

# Vertical Loads: When And How Should Brakes Be Used On A Linear Actuator?

## Where To Apply A Brake To A Vertical Load

A brake can be applied in three primary locations of a linear positioner in the overwhelming majority of applications:

1. It can be directly applied onto the linear drive unit – i.e. the ballscrew or the belt drive pulley shaft, which would be the optimal location as far as fail safe operation. This eliminates a crucial mechanical failure point: the coupling between the drive unit and the servo motor shaft.
2. Brakes can be applied onto the linear bearing, such as a linear square rail. This would be the second safest option for applying the brake and can actually prohibit a belt drive from freefalling. This is achieved because the square rails bearing blocks are rigidly fixed to the carriage of the linear actuator.
3. The least safe place to attach the brake would be on the servo shaft itself. This option does not prevent load freefall due to the chance of coupling failure. Just because this is the least safe option does not mean that it is not safe. It ensures better protection against load freefall than nothing at all!

## Vertical Load Brakes

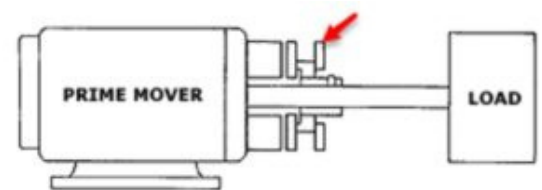
### Power-On Brakes

These brakes energize the armature of the brake allowing it to clamp the friction material onto the moving shaft once it receives power from its power supply, which would be independent from the servo motor power bus. This brake control design would not be properly used in an application to prevent a load from falling since its power supply would have to rely on a separate control signal in an emergency servo power loss situation. More than likely this brake would be used for an application specific process during the normal application cycle.

### Power-Off Brakes

The inherent design of this brake is to actuate once the power has been removed. This can usually be tied into the same power bus as the servo drive power bus and therefore it will lose power at the same time that the drive loses power. This

brake usually has a spring assist which forces the armature of the brake to press against the shaft causing it slow to a stop when power is removed from the brake. However when power is applied, the electromagnetic field pulls the armature off of the shaft causing it to spin freely. This design makes the brake failsafe in an emergency servo drive power loss situation.



There are many applications which require brakes. However, it is not always easy to decide which brake or which drive technology to use in a vertical application. There are exceptions to every rule due to a variety of factors, such as environmental concerns or the physics of the movement of the application, which could require a less safe drive technology to be used.

# Vertical Loads: When And How Should Brakes Be Used On A Linear Actuator?

The actual sizing of a mechanical brake is another discussion that needs to be considered to ensure that the brake applied has enough torque and power to stop the dynamics of a particular load. It is important to consult an expert in the motion control field to assist with weighing the options and the risks encountered in each application. Our team can help you decide when to use a brake and where to apply them on the mechanical system. We have experience working with linear actuators in a range of application and can help your team ensure safe and efficient operation.