

# Motion-Detecting Sensor (AMP)

# NAIS

## MOTION-DETECTING SENSOR (PASSIVE INFRARED TYPE)

# AMP Series



## FEATURES

- **Detects even slight motion of a person (e.g. a 20 cm 7.87 inch movement of the hand)**

With our unique motion detector—highly sensitive type, even slight motions made by people will be detected easily.

- **Compact lens**

We have decreased the exposed portion of the lens, and at the same time maintained a detection ability that is as good or better than other motion sensors on the market.

Lens dimensions:

Standard sensitive type

16×20 mm .630×.787 inch

Highly sensitive type  
24×24 mm .945×.945 inch

- **High detection ability**

This sensor is a stable, sensitive sensor that detects 2°C 3.6°F temperature changes regardless of the location or speed of the subject. In other words, this sensor ensures detection whether a person is at the edge of the detection area or in the middle, regardless of how fast they are moving.

- **Low current consumption**

The standard model consumes 260 μA (during stand-by), while the low consumption current type consumes 30 μA (during stand-by). This makes battery operation possible.

- **Wide operation voltage range (2.6 to 5.5 V DC)**

The usable range extends from a standard 5 V DC for microcomputers to 3 V DC and 4.5 V DC for battery operation.

- **Varied operation in accordance with the surrounding brightness**

If used together with a brightness sensor (CdS), you can make the sensor operate only during bright hours or dark hours.

- **Output time can easily be changed**

By simply changing the resistor attached to the outside of the sensor, the output time can be changed from approximately 10 seconds to 6 minutes.

## TYPICAL APPLICATIONS

- Lighting and ventilation control of conference rooms
- Control of illumination and exhaust fans in toilets
- Lighting control of halls
- Nighttime lighting control of vending machines
- Lightning control around cash dispensing machines (ATMs)

## ORDERING INFORMATION

Ex. AMP   0 9

Detection performance	Current consumption	Lead wire	Operating voltage
1: Standard sensitive type: 0.3 to 2.0 m/s 2: Highly sensitive type: 0.3 to 1.0 m/s	0: Standard type 1: Low current consumption type	0: No lead wire type	9: 2.6 to 5.5 V DC

## TYPES

Detection performance	Current consumption	Rated operating voltage	Part No.	Packing quantity	
				Inner	Outer
Standard sensitive type	Standard type	2.6 to 5.5 V DC	AMP1009	20 pcs.	200 pcs.
	Low current consumption type		AMP1109		
Highly sensitive type	Standard type		AMP2009		
	Low current consumption type		AMP2109		

## PERFORMANCE

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

Items	Standard sensitive type	Highly sensitive type	Conditions of objects to be detected	
Rated detection distance	5 m min.	2 m min.	1. To have more than 2°C 36°F of temperature difference from background 2. Movement speed • Standard sensitive type: 0.3 to 2.0 m/s • Highly sensitive type: 0.3 to 1.0 m/s 3. Detection object = human body	
Detection range	Horizontal	95°		73°
	Vertical	55°		73°
	Detection zone	34 zones		64 zones

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

Items	Specified value	Remarks
Power supply voltage	7 V	
Output (Open collector)	Voltage	30 V
	Current	50 mA
Usable ambient temperature	-20 to +55°C -4 to +131°F	No freezing and condensing at low temperature.
Storage temperature	-30 to +80°C -22 to +176°F	

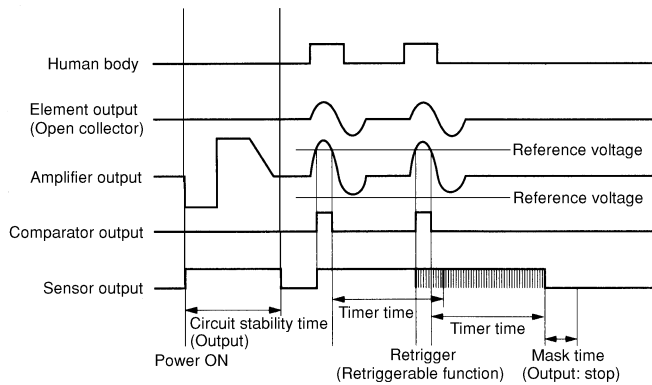
# Motion-Detecting Sensor (AMP)

