pco.1200 hs / pco.1200 s
digital high speed 10bit CMOS camera system

- 636 fps at full resolution (1357 fps at VGA resolution)
- high resolution (1280 x 1024 pixel)
- exposure time range 50ns - 5s
- image memory in camera (camRAM up to 4 GB)
- standard interfaces (IEEE 1394, camera link)
- mobile solution with Tablet PC LE1600

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pco.1200 hs / pco.1200 s

This high speed 10bit CMOS camera system comprises advanced CMOS and electronics technology. With the new approach to integrate the image memory into the camera itself (camRAM up to 4GB), it enables unmatched fast image recording with 1GB/s (hs) / 820MB/s (s). The system features an excellent resolution (1280 x 1024 pixel) and low noise. It consists of a compact camera with an external intelligent power supply. The image data are transferred via customer selectable standard data interfaces to a computer (IEEE 1394a Firewire, Camera Link). The available exposure times range from 1µs (50ns opt.) to 5s (hs) / 1µs to 1s (s). This digital camera system is perfectly suited for high speed camera applications such as material testing, fast inspection, external crash tests or super slow motion image recordings for video clips and advertising.

technical data

	unit	setpoint	pco.1200 hs	pco.1200 s
resolution (hor x ver)[1]	pixel		1280x1024	1280x1024
pixel size (hor x ver)	µm²		12.0 x 12.0	12.0 x 12.0
sensor format/ diagonal	mm²/ mm		15.36x12.29/ 19.67	15.36x12.29/ 19.67
peak quantum efficiency	%	@ 520nm typical	25	25
full well capacity	e⁻		63 000	63 000
image sensor			MT9M413	MT9M413
dynamic range	dB	@ camera	59.6	59.6
dynamic range A/D[2]	bit		10	10
readout noise	e⁻ rms	@ 66 MHz @ 67.7 MHz	41	 41
imaging freq., frame rate	fps	@ full frame @ ROI VGA	636 1357	501 1068
pixel scan rate	MHz	hs: dual speed	66 / 86	67.7
A/D conversion factor	e⁻/count		25	25
spectral range	nm		290..1100	290..1100
exposure time	s	hs: 50ns opt.	1µs..5s	1µs..1s
anti-blooming factor		typical	no blooming	no blooming
smear	%		no smear	no smear
binning horiz.	pixel		1, 2	1
binning vert.	pixel		1, 2	1
dark current	e⁻/pixel·s	@25 °C typical	5900	5900
region of interest (ROI)	pixel	horizontal vertical	steps of 10 steps of 1	steps of 10 steps of 1
interframing time (PIV mode)	ns	@ FWHM[3] and 100% fullwell signal	70	not available

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technical data

	unit	setpoint	pco.1200 hs	pco.1200 s
non linearity	%	full temperature	< 2	< 2
uniformity darkness DSNU[4]	e^- rms	@ 90% center zone	< 700	< 700
uniformity brightness PRNU[5]	%	typical	0.6	0.6
trigger auxiliary signals		internal external	software TTL level	software TTL level
power consumption	W	typical maximum	25 40	25 40
power supply	VAC		90..260 (12VDC opt.)	90..260 (12VDC opt.)
mechanical dim. camera (w x h x l)	mm^3		84 x 66 x175	84 x 66 x 175
mechanical dim. power supply (w x h x l)	mm^3		135 x 51 x 195	135 x 51 x 195
weight	kg		1	1
operating temp. range	°C		+5..+40	+5..+40
operating humidity range	%		10..90	10..90
storage temp. range	°C		-20..+70	-20..+70
optical input			Nikon f-mount, c-mount	Nikon f-mount, c-mount
data interface			IEEE1394a, camera link	IEEE1394a, camera link
CE certified			yes	yes

[1] horizontal versus vertical
[2] Analog-to-Digital-converter
[3] full width half maximum
[4] dark signal non-uniformity
[5] photo reponse non-uniformity

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software: Camware software for camera control, image acquisition and archiving of images in various file formats, WindowsXP and later, 32bit-dynamic link library (DLL) is available for user customisation and integration on PC platforms (software development kit - SDK), software is operational in either single mode or with built-in recorder functions, drivers for popular third party software packages are available (see website)

options: CMOS image sensor in color version
custom-made versions
camRAM available in: 1 GB, 2 GB, and 4 GB

pco.1200 hs frame rate table [frames per second][1]

pixelclock exposure time	66 MHz 1/fps / <1/fps	86 MHz 1/fps / < 1/fps
1280x1024 pixel (full frame)	488 / 486	636 / 634
1280x512 pixel	977 / 969	1272 / 1263
1280x256 pixel	1953 / 1923	2545 / 2506
1280x128 pixel	3906 / 3788	5090 / 4936
1280x64 pixel	7813 / 7353	10180 / 9581
1280x32 pixel	15625 / 13889	20360 / 18098
1280x16 pixel	31250 / 25000	40720 / 32576

