

**TAKEX**

# **PHOTO SENSORS**

**DIGEST CATALOG**

**TAKENAKA ELECTRONIC INDUSTRIAL CO.,LTD.**

## DUAL DISPLAY FIBER OPTIC SENSOR

F85RN is a new Dual Display Fiber Optic sensor with excellent operability than ever. Only three button operation (SET, UP and DOWN) controls all functions and settings. Teaching can be selected from four modes (Two-point, Position, Maximum sensitivity and Auto) and conducted by a single (SET) button operation. The sensor has both NPN and PNP outputs and it makes inventory management more efficient. Essential functions including mutual interference prevention up to eight units, energy saving ECO mode and Two Displacement Display options (Percentage and Zero offset) are available. View quick reference manuals on smartphones or tablets by a provided QR code.



## F85RN

<b>Model</b>	F85RN
<b>Power supply</b>	12 to 24 V DC $\pm 10\%$ / Ripple 10% or less
<b>Power consumption</b>	Normal mode : 770 mW or less (32 mA or less at 24 V) ECO mode : 600 mW or less (25 mA or less at 24 V)
<b>Control output</b>	NPN open collector output / Load current 100 mA (30 V DC) or less / Residual voltage: 1 V or less PNP open collector output / Load current 100 mA (30 V DC) or less / Residual voltage: 2 V or less
<b>Operation mode</b>	Light ON/Dark ON
<b>Timer</b>	ON delay / OFF delay / ON/OFF delay / One shot/ No timer Delay timer: 1 to 9999 ms (set in milliseconds)
<b>Response time</b>	High speed mode: 65 $\mu$ s or less / Standard mode: 500 $\mu$ s or less / Long mode: 4 ms or less
<b>Light source (wavelength)</b>	Four-element (AlGaInp) red LED (660 nm)
<b>Indicator</b>	Operation indicator, Setting indicator, Light ON / Dark ON indicator: orange LED
<b>Display</b>	Received light level: 4 digits in red LED (high-speed mode (0 to 3800), standard / long mode (0 to 9999)) Threshold: 4 digits in green LED (high-speed mode (0 to 3500), standard / long mode (0 to 9700))
<b>Switch</b>	Teaching and set switch (SET) Switch for threshold adjustment (UP/DOWN)
<b>Sensitivity setting</b>	2-point teaching / Max. sensitivity teaching / Full auto teaching / Position teaching
<b>Sensitivity adjustment</b>	Provided (manual)
<b>Light source intensity adjustment</b>	Provided (automatic/manual)
<b>Mutual Interference prevention</b>	UP to 8 units (standard / long mode)
<b>Protection circuit</b>	Power supply reverse connection protection / Output short circuit protection

## DIGITAL DISPLAY FIBER OPTIC SENSORS

The F80R series is a Fiber Optic sensor that boasts a larger digital display than previous models. It has a user-friendly teaching mode and offers an increased detecting distance. It has a low power consumption and is Light ON/Dark ON selectable.



## F80R series

<b>NPN model</b>	F80R
<b>PNP model</b>	F80RPN
<b>Power supply</b>	12 to 24VDC $\pm 10\%$ , Ripple 10% or less
<b>Output mode</b>	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less. PNP model : PNP open collector output, Source current 100mA (30VDC) or less.
<b>Operation mode</b>	Light ON / Dark ON selectable with sliding switch.
<b>Timer</b>	Off delay (45ms fixed) / disabled selectable
<b>Response time</b>	High speed mode: 190 $\mu$ s or less / Long distance mode: 1.8 ms or less
<b>Light source</b>	Red LED (680nm)

## DIGITAL DISPLAY FIBER OPTIC SENSORS

The F70AR series is a 9mm wide high-performance Fiber Optic sensor with digital displays. Red, Green, Blue or White light source models are available. Simple operation for setting functions save installation time. Features include Two-way monitoring, Full-auto/Auto teaching, mutual interference prevention, manual sensitivity setting and off-delay timer. NPN and PNP output models are available.



## F70A series

<b>NPN model</b>	F70AR	F70AG	F70AB	F70AW	F70AR-J	F70AG-J	F70AB-J	F70AW-J
<b>PNP model</b>	F70ARPN	F70AGPN	F70ABPN	F70AWPN	F70ARPN-J	F70AGPN-J	F70ABPN-J	F70AWPN-J
<b>Power supply</b>	12 to 24VDC $\pm 10\%$ , Ripple 10% or less							
<b>Output mode</b>	NPN model: NPN Open collector output, Rating: Sink current 100mA (30 VDC) or less PNP model: PNP Open collector output, Rating: Source current 100mA (30 VDC) or less							
<b>Operation mode</b>	Light ON/Dark ON selectable							
<b>Response time</b>	Light emission frequency channel 1: 600 $\mu$ s or less Light emission frequency channel 2: 700 $\mu$ s or less							
<b>Light source</b>	Red LED	Green LED	Blue LED	White LED	Red LED	Green LED	Blue LED	White LED





## F71 series

### MANUAL SETTING FIBER OPTIC SENSORS

The F71 series is a manual high-performance Fiber Optic sensor offered in either NPN or PNP models. Red, Green, Blue or White light source models are available. Up to 8 units can be mounted next to each other without any interference. This 30 micro-second high-speed response time sensor also boasts a turbo function that increases detection distance up to 30% than other sensors of this type. F71CR is a cost effective model with simpler functions.

NPN model	F71R	F71G	F71B	F71W	F71RH	F71BH	F71WH	F71CR
PNP model	F71RPN	F71GPN	F71BPN	F71WPN	F71RHPN	F71BHPN	F71WHPN	F71CRPN
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less							
Output mode	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less. PNP model : PNP open collector output, Source current 100mA (30VDC) or less.							
Operation mode	Light ON / Dark ON selectable with sliding switch.							
Response time	With switch at 4 : 250 $\mu$ s or less With switch at 8 : 500 $\mu$ s or less				30 $\mu$ s or less(*1)			250 $\mu$ s or less
Light source	Red LED	Green LED	Blue LED	White LED	Red LED	Blue LED	White LED	Red LED

(\*1) The detecting distance for high-speed response H type is reduced to roughly 30% of the ordinary type.



## F71RAN

### ANALOG OUTPUT FIBER OPTIC SENSOR

F71RAN is an Analog Output Fiber Optic sensor. It has an analog voltage output from 2V to 8V in proportion to the received light intensity. Detection of liquid level or comparative thickness of papers may be one of typical applications.

Model	F71RAN
Detection method	Through beam type / reflective type (depending on fiber optic cable)
Power supply	12 - 24 VDC $\pm 5\%$ / Ripple: 2% or less
Current consumption	30 mA or less
Output mode	Effective voltage range: 2 - 8 V (NPN emitter follower)*
Operation mode	Voltage output in proportion to received light intensity (current 3 mA or less)
Response time	Rise from 2 to 8 V 10 ms or less Fall from 8 to 2 V 25 ms or less
Temperature drift	0.3%/ °C or less at -10 - +50 °C
Output ripple	80 mV or less

\* The range maybe 1 to 9 V depending on the characteristics the individual products and fiber optic cables.



## GT2-WS/F70A-WS

### WATER DETECTION SENSORS

The GT2 series of Embedded Amplifier Photoelectric sensors and F70A-WS of Fiber Optic sensor are specialized to detect water. A light source having a wavelength range absorbed by water is used and these sensors reliably detect water in transparent bottles, ampules or dripping packs. GT2 series are offered in head-on or side-on detection models as well as either NPN or PNP (GT2PN-WS) output type. The sensors are rated IP67 for wash-down environments. F70A-WS makes use of optical fiber cables and enables through beam and diffuse reflective type detection.

Model	Head on Side on	GT2-WS GT2S-WS	F70A-WS
Power supply		12 to 24VDC $\pm 10\%$ , Ripple 10% or less	12 to 24VDC $\pm 10\%$ , Ripple 10% or less
Detection method		Through beam	Through beam/Reflective (by fiber unit)
Detection object		Liquid or opaque object	Liquid or opaque object
Detecting distance		2m	Through beam: 600 mm (with lens), Reflective: 7 mm
Output mode		NPN open collector, Rating: sink current 100mA (30VDC) or less	NPN open collector output
Recommended fiber optical cable			Through beam: GT505J, GT510J Reflective: GX505J, GX510J

### ANALOG COMPARATOR

DMC-A4A is an Analog Comparator which converts analog input to four open collector outputs in accordance with a preset logic. Threshold and hysteresis are freely set for each output. The comparator supports both voltage and current inputs and provides a 24VDC sensor power supply.
















## DMC-A4A



Model	DMC-A4A
Power supply	DC24V $\pm 10\%$
Current consumption	40mA or less
A/D conversion method	Sequential comparison system 10bit (1024)
Measurement range (input mode)	DC 0 to 5V / 0 to 10V / 0 to 20mA (selectable)
Display resolution	DC 0 to 5V : 0.01V / 0 to 10V : 0.01V / 0 to 20mA : 0.1mA
Output mode	NPN open collector output, Rating: 50mA (DC30V) or less, 4 outputs
Sensor power supply	DC24V (200mA or less) *1
Indication method	3 digits, 0 to 5V : 0.00 to 5.50 / 0 to 10V : 0.00 to 11.0 / 0 to 20mA : 0.00 to 22.0
Indication size	7 segments, Red $\times$ 1, Green $\times$ 3, Font size: 8 $\times$ 4 mm

\*1 Power supply directly connected


## ■Through beam

Type	Tip appearance (typical)	Model No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
				F85RN		F80R	F70R F70AR	F71R
				Long distance	High speed	Long distance		
Hex head		FNU-T5NYBC	M4 hex head, built-in lens	3500	700	3000	1600	960
Flat		FAL-T5YBC	Top edge view	1000	200	900	500	200
		FAL-T5SYBC	Side edge view	360	75	300	165	70
		FAL-T5TYBC	Flat view	360	75	300	165	70
Long distance		FT105BC	M4 threaded, long distance	2200	440	1800	1000	600
General purpose		FT8EBC	M3 threaded, low cost	600	120	470	260	150
Side view		FTV74BC	φ4 mm cylindrical	1000	200	830	460	270
Flexible		FT5YBC	M4 threaded, bending radius 1 mm	850	170	700	380	230
Narrow view		FTN5BC	M4 threaded, long distance	2600	520	2300	1300	750
SUS tube		FTS8BC	M3 threaded, SUS 70 mm	280	60	230	130	75
U-shaped		FU712BC	No optical axis alignment required	12				
Wide area		FTL716BC	Detecting width 5.5 mm	820	170	680	380	220
Side view		FTVW7YBC	Long distance with detecting width 10 mm	2200	440	1800	1000	-
Heat resistant		FTH7BC	Low cost, heat resistance 105 °C	1000	200	830	460	270
		GTH500J series	M4 threaded, heat resistance 350 °C	740	150	610	340	195













