Zaber Technologies Inc.
#2 - 605 West Kent Ave.
Vancouver, BC

1-604-569-3780 *Direct*
1-888-276-8033 *Toll Free*
1-604-648-8033 *Fax*

# X-LSM-E Series Datasheet



- 25, 50, 100, 150, 200 mm travel
- Up to 104 mm/s speed and up to 55 N thrust
- Recirculating ball bearing design for high load (25 kg) and long lifetime
- Built-in controller; daisy-chains with other Zaber products
- Integrated, 200 CPR, motor mounted encoder provides slip/stall detection and recovery
- Custom versions available

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## X-LSM-E Series Overview

Zaber's X-LSM-E Series devices are computer-controlled, motorized linear stages with high thrust and speed capabilities and a compact size. They are stand-alone units requiring only a standard 24 V or 48 V power supply. The built-in motor encoder allows closed-loop operation and slip/stall recovery features. An optional indexed knob provides convenient manual control for versatile operation even without a computer.

These stages connect to the RS-232 port or USB port of any computer, and they can be daisy-chained with any other Zaber products. The daisy-chain also shares power, making it possible for multiple X-Series products to share a single power supply. Convenient locking, 4-pin, M8 connectors on the unit allow for secure connection between units.

At only 21 mm high, these miniature stages are excellent for applications where a small profile is required. The X-LSM-E's innovative design allows speeds up to 104 mm/s and loads up to 25 kg. Like all of Zaber's products, the X-LSM-E Series is designed to be 'plug and play' and very easy to set up and operate. If you are considering a multi-axis system, in the XY configuration, these stages make excellent microscope stages. Adding an X-JOY3 joystick controller allows manual control of both X and Y or XYZ axes from a single interface as well as allowing microscope stage positions to be saved and recalled at the touch of a button.

For more information visit: https://www.zaber.com/products/linear-stages/X-LSM-E

## X-LSM-E Series Part Numbering & Options

**X-LSM 025 A - _ E03**

**Travel**
- **025** — 25 mm
- **050** — 50 mm
- **100** — 100 mm
- **150** — 150 mm
- **200** — 200 mm

**Lead Screw Options**
- **A** — Fine pitch lead screw
- **B** — Medium pitch lead screw

**Options**
- **None** — Manual control
- **S** — No manual knob

**Encoder Options**
- **E03** — Motor Encoder, 200 CPR

## X-LSM-E Series Drawings

- X-LSM-E (Drawing for the X-LSM-E)
- View all drawings and documents at zaber.com

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# X-LSM-E Series Specifications

## Overview

| Specification | Value |
|---|---|
| Built-in Controller | Yes |
| Axes of Motion | 1 |
| LED Indicators | Yes |

## Positioning Performance

| Specification | Value |
|---|---|
| Default Resolution | 1/64 of a step |
| Stage Parallelism | <25 µm<br>(<0.000984 ") |

## Load Performance

| Specification | Value |
|---|---|
| Maximum Continuous Thrust | 25 N<br>(5.6 lb) |
| Maximum Centred Load | 250 N<br>(56.1 lb) |
| Maximum Moment (Pitch) | 4 N·m<br>(3 lb·ft) |
| Maximum Moment (Roll) | 10 N·m<br>(7.38 lb·ft) |
| Maximum Moment (Yaw) | 4 N·m<br>(2.952 lb·ft) |
| Stiffness (Pitch) | 150 N·m/° |
| Stiffness (Roll) | 150 N·m/° |
| Stiffness (Yaw) | 150 N·m/° |

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## Encoder & Sensing

| Specification | Value |
|---|---|
| Encoder Type | Rotary quadrature encoder (incremental) |
| Encoder Resolution | 200 CPR (8 states/rev) |
| Limit or Home Sensing | Magnetic hall sensor |

## Motor

| Specification | Value |
|---|---|
| Motor Steps Per Rev | 200 |
| Motor Type | Stepper (2 phase) |
| Motor Rated Current | 600 mA/phase |
| Motor Winding Inductance | 3.5 mH/phase |
| Motor Rotor Inertia | 3.8e-7 kg·m2 |

## Power and Communication

| Specification | Value |
|---|---|
| Communication Interface | RS-232 |
| Communication Protocol | Zaber ASCII (default), Zaber Binary |
| Data Cable Connection | Locking 4-pin M8 |
| Power Supply | 24-48 VDC |
| Power Plug | 2-pin screw terminal |
| Maximum Current Draw | 350 mA |

## Mechanical

| Specification | Value |
|---|---|
| Guide Type | Recirculating ball bearing |
| Mechanical Drive System | Precision lead screw |
| Mounting Interface | M3 and M6 threaded holes and M4 threaded centre hole |

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| | |
|---|---|
| Moving Mass | 0.063 kg<br>(0.139 lbs) |

