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MZF001 - September 1, 2023

Item # MZF001 was discontinued on September 1, 2023. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

XYZ MICROSCOPE STAGES

- **Ideal for use in 3D Imaging Applications**
- **X and Y Position Accuracy: <3.0 µm**
- **Z-Axis Resolution: 25 nm**
- **Compatible with Cerna®, Nikon, Olympus, and Zeiss Microscopes**

MZS500-E Z-Axis Stage Mounted to an MLS203-1 XY Microscopy Stage, Shown Attached to a Nikon Eclipse Ti-U Microscope

Motorized XYZ Scanning
MZS500-E Z-Axis Stage and MLS203-1 XY Stage Shown with the MZS500P2 Slide Holder

Hide Overview

OVERVIEW

Features

- XY DC Linear Servo Stage with Position Accuracy of <3.0 µm
  - Mounting Bracket Available for Thorlabs' Cerna®, Nikon, Olympus, or Zeiss Microscopes
- Z-Axis Piezo Stage with 500 µm of Vertical Travel and 25 nm Resolution
  - Mount to Compatible XY Scanning Stage for Complete XYZ Microscope Stage
- XYZ Microscope Stage Specimen Holders and Accessories Available

The MLS203/MZS500-E motorized XYZ microscope stage system presents a 3D positioning solution for applications such as Z-axis slicing or 3D image collection, including laser scanning microscopy. It provides active feedback to compensate for thermal changes and other factors that might lead to stage drift. The closed-loop, active feedback ensures correct positioning with submicron repeatability and Z-axis resolution of 25 nm, making the XYZ stage system ideal for applications that require highly accurate focus control. To build a complete XYZ motorized microscopy stage package, purchase both the MLS203 XY Scanning Stage and the MZS500-E Z-Axis Stage along with their respective controllers and the mounting brackets for the MLS203 stage. Optional Z-axis stage accessories can also be purchased below. The table below outlines the items that should be purchased to form a complete XYZ stage package for various microscopes.

XY Scanning Stage
The MLS203 XY Scanning Stage is the first of the two components needed to construct the XYZ microscope stage. This stage has been designed as a drop-in replacement for the manual stage found on select Nikon, Olympus, and Zeiss microscopes or for use with Thorlabs' Cerna microscopes to provide motorized XY positioning of microscopy samples. Characterized by high-speed scanning capabilities and high positional accuracy of <3.0 µm, this stage is ideal for manually or automatically positioning a wide range of specimens and samples in many types of microscopy or imaging techniques and applications. To incorporate the XY stage into a microscope imaging system, you must use one of the mounting brackets provided below; the type of bracket will be dependent on the microscope being used. Alternatively, we also offer adapters to bolt the XY scanning stage to an optical table or breadboard for use in typical photonics applications or in a

custom microscope setup.

Z-Axis Piezo Stage
The MZS500-E Z-Axis Piezo Stage is the second of the two components needed to construct the XYZ microscope stage. This low-profile, piezo-driven stage provides 500 µm of travel in the vertical (Z-axis) direction. The stage is sold with a closed-loop, piezo controller; together, the stage and controller provide computer-controlled Z-axis positioning and active location feedback. To incorporate the stage into the microscope imaging system, it must first be mounted to an MLS203 XY scanning stage using the provided cap screws. Please refer to the table below to verify which XY stage can mount the MZS500-E Z-axis stage. Once a compatible XY stage is chosen, select the compatible XY stage mounting bracket to incorporate the XYZ stage into your microscope imaging system.

Specimen Holders and Accessories
We offer a range of adapters to allow the positioning of microscope slides, Petri dishes, and mounted metalurgical specimens. The Z-axis piezo stage accepts a well plate directly. The MJC001 XY-Axis and MZF001 Z-Axis Joysticks are also available for both the MLS203 and MZS500 stages, respectively. Please see the details below.

Complete XYZ Microscope Stage Assemblies

Microscope[a]	XY Stage	XY Stage Mounting Bracket	XY Stage Controller	Z-Axis Stage[c]	Optional Specimen Holders and Accessories[b]
Thorlabs Cerna®	MLS203-1	CSA1000	BBD302	MZS500-E	**C4SH01:** Multi Slide Holder **MZS500P2:** Slide/Petri Dish Holder **MZS500P3:** Blank Adapter Plate **MZS500P5:** 1/4"-20 Tapped Breadboard Plate **MZS500P4:** M6-Tapped Breadboard Plate **MZF001:** Z-Axis Joystick Console **MJC001:** XY Joystick Console
Nikon 50i, 80i, 90i, and Ci-L	MLS203-1	MLSA06			
Nikon TE2000 and Eclipse Ti	MLS203-1	MLSA03			
Nikon Eclipse FN1	MLS203-1	MLSA07			
Olympus BX41, BX43, BX51, and BX61	MLS203-1	MLSA08			
Olympus IX71, IX73, IX81, and IX83	MLS203-1	MLSA02			
Olympus IX70	MLS203-1	MLSA09			
Zeiss Axio Observer and Axiovert 40	MLS203-2	None Needed			
Optical Breadboard / Custom Configuration	MLS203-1	MLSA01 or MLSA04			
	MLS203-2	MLSA04			

a. We support additional microscopes from Olympus, Nikon, Zeiss, and Leica with custom mounting brackets. Please contact Technical Support to inquire about bracket availability if your microscope model is not listed above.
b. Accessories for an XY stage configuration can be purchased here.
c. Controller included with stage.

