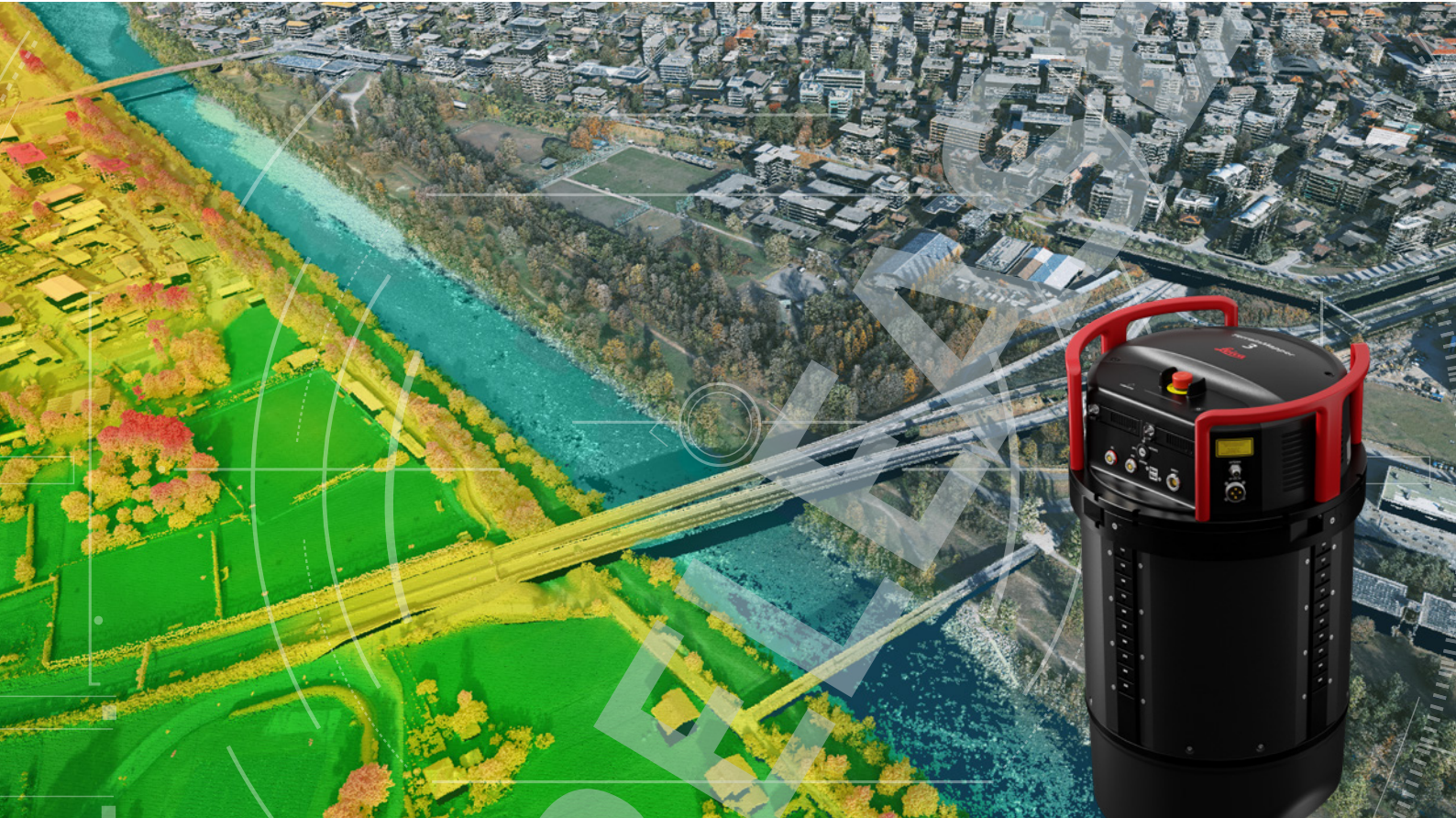


Leica TerrainMapper-3

One system, multiple LiDAR applications



Maximum Flexibility

Leica TerrainMapper-3 combines Leica Geosystems' industry-leading LiDAR efficiency with scan pattern configurability to support the widest variety of applications and requirements in a single system. The sensor provides circle, ellipse and skew-ellipse scan patterns to optimise data collection in lower density areas, steep terrains, urban canyons and for corridor mapping applications.



Improved Efficiency

Higher scan speeds enable users to fly faster while capturing high-quality data, and the 60-degree adjustable field of view maximises data collection with fewer flight lines. The system is further complemented by the Leica MFC150 4-band camera, operating with the same 60-degree field of view coverage as the LiDAR for exact data consistency.