## Environmental & Compliance

| Specification | Value |
|---|---|
| Operating Temperature Range | 0 to 50 °C |
| CE Compliant | Yes |
| Vacuum Compatible | No |

| Part Number | Travel Range | Manual Control | Weight | Accuracy (unidirectional) |
|---|---|---|---|---|
| X-LSM025A-E03 | 25.4 mm<br>(1 ") | Yes | 0.35 kg<br>(0.772 lb) | 15 µm<br>(0.000591 ") |
| X-LSM025A-SE03 | 25.4 mm<br>(1 ") | No | 0.35 kg<br>(0.772 lb) | 15 µm<br>(0.000591 ") |
| X-LSM025B-E03 | 25.4 mm<br>(1 ") | Yes | 0.35 kg<br>(0.772 lb) | 15 µm<br>(0.000591 ") |
| X-LSM025B-SE03 | 25.4 mm<br>(1 ") | No | 0.35 kg<br>(0.772 lb) | 15 µm<br>(0.000591 ") |
| X-LSM050A-E03 | 50.8 mm<br>(2 ") | Yes | 0.36 kg<br>(0.794 lb) | 20 µm<br>(0.000787 ") |
| X-LSM050A-SE03 | 50.8 mm<br>(2 ") | No | 0.36 kg<br>(0.794 lb) | 20 µm<br>(0.000787 ") |
| X-LSM050B-E03 | 50.8 mm<br>(2 ") | Yes | 0.36 kg<br>(0.794 lb) | 25 µm<br>(0.000984 ") |
| X-LSM050B-SE03 | 50.8 mm<br>(2 ") | No | 0.36 kg<br>(0.794 lb) | 25 µm<br>(0.000984 ") |
| X-LSM100A-E03 | 101.6 mm<br>(4 ") | Yes | 0.39 kg<br>(0.86 lb) | 35 µm<br>(0.001378 ") |
| X-LSM100A-SE03 | 101.6 mm<br>(4 ") | No | 0.39 kg<br>(0.86 lb) | 35 µm<br>(0.001378 ") |
| X-LSM100B-E03 | 101.6 mm<br>(4 ") | Yes | 0.39 kg<br>(0.86 lb) | 45 µm<br>(0.001772 ") |
| X-LSM100B-SE03 | 101.6 mm<br>(4 ") | No | 0.39 kg<br>(0.86 lb) | 45 µm<br>(0.001772 ") |

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| | | | | |
|---|---|---|---|---|
| X-LSM150A-E03 | 152.4 mm (6 ") | Yes | 0.43 kg (0.948 lb) | 50 µm (0.001968 ") |
| X-LSM150A-SE03 | 152.4 mm (6 ") | No | 0.43 kg (0.948 lb) | 50 µm (0.001968 ") |
| X-LSM150B-E03 | 152.4 mm (6 ") | Yes | 0.43 kg (0.948 lb) | 65 µm (0.002559 ") |
| X-LSM150B-SE03 | 152.4 mm (6 ") | No | 0.43 kg (0.948 lb) | 65 µm (0.002559 ") |
| X-LSM200A-E03 | 203.2 mm (8 ") | Yes | 0.46 kg (1.014 lb) | 60 µm (0.002362 ") |
| X-LSM200A-SE03 | 203.2 mm (8 ") | No | 0.46 kg (1.014 lb) | 60 µm (0.002362 ") |
| X-LSM200B-E03 | 203.2 mm (8 ") | Yes | 0.46 kg (1.014 lb) | 85 µm (0.003346 ") |
| X-LSM200B-SE03 | 203.2 mm (8 ") | No | 0.46 kg (1.014 lb) | 85 µm (0.003346 ") |

| Part Number | Repeatability | Backlash | Flatness of Travel | Straightness of Travel |
|---|---|---|---|---|
| X-LSM025A-E03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <8 µm (<0.000315 ") | <12 µm (<0.000472 ") |
| X-LSM025A-SE03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <8 µm (<0.000315 ") | <12 µm (<0.000472 ") |
| X-LSM025B-E03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <8 µm (<0.000315 ") | <12 µm (<0.000472 ") |
| X-LSM025B-SE03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <8 µm (<0.000315 ") | <12 µm (<0.000472 ") |
| X-LSM050A-E03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <11 µm (<0.000433 ") | <14 µm (<0.000551 ") |
| X-LSM050A-SE03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <11 µm (<0.000433 ") | <14 µm (<0.000551 ") |
| X-LSM050B-E03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <11 µm (<0.000433 ") | <14 µm (<0.000551 ") |
| X-LSM050B-SE03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <11 µm (<0.000433 ") | <14 µm (<0.000551 ") |
| X-LSM100A-E03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <18 µm (<0.000709 ") | <18 µm (<0.000709 ") |
| X-LSM100A-SE03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <18 µm (<0.000709 ") | <18 µm (<0.000709 ") |

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| | | | | |
|---|---|---|---|---|
| X-LSM100B-E03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <18 µm (<0.000709 ") | <18 µm (<0.000709 ") |
| X-LSM100B-SE03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <18 µm (<0.000709 ") | <18 µm (<0.000709 ") |
| X-LSM150A-E03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM150A-SE03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM150B-E03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM150B-SE03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM200A-E03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM200A-SE03 | <3 µm (<0.000118 ") | <12 µm (<0.000472 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM200B-E03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |
| X-LSM200B-SE03 | <6 µm (<0.000236 ") | <16 µm (<0.00063 ") | <20 µm (<0.000787 ") | <20 µm (<0.000787 ") |

| Part Number | Pitch Error | Roll Error | Yaw Error | Microstep Size (Default Resolution) |
|---|---|---|---|---|
| X-LSM025A-E03 | 0.02 ° (0.349 mrad) | 0.02 ° (0.349 mrad) | 0.03 ° (0.523 mrad) | 0.047625 µm |
| X-LSM025A-SE03 | 0.02 ° (0.349 mrad) | 0.02 ° (0.349 mrad) | 0.03 ° (0.523 mrad) | 0.047625 µm |
| X-LSM025B-E03 | 0.02 ° (0.349 mrad) | 0.02 ° (0.349 mrad) | 0.03 ° (0.523 mrad) | 0.1905 µm |
| X-LSM025B-SE03 | 0.02 ° (0.349 mrad) | 0.02 ° (0.349 mrad) | 0.03 ° (0.523 mrad) | 0.1905 µm |
| X-LSM050A-E03 | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.047625 µm |
| X-LSM050A-SE03 | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.047625 µm |
| X-LSM050B-E03 | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.1905 µm |
| X-LSM050B-SE03 | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.03 ° (0.523 mrad) | 0.1905 µm |

