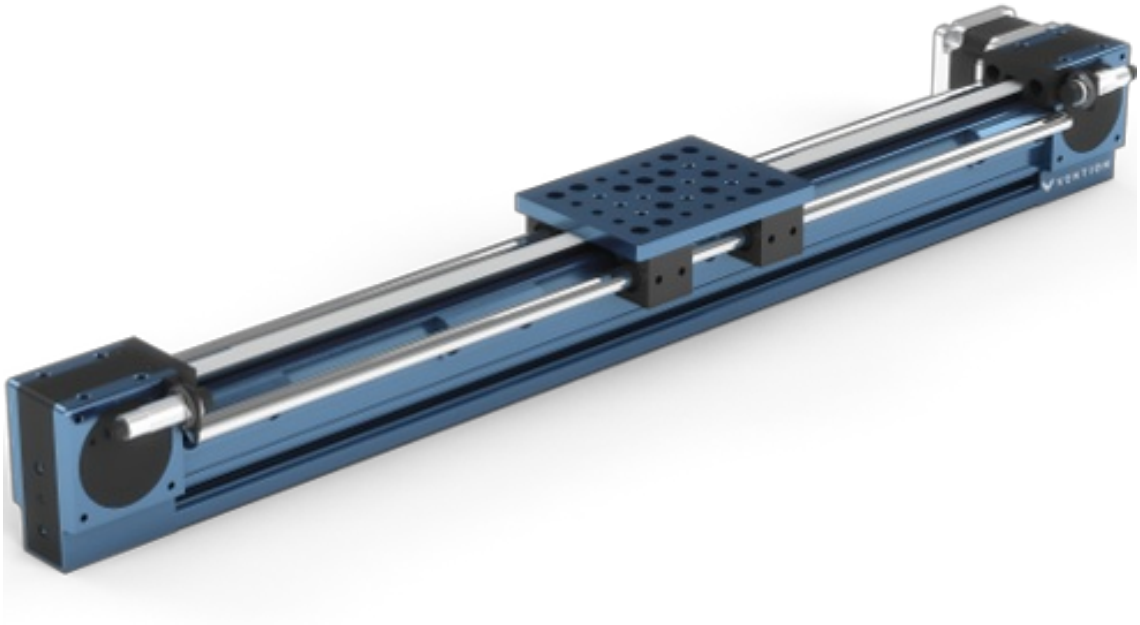
Timing Belt Actuator

Contents

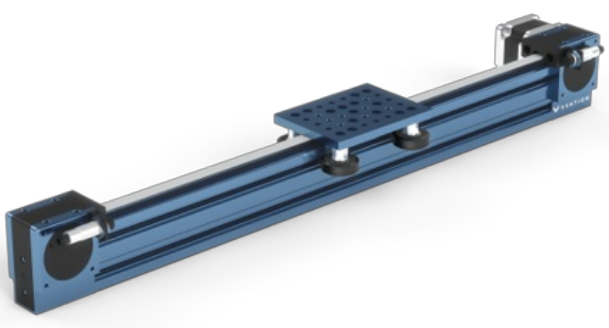


Overview

Belt-driven linear actuators are typically used for light to medium duty applications that require higher speeds and acceleration. Consisting of two concealed timing belt pulleys mounted at the ends of a Vention 45 x 90 mm extrusion, the assembly can accommodate any of Vention's Nema 34 stepper motors and comes in a variety of lengths.

Compatible Guides

The belt-driven linear actuator can drive a variety of gantries that are in turn supported by both Eccentric and Concentric V-shaped rollers (MO-LM-001-0027/0028) or linear bearings on shafts (MO-LM-014-XXXX). Both configurations can be seen below.



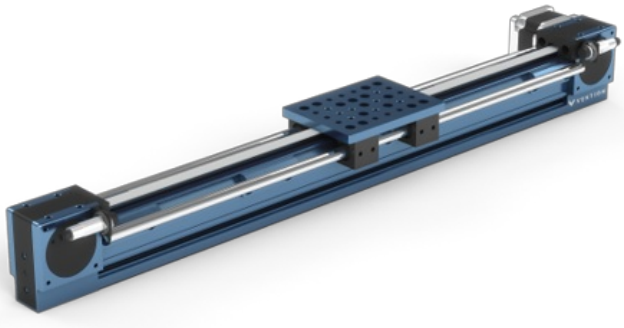
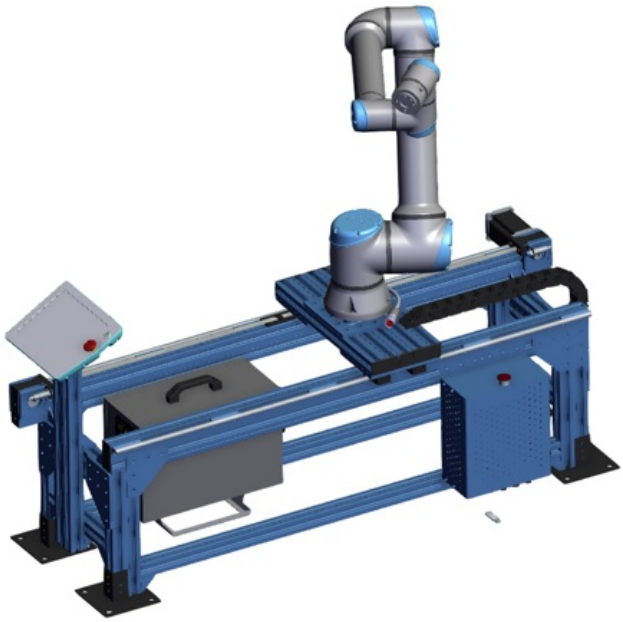


Exhibit 1. Belt-driven linear actuator shown with medium gantry and nylon V-shaped wheels

Exhibit 2. Belt-driven linear actuator shown with medium gantry and linear bearings and shafts

