

Linear Axis Sizing and Selection

This page gives the procedure to **size and select a NILAB linear axis** — not just the motor. It combines the axis-level requirements (payload, stroke, speed, acceleration, precision) with the motor sizing procedure. Use it when you need to dimension an axis for a machine.

Step 1 — Define the requirements

- **Payload** (kg) and **thrust / feed force** (N) — including friction and the force needed to accelerate the load. - **Stroke** (mm) — the required travel. - **Speed** (m/s) and **acceleration** (m/s²) — from the motion profile. - **Precision / repeatability** — from the application. - **Duty cycle** — motion time vs total cycle time. - **Environment** — IP rating, washdown, dust, temperature, bellows.

Step 2 — Select the axis family

Use the [Axis selection](#) page to shortlist the family based on force, stroke, guide, encoder, and the “best for” column. For a multi-axis machine, also see [Multi-axis systems](#).

Step 3 — Size the motor

Use the [Motor sizing](#) procedure and the [Websmart](#) tool:

- Enter the payload, select the motor family (NL, GD, GDi, ...), create the motion profile, press the **Sizing** button, review the compatible motors, then check the **performance limits** and the **safety margin**.

Step 4 — Verify the axis

- **Force** — the rated force (Fr) and peak force (Fp) must cover the required thrust and the peak force. - **Speed** — the rated speed must cover the required maximum speed. - **Guide capacity** — the guide must carry the payload and any off-axis moment (see GDM for off-axis load). - **Stiffness / natural frequency** — see [Machine design](#) (lowest natural frequency $\geq \sim 200$ Hz).

Step 5 — Finalize

- Check the mounting (flange / T-slot), the cable chain, the bellows, and the encoder option. - See [Installation and alignment](#) for the mounting and commissioning steps.

Related pages

* [Linear axes selection](#) * [Motor sizing](#) * [Machine design](#) * [Installation and alignment](#)

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Last update: **2026/09/13 07:17**

