

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

| | S320D | | S320T | | S320Q | | |
|--|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|----------|
| Electrical Specs | S320D | S320D 1S | S320T | S320T 1S | S320Q | S320Q 2S | S320Q 1S |
| Continuous Force ¹ | 56N (12.59lbs) | 55N (12.37lbs) | 85N (19.11lbs) | 80N (17.99lbs) | 113N (25.40lbs) | 104N (23.38lbs) | |
| Continuous Current ¹ | 1.2Arms | 2.4Arms | 1.2Arms | 3.5Arms | 1.2Arms | 2.3Arms | 4.6Arms |
| Acceleration Force ² | 226N (50.81lbs) | 221N (49.69lbs) | 338N (75.99lbs) | 318N (71.49lbs) | 451N (101.39lbs) | 417N (93.75lbs) | |
| Acceleration Current ² | 5.0Arms | 9.8Arms | 5.0Arms | 14Arms | 5.0Arms | 9.2Arms | 18.4Arms |
| Force Constant (K _f) | 45N/Arms | 23N/Arms | 68N/Arms | 23N/Arms | 91N/Arms | 45N/Arms | 23N/Arms |
| Back EMF (K _e) | 15V/m/s | 7.6V/m/s | 23V/m/s | 7.6V/m/s | 30V/m/s | 15V/m/s | 7.6V/m/s |
| Resistance 25°C ³ | 11Ω | 2.8Ω | 17Ω | 1.9Ω | 23Ω | 5.8Ω | 1.4Ω |
| Inductance ³ | 17mH | 4.3mH | 26mH | 2.9mH | 34.0mH | 8.5mH | 2.1mH |
| Electric Time Constant | 1.55ms | | 1.53ms | | 1.48ms | | |
| Max. Rated Voltage (AC) | 240V | | | | | | |
| Fundamental Motor Constant (K _m) | 13.84N√W | 13.66N√W | 17.62N√W | 16.49N√W | 20.49N√W | 18.89N√W | |
| Magnetic Pitch (North-North) | 120mm | | | | | | |

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.

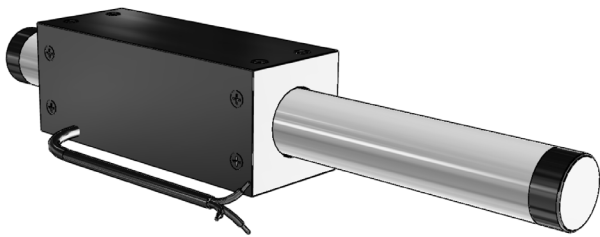
¹ Based on a temp rise of coil surface of 110°K over 25°C ambient temperature stalled forcer, and no external cooling or heat sinking.

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.

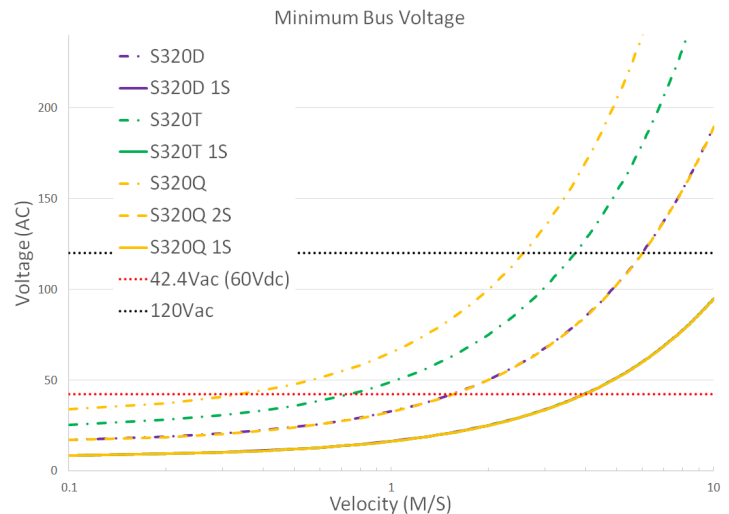
³ All winding parameters listed are measured line-to-line (phase-to-phase).

| Thermal Specs | S320D | S320T | S320Q |
|---|--------------------|--------------------|--------------------|
| Max Phase Temperature ⁴ | 135°C (275°F) | | |
| Thermal Resistance (Coil) (K _c) | 6.7°C/W (44.1°F/W) | 4.7°C/W (40.5°F/W) | 3.6°C/W (38.5°F/W) |

⁴ The standard temperature difference between the coil and the forcer surface is 25°C.



