

**SERIES:** NEMA23-AMT112S | **DESCRIPTION:** STEPPER SERVO MOTOR**FEATURES**

- Same Sky AMT112S encoder + LIN Engineering stepper motor
- stepper motor with encoder for closed-loop mode when paired with a controller
- small, compact NEMA 23 frame size
- up to 270 oz-in [1.90 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<br>angle | current/<br>phase | resistance/<br>phase<br>typ | inductance<br>/phase<br>typ | max holding<br>torque | max optimal<br>speed | body length   |
|------------------------|---------------|-------------------|-----------------------------|-----------------------------|-----------------------|----------------------|---------------|
|                        | (°)           | [A]               | [Ω±10%]                     | [mH±20%]                    | [oz-in]               | [RPS]                | max<br>[inch] |
| NEMA23-17-15SD-AMT112S | 1.8           | 2.10              | 1.2                         | 2.18                        | 85.0                  | 13                   | 1.74          |
| NEMA23-17-15PD-AMT112S | 1.8           | 4.20              | 0.3                         | 0.39                        | 85.0                  | 24                   | 1.74          |
| NEMA23-17-01SD-AMT112S | 1.8           | 1.40              | 2.8                         | 4.1                         | 85.0                  | 6                    | 1.74          |
| NEMA23-17-01PD-AMT112S | 1.8           | 2.80              | 0.7                         | 1.15                        | 85.0                  | 11                   | 1.74          |
| NEMA23-22-02SD-AMT112S | 1.8           | 2.10              | 1.8                         | 4.8                         | 170.0                 | 3                    | 2.22          |
| NEMA23-22-02PD-AMT112S | 1.8           | 4.20              | 0.5                         | 1.2                         | 170.0                 | 9                    | 2.22          |
| NEMA23-31-01SD-AMT112S | 1.8           | 1.40              | 4.5                         | 12.76                       | 270.0                 | 2                    | 3.1           |
| NEMA23-31-01PD-AMT112S | 1.8           | 2.80              | 1.1                         | 3.82                        | 270.0                 | 5                    | 3.1           |

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

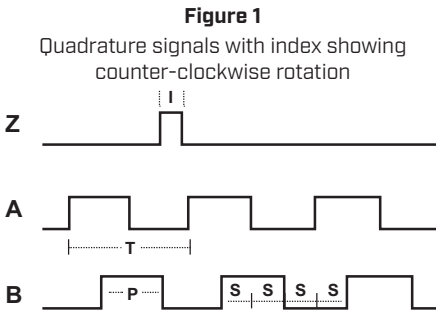
| parameter                           | conditions/description                                                                                            | min | typ | max | units   |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------|
| 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



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 23                                   |     |       |       |                    |
| step angle          |                                                |     | 1.8   |       | °                  |
| rated current/phase | see page 1 for details                         |     |       |       |                    |
| rated voltage       |                                                |     | 24-80 |       | Vdc                |
| resistance/phase    | see page 1 for details                         |     |       |       |                    |
| inductance/phase    | see page 1 for details                         |     |       |       |                    |
| connection type     | bipolar                                        |     |       |       |                    |
| rotor inertia       | NEMA23-22-02SD-AMT112S, NEMA23-22-02PD-AMT112S |     | 1.5   |       | oz-in <sup>2</sup> |
|                     | NEMA23-31-01SD-AMT112S                         |     | 2.60  |       | oz-in <sup>2</sup> |
|                     | NEMA23-31-01PD-AMT112S                         |     | 3.60  |       | oz-in <sup>2</sup> |
|                     | all other models                               |     | 0.70  |       | oz-in <sup>2</sup> |
| max holding torque  | see page 1 for details                         |     |       |       |                    |
| bearing type        | ABEC3                                          |     |       |       |                    |
| front shaft OD      |                                                |     | 6.35  |       | mm                 |
| front shaft length  |                                                |     | 0.81  |       | inch               |
| max optimal speed   | see page 1 for details                         |     |       |       |                    |
| max axial load      |                                                |     |       | 15    | 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

