azbil

Stainless Steel Sensing Face Proximity Switch

Model FL7S-____

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https://www.azbil.com/products/factory/order.html

Azbil Corporation
Advanced Automation Company

Yamatake Corporation changed its name to Azbil Corporation on April 1, 2012.

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URL: https://www.azbil.com

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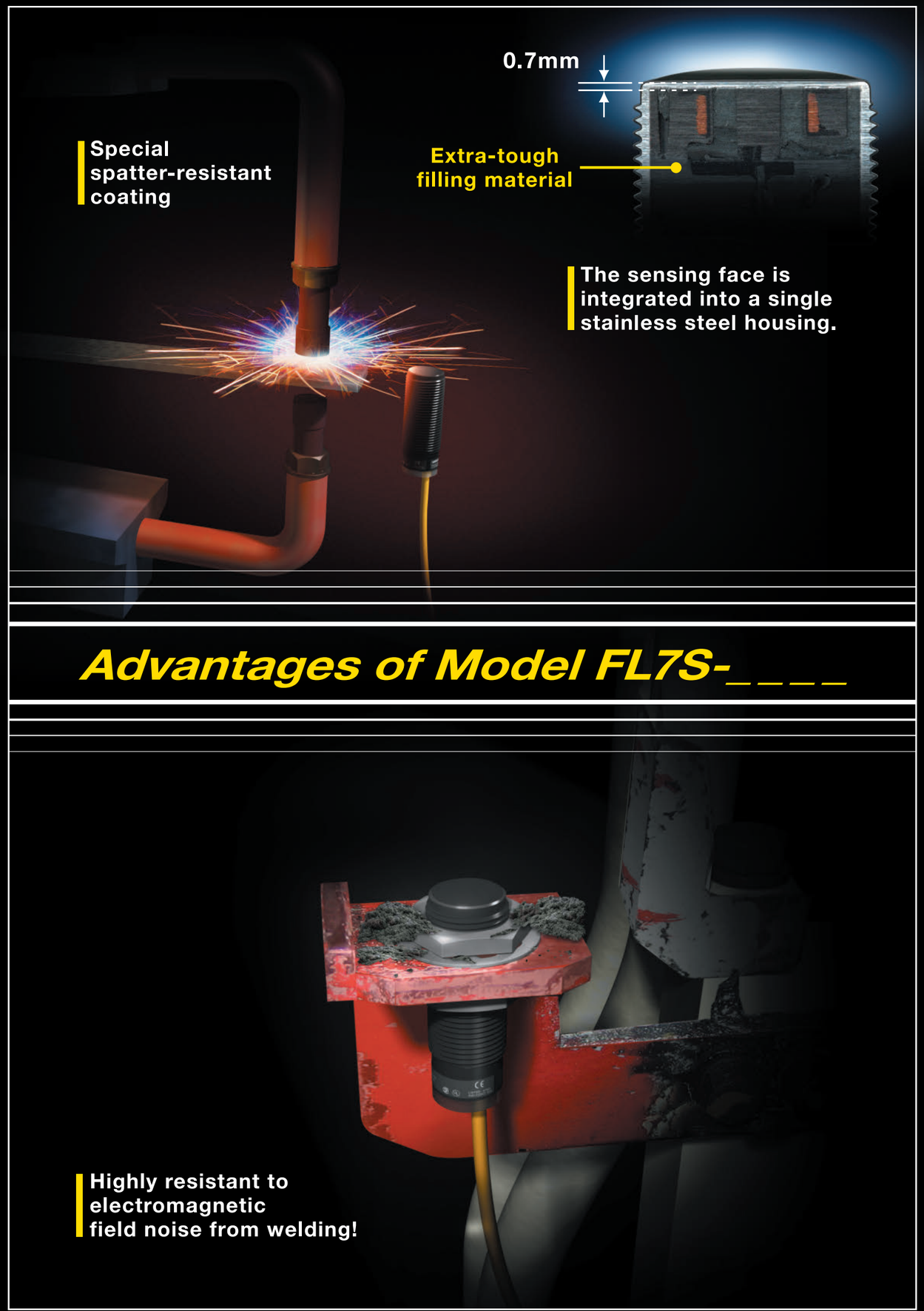
CP-PC-2237E



Advantages of Model FL7S-____

Model FL7S-____ Has Especially Superior Performance — Here is the Evidence!

Two endurance tests were made in order to develop a switch that could meet the severe requirements demanded by users in the field. Model FL7S-____ has proven to have superior performance in both tests.

Sensing face strength tests

TEST-1 The Metal Brush Test (measurement of abrasion resistance)

With conventional switches, welding sparking leads to hard-to-remove spatter and slag. The big problem is the scratches caused by the abrasive metal brush used to remove the stuck spatter and slag. Azbil Corporation has solved this major problem by creating for model FL7S-____ a stainless steel sensing face that resists abrasion. The Metal Brush Test shows that this switch has excellent endurance.

