P-545 Plnano™ Trak High-Speed Piezo Tracking Stage

Fastest XY(Z) Microscope Stage to Enable Use of Full Turret Motion

The low profile of 20 mm and special design to allow for a full slide to be mounted at the bottom set Plnano™ piezo microscope stages apart.
The Plnano™ Trak version shown above is optimized for extremely fast motion and provides sub-nanometer resolution in up to three axes

- **Fast Response < 5 ms: Ideal for Tracking**
- **Sub-Nanometer Resolution**
- **Low Profile for Easy Integration: 20 mm (0.8")**
- **Countersunk Insertion Frame: Ideal for Inverted Microscopy**
- **Revolving Nosepiece Freely Rotatable Without Additional Z Motion**
- **Travel Ranges up to 70 x 70 x 50 µm**
- **Cost-Effective Design due to Piezoresistive Sensors**
- **Compatible w/ Leading Image Acquisition Software Package**
- **Position Servo-Control for Repeatable Sub-Nanometer Resolution**
- **Ideal for Super-Resolution Microscopy**
- **Controller Included**
- **Available Long-Travel Stage**

Application Examples

- Super-resolution microscopy
- 3D Imaging
- Laser technology
- Interferometry
- Metrology
- Biotechnology
- Screening
- Micromanipulation

High Speed, Long Travel, Low Profile, Ideal for Single Molecule Tracking

The new Plnano™ Trak XY and XYZ high-speed piezo scanners are designed for extremely fast response such as required for single molecule tracking applications. The special low-profile design with a large aperture and recessed full size slide mount at the bottom of the stage allows easy integration into high-resolution inverted microscopes.

Cost Effective Design, High Performance

Plnano™ series piezo positioning stages are designed to provide high performance at minimum cost. For highly-stable, closed-loop operation, piezoresistive sensors are applied directly to the moving structure and precisely measure the displacement of the stage platform. The very high sensitivity of these sensors provides optimum position stability and responsiveness as well as sub-nanometer resolution. A proprietary servo controller significantly improves the motion linearity compared to conventional piezoresistive sensor controllers.

High Reliability and Long Lifetime

The compact P-545 systems are equipped with preloaded PICMA® high-performance piezo actuators which are integrated into a sophisticated, FEA-modeled, flexure guiding system. The PICMA® actuators feature cofired ceramic encapsulation and provide better performance and reliability than conventional piezo actuators. Actuators, guidance and sensors are maintenance-free, not subject to wear and offer extraordinary reliability.

Ordering Information

P-545.2D7
Plnano™ High-Dynamics XY Piezo Stage System, Slide-Size Aperture, 70 x 70 µm, Direct Drive, Piezoresistive Sensors, with Controller

P-545.3D7
Plnano™ High-Dynamics XYZ Piezo Stage System, Slide-Size Aperture, 70 x 70 x 50 µm, Direct Drive, Piezoresistive Sensors, with Controller

Accessories

M-545.2MO
XY Microscope Stage, 25 x 25 mm, Micrometer Drive, High Stability, Compatible with PI Piezo Stages, for Olympus Microscopes

M-545.2MN
XY Microscope Stage, 25 x 25 mm, Micrometer Drive, High Stability, Compatible with PI Piezo Stages, for Nikon Microscopes

M-545.2ML
XY Microscope Stage, 25 x 25 mm, Micrometer Drive, High Stability, Compatible with PI Piezo Stages, for Leica Microscopes

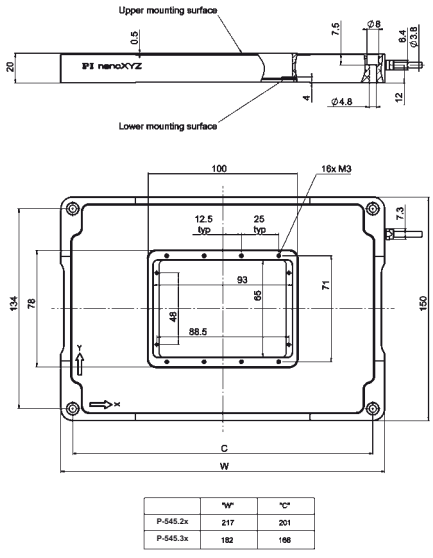
M-545.2MZ
XY Microscope Stage, 25 x 25 mm, Micrometer Drive, High Stability, Compatible with PI Piezo Stages, for Zeiss Microscopes

