

Ultrasonic Sensors

File 9006



- Merlin Gerin**
- Modicon**
- Square D**
- Telemecanique**

Schneider Electric Brands

CONTENTS

Description	Page
Selection / Operation	370
Specifications / Wiring	371

Ultrasonic Sensors

12, 18, and 30 mm Plastic Tubular DC



thread
M12X1



thread
M18X1



thread
M30X1.5

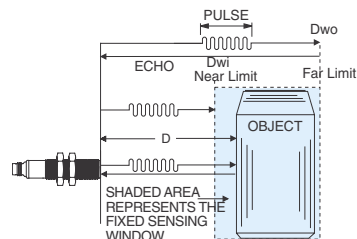
Features:

- PNP or NPN output
- Self-teach on 30 mm version
- Housing: Plastic
- Mounting nuts included

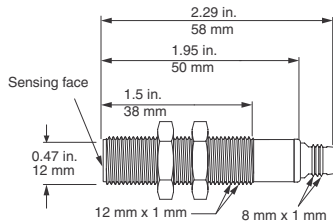
Output Mode	Circuit Type	Voltage Range	Connection Type	Load Current Maximum	Ultrasonic Frequency	Catalog Number
12 mm Diameter – Nominal Sensing Range 2" (51 mm)						
N.O.	PNP/NPN	12-24 Vdc	4 pin Nano	100 mA	500 kHz	XX512A1KAM8
18 mm Diameter – Nominal Sensing Range 5.98" (152 mm)						
N.O.	PNP/NPN	12-24 Vdc	4 pin Micro	100 mA	500 kHz	XX518A1KAM12
30 mm Diameter – Nominal Sensing Range 3.2" (1 m)						
N.O.	PNP/NPN	12-24 Vdc	4 pin Micro	100 mA	200 kHz	XX630A1KAM12

Operation

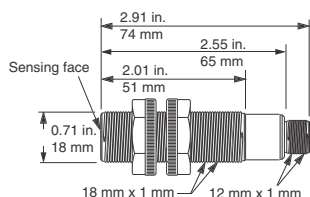
During set up and operation of the XX ultrasonic sensor continually and accurately measures the elapsed time of every pulse echo reception after each pulse transmission. The transmitted pulse starts a clock to register the elapsed time for the received echoes. Given the elapsed time, the sensor software calculates the distance traveled to the object of surface and back to the sensor, using a $D = TV_s/2$, $D =$ Distance from the sensor to the object; $T =$ Elapsed time between the pulse transmission and its echo reception, $V_s =$ the Velocity of sound, approximately 1100 feet per second.



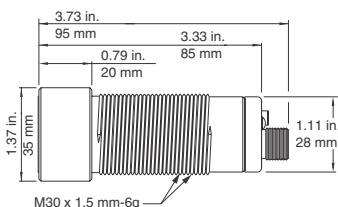
Dimensions



12 mm



18 mm

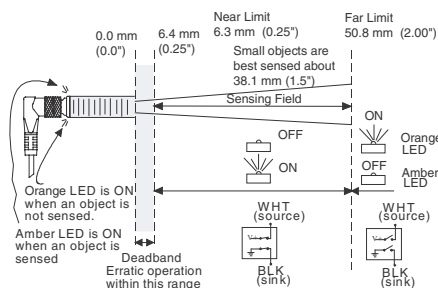


30 mm

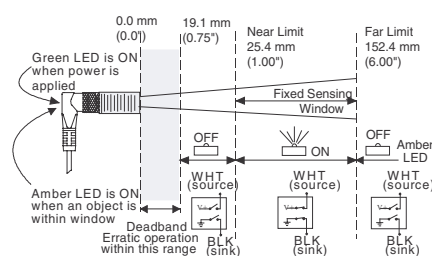
While the sensor is in operation, the calculated distance (D) between the sensor and the object is compared to the distances associated with the fixed window limits. These limits are shown in the illustration above as Dwi and Dwo. If D is within these limits, an output is generated. The output remains on until the echo does not return or it returns from outside the window limits.

Normally open operation diagrams shown below for all the XX Ultrasonic ranges.

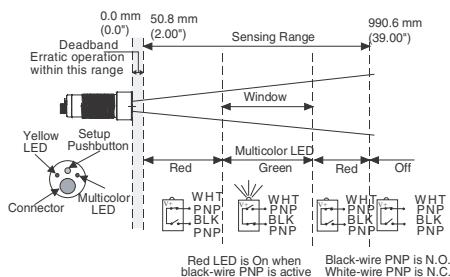
12 mm



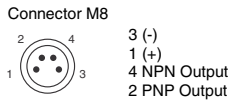
18 mm



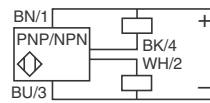
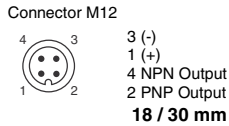
30 mm