Applications

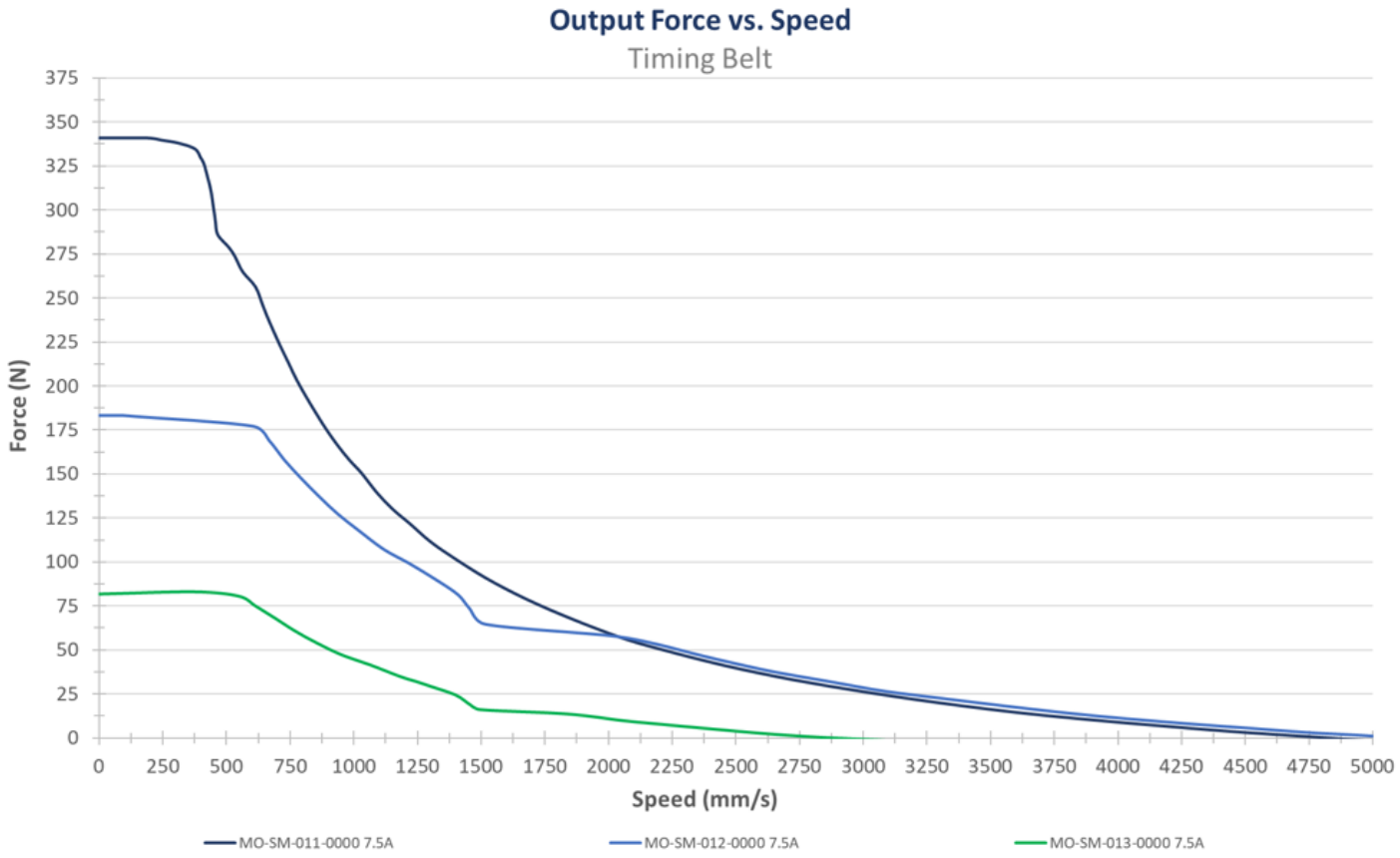


There are several application for belt-driven linear actuators, including a UR10 7th Axis or a 3-Axis Palletizer.

