Phantom Flex4K-GS

Phantom® Flex4K-GS

- 4K at up to 1000 fps
- 35mm, 9.4 Mpx resolution
- Global Shutter
- Choose between raw and compressed recording formats

Key Benefits:

Introducing the Phantom Flex4K-GS

Built upon the award winning technology of Phantom digital cinema products, the Flex4K-GS offers a unique set of features for demanding science and aerospace applications which require as much pixel resolution as possible. The custom 9.4 megapixel 4K sensor resolves tiny details with clarity and precision beyond what is typically possible in high-speed imaging.

The key difference between this camera model and the original Flex4K is the ability to run the sensor in global shutter mode, which ensures every pixel exposes at the same moment in time. While rolling shutter cameras typically achieve higher dynamic range and lower noise, the way the electronic shutter integrates can create motion artifacts, making high precision measurements difficult.

The Flex4K-GS has the unique ability to switch between global and rolling shutter modes to take advantage of both scenarios and allow researchers to choose what is best for the subject at hand.

Key Features:

4096 x 2304 max fps 938
4096 x 2160 max fps 1000
2048 x 1080 max fps 1975

Global shutter, switchable to rolling shutter for increased dynamic range

Minimum exposure: 5 µs

Memory: 64GB or 128GB RAM
Supports up to 63 partitions

Recording media: Phantom CineMag® IV available with 1TB and 2TB capacity.
CineMag IV recording formats:
- Cine Raw
- Apple ProRes 422 HQ

PC connection: Gb Ethernet.
CineMag download via Gb or 10Gb Ethernet, using the CineStation IV.

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when it's too fast to see, and too important not to.®

Flex4K-GS

Available lens mounts

- Nikon F, with manual support for G-style lenses
- Canon EF with electronic control for EOS lenses
- 35mm PL-mount
- C-mount (for use at 2K resolutions)

Additional features

Optical Low Pass Filter for Color cameras

Internal Mechanical Shutter for black references

3G-SDI video outputs

Dual-SDI mode for simultaneous live video and playback

Component video output

AES/EBU Audio recording

Power outputs for on-camera monitors and other accessories

Sensor and Image Specifications

The Flex4K-GS incorporates a custom 12-bit CMOS sensor with 6.75 micron pixels. Color cameras include a removable OLPF (Optical Low Pass Filter) to eliminate aliasing caused by the sensor's bayer-pattern.

Because the Flex4K-GS supports both global and rolling shutter modes, it is necessary to understand the differences between each version. This includes important image specifications such as ISO and dynamic range.

Spec	Global Shutter Mode	Rolling Shutter Mode
Base ISO*	640-T, 640-D Color; 5000-T, 2500-D Monochrome	320-T, 320-D Color; 2000-T, 1000-D Monochrome
Recommended Exposure Index Range	E.I. 1000 - 1600 Color; 10,000 - 20,000 Monochrome	E.I. 1000 - 1600 Color; 4000 - 8000 Monochrome
Dynamic Range	54.8 dB; 9-stops	71.6 dB; 12-stops
Video image of a fast rotating subject		

*ISO is measured according to ISO 12232:2006 method

The video example shown above demonstrates the motion artifact often associated with a rolling, or progressive scan shutter. The exposure integrates from top to bottom, which can cause distortion with very fast vertical motion and rotating objects. In global shutter mode the sensor exposes every pixel at the same moment to eliminate this effect and ensure measurements are 100% accurate. The shutter mode can be switched using the on-camera menu or PCC software.

The best lens format for image coverage depends on sensor resolution, as shown:

Sensor Resolution	Active Size	Lens Format
4096 x 2304	27.6 x 15.6 mm	Super 35
2048 x 2048	13.8 x 13.8 mm	4/3"
1920 x 1080	13.0 x 7.3 mm	16 mm
1280 x 720	8.6 x 4.9 mm	2/3"

Recording Options and Different Capture Techniques

The Phantom Flex4K-GS is available with 64 or 128 Gigabytes of internal RAM. More RAM allows longer record times at high frame rates. Loop mode records into the RAM buffer at the camera's top speeds, and once the camera is triggered, files can be previewed immediately, and then quickly offloaded over Gb Ethernet or to an installed Phantom CineMag IV.

For longer record times, use run/stop (R/S) mode and record directly to the CineMag IV for several minutes. This is an excellent option when high-speed is not required. In fact, at 24 fps two hours of raw 4K footage can be recorded directly to a 2TB CineMag IV.

