



# GYRO STABILIZATION MOUNTS



MARINE



AIRBORNE



LAND

# CONTENTS



**6** Key Features  
Airborne Mounts

**10** DSM 400  
Dynamic  
Stabilization Mount

**4** How SOMAG  
Airborne Mounts  
work

**8** GSM 4000  
Gyro Stabilization  
Mount

**12** CSM 40  
Compact  
Stabilization Mount



**16** Key Features  
Marine & Land  
Mounts

**20** NSM 400  
Nautical  
Stabilization Mount

**14** How SOMAG  
Marine & Land  
Mounts work

**18** OSM 4000  
Offshore  
Stabilization Mount

**22** RSM 400  
Ruggedized  
Stabilization Mount

**24** Technical Benefits  
of Gyro Mounts for  
LIDAR Systems

**26** Technical Benefits  
of Gyro Mounts for  
Camera Systems

**28** SOMAG  
Mount Control App

**32** SOMAG  
Customization  
Services

**30** Sensor Adapters

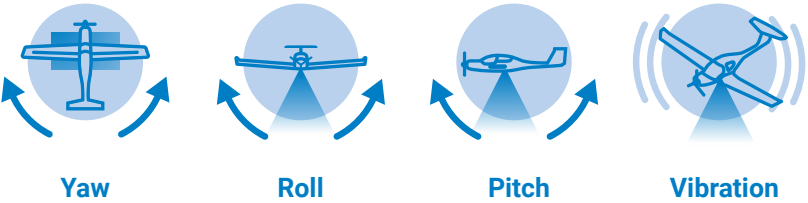
**34** About  
SOMAG AG Jena



# HOW SOMAG AIRBORNE MOUNTS WORK

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 automatically compensate arbitrary vehicle movements and vibrations in all three axes. This technology ensures a high-resolution image quality and more flying time at lower costs. All SOMAG Mounts can be connected with the most popular Inertial Measurement Units (IMUs) and Flight Management Systems (FMS) to complete flight missions even more efficiently.

**Movements stabilized by SOMAG Airborne Mounts:**

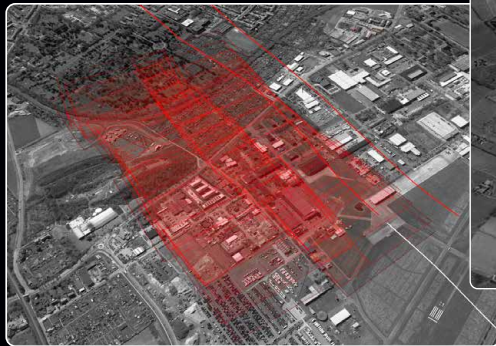


**Compatible with:**

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

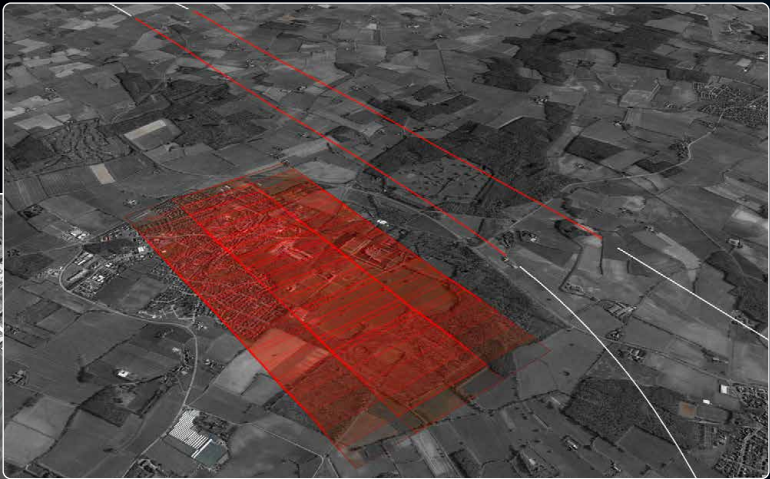
# AIRBORNE

## 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 enables an efficient workflow
- Smearing of images is highly reduced
- Pitch compensation increases ranging accuracy of LiDARs





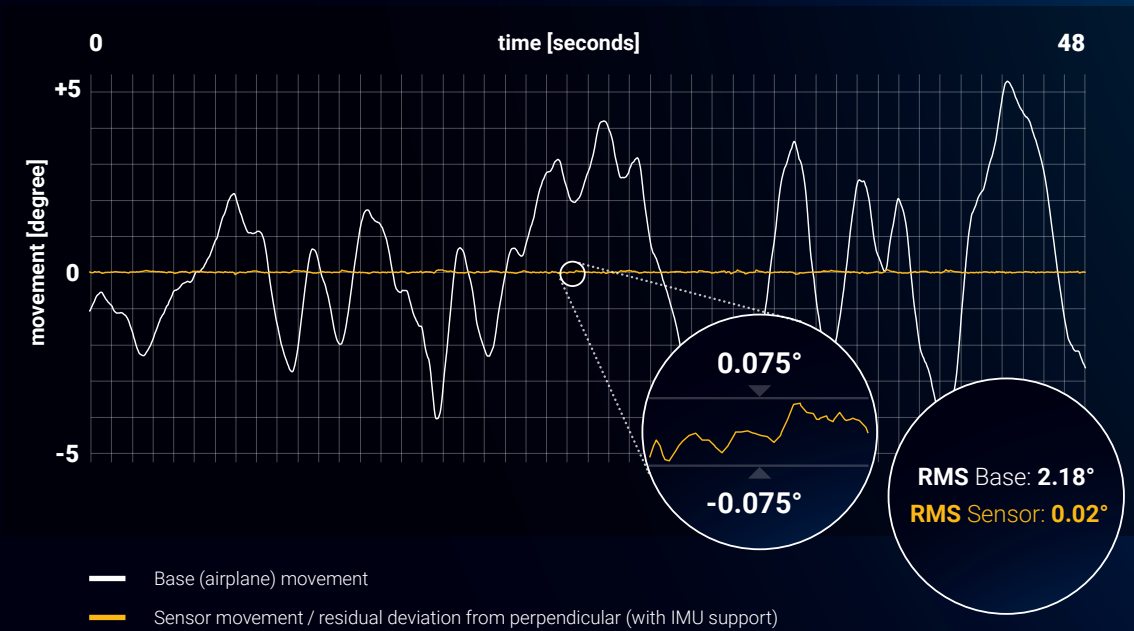
# KEY FEATURES

## AIRBORNE MOUNTS

- High stabilization accuracy: Using a SOMAG Airborne Mount reduces the existing movements at the sensor usually by 50 times<sup>1</sup>
- Highest compatibility on the market with existing airborne sensor systems
- Passive Vibration Isolation Rings for all Airborne Mounts
- User-friendly interface and easy handling
- Minimal weight and dimensions by maintaining maximum performance
- Usable with SOMAG Mount Control App

### STABILIZATION ACCURACY SOMAG MOUNTS (ROLL AXIS)

The use of a SOMAG Airborne Mount reduced the existing movements in this mission data example<sup>2</sup> by ca. 110 times<sup>3</sup> for the sensor system



## APPLICATION EXAMPLES



## TECHNICAL SPECIFICATIONS

		GSM 4000	DSM 400	CSM 40
Angular Stabilization Ranges	Pitch at 0° Roll:	≤±8.8°	≤±10.5°	≤±15.0°
	Roll at 0° Pitch:	≤±7.0°	≤±10.5°	≤±15.0°
	Yaw (drift):	≤±25.0°	≤±25.0°	≤±25.0°
Usable Diameter		Ø410 mm	Ø270 mm	Ø130 mm
		Ø16.1 in	Ø10.6 in	Ø5.1 in
Payload <sup>1</sup>		10...120 kg	5...35 kg	0...15 kg
		22...264.6 lbs	11...77.1 lbs	0...33.1 lbs
Mass		29 kg	14 kg	5.2 kg
		63.9 lbs	30.9 lbs	11.5 lbs
Dimensions (Regular Leveling Positions)	Length:	615 mm   24.2 in	460 mm   18.1 in	290 mm   11.4 in
	Width:	530 mm   20.9 in	430 mm   16.9 in	275 mm   10.8 in
	Average Height <sup>2</sup> :	175 mm   6.9 in	165 mm   6.5 in	121 mm   4.7 in

Preliminary data, subject to change

<sup>1</sup> Minimum payload is based on usage of Passive Vibration Isolation Ring

<sup>2</sup> Minimum/maximum height – see technical specification on product pages

<sup>1</sup> The factor may vary depending on the base excitation and IMU accuracy

<sup>2</sup> Vehicle angular motion <10°/s with typical data acquisition profile frequency spectrum

<sup>3</sup> Ratio RMS base movement to RMS sensor movement



# GSM 4000

## GYRO

## STABILIZATION MOUNT

The GSM 4000 is the flagship of the airborne product line and was developed for large format sensors. SOMAG's largest three-axis gimbal features a hydraulic gimbal system, making the Mount very powerful. The GSM 4000 stabilizes payloads up to 120 kg with a self-weight of only 29 kilos. The control panel on the top of the Mount guarantees a user-friendly handling. Via the USB port, the gimbal can be connected to the SOMAG Mount Control App. In addition, the aux port interface is also available for this Mount now.

The Gyro Stabilization Platform offers a lift-up function for easy access to the camera lens or the bottom of the sensor.

The GSM 4000 is the successor to the world-renowned GSM 3000 and is 100 % downward compatible with current GSM 3000 installations. If you want to exchange your GSM 3000 for a new GSM 4000, SOMAG offers a trade-in at special conditions.

