

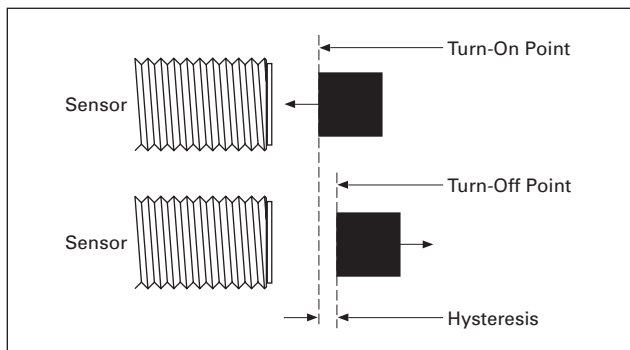
# iProx inductive proximity sensors— optimizing hysteresis

## Description

The iProx™ family of inductive sensors features extremely high sensing performance. Like many sensors, the various operating characteristics, such as range, hysteresis, and output, have been preset from the factory to be ideal for a wide variety of sensing applications. Where iProx differs from other sensors is in the ease of changing these default operating characteristics to suit specific applications. This document will cover hysteresis—what it is, the benefits of modifying it, and how to change it.

## Hysteresis and why it is important

All sensing devices incorporate some level of hysteresis. Hysteresis is the difference between the signal levels at which a sensor turns off and turns on. This difference can usually be observed by slowly bringing a target toward the sensor until it turns on and then moving it away until it turns off. The point where the sensor turns on will be slightly closer to the sensor than the point it turns off (see **Figure 1**).



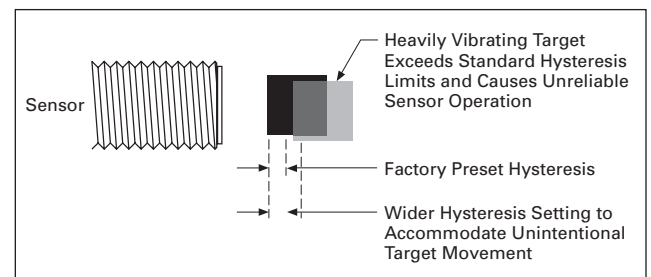
**Figure 1. Hysteresis in Presence Sensing**

This difference, usually in the area of 10% to 15%, is necessary to reduce the sensor's sensitivity to noise and vibration. It also eliminates multiple transitions (called "chattering") at the point where the output switches. A mechanical version of this effect can be found in many electrical switches. For instance, as you move the handle just past the center point, a spring in the switch will pull the handle all the way over, ensuring that the switch ends up in a definite ON or OFF state.

## When it is necessary to adjust hysteresis

As stated before, the factory preset hysteresis setting is appropriate for most sensing applications. But for some, the ability to fine-tune the sensor hysteresis setting will greatly increase reliability. For others, it may be the only way to solve the application.

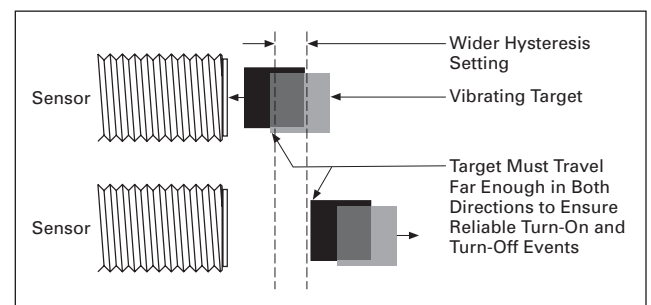
For sensing applications that occur in areas of high shock or vibration, a wider hysteresis setting may be necessary to ensure reliable machine operation (see **Figure 2**).



**Figure 2. An Example Requiring Increased Sensor Hysteresis**

By increasing the hysteresis, you can accommodate unintentional movement of the target due to shock or vibration without causing multiple output signals during one sensing event.

When widening the hysteresis, it is important to ensure that the normal travel of the target will take it far enough in both extremes to ensure reliable turn-on and turn-off events (see **Figure 3**).



**Figure 3. Target Travel Considerations With Increased Hysteresis**

On the other end of the spectrum, you may have an extremely precise and stable application where you need highly accurate results. In this case, setting the hysteresis to a tighter setting than the factory preset will provide this high accuracy.



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## Setting iProx hysteresis

To adjust the hysteresis on the iProx sensor, follow the procedure listed below. For more detailed instructions on adjusting hysteresis with the software, consult the iProx Programming Software User Guide (P50228) included on the software CD-ROM.

1. Connect the programming device to your computer. Connect the remote programmer (E59RP1) to your computer's serial or USB port.
2. Launch the iProx Programming Software from the Start menu.
3. Affix the magnetic puck to the face of the sensor. To ensure proper mounting, it may be necessary to remove the mounting nuts from the sensor.
4. Ensure that the sensor(s) you intend to program are powered on.
5. The iProx Programming Software should automatically detect the sensor(s). See the "Connection Status" information displayed at the bottom of the "Getting Started" window to confirm the software has detected the sensor(s). If the software does not detect the connected sensor(s), you may need to select a wider COM port range in the software settings. For more troubleshooting information, consult the iProx Programming Software User Guide (P50228) by clicking on the "Help" window and selecting "Contents/FAQs."
6. From the "Getting Started" window, select "Configure iProx" to modify the parameters of your iProx sensor.
7. Under "Step 1: Select Sensor to Modify," click the drop-down menu and select the sensor that you intend to modify. It may take a few seconds to communicate with the sensor. Once this is complete, the rest of the screen should become enabled, allowing you to modify the parameters of the selected sensor.
8. The "Modify Sensing Range" section at the bottom of the window displays operate and release points as well as a graphic depiction of the sensing attributes. The "Operate Point" is the distance at which an incoming target is first detected. The "Release Point" is the point at which the target is beyond the detection range of the sensor. The difference between these two points is the hysteresis. To add hysteresis, simply widen the distance between the operate point and release point (by reducing the operate point or increasing the release point). Notice that the sensing range graphic will dynamically change as you modify the hysteresis. Conversely, to reduce hysteresis, just decrease the distance between the two points (by increasing the operate point or decreasing the release point).
9. When you are satisfied with your changes, click the "Program" button at the bottom of the screen. Repeat this process for each iProx sensor.

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