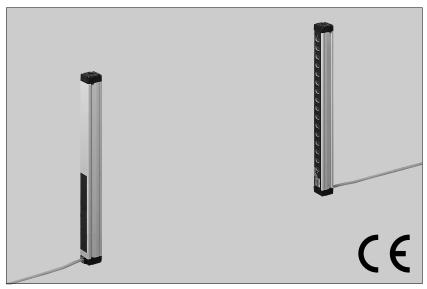


20mm BEAM PITCH GLOBAL SAFETY STANDARD CONFORMING LIGHT CURTAIN SENSORS

UZKA2 Series

CONFORMING TO LATEST INTERNATIONAL SAFETY STANDARDS



Global Safety

The **UZKA2** series complies with the IEC61496-1/-2 international standards, so that it can be used in many countries throughout the world.

- UL and C-UL lised (IEC61496-1/-2) which are required for use in the United states and Canada have been obtained.
- CE marking based on relevant equipment and EMC directives has been obtained. [Type 4 based on IEC (EN) 61496-1/-2, and Category 4 based on EN954-1]
- This series is also compatible with equipment conforming to OSHA (1910.212/217), ANSI (B11.1 to B11.20) and ANSI/RIA15.06 regulations.

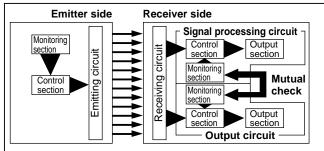




Pursuit of Safety

It uses two independent CPUs, which mutually check the safety conditions. High reliability fail-safe design is realized by incorporating dual circuits for signal processing and output. Further, in order to ensure safety, FMEA (Failure Mode & Effect Analysis) has been used to prove safe operation.





Safety Design of UZKA2 series

UZKA2 series checks by itself for any internal circuit failure, cable breakage/short-circuit, or even abnormal incident ambient light. If any error occurs, UZKA2 series outputs the same signal as when a beam is interrupted (OFF signal), so that the machine is stopped and cannot restart.

Emitter



Emitting element failure



Emitting circuit failure



Cable breakage/ short-circuit

Receiver



Receiving element failure



Receiving circuit failure



Strong extraneous light



Output drive circuit failure



Abnormal condition of CPU

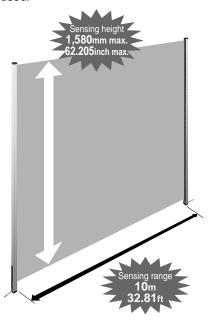
Cable breakage/ short-circuit

Wide Area: 1,580mm imes 10m

62.205inch × 32.81ft

It realizes a wide sensing area with a sensing height of 1,580mm 62.205inch max. (80 beam channels) and a long sensing range of 10m 32.81ft.

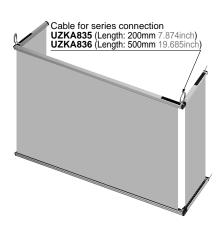
Just one sensor can cover an area where previously 2 sensors had to be used.



Sensors Connectable in Series

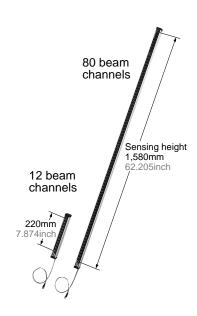
Using the optional cable (UZKA835, UZKA836) for series connection, maximum 4 sets of sensors with a total of 192 beam channels can be connected in series.

For example, in case of mounting the sensors on the front, as well as, both the sides of a danger region, previously separate wiring was required for 3 sets of sensors. But now, wiring equivalent to that for only 1 set is required, thus saving troublesome wiring and cost.



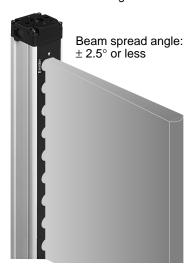
Wide Variety

There are 13 types of sensor units having a sensing height ranging from 220mm 8.661inch (12 beam channels) to 1,580mm 62.205inch (80 beam channels). The sensors can be selected to suit the monitoring area of the used equipment.



