

## Warning



- Designed for general industrial use, not for safety equipment.
- Do not connect this device to AC power. Doing so might cause rupture or burnout.

## ▶ Cautions for use

- Use the included mounting screws for installation. The recommended tightening torque is 1.6 to 2.1 N·m. If screws other than the included ones are used, be sure that they extend into this product at least 5 mm. Also, note that the use of stainless steel screws with this product can lead to corrosion.
- Note that if this product is exposed to a corrosive environment such as salt water (but not cutting oil), galvanic corrosion may result.
- Although the cable is oil-resistant, watch for hardening of the cable outer sheath or loss of seal that can be caused by some kinds of oil (such as non-water-soluble cutting oil or machine oil). Also, do not allow water or oil to be splashed on the end of the cable.
- The lens cover is made of glass and can be damaged by a direct shock. Do not use this product in an application where broken glass might create a dangerous state.
- Do not connect this switch to AC power. Doing so might cause rupture or burnout.
- Approx. 60 ms is necessary after power on to reach stable operation.
- Place a switch in the case to avoid sunlight or rain when used in outdoors.
- Avoid usage with big vibration or shock which may cause misalignment of light axis.
- To avoid malfunction, install a shielding plate, etc., so that the lens is not exposed to water or oil.
- Do not use in an atmosphere with chemicals (organic, acid, alkali).
- Confirm the stable operation by shielding or changing mounting direction if ambient light is very strong.
- Keep dust away from lens by using sealed case and air purge.
- Put the protective cover on the switch if it is likely to be struck by an object or person.
- Do not bend the part of the cable nearest to the switch with minimum radius of 30 mm and also avoid continuous bending stress.
- Cable cut may occur when cable is pulled with over 50 N.
- Please wipe the reflector with soft cloth (dry or with a little water). Do not use an organic solvent such as alcohol, benzene, acetone or thinner.
- Be careful of mutual interference when several switches are applied in close proximity. Handle the switch with care.
- If a retroreflective-scan is used to detect highly reflective objects or objects that disturb polarization, unreliable detection may result. In such a case, take the following countermeasures:
  - Examples of target objects that might cause faulty operation:
    - Objects covered with transparent film
    - Translucent objects (such as a semitransparent case)
    - Mirrors or highly reflective mirrorlike objects
  - Countermeasures to improve detection reliability:
    - Mount the switch at an angle to the target object.
    - Increase the distance between the switch and the target object.
- It can be expected that cables will become stiff at low temperatures (below 0 °C). In such a case, avoid bending cables or subjecting them to vibration or impact.
- Note that the operation button will become stiff at low temperatures (below 0 °C).

## ▶ Wiring cautions

- If an extension of cable is necessary, use a 0.3 mm<sup>2</sup> minimum cable of 100 m maximum length.
- Route the cables of the switch separately from power lines or through an exclusive conduit, otherwise the electrical noise or surge may cause incorrect operation or damage.
- When using a commercially available switching regulator, ground the FG (frame ground) and G (ground) terminals. Otherwise the switching noise may cause incorrect operation.
- When using a load which generates a transient current, connect a current limiting resistor between the load and the output terminal. Otherwise the short-circuit protection may function.

## ▶ Adjustment method

## ■ Thru-scan model and retroreflective model

1. Move the emitter and receiver (Main body and reflector in case of a 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.

## ■ Diffuse-scan model

1. Mount the photoelectric switch pointing toward the desired detection position.
2. Check switch operation using a target object then use the Auto Adjust button to adjust the sensitivity setting.

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## Azbil Corporation

Advanced Automation Company

Yamatake Corporation changed its name to Azbil Corporation on April 1, 2012.

