



somag®
AG JENA



Gyro Stabilization Mounts

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A Team of Specialists for Your Success

SOMAG AG Jena is an innovative, medium-sized and worldwide operating company. SOMAG stands for Sensors, Optics, Mechanics, Application Software and Gadgets. Since 2002, we at SOMAG AG Jena have been developing, manufacturing and selling Gyro Stabilization Mounts for data acquisition, surveillance and other applications. Our stabilization platforms improve the quality and efficiency of aerial imagery and geodata

acquisition processes. SOMAG AG Jena Gyro Mounts set the pace for gyro stabilization devices worldwide – in the air, on the ground and offshore.

In addition to our own devices, we also offer engineering services, like the design of equipment for airborne applications. With long-standing expertise, we develop individual solutions for the specific needs of our customers. In our work we attach utmost importance to highest precision.

Our Advantages

- ▲ Quality made in Germany
- ▲ over 15 years of market experience
- ▲ OEM partner of well-known camera, LiDAR and FMS manufacturers
- ▲ Independent company
- ▲ Customized solutions
- ▲ Fast and reliable support



Gyro Stabilization Makes a Difference

Pitch, roll and yaw angles present a constant challenge for aerial photography, geospatial data acquisition and surveillance. The solution - Gyro Stabilization Mounts, which drastically reduce the movements of airborne sensor systems. Our three axes gimbals compensate arbitrary vehicle movements and vibra-

tions in all three axes. This technology allows a high resolution image quality and more flying time at lower costs. All our devices can be connected with the most popular Inertial Measurement Units (IMUs) and Flight Management Systems (FMS) to complete your flight missions even more efficiently.

Compatible with

- ▲ Multispectral Cameras
- ▲ Hyperspectral Cameras
- ▲ LiDAR Systems
- ▲ Radar Systems
- ▲ Mapping Systems
- ▲ Hybrid Mapping Systems

Movements stabilized by SOMAG Airborne Mounts



Pitch



Roll



Yaw



Vibration

Data Comparison Airborne Camera

Without Stabilization



- ▲ Lack of adjacent overlap could cause missing data
- ▲ Large overlap to avoid missing data costs time and money, which results in an inefficient workflow
- ▲ The acquisition of blurred images causes more post-processing issues
- ▲ Ranging errors for LiDARs because of aircraft pitch movement



With Stabilization



- ▲ Turbulences are stabilized & risk of data gaps is highly reduced
- ▲ Overlap can be highly reduced, which saves time, money and enable an efficient workflow
- ▲ Smearing of images is highly reduced
- ▲ Pitch compensation increases ranging accuracy of LiDARs



Gyro Stabilization Makes a Difference

SOMAG AG Jena develops and manufactures a range of Gyro Stabilization Mounts specifically for marine and land applications to perfectly stabilize sensors in extremely harsh environments. The stabilizers have been designed to be dust-, salt- and splash-water resistant. High-quality materials and a robust design guarantee an effective use of these Mounting Systems. The Gyro Stabi-

lizers compensate roll and pitch motions of boats, ships, Unmanned Surface Vessels (USVs) and buoys caused by the waves. They also stabilize roll and pitch motions of any kind of vehicle caused by uneven terrain, providing a stabilized field of view of the panoramic environment. Like all SOMAG devices, our land and marine series can read in external IMU data.

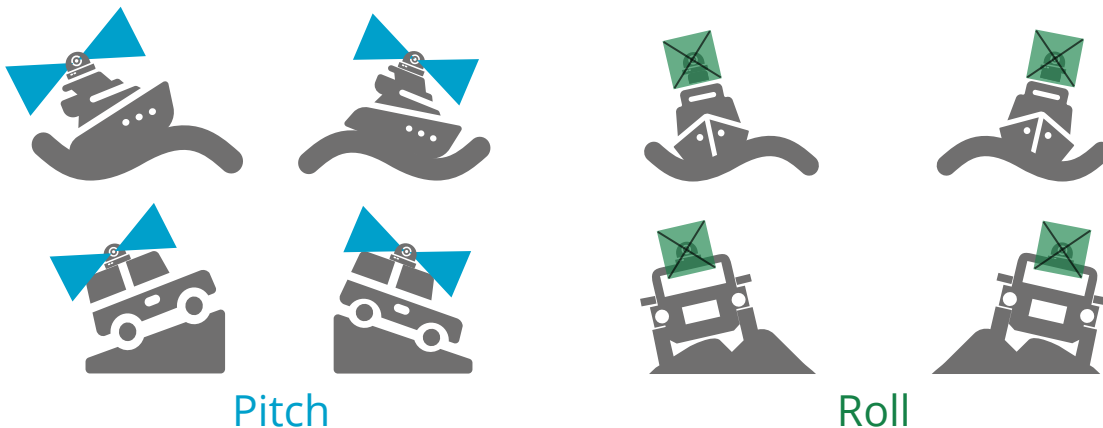
Possible Land Applications

- ▲ Border protection
- ▲ Mobile mapping and scanning
- ▲ Agriculture
- ▲ Mining vehicles
- ▲ Chemical detection

