

Cat. No. C15-1953-W0

Magnetic Levitation Track

INSTRUCTION MANUAL



Narika Corporation
Ver.20121120

INTRODUCTION

Thank you for purchasing the magnetic floating type simple dynamic slide. Different from the traditional dynamic slides that float sliding bodies with air, this product is an experiment set for conducting standard experiments, such as collision experiments of a sliding body and horizontal spring pendulum, more easily without using electrical energy, but by using a sliding body and slides by magnetic repulsion between the surface of a track and the bottom of the sliding body and slides. Read this instruction manual carefully and conduct experiments properly and safely.

1. Caution and Warning for Using Product

- (i) The track of this product is made of aluminum and acrylic resin. If it is dropped or intense shocks are applied to it intentionally or by mistake, the resin part may break or the aluminum track may deform and the sliding body may become incapable of sliding. Be very careful.

(Caution about breakage of product)

- (ii) Never disassemble the bearings of the sliding body or replace with other bearings. If they are disassembled or replaced, the sliding performance cannot be maintained and the track may be damaged. Failure to heed the instructions will void the one-year warranty for the product. Be careful.

(Caution about breakage of product)

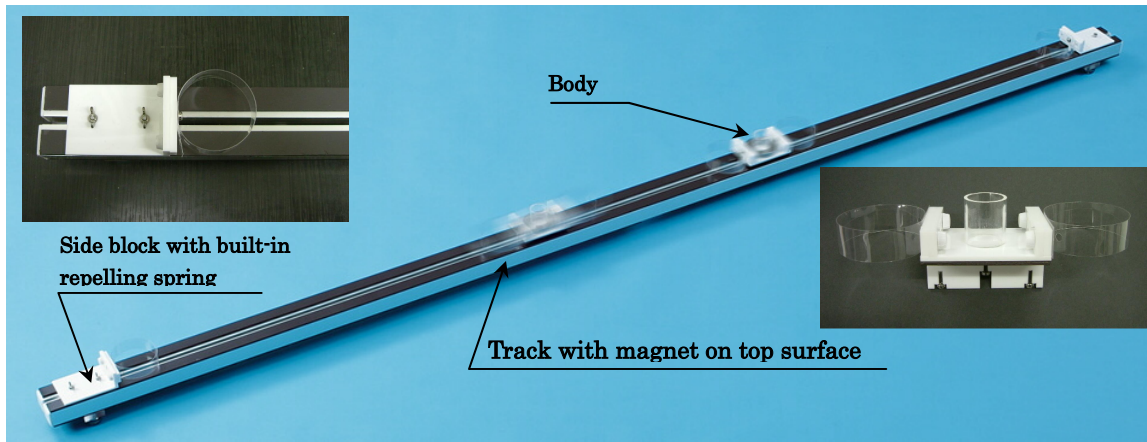
- (iii) This experiment uses strong magnets adhered to both the track of the two-meter overall length and the two sliding bodies. Never bring magnetic memory cards or equipment with precision mechanisms close to it.

(Caution for avoiding damages caused by magnetization)

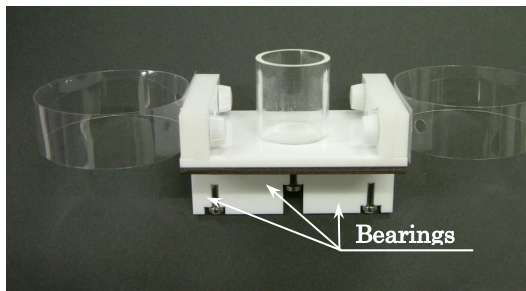
- (iv) The sliding body consists of acrylic resin and precision bearings. Dropping it or hitting it against the floor, whether intentionally or by mistake, may not only break the sliding body but also cause personal injury. Never carry out such actions.

(Warning and caution about injury and equipment damage)

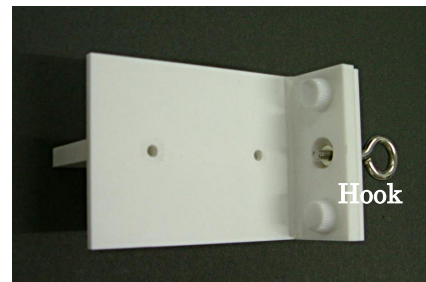
2. Overview of Product



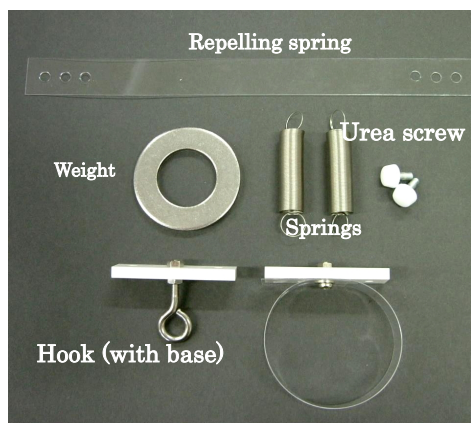
- Configuration of experiment: Aluminum track of two-meter



● Sliding body



● Side block with spring fixing hook



● Accessories

Contents of product

- Track (slide): Two-meter all over length, made of aluminum
Pair of parallel bases with magnet stuck on top, **1 set**
- Sliding body: Made of acrylic resin, with magnet on bottom
Small horizontal balance bearings, **2**
- Base parts: Acrylic side blocks, **3**
- Accessories
 1. Acrylic repelling springs, **6**
 2. Repelling spring bases, **6**
 3. Spring pendulum coil springs (spring constant = 5 g/cm), **2**
 4. Spring pendulum hook (with base), **4**
 5. Weights (about 44g), **6**
 6. Urea screws, **16**
 7. Set screws & nuts

