

Compact Micropositioning Stages

FAST



PRECISE



COMPACT

Compact Micropositioning Stages



M-110, M-111, M-112, miniature micropositioning stage series, 5, 15, 25mm travel.



M-122 miniature micropositioning stage with linear encoder



M-116 miniature rotation stage



M-661, M-662 miniature micropositioning stages with ultrasonic linear motor



M-663 miniature micropositioning stage with ultrasonic linear motor & encoder



M-106 Stage with Motor Upgrade Option

Miniature Micropositioning Stage

Choice of Drives & Travel Ranges, XY(Z) Combinations Possible



M-112.2DG, M-111.2DG, M-110.2DG
(from front to back) providing 25 mm,
15 mm and 5 mm travel range

- Travel Ranges 5, 15 and 25 mm
- Very Cost Effective
- Min. Incremental Motion to 50 nm
- Max. Velocity 2 mm/s
- Closed-Loop DC Motors and Stepper Motors
- Non-Contact Limit and Reference Switches
- Optional Recirculating Ball Screw Drives Provide High Speeds & Long Lifetimes
- Vacuum-Compatible Versions Available to 10^{-6} hPa

M-110, M-111 and M-112 are ultra-high resolution motorized translation stages providing linear motion of 5 to 25 mm in an extremely compact package. They feature a precision lead-screw with sub-micron resolu-

tion and precision linear ball bearings guaranteeing $<0.5 \mu\text{m}$ straightness of travel.

Compact Dimensions, High Performance

To meet industrial demands, the M-11x.2 linear translation stages are equipped with a recirculating ball screw for precise motion with reduced friction. This allows 24/7 duty cycles. M-110, M-111 and M-112 can be combined to XY and XYZ systems for multiaxis alignment applications.

Stepper and Servo Motors

A miniature DC or stepper motor actuates motion via a backlash-compensated screw /

Ordering Information

Translation stage

- 0 Travel Range 5 mm
 - 1 Travel Range 15 mm
 - 2 Travel Range 25 mm
- M-11
- 1 Leadscrew
 - 2 Ball screw

- DG DC Motor Gearhead
- 2S Stepper Motor with Gearhead

Ask about custom designs!

nut system and gearhead. Both drive options provide a cost-effective solution for industrial and OEM environments. To meet the most critical positioning demands, the DC motor is equipped with a high resolution encoder featuring resolution down to $0.007 \mu\text{m}$ per count.



F-130 fiber alignment system consisting of an M-110 XYZ positioning system and a P-611 XYZ Piezo-Nano Positioning system. This combination can be operated by the C-880 controller or NI controllers (request our technote!)

Limit and Reference Switches

For the protection of your equipment, non-contact Hall-effect limit and reference switches are installed. The direction-sensing reference switch supports advanced automation applications with high precision.

Note

See "Accessories" (see p. 4-89 ff) for adapters, brackets, etc.

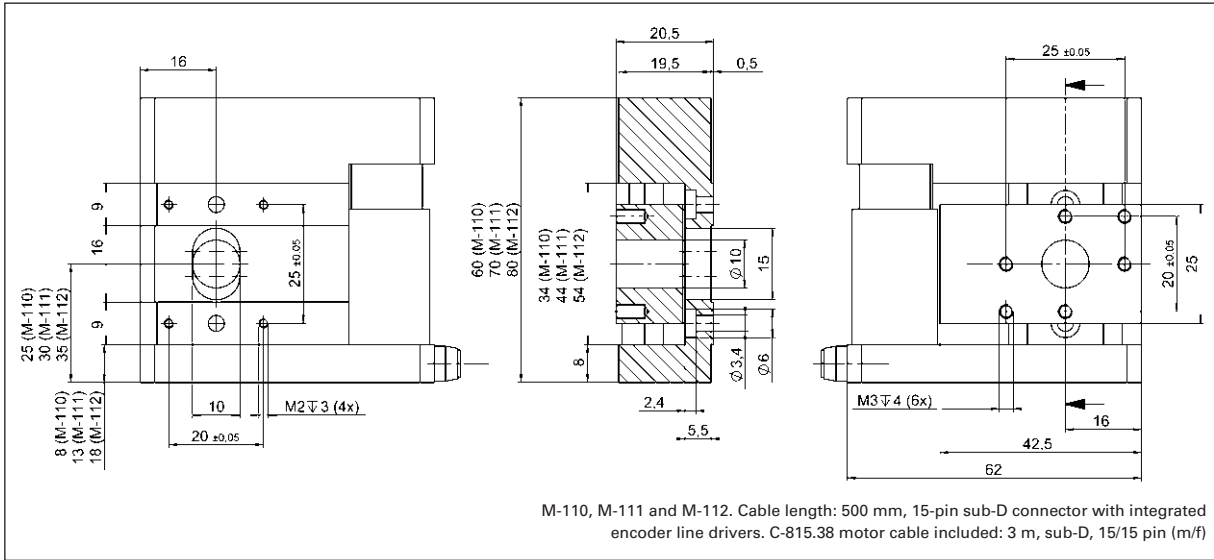
All stages include an integral 0.5 m cable with 15-pin sub-D connector and come with a 3 m extension cable. On the DC servo versions, the connector features integrated line drivers for cable lengths up to 10 meters between stage and controller (DC-motors only).

Low Cost of Ownership

The combination of these positioners with the networkable, single-channel C-863 Mercury™ (DC-Motor, see p. 4-114) or C-663 Mercury™ Step (see p. 4-112) controller offers high performance for a very competitive price in both single- and multi-axis configurations. For 3 or 4 axes, the C-843 PC plug-in board for DC motors (see p. 4-120) can also be recommended.

Application Examples

- Fiber optics testing
- Fiber positioning
- Metrology
- Micromachining
- Photonics packaging
- Quality assurance testing
- Testing equipment



