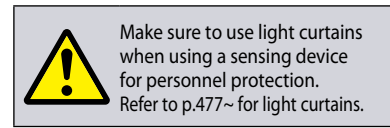
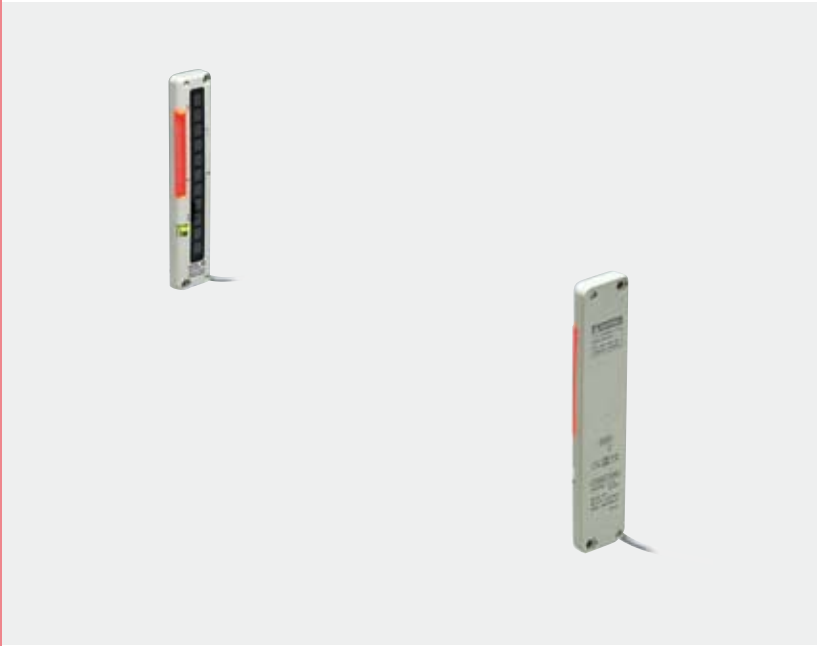


# NA1-11

Related Information

General terms and conditions .....P.1  
 Glossary of terms .....P.983~

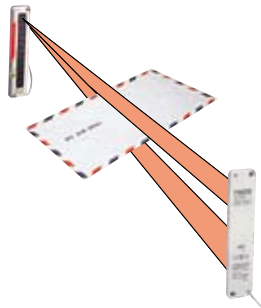
Sensor selection guide .....P.11~ / P.727~  
 General precautions .....P.986~



## Cross-beam scanning system to detect slim objects

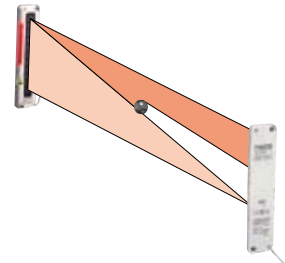
### Letter or visiting card detectable!

Slim objects can be detected by using the cross-beam scanning system.



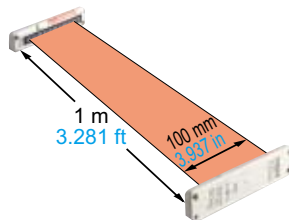
### Emitting and receiving element pitch: 10 mm 0.394 in

A minimum sensing object size of  $\varnothing 13.5$  mm  $\varnothing 0.531$  in is realized by using an emitting and receiving element pitch of 10 mm 0.394 in.



### Wide area

Though being very slim, it realizes a wide sensing area of 1 m 3.281 ft length and 100 mm 3.937 in width. It is most suitable for object detection on a wide assembly line, or for detecting the dropping of, or incursion by, small objects whose travel path is uncertain.



### Just 10 mm 0.394 in thick

It is extremely slim, being just 10 mm 0.394 in thick. Further, it can be mounted in a narrow space since you can select from two cable orientation directions.



It is possible to select from two cable orientation directions.