Hide Specs

SPECS

MZS500-E Controller

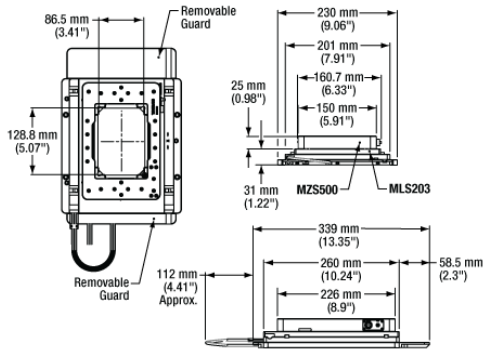
Item #	MZS500-E
Piezoelectric Output (SMC Male)	
Voltage (Software Control)	0 to 150 VDC
Voltage (External Input)	-10 to +10 VDC
Current	500 mA Max Continuous
Stability	100 ppm Over 24 hours (After 30 min Warm-Up Time)
Noise	<3 mV RMS
Typical Piezo Capacitance	1 to 20 µF
Bandwidth	1.0 kHz, Digital Closed Loop
Position Feedback (9-Pin D-Type Female)	
Feedback Transducer Type	Strain Gauge and Capacitive Compatible
Detection Method	AC Bridge (18 kHz Excitation)
Typical Resolution	5 nm (for 20 µm Actuator e.g. PAZ005)

Auto-Configure	ID Chip in Stage
User Input/Output (15-Pin D-type Female)	
4 Digital Inputs	TTL Levels
4 Digital Outputs	Open Collector
Trigger Input/Output	TTL
Trigger Input Functionality	Triggered Voltage Ramps/Waveforms
Trigger Output Functionality	Trigger Generation During Voltage Ramp Output
User 5 V (with Ground)	250 mA Max
Controller Specifications (Main Unit)	
Front Panel Controls	
Display	5-Digit, 7-Segment
Buttons	Volts/Microns Select, Open/Closed Loop Select, Zero, Resolution
Display Brightness	Adjustable
Resolution	Switchable Coarse and Fine Adjustment
Output	Infinite Turn Precision Digital Potentiometer (Encoder)
USB Port	USB 2 Full speed (12Mbps) Compatible
Input Power Requirements	
Voltage	85 - 264 VAC
Power	150 W
Fuse	3.15 A
General	
Dimensions (W x D x H)	152 mm x 244 mm x 104 mm (6" x 9.6" x 4.1")
Weight	3.18 kg (7 lbs)

MZS500-E Z-Axis Stage

Item #	MZS500-E
Drive Voltage	0 to 150 V
Travel	500 µm
Resolution	25 nm
Minimum Step Size	250 nm Typical
Feedback Transducer Type	Capacitive
Position Linearity Error	< 0.05% over Full Travel
Typical Settling Time for 1 to 100 µm Step	25 ms Typical
Max Travel Bandwidth	10 Hz
Drive Signal Shape	Saw Tooth, Sinusoidal or Square Wave
Resonant Frequency (± 10%)	155 Hz at No Load 130 Hz at 100 g Load 110 Hz at 200 g Load 100 Hz at 250 g Load
Maximum Load[a]	250 g (0.5 lbs)
Tilt Angle	X-Axis: ± 50 µrad Y-Axis: ±30 µrad
Operating Temperature	25° C
Dimensions (X, Y, Z)[b]	8.9" x 5.9" x 0.98" (226 mm x 150 mm x 25 mm)
Weight (with cables, no accessories fitted)	850 g (1.85 lb)
Surface Finish	Black Anodized

a. This is the total load of the stage; the weight of any accessory plates must be included in your load calculation.
b. Z dimension is the distance above the MLS203 top surface.



Click to Enlarge
Mechanical Drawing Showing the MZS500-E Z-Axis Stage Mounted to the MLS203 XY Scanning Stage

MLS203 XY Scanning Stage

Item #	MLS203-1/ML203-2
Travel Range	110 mm x 75 mm (4.3" x 2.95")
Speed (Max)	250 mm/s
Acceleration (Max)	2000 mm/s^2
Bidirectional Repeatability	0.25 µm
Unidirectional Repeatability	0.25 µm
Backlash[a]	N/A
Load Capacity (Max)	1 kg (2.2 lb)
Incremental Movement (Min)	0.1 µm
Absolute On-Axis Accuracy	< 3 µm
Percentage Accuracy (Max)	X-Axis: 0.0027% Y-Axis: 0.004%
Flatness in X Axis	±3 µm over full travel, ±1 µm over 10 mm
Flatness in Y Axis	±2 µm over full travel, ±1 µm over 10 mm
Home Location Accuracy	0.25 µm
Settling Time within 1 µm (600 g Load)	0.1 s
Settling Time within 0.1 µm (600 g Load)	0.6 s
Weight (Including Cables)	3.2 kg (7.0 lbs)
Limit Switches	X and Y as Standard
Bearing Type	Precision Linear Bearing
Motor Type	Brushless DC Linear Motor
Dimensions (Mid Travel)	250 mm x 229.3 mm x 31 mm (9.84" x 9.03" x 1.22")
Recommended Controller	BBD302

a. The stage does not suffer from backlash because there is no leadscrew.

