

HPB Series

Photoelectric Sensors with Self-contained General-use Amplifier

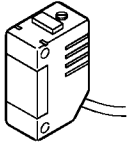
FEATURES

General-use Photoelectric Sensors Ideal for Distribution Equipment.

- Retroreflective models are provided with a polarized switch as standard.
- Sealability IP67. Integrated formed structure.
- Long scanning distance
 - Thru scan model: 10m
 - Polarized retroreflective model: 2.5m
- Acceptable world wide. (EN compatible product) (PNP and NPN versions available)



ORDER GUIDE

Shape	Scanning method	Scanning distance	Light ON/dark ON selectable	Sensitivity adjustment	Supply voltage	Output mode	Catalog listing
	Thru scan	10m	☐	—	10 to 30Vdc	NPN open collector	HPB-T1
						PNP open collector	HPB-T2
	Thru scan (with light quantity adjustment potentiometer)	2.5m (when reflector FE-RR8 is used)	☐	☐		NPN open collector	HPB-T3
						PNP open collector	HPB-T4
	Polarized retroreflective		☐	—		NPN open collector	HPB-P1
						PNP open collector	HPB-P2
	Polarized retroreflective (with light quantity adjustment potentiometer)		☐	☐		NPN open collector	HPB-P3
						PNP open collector	HPB-P4
	Diffuse scan	0.5m	☐	☐		NPN open collector	HPB-A1
						PNP open collector	HPB-A2
	Diffuse scan (wide beam area)	50mm	☐	☐		NPN open collector	HPB-D1
						PNP open collector	HPB-D2

ATTACHMENTS (sold separately)

Product name	Shape	Description	Catalog listing	Applicable models
Reflector for polarized retroreflective model		Reflecting surface 30.8 × 30.8mm	FE-RR15	HPB-P ☐
Reflector for polarized retroreflective model		Scanning distance 2.5m Reflecting surface 47 × 47mm	FE-RR8	HPB-P ☐
Reflector for polarized retroreflective model		Reflecting surface 8.4 × 32.8mm	FE-RR16	HPB-P ☐
Reflector for polarized retroreflective model		Reflecting surface 47 × 47mm	FE-RR17	HPB-P ☐
Reflector for polarized retroreflective model		Reflecting surface 30.9 × 30.9mm	FE-RR18	HPB-P ☐
Reflector for polarized retroreflective model		Reflecting surface 8.6 × 29.5mm	GP-RR20	HPB-P ☐
Standard bracket		Bottom face mounting L-shaped bracket (material: SUS)	HPB-B01	All models
		Rear face mounting L-shaped bracket (material: SUS)	HPB-B04	
Cover bracket		Vertical model mounting bracket (material: SUS)	HPB-B02	All models
Cover bracket		Horizontal model mounting bracket (material: SUS)	HPB-B03	All models
Slit for thru scan model		W 1mm vertical	HPB-U01	HPB-T ☐
		W 1mm horizontal	HPB-U02	

