

# Azbil

## Технические характеристики Фотоэлектрические датчики НР7, НЛА, НЛВ

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# Catalog listings

## Basic model numbers Connection: 2 m cable

















Detection method / Configuration		Detection range / Light source	Catalog listing	Output	Different-frequency model No.	Different-frequency Output	Wiring method	
Thru-scan		30 m / Infrared	HP7-T41	NPN	HP7-T45	NPN	cable	2 m
			HP7-T42	PNP	HP7-T46	PNP	cable	2 m
		15 m / Red	HP7-T11	NPN	HP7-T15	NPN	cable	2 m
			HP7-T12	PNP	HP7-T16	PNP	cable	2 m
		15 m / Infrared	HP7-T21	NPN	HP7-T25	NPN	cable	2 m
			HP7-T22	PNP	HP7-T26	PNP	cable	2 m
		4 m / Red	HP7-T51	NPN	HP7-T55	NPN	cable	2 m
			HP7-T52	PNP	HP7-T56	PNP	cable	2 m
Retroreflective		5 m / Red	HP7-P11	NPN			cable	2 m
			HP7-P12	PNP			cable	2 m
		3 m / Red	HP7-P51	NPN			cable	2 m
			HP7-P52	PNP			cable	2 m
Diffuse-scan		1 m / Infrared	HP7-A43	NPN			cable	2 m
			HP7-A44	PNP			cable	2 m
		0.5 m / Red	HP7-A13	NPN			cable	2 m
			HP7-A14	PNP			cable	2 m
Wide-beam diffuse scan		100 mm / Infrared	HP7-D23	NPN			cable	2 m
			HP7-D24	PNP			cable	2 m
		50 mm / Infrared	HP7-D63	NPN			cable	2 m
			HP7-D64	PNP			cable	2 m
Retroreflective transparent object detection		0.5 m / Red	HP7-C11S	NPN			cable	2 m
			HP7-C12S	PNP			cable	2 m

Note: HP7-T Thru-scan: Emitter model number is HP7-E and receiver model number is HP7-R.

## Connection options

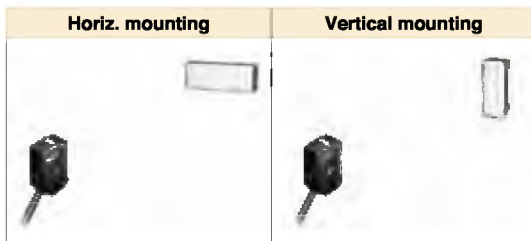
Type	Configuration Base model number	Catalog listing	HP7-P11-L050	HP7-P11-C003	HP7-P11-S003	HP7-P11-T	
		Connection type	5 m cable	M12 prelead <sup>2</sup> connector	Quick Lock <sup>1,2</sup>	M8 connector	
		Base model number	Base model number-L050	Base model number-C003	Base model number-S003	Base model number-T	
Thru-scan		30 m / Infrared	HP7-T41	✓	✓	-	-
			HP7-T42	✓	✓	-	-
		15 m / Red	HP7-T11	⊙	⊙	✓	✓
			HP7-T12	⊙	✓	✓	✓
		15 m / Infrared	HP7-T21	✓	✓	-	-
			HP7-T22	✓	✓	-	-
		4 m / Red	HP7-T51	✓	✓	-	-
			HP7-T52	✓	✓	-	-
Retroreflective		5 m / Red	HP7-P11	⊙	⊙	✓	✓
			HP7-P12	✓	✓	✓	✓
		3 m / Red	HP7-P51	✓	✓	-	-
			HP7-P52	✓	✓	-	-
Diffuse-scan		1 m / Infrared	HP7-A43	✓	✓	✓	✓
			HP7-A44	✓	✓	✓	✓
		0.5 m / Red	HP7-A13	✓	-	-	-
			HP7-A14	✓	-	-	-
Wide-beam diffuse scan		100 mm / Infrared	HP7-D23	✓	-	-	-
			HP7-D24	✓	-	-	-
		50 mm / Infrared	HP7-D63	-	-	-	-
			HP7-D64	-	-	-	-
Retroreflective transparent object detection		0.5 m / Red	HP7-C11S	✓	✓	✓	✓
			HP7-C12S	✓	✓	✓	✓
Thru-scan Different frequency		30 m / Infrared Different frequency	HP7-T45	✓	-	-	-
			HP7-T46	✓	-	-	-
		15 m / Red Different frequency	HP7-T15	✓	✓	✓	✓
			HP7-T16	✓	✓	✓	✓
		15 m / Infrared Different frequency	HP7-T25	✓	-	-	-
			HP7-T26	✓	-	-	-
		4 m / Red Different frequency	HP7-T55	✓	-	-	-
			HP7-T56	✓	-	-	-