### Field of Application



AIRBORNE

### Application Examples



Vexcel UltraCams



Riegl LiDARs



Teledyne Optech  
LiDARs



IGI Mapping Systems

# GSM 4000

## TECHNICAL SPECIFICATIONS

<b>Angular Stabilization Ranges</b>		Pitch at 0° Roll: $\leq \pm 8.8^\circ$
		Roll at 0° Pitch: $\leq \pm 7.0^\circ$
		Yaw (Drift): $\leq \pm 25.0^\circ$
<b>Residual Angular Rate<sup>1</sup></b>		$\leq \pm 0.2^\circ/\text{s rms}$
<b>Residual Deviation<sup>1</sup></b>		without IMU support: $\leq 0.3^\circ \text{ rms}$
		with IMU support <sup>2</sup> : $\leq 0.02^\circ \text{ rms}$
<b>Payload<sup>3</sup></b>		10...120 kg   22...264.6 lbs
<b>Mass</b>		29 kg   63.9 lbs
<b>Dimensions</b> (Regular Leveling Positions)		Length: 615 mm   24.2 in
		Width: 530 mm   20.9 in
		Height <sup>4</sup> : 175 mm   6.9 in
<b>Usable Diameter</b>		$\varnothing 410 \text{ mm}$   $\varnothing 16.1 \text{ in}$
<b>Operating Temperature</b>		-15 °C ... +55 °C   -5 °F ... +131 °F
<b>Storage Temperature</b>		-55 °C ... +85 °C   -40 °F ... +185 °F
<b>Communication Interfaces</b>		RS 232   USB
<b>Operational Voltage</b>		28 VDC (24...30 VDC)
<b>Average Power Consumption at Operational Voltage</b>		50 W
<b>Peak Power Consumption at Operational Voltage</b>		180 W
<b>Applied Standards</b>		RTCA DO-160-G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery

Preliminary data, subject to change

<sup>1</sup> Vehicle angular motion  $<10^\circ/\text{s}$  and with typical data acquisition profile frequency spectrum

<sup>2</sup> Deviation from perpendicular depends on accuracy of used IMU

<sup>3</sup> Minimum payload is based on usage of Passive Vibration Isolation Ring

<sup>4</sup> Minimum 149.5 mm (5.8 in) | Maximum 200.5 mm (7.9 in)





# DSM 400 DYNAMIC STABILIZATION MOUNT

The DSM 400 is a cost efficient and mid-size modular stabilization device for multiple medium format cameras and sensors. The Mount features an electro-mechanical gimbal system and supports the reduction of the angular rate to provide optimal stabilization of the sensor system. The Mount features a simplified and redesigned control panel. The panel includes one FMS port and an USB port to connect with our SOMAG Mount Control App. The DSM is complemented by a Passive Vibration Isolation Ring to decouple high-frequency vibrations of the aircraft.

### Field of Application



AIRBORNE

### Application Examples



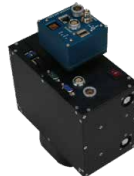
Phase One Aerial Systems



Riegl VUX Series



HySpex VNIR - 1800



Itres microCASI 1920

# DSM 400

## TECHNICAL SPECIFICATIONS

<b>Angular Stabilization Ranges</b>		Pitch at 0° Roll:	≤± 10.5°
		Roll at 0° Pitch:	≤± 10.5°
		Yaw (Drift):	≤± 25.0°
<b>Residual Angular Rate<sup>1</sup></b>			≤± 0.5°/s rms
<b>Residual Deviation<sup>1</sup></b>		without IMU support:	≤0.3° rms
		with IMU support <sup>2</sup> :	≤0.08° rms
<b>Payload<sup>3</sup></b>			5...35 kg   11...77.2 lbs
<b>Mass</b>			14 kg   30.9 lbs
<b>Dimensions</b> (Regular Leveling Positions)		Length:	460 mm   18.1 in
		Width:	430 mm   16.9 in
		Height <sup>4</sup> :	165 mm   6.5 in
<b>Usable diameter</b>			Ø270 mm   Ø10.6 in
<b>Operating Temperature</b>			-15 °C ... +55 °C   -5 °F ... +131 °F
<b>Storage Temperature</b>			-55 °C ... +85 °C   -40 °F ... +185 °F
<b>Communication Interfaces</b>			RS 232   USB
<b>Operational Voltage</b>			28 VDC (24...30 VDC)
<b>Average Power Consumption at Operational Voltage</b>			30 W
<b>Peak Power Consumption at Operational Voltage</b>			120 W
<b>Applied Standards</b>			RTCA DO-160-G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery

Preliminary data, subject to change  
<sup>1</sup> Vehicle angular motion <10°/s and with typical data acquisition profile frequency spectrum  
<sup>2</sup> Deviation from perpendicular depends on accuracy of used IMU  
<sup>3</sup> Minimum payload is based on usage of Passive Vibration Isolation Ring  
<sup>4</sup> Minimum 131 mm (5.1 in) | Maximum 199 mm (7.8 in)



# CSM 40

## COMPACT STABILIZATION MOUNT

The CSM 40 features an electro-mechanical gimbal system and is extra small and cost efficient. The device is characterized by its minimum dimensions and low weight. The compact design and highly functional modularity enable a powerful mounting system, which is particularly suitable for ultralight aircraft and UAVs. The Mount is designed to stabilize single medium format cameras and sensors. Like all SOMAG Airborne Mounts, the CSM 40 offers an easy-to-use control panel and can optionally be ordered with a Passive Vibration Isolation Ring.

### Field of Application



AIRBORNE

### Application Examples



Phase One Cameras



Telops Hyperspectral Camera



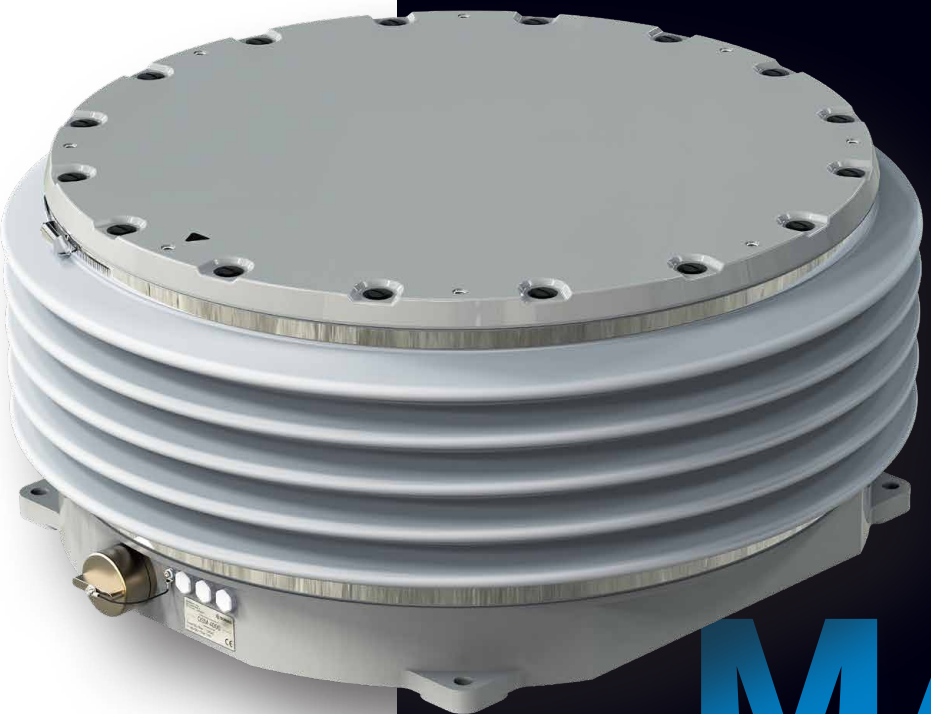
Specim AisaKESTREL

# CSM 40

## TECHNICAL SPECIFICATIONS

<b>Angular Stabilization Ranges</b>		Pitch at 0° Roll:	≤± 15.0°
		Roll at 0° Pitch:	≤± 15.0°
		Yaw (Drift):	≤± 25.0°
<b>Residual Angular Rate<sup>1</sup></b>			≤± 0.5°/s rms
<b>Residual Deviation<sup>1</sup></b>		without IMU support:	≤0.3° rms
		with IMU support <sup>2</sup> :	≤0.08° rms
<b>Payload</b>			0...15 kg   0...33.1 lbs
<b>Mass</b>			5.2 kg   11.5 lbs
<b>Dimensions</b> (Regular Leveling Positions)		Length:	290 mm   11.4 in
		Width:	275 mm   10.8 in
		Height <sup>3</sup> :	121mm   4.8 in
<b>Usable Diameter</b>			Ø130 mm   Ø5.1 in
<b>Operating Temperature</b>			-15 °C ... +55 °C   -5 °F...+131 °F
<b>Storage Temperature</b>			-55 °C ... +85 °C   -40 °F...+185 °F
<b>Communication Interfaces</b>			RS 232   USB
<b>Operational Voltage</b>			28 VDC (24...30 VDC)
<b>Average Power Consumption at Operational Voltage</b>			15 W
<b>Peak Power Consumption at Operational Voltage</b>			60 W
<b>Applied Standards</b>			RTCA DO-160-G, EUROCAE-14G, ISO 7137, 2006/42/EC Machinery

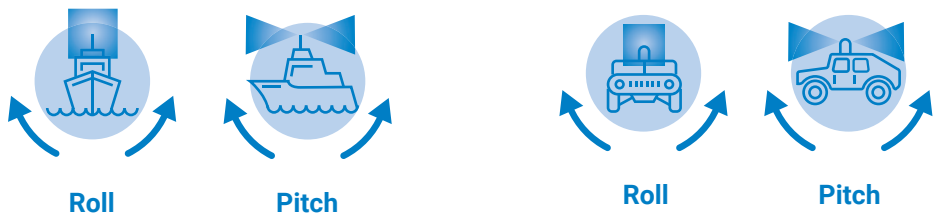
Preliminary data, subject to change  
<sup>1</sup> Vehicle angular motion <10°/s and with typical data acquisition profile frequency spectrum  
<sup>2</sup> Deviation from perpendicular depends on accuracy of used IMU  
<sup>3</sup> Payload installation level: 110 mm | Minimum: 86 mm | Maximum 134 mm



# HOW SOMAG MARINE & LAND MOUNTS WORK

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 stabilizers compensate roll and pitch motions of boats, ships, Unmanned Surface Vessels (USVs) and floating platforms caused by swell. 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.

