Ultra-slim Photoelectric Sensor Amplifier Built-in

SERIES Ver.2

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Amplifier Built-in Power Supply Built-in separated

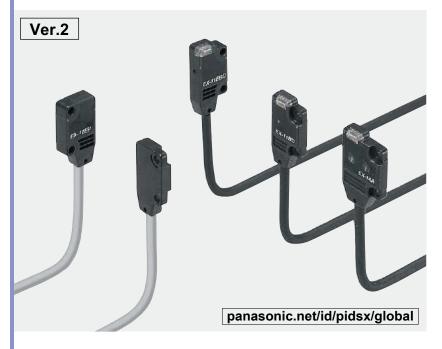
> EX-Z CX-400 CY-100

EX-10 EX-20 EX-30 EX-40 CX-440 **EQ-30** EQ-500 MQ-W

RX-LS200 RT-610

■ Glossary of terms / General precautionsP.1549~ / P.1552~

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Amplifier built-in extraordinarily small and slim size

Smallest body, just 3.5 mm 0.138 in thick

It can be mounted in a very small space as its size is just W10 × H14.5 × D3.5 mm W0.394 × H0.571 × D0.138 in (thru-beam, front sensing type).



Flexible mounting

The diffuse reflective type sensor is front sensing and is so thin that it gives an impression of being just pasted on the mounting base. The thru-beam type is available as front sensing type, as well as, side sensing type, allowing flexible mounting.

Thru-beam · Front sensing type



· Side sensing type



Diffuse reflective Front sensing type



A wide variety of narrow-beam type! Light diffusion is approx. 1/2 of standard type.

Less interference with no slit. narrow-pitch can be set.

The pitch of installation is 1/2 of conventional models, so that the close-installation is possible. No cost is necessary to purchase or install a slit.

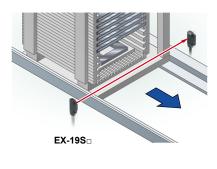
EX-11 - / EX-11E -EX-11S / EX-11SE Possible to sense a minute object less than Ø0.5 mm Ø0.039 in with no slit.

The series is applicable to sense a minute object without any cost.

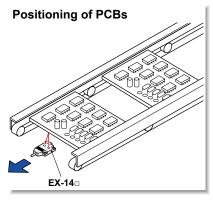
ø0.5mm EX-11S□

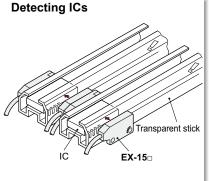
Long sensing range of 1 m 3.281 ft with narrow beam

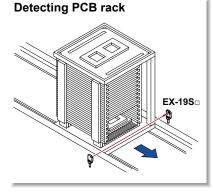
A long 1 m 3.281 ft sensing range is possible with narrow beam.

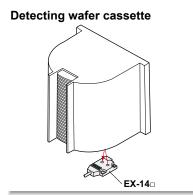


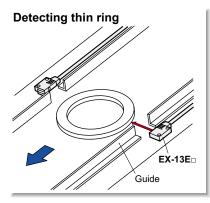
APPLICATIONS

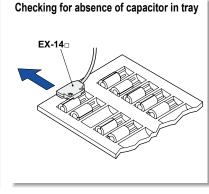










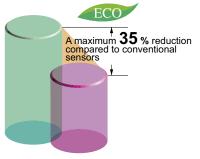


BASIC PERFORMANCE

Electric power saving *

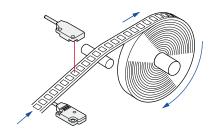
The **EX-10** series achieves reductions in power consumption of up to 65 %. These sensors contribute to environmental friendliness.

* Effective from production in October 2010.



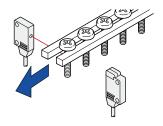
High-speed response time: 0.5 ms

The sensor is suitable for detecting small and highspeed traveling objects.



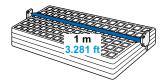
Minimum sensing object: ø1 mm ø0.039 in EX-11(E)□, EX-15(E)□

EX-11□, EX-11E□, EX-15 and EX-15E are incorporated with Ø1 mm Ø0.039 in slit masks so that Ø1 mm Ø0.039 in, or more, object can be detected. Hence, they are suitable for precise positioning or small parts detection.



