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	S120D		S120T		S120Q		
Electrical Specs	S120D	S120D 1S	S120T	S120T 1S	S120Q	S120Q 2S	S120Q 1S
Continuous Force ¹	4.5N (1.01lbs)		6.6N (1.48lbs)		8.9N (2.0lbs)		
Continuous Current ¹	0.4Arms	0.8Arms	0.4Arms	1.2Arms	0.4Arms	0.8Arms	1.6Arms
Acceleration Force ²	18N (4.0lbs)		27N (6.07lbs)		36N (8.1lbs)		
Acceleration Current ²	1.6Arms	3.2Arms	1.6Arms	4.8Arms	1.6Arms	3.2Arms	6.4Arms
Force Constant (K _f)	11N/Arms (2.5lbs/amp)	5.6N/Arms (1.27lbs/amp)	17N/Arms (3.72lbs/amp)	5.5N/Arms (1.20lbs/amp)	22N/Arms (5.0lbs/amp)	11N/Arms (2.5lbs/amp)	5.6N/Arms (1.27lbs/amp)
Back EMF (K _e)	3.7V/m/s (0.09V/in/s)	1.9V/m/s (0.05V/in/s)	5.5V/m/s (0.14V/in/s)	1.8V/m/s (0.045V/in/s)	7.4V/m/s (0.19V/in/s)	3.7V/m/s (0.095V/in/s)	1.9V/m/s (0.049V/in/s)
Resistance 25°C ³	37Ω	9.3Ω	54Ω	6Ω	73Ω	18Ω	4.6Ω
Inductance ³	12mH	3mH	18mH	2mH	24mH	6mH	1.5mH
Electric Time Constant	0.32ms				0.33ms		
Max. Rated Voltage (AC)	240V						
Fundamental Motor Constant (K _m)	1.85N√W		2.25N√W		2.60N√W		
Magnetic Pitch (North-North)	48mm (1.89in)						

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.

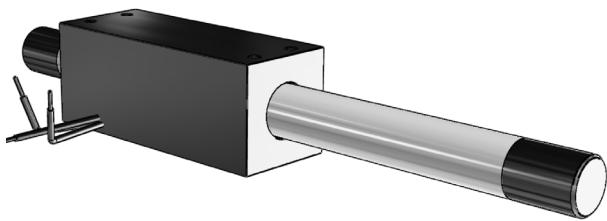
¹ Based on a temp rise of coil surface of 110°K over 25°C ambient temperature stalled forcer, and no external cooling or heat sinking.

² Can be maintained for a maximum of 40 seconds. Higher forces and current possible for short periods of time, consult Nippon Pulse for more information.

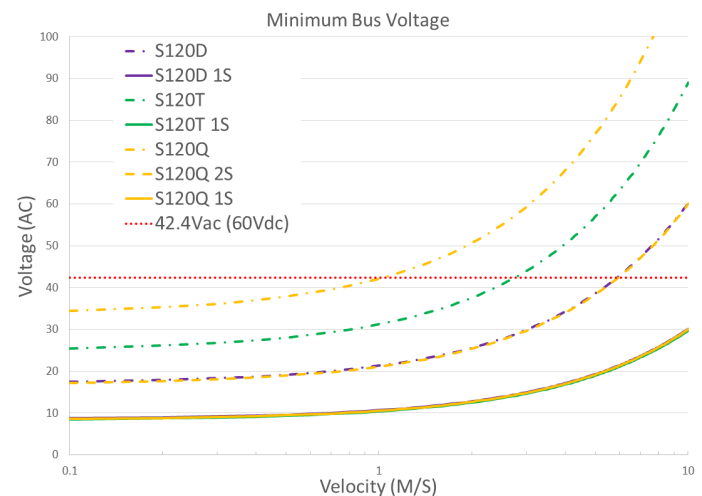
³ All winding parameters listed are measured line-to-line (phase-to-phase).

Thermal Specs	S120D	S120T	S120Q
Max Phase Temperature ⁴	135°C (275°F)		
Thermal Resistance (Coil) (K _q)	18.6°C/W	12.7°C/W	9.4°C/W

⁴ The standard temperature difference between the coil and the forcer surface is 10°C.



