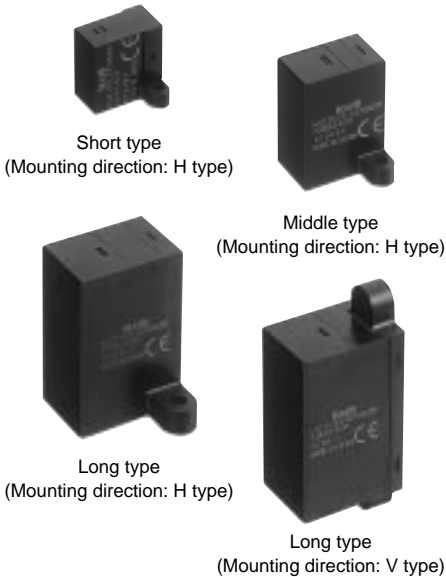


NAiS

MOTION SENSOR
(AREA REFLECTIVE TYPE)

MA MOTION
SENSOR Series



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.

FEATURES

- 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.
- Only connecting DC power supply for operating**
Built-in oscillation circuit type obviates the hitherto existing need for start signal input.
- 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.
- Battery drive possible**
By applying longer interval for the trigger signal, you can reduce the total power consumption.
- Ultra compact size**
Suitable for building in equipment as the size is ultra compact.
- Can be used with a number of different supply voltages.**
 - The DC 5V type (DC 4.5 to 6.5V)
 - The free-ranging power type (DC 6.5 to 27V)They support the DC power supplies of electronic products and equipment in general.

- 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.
- 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

- Water-based product market**
 - Automatic lighting of wash basin units
 - Toilets
 - Automatic water flow from faucets
- Stores and financial instructions**
 - Automatic doors
 - Automatic lighting
 - Cash dispensing machines
 - Automatic teller machines
 - Visitor detecting sensors
- Amusement market**
Automatic lighting for game display
- Medical field**
Non-contact switch
- Others**
 - Automatic ticket gates
 - Seat-taking sensors
 - Golf cart collision prevention

ORDERING INFORMATION

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 (DC6.5 to 27V) 9: The DC 5V type (DC 4.5 to 6.5V)

AMB

| 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 | mm | — | — | — | 5 | 6 | 7 | 8 | 9 | 10 | — | — | — | — | — | — | — | — | — | — |
| | inch | — | — | — | 1.969 | 2.362 | 2.756 | 3.150 | 3.543 | 3.937 | — | — | — | — | — | — | — | — | — | — |
| Middle type | mm | 20 | 30 | 40 | 50 | 60 | 70 | 80 | — | — | — | — | — | — | — | — | — | — | — | — |
| | inch | 7.874 | 11.811 | 15.748 | 19.685 | 23.622 | 27.559 | 31.496 | — | — | — | — | — | — | — | — | — | — | — | — |
| Long type | mm | — | 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.

MA Motion Sensor (AMB)

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 200 cm 78.740 inch | AMB340219 AMB3402 | AMB310219 AMB3102 | 20 pcs. | 200 pcs. |
| 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 | | |
| V type | Long type | 6.5 to 27 V DC | 190 cm 74.803 inch | AMB345919 | AMB315919 | 20 pcs. | 200 pcs. |
| | | | 200 cm 78.740 inch | AMB3459 | AMB3159 | | |
| | | | 30 cm 11.811 inch | AMB345203 | AMB315203 | | |
| | | | 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)

| 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 | 54 mm | 63 mm | 72 mm | 81 mm | 90 mm | with a standard reflection board | |
| | Typical | 1.772 inch | 2.126 inch | 2.480 inch | 2.835 inch | 3.189 inch | 3.543 inch | | |
| | | 50 mm | 60 mm | 70 mm | 80 mm | 90 mm | 100 mm | | |
| | | 1.969 inch | 3.362 inch | 2.756 inch | 3.150 inch | 3.543 inch | 3.937 inch | | |
| Maximum | 55 mm | 66 mm | 77 mm | 88 mm | 99 mm | 110 mm | | | |
| | 2.165 inch | 2.598 inch | 3.031 inch | 3.465 inch | 3.898 inch | 4.331 inch | | | |
| | | | | | | | | | |
| Measuring tolerance | | Typical | 10% | | 15% | 20% | | 25% | Reflection rate: 90 to 18% |
| Usable ambient brightness (Resistance to ambient light)*Remark 2 | 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 (AMB)

