August 2007

SpeedSense
Inductive Proximity Sensors

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The newly released SpeedSense sensor from Eaton's electrical business is one of the first tubular inductive sensors to feature built-in speed detection technology. This functionality allows the sensor to detect when the target RPM falls under a specified limit.

SpeedSense is not just limited to rotating applications. By measuring the time between two detections, the sensor can fit in a wide variety of applications. When the time between two target detections exceed the rated millisecond limit, the sensor will activate.

Such a solution once required a sensor, PLC and programmed logic. Now, SpeedSense can do it all. There is no need for costly engineering and installation time. SpeedSense is a quick, drop-in solution available with different fixed speed limits, called activation points. Consolidate your controls and reduce engineering time with SpeedSense, available in 12, 18 and 30 mm diameter models with either pre-wired cables or micro connectors.

Approvals

- UL Listed

Unless otherwise noted, the products contained in this document are not designed or intended for use in human safety applications.

Detect Target Slowdown or Stoppage with SpeedSense

Product Features

- Built-in speed detection technology activates the sensor when the target's rotational or lateral speed slows (output "closes" when motion stops)
- Outputs are N.O. by default, but N.C. models can be special ordered from the factory
- Reliably detect metal targets at up to three times range of conventional inductive proximity sensors
- No special programming necessary
- Auto-configure output allows for automatic NPN or PNP
- Resistant to extreme temperature (-40˚C) and high pressure washdown
- High electrical noise immunity of 10 V/m

Typical Applications

- Automotive
- Machine Tool
- Material Handling

Speed Detection

SpeedSense detects speed by measuring time between two target detections.

Model Selection — SpeedSense

	Sensing Range	Shielding	Maximum Rated Target Speed ①	Activation Point ②	Connection Type	Catalog Number
3-Wire DC Sensors, Normally Open (Sensors output is "on" when underspeed condition detected)						
12 mm Diameter Standard Range	4 mm	Shielded	2,175 rpm 27.5 mS	50 rpm or 1,200 mS	4-pin Micro DC Connector	**E59-M12A105D01-D1S1** ⊛
					2-meter Cable	**E59-M12A105C02-D1S1**
				100 rpm or 600 mS	4-pin Micro DC Connector	**E59-M12A105D01-D1S2** ⊛
					2-meter Cable	**E59-M12A105C02-D1S2**
				500 rpm or 120 mS	4-pin Micro DC Connector	**E59-M12A105D01-D1S3** ⊛
					2-meter Cable	**E59-M12A105C02-D1S3**
Extended Range				1,500 rpm or 40 mS	4-pin Micro DC Connector	**E59-M12A105D01-D1S4** ⊛
					2-meter Cable	**E59-M12A105C02-D1S4**
	10 mm	Unshielded	1,125 rpm 53 mS	50 rpm or 1,200 mS	4-pin Micro DC Connector	**E59-M12C110D01-D1S1** ⊛
					2-meter Cable	**E59-M12C110C02-D1S1**
				100 rpm or 600 mS	4-pin Micro DC Connector	**E59-M12C110D01-D1S2** ⊛
					2-meter Cable	**E59-M12C110C02-D1S2**
				500 rpm or 120 mS	4-pin Micro DC Connector	**E59-M12C110D01-D1S3** ⊛
					2-meter Cable	**E59-M12C110C02-D1S3**
18 mm Diameter Standard Range	8 mm	Shielded	1,460 rpm 41 mS	50 rpm or 1,200 mS	4-pin Micro DC Connector	**E59-M18A108D01-D1S1** ⊛
					2-meter Cable	**E59-M18A108C02-D1S1**
				100 rpm or 600 mS	4-pin Micro DC Connector	**E59-M18A108D01-D1S2** ⊛
					2-meter Cable	**E59-M18A108C02-D1S2**
				500 rpm or 120 mS	4-pin Micro DC Connector	**E59-M18A108D01-D1S3** ⊛
					2-meter Cable	**E59-M18A108C02-D1S3**
30 mm Diameter Standard Range	15 mm	Shielded	900 rpm 66 mS	50 rpm or 1,200 mS	4-pin Micro DC Connector	**E59-M30A115D01-D1S1** ⊛
					2-meter Cable	**E59-M30A115C02-D1S1**
				100 rpm or 600 mS	4-pin Micro DC Connector	**E59-M30A115D01-D1S2** ⊛
					2-meter Cable	**E59-M30A115C02-D1S2**
				500 rpm or 120 mS	4-pin Micro DC Connector	**E59-M30A115D01-D1S3** ⊛
					2-meter Cable	**E59-M30A115C02-D1S3**

① Sensor will not perform reliably if (a) target speed rotation exceeds the max rated rpm or (b) the time between target detections is less than the rated milliseconds.

② The sensor will activate when (a) target rotation drops below the rated rpm, or (b) when the time between two target detections exceeds the milliseconds indicated.

⊛ See listing of compatible connector cables on **Page 3**.

