



Dynetics

DYNAMIC IN MECHATRONICS

LINEAR MOVEMENTS

Linear Motors, Precision
Lead Screws & Miniature Ball Screws





Linear stages



Linear servomotors

Introduction:

Dynerics – dynamic in mechatronics

Dynerics specialises in high-quality, high-precision mechatronic components and helps customers economise their designs by offering solutions with an optimum price-performance ratio. Most of its products can be customised to the client's specific needs.

Dynerics, founded in 1994 and with offices in Germany and the Netherlands, assists engineers in selecting the most suitable motor for their mechatronic assignment.

Dynerics represents leading manufacturers such as Nidec (Copal, Servo Etc.), KSS, Nippon Pulse Motor (NPM) and Elmo, and offers a wide range of small rotating motors (up to 200 W) and high precision linear motors (up to 100,000 N) with various technologies (piezo, brush, brushless, coreless), together with peripherals like ultra-high-precision lead screws, miniature ball screws, gearboxes, electronics and so on.

Many of the motors supplied by Dynerics can be customised. Examples of such include a double shaft or modified shafts, encoders and different windings. All fans and motors can be fitted with connectors as per customer request.

Many of our fans and blowers can also be customized, e.g. with wire, plug, pulse generator, PWM connection for speed control, IP class protection, etc.

Portfolio

The products in the Dynerics portfolio can be roughly divided into five groups:

1. Rotating solutions in different technologies:
 - stepping motors (PM or hybrid);
 - brush and brushless AC, and PMDC-motors (with or without gear head);
 - coreless motors;
 - piezo motors;
 - options like gearheads and encoders.
2. Linear solutions in different technologies:
 - linear servo motors (actuators, cylinders and stages);
 - precision lead screws and miniature ball screws.
3. Motion controllers (ASIC, PCB and box level).
4. Fans and blowers.
5. Customised solutions.

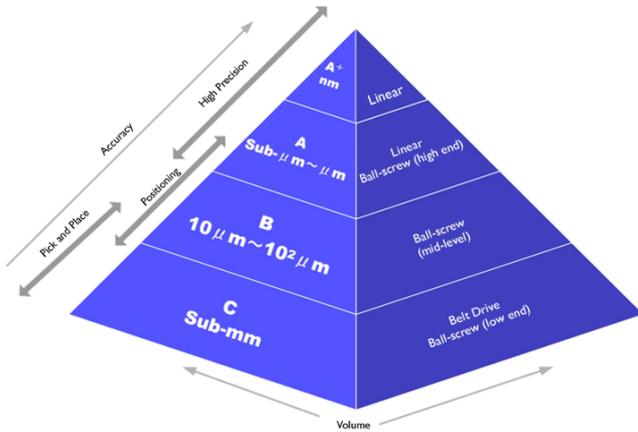
Logistics and service

Dynerics offers a comprehensive logistic system with a central warehouse in Best, the Netherlands, for optimal supply chain management. While the main focus is on the European market, Dynerics has customers around the world. As it understands that local presence is sometimes required, Dynerics also works with an extensive reseller network that is able to provide customers with the best possible service, as reflected in its motto: **“Dynerics is a reliable partner with a long-term commitment focus”**.

LINEAR MOVEMENTS

Thank you for your interest in our products.

The market for linear applications can be roughly divided in the following pyramid



In this magazine we give you an overview of our possibilities in these segments.

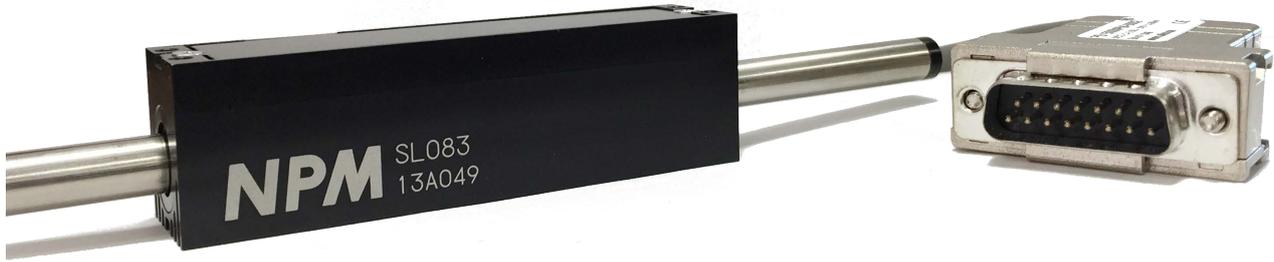
The products in this magazine are overall standard versions of Linear motors and actuators, but because every application has its own specific requirements we can help you select a product, ideal for your application and specified to the demands of your application.

We like to assist you in selecting the right linear solution for your application.

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 - B. "Standard" Linear Servomotor models
 - C. Scaleless linear motor with built-in encoder
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 - E. Selection of the servo amplifier (Nippon Pulse)
4. Linear PM Stepper Motors
5. Linear hybrid steppermotors
6. Piezoelectric Linear Motors
7. Precision Lead Screws & Miniature Ball Screws
 - A. Ball Screw
 - B. Customized products
 - C. Ball Screw Support Units
 - D. Linear Actuator External (Ball Screw type)
 - E. Linear Actuator Captive type and Non-Captive type (Miniature Electric cylinder)
 - F. Flex Actuator
 - G. MoBo Actuator (MA Series)
 - H. Multi-purpose products (Miniature Ball Screw with Ball Spline : BSSP)
 - I. Multi-Functional VZ θ Actuator
 - J. Precision Lead Screw
 - K. Original Grease for Miniature Ball Screws

Please contact us for more information.

The Nippon Pulse Linear Servo Motor - The Next Generation Actuator



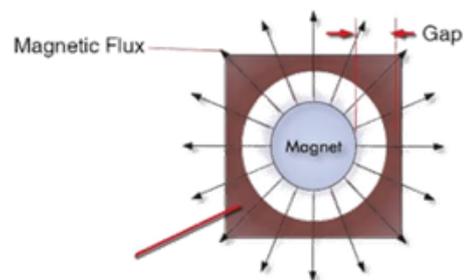
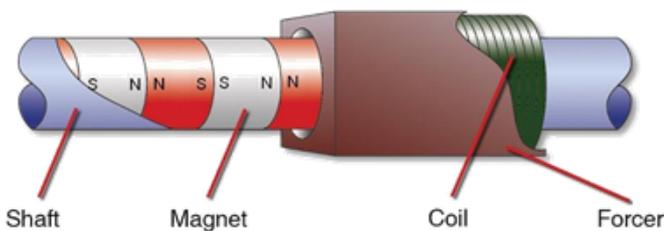
Nippon Pulse:

The Nippon Pulse family of linear Servo motors represent the next generation of linear brushless motors. Where reliability, maintenance and cogging freedom and precision are paramount, Nippon Pulse linear servo motors are the ideal choice. They offer users uncompromising performance, easy operation, compact dimensions and a high added value

What is a linear servo motor?

