



PHANTOM VEO 1310 VEO 1010 VEO 610

HIGH-SPEED CAMERAS

1.2 Megapixels, 1280 x 960
Up-to 10,860 fps (1310);
8,420 (1010); 5,610 (610)
L and S body styles

FEATURES & BENEFITS

PHANTOM VEO PRODUCT FAMILY

Designed to perform in a wide array of scientific and industrial applications, Phantom VEO high-speed cameras provide valuable insight into events that are otherwise too fast to be seen.

VEO 1310, 1010 and 610 models incorporate recent advancements in sensor technology to deliver exceptional image quality with **2.5X greater light sensitivity** and the **highest frame rates** available in the VEO platform. Binned mode boosts throughput and sensitivity at 640 x 480 and below.

EXTREME CONFIGURABILITY

VEO cameras are available in color or monochrome, up to 72GB RAM, with a variety of lens mounts and two body styles to allow users to **choose the best configuration** in terms of features and budget:

- **L-model** is for basic, software based imaging in a lab or office environment
- **S-model** provides additional signals, on-camera controls for untethered and remote recording, ruggedized connectors and compatibility with removable CFast 2.0 storage media.

FRAME RATES & EXPOSURE			
Top FPS at Max Resolution	1310: 10,860	1010: 8,420	610: 5,610
1 Megapixel FPS	1310: 12,900	1010: 10,010	610: 6,670
Maximum FPS*	1310: 423,350	1010: 328,460	610: 218,970
Minimum FPS	50		
CAR Increments	640 x 12		
Minimum Exposure	1 μ s Standard	709 ns with Fast Option**, all models	
Electronic Shutter	Global		
PIV Features	Shutter-off mode with a straddle time of 726 ns, Supports Burst Mode		
Exposure Features	Auto-Exposure, Overexposure Indication over video and in PCC		

IMAGING		
Sensor Type	CMOS with Correlated Double Sampling	
Maximum Resolution	1280 x 960	
Bit Depth	12-bit	
Pixel Size	18 μ m	
Sensor Size	23 x 17.2; 28.7 mm diagonal	
ISO Daylight (12232 STD)	Standard: Mono 25,000; Color 6,400	Binned: Mono 50,000; Color 8,000
ISO Tungsten (12232 STD)	Standard: Mono 80,000; Color 8,000	Binned: Mono 125,000; Color 10,000
Exposure Index	Standard: Mono 25,000 - 125,000; Color 6,400 - 32,000	Binned: Mono 50,000 - 250,000; Color 8,000 - 40,000
Dynamic Range	Standard: 60.3 dB	Binned: 59.4 dB
Readout Noise	Standard: 10 e-	Binned: 24 e-

FRAME RATE CHART

Table provides examples of common resolutions and frame rates. The record times shown are for 72GB RAM at the frame rate shown. Duration will be 1/2 the time for 36GB and 1/4 the time for 18GB RAM.

Maximum Frame Rate - FPS; (72GB Record time - Sec)						
Resolution (H x V)	VEO 1310		VEO 1010		VEO 610	
	Standard	Binned	Standard	Binned	Standard	Binned
1280 x 960	10,860 (3.6)	-	8,420 (4.4)	-	5,610 (7.1)	-
1280 x 804	12,900 (3.6)	-	10,010 (4.4)	-	6,670 (7.1)	-
1280 x 720	14,350 (3.6)	-	11,140 (4.4)	-	7,420 (7.1)	-
1280 x 240	40,300 (3.9)	-	31,270 (4.8)	-	20,840 (7.6)	-
960 x 960	13,330 (3.9)	-	10,340 (4.8)	-	6,890 (7.6)	-
640 x 480	30,030 (5.1)	40,300 (3.9)	23,300 (6.4)	31,270 (4.8)	15,530 (10)	20,840 (7.5)
640 x 240	57,360 (5.3)	73,510 (4.2)	44,510 (6.8)	57,030 (5.2)	29,670 (10)	38,020 (8)
640 x 120	105,260 (5.7)	125,000 (4.9)	81,660 (7.2)	96,980 (6.4)	54,440 (11)	64,650 (9.4)
640 x 96	126,360 (5.9)	145,360 (5.2)	98,030 (7.6)	112,780 (6.8)	65,350 (11)	75,180 (10)
640 x 72	158,030 (6.3)	173,650 (5.8)	122,610 (8.0)	134,730 (7.2)	81,740 (11)	89,820 (10)
640 x 48	210,900 (6.9)	215,610 (6.9)	163,630 (8.8)	167,280 (8.8)	109,090 (12)	111,520 (10)
320 x 240	57,360 (10.3)	105,260 (5.7)	44,510 (13.2)	81,660 (7.2)	29,670 (20)	54,440 (10)
320 x 72	158,030 (11.9)	253,270 (7.6)	122,610 (15.2)	196,500 (9.6)	81,740 (23)	131,000 (14)
320 x 24	316,930 (15.3)	423,350 (11.9)	245,900 (19.6)	328,460 (15.2)	163,930 (29)	218,970 (22)

