Introduction: What is an electric linear actuator?
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Introduction

What is an electric linear actuator?

- An electric linear actuator is a device that converts the rotational motion of an electric motor into linear motion (push or pull movement).
- An electric linear actuator can be used anywhere a machine pushes or pulls a load, raises or lowers a load, roughly positions a load, or rotates a load.

TiMOTION specializes in linear actuators and motion systems that are best suited for medical, industrial, ergonomic, and furniture applications.

There are many components and options to an electromechanical linear actuator. TiMOTION is a vertically integrated company. We are able to customize, design, and manufacture all of these components in house for a customer depending on their application needs. We manufacture motors and components, including the spindle and drive nut, for our electric actuators. Plastic injection molding and PC board manufacturing is done in-house to ensure high product quality and durability. Building our own PC boards allows TiMOTION to optimize the level of software and various movements needed within an application. A primary example of this is combining multiple linear actuators with position feedback to create synchronized movement. As a result of being vertically integrated, TiMOTION is proud to offer a five year mechanical warranty and a two year electrical warranty.

We will discuss a new subject in each section related to the basics of an electric linear actuator and the factors to consider when purchasing components for a linear motion system. In this section of the white paper we will discuss the common styles and configurations of an electric actuator. Next, we will review the internal and external components of a linear actuator. Then, we will cover the safety related options that can be added to an actuator. Following that, we will explain the various actuator load and speed characteristics to consider and how it can be adjusted to meet an applications’ needs. We will follow that with the various levels of IP ratings an actuator can have for liquid and dust protection as well as lubrication that goes into an actuator. Lastly, we’ll consider the certifications and standards that are needed to meet certain market and country requirements.
Common Styles of Actuators

TiMOTION designs and manufactures various styles of linear actuators that are all interchangeably customizable to fit a customer’s application needs. Some common styles of electric or electromechanical linear actuators include:

A. **Parallel Drive Actuator** - The motor is directly parallel to the drive spindle. Typically these types of electric linear actuators are spur gear or belt driven with more gear ratio options. Parallel drive actuators allow for a wider range of loads and speeds, however they can operate louder than worm gear driven actuators. Some examples of parallel drive actuators that TiMOTION manufactures can be seen in our TA2, TA2P, MA1, and TA16 models.

B. **Right-Angle or "L" Drive Actuator** - The motor is set perpendicular to the drive spindle. Typically these types of electric linear actuators are worm gear driven. Worm gear driven motors have fewer gear ratio options, however because of that they are more efficient than spur gear driven motors and operate with low noise. In addition, one of the key benefits of a worm gear driven, right angle electric linear actuator is increased self-locking ability. Some examples of right-angle drive actuators that TiMOTION manufactures can be seen in our TA1, TA4, TA7, TA9, TA10, TA12 and TA23 models.

C. **Inline Actuators** - An electric inline actuator has a longer retracted length, but is designed specifically
to fit into smaller or compact spaces. The inline actuator is typically made up of a motor, planetary gear assembly and drive spindle. These usually operate at a higher noise level. Examples of inline actuators can be seen on our JP3 and JP4 models.

D. **Gear Motors** - Gear motors allow for economical and flexible designs, when matching them with various external spindle assemblies. The compact design is typically worm gear driven and an excellent choice for mechanical synchronization. Examples of gear motors can been seen in TiMOTION's TGM1, TGM2, TGM3, TGM4, TGM5, and TGM7 models.

E. **Dual Motor** - A dual motor linear actuator creates movement in two directions either individually or simultaneously. This minimizes the number of linear actuators required in a particular application. They are also typically worm gear driven motors, which operate at a lower noise level. While these are typically more expensive per unit, the total system cost will be more economical due to less parts. An example of this can be seen in our TT1 model.

F. **Linear Slide Actuator** - This actuator style creates a linear movement without the use of an outer
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tube. It utilizes a plastic slide mechanism which travels across the actuator, attached to the frame of common household furniture (such as power recliners and couches) seen in our TA5L and TA5P actuators.

G. Electric Lifting Column - TiMOTION manufactures lifting columns catering to the industrial, medical, and ergonomic markets. The primary advantage of an electric column is its ability to vertically lift high loads while retaining a high degree of stability. Our industrial and medical grade columns are designed for applications such as medical and bariatric beds and height-adjustable industrial work stations, where worker and patient safety is essential. Some examples of these columns are the TL3, TL8, TL17, and TL18. Our office ergonomic columns come in various colors, shapes, orientations, as well as 2 or 3 stages for BIFMA compatibility depending on user preference. Some examples of TiMOTION’s office ergonomic columns can be seen on the TL4, TL5, TL7, TL9, TL13, TL14, and TL15.

We hope that this has helped you develop a better understanding and foundation for electric linear actuators.
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and their incorporation into linear motion systems. Next, we will review the important components inside and outside of an electric linear actuator. If you have further questions and/or would like help with your next application, TiMOTION would be glad to assist you. We specialize in partnering with our clients while providing quality solutions for their actuation needs.