



Rotary Actuator Calculations

Data Sheet

How to calculate a moment of inertia

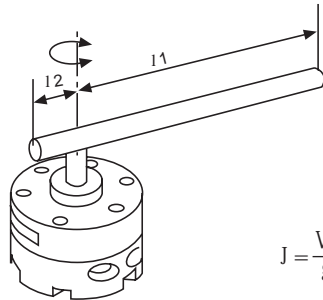
Calculating a moment of inertia

J: Moment of inertia (kgf/cm/s²) Weight: Weight of load (kgf)

g: Acceleration due to gravity (980cm/s³)

1. Thin rod

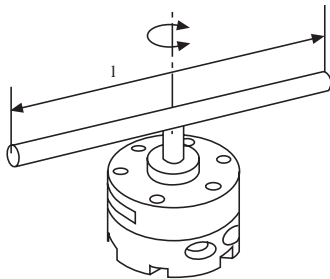
Position of pivot: Passes through one end perpendicular to the rod.



$$J = \frac{W_1}{g} \cdot \frac{l_1^2}{3} + \frac{W_2}{g} \cdot \frac{l_2^2}{3}$$

2. Thin rod

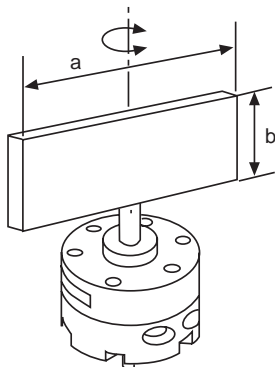
Position of pivot: Passes through the centre of gravity perpendicular to the rod.



$$J = \frac{W}{g} \cdot \frac{l^2}{12}$$

3. Thin rectangular plate (rectangular parallel piped)

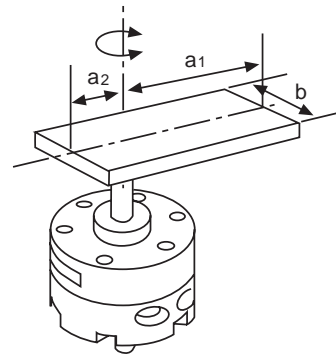
Position of pivot: Passes through the centre of gravity, parallel to side b.



$$J = \frac{W}{g} \cdot \frac{a^2}{12}$$

4. Thin rectangular plate (rectangular parallel piped)

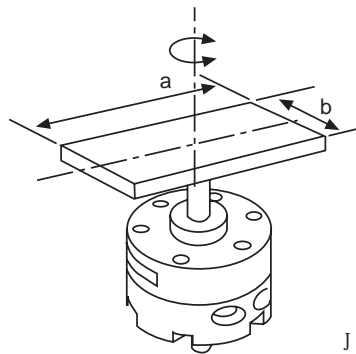
Position of pivot: Passes through one end perpendicular to the plate.



$$J = \frac{W_1}{g} \cdot \frac{4a_1^2 + b^2}{12} + \frac{W_2}{g} \cdot \frac{4a_2^2 + b^2}{12}$$

5. Thin rectangular plate (rectangular parallel piped)

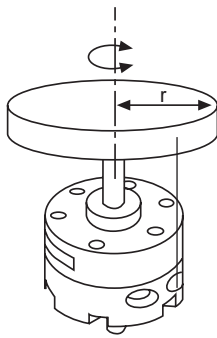
Position of pivot: Passes through the centre of gravity, perpendicular to the plate (inclusive of rectangular parallel piped)



$$J = \frac{W}{g} \cdot \frac{a^2 + b^2}{12}$$

6. Column (inclusive of thin disk)

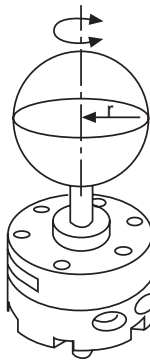
Position of pivot: Axis.



$$J = \frac{W}{g} 3 \frac{r^2}{2}$$

7. Solid globe

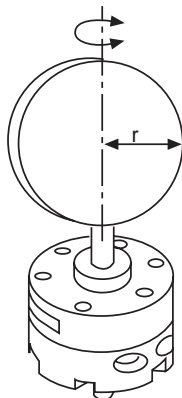
Position of pivot: Diameter.



$$J = \frac{W}{g} 3 \frac{2r^2}{5}$$

8. Thin disk

Position of pivot: Diameter.

