



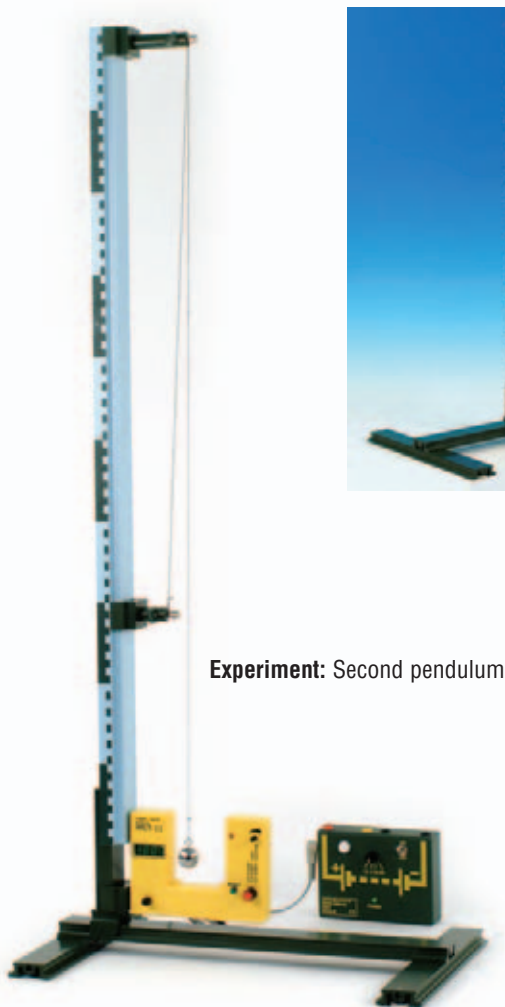
pendulum



DM380-6E Ball, steel, D=60 mm, tapped
DM380-6K Ball, plastic, white, D=60 mm, tapped, for use as pendulum bob; M6 tapping for screwing in threaded c-hook DS102-3S
DS102-3S C-hook, threaded
DG200-1S Cord, white, D=1.7 mm, L=5 m



DM385-1P Pendulum bobs, with hooks, D=1", set of 6
 Six pendulum bobs of various materials with equal diameters; with hooks for suspension
 Material: Al, Me, Cu, Fe, Pb, Zn
 Diameter (each): 1" (25.4 mm)



Experiment: Second pendulum

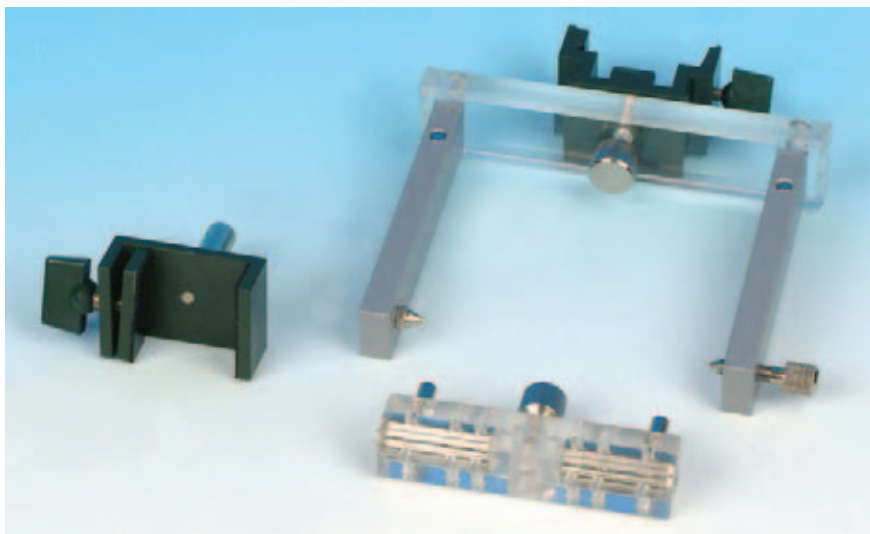


Experiment: Various simple pendulums



Experiment:
 Period of oscillation of simple pendulums of different lengths

pendulum



Experimental apparatus required for rotating the plane of oscillation and thus influencing the force of gravity:

DS406-1G Fork on pivots

Broad fork with a metal knurled-head screw at centre for fastening it to a slider at any desired angle; metal pivots suited to mounting bearing bridge DE454-2P with very little friction; fork width: 100 mm; dimensions: 120x140x30 mm (without slider)

DE454-2P Bearing bridge

Acrylic block with two metal cores; three lateral holes on each side and a socket for a 4-mm pin; lengthwise hole through the centre for rods up to 10 mm in diameter, may be fixed by a screw; depression on the sides for mounting it on the pivots of fork DS406-1G with very little friction; dimensions: 90x20x20 mm

DS402-3H Holder for ruler

Aluminium u-profile, green powder-coated; with clamping jaws and M8 wing screw for holding fast metal rulers DG100-ff or metal lever rods DM221-ff using a support rod, 10 mm in diameter, at centre; may be mounted in pivot bearing DS402-ff in order to rotate; max. span width: 31 mm; dimensions: 50x 35x 20 mm



Experiment: Physical pendulum using 100-cm compound pendulum DM375-1P



Experiment: Physical pendulum using 100-cm lever rod DM221-1P



Experiment: Spring pendulum
Required accessories:
DE722-1W Stopwatch "inno"
DE722-2W Remote control for stopwatch



Experiment: Coupled pendulums

DM375-1P Compound pendulum

Rigid pendulum with a weight that may be positioned as desired; used for demonstrating duration of oscillation in relationship to pendulum length and for determining gravitational acceleration (g)

Pendulum rod: L=1100 mm,

D=10/7 mm

Weight: 372 g

Movable weight: 628 g

Total weight: 1,000 g





torque

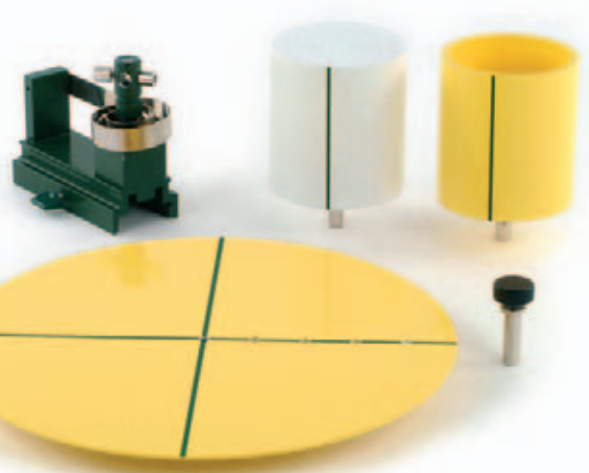


DW131-1S Torsion rods, set

For determining the moment of inertia using a torsion pendulum; three steel rods of equal length but differing diameters; fixing bolts at each end ($D=10\text{mm}$) and clamps for holding rods max. 10 mm in diameter

DM372-5G Flat weights, 500 g, set of , nickel-plated metal cylinder, $D=56\text{ mm}$, $H=30\text{ mm}$, with hole for rod with max. diameter of 10 mm and fastening screw M8

DS201-40 Support rod, round, $L=400\text{ mm}$, $D=10\text{ mm}$
Nickel-plated steel rod



DW357-1D Torsional oscillation apparatus

For investigation torsional oscillation and for determining the moment of inertia of various suspended objects based on the period of oscillation; special NTL aluminium profile including axle with torsion spring mounted on double ball bearings; rods up to 10 mm in diameter may be fixed in the apparatus horizontally or vertically; dimensions: $L=120\text{ mm}$, total height = 70 mm

DW357-3V Solid roller for measuring torsional oscillation

For determining the moment of inertia of objects having almost the same mass yet with differing mass distribution; with a support through the axis ($10 \times 35\text{ mm}$)
 $D=90\text{ mm}$, $H=100\text{ mm}$; weight: approx. 500 g

