# L-MAP

## HIGH-PERFORMANCE AIRBORNE LASER MAPPING SOLUTIONS

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ELMAP Airborne LiDARs are a series of high-performance mid- and high-range laser-scanners designed for cost-effective airborne laser mapping with fixed-wing aircraft, helicopters, and gyrocopters. They provide highly accurate measurements in a compact and lightweight package that can easily be installed even on small survey aircraft. ELMAP systems make advanced airborne lidar technology affordable. They are the ideal choice for replacing outdated or updating older systems with state-of-the-art performance.

The ELMAP lidar sensor was designed for use in aircraft with large-diameter camera hatches, on helicopters, gyrocopters, or in heli-/belly pods.

## KEY FEATURES

- Industry-leading field-of-view of 80°
- Up to 1.400.000 shots-per-second on the ground
- High range up to 4300 m at 20% reflectance
- Linear, uniform scan pattern with parallel scan lines
- High-resolution waveform digitization for every shot
- Integrated removable data storage on standard high-capacity SSDs
- Compact size and the lowest power consumption of their class
- Optionally with internal MEMS IMU
- Friendly price tag

## APPLICATIONS

WIDE-AREA TOPOGRAPHIC MAPPING

FORESTRY

MOUNTAINOUS TERRAIN

URBAN AREA MAPPING

INFRASTRUCTURE MONITORING

CORRIDOR

AGRICULTURE

MINING

ICE SHEET AND GLACIER MONITORING

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| SPECIFICATIONS | ELMAP15 | ELMAP30 |
|---|---|---|
| Ranging method | laser pulse time-of-flight, waveform digitization | |
| Measurement range [1] | 2500 m | 4300 m |
| Ranging precision [2] | 0.007 m | |
| Ranging accuracy [3] | 0.03 m | |
| Laser pulse rate | 100 - 1.600 kHz | |
| Effective measurement rate [4] | 90.000 - 1.400.000 meas/s | |
| Data output [5] [6] [7] | range, intensity, pulse width for every target/return | |
| Beam divergence [8] | 0.3 mrad | |
| Laser eye-safety class | Class 3B | |
| Beam deflection | polygon mirror scanner | |
| Scan pattern | linear parallel scan lines | |
| Field of View | 10° - 80° | |
| Scan rate | 20 - 250 scans lines/s | |
| Angular accuracy | 0.0025° | |
| Operational altitude [9] | up to 2100 m | up to 3600 m |
| Swath width [10] | up to 3000 m | up to 5150 m |
| Data storage capacity [11] | 1TB internal (2.2 h) \| 4TB removable (8.8 h) | |

| INTERFACES | |
|---|---|
| Sensor control and monitoring | GigaBit Ethernet |
| GNSS synchronization | Serial RS-232 (time-tag), 1 PPS inputs |
| Sensor control | USB 2 |
| External storage | USB 3 |
| Sensor monitoring | HDMI output |
| Remote control and laser safety | RemoteBox (LEMO) |
| Mission management or camera control | GPIO (LEMO) |
| Data storage | SATA 6 (SSD bay) |

1) to single, flat target perpendicular to beam, entirely covering laser footprint, with 20% diffuse target reflectance at laser wavelength, 40 km visibility, 95% detection probability

2) standard deviation one sigma to single flat target perpendicular to beam, entirely covering laser footprint, at range of 150 m

3) RMS one sigma to single, flat target perpendicular to beam, entirely covering laser footprint, with 20% diffuse reflectance, at range of 1200 m

4) shots-on-the ground at 80° FOV - each measurement may consist of returns from multiple targets

5) derived from recorded waveform data in post-processing; minimum return amplitude required for pulse detection, i.e. targets at large distance, with small cross section, or low reflectance may go undetected

6) true range is derived in post-processing using RDA (range disambiguation) technology for an unlimited number of range zones

7) data gaps and banding between range zones are minimized using Adaptive PRF technology based on Riegl Patent No. WO2016/201469 and used under license