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URL: <https://www.azbil.com>

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# Photoelectric Switches for Harsh Environments

Models H2B-T\_/H2B-P\_/H2B-A\_



## Rugged photoelectric switches designed for severe conditions

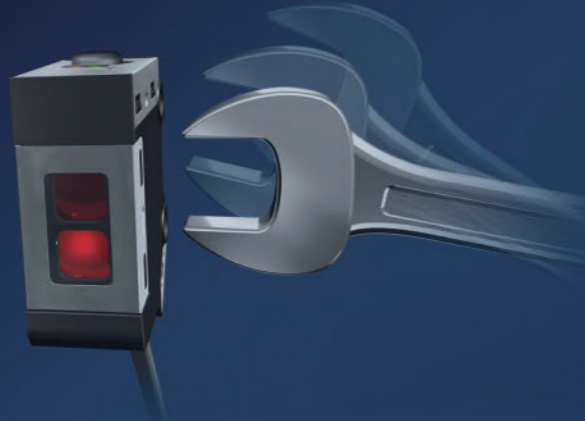


# Model H2B structural features for harsh environments

Die-cast housing + glass cover + special cable seal → robustness & oil resistance

## Main unit

- Die-cast housing
- Shock resistance to 1000 m/s<sup>2</sup>



## Display

Polyether sulfone + multilayer seal

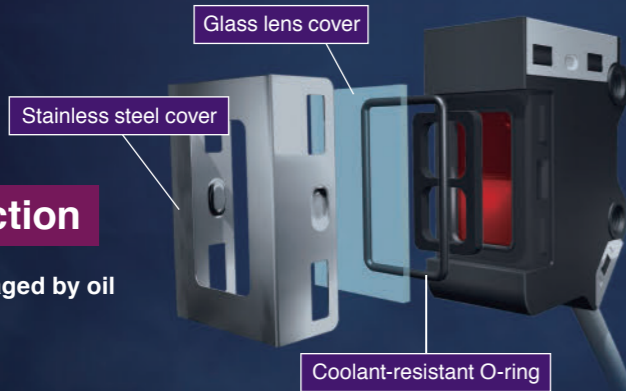


Internal switch is protected by strong housing and structure of seal



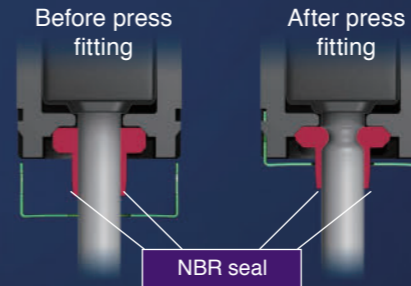
## Lens section

Lens is undamaged by oil



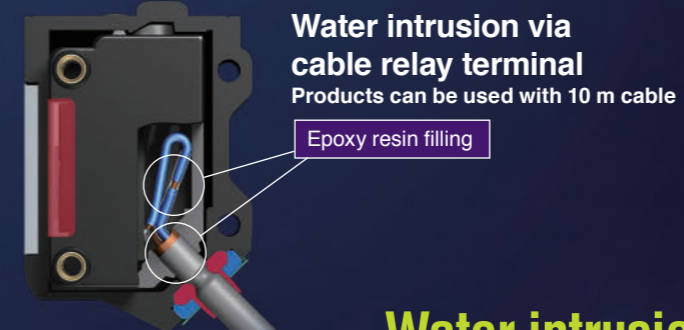
## Cable port

High sealing performance by press-fit NBR seal



## Cable interior

Epoxy potting prevents water intrusion



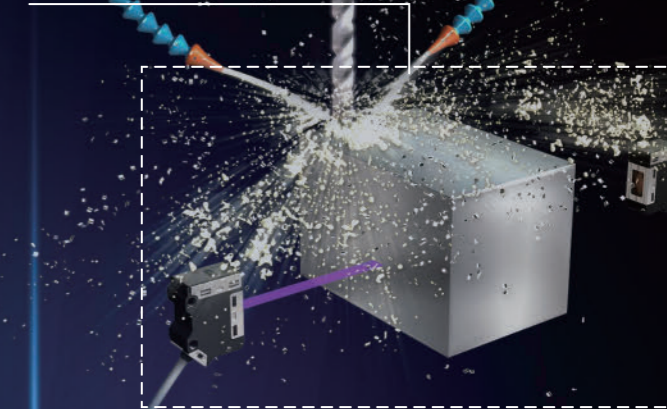
Water intrusion via cable relay terminal  
Products can be used with 10 m cable

