

Reversing power connections will not damage the instrument as long as voltage is less than 25 V. The timer consumes less than 500 mA with both light gates connected. Mains transformers with 300 mA output current are therefore unsuitable! The power supply is connected to the DC jack (5) on the front panel of the device. The receptacle is designed for plug pins 2.5 mm in diameter. The inner tube is positive and the outer surface negative. Switch off the battery when inserting a DC plug. Using faulty batteries or the wrong transformer results in a weak or dark display. The display shows a correct reading as long as it is illuminated. For this reason, no LoBat indicator is provided.

The device is powered by four built-in AA-type cells. Battery service life depends to a large extent on the type and number of light gates connected. When the latest generation of cells, having a capacity of approx. 3 Ah, is used, batteries last long enough for between about 6 and 25 hours of operation. In order to avoid damage to the instrument through leakage, batteries should be removed from the instrument if it is not used for several months. Loosen the screws on the back of the device to remove and replace AA cells.

#### **Note:**

The device may only be operated by skilled persons or by those instructed by such persons!

Take care that the device does not fall. In the event that this does occur, have the device examined or repaired by authorized service personnel.

In the event that unforeseen difficulties arise during operation, switch off the device and contact the dealer.

Do not subject the device to dripping or sprayed water.

**The device may be repaired only by authorized service personnel.**

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**NTL**  
**InnoSYSTEM**

## Universal timer “inno” P3120-2Z



This instrument is used in demonstrations and students' experiments for time measurement and for counting passes of moving objects. The device supplies the light gates connected to it with power, making it very easy to set up experiments.

Depending on the set-up, the “inno” universal timer is connected either to one or more infrared light gates (P1320-3A) using DIN cables, to other light gates using adapter cables, to the electromagnetic launcher on the track or to the falling body apparatus. A stabilized supply of 5 V is led through the device for the light gates. This power supply is protected against short circuiting and may take a load of up to 300 mA, allowing various types of light gates to be connected.

**Universal timer “inno” P3120-2Z**  
on s-shaped assembly platform P3120-5B  
connected to  
light gate P3210-3LR



**Recommended accessory:**  
Mains transformer 6 V/500 mA P3120-6N

The counting result is shown on a four-digit, 26 mm LED display. Measurements in seconds and in impulses are displayed on separate LEDs, (7) or (8). Resolution in time measurement ranges is 1 ms and the maximum time is 10 s.



#### **Control elements:**

- 1 5-pin DIN jack for connecting the first light gate (L1), e.g. light gate P3120-3LR or ball holder of falling body apparatus DM340-1F with adapter cable P3129-9A
- 2 5-pin DIN jack for connecting a second light gate (L2) or the collector of falling body apparatus DM340-1F with adapter cable P3129-9A

- 3 Selector dial for function

**Free Fall Timer:** L1 (1) is connected to the ball holder and L2 (2) to the collector of falling body apparatus DM340-1F using adapter cables P3129-9A. Measurement of the time it takes the ball to fall.

**L1 Start - L2 Stop:** Measurement of time between activation of L1 and L2; e.g. a trolley passes through two light gates, with L1 starting and L2 stopping measurement. Timing is governed by the beginning of activation. The electromagnetic launcher on the track may optionally be connected instead of L1.

**Impulses:** A count is taken of the number of times an object passes through L1.

**L1 Start - L2 Stop:** Measurement of the time between activations of L1, e.g. by a swinging pendulum.

**L1 Gate:** Measurement of the interruption time for L1.

**L1 Count/10 s:** When in this operating mode, the number of interruptions of light gate 1 during a period of 10 seconds is measured beginning from the first interruption.

- 4 “Reset” switch: The display is reset to zero when this button is pressed. At the same time, in start/stop operating modes counting is stopped. In Count/10 s operating mode, the device is reset to enable a new measurement.
- 5 5.5/2.5 mm DC jack for connecting 6 V power supply, e.g. 6 V/500 mA plug mains transformer P31206N
- 6 “ON/OFF” switch: Used to switch the instrument on and off.
- 7 LED display for “second” measurement
- 8 LED display for “impulse” measurement
- 9 26 mm LED display showing readings

#### **Note:**

Connecting a light gate L2 (2) is only necessary and effective in “L1 Start L2 Stop” operating mode.

Except in “L1 Count/10 s” operating mode, the device is not safeguarded against repeated measurement. The user should therefore ensure that no undesired repeat measurements can occur.

The instrument is powered either with the built-in battery or an external battery or using a mains transformer with filtered output voltage. It is not necessary to use a stabilized mains transformer. Power supply voltage must be at least 6 V but not more than 12 V.