

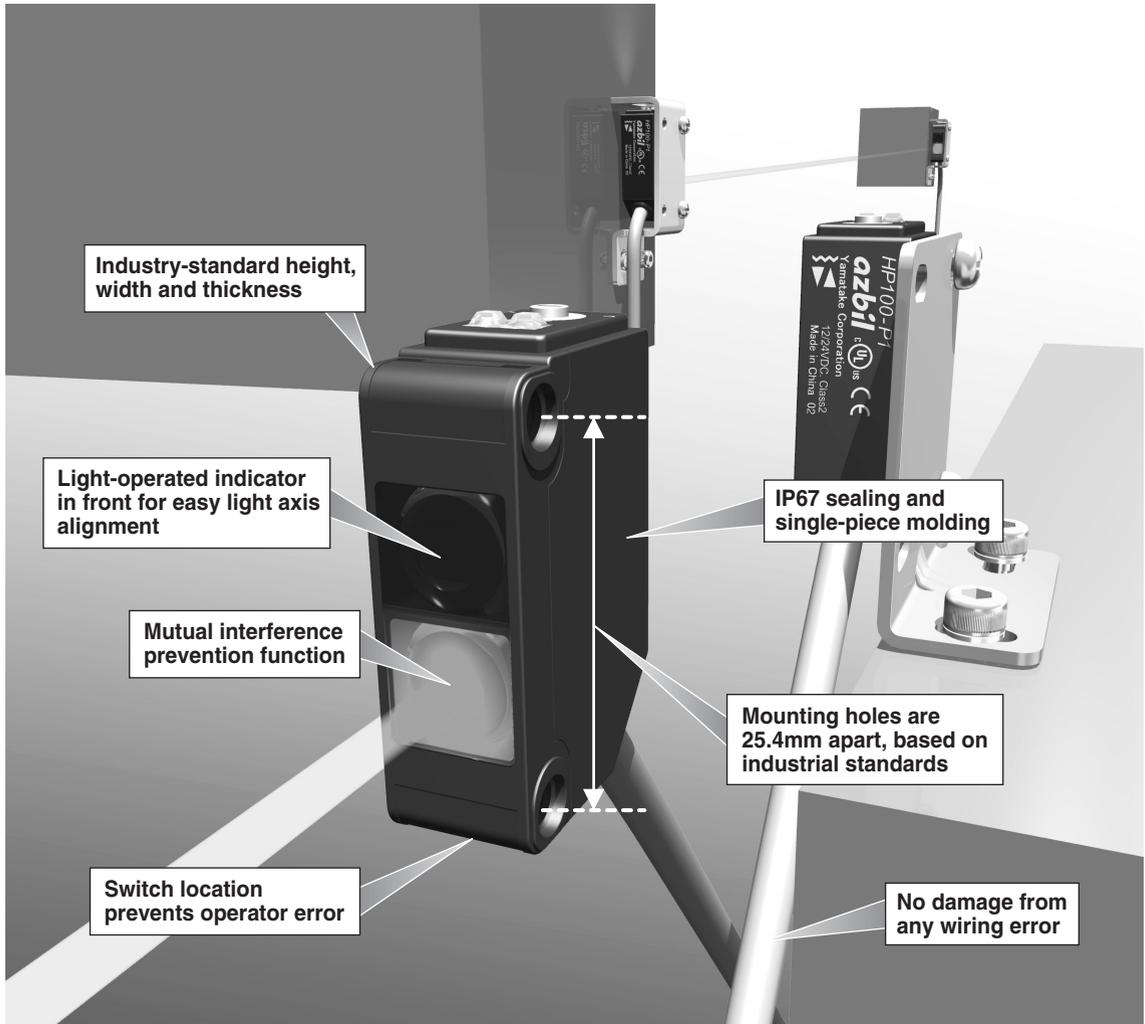
HP100 Series

The convenience of industry standards, plus reliability.



- Effective light axis alignment
- 50% power savings
- Prevention of accidental switch operation
- Guaranteed wide operating temperature range
- Longest scanning distance in the industry
- No damage from any wiring error
- Reduced operating error due to noise
- Error due to ambient light greatly reduced
- Significant reduction in error due to sensor mutual interference

EXPLANATION OF MAJOR FUNCTIONS AND FEATURES



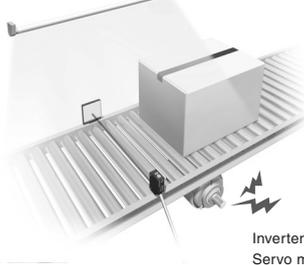
The highest performance level in the industry

Reliability

● Strong noise resistance!

