Panasonic
ideas for life

MOTION SENSOR (AREA REFLECTIVE TYPE)

MA MOTION SENSOR Series

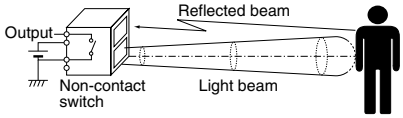
Short type
(Mounting direction: H type)

Middle type
(Mounting direction: H type)

Long type
(Mounting direction: H type)

Long type
(Mounting direction: V type)

What is area reflective type?
The sensor emits a ray of light toward the human body and detects the distance and determine whether there is a person within a given distance of the sensor. If the sensor detects a person, it sets an output non-contact switch to ON.



RoHS Directive compatibility information
http://www.nais-e.com/

FEATURES

1. Certain detection unaffected by the reflectance of the object
The sensor can provide stable detection that is not affected by the condition (color or material of the clothing) or parts (skin, hair, etc.) of the object being monitored. (Reflectance 18% to 90%). Excellent performance even when the detection surface is dirty.

2. Only connecting DC power supply for operating
Built-in oscillation circuit type obviates the hitherto existing need for start signal input.

3. Use in adjacent positions is possible
These sensors can be located in adjacent positions, because the timing of the external trigger signals can be adjusted so that the beam frequency of each adjacent sensor will not interfere with the other.

4. Battery drive possible
By applying longer interval for the trigger signal, you can reduce the total power consumption.

5. Ultra compact size
Suitable for building in equipment as the size is ultra compact.

6. Can be used with a number of different supply voltages.
1) The 5V DC type (4.5 to 6.5V DC)
2) The free-ranging power type (6.5 to 27V DC)
They support the DC power supplies of electronic products and equipment in general.

7. The open collector output system makes for easy load drive.
These sensors provide a continuous output during detection because the output system makes it easy to drive the load.
They achieve an output performance of 30V, Built-in oscillation circuit type: 100 mA, External triggering type: 10 mA.

8. All models with Built-in oscillation circuit type meet CE mark standards.
Conforms with EMC directive for CE certification vital for use in Europe.

APPLICATIONS

1. Water-based product market
- Automatic lighting of wash basin units
- Toilets
- Automatic water flow from faucets

2. Stores and financial instructions
- Automatic doors
- Automatic lighting
- Cash dispensing machines
- Automatic teller machines
- Visitor detecting sensors

3. Amusement market
- Automatic lighting for game display

4. Medical field
- Non-contact switch

5. Others
- Automatic ticket gates
- Seat-taking sensors
- Detection of passengers getting on and off a bus

ORDERING INFORMATION

AMB □ □ □ □ □

AMB; MA Motion Sensor

Detection distance type (shape)
1: Short type 2: Middle type 3: Long type

Triggering function
1: External triggering type 4: Built-in oscillation circuit type (Internal trigger)

Classification by output method & mounting direction
0: Transistor/H type 5: Transistor/V type

Operating voltage
2: Free-ranging power type (6.5 to 27V DC) 9: The DC 5V type (4.5 to 6.5V DC)

Detection distance \ Part No.		02	03	04	05	06	07	08 (Middle type does not need 08.)	09	10 (Short type does not need 10.)	11	12	13	14	15	16	17	18	19	20 (Long type does not need 20.)
Short type	cm	—	—	—	5	6	7	8	9	10	—	—	—	—	—	—	—	—	—	—
	inch				1.969	2.362	2.756	3.150	3.543	3.937										
Middle type	cm	20	30	40	50	60	70	80	—	—	—	—	—	—	—	—	—	—	—	—
	inch	7.874	11.811	15.748	19.685	23.622	27.559	31.496												
Long type	cm	—	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
	inch		11.811	15.748	19.685	23.622	27.559	31.496	35.433	39.37	43.307	47.244	51.181	55.118	59.055	62.992	66.929	70.866	74.803	78.74

DETECTION DISTANCE TYPE (distance limited)

Mounting direction	Type (shape)	Rated operating voltage	Rated detection distance	Part No.		Packing quantity	
				Built-in oscillation circuit type	External triggering type	Inner	Outer
H type	Short type	4.5 to 6.5 V DC	5 cm 1.969 inch	AMB140905	AMB110905	20 pcs.	200 pcs.
			6 cm 2.362 inch	AMB140906	AMB110906		
			7 cm 2.756 inch	AMB140907	AMB110907		
			8 cm 3.150 inch	AMB140908	AMB110908		
			9 cm 3.543 inch	AMB140909	AMB110909		
			10 cm 3.937 inch	AMB1409	AMB1109		
		6.5 to 27 V DC	5 cm 1.969 inch	AMB140205	AMB110205		
			6 cm 2.362 inch	AMB140206	AMB110206		
			7 cm 2.756 inch	AMB140207	AMB110207		
			8 cm 3.150 inch	AMB140208	AMB110208		
			9 cm 3.543 inch	AMB140209	AMB110209		
			10 cm 3.937 inch	AMB1402	AMB1102		
H type	Middle type	4.5 to 6.5 V DC	20 cm 7.874 inch	AMB240902	AMB210902	20 pcs.	200 pcs.
			30 cm 11.811 inch	AMB240903	AMB210903		
			40 cm 15.748 inch	AMB240904	AMB210904		
			50 cm 19.685 inch	AMB240905	AMB210905		
			60 cm 23.622 inch	AMB240906	AMB210906		
			70 cm 27.559 inch	AMB240907	AMB210907		
			80 cm 31.496 inch	AMB2409	AMB2109		
		6.5 to 27 V DC	20 cm 7.874 inch	AMB240202	AMB210202		
			30 cm 11.811 inch	AMB240203	AMB210203		
			40 cm 15.748 inch	AMB240204	AMB210204		
			50 cm 19.685 inch	AMB240205	AMB210205		
			60 cm 23.622 inch	AMB240206	AMB210206		
			70 cm 27.559 inch	AMB240207	AMB210207		
			80 cm 31.496 inch	AMB2402	AMB2102		
H type	Long type	4.5 to 6.5 V DC	30 cm 11.811 inch	AMB340903	AMB310903	20 pcs.	200 pcs.
			40 cm 15.748 inch	AMB340904	AMB310904		
			50 cm 19.685 inch	AMB340905	AMB310905		
			60 cm 23.622 inch	AMB340906	AMB310906		
			70 cm 27.559 inch	AMB340907	AMB310907		
			80 cm 31.496 inch	AMB340908	AMB310908		
			90 cm 35.433 inch	AMB340909	AMB310909		
			100 cm 39.370 inch	AMB340910	AMB310910		
			110 cm 43.307 inch	AMB340911	AMB310911		
			120 cm 47.244 inch	AMB340912	AMB310912		
			130 cm 51.181 inch	AMB340913	AMB310913		
			140 cm 55.118 inch	AMB340914	AMB310914		
			150 cm 59.055 inch	AMB340915	AMB310915		
			160 cm 62.992 inch	AMB340916	AMB310916		
			170 cm 66.929 inch	AMB340917	AMB310917		
			180 cm 70.866 inch	AMB340918	AMB310918		
			190 cm 74.803 inch	AMB340919	AMB310919		
			200 cm 78.740 inch	AMB3409	AMB3109		
H type	Long type	6.5 to 27 V DC	30 cm 11.811 inch	AMB340203	AMB310203	20 pcs.	200 pcs.
			40 cm 15.748 inch	AMB340204	AMB310204		
			50 cm 19.685 inch	AMB340205	AMB310205		
			60 cm 23.622 inch	AMB340206	AMB310206		
			70 cm 27.559 inch	AMB340207	AMB310207		
			80 cm 31.496 inch	AMB340208	AMB310208		
			90 cm 35.433 inch	AMB340209	AMB310209		
			100 cm 39.370 inch	AMB340210	AMB310210		
			110 cm 43.307 inch	AMB340211	AMB310211		
			120 cm 47.244 inch	AMB340212	AMB310212		
			130 cm 51.181 inch	AMB340213	AMB310213		
			140 cm 55.118 inch	AMB340214	AMB310214		
			150 cm 59.055 inch	AMB340215	AMB310215		
			160 cm 62.992 inch	AMB340216	AMB310216		
			170 cm 66.929 inch	AMB340217	AMB310217		
			180 cm 70.866 inch	AMB340218	AMB310218		

Note: If you plan to use multiple sensors side-by-side, or you wish to keep the current consumption small, inquire for details about external trigger type, which is suitable for such applications.

DETECTION DISTANCE TYPE (distance limited) (cont.)

Mounting direction	Type (shape)	Rated operating voltage	Rated detection distance	Part No.		Packing quantity	
				Built-in oscillation circuit type	External triggering type	Inner	Outer
H type	200 cm type	6.5 to 27 V DC	190 cm 74.803 inch	AMB340219	AMB310219	20 pcs.	200 pcs.
			200 cm 78.740 inch	AMB3402	AMB3102		
V type	Long type	4.5 to 6.5 V DC	30 cm 11.811 inch	AMB345903	AMB315903	20 pcs.	200 pcs.
			40 cm 15.748 inch	AMB345904	AMB315904		
			50 cm 19.685 inch	AMB345905	AMB315905		
			60 cm 23.622 inch	AMB345906	AMB315906		
			70 cm 27.559 inch	AMB345907	AMB315907		
			80 cm 31.496 inch	AMB345908	AMB315908		
			90 cm 35.433 inch	AMB345909	AMB315909		
			100 cm 39.370 inch	AMB345910	AMB315910		
			110 cm 43.307 inch	AMB345911	AMB315911		
			120 cm 47.244 inch	AMB345912	AMB315912		
			130 cm 51.181 inch	AMB345913	AMB315913		
			140 cm 55.118 inch	AMB345914	AMB315914		
			150 cm 59.055 inch	AMB345915	AMB315915		
			160 cm 62.992 inch	AMB345916	AMB315916		
			170 cm 66.929 inch	AMB345917	AMB315917		
			180 cm 70.866 inch	AMB345918	AMB315918		
			190 cm 74.803 inch	AMB345919	AMB315919		
			200 cm 78.740 inch	AMB3459	AMB3159		
V type	Long type	6.5 to 27 V DC	30 cm 11.811 inch	AMB345203	AMB315203	20 pcs.	200 pcs.
			40 cm 15.748 inch	AMB345204	AMB315204		
			50 cm 19.685 inch	AMB345205	AMB315205		
			60 cm 23.622 inch	AMB345206	AMB315206		
			70 cm 27.559 inch	AMB345207	AMB315207		
			80 cm 31.496 inch	AMB345208	AMB315208		
			90 cm 35.433 inch	AMB345209	AMB315209		
			100 cm 39.370 inch	AMB345210	AMB315210		
			110 cm 43.307 inch	AMB345211	AMB315211		
			120 cm 47.244 inch	AMB345212	AMB315212		
			130 cm 51.181 inch	AMB345213	AMB315213		
			140 cm 55.118 inch	AMB345214	AMB315214		
			150 cm 59.055 inch	AMB345215	AMB315215		
			160 cm 62.992 inch	AMB345216	AMB315216		
			170 cm 66.929 inch	AMB345217	AMB315217		
			180 cm 70.866 inch	AMB345218	AMB315218		
			190 cm 74.803 inch	AMB345219	AMB315219		
			200 cm 78.740 inch	AMB3452	AMB3152		

Note: If you plan to use multiple sensors side-by-side, or you wish to keep the current consumption small, inquire for details about external trigger type, which is suitable for such applications.