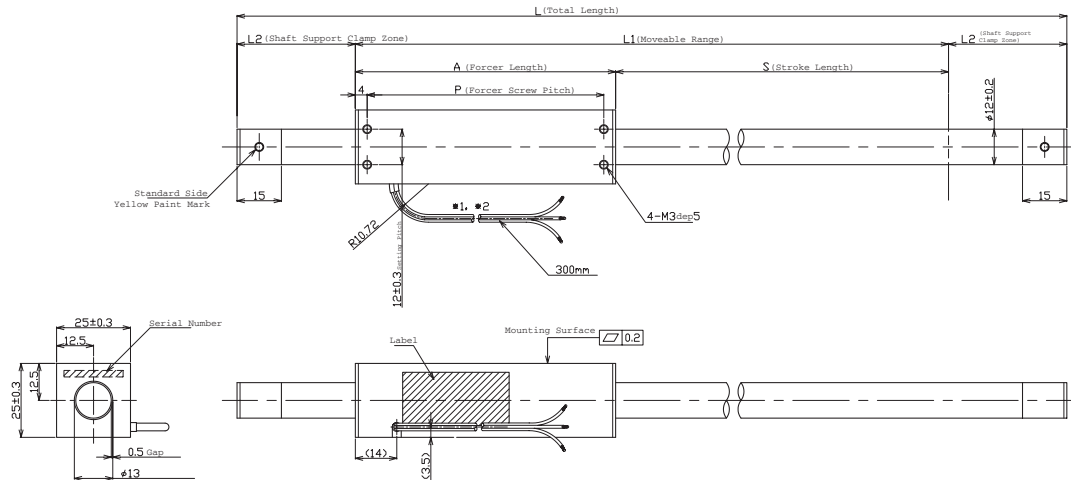
Bus Voltage



Part Numbering System

S	—	Shaft Size 120	—	Forcer Size (A) <u>X</u>	—	Parallel Option <u>XX</u>	—	Usable Stroke (S) <u>XXXXst</u>	—	Options <u>XX</u>	—	Options <u>XX</u>
				D: Double (2) windings T: Triple (3) windings Q: Quadruple (4) windings		Blank: Single Motor PL: Parallel Motors		50-1500mm		Blank: Standard WP: Water Resistant HA: Digital Hall Effect CE: CE type motor FG: Frame Ground		Blank: Standard FO: Forcer Only SO: Shaft Only

Forcer Specs	S120D	S120T	S120Q
Forcer Length (A)	64mm (2.52in)	88mm (3.46in)	112mm (4.41in)
Forcer Width	25mm (0.98in)		
Forcer Screw Pitch (P)	56mm (2.20in)	80mm (3.15in)	104mm (4.09in)
Forcer Weight	0.09kg (0.20lbs)	0.12kg (0.26lbs)	0.16kg (0.35lbs)
Gap	0.50mm (0.02in)		
Screw	M3		
Tightening torque	0.63 Nm		



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 10.72 mm (wire diameter 1.34 * 8) 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.

Hall Effect Specs

Note: The bending radius of the motor cable should be R10.72mm (wire diameter 4.6 * 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.

Sensor Cable Specs

Wire Type	UL 758
Wire AWG	28
VCC	White/Red
GND	White/Black
Sensor 1	Orange/Red
Sensor 2	Orange/Black
Sensor 3	Gray/Red
No Connection	Gray/Black

The bending radius of the sensor cable should be R27.6 mm (wire diameter 1.38 * 8) as suggested by the wire manufacturer. Attach the proper high-flex cable as required by your application.

FG/FGA Type Motor Cable

Wire Type	UL 1330
Wire AWG	20
Frame Ground	Green/Yellow

Shaft Length (L)

Stroke	S120D	S120T	S120Q
50	164mm (6.5in)	188mm (7.4in)	212mm (8.3in)
100	214mm (8.4in)	238mm (9.4in)	262mm (10.3in)
150	264mm (10.4in)	288mm (11.3in)	312mm (12.3in)
200	314mm (12.4in)	338mm (13.3in)	362mm (14.3in)
250	364mm (14.3in)	388mm (15.3in)	412mm (16.2in)
300	414mm (16.3in)	438mm (17.2in)	462mm (18.2in)
350	464mm (18.3in)	488mm (19.2in)	512mm (20.2in)
400	544mm (21.4in)	568mm (22.4in)	592mm (23.3in)
450	594mm (23.4in)	618mm (24.3in)	642mm (25.3in)
500	644mm (25.4in)	668mm (26.3in)	692mm (27.2in)
550	694mm (27.3in)	718mm (28.3in)	742mm (29.2in)
600	744mm (29.3in)	768mm (30.2in)	792mm (31.2in)
650	794mm (31.3in)	818mm (32.2in)	842mm (33.1in)
700	844mm (33.2in)	868mm (34.2in)	892mm (35.1in)
750	894mm (35.2in)	918mm (36.1in)	942mm (37.1in)
800	944mm (37.2in)	968mm (38.1in)	992mm (39.1in)
850	1034mm (40.7in)	1058mm (41.7in)	1082mm (42.6in)
900	1084mm (42.7in)	1108mm (43.6in)	1132mm (44.6in)
950	1134mm (44.6in)	1158mm (45.6in)	1182mm (46.5in)
1000	1184mm (46.6in)	1208mm (47.6in)	1232mm (48.5in)
1050	1234mm (48.6in)	1258mm (49.5in)	1282mm (50.5in)

