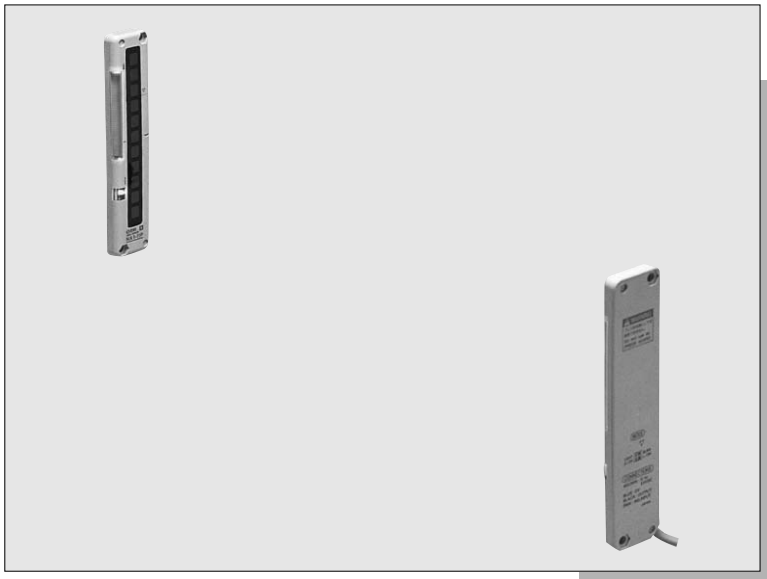
NA1-11

Small/Slim Object Detection Area Sensor



Cross-beam Scanning System to Detect Slim Objects

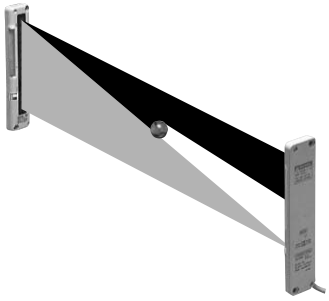
CE Marked
Conforming to EMC Directive

Letter or Visiting Card Detectable!

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

Emitting and Receiving Element Pitch: 10mm

A minimum sensing object size of ϕ13.5mm is realized by using an emitting and receiving element pitch of 10mm.



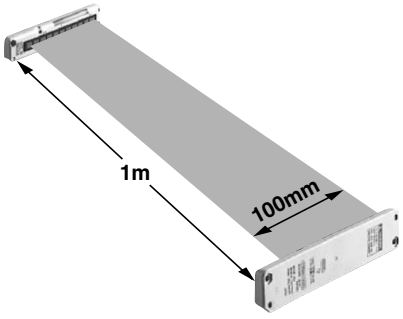
Just 10mm Thick

It is extremely slim, being just 10mm thick. Further, it can be mounted in a narrow space since its cable exit direction is freely adjustable.

Flexible cable orientation

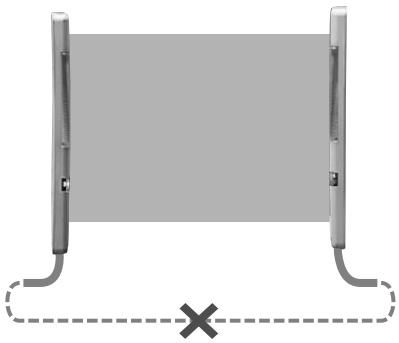
Wide Area

Though being very slim, it realizes a wide sensing area of 1m length and 100mm 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.



No Synchronization Wire

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



Globally Useable

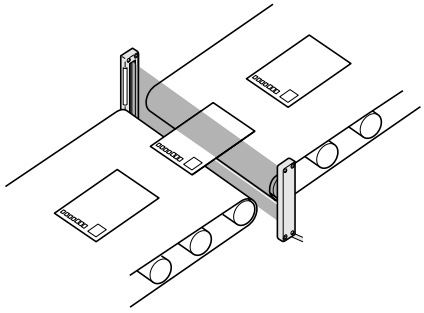
It conforms to the EMC Directive and has UL Recognition.
Moreover, PNP output type, which is much in demand in Europe, is also available.