PERFORMANCE

1. Detection performance (Measuring conditions: ambient temp.: 25°C 77°F; operating voltage: 5 V DC)

Items \ Detection distance		Short type*Remark 1						Measured conditions
		5 cm 1.969 inch	6 cm 2.362 inch	7 cm 2.756 inch	8 cm 3.150 inch	9 cm 3.543 inch	10 cm 3.937 inch	
Rated detection distance	Minimum	45 mm 1.772 inch	54 mm 2.126 inch	63 mm 2.480 inch	72 mm 2.835 inch	81 mm 3.189 inch	90 mm 3.543 inch	with a standard reflection board
	Typical	50 mm 1.969 inch	60 mm 3.362 inch	70 mm 2.756 inch	80 mm 3.150 inch	90 mm 3.543 inch	100 mm 3.937 inch	
	Maximum	55 mm 2.165 inch	66 mm 2.598 inch	77 mm 3.031 inch	88 mm 3.465 inch	99 mm 3.898 inch	110 mm 4.331 inch	
Measuring tolerance	Typical	10%		15%	20%		25%	Reflection rate: 90 to 18%
Usable ambient brightness (Resistance to ambient light)*Remark	Brightness of sensor surface / Maximum	30,000 lx						See the drawing on the next page.
	Brightness of reflection surface / Maximum	30,000 lx						

Remarks:1. After receipt of order, average rated detection distance to 15 cm 5.906 inch is possible. Please inquire.
2. Install so that light from direct light sources does not enter the sensor (within 30° of the sensor light beam).

MA Motion Sensor (AMB1, 2, 3)

Items \ Detection distance			Middle type*Remark 1							Measured conditions
			20 cm 7.874 inch	30 cm 11.811 inch	40 cm 15.748 inch	50 cm 19.685 inch	60 cm 23.622 inch	70 cm 27.559 inch	80 cm 31.496 inch	
Rated detection distance		Minimum	190 mm 7.480 inch	285 mm 11.220 inch	380 mm 14.961 inch	475 mm 18.701 inch	570 mm 22.441 inch	665 mm 26.181 inch	760 mm 29.921 inch	with a standard reflection board
		Typical	200 mm 7.874 inch	300 mm 11.811 inch	400 mm 15.748 inch	500 mm 19.685 inch	600 mm 23.622 inch	700 mm 27.559 inch	800 mm 31.496 inch	
		Maximum	210 mm 8.268 inch	315 mm 12.402 inch	420 mm 16.535 inch	525 mm 20.669 inch	630 mm 24.803 inch	735 mm 28.937 inch	840 mm 33.071 inch	
Measuring tolerance		Typical	3%			5%		10%		Reflection rate: 90 to 18%
Usable ambient brightness (Resistance to ambient light)*Remark	Brightness of sensor surface	Maximum	30,000 lx							See the drawing on the next page.
	Brightness of reflection surface	Maximum	30,000 lx							

Remarks:1. After receipt of order, average rated detection distance to 110 cm 43.307 inch is possible. Please inquire.
2. Install so that light from direct light sources does not enter the sensor (within 30° of the sensor light beam).

Items \ Detection distance			Long type									Measured conditions
			30 cm 11.811 inch	40 cm 15.748 inch	50 cm 19.685 inch	60 cm 23.622 inch	70 cm 27.559 inch	80 cm 31.496 inch	90 cm 35.433 inch	100 cm 39.37 inch	110 cm 43.307 inch	
Rated detection distance		Minimum	285 mm 11.220 inch	380 mm 14.961 inch	475 mm 18.701 inch	570 mm 22.441 inch	665 mm 26.181 inch	760 mm 29.921 inch	855 mm 33.661 inch	950 mm 37.402 inch	1045 mm 41.142 inch	with a standard reflection board
		Typical	300 mm 11.811 inch	400 mm 15.748 inch	500 mm 19.685 inch	600 mm 23.622 inch	700 mm 27.559 inch	800 mm 31.496 inch	900 mm 34.433 inch	1000 mm 39.37 inch	1100 mm 43.307 inch	
		Maximum	315 mm 12.402 inch	420 mm 16.535 inch	525 mm 20.669 inch	630 mm 24.803 inch	735 mm 28.937 inch	840 mm 33.071 inch	945 mm 37.205 inch	1050 mm 41.339 inch	1155 mm 45.472 inch	
Measuring tolerance		Typical	3%						5%			Reflection rate: 90 to 18%
Usable ambient brightness (Resistance to ambient light)*Remark	Brightness of sensor surface	Maximum	30,000 lx									See the drawing on the next page.
	Brightness of reflection surface	Maximum	30,000 lx									

Remark: Install so that light from direct light sources does not enter the sensor (within 30° of the sensor light beam).

