Engineer's Guide

Technical resources for automation designers and system integrators — from motor sizing to fieldbus integration.



Welcome to the Engineer's Guide

Welcome to the **NILAB Engineer's Guide** — the central reference section of this knowledgebase for everyone involved in the design, commissioning, and integration of electric linear drives and servo systems.

This section is written specifically for automation designers, machine builders, and system integrators who need to make informed engineering decisions. It gathers, in one place, the technical background and the practical tools that NILAB provides to support the transition from traditional pneumatic and rotary motion to modern electric direct-drive linear motion. Whether you are sizing a motor for a new machine, replacing a pneumatic cylinder with an electric actuator, or evaluating a NILAB motor against a competitor, the Engineer's Guide is designed to be your first point of reference.

The content here is deliberately more explanatory and in-depth than the product pages. The product pages tell you what a motor is and what it can do; the Engineer's Guide explains why and how to make the right choice. It bridges the gap between the raw product data and the engineering reasoning that turns that data into a working machine.

What You Will Find Here

The Engineer's Guide is organised around five main resources. Each one answers a specific question that engineers ask during the design phase.

Resource	What it answers
Competitor Cross-Reference Tool	Which NILAB motor is the best match for an existing competitor motor from LinMot or Dunkermotoren? The tool compares motors based on continuous rated force, mechanical dimensions, and flange footprint, and produces an immediate visual and numerical comparison.
How a Tubular Linear Motor Works	How does a tubular linear motor actually work? This page explains the construction, the Lorentz force principle, three-phase commutation, the force–speed characteristic, and the closed-loop control structure, together with the advantages over pneumatic cylinders and ball-screw actuators.
How an Ironcore Flat Linear Motor Works	How does an ironcore flat linear motor actually work? This page explains the slotted laminated primary, the magnet track with steel back iron, the Lorentz force principle in the iron circuit, the normal attraction force and its countermeasures, three-phase commutation, the force–speed characteristic and the closed-loop control structure — plus a direct comparison with the tubular (ironless) architecture.
How a Linear Motor Can Help Your Application	Which linear-motor technology fits your application? This overview explains what a linear motor is, how the synchronous permanent-magnet principle works, and compares the two subfamilies — ironcore flat and ironless — including the concrete benefits for your machine, the honest limitations and a technology checklist.
Electric Actuator vs Pneumatic Cylinder — The Complete Engineer's Guide	Should the application use a pneumatic cylinder or an electric actuator? This in-depth comparison covers technology, side-by-side performance, real energy numbers, the scenarios in which each solution wins, and the migration procedure from pneumatic to electric.

How to Use the Engineer's Guide

The best way to use this section depends on what you are trying to achieve.

If you are **replacing an existing pneumatic cylinder** with an electric actuator, start with the **Pneumatic to Electric guide** and the online calculator it references. The guide walks you through documenting the current cylinder, using the sizing tool, and selecting the servo drive — a complete path from existing machine to new solution.

If you are **looking for a NILAB motor to replace a competitor motor**, use the **Competitor Cross-Reference Tool**. It lets you select a LinMot or Dunkermotoren model and immediately see the best-matching NILAB alternatives, with flange dimensions, force data, and a visual overlay of the installation envelope.

If you want to **understand the technology behind the products**, start with **How a Linear Motor Can Help Your Application** — the overview of the technology and of the choice between ironcore and ironless. Then continue with **How a Tubular Linear Motor Works** or **How an Ironcore Flat Linear Motor Works** for the architecture details: the stator, the magnets, the encoder, the Lorentz force, commutation, and thermal management.

Related Topics Elsewhere in the Knowledgebase

The Engineer's Guide is closely related to the other sections of this knowledgebase. The product family pages (NLi, GDi, GD, NL, MBD, Epulse, and so on) provide the detailed technical data and specifications for each series. The NILAB Knowledgebase home page provides the overall navigation and the most-used search terms. When you have identified the motor you need from the Engineer's Guide, the corresponding product family page gives you the full datasheet, the ordering code, and the installation information.

A Note on the Content

The Engineer's Guide is maintained with the same care as the rest of this repository. The technical background and the comparison data are kept up to date with the latest product developments and with the current state of the relevant standards and regulations. If you find an error, or if a topic you need is not covered, please contact the technical support team — this guide is meant to be a living document that reflects the real questions engineers ask, and your feedback helps us improve it.

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