BBD302 Controller

Item #	BBD302
Number of Channels	2
Drive Connector	8 Pin DIN, Round, Female
Feedback Connector	15-Pin D-Type, Female
Brushless Continuous Output	2.5 A per Channel, 5.2 A Max All-Channel Total Output
Brushless Peak Output	4.0 A per Channel, 5.2 A Max All-Channel Total Output
PWM Frequency	40 kHz
Operating Modes	Position and Velocity
Control Algorithm	16-Bit Digital PID Servo Loop with Velocity and Acceleration Feedforward
Velocity Profile	Trapezoidal/S-Curve
Position Count	32 Bit
Position Feedback	Incremental Encoder
Encoder Bandwidth	2.5 MHz (10 M Counts/sec)
Encoder Supply	5 V
AUX Control Connector	37-Pin D-Type Female (User Digital IO, 5 V O/P)
Front Panel Display	4.3" Full-Color LCD, 480 x 272 Pixels
Input Power Requirements	250 VA Voltage: 100 to 240 VAC Frequency: 47 to 63 Hz Fuse: 3.15 A
Dimensions (W x D x H)	250.0 mm x 279.1 mm x 108.8 mm (9.84" x 10.99" x 4.28")
Mass (Weight)	1.70 kg (3.75 lbs)

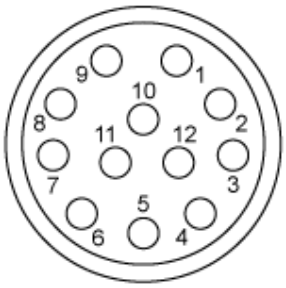
Hide Pin Diagrams

PIN DIAGRAMS

MZS500-E Stage Pin Out Descriptions

Feedback

Male



Drive

SMC Male

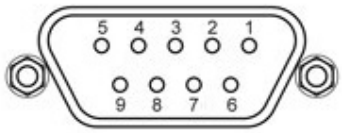
0 - 150 V
0 - 500 mA

Pin	Description	Pin	Description
1[a]	Sine +	7	Reserved for Future Use
2[a]	Sine -	8	+15 V Supply
3	Ground	9	-15 V Supply
4	Reserved for Future Use	10	Ground
5[b]	Position +	11	Ground
6[b]	Position -	12	Ground

a. Differential sine wave signal from controller (Piezo IN) to stage at fixed 20 kHz - 35 kHz frequency range.
b. Differential signal output from the sensor in the stage.

MZS500-E Controller Pin Out Descriptions

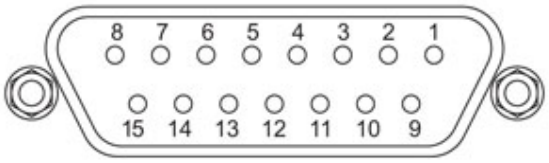
Strain Gauge



Pin	Description	Pin	Description
1	Strain Gauge Excitation	5	AC Feedback IN
2	-15 V_{out}[a]	6	Ground
3	+15 V_{out}[a]	7	Actuator ID Signal[b]
4	Ground	8	Reserved For Future Use
		9	Reserved For Future Use

a. Power supply for the piezo actuator feedback circuit. It must not be allowed to drive any other circuits or devices.
b. This signal is applicable only to Thorlabs actuators. It enables the system to identify the piezo extension associated with the actuator.

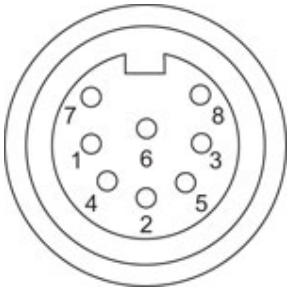
User I/O



Pin	Description	Return	Pin	Description	Return
1	Digital O/P 1	5,9,10	9	Digital Ground	-
2	Digital O/P 2		10	Digital Ground	
3	Digital O/P 3		11	Reserved for Future Use (Trigger OUT)	5,9,10
4	Digital O/P 4		12	Reserved for Future Use (Trigger IN)	
5	Digital Ground	-	13	Digital I/P 4	
6	Digital I/P 1	5,9,10	14	5 V Supply Output	
7	Digital I/P 2		15	5 V Supply Output	
8	Digital I/P 3				

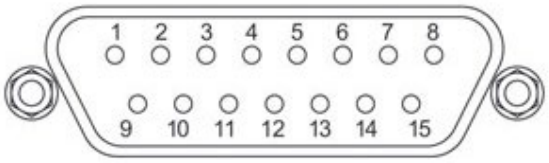
MLS203 XY Scanning Stage Pin Out Descriptions

