

dynamics - rotation



DS402-4H Whirling table, demo, powered by hand

- Very large base: 500x325 mm, with levelling screws
- Drive pulley and rotating bearing adjustable to any position on support base
- Rods up to 10 mm D may be positioned vertically or horizontally in rotating bearing
- Both pivots with double ball bearings
- Transmission ratio 1:1 or approx. 1:9

consisting of:

DS101-1G 1x Support base, large, L=500 mm

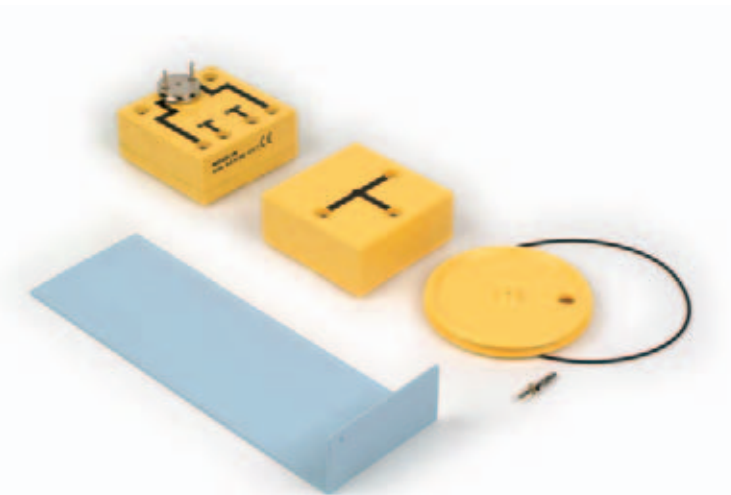
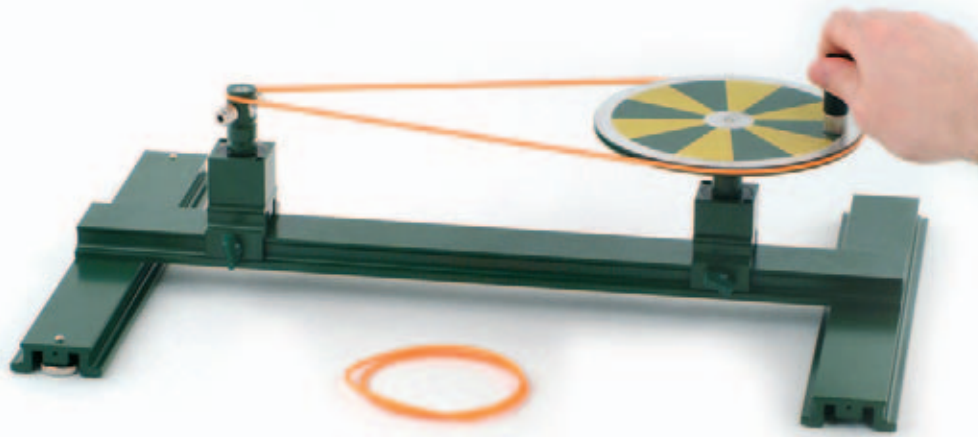
DS402-4B 1x Pivot bearing, short, on saddle

DS402-3D 1x Drive pulley, D=160 mm

DS402-3B 1x Pivot bearing with transverse hole, on saddle

DS402-2N 1x Crank pin

DS401-1A 1x Drive belts, set



MB402-4H Whirling table CS, demo, powered by hand Device in set consisting of:

P3410-1A L-bracket for MBP system

Metal bracket, L-shaped, blue powder-coated, 255+40x84x2 mm

MB200-1M MBP Motor with adapter wheel

Magnetic module for students' experiments, 84x84x35 mm, with built-in motor and 4 mm jack connector; pulley, D=28 mm, permanently mounted on drive shaft, fitted with two 2 mm plug pins and tapped hole at centre for attaching various adapters for rotation; max. load: 4.5 V DC

P3710-1T MBP Lead, t-shaped

Magnetic module for students' experiments, 84x84x35 mm, with three 4 mm jack connectors

P3410-3L Plug pin with axle, short

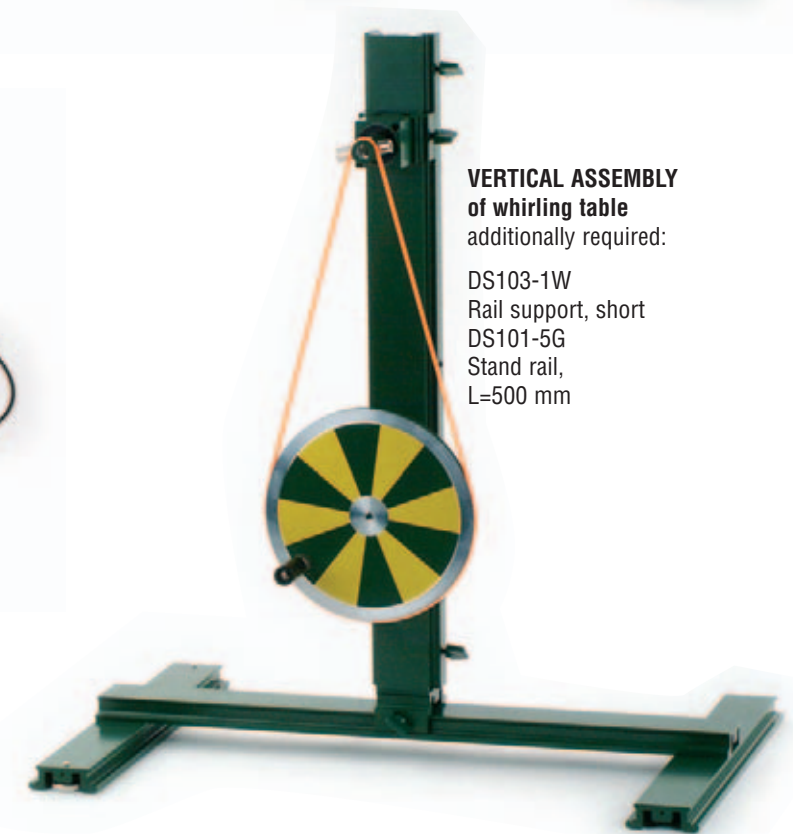
Metal axle on 4 mm plug pin, for mounting drive pulley P3410-4A rotate; axle: D=3 mm, L=18 mm

