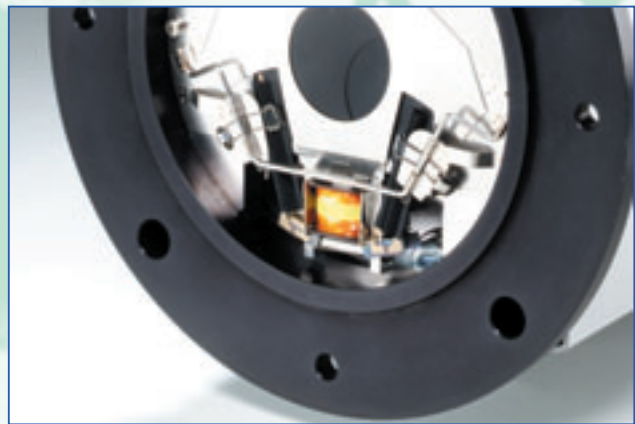
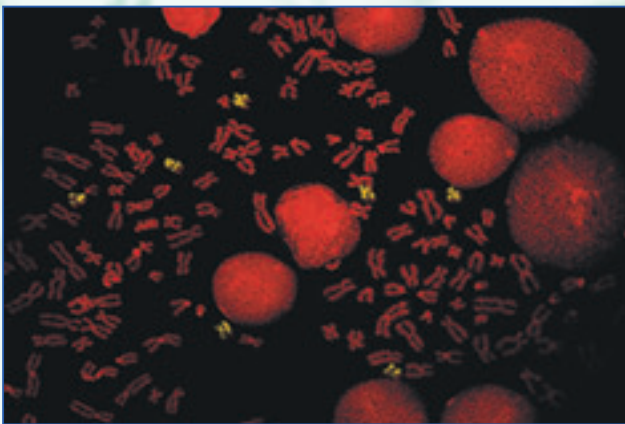


detect and identify



NightOWLcam LB 982

Cooled Slow Scan
CCD Cameras
for Molecular Imaging

NightOWLcam LB 982

Cooled Slow Scan CCD Cameras for Molecular Imaging

Using the latest technology NightOWL™ cameras from BERTHOLD TECHNOLOGIES are high sensitive cooled slow scan CCD cameras for applications in ultra high-sensitivity luminescence imaging and other low light applications at longer exposure times with a standard C-mount for microscopes.

Adaption of such CCD cameras to a microscope enables the investigation of tissue sections from insects, animals and plants or even single cell events. Two models are available:

NC 320, a front-illuminated with high array resolution, best suited for fluorescence applications. NC 100, a back-illuminated with high full well capacity and very low readout noise, best suited for low level luminescence imaging.

Applications for	NC 100	NC 320
Biochip	+	+
Bioluminescence	+++	++
Blot documentation	++	++
Chemiluminescence	+++	++
Colony counting	++	++
Fluorescence	++	+++
Gel documentation	++	++
In-vivo Imaging	+++	++
Microplates	+	+
Microscopy	++	+++
Multi-label measurements	+++	++

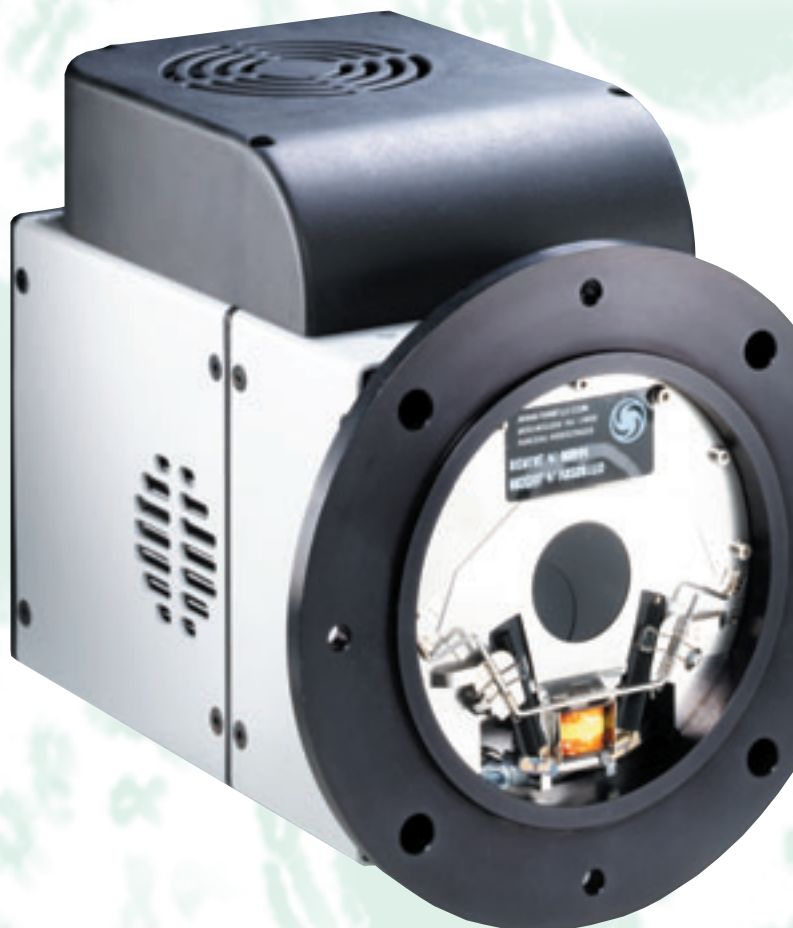
+ good performance ++ superior performance +++ excellent performance