## ■ Accessories

Name	Configuration	Description	Catalog listing	Compatible model
Reflector for retroreflective model		Reflector size 47 x 47 mm	<b>FE-RR22</b> (Scanning distance 0.05 to 5 m)	<sup>*3</sup> <b>HP7-P_</b>
		Reflector size 30.8 x 30.8 mm	<b>FE-RR18</b> (Scanning distance 0.05 to 3.3 m)	<sup>*3</sup> <b>HP7-P_</b>
		Reflector size 37 x 56 mm	<b>FE-RR21</b> Scanning distance: horiz. amounting 0.05 to 5 m, vertical mounting 0.05 to 4.8 m	<sup>*3</sup> <sup>*4</sup> <b>HP7-P_</b>
		Reflector size 47 x 47 mm	<b>FE-RR8</b> (Scanning distance 0.05 to 5 m)	<sup>*3</sup> <b>HP7-P_</b>
		Reflector size 30.8 x 30.8 mm	<b>FE-RR15</b> (Scanning distance 0.05 to 3.3 m)	<sup>*3</sup> <b>HP7-P_</b>
		Reflector size 8.6 x 29.5 mm	<b>FE-RR23</b> Scanning distance: horiz. mounting 0.05 to 1.8 m, vertical mounting 0.05 to 1.3 m	<sup>*3</sup> <sup>*4</sup> <b>HP7-P_</b>
		Reflector size 22.5 x 39.2 mm	<b>FE-RR24</b> (Scanning distance 0.05 to 2.5 m)	<sup>*3</sup> <b>HP7-P_</b>
Reflector (for retroreflective transparent object detection)		Reflector size 47 x 47 mm	<b>FE-RR17C</b> Scanning distance 0.05 to 0.5 m (in combination with <b>HP7-C1_S</b> )	<b>HP7-C1_S</b>
Standard bracket		Bottom-mounting L-bracket	<b>HP-B08</b>	<b>All models</b>
		Bottom-mounting L-bracket	<b>HP-B09</b>	<b>All models</b>
		Rear-mounting L-bracket	<b>HP-B10</b>	<b>All models</b>
Wraparound mounting bracket		Wraparound vertical mounting bracket	<b>HP-B11</b>	<b>All models</b>
		Wraparound horizontal mounting bracket	<b>HP-B12</b>	<b>All models</b>
Slit for thru-scan model		Vertical slit	<b>HP-SV05</b> <b>HP-SV10</b> <b>HP-SV20</b>	<sup>*5</sup> <b>HP7-T_</b>
		Horizontal slit	<b>HP-SH05</b> <b>HP-SH10</b> <b>HP-SH20</b>	<sup>*5</sup> <b>HP7-T_</b>
Mutual interference protection filter for thru-scan model		Mutual interference can be prevented by changing the polarizing direction of 2 adjacent emitter-receiver pairs	<b>HP-U02</b>	<sup>*6</sup> <b>HP7-T1_/T5_</b>

<sup>\*3</sup>. Scanning distance when used with **HP7-P1\_**.

<sup>\*4</sup>.



<sup>\*5</sup>. Scanning distance of thru-scan sensor with slit.

