

## LSM-E Series Datasheet

Applies to devices sold prior October 2021



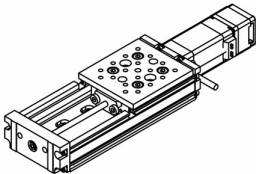
- 25, 50, 100, 150 and 200 mm travel
- 10 kg load capacity
- Encoder position feedback with slip/stall detection and automatic recovery
- Multiple LSM-E stages can be assembled in XY or XYZ configurations without additional hardware
- Designed for use with an X-MCC Series stepper motor controller or any 2-phase stepper motor controller
- With AutoDetect, the X-MCC controller configures its settings automatically for the connected peripheral
- Custom versions available

# LSM-E Series Overview

Zaber's LSM-E Series devices are computer-controlled, motorized linear stages with high thrust and speed capabilities and a very compact size. They are designed to interface with our X-MCC Series universal motor controllers, offering high resolution daisy-chainable operation. Set up is easy with AutoDetect. Once connected, the X-MCC controller will automatically detect and configure the LSM-E.

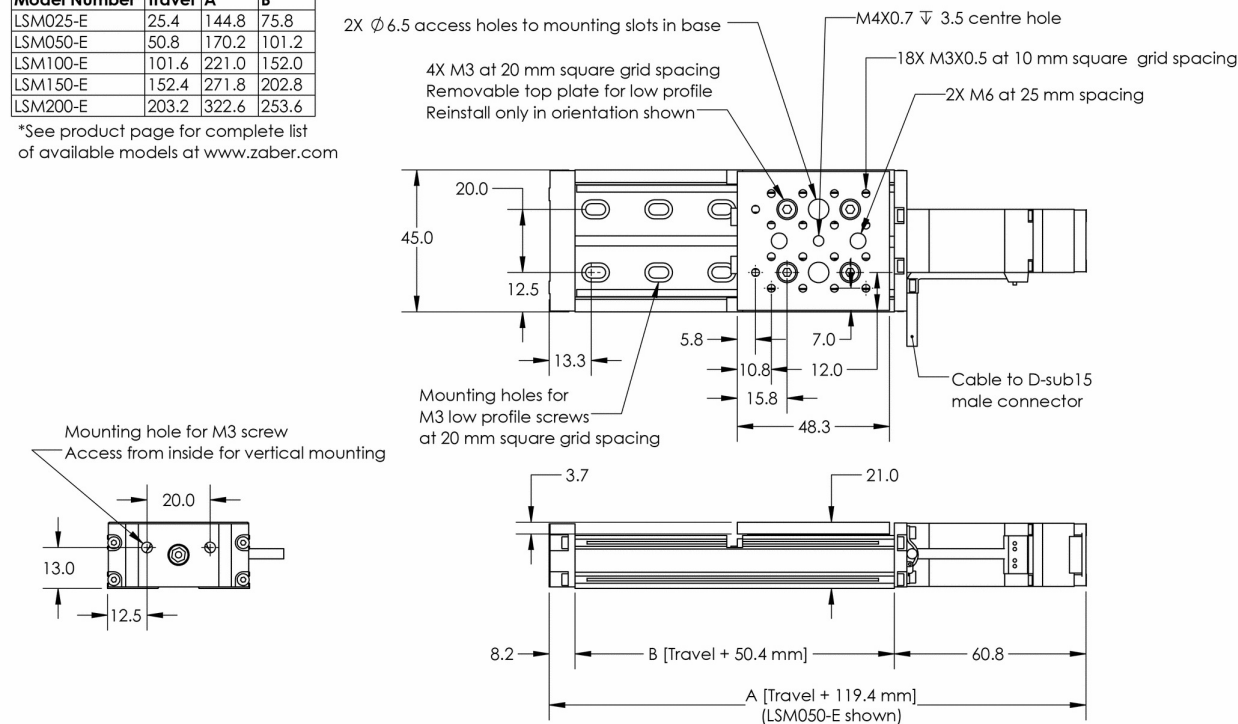
The built-in motor encoder allows closed-loop operation and slip/stall recovery features. At only 21 mm high, these miniature stages are excellent for applications where a small profile is required. The LSM-E's innovative design allows speeds up to 104 mm/s and loads up to 10 kg. The stages can be mounted in XY and XYZ configurations with no additional hardware.