## Movements stabilized by SOMAG Marine & Land Mounts:



### Possible Marine Application:

- Maritime Patrol and Coastal Surveillance
- Search and Rescue Missions
- Anti-Collision Systems on USVs
- Offshore Data Transmission
- Offshore Survey

### Possible Land Application:

- Border and Force Protection
- Mobile Mapping and Scanning
- Agriculture
- Mining Vehicles
- Chemical Detection

# MARINE & LAND

## DATA COMPARISON MARITIME SURVEILLANCE SYSTEM



### Without Stabilization

- Imaging system follows vessel motion caused by swell
- Unstable Field of View and decreased data quality
- Deterioration of detection, tracking and pointing capabilities of sensor systems

### With Stabilization

- Pin-sharp images
- High quality video recording
- Perfectly stabilized Field of View
- Enhanced situational awareness
- Improved detection and tracking of moving objects even from a distance and in harsh environments





# KEY FEATURES

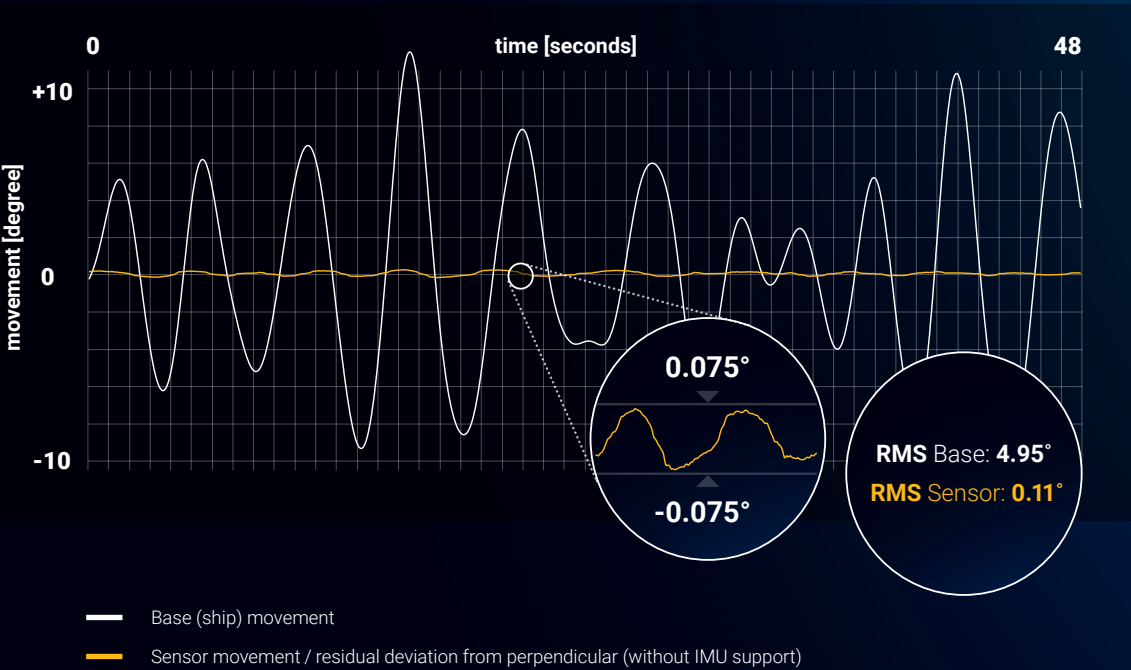
## MARINE AND LAND

## GYRO MOUNTS

- Ruggedized design for use in harsh off-road and offshore environments
- High stabilization accuracy: Using a SOMAG Marine & Land Mount reduces the existing movements at the sensor by ca. 45 times<sup>1</sup>
- IP-67 compliant (dust-, salt- and splash-water resistant)
- innovative round shape enables compatibility with a wide range of payloads
- operation down to -30 °C possible
- Import of external IMU data or NMEA frames possible
- Usable with SOMAG Mount Control App

### STABILIZATION ACCURACY SOMAG MOUNTS (ROLL AXIS)

The use of a SOMAG Marine Mount reduced the existing movements in this mission data example<sup>2</sup> by ca. 45 times<sup>3</sup> for the sensor system

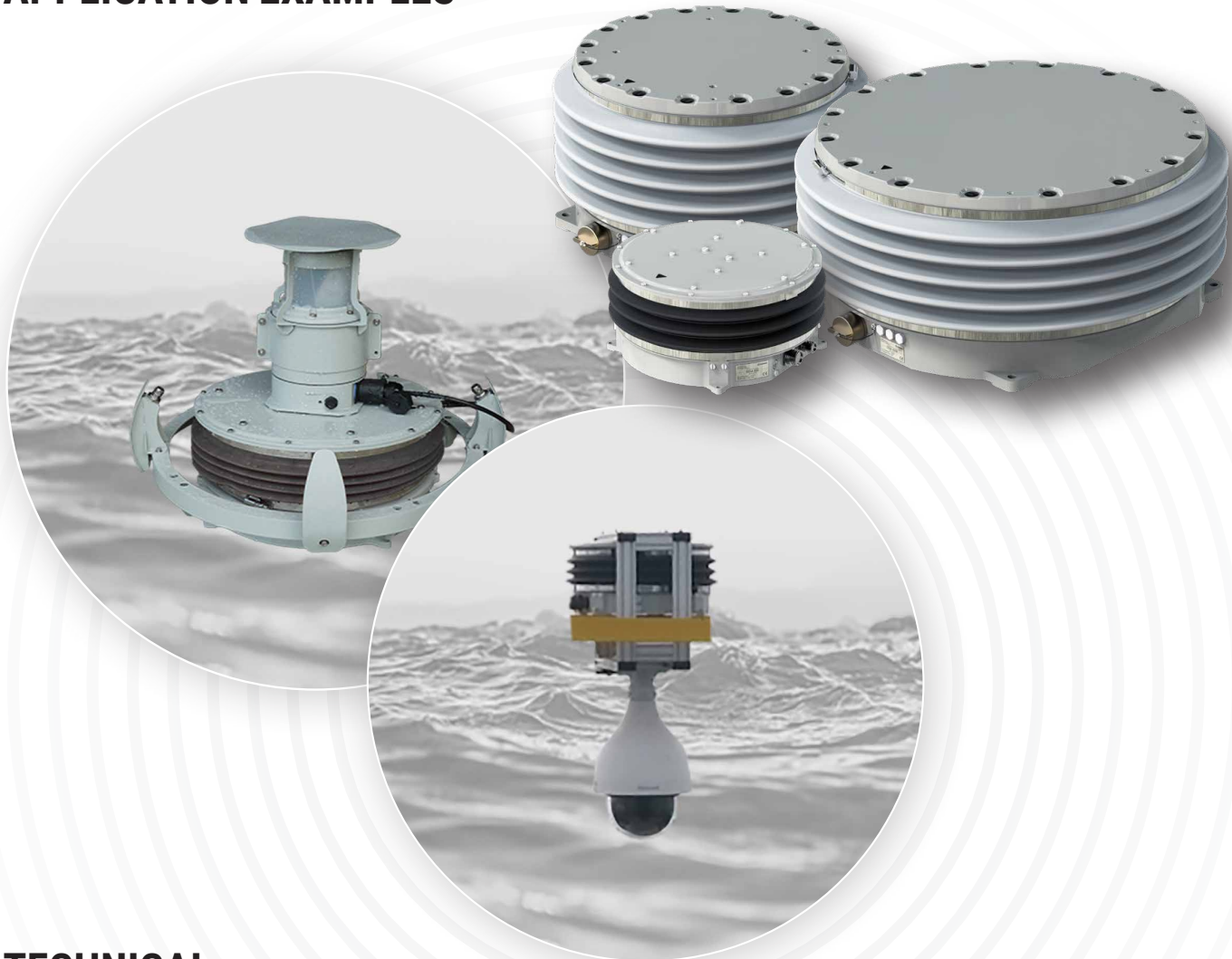


<sup>1</sup> The factor may vary depending on the base excitation and IMU accuracy

<sup>2</sup> Real ship motion data recorded from LNG tanker at sea state 7

<sup>3</sup> Ratio RMS base movement to RMS sensor movement

### APPLICATION EXAMPLES



### TECHNICAL SPECIFICATIONS

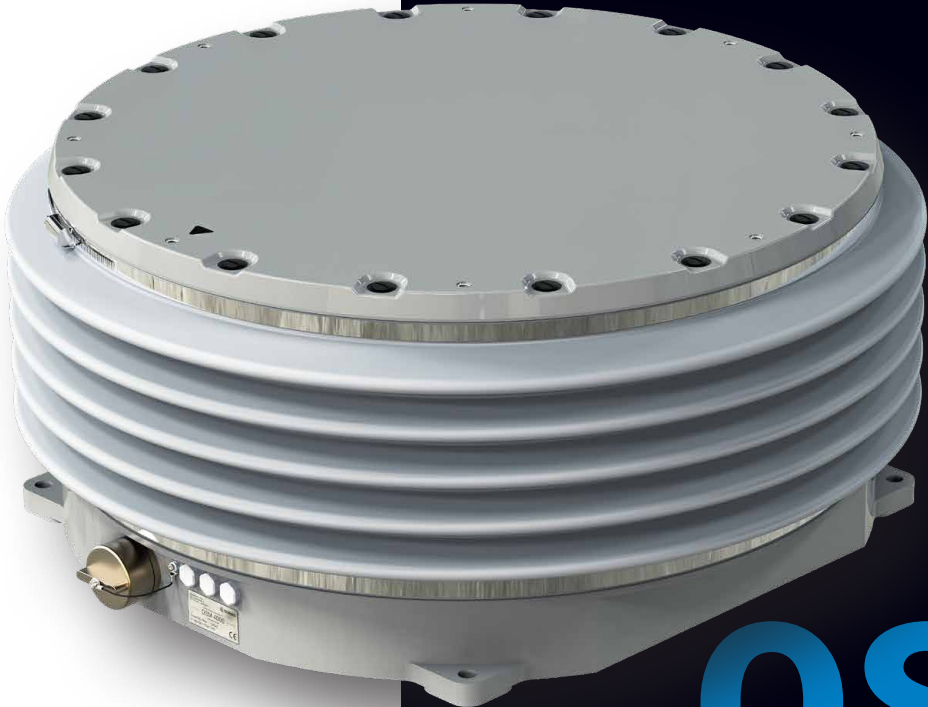
	OSM 4000	NSM 400	RSM 400
<b>Angular Stabilization Ranges</b>	Pitch at 0° Roll: $\leq \pm 12.2^\circ$   $14.1^\circ$ (optional) Roll at 0° Pitch: $\leq \pm 17.4^\circ$   $14.1^\circ$ (optional) Yaw (drift): no drift correction	$\leq \pm 20.0^\circ$ $\leq \pm 20.0^\circ$ no drift correction	$\leq \pm 15.5^\circ$ $\leq \pm 15.5^\circ$ no drift correction
<b>Payload<sup>1</sup></b>	300 kg   250 kg   200 kg 660 lbs   550 lbs   440 lbs	100 kg   70 kg   55 kg 220.5 lbs   154.3 lbs   121.3 lbs	15 kg   12.3 kg   10.5 kg 33.1 lbs   27.1 lbs   23.1 lbs
<b>Optional Payload<sup>2</sup></b>			25 kg   22.5 kg   19 kg 55.1 lbs   49.6 lbs   41.9 lbs
<b>Mass</b>	55 kg   120 lbs	33 kg   72.5 lbs	6.6 kg   14.55 lbs
<b>Dimensions / Height<sup>3</sup></b>	290 mm   11.4 in	290 mm   11.4 in	156.5 mm   6.2 in
<b>Dimensions / Diameter</b>	$\varnothing 665$ mm   $\varnothing 26.1$ in	$\varnothing 486$ mm   $\varnothing 19.1$ in	$\varnothing 335$ mm   $\varnothing 13.1$ in

