



HARRIER 56/G4

Full Equipment Specifications



Specifications subject to change without notice.
 Errors and omissions excepted.
 Version: 2008/09
 TopoSys GmbH: Precision Is Our Dimension

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Laser Sensor Specifications

Laser-Scanner:	Riegl LMS-Q560
Beam deflection:	Pyramidal polygon mirror
Number of facets:	4
Scan pattern:	Parallel scan lines
Field of view:	± 22.5 degrees to ± 30.0 degrees max. with reduced range (90%)
Angular resolution:	0.001 degrees
Range accuracy:	≤ 20 mm (1σ) ± 20 ppm under test conditions
Laser pulse rate:	Up to 240 000 Hz PRR
Measurement rate:	120 000 Hz (45 deg.) 160 000 Hz (60 deg.)
Scan frequency:	10 Hz to 160 Hz
Maximum range: flat surface, ρ =60%	1 800 m (PRR: 50 kHz) 1 200 m (PRR: 100 kHz) 700 m (PRR: 200 kHz)
Maximum range: flat surface, ρ =20%	1 200 m (PRR: 50 kHz) 1 000 m (PRR: 100 kHz) 700 m (PRR: 200 kHz)
Minimum range:	30 m
Typical Operating flight altitude (AGL):	1 000 m (PRR: 50 kHz) 800 m (PRR: 100 kHz) 450 m (PRR: 240 kHz)
Swath width:	83 % of op. altitude (45 degrees FOV) 115 % of op. altitude (60 degrees FOV)
Beam divergence:	0.5 mrad
Spot diameter	50 cm @ 1 000 m diameter on ground
Laser wavelength:	Near Infrared
Range capture:	Online monitoring: - First or last return Waveform mode: - Unlimited number of returns
Intensity:	16 bit dynamic range for each echo signal
Target separation:	0.6 m (wave form mode) at single pulse
Point accuracy:	19 cm / 7 cm (1σ) horizontal / vertical

@ 800 m AGL without GPS errors; enhancement by different IMU types possible

The below point spacing values show across and along point distance and the resulting points per square meter for a specific flight height with a 45 degree FOV. Examples:

200 m AGL @ 20 m/s
0.16 m / 0.16 m → 36 pts/m ²
@ flight height 200 m and flight speed of 20 m/s, the resulting point distance will be 16 cm across and 16 cm along flight line and the resulting point density will be 36 points per square meter
200 m AGL @ 20 m/s
0.16 m / 0.16 m → 36 pts/m ²
400 m AGL @ 20 m/s
0.23 m / 0.23 m → 18 pts/m ²
600 m AGL @ 50 m/s
0.53 m / 0.53 m → 3.6 pts/m ²
800 m AGL @ 50 m/s
0.81 m / 0.81 m → 1.5 pts/m ²
900 m AGL @ 60 m/s
1.13 m / 1.13 m → 0.8 pts/m ²

Pulse resolution:	0.1 m (wave form mode) pulse width resolution
Eye safety class:	class 1 (eye-safe) 0 m

Digital Optical Brush Broom Scanner Specifications (Option)

Model:	TopoSys
Pixel:	8192 pixel across track
Channels:	Four (R, G, B, NIR) simultaneously
Line rate:	Up to 300 Hz
Field of view:	30 degrees
Image pixel size:	Down to 0.05 m
Imagery scales:	1:500 to 1:10 000
Position accuracy:	Down to 0.07 m
Exposure control:	Fully automatic
Operating altitude:	10 000 ft

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Digital Camera Specifications (Option)

