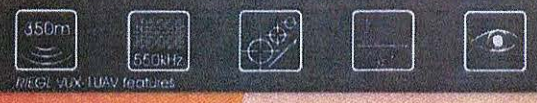
PRÍLOHA č. 1

RiCOPTER
with *RIEGL* VUX®-SYS integrated

ULS



RIEGL VUX-1UAV features

The RiCOPTER is a high-performance unmanned multi-rotor aircraft equipped with *RIEGL*'s VUX-SYS sensor system to offer a fully integrated turnkey solution for professional UAS surveying missions.

The excellent measurement performance of the VUX-1UAV in combination with IMU/GNSS unit, antenna, control unit, and optional digital cameras results in survey grade measurement accuracy.

The RICOPTER is a complete UAS LiDAR solution from one single manufacturer!

RiCOPTER®

Remotely Piloted Aircraft System for Unmanned Laser Scanning (ULS)

Typical Applications

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

RIEGL®

www.riegl.com
www.ricopter.com

RiCOPTER Main Features & Key Facts

- robust und reliable airborne scanner carrying platform
- full mechanical and electrical integration of sensor system components with aircraft fuselage
- carbon fibre main frame, foldable propeller carrier arms, and shock-absorbing undercarriage for stable flight, landings and comfortable transportation
- ***NEW*** **RiCOPTERControl (RiCC)**: redundant flight control system developed and produced by *RIEGL*
- optimized for operation of VUX-SYS Sensor System including camera(s)
- remote control Graupner MC32 (2.4 GHz; telemetry supported)
- 433, 868 or 915 MHz command and control link; 5.8 GHz live video downstream
- UN 38.3 certified batteries

RiCOPTER Aircraft Technical Data

Specifications and Performance:

Main Dimensions ready to fly arms folded for transportation & storage	 1,920 mm x 1,820 mm x 470 mm 624 mm x 986 mm x 470 mm
MTOM (Maximum Take-Off Mass)	25 kg
Max. Sensor Load	up to 6.5 kg
Empty Weight	11 kg
Max. tested and permitted Operating Altitude AMSL [1]	up to 3000 m (10,000 ft) [2] [3] [4] (under ISA[5] conditions)
Max. Flight Endurance	up to 30 min [6]
Cruise Speed	typ. 6 - 8 m/sec
Take-off / Landing	VTOL (Vertical Take-off and Landing)
RiCOPTER Transportation Case dimensions empty weight	 1,220 mm x 810 mm x 540 mm approx. 20 kg
RiCOPTER Ground Station (optional) dimensions weight components	 525 mm x 437 mm x 217 mm approx. 18.5 kg • monitor for video downstream • video receiver with two antennas • ground station PC (flight planning, mission guidance) • internal batteries for power supply

1) AMSL – Above Mean Sea Level
2) depending on rotor blade configuration
3) For flight altitude above ground level, operational limits for civil unmanned aircraft according to national regulations have to be observed.
4) higher altitude possible with reduced performance
5) ISA – International Standard Atmosphere
6) with 6.5 kg sensor load

Limitations:

Max. Ground Speed	14 m/sec [1]
Max. Tolerable Wind Speed	8 m/sec
Max. Climb Rate	5 m/sec [1]
Max. Descent Rate	2 m/sec [1]

1) electronically limited

Hot / Cold Weather Operation:

Min. Operating Temperature	-5°C OAT (Outside Air Temperature)
Max. Operating Temperature	+40°C OAT (Outside Air Temperature)

Remote Control Graupner MC32

easy to carry with integrated handle

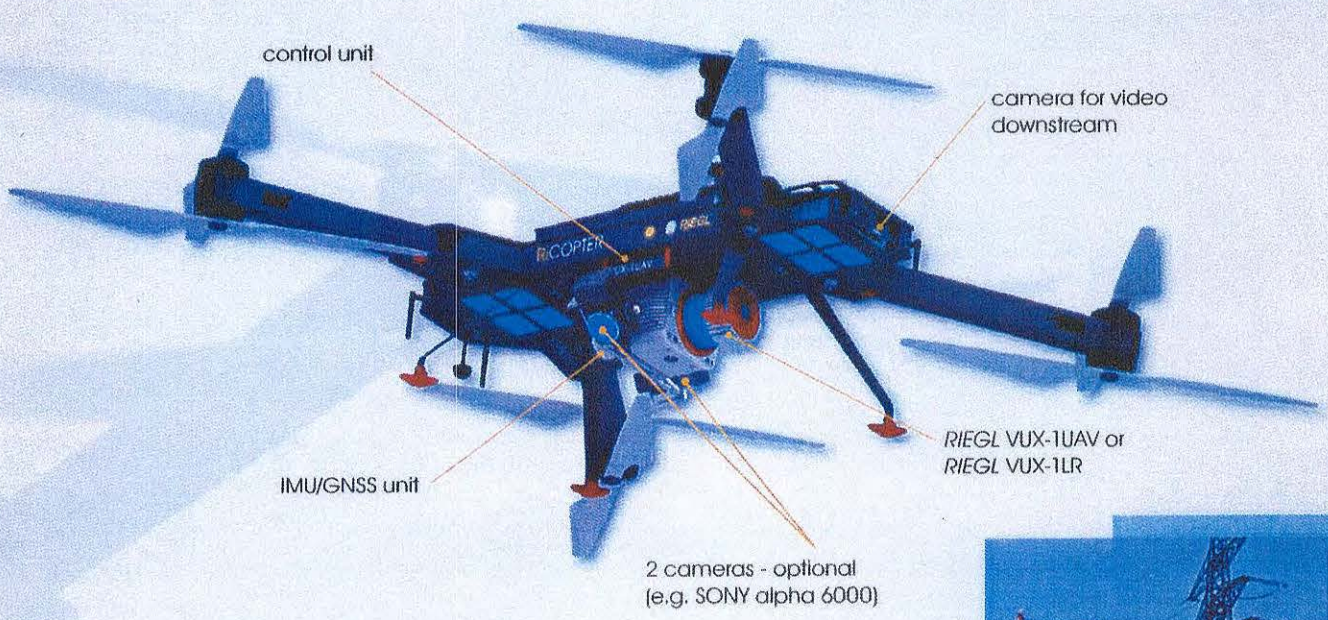
RiCOPTER ready for take off

Transportation Case: foldable arms facilitate easy transportation and storage

55.

RiCOPTER Setup with Integrated *RIEGL* VUX-SYS Sensor System

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 25 kg.



RIEGL VUX-SYS Sensor System Technical Data

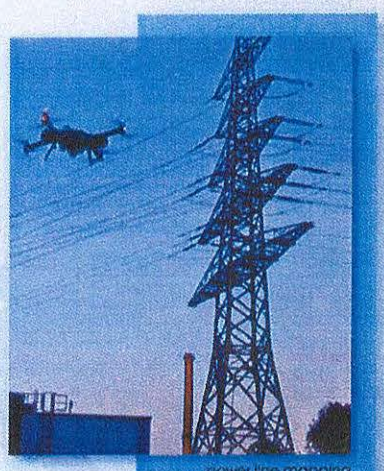
System Components	• *RIEGL* VUX-1UAV • IMU/GNSS unit with antenna • control unit • up to 2 cameras (optional)
***RIEGL* VUX-1UAV Scanner Performance when integrated in RiCOPTER**	
Field of View (FOV)	230°
max. effective measurement rate	up to 350,000 meas./sec
max. range @ target reflectivity 20 %	550 m
minimum range	3 m
range accuracy	10 mm
Laser Safety Class according to IEC 60825-1:2014	Laser Class 1 (eye safe)
IMU/GNSS Unit	
accuracy Roll, Pitch / Heading	0.015° / 0.035°
IMU sampling rate	200 Hz
position accuracy (typ.)	0.05 m - 0.3 m
Camera Interfaces	2x trigger and event marker

The VUX-SYS Sensor System can also be equipped with the *RIEGL* VUX-1LR (details on request).
Details to be found in the latest *RIEGL* VUX-1UAV, VUX-1LR & VUX-SYS data sheets.


RIEGL VUX-1UAV Data Sheet


RIEGL VUX-1LR Data Sheet


RIEGL VUX-SYS Data Sheet


power line mapping


canyon mapping


open-cast mining

RIEGL VUX-1UAV Technical Data

- max. measurement range
- pulse repetition rate PRR (peak)
- online waveform processing
- optional digital camera
- multiple target capability
- eye safe operation at Laser Class 1

RIEGL VUX-1UAV LiDAR Sensor

Optional RiCOPTER Components / Accessories

RiCOPTER Ground Station

The Ground Station comes in a PELI-Carrying-Case for easy and safe transportation and includes:

- monitor for receiving the video stream
- video receiver with 2 antennas
- mounting possibility for data link
- internal batteries for power supply
- Ground Station PC for flight planning and configuration of the mission (optional)

RiCOPTER Ground Station

RiCOPTER Charging Control Unit

- professional PELI-Carrying-Case for easy and safe transportation
- equipped with all required connectors and cables
- Power Supply: 100 – 240 VAC / max. 1.200 Watt
- 2 charging slots for max. 10 A each (2 Charging Control Units are recommended)
- charging time: approx. 1 hour for 1 set (4 batteries; 2 Charging Control Units)

Further accessories available (more information on request).

RiCOPTER Charging Control Unit

Further Information & Scan Data Projects

For receiving more information about the scope of delivery, pricing, and availability of sample data, please get in contact with info@ricopter.com.

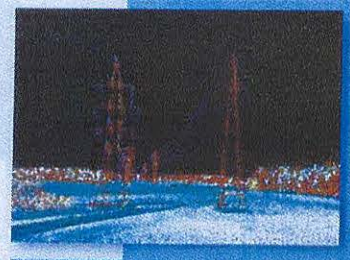
Reference projects have already been carried out successfully in applications like power line & infrastructure mapping, forestry & agriculture, environmental monitoring, flood analysis, and many more.

Executive Summary Power Line Project

Executive Summary Environmental & Flood Analysis

YouTube

Watch our videos! youtube.com/riegllas



Scan Data Examples

The RiCOPTER is a high performance unmanned multi-rotor aircraft, designed & manufactured by *RIEGL* Laser Measurement Systems GmbH. It is distributed, supported and serviced by RiCOPTER UAV GmbH, also a *RIEGL* company.

