PHYSICS CHEMISTRY BIOLOGY ENGINEERING

LD DIDACTIC

05/07-W2k-Wie

Instruction sheet 560361

Lenz's Law demonstrator (560 361)

1 Description

Apparatus for testing the eddy-current braking of magnets free-falling in a pipe.

Falling times of the magnets in a

copper pipe: Approx. 5.0 seconds

Aluminium: Approx. 3.7 s

Plexiglass: Approx. 0.3 s

2 Scope of supply

Three pipes; one from copper, aluminium and plexiglass respectively.

10 spherical magnets from NdFeB

Cord for suspending the pipes

3 Additional apparatus

Clip plug	590 02 ET2
Double spring clip	590 021

4 Technical data

Pipes:

External diameter 12 mm

Internal diameter 10 mm

Length 50 cm

Magnet:

8 mm diameter

5 Experiment recommendations

The pipes can be optionally suspended vertically with a hanging cord or vertically in clip plugs and a stand.

During the experiment the spherical magnets are allowed to fall into the pipe from above and the falling time is measured.

The time measurement can be taken manually here, although this can also take place using a light barrier above and below the pipe.

In the case of advanced experiments the time measurement can be implemented with two coils, e.g. 590 84, with magnet-induced voltages.

In order to answer the question as to how heavy the pipe is whilst the magnet drops through it, the pipe can be suspended on a force sensor 524 042. Here it is apparent that the increase in the weight of the metal tube equates to precisely the weight of the magnets as these drop during the falling time. The duration of the weight increase also equates to the falling time.

6 Note

The magnets are Neodymium Iron Boron magnets, which exhibit a particularly strong magnetic field. The magnets internally consist of NdFeB sintered bodies, which are coated with multiple metal layers. The external coat is chrome.

Due to the brittle sintered material and the high energy density, cautious handling of the magnets is necessary. Magnets impacting with each other can burst and sharp-edged splinters can fly off. Wear eye protection.

Close proximity between the magnets and a pacemaker, credit cards and other devices is prohibited.

If a magnet is ingested seek medial attention. Swallowing multiple magnets may be fatal.