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# Vernier Go Direct<sup>®</sup> Sensor Cart Accessory Kit

(Order Code GDX-CART-AK)



The Go Direct Sensor Cart Accessory Kit is a collection of additional hardware for use with the Sensor Cart.

## What's Included

- Hoop spring bumper (heavy)
- Hoop spring bumper (light)
- Magnet tabs (4)
- Hook-and-pile tabs (4 pair)
- Masses (4 hex)
- Magnetic disk bumper for force sensor (2)
- Additional metal hook and nut for force sensor (3)
- Additional flat-top rubber bumper (3)
- Additional anti-roll pegs (3)

## Use Cases for Additional Hardware

### Hoop Springs

Hoop spring bumpers are designed for collisions between carts and against fixed objects. The springs spread out a collision in time so that there is a clear distinction of before, during, and after the collision, both visually and in collected data.

Attach the hoop spring to the force sensor on the Sensor Cart. Light and heavy springs allow for different collisions. To configure cart-on-cart collisions, attach a rubber bumper to one cart and a spring on the other.

Orient the hoop so that it is horizontal, and tighten one plastic nut against the hex barrel of the force sensor. Never remove the hex barrel of the force sensor.

### Collision Tabs

The carts are supplied with magnets and hook-and-pile tabs. These parts are attached using removable collision tabs. Since the magnets may interfere with certain experiments using force sensors on the carts, only install the magnets if you need them.

The magnets are useful in studying collisions with the magnets positioned so that they are the same polarity on both sides and on both carts. This way the carts will repel one another, and you can arrange a collision in which the carts never actually touch. The collision will be very nearly elastic, unlike a collision using a spring or any kind of contact.

The removable collision tabs have two sides. One is marked N, and the other is plain. The plain side is for use with hook-and-pile material on tabs without magnets.

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The removable collision tabs have two sides. One is marked N, and the other is plain. The plain side is for use with hook-and-pile material on tabs without magnets.

The collision tabs can be inserted either way, exposing or concealing any hook-and-pile material. To quickly perform an experiment without magnets, remove the collision tabs.

### **Hook-and-Pile Tabs**

To study totally inelastic collisions, place hook-and-pile tabs on the collision tabs without magnets. Looking at the end of the cart, place a hook pad on the left-hand tab, and a pile tab on the right-hand tab. Center the pad on the round part of the collision tab. This way any cart with hook-and-pile tabs will stick to any other. Hook-and-pile equipped carts will stick together, creating a totally inelastic collision.

### **Masses**

The four 125 g masses are used to change the mass of the cart for dynamics experiments. The cart mass is nominally 275 g, but additions such as magnets or hook-and-pile tabs will increase the total mass. As a result, it is best to weigh the cart as used when the mass is important.

The four masses can be used one at a time or in combination on either cart. The mass trays on the sides allow the addition of masses without removing sensors. It is not necessary to keep the carts balanced with the same mass on each side.

### **Magnetic Disk Bumper**

The magnetic disk bumper is used with the force sensor on the Vernier Sensor Cart for elastic collisions where the force record is of interest.

### **Replacement Parts: Hook, Bumper, and Pegs**

The hook, rubber bumper, and anti-roll peg parts are identical to those included with the Sensor Cart.

### **Warranty**

Vernier warrants this product to be free from defects in materials and workmanship for a period of five years from the date of shipment to the customer. This warranty does not cover damage to the product caused by falls, abuse, or improper use.

**NOTE:** Vernier products are designed for educational use. Our products are not designed nor are they recommended for any industrial, medical, or commercial process such as life support, patient diagnosis, control of a manufacturing process, or industrial testing of any kind.

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