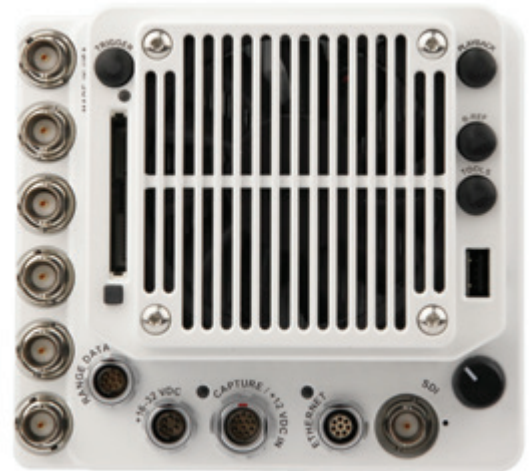
* Higher frame rates are available with shutter-off mode and FAST option at 640x12 and 320x24 resolution: 604,000 fps (1310); 468,000 fps (1010); 312,000 fps (610)

**Certain Phantom cameras are held to export licensing standards. Details available at: www.phantomhighspeed.com/export



CONNECTIVITY & SIGNALS

Ethernet	Gigabit Standard, 10Gb Optional		
Timecode	IRIG-B Modulated and Un-modulated		
Port Descriptions		S-model	L-model
	Ethernet	Fischer 8-pin	RJ45
	Power	Fischer 6-pin	Fischer 6-pin
	Range Data	Fischer 8-pin	N/A
	USB	Yes for WiFi dongle	N/A
	Video output	3G-SDI (2 ports), HDMI	3G-SDI (1 port), HDMI
	Dedicated BNC	Trigger, Timecode-in, 3G-SDI	Trigger, Timecode-in
	Programmable I/O BNC	4 ports	2 ports
I/O Signals	Programmable I/O for Fsync, Strobe, Ready, Timecode-out, Event, Memgate, Pretrigger. Assign and define signals in PCC		
Hardware Trigger	Dedicated BNC		
Software Trigger	Trigger button (S-model); via Ethernet; via Image-based auto trigger (IBAT)		
Synchronization	External Sync via FSync or IRIG Timecode		
Recording Features	Burst mode; Image-based auto trigger, Continuous recording & AutoSave to CFAST (S-model)		
Video Output	3G-SDI via BNC (rear-S-model only), Din and Micro HDMI type D port (front). <i>Cameras prior to 2021 had HDMI type A port.</i>		
Accessory Power	4-pin Hirose (front) for 12V monitors up to 1 Amp		



VEO S-model (Top),
L-model (Bottom)

CONTROL

Software & OS	Phantom PCC (Windows); SDK also available with MatLab and LabView drivers
On-camera Controls	S-models only. Access menu system with encoder, viewed on video monitor. Buttons for trigger, play and save – Color indicates current camera state
Primary File Format	Phantom Cine RAW (.cine)
Alternative File Formats	Easily convert to formats including .mp4, Apple ProRes .mov, .avi, Tiff, JPG, DNG and many more using PCC. Cine files are directly compatible with many major video editing and motion analysis programs
Software Feature Highlights	Continuous Recording for automated workflows, Integrated Data Acquisition (NI-DAQ), support for DIC Calibration with Sync-Snapshot menu, advanced Image Tools including Crop & Resample, Tone Curves, Filters and more