Items \ Detection distance			Long type									Measured conditions
			120 cm 47.244 inch	130 cm 51.181 inch	140 cm 55.118 inch	150 cm 49.055 inch	160 cm 62.992 inch	170 cm 66.929 inch	180 cm 70.866 inch	190 cm 74.803 inch	200 cm 78.74 inch	
Rated detection distance		Minimum	1140 mm 44.882 inch	1235 mm 48.622 inch	1330 mm 52.362 inch	1425 mm 56.102 inch	1520 mm 59.842 inch	1615 mm 63.583 inch	1710 mm 67.323 inch	1805 mm 71.063 inch	1900 mm 74.803 inch	with a standard reflection board
		Typical	1200 mm 47.244 inch	1300 mm 51.181 inch	1400 mm 55.118 inch	1500 mm 59.055 inch	1600 mm 62.992 inch	1700 mm 66.929 inch	1800 mm 70.866 inch	1900 mm 74.803 inch	2000 mm 78.74 inch	
		Maximum	1260 mm 49.606 inch	1365 mm 53.740 inch	1470 mm 57.874 inch	1575 mm 62.008 inch	1680 mm 66.142 inch	1785 mm 70.275 inch	1890 mm 74.409 inch	1995 mm 78.543 inch	2100 mm 82.677 inch	
Measuring tolerance		Typical	5%	10%				15%				Reflection rate: 90 to 18%
Usable ambient brightness (Resistance to ambient light)*Remark	Brightness of sensor surface	Maximum	30,000 lx									See the drawing on the next page.
	Brightness of reflection surface	Maximum	30,000 lx									

Remark: Install so that light from direct light sources does not enter the sensor (within 30° of the sensor light beam).

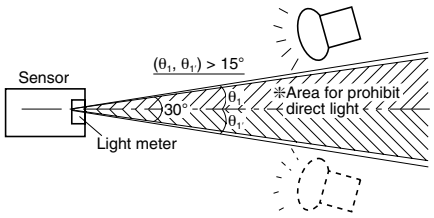
- For short type:
  100 mm 3.937 inch square area, 90% reflection rate.
- For middle type:
  200 mm 7.874 inch square area, 90% reflection rate.
- For long type:
  500 mm 19.685 inch square area, 90% reflection rate.

Notes: 1. Detecting an object within the maximum preset detection distance.

2. Distance deviation = $\frac{a-b}{a} \times 100$ (%)

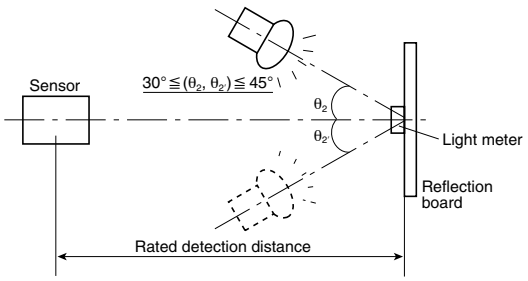
a: detection distance of standard detection target with reflectance of 90%.
b: detection distance of standard detection target with reflectance of 18%.

[Brightness of sensor surface]



Note: Light from direct light sources (sunlight, strobe light, inverter illumination, reflected light from glass or mirrors etc.) that enters the sensor from within the prohibited range can cause the sensor to operate erroneously.

[Brightness of reflection surface]



2. Absolute maximum rating (Measuring condition: ambient temp.: 25°C 77°F)

Items \ Type	Built-in oscillation circuit type		External triggering type	
	5 V DC type	Free-ranging power type	5 V DC type	Free-ranging power type
Power supply voltage	–0.3 to 8 V DC	–0.3 to 30 V DC	–0.3 to 8 V DC	–0.3 to 30 V DC
Output dielectric strength	30 V		30 V	
Output flow current	100 mA		10 mA	
Usable ambient temperature	–25 to +75°C +5 to +131°F (No freezing)		–25 to +75°C +5 to +131°F (No freezing)	
Storage temperature	–30 to +85°C –4 to +176°F		–30 to +85°C –4 to +176°F	

3. Electrical characteristics

(Measuring conditions: ambient temp.: 25°C 77°F; operating voltage: 5 V DC type =5V DC, free-ranging power type =24V DC)

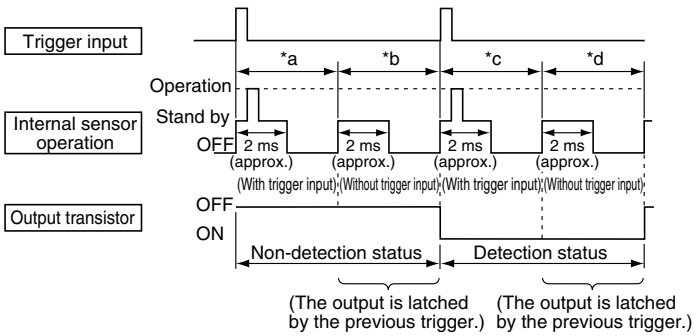
1) Built-in oscillation circuit type

Items				Symbol	Short type	Middle type	Long type	Measured conditions
Rated operating voltage			Minimum Typical Maximum	Vdd	5V DC type: 4.5V Free-ranging power type: 6.5V — 5V DC type: 6.5V Free-ranging power type: 27V			
Average current consumption (Iout = 0 mA)	No detection		Minimum Typical Maximum	It	— 5V DC type: 4.5mA Free-ranging power type: 5.6mA 5V DC type: 6.2mA Free-ranging power type: 7.8mA			
	Detection		Minimum Typical Maximum	It	— 5V DC type: 7.0mA Free-ranging power type: 9.1mA 5V DC type: 11.2mA Free-ranging power type: 14.2mA			
Measuring cycle			Minimum	T	8ms/cycle			
Output characteristics	Remain voltage		Maximum	Vr	1 V DC			It = 100 mA
	Leakage current		Maximum	Il	3μA			V = 30V