Model FL7M-7J6HD

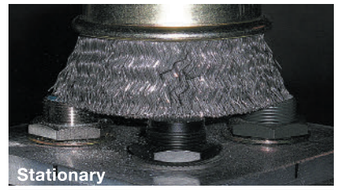
Survives 5 min of brushing

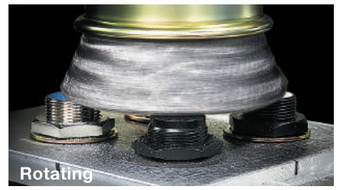
Model FL7M-7J6HW

Survives 25 min of brushing

Model FL7S-5W6W-CN03

Operation is normal even after 200 minutes!





Test conditions | Brush: Stainless steel brush
Rotation speed: 130 cycles/min

TEST-2 Repetitive Shock Test (measurement of shock resistance)

Repetitive shocks when welding parts hit the switch head result in a shortening of switch life. Model FL7S-____' greatly strengthened stainless steel sensing face is the answer to this problem! The repetitive shock test has proven that this switch has robust shock resistance.

Model FL7M-7J6HD

Housing survives 310 repetitions

Model FL7M-7J6HW

Housing survives 5,000 repetitions

Model FL7S-5W6W-CN03

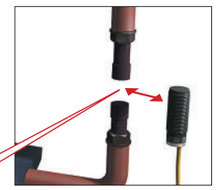
Operation is normal even after 200,000 repetitions!

Test conditions | Shock: Approx. 50G
Shock application speed: 240 cycles/min

Reference resistance to electromagnetie field noise

Welding current (A) (DC or AC)	Distance between welding gun and switch (mm)							
	12.7	25.4	51	76	102	127	152	305
10,000	160mT	80mT	40mT	25mT	20mT	16mT	13mT	7mT
20,000	315mT	160mT	80mT	50mT	40mT	30mT	25mT	13mT
30,000	470mT	235mT	120mT	80mT	60mT	50mT	40mT	20mT

Usable range (for model FL7S-2/5/8 with less than 85 msec welding duration.)



Ex.: When the welding current is 10,000A, the switch operates without error even when it is installed as close as approx. 12.7 mm from the welding gun.

Model FL7S-____
Features and Major Specifications

Model FL7S-____ is a proximity switch having a stainless steel sensing face and housing, and is specially designed for welding applications on the automobile manufacturing line.

- **The sensing face is integrated into a stainless steel housing having high shock resistance and superior abrasion resistance.**
- **Switches have a spatter and slag proof special coating.**
- **An electromagnetic field noise elimination circuit is built in.**
- **The lineup includes M8, M12, M18 and M30 models.**

Connector-type cables are also available for model FL7S-____.

Ex.: Model PA5-4ISX_FK-E (incombustible cable)
Model PA5-4ISX_UK-E (flame-resistant cable)
Model PA5-4ISX_MK-E (flame-resistant cable)

Selection guide

Preleaded Connector type

Appearance		Sensing distance (Ferrous material only)	Operation Mode		Connector				Catalog listing
Shape example (M18)	Outer diameter		Wiring	Output	+	—	Output	Non-polarity	
(Cable length: M8=80 cm, others=30 cm) 	M8	1.5 mm	2-wire non-polarity	N.O.	—			3 - 4	FL7S-1W6W-CN03
					—			1 - 4	FL7S-1W6W-CN03B
	M8	1.5 mm	3-wire NPN	N.O.	1	3	4	—	FL7S-1A6W-CN08
			3-wire PNP	N.O.	1	3	4	—	FL7S-1D6W-CN08
	M12	2 mm	2-wire non-polarity	N.O.	—			3 - 4	FL7S-2W6W-CN03
					—			1 - 4	FL7S-2W6W-CN03B
	M18	5 mm	2-wire non-polarity	N.O.	—			3 - 4	FL7S-5W6W-CN03
					—			1 - 4	FL7S-5W6W-CN03B
	M30	8 mm	2-wire non-polarity	N.O.	—			3 - 4	FL7S-8W6W-CN03
					—			1 - 4	FL7S-8W6W-CN03B

Preleaded type

Appearance		Sensing distance (Ferrous material only)	Operation Mode		Catalog listing
Shape example (M18)	Outer diameter		Wiring	Output	
(Cable length: M8=80 cm, others=30 cm) 	M8	1.5 mm	2-wire non-polarity	N.O.	FL7S-1W6W- L5
	M12	2 mm	2-wire non-polarity	N.O.	FL7S-2W6W-L5
	M18	5 mm	2-wire non-polarity	N.O.	FL7S-5W6W- L5
	M30	8 mm	2-wire non-polarity	N.O.	FL7S-8 W6W- L5

