

# HPA-G Series

## Reflector Type Photoelectric Sensors with Integrated Amplifier Exclusively for Detection of Transparent Objects

### FEATURES

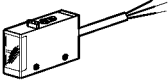
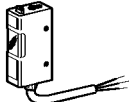
Ideal for the Detection of Transparent Bottles, Sheet and Other Highly Transparent Workpieces.

- Reflector type for the detection of transparent bodies.
- Sensitivity can be easily fine-tuned by a 2-turn control with indicators.
- Automatic pulse phase shift system greatly prevents mutual interference.
- High sealability, integrated structure. (IP67 compliant)
- Optical axis can be easily adjusted by red LED.
- Consistent detection of highly transparent bodies. (glass substrates, PET bottles, film, etc.)



### ORDER GUIDE

- Pre-leaded Type (cable length: 2m)

Type	Scanning method	Scanning distance	Light ON/dark ON selectable	Sensitivity adjustment	Supply voltage	Output mode	Catalog listing
Horizontal type 	Reflector type	50cm	○	○	10 to 30 Vdc	NPN open collector	HPA-G11
Vertical type 							HPA-G21





Note: Reflectors **FE-RR15** or **FE-RR8** (sold separately) can be used in combination with this sensor.

## SPECIFICATIONS

Scanning method	Reflector type
Type	Transparent object detection type
Catalog listing	<b>HPA-G11, HPA-G21</b>
Supply voltage	10 to 30Vdc (ripple 10% max.)
Current consumption	40mA max.
Scanning distance	50 cm (reflector <b>FE-RR15</b> used)
Detection object	Opaque object, semi-transparent type 45mm dia. min. (reflector <b>FE-RR15</b> used)
Standard detection object	—
Scanning angle	Body 1 to 5°, reflector 40°
Differential travel	—
Operation mode	Light ON/dark ON switch selectable
Output mode	NPN transistor open collector
Control output	Switching current: 100mA max. (resistive load), Dielectric strength: 30V max., Voltage drop: 1V max. (at 100mA switching current), with output short-circuit protection circuit
Response time	0.5ms max. for operation and recovery
Sensitivity adjustment	2-turn control with indicator
Light emitter	LED
Indicators	Incoming light indicator: red (light ON), Stability indicator: green (ON during stable LO/ON during stable dark ON)
Ambient light immunity	Incandescent lamp: 5,000lux max., Sunlight: 20,000lux max.
Operating temperature range	– 25 to +60°C
Storage temperature range	– 40 to +70°C
Humidity range	35 to 85% RH (condensation not allowed)
Insulation resistance	Min. 20MΩ (at 500Vdc)
Dielectric strength	1,000Vac (50/60 Hz) for 1 minute between case and electrically live metals
Vibration resistance	10 to 55Hz, 1.5mm peak-to-peak amplitude, 2hrs in X, Y and Z directions
Shock resistance	490m/s <sup>2</sup> 10 times in X, Y and Z directions
Protective structure	IP67 (IEC standard)
Wiring method	Pre-leaded
Weight	Approx. 55g (body only with 2m cable)
Circuit protection	Power ON/OFF malfunction prevention circuit (approx. 100ms), reverse connection protection circuit

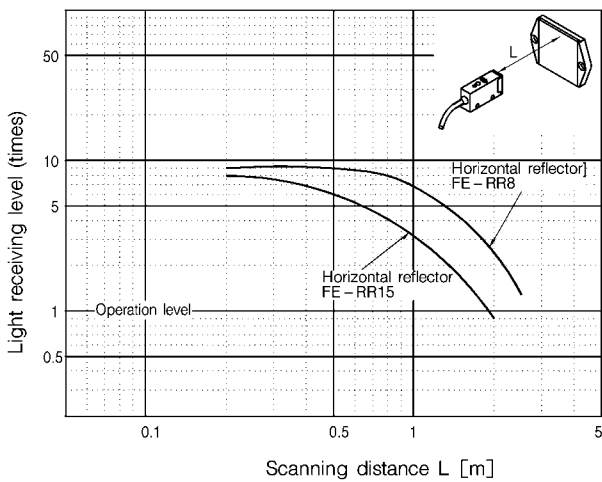
- Installation Instructions No.: CP-UM-3120E

