

# High-Precision Linear Stage for Heavy Loads

## Excellent Repeatability and Travel Accuracy



### HPS-170

- Travel ranges from 52 to 205 mm (2 to 8")
- Max. Velocity up to 100 mm/s
- Load capacity up to 35 kg
- Optional: Linear encoder for direct position measuring

#### Reference-class linear stage

High travel accuracy and load capacity due to crossed roller guides. Precision ball screw. Stress-relieved aluminum base for high stability. Mechanical limit switches.

#### Drive types

- Closed-loop DC servo motor with rotary encoder on the motor shaft
- 2-phase stepper motor for high torque even at low velocities and high resolution

#### Highly accurate position measuring with incremental linear encoder

Noncontact optical linear encoders measure the position with highest accuracy directly on the platform. Nonlinearity, mechanical play or elastic deformation have no influence on the measurement.

#### 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.

#### Minimum incremental motion

In conjunction with the SMC Hydra controller, versions with stepper motor and integrated linear encoder achieve repeatable minimum incremental motion in the range of the sensor resolution. The same configuration achieves constant low velocities of a few sensor increments per second.

#### Application fields

Sample inspection. Semiconductor technology. Measuring technology. Laser inscription.

Motion	Unit	Tolerance	626291100	626291200	626291300	626291110	626291210	626291310	626291410	626292100
Active axes			X	X	X	X	X	X	X	X
Travel range in X	mm		52	102	155	52	102	155	205	52
Maximum velocity in X, unloaded	mm/s		100	100	100	100	100	100	100	35
Straightness (Linear crosstalk in Y with motion in X)	µm	Typ.	±0.75	±1	±2	±0.75	±1	±2	±3	±0.75
Flatness (Linear crosstalk in Z with motion in X)	µm	Typ.	±0.75	±1	±2	±0.75	±1	±2	±3	±0.75
Pitch (Rotational crosstalk in θY with motion in X)	µrad	Typ.	±20	±25	±30	±20	±25	±30	±35	±20
Yaw (Rotational crosstalk in θZ with motion in X)	µrad	Typ.	±40	±40	±40	±40	±40	±40	±40	±40

Positioning	Unit	Tolerance	626291100	626291200	626291300	626291110	626291210	626291310	626291410	626292100
Integrated sensor			Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental linear encoder	Incremental linear encoder	Incremental linear encoder	Incremental linear encoder	
Unidirectional repeatability in X	µm	Typ.	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Bidirectional repeatability in X	µm	Typ.	±2	±2	±2	±0.2	±0.2	±0.2	±0.2	±2
Minimum incremental motion in X	µm	Typ.	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Sensor signal			A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	
Sensor resolution	nm					50	50	50	50	
Sensor signal period	µm									
Sensor resolution	Cts./rev.		20000	20000	20000	2000	2000	2000	2000	
Limit switches			Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN
Motor encoder						Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	Incremental rotary encoder	
Resolution, motor encoder	Cts./rev.					20000	20000	20000	20000	
Motor encoder: Sensor signal						A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	A/B quadrature, RS-422	

Drive Properties	Unit	Tolerance	626291100	626291200	626291300	626291110	626291210	626291310	626291410	626292100
Drive type			DC motor	DC motor	DC motor	DC motor	DC motor	DC motor	DC motor	2-phase stepper motor
Nominal voltage	V		24	24	24	24	24	24	24	24
Peak voltage	V		48	48	48	48	48	48	48	48
Peak current, RMS	A	Typ.	3.8	3.8	3.8	3.8	3.8	3.8	3.8	1.2
Drive force in positive direction of motion in X	N	Typ.	100	100	100	100	100	100	100	150
Drive force in negative direction of motion in X	N	Typ.	100	100	100	100	100	100	100	150
Torque constant	N·m/A	Typ.	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
Time constant	ms		6	6	6	6	6	6	6	
Resistance phase-phase	Ω	Typ.	0.62	0.62	0.62	0.62	0.62	0.62	0.62	3.3
Inductance phase-phase	mH		0.13	0.13	0.13	0.13	0.13	0.13	0.13	2.8
Back EMF, phase-phase, rotational	V/kRPM	Max.	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	0.0035	