## LSM-E Series Drawings



| Model Number* | Travel | A     | B     |
|---------------|--------|-------|-------|
| LSM025-E      | 25.4   | 144.8 | 75.8  |
| LSM050-E      | 50.8   | 170.2 | 101.2 |
| LSM100-E      | 101.6  | 221.0 | 152.0 |
| LSM150-E      | 152.4  | 271.8 | 202.8 |
| LSM200-E      | 203.2  | 322.6 | 253.6 |

\*See product page for complete list of available models at [www.zaber.com](http://www.zaber.com)



DWG 1178 R01

## LSM-E Series Specifications

| Specification               | Value                                                | Alternate Unit |
|-----------------------------|------------------------------------------------------|----------------|
| Built-in Controller         | No                                                   |                |
| Recommended Controller      | X-MCC (48 V) Recommended                             |                |
| AutoDetect                  | Yes                                                  |                |
| Encoder Resolution          | 200 CPR                                              | 800 states/rev |
| Encoder Type                | Rotary quadrature encoder                            |                |
| Maximum Continuous Thrust   | 25 N                                                 | 5.6 lb         |
| Maximum Centered Load       | 100 N                                                | 22.4 lb        |
| Maximum Cantilever Load     | 300 N-cm                                             | 424.8 oz-in    |
| Guide Type                  | Needle roller bearing                                |                |
| Stiffness in Pitch          | 55 N-m/°                                             | 317 µrad/N-m   |
| Stiffness in Roll           | 52.5 N-m/°                                           | 332 µrad/N-m   |
| Stiffness in Yaw            | 85 N-m/°                                             | 205 µrad/N-m   |
| Motor Steps Per Rev         | 200                                                  |                |
| Motor Type                  | Stepper (2 phase)                                    |                |
| Motor Rated Current         | 600 mA/phase                                         |                |
| Motor Winding Resistance    | 6.5 ohms/phase                                       |                |
| Inductance                  | 3.5 mH/phase                                         |                |
| Motor Connection            | D-sub 15                                             |                |
| Motor Rotor Inertia         | 2.9 g-cm <sup>2</sup>                                |                |
| Default Resolution          | 1/64 of a step                                       |                |
| Motor Frame Size            | NEMA 08                                              |                |
| Mechanical Drive System     | Precision lead screw                                 |                |
| Limit or Home Sensing       | Magnetic hall sensor                                 |                |
| Axes of Motion              | 1                                                    |                |
| Mounting Interface          | M3 and M6 threaded holes and M4 threaded centre hole |                |
| Operating Temperature Range | 0 to 50 °C                                           |                |
| Vacuum Compatible           | No                                                   |                |
| RoHS Compliant              | Yes                                                  |                |
| Stage Parallelism           | < 25 µm                                              | < 0.000984"    |
| CE Compliant                | Yes                                                  |                |

| Part Number    | Microstep Size<br>(Default Resolution) | Travel Range         | Accuracy<br>(unidirectional) | Repeatability           |
|----------------|----------------------------------------|----------------------|------------------------------|-------------------------|
| LSM025A-E03T4A | 0.047625 µm                            | 25.4 mm (1.000")     | 15 µm<br>(0.000591")         | < 3 µm<br>(< 0.000118") |
| LSM025B-E03T4A | 0.1905 µm                              | 25.4 mm (1.000")     | 15 µm<br>(0.000591")         | < 6 µm<br>(< 0.000236") |
| LSM050A-E03T4A | 0.047625 µm                            | 50.8 mm (2.000")     | 20 µm<br>(0.000787")         | < 3 µm<br>(< 0.000118") |
| LSM050B-E03T4A | 0.1905 µm                              | 50.8 mm (2.000")     | 25 µm<br>(0.000984")         | < 6 µm<br>(< 0.000236") |
| LSM100A-E03T4A | 0.047625 µm                            | 101.6 mm<br>(4.000") | 35 µm<br>(0.001378")         | < 3 µm<br>(< 0.000118") |
| LSM100B-E03T4A | 0.1905 µm                              | 101.6 mm<br>(4.000") | 45 µm<br>(0.001772")         | < 6 µm<br>(< 0.000236") |
| LSM150A-E03T4A | 0.047625 µm                            | 152.4 mm<br>(6.000") | 50 µm<br>(0.001968")         | < 3 µm<br>(< 0.000118") |
| LSM150B-E03T4A | 0.1905 µm                              | 152.4 mm<br>(6.000") | 65 µm<br>(0.002559")         | < 6 µm<br>(< 0.000236") |
| LSM200A-E03T4A | 0.047625 µm                            | 203.2 mm<br>(8.000") | 60 µm<br>(0.002362")         | < 3 µm<br>(< 0.000118") |
| LSM200B-E03T4A | 0.1905 µm                              | 203.2 mm<br>(8.000") | 85 µm<br>(0.003346")         | < 6 µm<br>(< 0.000236") |

