NAiS

SUPER-SLIM PHOTOELECTRIC SENSORS

UZB1/2 series

AMPLIFIER BUILT-IN EXTRAORDINARILY DOWN-SIZED

CE

PNP output type available

PNP output type which is much in demand in Europe is now available.
Of course, it conforms to the EMC directive.

The Smallest Body Just 3.5mm .138inch Thick

Just W10 × H14.5 × D3.5mm W.394 × H.571 × D.138inch in dimensions (the front sensing type of thru-beam mode) The smallest in small sensors you have never seen before.
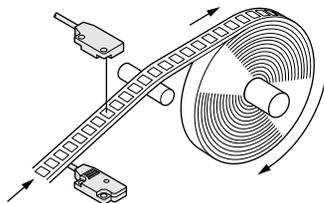It needs only a minute space to be mounted.

High-speed Response Time : 0.5ms

The sensor is suitable to detect small and high-speed traveling objects.

Flexible Mounting

In the diffuse reflective mode, there is the front sensing type that keeps original flatness of the mounting base.
In the thru-beam mode, there are the front sensing type and the side sens-ing type, that give you versatility in mounting.

Diffuse reflective/
Front sensing type

Thru-beam
• Front sensing type

• Side sensing type

Visible Two-color Indicator

Every **UZB** sensor is incorporated with the visible two-color indicator in the miniature body.

Two-color indicator
(Red : Operation indicator)
(Green : Stability indicator)

Waterproof

The **UZB** series has IP67 protection.
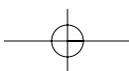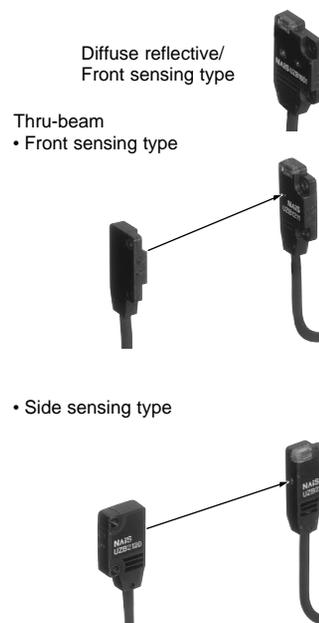No matter where it is washed down with water.

Note : Do not expose it to water splash during oper-
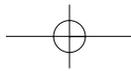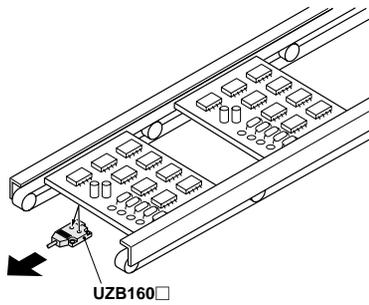ation. If it may so, it detects water drop on it.

Red Beam Makes Beam Alignment Easy

The red LED beam projected from the emitter helps you to align the sensor heads.

2

APPLICATIONS

Verifying position of PCBs

UZB160☐

Detecting ICs

Transparent stick

IC **UZB10☐**
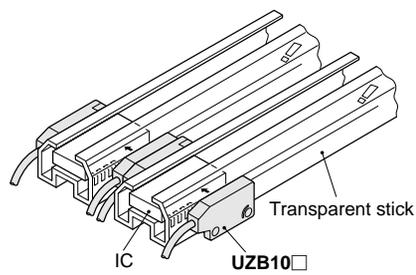
Detecting PCB rack

UZB20☐
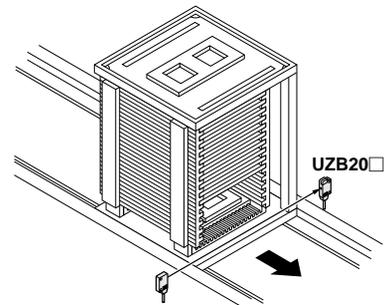
Detecting wafer cassette

UZB160☐
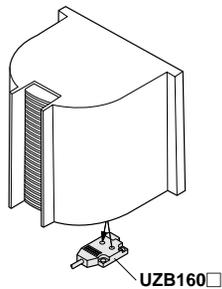
Detecting thin ring

UZB20☐

Guide
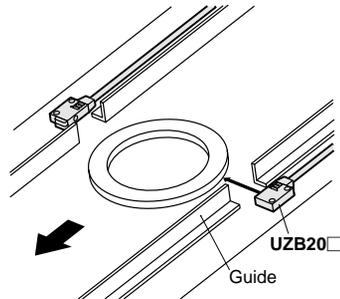
Checking for absence of capacitor in tray