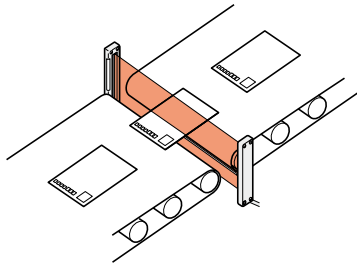
### Globally useable

It conforms to the EMC Directive and has UL Recognition. Moreover, PNP output type, which is much in demand in Europe, is also available.

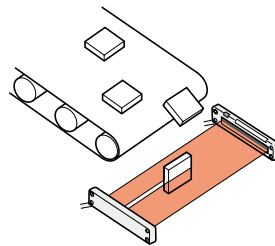
|                                   |
|-----------------------------------|
| Selection Guide                   |
| Wafer Detection                   |
| <b>M-DW1</b>                      |
| <b>HD-T1</b>                      |
| Liquid Leak Detection             |
| <b>EX-F70 / EX-F60</b>            |
| Liquid Level Detection            |
| <b>EX-F1</b>                      |
| Color Mark Detection              |
| <b>LX-100</b>                     |
| <b>FZ-10</b>                      |
| Small / Slim Object Detection     |
| <b>NA1-11</b>                     |
| Metal-sheet Double-feed Detection |
| <b>GD</b>                         |
| Other Products                    |

## APPLICATIONS

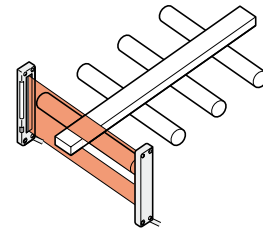
Detecting post-cards




Detecting falling objects whose path is uncertain



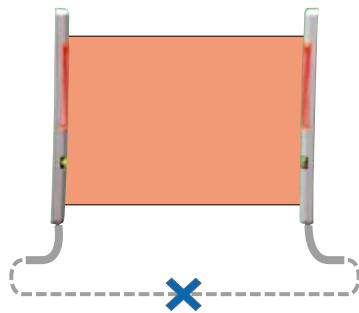
Detecting edge of moving object



 **WARNING** Never use this product in any personnel safety application.

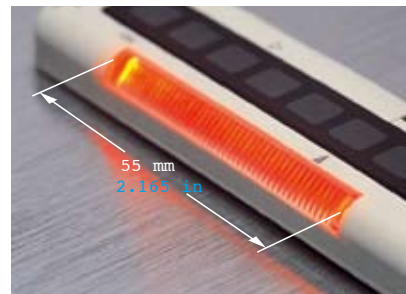
### No synchronization wire

Wiring is saved and made simple as no synchronization wire is required between the emitter and the receiver.



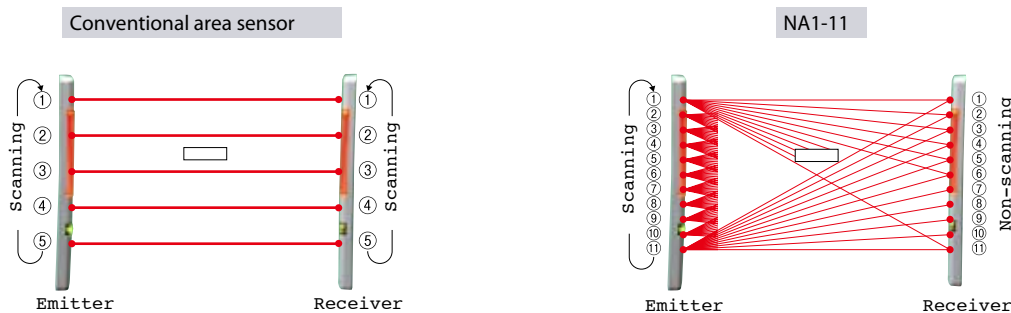
### Clearly visible indicator

A clearly visible large indicator, having a 55 mm 2.165 in width, is incorporated on both the emitter and the receiver. Further, if the sensing output is directly connected to the large indicator input, the indicator can be conveniently used as a large operation indicator. Moreover, its operation can be selected as lighting or blinking.