Preliminary data, subject to change

<sup>1</sup> Possible payload weight depends on lateral acceleration and CoG of payload – see technical specification on product pages

<sup>2</sup> Movement reduction in roll and pitch to  $\leq \pm 12.5^\circ$  / Height: 158 mm (6.2 in)

<sup>3</sup> Minimum/Maximum height – see technical specification on product pages



# OSM 4000 OFFSHORE STABILIZATION MOUNT

The OSM 4000 combines power with versatility. A combination of high-torque engines and a hydraulic gimbal system enables the Mount to lift an unprecedented payload up to 300 kilograms. The weatherproof design makes this device extremely ruggedized for land and marine usage. Even harsh conditions set no limits to its functionality and precise performance. The OSM 4000 offers and usable mounting space of Ø600 mm with sufficient space for a wide range of large sensor systems and antennas. The Mount is equipped with an Ethernet port to integrate it into an existing network.

## Field of Application



MARINE



LAND

## Application Examples



Pan/Tilt Surveillance System



Radar System

# OSM 4000

## TECHNICAL SPECIFICATIONS

<b>Angular Stabilization Ranges</b>		Pitch at 0° Roll: $\leq \pm 12.2^\circ$   $14.1^\circ$ (optional)
		Roll at 0° Pitch: $\leq \pm 17.4^\circ$   $14.1^\circ$ (optional)
		Yaw (Drift): no drift correction
<b>Residual Deviation<sup>1</sup></b>		$\leq 0.4^\circ$ rms
<b>Payload<sup>2</sup></b>		300 kg   250 kg   200 kg 660 lbs   550 lbs   440 lbs
<b>Continuous Torque</b>		225 Nm
<b>Dynamic Peak Torque<sup>3</sup></b>		550 Nm
<b>Mass</b>		55 kg   120 lbs
<b>Dimensions</b>		Height: 290 mm   11.4 in Diameter: Ø665 mm   Ø26.1 in
<b>IP Class</b>		IP 67
<b>Operating Temperature</b>		-30 °C ... +55 °C   -22 °F ... +131 °F
<b>Storage Temperature</b>		-55 °C ... +85 °C   -67 °F ... +185 °F
<b>Communication Interfaces</b>		Ethernet   RS422   RS232
<b>Operational Voltage</b>		48 VDC (44...52 VDC)
<b>Average Power Consumption<sup>4</sup> at Operational Voltage</b>		120 W
<b>Peak Power Consumption<sup>4</sup> at Operational Voltage</b>		950 W
<b>Applied Standards</b>		IACS E10, DNV GL, 2006/42/EC Machinery

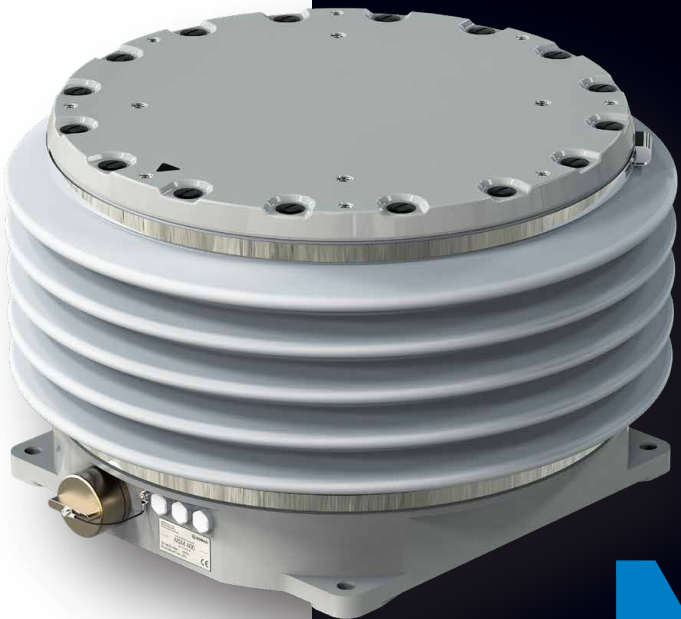
Preliminary data, subject to change

<sup>1</sup> Vehicle motion  $\leq \pm 12^\circ$  /  $12^\circ/\text{s}$  /  $10^\circ/\text{s}^2$  - small periodical lateral accelerations ( $\leq 0.5\text{ g}$ ) acceptable, constant lateral accelerations for more than 1 minute reduce the performance of the Mount (can be compensated by external GPS input)

<sup>2</sup> Possible payload weight depends on lateral acceleration and CoG of payload / shown data is based on  $0.5\text{ g}$  lateral acceleration and a CoG payload offset to the Mount surface of: 370 mm (14.6 in) | 450 mm (17.7 in) | 550 mm (21.7 in)

<sup>3</sup> Maximum duration 90 s at  $55^\circ\text{C}$  surrounding temperature | longer if temperature inside the unit is  $< 55^\circ\text{C}$

<sup>4</sup> Horizontal payload CoG offsets are not considered; without wind force and other possible external forces



# NSM 400 NAUTICAL STABILIZATION MOUNT

The NSM 400 was designed for the stabilization of sensor systems on medium (starting from 1.0 kt onwards) to large maritime vessels and land vehicles. Like all SOMAG Marine and Land Mounts, the NSM 400 is IP 67 compliant and made to perform in very rough weather conditions and ensures high image quality capturing while maneuvering through high waves or driving over bumpy terrain. To achieve this performance, the NSM 400 features a peak torque of 250 Nm. The Mount offers both, a large stabilization range to compensate movements up to  $\pm 20^\circ$  in roll and pitch and an unmatched stabilization accuracy without external IMU data. The Mount is equipped with an Ethernet port to integrate it into an existing network.

### Field of Application



MARINE



LAND

### Application Examples



Antenna System



Pan/Tilt Camera

# NSM 400

## TECHNICAL SPECIFICATIONS

Angular Stabilization Ranges	Pitch at 0° Roll:	$\leq \pm 20.0^\circ$
	Roll at 0° Pitch:	$\leq \pm 20.0^\circ$
	Yaw (Drift):	no drift correction
Residual Deviation <sup>1</sup>	$\leq 0.4^\circ$ rms	
Payload <sup>2</sup>	100 kg   70 kg   55 kg 220.5 lbs   154.3 lbs   121.3 lbs	
Continuous Torque	125 Nm	
Dynamic Peak Torque <sup>3</sup>	250 Nm	
Mass	33 kg   72.5 lbs	
Dimensions	Height:	290 mm   11.4 in
	Diameter:	Ø486 mm   Ø19.1 in
IP Class	IP 67	
Operating Temperature	-30 °C ... +55 °C   -22 °F ... +131 °F	
Storage Temperature	-55 °C ... +85 °C   -67 °F ... +185 °F	
Communication Interfaces	Ethernet   RS422   RS232	
Operational Voltage	28 VDC (24...30 VDC)	
Average Power Consumption <sup>4</sup> at Operational Voltage	90 W	
Peak Power Consumption <sup>4</sup> at Operational Voltage	450 W	
Applied Standards	IACS E10, DNV GL, 2006/42/EC Machinery	

Preliminary data, subject to change

<sup>1</sup> Vehicle motion  $\leq \pm 18^\circ / 15^\circ/s / 40^\circ/s^2$  - small periodical lateral accelerations ( $\leq 0.5$  g) acceptable, constant lateral accelerations for more than 1 minute reduce the performance of the Mount (can be compensated by external GPS input)

<sup>2</sup> Possible payload weight depends on lateral acceleration and CoG of payload | shown data is based on 0.9 g lateral acceleration and a CoG payload offset to the Mount surface of: 250 mm (9.8 in) | 400 mm (15.7 in) | 500 mm (19.7 in)

<sup>3</sup> Maximum duration 90 s at 55 °C surrounding temperature | longer if temperature inside the unit is  $< 55^\circ\text{C}$

<sup>4</sup> Horizontal payload CoG offsets are not considered; without wind force and other possible external forces



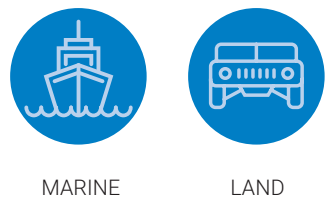


# RSM 400

## RUGGEDIZED STABILIZATION MOUNT

The RSM 400 is the smallest and most cost-effective of SOMAG's marine and land stabilizers. The ruggedized gimbal compensates roll and pitch motions and is specifically designed to stabilize small and light weight sensor systems in off-road and offshore environments to capture high quality data. The Mount is dust-, salt- and splash-water resistant. 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 and even unmanned missions.

