RM21® Advanced Microscope

Features

- *Unique MicroMirror TIRF modality ideally suited for multispectral single molecule microscopy*
- *Spatially separated excitation & emission beams yielding superior signal-to-noise ratios*
- *Dichroic TIRF modality*
- *High stability microscopy platform with open access to optical pathways - ideal for future innovation*
- *Integrated high resolution closed loop nanopositioning*
- *High resolution motorized and piezo driven sample positioning*
- *3rd Generation Micromirrors with synchronized motorized movement and software control*

Product Description

The RM21® Advanced Microscope is an inverted optical microscope with a fixed objective lens position for maximum stability. The RM21® Advanced microscope is our most versatile inverted optical microscope featuring the unique MicroMirror TIRF modality, as well as dichroic TIRF, while still being adaptable to other single molecule microscopy techniques that users may develop.

In common with all RM21® microscopes, there is direct access to the optical pathway and the microscope has been engineered for precision alignment and nanoscale stability in all three axes. The RM21® Advanced Microscope includes a sub-nanometer precision, XYZ closed loop piezo nanopositioning system designed to meet the requirements of super resolution microscopy. The position of the objective lens is fixed to maximize the stability of the microscope. In addition to the nanopositioning stage are two axes of precision stepper motor control for millimeter range motion. All micropositioning axes use our proprietary intelligent control for low drift and high performance with 95nm step size. An adjustable height sample holder is included.

MicroMirror TIRF uses through-the-objective excitation, but replaces the dichroic used in conventional TIRF systems with two broadband micromirrors positioned at the back aperture of the (fixed) objective lens. Spatially separating the excitation and emission beams and eliminating the dichroic mirror leads to superior signal-to-noise ratios and simplifies the introduction of multiple spectral lines to your experiment. This makes the technique ideally suited to studies that employ more than 2 excitation lasers.

Each micromirror is installed on a factory calibrated manipulator designed to place the micromirrors in close proximity to the back aperture of the objective lens. The micromirrors are stepper motor driven and are controlled via software. Setpoints for different TIRF angles can be saved in software for easy return during experiments. Moreover, the final focusing lens just prior to the entrance micromirror moves in synchrony with these positional changes. The micromirrors can be moved independently to facilitate alignment procedures or experimental needs. When micromirror TIRF is not used on the microscope, the mirrors can be manually retracted.

The RM21®Advanced microscope also includes a TIRF module which allows simple adjustment of the total internal reflection (TIR) excitation beam, without using the micromirrors, to achieve epifluorescence or TIR illumination of the sample and all angles in between (HILO). Both the standard and motorized versions of the TIRF Module control the angle of illumination and the focusing of the excitation beam onto the back focal plane of the objective lens. The TIRF module can be upgraded to a motorized version with software control which allows the user to program up to five setpoints for angle of illumination.

The RM21®Advanced microscope use can be extended to additional techniques by simply adding standard options. In addition to the supported methods listed above, this microscope is also suitable for applications such as magnetic tweezers and other fluorescence methods.

What is included?

- RM21® Advanced Microscope.
- Two distinct TIRF modalities.
- On-site installation with training.
- Support documentation, including bill of materials for excitation and emission pathways (parts not included).
- Extensive pre-installation support.

Models \ Methods	Epi-Fluorescence	Sinlge Molecule Localization	MicroMirror TIRF	Dichroic TIRF	Magnetic Tweezers	Atomic Force Microscopy	Z Drift correction	3D Drift correction	Multi-View Imaging
RM21® Versa	●	●		○	○		○		○
RM21® Classic	●	●		○	○	○	○	○	○
RM21® Advanced	●	●	●	●	○	○	○	○	○
RM21® MicroMirror TIRF		●	●	○	○		○	○	○

● supported ○ requires additional options

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Technical Specifications

Sample Control	
Closed loop nanopositioner	200µm x 200µm x 200µm
Mechanism	Piezo, flexure guided
Position Sensors	PicoQ®
Nanopositioner resolution	0.4nm
Recommended max. load	500g
Body material	anodized aluminum
Micropositioner (M1/M2)	25mm x 25mm
Mechanism	stepper motor
Minimum step size	95nm
Micropositioner (Z)	10mm, manual
Sample media supported	75mm slide, 30mm petri dish, selected incubators
MicroMirrors	
Retractable micromirrors	YES, manual
MicroMirror motion (M7/M8)	10mm
Focusing lens motion (M6)	10mm
Mechanism	stepper motor
Minimum step size	95nm
Synchronous movement	YES, in MicroMirror TIRF mode
Micromirrors	Broadband 5mm prisms
Saved positions	YES
TIRF Module	
Standard version	manual
Motorized option (M3)	95nm steps
	5 saved positions

General	
Microscope body	Black anodized aluminum, brass microscope thread
Objective position	fixed (45mm or 60mm parfocal)
Nanopositioner Controller	Nano-Drive®
Nano-Drive® features	16bit DAC/ADC ISS (TTL synchronization)
Micropositioner Controller	MicroMirror TIRF
Controller interface	USB 2.0
Nanopositioner connector	DB-9 (male) per channel
Micropositioner connector	DB-9 (female) per channel
Available options	TIRF module (motorized) TIRF-Lock® Magnetic Tweezers Nano-Cyte® MadView® multiview imaging
Available accessories	75mm slide holders 30mm petri dish holders 3 point adjustable sample holder

Compatible Software

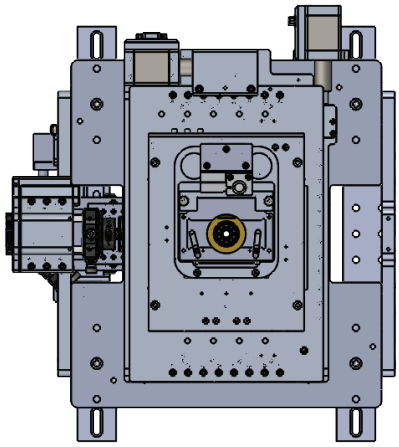
Examples, tutorial, and Mad City Labs Nano-Route® 3D motion control software

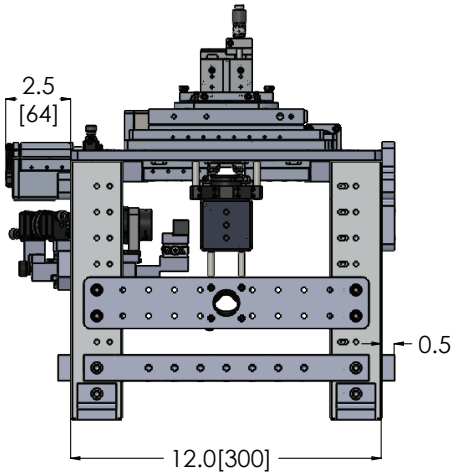
LabVIEW

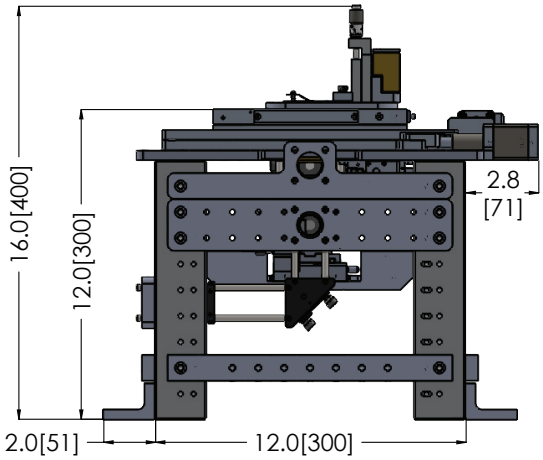
µManager
Open Source Microscopy Software

python™

Dimensions







Note: All Dimensions in inches [millimeters]