Full-frame CCD cameras

Images are optically projected onto the front of a parallel array that acts as the image plane. The array takes the image information and partitions the image into discrete elements that are defined by the number of pixels thus "quantizing" the image. The resulting rows of image information are then shifted in a parallel fashion to the serial register that subsequently shifts the row of information to the output as a serial stream of data. The process repeats until all rows are transferred off chip.

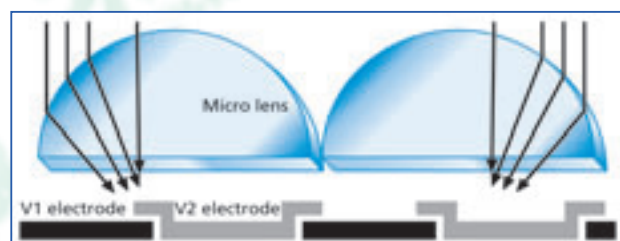
The image is then reconstructed as dictated by the system. Since the parallel register is used for both image detection and readout, a mechanical shutter must be used to preserve image integrity.

This technology allows quantification of the taken images very reliable, which is the need of every researcher to compare his results.



NightOWLcam NC 320

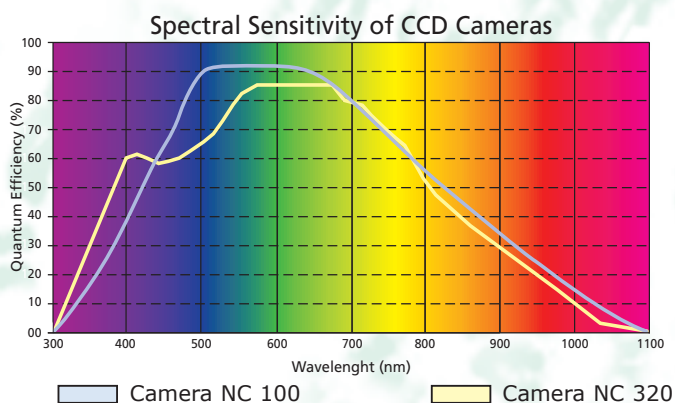
is a front-illuminated (or frontlit) CCD camera with a 3.2 Mpixel CCD chip. Such a pixel density results in high optical resolution. Cooling is performed up to 60 °C below ambient temperature, which is efficient in fluorescence.



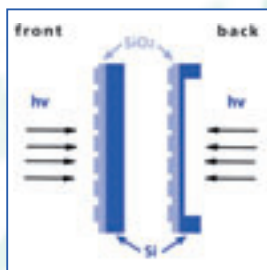
To improve the sensitivity of the camera, microlenticular arrays are formed directly over each pixel. These arrays are tiny little lenses ("lenslets") which act to focus the light that would normally strike the non-photosensitive areas into those regions which are sensitive. This new technology results in enhancing the quantum efficiency of front-illuminated CCD up to 85%.

NightOWLcam NC 100

is an ultra sensitive back-illuminated (or backlit) CCD camera with midband coating enhancing the quantum efficiency up to 90% in the spectral range between 500 – 660 nm, which is optimal for e. g. firefly luciferase and GFP.



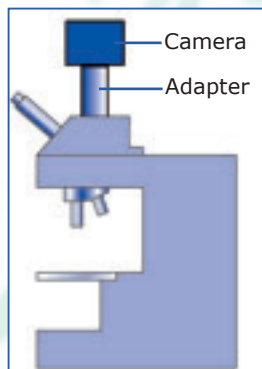
Back-illumination refers to a method of preparing the CCD sensor so that the photons directly strike the light-sensitive thinned back surface, in contrast to conventional CCDs where photons pass through non-light sensitive elements on the front of the CCD with a resulting loss of efficiency.



Today, these systems also have very low noise, and long exposures can therefore be used to integrate the signal over time and to obtain a usable signal. Noise of a digital image consists of the signal noise and the camera noise which again comprises readout noise and dark noise, which is directly linked to the temperature. Efficient cooling of the array to more than 100 °C below ambient temperature and AIMO technology for best readout result in a cooling equivalent of more than 170 K for lowest light detection.

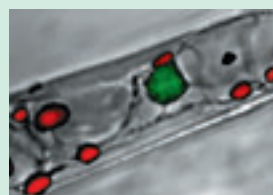
Optical interface

The cameras are equipped with a female C-mount adapter, the standard connection in microscopy. Other optical interfaces like F-mount are available on request.