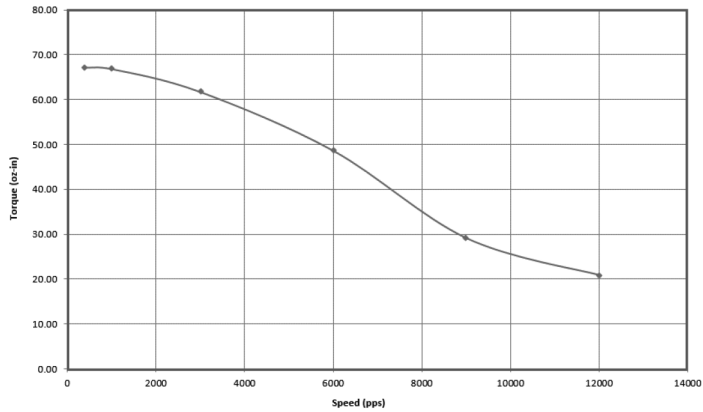
| SWITCHING SEQUENCE                                                                  |      |   |   |   |   |
|-------------------------------------------------------------------------------------|------|---|---|---|---|
| CCW                                                                         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

ENVIRONMENTAL

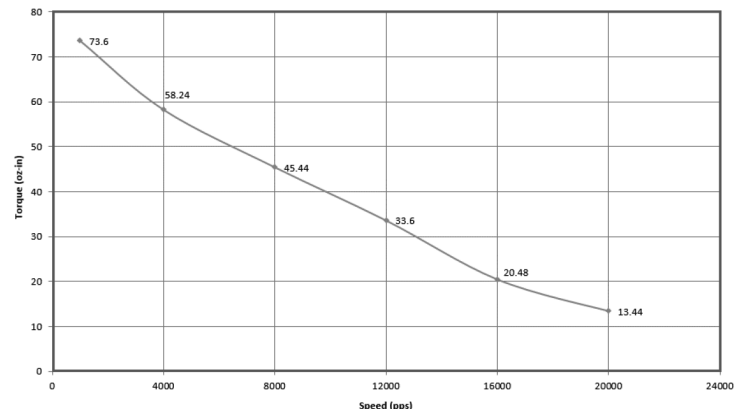
| parameter             | conditions/description                         | min | typ | max | units |
|-----------------------|------------------------------------------------|-----|-----|-----|-------|
| operating temperature |                                                | -20 |     | 50  | °C   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

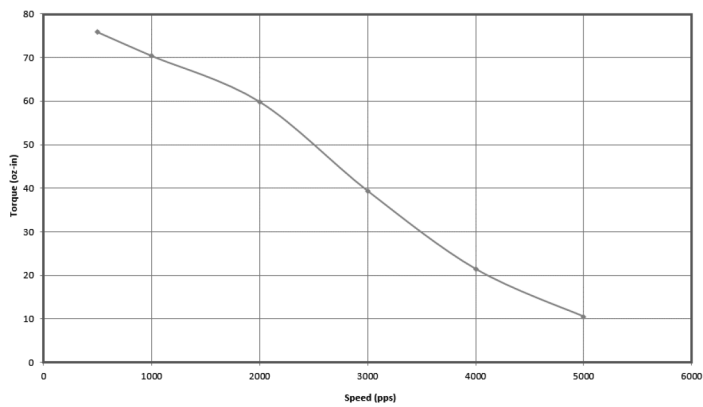
Same Sky P/N NEMA23-17-15SD-AMT112S  
Lin Engineering P/N WD-5718X-15S (1.8 Step Motor)  
24 Vdc, 2.10 Amp/Phase, R356, 1/2 Stepping