| Part Number    | Backlash                 | Maximum Speed          | Minimum Speed                  | Speed Resolution               |
|----------------|--------------------------|------------------------|--------------------------------|--------------------------------|
| LSM025A-E03T4A | < 12 µm<br>(< 0.000472") | 26 mm/s<br>(1.024"/s)  | 0.000029 mm/s<br>(0.000001"/s) | 0.000029 mm/s<br>(0.000001"/s) |
| LSM025B-E03T4A | < 16 µm<br>(< 0.000630") | 104 mm/s<br>(4.094"/s) | 0.000116 mm/s<br>(0.000005"/s) | 0.000116 mm/s<br>(0.000005"/s) |
| LSM050A-E03T4A | < 12 µm<br>(< 0.000472") | 26 mm/s<br>(1.024"/s)  | 0.000029 mm/s<br>(0.000001"/s) | 0.000029 mm/s<br>(0.000001"/s) |
| LSM050B-E03T4A | < 16 µm<br>(< 0.000630") | 104 mm/s<br>(4.094"/s) | 0.000116 mm/s<br>(0.000005"/s) | 0.000116 mm/s<br>(0.000005"/s) |
| LSM100A-E03T4A | < 12 µm<br>(< 0.000472") | 26 mm/s<br>(1.024"/s)  | 0.000029 mm/s<br>(0.000001"/s) | 0.000029 mm/s<br>(0.000001"/s) |
| LSM100B-E03T4A | < 16 µm<br>(< 0.000630") | 104 mm/s<br>(4.094"/s) | 0.000116 mm/s<br>(0.000005"/s) | 0.000116 mm/s<br>(0.000005"/s) |
| LSM150A-E03T4A | < 12 µm<br>(< 0.000472") | 26 mm/s<br>(1.024"/s)  | 0.000029 mm/s<br>(0.000001"/s) | 0.000029 mm/s<br>(0.000001"/s) |
| LSM150B-E03T4A | < 16 µm<br>(< 0.000630") | 104 mm/s<br>(4.094"/s) | 0.000116 mm/s<br>(0.000005"/s) | 0.000116 mm/s<br>(0.000005"/s) |
| LSM200A-E03T4A | < 12 µm<br>(< 0.000472") | 26 mm/s<br>(1.024"/s)  | 0.000029 mm/s<br>(0.000001"/s) | 0.000029 mm/s<br>(0.000001"/s) |
|                | < 16 µm                  | 104 mm/s               | 0.000116 mm/s                  | 0.000116 mm/s                  |

| Part Number    | Backlash      | Maximum Speed | Minimum Speed | Speed Resolution |
|----------------|---------------|---------------|---------------|------------------|
| LSM200B-E03T4A | (< 0.000630") | (4.094"/s)    | (0.000005"/s) | (0.000005"/s)    |