Possible Marine Applications

- ▲ Harbour safety
- ▲ Coastal surveillance
- ▲ Gas and oil rigs security
- ▲ Anti-collision systems on USVs
- ▲ Offshore survey

Movements stabilized by SOMAG Marine & Land Mounts



Data Comparison Marine and Land Camera

Without Stabilization

Unstabilized FOV



- ▲ Images are not aligned to each other because of vessel movements and an unstable **Field of View** could cause data gaps or decreased data quality
- ▲ Acquisition of blurred images causes more post-processing issues
- ▲ Ranging errors for LiDAR's because of vessel pitch movement

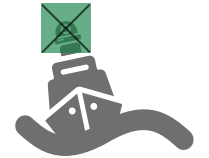
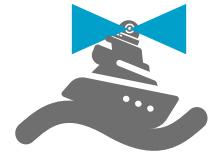


With Stabilization

Stabilized FOV

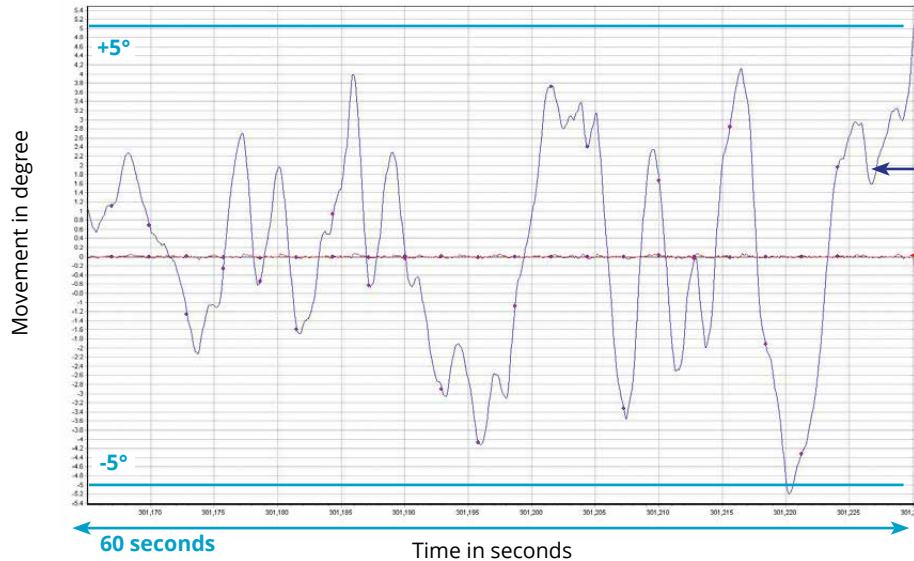


- ▲ Perfectly aligned images
- ▲ High quality data capturing
- ▲ Less data gaps
- ▲ Smearing of images is highly reduced
- ▲ Pitch compensation increases ranging accuracy of LiDAR's



Stabilization Accuracy SOMAG Mounts

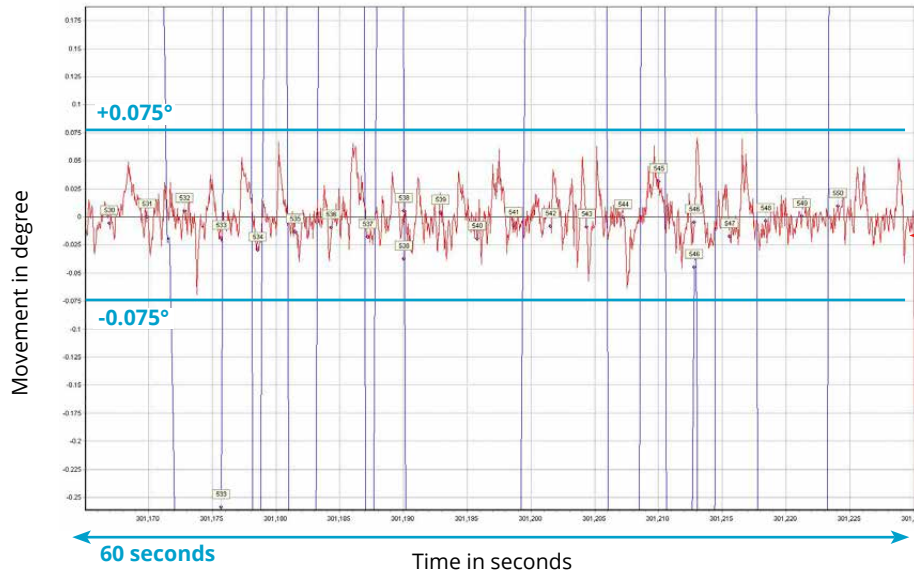
Roll Axis



Mount movement

Payload movement/
residual deviation from
perpendicular
(with IMU support)