P3410-4A Drive pulley "compact"

Plastic disk with deep groove, hole at centre for 3 mm axle, with hole for finger to rotate manually

P3410-5A Drive belt "compact"

Rubber belt for momentum apparatus CS, circumference approx. 40 cm "compact", U=ca. 40 cm



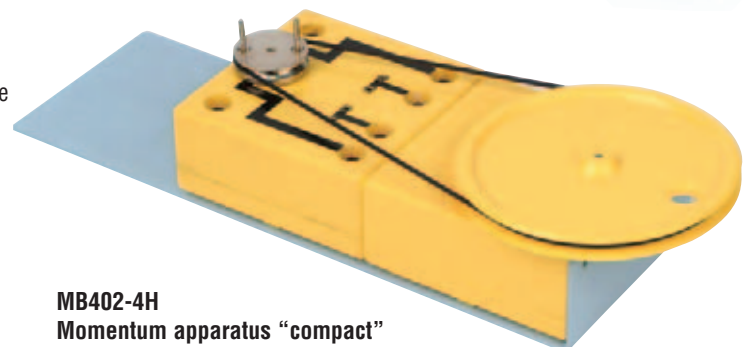
VERTICAL ASSEMBLY
of whirling table
additionally required:

DS103-1W

Rail support, short

DS101-5G

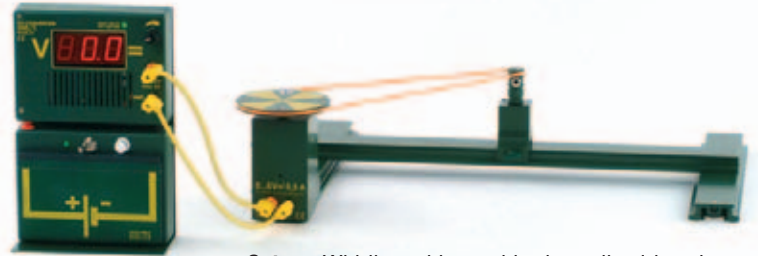
Stand rail,
L=500 mm



MB402-4H
Momentum apparatus "compact"
ready to operate



dynamics - rotation



Set up: Whirling table used horizontally, driven by geared motor DS403-1G

DS403-1G Geared motor

Electric motor with metal gears and high torque in aluminium case; drive shaft with permanently mounted aluminium pulley with groove and M6 tapping for attaching crank pin DS402-2N when used as a generator.

Drive pulley diameter: 100 mm; green powder-coated printed with circle sectors in yellow; case mounted on sliding saddle of special aluminium profile with clamping screw for mounting and fastening onto large support base DS101-1G, rail support DS103ff or stand rails DS104ff

Nominal voltage: 6 V DC (3-12V),

Current consumption idling: 570 mA DC

Speed: approx. 0...250 rpm

Case dimensions: 128x60x60 mm

DS403-2K Clamp socket adapter with fastening screw

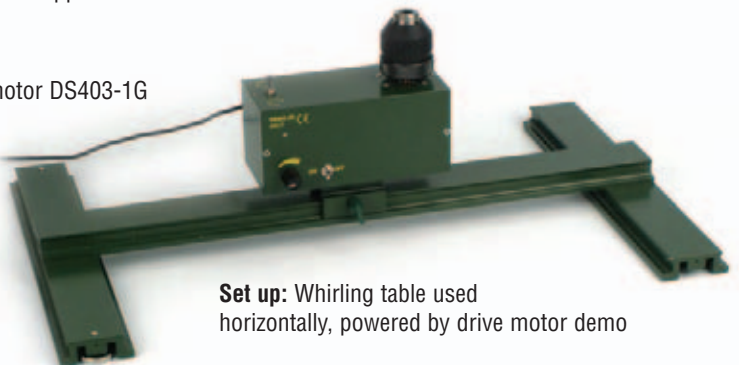
Clamp socket on support for mounting on drive pulley of geared motor DS403-1G. The clamp socket, green powder-coated, is used to attach and fix in place devices on supports 10 mm in diameter.

