PHOENIX LiDAR SYSTEMS

RANGER ULTRA SERIES

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RANGER-U160[23]

The **RANGER-U160[23]** adds range and density capabilities to an already unrivaled mapping system. It's unique forward and rear looking field of view was designed to minimize laser shadowing and provide a high level of detail on vertical surfaces. Pulse rates up to 2400 kHz and the ability to be carried by a variety of aircraft make this a highly versatile system that is suitable for mapping at various scales in order to meet your unique project objectives. The **RANGER-U160[23]** is ideal for corridor mapping applications such as utility, rail and pipeline inspection.

VTOL UAV HELICOPTER AIRPLANE

QUICK SPECS

ABSOLUTE ACCURACY (1)(2)(3)
1.5 - 3 cm RMSEz @ 120 m (preliminary)

INTRASWATH PRECISION (1)(2)(4)
2 cm RMSDz @ 120 m (preliminary)

EXAMPLE ACQUISITIONS:

UAV

» 120 m AGL , 8 m/s, 100° FOV, 2400 kHz
» Swath Width = 286 m
» Avg. Density = 875 points/m²

HELICOPTER

» 250 m AGL, 60 knots, 100° FOV, 1200 kHz
» Swath Width = 595 m
» Avg. Density = 54 points/m²

(1) Approximate values based on PLS test methods described at: https://docs.phoenixlidar.com/accuracy-standards-and-quantification.
(2) Using a 90° 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.

APPLICATIONS

- UTILITIES MAPPING
- RAILWAY TRACK MAPPING
- CONSTRUCTION SURVEYING
- AGRICULTURE & FORESTRY MONITORING
- OPEN PIT MINING OPERATIONS
- OIL & GAS SURVEYING

FEATURES

- Exceptional data density with measurement rates up to 2,000,000/s
- 3 facet polygon mirror with -10° back, 0° nadir, and +10° forward for improved detail on vertical structures and surfaces
- Easily mountable to unmanned platforms (UAVs) and to helicopters, gyrocopters, and other small piloted aircrafts
- 100° lateral field of view for single pass corridor coverage

PLATFORM

* Without Accessories

DIMENSIONS*	27.5 x 11.7 x 22.2 cm
OPERATING VOLTAGE	20 - 28 VDC
POWER CONSUMPTION*	75 W typical
OPERATING TEMPERATURE	0° - 40° C / 32° - 104° F
WEIGHT*	3.4 kg / 7.5 lbs

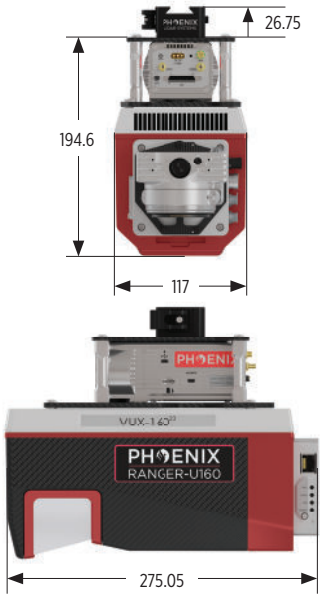
LiDAR SENSOR

LASER WAVELENGTH	1550 nm
RANGE MINIMUM	5 m
RANGE MAXIMUM	980 m @ 20% reflectivity, 300 kHz
PULSE REPETITION RATE	300 - 2400 kHz
SCAN SPEED	50 - 400 lines/second
MAX RETURN COUNT	32
BEAM COUNT	3
BEAM DIVERGENCE	0.4 mrad
HORIZONTAL FIELD OF VIEW	100°
VERTICAL FIELD OF VIEW	20° @ nadir
LASER ACCURACY	0.01 m (1σ @ 150 m)
LASER SAFETY	CLASS 1

NAVIGATION SYSTEM

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

RANGER-U160[23] DIMENSIONS (mm)



