FASTCAM MC2
HIGH PERFORMANCE H.S. VIDEO SYSTEM

High Speed Video System developed specifically for production line and automation fault finding

The FASTCAM MC2 has been designed to meet the requirements of development and production engineers in manufacturing and automation environments:

- A robust system with one or two remote camera heads that are small and light weight enabling it to be positioned in inaccessible and space limited environments.

- A light sensitive CMOS imaging sensor allowing images to be captured with minimal additional lighting.

- High frame rates and image resolution to allow clear visualization and motion analysis.

- Operational features necessary for recording in production environments including optional handheld remote controller with built-in LCD display.

- Gigabit Ethernet interface, complete with automatic download to users network.

Benefits

- Two small and lightweight camera head types:
  - Cube Cam: 35mm (1.38") x 35mm (1.38") x 33.3 mm (1.31")
  - Pencil Cam: 23mm (0.91") x 23.2mm (0.91") x 77.1mm (3.04")

- 2,000 fps (frames per second) recording rate at full image resolution

- Rugged design for use in industrial environments. Remote camera head with 7 meter cable allows positioning in difficult to access locations

- Three model options (monochrome or color):
  - **Model 500**: 512 x 512 pixel resolution at frame rates up to 500 fps
  - **Model 2K**:   512 x 512 pixel resolution at frame rates up to 2,000 fps
  - **Model 10K**: 512 x 512 pixel resolution at frame rates up to 2,000 fps and frame rates up to 10,000 fps with reduced image resolution

- 1GB (4 seconds recording time at 1,000 fps) or 2GB (8 seconds recording time at 1,000 fps) memory

- Gigabit Ethernet control via Photron FASTCAM Viewer (PFV) software

- Optional handheld remote controller with integrated 5" LCD monitor for simple control of all functions and viewing of live and recorded images

- High speed video can be synchronized with external analog data from load cells or accelerometers with optional DAQ

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FASTCAM MC2
HIGH PERFORMANCE VIDEO SYSTEM
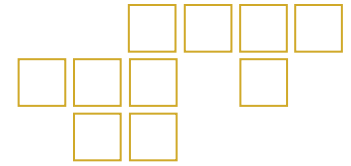
Specifications

MODEL			FRAME RATE (fps)	MAX RESOLUTION Horizontal	MAX RESOLUTION Vertical	EXPOSURE TIME	RECORD DURATION TIME (Sec.) 1GB	RECORD DURATION TIME (Sec.) 2GB	RECORD DURATION FRAMES 1GB	RECORD DURATION FRAMES 2GB
10K	2K	500	250	512	512		16.37	32.75	4,092	8,188
			500	512	512		8.18	16.38	4,092	8,188
			1,000	512	512		4.09	8.19	4,092	8,188
			2,000	512	512	6 µs 1/160,000sec	2.05	4.09	4,092	8,188
			3,000	512	352		1.98	3.97	5,952	11,909
			4,000	512	256		2.05	4.09	8,184	16,376
			8,000	512	128		2.05	4.09	16,368	32,752
			10,000	512	96		2.18	4.37	21,824	43,669

Sensor	CMOS (Bayer system color, single sensor) with 10µm pixel
Shutter	Global electronic shutter from 20ms to 6µs
Saved Image Formats	JPEG, AVI, TIFF, BMP, RAW, PNG, MOV, and FTIF. Images can be saved with or without image or comment data
Phase Lock	Enables cameras to be synchronized precisely together to a master camera or external source
Triggering	Selectable positive or negative TTL 5Vp-p, or switch closure
Lens Mount	Cube Cam: C-mount Pencil Cam: NF-mount
Data Display	Frame Rate, Shutter Speed, Trigger Mode, Date or Time (can be switched), Status (Playback/Record), Real Time, Frame Count and Resolution
Video Output	NTSC or PAL. Live video during recording. Ability to zoom, pan and scroll within image via keypad
Recording Modes	Start, End, Center, Manual, Random
Camera Control	Through a Gigabit Ethernet PC interface and optional RS-422 keypad
Camera Cable Length	7 meters (23')
Dimensions and Weight	Processor: 195mm (7.68")H x 159mm (6.26")W x 130mm (5.12")D *excluding protrusions Weight: 5 kg (11 lbs) Cube Cam: 35mm (1.38")H x 35mm (1.38")W x 33.3 mm (1.31")D *excluding protrusions Weight: 90g (0.2 lbs) Pencil Cam: 23mm (0.91")H x 23.2mm (0.91")W x 77.1mm (3.04")D *excluding protrusions Weight: 145g (0.3 lbs)
Power Requirements	DC operation 18 - 36 VDC, 45VA, 100V - 240V AC, 50 - 60Hz power supply provided
Video Output	NTSC, PAL RS170 video output