Enlargement Roll Axis

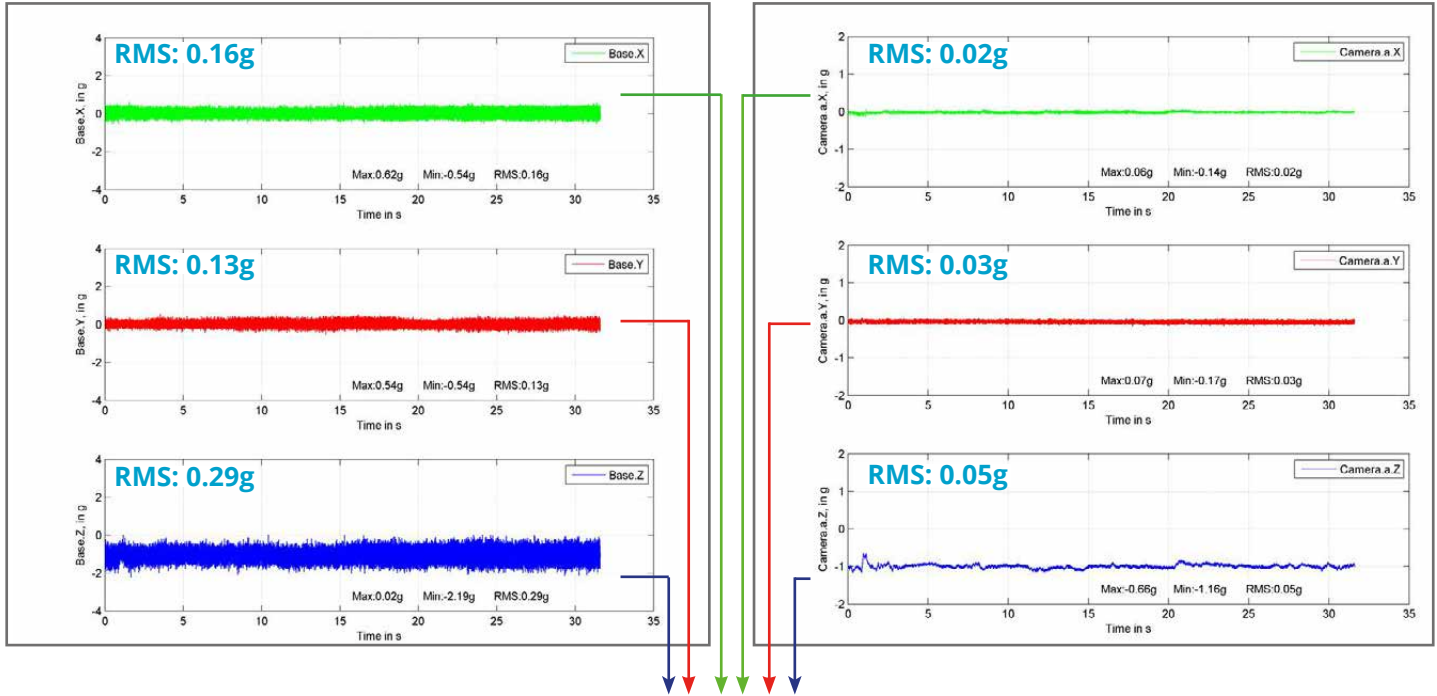


Vibration Reduction

Vibration of Aircraft Floor



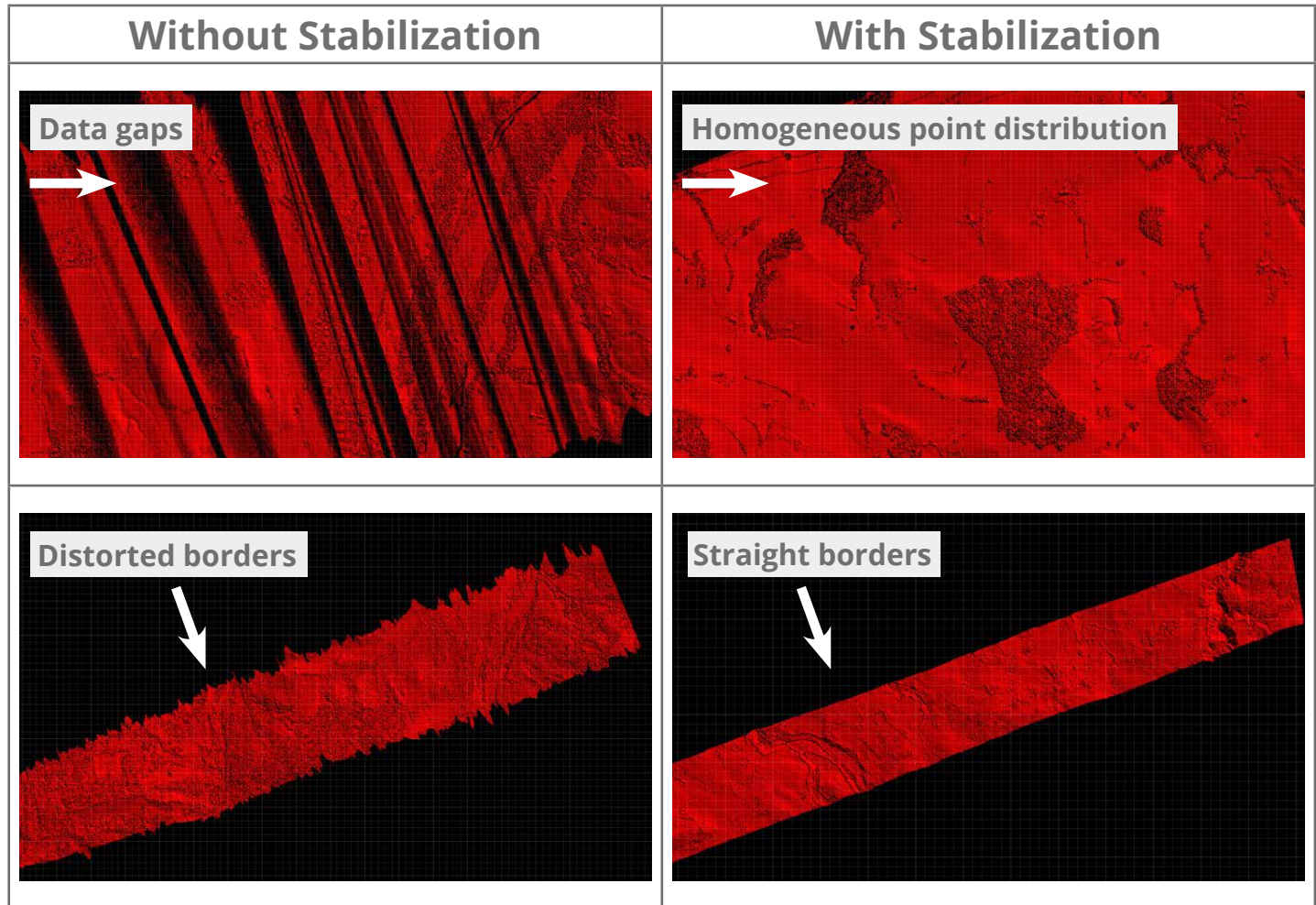
Vibration on Top of Passive Vibration Isolation Ring