Shaft Mass

Stroke	S120D	S120T	S120Q
50	0.1kg (0.2lb)	0.1kg (0.3lb)	0.1kg (0.3lb)
100	0.1kg (0.3lb)	0.2kg (0.4lb)	0.2kg (0.4lb)
150	0.2kg (0.4lb)	0.2kg (0.5lb)	0.2kg (0.5lb)
200	0.2kg (0.5lb)	0.2kg (0.5lb)	0.3kg (0.6lb)
250	0.3kg (0.6lb)	0.3kg (0.6lb)	0.3kg (0.7lb)
300	0.3kg (0.7lb)	0.3kg (0.7lb)	0.3kg (0.8lb)
350	0.3kg (0.8lb)	0.4kg (0.8lb)	0.4kg (0.8lb)
400	0.4kg (0.9lb)	0.4kg (0.9lb)	0.4kg (1lb)
450	0.4kg (1lb)	0.5kg (1lb)	0.5kg (1lb)
500	0.5kg (1lb)	0.5kg (1.1lb)	0.5kg (1.1lb)
550	0.5kg (1.1lb)	0.5kg (1.2lb)	0.6kg (1.2lb)
600	0.6kg (1.2lb)	0.6kg (1.3lb)	0.6kg (1.3lb)
650	0.6kg (1.3lb)	0.6kg (1.3lb)	0.6kg (1.4lb)
700	0.6kg (1.4lb)	0.7kg (1.4lb)	0.7kg (1.5lb)
750	0.7kg (1.5lb)	0.7kg (1.5lb)	0.7kg (1.6lb)
800	0.7kg (1.6lb)	0.7kg (1.6lb)	0.7kg (1.7lb)
850	0.8kg (1.7lb)	0.8kg (1.7lb)	0.8kg (1.8lb)
900	0.8kg (1.8lb)	0.8kg (1.8lb)	0.8kg (1.9lb)
950	0.8kg (1.9lb)	0.9kg (1.9lb)	0.9kg (1.9lb)
1000	0.9kg (1.9lb)	0.9kg (2lb)	0.9kg (2lb)
1050	0.9kg (2lb)	0.9kg (2.1lb)	1kg (2.1lb)

Additional stroke lengths are available (up to 1540mm for S120D, up to 1510mm for S120T, and up to 1490mm for S120Q). Contact Nippon Pulse for more information.

Forcer Spacing Distance

Spec	S120T	S120Q
Forcer Spacing Distance	8mm	
Pole (N/S) Distance	24mm	
Forcer Length	88mm	112mm
Flip Forcers	No	Yes

Tandem S120D forcers are possible, but are equivalent to one (1) S120Q forcer and thus are not listed above.

Connector (Motor Cable)

Receptacle Housing	XMR-03V
Plug Housing	XMP-03V
Retainer	XMS-03V
Pin Contact	SXM-001T-P0.6
Socket Contact	SXA-001T-P0.6

To be installed by the user.

Support and Bending

Stroke	Support Length (L2)	Max. Bending
0~350	25mm	0.00mm
351~800	40mm	0.30mm
801~max.	60mm	0.50mm

Shaft Diameter (D) - 12mm ±0.2

Total Length (L)=Stroke (S)+Forcer Length (A)+(Support Length (L2)x2)

Tandem Forcer



Not all motors on this datasheet have received a CE Declaration of Conformity. Only the standard S120D, S120T and S120Q motors have been certified to CE standards. The motors and motor options with the following designations have not received a CE Declaration of Conformity, and as such are designated FGA: S120D-1S, S120T-1S, S120Q-2S, S120Q-1S, any S120 motor with Hall Effects.