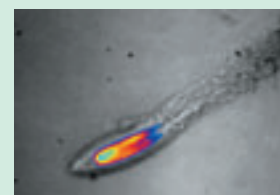


Applications

- In vivo imaging of reporter gene expression in single cells for studying gene expression, transfection efficiency, protein targeting, protein localization and living cells

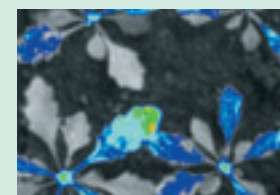
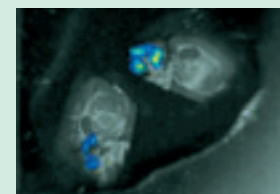


Visualization of GFP expression in tobacco roots. With the powerful overlay technique localization of fluorescent signals in tissues, individual cells and organelles is possible.



Monitoring of GFP localization in a leafhair cell of a transgenic tobacco plant. GFP cDNA was modified to include a targeting sequence to localize GFP selectively in the nucleus of the cell.

- ATP measurement
- Visualization of cellular luminescence e.g. in the brain of a transgenic mouse section
- FISH imaging
- BRET
- Imaging of immunofluorescence stained samples
- Monitoring of Ca²⁺ flux
- Adaption into plant chambers
- Gel and Blot documentation



NightOWLview Software

is a TWAIN based software module enabling the integration of NightOWLcams into any TWAIN 16-bit compatible imaging software. NightOWLview controls all camera and shutter functions. After acquisition the image is automatically transferred into imaging software e.g. Image-PRO® for further evaluation. Camera and PC are connected with a standard Ethernet network to control the camera also from a distance (darkroom).

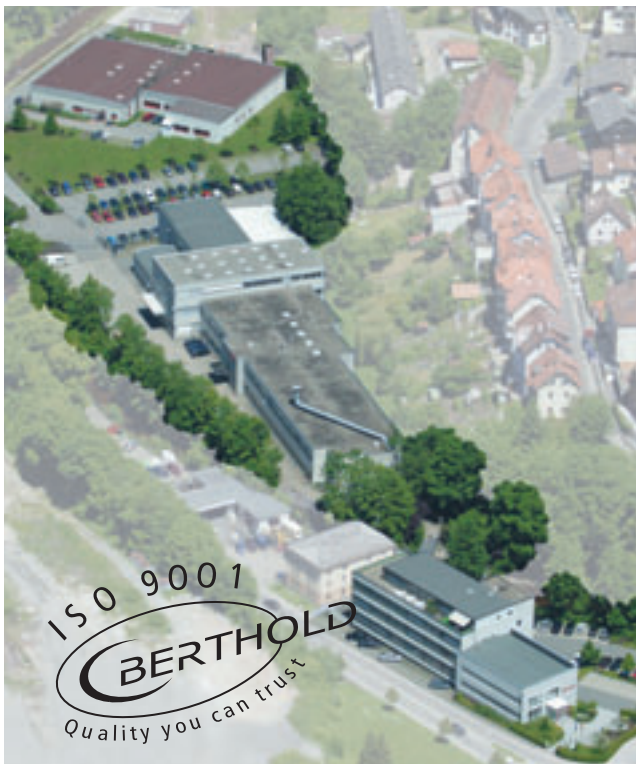
NightOWLcam LB 982

Technical Specification and Order Information

All cameras are slow scan CCD cameras with full frame architecture and 100 % fill factor.
A/D conversion is 16 bit.
Mechanical shutter, to preserve image integrity.
C-mount as standard optical interface (others on request)
115–230 V transformer included

Camera	NC100	NC320
CCD array type	back-illuminated	front-illuminated
Grade	1	1
Sensitive area	13,6 x 13,6 mm	14,8 x 10,3 mm
Pixel size	13,3 x 13,3 μm	6,8 x 6,8 μm
Pixel resolution	1024 x 1024	2184 x 1472
Optical resolution (10 cm sample distance)	<100 μm	<50 μm
Spectral range from	300 to 1050 nm	300 to 1050 nm
Max. quantum efficiency	90% at 620 nm	85% at 600 nm
Full well capacity (without binning)	100.000 e-/pix	55.000 e-/pix
Readout noise	<7 e- rms	<12 e- rms
Dynamic range	82 dB	73 dB
Dark current	0,0007 e-/s/pix at -60 °C	0,01 e-/s/pix at -35 °C
Cooling performance	>- Δ 80 °C	>- Δ 60 °C
Integral linearity	\pm 1%	\pm 1%
Pixel readout rate	100/500 kpix/s	500 kpix/s
Ethernet data rate	1 Mb/s	1 Mb/s

Order information	Order Number
LB 982 NightOWLcam NC 100, back-illuminated, 1 MPixel	27866-20
LB 982 NightOWLcam NC 320, front-illuminated, 3,2 MPixel	27866-21



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Image-PRO is a registered trademark of MediaCybernetics.

BERTHOLD TECHNOLOGIES reserves the right to implement technical improvements and/or design changes without prior notice.



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