### Field of Application



MARINE

LAND

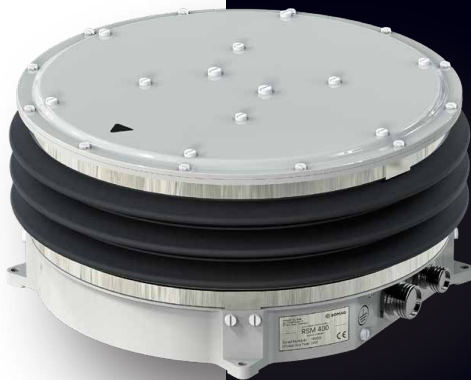
### Application Examples



Antenna System



LiDAR System



# RSM 400

## TECHNICAL SPECIFICATIONS

<b>Angular Stabilization Ranges</b>		Pitch at 0° Roll: $\leq \pm 15.5^\circ$ Roll at 0° Pitch: $\leq \pm 15.5^\circ$ Yaw (Drift): no drift correction
<b>Residual Deviation<sup>1</sup></b>	$\leq 0.4^\circ$ rms	
<b>Payload<sup>2</sup></b>	15 kg   12.3 kg   10.5 kg 33.1 lbs   27.1 lbs   23.1 lbs	
<b>Optional Payload<sup>3</sup></b>	25 kg   22.5 kg   19 kg 55.1 lbs   49.6 lbs   41.9 lbs	
<b>Continuous Torque</b>	8 Nm	
<b>Optional Continuous Torque<sup>3</sup></b>	15 Nm	
<b>Dynamic Peak Torque<sup>4</sup></b>	16 Nm	
<b>Optional Dynamic Peak Torque<sup>3,4</sup></b>	30 Nm	
<b>Mass</b>	6.6 kg   14.5 lbs	
<b>Dimensions</b>	Height <sup>5</sup> :	156.5 mm   6.2 in
	Diameter:	Ø335 mm   Ø13.1 in
<b>IP Class</b>	IP 67	
<b>Operating Temperature</b>	-30 °C ... +55 °C   -22 °F ... +131 °F	
<b>Storage Temperature</b>	-55 °C ... +85 °C   -67 °F ... +185 °F	
<b>Communication Interfaces</b>	USB   RS422   RS232	
<b>Operational Voltage</b>	28 VDC (24...30 VDC)	
<b>Average Power Consumption<sup>6</sup> at Operational Voltage</b>	70 W	
<b>Peak Power Consumption<sup>6</sup> at Operational Voltage</b>	130 W	
<b>Applied Standards</b>	IACS E10, DNV GL, 2006/42/EC Machinery	

Preliminary data, subject to change

<sup>1</sup> Vehicle angular motion  $\leq \pm 10^\circ / 15^\circ/s / 40^\circ/s^2$  - small periodical lateral accelerations ( $\leq 0.2$  g) acceptable, constant lateral accelerations for more than 1 minute reduce the performance of the Mount (can be compensated by external GPS input)

<sup>2</sup> Possible payload weight depends on lateral acceleration and CoG of payload | shown data is based on 0.3 g lateral acceleration and a CoG payload offset to the Mount surface of: 100 mm (3.9 in) | 200 mm (7.9 in) | 250 mm (9.8 in)

<sup>3</sup> Movement reduction in roll and pitch to  $\leq \pm 12.5^\circ$  | Height: 158 mm (6.2 in)

<sup>4</sup> Maximum duration 90 s at 55 °C surrounding temperature | longer if temperature inside the unit is  $< 55^\circ\text{C}$

<sup>5</sup> Minimum 132.5 mm (5.2 in) | Maximum: 180.5 mm (7.1 in)

<sup>6</sup> Horizontal payload CoG offsets are not considered; without wind force and other possible external forces

# TECHNICAL BENEFITS OF AIRBORNE GYRO MOUNTS FOR **LIDAR SYSTEMS**

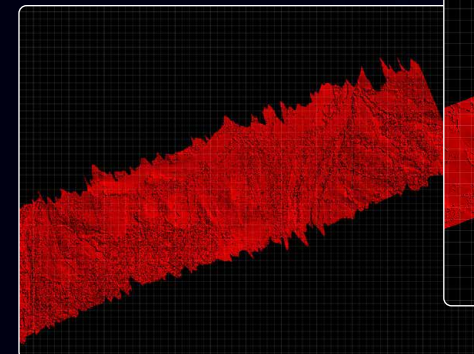
- Compensation of random vehicle motions which ensures an even point density across the entire data set
- Very homogeneous point distribution for LiDAR systems even at very high scan rates (e. g. 300 kHz)
- Regularly sampled and aligned data collection
- Improved collection efficiency (coverage)
- Predictable 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

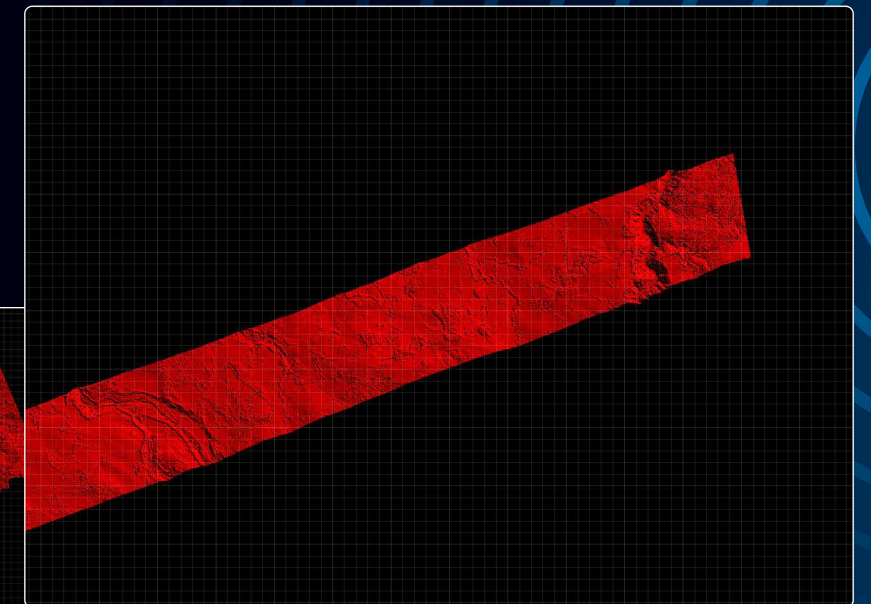
“ The most important criteria in a LiDAR capture project is point density [...]. The big “advantage” of having the gimbal is that: Smaller margins are required to fulfill point density requirements, which **reduces flying time and project costs & the risk for data gaps is decreased substantially**, which reduces cost for re-flying. ”

*Dragan Vogel, Swiss Flight Services SA*

## DATA COMPARISON AERIAL LIDAR



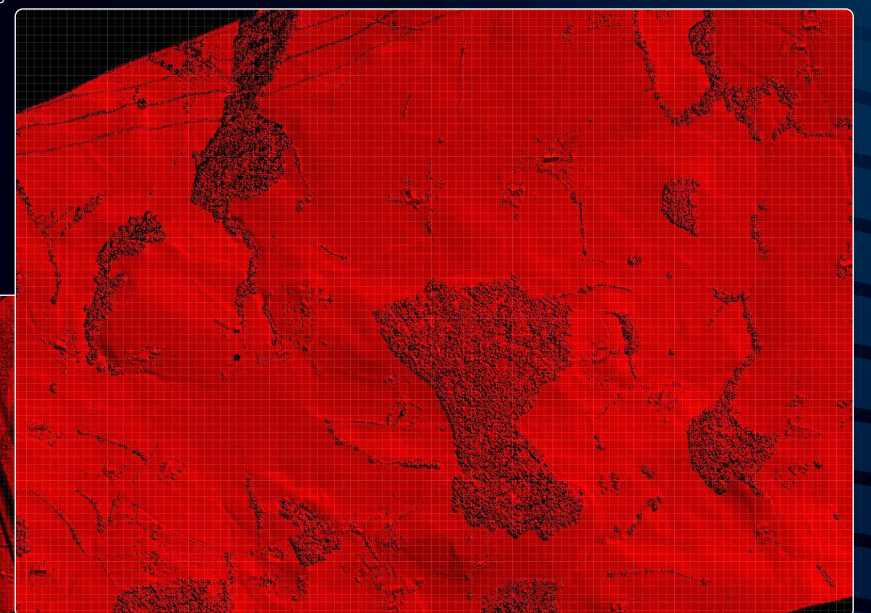
**Without Stabilization** - Distorted borders



