

# Instruction manual

Cat. No. C15-1624-W0

## ICT-enabled Dynamic Cart F-2 (One pair)



April. 2022

## **Safety Precaution**

- ⊘ Do not disassemble, repair, and remodel this product. This product might not work properly, and warranty will be void.**
- ⊘ Teachers or trainers must instruct students about the operating procedure and the safe ways of conducting experiments with this product prior to experiments.**
- ⊘ Always carry students' experiments under the supervision of teachers/trainers.**
- ⊘ Don't step onto the cart. It may cause serious injury and/or damage to the cart.**
- ⊘ Do not use the cart on an unstable bench. It may cause serious injury and/or damage to the cart.**

## **Product's Feature**

Multifunctional metallic cart for dynamic experiments with its top designed as a versatile platform to mount a smartphone with installed apps for speed/acceleration measurement, and/or, to mount a digital camera for recording the cart's motion.

A variety of dynamics experiments and demonstrations including ones for kinetic energy and for the law of conservation of momentum possible.

The breaking, holding, and stacking (BHS) mechanism help to achieve user-friendly operability of the cart (see section 5 of this instruction guide). Wheels are protected from damage, when objects over 10 kg is loaded, because the cart is designed to connect its bottom surface to the ground to prevent overload to the wheels, thus stopping the cart.

Furthermore, Cart's nominal mass (1kg) falls within the error range of  $\pm 3\%$  that is an very low variance in mass for a body made from zinc die cast, Which also enables simple analysis (calculation) of experiments results for students when substituting the mass ( $m=1$ ) to motion equation.

## **Specification**

\*Material: Body – Zinc die cast

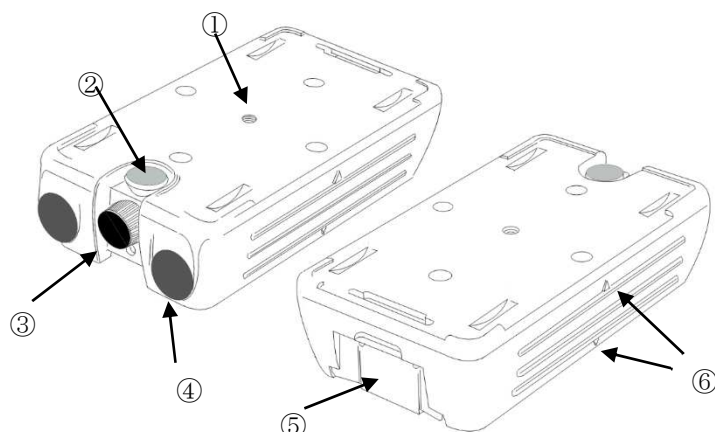
\*Wheels – ABS resin,

\*Size: 150 x 85 x 45mm

\*Axle: with suspension system

\* Wheel: with ball bearings

\*Extra functions: Overload prevention mechanism, Hook-and-loop fasteners (in two colors) to connect two carts, Built-in spring plunger, Triangle-shaped position marks

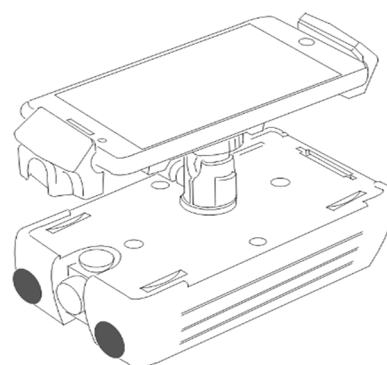


- ①Screw hole for 1/4 inch      ②Launching Button      ③Built-in spring plunger (BSP)  
 ④Hook-and-loop fasteners (Coupling mechanism)  
 ⑤BHS mechanism   ⑥Triangle-shaped marks

## Instruction Guide

### **1. Screw hole for a camera/smartphone platform:**

Top of the cart has a built-in 1/4 (one quarter) inch screw hole to mount a camera/smartphone/tablet platform for using the sensor or camera function. Narika's Tablet Holder for Dynamic Cart (S77-2561-W0) (sold separately) will work as the appropriate platform.