2) External triggering type (trigger conditions: trigger pulse width = 20μs and trigger synchronization = 5ms)

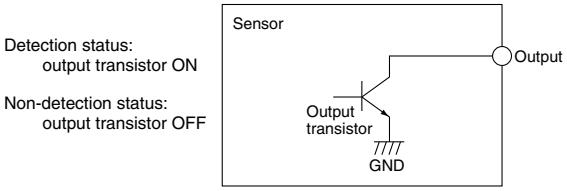
Items				Symbol	Short type	Middle type	Long type	Measured conditions
Rated operating voltage			Minimum Typical Maximum	Vdd	5V DC type: 4.5V Free-ranging type: 6.5V — 5V DC type: 6.5V Free-ranging type: 27V			
Average current consumption	Without trigger input	Output OFF	Minimum Typical Maximum	Ib	— 5V DC type: 0.1mA Free-ranging type: 1.0mA 5V DC type: 0.3mA Free-ranging type: 1.8mA			Notes: 1.*b
		Output ON	Minimum Typical Maximum	Id	— 5V DC type: 0.5mA Free-ranging type: 1.4mA 5V DC type: 3.4mA Free-ranging type: 4.5mA			Notes: 1.*d
	With trigger input	Output OFF	Minimum Typical Maximum	Ia	— 5V DC type: 2.2mA Free-ranging type: 3.1mA 5V DC type: 6.2mA Free-ranging type: 7.2mA			Notes: 1.*a
		Output ON	Minimum Typical Maximum	Ic	— 5V DC type: 2.4mA Free-ranging type: 3.3mA 5V DC type: 8.2mA Free-ranging type: 9.3mA			Notes: 1.*c
Measuring cycle (Trigger interval)			Minimum	Tt	5ms/cycle			
External trigger	Pulse width		Minimum Maximum	Tw	20μs 1/2Tt			Half off the distance period
	Level		Maximum Minimum	V_{TL} V_{TH}	0.8V 3V			Notes: 2
Response performance: time from trigger pulse fall to detection output			Maximum	Tr	5ms			
Output characteristics	Remain voltage		Maximum	Vr	1 V			I = 10 mA
	Leakage current		Maximum	Il	3μA			V = 30 mA

Notes: 1. The ratio between the 4 operating modes (*a to *d) depends on the external trigger period and detector time, and the current consumption corresponds with this varying ratio.



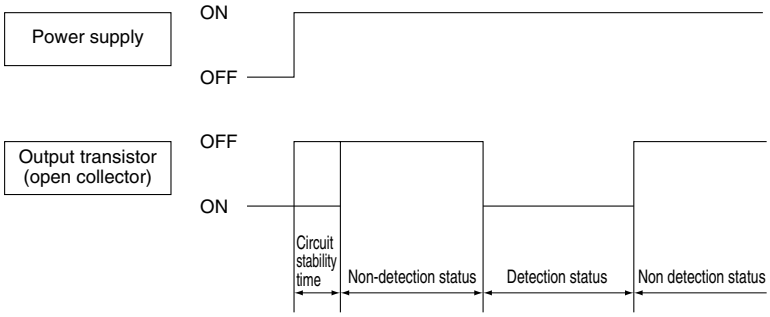
Notes: 2. A high level is established in the open state due to pull-up by the internal circuit. (Refer to the connector wiring diagram.)

Notes: 3. The output transistor is open collector.
The output transistor is turned ON by the sensor detection status and turned OFF by its non-detection status.



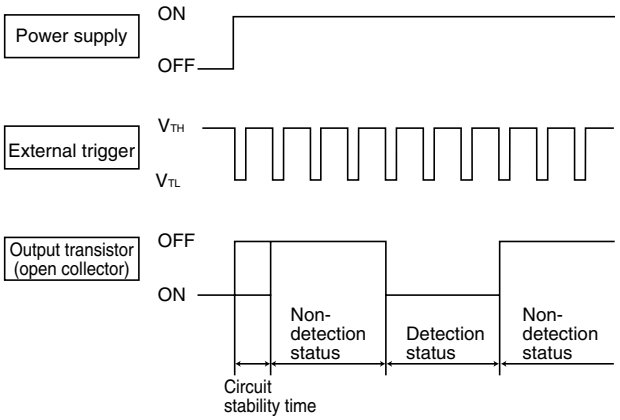
TIMING CHART

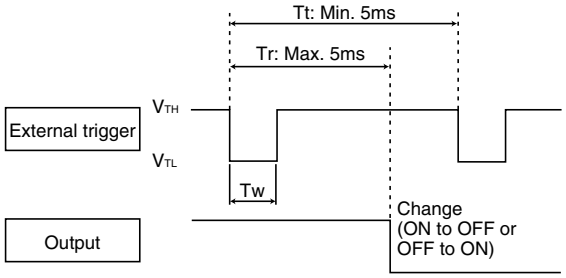
1) Built-in oscillation circuit type



Notes: 1. Circuit stability time : Max. 12 ms
2. During the time taken for the circuit to stabilize after the power is turned on, the ON/OFF status of the output transistor is not determined by whether the sensor is in the detection status or non-detection status.

