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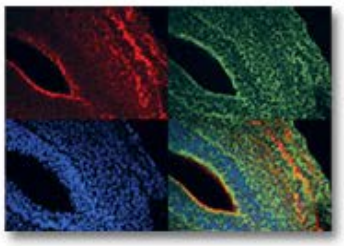
THORLABS

MPM-SL - July 11, 2016

Item # MPM-SL was discontinued on July 11, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

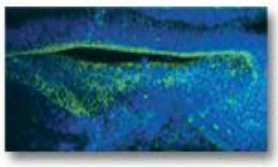
NIR SCAN AND TUBE LENS FOR MULTIPHOTON IMAGING

- **Scan and Tube Lens Combination**
- **For Constructing Custom-Built Multiphoton Imaging Systems**
- **Optimized for Broadband NIR Range**



Application Idea

Thorlabs Multiphoton Microscope

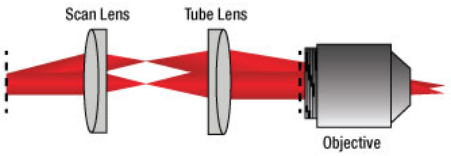


Hide Overview

OVERVIEW

Features

- Designed for Custom Multiphoton or Other NIR Imaging Systems
- Both Lenses are Optimized for Broadband NIR Imaging (680 - 1400 nm)
- Externally SM1 Threaded on the Scan Lens End
- Externally SM2 Threaded Tube Lens End Includes D1N Female Dovetail Adapter



Click to Enlarge

The MPM-SL is a premounted scan and tube lens combination that is designed to image the scan plane of a laser scanning mirror system onto the back aperture of the objective lens. The MPM-SL was designed for Thorlabs' multiphoton imaging systems and multiphoton essentials kit and is now available as a component to support the construction of custom multiphoton or other NIR imaging systems. The scan lens has an effective focal length (EFL) of 40 mm while the tube lens has an EFL of 200 mm. Both lenses are optimized for broadband NIR imaging in the 680 - 1400 nm wavelength range.

A typical application is shown in the schematic to the right. Light enters the system from the left, with the rays aligned either on-axis or off-axis. The scan and tube lens system relays the light through an objective, where it is focused onto a sample at a location dependent on the direction with which the rays entered the system.

The scan lens end of the system is SM1 threaded (1.035"-40) to be used with our SM1-threaded components and also has 4-40 tapped holes on 30 mm spacing for compatibility with our 30 mm cage system. The tube lens end of the unit features SM2 (2.035"-40) threading for compatibility with our SM2-threaded components. The tube lens end of the unit also attaches to the included D1N female dovetail adapter, which is designed for compatibility with our

Objective Lens Selection Guide
Objectives
Microscopy Objectives, Dry
Microscopy Objectives, Oil Immersion
Physiology Objectives, Water Dipping or Immersion
Long Working Distance Objectives
Reflective Microscopy Objectives
UV Microscopy Objectives
532 nm and 1064 nm Objectives

multiphoton essentials kit. These Thorlabs standard threads facilitate the construction of home-built imaging systems using standard components.

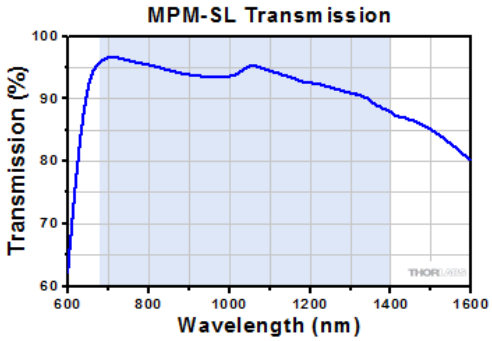
Scan Lenses and Tube Lenses
Scan Lenses
NIR Scan and Tube Lens Combination
Infinity-Corrected Tube Lens

