



Accessories

Mounting Adaptors, Angle Brackets, PI Standard Hole Pattern

To allow different PI stages to be combined with a minimum number of adapter plates, a standard hole pattern has been adopted. This pattern is available on most stages. The

dashed line shows the hole pattern of 60 x 60 mm stages.

The following table gives an overview of all possible combinations of PI linear, rotary and

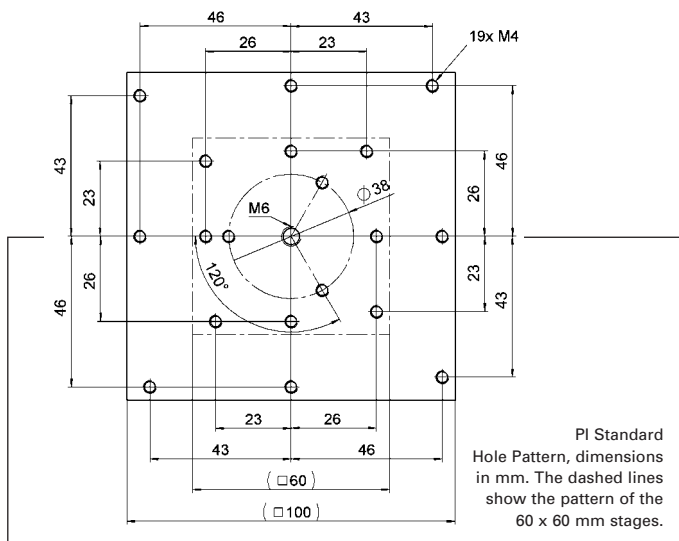
tilt stages. Select the positioner to be mounted on top from the left column (e.g. M-011) and the supporting positioner from the top row.

Example:

To mount an M-011 vertically on an M-511, the M-052.00 adapter is required. No adapter is required for horizontal mounting.

Mounting Adapter Matrix

	Bottom:	M-011	M-014	M-035	M-036, M-038	M-041, M-042	M-043, M-044	M-105, M-106	M-110	M-111
Top	Orientation									
M-011	horizontal	n/r	n/r	M-087.10	M-087.10	n/r	n/r	M-105.AP	x	x
M-011	vertical	M-052.00	M-052.00	M-052.40	M-052.40	M-052.00	M-052.00	M-052.00+ M-105.AP	x	x
M-014	horizontal	x	n/r	M-088.10	M-088.10	n/r	n/r	x	x	x
M-014	vertical	x	M-053.10 **	M-053.40	M-053.40	M-053.10**	M-053.10**	x	x	x
M-014		x								
M-035, M-037	horizontal	n/r	n/r	x	x	n/r	n/r	M-105.AP	x	x
M-035, M-037	vertical	M-052.00	M-052.00	M-052.40	M-052.40	M-052.00	M-052.00	M-052.00+ M-105.AP	x	x
M-036, M-038	horizontal	x	n/r	x	x	x	n/r	M-400.AP	x	x
M-036, M-038	vertical	x	M-053.10**	M-053.40	M-053.40	x	M-053.10** M-400.AP	M-053.10***+	x	x
M-041, M-042	horizontal	n/r	n/r	M-087.10/ M-105.AP	M-087.10/ M-105.AP	n/r	n/r	M-105.AP	x	x
M-041, M-042	vertical	M-052.00	M-052.00	M-052.40	M-052.40	M-052.00	M-052.00	M-052.00+ M-105.AP	x	x
M-043, M-044	horizontal	x	n/r	M-088.10/ M-400.AP	M-088.10/ M-400.AP	x	n/r	M-400.AP	x	x
M-043, M-044	vertical	x	M-053.10**	M-053.40	M-053.40	x	M-053.10**	M-053.10***+ M-400.AP	x	x
M-105, M-106	horizontal	B-082.10	B-082.10	M-105.AP	M-105.AP	M-105.AP	M-105.AP	n/r	x	x
M-105, M-106	vertical	M-009.30+ M-009.10	M-009.30+ M-009.10	M-009.30+ M-009.10	M-009.30+ M-009.10	M-009.30+ M-009.10	M-009.30+ M-009.10	M-009.10/ M-105.VB1	x	x
M-110	horizontal	x	x	M-110.01	M-110.01	x	x	x	n/r	n/r
M-110	vertical	x	x	x	x	x	x	x	M-110.02	x
M-111	horizontal	x	x	M-110.01	M-110.01	x	x	x	n/r	n/r
M-111	vertical	x	x	x	x	x	x	x	x	M-110.03
M-126	horizontal	M-105.AP	M-105.AP	M-105.AP	M-105.AP	M-105.AP	M-105.AP	M-105.AP	x	x
M-126	vertical	M-125.90	M-125.90	M-125.90+ M-105.AP	M-125.90+ M-105.AP	M-125.90	M-125.90	M-125.90+ M-105.AP	x	x
M-311	horizontal	x	x	x	x	x	x	x	x	x
M-311	vertical	x	x	x	x	x	x	x	x	x
M-400	horizontal	x	x	x	x	x	x	x	x	x
M-400	vertical	x	x	x	M-592.00+ M-400.AP	x	x	x	x	x
M-505	horizontal	x	x	x	x	x	x	x	x	x
M-505	vertical	x	x	x	M-592.00+ M-400.AP	x	x	x	x	x
M-511, M-521, M-531	horizontal	x	x	x	x	x	x	x	x	x
M-511, M-521, M-531	vertical	x	x	x	x	x	x	x	x	x
M-501	horizontal	x	x	x	x	x	x	x	x	x
M-501	vertical	x	x	x	x	x	x	x	x	x
M-605	horizontal	x	x	x	M-110.01	x	X	x	x	x
M-605	vertical	x	x	x	x	x	x	x	x	x