## Cross-beam Scanning System

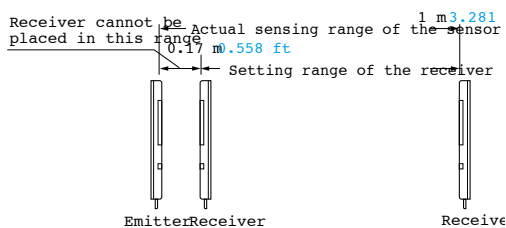
In a conventional area sensor, slim objects cannot be detected since the emitting and the receiving elements are scanned, synchronously, as a set. In contrast, in NA1-11, only the elements to ① of the emitter are scanned to obtain emission. The elements of the receiver are not scanned, so that when element ① of the emitter emits light, all the elements of the receiver receive light. Hence, even if there is one element on the receiver which does not receive light, it results in light interrupted operation. With this technique, detection of slim objects is possible.



ORDER GUIDE

| Type                                     | Appearance | Sensing range (Note1) | Model No.(Note2) | Output                        |
|--|------------|-----------------------|------------------|-------------------------------|
| NPN output<br>5 m 16.404 ft cable length |            |                       | NA1-11           | NPN open-collector transistor |
|  |            |                       | NA1-11-C5        |                               |
| PNP output                               |            |                       | NA1-11-PN        | PNP open-collector transistor |

Notes: 1) The sensing range is the possible setting distance between the emitter and the receiver. The sensor can detect an object less than 0.17 m 0.558 ft away.



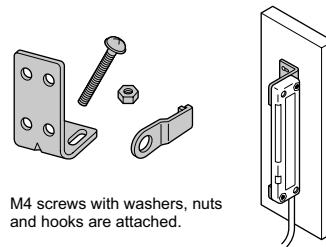
2) The model No. with suffix "P" shown on the label affixed to the product is the emitter, "D" shown on the label is the receiver. (e.g.) Emitter of NA1-11: NA1-11P, Receiver of NA1-11: NA1-11D

OPTIONS

| Designation             | Model No. | Description  |
|-------------------------|-----------|--|
| Sensor mounting bracket | MS-NA1-1  | Four bracket set<br>Four M4 (length 15 mm 0.591 in) screws with washers, eight nuts, four hooks, four spacers and eight M4 (length 18 mm 0.709 in) screws with washers are attached. (Spacers are not attached with MS-NA1-1.) |
|                         | MS-NA2-1  |  |

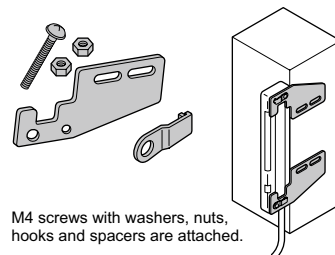
Sensor mounting bracket

- MS-NA1-1



M4 screws with washers, nuts and hooks are attached.

- MS-NA2-1



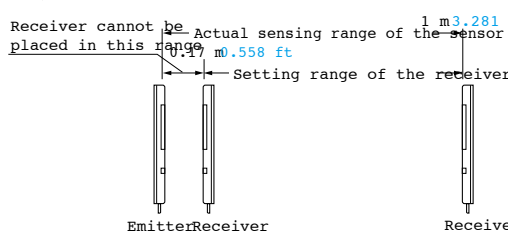
M4 screws with washers, nuts, hooks and spacers are attached.