Cube Cam

Pencil Cam

Specifications subject to change without notice

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SLOW MOTION IMAGING SOLUTIONS

FASTCAM MH4

HIGH-G PERFORMANCE FROM SUB-COMPACT MULTI CAMERA HEADS
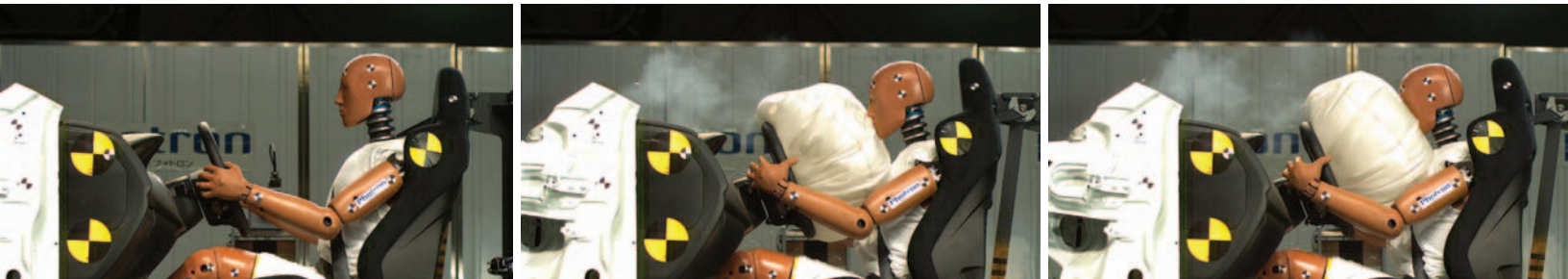
On-board, Multi-head High-Speed Video System developed specifically for Automotive Safety Testing

The world's smallest camera head design providing high frame rates and excellent light sensitivity

Photron introduces the FASTCAM MH4 with four tiny cameras, each less than one and a half inches (35mm) cubed, providing incredibly light sensitive performance up to two thousand full resolution fps (frames per second). The cameras are connected to a compact processor unit; complete with battery backup for thirty minutes data retention in the event of power loss, via light-weight, flexible cables, and are available with either one or two Gigabyte onboard memory configurations dependent on your event duration.

The FASTCAM MH4 is engineered referring to SAE-J211 for operation under the most testing of environments and can operate under shock forces as massive as 100G's in any axis. The sub-compact camera heads are available with high-G lens mounts but are still lightweight enough to fit in just about any onboard location without requiring serious reinforcements. Camera heads are available in two different configurations (top cable or rear cable), and camera cable connectors are available in three different arrangements, so that cameras can be mounted in just about any configuration or orientation, ensuring you get good looking results every time.

An additional high-G battery pack is available for tests where supplying external power through costly and potentially weak umbilical cables is undesirable, or where the security of an uninterrupted power supply unit (UPS) is advantageous.