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... A *RIEGL*® COMPANY

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PRILOHA C. 2

Preliminary Infosheet

RiCopterControl

NEW

Redundant Flight Control System

RiCopterControl RiCC

developed and produced by *RIEGL*

The new flight control system RiCopterControl (RICC) is *RIEGL*'s response to highest safety and reliability requirements and features a fully redundant hardware design. RiCC supports a wide variety of power and control interfaces, straightforward sensor payload integration and thus enables high flexibility in system configuration.

Key features

- redundant hardware system design (including flight controller CPU and sensors)[1)]
- sophisticated power management and battery balancing concept
- outstanding build quality for highest reliability, robustness and lifetime
- temperature-calibrated and damped sensors to optimize operation in harsh environments
- resilient to electrical short circuits, CPU or sensor crash failures, cable breaks, etc.
- rigorous in-flight failure detection, handling, and alarming
- highly customizable and optimized for multi-sensorsystem integrations
- powerful telemetry functions (remote control, on-screen-display, operator software, blackbox)
- standard (433, 868, 915 MHz) or customizable frequencies; MAVLINK-based command and control link

1) partly based on open-hardware project Pixhawk and open-source firmware PX4

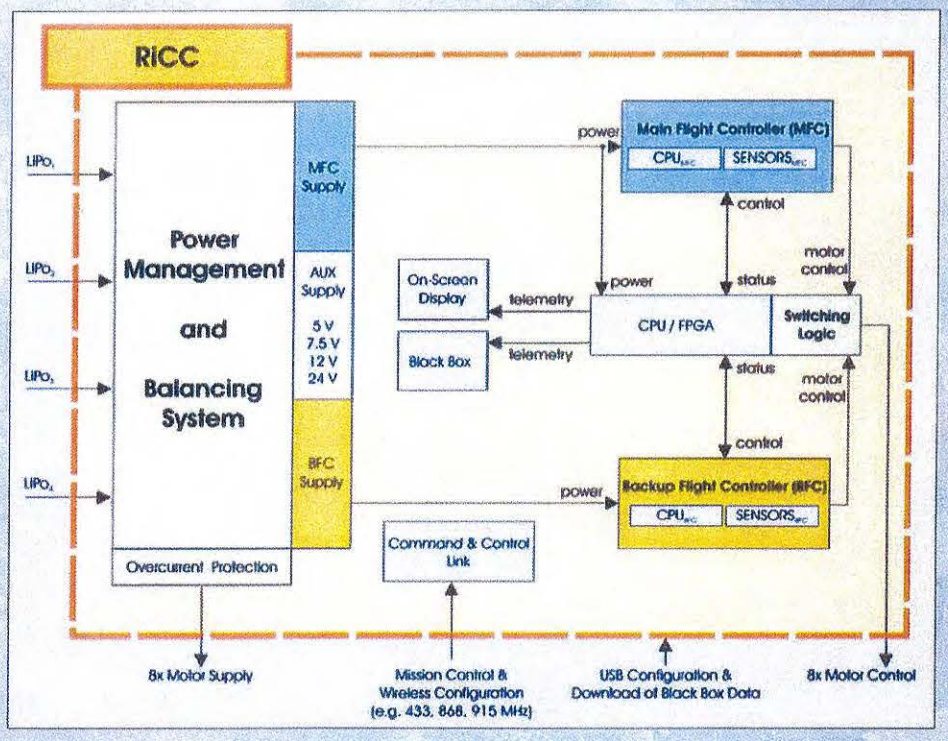
Interfaces for sensor payload

Power supply:
2x 5 V (in total 4 A)
3x 7.5 V (in total 6 A)
2x 12 V (in total 8 A)
1x 24 V (8 A)

Control interfaces:
1x RS232
2x UART (3V3)
3x PWM or I/O Pin (3V3)

Integration examples

- *RIEGL* VUX and miniVUX series
- *RIEGL* BDF-1
- ADS-B transponder
- siren, parachute
- strobe-light, landing-light
- data processing hardware
- data transmission hardware



www.riegl.com

RIEGL®

PŘÍLOHA č. 3

Lightweight UAV Laser Scanner with Online Waveform Processing

RIEGL VUX®-1UAV

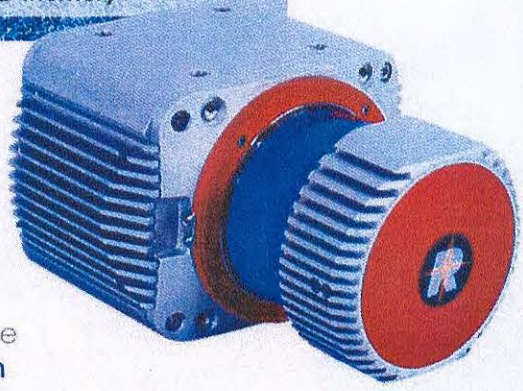
- *10 mm survey-grade accuracy*
- *scan speed up to 200 scans / second*
- *measurement rate up to 500,000 meas./sec (@ 550 kHz PRR & 330° FOV)*
- *operating flight altitude more than 1,000 ft*
- *field of view up to 330° for practically unrestricted data acquisition*
- *regular point pattern, perfectly parallel scan lines*
- *cutting edge RIEGL technology providing:*
  - *echo signal digitization*
  - *online waveform processing*
  - *multiple-time-around processing*
- *multiple target capability - practically unlimited number of target echoes*
- *NEW* Smart Waveform Data Output optional
- *compact (227x180x125 mm), lightweight (3.5 kg), and rugged*
- *easily mountable to professional UAS / UAV / RPAS*
- *mechanical and electrical interface for IMU mounting*
- *electrical interfaces for GPS data string and Sync Pulse (1PPS)*
- *LAN-TCP/IP interface*
- *scan data storage on internal 240 GByte SSD Memory*

The *RIEGL* VUX-1UAV is a very lightweight and compact laser scanner, meeting the challenges of emerging survey solutions by UAS/UAV/RPAS both in measurement performance as well as in system integration. With regard to the specific constraints and flight characteristics of the UAS, the *RIEGL* VUX-1UAV is designed to be mounted in any orientation and even under limited weight and space conditions. Modest in power consumption, the instrument requires only a single power supply. The entire data set of an acquisition campaign is stored onto an internal 240 GByte SSD and/or provided as real-time line scan data via the integrated LAN-TCP/IP interface.

The *RIEGL* VUX-1UAV provides highspeed data acquisition using a narrow infrared laser beam and a fast line scanning mechanism. High-accuracy laser ranging is based on *RIEGL*'s unique echo digitization and online waveform processing, which enables achieving superior measurement results even under adverse atmospheric conditions, and the evaluation of multiple target echoes. The scanning mechanism is based on an extremely fast rotating mirror, which provides fully linear, unidirectional and parallel scan lines, resulting in excellent regular point pattern.

Typical applications include

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



visit our website
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RIEGL®
LASER MEASUREMENT SYSTEMS

Unmanned Laser Scanning

Technical Data *RIEGL* VUX®-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 deviations pursuant to Laser Notice No. 50, dated June 24, 2007

Range Measurement Performance

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

Laser Pulse Repetition Rate PRR [1]	*50 kHz*	*100 kHz*	*200 kHz*	*300 kHz*	*380 kHz*	*550 kHz full power*	*550 kHz reduced power* [2]
Max. Measuring Range [3] [4]							
natural targets ρ ≥ 20 %	550 m	400 m	280 m	230 m	200 m	170 m	85 m
natural targets ρ ≥ 60 %	920 m	660 m	480 m	400 m	350 m	300 m	150 m
Max. Operating Flight Altitude AGL [1] [5]	350 m (1150 ft)	250 m (820 ft)	180 m (590 ft)	150 m (490 ft)	130 m (430 ft)	110 m (360 ft)	55 m (180 ft)
Max. Number of Targets per Pulse [6]	practically unlimited (details on request)						

1) Rounded values.
2) Laser power optimized (reduced) for measurements of short ranges with high pulse repetition rate.
3) 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.
4) Ambiguity to be resolved by post-processing with RiMTA software.
5) Reflectivity ρ ≥ 20%, flat terrain assumed, scan angle ±45° FOV
6) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achieveable range is reduced.

Minimum Range	3 m
Accuracy [7] [9]	10 mm
Precision [8] [9]	5 mm
Laser Pulse Repetition Rate [1] [10]	up to 550 kHz
Max. Effective Measurement Rate [1]	up to 500 000 meas./sec. (@ 550 kHz PRR & 330° FOV)
Echo Signal Intensity	for each echo signal, high-resolution 16 bit intensity information is provided
Laser Wavelength	near infrared
Laser Beam Divergence	0.5 mrad [11]
Laser Beam Footprint (Gaussian Beam Definition)	50 mm @ 100 m, 250 mm @ 500 m, 500 mm @ 1000 m

7) Accuracy is the degree of conformity of a measured quantity to its actual (true) value.
8) Precision, also called reproducibility or repeatability, is the degree to which further measurements show the same result.
9) One sigma @ 150 m range under *RIEGL* test conditions.
10) User selectable.
11) Measured at the $1/e^2$ points. 0.50 mrad corresponds to an increase of 50 mm of beam diameter per 100 m distance.

Scanner Performance

Scanning Mechanism	rotating mirror
Field of View (selectable)	up to 330° (full range measurement performance)
Scan Speed (selectable)	10 - 200 revolutions per second, equivalent to 10 - 200 scans/sec
Angular Step Width Δ ϑ (selectable) between consecutive laser shots	0.006° ≤ Δ ϑ ≤ 1.5°
Angle Measurement Resolution	0.001°
Internal Sync Timer	for real-time synchronized time stamping of scan data
Scan Sync (optional)	scanner rotation synchronization

Data Interfaces

Configuration	LAN 10/100/1000 Mbit/sec
Scan Data Output	LAN 10/100/1000 Mbit/sec or USB 2.0
GNSS Interface	Serial RS232 interface for data string with GNSS-time information, TTL input for 1PPS synchronization pulse
Internal Memory	240 GByte SSD
External Camera	TTL input/output
External GNSS Antenna	SMA connector

General Technical Data

Power Supply Input Voltage / Consumption [12]	11 - 34 V DC / typ. 60 W
Main Dimensions [12]	
VUX-1UAV without / with Cooling Fan	227 x 180 x 125 mm / 227 x 209 x 129 mm
Weight [12]	
VUX-1UAV without / with Cooling Fan	approx. 3.5 kg / approx. 3.75 kg
Humidity	max. 80 % non condensing @ 31°C
Protection Class	IP64, dust and splash-proof
Max. Flight Altitude (operating / not operating)	16 500 ft (5 000 m) above MSL / 18 000 ft (5 500 m) above MSL
Temperature Range [13]	-10°C up to +40°C (operation) / -20°C up to +50°C (storage)

Optional Components (integrated)

Embedded GNSS-Inertial System	high performance multi-channel, multi-band GNSS receiver, solid-state MEMS IMU

12) without external IMU/GNSS, cooling fan not in operation
13) The instrument requires air convection with a minimum flow rate of 5 m/s for continuous operation at +15 °C and above. If the necessary flow rate cannot be provided by the moving platform, the cooling fan (included in the scope of delivery) has to be used.

