

**SERIES:** NEMA11-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 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<br>(Ω±10%)   | typ<br>(mH±20%)  | (oz-in)            | (RPS)             | max<br>(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 <sup>1</sup> | 48, 96, 100, 125, 192, 200, 250, 256, 360, 384, 400, 500, 512, 768, 800, 1000, 1024, 1600, 2000, 2048, 2500, 4096 |     |     |     | PPR     |
| index <sup>2</sup>                  | one pulse per 360 degree rotation                                                                                 |     |     |     |         |
| accuracy                            |                                                                                                                   |     | 0.2 |     | degrees |
| quadrature duty cycle               |                                                                                                                   |     | 50  |     | %       |

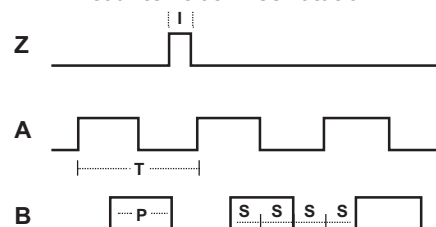
Notes: 1. Resolution programmed with AMT Viewpoint™ PC software. Default resolution set to 400 PPR.  
2. Zero position alignment set with AMT One Touch Zero™ module, AMT Viewpoint™ PC software, or serial commands

## 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

**Figure 1**  
Quadrature signals with index showing counter-clockwise rotation



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 <sup>2</sup> |
|                     | NEMA11-18-01D-AMT112S, NEMA11-18-02D-AMT112S |     | 0.07  |       | oz-in <sup>2</sup> |
|                     | all other models                             |     | 0.10  |       | oz-in <sup>2</sup> |
| 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

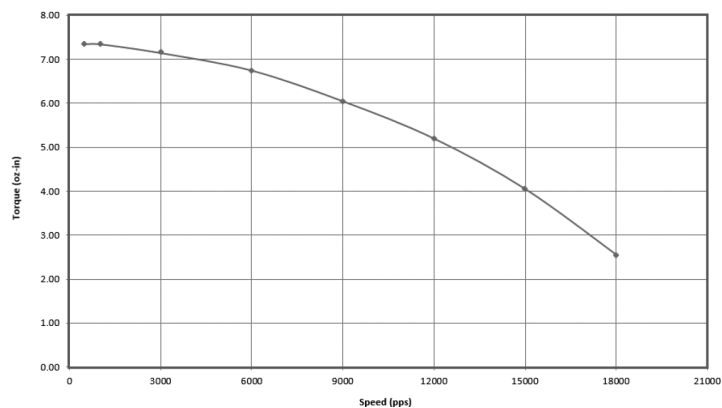
| SWITCHING SEQUENCE                                                                  |      |   |   |   |   |
|-------------------------------------------------------------------------------------|------|---|---|---|---|
| CCW                                                                         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

## ENVIRONMENTAL

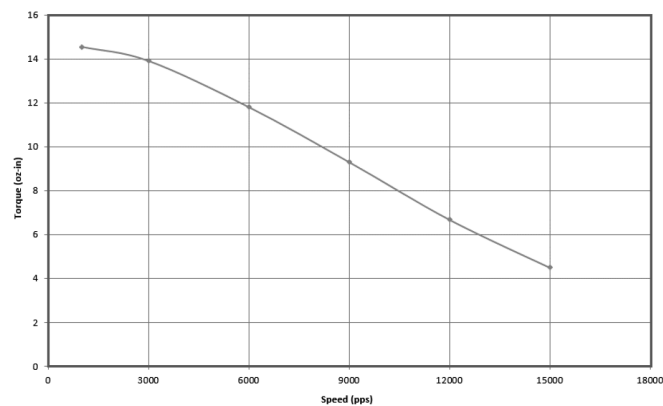
| parameter             | conditions/description                         | min | typ | max | units |
|-----------------------|------------------------------------------------|-----|-----|-----|-------|
| operating temperature |                                                | -20 |     | 50  | °C    |
| 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