CE Conforming to EMC Directive

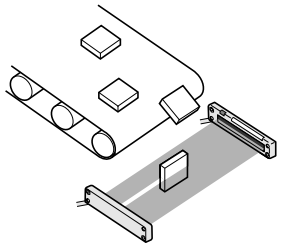
UL Recognition

APPLICATIONS

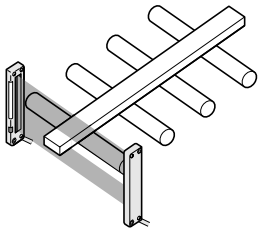
Detecting post-cards



Detecting falling objects whose path is uncertain



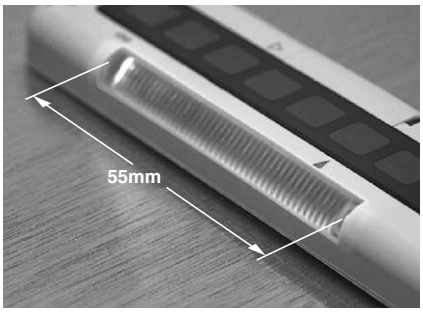
Detecting edge of moving object



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

Clearly Visible Indicator

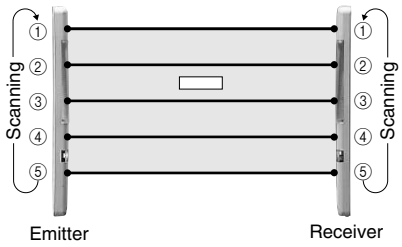
A clearly visible large indicator, having a 55mm width, is incorporated on both the emitter and the receiver. Further, if the sensing output is directly connected to the large indicator input, the indicator can be conveniently used as a large operation indicator. Moreover, its operation can be selected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



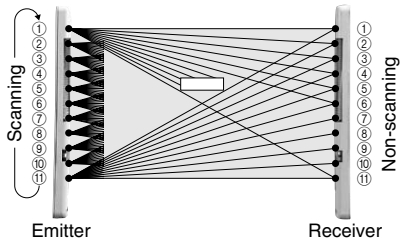
Cross-beam Scanning System

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 ① to ⑪ 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.

Conventional area sensor

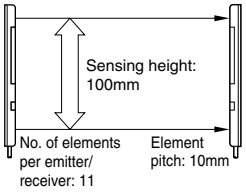
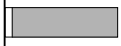


NA1-11

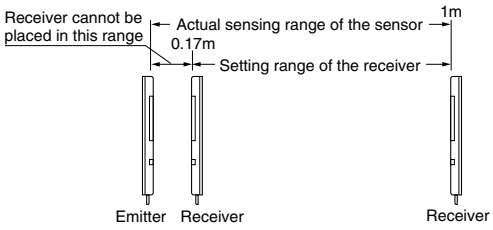


NA1-11

ORDER GUIDE

Appearance	Sensing range (Note)	Model No.	Output
		**NA1-11**	NPN open-collector transistor
		NA1-11-PN	PNP open-collector transistor

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

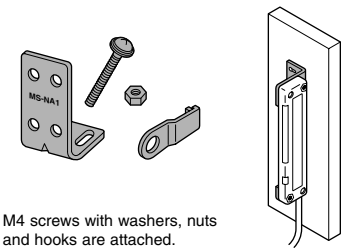


OPTIONS

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

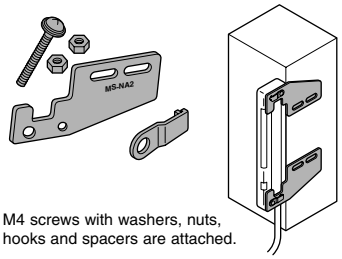
Sensor mounting bracket

• **MS-NA1-1**



M4 screws with washers, nuts and hooks are attached.

• **MS-NA2-1**

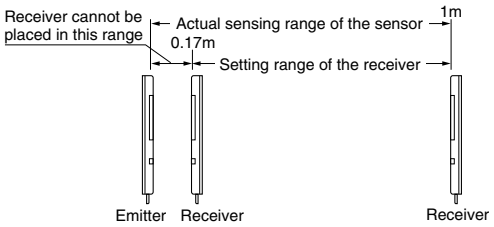


M4 screws with washers, nuts, hooks and spacers are attached.