**With Stabilization** - Straight borders



**Without Stabilization** - Data gaps

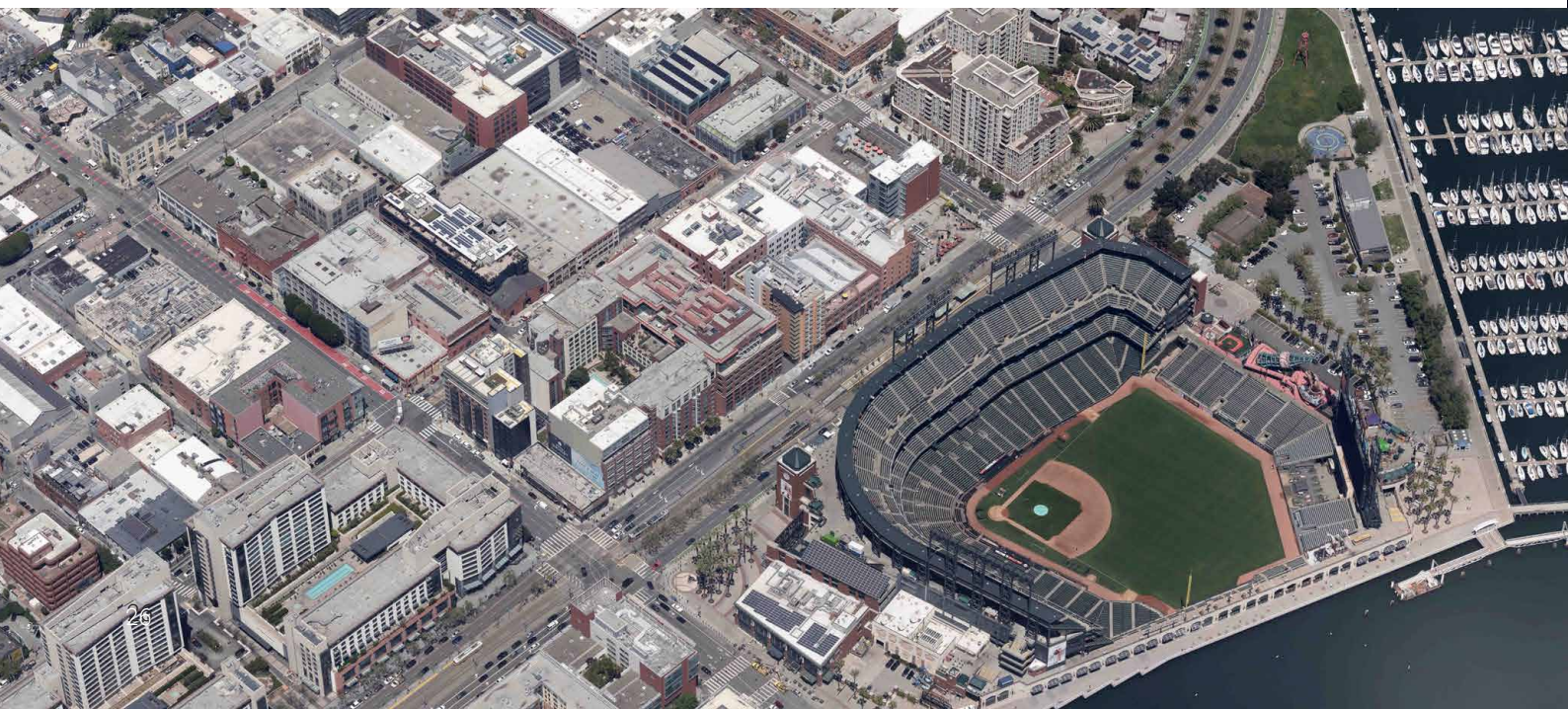


**With Stabilization** - Homogeneous point distribution

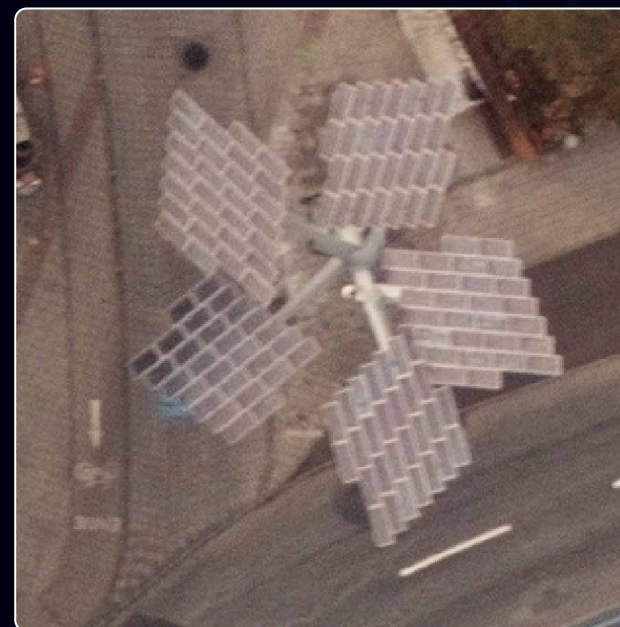


# TECHNICAL BENEFITS OF AIRBORNE GYRO MOUNTS FOR **CAMERA SYSTEMS**

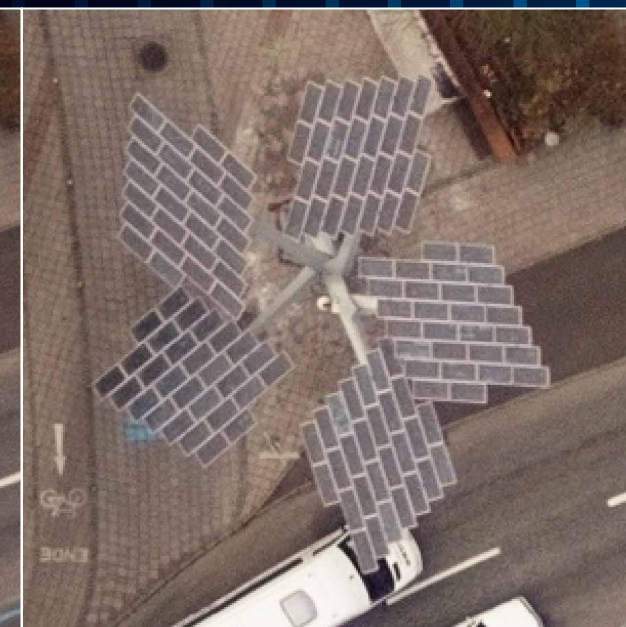
- Precise camera stabilization guarantees a high quality for orthogonal and oblique images
- Overlap can be highly reduced for an economical data acquisition process
- Risk of data gaps is highly minimized
- Output of gimbal data at high data rates
- Angular motion compensation prevents image smearing
- 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 (> 15Hz) because of Passive Vibration Isolation Ring



## DATA COMPARISON AERIAL IMAGERY



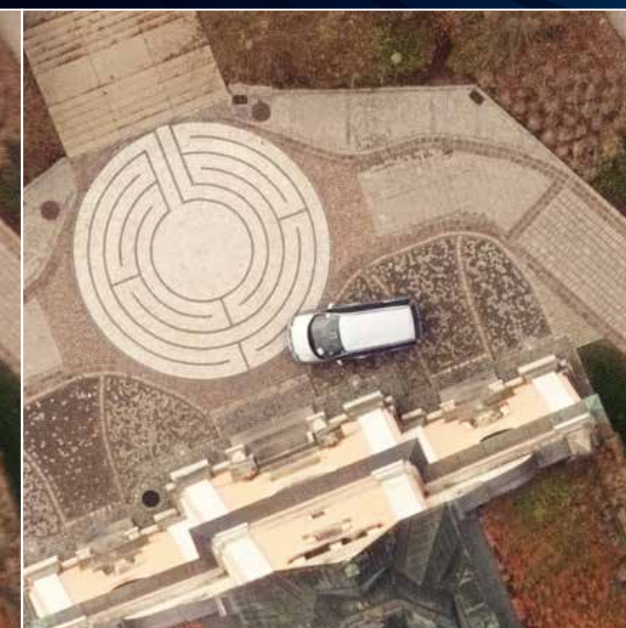
Without Stabilization



With Stabilization



Without Stabilization



With Stabilization

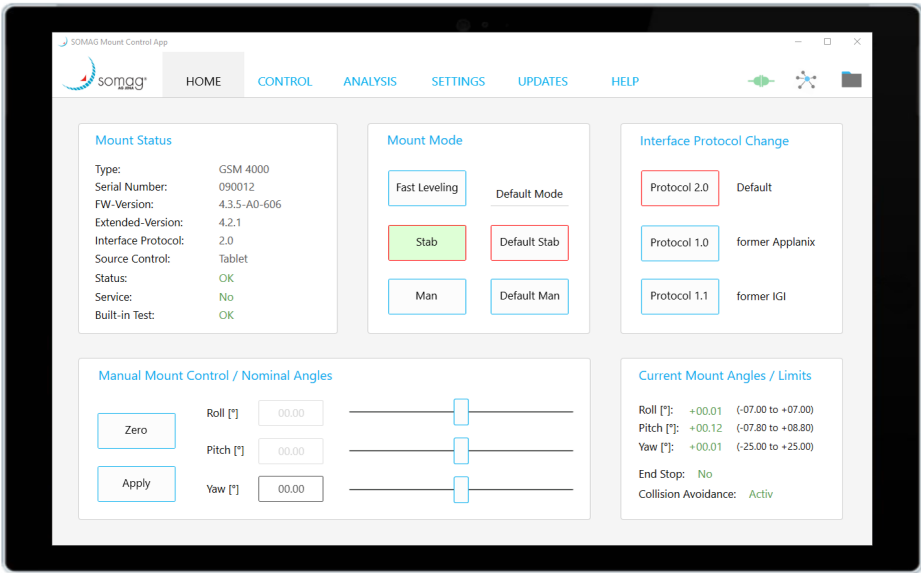




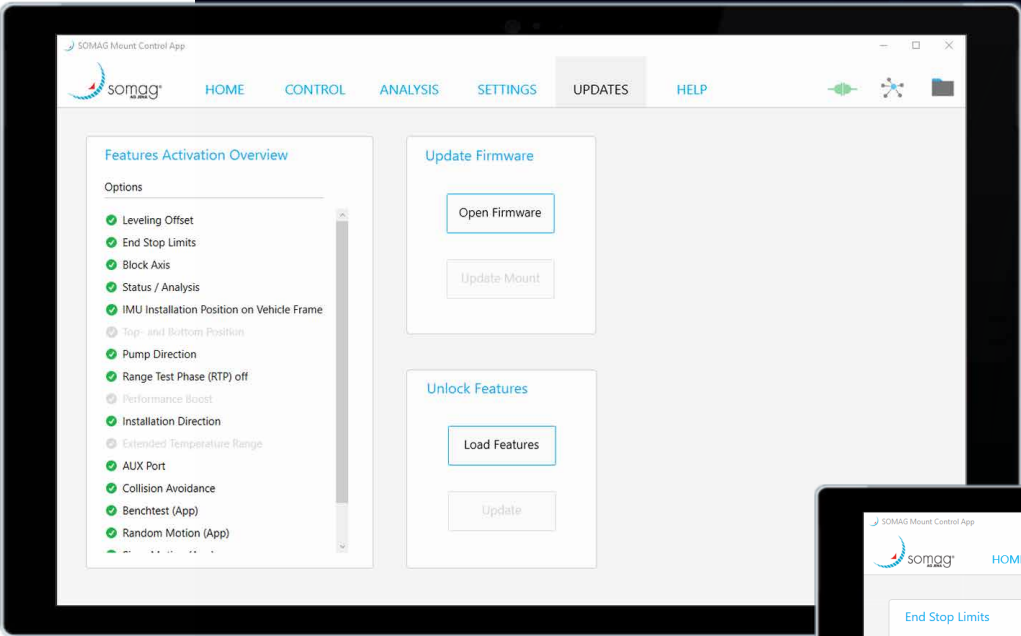
# SOMAG MOUNT CONTROL APP

For all Gyro Mounts SOMAG AG Jena provide its own developed SOMAG Mount Control App with numerous benefits:

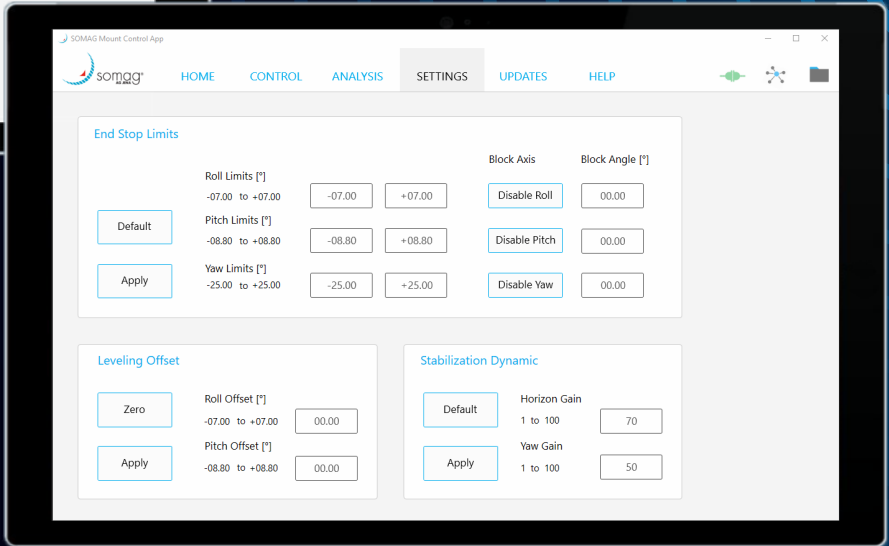
- Quick Mount status overview
- Manual control of the Mount
- Setting of optional Software Features
- Real-time Mount feedback
- Self-test for quick status analysis
- Simple firmware update
- Access to all documents e.g. user manuals
- Input and reporting functions directly accessible



Home view example in SOMAG Mount Control App



Update view with feature activation overview



Software Feature configurations in Settings 1 view

## OPTIONAL SOFTWARE FEATURES

SOMAG offers optional Software Features which allow you to customize your Mount individually to your mission requirements.

**The following features can be ordered optionally:**

- Leveling Offset: adjustment of the Mount virtual horizon
- End Stop Limits: adjustment of the Mount movement range
- Collision Avoidance: adjustment of Mount movement range and working height, in case of narrow installation condition
- Status/Analysis: logging and analyzing functions in SOMAG Mount Control App
- IMU Installation Position on Vehicle Frame: adjustment of horizontal IMU position
- Installation Direction: adjustment of Mount horizontal installation direction
- AUX port: enables communication to 3rd party interface

# SENSOR ADAPTERS

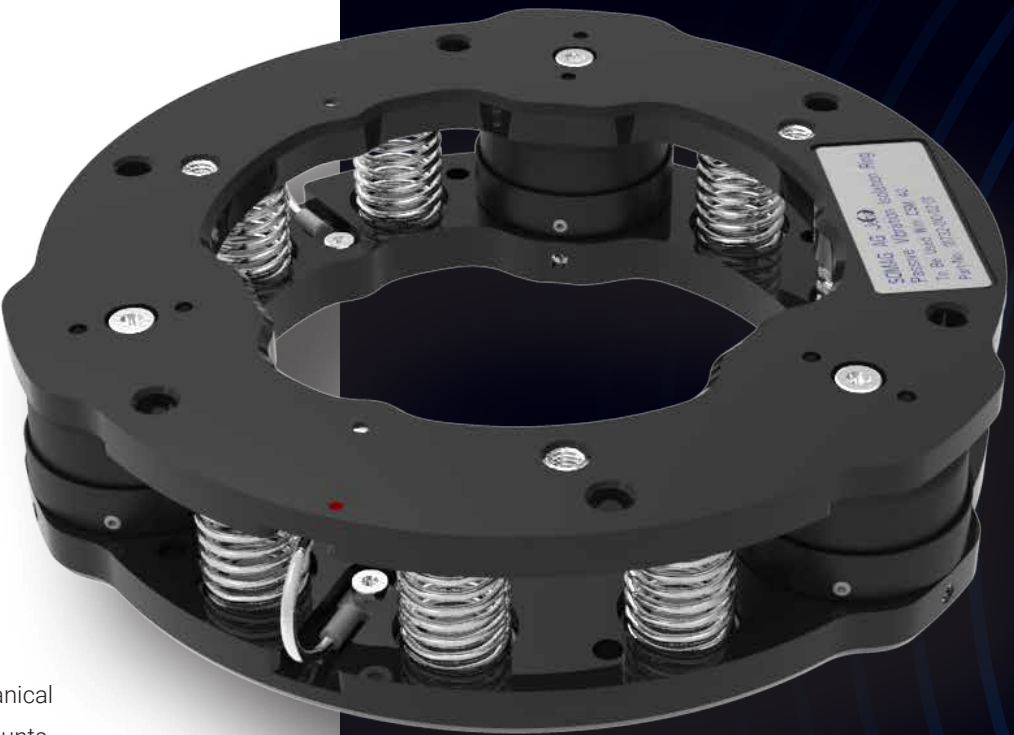
Every project is different and so are the system requirements. We support you in the mechanical integration of your cameras, scanners and other payloads with our Gyro Stabilization Mounts. Upon request, our highly experienced engineers will design an adapter frame tailored to your individual needs that will 100 % meet the application 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 multiple sensors. Together we will find the right solution for your requirements. Please contact us for more information and an individual consultation.



Adapter for multiple cameras mounted in oblique view



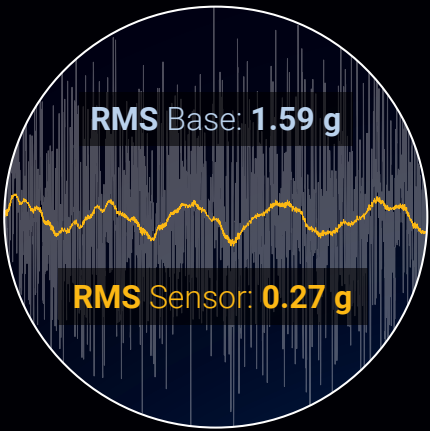
Airborne mapping system adapter



# VIBRATION ISOLATION SYSTEMS

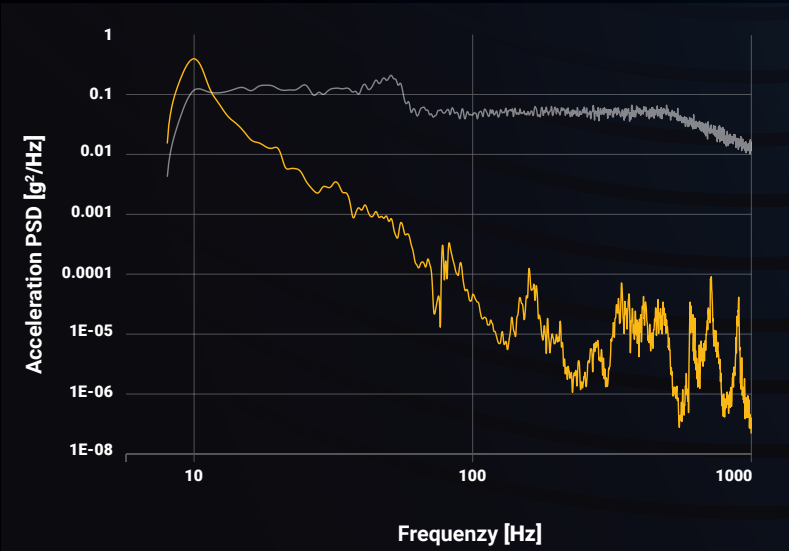
High-frequency vibrations of the aircraft floor can lead to severe damage to the sensitive sensor systems. By using a SOMAG Passive Vibration Isolation Ring (PaVIR), vibrations are drastically reduced which increases the data quality especially for scanners, LiDAR's and cameras. For the GSM 4000 and DSM 400, the PaVIR is part of the standard scope of delivery and adjusted accordingly to the weight of the payload. For the CSM, the ring can be ordered optionally. The rings are also available individually.

Using a SOMAG AG Jena **Passive Vibration Isolation Ring** reduces existing **vibrations** in an aircraft or other vehicles around **6 times** in all three axes.



Acceleration data recorded during a flight mission

— Base (airplane) movement  
— Sensor



Power Spectral Density analysis of the recorded data

— Base (airplane) movement  
— Sensor

# SOMAG CUSTOMIZATION SERVICES

It is highly important for us to process orders on a customer-specific basis. Depending on the project, SOMAG will assist your company from concept through development to delivery of the whole 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 offers different customization services including Custom-Made Mounts and OEM Branding Services.



