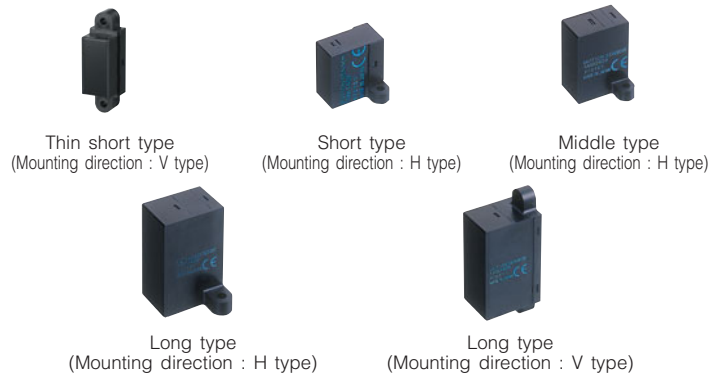


Active infrared (area reflective) human detection sensor MA MOTION SENSOR



Features

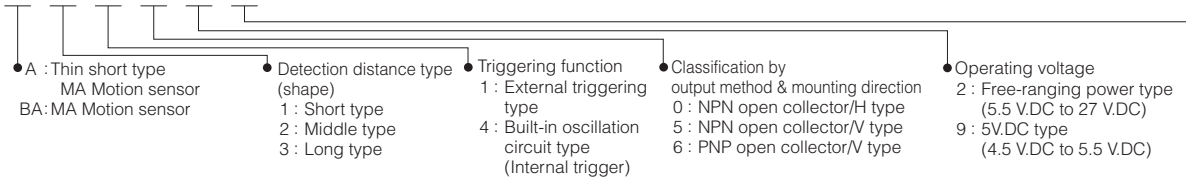
- Reliable detection hardly influenced by reflectivity of targeted objects
- Ready-to-use with DC power source (built-in oscillation circuit type)
- Capability to adjoin sensors
- RoHS compliant

Typical Applications

- Equipment around water: automatic lighting of wash-units, toilets, automatic flush
- Stores and financial markets: automatic doors, lighting, ATM, visitor sensors
- Amusement equipment: seating detection for pachinko machines, game displays
- Medical equipment markets: noncontact switches

Ordering Information

AM



● Rated detection distance

Unit : cm inch

| 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) |
|-----------------|-------------|--------------|--------------|--------------|--------------|--------------|--|--------------|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|--|
| Thin short type | - | - | - | 5 1.969 | - | - | - | - | 10 3.937 | - | - | - | - | 15 5.906 | - | - | - | - | - |
| Short type | - | - | - | 5 1.969 | 6 2.362 | 7 2.756 | 8 3.150 | 9 3.543 | 10 3.937 | - | - | - | - | - | - | - | - | - | - |
| Middle type | 20 7.874 | 30 11.811 | 40 15.748 | 50 19.685 | 60 23.622 | 70 27.559 | 80 31.496 | - | - | - | - | - | - | - | - | - | - | - | - |
| Long type | - | 30 11.811 | 40 15.748 | 50 19.685 | 60 23.622 | 70 27.559 | 80 31.496 | 90 35.443 | 100 39.37 | 110 43.307 | 120 47.244 | 130 51.181 | 140 55.118 | 150 59.055 | 160 62.992 | 170 66.929 | 180 70.866 | 190 74.803 | 200 78.74 |

Product Types

- Detection distance type (distance limited)
 - 1) Thin short type (V type)

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

| Operating voltage | Output method | Rated detection distance | Built-in oscillation circuit type | External triggering type |
|----------------------|---------------------------|--------------------------|-----------------------------------|--------------------------|
| | | | Part No. | Part No. |
| 4.5 V.DC to 5.5 V.DC | NPN open collector output | 5 cm 1.969 inch | AMA145905 | AMA115905 |
| | | 10 cm 3.937 inch | AMA1459 | AMA1159 |
| | | 15 cm 5.906 inch | AMA145915 | AMA115915 |
| | PNP open collector output | 5 cm 1.969 inch | AMA146905 | AMA116905 |
| | | 10 cm 3.937 inch | AMA1469 | AMA1169 |
| | | 15 cm 5.906 inch | AMA146915 | AMA116915 |

Note: If using multiple sensors adjacently or reducing power consumption, contact us for the optimal external trigger type.

2) Short type (H type)

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

| Rated operating voltage | Rated detection distance | Mounting direction : H type | |
|-------------------------|--------------------------|-----------------------------------|--------------------------|
| | | Short type | |
| | | Built-in oscillation circuit type | External triggering type |
| | | Part No. | Part No. |
| 4.5 V.DC to 5.5 V.DC | 5 cm 1.969 inch | AMBA140905 | AMBA110905 |
| | 6 cm 2.362 inch | AMBA140906 | AMBA110906 |
| | 7 cm 2.756 inch | AMBA140907 | AMBA110907 |
| | 8 cm 3.150 inch | AMBA140908 | AMBA110908 |
| | 9 cm 3.543 inch | AMBA140909 | AMBA110909 |
| | 10 cm 3.937 inch | AMBA1409 | AMBA1109 |
| 5.5 V.DC to 27 V.DC | 5 cm 1.969 inch | AMBA140205 | AMBA110205 |
| | 6 cm 2.362 inch | AMBA140206 | AMBA110206 |
| | 7 cm 2.756 inch | AMBA140207 | AMBA110207 |
| | 8 cm 3.150 inch | AMBA140208 | AMBA110208 |
| | 9 cm 3.543 inch | AMBA140209 | AMBA110209 |
| | 10 cm 3.937 inch | AMBA1402 | AMBA1102 |

Note: If using multiple sensors adjacently or reducing power consumption, contact us for the optimal external trigger type.

