

47.10 Inductive Proximity Sensors

E56 Pancake Sensors

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E56 Pancake Sensors



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E56 Pancake Sensors

Product Description

The E56 Pancake Sensor from Eaton's electrical sector is a high performance inductive proximity sensor. The E56 Pancake provides greater sensing ranges than other inductive sensor package types.

The E56 Pancake family provides convenience and ease of wiring with auto-configurable, complementary outputs. (Auto-configurable outputs automatically detect an NPN or PNP output configuration and switch the sensor accordingly, without user intervention.) Power and output LEDs make troubleshooting much easier than conventional proximity sensors, which usually only feature output LEDs. These convenience features, combined with the performance of the E56 Pancake, make it an excellent inductive sensing solution for applications requiring an extremely rugged, long-range sensing solution.

Application Description

Typical Applications

- Heavy-duty trucks, cranes and machinery
- Steel mills
- Pipe and rod manufacturing
- Automotive manufacturing
- Amusement parks

Features

- Longest inductive sensing ranges available (up to 100 mm)
- Three sizes to meet your application needs, with maximum ranges of 50, 70 or 100 mm
- Complementary outputs (1NO/1NC) on four-wire DC models
- Auto-configure output technology on four-wire DC models, which automatically detect how the sensor has been wired (NPN or PNP) and switch the sensor without user intervention
- Small diameter, two-wire AC/DC models feature a selector switch inside the housing, enabling output contacts to be used as either NO or NC
- Robust design featuring vibration and impact-absorbing potting compound
- Ideal for extreme temperatures or high pressure washdown environments

Standards and Certifications

- CE



Safety Note



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

For the most current information on this product, visit our web site: www.eaton.com

For Customer Service in the U.S. call 1-877-ETN CARE (386-2273), in Canada call 1-800-268-3578. For Application Assistance in the U.S. and Canada call 1-800-426-9184.

Product Selection

E56 Pancake Sensors

Pancake Style



Two-Wire Sensors

Voltage Type	Output Configuration	Output Contacts	Shielding	Sensing Range	Connector Style	Catalog Number
Pancake Style						
20–250 Vac 20–60 Vdc 45/65 Hz	—	NO or NC	Unshielded	1.57 in (40 mm)	Screw terminals	E56CDL40A2
					3-pin mini-connector	E56CDL40A2B1 ☹️
		NO or NC	Unshielded	2 in (50 mm)	Screw terminals	E56CDL50A2E
					3-pin mini-connector	E56CDL50A2EB1 ☹️
90–260 Vac 20–60 Vdc 45/65 Hz	—	NO	Unshielded	2.75 in (70 mm) ①	3-pin mini-connector	E56CAL70B1S1 ☹️
					NO	Unshielded

DC Four-Wire Sensors

Small Diameter



Voltage Type	Output Configuration	Output Contacts	Shielding	Sensing Range	Connector Style	Catalog Number
Small Diameter (79 x 79 x 39 mm)						
10–42 Vdc	NPN/PNP autoconfigure ②	1 NO and 1 NC	Shielded	1.57 in (40 mm)	DC screw	E56ADL40SA
					DC 4-pin mini	E56ADL40SAE01 ☹️
					DC 4-pin micro	E56ADL40SAD01 ☹️
			Unshielded	1.57 in (40 mm)	DC screw	E56ADL40UA
					DC 4-pin mini	E56ADL40UAE01 ☹️
					DC 4-pin micro	E56ADL40UAD01 ☹️
Unshielded	2 in (50 mm)	DC screw	E56ADL50UA			
		DC 4-pin mini	E56ADL50UAE01 ☹️			
		DC 4-pin micro	E56ADL50UAD01 ☹️			

Medium Diameter



Medium Diameter (110 x 110 x 41 mm)						
10–42 Vdc	NPN/PNP autoconfigure ②	1 NO and 1 NC	Unshielded	2.75 in (70 mm)	DC 4-pin mini	E56BDL70UAE01 ☹️
					DC 4-pin micro	E56BDL70UAD01 ☹️

Large Diameter



Large Diameter (172 x 172 x 68 mm)						
10–42 Vdc	NPN/PNP autoconfigure ②	1 NO and 1 NC	Unshielded	3.94 in (100 mm)	DC 4-pin mini	E56CDL100UAE01 ☹️
					DC 4-pin micro	E56CDL100UAD01 ☹️

Notes

☹️☹️ See listing of compatible connector cables on **Page 184**.

① Includes potentiometer for adjustment of sensing range.





