

CellCam™ Kikker Camera

Manual



The Kikker provides excellent image quality with a large field of view at an affordable price. The camera is thermoelectrically cooled giving low dark current and has 90% Quantum Efficiency and true 14-bit digitisation which can be optimised for low light and/or high dynamic range. This is the go-to camera for versatile imaging with 40X to 100X microscope objectives, but also includes an auxiliary high resolution mode for diffraction limited imaging with lower magnification objectives, or 4/3 inch format macro cameras lenses.

System Installation

Introduction

The Kikker CMOS camera system includes the following hardware components:

- Kikker CMOS camera
- USB Hub
- USB Cable
- DC Power Supply
- USB Memory Device containing CellCam library and drivers and manual

The Kikker camera is powered via a DC power supply and connects to the PC via USB 3.0 connection. While it is recommended to operate the camera via the USB Hub supplied, it is also possible to run the camera through a PC's native USB 3.0 port. All these hardware components should be included with the shipment. Please retain original packing materials so you can safely ship the camera to another location or return for service if necessary. Please get in contact with a member of our support team if you have any difficulties with the camera setup procedure (tech@cairn-research.co.uk).

Software Compatibility

The latest version of the camera driver is provided on the USB memory device. The latest driver version and CellCam SDK can also be accessed through our website (www.cairn-research.co.uk/support/software).

Host Computer Requirements

The host computer (PC) for the Kikker camera must meet the following minimum requirements:

- Windows 10 64-Bit operating system
- 2.0GHz or faster Intel processor: either Xeon or Core i7
- 16GB RAM
- 250+ GB serial ATA (SATA) HDD and/or >512 GB solid state drive (SSD) for high speed imaging and storage
- USB port for use with USB memory device

Software Installation

The Cairn USB memory device contains the following files:

- Manual directory - contains user manuals in PDF format
- Micromanager directory - contains Micromanager 2.0 installer and CellCam Micromanager driver.

Follow the installation guide on the memory stick.

Connecting the Power and USB cable

Once the power cable is connected to the camera it will power on. Once the USB cable is connected from the camera to the host PC you will be able to use the camera.

Theory of Operation

Digital Binning

The sensor is set up for the default acquisition mode to be a sensor-locked hardware 2x2 bin giving 11.7 MPixel, but this can be unlocked in software to give 46.8MPixels

Expose Out Behaviour

The Kikker is a rolling shutter camera.

Cooling

The Kikker camera is a thermoelectrically cooled camera down to -30°C (below ambient).

Gain

The Kikker has an additional setting for High Conversion Gain (HCG) or Low Conversion Gain (LCG). We would suggest 100 (1X) at LCG for full dynamic range and 1000 (10X) at HCG for high sensitivity, but still with good dynamic range.

Specifications	Camera Performance
Interface	USB 3.0
Sensor Type	Mono, Sony Based Back-Side Illuminated CMOS
Peak QE%	90%
Read Noise	<1.5e-
Active Array Size	4128 x 2808 (11.6 Megapixel)
Pixel Area	4.63µm x 4.63µm (2.32µm x 2.32µm in high resolution mode)
Sensor Size	19 x 13mm, 23.2mm Diagonal
Bit Depth	14-bit and 8-bit
Cooling	Thermoelectric to -30°C (below ambient)
Frame Rates (full sensor)	35 FPS @8-bit (17FPS @14-bit)

Field of view		8-bit		14-bit	
X/pixels	Y/pixels	Exposure (msec)	Frames / sec	Exposure (msec)	Frames / sec
4128	2808	28	33	60	16.5
2064	1404	15	63	30	31
1032	702	8	122	16	56
516	351	5	181	10	90
258	176	3	267	7	132
129	88	2	350	5	175

Device Properties in MicroManager

Device Properties	Factory Value	Range	Notes
Acquisition Start Delay	100	0-1000	Default 100msec is fine on most computers, the delay only applies to the first frame
Binning	1	1-8	Standard CMOS camera binning
Binning Mode	Average	Add / Average	Displays either the sum of binned pixels or the average - recommend defaulting to average
Continuous Snap	Enabled	Disabled / Enabled	Normally enabled if using camera for timelapse
Conversion Gain	Low Gain	High Gain / Low Gain	
Fan Speed	1	0 / 1	Fan should be on as peltier cooled
Format	8-Bit	8-Bit / 14-Bit	14-Bit for most applications
Gain	400	100-16000	See notes above
High Resolution Mode	Disabled	Disabled / Enabled	Default to disabled leaving 4.63µm pixels @11.6 MPixel, Hi Res mode switches to 2.315µm pixels @ 46.8 MPixel
TransposeCorrection	0	0 / 1	Not usually used
TransposeMirrorX	0	0 / 1	Not usually used
TransposeMirrorY	0	0 / 1	Not usually used
TransposeXY	0	0 / 1	Not usually used
USB-Speed	2	0 / 1 / 2	Default to 2 unless having USB connection issues