3) Middle type (H type)

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

| Rated operating voltage | Rated detection distance | Mounting direction : H type | |
|-------------------------|--------------------------|-----------------------------------|--------------------------|
| | | Middle type | |
| | | Built-in oscillation circuit type | External triggering type |
| | | Part No. | Part No. |
| 4.5 V.DC to 5.5 V.DC | 20 cm 7.874 inch | AMBA240902 | AMBA210902 |
| | 30 cm 11.811 inch | AMBA240903 | AMBA210903 |
| | 40 cm 15.748 inch | AMBA240904 | AMBA210904 |
| | 50 cm 19.685 inch | AMBA240905 | AMBA210905 |
| | 60 cm 23.622 inch | AMBA240906 | AMBA210906 |
| | 70 cm 27.559 inch | AMBA240907 | AMBA210907 |
| | 80 cm 31.496 inch | AMBA2409 | AMBA2109 |
| 5.5 V.DC to 27 V.DC | 20 cm 7.874 inch | AMBA240202 | AMBA210202 |
| | 30 cm 11.811 inch | AMBA240203 | AMBA210203 |
| | 40 cm 15.748 inch | AMBA240204 | AMBA210204 |
| | 50 cm 19.685 inch | AMBA240205 | AMBA210205 |
| | 60 cm 23.622 inch | AMBA240206 | AMBA210206 |
| | 70 cm 27.559 inch | AMBA240207 | AMBA210207 |
| | 80 cm 31.496 inch | AMBA2402 | AMBA2102 |

Note: If using multiple sensors adjacently or reducing power consumption, contact us for the optimal external trigger type.

4) Long type

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

| Rated operating voltage | Rated detection distance | Mounting direction : H type | | Mounting direction: V type | |
|-------------------------|--------------------------|-----------------------------------|--------------------------|-----------------------------------|--------------------------|
| | | Long type | | | |
| | | Built-in oscillation circuit type | External triggering type | Built-in oscillation circuit type | External triggering type |
| | | Part No. | Part No. | Part No. | Part No. |
| 4.5 V.DC to 5.5 V.DC | 30 cm 11.811 inch | AMBA340903 | AMBA310903 | AMBA345903 | AMBA315903 |
| | 40 cm 15.748 inch | AMBA340904 | AMBA310904 | AMBA345904 | AMBA315904 |
| | 50 cm 19.685 inch | AMBA340905 | AMBA310905 | AMBA345905 | AMBA315905 |
| | 60 cm 23.622 inch | AMBA340906 | AMBA310906 | AMBA345906 | AMBA315906 |
| | 70 cm 27.559 inch | AMBA340907 | AMBA310907 | AMBA345907 | AMBA315907 |
| | 80 cm 31.496 inch | AMBA340908 | AMBA310908 | AMBA345908 | AMBA315908 |
| | 90 cm 35.433 inch | AMBA340909 | AMBA310909 | AMBA345909 | AMBA315909 |
| | 100 cm 39.370 inch | AMBA340910 | AMBA310910 | AMBA345910 | AMBA315910 |
| | 110 cm 43.307 inch | AMBA340911 | AMBA310911 | AMBA345911 | AMBA315911 |
| | 120 cm 47.244 inch | AMBA340912 | AMBA310912 | AMBA345912 | AMBA315912 |
| | 130 cm 51.181 inch | AMBA340913 | AMBA310913 | AMBA345913 | AMBA315913 |
| | 140 cm 55.118 inch | AMBA340914 | AMBA310914 | AMBA345914 | AMBA315914 |
| | 150 cm 59.055 inch | AMBA340915 | AMBA310915 | AMBA345915 | AMBA315915 |
| | 160 cm 62.992 inch | AMBA340916 | AMBA310916 | AMBA345916 | AMBA315916 |
| | 170 cm 66.929 inch | AMBA340917 | AMBA310917 | AMBA345917 | AMBA315917 |
| | 180 cm 70.866 inch | AMBA340918 | AMBA310918 | AMBA345918 | AMBA315918 |
| 190 cm 74.803 inch | AMBA340919 | AMBA310919 | AMBA345919 | AMBA315919 | |
| 200 cm 78.740 inch | AMBA3409 | AMBA3109 | AMBA3459 | AMBA3159 | |
| 5.5 V.DC to 27 V.DC | 30 cm 11.811 inch | AMBA340203 | AMBA310203 | AMBA345203 | AMBA315203 |
| | 40 cm 15.748 inch | AMBA340204 | AMBA310204 | AMBA345204 | AMBA315204 |
| | 50 cm 19.685 inch | AMBA340205 | AMBA310205 | AMBA345205 | AMBA315205 |
| | 60 cm 23.622 inch | AMBA340206 | AMBA310206 | AMBA345206 | AMBA315206 |
| | 70 cm 27.559 inch | AMBA340207 | AMBA310207 | AMBA345207 | AMBA315207 |
| | 80 cm 31.496 inch | AMBA340208 | AMBA310208 | AMBA345208 | AMBA315208 |
| | 90 cm 35.433 inch | AMBA340209 | AMBA310209 | AMBA345209 | AMBA315209 |
| | 100 cm 39.370 inch | AMBA340210 | AMBA310210 | AMBA345210 | AMBA315210 |
| | 110 cm 43.307 inch | AMBA340211 | AMBA310211 | AMBA345211 | AMBA315211 |
| | 120 cm 47.244 inch | AMBA340212 | AMBA310212 | AMBA345212 | AMBA315212 |
| | 130 cm 51.181 inch | AMBA340213 | AMBA310213 | AMBA345213 | AMBA315213 |
| | 140 cm 55.118 inch | AMBA340214 | AMBA310214 | AMBA345214 | AMBA315214 |
| | 150 cm 59.055 inch | AMBA340215 | AMBA310215 | AMBA345215 | AMBA315215 |
| | 160 cm 62.992 inch | AMBA340216 | AMBA310216 | AMBA345216 | AMBA315216 |
| | 170 cm 66.929 inch | AMBA340217 | AMBA310217 | AMBA345217 | AMBA315217 |
| | 180 cm 70.866 inch | AMBA340218 | AMBA310218 | AMBA345218 | AMBA315218 |
| 190 cm 74.803 inch | AMBA340219 | AMBA310219 | AMBA345219 | AMBA315219 | |
| 200 cm 78.740 inch | AMBA3402 | AMBA3102 | AMBA3452 | AMBA3152 | |

Note: If using multiple sensors adjacently or reducing power consumption, contact us for the optimal external trigger type.