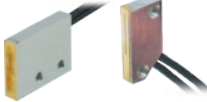

## ■Polarized retroreflective (For detection of transparent objects)

Type	Tip appearance (typical)	Model No.	Prominent feature	Detecting distance (mm) (inapplicable combinations marked with-)				
				F85RN		F80R	F70R F70AR	F71R
				Long distance	High speed	Long distance		
Hex head		FNU-M5NYBC	M6 hex head, built-in lens	1800	360	1500	900	480
Box		FM5BC	Box housing	100~1000		100~1000	100~1000	100~1000





## ■Reflective

Type	Tip appearance (typical)	Model No.	Prominent feature	Detecting distance (mm)				
				F85RN		F80R	F70R F70AR	F71R
				Long distance	High speed	Long distance		
Hex head		FNU-R5NYBC	M6 hex head, built-in lens	210	45	160	90	45
		FNU-R8YBC	M4 hex head	300	60	230	120	60
		FNU-X7YBC	M6 hex head, coaxial	360	75	300	150	75
		FNU-X8YBC	M3 hex head, coaxial	210	45	150	75	35

## ■ Reflective

Type	Tip appearance (typical)	Model No.	Prominent feature	Detecting distance (mm)				
				F85RN		F80R	F70R F70AR	F71R
				Long distance	High speed	Long distance		
Flat		FAL-R5YBC	Top edge view	330	70	280	155	60
		FAL-R5SYBC	Side edge view	100	20	80	50	20
		FAL-R5TYBC	Flat view	100	20	80	50	20
Long distance		FR105BC	M6 threaded, long distance	690	140	570	320	190
General purpose		FR8EBC	M3 threaded, low cost	250	50	190	110	65
		FR108BC	M4 threaded	440	90	360	200	120
Flexible		FR5YBC	M6, 1 mm pitch threaded, bending radius 1 mm	270	60	220	120	70
Narrow view Coaxial		FXN84BC	M4 threaded, coaxial narrow view	50	10	40	22	13
SUS tube		FRS83BC	φ3 mm cylindrical, φ1.3 mm head	110	25	90	50	30
		FRS84BC	M4 threaded, SUS 70 mm	110	25	90	50	30
Side view		FRSV83BC	φ3 mm cylindrical, SUS 20 mm	50	10	40	20	12
Coaxial		FX83BC	φ3 mm short head	100	20	90	44	25
		FX84BC	M4 threaded, φ2.5 mm head	100	20	90	44	25
		FX7BC	M6 threaded, φ2.5 mm head	280	60	230	130	75
Wide area		FRL7W16BC	Detecting width 5.5 mm	210	50	170	95	55
		FRLV732BC	Detecting width 11.1 mm	210	50	170	95	55
Heat resistant		GXH500J series	M4 threaded, heat resistance 350 °C	170	35	135	75	45
		FRH7BC	M6 threaded, low cost, heat resistance 105 °C	390	80	320	180	100

## ■ For Specific Applications

Type	Tip appearance (typical)	Model No. (made-to-order models marked with ●)	Prominent feature	Detecting distance (mm)				
				F85RN		F80R	F70R F70AR	F71R
				Long distance	High speed	Long distance		
Liquid level detection		FL-7013	Covered with PFA tube for detection of virtually any type of liquid including water, oil, chemicals, etc.	Detection occurs when sensor is immersed in liquid				
		FL-7161						
		FLH-7013						
Detection of liquid level in pipe		FU901BC	Mountable on translucent or transparent pipes of glass, PFA, etc. of 6 - 26 mm in diameter					
Chemical resistant		FTH7FEBC	Excellent oil/chemical resistance, long distance detection	2500	500	2300	1300	780
		FRH7FEBC	Excellent oil / chemical resistance	160	35	130	70	70

### • Detecting distance and light sources

Detecting distances depend on the type of light source.

The detecting distances in the table show the values for combinations with amplifiers using red (R) LED as the light source.

CE



UX series

### ULTRA-EXTREME MINIATURE EMBEDDED AMPLIFIER PHOTO SENSORS

The UX series is a self contained device designed for constrained area applications available in either M5 or M6 threaded screw type. The stainless steel housing secures high solidity and durability. Through beams are available both in Side View range to 500mm and Head On (straight) range to 1,000mm. Diffuse reflective type has a model with sensitivity adjustment volume. NPN and PNP output models are available.

NPN model	UX-T100D	UX-T50DS	UX-R2	UX-R3	UX-R5	UX-R5V
PNP model	UX-T100DPN	UX-T50DSPN	UX-R2PN	UX-R3PN	UX-R5PN	UX-R5VPN
Detection method	Through beam		Diffuse reflective			
Detecting distance	1000mm	500mm	3 to 20mm	3 to 30mm	3 to 50mm	3 to 50mm
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less					
Output mode	NPN model : NPN open collector output, Sink current 80mA (30VDC) or less.					
	PNP model : PNP open collector output, Source current 80mA (30VDC) or less.					
Operation mode	Dark ON		Light ON			
Response time	0.5ms or less					
Light source	Red LED		Infrared LED			

### ULTRA MINIATURE EMBEDDED AMPLIFIER PHOTO SENSORS

The UM series are among the smallest self-contained sensors in the world and make use of innovative technology to eliminate space waste and cost in your machinery. These units are available in sizes smaller than a postage stamp and cover all methods of photo sensing. The UM series incorporates a new generation of micro detectors to provide enhanced performance and long product life.

CE



Through beam

#### Through beam

Light ON	NPN model	UM-T15T	UM-T15TV	UM-T50T	UM-T50TV	UM-T50S	UM-T50SV	UM-T100T	UM-T100S
	PNP model	—	—	—	—	UM-T50SP	UM-T50SVP	UM-T100TP	—
Dark ON	NPN model	UM-T15DT	UM-T15DTV	UM-T50DT	UM-T50DTV	UM-T50DS	UM-T50DSV	UM-T100DT	UM-T100DS
	PNP model	UM-T15DTP	UM-T15DTVP	UM-T50DTP	UM-T50DTVP	UM-T50DSP	UM-T50DSPV	UM-T100DTP	—
Detection method		Through beam							
Detecting distance		150mm		500mm				1m	
Power supply		24VDC $\pm 10\%$ , Ripple 10% or less*							
Output mode	NPN model	NPN open collector Rating: sink current 80mA (30VDC) or less							
	PNP model	PNP open collector Rating: source current 80mA (30VDC) or less							
Response time		0.5ms or less							
Light source		Red LED						Infrared LED	

\* 12VDC type is available.

#### Diffuse and convergent reflective

Light ON	NPN model	UM-R3T	UM-R3TV	UM-R5T	UM-R5TV	UM-Z3SV
	PNP model	UM-R3TP	UM-R3TVP	—	UM-R5TVP	UM-Z3SVP
Dark ON	NPN model	UM-R3DT	UM-R3DTV	UM-R5DT	UM-R5DTV	UM-Z3DSV
	PNP model	—	—	—	—	—
Detection method		Diffuse reflective				Convergent reflective
Detecting distance		2 to 30mm		2 to 50mm		5 to 30mm
Power supply		12 to 24VDC ± 10%, Ripple 10% or less				
Output mode	NPN model	NPN open collector Rating: sink current 80mA (30VDC) or less				
	PNP model	PNP open collector Rating: source current 80mA (30VDC) or less				
Response time		0.5ms or less				
Light source		Red LED				

• All the models that end in V or VP are equipped with in-line sensitivity adjustment volume.

CE



Reflective

UM series

cULus  
CE

GN series

### COMPACT FOR BUILT-IN USE EMBEDDED AMPLIFIER PHOTO SENSORS

The GN series is one of our most versatile series of Embedded Amplifier sensors. These space-saving and light-weight sensors offer the most flexible mounting options. The sensor incorporates a new generation of components to insure many years of availability. Through beam, Diffuse and Polarized retroreflective and Convergent reflective models are available with excellent stability under fluorescent, mercury and sodium lighting. Both the NPN and PNP versions have a Light ON/ Dark ON selectable switch option.

NPN model	GN-T10CR	GN-T7C	GN-M2CR	GN-R40CR	GN-R30C	GN-R7C	GN-Z3CR	GN-Z3C
PNP model	GN-T10CRPN	GN-T7CPN	GN-M2CRPN	GN-R40CRPN	GN-R30CPN	GN-R7CPN	GN-Z3CRPN	GN-Z3CPN
Detection method	Through beam		Polarized retroreflective	Diffuse reflective			Convergent reflective	
Detecting distance	10m	7m	0.03 to 1.3m	400mm	300mm	70mm	3 to 30mm	1 to 40mm
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less							
Output mode	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less.							
	PNP model : PNP open collector output, Source current 100mA (30VDC) or less.							
Operation mode	Light ON/ Dark ON selectable							
Response time	0.5ms or less							



## ULTRA COMPACT FOR BUILT-IN USE EMBEDDED AMPLIFIER PHOTO SENSORS

The Mini-G series of Embedded Amplifier sensor has a track record of 25 years as an ultra-compact built-in-use sensor. The series offers a various type of sensors including wide diffuse reflective, high power through beam or convergent reflective in head-on/side-on housing. Both the NPN and PNP versions have a Light ON/Dark ON selectable switch.



## Mini-G series

Side-ON	NPN model	GT1SN	—	GT3RSN	GT7SN	GSM2RSN	GS5SN	GS20RSN	GS20SN	GSZ3N	GSZ3RSN
	PNP model	GT1SPN	—	GT3RSPN	GT7SPN	GSM2RSPN	GS5SPN	GS20RSPN	GS20SPN	GSZ3SPN	GSZ3RSPN
Head-ON	NPN model	GT1N	GT3N	—	—	—	GS5N	GS20RN	GS20N	—	—
	PNP model	GT1PN	GT3PN	—	—	—	GS5PN	GS20RPN	GS20PN	—	—
Detection method		Through beam				Retroreflective	Diffuse reflective		Convergent reflective		
Detecting distance		1m	7m	10m	7m	0.01m to 2m (When used with K-71 reflector)	70 mm	400 mm (GS20RSN) 300 mm (GS20RN)	300 mm (GS20SN) 200 mm (GS20N)	1 to 40mm	3 to 30mm
Power supply		12 to 24VDC ±10%, Ripple 10% or less									
Control output	NPN	NPN open collector output Rating: sink current 100mA (30VDC) or less									
	PNP	PNP open collector output Rating: source current 100mA (30VDC) or less									
Stability output	NPN	NPN open collector output Rating: sink current 50mA (30VDC) or less									
	PNP	PNP output type does not have stability output									
Operation mode		Light ON/ Dark ON selectable (with switch)									
Response time		0.35ms or less									



## LONG RANGE EMBEDDED AMPLIFIER PHOTO SENSORS

The NE2 series of Embedded Amplifier Photoelectric Sensors has the largest detecting distance in its category. Basic functionality and high quality for volume OEM applications. Available in Through-beam, Polarized retroreflective, Diffuse reflective and Background Suppression models. Features include panel indicators, up to 1m detecting distance, light emission inhibit function and IP67 rating for tough environments. 90 degree swing connector version is available.