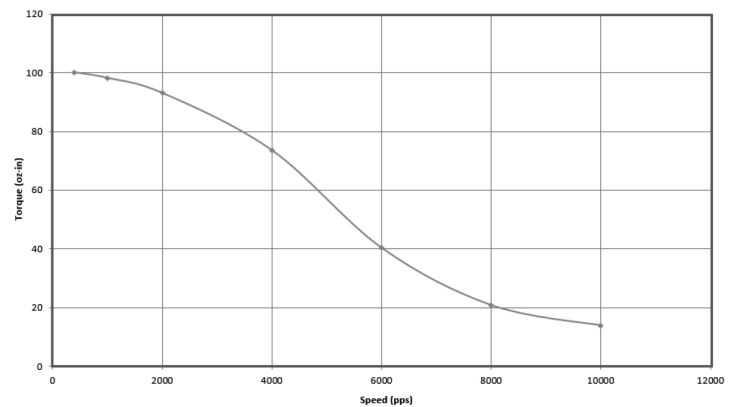
Same Sky P/N NEMA23-17-15PD-AMT112S  
Lin Engineering P/N WD-5718X-15P (1.8 Step Motor)  
24 Vdc, 4.2 Amp/Phase, Bipolar, 1/2 Stepping



Same Sky P/N NEMA23-17-01SD-AMT112S  
Lin Engineering P/N WD-5718X-01S (1.8 Step Motor)  
24 Vdc, 1.4 Amp/Phase, Bipolar, 1/2 Stepping

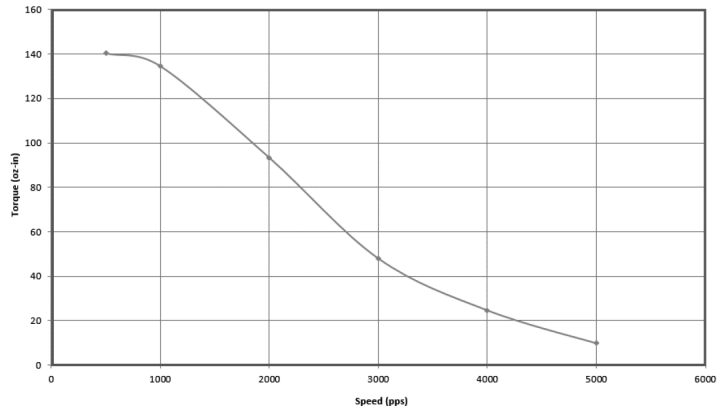


Same Sky P/N NEMA23-17-01PD-AMT112S  
Lin Engineering P/N WD-5718X-01P (1.8 Step Motor)  
24 Vdc, 2.8 Amp/Phase, 1B463, 1/2 Stepping