## ATTACHMENTS (sold separately)

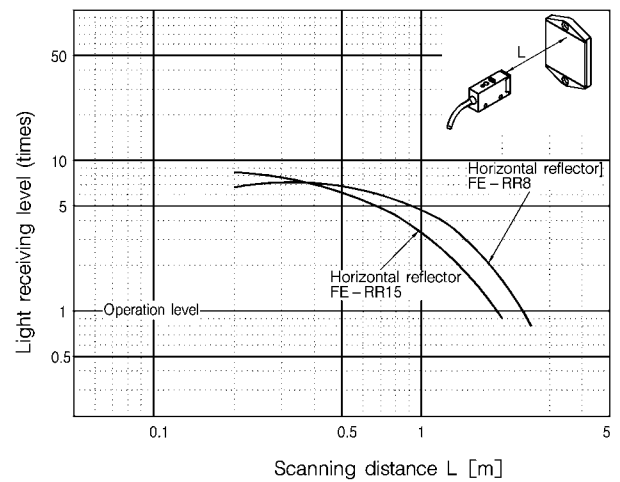
Name	Shape	Description	Catalog listing	Applicable model
Small reflector for polarized retroreflective model		Small type for when there is no space to attach the reflector Sold separately from <b>HPA-P</b> □□, <b>HPA-F</b> □□ and <b>HPA-G</b> □□.	<b>FE-RR15</b>	<b>HPA-P</b> □□, <b>HPA-F</b> □□ <b>HPA-G</b> □□
Reflector for polarized retroreflective model		Sold separately from <b>HPA-P</b> □□, <b>HPA-F</b> □□ and <b>HPA-G</b> □□.	<b>FE-RR8</b>	
Vertical model mounting bracket		—	<b>HPA-B02</b>	All vertical models
Cover mounting bracket		—	<b>HPA-B03</b>	All models

## CHARACTERISTICS DIAGRAMS

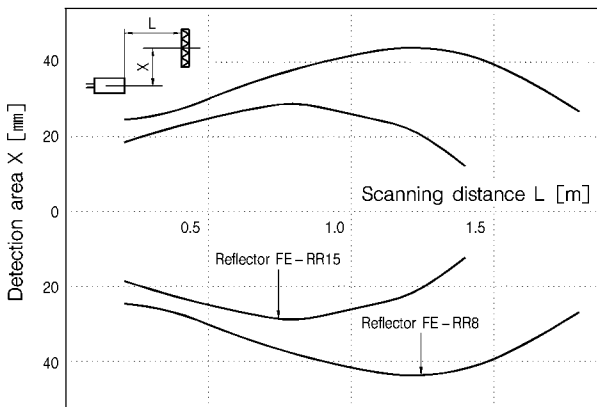
- Excess gain (light receiving level margin)
- Horizontal reflector