Motor Drive
Male



Pin	Description	Pin	Description
1	Motor Phase V	5	Stage ID
2	GND	6	GND
3	Thermistor (Not Used)	7	Motor Phase W
4	Motor Phase U	8	Enable

Encoder Feedback
D-Type Male



Pin	Description	Pin	Description
1	Reserved for Future Use	9	GND
2	GND	10	Limit Switch +
3	Reserved for Future Use	11	Limit Switch -
4	Encoder Index -	12	Encoder Index +

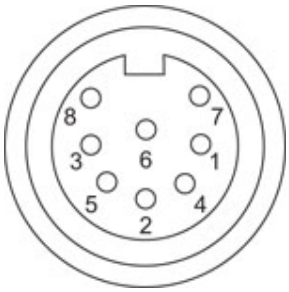
5[a]	QB -	13[a]	QB +
6[a]	QA -	14[a]	QA +
7	5 V	15	Reserved for Future Use
8	5 V		

- Differential Input Signals

BBD302 Controller Pin Out Descriptions

MOTOR DRIVE

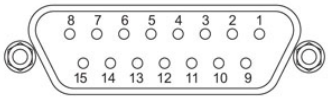
Female DIN Connector



Pin	Description	Pin	Description
1	Motor Phase V	5	Stage ID
2	GND	6	GND
3	Temp. Sensor (Not Used)	7	Motor Phase W
4	Motor Phase U	8	Enable

FEEDBACK

Female D-Type Connector

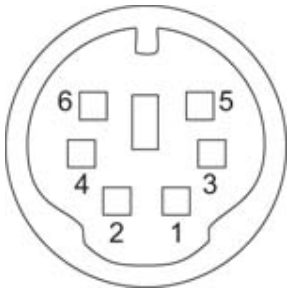


Pin	Description	Pin	Description
1	Not Connected	9	GND
2	GND	10	Limit Switch +
3	Not Connected	11	Limit Switch -
4	Index -	12	Index +
5	QB -	13	QB +
6	QA -	14	QA +
7[a]	5 V	15	Not Connected
8[a]	5 V		

a. Pins 7 and 8 are short circuited internally.

HANDSET

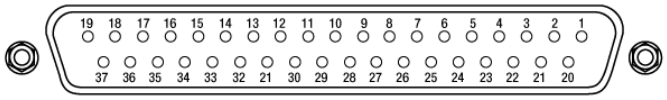
Female Mini DIN Connector



Pin	Description	Pin	Description
1	RX (Controller Input)	4	Supply Voltage for Handset 5 V
2	Ground	5	TX (Controller Output)
3	Ground	6	Ground

AUX I/O

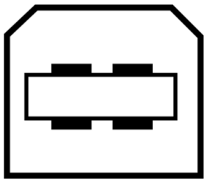
Female D-Type Connector



Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	RS232 TX	11	User Digital O/P 11+	21	+5 V	31	User Digital O/P 4+
2	RS232 RX	12	User Digital O/P 10-	22	User Digital I/P 3	32	User Digital O/P 4-
3	Ground	13	User Digital O/P 10+	23	User Digital I/P 2	33	User Digital O/P 5+
4	Differential I/P 2+	14	User Digital O/P 9-	24	User Digital I/P 1	34	User Digital O/P 5-
5	Differential I/P 2-	15	User Digital O/P 9+	25	User Digital I/P 0	35	User Digital O/P 6+
6	Differential I/P 1-	16	User Digital O/P 8-	26	User Digital O/P 0	36	User Digital O/P 6-
7	Differential I/P 1+	17	User Digital O/P 8+	27	User Digital O/P 1	37	Ground
8	User Digital O/P 12-	18	User Digital O/P 7-	28	User Digital O/P 2		

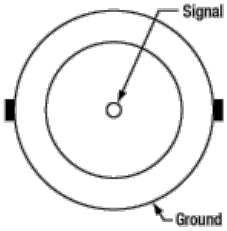
USB

Type B USB Female



I/O

Female BNC Connector



5 V TTL

9	User Digital O/P 12+	19	User Digital O/P 7+	29	User Digital O/P 3	-	-
10	User Digital O/P 11-	20	+5 V	30	Ground		

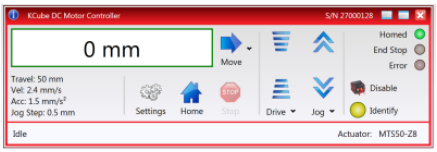
Hide Motion Control Software

MOTION CONTROL SOFTWARE

Thorlabs offers two platforms to drive our wide range of motion controllers: our Kinesis® software package or the legacy APT™ (Advanced Positioning Technology) software package. Either package can be used to control devices in the Kinesis family, which covers a wide range of motion controllers ranging from small, low-powered, single-channel drivers (such as the K-Cubes™ and T-Cubes™) to high-power, multi-channel, modular 19" rack nanopositioning systems (the APT Rack System).

The Kinesis Software features .NET controls which can be used by 3rd party developers working in the latest C#, Visual Basic, LabVIEW™, or any .NET compatible languages to create custom applications. Low-level DLL libraries are included for applications not expected to use the .NET framework. A Central Sequence Manager supports integration and synchronization of all Thorlabs motion control hardware.