Accurate Data

Reduced beam divergence improves planimetric accuracy, and the new MPIA (Multiple Pulses in Air) handling ensures more consistent data, even in steep terrains. The TerrainMapper-3 introduces possibilities for real-time full waveform recording at maximum pulse rate, opening new opportunities for advanced and automated point classification.

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Leica TerrainMapper-3 product specifications

LEICA TERRAINMAPPER-3

TerrainMapper-3	14,192x 10,640 pixels RGBN Image FOV 61.3° LiDAR FOV 10° - 60°		
RGB : NIR ratio	1 : 1		
Collection parameters			
Image GSD	GSD (cm)	Flying height (m)	
	2.5	300	
	5	600	
	7.5	900	
	10	1200	
	15	1800	
	20	2400	
	30	3600	
	50	6000	
	Point Density (Points/m2) by AGL (m)		
	PD	FOV-60°	FOV-45°
	16	797	1123
	12	1073	1507
	8	1624	2275
	4	3050	3270
	2	3900	4500
	1	4950	5700
		FOV-30°	
		1750	
		2375	
		3100	
		4150	
		5300	
		6000	
Dimensions	Height 757 mm Diameter 408 mm (bottom) / 435 mm (top)		
Weight	47 kg		

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
Attitude RMS	Post-processed (specification): R,P ≤ 0.005°, H ≤ 0.008° Post-processed (experienced): R,P ≤ 0.003°, H ≤ 0.004°

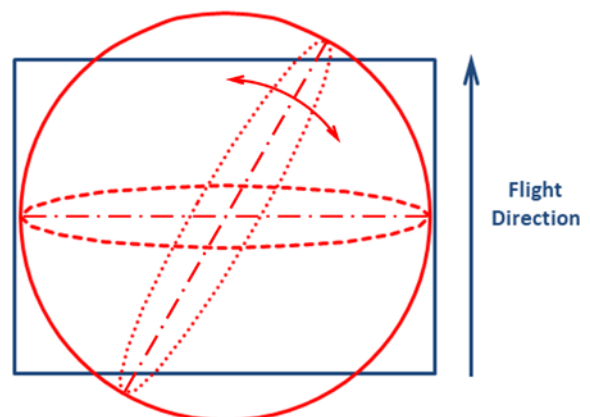
IMAGING SPECIFICATIONS

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
Aperture	Automatically controlled aperture 7 half f-stop steps
Real-time processing	<ul style="list-style-type: none"> 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
Scanner pattern	Circle scanning Ellipse scanning ⁹ Skew ellipse scanning ⁹
Pulse repetition frequency	Up to 2.0 MHz (height dependent)
Laser divergence	0.12 mrad (1/e) nominal 0.17 mrad (1/e ²) nominal
Laser wavelength³	1,064 nm
Laser classification³	Class 4
Operation altitude⁴	300 m minimum AGL 6000 m maximum AGL
Return pulses	<ul style="list-style-type: none"> Programmable up to 15 returns at all pulse rates, including intensity (14-bits digitisation) Gateless Multiple-Pulses-in-the-Air (MPiA), zone independent operation Waveform recording for each shot Waveform attributes for each return
Min. vertical separation	0.5 m
Vertical accuracy^{5,6,7}	< 5 cm 1 σ
Horizontal accuracy^{5,6,7}	< 13 cm 1 σ

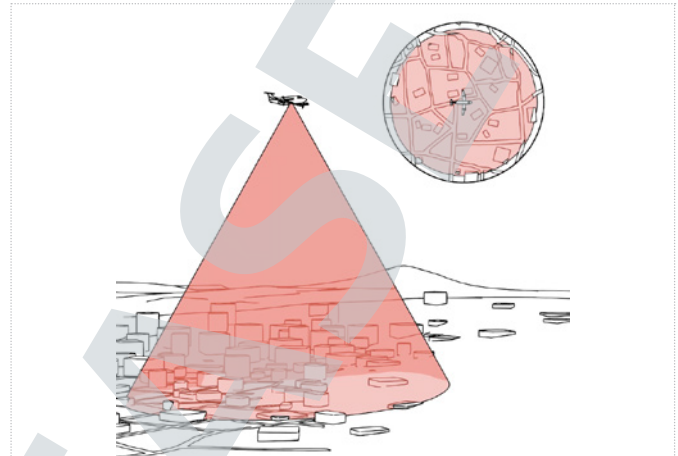
- TerrainMapper-3 Image (RGBN)
- TerrainMapper-3 LiDAR (Circle, 10-60 deg.)
- - - TerrainMapper-3 LiDAR (Ellipse, 10 x 60 deg.)
- TerrainMapper-3 LiDAR (Skew Ellipse, 10 x 60 deg.)



