



# measuring instruments - time



## DM150-2A Metronome

Mechanical impulse generator, adjustable impulse frequency: 40 - 208 beats per minute, in a pyramid-shaped, nut-brown wooden case.  
Dimensions: approx. 116x115 mm, H=220 mm



## DG120-1M Stopwatch analogue, magnetic

Powder-coated metal case, mounted on a magnetic backing plate; large second and smaller minute hand, additive stopwatch with side-mounted levers for starting/stopping and resetting hands

Measurement range: 0...60 s, 0...60 min  
Accuracy of readings: 1 s  
Dimensions: W=116 mm, H=125 mm



**Experiment:** Second pendulum (magnetic)



## DE722-1W Stopwatch "inno"

Digital stopwatch, easy to operate, magnetic. Measurement can be started and stopped using the switches on the device itself or the remote control switch DE722-2W. The 26 mm LED display allows readings to be taken from a distance. Functions: START/STOP: starts or stops measurement, LAP: stores interim times  
RESET: resets display to zero

Measuring ranges:	Measuring range	Maximum	Precision
	$10^2$ s	99,99 s	0,01 s
	$10^3$ s	999,9 s	0,1 s
	$10^4$ s	9999 s	1 s

Power supply: 4 x 1.5 V mignon cells (included) or external power supply 6 V/500 mA, P3120-6N

Case: plastic, ABS

Dimensions: approx. 160x120x45 mm

Weight: approx. 670 g

Recommended accessory:

DE722-2W Remote control for stopwatch "inno" DE722-1W

Cable length approx. 150 cm Dimensions: 21x80 mm



### Recommended accessory:

With the s-shaped assembly platform P3120-5B (height: 245 mm) the MBI stopwatch "inno" is easily converted into a table model.  
P3120-6N 6 V/500 mA transformer as an external power supply for connecting the stopwatch to a 230 V AC/50 - 60 Hz mains outlet.



## DG123-1A Hand stopwatch, analogue

Additive stopwatch with starting, stopping and resetting functions.  
Measuring range: 15 min;  
Graduation: 0.1 s  
Metal case, D=50 mm

## DG122-1D Hand stopwatch, digital

Quartz-controlled, with LC display  
Time and date display, measurement of starting, stopping and intermittent times.  
Accuracy: 0.01 s  
Plastic case, 52x75 mm, supplied with battery

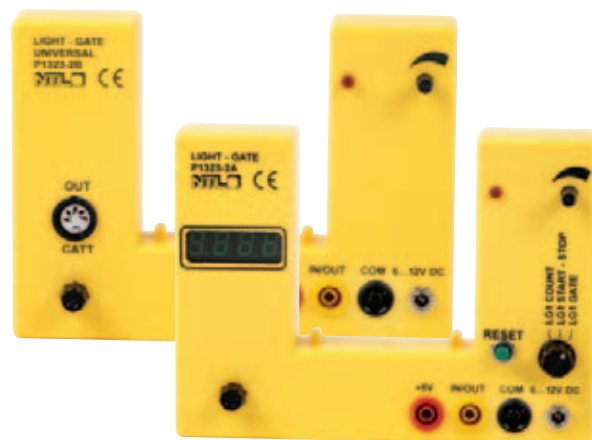
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## P1320-3LR Light gate

Precision light gate with infrared light source for controlling external timing devices; variable control with LED indicator for adjusting intensity to surrounding lighting conditions; with hole and capstan-head screw for fixing on rods of up to 10 mm in diameter; measuring accuracy: 0.1 mm. Signal output and power supply by way of 3-pin DIN jacks, for the direct connection with the universal counter P3120-2Z (shown on the next page) or digital counter, universal DR260-1D.

Internal gate width: 74 mm; external dimensions: 175x130 mm.



## P1323-2A Light gate universal, with digital display

Precision light gate with infrared light source for controlling external timing devices; variable control with LED indicator for adjusting intensity to surrounding lighting conditions; with hole and capstan-head screw for fixing on rods of up to 10 mm in diameter; measuring accuracy: 0.1 mm; 4-digit LED display, digit-height: 10 mm

Switch for selecting operating mode: Count, Start-Stop, Gate 3 safety-sockets for connection with the light gate universal P1323-2B

7-pin DIN jack for connection to CATT4 - interface P4100-4A Reset-button, DC-hollow-socket for external power supply, e. g. mains transformer 6 V/500 mA P3120-6N

Internal gate width: 74 mm; external dimensions: 175x130 mm

## P1323-2B Light gate universal

Technical details similar to light gate P1323-2A, but without LED display and switch for selecting operating mode; In combination with light gate P1323-2A and the mains transformer P3120-6N this light gate builds a complete "timing - unit"!