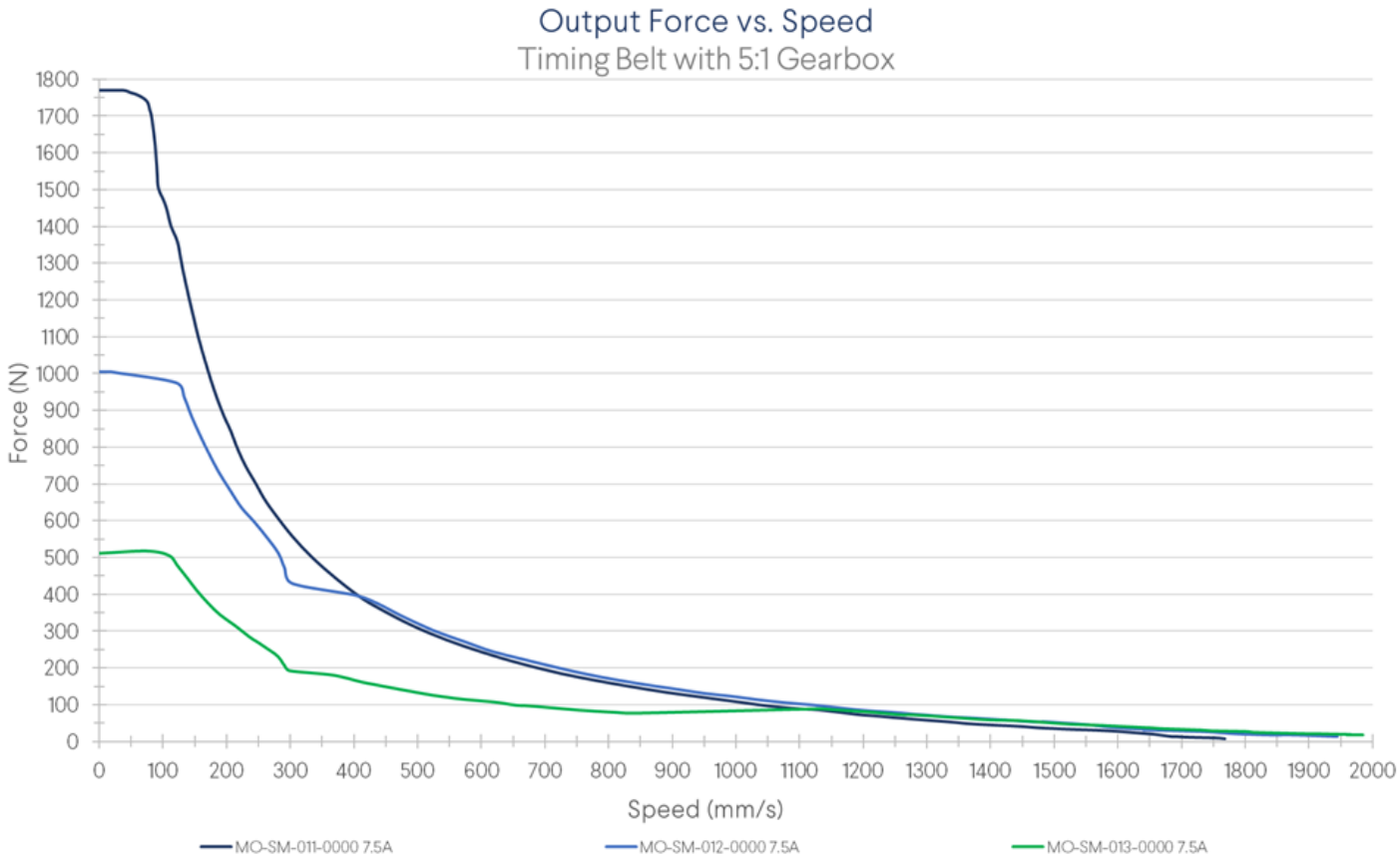
Technical Specifications

Available Lengths	585mm to 1530mm in 45mm increments + 1980mm, 2295mm Net displacement is equivalent to the extrusion length minus the gantry's longitudinal dimension
Displacement Ratio (mm/turn)	150
Linear Force / Torque Ratio (N/Nm)	42
Output Force Capacity (N)	See Exibit 3 & 4 below
Repeatability (mm)	±0.25 (with roller wheels) ±0.025 (with linear bearings & shafts)
Back Drive Resistance	Low
Motor Compatibility	NEMA 34, 14mm shaft MO-SM-001-0001, MO-SM-002-0001, MO-SM-003-0001
Sensor Compatibility	Compatible with all M18 sensors using the left or right end stops(MO-LM-015-0001/0002)
Belt Life (hours)	6000-11000

The figure below demonstrates the linear force output in function of the linear speed of the belt-driven linear actuator. This was calculated using Vention's NEMA 34 stepper motors driven by MachineMotion 2.



Observing the figure above, the force slowly decreases as the linear velocity increases, making the timing belt actuator ideal for lower force applications that require higher movement speeds. If more force is required and travel speed is not as critical, consider adding a gearbox to the powertrain. See the below figure for expected performance with a gearbox.