SPECIFICATIONS

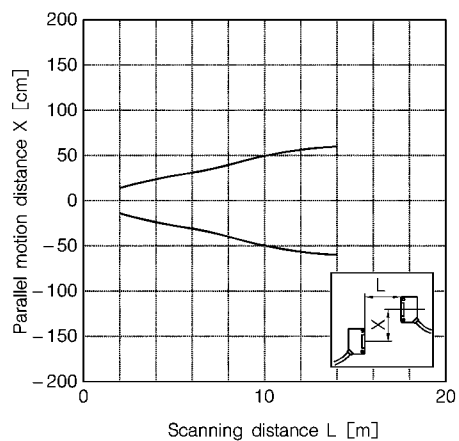
Scanning method	Thru scan	Thru scan (with light quantity adjustment potentionmeter)	Polarized retroreflective	Polarized retroreflective (with light quantity adjustment potentionmeter)	Diffuse scan	Diffuse scan (wide beam area)
Catalog listing	HPB-T1 HPB-T2	HPB-T3 HPB-T4	HPB-P1 HPB-P2	HPB-P3 HPB-P4	HPB-A1 HPB-A2	HPB-D1 HPB-D2
Supply voltage	10 to 30Vdc					
Current consumption	55mA max. Emitter: 30mA Receiver: 25mA		30mA max.		30mA max.	
Scanning distance	10m		2.5m (when reflector FE-RR8 is used)		0.5m	50mm
Detection object	Opaque object 9mm dia. min.		Opaque object 80mm dia. min. (when reflector FE-RR8 is used)		—	
Standard target object	—		—		20×20cm white paper	10×10cm white paper
Scanning angle	2 to 20°		Body: 1 to 10°, reflector: 40° min.		—	
Differential travel	—		—		20% max. (within rated sensing distance)	
Operation mode	Set operation mode selection line. Operation mode selection line open or 0V connection: light ON/Vcc connection: dark ON					
Output mode	HPB-□1, HPB-□3 : NPN transistor output, open collector HPB-□2, HPB-□4 : PNP transistor output, open collector					
Control output	Switching current: 100mA max. (resistive load) Output dielectric strength: 30V Voltage drop: 2V max. (at 100mA switching circuit)					
Response time	1ms max. (for operation and recovery)					
Light emitter	Infrared LED		Red LED		Infrared LED	
Indicator lamps	Other than thru scan emitter: output ON indicator (orange), stability indicator (green), Thru scan emitter: power indicator (orange)					
Ambient light immunity (at light receiving surface)	Incandescent lamp 5,000lx max., sunlight 20,000lx max.					
Operating temperature range	− 25 to +60°C (icing, condensation not allowed)					
Operating humidity range	35 to 85%RH (icing, condensation not allowed)					
Storage humidity range	− 40 to +70°C (icing, condensation not allowed)					
Insulation resistance	20MΩ min. (by 500Vdc megger)					
Dielectric strength	1,000Vac, 50/60Hz 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	500m/s² 10 times in X, Y and Z directions					
Protection	IP67 (IEC standard)					
Wiring method	Pre-leaded					
Weight	Approx. 60g (body only, with 2m cord)					
Circuit protection	Reverse connection protection circuit, output short-circuit protection circuit, power ON malfunction prevention circuit (approx. 50ms)					

- Installation Instructions No.: CP-UM-5049E

CHARACTERISTICS DIAGRAMS

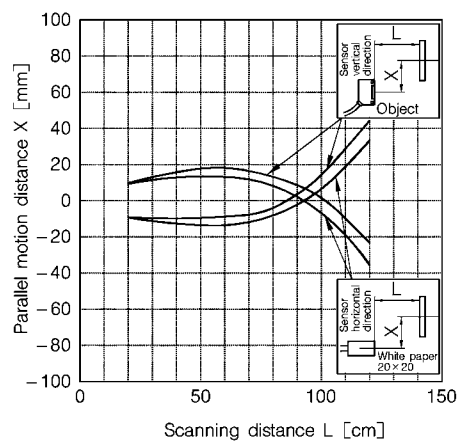
- Thru scan model (**HPB-T**)

- Parallel motion characteristics



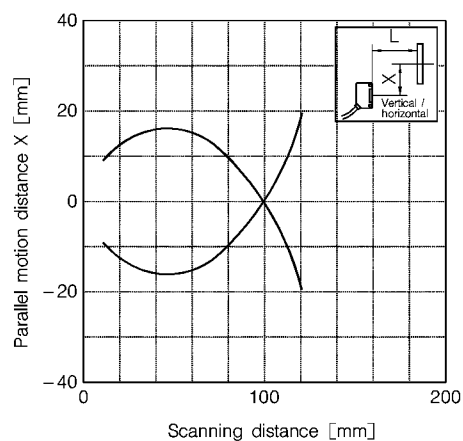
- Diffuse scan model (**HPB-A**)

