

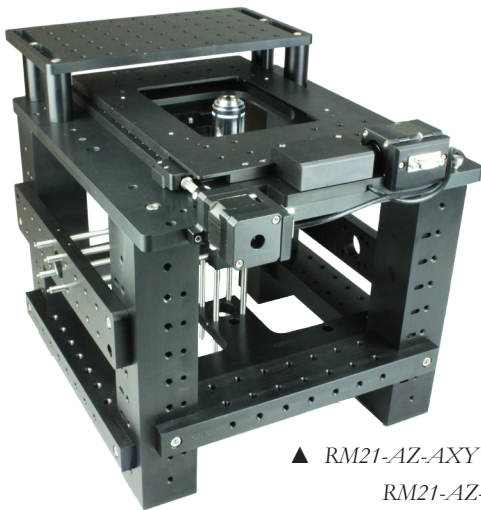
# RM21™ microscopy platform

## Applications

- ▶ *Fluorescence Microscopy*
- ▶ *Single Molecule Imaging*
- ▶ *Super Resolution Microscopy*
- ▶ *AFM/SPM*
- ▶ *Optical and Magnetic Tweezers*

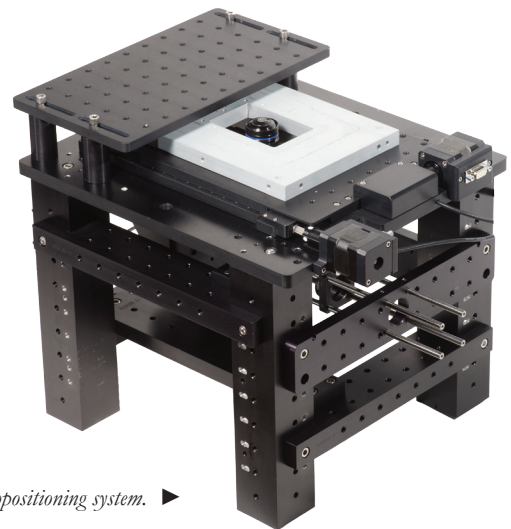
## Advantages

- ▶ *Direct optical access*
- ▶ *Nanopositioning ready*
- ▶ *High stability microscope with precision alignment*
- ▶ *Fixed or automated objective lens positioning*
- ▶ *Flexible design with multiple configurations*
- ▶ *Compatible with Mad City Labs nanopositioners*
- ▶ *Compatible with 30mm & 60mm cage systems*



▲ RM21-AZ-AXY model with 30mm cage system installed.

RM21-AZ-AXY model with Nano-LPS100 nanopositioning system. ▶



## Product Description

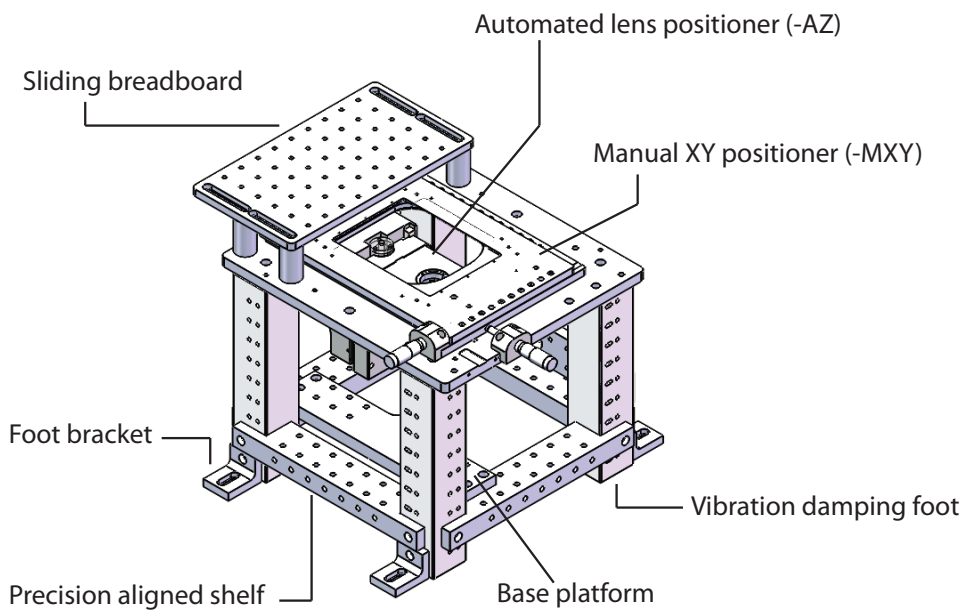
The RM21™ is designed as an adaptable microscopy platform which may be configured for a wide variety of microscopy techniques. The design approach to the RM21™ is unlike conventional optical microscopes. The RM21™ allows direct access to all of the optical pathway and has been engineered for precision alignment in all three axes. The RM21™ is compatible with 30mm and 60mm cage systems and is designed to be configured on a standard optical table. The RM21™ has been designed for stability and is nanopositioner ready. These attributes make the RM21™ an ideal platform for innovative instrument development and single molecule microscopy.

The RM21™ has three axes of precision motion. The objective lens holder (z-axis) is precision aligned with the optical axis of the platform and accommodates a single objective lens. The motorized lens positioner uses our proprietary intelligent control for low drift and high performance and has 50mm travel with 95nm step size. A fixed objective lens option is also available for maximum stability. Precision motion in X and Y can be achieved with manual XY micro-positioning (-MXY models) or automated XY micropositioning (-AXY models). All XY micropositioning stages travel 25mm per axis and are engineered for nanopositioning compatibility. The -AXY models employ our proprietary intelligent control. All automated axes may be ordered with optional optical encoders to provide displacement readouts.

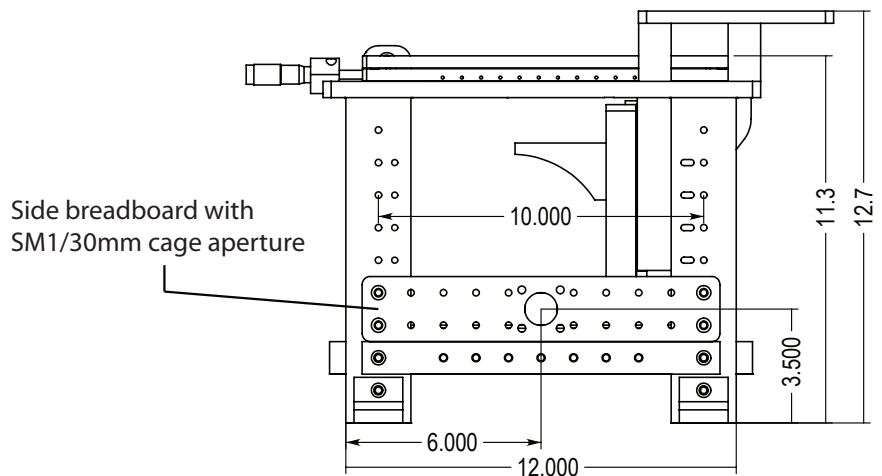
The RM21™ is suitable for applications such as optical and magnetic tweezers, AFM integration and fluorescence microscopy. We offer a number of standard options including a TIRF Module that allows users to effortlessly shift between epifluorescence/TIRF/HILO microscopy techniques and a TIRF Lock™ to maintain the illumination angle. A wide range of customizations, such as increased ranges of motion, are also available. The RM21™ is nanopositioning ready and compatible with the Nano-Cyte® and Mad City Labs nanopositioners.

## Highlights

- ▶ Three (3) axes of precision motion
- ▶ Fixed objective lens or automated objective lens positioning available
- ▶ Precision aligned three dimensional grid with over 200 tapped holes
- ▶ TIRF Module and TIRF Lock™ options available
- ▶ Adjustable, precision aligned shelves and breadboards
- ▶ Compatible with SM1/30mm & 60mm cage system
- ▶ Precision manufactured base platforms for 45° prism mirror & SM1/30mm cage system
- ▶ Vibration damping feet with removeable foot brackets



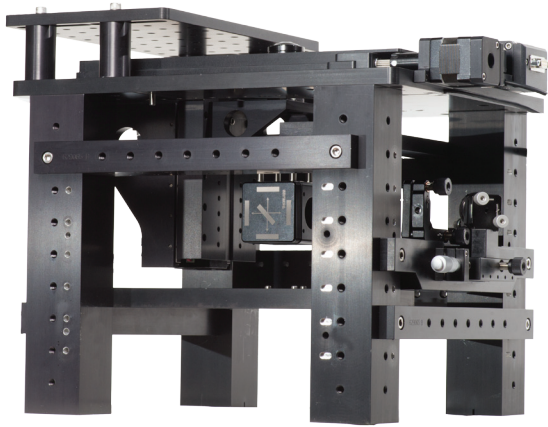
Above: A rendering of the RM21-AZ-MXY model shown with the prism platform.



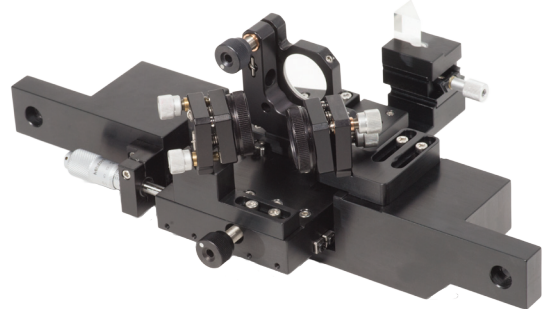
Above: Dimensions (in inches) of the RM21-AZ-MXY-xxx-I model (side view).

Visit [madcitylabs.com/RM21.html](http://madcitylabs.com/RM21.html)  
for additional technical drawings.

# RM21™ microscopy platform



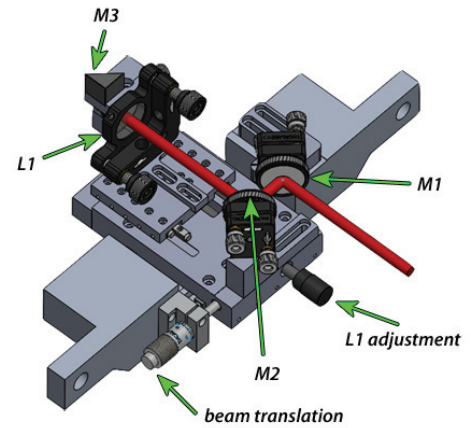
RM21-AZ-AXY model with TIRF Module installed.



TIRF Module compatible with RM21 microscopes

## TIRF microscopy options

A typical application of the RM21™ microscope is single molecule fluorescence microscopy. A standard option available with the RM21™ is the TIRF Module, which provides simple adjustment of the TIR excitation beam to achieve epifluorescence or TIR illumination of the sample and all angles in between (HILO). The TIRF Module controls the angle of illumination and the focusing of the excitation beam onto the back focal plane of the objective lens. The diagram, right, illustrates the beam path and the adjustments available with the TIRF Module. The TIRF Module is fully compatible with all models of the RM21™ and may be used in conjunction with Mad City Labs nanopositioning systems and the TIRF Lock™ option. The TIRF Lock™ comprises a quadrant photodiode (QPD) head, electronic controller and LabVIEW based software. Once a user has set up TIR illumination and establishes a desired sample Z position, the TIRF Lock™ keeps the sample in the focal plane by measuring the displacement of the exiting TIRF beam and maintaining that position via software feedback control of the sample positioner. The TIRF Lock™ is fully compatible with Mad City Labs nanopositioning systems. The RM21™ microscope when combined with the TIRF Module and TIRF Lock™ is an excellent instrument for single molecule microscopy offering versatility and stability.



Detailed view of TIRF Module



TIRF Lock™ for use with TIRF Module

## RM21™ Technical Specifications

Tapped hole size .....	1/4"-20 or M6
Tapped hole spacing.....	1" or 25mm
Micropositioning Axes .....	X, Y, Z
Range of motion (XY) .....	25 mm
Range of motion (Z) .....	50 mm
Vernier gradations (-MXY) .....	1µm
Step Size (-AZ-AXY) .....	95 nm
Micropositioning Controller .....	Micro-Drive®
Digital Interface.....	USB 2.0
Precision aligned shelves.....	6
Side breadboards .....	3
Sliding breadboard .....	1
Foot brackets.....	4
Base platform .....	2
Body Material .....	Anodized Aluminum

## TIRF Lock™ Specifications

Sensor type .....	Quadrant Photodiode
Wavelength range.....	400nm - 1100nm
Sensor size.....	2.4mm x 2.4mm
Clear aperture diameter.....	0.5" (1.25mm)
Recommended beam size.....	300µm - 1.5mm
Cable Length.....	6 feet (2m)
Controller .....	TIRF Lock™
Controller dimensions.....	8.375" x 3.5" x 12"
Digital Interface.....	USB 2.0
Operating System.....	Windows XP Pro/Vista/7/8

TIRF Lock™ is recommended for use with Mad City Labs nanopositioning systems.

### RM21™ Models available

All models available in imperial (-I) or metric (-M).

Supported lens threads: RMS, M25, M26, M27, M32

Side breadboards compatible with SM1/30mm/60mm cage systems

Nano-Cyte® compatible model

- Model: RM21-NC-(thread)-I/M

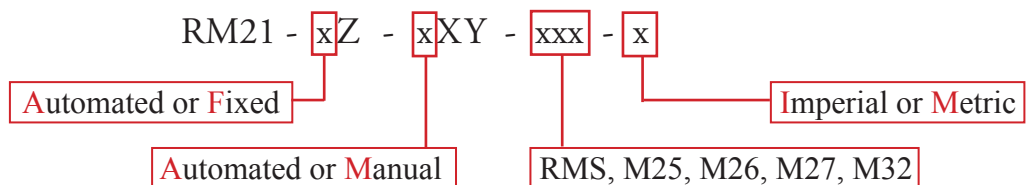
Available options

- 20nm optical encoders added to a specified axis
- TIRF Module
- TIRF Lock


Custom options

Fixed objective (-FZ). Please consult with our applications engineers prior to ordering.


### Model ordering




**Compatible Software Packages**




Examples, tutorial, and Nano-Route® 3D supplied with Nano-Drive® USB interfaces.




AMS  
USB and analog motion control



THE OPEN SOURCE MICROSCOPY SOFTWARE  
USB motion control



MetaMorph®  
USB and analog motion control



SLIDEBOOK 5.0  
Analog motion control, 1 or 2 axes.