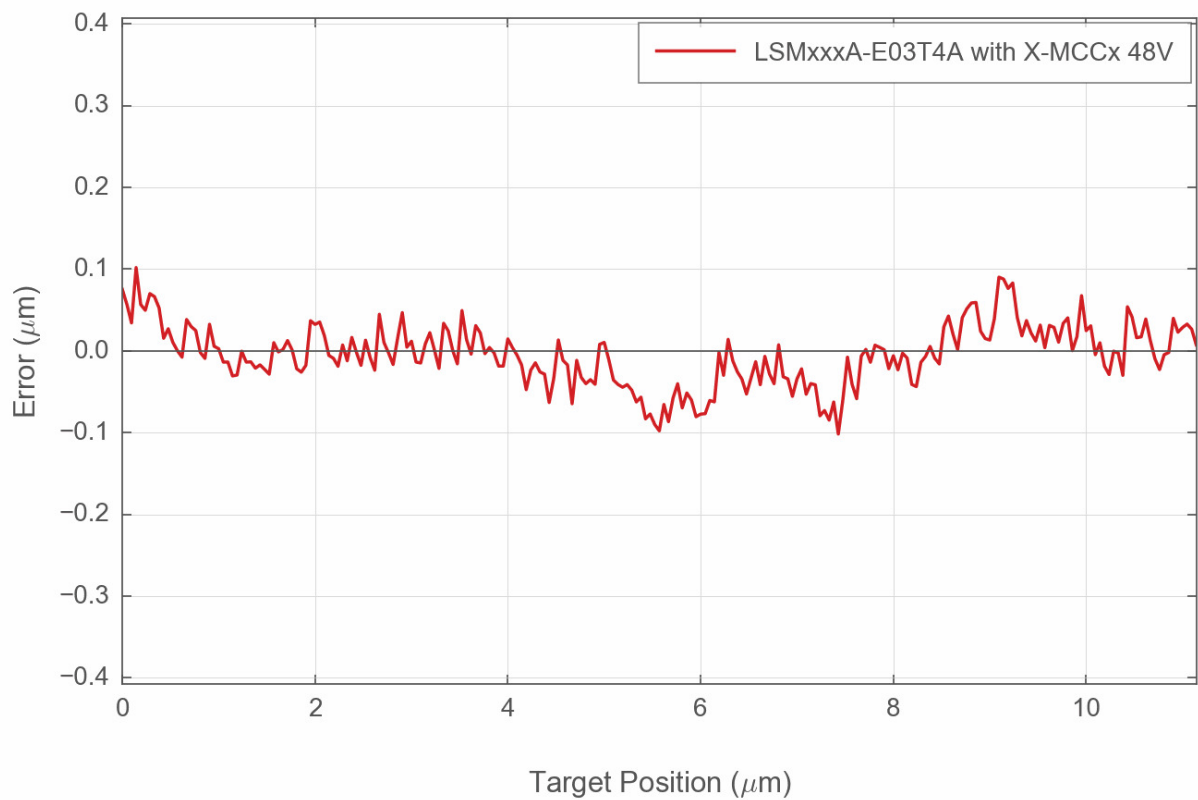
| Part Number    | Peak Thrust    | Vertical Runout          | Horizontal Runout        | Pitch                 |
|----------------|----------------|--------------------------|--------------------------|-----------------------|
| LSM025A-E03T4A | 55 N (12.3 lb) | < 8 µm<br>(< 0.000315")  | < 12 µm<br>(< 0.000472") | 0.02°<br>(0.349 mrad) |
| LSM025B-E03T4A | 25 N (5.6 lb)  | < 8 µm<br>(< 0.000315")  | < 12 µm<br>(< 0.000472") | 0.02°<br>(0.349 mrad) |
| LSM050A-E03T4A | 55 N (12.3 lb) | < 11 µm<br>(< 0.000433") | < 14 µm<br>(< 0.000551") | 0.03°<br>(0.523 mrad) |
| LSM050B-E03T4A | 25 N (5.6 lb)  | < 11 µm<br>(< 0.000433") | < 14 µm<br>(< 0.000551") | 0.03°<br>(0.523 mrad) |
| LSM100A-E03T4A | 55 N (12.3 lb) | < 18 µm<br>(< 0.000709") | < 18 µm<br>(< 0.000709") | 0.04°<br>(0.698 mrad) |
| LSM100B-E03T4A | 25 N (5.6 lb)  | < 18 µm<br>(< 0.000709") | < 18 µm<br>(< 0.000709") | 0.04°<br>(0.698 mrad) |
| LSM150A-E03T4A | 55 N (12.3 lb) | < 25 µm<br>(< 0.000984") | < 23 µm<br>(< 0.000906") | 0.04°<br>(0.698 mrad) |
| LSM150B-E03T4A | 25 N (5.6 lb)  | < 25 µm<br>(< 0.000984") | < 23 µm<br>(< 0.000906") | 0.04°<br>(0.698 mrad) |
| LSM200A-E03T4A | 55 N (12.3 lb) | < 32 µm<br>(< 0.001260") | < 27 µm<br>(< 0.001063") | 0.04°<br>(0.698 mrad) |
| LSM200B-E03T4A | 25 N (5.6 lb)  | < 32 µm<br>(< 0.001260") | < 27 µm<br>(< 0.001063") | 0.04°<br>(0.698 mrad) |

| Part Number    | Roll                  | Yaw                   | Linear Motion Per Motor Rev | Weight                |
|----------------|-----------------------|-----------------------|-----------------------------|-----------------------|
| LSM025A-E03T4A | 0.02°<br>(0.349 mrad) | 0.03°<br>(0.523 mrad) | 0.6096 mm<br>(0.024")       | 0.26 kg<br>(0.573 lb) |
| LSM025B-E03T4A | 0.02°<br>(0.349 mrad) | 0.03°<br>(0.523 mrad) | 2.4384 mm<br>(0.096")       | 0.26 kg<br>(0.573 lb) |
| LSM050A-E03T4A | 0.03°<br>(0.523 mrad) | 0.03°<br>(0.523 mrad) | 0.6096 mm<br>(0.024")       | 0.28 kg<br>(0.617 lb) |
| LSM050B-E03T4A | 0.03°<br>(0.523 mrad) | 0.03°<br>(0.523 mrad) | 2.4384 mm<br>(0.096")       | 0.28 kg<br>(0.617 lb) |
| LSM100A-E03T4A | 0.04°<br>(0.698 mrad) | 0.04°<br>(0.698 mrad) | 0.6096 mm<br>(0.024")       | 0.32 kg<br>(0.705 lb) |
| LSM100B-E03T4A | 0.04°<br>(0.698 mrad) | 0.04°<br>(0.698 mrad) | 2.4384 mm<br>(0.096")       | 0.32 kg<br>(0.705 lb) |
| LSM150A-E03T4A | 0.05°<br>(0.873 mrad) | 0.05°<br>(0.873 mrad) | 0.6096 mm<br>(0.024")       | 0.37 kg<br>(0.816 lb) |
|                | 0.05°                 | 0.05°                 | 2.4384 mm                   | 0.37 kg               |

