



Leica CountryMapper

Hybrid sensor for large area data collection

Performance booster

The Leica CountryMapper combines a large-format photogrammetric camera and a high-performance LiDAR unit to simultaneously collect foundational geospatial data. The system enables the acquisition of highly consistent data in fewer flying lines, reducing the carbon footprint of each mapping project.

Outstanding flexibility

One aircraft? No problem. Leica Geosystems' exclusive modular design allows the CountryMapper to perform dedicated imaging, LiDAR or hybrid missions. Leica HxMap, the intuitive end-to-end multi-sensor workflow enables parallel data processing after landing.

Versatile applications

Hybrid airborne technology allows for generation of the most accurate and comprehensive 2D and 3D geospatial data products. The CountryMapper supports a wide variety of applications such as orthophoto generation, forestry monitoring, and infrastructure management.



Leica CountryMapper

Sensor configuration

CountryMapper-S 31,520 x 13,440 pixels RGBN
Image FOV 58.0°
LiDAR FOV 10° to 60°

CountryMapper-H 31,520 x 13,760 pixels RGBN
Image FOV 45.0°
LiDAR FOV 10° to 60°

CountryMapper-W 40,000 x 8,320 pixels RGBN
Image FOV 66.2°
LiDAR FOV 10° to 60°

RGB: NIR ratio
CountryMapper-S 1:1.6
CountryMapper-H 1:2.1
CountryMapper-W 1:1.6

Dimension Height 770 mm
Diameter 408 mm (bottom) /
435 mm (top)

Sensor Weight 55 kg

CountryMapper-S Imaging and LiDAR performance^{1,2}

Example Collection 710 m 1,425 m 2,135 m 2,845 m 5,690 m
AGL

Imaging GSD 2.5 cm 5 cm 7.5 cm 10 cm 20 cm

LiDAR³ Density (ppm²) 21.8 11.1 7.4 5.6 1.1

LiDAR³ Area Rate (km²/h) 205 411 616 822 1,643

Hybrid⁴ Density (ppm²) 27.0 13.7 9.2 6.9 1.3

Hybrid⁴ Area Rate (km²/h) 155 309 464 619 1,237

CountryMapper-H Imaging and LiDAR performance^{1,2}

Example Collection 950 m 1,900 m 2,850 m 3,800 m 5,700 m
AGL

Imaging GSD 2.5 cm 5 cm 7.5 cm 10 cm 15 cm

LiDAR³ Density (ppm²) 16.4 8.3 5.6 3.5 1.1

LiDAR³ Area Rate (km²/h) 275 549 823 1,098 1,647

Hybrid⁴ Density (ppm²) 25.7 13.0 8.7 5.5 1.7

Hybrid⁴ Area Rate (km²/h) 155 309 463 618 927

CountryMapper-W Imaging and LiDAR performance^{1,2}

Example Collection 765 m 1,530 m 2,295 m 3,060 m 6,115 m
AGL

Imaging GSD 2.5 cm 5 cm 7.5 cm 10 cm 20 cm

LiDAR³ Density (ppm²) 20.3 10.3 6.9 5.2 0.8

LiDAR³ Area Rate (km²/h) 221 441 662 883 1,732

Hybrid⁴ Density (ppm²) 22.2 11.3 7.6 5.7 1.0

Hybrid⁴ Area Rate (km²/h) 195 390 584 779 1,529

Integrated GNSS/IMU system

IMU SPAN CNUS5-H, Class 5, 500 Hz, FOG
no export license required US ECCN 7A994

GNSS NovAtel SPAN OEM7, 555 channel multi
constellation receiver with 10 Hz GNSS data rate

Additional features Real-time deeply coupled solution for position
and attitude at highest accuracies, fully
integrated and embedded solution

Position RMS DGNSS Post-processed (specification):
X,Y ≤ 3-5 cm, Z ≤ 5-7 cm
Post processed (typical):
X,Y ≤ 2-3 cm, Z ≤ 3-5 cm

Imaging specifications

Sensor Type BSI CMOS

Dynamic range 83 dB

A/D conversion 14-bit

Motion compensation Mechanical forward-motion-
compensation (FMC)

Min. frame interval 0.7 sec

Spectral bands R (580 - 660 nm)
G (480 - 590 nm)
B (420 - 510 nm)
NIR (720 – 850 nm, monochrome)

Shutter Mechanical central shutter, designed
for up to 500,000 cycles, field
exchangeable

Real-time processing • Data compression
• Georeferenced thumbnails for in-
flight visualisation and post-flight
quality control

LiDAR specifications

Field of view 10 - 60° programmable

Scan speed 33 - 166 Hz, programmable
66 - 333 scans per second

Scan pattern⁵ Circle scanning
Ellipse scanning
Skew ellipse scanning

Pulse repetition frequency Up to 2.0 MHz (height dependent)

Laser divergence 0.12 mrad (1/e) nominal
0.17 mrad (1/e²) nominal

Laser wavelength⁶ 1,064 nm

Laser classification⁶ Class 4

Operation altitude⁷ 300 m minimum AGL
6000 m maximum AGL

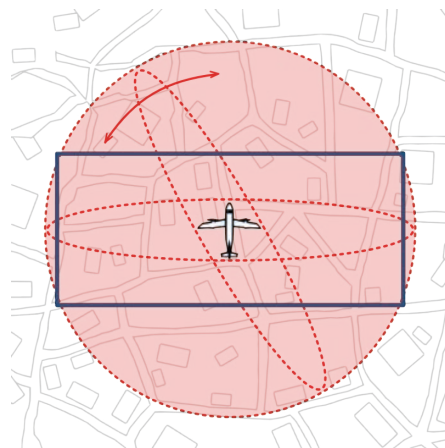
Return pulses • Programmable up to 15 returns at all
pulse rates, including intensity (14-
bits digitisation)
• Gateless Multiple-Pulses-in-the-Air
(MPiA), zone independent operation
• Full waveform recording for each shot
• Waveform attributes for each return