UZB160☐
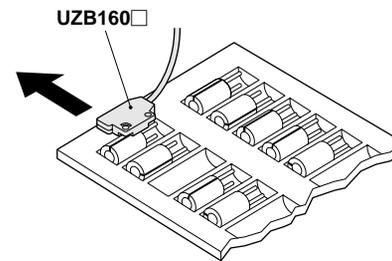
Mountable with M3 Screws

• **UZB801 (SPCC) (mounting bracket for the front sensing type)**

M3 screws

• **UZB802 (SPCC) (mounting bracket for the side sensing type)**

M3 screws
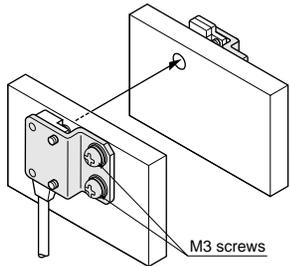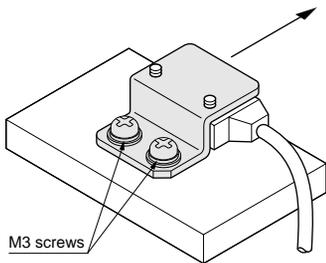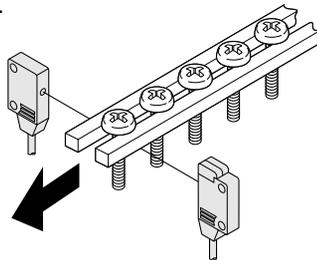
• **UZB803 (SPCC) (L-shaped mounting bracket)**

M3 screws
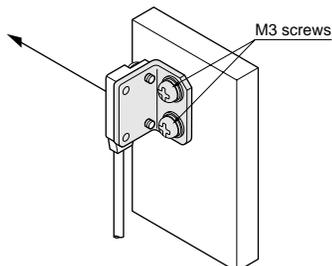
Minimum Sensing Object : ϕ1mm .039inch

Each of the **UZB101☐** and the **UZB201☐** is incorporated with the slit masks ϕ1mm .039inch on both the emitter and the receiver.

Any object more than ϕ1mm .039inch can be detected so that they work for precise positioning or small parts detection.

Long Sensing Range : 1,000mm 39.37inch

A sensing range of 1,000mm 39.37inch has been realized with a slim size of just 3.5mm .138inch.

It can be used for wide objects. Moreover, the visible red LED beam projected from the emitter helps you to align the sensor heads.

Background Suppression : UZB1601, UZB1602

• **Not affected by background**
Its convergent reflection does not sense any background right opposed more than 100mm 3.937inch apart.

Background

100mm
3.937inch
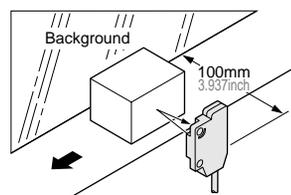
• **Black object securely detected**
As the other advantage of the convergent reflection, it can securely detect dark color objects.

The best distance is approx. 10mm .394inch apart from an object.