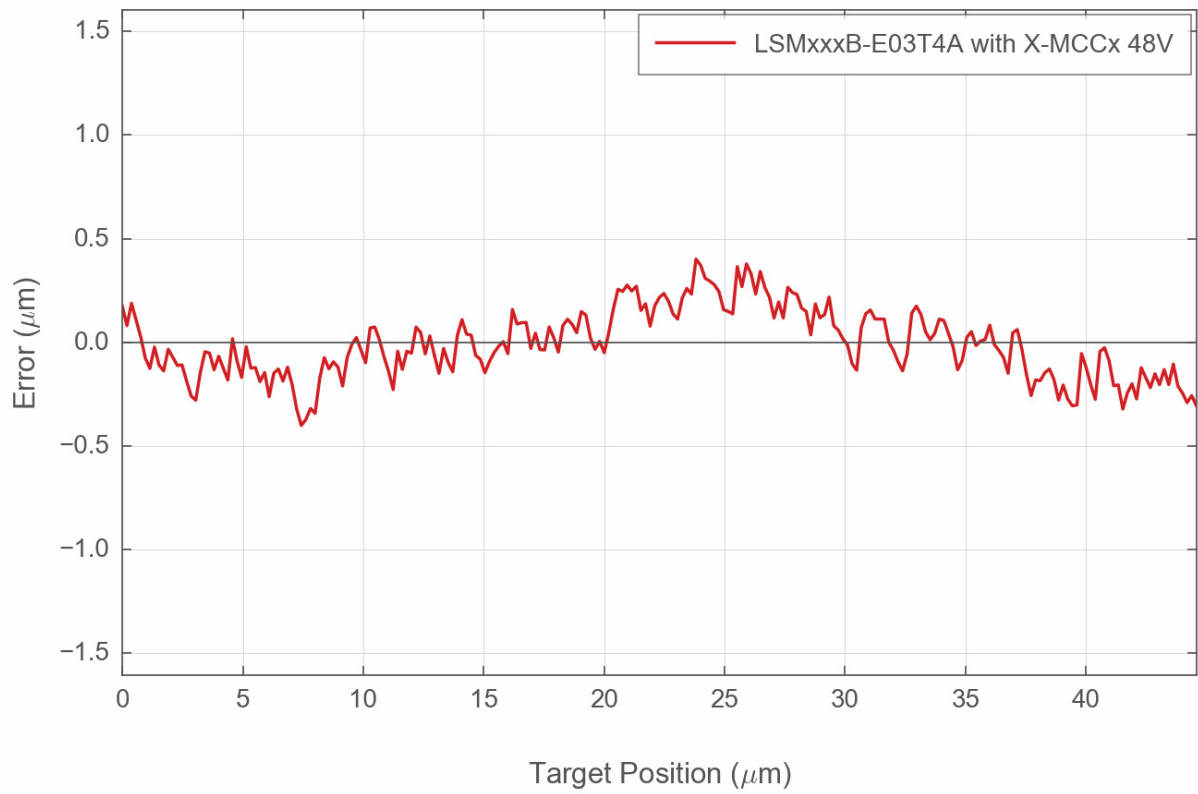
| Part Number    | Roll                  | Yaw                   | Linear Motion<br>Per Motor Rev | Weight                |
|----------------|-----------------------|-----------------------|--------------------------------|-----------------------|
| LSM150B-E03T4A | (0.873 mrad)          | (0.873 mrad)          | (0.096")                       | (0.816 lb)            |
| LSM200A-E03T4A | 0.05°<br>(0.873 mrad) | 0.05°<br>(0.873 mrad) | 0.6096 mm<br>(0.024")          | 0.42 kg<br>(0.926 lb) |
| LSM200B-E03T4A | 0.05°<br>(0.873 mrad) | 0.05°<br>(0.873 mrad) | 2.4384 mm<br>(0.096")          | 0.42 kg<br>(0.926 lb) |

