

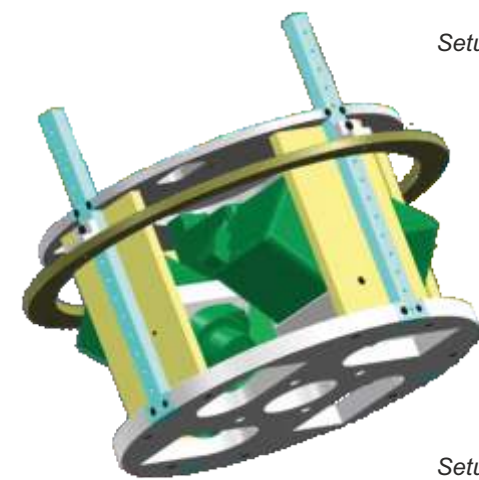
OIS - Oblique Imaging System

GGs has already integrated Phase One technology into an oblique imaging system with customers successfully operating this system. With the wide range of sensors, lenses and offset angles we provide two standard products: the iOS XL using 5 iXU-RS 1000 with 70mm and the iOS XXL using 7 iXU-RS 1000. We also manufacture on user request, e.g. with 9 camera heads of different angles, sensors and layouts.

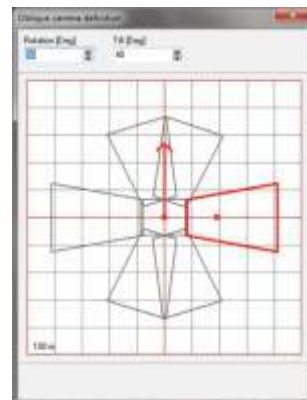
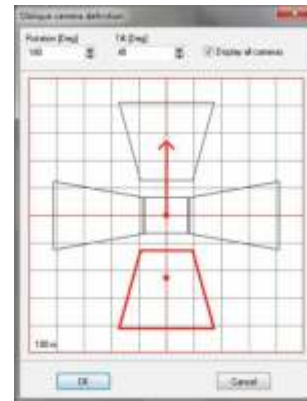
The cameras are mounted extremely closely with respect to low vignetting by the camera hatch. All components are designed for high-accuracy mapping. The camera's tilt angles can be modified between 30 and 45 degrees in 2.5 unit steps. The complete system is delivered all calibrated as per single camera calibration, relative offset angles between the cameras, the nodal-point shift between the IMU and the cameras as well as the boreside angles of the GNSS-INS system.

We now offer the AeroStab-XL mount that is able to host also a setup with 7 cameras. Our AeroTopoL FMS has special tools to perform multi-camera surveys and combined with our AeroDiDOS GNSS-INS, you'll receive directly referenced data for a smooth workflow.

What you get is a highly accurate and sound mapping system for generating 3D city models with an outstanding precision!



Setup of the OIS XL 5



3D view of the calibration area of Speyer

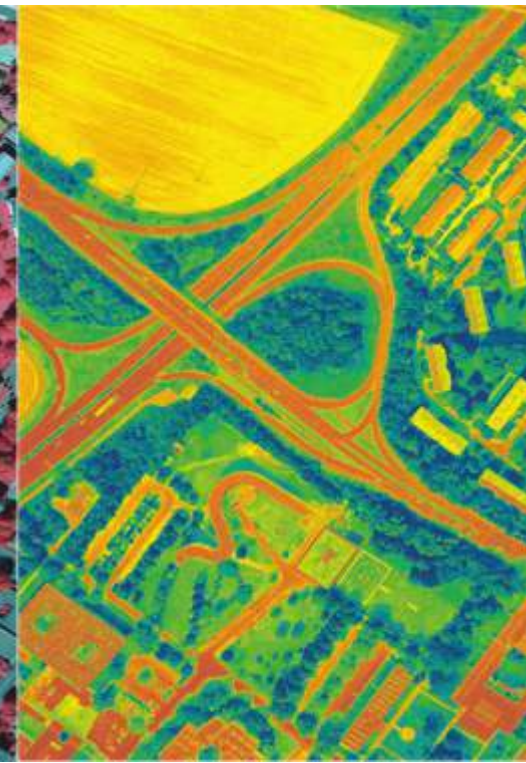
4-Band Solution

With the increasing demand for combined NIR and RGB aerial imagery for applications such as crop analysis for growth optimization, vegetation health and environmental contamination as well as projects including city observation for green site monitoring, Phase One has developed a fully automatic solution for capturing and processing 4-band imagery*, using two high-resolution Phase One aerial cameras, specifically designed for the photogrammetric airborne market. The 4-band solution includes two synchronized Phase One metric calibrated cameras (RGB and NIR) mounted side by side on an AeroStab Gyromount, an iX Controller computer and the iX Capture software.