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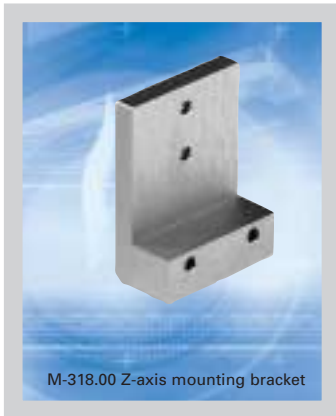
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M-126	M-311	M-400	M-505	M-511, M-521, M-531	M-501	M-605	M6 on 25 mm	1/4 s-20 on 1"
M-105.AP	x	M-105.AP	n/r	n/r	n/r	M-605.11	B-094.00	x
M-052.00	x	M-052.00	M-052.00	M-052.00	M-052.00	x	x	x
M-400.AP	x	M-400.AP	n/r	n/r	n/r	M-605.11	B-094.00	x
M-400.AP+	x	M-400.AP+	M-053.10**	M-053.10**	M-053.10**	x	x	x
M-053.10**	x	M-053.10**				x	x	x
M-105.AP	x	M-105.AP	n/r	n/r	n/r	M-605.11	B-094.00	x
M-052.00	x	M-052.00	M-053.10	M-053.10	M-053.10	x	x	x
M-400.AP	x	M-400.AP	n/r	n/r	n/r	M-605.11	B-094.00	x
M-053.10**+	x	M-053.10**+	M-053.10**	M-053.10**	M-053.10**	x	x	x
M-400.AP		M-400.AP						
M-105.AP	x	M-105.AP	n/r	n/r	n/r	M-605.11	B-094.00	x
M-052.00	x	M-052.00	M-053.10	M-053.10	M-053.10	x	x	x
M-400.AP	x	M-400.AP	n/r	n/r	n/r	M-605.11	B-094.00	x
M-053.10**+	x	M-053.10**+	M-053.10**	M-053.10**	M-053.10**	x	x	x
M-400.AP		M-400.AP						
M-105.AP	x	M-105.AP	M-105.AP	M-105.AP	M-105.AP	M-605.11	M-105.HP/ M-105.HP1	M-105.HP/ M-105.HP1
M-009.30+	x	M-009.30+	M-009.30+	M-009.30+	M-009.30+	x	x	x
M-009.10		M-009.10	M-009.10	M-009.10	M-009.10			
M-110.01	x	M-110.01	M-110.01	M-110.01	M-110.01	M-110.01	M-110.01	M-110.01
x	x	x	x	x	x	x	x	x
M-110.01	x	M-110.01	M-110.01	M-110.01	M-110.01	M-110.01	M-110.01	M-110.01
x	x	x	x	x	x	x	x	x
n/r	x	x	M-105.AP	M-105.AP	M-105.AP	M-605.11	M-126.80	M-126.80
M-125.90	x	x	M-125.90	M-125.90	M-125.90	x	x	x
x	x	x	x	x	x	x	M-318.40	M-318.40
x	M-318.00	x	x	x	x	x	x	x
x	x	n/r	M-400.AP	M-400.AP	M-400.AP	x	M-490.MS	M-490.MS
x	x	M-592.00	M-592.00	M-592.00	M-592.00	x	x	x
x	x	x	n/r	n/r	n/r	x	M-590.00	M-590.00
x	x	M-592.00	M-592.00	M-592.00	M-592.00	x	x	x
x	x	x	x	n/r	n/r	M-110.01	M-590.00	M-590.00
x	x	x	x	M-592.10	x	x	x	x
x	x	x	x	n/r	n/r	x	x	x
x	x	x	x	x	x	x	x	x
x	x	M-110.01	x	M-110.01	M-110.01	n/r	M-110.01	M-110.01
x	x	x	x	x	x	M-605.AV1	x	x

n/r: no adapter required;
x: combination not possible;
** Version with DC-Mike-Drive require angle bracket
M-053.20

Accessories (cont.)

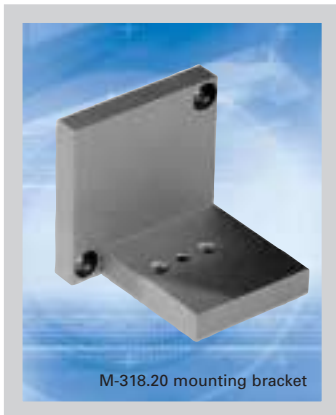
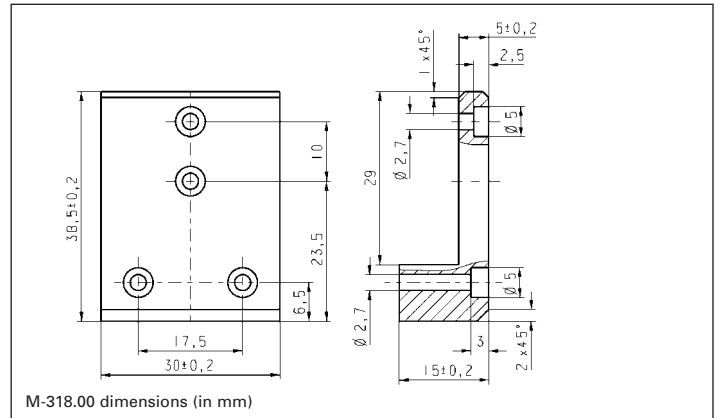
Mounting Adapters for M-310 Series Stages



M-318.00

Z-axis mounting bracket for vertical mount of M-310 series stages on M-310 series stages

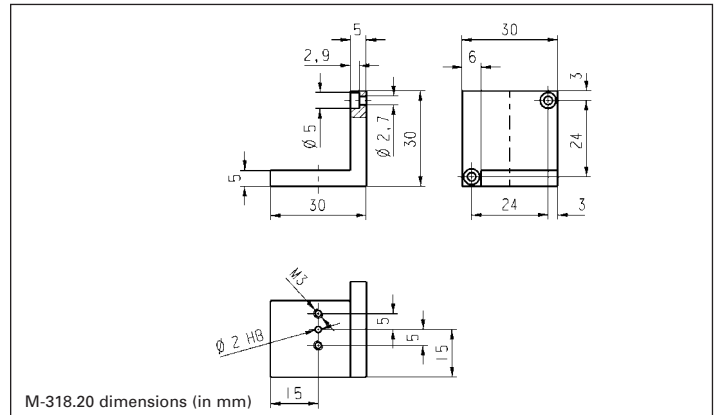
Material: Al; Weight: 0.025 kg



M-318.20

Mounting bracket for mounting F-010 fiber holders on vertically mounted M-310 series stages

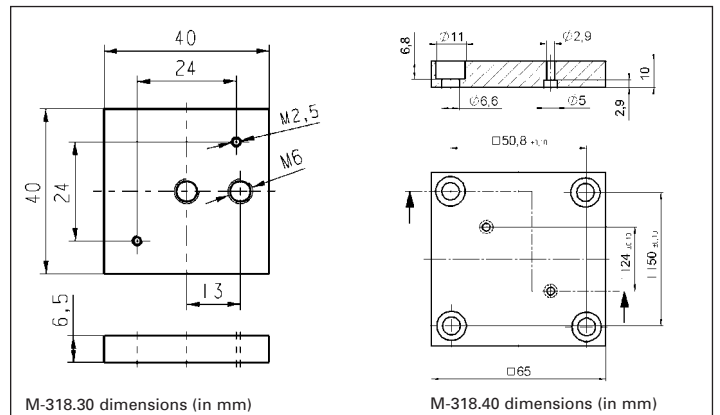
Material: Al; Weight: 0.02 kg



M-318.30

Adapter plate for mounting M-310 series stages on a post with M6 threaded stud.