SPECIFICATIONS

Item \ Type		NPN output	PNP output
Model No.		**NA1-11**	**NA1-11-PN**
Sensing height		100mm	
Sensing range (Note 1)		0.17 to 1m	
Element pitch		10mm	
Number of emitting/receiving elements		11 Nos. each on the emitter and the receiver, respectively	
Sensing object		ϕ13.5mm or more opaque object (Note 2)	
Supply voltage		12 to 24V DC ± 10% Ripple P-P 10% or less	
Current consumption		Emitter: 80mA or less, Receiver: 100mA or less	
Output		NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between output and 0V) • Residual voltage: 1V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)	PNP open-collector transistor • Maximum source current: 100mA • Applied voltage: 30V DC or less (between output and + V) • Residual voltage: 1V or less (at 100mA source current) 0.4V or less (at 16mA source current)
	Utilization category	DC-12 or DC-13	
	Output operation	ON or OFF when beam is interrupted, selectable by operation mode switch	
	Short-circuit protection	Incorporated	
Response time		In Dark state: 5ms or less, In Light state: 10ms or less	
Indicators	Emitter	Power indicator: Green LED (lights up when the power is ON) Large indicator: Orange LED (lights up or blinks when the large indicator input is Low, lighting pattern is selected by operation mode switch)	
	Receiver	Operation indicator: Orange LED (lights up when the output is ON) Power indicator: Green LED (lights up when the power is ON) Large indicator: Orange LED (lights up or blinks when the large indicator input is Low, lighting pattern is selected by operation mode switch)	
Environmental resistance	Pollution degree	3 (Industrial environment)	
	Protection	IP62 (IEC)	
	Ambient temperature	− 10 to + 55°C (No dew condensation or icing allowed), Storage: − 20 to + 70°C	
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH	
	Ambient illuminance	Sunlight: 10,000 ℓx at the light-receiving face, Incandescent light: 3,000 ℓx at the light-receiving face	
	EMC	Emission: EN50081-2, Immunity: EN50082-2	
	Voltage withstandability	1,000V AC for one min. between all supply terminals connected together and enclosure	
	Insulation resistance	20MΩ, or more, with 250V DC megger between all supply terminals connected together and enclosure	
	Vibration resistance	10 to 150Hz frequency, 1.5mm amplitude in X, Y and Z directions for two hours each	
	Shock resistance	500m/s^2 acceleration (50G approx.) in X, Y and Z directions for three times each	
Emitting element		Infrared LED (cross-beam scanning system)	
Material		Enclosure: Heat-resistant ABS, Lens: Acrylic, Indicator cover: Acrylic	
Cable		0.3mm^2 4-core (emitter: 3-core) oil resistant cabtyre cable, 2m long	
Cable extension		Extension up to total 100m is possible, for both emitter and receiver, with 0.3mm^2, or more, cable.	
Weight		Emitter: 80g approx., Receiver: 85g approx.	

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



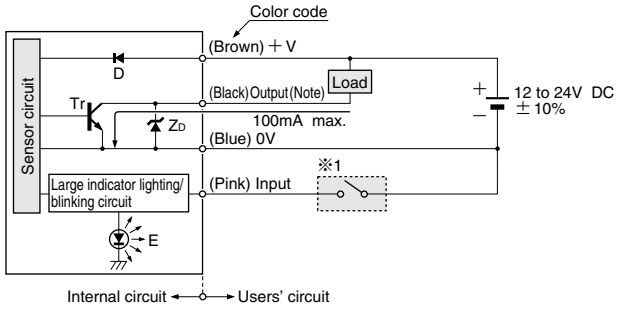
2) Although this product can detect slim objects by using the cross-beam scanning system, the size of the slim object which can be stably detected differs with the setting distance. When this sensor is used to detect slim objects, make sure to confirm stable detection using the actual objects.

NA1-11

I/O CIRCUIT AND WIRING DIAGRAMS

NA1-11 NPN output type

I/O circuit diagram

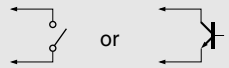


Note: The emitter is not incorporated with the output.