## Available cables

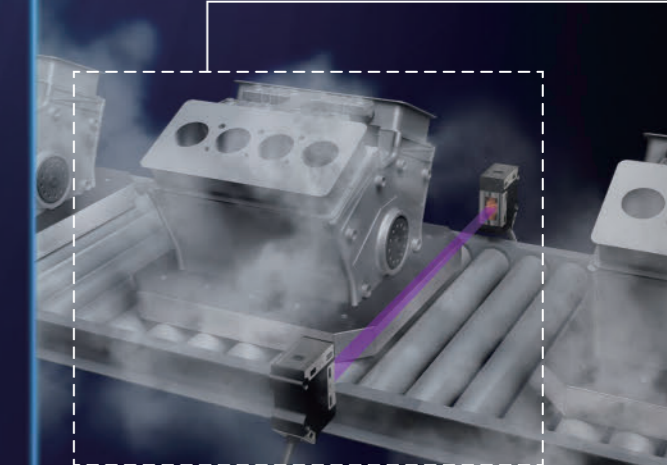
10 m cable is OK

APPLICATION recommendations >>>

Detecting if workpiece is properly seated



Detecting engine blocks or metal parts



Checking for drill bit, etc.  
Small-dia. tool check

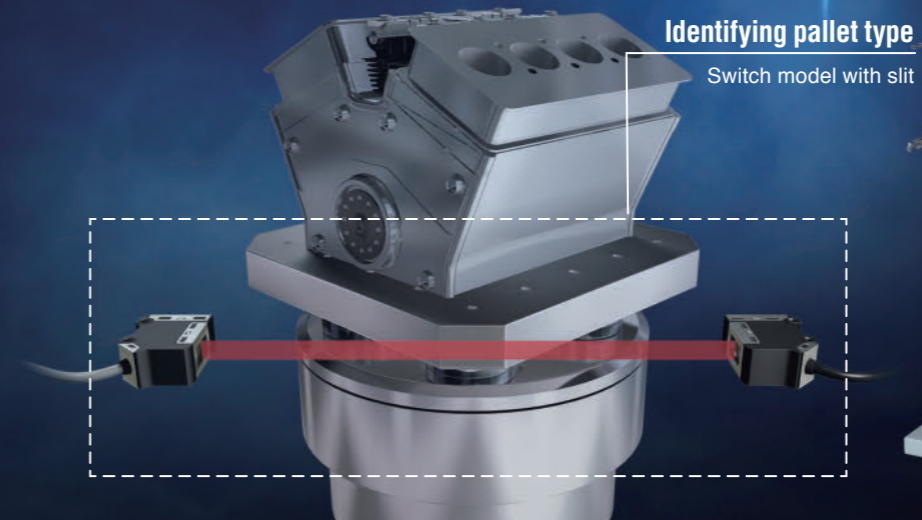


## What we mean by “oil-resistant”

These photoelectric switches pass in-house oil resistance tests that use (1) the oil used in testing for the JEM IP67g standard and (2–7) six types of water-soluble cutting oil that are widely used in manufacturing processes (see table below).

No.	Oil type	Oil name	Dilution	Details of test
1	Water-insoluble cutting oil	Yushiron Cut Abas BM405	–	Immersion in 50 °C oil for 240 h
2	Water-soluble cutting oil	Yushiroken EC50-T3	20×	Immersion in 25 °C and 60 °C oil for 2 h each, 250 cycles (= 1000 hours)
3		Yushiroken Synthetic 770TG		
4		Yushiroken Synthetic #663		
5		Castrol Syntilo 9954		
6		Hangsterfer S-500		
7		Blasocut 4000		

Note: Test results are for reference only. Please verify with the actual products.