DS403-3F Fixing screw M6

Used for the connection of the clamp socket DS403-2K to the geared motor DS403-1G



Set up: Whirling table used vertically, powered by drive motor demo



Set up: Whirling table used horizontally, powered by drive motor demo

DS403-2S Drive motor, demo

Electric motor with gears at angle in aluminium case (70x70x150mm), green powder-coated, mounted on sliding saddle for setting directly on large support base DS101-1G and support rails DS104ff, may be mounted horizontally or vertically; keyless chuck for attaching rods with a diameter of up to 10 mm, switch for clockwise or counter-clockwise rotation, on/off switch, button for continuously varying speed; power supplied by way of two 4 mm safety jacks or hollow jack for connecting mains transformer 12 V/5.8 A P3130-2P

Speed: approx. 0...4000 rpm

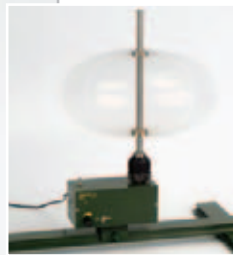
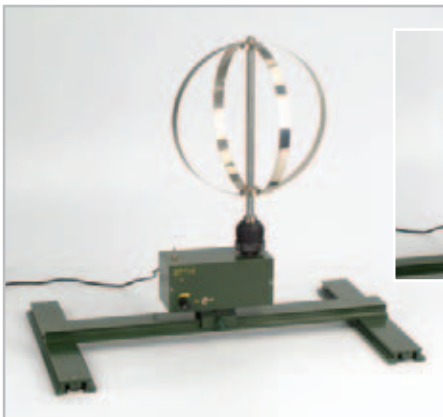
Nominal torque: 20 N cm

Dimensions: 70x150x155 mm

dynamics - rotation



DM352-1E Centrifugal hoops
For demonstrating flattening at the poles of a deformable object under the influence of centrifugal force; two crossing, elastic metal hoops with one pole fixed and the other sliding on a support rod, D=10 mm
Diameter of rings: approx. 220 mm
Total height: 280 mm.



Experiment: Flattening at the poles of a deformable object



P1340-2E Centrifugal hoops "compact"
For demonstrating flattening at the poles of a deformable object under the influence of centrifugal force; two crossing, plastic hoops, D = approx. 120 mm, W=12 mm, a support rod with M3 threading for attaching to MBC motor with adapter wheel MB200-1M



MB402-4B Whirling table for "compact system", battery-powered consisting of:
1x MB200-1M MBC Motor
Magnetic module for student's experiments, 84x84x35 mm, with built-in motor and 4 mm jack connector; pulley, D=28 mm, permanently mounted on drive shaft, fitted with two 2 mm plug

pins and tapped hole at centre for attaching various adapters for rotation; max. load: 4.5 V DC

1x MB201-2B MBC Battery, variable, 1.5/3/4.5 V
Magnetic module for "compact", 84x84x35 mm, with three built-in battery cells (included); on/off switch, variable switch for 1.5/3 or 4.5 volts, six 4 mm jack connectors

2x P3712-1S Jumper plugs "compact", black
Jumper plugs for short-circuiting, with two 4 mm plug pins, spaced 25 mm apart, black plastic case, 36x12x20 mm

Shown with centrifugal hoops "compact", P1340-2E (not included)



Experiment: Flattening at the poles of a deformable object



Demonstration of how "simple" the students' experiment system is



dynamics - rotation



DM352-1R Watt's Governor demo

Model of a centrifugal governor on support,
 $D=10$ mm
 Length of rods: 175 mm;
 Total height: 250 mm



Experiment: Centrifugal governor



DM358-1Z Centrifuge demo

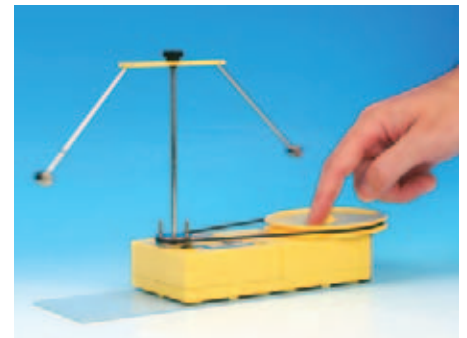
Model of a centrifuge with support bridge
 (220x40 mm) and tilting holder for two test
 tubes 16 mm in diameter, on support rod
 $D=10$ mm
 Total height: 210 mm



P1340-2Z

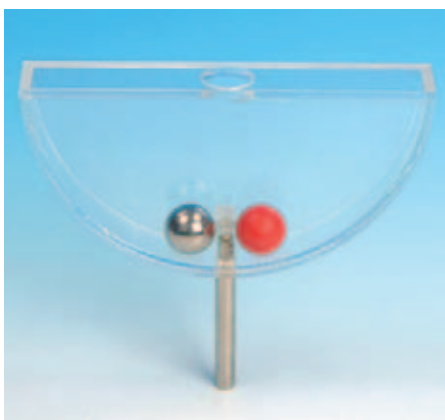
Watt's Governor "compact"

Model of a centrifugal governor; t-shaped
 adapter with two movable centrifugal rods
 with small metal cylinders, end of axle rod
 threaded for attaching to MBP motor with
 adapter wheel MB200-1M
 Dimensions: 90x100 mm



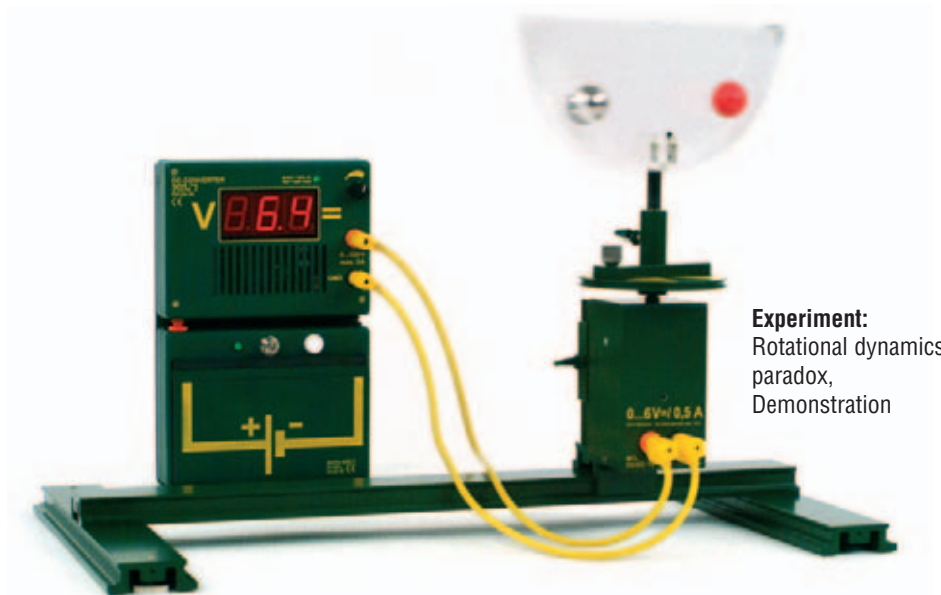
Experiment:

Demonstration of centrifugal force
 "compact"



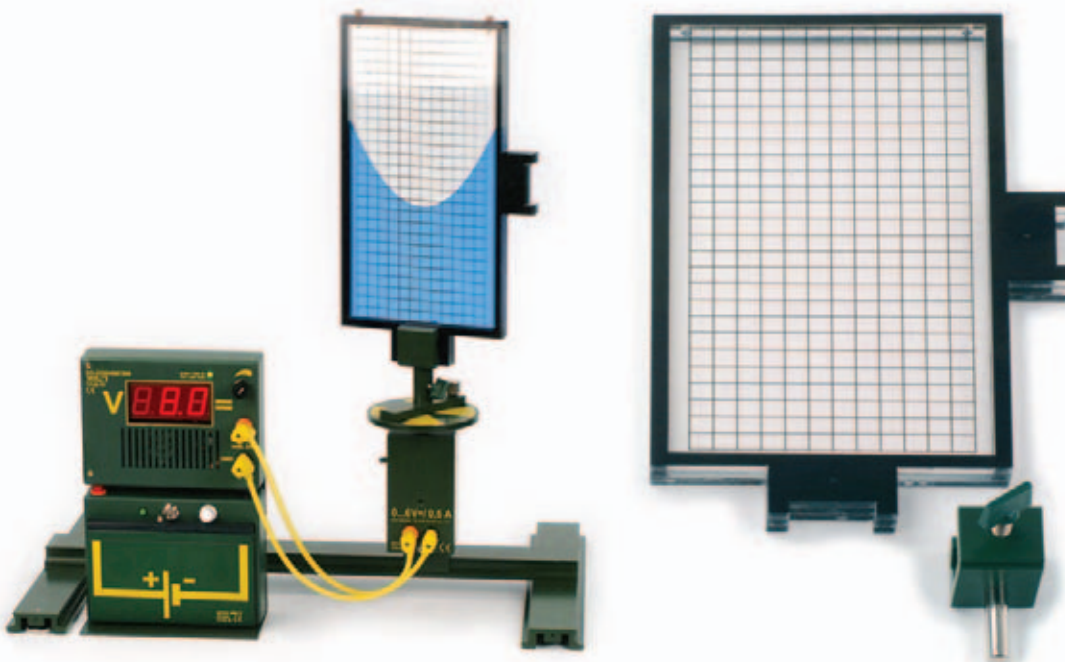
DM358-1K Rotational dynamics paradox

For demonstrating that centrifugal force is
 proportional to mass; hollow hemispherical
 acrylic body ($D=200$ mm, $W=37$ mm)
 on support (10x70 mm), with one plastic
 and one metal ball of the same diameter
 ($D=1$ ")



Experiment:
 Rotational dynamics
 paradox,
 Demonstration

dynamics - rotation



DM353-1K Accelerometer

For investigating the relationship between the surface shape of rotating liquids and their angular velocity.

Acrylic cell with two adapters for mounting horizontally or vertically in clamp on support (included); one side printed with cm grid (120x260 mm); on upper edge two openings with stoppers for filling
Dimensions: 155x280x15 mm

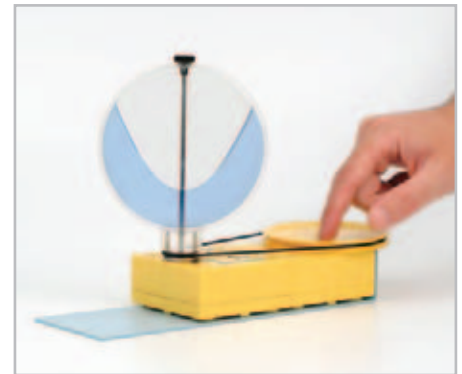
Experiment: Rotating liquid - demonstration



Detail: Filling the cell with a liquid



Experiment: High rotational speed causes the water in the cell to "divide"



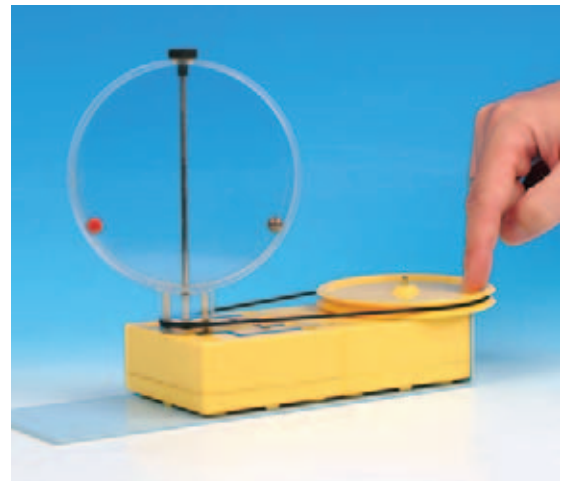
Experiment: Rotating liquid - low rotational speed



P1340-2K Rotational dynamics paradox/accelerometer "compact"

For investigating the relationship between the surface shape of rotating liquids and their angular velocity as well as for demonstrating that centrifugal force is proportional to mass.

