

FREQUENCY RESPONSE

TWO PARAMETERS—*frequency response* and *stroking speed*—are most often used to reflect the reaction of an actuator to changes in control signal. The frequency response indicates how the unit will react to small, constantly varying changes in signal (modulating); while the stroke speed reflects step changes in input most often caused by upset conditions.

REXA uses ISA standard S26 to test for frequency response. A sinusoidal input signal (10% or less of full scale) is applied to the actuator, and the output motion is measured. As the frequency of the input signal increases, the output motion changes in two ways: (1) its amplitude decreases from steady state conditions, and (2) it begins to fall behind (lag) the input.

A critical concern in any frequency response test is to insure that the response is not limited by the speed of the actuator. As an example, Figure 1 shows the frequency response of a 2000 lb thrust linear actuator with a B size power module. The tests were performed at various speed settings. As the speed increased, so did the response. This indicated that the response was speed limited and not a true value.

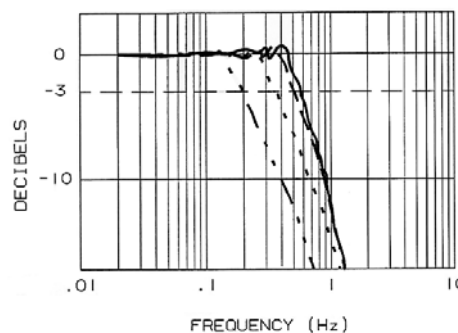


FIGURE 1
L2000-2-B-P
SPEED SETTING
100% ———
75% - - - -
50%
25% - . - . -
NO LOAD
10% FULL SCALE

The test was now performed on the same size actuator, but with two C size power modules. This represented a 6 fold increase in flow volume at 100% speed. A considerably higher frequency response was indicated (figure 2). Based on this testing, REXA feels that the corner frequency for the B and C power modules to be in the 2.0 Hz range. For small changes in input signal (< 1%), this frequency can be thought of as the maximum rate which the actuator can track.

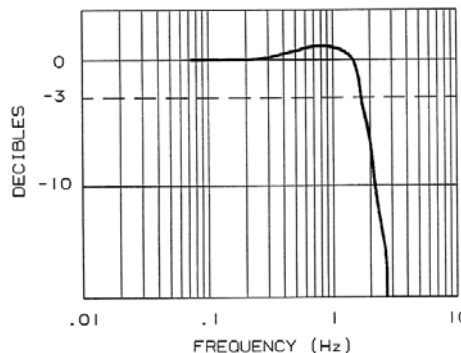


FIGURE 2
L2000-2-2C-E
SPEED SETTING: 100%
LOADED: COIL SPRING
10% FULL SCALE

The B and C size power modules use stepper motors. Although the C size is capable of pumping more volume, the response for both is similar. The D size power modules use a servo motor. Its operational characteristics are considerably different than a stepper motor. Our tests and calculations have indicated that the corner frequency for actuators using a ¼D, ½D or a D size module will be in excess of 5 Hz.

The stroking speed of REXA actuators is well documented and shown in Technical Memo #1, *Stroking Time*. For any given actuator output (thrust or torque), different power module combinations are available to increase the maximum speed. The speed can always be reduced from the maximum by decreasing the speed parameters during setup.