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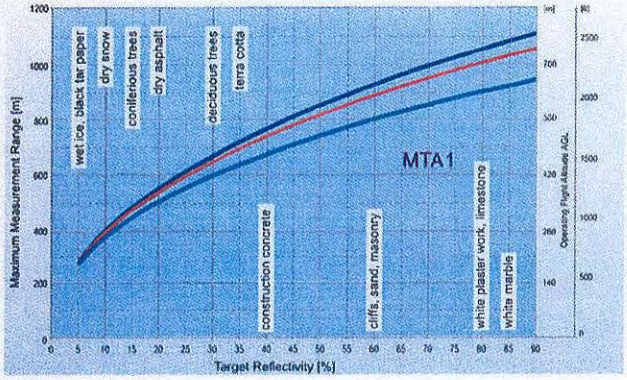
Maximum Measurement Range & Point Density *RIEGL* VUX®-1UAV

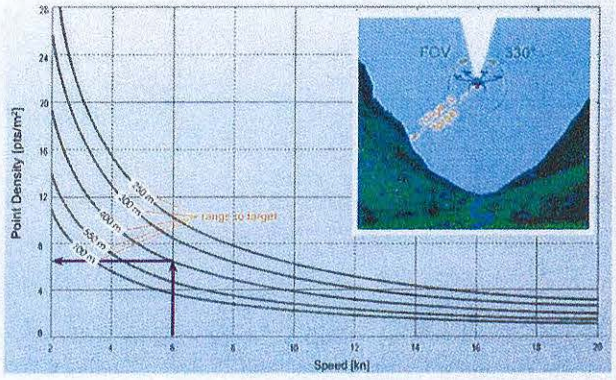
PRR = 50 kHz



MTA1: no ambiguity / one transmitted pulse „in the air"

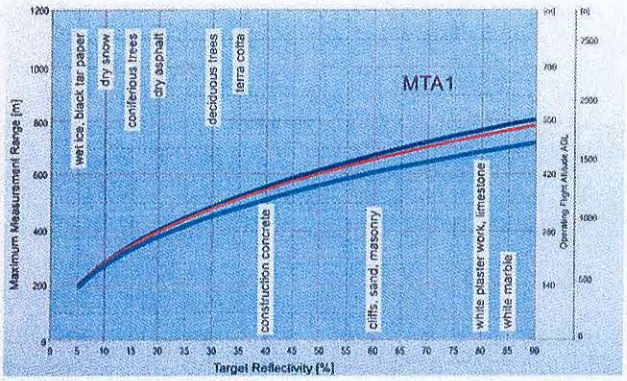
@ visibility 23 km
@ visibility 15 km
@ visibility 8 km

PRR = 50 kHz



Example: VUX-1UAV at 50.000 pulses/second
range to target = 400 m, speed = 6 kn
Resulting Point Density ~ 6.5 pts/m²

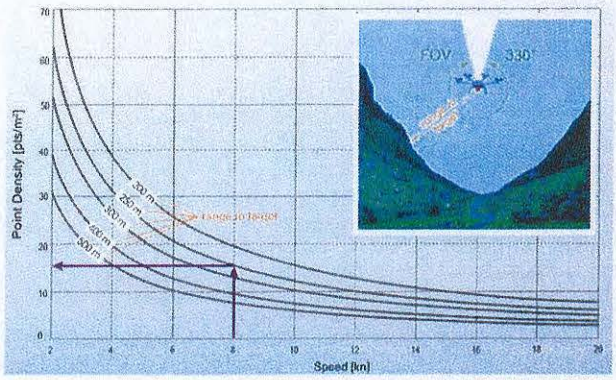
PRR = 100 kHz



MTA1: no ambiguity / one transmitted pulse „in the air"

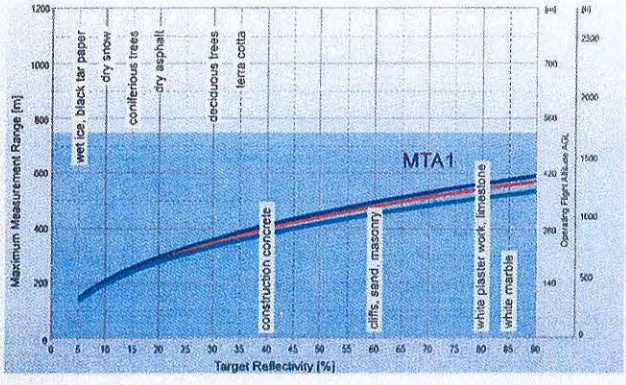
@ visibility 23 km
@ visibility 15 km
@ visibility 8 km

PRR = 100 kHz



Example: VUX-1UAV at 100.000 pulses/second
range to target = 250 m, speed = 8 kn
Resulting Point Density ~ 15.5 pts/m²

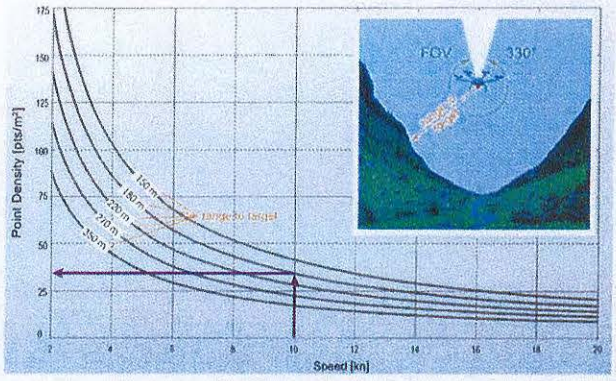
PRR = 200 kHz



MTA1: no ambiguity / one transmitted pulse „in the air"

@ visibility 23 km
@ visibility 15 km
@ visibility 8 km

PRR = 200 kHz



Example: VUX-1UAV at 200.000 pulses/second
range to target = 180 m, speed = 10 kn
Resulting Point Density ~ 34 pts/m²

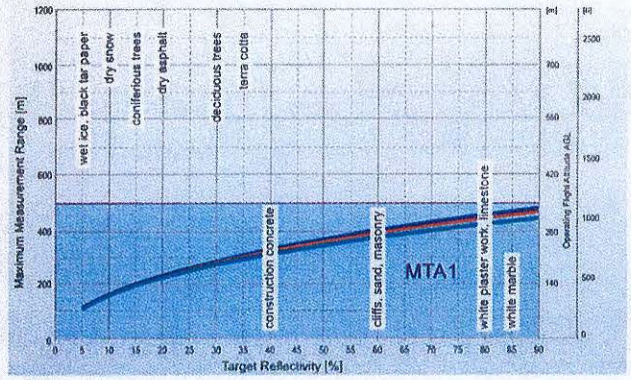
The following conditions are assumed for the Operating Flight Altitude AGL

- ambiguity resolved by multiple-time-around (MTA) processing & flight planning
- target size ≥ laser footprint
- average ambient brightness
- operating flight altitude given at a FOV of ±45°

61.

Maximum Measurement Range & Point Density *RIEGL* VUX®-1UAV

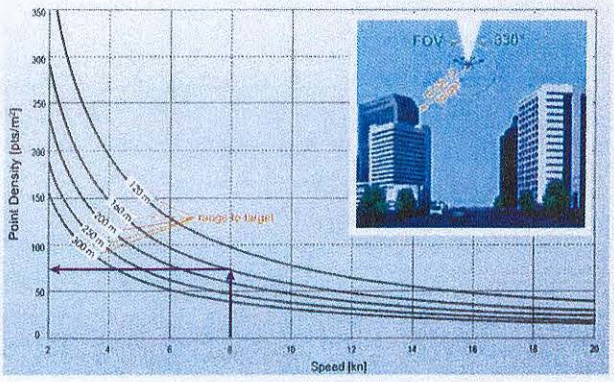
PRR = 300 kHz



MTA1: no ambiguity / one transmitted pulse „in the air"

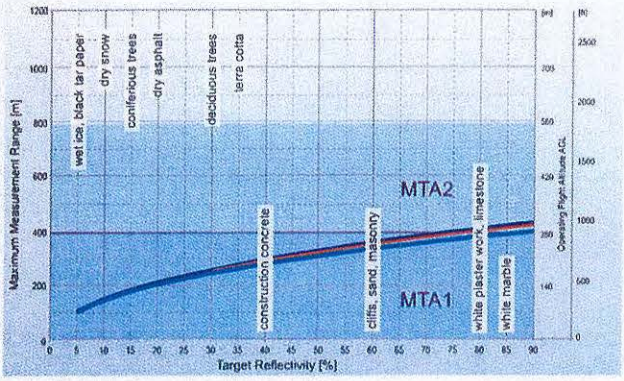
@ visibility 23 km
@ visibility 15 km
@ visibility 8 km

PRR = 300 kHz



Example: VUX-1UAV at 300,000 pulses/second
range to target ~ 160 m, speed ~ 8 kn
Resulting Point Density ~ 72 pts/m²

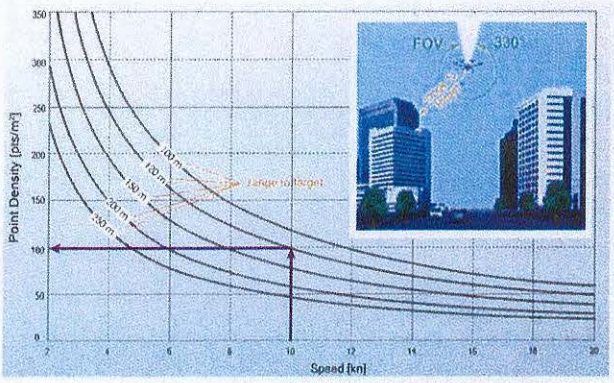
PRR = 380 kHz



MTA1: no ambiguity / one transmitted pulse „in the air"
MTA2: two transmitted pulses „in the air"

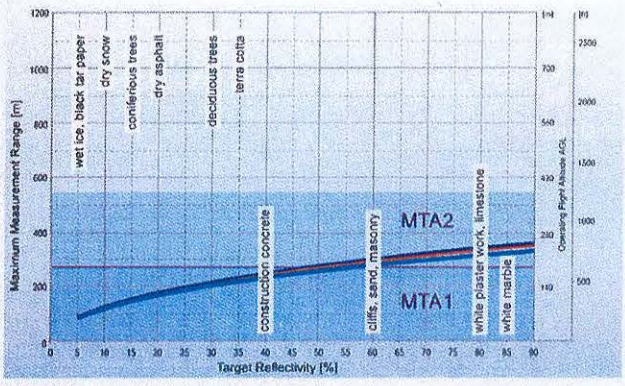
@ visibility 23 km
@ visibility 15 km
@ visibility 8 km

PRR = 380 kHz



Example: VUX-1UAV at 380,000 pulses/second
range to target ~ 120 m, speed ~ 10 kn
Resulting Point Density ~ 95 pts/m²

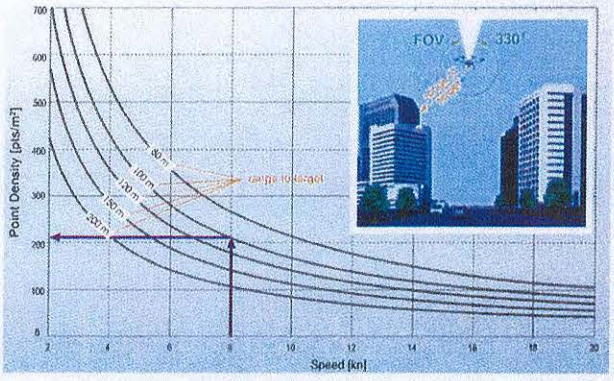
PRR = 550 kHz



MTA1: no ambiguity / one transmitted pulse „in the air"
MTA2: two transmitted pulses „in the air"

@ visibility 23 km
@ visibility 15 km
@ visibility 8 km

PRR = 550 kHz



Example: VUX-1UAV at 550,000 pulses/second
range to target ~ 100 m, speed ~ 8 kn
Resulting Point Density ~ 210 pts/m²

The following conditions are assumed for the Operating Flight Altitude AGL

- ambiguity resolved by multiple-time-around (MTA) processing & flight planning
- target size ≥ laser footprint
- average ambient brightness
- operating flight altitude given at a FOV of ±45°

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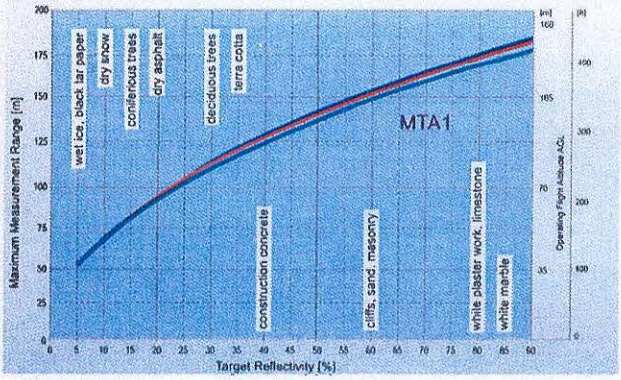
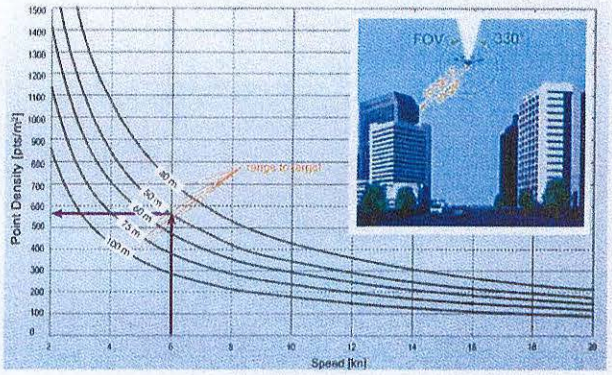
Maximum Measurement Range & Point Density *RIEGL* VUX®-1UAV

PRR = 550 kHz reduced power



MTA1: no ambiguity / one transmitted pulse „in the air"

PRR = 550 kHz reduced power

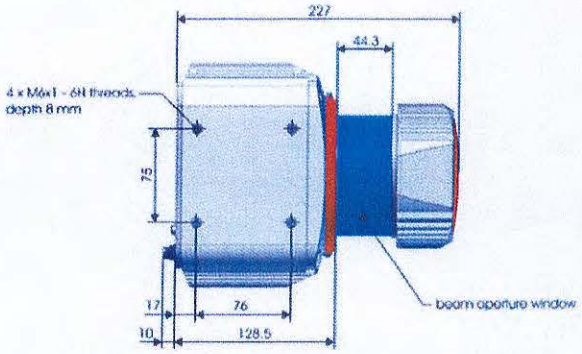


Example: VUX-1UAV at 550,000 pulses/second reduced power
range to target – 50 m, speed – 6 kn
Resulting Point Density – 670 pts/m²

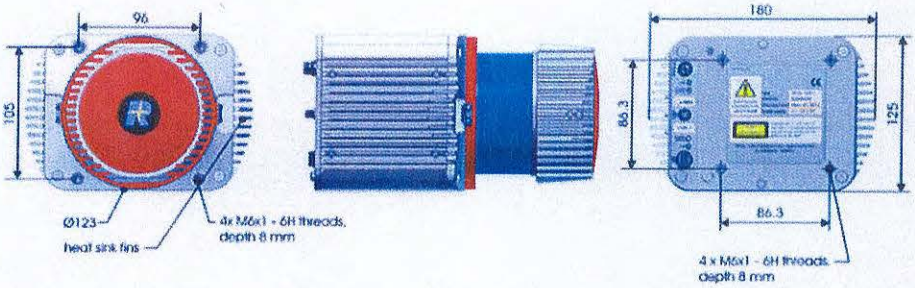
Dimensional Drawings *RIEGL* VUX®-1UAV

all dimensions in mm

bottom view

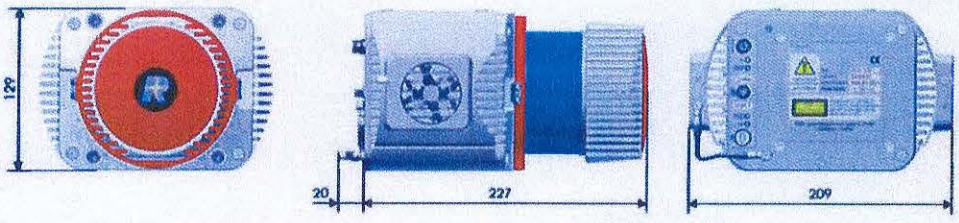


front view **side view** **rear view**



RIEGL VUX®-1UAV with Cooling Fan Device

front view **side view** **rear view**



RIEGL VUX®-1UAV Additional Equipment and Integration

Cooling Fan

***RIEGL* VUX-1UAV with Protective Cap**

***RIEGL* VUX-1UAV with external IMU-Sensor (*RIEGL* VUX-SYS)**

Additional Equipment for *RIEGL* VUX-1UAV

Cooling Fan

Lightweight structure with two axial fans providing forced air convection for applications where sufficient natural air flow cannot be guaranteed. Power supply is provided via a connector on the rear side of the *RIEGL* VUX-1UAV. The cooling fan can be mounted either on the top side or on the bottom side of the *RIEGL* VUX-1UAV and is included in the scanner's scope of delivery.

The cooling fan has to be mounted whenever the environmental conditions/ temperatures require (see "temperature range" on page 2 of this data sheet).

Protective Cap

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

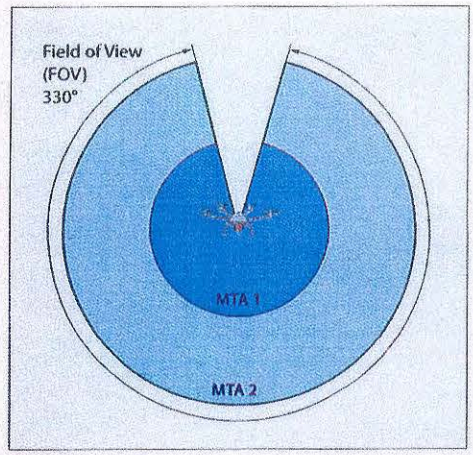
Options for *RIEGL* VUX-1UAV Integration

RIEGL provides user-friendly, application- and installation-oriented solutions for integration of the VUX-1UAV LiDAR sensor:

- ***RIEGL* VUX-SYS**
  Complete airborne laser scanning system for flexible use in UAS/UAV/RPAS, helicopter, gyrocopter and ultra-light aircraft installations comprising the *RIEGL* VUX-1UAV, an IMU/GNSS unit and a dedicated control unit.
- **RiCOPTER**
  Ready to fly remotely piloted aircraft system with *RIEGL* VUX-SYS integrated
- ***RIEGL* VP-1**
  Small and lightweight pod with integrated *RIEGL* VUX-SYS to be mounted on standard hard points and typical camera mounts of manned helicopters

Details to be found on the relevant datasheets and infosheets.

Multiple-Time-Around Data Acquisition and Processing



In time-of-flight laser ranging a maximum unambiguous measurement range exists, which is defined by the laser pulse repetition rate and the speed of light. In case the echo signal of an emitted laser pulse arrives later than the emission of the subsequently emitted laser pulse, the range result becomes ambiguous - an effect known as **„Multiple-Time-Around" (MTA).**

The *RIEGL* VUX-1UAV allows ranging beyond the maximum unambiguous measurement range using a sophisticated modulation scheme applied to the train of emitted laser pulses. The dedicated post-processing software RiMTA provides algorithms for multiple-time-around processing, which automatically assign definite range results to the correct MTA zones without any further user interaction required.