DW357-3H Hollow roller for measuring torsional oscillation

Description as for DM357-3V except:
 $D=90/80\text{ mm}$, $H=100\text{ mm}$; weight: approx. 500 g

DM357-3K Rotating disk demo

For measuring the moment of inertia, even when the axis of rotation is eccentric, and for experimentally verifying the parallel axis theorem; metal disk, yellow powder-coated, with four holes spaced 30, 60, 90 and 120 mm from axis, centre hole for attaching to support rod DM357-3H; $D=300\text{ mm}$

DM357-3H Support rod for rotating disk demo

Metal rod with plastic nut with recess in axis for setting ball in experiments with centrifugal force; $D=10\text{mm}$, $L=40\text{ mm}$



Experiment:

Torsion pendulum; moment of inertia is displayed by an analogue measuring instrument using converter DM132-1K and torque sensor DM725-1S (For technical description s. page 79 and 162)



Experiment: Parallel axis theorem

torque

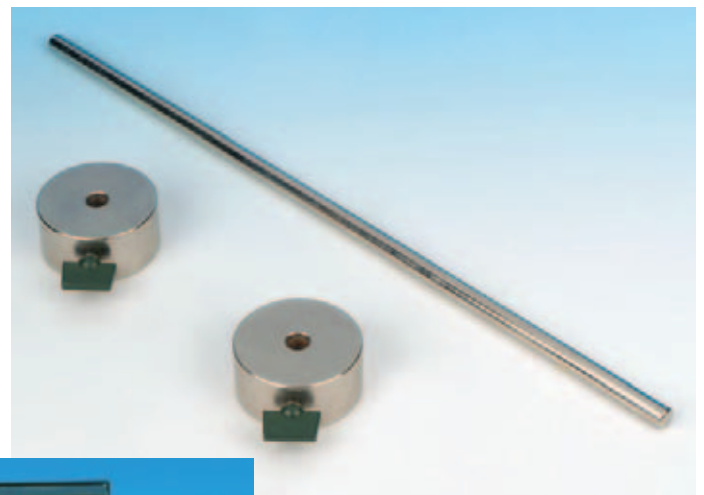


Experiment: Moment of inertia of hollow and solid bodies

Additionally recommended:
DE451-3A Rod alu, with plug, L=200 mm
(acting as pointer)



Experiment: Harmonic torsional oscillation



Experiment: Moment of inertia and period of oscillation

DM372-5G
Flat weights, 500 g,
set of 2
Nickel-plated metal cylinder,
D=56 mm, H=30 mm, with hole
for rod with max. diameter of
10 mm and fastening screw M8

DS201-40 Support rod, round,
L=400 mm, D=10 mm
Nickel-plated steel rod



rotary pendulum

DW360-1P Rotary pendulum (Pohl's pendulum)

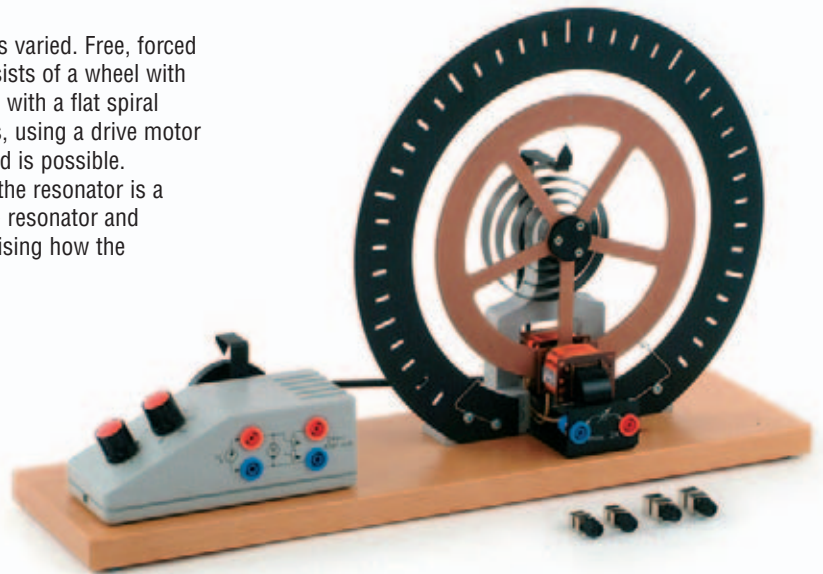
This apparatus is used to investigate oscillation as damping is varied. Free, forced and chaotic oscillation may be generated. The resonator consists of a wheel with spokes, made of sheet copper and mounted on ball bearings, with a flat spiral spring. The resonator is excited by means of lever mechanics, using a drive motor connected to a cam. Rough or fine adjustment of motor speed is possible.