## Catalog Listings

Detection method	Detection range	Configuration	Light source	Wiring method	Cable length	Output	Adjustable sensitivity	Catalog listing											
Thru-scan	Standard		Infrared LED	Preleaded	2 m	NPN	DO	H2B-T41N-L02											
					5 m			H2B-T41N-L05											
					10 m			H2B-T41N-L10											
					Built-in horizontal slit	2 m		Red LED	Preleaded	2 m	NPN	DO	H2B-T42N-L02						
										5 m			H2B-T42N-L05						
										10 m			H2B-T42N-L10						
															2 m	NPN	LO	H2B-T43N-L02	
															5 m			H2B-T43N-L05	
															10 m			H2B-T43N-L10	
																2 m	PNP	LO	H2B-T44N-L02
																5 m			H2B-T44N-L05
																10 m			H2B-T44N-L10
					Retroreflective	4.5 m		Infrared LED	Preleaded							2 m	NPN	DO	H2B-P11N-L02
																5 m			H2B-P11N-L05
																10 m			H2B-P11N-L10
																2 m	PNP	DO	H2B-P12N-L02
																5 m			H2B-P12N-L05
																10 m			H2B-P12N-L10
															2 m	NPN	LO	H2B-P13N-L02	
															5 m			H2B-P13N-L05	
															10 m			H2B-P13N-L10	
																2 m	PNP	LO	H2B-P14N-L02
																5 m			H2B-P14N-L05
																10 m			H2B-P14N-L10
										Diffuse-scan	0.8 m		Infrared LED	Preleaded		2 m	NPN	DO	H2B-A41N-L02
																5 m			H2B-A41N-L05
																10 m			H2B-A41N-L10
																2 m	PNP	DO	H2B-A42N-L02
																5 m			H2B-A42N-L05
																10 m			H2B-A42N-L10
															2 m	NPN	LO	H2B-A43N-L02	
															5 m			H2B-A43N-L05	
															10 m			H2B-A43N-L10	
																2 m	PNP	LO	H2B-A44N-L02
																5 m			H2B-A44N-L05
																10 m			H2B-A44N-L10

\* Switchable between LO and DO

## Specifications

Detection method	Retroreflective	Thru-scan	Thru-scan (with 2-mm horizontal slit)	Diffuse-scan
Catalog listing	H2B-P1_N-L__	H2B-T4_N-L__	H2B-T1_H-L__	H2B-A4_N-L__
Power	10.2 to 26.4 V DC (ripple: 10 % max.)			
Power consumption	14 mA max.	32 mA max.		17 mA max.
Detection range	0.05 to 4.5 m *2	23 m	2 m	0.8 m
Target object	Opaque, min. 80 mm dia. *3	Opaque, min. 12 mm dia.	Opaque, L 3 x W 9 mm or larger (detection range: 2 m) *3	White paper 200 x 200 mm (90 % reflectivity)
Hysteresis	—	—	—	20 % or less
Operation mode	Selection of light-ON or dark-ON models. Note: Diffuse-scan models only have a button to switch between LO and DO.			
Output mode *1	Selection of NPN or PNP open collector.			
Output switching current	100 mA max. (resistive load)			
Output withstand voltage	30 V			
Residual voltage	2 V max. (at 100 mA switching current), 1.1 V max. (at 10 mA switching current)			
Output leak current	0.1 mA max.			
Response time	1 ms max. for both operation and recovery			
Light source	Red LED (approx. 645 nm)	Infrared LED (approx. 860 nm)	Red LED (approx. 645 nm)	Infrared LED (approx. 860 nm)
Scanning angle	Switch: 0.5° to 10°	2 to 20°	2 to 20°	—
Indicator	Thru-scan receiver, retroreflective models, diffuse-scan models: when output is ON, orange indicator is ON. Under stable light (/dark) conditions, green stability indicator is ON. When light is received, front orange received light indicator is ON (only H2B-T receiver). Thru-scan emitter: power indicator is orange.			
Ambient light	10,000 lux max. for incandescent light, 40,000 lux max. for sunlight Min. angle of incidence for ambient light is 5° for H2B-T4_N-L__ and H2B-P1_N-L__, and 15° for H2B-A4_N-L__.			
Operating temperature	-30 to +55 °C (without freezing or condensation) *4			
Storage temperature	-40 to +70 °C (without freezing or condensation)			
Operating humidity	35 to 85 % RH (without freezing or condensation)			
Insulation resistance	20 MΩ min. (at 500 V DC)			
Dielectric strength	1000 V AC 50/60 Hz for 1 min between electrically live metal and case			
Vibration resistance	10 to 55 Hz, 1.5 mm peak-to-peak amplitude, 2 hours each in X, Y, and Z directions			
Shock resistance	1000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions			
Protective structure	IP67 (IEC standard), IP67g (JEM standard)			
Circuit protection	Power-ON malfunction prevention circuit (60 ms max.), wiring error protection, and output short-circuit protection			
Weight	Approx. 105 g (switch with 2 m preleaded cable only). For thru-scan models, weight of emitter + receiver only is approx. 210 g.			

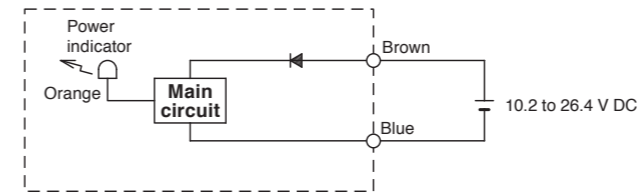
\*1. A FET is used for output. \*2. In combination with reflector FE-RR8. \*3. Mounting the emitter or receiver on an angle affects the ability to detect objects.

\*4. In a low-temperature environment, the cable will become stiff. Do not bend it forcefully or exert excessive force on it while at a low temperature because it may crack.

## Reflectors and Brackets

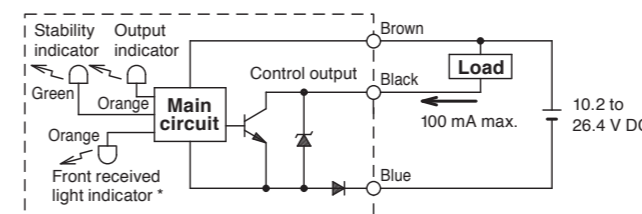
Name	Appearance	Catalog listing	Description	Compatible model
Reflectors for retroreflective models		FE-RR8 (for 4.5 m detection range)	Reflector size: 47x 47 mm	All H2B models
		FE-RR17 (for 4.5 m detection range)		All H2B models
		FE-RR15 (for 2.7 m detection range)	Reflector size: 30.8 x 30.8 mm	All H2B models
		FE-RR18 (for 2.7 m detection range)		All H2B models
			FE-RR23 (for 1.8 m detection range)	Reflector size: 8.6 x 29.5 mm
Bottom-mounted L-bracket		SZ-A04	Beam center position: 23.3 mm	All H2B models
Bottom-mounted wraparound bracket		SZ-A05	Side-mounted wraparound bracket	All H2B models
Bottom-mounted L-bracket		SZ-A06	Beam center position: 26.5 mm	All H2B models
Bottom-mounted L-bracket		SZ-A07	Beam center position: 26.2 mm	All H2B models
Bottom-mounted L-bracket		SZ-A08	Beam center position: 54.7 mm	All H2B models

### Thru-scan emitter



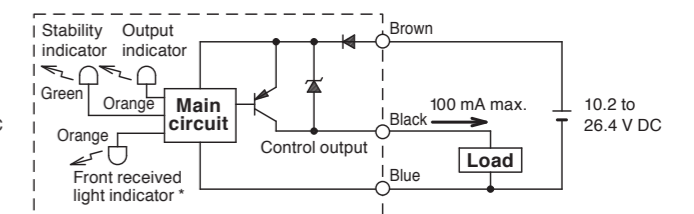
### Thru-scan receivers, retroreflective models, and diffuse-scan models