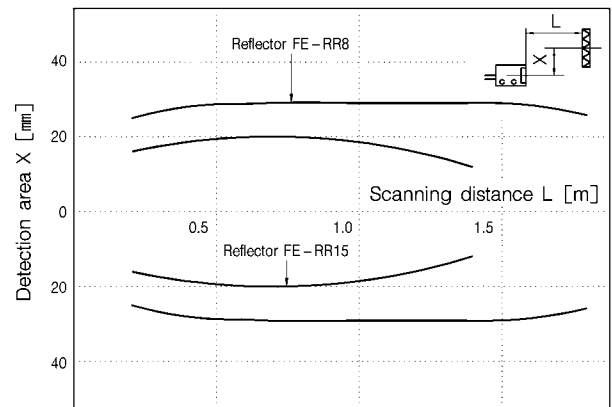
- Vertical reflector



- Parallel motion characteristics
- Horizontal direction

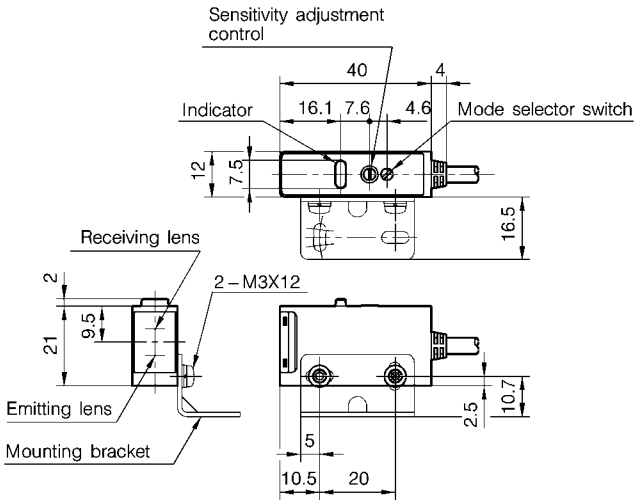


- Vertical direction



## EXTERNAL DIMENSIONS

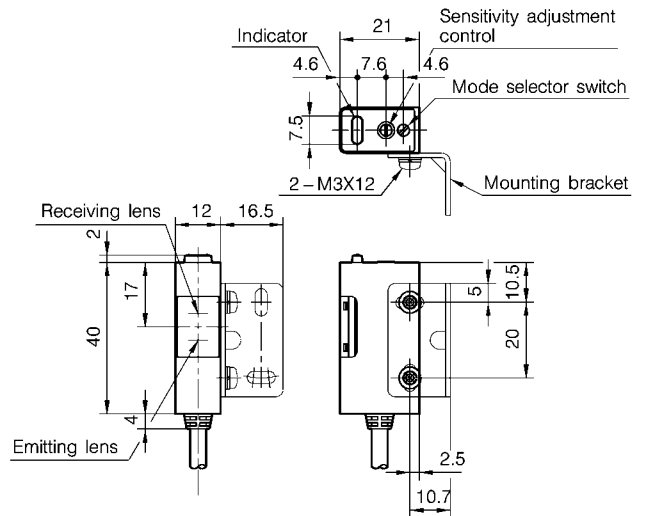
### • HPA-G11



Note: PVC insulated cable (oil-proof 0.2mm<sup>2</sup>) 4.2dia.  
Standard cable length 2m (pre-leaded)  
Cable color: Gray

### • HPA-G21

(unit: mm)



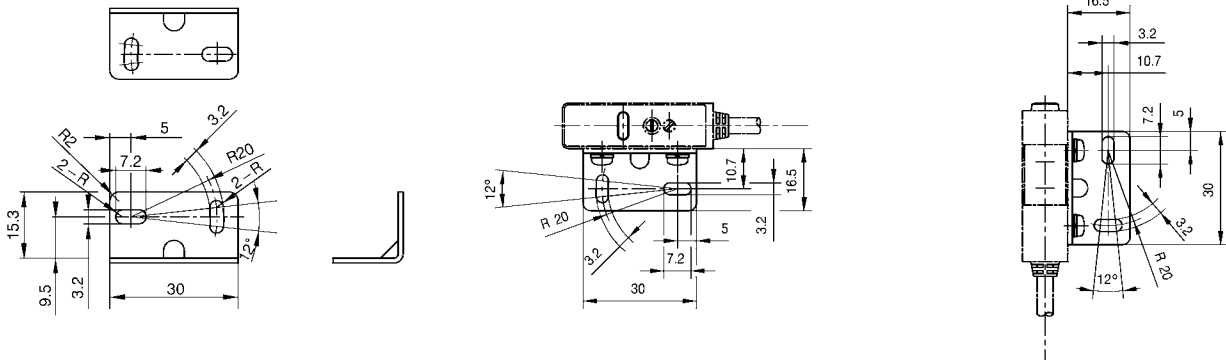
Note: PVC insulated cable (oil-proof 0.2mm<sup>2</sup>) 4.2dia.  
Standard cable length 2m (pre-leaded)  
Cable color: Gray

### • Brackets

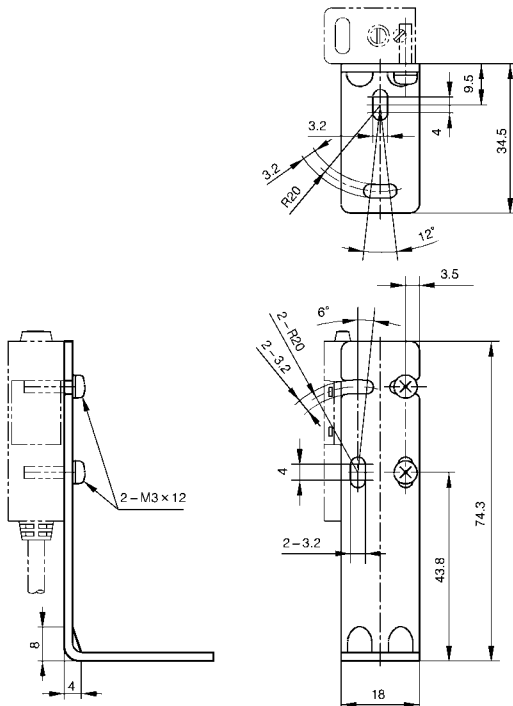
#### • Mounting bracket HPA-B01 (standard accessory)

