56 Sparta Avenue • Newton, New Jersey 07860
(973) 300-3000 Sales • (973) 300-3600 Fax
www.thorlabs.com

THORLABS

ODL100-FS/M - March 13, 2017

Item # ODL100-FS/M was discontinued on March 13, 2017. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

100 MM OPTICAL DELAY LINE KIT

- **Delay Steps as Short as 3.3 fs over a 666.6 ps Range**
- **Computer Controlled by Included apt™ Software**
- **High-Speed Delay Stage Capable of 500 mm/s**

ODL100-FS
Kit Includes Controller and All Parts Pictured (Except Breadboard)

Pre-Aligned V-Block with Kinematic Adjusters and Iris Slots

Hide Overview

OVERVIEW

Thorlabs' ODL100-FS(/M) Free-Space Optical Delay Line Kit consists of a selection of proven Thorlabs components that allow customers to quickly assemble a computer-controlled delay stage. Based on our DDSM100(/M) Direct Drive Stage, its 100 mm travel range and double-pass beam geometry provide an optical delay that is variable from 0 to 666.6 ps, with a minimum delay shift of 3.3 fs and timing repeatability of 10 fs. Our UM10-AG Ultrafast-Enhanced Silver Mirrors and MRAK25-P01 Protected Silver Knife-Edge Right-Angle Prism Mirror provide high reflectance in the 750 - 1000 nm spectral range and minimal group delay dispersion (see the *Graphs* tab), making this kit well suited for use with femtosecond pulsed lasers.

Applications

- Pulsed Pump-Probe Experiments
- Auto Correlations, Cross Correlations, and Optical Sampling
- Pulse Synchronization
- Interferometric Sensors and Instruments
- Coherent Communication Systems
- Reconfigurable Switching, Buffering, and Processing

The kit includes two irises, a previous-generation TBD001 T-Cube Motor Controller with a USB interface, and a user interface (pictured below). The included periscope accepts a range of input beam heights from 2.4" to 6.0" (61.0 to 152.4 mm); the upper end of the range can be increased by purchasing additional Ø1" Pillar Posts.

Click to Enlarge
Prism Mirror Mount is Easily Installed and Removed using Three 8-32 (M4) Cap Screws

Kit Features

This compact kit is easily assembled and contains several convenient mechanical features. As shown in the figure at the bottom of the page, the beam is steered at right angles by the right-angle prism mirror and the V-block, minimizing any necessary alignment. The RS99(/M) Periscope Assembly, which lowers the beam to the height of the translation stage, features easy-to-grip knobs that rotate the mirrors through a full 360°.

Click to Enlarge
Mount for Right-Angle Prism Mirror with Irises Removed

Click to Enlarge
V-Block Includes Two Iris Locations

Two SM05D5D Irises mounted on twin steel dowel pins are provided; these pins were originally designed for FiberBench optic mounts and allow the irises to be quickly inserted and removed at four positions: two on the moving carriage and two adjacent to the right-angle prism, as shown in the photos to the left and right. The prism mirror holder is machined to perfectly match the DDSMA1 Mounting Plate that attaches to the translation stage, allowing the prism mirror to be repeatably removed and replaced if the user wishes to bypass the moving carriage, as shown to the left.

The T-Cube motor controller can be externally triggered by a signal provided through the SMA input, and it also contains an SMA output that can be configured to provide a signal when a given position has been reached.

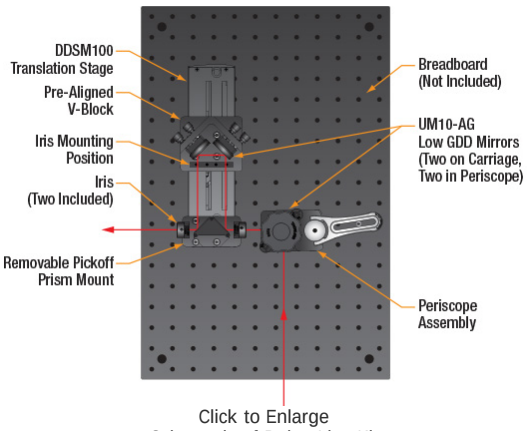
Linear Translation Stage

The DDSM100(/M) stage features a 100 mm travel range and can be driven at speeds of up to 500 mm/s, making this kit well suited for studying experimental phenomena in a single-shot scanning mode. High-speed scans can also be used to minimize the effects of slow changes in a system (such as thermal drifts) on experimental data.

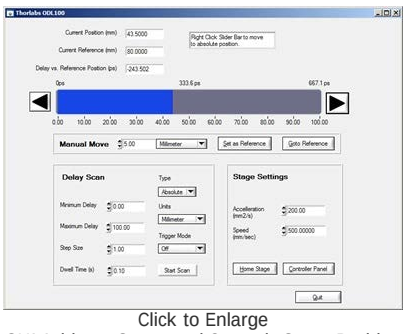
This stage uses direct drive technology that eliminates the need for a lead screw, enabling backlash-free operation. The absolute position of the stage is determined using a high-resolution, closed-loop optical feedback signal that provides bidirectional repeatability of 1.5 µm (timing repeatability of 10 fs). The stage also features a precision-grooved linear bearing that provides superior linearity and on-axis accuracy, which makes the stage an ideal choice for a delay line setup.