Mechanical Properties	Unit	Tolerance	626291100	626291200	626291300	626291110	626291210	626291310	626291410	626292100
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
Drive screw type			Ball screw	Ball screw	Ball screw	Ball screw	Ball screw	Ball screw	Ball screw	Ball screw
Drive screw pitch	mm		2	2	2	2	2	2	2	2
Holding force in X, passive	N		20	20	20	20	20	20	20	60
Moved mass in X, unloaded	g		1100	1100	1100	1400	1400	1400	1400	1100
Permissible push force in Y	N	Max.	150	150	150	150	150	150	150	150
Permissible push force in Z	N	Max.	350	350	350	350	350	350	350	350
Permissible torque in $\theta_x$	N·m	Max.	400	400	400	400	400	400	400	400
Permissible torque in $\theta_Y$	N·m	Max.	300	300	300	300	300	300	300	300
Permissible torque in $\theta_Z$	N·m	Max.	300	300	300	300	300	300	300	300
Overall mass	g		5100	5800	6600	5100	5800	6600	7500	5000
Material			Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel

Miscellaneous	Unit		626291100	626291200	626291300	626291110	626291210	626291310	626291410	626292100
Operating temperature range	°C		5 to 40	5 to 40	5 to 40	5 to 40	5 to 40	5 to 40	5 to 40	5 to 40
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)
Sensor connector						D-sub 9-pin (m)	D-sub 9-pin (m)	D-sub 9-pin (m)	D-sub 9-pin (m)	
Recommended controllers / drivers			C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-863 with C-863.AD12 line driver C-885 with C-863. 20C885 and C-863.AD12 line driver C-884 with C-863.AD12 line driver Modular ACS controller	C-663.12 C-885 with C-663. 12C885 Modular ACS controller

Motion	Unit	Tolerance	626292200	626292300	626292400	626292110-0001	626292210-0001	626292310-0001	626292410-0001
Active axes			X	X	X	X	X	X	X
Travel range in X	mm		102	155	205	52	102	155	205
Maximum velocity in X, unloaded	mm/s		35	35	35	35	35	35	35
Straightness (Linear crosstalk in Y with motion in X)	$\mu\text{m}$	Typ.	$\pm 1$	$\pm 2$	$\pm 3$	$\pm 0.75$	$\pm 1$	$\pm 2$	$\pm 3$
Flatness (Linear crosstalk in Z with motion in X)	$\mu\text{m}$	Typ.	$\pm 1$	$\pm 2$	$\pm 3$	$\pm 0.75$	$\pm 1$	$\pm 2$	$\pm 3$
Pitch (Rotational crosstalk in $\theta_Y$ with motion in X)	$\mu\text{rad}$	Typ.	$\pm 25$	$\pm 30$	$\pm 35$	$\pm 20$	$\pm 25$	$\pm 30$	$\pm 35$
Yaw (Rotational crosstalk in $\theta_Z$ with motion in X)	$\mu\text{rad}$	Typ.	$\pm 40$	$\pm 40$	$\pm 40$	$\pm 40$	$\pm 40$	$\pm 40$	$\pm 40$

