Ultra-slim Body Picking Sensor

-PK5 SERIES NA1-5 SERIES

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NA1-PK3

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■ Glossary of terms......P.1455~

■ Sensor selection guideP.461~

■ General precautionsP.1458~









Make sure to use light curtains when using a sensing device for personnel protection. Refer to p.495~ for details of light curtains.





Even a slim hand is detectable by the 25 mm 0.984 in pitch beam area sensor

10 mm 0.394 in thick: half the thickness of conventional models

Space saving is now possible. The ultra-thin design does not obstruct picking operation.





Cable can be freely arranged in any position

Clearly visible job indicators

Bright, easy-to-see job indicators, 55 mm 2.165 in in length, have been incorporated into both the emitter and

This sensor is optimal for picking. With the NA1-PK5, we've enhanced visibility even further by using 8 orange LED



BASIC PERFORMANCE

Long sensing range: 3 m 9.843 ft

NA1-5

Its long sensing range of 3 m 9.843 ft is sufficient for confirming access to a parts shelf.

FUNCTIONS

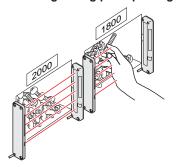
Two unit installation is possible

Sensor units can now be set to different light emission frequencies in order to prevent mutual interference. Two units can now be operated in a side-by-side configuration without interference, for problem-free detection over wider areas.

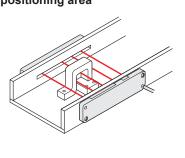


APPLICATIONS

Preventing wrong parts picking



Detecting parts having wide positioning area





Never use this product in any personnel safety application.

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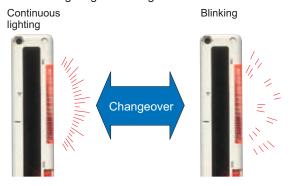
MACHINE VISION SYSTEMS

UV CURING SYSTEMS

FUNCTIONS

Lighting pattern selectable

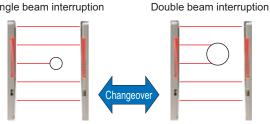
The job indicator operation can be selected as either continuous lighting or blinking.



Selectable detection operation

Either of the two different detection operations may be selected in order to suit the particular application. Sensor units can be set to detect the interruption of 1 or more beam channels, or can be set to detect only the interruption of 2 or more beam channels.

Single beam interruption



All opaque bodies with ø35 mm ø1.378 in or greater will be detected.

The accidental passage of small objects through the beam axis will not trigger detection, yet the operator's hands will always be accurately detected. This function is also useful when small objects regularly

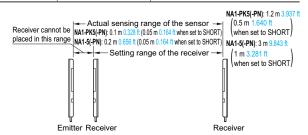
interrupt the beam axis.

ORDER GUIDE

Туре	Appearance	Sensing range (Note)	Model No.	Output
High-luminous job indicator type		0.1 to 1.2 m 0.328 to 3.937 ft	NPN open-collector transistor	
High-lu job indi type	Sensing height 100 mm 3.937 in	(0.05 to 0.5 m 0.164 to 1.640 ft) when set to SHORT.	NA1-PK5-PN	PNP open-collector transistor
Long sensing range type	Beam pitch 5 beam channels 25 mm 0.984 in	0.2 to 3 m 0.656 to 9.843 ft	NA1-5	NPN open-collector transistor
		(0.05 to 1 m 0.164 to 3.281 ft) when set to SHORT.	NA1-5-PN	PNP open-collector transistor

Notes: 1) The sensing range is the possible setting distance between the emitter and the receiver.

2) The model No. with "P" shown on the label affixed to the product is the emitter, "D" shown on the label is receiver.



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NA1-PK3

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MACHINE VISION SYSTEMS UV CURING SYSTEMS 5 m 16.404 ft cable length type

5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) is also available. Model No.: NA1-5-C5

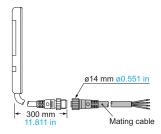
Pigtailed type

Pigtailed type is also available. When ordering this type, suffix "-J" to the model No. Please order the mating cable separately.

(e.g.) Pigtailed type of NA1-PK5-PN is "NA1-PK5-PN-J".