- FIBER SENSORS
- LASER SENSORS
- PHOTO-ELECTRIC SENSORS
- MICRO PHOTO-ELECTRIC SENSORS
- AREA SENSORS
- SAFETY COMPONENTS
- PRESSURE SENSORS
- INDUCTIVE PROXIMITY SENSORS
- PARTICULAR USE SENSORS
- SENSOR OPTIONS
- WIRE-SAVING SYSTEMS
- MEASUREMENT SENSORS
- STATIC CONTROL DEVICES
- LASER MARKERS
- Selection Guide
- Wafer Detection
- M-DW1
- HD-T1
- Liquid Leak Detection
- EX-F70 / EX-F60
- Liquid Level Detection
- EX-F1
- Color Mark Detection
- LX-100
- FZ-10
- Small / Slim Object Detection
- NA1-11
- Metal-sheet Double-feed Detection
- GD
- Other Products

## SPECIFICATIONS

| Item                                    | Type   | NPN output  | PNP output   |
|---|--|---|--|
|   | Model No.  | NA1-11  | NA1-11-PN  |
| Sensing height                          |  | 100 mm <b>3.937 in</b>  |  |
| Sensing range (Note 2)                  |  | 0.17 to 1 m <b>0.558 to 3.281 ft</b>  |  |
| Element pitch                           |  | 10 mm <b>0.394 in</b>   |  |
| Number of emitting / receiving elements |  | 11 Nos. each on the emitter and the receiver, respectively  |  |
| Sensing object                          |  | ø13.5 mm <b>ø0.531 in</b> or more opaque object (Note 3)  |  |
| Supply voltage                          |  | 12 to 24 V DC ± 10 % Ripple P-P 10 % or less  |  |
| Current consumption                     |  | Emitter: 80 mA or less, Receiver: 100 mA or less  |  |
| Output                                  |  | NPN open-collector transistor <ul style="list-style-type: none"> <li>Maximum sink current: 100 mA</li> <li>Applied voltage: 30 V DC or less (between output and 0 V)</li> <li>Residual voltage: 1 V or less (at 100 mA sink current)<br/>0.4 V or less (at 16 mA sink current)</li> </ul> | PNP open-collector transistor <ul style="list-style-type: none"> <li>Maximum source current: 100 mA</li> <li>Applied voltage: 30 V DC or less (between output and +V)</li> <li>Residual voltage: 1 V or less (at 100 mA source current)<br/>0.4 V or less (at 16 mA source current)</li> </ul> |
|   | Utilization category   | DC-12 or DC-13  |  |
|   | Output operation   | ON or OFF when beam channel is interrupted, selectable by operation mode switch   |  |
|   | Short-circuit protection   | Incorporated  |  |
| Response time                           |  | In Dark state: 5 ms or less, In Light state: 10 ms or less  |  |
| Indicators                              | Emitter  | Power indicator: Green LED (lights up when the power is ON)<br>Large indicator: Orange LED (lights up or blinks when the large indicator input is Low, lighting pattern is selected by operation mode switch)   | Power indicator: Green LED (lights up when the power is ON)<br>Large indicator: Orange LED (lights up or blinks when the large indicator input is High, lighting pattern is selected by operation mode switch)   |
|   | Receiver   | Operation indicator: Orange LED (lights up when the output is ON)<br>Power indicator: Green LED (lights up when the power is ON)<br>Large indicator: Orange LED (lights up or blinks when the large indicator input is Low, lighting pattern is selected by operation mode switch)        | Operation indicator: Orange LED (lights up when the output is ON)<br>Power indicator: Green LED (lights up when the power is ON)<br>Large indicator: Orange LED (lights up or blinks when the large indicator input is High, lighting pattern is selected by operation mode switch)            |
| Environmental resistance                | Pollution degree   | 3 (Industrial environment)  |  |
|   | Protection   | IP62 (IEC) (Refer to p.984 for details of standards)  |  |
|   | Ambient temperature  | -10 to 55 °C <b>+14 to +131 °F</b> (No dew condensation or icing allowed), Storage: -20 to +70 °C <b>-4 to +158 °F</b>  |  |
|   | Ambient humidity   | 35 to 85 % RH, Storage: 35 to 85 % RH   |  |
|   | Ambient illuminance  | Incandescent light: 3,000 lx at the light-receiving face  |  |
|   | EMC  | EN 60947-5-2  |  |
|   | Voltage withstandability   | 1,000 V AC for one min. between all supply terminals connected together and enclosure   |  |
|   | Insulation resistance  | 20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure  |  |
|   | Vibration resistance   | 10 to 150 Hz frequency, 1.5 mm <b>0.059 in</b> amplitude in X, Y and Z directions for two hours each  |  |
| Shock resistance                        | 500 m/s <sup>2</sup> acceleration (50 G approx.) in X, Y and Z directions for three times each                                       |   |  |
| Emitting element                        | Infrared LED (Peak emission wavelength: 880nm <b>0.035mil</b> , cross-beam scanning system)  |   |  |
| Material                                | Enclosure: Heat-resistant ABS, Lens: Acrylic, Indicator cover: Acrylic   |   |  |
| Cable                                   | 0.3 mm <sup>2</sup> 4-core (emitter: 3-core) oil resistant cabtyre cable, 2 m <b>6.562 ft</b> long                                   |   |  |
| Cable extension                         | Extension up to total 100 m <b>328.084 ft</b> is possible, for both emitter and receiver, with 0.3 mm <sup>2</sup> , or more, cable. |   |  |
| Weight                                  | Net weight: Emitter 80 g approx., Receiver 85 g approx, Gross Weight: 210 g approx.  |   |  |