Remarkable resistance to high-frequency electrical noise from inverter/servo motors, and to high-frequency ambient light from inverter fluorescent lamps.

Inverter fluorescent lamp



● Strong resistance to interference!

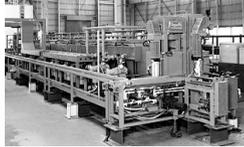
Automatic mutual interference prevention function enables close mounting of 2 units.

Note: For the thru-scan model, an interference prevention filter is used.



● Strong resistance to temperature!

Guaranteed performance in harsh environments such as cold storage warehouse (-30°C) or heat treatment equipment (+60°C).



Heat treatment equipment

Cold storage warehouse

Long range

● Longest scanning distance in the industry!

The **HP100** retroreflective model has a scanning range of 5m, the longest in the industry, and it performs well in locations difficult for conventional models. Its polarization system effectively counters reflection from mirrorlike objects.

A polarizing filter is used to eliminate reflections from mirrorlike objects. If the target object itself is highly reflective or interferes with polarization, detection might be inconsistent. For details, see handling

Polarized retroreflective



Thru-scan



Longest range in the industry! 5m

● Light-operated indicator in front



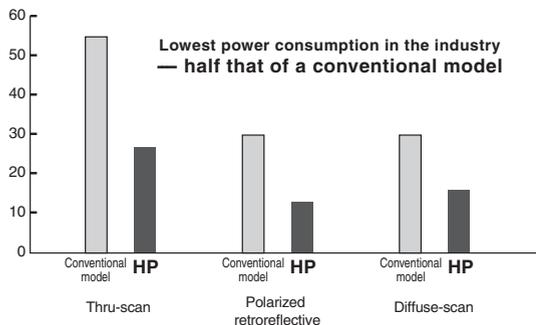
The **HP100** thru-scan receiver has a light-operated indicator in front, allowing a single operator to align the light axis at a distance up to 15m from the emitter.



Diffuse-scan

Energy savings

● Low power consumption



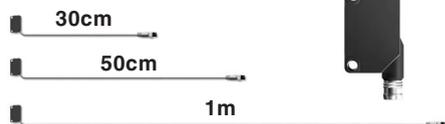
● Reduced wiring work

All models have an M12 prelead connector (and M8 connector for HP100 only)

62 connector-type models in total

M12 prelead connector
HP100 / HP800

M8 connector
HP100



CATALOG LISTINGS

Detection method	Scanning distance	Configuration	L-ON/D-ON selection	Sensitivity adjustment	Wiring method	Cable length	Power supply	Output mode	Catalog listing
Thru-scan	15m		●	●	Preleaded	2m	10 to 30Vdc	NPN open collector	HP100-T1
			●	●		5m			HP100-T1-L05
			●	●		50cm			HP100-T1-LP5
			●	●	M12 preleaded connector	30cm			HP100-T1-CN03
			●	●		50cm			HP100-T1-CN05
			●	●		1m			HP100-T1-CN1
			●	●	M8 connector	1m			HP100-T1-CT
			●	●	Preleaded	2m		HP100-T2	
			●	●		5m		HP100-T2-L05	
			●	●		50cm		HP100-T2-LP5	
			●	●	M12 preleaded connector	30cm		HP100-T2-CN03	
			●	●		50cm		HP100-T2-CN05	
			●	●		1m		HP100-T2-CN1	
			●	●	M8 connector	1m		HP100-T2-CT	
			Polarized retroreflective	5m (when used with FE-RR8 or FE-RR17 or FE-RR21)		●		●	Preleaded
●	●	5m				HP100-P1-L05			
●	●	50cm				HP100-P1-LP5			
●	●	M12 preleaded connector				30cm	HP100-P1-CN03		
●	●					50cm	HP100-P1-CN05		
●	●					1m	HP100-P1-CN1		
●	●	M8 connector				1m	HP100-P1-CT		
●	●	Preleaded				2m	HP100-P2		
●	●					5m	HP100-P2-L05		
●	●					50cm	HP100-P2-LP5		
●	●	M12 preleaded connector				30cm	HP100-P2-CN03		
●	●					50cm	HP100-P2-CN05		
●	●					1m	HP100-P2-CN1		
●	●	M8 connector				1m	HP100-P2-CT		
Diffuse scan	1m					●	●	Preleaded	2m
			●	●	5m	HP100-A1-L05			
			●	●	50cm	HP100-A1-LP5			
			●	●	M12 preleaded connector	30cm	HP100-A1-CN03		
			●	●		50cm	HP100-A1-CN05		
			●	●		1m	HP100-A1-CN1		
			●	●	M8 connector	1m	HP100-A1-CT		
			●	●	Preleaded	2m	HP100-A2		
			●	●		5m	HP100-A2-L05		
			●	●		50cm	HP100-A2-LP5		
			●	●	M12 preleaded connector	30cm	HP100-A2-CN03		
			●	●		50cm	HP100-A2-CN05		
			●	●		1m	HP100-A2-CN1		
			●	●	M8 connector	1m	HP100-A2-CT		