## NE2 series

Attached cable model	NE2-T50-2	NE2-T30R-2	NE2-M10R-2	NE2-R10-2	NE2-D70-2	NE2-D50R-2
Connector model	NE2-T50-J2	NE2-T30R-J2	NE2-M10R-J2	NE2-R10-J2	NE2-D70-J2	NE2-D50R-J2
Detection method	Through beam		Polarized retroreflective	Diffuse reflective	Limited Range Reflective(Background Suppression)	
Detecting distance	50m	30m	0.05 to 8m (with reflector model k-7)	1m(With 200×200 mm white drawing paper)	70 to 700mm 120 to 700mm (setting range)	70 to 500mm 120 to 500mm (setting range)
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less					
Output mode	NPN / PNP open collector dual output					
	Sink current / Source current 100mA (30VDC) or less					
Operation mode	Light ON / Dark ON selectable					
Response time	0.5ms or less					



## CYLINDRICAL TYPE EMBEDDED AMPLIFIER PHOTO SENSORS

The CX series of Embedded Amplifier sensors conform to the CENELEC European Standards. They are M18 cylindrical sensors offered in either Light ON or Dark ON modes depending on the detection distance required. They are rated IP66 and offer short-circuit protection against failure.



## CX series

NPN model	CX-T3D	CX-M2RD	CX-R01	CX-R03V
PNP model	CX-T3DPN	CX-M2RDPN	CX-R01PN	CX-R03VPN
Detection method	Through beam	Polarized retroreflective	Diffuse reflective	
Detecting distance	3m	2m	100mm	300mm
Power supply	12 to 24VDC ±10%, Ripple 10% or less			
Output mode	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less.			
	PNP model : PNP open collector output, Source current 100mA (30VDC) or less.			
Operation mode	Dark ON		Light ON	
Response time	0.35ms or less			



## U-SHAPED EMBEDDED AMPLIFIER PHOTO SENSORS

The PU/AS series are U-Shaped Embedded Amplifier sensors for various applications like hole counting, edge detection or sensing objects on a conveyor. AS-U30M has a metal housing rated IP67 usable in adverse environment.



## PU/AS series

Through beam

NPN model		PU5	PU10	AS-U20	AS-U20D	AS-U25	AS-U25D	AS-U30	AS-U30D	AS-U30M	
PNP model		—	—	AS-U20PN	AS-U20DPN	AS-U25PN	AS-U25DPN	AS-U30PN	AS-U30DPN	AS-U30MPN	
Detecting distance		5mm fixed	10mm fixed	19mm fixed	25mm fixed	30mm fixed					
Power supply		12 to 24VDC ±10%, Ripple 10% or less									
Output mode	NPN model	NPN open collector Sink current 100 mA (30 VDC) or less	Current output Sink current 75 mA (48 VDC) voltage output Output impedance: 4.7 kΩ	NPN open collector Rating: sink current 100mA (30VDC) or less							
	PNP model	—		PNP open collector Rating: sink current 100mA (30VDC) or less							
Operation mode		Light ON/ Dark ON (2 outputs)			Light ON	Dark ON	Light ON	Dark ON	Light ON	Dark ON	Light ON/ Dark ON selectable
Response time		200us or less	50us or less	0.35ms or less			0.5ms or less				





## DN-S10R /DN-S30

### OPTICAL DISTANCE ADJUSTMENT BACKGROUND SUPPRESSION PHOTO SENSORS

The DN-S series of Background Suppression sensors offer a triangular measurement technology that protects against stains or dirt adhering to the lens and ensures accurate detection regardless of the type of objects or background. They are rated IP67 and the reinforced mounting design provides durability in the most rugged environments. All sensors include mounting brackets and are offered in either NPN or PNP model.

<b>NPN model</b>	DN-S10R	DN-S10R-J	DN-S30R	DN-S30
<b>PNP model</b>	DN-S10RPN	DN-S10RPN-J	DN-S30RPN	DN-S30PN
<b>Detecting distance</b>	10 to 100mm		30 to 300mm	
<b>Power supply</b>	12 to 24VDC ±10%, Ripple 10% or less			
<b>Output mode</b>	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less.			
	PNP model : PNP open collector output, Source current 100mA (30VDC) or less.			
<b>Operation mode</b>	Light ON / Dark ON selectable			
<b>Response time</b>	0.5ms or less			
<b>Connection</b>	Attached cable: 2m	M8 4pin connector	Attached cable: 2m	



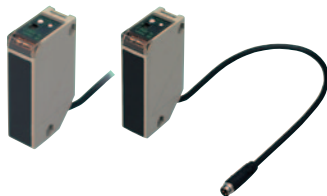
## DL-S series

(Short/medium range)

### BACKGROUND SUPPRESSION PHOTO SENSORS

The DL-S series are Background Suppression sensors with distance convergent beams for application between 10 to 200mm, in RED or IR LED versions. Units are equipped with Self Check Feature (NPN type only) to prevent unnecessary machine shutdown and IP67 rated housing for wash-down environment.

Type	Short range						Medium range				
NPN model	DL-S3R	DL-S4R	DL-S5R	DL-S3	DL-S4	DL-S5	DL-S10R	DL-S10	DL-S15	DL-S20R	DL-S20
PNP model	DL-S3RPN	DL-S4RPN	DL-S5RPN	DL-S3PN	DL-S4PN	DL-S5PN	DL-S10RPN	DL-S10PN	DL-S15PN	DL-S20RPN	DL-S20PN
Detecting distance	10 to 30mm	10 to 40mm	10 to 50mm	10 to 30mm	10 to 40mm	10 to 50mm	10 to 100mm	10 to 150mm	10 to 150mm	10 to 200mm	10 to 200mm
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less										
control	NPN										
output	NPN open collector Rating: sink current 100mA (30VDC) or less.										
stability	PNP										
output	PNP open collector Rating: source current 100mA (30VDC) or less.										
stability	NPN										
output	NPN open collector Rating: sink current 30mA (30VDC) or less.										
Operation mode	Not available										
Response time	Light ON/ Dark ON selectable (with switch)										
	0.35ms or less										



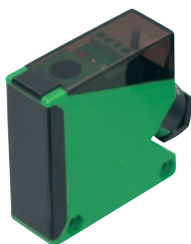
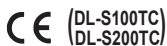
## DL-S100R /DL-S202

(Long range)

### BACKGROUND SUPPRESSION PHOTO SENSORS

The DL series are long distance Background Suppression sensors equipped with two segment photo diode which enables the sensors to be less susceptible to the color or material of detection objects. The sensors have NPN and PNP dual outputs with a selectable switch of Light ON or Dark ON modes and are offered with either a red or an infrared light source.

Model	DL-S100R	DL-S100R-J	DL-S202R	DL-S202	DL-S202-J
Detecting distance	0.2 to 1m		0.2 to 2m		
Power supply	12 to 24VDC ±10%, Ripple 10% or less				
Output mode	NPN/PNP open collector Dual output, Sink current (NPN), Source current (PNP) 100mA (30VDC) or less.				
Operation mode	Light ON/ Dark ON selectable				
Response time	2ms or less				
Light source	Red LED (650nm)			Infrared LED (880nm)	



## DL-S100<sup>TC</sup>/<sub>P</sub> /DL-S200<sup>TC</sup>/<sub>P</sub>

(Long range)

### BACKGROUND SUPPRESSION PHOTO SENSORS

DL-S100TC/200TC and DL-S100P/200P are long distance Background Suppression sensors with terminal block connection to cover 1m and 2m respectively. DL-S100TC/200TC has NPN/PNP dual outputs with 12 to 24VDC power supply. DL-S100P/200P has 1a relay output with a universal AC/DC power supply. Light ON/Dark ON selectable switch is equipped with the both models.

Type	Long distance (with terminal block connection)			
	Open collector output		Relay output (AC/DC power supply type)	
Model	DL-S100TC	DL-S200TC	DL-S100P	DL-S200P
Detecting distance	0.2 to 1m	0.2 to 2m	0.2 to 1m	0.2 to 2m
Power supply	12 to 24VDC ±10%, Ripple 10% or less		24 to 240VAC / DC ±10% 50/60Hz	
Output mode	NPN/PNP open collector dual outputs Rating: current 100mA (30VDC) or less *2		Relay output 1a 3A 250V 750VA AC or less resistive load 3A 30V 90W DC or less resistive load	
Operation mode	Light ON/Dark ON selectable (with switch)			
Response time	10ms or less		20ms or less	



### PASSIVE TYPE COLOR SENSORS

The CS-R80 and CST-R80 series are Passive type Color Recognition sensors. Colors of the received light are identified by a comparator for the three primary colors; red, green and blue. Models are either NPN or PNP. The CST series is also equipped with two separate outputs for RGB composition and brightness. Both series of sensors offer a teaching mode for operation.

NPN model	CS-R80	CST-R80
PNP model	CS-R80PN	CST-R80PN
Detection method	RGB color composition (RGB light receiving element)	RGB color composition / Brightness (RGB light receiving element)
Resolution	0.1%	Color composition: 0.01%, Brightness: 0.1%
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less	
Output mode	NPN model : NPN open collector output, Sink current 50mA (30VDC) or less. PNP model : PNP open collector output, Source current 50mA (30VDC) or less.	
Operation mode	Conformity ON or OFF selectable	
Response time	0.5ms or less	

## CST-R80 /CS-R80

CE

### RGB COMPOSIT TYPE COLOR SENSORS

The CS-D3 series LED Color sensor is designed to discriminate a color of objects which is registered by teaching. It offers a 3-color memory bank and a changeover switch. Mix teaching enables to create a reference color zone which is defined by the maximum and the minimum color value learned through the teaching.

NPN model	CS-D3
PNP model	CS-D3PN
Detection method	Spectroscopy measurement by red/green/blue LEDs
Detecting distance	CS-DF10 : 13mm (10 to 16mm), CS-DF30 : 33mm (28 to 38mm)
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less
Output mode	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less. PNP model : PNP open collector output, Source current 100mA (30VDC) or less.
Differentiation factor	COL (color component) / C+Y (color component and brightness)
Response time	Normal (NML) mode: 1ms or less. Average value (AVE) mode: 5ms or less.

## CS-D3

CE

### LED TYPE MARK SENSORS WITH VARIOUS LIGHT SOURCES

The GR series are versatile Mark sensors offered in red, green, blue, white and ultraviolet light source models. They all have the Light ON/Dark ON feature by means of a selectable switch on the sensor. The ultraviolet version is used in applications for detecting fluorescent marks. The sensor is also rated IP67 for wash-down environments.