## 3. Electrical characteristics (Measuring conditions: ambient temp.: 25°C 77°F; operating voltage: 5V)

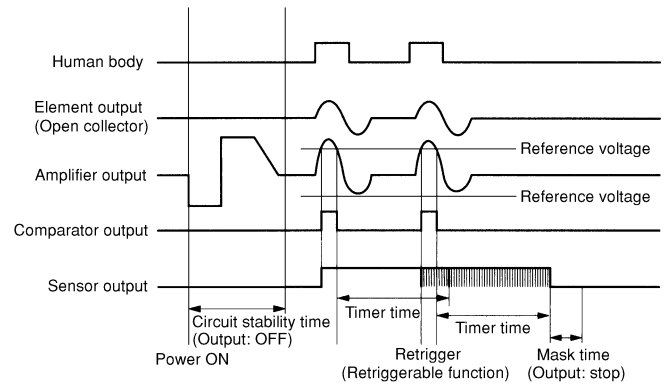
Items		Symbol	Specified value	Measured conditions	
Rated operating voltage		V <sub>dd</sub>	2.6 V DC — 5.5 V DC		
Rated consumption current	Standby		I <sub>w</sub>	Standard type: 200 μA; Low consumption current type: 12 μA Standard type: 260 μA; Low consumption current type: 30 μA Standard type: 560 μA; Low consumption current type: 96 μA	
	ON	I <sub>a</sub>		Standard type: 1,000 μA; Low consumption current type: 1,000 μA Standard type: 1,250 μA; Low consumption current type: 1,200 μA Standard type: 1,600 μA; Low consumption current type: 1,400 μA	
Mask time*		T <sub>m</sub>	0.8 s 1.3 s 1.8 s		
Circuit stability time			T <sub>wu</sub>	15 s 30 s 45 s	When power is ON.
Timer time				T <sub>d</sub>	5 s 10 s 15 s

### [Timing chart]

#### Standard type



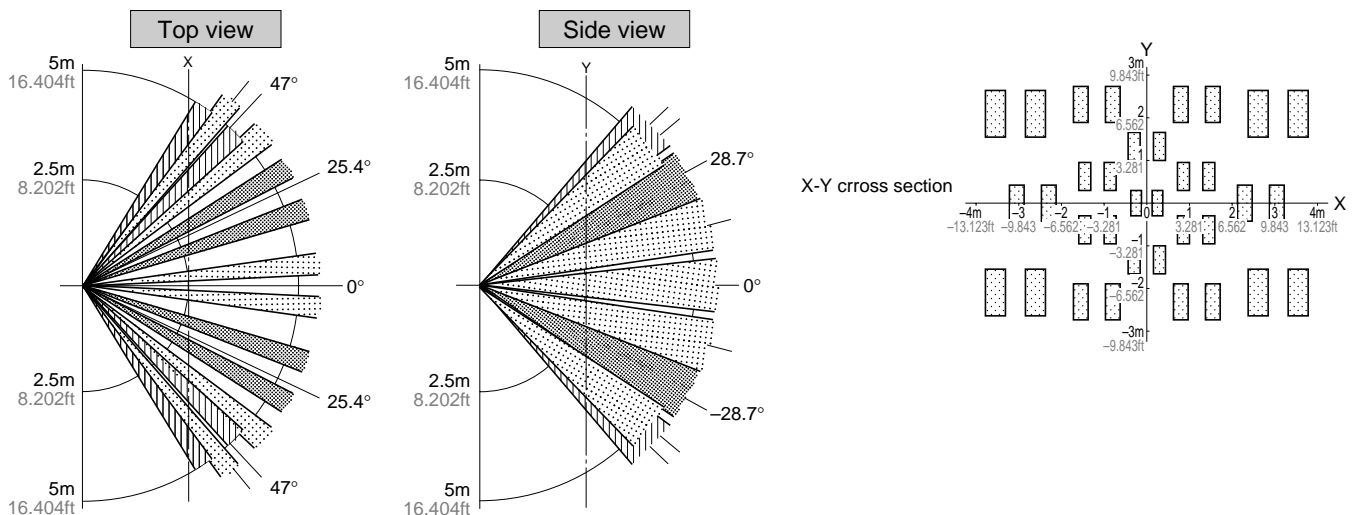
#### Low current consumption type



\* "Mask time" is included to prevent malfunctions caused by fluctuations in the load current at the moment the timer stops operation. During the "Mask time", the output from the sensor is turned off.

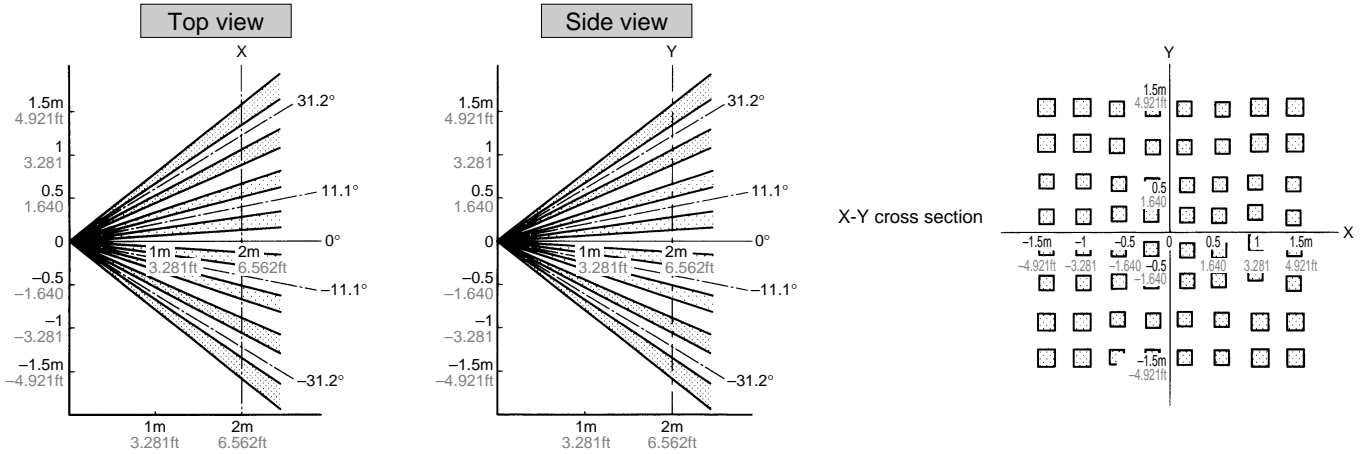
## DETECTION PERFORMANCE

### 1. Standard sensitive type



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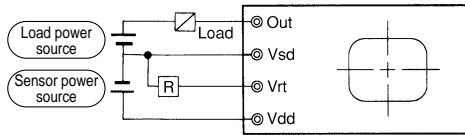
## 2. Highly sensitive type



## HOW TO USE

### 1. Wiring diagram

Sensor module



Out: Output (open collector)  
Vsd: GND  
Vrt: Time setting  
Vdd: Input power source (DC)

### 2. Time setting

Standard sensitive type/Highly sensitive type  
Timer time and external mounted resistor

Timer time (Td)	R-value	External mounted resistor
10 sec.	8.86 KΩ	Short
30 sec.	66.6 KΩ	68 KΩ
1 min.	153.2 KΩ	160 KΩ
2 min.	326.3 KΩ	330 KΩ
3 min.	499.5 KΩ	510 KΩ
4 min.	672.6 KΩ	680 KΩ
5 min.	845.8 KΩ	820 KΩ
6 min.	1,019 KΩ	1 MΩ

Note Timer time, 1 sec. is available as a custom ordered product.

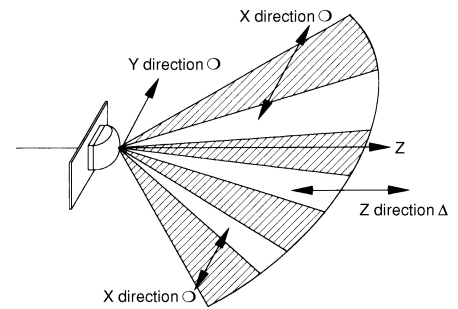
Time calculation:

$$T_d = 0.3465 \times (20 + R)$$

R: External mounted resistor (KΩ)

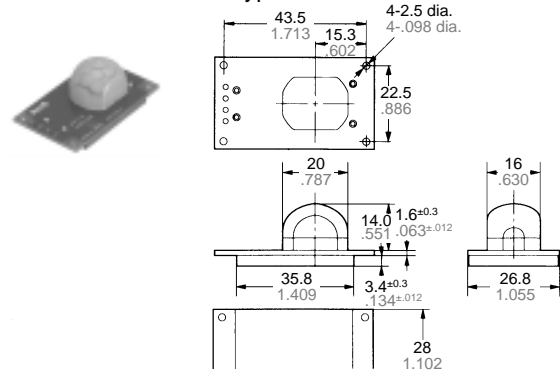
### 3. Installation

Install the sensor so that people will be entering from the X or Y direction shown below. If persons approach the sensor from the Z direction, detection distance will be shortened.