Please note that when no power is applied, the platform of the stage is free to move. This allows the user to easily align the beam when power is off but may make the kit unsuitable for applications where the stage needs to remain in place when power is lost.

If your application would benefit from gold, aluminum, broadband dielectric, dielectric laser line, or low GDD dielectric mirrors for 700 - 930 nm, 950 - 1170 nm, or 1400 - 1700 nm, please contact Technical Support to discuss the various options. Thorlabs also manufactures the ODL220-FS Optical Delay Line Kit, which offers a total range of 1466 ps, for customers who require a larger variable delay.



Click to Enlarge
Schematic of Delay Line Kit



Click to Enlarge
GUI Initiates Scans and Controls Stage Position
(See the *Software* Tab for More Details)

Hide Specs

SPECS

Optical Delay Specifications	
Maximum Optical Delay	666.6 ps
Delay Sensitivity[a]	3.3 fs
Input Beam Height	2.4" - 6.0" (61.0 mm - 152.4 mm)
Output Beam Height	2.4" (61.0 mm)

- Based on the minimum incremental motion of the stage.

List of Included Parts		
Item #	**Quantity**	**Description**
DDSM100 (DDSM100/M)	1	Linear Translation Stage
TBD001[a]	1	T-Cube Controller
UM10-AG	4	Ø1" Ultrafast-Enhanced Silver Mirror for 750 - 1000 nm
MRAK25-P01	1	1" Protected Silver Knife-Edge Right-Angle Prism Mirror
RS99 (RS99/M)	1	Periscope Assembly
MH25	2	Mirror Holder
SM05D5D	2	Ring-Actuated Iris, Ø0.7 mm - Ø5.0 mm Beam Size

FT-SM05	2	FiberBench Optic Mount
DDSMA1	1	Left Mounting Plate for DDSM100(/M)
N/A	1	Prism Mirror Mount
N/A	1	Pre-Aligned V-Block

- This is a previous generation T-Cube. Please see our KBD101 DC Servo Motor presentation for our current-generation controller.

Click to Enlarge
DDSM100 Stage

Key Specifications of DDSM100(/M) Stage	
Travel Range	100 mm (3.9")
Max Velocity	500 mm/s
Max Acceleration	5000 mm/s^2
Bidirectional Repeatability	±1.5 µm
Backlash[a]	N/A
Min Incremental Movement	500 nm
Absolute On-Axis Accuracy	±5.0 µm
Pitch	±175 µrad
Yaw	±175 µrad
Max Horizontal Load Capacity	0.9 kg (1.98 lbs)
Dimensions	195 mm x 57 mm x 35 mm (7.68" x 2.24" x 1.38")

- The stage does not exhibit backlash since it does not utilize a lead screw.

Additional information on the DDSM100(/M) stage is available here.

Click to Enlarge
TBD001 T-Cube Controller

Key Specifications of TBD001[a] Controller	
Control Algorithm	16-Bit Digital PID Servo Loop with Velocity and Acceleration Feedforward
Velocity Profile	Trapezoidal/S-Curve
Position Feedback	Incremental Encoder
Encoder Bandwidth	2.5 MHz (10 M Counts/s)
Input Voltage	14.5 - 15.5 V Regulated DC
Input Current	2 A (Peak)
Dimensions	60 mm x 60 mm x 47 mm (2.4" x 2.4" x 1.9")

- This is a previous-generation T-Cube. Please see our KBD101 DC Servo Motor presentation for our current-generation controller.

Hide Graphs

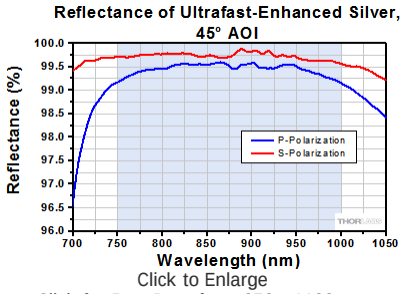
GRAPHS

The ODL100-FS(/M) Optical Delay Line Kit includes four UM10-AG Ultrafast-Enhanced Silver Mirrors and one MRAK25-P01 Protected Silver Knife-Edge Right-Angle Prism Mirror. If your application would benefit from gold, aluminum, broadband dielectric, dielectric laser line, or low GDD dielectric mirrors for 700 - 930 nm, 950 - 1170 nm, 1400 - 1700 nm, please contact Technical Support to discuss the various options.

