

Precision Linear Stage

High Travel Accuracy and Inexpensive



M-406

- Travel ranges to 150 mm
- Crossed roller bearings
- DC servo motor drive
- Direction-sensing reference switch

Precision-class linear stage

High travel accuracy and load capacity due to crossed roller guides. Precision threaded spindle with 0.5 mm thread pitch, backlash-compensated. Stress-relieved aluminum base for high stability.

- PD variant: DC motor with integrated ActiveDrive amplifier for high velocity.
 - DG variant: DC servo motor with gearhead in conjunction with precision rotary encoder for high resolution and repeatability
- Noncontact limit switches. Noncontact reference switch with direction sensing in the middle of the travel range.

Crossed roller guide

For crossed roller guides, the point contact of balls in ball guides is replaced by the line contact of hardened rollers. Consequently, they are considerably stiffer and need less preloading, which reduces friction and enables smoother running. Crossed roller guides are also characterized by high guide accuracy and load capacity. Force-guided rolling element cages prevent cage creep.

Application fields

Precision positioning in laboratory environments. Test equipment.

Motion	Unit	Tolerance	M-406.2DG	M-406.4DG	M-406.6DG	M-406.2PD	M-406.4PD	M-406.6PD	M-406.22S	M-406.42S
Active axes			X	X	X	X	X	X	X	X
Travel range in X	mm		50	100	150	50	100	150	50	100
Maximum velocity in X, unloaded	mm/s		1	1	1	15	15	15	3.5	3.5
Pitch (Rotational crosstalk in θY with motion in X)	μrad	Typ.	± 25	± 50	± 75	± 25	± 50	± 75	± 25	± 50
Yaw (Rotational crosstalk in θZ with motion in X)	μrad	Typ.	± 25	± 50	± 75	± 25	± 50	± 75	± 25	± 50

Positioning	Unit	Tolerance	M-406.2DG	M-406.4DG	M-406.6DG	M-406.2PD	M-406.4PD	M-406.6PD	M-406.22S	M-406.42S
Minimum incremental motion in X	μm	Typ.	0.1	0.1	0.1	0.25	0.25	0.25	0.1	0.1
Unidirectional repeatability in X	μm	Typ.	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1	± 0.1
Backlash in X	μm	Typ.	2	2	2	2	2	2	1	1
Reference switch			Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect
Limit switches			Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect
Integrated sensor			Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder		
Sensor resolution	Cts./rev.		2000	2000	2000	4000	4000	4000		

Drive Properties	Unit	Tolerance	M-406.2DG	M-406.4DG	M-406.6DG	M-406.2PD	M-406.4PD	M-406.6PD	M-406.22S	M-406.42S
Drive type			DC gear motor	DC gear motor	DC gear motor	DC motor with Active-Drive	DC motor with Active-Drive	DC motor with Active-Drive	2-phase stepper motor	2-phase stepper motor
Operating voltage	V		0 to ± 12	0 to ± 12	0 to ± 12	24	24	24	24	24
Motor resolution	Full steps/rev.								400	400
Drive force in positive direction of motion in X	N	Typ.	50	50	50	50	50	50	50	50
Drive force in negative direction of motion in X	N	Typ.	50	50	50	50	50	50	50	50

Mechanical Properties	Unit	Tolerance	M-406.2DG	M-406.4DG	M-406.6DG	M-406.2PD	M-406.4PD	M-406.6PD	M-406.22S	M-406.42S
Permissible push force in Y	N	Max.	150	150	150	150	150	150	150	150
Permissible push force in Z	N	Max.	200	200	200	200	200	200	200	200
Permissible torque in Θ_x	N·m	Max.	6	6	6	6	6	6	6	6
Permissible torque in Θ_Y	N·m	Max.	4	4	4	4	4	4	4	4
Permissible torque in Θ_Z	N·m	Max.	4	4	4	4	4	4	4	4
Holding force in X, passive	N								50	50
Drive screw type			Metric leadscrew	Metric leadscrew	Metric leadscrew	Metric leadscrew	Metric leadscrew	Metric leadscrew	Metric leadscrew	Metric leadscrew
Drive screw pitch	mm		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Gear ratio i			29,6 : 1	29,6 : 1	29,6 : 1					
Guide			Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide
Overall mass	g		2100	2400	2800	2100	2400	2800	2100	2400
Material			Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel

Miscellaneous	Unit		M-406.2DG	M-406.4DG	M-406.6DG	M-406.2PD	M-406.4PD	M-406.6PD	M-406.22S	M-406.42S
Operating temperature range	°C		-20 to 65	-20 to 65	-20 to 65	-20 to 65	-20 to 65	-20 to 65	-20 to 65	-20 to 65
Connector			D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)
Recommended controllers / drivers			C-863.12 C-885 with C-863. 20C885 C-884 ACS modular controller	C-863.12 C-885 with C-863. 20C885 C-884 ACS modular controller	C-863.12 C-885 with C-863. 20C885 C-884 ACS modular controller	C-863.12 C-885 with C-863. 20C885 C-884	C-863.12 C-885 with C-863. 20C885 C-884	C-863.12 C-885 with C-863. 20C885 C-884	C-663.12 C-885 with C-663. 12C885 ACS modular controller	C-663.12 C-885 with C-663. 12C885 ACS modular controller

Motion	Unit	Tolerance	M-406.62S
Active axes			X
Travel range in X	mm		150
Maximum velocity in X, unloaded	mm/s		3.5
Pitch (Rotational crosstalk in Θ_Y with motion in X)	μrad	Typ.	± 75
Yaw (Rotational crosstalk in Θ_Z with motion in X)	μrad	Typ.	± 75

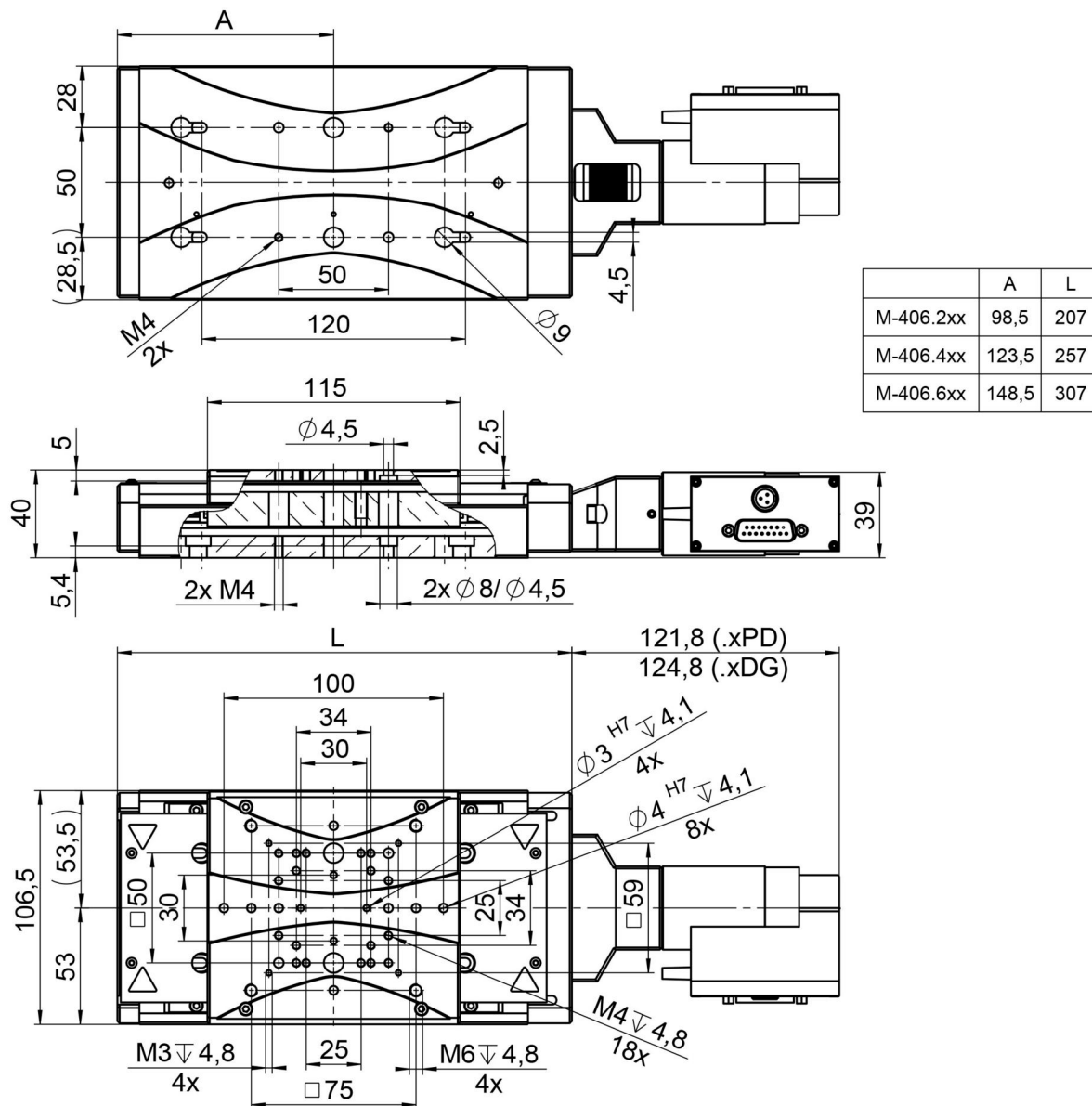
Positioning	Unit	Tolerance	M-406.62S
Minimum incremental motion in X	μm	Typ.	0.1
Unidirectional repeatability in X	μm	Typ.	±0.1
Backlash in X	μm	Typ.	1
Reference switch			Hall effect
Limit switches			Hall effect
Integrated sensor			
Sensor resolution	Cts./rev.		