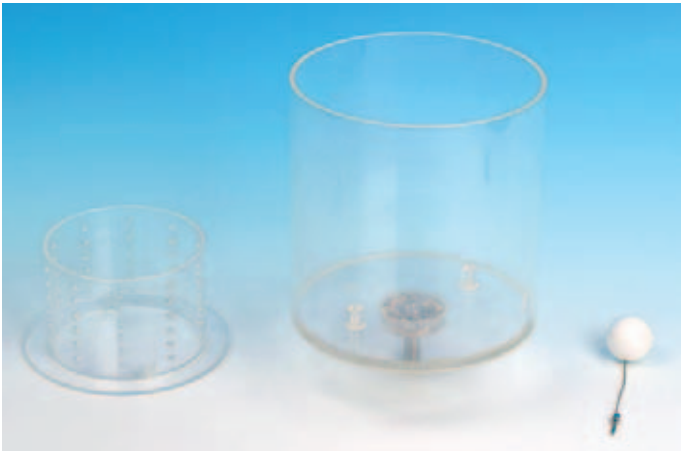
Round acrylic cell with threaded support rod for attaching to MBC motor with adapter wheel MB200-1M, one metal and one plastic ball
Dimensions: D=120 mm, B=16 mm



Experiment: Rotational dynamics paradox "compact"



dynamics - rotation



DM366-2P Centrifugal vessel

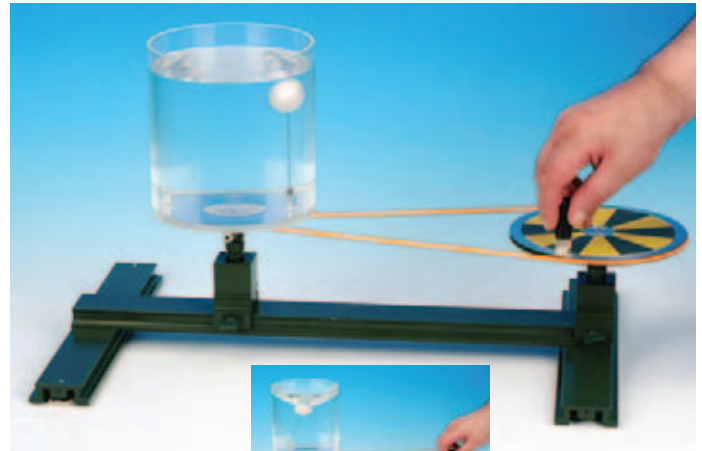
Acrylic cylinder on support, $D=10$ mm, $L=30$ mm, two protrusions on floor for inserting centrifuge insert DM367-2Z or for plugging in pins of Styrofoam ball DM366-3S
 $D=150$ mm; height (without support): 155 mm

DM367-2Z Centrifuge insert

Acrylic cylinder for insertion in centrifuge vessel DM366-2P, may be used as "centrifugal spinner" with wet cloth or sponge
 $D=100$ mm, $H=70$ mm

DM366-3S Styrofoam ball on cord with plug

For demonstrating a physical paradox
 Plug for attaching to floor of centrifuge insert, ball $D=30$ mm



Experiment:
Centrifugal force - paradox



P1340-2R Foucault's Pendulum, "compact"

For demonstrating "Foucault's Pendulum"; gibbet with suspended pendulum bob, metal, $200+80$ mm, ball $D=12$ mm, nut at base for attaching to rotating disk CS P1340-2D

P1340-2D Rotating disk "compact"

Metal disk, yellow powder-coated, with 3 holes spaced 30, 60 and 75 mm from axis, centre hole for attaching to MBC motor with adapter wheel MB200-1M; $D=160$ mm

MB200-1M MBC Motor with adapter wheel

Magnetic module for students' experiments, $84 \times 84 \times 35$ mm, with built-in motor and 4 mm jack connector; pulley, $D=28$ mm, permanently mounted on drive shaft, fitted with two 2 mm plug pins and tapped hole at centre for attaching various adapters for rotation; max. load: 4.5 V DC

P3410-5S Pulley adapter

Acrylic spacing disk for mounting on pulley of MBP motor MB200-1M, for attaching rotating disk CS P1340-2D or coloured disk CS, $D=27$ mm

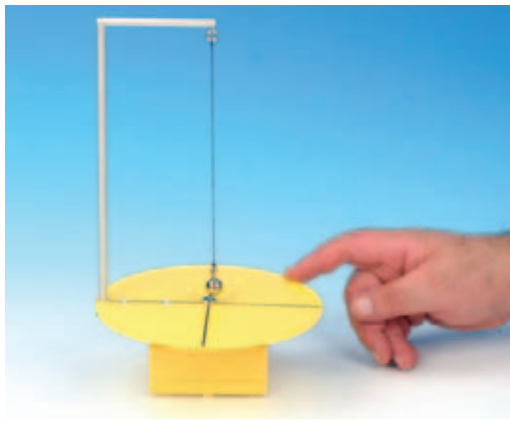
P3711-1F Fastening screw, short

Metal screw with M3 thread, head $D=10$ mm, $L=22$ mm

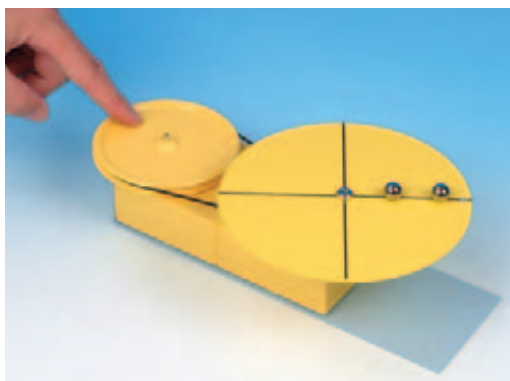
P1340-2S Steel balls fit (12.7 mm), set of 2

