

Product Fact Sheet

# MMI CellManipulator

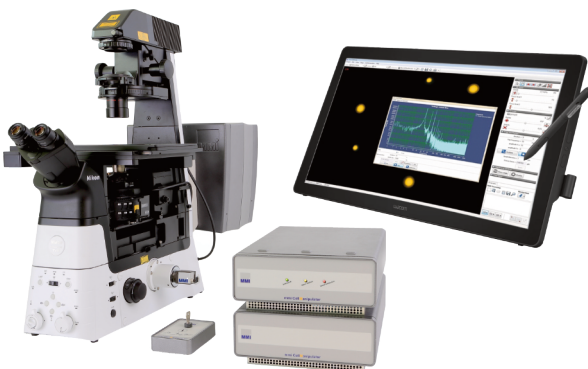


Optical Tweezers for Real-Time Manipulation and Visualization of Molecular Interactions

## Product name

MMI CellManipulator

## Product picture



The MMI CellManipulator on the Nikon T12 inverted microscope. The system is extremely customizable with a wide range of microscope brands and models

## Manufacturer information



**MMI GmbH -  
Molecular Machines & Industries**  
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## Summary

The first version of the MMI CellManipulator was introduced in 1992 as one of the very first commercial optical tweezers systems. The long history and success behind the MMI CellManipulator make it the most reliable, effective and comfortable optical tweezers tool in the scientific community. The MMI CellManipulator can easily be implemented on almost all major microscope systems.

## Applications

Optical tweezers are highly accurate instruments. When combined with the extremely sensitive quadrant detector technology, they are capable of the manipulation and detection of sub-nanometer displacements for sub-micrometer dielectric particles.

### Cell-based studies:

- Cell fusions and cell-to-cell interactions
- Implant studies
- Intracellular manipulations
- Study of neuronal networks
- Drug effects on cells
- Ca<sup>2+</sup>-channel studies

### Measurements of binding forces:

- DNA studies
- Viscosity measurements
- Antibody, antigen binding forces
- Bacterial adhesion studies
- Virus to cell adhesion studies
- Protein folding forces
- Microrheology experiments
- Interactions experiments

### Molecular motor studies:

- Actin, Myosin interactions
- Kinesin motors
- Dynein motors

### Laser Raman Tweezers:

- Identification and isolation of cells and single living microorganisms
- Cancer research

### Lab-on-a-Chip device:

- Biosensor assays
- Single cell isolation and sorting

## Specifications

Features	Description
Compatible Microscopes	<p>Inverted or upright research microscopes</p> <ul style="list-style-type: none"> <li>• Olympus IX-53/73/83</li> <li>• Nikon Ti (S, U, E)</li> <li>• Nikon Ni (U, E)</li> <li>• Nikon Ti2 (U,E)</li> <li>• External z-Drive motorisations for different manual inverted microscopes</li> </ul>
Microscopy	<p>Bright-field</p> <ul style="list-style-type: none"> <li>• No restrictions</li> </ul> <p>Fluorescence</p> <ul style="list-style-type: none"> <li>• No restrictions due to separate laser port</li> </ul> <p>Confocal/TIRF</p> <ul style="list-style-type: none"> <li>• No restrictions with side port adaption</li> </ul> <p>CO<sup>2</sup> and temperature control</p> <ul style="list-style-type: none"> <li>• Available</li> </ul>
Minimum workspace	<p>The table top for the microscope, laser, optical equipment, computer monitor and keyboard requires a minimum workspace of 1.20 m × 0.90 m</p>

Features	Description
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| Laser system | <ul style="list-style-type: none"> <li>• Laser Power:<br/>Single-level: 20 W<br/>Dual-level: 10 W</li> <li>• Wave length: 1070 nm</li> <li>• Line voltage: 200–240 VAC or 100–110 VAC, 50–60 Hz, 4.0 A</li> <li>• Steered beam</li> <li>• Separated power controller for each layer</li> <li>• Extremely sharp focus due to computer simulated optics</li> <li>• Computer controlled laser power</li> <li>• Computer controlled laser focus (z-position of the beam)</li> <li>• Safety shutters and eye protection filters</li> </ul> |
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| Optical setup | <p>Galvanic scanner (X-Y scanning system)</p> <ul style="list-style-type: none"> <li>• Max. oscillation frequency: 2 kHz</li> <li>• Update rate: 100 kHz</li> <li>• Typical resolution: 17 nm</li> </ul> <p>Number of independent traps</p> <ul style="list-style-type: none"> <li>• Single-level = 1</li> <li>• Dual-level = 2 (optional)</li> </ul> <p>Total number of traps</p> <ul style="list-style-type: none"> <li>• Single-level = 10</li> <li>• Dual-level = 20 (optional)</li> </ul> |
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| Software | <ul style="list-style-type: none"> <li>• MMI CellTools (data acquisition, visualisation and interpretation)</li> <li>• Single click trap control</li> <li>• Automatic distance force calibration</li> <li>• Automated stiffness calibration</li> <li>• Automated force distance measurements</li> <li>• Synchronised QD-data and video acquisition</li> <li>• Automated voltage-distance calibration</li> </ul> |
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Features	Description
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| Force measurement | <p>Quadrant detector</p> <ul style="list-style-type: none"> <li>• Imaging- or back-focal plane mode</li> </ul> <p>Sample rate</p> <ul style="list-style-type: none"> <li>• 20 kHz</li> </ul> |
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| Trapping parameters | <p>Particle sizes</p> <ul style="list-style-type: none"> <li>• 100 nm - 20 µm</li> </ul> <p>Min. Escape force: 1200 pN</p> |
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| Motion control (Motorised stages) | <p>Standard stage</p> <ul style="list-style-type: none"> <li>• Scanning area: 120 × 100 mm<sup>2</sup></li> <li>• Repositioning accuracy: &lt; 1 µm</li> <li>• Step resolution: 0.156 µm</li> <li>• Speed: 20 mm/sec</li> </ul> |
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| Modularity | <ul style="list-style-type: none"> <li>• Microdissection module (MMI CellCut)</li> <li>• Single cell isolation in suspensions (MMI CellEctor)</li> <li>• Digital slide scanner module (MMI CellScan)</li> <li>• Automated analysis of biological samples (MMI CellDetector)</li> </ul> |
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## Ordering information

Article No.	Item
[10400]	MMI CellManipulator
[10401]	MMI 4QD force measurement - imaging mode
[10403]	Dual-level multi trap
[10406]	Dual-level single trap
[10409]	MMI 4QD force measurement - BFP mode

## Key features

- Strongest trap with > 1200 pN escape force
- Compatible with almost all microscopes brands and models
- Easily extendable to fluorescence, STED, Raman spectroscopy, TIRF, or Confocal Microscopy
- Compact and ultrastable modular design
- Real-time quadrant-detector force measurements with sub-pN resolution
- Single or dual channel independent trap
- Huge free space above optical trap for customizable force measurements and other applications
- Extreme easy and intuitive analysis software. Become an expert in 10 min

CellManipulator\_PFS\_EN\_001\_C

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