



It is this discrete sensing program that enables the SUPERPROX® sensors to detect only those objects that are within a set "window" and to ignore all others. A simple push-button is used to set a window as small as 13 mm (1/2").

Used throughout plants in all industries, the SUPERPROX® Model SM500 (cable style) and Model SM550 (connector style) series of non contact sensors control various operations. Typical applications include loop control and end of roll detection, web breaks, and parts presence. The sensors are also used to detect containers and produce outputs for no container/no fill and no container/no cap control. In conveying operations, with objects in a captured state, these sensors are used for counting at speeds up to 2000 units per minute.

AC and DC models are available with a sensing range of 51 mm to 1 m (2 to 39") and 120 mm to 2 m (4.7 to 79"), respectively. These sensors carry the CE Mark and the AC-powered models are also ETL approved. The sensor housing meets NEMA 4X (indoor use only) and IP67 industry standards. A Dairy 3A compliant housing is available as an option.

This basic model series in the SUPERPROX® family of ultrasonic, non contact sensors offers reliable object detection where simple on/off control of the outputs is required. These "smart" sensors use the latest ultrasonic technology to ensure the ultimate in sensing reliability through a discriminating microprocessor, push-button setup program.

## SUPERPROX® Ultrasonic Proximity Sensors

### No delay sensing

- **Easy push-button setup for the specific application**
- **Onboard microprocessor for reliability and repeatability**
- **Non contact sensing range up to 2 m (79")**
- **Epoxy sealed in tough ULTEM® housing**
- **Virtually impervious to the harshest environments**
- **CE certified**
- **AC-powered models ETL listed**

## Control Compartment

A unique feature available to the user of these sensors is the ability to quickly set up each sensor for a specific application. The sensor is configured through either three or four slide switches, depending on the model, and a push-button (See Figure 1) located inside a wa-

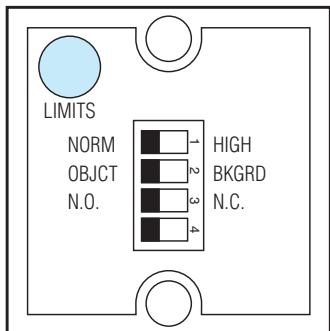


Figure 1

ter-tight control compartment on the sensor. To access the controls, remove the small square cover on the back of the sensor. Simply loosen the two flat-head cover screws and insert a small-blade screwdriver in either the top or bottom slot to remove the cover. A short plastic tether prevents separation of the cover from the sensor. NOTE: The switch settings may require changing for the intended application.

## Sensor Configuration Switches

**Switch 1** configures the sensor to operate in either a normal or a high sensitivity mode. Place this switch in the NORM position for sensing liquid or solid materials. Place the switch in the HIGH position for sensing soft or porous materials that will absorb some of the ultrasonic energy.

**Switch 2** configures the sensor to operate in either an object or a background sensing mode. Place this switch in the OBJCT position to perform a sensing function for receiving the reflected ultrasonic energy directly off an object. Place this switch in the BKGRD position to perform a break-beam sensing function for receiving the reflected ultrasonic energy directly off a fixed background target.

**Switch 3** selects the operating mode for the sensor output to be either normally open (N.O.) or normally closed (N.C.).

**Switch 4** (Not used)

## Model Reference Guide – SM500 Series

Use the guide below to ensure the correct model number is specified for the application. Please note that not all sensor model combinations are available.

### EXAMPLE MODEL:

#### SUPERPROX® Product Series

SM5 0 0 A - 1 00 - FS R 2

#### Power/Connection Type

- 0...12 to 24 VDC / cable style
- 2...100 to 240 VAC / cable style
- 5...12 to 24 VDC / connector style
- 7...100 to 240 VAC / connector style

#### Sensing Function

- 0...Proximity - no on/off delay

#### Design Level

- A...Applies to all DC-powered models
- B...Applies to all AC-powered models

#### Sensing Range

- 0...51 to 635 mm (2 to 25")
- 1...51 to 1 m (2 to 39")
- 4...120 mm to 2 m (4.7 to 79")

#### Functionality

- 00...Standard proximity
- 44...Default window:  $\pm 0.10"$
- 75...High gain, default window:  $+0.5"/-0.25"$
- 80...Delay: divide by 10 output
- 91...Default window:  $\pm 0.05"$  hysteresis:  $0.02, \pm 0.0625"$  automatic setup window

