

data sheet

pco.edge 9.4 bi CLHS

the next level **sCMOS** camera

bi back
illuminated

resolution

9.4 MPixel

pixel size

4.6 μm x 4.6 μm

interface

CLHS FOL



high dynamic range
20,000 : 1

high frame rate
122 fps

high resolution
4096 x 2300 pixel

ultra low readout noise
0.3 e^- _(med)

back illuminated sCMOS
with high MTF

temperature-stabilized
image sensor

technical data

image sensor

sensor technology	back illuminated scientific CMOS (bi sCMOS)
color type	monochrome
resolution (horizontal x vertical)	4096 pixel x 2300 pixel
pixel size (horizontal x vertical)	4.6 μm x 4.6 μm
sensor size (horizontal x vertical)	18.8 mm x 10.6 mm
sensor diagonal	21.6 mm
shutter type	rolling shutter
modulation transfer function (theoretical max.)	108.6 lp/mm
fullwell capacity	7000 e ⁻
readout noise (typ.)	0.5 e ⁻ rms @ fast scan 0.4 e ⁻ med @ fast scan 0.4 e ⁻ rms @ slow scan 0.3 e ⁻ med @ slow scan
dynamic range (intra-scene)	20,000 : 1
peak quantum efficiency	85 % @ 500 nm
spectral range	400 nm - 1100 nm
dark current	0.4 e ⁻ /pixel/s @ +10 °C sensor temperature

frame rate table

vertical resolution reduction		
	fast scan	slow scan
4096 x 2300	122 fps	30 fps
4096 x 2048	137 fps	34 fps
4096 x 1024	274 fps	68 fps
4096 x 512	546 fps	136 fps
4096 x 256	1079 fps	269 fps
4096 x 128	2111 fps	527 fps
4096 x 64	4041 fps	1010 fps
4096 x 32	7445 fps	1861 fps
4096 x 16	12,860 fps	3215 fps
4096 x 8	20,208 fps	5052 fps

typical resolutions

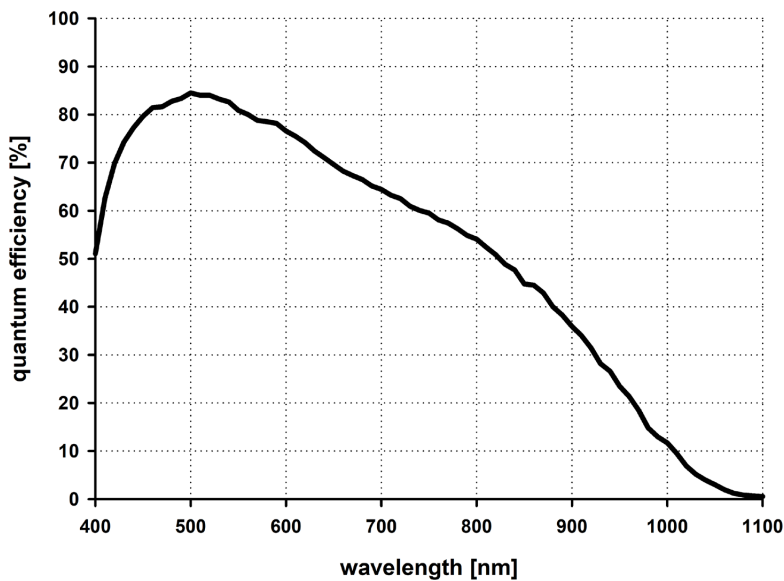
	fast scan	slow scan
2048 x 2048	137 fps	34 fps
1920 x 1080	260 fps	65 fps
1280 x 1024	274 fps	68 fps
640 x 512	546 fps	136 fps
320 x 256	1079 fps	269 fps

camera

max. frame rate @ full resolution	122 fps @ fast scan 30 fps @ slow scan
exposure time range	7.1 μ s - 1 s @ fast scan 28.3 μ s - 1 s @ slow scan
dynamic range A/D	16 bit
conversion factor¹	0.11 e ⁻ /DN
pixel rate	1467 MPixel/s @ fast scan 366 MPixel/s @ slow scan
region of interest (ROI)	horizontal: steps of 32 columns vertical: steps of 4 rows
binning	horizontal: x2, x4 (average, sum) vertical: x2, x4 (average, sum)
non-linearity	< 0.3 %
dark signal non-uniformity (DSNU)	< 0.1 e ⁻ rms
photo response non-uniformity (PRNU)	< 0.3 %
cooling temperature image sensor	+10 °C stabilized
cooling method	forced air & water
trigger input signals	frame trigger, sequence trigger, programmable input
trigger output signals	exposure, busy, programmable output
input / output signal interface	SMA connectors
time stamp	in image (1 μ s resolution)
data interface	Camera Link HS FOL

¹ According to EMVA1288 the conversion factor equals the inverse of the system gain and can be operational mode dependent.

quantum efficiency



general

power supply	24 VDC (±10 %)
power consumption	< 40 W
weight	1.35 kg
dimensions (height x width x length ¹)	95 mm x 90 mm x 109 mm
operating temperature range	+10 °C to +40 °C
storage temperature range	-10 °C to +60 °C
humidity range (non-condensing)	10 % to 80 % (recommended <65 %)
CE / FCC certified	yes