Steel balls for mounting on rotating disk CS P1340-2D for experiments in centrifugal force

Experiment:
Foucault's Pendulum
"compact"



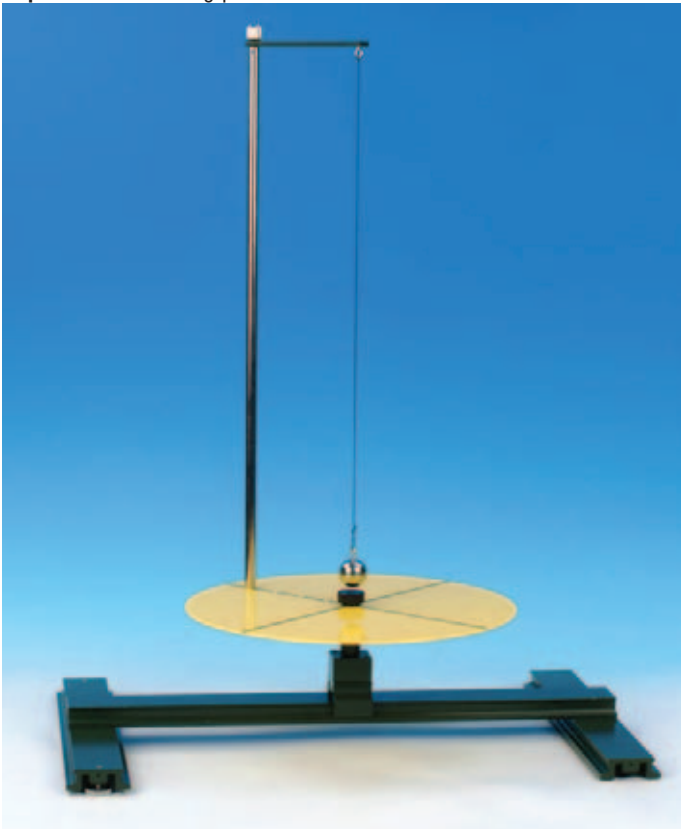
Experiment:
Centrifugal force
"compact"



dynamics - rotation



Experiment: Rotating pendulum - demonstration



DM358-1F Rotating Pendulum, demo-set

For demonstrating that the plane of oscillation is maintained during rotation

consisting of:

DM357-3K 1x Rotating disk demo, D=300 mm

DM357-3H 1x Support rod for rotating disk demo

DM357-3S 1x Gibbet for suspending pendulum bob

Support rod with nut for attaching to rotating disk DM357-3K and

cross piece with hook for suspending pendulum bob DM385-2S

Max. pendulum length = 500 mm

DM385-2S 1x Pendulum bob with eyelet, steel, D=1" (25,4 mm)



DM357-3K Rotating disk demo

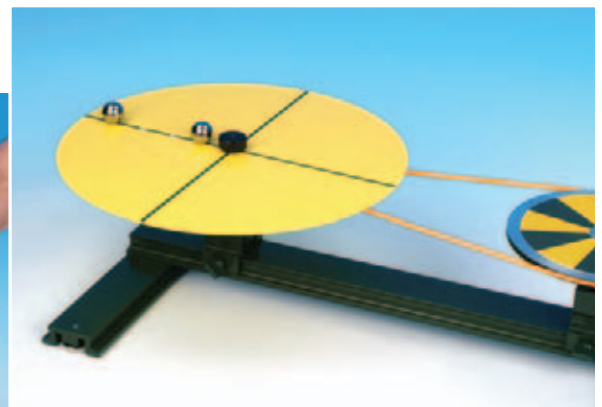
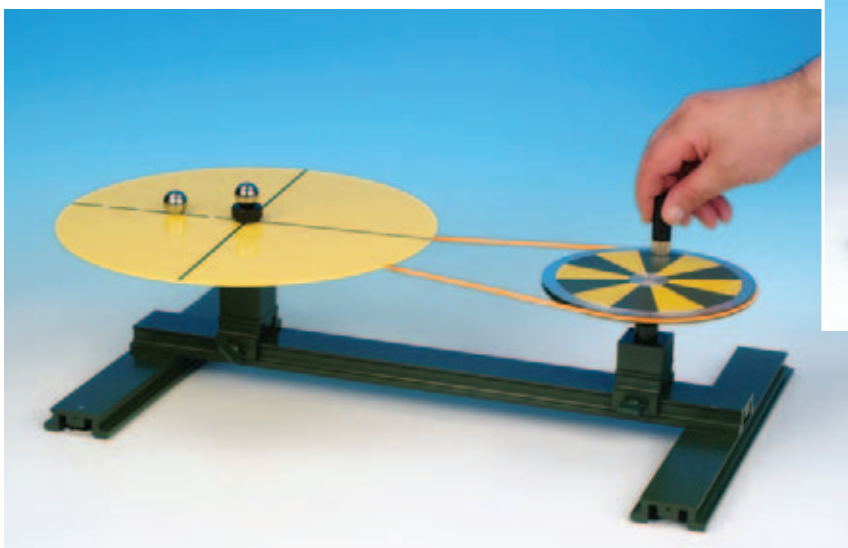
Metal disk, yellow powder-coated, with 4 holes spaced 30, 60, 90 and 120 mm from axis, centre hole for attaching to support rod DM357-3H; D=300 mm