3
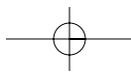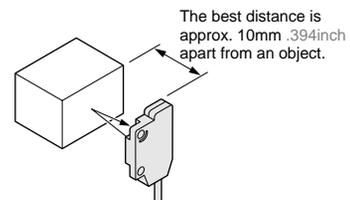
ORDER GUIDE

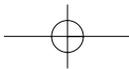|			Appearance	Sensing range	Model No.	Output operation	Min. sensing object
NPN Output type	Thru-beam	Front sensing		150mm 5.906inch	UZB1011	Light-ON	Opaque object of φ1mm φ.039inch
					UZB1012	Dark-ON	
				500mm 19.685inch	UZB1021	Light-ON	Opaque object of φ2mm φ.079inch
					UZB1022	Dark-ON	
				1,000mm 19.685 inch	UZB1031	Light-ON	Opaque object of φ2mm φ.079inch
					UZB1032	Dark-ON	
		Side sensing		150mm 5.906inch	UZB2011	Light-ON	Opaque object of φ1mm φ.039inch
					UZB2012	Dark-ON	
				500mm 19.685inch	UZB2021	Light-ON	Opaque object of φ2mm φ.079inch
					UZB2022	Dark-ON	
	Fixed-focus reflective (diffused light type)	Front sensing		2 to 25 mm (*1) .079 to .984inch (Center : 10mm .394inch)	UZB1601	Light-ON	Opaque object of φ0.1mm φ.004inch (Setting distance : 10mm .394inch)
					UZB1602	Dark-ON	
PNP Output type	Thru-beam	Front sensing		150mm 5.906inch	UZB10115	Light-ON	Opaque object of φ1mm φ.039inch
					UZB10125	Dark-ON	
				500mm 19.685inch	UZB10215	Light-ON	Opaque object of φ2mm φ.079inch
					UZB10225	Dark-ON	
				1,000mm 19.685 inch	UZB10315	Light-ON	Opaque object of φ2mm φ.079inch
					UZB10325	Dark-ON	
		Side sensing		150mm 5.906inch	UZB20115	Light-ON	Opaque object of φ1mm φ.039inch
					UZB20125	Dark-ON	
				500mm 19.685inch	UZB20215	Light-ON	Opaque object of φ2mm φ.079inch
					UZB20225	Dark-ON	
	Fixed-focus reflective (diffused light type)	Front sensing		2 to 25 mm (*1) .079 to .984inch (Center : 10mm .394inch)	UZB16015	Light-ON	Opaque object of φ0.1mm φ.004inch (Setting distance : 10mm .394inch)
					UZB16025	Dark-ON	

(*1) : The sensor does not detect even a specular background object if a distance of 100mm 3.937inch or more from a sensing surface.

OPTION

| Designation	Model No.	Description
Sensor mounting bracket	UZB801	Mounting bracket for the front sensing type (SPCC) (The thru-beam sensor needs two brackets)
	UZB802	Mounting bracket for the side sensing type (SPCC) (The thru-beam sensor needs two brackets)
	UZB803	L-shaped mounting bracket (SPCC) (The thru-beam sensor needs two brackets)

Sensor mounting bracket

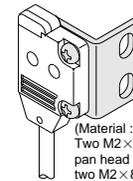- **UZB801**
- **UZB802**
- **UZB803**
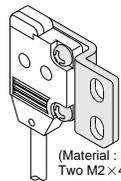
(Material : SPCC) Two M2×4mm .157inch pan head screws are attached.
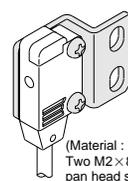
(Material : SPCC) Two M2×8mm .315inch pan head screws are attached.

(Material : SPCC) Two M2×4mm .157inch pan head screws, and two M2×8mm .315inch pan head screws are attached.

Slit mask

		For front sensing type				For side sensing type
		Hole diameter φ1.2mm φ.047inch		Hole diameter φ1.5mm φ.059inch		Hole diameter φ1.2mm φ.047inch
	Model No.	UZB811		UZB812		UZB813
Applicable sensor		UZB102□	UZB103□	UZB102□	UZB103□	UZB202□
Min. sensing object	Slit on one side	φ2mm φ.079inch	φ2mm φ.079inch	φ2mm φ.079inch	φ2mm φ.079inch	φ2mm φ.079inch
	Slit on both sides	φ1.2mm φ.047inch	φ1.2mm φ.047inch	φ1.5mm φ.059inch	φ1.5mm φ.059inch	φ1.2mm φ.047inch
Sensing range	Slit on one side	250mm 9.843inch	600mm 23.622inch	350mm 13.780inch	800mm 31.496inch	250mm 9.843inch
	Slit on both sides	200mm 7.874inch	400mm 15.748inch	300mm 11.811inch	500mm 19.685inch	200mm 7.874inch