Min. vertical separation 0.5 m

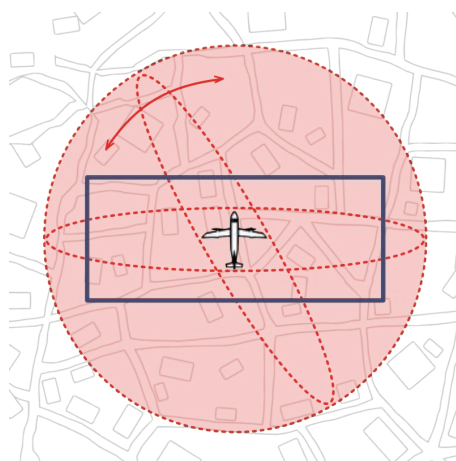
Vertical accuracy^{8, 9, 10} < 5 cm 1σ

Horizontal accuracy^{8, 9, 10} < 13 cm 1σ

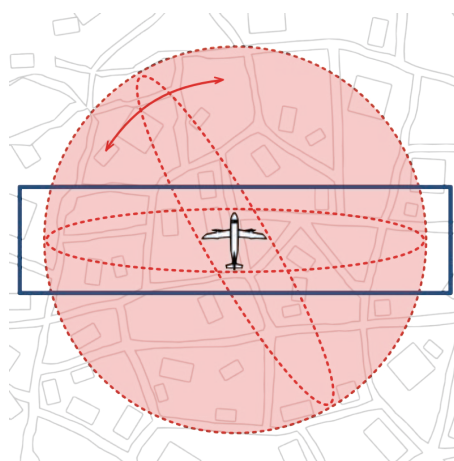
Peripherals	
Mass memory	• 2x Leica MM60 solid state drive, 15.36 TB each • Total storage 30.72 TB • Recording time about 8.0 hours for typical requirements • Weight including drives and enclosure, 0.4 kg • Removable, portable and extendable
Operator console	Leica OC61 12.1" screen 3.9 kg
Pilot display	Leica PD61 6.3" screen 1.0 kg designed for cockpit mounting
Display stand	IS40-LW stand for Leica OC61 operator console 3.2 kg
Sensor mount	Leica PAV200 gyro-stabilised sensor mount for high-performance data acquisition, 36.0 kg compensation range: roll -7° to 7°, pitch -8° to 6°, drift -30° to 30°
Environmental	
Pressure	Non-pressurised cabin up to ICAO 25,000 ft
Humidity	0% to 95% RH according to ISO 7137 (non-condensing)
Operating temperature	-10°C to 35°C
Storage temperature	-10°C to 70°C
Electrical	
Max. avg. power consumption of complete system	870 W / 28 VDC
Max. peak power consumption of complete system	1100 W (<60s) / 28 VDC
Fuse on aircraft power outlet	1 x 50 A recommended
System weight	
System installation	< 104.8 kg
Software	
Mission planning	Leica MissionPro
Flight navigation & sensor operation	Leica FlightPro
GNSS/IMU processing	NovAtel Inertial Explorer
Point cloud/image processing	Leica HxMap
Standards	
RTCA DO-160G, EUROCAE-14G, USA FCC Part 15, ISO 7137, EN/IEC 60825-1:2014	



CountryMapper-S footprint



CountryMapper-H footprint



CountryMapper-W footprint

¹ Target reflectivity ranges from 10% to a maximum 20% at a ground speed of 150 knots and a visibility of 23 km in sunlight conditions. The calculation of the collection rate already includes a 10% side overlap.

² USGS QLO accuracy is achieved at 20% target reflectivity for AGL < 2450m and 10% target reflectivity for AGL < 1750m, using Circular pattern at 60° FOV.

³ LiDAR collection minimum LiDAR density performance using 10% LiDAR side overlap at 60° LiDAR field-of-view. Imagery side overlap is restricted in this collection mode with CountryMapper.

⁴ Hybrid collection minimum LiDAR density performance for projects requiring 30% imagery side overlap. LiDAR field-of-view is 47° for CountryMapper-S, 36° for CountryMapper-H and 54° for CountryMapper-W.

⁵ Scan patterns with port glass. Coated port glass performance is optimized with circular pattern field-of-view greater than 25°. Elliptical patterns are constrained due to potential back-reflectance. For the highest data quality, operating without port glass is recommended.

⁶ Invisible laser radiation, avoid eye or skin exposure to direct or scattered radiation. Class 4 laser product in accordance with EN/IEC 60825-1:2014.

⁷ Maximum operating altitude is specified for 90% detection at 20% reflectivity (e.g., old dry asphalt), target larger than laser footprint, 100% laser output at 60 degrees FOV.

⁸ Accuracy stated is acquired @1,000 m AGL, max. FOV and, 150 knots aircraft speed.

⁹ The standard deviation σ represents the 68% confidence interval. Typically, the RMSE value represents 1 σ .

¹⁰ Stated vertical and horizontal accuracies after calibration and registration using Leica HxMap workflow and with an assumed GNSS position error of 4 cm.



GEOSYSTEMS

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