#### Special Features

- ... No letter indicates standard sensor with no special features
- FS... Fluorosilicone transducer face
- AA... Remote limit setup (Available on cable models only.)
- AB... RS232, 4-digit/2-decimal place output
- AD... Limits push-button disabled
- AE... RS232, 5-digit/3-decimal place output
- AF... No LEDs

#### Housing Types

- ...No letter indicates standard ULTEM® plastic housing
- N...NORYL® Dairy 3A gray plastic housing

#### Remote Type

- ...No letter indicates standard coupler
- R...Right-angle sensing head with armor cable
- S...Straight sensing head with armor cable

#### Remote Cable Length

- ...No number indicates standard coupler
  - 1 ...254 mm (10")
  - 2 ...508 mm (20")
  - 3 ...762 mm (30")
  - 4 ...1016 mm (40")
  - 5P...1270 mm (50")
  - 6P...1524 mm (60")
- Armored (standard) or PVC cable (specify P after number)  
Available in PVC cable only

\* ULTEM® and NORYL® are registered trademarks of The General Electric Company.

## Sensor Limits Setup

### Push-button

First, during installation make sure the sensor face is as parallel as possible to the surface of the material being detected.

To set the limits, simply place an object at the desired distance from the sensor for one limit and press the LIMITS push-button once. This sets the first limit and switches the sensor output to an inactive state during the limit setup. While the LIMITS push-button is depressed, the multicolored LED located on top of the sensor is amber. Upon release of the push-button, the LED flashes amber indicating that the second limit needs to be set within 30 seconds. Place an object at the desired position for the second limit and press the LIMITS push-button once. Again, while the push-button is depressed, the LED is amber. Upon release of the push-button, the LED flashes amber momentarily and then turns green to indicate acceptance of both limits. If 30 seconds elapse before the second limit is set, the limits revert back to the previous settings.

At the same time, the sensor output switches from the inactive to the active state, placing the sensor into the operational mode and ready to use. When power is off or interrupted, the limits are retained in a nonvolatile memory.

When setting either limit if the echo from the object is too weak or distorted, the LED flashes RED for 10 seconds (or until the button is pressed again) indicating the limit setting was not accepted by the sensor. Attempt to set both limits again, being careful to keep the object surface parallel to the face of the sensor.

Minimum allowed distance between any two setup limits is 13 mm (1/2"). The multicolored LED flashes RED after the press and release of the LIMITS push-button for the second limit setting if the distance between the limit settings is less than 13 mm. The multicolored LED continues flashing RED either until the LIMITS push-button is pressed and released once for the first limit setting or until 10 seconds has elapsed. Pressing and releasing the LIMITS push-button once reinitiates the limit setup sequence. If 30 seconds elapse before the LIMITS push-button is pressed and released for the second limit setup, the limits revert back to the previous settings.

A special feature provides an automatic 13 mm (1/2") window limits setup function. Simply place an object within the sensing range of the sensor and press the LIMITS push-button twice in succession without moving the object. A limit is set on a line 1/4" in front and back of the object surface nearest the sensor.

### Multicolored LED Indicator During Limit Setup

Prior to pressing LIMITS push-button

- Off - Sensing no object or object is outside the sensing range
- Red - Sensing an object outside the set limits
- Green - Sensing an object inside the set limits

LIMITS push-button depressed for first time

- Amber - Sensing a good object surface condition
- Red - Sensing no object or a poor object surface condition

LIMITS push-button released for first time

- Flashing Amber - First limit accepted, waiting for second limit
- Flashing Red - First limit not accepted; retry setting limit

LIMITS push-button depressed for second time

- Amber - Sensing a good object surface condition
- Red - Sensing no object or a poor object surface condition

LIMITS push-button released for second time

- Green, Red, or Amber - Second limit accepted
- Flashing Red - Second limit not accepted; retry setting both limits

### Multicolored LED Indicator in Operational Mode

- Off - Sensing no object or object is outside the sensing range
- Red - Sensing an object outside the set limits
- Green - Sensing an object inside the set limits

### Red LED Indicator in Operational Mode

The red LED serves as a visual indicator for the sensor output. The LED is illuminated when the output is in an active (ON) state.

### Electrical Wiring

Sensor wires must be run in conduit free of any AC power or control wires.