3. Experiment Examples with Magnet Floating Type Simple Dynamic Slide

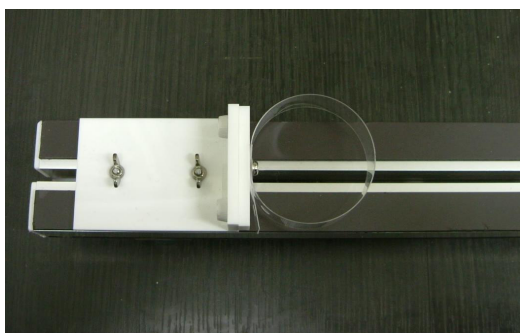
- **Traveling test**

Attach the acrylic repelling springs to the side blocks fixed on both ends of the track and two sliding bodies as shown in “**Configuration of experiment**” on the previous page.

Set the sliding bodies on the two-meter track and make sure that they float in the same condition. (This product is made so that both sliding bodies float the same distance from the surface.)

Then, move each sliding body on the track. It is okay if it is repelled by the side blocks on both ends and goes and comes back three times or so. However, it may not do so, three times, depending on the bearing condition (product variance). If it goes and comes back 2.5 times or so, you may regard that it moves properly. If the inertial mass of the sliding body is increased, the traveling condition may be improved.

Put one weight plate included in the accessories at the center of the sliding body as shown in Fig. 1 and check the traveling condition. It is effective to clean the bearings of the sliding body with ethanol if the traveling condition is not good. Contact our support center for details.



Repelling



Attach the supplied weight plate to the acrylic pipe



Fig. 1 Sliding body traveling test on magnetic floating track

• **Collision experiment**

Let's anticipate how two sliding bodies move differently if the supplied weight plates are placed on them and they collide with each other.

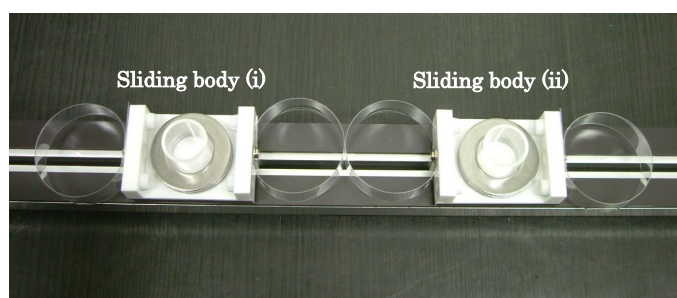


Fig. 2 Collision experiment of sliding bodies with weight on them

- [1] Placing the same quantity of weight plates
- [2] Placing weight plates at the ratio of 2:1, 3:1 or 3:2

Answer examples

○ When the sliding bodies with the same quantity of weight plates on them collide with each other

[Momentum of sliding body (i)] = [Momentum of sliding body (ii)] and

[Kinetic energy of sliding body (i)] = [Kinetic energy of sliding body (ii)]

When the both shown above are met simultaneously, the aspect of the following movement can be observed:

(Sliding body (i) collides with stationary sliding body (ii) at speed V) ⇒ (Sliding body (i) stops and sliding body (ii) moves at speed V)

○ What aspect of movement can we observe if the quantity of weight plates placed on both sliding bodies is changed?

Each sliding body accommodates a maximum of three weight plates. Check the aspect in experiments.

● **Horizontal spring pendulum**

There is a hole for setting the “**side block with a hook**” shown in Fig. 3 at a position shorter than the center of the track with a magnet (magnet floating type slide).

Attach the side block at this position with the **wing nut** supplied with the product. **See Fig. 3.**

Then, replace the repelling spring at both ends of the sliding body (one only) with the hook supplied with the product and connect it to the hook of the side block using the **spring**.

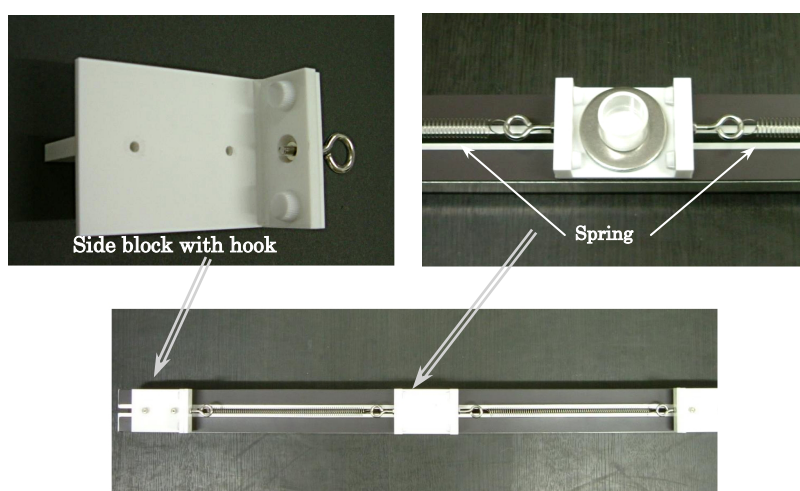


Fig. 3. Preparation for experiment of horizontal spring pendulum

- **Experiment**

Pull the sliding body to the right or left and release it. A peculiar simple harmonic motion occurs. Check the relationship between the number of weight plates and the frequency.

$$\text{Frequency} = 2\pi \left(\frac{m}{k} \right)^{1/2}$$

Where, m : Mass of sliding body with weight plates

k : Spring constant

A stopwatch, optical gate measuring instrument, or the like is necessary for this experiment.

== MEMO ==

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