Slit width	Catalog listing	Catalog listing of compatible sensors	
		HP7-T1_ / HP7-T2_	HP7-T5_
0.5 x 6.4 mm	<b>HP-S_05</b>	Scanning distance 1.2 m	Scanning distance 0.4 m
1.0 x 6.4 mm	<b>HP-S_10</b>	Scanning distance 3 m	Scanning distance 0.7 m
2.0 x 6.4 mm	<b>HP-S_20</b>	Scanning distance 5 m	Scanning distance 1.5 m

<sup>\*6</sup>. Scanning distance of thru-scan sensor with mutual interference protection filter.

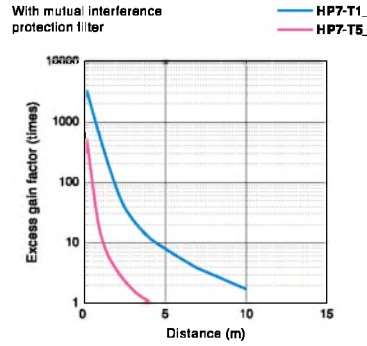
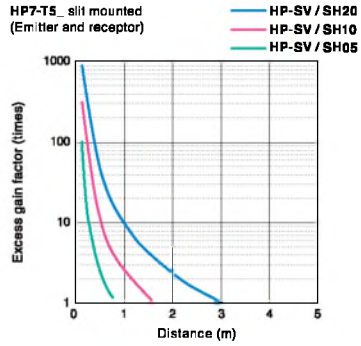
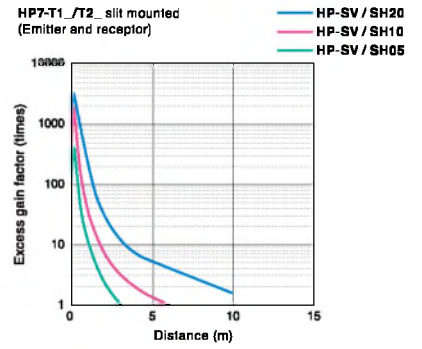
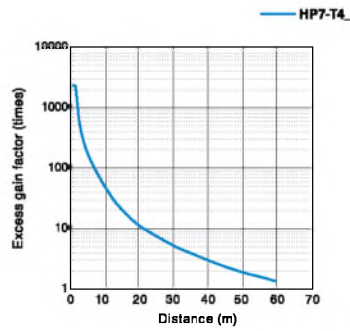
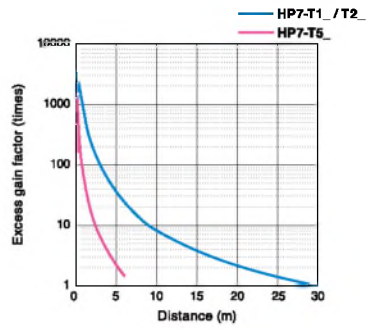
Catalog listing	Catalog listing of compatible sensors	
	HP7-T1_	HP7-T5_
<b>HP-U02</b>	Scanning distance 7 m	Scanning distance 1.8 m

