Nippon Pulse
Your Partner in Motion Control

L350xS
Linear Shaft Motor

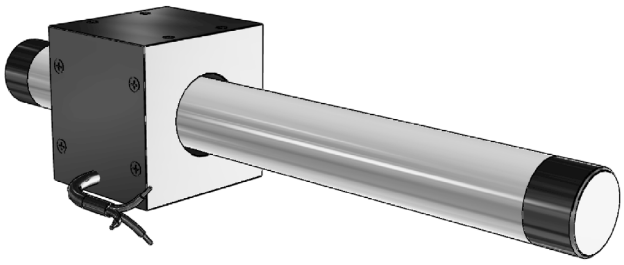
Visit nipponpulse.com to download 3D CAD drawings and 2D prints of this motor.

Electrical Specs	L350SS	L350DS	L350TS	L350QS
Continuous Force[1]	24N (5.4lbs)	43N (9.7lbs)	55N (12.4lbs)	74N (16.6lbs)
Continuous Current[1]	2.0Arms	1.8Arms	1.6Arms	
Acceleration Force[2]	95N (21.4lbs)	170N (38.2lbs)	222N (49.9lbs)	298N (67.0lbs)
Acceleration Current[2]	7.8Arms	7.3Arms	6.4Arms	
Force Constant (K_f)	12N/amp (2.7lbs/amp)	23N/amp (5.2lbs/amp)	35N/amp (7.9lbs/amp)	47N/amp (10.6lbs/amp)
Back EMF (K_e)	4.0V/m/s	7.7V/m/s	12V/m/s	16V/m/s
Resistance 25°C[3]	2.7Ω	5.3Ω	7.9Ω	11Ω
Inductance[3]	2.9mH	4.4mH	6.7mH	8.7mH
Electric Time Constant	1.09ms	0.83ms	0.85ms	0.82ms
Fundamental Motor Constant (K_m)	7.42N√W	10.08N√W	12.28N√W	14.31N√W
Magnetic Pitch (North-North)	60mm (2.36in)			

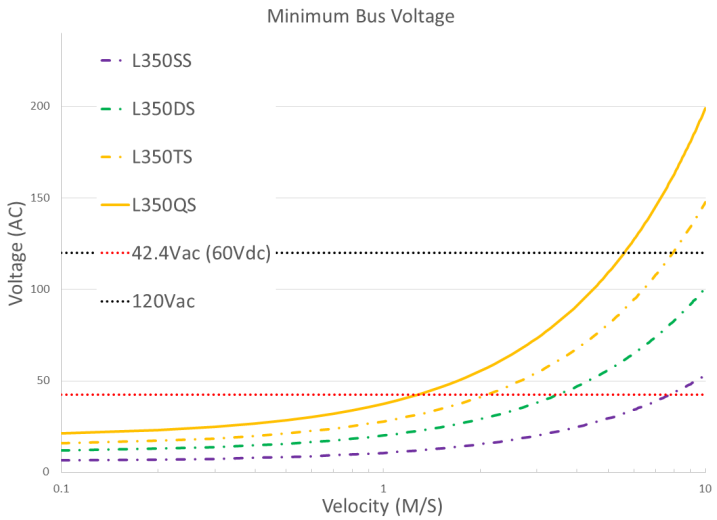
Is this the proper Linear Shaft Motor for your application? Use our SMART sizing program to assist in your decision.
This motor can be customized to fit your application demands; contact your application engineer for more information.
[1] Based on a temp rise of coil surface of 110°K over 25°C ambient temperature stalled forcer, and no external cooling or heat sinking.
[2] Can be maintained for a maximum of 40 seconds. Higher forces and current possible for short periods of time, contact Nippon Pulse for more information.
[3] All winding parameters listed are measured line-to-line (phase-to-phase).

Thermal Specs	L350SS	L350DS	L350TS	L350QS
Max Phase Temperature[4]	135°C (275°F)			
Thermal Resistance (Coil) (K_q)	11°C/W	6.2°C/W	5.4°C/W	4.1°C/W

[4]The standard temperature difference between the coil and the forcer surface is 40°C.



Bus Voltage



These motors have not received a CE Declaration of Conformity, and as such are designated FGA.

Forcer Specs	L350SS	L350DS	L350TS	L350QS
Forcer Length (A)	50mm (1.97in)	80mm (3.15in)	110mm (4.3in)	140mm (5.51in)
Forcer Width	60mm (2.36in)			
Forcer Screw Pitch (P)	40mm (1.57in)	70mm (2.76in)	100mm (3.94in)	130mm (5.12in)
Forcer Weight	0.34kg (0.75lb)	0.56kg (1.23lb)	0.78kg (1.72lb)	1.0kg (2.20lb)
Gap	3mm (0.12in)			

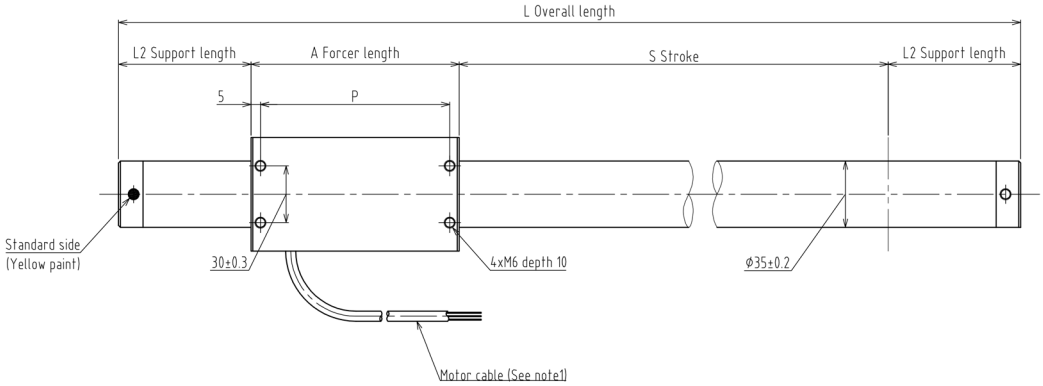
Tolerances are as follows:

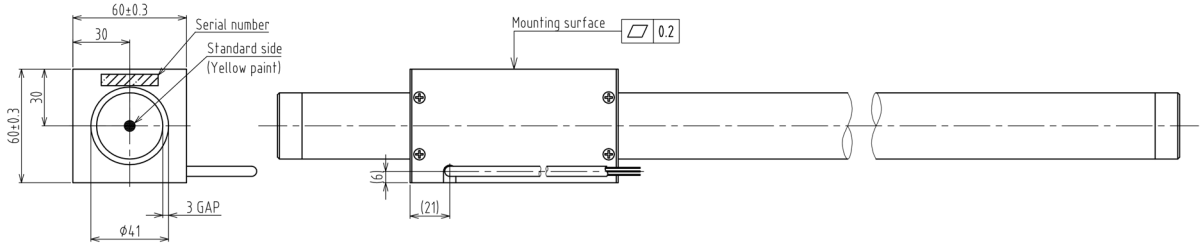
Dimension (mm)	Tolerance (mm)
0 - 6	±0.1
7 - 30	±0.2
31 - 120	±0.3
121 - 315	±0.5
316 - 1000	±0.8
1001 - 2000	±1.2
2000 -	±1.5

L = See Shaft Length
L1 = Usable Stroke + A
L2 = See Support Length
A = See Forcer Length
P = See Forcer Screw Pitch

Unless otherwise specified, dimensions are in mm

Note: Cable length 300mm. The bending radius of the motor cable should be 36.6mm (wire diameter 6.1 * 6) as suggested by the wire manufacturer. This radius should be maintained. Use supplied connector to attach the proper high-flex cable as required by your application.





Note: Metric units guaranteed. Imperial (United States customary) units are calculated.