Hide Specs

SPECS

MPM-SL Specifications	
Effective Focal Length	Scan Lens: 40 mm Tube Lens: 200 mm
Back Focal Length[a]	Scan Lens: 33 mm
Working Distance[b]	Scan Lens: 30.0 mm Tube Lens (without Dovetail Adapter): 133.2 mm Tube Lens (with Dovetail Adapter): 72.4 mm
Entrance Pupil Diameter	4 mm
Diffraction-Limited Field of View[c]	FN12
Design Field-of-View[c]	FN16
F-Theta Distortion	<4.25% @ FN16 <2.25% @ FN12
Optical Path Difference	<0.25λ Across All Wavelengths

a. The back focal length is measured from the last optical surface of the lens.
. The Working distance is measured from the edge of the housing.
c. The Field Number (FN) is given in mm. The Field of View of the imaging system equals the FN divided by the magnification of the objective lens.



Click to Enlarge
Click Here for Raw Data
The blue shaded region indicates the specified 680 - 1400 nm wavelength range for optimum performance. Performance outside of the specified range is not guaranteed and varies from lot to lot.

Hide Microscope Dovetails

MICROSCOPE DOVETAILS

Microscope Dovetails

Many components and modules in Thorlabs' Cerna Microscopy Platform use dovetails for mechanical mating and optical port alignment. These components are connected by inserting one dovetail into another, then tightening one or more locking setscrews.

Click to Enlarge
This photo shows the male D1N dovetail on the trinoculars next to the female D1N dovetail on the epi-illumination arm.

Dovetail Type	Outer Diameter	Angle
D1N	2.018"	60°
D2N[a]	1.50"	90°
D2NB[a]	1.50"	90°
D3N	45 mm	70°
D4N	3.605"	60°
D5N	1.58"	90°
D1O	107 mm	60°

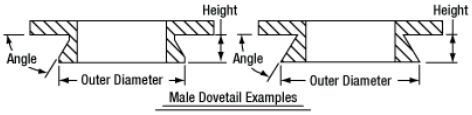
a. D2N and D2NB dovetails have the same outer diameter and angle, as defined by the drawings below. The D2N designation does not specify a height. The D2NB designation specifies a dovetail height of 0.40" (10.2 mm).

To help ensure that only compatible components can be mated together, different dovetail types are used for different sections of the microscope. For example, our WFA2002 Epi-Illuminator Module has a male D1N dovetail that mates with the female D1N dovetail on the microscope body's epi-illumination arm, while the CSS2001 XY Microscopy Stage has a female D1O dovetail that mates with the male D1O dovetail on the CSA1051 Mounting Arm.

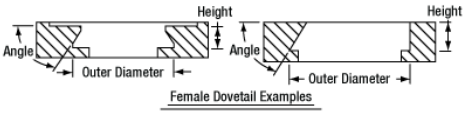
To learn which dovetail type(s) are on a particular component, consult its mechanical drawing, available by clicking on the red Docs icon ( ) below. Each drawing also indicates the size of the hex key needed for the locking setscrew(s). It is important to note that mechanical compatibility does not ensure optical compatibility. Information on optical compatibility is available from Thorlabs' web presentations.

For customers interested in machining their own dovetails, the table to the right gives the outer diameter and angle (as defined by the drawings below) of each dovetail type used by the Cerna platform. However, the dovetail's inner diameter, bore diameter, and height must be determined by the user, as these quantities can vary for dovetails of the same type. One can use the intended mating part to verify compatibility.

In order to reduce wear and simplify connections, dovetails are often machined with chamfers, recesses, and other mechanical features. Some examples of these variations are shown by the drawings below.



Click to Enlarge
These cross sections show two examples of how male dovetails can be manufactured.



Click to Enlarge
These cross sections show two examples of how female dovetails can be manufactured.

Hide Part Numbers

Part Number	Description	Price	Availability
MPM-SL	**Scan and Tube Lens System for Multiphoton Imaging, 680 - 1400 nm**	**$6,500.00**	**Lead Time**

Visit the *NIR Scan and Tube Lens for Multiphoton Imaging* page for pricing and availability information:
https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=5728