Benefits

- Small and lightweight camera head 35mm x 35mm x 34mm, weight 90g per head (excluding lense)
- Supports from one to four camera heads per processor
- High-G; 100G for 10ms in any axis
- 512 x 512 pixel resolution up to 2,000 fps
  Reduced resolution up to 10,000 fps
- Gigabit Ethernet (1000BASE-T) interface
- Optional remote keypad with integrated 5" LCD video monitor for simple control of all functions and rapid switching between camera heads
- Optional Hi G battery pack for operation where external power is unavailable
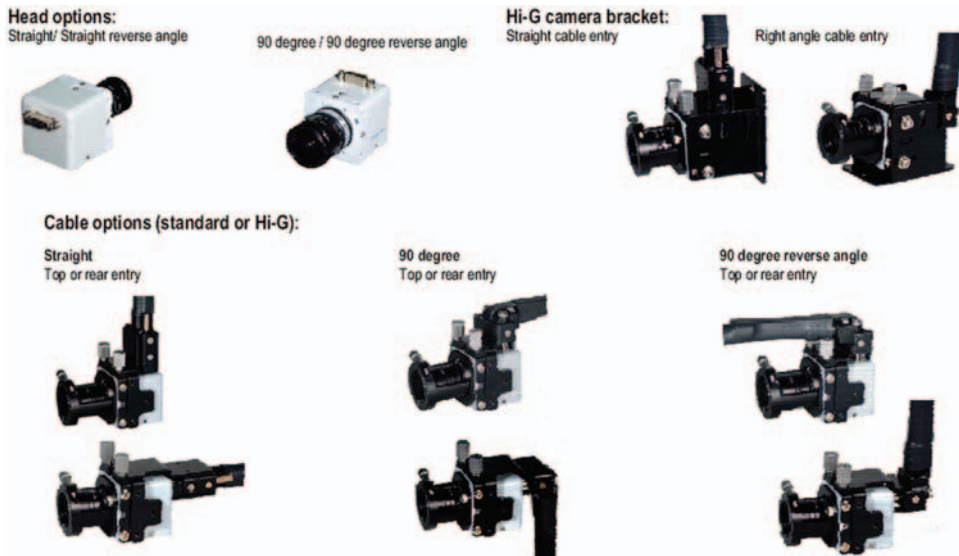
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FASTCAM MH4
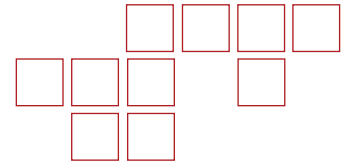
Specifcations

FRAME RATE (fps)	MAX RESOLUTION (pixels)	EXPOSURE TIME	RECORD DURATION (seconds) 1GB / 2GB memory	RECORD DURATION (frames) 1GB / 2GB memory
250	512×512		16.0 / 32.0	4,092 / 8,184
500	512×512		8.0 / 16.0	4,092 / 8,184
1,000	512×512		4.0 / 8.0	4,092 / 8,184
2,000	512×512	1/frame rate to 6µS	2.0 / 4.0	4,092 / 8,184
3,000	512×352		1.9 / 3.8	5,693 / 11,386
4,000	512×256		2.0 / 4.0	8,184 / 16,368
8,000	512×128		2.0 / 4.0	16,368 / 32,736
10,000	512×96		2.2 / 4.4	21,824 / 43,648

Sensor
CMOS (Bayer system color, single sensor) with 10µm pixel, global electronic shutter and over-exposure protection

Shutter
Global electronic shutter from 20ms to 6µs

Saved Image Formats
JPEG, AVI, TIFF, BMP, RAW, RAWW, PNG, and FTIF

Phase Lock
Enables cameras to be synchronized precisely together to a master camera or external source

Triggering
Selectable positive or negative TTL 5Vp-p, switch closure

Lens Mount
NF-mount, C-mount (Optional)

Data Display
Frame Rate, Shutter Speed, Trigger Mode, Date or Time (can be switched), Status (Playback/Record), Real Time, Frame Count and Resolution

Video Formats
NTSC, PAL RS170 video output

Video Output
NTSC or PAL. Live video during recording. Ability to zoom, pan and scroll within image via keypad

Recording Modes
Start, End, Center, Manual, Random

Camera Control
Through PFV software via Gigabit Ethernet and RS422 keypad with built in LCD monitor

