Cellular-resolution Photostimulation

Polygon

DMD Pattern Illuminators

INTRODUCTION

The Polygon DMD pattern illuminators are Mightex's market-leading modules for targeted photostimulation. The Polygon provides precise spatio-temporal control of light with subcellular resolution, making it the perfect illumination tool for scientific research. Compatible with any upright or inverted microscope, the Polygon enables researchers to send light to anywhere on their specimen, and in any shape, size and complexity now within a large projection field of view. In addition, multiple regions-of-interest (ROIs) can be illuminated simultaneously, and patterns can be switched at kHz speeds. Different wavelengths of light can be used with the Polygon for virtual simultaneous multi-color illumination of unique ROIs. Polygon systems seamlessly integrate via TTL with other equipment such as electrophysiology tools or cameras.

DMD TECHNOLOGY

The Polygon uses digital micromirror device (DMD) technology to illuminate multiple ROIs simultaneously. A DMD chip is composed of up to millions of micromirrors that can be individually turned ON/OFF to reflect light onto the sample. Thus, you can assign each mirror to control the area(s) of illumination and create any number of different-sized ROIs simultaneously.

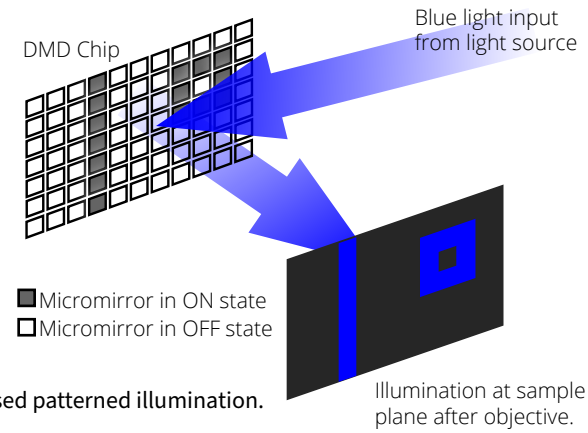

Figure 1. DMD-based patterned illumination.

FEATURES

- Illuminate any Shape or Size Within Large Field of View
- Multi-Wavelength Illumination of Distinct ROIs
- Simultaneous Multi-Region Illumination
- Fast Pattern Switching Speed
- Fits on any Microscope
- External Equipment Synchronization

APPLICATIONS

- Neuroscience: Single-cell Resolution Optogenetics
- Cell Biology: Subcellular Resolution Optogenetics
- Freely-Behaving Optogenetics
- Cortex-Wide Optogenetics
- Photoactivation, Photoconversion & Photoswitching
- Uncaging
- Photopatterning

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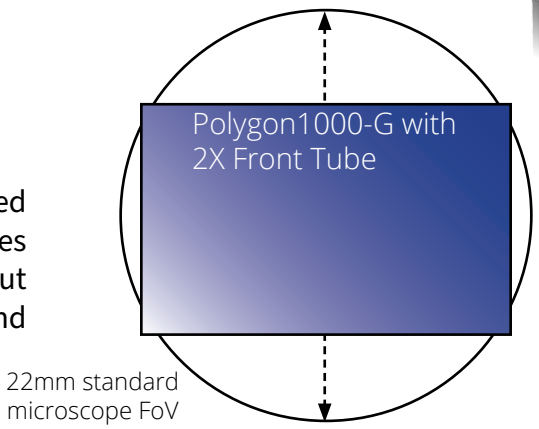
POLYGON1000

FEATURE-RICH DMD DESIGN

1 Large field of view. Fine resolution.

Large DMD chip combined with front tube optics enables larger field of view without compromising resolution and power.



2 Faster than anything else in the market.

High maximum frame rate means better temporal resolution for advanced physiologically-relevant experiments and virtually simultaneous 2-color illumination of distinct ROIs.

1000 SERIES — 6,600 fps*

*in External Trigger Mode

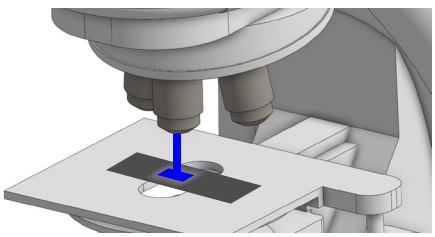
3 Real-time projection. Closed-loop experiments.