### Sensor Wire Colors

DC Models	Cable Style	Connector Style
+12 to 24 VDC	RED	BROWN
NPN/Sinking Output	WHITE	BLACK
PNP/Sourcing Output	GREEN	WHITE
Common	BLACK	BLUE

### AC Models\*

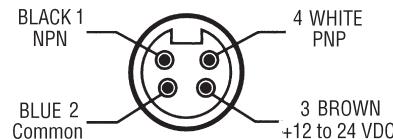
100 to 240 VAC	BROWN	BROWN
Switch Line Side	BLACK	BLACK
Switch Load Side	WHITE	WHITE
Neutral	RED	BLUE

### \*WARNING

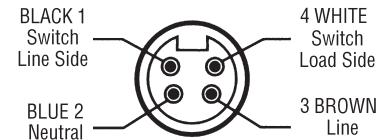
Not all cables are alike. Verify that connector pin outs and cable conductor colors match up with the wiring illustrations shown in the operating instructions.

### View of Plug on Connector Style Sensor

#### DC Power Models

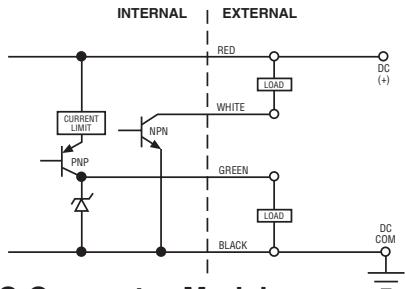


#### AC Power Models

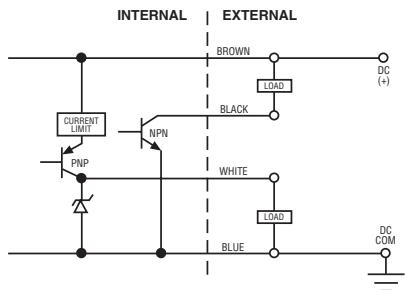


## Outputs

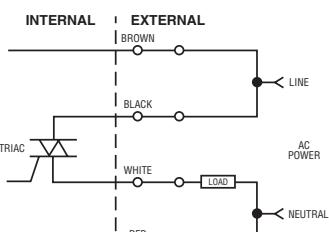
### DC Cable Models



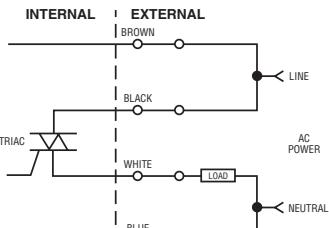
### DC Connector Models



### AC Cable Models

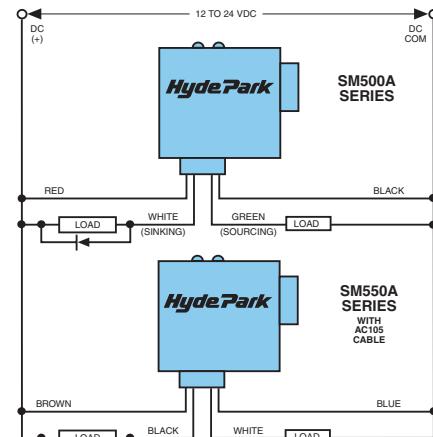


### AC Connector Models

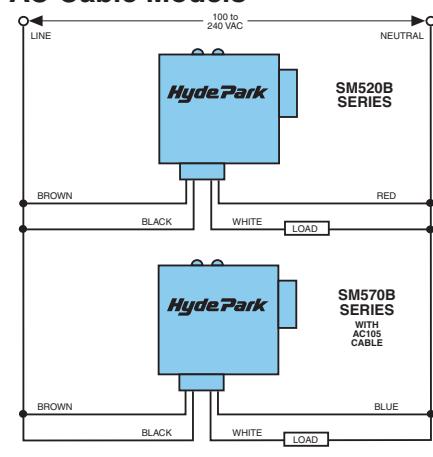


## Sensor Wire Connections

### DC Cable Models

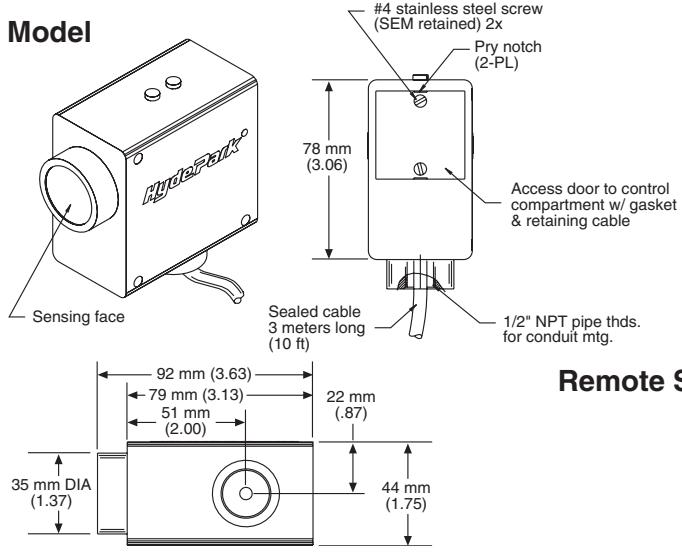


### AC Cable Models

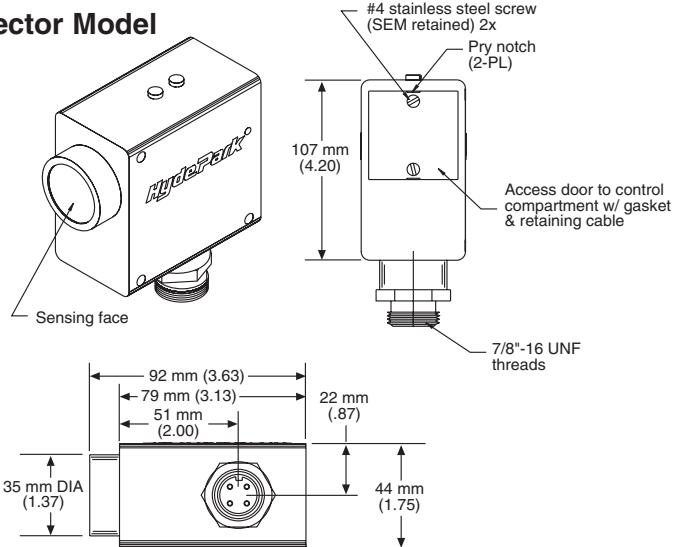


## Dimensions

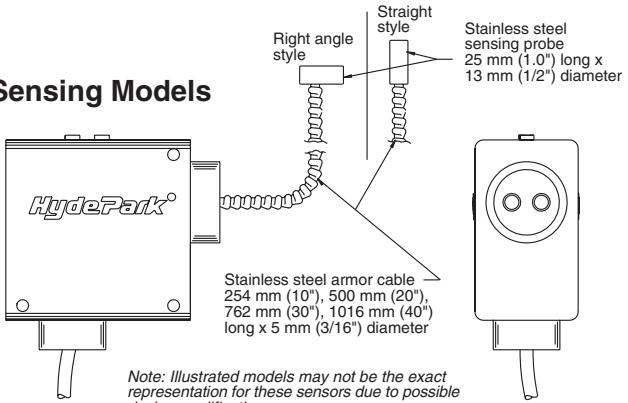
### Cable Model



### Connector Model

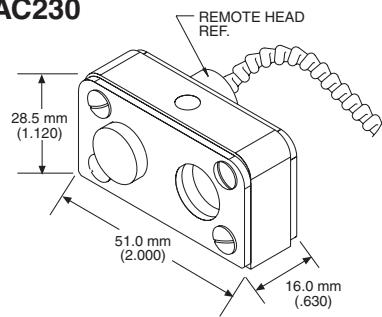


## Remote Sensing Models



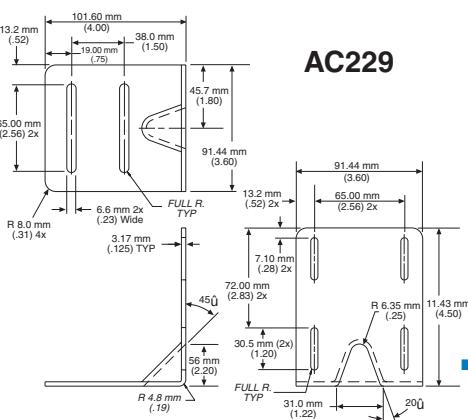
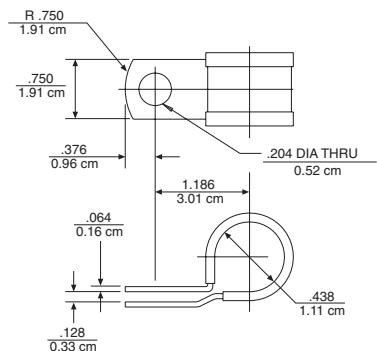
## Mounting Accessories

