Leica ADS100
Calibration Certificate

	Sensor Head	Serial Number	Control Unit	Serial Number
This certificate is valid for	***SH100***	***10510***	***CC33***	***33601***
	IMU	Serial Number		
	CUS6	**560760137**		

Inspector

Calibration certificate issued on ***14 Jul 2018*** ***by***

Robert Bosch

Certificate and calibration data ID ***807905_10510_180714-1***
Document Code 807905

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- when it has to be **right**

Leica Geosystems

Components

Component	Device	Type	Serial Number
SH100 # 10510	Lens system	DO65	0071
	Beam Splitter	Standard	2013-0005
	Focal Plate Module (FPM)	FPM	22032013-002
	Inertial Measurement Unit	CUS6 - uIRS	560760137
CC33 # 33553	Positioning system incl. GPS/GLONASS	SPAN	BMAW17380118J

Nominal FPM layout of tested system

Reference line positions

Line	X [mm]	Y [mm] Pixel 1	Y [mm] center of line	Y[mm] Pixel 20064	Usable length [pixels]
GRNF26A	30.0000	-50.1575	0.0000	50.1575	16000
GRNN00A	0.0000	-50.1575	0.0000	50.1575	20012
GRNB19A	-22.0000	-50.1575	0.0000	50.1575	18330

Positions of other lines, relative to reference line

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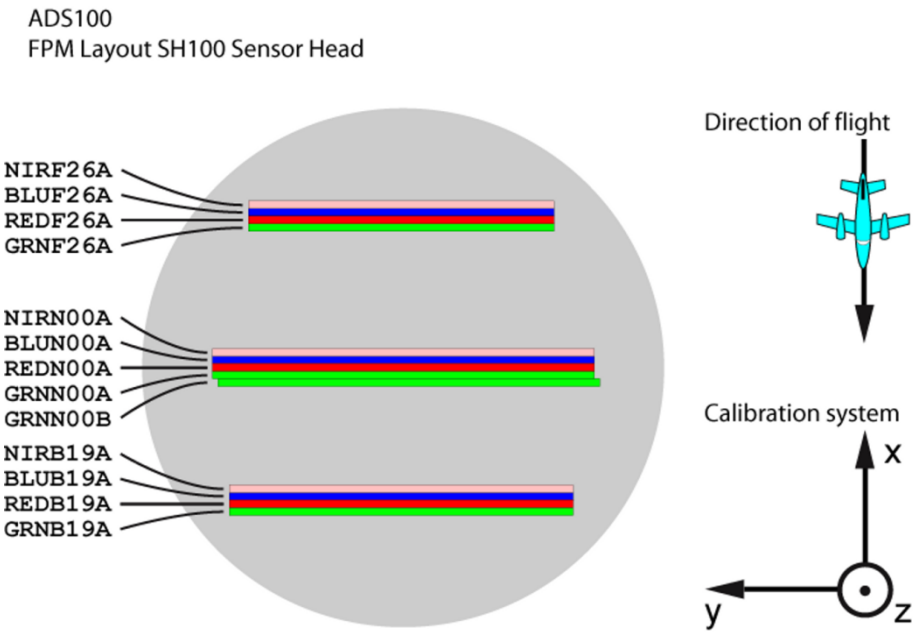
Line	Reference	ΔX [mm]	ΔY [mm]
GRNN00B	GRNN00A	0.0025	0.0025
BLUxxxA	GRNxxxA	0.0000	0.0000
REDxxxA	GRNxxxA	0.0000	0.0025
NIRxxxA	GRNxxxA	0.0000	0.0025

View from top of Sensor Head



Calibration process

Adjustment and calibration of optical systems in optical laboratory

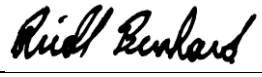
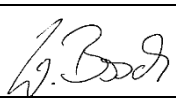
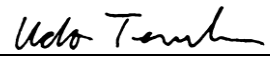
	Passed	Date	Inspector
DSNU (Dark Signal Non Uniformity)	***ok***	***03.07.2018***	**Bernhard Riedl**
PRNU (Photo Response Non Uniformity)	***ok***	***03.07.2018***	**Bernhard Riedl**
Image sharpness	***ok***	***03.07.2018***	**Bernhard Riedl**
Best image plane	***ok***	***03.07.2018***	**Bernhard Riedl**
Relative geometry of staggered and multispectral lines	***ok***	***03.07.2018***	**Udo Tempelmann**

Flight and data processing

	Passed	Date	Inspector
Test flight	***ok***	***08.07.2018***	**Deniz Arslan**
GNSS and IMU data processing	***ok***	***08.07.2018***	**Zoltan Poth**
IMU accelerometer biases	***ok***	***11.07.2018***	**Zoltan Poth**
IMU latency	***ok***	***11.07.2018***	**Zoltan Poth**
Image data processing	***ok***	***11.07.2018***	**Muzaffer Adigüzel**
Geometry of reference lines	***ok***	***14.07.2018***	**Muzaffer Adigüzel**