Shock
100G @ 10ms 6 axis

Dimensions and Weight
Processor: 150mm (5.91")H x 245mm (9.65")W x 180mm (7.09")D *excluding protrusions Weight: 16.75 lbs (7.6kg)

Camera Head: 35mm (1.38")H x 35mm (1.38") W x 34mm (1.34")D *excluding protrusions Weight: 0.66 lbs (0.3 kg)

Power Requirements
100V - 240V AC , 65VA, 50-60Hz optional DC operation 22-32 VDC

Head options:
Straight/ Straight reverse angle
90 degree / 90 degree reverse angle

Hi-G camera bracket:
Straight cable entry
Right angle cable entry

Cable options (standard or Hi-G):
Straight Top or rear entry
90 degree Top or rear entry
90 degree reverse angle Top or rear entry

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SLOW MOTION IMAGING SOLUTIONS

FASTCAM Multi
MULTI HEAD HIGH-SPEED CAMERA SYSTEM
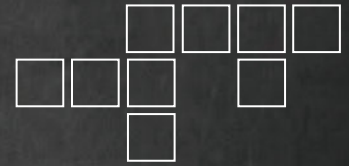
Compact Camera Heads provide Big Performance

The FASTCAM Multi is a unique, high-speed camera system featuring one or two compact and lightweight camera heads tethered to a remote processor. The small camera heads allow image capture at up to 6,000 frames per second (fps) at megapixel resolution within confined areas that are not large enough to support the size of a "typical stand alone" high-speed camera. The separation of the camera head from the processor ensures that image data is safely retained in the processor, even if the camera head is damaged or destroyed during an explosive event. No other high speed camera has the combination of high resolution, frame rate performance and small camera size that is available with the FASTCAM Multi.

Despite the small size of its camera head(s), the FASTCAM Multi provides a very high level of imaging performance. The system offers up to 4,800 fps at full 1,280 x 1,024 pixel resolution and 6,000 fps at 720 High Definition (HD) resolution, and with reduced resolution to 750,000 fps. A global shutter provides blur free 12-bit images with exposure times as short as 1 microsecond. The FASTCAM Multi's CMOS sensor features 10 micron square pixels that deliver light sensitivity of ISO 10,000 monochrome and ISO 5,000 color according to the ISO 12232 Ssat standard.

The FASTCAM Multi is compatible with a large quantity of off-the-shelf commercial lenses, including C mount, Nikon F (G-type) and Micro Four Thirds (MFT) lense mounts. Due to the small pixel pitch of the FASTCAM Multi's sensor, the camera is capable of utilizing 1" C mount lenses without the appearance of vignetting. Its distinctive feature set makes the FASTCAM Multi well-suited for many different applications including microscopy, detonation and explosives testing, off board automotive safety testing and more.

Target applications include:

- Biomechanics
- Life sciences
- Fluid dynamics
- Material science
- Defense and aerospace research
- Digital Image Correlation

Benefits

- Frame Rate Performance examples:
  - 4,800 fps at 1,280 x 1,024 pixel resolution
  - 6,000 fps at 1,280 x 824 pixel resolution
  - 10,000 fps at 896 x 488 pixel resolution
  - 16,000 fps at 1,280 x 296 pixel resolution
  - 150,000 fps at 1,280 x 24 pixel resolution
  - 750,000 fps at 640 x 8 pixel resolution

- One or two compact and lightweight camera heads
  - 69mm (2.72")W x 70mm (2.76")H x 151.4mm (5.96")D
  - 0.98kg (2.16 lbs.)

