

4 – Circular Motion User's Guide:

1/30/25

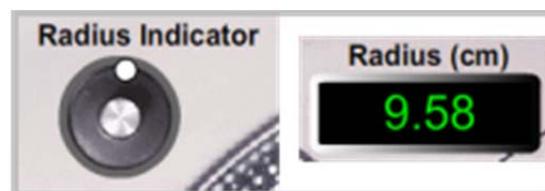
The record player. To start or stop the record player, click on the switch on the bottom right of its base. Like with any record player, there is a ramping up time to get to full speed from a stop and vice versa.



The speed control. Located at the bottom left of the record player, the speed control dial can be adjusted by clicking and rotating. The target speed can be set in the range between 0 and 90 rpm, and this speed is shown in the digital display in the bottom left corner.



The radius indicator. At the top left of the record player is another dial called the radius indicator. Clicking and rotating this dial will display and adjust a green circle on the record. This can be used to determine the radial distance between the center of the record player and the center of any masses used. The radius of the green circle is displayed in centimeters and is shown at the top right of the record player.



Wireless force sensor. The force sensor is located at the bottom center of the screen. There is a hole in this sensor that allows it to rest on the center of the turntable, on the spindle. Drag and drop the sensor to the center of the record player to place. To remove, just drag and drop back to the bottom of the screen. Any force readings from the sensor are shown in the readout at the bottom of the screen and the units are Newtons.



Disc Masses. In the top right corner of the screen there are 4 discs and 4 matching cylinders and these are all labeled A, B, C, or D. Each of these pairs of masses weighs a different amount and is made from a different metal. The discs can be placed on the record by dragging and dropping them on to the player. Once on the record, the discs can be moved just by dragging and dropping again, although it will be much easier to do if the record player is turned off first. If the speed is high enough to send the disc flying, simply drag and drop again to reuse or just select a new mass.



Cylindrical Masses. The cylindrical masses are designed to be used with the force sensor, so it must first be in place on the record player. Once this is done, a cylindrical mass can be dragged and dropped on the record player like a disc, except when dropped it will be automatically connected to the sensor by a string. Unlike the discs, the cylinders will not fly off at any speed because of this string. To use a different mass, cylinder or disc, simply click on the new mass and the old mass will return to its home position.



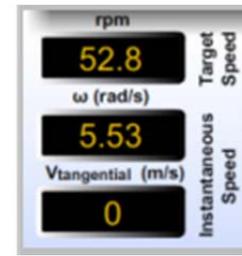
Mass Multiplier. Located under the masses labeled D, and above the information text box, there is a line that reads "Min Mass x 1." This is the mass multiplier. Each of the masses has a default mass and the multiplier is used to increase this mass up to 10 times the original value, without having to use 10 times as much space on the screen. By clicking the up or down arrows next to the number, the multiplier can be changed and all the masses on the screen are changed with it. For example, the mass labeled B has a default value of 51g. Setting the multiplier to 5x makes this mass 255g, and setting it to 10x makes it 510g. These values are automatically updated if there is a mass currently on the scale.



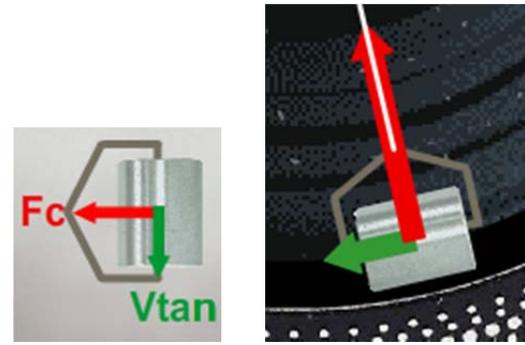
Digital Scale. Any of the eight masses can be measured by dragging and dropping onto the digital scale at the bottom right corner of the screen. The mass is shown in grams directly on the scale's display.



Speed Displays. The bottom left corner of the screen shows three displays: Target speed rpm, instantaneous angular velocity, and instantaneous tangential velocity. The target speed refers to the speed set on the speed dial for the record player. The angular velocity shows the actual angular velocity of the record player system at that moment, while the tangential velocity refers to any masses currently on the record. These displays are always active, although both instantaneous displays will read zero when the record player is off.



Vectors. When the Force Sensor and a cylindrical rolling mass are in place on the record player, an option is available to turn on a vector display. The button for this is located directly above the on/off switch, and can be clicked to turn the vectors on or off. A red centripetal force vector and a green tangential velocity vector will be shown.



Snapshot. As with most of our labs, you can take a screenshot of any portion of the screen by clicking on the Snapshot icon and then clicking and dragging a box around what you want to capture. A dialog will then appear asking you what you want to call the image and where you want to save it. In most labs, a timestamp will be added to the image to keep track of it better.

