APM Series Compact Proximity Sensors

FEATURES

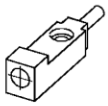
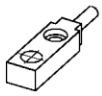
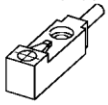
Compact Proximity Sensors Can be Installed Anywhere.
Locking Boss Ensures Easy Mounting.

- This thin 5.9mm (side sensing type) sensor takes up little space.
- 8mm wide, compact with a 2.5mm sensing range.
- Locking boss allows easy mounting by single screw. Mounting bracket not required. (locking boss type)
- Indicator lamp visible from all three directions allows easy checking of the operating state.
- Wide variety of sensor types support all kinds of applications.

click

ORDER GUIDE

• DC 3-wire type

Appearance		Sensing distance (mm)	Location of sensing face	Locking boss	Output/operation mode (open collector)		Catalog listing
Sensor package style	Dimensions (mm) W × D × H						
Top sensing type 	8 × D × H (sensing face) D=5.9 H=9.4 (body) D=21.6 H=5.9	2.5	Top	Not provided	NPN	N.O.	APM-A3A1
						N.C.	APM-A3B1
					PNP	N.O.	APM-A3D1
						N.C.	APM-A3E1
				Provided	NPN	N.O.	APM-B3A1
						N.C.	APM-B3B1
					PNP	N.O.	APM-B3D1
						N.C.	APM-B3E1
Side sensing type 	8 × 25 × 5.9		Side	Not provided	NPN	N.O.	APM-C3A1
						N.C.	APM-C3B1
					PNP	N.O.	APM-C3D1
						N.C.	APM-C3E1
				Provided	NPN	N.O.	APM-D3A1
						N.C.	APM-D3B1
					PNP	N.O.	APM-D3D1
						N.C.	APM-D3E1
Side sensing type 	8 × 25 × 7.5		Side	Not provided	NPN	N.O.	APM-C3A1-S
						N.C.	APM-C3B1-S
				Provided	NPN	N.O.	APM-D3A1-S
						N.C.	APM-D3B1-S

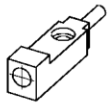
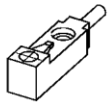
Note:
Different-frequency types also available for all models. These types are appended with the letter "-F" is used.
Example: Different-frequency type of APM-C3A1 is expressed as APM-C3A1F.

"Different-frequency type" is a type having an oscillation frequency different to that of the standard type to reduce the influence of mutual interference. Select this type when mounting two or more proximity sensors close to each other.

For details, contact your nearest Yamatake dealer.

No. CP-PC-2173E

• DC 2-wire type

Appearance		Sensing distance (mm)	Location of sensing face	Locking boss	Operation mode	Catalog listing
Sensor package style	Dimensions (mm) W ×D ×H					
Top sensing type 	8 ×D ×H (sensing face) D=5.9 H=9.4 (body) D=21.6 H=5.9	2.5	Top	Not provided	N.O.	APM-A3J1
					N.C.	APM-A3K1
				Provided	N.O.	APM-B3J1
					N.C.	APM-B3K1
Side sensing type 	8 ×25 ×5.9		Side	Not provided	N.O.	APM-C3J1
					N.C.	APM-C3K1
				Provided	N.O.	APM-D3J1
					N.C.	APM-D3K1
Side sensing type 	8 ×25 ×7.5		Side	Not provided	N.O.	APM-C3J1-S
					N.C.	APM-C3K1-S
				Provided	N.O.	APM-D3J1-S
					N.C.	APM-D3K1-S

