

MCAM™ Safety Manual

Kestrel and Model B

Ramona Optics, Inc.



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Durham, North Carolina, USA

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Contact Manufacturer

Ramona Optics
1000 West Main Street, Suite 2A
Durham, NC 27701

Phone: (919) 797-9975

Email: info@ramonaoptics.com

Website: <https://www.ramonaoptics.com/>

System Ratings

Main Supply: 100-240 VAC, 50/60Hz, 10A

Indoor use only

Altitudes up to 2000m

Temperatures 15-28C

Maximum relative humidity: 80% up to 31C, decreasing linearly to 50% at 40C

OVERVOLTAGE CATEGORY II (EN 61010-1 2010)

POLLUTION DEGREE II (EN 61010-1 2010)

System Specifications

MCAM™ Kestrel Dimensions: 413 x 310 x 453 mm (width x height x depth)

MCAM™ Kestrel Mass (weight): 13 kg (29 lbs)

MCAM™ Model B Dimensions: 483 x 661 x 534 mm (width x height x depth)

MCAM™ Model B Mass (weight): 41kg (90lbs)

Safety Warnings and Precautions

The MCAM™ system should always be used in accordance with the guidelines of this manual to avoid risk of personal injury and/or damage to the instrument. **If the MCAM™ system is used in a manner not consistent with the manner specified by Ramona Optics, Inc. in this manual, protection provided by the equipment may be impaired.**

Note the following safety warnings:

	The MCAM™ system is heavy (Kestrel: ~29 lbs/13 kg; Model B: ~90lbs/41kg). Use caution when lifting. Use your legs and core muscles to lift the equipment, not your back. Keep the load close to your body during the lift. Maintain a firm grip on the load with both hands.
	The MCAM™ system is heavy. For stability, position all system hardware on a stable surface prior to use.
	Prior to moving, cleaning, or performing maintenance on the MCAM™ system, always power off and disconnect power from hardware and disconnect MCAM™ and MCAM™ Workstation.
	The MCAM™ is an electronic system. Do not touch any MCAM™ system hardware with wet hands.
	Ventilation is required for proper function of the MCAM™ system. Make sure to leave a minimum of two inches or 5 cm of space around all sides of the MCAM™ as well as the MCAM™ Workstation.
	MCAM™ system's X, Y, and Z stages can cause pinch hazards for users can move quickly. To avoid pinch hazard, ensure hands are outside MCAM™ imaging chamber before operating the moving MCAM stages using the provided software.
	LEDs on MCAM™ Reflection Illumination Module can become very hot after use. Do NOT touch any part of MCAM™ Reflection Illumination Module except for Quick Release Handles (see MCAM™ User Manual).
	The MCAM™ is an electronic device. Disconnect power prior to moving, cleaning, or performing maintenance.

Avertissements de sécurité et précautions

Le système MCAM™ doit toujours être utilisé conformément aux directives de ce manuel afin d'éviter tout risque de blessure personnelle et/ou de dommage à l'appareil. **Si le système MCAM™ est utilisé d'une manière non conforme aux indications spécifiées par Ramona Optics, Inc. dans ce manuel, la protection offerte par l'équipement peut être compromise.**

Prenez note des avertissements de sécurité suivants :

	Le système MCAM™ est lourd (Modèle A : ~29 livres/13 kg ; Modèle B : ~90 livres/41 kg). Faites attention lorsque vous le soulevez. Utilisez vos jambes et les muscles de votre tronc pour soulever l'équipement, pas votre dos. Gardez la charge près de votre corps pendant le soulèvement. Maintenez une prise ferme sur la charge avec vos deux mains.
	Le système MCAM™ est lourd. Pour une meilleure stabilité, placez tout le matériel du système sur une surface stable avant son utilisation.
	Avant de déplacer, nettoyer ou effectuer la maintenance du système MCAM™, éteignez toujours et débranchez l'alimentation du matériel et déconnectez le système MCAM™ et la station de travail MCAM™.
	Le MCAM™ est un système électronique. Ne touchez à aucun composant matériel du système MCAM™ avec vos mains mouillées.
	Une ventilation est nécessaire pour le bon fonctionnement du système MCAM™. Assurez-vous de laisser un espace minimal de 5 cm autour de chaque côté du MCAM™ ainsi que de la station de travail MCAM™.
	Les plateaux X, Y et Z du système MCAM™ peuvent présenter des risques de pincement car ils peuvent se déplacer rapidement. Pour éviter ceci, assurez-vous que vos mains sont à l'extérieur de la chambre d'imagerie MCAM™ avant d'opérer les déplacements des plateaux MCAM à l'aide du logiciel fourni.
	Les LED du module d'éclairage par réflexion MCAM™ peuvent devenir très chaudes après l'utilisation de l'appareil . Ne touchez à AUCUNE partie du module d'éclairage par réflexion MCAM™ à l'exception des poignées de dégagement rapide (voir le manuel d'utilisation MCAM™).
	Le MCAM™ est un dispositif électronique. Déconnectez l'alimentation avant de le déplacer, de le nettoyer ou d'effectuer sa maintenance.