ACCESSORIES

Name	Configuration	Description	Catalog listing	Compatible model
Reflector for polarized retroreflective model		Reflector size 37mm x 56mm	FE-RR21 (Scanning distance 5m)	HP100-P □
		Reflector size 47mm x 47mm	FE-RR8 (Scanning distance 5m)	HP100-P □
		Reflector size 47mm x 47mm	FE-RR17 (Scanning distance 5m)	HP100-P □
		Reflector size 30.8mm x 30.8mm	FE-RR15 (Scanning distance 3.5m)	HP100-P □
		Reflector size 30.8mm x 30.8mm	FE-RR18 (Scanning distance 3.5m)	HP100-P □
		Reflector size 8.6mm x 29.5mm	FE-RR20 (Scanning distance 2m)	HP100-P □
Standard bracket		Bottom-mounting L-bracket (material: SUS)	HP100-B01	All models
		Rear-mounting L-bracket (material: SUS)	HP100-B04	All models
Wraparound mounting bracket		Wraparound vertical mounting bracket (material: SUS)	HP100-B02	All models
		Wraparound horizontal mounting bracket (material: SUS)	HP100-B03	All models
Slit for thru-scan model		Vertical slit (0.5mm / 1mm / 1.5mm / 2mm)	HP100-SV05/ SV10/SV15/SV20	HP100-T □
		Horizontal slit (0.5mm / 1mm / 1.5mm / 2mm)	HP100-SH05/ SH10/SH15/SH20	HP100-T □
Mutual interference protection filter for thru-scan model		Mutual interference can be prevented by changing the polarizing direction of 2 adjacent emitter-receiver pairs	HP100-U01	HP100-T □

SPECIFICATIONS

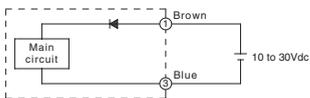
Catalog listing	HP100-P1	HP100-P2	HP100-T1	HP100-T2	HP100-A1	HP100-A2
Detection method	Polarized retroreflective*2		Thru-scan		Diffuse-scan	
Power supply	10 to 30Vdc (ripple 10% max.)					
Power consumption	13mA max.		HP100-E1: 16mA max. , HP100-R□: 11mA max.		16mA max.	
Scanning distance	0.05 to 5m (with FE-RR8, FE-RR17, or FE-RR21 reflector)		15m		1m	
Target object	Opaque object 80mm dia. min (with FE-RR8, FE-RR17, or FE-RR21 reflector)		Opaque object 9mm dia. min.		—	
Standard target object	—		—		300 x 300mm white paper (Kodak 90% reflective paper)	
Scanning angle	Body: 0.5 to 10°. Reflector: 30° min.		2 to 20°		—	
Differential travel	—		—		20% max. (at rated scanning distance)	
Operation mode	Light-ON / Dark-ON selectable by switch					
Output mode*1	HP100-□1: NPN open collector , HP100-□2: PNP open collector					
Control output	Switching current: 100mA (resistive load). Output dielectric strength: 30V. Voltage drop: 3V max. (at 100mA switching current). Short-circuit protection.					
Response time	500μs max. for both operation and recovery					
Emitter	Red LED		Red LED		Infrared LED	
Indicator	Indicators other than thru-scan emitter: orange when output ON, and green at stable light-ON and light-OFF. Thru-scan emitter: orange light on power supply indicator. Thru-scan receiver: light-operated red indicator on front of unit.					
Ambient light immunity	Incandescent lamp: 10,000 lux max. Sunlight: 40,000 lux max.					
Operating temperature	-30 to +60°C (without freezing or condensation)					
Operating humidity	35 to 85% RH (without freezing or condensation)					
Storage temperature	-40 to +70°C (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, 1.5mm peak-to-peak amplitude, 2 hours each in X, Y, and Z directions					
Shock resistance	500m/s ² 10 times each in X, Y and Z directions					
Protective structure	IP67 (IEC standard)					
Wiring method	HP100-□□-LP5: preleaded (0.5m), HP100-□□: preleaded (2m), HP100-□□-L05: preleaded (5m), HP100-□□-CN03: M12 preleaded connector (0.3m), HP100-□□-CN05: M12 preleaded connector (0.5m), HP100-□□-CN1: M12 preleaded connector (1m), HP100-□□-CT: M8 connector					
Weight	Approx. 55g (body with 2m cable only)					
Circuit protection	Power ON malfunction prevention circuit (approx. 8ms), wiring error protection					