# Specification

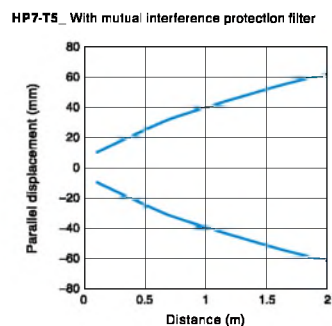
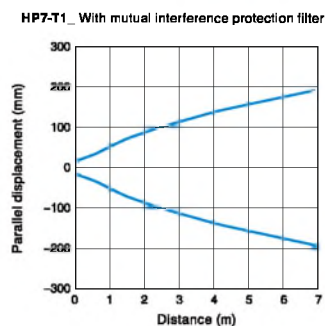
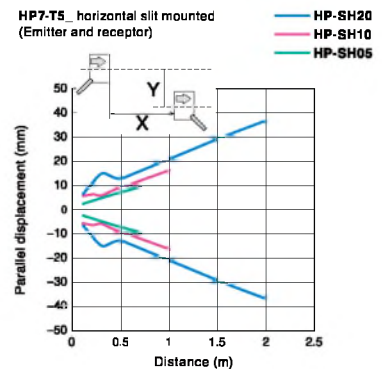
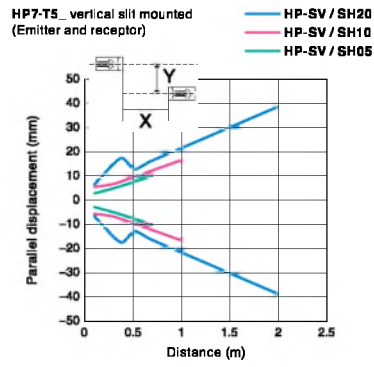
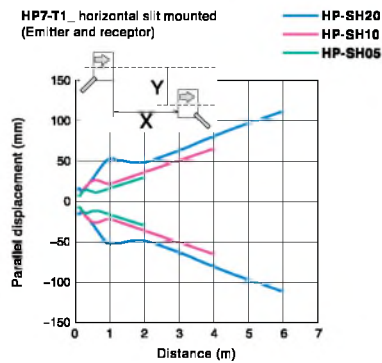
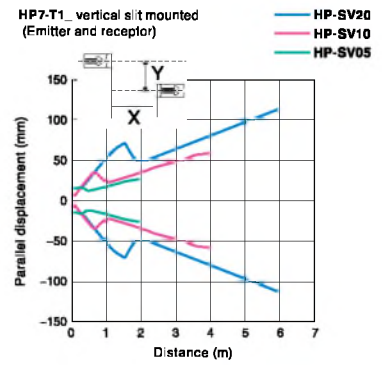
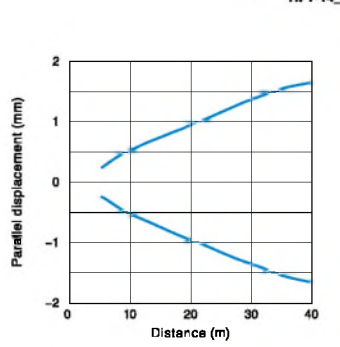
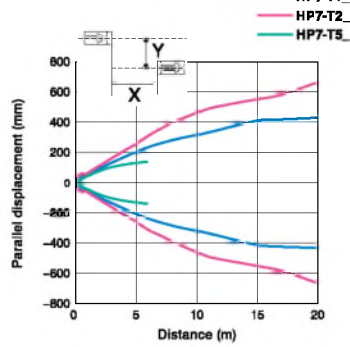
Catalog listing	NPN	HP7-P51	HP7-P11	HP7-T51	HP7-T11 (Red) HP7-T21 (Infrared)	HP7-T41	HP7-A13	HP7-A43	HP7-D23	HP7-D63	HP7-C11S
	PNP	HP7-P52	HP7-P12	HP7-T52	HP7-T12 (Red) HP7-T22 (Infrared)	HP7-T42	HP7-A14	HP7-A44	HP7-D24	HP7-D64	HP7-C12S
Detection method	Retroreflective <sup>2</sup>		Thru-scan			Diffuse-scan				Retroreflective transparent object detection	
Power supply	10.2 to 26.4V DC (Ripple 10% max.)										
Power consumption	14 mA max.		22 mA max.	25 mA max. (Red) 30 mA max. (Infrared)	32 mA max.	14 mA max.	17 mA max.	17 mA max.		15 mA max.	
Scanning distance	3 m (with FE-RR8 reflector)	5 m (with FE-RR8 reflector)	4 m	15 m	30 m	0.5 m	1 m	100 mm	50 mm	0.05 to 0.5 m (when combined with FE-RR17C reflector)	
Target object	Opaque object 80 mm dia. min (with FE-RR8 reflector)		Opaque object 12 mm dia. min.			Standard target object: 200 x 200 mm paper, 90 % reflectivity				10% light blockage or more, 50 x 50 mm or more (when combined with FE-RR17C reflector)	
Differential travel	—		—			20% max. (at rated scanning distance)				—	
Operation mode	Light-operate / Dark-operate selectable by operation button										
Output mode <sup>1</sup>	NPN open collector / PNP open collector										
Control output	Switching current: preloaded. Preloaded connector type 100 mA (Resistance load) M8 connector type and low-temperature cable type 50 mA (Resistance load) Output withstand voltage: 30 V Residual voltage: 2 V or lower (at switching current of 100 mA/50 mA), 1.1 V or less (at switching current below 10 mA)									Switching current: 50 mA or lower (Resistive load) Output withstand voltage: 30 V Residual voltage: 1 V or less	
Response time <sup>3</sup>	1 msec		1 msec (Different frequency model: 3 ms)			1 msec				1 msec	