SPECIFICATIONS

• DC 3-wire type

Item		Standard catalog listing			
		APM-□3A1□(-S)	APM-□3B1□(-S)	APM-□3D1□	APM-□3E1□
Actuation method		High-frequency oscillation type (unshielded type)			
Rated supply voltage		12/24Vdc			
Rated sensing distance		2.5mm, ±15%			
Usable sensing distance		0 to 1.8mm			
Standard target object		15 ×15mm, 1mm thick iron			
Differential travel		15% max. of sensing distance			
Operating voltage range		10.8 to 26.4Vdc (ripple voltage 10% max.)			
Current consumption		10mA max.			
Output mode		NPN transistor open collector		PNP transistor open collector	
Operation mode		Normally open (N.O.)	Normally closed (N.C.)	Normally open (N.O.)	Normally closed (N.C.)
Control output	Switching current	30mA max. (resistive load)			
	Voltage drop	1V max. (switching current 30mA)			
	Output dielectric strength	26.4V			
Operating frequency		120Hz			
Hysteresis		0.05mm max.			
Temperature characteristics		±15% max. for the range of ~10 to +55°C when +25°C is taken as standard temperature in sensing distance			
Supply voltage characteristics		±2% max. with ±10% voltage fluctuation with rated supply voltage as standard voltage in sensing distance			
Indicator lamps		Lights (red) when object approaches			
Operating temperature range		~10 to +55°C			
Storage temperature range		~25 to +70°C			
Operating humidity range		35 to 85% RH			
Insulation resistance		50MΩmin. (by 500Vdc megger)			
Dielectric strength		1,000Vac, 50/60Hz for 1 minute between case and electrically live metals			
Vibration resistance		10 to 55Hz, 1.5mm peak-to-peak amplitude, 2hrs in X, Y and Z directions			
Shock resistance		500m/s² 3 times in X, Y and Z directions			
Protection		IP67 (IEC 529)			
Weight		Approx. 10g			
Circuit protection		Surge absorption, reverse connection protection circuit			
Wiring method		Pre-leaded (oil-resistant cord: 2.5mm O.D., 0.08mm², 3-core, 1m)			
Case material		Polyalylate resin			
Tightening torque		0.5N-m (M2.6 screw)			

• InstallationInstructionsNo.:CP-UM-3162E

Note:
Normally open: Load operates when object approaches the sensor (output circuit ON when detected).
Normally closed: Load is reset when object approaches the sensor (output circuit ON when not detected).

• DC 2-wire type

Stanard catalog listing		APM-□3J1(-S)	APM-□3K1(-S)
Actuation method		High-frequency oscillation type (unshielded type)	
Rated supply voltage		12/24Vdc	
Rated sensing distance		2.5mm, ±15%	
Usable sensing distance		0 to 1.8mm	
Standard target object		15×15mm, 1mm thick iron	
Differential travel		7% max. of sensing distance	
Operating voltage range		10 to 30Vdc	
Leakage current		0.65mA max. (24Vdc)	
Operation mode		Normally open (N.O.)	Normally open (N.O.)
Control output	Switching current	3 to 50mA	
	Voltage drop	3V max.	
	Output dielectric strength	30Vdc	
Operating frequency		1,500Hz	
Temperature characteristics		±10% max. for the range of ~10 to +55°C when +25°C is taken as standard temperature in sensing distance ±15% max. for the range of ~25 to +70°C when +25°C is taken as standard temperature in sensing distance	
Supply voltage characteristics		±2% max. with ±10% voltage fluctuation with rated supply voltage as standard voltage in sensing distance	
Indicator lamps		Lights (red) when object approaches	
Operating temperature range		~10 to +55°C (Note 1)	
Storage temperature range		~25 to +70°C	
Insulation resistance		50MΩ min. (by 500Vdc megger)	
Dielectric strength		1,000Vac, 50/60Hz for 1 minute between case and electrically live metals	
Vibration resistance		10 to 55Hz, 1.5mm peak-to-peak amplitude, 2hrs in X, Y and Z directions	
Shock resistance		500m/s^2 3 times in X, Y and Z directions	
Protection		IP67 (IEC 529)	
Weight		Approx. 10g	
Circuit protection		Surge absorption, reverse connection protection circuit	
Wiring method		Pre-leaded (oil-resistant cord: 2.5mm O.D., 0.08mm^2, 3-core, 1m)	
Case material		Polyalylate resin	
Tightening torque		0.5N-m (M2.6 screw)	

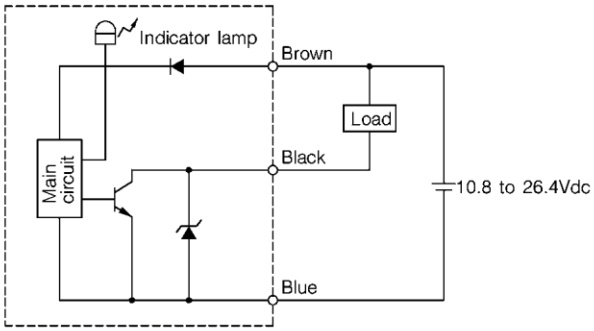
• Installation Instructions No.: CP-UM-3162E

Note 1: ~25 to +70°C when APM-PA01 mounting bracket (sold separataly) is used.

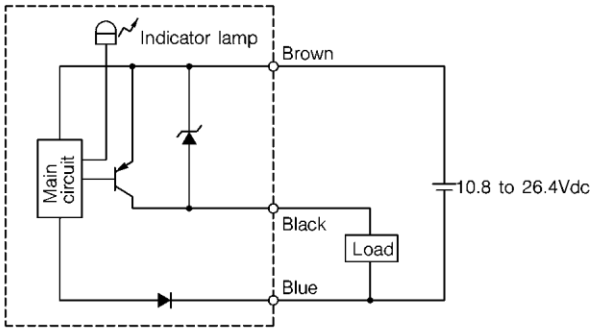
WIRING DIAGRAMS

- DC 3-wire type

・NPN transistor, open collector type
(Catalog listing APM-□3A1□, APM-□3B1□)

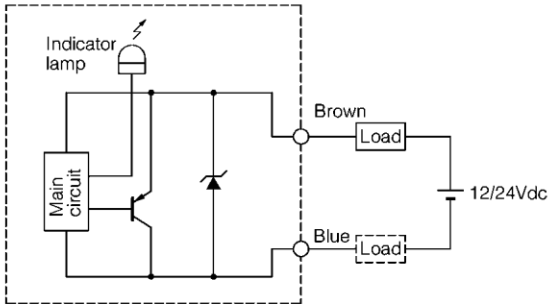


・PNP transistor, open collector type
(Catalog listing APM-□3D1□, APM-□3E1□)



- DC 2-wire type

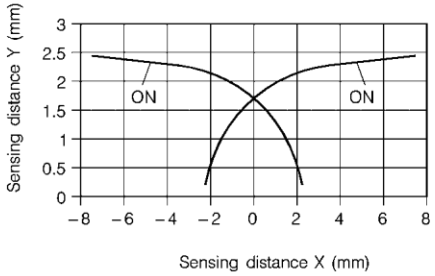
・All catalog listing



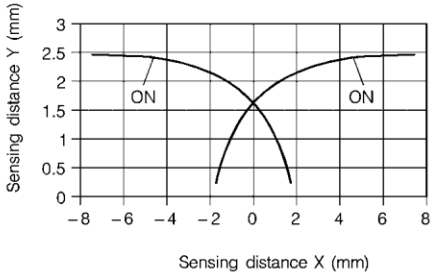
The load can be connected to either of the power supplies.

SENSING AREA DIAGRAMS (typical examples)

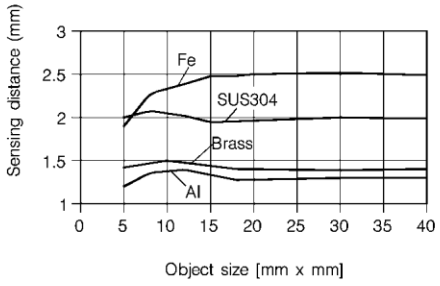
- Side sensing type



- Top sensing type



SENSING DISTANCE ACCORDING TO MATERIAL & SIZE OF OBJECT (typical example)

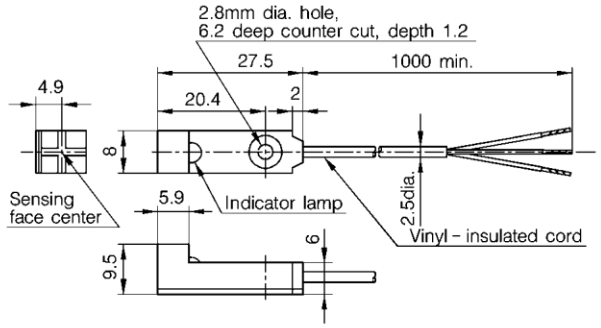


EXTERNAL DIMENSIONS

(unit: mm)

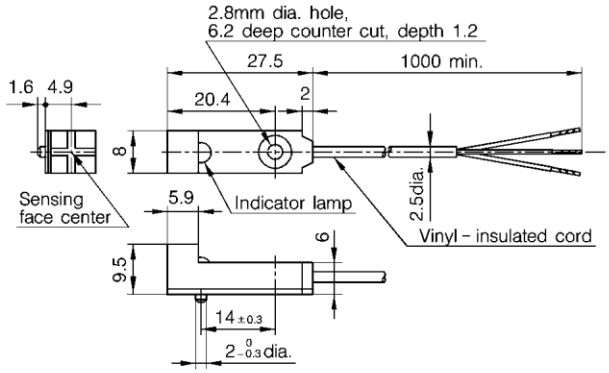
• Top sensing type

・Without locking boss



- Vinyl-insulatedcord
  (oil-resistant: 0.1mm^2, 0.08/16, 3-core) 2.5mm dia.
- DC 2-wire type: 2 cores

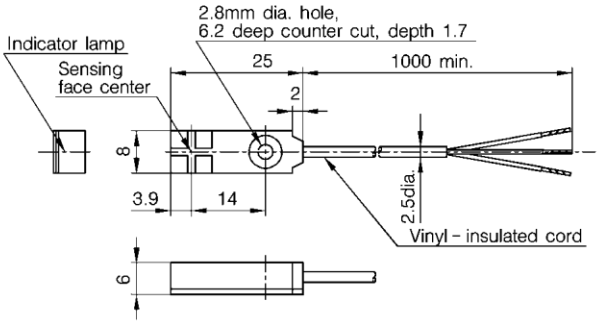
・With locking boss



- Vinyl-insulatedcord
  (oil-resistant: 0.1mm^2, 0.08/16, 3-core) 2.5mm dia.
- DC 2-wire type: 2 cores

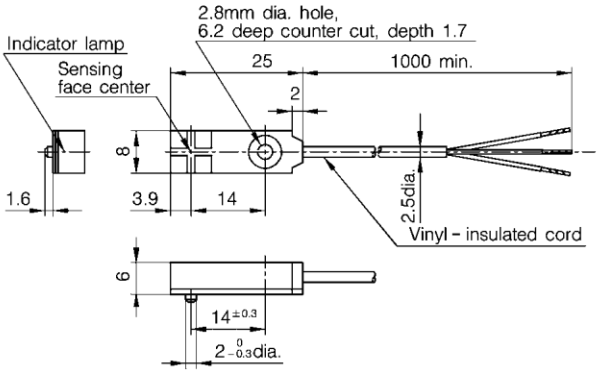
• Side sensing type

・Without locking boss



- Vinyl-insulatedcord
  (oil-resistant: 0.1mm^2, 0.08/16, 3-core) 2.5mm dia.
- DC 2-wire type: 2 cores

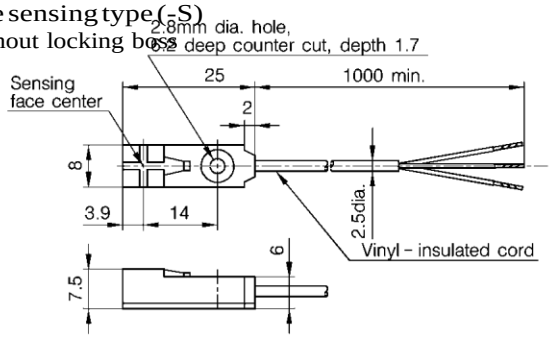
・With locking boss



- Vinyl-insulatedcord
  (oil-resistant: 0.1mm^2, 0.08/16, 3-core) 2.5mm dia.
- DC 2-wire type: 2 cores

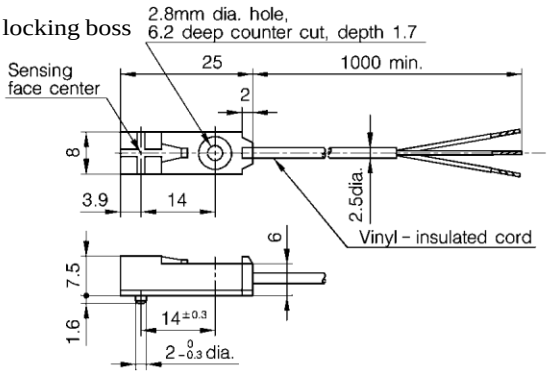
• Side sensing type (-S)

・Without locking boss



- Vinyl-insulatedcord
  (oil-resistant: 0.1mm^2, 0.08/16, 3-core) 2.5mm dia.