## LSM-E Series Charts

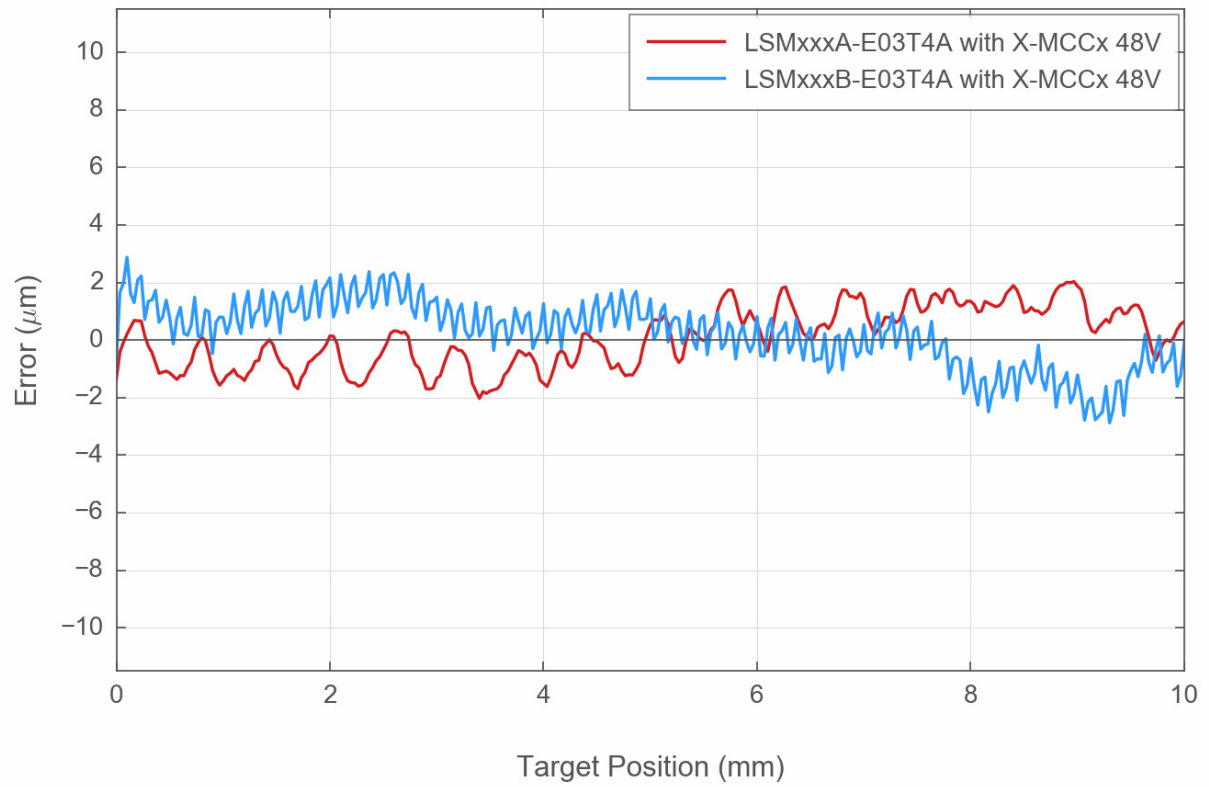
### Typical Microstepping Accuracy



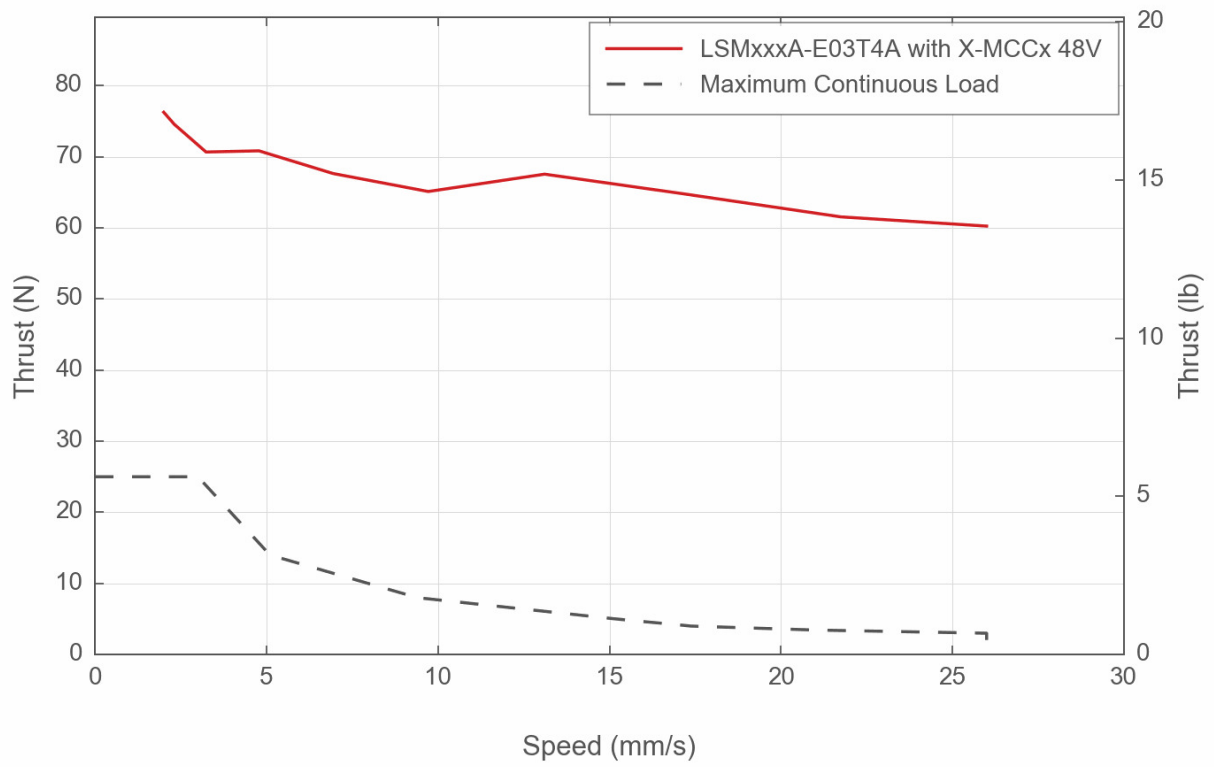
## Typical Microstepping