SPECIFICATIONS

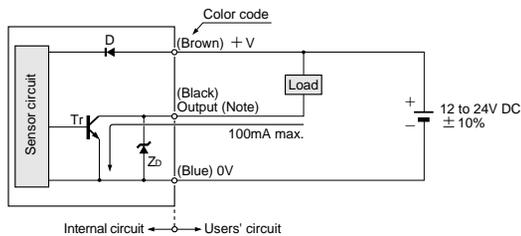| Item		Type → Model No.	Thru-beam — Front sensing						Thru-beam — Side sensing				Fixed-focus reflective (diffused light type) — Front sensing	
		NPN output	UZB1011	UZB1012	UZB1021	UZB1022	UZB1031	UZB1032	UZB2011	UZB2012	UZB2021	UZB2022	UZB1601	UZB1602
		PNP output	UZB10115	UZB10125	UZB10215	UZB10225	UZB10315	UZB10325	UZB20115	UZB20125	UZB20215	UZB20225	UZB16015	UZB16025
Sensing range			150mm 5.901inch		500mm 19.685inch		1,000mm 39.37inch		150mm 5.901inch		500mm 19.685inch		2 to 25mm .079 to .984inch (Center: 10mm .394inch) (*1)	
Min. sensing object			Opaque object of ϕ1mm ϕ.039inch (Setting distance of the emitter & receiver : 150mm 5.901inch)		Opaque object of ϕ2mm ϕ.079inch (Setting distance of the emitter & receiver : 500mm 19.685inch)		Opaque object of ϕ2mm ϕ.079inch (Setting distance of the emitter & receiver : 1,000mm 39.37inch)		Opaque object of ϕ1mm ϕ.039inch (Setting distance of the emitter & receiver : 150mm 5.901inch)		Opaque object of ϕ2mm ϕ.079inch (Setting distance of the emitter & receiver : 500mm 19.685inch)		Copper wire of ϕ0.1mm ϕ.004inch (Setting distance : 10mm .394inch)	
Hysteresis													15% or less of the set range	
Repeatability (Perpendicular to axial direction)			0.05mm .002inch or less										0.1mm .004inch or less	
Supply voltage			12 to 24V DC ± 10% Ripple P-P : 10% or less											
Current consumption			Emitter : 10mA or less, Receiver : 15mA or less										20mA or less	
Output			<NPN output type> NPN open-collector transistor • Maximum sink current : 50mA • Applied voltage : 30V DC or less • Residual voltage : 1V or less (at 50mA sink current) 0.4V or less (at 16mA sink current)						<PNP output type> PNP open-collector transistor • Maximum source current : 50mA • Applied voltage : 30V DC or less • Residual voltage : 1V or less (at 50mA source current) 0.4V or less (at 16mA source current)					
	Utilization category		DC-12 or DC-13											
	Output operation		Light-ON	Dark-ON	Light-ON	Dark-ON	Light-ON	Dark-ON	Light-ON	Dark-ON	Light-ON	Dark-ON	Light-ON	Dark-ON
	Short-circuit protection		Incorporated											
Response time			0.5ms or less											
Operation indicator			Red LED (lights up when output is ON)											
Stability indicator			Green LED (lights up under stable light received condition or stable dark condition)											
Environmental resistance	Pollution degree		3 (Industrial environment)											
	Protection		IP67 (IEC)											
	Ambient temperature		− 25 to ＋ 55°C − 13 to ＋ 131°F (No dew condensation or icing allowed), Storage : − 30 to ＋ 70°C − 22 to ＋ 158°F											
	Ambient humidity		35 to 85%RH, Storage : 35 to 85%RH											
	Ambient illuminance		Sunlight : 10,000 ℓx at the light-receiving face, Incandescent : 3,000 ℓx at the light-receiving face											
	EMC		Emission: EN50081-2, Immunity: EN50082-2											
	Voltage withstandability		1,000V AC for one min. between all supply terminals connected together and enclosure											
	Insulation resistance		20MΩ or more with 250V DC megger between all supply terminals connected together and enclosure											
	Vibration resistance		10 to 500Hz frequency 3mm .118inch amplitude in X, Y and Z directions for two hours each											
	Shock resistance		500m/s^2 acceleration (50G approx.) In X, Y and Z directions for three times each											
Emitting element			Red LED (modulated)											
Material			Enclosure: Polyethylene terephthalate, Lens: Polyaly late											
Cable			0.1mm^2 3 cores (thru-beam type emitter: 2-core) cabtyre cable, 2m 6.562ft long											
Cable extension			Extensible up to total 50m 164.04ft is possible with 0.3mm^2, or more, cable (thru-beam type: both emitter and receiver)											
Weight			Emitter: 20g .071oz approx. Receiver: 20g .071oz approx.										20g .071oz approx.	
Accessories			Mounting screws : 2 sets										Mounting screw : 1 set	

