

SERIES: NEMA17-AMT112S | **DESCRIPTION:** STEPPER SERVO MOTOR**FEATURES**

- CUI Devices AMT112S encoder + LIN Engineering stepper motor
- stepper motor with encoder for closed-loop mode when paired with a controller
- small, compact NEMA 17 frame size
- up to 110 oz-in (0.77 N-m) holding torque
- patented capacitive encoder ASIC technology
- incremental resolutions up to 4096 PPR
- resolutions programmable with AMT Viewpoint™ PC software
- digitally set zero position



IN PARTNERSHIP WITH
 **LIN ENGINEERING**
 The Step Motor Specialists
 BACKED BY **MOONS'**

**MODEL**

| | step angle | current/phase | resistance/phase typ | inductance/phase typ | max holding torque | max optimal speed | body length |
|------------------------|-------------------|----------------------|-----------------------------|-----------------------------|---------------------------|--------------------------|--------------------|
| | (°) | (A) | ($\Omega \pm 10\%$) | (mH $\pm 20\%$) | (oz-in) | (RPS) | max (inch) |
| NEMA17-13-04SD-AMT112S | 1.8 | 0.67 | 9.9 | 12.52 | 42.0 | 6 | 1.34 |
| NEMA17-13-04PD-AMT112S | 1.8 | 1.33 | 2.5 | 3.09 | 42.0 | 11 | 1.34 |
| NEMA17-16-06SD-AMT112S | 1.8 | 0.70 | 10.8 | 21.84 | 63.0 | 3 | 1.58 |
| NEMA17-16-06PD-AMT112S | 1.8 | 1.40 | 2.7 | 5.46 | 63.0 | 6 | 1.58 |
| NEMA17-19-07SD-AMT112S | 1.8 | 1.05 | 1.3 | 9.36 | 83.0 | 5 | 1.89 |
| NEMA17-19-07PD-AMT112S | 1.8 | 2.10 | 5.2 | 2.34 | 83.0 | 9 | 1.89 |
| NEMA17-23-01D-AMT112S | 1.8 | 2.00 | 2.0 | 2.91 | 110.0 | 7 | 2.34 |

AMT112S ENCODER ELECTRICAL

| parameter | conditions/description | min | typ | max | units |
|------------------------------|------------------------|---------|-----|-----|-------|
| power supply | VDD | 4.5 | 5 | 5.5 | V |
| start up time | | | 200 | | ms |
| current consumption | with unloaded output | | 16 | | mA |
| output high level | | VDD-0.1 | | | V |
| output low level | | | | 0.1 | V |
| output current (per channel) | | | | 15 | mA |
| rise/fall time | | | 8 | | ns |

INCREMENTAL CHARACTERISTICS

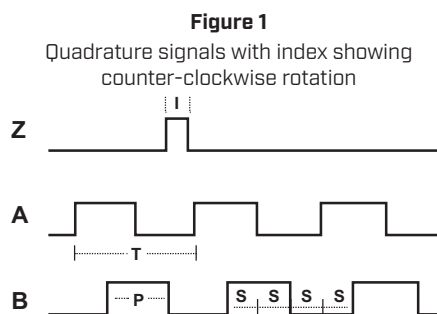
| parameter | conditions/description | min | typ | max | units |
|-------------------------------------|---|-----|-----|-----|---------|
| channels | CMOS Voltage: A, B, Z | | | | |
| waveform | CMOS voltage square wave | | | | |
| phase difference | A leads B for CCW rotation (viewed from front) | | | | |
| quadrature resolutions ¹ | 48, 96, 100, 125, 192, 200, 250, 256, 360, 384, 400, 500, 512, 768, 800, 1000, 1024, 1600, 2000, 2048, 2500, 4096 | | | | PPR |
| index ² | one pulse per 360 degree rotation | | | | |
| accuracy | | | 0.2 | | degrees |
| quadrature duty cycle | | | 50 | | % |

Notes: 1. Resolution programmed with AMT Viewpoint™ PC software. Default resolution set to 400 PPR.
2. Zero position alignment set with AMT One Touch Zero™ module, AMT Viewpoint™ PC software, or serial commands

MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---------------------------------------|---|-----|------|------|-------|
| weight | | | 15.7 | | g |
| rotational speed (at each resolution) | 48, 96, 100, 125, 192, 200, 250, 256, 384, 400, 500, 512, 800, 1000, 1024, 2048 | | | 8000 | RPM |
| | 360, 768, 1600, 2000, 4096 | | | 4000 | RPM |
| | 2500 | | | 2500 | RPM |

