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 ≥ ~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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