• Mating cable (2 cables are required.)

Model No.	Description	
CN-24-C2	4-core, cable length 2 m 6.562 ft	
CN-24-C5	4-core, cable length 5 m 16.404 ft	



S-LINK direct hook-up picking sensor

SL-N15 can be hooked up to the sensor & wire-saving link system **S-LINK**. Refer to p.1033~ for the sensor & wire-saving link system **S-LINK**.

Model No.	Description	
SL-N15	Sensing range: 0.2 to 3 m 0.656 to 9.843 ft (0.05 to 1 m 0.164 to 3.281 ft when the switch is set to SHORT) Beam pitch: 25 mm 0.984 in Sensing height: 100 mm 3.937 in Sensing object: Ø35 mm Ø1.378 in or more opaque object	It is a parts-taking verification sensor with five sensing beams and can be hooked up to the S-LINK cable without any interface. Both the emitter and the receiver are incorporated with bright orange LED job indicators that are easily visible to the operator.



Selection Guide Slim Body Picking Other Products

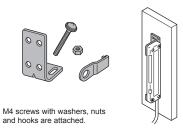
NA1-PK5/ NA1-5 NA1-PK3

OPTIONS

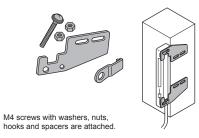
Designation	Model No.	Description
Sensor	MS-NA1-1	Four bracket set Four M4 (length 15 mm 0.591 in) screws with washers, eight
mounting bracket	MS-NA2-1	nuts, four hooks, four spacers and eight M4 (length 18 mm 0.709 in) screws with washers are attached. (Spacers are not attached with MS-NA1-1.)
Sensor	MS-NA3	It protects the sensor body. Two silver bracket set [Four M4 (length 15 mm 0.591 in) screws with washers, and four nuts are attached.]
protection bracket	MS-NA3-BK	It protects the sensor body. Two black bracket set [Four M4 (length 15 mm 0.591 in) screws with washers, and four nuts are attached.]
Slit mask	OS-NA1-5 10 pcs. per set	The slit mask restrains the amount of beam emitted or received. (Seal type)
Y-shaped connector	SL-WY 5 pcs. per set	This connector is able to combine the cables of receiver and emitter into one.

Sensor mounting bracket

• MS-NA1-1

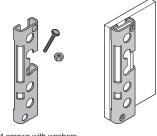


• MS-NA2-1



Sensor protection bracket

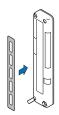
- MS-NA3
- MS-NA3-BK



M4 screws with washers, and nuts are attached.

Slit mask

• OS-NA1-5



Since the slit mask is of seal type, it can be used by sticking to the detection surface.

Take care that the sensing range will be reduced when the slit mask is used. Please contact our office for details.