Technical Data

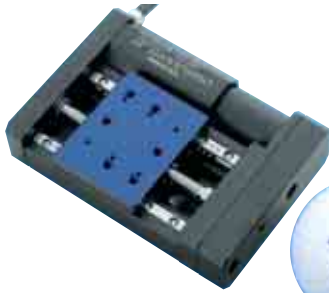
Model	M-110.1DG / M-111.1DG / M-112.1DG	M-110.12S / M-111.12S / M-112.12S	M-110.2DG / M-111.2DG / M-112.2DG	M-110.22S / M-111.22S / M-112.22S	Units
Motion and positioning					
Travel range	5 / 15 / 25	5 / 15 / 25	5 / 15 / 25	5 / 15 / 25	mm
Integrated sensor	Rotary encoder	–	Rotary encoder	–	
Sensor resolution	2048		2048		Cts./rev.
Design resolution	0.0069	0.038*	0.0086	0.046*	µm
Min. incremental motion	0.05	0.05	0.2	0.2	µm
Backlash	2	2	4	4	µm
Unidirectional repeatability	0.1	0.1	0.5	0.5	µm
Pitch / Yaw	±50 / ±150 / ±150	±50 / ±150 / ±150	±50 / ±150 / ±150	±50 / ±150 / ±150	µrad
Max. velocity	1 / 1.5 / 1.5	1 / 1 / 1	1.5 / 2 / 2	1 / 1 / 1	mm/s
Mechanical properties					
Drive screw	Leadscrew	Leadscrew	Recirculating ballscrew	Recirculating ballscrew	
Thread pitch	0.4	0.4	0.5	0.5	mm
Gear ratio	28.44444:1	28.44444:1	28.44444:1	28.44444:1	
Motor resolution*	–	384*	–	384*	
Max. load	30 / 30 / 20	30 / 30 / 20	30 / 30 / 20	30 / 30 / 20	N
Max. push / pull force	10	10	10	10	N
Max. holding force	10	10	10	10	N
Max. lateral force	15 / 10 / 10	15 / 10 / 10	15 / 10 / 10	15 / 10 / 10	N
Drive properties					
Motor type	DC-motor, gearhead	2-phase stepper motor	DC-motor, gearhead	2-phase stepper motor	
Operating voltage	0 to ±12	24	0 to ±12	24	V
Electrical power	0.52 / 1.75 / 1.75	1.5	0.52 / 1.75 / 1.75	1.5	W
Current consumption	160 / 320 / 320**		160 / 320 / 320**		mA
Limit and reference switches	Hall-effect	Hall-effect	Hall-effect	Hall-effect	
Miscellaneous					
Operating temperature range	-20 to +65	-20 to +65	-20 to +65	-20 to +65	°C
Material	Al (black anodized)	Al (black anodized)	Al (black anodized)	Al (black anodized)	
Mass	0.3 / 0.4 / 0.3	0.3 / 0.4 / 0.3	0.3 / 0.4 / 0.3	0.3 / 0.4 / 0.3	kg
Recommended controller/driver	C-863 single-axis C-843 PCI board, for up to 4 axes	C-663 single-axis	C-863 single-axis C-843 PCI board, for up to 4 axes	C-663 single-axis	

*2-phase stepper motor, 24 V chopper voltage, max. 0.25 A/phase, 24 full steps/rev., motor resolution with C-663 stepper motor controller

**thermally limited

Miniature Micropositioning Stage w/ Linear Encoder

Fast & Compact with Direct Position Measurement



The M-122.2DD miniature translation stage features an optical linear encoder with 0.1 μm position resolution and a highly efficient ballscrew

- Travel Range 25 mm
- 0.1 μm Optical Linear Encoder for Highest Accuracy & Repeatability
- Min. Incremental Motion to 0.2 μm
- Max. Velocity 20 mm/s
- Cross-Roll Bearings
- Recirculating Ball Screw Drives Provide High Speeds & Long Lifetimes

The M-122 palm-top-sized translation stage combines small dimensions, high speeds and very high accuracy at a competitive price. It features a space-saving, folded drive train with the servo motor and drive screw side-by-side. Equipped with a non-contacting optical linear encoder and a preloaded, precision-ground, ball-screw, these stages can provide much higher accuracy and better repeatability than conventional stepper motor stages or rotary encoder-equipped servo motor stages.

Low Friction, High Speed, Maintenance-Free

Due to its low-friction, the backlash-free ball screw yields significantly higher mechanical

efficiency than leadscrews, and allows maintenance-free, high duty-cycle operation at high velocities up to 20 mm/sec.

XY and XYZ Combinations

M-122 stages can be combined to very compact XY and XYZ systems. The M-122.AP1 mounting bracket is available to mount the Z-axis.

Limit and Reference Switches

For the protection of your equipment, non-contact Hall-effect limit and reference switches are installed. The direction-sensing reference switch supports advanced automation applications with high precision.

Low Cost of Ownership

The combination of these positioners with the networkable, single-channel C-863 Mercury™ servo motor controller (s. p. 4-114) offers high performance for a very competitive price in both single- and multi-axis configurations. For multi-axis applications, the C-843 PC plug-in controller board with on-board servo amplifiers (s. p. 4-120) is another cost-effective alternative.

Ordering Information

M-122.2DD

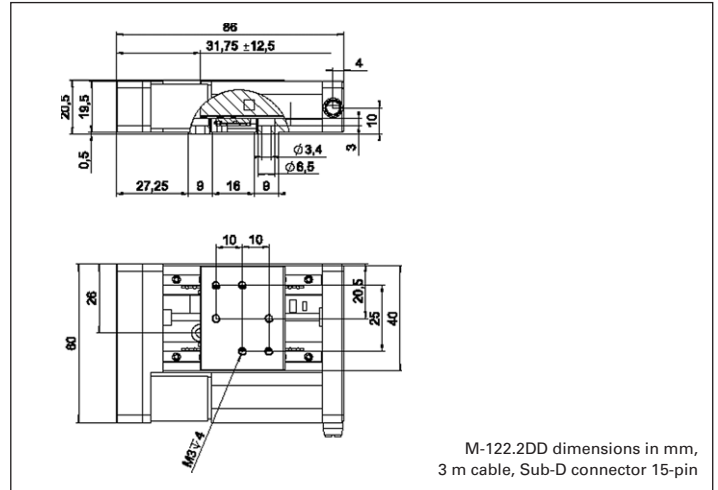
High-Precision Translation Stage, 25 mm, Direct-Drive DC Motor, Ballscrew

Accessories

M-122.AP1

Angle bracket for vertical mounting of M-122 stages

Ask about custom designs



M-122.2DD dimensions in mm, 3 m cable, Sub-D connector 15-pin

Technical Data

Model	M-122.2DD
Active axes	X
Motion and positioning	
Travel range	25 mm
Integrated sensor	Linear encoder
Sensor resolution	0.1 μm
Design resolution	0.1 μm
Min. incremental motion	0.2 μm
Backlash	0.2 μm
Unidirectional repeatability	0.15 μm
Pitch	$\pm 150 \mu\text{rad}$
Yaw	$\pm 150 \mu\text{rad}$
Max. velocity	20 mm/s
Origin repeatability	1 μm
Mechanical properties	
Drive screw	Recirculating ballscrew
Thread pitch	0.5 mm
Stiffness in motion direction	0.25 N/ μm
Max. load	50 N
Max. push/pull force	20 N
Max. lateral force	25 N
Drive properties	
Motor type	DC motor
Operating voltage	0 to $\pm 12 \text{ V}$
Electrical power	2.25 W
Limit and reference switches	Hall-effect
Miscellaneous	
Operating temperature range	-20 to +65
Material	Aluminum, steel
Dimensions	86 x 60 x 20.5 mm
Mass	0.3 kg
Recommended controller/driver	C-863 (single-axis) C-843 PCI board (up to 4 axes)

Application Examples

- Photonics packaging
- Fiber positioning
- Metrology
- Quality assurance testing
- Testing equipment
- Micromachining

M-116 Mini Precision Micropositioning Rotation Stage

Compact, Multi-Axis Combinations with M-110 Translation Stage Series



M-116.DG micro rotary stage

- Compact Design
- Continuous Rotation Range
- Encoder Resolution 2.5 μ rad
- Clear Aperture
- Max. Velocity 20 degrees/second
- Preloaded Worm Drive for Zero Backlash
- Fits Directly on M-110 Micro Translation Stages
- Non-Contact Reference Switch
- Repeatability to ± 10 μ rad

M-116 rotation stages are equipped with low-friction, spring-preloaded worm gear drives allowing unlimited rotation in either direction in an extremely compact package.