The Linear Servo Motor is a high-precision direct-drive linear servo motor consisting of a servo with rare earth iron boron neodymium permanent magnets and a cylindrical coil winding driver offered with optional Hall effect devices. The wave provides the magnetic fields to which the driver acts. The driver assembly in combination with the amplifier and the control electronics generates the power for the motor. The Hall effect devices can be supplied if required for proper commutation of a brushless linear motor of the servo drive you select and will be integrated into the driver board. The linear servo motor is based on three basic design concepts:

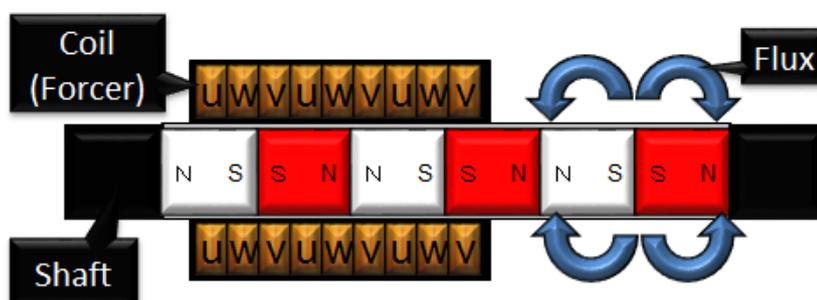
- simplicity
- High precision
- contactless



Linear servo motors are simple.

They consist of only two parts, a magnetic shaft and a driver of cylindrical coil windings.

Linear servo motors ensure high precision. There is no iron in either the shaft or the driver, which provides high precision and no cogging, as one would expect in a coreless design. The coils of the linear servo motor itself form the core, giving the motor the rigidity expected in an iron core Motor. Linear shaft motors are contactless. As the coil completely wraps around the magnets, the magnetic flux density is effectively utilized. This allows a large (0.5 to 5 mm) annular nominal air gap. This air gap is not critical, in the sense that there are no force changes, since the gap varies over the stroke of the device.

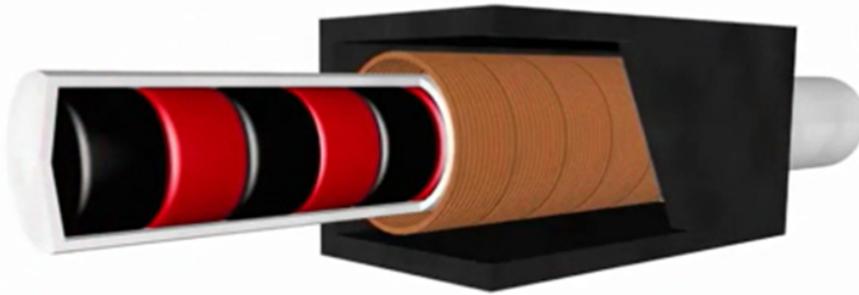


Characteristics of the linear servo motor

- Develops high thrust (up to 100,000 N).
- Quiet smooth running, the only mechanical contact section is the LM Guide (Fully contactless operation is possible with an air bearing slider).
- The unit's simple design allows a stroke of up to 4.6 meters.
- High precision (0.07 nm1)
- High speed drive (greater than 10 m / s) with acceleration up to 20 G
- Low-speed drive (8 μm / s)
- Allows parallel drive with only one encoder and one drive2
- Almost no speed fluctuations ($\pm 0.006\%$ at 100 mm / s)
- Durable construction, operation even under water or in vacuum

Uncritical air gap

The advantage of linear servo motors over other non-contact linear motors is that the air gap is not critical in linear servo motors with a magnetic core. The coil completely surrounds the magnet so that the force equals the net effect of the magnetic field. Any force variation caused by air gap differences due to alignment or processing differences is eliminated. This ensures easy alignment and installation of the motors. Only the sinusoidal error can lead to force differences in any contactless linear motor.



Coreless design with ultra-high rigidity

Flat linear motors have a very high rigidity due to their iron core. This iron core creates eddy currents that generate large amounts of heat while moderately dissipating heat. The iron core also provides high pick-up forces between the stator and fitting, resulting in cogging in linear motion. On the other hand, U-shaped linear motors use an epoxy core that does not generate eddy currents or take-up forces. This type of motor has a stiffness of at best 1/125 and corresponds to that of a similar iron core Motor. Pinching the coil between the magnetic track and the low thermal conductivity of the epoxy create one

thermally very limited Motor. The linear servo motor is designed to have a motor stiffness 100 times that of a U-shaped motor with four times more heat dissipation than similarly sized flat linear motors.

Advantages of the linear servo motor

- Compact & Lightweight: Less weight compared to traditional linear motor types.
- Cogging freedom: The coreless version prevents magnetic cogging.
- Large Air Gap: The non-critical 0.5 to 5 mm annular nominal air gap provides easy installation and easy alignment.
- High efficiency: one of the highest efficiency values of all linear motors.
- Enclosed Magnets: Easy installation in many environments.

Linear servo motors generate a direct thrust force for the positioning of the payload. Makes a conversion from rotating to linear redundant.

Example: Ball screws, racks and toothed belts.

No lubrication / maintenance required

The linear servo motor does not require greasing as in a ball screw and does not show a performance degradation due to wear / aging as in a ball screw and belt systems. Its maintenance-free long life contributes to a lifetime cost reduction. The clearance between the servo and the driver eliminates the need for adjustments such as guide positioning or concentric adjustments, such as ball screws.

Noiseless / dust-free operation

Dust and noise, which are necessary in ball screws and pneumatic systems, do not occur in the contactless linear servo motor. Not only does this benefit cleanroom applications, it also helps to improve the working environment by eliminating noise and dust.

Advantages of the linear servo motor

- Simple mechanical arrangement, minimum number of moving parts
- Direct shear drive, backlash-free, wear-free
- Wide speed range: 8 $\mu\text{m} / \text{s}$ to $> 10 \text{ m} / \text{s}$
- Uniform: Almost no speed fluctuations
- Quiet: almost silent operation
- Maintenance-free motor: no moving internal parts
- Lower inertia: less mass to move
- Low power requirement: Direct drive systems are more effective than coupled systems

SMART -Tool

The screenshot displays the NPM Linear Shaft Motor Application Worksheet. Key components include:

- Parameter Input (Left):** Fields for Load (4.8 kg), Inertia angle (53 degrees), Friction coefficient (0.01), Thrust Force (600 Newton), Bearing Pre-load Force (0 Newton), Ambient Temp (25 °C), Max. allowable coil temp (110 °C), Allowable Temperature Rise (5 °C), and Bus Voltage (5 V).
- Motor Selection (Left):** Drive Type (Single Drive), Motor Model (S640D - 50), and Results (Total Stroke 50 mm, Peak Force 186.2 N, Peak Force 136.1 N, Reg Voltage 124.1 V, Coil Temp. 111.11 °C).
- More Profiles (Center):** Configuration for Segment #1 to #6, including S-Curve/3erk Limitator (50 %), Add Thrust Force options, and various motion parameters like Velocity, Acceleration, and Deceleration.
- Motion Profile Graphs (Center):** Velocity and Force Profiles (Time 0-45s, Velocity -8.00 to 8.00 mm/sec, Force -140 to 140 Newton) and Cam Profile (Time 0-45s, Displacement 0-50 mm).
- Motor Selection Tree (Center-Right):** A vertical list of motor models such as L3500, L3500 2C, S2500, S2500 2C, L3200, L3200 2C, S3500, S3500 2C, L4270, L4270 2C, S4350, S4350 2C, S4350 AC, S2500, S3500, S3500 2C, S4270 1S, S4270 1S, L4277, L4277 1S, S435T 1S, S435T 1S, S3500, S3500 2C, S3500 4S, S4270 2S, S4270 2S, L4270, L4270 2S, S4350 2S, S4350 2S, S4350, S4350 2S, S660D 1S, S660D 1S, S660D, S660D, S660T 3S, S5000, S5000 2S, S5000 2S.
- Calculators (Right):** Motion Profile (Triangle #1, L1, Supply Any 2), Trapezoidal #1, #2, #3, Variable Trapezoidal, and Unit Converter (Mass: 1 lb = 0.45 kg = 0.45 in = 11.43 mm; Force: 1 lbf = 35.6 N; Time: 1 min = 60 sec; Linear Speed: 127 mm/min = 217 mm/s; Linear Acceleration: 1 g = 9.80665 m/sec²).
- Change Log (Bottom Right):** A list of updates from V2.0 to V2.5, including support for stages, custom NPA motors, and various bug fixes.