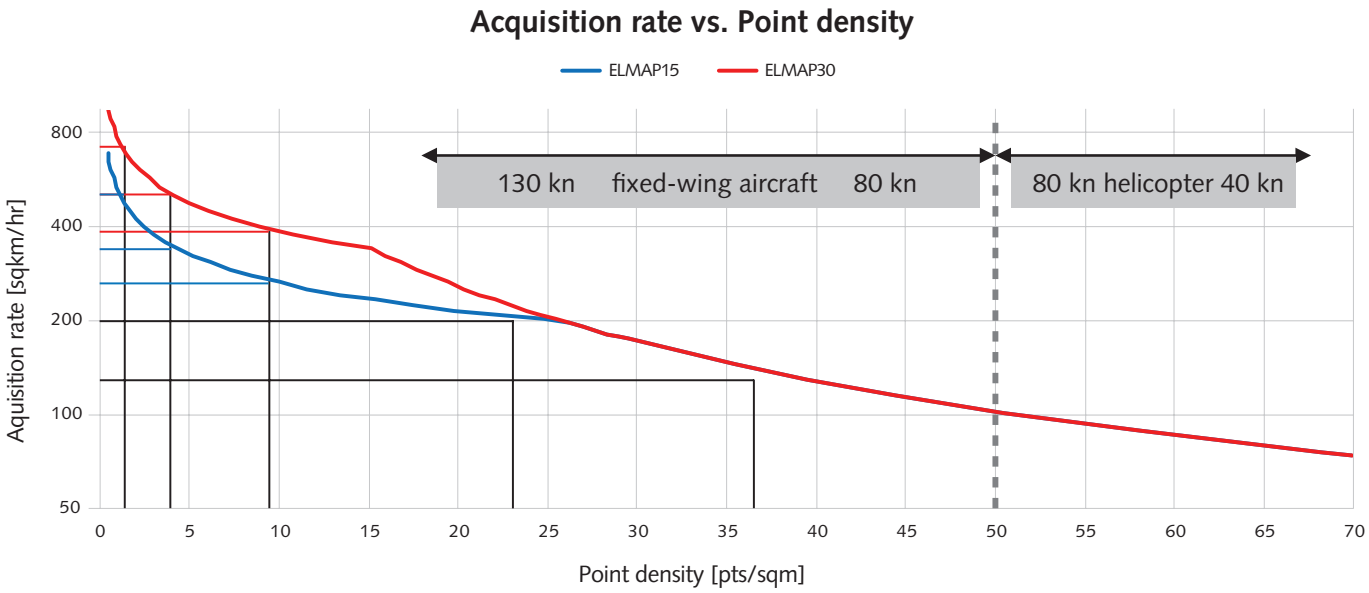
8) $1/e^2$ value

9) flat surface, 20% reflectance, 30km visibility, 100 kHz PRF, 100% output power, 60° FOV