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| | | | | |
|---|---|---|---|---|
| X-LSM100A-E03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.04 °<br>(0.698 mrad) | 0.047625 µm |
| X-LSM100A-SE03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.04 °<br>(0.698 mrad) | 0.047625 µm |
| X-LSM100B-E03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.04 °<br>(0.698 mrad) | 0.1905 µm |
| X-LSM100B-SE03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.04 °<br>(0.698 mrad) | 0.1905 µm |
| X-LSM150A-E03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.047625 µm |
| X-LSM150A-SE03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.047625 µm |
| X-LSM150B-E03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.1905 µm |
| X-LSM150B-SE03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.1905 µm |
| X-LSM200A-E03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.047625 µm |
| X-LSM200A-SE03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.047625 µm |
| X-LSM200B-E03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.1905 µm |
| X-LSM200B-SE03 | 0.035 °<br>(0.611 mrad) | 0.035 °<br>(0.611 mrad) | 0.045 °<br>(0.785 mrad) | 0.1905 µm |

| Part Number | Peak Thrust | Back-driving Force* | Maximum Speed | Minimum Speed |
|---|---|---|---|---|
| X-LSM025A-E03 | 55 N<br>(12.3 lb) | Non-back-driving | 26 mm/s<br>(1.024 "/s) | 0.000029 mm/s<br>(0.000001 "/s) |
| X-LSM025A-SE03 | 55 N<br>(12.3 lb) | Non-back-driving | 26 mm/s<br>(1.024 "/s) | 0.000029 mm/s<br>(0.000001 "/s) |
| X-LSM025B-E03 | 25 N<br>(5.6 lb) | 24 (± 30%) N<br>(5.4 lb) | 104 mm/s<br>(4.094 "/s) | 0.000116 mm/s<br>(0.000005 "/s) |
| X-LSM025B-SE03 | 25 N<br>(5.6 lb) | 24 (± 30%) N<br>(5.4 lb) | 104 mm/s<br>(4.094 "/s) | 0.000116 mm/s<br>(0.000005 "/s) |
| X-LSM050A-E03 | 55 N<br>(12.3 lb) | Non-back-driving | 26 mm/s<br>(1.024 "/s) | 0.000029 mm/s<br>(0.000001 "/s) |
| X-LSM050A-SE03 | 55 N<br>(12.3 lb) | Non-back-driving | 26 mm/s<br>(1.024 "/s) | 0.000029 mm/s<br>(0.000001 "/s) |

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| | | | | |
|---|---|---|---|---|
| X-LSM050B-E03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM050B-SE03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM100A-E03 | 55 N (12.3 lb) | Non-back-driving | 26 mm/s (1.024 "/s) | 0.000029 mm/s (0.000001 "/s) |
| X-LSM100A-SE03 | 55 N (12.3 lb) | Non-back-driving | 26 mm/s (1.024 "/s) | 0.000029 mm/s (0.000001 "/s) |
| X-LSM100B-E03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM100B-SE03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM150A-E03 | 55 N (12.3 lb) | Non-back-driving | 26 mm/s (1.024 "/s) | 0.000029 mm/s (0.000001 "/s) |
| X-LSM150A-SE03 | 55 N (12.3 lb) | Non-back-driving | 26 mm/s (1.024 "/s) | 0.000029 mm/s (0.000001 "/s) |
| X-LSM150B-E03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM150B-SE03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM200A-E03 | 55 N (12.3 lb) | Non-back-driving | 26 mm/s (1.024 "/s) | 0.000029 mm/s (0.000001 "/s) |
| X-LSM200A-SE03 | 55 N (12.3 lb) | Non-back-driving | 26 mm/s (1.024 "/s) | 0.000029 mm/s (0.000001 "/s) |
| X-LSM200B-E03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |
| X-LSM200B-SE03 | 25 N (5.6 lb) | 24 (± 30%) N (5.4 lb) | 104 mm/s (4.094 "/s) | 0.000116 mm/s (0.000005 "/s) |

| Part Number | Speed Resolution | Linear Motion Per Motor Rev |
|---|---|---|
| X-LSM025A-E03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM025A-SE03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM025B-E03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM025B-SE03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |

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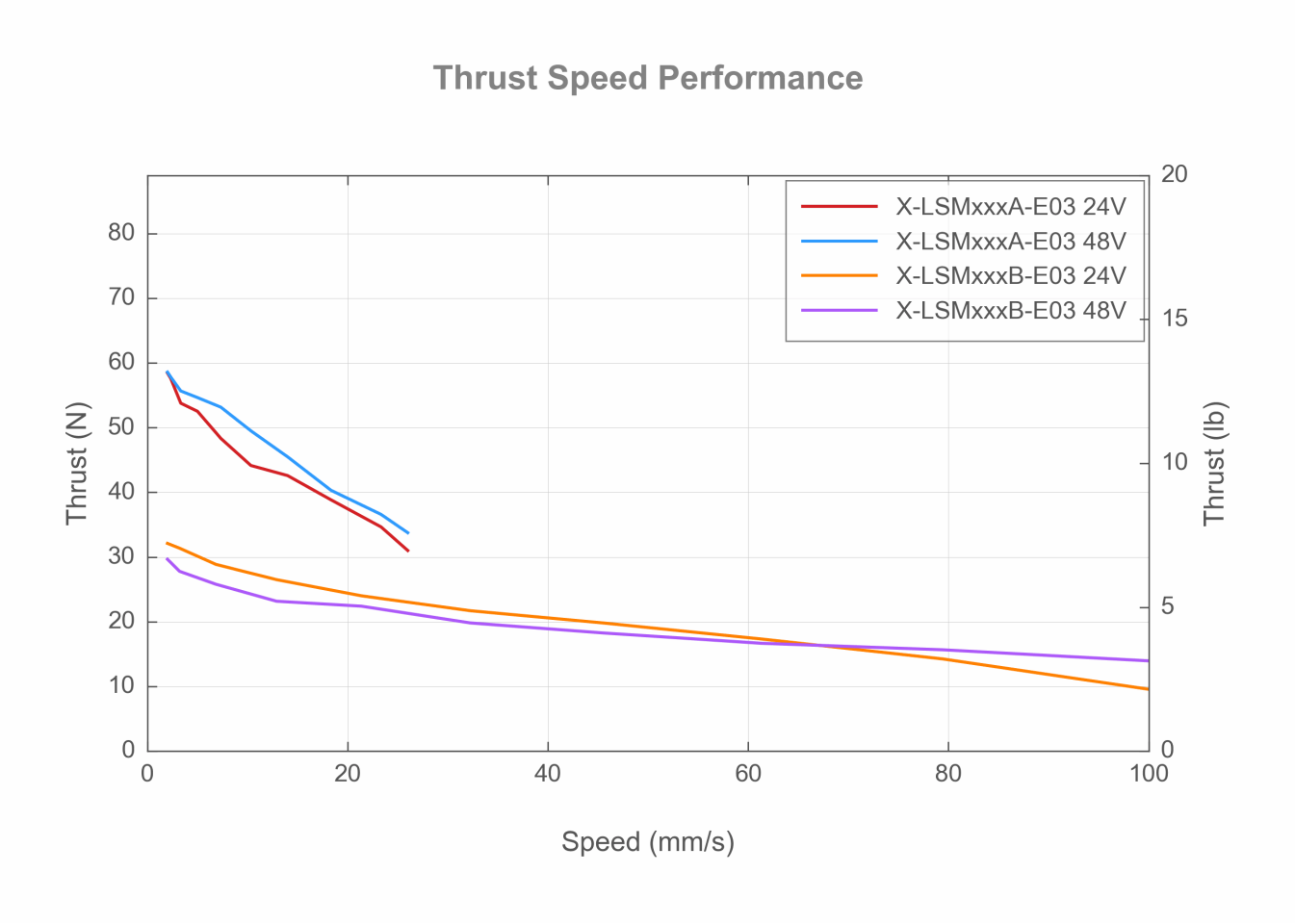
| | | |
|---|---|---|
| X-LSM050A-E03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM050A-SE03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM050B-E03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM050B-SE03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM100A-E03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM100A-SE03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM100B-E03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM100B-SE03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM150A-E03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM150A-SE03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM150B-E03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM150B-SE03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM200A-E03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM200A-SE03 | 0.000029 mm/s (0.000001 "/s) | 0.6096 mm (0.024 ") |
| X-LSM200B-E03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |
| X-LSM200B-SE03 | 0.000116 mm/s (0.000005 "/s) | 2.4384 mm (0.096 ") |