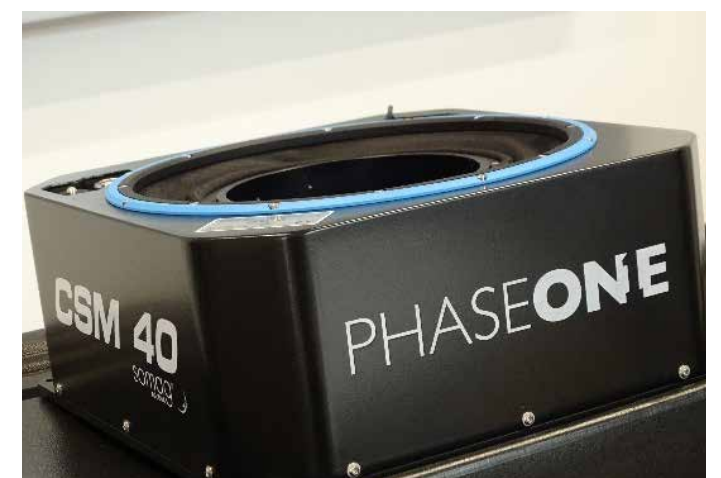
## CUSTOM MADE MOUNTS

Our standard product portfolio does not reflect what you are looking for? Do you need a Mount that meets specific requirements? Then we are exactly the right partner for you! The design and manufacturing of Gyro Stabilization Mounts is our core business and therefore we can draw on many years of expertise when it comes to providing customized solutions. In the past years we have designed numerous Mounts in various configurations for our customers who approached us with special requests. A current example is the GSM 4000 Open Skies, which we manufactured on behalf of the German Federal Armed Forces. This Mount meets the special requirements of the aviation industry. We at SOMAG see each custom-made Mount as an engineering challenge that we gladly accept, as it contributes to our professional growth. Please get in touch with our experts about your project.



## OEM BRANDING

SOMAG AG Jena has been working as an Original Equipment Manufacturer for numerous well-known camera, scanner and FMS manufacturers for several years. As an OEM partner, we offer our partner companies an individual product design. In this service we attach great importance to your company, your wishes and of course your end customers. When designing individual Gyro Stabilization Mounts, SOMAG follows your corporate design. Color design, logo and company name play a central role. These features make your brand unmistakable and directly trigger an association with your company among your customers, which has an immediate impact on their purchase decision. Benefit from the SOMAG OEM Branding Service and increase your brand awareness with unique Gyro Mounts matching your visual system.





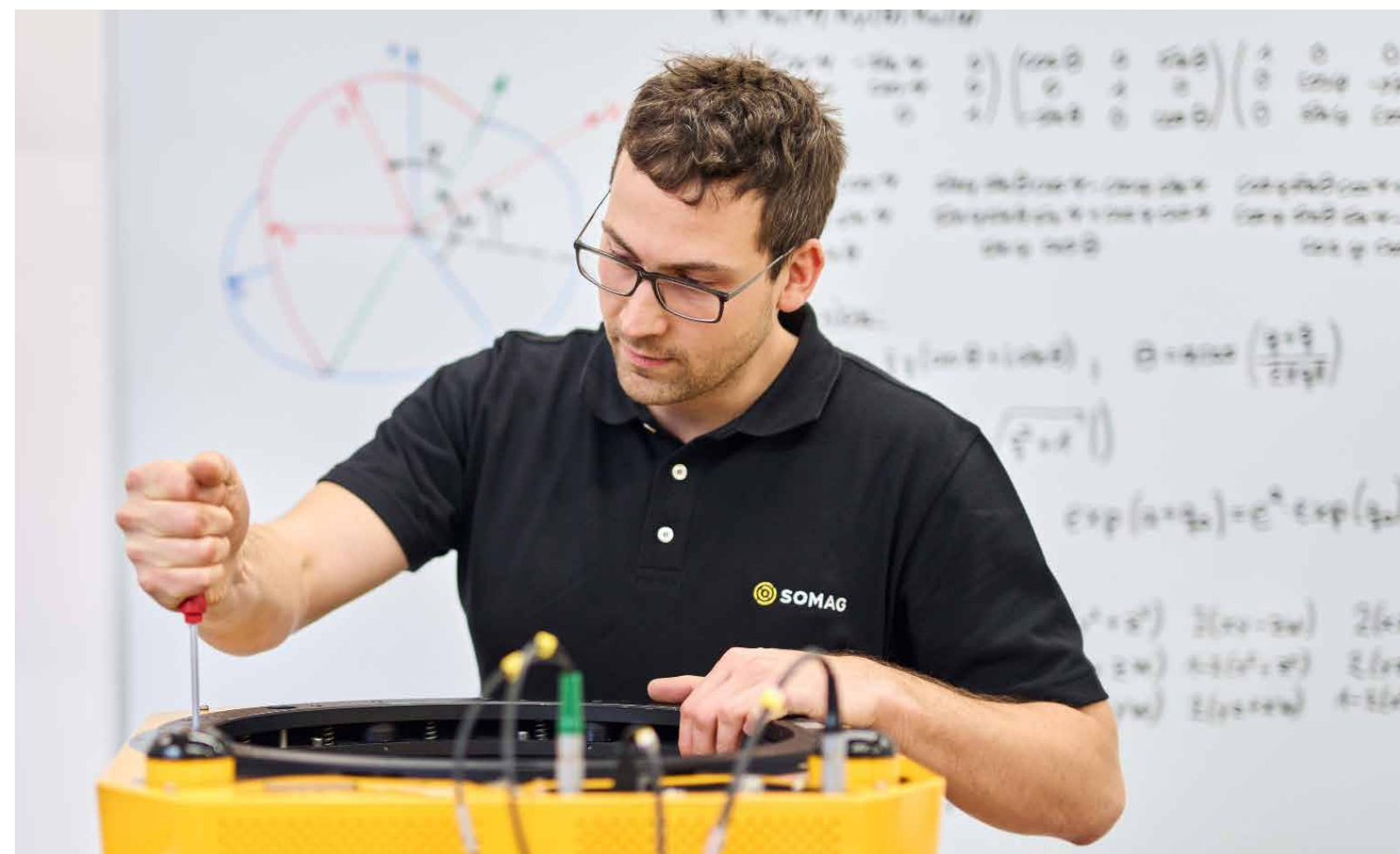
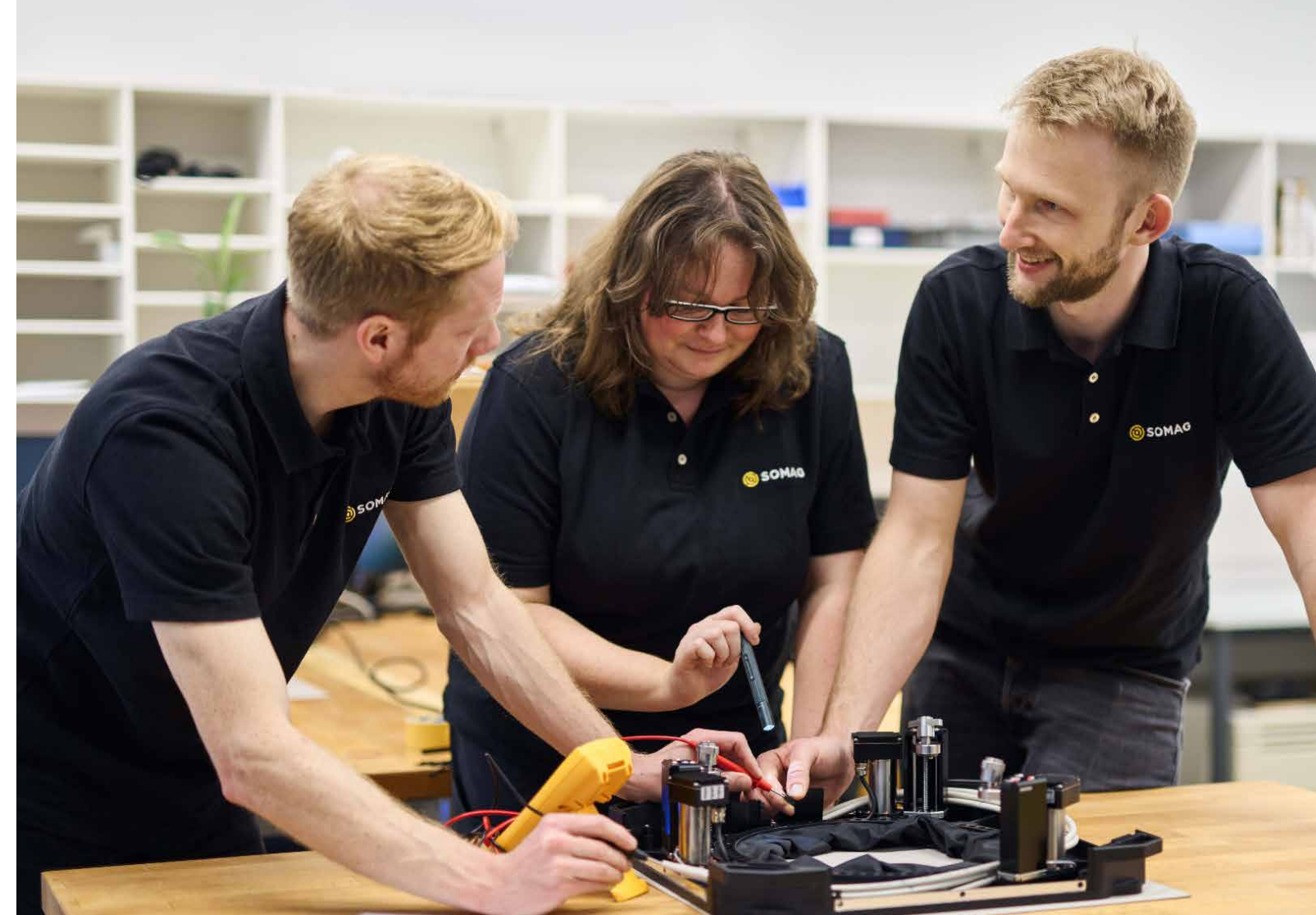


## ABOUT SOMAG AG JENA

SOMAG AG Jena is a worldwide operating specialist for high-precision gimbal systems. The company, consisting of hand-picked experts in the fields of electronics, mechanics and software, focuses since 2004 on the development of Gyro Stabilization Mounts for data acquisition and surveillance applications. SOMAG is an ISO 9001 certified company and maintains a strict quality control system. All products are assembled and tested with highest precision at the headquarters in Jena, Germany and at independent test facilities.

The gimbal specialist works as an OEM partner of well-known camera and lidar manufacturers but has always maintained its status as an independent supplier in the market. SOMAG clients include commercial, governmental and defense organizations as well as research institutions.

The uniqueness of their customer projects and the multitude of different applications drives the SOMAG team to provide customized solutions and to improve performance with each newly developed device. This is why SOMAG Mounts set the pace for gyro stabilization devices worldwide.






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