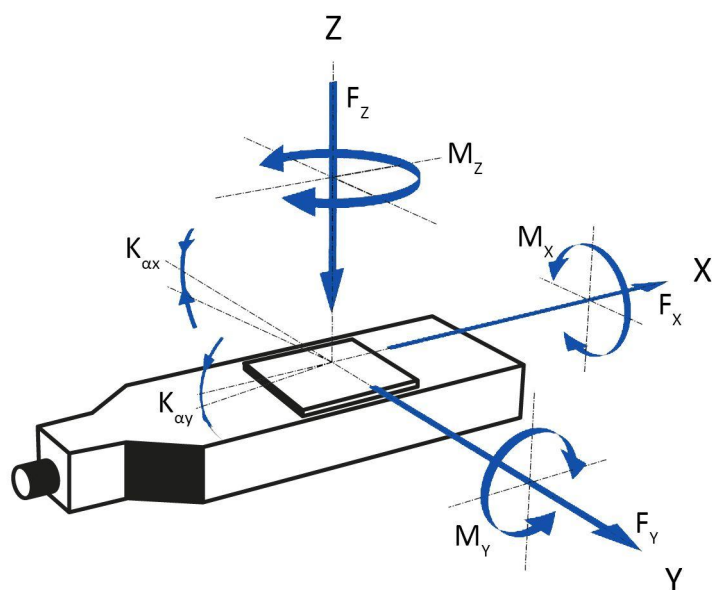
Positioning	Unit	Tolerance	626292200	626292300	626292400	626292110-0001	626292210-0001	626292310-0001	626292410-0001
Integrated sensor						Incremental linear encoder	Incremental linear encoder	Incremental linear encoder	Incremental linear encoder
Unidirectional repeatability in X	μm	Typ.	0.2	0.2	0.2	0.05	0.05	0.05	0.05
Bidirectional repeatability in X	μm	Typ.	±2	±2	±2	±0.05	±0.05	±0.05	±0.05
Minimum incremental motion in X	μm	Typ.	0.2	0.2	0.2	0.05	0.05	0.05	0.05
Sensor signal						Sin/cos, 1 V peak-peak	Sin/cos, 1 V peak-peak	Sin/cos, 1 V peak-peak	Sin/cos, 1 V peak-peak
Sensor resolution	nm								
Sensor signal period	μm					20	20	20	20
Sensor resolution	Cts./rev.								
Limit switches			Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN	Mechanical, N/C contact, to 30 V, NPN
Motor encoder									
Resolution, motor encoder	Cts./rev.								
Motor encoder: Sensor signal									

Drive Properties	Unit	Tolerance	626292200	626292300	626292400	626292110-0001	626292210-0001	626292310-0001	626292410-0001
Drive type			2-phase stepper motor	2-phase stepper motor	2-phase stepper motor	2-phase stepper motor	2-phase stepper motor	2-phase stepper motor	2-phase stepper motor
Nominal voltage	V		24	24	24	24	24	24	24
Peak voltage	V		48	48	48	48	48	48	48
Peak current, RMS	A	Typ.	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Drive force in positive direction of motion in X	N	Typ.	150	150	150	150	150	150	150
Drive force in negative direction of motion in X	N	Typ.	150	150	150	150	150	150	150
Torque constant	N·m/A	Typ.							
Time constant	ms								
Resistance phase-phase	Ω	Typ.	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Inductance phase-phase	mH		2.8	2.8	2.8	2.8	2.8	2.8	2.8
Back EMF, phase-phase, rotational	V/kRPM	Max.							

Mechanical Properties	Unit	Tolerance	626292200	626292300	626292400	626292110-0001	626292210-0001	626292310-0001	626292410-0001
Guide			Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide	Crossed roller guide
Drive screw type			Ball screw	Ball screw	Ball screw	Ball screw	Ball screw	Ball screw	Ball screw
Drive screw pitch	mm		2	2	2	2	2	2	2
Holding force in X, passive	N		60	60	60	60	60	60	60
Moved mass in X, unloaded	g		1100	1100	1100	1400	1400	1400	1400
Permissible push force in Y	N	Max.	150	150	150	150	150	150	150
Permissible push force in Z	N	Max.	350	350	350	350	350	350	350
Permissible torque in θx	N·m	Max.	400	400	400	400	400	400	400
Permissible torque in θY	N·m	Max.	300	300	300	300	300	300	300
Permissible torque in θZ	N·m	Max.	300	300	300	300	300	300	300
Overall mass	g		5700	6500	7400	5000	5700	6500	7400
Material			Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel	Aluminum, steel