Light source	Red, 4 elements (Wavelength approx. 645 nm)		Red, 4 elements (Wavelength approx. 645 nm)	Red, 4 elements (Wavelength approx. 645 nm) Infrared (Wavelength approx. 860 nm)	Infrared (Wavelength approx. 860 nm)	Red, 4 elements (Wavelength approx. 645 nm)	Infrared (Wavelength approx. 860 nm)			Red, 4 elements (Wavelength approx. 645 nm)	
Scanning angle	0.5 to 10°		2 to 20°			—				Sensor: 0.5° to 10°	
Indicator	Output ON: orange indicator ON. At stable light and stable dark: green indicator Thru-scan emitter: power indicator, 30 m thru-scan receiver: light-operated indicator on front										
Ambient light immunity	Incandescent lamp: 10,000 lux max. Sunlight: 40,000 lux max. HP7-T_, HP7-P_, HP7-C_: Minimum angle of incidence of surrounding light = 5° HP7-A_: Minimum angle of incidence of surrounding light = 15° HP7-D_: Figures apply to indirect illumination.										
Operating temperature	-30 to + 55°C (without freezing or condensation) <sup>6</sup>									-10 to + 55°C (without freezing or condensation) <sup>6</sup>	
Storage temperature	-40 to + 70°C (without freezing or condensation)										
Operating humidity	35 to 85% RH (without freezing or condensation)										
Insulation resistance	20MΩ min. (at 500Vdc)										
Dielectric strength	1,000Vac 50/60Hz for one minute between electrically live metal and case										
Vibration resistance	10 to 55Hz, 1.5 mm peak-to-peak amplitude, 2 hours each in X, Y, and Z directions										
Shock resistance	500m/s <sup>2</sup> 10 times each in X, Y and Z directions										
Sensitivity adjustment	Operation button										
Protective structure	IP67 (IEC standard)										
Wiring method	HP7-_: preloaded 2 m, HP7-_-L050: preloaded 5 m, HP7-_-C003: M12 preloaded connector 30 cm, HP7-_-T: M8 connector										
Circuit protection	Error prevention circuit at power on (max. 60 ms) Full wiring error protection									Error prevention circuit at power on (max. 80 ms) Power supply reverse polarity protection, output short-circuit protection	
Interference suppression <sup>5</sup>	Diffuse-scan, retroreflective, retroreflective transparent object detection models up to 2 units. Thru-scan models with different frequencies, up to 2 units. Thru-scan models with mutual interference prevention filter <sup>4</sup> (for red), up to 2 units. Different frequency models + mutual interference prevention filters (for red), up to 4 units.										