NPN model	GR12RSN	GR12RN	GR12GSN	GR12GN	GR12BSN	GR12WSN	GR40RN	GR60RN	GR100R	GR12UVS
PNP model	GR12RSN-PN	GR12RN-PN	GR12GSN-PN	GR12GN-PN	GR12BSN-PN	GR12WSN-PN	GR40RN-PN	GR60RN-PN	GR100RPN	GR12UVSPN
Light source (wavelength)	RedLED (680nm)		GreenLED (525nm)		BlueLED (470nm)	WhiteLED	RedLED (660nm)		UltravioletLED (375nm)	
Detection method	Convergent reflective									
Detecting distance	12mm ± 2mm					20 to 70mm	30 to 90mm	30 to 120mm	12mm ± 2mm	
Power supply	12 to 24VDC ±10%, Ripple 10% or less									
Output mode	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less.									
	PNP model : PNP open collector output, Source current 100mA (30VDC) or less.									
Operation mode	Light ON/ Dark ON selectable									
Response time	0.5ms or less									

## GR series

CE

### U-SHAPED MARK SENSOR

The MC series is a U-Shaped Mark sensor offered in red, blue or green light source models. It stably detects register marks without damaging the work sheet by a lens with a large radius of convex curvature. There is an NPN version and also an NPN/PNP version that has two distinct outputs. All models have the Light ON/Dark ON feature by means of an external selectable switch on the sensor. It has an easy-to-use multi-tune potentiometer and the sensor is rated IP67 for wash down environments.

Model	MC-U2R	MC-U2G	MC-U2B	MC-U2RTC	MC-U2GTC	MC-U2BTC
Detection method	U-shaped through beam					
Detecting distance	2mm					
Power supply	12 to 24VDC ±10%, Ripple 10% or less					
Output mode	NPN open collector output, Sink current 100mA (30VDC) or less.			NPN/ PNP open collector Dual output, Sink current (NPN) Source current (PNP) 100mA (30VDC) or less.		
Operation mode	Light ON / Dark ON selectable with sliding switch.					
Response time	0.5ms or less					

## MC series

CE

**LD** series

### LASER TYPE EMBEDDED AMPLIFIER PHOTO SENSORS

The LD series of Laser sensors are offered in Through beam, Polarized retroreflective, Diffuse reflective and Convergent reflective types. These high-power laser sensors have long range detection and accuracy by means of a red laser. The easy adjustment by the red laser spot allows for accurate detection through narrow gaps or holes. All models have the Light ON/Dark ON switch selectable mode as standard.

NPN model	LD-T20R	LD-T20R-C1	LD-MX5R	LD-MX5R-C1	LD-M10R	LD-S20R
PNP model	LS-T20RPN	LD-T20RPN-C1	LD-MX5RPN	LD-MX5RPN-C1	LD-M10RPN	LD-S20RPN
Detection method	Through beam		Polarized retroreflective			Variable focus reflective
Detecting distance	20m		Depending on reflectors(Reflectors are optional)			30 to 300mm
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less					
Output mode	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less.					
	PNP model : PNP open collector output, Source current 100mA (30VDC) or less.					
Operation mode	Light ON / Dark ON selectable					
Response time	0.5ms or less					

Convergent reflective type (LD-S33R) is available. (Detecting distance: 200 to 400mm)

CE

**PF** series

### OIL RESISTANT AND CHEMICAL RESISTANT EMBEDDED AMPLIFIER PHOTO SENSORS

The PF series is an oil and chemical resistant Embedded Amplifier sensors with protective fluoroplastic covering. Units have strong resistance to most of oils and chemicals, and capable of immersed applications. The unit is available as 3m Through beam and 300mm Diffuse reflective models and an external sensitivity adjustment is provided separately.

Model	PF-T3DS	PF-T3S	PF-R03DS	PF-R03S
Detection method	Through beam		Diffuse reflective	
Detecting distance	3m		300mm	
Power supply	12 to 24VDC ±10%, Ripple 10% or less			
Output mode	NPN open collector output Sink current 100 mA, 30VDC or less			
Operation mode	Dark ON	Light ON	Dark ON	Light ON
Response time	0.35ms or less			

**NE** series

### ULTRA COMPACT AC/DC POWER SUPPLY PHOTO SENSOR

The NE series are Ultra Compact (18 x 55 x 35mm) Amplifier Embedded sensors with universal AC/DC power supply. Available in longest-in-class detecting distance of 30m/10m Through beam, 5m Polarized retroreflective and 1m Diffuse reflective models. 2m attached cable and 300mm pig tail types are available.

Model	Cable type	NE-T10R	NE-T10RD	NE-T30	NE-T30D	NE-M5R	NE-M5RD	NE-R10	NE-R10D
	Connector type	NE-T10R-J	NE-T10RD-J	NE-T30-J	NE-T30D-J	NE-M5R-J	NE-M5RD-J	NE-R10-J	NE-R10D-J
Detection method	Through beam					Polarization reflector		Diffuse-reflector	
Detecting distance	10m			30m		0.03-5m		1m	
Detection object	Opaque object of φ20 min.					Mirror-like objects, opaque objects		Opaque objects, translucent objects	
Power supply	AC/DC24 to 240V ±10% 50/60Hz								
Output mode	Cable type	Relay output 1c 1A 250V AC / 30V DC or less resistive load							
	Connector type	Relay output 1c 1A 250V AC / 30V DC or less resistive load							
Operation mode	Light ON	Dark ON	Light ON	Dark ON	Light ON	Dark ON	Light ON	Dark ON	
Response time	5ms or less								

CE

**NA** series

### FULL OPEN TERMINAL BOARD AC/DC POWER SUPPLY PHOTO SENSORS

The NA series of Embedded Amplifier sensors are equipped with universal AC/DC power supply and full open terminal board. 20/30m Through beam, 0.03 to 7m Polarized retroreflective and 1m Diffuse reflective models are available. Multifunctional timer version is also available for each model. One shot, real time, ON delay and OFF delay output can be selected and the timer is adjustable between 0.1 to 5 seconds. All models have the Light ON/Dark ON selectable switch as standard.

Models	NA-T30	NA-T20R	NA-M7R	NA-R10	NA-T30F	NA-T20RF	NA-M7RF	NA-R10F
Detection method	Through Beam		Polarized Retroreflective	Diffuse reflector	Through Beam		Polarized Retroreflective	Diffuse reflector
Detecting distance	30m	20m	0.03 to 7m (with reflector model k-7)	1m (200×200mm white drawing paper)	30m	20m	0.03 to 7m (with reflector model k-7)	1m (200×200mm white drawing paper)
Power supply	24 to 240VAC/DC ± 10% 50/60Hz							
Output mode	Relay output 1a / Ratin: 3A 250VAC or less 30VDC or less: resistive load							
Operation mode	Light ON/ Dark ON Selectable				Light ON/ Dark ON Selectable Timer function selectable			
Response time	10ms or less							

CE


**LS** series

**LIQUID LEVEL SENSOR  
FOR THIN DIAMETER  
PIPES**

The LS series is a Liquid Level sensor specially designed for thin diameter pipes from 1.6 to 2.6mm in diameter. It detects presence/non-presence of a liquid in a thin pipe or tube to control medical equipment, analyzers, dispensers or tube pumps. Compact size and easy setting facilitate built-in application. The sensor is offered in either NPN or PNP output model and also Light ON or Dark ON operation mode.

NPN model	LS-24L	LS-24D	LS-5L	LS-5D
PNP model	LS-24LP	LS-24DP	LS-5LP	LS-5DP
Detection method	Refractive index differential			
Detection object	Liquid (transparent) / colored liquid may not be detected.			
Power supply	12 to 24VDC ±10%, Ripple 10% or less		5VDC ±10%, Ripple 5% or less	
Output mode	NPN model : NPN open collector output, Sink current 80mA (30VDC) or less.			
	PNP model : PNP open collector output, Source current 80mA (30VDC) or less.			
Operation mode	Light ON	Dark ON	Light ON	Dark ON
Response time	0.5ms or less			

CE


**DX-S35F  
/DX-S33C**
**PHASE DIFFERENTIAL  
DETECTION  
BGS SENSOR**

The DX-S series of sensors measure distance with a Phase Differential system which uses a comparator algorithm to detect time lag between emission and reflection with high accuracy up to 3m. 4 units can be connected together without interference. The sensor offers a high degree of freedom because of the wide detection area capability through means of a setting function. The sensor is offered in Light ON mode only.

Model	DX-S35F	DX-S35F-Y5	DX-S33C	DX-S33C-Y5
Detection method	Reflective / Phase differential detection			
Detecting distance	0.1 to 3m (300×900mm white paper)			
Power supply	12 to 24VDC ±10%, Ripple 10% or less			
Number of optical zones	5 zones with area setting function		3 zones (w/o area setting)	
Output mode	PhotoMOS output (short circuit protection) load current 50mA (30VDC) or less			
Operation mode	Light ON			
Response time	ON:0.1s OFF:0.3s or less			


**DX-S400  
/DX-S300W**
**PRESENCE/ MOTION  
DETECTION SENSOR**

DX-S400/300 ceiling mount sensors make use of Phase Differential detection technology and detect presence of a car or another objects by measuring the distance to the object. Units assure reliable car detection without being affected by the color or shape of the car. Two detection modes, Presence and Motion Detection modes are available and teaching/setting can be done by a remote controller sold separately. Flexible installation is possible with the mutual interference prevention function.

Model	DX-S400	DX-S400L	DX-S300W
Installation height	1 to 4m		1 to 3m
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less		
Output mode	Relay output 1c, Rating: 0.5A (Resistive load 30VDC or less)		
Operating mode	Presence mode, Motion detection mode selectable		
Response Time	Presence mode: 10.5s or less when LONG is selected		Motion detection mode: 0.2s or less when SHORT is selected

**PHASE DIFFERENTIAL  
DISTANCE DETECTION**

DX-7AH provides Phase Differential, analog distance measurement with integral 4 to 20mA and comparator outputs. The unit has 3 teaching modes, One-point/Two-points normal and One-point zone teaching for wide variety of detecting situations. It covers 0.5 to 7.5m long range.


**DX-7AH**

Model	DX-7AH	
Detection method	Diffuse reflective phase differential detection	
Detecting distance	0.5 to 7.5m	
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less	
Analog output	Current output	4 to 20mA (allowable resistive load: 250 $\Omega$ or less)
	Resolution	$\pm 5\%$ F.S. or less
	Linearity	10% F.S. or less
	Response frequency	Approx. 20Hz
Comparator output	Output mode	NPN open collector Sink current: 50mA (30VDC) or less, Residual voltage: 2V or less
	Response frequency	Approx. 20Hz
	Mode switching	Light ON/Dark ON selectable
	Circuit protection	Provided (load short circuit)

CE



## ASW-SG series

### WAFFER DETECTION SENSORS

The ASW-SG series of Wafer Mapping sensors detect silicon sapphire, silicon and other translucent wafers and are offered in 6, 8 and 12 inch models. Equipped with two detection modes the sensor is capable to detect the latest high transmittance wafers (8 and 12 inch models). The units are electrostatic malfunction free as the comb (sensor) unit contains only optical structures. Each comb can be replaced in a single operation.