| 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 | |
| Items | | | | | | | | | | |
| Rated detection distance | Minimum | 190 mm | 285 mm | 380 mm | 475 mm | 570 mm | 665 mm | 760 mm | with a standard reflection board | |
| | Typical | 7.480 inch | 11.220 inch | 14.961 inch | 18.701 inch | 22.441 inch | 26.181 inch | 29.921 inch | | |
| | | 200 mm | 300 mm | 400 mm | 500 mm | 600 mm | 700 mm | 800 mm | | |
| | | 7.874 inch | 11.811 inch | 15.748 inch | 19.685 inch | 23.622 inch | 27.559 inch | 31.496 inch | | |
| Measuring tolerance | Typical | 210 mm | 315 mm | 420 mm | 525 mm | 630 mm | 735 mm | 840 mm | Reflection rate: 90 to 18% | |
| | | 8.268 inch | 12.402 inch | 16.535 inch | 20.669 inch | 24.803 inch | 28.937 inch | 33.071 inch | | |
| | | 3% | | | 5% | | 10% | | | |
| | | | | | | | | | | |
| Usable ambient brightness (Resistance to ambient light)*Remark 2 | Brightness of sensor surface | Maximum | 30,000 lx | | | | | | | See the drawing below. |
| | 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).

| Detection distance | | Long type | | | | | | | | | Measured conditions |
|---|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------------------|
| | | 30 cm | 40 cm | 50 cm | 60 cm | 70 cm | 80 cm | 90 cm | 100 cm | 110 cm | |
| Items | | 11.811 inch | 15.748 inch | 19.685 inch | 23.622 inch | 27.559 inch | 31.496 inch | 35.433 inch | 39.37 inch | 43.307 inch | |
| Rated detection distance | Minimum | 285 mm | 380 mm | 475 mm | 570 mm | 665 mm | 760 mm | 855 mm | 950 mm | 1045 mm | with a standard reflection board |
| | Typical | 11.220 inch | 14.961 inch | 18.701 inch | 22.441 inch | 26.181 inch | 29.921 inch | 33.661 inch | 37.402 inch | 41.142 inch | |
| | | 300 mm | 400 mm | 500 mm | 600 mm | 700 mm | 800 mm | 900 mm | 1000 mm | 1100 mm | |
| | | 11.811 inch | 15.748 inch | 19.685 inch | 23.622 inch | 27.559 inch | 31.496 inch | 34.433 inch | 39.37 inch | 43.307 inch | |
| Measuring tolerance | Typical | 315 mm | 420 mm | 525 mm | 630 mm | 735 mm | 840 mm | 945 mm | 1050 mm | 1155 mm | |
| | | 12.402 inch | 16.535 inch | 20.669 inch | 24.803 inch | 28.937 inch | 33.071 inch | 37.205 inch | 41.339 inch | 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 below. |
| | 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).

| 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 | | |
| Items | | | | | | | | | | | | |
| 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 below. |
| | 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.

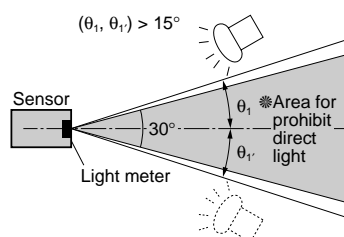
Notes: 1. Detecting an object within the maximum preset detection distance.

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

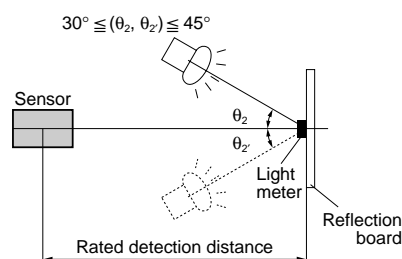
a: detection distance of standard detection target with reflectance of 90%.

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

[Brightness of sensor surface]



[Brightness of reflection 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.

MA Motion Sensor (AMB)

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

| Items | Type | Built-in oscillation circuit type | | External triggering type | |
|----------------------------|------|---|------------------------|---|------------------------|
| | | DC 5 V type | Free power supply type | DC 5 V type | Free power supply 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)

1) Built-in oscillation circuit type

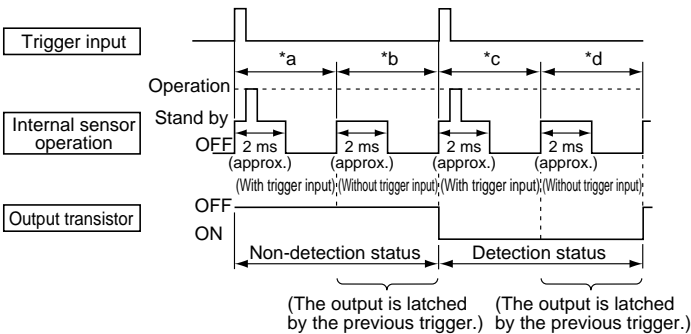
| Items | | Symbol | Short type | Middle type | Long type | Measured conditions |
|---|-----------------|-------------------------------|------------|---|-----------|---------------------|
| Rated operating voltage | | Minimum Typical Maximum | Vdd | DC 5V type: 4.5V Free-ranging power type: 6.5V — DC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

