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## Operating instructions



Fig. 1: Bicycle wheel gyro 02566-00



Fig. 2: Prandtl's rotatable disk

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## 1 SAFETY INSTRUCTIONS



### Caution!

- Read the operating instructions thoroughly and completely prior to using this instrument. This is important for your own protection and for avoiding damage to the unit.
- Do not start up this instrument should there be visible signs of damage to it.
- Use the instrument solely for its intended purpose.

## 2 PURPOSE AND CHARACTERISTICS

The bicycle gyroscope, together with the rotating disc, is used to prove the theorem on the conservation of angular momentum. It consists of a large 20" steel bicycle wheel that runs on ball bearings and on which a heavy solid rubber tyre is mounted to ensure a large moment of inertia. A handle is attached to each end of the axle with an eyelet at the end. The Prandtl turntable has a footrest and can be rotated about its vertical axis with low friction.

### 3 HANDLING

The two handles are mounted on the axle of the bicycle gyroscope.

In many cases, it is sufficient to hold the spinning top by one handle with one hand and rotate the wheel with the other.

Caution: Never reach into the spokes of the rotating spinning top! When starting by hand or braking, only grip the outside of the tyre. Always hold the spinning top with both hands! The rotating disc should be set up on a floor that is as level as possible, but a slight incline will hardly interfere with experimentation.

### 4 EXPERIMENTS

The experimenter sits on the stationary spinning disc and holds the stationary bicycle spinning top in their hand.

3.1 Hold the wheel axle vertically, start the spinning top by hand:

The turntable starts to rotate in the opposite direction to the bicycle gyroscope. Brake the bicycle rotor or bring the wheel axle into a horizontal position: The turntable comes to rest.

3.2 Keep the wheel axle horizontal, start the bicycle rotor by hand: The centre pivot remains at rest.

Bring the wheel axle into the vertical position: The turntable starts to rotate in the opposite direction to the bicycle gyroscope.

The experimenter sits on the stationary spinning disc; a second person holds the spinning top and makes it rotate.

3.3 Receiving the rotating bicycle spinning top - wheel axle vertical: The turntable remains at rest.

Tilt the wheel axle from the vertical ( $\alpha = +90^\circ$ ) to the horizontal ( $\alpha = 0^\circ$ ) and further to  $\alpha = -90^\circ$ : The turntable begins to rotate in the same direction as the bicycle gyroscope; the rotational movement is greatest for  $\alpha = -90^\circ$ . Return the wheel axle to its starting position: The turntable comes to rest.

3.4 Take delivery of the rotating bicycle gyroscope - wheel axle horizontal: The turntable remains at rest. Tilt the wheel axle from the horizontal ( $\alpha = 0^\circ$ ) upwards ( $\alpha = +90^\circ$ ) and downwards ( $\alpha = -90^\circ$ ): The observations are the same as in 3.2.

The experimenter holds two weights in his hands (e.g. commercial weights, 5 kg, order no. 44096-81).

3.5 Extend and pull the arms during the rotation: The angular velocity changes.

### 5 TECHNICAL DATA

Bicycle wheel gyro	02566-00
20"- steel bike	
Weight	4,5 kg
Prandtl's rotatable disk	02572-00
height-adjustable	
Weight	15 kg

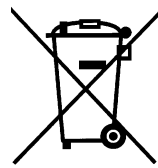
### 6 WARRANTY

We give a warranty of 24 months for units that are supplied by us inside the EU, and a warranty of 12 months outside the EU. The following is excluded from the warranty: damage that is due to non-compliance with the operating instructions, improper use, or natural wear.

The manufacturer can only be held liable for the function and safety-relevant properties of the unit, if the maintenance, service, and modifications of the unit are performed by the manufacturer or by an institution that is expressly authorised by the manufacturer.

### 7 DISPOSAL

The packaging mainly consists of environmentally-friendly materials that should be returned to the local recycling stations.



Do not dispose of this product with normal household waste.

If this unit needs to be disposed of, please return it to the address that is stated below for proper disposal.

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