- Detection area characteristics



- Diffuse scan (wide beam area) (**HPB-D**)

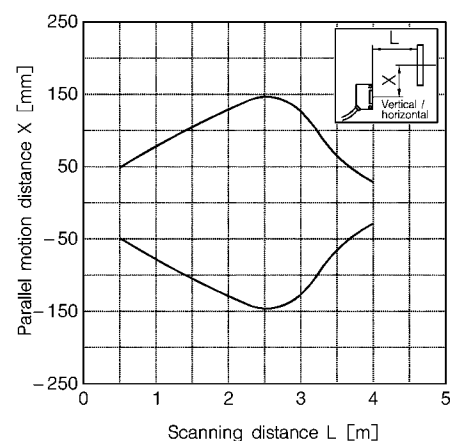
- Detection area characteristics



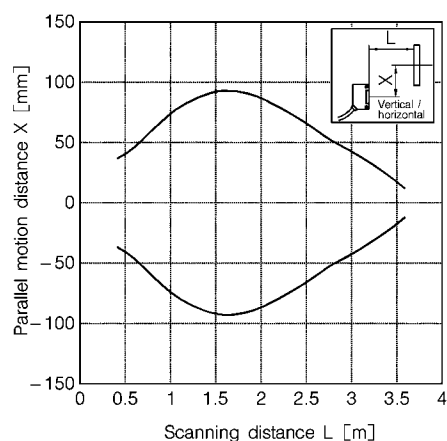
- Polarized retroreflective (**HPB-P**)

- Parallel motion characteristics

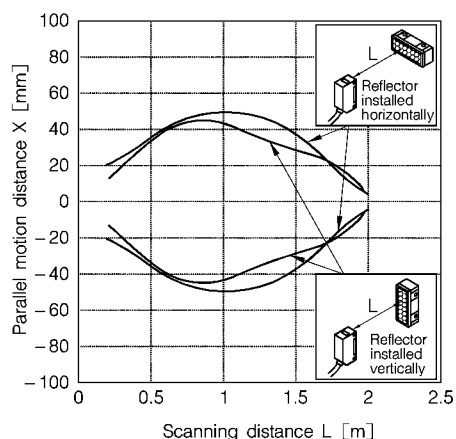
Combined with **FE-RR8** or **FE-RR17**



Combined with **FE-RR15** or **FE-RR18**



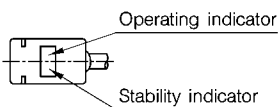
Combined with **FE-RR16**



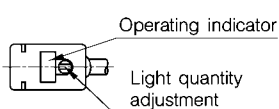
EXTERNAL DIMENSIONS

• Thru scan (HPB-T□)

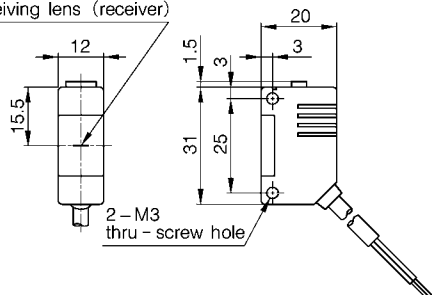
- **HPB-T1** and **HPB-T2** emitters,
all receivers



- **HPB-T3** and **HPB-T4** emitters



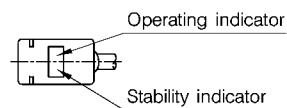
Emitting lens (emitter)
Receiving lens (receiver)



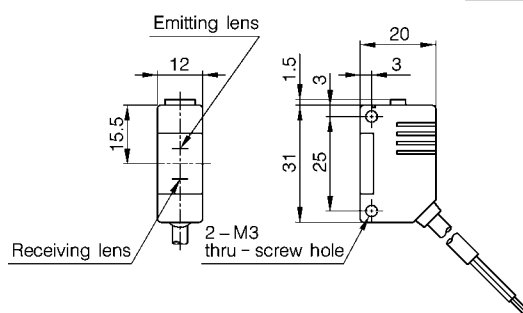
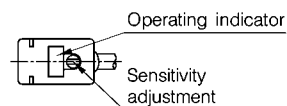
• Polarized retroreflective (HPB-P□)