10) flat surface, 85% of max. AGL, 80° FOV

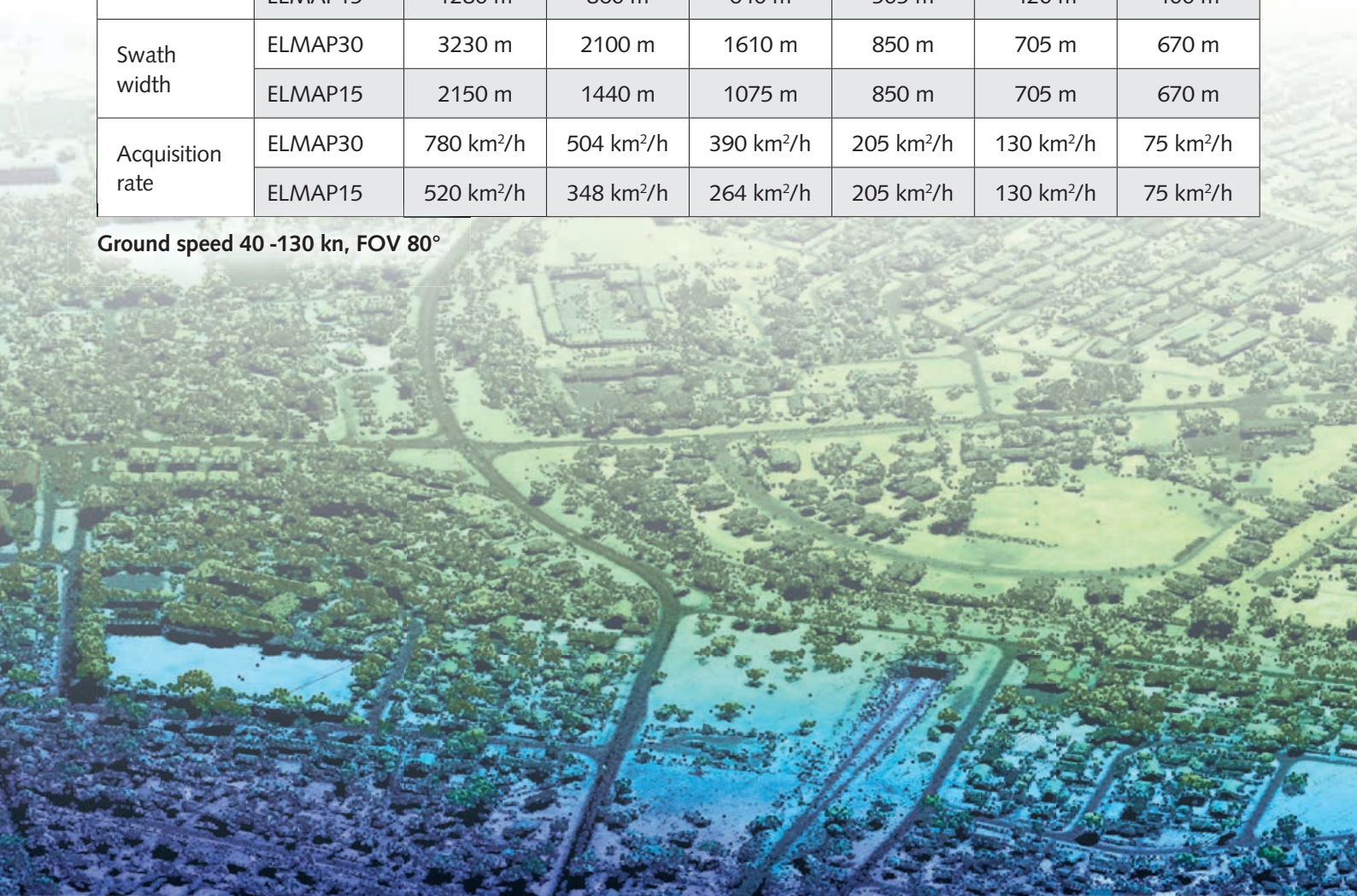
11) minimum endurance for continuous (uninterrupted) data acquisition, at maximum data rate

