Ultrasonic Sensors

File 9006

Merlin Gerin
Modicon
Square D
Telemecanique

Schneider Electric Brands

CONTENTS

Schneider Electric

Ultrasonic Sensors
12, 18, and 30 mm Plastic Tubular
DC

thread
M12X1

thread
M18X1

thread
M30X1.5

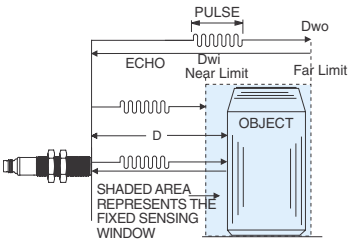
Features:

- PNP or NPN output
- Housing: Plastic
- Self-teach on 30 mm version
- 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**

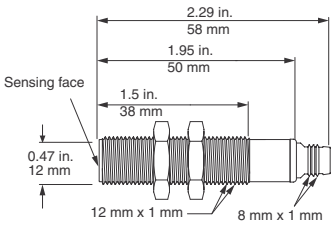
Operation

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=TVs/2, D= Distance from the sensor to the object; T = Elapsed time between the pulse transmission and its echo reception, Vs = the Velocity of sound, approximately 1100 feet per second.

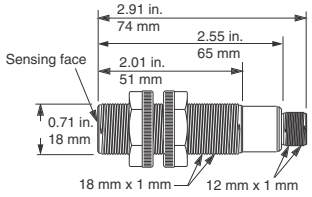


While the sensor is in operation, the calculated distance (D) between the sensor and the object is compared to the distances associated with the fixed window limits. These limits are shown in the illustration above as Dwi and Dwo. If D is within these limits, an output is generated. The output remains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

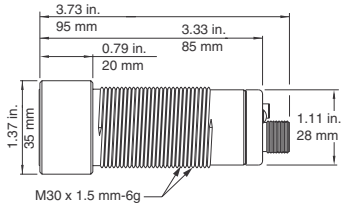
Dimensions



12 mm



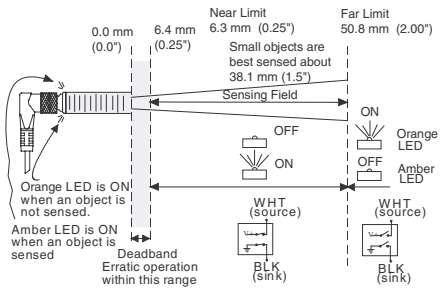
18 mm



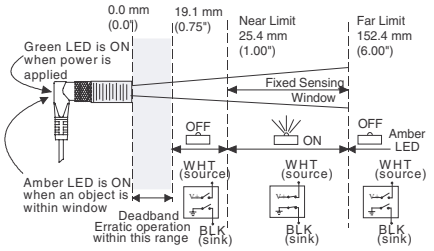
30 mm

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

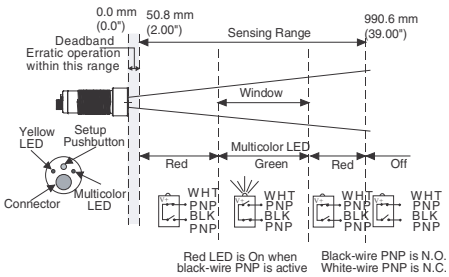
12 mm



18 mm



30 mm



Wiring

Connector M8

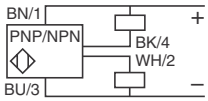
3 (-)
1 (+)
4 NPN Output
2 PNP Output

12 mm

Connector M12

3 (-)
1 (+)
4 NPN Output
2 PNP Output

18 / 30 mm



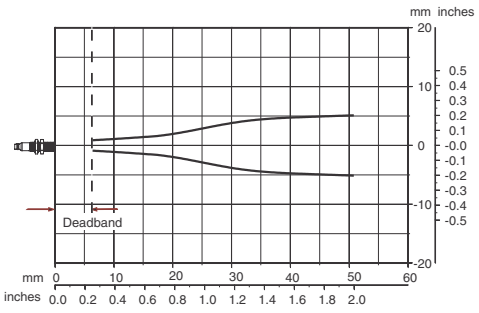
Specifications

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

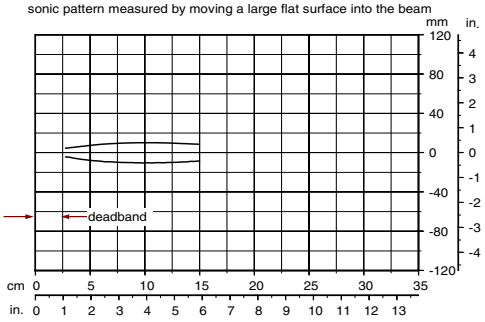
The beam plots below, were developed from data collected at 20 °C and zero air flow, which defines the boundaries and shape of the sonic beams shown for the XX ultrasonic sensor range. The boundaries were established using a 10 cm x 10 cm target positioned parallel to the sensor face, moved in and out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

12 mm

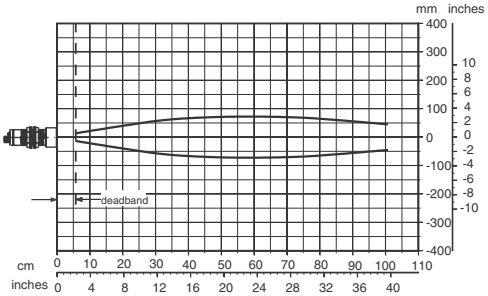


18 mm

sonic pattern measured by moving a large flat surface into the beam



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

Schneider Electric

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:	*XX512A1KAM8, 12mm cylindrical ultrasonic sensor* *XX518A1KAM12, 18mm cylindrical ultrasonic sensor* *XX630A1KAM12, 30mm cylindrical ultrasonic sensor*

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

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

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
73/23/CCE	*Low-voltage Directive of February 19, 1973 modified by Directive 93/68/EC of July 22, 1993.*
89/336/CEE	*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.*

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: