BP308 Resolution

XAxis Lead Screw

$XLS := 8 \cdot mm$ Lead Screw Pitch

$XGear := 2$ Motor to Lead Screw Gear Ratio

$XEnc := 4000$ Motor Encoder Resolution

$XRes := \frac{XLS}{XGear \cdot XEnc}$ $XRes = 1 \times 10^{-6}\,m$ $XRes = 39.370079 \times 10^{-6}\,in$

$\frac{1}{XRes} = 25.4 \times 10^{3}\,\frac{1}{in}$

$Velocity := 160000\,\frac{1}{sec}$

$Xvel := Velocity \cdot XRes$ $Xvel = 377.953\,\frac{in}{min}$ $Xvel = 9600\,\frac{mm}{min}$

At top speed what is the motor RPM?

$XMotRPM := \frac{Xvel \cdot XGear}{XLS} = 40\,\frac{1}{s}$ $XMotRPM = 2400\,\frac{1}{min}$

Voltage Scaling for Motor Drive

$MotorGain := \frac{9}{3000} \cdot V \cdot min$ 9 Volts = 3000 RPM

$DACRes := 2^{12}$ $DACRes = 4096$

$DAC\_V := \frac{11 \cdot V}{\frac{DACRes}{2}}$ $DAC\_V = 0.00537V$ Volts per bit

$XMotRPM \cdot MotorGain = 7.2V$

$\frac{XMotRPM \cdot MotorGain}{DAC\_V} = 1340.5091$ This is the max that the DAC output should probably ever be…

$1400 \cdot DAC\_V = 7.52V$

$XAccel := \frac{7 \cdot 10^{6}}{s^{2}}$ $XAccel \cdot XRes = 7000\,\frac{1}{s^{2}}\,mm$

$Xvel = 6.299\,\frac{1}{s}\,in$ $XAccel \cdot XRes = 275.591\,\frac{1}{s^{2}}\,in$