Faster uploading time enables the Polygon1000 to perform real-time pattern illumination for closed-loop experiments.

up to 4ms
uploading speed per frame

4 More power. Extra flexibility.

Large chip and optimized optics enhance transmission efficiency enabling the Polygon1000 to achieve high power densities power density at the specimen level, and giving the researcher room for intensity control.



POLYGON MODELS

1000 SERIES

POLYGON1000-G

P/N: DSI-K3-000

- Accepts a 3mm-core liquid lightguide.
- Can be used with any light source.
- Wavelength range: 350-1000nm.*
- Add-on front tube available for large field of view.

POLYGON1000-DL

P/N: DSI-K3-L20

- Accepts SMA-connectorized optical fiber patch cord (400µm, 0.22NA recommended).
- Compatible with laser sources.
- Wavelength range: 400-1000nm.*

POLYGON1000-DI

P/N: DSI-K3-DI20

- Accepts a 3mm-core liquid lightguide and SMA-connectorized optical fiber patch cord
- Compatible with LED lights and laser sources.
- Wavelength ranges:
  - lightguide input: 350-1000nm*
  - SMA fiber optic input: 400-1000nm*

*Focus readjustment may be needed when using two wavelengths that are greater than 350nm apart.

POLYGON1000-G

POLYGON1000-DL

POLYGON1000-DI

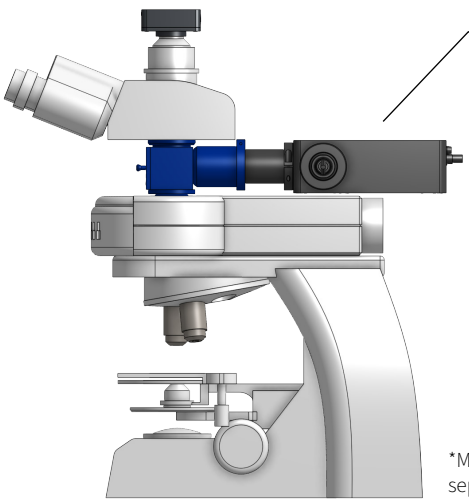
MICROSCOPE INTEGRATION

The Polygon can be coupled to most commercially available inverted and upright microscopes (Nikon, Leica, Zeiss, Olympus) in the following configurations:

INFINITY PATH CONFIGURATION

This configuration projects the spatial patterns at infinity, and hence it is mounted directly into the infinity path of a microscope by using a beam-combiner (for upright microscopes) along with an adaptor that matches the exact make/model of the microscope.

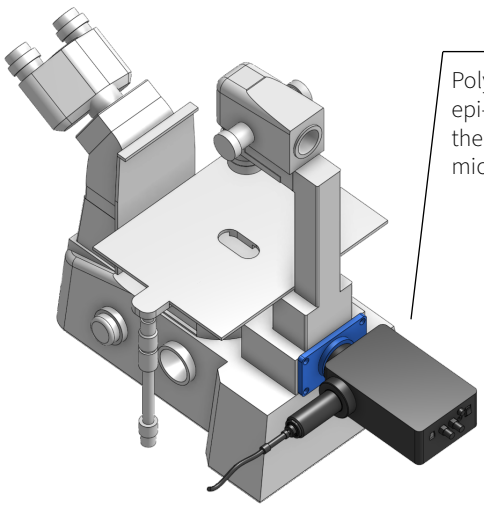
UPRIGHT



An adaptor is inserted in between the trinocular head and epi-illuminator of upright microscopes.*

*Microscope adaptors sold separately.

INVERTED

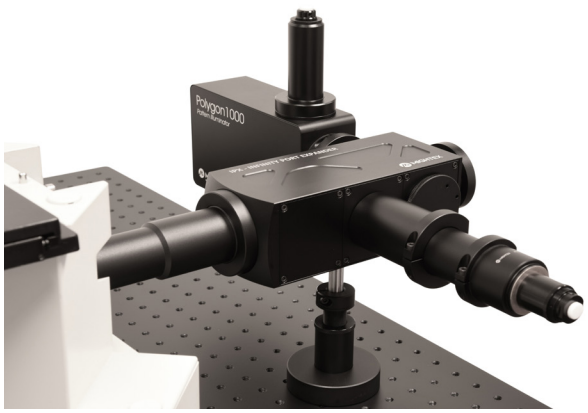


Polygon replaces the epi-illuminator at the back of inverted microscopes.*

PLEASE CONTACT MIGHTEX FOR INTEGRATION OF MULTIPLE POLYGONS AND ALTERNATIVE MICROSCOPE INTEGRATION SOLUTIONS.