TerrainMapper-3 footprint

PERIPHERALS

Mass memory ⁸	<ul style="list-style-type: none"> • Leica MM60 solid state drive, 15,360 GB, 0.4 kg • Removable and portable • Two MM60 required, recording time about 8.0 hours
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
Weight	36.0 kg
Compensation range	Roll -7° to 7° Pitch -8° to 6° Drift -30° to 30°



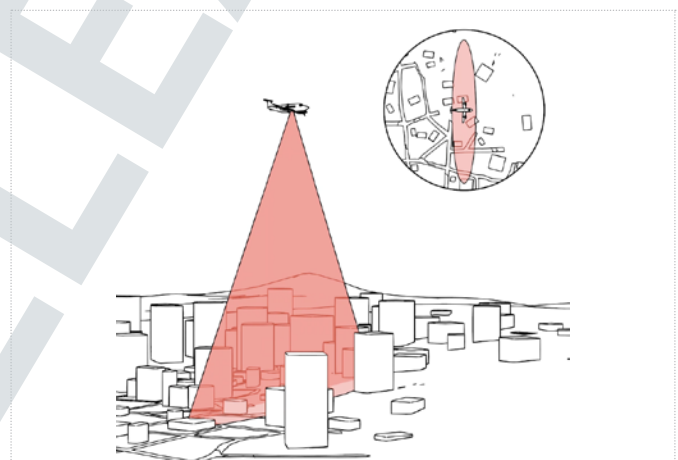
Circle scan pattern

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	800 W / 28 VDC
Max. peak power consumption of complete system	1000 W (<60s) / 28 VDC
Fuse on aircraft power outlet	1 x 50 A recommended



Ellipse scan pattern

SYSTEM WEIGHT

System installation	< 97 kg
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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

¹ LiDAR on 20% reflectivity target at 150 knots.

² USGS QLO: 5 cm RMSEz and > 8 points/m²; QL1: 10 cm RMSEz and > 8 points/m²; QL3: 10 cm RMSEz and < 8 and > 2 points/m².

³ 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.

⁴ 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.

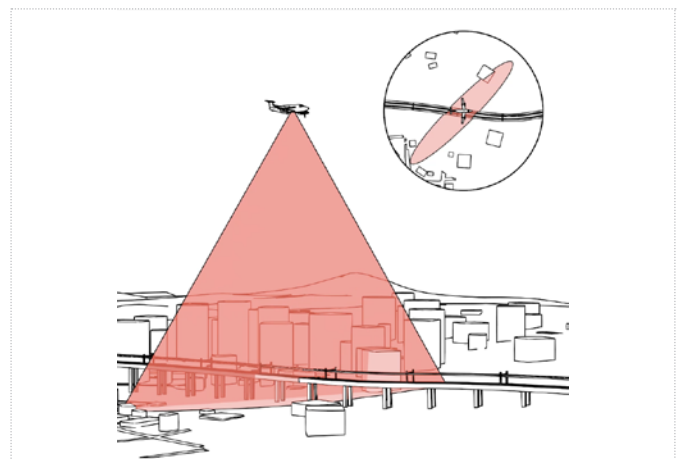
⁵ Accuracy stated is acquired @1,000 m AGL, max. FOV and, 150 knots aircraft speed.

⁶ The standard deviation σ represents the 68% confidence interval. Typically, the RMSE value represents 1 σ .

⁷ Stated vertical and horizontal accuracies after calibration and registration using Leica HxMap workflow and with an assumed GNSS position error of 4 cm.

⁸ Data collection is based on typical image and LiDAR recording modes.

⁹ Ellipse and skew ellipse scanning can't be used with optical port glass and PAV. Circular scanning in combination with a special coated port glass and with FOV > 25°, allowed but not recommended.



Skew ellipse scan pattern

Revolutionising the world of measurement and survey for nearly 200 years, Leica Geosystems creates complete solutions for professionals across the planet. Known for premium products and innovative solution development, professionals in a diverse mix of industries, such as surveying and engineering, safety and security, building and construction, and power and plant, trust Leica Geosystems to capture, analyse and present smart geospatial data. With the highest-quality instruments, sophisticated software and trusted services, Leica Geosystems delivers value every day to those shaping the future of our world.

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Leica CityMapper-2
More information,
smarter decisions



Leica DMC-4
Precision, efficiency,
versatility



Leica CountryMapper
Hybrid sensor for large
area data collection

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