Stepper and Servo Motors

Both drive options provide a cost-effective solution for industrial and OEM environ-

ments. A miniature DC or stepper motor actuates motion via a spring-preloaded worm gear drive and zero-backlash (with M-116.xxH versions) gearhead.

To meet the most critical positioning demands, the DC motor is equipped with a high-resolution encoder featuring resolution of 2048 counts per revolution. The combination of the extremely low-stiction/low-friction construction and high-resolution encoder allows for minimum incremental motion of 25 μ rad at speeds up to 20 degrees/second.

Multi-Axis Combinations

M-116 rotary stages can be combined with the M-110, M-111 and M-112 micro linear stages without an additional

adapter plate to keep the total height at a minimum.

Clear Aperture, Lens Adapter

The M-116 is designed with a clear aperture for extended versatility in optics applications. The M-116.AL1 lens adapter is available to accommodate 0.5" optics such as polarizers.

Non-Contact Limit and Reference Switches

Motorized models are equipped with an integrated Hall-effect origin switch. To protect your equipment and increase versatility in automation applications, the rotary stage can optionally be equipped with Hall-effect limit switches. Travel can be limited to a range between 0° and 330° $\pm 2^\circ$.

For ease of operation and setup, all models come with a scale ring on the outer edge of the turntable.

Ordering Information

M-116.DG
Rotation Stage, 360°, Closed-Loop DC Motor Gearhead

M-116.DGH
Rotation Stage, 360°, Closed-Loop Backlash-Free DC Motor Gearhead

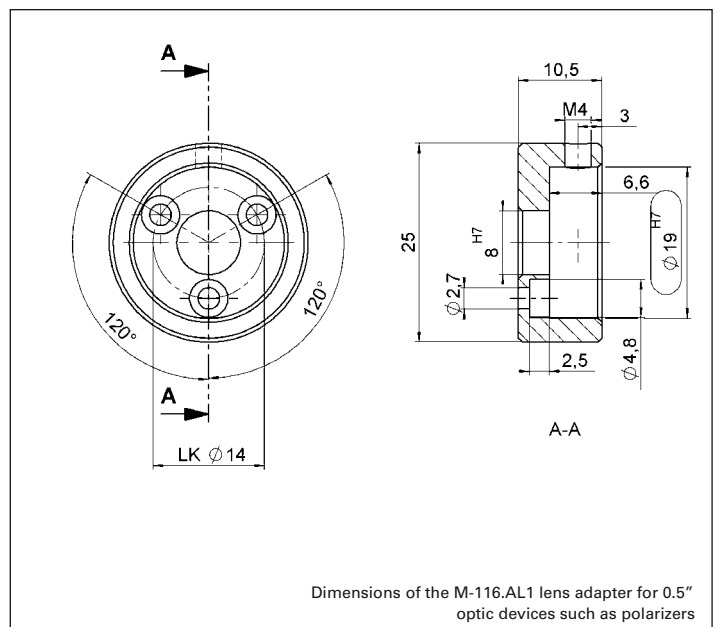
M-116.2SH
Rotation Stage, 360°, 2-Phase Stepper Motor with Backlash-Free Gearhead

M-116.AL1
Lens Adapter for 0.5" Optics

Ask about custom designs!



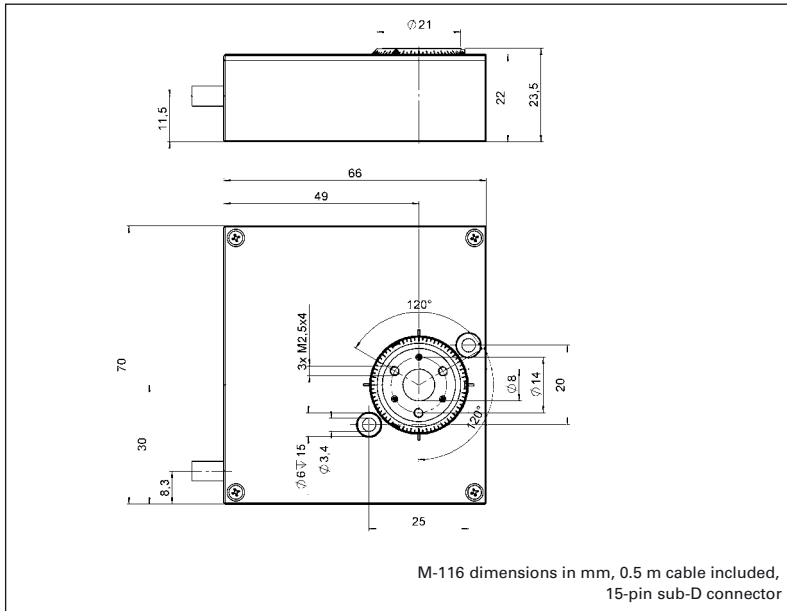
XY θ_z micropositioning combination consisting of (from top to bottom) M-116 micro rotary stage and two M-111 translation stages (M-110.01 adapter for mounting the M-111 on a honeycomb breadboard with M6 on 25 mm centers)



Dimensions of the M-116.AL1 lens adapter for 0.5" optic devices such as polarizers

Application Examples

- R&D
- Laser technology
- Metrology
- Adjustment of optics
- Photonics packaging
- Quality assurance testing