No Interference

• Beam spread angle \pm 2.5° or less Since the beam spread angle is narrow (\pm 2.5° or less), it reduces the effect of reflection from walls, etc., and interference from extraneous light.

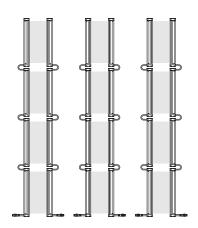


Exclusive Controller Not Required

Since an exclusive controller is not required, there is no need to provide space for it.

• Up to 12 sets mountable

In case of series connection or parallel connection, interference can be prevented for up to 4 sets, respectively. Further, in case of series and parallel mixed connection, up to 12 sets (total 192 beam channels) can be mounted.



Easy Maintenance

An optional front protection cover (UZKA81) is available, so that the sensing face of the sensor can be protected in an adverse environment. Further, if the front protection cover becomes dirty or scratched, you can just change the cover. The sensor, itself, need not be changed.

• Convenient slit mask available

By using the optional slit mask (UZKA82\(\top)\), the amount of beam emitted or received can be restrained to reduce the effect of extraneous light from other sensors, etc.



Mounting Bracket Enables Easy Beam Alignment

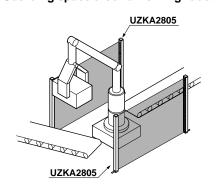
The beam alignment is easy since angle adjustment is possible with the sensor mounting bracket (**UZKA801**).

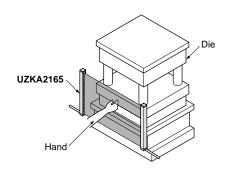
APPLICATIONS

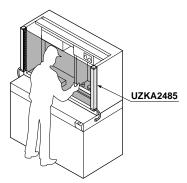
Guarding space around working robot

Safeguard for press machine

Safeguard for special purpose machine







ORDER GUIDE

Sensors

		Model No.	Number of beam	Sensing height	
Appearance	Sensing range	PNP output equivalent type	channels	(mm inch)	
		UZKA2125	12	220 8.661	
		UZKA2165	16	300 11.811	
Beam channel No.		UZKA2205	20	380 14.961	
Sensing height 3 Beam pitch		UZKA2245	24	460 18.110	
	0.3 to 10m .984 to 32.808ft. (Note)	UZKA2285	28	540 21.260	
		UZKA2325	32	620 24.409	
		UZKA2365	36	700 27.559	
		UZKA2405	40	780 30.709	
0.5m 20mm 1.64t 7.787inch		UZKA2485	48	940 37.008	
		UZKA2565	56	1,100 43.307	
		UZKA2645	64	1,260 49.606	
Optional mating cable		UZKA2725	72	1,420 55.905	
		UZKA2805	80	1,580 62.205	

Note: The sensing range is the possible setting distance between the emitter and the receiver. The sensor can detect an object less than 0.3m .984ft away.

Mating cable is not supplied with the sensor. Please order it separately.

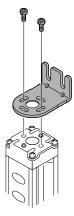
Mating cables

wating cables	-			
Type	Appearance	Model No.		Description
		UZKA831	Length: 3m 9.843ft Weight: 410g 14.46oz approx.	
Cable with connector on one end		UZKA832	Length: 7m 22.966ft Weight: 890g 31.40oz approx.	8-core shielded cable, with connector on one end, two cables per set • Cable outer diameter: φ 6mm .236inch • Connector outer diameter: φ 14mm .551inch max.
		UZKA833	Length: 10m 32.808ft Weight: 1.2kg 42.33oz approx.	
Cable with connector on both end		UZKA834	Length: 10m 32.808ft Weight: 1.2kg 42.33oz approx.	8-core shielded cable, with connector on both end, two cables per set • Cable outer diameter: φ 6mm .236inch • Connector outer diameter: φ 14mm .551inch max.
Cable for series connection		UZKA835	Length: 200mm 7.874ft Weight: 150g 5.30oz approx.	It can connect two sensors in series. 8-core shielded cable, two cables per set
		UZKA836	Length: 500mm 19.685inch Weight: 170g 6.00oz approx.	Cable outer diameter: φ 6mm .236inch Connector outer dimensions: □35mm 1.378inch max.

