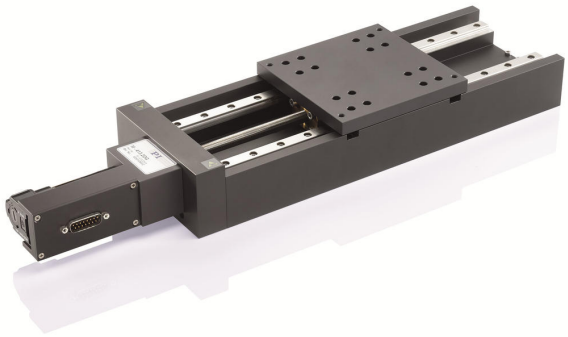
High-Load Linear Stage

Inexpensive, Reliable, Precise



M-413

- Very inexpensive, robust models
- Flexible modular system M-403, M-404, M-413, M-414
- Travel ranges from 100 to 300 mm
- Resolution to 0.018 µm
- Preloaded precision leadscrew
- Minimum incremental motion 0.2 µm

Application fields
Measuring technology. Adjustment.

Motion	Unit	Toleran-ce	M-413.1PD	M-413.2PD	M-413.3PD	M-413.1DG	M-413.2DG	M-413.3DG	M-413.12S	M-413.22S
Active axes			X	X	X	X	X	X	X	X
Travel range in X	mm		100	200	300	100	200	300	100	200
Maximum velocity in X, unloaded	mm/s		10	10	10	2.5	2.5	2.5	3	3
Pitch (Rotational crosstalk in θY with motion in X)	µrad	Typ.	± 300	± 300	± 300	± 300	± 300	± 300	± 300	± 300
Yaw (Rotational crosstalk in θZ with motion in X)	µrad	Typ.	± 300	± 300	± 300	± 300	± 300	± 300	± 300	± 300

Positioning	Unit	Toleran-ce	M-413.1PD	M-413.2PD	M-413.3PD	M-413.1DG	M-413.2DG	M-413.3DG	M-413.12S	M-413.22S
System resolution in X	nm		250	250	250	17.5784	17.5784	17.5784	156.25	156.25
Unidirectional repeatabili-ty in X	µm	Typ.	1	1	1	1	1	1	1	1
Bidirectional repeatability in X	µm	Typ.								
Minimum incremental motion in X	µm	Typ.	0.25	0.25	0.25	0.2	0.2	0.2	0.2	0.2
Backlash in X	µm	Typ.	6	6	6	10	10	10	6	6
Integrated sensor			Incremental rotary en-coder	Incremental rotary en-coder	Incremental rotary en-coder	Incremental rotary en-coder	Incremental rotary en-coder	Incremental rotary en-coder		
Sensor signal			A/B quadra-ture, RS-422	A/B quadra-ture, RS-422	A/B quadra-ture, RS-422	A/B quadra-ture, RS-422	A/B quadra-ture, RS-422	A/B quadra-ture, RS-422		
Sensor resolution	Cts./rev.		4000	4000	4000	2000	2000	2000		
Reference switch			Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect
Reference switch repeata-bility	µm		1	1	1	1	1	1	1	1
Limit switches			Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect	Hall effect

Drive Properties	Unit	Tolerance	M-413.1PD	M-413.2PD	M-413.3PD	M-413.1DG	M-413.2DG	M-413.3DG	M-413.12S	M-413.22S
Drive type			Electric motor/Rotating electric motor/DC motor with ActiveDrive	Electric motor/Rotating electric motor/DC motor with ActiveDrive	Electric motor/Rotating electric motor/DC motor with ActiveDrive	Electric motor/Rotating electric motor/DC gear motor	Electric motor/Rotating electric motor/DC gear motor	Electric motor/Rotating electric motor/DC gear motor	Electric motor/Rotating electric motor/2-phase stepper motor	Electric motor/Rotating electric motor/2-phase stepper motor
Motor resolution	Full steps/rev.								400	400
Nominal voltage	V		24	24	24	12	12	12	24	24
Nominal current, RMS	A	Typ.				0.43	0.43	0.43	1.2	1.2
Drive force in negative direction of motion in X	N	Typ.	50	50	50	50	50	50	50	50
Drive force in positive direction of motion in X	N	Typ.	50	50	50	50	50	50	50	50
Resistance phase-phase	Ω	Typ.				9.6	9.6	9.6	2.6	2.6
Inductance phase-phase	mH					0.44	0.44	0.44	1.9	1.9

Mechanical Properties	Unit	Tolerance	M-413.1PD	M-413.2PD	M-413.3PD	M-413.1DG	M-413.2DG	M-413.3DG	M-413.12S	M-413.22S
Guide										
Drive screw type			Trapezoidal drive screw	Trapezoidal drive screw	Trapezoidal drive screw	Trapezoidal drive screw	Trapezoidal drive screw	Trapezoidal drive screw	Trapezoidal drive screw	Trapezoidal drive screw
Drive screw pitch	mm		1	1	1	1	1	1	1	1
Gear ratio i						28.444	28.444	28.444		
Stiffness in X	N/µm		3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Moved mass in X, unloaded	g									
Permissible push force in Y	N	Max.	200	200	200	200	200	200	200	200
Permissible push force in Z	N	Max.	500	500	500	500	500	500	500	500
Overall mass	g		4400	5400	6600	4200	5200	6400	4400	5400
Material			Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized	Aluminum, anodized

