VISION RESEARCH

PHANTOM

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

DATA SHEET

For the most current version visit www.phantomhighspeed.com
Subject to change Rev August 2017

VEO4K-990S

Phantom® VEO4K

Models: 990S, 990L, 590S, 590L, 4K-PL

4K at up to 1000 fps

9.4 Mpx resolution

Super 35mm sensor

10Gb Ethernet option for optimized workflow

Introducing the Phantom VEO4K

The VEO4K camera family combines two platforms, the popular VEO and Flex4K, for high-speed imaging with the ultimate in image quality and pixel resolution. Examples of applications that can take advantage of this resolution include those that need high magnification, those where movement is travelling across a large space, and those that require fine detail precision such as particle tracking analysis.

Imaging Specifications

The VEO4K employs a custom 9.4 megapixel, 12-bit CMOS sensor with 6.75 micron pixels. Support for both global shutter and rolling shutter modes is included. Advantages of rolling shutter mode include increased dynamic range and the lack of need to perform a black reference after changing parameters.

Global Shutter Mode	Rolling Shutter Mode
Base ISO*: 640-T, 640-D Color; 5000-T, 2500-D Monochrome	Base ISO: 320-T, 320-D Color; 2000-T, 1000-D Monochrome
Recommended Exposure Index Range**: EI 800-1000 Color; 10,000-20,000 Monochrome	Recommended Exposure Index Range: EI 800-1000 Color; 4,000-8,000 Monochrome

*ISO is measured according to ISO 12232:2006 method.

**Recommended Exposure Index (E.I.) range is specified. Set with On-camera controls or PCC software. Higher EI settings are possible using image processing.

Key Features:

Two Performance Levels
- *4K-590 at 5 Gpx/sec*
- *4K-990 at 9 Gpx/sec*

Two Memory Configurations
- *36GB & 72GB*

Three Body Styles
- *4K-L model for software-based control*
- *4K-S model for added I/O ports, on-camera controls, power input and CFast 2.0*
- *4K-PL model for cinema-style black housing, OLPF and PL mount*

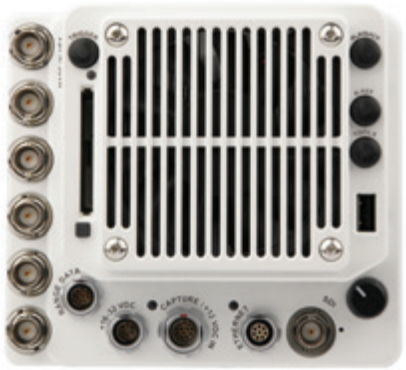
All VEO cameras are rugged, milled out of solid aluminum with electronics completely isolated from airflow.

Made in the USA

AMETEK®
MATERIALS ANALYSIS DIVISION

Phantom VEO4K Family

Inputs & Outputs

	4K-L models	4K-S and 4K-PL models
		
Front/Side	SDI: Din port for 3G HD-SDI HDMI: Standard HDMI output VFPWR: 4-pin Hirose for 12V power output, rated for 12W	SDI: Din port for 3G HD-SDI HDMI: Standard HDMI output VFPWR: 4-pin Hirose for 12V power output, rated for 12W
Ethernet	RJ45 for Gb Ethernet and 10Gb Ethernet; auto-negotiating	8-pin Fischer for Gb Ethernet and 10Gb Ethernet; auto-negotiating
Power Input	6-pin Fischer: 16-32 VDC	6-pin Fischer: 16-32 VDC 12-pin Capture port: Secondary 12V input for battery mount
Capture Port	None	Yes, 12-pin Fischer
Available Signals	Timecode-in, 2 Programmable I/O	Timecode-in, F-Sync/P, Strobe/P, Ready/P, Timecode-out/P, Range Data
Trigger BNC	Yes	Yes
Rear SDI BNC	None	Yes (3G)
Programmable I/O	2 BNC ports Available signals: Strobe, Event, Pre-trigger, Timecode-out, Ready, F-Sync, Aux Trigger, Auto-Trigger	4 BNC ports Available signals: Strobe, Event, Pre-trigger, Timecode-out, Ready, F-Sync, Aux Trigger, Auto-Trigger
Serial RS232	Via 6-pin Power	Via 6-pin Power
Range Data	None	Dedicated 6-pin Fischer
On-camera Controls	None	Yes, Encoder knob and buttons for access to menu and control
USB	None	Yes, for Wi-Fi dongle
Removable Media	None	CFast 2.0 cards, NTFS formatted