## Thru-scan models (HP7-T1\_ / T2\_ / T5\_)

Excess gain (Light received over the required amount)



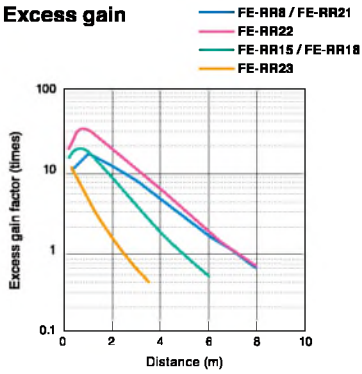
## Parallel displacement



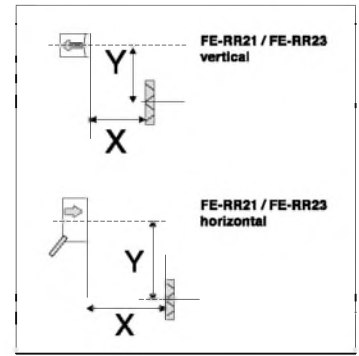
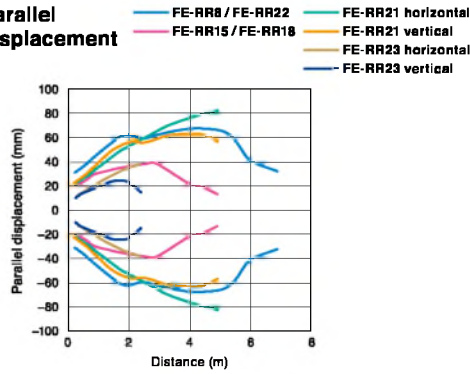
# Characteristics diagrams (Typical examples)

## Retroreflective models (HP7-P1\_)

### Excess gain

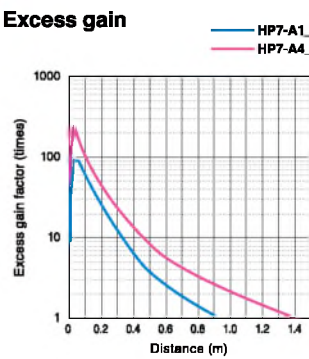


### Parallel displacement

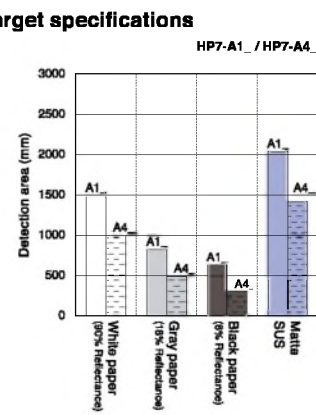


## Diffuse-scan models (HP7-A1\_ / A4\_)

### Excess gain

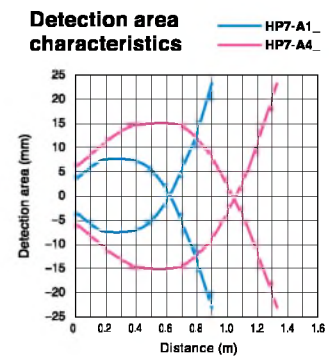


### Target specifications

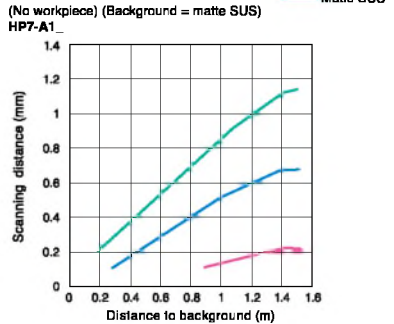


When used with highly reflective backgrounds, tilting the sensor may improve background suppression.

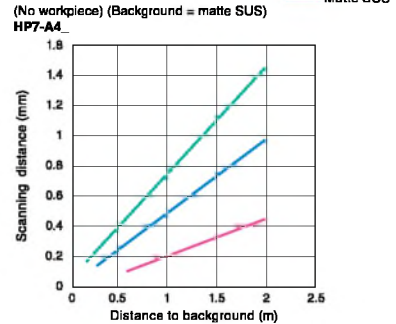
### Detection area characteristics



### Background interference during tuning

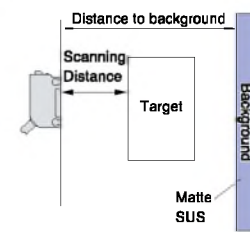


### Background interference during tuning



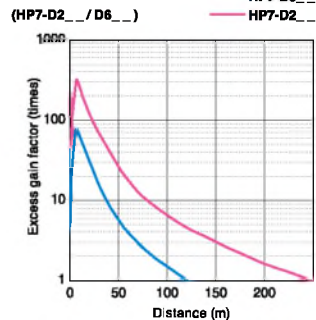
### How to interpret the table

Example: Tuning (without a workpiece) of model HP7-A1\_ against a matte SUS background at 1 m where white paper target is detected at distances of up to approx. 0.5 m.