ENCODER WAVEFORMS




The following parameters are defined by the resolution selected for each encoder, where R = resolution.

| Parameter | Description | Expression | Units |
|-----------|-----------------|------------|--------------------|
| T | period | $360/R$ | mechanical degrees |
| P | pulse width | $T/2$ | mechanical degrees |
| I | index width | $P/2$ | mechanical degrees |
| S | A/B state width | $P/2$ | mechanical degrees |

STEPPER MOTOR SPECIFICATIONS

| parameter | conditions/description | min | typ | max | units |
|---------------------|--|-----|-------|-------|--------------------|
| motor frame size | NEMA Size 17 | | | | |
| step angle | | | 1.8 | | ° |
| rated current/phase | see page 1 for details | | | | |
| rated voltage | | | 24-48 | | Vdc |
| resistance/phase | see page 1 for details | | | | |
| inductance/phase | see page 1 for details | | | | |
| connection type | bipolar | | | | |
| rotor inertia | NEMA17-13-04SD-AMT112S, NEMA17-13-04PD-AMT112S | | 0.18 | | oz-in ² |
| | NEMA17-16-06SD-AMT112S, NEMA17-16-06PD-AMT112S | | 0.28 | | oz-in ² |
| | NEMA17-19-07SD-AMT112S, NEMA17-19-07PD-AMT112S | | 0.37 | | oz-in ² |
| | NEMA17-23-01D-AMT112S | | 0.56 | | oz-in ² |
| max holding torque | see page 1 for details | | | | |
| bearing type | ABEC3 | | | | |
| front shaft OD | | | 5 | | mm |
| front shaft length | | | 0.94 | | inch |
| max optimal speed | see page 1 for details | | | | |
| max axial load | | | | 6 | lb |
| radial play | at 1 lb load | | | 0.001 | inch |
| end play | at 2 lbs load | | | 0.003 | inch |
| shaft run out | | | 0.002 | | inch TIR |
| dielectric strength | | | 500 | | V |
| EMI/EMC | EN 55014-1:2007 | | | | |

SWITCHING SEQUENCE

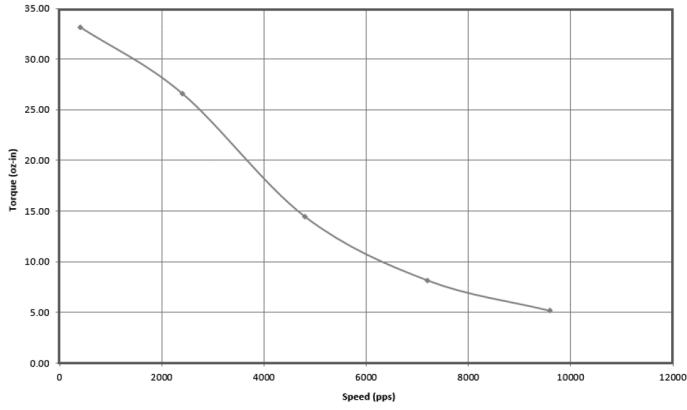
| SWITCHING SEQUENCE | | | | | |
|---|------|---|---|---|---|
| CCW | STEP | A | A | B | B |
|  | 1 | + | - | + | - |
| | 2 | + | - | - | + |
| | 3 | - | + | - | + |
| | 4 | - | + | + | - |
| | 1 | + | - | + | - |
| Motor Rotation Viewed from Front Shaft End | | | | | |

ENVIRONMENTAL

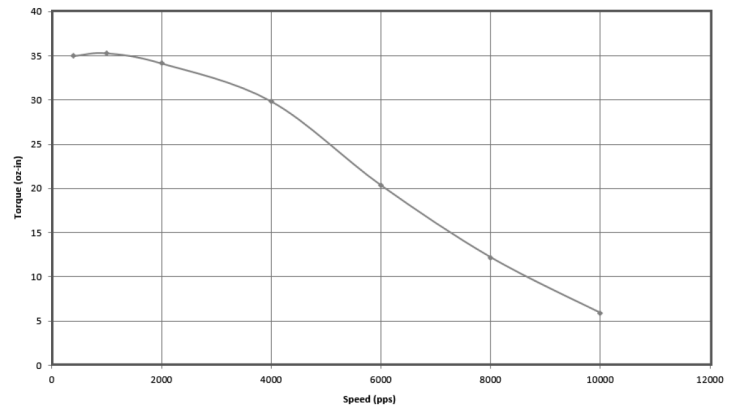
| parameter | conditions/description | min | typ | max | units |
|-----------------------|--|-----|-----|-----|-------|
| operating temperature | | -20 | | 50 | °C |
| storage temperature | | -20 | | 100 | °C |
| humidity | non-condensing | | | 85 | % |
| vibration | 10-500 Hz, 5 minute sweep, 2 hours on each XYZ | | | 5 | G |
| shock | 3 pulses, 6 ms, 3 on each XYZ | | | 200 | G |
| RoHS | yes | | | | |