Gravity acceleration g in all three space axes

Using a SOMAG AG Jena **PASSIVE VIBRATION ISOLATION RING** **REDUCES** existing **VIBRATIONS** in an aircraft or other vehicles **AROUND 6x** in all three axes.

Airborne LiDAR Data Example



Technical Benefits for LiDAR Systems

- ▲ Compensation of random vehicle motions which ensures an even point density across the entire data set
- ▲ Very homogeneous point distribution for LiDAR systems even at very high scan rates (e. g. 300 kHz)
- ▲ Regularly sampled and aligned data collection
- ▲ Improved collection efficiency (coverage)
- ▲ Predictable LiDAR point distribution (pitch variability in x-axis)
- ▲ Automatic drift setting and initializing
- ▲ Decoupling of high frequency vibrations (>15 Hz) because of Passive Vibration Isolation Ring
- ▲ No pixel mixing under strong vibrations for hyperspectral scanners
- ▲ Output of gimbal data at high data rates
- ▲ Angular motion compensation
- ▲ Remotely controlled operation via FMS
- ▲ Adaptable to sensor weight from 0 to 120 kg
- ▲ SOMAG Mount Control App for easy initial setup and diagnosis

Stabilization is of Key Importance

„The most important criteria in a LiDAR capture project is point density [...].

The big advantage of having the gimbal is that:

Smaller margins are required to fulfill point density requirements, which

REDUCES FLYING TIME AND PROJECT COSTS &

*the **RISK FOR DATA GAPS IS DECREASED SUBSTANTIALLY**, which reduces cost for re-flying.“*

-Dragan Vogel, Swiss Flight Services SA-

Aerial Image Examples

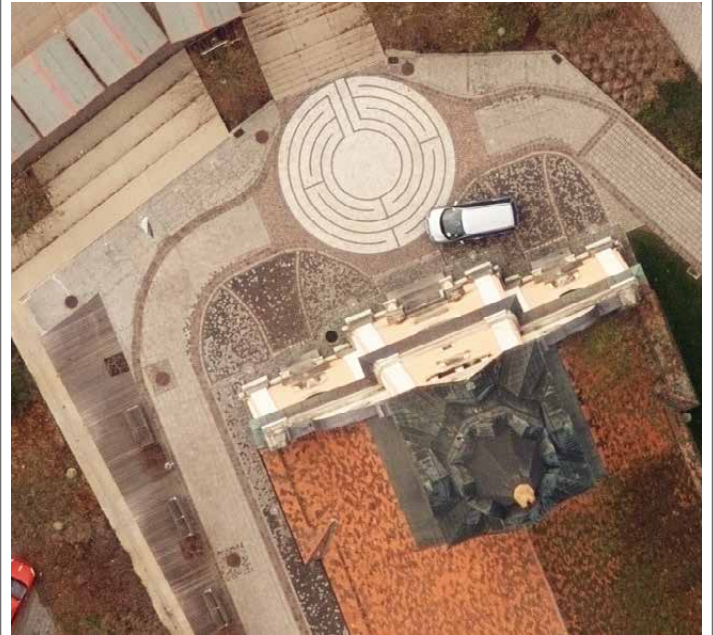
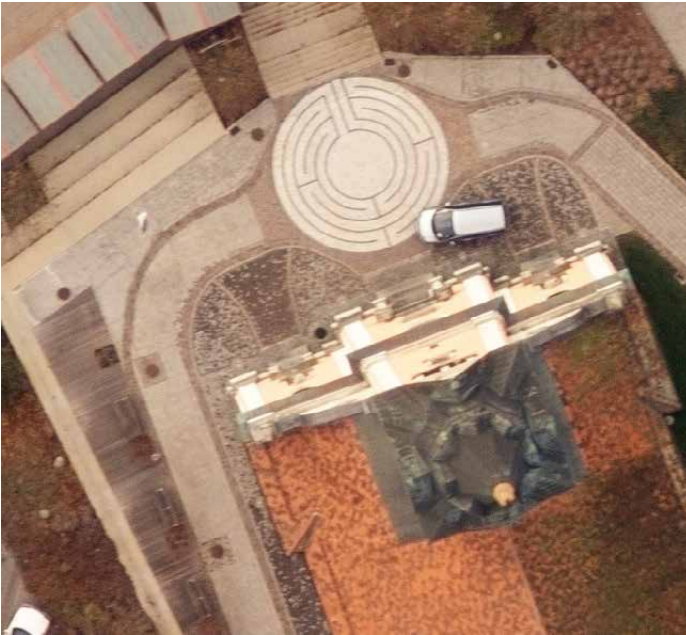
Without Stabilization

