

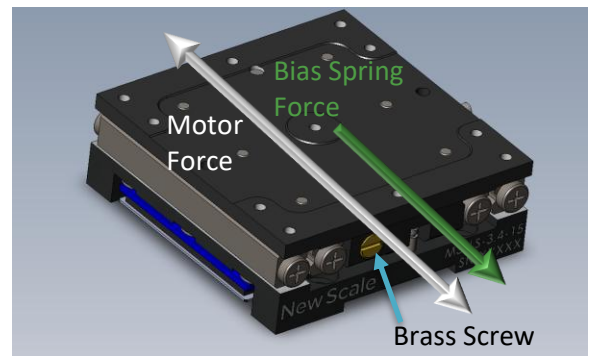
M3-LS-3.4-15 Linear Smart Stage and M3-LS-3.4-15-XYZ-MPM Linear Smart Stage Assembly

Confirming Proper Stage Orientation Relative to Gravity

M3-LS Linear Smart Stages are designed to operate reliably with payloads up to 200 grams with a horizontal stage orientation, 100 grams with a vertical stage orientation, and 25 grams with any stage orientation. Therefore, when the payload is greater than 25 grams, the orientation of gravity must be considered.

Background

The patented SQUIGGLE® motor inside the smart stage rotates a fine-pitch precision screw to generate precision linear movements. An internal bias spring is incorporated in the stage, to remove the clearance in the threads and also maintain contact of the spherical tip of the screw to the moving stage top. This bias spring eliminates backlash and ensures stable positioning and off-power holding.



Stage orientation with respect to gravity (single stage)

When the payload exceeds 25 grams, the gravity direction should be zero (horizontal) or in the same direction as the bias spring force.

The bias spring force is determined by locating the brass screw on end of the moving stage top (*Figure 1*). The bias spring force is always pulling the brass screw *away* from the center of the stage.

Proper stage axis orientation (*Figure 1*) is:

- Horizontal (0 degrees) where gravity force is zero.
- Greater than 0 degrees to 90 degrees (vertical) with the brass screw on the bottom of the moving stage (facing down) and gravity force in the same direction as the bias spring.

Stage orientation for multi-axis stage assemblies (including the M3-LS-3.4-15-XYZ-MPM Motorized Stage Assembly)

For the case of multi-axis assemblies, especially XYZ stage assemblies, if the payload will exceed 25 grams the orientation must be considered. In New Scale's Multi-Probe Micromanipulator (MPM) Systems, the XYZ motorized stage assembly is delivered with the stages properly assembled for either **inverted configuration** or **upright configuration**. Should the user need to change from inverted to upright, or vice-versa, the stages must be reassembled for the new orientation with respect to gravity (*Figure 2*). New Scale Technologies provides this service.

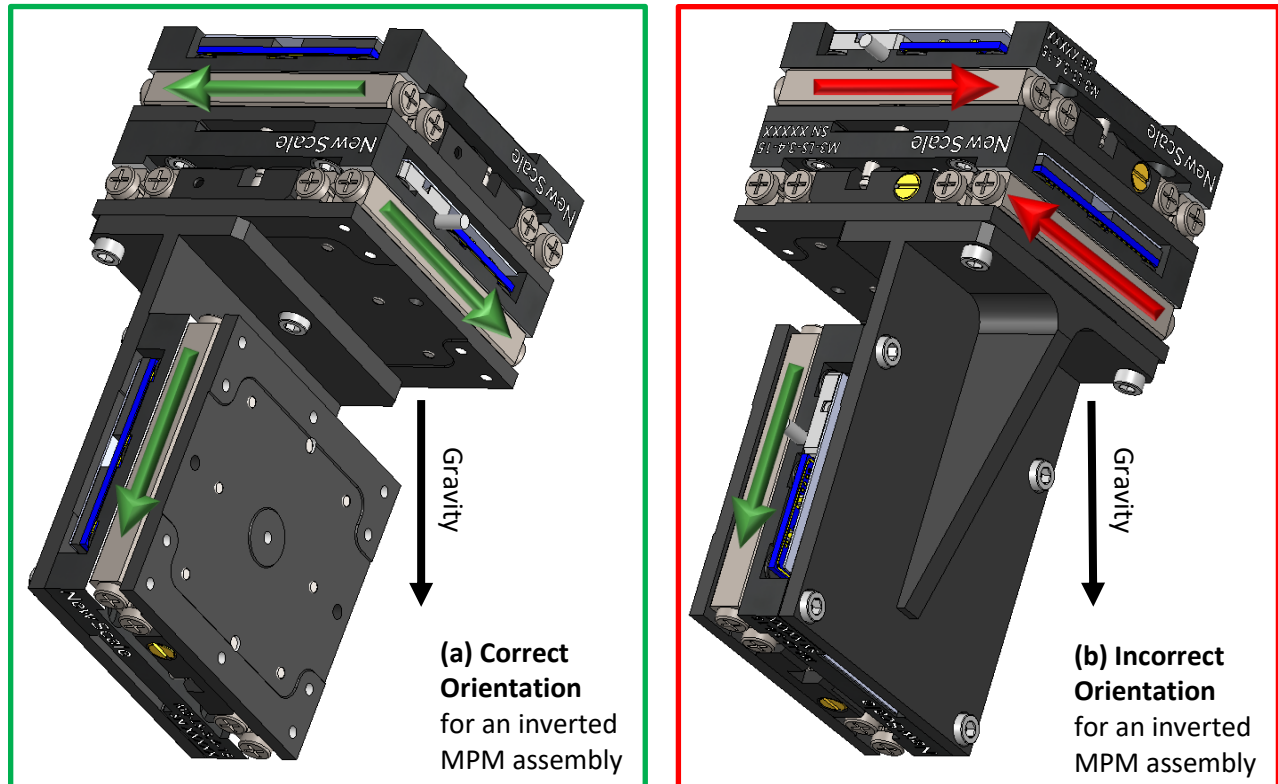


Figure 2 – Example - An M3-LS-3.4-15-XYZ-MPM Motorized Stage Assembly configured for inverted operation in an MPM System. Each stage is oriented so that the brass screw is on the lowest side of the stage. Therefore, the bias spring force is working with gravity, not against gravity.