Linear Shaft Motor Part Numbering Guide (SS Series)

L | Shaft Size (D) | Forcer Size (A) | Alt. Winding | Usable Stroke | Options | Options | # of Forcers

L | 250 / 320 / 350 | X | XX | XXXXst | XX | XX | XX

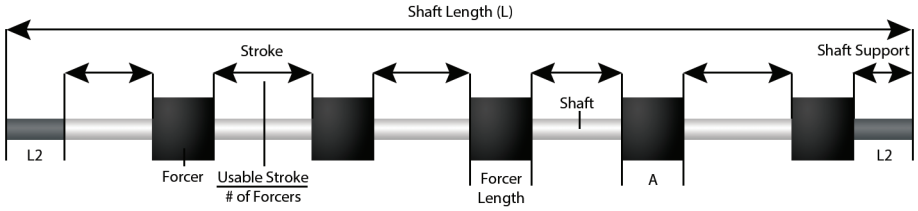
- **Shaft Size (D):** XX Shaft diameter in mm *10
- **L:** L Large Air Gap
- **Forcer Size (A):**
  - SS Single winding small forcer
  - DS Double winding small forcer
  - TS Triple winding small forcer
  - QS Quadruple winding small forcer
- **Alt. Winding:** Blank Standard; _S Alternate Winding Assigned by factory based on customer needs
- **Usable Stroke:** XX Usable stroke in millimeters only needed if ordering shaft
- **Options:**
  - WP Waterproof
  - HA Digital Hall Effect
  - CE CE type motor
  - FG Frameground

  only needed if ordering forcer
- **Options:** Blank Standard; FO Forcer Only; SO Shaft Only
- **# of Forcers:** Two or more forcers (only for SS series)

Usable Stroke is = L - (L2 * 2) - (A * # of forcers)

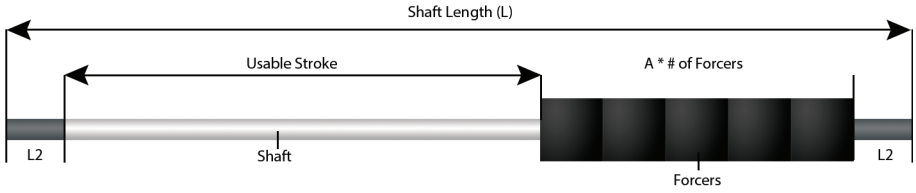
Example: For a L320SS-2500st-05
Usable stroke = 2500
L = 2950
L2 = 100
A = 50
# of Forcers = 5

Usable stroke =
= 2950 - (100 * 2) - (50 * 5)
= 2950 - 200 - 250
= 2500

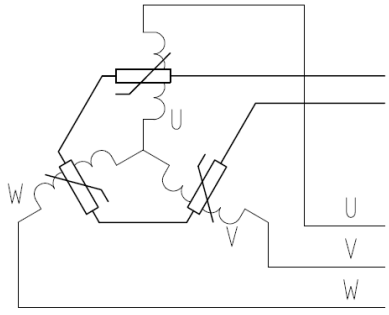


Part Numbering Example

L350SS-1500st-03: Large air gap, 35mm shaft diameter, single winding, small forcer, stroke of 1500mm, three forcers



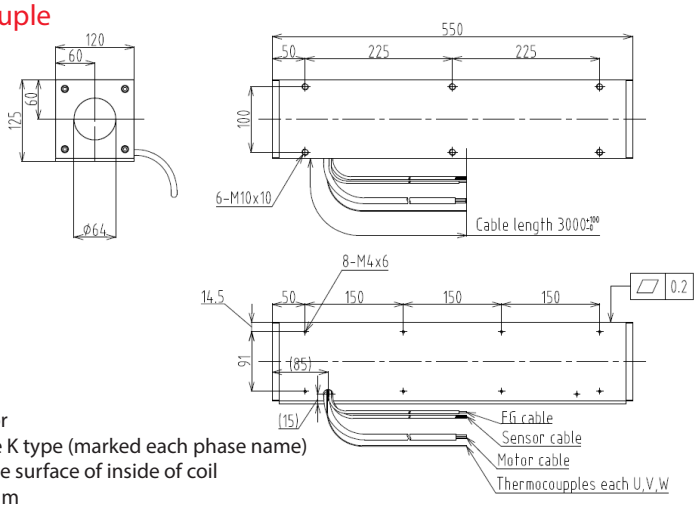
THM Option



Circuit Diagram

4. Thermistor
PTCSL20T071DBE(Vishay)

Thermocouple



Thermal sensor
Thermocouple K type (marked each phase name)
Attached to the surface of inside of coil
Length 3000mm