Blurred images



With Stabilization

Pin-sharp images



Technical Benefits for Camera Systems

- ▲ Precise camera stabilization guarantees a high quality for orthogonal and oblique images
- ▲ Overlap can be highly reduced for an economical data acquisition process
- ▲ Risk of data gaps is highly minimized
- ▲ Output of gimbal data at high data rates
- ▲ Angular motion compensation prevents image smearing
- ▲ Remotely controlled operation via FMS
- ▲ Adaptable to sensor weight from 0 to 120 kg
- ▲ Automatic and independent operation
- ▲ SOMAG Mount Control App for easy initial setup and diagnosis
- ▲ Automatic drift setting and initializing
- ▲ Compensates not only aircraft movements like roll, pitch and yaw, but also vibrations
- ▲ Decoupling of high frequency vibrations ($> 15\text{Hz}$) because of Passive Vibration Isolation Ring



Gyro Stabilization Mount - GSM 4000

The GSM 4000 is the flagship of the airborne product line and was developed for large format sensors. SOMAG's largest three axes gimbal is extremely powerful with a payload up to 120 kg. The control panel on top of the mount guarantees user-friendly handling. The USB port allows you to connect the device with the SOMAG Mount Control App.

Key Features

- ▲ Hydraulic gimbal system for highest stiffness with unmatched dynamics
- ▲ Lift up function for easy accessibility of the camera lens or the bottom of the sensor
- ▲ Passive Vibration Isolation Ring for decoupling of high frequency oscillations
- ▲ Usable with SOMAG Mount Control App



Field of Application



Vexcel UltraCam's

Application Examples

Riegl LiDAR's















IGI Mapping Systems



Teledyne Optech LiDAR's

Technical Specifications

Angular Stabilization Ranges ¹				
Pitch at 0° Roll				≤±8.8°
Roll at 0° Pitch				≤±7.0°
Yaw (Drift)				≤±25.0°
Residual Angular Rate ¹				≤0.2°/s rms
Residual Deviation ¹ with IMU support ²				≤0.02° rms
without IMU support (with feature ,Performance Boost')				≤0.3° rms
Mass				29 kg
Payload ³				10...120 kg
Usable Diameter				Ø410 mm
Dimensions (Regular Leveling Position)		Length 615 mm	Width 530 mm	Height ⁴ 175 mm
Interface				RS 232 / USB
Operational Voltage				28 VDC (24...30 VDC)
Power Consumption at 28 VDC				50 W rms / Peak 180 W
Recommended Pre-Fuse				15 Amp Fuse
Operating Temperature				-20 °C...+60 °C
Storage Temperature				-55 °C...+85 °C
Gimbal System				Hydraulic Gimbal System
Applied Standards				RTCA DO-160G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery

¹ Vehicle angular motion <10°/s with typical data acquisition profile frequency spectrum

² Residual deviation depends on accuracy of used IMU

³ Minimum payload is based on usage of Passive Vibration Isolation Ring

⁴ Minimum: 149.5 mm / Maximum: 200.5 mm

Dynamic Stabilization Mount - DSM 400

Cost efficient and medium modular stabilization devices gain more importance. For this case we developed the DSM 400, a high class Gyro Mount for medium format cameras and sensors. The Mount comes with a new simplified and redesigned control panel. The panel includes one FMS port and an USB port to connect with our SOMAG Mount Control App.