Model	ASW-SG625AP	ASW-SG85F	ASW-SG85F-Y05	ASW-SG86F	ASW-SG86F-Y05	ASW-SG125VF
Detection method	Through beam					
Detecting distance	4.76mm	6.35mm				10mm
Number of channels	25ch	25ch		26ch		25ch
Power supply	24VDC $\pm 10\%$ , Ripple 10% or less					12 to 24VDC $\pm 10\%$ , Ripple 10% or less
Output mode	NPN open collector output Rating, Sink current 20mA (30 VDC) or less					NPN, 30mA (30 VDC) or less
Operation mode	Dark ON ON at error output	Dark On Normal output mode/ latch output mode selectable (with switch)				
Response time	12ms or less					35ms or less

CE



## ASG series

### EMBEDDED AMPLIFIER PHOTO SENSORS FOR GLASS OR TRANSPARENT OBJECT DETECTION

The ASG Series of photoelectric sensors are thin (4mm) Embedded Amplifier sensors for the use of detecting glass or transparent objects. These sensors reliably detect glass deformed by its own weight and are most ideal for end-effector robotic applications. They are offered in Light ON mode only as well as either NPN or PNP model.

NPN model	ASG-S20R	ASG-S20RV	ASG-Z15R	ASG-Z15RV
PNP model	ASG-S20RPN	ASG-S20RVPN	ASG-Z15RPN	ASG-Z15RVPN
Detection method	Diffuse reflective sensor for glass detection		Convergent reflective sensor for glass detection	
Detecting distance	Transparent glass 20mm or less.		Transparent glass 3 to 15mm or less.	
Power supply	12 to 24VDC ±10%, Ripple 10% or less			
Output mode	NPN model : NPN open collector output, Sink current 50mA (30VDC) or less.			
	PNP model : PNP open collector output, Source current 50mA (30VDC) or less.			
Sensitivity adjustment	—	Provided	—	Provided
Response time	0.5ms or less			

CE



## GA-MT1R

### TRANSPARENT CONTAINER(PET) DETECTION

GA-MT1R is specifically tuned to sense and control thin clear films and PET bottles at a high rate of speed. The sensor makes use of the latest technologies to provide for one push-button operation and setup.

NPN model	GA-MT1R
PNP model	GA-MT1RPN
Detection method	Retroreflective
Detecting distance	0.1 to 1m (with K-MT4 reflector)
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less
Output mode	NPN model : NPN open collector output, Sink current 50mA (30VDC) or less. PNP model : PNP open collector output, Source current 50mA (30VDC) or less.
Operation mode	Light ON / Dark ON
Response time	1ms or less

### HEAVY-DUTY SENSOR WITH ANALOG OUTPUT

IR3AN is an Analog Output sensor with a heavy-duty zinc die-cast housing. The sensor has a 1 to 8V analog output for various linear control.



## IR3AN

Model	IR3AN
Detection Method	Diffuse Reflective
Detecting Distance	40 to 300mm (100×100mm White paper)
Power Supply	12 to 24VDC $\pm 5\%$ , Ripple 2% or less
Operation mode	Voltage output in proportion to reflective light intensity
Output mode	Effective voltage range : 1 to 8V ; NPN emitter follower Rating: Outflow current 3mA or less
Slew Rate	1V / ms or less
Temperature Drift	0.15% / °C or less
Output Ripple	80mV or less



CE


**USA** series

### ULTRASONIC SENSORS

The USA series Ultrasonic distance/object detectors are designed for durability, accurate repeatability, easy setup and low maintenance. The sensor is capable of long distance measurement up to 6m and has analog output with high resolution 12-bit D/A converter. Self-diagnostics and push-button setup provide a quick installation. Accessories include elbow wave guide for those hard to reach areas. The sensor has a 4 to 20mA analog output and standard M12 connector cable interface.

Model	USA-S1AN	USA-S3MAN	USA-S6AN
Detection method	Ultrasonic reflective		
Detecting distance	0.1 to 1m	0.4 to 3m	0.4 to 6m
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less		
Output mode	Analog: 4 to 20mA current output (applicable load: 0 to 250 $\Omega$ ), (converted into voltage output (1 to 5V) with the resistor (250 $\Omega$ ) provided.)		
Minimum resolution	0.9mm (0.1%F.S.)	2.6mm (0.1%F.S.)	5.6mm (0.1%F.S.S.)
Response time	150ms or less	300ms or less	600ms or less

CE


**US-S25AN**

### ULTRASONIC SENSORS

US-S25AN is a low cost and versatile miniature Ultrasonic sensor with an analog output. It has handy M18 cylindrical housing, ensures easy alignment with sharp and narrow view, and covers 60 to 250mm detection range.

Model	US-S25AN
Detection method	Ultrasonic reflective
Detecting distance	60 to 250mm
Power supply	24VDC $\pm 10\%$ , Ripple 10% or less
Output mode	Voltage output in proportion to distance, 60mm: 2.4V $\pm 0.5V$ , 250mm: 10.0V $\pm 0.5V$
Indicator	Not provided
Response time	10 $\rightarrow$ 2 V: 30 ms or less / 2 $\rightarrow$ 10 V: 300 ms or less

CE


**US-U30AN**

### U-SHAPE ULTRASONIC SENSOR FOR EDGE DETECTION

US-U30AN is an Edge Detection Ultrasonic sensor. Ultrasonic ensures precise edge detection regardless of the color or transparency of the work film/paper. Easy installation and no controller required. Position is proportional to standard analog 1 to 5V signal. Fixed 30mm detecting distance.

Model	US-U30AN
Detection method	U-shaped Ultrasonic through
Detecting distance	30mm fixed
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less
Output mode	Analog output (1V to 5V within output voltage range, otherwise 6V or less) allowable load resistance : 10k $\Omega$ or more *1
Indicator	Output level indicator : five steps depending on the output voltage (green LED)
Operation mode	Light ON / Dark ON
Response time	1ms or less

CE


**US-T50  
/US-R25**

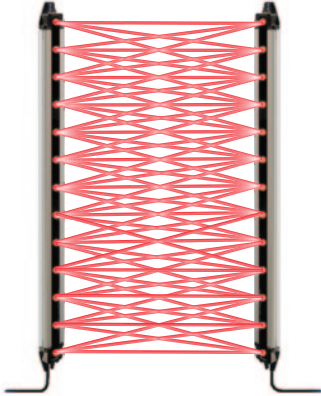
### MICROMINIATURE ULTRASONIC SENSORS

US-T50(PN)/R25(PN) are Ultrasonic sensors embedded in a conventional sensor housing. The units reliably detect transparent films, bottles or PETs. The sensors are offered in Through and Reflective types and also NPN and PNP output versions.

NPN model	US-T50	US-R25
PNP model	US-T50PN	US-R25PN
Detection method	Through	Reflective
Detecting distance	500mm	60 to 250mm
Power supply	24VDC $\pm 10\%$ , Ripple 10% or less	
Output mode	Rating: Sink current 100mA (30VDC) or less	
	Rating: Source current 100mA (30VDC) or less	
Indicator	Operation indicator (red LED) / Stability indicator (green LED)	
Operation mode	ON at deafened	ON at hearing
Response time	10ms or less	ON: 30ms or less / OFF: 50ms or less

### ULTRA-THIN FACE MOUNT TYPE LIGHT CURTAIN SENSORS

The SSXU20 series is a Face Mount type Light Curtain sensor with a 20mm optical pitch having a ultra-thin 9.9mm aluminum housing. The sensor offers the Cross Beam mode in which small objects (down to 15mm in diameter) or sheet like objects can be detected. A single light beam is monitored by five light receiving elements in the Cross Beam mode and it creates dense detection area. The detection mode is switchable to conventional Parallel Beam mode which allows double stacking detection creating wider protection area by Mutual Interference Prevention function. SSXU20 provides a 4m detection distance with eight detection width models from 160mm to 720mm. Both NPN and PNP outputs are available.

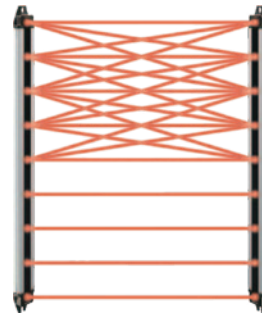


Model	SSXU20-T160	SSXU20-T240	SSXU20-T320	SSXU20-T400	SSXU20-T480	SSXU20-T560	SSXU20-T640	SSXU20-T720
Detection method	Through beam							
Detection distance	Parallel beam mode: 0 to 4m				Cross beam mode: 0.5 to 4m			
Detection target	Parallel beam mode: Opaque $\phi 25$ mm or more				Cross beam mode: Opaque $\phi 15$ mm or more			
Optical axis interval	20mm							
Number of optical axes	9	13	17	21	25	29	33	37
Detecting width	160mm	240mm	320mm	400mm	480mm	560mm	640mm	720mm
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10%							
Output mode	NPN/PNP Open collector output (Output selectable) Load current: 50mA (30VDC) or less Residual voltage: 2V or less							
Operation mode	Light ON: Activated when beams of all optical axes are received (Deactivated when a beam of any optical axis is blocked).							
Response time	Parallel beam mode: 20ms or less when light blocked, 30ms or less if when light received. Cross beam mode: 30ms or less when light blocked, 50ms or less if when light received.							

■ Ultra-thin body



■ Cross beam and Parallel beam modes



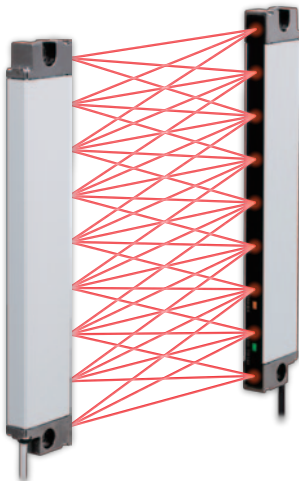
**Cross beam mode**  
(up to five receivers covered)  
Smaller items are detectable.  
Minimum detection object:  
 $\phi 15$  mm or more

**Parallel beam mode**  
(one-to-one relationship)  
Conventional method enabling  
our mutual interference  
prevention function  
Minimum detection object:  
 $\phi 25$  mm or more

**SSXU20** series

### ULTRA-THIN SIDE MOUNT TYPE LIGHT CURTAIN SENSORS

The SSX20 series is a Side Mount type Light Curtain sensor with a 20mm optical pitch having a slim and square 12mm x 30mm aluminum body. The optical window located on the side edge enables flexible installation such like long and narrow spaces where Face Mount type Light Curtains are difficult to fit. The sensor offers the Cross Beam and the Parallel Beam modes. SSX20 provides a 4m detection distance with eight detection width models from 160mm to 720mm. Both NPN and PNP outputs are available.