Spare parts

Designation	Model No.	Description
Sensor mounting bracket	UZKA801	A set of brackets for both the emitter and the receiver
Intermediate supporting bracket	UZKA802	A set of brackets for both the emitter and the receiver
Test rod	UZKA803	Sensing object (ϕ 30mm 1.181inch) for daily check

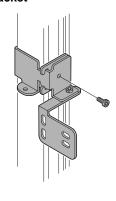
Sensor mounting bracket



Four bracket set

Eight M4 (length 8mm .315inch)
hexagon-socket-head bolts and
eight spring washers are attached.

Intermediate supporting bracket



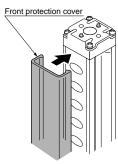
Set of 2 Nos. each of U-shaped intermediate supporting bracket and L-shaped intermediate supporting bracket

Two M4 (length 6mm .236inch), two M4 (length 8mm .315inch) hexagon-socket-head bolts, two nuts and two spring washers are attached.

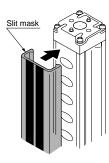
OPTIONS

	Component	Model No.		Description		
		UZKA8112	For 12 beam channels			
		UZKA8116	For 16 beam channels			
		UZKA8120	For 20 beam channels			
		UZKA8124 For 24 beam channels				
		UZKA8128	For 28 beam channels			
		UZKA8132	For 32 beam channels			
	Front protection cover	UZKA8136	For 36 beam channels	Protects front lens		
		UZKA8140	For 40 beam channels			
		UZKA8148	For 48 beam channels			
		UZKA8156	For 56 beam channels			
		UZKA8164	For 64 beam channels			
		UZKA8172	For 72 beam channels			
		UZKA8180	For 80 beam channels			
		UZKA8212	For 12 beam channels			
	The state of the s	UZKA8216	For 16 beam channels			
		UZKA8220 For 20 beam channels				
		UZKA8224	For 24 beam channels			
		UZKA8228	For 28 beam channels	The slit mask restrains the amount of beam		
		UZKA8232	For 32 beam channels	emitted or received and hence reduces the		
	Slit mask	UZKA8236	For 36 beam channels	interference between neighbouring sensors. However, the sensing range reduces when the		
		UZKA8240	For 40 beam channels	slit mask is used.		
		UZKA8248	For 48 beam channels	Contact our office for details.		
		UZKA8256	For 56 beam channels			
		UZKA8264	For 64 beam channels			
		UZKA8272	For 72 beam channels			
		UZKA8280	For 80 beam channels			

Front protection cover



Slit mask



Note: The model Nos. given above denote a single unit, not a pair of units.