*1. An FET is used for output

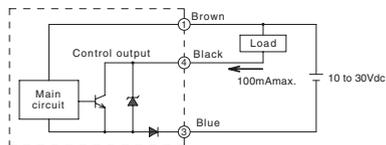
*2. If a polarized retroreflective model is used to detect highly reflective objects or objects that interfere with polarization, detection might be inconsistent.

OUTPUT CIRCUIT DIAGRAM (Note that a FET is used for output)

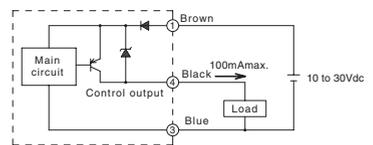
● Thru-scan emitter



● (NPN output type) Polarized retroreflector model Thru-scan receiver Diffuse-scan model

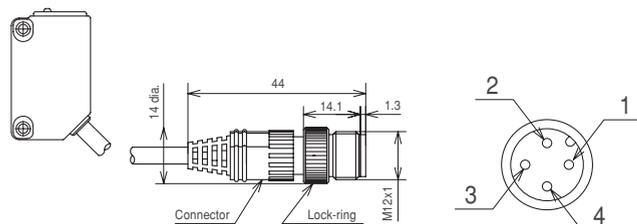


● (PNP output type) Polarized retroreflector model Thru-scan receiver Diffuse-scan model

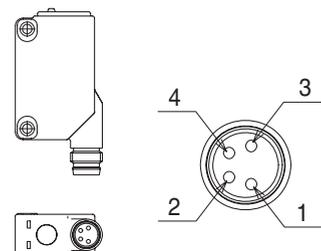


EXTERNAL DIMENSIONS/CONTACT ARRANGEMENT

● M12 preleaded connector

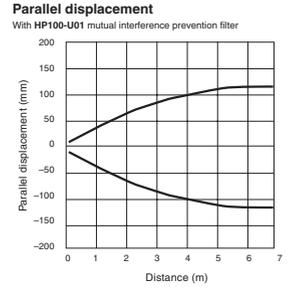
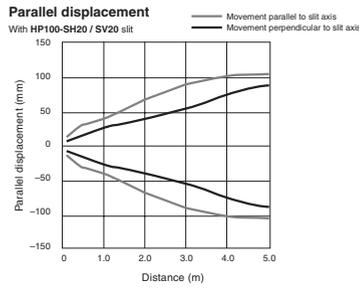
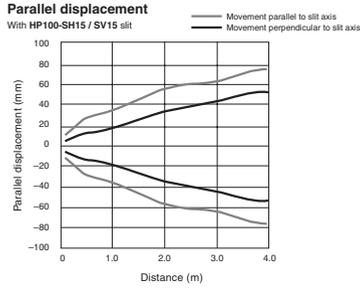
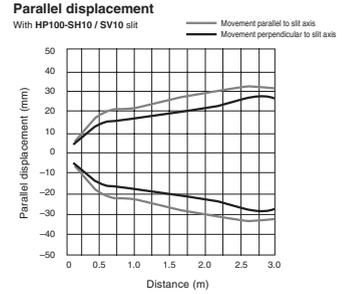
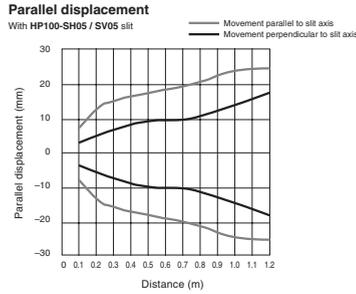
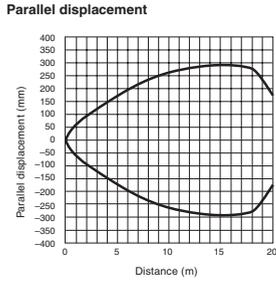
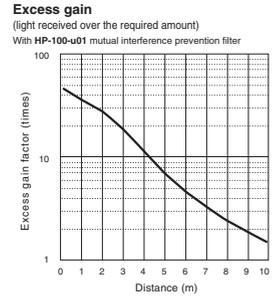
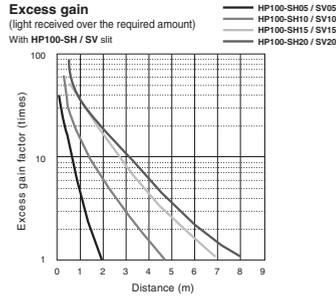
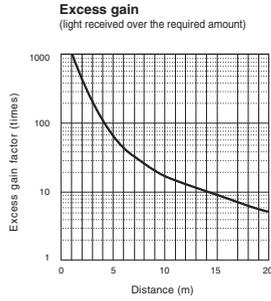