When selecting the correct linear servo motor, the selection wizard supports you in the Technical Notes section and the "SMART" tool. The linear servo motor should be mounted as close as possible to the center of gravity of the moving load and at the working point of the machine. If the motor and feedback are too far apart, then the machine assembly and linear guides (bearings) must have sufficient mechanical rigidity to minimize the dynamic distractions of the assembly. Make sure that there is sufficient space for ventilation and access for cleaning, repair, maintenance and inspection purposes. The ventilation is extremely important. Make sure that the ventilation area is not obstructed. Obstacles affect the free passage of air. Engines become warm and heat must be dissipated to prevent damage.

"Standard" Linear Servomotor models

Part No.	Continuous Force	Acceleration Force	Acceleration Current	Stroke Length Range
L160D	8.8 N	35 N	2.2 A	100 ~ 1800 mm
L250DS	29 N	118 N	4.3 A	100 ~ 1620 mm
L250QS	55 N	220 N	3.9 A	100 ~ 1560 mm
L250SS	17 N	69 N	5.1 A	100 ~ 1650 mm
L250SSS	7.1 N	28 N	7.6 A	100 ~ 2685 mm
L250TS	44 N	176 N	4.2 A	100 ~ 1590 mm
L320DS	33 N	132 N	6.0 A	100 ~ 2320 mm
L320QS	59 N	235 N	5.2 A	100 ~ 2260 mm
L320SS	19 N	75 N	6.9 A	100 ~ 2350 mm
L320TS	48 N	193 N	5.9 A	100 ~ 2290 mm
L350DS	43 N	170 N	7.3 A	100 ~ 2120 mm
L350QS	74 N	298 N	6.4 A	100 ~ 2060 mm
L350SS	24 N	95 N	7.8 A	100 ~ 2150 mm
L350TS	55 N	222 N	6.4 A	100 ~ 2090 mm
L427D	110 N	450 N	14 A	100 ~ 4600 mm
L427Q	170 N	680 N	14 A	100 ~ 4600 mm
L427T	210 N	830 N	13 A	100 ~ 4600 mm
S605D	420 N	1700 N	35 A	100 ~ 3000 mm
SL083	2.9 N	11.5 N	3.6 A	mm
S040D	0.29 N	1.2 N	1.1 A	20 ~ 40 mm
L160T	18 N	70 N	2.2 A	100 ~ 1800 mm
S040T	0.45 N	1.8 N	1.1 A	20 ~ 40 mm
L160Q	13 N	53 N	2.2 A	100 ~ 1800 mm
S040Q	0.58 N	2.3 N	1.1 A	20 ~ 40 mm
S080D	1.8 N	7.2 N	3.4 A	25 ~ 300 mm
S080T	2.7 N	10.7 N	3.4 A	25 ~ 300 mm
S080Q	3.5 N	14 N	3.4 A	25 ~ 300 mm
S120D	4.5 N	18 N	1.6 A	50 ~ 1500 mm
S120T	6.6 N	27 N	1.6 A	50 ~ 1500 mm
S120Q	8.9 N	36 N	1.6 A	50 ~ 1450 mm
S160D	10 N	40 N	2.5 A	100 ~ 1800 mm
S160T	15 N	60 N	2.5 A	100 ~ 1800 mm
S160Q	20 N	81 N	2.5 A	100 ~ 1800 mm
S200D	18 N	72 N	2.4 A	100 ~ 2450 mm
S200T	28 N	112 N	2.4 A	100 ~ 2400 mm
S200Q	38 N	152 N	2.4 A	100 ~ 2350 mm
S250D	40 N	160 N	5.1 A	100 ~ 2550 mm
S250T	60 N	240 N	5.1 A	100 ~ 2550 mm
S250Q	75 N	300 N	5.1 A	100 ~ 2550 mm
S250X	140 N	560 N	9.6 A	100 ~ 1700 mm
L250D	34 N	138 N	5.2 A	100 ~ 3650 mm
L250T	52 N	207 N	5.2 A	100 ~ 3550 mm
L250Q	69 N	276 N	5.2 A	100 ~ 3550 mm
S320D	56 N	226 N	5.0 A	100 ~ 2300 mm
S320T	85 N	338 N	5.0 A	100 ~ 2250 mm
S320Q	113 N	451 N	5.0 A	100 ~ 2150 mm
L320D	55 N	218 N	5.0 A	100 ~ 3600 mm
L320T	82 N	327 N	5.0 A	100 ~ 3500 mm
L320Q	109 N	436 N	5.0 A	100 ~ 3500 mm
S350D	104 N	416 N	6.0 A	100 ~ 2100 mm
S350T	148 N	592 N	6.0 A	100 ~ 2050 mm
S350Q	190 N	760 N	10.8 A	100 ~ 2000 mm
S427D	100 N	400 N	12.0 A	100 ~ 3150 mm
S427T	150 N	600 N	12.0 A	100 ~ 3050 mm
S427Q	200 N	800 N	12.0 A	100 ~ 3000 mm
S435D	116 N	464 N	12.0 A	100 ~ 2150 mm
S435T	175 N	700 N	12.0 A	100 ~ 2050 mm
S435Q	233 N	932 N	12.0 A	100 ~ 2000 mm
S500D	289 N	1156 N	15.2 A	100 ~ 3350 mm
S500T	440 N	1760 N	23.2 A	100 ~ 3250 mm
S500Q	585 N	2340 N	30.8 A	100 ~ 3200 mm
S605T	610 N	2400 N	34 A	100 ~ 3000 mm
S605Q	780 N	3100 N	34 A	100 ~ 3000 mm

Scaleless linear motor with built-in encoder

The linear servo motor is a high-precision direct-drive linear servomotor consisting of a shaft with rare-earth-iron-boron neodymium permanent magnets and a cylindrical coil winding driver.

The Scaleless SL motor is a tubular linear motor with a built-in linear encoder.

The simple design consists of only two parts: the shaft (magnets) and the forcer (coils). In addition to the coils, the Forcer includes a built-in linear encoder in one unit. The Scaleless SL motor makes it possible to easily integrate the linear movement into a multitude of applications in different markets. Nippon Pulse Motor supplies two linear servo motors with integrated encoder:

- SL083
- SL060

Medical equipment, laboratory equipment, instrumentation, factory automation and robotics are just a few examples of the many possibilities.

The highlights

- Linear motor with integrated encoder
- Forcer with integrated read head
- Scala integrated into the shaft
- Built-in interpolator
- Resolution of 5 microns

Real digital magnetic encoder, built-in

- actual HALL effects
- guaranteed resolution of 5 microns
- balanced A and B quadrature line driver outputs

Built around linear shaft drive technology

- highly efficient
- excellent force-volume ratio
- compact and robust construction
- no lubrication required
- easy installation and configuration



For high precision and control, the very compact servo drive manufacturer ELMO and Panasonic are very suitable.

ELMO has succeeded in integrating its extremely small, lightweight and powerful servo drives into its complete motion control solution. This allows precise control of the forces and positioning of the linear servomotors. Some features fast responsiveness, high linearity, precise force control of the very compact and lightweight 4-axis servo drive unit. The ELMO controller is insensitive to extreme environmental conditions including vibrations and shock loads within the machine.