Model:	Applanix DSS or Rollei AIC
Pixel:	22 MP /39 MP
Array size:	Up to 5 428 x 7 228 pixel along x across flight line
Pixel size:	0.0090 / 0.0068 mm
Filter array:	Colour (RGB) or Colour-IR (CIR) or IR only
Lenses:	DSS: 60 mm lens made by Carl Zeiss Rollei: 47 mm lens made by Schneider
Exposure control:	Manual, aperture or shutter priority
Light metering:	Centre weighted average
Shutter:	DSS: Electronically controlled focal plane Rollei: Leaf Shutter in lens
Shutter speed:	125 – 4 000 (DSS) 125 – 1 000 (Rollei)
Aspect ratio:	1:1
Exposure compensation:	± 2 EV in 1/3 steps
Max. Exp. rate:	Down to 2.5 sec.
Calibration:	Radiometrical and geometrical with full report
Operating altitude:	0 – 6 000 m (DSS) 0 – 3 000 m (Rollei)
Image pixel size:	Down to 0.03 m
Imagery scales:	1:250 to 1:10 000
Position accuracy:	Down to 0.03 m
Data logger:	Removable hard disc

Positioning/Orientation System Specifications

Standard POS:	Applanix POSTrack 410
IMU accuracy:	0.008/ 0.008/ 0.015 roll / pitch / heading
IMU accuracy:	0.005 velocity
GPS:	12 channel dual frequency, low noise, 10 Hz
Optional POS:	Applanix POSTrack 510
IMU accuracy:	0.005 / 0.005 / 0.008
Optional POS:	Applanix POSTrack 310 (German IMU)
IMU accuracy:	0.015 / 0.015 / 0.035

Sensor Rack Specifications

Weight:	42 kg, including IMU, laser and digital frame camera
Rack dimensions:	64 x 30 x 48 cm
Vibration isolated case mounts directly on the aircraft floor. Custom specific housing possible.	

Computer Rack Specifications

Weight :	42 kg, including POS/AV, HCC and flight management system, UPS
Rack dimensions:	54 x 50 x 44 cm
Vibration isolated case mounts directly on the aircraft floor. Custom specific housing possible.	

Operational Parameters

Log time:	> 8 h for laser data and image data in parallel
Power:	28 V DC, 20 A max. with camera and flight management system
Temperature:	-0 – +40 °C (operation) -10 – +50 °C (storage)
Humidity:	0 % – 90 % Non-condensing
Laser calibration:	Only bore sight No repetitive calibration
Line scanner calibration:	Only bore sight No repetitive calibration
Camera calibration:	Bore sight and annual recalibration

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Software Description

Software suite for GNSS/Inertial processing and direct geo-referencing, consisting of:

- Importing and data analysis
 - GNSS-Aided inertial solution processing
- Requires Windows XP

Software suite for laser data pre-processing, consisting of:

- Data download, Echo extraction and Full waveform analysis
- Requires Windows XP

Software suite for raw imagery processing of the digital frame camera, consisting of:

- Image development software, photogrammetric tools (DSS)
 - Image viewer
- Requires Windows XP

TopPIT DSM/DTM software suite for:

- Calculation of x-y-z coordinates with transformation into local coordinate system
 - Point cloud classification
 - Full LIDAR data (DSM, DTM) processing
 - Transformation of point clouds into a regular grid applying selectable sorting and filtering schemes
 - Filtering of objects such as houses or trees (automated and manually)
- Requires Linux

TopPIT RGB/CIR software suite for:

- Complete true-ortho imagery processing also for frame cameras (RGB, CIR)
 - Geo-referencing and ortho-rectifications
 - Radiometric corrections
- Requires Linux

TopPIT software tools for:

- Data handling
 - Project organization
 - Data visualization
- Requires Linux

Tracker software suite for:

- Mission planning
 - Pilot mission guidance
 - Mission tracking
- Requires Windows XP

Service Description

Installation: On-site support by experts of TopoSys for sensor installation

Setup: On-site support by experts of TopoSys for software installation and setup and organization of the data processing centre

Training: On-site training by experts of TopoSys for sensor installation, mission planning, sensor operation, troubleshooting, project organization and project handling, data processing

Extended training: On-site training and after-sales support by experts of TopoSys for all aspects of LIDAR and image surveys, projects and applications

Maintenance: Maintenance program for sensor hardware and processing software ensures full operation and accuracy

Support: Support centre for permanent customer support by experts of TopoSys