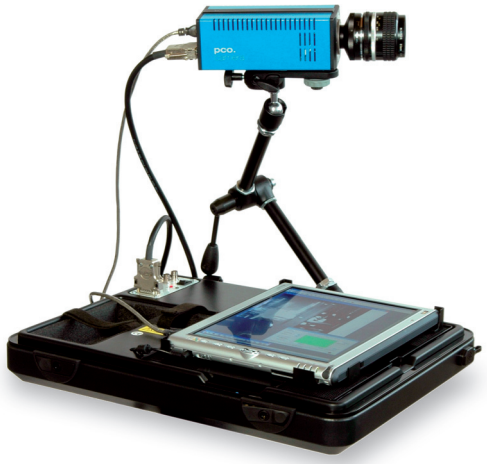
pco.1200 s frame rate table [frames per second][1]

pixelclock exposure time	67.7 MHz 1/fps / <1/fps
1280x1024 pixel (full frame)	501 / 499
1280x512 pixel	1002 / 994
1280x256 pixel	2003 / 1972
1280x128 pixel	4006 / 3883
1280x64 pixel	8011 / 7533
1280x32 pixel	16019 / 14216
1280x16 pixel	32023 / 25545

[1] The given resolutions are selected for the frame rate calculations in the tables only, they are not mandatory. For ROIs see "technical data" table on page 2.

pco.inspector high speed

- all-in-one mobile solution with Tablet PC LE1600
- more than 2 h operation by battery
- easy to use tripod



Tablet PC - Motion Computing LE1600

technical data: Tablet PC LE1600

processor		@ 1.5 GHz	Intel® Pentium® M processor LV758
operating system			MS® Windows® XP Tablet PC Edition
RAM	GB		1
harddisk	GB		60
display		XGA TFT LCD View Anywhere®	12"
weight	kg		1.42
mechanical dimensions Tablet PC (w x h x l)	mm^3		296 x 240 x 22
operating temperature range	°C		+5..+35
operating humidity range	%		20..80
storage temperature range	°C		-20..+65
CE certified			yes

Further technical information can be found on:
www.motioncomputing.com or www.thetabletstore.de

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Adept Electronic Solutions
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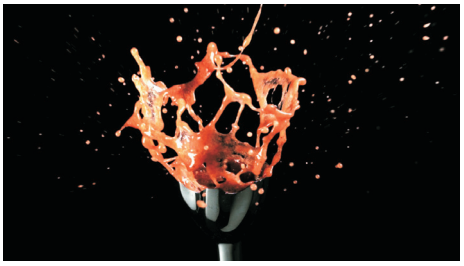
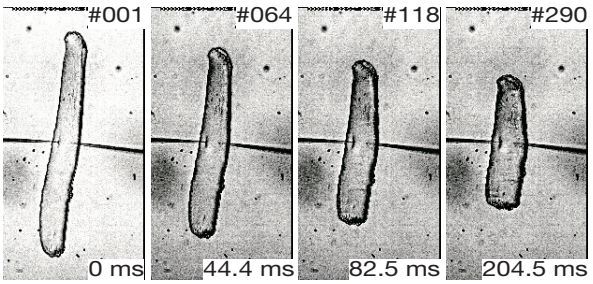
areas of application

■ high speed particle image velocimetry (PIV) ■ high speed inspection ■ short time physics ■ hyper velocity impact studies ■ automobile crash tests ■ material testing ■ tensile tests ■ airbag inflation ■ fast flow visualisation ■ visualisation of fast biological events ■ traffic control ■ spray analysis ■ hydrodynamics ■ fuel injection ■ super slow motion video clips ■ combustion process analysis ■ semiconductor quality control ■ fast events in nature and medicine ■ ballistics

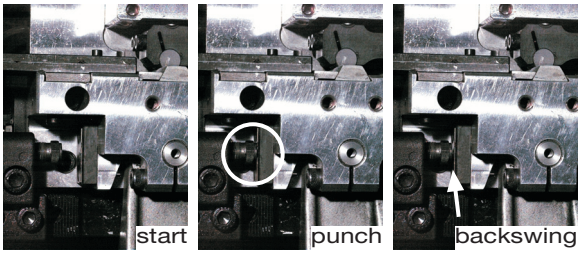
Image out of a sequence recording a strawbeery falling into a mixer, which was part of an advertising clip recorded at 900 fps (resolution 1280 x 720 pixel).
...with friendly permission of S. Weiss, Munich, Germany, www.weisscam.com



The images are taken from a sequence showing the contraction of a single skeletal muscle cell (length = 600µm, thickness = 50µm) after intra-cellular stimulation. The series starts at time 0 with image #001 (300x479pixel, 1400fps).
...with friendly permission of O. Friederich, Medical Biophysics Group, Institut für Physiologie & Pathophysiologie, Heidelberg, Germany



The images are taken with a pco.inspector hs from a sequence showing the punching action of a machine with a backswing that caused errors in the process. After having seen the sequence, the problem had been solved (1280x1024pixel, 636fps).
...with friendly permission of N. Porta, Vettweiss, Germany, www.sciencedocu.com



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