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LASER MEASUREMENT SYSTEMS

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PRÍLOHA č.4

DATASHEET

APX-20 UAV

HIGH PERFORMANCE GNSS-INERTIAL SOLUTION WITH DUAL IMU'S

The Trimble APX-20 UAV is a GNSS-Inertial OEM solution designed to reduce the cost and improve the efficiency of mapping from small Unmanned Aerial Vehicles (UAVs). Comprised of small, low power, precision GNSS and inertial hardware components and POSPac UAV post-mission Differential GNSS-Inertial office software, the APX-20 UAV eliminates the need to survey extensive Ground Control Points (GCP's), and reduces the amount of sidelap required to be flown per flight. The innovative APX-20 UAV features a precision, survey grade GNSS receiver and dual inertial measurement units; one embedded onto the GNSS-inertial board and one as an external unit mounted on the sensor to be georeferenced. With this feature the APX-20 UAV automatically supports integration on gimballed platforms without requiring an external interface to an autopilot or the mount itself.

HIGH ACCURACY, EXTREMELY SMALL PACKAGE

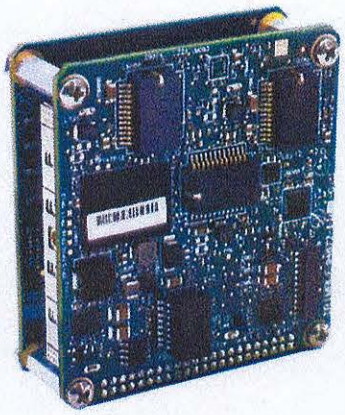
Weighing only 90 grams, and measuring just 60 x 67 x 34 mm for the GNSS-Inertial board, and only 330 grams and just 61 x 68 x 65 mm for the external IMU, the APX-20 UAV provides unparalleled performance in an extremely small and lightweight package. The APX-20 UAV computes a real-time navigation solution at 100 Hz using its embedded IMU while simultaneously logging the raw IMU data from both the internal and external IMU at 200 Hz for post-processing in POSPac UAV. The highly accurate post-processed position and orientation solutions are used for direct georeferencing of cameras, LIDARs and other sensors.

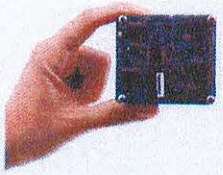
THE APX-20 UAV BRINGS ALL THE BENEFITS OF DIRECT GEOREFERENCING TO UAV PLATFORMS:

- Turn your UAV into a professional mapping solution
- Ultra-fast image georeferencing for faster map production and delivery
- Reduced number of ground control points, saving time and money
- Consistent, reliable, highly accurate results
- Increased collection area per flight for greater productivity
- Redundant navigation solution to autopilot for enhanced safety

Key Features

- High-performance Direct Georeferencing solution for improved efficiency and accuracy of mapping from small Unmanned Aerial Vehicles
  - Reduce/eliminate GCP's
  - Reduce sidelap
  - Accurate LIDAR/Camera georeferencing
  - Seamless workflow with gimballed platforms
- Compact OEM module complete with survey-grade multi-frequency GNSS receiver and embedded and external IMU's
- Applanix IN-Fusion™ GNSS-Inertial and SmartCal™ compensation technology for superior position and orientation performance
- POSPac UAV Differential GNSS Inertial post-processing software for highest accuracy georeferencing
- RTK real-time position for precision landing and real-time mapping applications
- Supports all common RTK corrections such as CMR, CMR+, RTCM





DATASHEET

APX-20 UAV

TECHNICAL SPECIFICATIONS

System Summary

- Advanced Applanix IN-Fusion™ GNSS-Inertial integration technology
- Dual IMU with solid-state MEMS inertial sensors with Applanix SmartCal™ compensation technology
- Advanced Trimble Maxwell Custom GNSS survey technology
- 336 Channels
  - GPS: L1 C/A, L2C, L2E, L5
  - GLONASS: L1 C/A, L2 C/A, L3 CDMA[8]
  - BeiDou: B1, B2
  - Galileo[1]: E1, E5A, E5B, E5AltBOC
  - QZSS: L1 C/A, L1 SAIF, L1C, L2C, L5, LEX
  - SBAS: L1 C/A, L5
  - MSS L-band: Trimble RTX, OmniSTAR
- High precision multiple correlator for GNSS pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurements data for low noise, low multipath error, low time domain correlation and high dynamic response
- Very low noise GNSS carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- Proven Trimble low elevation tracking technology
- 100 Hz position, roll, pitch and heading output
- IMU data rate 200 Hz for both internal and external IMU
- Navigation output format: ASCII (NMEA-0183), Binary (Trimble GSOF)
- Supported Reference input: CMR, CMR+, sCMRx, RTCM 2.1, 2.2, 2.3, 3.0, 3.1
- Support for POSPac UAV post-processing software (included)
- No export permit required

LAN INPUT/OUTPUT

All Ethernet functions are supported through dedicated IP address (Static or DNS) simultaneously.

TCP/IP and UDP	ASCII and Binary data streaming (Time tag, PPS sync, status, position, attitude, velocity, track and speed, dynamics, performance metrics, GNSS data)
HTTP	Web based Control software (GUI) for easy system configuration and low rate display. Support for all common browsers (IE, Safari, Mozilla, Google Chrome, Firefox)

SERIAL INPUT/OUTPUT

RS232 level port
TTL level (3.3 V) port

Parameters	ASCII and Binary data streaming (Time tag, PPS sync, status, position, attitude, velocity, track and speed, dynamics, performance metrics, GNSS data), reference input (CMR, CMR+, sCMRx, RTCM), configuration messages

OTHER INPUT/OUTPUT

PPS (pulse-per-second)	Time Sync Pulse output
Event Input (2)	Two time mark of external events TTL 3.3 V pulses, max rate 50 Hz
Digital I/O (3)	LED drivers with dedicated functionality for systems integrators

LOGGING

Internal Logging	6 GByte Flash memory
External Logging	USB 2.0 Device port
Parameters	Time tag, status, position, attitude, velocity, track and speed, dynamics, performance metrics, raw IMU data (200 Hz), raw GNSS data

1 Developed under a License of the European Union and the European Space Agency
2 Typical performance. Actual results are dependent upon satellite configuration, atmospheric conditions and other environmental effects
3 Typical survey mission profile, max RMS error. Heading error will increase for low speed rotor applications and when hovering
4 Requires base station and radio link, sold separately
5 POSPac UAV, short base line operation
6 Sensor bandwidth (-3 dB amplitude) ~ 50 Hz
7 Sold separately
8 There is no official GLONASS L3CDMA or Galileo E6 ICD. The current tracking capability is based on publicly available information. Full receiver compatibility cannot be guaranteed.
9 Not including external IMU
10 Real time performance based upon internal IMU
11 Post-processed performance based upon external IMU

INERTIAL MEASUREMENT UNITS (IMUS)

IMU Type	Range[1]	Temperature c	Power	Size mm	Weight g
Internal onboard IMU59	+/-6g, +/-350dps	-40 - +75	n/a	n/a	n/a
External IMU71	+/-10g, +/-490dps	-40- +85	4.75 to 36 VDC (4W max)	61 x 68 x 65 (L x W x H)	330

PERFORMANCE SPECIFICATIONS[2] (RMS ERROR)

Unmanned Airborne Vehicle Applications

	SPS[4]	DGPS[5]	RTK[4,10]	Post-Processed[5,11]
Position (m)	1.5 - 3.0	0.5 - 2.0	0.02 - 0.05	0.02 - 0.05
Velocity (m/s)	0.05	0.05	0.02	0.010
Roll & Pitch (deg)	0.04	0.03	0.03	0.015
True Heading[3] (deg)	0.30	0.28	0.18	0.035

PHYSICAL CHARACTERISTICS

Size[9]	67 L x 60 W x 34 H mm
Weight[9]	90 grams
Power[9]	Wide range input 8-32 V DC, typical power consumption of 4W at room temperature
Connectors	I/O: 44 Pin Header Samtec TMM-122-03-S-S-MW (mating part FCI 90311-044LF) IMU Connector: Molex 503148 (mating part Molex 503149)
Antenna Port:	Connector: MMCX receptacle Output Voltage: 3.3 V DC to 5 V DC Maximum Current: 400 mA Minimum Input Signal Strength: 28.5 dB

ENVIRONMENTAL CHARACTERISTICS

Temperature:	-40 deg C to +75 deg C (Operational) -55 deg C to +85 deg C (Storage)
Mechanical Shock:	+/- 75g Survival
Operating Humidity:	5% to 95% R.H. non-condensing at +60 deg C
Maximum Operating Limits:	515 m/sec 18,000 m

ADDITIONAL ACCESSORIES[7]

Evaluation Kit (Development Board)

POSPAC UAV OFFICE SOFTWARE

- Post-processed Differential GNSS-Inertial SW for APX-20
- 200 Hz Navigation solution (Position, Velocity, Orientation, Rates, Accelerations)
- Applanix IN-Fusion GNSS-Integration technology
- Full support for UAV dynamic models
- Single Base Differential GNSS-Inertial processing
- Forward and reverse processing with optimal Smoother with support for Applanix SmartBase virtual reference station module[7]

Specifications subject to change without notice.

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PRÍLOHA č.5

INFO SHEET

POSPAC UAV

POST-PROCESSING SOFTWARE FOR DIRECT GEOREFERENCING ON UAVS

POSPac UAV is Applanix' industry-leading differential GNSS-aided inertial post-processing software for georeferencing data from the Trimble APX series of board sets flying on small UAVs. POSPac UAV turns your UAV into a low-cost, highly efficient, professional grade mapping solution compatible with cameras, LiDAR and other mapping sensors.

DIRECT GEOREFERENCING FOR UNMANNED AERIAL VEHICLES

POSPac UAV coupled with a Trimble APX UAV GNSS-inertial system delivers the benefits of Direct Georeferencing to aerial surveyors flying small UAVs:

- Achieve high accuracy position and orientation ready for map production, minutes after data collection
- Eliminate or reduce the need for Ground Control Points
- Fly less sidelap for greater effciency
- Map inaccessible and dangerous areas remotely with lower cost

WHY POST-PROCESSING?

POSPac UAV post-processing produces a higher accuracy and more robust georeferencing solution that can be generated in real-time, all within minutes of flying.