The software automatically generates distortion-free images and performs fine co-registration of pixels from the NIR to the RGB images, including the processing of different image sizes. This fully automatic process is supported by Phase One's iX Capture software, ensuring that these 4-band images offer precise output data you can rely on whenever combined NIR and RGB aerial images are the only option for your project.

iX Capture outputs the following products:

- ♦ 4-band combined NIR and RGB (RGBN) TIFF (4-band CIR)
- ♦ 3-band combined NIR and RGB (NRG) TIFF (3-band CIR)
- ♦ NDVI (Normalized Difference Vegetation Index) TIFF
- ♦ Distortion-free / corrected RGB TIFF
- ♦ Distortion-free / corrected NIR TIFF
- ♦ RGB TIFF
- ♦ NIR TIFF



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GGGS has developed and integrated aerial surveying systems for more than 14 years. For more than 10 years we have integrated the PhaseOne technology in our various mapping systems. Our gyro stabilized mounts series (AeroStab) is the perfect basis to accommodate PhaseOne cameras: it compensates the roll, pitch and yaw movements of the aircraft fast, precisely; it triggers the camera and enables precise orientation for the images. Our flight management system AeroTopoL is a perfect partner for planning and navigating aerial missions! We also support technology for direct referencing (AeroDiDOS) that can be ideally combined with our stabilizers to achieve the best stabilization and enable the best post-processing accuracy by using floating lever arms. Combining several camera heads helps customers with wide area mapping (AeroCam Tri), wide corridor mapping or - as twin-setup - for monitoring purposes. The new 4-band solution can be well fitted on our AeroStab-M. In terms of 3D city modelling, we designed a high-tech OIS (Oblique Imaging System) that can accommodate 5, 7 or 9 camera heads. Our new AeroStab-XL is the largest stabilizer in the market and is specifically designed for the OIS.

On top of this, we also combine different sensors e.g. RGB and thermal sensors or hyperspectral with RGB cameras and, of course, Lidar.

iXU 1000

The 100 MP PhaseOne iXU 1000 is the flagship product in the range of medium format aerial cameras, presenting exceptional performance and advanced features. Equipped with CMOS sensor technology and an innovative electromagnetic central leaf shutter, the iXU 1000 provides enhanced capture rates and speed with zero latency ensuring the precise image quality expected from a reliable aerial photography camera.

The PhaseOne iXU aerial cameras include features such as: accurate metric calibration, central leaf shutters, scalability to form multi-camera arrays as well as easy integration in the GGS portfolio. The iXU-RS cameras are built with one of seven lenses. The interchangeable lenses are individually inspected and factory-calibrated for infinity focus. The range of focal lengths covers most applications and is suitable for creating DTMs and DSMs for surveying as well as orthophotos. The CMOS technology of the iXU 1000 enables you to move from ISO 50 all the way up to 6400, providing quality images all across the ISO range. If weather conditions deteriorate or on days when you were previously unable to capture, the CMOS-based cameras provide the high sensitivity that can make all the difference.

Carrying an iXU 1000 provides more coverage during a flight, while maintaining the same ground sample distance (GSD), or a lower GSD, while flying at the same height. The small form factor makes it an ideal camera to be used as a stand-alone camera for photogrammetric work or as part of an array of multiple cameras, either to cover a larger swath or as part of an oblique camera system.

