Rotational Motion Accessory Kit

(Order Code AK-RMV)

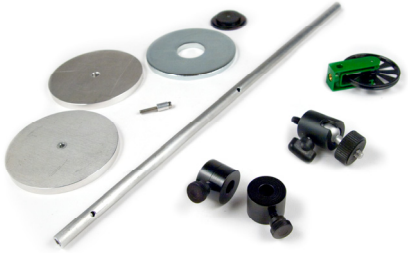
This kit provides a variety of items that add to the versatility of the Rotary Motion Sensor. It is used for investigations such as:

- Measurement of rotational inertia of a disk
- Measurement of rotational inertia of a point mass
- Verification of the conservation of angular momentum
- Studying the motion a physical pendulum

What is included with the Rotary Motion Sensor?

This kit includes the following accessories.

Large aluminum disks (2)	Use one to measure the rotational inertia of a disk. Use two to observe conservation of angular momentum.
Steel washer	Use with the hub to measure rotational inertia of a cylinder
Hub	Use with the steel washer described above to measure rotational inertia of a cylinder.
Hollow rod	Use with the masses to measure rotational inertia or to make a pendulum
Masses (2) with locking screws	Use with the hollow rod to measure rotational inertia.
Spindle/screw	Use to hold disks in place
Ultra Pulley	Use to apply a torque to the 3-step pulley
Ultra Pulley Swivel Mount	Allows the Ultra Pulley to be connected to the Rotary Motion Sensor



Example Experiments

The following examples show various ways to use this kit with the Rotary Motion Sensor.

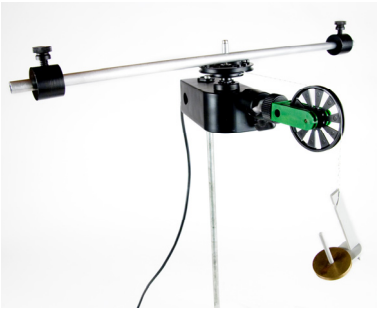
Moment of Inertia of a Disk Attach an Ultra Pulley to the Rotary Motion Sensor. Attach the 3-step pulley to the rotating shaft. Attach the disk to the 3-step pulley. Attach a string to the underside of the hub. Attach the Ultra Pulley to the Rotary Motion Sensor using the Ultra Pulley Swivel Mount. Run the string over the Ultra Pulley and attach a weight to the end of the string. Use the weight to apply a torque to the system while the Rotary Motion Sensor measures the angular acceleration.

Moment of inertia values include the following:

- The following rough steel washer values are approximate, as dimensions and mass vary. The sample we measured was 267.6 g, 88.5 mm diameter, and with a 27 mm diameter inner hole, for a moment of 2.86×10^{-4} kg m^2.
- Both smooth aluminum discs have a moment of 1.05×10^{-4} kg m^2 to three decimal places. The disc with a small hole is 106.1 g, with a diameter of 89.0 mm and a hole of 3.6 mm. The disc with cork and a larger hole is 105.2 g, with a diameter of 89.0 mm and a hole of 6.0 mm.
- The plastic center disk (that fits the washer) is just 4.5 g in mass, so its approximate moment is 5×10^{-7} kg m^2.
- The three step pulley has an approximate moment of 2×10^{-6} kg m^2.
- In comparison to the metal disks, the plastic parts have negligible moments and can be disregarded.

Moment of Inertia of a Point Masses

Use the same set up as described in the previous section. This time attach a rod with two masses to the 3-step pulley. Use the weight to apply a torque to the system while the Rotary Motion Sensor measures the angular acceleration.



Conservation of Angular Momentum

Attach disk to the 3-step pulley. Give the disk a spin. While the system is rotating, drop a second disk onto the first disk. Observe the change in the angular velocity before and after the mass is added to the system.

Motion of a Physical Pendulum

Attach the 3-step pulley to the rotary motion sensor with the small step next to the sensor body. Attach the center of the rod with two masses to the pulley. Position the masses so they are not symmetric. Position the sensor so the face of the pulley is vertical. Start the pendulum swinging, and determine the angular acceleration as a function of the angle.

Warranty

Vernier warrants this product to be free from defects in materials and workmanship for a period of five years from the date of shipment to the customer. This warranty does not cover damage to the product caused by abuse or improper use.

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