2) External triggering type





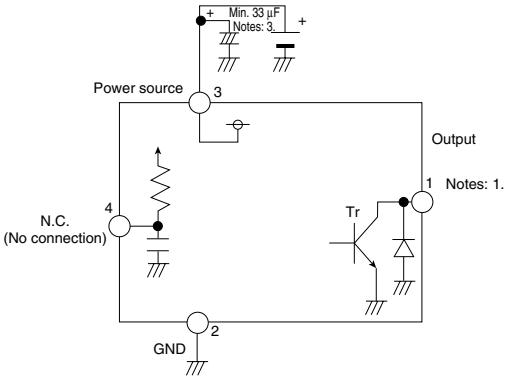
Notes: 1. Circuit stability time : Max. 12 ms
2. During the time taken for the circuit to stabilize after the power is turned on, the ON/OFF status of the output transistor is not determined by whether the sensor is in the detection status or non-detection status.

Note: The sensor recognizes at the $V_{TH} \rightarrow V_{TL}$ edge of an external trigger that the external trigger has been input.

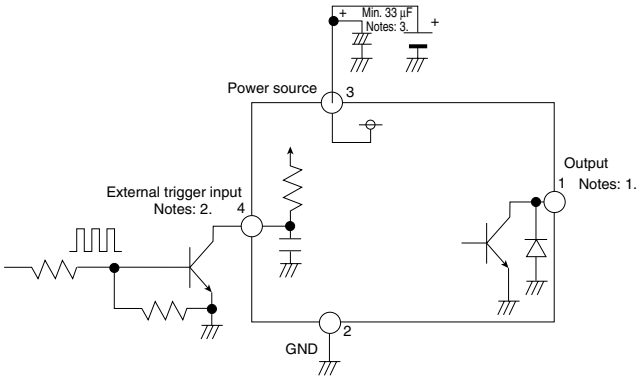
HOW TO USE

1. Wiring diagram of connector

Built-in oscillation circuit type



External triggering type



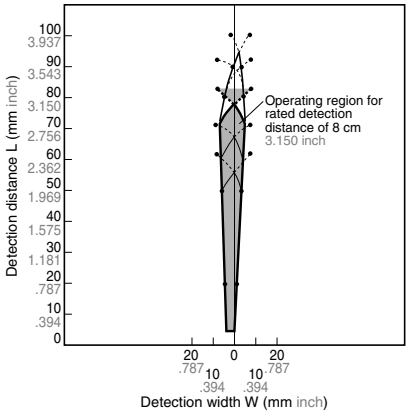
Notes: 1. The output transistor has an open collector structure.
Detection status: Output transistor ON (connected to GND)
Non-detection status: Output transistor OFF (open state)
2. The status of the external trigger input is as follows:
Open at the high level
GND (less than 0.8V) at the low level
Under no circumstances must a high-level voltage be applied.
3. In the case of the external trigger type, to maintain the power supply noise performance, be certain to connect a capacitor (33µF or more) to the sensor power supply input terminal in order to stabilize the power supply voltage.

REFERENCE DATA

Operating region characteristics

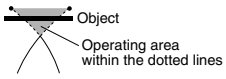
• How to interpret the graph

Example: Operating area of the Short Type with rated detection distance of 8 cm 3.150 inch.



Operating area within the dotted lines

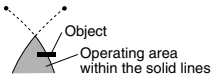
Objects that enter the entire area are detected.



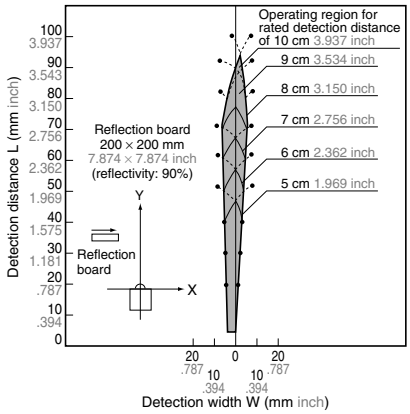
Note: If only part of the object is in the detection area, it is not detected.

Operating area within the solid lines

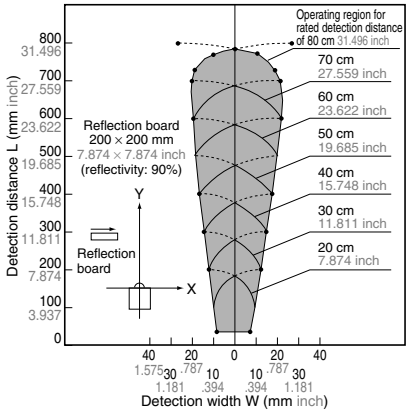
Objects that even partially enter the area are detected.



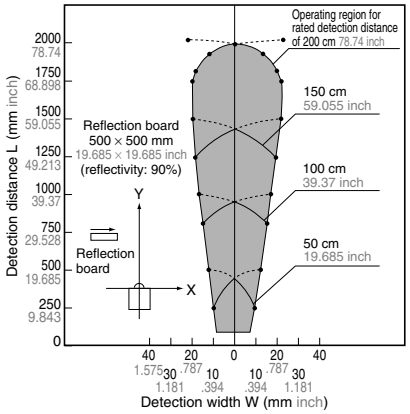
(1) Short type (AMB14□□□□□)



(2) Middle type (AMB24□□□□□)



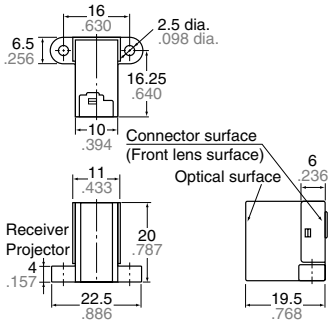
(3) Long type (AMB34□□□□□)