Miscellaneous	Unit		M-413.1PD	M-413.2PD	M-413.3PD	M-413.1DG	M-413.2DG	M-413.3DG	M-413.12S	M-413.22S
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)
Connector: Supply voltage			M8 4-pin (m)	M8 4-pin (m)	M8 4-pin (m)					
Recommended controllers / drivers			C-863 (single axis) C-884 (up to 6 axes)	C-863 (single axis) C-884 (up to 6 axes)	C-863 (single axis) C-884 (up to 6 axes)	C-863 (single axis) C-884 (up to 6 axes)	C-863 (single axis) C-884 (up to 6 axes)	C-863 (single axis) C-884 (up to 6 axes)	C-663 (single axis)	C-663 (single axis)
Cable length	m		3	3	3	3	3	3	3	3
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

Motion	Unit	Tolerance	M-413.32S
Active axes			X
Travel range in X	mm		300
Maximum velocity in X, unloaded	mm/s		3
Pitch (Rotational crosstalk in θY with motion in X)	µrad	Typ.	± 300
Yaw (Rotational crosstalk in θZ with motion in X)	µrad	Typ.	± 300

Positioning	Unit	Toleran-ce	M-413.32S
System resolution in X	nm		156.25
Unidirectional repeatabili-ty in X	µm	Typ.	1
Bidirectional repeatability in X	µm	Typ.	
Minimum incremental motion in X	µm	Typ.	0.2
Backlash in X	µm	Typ.	6
Integrated sensor			
Sensor signal			
Sensor resolution	Cts./rev.		
Reference switch			Hall effect
Reference switch repeata-bility	µm		1
Limit switches			Hall effect

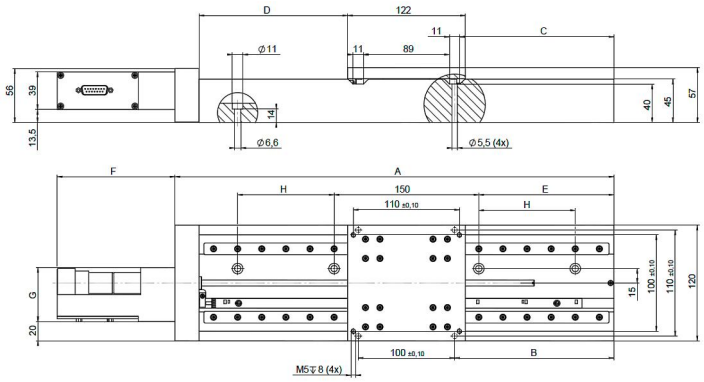
Drive Properties	Unit	Toleran-ce	M-413.32S
Drive type			Electric motor/Rotating electric motor/2-phase stepper motor
Motor resolution	Full steps/ rev.		400
Nominal voltage	V		24
Nominal current, RMS	A	Typ.	1.2
Drive force in negative di-rection of motion in X	N	Typ.	50
Drive force in positive di-rection of motion in X	N	Typ.	50
Resistance phase-phase	Ω	Typ.	2.6
Inductance phase-phase	mH		1.9

Mechanical Properties	Unit	Toleran-ce	M-413.32S
Guide			
Drive screw type			Trapezoidal drive screw
Drive screw pitch	mm		1
Gear ratio i			
Stiffness in X	N/µm		3.5
Moved mass in X, unloa-ded	g		
Permissible push force in Y	N	Max.	200
Permissible push force in Z	N	Max.	500
Overall mass	g		6600
Material			Aluminum, anodized

Miscellaneous	Unit		M-413.32S
Connector			D-sub 15-pin (m)
Connector: Supply voltage			
Recommended controllers / drivers			C-663 (single axis)
Cable length	m		3
Operating temperature range	°C		-20 to 65

Note on the velocity for M-413.xPD: Maximum recommended velocity
Note on the sensor resolution: Quadruple evaluated
Note on pitch and yaw: For travel ranges greater than 100 mm, the value applies respectively per 100 mm.
Note on the motor resolution and drive type for M-413.x2S: 24 V chopper voltage, max. 0.8 A/Phase; 400 full steps/rev., motor resolution with C-663 stepper motor controller

Drawings / Images



M-41x, dimensions in mm

Order Information

M-413.1PD
High-load linear stage, leadscrew, 120 mm width, 100 mm travel range, ActiveDrive

M-413.2PD
High-load linear stage, leadscrew, 120 mm width, 200 mm travel range, ActiveDrive

M-413.3PD
High-load linear stage, leadscrew, 120 mm width, 300 mm travel range, ActiveDrive

M-413.1DG
High-load linear stage, leadscrew, 120 mm width, 100 mm travel range, DC gear motor

M-413.2DG
High-load linear stage, leadscrew, 120 mm width, 200 mm travel range, DC gear motor

M-413.3DG
High-load linear stage, leadscrew, 120 mm width, 300 mm travel range, DC gear motor

M-413.12S
High-load linear stage, leadscrew, 120 mm width, 100 mm travel range, stepper motor

M-413.22S
High-load linear stage, leadscrew, 120 mm width, 200 mm travel range, stepper motor

M-413.32S
High-load linear stage, leadscrew, 120 mm width, 300 mm travel range, stepper motor