Wiring



12 mm



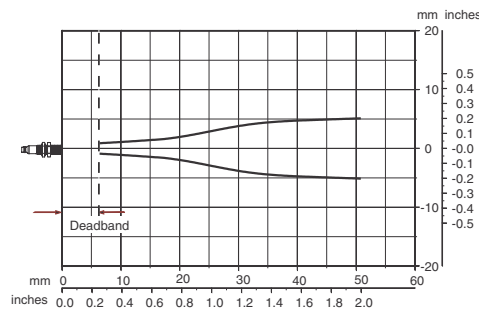
Specifications

Mechanical			
Diameter	12 mm	18 mm	30 mm
Nominal Sensing Range	2" (51 mm)	5.98" (152 mm)	3.21' (1 m)
Sensing Zone	0.25 - 2.0" (6.4 - 50.8 mm)	1.0 - 6.0" (25.4 - 152.4 mm)	2.0 - 39.0" (51 - 991 mm)
Ultrasonic Cone Angle (see beam plots)	7 °	10 °	
Temperature Range	- 4 to + 149 °F (- 20 to + 65 °C)	+ 32 to + 122 °F (0 to + 50 °C)	
Humidity	100 %		
Enclosure Rating	IP67		
Vibration	7 G @ 1 mm (F = 10 to 55 Hz)		
Shock	30 G, 11 ms		
Repeat Accuracy	+ / - 0.027" (0.7 mm)		+ / - 0.034" (0.87 mm)
Maximum Angular Deviation	+ / - 10 °		
Minimum Size Detection	0.1" (2.5 mm) dia. rod 0.04" (1 mm) flat bar	0.06" (1.59 mm) dia. rod	
Enclosure Material	Case: plastic; Sensing Face: silicon rubber / except 0.47" (12 mm) glass epoxy		
LED Indicators	LED ring	No LED	Two LED's
Electrical			
Rated Supply Voltage	12 to 24 Vdc		
Voltage Limits (including ripple)	10 to 28 Vdc		
Maximum Load Current	100 mA		
Voltage Drop; on-state	0.79 V PNP / 0.58 V NPN	0.75 V PNP / 0.67 V NPN	0.75 V PNP / 0.33 V NPN
Residual Current; open state	0.07 uA max.		0.05 uA max.
Current Consumption, no load	20 mA	60 mA	80 mA
Power Up Delay	20 ms	350 ms	720 ms
On / Off Delay	2 ms on / 2 ms off	3 ms on / 3 ms off	25 ms on / 25 ms off
Ultrasonic Frequency	500 kHz		
Protection	ESD	Yes	
	Overvoltage	Yes	
	Reverse Polarity	Yes	
Approvals	CE		

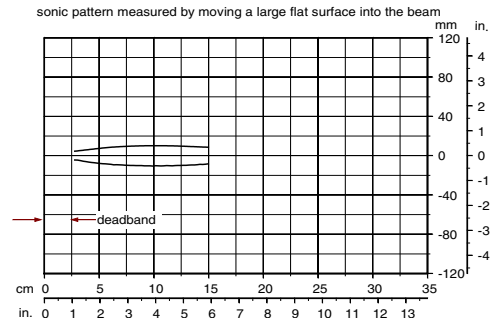
Beam Plots

The beam plots below, were developed from data collected at 20 °C and zero air flow, which defines the boundaries and shape of the sonic beams shown for the XX ultrasonic sensor range. The boundaries were established using a 10 cm x 10 cm target positioned parallel to the sensor face, moved in and out of the sensors operating range.

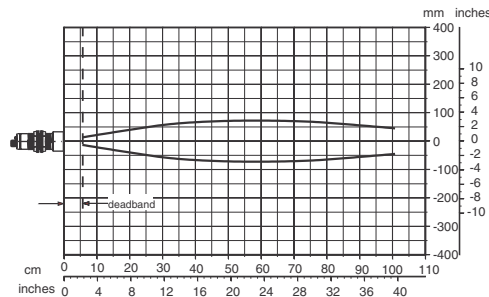
12 mm



18 mm



30 mm



Connector Cables

(M8 or S suffix; M12 or D suffix)

XSZCS141	Nano Conn., 4 pin, 2 m, straight
XSZCS151	Nano Conn., 4 pin, 2 m, 90°
XSZCD101Y	Micro Conn., 4 pin, 2 m, straight
XSZCD111Y	Micro Conn., 4pin, 2 m, 90°

For additional cable options and lengths see p. 518



MANUFACTURER'S DECLARATION OF CONFORMITY

The undersigned, representing the manufacturer

Document No: R-MDOC-XX5&6-R1

Company:	SQUARE D COMPANY
address:	8001 HWY 64 East Knightdale, NC 27545-9023 USA

Herewith declares that the product(s)

Product identification:	<i>XX512A1KAM8, 12mm cylindrical ultrasonic sensor XX518A1KAM12, 18mm cylindrical ultrasonic sensor XX630A1KAM12, 30mm cylindrical ultrasonic sensor</i>
-------------------------	--


To which this declaration refers are in conformity with the following:

Standards	<i>Low Voltage Switchgear and Controlgear,</i>
And/Or	<i>EN60947-1: General rules</i>
Normative Documents:	<i>EN60947-5-2: Proximity Switches</i>

Subject to installation, maintenance and utilization in accordance with their purpose, regulations, current standards, manufacturer's instructions and industry standards. Meet(s) the provisions of the following EC Directive(s): (Including all applicable amendments)

reference n°	title
<i>73/23/CCE</i>	<i>Low-voltage Directive of February 19, 1973 modified by Directive 93/68/EC of July 22, 1993.</i>
<i>89/336/CEE</i>	<i>Electromagnetic Compatibility Directive of May 3, 1989 modified by Directives 92/31/CEE of April 28, 1992 and 93/68/CEE of July 22, 1993.</i>

The CE marking on the product and/or the packaging signifies that the product is in compliance with the applicable EU Directives .

Location	Date	Authorization Signature
Raleigh, NC	February 13, 2002	Name: John Gawron Position: Director, Industrial Control Activity Signature: 

Ultrasonic Sensors