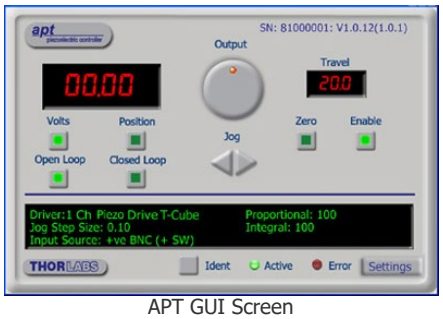
Our legacy APT System Software platform offers ActiveX-based controls which can be used by 3rd party developers working on C#, Visual Basic, LabVIEW™, or any Active-X compatible languages to create custom applications and includes a simulator mode to assist in developing custom applications without requiring hardware.



Kinesis GUI Screen

By providing these common software platforms, Thorlabs has ensured that users can easily mix and match any of the Kinesis and APT controllers in a single application, while only having to learn a single set of software tools. In this way, it is perfectly feasible to combine any of the controllers from single-axis to multi-axis systems and control all from a single, PC-based unified software interface.

The software packages allow two methods of usage: graphical user interface (GUI) utilities for direct interaction with and control of the controllers 'out of the box', and a set of programming interfaces that allow custom-integrated positioning and alignment solutions to be easily programmed in the development language of choice.



APT GUI Screen

A range of video tutorials is available to help explain our APT system software. These tutorials provide an overview of the software and the APT Config utility. Additionally, a tutorial video is available to explain how to select simulator mode within the software, which allows the user to experiment with the software without a controller connected. Please select the *APT Tutorials* tab above to view these videos.

Software

Kinesis Version 1.14.37

The Kinesis Software Package, which includes a GUI for control of Thorlabs' Kinesis and APT™ system controllers.

Also Available:

- Communications Protocol

Software

Software

APT Version 3.21.6

The APT Software Package, which includes a GUI for control of Thorlabs' APT™ and Kinesis system controllers.

Also Available:

- Communications Protocol

Software

Hide APT Tutorials

APT TUTORIALS

The APT video tutorials available here fall into two main groups - one group covers using the supplied APT utilities and the second group covers programming the APT System using a selection of different programming environments.

Disclaimer: The videos below were originally produced in Adobe Flash. Following the discontinuation of Flash after 2020, these tutorials were re-recorded for future use. The Flash Player controls still appear in the bottom of each video, but they are not functional.

Every APT controller is supplied with the utilities APTUser and APTConfig. APTUser provides a quick and easy way of interacting with the APT control hardware using intuitive graphical control panels. APTConfig is an 'off-line' utility that allows various system wide settings to be made such as pre-selecting mechanical stage types and associating them with specific motion controllers.

APT User Utility

The first video below gives an overview of using the APTUser Utility. The OptoDriver single channel controller products can be operated via their front panel controls in the absence of a control PC. The stored settings relating to the operation of these front panel controls can be changed using the APTUser utility. The second video illustrates this process.

APT User - Overview APT User - OptoDriver Settings

APT Config Utility

There are various APT system-wide settings that can be made using the APT Config utility, including setting up a simulated hardware configuration and associating mechanical stages with specific motor drive channels. The first video presents a brief overview of the APT Config application. More details on creating a simulated hardware configuration and making stage associations are present in the next two videos.

APT Config - Overview APT Config - Simulator Setup APT Config - Stage Association

APT Programming

The APT Software System is implemented as a collection of ActiveX Controls. ActiveX Controls are language-independant software modules that provide both a graphical user interface and a programming interface. There is an ActiveX Control type for each type of hardware unit, e.g. a Motor ActiveX Control covers operation with any type of APT motor controller (DC or stepper). Many Windows software development environments and languages directly support ActiveX Controls, and, once such a Control is embedded into a custom application, all of the functionality it contains is immediately available to the application for automated operation. The videos below illustrate the basics of using the APT ActiveX Controls with LabVIEW, Visual Basic, and Visual C++. Note that many other languages support ActiveX including LabWindows CVI, C++ Builder, VB.NET, C#.NET, Office VBA, Matlab, HPVEE etc. Although these environments are not covered specifically by the tutorial videos, many of the ideas shown will still be relevant to using these other languages.

Visual Basic

Part 1 illustrates how to get an APT ActiveX Control running within Visual Basic, and Part 2 goes on to show how to program a custom positioning sequence.

APT Programming Using Visual Basic - Part 1 APT Programming Using Visual Basic - Part 2

LabVIEW

Full Active support is provided by LabVIEW and the series of tutorial videos below illustrate the basic building blocks in creating a custom APT motion control sequence. We start by showing how to call up the Thorlabs-supplied online help during software development. Part 2 illustrates how to create an APT ActiveX Control. ActiveX Controls provide both Methods (i.e. Functions) and Properties (i.e. Value Settings). Parts 3 and 4 show how to create and wire up both the methods and properties exposed by an ActiveX Control. Finally, in Part 5, we pull everything together and show a completed LabVIEW example program that demonstrates a custom move sequence.