Technical Data

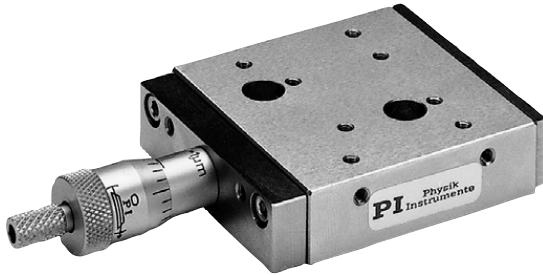
Model	M-116.DG	M-116.DGH	M-116.2SH	Units
Active axes	Rotation	Rotation	Rotation	
Motion and positioning				
Rotation range	>360	>360	>360	°
Integrated sensor	Rotary encoder	Rotary encoder	–	
Sensor resolution	2048	2048	–	Cts./rev.
Design resolution	2.45 (0.00013)	3.16 (0.00018)	16.9* (0.00097)	μrad (°)
Min. incremental motion	50	25	30	μrad
Backlash	1000	500	500	μrad
Unidirectional repeatability	12	10	10	μrad
Max. velocity	20	20	20	°/s
Mechanical properties				
Worm gear ratio	44:1	44:1	44:1	
Gear ratio	28.444:1	22.0335:1	22.0335:1	
Motor resolution	–	–	384*	steps/rev.
Axial force	±15	±15	15	N
Max. Torque (θ_x, θ_y)	±1.5	±1.5	±1.5	Nm
Max. Torque clockwise (θ_z)	0.4	0.4	0.4	Nm
Max. torque counterclockwise (θ_z)	0.8	0.8	0.8	Nm
Drive properties				
Motor type	DC-motor, gearhead	DC-motor, gearhead	2-phase stepper motor*	
Operating voltage	0 to ±12	0 to ±12	24	V
Electrical power	1.75	1.75		W
Reference switch	optical	optical	optical	
Miscellaneous				
Operating temperature range	-20 to +65	-20 to +65	-20 to +65	°C
Material	Aluminum	Aluminum	Aluminum	
Mass	0.4	0.4	0.4	kg
Recommended controller/driver	C-863 single-axis C-843 PCI board, for up to 4 axes	C-863 single-axis (p. 4-114) C-843 PCI board (p. 4-120), for up to 4 axes	C-663 single-axis (p. 4-112)	

*2-phase stepper motor, 24 V chopper voltage, max. 0.25 A/phase, 24 full steps/rev., motor resolution with C-663 stepper motor controller

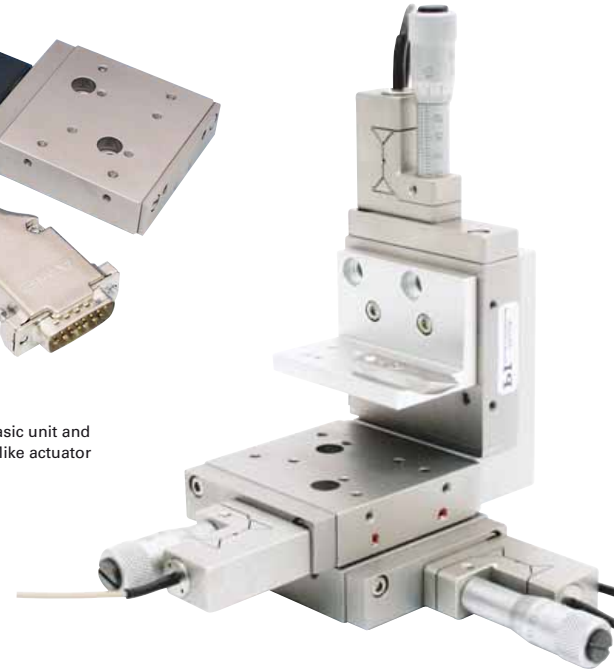
Miniature Micropositioning Stage w/Piezo Option

Precision Crossed Roller Guides, PiezoMike Option, XY(Z) Combinations

M-106.10 translation stage with differential micrometer drive



Combination of M-105.1B basic unit and M-232.17 high-resolution DC-Mike actuator



M-105.3P XYZ translation stage (includes PiezoMikes and M-009.10, side mount Z-bracket) and optional M-009.20 bracket with F-010.00 V-groove fiber holder

- Travel Range to 18 mm
- All-Stainless-Steel Construction
- XY and XYZ Combinations
- Resolution up to 0.1 μm
- Optional PiezoMike with 10 nm Resolution
- Optional Motor Drives

M-105 and M-106 are micrometer-driven translation stages with travel ranges of 18 mm and 5 mm, respectively. The carriage is spring preloaded against the micrometer tip for excellent repeatability and elimination of backlash. M-105 and M-106 stages are available in one-, two- or three-axis configurations. Precision crossed roller bearings guarantee straightness of travel of better than 2 μm . The M-106 is equipped with a differential micrometer drive providing resolution of 0.1 μm .

PiezoMike Option

Versions with PiezoMike drive provide additional 30 μm fine range for remotely controlled ultra-high-resolution (e.g. scanning or tracking, (see p. 1-54) for further details and recommended controllers).

The vertical stage in the XYZ assembly supports the load through the micrometer spin-

dle (not the preload springs) providing excellent stability.

Motor Drive Upgrades

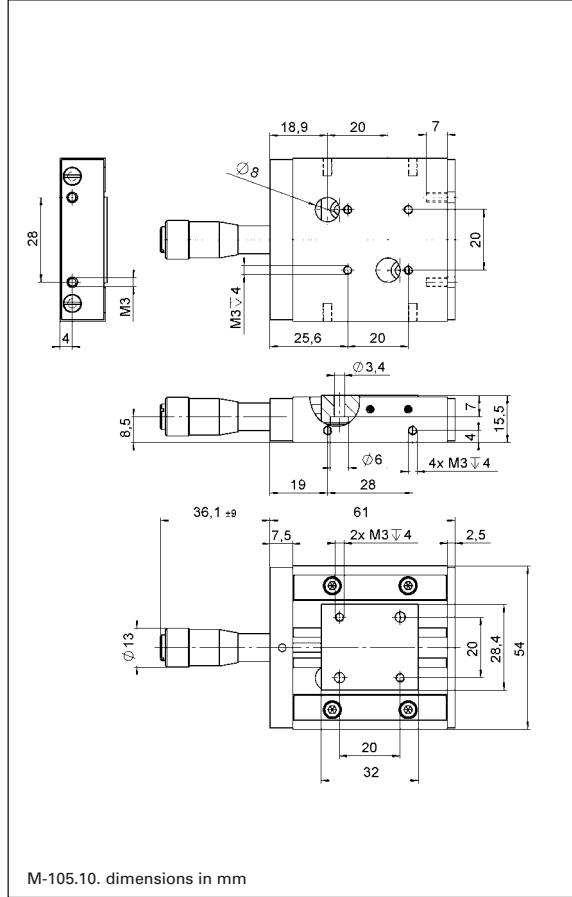
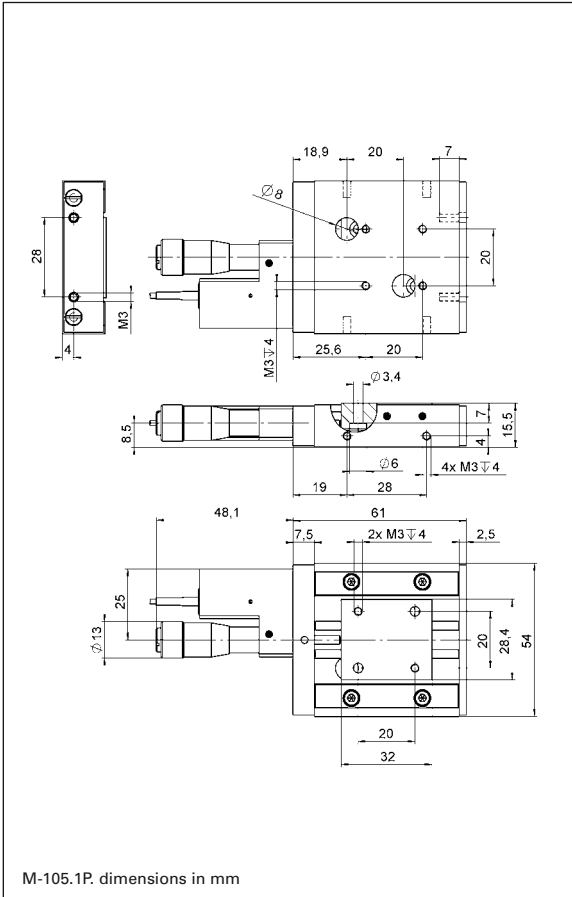
Two motor drives are available, the M-231.17 and the M 232.17 actuators (see p. 1-48 and p. 1-49). Both provide resolution a resolution of 0.1 μm .