(when attached to horizontal models)

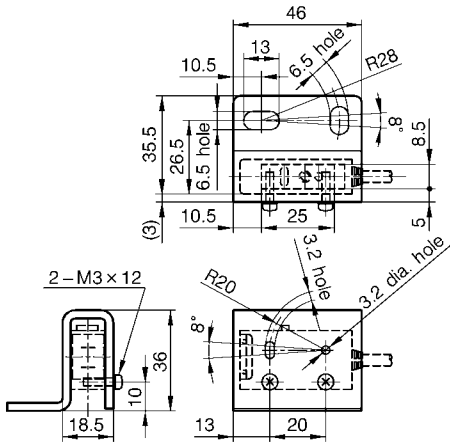
(when attached to vertical models)



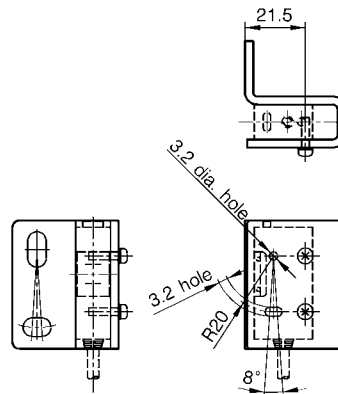
#### • Vertical mounting bracket HPA-B02 (sold separately)



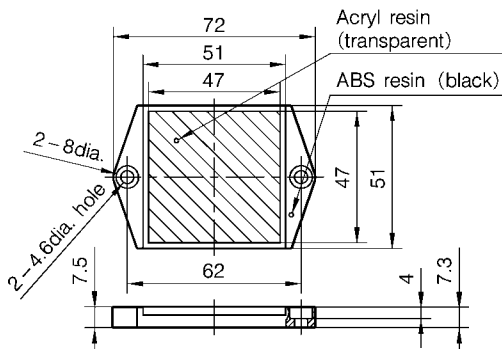
- Cover mounting bracket **HPA-B03** (sold separately)  
(when attached to horizontal models)



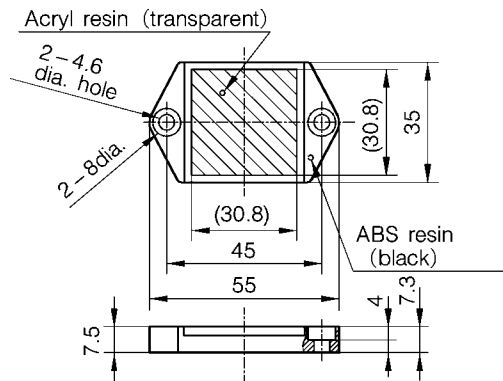
- (when attached to vertical models)



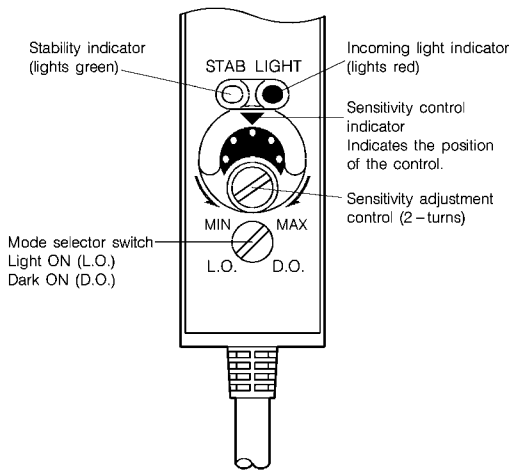
- Reflector
- Reflector **FE-RR8** (sold separately)



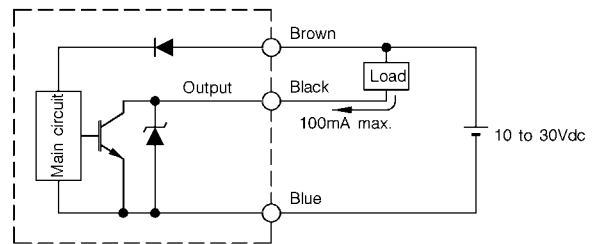
- Small reflector **FE-RR15** (sold separately)