Rating

● Detection performance

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

| Items | | Unit | Thin short type | | | Measured conditions | |
|--|----------------------------------|---------|-----------------|-----------|-----------|-------------------------------------|---|
| | | cm inch | 5 1.969 | 10 3.937 | 15 3.937 | | |
| Rated detection distance | Minimum | mm inch | 45 1.772 | 90 3.543 | 135 5.315 | with a standard reflection board *1 | |
| | Typical | | 50 1.969 | 100 3.937 | 150 5.906 | | |
| | Maximum | | 55 2.165 | 110 4.331 | 165 6.496 | | |
| Measuring tolerance | | Typical | % | 10 | 25 | 35 | Reflection rate: 90 % to 18 % |
| Usable ambient brightness (Resistance to ambient light) *2 | Brightness of sensor surface | Maximum | lx | 30,000 | | | See the drawing (Fig. 1) on the Brightness next page. |
| | Brightness of reflection surface | | | 24,000 | | | |

Notes : *1. Ambient brightness: 500 lx

*2. Prevent direct light (within 30 ° against the optical axis of the sensor) from entering into the sensor.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

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

| Items | | Unit | | Short type *1 | | | | | Measured conditions |
|--|----------------------------------|------------|-------|---------------|-------|-------|-------|-------------------------------|--|
| | | cm | inch | 5 | 6 | 7 | 8 | 9 | |
| Rated detection distance | Minimum | mm inch | 45 | 54 | 63 | 72 | 81 | 90 | with a standard reflection board |
| | Typical | | 1.772 | 2.126 | 2.480 | 2.835 | 3.189 | 3.543 | |
| | Maximum | | 50 | 60 | 70 | 80 | 90 | 100 | |
| Measuring tolerance | | Typical | % | 10 | 15 | 20 | 25 | Reflection rate: 90 % to 18 % | |
| Usable ambient brightness (Resistance to ambient light) *2 | Brightness of sensor surface | Maximum | lx | 30,000 | | | | | See the drawing (Fig. 1) on the next page. |
| | Brightness of reflection surface | Maximum | | 24,000 | | | | | |

Notes : *1. After the order receipt, the average rated detecting distance can be increased to max 15 cm 5.906 inch. Please consult us.

*2. Prevent direct light (within 30 ° against the optical axis of the sensor) from entering into the sensor.

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

| Items | | Unit | | Middle type *1 | | | | | Measured conditions | |
|--|----------------------------------|------------|-------|----------------|--------|--------|-------------------------------|--------|--|----------------------------------|
| | | cm | inch | 20 | 30 | 40 | 50 | 60 | | 70 |
| Rated detection distance | Minimum | mm inch | 190 | 285 | 380 | 475 | 570 | 665 | 760 | with a standard reflection board |
| | Typical | | 7.480 | 11.220 | 14.961 | 18.701 | 22.441 | 26.181 | 29.921 | |
| | Maximum | | 200 | 300 | 400 | 500 | 600 | 700 | 800 | |
| Measuring tolerance | | Typical | % | 3 | 5 | 10 | Reflection rate: 90 % to 18 % | | | |
| Usable ambient brightness (Resistance to ambient light) *2 | Brightness of sensor surface | Maximum | lx | 30,000 | | | | | See the drawing (Fig. 1) on the next page. | |
| | Brightness of reflection surface | Maximum | | 24,000 | | | | | | |

Notes : *1. After the order receipt, the average rated detecting distance can be increased to max 110 cm 43.307 inch. Please consult us.

*2. Prevent direct light (within 30 ° against the optical axis of the sensor) from entering into the sensor.

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

| Items | | Unit | | Long type | | | | | | | Measured conditions | |
|---|----------------------------------|------------|--------|-----------|--------|-------------------------------|--------|--------|--------|--------|--|----------------------------------|
| | | cm | inch | 30 | 40 | 50 | 60 | 70 | 80 | 90 | | 100 |
| Rated detection distance | Minimum | mm inch | 285 | 380 | 475 | 570 | 665 | 760 | 855 | 950 | 1045 | with a standard reflection board |
| | Typical | | 11.220 | 14.961 | 18.701 | 22.441 | 26.181 | 29.921 | 33.661 | 37.402 | 41.142 | |
| | Maximum | | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | |
| Measuring tolerance | | Typical | % | 3 | 5 | Reflection rate: 90 % to 18 % | | | | | | |
| Usable ambient brightness (Resistance to ambient light) * | Brightness of sensor surface | Maximum | lx | 30,000 | | | | | | | See the drawing (Fig. 1) on the next page. | |
| | Brightness of reflection surface | Maximum | | 24,000 | | | | | | | | |

| Items | | Unit | | Long type | | | | | | | Measured conditions | |
|---|----------------------------------|------------|--------|-----------|--------|--------|-------------------------------|--------|--------|--------|--|----------------------------------|
| | | cm | inch | 120 | 130 | 140 | 150 | 160 | 170 | 180 | | 190 |
| Rated detection distance | Minimum | mm inch | 1140 | 1235 | 1330 | 1425 | 1520 | 1615 | 1710 | 1805 | 1900 | with a standard reflection board |
| | Typical | | 44.882 | 48.622 | 52.362 | 56.102 | 59.842 | 63.583 | 67.323 | 71.063 | 74.803 | |
| | Maximum | | 1200 | 1300 | 1400 | 1500 | 1600 | 1700 | 1800 | 1900 | 2000 | |
| Measuring tolerance | | Typical | % | 5 | 10 | 15 | Reflection rate: 90 % to 18 % | | | | | |
| Usable ambient brightness (Resistance to ambient light) * | Brightness of sensor surface | Maximum | lx | 30,000 | | | | | | | See the drawing (Fig. 1) on the next page. | |
| | Brightness of reflection surface | Maximum | | 24,000 | | | | | | | | |

Notes : * Prevent direct light (within 30 ° against the optical axis of the sensor) from entering into the sensor.