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

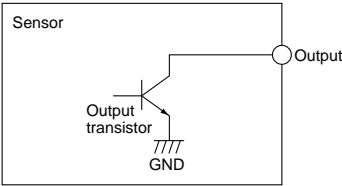
| Items | | | Symbol | 10 cm type | 80 cm type | 200 cm type | Measured conditions |
|---|-----------------------|--------------------|-------------------------------|---------------|--|-------------|------------------------------|
| Rated operating voltage | | | Minimum Typical Maximum | Vdd | DC 5V type: 4.5V Free-ranging type: 6.5V — DC 5V type: 6.5V Free-ranging type: 27V | | |
| Average current consumption | Without trigger input | Output OFF | Minimum Typical Maximum | Ib | — DC 5V type: 0.1mA Free-ranging type: 1.0mA DC 5V type: 0.3mA Free-ranging type: 1.8mA | | Notes: 1.*b |
| | | Output ON | Minimum Typical Maximum | Id | — DC 5V type: 0.5mA Free-ranging type: 1.4mA DC 5V type: 3.4mA Free-ranging type: 4.5mA | | Notes: 1.*d |
| | With trigger input | Output OFF | Minimum Typical Maximum | Ia | — DC 5V type: 2.2mA Free-ranging type: 3.1mA DC 5V type: 6.2mA Free-ranging type: 7.2mA | | Notes: 1.*a |
| | | Output ON | Minimum Typical Maximum | Ic | — DC 5V type: 2.4mA Free-ranging type: 3.3mA DC 5V type: 11.2mA 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 | Minimum Maximum | VTL VTH | 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 DC | | 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: 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.



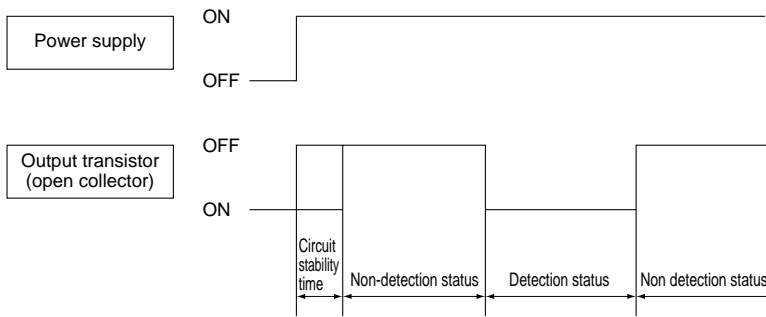
Detection status:
output transistor ON
Non-detection status:
output transistor OFF



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.)