	Ø1 Å 000	iXU1000	iXU-RS 180	iXU180	iXU-RS 160	iXU160	iXU-RS 160 A	iXU160 A	iXU150
	100MP	100MP	80MP	80MP	60.5MP	60.5MP	60MP	60MP	50MP
Resolution	11.608x8.708	11.608x8.708	10.328x7.760	10.328x7.760	8.984x6.732	8.984x6.732	8.964x6.716	8.964x6.716	8.280x6.208
Pixel size	4.6µm	4.6µm	5.2µm	5.2µm	6.0µm	6.0µm	6.0µm	6.0µm	5.3µm
Sensor size	53.4x40.0mm	53.4x40.0mm	53.7x40.4mm	53.7x40.4mm	53.9x40.4mm	53.9x40.4mm	53.9x40.4mm	53.9x40.4mm	48.8x32.9mm
Isorange	50-6400	50-6400	35-800	35-800	50-800	50-800	200-3200	200-3200	100-6400
Shutter Speed	1/2500s	1/1600s	1/2500s	1/1600s	1/2500s	1/1600s	1/2500s	1/1600s	1/1600s
Shutter control	1/3increments								
FMCOption	N/A	N/A	TDI	TDI	TDI	TDI	TDI	TDI	N/A
Capture rate	0.6s	0.6s	1.25s	1.25s	1.1s	1.1s	1.1s	1.1s	0.85s
File size IIQI	100MB	100MB	80MB	80MB	60MB	60MB	60MB	60MB	50MB
File size IIQs	65MB	65MB	54MB	54MB	40MB	40MB	40MB	40MB	33MB
Weight	990g								750g

iXU 180, 160, 160 Achromatic and 150

With a choice of models, the iXU CCD-based aerial cameras are designed to easily fit into existing or new systems, making it the perfect solution for integrators or end users looking for a rugged, high-quality state-of-the-art aerial camera system. The medium format solution offers exceptional image quality and features that rival large format cameras at a fraction of the price. The range of focal lengths covers most uses and is suitable for creating DTMs and DSMs for surveying as well as Orthophotos. 80 MP, 60 MP and 60 MP achromatic CCD versions for users looking for a standalone camera or an array of multiple cameras. The iXU 150 hosts a 50 MP CMOS chip.

Forward Motion Compensation

The PhaseOne forward motion compensation (FMC) solution employs Time Delayed Integration (TDI) to compensate for image blurring resulting from slower shutter speeds, faster flight speeds or higher GSDs. This enables more flexibility when determining flight schedules and enhanced image quality under low light conditions. The FMC option enables increased profitability through the ability to fly more days and in less optimal light conditions, compensating blurring and smearing issues. The PhaseOne FMC feature is sold either as an option on a new system or as an upgrade on an existing camera. It is available on the 80 MP and 60 MP

iX Controller

PhaseOne offers a choice of hardware and software solutions to enable the integration of the camera with GGS components. Designed to provide the ultimate in speed, and with the ability to control up to six PhaseOne aerial cameras, the iX Controller is a rugged, fanless PC, running on the 4th generation Intel® Core™ i7 Processor. With a small footprint and easy integration in any aircraft, the PhaseOne iX Controller acts as a central hub of your aerial camera system controlling multiple cameras. The iX Controller employs two removable SSD drives which have extra high writing speeds to ensure that every image is captured quickly and reliably. When the mission is over, the compact and light SSD drives are easily removed from the iX Controller and handed in for processing.



iX Controller

PhaseOne RS Shutter

The new RS Lens Shutter was designed especially for the tough requirements of aerial imaging. It uses an innovative direct drive concept with electronic charging enabling exposure speed as fast as 1/2500s, guaranteeing half a million exposures. The blades in the RS shutter are made of purpose-built carbon fiber material - as used in aerospace industry - powered by a linear motor and controlled in real time for absolute precision of exposure time. Relying on the RS shutter's capacity of 500,000 cycles along with the exposure time of 1/2500s enables faster flying and allows customers to perform and manage the most demanding aerial photography missions with high operational efficiency, reliability - all at competitive pricing!



The innovative RS Shutter

Ø1 T1 Å 000	Shutter Speed	Lens Type	Weight
32 mm f/4.0	1/2500	Rodenstock	790 g
40 mm f/4.0	1/2500	Rodenstock	730 g
50 mm f/4.0	1/2500	Rodenstock	800 g
70 mm f/5.6	1/2500	Rodenstock	580 g
90 mm f/5.6	1/2000	Rodenstock	1150 g
110 mm f/4.0	1/2500	Schneider-Kreuznach	620 g
150 mm f/5.6	1/2500	Schneider-Kreuznach	630 g
iXU Lenses			
55 mm f/2.8	1/1600	Schneider-Kreuznach	630 g
80 mm f/2.8	1/1600	Schneider-Kreuznach	480 g
110 mm f/2.8	1/1600	Schneider-Kreuznach	635 g
150 mm f/3.5	1/1600	Schneider-Kreuznach	650 g
240 mm f/4.5	1/1000	Schneider-Kreuznach	1600 g