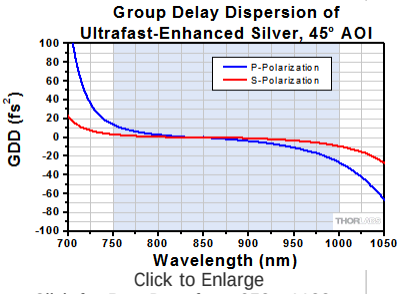
Low GDD Mirrors (UM10-AG)

The UM10-AG is specifically designed for use with femtosecond Ti:Sapphire lasers. In the 750 - 1000 nm wavelength range, it provides R_S > 99.0%, R_P > 98.5%, GDD <|20 fs^2| for S-polarized light, and GDD <|30 fs^2| for P-polarized light.

The graphs below represent the measured reflectance and theoretically calculated group delay dispersion (GDD) of the ultrafast-enhanced silver coating. The shaded regions denote the wavelength range over which we guarantee the mirrors will meet the specifications stated above. Performance outside the shaded regions will vary from lot to lot and is not guaranteed.

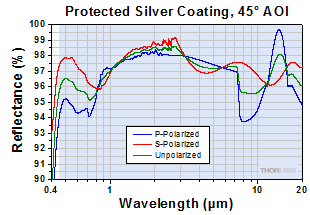


Click to Enlarge
Click for Raw Data from 650 - 1100 nm



Click to Enlarge
Click for Raw Data from 650 - 1100 nm

Protected Silver Knife-Edge Right-Angle Prism Mirror (MRAK25-P01)



Click to Enlarge
Excel Spreadsheet with Raw Data for Protected Silver

The protected silver coating on the MRAK25-P01 provides >96% average reflectance from 450 nm to 20 µm. While a bare silver coating has almost no dispersion, some silver mirrors do feature a dielectric coating, which can increase the dispersion, especially when the dielectric coating is used to enhance spectral features. Our protected silver mirrors feature a dielectric coating for protection of the fragile silver coating, and this coating has only a negligible effect on the dispersion.

The shaded region in the graph denotes the range over which we recommend using this mirror. Please note that the reflectance outside of this band is not as rigorously monitored in quality control, and can vary from lot to lot, especially in out-of-band regions where the reflectance is fluctuating or sloped.

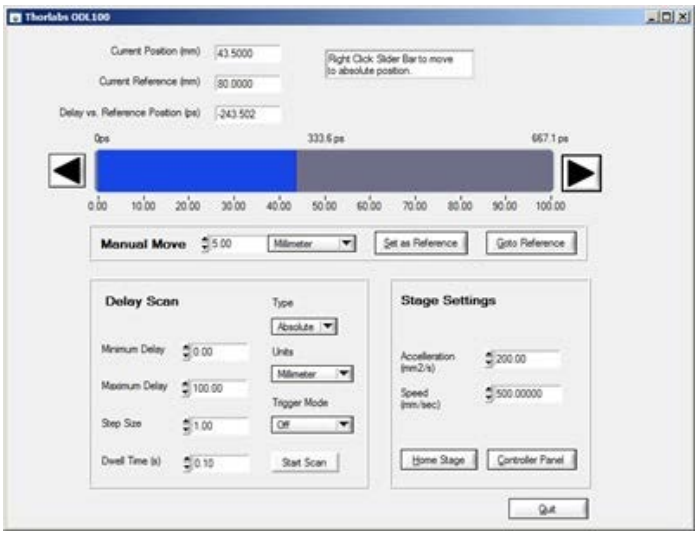
Hide Software

SOFTWARE

Custom GUI Software for Optical Delay Control

Thorlabs' ODL100-FS(/M) includes a GUI for reading and controlling the stage position, speed, and acceleration, as well as executing scan sequences. It accepts input in units of millimeters or picoseconds and can perform relative or absolute stage movements. Scans at discrete steps over a user-defined range can be initiated from the software or by using an external trigger signal supplied through the SMA input on the TBD001 controller.

The GUI is provided with the purchase of the delay line along with our powerful APT™ software package. This software package allows the translation stage to communicate with programs from other manufacturers via ActiveX controls and also serves as a standalone stage controller. The APT™ software can be downloaded by clicking on the button below and to the right.



Optical Delay Line Software

Version 3.2.0

Includes a GUI for control of Thorlabs' Optical Delay Lines. Also requires Thorlabs' APT software available from the link below.

Software

APT Software

Version 3.19.0

Includes a GUI for control of Thorlabs' APT™ system controllers, as well as a wealth of support information in the form of handbooks, help files, tutorial videos, and FAQs.

Also Available:

- Support Package
- Redistribution Module

Software

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Hide Part Numbers

Part Number	Description	Price	Availability
ODL100-FS/M	Free-Space Optical Delay Line Kit, 100 mm Travel, Metric	$5,170.00	Today
ODL100-FS	Free-Space Optical Delay Line Kit, 100 mm Travel	$5,170.00	Today