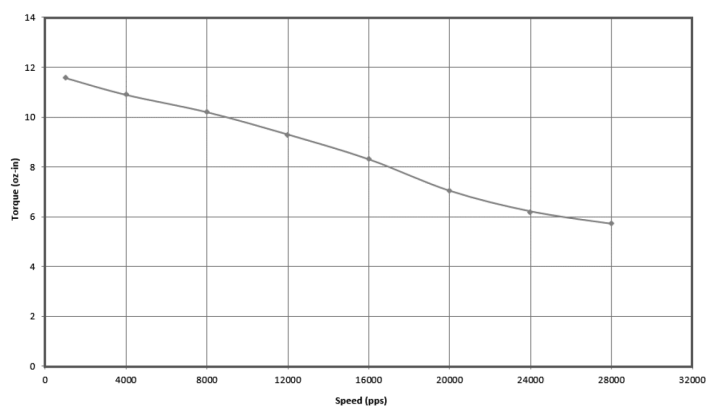
CUI Devices P/N NEMA11-13-01D-AMT112S  
Lin Engineering P/N WO-211-13-01 (1.8 Step Motor)  
24 Vdc, 0.67 Amp/Phase, IB462, 1/2 Stepping



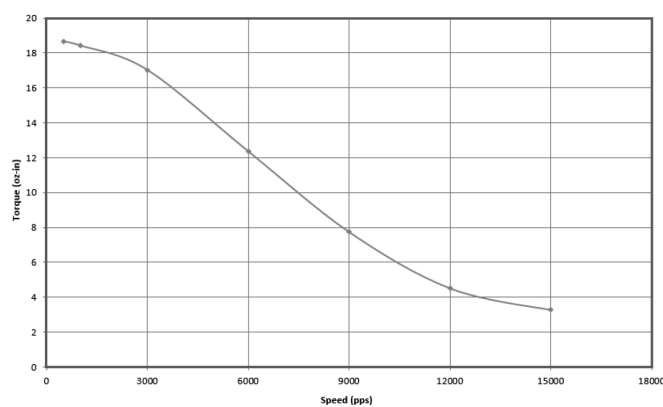
CUI Devices P/N NEMA11-18-01D-AMT112S  
Lin Engineering P/N WO-211-18-01 (1.8 Step Motor)  
24 Vdc, 0.67 Amp/Phase, R208, 1/2 Stepping



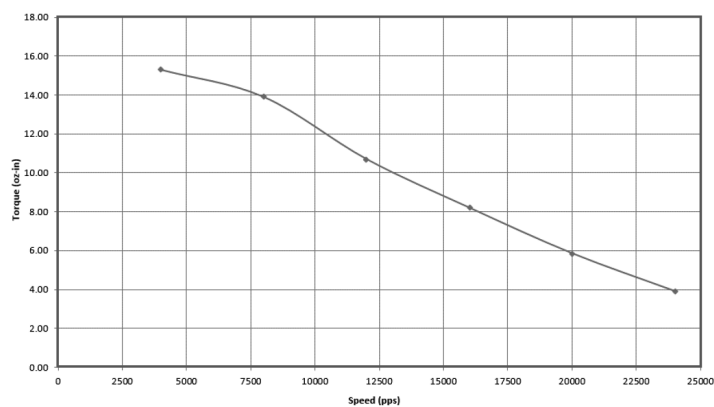
CUI Devices P/N NEMA11-18-02D-AMT112S  
Lin Engineering P/N WO-211-18-02 (1.8 Step Motor)  
24 Vdc, 1.3 Amp/Phase, R208, 1/2 Stepping



CUI Devices 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 Devices 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





## REVISION HISTORY

| rev. | description     | date       |
|------|-----------------|------------|
| 1.0  | initial release | 06/26/2018 |
| 1.01 | brand update    | 02/20/2020 |

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

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# CUI DEVICES

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