P-545.PD3
35 mm Petri Dish Holder for Plnano™ Piezo Stages

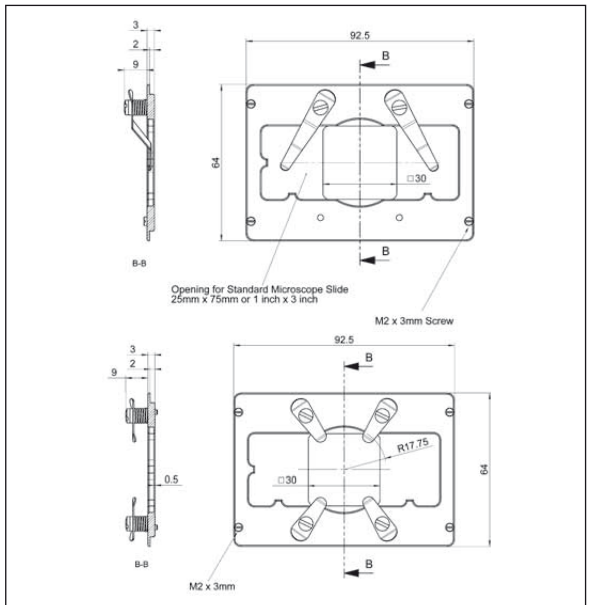
P-545.SH3
Microscope Slide Holder for Plnano™ Piezo Stages

P-545.PP3
Plain Plate for Accessories for Plnano™ Piezo Stages

Additional accessories on request. Ask about custom designs!



P-545.2D7 and P-545.3D7, dimensions in mm



Accessories: Slide holder (above) and Petri dish holder (below), dimensions in mm

Technical Data

Model	P-545.2D7 for two axes P-545.3D7 for three axes	Unit	Tolerance
Active axes	X, Y, (Z)		
Motion and positioning			
Integrated sensor	Piezoresistive		
Closed-loop travel	70 x 70 (x 50)	µm	
Closed-loop resolution*	<1	nm	typ.
Mechanical properties			
Unloaded resonant frequency	1 (X), 1 (Y), 0.8 (Z)	kHz	
Push/pull force capacity	100 / 30	N	max.
Recommended load**	0,5	kg	max.
Drive properties			
Ceramic type	PICMA® P-885		
Electrical capacitance	6 (X, Y), 12 (Z)	µF	± 20%
Miscellaneous			
Operating temperature range	-20 to 80	°C	
Material	Aluminum		
Mass	1	kg	± 5%
Cable length	1.5	m	± 10 mm
Sensor / voltage connection	Sub-D, 25 pin		
Piezo controller	E-545 (included in delivery)		
Piezo connector	Sub-D, 25-pin		
Communication interfaces	Ethernet (TCP/IP) USB, RS-232		
Analog control input connector	BNC		
Command set	PI General Command Set (GCS)		
User software	PIMikroMove, NanoCapture		
Software drivers	Lab VIEW drivers, Windows and Linux Libraries (DLL) compatible with MetaMorph, µManager, MATLAB		
Supported functionality	Wave generator, data recorder, auto zero, trigger I/O		
Dimensions	450 x 88 x 343 + mounting rails		

* Resolution of PI Piezo Nanopositioners is not limited by friction or stiction. Value given is noise equivalent motion measured with interferometer.
** for optimum dynamics. Less load = higher dynamics.

P-545 PI nano™ XYZ / PI nano™ XY Piezo Stage Systems

Low-Profile, Low-Cost Nanopositioning Systems for Super-Resolution Microscopy

PI nano™series nanopositioning stages feature a very low profile of 20 mm (0.8), a large aperture for 3 x 1'' slides and deliver highly accurate motion with sub-nanometer resolution in up to 3 axes. Slide / petri dish holders optional

- **Low Profile for Easy Integration: 20 mm (0.8")**
- **Up to 200 x 200 x 200 µm Travel Ranges**
- **Large Clear Aperture for 3 x 1" Slides**
- **Recessed Sample Holders for Maximized Utility Available**
- **Outstanding Lifetime Due to PICMA®Piezo Actuators**
- **Cost-Effective Design due to Piezoresistive Sensors**
- **Compatible w/ Leading Image Acquisition Software Package**
- **Closed-Loop Control for High Repeatability and Accuracy**
- **Millisecond Step Time, Ideal for Super-Resolution Microscopy**
- **24-Bit Controller w/ USB, Ethernet, RS-232 Interface and Analog Control**
- **Available Manual Long-Travel Stage with Motor Upgrade Option**