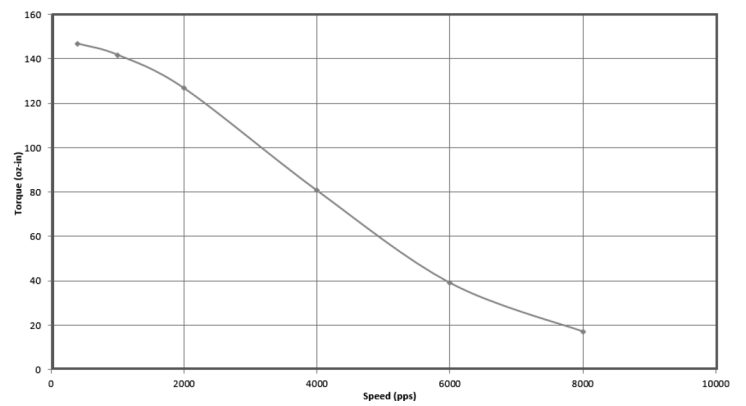


## TORQUE CURVES (CONTINUED)

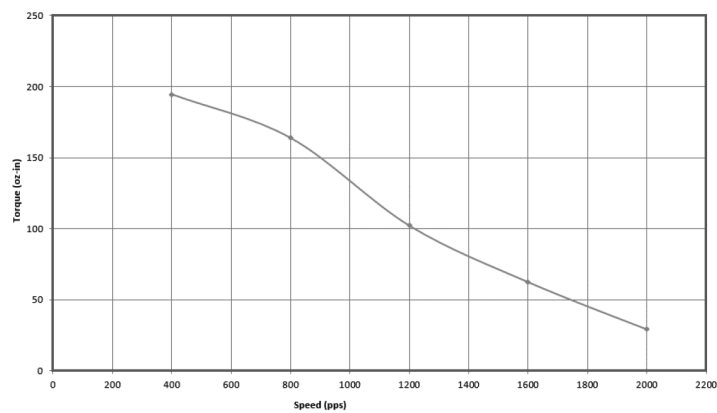
Same Sky P/N NEMA23-22-02SD-AMT112S  
Lin Engineering P/N WD-5718M-02S (1.8 Step Motor)  
24 Vdc, 2.1 Amp/Phase, Bipolar, 1/2 Stepping



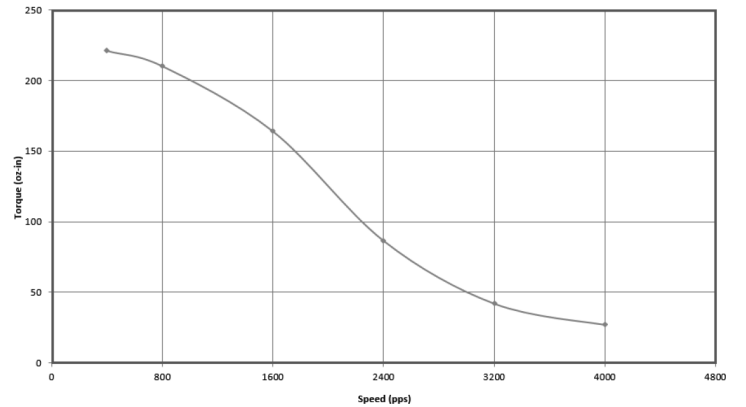
Same Sky P/N NEMA23-22-02PD-AMT112S  
Lin Engineering P/N WD-5718M-02P (1.8 Step Motor)  
24 Vdc, 4.2 Amp/Phase, IB1010, 1/2 Stepping



Same Sky P/N NEMA23-31-01SD-AMT112S  
Lin Engineering P/N WD-5718L-01S (1.8 Step Motor)  
24 Vdc, 1.4 Amp/Phase, Bipolar, 1/2 Stepping