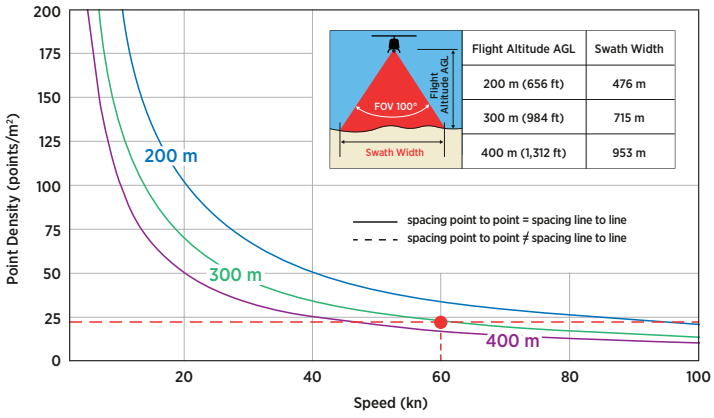
RANGE MEASUREMENT PERFORMANCE

Laser Pulse Repetition Rate PRR [1]	300 kHz	600 kHz	1200 kHz	1800 kHz	2400 kHz
Max. Measuring Range [2] [3] natural targets ρ ≥ 20% natural targets ρ ≥ 60% natural targets ρ ≥ 80%	 980 m 1600 m 1800 m	 720 m 1180 m 1340 m	 520 m 860 m 980 m	 420 m 720 m 820 m	 370 m 620 m 720 m
Max. Operating Flight Altitude AGL [2] [4] @ ρ ≥ 20% @ ρ ≥ 60%	560 m (1800 ft) 900 m (2950 ft)	400 m (1350 ft) 670 m (2200 ft)	290 m (950 ft) 490 m (1600 ft)	240 m (800 ft) 400 m (1350 ft)	210 m (700 ft) 350 m (1150 ft)
Max. Number of Targets per Pulse [5]	32	24	11	7	5

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) Considering max. effective FOV 100°, additional roll angle <± 5 deg.
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.
Source: RIEGL Laser Measurement Systems

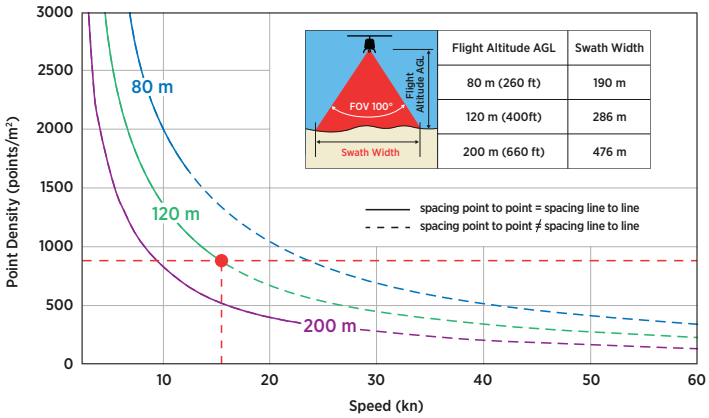
MAX MEASUREMENT RANGE & POINT DENSITY RANGER-U160[23]

PRR = 600 kHz



EXAMPLE	RANGER-U160[23] at 600 kHz, 100° Field of view, Flying height AGL = 300 m, Flying speed = 60 knots (31 m/s)	RESULTING POINT DENSITY	23 pts/m²

PRR = 2400 kHz



EXAMPLE	RANGER-U160[23] at 2400 kHz, 100° Field of view, Flying height AGL = 120 m, Flying speed = 16 knots (8 m/s)	RESULTING POINT DENSITY	875 pts/m²

RANGER-U160[23] ACCESSORIES

A6K Lite Camera

Helicopter Mount

UltraPod

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

PhoenixLiDAR.com • sales@phoenixlidar.com • USA +1.323.577.3366

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