**NAMES OF PARTS**

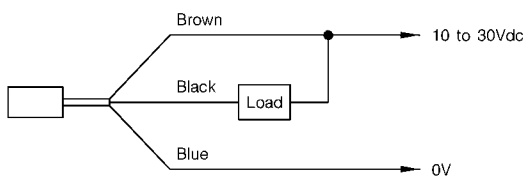


**OUTPUT CIRCUIT**

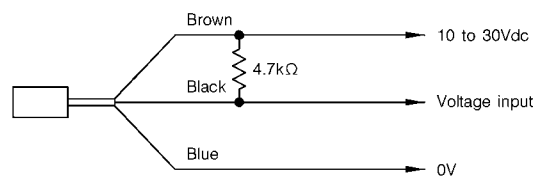


**WIRING DIAGRAM**

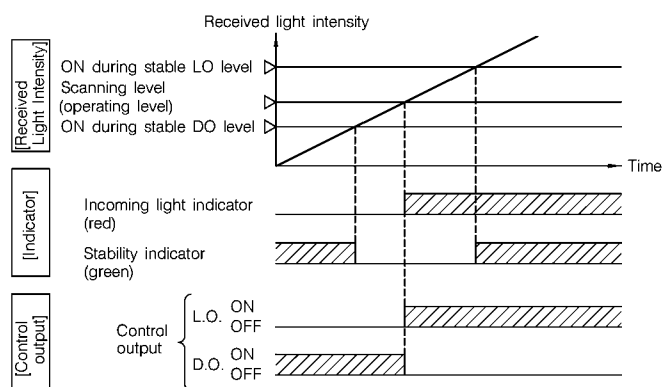
- (when load is driven directly)



- (when connected to voltage input equipment)



## OPERATIONAL TIMING CHARTS OF OUTPUT & INDICATORS



## SENSITIVITY ADJUSTMENT

Procedure	Setting the Detection Object	Sensitivity Adjustment Control	Indicator	Adjustment Method	
(1)			Green ● Out	Red ● Out	Place a target in front of the photoelectric sensor, gradually turn the sensitivity adjuster counterclockwise from MAX, and find the point (A) where the indicator turns OFF as shown in the figure on the left. Even if the indicator remains OFF at MAX, take this point as (A).
(2)			Green ● Out	Red ○ Lit	Without a target placed, gradually turn the sensitivity adjuster clockwise from MIN, and find the point (B) where the indicator turns ON.
(3)			Green ○ Lit	Red ● Out	Set the sensitivity adjuster to point at the center of points (A) and (B).
			Green ○ Lit	Red ○ Lit (stable light ON)	<b>Note:</b> When the control is turned more than one turn, adjust the control based upon the position of the indicator.

## BASIC PRECAUTIONS

### ● Wiring Precautions

- Wire the power supply and load for the photoelectric sensor correctly.
- This photoelectric sensor is influenced by current surge or electrical noise when high-voltage leads or power leads are placed near the photoelectric sensor cable. To prevent this, wire the cable separately from these leads, or provide a separate wiring duct for the cable.
- Firmly connect the cable terminals using crimped terminals, for example.
- When extending cables, use 0.3mm<sup>2</sup> min. cable. Keep the cable length to within 100m. Pay sufficient attention to the influence of noise caused by cable extensions.
- When a switching power supply is used, first ground the frame ground (FG) terminal on the power supply before use.
- When connecting to a capacitive load, insert a current limiting resistor to keep rush current within 100mA.

### ● Handling Precautions

- Do not swing the photoelectric sensor by its cable.
- Do not tug the photoelectric sensor cable with excessive force. The maximum extraction strength of the cable is 49N.
- Prevent objects from bumping against or scratching the scanning head.
- Do not use this sensor at locations where it may be splashed with water or oil, outdoors or in chemical (organic solvents, acid or alkali) atmospheres.
- Firmly tighten connectors by hand.
- Keep the bending radius of the cable to 30mm or larger.



## RESTRICIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

**YAMATAKE**

*Specifications are subject to change without notice.*

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This has been printed on 100% recycled paper.

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Printed in Japan (SP)

1st Edition: Issued in Apr., 2002

2nd Edition: Issued in Oct., 2003