(*1) : The sensing range of convergent reffective type sensor is specified for white non-glossy paper (50×50mm 1.969×1.969inch) as the object.
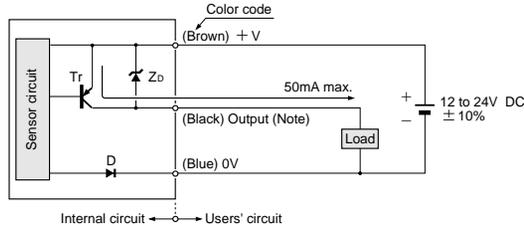
5
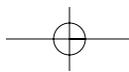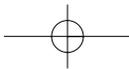
I/O CIRCUIT DIAGRAMS

NPN output type

Color code
(Brown) +V
(Black) Output (Note)
100mA max.
(Blue) 0V
12 to 24V DC ±10%
Load
D
Tr
Z_D
Sensor circuit
Internal circuit ← → Users' circuit

Note: The emitter of the thru-beam sensor does not incorporated the output.

Symbol...D : Reverse polarity protection diode
Z_D: Surge absorption zener diode
Tr : NPN output transistor

PNP output type

Color code
(Brown) +V
50mA max.
(Black) Output (Note)
(Blue) 0V
12 to 24V DC ±10%
Load
Tr
Z_D
D
Sensor circuit
Internal circuit ← → Users' circuit

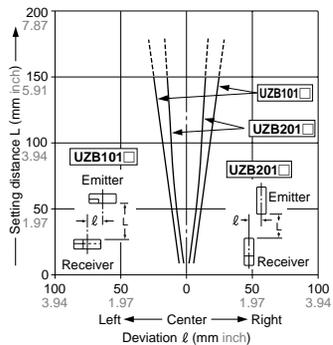Note: The emitter of the thru-beam sensor does not incorporated the output.

Symbol...D : Reverse polarity protection diode
Z_D: Surge absorption zener diode
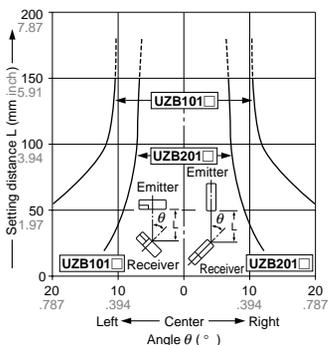Tr : PNP output transistor

SENSING FIELDS

There are typical sensing fields, which may slightly change from model to model.

