PBCLinear Mechatronics Enabled

Linear Motion Solutions

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1-800-962-8979

Selection Chart																
	Product	Car & Rail Cross Section	MAX Horizontal	300	600	900	Max 1200	imum 1500	Stok 1800	e - mn 2100	n (inc 2400	hes)	3000	3300	3600	
Linear Actuator Series	Style	(H mm x W mm)	Payload • N (Ib.)	(12")	(24") (ead scre	36") (w ¹ mot	48") or) I	(59")	(71") I I I I I I I	(83") 	(94")) (106") 	(118") 	(130")	(142")	
ML Series		MIN 32 X 32 MAX 58 X 40	MIN 178 (40) MAX 890 (200)	ML 1												
S SIZE	Compact	55 X 23	240 (54) 2,500 (562)	Compac	xt 											
Compact Series	Plus	55 X 23	5,350 (1,202)	Compa	act Plus											
M SZE	Screw	MIN 73 X 24 MAX 100 X 40	880 (197)	SIMO Screw												
SIMO Series	Belt	MIN 73 X 24 MAX 100 X 40	MIN 880 (197) MAX 1,600 (360)	Belt												
PLA Series	055	55 X 68	980 (220)	PLA												
MTB Series	042-105	MIN 60 X 42 MAX 133 X 105	MIN 1,560 (351) MAX 7,500 (1,686)	MTB 042 055, 08	30, 105								600	0 (2:	36.22	2")
XL SIZE	65 Single Car	145 X 65	8,500 (1,910)	MUK Single	and Dua	I I I Car										
MUK Series	65 Dual Car	145 X 65	11,200 (2,517)													
XXL SIZE	Simplicity 08-32	MIN 153 X 65 MAX 457 X 187	MIN 6,450 (1,450) MAX 83,400 (18,750)	Simplici	tý I											
Simplicity Series	Ball 08-32	MIN 153 X 65 MAX 457 X 187	MIN 2,028 (456) MAX 15,266 (3,432)													
			,	300 (12")	600 (24") (900 36") (1200 (48")	1500 (59")	1800 (71")	2100 (83")	2400 (94")) 2700) (106")	3000 (118")	3300 (130")	3600 (142")	

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Actuator Technology Selection Options

Bearing Options:

Plain Bearing

Cam Roller

Profile Rail



- FrelonGOLD[®] self-lubricating and maintenance free bearing surfaces
- · Smooth and quiet operation
- Vibration damping
- Shock resistant

Precision

 Applicable in contaminated environments



High speed

- Increased cantilevered loads
- Corrosion resistant stainless steel raceways
- Contamination resistance

Ball Screw



- · High precision, rigidity, and speeds
- · Increased stiffness and preloaded bearing performance
- Cantilevered loads support
- Low coefficient of friction

Transmission Options:

Motor Options:



· Smooth and quiet operation

anti-backlash nut options

Integrated

Lead Screw Stepper

Vibration damping

· Self-lubricating and maintenance free

Standard fixed or



- High Loads
- · Increased stiffness and preloaded bearing performance
- Cantilevered loads support
- Multiple accuracy classes available

High torque density

· Low rotor inertia

Rigid preloaded nut design

Servo & Step Servo



- High speed
- Long stroke applications
- contamination
- Lubrication free and low maintenance cost



- · Combined motor and drive

· Decreased costs · High resolution IoT compatible

Compact design

· Coupler not required

- · Protection against

Integrated Stepper (Smart)

- Space saving design
- Reduced wiring
- IoT compatible

Motor Options Overview

Classic Stepper



Feedback: None · Network: Defined by motion controller manufacturer

Integrated Motor Mounted Amplifier

Used when a large amplifier is needed and reduces wiring





Feedback: None • Network: Defined by motion controller manufacturer

Integrated Smart Motor



Open Market Motor Flexibility

Used when manufacturer specific motors and control architectures are preferred and when special motor configurations are required. Motion Controller Customer Choice

Manufacturer Specific

Motion Command

Manufacturer Specific

Amplifier

Motor Flexible: Stepper, Servo BLDC, or Gear Motors

PBC Motor Mount

Feedback: Manufacturer specific • Network: Manufacturer specific

PBC Linear Core Competencies

Bonding polymer and fluoropolymer bearing material to metals

Developed and refined over the years, linear plain bearings excel where traditional ball bearings fail.