Key Features

- ▲ Electromechanical gimbal system
- ▲ Gyro Mount for multiple medium format cameras and sensors
- ▲ Passive Vibration Isolation Ring for decoupling of high frequency oscillations
- ▲ Usable with SOMAG Mount Control App



Field of Application



Phase One Aerial Systems

Application Examples

Riegl VUX-1LR















Itres microCASI 1920



NEO VNIR - 1800

Technical Specifications

Angular Stabilization Ranges ¹					
Pitch at 0° Roll				≤±10.5°	
Roll at 0° Pitch				≤±10.5°	
Yaw (Drift)				≤±25.0°	
Residual Angular Rate ¹				≤0.5°/s rms	
Residual Deviation ¹					
with IMU support ²				≤0.08° rms	
without IMU support (with feature ,Performance Boost')				≤0.3° rms	
Mass				14 kg	
Payload ³				5...35 kg	
Usable Diameter				Ø270 mm	
Dimensions (Regular Leveling Position)			Length 460 mm	Width 430 mm	Height ⁴ 165 mm
Interface				RS 232 / USB	
Operational Voltage				28 VDC (24...30 VDC)	
Power Consumption at 28 VDC				30 W rms / Peak 120 W	
Recommended Pre-Fuse				15 Amp Fuse	
Operating Temperature				-15 °C...+55 °C	
Storage Temperature				-40 °C...+85 °C	
Gimbal System			Electromechanical Gimbal System		
Applied Standards			RTCA DO-160G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery		

¹ Vehicle angular motion <10°/s with typical data acquisition profile frequency spectrum

² Residual deviation depends on accuracy of used IMU

³ Minimum payload is based on usage of Passive Vibration Isolation Ring

⁴ Minimum: 131 mm / Maximum: 199 mm

Compact Stabilization Mount - CSM 40

The CSM 40 is part of our new Mount generation, which is extra small and cost efficient. The compact design and highly functional modularity enable a powerful mounting system, which is particularly suitable for ultralight aircraft and drones. Like all SOMAG airborne Mounts, the CSM 40 offers a control panel and can also be connected to the SOMAG Mount Control App.

Key Features

- ▲ Electromechanical gimbal system
- ▲ Gyro Mount with minimum dimensions and weight for single medium format cameras and sensors
- ▲ Optional Passive Vibration Isolation Ring for decoupling of high frequency oscillations
- ▲ Usable with SOMAG Mount Control App



Field of Application



Application Examples

Leica RCD 30



Phase One iXU/iXM series















Specim AisaKESTREL

Hasselblad A6D



Technical Specifications

Angular Stabilization Ranges ¹					
Pitch at 0° Roll				≤±15.0°	
Roll at 0° Pitch				≤±15.0°	
Yaw (Drift)				≤±25.0°	
Residual Angular Rate ¹				≤0.5°/s rms	
Residual Deviation ¹					
with IMU support ²				≤0.08° rms	
without IMU support (with feature ,Performance Boost')				≤0.3° rms	
Mass				5.2 kg	
Payload				0...15 kg	
Usable Diameter				Ø130 mm	
Dimensions (Regular Leveling Position)			Length 290 mm	Width 275 mm	Height ³ 121 mm
Interface				RS 232 / USB	
Operational Voltage				28 VDC (24...30 VDC)	
Power Consumption at 28 VDC				30 W rms / Peak 90 W	
Recommended Pre-Fuse				5 Amp Fuse	
Operating Temperature				-15 °C...+55 °C	
Storage Temperature				-40 °C...+85 °C	
Gimbal System			Electromechanical Gimbal System		
Applied Standards			RTCA DO-160G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery		

¹ Vehicle angular motion <10°/s with typical data acquisition profile frequency spectrum

² Residual deviation depends on accuracy of used IMU

³ Payload installation level: 110 mm / Minimum: 86 mm / Maximum: 134 mm

Ruggedized Stabilization Mount - RSM 400

The heat and cold resistant RSM 400 is specifically designed for marine and land applications to capture perfectly stabilized data in rough environments. The design of the base plate allows the adaptation of a wide range of cameras and scanners, making the device very versatile for various applications.

Key Features

- ▲ Compact and robust Gyro Mount for use in harsh environments
- ▲ IP Class 67: dust-, salt- and splash-water resistant
- ▲ Operation down to -35 °C possible by installation of additional heating elements
- ▲ Usable with SOMAG Mount Control App



Fields of Application















PTZ camera



Thermal camera

Technical Specifications

Angular Stabilization Ranges ¹				
Pitch at 0° Roll			≤±15.5°	
Roll at 0° Pitch			≤±15.5°	
Yaw (Drift)			no drift correction	
Residual Angular Rate ¹			≤0.5°/s rms	
Residual Deviation ¹				
with IMU support ²			≤0.2° rms	
without IMU support (with feature ,Performance Boost')			≤0.5° rms	
Mass			6.6 kg	
Payload			0...15 kg	
Usable Mounting Space			Ø286 mm	
Dimensions (Regular Leveling Position)			Diameter Ø335 mm	Height ³ 156.5 mm
Interface			RS 422 / USB	
Operational Voltage			28 VDC (24...30 VDC)	
Power Consumption at 28 VDC			70 W rms / Peak 130 W	
Recommended Pre-Fuse			7.5 Amp Fuse	
Operating Temperature			-15 °C (optional -35°C)...+55 °C	
Storage Temperature			-40 °C...+85 °C	
Gimbal System			Electromechanical Gimbal System	
Applied Standards			RTCA DO-160G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery	

¹ Vehicle angular motion <10°/s with typical data acquisition profile frequency spectrum

² Residual deviation depends on accuracy of used IMU

³ Minimum: 132.5 mm / Maximum: 180.5 mm

Offshore Stabilization Mount - OSM 4000

SOMAG AG Jena's latest development - the OSM 4000 combines power with versatility. A combination of high-power engines and a hydraulic gimbal system enables the Mount to lift an unprecedented payload up to 160 kilos. The weatherproof design makes this device extremely ruggedized. Even harsh conditions set no limits to its functionality and precise performance.