Long Travel, Low Profile, Optimized for Microscopy

PI nano™ XY and XYZ low-profile piezo scanning stages are optimized for easy integration into high-resolution microscopes. They feature a very low profile of 20 mm (0.8") and a large aperture designed to hold Petri dishes and standard slide holders. The long travel ranges of up to 200 x 200 x 200 µm with nanometer closed-loop resolution are ideal for leading-edge microscopy and imaging applications.

Application Examples

- Super-resolution microscopy
- 3D Imaging
- Laser technology
- Interferometry
- Metrology
- Biotechnology
- Screening
- Micromanipulation

Cost Effective Design, High Performance

PI nano™ series piezo positioning stages are designed to provide high performance at minimum cost. For highly-stable, closed loop operation, piezoresistive sensors are applied directly to the moving structure and precisely measure the displacement of the stage platform. The very high sensitivity of these sensors provides optimum position stability and responsiveness as well as nanometer resolution. A proprietary servo controller significantly improves the motion linearity compared to conventional piezoresistive sensor controllers.

High Reliability and Long Lifetime

The compact P-545 systems are equipped with preloaded PICMA® high-performance piezo actuators which are integrated into a sophisticated, FEA-modeled, flexure guiding system. The PICMA® actuators feature cofired ceramic encapsulation and provide better performance and reliability than conventional piezo actuators. Actuators, guidance and sensors are maintenance-free, not subject to wear and offer extraordinary reliability.

Background: the piezo controller is included and comes with a 24-bit resolution USB port as well as ethernet, RS-232 and analog interface. Foreground: The optional M-545 manual XY stage provides a stable platform for the PI nano™ piezo stages. Custom stage version shown

Ordering Information

P-545.2R7
PInano™ XY Piezo Stage, Slide-Size Aperture, 200 x 200 µm, Piezoresistive Sensors, with USB Controller

P-545.3R7
PInano™ XYZ Piezo Stage, Slide-Size Aperture, 200 x 200 x 200 µm, Piezoresistive Sensors, with USB Controller

Controller included

E-545.3RD
PInano™ Multi-Channel Piezo Controller with High-Speed Digital Interface, 3 Channels, Piezoresistive Sensors, Sub-D Connectors

Accessories

M-545.2MO
XY Microscope Stage, 25 x 25 mm, Micrometer-Driven, High Stability, Compatible with PI® Piezo Stages, for Olympus Microscopes

M-545.2MN
XY Microscope Stage, 25 x 25 mm, Micrometer-Driven, High Stability, Compatible with PI® Piezo Stages, for Nikon Microscopes

M-545.2ML
XY Microscope Stage, 25 x 25 mm, Micrometer-Driven, High Stability, Compatible with PI® Piezo Stages, for Leica Microscopes

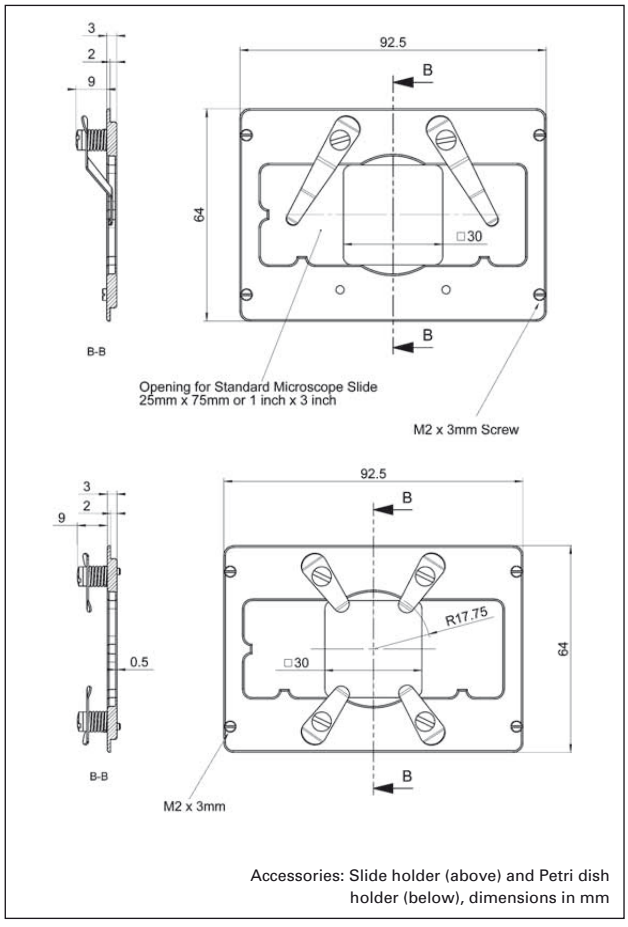
M-545.2MZ
XY Microscope Stage, 25 x 25 mm, Micrometer-Driven, High Stability, Compatible with PI® Piezo Stages, for Zeiss Microscope

