# MCAM ™
Kestrel
A-K2850
Behavior

Ramona's **Multi-Camera Array Microscope™ (MCAM)** uses an array of micro-cameras to capture an entire well plate in a single snapshot at 18K resolution.

The **Kestrel Behavior System** allows users to simultaneously observe all wells of a standard well plate with 24X higher spatial and temporal resolution than leading competitors. Detailed locomotion kinematics and gross morphology are rapidly quantified as readouts via customized high-speed software to unlock completely new workflows for quantifying organism behavior at high throughput.
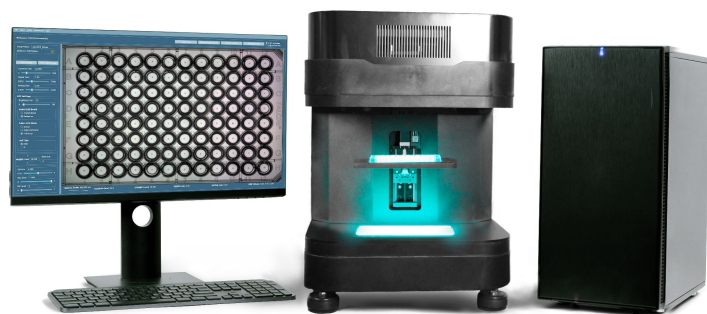
Development Partners

High-throughput

Inspired by the tools scientists use everyday, the **Kestrel Screening System** is ideal for assessments in standard SBS 96-well plates.

A Uniform View

Perspective makes peering into many well plates problematic with a single lens. Our array of micro-cameras and wide-field illumination ensure uniform observation across all wells.

Speed Control

Select speeds from 20fps to 340fps depending on the behavioral question being asked — total movement vs escape response, for example.

Custom Workflows

Already have an assay? Integrate it easily in our intuitive software and build upon your lab expertise and our technology.

MCAM ™ Model A
Kestrel *2850*
Behavior

Multi-Camera Array Microscope ™

Optical Characteristics

Field Of View	82mm x 118mm
Live View | Stitched View	Continuous | Live
Resolution	9.1µm/ pixel
Numerical Aperture	0.02
Working Distance	240mm
Depth of Field	3mm
Micro-Camera Array Size	6 x 4 = 24 micro-cameras
Micro-Camera Array Spacing	18mm
Micro-Camera Field of View	28.5mm x 28.5mm

Sensor Characteristics

Image Sensors	CMOS - RGB Color | Monochrome
Array Pixel Count	314 Megapixel
Pixel Size	1.1µm
Bit Depth	8
Dark Current (Typ.)	5.9 LSB/s
SNR (Typ.)	35 dB
Dynamic Range (Typ.)	70.3 dB
Monochrome Peak QE	92% at 460 nm
RGB Color Peak QE	85% at 520 nm
Digital Gain	7.75
Analog Gain	2
Minimum Exposure	1.5 microseconds
Maximum Exposure	9 seconds
Max. Frame Rate (full array)	22 fps (bin1)
Max. Frame Rate (partial array)	22 fps (bin 1)

Data

Maximum Data Rate	45 Gb/sec | 19 Gb/sec
Data Transfer Interface	PCIe 3.0 (x16) | (x4)
Native File Format	.nc (HDF5)
Exported Image File Format	.tiff, .bmp
Exported Video File Format	.mp4
Export Options	By Well ID
Metadata	.json
Metadata Options	By Plate Barcode
Local Storage	4 TB
Network-Attached Storage	Available Upon Request

Mechanical, Power, & Thermal

Microscope Orientation	Upright | Inverted
Access	Open | Enclosed
Vibration Dampening	Integrated
Dimensions (Typ.)	350mm x 350mm x 450mm
Weight (Typ.)	18kg
Stages - Motorized Linear Motion	<3µm Repeatability
	<50µm Unidirectional Accuracy
Stage Inserts	160mm x 110mm Universal Mount
Accepted Formats of Data by Well ID	Standard 24 & 96 Well Plates
Nominal Power Consumption	400W
Maximum Power Consumption	850W
Power	120V @ 60Hz | 240V @ 55Hz
Thermal Monitoring	K-Type Thermo. +/- 1.5C Accuracy | Reporting Integrated in Metadata
Active Thermal Control	Available Upon Request - Ramona + Tokai Hit Stage Top Module

Illumination

Transmission	LED Structured Illumination Panel
Control	Individually Addressable (+1400 LEDs)
Spectra	470 (B) + 518 (G) + 620 (R) + 840 (IR)
Reflection	LED Diffuse Illumination Rails
Control	Group Digital Addressable
Spectra	VIS | IR | UV

Operating Standards

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Ubuntu Linux	Version 22.04
Python	Version 3.9

Operation

Acquisition Modes	Snapshot, Z-Stack, Timelapse, Video
Observation Modes	Brightfield, Darkfield, Fluorescence
Focus	Global Linear Z-Positioning
GUI	Simple and Intuitive Application
API	Python-Based
Output Trigger	SMA Type @ 5V Signal

Software & Firmware

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Image Capture Firmware	Custom Gigapixel Frame Grabber
Cross-Sensor Synchronization	<6 microseconds
2D Image Mosaicing	Live
Gigapixel Image Stitching	Composite Array Frame Output (.tiff)
Mosaic-Based 2D	Included
Neural Network-Based 2D	Available
High-Speed Video	Available
Bin2	60fps
Bin4	180fps; 340 fps (partial array)
Control software	For MCAM Computer
Viewing Software	For Windows and Linux
Open API	docs.ramonaoptics.com

System Field-of-View Over 24 Multi-Well Plate
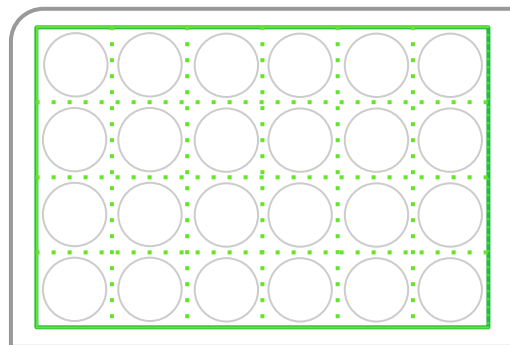
◯ = Well

⬚ = Micro-Cam FOV

▭ = System FOV

— = Well Plate Perimeter

System Resolution: 9.1 µm per pixel

t = 0
t = 10 ms
t = 20 ms
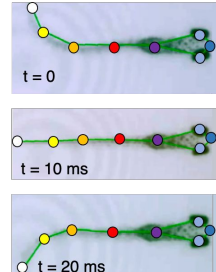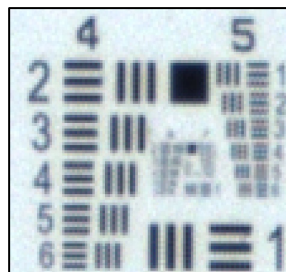
Example: Parallelized tracking, 96 well-plate
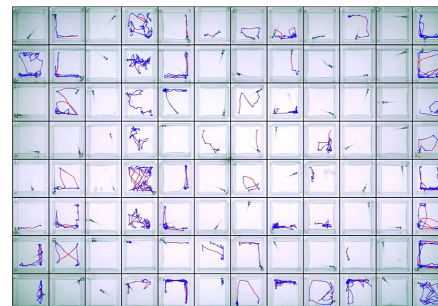
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