APT Programming Using LabVIEW - Part 1: Accessing Online Help APT Programming Using LabVIEW - Part 2: Creating an ActiveX Control APT Programming Using LabVIEW - Part 3: Create an ActiveX Method

APT Programming Using LabVIEW - Part 4: Create an ActiveX Property APT Programming Using LabVIEW - Part 5: How to Start an ActiveX Control

The following tutorial videos illustrate alternative ways of creating Method and Property nodes:

APT Programming Using LabVIEW - Create an ActiveX Method (Alternative) APT Programming Using LabVIEW - Create an ActiveX Property (Alternative)

Visual C++

Part 1 illustrates how to get an APT ActiveX Control running within Visual C++, and Part 2 goes on to show how to program a custom positioning sequence.

APT Programming with Visual C++ - Part 1 APT Programming with Visual C++ - Part 2

MATLAB

For assistance when using MATLAB and ActiveX controls with the Thorlabs APT positioners, click here.

To further assist programmers, a guide to programming the APT software in LabVIEW is also available here.

Hide Motorized XY Scanning Stage for XYZ Stage Configuration

Motorized XY Scanning Stage for XYZ Stage Configuration

- XY Scanning Component of the Motorized XYZ Microscope Stage System
- Integrates with Cerna®, Nikon, Olympus, and Zeiss Upright and Inverted Microscopes
- Recommended Controller: BBD302 Dual-Axis Brushless DC Servo Motor Controller (Sold Separately)
- Integrated Brushless DC Linear Servo Motor Actuators
- Linear Optical Encoders
- High-Quality, Precision-Engineered Linear Bearings
- High Repeatability (0.25 µm) and Position Accuracy (<3 µm)

Key Stage Specifications	
Travel Range	110 mm x 75 mm (4.3" x 2.95")
Velocity (Max)	250 mm/s
Acceleration (Max)	2000 mm/s^2
Bidirectional Repeatability	0.25 µm
Unidirectional Repeatability	0.25 µm
Horizontal Load Capacity (Max)	1.0 kg (2.2 lb)
Min Achievable Incremental Movement	0.1 µm
Home Location Accuracy	0.25 µm
Absolute On-Axis Accuracy	<3 µm

These Motorized XY Scanning Stages are required when using the MZS500-E Z-Axis Piezo Stage (sold below). When combined with the Z-axis piezo stage, it forms a versatile 3D translation stage for scanning across a sample with high precision in the X, Y, and Z axes. The MLS203-1 Stage is compatible with inverted and upright microscopes from Nikon and Olympus, as well as with upright Thorlabs Cerna microscopes; mounting brackets are required (sold below). The MLS203-2 Stage is directly compatible with Zeiss Axio Observer and Axiovert 40 microscopes; mounting brackets are not required.

The recommended controller for the XY scanning stages is the BBD302 Two-Channel Controller, which features Thorlabs' Kinesis® control and programming interface, enabling easy integration into automated microscopy applications. This controller is ideal for applications demanding operation at high speeds (hundreds of mm/s) and high encoder resolution (<100 nm). For greater flexibility, communication with the PC is supported using either a USB or RS232 interface.

The controller is supplied with a software development kit (SDK) in order to also support automated PC control of the MLS203 stages. This is useful to system integrators and other automation specialists who need to combine operation of the stage with other microscopy automation accessories. The fully documented SDK supports all major development languages running on Windows, such as LabVIEW, C++, and MATLAB, and comes in the form of ActiveX libraries or a conventional dynamic link library (DLL). Multiple units can be connected to a single PC using a USB hub; for example, the BBD302 Controller for the MLS203 XY stages and the controller supplied with our MZS500-E Z-Axis Stage Kit can be controlled simultaneously with a single PC. Please click here to view the full presentation for these Brushless DC Motor Controllers.

Part Number	Description	Price	Availability
MLS203-1	**Fast XY Scanning Stage**	**$8,105.83**	**Lead Time**
MLS203-2	**Fast XY Scanning Stage for Zeiss Microscopes**	**$8,105.83**	**Lead Time**
BBD302	**Customer Inspired! 2-Channel Benchtop 3-Phase Brushless DC Servo Controller**	**$3,575.74**	**Today**

Hide Mounting Brackets and Adapters for MLS203 XY Scanning Stages

Mounting Brackets and Adapters for MLS203 XY Scanning Stages

We offer a choice of brackets to facilitate mounting the MLS203-1 stage to a range of upright and inverted microscopes from Thorlabs, Nikon, and Olympus. Please see the table below for specific compatibility. Each bracket (with the exception of the CSA1000) comes with instructions describing how to attach the stage to the microscope. Please note that the MLS203-2 is directly compatible with Zeiss Axio Observer and Axiovert 40 microscopes. Mounting brackets are not required.

Additionally, there are two options for attaching an MLS203 stage to an imperial or metric breadboard to support home-built microscopes or general photonics applications. The MLSA01 Riser Plates, compatible with stage Item # MLS203-1, will raise the height of the stage by 1.24" (31.5 mm). The MLSA04 Adapter, compatible with stage Item #s MLS203-1 and MLS203-2, connects to the base of the stage, blocking the central aperture; however, it raises the height of the stage by only 0.03" (0.7 mm), making it well suited for height-limited applications.