TORQUE CURVES

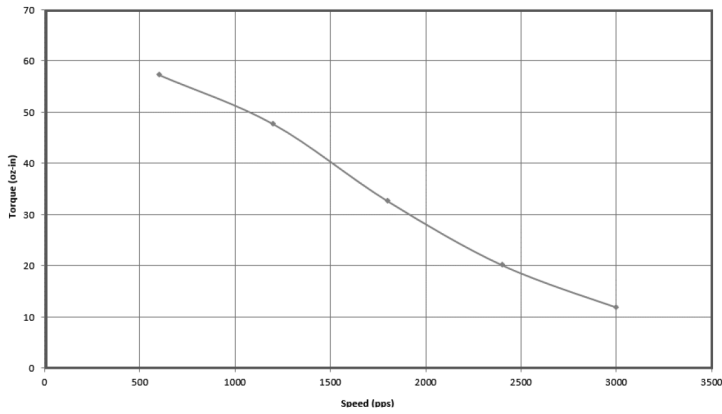
CUI Devices P/N NEMA17-13-04SD-AMT112S
Lin Engineering P/N WO-4118S-04S (1.8 Step Motor)
24 Vdc, 0.67 Amp/Phase, IB463, 1/2 Stepping



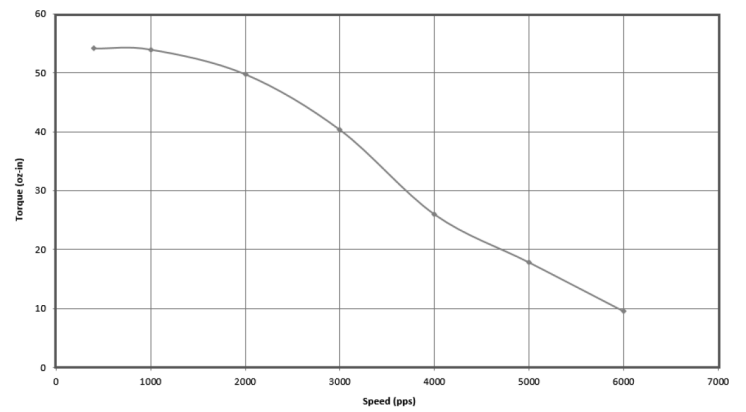
CUI Devices P/N NEMA17-13-04PD-AMT112S
Lin Engineering P/N WO-4118S-04P (1.8 Step Motor)
24 Vdc, 1.33 Amp/Phase, IB462, 1/2 Stepping



CUI Devices P/N NEMA17-16-06SD-AMT112S
Lin Engineering P/N WO-4118M-06S (1.8 Step Motor)
24 Vdc, 0.7 Amp/Phase, R208, 1/2 Stepping

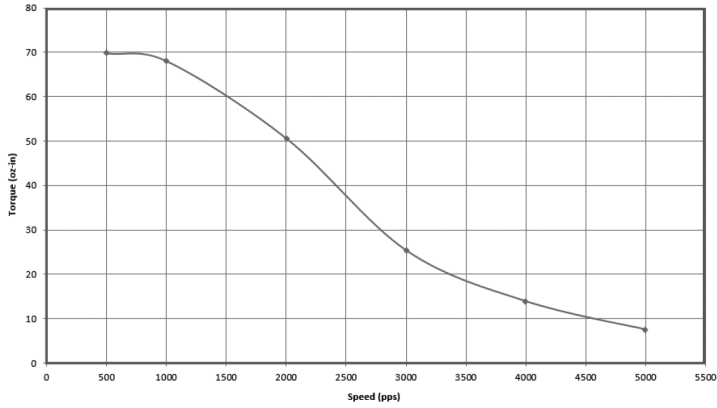


CUI Devices P/N NEMA17-16-06PD-AMT112S
Lin Engineering P/N WO-4118M-06P (1.8 Step Motor)
24 Vdc, 1.4 Amp/Phase, IB462, 1/2 Stepping