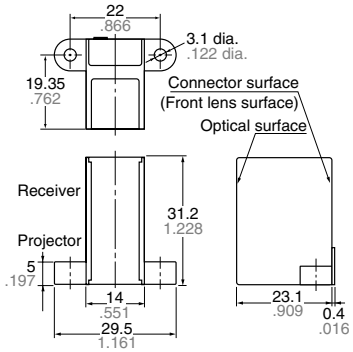
DIMENSIONS (Common to the Built-in oscillation circuit type and External triggering type)

mm inch

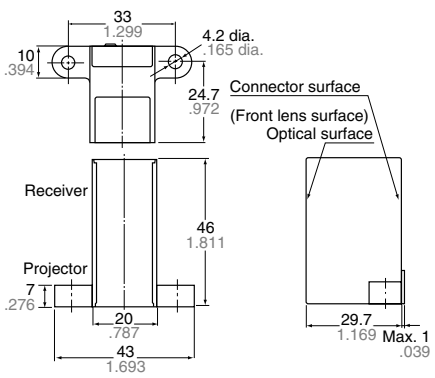
1) Short type (H) (10 cm 3.937 inch)



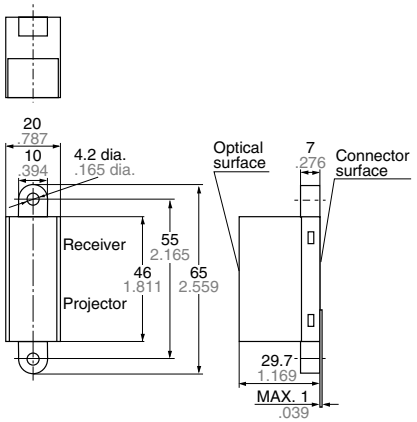
2) Middle type (H) (80 cm 31.496 inch)



3) Long type (H) (200 cm 78.74 inch)

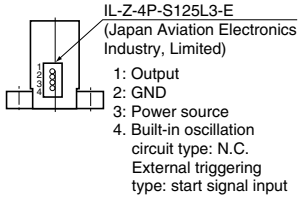


Long type (V) (200 cm 78.74 inch)

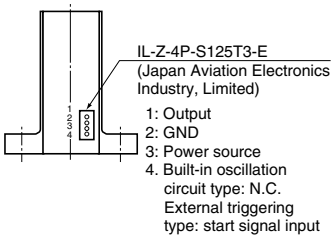


WIRING DIAGRAM (Connector surface view)

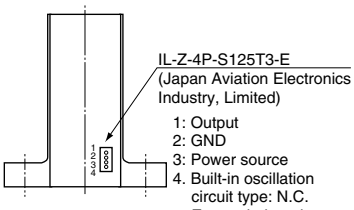
1) Short type (H)
(10 cm 3.937 inch)



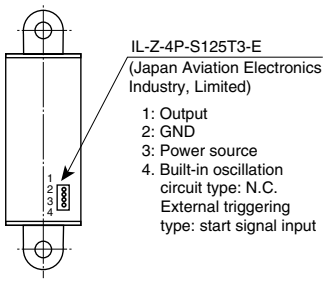
2) Middle type (H)
(80 cm 31.496 inch)



3) Long type (H)
(200 cm 78.740 inch)



4) Long type (V)
(200 cm 78.740 inch)

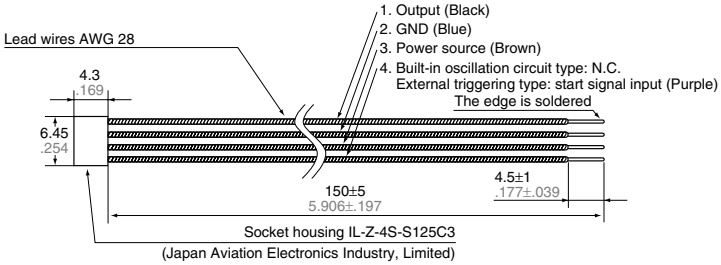


Notes: Purchase the follwing connections:
1. Socket housing IL-Z-4S-S125C3 (Japan Aviation Electronic Industry, Ltd.)
2. Lead wire (with metal connector at one end)

OPTIONAL

mm inch

1. Connector with cable
AMV9001



Note: Mistaken cable assembly can cause damage to the internal circuits, so please check the power cord before switching ON. (Particular care must be taken as to avoid reverse connection of the power.)

NOTES

1. Environment

1) Avoid using the sensor in environments containing excessive amounts of steam, dust, corrosive gas, or where organic solvents are present.
2) When the sensor is used in noisy environments, connect a capacitor (minimum 33 µF) across its power input terminals.

2. Wiring

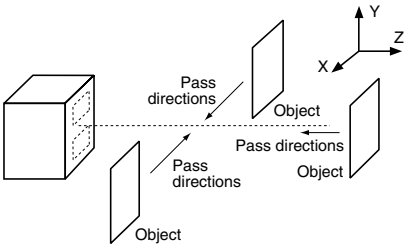
1) Check all wiring before applying power. Incorrect wiring may damage the internal circuit (in particular, check that the connection to the power supply is not reversed.)
2) Avoid excessive removing and replacing of the connector.

