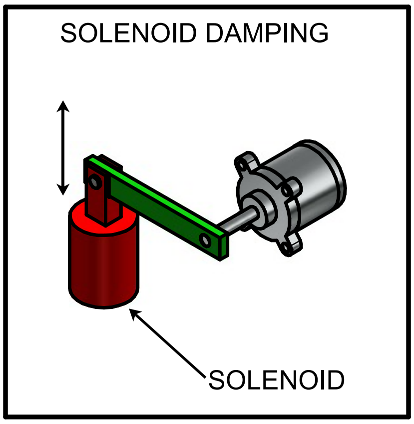
Solenoid Damping



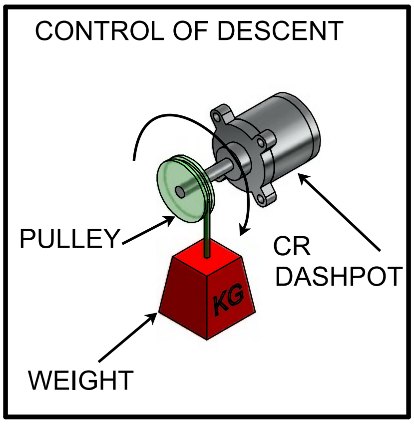
Solenoid force **F** = 10 N
Solenoid travel **d** = 25 mm = 0.025 m
Lever arm length **L** = 75 mm = 0.075 m
Travel time required **t** = 5 s

Use Formula 1: Rate $= \dfrac{FL^2t}{d} = \dfrac{10 \times 0.075^2 \times 5}{0.025}$

$= 11.2$ Nm/rad/s (99 lbf.Ins/rad/s)

Conclusion: **Use KD – A2**

Control of Descent



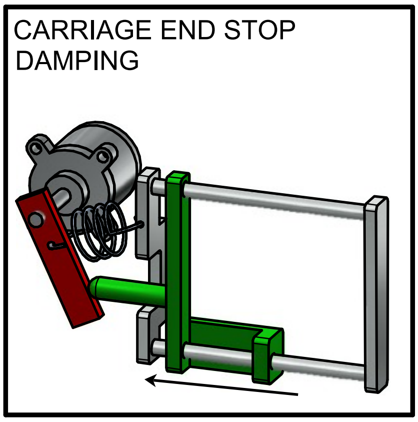
Weight = 1 kg
Pulley radius = 50 mm = 0.05 m
Speed required **V** = 100 mm/s = 0.1 m/s
Force **F** = 1 x 9.81 = 9.81 N
Torque **T** = 9.81 x 0.05 = 0.49 Nm
Speed of rotation **w** = 0.1 m/s ÷ 0.05 m = 2 rad/s

Use Formula 2: Rate = T/w = 0.49/2 = 0.245 Nm/rad/s

This is a CR dashpot application. Find point on the S – CRD graph for torque and speed

Conclusion: **Use S – CRD – 30,000**

Carriage Mechanism End Stop Damping



Carriage mass **M** = 10 kg
Velocity **V** = 1 m/s
Deceleration distance **d** = 50 mm = 0.05 m
Lever length **L** = 75 mm = 0.075 m

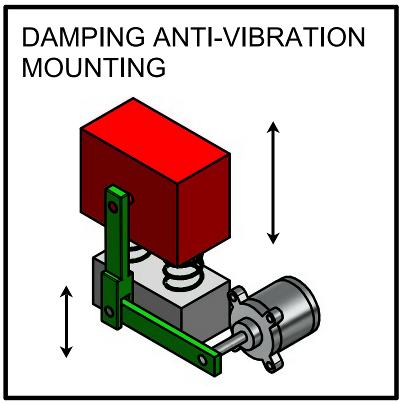
Use Formula 3: Rate $= \dfrac{MVL^2}{d} = \dfrac{10 \times 1 \times 0.075^2}{0.05}$

$= 1.1$ Nm/rad/s (9.7 lbf.Ins/rad/s)

Check max. rotation speed = 1 m/s ÷ 0.075 m = 13.3 rad/s
Hence max. torque = 13.3 x 1.1 = 14.7 Nm (130 lbf.Ins)

Conclusion: **Use KD – A1**

Damping Anti-Vibration Mounting



Mass **M** = 10 kg
Natural frequency **f** = 20 Hz
Lever length **L** = 100 mm = 0.10 m

Use Formula 4: Rate $= \dfrac{MfL^2}{0.08} = \dfrac{10 \times 20 \times 0.1^2}{0.08}$

$= 25$ Nm/rad/s (220 lbf.Ins/rad/s)

Conclusion: **Use KD – A3**