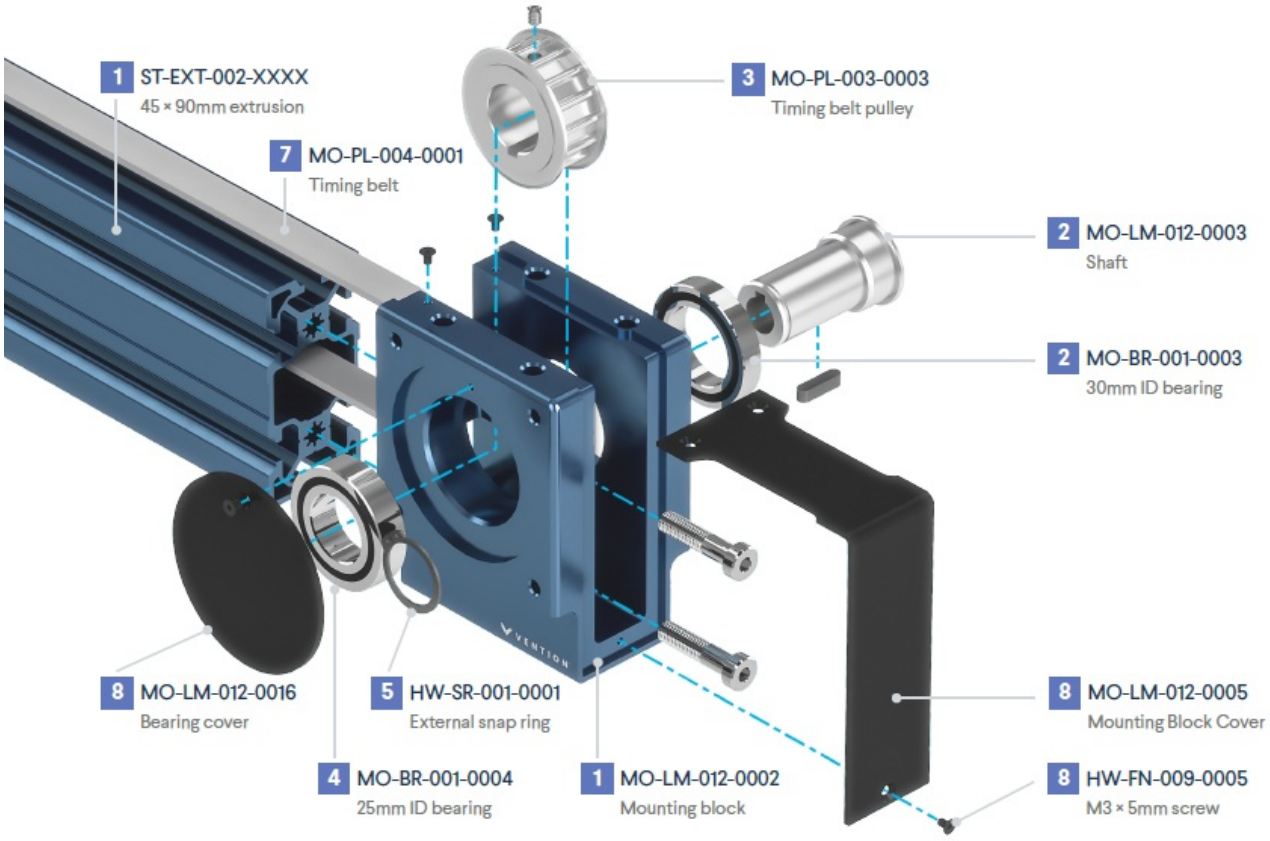


Observing the figure above, the force is much higher when using the gearbox, however it decreases much faster as the linear velocity increases. This makes the combination ideal for slower moving applications with higher forces.

Note: During MachineMotion's boot up sequence, the holding force is momentarily 65% of its rated value. Please keep in mind when using in vertical and/or angled applications.

Assembly Instructions

End Block



1. Tap the end of the extrusion and mount the end block using 2 X M8 X 35mm screws.
2. Insert the shaft through the 30mm ID bearing and insert the machine key into the shaft's keyway.
3. While holding the pulley within the end block, slide the shaft through one side of the end block and into the pulley. Place the pulley against the shaft's shoulder and secure using the provided set screw.
4. Insert the 25mm ID bearing on the other side of the end block, supporting the shaft.
5. Secure the smaller side of the shaft to the bearing using a snap ring and snap ring pliers.
6. Repeat steps 1 through 5 for the second end block at the other extremety of the extrusion.
7. Route the timing belt through the opening of the 45 x 90mm extrusion and around both installed pulleys, making sure the belt's teeth are facing inwards (not shown)
8. Enclose the pulleys and appropriate bearings using the provided covers and M3 X 5mm screws

Tensioning

To tension the timing belt, locate the two screw heads under the gantry and use a hex key to tighten both screws equally until desired belt tension is reached.