Click to Enlarge
MLS203-1 Stage Attached to a Breadboard with our MLSA01 Bracket Set

Click Image									

for Details									
Item #	CSA1000	MLSA02	MLSA09	MLSA08	MLSA03	MLSA06	MLSA07	MLSA01	MLSA04
Stage Item #	MLS203-1	MLS203-1			MLS203-1			MLS203-1	MLS203-1 or MLS203-2
Microscope Brand	Thorlabs	Olympus			Nikon			Optical Breadboard, Custom Configuration	
Microscope Model	Cerna®	IX71, IX73, IX81, IX83	IX70	BX41, BX43, BX51, BX53, BX61	TE2000, Eclipse Ti	50i, 80i, 90i, Ci-L	Eclipse FN1	N/A	
Microscope Type	Upright	Inverted	Inverted	Upright	Inverted	Upright	Upright	N/A	

a. Item # MLSA01 consists of two riser plates, each of which has two through holes that accept 1/4"-20 (M6) screws and support mounting to a surface with 1/4"-20 (M6) holes spaced 6" (175 mm) apart. Item # MLSA04 consists of a single adapter plate with four counterbores that accept 1/4"-20 (M6) screws and support mounting to a surface with 1/4"-20 (M6) holes on a 3" x 3" (75 mm x 75 mm) grid.

We support microscopes from Olympus, Nikon, Zeiss and Leica. Please contact Technical Support to inquire about bracket availability if your microscope model is not listed above.

Part Number	Description	Price	Availability
CSA1000	**Fixed Arm Holder for MLS203-1 Fast XY Scanning Stage**	**$793.55**	**Today**
MLSA02	**Olympus IX51, IX71, IX73, IX81, and IX83 Mounting Brackets, 2 Pieces**	**$125.77**	**Today**
MLSA09	**Olympus IX70 Mounting Brackets, 2 Pieces**	**$138.16**	**Today**
MLSA08	**Olympus BX41, BX43, BX51, BX53, and BX61 Adapter**	**$304.47**	**Today**
MLSA03	**Nikon TE2000 and Eclipse Ti Mounting Brackets, 2 Pieces**	**$153.73**	**Today**
MLSA06	**Nikon 50i, 80i, 90i, and Ci-L Adapter**	**$304.47**	**Today**
MLSA07	**Customer Inspired! Nikon Eclipse FN1 Mounting Adapter**	**$415.77**	**Today**
MLSA01	**31.5 mm Riser Plates for MLS203-1 Breadboard Mounting, 2 Pieces**	**$185.18**	**Today**
MLSA04	**Breadboard Adapter for MLS203 Fast XY Scanning Stages**	**$150.00**	**Today**

Hide Z-Axis Piezo Stage and Controller Bundle for XYZ Stage Configuration

Z-Axis Piezo Stage and Controller Bundle for XYZ Stage Configuration

- Includes the Z-Axis Piezo Stage and Controller
- Z-Axis Piezo Stage:
  - Z-Axis Component of the Motorized XYZ Microscope Stage System
  - Must First be Mounted to the MLS203 XY Stage (See Photo to Right)
  - Accessories, Such as Sample Plates and MZF001 Joystick Control, are Sold Below
- Controller:
  - Quiet, High-Resolution Position Control
  - High Power: 150 V, 500 mA Continuous
  - Full Software Control Suite Supplied
  - Software Integrated with Other APT™ Family Controllers (Integrated Systems Development)
  - Closed-Loop PID Position via Capacitive Feedback Circuit
  - Voltage Ramp/Waveform Generating Capability (for Scanning Applications)
  - User-Controlled Digital I/O Port

Click to Enlarge
MZS500-E Z-Axis Piezo Stage with Multiwell Plate Fitted

Click to Enlarge
MZS500-E Z-Axis Piezo Stage Being Attached to the Motorized XY Scanning Stage

Key Stage Specifications	
Travel Range	500 µm
Resolution	25 nm
Minimum Step Size	250 nm (Typical)
Settling Time for 1 to 100 µm Step	25 ms (Typical)

The MZS500-E Z-axis stage and controller bundle includes a Z-axis stage and a closed-loop piezo controller. The piezo-driven stage provides 500 µm of vertical (Z-axis) travel, 25 nm of resolution, and a 0.5 lb (0.25 kg) max load capacity. The bundle includes everything needed for computer-controlled, Z-axis positioning and active location feedback. Please see the Specs tab for more information on the Z-axis piezo stage.

To incorporate the Z-Axis Stage into a system, it must first be mounted to an MLS203 series XY stage (shown to the upper far right). These two products combined present a versatile 3D solution for translating samples over a long range or across a sample with high precision. The stage can also be directly fitted with a multiwell plate (shown to the upper right); additional accessories can be found below.