Sicherheitswarnungen und Vorsichtsmaßnahmen

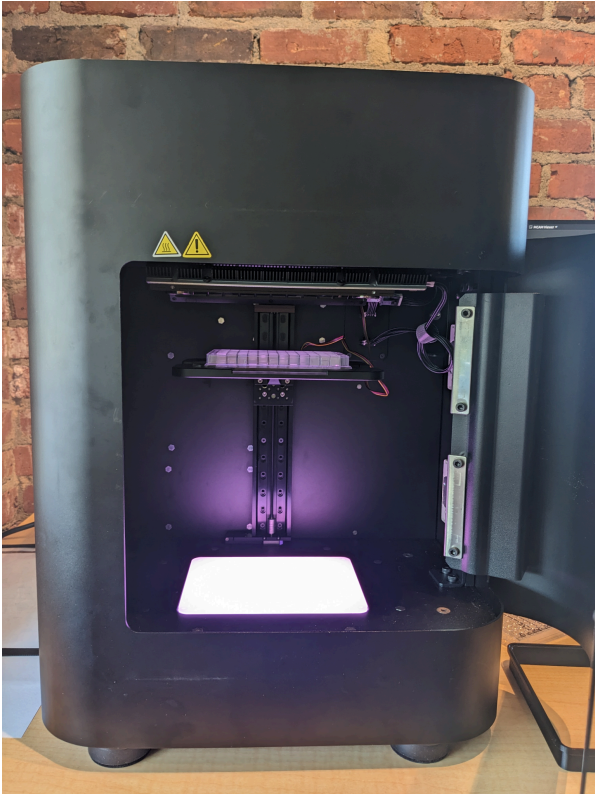
Das MCAM™-System sollte immer gemäß den Richtlinien dieses Handbuchs verwendet werden, um das Risiko von persönlichen Verletzungen und/oder Schäden am Gerät zu vermeiden. **Wird das MCAM™-System auf eine Art und Weise verwendet, die nicht mit den von Ramona Optics, Inc. in diesem Handbuch angegebenen Verfahren übereinstimmt, kann der durch die Ausrüstung gebotene Schutz beeinträchtigt werden.**

Beachten Sie die folgenden Sicherheitswarnungen:

	Das MCAM™-System ist schwer (Modell A: ~29 lbs/13 kg; Modell B: ~90 lbs/41 kg). Seien Sie vorsichtig beim Heben. Benutzen Sie Ihre Bein- und Rumpfmuskulatur zum Heben der Ausrüstung, nicht Ihren Rücken. Halten Sie die Last während des Hebens nah am Körper. Behalten Sie einen festen Griff an der Last mit beiden Händen.
	Das MCAM™-System ist schwer. Für die Stabilität positionieren Sie die gesamte Systemhardware vor der Verwendung auf einer stabilen Oberfläche.
	Bevor Sie das MCAM™-System bewegen, reinigen oder Wartungsarbeiten daran durchführen, schalten Sie das System immer zuerst aus, trennen Sie die Stromversorgung von der Hardware und trennen Sie die Verbindung zwischen dem MCAM™-System und der MCAM™-Workstation.
	Das MCAM™ ist ein elektronisches System. Berühren Sie keine Hardware des MCAM™-Systems mit nassen Händen.
	Eine Belüftung ist für die ordnungsgemäße Funktion des MCAM™-Systems erforderlich. Stellen Sie sicher, dass auf allen Seiten des MCAM™-Systems sowie der MCAM™-Workstation mindestens zwei Zoll oder 5 cm Platz gelassen werden.
	Die X-, Y- und Z-Achsen des MCAM™-Systems können sich schnell bewegen und so Quetschgefahren für Benutzer verursachen. Um Quetschgefahren zu vermeiden, stellen Sie sicher, dass Ihre Hände außerhalb der Bildgebungskammer des MCAM™-Systems sind, bevor Sie die beweglichen MCAM™-Stufen mit der bereitgestellten Software betreiben.
	Die LEDs am MCAM™-Reflexionsbeleuchtungsmodul können nach Gebrauch sehr heiß werden. Berühren Sie KEINEN Teil des MCAM™-Reflexionsbeleuchtungsmoduls außer den Schnellverschlussgriffen (siehe MCAM™-Benutzerhandbuch).
	Das MCAM™ ist ein elektronisches Gerät. Trennen Sie vor dem Bewegen, Reinigen oder Durchführen von Wartungsarbeiten den Strom.