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C **+73.4 °F**.  
2) The sensing range is the possible setting distance between the emitter and the receiver. The sensor can detect an object less than 0.17 m **0.558 ft** away.



3) Although this product can detect slim objects by using the cross-beam scanning system, the size of the slim object which can be stably detected differs with the setting distance. When this sensor is used to detect slim objects, make sure to confirm stable detection using the actual objects.

FIBER SENSORS  
LASER SENSORS  
PHOTO-ELECTRIC SENSORS  
MICRO PHOTO-ELECTRIC SENSORS  
AREA SENSORS  
SAFETY COMPONENTS  
PRESSURE SENSORS  
INDUCTIVE PROXIMITY SENSORS  
PARTICULAR USE SENSORS  
SENSOR OPTIONS  
WIRE-SAVING SYSTEMS  
MEASUREMENT SENSORS  
STATIC CONTROL DEVICES  
LASER MARKERS

mailbox@sentronic.com  
www.sentronic.com  
Tel. +41 (0)56 222 38 18  
Fax +41 (0)56 222 10 12  
Rugghölzli 2  
CH - 5453 Busslingen

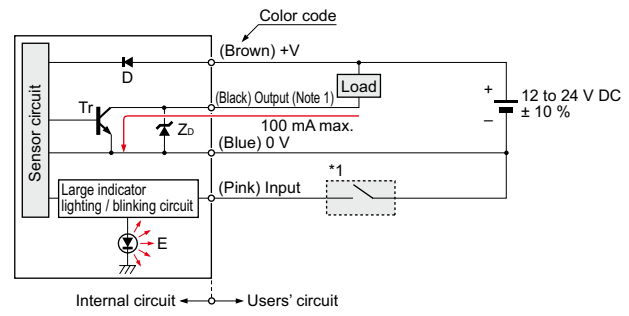
Produkte, Support und Service

SENTRONIC AG

I/O CIRCUIT AND WIRING DIAGRAMS

NA1-11 NPN output type

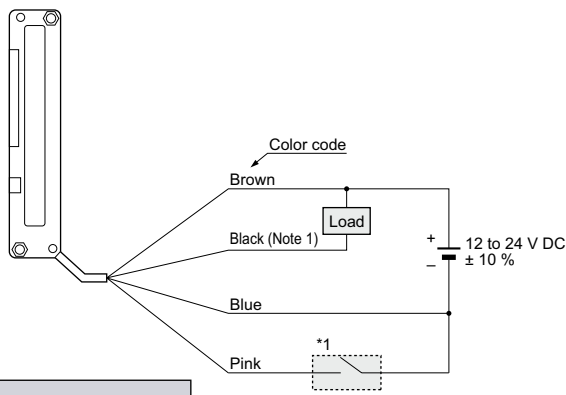
I/O circuit diagram



Notes: 1) The emitter does not incorporate the output (black).  
2) Unused wires must be insulated to ensure that they do not come into contact with wires already in use.