Accuracy



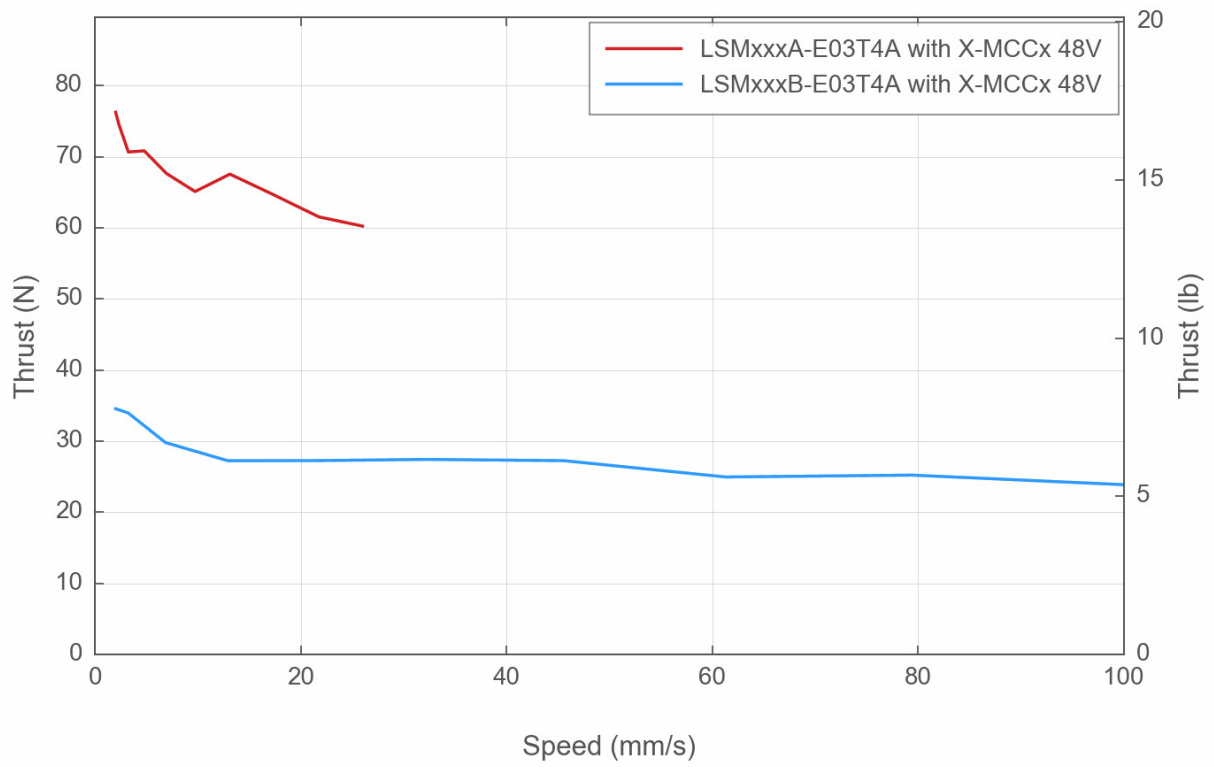
## Typical Accuracy



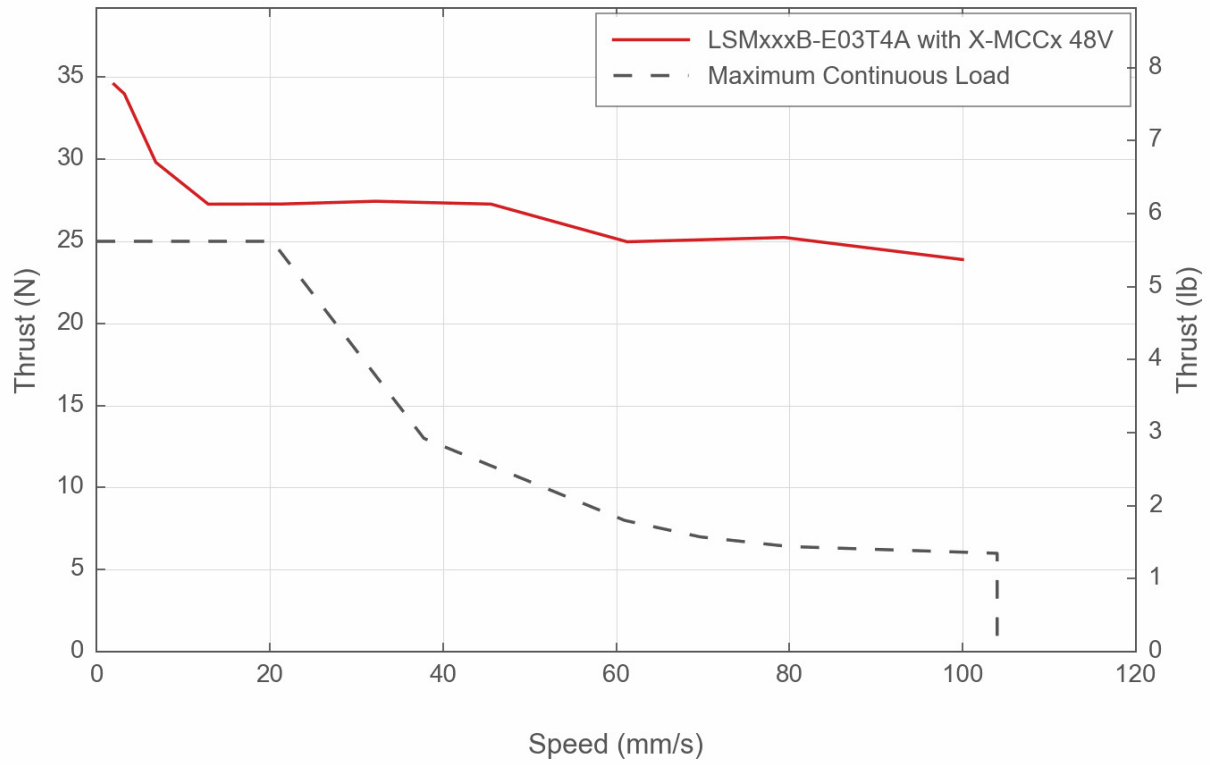
## Thrust Speed Performance



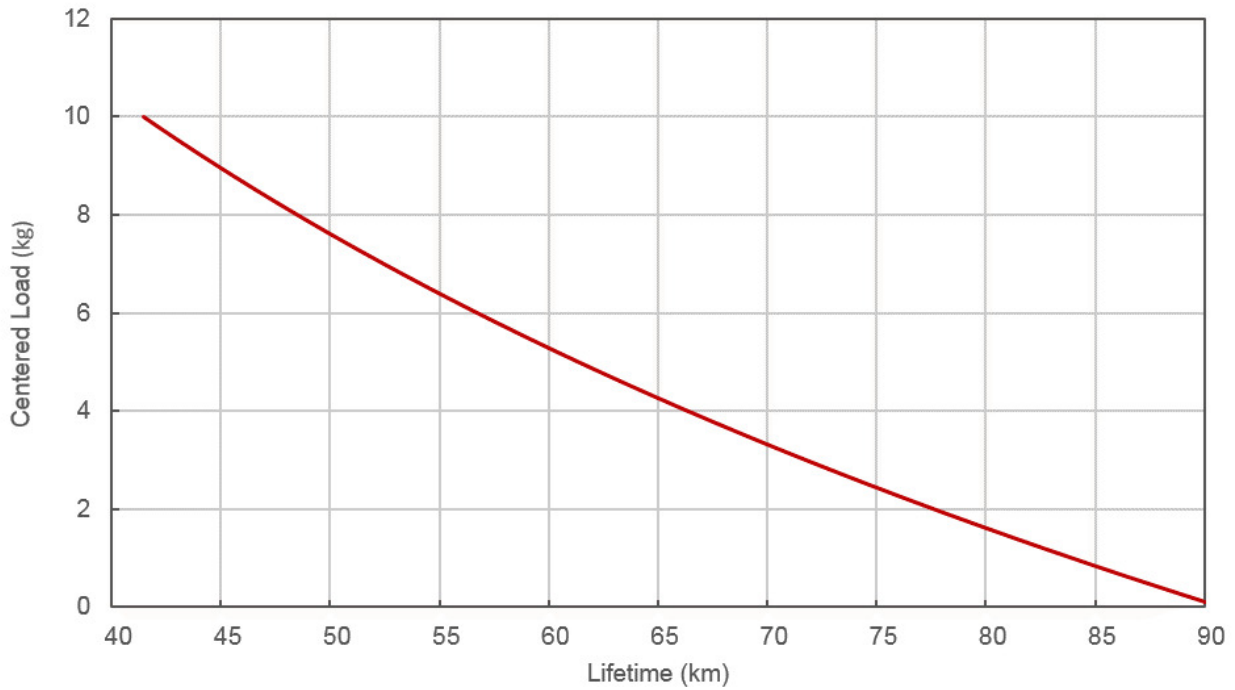
## Thrust Speed Performance



## Thrust Speed Performance



## LSM Linear Bearing Lifetime



## Contact

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