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## RANGER-UAV<sup>22</sup> FLEX

The **RANGER-UAV<sup>22</sup> FLEX** is our most versatile system, capable of seamlessly integrating into various platforms such as backpacks, UAVs, and Dual Scanner Mobile Mapping setups. The high pulse rate measurement capability ensures exceptional precision in data collection. Whether you're embarking on high-density UAS missions, tackling detailed mobile mapping projects, or conducting surveys with low-altitude piloted aircraft, the **RANGER-UAV<sup>22</sup> FLEX** is up to the task.

### FEATURES

- A 360° scanner FOV creates a payload designed for flexible mounting options for Backpack, UAV, and Mobile
- Class leading 10 mm range measurement accuracy
- Removable 61 MP RGB camera for UAV applications optional
- Grows with your needs - Single RANGER FLEX unit can be installed in dual scanner mobile accessory



VTOL



UAV



VEHICLE



BACKPACK

### QUICK SPECS

#### ABSOLUTE ACCURACY <sup>(1)(2)(3)</sup>

1.5 - 3.0 cm RMSEz @ 120 m

#### INTRASWATH PRECISION <sup>(1)(2)(4)</sup>

2.0 cm RMSDz @ 120 m

#### EXAMPLE ACQUISITIONS:

##### UAV

- » 100 m AGL, 10 m/s, 90° FOV, 1200 kHz
- » Swath Width = 200 m
- » Avg. Density = 150 points/m<sup>2</sup>
- » Collection Rate = ~7 km<sup>2</sup>/hr

##### MOBILE

- » 360° FOV, 1200 kHz
- » Point Density = 1700 points/m<sup>2</sup> @ 10 m range to target
- » Collection Rate = 40 km/h (25 mph)

### PAYLOAD

	RANGER FLEX	RANGER FLEX w/CAMERA
OVERALL DIMENSIONS (L x W x H) (cm)	27.9 x 20.9 x 17.3	33.4 x 20.9 x 17.3
POWER CONSUMPTION	75 W typical	85 W typical
WEIGHT	4.7 kg / 10.3 lbs	5.5 kg / 12.1 lbs
OPERATING TEMPERATURE	0° - 40° C / 32° - 104° F	
OPERATING VOLTAGE	14 - 28 VDC	

### LiDAR SENSOR

Source: RIEGL Laser Measurement Systems

LASER WAVELENGTH	1550 nm
RANGE MIN	1.5 m at ≥1 MHz PRR
RANGE MAX	755 m at 20% reflectivity, 50 kHz PRR
PULSE REPETITION FREQUENCY	Up to 1200 kHz
SCAN SPEED	10 - 200 lines/second
MAX RETURN COUNT	15
BEAM COUNT	1 facet rotating mirror
BEAM DIVERGENCE	0.35 mrad @ 1/e
HORIZONTAL FIELD OF VIEW	360°
LASER ACCURACY	10 mm One sigma @ 150 m
LASER SAFETY	CLASS 1

### NAVIGATION SYSTEM

CONSTELLATION SUPPORT	GPS + GLONASS + BEIDOU + GALILEO
SUPPORT ALIGNMENT	Static, Kinematic, Dual-Antenna
OPERATION MODES	Real-time, Post-Processed
ACCURACY POSITION	1 cm + 1 ppm GNSS baseline RMS horizontal
ACCURACY ATTITUDE <sup>(5)</sup>	ROLL, PITCH: 0.002° RMS HEADING: 0.007° RMS

### APPLICATIONS



UTILITIES MAPPING



OIL & GAS SURVEYING



RAILWAY TRACK MAPPING



CONSTRUCTION SITE SURVEYING

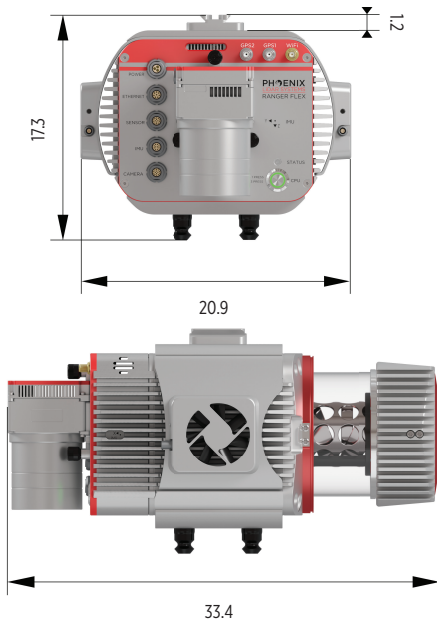


GENERAL MAPPING

(1) Approximate values based on PLS test methods described at <https://docs.phoenixlidar.com/accuracy-standards-and-quantification>.  
 (2) Using a 90° max downward field of view.  
 (3) Expected RMSEz when following the PLS recommended acquisition & processing workflow and ASPRS check point guidelines.  
 (4) Flat surfaces with >20% reflectivity at the laser's wavelength.  
 (5) Estimated post-processed accuracy with IMU-30.