Electrical Specs	S080T	L250TS
Continuous Force	2.7N	51N
Continuous Current	0.8Arms	1.3Arms
Acceleration Force	10.8N	206N
Acceleration Current	3.4Arms	5.1Arms
Force Constant (K)	3.2N/Arms	40N/Arms
Back EMF (K)	1.1V/m/s	13.5V/m/s
Resistance 25°C,3	6.8Ω	19.5Ω
Inductance3	1.0mH	34.1mH
Electric Time Constant	0.147ms	1.75ms
Rated Voltage (AC)	240V	240V
Fundamental Motor Constant	1.23N√W	9.05N√W
Magnetic Pitch (North-North)	30mm	60mm

Forcer Specs	L250TS	S080T
Forcer Length (A)	110mm	55mm
Forcer Width	56mm	20mm
Forcer Screw Pitch (P)	100mm	49mm
Forcer Weight	1.1kg	0.06kg
Gap	2mm	0.50mm

Spec	Value
Power Supply	5VDC, ±5%
Output	LD
Output Signals	A; /A; B; /B; I; /I
Working Temp.	-10°C~+70°C
Storage Temp.	-30°C~+80°C
Humidity	100%, condensation allowed
Pole Length	15mm
Cable Length	Increments of 0.1m, max. 10m
Resolution (mm)	0.003, 0.00375, 0.006, 0.0075, 0.01, 0.015
Pulse Interval (us)	0.2, 0.5, 2.5, 4.0, 8.0, 16.0, 32.0, 66.0

		SLP series			SCR series	
	Units	SLP15	SLP25	SLP35	SCR075	SCR100
Resolution	µm	1 (Hidenhain LIDA279)	1 (Hidenhain LIDA279)	1 (Hidenhain LIDA279)	1, 0.5, 0.1, 0.05, 0.01 (Renishaw Tonic)	1, 0.5, 0.1, 0.05, 0.01 (Renishaw Tonic)
Stroke/Single Slider	mm	100 to 1300 (100 interval)	200 to 1200 (100 interval)	200 to 1200 (100 interval)	50, 100, 150	50 to 300 (50 interval)
Strike/ Double Slider	mm	100 to 1200 (100 interval)	200 to 1000 (100 interval)	300 to 900 (100 interval)	-	-
Continuous Force	N	17	80	185	3.5	3.5
Continuous Current	A rms	0.51	1.2	2.7	0.84	0.84
Peak Force	N	90	340	970	14	14
Peak Current	A rms	2.7	5.1	14.4	3.4	3.4
Max. Velocity	m/sec	3.0	3.0	3.0	1.1 to 1.5 (depends)	0.9 to 1.3 (depends)
Resistance	Ω	56	22	22	9.0	9.0
Inductance	mH	24	31	12	1.3	1.3
Magnet Pitch N-N	mm	60	90	120	30	30
Load Capacity	kg	3	15	30	45.5	45.5
Panasonic A5L	200 V	MADHT1505LXX	MADHT1507KXX	MCDHT3520LXX	MADHT1505LXX	MADHT1505LXX
	100 V	MADHT1105L	MADHT1107LXX	MCADHT3120LXX	MADHT1105LXX	MADHT1105LXX

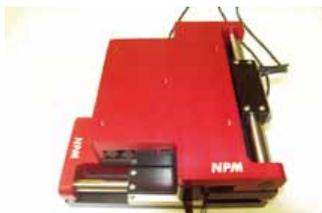
The SCR and SLP series

The SCR series is a complete single axis series with one slide, one encoder and one linear servo motor. It offers a wide range of benefits for applications requiring the highest precision and highest accuracy. The linear servo motor provides higher resolution, speed and continuous force than the standard stepper motor or piezo servomotor. The linear servo motor and the contactless optical

Linear encoders are independent in the series and allow a flat and compact solution. Each model of the SCR series requires a servo drive for operation. Two SCR models are bolted together to form a rigid, compact X-Y assembly without the need for adapter plates. Two SCR models can be supplied as an XY assembly to ensure proper orthogonal alignment between the two axes.



The SLP (Acculine) series, based on the coreless linear servo motor, gives an equal or greater force than conventional flat linear stages with a core. The SLP series has compact dimensions, allowing greater space savings than any other conventional product. Characterized by features such as high responsiveness, low ripple due to coreless construction, and outstanding positioning as a result of constant feedback directly from the table position, the SLP range provides simple input and output drives as well as complex movements with constant precision. There is no adhesion between coil and shaft. A non-critical air gap has no force deviations due to gap deviations. In addition, it is easy to change from a conventional ball screw system. The configuration of the shaft is simple and the assembly is done in one go. A simple, lightweight and compact linear servo motor consisting of only one magnet and one coil produces a large driving force with an efficient and short coil length. In addition, it is characterized by friction and quietness, dust and maintenance freedom.



Selection of the servo amplifier / drive according to the performance requirements of the linear servo motor

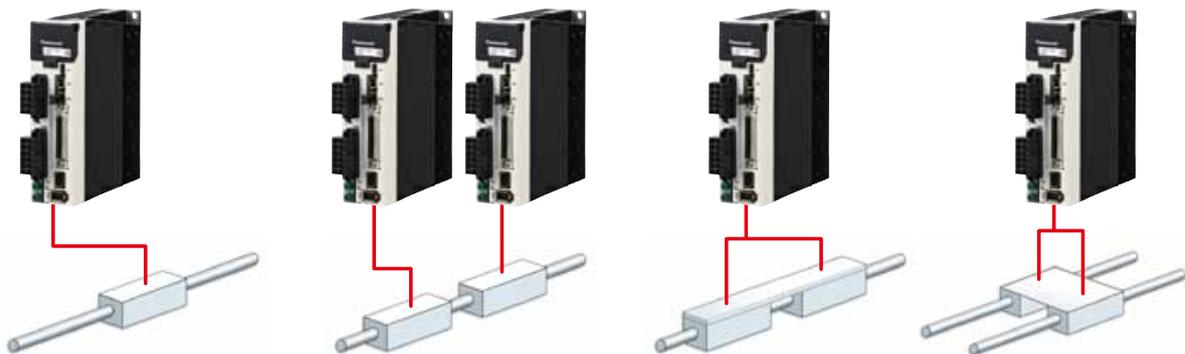
Select a servo drive according to the performance requirements of your selected linear servo motor. To assist in selecting the right servo drive, use the sizing guide Amplifier / drive in section Technical Information. (Note: This information is also calculated in the SMART tool). All three-phase brushless DC servomotordrivers can be used to drive the linear servo motor. When selecting a servo drive, check the magnetic position detection method.

Since Hall effect sensors are not included in the standard scope of delivery of the linear servo motor, they must be added as an option according to the requirements of the servo drive you select. If the servo drive you selected does not require Hall effect sensors, you can use the linear servo motor in its default configuration.

Most servo drives give voltage and current ratings in peak DC units, while most servomotors (such as the linear servo motor) specify them in RMS AC units. Please pay attention to the units when selecting the servo drive. See Technical Notes for formulas for converting peak values to RMS values.

Dynetics represents drivers from various manufacturers.

Please do not hesitate to Contact Dynetics for advise.



Linear servo motor in parallel systems

Flat linear motors have a very high rigidity due to their iron core. This iron core creates eddy currents that generate large amounts of heat while moderately dissipating heat. The iron core also provides high pick-up forces between the stator and fitting, resulting in cogging in linear motion. On the other hand, U-shaped linear motors use an epoxy core that does not generate eddy currents or take-up forces. This type of motor has a stiffness of at best 1/125 and corresponds to that of a similar iron core Motor. Pinching the coil between the magnetic track and the low thermal conductivity of the epoxy create one

thermally very limited Motor. The linear servo motor is designed to have a motor stiffness 100 times that of a U-shaped motor with four times more heat dissipation than similarly sized flat linear motors.