Damping is provided by an eddy current brake. Surrounding the resonator is a scale shaped like a ring. Slits in the scale and pointers on the resonator and exciter lever can be used to project shadows for better visualising how the experiment works. Apparatus mounted on a base plate.

Motor power supply: 24 V DC, min. 600 mA

Damping unit power supply: 0-12V DC, continually variable

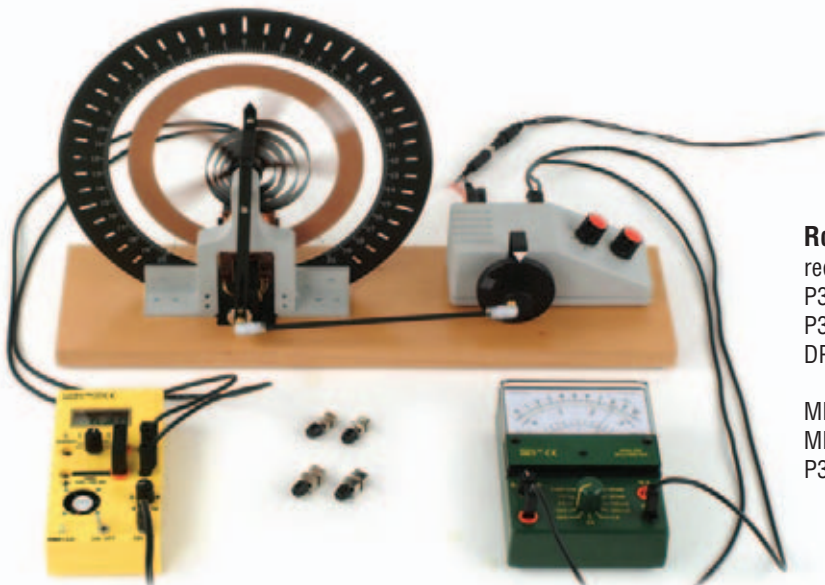
Dimensions: 400x140x270 mm



Rotary pendulum for demo experiment -

required accessories:

- P3139-1A Mains transformer 24V DC
- DP130-2A Adapter cable, 2x hollow DC plugs, 5/5 mm, to 2x 4-mm plugs
- P3125-2W AC/DC regulator "inno"
- P3130-2P Fixed voltage transformer 12V/5, 8A
- DE722-1P Panelmeter "inno"
- DE710-00 Universal multimeter "inno"
- DE722-1W Stopwatch "inno"
- DE722-2W Remote control for stop watch "inno"



Rotary pendulum for students' experiment -

required accessories:

- P3139-1A Mains transformer 24V DC
- P3130-1P Mains transformer 12V/2A
- DP130-2A Adapter cable, 2x hollow DC plugs, 5/5 mm, to 2x 4-mm plugs
- MB230-1D DC regulator "compact"
- MB220-1L Digital measurement device "compact"
- P3210-1C Multimeter, analogue