### AC230

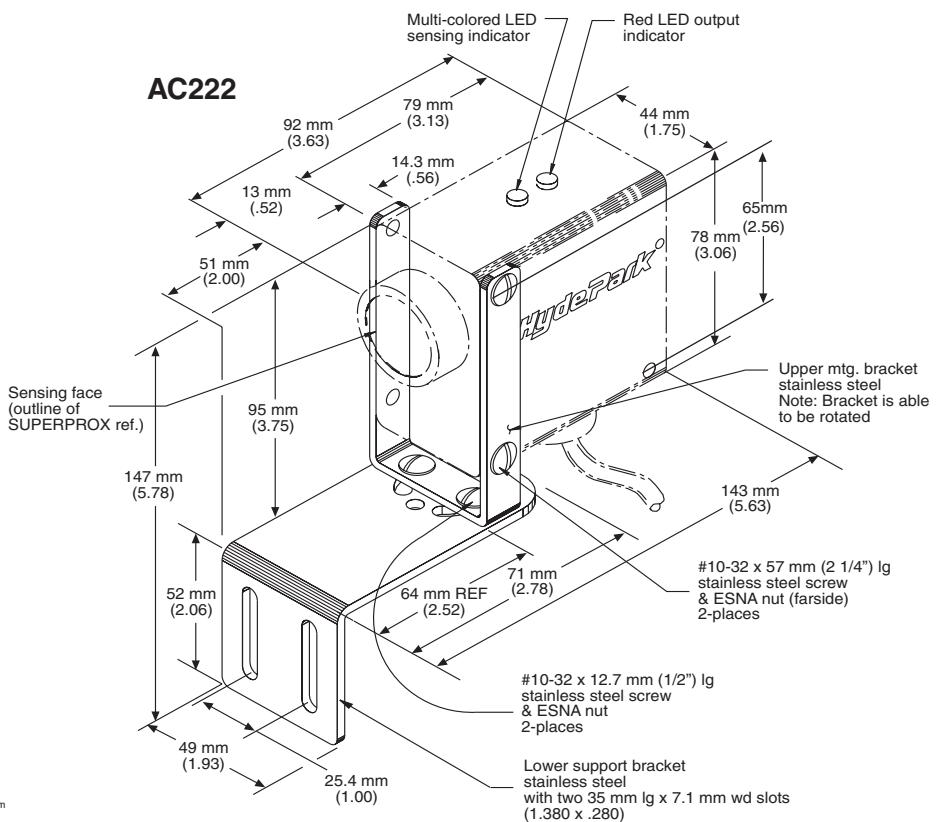


## Mounting Accessories

### AC213



### AC222



## General Specifications

### Sensing

Ranges:

51 to 1 m (2 to 39")  
120 mm to 2 m (4.7 to 79")

Sonic Frequency: 200 kHz

### Power Requirements

DC Models:

12 to 24 VDC  $\pm$  10% @ 80 mA, 2 W max., excluding output load (regulated supply)

AC Models:

100 to 240 VAC, 50/60 Hz, @ 30 mA, 7.5 VA max., excluding load

### Outputs

DC Models:

NPN Sinking: Switch selectable N.O./N.C.

Sinking on-state voltage drop:

Maximum 0.25 volts @ 60 mA

Sinking load current:

Maximum 100 mA

Sinking output voltage:

Maximum applied 30 VDC

PNP Sourcing: Switch selectable N.O./N.C.

Sourcing output current:

Maximum 100 mA

Current limit protected to less than 160 mA

AC Models:

Triac, switch selectable N.O./N.C.

Maximum continuous load current: 1 Amp

Maximum applied output voltage: 260 VAC

Maximum off-state leakage current: less than

50  $\mu$ A (100% PLC/AC input interface compatibility)

### Response Time

"On" 10 ms,  
"Off" 10 ms to "On" 30 ms,  
"Off" 30 ms, depending upon model

### Indicators

Multicolored (Amber, Red, Green) LED: Indicates limits setup and operational modes

Red LED: Visual indicator for sensor output;  
Illuminated when output is in an active (on) state.