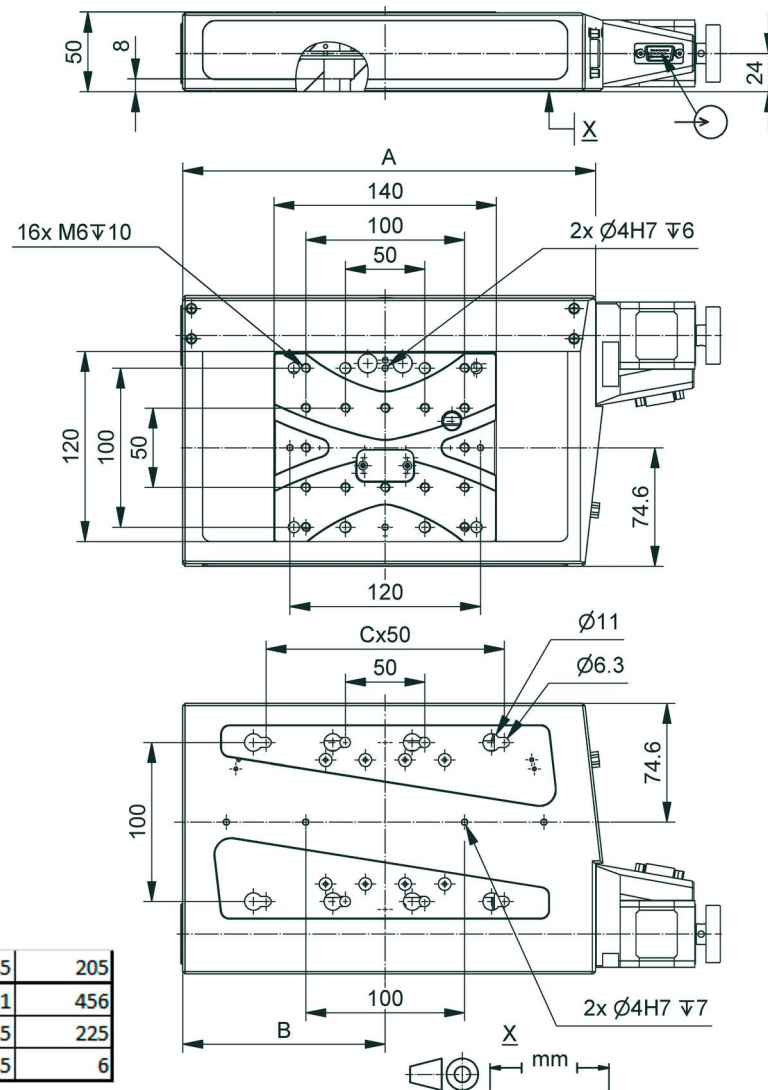
Miscellaneous	Unit	626292200	626292300	626292400	626292110-0001	626292210-0001	626292310-0001	626292410-0001
Operating temperature range	°C	5 to 40	5 to 40	5 to 40	5 to 40	5 to 40	5 to 40	5 to 40
Connector		D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)	D-sub 15-pin (m)
Sensor connector					D-sub 9-pin (m)	D-sub 9-pin (m)	D-sub 9-pin (m)	D-sub 9-pin (m)
Recommended controllers / drivers		C-663.12 C-885 with C-663.12C885 Modular ACS controller	C-663.12 C-885 with C-663.12C885 Modular ACS controller	C-663.12 C-885 with C-663.12C885 Modular ACS controller	C-663.12 C-885 with C-663.12C885 Modular ACS controller	C-663.12 C-885 with C-663.12C885 Modular ACS controller	C-663.12 C-885 with C-663.12C885 Modular ACS controller	C-663.12 C-885 with C-663.12C885 Modular ACS controller

## Drawings / Images



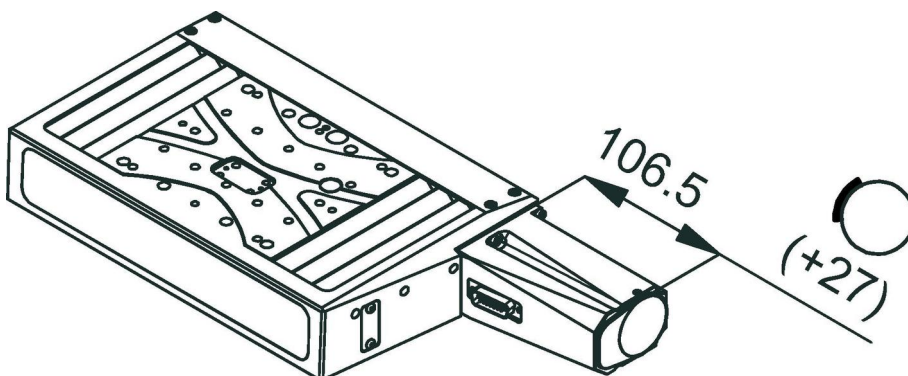
Direction of the axes and torques for linear stages