● M8 connector

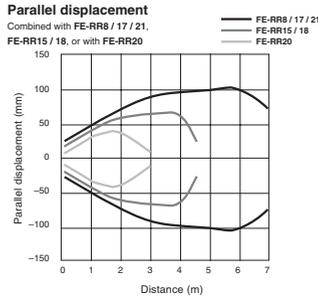
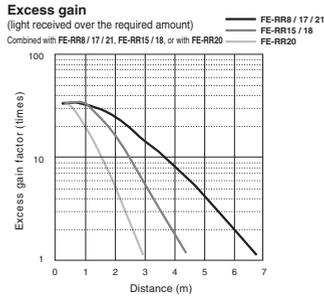


CHARACTERISTICS DIAGRAMS (typical examples)

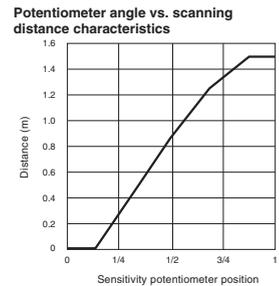
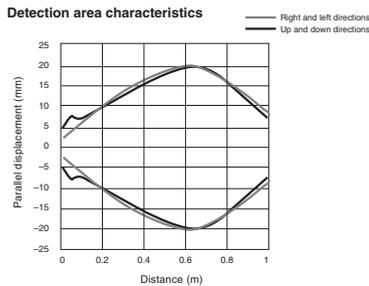
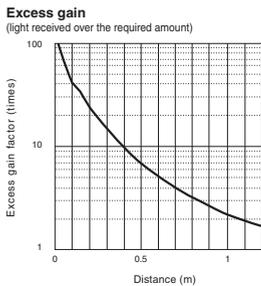
● Thru-scan models (HP100-T□)



● Thru-scan models (HP100-T□)



● Diffuse-scan models (HP100-A□)

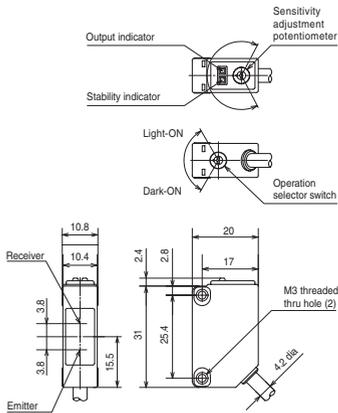


EXTERNAL DIMENSIONS

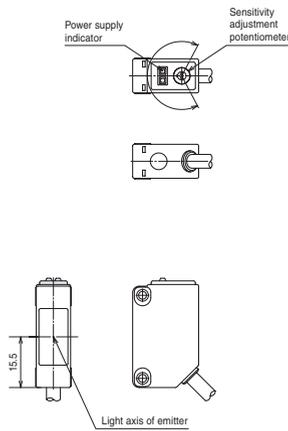
(unit: mm)

Preleaded and M12 preleaded connector types

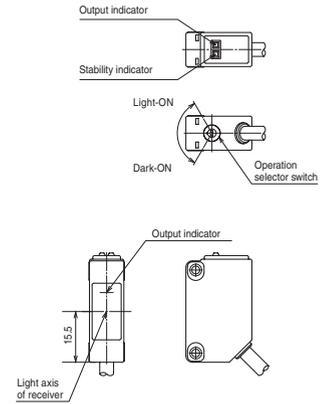
● HP100-P/HP100-A



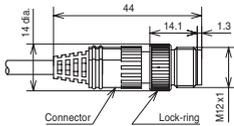
● HP100-T (emitter: HP100-E1)