## PRODUCTIVITY



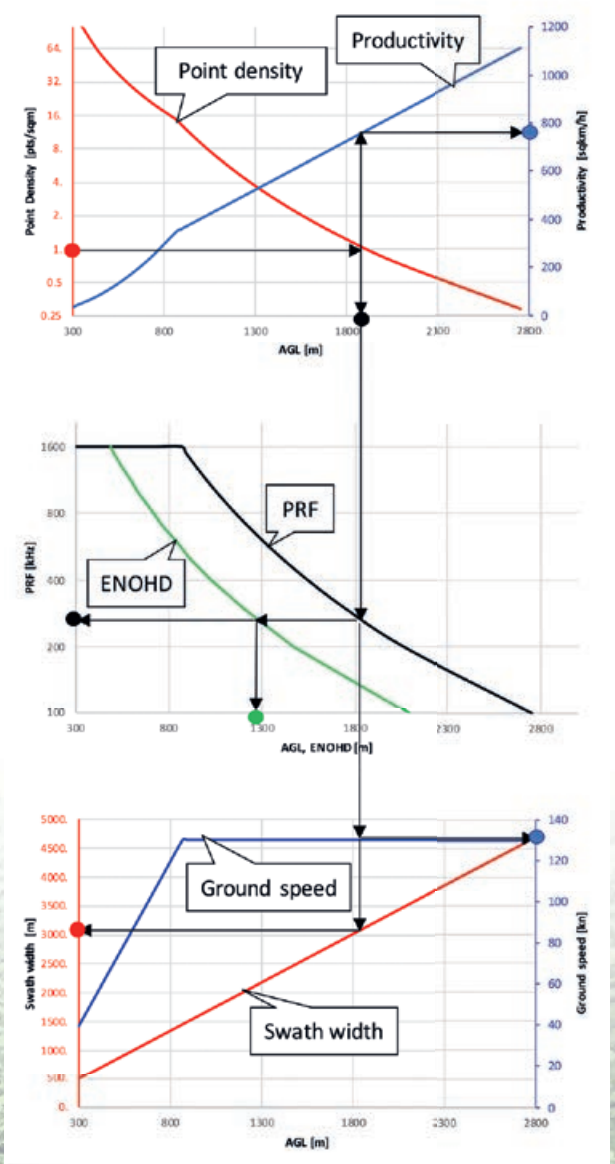

| Avg. point density | | 1 pt/m² | 4 pts/m² | 10 pts/m² | 25 pts/m² | 40 pts/m² | 70 pts/m² |
|---|---|---|---|---|---|---|---|
| **Ground speed** | | **130 kn** | **130 kn** | **130 kn** | **130 kn** | **100 kn** | **60 kn** |
| Flying height | ELMAP30 | 1925 m | 1250 m | 960 m | 505 m | 420 m | 400 m |
| | ELMAP15 | 1280 m | 860 m | 640 m | 505 m | 420 m | 400 m |
| Swath width | ELMAP30 | 3230 m | 2100 m | 1610 m | 850 m | 705 m | 670 m |
| | ELMAP15 | 2150 m | 1440 m | 1075 m | 850 m | 705 m | 670 m |
| Acquisition rate | ELMAP30 | 780 km²/h | 504 km²/h | 390 km²/h | 205 km²/h | 130 km²/h | 75 km²/h |
| | ELMAP15 | 520 km²/h | 348 km²/h | 264 km²/h | 205 km²/h | 130 km²/h | 75 km²/h |