- For thin short type:
Standard reflection board : 150 mm 5.906 inch square area, 90% reflection rate.
- For short type:
Standard reflection board: 100 mm 3.937 inch square area, 90% reflection rate.
- For middle type:
Standard reflection board: 200 mm 7.874 inch square area, 90% reflection rate.
- For long type:
Standard reflection board: 500 mm 19.685 inch square area, 90% reflection rate.

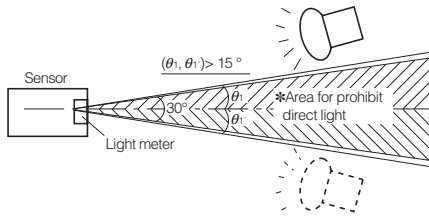
Notes : 1. Detecting an object within the maximum preset detection distance.

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

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

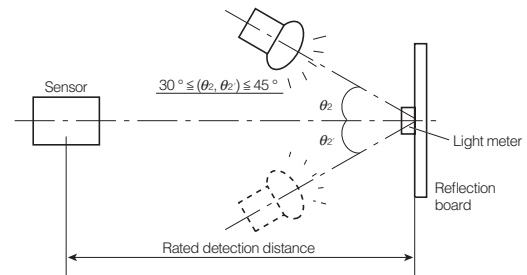
<Fig. 1>

[Brightness of sensor surface]



Notes : If sunlight or strobe/inverter light (including the regular reflection light from glasses and mirrors) directly enters from the inhibition area, those lights may cause malfunction of the sensor(sensor) from entering into the sensor.

[Brightness of reflection surface]



Absolute maximum rating

- Measuring condition: ambient temp.: 25 °C 77 °F

| Items | Absolute maximum rating | | | |
|----------------------------|---|-------------------------|---|-------------------------|
| | 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 V.DC to 6 V.DC | -0.3 V.DC to 30 V.DC | -0.3 V.DC to 6 V.DC | -0.3 V.DC to 30 V.DC |
| Output dielectric strength | 30 V.DC | | 30 V.DC | |
| Output flow current | 100 mA | | 10 mA* | |
| Usable ambient temperature | -25 °C to +75 °C +5 °F to +131 °F (No freezing) | | -25 °C to +75 °C +5 °F to +131 °F (No freezing) | |
| Storage temperature | -30 °C to +85 °C -4 °F to +176 °F | | -30 °C to +85 °C -4 °F to +176 °F | |

Notes : * Thin short type is only: 100 mA

Electrical characteristics

- Measuring conditions : ambient temp.: 25 °C 77 °F, operating voltage: 5 V.DC type, free-ranging power type 24 V.DC
- 1) Built-in oscillation circuit type

| Items | Symbol | Thin short type* | | Short type | Middle type | Long type | Measured conditions | |
|--|-----------------|--|-----------------|------------|--|-----------|------------------------|--|
| | | NPN output type | PNP output type | | | | | |
| Rated operating voltage | Minimum | 5 V.DC type : 4.5V.DC / Free-ranging power type : 5.5 V.DC | | | | | | |
| | Typical | - | | | | | | |
| | Maximum | 5 V.DC type : 5.5 V.DC /Free-ranging power type : 27 V.DC | | | | | | |
| Average current consumption (I _{out} =0 mA) | No detection | Minimum | - | | | | | |
| | | Typical | 4.5 mA | | 5 V.DC type : 4.5 mA Free-ranging power type : 5.6 mA | | | |
| | | Maximum | 6.2 mA | | 5 V.DC type : 6.2 mA Free-ranging power type : 7.8 mA | | | |
| | Detection | Minimum | - | | | | | |
| | | Typical | 7.0 mA | 11.0 mA | 5 V.DC type : 7.0 mA Free-ranging power type : 9.1 mA | | | |
| | | Maximum | 11.2 mA | 15.2 mA | 5 V.DC type : 11.2 mA Free-ranging power type : 14.2 mA | | | |
| Measuring cycle | Typical | T | 8 ms/cycle | | | | | |
| Output characteristics | Remain voltage | Maximum | V _r | 1 V.DC | 1.2 V.DC | 1 V.DC | I _t =100 mA | |
| | Leakage current | Maximum | II | 5 μA | | 3 μA | V=30 V.DC | |

Notes : * The thin short type is only available for 5 V.DC.