● HP100-T (receiver: HP100-R)

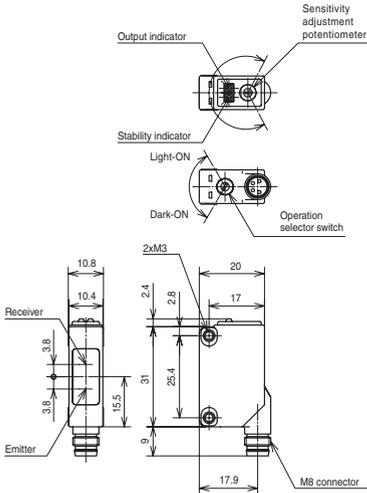


● Connector (common)

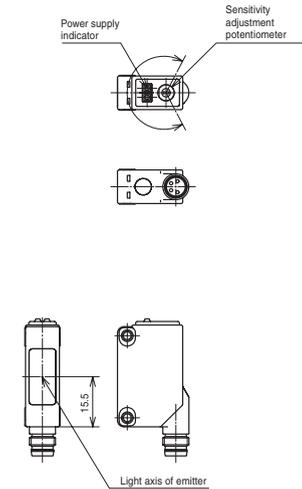


M8 connector types

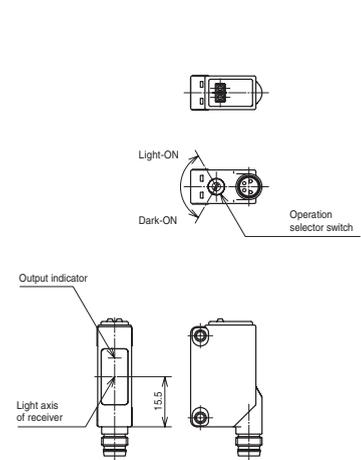
● HP100-P□-CT/HP100-A□-CT



● HP100-T□-CT (emitter: HP100-E1-CT)

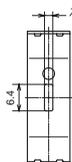


● HP100-T□-CT (receiver: HP100-R□-CT)

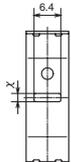


Slit and filter

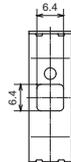
Vertical slit



Horizontal slit

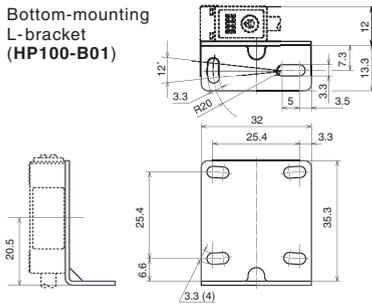


Filter

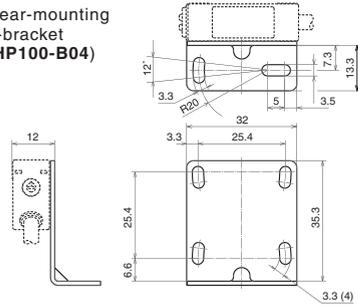


■ Bracket (sold separately)

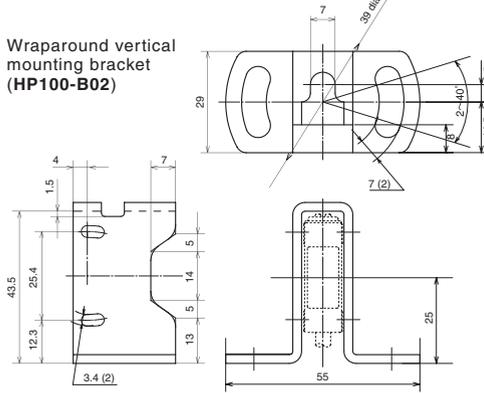
Bottom-mounting L-bracket (HP100-B01)



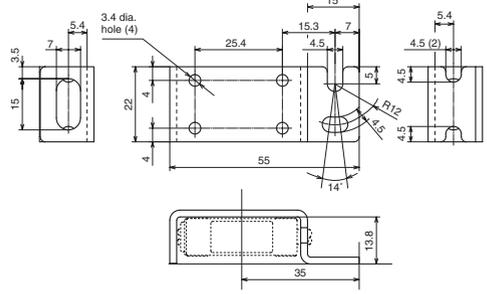
Rear-mounting L-bracket (HP100-B04)



Wraparound vertical mounting bracket (HP100-B02)

