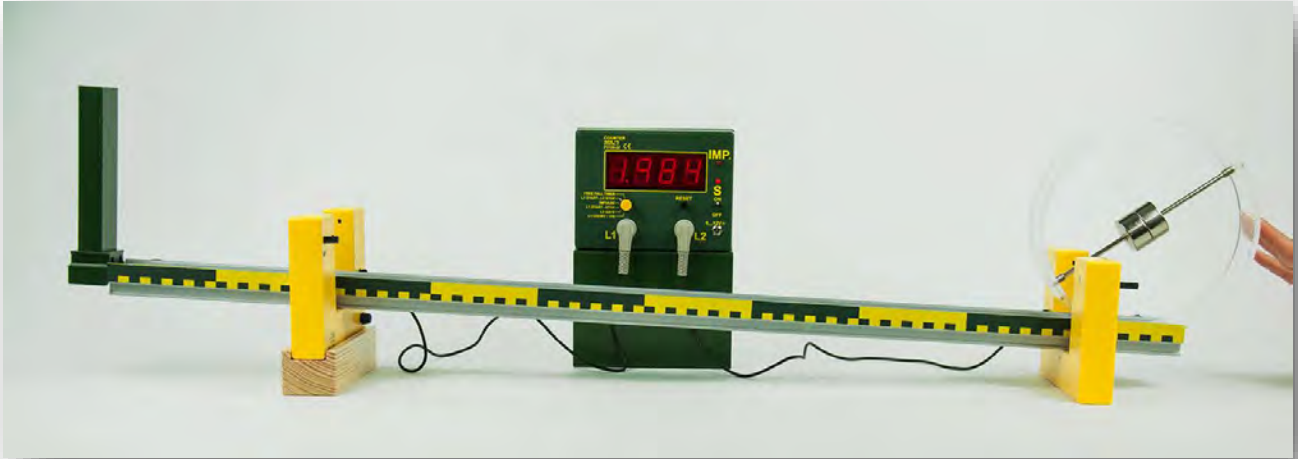


VARYING MOMENTS OF INERTIA AND MASS DISTRIBUTION - QUANTITATIVELY

MED 09.14b



Material

Item-no.	Qty.	Description
DS101-3B	1	Stand rail with scale, L=1000 mm
P5310-1S	1	Rail bond SE, universal
DS103-1G	1	Rail support stand, vertical, H=152mm
P1320-4A	2	Light gate, Demo 04
P1321-3K	1	Block for light gate
P3120-2Z	1	Universal timer "inno"
P3120-5B	1	S-shaped assembly platform
DM360-2R	1	Rotating ring, D=200 mm

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MED 09.14b

Purpose:

Detection of varying moments of inertia with the same mass and the same outside diameter.

Preparation:

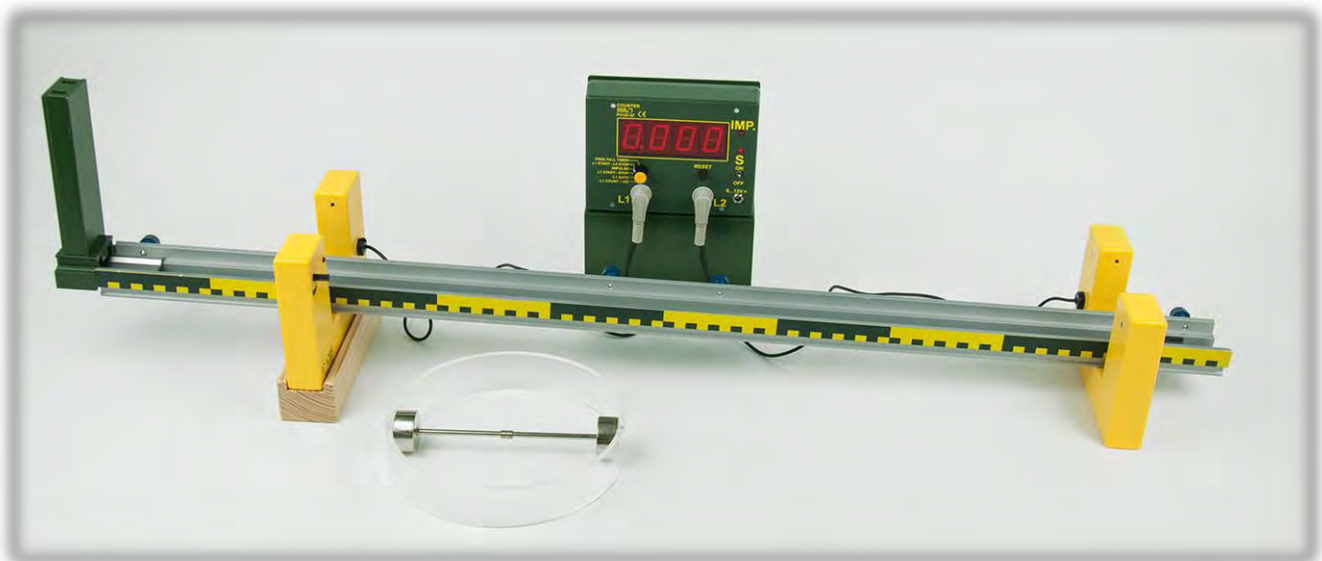
The universal rail is placed upside down (as a channel).
The rail connector is clamped at one end.
The rail support is attached to the rail connector.

The two light gates are set up about 70 cm apart.
One of the two light gates is placed on the wooden block and thus placed at a higher position.

Attach the universal timer to the S-shaped assembly platform, afterwards connect the light gates to the universal timer.
The higher placed light gate is connected to "L1", the second to "L2".
The selector switch of the universal timers is set to "L1 START - L2 STOP".

The universal rail is inserted into the leg bottoms of the light gates.
The lower light barrier is placed under the 90 cm marking on the rail, the knobs of the leg bottom should be under this marking.
The raised light barrier is placed under the 20 cm marking on the rail.

The two metal cylinders on the rotation ring should be screwed onto the outside of the threads.



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Experiment 1:

We turn the universal timer on.

The brightness control of the two light gates is adjusted so that the diodes just do not light up. Push the reset button on the timer afterwards.

The rotation ring is pressed lightly against the rail support.

The higher light gate must be a little further away from the ring; the start signal must not be triggered yet.

If the light gate has triggered a signal, the reset button on the time has to be pressed.



The rotation ring is released and stopped again at the end of the rail.

The rotation ring with the masses outside covers the distance of 70 cm in s.

VARYING MOMENTS OF INERTIA AND MASS DISTRIBUTION - QUANTITATIVELY

Experiment 2:

The two metal cylinders on the rotation ring are now screwed on in the middle.

Again the rotation ring is pressed lightly against the rail support.

Push the reset button on the timer afterwards.



The rotation ring is released and stopped again at the end of the rail.

The rotation ring with the masses in the centre covers the distance of 70 cm in s.

Result:

If the masses are placed in the middle of the rotation ring, it covers the distance of 70 cm faster.

Explanation:

A rolling body translates and rotates at the same time.
The kinetic energy is distributed between rotational energy and translational energy.

The further away the mass particles are from the axis of rotation, the greater their moment of inertia.

In this case, a large proportion of the total energy $E = m \times g \times h$ is converted into rotational energy, but the body has less translational energy at its disposal.