Long sensing range: 1 m 3.281 ft EX-19(E)□

A sensing range of 1 m 3.281 ft has been realized with a slim size of just 3.5 mm 0.138 in. It can be used to detect even wide IC trays.

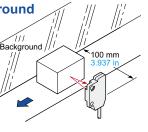


EX-14_□

Background suppression

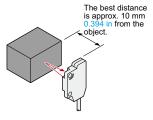
Hardly affected by background

Even a specular background separated by 100 mm 3.937 in, or more, is not detected. (However, the background should be directly opposite. A spherical or curved background may be detected.)



Black object reliably detected

It can reliably detect dark color objects since it is convergent reflective type.



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EX-Z

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EX-20

EX-30

EX-40 CX-440

EQ-30

EQ-500

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RX

RT-610

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RX-LS200 RX

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ENVIRONMENTAL RESISTANCE

Incorporated an inverter countermeasure circuit *

The **EX-10** series become significantly stronger against inverter light and other extraneous light.

* Effective from production in October 2010.



Waterproof IP67

The sensors features an IP67 rating to allow their use in process lines where water is used or splashed. Rust-resistant stainless steel sensor mounting brackets are available.

Note: If water splashes on the sensor during sensing operation, it may sense water as an object.

Bending durability

EX-□-R

Bending-resistant cable type **EX-**□-**R** is available. It is most suitable for moving parts, such as robot arm, etc.

MOUNTING / SIZE

Mountable with M3 screws

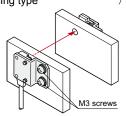
Non-corrosive stainless steel type sensor mounting bracket is also available.

MS-EX10-

[Cold rolled carbon steel (SPCC)]

MS-EX10-11

[Stainless steel (SUS304)] (mounting bracket for the front) (sensing type

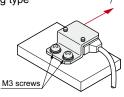


Note: Sensor mounting brackets can not be used for the narrow beam type (EX-□S□).

• MS-EX10-2 [Cold rolled carbon steel (SPCC)]

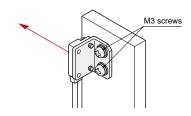
MS-EX10-12

[Stainless steel (SUS304)] (mounting bracket for the side sensing type



MS-EX10-3
[Cold rolled carbon steel (SPCC)]
 MS-EX10-13
[Stainless steel (SUS304)]

(L-shaped mounting bracket)



Red beam makes beam alignment easy

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

FUNCTIONS

Bright 2-color indicator

A convenient 2-color indicator has been incorporated in the miniature body.



OTHERS

October 2010.

Less resources used *

Based on environmental considerations, simplified packaging is used in order to reduce waste. In addition, the bag is made from polyethylene which produces no toxic gases even when burned. * Effective from production in

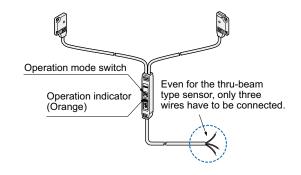


VARIETIES

Operation mode switch

EX-15_□/17_□

Thru-beam type sensor incorporated with an operation mode switch on the bifurcation is also available. It helps you to test the operability before start-up.



ORDER GUIDE

T				A	Operation and the	Model N	o.(Note 2)	Output	Outrot		
Ty		ре		Appearance	Sensing range	NPN output	PNP output	operation	Output		
					150 mm 5 000 in	EX-11A	EX-11A-PN	Light-ON	· · · · · · · · · · · · · · · · · · ·		
					150 mm 5.906 in	EX-11B	EX-11B-PN	Dark-ON			
					500 mm	EX-13A	EX-13A-PN	Light-ON			
		lug			19.685 in	EX-13B	EX-13B-PN	Dark-ON			
		sensi			(1 m	EX-19A	EX-19A-PN	Light-ON			
		Front sensing	mode bifurcation)) 3.281 ft	EX-19B	EX-19B-PN	Dark-ON			
				W W	150 mm 5.906 in EX-15 EX-15 -PN		EX-15 -PN	Switchable either			
	Thru-beam		With operation mode switch on the bifurcation		500 mm 19.685 in	EX-17	EX-17-PN	Light-ON or Dark-ON			
ype	_hru-				150 mm 5.906 in	EX-11EA	EX-11EA-PN	Light-ON	NPN open- collector		
Standard type	-		n mode bifurcation		150 mm 5.906 m	EX-11EB	EX-11EB-PN	Dark-ON	transistor or		
tand					500 mm	EX-13EA	EX-13EA-PN	Light-ON	PNP open- collector		
S					19.685 in	EX-13EB	EX-13EB-PN	Dark-ON	transistor		
					1 m 3.281 ft	EX-19EA	EX-19EA-PN	Light-ON			
						EX-19EB	EX-19EB-PN	Dark-ON			
				ω ω	150 mm 5.906 in	EX-15E		Switchable either			
			With operation mode switch on the bifurcation		500 mm 19.685 in	EX-17E		Light-ON or Dark-ON			
	Convergent reflective (Diffused beam type)	Front sensing			2 to 25 mm 0.079 to 0.984 in (Note 1)	EX-14A	EX-14A-PN	Light-ON			
	Converge (Diffused				(Convergent point: 10 mm 0.394 in)	EX-14B	EX-14B-PN	Dark-ON			
Narrow beam type					150 mm 5.906 in	EX-11SA	EX-11SA-PN	Light-ON			
		5	<u> </u>		100 11111 0.000 111	EX-11SB	EX-11SB-PN	Dark-ON			
		Front sensing			500 mm	EX-13SA	EX-13SA-PN	Light-ON			
	۴	onts			19.685 in	EX-13SB	EX-13SB-PN	Dark-ON	NPN open- collector		
	Thru-beam	Ľ	ᇤ	W W	1 m	EX-19SA	EX-19SA-PN	Light-ON	transistor or		
	Thru-)) 3.281 ft	EX-19SB	EX-19SB-PN	Dark-ON	PNP open-		
			<u> </u>		150 mm 5.906 in	EX-11SEA	EX-11SEA-PN	Light-ON	collector transistor		
			2 2		100 11111 0.000 111	EX-11SEB	EX-11SEB-PN	Dark-ON			
		3	Sine selisiid		500 mm	EX-13SEA	EX-13SEA-PN	Light-ON			
		<u>o</u>		u u	19.685 in	EX-13SEB	EX-13SEB-PN	Dark-ON			

NOTE: Mounting bracket is not supplied with the sensor. Please select from the range of optional sensor mounting brackets (MS-EX10-□). Sensor mounting brackets (MS-EX10-□) can not be used for the narrow beam type (EX-□S□).

Notes: 1) The sensor does not detect even a specular background if it is separated by 100 mm 3.937 in or more. (However, the background should be directly opposite. A spherical or curved background may be detected.)

2) The model No. with "P" shown on the label affixed to the thru-beam type sensor is the emitter, "D" shown on the label is the receiver.

Bending-resistant cable type

Bending-resistant cable type is also available for NPN output type. (excluding narrow beam type EX-uSu and sensor with operation mode switch on the bifurcation EX-15□/17□)

When ordering this type, suffix "-R" to the model No.

(e.g.) Bending-resistant cable type of EX-11A is "EX-11A-R".

5 m 16.404 ft cable length type

5 m 16.404 ft cable length type (standard: 2 m 6.562 ft) is also available for NPN output type. (excluding narrow beam type **EX-**□**S**□ and bending-resistant cable type) When ordering this type, suffix "-**C5**" to the model No.

(e.g.) 5 m 16.404 ft cable length type of **EX-11A** is "**EX-11A-C5**".

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EX-40 CX-440 EQ-30

EQ-500

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CX-400

CY-100 EX-10 EX-20 EX-30

EX-40 CX-440 EQ-30

MQ-W RX-LS200

EQ-500

RX-LS200 RX RT-610

OPTIONS

NOTE: Sensor mounting brackets can not be used for the narrow beam type (**EX-**□**S**□).

