

# RIEGL VUX-SYS<sup>®</sup>

- **complete miniaturized & lightweight kinematic LiDAR system**
- **fully integrated RIEGL VUX-1 Series LiDAR sensor**
- **inertial measurement unit and GPS/GLONASS receiver integrated**
- **compact control unit with various interfacing options**
- **various mounting options for highly flexible installation**
- **prepared for remote control via low-bandwidth data link**
- **operates up to 4 digital cameras**

The **RIEGL VUX-SYS** is a completely integrated laser scanning system of low weight and compact size for flexible use in kinematic applications (e.g. UAS/UAV/RPAS, helicopter, gyrocopter and ultra-light aircraft installations).

The system comprises a **RIEGL VUX-1 Series LiDAR Sensor**, an IMU/GNSS system and a dedicated control unit. The excellent measurement performance of the VUX-1 in combination with the precise inertial measurement unit and the associated GPS/GLONASS receiver results in survey-grade measurement accuracy over its full range of applications.

The VUX-SYS is specifically designed to be easily installed or exchanged by the user, alternatively either in the **RIEGL VP-1** helicopter pod, the **RIEGL RiCOPTER** unmanned aerial system, or in any kinematic measuring system, whatsoever.

The VUX-SYS is complemented within the VP-1 by one single high resolution digital camera, and in the RiCOPTER by two lightweight consumer-grade digital cameras. It is prepared to handle up to 4 independent cameras in other installations.

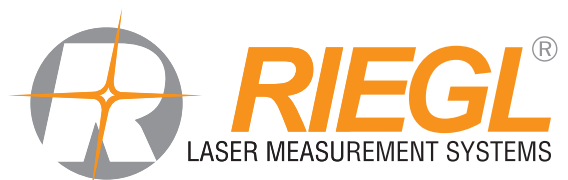
The small size, low weight, and small number of interconnecting cables required account for a very short set-up time of the system. The VUX-SYS is delivered with the necessary software tools for processing scan data as well as IMU/GNSS data.

Based on the software bundle RiPROCESS and its associated software tools, scan data is geo-referenced, calibrated and exported fully automatically. **RIEGL** offers an optional system calibration service.

#### Typical applications include

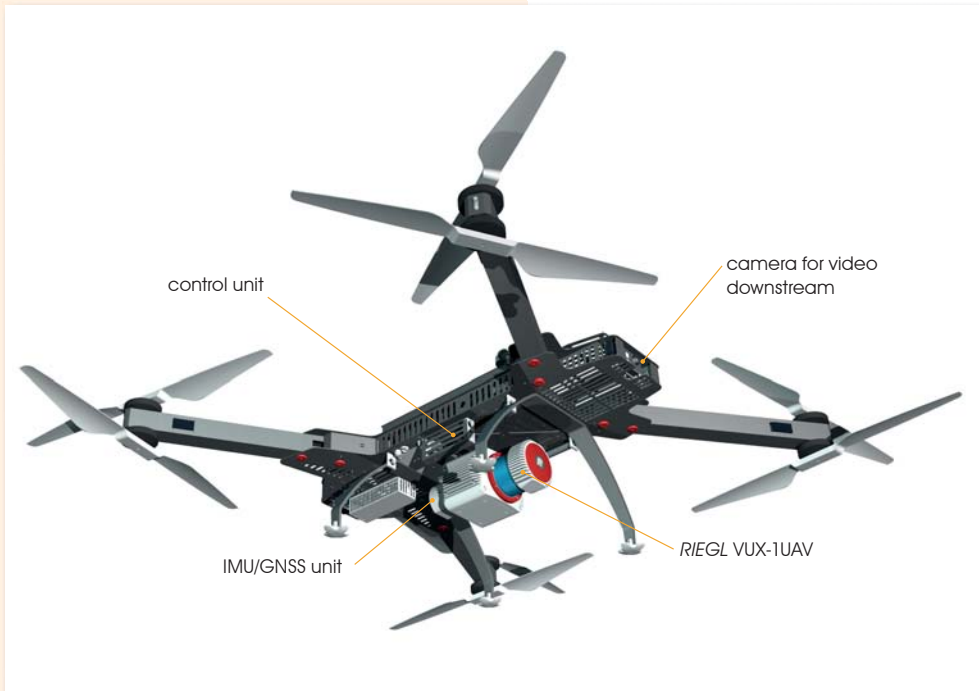
- **Corridor Mapping: Power Line, Railway Track, and Pipeline Inspection**
- **Terrain and Canyon Mapping**
- **Surveying of Urban Environments**
- **Topography in Open-Cast Mining**
- **Agriculture & Forestry**
- **Archeology and Cultural Heritage Documentation**
- **Construction-Site Monitoring**

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## RIEGL VUX®-SYS installed in RiCOPTER

The VUX-SYS fits the dedicated mounting bay of the RiCOPTER directly without any adaptations. The system is supplemented by two digital cameras, covering a field of view of approximately 160 degrees. The low weight of the VUX-SYS enables the RiCOPTER to operate up to half an hour at a gross weight of 25kg.