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NA1-PK5/ NA1-5 NA1-PK3

Y-shaped connector

• SL-WY

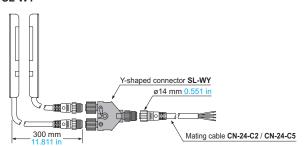




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NA1-PK5/ NA1-5 NA1-PK3

SPECIFICATIONS

Туре		NPN output		PNP output		
		High-luminous job indicator type	Long sensing range type	High-luminous job indicator type	Long sensing range type	
Item	n Model No.	NA1-PK5	NA1-5	NA1-PK5-PN	NA1-5-PN	
Sens	sing height		100 mm	3.937 in	l.	
Sens	sing range (Note 2)	0.1 to 1.2 m 0.328 to 3.937 ft (0.05 to 0.5 m 0.164 to 1.640 ft when set to SHORT)	0.2 to 3 m 0.656 to 9.843 ft (0.05 to 1 m 0.164 to 3.281 ft when set to SHORT)	0.1 to 1.2 m 0.328 to 3.937 ft (0.05 to 0.5 m 0.164 to 1.640 ft when set to SHORT)	0.2 to 3 m 0.656 to 9.843 ft (0.05 to 1 m 0.164 to 3.281 ft when set to SHORT	
Bear	m pitch	25 mm 0.984 in				
Num	ber of beam channels		5 beam	channels		
Sens	sing object	ø35 mm ø1.378 in or more opaque object (completely beam interrupted object)				
Supp	ply voltage	12 to 24 V DC ±10 % Ripple P-P 10 % or less				
Pow	er consumption (Note 3)	Emitter: 0.5 W or less,	Receiver: 0.8 W or less	Emitter: 0.6 W or less,	Receiver: 0.9 W or less	
Output		Residual voltage: 1 V or le	r less (between output and 0 V)	Residual voltage: 1 V or le	100 mA or less (between output and +V) sss (at 100 mA source current) less (at 16 mA source current)	
	Utilization category		DC-12 c	or DC-13		
	Output operation	ON or OFF when one or more beam channels are interrupted / ON or OFF when two or more beam channels are interrupted, selectable by operation mode switch				
	Short-circuit protection	Incorporated				
Resp	ponse time	10 ms or less (when the	interference prevention is used,	in Light state: 30 ms or less, in E	Dark state: 13 ms or less)	
	Emitter	Power indicator: Green LED (lights up when the power is ON) Job indicator: Orange LED (lights up or blinks when the job indicator input is Low, lighting pattern is selected by operation mode switch) Power indicator: Green LED (lights up when the power i Job indicator: Orange LED (lights up or blinks when the indicator input is High, lighting pattern is selected by operation mode switch)		its up or blinks when the job		
Indicators	Receiver	Operation indicator: Red LED (lights up when one or more beam channels are interrupted, but lights up when two beam channels or more are interrupted in the double-beam-interruption mode) Stable incident beam indicator: Green LED (lights up when all beam channels are stably received) Job indicator: Orange LED (lights up or blinks when the job indicator input is Low, lighting pattern is selected by operation mode switch)		Operation indicator: Red LED (I beam channels are interrupted, channels or more are interrupted interruption mode) Stable incident beam indicator: beam channels are stably recei Job indicator: Orange LED (ligh indicator input is High, lighting mode switch)	but lights up when two beam d in the double-beam- Green LED (lights up when all wed) tts up or blinks when the job	
Inter	ference prevention function	Incorporated				
	Pollution degree		3 (Industrial	environment)		
ė	Protection	IP62 (IEC)				
stanc	Ambient temperature	-10 to +55 °C +14 to +131 °F (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F				
Environmental resistance	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH				
	Ambient illuminance	Incandescent light: 3,000 fx 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, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each				
Shock resistance		490 m/s² acceleration (50 G approx.) in X, Y and Z directions for three times each				
Emitting element		Infrared LED (Peak emission wavelength: 950 nm 0.037 mil, synchronized scanning system)				
Material		Enclosure: Heat-resistant ABS, Lens cover: Acrylic, Indicator cover: Acrylic				
Cable		0.3 mm² 4-core (emitter: 3-core) oil resistant cabtyre cable, 2 m 6.562 ft long				
Cabl	le extension	Net weight:	Net weight:	Net weight:	Net weight:	

- 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.

Gross weight: 270 g approx.

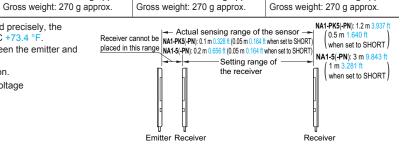
Emitter 80 g approx.

Receiver 85 g approx.

3) Obtain the current consumption by the following equation.

Current consumption = Power consumption \div Supply voltage

(e.g.) When the supply voltage is 12 V, the current consumption of the emitter is: 0.5 W ÷ 12 V ≈ 0.042 A = 42 mA



Emitter 80 g approx.

Receiver 85 g approx.

Weight

Emitter 70 g approx.

Receiver 80 g approx.

Emitter 70 g approx. Receiver 80 g approx.

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I/O CIRCUIT AND WIRING DIAGRAMS

NA1-PK5 NA1-5 NPN output type

I/O circuit diagram

Color code / Connector pin No. of the pigtailed type (Brown / 1) +V D (Black / 4) Load Sensor circuit 12 to 24 V DC Output (Note 1) ±10 % 100 mA max **☆** Z⊳ (Blue / 3) 0 V (Pink / 2) Job Job indicato indicator input lighting / blinking circuit (Note 2) **\$**←E Internal circuit ← Ó → Users' circuit

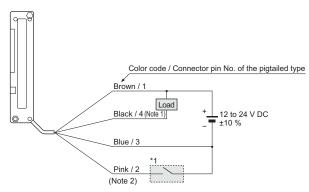
Notes: 1) The emitter does not incorporate the output (black).

- 2) If a connection cable is connected to the relay connector type, then the lead wire color is "white"
- 3) Unused wire 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 : Job indicator (IND.)

Non-contact voltage or NPN open-collector transistor · Job indicator input Low (0 to 2 V): Lights up or Blinks High (5 to 30 V, or open): Lights off

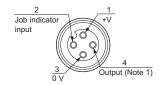
Wiring diagram



Notes: 1) The emitter does not incorporate the black lead wire.

- 2) If a connection cable is connected to the relay connector type, then the lead wire color is "white".
- 3) Unused wires must be insulated to ensure that they do not come into contact with wires already in use.

Connector pin position (Pigtailed type)



Wiring diagram

Notes: 1) No connection is required for the emitter.

2) The pin arrangement of the **SL-WY** Y-shaped connector (optional) is identical to the receiver.

Color code / Connector pin No. of the pigtailed type

12 to 24 V DC

±10 %

PNP output type

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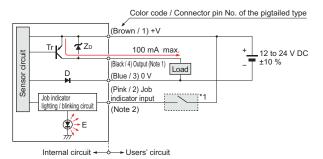
UV CURING SYSTEMS

Other Products

NA1-PK5 NA1-5 NA1-PK3

NA1-PK5-PN NA1-5-PN

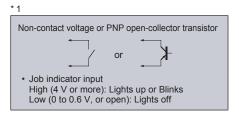
I/O circuit diagram



Notes: 1) The emitter does not incorporate the output (black).

- 2) If a connection cable is connected to the relay connector type, then the lead wire color is "white"
- 3) Unused wire 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: Job indicator (IND.)



Pink / 2: (Note 2)

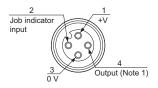
Brown / 1

Black / 4 (Note 1)

Load

- Notes: 1) The emitter does not incorporate the black lead wire. 2) If a connection cable is connected to the relay connector type, then the lead wire color is "white"
 - 3) Unused wires must be insulated to ensure that they do not come into contact with wires already in use.

Connector pin position (Pigtailed type)



Notes: 1) No connection is required for the emitter.

2) The pin arrangement of the **SL-WY** Y-shaped connector (optional) is identical to the receiver.

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NA1-PK3

SENSING CHARACTERISTICS (TYPICAL)

NA1-PK5 NA1-PK5-PN

Parallel deviation

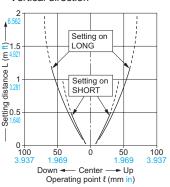
Vertical direction



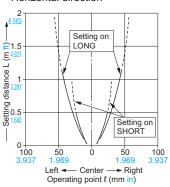
Horizontal direction



Vertical direction



Horizontal direction



Angular deviation

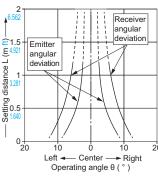
Emitter angular deviation



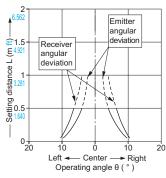
Receiver angular deviation

ĺδ

Setting on LONG



Setting on SHORT



NA1-5 NA1-5-PN

Emitter

Parallel deviation

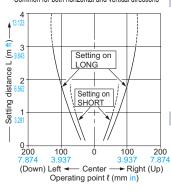


Horizontal direction

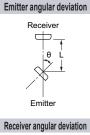
Emitter

Receiver

· Common for both horizontal and vertical directions Vertical direction

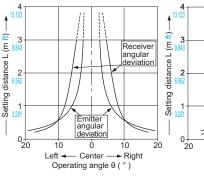


Angular deviation

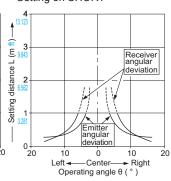




· Setting on LONG



Setting on SHORT



PRECAUTIONS FOR PROPER USE

Refer to p.1458~ for general precautions.