Symbols ... D : Reverse supply polarity protection diode  
Zd: Surge absorption zener diode  
Tr : NPN output transistor  
E : Large indicator (INDICATOR)

Wiring diagram



Notes: 1) The emitter does not incorporate the black lead wire.  
2) Unused wires must be insulated to ensure that they do not come into contact with wires already in use.

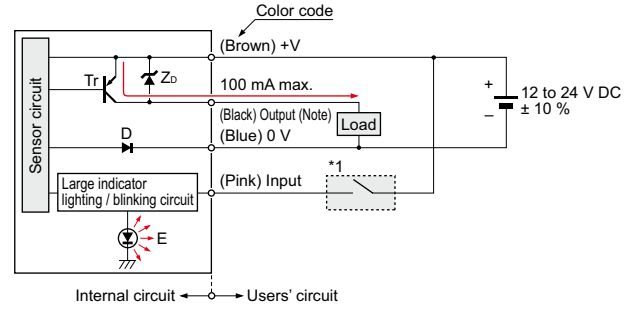
\* 1

Non-voltage contact or NPN open-collector transistor

Input  
Low (0 to 2 V): Lights up or blinks  
High (5 to 30 V, or open): Lights off

NA1-11-PNP PNP output type

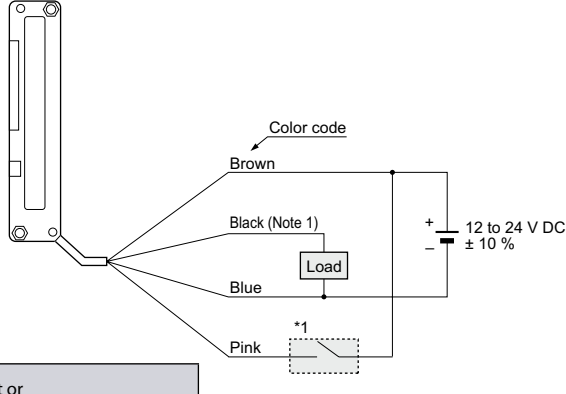
I/O circuit diagram



Notes: 1) The emitter does not incorporate the output (black).  
2) Unused wires must be insulated to ensure that they do not come into contact with wires already in use.

Symbols ... D : Reverse supply polarity protection diode  
Zd: Surge absorption zener diode  
Tr : PNP output transistor  
E : Large indicator (INDICATOR)

Wiring diagram



Notes: 1) The emitter does not incorporate the black lead wire.  
2) Unused wires must be insulated to ensure that they do not come into contact with wires already in use.

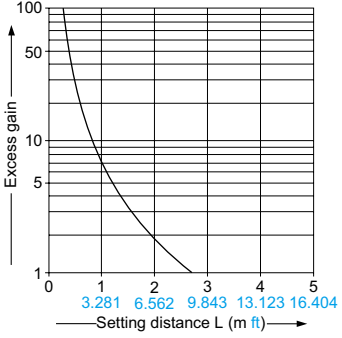
\* 1

Non-voltage contact or PNP open-collector transistor

Input  
Low (4 V or more): Lights up or blinks  
High (0 to 0.6 V, or open): Lights off

SENSING CHARACTERISTICS (TYPICAL)