Model	SSX20-T160	SSX20-T240	SSX20-T320	SSX20-T400	SSX20-T480	SSX20-T560	SSX20-T640	SSX20-T720
Detection method	Through beam							
Detecting distance	Parallel beam mode: 0 to 4m				Cross beam mode: 0.5 to 4m			
Detecting object	Parallel beam mode: Opaque $\phi 25\text{mm}$ or more				Cross beam mode: Opaque $\phi 15\text{mm}$ or more			
Optical axis interval	20mm							
Number of optical axes	9	13	17	21	25	29	33	37
Detecting width	160mm	240mm	320mm	400mm	480mm	560mm	640mm	720mm
Power supply	12 to 24VDC $\pm 10\%$ , Ripple 10% or less							
Output mode	NPN/PNP Open collector output (Output selectable) Load current: 50mA (30VDC) or less Residual voltage: 2V or less							
Operation mode	Light ON: Activated when beams of all optical axes are received (Deactivated when a beam of any optical axis is blocked).							
Response time	Parallel beam mode: 20ms or less when light blocked, 30ms or less when light received. Cross beam mode: 30ms or less when light blocked, 50ms or less when light received.							

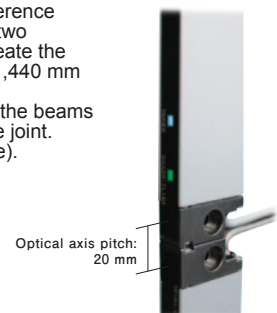
■ Mutual interference prevention

The mutual interference prevention function allows wider detection area by the sensors stacked or arranged in parallel beam mode.



■ Maximum 1440 mm of detection width by stacking two sensors

By the mutual interference prevention function two stacked sensors, create the 20 mm pitch and a 1,440 mm wide detection area. Optical axis pitch of the beams remain 20 mm at the joint. (Parallel beam mode).



**SSX20** series

CE



## ESN series

Through beam

### ULTRA THIN LIGHT CURTAIN SENSORS

The ESN series of Light Curtain sensors have high intensity red LED indicator that offers superb visibility. Four types of detection width, 140, 220, 300 and 380mm, are available in a thin (13 x 30mm) housing. The sensors have 20mm beam interval and objects as small as 30mm in diameter can be detected.

NPN model		ESN-T8	ESN-T12	ESN-T16	ESN-T20
PNP model		ESN-T8PN	ESN-T12PN	ESN-T16PN	ESN-T20PN
Power supply		12 to 24VDC ±10%, Ripple 10% or less			
Detecting distance		5m			
Detection object		φ30mm or more			
Optical axis interval		20mm			
Number of optical axes		8	12	16	20
Detecting width		140mm	220mm	300mm	380mm
Output mode	NPN	Open collector output Rating : Sink current 100mA (30VDC) or less			
	PNP	Open collector output Rating : Source current 100mA (30VDC) or less			
Operation mode		Activated when light beams of all axes are received (deactivated when light beam of any axis is blocked)			
Response time		7ms or less			

cULus  
CE



## SSC-T800 series

Through beam

### SEQUENTIAL ARRAY SCANNING LIGHT CURTAIN SENSORS

The SSC-T800 series Light Curtains for the detection and counting of small items use a sequential array scanning to insure that the light beams intersect with objects as small as  $\phi 6\text{mm}$ . The units have integral non-wired synchronization circuits to reduce the wiring and installation cost.

<b>NPN model</b>	SSC-T801	SSC-T802	SSC-T804	SSC-T805	SSC-T850	SSC-T810	SSC-T815	SSC-T830	SSC-T835
<b>PNP model</b>	SSC-T801PN	SSC-T802PN	SSC-T804PN	SSC-T805PN	SSC-T850PN	SSC-T810PN	SSC-T815PN	SSC-T830PN	SSC-T835PN
<b>Power supply</b>	12 to 24VDC ±10%, Ripple 10% or less								
<b>Detecting distance</b>	100 to 500mm	0.4 to 1.2m	0.5 to 2m	100 to 500mm	150 to 800mm			0.5 to 2.5m	
<b>Detection object</b>	Opaque Φ6mm or more	Opaque Φ8mm or more	Opaque Φ15mm or more	Opaque Φ12.5mm or more	Opaque Φ17mm or more	Opaque Φ11mm or more	Opaque Φ20mm or more	Opaque Φ13mm or more	Opaque Φ22mm or more
<b>Optical axis interval</b>	5.55mm		12.5mm		16.6mm	11mm	20mm	11mm	20mm
<b>Number of optical axes</b>	10		5		10		6	10	6
<b>Detecting width</b>	50mm				150mm	100mm			
<b>Output mode</b>	NPN model : NPN open collector output, Sink current 100mA (30VDC) or less.								
	PNP model : PNP open collector output, Source current 100mA (30VDC) or less.								
<b>Operation mode</b>	Activated when beams of all optical axes are received, deactivated when beam of any optical axis is blocked								
<b>Response time</b>	8ms or less		4ms or less		8ms or less				

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## SSP series

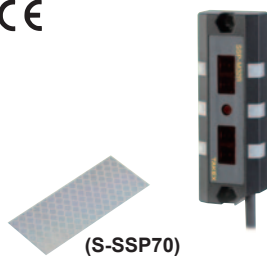
### LIGHT CURTAIN SENSORS FOR BIN-PICKING SYSTEM

The SSP series of Light Curtains are designed for Bin-Picking Systems. Slim 13mm design and 4 detection width are available for different size of part bins. Job indicator lights in green and red to warn mis-picking. Through Beam (SSP-T) and Reflective (SSP-S:Retroreflective/Diffuse reflective switchable) types are available.

Attached cable model	SSP-T205	SSP-T210	SSP-T213	SSP-T216	SSP-S204R	SSP-S208R
Cable with connector model	SSP-T205-PJ	SSP-T210-PJ	SSP-T213-PJ	SSP-T216-PJ	SSP-S204R-PJ	SSP-S208R-PJ
Detection method	Through beam				Retroreflective/Diffuse reflective selectable	
Detecting distance	4m				Retroreflective:2m or less Diffuse reflective : 700mm *1	
Power supply	12 to 24VDC ±10%, Ripple 10% or less					
Optical axis interval	25mm				-	
Number of optical axes	5	10	13	16	4	8
Detecting width	100mm	225mm	300mm	375mm	100mm	225mm
Output mode	NPN/PNP selectable load current 50mA(30VDC) or less				NPN/PNP selectable load current 50mA(30VDC) or less	
Operation mode	Normal open / Normal close selectable				Normal open/Normal close selectable	
Response time	35ms or less	68ms or less	70ms or less	94ms or less	120ms or less	

\*1 Diffuse reflective: 700mm (White drawing paper 300x300mm) 400mm (18% reflectivity gray card A4 size)

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## SSP-M32R series

### POLARIZED RETROREFLECTIVE BIN-PICKING LIGHT CURTAIN SENSOR

SSP-M32R is a Bin-picking sensor with 12mm super thin body designed for small part shelves. Single side wiring of the Polarized retroreflective type makes installation easier and cost effective. Green job indicator and red fault indicator are equipped to avoid mis-picks.

Model Name	SSP-M32R
Detection method	Polarized retroreflective
Detecting distance	60 - 300mm (S-SSP70 is used)
Number of optical axes	2
Detecting width	40mm
Power supply	12 - 24VDC $\pm 10\%$ Ripple 10% or less
Output mode	NPN open collector output, rating : sink current 100mA(DC30V) or less
Operating mode	Dark on



## SS10 series

Through beam

### SLIM TYPE LIGHT CURTAIN SENSORS BEAM INTERVAL :10MM

The SS10 series light curtains provide a 2 meter detection distance with a 10mm optical pitch and lengths up to 950mm. Anti-interference feature for parallel installation is available.

<b>NPN model</b>	SS10-T16	SS10-T24	SS10-T32	SS10-T48	SS10-T64	SS10-T80	SS10-T96
<b>PNP model</b>	SS10-T16-PN	SS10-T24-PN	SS10-T32-PN	SS10-T48-PN	SS10-T64-PN	SS10-T80-PN	SS10-T96-PN
<b>Power supply</b>	12 to 24VDC $\pm 10\%$ , Ripple 10% or less						
<b>Detecting distance</b>	2m						
<b>Detection object</b>	$\phi 17\text{mm}$ or more						
<b>Output mode</b>	<b>NPN</b>	NPN open collector (*) Rating: Sink current 100mA (30VDC) or less					
	<b>PNP</b>	PNP open collector (*) Rating: Source current 100mA (30VDC) or less					
<b>Indicator</b>	Transmitter: M/S indicator (red LED) / Power indicator (green LED) Receiver: Stable light reception indicator (green LED) / Operation indicator (red LED)						
<b>Operation mode</b>	A/O operation mode switchable A: ON only when receiving all optical axes (OFF when not receiving even one optical axis) O: ON when receiving at least one optical axis (OFF when receiving no optical axis)						
<b>Response time</b>	30ms or less						



## SS20 series

Through beam

### SLIM TYPE LIGHT CURTAIN SENSORS BEAM INTERVAL :20MM

The SS20 series light curtains provide a 7 meter detection distance with a 20mm optical pitch and lengths up to 940mm. Made-to-order versions are available for longer detection distance and optical length. Anti-interference feature for parallel installation is available.

NPN model		SS20-T8	SS20-T12	SS20-T16	SS20-T20	SS20-T24	SS20-T32	SS20-T40	SS20-T48
PNP model		SS20-T8-PN	SS20-T12-PN	SS20-T16-PN	SS20-T20-PN	SS20-T24-PN	SS20-T32-PN	SS20-T40-PN	SS20-T48-PN
Power supply		12 to 24VDC ±10%, Ripple 10% or less							
Detecting distance		7m							
Detection object		φ32mm or more							
Output mode	NPN	NPN open collector (*) Rating: Sink current 100mA (30VDC) or less							
	PNP	PNP open collector (*) Rating: Source current 100mA (30VDC) or less							
Indicator		Transmitter: M/S indicator (red LED) / Power indicator (green LED) Receiver: Stable light reception indicator (green LED) / Operation indicator (red LED)							
Operation mode		A/O operation mode switchable A: ON only when receiving all optical axes (OFF when not receiving even one optical axis) O: ON when receiving at least one optical axis (OFF when receiving no optical axis)							
Response time		15ms or less							



## SS40 series

Through beam

### SLIM TYPE LIGHT CURTAIN SENSORS BEAM INTERVAL :40MM

The SS40 series light curtains provide a 7 meter detection distance with a 40mm optical pitch and lengths up to 920mm. Made-to-order versions are available for longer detection distance and optical length. Anti-interference feature for parallel installation is available.