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

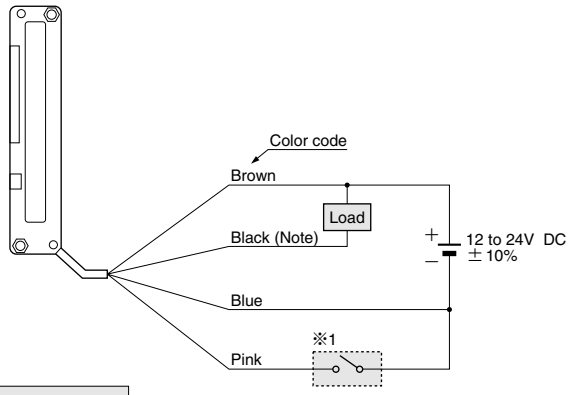
※1

Non-contact voltage or
NPN open-collector transistor



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

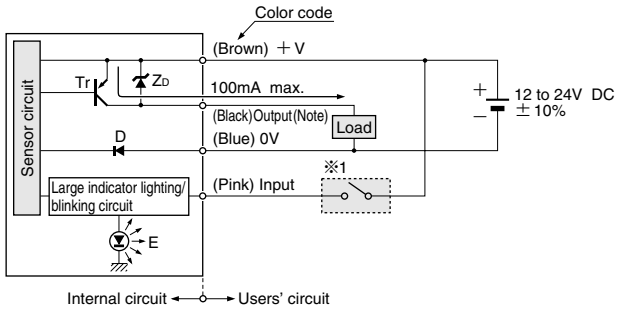
Wiring diagram



Note: The emitter does not have the black wire.

NA1-11-PN PNP output type

I/O circuit diagram

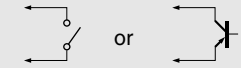


Note: The emitter is not incorporated with the output.

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

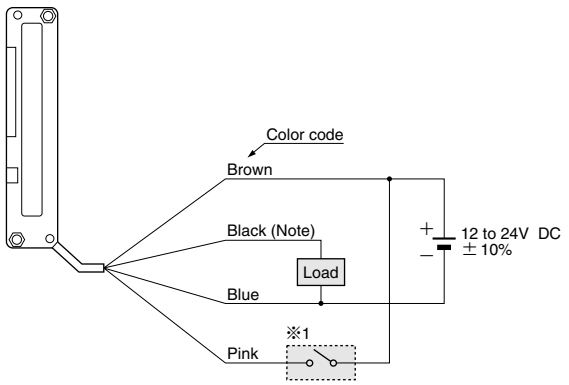
※1

Non-contact voltage or
PNP open-collector transistor



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

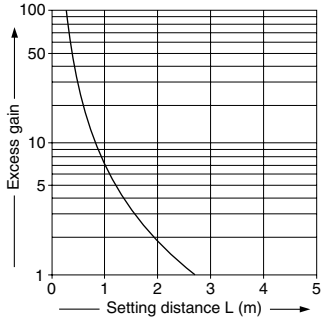
Wiring diagram



Note: The emitter does not have the black wire.

SENSING CHARACTERISTICS (TYPICAL)

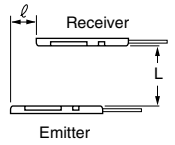
Correlation between setting distance and excess gain



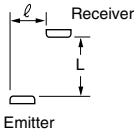
SENSING CHARACTERISTICS (TYPICAL)