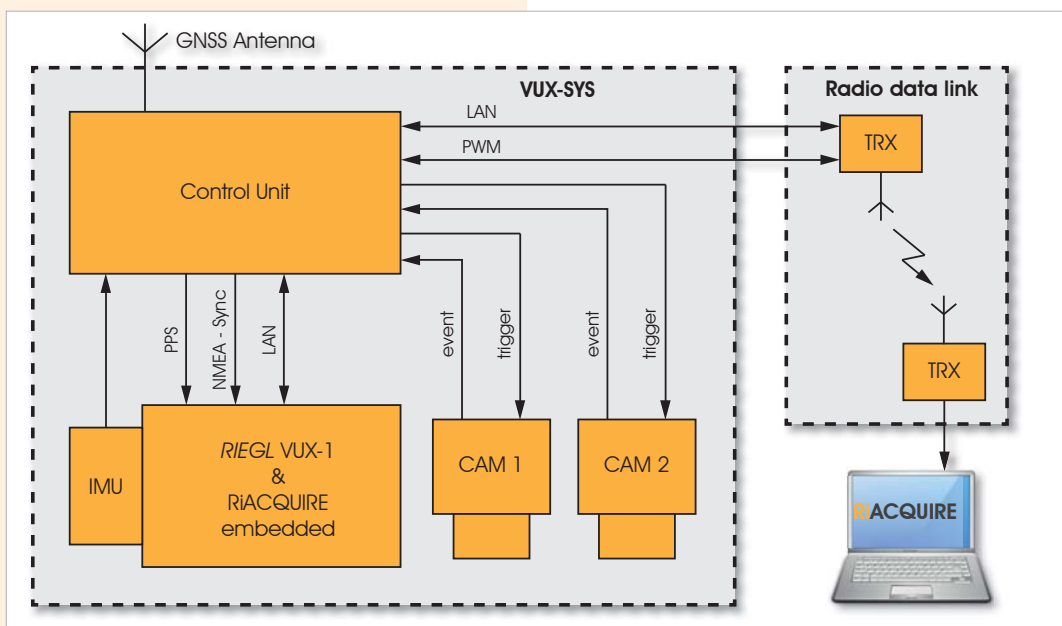
### RIEGL VUX-SYS for RiCOPTER System Components:

- RIEGL VUX-1UAV or RIEGL VUX-1LR LiDAR sensor
- IMU/GNSS unit (Applanix AP20)
- GNSS antenna
- control unit
- 2 cameras (SONY alpha 6000)
- connecting cables

## RIEGL VUX®-SYS - Block Diagram Remote Control Setup

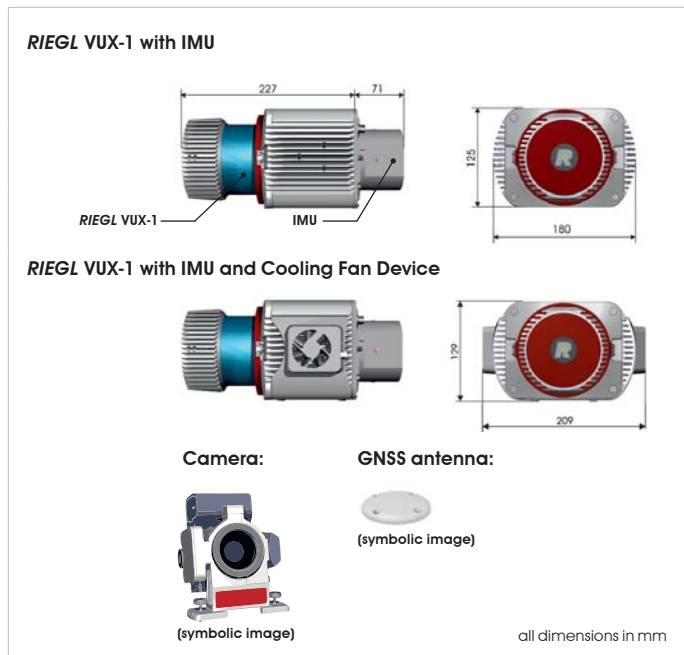
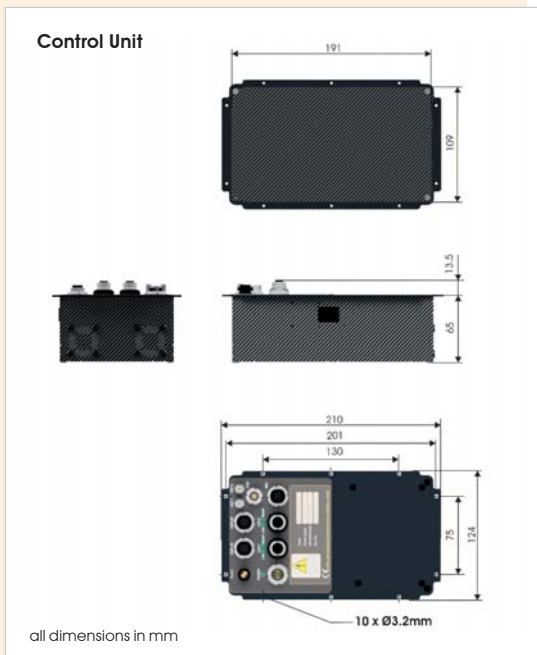
Accounting for the integration in unmanned remotely piloted systems, a dedicated TTL interface for receiving and emitting **Pulse-Width Modulated (PWM)** signals enables full control as well as system status feedback. Based on a predefined set of commands and associated pulse widths the system can be controlled easily via a standard remote-control radio channel of low bandwidth.

