

NanoStar

Lens-coupled intensified
sCMOS camera

LaVision's **NanoStar** cameras couple optically a 25 mm high resolution image intensifier with an outstanding high efficiency tandem lens system to a 16 bit 4 Mpixel sCMOS sensor. Camera Link HS, the latest standard of high performance data interfaces for scientific cameras, guarantees uncompressed and robust 16 bit data transfer via optical fiber over virtually any distance.



System Features

- ▶ lens coupled 25 mm intensifier
- ▶ exposure times: 4 ns - 1 s
- ▶ 2048 x 2048 pixel sCMOS sensor
- ▶ up to 104 fps@16 bit and full resolution
- ▶ S20 photo cathode, P43 phosphor other combinations on request
- ▶ Camera Link HS data interface
- ▶ camera operation under DaVis software control

Applications

- ▶ combustion diagnostics
- ▶ Laser Induced Fluorescence (LIF)
- ▶ chemiluminescence
- ▶ low light level imaging

sCMOS Sensor Specifications

Type of sensor	scientific CMOS (sCMOS)
Resolution (h x v)	2048 x 2048 active pixel
Pixel size (h x v)	6.5 μm x 6.5 μm
Sensor format / diagonal	13.3 mm x 13.3 mm / 18.8 mm
Shutter mode	single image / double image
MTF	76.9 lp/mm (theoretical)
Full well capacity	15 000 e ⁻
Readout noise	1.5 e ⁻ rms, single image 2.5 e ⁻ rms, double image
Dynamic range	13 600 : 1 (82.7 dB)
Quantum efficiency	58 % for P43 peak emission @ 545 nm 57 % for P46 peak emission @ 530 nm
Spectral range	370 nm ... 1100 nm

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Camera System Specifications

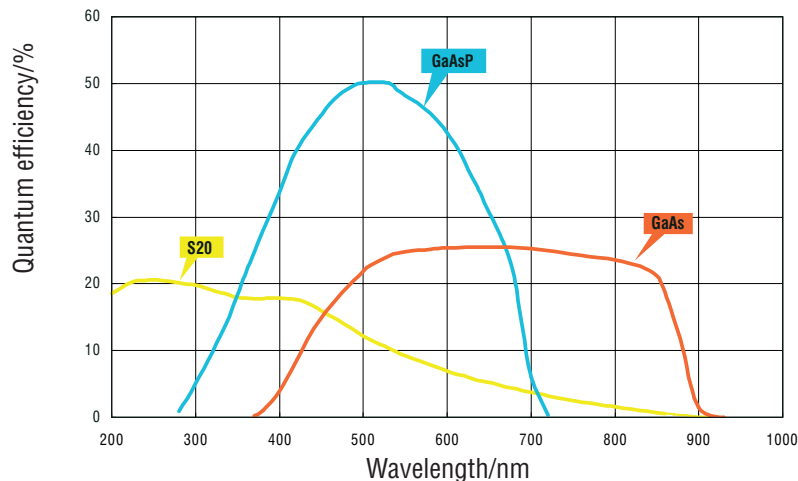
Frame rate	up to 104 fps@ 2048 x 2048, (up to 830 fps@2048 x 256) depending on phosphor, e.g. for P43: 93 fps@ 2048 x 2048
Dynamic range A/D⁴⁾	16 bit
Pixel scan rate	286.0 MHz
Binning horizontal	x1, x2, x4
Binning vertical	x1, x2, x4
Non linearity	< 1 %
Cooling method	+7 °C stabilized, 1 stage peltier with forced air (fan)
Data interface	Camera Link HS (Single F2,1X1, S10), frame grabber CLHS (optical CamLink HS) for PCIe slot included

⁴⁾ The high dynamic signal is simultaneously converted at high and low gain by two 11 bit A/D converters and the two 11 bit values are sophisticatedly merged into one 16 bit value.