(unit: mm)

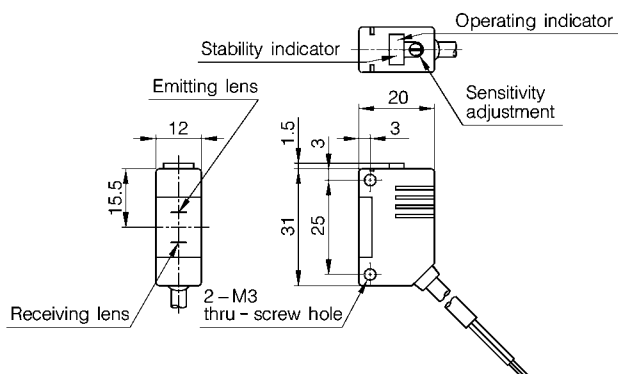
- **HPB-P1, HPB-P2** :



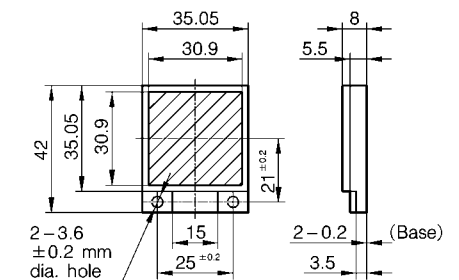
- **HPB-P3, HPB-P4** :



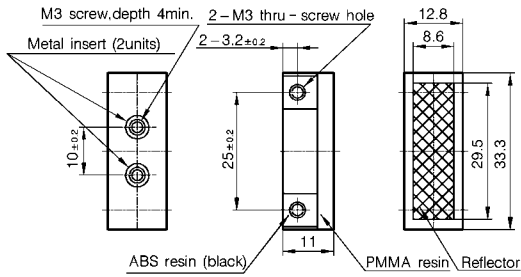
• Diffuse scan model (HPB-A□, HPB-D□)



- (unit: mm)



