs that are capable of carrying this payload weight. Optionally, a single or a dual RGB camera system is available.

RIEGL miniVUX-3UAV / RIEGL miniVUX-2UAV / RIEGL miniVUX-1UAV equipped with APX-20 UAV

with two Sony Alpha 6000 cameras (oblique mount)

RIEGL miniVUX-1DL equipped with APX-20 UAV

with nadir-looking camera

e.g. Sony Alpha 6000 camera

1) See technical details in the corresponding Applanix data sheet.
2) Multispectral camera, hyperspectral camera, thermal imaging sensor – more information on request.
**RIEGL Integration Kit 600**
(e.g. for multi-rotor UAVs)

The RIEGL Integration Kit 600 is an add-on to the miniVUX-SYS for its integration with your multi-rotor UAV, e.g. a DJI Matrice M600. The package comes with an appropriate, shock absorbing mounting-kit, power supply module, and necessary cabling for quick and straight forward integration.

![DJI Matrice M600 equipped with RIEGL miniVUX-SYS using RIEGL Integration Kit 600](image)

**RIEGL miniVUX®-SYS – Processing Workflow and Scan Data Examples**

Using RIEGL’s software suites (RIPROCESS, RIWORLD) and dedicated processing workflows with specialized alignment tools like RIPRECISION conducting the whole procedure of scan data alignment fully automatically, processing time can be reduced to a minimum. RIPROCESS can interface the optimized, georeferenced point cloud in further post-processing tools via LAS or other data exchanges in various user-defined coordinate systems.

![RIEGL miniVUX®-SYS integration options](image)
Scanner Performance

<table>
<thead>
<tr>
<th>RIEGL miniVUX-3UAV</th>
<th>RIEGL miniVUX-2UAV</th>
<th>RIEGL miniVUX-1UAV</th>
<th>RIEGL miniVUX-1DL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser Pulse Repetition Rate (PRR)</td>
<td>Laser Pulse Repetition Rate (PRR)</td>
<td>Laser Pulse Repetition Rate (PRR)</td>
<td>Laser Pulse Repetition Rate (PRR)</td>
</tr>
<tr>
<td>up to 300 kHz</td>
<td>up to 200 kHz</td>
<td>up to 100 kHz</td>
<td>up to 100 kHz</td>
</tr>
<tr>
<td>up to 200,000 meas./sec.</td>
<td>up to 200,000 meas./sec.</td>
<td>100,000 meas./sec.</td>
<td>100,000 meas./sec.</td>
</tr>
<tr>
<td>330 m</td>
<td>280 m</td>
<td>330 m</td>
<td>260 m</td>
</tr>
<tr>
<td>15 mm / 10 mm</td>
<td>15 mm / 10 mm</td>
<td>15 mm / 10 mm</td>
<td>15 mm / 10 mm</td>
</tr>
<tr>
<td>up to 360°</td>
<td>up to 360°</td>
<td>up to 360°</td>
<td>up to 46°, +23° off nadir</td>
</tr>
<tr>
<td>100 scans/sec</td>
<td>100 scans/sec</td>
<td>100 scans/sec</td>
<td>150 scans/sec</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

IMU & GNSS

IMU Accuracy
- Roll, Pitch: 0.015°, 0.025°
- Heading: 0.035°, 0.08°

IMU Sampling Rate: 200 Hz

Position Accuracy (typ.):
- horizontal: < 0.05 m
- vertical: < 0.1 m

IMU & GNSS Interfaces
- 2 x LAN 10/100/1000 Mbit/sec
- Serial RS-232 interface for data string with GNSS-time information
- TIL input for 1PPS synchronization pulse
- Power Output 10 V DC, max. 4.5 W
- 2 x TTL input/output, 1 x Remote on/off
- 2 x GNSS RS-232 Tx & PPS, Power (USB 2.0), Trigger, Exposure
- SPI (Serial Peripheral Interface)

General Technical Data

RIEGL UAV LiDAR Sensors

Power Supply Input Voltage: 11 - 34 V DC

Consumption:
- typ. 18 W @ 100 scans/sec
- typ. 43 W @ 75 revolutions/sec

Main Dimensions (L x W x H) / Weight:
- with Cooling Fan: approx. 1.6 kg
- without Cooling Fan: approx. 1.55 kg

Temperature Range:
- operation: 0°C up to +40°C
- storage: -20°C up to +50°C

Humidity: max. 80 % non condensing @ 31°C

Protection Class: IP64, dust and splash-proof

General Technical Data - RIEGL miniVUX-SYS

Main Dimensions (L x W x H) / Weight:
- with APX-15 UAV: approx. 2.5 kg
- with APX-20 UAV: approx. 3.3 kg

Integration Kit 600
- Camera(s): optional, technical data depending on selected camera type

Weight
- approx. 0.7 kg

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.

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.

Valid for the initial start-up. After a warm-up phase, operation down to -10°C is also possible.