Technical Data

Model	M-105.10*	M-105.1P*	M-106.10*	Unit
Travel range	18	18	5	mm
Piezo fine travel range	-	30	-	μm
Min. incremental motion (piezo drive)	-	0.01	-	μm
Min. incremental motion (micrometer drive)**	1	1	0.1	μm
Backlash	2	2	2	μm
Straightness	2	2	2	μm
Flatness	2	2	2	μm
Max. normal load capacity	100	100	100	kg
Max. push/pull force	20 / 4	20 / 4	20 / 4	N
Max. lateral force	4	4	4	N
Drive	M-626.00	P-854.00	M-653.00	
Micrometer pitch	0.5 / -	0.5 / -	0.4 / 0.02	mm/rev.
Mass	0.32	0.38	0.33	kg
Body material	St	St	St	
Recommended piezo driver	-	E-660 (p. 2-119), E-610 (p. 2-110) E-500 System (p. 2-142)	-	

*Versions M-105.2x, M-106.2x and M-105.3x M-106.x0 are combinations of basic .1x. versions

**Motorized versions achieve up to 100 nm.



Miniature Micropositioning Stage w/ Linear Motor

With Ultrasonic Piezo Linear Drives



PILine® M-662 (left side) and M-661 stages are the smallest piezo-motor-driven translation stages available on the market that achieve speeds of up to 500 mm/s

- **Smallest Translation Stages with Linear Motor Drive**
- **Travel Ranges to 20 mm**
- **Max. Velocity 500 mm/s**
- **Acceleration to 5 g**
- **Incremental Motion to 50 nm**
- **Self Locking at Rest**
- **XY-Combination Possible**
- **MTBF 20.000 h**
- **Vacuum Versions to 10⁻⁷ hPa**

M-661 and M-662 PILINE® translation stages offer accelerations to 5 g with millisecond response and velocities to 500 mm/sec in an extremely compact package. Providing travel ranges to 20 mm, they

are among the smallest motorized translation stages currently on the market. Both models are designed for open-loop operation (a similar closed-loop stage with linear encoder is available as model M-663). The M-662, with its square footprint, is also suitable for use in XY configurations. For applications where the smallest dimensions are essential, the P-652 micro stage is offered.

Working Principle

PILine® piezo motors use a new, patented, ultrasonic drive developed by PI. At the heart of the system is a piezo ceramic plate, which is excited with high-frequency eigenmode oscillations. A friction tip attached to the plate moves

along an inclined linear path at the eigenmode frequency. Through its contact with the friction bar, the moving part of the mechanics drives forward or backwards. With each oscillatory cycle, the mechanics execute a step of a few nanometers; the macroscopic result is smooth motion with a virtually unlimited travel range.

Advantages of PILINE® Micropositioning Systems

The ultrasonic piezoceramic drives used in PILINE® micropositioners have a number of advantages over classical drives:

- Higher Accelerations, up to 5 g
- Speeds up to 500 mm/s
- Small Form Factor
- Self-Locking When Powered Down
- No Shafts, Gears or Other Rotating Parts
- Non-Magnetic and Vacuum-Compatible Drive Principle

Choice of Drive Electronics

Special driver electronics are required to create the ultrasonic oscillations for PILINE® piezo-

Ordering Information

M-661.370
PILINE® Translation Stage, 18 mm, Open-Loop

M-662.470
PILINE® Translation Stage, 20 mm, Open-Loop, XY Mountable

Accessories:

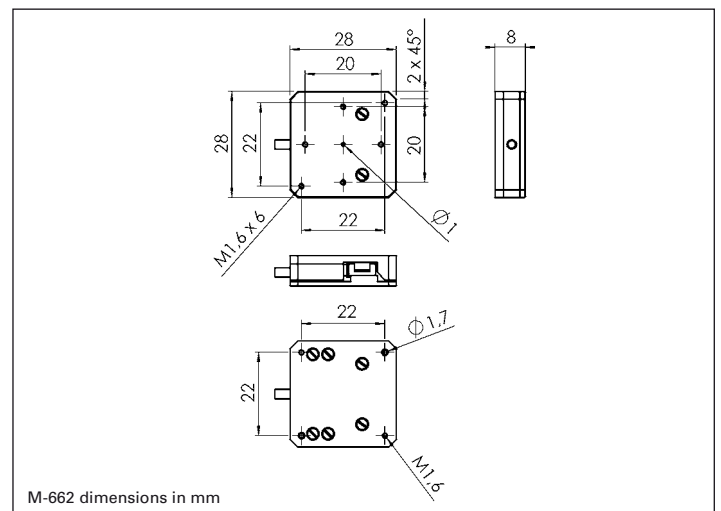
C-184.161
Analog OEM Driver Board for PILINE® P-661 Motors

C-185.161
Analog Stand-Alone Drive Electronics with Power Supply for PILINE® P-661 Motors

motors. The driver controls the motor speed as a function of an analog ± 10 V signal. The driver is not included, as it is available in different versions, from the low-priced C-184.161 OEM-board to the C-185.161 bench-top unit. The stage and the driver electronics, however, must be ordered together, so that they can be tuned to one-another for optimum performance.