MEMORY & STORAGE

RAM Buffer	18GB, 36GB, 72GB RAM options
Multi-Cine	Up-to 64 Partitions
Non-Volatile Media	VEO S-model supports CFAST 2.0 (NTFS format) 80 MB/s Cine Raw file transfer rate from RAM

MECHANICAL

Housing Variants	L-model and S-model variants
Size	L-model: 5 x 5 x 5" (12.7 x 12.7 x 12.7 cm); S-model: 5 x 5.5 x 5" (12.7 x 14 x 12.7 cm)
Weight	L-model: 5.0 lbs (2.3 kg); S-model: 5.6 lbs (2.5 kg)
Lens Mounts	Choose lens mount at time of purchase: F-mount (with aperture support for Nikon G-style lenses), Canon EF mount (with electronic focus and iris control), PL, C-mount
Mounting Points	Standard 1/4 x 20" mounting points on bottom. Top, bottom and side are compatible with Cameo cheese plate for added mounting points, riser, and custom handle
Internal Shutter	Standard, for remote black references
Cooling	Active cooling. Quiet mode disables fans during capture

GLOBAL SUPPORT NETWORK

The Phantom VEO product line is supported by Vision Research's Global Service and Support network, offering PhantomCare Performance Services from multiple sites around the globe. Maximize the value of your Phantom camera with a selection of professional services from which to choose.

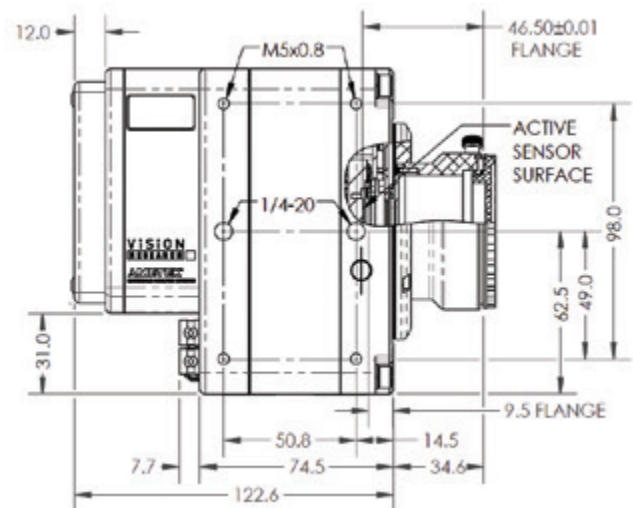
Learn more about our service offering at www.phantomhighspeed.com/Service-Support

POWER

AC Power	100-240 VAC, 80W power supply included
Voltage Range	16-32VDC Primary; Secondary Power down to 12VDC via 12-pin capture port (S-models only)
Power Consumption	65W typical
Battery Options	S-model includes 12V input for compatibility with common 14.4V batteries. V-Lock and Gold-mount VEO side-mounts are available for VEO-S cameras

ENVIRONMENTAL

Operating Temperature	-10 to +50°C
Storage Temperature	-20 to +70°C
Operational Shock	MIL-STD-202G Method 213-B. Rated 30G with shutter; 100G without; sawtooth wave, 11ms, +/- 10 pulses all axes
Operational Vibration	MIL-STD-202G Method 214-A. Rated 12Grms; Figure 2A-1, Test Condition D, 15 min per axis
Relative Humidity	≤85% non condensing
Regulatory	CE Emissions – CE Compliant EN 61326-1 CE Immunity – CE Compliant EN 61326-1 FCC – CFR 47, Part 15, Subpart B & ICES-0003, Class A



ABOUT VISION RESEARCH

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

AMETEK[®]
MATERIALS ANALYSIS DIVISION

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