② Autoconfigure technology allows the sensor to automatically adapt to NPN or PNP without user intervention.

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Compatible Connector Cables

Standard Cables ^①

Current Rating at 600V	Voltage Style	Number of Pins	Gauge	Length	Pin Configuration/Wire Colors (Face View Female Shown)	PVC Jacket Catalog Number	PUR Jacket Catalog Number
Micro-Style, Straight Female							
—	AC	3-pin, 3-wire	22 AWG	6.0 ft. (2m)	 1-Green 2-Red/Black 3-Red/White	CSAS3F3CY2202	CSAS3F3RY2202
				16.4 ft. (5m)		CSAS3F3CY2205	CSAS3F3RY2205
				32.8 ft. (10m)		CSAS3F3CY2210	CSAS3F3RY2210
—	DC	4-pin, 4-wire	22 AWG	6.0 ft. (2m)	 1-Brown 2-White 3-Blue 4-Black	CSDS4A4CY2202	CSDS4A4RY2202
				16.4 ft. (5m)		CSDS4A4CY2205	CSDS4A4RY2205
				32.8 ft. (10m)		CSDS4A4CY2210	CSDS4A4RY2210
Mini-Style, Straight Female							
13A	—	3-pin, 3-wire	16 AWG	6.0 ft. (2m)	 1-Green 2-Black 3-White	CSMS3F3CY1602	—
				13.1 ft. (4m)		CSMS3F3CY1604	—
10A	AC/DC	4-pin, 4-wire	16 AWG	6.0 ft. (2m)	 1-Black 2-Blue 3-Brown 4-White	CSMS4A4CY1602	—
				13.1 ft. (4m)		CSMS4A4CY1604	—
				19.7 ft. (6m)		CSMS4A4CY1606	—

Note

^① For a full selection of connector cables, see **Tab 54, section 54.1**.

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Technical Data and Specifications

Two-Wire

Description	AC/DC Two-Wire		
	Small Diameter	Medium Diameter	Large Diameter
Operating voltage	20–250 Vac, 20–60 Vdc	20–250 Vac, 20–60 Vdc	20–250 Vac, 20–60 Vdc
Load current (maximum)	400 mA	400 mA	400 mA
Off-state leakage	At or above 32°F (0°C): <1.7 mA; below 32°F (0°C): 2.0 mA	At or above 32°F (0°C): <1.7 mA; below 32°F (0°C): 2.0 mA	At or above 32°F (0°C): <1.7 mA; below 32°F (0°C): 2.0 mA
Voltage drop	<10V (5V nominal)	<10V (5V nominal)	<10V (5V nominal)
Outputs	NO or NC (switch selectable)	NO or NC by model	NO or NC by model
Sensing range (maximum)	50 mm	70 mm	100 mm
Range adjustment	Not adjustable	Potentiometer adjustable down to 50% of rated maximum range	Potentiometer adjustable down to 50% of rated maximum range
Standard target size (mild steel)	150 mm	210 mm	300 mm
Frequency of operation	30 Hz	10 Hz	10 Hz
Repeatability	<3%	<3%	<3%
Hysteresis (maximum)	10–15%	10–15%	10–15%
Time delay before availability	300 ms	300 ms	300 ms
Circuit protection	Short circuit protection with auto-reset	Short circuit protection with auto-reset	Short circuit protection with auto-reset
Operating temperature	–13° to 158°F (–25° to 70°C) ①	–13° to 158°F (–25° to 70°C) ①	–13° to 158°F (–25° to 70°C) ①
Temperature drift	±10%	±10%	±10%
Enclosure rating	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67)	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67)	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67)
Indicator LEDs	Output status	Output status	Output status
Materials of construction	PPS housing	PPS housing; aluminum baseplate	PPS housing; aluminum baseplate