Correlation between setting distance and excess gain



GD  
Other Products

NA1-11  
Metal-sheet  
Double-feed Detection

FZ-10  
Small / Slim  
Object Detection

LX-100  
Color Mark  
Detection

EX-F1  
Liquid Level  
Detection

EX-F70 /  
EX-F60  
Liquid Leak  
Detection

HD-T1  
Liquid Leak  
Detection

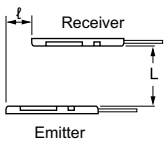
M-DW1  
Wafer  
Detection

Selection  
Guide

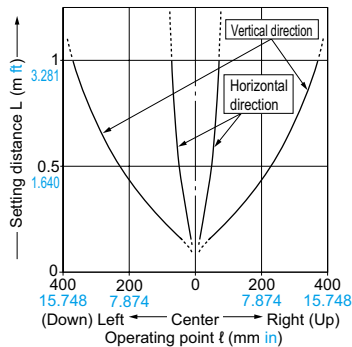
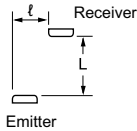
## SENSING CHARACTERISTICS (TYPICAL)

### Parallel deviation

#### Vertical direction

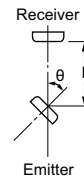


#### Horizontal direction

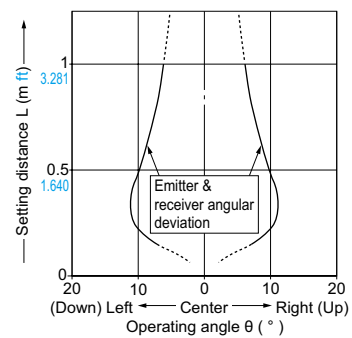
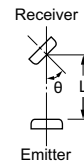


### Angular deviation

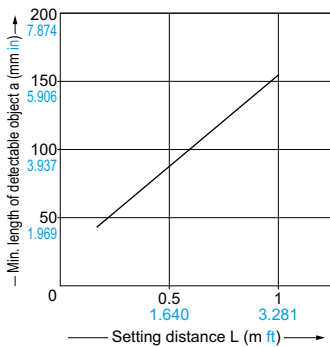
#### Emitter angular deviation



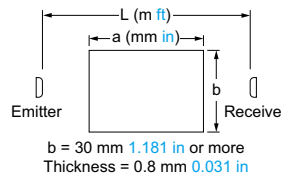
#### Receiver angular deviation



### Correlation between setting distance and minimum length of detectable object



The minimum length of the detectable object, which lies in a plane perpendicular to the sensor front surface, varies with the setting distance, as shown in the left graph. However, note that the minimum length of the detectable object also varies with the object thickness.



\* The sensing object is considered to be placed at the center of the sensing area.

## PRECAUTIONS FOR PROPER USE

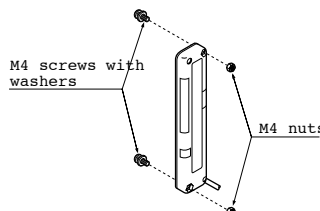
Refer to p.986~ for general precautions.



- Never use this product as a sensing device for personnel protection.
- For sensing devices to be used as safety devices for press machines or for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.
- If this product is used as a sensing device for personnel protection, death or serious body injury could result.
- For a product which meets safety standards, use the following products.  
Type 4: SF4B series (P.481~)  
Type 2: SF2B series (P.515~)

### Mounting

- Use M4 screws with washers and M4 nuts. The tightening torque should be 0.5 N·m or less. (Please arrange the screws and nuts separately.)



### Selection of large indicator operation

- Lighting / Blinking is selected by the operation mode switch on the emitter and the receiver.

| Operation of large indicator | Operation mode switch |              |
|------------------------------|-----------------------|--------------|
|                              | Emitter               | Receiver     |
| Lighting                     | LIGHT  BLINK          | LIGHT  BLINK |
| Blinking                     | LIGHT  BLINK          | LIGHT  BLINK |

### Selection of output operation

- The output operation mode is selected by the operation mode switch on the receiver.

(The switches must be set with the power supply off. The operation mode does not change if the switch setting is changed with the power supplied.)

| Operation mode switch (Receiver) | Output operation  | Operation indicator (Orange)    |
|----------------------------------|-------------------|---------------------------------|
| D-ON  L/ON                       | ON in Dark state  | Lights up when the output is ON |
| L-ON  L/ON                       | OFF in Dark state | Lights up when the output is ON |

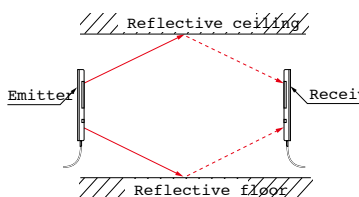
Note: LIGHT / BLINK switch is not related to the output operation selection.