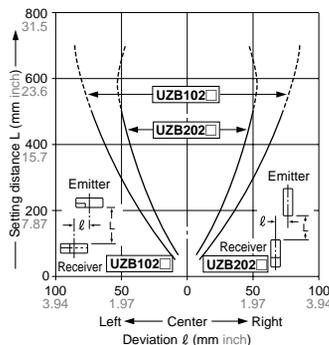### UZB1011 UZB2011 / UZB1012 UZB2012
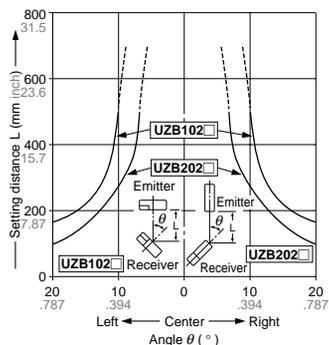
Parallel deviation

Angular deviation

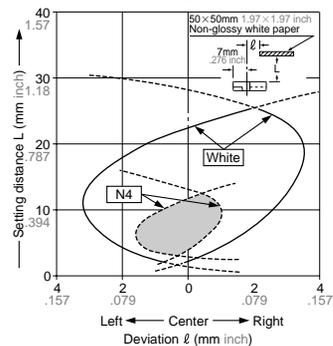

UZB1021 UZB2021 / UZB1022 UZB2022
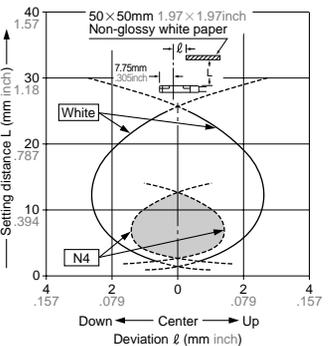
Parallel deviation

Angular deviation

UZB1601 / UZB1602

Sensing field
• Horizontal (left & right) direction
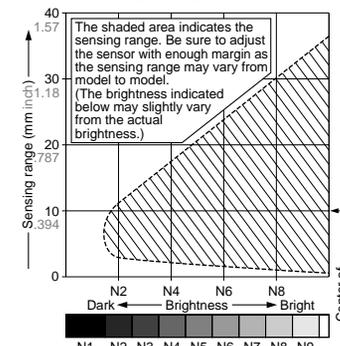

• Vertical (up & down) direction

Brightness
– Sensing range correlation

The shaded area indicates the sensing range. Be sure to adjust the sensor with enough margin as the sensing range may vary from model to model. (The brightness indicated below may slightly vary from the actual brightness.)

Material (50×50mm 1.969×1.969inch)
– Sensing range correlation

The bar graph indicates the sensing range. Be sure to adjust the sensor with enough margin as the sensing range may vary from model to model.

6
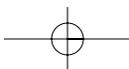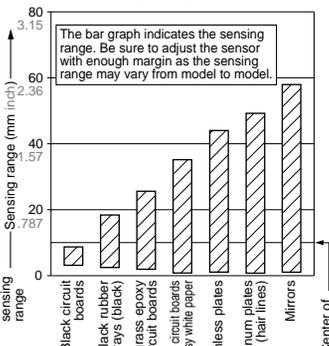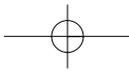
PRECAUTIONS FOR PROPER USE

⚠ These products are **not** safety sensors and are **not** designed or intended to be used to protect life and prevent bodily injury or property damage.

Mounting
When making a tap for mounting

Side sensing	Front sensing

Tightening torque must not exceed 0.2N·m{2.04kgf·cm}.
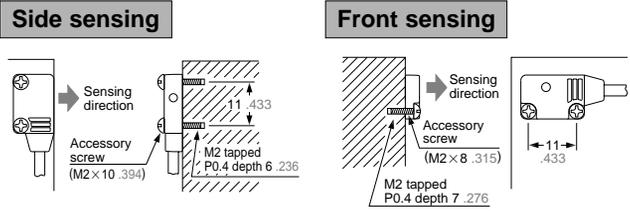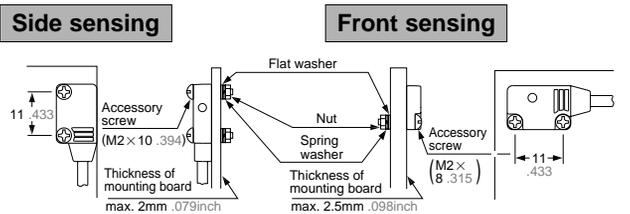
When using an accessory screw and nut

Side sensing	Front sensing

Tightening torque must not exceed 0.2N·m{2.04kgf·cm}.