Four-Wire

Description	DC Four-Wire		
	Small Diameter	Medium Diameter	Large Diameter
Operating voltage	10–42 Vdc	10–42 Vdc	10–42 Vdc
Load current (maximum)	300 mA	300 mA	300 mA
Burden current	<25 mA	<25 mA	<25 mA
Off-State leakage	<150 µA per output	<150 µA per output	<150 µA per output
Voltage drop	<2.5V	<2.5V	<2.5V
Outputs	1 NO/1 NC (complementary)	1 NO/1 NC (complementary)	1 NO/1 NC (complementary)
Sensing range (maximum)	50 mm	70 mm	100 mm
Range adjustment	Not adjustable	Potentiometer adjustable down to 50% of rated maximum range	Potentiometer adjustable down to 50% of rated maximum range
Standard target size (mild steel)	150 mm	210 mm	300 mm
Frequency of operation	70 Hz	40 Hz	30 Hz
Repeatability	<3%	<3%	<3%
Hysteresis (maximum)	10–15%	10–15%	10–15%
Time delay before availability	300 ms	300 ms	300 ms
Circuit protection	Short circuit protection with auto-reset	Short circuit protection with auto-reset	Short circuit protection with auto-reset
Operating temperature	–13° to 158°F (–25° to 70°C) ①	–13° to 158°F (–25° to 70°C) ①	–13° to 158°F (–25° to 70°C) ①
Temperature drift	±10%	±10%	±10%
Enclosure rating	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67)	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67)	NEMA 4, 4X, 6, 6P, 12 and 13 (IP67)
Indicator LEDs	Green: power; Red: output status	Green: power; Red: output status	Green: power; Red: output status
Materials of construction	PPS housing	PPS housing; aluminum baseplate	PPS housing; aluminum baseplate

Note

① Small diameter DC unshielded models are rated at –40°F (–40°C). All other models can be operated at –40°F (–40°C), but range drift will occur.

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Wiring Diagrams

Pin numbers are for reference, rely on pin location when wiring.

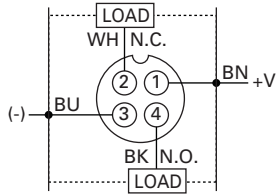
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Voltage Type

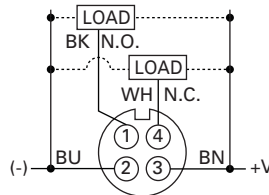
DC four-wire

Micro-Connector Models



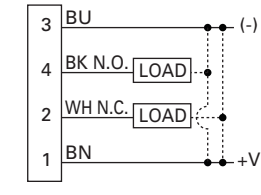
AutoConfigure enables load to be wired to +V or (-)

Mini-Connector Models



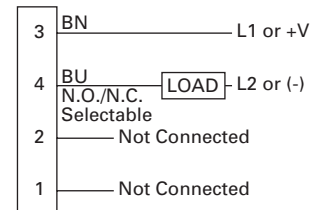
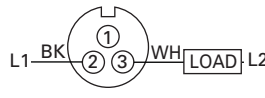
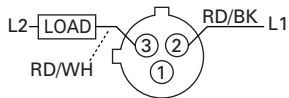
AutoConfigure enables load to be wired to +V or (-)

Screw Terminal Models



AutoConfigure enables load to be wired to +V or (-)

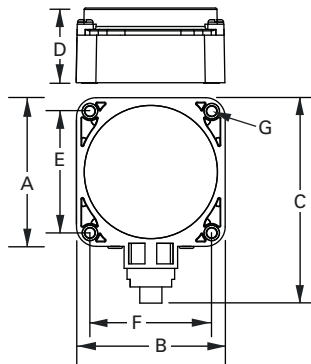
AC/DC two-wire



Dimensions

Approximate Dimensions in Inches (mm)

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Model	A (Depth)	B (Width)	C (Depth)	D (Height)	E (Mounting)	F (Mounting)	G (Diameter)
Small Diameter Models							
Micro-connector	3.13 (79.0)	3.13 (79.0)	4.32 (110.0)	1.54 (39.0)	2.56 (65.0)	2.56 (65.0)	0.21 (5.0)
Mini-connector	3.13 (79.0)	3.13 (79.0)	4.67 (119.0)	1.54 (39.0)	2.56 (65.0)	2.56 (65.0)	0.21 (5.0)
Screw terminal	3.13 (79.0)	3.13 (79.0)	3.87 (92.0)	1.54 (39.0)	2.56 (65.0)	2.56 (65.0)	0.21 (5.0)
Medium Diameter Models							
Micro-connector	4.35 (110.0)	4.35 (110.0)	4.94 (125.4)	1.63 (41.0)	3.625 (92.0)	3.625 (92.0)	0.218 (5.5)
Mini-connector	4.35 (110.0)	4.35 (110.0)	5.29 (134.4)	1.63 (41.0)	3.625 (92.0)	3.625 (92.0)	0.218 (5.5)
Large Diameter Models							
Micro-connector	6.75 (171.5)	6.75 (171.5)	7.26 (184.4)	2.66 (67.5)	5.875 (149.0)	5.875 (149.0)	0.266 (7.0)
Mini-connector	6.75 (171.5)	6.75 (171.5)	7.61 (193.3)	2.66 (67.5)	5.875 (149.0)	5.875 (149.0)	0.266 (7.0)

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