Notes

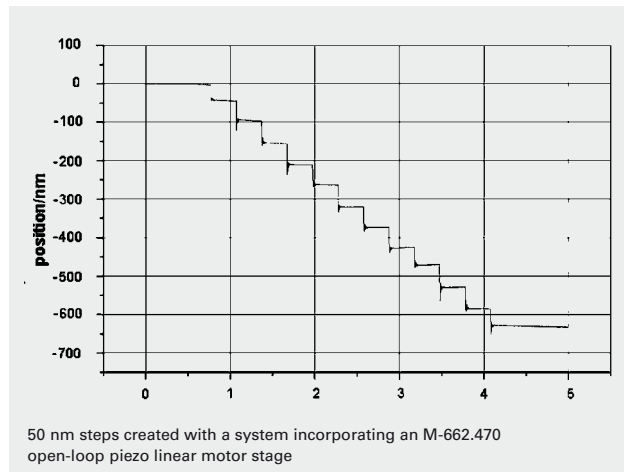
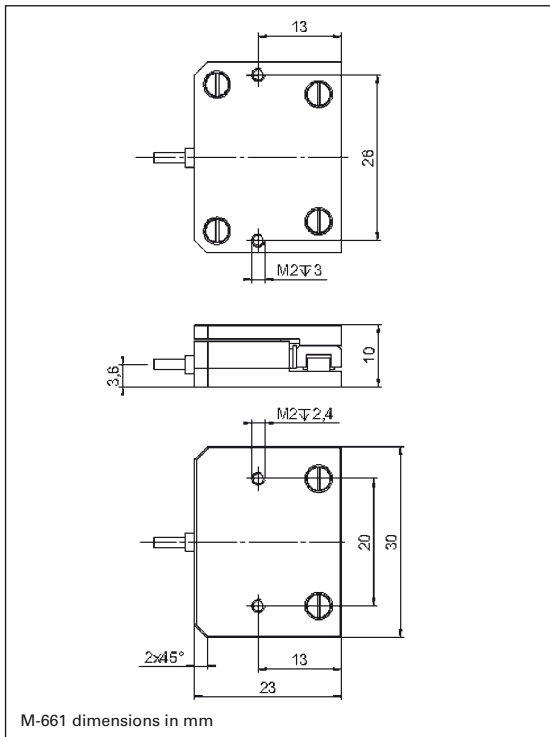
The products described in this document are in part protected by the following patents: US Pat. No. 6,765,335 German Patent No. 10154526



M-662 dimensions in mm

Application Examples

- Biotechnology
- Micromanipulation
- Microscopy
- Quality assurance testing
- Semiconductor testing
- Metrology
- Mass storage device testing
- R&D
- Photonics packaging



Technical Data

Model	M-661.370	M-662.470	Units	Tolerance
Motion and positioning				
Travel range	18	20	mm	
Min. incremental motion	0.05*	0.05*	µm	typ.
Max. velocity	500	500	mm/s	
Mechanical properties				
Max. load	5	5	N	
Max. push/pull force	1	1	N	
Max. holding force	2	2	N	
Drive properties				
Motor type	P-661 PLine® ultrasonic piezomotor drive	P-661 PLine® ultrasonic piezomotor drive		
Operating voltage	120 (Peak-Peak)**	120 (Peak-Peak)**	V	
Electrical power	42 (RMS)**	42 (RMS)**	W	nominal
Current	400***	400***	mA	
Miscellaneous				
Operating temperature range	-20 to +50	-20 to +50	°C	
Material	Al (black anodized)	Al (black anodized)		
Dimensions	30 x 23 x 10	28 x 28 x 8		
Mass	0.03	0.03	kg	±5%
Cable length	1.5	1.5	m	±10 mm
Connector	LEMO connector	LEMO connector		
Recommended controller/driver	C-184.161 OEM board C-185.161 Bench-top	C-184.161 OEM board C-185.161 Bench-top (p. 1-36)		

*The minimum incremental motion is a typical value that can be achieved in the open-loop mode of a piezomotor stage.

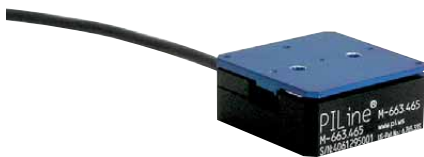
To obtain it, it is important to follow the mounting guidelines in the motor documentation.

**The stage supply power is drawn from the drive electronics, which runs on 12 VDC.

***For drive electronics.

Miniature Micropositioning Stage w/ Linear Motor & Encoder

Compact, Fast, with Ultrasonic Piezo Linear Drives, Direct Position Measurement



PILine® M-663 micropositioning stages with integrated linear encoder and C-867 controller/driver in the background

- **Smallest Translation Stage with Closed-Loop Linear Motor and Encoder**
- **Travel Range 19 mm**
- **Max. Velocity 400 mm/s**
- **Acceleration up to 10 g**
- **Direct Metrology Linear Encoder**
- **0.1 µm Resolution**
- **XY Combination Possible**
- **Vacuum-Compatible Versions Available**

PILine® M-663 micropositioning systems offer high velocities of up to 400 mm/s and travel ranges of 19 mm in a compact package. The M-663 is the smallest closed-loop trans-

lation stage with piezomotor drives currently on the market. Its square footprint makes it suitable for use in compact XY configurations.

Application Examples

- Biotechnology
- Micromanipulation
- Microscopy
- Quality assurance testing
- Metrology
- Mass storage device testing
- R&D
- Photonics packaging

Working Principle

PILine® motors have a new, patented, ultrasonic drive developed by PI. The core piece of the system is a piezoceramic plate, which is excited to produce high-frequency eigenmode oscillations. A friction tip attached to the plate moves along an inclined linear path at the eigenmode frequency. Through its contact with the friction bar, the moving part of the mechanics drives forward or backwards.

With each oscillatory cycle, the mechanics executes a step of a few nanometers; the macroscopic result is smooth motion with a virtually unlimited travel range.

Advantages of PLine® Micropositioning Systems

The ultrasonic piezoceramic drives used in PLine® micropositioners have a number of advantages over classical drives:

- Higher Accelerations, up to 5 g
- Speeds up to 500 mm/s
- Small Form Factor
- Self-Locking When Powered Down
- No Shafts, Gears or Other Rotating Parts
- Non-Magnetic and Vacuum-Compatible Drive Principle

Optimized Controller and Drive Electronics

PILine® motors require a special drive electronics to generate the ultrasonic oscillations for piezoceramic element. For optimum performance the highly specialized C-867 (see p. 4-116) motion controller is recommended. This sophisticated controller also integrates the drive electronics. Furthermore, the controller has a number of special features, including dynamic parameter switching for an optimized high-speed motion and settling behavior to take into account the motion characteristics typical of piezomotors. The broad-band encoder input (50 MHz) supports the outstanding high accelerations and velocities of PLine® drives at high resolutions.