SPECIFICATIONS

	mber of beam	12	16	20	24	28	32	36	40	48	56	64	72	80
Мо	del No.	UZKA2125	UZKA2165	UZKA2205	UZKA2245	UZKA2285	UZKA2325	UZKA2365	UZKA2405	UZKA2485	UZKA2565	UZKA2645	UZKA2725	UZKA2805
Sei	nsing height 8.661 inch 11.811 inch 14.961 inch 18.110 inch 21.260 inch 24.409 inch 27.559 inch 30.709 inch 37.008 inch 43.307 inch 49.606 inch 55 inch							1,420mm 55.905 inch	1,580mm 62.205 inch					
Sei	nsing range				•		0.3 to 10r	n .984 to	32.808ft		•	•	•	•
Bea	am pitch						201	mm .787ii	nch					
	am spread angle		±	2.5° or le	ess [for se					`	ng to IEC	61496-2)]	
	nsing object					φ 30mn	n 1.181in			object				
	pply voltage							V DC ± 1						
Cu	rrent consumption	200mA or less												
(03	tputs SSD1, OSSD2) ote 1)	<pnp equivalent="" output="" type=""> Semiconductor output (PNP output equivalent) 2 outputs • Maximum source current: 300mA • Applied voltage: same as supply voltage • Residual voltage: 2.5V or less (at 300mA source current)</pnp>												
	Output operation		(It a	ON whe							ns are inte nchroniz		nal.)	
	Short-circuit protection		Incorporated ON→OFF: 15ms or less, OFF→ON: 20ms or less											
Re	sponse time			Г-										
ģ	Emitter			Er	nission st	dicator: G top indica tor: Yellov	tor: Orang	ge LED (l	ights up v	vhen emi	ssion stor	os)		
Indicators	Receiver	OSSD ON indicator: Green LED (lights up when OSSDs are ON) OSSD OFF indicator: Red LED (lights up when OSSDs are OFF) Incident beam indicator: Green/Red LED [lights up in red with intensity proportional to the incident light intensity for reference channel (second channel from cable side), lights up in green when all beams are received] Fault indicator: Yellow LED (lights up or blinks if the sensor fails)							sity for ams					
Tes	st input function				(9			corporate						
Inte	erference evention function	Incorporated Series connection: 4 sets max., however total 192 beam channels max.						ax.)						
	Protection						I	P65 (IEC	:)					
Φ	Ambient temperature	-10) to +55°(C –13 to	+131°F (I	No dew c	ondensati	on or icir	ng allowe	d), Storaç	ge: –25 to	+70°C –	13 to +15	8°F
anc	Ambient humidity					30 to	85% RH,	Storage:	30 to 95	% RH				
nmental resistance	Ambient illuminance		Sun light	: 20,000 ℓ								light-rece	iving face	!
ntal	EMC				Emissio	n: EN500	81-2, Imn	nunity: EN	N50082-2	and IEC	61496-1			
	Voltage withstandabillity		1	,000V AC	for 1 min	n. betwee	n all supp	oly termin	als conn	ected tog	ether and	enclosur	re	
Enviro	Insulation resistance	:	20 Μ Ω or	more, witl	h 500V D	C megge	r betweer	all supp	oly termin	als conne	ected toge	ther and	enclosure	9
	Vibration resistance			10 to 55H			·						n	
_	Shock resistance			300m/s	² accelera	•	- ' ' '	•			three tim	es each		
	itting element						LED (Em							
Ма	terial		(0.0				closure: /		•					
Ca		8-core (0.3mm² × 4-core, 0.2mm² × 4-core) shielded cable, 0.5m 1.640ft. long, with a connector at the end ** Use together with the optical mating cable												
	ble extension eight	1.1Kg	1.3Kg	1.5Kg	1.7Kg	1.9Kg	2.2Kg	2.4Kg	2.6Kg	3.1Kg	3.5Kg	4.0Kg	ng cable	4.9Kg
	cessories	approx.	UZKA8	approx. 01 (Senso 03 (Test r	or mounti	ng bracke	approx. et): 1 set,			approx. ediate su			Note 2),	approx.
			UZNAO	00 (1691)	5u). I INO	•								

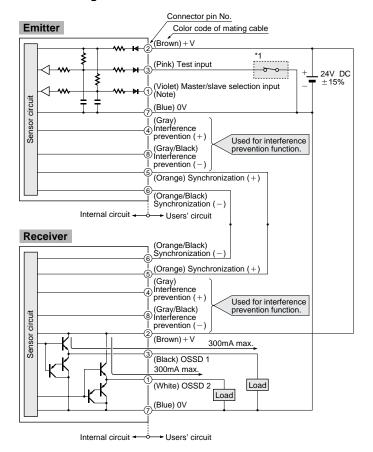
Notes: 1) OSSD stands for 'Output Signal Switching Device'.