- It uses "gap-free" dedicated base station data or that from a CORS service instead of corrections over a radio link that can be jammed or interrupted.
- It uses the inertial data to bridge outages in the rover GNSS receiver data to ensure a continuous, gap free position and orientation solution.
- It improves the accuracy of both the position and orientation (especially heading), by running the data forward and reverse in time.

INDUSTRY LEADING SOFTWARE

- POSPac UAV is integrated with Applanix' industry leading IN-Fusion™ GNSS-Aided Inertial processing technology for:

  - robust, centimeter level position and orientation information worldwide without reference stations

  - maintaining full accuracy before and after GNSS outages

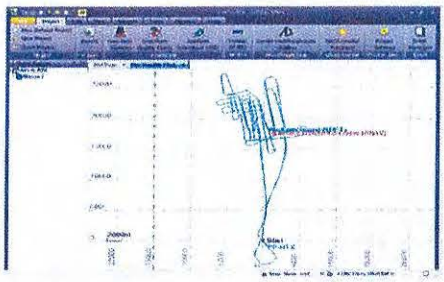
  - no restriction on minimum number of satellites

  - fly turns without limiting bank angles => faster turns

- POSPac UAV also includes Applanix SmartBase Cloud for generating a set of observations for a virtual base station exactly where and when you need it, and emails it to your inbox ready for Differential GNSS processing (where available)

YOUR BENEFITS

- Reduced acquisition costs
- Reduced re-work costs with "know before you go" in field quality control
- Faster production
- Better accuracy
- Increased utilization



Key Features

- Cm-level post-processed DGNSS position accuracy

  - removes the need for Ground Control Points in aero-triangulation (AT)

  - achieve cm level accuracy in LIDAR point cloud

- Accurate GNSS position translation from Antenna Phase Center (APC) to sensor origin

  - eliminates the need to estimate offset in AT which results in better accuracy

  - obtains cm level accuracy in LIDAR point cloud

- High accuracy orientation

  - strengthens the geometry in the AT block which reduces or eliminates sidelap

  - obtains cm level accuracy in LIDAR point cloud

- Speeds up processing time of AT by improving point matching success and blunder detection
- 200 Hz Georeferencing solution

  - filters out bad GNSS observables

  - improves heading accuracy

  - reduces interpolation errors to sensor sampling times

- Automatically survey in dedicated base stations direct from POSPac using Trimble Centerpoint™ RTX™

  - streamline map production workflow

- Full transformation support

  - user selectable datums and projections

  - transformation to camera Exterior Orientation

PŘÍLOHA č. 6

Data Processing Software

RiPROCESS

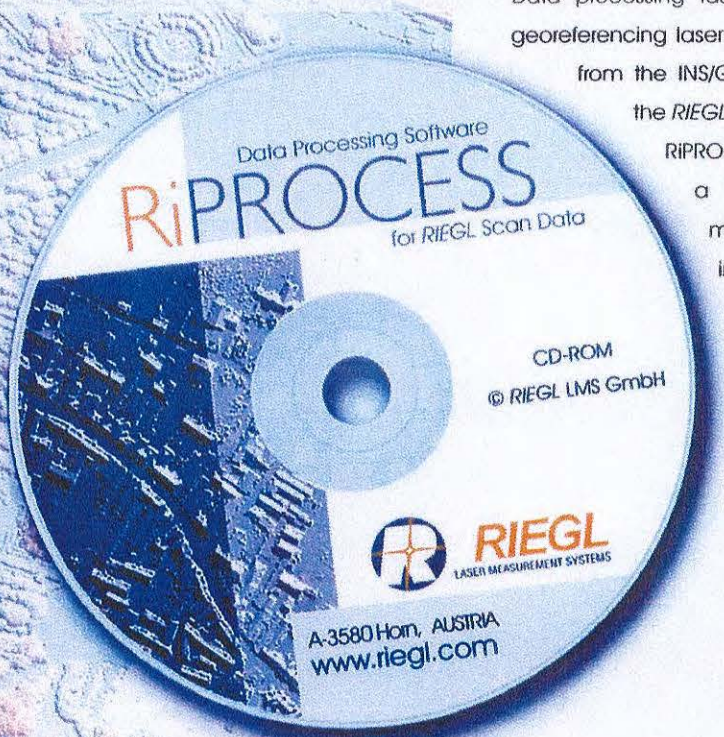
for *RIEGL* Scan Data

- *project-oriented software for managing and processing RIEGL ALS and MLS data*
- *operation in a multiple-workstation environment, parallel task processing*
- *fast access to data for inspection in different visualization formats*
- *system calibration and scandata adjustment*
- *statistical analysis of referencing, matching quality*
- *interfacing to third party software packages*

RiPROCESS is designed for managing, processing, analyzing, and visualizing data acquired with airborne laser scanning systems (ALS systems) and mobile laser scanning systems (MLS systems) based on *RIEGL*® Laser Scanners. Data export in geodetic systems is supported by the GeoSysManager.

RiPROCESS is project-oriented and enables the user to manage all data acquired and processed within a single project. This data includes project data, scanning system information such as mounting information and calibration, laser raw data, e.g., the digitized echo signals from the *RIEGL* Laser Scanners, camera data, position and orientation data from the INS/GNSS system, and georeferenced point cloud with additional attributes for every measured point.

Data processing tasks include, e.g., full waveform analysis and georeferencing laser data by merging it with the trajectory derived from the INS/GNSS system. These functions are provided by the *RIEGL* Software RiANALYZE and RiWORLD, respectively. RiPROCESS is intended for mass data production in a multiple-workstation environment. RiPROCESS makes use of these programs, which can be installed on different workstations and are accessed via RiSERVER.



visit our website **www.riegl.com**

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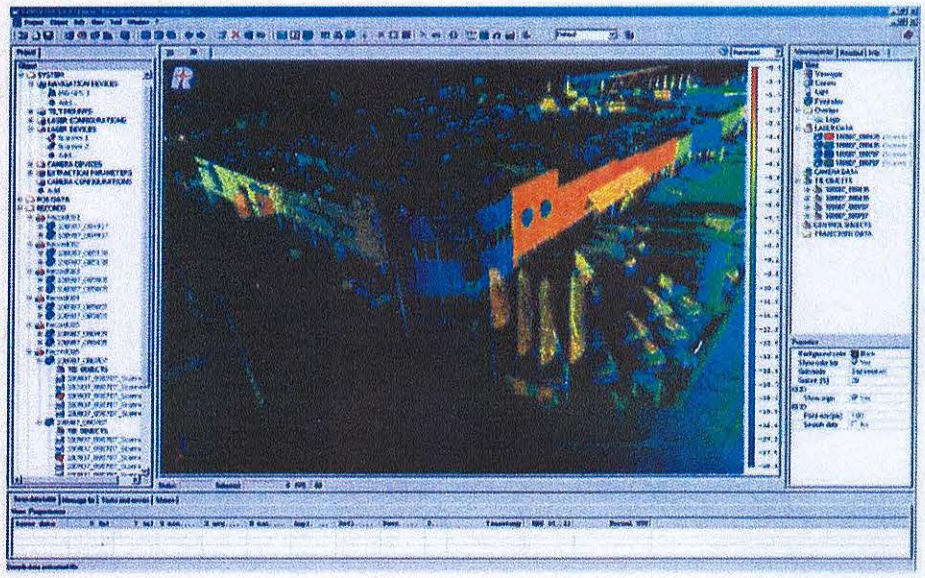


Fig. 1 Mobile laser scan data, color-coded reflectance

RiPROCESS distributes the computational load to the available server-enabled processing tools in the form of individual tasks thus optimizing data throughput.

For data quality analysis laser scans can be visualized in 2D and 3D in various ways, e.g., in true color, in color-encoded height, height differences, in point density, and many more. Even huge amounts of data can quickly be accessed for display in 3D. Quality of scan data matching can be assessed in different ways, by visual inspection or by statistical analysis.