DM357-3H Support rod for rotating disk demo

Metal rod with plastic nut for manual fastening, nut with recess in axis for setting ball in experiments with centrifugal force; D=10mm, L=40 mm

DM340-2S Steel balls 1/2" (19 mm), set of 2

Steel balls for mounting on rotating disk demo DM357-3K for experiments in centrifugal force



Experiment: Centrifugal force - demonstration



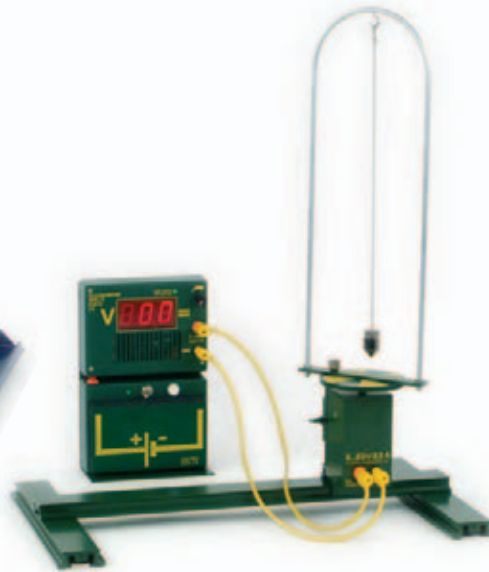
dynamics - rotation



DM358-1P Rotating Pendulum, electric, overhead model

For demonstrating how "Foucault's Pendulum" works as well as the Coriolis Effect

Rotating acrylic disk for overhead projector, $D=225$ mm, base plate with levelling screws, motor drive; voltage source: $0 \dots 6V$ (12 V peaks possible); rotation speed of the disk: $3.5 \dots 33$ rpm; runs clockwise or counter-clockwise; ball runway ramp, two steel balls $D=1/2"$ (12.7 mm); pendulum height: approx. 200 mm; motor housing: $60 \times 60 \times 130$ mm
Dimensions: $285 \times 285 \times 210$ mm



Experiment:

Rotating pendulum - demonstration
Assembly on stand with geared motor
DS403-1G

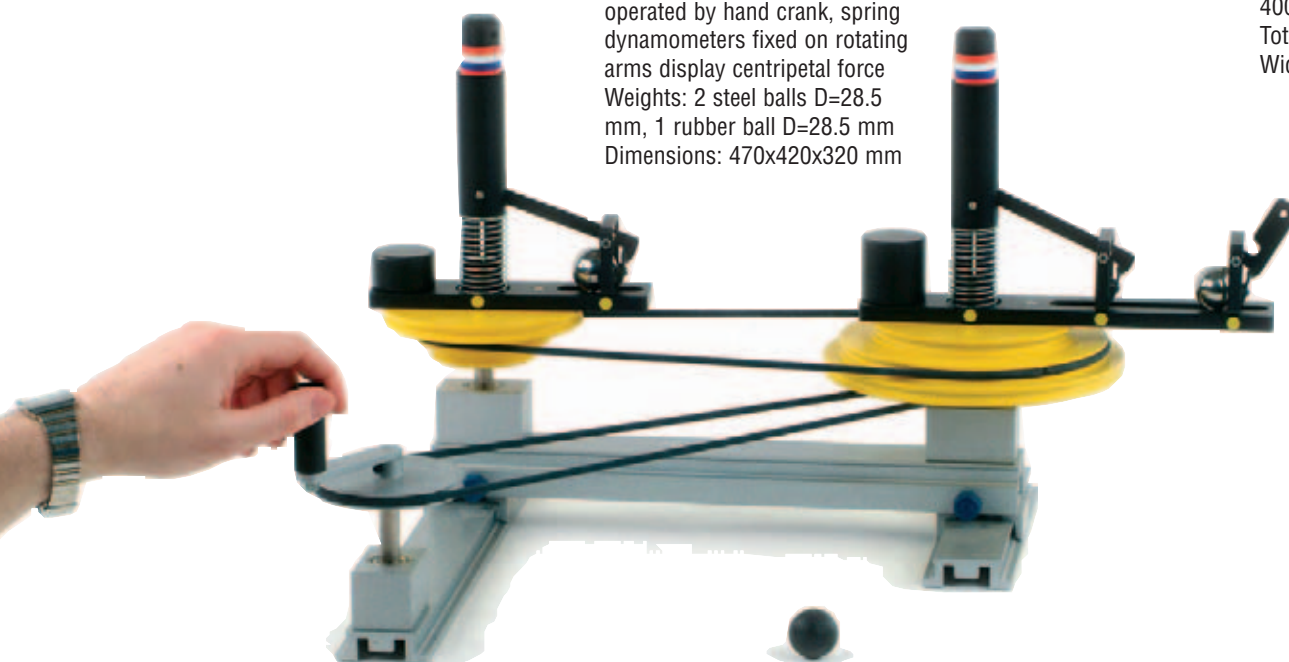
DM350-1Z Centripetal force apparatus, powered by hand

For investigating centripetal force during the rotation of a body around a certain axis in relation to mass, orbital radius and angular velocity
two rotating arms with double ball bearings, with scales of different lengths: $r_1=80$ mm, $r_2=80/160$ mm; drive pulleys of different circumferences permanently mounted on top of each other (transmission ratio options 1:1, 1:2, 1:3), operated by hand crank, spring dynamometers fixed on rotating arms display centripetal force
Weights: 2 steel balls $D=28.5$ mm, 1 rubber ball $D=28.5$ mm
Dimensions: $470 \times 420 \times 320$ mm