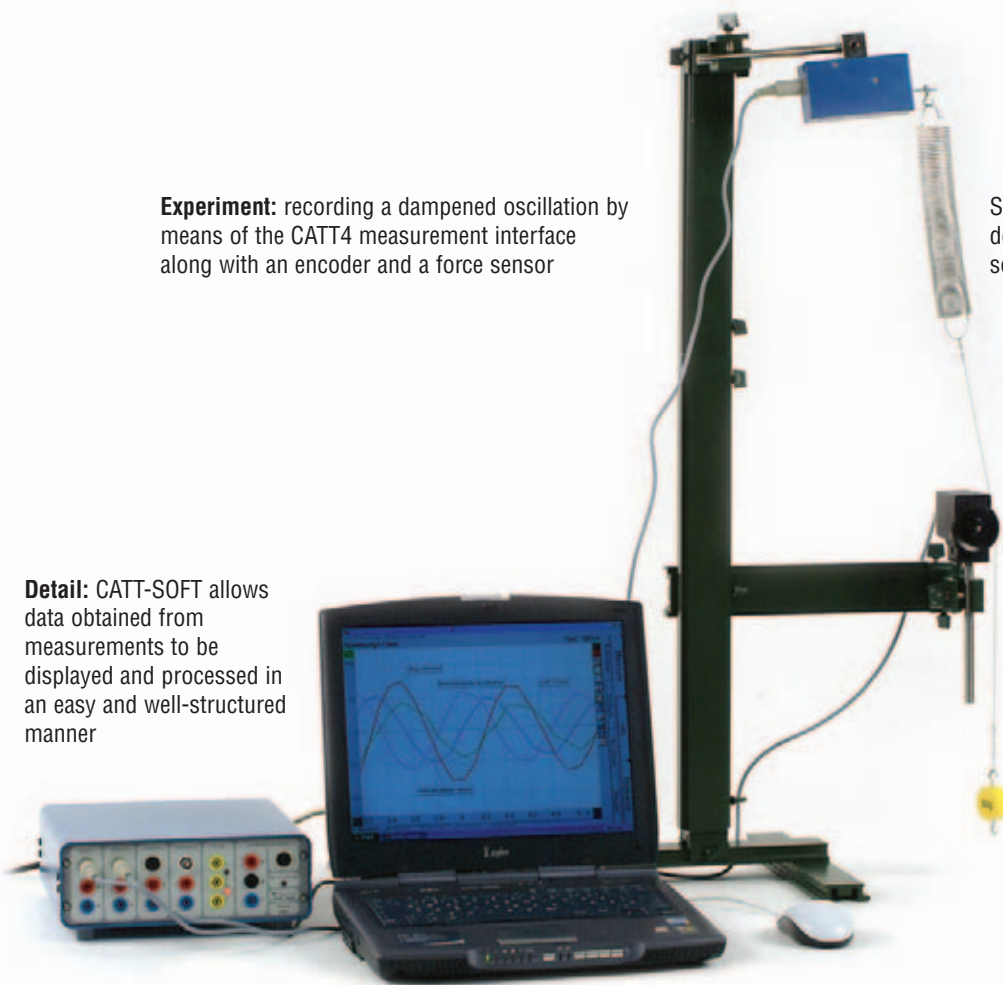
chaos pendulum



Experiment: recording a dampened oscillation by means of the CATT4 measurement interface along with an encoder and a force sensor

See page 506ff for a more detailed description of the interface, the software and sensors

Detail: CATT-SOFT allows data obtained from measurements to be displayed and processed in an easy and well-structured manner



DW359-1M Chaos pendulum (magnetic pendulum)

Thanks to its great, adjustable length, the NTL chaos pendulum has a long oscillation period; in addition, it can be set up within a very short time. Even when the pendulum is consistently started from the same initial position, it is impossible to predict how it will oscillate - the pendulum behaves chaotically.

The four magnets in the base can be repositioned by means of knurled-head screws, allowing pendulum motion to be additionally influenced.

Pendulum bob (D=1") with built-in neodymium magnet, eyelet for suspension and pendulum cord; base (D = 125 mm) on support (10x35 mm), with four adjustable neodymium magnets

Experiment:
Chaos pendulum