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## X-LSM-E Series Charts

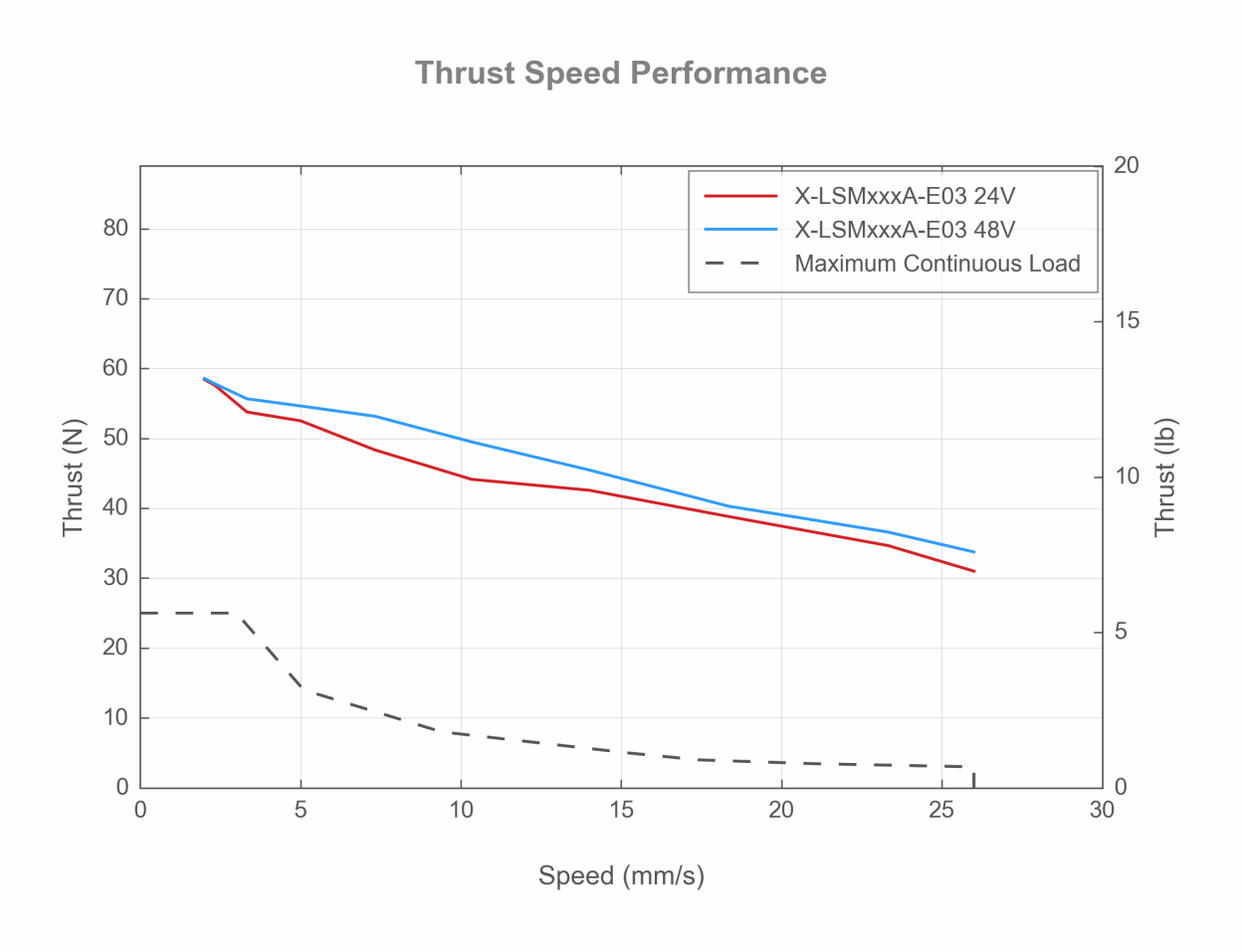
Thrust Speed Performance



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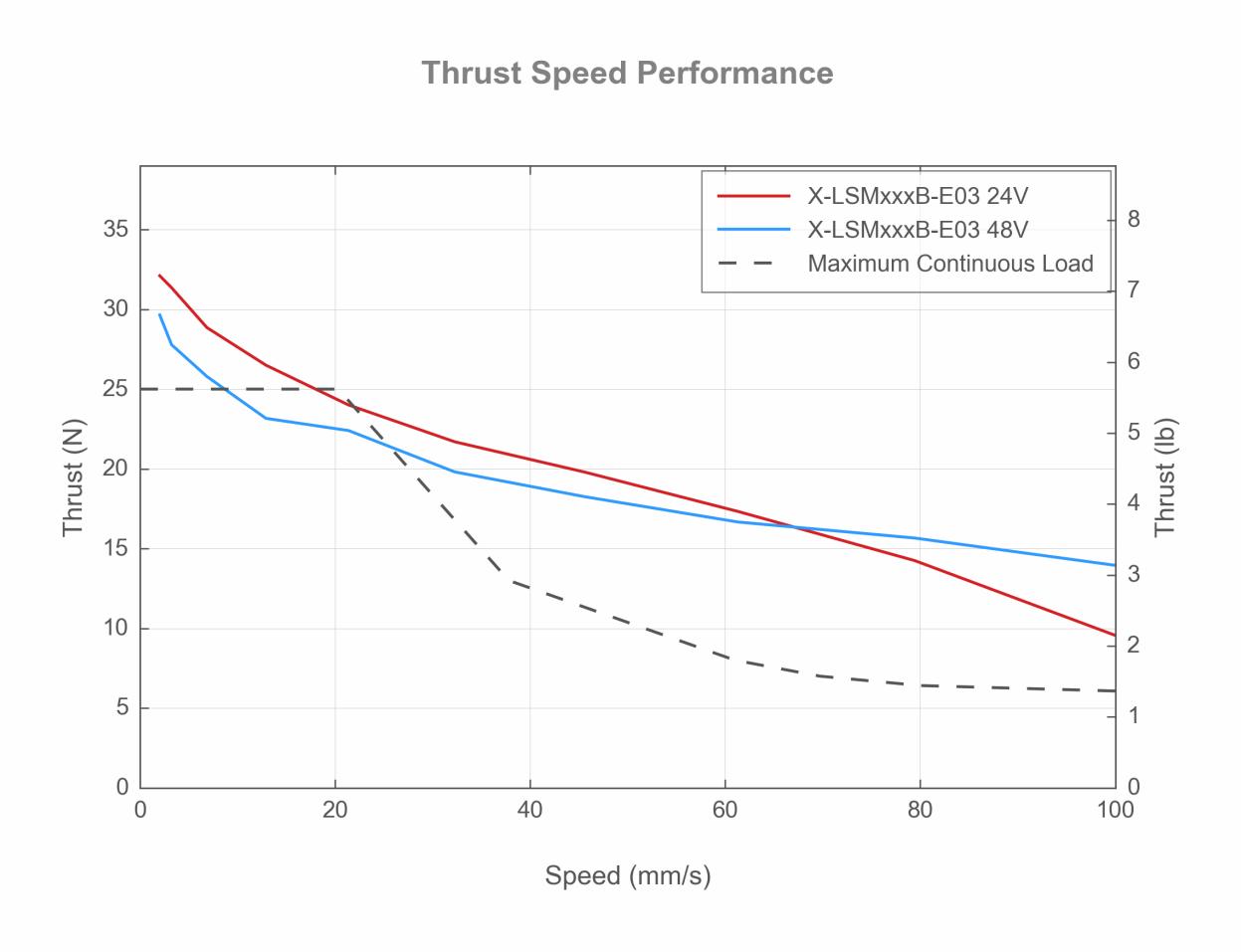
## Thrust Speed Performance



