The RIEGL VUX-240 is a lightweight airborne laser scanner, especially designed for use on UAS/UAV/RPAS and small manned aeroplanes or helicopters.

With its wide field of view of 75 degrees and an extremely fast data acquisition rate of up to 1.8 MHz, the instrument is perfectly suited for high point density corridor mapping applications.

The VUX-240 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.

A continuously rotating polygon mirror wheel enables scan speeds of up to 400 lines per second, for efficiently covering large areas when operated from fast UAVs or aircrafts.

The scanner provides an internal data storage capacity of 1 TByte and is equipped with interfaces for an external IMU/GNSS system as well as to control up to four external cameras. WLAN enables direct access to the laser scanner for changing configuration settings and checking the system status.

Typical applications include

- Corridor Mapping: Power Line, Railway Track and Pipeline Inspection
- Topography in Open-Cast Mining
- Surveying of Urban Environments
- Archeology and Cultural Heritage Documentation
- Agriculture & Forestry

visit our website
www.riegl.com
Technical Data RIEGL VUX®-240

Laser Product Classification

RIEGL VUX®-240

Range Measurement Performance

Measuring Principle
time of flight measurement, echo signal digitization, multiple target capability, online waveform processing, multiple-time-around-processing

<table>
<thead>
<tr>
<th>Laser Pulse Repetition Rate PRR</th>
<th>150 kHz</th>
<th>300 kHz</th>
<th>600 kHz</th>
<th>1200 kHz</th>
<th>1800 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Measuring Range (natural targets p ≥ 20 %)</td>
<td>1200 m</td>
<td>850 m</td>
<td>650 m</td>
<td>450 m</td>
<td>350 m</td>
</tr>
<tr>
<td>(natural targets p ≥ 60 %)</td>
<td>1900 m</td>
<td>1400 m</td>
<td>1050 m</td>
<td>750 m</td>
<td>650 m</td>
</tr>
<tr>
<td>(natural targets p ≥ 80 %)</td>
<td>2150 m</td>
<td>1600 m</td>
<td>1200 m</td>
<td>850 m</td>
<td>700 m</td>
</tr>
<tr>
<td>Max. Operating Flight Altitude AGL</td>
<td>900 m (2950 ft)</td>
<td>600 m (1950 ft)</td>
<td>500 m (1650 ft)</td>
<td>350 m (1150 ft)</td>
<td>250 m (800 ft)</td>
</tr>
<tr>
<td>@ p ≥ 20 %</td>
<td>1400 m (4600 ft)</td>
<td>1050 m (3450 ft)</td>
<td>900 m (2950 ft)</td>
<td>550 m (1800 ft)</td>
<td>500 m (1650 ft)</td>
</tr>
<tr>
<td>@ p ≥ 60 %</td>
<td>1750 m (5000 ft)</td>
<td>1250 m (3800 ft)</td>
<td>1100 m (3500 ft)</td>
<td>700 m (2300 ft)</td>
<td>650 m (2000 ft)</td>
</tr>
<tr>
<td>Max. Number of Targets per Pulse</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

Minimum Range

Accuracy 7) 5 m
Precision 8) 20 mm

Laser Pulse Repetition Rate 1) 150 kHz

Max. Effective Measurement Rate 1) up to 1,500,000 meas./sec. (@ 1800 kHz PRR & 75° FOV)

Echo Signal Intensity

Laser Wavelength near infrared

Laser Beam Divergence 0.35 mrad

Laser Beam Footprint (Gaussian Beam Definition) 35 mm @ 100 m, 175 mm @ 500 m, 350 mm @ 1000 m

Scanner Performance

Scanning Mechanism rotating polygon mirror

Field of View (selectable) parallel scan lines

Scan Pattern ± 37.5° = 75°

Scan Speed (selectable) 40 - 400 lines/sec

Angular Step Width Δ θ (selectable) 0.002° ≤ Δ θ ≤ 0.24° 12) 13)

Angle Measurement Resolution 0.001°

Scan Sync (optional) scanner rotation synchronization

Data Interfaces

Configuration LAN 10/100/1000 Mbit/sec, WLAN

Scan Data Output LAN 10/100/1000 Mbit/sec

GNSS Interface Serial RS-232 interface for data string with GNSS-time information, TTL input for 1PPS synchronzation pulse