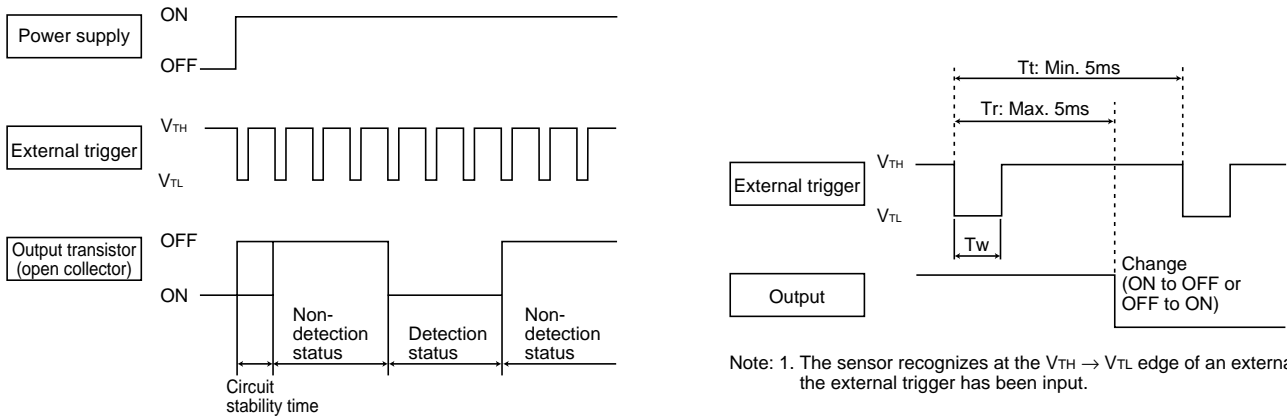
TIMING CHART

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

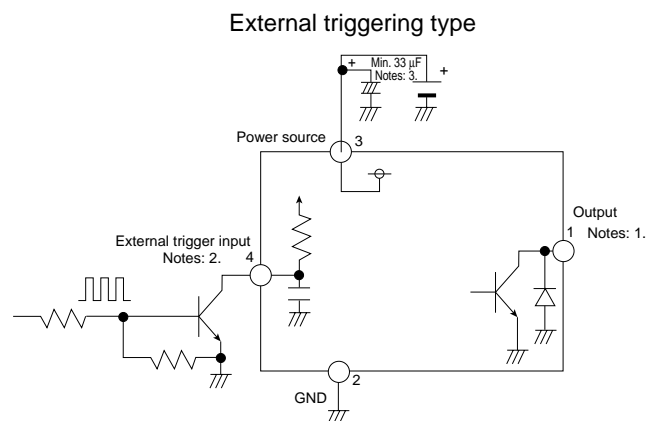
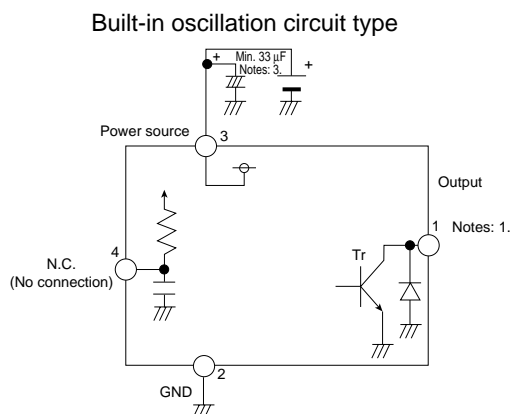


- Note: 1. The sensor recognizes at the $V_{TH} \rightarrow V_{TL}$ edge of an external trigger that the external trigger has been input.

- 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

1. 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 0.8V) 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.

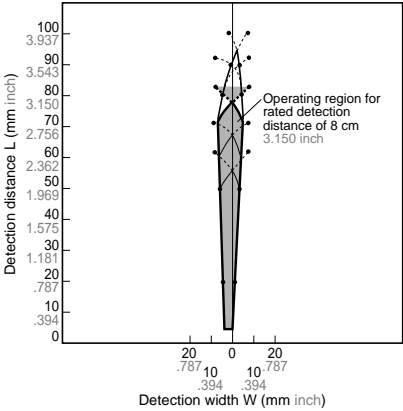
MA Motion Sensor (AMB)

REFERENCE DATA

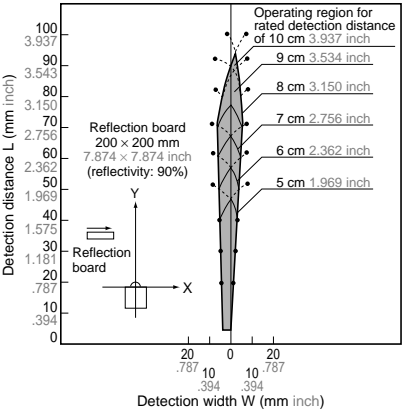
Operating region characteristics

- How to interpret the graph

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



(1) Short type (AMB14)

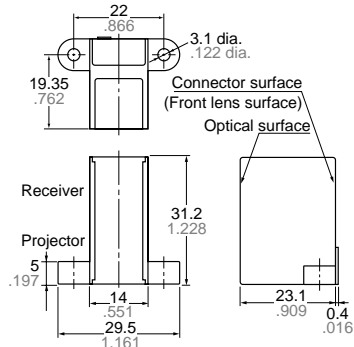
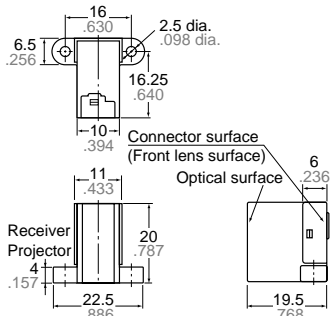