・With locking boss



- Vinyl-insulatedcord
  (oil-resistant: 0.1mm^2, 0.08/16, 3-core) 2.5mm dia.

PRECAUTIONS

• Mounting

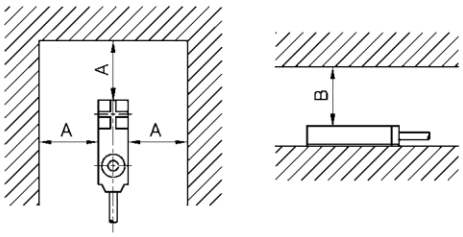
This sensor is provided with an M2.6 screw (neck length 12mm), hexagonal head unit, plain washer and spring washer. Tighten the screw to the torque shown below.

Allowable tightening torque	Recommended screw diameter
0.5N-m	M2.6

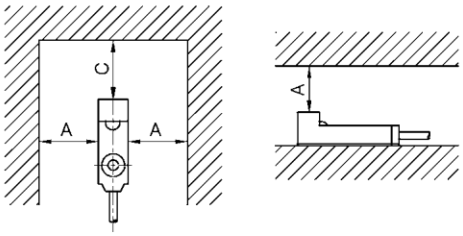
• Influence of surrounding metal

Metal other than the object surrounding the sensor may influence operating characteristics. Maintain the following space between the sensor and surrounding metal:

Side (mm)	Top (mm)
A=3	B=8, C=10



Side sensing type

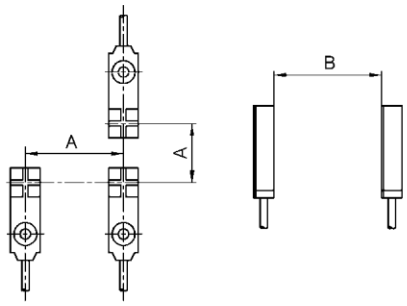


Top sensing type

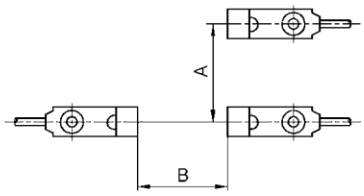
• Mutual interference prevention

When mounting proximity sensors in parallel or facing each other, mutual interference may cause the sensor to malfunction. Maintain at least the spaces indicated in the figures above.

When alternately mounting standard-frequency types and different-frequency types (Catalog listing APM- 3 1F) in a row, maintain at least the space indicated by the figure in parentheses for both dimensions A and B.



Side sensing type



Top sensing type

Facing each other isolation	A (mm)	B (mm)
Side sensing type	20(0)	40(10)
Top sensing type	20(0)	40(10)

• Operation at power ON

After the power is turned ON, it takes 40ms or less until the proximity sensor is ready for sensing.

When the load and the proximity sensor use different power supplies, be sure to turn the proximity sensor ON before turning the load ON.

• Minimum cord bending radius (R)

The minimum bending radius (R) of the cord is 10mm. Take care not to excessively bend the cord beyond this radius. Also, do not excessively bend the cord within 30mm of the cord lead-in port.

RESTRICIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

YAMATAKE

Specifications are subject to change without notice.

Yamatake Corporation
Advanced Automation Company

International Business Headquarters
Totate International Building
2-12-19 Shibuya Shibuya-ku
Tokyo 150-8316 Japan
URL:http://www.yamatake.com

This has been printed on 100% recycled paper.

(01)

Printed in Japan (SP)

1st Edition: Issued in Apr., 2002
2nd Edition: Issued in Oct., 2003