Pointer Driving Specifications

1. The parameter of the pointer:

	Min	Typical	**Suggested Max Value (*)**
Size:		50mm	80mm
Weight:		2.5g	10g
Inertia moment:		$2\times10^{-7}kgm^2$	$20\times10^{-7}kgm^2$
Unbalance:		$0.01mNm$	$0.025mNm$

(*) bigger values can be choose in order to satisfy the followings specification

2. Start-Stop frequency:

The frequency in the following text means full step frequency, 1Hz means the rotor has angular velocity $180^o/s$, if we say the motor running at frequency f, the shaft angular velocity of the motor is:

$$\omega = \frac{f\times\pi}{180}(rad/s)$$

At the typical driving pulse, the inertia of pointer(J_p) @ star-stop frequency(f_{ss}) can be caculated:

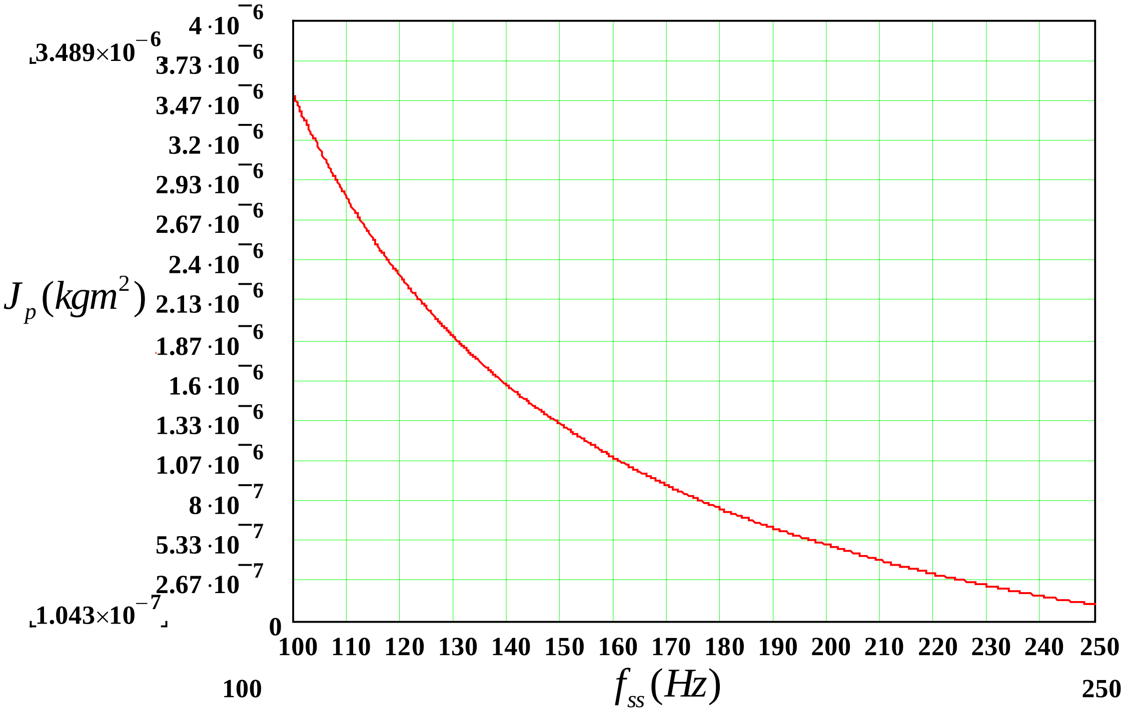
$$J_p = \frac{G_r M_d(f_{ss})}{\sigma_s \pi f_{ss}^2} - J_m$$

J_m – Inertia of the motor $J_m = 4.22\times10^{-7}kgm^2$

G_r – Gear reduction ratio $G_r = 180$

σ_s – Safety factor $\sigma_s = 2$

The following graph show the maximal (f_{ss})@ the inertia of the pointer(J_p):



3. Frequency Acceleration:

The frequency acceleration is defined as:

$$A_f = f_i(f_i - f_o)$$

The angular acceleration of the shaft is:

$$\alpha = A_f \times \frac{\pi}{G_r}(rad/s^2)$$

G_r – Gear reduction ratio $G_r = 180$

At the typical driving pulse, the inertia of pointer(J_p) @maxiumal frequency acceleration(A_f) can be caculated:

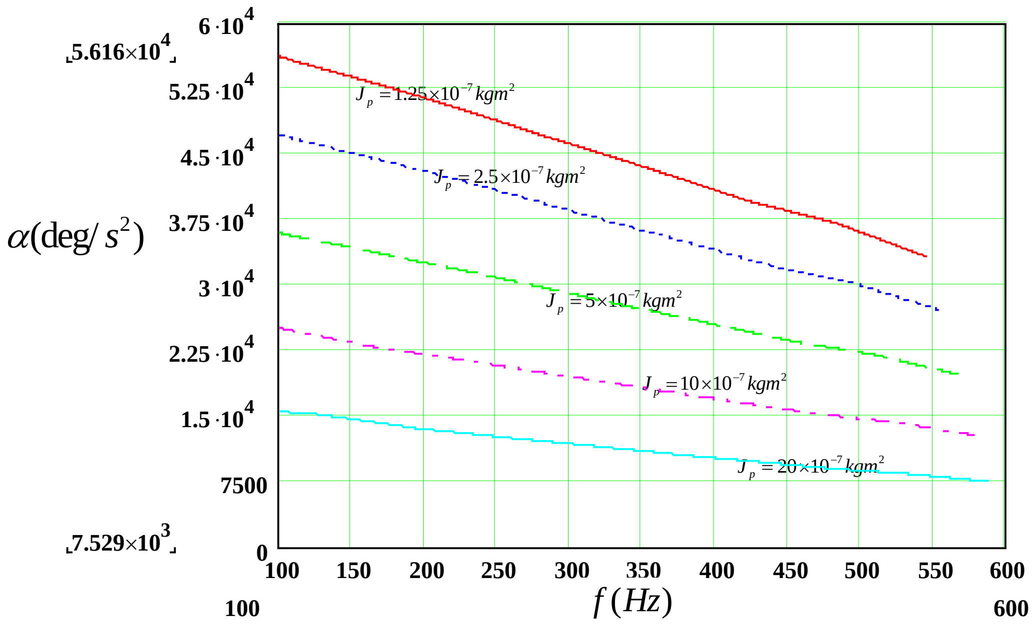
$$A_f = \frac{G_r Min[M_d(f_o), M_d(f_i)]}{\sigma_s \pi (J_p + J_m)}$$

σ_s – Safety factor $\sigma_s = 2$

The maxiumal angular acceleration of the shaft is:

$$\alpha = \frac{Min[M_d(f_o), M_d(f_i)]}{\sigma_s (J_p + J_m)}(rad/s^2)$$

The following plot show the maxiumal acceleration of the shaft@frequency.



If the motor is running at frequency f_o, the maxiumal next frequency you can give is f_i: