


SERIES: NEMA11-AMT112S | **DESCRIPTION:** STEPPER SERVO MOTOR

FEATURES

- CUI AMT112S encoder + LIN Engineering stepper motor
- stepper motor with encoder for closed-loop mode when paired with a controller
- small, compact NEMA 11 frame size
- up to 16.6 oz-in (0.12 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 | inductance/phase | max holding torque | max optimal speed | body length |
|-----------------------|------------|---------------|------------------------------|-------------------------|--------------------|-------------------|---------------|
| | (°) | (A) | typ ($\Omega \pm 10\%$) | typ (mH $\pm 20\%$) | (oz-in) | (RPS) | max (inch) |
| NEMA11-13-01D-AMT112S | 1.8 | 0.67 | 5.6 | 3.08 | 9.2 | 16 | 1.26 |
| NEMA11-18-01D-AMT112S | 1.8 | 0.67 | 7.1 | 4.79 | 13.7 | 13 | 1.77 |
| NEMA11-18-02D-AMT112S | 1.8 | 1.3 | 1.3 | 0.63 | 12.0 | 44 | 1.77 |
| NEMA11-20-01D-AMT112S | 1.8 | 0.67 | 8.6 | 6.16 | 16.6 | 11 | 2.01 |
| NEMA11-20-02D-AMT112S | 1.8 | 1.3 | 1.9 | 1.46 | 16.6 | 22 | 2.01 |

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

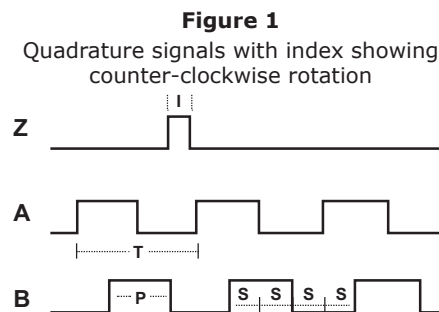
| parameter | conditions/description | min | typ | max | units |
|-------------------------------------|---|-----|-----|-----|---------|
| channels | CMOS Voltage: A, B, Z | | | | |
| waveform | CMOS voltage square wave | | | | |
| phase difference | A leads B for CCW rotation (viewed from front) | | | | |
| 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 11 | | | | |
| 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 | NEMA11-13-01D-AMT112S | | 0.05 | | oz-in ² |
| | NEMA11-18-01D-AMT112S, NEMA11-18-02D-AMT112S | | 0.07 | | oz-in ² |
| | all other models | | 0.10 | | oz-in ² |
| max holding torque | see page 1 for details | | | | |
| bearing type | ABEC3 | | | | |
| front shaft OD | | | 5 | | mm |
| front shaft length | | | 0.79 | | inch |
| max optimal speed | see page 1 for details | | | | |
| max axial load | | | | 2.25 | 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 | + | - | + | - |

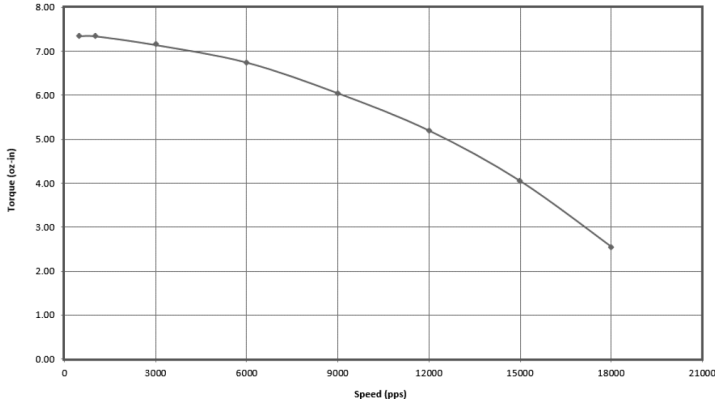
Motor Rotation Viewed from Front Shaft End