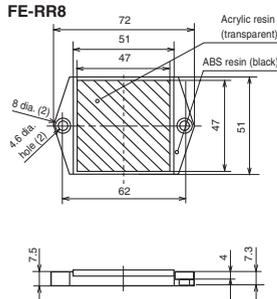


Wraparound horizontal mounting bracket (HP100-B03)

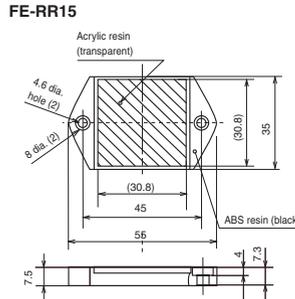


■ Reflector (sold separately)

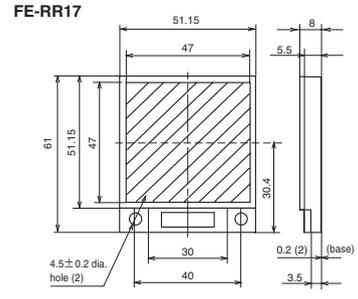
FE-RR8



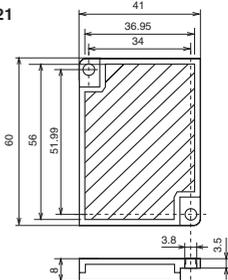
FE-RR15



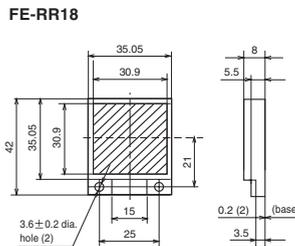
FE-RR17



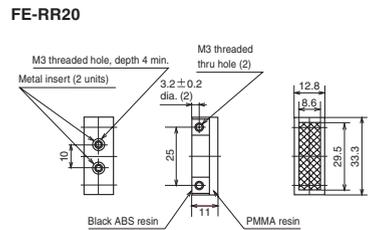
FE-RR21



FE-RR18



FE-RR20



Scanning distance with slit on thru-scan model

Slit width	Type	Catalog listings	Scanning distance	Catalog listing of a model used with
0.5x6.4mm	Vertical	HP100-SV05	1.2m	HP100-T□
	Horizontal	HP100-SH05		
1.0x6.4mm	Vertical	HP100-SV10	3m	
	Horizontal	HP100-SH10		
1.5x6.4mm	Vertical	HP100-SV15	4m	
	Horizontal	HP100-SH15		
2.0x6.4mm	Vertical	HP100-SV20	5m	
	Horizontal	HP100-SH20		

Note: Data assumes slit is mounted on both emitter and receiver.

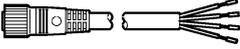
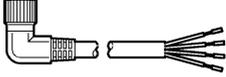
Scanning distance when mutual interference prevention filter is mounted on thru-scan model

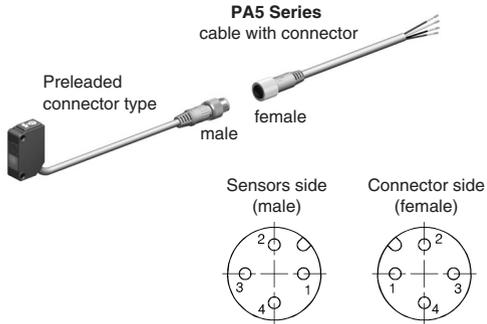
Catalog listings	Scanning distance	Catalog listing of a model used with
HP100-U01	7m	HP100-T□

CABLE WITH CONNECTOR

Be sure to use a **PA5 Series** cable with connector when connecting a preleaded connector or connector-type sensor.

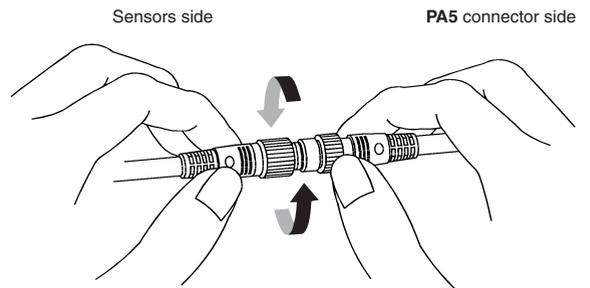
● PA5 Series cable with connector

Shape	Power supply	Cable properties	Cable length	Catalog listing	Lead colors
	DC	Oil-resistant, flexible; UL2464; flame-resistant; EN-compliant	2m	PA5-4I SX2MK-E	1: brown, 2: white, 3: blue, 4: black
			5m	PA5-4I SX5MK-E	1: brown, 2: white, 3: blue, 4: black
			2m	PA5-4I LX2MK-E	1: brown, 2: white, 3: blue, 4: black
			5m	PA5-4I LX5MK-E	1: brown, 2: white, 3: blue, 4: black



● Tightening the connector

Align the grooves and rotate the fastening nut on the **PA5** connector by hand until it fits tightly with the connector on the sensors side.