## P1320-1H Rail holder for light gates

For fastening the light gates to a track or rail (s. illustration below)

Dimensions: 135x185x30 mm; support: 10x40 mm

## P1320-2M Magnetic holder for light gates

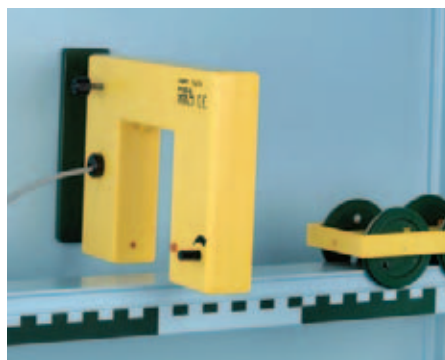
For fastening the light gates to steel panels magnetically (s. illustration below)

Dimensions: 30x125 mm; support: D=10mm, L=70mm

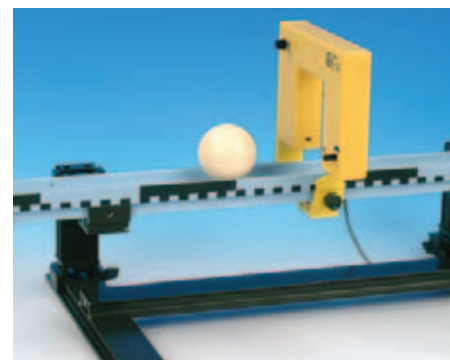
## Experiment:

Measuring time intervals of a second pendulum

Battery inno 1.5 - 6 V, variable P3120-4B, for supplying power to light gate with digital display



Detail: Light gate mounted on magnetic holder



Detail: Light gate mounted on track



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Universal timer "inno"  
 P3120-2Z  
 on s-shaped  
 assembly platform  
 P3120-5B  
 connected to  
 light gate  
 P1320-3LR  
 Recommended  
 accessory:  
 mains transformer  
 P3120-6N  
 6 V/500 mA



## P3120-2Z Universal timer "inno"

Digital timer with magnetic holder for universal use, can be connected to light gate P1320-3LR and to falling body apparatus DM340-1F, with LED display 26 mm tall, resolution: 1 ms

### Functions:

- Time measurement during free fall
- Time measurement in dynamics (L1 start - L2 stop)
- Counting pulses (L1 count)
- Time measurement of pendulum (L1 start - stop)
- Measurement of transit time (L1 - Gate)
- L1 start - automatic stop after 10 s

Reset button, LED display for pulse and second mode

Signal input by way of two 5-pin DIN jacks

Power supply: 4 x 1.5 V mignon cells (included)

or external power supply 6 V/500 mA, P3120-6N

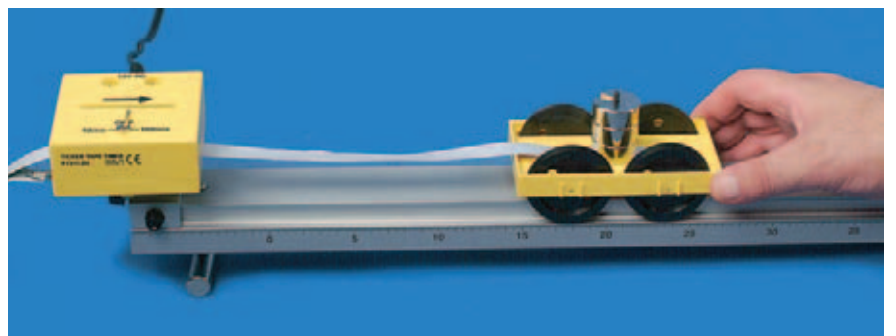
Case: plastic, ABS

Dimensions: approx. 160x120x45 mm

Weight: approx. 425 g



Demonstration of uniform motion - time measurement using the universal timer "inno"



Experiment: Non-uniform linear motion

## P1311-2H Ticker tape timer

For recording sequences of linear motion on a track or during free-fall experiments by means of markings on metallic paper P1311-2G, selection switch: 10ms - off - 100ms, voltage source: 12 V DC  
 Dimensions: 84x84x66 mm

Recommended accessories: P3130-1P mains transformer 12V/ 2A

## P1311-2G Metallic paper, roll

Recording paper for ticker tape timer P1311-2H, length: approx. 30 mm; W=15 mm