ENVIRONMENTAL

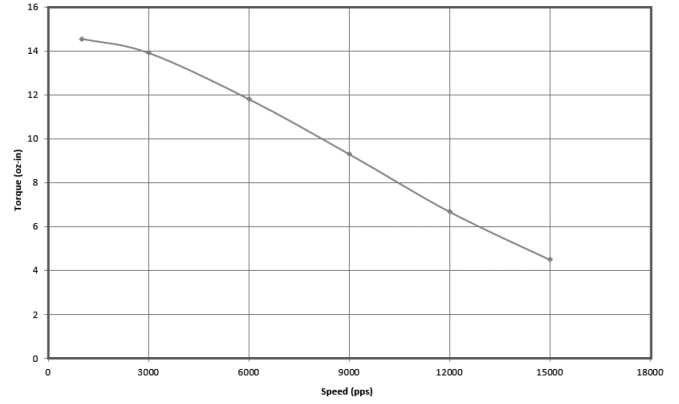
| parameter | conditions/description | min | typ | max | units |
|-----------------------|--|-----|-----|-----|-------|
| operating temperature | | -20 | | 50 | °C |
| storage temperature | | -20 | | 100 | °C |
| humidity | non-condensing | | | 85 | % |
| vibration | 10~500 Hz, 5 minute sweep, 2 hours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

TORQUE CURVES

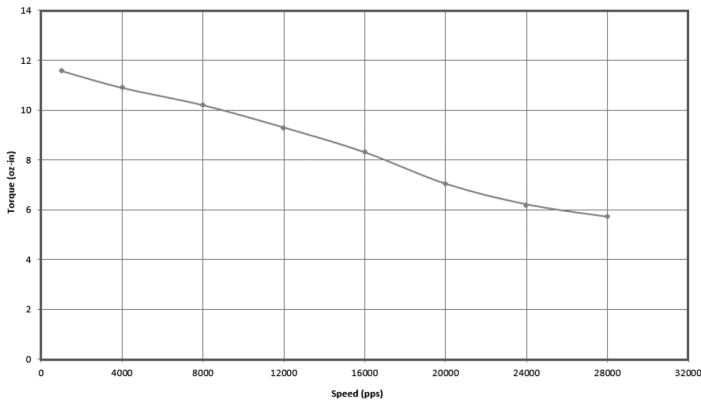
CUI P/N NEMA11-13-01D-AMT112S
 Lin Engineering P/N WO-211-13-01 (1.8 Step Motor)
 24 Vdc, 0.67 Amp/Phase, IB462, 1/2 Stepping



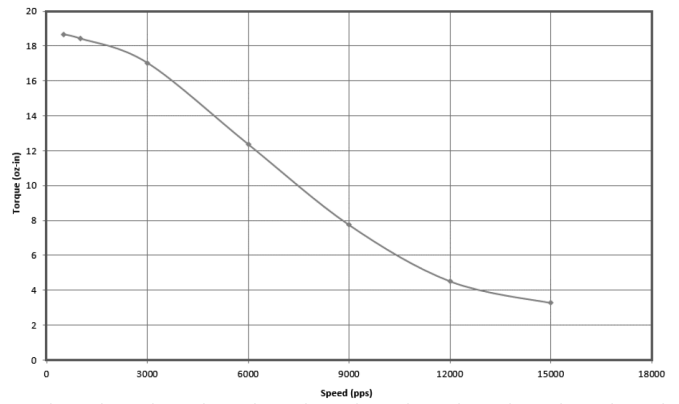
CUI P/N NEMA11-18-01D-AMT112S
 Lin Engineering P/N WO-211-18-01 (1.8 Step Motor)
 24 Vdc, 0.67 Amp/Phase, R208, 1/2 Stepping



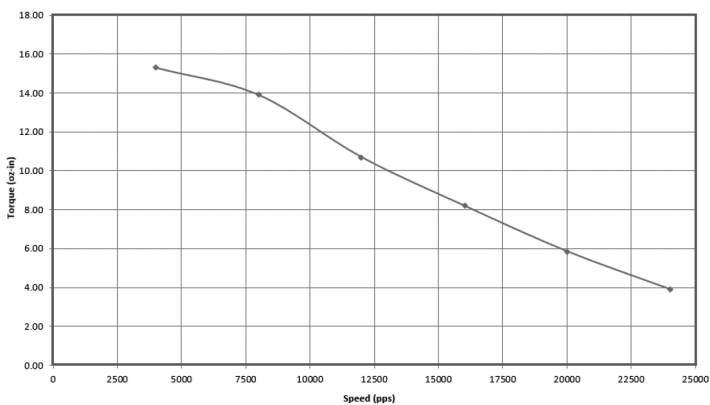
CUI P/N NEMA11-18-02D-AMT112S
 Lin Engineering P/N WO-211-18-02 (1.8 Step Motor)
 24 Vdc, 1.3 Amp/Phase, R208, 1/2 Stepping