HANDLING

1. Handling precautions

- Tighten the mounting screws to a torque of less than 0.5N•m.
- Output is disabled upon power-up for 50ms max. until the unit stabilizes.
- When used outdoors, use a case to ensure that the unit is not exposed to direct sunlight or rain.
- Applications involving strong vibration or shock should be avoided due to potential for misalignment of the optical axis.
- Water or oil splashed on the lens surface may cause incorrect operation. Shield it to prevent direct splashes.
- Do not use where exposed to chemicals (organic solvents, acids, alkalis, etc.).
- Use a cover or change the mounting direction to ensure correct sensor operation if there is heavy interference from ambient light.
- When used in a very dusty environment, be sure to take countermeasures to keep dust away from the lens surface by using a sealed case or air purging.
- Even when oil-resistant cable is used, do not use in a location subject to continuous splashing by water or oil, or where the unit is immersed in liquid. Ensure that the end of the cable is not subject to splashing by water or oil.
- Do not bend the part of the cable nearest to the main body beyond the bend radius of 30mm. Avoid continuous bending stress.
- Pulling with excessive force may break the cable. Do not apply a force of more than 50N.
- Photoelectric sensors are assembled with precision. Never strike with another object. Especially if the lens surface is scratched or cracked, sensor performance may decline. Handle with care.
- To clean the lens or reflector, wipe lightly with a soft, clean cloth or cloth moistened with water. Do not use an organic solvent such as alcohol, benzene, acetone, or thinner.
- When multiple photoelectric sensors are used close together, mutual interference may occur. After installation, check the operation carefully before use.
- When a polarized retroreflective model is used to detect highly reflective object or objects that disturb polarization, detection might be inconsistent. In such case, take the following countermeasures:

Examples of target object that might cause faulty operation:	----- ● Target object covered with a transparent film
	● Semi-transparent target object (semi-transparent case, etc.)
	● Mirror or highly reflective mirrorlike object
Countermeasures:	----- ● Mount the sensor at a slight angle to the target object.
	● Increase the distance between the sensor and the target object.
	● Lower the sensitivity setting of the sensor.

2. Wiring precautions

- If a cable extension is necessary, use wire at least 0.3mm² in cross-sectional area and at most 100m long.
- If the wires of photoelectric sensor are laid in the same conduit as high-voltage or power lines, inductance may cause malfunction or damage. Isolate the photoelectric sensor's cable or lay it in a separate conduit.
- When using a commercially available switching regulator, ground the frame ground and ground terminals. If used without grounding, switching noise may cause faulty operation.
- When using a load which generates an inrush current above the switching capacity, such as a capacitive load or incandescent lamp, connect a current-limiting resistor between the load and the output terminals. Otherwise, the output short-circuit protection function may be activated.

3. Adjustment method

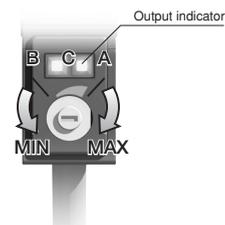
When there are many target objects or detection position changes, check the sensor's operation check during trial run adjustment. Be sure to check that there is no effect from light reflected from surrounding objects.

Thru-scan model and polarized retroreflective model

1. Move the emitter and receiver (main body and reflector in case of a polarized retroreflective model) up, down, right, and left, and then align them in the center of the area where the green stable-operation indicator lights up.
2. Finally, with the target object in position, be sure to check that the sensor correctly operates.

Diffuse-scan model

1. Mount the photoelectric sensor pointing toward the desired detection position.
2. With no target object present, slowly turn the light quantity adjustment potentiometer from MAX position toward MIN position, and find the position (called position A) where the output indicator (orange) goes off (or lights up). If the output indicator is off (on) even with the knob at MAX position, MAX position is position A.
3. With a target object in place, slowly turn the light quantity adjustment potentiometer from MIN position toward MAX position, and find the position (position B) where the output indicator (orange) lights up (or goes off).
4. Put the light quantity potentiometer in the center between A and B.



Note: The above adjustment method is primarily for light-ON operation. For dark-ON operation, apply the text in parentheses.