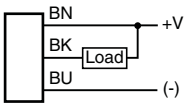
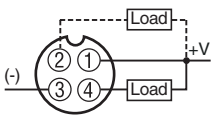
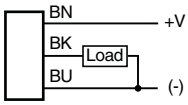
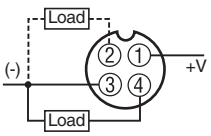
Model Selection — Compatible Connector Cables ①

	Voltage Style	Number of Pins	Gauge	Length	Catalog Number			Pin Configuration/Wire Colors (Face View Female Shown)
					PVC Jacket	PUR Jacket	IRR PUR Jacket	
Standard Cables — Micro Style								
Micro Style Straight Female	DC	4-pin 4-wire	22 AWG	6.0 feet (2m)	CSDS4A4CY2202	CSDS4A4RY2202	CSDS4A4IO2202	1-Brown 2-White 3-Blue 4-Black

① For a full selection of connector cables, see **PG.05.05.T.E**.

Stocked product, typical order quantities guaranteed in stock.

Wiring Diagrams (Pin numbers are for reference, rely on pin location when wiring)

Operating Voltage	Output	Cable Models	Connector Models (Face View Male Shown)
			Micro
3-Wire Sensors			
6 – 48V DC	N.O. (NPN)		② 
	N.O. (PNP)		② 

② Note: Pin numbers 2 and 4 are internally jumpered together. Either pin may be used.

Specifications — SpeedSense

Description	3-Wire Sensors
Input Voltage	6 – 48V DC
Load Current	≤500 mA @ 6 – 30V DC; ≤300 mA @ 32 – 48V DC
Leakage Current	≤150 µA
Voltage Drop	≤2.5V DC
Burden Current	≤15 mA
Protection	Auto Reset
Switching Hysteresis	< 15% Rated Sensing Distance
Repeat Accuracy	Shielded models: < 1% Sensing Distance; Unshielded models: < 3% Sensing Distance
Temperature Range	-40° to 158°F (-40° to 70°C)
Output Status	Sensors output is "on" when an underspeed condition is detected.
Material of Construction	303 Stainless steel; End bells: Polycarbonate; Face caps: Ryton®; Cable: AWM Style 20387 (PVC) ③
Vibration and Shock	Vibration: 10 to 55 Hz, 1 mm Amplitude, IEC 60068-2-6; Shock: 30g, 11 mS per IEC 68-2-27
Indicator LED	360° viewable LED
Enclosure Ratings	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67) ④

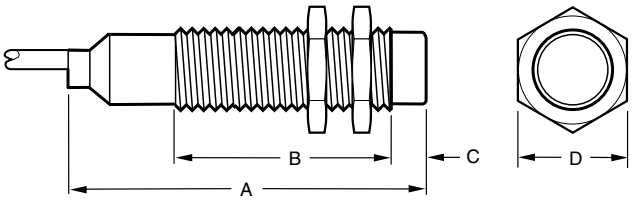
Response Time	3-Wire Sensors			
	Shielded			Unshielded
	12 mm	18 mm	30 mm	12 mm
Factory Default Mode (20 V/m)	580 Hz	390 Hz	240 Hz	300 Hz

③ Ryton® is a registered trademark of Phillips Chemical (division of Phillips Petroleum).

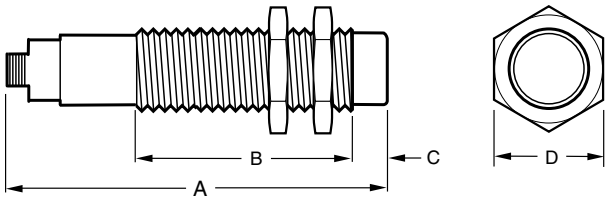
④ Our products conform to NEMA tests as indicated, however, some severe washdown applications can exceed these NEMA test specifications. For questions about a specific application, contact our applications department at 1-800-426-9184.

Approximate Dimensions — SpeedSense in Inches (mm)

Cable Models



Micro-Connector Models



Cable Models

Size	Shielding	A	B	C	D
12 mm	Shielded	2.46 (62.4)	1.98 (50.3)	0.02 (0.5)	0.67 (17)
	Unshielded	2.46 (62.4)	1.64 (41.6)	0.36 (9)	0.67 (17)
18 mm	Shielded	2.54 (64.5)	2.00 (50.9)	0.02 (0.5)	0.94 (24)
30 mm	Shielded	2.74 (69.6)	2.13 (54.1)	0.03 (0.75)	1.41 (36)

Micro-Connector Models

Size	Shielding	A	B	C	D
12 mm	Shielded	2.71 (68.7)	1.98 (50.3)	0.02 (0.5)	0.67 (17)
	Unshielded	2.71 (68.7)	1.64 (41.6)	0.36 (9)	0.67 (17)
18 mm	Shielded	2.73 (69.3)	2.00 (50.9)	0.02 (0.5)	0.94 (24)
30 mm	Shielded	2.92 (74.1)	2.13 (54.1)	0.03 (0.75)	1.41 (36)