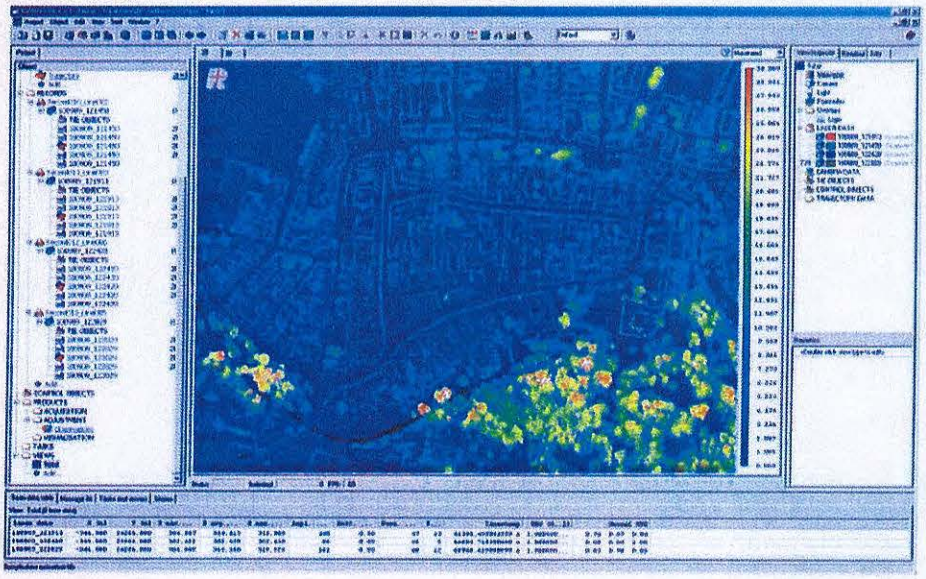
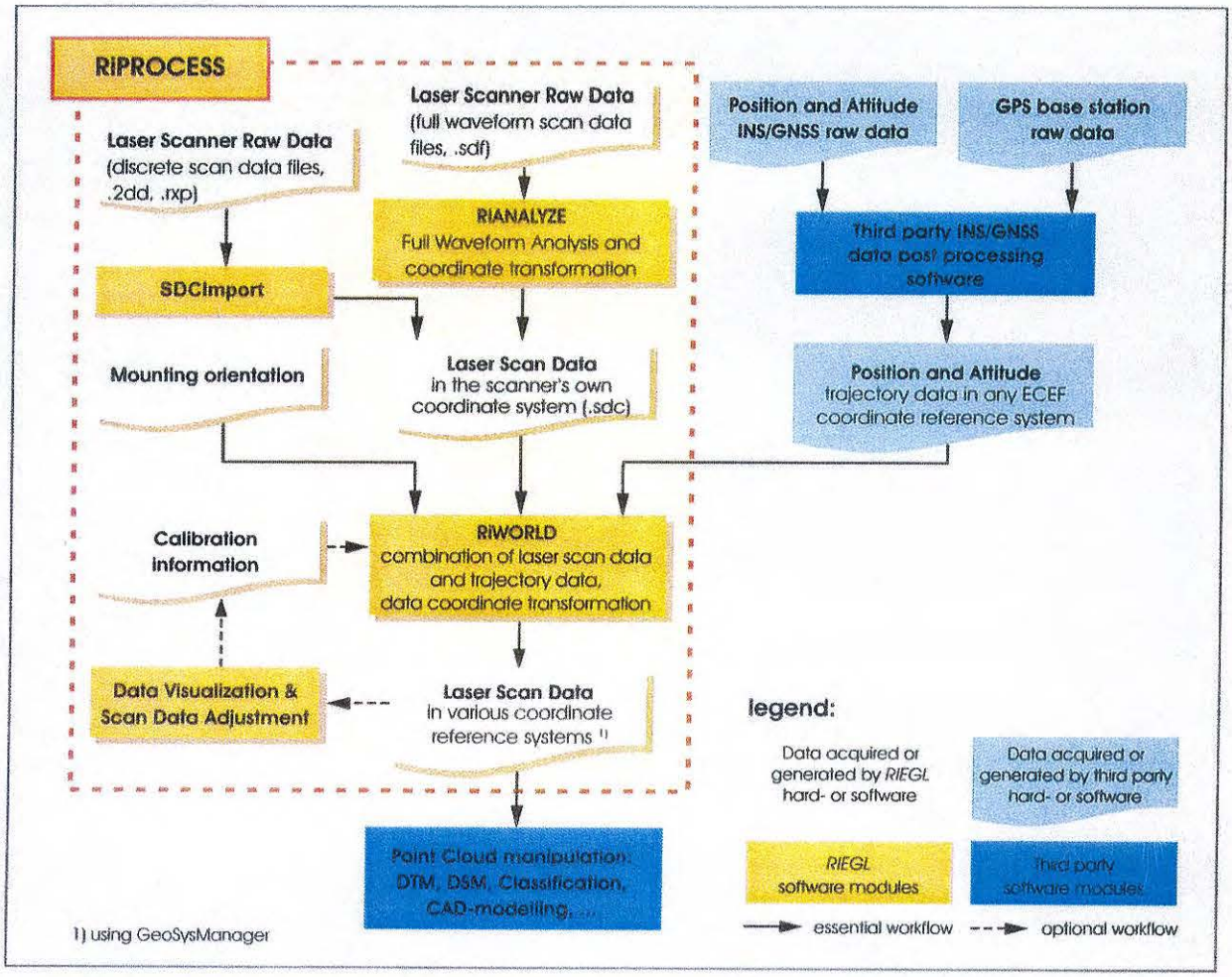


Fig. 2 Airborne laser scan data, color-coded height

In order to improve data quality, RiPROCESS offers an integrated scan data adjustment feature based on matching data acquired on planar objects, e.g., roofs of buildings. Data acquired on planar objects is automatically detected within the scan data and displayed for inspection in 2D and 3D. Parameters optimized within the scan data adjustment include system calibration information, and up to 6 offsets (angular and translational) for each single scan. Terrestrially surveyed control points or planar control objects can also be used to additionally improve absolute georeferencing of the data set.

RiPROCESS allows data export in the widely-used LAS format (amongst others) to execute common tasks such as classification, triangulation and decimation by third-party software packages. The included GeoSysManager offers a powerful tool for exporting the geo-referenced point cloud in Cartesian ECEF, geographic and local grid coordinates. An interface to RiSCAN PRO, the accompanying software for *RIEGL*'s terrestrial 3D scanners, allows utilizing further visualization and pointcloud manipulation tools.

RiPROCESS Workflow



RiPROCESS Key Features

- *Project-oriented managing software for processing of RIEGL airborne and mobile laser scanner data from raw data to point-cloud-based data in Cartesian ECEF or map projection (e.g. UTM) utilizing RiANALYZE and RiWORLD in remote control mode*
- *Fast access to data for visual inspection in a large variety of visualization formats, ranging from color-coded raster data to digitized echo data for every laser measurement (depending on used laser scanner)*
- *System calibration and scan data adjustment based on matching data acquired on flat objects*
- *Statistical analysis of matching quality of scan data; comparison of laser data to surveyed reference objects*
- *Interface to further post-processing tools via LAS, Terrasolid, and ASCII data exchange*
- *Operation in a multiple-workstation environment enhancing data post-processing throughput by parallel computing*
- *Serves as platform for RiPRECISION MLS/UAV for point cloud adjustment of mobile and UAV scan data (optional)*
- *Operates different hydrographic processing tools (optional) for RIEGL's topo-hydrographic laser scanners*

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RiPROCESS System Requirements

Operating systems:	Windows Vista Professional, Windows 7 Professional, 32 or 64 bit operating system
Memory requirements:	1024 MB RAM minimum, 2048 MB (32 bit) / 4096 MB (64 bit) or more recommended Note: On 32 bit operating systems, RiPROCESS can use up to 3 GB RAM and on 64 bit operating systems up to 4 GB RAM.
Disk space requirements:	approx. 130 MB of free disk space for the program and plugins (not including project data) at least 100 GB recommended for your own projects optional: Dedicated RAID controller (e.g. RAID 0 mode) and fast hard disks to speed up file access
Interfaces:	Network interface (Ethernet, LAN)
Graphics requirements:	Screen resolution at least 1024 by 768 pixels OpenGL accelerated graphics card (OpenGL 2.0 or higher required) nVIDIA GeForce series recommended (GeForce-7 or higher)
Peripherals:	3 button mouse, optical wheel mouse recommended standard keyboard

RiPROCESS Download Information

RiPROCESS is available for download in the members' area of www.riegl.com

In order to download RiPROCESS, it is necessary to be registered. After registration and activation, you will be able to download the current version. Subsequently, you will be kept updated in case of later software version releases.

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PARAMETRY PRO HODNOCENÍ NABÍDKY

Technická úroveň

Subkritérium S1		
S1) Doba letu s LIDAR skenerem a jednou kamerou na jeden bateriový set – maximálně 20 bodů:		
	Kritérium předložené uchazečem	*Bodové hodnocení dle ZD*
ad1) Min. 15 minut.. max. 20 minut…..		**0 bodů**
ad2) Více než 20 minut… max. 25 minut….		**10 bodů**
ad3) Více než 25 minut….	**30 minut**	**20 bodů**
Subkritérium S2		
S2) Maximální vzletová hmotnost (MTOM) – maximálně 10 bodů:		
	Kritérium předložené uchazečem	*Bodové hodnocení dle ZD*
ad1) Min. 15 kg max. 18 kg…..		**0 bodů**
ad2) Více než 18 kg… max. 21 kg….		**5 bodů**
ad3) Více než 21 kg…. max. 25 kg….	**25 kg**	**10 bodů**
Subkritérium S3		
S3) Užitečné zatížení bez baterií (Payload) – maximálně 10 bodů:		
	Kritérium předložené uchazečem	*Bodové hodnocení dle ZD*
ad1) Min. 5,5 kg max. 5,8 kg….		**0 bodů**
ad2) Více než 5,8 kg… max. 6,3 kg….		**5 bodů**
ad3) Více než 6,3 kg….	**6,5 kg**	**10 bodů**
	Celkový počet dosažených bodů	**40 bodů**

KALKULACE NABÍDKOVÉ CENY

Podrobná kalkulace nabídkové ceny

Položka dodávky	Cena bez DPH (Kč)
UAV - bezpilotní vrtulník včetně příslušenství	2 900 000,00
Letecký laserový skener s kamerami	2 350 000,00
Navigační a inerciální jednotka	1 610 000,00
Příslušenství systému	800 000,00
SW pro zpracování dat	650 000,00
Související služby s instalací a zaškolením	340 000,00

Nabídková cena

Celková cena bez DPH	8 650 000,00Kč
DPH ve výši 21 %	1 816 500,00Kč
Celková cena včetně DPH	10 466 500,00Kč

V Brně dne 07. 05. 2018

[redacted]

Ing. Jan Sukup
jednatel

OSTATNÍ DOKUMENTY

- **Prohlášení o shodě**

RiCOPTER®
... A RIEGL® COMPANY

PONYSTAR s.r.o.
Skryjová 1606/8, Husovice
61400 Brno
CZECH REPUBLIC

Ihre Nachricht vom	Ihr Zeichen	Unser Zeichen	Datum
-	-	MM/NZ	24.04.2018

Subject: Letter of Information

Dear Ladies and Gentlemen,

RiCOPTER UAV GmbH with its business address at 3580 Horn, Ing. Karl Prokschgasse 4, is a subsidiary of *RIEGL* Laser Measurement Systems GmbH and the distributor for the RiCOPTER UAS and its payloads.

We would like to inform you hereby that, to the best of our knowledge, the following applies:

- The RiCOPTER does not fall within the scope of the Directive 2004/108/EC relating to electromagnetic compatibility, because the aforementioned Directive does not apply to aircraft.
- The remote control of the RiCOPTER is regulated by Directive 1999/5/EC relating to radio equipment and telecommunications terminal equipment, and is therefore excluded from the scope of Directive 2004/108/EC.
  For the remote control's CE certification/marking please find hereby attached, for your reference, the respective declaration by the manufacturer.
- The voltage rating of the RiCOPTER's batteries is lower than the voltage rating of electronic equipment falling within the scope of the Directive 2006/95/EC (Low Voltage Directive) and consequently does not fall within its scope.

We hope to have satisfied your requirements and we remain,

[redacted]

Horn, April 24th, 2018

3580 Horn, Ing. Karl Proksch-Gasse 4
AUSTRIA

Enclosure: Declaration of conformity, RiCOPTER remote control (2 documents)

Překlad

RiCOPTER

RIEGL COMPANY

PONYSTAR s.r.o.
Skryjova 1606/8
614 00 Brno
Česká republika

Věc: Informační dopis

Dámy a pánové,

RiCOPTER UAV GmbH, s obchodním sídlem 3580 Horn, Ing. Karl Prokschgasse 4, je dceřinou společností *RIEGL* Laser Measurement System GmbH a distributor pro RiCOPTER UAV a souvisejícího vybavení.