NPN model		SS40-T4	SS40-T6	SS40-T8	SS40-T10	SS40-T12	SS40-T16	SS40-T20	SS40-T24
PNP model		SS40-T4-PN	SS40-T6-PN	SS40-T8-PN	SS40-T10-PN	SS40-T12-PN	SS40-T16-PN	—	SS40-T24-PN
Power supply		12 to 24VDC ±10%, Ripple 10% or less							
Detecting distance		7m							
Detection object		φ52mm or more							
Output mode	NPN	NPN open collector (*) Rating: Sink current 100mA (30VDC) or less							
	PNP	PNP open collector (*) Rating: Source current 100mA (30VDC) or less							
Indicator		Transmitter: M/S indicator (red LED) / Power indicator (green LED) Receiver: Stable light reception indicator (green LED) / Operation indicator (red LED)							
Operation mode		A/O operation mode switchable A: ON only when receiving all optical axes (OFF when not receiving even one optical axis) O: ON when receiving at least one optical axis (OFF when receiving no optical axis)							
Response time		7ms or less (4 to 24 optical axes), 15ms or less (26 to 48 optical axes)							



## SS80 series

Through beam

### SLIM TYPE LIGHT CURTAIN SENSORS BEAM INTERVAL :80MM

The SS80 series light curtains have 3 to 15 meter detection distance with a 80mm optical pitch and lengths up to 1,840mm. Anti-interference feature for parallel installation is available.

NPN model		SS80-T2	SS80-T4	SS80-T6	SS80-T8	SS80-T10	SS80-T12	SS80-T14	SS80-T16	SS80-T18	SS80-T20	SS80-T22	SS80-T24
PNP model		SS80-T2-PN	SS80-T4-PN	SS80-T6-PN	SS80-T8-PN	SS80-T10-PN	SS80-T12-PN	SS80-T14-PN	SS80-T16-PN	SS80-T18-PN	SS80-T20-PN	SS80-T22-PN	SS80-T24-PN
Power supply		12 to 24VDC ±10%											
Detecting distance		3 to 15m											
Detection object		φ92mm or more											
Optical axis interval		80mm											
Output mode	NPN	NPN open collector output Rating: sink current 100mA (30VDC) or less											
	PNP	PNP open collector output Rating: Source current 100mA (30VDC) or less											
Indicator		Transmitter: Power indicator (green LED) / M/S indicator (red LED) / Optical axis alignment indicator (green LED) Receiver: Operation indicator (red LED) / Stable light reception indicator (green LED) / Optical axis alignment indicator (green LED)											
Operation mode		A/O mode switching A mode: activated when beams of all axes are received (deactivated when beam of any axis is blocked) O mode: activated when beam of any axis is received (deactivated when beams of all axes are blocked)											
Response time		15ms or less											



### FIBER OPTIC HMD (HOT METAL DETECTOR) DUAL/SINGLE DIGITAL DISPLAY

The FD-A320/A300P series are HMD (Hot Metal Detector) which detect infrared energy radiated from heated materials such as steel or glass. Provided with two temperature modes the sensor covers wide temperature ranges from 350 to 1,300 degrees. FD-A320 series has a Dual Digital Display which indicates a threshold level and real time receiving light intensity. An analog output of 4 to 20mA proportional to receiving IR intensity is also equipped with FD-A320 and it achieves better traceability or line monitoring. FD-A300P is a simpler version of FD-A320 having a Single Digital Display for receiving light intensity. The both series offer various types of outputs to match any type of control equipment.

#### FD-A320 series

Model	FD-A320		FD-A320H	
Output type	Mini power relay output	PhotoMOS relay output	BESTACT <sup>(+)</sup> relay output	PhotoMOS relay output
Analog output	4 to 20 mA (Allowable resistive load : 0 to 500Ω, Response time: 4ms F.S. or less)			
Detection object temperature	LOW: 350 to 800°C HIGH: 490 to 1300°C The minimum temperature depends on the fiber optic cable.			
Power supply	100 to 240VAC +10%, -15% 50/60Hz			
Output rating	1c 250VAC 5A or less (Resistive load)	1a 250VAC 0.1A or less (Resistive load)	1c 220VAC 0.5A/ 110VDC 0.3A or less (Inductive load)	1a 250VAC/ DC 0.1A or less (Resistive load)
Operation mode	Light ON(output activated when light received)			
Response time	17ms or less	4ms or less	6ms or less	4ms or less

(+) BESTACT RELAY is a registered trademark of Yaskawa Controls Co., LTD.

#### FD-A300P series

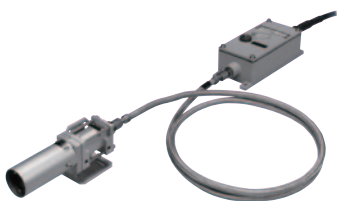
Model	FD-A300P	FD-A300PH	FD-A300PC	FD-A300PM
Output type	Mini power relay output	Signal relay output	Solid state output	Photo MOS relay output
Detection object temperature	LOW: 350 to 800°C HIGH: 490 to 1300°C The minimum temperature depends on the fiber optic cable.			
Power supply	100 to 220V AC +10%, -15% 50/60Hz			
Output rating	1c 5A 250VAC or less (Resistive load)	1c 0.5A 48VDC or less (Resistive load)	0.5A 250VAC/DC or less (Resistive load)	0.1A 100VAC/DC or less (Resistive load)
Operation mode	Light ON/Dark ON selector switch provided (DIP switch) Default setting: Light ON (output activated when light received)			
Response time	Approx. 15ms (17ms)	Approx. 5ms (7ms)	Approx. 5ms (7ms)	Approx. 4ms (6ms)

### FIBER OPTIC HMD 5 POINT INDICATOR

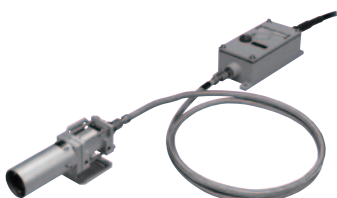
The FD300A/600A series are HMD (Hot Metal Detector) which detect infrared energy radiated from heated materials such as steel or glass. Simple 5-point indicator indicates real time received light intensity and offers easy monitoring of excess gain. The optical head integrating hood, optical head and fiber optic cable have no electronic component, which allows use in ambient temperature of up to 200C without cooling. Models for low temperature (FD300A) and medium/high temperature materials (FD600A) are available.

Model	FD-300A FD-600A	FD300AH FD600AH	FD300AC FD600AC
Output mode	Mini power relay output	Signal relay output	Solid-state output
Control output	ON-OFF control (Light ON)		
Rating	1c 250VAC 5A or less (Resistive load)	1c 48VDC 0.5A or less (Resistive load)	250VAC/DC 0.5A or less (Resistive load)
Response time	15ms or less	5ms or less	3ms or less
SAFETY ALARM output	<div> <div>Power supply</div> <div>ON</div> <div>OFF</div> <div>Operation</div> <div>Abnormal</div> <div>Normal</div> <div>Output</div> <div>CLOSE</div> <div>OPEN</div> </div>		
Rating	Relay output 1a Rating: 250VAC 5A or less (Resistive load)		
Valid lens diameter	φ28mm (OHA, OHAN, OHAN10)		
Power Supply	100 to 220VAC+10%, -15% 50/60Hz		
Power consumption	10W or less		

## FD-A320 series

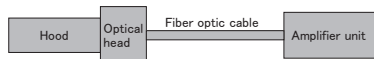


## FD-A300P series



## FD300A /FD600A series

#### Fiber type HMD



##### Airless hood

Appearance	Applicable optical head
Standard view F38A	OHA OHAN10 OHAN
Wide view F38W	OHW1 OHW2

##### Air purge hood

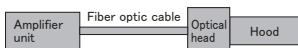
Appearance	Applicable optical head
Standard view F38PC-02	OHA
Wide view 302W	OHW1 OHW2

##### Optical head

Appearance	Appearance
Standard view	OHA
Narrow view	OHAN
Wide view	OHW1
Narrow view	OHAN10
Wide view	OHW2

Optical component that detects infrared radiation from heated material and condenses into fiber optic cable. Standard-, wide- and narrow-view types are available according to the intended detection field of view.

#### Fiber type CMD



##### Airless hood

Appearance	Applicable optical head
Standard view F38A	OHA
High-powered F70N	OH2 OH2N

##### Air purge hood

Appearance	Applicable optical head
Standard view F38PC-02	OHA
High-powered 702L	OH2 OH2N

Provided for prevention of soiling of optical head lens or protection from disturbing light. Choice between airless and air purge hoods is available.

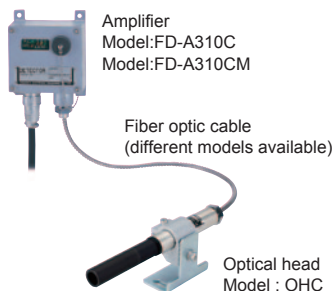
##### Optical head

Appearance	Appearance
Standard view	OHA
Wide view	OH2
Wide view	OH2N

##### Fiber optic cable

Appearance
FG

Light guide that transmits infrared ray captured with optical head into amplifier. Flexible tube with stainless steel braid is used as covering.



## FD-A310C series

### FIBER OPTIC HMD (HOT METAL DETECTOR) 3 POINT INDICATOR

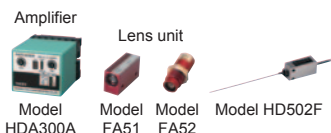
FD-310C series is a HMD (Hot Metal Detector) which performs basic functions at a low cost. The compact and lightweight amplifier and flexible heat resistant fiber optic cable are suitable to detect heated metal pieces or glass bottles in a process line. 3-point indicator for received light intensity is equipped. Relay output and Photo MOS relay output models are available.

Model	FD-A310C	FD-A310CM
Output mode	Relay output	Photo MOS relay output
Control output	ON-OFF output (Light ON / Dark ON selector switch provided)	
Rating	1c 5A 250VAC or less (Resistive load)	1a 80 mA 250VAC/DC or less (Resistive load) Saturation voltage = 1 V or less
Response time	10ms or less	5ms or less
Power Supply	100 to 220VAC +10% -15% 50/60Hz	
Power consumption	5W or less	

Low temperature model: 350 °C or more:  
Model HD301N  
Medium/high temperature  
model: 650 °C or more:  
Model HD601N



Model HD400+GT205



## HD series

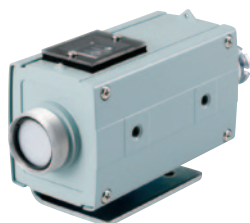
### SIMPLIFIED HMD

The HD series are simplified and cost effective Hot Metal Detectors (HMD). HD301N is designed to detect low temperature objects which have 350°C or more in the ambient temperature of 50°C or less. HD601N is designed to detect higher temperature objects that is 650°C or more in the ambient temperature of 70°C or less. HD400 is a fiber sensor which can be used in high temperature environment. HD502F has a thin fiber optic cable covered with φ1.1mm stainless tube and detects heated condition of a small spot area including electronic components or mechanical parts.