External Camera 4x power, RS-232, 1pps, trigger, exposure, TTL input/output

External IMU & GNSS combined connector with power supply and signal interface to external IMU & GNSS

General Technical Data

Power Supply Input Voltage / Consumption 14) 11 - 34 V DC / typ. 60 W

Main Dimensions (L x W x H) 292 mm x 164 mm x 185 mm (without IMU/GNSS)

Weight 380 mm x 164 mm x 185 mm (with IMU/GNSS)

≤ 4.1 kg (without IMU/GNSS), ≤ 4.9 kg (with IMU/GNSS)

Humidity max. 80 % non condensing @ 31°C

Protection Class IP64, dust and splash-proof

Max. Flight Altitude (operating & not operating) 18 500 ft (5 600 m) above MSL (Mean Sea Level)

Temperature Range -10°C up to +40°C (operation) / -20°C up to +50°C (storage)

1) Rounded average PRR.
2) Typical values for average conditions and average ambient brightness. In bright sunlight, the max. range is shorter than under an overcast sky.
3) The 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. Range ambiguities have to be resolved by multiple-time-around processing.
4) Effective FOV 75°, additional roll angle ± 5°.
5) If the laser beam hits, in part, more than one target, the laser’s pulse power is split accordingly. Thus the achievable range is reduced.
6) Angular step width depends on the selected laser PRR.
7) The maximum angular step width is limited by the maximum scan rate.
8) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.
9) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.
10) User selectable.
11) Measured at the 1/e2 points. 0.35 mrad corresponds to an increase of 35 mm of beam diameter per 100 m distance.
12) The angular step width depends on the selected laser PRR.
13) The maximum angular step width is limited by the maximum scan rate.
14) without external IMU/GNSS

NOHD (Nominal Ocular Hazard Distance) 0.3 m
ENOHD (Extended Nominal Ocular Hazard Distance) 2.5 m
The following conditions are assumed for the Operating Flight Altitude AGL:

- ambiguity resolved by multiple-time-around (MTA) processing
- target size ≥ laser footprint
- average ambient brightness
- roll angle ±5°
- operating flight altitude given at a FOV 75°
The following conditions are assumed for the Operating Flight Altitude AGL:

- ambiguity resolved by multiple-time-around (MTA) processing
- roll angle ±5°
- target size ≥ laser footprint
- average ambient brightness
- operating flight altitude given at a FOV of 75°
### Technical Data RIEGL VUX®-240 (continued)

#### Data Storage

<table>
<thead>
<tr>
<th>Internal Data Storage</th>
<th>Solid State Disc SSD, 1TByte for CFAST® 2) memory card 120 GByte (can be upgraded to 256 GByte)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Card Slot 1)</td>
<td>1) applies to IMU APX-20 UAV only</td>
</tr>
</tbody>
</table>

#### External IMU & GNSS (optional)

<table>
<thead>
<tr>
<th>IMU Accuracy 4)</th>
<th>recommendated: Applanix APX-20 UAV 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll, Pitch</td>
<td>0.015°</td>
</tr>
<tr>
<td>Heading</td>
<td>0.035°</td>
</tr>
<tr>
<td>IMU Sampling Rate</td>
<td>200 Hz</td>
</tr>
<tr>
<td>Position Accuracy (typ.)</td>
<td></td>
</tr>
<tr>
<td>horizontal</td>
<td>&lt; 0.05m</td>
</tr>
<tr>
<td>vertical</td>
<td>&lt; 0.1 m</td>
</tr>
</tbody>
</table>

3) See technical details at the according Applanix datasheet.

4) Accuracy specifications for post-processed data.

---

**RIEGL VUX®-240 UAV Platform Integration (optional)**

---

**RICOPTER with RIEGL VUX-240 LiDAR Sensor, APX-20 UAV and nadir RGB camera fully integrated**

---

Copyright RIEGL Laser Measurement Systems GmbH © 2019 – All rights reserved.
Use of this data sheet other than for personal purposes requires RIEGL's written consent.
This data sheet is compiled with care. However, errors cannot be fully excluded and alternations might be necessary.