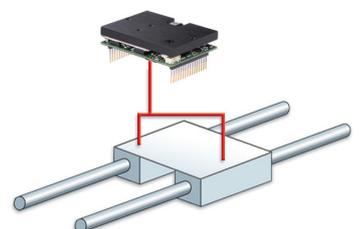
Parallel execution of the linear servo motor

Advantages of a linear servo motor in a parallel arrangement

In the past, systems had two different motors that powered separate ballscrews using two different electronically interconnected controllers. Now the same system can be achieved with two servo motors, an encoder and an amplifier, as long as the rigidity of the system itself is sufficient (see figures below). This is also an advantage in applications where extremely high force is required. It is also possible to connect any number of linear servo motors and thus combine their power.

Multiple motors, one encoder, one amplifier, unlimited number of interconnected linear servo motors, examples of parallel systems, other components

Each component must have the lowest possible mass and the highest possible mechanical rigidity in order to reduce set-up times. Hollow and ribbed components as well as honeycomb structures and special materials are often used to achieve this. Reaching the highest possible stiffness with the lowest possible mass requires that the linear motor as integral part of a movement system and not considered as an attachment.



Linear PM Stepper Motors

Stepper motors are often used for positioning tasks. The driver electronics is cost-effective and every control pulse generates a step with a defined rotation angle

Nippon Pulse LINEARSTEP® Motors

As a simple motion system, the PFL series Linear Tin-Can stepper motors (LINEARSTEP®) are available at a fraction of the cost of a conventional rotary stepper motor. The variants of the LINEARSTEP® series include two motor sizes (25 mm or 35 mm diameter) and three thread pitches (0.48 mm, 0.96 mm and 1.2 mm). The models of the LINEARSTEP® series are available with bipolar or unipolar winding.

24 Schritte/Umdrehung

Einheit: mm/s

Gewindesteigung (mm)	Pulsrate (PPS)						
	100	200	300	400	500	600	700
0,48	2	4	6	8	10	12	14
0,96	4	8	12	16	20	24	28
1,20	5,0	10	15	20	25	30	35

48 Schritte/Umdrehung

Einheit: mm/s

Gewindesteigung (mm)	Pulsrate (PPS)						
	100	200	300	400	500	600	700
0,48	1	2	3	4	5	6	7
0,96	2	4	6	8	10	12	14
1,20	2,5	5,0	7,5	10	12,5	15	17,5



PFCL25 Captive-Design

		PFCL25-48 w/ Captive			
		Unipolar		Bipolar	
Type Of Winding					
Steps Per Revolution		48			
Thread Pitch	mm	0.48			
Travel/Step	mm	0.01			
Effective Stroke	mm	19			
Rated Voltage	V	12	5	12	5
Rated Current	A/Ø	0.10	0.31	0.10	0.33
Resistance Tolerance	ohm/Ø	120 ±7%	16 ±7%	122 ±7%	15 ±7%
Inductance	mH/Ø	33	4.5	71	8.5
Operating Temp. Range	°C	-10 to +50			
Temperature Rise	°K	70			
Weight	g	60			

Captive actuators:

NPM also supplies a series of linear actuators with integrated twist-lock ("captive"). The captive linear actuators have a built-in guide for linear movements. The movable shaft does not rotate and the result is a pure linear motion. The simple design saves costs and reduces the error rate.

Advantages:

- Cost
- High linear ratio of power to size
- Long life span
- Simple digital control
- Fast, powerful and accurate positioning



PFCL25 Captive:

The linear PM stepper motor in Ø25 mm housing is a captive linear actuator with built-in guide for linear movements. The shaft does not rotate and has an effective stroke of 19mm, thread pitch of 0.48mm

Linear Stepper Motors

The PFCL series of linear actuators based on PM stepper motors, Thanks to the integrated spindle, they can directly move linearly perform without the need for additional mechanical components. NPM offers 2 models in sizes 25mm (PFCL25) and 35mm (PFL35T) a stroke of 30mm (custom versions are possible). The Feed motion has a resolution of 0.001 mm to 0.05 mm per Step and deliver up to 5Kg feed force.

The "LINEARSTEP" motors have a ball bearing on the shaft and a welded housing, which guarantees a long service life.

The linear actuators are ideal for applications such as 3-way valves in heating and air conditioning systems or controlling physical processes in medical analyzers.



Family Model Number	Motor Diameter	step Angle	Thread pitch	Effective Stroke
	mm	deg/step	mm	mm
PFCL25-24	25	15	0,48; 0,96; 1,2	30 or 60
PFCL25-48	25	7,5	0,48; 0,96; 1,2	30 or 60
PFL35T-48	35	7,5	0,48; 0,96; 1,2	30 or 60

PFCL25-24

Wicklungstyp		Unipolar						Bipolar					
Schritte pro Umdrehung*		24											
Gewindesteigung	mm	0,48	0,96	1,2	0,48	0,96	1,2	0,48	0,96	1,2	0,48	0,96	1,2
Verfahrweg/Schritt	mm	0,02	0,04	0,05	0,02	0,04	0,05	0,02	0,04	0,05	0,02	0,04	0,05
Effektive Hublänge	mm	30 oder 60											
Kraft bei 200 PPS	N	11	9,5	8	11	9,5	8	16	14	11	16	14	11
Nennspannung	V	12			5			12			5		
Nennstrom	A/Ø	0,10			0,31			0,10			0,30		
Widerstand	Ohm/Ø	120 ± 7 %			16 ± 7 %			122 ± 7 %			15 ± 7 %		
Induktivität	mH/Ø	27			3,7			59			7,1		
Betriebstemperaturbereich	°C	-10 bis +50											
Temperaturanstieg*	°K	70											
Gewicht	g	60											

PFCL25-48

Wicklungstyp		Unipolar						Bipolar					
Schritte pro Umdrehung		48											
Gewindesteigung	mm	0,48	0,96	1,2	0,48	0,96	1,2	0,48	0,96	1,2	0,48	0,96	1,2
Verfahrweg/Schritt	mm	0,01	0,02	0,025	0,01	0,02	0,025	0,01	0,02	0,025	0,01	0,02	0,025
Effektive Hublänge	mm	30 oder 60											
Kraft bei 200 PPS	N	22	17,5	15	22	17,5	15	31	22,5	20,5	31	22,5	20,5
Nennspannung	V	12			5			12			5		
Nennstrom	A/Ø	0,10			0,31			0,10			0,33		
Widerstand	Ohm/Ø	120 ± 7 %			16 ± 7 %			122 ± 7 %			15 ± 7 %		
Induktivität	mH/Ø	33			4,5			73			8,7		
Betriebstemperaturbereich	°C	-10 bis +50											
Temperaturanstieg	°K	70											
Gewicht	g	60											