Getting Started

Begin by identifying your MCAM model, referring to the table below:

Kestrel	Model B
	

Overview

The Multi-Camera Array Microscope (MCAM™) is a form of Gigapixel Microscope™. This new class of instrument enables Gigapixel Microscopy™ and consists of 6 main components: data acquisition electronics, image forming optics, an illumination unit, a motion control unit, the graphical user interface (GUI) and the software development kit (SDK). The data acquisition electronics consists of 48 optical sensors, each made up of 13 Megapixels, arranged in a rectangular grid acquiring nearly 700 megapixels per snapshot. The software and firmware coordinate these sensors so that they operate in the desired configuration. The illumination unit enables one to control both the spectral and the angular profile of the illumination. The GUI is provided to give users a quick way to navigate many of the functions of the MCAM™. The software development kit (SDK) provides finer grained control over the MCAM's functionality enabling more advanced acquisition through *Python*®.

Included Hardware

Item	Qty
Multi-Camera Array Microscope (MCAM™) Kestrel may include MCAM™ Reflection Illumination Module (Qty: 1)	1
Universal Power Cable (3-prong IEC, rated for 100-240VAC, 10A-5A, 47-63Hz) <i>Note: Universal Power Cables (3-prong IEC, rated for 100-240VAC, 10A-5A, 47-63Hz) are rated for MCAM™ and MCAM™ Workstation power supplies. Do not connect other cable types to the MCAM™ system.</i> <i>Note: To ensure proper grounding, only Universal Power Cables (3-prong NEMA, rated for 100-240VAC, 10A-5A, 47-63Hz) can be used with the MCAM™ system. Do not use other cable types with the MCAM™ system.</i>	3
USB Cable (USB-A to USB-B)	1
Kestrel Only: Mini SAS Cables (SF-8766) The provided quantity depends in part on the purchased performance.	2 or 4
Kestrel Only: Transmission Illumination Diffuser	1
Kestrel Only: Universal Stage Insert	1
Model B Only: Thunderbolt Cable	1
MCAM™ Workstation: MCAM™ Desktop Workstation Computer Monitor Mouse Keyboard	1

Included Software

Item	Description
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MCAM™ User Interface	User interface for controlling the MCAM™ Kestrel Unit and capturing data.
MCAM™ Viewer	Viewing software for data captured on the MCAM™ Kestrel. For optimal performance, it is recommended the MCAM™ Viewer be run on a computer with the following specs: • Ubuntu 20.04 or Windows 10 • A modern Intel i7, Xeon processor, or Ryzen (from the last 3 years) • 16 GB of RAM (64 GB recommended) • An internal solid state drive for data storage • A dedicated graphics card Using an external hard drive can significantly reduce data transfer rates and system performance.

Technical Support

For technical and/or service issues please contact the manufacturer at info@ramonaoptics.com.

To resolve any questions not addressed within this manual or to request additional material regarding the MCAM™ system, contact the manufacturer.