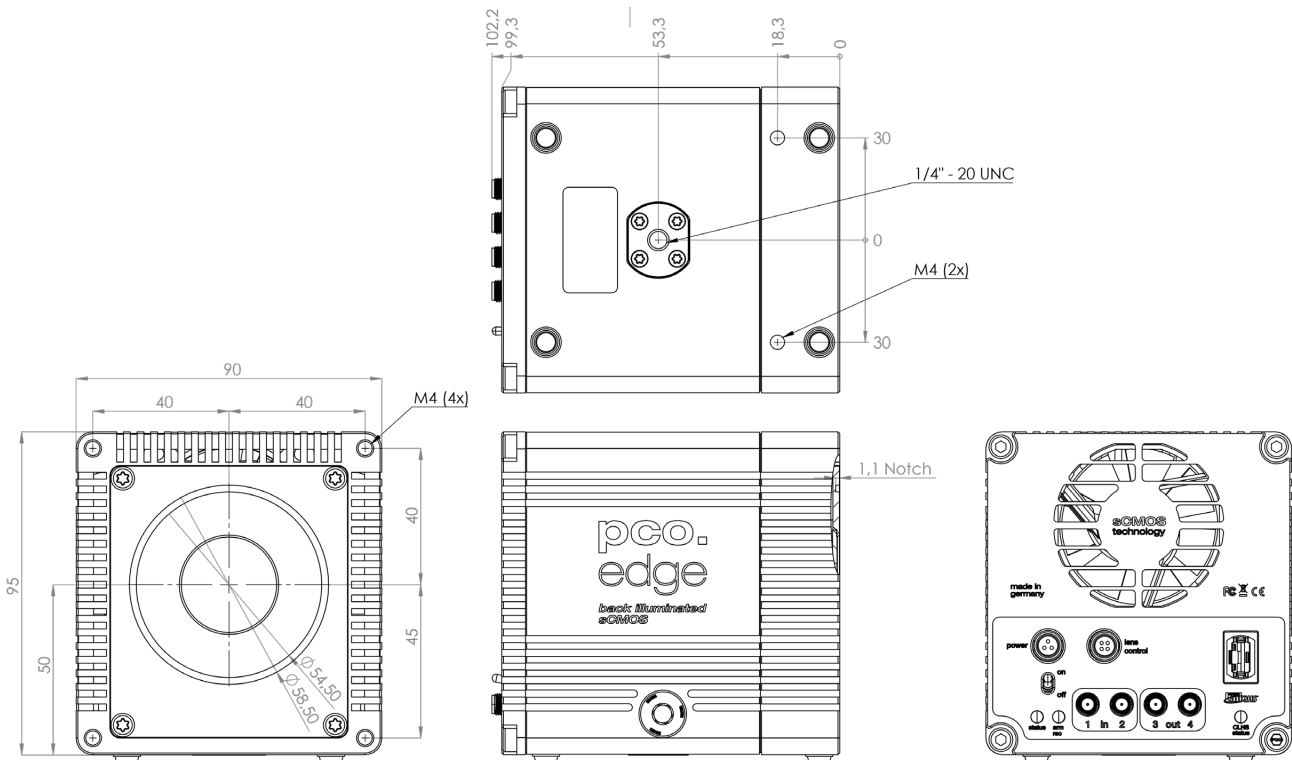
¹This value refers to the length including the lens mount adapter.

optical interface

direct mounting	6.2 mm ± 10 %
lens mounting	C-mount
optional lens mounting	F-mount, TFL-mount
optional lens remote controller	EF-mount, EF-S-mount (Canon)

Configure your optical setup with our **MachVis Lens Selector** online tool.

dimensions



Outlines of pco.edge 9.4 bi CLHS without lens mount adapter (all dimensions given in mm).

software

Your first choice is pco.camware:

Our main camera control software enables full control of all camera settings and facilitates image acquisition and storage. You can customize it exactly to your needs using different layouts, styles and features.



You prefer to use a different software:

PCO cameras are integrated in a variety of software applications.



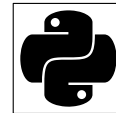
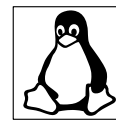
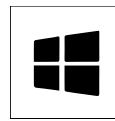
(in preparation)



(in preparation)

You want to create your own application:

We offer a wide range of Software Development Kits (SDK) for different programming languages, both for windows and linux. Our pco.sdk, pco.recorder and high-level SDK are designed for C/C++ apps. With pco.python, pco.matlab, pco.labview and pco.java you can control the camera in your C#, python, matlab, labview and java applications, respectively.



You are in the field of microscopy:

PCO cameras are integrated in μ Manager.



areas of application

brightfield microscopy | fluorescence microscopy | digital pathology | single molecule localization microscopy (SMLM) | lightsheet fluorescence microscopy (LSFM) | selective plane illumination microscopy (SPIM) | structured illumination microscopy (SIM) | raman spectroscopy | calcium imaging | Förster resonance energy transfer (FRET) | fluorescence recovery after photobleaching (FRAP) | high-speed brightfield ratio imaging | high throughput screening | ophthalmology | biochip reading | total internal reflection fluorescence microscopy (TIRF) | 3D metrology | industrial quality inspection | wafer inspection | image intensifier imaging | intravital microscopy | inspection | material testing | biometrics | in-vivo microscopy

ordering information

pco.edge 9.4 bi CLHS

85108076030

camera system, mono, 122 fps @ 4096x2300 pixel, CLHS, rolling shutter

pco.[®]

address: Excelitas PCO GmbH
Donaupark 11
93309 Kelheim, Germany

phone: (+49) 9441-2005-0
(+1) 86-662-6653
(+86) 0512-6763-4643

mail: pco@excelitas.com

web: www.excelitas.com/pco



excelitas.com


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