### Connections

Cable Style Models:

DC: 24 AWG, PVC jacket, 4-conductor,  
3 meters (10') long, standard

AC: 20 AWG, PVC jacket,  
4-conductor, 3 meters (10') long, standard

Connector Style Models:

DC: 4-pin "mini" style

AC: 4-pin "mini" style

### Protection

Power Supply: current-limited over-voltage, ESD,  
reverse polarity, fuse on AC model

Outputs: current-limited over voltage, ESD,  
over-current, fused TRIAC on AC model

### Environmental

Operating Temperature Range:

0° to 50° C (32° to 122° F)

Storage Temperature Range: -40° to 100° C  
(-40° to 212° F)

Operating Humidity: 100%

Protection Ratings: NEMA 4X (indoor use only),  
IP67

Chemical Resistance: Resists most acids and  
bases, including most food products.

Fluorosilicone transducer face is available to  
provide resistance to aromatic and petroleum-  
based hydrocarbons.

Agency Approvals

CE Mark: CE conformity is declared to:

EN61010-1: 1990 including amend. No.1:

1992 EN55011 Group 1 Class A, EN50082-1.

*Declaration of conformity available upon  
request.*

AC Models SM520/570 carry the ETL safety  
label.

### Construction

Dimensions (overall)

92 mm (3.625") L x 44 mm (1.75") W x 91 mm  
(3.58") H

Housing:

Case: ULTEM® (FDA approved)

Optional: NORYL® (USDA-Dairy 3A

Sanitary Standards compliant)

Transducer Face: Silicone rubber (FDA approved)

Optional: Fluorosilicone rubber

Sensor Cable: PVC jacket

LED: Polycarbonate

\* ULTEM® and NORYL® are registered trademarks of The  
General Electric Co.

### Accessories

**Model AC105**, Straight, 7/8-16 mini, 4-conductor,  
mating connector cable, 4 m (12'), for connector-  
style sensors

**Model AC105-50**, Straight, 7/8-16 mini, 4-conductor,  
mating connector cable, 15 m (50'), for connector-  
style sensors

**Model AC213**, Stainless and Teflon, remote sensing  
probe mounting bracket

**Model AC222**, Standard, stainless mounting bracket  
assembly, slotted for vertical adjustment

**Model AC229**, Stainless, plate-style, right-angle,  
mounting bracket, with base slotted for forward/  
reverse adjustment and side slotted for sensor  
adjustment

**Model AC230**, Three-piece, stainless, mounting  
bracket assembly with O-ring mount for sensor  
models with remote heads.

See page 7-1 for accessory photos.