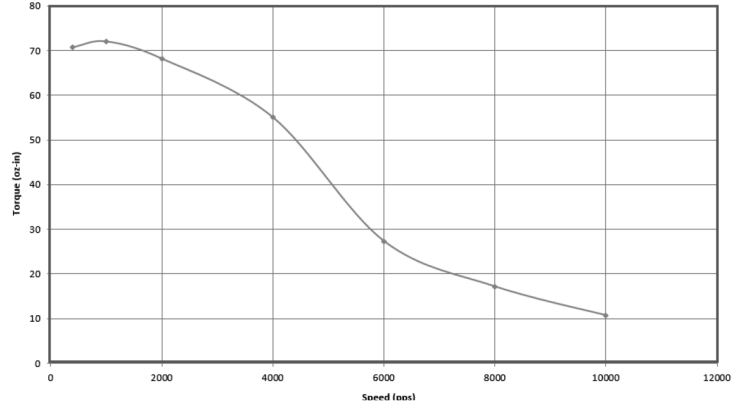


TORQUE CURVES (CONTINUED)

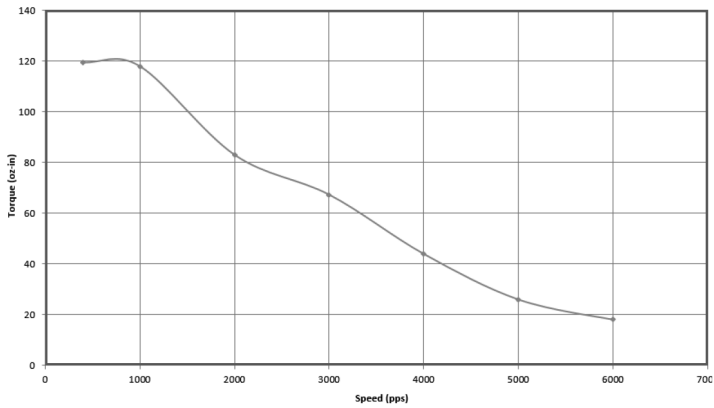
CUI Devices P/N NEMA17-19-07SD-AMT112S
 Lin Engineering P/N WD-4118L-07S (1.8 Step Motor)
 24 Vdc, 1.05 Amp/Phase, IB462, 1/2 Stepping



CUI Devices P/N NEMA17-19-07PD-AMT112S
 Lin Engineering P/N WD-4118L-07P (1.8 Step Motor)
 24 Vdc, 2.1 Amp/Phase, IB463, 1/2 Stepping