The controller included with the stage is a single-channel, high-power (150 V, 500 mA), benchtop piezo controller for open- and closed-loop nanometer position control. Flexible software settings make this controller suitable for driving a wide range of third-party piezo products. In addition, USB connectivity provides easy plug-and-play PC operation; multiple units can be connected to a single PC via a standard USB hub for multi-axis motion control applications. Coupling this with the user-friendly APT™ software allows the user to quickly get up and running. Advanced custom motion control applications and sequences are also possible using the extensive ActiveX® programming environment. These ActiveX Controls can be incorporated into a wide range of software development environments including Labview, C++, and Matlab. Please see the *Specs* tab for more information on the Z-axis stage controller.

Part Number	Description	Price	Availability
MZS500-E	**Z-Axis Piezo Stage and Controller Kit**	**$12,519.77**	**Lead Time**

Hide Accessory Plates for Z-Axis Stage

Accessory Plates for Z-Axis Stage

MZS500P5 and MZS500P4 Breadboards

Click to Enlarge

- MZS500P5: 15 x 1/4"-20, 1" Pitch
- MZS500P4: 15 x M6, 25 mm Pitch

C4SH01 Multi Slide Holder

Click to Enlarge

- Plastic Holder Compatible with 25 mm x 75 mm, 1.1 ± 0.2 mm Thick Microscope Slides
- Does Not Hold 26 mm x 76 mm Slides Sold by Thorlabs
- Mount up to Four Slides for Automated Tissue and Tissue Microarray Analysis
- Same Footprint as Multiwell Plates (127.6 mm × 85.5 mm)

MZS500P2 Slide/Petri Dish Holder

Click to Enlarge

- Compatible with Microscope Slides Measuring 25 mm to 25.4 mm (0.98" to 1.0") in Width
- Compatible with Petri Dishes
- Does Not Hold 26 mm x 76 mm Slides Sold by Thorlabs
- Measuring 30 mm to 60 mm (1.18" to 2.36") in Diameter
- Can be Used with Imperial or Metric Accessories

MZS500P3 Blank Adapter Plate

Click to Enlarge

- Ideal for Custom Applications
- Easily Drilled and Tapped

Breadboard Plate Application

Click to Enlarge
MZS500P5 Mounted in the MZS500-E Z-Axis

Multi Slide Holder Application

Click to Enlarge
C4SH01 Slide Holder Tray Mounted in the

Slide/Petri Dish Application

Click to Enlarge
MZS500P2 Slide/Petri Dish Holder Mounted in

Stage

MZS500-E Z-Axis Stage

the MZS500-E Z-Axis Stage with the Stage Micrometer

Blank Adapter Plate Application

Click to Enlarge
MZS500P3 Mounted in the MZS500-E Z-Axis Stage

Part Number	Description	Price	Availability
MZS500P4	MZS500-Compatible Breadboard Plate, M6 Taps	$137.01	Today
C4SH01	Four-Position Microscope Slide Holder	$94.33	Today
MZS500P2	MZS500-Compatible Slide/Petri Dish Holder	$475.17	Today
MZS500P3	MZS500-Compatible Blank Adapter Plate	$91.34	Today
MZS500P5	MZS500-Compatible Breadboard Plate, 1/4"-20 Taps	$137.01	Today

Hide Z-Axis Joystick Console for Z-Axis Stage

Z-Axis Joystick Console for Z-Axis Stage

- High Reliability Hall Effect Finger Joystick
- Speed Adjustment for Fast or High-Precision Moves
- Speed Dial for Sensitivity Adjustment
- Allows Remote Manual Control
- Can be Reprogrammed using a Benchtop Controller and a PC
- Ergonomic Design
- High-Quality Machined Anodized Aluminum Casing

The MZF001 joystick console has been designed for microscope users to provide intuitive, tactile, manual positioning of the MZS500 stage. It is used in conjunction with the MZS500-E controller above. Furthermore, if the parameter settings are saved (persisted) to the controller using a PC, the controller can be disconnected from the computer allowing for remote operation.

Part Number	Description	Price	Availability
MZF001	Single-Axis Joystick Console	$1,182.10	Lead Time

Hide 2-Axis Joystick Console for XY Scanning Stage

2-Axis Joystick Console for XY Scanning Stage

- Ideal for use with MLS203 Stages
- Speed Adjustment for Fast or High Precision Moves
- Speed Dial for Sensitivity Adjustment
- Ergonomic Design
- High-Quality Machined Anodized Aluminum Casing
- High-Reliability Hall Effect Joystick

The MJC001 Joystick Console has been designed for microscope users and provides intuitive, tactile, manual positioning of the MLS203 Stages and other XY translation stages. The console features a two-axis joystick for XY control. In most applications, the default parameter settings saved within the controller allow the joystick to be used out-of-the-box, with no need for further setup, thereby negating the requirement to be connected to a host PC and allowing true remote operation.

The MJC001 is compatible with our Benchtop Brushless Controllers, Rack-Mounted Brushless Controller, and Stepper Motor Controllers. The joystick is shipped

complete with cables for use with these controllers. If you intend to use the joystick with a legacy BBD10x series unit, please contact Tech Support for a compatible cable.

Part Number	Description	Price	Availability
MJC001	2-Axis Microscopy Joystick Console	$1,182.10	Lead Time