#### NPN output models



\* Thru-scan receiver only

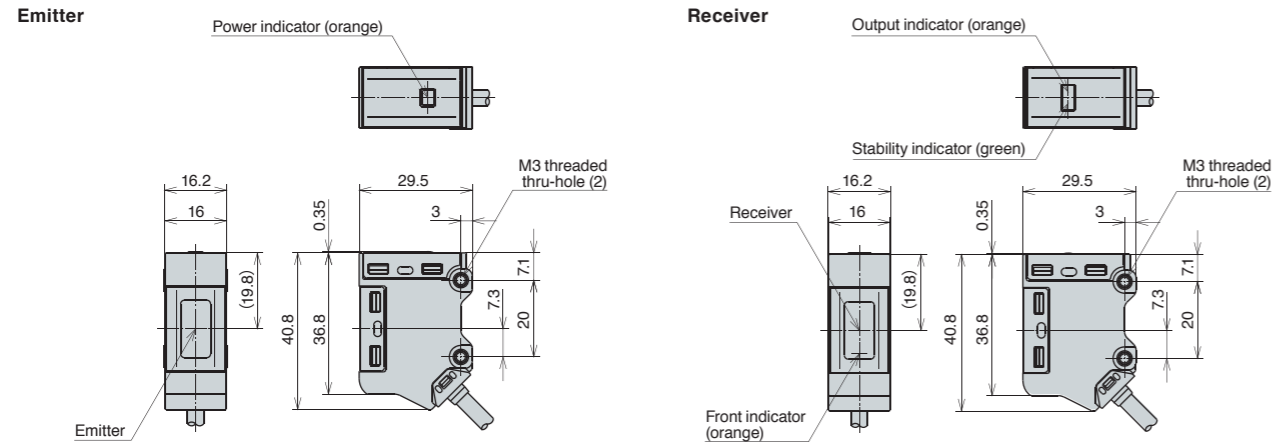
#### PNP output models



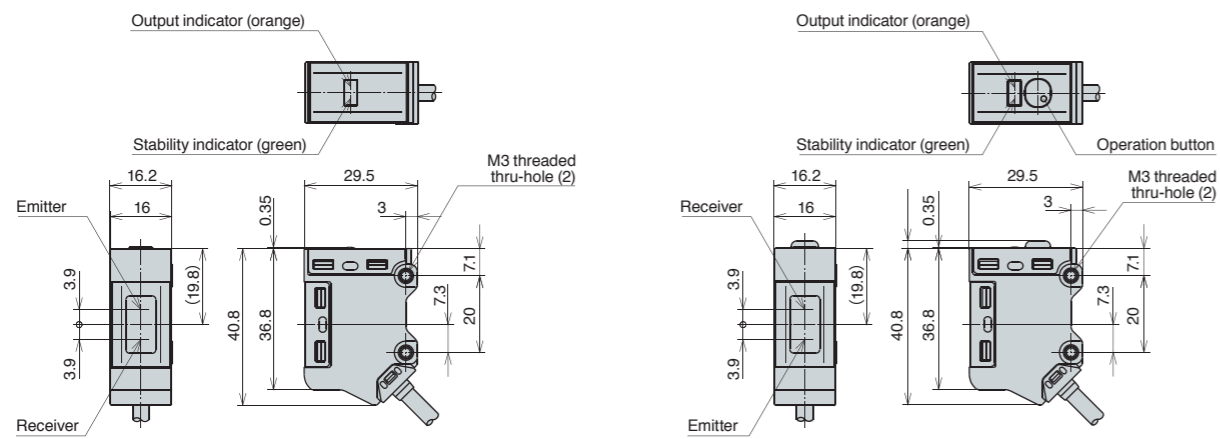
\* Thru-scan receiver only

**External dimensions (unit: mm)**

**Thru-scan models**

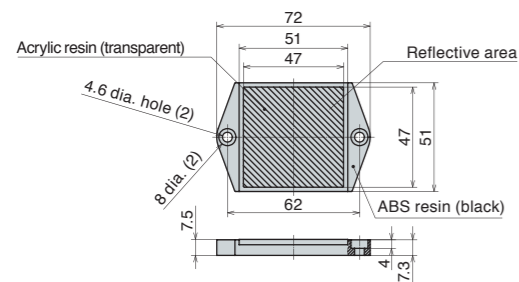


**Retroreflective models**

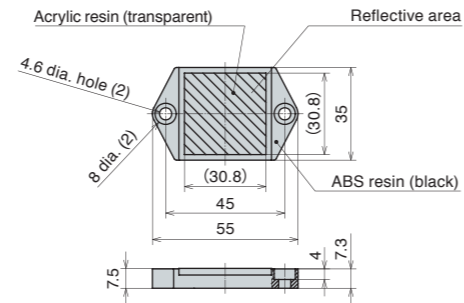


**Reflectors**

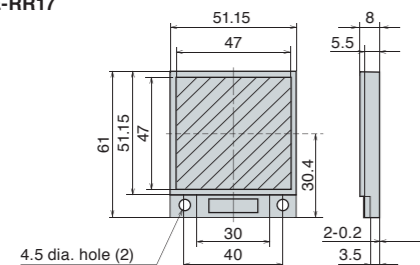
**Model FE-RR8**



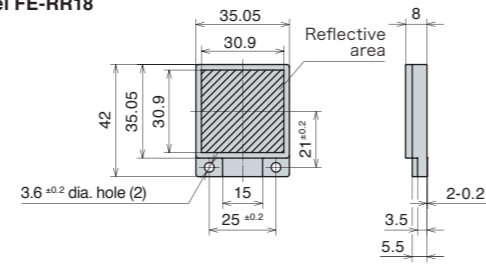