Designation	Model No.	Description					
	MS-EX10-1	Mounting bracket for the front sensing type sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)					
	MS-EX10-2	Mounting bracket for the side sensing type sensor [Cold rolled carbon steel (SPCC) (The thru-beam type sensor needs two brackets.)					
Sensor mounting	MS-EX10-3	L-shaped mounting bracket sensor [Cold rolled carbon steel (SPCC)] (The thru-beam type sensor needs two brackets.)					
bracket (Note 1)	MS-EX10-11	Mounting bracket for the front sensing type sensor [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)					
	MS-EX10-12	Mounting bracket for the side sensing type sensor [Stainless steel (SUS (The thru-beam type sensor needs two brackets.)					
	MS-EX10-13	L-shaped mounting bracket [Stainless steel (SUS304)] (The thru-beam type sensor needs two brackets.)					
	OS-EX10-12	Sensing range: 600 mm 23.622 in [EX-19□] Slit on one side					
	(Slit size Ø1.2 mm Ø0.047 in)	• Sensing range: 400 mm 15.748 in [EX-19□] Slit on both sides 200 mm 7.874 in [EX-13□, EX-17□] • Min. sensing object: Ø1.2 mm Ø0.047 in					
Slit mask	OS-EX10-15	• Sensing range: 800 mm 31.496 in [EX-19 □] Slit on one side 350 mm 13.780 in [EX-13 □] • Min. sensing object: ø2 mm ø0.079 in					
	(Slit size Ø1.5 mm Ø0.059 in)	• Sensing range: 500 mm 19.685 in [EX-19□] Slit on both sides 300 mm 11.811 in [EX-13□] • Min. sensing object: ø1.5 mm ø0.059 in					
	OS-EX10E-12	Sensing range: 400 mm 15.748 in [EX-19E□] (Note 3) 250 mm 9.843 in [EX-13E□, EX-17E□] • Min. sensing object: ø2 mm Ø0.079 in					
	(Slit size ø1.2 mm ø0.047 in)	Slit on both sides • Sensing range: 200 mm 7.874 in [EX-13E \square , EX-17E \square] • Min. sensing object: Ø1.2 mm Ø0.047 in					
Sensor checker (Note 2)	CHX-SC2	It is useful for beam alignment of thru-beam type sensors. The optimum receiver position is given by indicators, as well as an audio signal.					
Mounting screw	MS-M2	Mounting screws with washers (50 pcs. lot). It can mount securely as it is spring washer attached.					

Notes: 1) Can not be used for the narrow beam type (EX-□S□).

- 2) Refer to p.959~ for the sensor checker CHX-SC2.
- Since EX-19E□ has a built-in ø1 mm ø 0.039 in slit in the emitter, be sure to mount it in the receiver.

Slit mask

- OS-EX10-12
- OS-EX10-15

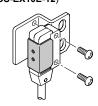


• OS-EX10E-12

OS-EX10E-1



Example of mounting (OS-EX10E-12)



Sensor checker

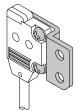
• CHX-SC2

Sensor checker

Tighten along with the sensor mounting bracket.

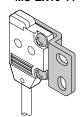
Sensor mounting bracket

• MS-EX10-1



Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated) Two M2 (length 4 mm 0.157 in) pan head screws are attached.

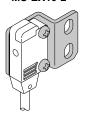
• MS-EX10-11



Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] are attached

• MS-EX10-2



Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated) Two M2 (length 8 mm 0.315 in) pan head screws are attached.

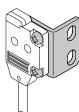
• MS-EX10-12



Material: Stainless steel (SUS304)

Two M2 (length 8 mm 0.315 in) pan head screws [stainless steel (SUS304)] are attached.

• MS-EX10-3

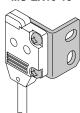


Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated) Two M2 (length 4 mm 0.157 in) pan head screws, and two M2 (length 8 mm 0.315 in)

pan head screws are

attached.

• MS-EX10-13



Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] and two M2 (length 8 mm 0.315 in) pan head screws [stainless steel (SUS304)] are attached.