- · No moving parts eliminates risk of catastrophic failure
- Temperature extremes (-400°F to +400°F)
- 20x shock loads of similar ball bearing
- Self-lubricated, no maintenance
- Both linear and rotary applications

Bearing Shell Bonding Agent Frelon

Constant Force[™] lead screw and thread rolling

Constant Force Technology is an intuitive leap forward in nut design for lead screw applications. The result is greater consistency in performance, life, and a greater resistance to backlash.

- Uniform pressure applied to nut for life
- Consistent precision at all stages of motion profile
- Optimized thread geometries
- Superior lead accuracy



Highly accurate length rails with SIMO[®] process

The Simultaneous Integral Milling Operation (SIMO) qualifies the rail to tolerances that have 6x less bow, 2x less twist, and 2x better flatness.

- Parallelism +/- 0.001"
- Straightness +/- 0.002"/ft
- Twist < 0.25 degree/ft
- 20 ft sections join-able to achieve greater lengths





Joining aluminum and steel together for longer rails

IVT rails are produced by mechanically embedding R"C" 58–62 hardened 420 stainless steel angle races onto an anodized aluminum profile.

- Precise, durable, and lightweight
- Raceway to raceway +/- 0.001"
- Raceway to surface +/- 0.002"





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Lead Screw Motors and Hybrid Linear Actuators



The patent pending Constant Force Lead Screw applies uniform pressure to the nut at all stages of travel along our quality CNC rolled lead screws. World class NEMA motors combined with an integrated lead screw make for one of the most accurate lead screw assemblies on the market.

Key Features

- Superior Performance: 2-4x less backlash over the life of the device, as validated by leading lab automation customer testing
- Self-lubricating: All nut styles offered are self-lubricating for the life of the nut
- CNC Roll Threading: Allow for standard accuracies of 0.003"/ft. (2-3 times better than the competition). Precision lead accuracy of 0.001"/ft is available upon request
- 300 series stainless steel screw
- Optional PTFE coating lowers friction and increases efficiency
- Machined journals available to suit application requirements

6, 10, 12, and 16 mm diameters with 1–25 mm leads ³/16", ¼", ¾", ⁷/16", ½", diameters with 0.05"–1" leads NEMA 08, 11, 14, 17, and 23 flange sized stepper motors

ML Series Actuators

Key Features

- Compact profile 28 x 32 mm for small-scale automation
- High speed precision, enhanced load capacities, and precise repeatability
- · Linear guide supports available in single or dual rails
- Long travel lengths up to 650 mm





with integrated motor

hand driven knob or shaft

Linear Guide Support Rails

Single or double rails



ML Series							
Size		mm	32 x 28				
Base Weight (without r	notor)	Kg	0.06				
	Fx^4	Ν	267				
MAX Load	Fy	Ν	107				
	Fz	Ν	178				
	Mx	Nm	1.4				
MAX Moments	My	Nm	1.4				
	Mz	Nm	1.42				
MAX Stroke Length		mm	650				
MIN Stroke Length		mm	5				
Add for 100 mm of Stro	ke	Kg	0.15				
MAX Speed		m/s	1				
Moment of Incutio	ly	cm ⁴	2.4				
woment of inertia	lz	cm ⁴	4.4				

Compact Series Actuators

UG Series SIMO[®]

Actuators Lead Screw Driven



- Versatile, Flexible, Affordable
- · All critical edges machined concurrently in one pass
- · Integrated or motor mount drive mechanism
- · Built to either low profile or tall base rail
- · Plain bearing or ball bearing options

Lead Screw Key Features

- 300 series stainless steel 10 mm diameter lead screw with PTFE coating and various lead options
- Utilizes our self-lubricating and maintenance free Constant Force anti-backlash nut or standard fixed nut
- Ideal for a broad range of applications such as kiosks, assembly, automation, medical, and laboratory

UG Series SIMO Lead Screw Driven							
			GST Plain Bearing Low/Tall	CRT V-Guide Low/Tall			
Size		mm	73x24 / 73x40	73x24 / 73x40			
Base Weight excluding motor		Kg	0.41/0.50	0.53/0.62			
MAX Static Load	Fx^4	Ν	111.2	111.2			
	Fy	Ν	3,150	740			
	Fz	Ν	6,000/4,710	880			
MAX Moments	Mx	Nm	100	15			
	Му	Nm	130	25			
	Mz	Nm	120	35			
MAX Stroke Ler	ngth	mm	1,400	1,400			
MIN Stroke Len	gth	mm	125	125			
Add for 100 mm o	of Stroke	Kg	0.24	0.26			
MAX Speed with lubrication		m/s	4.2	5.5			
Moment of	ly	$\rm cm^4$	48.9	102.6			
Inertia	lz	cm ⁴	51.4	104.4			