DIMENSIONS (Common to the Built-in oscillation circuit type and External triggering type)

mm inch

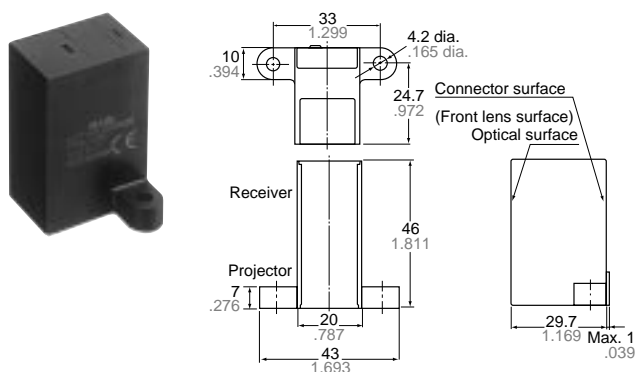
1) Short type (H) (10 cm 3.937 inch)

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

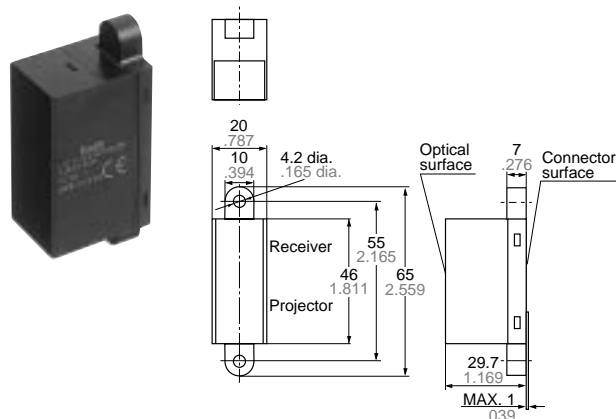


MA Motion Sensor (AMB)

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

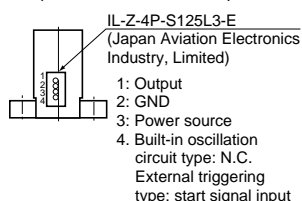


Long type (V) (200 cm 78.74 inch)

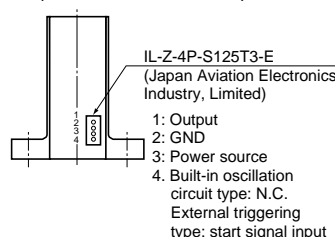


WIRING DIAGRAM (Connector surface view)

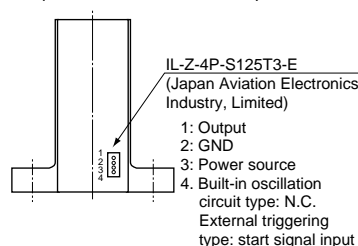
1) Short type (H)
(10 cm 3.937 inch)



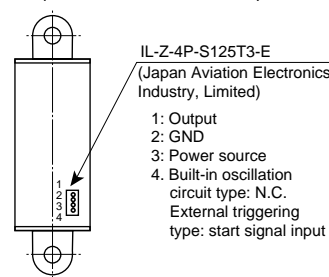
2) Middle type (H)
(80 cm 31.496 inch)



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



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

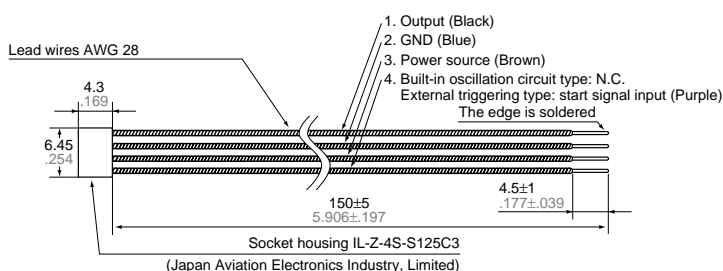


(Notes) Purchase the following connections:

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

OPTIONAL

1. Connector with cable
AMB9001



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.

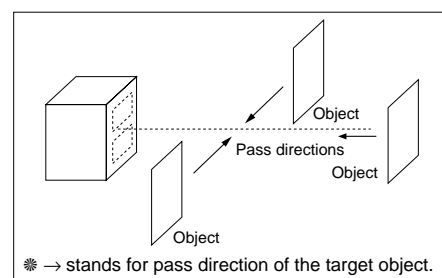
- 5) If you use the sensor with a cover or filter connected to the front of the sensor, the sensor may detect the cover itself, the detection distance can change, and unstable operation can result.

- 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.



MA Motion Sensor (AMB)

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) 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.

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.

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 ($\pm 1.2 \times 50\mu\text{s}$ 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 (50ms, $1\mu\text{s}$ wide square waves)

MP motion sensors: ± 20 V (50ms, $1\mu\text{s}$ wide square waves)

2) To maintain the power supply noise performance, be certain to connect a capacitor ($33\mu\text{F}$ 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.