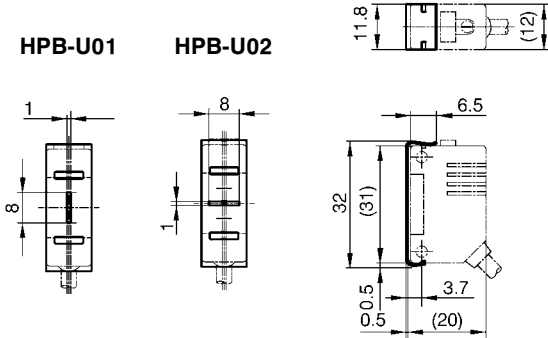
• FE-RR20



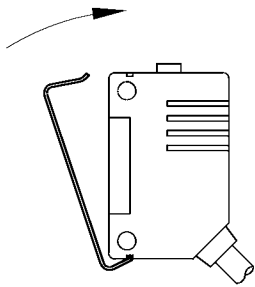
• Slit

HPB-U01

HPB-U02

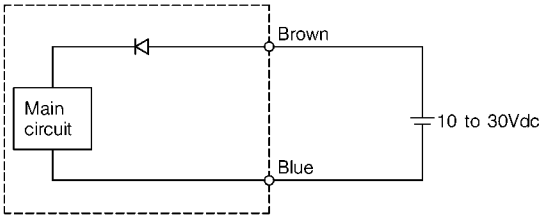


Mounting method

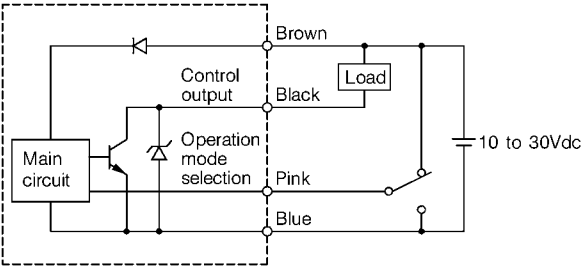


OUTPUT STAGE CIRCUIT DIAGRAMS

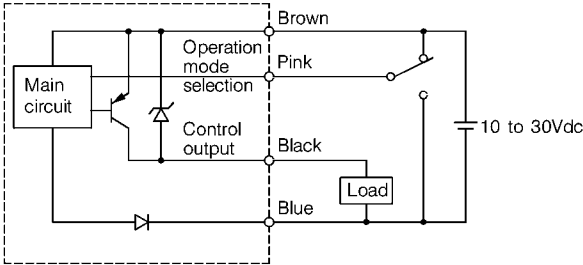
• Thru scan model emitter



• (NPN output type) polarized retroreflective model, thru scan model receiver, diffuse scan type



• (PNP output type) polarized retroreflective model, thru scan model receiver, diffuse scan type



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.
- Reliably connect the ends of the cable using a crimped terminal, for example.
- When extending cords, use 0.3mm² min. cable. Keep the cable length to within 100m. Pay attention to the influence of noise when cables are extended beyond this length.
- When a switching power supply is used, 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 cord.
- Do not tug the cable of the photoelectric sensor using excessive force. The pull-out 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 the connectors by hand.
- Do not bend the cord with a minimum radius of 30mm.

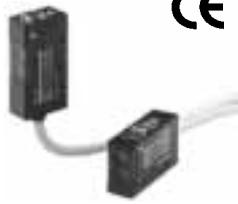
● Polarized retroreflective model

The polarized retroreflective model uses a light-polarizing filter, and employs a detection method intended to prevent reflection from mirror surfaces or shiny detection objects. For this reason, malfunction may occur when the characteristics of the detection body are such that the body itself polarizes light. Check this before use.

Example

- : Detection objects covered in transparent film
- : Mirror surfaces with slight surface unevenness or shiny detection objects

OTHER SELF-CONTAINED TYPE PHOTOELECTRIC SENSOR SERIES

Model		Self-contained type		
		HPA High function 	HPA-G Exclusively for detection of transparent objects 	HPJ Ultraminiature type 
Major specifications		Vertical/horizontal	Vertical/horizontal	Vertical/horizontal
Features		- Strobe light emission, high margin setting, front incoming light display, high speed accurate optical axis adjustment by single operation, using output OFF forcing function. - High speed response. - Mutual interference, prevention function. - High sealing in monoblock. (IP67)	- Even highly transparent bodies (glass substrates, PET bottles, transparent film etc.) can be stably scanned. - 2-turn potentiometer with indicator facilitates finetuning of sensitivity.	- Ultraminiature type - Convergent beam type - Emitting light quantity adjustment type
Scanning distance	Thru scan	10m	—	1.5m
	Polarized retroreflective	4m (for transparent object detection: 1m)	—	3±0.5cm
	Reflective	—	50cm	—
	Diffuse scan	80cm, 20cm	—	—
Power supply		DC	DC	DC
Output		NPN, PNP	NPN, PNP	NPN, PNP
Response time		0.5ms (1ms, 5ms)	0.5ms	1ms
Operating temperature range		−20 to +60°C	−25 to +60°C	−20 to +50°C
Protection		IP67	IP67	IP40
Dimensions (mm)		12×21×40	12×21×40	8×11×22
Major applications		- Transportation - Food, chemicals truck - Packing machine - Automobile parts	- Liquid crystal - Semiconductors - Packing machine - Food, chemicals truck	- Automatic assembly - Semiconductors - Home electric appliances - Electronic parts plant
Pre-leaded connector type		○	—	—



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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