PFL35T-48

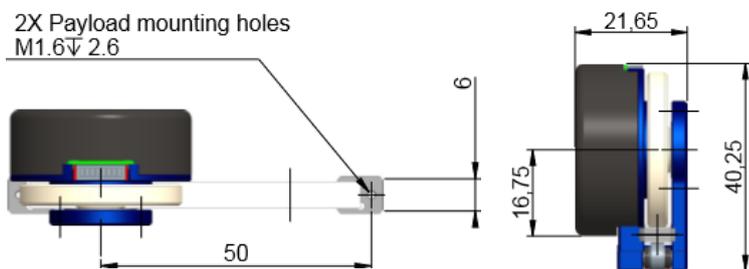
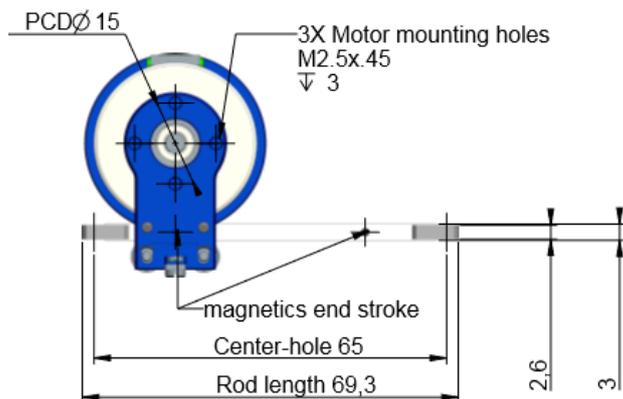
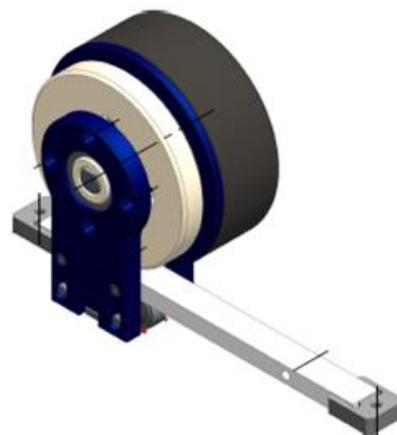
Wicklungstyp		Unipolar						Bipolar					
Schritte pro Umdrehung		48											
Gewindesteigung	mm	0,48	0,96	1,2	0,48	0,96	1,2	0,48	0,96	1,2	0,48	0,96	1,2
Verfahrweg/Schritt	mm	0,01	0,02	0,025	0,01	0,02	0,025	0,01	0,02	0,025	0,01	0,02	0,025
Effektive Hublänge	mm	30 oder 60											
Kraft bei 200 PPS	N	35	32	30	35	32	30	39,5	38	35	39,5	38	35
Nennspannung	V	12			5			12			5		
Nennstrom	A/Ø	0,17			0,33			0,17			0,34		
Widerstand	Ohm/Ø	70 ± 7 %			12 ± 7 %			72 ± 7 %			16 ± 7 %		
Induktivität	mH/Ø	27			5			54			6,4		
Betriebstemperaturbereich	°C	-10 bis +50											
Temperaturanstieg	°K	70											
Gewicht	g	95											

The WAVELLING™ technology developed and patented by TEKCELEO is based on piezoelectric drive technology with mechanical shafts. This mode provides high power density combined with good efficiency for small motors (<20W mechanical). The motor has a very simple and purely mechanical structure (no winding), which facilitates the integration. TEKCELEO has developed a range of piezoelectric motors with speed / position sensors and torque sensors that give these motors outstanding features for light robotics applications, haptic interfaces, energy saving electrovalves, mini dosing pumps and optronic device control applications.

Each type of Motor may embed a speed position sensor and / or a torque sensor. Output signals from the sensors can be used directly on the control board of the motor (see Properties).

- Lightweight and compact design (built-in sensors)
- Pancake form ultrasonic motor
- stepper motors competitors (or direct drive high torque motors)
- High torque / low speed. No-Reducer (direct drive)
- no holding torque of the power supply (built-in brake)
- No electromagnetic interference
- Quiet, vibration-free
- Modular design: It can be installed in the core of the mechanism
- 0.01 ° accuracy (depending on the sensor)
- Fast mechanical reaction <1 ms
- Operating temperatures: -20 + 140 ° C
- High shock and vibration resistance (compact)
- Torque or speed control (depends on the built-in sensors)
- Very easy to control thanks to its responsiveness and built-in sensors.

Piezoelectric motor WLG-30L	
Stator Diameter (mm,in) :	30(1.18)
Motor weight (mechanical part) (g) :	45
Electronic card weight (g) :	23
Rated speed (mm/s) :	11
Rated force (N) :	3.5
Max force (N) :	7
Holding torque (N) :	10
Output power (W) :	1.3
Response time (ms) :	0.5
Direction change time (ms)(CW/CCW) :	0.5
Linear precision (µm) :	50
Stroke (mm) :	50
PCB Dimensions (mm) :	36 x 33 x 25
Power Supply (V) :	7.5
Max current (A) :	1.2



Ball Screw

Standard Products

SG series (Precision Ball Screws)

- Configuration of fixed side end-journal is standardized, supported side end-journal is free type and standard travel is set up.
- Since supported side end-journal is unfinished, it is possible to do additional end machining with your requested thread length.

SD series (Bi-directional Ball Screws)

- These are economical Ball Screws because a shaft has bi-directional thread. • Since fixed and supported side end-journal are unfinished, design flexibility is enlarged.

SR series (Rolled Ball Screws)

SSR series (Stainless Rolled Ball Screws)

- Standard and reasonable price products by Rolling formed process.
- Since fixed and supported side end-journal are unfinished, design flexibility is enlarged.
- There are also Rolled Ball Screws made of stainless steel (SSR series) in stock.

SRT series (Integrated end-journal Rolled Ball Screws)

SSRT series (Integrated end-journal stainless Rolled Ball Screws)

- Fixed side end-journal is set up bigger than Shaft nominal diameter and unfinished.
- It is possible to design end-journal configuration compatible with SG series.
- There are also Integrated end-journal Rolled Ball Screws made of stainless steel (SSRT series) in stock.

PSRT series (Precision Rolled Ball Screws)

- The conventional type of Rolled Ball Screws can reach the accuracy grade of Ct10 or Ct7. KSS newly developed the high grade accuracy of Rolled Ball Screw, which can achieve JIS C5 grade.
- End-journal profile and dimension are standardized, so KSS Compact Support-Unit can be installed.
- Zero backlash is possible by your request.



Standard Products in stock

Table of Shaft dia. and Lead combination (Model distinction)

Shaft dia. (mm)	Lead (mm)											
	0.5	1	2	2.5	4	5	6	8	10	12	15	20
3	SG	SG										
4		SG SD SR SRT	SG SR SRT									
5					SG SR SRT							
6		SG SD SR SSR SRT SSRT	SG SR SRT	SG			SG SR SRT		SG SR SRT			
8		SG SD SR SSR SRT SSRT PSRT	SG SD SR SSR SRT SSRT PSRT	SG SR SRT	SG	SG SR SRT		SG SR SRT	SR	SG SR SRT		
10	SG				SG SR	SG SR SRT			SG SR SRT		SG SR SRT	SR SRT
12			SG SD SR SRT						SG SR SRT			
14			SG SR		SG SR							
15						SG SR			SG SR			SG SR

Customized products

KSS offers customized products. To reduce design process at customer, each Nut type is standardized.

Single Nut with Flange (FBS,FKB,FDB,FEB,MRB series)

It is the most simple Single Nut type. Nut should be mounted using bolt holes in Flange. FBS,MRB (Return-plate), FKB (Internal-deflector), FDB (End-deflector), FEB (End-cap) circulation system can be distinguished.



Sleeve type Single Nut (BS,BSR series)

It is Cylindrical Single Nut which is compact. The Nut should be mounted by clamping on the key way on the Nut outer and Nut end surface.



Single Nut with Mthread (MS,MSR series)

The Cylindrical type with M-thread at the Nut end. The Nut should be mounted using M-thread. It is suitable for mounting with cylinder.