Parallel deviation

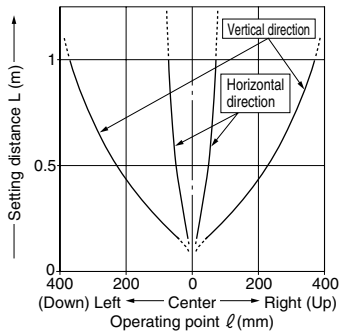
Vertical direction



Horizontal direction

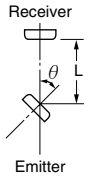


• Common for both horizontal and vertical directions

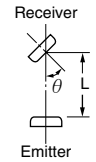


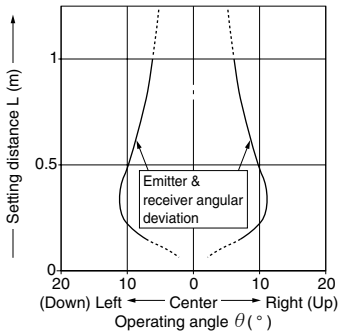
Angular deviation

Emitter angular deviation

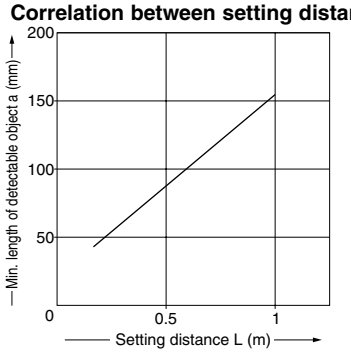


Receiver angular deviation

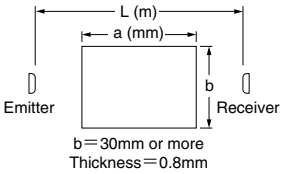




Correlation between setting distance and minimum length of detectable object



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.



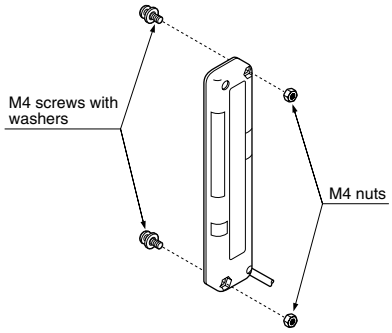
※The sensing object is considered to be placed at the center of the sensing area.

PRECAUTIONS FOR PROPER USE

- This sensor is not for press machine safeguard. Do not use this sensor for any press machine.
- This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.
- Area sensors conforming to safety standards are available. For details, please contact our office.

Mounting

- Use M4 screws with washers and M4 nuts. The tightening torque should be 0.5N·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 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		Output operation	Operation indicator (Orange)
D-ON	D/ON ▣ L/ON	ON in Dark state	Lights up when the output is ON
L-ON	D/ON ▣ L/ON	OFF in Dark state	Lights up when the output is ON

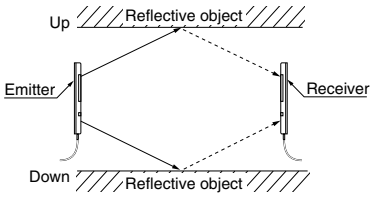
Note: LIGHT/BLINK switch is not related to the output operation selection.