Rádi bychom Vás seznámili s následujícím:

- RiCOPTER nespadá do oblasti působnosti Směrnice 2004/108/EC týkající se elektromagnetické kompatibility, jelikož výše uvedená směrnice se nevztahuje na letadla.

- Dálkové ovládání přístroje RiCOPTER je upraveno Směrnicí 1999 / ES pro rádiová zařízení a telekomunikační koncová zařízení a je proto vyloučeno z působnosti Směrnice 2004/108 / ES. Certifikát pro dálkové ovládání CE je součástí příslušného prohlášení výrobce.

- Napětí baterií RiCOPTER je nižší než jmenovité napětí elektronických zařízení, které spadají do oblasti působnosti Směrnice 2006/95 / EC (Směrnice o nízkém napětí) a nespadají do její působnosti.

Doufáme, že jsme odpověděli na Vaše požadavky a jsme s pozdravem

Razitko a podpis

Horn, 24. dubna 2018

- *Konec překladu* -

RIEGL LASER MEASUREMENT SYSTEMS

Doc. No.: SC-CECD-005254-001-14112017.doc

EC Declaration of Conformity

according to EMC Directive 2014/30/EU, Annex IV

Manufacturer: *RIEGL LASER MEASUREMENT SYSTEMS* GmbH

Address: **Riedenburgstraße 48**
3580 Horn
Österreich

The manufacturer declares, that the products of

Type: **Lightweight UAV Laser Scanner with Online Waveform Processing *RIEGL* VUX-1UAV**

Lightweight UAV Laser Scanner with Online Waveform Processing *RIEGL* VUX-1LR

Heigh-Performance LiDAR Sensor for KINEMATIC Laser Scanning *RIEGL* VUX-1HA

including the options mentioned in the user's manual, if delivered with CE-marking ex works, meet the regulations of Council Directive EMC 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility dated February 26th, 2014.

The products have been tested in a typical and/or in a critical configuration. Further details are given by the Annex, which is to be seen as an integral part of this declaration.

Horn, April 04th, 2018

[redacted]

This declaration certifys the accordance with the listed directives, however it does not imply any assurance of specific properties. The safety hints as given in the user's manual are to be observed.This EC Declaration of Conformity may be forwarded to third partys unchanged only. Extractions or modifications require the written authorization of *RIEGL LASER MEASUREMENT SYSTEMS* GmbH. Unsigned Declarations of Conformity are not valid.

RIEGL LASER MEASUREMENT SYSTEMS

Doc. No.: SC-CECD-005254-001-14112017.doc

Annex to the EC-Declaration of Conformity

Product type:

***RIEGL* VUX-1UAV**
***RIEGL* VUX-1LR**
***RIEGL* VUX-1HA**

The accordance of the products with the regulations of Council Directive EMC 2014/30/EU on the approximation of the laws of the Member States relating to electromagnetic compatibility dated February 26th, 2014, has been proved by observance of the following standards:

EN 61326-1: 2013	*Electrical equipment for measurement, control and laboratory use - EMC requirements; (IEC61326-1:2012)*
CISPR 16-1: Edition 2.1 2002	*Specification for radio disturbance and immunity measuring apparatus and methods* - Part 1: *Radio disturbance and immunity measuring apparatus*
CISPR 16-2: Edition 1.2 2002	*Specification for radio disturbance and immunity measuring apparatus and methods* - Part 2: *Methods of measurement of disturbances and immunity*
EN 61000-4-2: 2009	*Electromagnetic compatibility (EMC);* Part 4-2: *Testing and measurement techniques - Electrostatic discharge immunity test (IEC 61000-4-2:2008)*
EN 61000-4-3: 2006 + A1:2008 + A2:2010	*Electromagnetic compatibility (EMC);* Part 4-3: *Testing and measurement techniques - Radiated, radio frequency, electromagnetic field immunity test (IEC 61000-4-3:2006 + A1:2007 + A2:2010)*
EN 61000-4-4: 2012	*Electromagnetic compatibility (EMC);* Part 4-4: *Testing and measurement techniques - Electrical fast transient/burst immunity test (IEC 61000-4-4:2012)*
EN 61000-4-5: 2014	*Electromagnetic compatibility (EMC);* Part 4-5: *Testing and measurement techniques - Surge immunity test (IEC 61000-4-5:2014)*
EN 61000-4-6: 2014	*Electromagnetic compatibility (EMC);* Part 4-6: *Testing and measurement techniques - Immunity to conducted disturbances, induced by radio frequency fields (IEC 61000-4-6:2013)*

1) Tests have been performed using a configuration of the instrument as described below:

- ***RIEGL* VUX-1UAV**
- Power supplied via external laboratory power supply unit @ 24V DC
- Original ***RIEGL*** shielded power supply and data cable
- GPS antenna outside testing room, connected via GPS antenna cable, for time synchronisation

Any changes of modifications of the instrument or its accessories not expressly approved by *RIEGL LASER MEASUREMENT SYSTEMS* GmbH as well as any non-observance of the directions for installation may cause harmful interference and void the authorization to operate this equipment.

Překlad

RIEGL
LASER MEASUREMENT SYSTEM

Doc. Nr. : SC-CECD-005254-001-14112017.Doc

EC PROHLÁŠENÍ O SHODĚ

podle směrnice EMC 2014 / 30/EU, příloha IV

Výrobce: ***RIEGL*** LASER MEASUREMENT SYSTEMS GmbH

Adresa: Riedenburgstrasse 48
3580 Horn
Rakousko

Výrobce deklaruje, že produkty typu:

- **Lightweight UAV Laser Scanner with Online Waveform processing *RIEGL* VUX- 1UAV**
- **Lightweight UAV Laser Scanner with Online Waveform processing *RIEGL* VUX- 1LR**
- **Heigh-Performance LiDAR Sensor for KINEMATIC Laser Scanning *RIEGL* VUX-1HA**

včetně možností uvedených v uživatelské příručce, a pokud jsou dodávány s označením CE od výrobce, splňují požadavky Směrnice EMC 2014/30 / EU o harmonizaci právních předpisů členských států týkajících se elektromagnetické kompatibility ze dne 26. 02. 2014

Produkty byly testovány v typické a/nebo kritické konfiguraci.
Další podrobnosti uvádí příloha, kterou je třeba považovat za nedílnou součást tohoto prohlášení.

Horn, 04. duben 2018

[redacted]

podpis

podpis

Toto prohlášení potvrzuje shodu s uvedenými směrnicemi, nicméně neznamená jistotu konkrétních vlastností. Je třeba dodržovat bezpečnostní pokyny uvedené v uživatelské příručce. Toto prohlášení o shodě ES může být předáno třetím stranám pouze beze změn. Extrakce nebo úpravy vyžadují písemné povolení společnosti RIEGL LASER MEASUREMENT SYSTEM GmbH.
Nesignované Prohlášení o shodě není platné.

RIEGL
LASER MEASUREMENT SYSTEM

Doc. Nr. : SC-CECD-005254-001-14112017.Doc

PŘÍLOHA K PROHLÁŠENÍ O SHODĚ

Produkty: ***RIEGL* VUX- 1UAV**
***RIEGL* VUX- 1LR**
***RIEGL* VUX-1HA**

Shoda výrobků s předpisy Směrnice EMC 2014/30 / EU o harmonizaci právních předpisů členských států týkajících se elektromagnetické kompatibility ze dne 26. 02. 2014 potvrzuje dodržování následujících standardů:

EN 61326-1: 2013	Elektrická měřící, řídící a laboratorní zařízení- požadavky na EMC (IEC61326-1:2012)
CISPR 16-1: Vydání 2.1 2002	Specifikace metod a přístrojů pro měření vysokofrekvenčního rušení a odolnosti proti vysokofrekvenčnímu rušení - Část 1: Přístroje pro měření vysokofrekvenčního rušení a odolnosti proti vysokofrekvenčnímu rušen
CISPR 16-2: Vydání 1.2 2002	Specifikace metod a přístrojů na měření rádiového rušení a odolnosti proti rádiovému rušení - Část 2: Metody měření rušení a odolnosti
EN 61000-4-2:2009	Elektromagnetická kompatibilita(EMC) – část 4-2: Zkušební a měřící technika- Elektrostatický výboj- Zkouška odolnosti (IEC 61000-4-2:2008)
EN 61000-4-3:2006 A1:2008, A2:2010	Elektromagnetická kompatibilita(EMC) – část 4-3: Zkušební a měřící technika- Vyzařované vysokofrekvenční elektromagnetické pole-Zkouška odolnosti (IEC 61000-4-3:2006, A1:2008, A2:2010)
EN 61000-4-4:2012	Elektromagnetická kompatibilita(EMC) – část 4-4: Zkušební a měřící technika- Rychlé elektrické přechodné jevy/skupiny impulzů – Zkouška odolnosti (IEC 61000-4-4:2012)
EN 61000-4-5:2014	Elektromagnetická kompatibilita(EMC) – část 4-5: Zkušební a měřící technika- Rázový impuls-Zkouška odolnosti (IEC 61000-4-5:2014)
EN 61000-4-6:2014	Elektromagnetická kompatibilita(EMC) – část 4-5: Zkušební a měřící technika- Odolnost proti rušením šířeným vedením, indukovaným vysokofrekvenčními poli (IEC 61000-4-6:2014)

Pl.

❖ Testy byly provedeny při konfiguraci přístroje, jak je popsáno níže:

***RIEGL* VUX- 1UAV**

- Napájení dodávané externím laboratorním napájecím zdrojem @24V DC
- Originální *RIEGL* stíněný zdroj napájení a datový kabel
- GPS anténa umístěna mimo testovací místnosti, připojená přes kabel antény GPS pro synchronizaci času

Jakékoliv změny modifikací přístroje nebo jeho příslušenství, které nejsou výslovně schváleny firmou RIEGL LASER MEASUREMENT SYSTEM GmbH, stejně jako nedodržení pokynů pro instalaci, mohou způsobit škodlivé rušení a zrušení oprávnění k provozu tohoto zařízení.

- *Konec překladu* -

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