Key Features

- ▲ Ruggedized Gyro Stabilization Mount for use in harsh environments
- ▲ Usable mounting space of Ø600 mm with sufficient space for a wide range of large sensor systems
- ▲ IP Class 67: dust-, salt- and splash-water resistant
- ▲ Usable with SOMAG Mount Control App















Fields of Application



Application Examples

- ▲ 360° cameras
- ▲ Antennas
- ▲ Hyperspectral cameras
- ▲ Infrared cameras
- ▲ Mobile laser scanners
- ▲ Thermal imaging cameras
- ▲ Video cameras

Technical Specifications

Angular Stabilization Ranges ¹				
Pitch at 0° Roll			≤±10.0°	
Roll at 0° Pitch			≤±13.0°	
Yaw (Drift)			no drift correction	
Residual Angular Rate ¹			≤0.5°/s rms	
Residual Deviation ¹				
with IMU support ²			≤0.2° rms	
without IMU support (with feature ,Performance Boost')			≤0.5° rms	
Mass			39 kg	
Payload			0...160 kg	
Usable Mounting Space			Ø600 mm	
Dimensions (Regular Leveling Position)			Diameter Ø665 mm	Height ³ 236.5 mm
Interface			RS 422 / USB	
Operational Voltage			28 VDC (24...30 VDC)	
Power Consumption ⁴ at 28 VDC			100 W rms / Peak 650 W	
Recommended Pre-Fuse			20 Amp Fuse	
Operating Temperature			-15 °C (optional -35° C)...+55 °C	
Storage Temperature			-55 °C...+85 °C	
Gimbal System			Hydraulic Gimbal System	
Applied Standards			RTCA DO-160G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery	

¹ Vehicle angular motion <10°/s with typical data acquisition profile frequency spectrum

² Residual deviation depends on accuracy of used IMU

³ Minimum: 199 mm / Maximum: 274 mm

⁴ without wind force / average power consumption with wind force (200 Nm) = 225 W

SOMAG Mount Control App

For all Gyro Mounts SOMAG AG Jena provide its own developed [Mount Control App](#) with numerous features. The app allows you to customize your Mount individually to your demands.

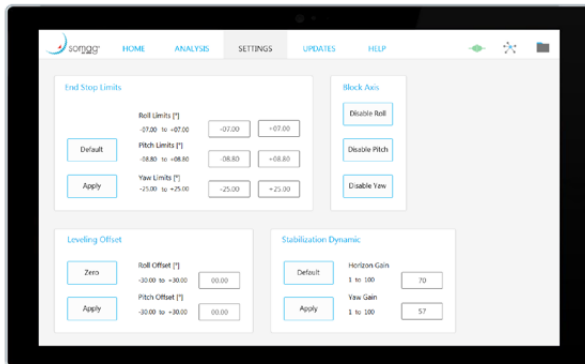
Benefits

- ▲ Quick Mount status overview
- ▲ Manual control of the Mount
- ▲ Unlock special Mount features
- ▲ Real time Mount feedback
- ▲ Self test for quick status analysis
- ▲ Simple firmware update
- ▲ Access to all documents e.g. user manuals
- ▲ Input and reporting functions directly accessible



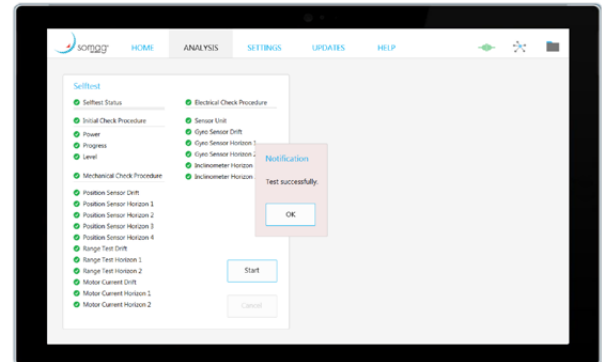
Key Features

Screen View of End Stop Limits



Limits the movement range of the Mount in all three axes to prevent the equipment from crashing against obstacles during operation.

Screen View of Self test



Checks all sensors, mechanics and electronics and stores the results to speed up the support in case of malfunctions.

Customized Solutions

It is highly important for us to process orders on a customer-specific basis. Depending on the project, SOMAG AG Jena will assist your company from concept through development to delivery of the system. The great flexibility of our company ensures that special customer wishes and changes are guaranteed. Our solutions are always durable, easy to handle and contain innovative technologies. SOMAG AG Jena is certified according to DIN EN ISO 9001:2015, which reflects our high quality standard.



