

1.3.19-00 Laws of gyroscopes / 3-axis gyroscope



**What you can learn about ...**

- Momentum of inertia
- Torque
- Angular momentum
- Precession
- Nutation

**Principle:**

The momentum of inertia of the gyroscope is investigated by measuring the angular acceleration caused by torques of different known values. In this experiment, two of the axes of the gyroscope are fixed.

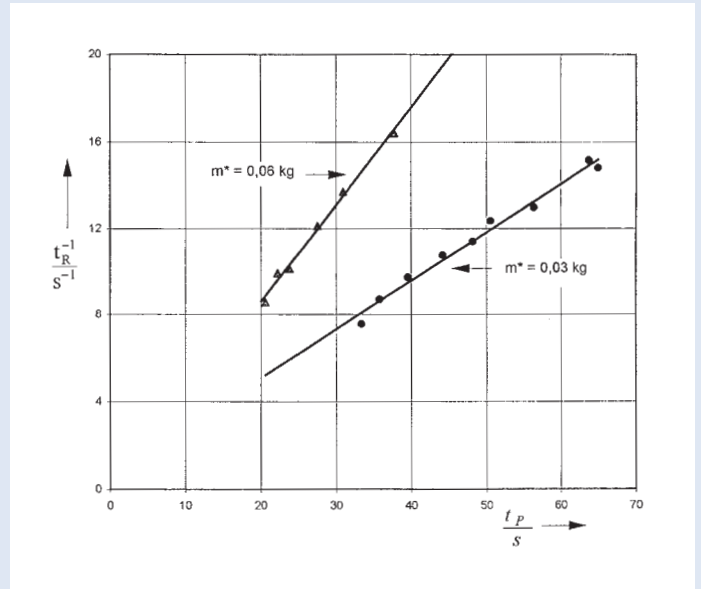
The relationship between the precession frequency and the gyro-frequency of the gyroscope with 3 free axes is examined for torques of different values applied to the axis of rotation.

If the axis of rotation of the force-free gyroscope is slightly displaced, a nutation is induced. The nutation frequency will be investigated as a function of gyro-frequency.

**What you need:**

Gyroscope with 3 axis	02555.00	1
Light barrier with counter	11207.30	1
Power supply 5 V DC/2.4 A with 4 mm plugs	11076.99	1
Additional gyro disk with counter weight	02556.00	1
Stopwatch, digital, 1/100 s	03071.01	1
Barrel base -PASS-	02006.55	1
Slotted weights, 10 g, coated black	02205.01	4

**Complete Equipment Set, Manual on CD-ROM included**  
**Laws of gyroscopes / 3-axis gyroscope P2131900**



Determination of the momentum of inertia from the slope of straight line  $t_R^{-1} = f(t_P)$ .

**Tasks:**

1. Determination of the momentum of inertia of the gyroscope by measurement of the angular acceleration.
2. Determination of the momentum of inertia by measurement of the gyro-frequency and precession frequency.
3. Investigation of the relationship between precession and gyro-frequency and its dependence from torque.
4. Investigation of the relationship between nutation frequency and gyro-frequency.