3. Detector surface (Optical surface)

1) Keep the detector surface clean. Excessive dust or dirt on the detector surface will deteriorate the sensing performance.
2) Do not allow condensation or freezing to occur on the surface of the sensor. If condensation or freezing does occur at low temperatures, the sensor may not detect objects correctly.
3) This product is designed to detect the existence of human body. The sensor will not detect objects consisting of a low reflective material (e.g., an object coated with black rubber, etc.) or of a highly reflective material (e.g., mirror, glass, coated paper, etc.)
4) The front surface of the lens and case are made of polycarbonate resin and can withstand water, alcohol, oils, salts and weak acids. Other fluids such as alkalines, aromatic hydrocarbons and halogenated hydrocarbons may melt or swell the lens and case, please do not have such fluids touch the lens and case.
5) If you use the sensor with a cover or filter connected to the front of the sensor, the sensor may detect the cover itself, the detection distance can change, and unstable operation can result.
6) When using multiple sensors in parallel, leave a space of at least 5 cm 1.969 inch between adjacent sensors, and confirm that they do not interfere with each other before use.
7) To protect the inner circuit, wiring should be max. 3 m 9.843 ft..

4. Recommended installation procedure

Install the photoelectric sensor so that it is orientated correctly in relation to the pass directions of the target objects as shown in the figure below.



❉ → stands for pass direction of the target object.

For the general precautions, refer to the Notes for Motion Sensors on next page.

NOTES FOR MOTION SENSOR

1. Ambient operating conditions

1) Temperature: Refer to the absolute maximum ratings for the temperature of each individual sensor.

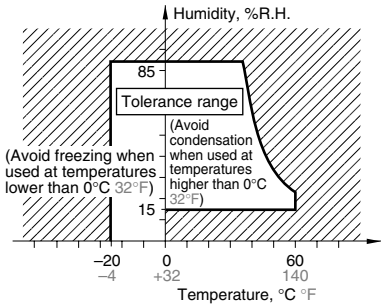
2) Humidity: 15% to 85% RH (No freezing nor condensation at low temperature)

3) Atmospheric pressure: 86 to 106 kPa

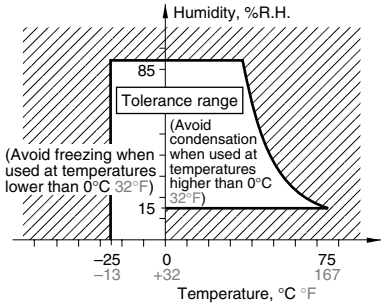
4) Because the humidity range differs depending on the ambient temperature, the humidity range indicated below should be used. Continuous operation of the switch is possible within this range, but continuous use near the limit of the range should be avoided.

• This humidity range does not guarantee permanent performance.

<MP Motion Sensor>



<MA Motion Sensor>



5) The operating temperature and humidity ranges are the ranges in which the sensor can be continuously operated. They are not the guaranteed environmental withstanding values. In general, degradation of electronic devices accelerates when they are operated under conditions of high temperature or high humidity. Before use, confirm the reliability of the sensors under the expected operating conditions.

6) The sensors do not have a water-proof or dust-proof construction. Depending on the ambient operating conditions, some means of providing protection from water and dust and preventing the formation of ice and condensation must be provided prior to using the sensors. If a sensor is used with a cover installed, the initial detection performance specifications may not be able to be met. Confirm the operation under the actual operating conditions.

7) Take care to avoid exposing the sensors to heat, vibration or impact since malfunctioning may result.

2. Concerning external surge voltages

Since the internal circuitry may be destroyed if an external surge voltages is supplied, provide an element which will absorb the surges. The levels of the voltage surges which the sensor can withstand is given below.

MA motion sensors: 500 V (±1.2 x 50µs unipolar full-wave voltage)

MP motion sensors: Within the supply voltage given in the absolute maximum ratings.

3. Concerning power supply-superimposed noise

1) Use a regulated power supply as the power supply. Otherwise, power supply-superimposed noise may cause the sensors to malfunction. The levels of noise which the sensor can withstand is given below.

MA motion sensors: ±200 V (50ns, 1µs wide square waves)

MP motion sensors: ±20 V (50ns, 1µs wide square waves)

2) To maintain the power supply noise performance, be certain to connect a capacitor (33µF or more) to the sensor power supply input terminal in order to stabilize the power supply voltage.

4. Drop damage

If the sensor is dropped, damage can occur resulting in incorrect operation. If dropped, be sure to do a visual check of the exterior for noticeable damage and check the operation characteristics for faulty operation.

5. Concerning the circuit sides

Since the circuit sides given in this catalog are not protected in terms of circuit design, check out the performance and reliability of the circuits prior to using the sensors.

SAFETY PRECAUTIONS

Head the following precautions to prevent injury or accidents.

• Do not use these sensors under any circumstances in which the range of their ratings, environment conditions or other specifications are exceeded. Using the sensors in any way which causes their specifications to be exceeded may generate abnormally high levels of heat, emit smoke, etc., resulting in damage to the circuitry and possibly causing an accident.

• Before connecting a connector, check the pin layout by referring to the connector wiring diagram, specifications diagram, etc., and make sure that the connector is connected properly. Take note that mistakes made in connection may cause unforeseen problems in operation, generate abnormally high levels of heat, emit smoke, etc., resulting in damage to the circuitry.

• Do not use any motion sensor which has been disassembled or remodeled.

• Protection circuit recommended

The possible failure mode is either open or short of the output transistor. An excess heat is the cause for short mode failure. For any important and serious application in terms of safety, add protection circuit or any other protection method.