UZKA802 (intermediate supporting bracket) is attached with sensors having 24, or more, beam channels.
 The number of attached intermediate supporting brackets is different depending on the sensor as follows.
 UZKA2245, UZKA2285, UZKA2325, UZKA2365, UZKA2405, UZKA2485, UZKA2565: 1 set
 UZKA2645, UZKA2725, UZKA2805: 2 sets

I/O CIRCUIT AND WIRING DIAGRAMS

PNP output equivalent type

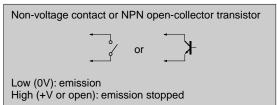
I/O circuit diagram



CAUTION

In order to maintain safety, use a safety relay or a safety relay unit for the load.

*1



Output waveform (when output is ON)

 When the sensor is in the light received condition (ON state), the receiver self-diagnoses the output circuit. For this purpose, the output transistor goes to the OFF state periodically. (Refer to the figure given at the right.)

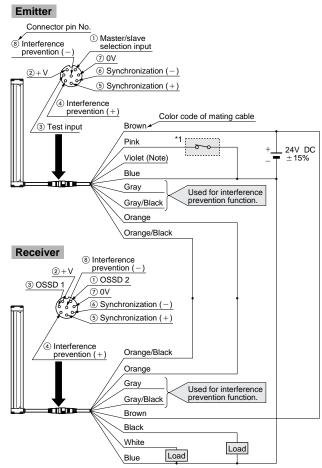
If the OFF signal is fed back, the receiver judges the output circuit as normal. If the OFF signal is not fed back, the receiver judges that the output circuit or the wiring is abnormal, and the output is maintained in the OFF state.

The frequency or the period for which the output transistor turns OFF does not change even for the maximum connected set No. of 4 sets connected in series.

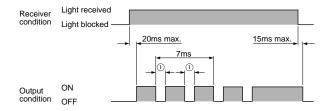


Take care of the input response time of the equipment connected to the sensor, since there is a possibility of the equipment malfunctioning due to the sensor OFF signal.

Wiring diagram



Note: Refer to P9 for master/slave selection input.



No. of pulses (No. of ①'s in the figure) in 7ms②	1 to 2
Pulse width (width of ① in the figure) [μs]③	200
Sum of the pulse widths in 7ms (product of ② and ③)	400 max.

PRECAUTIONS FOR PROPER USE



To use this product in the U.S.A., refer to OSHA 1910. 212 and OSHA 1910. 217 for installation, and in Europe, refer to prEN 999 as well. Observe your national and local requirements before installing this product.

Refer to the instruction manual enclosed with this product for detailed instructions.

- Make sure to carry out the test run before regular operation.
- This safety system is for use only on machinery in which the dangerous parts can be stopped immediately, either by an emergency stop unit or by disconnecting the power supply.
 Do not use this system with machinery which cannot be stopped at any point in its operation cycle.

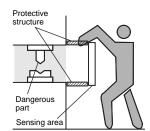
Sensing area



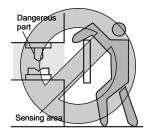
Make sure to install this product such that any part of the human body must pass through its sensing area in order to reach the dangerous parts of the machinery. If the human body is not detected, there is a danger of serious injury or death.

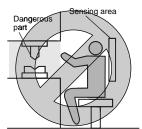
Correct mounting method





Wrong mounting method



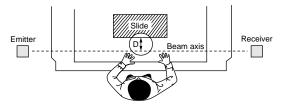


Safety distance



Calculate the safety distance correctly, and always maintain a distance which is equal to or greater than the safety distance, between the sensing area of this sensor and the dangerous parts of the machinery.

If the safety distance is miscalculated or if sufficient distance is not maintained, there is a danger of serious injury or death.



 Safety distance is calculated based on the following equation when a person moves perpendicular (normal intrusion) to the sensing area of the sensor.

For use Europe (as per prEN 999)

- Equation ① D=K×T+C
- D: Safety distance (mm)

Minimum required distance between the surface of the sensing area and dangerous part of machine.

K: Intrusion velocity of operator's body (hand, finger, etc.) (mm/sec.)

Normally taken as 2,000 (mm/sec.) for calculation.

T: Response time of total equipment (sec.)

Tm: Maximum halt time of device (sec.)

Tslc: Response time of the **UZKA2** series 0.015 (sec.)