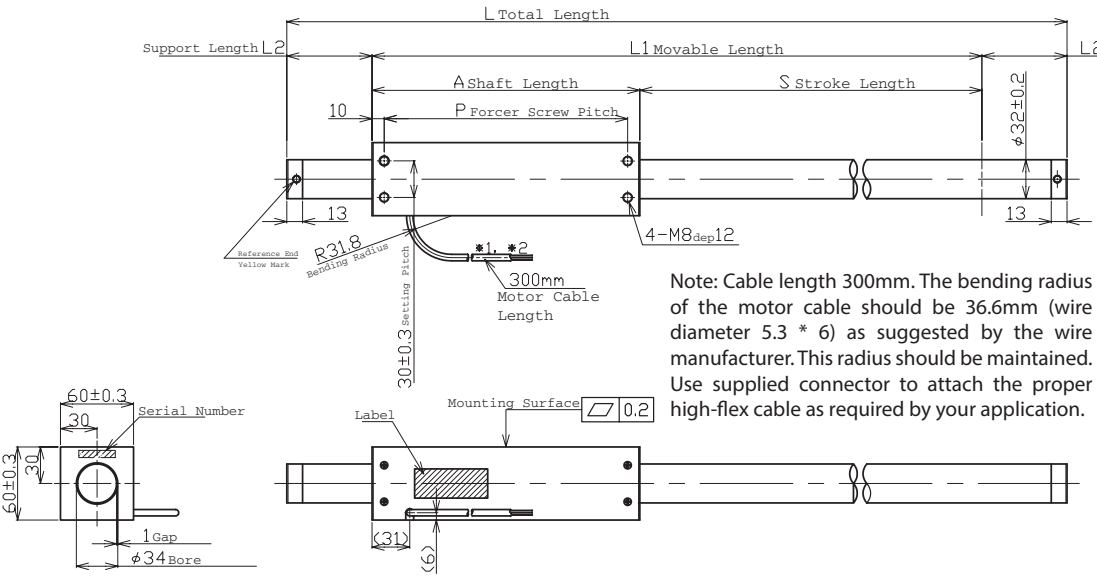
Bus Voltage



Part Numbering System

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|------------|-----|---|------------------------|------------------------|---------------------------|-----------------|---------------------|---------------------|-------------------|--------|---|-----------------|---------------------|-------------------------|-------------------|------------------|-----------------|-----------------|----------------|
| S | — | Shaft Size | 320 | — | Forcer Size (A) | X | — | Parallel Option | XX | — | Usable Stroke (S) | XXXXst | — | Options | XX | — | Options | XX | | | |
| | | | | | D: Double (2) windings | T: Triple (3) windings | Q: Quadruple (4) windings | | Blank: Single Motor | PL: Parallel Motors | 100-2000mm | | | 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 | S320D | S320T | S320Q |
|------------------------|-----------------|----------------|----------------|
| Forcer Length (A) | 160mm (6.3in) | 220mm (8.7in) | 280mm (11.0in) |
| Forcer Width | 60mm (2.36in) | | |
| Forcer Screw Pitch (P) | 140mm (5.51in) | 200mm (7.9in) | 260mm (10.2in) |
| Forcer Weight | 1.2kg (2.6lbs) | 1.7kg (3.7lbs) | 2.2kg (4.9lbs) |
| Gap | 1.00mm (0.04in) | | |



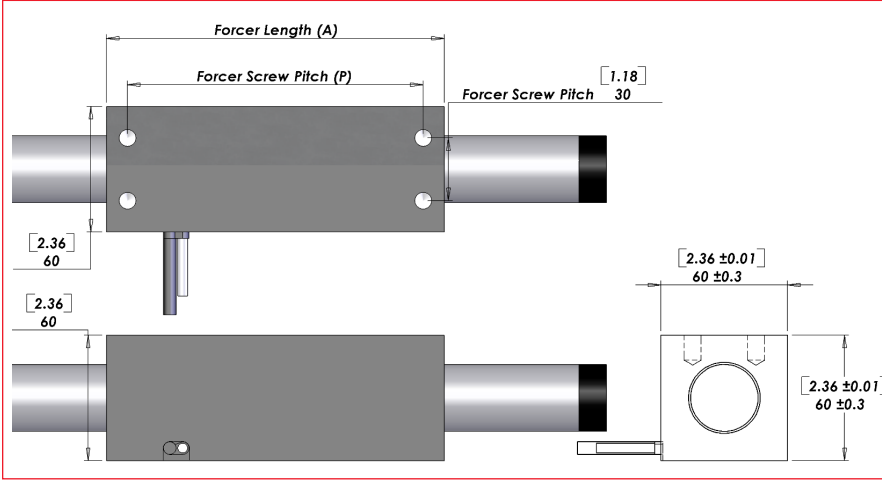
Tolerances are as follows:

| 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

Hall Effect Specs



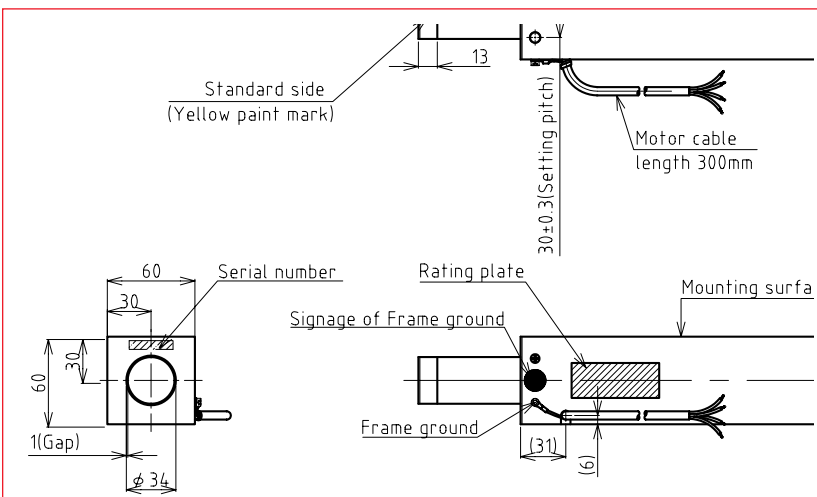
Note: The bending radius of the motor cable should be R36.6mm (wire diameter 4.6 * 6) as suggested by the wire manufacturer. This radius should be maintained. Use supplied connector to attach the proper high-flex cable as required by your application.

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 |

The bending radius of the sensor cable should be R27.6mm (wire diameter 6.1 * 6) as suggested by the wire manufacturer. This radius should be maintained.

FG/FGA Type Motor Cable



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

Standard Lead Wire

| | |
|-----------|-----------|
| Wire Type | UL 2464FA |
| Wire AWG | 20 |
| U Phase | Red |
| V Phase | White |
| W Phase | Black |

300mm lead wire bare leads. The bending radius of the motor cable should be 36.6mm as suggested by the wire manufacturer.

Shaft Length (L)

| Stroke | S320D | S320T | S320Q |
|--------|--|------------------|------------------|
| 100 | Stroke is less than the electrical cycle length. Contact Nippon Pulse. | | |
| 150 | 410mm (16.1in) | 470mm (18.5in) | 530mm (20.9in) |
| 200 | 460mm (18.1in) | 520mm (20.5in) | 580mm (22.8in) |
| 250 | 510mm (20.1in) | 570mm (22.4in) | 630mm (24.8in) |
| 300 | 560mm (22in) | 620mm (24.4in) | 680mm (26.8in) |
| 350 | 610mm (24in) | 670mm (26.4in) | 730mm (28.7in) |
| 400 | 660mm (26in) | 720mm (28.3in) | 780mm (30.7in) |
| 450 | 710mm (28in) | 770mm (30.3in) | 830mm (32.7in) |
| 500 | 760mm (29.9in) | 820mm (32.3in) | 880mm (34.6in) |
| 550 | 810mm (31.9in) | 870mm (34.3in) | 930mm (36.6in) |
| 600 | 860mm (33.9in) | 920mm (36.2in) | 980mm (38.6in) |
| 650 | 910mm (35.8in) | 970mm (38.2in) | 1030mm (40.6in) |
| 700 | 960mm (37.8in) | 1020mm (40.2in) | 1080mm (42.5in) |
| 750 | 1010mm (39.8in) | 1070mm (42.1in) | 1130mm (44.5in) |
| 800 | 1100mm (43.3in) | 1160mm (45.7in) | 1220mm (48in) |
| 850 | 1150mm (45.3in) | 1210mm (47.6in) | 1270mm (50in) |
| 900 | 1200mm (47.2in) | 1260mm (49.6in) | 1320mm (52in) |
| 950 | 1250mm (49.2in) | 1310mm (51.6in) | 1370mm (53.9in) |
| 1000 | 1300mm (51.2in) | 1360mm (53.5in) | 1420mm (55.9in) |
| 1050 | 1350mm (53.1in) | 1410mm (55.5in) | 1470mm (57.9in) |
| 1100 | 1400mm (55.1in) | 1460mm (57.5in) | 1520mm (59.8in) |
| 1150 | 1450mm (57.1in) | 1510mm (59.4in) | 1570mm (61.8in) |
| 1200 | 1500mm (59.1in) | 1560mm (61.4in) | 1620mm (63.8in) |
| 1250 | 1550mm (61in) | 1610mm (63.4in) | 1670mm (65.7in) |
| 1300 | 1600mm (63in) | 1660mm (65.4in) | 1720mm (67.7in) |
| 1350 | 1650mm (65in) | 1710mm (67.3in) | 1770mm (69.7in) |
| 1400 | 1700mm (66.9in) | 1760mm (69.3in) | 1820mm (71.7in) |
| 1450 | 1750mm (68.9in) | 1810mm (71.3in) | 1870mm (73.6in) |
| 1500 | 1800mm (70.9in) | 1860mm (73.2in) | 1920mm (75.6in) |
| 1550 | 1910mm (75.2in) | 1970mm (77.6in) | 2030mm (79.9in) |
| 1600 | 2020mm (79.5in) | 2080mm (81.9in) | 2140mm (84.3in) |
| 1650 | 2130mm (83.9in) | 2190mm (86.2in) | 2250mm (88.6in) |
| 1700 | 2240mm (88.2in) | 2300mm (90.6in) | 2360mm (92.9in) |
| 1750 | 2350mm (92.5in) | 2410mm (94.9in) | 2470mm (97.2in) |
| 1800 | 2460mm (96.9in) | 2520mm (99.2in) | 2580mm (101.6in) |
| 1850 | 2570mm (101.2in) | 2630mm (103.5in) | 2690mm (105.9in) |
| 1900 | 2680mm (105.5in) | 2740mm (107.9in) | 2800mm (110.2in) |
| 1950 | 2790mm (109.8in) | 2850mm (112.2in) | 2910mm (114.6in) |
| 2000 | 2900mm (114.2in) | 2960mm (116.5in) | 3020mm (118.9in) |