Others
Do not use the sensor output signal for 50ms immediately after the power is supplied to the sensor.

Do not use the sensor where it may be exposed to steam or dusts, or immersed in water.

Avoid places where the sensor may be directly exposed to fluorescent lights with rapid-starters or high frequency lighting as it may affect the sensing performance.

Wiring
Power supply should be turned off before wiring.

Verify voltage fluctuation so that it should not exceed the rated value.

When using a switching regulator for the power supply readily available in the market, always ground the frame ground (F.G.) terminal.
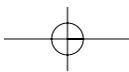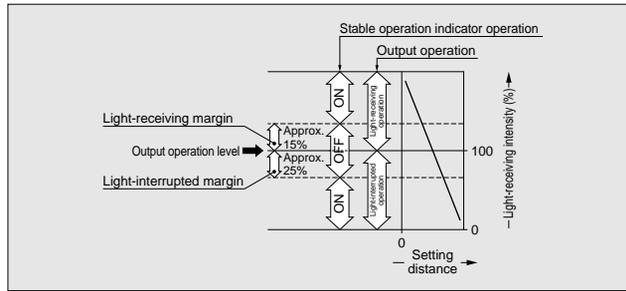
When using an equipment which generates the noises (switching regulator or inverter motor, etc.) near the sensor, ground the frame ground (F.G.) terminal of the equipment.

Do not run sensor cables near high-voltage lines or power lines, nor put them together in the same raceway.

Doing so may cause malfunctions due to inductive interference.

Stable operation indicator
The stable operation indicator (green) lights when the light-receiving intensity of the signal light is sufficient against the operation level. If the light-receiving level where the stable operation indicator lights, the sensor can detect stably without affecting the temperature and the voltage changes at the light-receiving and the light-interrupted operations.
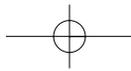
DIMENSIONS (Unit : mm inch)