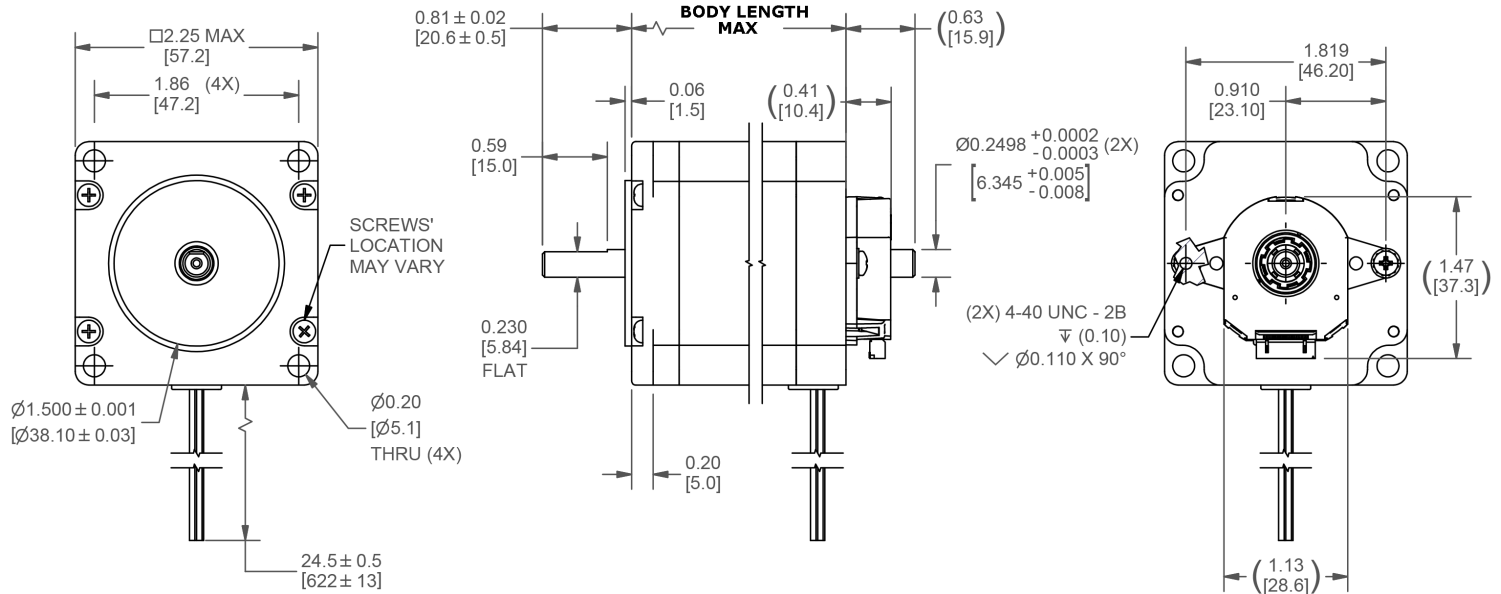
Same Sky P/N NEMA23-31-01PD-AMT112S  
Lin Engineering P/N WD-5718L-01P (1.8 Step Motor)  
24 Vdc, 2.8 Amp/Phase, IB463, 1/2 Stepping



## MECHANICAL DRAWING

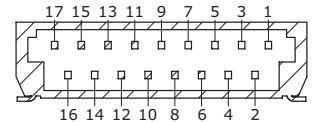
units: inch [mm]

tolerance:

X.XX  $\pm 0.01$  [ $\pm 0.25$ ]X.XXX  $\pm 0.005$  [ $\pm 0.13$ ]X.XXXX  $\pm 0.0005$  [ $\pm 0.013$ ]

## MOTOR WIRE CONNECTIONS

| Color       | Function  |
|-------------|-----------|
| red         | A         |
| blue        | $\bar{A}$ |
| green       | B         |
| black       | $\bar{B}$ |
| 22 AWG, PVC |           |

Mating Connector:  
JAE FI-W17S

## 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 B   |
| 15 | N/A      |
| 16 | N/A      |
| 17 | N/A      |

| MODEL NO.              | BODY LENGTH [inch] | WEIGHT [lb] |
|------------------------|--------------------|-------------|
| NEMA23-17-15SD-AMT112S | 1.74               | 1.05        |
| NEMA23-17-15PD-AMT112S | 1.74               | 1.05        |
| NEMA23-17-01SD-AMT112S | 1.74               | 1.05        |
| NEMA23-17-01PD-AMT112S | 1.74               | 1.05        |
| NEMA23-22-02SD-AMT112S | 2.22               | 1.50        |
| NEMA23-22-02PD-AMT112S | 2.22               | 1.50        |
| NEMA23-31-01SD-AMT112S | 3.10               | 2.35        |
| NEMA23-31-01PD-AMT112S | 3.10               | 2.35        |

REVISION HISTORY

| rev. | description                       | date       |
|------|-----------------------------------|------------|
| 1.0  | initial release                   | 06/26/2018 |
| 1.01 | brand update                      | 02/20/2020 |
| 1.02 | logo, datasheet style update      | 08/05/2022 |
| 1.03 | CUI Devices rebranded to Same Sky | 09/12/2024 |

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



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

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