**Ground speed 40 -130 kn, FOV 80°**

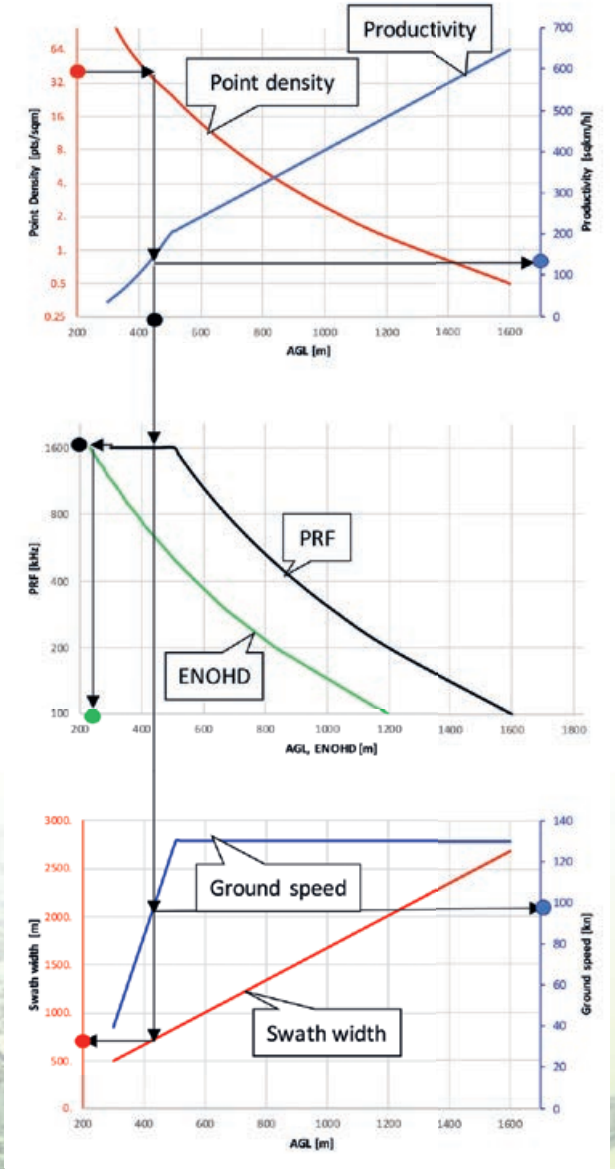


## PERFORMANCE ENVELOPE

**ELMAP30**

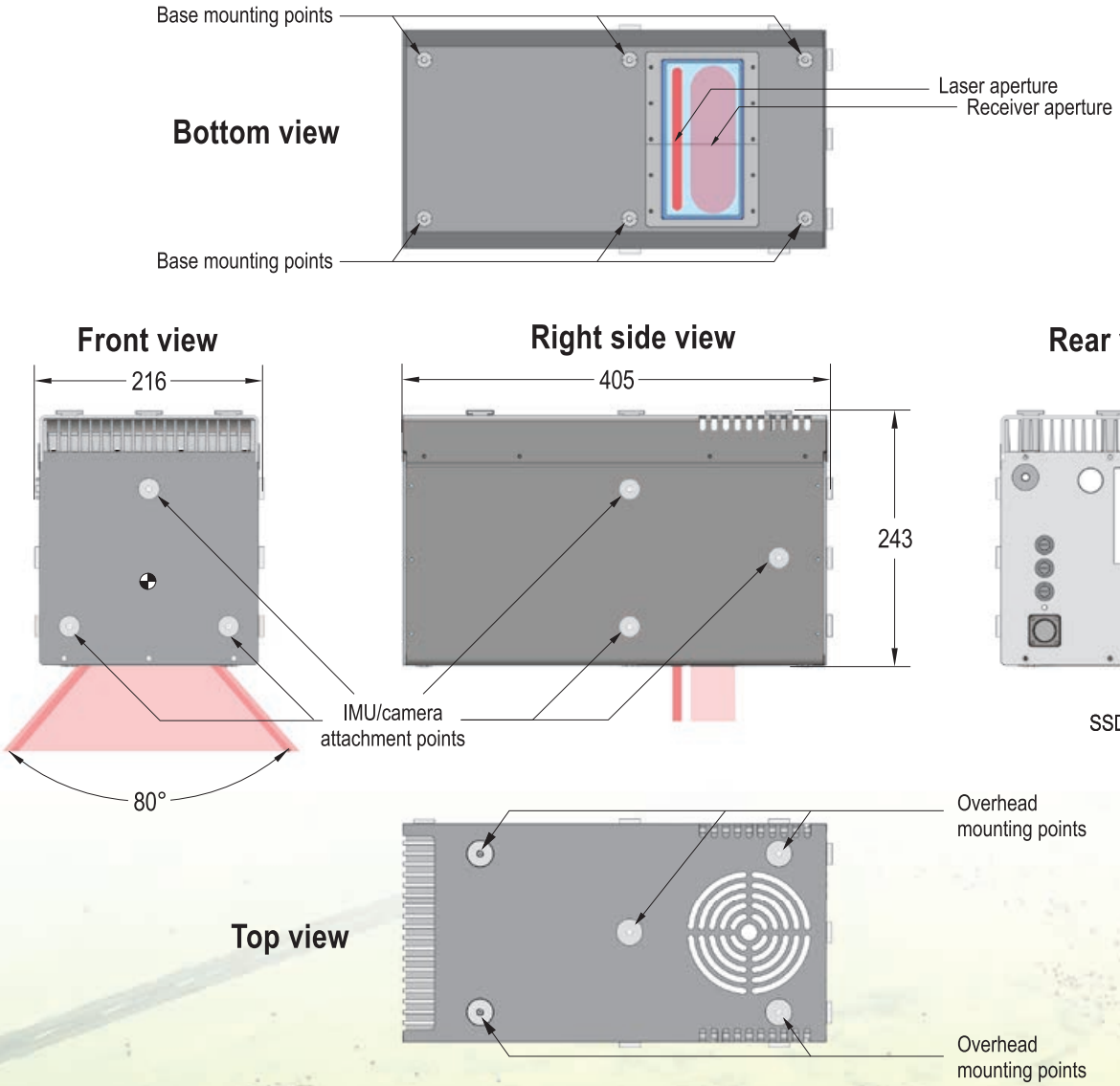



**ELMAP15**



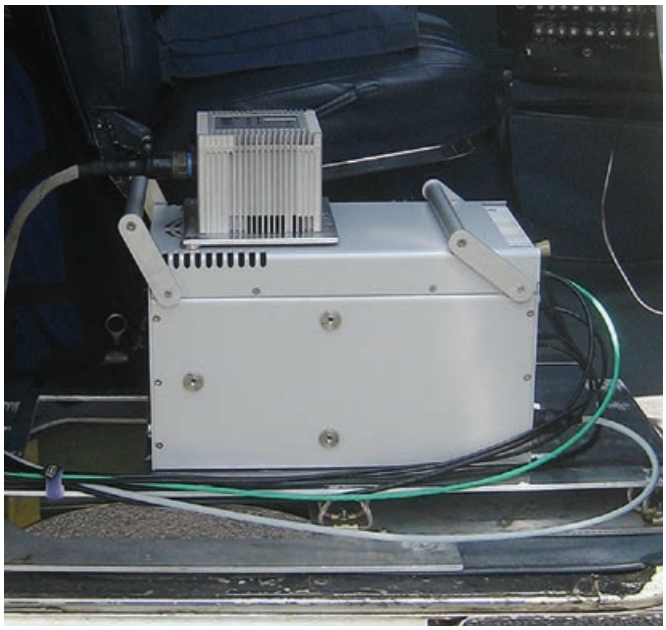

| | ELMAP30 with 80° FOV | ELMAP15 with 80° FOV |
|---|---|---|
| Required avg. point density | 1 pt/m² | 40 pts/m² |
| => AGL | 1925 m | 430 m |
| => Ground speed | 130 kn | 98 kn |
| => PRF | 240 kHz | 1600 kHz |
| => Swath width | 3230 m | 724 m |
| => Productivity | 780 km²/h | 132 km²/h |
| => ENOHD | 1350 m | 230 m |

## DIMENSIONS

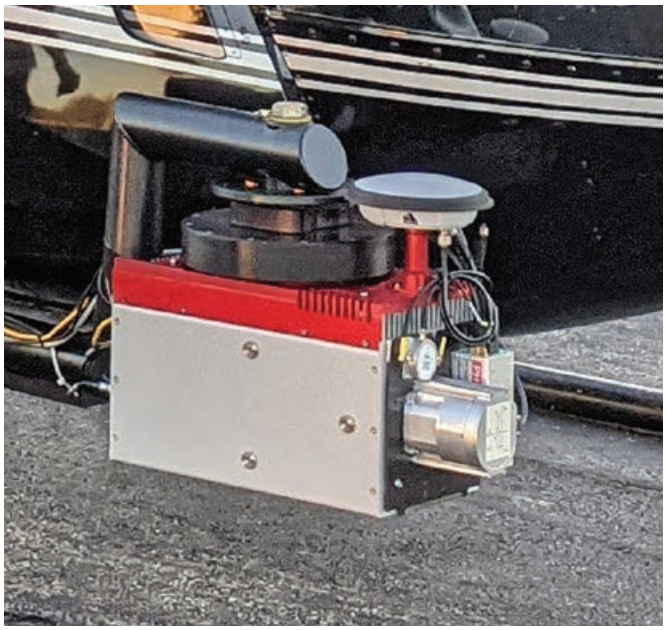



| | | |
|---|---|---|
| Dimensions | 405 x 216 x 243mm (LxWxH) | |
| Weight | 20 kg | |
| Instrument mounting points | 6 threads M6 on bottom, 5 threads M6 on top | |
| External IMU/Camera mounting points | 3 threads M6 each on top, front, and sides | |
| Power requirements | **ELMAP15** | **ELMAP30** |
| | 18 - 32 VDC, 100 W (avg.)<br>110 W (max during startup) | 18 - 32 VDC, 110 W (avg.)<br>125W (max during startup) |
| Operating conditions | 0°C - 40°C, 0 - 5000m MSL | |

## INSTALLATION EXAMPLE



CESSNA 337



ROBINSON R44

## ACCESSORIES

- RemoteBox remote control unit with laser safety keyswitch and emergency button
- One removable SATA SSD (4TB capacity)
- SATA docking station
- Set of cables and spare fuses
- Transportation case
- Perpetual Geocode lidar raw data processing and geocoding software license
- Software utilities
- Operating manuals and documentation

## OPTIONS

- Customized adapter with vibration isolators and spacers for mounting the sensor in the customer's aircraft
- Sunlight-readable touchscreen monitor and ruggedized keyboard
- Ruggedized tablet computer
- Integrated GNSS receiver
- Integrated internal or external IMU
- 12V voltage converter
- Boresight calibration and strip alignment software
- Point-cloud visualization and post-processing software

**Class 3B Laser Product according to IEC60825-1:2014**

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 6085-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019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