SPECIFICATIONS

Туре			Thru-beam·standard type								
			Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Side sensing			
	Model No.	Light-ON	EX-11A(-PN)	EX-11EA(-PN)	EX-13A(-PN)	EX-13EA(-PN)	EX-19A(-PN)	EX-19EA(-PN)			
ltem	(Note 2)	Dark-ON	EX-11B(-PN)	EX-11EB(-PN)	EX-13B(-PN)	EX-13EB(-PN)	EX-19B(-PN)	EX-19EB(-PN)			
CE r	narking direc	tive compliance		,	EMC Directive,	RoHS Directive	,				
Sen	sing range		150 mm 5.906 in 500 mm 19.685 in 1 m 3.281 f								
Min. sensing object			ø1 mm ø0.039 in opaque object (Completely beam interrupted object) Setting distance between emitter and receiver: 150 mm 5.906 in				ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Setting distance between emitter and receiver: 1 m 3.281 ft				
Hyst	teresis										
Repea	atability (perpendi	icular to sensing axis)	0.05 mm 0.002 in or less								
Sup	ply voltage			12	2 to 24 V DC ±10 %	Ripple P-P 10 % or le	ess				
Curr	ent consum	ption	Emitter: 10 mA or less, Receiver: 10 mA or less								
Output			<npn output="" type=""> NPN open-collector transistor Maximum sink current: 50 mA Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 2 V or less (at 50 mA sink current) 1 V or less (at 16 mA sink current) 1 V or less (at 16 mA sink current) *PNP output type> Maximum source current: 50 mA Applied voltage: 30 V DC or less (between output and +V) Residual voltage: 2 V or less (at 50 mA source current) 1 V or less (at 16 mA source current) </npn>								
	Utilization	category	DC-12 or DC-13								
Short-circuit protection			Incorporated								
Res	ponse time		0.5 ms or less								
Оре	ration indica	itor	Orange LED (lights up when the output is ON)								
Incid	dent beam in	ndicator									
Stability indicator			Green LED (lights up under stable light received condition or stable dark condition)								
	Pollution degree		3 (Industrial environment)								
Φ	Protection										
ental resistance	Ambient te	mperature	-25 to +55 °C −13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C -22 to +158 °F								
resis	Ambient hu	umidity	35 to 85 % RH, Storage: 35 to 85 % RH								
ntal	Ambient ill	uminance	Incandescent light: 3,000 & or less at the light-receiving face								
	Voltage wit	thstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure								
Environn	Insulation i	resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure								
Ш	Vibration re	esistance	10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X, Y and Z directions for two hours each								
	Shock resistance		500 m/s ² acceleration (50 G approx.) in X, Y and Z directions three times each								
Emitting element			Red LED [Peak emission wavelength: 680 nm 0.027 mil (EX-19E: 624 nm 0.025 mil), modulated]								
Material			Enclosure: Polyethylene terephthalate, Lens: Polyalylate								
Cable (Note 3)			0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long								
Cable extension			Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver).								
Weight			Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx.								
Acce	essories		Mounting screws: 1 set								

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.

2) Model Nos. having the suffix "-PN" are PNP output type.

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FA COMPONENTS MACHINE VISION SYSTEMS

EX-Z CX-400 CY-100

EX-20 EX-30

EX-40 CX-440

EQ-30 EQ-500

MQ-W RX-LS200

³⁾ The bending-resistant cable type (model Nos. having suffix "-R") has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) bending-resistant cabtyre cable, 2 m 6.562 ft long.