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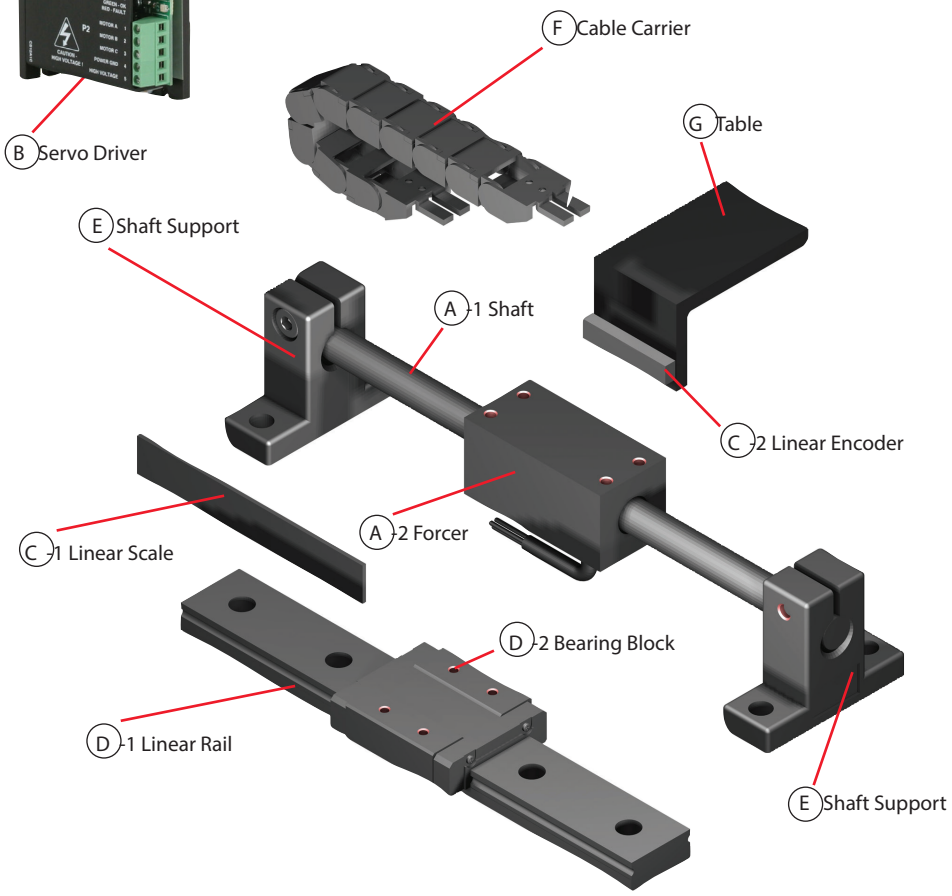
System Design
Linear Shaft Motor

The design of the Linear Shaft Motor allows you to replace traditional linear motion systems, such as a standard ball screw, with the Linear Shaft Motor and achieve higher speed and resolution.

To achieve the highest performance with the Linear Shaft Motor system, the entire system structure must be optimized.

Be aware there are various design considerations which are somewhat different from traditional servo system practices. These are the main components needed to make a Linear Shaft Motor system, as well as factors to consider when designing a system.



Steps to putting together a Linear Shaft Motor System

Choose the Linear Shaft Motor based on force and stroke requirements.

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Choose the shaft supports based on design and motor specifications.

↓

Choose the linear guide (bearings) based on cost and smoothness (performance) constraints.

↓

Choose the linear encoder to achieve the required position resolution.

↓

Choose the servo driver to match the power requirements of the Linear Shaft Motor.

↓

Choose the OTL, limit switches/other components and assemble the Linear Shaft Motor system.

Configuring the Linear Shaft Motor

To configure a system using the Linear Shaft Motor, the following peripheral devices are required:

A. Linear Shaft Motor
B. Servo Driver
C. Linear encoder (optical or magnetic)

Item D (Linear Guide) is a necessary part of a system, but consideration must be given to the application, demand specifications, environmental conditions, and which will be moving--the forcer or the shaft.

The other items, E through G, are optional and will need to be selected depending on the application.