Passive Vibration Isolation Rings

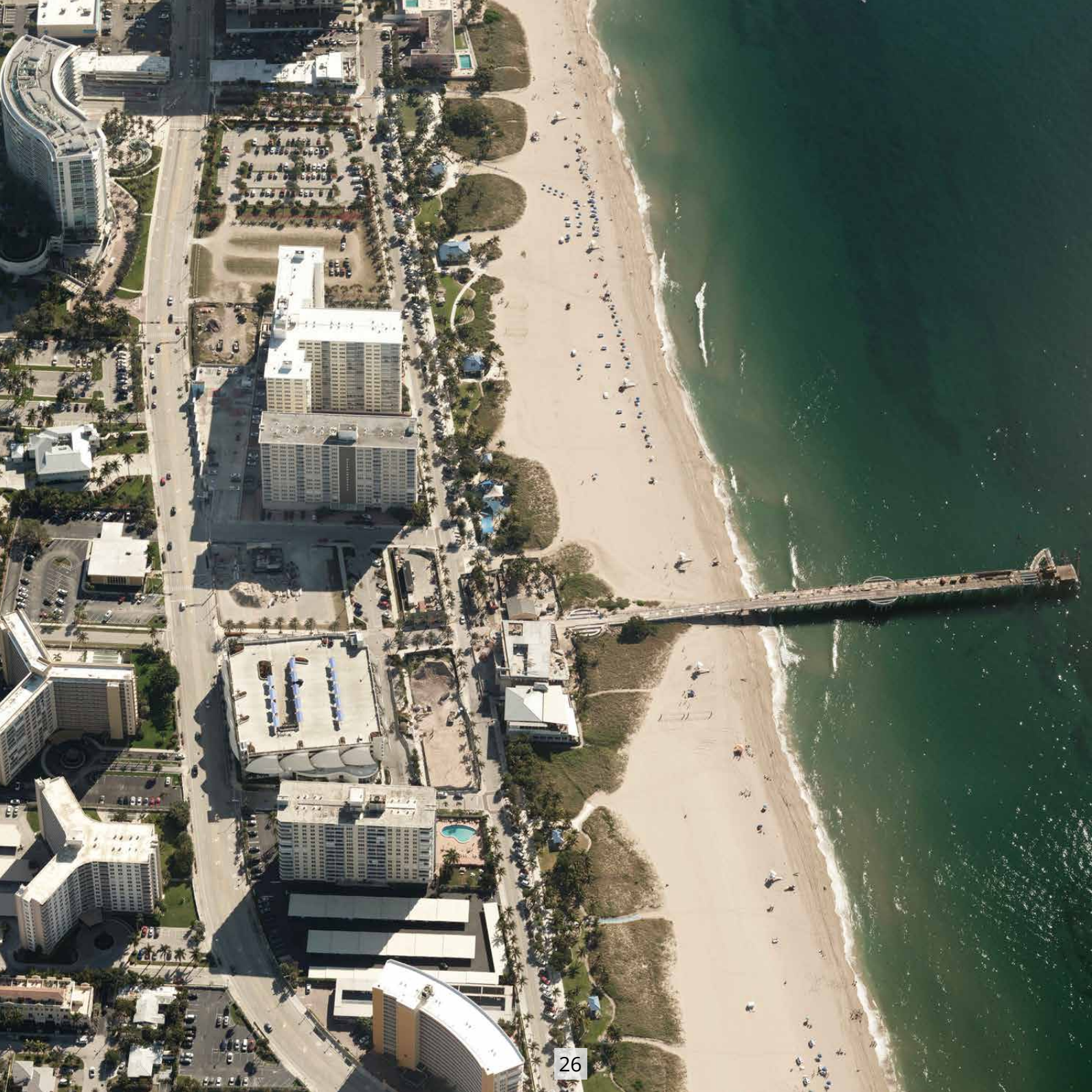
High-frequency vibrations of the aircraft floor can lead to severe damage to the sensitive sensor systems. By using a passive damping system such as the PaVIR, vibrations are drastically reduced, which increases the data quality especially for scanners, LiDAR's and cameras.



Individual Sensor Mounting Systems

Every project is different and so are the system requirements. According to your wishes SOMAG AG Jena offers the possibility to design your very own adapter frame which corresponds 100% to the operating conditions. The design of the Sensor Mounting System can vary between adapter frames for single medium format cameras and larger pods for the integration of several sensors. Together we will find the right solution for your requirements.





Imprint

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Diamond Aircraft Industries GmbH

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Matt Hardy page 20 & 22 bottom middle

The Lazy Artist Gallery front & back cover

Phase One A/S

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Pixabay

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RIEGL LMS GmbH

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Specim, Spectral Imaging Ltd.

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Stellar Vision Inc.

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Teledyne Optech Inc.

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TJ Infotech Pte Ltd

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Vexcel Imaging GmbH

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Victor Hasselblad AB

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