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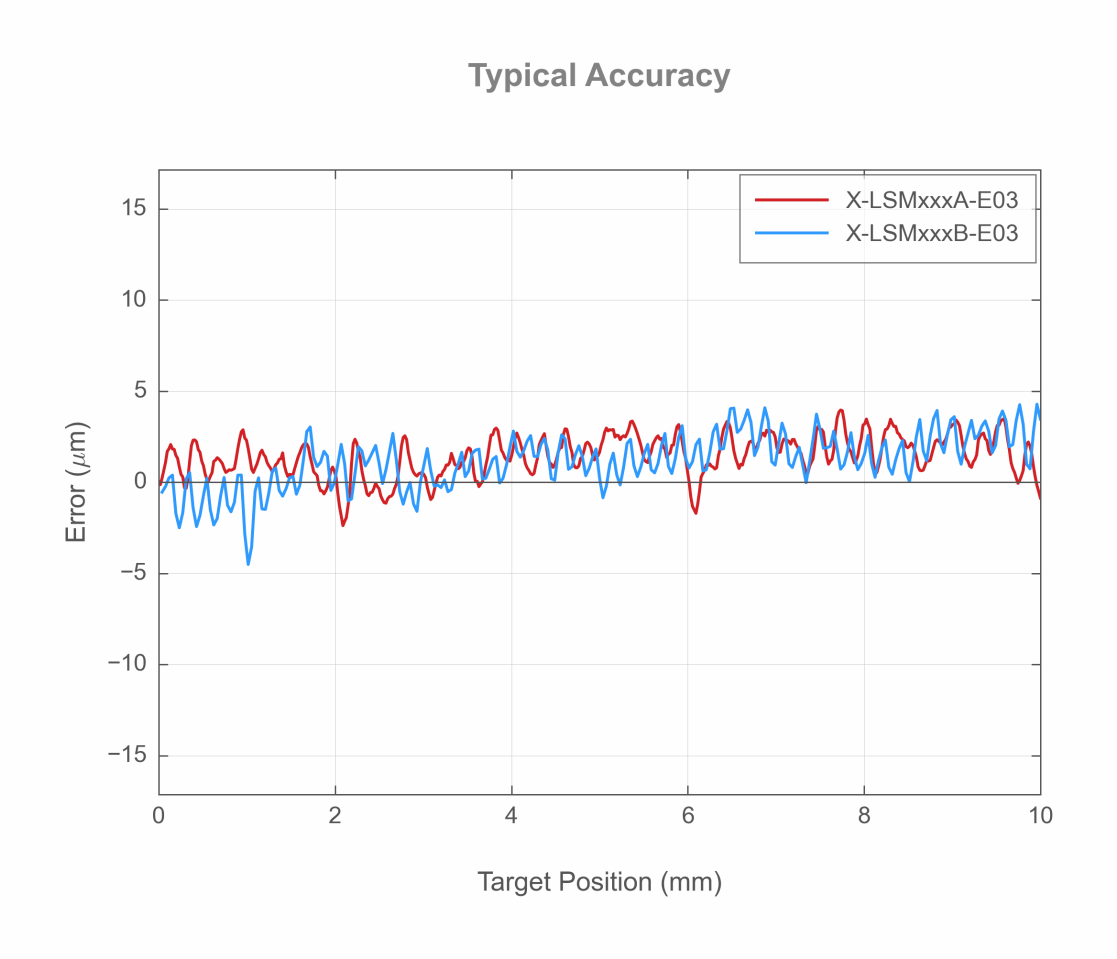
## Thrust Speed Performance