Material: Al; Weight: 0.03 kg



M-318.40

Adapter plate for mounting M-310 series stages on a honeycomb table (metric or imperial)

Material: Al; Weight: 0.06 kg

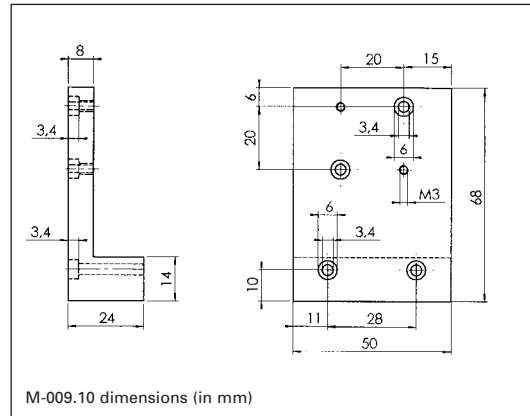
Mounting Adapters for M-105 Stages



M-009.10

Z-axis mounting bracket for vertical mount of M-105/106 stages on M-105/106 stages (attaches to side of M-105).

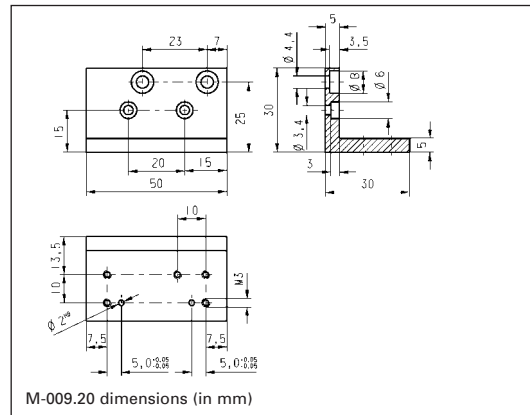
Material: Al; Weight: 0.1 kg



M-009.20

Mounting bracket for mounting P-280 PZT block actuators or F-010 fiber holders on vertically mounted M-105 / M-106 stages.

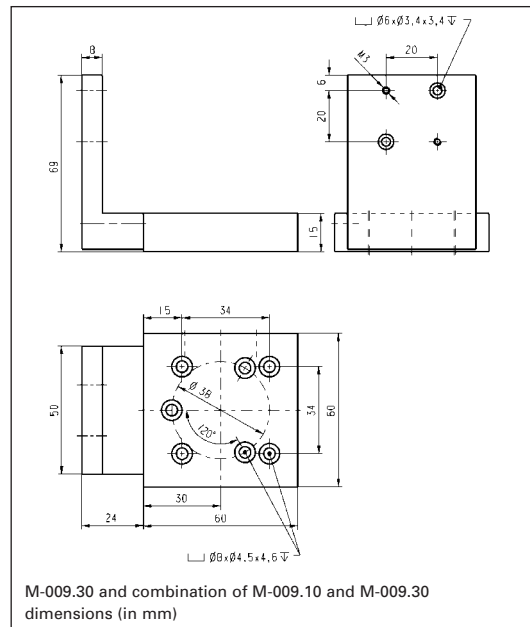
Material: Al; Weight: 0.04 kg



M-009.30

Z-axis adapter plate for vertical mount of M-105/6 stages on stages with PI Standard Hole Pattern (requires M-009.10)

Material: Al; Weight: 0.14 kg



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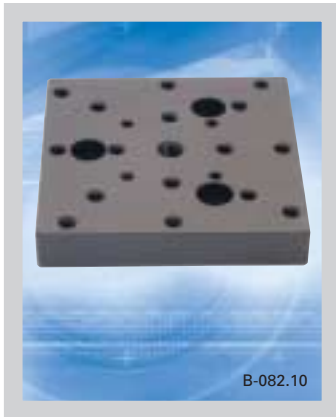
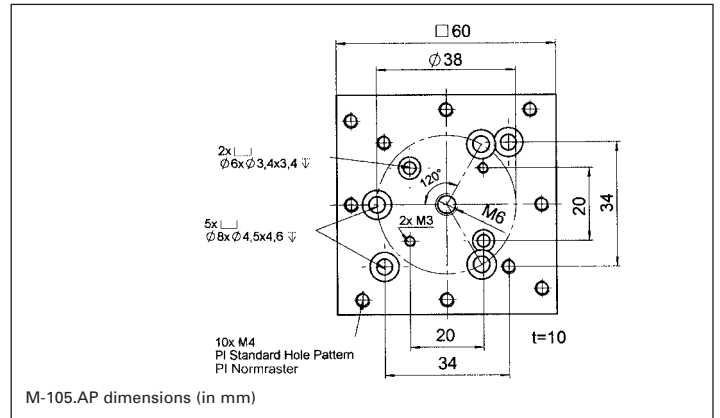
Mounting Adapters for M-105 and M-126 Stages



M-105.AP

Adapter plate for mounting stages w/o PI Standard Hole Pattern (M-105/M-106, M-126 etc.) on stages with PI Standard Hole Pattern and vice versa.

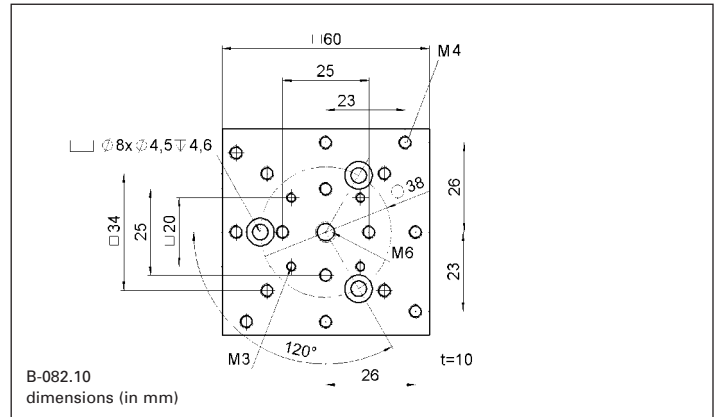
Material: Al, Weight: 0.09 kg



B-082.10

Adapter plate for horizontal mount of M-105/M-106 stages on stages with PI Standard Hole Pattern (e.g. M-011, M-014).