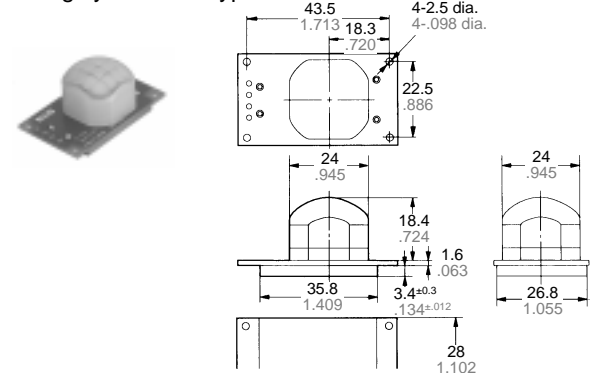


## DIMENSIONS

### 1. Standard sensitive type



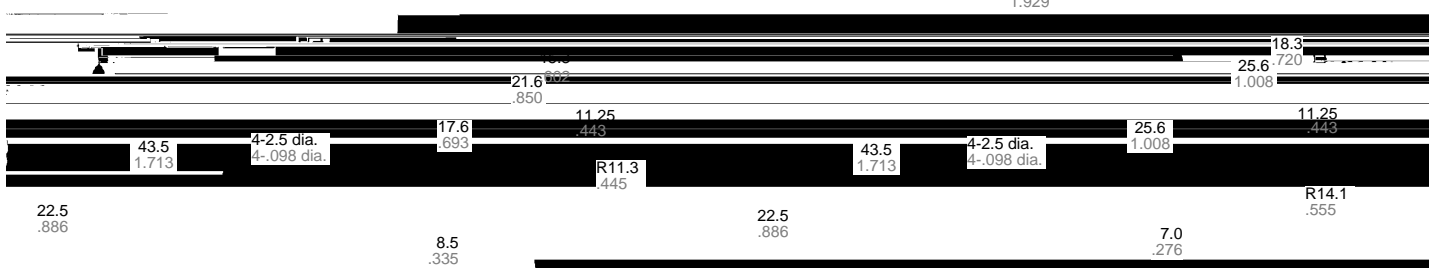
### 2. Highly sensitive type



mm inch

General tolerance:  $\pm 0.4 \pm 0.16$

General tolerance:  $\pm 0.4 \pm 0.16$



Note 1: In order to ensure proper detection, install it with

Note 2: In order to ensure proper detection, install it with

## CAUTIONS WHEN USING

This product is mainly designed for use indoors with general electronic devices. If it is to be used outdoors, take suitable precautions to protect it from water, dust, dew condensation, and freezing.

Example:

1. Safety devices
2. Security equipment
3. Traffic signal equipment
4. Miscellaneous safety devices and control equipment for trains, automobiles.

### 1. Operation environment

1) Shown below are ambient temperature, humidity and air pressure conditions for operation, transportation, and storage of the sensor.

- ① Usable ambient temperature:  
 -20 to 55°C -4 to +131°F  
 Storage temperature:  
 -30 to 80°C -22 to +176°F
- ② Humidity: 15 to 85% R.H.  
 (with no freezing and condensation)
- ③ Air pressure: 86 to 106 kPa
  - Condensation  
 Condensation may occur if the relay is exposed to sudden temperature change in a high-temperature, high-humidity environment. This may result in problems such as sensing performance deterioration, non-operation or insulation failure.
  - Freezing  
 At temperature below 0°C 32°F, condensation and moisture may freeze onto the sensor and cause problems such as sensing performance deterioration, non-operation or insulation failure.

- Low-temperature, low-humidity atmosphere

If the relay is exposed to a low-temperature, low-humidity environment for an extended period of time, the plastic components may become brittle and fragile.

- 2) Be sure to use a stable power source for the sensor. The sensor may operate incorrectly if it receives voltage ripples of more than 40 mV P-P.
- 3) Be sure to employ an absorber element to prevent the internal circuit from being destroyed if an external voltage surge of more than 500 V occurs (monopolarized all-wave voltage of  $\pm 1.2 \times 50 \mu\text{sec}$ ).
- 4) Static electricity or lightning may cause the sensor to operate incorrectly.
- 5) Avoid using the sensor in the following locations:
  - ① Locations exposed to direct sunlight or other bright light sources.
  - ② Locations where a heater lies within the detection range.
  - ③ Locations subject to direct air from an air conditioner.
  - ④ Locations with high humidity (e.g., bathrooms, etc.).
  - ⑤ Locations subject to sudden, extreme temperature changes.
  - ⑥ Locations subject to strong vibrations or shocks.
  - ⑦ Locations containing objects that block infra-red rays such as glass.
  - ⑧ Locations where blinds or curtains are located near the detection range.
  - ⑨ Locations near to a heat source or switching device.

- ⑩ Locations containing dust or corrosive gases.

- ⑪ Outdoors.

### 2. Detection characteristics

1) Since this sensor works by detecting fluctuations in infrared rays, it will also detect non-human heat sources (e.g., small animals, etc.) if they enter the detection range.

2) Since this sensor works by detecting fluctuations in infra-red rays, it will not detect a person that is motionless, even if within the detection range.

### 3. 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.

### 4. Other handling cautions

- 1) When installing the sensor, be sure not to apply stress to the printed circuit board.
- 2) Be careful not to allow dust or dirt to accumulate on the lens as this will adversely affect the detection sensitivity.
- 3) When soldering the lead wire, perform the operation within 3 seconds at 350°C 662°F.
- 4) In order to avoid adverse effects from noise, we recommend the use of shielded wire when wiring.
- 5) In order to protect the internal circuitry, keep wire to a length of 1 m 3.3 ft maximum from the sphere.