# Selection Chart

## SM500 Series Proximity

Model No.	100-240 VAC	12-24 VDC	Power Version	Cable	Connection Style	Connector	2m (79")	1 m (39")	Sensing Range	Rt. Angle	Transducer Style	Silicone*	Fluorosilicone*	Housing Materials	Transducer Housing	Fast Response	Default Windows	Other	Special Features
SM500A-000•	■	■ (10")						■				■	■	■					
SM500A-000 AB	■	■						■	■			■	■	■					RS232 (4 digit/2 decimal place) output
SM500A-000 FS	■	■						■	■			■	■	■					
SM500A-000 R2	■	■						■	■ (20")			■	■	■					
SM500A-000 R3	■	■						■	■ (30")			■	■	■					
SM500A-000 R4	■	■						■	■ (40")			■	■	■					
SM500A-000 S1	■	■						■	■ (10")			■	■	■					
SM500A-000 S2	■	■						■	■ (20")			■	■	■					
SM500A-000 S4	■	■						■	■ (40")			■	■	■					
SM500A-044	■	■						■	■			■	■	■		± 0.1"			Hysteresis: 0.05, 0.2" W, O Limit
SM500A-075	■	■						■	■			■	■	■		± 0.5"/-0.25"			High Gain
SM500A-080	■	■						■	■			■	■	■					Delay: Divide by 10 output
SM500A-091	■	■						■	■			■	■	■					± 0.05
SM500A-091 AA	■	■						■	■			■	■	■					"Hysteresis: 0.02 ± 0.0625" automatic setup window
SM500A-091 R2	■	■						■	■ (20")			■	■	■					Hysteresis: 0.02 ± 0.0625" automatic setup window
SM500A-091 R4	■	■						■	■ (40")			■	■	■					Hysteresis: 0.02 ± 0.0625" automatic setup window
SM500A-100•	■	■						■	■			■	■	■					
SM500A-100 AE	■	■						■	■			■	■	■					RS232 (5 digit/3 decimal place) output
SM500A-100 FS	■	■						■	■			■	■	■					
SM500A-100 R2	■	■						■	■ (20")			■	■	■					
SM500A-100 R3	■	■						■	■ (30")			■	■	■					
SM500A-100 R4	■	■						■	■ (40")			■	■	■					
SM500A-100 S3	■	■						■	■ (30")			■	■	■					
SM500A-191 R3	■	■						■	■ (30")			■	■	■					
SM500A-400•	■	■						■	■			■	■	■					
SM500A-400 AA	■	■						■	■			■	■	■					Remote Limit Setup
SM500A-400 S1	■	■						■	■ (10")			■	■	■					
SM520B-000•	■	■						■	■			■	■	■					
SM520B-000 FSS4	■	■						■	■ (40")			■	■	■					
SM520B-000 R3	■	■						■	■ (30")			■	■	■					
SM520B-000 R4	■	■						■	■ (40")			■	■	■					
SM520B-000 S4	■	■						■	■ (40")			■	■	■					
SM520B-075	■	■						■	■			■	■	■		± 0.5"/-0.25"			High Gain
SM520B-091	■	■						■	■			■	■	■		± 0.05"			"Hysteresis: 0.02 ± 0.0625" automatic setup window
SM520B-100•	■	■						■	■			■	■	■					
SM520B-100 N	■	■						■	■			■	■	■					
SM520B-100 R3	■	■						■	■ (30")			■	■	■					
SM520B-100R4	■	■						■	■ (40")			■	■	■					
SM520B-144	■	■						■	■			■	■	■		± 0.1"			Hysteresis: 0.05, 0.2" W, O Limit
SM550A-000•	■	■						■	■			■	■	■					
SM550A-000 R1	■	■						■	■ (10")			■	■	■					
SM550A-000 R2	■	■						■	■ (20")			■	■	■					
SM550A-000 R3	■	■						■	■ (30")			■	■	■					
SM550A-000 R4	■	■						■	■ (40")			■	■	■					
SM550A-000 S1	■	■						■	■ (10")			■	■	■					
SM550A-044	■	■						■	■			■	■	■		± 0.1"			Hysteresis: 0.05, 0.2" W, O Limit
SM550A-100•	■	■						■	■			■	■	■					
SM550A-100 R4	■	■						■	■ (40")			■	■	■					
SM550A-144	■	■						■	■			■	■	■		± 0.1"			Hysteresis: 0.05, 0.2" W, O Limit
SM550A-400•	■	■						■	■			■	■	■		± 0.1"			Hysteresis: 0.05, 0.2" W, O Limit
SM550A-444	■	■						■	■			■	■	■		± 0.1"			Hysteresis: 0.05, 0.2" W, O Limit

# Selection Chart

## SM500 Series (cont.)

### Proximity

Model No.	Power Version		Cable	Connection Style	Sensing Range	Transducer Materials	Transducer Housing	Fast Response	Default Windows	Other	Special Features
	100-240 VAC	12-24 VDC			2m (79")	1 m (39")	635mm (25")	254mm (10")	Rt. Angle	Remote	Straight
SM570B-000•	■	■	■	■	■	■	■	■	■	■	■
SM570B-000 R2	■	■	■	■	■	■(20")	■	■	■	■	■
SM570B-000 R3	■	■	■	■	■	■(30")	■	■	■	■	■
SM570B-000 R4	■	■	■	■	■	■(40")	■	■	■	■	■
SM570B-000 S2	■	■	■	■	■	■(20")	■	■	■	■	■
SM570B-091	■	■	■	■	■	■	■	■	■	■	± 0.05" Hysteresis: 0.02±0.0625" automatic setup window
SM570B-100•	■	■	■	■	■	■	■	■	■	■	■
SM570B-100 R2	■	■	■	■	■	■(20")	■	■	■	■	■
SM570B-100 R3	■	■	■	■	■	■(30")	■	■	■	■	■
SM570B-100 R4	■	■	■	■	■	■(40")	■	■	■	■	■
SM570B-100 S3	■	■	■	■	■	■(30")	■	■	■	■	■
SM570B-100 S4	■	■	■	■	■	■(40")	■	■	■	■	■
SM570B-144	■	■	■	■	■	■	■	■	■	■	± 0.1" Hysteresis: 0.05, 0.2" W, 0 Limit

• = Most commonly stocked sensors

\* = See definition in *Sensing Terms*.

All possible sensor configurations are not listed here.