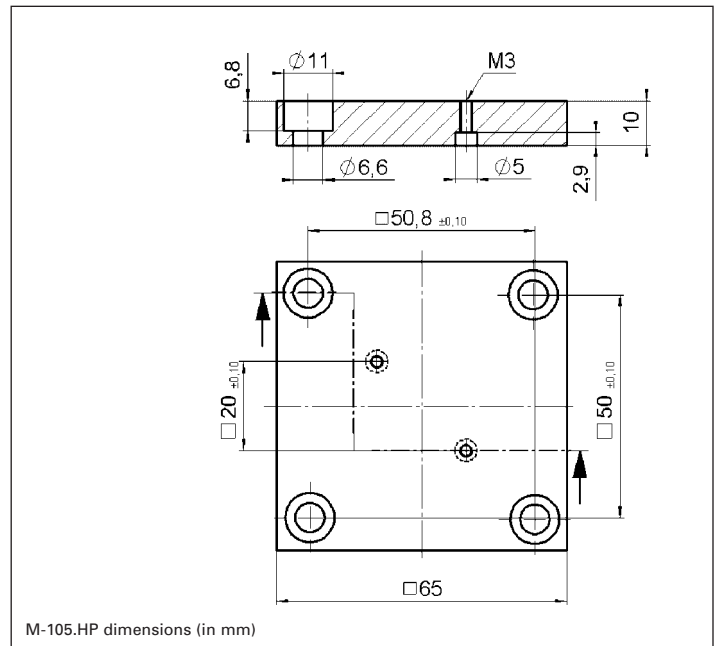
Material: Al, Weight: 0.14 kg



M-105.HP

Adapter plate. For mounting M-105 stages (and F-110) on honeycomb tables (metric & imperial).

Material: Al



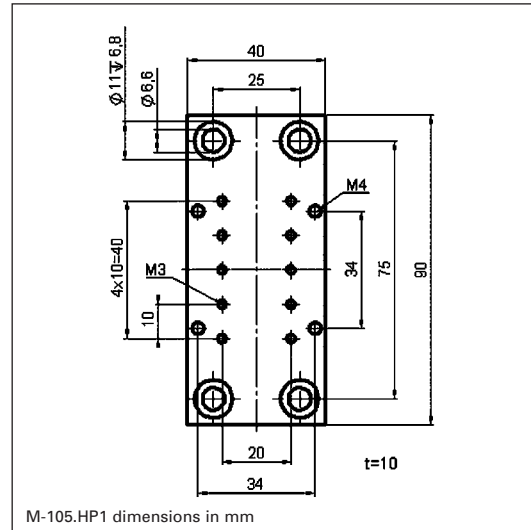
Mounting Adapters for M-105 Stages



M-105.HP1

Adapter plate. For mounting M-105 stages (and F-110) on honeycomb tables (metric & imperial).

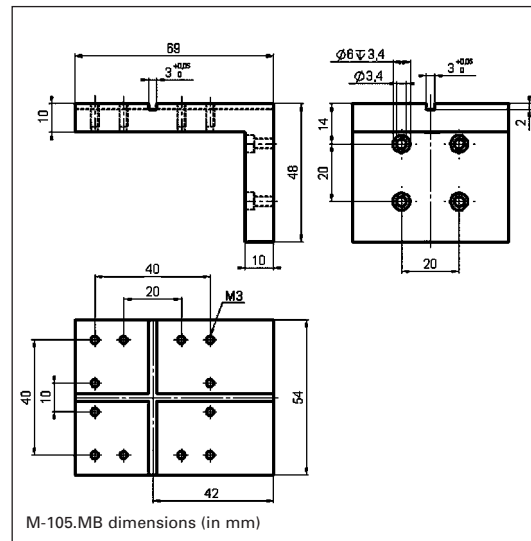
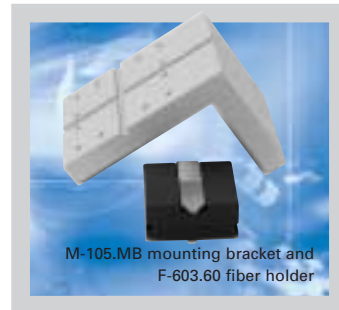
Material: Al



M-105.MB

Mounting bracket for mounting accessories (e.g. F-603 objective holders) on M-105 stages.

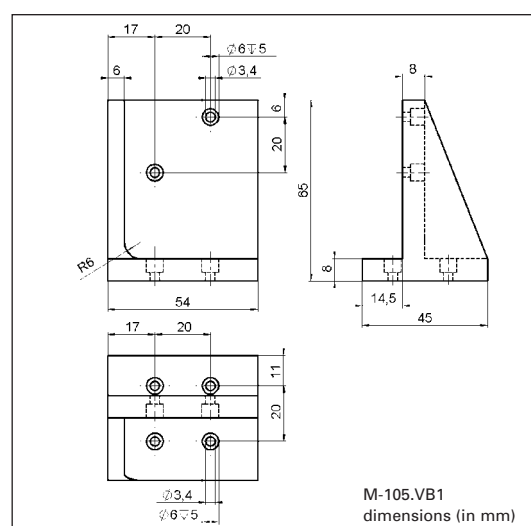
Material: AL



M-105.VB1

Z-axis mounting bracket for vertical mount of M-105/6 stages on M-105/6 stages (attaches to top of M-105).

Material: Al; Weight: 0.15 kg



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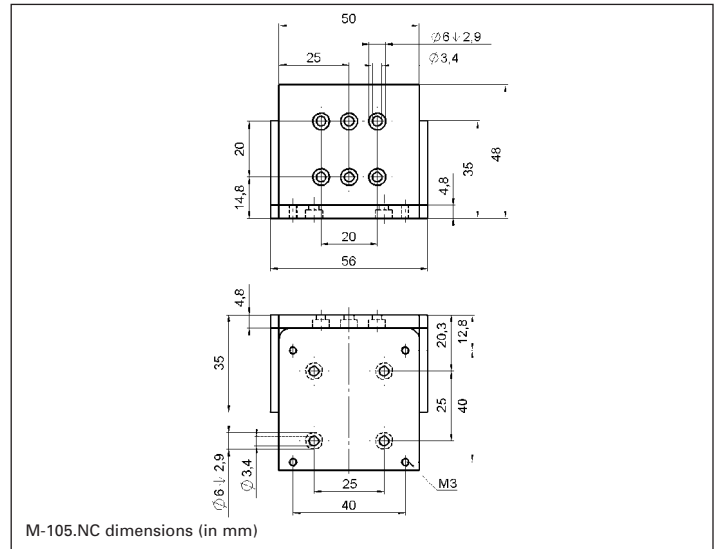
Mounting Adapters for M-105, M-110, M-111, M-112



M-105.NC

Mounting bracket for mounting P-611 NanoCube® NanoPositioning stages on M-105, M-110 and M-111 stages. Can be combined with B-082.10 adapter plate for adaptation to other PI translation stages.