- C: Additional distance calculated from the size of the minimum sensing object of the area sensor (mm)

 Note that the value of C is not 0 or less.

 C=8×(d-14)
 - d: Minimum sensing object diameter 30 (mm)

For use in U.S.A. (as per ANSI B11.19)

- Equation ② $D=K\times(T_s+T_c+T_{SLC}+T_{bm})+D_{pf}$
- D: Safety distance (mm)

Minimum required distance between the surface of the sensing area and dangerous part of machine.

K: Intrusion velocity of operator's body (hand, finger, etc.) (mm/sec.)

Normally taken as 63 (inch/sec.) ≒ 1,600 (mm/sec.) for calculation

- Ts: Halt time calculated from the operation time of the control element (air valve, etc.) (sec.)
- Tc: Maximum response time of the control circuit required for functioning the brake. (sec.)

Tslc: Response time of UZKA2 series 0.015 (sec.)

Tbm: Additional halt time tolerance for the brake monitor (sec.)

Tbm=Ta-(Ts+Tc)

Ta: Setting time of brake monitor (sec.)

Dpr: Additional distance calculated from the size of the minimum sensing object of the area sensor (mm)

Note that the value of D_{pf} is not 0 or less. $D_{pf}=3.4\times(d-0.726)$ (inch)

 $=3.4\times(d-7)$ (mm)

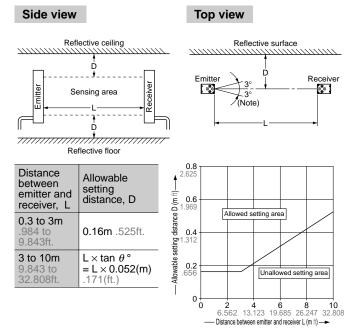
d: Minimum sensing object diameter 1.2 (inch) ≒30 (mm)

Influence of reflective surface



Install the sensor by considering the effect of nearby reflective surfaces and taking suitable countermeasures. Failure to do so may cause the sensor not to detect, resulting in serious injury or death

 Keep the minimum distance given below, between the sensor and a reflective surface.



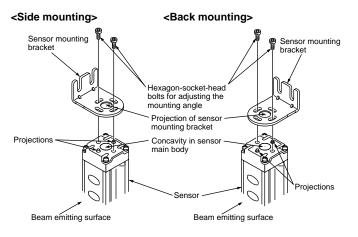
Note: The beam spread angle for this sensor is $\pm 2.5^{\circ}$ (with L> 3m) as required by IEC 61496-2. However, install this sensor away from the reflective surfaces, assuming a beam spread angle $\pm 3^{\circ}$ to provide for misalignment, etc., during installation.

Mounting

 When mounting the sensor, the tightening torque should be 2N•m or less.

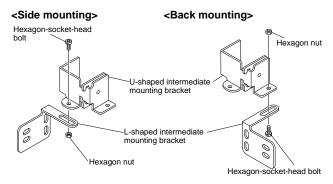
Mounting of sensor mounting bracket (UZKA801)

 Choose the mounting direction for the sensor mounting bracket based on the mounting direction (side or back), and temporarily tighten the brackets with the two hexagon-sockethead bolts for adjusting the mounting angle (M4, length 8mm .315inch). Tighten the two hexagon-socket-head bolts securely, after beam alignment.

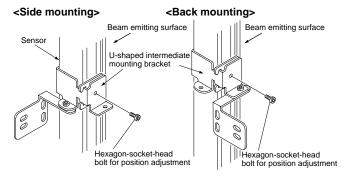


Mounting of intermediate supporting bracket (UZKA802)

① Choose the mounting direction for the L- and U-shaped intermediate supporting brackets based on the mounting direction (side or back), and temporarily tighten the mounting brackets with the hexagon-socket-head bolt (M4, length 8mm .315inch). Tighten it securely, after beam alignment.



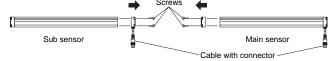
② Clasp the body of the sensor with the U-shaped intermediate supporting bracket, and temporarily tighten with the hexagon-socket-head bolt (M4, length 6mm .236inch) for position adjustment. Tighten it securely, after beam alignment.