8 mm ball screw option 6 and 10 mm lead screw option

· Low and tall profile cover option

Key Features

Plain bearing or

profile rail options

- Utilizes our self-lubricating and maintenance free Constant Force[™] anti-backlash nut or standard fixed nut
- Integrated NEMA 17 or NEMA 23 motor or motor mount drive mechanism
- · Manual hand knob or stub shafts available
- Ideal for medical & lab automation, automated delivery systems, robotic dispensing, and electronics manufacturing

Compact Series			GST-Plain Bearing	rofile	ofile Rail		
			Lead Screw	Lead S	Screw	Ball Screw	
Size		mm	23 x 55	23 X 55		23 X 55	
	Fx	Ν	25	25	222	386	
MAX Load	Fy	Ν	200	950		1,425	
	Fz	Ν	200	950		1,425	
MAX Moments	Mx	Nm	9	20.2		30.4	
	My	Nm	9	13.1		29.8	
	Mz	Nm	15.1	13.1		29.8	
MAX Stroke Length		mm	510	1,000		1,000	
MIN Stroke Length		mm	37	70		70	
Add for 100 mm of Stroke		Kg	0.059	6 mm/10 mm 0.12/0.16		0.14	
MAX Speed		m/s	0.83	1.25		0.40	

UG Series SIMO[®] Actuators MTB Series Actuators

Cont.

Belt Driven





Horizontal Motor Mount Tall

Belt Driven Key Features

- · Ideal for higher speed, high duty cycle applications
- Belt material is nylon covered, fiberglass reinforced, neoprene
- Temperature range of 0° C to +80° C (32° F to 176° F)
- Rounded GT[®]2 tooth design creates better engagement with the pulley for greater torque transfer, reduced vibration, and extended life



Key Features

- Long travel lengths
- · High acceleration, speeds, and rigidity
- Fully enclosed aluminum housing
- Strong yet lightweight and corrosion-resistant
- · Low friction, noise and vibration
- · Anodized aluminum housing and carriage
- Steel reinforced belt capable of handling high loads
- Ball guided rail system
- Adjustable belt tension
- Multiple drive configurations



UG Series SIMO Belt Driven								
			Horizontal Motor Mount Tall	Vertical Motor Mount Low				
Rail Style			GST/CRT	GST/CRT				
Base Weight excluding motor		Kg	0.50/0.62	0.41/0.53				
	Fx ⁴	Ν	200					
MAX Static Load	Fy	Ν	3,150/740					
	Fz	Ν	4,710/880	6,000/880				
	Mx	Nm	100/15					
MAX Moments	Му	Nm	130/25					
	Mz	Nm	120/35					
MAX Stroke Le	ngth	mm	1,900					
MIN Stroke Len	gth	mm	5					
Add for 100 mm o	of Stroke	Kg	0.18	0.11				
MAX Speed with lubrication		m/s	4.2	5.5				
Moment of	ly	$\rm cm^4$	48.9	102.6				
Inertia	lz	$\rm cm^4$	51.4	104.4				

MTB Series										
Size		mm	42 x 42	55 x 55	80 x 80	105 x 105				
Base Weight		Kg	1.60	4.80	6.00	12.50				
	Fx ⁴	Ν	460	820	1,650	2,750				
MAX Load	Fy	Ν	1,560	1,850	4,500	7,500				
	Fz	Ν	1,560	1,850	4,500	7,500				
MAX Moments	Мx	Nm	20	25	80	120				
	My	Nm	55	120	450	700				
	Mz	Nm	55	120	450	700				
MAX Stroke Lengt	MAX Stroke Length		2,000	6,000	6,000	6,000				
MIN Stroke Lengt	ı	mm	100	100	100	100				
Add for 100 mm of Stroke		Kg	0.25	0.37	0.90	1.50				
MAX Speed		m/s	3	3	3	3				
Moment of Inertia	lx	cm ⁴	12	36	183	440				
Moment of Inertia	ly	$\rm cm^4$	15	45	226	535				

PLA Series Actuators

MUK Series Actuators

Key Features

- Enclosed aluminum housing with Integral-V[™] hardened steel raceways
- High speed cam roller design is sealed against contamination
- T-slots for easy mounting
- Stainless steel seal strip magnetically sealed
- Many accessories such as sensors, mounting brackets, couplings, motor mounts, etc.