UZB101☐ UZB102☐ UZB103☐ Sensor

Receiver

Actual size

Emitter

Stable operation indicator
Operation indicator
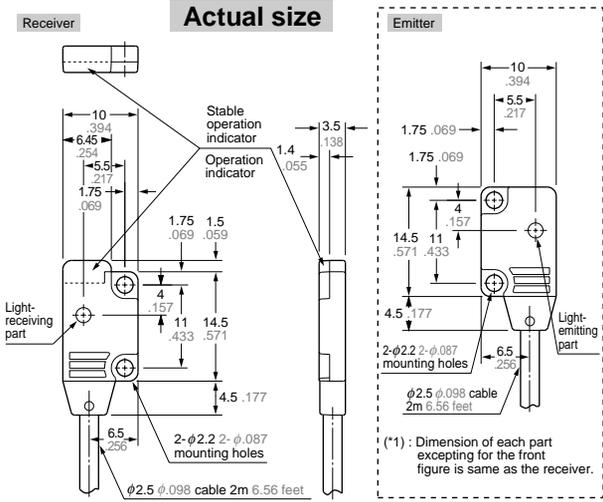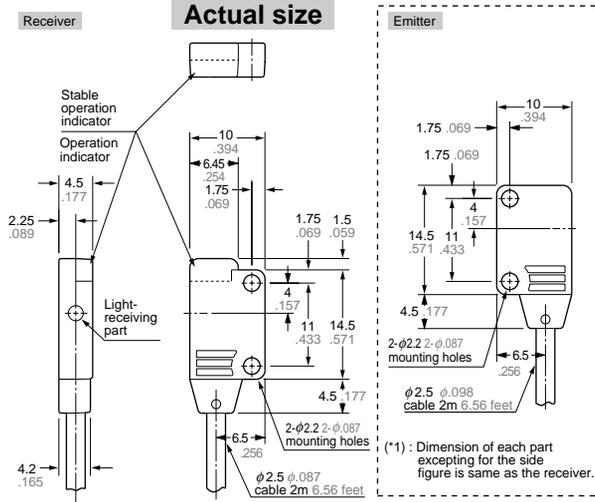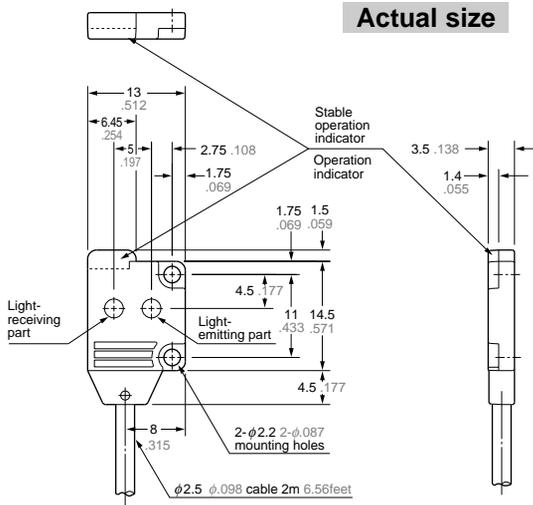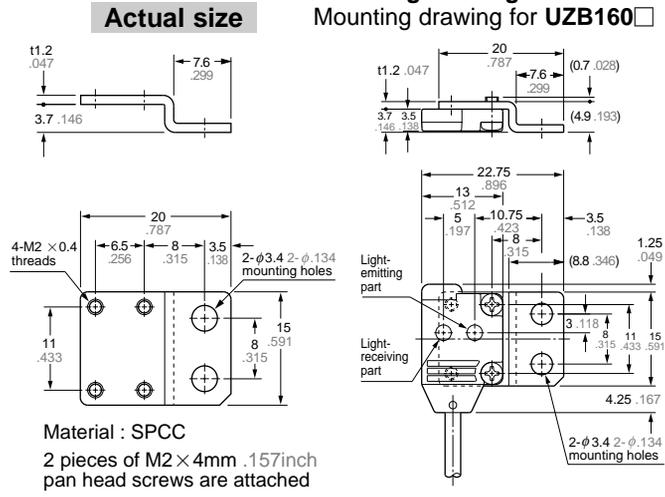Light-receiving part

2-φ2.2 2-φ.087 mounting holes
φ2.5 φ.098 cable 2m 6.56 feet

2-φ2.2 2-φ.087 mounting holes
φ2.5 φ.098 cable 2m 6.56 feet
Light-emitting part

(*1) : Dimension of each part excepting for the front figure is same as the receiver.

UZB201☐ UZB202☐ Sensor

Receiver

Actual size

Emitter

Stable operation indicator
Operation indicator
Light-receiving part

2-φ2.2 2-φ.087 mounting holes
φ2.5 φ.087 cable 2m 6.56 feet

φ2.5 φ.098 cable 2m 6.56 feet

(*1) : Dimension of each part excepting for the side figure is same as the receiver.

UZB160☐ Sensor

Actual size

Stable operation indicator
Operation indicator
Light-receiving part
Light-emitting part

2-φ2.2 2-φ.087 mounting holes
φ2.5 φ.098 cable 2m 6.56feet

UZB801 Sensor mounting bracket (option)

Actual size

Mounting drawing
Mounting drawing for **UZB160☐**

Light-emitting part
Light-receiving part

4-M2 ×0.4 threads
2-φ3.4 2-φ.134 mounting holes

2-φ3.4 2-φ.134 mounting holes

Material : SPCC
2 pieces of M2×4mm .157inch pan head screws are attached

UZB802 Sensor mounting bracket (option)

Actual size

2-M2 ×0.4 threads

Material : SPCC
2 pieces of M2×8mm .315inch pan head screws are attached

UZB803 Sensor mounting bracket (option)

Actual size

4-M2 ×0.4 threads

Material : SPCC
2 pieces of M2×4mm .157inch and 2 pieces of M2×8mm .315inch pan head screws are attached