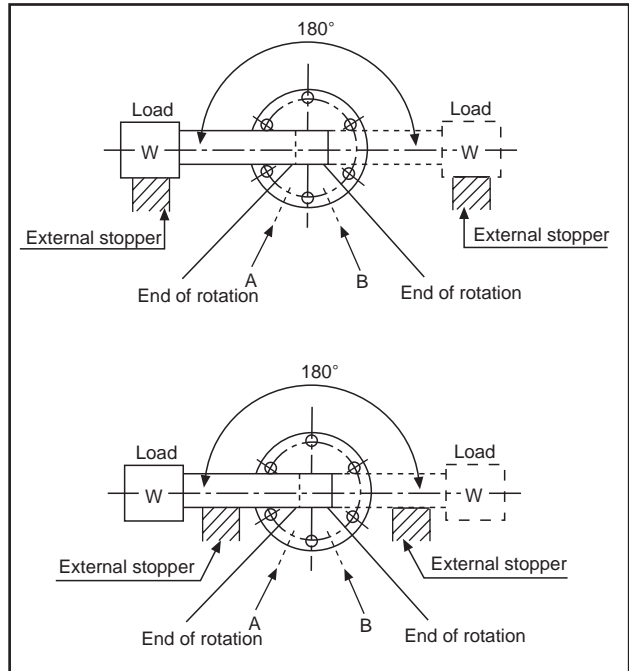


$$J = \frac{W}{g} 3 \frac{r^2}{2}$$

Installation of external stop

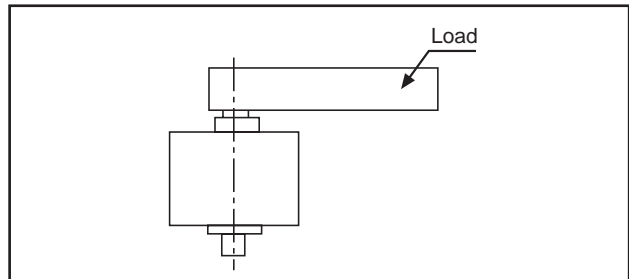
Since the shaft and bearings of the actuator could be damaged depending on the shape of load and installation, install an external stop at the mass point of the work or at the load location furthest away from the actuator.

When the load exceeds the allowable energy and the external stop has no shock absorption capability, avoid using the single flat shaft. Also avoid installation of external stop anywhere along the length of the actuator.



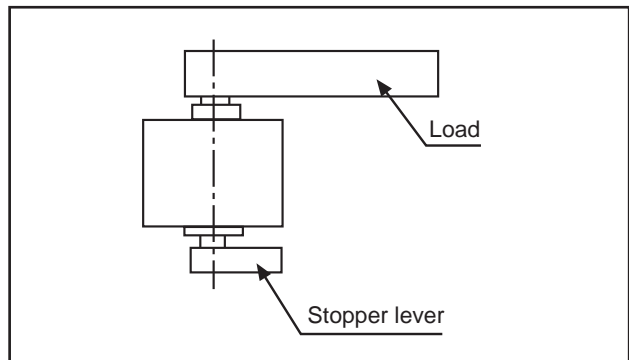
1. Stop of load movement via external stop

Never use a single flat shaft when the external stop has no ability to absorb the shock.



2. Movement stop by using the single flat shaft and external stop

When the external stop has the ability to absorb the shock, and the load is within the allowable energy limit, the single flat shaft can be used for stopping.



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