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

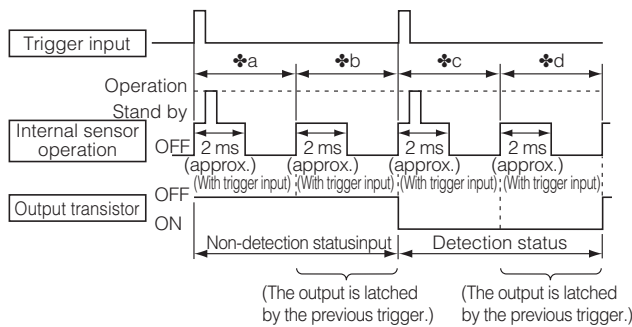
| Items | | | Symbol | Thin short type*1 | | Short type | Middle type | Long type | Measured conditions |
|--|-----------------------|------------|-----------------|---|--------------------|---|-------------|------------------------------|---------------------|
| | | | | NPN output type | PNP output type | | | | |
| Rated operating voltage | | | Minimum | 5 V.DC type : 4.5 V.DC / Free-ranging type : 5.5 V.DC | | | | | |
| | | | Typical | - | | | | | |
| | | | Maximum | 5 V.DC type : 5.5 V.DC / Free-ranging type : 27 V.DC | | | | | |
| Average current consumption | Without trigger input | Output OFF | Minimum | - | | | | | |
| | | | Typical | I _b | | 5 V.DC type: 0.1 mA/Free-ranging type: 1.0 mA | | | *2 ♣b |
| | | | Maximum | | | 5 V.DC type: 0.3 mA/Free-ranging type: 1.8 mA | | | |
| | | Output ON | Minimum | - | | | | | |
| | | | Typical | I _d | | 5 V.DC type: 0.5 mA/Free-ranging type: 1.4 mA | | | *2 ♣d |
| | | | Maximum | | | 5 V.DC type: 3.4 mA/Free-ranging type: 4.5 mA | | | |
| | With trigger input | Output OFF | Minimum | - | | | | | |
| | | | Typical | I _a | | 5 V.DC type: 2.2 mA/Free-ranging type: 3.1 mA | | | *2 ♣a |
| | | | Maximum | | | 5 V.DC type: 6.2 mA/Free-ranging type: 7.2 mA | | | |
| | | Output ON | Minimum | - | | | | | |
| | | | Typical | I _c | | 5 V.DC type: 2.4 mA/Free-ranging type: 3.3 mA | | | *2 ♣c |
| | | | Maximum | | | 5 V.DC type: 8.2 mA/Free-ranging type: 9.3 mA | | | |
| Measuring cycle (Trigger interval) | | | Typical | T _t | 5 ms/cycle | | | | |
| External trigger | Pulse width | Minimum | 20 μs | | | | | | |
| | | Maximum | T _w | | 1/2 T _t | | | Half off the distance period | |
| | Level | Minimum | V _{TL} | 0.8 V | | | | | |
| | | Maximum | V _{TH} | 3 V | | | *3 | | |
| Response performance: time from trigger pulse fall to detection output | | | Typical | T _r | 5 ms | | | | |
| Output characteristics | Remain voltage | Minimum | V _r | 1 V.DC | 1.2 V.DC | 1 V.DC | | I _t =10 mA | |
| | Leakage current | Maximum | I _l | 5 μA | | 3 μA | | V=30 V.DC | |

Notes : *1. The thin short type is only available for 5 V.DC.

*2. 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.

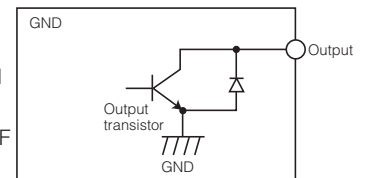
*4. The output transistor is open collector.

The output transistor is turned ON by the sensor detection status and turned OFF by its non-detection status.



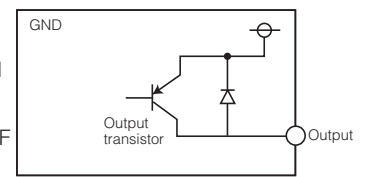
*3. A high level is established in the open state due to pull-up by the internal circuit. (Refer to the connector wiring diagram.)

Detection status: output transistor ON
Non-detection status: output transistor OFF



(NPN output types of the AMA series and all of AMBA series)

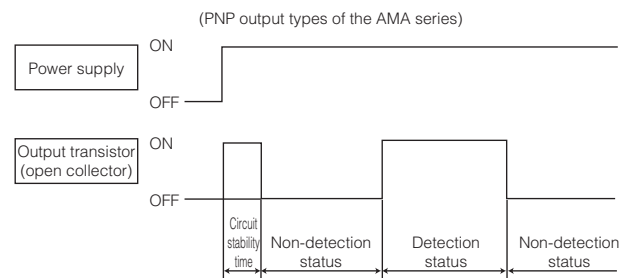
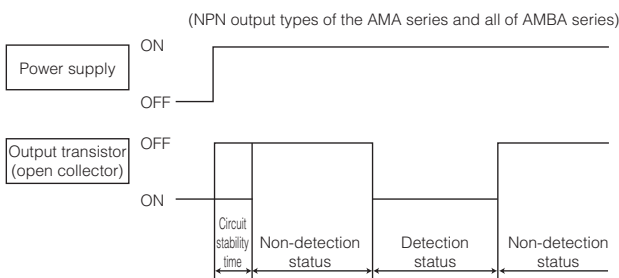
Detection status: output transistor ON
Non-detection status: output transistor OFF



(PNP output types of the AMA series)

Timing Chart

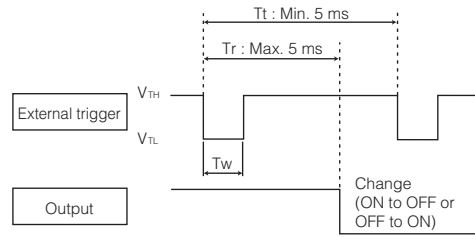
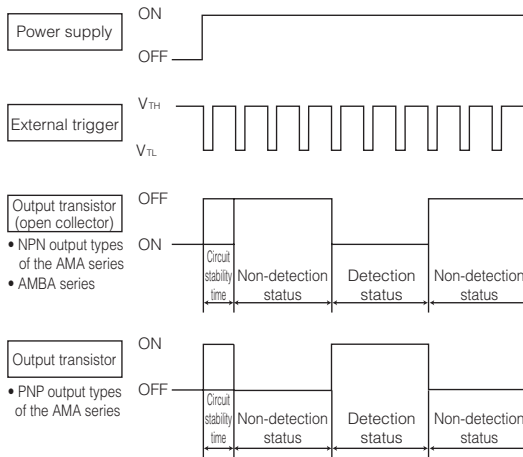
Built-in oscillation circuit type



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.