Specifications

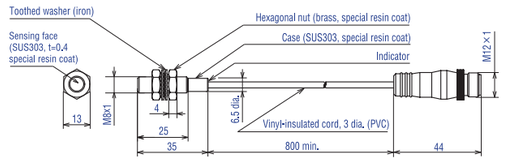
Catalog listing	Preleaded Connector type	FL7S-1_6W-CN08	FL7S-1W6W-CN03 (B)	FL7S-2W6W-CN03 (B)	FL7S-5W6W-CN03 (B)	FL7S-8W6W-CN03 (B)
	Preleaded type	—	FL7S-1W6W-L5	FL7S-2W6W-L5	FL7S-5W6W-L5	FL7S-8W6W-L5
Actuation method		High-frequency oscillation type				
Rated sensing distance		1.5±0.15 mm		2±0.2 mm (Note 1)	5±0.5 mm (Note 1)	8±0.8 mm (Note 1)
Standard target object		Iron 8X8 mm, t=1 mm		Iron 12X12 mm, t=1 mm	Iron 18X18 mm, t=1 mm	Iron 30X30 mm, t=1 mm
Differential travel		Max. 15% of sensing distance				
Rated supply voltage		12/24 Vdc				
Operating voltage range		10 to 30 Vdc				
Current consumption		10 mA max.	–			
Control output	Voltage drop at ON	2V max.	4.8V max.(switching current 30 mA)	5.5V max. (switching current 30 mA)		
	Leakage current	10 μA max.	1 mA max.			
	Switching current	100 mA max.	3 to 100 mA			
Operating frequency		5 Hz	4 Hz	5 Hz		
Temperature characteristics		-10 to +15% of sensing distance (25℃) (-10 to +60℃)		±10% of sensing distance (25℃) (-10 to +60℃)		
Operating indicator		Lights (red) at output ON				
Operating temperature range		-10 to +60℃				
Storage temperature range		-10 to +60℃				
Insulation resistance		50 MΩ max., DC 500V				
Dielectric strength		1,000 Vac, 50/60 Hz between case and electrically live metals	500 Vac, 50/60 Hz between case and electrically live metals	1,000 Vac, 50/60 Hz between case and electrically live metals		
Vibration resistance		55 Hz, 1mm peak-to-peak amplitude, 2 h in X, Y and Z directions				
Shock resistance		294 m/s², 6 times in X, Y and Z directions				
Protection		IP67 (Note 2)				
Electromagnetic field noise resistance		100 mT (Note 3)		250 mT (Note 3)		
Sensing face thickness		0.4 mm		0.7 mm		
Weight	-CN__	30 g	50 g	50 g	70 g	130 g
	-L5	–	190 g	200 g	220 g	280 g
Circuit protection		Reverse connection protection circuit, output short-circuit protection circuit	Electromagnetic field noise elimination circuit			
Material	Switch body	Stainless steel 303 (with spatter and slag proof special coating)				

Note 1: No good for detecting nonferrous metal.
Note 2: Avoid using this switch in an environment always subject to splashing water or oil.
Note 3: Good for less than 85 msec welding duration.

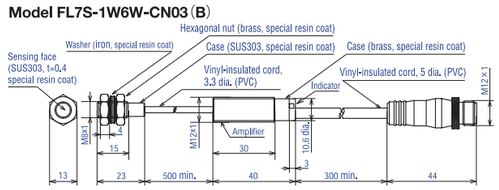
External dimensions

Preleaded Connector type

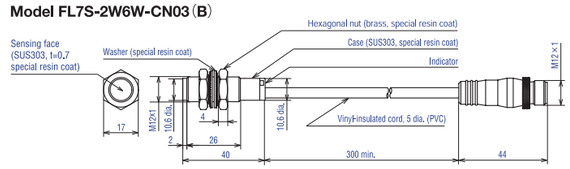
Model FL7S-1_6W-CN08



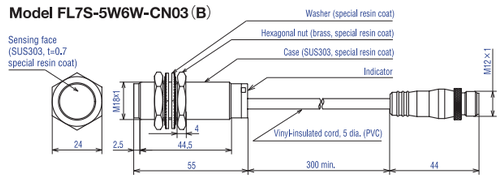
Model FL7S-1W6W-CN03 (B)



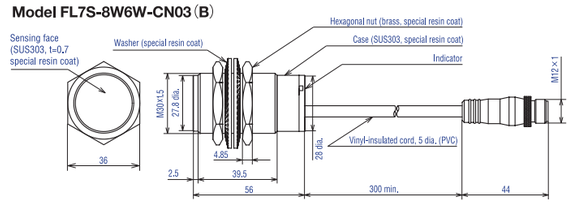
Model FL7S-2W6W-CN03 (B)



Model FL7S-5W6W-CN03 (B)

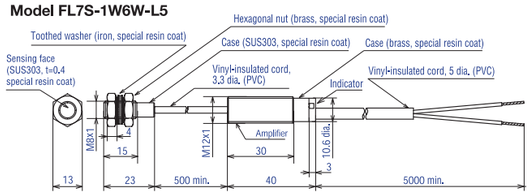


Model FL7S-8W6W-CN03 (B)

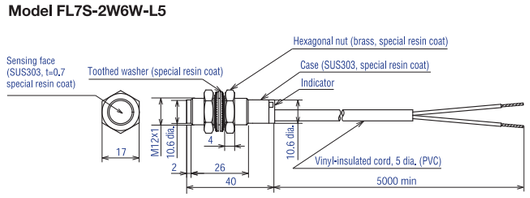


Preleaded type

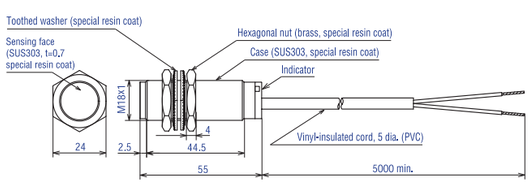
Model FL7S-1W6W-L5



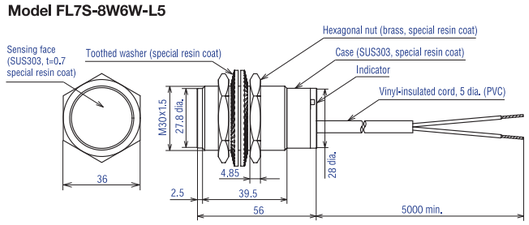
Model FL7S-2W6W-L5



Model FL7S-5W6W-L5



Model FL7S-8W6W-L5



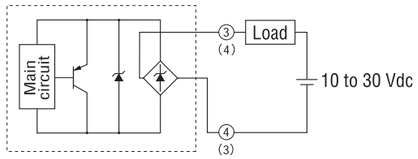
Note: When the sensor is flush-mounted in metal, be sure to mount it so that the top of the sensing face projects 2 to 2.5 mm from the metal surface. M12 type=2 mm M18 and M30 type=2.5 mm

Output circuit and wiring

Preleaded Connector type

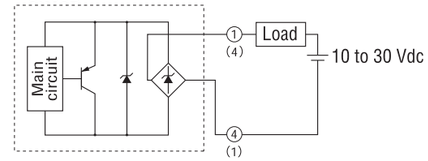
●2-wire non-polarity type

●-CN03



・The load can be connected to either of the power supplies.

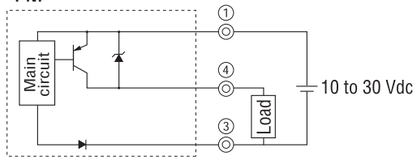
●-CN03B



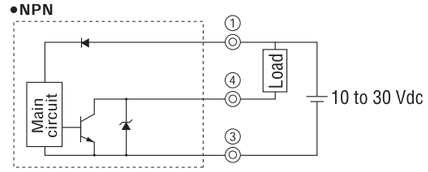
・The load can be connected to either of the power supplies.

●3-wire type

●PNP

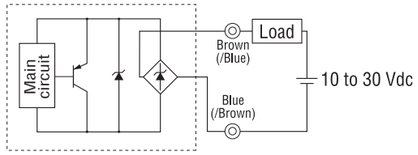


●NPN



・Do not directly connect the power to the switch when there is no load. ・Fasten the connector tightly by hand.

Preleaded type

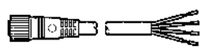
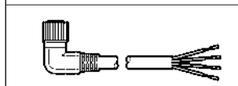


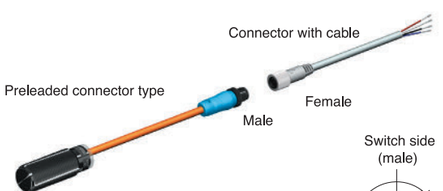
・The load can be connected to either of the power supplies.

Connector with cable

Be sure to use a model PA5-___ connector with cable when connecting a preleaded connector or connector-type switch.

● Connector with cable

Shape	Power supply	Cord properties	Cord length	Catalog listing	Lead colors
	DC	Vinyl-insulated cord with high resistance to oil and vibration (UL/NFPA79 CM, CL3)	2 m	**PA5-4ISX2SK**	1: brown, 2: white, 3: blue, 4: black
			5 m	**PA5-4ISX5SK**	1: brown, 2: white, 3: blue, 4: black
			2 m	**PA5-4ILX2SK**	1: brown, 2: white, 3: blue, 4: black
			5 m	**PA5-4ILX5SK**	1: brown, 2: white, 3: blue, 4: black



● Tightening the connector

Align the grooves and rotate the fastening nut on the PA5 connector by hand until it fits tightly with the connector on the switch side.