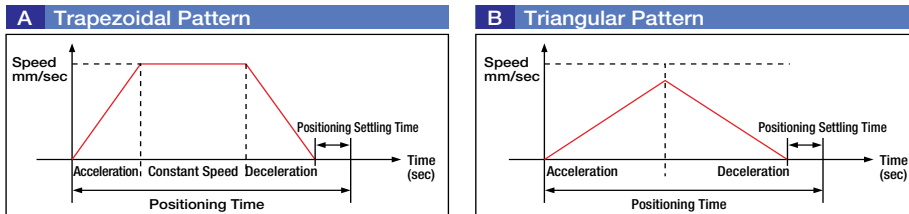


# Technical Information

## How to calculate positioning time

The actuator positioning time can be found from an equation. Depending on the distance to be moved and the amount of acceleration/deceleration to be applied, the positioning operation can follow one of two patterns, shown below:



First confirm the movement pattern as trapezoidal or triangular, then calculate the positioning time using the respective equation.

## Confirming the Movement Pattern

Whether a movement pattern is trapezoidal or triangular can be determined by whether the peak speed reached after accelerating over a distance at a specified rate is greater than or less than the specified speed.

$$\begin{aligned} \text{Peak speed (Vmax)} &= \sqrt{\text{Distance travelled (Smm)} \times \text{Specified acceleration}} \\ &= \sqrt{\text{Smm} \times 9,800\text{mm/sec}^2 \times \text{Acceleration setting (G)}} \end{aligned}$$

If  $V_{max} > V$ : Trapezoidal pattern

If  $V_{max} < V$ : Triangular pattern, where  $V_{max}$  is the peak speed reached and  $V$  is the speed that was specified.

## Method of Calculating the Positioning Time

### A Trapezoidal Pattern

$$\text{Positioning Time (T)} = \frac{\text{Distance (mm)}}{\text{Speed (mm/sec)}} + \frac{\text{Speed (mm/sec)}}{\text{Accel. (mm/sec}^2)} + \text{Positioning Settling Time}$$

### B Triangular Pattern

$$\text{Positioning Time} = 2 \sqrt{\frac{\text{Distance (mm)}}{\text{Accel. (mm/sec}^2)}} + \text{Positioning Settling Time}$$

$$\text{Accel. Time} = \frac{\text{Speed* (mm/sec)}}{\text{Accel. (mm/sec}^2)}$$

$$\text{Distance Accelerated} = \frac{\text{Accel. (mm/sec}^2) \times (\text{Accel. Time (sec)})^2}{2}$$

\* Here, "Speed" refers to the specified speed in the trapezoid pattern, and the peak speed in the triangle pattern.

**Note**

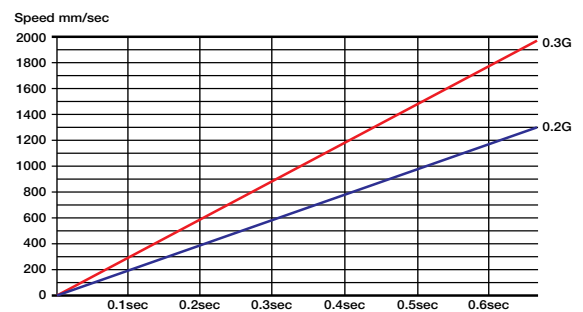
- The acceleration is calculated by the following: Acceleration setting in the controller (G) × 9,800mm/sec<sup>2</sup>. If the acceleration setting in the controller is 0.3G, then 0.3 × 9,800mm/sec<sup>2</sup> = 2,940mm/sec<sup>2</sup>.
- The positioning settling time is the time required to determine the completion of movement to the target position, typically around 0.15sec for ball screw types and 0.2sec for belt types.

## Positioning time (sec)

Accel. Setting	Specified Speed (mm/sec)	Distance Moved (mm)																		
		10	20	30	40	50	100	150	200	250	300	350	400	450	500	600	1000	1100	1300	1400
0.3G	100	0.13	0.23	0.33	0.43	0.53	1.03	1.53	2.03	2.53	3.03	3.53	4.03	4.53	5.03	6.03	10.03	11.03	13.03	14.03
	200	0.12	0.17	0.22	0.27	0.32	0.57	0.82	1.07	1.32	1.57	1.82	2.07	2.32	2.57	3.07	5.07	5.57	6.57	7.07
	300	0.12	0.16	0.2	0.24	0.27	0.44	0.6	0.77	0.94	1.1	1.27	1.44	1.6	1.77	2.1	3.44	3.77	4.44	4.77
	400	0.12	0.16	0.2	0.23	0.26	0.39	0.51	0.64	0.76	0.89	1.01	1.14	1.26	1.39	1.64	2.64	2.89	3.39	3.64
	500	0.12	0.16	0.2	0.23	0.26	0.37	0.47	0.57	0.67	0.77	0.87	0.97	1.07	1.17	1.37	2.17	2.37	2.77	2.97
	600	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.54	0.62	0.7	0.79	0.87	0.95	1.04	1.2	1.87	2.04	2.37	2.54
	700	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.52	0.6	0.67	0.74	0.81	0.88	0.95	1.1	1.67	1.81	2.1	2.24
	800	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.52	0.58	0.65	0.71	0.77	0.83	0.9	1.02	1.52	1.65	1.9	2.02
	900	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.52	0.58	0.64	0.7	0.75	0.81	0.86	0.97	1.42	1.53	1.75	1.86
	1000	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.52	0.58	0.64	0.69	0.74	0.79	0.84	0.94	1.34	1.44	1.64	1.74
1750	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.52	0.58	0.64	0.69	0.74	0.78	0.82	0.9	1.17	1.37	1.56	1.65	
2000	0.12	0.16	0.2	0.23	0.26	0.37	0.45	0.52	0.58	0.64	0.69	0.74	0.78	0.82	0.9	1.17	1.22	1.33	1.48	

Note: Does not include the positioning settling time (0.15sec for ball screw, and 0.2sec for belt).   Triangular Pattern

## Acceleration time

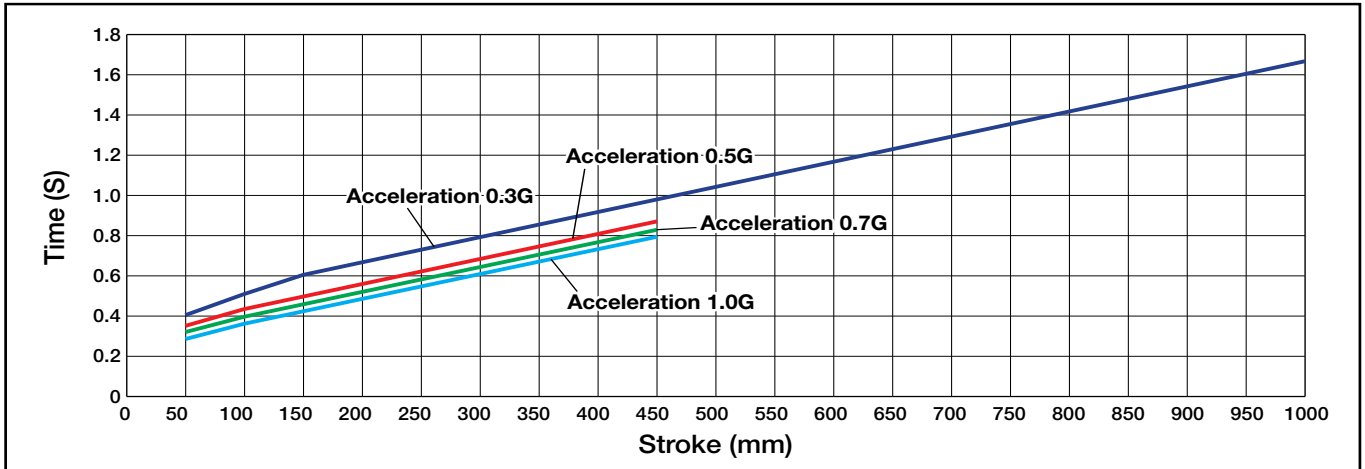


# Reference Chart of Movement Time per Speed/Acceleration

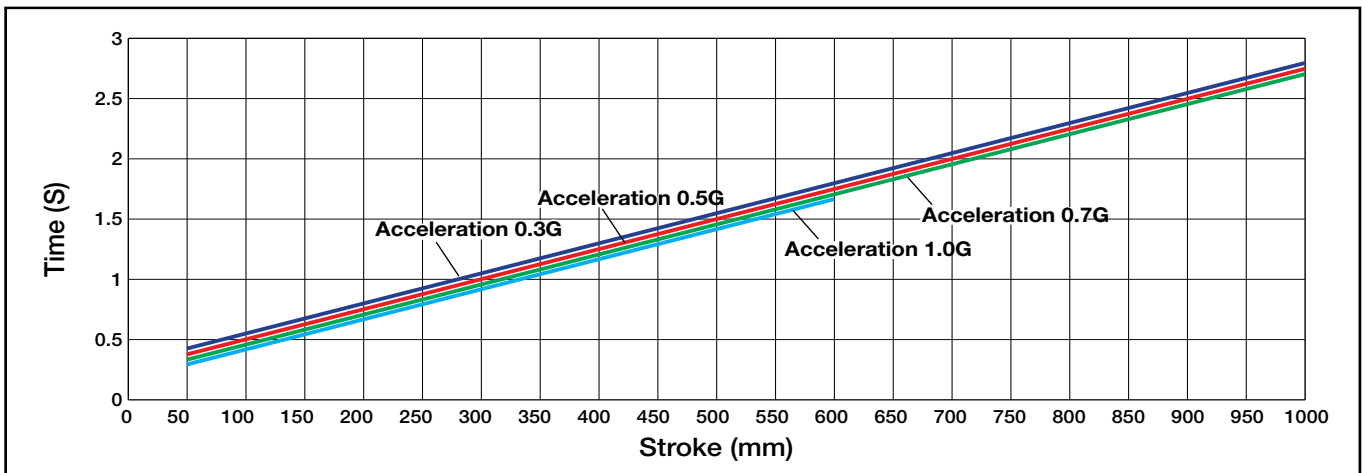
The charts below show the estimated time required for the movement per speed/acceleration. Please use it as a reference for cycle time.

(Note) Stroke indicates the one-sided and unidirectional movement distance. For RCP2, RCP3 and ERC2, please note that the maximum speed varies depending on load capacity.

## Speed 800mm/s



## Speed 400mm/s



## Speed 200mm/s