Operation mode switch

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· 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 standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.



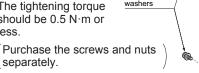
If this product is used as a sensing device for personnel protection, death or serious body injury could result.

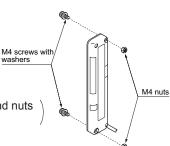
· For a product which meets safety standards, use the following products.

Type4: SF4C series (p.531~) Type2: SF2C series (p.551~)

Mounting

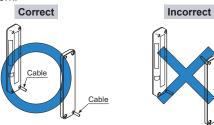
· Use M4 screws with washers and M4 nuts. The tightening torque should be 0.5 N·m or





Orientation

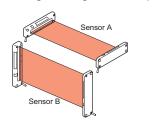
• The emitter and the receiver must face each other correctly. If they are set upside down, the sensor does not work.

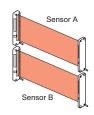


Interference prevention function

· By setting different emission frequencies, two units of the sensor can be mounted close together, as shown in the figure below.

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		
	Emitter	Receiver	
Sensor A (FREQ. A)	FREQ. A FREQ. B	FREQ. A FREQ. B	
Sensor B (FREQ. B)	FREQ. A FREQ. B	FREQ. A FREQ. B	

Selection of output operation

Setting distance

0.05 to 0.5 m 0.164 to 1.640 ft [NA1-PK5(-PN)]

0.5 to 1.2 m 1.640 to 3.937 ft [NA1-PK5(-PN)] 1 to 3 m 3.281 to 9.843 ft [NA1-5(-PN)]

0.05 to 1 m 0.164 to 3.281 ft [NA1-5(-PN)]

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

LONG / SHORT selection switch (incorporated on the emitter)

· Select the switch setting according to the setting distance

between the emitter and the receiver as given below.

The operation mode does not change if the switch

setting is changed with the power supplied.

The switches must be set with the power supply off.

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.

Output operation	Operation mode switch
ON when one or more beam channels are interrupted (OFF when all beam channels are received).	SINGLE DOUBLE L/ON
OFF when one or more beam channels are interrupted (ON when all beam channels are received).	SINGLE DOUBLE L/ON
ON when any two or more beam channels are interrupted.	SINGLE DOUBLE L/ON
OFF when any two or more beam channels are interrupted.	SINGLE DOUBLE L/ON

Job indicator operation selection

· Lighting / Blinking is selected by the operation mode switch on the emitter and 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		
	Emitter	Receiver	
Lighting	LIGHT	LIGHT	
Blinking	LIGHT	LIGHT	

Selection Guide



Others

• Do not use during the initial transient time (0.5 sec.) after the power supply is switched on.

> LASER SENSORS PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS

LIGHT
CURTAINS!
SAFETY
COMPONENTS

PRESSURE /
FLOW
SENSORS

INDUCTIVE
PROXIMITY
SENSORS

PARTICULAR
USE
SENSORS

SENSOR OPTIONS SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

STATIC ELECTRICITY PREVENTION DEVICES

> LASER MARKERS

> > PI C

HUMAN MACHINE INTERFACES ENERGY CONSUMPTION VISUALIZATION COMPONENTS

COMPONENTS

MACHINE VISION SYSTEMS

CURING SYSTEMS

Selection Guide Slim Body Picking

NA1-PK5/ NA1-5 NA1-PK3

DIMENSIONS (Unit: mm in)

Emitter

The CAD data in the dimensions can be downloaded from our website.

2-ø4.6 ø0.181

(on both sides)

15 0.59

25

supplementary mounting holes, 1.1 0.043 deep

Beam Channel 1

Beam Channel 2

Beam Channel 3 Stable incident

Job indicator (Orange)

beam indicator (Green)

Sensor

_10 __0.394

NA1-PK5(-PN) NA1-5(-PN) 2-ø4.5 ø0.177 2-ø4.6 ø0.181 2-ø4 5 ø0 177 supplementary mounting holes, 1.1 0.043 deep mounting through holes with mounting through holes with M4 nut seats, 3.3 0.130 deep M4 nut seats, 3,3 0,130 deep (1.1 0.043 deep on back side) (1.1 0.043 deep on back side) (on both sides) 30 1.181 30 1.181 18 0.709 10 0.394 15 0.591 \bigoplus Beam Channel 1 1 25 Operation Operation mode switch Job indicator (Orange) mode switch Beam Channel 2 130 5.118 140 130 5.512 5.118 Beam Channel 4 Beam Channel 5 indicator (Green)