Drive Properties	Unit	Tolerance	M-406.62S
Drive type			2-phase stepper motor
Operating voltage	V		24
Motor resolution	Full steps/rev.		400
Drive force in positive direction of motion in X	N	Typ.	50
Drive force in negative direction of motion in X	N	Typ.	50

Mechanical Properties	Unit	Tolerance	M-406.62S
Permissible push force in Y	N	Max.	150
Permissible push force in Z	N	Max.	200
Permissible torque in θx	N·m	Max.	6
Permissible torque in θY	N·m	Max.	4
Permissible torque in θZ	N·m	Max.	4
Holding force in X, passive	N		50
Drive screw type			Metric leadscrew
Drive screw pitch	mm		0.5
Gear ratio i			
Guide			Crossed roller guide
Overall mass	g		2800
Material			Aluminum, steel

Miscellaneous	Unit		M-406.62S
Operating temperature range	°C		-20 to 65
Connector			D-sub 15-pin (m)
Recommended controllers / drivers			C-663.12 C-885 with C-663.12C885 ACS modular controller

Drawings / Images



M-406, dimensions in mm. Note that a comma is used in the drawing instead of a decimal point.

Order Information

M-406.2DG

Precision linear stage; DC gear motor; 50 mm travel range; 200 N load capacity; 1 mm/s maximum velocity; metric threaded spindle; incremental rotary encoder, 2000 counts/rev. sensor resolution

M-406.4DG

Precision linear stage; DC gear motor; 100 mm travel range; 200 N load capacity; 1 mm/s maximum velocity; metric threaded spindle; incremental rotary encoder, 2000 counts/rev. sensor resolution

M-406.6DG

Precision linear stage; DC gear motor; 150 mm travel range; 200 N load capacity; 1 mm/s maximum velocity; metric threaded spindle; incremental rotary encoder, 2000 counts/rev. sensor resolution

M-406.2PD

Precision linear stage; DC motor with ActiveDrive; 50 mm travel range; 200 N load capacity; 15 mm/s maximum velocity; metric threaded spindle; incremental rotary encoder, 4000 counts/rev. sensor resolution

M-406.4PD

Precision linear stage; DC motor with ActiveDrive; 100 mm travel range; 200 N load capacity; 15 mm/s maximum velocity; metric threaded spindle; incremental rotary encoder, 4000 counts/rev. sensor resolution

M-406.6PD

Precision linear stage; DC motor with ActiveDrive; 150 mm travel range; 200 N load capacity; 15 mm/s maximum velocity; metric threaded spindle; incremental rotary encoder, 4000 counts/rev. sensor resolution

M-406.22S

Precision linear stage; 2-phase stepper motor; 50 mm travel range; 200 N load capacity; 3.5 mm/s maximum velocity; metric threaded spindle

M-406.42S

Precision linear stage; 2-phase stepper motor; 100 mm travel range; 200 N load capacity; 3.5 mm/s maximum velocity; metric threaded spindle

M-406.62S

Precision linear stage; 2-phase stepper motor; 150 mm travel range; 200 N load capacity; 3.5 mm/s maximum velocity; metric threaded spindle