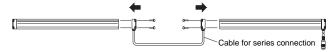
Note: The above drawing shows the intermediate supporting bracket mounted on the emitter. In case of mounting on the receiver, note that the intermediate supporting bracket is upside down.

Mounting of cable for series connection (UZKA835, UZKA836)

 Remove four M4 screws (length 10mm .394inch) on the main sensor and the sub sensor as given below.

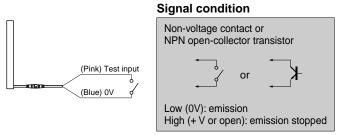


② As shown below, mount the cable for series connection at the place on the main sensor and the sub sensor from where the screws have been removed.



Test input function

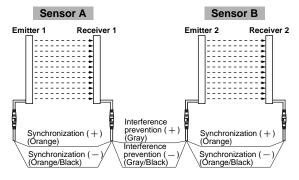
The emission is halted when the test input wire (pink) is connected to +V or kept open. The test input is useful for a start-up check since the sensing output can be switched ON/OFF without the sensing object.



Note: When test input function is not used, make sure to connect the test input wire (pink) to 0V.

Interference prevention function

Interference can be prevented between 4 sets max. (192 beam channels max.) for series connection, 4 sets max. (192 beam channels max.) for parallel connection, and 12 sets max. (192 beam channels max.) for series and parallel mixed connection. In this case, connect the respective interference (+) (gray) and interference (-) (gray/black) of the adjacent sensors.

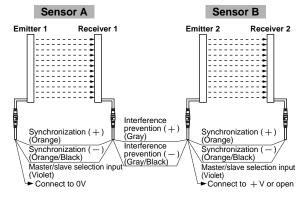


Master/slave selection input

 In case of parallel connection, or series and parallel mixed connection, before switching on the power supply, connect the master/slave selection input (violet) of Sensor A, as master, to 0V and connect the master/slave selection input (violet) of Sensor B, as slave, to + V or open.

The master/slave selection is done only once at the time of switching on of the power supply. If selection is done after switching on of the power supply, it does not change. Further, if the master/slave selection input is kept open when the sensor is set as slave, ensure to insulate it.

 In case of series connection or when using 1 set, connect the master/slave selection input (violet), as master, to 0V.



Others

• Do not use during the initial transient time (5 sec.) after the power supply is switched on.

Connection

Series connection [4 sets max. (192 beam channels max.) connectable]

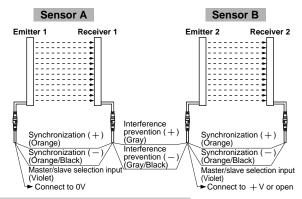
Emitter Receiver When the danger region can be approached from two or more directions, multiple sets of emitters and receivers should be connected in series. When a beam of any set is interrupted, the output turns OFF. Cable for serial connection (optional) UZKA835 Synchronization (+) (Orange) Synchronization (-) (Orange/Black) (Length: 200mm 7.874inch) UZKA836 (Length: 500mm 19.685inch)

Parallel connection [4 sets max. (192 beam channels max.) connectable]

Master/slave selection input (Violet)

→ Connect to 0V

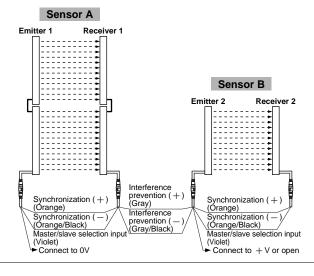
 In case there are two, or more, danger regions which can be approached from a single direction only, multiple sets of emitters and receivers can be connected in parallel by connecting their interference prevention wires to individually monitor the danger regions. Since the outputs are separate, only the output of the sensor whose beams are interrupted is turned OFF.