**Model FE-RR15**



**Model FE-RR17**

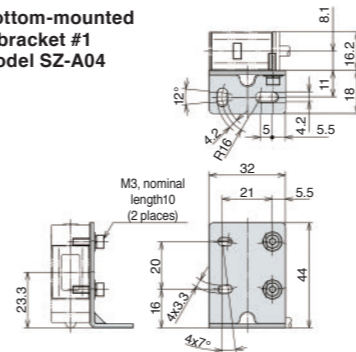


**Model FE-RR18**

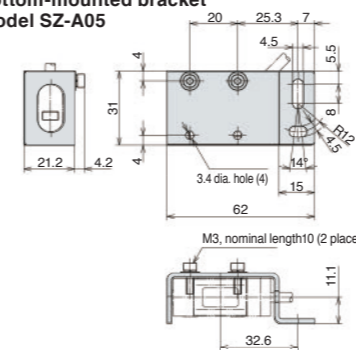


**Brackets**

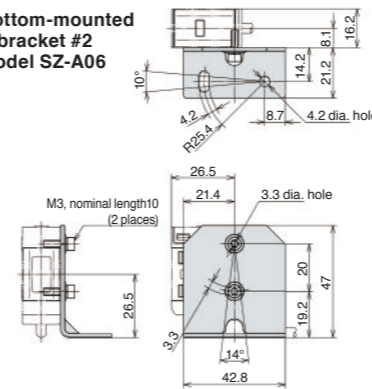
**Bottom-mounted L-bracket #1 Model SZ-A04**



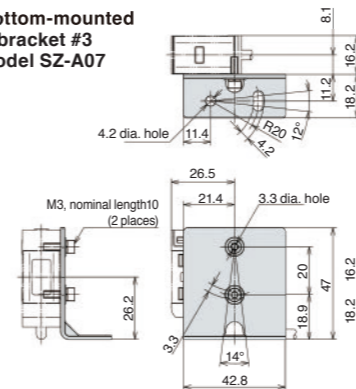
**Wraparound bottom-mounted bracket Model SZ-A05**



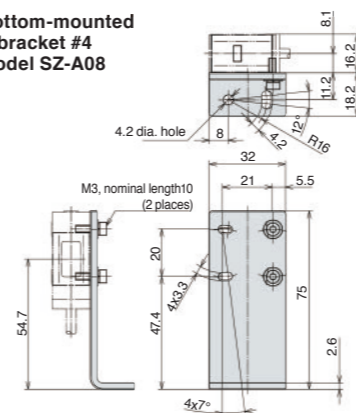
**Bottom-mounted L-bracket #2 Model SZ-A06**



