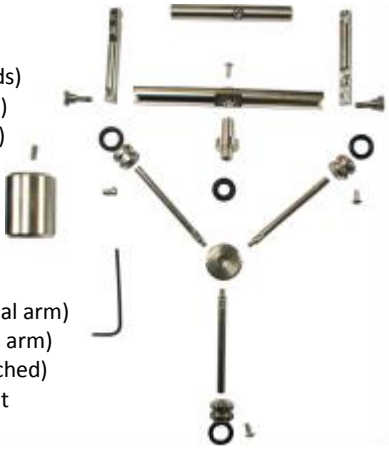
Gimbals Kit

For the Super Precision Gyroscope

What is included:

1 x Centre hub
3 x Legs (can use as extension rods)
3 x Feet (connects to ends of legs)
3 x Hex screws (secures feet/legs)
3 x Rubber O rings (fit on feet)
2 x Gimbal vertical arms
2 x Thumb Screws
1 x Counter weight
1 x Plastic washer for top of hub
1 x Pin (fits into hub and horizontal arm)
1 x Hex screw (secures horizontal arm)
1 x Centre beam (Hex screw attached)
1 x Grub screw for counter weight
1 x Alan/hex key



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 give the gyroscope a shock as this may damage the gyroscope or bearings. Ensure clothing (e.g. ties) and hair kept away from the gyroscope when it is spinning. Keep the gyroscope away from young children and make sure older children are supervised.

CAUTION!

The gyroscope gimbals kit comes with 2 thumb screws. Be careful not to screw them into the gyroscope directly. In some of the 7 positions on the gyroscope the screw can touch the brass disk. This WILL DAMAGE the gyroscope.

Putting the gimbals kit together for the first time

There is one thing you need to do before you use the gimbals. This only needs to be done once. You will need the centre beam, the two vertical arms and thumb screws. Put them together as show in the picture on the right. Note: the vertical arms have the concave parts pointing at one another. Tighten the thumb screws up hard just using your hand. Wiggle the vertical arms quite hard towards one another. If there is a small amount of movement tighten the thumbscrews and repeat. Keep doing this until there is no more movement. This ensures the gimbals kit is a good fit when the gyroscope is clamped in place as in configuration 2.

The gimbals kit enables numerous configurations and experiments to be performed using the gyroscope. We have listed just some of the configurations below.

Configuration 1

This is probably the simplest configuration you can use with the gimbals kit. This experiment can be easily done without the gimbals kit but using the gimbals kit keeps the ball end of the gyroscope secure in one place. Note: The part the ball sits on can be reversed. In this experiment the concave end should be facing upwards.

Configuration 2

In this configuration most gimbal parts are used with the exception of the weight and grub screw. Note: the use of the two ball ends that come with the gyroscope. This configuration is ideal to learn some of the fundamentals of gyroscopes. Try moving the gyroscope around while it is not spinning and then spin the gyroscope up using the electric motor. Move the gyroscope the same as before and see what happens. You can also try holding the entire gyroscope and gimbals while it is spinning on the palm of your hand. Point the gyroscopes axle north. Now walk around the room in a circle. Did you notice how the gyroscope continues to point in the same direction?

Configuration 3

Using the same configuration as above but using one or two of the extension rods that come with the gyroscope, screw them into one of the threaded holes of the gyroscope. Spin the gyroscope up using the electric motor and lift the extension rods up like shown in the picture. Let go and watch what happens. The gyroscope will slowly precess around.

Configuration 4

This is the same as configuration 3 but utilises the counter weight. Notice the difference with and without the counter weight. Try the counter weight on the end of an extension rod (as shown) and directly connected to the gyroscope.

Configuration 5

This configuration uses the centre beam. One or two extension rods are screwed into the gyroscope (one is used in picture). The extension rod is then slid into the centre beam. You can then tighten up the screw in the centre beam with the provided Alan/hex key. Spin up the gyroscope and lift the gyroscope up and let go. You will see that the gyroscope spins around the gyroscope. You may want to try adjusting the gyroscopes distance from the centre beam and watching what happens when the gyroscopes slows down. Please note that nutation is also visible in this experiment.

Configuration 6

This configuration is very similar to the previous configuration but with the counter weight added. Again trying experimenting with the positioning and see what happens.

Configuration 7

You can balance the gyroscope on a piece of string without the gimbals kit. However it is safer to use the gimbals as you will have your hands free to catch it when it does finally fall off. The string can be threaded through the uprights and then wrapped around the thumb screws. You may want to undo the thumbscrews and tighten again trapping the string to make it very secure. Note: The slot end attachment should be used rather than the ball ends.

Configuration 8

If you have two gyroscopes you can link them together. Firstly remove the grub screw counter weight. Take one of the extensions rods and put grub screw into the one end. Tighten with the Alan/hex key. You now have a thread at each end of the extension. Screw both ends into a gyroscope. Start the gyroscopes and see the effect.