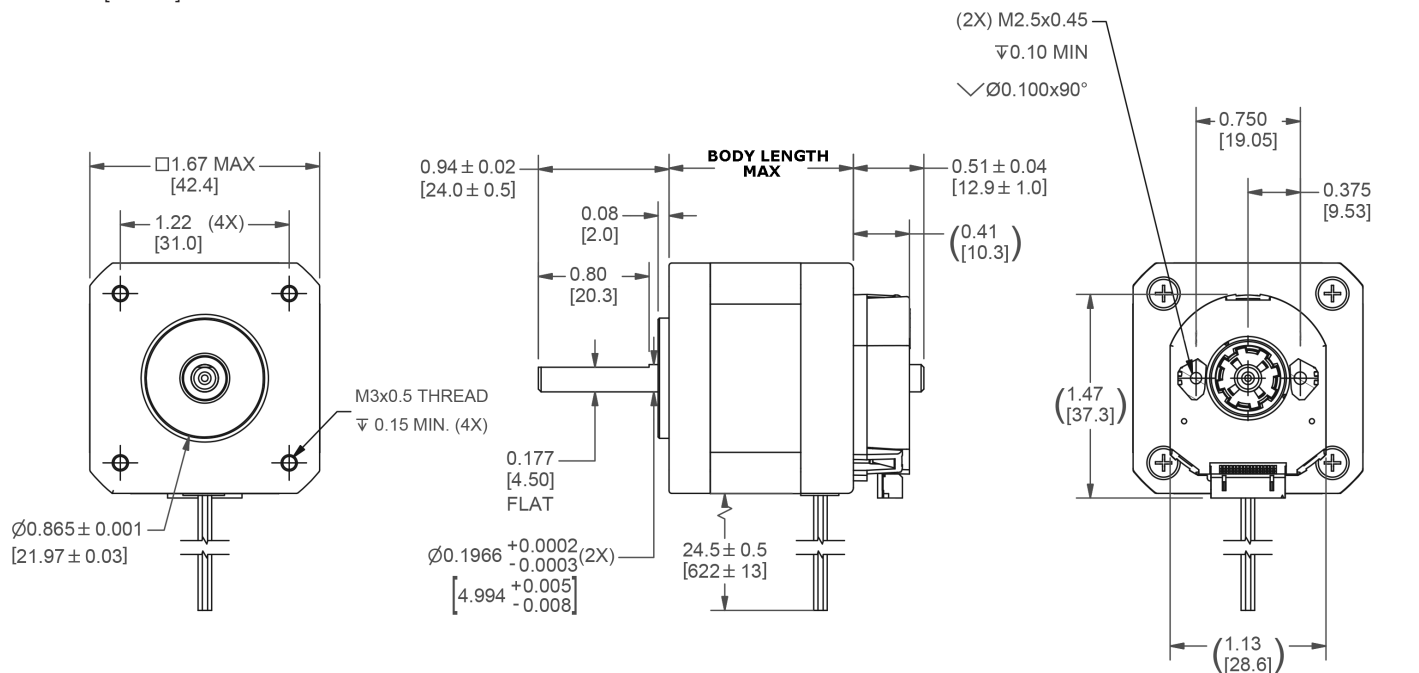


CUI Devices P/N NEMA17-23-01D-AMT112S
 Lin Engineering P/N WD-4118C-01 (1.8 Step Motor)
 24 Vdc, 2 Amp/Phase, IB463, 1/2 Stepping

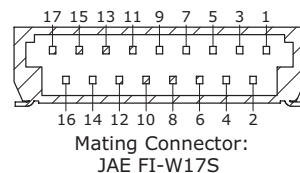


MECHANICAL DRAWING

units: inch [mm]
 tolerance:
 X.XX ±0.01 [±0.25]
 X.XXX ±0.005 [±0.13]
 X.XXXX ±0.0005 [±0.013]



| MOTOR WIRE CONNECTIONS | |
|---------------------------|-----------|
| Color | Function |
| red | A |
| blue | \bar{A} |
| green | B |
| black | \bar{B} |
| 26 AWG ³ , PVC | |



| MODEL NO. | BODY LENGTH (inch) | WEIGHT (lb) |
|------------------------|--------------------|-------------|
| NEMA17-13-04SD-AMT112S | 1.34 | 0.50 |
| NEMA17-13-04PD-AMT112S | 1.34 | 0.50 |
| NEMA17-16-06SD-AMT112S | 1.58 | 0.65 |
| NEMA17-16-06PD-AMT112S | 1.58 | 0.65 |
| NEMA17-19-07SD-AMT112S | 1.89 | 0.80 |
| NEMA17-19-07PD-AMT112S | 1.89 | 0.80 |
| NEMA17-23-01D-AMT112S | 2.34 | 0.90 |

| ENCODER CONNECTIONS | |
|---------------------|----------|
| # | Function |
| 1 | TX_ENC+ |
| 2 | RX_ENC+ |
| 3 | N/A |
| 4 | GND |
| 5 | N/A |
| 6 | +5 V |
| 7 | N/A |
| 8 | B+ |
| 9 | N/A |
| 10 | A+ |
| 11 | N/A |
| 12 | Z+ |
| 13 | N/A |
| 14 | MCLRB |
| 15 | N/A |
| 16 | N/A |
| 17 | N/A |

Note 3. NEMA17-19-07PD-AMT112S & NEMA17-23-01D-AMT112S models have 22 AWG wires.

REVISION HISTORY

| rev. | description | date |
|------|------------------------------|------------|
| 1.0 | initial release | 06/26/2018 |
| 1.01 | corrected datasheet typos | 08/29/2019 |
| 1.02 | brand update | 02/20/2020 |
| 1.03 | logo, datasheet style update | 08/05/2022 |

The revision history provided is for informational purposes only and is believed to be accurate.



CUI Devices offers a one (1) year limited warranty. Complete warranty information is listed on our website.

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