

Leica Chiroptera-5

Highest bathymetric efficiency



Increased point density & water depth penetration

The Leica Chiroptera-5 bathymetric LiDAR sensor collects seamless data from seabed to land with 40% increased point density and 20% higher water depth penetration compared to previous generations. The system enables more detailed and efficient hydrographic survey for shallow water areas.



High-performance workflow & data analysis

Near real-time data processing enables QC immediately after landing. The Leica LiDAR Survey Studio (LSS) processing suite provides full waveform analysis, automatic calibration, refraction correction and data classification to extract maximum detail from the data.



Improved productivity for extended applications

This highly efficient LiDAR solution improves bathymetric and topographic data capture performance for river and coastal surveys and maritime surveillance projects. The sensor provides best-in-class productivity for applications such as nautical charting, erosion analysis and environmental monitoring.

- when it has to be **right**

Leica
Geosystems

Leica Chiroptera-5 product specifications

SENSOR HEAD

Consists of	
1 x Chiroptera-5 bathymetric LiDAR unit	
1 x Chiroptera-5 topographic LiDAR unit	
1 x Leica RCD30 RGBN mid-format camera	
1 x RGB small format QA camera	
1 x IMU class 5, 500 Hz	
Dimensions (l/w/h)	480 / 510 / 640 mm
Weight	48 kg
Typical data resolution ¹	
Bathymetric data	5 points/m ²
Topographic data	Up to 12 points/m ²
RGB image	5 cm GSD
NIR image	5 cm GSD

BATHYMETRIC LiDAR

Laser wavelength	515 nm
Laser divergence	4.75 mrad
Bathymetric capture ²	Up to 200 KHz, full waveform capture
Depth penetration ^{1,3}	$D_{max} = 3.2/K_d @ p=15\%$ $D_{max} \approx 3.8/K_d @ p=60\%$
Flying altitude	400 - 600 m AGL nominal, higher altitudes feasible
Ranging accuracy ⁴	< 1 cm (1 σ)
Elevation accuracy ^{1,3,5,6}	IHO special order
Horizontal accuracy ^{1,3,5,6}	IHO special order
Hydrographic object detection ^{1,3,5,6,7}	IHO special order to $D_{max}=1.6/k_d$

TOPOGRAPHIC LiDAR

Laser wavelength	1,064 nm
Laser divergence	0.5 mrad
Topographic capture	Up to 500 KHz, full waveform recording option at down-sampled rate's
Flying altitude	400 - 1,600 m AGL
Ranging accuracy ⁴	< 1 cm (1 σ)
Elevation accuracy ^{1,5}	< 5 cm (1 σ)
Horizontal accuracy ^{1,5}	< 15 cm (1 σ)

QA CAMERA

Resolution	5 MP (2,448 x 2,050 pixels)
Spectral bands	RGB
Typical GSD ¹	25 cm

COMMON LiDAR SPECIFICATIONS

Field of view	$\pm 14^\circ$ front/back, $\pm 20^\circ$ left/right
Scan pattern	Oblique front-back palmer scan pattern
Scanner speed	Up to 4,200 rpm (140 scans/s)
Swath width	70% AGL
Intensity digitisation	14 bit
Sampling speed	1.8 GHz
Min vertical separation	< 50 cm

¹ Assumed 400 m AGL flight altitude, 65 m/s flight speed.

² Using Leica Geosystems proprietary 4X technology.

³ K_d is the water down-dwelling diffuse attenuation coefficient. Formula valid for $0.1 < K_d < 0.4$. Data is however captured both in clearer water $K_d < 0.1$, and significant more turbid water up to approximately $K_d=1.0$. Stated vertical and horizontal accuracies after calibration and registration using Leica Geosystems workflow and with an assumed GNSS position error of 4 cm.

⁴ In Leica Geosystems test lab environment towards flat target.

⁵ Post-processed data with GPS reference station within 30 km and under good satellite coverage conditions.

⁶ Referenced to IHO S44 specification. Transformation errors between ellipsoid and chart datum (not measured by the system) assumed neglectable.

⁷ Object diffuse reflection assumed =15%.

MID-FORMAT MULTISPECTRAL CAMERA

Type	Leica RCD30
Resolution	80 MP (10,20 x 7,752 pixels)
Motion compensation	2-axis mechanical
Spectral co-registered bands	B: 440 - 520 nm G: 500 - 580 nm R: 570 - 650 nm NIR: 780 - 880 nm
Frame rate	1 fps
Lens	50 mm 53.8° FOV across track 41.8° FOV along track

SENSOR CONTROLLER UNIT

Consist of	
1 x Sensor Control Unit (SCU) controlling and logging the bathymetric and topographic LiDAR scanners	
1 x Leica CC43 camera controller, controlling and logging the RCD30 camera, controls the PAV stabilisation and includes a deeply coupled GNSS	
4 x SSD removable mass memories	

INTEGRATED GNSS IMU SYSTEM

IMU	SPAN CNU55-H, Class 5, 500 Hz
GNSS	NovAtel SPAN OEM7, 555 channel, multi constellation, 10 Hz GNSS data rate
Additional features	Real-time deeply coupled solution for position and attitude at highest accuracies
Position RMS DGNSS	Post-processed spec X,Y < 3 - 5 cm, Z < 5 - 7 cm Post-processed typical X,Y < 2 - 3 cm, Z < 3 - 5 cm

PERIPHERALS

Aircraft mount	Leica PAV100 gyro-stabilised sensor mount for high performance data acquisition, 40 kg
Helicopter mount	Helipod for installation to AS350 helicopter
Operator console	2 x Leica OC60 12.1" operators' consoles, 3.2 kg each
Pilot display	Leica PD60 6.3" Pilot display, designed for installation in cockpit, 1 kg
Display stand	IS40 stand for mounting the OC60 operator consoles, 8 kg
GPS	GPS antenna, cabling and safety controls, 10 - 15 kg

ENVIRONMENTAL

Pressure	3,000 m operational 5,000 m non-operational
Humidity	DO-160G, Section 6, Cat A
Operating temperature	0 to 35°C
Storage temperature	-10 to 50°C

ELECTRICAL

Average power	< 900 W
Max peak power	1,200 W
Fuse on AC power	1 x 50 A recommended

SOFTWARE

Mission planning	Leica MissionPro
Flight navigation & sensor operation	Leica FlightPro
GNSS/INS trajectory processing	NovAtel Inertial Explorer
Image processing	Leica HxMap
Topo/Bathy LiDAR processing	Leica LiDAR Survey Studio (LSS)

STANDARDS

RTCA DO-160G, EUROCAE-14G, USA FCC Part 15, ISO 7137, EN/IEC 60825-1:2014, IHO S-44 Ed 6.0.