Square type Single Nut (KS series)

The Square Nut is finished with a large mounting face parallel to the Nut center. Nut itself has Housing function. This allows for a more compact design compared to Flange type.



Bi-directional Nut with Flange (FKB,FBS series)

Since there are both Right-handed thread and Left-handed thread on a Shaft, it has Bi-directional function. In addition, absolute position control for both Nut is available.



Customized products

Nut style list for Precision Ball Screws & Rolled Ball Screws.

Nut style	Precision Ball Screws	Rolled Ball Screws
Single Nut with Flange	FKB FBS FDB FEB	MRB
Sleeve type Single Nut	BS	BSR
Single Nut with M-thread	MS	MSR
Square type Single Nut	KS	—
Bi-directional Nut with Flange	FBS* FKB*	—

Customized Products Table of Shaft dia. and Lead combination (Model distinction)

Shaft dia. (mm)	Lead (mm)															
	0.5	1	1.5	2	2.5	3	4	5	6	8	10	12	15	20	25	30
1.8	FBS															
3	FBS	FBS BS														
4	FBS	FKB FBS BS MS FKB* FBS* MRB BSR MSR		FBS BS MRB BSR		FBS BS	FEB									
5	FBS	FKB FBS BS MS FKB* FBS* MRB BSR MSR					FBS BS MRB BSR									
6	FBS	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FBS BS	FBS BS KS MRB BSR	FBS BS				FEB MRB		FEB MRB	FEB				
8	FBS	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FBS BS MS	FBS BS MS	FBS BS MS MRB BSR MSR		FEB MRB	FEB MRB	FEB MRB				
10		FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FBS BS MS	FBS BS MS	FBS BS MS MRB BSR MSR		MRB BSR	FEB MRB	FEB MRB	FEB MRB	FEB MRB	FEB	FEB
12		FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FBS BS MS	FBS BS MS	FBS BS MS	FBS BS		FEB MRB					
13												FEB MRB	FEB MRB	FEB MRB		
14		FBS BS FBS*		FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FBS BS FBS*	FBS BS FBS*							
15								FBS	FBS FBS MRB		FEB FBS MRB		FEB FBS MRB		FEB	
16		FBS BS FBS*		FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FKB FBS BS MS FKB* FBS* MRB BSR MSR	FBS BS FBS*	FBS BS FBS*							
20									FBS		FBS					

Note) * means Bi-directional Nut with Flange.

Ball Screw Support Units

●Features

KSS Support Units are suitable for Miniature Ball Screw end journal. Several types of Support Units are available with Ball Screws.

MSU series (Compact type)

- By eliminating extra shape of Housing, and minimizing pitch of mounting holes, light-weight & compact design Support Units became reality.
- Ultra-compact size (φ3) is standardized, it would be suitable for Ultra Miniature Ball Screws.
- Pillow & Flange type are standardized for both fixed & supported side, so wide variety of choices are available.

SUP & EK, EF series

- Block type support units



Combination of inner dia.

Inner dia.	MSU		SUP/EK	
	fixed side	supported side	fixed side	supported side
φ2		○		
φ3	○	○		○
φ4	○	○	○	○
φ5	○		○	
φ6	○	○	○	○
φ8	○		○	○
φ10			○	○
φ12			○	

Linear Actuator External (Ball Screw type)

●Features

- It's a Compact Linear Actuator installed Motor directly onto the Ball Screw Shaft, which makes less-Coupling structure available.
- Ball Screw Shaft is ideally constructed to form the Motor Rotor Shaft.
- Since combining the Motor Shaft and Ball Screw Shaft, Coupling-less, saving total length, low lost-motion can be achieved.
- SiMB type has three features, which are "high accuracy positioning", "vibration free", "never step-out".



Combination of Drive Screw and Stepping Motor

Type	Drive Screw type		Stepping Motor	
	Precision Ball Screw	Rolled Ball Screw	2-phase	5-phase
MB Precision type	○ JIS C3			○
TMB Rolled type		○ JIS Ct7		○
2TMB 2-phase Rolled type		○ JIS Ct7 equivalent	○	
SiMB Hybrid type	○ JIS C3 /C5		○	

Combination of Shaft Nominal dia. & Lead

Lead shaft dia.	Unit:mm						
	0.5	1.0	2	4	5	6	12
4	MB	MB TMB SiMB					
5				TMB			
6		MB TMB	MB TMB			TMB	
8		MB TMB 2TMB SiMB	MB TMB 2TMB SiMB		TMB 2TMB SiMB		TMB 2TMB
10			MB	MB			

Linear Actuator Captive type and Non-Captive type (Miniature Electric cylinder)

Compact Cylinder with 2-phase Hollow Stepping Motor integrated with Ball Screw or Ball Screw with Ball Spline (BSSP).

●Features

- The new Cylinder type Actuator comes with 2 Motor sizes, NEMA11(□28) & NEMA17(□42). Captive type with anti-rotating device or Non-Captive type without anti-rotating device can be selected in each Motor size as standard.
- Variety of Shaft diameter & Lead combination allows wider selection of Accuracy and Thrust Force.

●Types

Captive (AR Cylinder)

KSS miniature Ball Screw with Ball Spline(BSSP) is used for an anti-rotating device.



Non-Captive (CL Cylinder)

Simple combination of the Hollow Motor and the Ball Screw contributes to lightweight and compact body.



Variation

	Drive Screw	Notation	Unit:mm			
			NEMA11 (□28)		NEMA17 (□42)	
			Lead	Travel	Lead	Travel
Captive (AR type)	Precision Ball Screw	G	1,2	40	2,5	50
			1,2	40,80	2,5	50,100
Non-Captive CL type	Precision Ball Screw	G	1,2	40,80	2,5	50,100
	Rolled Ball Screw	R	1,2	40,80	2,5	50,100
	Resin Lead Screw	Re	2,6	40,80	2,5	50,100

Miniature Actuator

Flex Actuator

There are many variety of choices among accuracy (Screw type), speed (Screw Lead), travel length and power (Motor type).



●Features

- We make full use of features of Miniature Ball Screw manufacturer and super compact design Actuator can be achieved.
- Depending on kinds of Lead Screws, wide range of choices related to positioning accuracy are available.
- Several variations of Screw Lead & Travel for each Screw type are standardized. So wide variety of choice for speed is available.
- Motor-less type is our standard, but a couple of Motors are in stock as an option. Suitable Motor and Actuator would be assembled in accordance with your specifications.
- Recommended Motor Drivers for each Motors are also in stock.
- Accessories can be provided as special design, such as outside photo-sensor, Brake unit and so on.

Specifications for each combination

		Resin Lead Screw			Rolled Ball Screw				Precision Ball Screw			
		±0.05 max.			±0.01 max.				±0.005 max.			
		0.05 max.			0.01 max.				0.005 max.			
		Lead (mm)										
		2	6	9	1	2	6	10	1	2	6	10
Travel (mm)	20				○				○			
	40	○	○	○	○	○	○	○	○	○	○	○
	80	○	○	○	○	○	○	○	○	○	○	○
	120		○	○			○	○			○	○
	160		○	○			○	○			○	○
	200		○	○			○	○			○	○

MoBo Actuator (MA Series)



Direct Motor Drive Ball Screws are built in this series, what we call MoBo Actuators. All of MoBo Actuators are produced as customized products, in accordance with customer's order.

Save the longitudinal dimension by using Direct Motor Drive Ball Screws. MoBo Actuator series is classified into MoBo Cylinder and MoBo Slider, which is rod-type and table-type respectively.