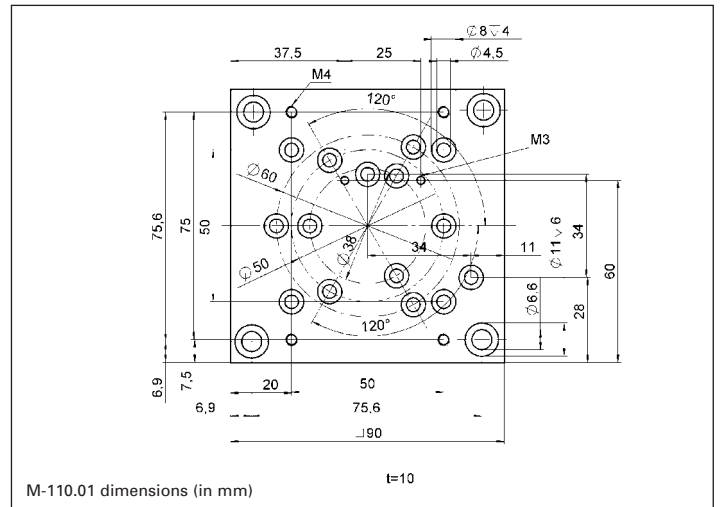
Material: Al



M-110.01

Adapter plate for mounting of M-110 and M-111 (F-130) and M-605 series stages on honeycomb tables (metric & imperial).

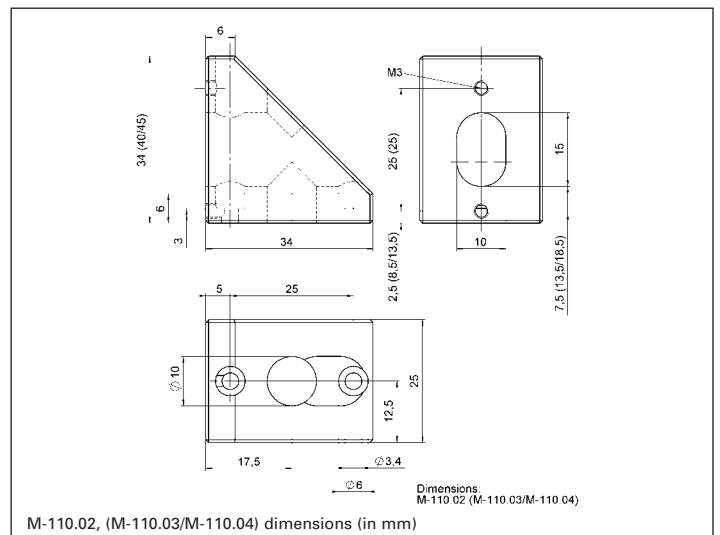
Material: Al



M-110.02, M-110.03, M-110.04

Z-axis mounting bracket for vertical mount of M-110 (M-110.02), M-111 (M-110.03) and M-112 (M-110.04) series stages on M-110, M-111 and M-112 series stages.

Material: Al



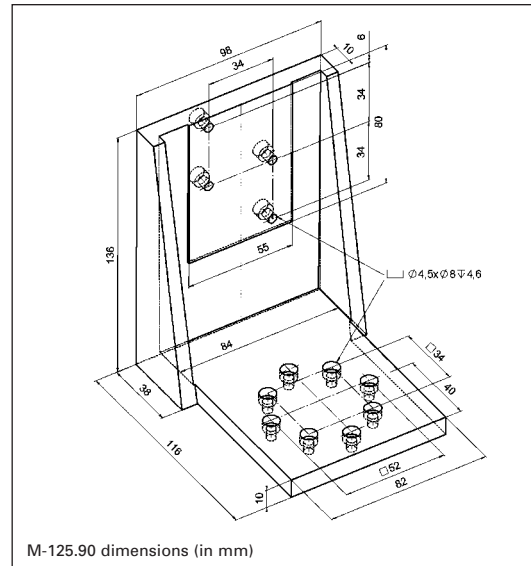
Mounting Adapters for M-126 Stages



M-125.90

Z-axis mounting bracket for vertical mount of M-126 stages.

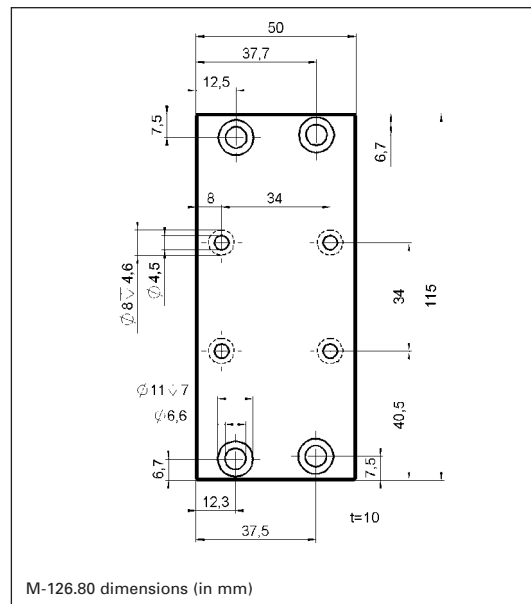
Material: Al; Weight: 0.68 kg



M-126.80

Adapter plate for mounting M-126 stages on honeycomb tables (metric & imperial).

Material: Al



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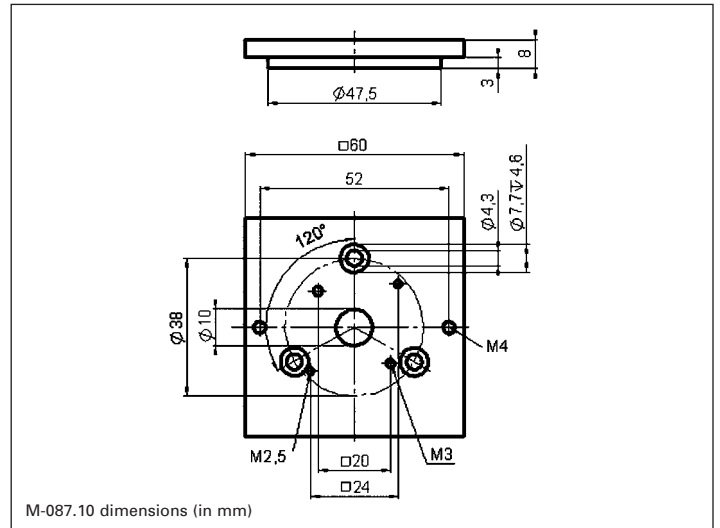
Mounting Adapters for M-037, M-038 Rotary Stages



M-087.10

Adapter plate for horizontal mounting of translation stages (e. g. M-105) on M-035 and M-037 rotation stages.