Example Frame Rates & Record Times

Estimated, subject to change

Phantom VEO4K-990 & 4K-PL			Phantom VEO4K-590		
Resolution	**Maximum Frame Rate**	**Rec time @ max fps (72GB RAM)**	**Resolution**	**Maximum Frame Rate**	**Rec time @ max fps (72GB RAM)**
4096 x 2304	938	5.6 seconds	4096 x 2304	500	10 seconds
4096 x 2160	1000	5.6 seconds	4096 x 2160	550	10 seconds
4096 x 1152	1850	5.6 seconds	4096 x 1152	900	11 seconds
2048 x 2048	1050	11 seconds	2048 x 2048	550	20 seconds
2048 x 1152	1850	11 seconds	2048 x 1152	900	22 seconds
2048 x 1080	1970	11 seconds	2048 x 1080	950	22 seconds

Record durations shown are for cameras with 72G of RAM at the max frame rate.
Cameras with 36G RAM will record for ½ this value. Lower frame rates provide longer record times.

Specifications and Features:

Video monitoring: Front 3G HD-SDI, HDMI & VF power available on all models. Additional rear 3G HD-SDI port on S models. Provides standard 720 and 1080 video standards up to 1080 p60.

Connectivity: Gb Ethernet standard, 10Gb Ethernet optional on all VEO4K models for control and download. Both protocols use same Ethernet port and auto-negotiate the connection based on network configuration.

Signals: Programmable I/O provides the ability to assign and define the parameters of various signals including: F-Sync, Strobe, Event, Pre-trigger, Memgate, Timecode-out, Ready, Aux and Auto-Trigger. Trigger and Timecode-in ports are fixed.

Timecode: IRIG in/out, SMPTE and MISP time system support.

Multi-Cine: Partition internal RAM into up-to 63 segments and capture quick recordings back-to-back.

Internal Mechanical Shutter: Activate to perform a black reference or protect the sensor while changing lenses. No physical access to the camera is needed.

Quiet Fans: Turn the fan off temporarily to eliminate noise and vibration.

Lens Mounts: Interchangeable. Supports Nikon F/G, Canon EF with electronic control of aperture and focus, 35mm PL and C-mount.

Accessories: Custom camera handle, cheese plate, battery mounts, case and more are available. Camera is pictured (right) with V-Lock battery mount and handle.

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Camera Control & File Formats

Software: Phantom Camera Control software (PCC) is used for complete setup, control, image processing and download, and includes tracking and motion analysis tools. An SDK including Matlab and Labview drivers are also available.

On-camera controls (OCC) for setup, capture, playback and saving to a CFast card are standard on VEO4K-S model cameras and are used with a connected SDI or HDMI monitor or viewfinder.

File formats: The native file format is Phantom Cine RAW (.cine). Cine files can be easily converted to other formats including h.264 mp4, Apple ProRes .mov, AVI, Tiff, JPEG and many more using PCC. Cine RAW files are also directly compatible with several major video editing and motion analysis programs.

CFast workflow: VEO4K-S and 4K-PL camera models feature compatibility with CFast 2.0 cards, which enable remote and untethered recording. Cine files are first recorded to RAM, and once captured the video can be played back immediately, trimmed and then saved to the CFast 2.0 card. Once on the card the Cine file is safely stored in non-volatile memory and you are free to take your next shot.

- Use standard CFast 2.0 cards, formatted with the NTFS file system.
- Transfer speed from RAM is 90 MB/second.
- Drag-and-drop saved files using standard CFast 2.0 card readers on Windows or Mac operating systems.

Vision Research Global Support - for wherever you are

The Phantom VEO 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.

AMETEK Vision Research's digital high-speed cameras are subject to the export licensing jurisdiction of the Export Administration Regulations. As a result, the export, transfer, or re-export of these cameras to a country embargoed by the United States is strictly prohibited. Likewise, it is prohibited under the Export Administration Regulations to export, transfer, or re-export AMETEK Vision Research's digital high-speed cameras to certain buyers and/or end users.

Customers are also advised that some models of AMETEK Vision Research's digital high-speed cameras may require a license from the U.S. Department of Commerce to be: (1) exported from the United States; (2) transferred to a foreign person in the United States; or (3) re-exported to a third country. Interested parties should contact the U.S. Department of Commerce to determine if an export or a re-export license is required for their specific transaction.

Phantom® VEO4K

Models: 990S, 990L, 590S, 590L, 4K-PL

Power Requirements:

Primary power: 16-32 VDC via 6-pin Fischer

Secondary power*: down to 12 VDC, via 12-pin capture port (S-models only)

Power draw at max load: 75 Watts (approx.)

** When both are connected, the power input with highest voltage gets used first.*

Mechanical & Environmental Specifications

Size: 5 x 5.5 x 6 in. (12.7 x 14 x 15 cm) L x W x H

Weight: 6 lbs (2.5 kg)

Operational Shock: 30G with shutter, 100G without shutter

Operating Temperature: -10 °C - +50 °C

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.

VISION RESEARCH

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