Standard Lead Wire

Wire Type	UL 1430
Wire AWG	28
U Phase	Red
V Phase	White
W Phase	Black

300mm lead wire bare leads.

The bending radius of the motor cable should be 10.72 mm as suggested by the wire manufacturer.

FGA/CE Type Lead Wire

Ground Wire	CE
Wire Type	UL 1330
Wire AWG	24
U Phase	Red
V Phase	White
W Phase	Black

300mm lead wire bare leads. The bending radius of the motor cable should be 16.96mm as suggested by the wire manufacturer. FG type with insulating sheet between coils and case. Meets all requirements of EN60034-1 (1998).

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

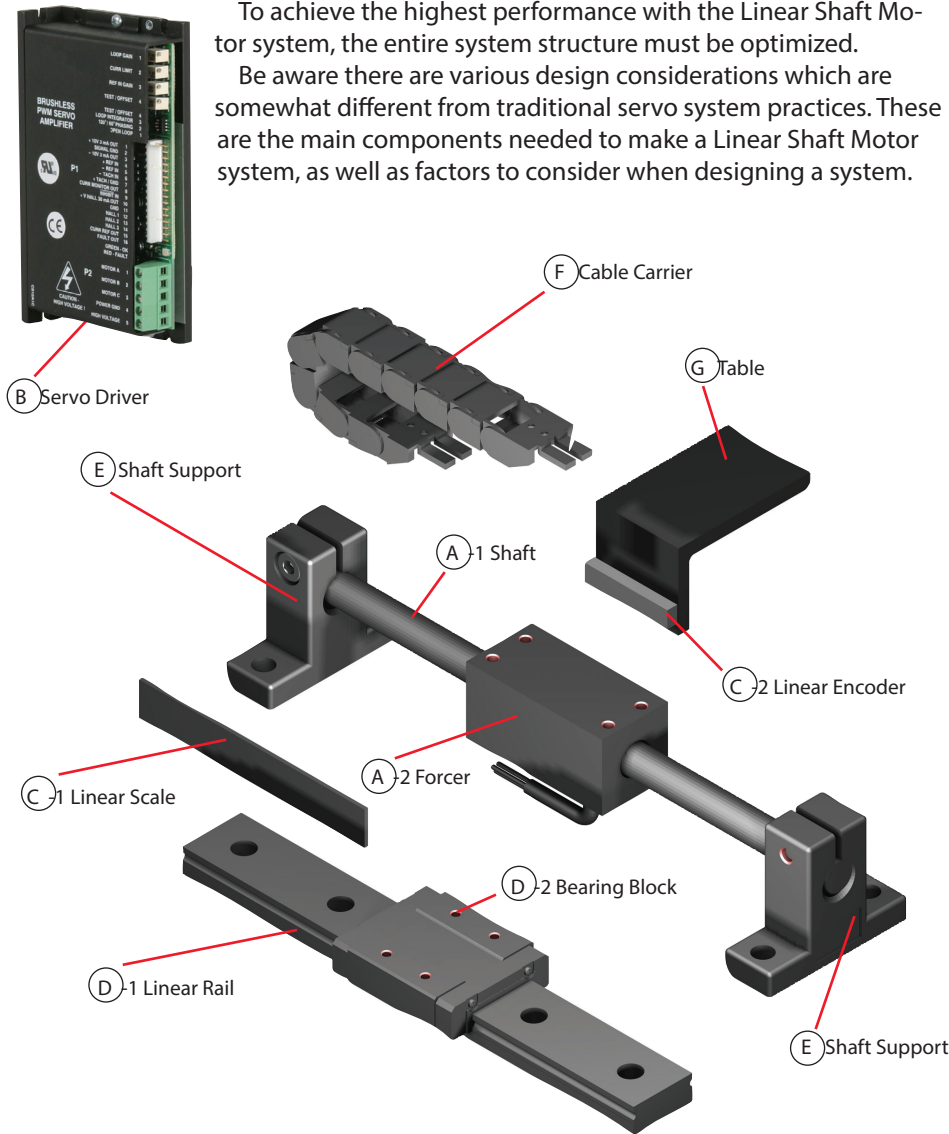
For assistance in selecting the best motor for your application, contact Nippon Pulse to speak with an applications engineer. 1-540-633-1677

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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.



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.

System Design Linear Shaft Motor

Steps to putting together a Linear Shaft Motor System