FIBER SENSORS

PHOTO-ELECTRIC SENSORS

ELECTRIC
SENSORS

AREA
SENSORS

SAFETY LIGHT
CURTAINS/
SAFETY
COMPONENTS

PRESSURE /
FLOW
SENSORS

INDUCTIVE
PROXIMITY
SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

SIMPLE WIRE-SAVING UNITS

WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES ENERGY

COMPONENTS

MACHINE VISION SYSTEMS UV

CURING SYSTEMS

Selection Guide Amplifier Built-in Power Supply Built-in Amplifierseparated

EX-Z
CX-400
CY-100
EX-10
EX-20
EX-30
EX-40
CX-440
EQ-30
EQ-500
MQ-W

RX-LS200

RT-610

RX

SPECIFICATIONS

Туре		Thru-beam narrow beam type				Convergent reflective (Diffused beam type)	Thru-beam · with operation mode switch on bifurcation							
		71	Front sensing	Side sensing	Front sensing	Side sensing	Front sensing	Front sensing	Front sensing	Side sensing	Front sensing	Side sensing		
\	Model No.	Light-ON	EX-11SA(-PN)	EX-11SEA(-PN)	EX-13SA(-PN)	EX-13SEA(-PN)	EX-19SA(-PN)	EX-14A(-PN)	EX-15	EX-15E	EX-17	EX-17E		
Item	(Note 2)	Dark-ON	EX-11SB(-PN)	EX-11SEB(-PN)	EX-13SB(-PN)	EX-13SEB(-PN)	EX-19SB(-PN)	EX-14B(-PN)	(Note 3)	(Note 3)	(Note 3)	(Note 3)		
	narking direc	tive compliance	,	EN	//C Directive,	RoHS Direct	tive					J.		
Sens	sing range		150 mm	5.906 in	500 mm	19.685 in	1 m 3.281 ft	2 to 25 mm 0.079 to 0.984 in (Note 4) (Conv. point: 10 mm 0.394 in)	150 mm	5.906 in	500 mm	19.685 in		
Min.	sensing ob	iect	ø0.5 mm ø0.002 in opaque object (Completely beam interrupted object) (Note 5) ø1 mm ø0.039 in opaque object (Completely beam interrupted object) (Note 5)			ø2 mm ø0.079 in opaque object (Completely beam interrupted object) (Note 5)		ø0.1 mm ø0.004 in copper wire (Setting distance: 10 mm 0.394 in)	(Completely beam Setting d between and received	1 mm ø0.039 in opaque object ompletely beam interrupted object) Setting distance between emitter and receiver: 150 mm 5.906 in 20 mm ø0.079 in opaque (Completely beam interrupted object) Setting distance between emitter and receiver: 500 mm 19.685		interrupted object) istance emitter iver:		
Hyst	eresis							15 % or less of operation distance (Note 4)						
Repea	tability (perpend	icular to sensing axis)		0.05 r	nm 0.002 in	or less		0.1 mm 0.004 in or less		0.05 mm 0.0	02 in or less			
Supp	oly voltage					12 to 24 V	DC ±10 %	Ripple P-P 1	0 % or less					
Curr	ent consum	ption	Emi	tter: 10 mA o	r less, Recei	ver: 10 mA or	less	13 mA or less		25 mA	or less	-		
Outp	out		<npn output="" type=""> NPN open-collector transistor Maximum sink current: 50 mA Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 2 V or less (at 50 mA sink current) 1 V or less (at 16 mA sink current) <pnp output="" type=""> Maximum source current: 50 mA Applied voltage: 30 V DC or less (between output and 0 V) Residual voltage: 2 V or less (at 50 mA source output and 0 V) Residual voltage: 2 V or less (at 16 mA source output and 0 V) Residual voltage: 2 V or less (at 16 mA source output and 0 V) </pnp></npn>						NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (at 100 mA sink current) 1 V or less (at 16 mA sink current)					
	Utilization	category	DC-12 or DC-13											
	Short-circu	it protection	Incorporated											
Resp	oonse time		0.5 ms or less											
Ope	ration indica	itor	Orange LED (lights up when the output is ON)							nts up when the outp	out is ON), located	on the bifurcation		
Incid	lent beam ir	ndicator							Orange LED (lights up under light received condition), located on the receiver			eived		
Stability indicator			Green LED (lights up under stable light received condition or stable dark condition)						Green LED (lights up under stable light received condition or stable dark condition), located on the receiver					
	Pollution degree		3 (Industrial environment)											
a)	Protection		IP67 (IEC)											
ance	Ambient te	mperature	-25 to +55 °C −13 to +131 °F (No dew condensation or icing allowed), Storage: -30 to +70 °C −22 to +158 °F											
esist	Ambient humidity		35 to 85 % RH, Storage: 35 to 85 % RH											
ıtal r	Ambient ill	uminance	Incandescent light: 3,000 tx or less at the light-receiving face											
ıme	Ambient temperature Ambient humidity Ambient illuminance Voltage withstandability Insulation resistance		1,000 V AC for one min. between all supply terminals connected together and enclosure											
viro	Insulation	resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure								e			
ш	Vibration re		10 to 500 Hz frequency, 3 mm 0.118 in double amplitude in X,											
	Shock resi		500 m/s² acceleration (50 G approx.) in X, Y and Z											
Emitting element		Red LED (Peak emission wavelength: 650 nm 0.026 mil, modulated) Red LED (Peak emission wavelength: 680 nm 0.026 mil, modulated)									. modulated)			
Material			Enclosure: Polyethylene terephthalate Lens: Polyalylate						Enclosure: Polyethylene terephthalate Lens: Polyalylate, Bifurcation: Polyalylate					
Cable (Note 6)			0.1 mm² 3-core (thru-beam type emitter: 2-core) cabtyre cable, 2 m 6.562 ft long					cable,	0.2 mm² 3-core cabtyre cable, 2 m 6.562 ft long (beyond bifurcation; from emitter / receiver to bifurcation: 0.5 m 1.640 ft long)					
Cable extension			Extension up to total 50 m 164 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver). Extension up to total 100 m 328 ft is possible with 0.3 mm², or more, cable (thru-beam type: emitter and receiver).						ossible with 0.3 mi	m ² , or more, cable.				
Weig	ght		Net weight (each emitter and receiver): 20 g approx., Gross weight: 50 g approx., Gross weight: 55 g approx., Gross weight: 80					80 g approx.						
Accessories			Mounting screws: 1 set					Mounting screws: 1 set	Mounting so					

Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.

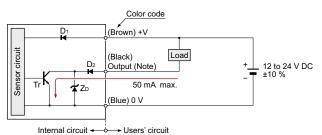
- 2) Model Nos. having the suffix "-PN" are PNP output type.
- 3) Either Light-ON or Dark-ON can be selected by the operation mode switch.
- 4) The sensing range and the hysteresis of convergent reflective type sensor are specified for white non-glossy paper (50 × 50 mm 1.969 × 1.969 in) as the object.
- 5) The min. sensing objects are specified in case the emitter / reciever sensing range is to set the maximum.
- 6) The bending-resistant cable type (model Nos. having suffix "-R") has a 0.1 mm² 3-core (thru-beam type emitter: 2-core) bending-resistant cabtyre cable, 2 m 6.562 ft long.

I/O CIRCUIT AND WIRING DIAGRAMS

EX-110 EX-11S0 EX-130 EX-13S0 EX-190 EX-19S0 EX-140

NPN output type

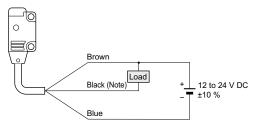
I/O circuit diagram



Note: The emitter of the thru-beam type sensor does not incorporate the

Symbols ... D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode ZD: Surge absorption zener diode Tr : NPN output transistor

Wiring diagram

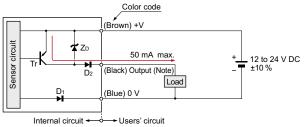


Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-11₀-PN EX-115₀-PN EX-13₀-PN EX-13₀-PN EX-19₀-PN EX-19₀-PN EX-14₀-PN

PNP output type

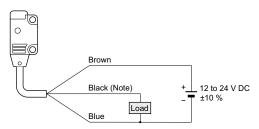
I/O circuit diagram



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

Symbols ... D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode ZD: Surge absorption zener diode Tr : PNP output transistor

Wiring diagram

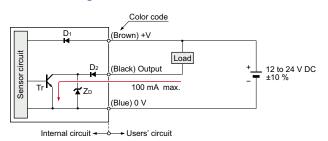


Note: The emitter of the thru-beam type sensor does not incorporate the black wire.

