

SUPER PRECISION GYROSCOPE

What's included:

- 1 x gyroscope
- 1 x electric motor and battery pack
- 2 x screws to attach motor to the gyroscope
- 1 x length of string to balance gyroscope on
- 1 x Alan/hex key for above screws
- 2 x extensions for demonstrations
- 2 x ball ends
- 1 x slot end
- 1 x screw for the battery box

4 AA batteries are required for the battery pack



IMPORTANT:

The gyroscope rotates at high speed and hence care should be taken to ensure that you do not touch the spinning disk/shaft when it is spinning. Do not drop or knock the gyroscope as this may damage or break the gyroscope (shaft or bearings). Ensure clothing such as ties, along with hair is kept away from the gyroscope when it is spinning. Keep the gyroscope away from young children and make sure older children are supervised.

About the gyroscope

This gyroscope has been designed and built to the highest precision from the very start, made from solid brass with a light-weight aluminium frame. Carefully chosen stainless-steel miniature ball bearings allow it to run smoothly and almost silently. The gyroscope operates up to 12,000 revolutions per minute using the provided electric motor and battery pack.

The motor can be fastened to the gyroscope with two screws providing hours of continuous use or it can be used briefly to start it, allowing you to perform experiments for around 7 minutes. The gyroscope comes with a number of attachments allowing numerous configurations to perform scientific, educational or simply mesmerising experiments.

Gyroscope Specification

RPM	12,000rpm+
Weight	
Total Weight :	345g / 12.16oz
Gyroscope weight without motor :	145.3g / 5.12oz
Brass disk (without shaft) :	111.2g / 3.92oz
Alu casing, bearings, shaft weight :	34.1g / 1.2oz
Shaft (includes bearing washers) :	4.7g / 0.16oz
Bearings :	0.6g / 0.02oz
Aluminium casing :	26.1g / 0.92oz
Screws (hold case together) :	2.7g / 0.10oz
Electrical	
Motor Amps (start-up):	2.5 amps / 14.5w ~
Motor Voltage:	5.8 volts
Batteries :	4x 'AA' (LR6) batteries
Sizes	
Outer casing diameter :	62.5mm / 2.46in
Brass disk diameter :	53mm / 2.08in
Brass disk thickness :	12mm / 0.47in
Brass disk cut-out depth :	5.25mm / 0.21in
Brass disk cut-out diameter :	40.9mm / 1.61in approx
Shaft Diameter (largest point) :	4mm / 0.15 in
Motor length :	58.2mm approx
Motor diameter (largest point) :	28.1mm approx

Starting the gyroscope

- Hold the gyroscope's frame in one hand.
- While the motor is OFF push the motor onto the axle of the gyroscope.
- Holding the motor and gyroscope firmly together turn the motor on (switch is on battery box)
- Wait until the gyroscope gets to the required speed and pull motor away from the gyroscope
- Turn OFF the motor (You are now free to conduct experiments with the gyroscope)

Should you want the motor permanently attached, then push on the motor and screw on the two screws using the supplied Alan key. You can then use the motor itself as a handle.

Demonstrating Gyroscopic Forces

Suspended by string

Screw one of the ball ends into the opposite side of the gyroscope that you connect the electric motor. Start the gyroscope spinning. Hold both ends of the string and put the 'ball' end into the loop of string. Raise the gyroscope. The gyroscope will roughly maintain its angle to the horizon. Be ready to catch the gyroscope when it slows down. You will notice that as the gyroscope disk slows down its rotations around the string (precessing) will speed up.



High Wire (Balancing on string)

Screw the 'slot end' into the opposite side of the gyroscope that you connect the electric motor. Place the gyroscope onto taut string or wire (note the slot on the bottom). The gyroscope will remain on the wire until it slows down. Be ready to catch it.



Simple Precession

Screw one of the ball ends into the opposite side of the gyroscope that you connect the electric motor. Spin the gyroscope up using the electric motor. Now place the ball end of the gyroscope onto a flat surface and let go. Watch as it remains upright to begin with but then starts to slowly twist around on the ball end. This is called precession. As the gyroscope slows down the precessing will speed up and the gyroscope will start to tilt over.



Adding an extension

Repeat the demonstration above but this time use one or two of the extensions between the ball end and the gyroscope. You will notice that the gyroscope precesses much faster.

Balancing on your finger

You can try balancing it on your finger. It is probably a good idea to do the other demonstrations first so you know how the gyroscope behaves. Don't let it tilt over too much and make sure you are ready to grab it before it falls off your finger. It may also be a good idea to do this demonstration while your hand is over a soft surface such as a cushion just in case it does fall.



Various other demonstrations

There are 7 places on the frame of gyroscope that the attachments can be screwed into. This allows you to try out the attachments in different places and explore the results.