Inspection

Inspectors

Name	**Bernhard Riedl**	***14.07.2018***	
Position	ADS Production Manager		
Name	**Robert Bosch**	***14.07.2018***	
Position	ADS Support Engineer		
Name	**Udo Tempelmann**	***14.07.2018***	
Position	Manager System Engineering		

Maintenance

Last date of service	
Recommendations	

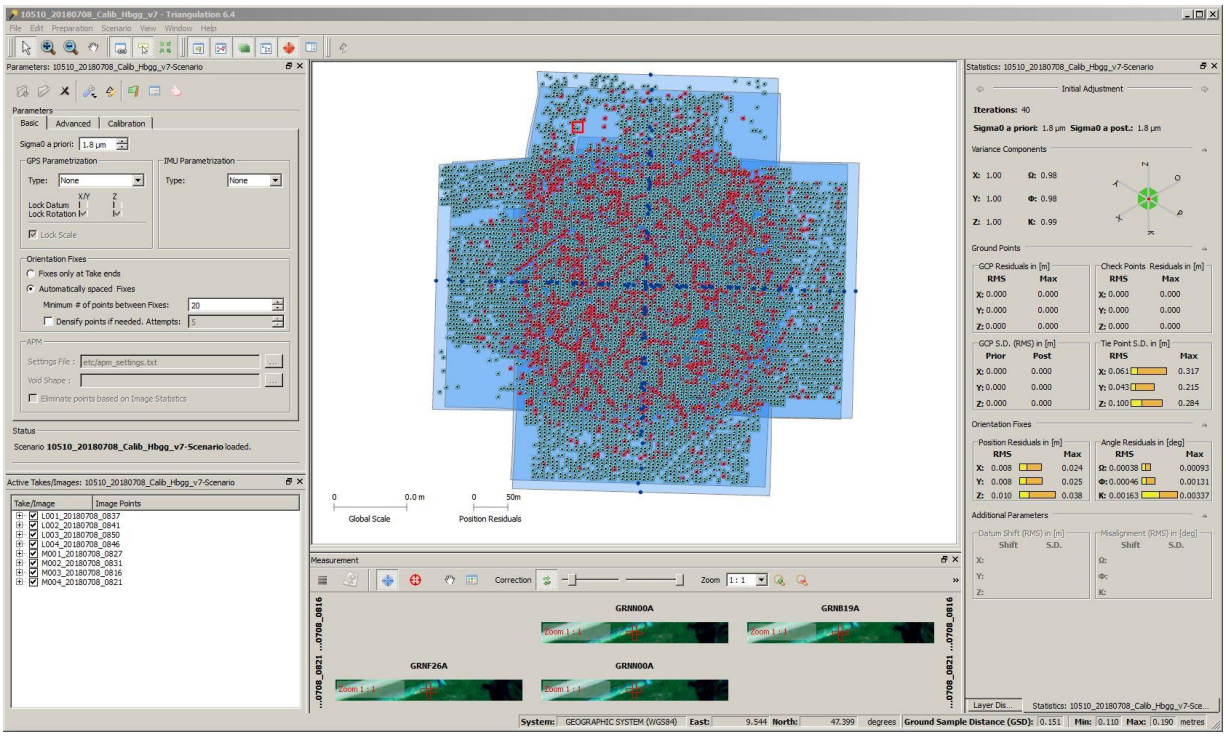
Results of geometrical calibration

Calibrated apparent pixel coordinates for all sensor lines are contained on the calibration file attached to this certificate. File: 10510_180714-1.zip

Stereo lines

A-lines	GRNN00A GRNF26A GRNB19A
Calibration method	Estimation of additional parameters in simultaneous bundle adjustment
Sigma naught of bundle adjustment	1.8 micron
Mean local redundancy	> 0.5
Accuracy of calibrated apparent pixel coordinates	±1.0 micron

Final bundle adjustment result:



IMU misalignment

Misalignment results in [deg]:	ω =	0.112920	± 0.00010
	ϕ =	0.010700	± 0.00011
	κ =	0.012490	± 0.00024

Staggered green and multispectral lines

Staggered green	GRNN00B
Multspectral	BLUN00A REDN00A NIRN00A BLUF26A REDF26A NIRF26A BLUB19A REDB19A NIRB19A
Calibration method	Offsets to GRNN00A GRNF26A GRNB19A by sub-pixel correlation on image pairs of vertical and horizontal bar patterns, taken with defined rotation speed in the goniometer.
Accuracy of offsets to the green reference band:	± 0.1 micron