## Drawings / Images



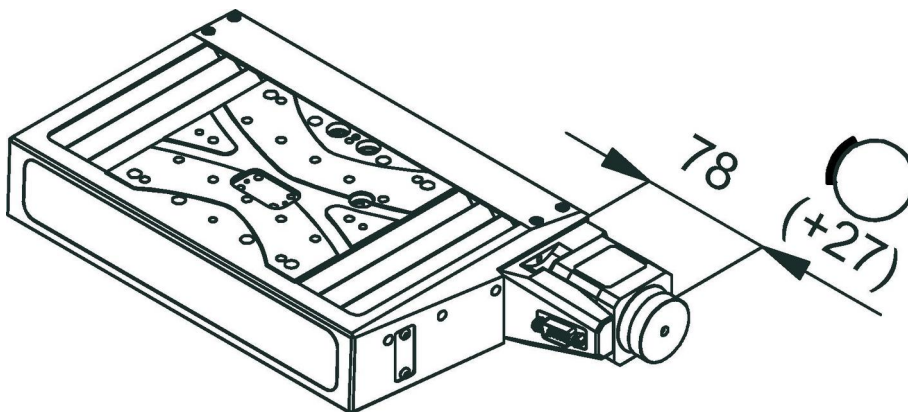
Stellweg / mm	52	102	155	205
A / mm	261	311	381	456
B / mm	127,5	152,5	187,5	225
C / mm	3	3	5	6

HPS-170, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.



HPS-170, DC motor, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

## Drawings / Images



HPS-170, stepper motor, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

## Order Information

### 626291100

High-precision linear stage for high loads; DC motor; 52 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

### 626291200

High-precision linear stage for high loads; DC motor; 102 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

### 626291300

High-precision linear stage for high loads; DC motor; 155 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

### 626291110

High-precision linear stage for high loads; DC motor; 52 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 20000 counts/rev resolution, incremental linear encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

### 626291210

High-precision linear stage for high loads; DC motor; 102 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 20000 counts/rev resolution, incremental linear encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

### 626291310

High-precision linear stage for high loads; DC motor; 155 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 20000 counts/rev resolution, incremental linear encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

### 626291410

High-precision linear stage for high loads; DC motor; 205 mm travel range; 350 N load capacity; 100 mm/s maximum velocity; ball screw; incremental rotary encoder, 20000 counts/rev resolution, incremental linear encoder, 2000 counts/rev sensor resolution, A/B quadrature, RS-422; mechanical limit switches

## Order Information

### **626292100**

High-precision linear stage for high loads; 2-phase stepper motor; 52 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; mechanical limit switches

### **626292200**

High-precision linear stage for high loads; 2-phase stepper motor; 102 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; mechanical limit switches

### **626292300**

High-precision linear stage for high loads; 2-phase stepper motor; 155 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; mechanical limit switches

### **626292400**

High-precision linear stage for high loads; 2-phase stepper motor; 205 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; mechanical limit switches

### **626292110-0001**

High-precision linear stage for high loads; 2-phase stepper motor; 52 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; incremental linear encoder, sin/cos, 1 V peak-peak; mechanical limit switches

### **626292210-0001**

High-precision linear stage for high loads; 2-phase stepper motor; 102 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; incremental linear encoder, sin/cos, 1 V peak-peak; mechanical limit switches

### **626292310-0001**

High-precision linear stage for high loads; 2-phase stepper motor; 155 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; incremental linear encoder, sin/cos, 1 V peak-peak; mechanical limit switches

### **626292410-0001**

High-precision linear stage for high loads; 2-phase stepper motor; 205 mm travel range; 350 N load capacity; 35 mm/s maximum velocity; ball screw; incremental linear encoder, sin/cos, 1 V peak-peak; mechanical limit switches