Multi-purpose products (Miniature Ball Screw with Ball Spline : BSSP)

● Features

- This is a combined product which is possible for linear and rotational movement as well as suction at the same time with one unit.
- Achieved developing very compact product as "Overlap type" using Miniature Ball Screws and Miniature Ball Splines .

Separated type (SP)

It's a combined products, which has Ball Screw and Ball Spline processed on the same Shaft.



Overlap type (OL)

By processing Ball Screw and Ball Spline on one place makes product have longer travel and compact.



Table of Shaft dia. and Lead combination (Model distinction)

Shaft dia. (mm)	Lead (mm)				
	2	4	6	10	12
6	SP		SP OL	SP OL	
8	SP	SP			SP OL

Specifications (Accuracy Grade & Axial/Radial play)

Unit:mm

Type	parts	C3 (Max.)	C5 (Max.)
Separated type	Ball Screw (Axial play)	0 or 0.005	0.005
	Ball Spline (Radial play)	0	
Overlap type	Ball Screw (Axial play)	0.005	
	Ball Spline (Radial play)	0.002	

Multi-Functional V θ Actuator

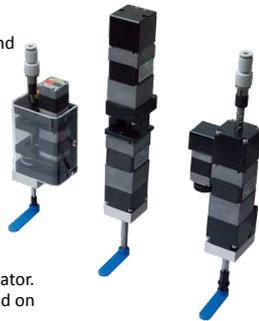
The brand new products which applied the KSS miniature Ball Screw with Ball Spline (BSSP), and realized three functions, linear motion (Z), rotary motion (θ), and vacuum (V), with one product.

● Types and Features

KSS provides 3-types of multi-functional V θ Actuator, which are Direct Drive type, Hybrid Drive type, and Belt-Drive type. It is possible to select one of them according to your specifications or application.

[Direct Drive type] (Photo center)

Slim form is realized by driving a Ball Screw and a Ball Spline Nut directly built in a Hollow Motor.



[Hybrid Drive type] (Photo right)

Combination of the Hollow Motor and Normal Motor gives dramatically short length of Actuator Body.

[Belt Drive type] (Photo left)

Wide variety of Motor can be set on this Actuator. This means various options are available based on Motor Specifications.

Model	Shaft dia.	Lead	Travel	Max. Speed (Z) (mm/sec)	Max. speed (θ) (rev/sec)	Thrust Force (N)	Max. Permissible Moment (kg·m ²)
Direct Drive type	ϕ 6	6	50	72	3	7	0.15×10^{-4}
		10		120	3	5	
	ϕ 8	5	50	100	3	50	0.15×10^{-3}
		10		200	3	25	
Hybrid Drive type	ϕ 6	10	50	200	3	5	0.15×10^{-4}
Belt-Drive type	ϕ 4	4	50	80	3	5	0.9×10^{-5}
	ϕ 6	10	50, 100	200	3	10	0.5×10^{-4}

Precision Lead Screw

Possible to select small Pitch

It is possible to select small Pitch which Ball Screws do not have.

Wide variety of size

Metric Fine Thread and Metric Coarse Thread based on JIS (Japanese Industrial Standard) are standardized but we also manufacture Trapezoidal Thread, Unified Screw Thread, ACME Screw Thread, special Pitch, and multiple start Thread.



Low torque

With knowhow of screw gauge, we make use of grinding technique, and lapping technique, so fine surface roughness and low wobble become reality, which lead low torque and less wear.

Flexibility of Nut configuration

Nut configuration is not restricted and it is possible to manufacture in accordance with customer's design.

Combination of Shaft dia. & Pitch

Unit:mm

Pitch	0.25	0.35	0.4	0.45	0.5	0.7	0.75	0.8	1.0	1.25	1.5	2.0
Shaft dia												
2	⊙		○									
2.5		⊙		○								
3			⊙		○							
4					⊙	○						
5								○				
6							⊙		○			
7								⊙		○		
8									⊙		○	□
9										⊙		○
10											⊙	○

⊙ Recommended model including Metric Fine Pitch Thread.

○ Metric Coarse Pitch Thread.

□ Metric Trapezoidal Thread.

***Blank : Can be manufactured, but please inquire KSS.

Original Grease for Miniature Ball Screws

● Features

This grease has high lubrication performance without deteriorating Ball Screw function. The original Grease for Clean room usage is also available.

General use

MSG No.1: High positioning usage appropriate for high smoothness requirement.
MSG No.2: General usage appropriate for high speed.

MCG No.1: High positioning usage in clean room focused on less contamination, high smoothness.





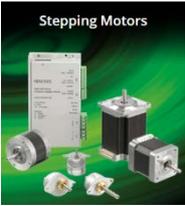
Linear precision ballscrews



Linear (captive) stepper motors



Motorized Ballscrew



A Nidec Group Company
SERVO
All for dreams.

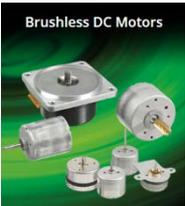
stepper motors

Hybrid, PM, low vibration, low noise
Compact design up to 50 Nm, linearstep, 2 & 3-phase versions
0.6 ° -3.75 ° step angle, integrated driver electronics
Manufacturers: Nidec Servo, Shinano Kenshi, NPM, KSS



Stepper and BLDC motor controller / driver boards and modules

Single & Multi axes 2,3,4 & 5 phases unipolar, bipolar
Up to 4 axes, microstep, up to 8A. Various communication
Fieldbus (CANopen, MODBUS) Ethernet, RS485, USB
Manufacturers: Nidec Servo, SHS, NPM, ELMO, Panasonic



DKM

Brushed motors and geared motors

Torque up to 35Nm
Manufacturers: Nidec Servo, Tsukasa, Canon

Nidec
All for dreams

Brushless Motors and gears

Outside, or insid- runners; Optionally with integrated driver electronics
Manufacturers: Nidec Servo, Nidec, Tsukasa, Canon, Mellor



ケイエスエス
KSS

Motors with ironless rotor and gearbox

Brushed, or brushless 0.4-46W torque to 20Nm planetary gear
Manufacturers: E-DriveSystem, Canon, TopBand



Piezomotoren

10 to 150 mm, up to 3Nm, noiseless, short response time integrated speed / position torque sensors
Manufacturers: Tekceleo

TEKCELEO
We Accelerate Innovation

Linear servo motors / Electric cylinders and modules

Ultra-precise, Dynamic, Stable.
Height reproducibility, compact direct drive. Maintenance and cogging free shaft diameter from 4mm to 100mm stroke from 20mm to 4600mm captive / non-captive. Top thrust force up to 10kN;
Manufacturer: NPM, KSS



System Drive

AC geared motors

Shaded pole & EC motors
Motors up to 90W torque up to 30Nm
Manufacturer: Nidec Servo, Mellor, DKM



TSUKASA

Mellor
MOTORS & GEARED MOTORS

Fans and blowers

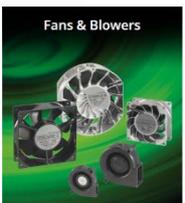
Reliable, kugelgelagert
Lifetime up to 100,000 hours. Tested to VDE / UL / CSA IP54-65 versions
Manufacturer: Nidec Servo, Nidec



SHINANO KENSHI
CORPORATION

Embedded IC's

One-chip stepper motor driver ICs, programmable pulse generators, integrated homing, anti-feedback, S-curve. Reduces engine noise Linear spiral, helical / circular interpolation
Manufacturer: Nippon Pulse



synapticom

Ball Screws

High accuracy, minimal friction, integr. Ball feedback, high rigidity, smooth running
Manufacturer: KSS



NPM

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