Installation

A Ramona technician will always perform installation for MCAM™ systems. Installation procedure is as follows:

Step	Action
1	Position the MCAM™, MCAM™ Workstation, Computer Monitor, Keyboard, and Mouse on a stable surface with minimal vibration. Do not position MCAM™ system components in a manner that makes power buttons difficult to access. Make sure to leave a minimum of six inches of space for ventilation around all sides of the MCAM™ as well as the workstation computer. Model B: Make sure to leave a minimum of six inches of space in front of the MCAM™ to allow for full extension of the sample tray outside the device enclosure.

2	Confirm that the power button at the back of the MCAM™ unit is in the OFF position (0).
3	Confirm that the MCAM™ Workstation is powered off.
4	Plug the MCAM™, MCAM™ Workstation, and Computer Monitor into standard 100-240V wall power outlets using the Universal Power Cables (3-prong NEMA, rated for 100-240VAC, 10A-5A, 47-63Hz). <i>Note: Universal Power Cables (3-prong NEMA, rated for 100-240VAC, 10A-5A, 47-63Hz) are rated for MCAM™ and MCAM™ Workstation power supplies. Do not connect other cable types to the MCAM™ system.</i> <i>Note: To ensure proper grounding, only Universal Power Cables (3-prong NEMA, rated for 100-240VAC, 10A-5A, 47-63Hz) can be used with the MCAM™ system. Do not use other cable types with the MCAM™ system.</i>
5	Connect MCAM™ and MCAM™ Workstation with one (1) USB Cable (USB-A to USB-B). Model B only: Connect MCAM™ and MCAM™ Workstation with one (1) Thunderbolt Cable.
6	Connect MCAM™ Workstation and Computer Monitor with Display Cable (HDMI or DisplayPort).
7	Connect MCAM™ and MCAM™ Workstation with Mini-SAS Cables. Note that the terminals of each cable are labeled with a number that corresponds to a numbered port on the MCAM™ as well as a numbered port on the MCAM™ Workstation. Only connect cable terminals to ports that are numbered correspondingly.
8	Connect keyboard and mouse to computer.
9	Consult the MCAM User Manual to ensure the system is tuned for your application.

Equipment Operation

Operating controls and their use in all operating modes for the **Kestrel** is described in detail in the **MCAM™ User Manual**. Operating controls and their use in all operating modes for the **Model B** is described in detail in the **MCAM™ User Guide for Automated Workflows**. To give a brief overview:

Users control the MCAM™ with the MCAM™ Workstation to change operating modes and capture data using pre-installed MCAM™ User Interface software. Modifying settings within the MCAM™ User Interface enables the user to change illumination wavelength and direction, sample position, and image sensor position, among other capabilities. The MCAM™ User Interface also enables the user to capture image, timelapse, and video data at selected resolution, intervals, and frame rates over a user-defined duration of time.

Data captured using the MCAM™ User Interface can be viewed using pre-installed MCAM™ Viewer software.

Kestrel: MCAM™ Fluorescence and Reflection Illumination Module

The **MCAM™ Fluorescence and Reflection Illumination Module** allows the user to illuminate samples from above and enables utilization of a subset of MCAM™ User Interface illumination modes. To connect/disconnect the **MCAM™ Fluorescence and Reflection Illumination Module** to the MCAM™, refer to the below instructions:

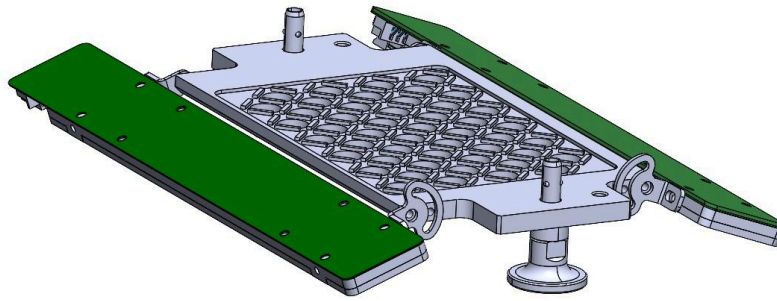


Figure 1: MCAM™ Fluorescence and Reflection Illumination Module

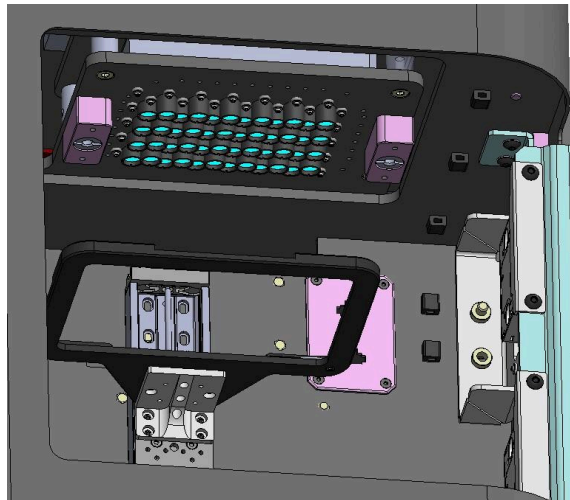


Figure 2: MCAM™ Kestrel imaging chamber upper surface

Step	Action
1	Remove the MCAM™ Fluorescence and Reflection Illumination Module from its packaging, taking care to only touch it by the quick release handles on either end of the module.

	Note: To protect the hardware of the MCAM™ Fluorescence and Reflection Illumination Module, never touch any part of the module except the quick release handles. Note: Surfaces of MCAM™ Fluorescence and Reflection Illumination Module can become hot after use. To avoid risk of burns, use caution when touching module. Do not touch any part of module except for quick release handles.
2	Simultaneously pressing both of the MCAM™ Fluorescence and Reflection Illumination Module's quick release handle buttons, insert the module's pins into the sockets on either side of the MCAM™ lens block (on the MCAM™ imaging chamber upper surface). Insert the MCAM™ Fluorescence and Reflection Illumination Module so cabling is closest to the MCAM™ Fluorescence and Reflection Illumination Module Ports on the right hand side of the MCAM™ imaging chamber interior.
3	Release the MCAM™ Fluorescence and Reflection Illumination Module quick release handle buttons. Connect back rail module cable to upper MCAM™ Fluorescence and Reflection Illumination Module Port. Connect front rail module cable to lower MCAM™ Fluorescence and Reflection Illumination Module Port.
4	To disconnect MCAM™ Fluorescence and Reflection Illumination Module from MCAM™, unplug module cables and disengage quick release connection by simultaneously pressing down on quick release handle buttons.

Equipment Maintenance and Service

Servicing the MCAM™

Do not attempt to get into the MCAM with a tool. There are no user-serviceable parts inside the MCAM. Users should not attempt to service their MCAM™ systems.

To prevent damage to the MCAM™ system and avoid risk of hazard exposure to users, only Ramona technicians should service the MCAM™ system.

Technicians servicing MCAM™ systems may use tools to dismantle system enclosures and access interior circuitry. To avoid risk of shock or burns, as well as damage to equipment, Ramona service technicians should confirm that both the MCAM™ and the MCAM™ workstation are powered off before servicing. Additionally, technicians should not replace any of the 3 Universal Power Cords in the MCAM™ system with power cords not adequately rated for equipment or for mains supply.

To verify the safe state of the equipment after servicing, Ramona service technicians should successfully complete functionality testing, exercising MCAM™ system components as a user would. Functionality testing will

include the exercising of any system stages and illumination components, and capturing data from all image sensors in the array.

Equipment Integration

Additional hazards may result from integration of the MCAM™ into a larger system. The safety of any larger system incorporating an MCAM™ system is the responsibility of the assembler of the larger incorporating system.

Cleaning and Decontamination

Instructions for surface cleaning and decontamination (can be performed by any users of the MCAM™ system) are as follows.

Step	Action
1	Confirm that the power button at the back of the unit is in the OFF position (0).
2	Confirm that the MCAM™ Workstation is powered off.
3	Prepare a fresh 70% ethanol disinfectant solution and pour it into a spray bottle.
4	Do not spray the MCAM directly. Spray soft cloth with ethanol disinfectant solution and wipe down all exterior surfaces, including handles, of MCAM™.
5	Let disinfectant sit on surfaces for 10 minutes. Contact time may vary depending on the product used, please refer to the instruction for your particular disinfecting product
6	After waiting for 10 minutes, use paper towels to wipe down all disinfected surfaces and discard towels as biohazard waste.

Cleaning and decontamination of the MCAM™ system interior should only be performed by a Ramona technician. If equipment requires interior cleaning or decontamination, please contact Ramona Optics Inc.