Optionally, for use with third party servo controllers, the C-185 analog drive electronics (stand-alone unit) is available. It controls the motor speed by an analog ±10 V signal. For

Ordering Information

M-663.465
PILine® Translation Stage, 19 mm, Linear Encoder, 0.1 µm Resolution

M-663.Y65
PILine® Translation Stage, 19 mm, Linear Encoder, 0.1 µm Resolution, turned cable outlet, XY mountable

M-663.46V
PILine® Translation Stage, 19 mm, Linear Encoder, 0.1 µm Resolution, Vacuum Compatible to 10⁻⁶ hPa

Accessories:

C-867.161
Piezomotor Controller with Drive Electronics, 1 Channel, for PLine® Systems with P-661 Motors

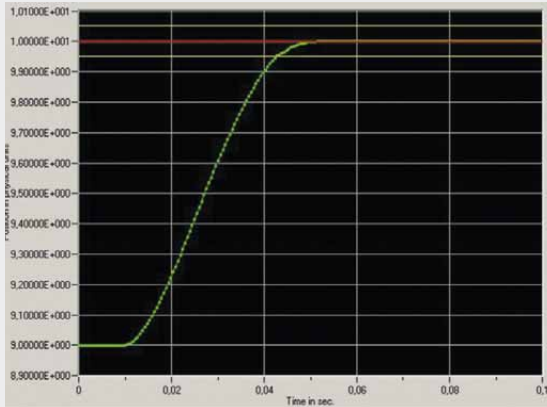
Driver for use with separate controller:

C-185.161
Analog Stand-Alone Drive Electronics with Power Supply for PLine® P-661 Motors

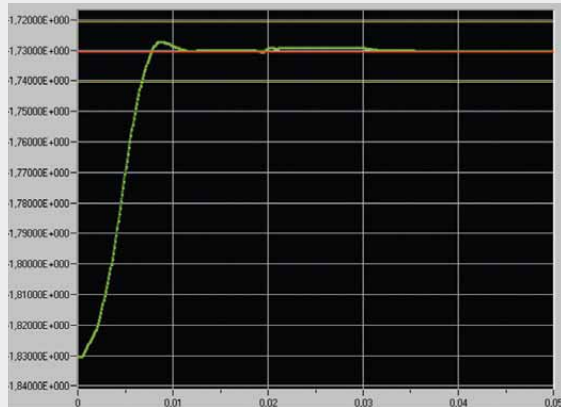
optimum performance the driver must be tuned together with the mechanics and should be ordered at the same time as the motor/stage.

Note

The products described in this document are in part protected by the following patents:
US Pat. No. 6,765,335
German Patent No. 10154526



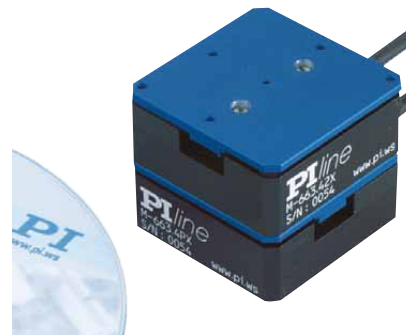
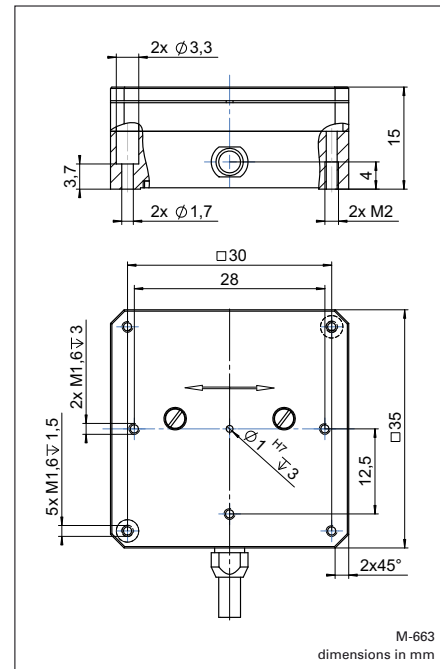
A 1 mm step performed by an M-663 stage with 300 g load controlled by a C-867 controller/driver reaches the end position in less than 40 ms



An M-663 with 100 g load settles to 0.1 µm accuracy in 10 ms after a 100 µm step, measured with C-867 controller/driver

Technical Data

Model	M-663.465	Units	Tolerance
Active axes	X		
Motion and positioning			
Travel range	19	mm	
Integrated sensor	Linear encoder		
Sensor resolution	0.1	µm	
Min. incremental motion	0.3	µm	typ.
Bidirectional repeatability	±0.3	µm	typ.
Unidirectional repeatability	0.2	µm	typ.
Pitch	300	µrad	typ.
Yaw	300	µrad	typ.
Max. velocity	400	mm/s	
Reference switch repeatability	1	µm	typ.
Mechanical properties			
Max. load	5	N	
Max. push/pull force	2	N	
Max. holding force	2	N	
Drive properties			
Motor type	P-661 PiLine® ultrasonic piezomotor		
Motor voltage range	120 (peak-peak)* 42 (RMS)*	V	
Electrical power	5**	W	nominal
Current	400**	mA	
Reference switch	Hall-effect		
Miscellaneous			
Operating temperature range	-20 to +50	°C	
Material	Al (black anodized)		
Dimensions	35 x 35 x 15	mm	
Mass	40	g	±5 %
Cable length	1.5	m	±10 mm
Connector	MDR, 14-pin		
Recommended controller/driver	C-867.161 Single-axis controller/driver (p. 4-116) C-185.161 Drive electronics (p. 1-36)		



XY combination of two M-663s; CD for size comparison

*Power is supplied by the drive electronics which runs on 12 V DC
**For drive electronics

Sub-Miniature Micropositioning Stage w/Piezo Option

X, XY, XYZ Miniature Translation Stages



M-311.00, M-312.00, M-313.00
miniature translation stage

- Extremely Compact
- All-Stainless-Steel Construction
- X, XY and XYZ Versions
- Optional PiezoMike for Nanometer Resolution
- 4 mm Clear Aperture
- Linear Ball Bearings

The M-310 series of translation stages are our smallest micrometer-driven positioners. The carriage is spring pre-loaded against the micrometer tip for elimination of backlash. M-310 series stages are available in one-, two- or three-axis

configurations. The latter consists of a two-axis stage, an angle bracket and a one-axis stage. Please note that an XY unit cannot be separated into two one-axis stages. The vertical stage in the M-313 XYZ assembly supports the load

through the micrometer spindle (not the preload springs) providing excellent stability.

PiezoMike Option

Versions with PiezoMike drive provide an additional 25 μ m fine range for remotely controlled ultra-high resolution (e.g. scanning or tracking). See page 7-86 for further details.