**PRECAUTIONS FOR PROPER USE**

Refer to p.986~ for general precautions.

**Others**

- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- Although this sensor can detect slim objects by using the cross-beam scanning system, the size of the slim object which can be stably detected differs with the setting distance. Hence, when the sensor is used to detect slim objects, make sure to confirm stable detection using the actual objects.
- In case of this sensor, light from the emitter spreads above and below the sensor. Hence, take care that if there is a reflective object above or below the sensor it will affect the sensing.

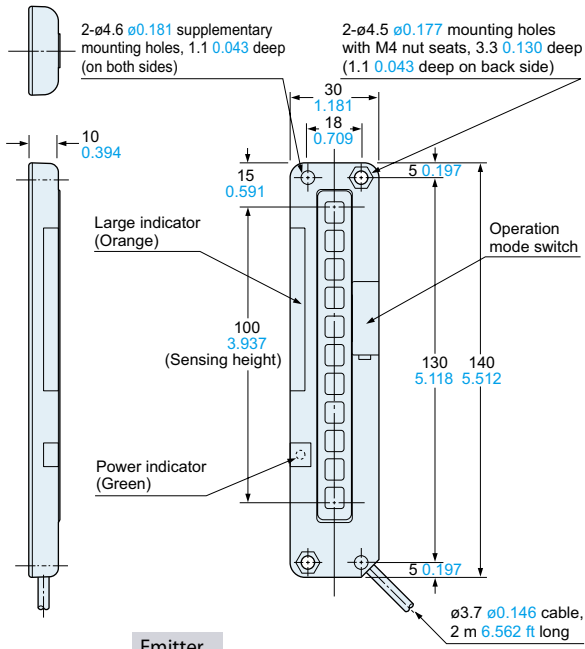


\* Refer to "Parallel deviation" on p.768.

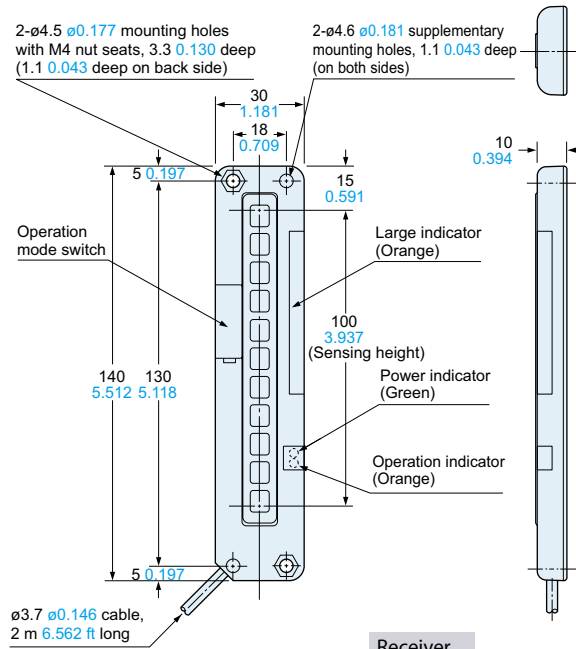
**DIMENSIONS (Unit: mm in)**

NA1-11 NA1-11-PN

Sensor



Emitter



Receiver

Selection Guide

Wafer Detection

**M-DW1**

**HD-T1**

Liquid Leak Detection

**EX-F70 / EX-F60**

Liquid Level Detection

**EX-F1**

Color Mark Detection

**LX-100**

**FZ-10**

Small / Slim Object Detection

**NA1-11**

Metal-sheet Double-bead Detection

**GD**

Other Products

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