DM358-3B Foucault's Pendulum, accessory

Compact accessory for Foucault's Pendulum to be used with geared laboratory motor DS403-1G
Metal bridge, accessory may be screwed onto drive pulley of geared motor, with tall metal wire bracket and hook, pendulum bob attached to cord
Pendulum length: approx. 400 mm
Total height: 430 mm;
Width 150 mm

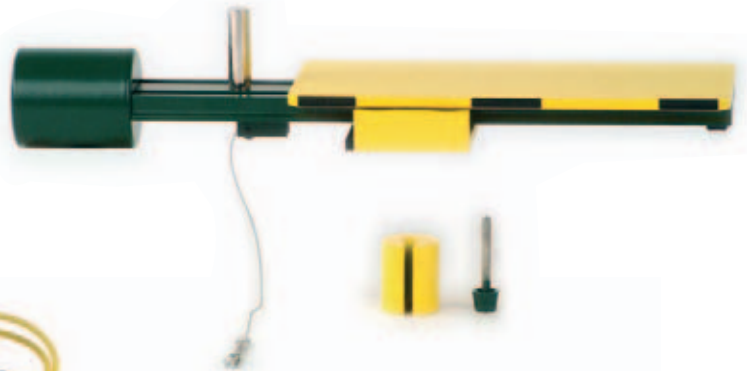


dynamics - rotation

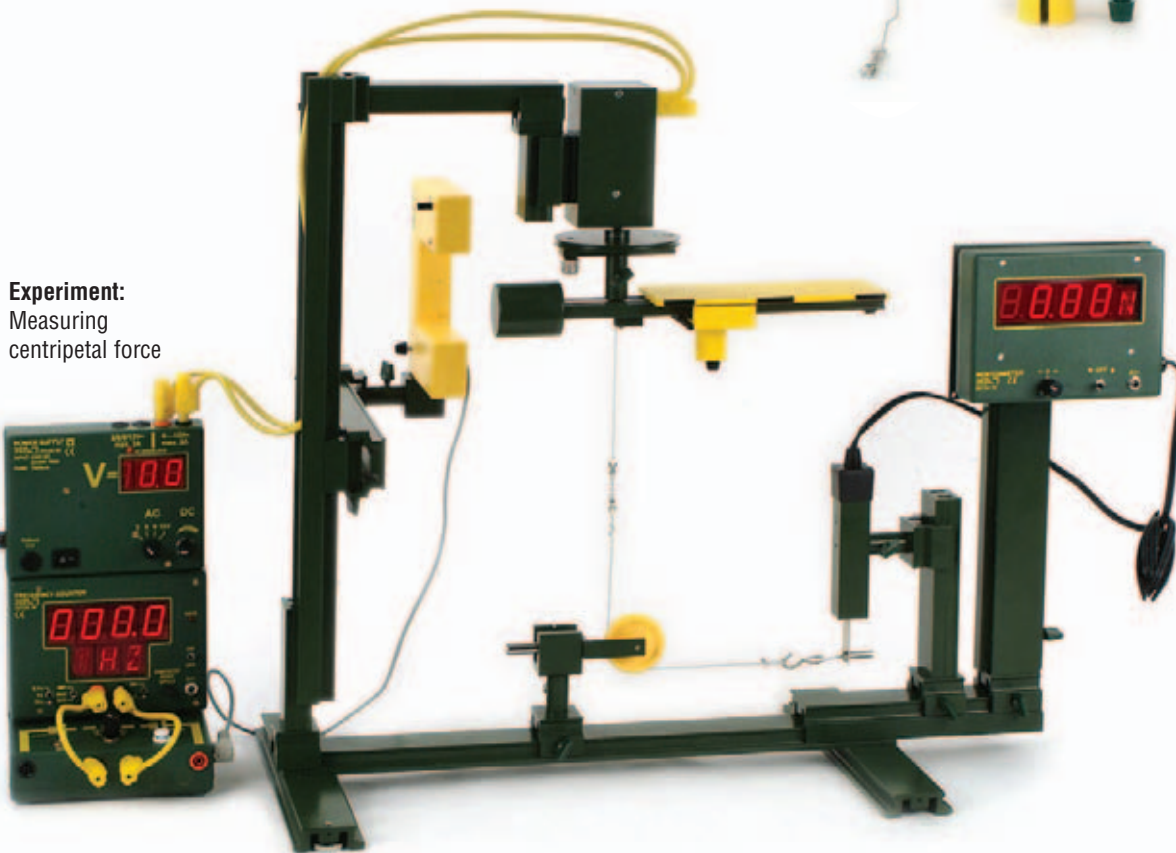


DM350-2P Centripetal force apparatus

For demonstrating that centripetal force is dependent on mass, radius and angular velocity
 Rotating arms made of aluminium; scale with distance markers spaced 80 and 160 mm from axis; 100 g centrifugal weights with 4 ball bearings run very smoothly on cord with eyelet and diverting pulley; additional 100 g weight included in set; weight compensation permanently mounted; support rod $D=10$ mm, $L=35$ mm
 Dimensions: 310x80x55 mm
 Driven by geared motor DS403-1G



Experiment:
 Measuring centripetal force



Measurement of the rotating velocity by light gate "inno", frequency counter "inno" or counter "inno"



Experiment: Moment of inertia and mass distribution



DM360-2R Rotating ring, $D=200$ mm

For testing for varying moments of inertia with a constant mass
 Acrylic ring, metal axle with two adjustable weights that can be shifted within the cylinder
 Dimensions: $D=200$ mm, $B=39$ mm