A special version with piezo block NanoActuators is available as product number F-111 (see page 8-22 in the "Photonics" section, for more examples of M-310 series stages in photonics alignment and packaging).

Notes

See "Accessories", page 7-92 ff. for adapters, brackets, etc.

Ordering Information

- M-311.00**
Miniature Translation Stage, 6 mm
 - M-312.00**
XY Miniature Translation Stage, 6 mm
 - M-313.00**
XYZ Miniature Translation Stage, 6 mm
 - M-311.80**
Miniature Translation Stage with PiezoMike Drive, 6 mm
 - M-312.80**
XY Miniature Translation Stage with PiezoMike Drive, 6 mm
 - M-313.80**
XYZ Miniature Translation Stage with PiezoMike Drive, 6 mm
- Accessories**
- M-318.20**
Angle Bracket (F-010 fiber holder \rightarrow M-313)
 - M-318.30**
Combination Plate 30 x 30 mm
 - M-318.00**
Z-axis Mounting Bracket (included in M-313)
 - M-318.40**
Adapter Plate for Honeycomb Tables, 1" & 25 mm

Ask about custom designs!

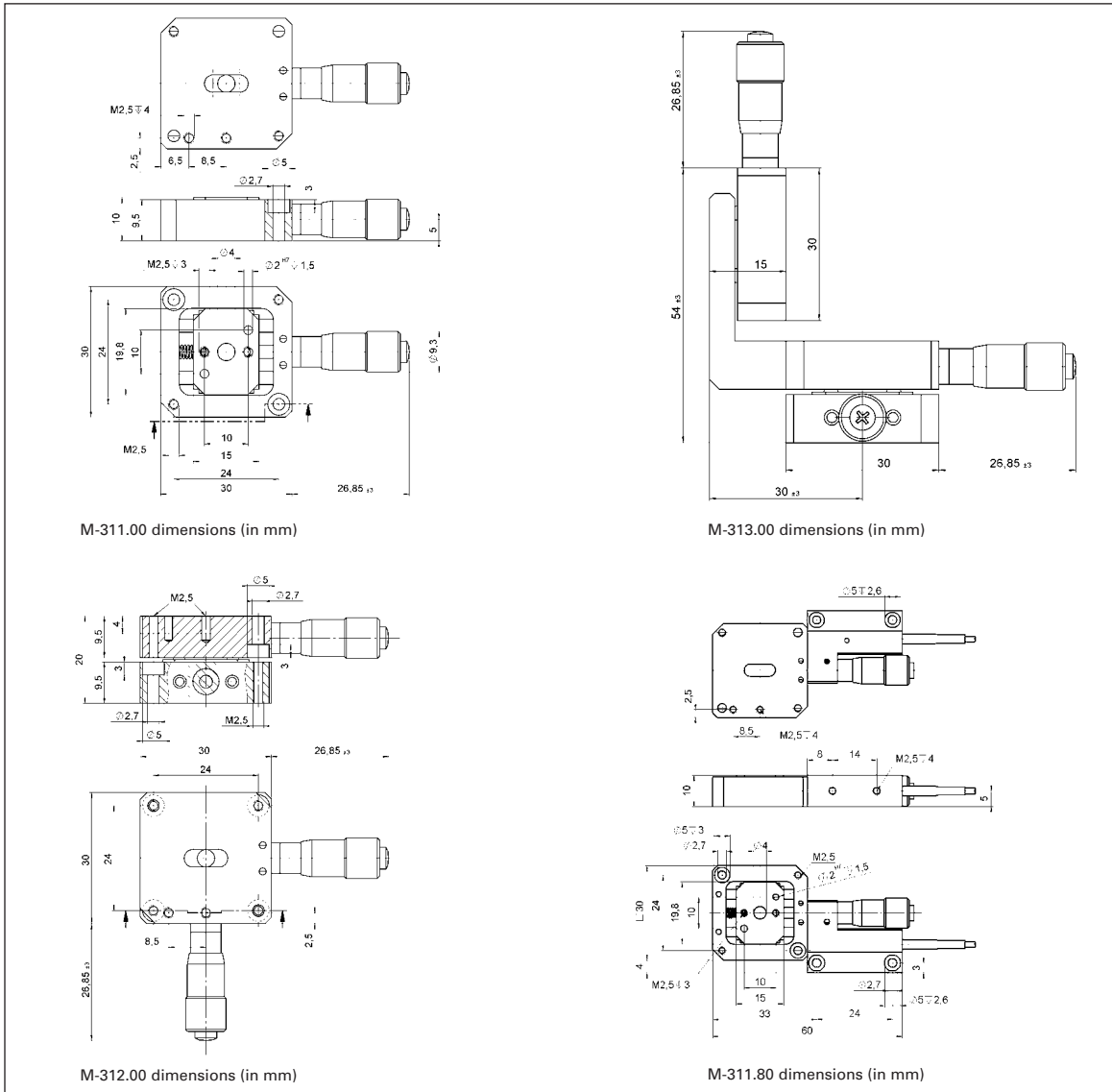


M-313.00 XYZ stage with M-318.20 angle bracket and F-010.00 fiber holder mounted on a pillar pin with M-318.30 adapter plate. See the F-111 on page 8-22 in the Photonics" section, for more examples of M-310 series stages in photonics alignment and packaging.



M-313.80 XYZ stage with P-853 PiezoMikes and optional M-318.20 angle bracket and F-010.00 fiber holder

More information: www.xyz-stage.com



Technical Data

Models	M-311.00	M-311.80	Units	Notes see page 7-106
Travel range	6	6	mm	
Piezo fine travel range	-	25	μm	
Min. incremental motion (piezo drive)	-	0.01	μm	A4
Min. incremental motion (micrometer drive)	1	1	μm	A4
Backlash	2	2	μm	
Straightness	0.4	0.4	μm	
Max. normal load capacity	4	4	kg	B1
Max. push/pull force	20 / 1	20 / 1	N	B2
Drive	M-619	P-853		
Micrometer pitch	0.5	0.5	mm/rev.	
Weight	58	100	g	
Body material	N -S	N -S		L
Recommended piezo driver (codes explained p. 6-11)	-	A, C, G		

More information: www.xyz-stage.com

Program Overview

- Piezo Ceramic Actuators & Motors
- Piezo Nanopositioning Systems and Scanners
- Active Optics / Tip-Tilt Platforms
- Capacitive Nanometrology Sensors
- Piezo Electronics: Amplifiers and Controllers
- Hexapod 6-Axis Positioners / Robots
- Micropositioning Stages & Actuators
- Photonics Alignment Systems, Solutions for Telecommunications
- Motor Controllers
- Ultrasonic Linear Motors

Request or download the complete PI Nanopositioning & Piezo Actuator Catalog



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