### **2.Launching Button and Built-in spring plunger**

1. Turn the knob of BSP (Built-in spring plunger) anti-clockwise to (partly) draw BSP out of the cart body. The length of drawn BSP out is freely adjustable., while BSP has equally spaced shallow cuts (grooves) on its surface as a guide to know the length of drawn BSP out. (Note that BSP will be removed from the cart body if you continue to turn the knob. Refrain from doing so). Draw BSP at an appropriate length for your experiment because the length of drawn BSP out determines the magnitude of launch power (pushing power) (See Fig.1).
2. Set BSP into the cart body with your finger until the concavity part of BSP, grooved part right next to the knob, fits into the housing of the body. If you have difficulty doing so, set BSP while slightly lifting it up (see Fig.2).
3. Hit Launching Button with a pen or a mechanical pen etc., instead of your figure, to release BSP (see Fig.3).

S77-2561-W0 Tablet Holder for Dynamic Cart

[Caution] When setting up BSP, do not bring your face or body close to it and alert your students likewise. When storing, make sure BSP is being unlocked.

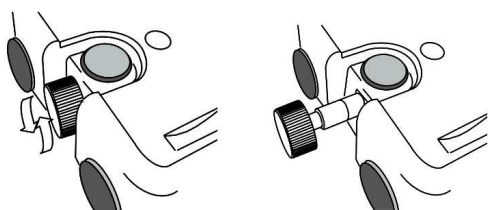


Fig.1

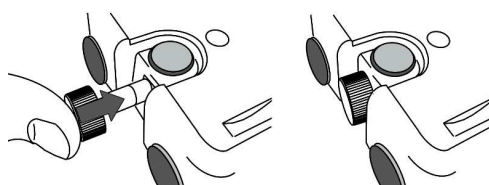


Fig.2

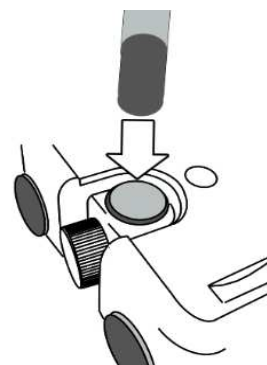


Fig.3

#### **4. Hook-and-loop fasteners (Coupling mechanism)**

The package includes two carts. One has two black Hook-and-loop fasteners, and the other has two yellow Hook-and-loop fasteners. Difference in the color helps easier identification of the cart colliding and the one being collided in case two carts collide each other. (see Fig.4).

The coupling mechanism provides a setting for perfectly doubling the mass of the cart by connecting two carts together using the Hook-and-loop fasteners in the experiment of the law of conservation of momentum. In this case, make sure BSPs of both carts are fully stored.

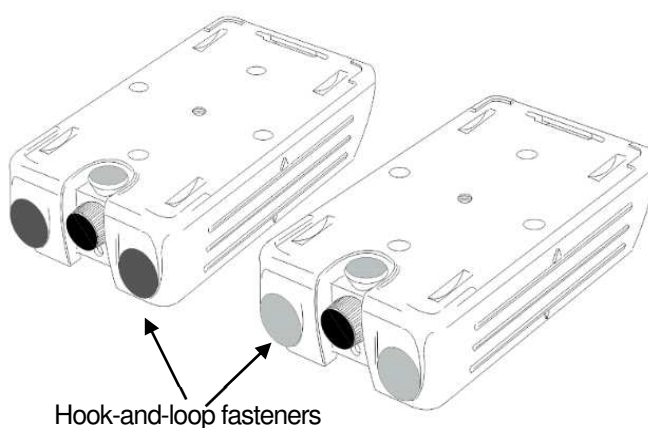


Fig.4

## 5. BHS Mechanism

1) Braking function “B”: Easy and safe operation available for students even on a ramp by stopping the dynamic cart with the built-in stopper.

A slidable plate works as a brake applied to the cart. When the plate is being pressed down on a ramp or a lab bench, it works as a brake. When the plate is being pulled up, the brake is released and the cart will be movable (see Fig.5).