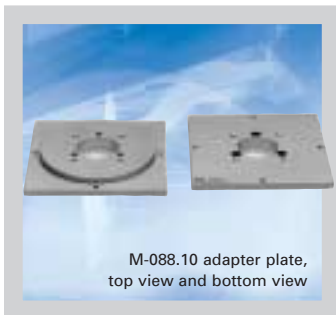
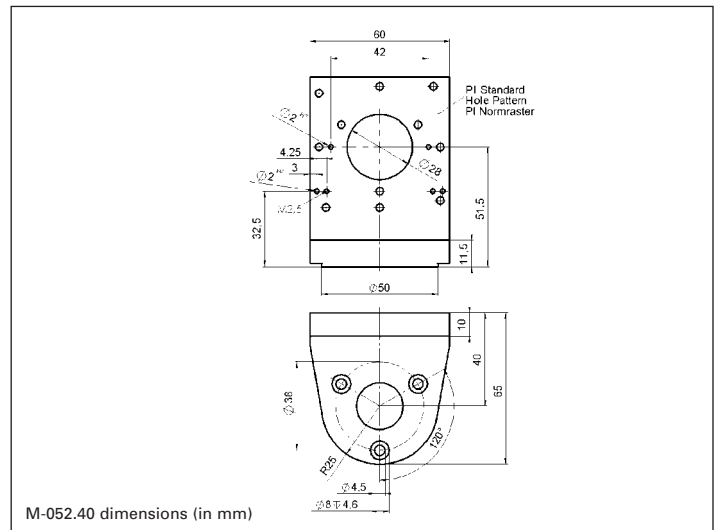
Material: Al; Weight: 0.07 kg



M-052.40

Z-axis mounting bracket for vertical mount of M-011, M-035, M-037 and M-041/42 on M-035 and M-037 rotation stages.

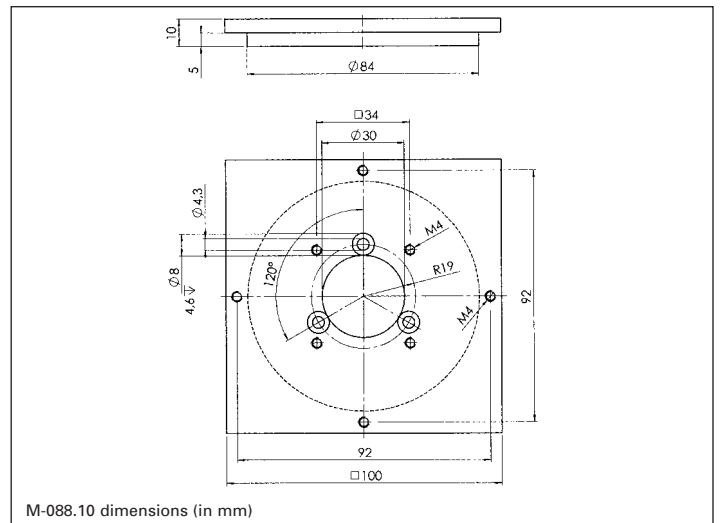
Material: Al; Weight: 0.19 kg



M-088.10

Adapter plate for horizontal mounting of translation stages on M-036 and M-038 rotation stages.

Material: Al; Weight: 0.2 kg



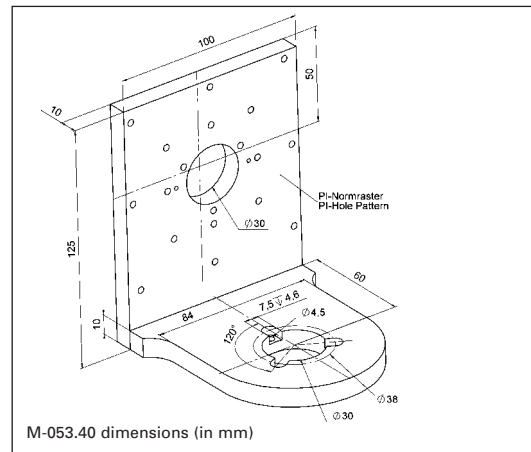


M-053.40 Z-axis mounting bracket

M-053.40

Z-axis mounting bracket for vertical mount of M-014 (manual versions), M-036, M-038 and M-043/M-044 on M-036 and M-038 rotation stages.

Material: Al; Weight: 0.5 kg



M-053.40 dimensions (in mm)

Angle Brackets for M-011, M-035, M-037, M-041, M-042

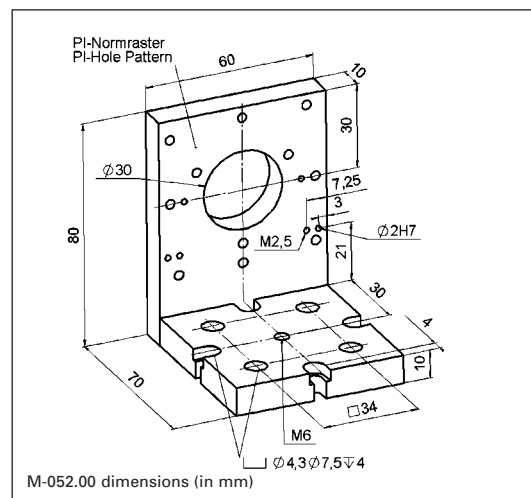


M-052.00 Z-axis mounting bracket

M-052.00

Z-axis mounting bracket for vertical mount of M-011, M-035, M-037 and M-041/42 on stages with PI standard hole pattern.

Material: Al; Weight: 0.22 kg



M-052.00 dimensions (in mm)

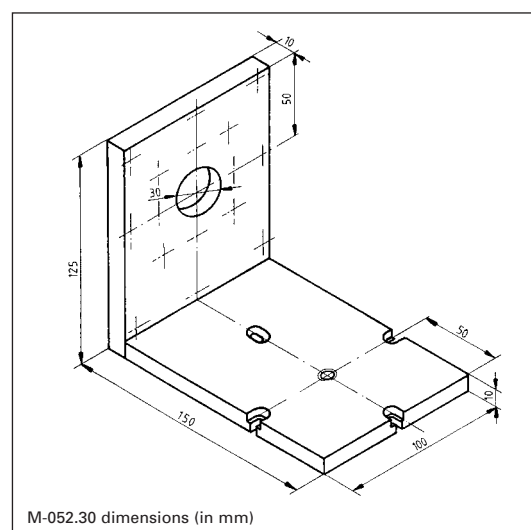


M-052.30 Z-axis mounting bracket

M-052.30

Z-axis mounting bracket (laterally extended M-052.00) for vertical mount of M-011, M-035, M-037 and M-041/42 on stages with PI standard hole pattern.