> ø3.7 ø0.146 cable, 2 m 6.562 ft long

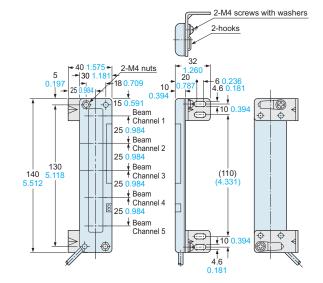
Ø3.7 Ø0.146 cable, 2 m 6.562 ft long

MS-NA1-1

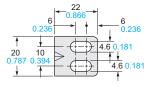
Sensor mounting bracket (Optional)

Assembly dimensions

Mounting drawing with the receiver



10 0.394 6 0.236 18 40 0.709 1.575 0.181 holes 1 2 1 0.078



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

Four bracket set

Four M4 (length 15 mm 0.591 in) screws with washers, eight nuts, four hooks and eight M4 (length 18 mm 0.709 in) screws with washers are attached.

[M4 (length 18 mm 0.709 in) screws with washers are not used for NA1-PK5/5 series.]

DIMENSIONS (Unit: mm in)

The CAD data in the dimensions can be downloaded from our website.

Sensor mounting bracket (Optional)

FIBER SENSORS

LASER SENSORS

> PHOTO-ELECTRIC SENSORS

MICRO PHOTO-ELECTRIC SENSORS AREA SENSORS

AREA SENSORS LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

INDUCTIVE PROXIMITY SENSORS

USE SENSORS SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS STATIC ELECTRICITY

LASER MARKERS

PLC HUMAN MACHINE INTERFACES

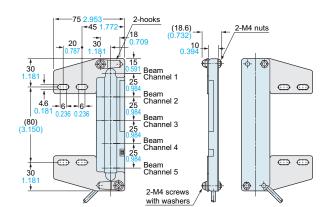
ENERGY CONSUMPTION VISUALIZATION COMPONENTS

FA COMPONENTS MACHINE

UV CURING SYSTEMS

Assembly dimensions

Mounting drawing with the receiver



10.063 1.772 2.953 2.953 2.953 2.953 2.953 0.236 0.236 0.236 0.236 0.181 1.181 0.236 0.236

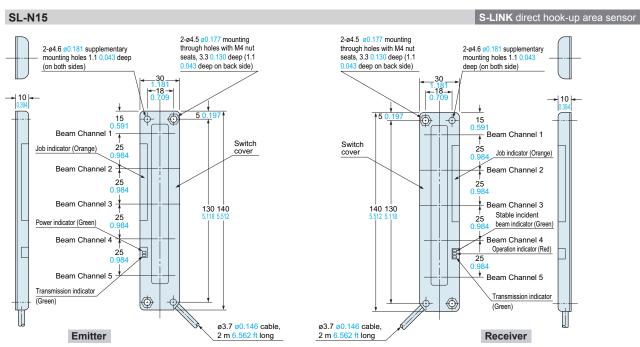
Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

Four bracket set

MS-NA2-1

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.

MS-NA3 MS-NA3-BK Sensor protection bracket (Optional) 2-ø4.8 ø0.189 2-ø4.8 ø0.189 17 0.669 72.5 25 <mark>0</mark> 25 10.5 10.5 0.413 27 17 0.669 5-ø14 ø0.551 \2-ø9 ø0.354 2-ø9 ø0. 4.5 0.177 4.35 Material: Cold rolled carbon steel (SPCC) MS-NA3: Chrome plated, MS-NA3-BK: Black chromate 13.7 10.5 t1.6t0 10.5 13.7 __31 Two bracket set Four M4 (length 15 mm 0.591 in) screws with washers, and four nuts are attached. For emitter For receiver



Selection Guide Slim Body Picking Other Products

NA1-PK5/ NA1-5 NA1-PK3