## DIMENSIONS (cm)

### RANGER-UAV<sup>22</sup> FLEX



## MEASUREMENT PERFORMANCE

Laser Pulse Repetition Rate PRR <sup>1)5)</sup>	50 kHz	100 kHz	200 kHz	400 kHz	800 kHz	1200 kHz
<b>Max. Measuring Range <sup>3)4)</sup></b>						
natural targets $\rho \geq 20\%$ (e.g. Dry roads)	755 m	545 m	390 m	280 m	200 m	160 m
natural targets $\rho \geq 60\%$ (e.g. Sand)	1250 m	910 m	660 m	480 m	340 m	280 m
natural targets $\rho \geq 80\%$ (e.g. Limestone)	1415 m	1040 m	755 m	550 m	390 m	320 m
<b>Max. Operating Flight Altitude AGL <sup>2)5)</sup></b>						
@ $\rho \geq 20\%$	490 m (1590 ft)	350 m (1150 ft)	250 m (820 ft)	180 m (590 ft)	130 m (420 ft)	100 m (340 ft)
@ $\rho \geq 60\%$	800 m (2640 ft)	580 m (1920 ft)	420 m (1390 ft)	310 m (1010 ft)	220 m (720 ft)	180 m (590 ft)

1) Rounded values.

2) Setting of intermediate PRR values possible.

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 25 km. In bright sunlight, the max range is shorter than under overcast sky.

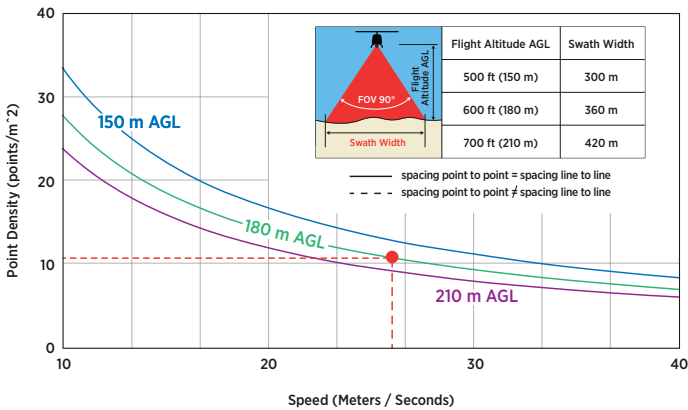
4) Ambiguity to be resolved by post-processing.

5) Flat terrain assumed, scan angle +/- 45°.

6) If more than one target is hit, the total laser transmitter power is split and, accordingly, the achievable range is reduced.

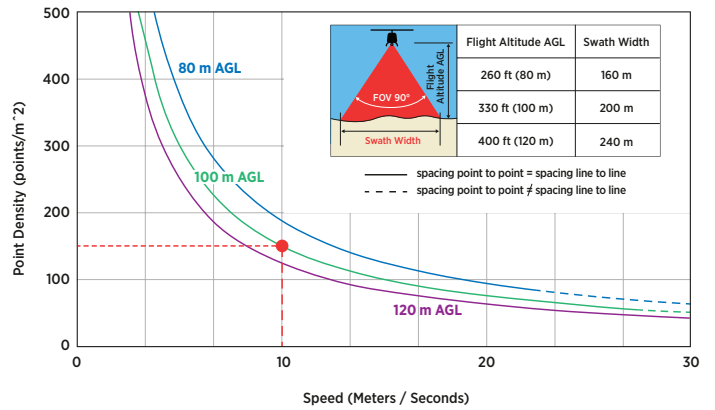
## RANGE & POINT DENSITY EXAMPLES

### PRR = 400KHZ



EXAMPLE	RESULTS
<b>RANGER-UAV<sup>22</sup> FLEX</b> at 400 kHz, 90° Field of View, Flying Height AGL = 180 m, Flying Speed = 50 knots (26 m/s)	<b>11 points/m<sup>2</sup> density</b> <b>~ 33 km<sup>2</sup>/hr collection rate</b>

### PRR = 1200KHZ



EXAMPLE	RESULTS
<b>RANGER-UAV<sup>22</sup> FLEX</b> at 1200 kHz, 90° Field of View, Flying Height AGL = 100 m, Flying Speed = 10 m/s	<b>150 points/m<sup>2</sup> density</b> <b>~ 7 km<sup>2</sup>/hr collection rate</b>

## ACCESSORIES



EXPLORE A PHOENIX LiDAR SYSTEM FOR YOUR TEAM, CONTACT US!

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