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Ser. 1	N.	1

PLA Series								
Size		mm	55 x 55					
Base Weight (without me	Kg	1.636						
	Fx^4	Ν	1,958					
MAX Load	Fy	Ν	285					
	Fz	Ν	980					
	Mx	Nm	12					
MAX Moments	My	Nm	52					
	Mz	Nm	52					
MAX Stroke Length		mm	2,710					
MIN Stroke Length		mm	50					
Add for 100 mm of Strok	e	Kg	0.379					
MAX Speed length depend	m/s	0.8						
Moment of Inertia	lx	cm ⁴	29					
woment of inertia	ly	cm ⁴	32					

Key Features

- Incorporates two 20 mm recirculating ball profile rail guide ways
- Load capabilities up to 11,200 N
- Single or dual carriage options available
- Class 7 (52 $\mu m/300~mm$) travel accuracy ball screw is standard, consult factory for other options
- Compact aluminum profile incorporates t-slots for easy sensor mounting

MUK Series								
			Single Car	riage	Dual Carriage			
Size		mm	145 x 65		145 x 65			
Base Weight		Kg	2.2		2.8			
Lead		mm	5 1		0	20		
	Fx	Ν	3,597	2,9	96	1,798		
MAX Load	Fy	Ν	8,500		11,200			
	Fz	Ν	8,500		11,200			
	Mx	Nm	550		950			
MAX Moments	Му	Nm	330		1,150			
	Mz	Nm	330		1,150			
MAX Stroke Length		mm	1,750*		1,750*			
MIN Stroke Length		mm	125		125			
Add for 100 mm of Stro	Kg	1.01		1.01				
MAX Speed length dependent		m/s	1		79			
Moment of Inortic	lx	cm ⁴	90		90			
woment of mertia	ly	cm4	687			687		

* Contact factory for lengths between 750–1750 mm.

Consultations available for lengths longer than 1750 mm.

Note: The moments and loads above are maximum values. For further information, contact PBC Linear. Class 7 (52 μm/300 mm) travel accuracy ball screw is standard.

Linear Slides

Simplicity Linear Slides

Key Features

- Handles heavy loads in harsh, contaminated environments
- Low profile systems for applications with height constraints
- Rail shaft diameters from 12.7 mm (0.5 in) to 50.8 mm (2.0 in)
- Rail lengths to 2,440 mm (96 in)
- Carriage speeds up to 0.457 m/s (18 in/s)
- Normal carriage loads up to 83,000 N (18,750 lbf)
- Available with plain or ball bearings
- Ideal for harsh environments such as, machine tools, fiberglass manufacturing & processing plants, stone cutters & other quarry applications, auto manufacturing facilities, welding & assembly lines, foundries



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Top 10 Benefits of Internet of Things Enabled Mechatronics







Integrating Internet Connected Smart Robot Modules

The top 10 advantages machine builders and users gain when combining enhanced mechanical components with advances in smart motor technology and control strategies include:

1. Lower Cost & Enhanced Functionality

Less wiring and connectors, fewer components and sensors, less labor invested, reduced time spent in setup and maintenance, and maximized operational uptime all add up to a cost savings.

2. Less Space

The driver, controller, and amplifier are built into the smart motor, eliminating extra panel space.

3. Simplified Wiring

Fewer sensors and I/O connections result in fewer input/output connections and less complicated wiring schemes.

4. Reduced Troubleshooting

Fewer components, less wire connections, and increased performance greatly reduce the occurrence of errors.

5. Streamlined Commissioning

Preprogrammed homing routines and distributed control reduces installation times and allows report progress via internet connectivity. It also allows an operator to make in-process adjustments at an individual axis without affecting the PLC or entire production line.

6. Modular Integration

Standardized smart robot modules make integration into multiple axes or multiple machines a natural and easy process.

7. Automated Adjustment

Automated adjustments increase manufacturing flexibility and speed. In addition, adaptive control is possible with conditions monitored and adjustments made locally, in real time, and right at the actuator level, without having to route instructions through the PLC.



VS.

8. Maximized Uptime

Real time monitoring of temperatures, friction, motor torque, and other performance related data can be routed to a mobile device allowing the human decision maker to proactively handle issues related to maximizing machine uptime.

> BREAKERS & SWITCHES

9. Preventative Maintenance

Established time frames for periodic maintenance based on cycles, number of pieces run, or other dynamic conditions can be monitored and reported to any IoT connected device, such as a work station, tablet, or mobile phone, allowing teams to proactively keep equipment running at peak efficiency.