CUI P/N NEMA11-20-01D-AMT112S
 Lin Engineering P/N WO-211-20-01 (1.8 Step Motor)
 24 Vdc, 0.67 Amp/Phase, R208, 1/2 Stepping

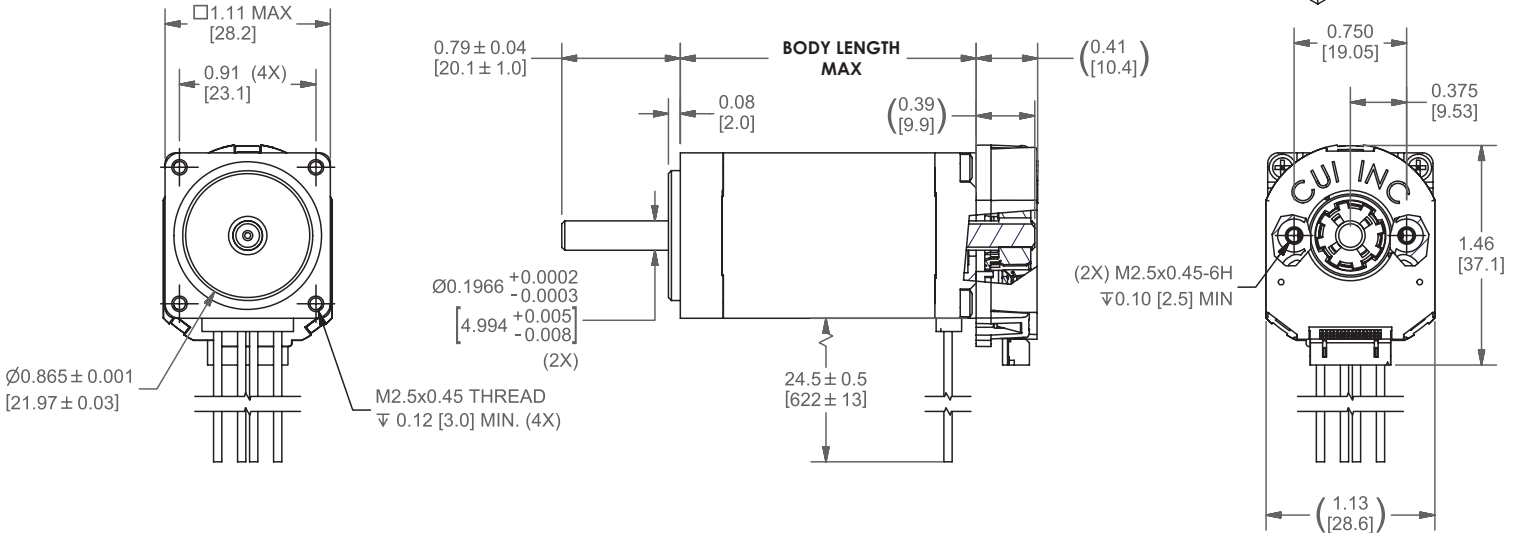
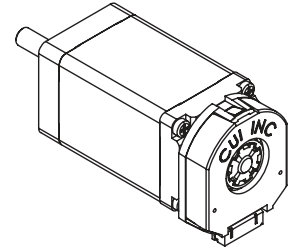


CUI P/N NEMA11-20-02D-AMT112S
 Lin Engineering P/N WO-211-20-02 (1.8 Step Motor)
 24 Vdc, 1.3 Amp/Phase, R208, 1/2 Stepping

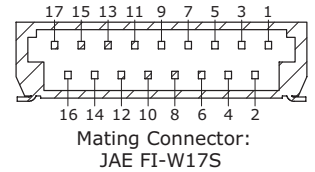


MECHANICAL DRAWING

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, PVC | |



| MODEL NO. | BODY LENGTH (inch) | WEIGHT (lb) |
|-----------------------|--------------------|-------------|
| NEMA11-13-01D-AMT112S | 1.26 | 0.24 |
| NEMA11-18-01D-AMT112S | 1.77 | 0.35 |
| NEMA11-18-02D-AMT112S | 1.77 | 0.35 |
| NEMA11-20-01D-AMT112S | 2.01 | 0.45 |
| NEMA11-20-02D-AMT112S | 2.01 | 0.45 |

| 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 | MCLR \bar{B} |
| 15 | N/A |
| 16 | N/A |
| 17 | N/A |

REVISION HISTORY

| rev. | description | date |
|------|-----------------|------------|
| 1.0 | initial release | 06/26/2018 |

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



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JONHON

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