NA1-11

PRECAUTIONS FOR PROPER USE

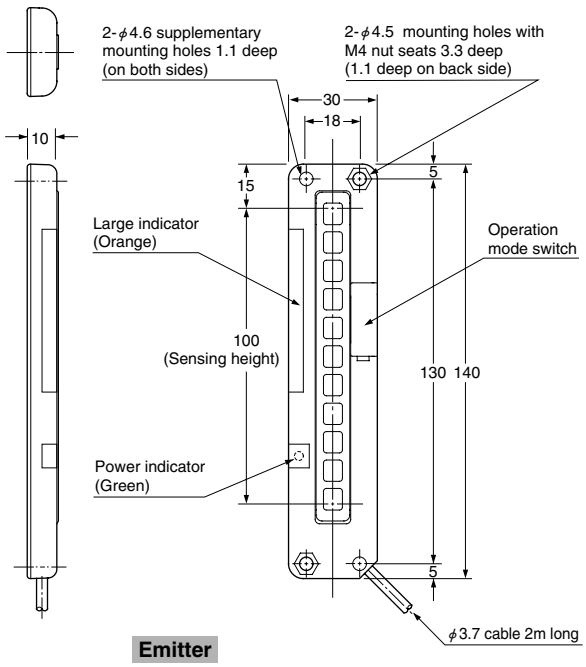
Others

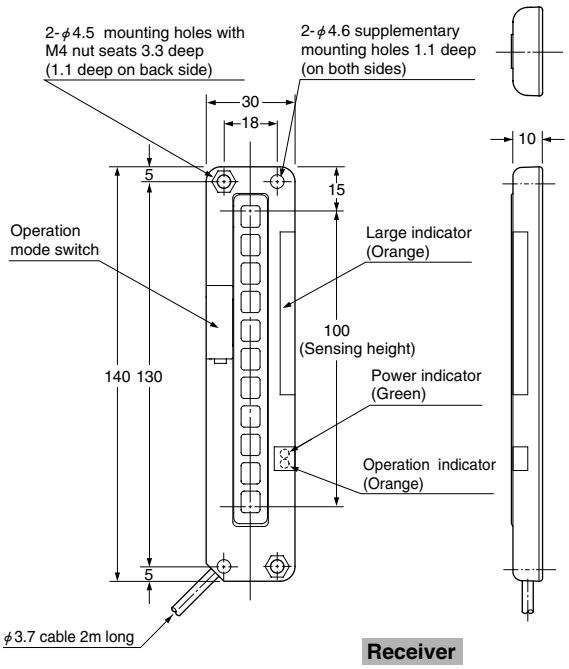
- Make sure to carry out the operation of the operation mode switch in the power supply off condition.
- Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.
- Although this sensor can detect slim objects by using the cross-beam scanning system, the size of the 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.



DIMENSIONS (Unit: mm)

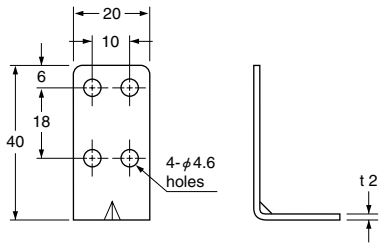
NA1-11
NA1-11-PN Sensor

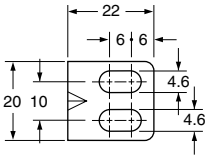




DIMENSIONS (Unit: mm)

MS-NA1-1 Sensor mounting bracket (Optional)



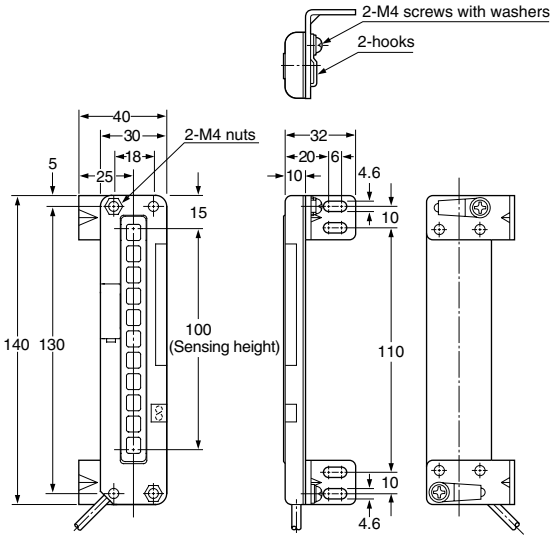


Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

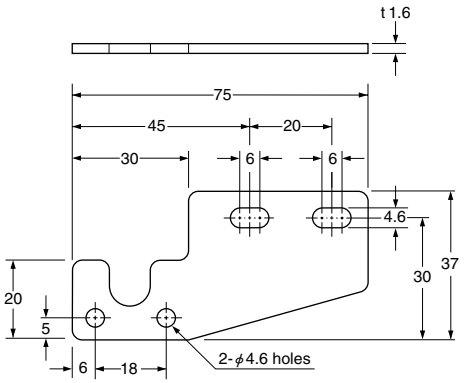
Four bracket set
Four M4 (length 15mm) screws with washers, eight nuts, four hooks and eight M4 (length 18mm) screws with washers are attached.
[M4 (length 18mm) screws with washers are not used for **NA1-11**.]

Assembly dimensions

Mounting drawing with the receiver



MS-NA2-1 Sensor mounting bracket (Optional)



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)

Four bracket set
Four M4 (length 15mm) screws with washers, eight nuts, four hooks, four spacers and eight M4 (length 18mm) screws with washers are attached.

Assembly dimensions

Mounting drawing with the receiver