Image Intensifier Specifications

Type	HighRes MCP (6 µm channel)
Input window	synthetic silica, borosilicate (MgF ₂ optional)
Photocathode material	S20, GaAs, GaAsP (others on request)
Image intensifier MCP type	single stage low resistance MCP for high strip current
MCP operational modes	continuous gated for enhanced extinction ratio
Image intensifier diameter	25 mm (18 mm optional on request)
Phosphor screen material	P43, P46
Output window	glass
System resolution	> 50 lp/mm @ 5 % MTF typical (depends on phosphor)
Shortest gating time	4 ns

Spectral Sensitivities



Photocathode material	Peak wavelength [nm]	Quantum efficiency at peak wavelength [%]	Equivalent background input (EBI) [W/cm ²]	Dark counts [s ⁻¹ /cm ²]
S20 (multialkali)	430	14 .. 18	3·10 ⁻¹⁴	1500
GaAs	530 - 750	23	3·10 ⁻¹⁴	30 000
GaAsP	480 - 530	50	3·10 ⁻¹⁴	10 000

Spectral sensitivities of different photocathode materials: S20 (multialkali), GaAs, GaAsP

Data courtesy of Hamamatsu Photonics

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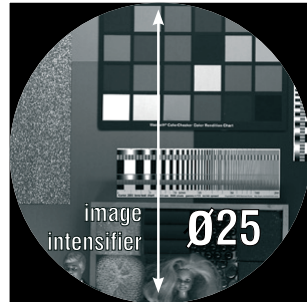
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Optical Coupling

“Ultra speed tandem lens” between image intensifier & sCMOS

Transmission efficiency > 30 %
Vignetting < 3 %
Resolution > 60 lp/mm

2048

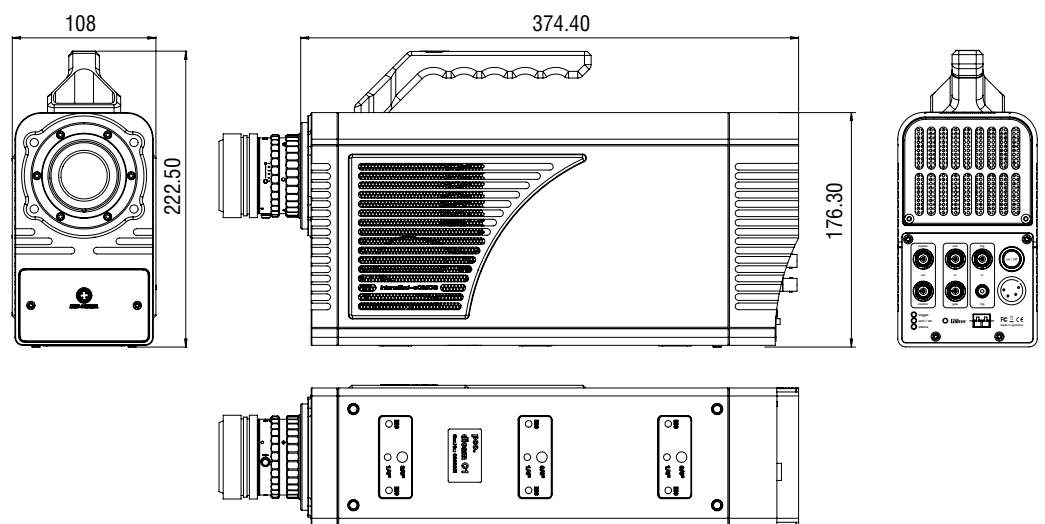


The projected image circle is completely covered by 2048 x 2048 6.5 µm pixels of the sCMOS detector - image left. There is no “waste” of valuable intensifier area. As a consequence the four corners of the sCMOS sensor remain black.

For a fast scan of just a few vertically centered lines - the camera module allows for up to 1.000 fps for such a ROI - the full line length of 2048 pixels is available.

Power supply 18 ... 28 VDC
Power consumption 35 ... 40 W
Weight 7 kg
Operating temperature + 10 °C ... + 40 °C
Operating humidity range 10 % ... 80 % (non-condensing)
Storage temperature range - 10 °C ... + 60 °C
Optical interface F-mount & C-mount
CE / FCC certified yes

Dimensions



all dimensions shown in mm

Data provided by LaVision are believed to be true. However, no responsibility is assumed for possible inaccuracies or omissions. All data are subject to change without notice.

Sep-23

Ordering information

Part number	Description
1102094	NanoStar intensified sCMOS camera, P43, S20, frame grabber included
1102098	NanoStar intensified sCMOS camera, P43, GaAsP selected, frame grabber included
1102099	NanoStar intensified sCMOS camera, P46, S20, frame grabber included

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