External triggering type

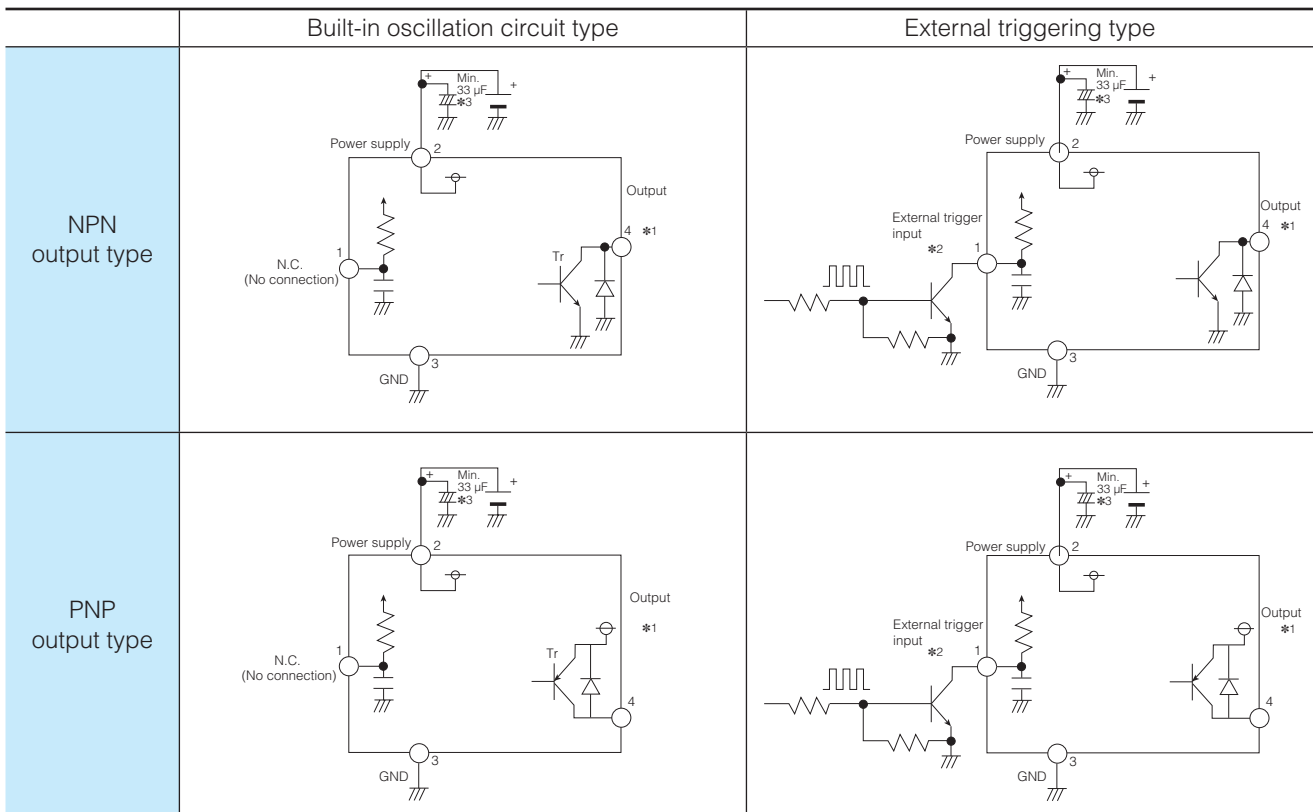


Notes : The sensor recognizes at the $V_{TH} \rightarrow V_{TL}$ edge of an external trigger that the external trigger has been input.

- 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.

How To Use

Wiring diagram of connector



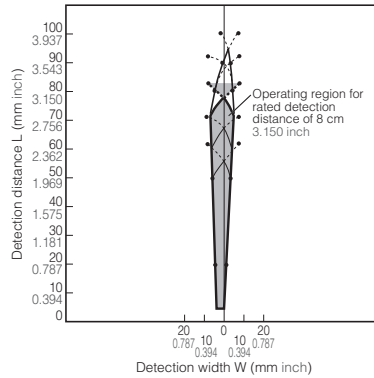
- Notes : *1. The output transistor has an open collector structure.
- Detection status: Output transistor ON (connected to GND)
 - Non-detection status: Output transistor OFF (open state)
- *2. The status of the external trigger input is as follows:
- Open at the high level
 - GND (less than 0.8 V) at the low level
- Do not apply a high voltage.
- *3. Install capacitor (of 33 μF or over) on the power input terminal of the sensor in order to secure power superimposed noise resistance and stabilize the power supply voltage.

Reference Data

Operating region characteristics

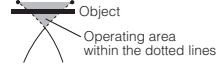
How to interpret the graph

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



Operating area within the dotted lines

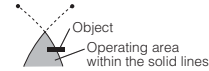
Objects that enter the entire area are detected.



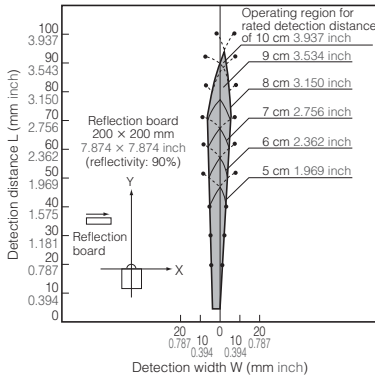
Note: If only part of the object is in the detection area, it is not detected.