Shaft Mass

| Stroke | S320D | S320T | S320Q |
|--------|--|-----------------|-----------------|
| 100 | Stroke is less than the electrical cycle length. Contact Nippon Pulse. | | |
| 150 | 2.1kg (4.6lb) | 2.4kg (5.4lb) | 2.8kg (6.1lb) |
| 200 | 2.4kg (5.2lb) | 2.7kg (6lb) | 3kg (6.7lb) |
| 250 | 2.7kg (5.8lb) | 3kg (6.6lb) | 3.3kg (7.3lb) |
| 300 | 2.9kg (6.5lb) | 3.3kg (7.2lb) | 3.6kg (8lb) |
| 350 | 3.2kg (7.1lb) | 3.6kg (7.8lb) | 3.9kg (8.6lb) |
| 400 | 3.5kg (7.7lb) | 3.8kg (8.5lb) | 4.2kg (9.2lb) |
| 450 | 3.8kg (8.3lb) | 4.1kg (9.1lb) | 4.5kg (9.8lb) |
| 500 | 4.1kg (8.9lb) | 4.4kg (9.7lb) | 4.7kg (10.4lb) |
| 550 | 4.3kg (9.6lb) | 4.7kg (10.3lb) | 5kg (11.1lb) |
| 600 | 4.6kg (10.2lb) | 5kg (10.9lb) | 5.3kg (11.7lb) |
| 650 | 4.9kg (10.8lb) | 5.2kg (11.6lb) | 5.6kg (12.3lb) |
| 700 | 5.2kg (11.4lb) | 5.5kg (12.2lb) | 5.9kg (12.9lb) |
| 750 | 5.5kg (12.1lb) | 5.8kg (12.8lb) | 6.1kg (13.5lb) |
| 800 | 5.8kg (12.9lb) | 6.2kg (13.6lb) | 6.5kg (14.4lb) |
| 850 | 6.1kg (13.5lb) | 6.5kg (14.3lb) | 6.8kg (15lb) |
| 900 | 6.4kg (14.1lb) | 6.7kg (14.9lb) | 7.1kg (15.6lb) |
| 950 | 6.7kg (14.7lb) | 7kg (15.5lb) | 7.4kg (16.2lb) |
| 1000 | 7kg (15.4lb) | 7.3kg (16.1lb) | 7.6kg (16.9lb) |
| 1050 | 7.3kg (16lb) | 7.6kg (16.7lb) | 7.9kg (17.5lb) |
| 1100 | 7.5kg (16.6lb) | 7.9kg (17.4lb) | 8.2kg (18.1lb) |
| 1150 | 7.8kg (17.2lb) | 8.2kg (18lb) | 8.5kg (18.7lb) |
| 1200 | 8.1kg (17.9lb) | 8.4kg (18.6lb) | 8.8kg (19.3lb) |
| 1250 | 8.4kg (18.5lb) | 8.7kg (19.2lb) | 9.1kg (20lb) |
| 1300 | 8.7kg (19.1lb) | 9kg (19.8lb) | 9.3kg (20.6lb) |
| 1350 | 8.9kg (19.7lb) | 9.3kg (20.5lb) | 9.6kg (21.2lb) |
| 1400 | 9.2kg (20.3lb) | 9.6kg (21.1lb) | 9.9kg (21.8lb) |
| 1450 | 9.5kg (21lb) | 9.8kg (21.7lb) | 10.2kg (22.4lb) |
| 1500 | 9.8kg (21.6lb) | 10.1kg (22.3lb) | 10.5kg (23.1lb) |
| 1550 | 10.2kg (22.5lb) | 10.5kg (23.3lb) | 10.9kg (24lb) |
| 1600 | 10.5kg (23.1lb) | 10.8kg (23.9lb) | 11.2kg (24.6lb) |
| 1650 | 10.8kg (23.8lb) | 11.1kg (24.5lb) | 11.5kg (25.2lb) |
| 1700 | 11.1kg (24.4lb) | 11.4kg (25.1lb) | 11.7kg (25.9lb) |
| 1750 | 11.3kg (25lb) | 11.7kg (25.7lb) | 12kg (26.5lb) |
| 1800 | 11.6kg (25.6lb) | 12kg (26.4lb) | 12.3kg (27.1lb) |
| 1850 | 11.9kg (26.2lb) | 12.2kg (27lb) | 12.6kg (27.7lb) |
| 1900 | 12.2kg (26.9lb) | 12.5kg (27.6lb) | 12.9kg (28.3lb) |
| 1950 | 12.5kg (27.5lb) | 12.8kg (28.2lb) | 13.1kg (29lb) |
| 2000 | 12.7kg (28.1lb) | 13.1kg (28.8lb) | 13.4kg (29.6lb) |

Additional stroke lengths are available (up to 2310mm for S320D, 2250mm for S320T, and 2190mm for S320Q). Contact Nippon Pulse for more information.

FGA/CE Option - 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 18.96mm as suggested by the wire manufacturer. FG type with insulating sheet between coils and case. Meets all requirements of EN60034-1 (1998).

Forcer Spacing Distance

| Spec | S320T | S320Q |
|-------------------------|-------|-------|
| Forcer Spacing Distance | 20mm | |
| Pole (N/S) Distance | 60mm | |
| Forcer Length | 220mm | 280mm |
| Flip Forcers | No | Yes |

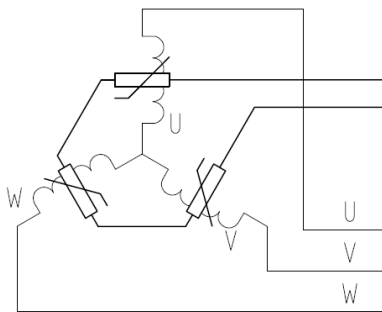
Tandem S320D forcers are possible, but are equivalent to one (1) S320Q forcer and thus are not listed above.

Tandem Forcer



Forcer Spacing Distance

THM Option



Circuit Diagram

4. Thermistor
PTCSL20T071DBE(Vishay)

Support and Bending

| Stroke (D/T/Q) | Support Length (L2) | Max. Bending |
|----------------|---------------------|--------------|
| 0~750 | 50mm | 0.00mm |
| 751~1000 | 70mm | 0.30mm |
| 1001~1500 | 70mm | 0.70mm |
| 1501~max | 100mm | 0.70mm |

Shaft Diameter (D) - 32mm ±0.2

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

Connector (Motor Cable)

| | |
|--------------------|--------------|
| Receptacle Housing | HLR-03V |
| Plug Housing | HLP-03V |
| Retainer | HLS-03V |
| Pin Contact | SSM-21T-P1.4 |
| Socket Contact | SSF-21T-P1.4 |

To be installed by the user.

Thermocouple

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

Not all motors on this datasheet have received a CE Declaration of Conformity. Only the standard S320D, S320T and S320Q 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: S320D-1S, S320T-1S, S320Q-2S, S320Q-1S, any S320 motor with Hall Effects, Thermistor or Thermocouple options.

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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