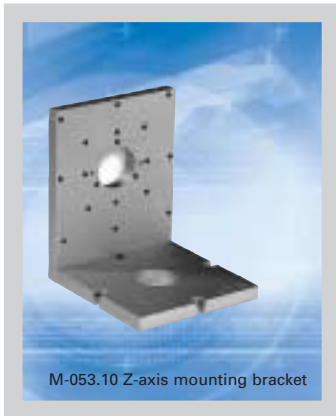
Material: Al; Weight: 0.4 kg



M-052.30 dimensions (in mm)

Accessories (cont.)

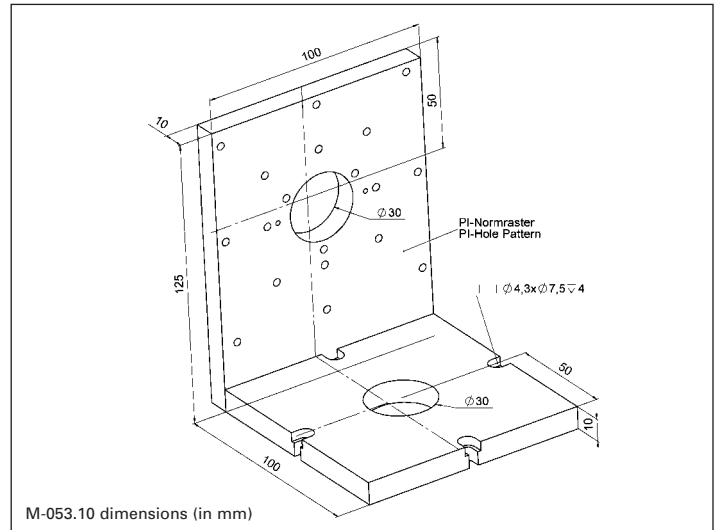
Angle Brackets for M-014, M-036, M-038, M-043, M-044



M-053.10

Z-axis mounting bracket for vertical mount of M-014 (non-motorized), M-036, M-038 and M-043/44 on stages with PI standard hole pattern.

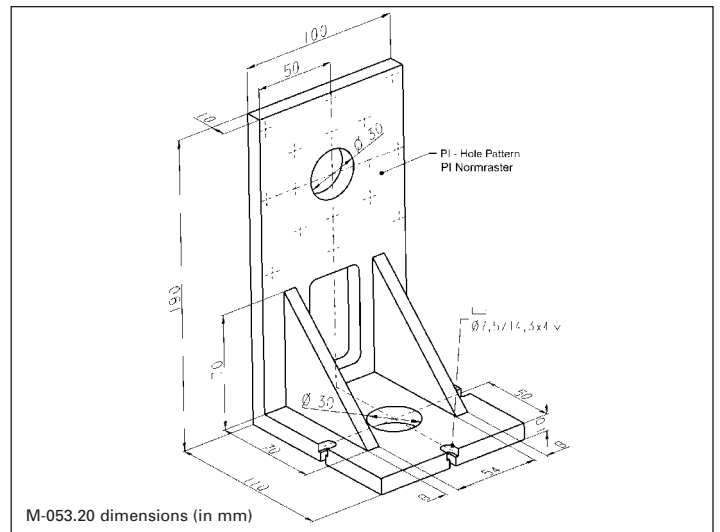
Material: Al; Weight: 0.6 kg



M-053.20

Z-axis mounting bracket (vertically extended M-053.10) for vertical mount of M-014 (motorized), M-036, M-038 and M-043/44 on stages with PI standard hole pattern.

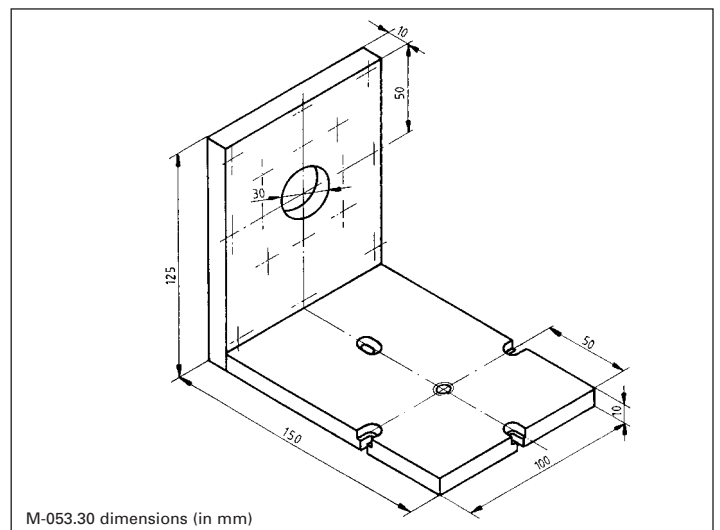
Material: Al; Weight: 0.7 kg



M-053.30

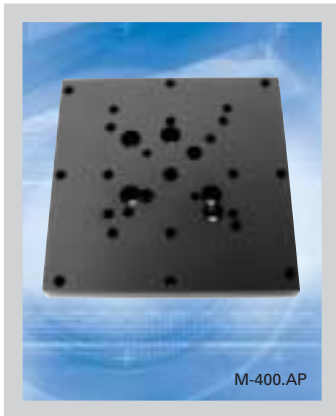
Z-axis mounting bracket (laterally extended M-053.10) for vertical mount of M-014 (non-motorized), M-036, M-038 and M-043/44 on stages with PI standard hole pattern.

Material: Al; Weight: 0.7 kg



Accessories (cont.)

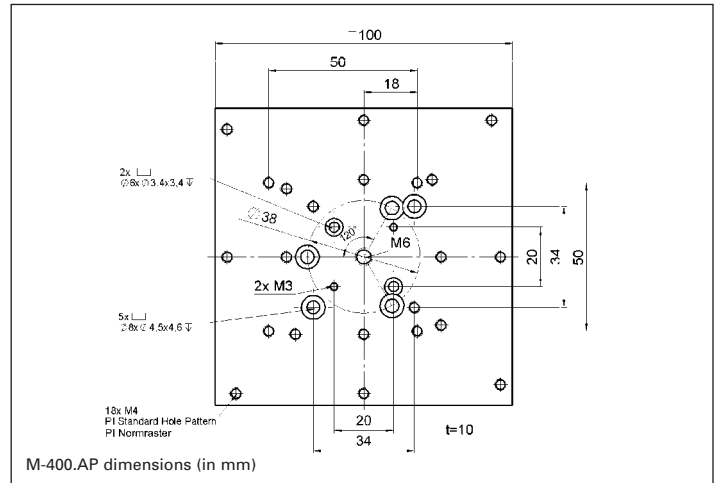
Mounting Adapters for Honeycomb Tables and M-405, M-410 and M-415 Stages



M-400.AP

Adapter plate for mounting stages w/o PI Standard Hole Pattern (e.g. M-405, M-410 and M-415) on stages with PI Standard Hole Pattern and vice versa.