Operating area within the solid lines

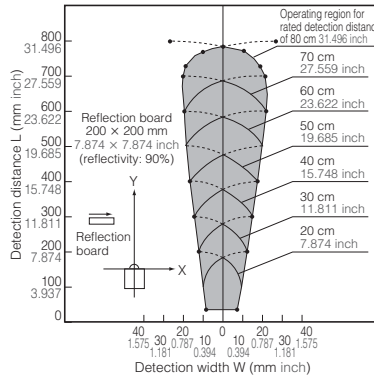
Objects that even partially enter the area are detected.



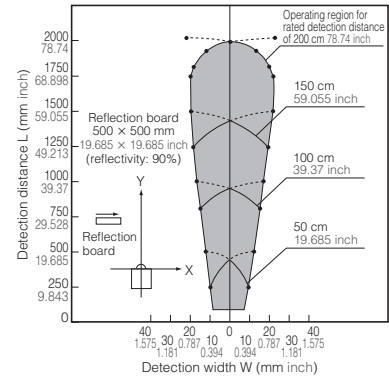
1.-(1) Thin short type (AMA1□□□□□) Short type (AMBA1□□□□□)



1.-(2) Middle type (AMBA2□□□□□)



1.-(3) Long type (AMBA3□□□□□)



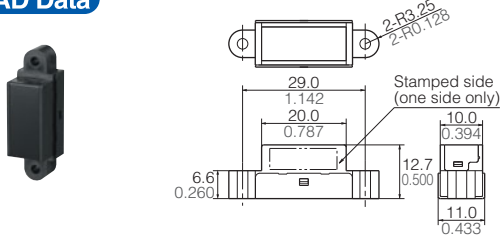
Dimensions

The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/>

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

Thin short type (V type)

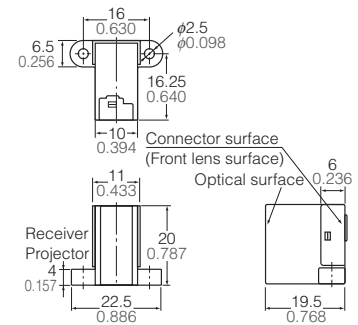
CAD Data



* Rear side connector protrusion: Max. 0.4mm

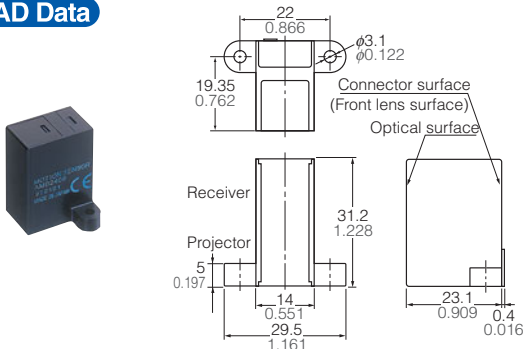
Short type (H type)

CAD Data



Middle type (H type)

CAD Data

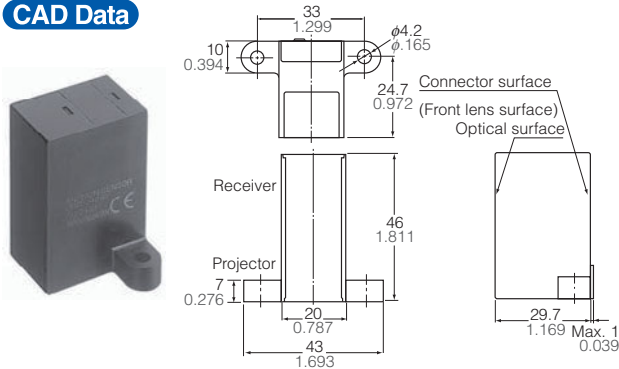


unit : mm inch

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

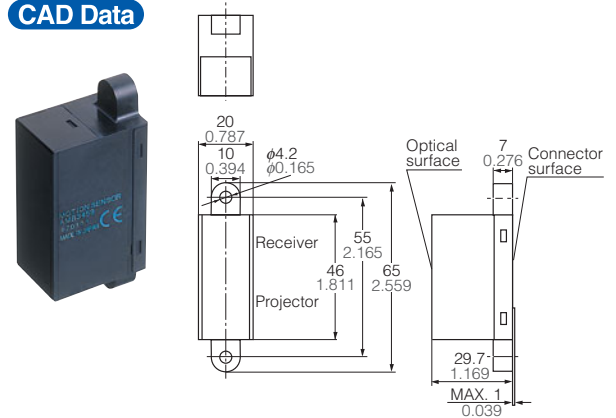
● Long type (H type)

CAD Data



● Long type (V type)

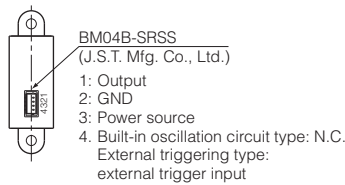
CAD Data



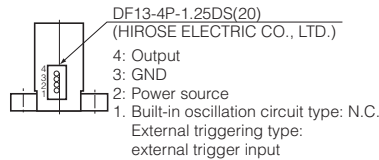
unit : mm inch

Wiring Diagram (Connector Surface View)

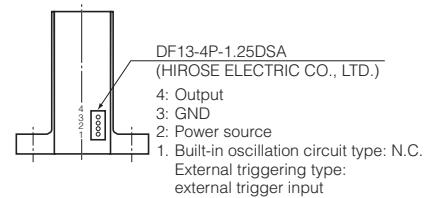
● Thin short type (V type)



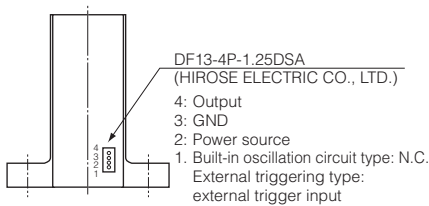
● Short type (H type)