10. Increased Output

IoT connected motion systems drive greater flexibility, less downtime, increased performance, and greater bottom line output for manufacturers, assembly lines, packaging equipment, and production equipment.

The integration of IoT processes and equipment is shortening the design phase with cross discipline communication, design development, and project management tools. Procurement and build cycles are shortened due to the need for fewer components along with the use of acting configuration and projection of the meed for fewer components along with the use of acting configuration and projection.

shortened due to the need for fewer components along with the use of online configuration and purchasing tools. With IoT connected programming and real time analytics, ease of use, maintenance, and overall life are increased for the user. All of these things combine adding to the bottom line, creating more opportunity and increasing financial returns.

PBC Linear Who We Are...

An extension of your team, from concept through pilot.

PBC Linear maintains a commitment to bring improved linear motion solutions to market. Since 1983, its goal has been to provide in-

> novative solutions through the development and manufacturing of linear motion components, mechanical sub-assemblies, and customized systems to meet customers' application and product needs and specifications.

Our diverse staff of engineers combines in-depth industry knowledge and decades of experience with a collaborative

> approach to meet the linear motion requirements of each application. With game-changing linear motion solutions, PBC Linear has a competitive advantage by streamlining assembly, improving application performance, and implementing innovative ideas that put customers on the path of success.



Quick turn

Collaborative

Engineering

Core Competencies

- Full line of ground-breaking linear motion products that simplify application and reduce costs.
- 24/7 in-house manufacturing that guarantees quality control and quick, on-time delivery.
- A significant Patent Estate that includes:
 - Pillow block housing for a shaft-supporting bearing.
 - Linear rail system with preload adjustment.
 - Linear rail system with preload adjustment apparatus.
 - Magnetic thrust motor.
- 10 patents pending that include:
 - Integral-V[™] linear guides.
 - MS ball-type manual and motor driven system.

Manufacturing Agility

Headquartered in a 200,000 square-foot facility in Roscoe, Illinois, USA, PBC Linear production is maximized to produced unmatched quality



and designed specifically for the most complex and meticulous applications resulting in ready to install solutions.

This allows PBC Linear to provide quiet, smooth, and reliable linear motion in a wide array of applications, ranging from very small pickand-place assemblies and scanners used in lab automation, to heavy-duty lift systems used in industrial manufacturing.

New technologies such as kiosks and unattended retail systems, as well as printers, scanners, and etchers utilize components or complete systems from PBC Linear.

by CEO Robert Schroeder 1985 Mr. Bob Schroeder invents the first self-lubricating plain bearing 1986 Simplicity product line expands to include - 96 pillow blocks, linear slides and shafting 1997 PBC Headquarters relocated to 150,000 ft² facility in Roscoe, Illinois Redi-Rail and Hevi-Rail products are launched 2000 Uni-Guide two piece modular guides is introduced to the market 2003 Mini-Rail® miniature linear guides released to market 2006 V-Rail introduced 2007 MTB Actuators & Commercial Rail introduced 2008 PBC Lineartechnik GmbH established to meet the needs of the European market Patent Pending Integral-V[™] technology is introduced at the renowned Hannover Messe tradeshow in Germany Pacific Bearing Co. d.b.a. PBC Linear to better represent their actuator offerings in the linear motion market 2009 ML - Miniature Linear Actuator Series offers new opportunities for lab automation, biotech and compact applications 2010 Low Profile Uni-Guide (UGA) is introduced, offering the same Uni-guide advantages, but in a compact 24 mm height profile 2011 Major manufacturing expansion of an additional FMS machine and a total of 130 pallets PBC achieves AS9100C certification utilized by the aerospace and defense industries as well as ISO9001 certification 2012 PBC Linear introduces SIMO® Series Linear Motion Platform & Constant Force[™] Tech 2013 PBC acquires LEE Controls LLC & introduces CS Compact Series actuators 2014 3D Platform is founded to provide large format 3D printers to the manufacturing market 2015 PBC + Moons' joint venture founded 2017 PBC Linear introduces Lead Screw Assemblies 2019 PBC expands 66,000 ft² with new building at their main location & PBC LinearTechnik GmbH renamed to PBC Lienar Europe GmbH

1983 Pacific Bearing Company is founded



A Pacific Bearing Company Engineering Your Linear Motion Solutions



Global Footprint



Range of Offerings







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