**Bottom-mounted L-bracket #3 Model SZ-A07**

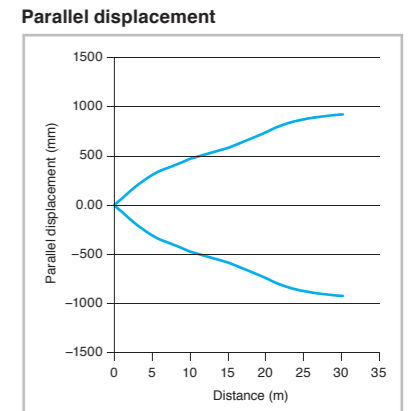
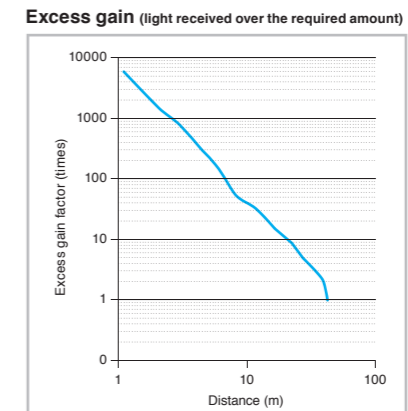


**Bottom-mounted L-bracket #4 Model SZ-A08**

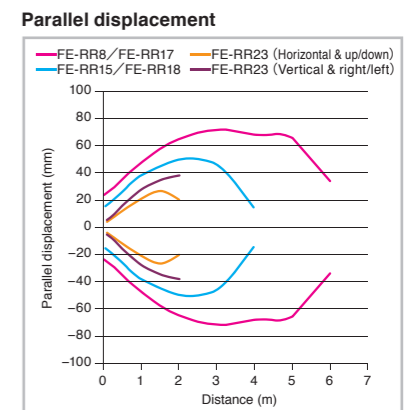
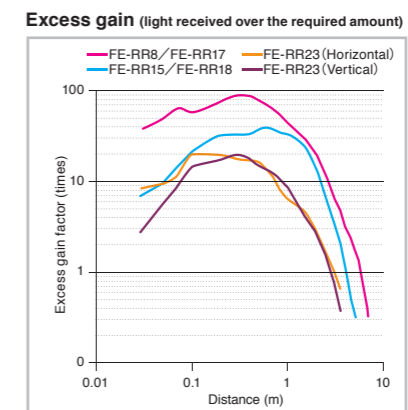


**Characteristics diagrams (typical examples)**

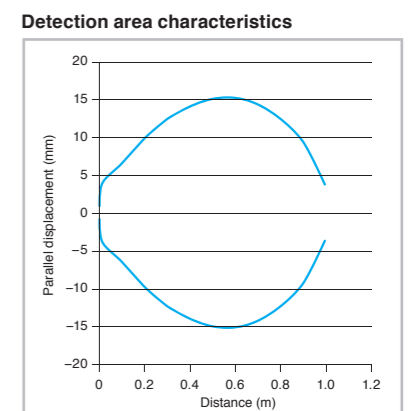
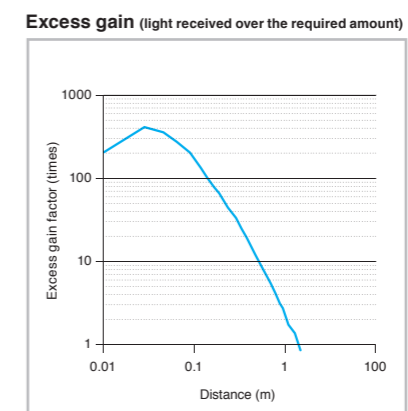
**Thru-scan models H2B-T4\_N-\_\_**



**Retroreflective models H2B-P1\_N-L-\_\_**



**Diffuse-scan models H2B-A4\_N-L-\_\_**



**Thru-scan models (with 2-mm horiz. slit) H2B-T1\_H-L-\_\_**

