

PI nano[®] High Precision & Stability XYZ Piezo Stage

CAPACITIVE POSITIONING MEASUREMENT FOR SUPER-RESOLUTION MICROSCOPY



P-545.xC7

- Highest stability and repeatability
- Travel ranges up to 200 x 200 x 200 μm
- Sub-nanometer resolution
- ms-response times
- Low Profile for easy integration: 20 mm
- Recessed slide holder, free rotation of turret

Reference-class system: high-resolution piezo stage for 3x1" object slides

USB controller and software included

PICMA[®] high-performance piezo drive

Frictionless flexure guiding system, FEM-optimized flexure joints. Piezo actuators with ceramic insulation for outstanding lifetime. High-dynamics system with millisecond response times

Direct-metrology capacitive sensors

Significantly improved stability and repeatability compared to piezoresistive sensors

Easy implementation

Large clear aperture. For standard object slides (25 x 75 mm). Optional: object slide holder, further accessories and with M-545 microscope stage mountable on most microscopes of leading manufacturers

Application fields

Super-resolution microscopy, screening, confocal microscopy, biotechnology. High reliability even under permanent high-humidity conditions

Related Products

P-721 PIFOC[®] High-Precision Objective Scanner
 P-726 PIFOC[®] High-Load Objective Scanner
 P-737 PIFOC[®] Sample Focusing System

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

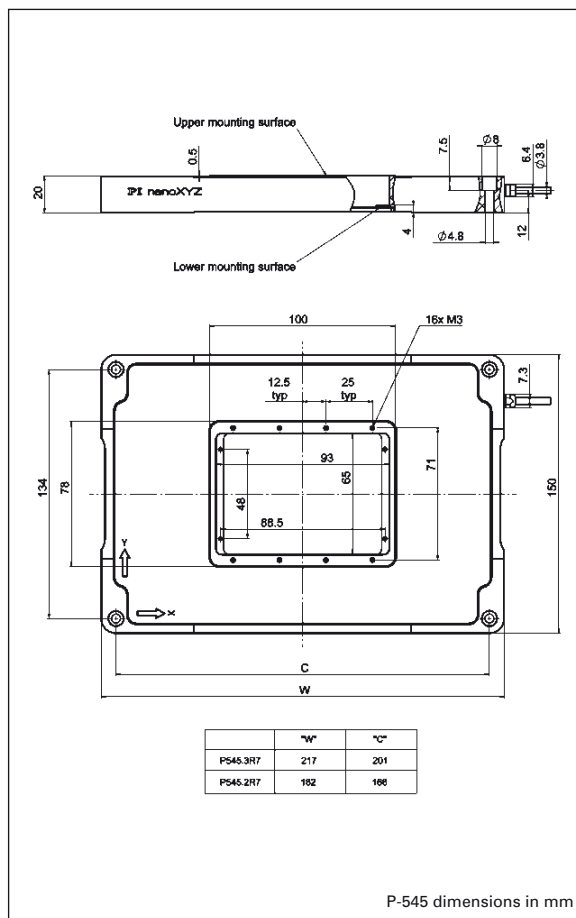
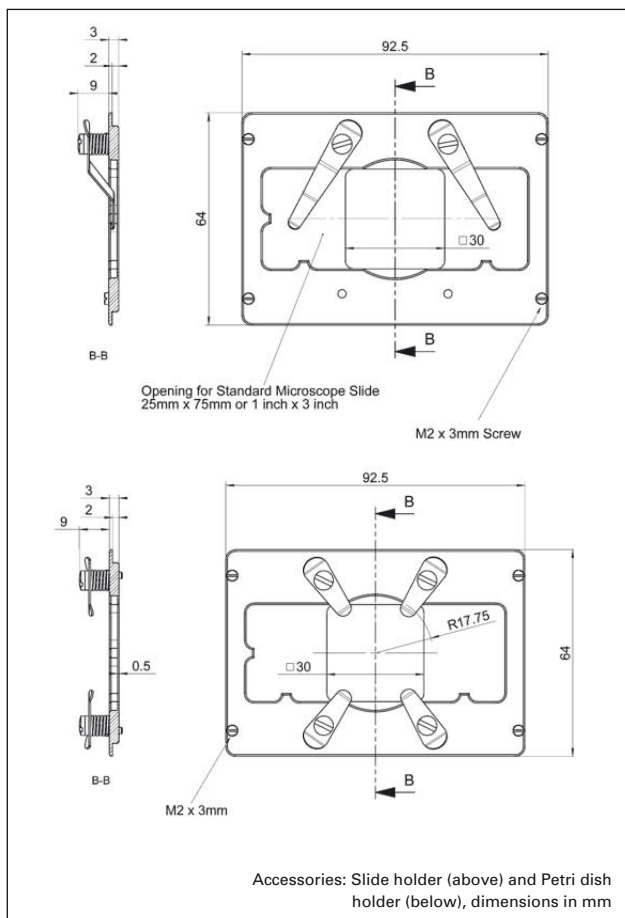
M-545.2MZ XY Microscope Stage, 25 x 25 mm, Micrometer Drive, High Stability, Compatible with PI Piezo Stages, for Zeiss Microscopes