Twin, Triple and Multisensor Setups

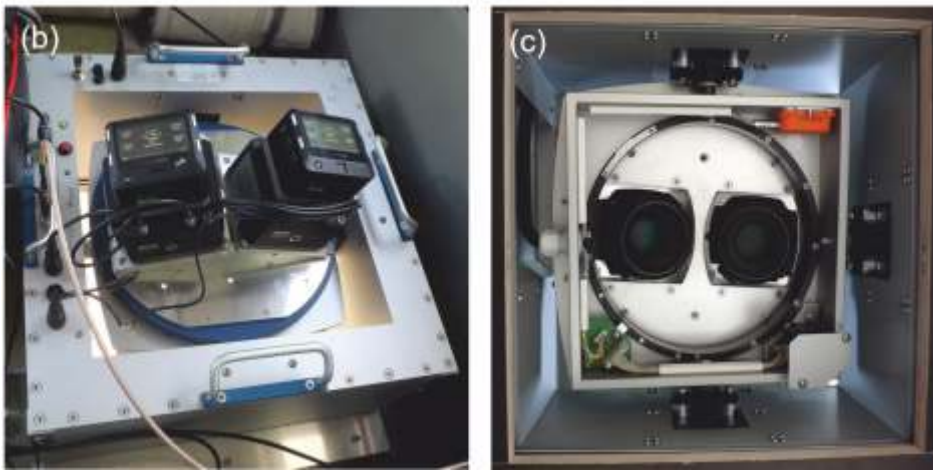
The PhaseOne iXU architecture is ideal for combining several units for special applications. A setup using 2 iXA 180 cameras for seabird monitoring provides a 400-meter view cross track @ 2 cm GSD. Combined with a NIR sensor for glare compensation, this system enables automated data processing for identifying single species. The system is hosted on an AeroStab-M in combination with AeroTopoL FMS.



(a) Equipping a twin-engine aircraft for aerial digital surveys of marine wildlife,

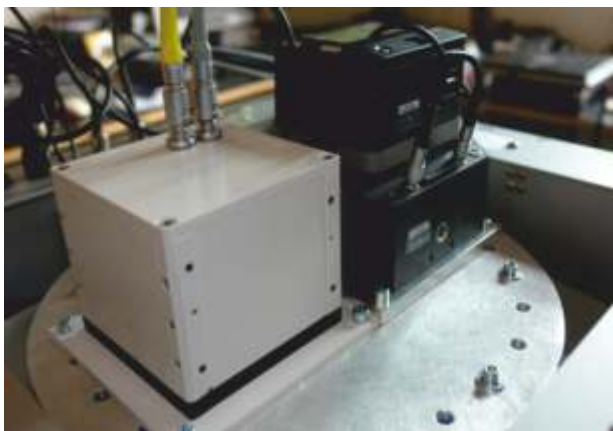
(b) View of a crosswise mounted tandem camera (iXA180) on AeroStab-M,

(c) Exterior view of the camera system through the hatch of the aircraft

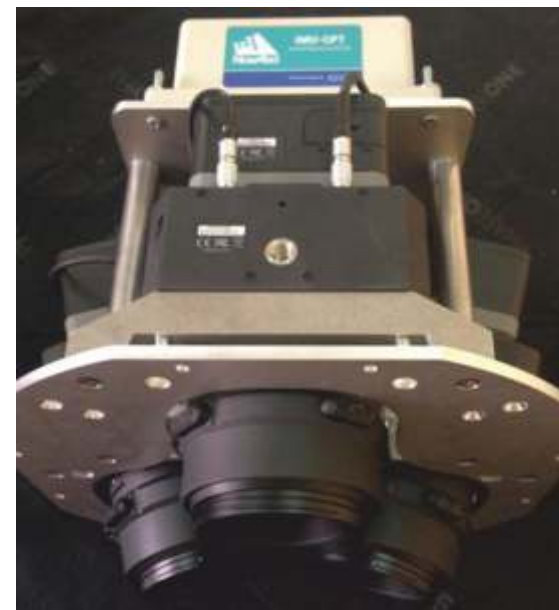


Wide corridor mapping is supported by both three iXA180 with 150 mm lens and 20% overlap between the sensors which results in 26.800 pixels cross track. Using the same setup with the new iXU-1000, we can generate a cross track width of 30.200 pixels, one of the widest mapping setups available.

We also combine various sensors e.g. RGB and ThIR for environmental surveys leaving us flexible to develop a solution for your tasks.



RGB and thermal imaging for environmental surveys



Camera-iX Controller triple for wide corridor mapping

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