Type		Cable connection type		Fiber optic cable detachable type				Fixed fiber optic cable
Model	Fiber (length)	—		GT205 (50cm)	GT21 (1m)	GT22 (2m)	GT23 (3m)	70mm fixed
	Sensor	HD301N (low temperature)	HD601N (medium/high temperature)	HD400				HD502F
	Amplifier	HDA300A						
Detection object temperature (min)		350 °C	650 °C	430 °C	440 °C	460 °C	490 °C	560 °C
Power supply		100 to 110VAC•200 to 220VAC ±10%, 50/60Hz						
Output mode		Relay output, voltage output						
	Rating	Relay output: 1c 250VAC 5 A or less (resistive load) Voltage output 12VDC 5 mA or less						
Operation mode		Light ON (activated for presence of material) Timer operation selectable, external gating						
	Timer	On delay, off delay, one shot, timer disabled (ON/OFF)						
Response time		Relay output: 25ms; voltage output: 3ms						

### WATER COOLED HMD

KD150C is a compact and cost effective HMD (Hot Metal Detector) with high sensitivity to detect low temperature (150°C) steel materials. The sensor is one of the smallest of water cooled HMDs with embedded amplifier powered by 12 to 24 VDC. Built-in water cooling system enables the sensor to operate in high ambient temperature of 150°C. An analog output of 0 to 3V proportional to receiving light intensity is equipped besides an open collector output.



## KD150C

Model	KD150C
Power Supply	12 to 24VDC ± 10%
Current consumption	20mA or less
Output mode	Open collector output Rating: 100 mA (30 VDC) or less Hysteresis: Approx. 2 °C Analog output Operation amplifier voltage output 0-3 V (3 V at 300 °C)
Detection object temperature	150 °C or higher (iron oxide)
Effective lens diameter	φ28mm
Response time	0.5s

#### • Cooling water specification

Flow rate	2L/minute or more
Temperature	+10 to +35 °C
Withstand Pressure	0.3MPa

#### • Air purge specification (with optional part)

Flow rate	200L/minute or more
Withstand Pressure	1MPa

Air not required for use of airless dust hood.

### WATER COOLED HMD

The KD50 series is a compact and cost effective Hot Metal Detector (HMD) with embedded amplifier and water cooling system. The sensors directly detect infrared radiation from hot materials like metal ingots, slabs, steel plates or molds and generate an output. It detects 450°C or higher objects (standard steel material) and can be used at an ambient temperature of 150°C when the unit is water cooled. Two types detectim field of view, narrow and wide are available.



## KD50 series

Model	KD50	KD50W
Detection field of view	Narrow view	Wide view
Power Supply	100 to 110VAC, 200 to 220VAC ±10% 50/60Hz	
Output mode	Relay output	
Rating	1c 200VAC 0.5A or less resistive load	
Detection object temperature	450 °C or higher (standard steel)	
Operation mode	Light ON	
Response time	25ms or less	



## FT44A series

### FIBER OPTIC LASER CMD (COLD METAL DETECTOR)

The FT44A series is a Fiber Optic CMD (Cold Metal Detector) using high-powered laser that is over 3,000 times more powerful than standard LED technology. The robust optical head and fiber optic cable need no special cooling system in ambient temperature up to 200 °C. The 5-point level indicator offers easy beam alignment. Self check feature is provided for reliable operation.

Transmitter	FTL44A		FTL441A
Light source	Semiconductor laser 904nm, 90W or less (JIS C 6802 Class 1M)		Semiconductor laser 904nm, 10W or less (JIS C 6802 Class 1)
Receiver	FTR44A	FTR44AH	FTR44AC
Output type	Mini power relay output	Signal relay output	Solid state output
Detection method	Through beam		
Detecting distance	50m		
Power supply	100 to 220VAC +10%, -20% 50/60Hz		
Output mode	1c 250VAC 5A or less (Resistive load)	1c 48VAC 0.5A or less (Resistive load)	250VAC/DC 0.5A or less (Resistive load)
Operation mode	Light ON		
Response time	25ms or less	12ms or less	10ms or less



## FT10A series

### FIBER OPTIC CMD

The FT10A series is a Fiber Optic CMD (Cold Metal Detector) using a standard LED and covers 40m detection distance with 2m fiber cables. The robust optical head and fiber optic cable need no special cooling in an ambient temperature up to 200°C. The 5-point level indicator offers easy beam alignment. Self check feature is provided for reliable operation.

Transmitter	FTL10A				
Output	Relay output 1b    Rating: 5A 250VAC or less (Resistive load)				
Detecting distance	Fiber length	2m : 40 m 15m : 18 m	5m : 30 m 20m : 15 m	10m : 20 m 30m : 10 m	12m : 19 m
Receiver	FTR10A		FTR10AH	FTR10AC	
Power Supply	100 to 220VAC +10%, -15% 50/60Hz				
Output type	Mini power relay output		Signal relay output		Solid state output
Control output	ON-OFF operation (Light ON)				
Rating	1c 5 A 250VAC or less (resistive load)		1c 0.5 A 48VDC or less (resistive load)		0.5 A 250VAC/DC or less (resistive load)
Response time	15ms or less		5ms or less		3ms or less

### Ultra small detecting head

Fiber optic cable  
(different models available)

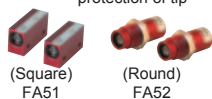
Optical head  
Model OHC



Transmitter: Model FT-L101  
Receiver: Model FT-R101

Transmitter and receiver as a set;  
dimensions are same for both

- For increased distance and protection of tip



Lens unit

## FT-101

### SIMPLIFIED FIBER OPTIC CMD

FT-101 is a Through beam type cost effective Fiber Optic CMD (Cold Metal Detector). 3-point level indicator offers easy checking of stability and light axis alignment. The transmitter is provided with light emission monitor circuit, which issues an alarm output when light emission stops due to failure. The sensor has a wide power supply range of 100 to 240 VAC.

Transmitter	FT-L101				
Light source	Infrared LED				
Output	Rating: 250VAC 2A or less (Resistive load)				
Detecting distance	Fiber	Only Fiber	on FA51/52	on OHC	on OHA
	GT205AD	0.55m	2.7m	22m	45m
	GT21AD	0.55m	2.7m	22m	45m
	GT22AD	0.5 m	2.5m	20m	40m
	GT23AD	0.45m	2.2m	18m	35m
	GT25AD	0.4 m	2.0m	16m	30m
	GT27AD	0.35m	1.8m	14m	27m
	GT210AD	0.3 m	1.5m	12m	25m
Receiver	FT-R101				
Output type	Relay output 1c				
Rating	250VAC 2A or less (Resistive load)				
Operation mode	Light ON / Dark ON (selectable with switch)				
Response time	20ms or less				
Power Supply	100 to 240 VAC ±10%, 50/60 Hz				
Power consumption	Transmitter: 2 W or less Receiver: 2 W or less				



## KL(R)50 series

### WATER COLD CMD

KL(R)50 series is a Through beam type cost effective CMD (Cold Metal Detector). One of the smallest of water cooled CMD with embedded amplifier achieves long detection distance of 50m with high sensitivity. Robust housing and built-in water cooling system enables the sensor to operate in high ambient temperature of 150C. Two types of outputs, relay and voltage outputs are available depending on the application.

Transmitter	KL50	
Receiver	KR50	KR50E
Detection method	Through beam	
Detecting distance	50m	
Power Supply	100 to 110VAC/200-220VAC±10% 50/60Hz	
Operation mode	Light ON	
Output mode Rating	Relay output 1c 200 VAC 0.5 A or less (resistive load)	Voltage output 10VDC 5mA or less
Smallest detection object	φ28mm	
Response time	25ms or less	5ms or less



## CN-T100MR

Through beam

**LONG DISTANCE  
M30 CYLINDRICAL TYPE  
EMBEDDED AMPLIFIER  
PHOTO SENSOR**

CN-T100MR is a 100m Through beam Embedded Amplifier sensor with M30 cylindrical metal housing and universal AC/DC power supply. Either 48 to 240VAC or 24 to 240VDC can be used as the power supply. The unit has 1a Photo MOS output, Dark ON operation and IP67 rated housing for harsh environment.

Transmitter	CN-TL100
Receiver	CN-TR100MR
Detecting distance	100m
Power supply	48 to 240VAC $\pm 10\%$ 50/60Hz 24 to 240VDC $\pm 10\%$ , Ripple 10% or less
Output mode	Photo MOS output 1a Rating : 250VAC / DC 50mA or less, resistive load
Operation mode	Dark ON
Response time	10 ms or less

CE  
(NT50  
NT100)



**COMPACT CMD**

The NT series are high-powered CMD having a compact and robust zinc die-cast housing which covers up to 100m. The unit is offered in either DC or AC powered models with a selectable switch of Light ON or Dark ON modes. The DC powered model has a self check function both for the transmitter and the receiver.

Model	Set	NT50	NT100	NT50P	NT100P
	Transmitter	NTL50	NTL100	NTL50P	NTL100P
	Receiver	NTR50	NTR100	NTR50P	NTR100P
Detection method		Through beam			
Detecting distance		50m	100m	50m	100m
Power Supply		12 to 24VDC ±10%, Ripple 10% or less		100 to 240VAC ±10%, 50/60Hz	
Output mode		NPN open collector output Rating: Sink current 200mA (30VDC) or less		Relay output 1c Rating: 250VAC 2A or less (resistive load)	
Indicator		(Transmitter) PL: Power indicator (green LED) ... Illuminated when power on OPL: Monitor indicator (red LED) ... Illuminated when emit light normally (Receiver) OPL: Operation indicator (red LED) ... Illuminated when output on LEVEL: Level indicator (three level display) LEVEL1: yellow LED illuminated when light intensity of about twice as much as operation level is detected. LEVEL2: yellow LED illuminated when light intensity of about four times as much as operation level is detected. LEVEL3: green LED illuminated when light intensity of about eight times as much as operation level is detected.			
Operation mode		Light ON/Dark ON (selectable with switch)			
Response time		5ms or less		20ms or less	

## NT-50 /NT-100 series



**PUNCH HOLE  
DETECTION SENSORS**

The SWD55/60 series of punch hole detectors are specially designed to detect (a) punch hole(s) bored on a steel sheet to indicate a joint and control the line speed. SWD55/60 have an effective detection width of 300 and 470mm respectively.

Model	SWD55	SWD60
Detection method	Through beam	
Detecting distance	400 to 1000mm	250 to 1000mm
Effective detecting width	300mm	470mm
Power Supply	100 to 110VAC or 200 to 220VAC	100, 110, 200 or 220VAC
Output mode	1c 250VAC 5A or less (resistive load) NPN open collector output	1c 250VAC 5A or less (resistive load) DUAL NPN open collector output
Operation mode	Light ON	
Response time	25ms or less	30ms or less

## SWD55 /SWD60 series



**CAUTION**

- This product is designed for industrial applications to detect a various kinds of objects. It has no function to prevent disasters, accidents, death or injuries.
- TAKEX will not held responsible for any damage or loss incurred due to accidents, faulty installation, abuse, misuse, improper maintenance or acts of God including lightning surge.
- This product can't be used as a safety equipment to protect human body.
- This product can't be used for usage or equipment that requires a high degree of reliability or considerable care or attention to safety.
- Carefully read the instruction manual attached to the product and use the product properly according to it.
- The specifications and dimensions in this catalog may be subject to change without notice.



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