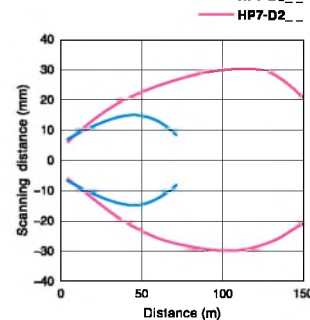


## Wide-beam diffuse scan model (HP7-D2\_ / D6\_)

### Wide-beam diffuse scan model

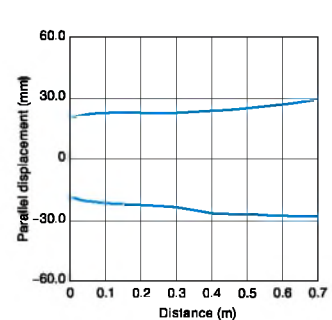


### Detection area characteristics



## Retroreflective transparent object detection model (HP7-C1\_ S)

### Parallel displacement



## Convergent Laser Measurement Sensor - Model: HLB

Very small or thin parts can be detected by differences in distance, unaffected by colour of reflection rate of the target object.

### Features

- Size: 12 x 16,3 x 27 mm
- Precise detection of minute differences in distance (or level)
- Easy mounting with a dedicated bracket
- Laser beam spot diameter of 0,2 mm or less
- Reliably detects the difference in level made by a sheet of paper



## Vane Type Photoelectric Switches with Self-Contained Amplifier - Model: HPV

Switches with 2 optical axes in an easy-to-use size (vane width 25 mm, depth 35 mm), saving space and reduced wiring.

### Features

- Highly visible indicators (for power ON and incoming light)
- Guaranteed down to -25 °C for use in cold-storage warehouses
- The first optical axis position is located a mere 4 mm from the tip of the switch
- Small, light plastic case (40 x 50 x 10 mm, 60 / 70 g)
- Sealed to IP64
- Operating mode can be set for individual axes with the L.O. / D.O. selector switch (2-optical axis type)
- Can be gang-mounted



## Ultraminiature Photoelectric Switches with Self-contained Amplifier - Model: HPJ

Fingertip-size, provided with various slit attachments.

### Features

- Fingertip-size
- Thru scan model: 22 x 11 x 8 mm
- Limited diffuse scan model: 30 x 12 x 8 mm
- Long distance scanning; Thru scan model: 1,5 m
- Limited diffuse scan model: 30 +/- 5 mm
- Six different types of slit attachments



# Photoelectric Switches for Harsh Environments - Model: HP800

Excellent performance in harsh metalworking environments.

## Description

Mist coolants are often used near photoelectric sensors. Since most sensors are made of resin, coolant intrusion through cracks in the case or lens, attenuation of light intensity, and similar problems occur after a short period of time, and the number of such cases is increasing.

**The HP800 series contains environment-resistant photoelectric switches.**

- No more need to worry about cracked cases or attenuation of light due to lens fogging.
- High sealing performance ensures normal operation even after 1.000-hour immersion heat cycle test.

## Features

- Die-cast housing for strength and shock resistance
- High-performance seal
- Resistance to the most advanced cutting oils
- Preleaded connector models are available



# Long-Distance Detection Laser Sensors - Model: HLA

High-accuracy detection of very small targets using the direct reflection method.

## Features

- Detecting a long distant and vary small spot.  
Switching output type: 0,1 mm dia at 80 mm
- Line-up of "contrast setting" and "distance setting" types for the switching output type





## По вопросам продаж и поддержки обращайтесь:

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