- Durable 5 meter (standard) and 10 meter (optional) cables

- Retention of video data if camera head is damaged or destroyed

- Electronics protected from dirt and dust

- Sensitivity: ISO 12232 Ssat standard
  - ISO 10,000 monochrome
  - ISO 5,000 color

- Compatibility with 1 inch C mount, Nikon G type and Micro Four Thirds (MFT) lenses

- 8GB, 16GB and 32GB memory options (per camera head) and high performance Gigabit Ethernet interface to PC

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FASTCAM Multi
MULTI HEAD HIGH-SPEED CAMERA SYSTEM
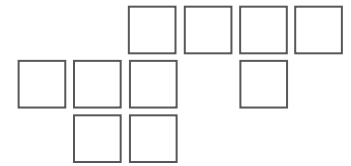
Specifications: Partial Frame Rate / Recording Duration Table

FRAME RATE	MAXIMUM RESOLUTION		RECORD DURATION (12-BIT)					
			TIME (Sec.)			FRAMES		
(fps)	Horizontal	Vertical	8GB	16GB	32GB	8GB	16GB	32GB
4,800	1,280	1,024	0.91	1.82	3.64	4,363	8,733	17,471
5,000	1,280	1,000	0.89	1.79	3.58	4,467	8,942	17,890
6,000	1,280	824	0.90	1.81	3.62	5,422	10,853	21,712
8,000	1,280	616	0.91	1.81	3.63	7,254	14,518	29,043
10,000	1,280	488	0.92	1.83	3.67	9,157	18,326	36,662
12,500	1,280	384	0.93	1.86	3.73	11,638	23,290	46,591
16,000	1,280	296	0.94	1.89	3.78	15,098	30,214	60,443
150,000	1,280	24	1.24	2.48	4.97	186,240	372,655	745,482
750,000	640	8	1.49	2.98	5.96	1,117,455	2,235,937	4,472,899

FASTCAM Multi Camera Head HS-01

Sensor
1,280x1,024 pixels, 10um pixel size, 12-bit ADC (Bayer system color, 36 bit single sensor)

Shutter
Global electronic shutter from 16.6ms to 1us dependent on frame rate

Lens Mount
F (G type lens mount compatible), C, MFT (optional)

Sensitivity
ISO 10,000 (mono), 5,000 (color) ISO 12232 Ssat Standard

Housing Design
RV (sealed body with fan) *fan stop feature is available

Mounting
1xM3, 1x1/4, 1x3/8

Dimensions
69mm (2.72") (W)×70mm (2.76") (H)×151.4mm (5.96) (D)

Weight
0.98kg (2.16lbs) (excluding protrusions)

Operating Temperature
0 - 45 degrees (32 - 104 degree F)

FASTCAM Multi Camera Cable

Type of cable
Multi Optical Camera Cable

Length
5m/10m *Special long distance will be available

Diameter
12.5mm (excluding connector)

Minimum bending radius
125mm

FASTCAM Multi Main Unit

Memory
8GB (4,363 frames @ maximum resolution) or
16GB (8,733 frames @ maximum resolution) memory options
32GB (17,471 frames @ maximum resolution) memory options

Camera Control
Software control through High speed Gigabit Ethernet or Remote Keypad (*Coming soon)

No. of Camera Port
1ch or 2ch selectable

Trigger Modes
Start, Center, End, Manual, Random, Random Reset, Random Center, Random Manual

I/O
Input: Trigger (TTL/Switch), Sync, Ready, Event, IRIG
Output: Trigger, Sync, Ready, Rec, Expose, IRIG_1PPS

Phase Lock
Enables cameras to synchronized precisely together to a master camera or external source, such as IRIG time codes

Timing
Internal clock or external source $<0V\sim+12V$ (H level$+2.5\sim+12V$) *Variable frequency synchronization is available$>$

Video Out
Mini Display Port *format is based on HDMI, HD-SDI (*Coming soon)

Saved Image Formats
JPEG, AVI, TIFF, BMP, RAW, PNG, MOV and FTIF. Images can be saved with or without image or comment data

Data Display
Frame Rate, Shutter Speed, Trigger Mode, Date or Time, Status (Playback /Record), Real Time, Frame Count and Resolution

Housing design
RV (sealed body with fan)

Operating Temperature
0 - 45 degrees (32 - 104 degree F)

Dimensions
260mm (10.24") (W)×140mm (5.51") (H)×223mm (8.78") (D)

Weight
7.8kg (17.2lbs) (excluding protrusions)

Power Requirements
100V-240V AC 200W , 50-60Hz DC operation 20-34V, 180VA

Specifications subject to change without notice

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