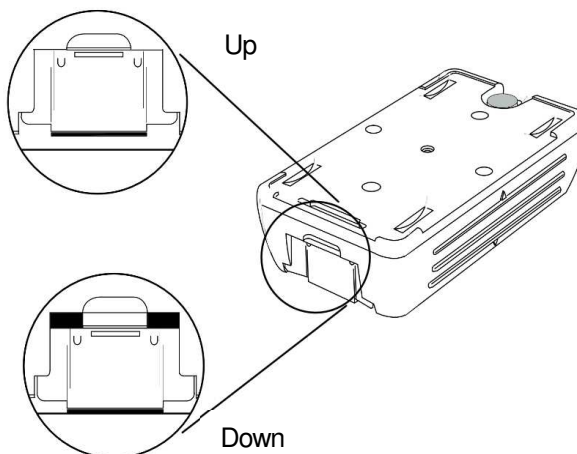


Fig.5

2) Holding function “H”: Easy for students to fix one end of a ticker timer tape on the dynamic cart.

Pull the plate up, insert the paper tape into the slot, and press the plate down to hold the tape (see Fig.5 and Fig.6).

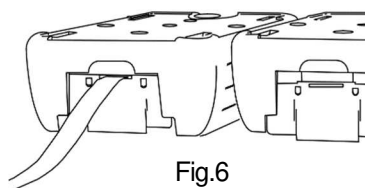


Fig.6

3) Stacking function “S”: The other cart can be stably stacked on a cart thanks to the stackable design of the top surface.

Possible to double the mass of the cart by stacking two vertically (see Fig.7). In that case, make sure the upper cart is securely being halted with the brake function. The slidable plate of the upper cart has to be pressed down, so that it is fully fitted into the concaved slit on the top surface of the lower cart (see Fig.5).

[Caution] It is recommended that just up to one cart is stackable on the other one for safety reason.

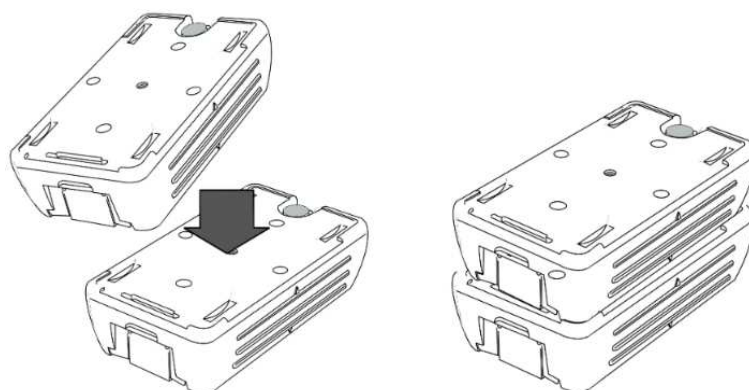


Fig.7

## **6. Overload prevention mechanism**

Wheels are protected from damage, when mass over 10 kg is loaded, because the cart is designed to connect its bottom surface to the ground to prevent overload to the wheels, thus stopping the cart

## **10. Triangle-shaped marks**

Triangle-shaped marks at both sides of the cart enables easier analysis of the motion of cart(s) in slow motion playback (Fig.9).

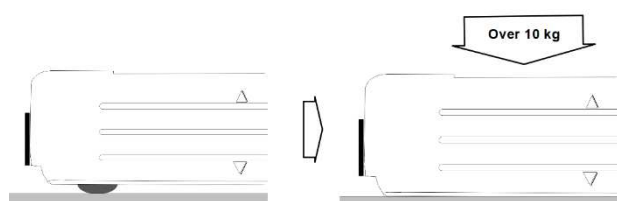


Fig.8

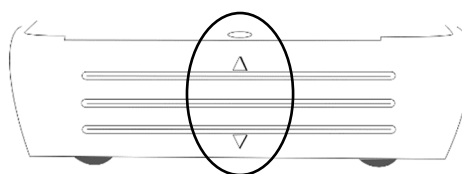


Fig.9

## **Related Products**

- C15-1624-W1: Weight for Dynamic Cart F-2 500g x 3 pcs
- C15-1624-W2: Sensor Bracket for Dynamic F-2 cart
- C15-1659-W0: Exclusively designed Track for Dynamic F-2 cart