P-545.PD3 35 mm Petri Dish Holder for PI nano[®] Piezo Stages

P-545.SH3 Microscope Slide Holder for PI nano[®] Piezo Stages

P-545.PP3 Plain Plate for Accessories for PI nano[®] Piezo Stages

Additional accessories on request.



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.
Recommend 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.
 ** for optimum dynamics. Less load = higher dynamics.

Plnano[®] Track High Speed XYZ Piezo 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**

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 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

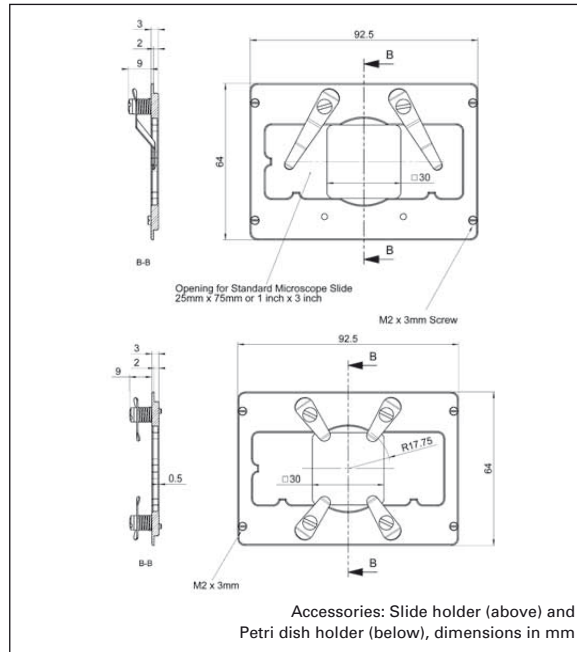
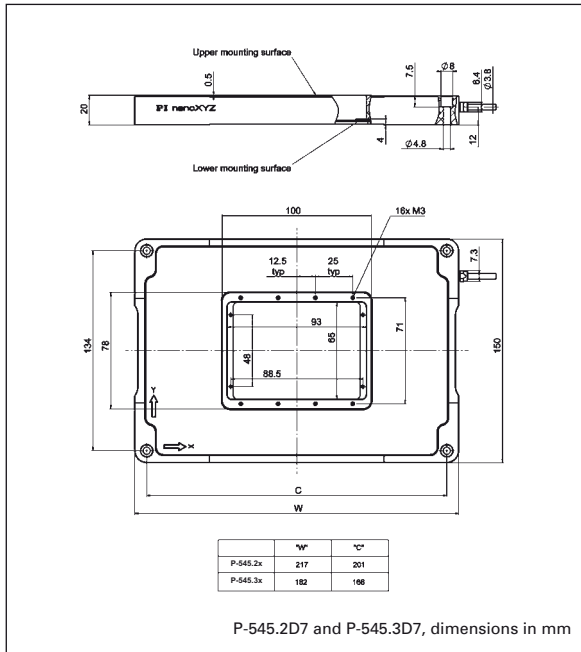
Additional accessories on request. Ask about custom designs!

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.



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			
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.
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