Maximum Record Time Examples			
Recording times vary based on memory size, frame rate and resolution			
Resolution	**Frame Rate (fps)**	**128GB RAM (seconds)**	**2TB CineMag IV PRO Run/Stop Mode**
4096 x 2304	938 (max)	10"	N/A
4096 x 2304	120	80"	22 minutes (raw) 55 minutes (ProRes HQ)
4096 x 2160	1000 (max)	10"	N/A
4096 x 2160	120	84"	24 minutes (raw)
4096 x 2160	24	7 min.	120 minutes (raw)
2048 x 1152	1900 (max)	20"	N/A
2048 x 1152	500	78"	40 minutes (raw) 100 minutes (ProRes HQ)

Resolutions & Maximum Frame Rates	
Resolution	**Max fps Loop Mode**
4096 x 2304 (max res)	938
4096 x 2160 (4K standard)	1000
2048 x 2048	1060
1920 x 1080	1975
1280 x 720	2930

Flex4K-GS On-camera control menu

File Formats

The Flex4K-GS generates Cine Raw files which include the maximum information for image processing. This native file format is directly compatible with major video editing and motion analysis programs. Cine files can also be easily converted to other formats including h.264 mp4, ProRes .mov, AVI, Tiff, JPEG, DPX, DNG and many more using Windows-based PCC software.

Alternatively, if raw files are not required, set the camera to record ProRes 422 HQ directly to the CineMag IV. The files become ~2.5X smaller, and a 2TB CineMag IV will hold more than 4 hours of 30 fps video playback. The camera supports ProRes recording at 4096 x 2304 and 2048 x 1152 resolutions.
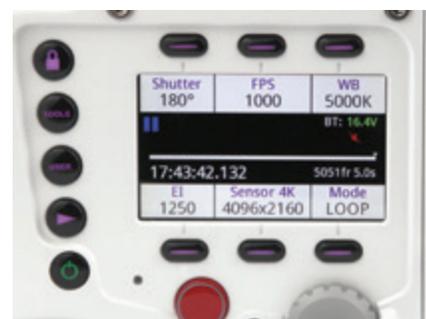
Convenient and Intuitive Camera Control

Controlling the Phantom Flex4K-GS is simple with a full-featured on-camera control interface for both basic and advanced camera operation. Set up universal capture and recording parameters before the shot, while retaining access to the more commonly adjusted parameters like frame rate and exposure settings at the push of a button. Remote control is also possible using a handheld Phantom RCU.

PC & Mac Based Workflow Solutions

Our Phantom Camera Control (PCC) software is full-featured and easy to use. Set up and control one or multiple cameras with easy access to all camera features. PCC even has a basic motion analysis and measurements package built-in. Download files from the CineMag IV with the Phantom CineStation IV, a simple download device that efficiently saves files via Gb or 10Gb Ethernet using PCC or Mac-based Séance software.

Optional Battery Backs

Choose a battery back at the time of purchase - or later as an accessory. Batteries can be used as primary power or for backup power. Three mounts are currently available:

- Hawk-Woods mount supports 26v Reel Power batteries
- Anton Bauer Gold mount supports high-capacity 14.4v gold-mount batteries
- V-Lock mount supports high-capacity 14.4v V-Lock batteries

Flex4K-GS pictured with V-Lock battery

DATA SHEET

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Flex4K-GS available with both a white or black housing. Existing Flex4K upgrades are possible.

Mechanical Design

The thermal design of the Flex4K-GS regulates the internal temperature of the camera, even in extreme conditions. The camera housing is completely sealed, the camera runs very quiet and the image remains stable.

The Flex4K-GS has a white powder-coated housing by default, but it can also be ordered with or upgraded from an existing Flex4K camera using the black cinema-style housing.

Inputs / Outputs	
Power input	1x 3-pin Fischer(+12 – 28V DC)
12V Power aux outputs	1x 2-pin Lemo; 1x 4-pin Hirose for viewfinder
24V Power aux outputs	2x 3-pin Fischer with R/S (24V is unregulated)
Ethernet	8-pin Fischer for software operation & download
HD-SDI	4x 3G HD-SDI outputs, 1 SDI return for Genlock
Sync	12-pin Fischer for Mini-BOB. Provides access to F-Sync, AES/EBU Audio in & out, Timecode in & out, Strobe, Ready, Trigger
Audio out	3.5mm headphone-jack (for monitoring)
Lens port	12-pin Hirose for power and control signals of ENG style lenses
Viewfinder	7-pin Fischer for component video

Additional Specifications:

Operational Temperature: -20˚ - +50˚ C

Camera size: 11.5 x 5.0 x 7.9 in (LxWxH); 29.2 x 14 x 20 cm

Camera weight: 14 lbs (6.3 kg) without lens, viewfinder or battery

Focused

Since 1950, Vision Research has been designing, and manufacturing high-speed cameras. Our single focus is to invent, build, and support the most advanced cameras possible.

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Vision Research Global Support - for wherever you are

Our Flex4K camera line is supported by Vision Research's Global Service and Support network offering AMECare Performance Services from multiple sites around the globe. Maximize the value of your Phantom camera with a full menu of professional support services. Learn more about our service and support options at www.phantomhighspeed.com/Service--Support

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