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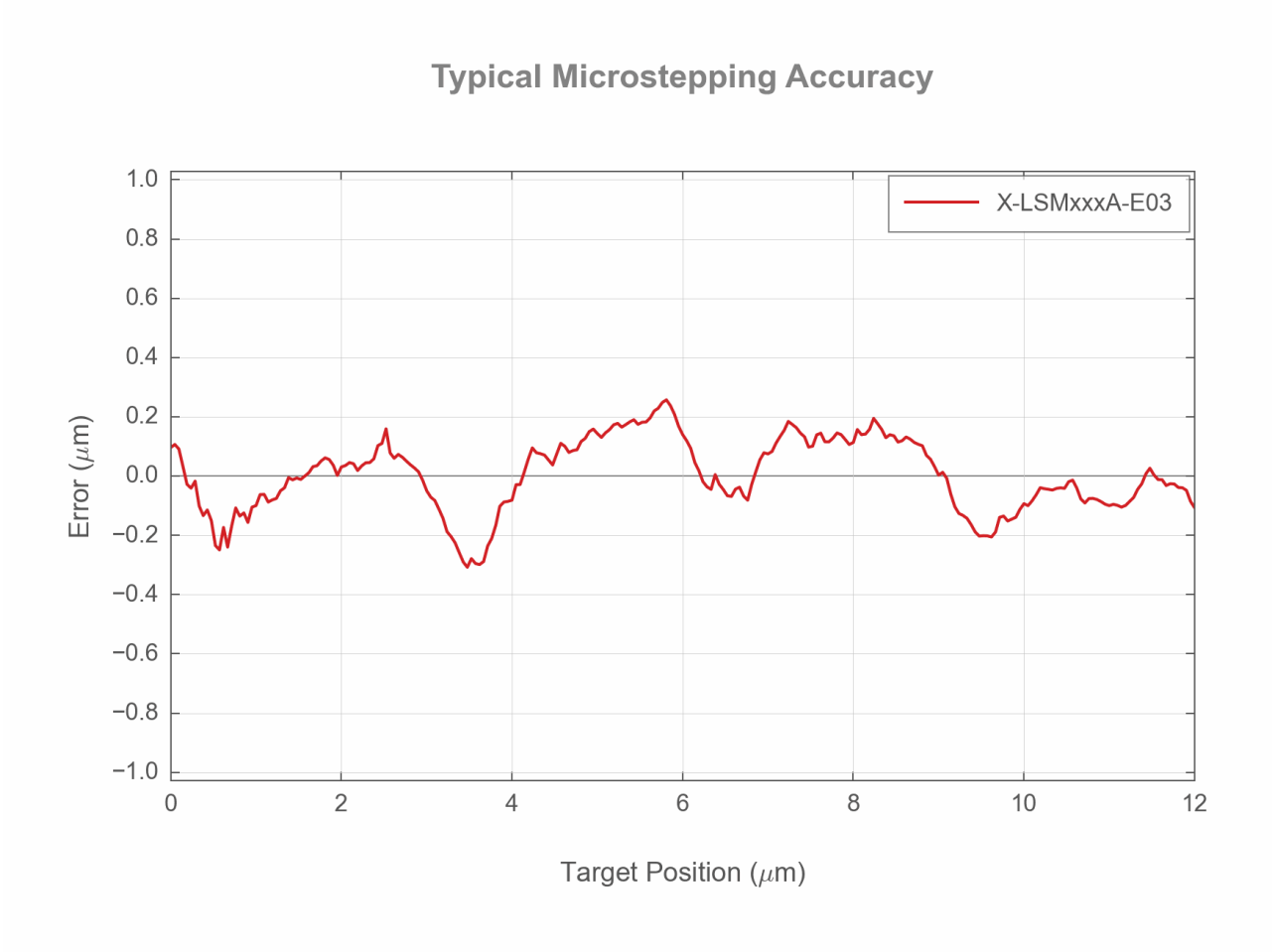
## Typical Accuracy



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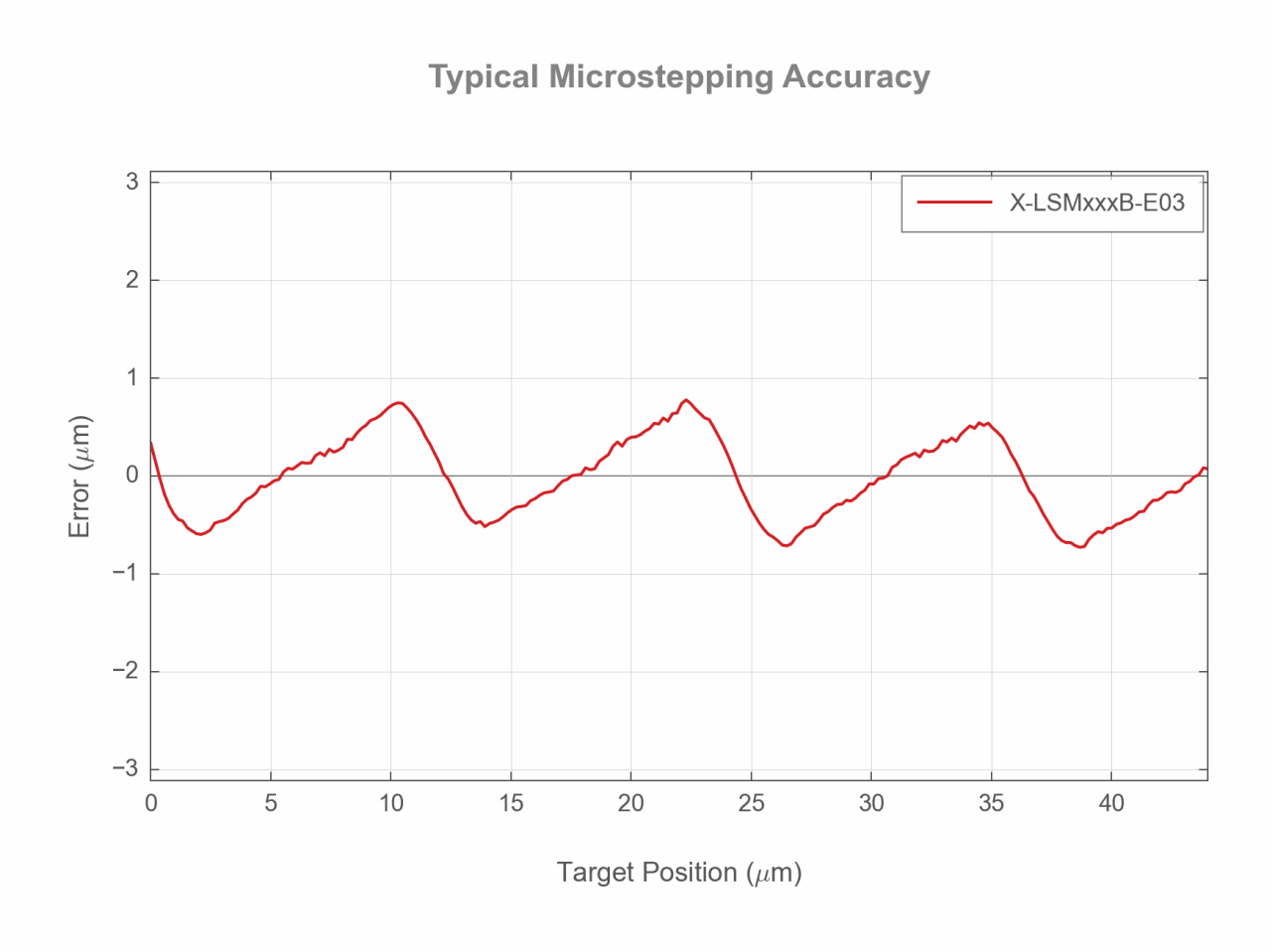
## Typical Microstepping Accuracy