IPX INFINITY PORT EXPANDER

Mightex's IPX expands an infinity-path port on a microscope into a maximum of 4 ports. It is compatible with all Mightex Polygon models as well as with Mightex and 3rd party widefield epi-fluorescent illumination sources via standard 3mm core liquid lightguide. It also supports cameras and laser scanners via appropriate adaptors. Ports 2, 3 and 4 feature pitch-yaw adjustable dichroic holders for centering FOV and each port can be mounted on either sides of the main IPX chassis, to avoid mechanical conflict with surrounding environment.



C-MOUNT CONFIGURATION

If the infinity path of your microscope is unavailable, this configuration can be mounted onto one of the standard C-mount camera ports of your microscope.

LAPP CONFIGURATION

Do you have a Nikon microscope with a LAPP modular illumination system? We provide a Polygon format that is LAPP compatible. Please contact Mightex for more information.

TECHNICAL SPECIFICATIONS

ILLUMINATION FIELD-OF-VIEW & RESOLUTION

Polygon1000-G

Field of View	Projection Area Dimensions	Commercial Microscope (1X Objective)[a]			
		Leica	Nikon	Olympus	Zeiss
Standard	**Height | mm**	6.2	6.2	5.5	5.1
	Width | mm	9.9	9.9	8.9	8.1
	Diagonal | mm	11.6	11.6	10.5	9.6
	Pixel Size | µm	7.6	7.6	6.9	6.3
Large[c]	**Height | mm**	12.4	12.4	11	10.2
	Width | mm	19.8	19.8	17.8	16.2
	Diagonal | mm	23.2	23.2	21	19.2
	Pixel Size | µm	15.2	15.2	13.8	12.6

[a] To calculate illumination field-of-view and pixel resolution at the specimen, simply divide the above numbers by the magnification of the objective.
[c] Requires large field-of-view front tube lens. Sold separately.

Polygon1000-DL

Field of View	Projection Area Dimensions	Commercial Microscope (1X Objective)[a]			
		Leica	Nikon	Olympus	Zeiss
Standard	**Diameter[b] | mm**	12.4	12.4	11	10.2
	Pixel Size | µm	15.2	15.2	13.8	12.6

[a] To calculate illumination field-of-view and pixel resolution at the specimen, simply divide the above numbers by the magnification of the objective.
[b] Polygon1000-DL has a circular illumination field-of-view.

Polygon1000-DI

Optical Input	Field of View	Projection Area Dimensions	Commercial Microscope (1X Objective)[a]			
			Leica	Nikon	Olympus	Zeiss
Liquid Light guide	Standard	Height | mm	6.2	6.2	5.5	5.1
		Width | mm	9.9	9.9	8.9	8.1
		Diagonal | mm	11.6	11.6	10.5	9.6
		Pixel Size | µm	7.6	7.6	6.9	6.3
	Large[c]	Height | mm	12.4	12.4	11	10.2
		Width | mm	19.8	19.8	17.8	16.2
		Diagonal | mm	23.2	23.2	21	19.2
		Pixel Size | µm	15.2	15.2	13.8	12.6
Multimode fiber	Standard	Diameter[b] | mm	12.4	12.4	11	10.2
		Pixel Size | µm	15.2	15.2	13.8	12.6

[a] To calculate illumination field-of-view and pixel resolution at the specimen, simply divide the above numbers by the magnification of the objective.
[c] Requires large field-of-view front tube lens. Sold separately.

CONTROL & TIMING

Maximum Frame Rate | fps*	up to 6,600
Input Trigger	TTL, BNC connector
Input Trigger Delay | µs	50
Output Trigger	TTL, BNC connector
Output Trigger Delay	User Programmable

* Values at 1bit depth. For grayscale features please contact Mightex for more information.

* Applicable to all models

SOFTWARE COMPATIBILITY

Mightex	PolyScan4 software included free of charge
3rd Party Support	Nikon's NIS Elements
	Micro-Manager Open Source Microscopy Software

SYSTEM & COMMUNICATION

Operating System	Windows XP, Vista, 7, 8, 10 and 11
Interface	USB2.0 and USB3.0
Power Supply	5Vdc 3A input power
Screen Resolution	1,366x768 or higher

ORDER NOW

Our primary goal is to help you find the optimal solution for your research. We have a dedicated technical support and sales team committed to providing expert guidance on our Polygon models and other Mightex products.

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