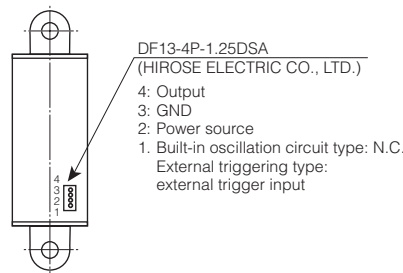
● Middle type (H type)



● Long type (H type)

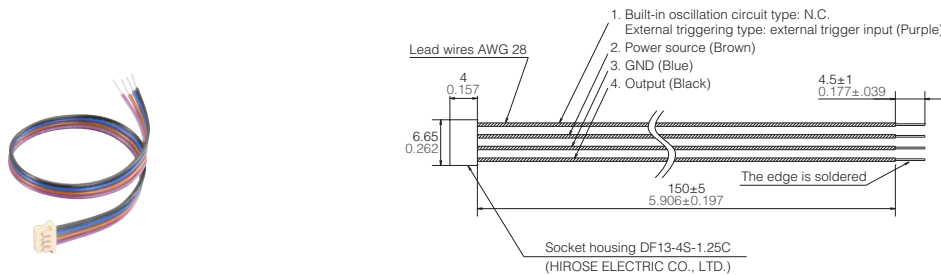


● Long type (V type)



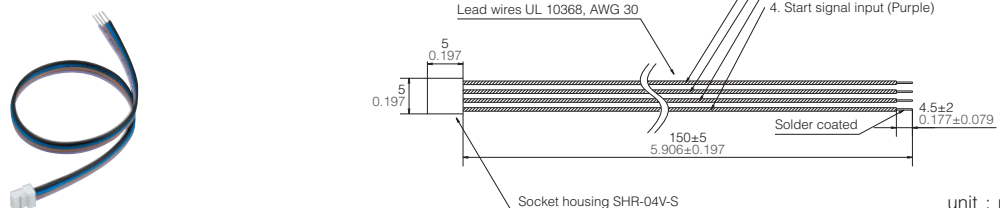
Options

● Connector with cable (for Short, Middle and Long type)
AMV9003



unit : mm inch

● Connector with cable (for Thin short type)
AMV9002



unit : mm inch

NOTES

■ Use environment

- 1) Avoid use in the steamy or dusty environment, the corrosive gas, an environment where organic solvent can be adhered.
- 2) When using in a high-noise environment, perform countermeasures such as installing capacitor (of 33 μ F or over) on the power input terminal of the sensor. Before use, check the performance under actual use conditions.

■ Wire connection

- 1) Before the power is supplied, recheck wiring as misconnection may damage the internal circuit. (ensure to avoid reverse connection)
- 2) Use wires shorter than 3 m 9.842 ft to protect the internal circuit. Before use, check under actual use conditions if there is no influence by surrounding environments.
- 3) Do not repeatedly attach/detach the connector.

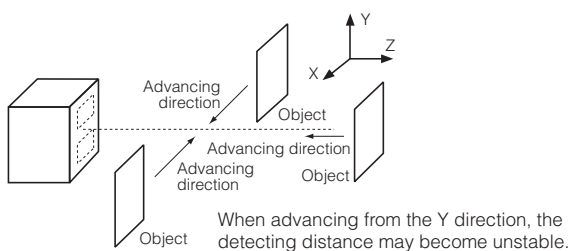
■ Detecting part

- 1) Keep the detecting surface clean. The detecting surface is resistant to trash/ dust, however, if an excessive amount of trash/dust adhere to the surface, it may reduce the margin of detecting distance.
- 2) Dew condensation on the detecting surface may cause malfunction.
- 3) The sensor aims to detect human bodies. If the targeted object has extremely low reflectivity (e.g., objects frosted by black rubbers) or extremely high reflectivity (e.g., objects which regularly reflect: mirrors, glasses or glossy papers), the sensor may not be able to detect or the detecting distance may become unstable.
- 4) The front face of the lense and the case are polycarbonate-based. Generally they are stable against water, alcohol, oil, salt and weak acids. However, avoid alkalis, aromatic hydrocarbons and halogenated hydrocarbons as those substances may expand or melt the lense and the case.
- 5) If placing filters (covers) in front of the sensor and perform detection through the filters, following may occur: detection of the filters (covers), changes of the detecting distance or unstable operations.
- 6) If sensors are in facing positions, light from the opposing sensor may cause mutual interferences and malfunction. Before use, check the installation conditions.
- 7) When arranging multiple sensors in parallel, keep the interval of neighboring sensors as below or over. Before use, ensure that there is no mutual interference.

| Part No. | Sensor interval |
|--------------|------------------|
| AMBA1 series | 5 cm 1.969 inch |
| AMA1 series | 8 cm 3.150 inch |
| AMBA2 series | 10 cm 3.937 inch |
| AMBA3 series | 20 cm 7.874 inch |

■ Recommended mounting direction

As below, install the sensor for the X and Z advancing directions of the targeted object.

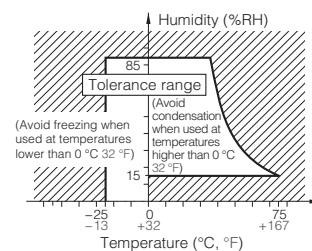


For general precautions, see "General precautions for motion sensors" in the next page.

■ 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.

<MA Motion Sensor>



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.

- 5) 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.
- 6) Take care to avoid exposing the sensors to heat, vibration or impact since malfunctioning may result.

■ 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.

■ Concerning power supplysuperimposed noise

- 1) Use a regulated power supply as the power supply. Otherwise, power supplysuperimposed noise may cause the sensors to malfunction.
- 2) To maintain the power supply noise performance, be certain to connect a capacitor (33 μ F or more) to the sensor power supply input terminal in order to stabilize the power supply voltage.

■ 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.

■ 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.