Serial/parallel mixed connection

[12 set max. (192 beam channel max.) connectable]

 In case there are two, or more, danger regions which can be approached from two or more directions, multiple sets of emitters and receivers can be connected in series and parallel mixed combination. For the sensors connected in series, the output turns OFF if the beams of any of these sensors are interrupted. For the sensors connected in parallel, the output of only the sensor whose beams are interrupted turns OFF.



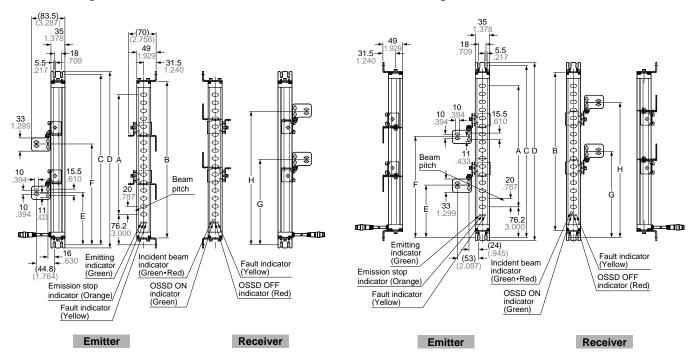
DIMENSIONS (Unit: mm inch)

UZKA2□5

Sensor

Assembly dimensions

Mounting drawing for the sensor on which the sensor mounting brackets and the intermediate supporting brackets are mounted <Side mounting> <Back mounting>



Model No.	А	В	С	D	Е	F	G	Н
UZKA2125	220	312	346	362	_	_	_	_
UZKA2165	300	392	426	442	_	_	_	_
UZKA2205	380	472	506	522	_	_	_	_
UZKA2245	460	552	586	602	332	_	280	_
UZKA2285	540	632	666	682	362	_	320	_
UZKA2325	620	712	746	762	402	_	360	_
UZKA2365	700	792	826	842	442	_	400	_
UZKA2405	780	872	906	922	482	_	440	_
UZKA2485	940	1,032	1,066	1,082	562	_	520	_
UZKA2565	1,100	1,192	1,226	1,242	642	_	600	_
UZKA2645	1,260	1,352	1,386	1,402	488	976	446	892
UZKA2725	1,420	1,512	1,546	1,562	542	1,084	500	1,000
UZKA2805	1,580	1,672	1,706	1,722	595	1,190	574	1,148

Note: **UZKA802** (intermediate supporting bracket) is attached with sensors having 24, or more, beam channels.

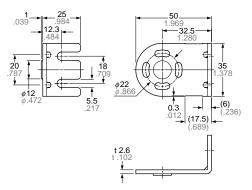
The number of attached intermediate supporting brackets is different depending on the sensor as follows.

UZKA2245, UZKA2285, UZKA2325, UZKA2365, UZKA2405, UZKA2485, UZKA2565: 1 set

UZKA2645, UZKA2725, UZKA2805: 2 sets

UZKA801

Sensor mounting bracket (Accessory)



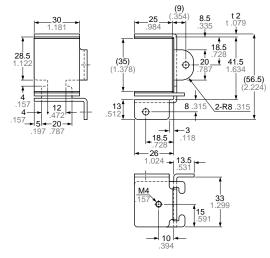
Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated) Four bracket set

Eight M4 (length 8mm .315inch) hexagon-socket-head bolts and eight spring washers are attached.

UZKA802

Intermediate supporting bracket (Accessory)

U-shaped intermediate supporting bracket



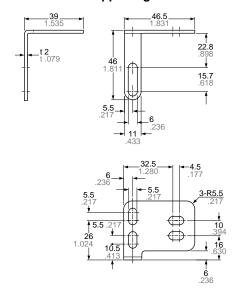
Material: Cold rolled carbon steel (SPCC)

(Uni-chrome plated)
Set of 2 Nos. each of U-shaped intermedi-ate supporting bracket and L-shaped

inter-mediate supporting bracket

Two M4 (length 6mm .236inch), two M4 (length 8mm .315inch) hexagon-socket-head bolts, two nuts and two spring washers are attached.

L-shaped intermediate supporting bracket



Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)