It is possible to adjust the data rate of scan data for streaming monitoring data even in real-time via suitable radio channels of sufficient bandwidth.





# RIEGL VUX®-SYS Mechanical Drawings



## Technical Data RIEGL VUX®-SYS

### Scanner Performance (for details refer to the corresponding info sheets and data sheets)

#### RIEGL VUX-1 Series Sensor

Maximum Range  
 Minimum Range  
 Accuracy / Precision  
 Laser Pulse Repetition Rate  
 Max. Effective Measurement Rate  
 Field of View (selectable) <sup>4)</sup>  
 Max. Scan Speed

VUX-1LR	VUX-1UAV	VUX-1HA <sup>1)</sup>
1,350 m <sup>2)</sup>	920 m <sup>2)</sup>	420 m <sup>3)</sup>
5 m	3 m	1.2 m
15 mm / 10 mm up to 750 kHz	10 mm / 5 mm up to 550 kHz	5 mm / 3 mm up to 1017 kHz
up to 750,000 meas./sec.	up to 500,000 meas./sec.	up to 1,000,000 meas./sec.
up to 330°	up to 330°	up to 360°
200 scans/sec	200 scans/sec	250 scans/sec

1) Not recommended to be seen as a first choice for UAV applications because of its lower range capability.

2) Maximum range is specified for natural targets  $\rho \geq 60\%$ .  
 3) Maximum range is specified for natural targets  $\rho \geq 80\%$ .  
 4) Note limitations when integrated in kinematic systems.

### Data Interfaces

Configuration  
 Scan Data Output  
 GNSS Interface

LAN 10/100/1000 Mbit/sec or TTL PWM  
 LAN 10/100/1000 Mbit/sec or USB 2.0  
 Serial RS232 interface for data string with GNSS-time information,  
 TTL input for 1PPS synchronization pulse  
 4x trigger and event marker

Camera

### IMU & GNSS (Applanix AP20)

IMU Accuracy  
 Roll, Pitch  
 Heading  
 IMU Sampling Rate  
 Position Accuracy (typ.)

0.015°  
 0.035°  
 200 Hz  
 0.05 m - 0.3 m

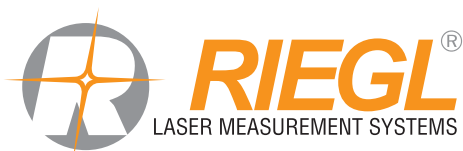
### General Technical Data

Power Supply Input Voltage / Consumption  
 Main Dimensions  
 VUX-1 with IMU, without Cooling Fan Device  
 VUX-1 with IMU and Cooling Fan Device  
 Control Unit  
 Weight  
 VUX-1 without / with Cooling Fan Device  
 Control Unit  
 IMU/GNSS (Applanix AP20)  
 Camera(s)  
 Humidity  
 Temperature Range

11 - 32 V DC / typ. 72 W (3 A @ 24 V DC)

298 x 180 x 125 mm  
 298 x 209 x 129 mm  
 210 x 124 x 78.5 mm

approx. 3.5 kg / approx. 3.75 kg  
 approx. 0.9 kg  
 approx. 0.7 kg  
 depending on selected camera type  
 max. 80 % non condensing @ 31°C  
 0°C up to +40°C (operation) / -20°C up to +50°C (storage)



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