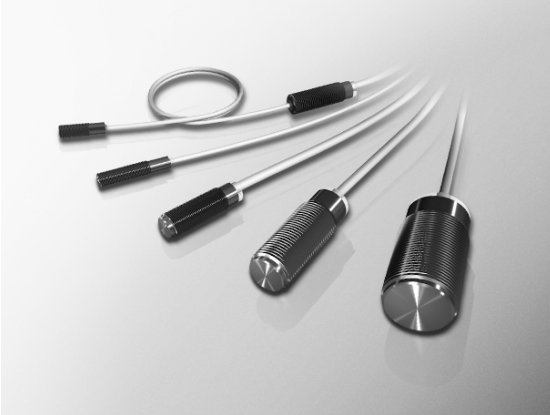


Stainless Steel Sensing Face Proximity Sensor

FL7S Series

The FL7S is a proximity sensor 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
- Sensors 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

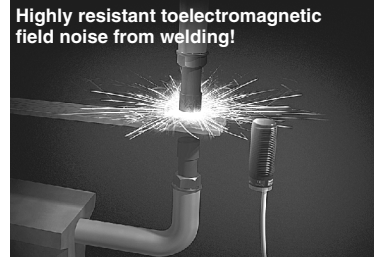
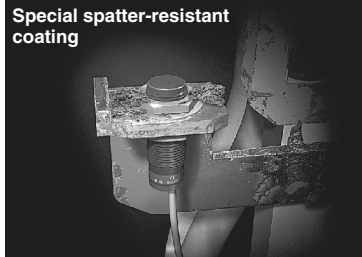
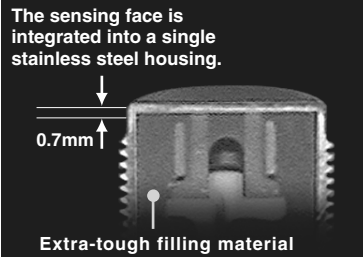
※ Connector-type cables are also available for the FL7S Series.

Ex.: PA5-4ISX □ FK-E (incombustible cable)
 PA5-4ISX □ UK-E (flame-resistant cable)




CLICK

ADVANTAGES OF FL7S SENSORS



SELECTION GUIDE

Appearance		Sensing distance (Ferrous material only)	Operation Mode		Connector			Catalog listing
Shape example (M18)	Outer diameter		Wiring	Output	+	-	Output non-polarity	
	M8	1.5mm	2-wire non-polarity	N.O.	-			3 - 4
					-			1 - 4
	M8	1.5mm	3-wire NPN	N.O.	1	3	4	-
					1	3	4	-
	M12	2mm	2-wire non-polarity	N.O.	-			3 - 4
					-			1 - 4
	M18	5mm	2-wire non-polarity	N.O.	-			3 - 4
					-			1 - 4
	M30	8mm	2-wire non-polarity	N.O.	-			3 - 4
					-			1 - 4

SPECIFICATIONS

Catalog listing	FL7S-1□6W-CN08	FL7S-1W6W-CN03(B)	FL7S-2W6W-CN03(B)	FL7S-5W6W-CN03(B)	FL7S-8W6W-CN03(B)
Actuation method	High-frequency oscillation type				
Rated sensing distance	1.5±0.15mm ^{Note 1}	2±0.2mm ^{Note 1}	5±0.5mm ^{Note 1}	8±0.8mm ^{Note 1}	
Standard target object	Iron 8 x 8mm, t=1mm	Iron 12 x 12mm, t=1mm	Iron 18 x 18mm, t=1mm	Iron 30 x 30mm, t=1mm	
Differential travel	Max. 15% of sensing distance				
Rated supply voltage	12/24V dc				
Operating voltage range	10 to 30V dc				
Current consumption	10mA max.	4.8V max. (switching current 30mA)		5.5V max. (switching current 30mA)	
Control output	Voltage drop at ON 2V2V max.				
Leakage current	10µA max.				
Switching current	100mA max.				
Operating frequency	5Hz	4Hz	5Hz		
Temperature characteristics	-10 to +15% of sensing distance (25°C) (-10 to +60°C)		±10% of sensing distance (25°C) (-10 to +60°C)		
Operating indicator	Lights (red) at output ON				
Operating temperature range	-10 to +60°C				
Storage temperature range	-10 to +60°C				
Insulation resistance	50MΩ max., DC 500V				
Dielectric strength	1,000Vac, 50/60Hz between case and electrically live metals	1,000Vac, 50/60Hz between case and electrically live metals	1,000Vac, 50/60Hz between case and electrically live metals		
Vibration resistance	55Hz, 1mm peak-to-peak amplitude, 2 hours in X, Y and Z directions				
Shock resistance	294m/s ² , 6 times in X, Y and Z directions				
Protection	IP67 (Note 2)				
Electromagnetic field noise resistance	100mT		250mT		
Sensing face thickness	0.4mm		0.7mm		
Weight	30g	50g	50g	70g	130g
Circuit protection	Reverse connection protection circuit, output short-circuit		Electromagnetic field noise elimination circuit		
Material	Sensor body				
	Stainless steel 303 (with spatter and slag proof special coating)				

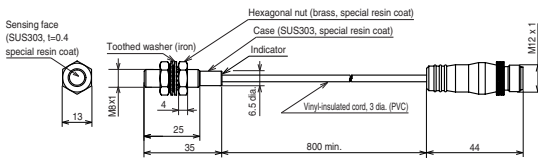
Note 1.: Does not detect non-ferrous metals.

Note 2.: Avoid using this sensor in an environment always subject to splashing water or oil.

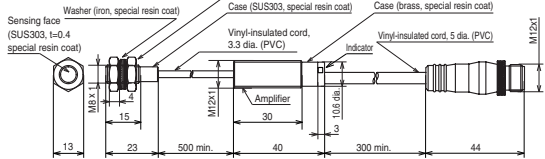
EXTERNAL DIMENSIONS

(unit: mm)

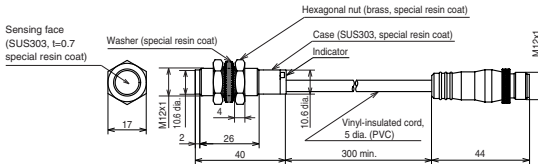
FL7S-1□6W-CN08



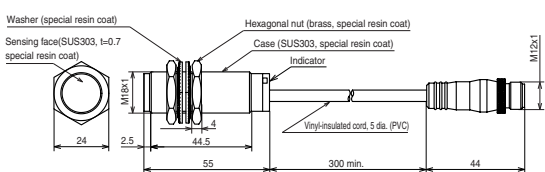
FL7S-1W6W-CN03(B)



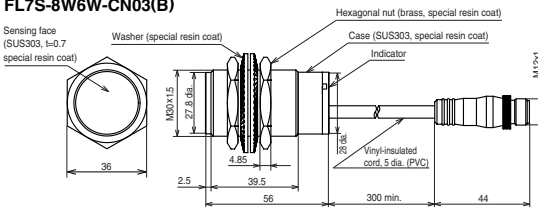
FL7S-2W6W-CN03(B)



FL7S-5W6W-CN03(B)



FL7S-8W6W-CN03(B)

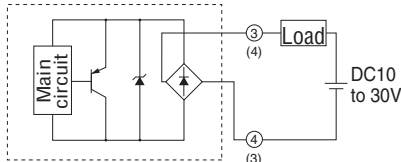


Note: When the sensor is flush-mounted in metal, be sure to mount it so that the top of the sensing face projects 2 to 2.5mm from the metal surface.

OUTPUT CIRCUIT AND WIRING

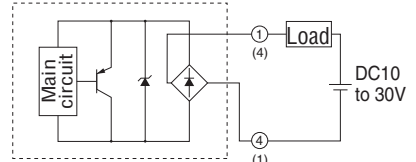
● 2-wire non-polarity type

● -CN03



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

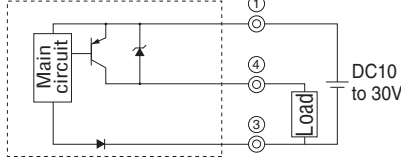
● -CN03B



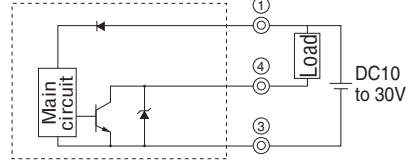
● The load can be connected to either of the power supplies.

● 3-wire type

● PNP



● NPN



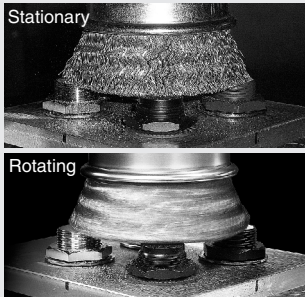
FL7S SERIES ENDURANCE TEST RESULTS

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

● Sensing face strength tests

TEST-1

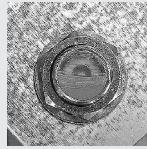
The Metal Brush Test (measurement of abrasion resistance)



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

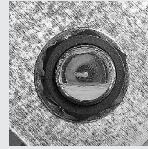
With conventional sensors, welding sparking leads to hard-to-remove spatter and slag. The big problem is the scratches caused by the abrasive metal brush used to remove the stuck spatter and slag. Yamatake has solved this major problem by creating for the FL7S Series a stainless steel sensing face that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

FL7M-7J6HD



Survives 5 min of brushing

FL7M-7J6HW



Survives 25 min of brushing

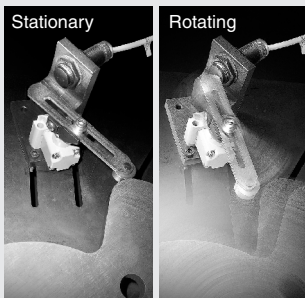
FL7S-5W6W-CN03



Operation is normal even after 200 minutes!

TEST-2

Repetitive Shock Test (measurement of shock resistance)



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

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

FL7M-7J6HD



Housing survives 310 repetitions

FL7M-7J6HW



Housing survives 5,000 repetitions

FL7S-5W6W-CN03



Operation is normal even after 200,000 repetitions!

Distance between welding gun and sensor



● Resistance to electromagnetic field noise¹ from welding! Usable range (for FL7S-2/5/8 Series)

Welding current(A) (DC or AC)	Distance between welding gun and sensor (mm)							
	12.7	25.4	51	76	102	127	152	306
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

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