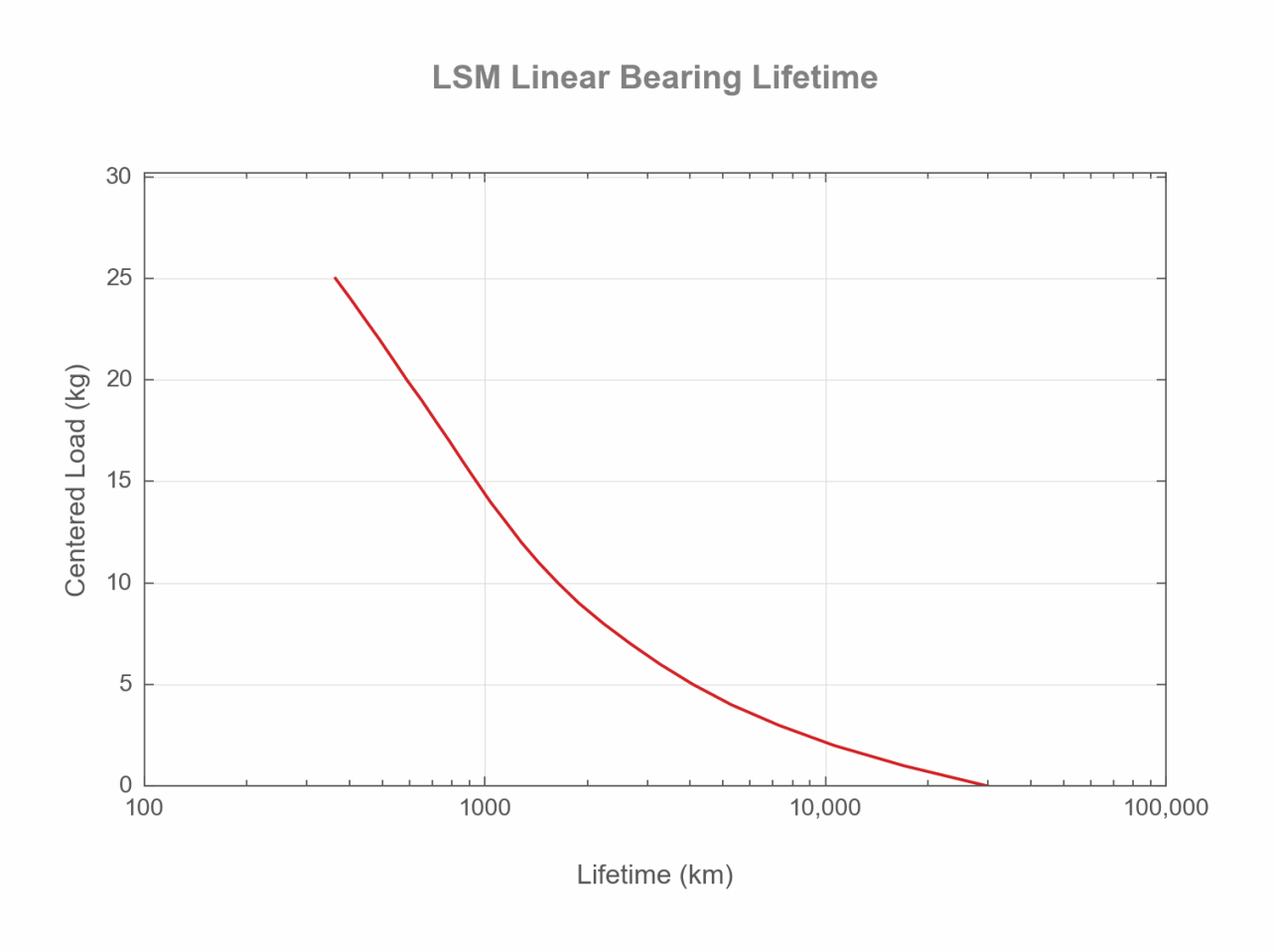
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## Typical Microstepping Accuracy



LSMxxx Lifetime




## Contact

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