

# SUPERPROX® 900 Series Introduction



## 30 mm Ultrasonic Sensors

**SUPERPROX®  
Model SM900 Series**  
*Proximity sensing with-  
out a delay*

**SUPERPROX®  
Model SM902 Series**  
*Dual-level sensing with  
on & off latch control*

**SUPERPROX®  
Model SM906 Series**  
*Level/distance sensing  
with analog output*

**Broad model selections in new SUPERPROX® 30 mm series bring convenience and cost-effective sensing to specific applications**

Using the same world-leading ultrasonic technology perfected and proven in the versatile SUPERPROX® 500 series, three new 30 mm series sensors broaden the list of reliable Hyde Park sensing solutions. With this SUPERPROX® 900 series, the design engineer, maintenance manager, and other professionals can easily select a “smart” ultrasonic sensor specifically configured for an application.

The applications cover those requiring either proximity sensing with on/off output, dual-level sensing with on/off latch control, or continuous level/distance sensing with analog output. Depending on the specific sensing application, 1 meter, 2 meter, and 8 meter sensing range models are available with specific sensing functionality. These models offer a variety of output modes and types, response times, features, and options. Threaded, barrel-style housings, available in either ULTEM® plastic or SS303 stainless steel, make installation quick, especially in those areas where mounting is often difficult. All the 30 mm sensors are CE certified.

For sensing applications requiring connection to a **DeviceNet** network, all models in this series are available with this capability as an optional selection.

The SM900 series continues the long tradition of providing sensing solutions where other sensing technologies have not met demanding standards for reliability and productivity. With these 30 mm sensors, the same degree of reliability is assured in the detection of most objects regardless of material. Harsh environments, high-speed runs, caustic cleaning solutions, and frequent washdowns are often the rule, not the exception, for this rugged, self-contained, sensor line. Like other Hyde Park sensors, this series has protection ratings of IP67 and NEMA 4X (indoor use only), providing resistance to most acids and bases, including most food products. They are sealed against dust, noise, and other hostile environments. Without exception, all three 30 mm series models can be counted on day in and day out for the reliable detection of objects whether they are transparent or opaque, liquid or solid; regardless of color or shape.

### **Field Programmable Sensor Models**

SUPERPROX+ software combined with the Model AC441A configurator interface module enables the SC900 series sensors to be programmed by the user

- **Field programmable capability**
- **DeviceNet capability**
- **CE certified**

with either standard or custom sensing configurations. These field programmable sensors use an ‘SC’ prefix in the model number to designate and differentiate the sensors from factory configured SM900 series models.

All the unique sensing capabilities and functions available in the SM900, 902, and 906 sensor series are also available in field programmable SC900/906 model versions. An even greater sensing capability in functionality is realized with these field programmable sensor models through the user-friendly SUPERPROX+™ software to allow customization for specific applications.

For more details on the Model SC900 series and other field programmable sensor models along with the Model AC441A configurator interface module go to the SUPERPROX+™ section found on page 4-143 in the catalog.

## Operation

Like the SUPERPROX® 500 series sensors, the 30 mm models are pulse-echo devices that both transmit and receive sonic energy within selected sensing ranges. A unique combination of advanced ultrasonic sensing technology and a discriminating microprocessor and push-button setup program enables the detection of only those objects within a set “window” or span while ignoring all surrounding interference. When the object to be detected is at or within the user-set window limits, either a discrete output switches or an analog output changes proportionally with respect to analog span limits set by the user.

## Easy to Set Up

Convenience in setting up the SM900 series sensors for operation begins with the ease in which the sensors can be mounted in the proper position. Whether placed in a bracket close to the object or through a vessel cover several feet above the object, the sensor is quickly secured using a pair of jam nuts. Depending on the model series selected, a single push-button at the rear of the sensor is used to set either the near and far window limits, the dual-level limits, or the analog span limits.

To set the limits, a target or object is placed in front of the sensor successively at the set points representing the desired near (Dwi) and far (Dwo) limits shown in the illustration. When the push-button is pressed at each set point, the respective distances (Dwi and Dwo) from the sensor are stored in the sensor memory to represent the sensing window limits.

For long distances or tall-tank applications where the long-range (8 meter) sensor’s push-button setup is not practical, an optional hand-held, configuration accessory (AC441A) is available to use in setting the window limits and configuring the sensor’s functionality for operation.

Located next to the sensor’s push-button is a pair of LED’s. The multicolor LED is used to indicate setup and operational status; the amber LED is used to indicate the status of the output.

The sensor outputs, whether discrete or analog, are compatible with most logic control systems and programmable controllers.

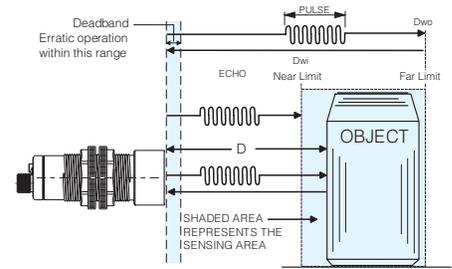
## How does it work?

During setup and operation, the SM900 series sensors continually and accurately measure the elapsed time of every pulse transmission. The transmitted pulse begins a time clock to determine the elapsed times for the received pulse echoes. Given the elapsed time, the sensor software calculates the distance traveled out to the object and back to the sensor, using the formula,  $D = TV_s/2$ , where  $D$  = distance from the sensor to the object;  $T$  = elapsed time between the pulse transmission and its echo receptions;  $V_s$  = velocity of sound, approximately 1100 feet per second.

During operation, the calculated distance ( $D$ ) between the sensor and the object is compared to the distances between the sensor and the set limits. The operation (discrete and analog) depends on the model number.

## Applications

For applications specific to the three series of SM 900 series sensors, see either the product information sections



that follow or the Application / Sensor Selection Chart on Page 2-1.

## Beam Plots

The following plots developed from data collected at 20°C and zero air flow, define the boundaries and shape of the sonic beam for the SM 900 series sensors.

For the 1 and 2 meter series the boundaries were established using a 10 cm x 10 cm (3.94" x 3.94") “target” positioned parallel to the sensor face. The plot for each sensor series is valid for targets equal to or larger than 10 cm x 10 cm. Beam boundaries are determined by moving the large flat target into the beam while the plane of the target is held perpendicular to the beam axis.

The same is true for the 8 meter series with the exception that the target is 30 cm x 30 cm (12" x 12").

In each sensor series, the plot extends from the end of the “deadband” on the left to the end of the sensing range on the right. The sensor is illustrated in the middle left margin.

# Beam Plots