P-545.PD3
35mm Petri Dish Holder for P-545 PInano™ Piezo Stages

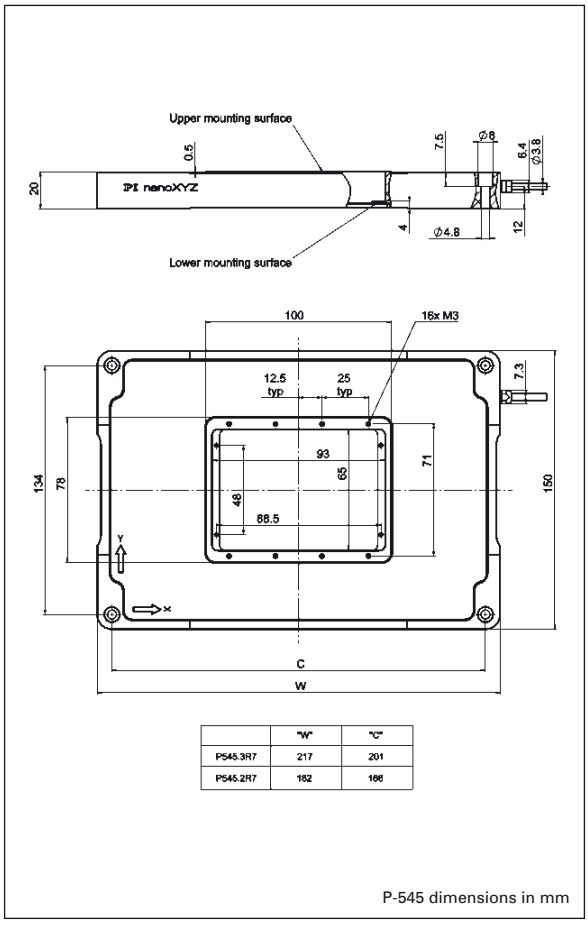
P-545.SH3
Microscope Slide Holder for PInano™ Piezo Stages

P-545.PP3
Plain Plate for Accessories for PInano™ Piezo Stages

Additional accessories on request.



Accessories: Slide holder (above) and Petri dish holder (below), dimensions in mm



	"W"	"C"
P545.3R7	217	201
P545.2R7	182	166

P-545 dimensions in mm

Technical Data

Model	P-545.2R7	P-545.3R7	Unit	Tolerance
Active axes	X, Y	X, Y, Z		
Motion and positioning				
Integrated sensor	piezoresistive	piezoresistive		
Closed-loop travel	200 x 200	200 x 200 x 200	µm	
Closed-loop resolution*	1	1	nm	typ.
Linearity	±0.1	±0.1	%	typ.
Repeatability	< 5	< 5	nm	typ.
Mechanical properties				
Push/pull force capacity	50 / 30	50 / 30	N	max.
Recommand load**	0,5	0,5	kg	max.
Drive properties				
Ceramic type	PICMA® P-885	PICMA® P-885		
Electrical capacitance	6	6 (X, Y), 12 (Z)	µF	±20%
Miscellaneous				
Operating temperature range	-20 to 80	-20 to 80	°C	
Material	Aluminum	Aluminum		
Mass	1	1.2	kg	±5%
Cable length	1.5	1.5	m	±10 mm
Sensor / voltage connection	Sub-D, 25 pin	Sub-D, 25 pin		
Piezo controller (included in delivery)	E-545	E-545		

* Resolution of PI Piezo Nanopositioners is not limited by friction or stiction. Value given is noise equivalent motion measured with interferometer.
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