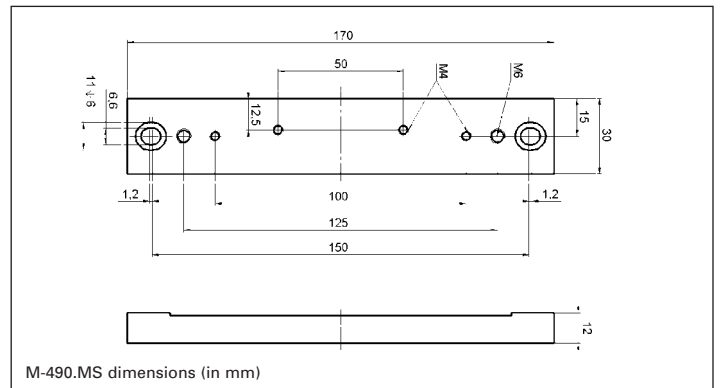
Material: Al; Weight: 0.25 kg



M-490.MS

Set of two for mounting M-405, M-410 and M-415 stages on honeycomb table tops etc. (metric and imperial).

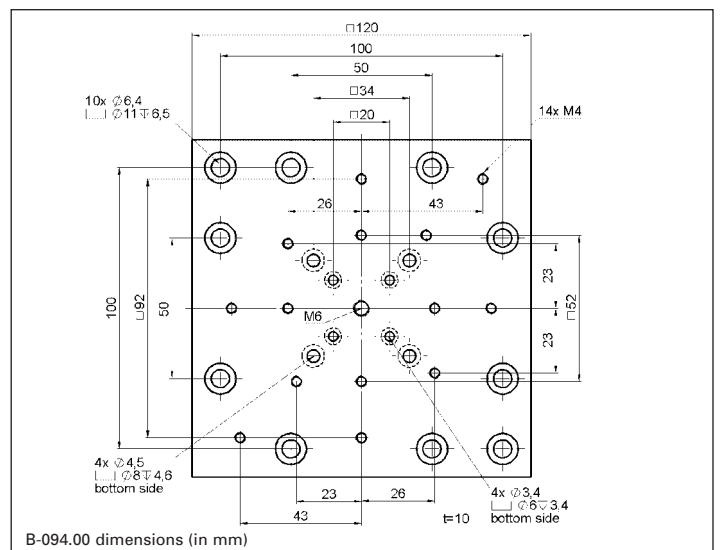
Material: Al; Weight: 0.4 kg



B-094.00

Adapter plate for mounting several translation stages and rotary stages on honeycomb tables (M 6 on 25 mm spacing).

Material: Al



Flexible Couplings and Mounting Adapters for Micrometers



M-149

The M-149 flexible bellows couplings allow zero-backlash connection between motor shaft and drive shaft automatically compensating for parallel and angular misalignment.

Dimensions (in mm)

(outside diameter x length;
bore shaft diameters left/right)

M-149.01:
17 x 30.2 mm; 4 mm / 4 mm

M-149.02:
17 x 30.2 mm; 5 mm / 5 mm

M-149.03:
17 x 30.2 mm; 6 mm / 6 mm

M-149.11:
12 x 23.6 mm; 4 mm / 4 mm

M-149.12:
12 x 23.6 mm; 5 mm / 5 mm

M-149.14:
12 x 23.6 mm; 2 mm / 5 mm



M-151

Holders for manual micrometers and DC-Mikes on M-011 and M-014.

Dimensions (in mm)

(inner diameter x length)

M-151.10:
12 x 17 mm (holds M-623/4 micrometer)

M-151.30:
16 x 10 mm (holds 10 mm M-227)

M-151.40:
16 x 14 mm (holds 25 & 50 mm M-227)

M-151.50:
19 x 14 mm (holds 25 & 50 mm M-227)

Piezo Actuators

Nanopositioning &
Scanning SystemsActive Optics /
Steering MirrorsTutorial: Piezo-
electrics in PositioningCapacitive Position
SensorsPiezo Drivers & Nano-
positioning Controllers**Hexapods /
Micropositioning**Photonics Alignment
Solutions

Motion Controllers

Ceramic Linear
Motors & Stages

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Notes (Technical Data)

A3 Design Resolution

The theoretical minimum movement that can be made, based on the selection of the mechanical drive components (drive screw pitch, gear ratio, angular motor resolution etc.). Design resolution is usually better than the practical position resolution (minimum incremental motion). The resolution of piezo actuators and piezo flexure nanopositioners is not limited by stiction and friction. The practical resolution of most PI piezo nanopositioning systems is in the sub-nanometer range.

A4 Minimum Incremental Motion

The minimum motion that can be repeatably executed for a given input, which is sometimes referred to as practical or operational resolution. Design resolution and practical resolution have to be distinguished. Design resolutions of 1 nm or better can be achieved with many motor, gearbox and lead-screw combinations. In practical applications, however, stiction/friction, windup, and elastic deformation limit operating resolution.

Repeatable nanometer or sub-nanometer resolution can be provided by solid-state piezo actuators (PZTs) and piezo flexure stages (see the "Nanopositioning & Scanning Systems" and "Piezo Actuators" sections for details). Several PI Micro-Positioners are available with additional piezo fine positioners for applications where repeatable nanometer scale resolution is required. The resolution of piezo actuators is not limited by stiction and friction.

A5 Rotation / Linear Input, Tangent-Arm Length

Angular displacement of tangent-arm rotation stages is determined by the arm length and the linear motion input pushing the arm (see page 7-60 for information on how to calculate angular displacement from linear input).

B1 Max. Normal Load Capacity

Centered, vertical load (horizontal installation).

B2 Max. Push/Pull Force

Active and passive force limit in operating direction, at center of stage. Some stages may be able to generate higher forces at the cost of reduced lifetime.

D1 Piezo Drive

See the "Piezo Actuators" section for details.

D2 Recommended Motor Controller

See the "Motion Controllers" section, page 9-5.

L Body Material

Stages are usually made of anodized aluminum or stainless steel. Small amounts of other materials can be used internally (for bearings, preload, coupling, mounting, etc.).

Al: Aluminum
N-S: Nonmagnetic stainless steel
St: Steel
I: Invar