EX-150 EX-15E0 EX-170 EX-17E0

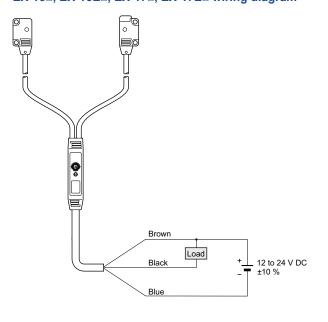
NPN output type

I/O circuit diagram



Symbols ... D1: Reverse supply polarity protection diode D2: Reverse output polarity protection diode ZD: Surge absorption zener diode Tr : NPN output transistor

EX-15, EX-15, EX-17, EX-17 wiring diagram



FIBER SENSORS

LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC

AREA SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

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SYSTEMS

Selection Guide

Amplifier Built-in

Power Supply Built-in

EX-Z

CX-400 CY-100 EX-10

EX-20 EX-30

EX-40 CX-440 EQ-30

EQ-500 MQ-W

RX-LS200

RT-610

RX

RT-610

SENSING CHARACTERISTICS (TYPICAL) LASER SENSORS *Optical properties of side sensing types (**EX-**□**E**□) EX-11₀ EX-11E₀ EX-15_□ **EX-15E** Due to the optical properties of side sensing types, note that sensing may be affected if multiple sensors are positioned in such a way that optical Parallel deviation Angular deviation axes intersect as shown in the diagram below. MICRO PHOTO-ELECTRIC SENSORS EX-11 EX-15□ Beam from Emitter 1 EX-11E 150 E5.906 Emitter 2 150 AREA SENSORS EX-15E mm) EX-11 may be caught by Receiver 2. EX-15□ 100 100 3.937 EX-11E EX-11 100 EX-11En Emitter √Receiver 2 EX-15E EX-15 Emitter EX-15E COMPONENTS Emitter PRESSURE / FLOW Emitter Setting (50 50 There is no problem when SENSORS --| ℓ i+sensors are installed in ■ -FX-11 FX-11F INDUCTIVE PROXIMITY SENSORS Receiver parallel Receiver 50 2 Receiver **EX-15E** (although the distance 25 Ó 10 Emitter 2 PARTICULAR Left Center Right between sensors should be SENSORS Left ◄ Center → Right Operating angle θ (°) $\ell \times 2$ or more). Operating point & (mm in) SENSOR OPTIONS **EX-17E** Thru-beam type SIMPLE WIRE-SAVING UNITS Parallel deviation **Angular deviation** Parallel deviation with slit Parallel deviation with slit masks (ø1.2 mm ø0.047 in) masks (ø1.5 mm ø0.059 in) 800 MEASURE-MENT SENSORS EX-13 / 17 Slit on one side or both sides .<u>=</u>300 E_{11,8}, FX-13-/17-300 E11.811 <u>=</u>600 600 STATIC CONTROL DEVICES EX-17 EX-13E -/17E FX-13F) distance L 1 distance L Slit on one side EX-17 1 distance EX-13En/17En distance 15.748 400 EX-17E EX-13E□ LASER MARKERS Emitte Slit on Slit on one side EX-17E both sid , Emitter Emitter Emitte sensing range: 350 mm 1 Slit on both sides Emitter Emitte -| £ |-- [Setting 500 Settin *** Setting 3.937 \Box 100 sensing range: 300 mm PLC 200 Receiver Receiver EX-17E . --| ℓ |--Receiver # 3 - 1-1 HUMAN Receiver EX-17E EX-17 0 + 20 0 + 40 100 100 20 50 20 50 100 10 Ó 50 50 10 - Center -→ Riaht - Right Operating angle θ (°) Left ◄ -Center Left ◄ Center → Right Center SOLUTIONS Operating point & (mm in) Operating point ℓ (mm in) Operating point (mm in) FA COMPONENTS EX-19_□ Thru-beam type MACHINE VISION SYSTEMS Parallel deviation Angular deviation Parallel deviation with slit Parallel deviation with slit masks (ø1.2 mm ø0.047 in) masks (ø1.5 mm ø0.059 in) CURING SYSTEMS 800 Slit on one side Slit on one side 1,000 <u>__1,000</u> <u>1,000</u> 600 nce L (mm distance L (mm mm) Setting distance L (mm Slit on both sides distance distance distance Amplifier Built-in Emitte 500 Emitte 500 500 Emitter ** Power Supply Built-in . -|₹|-| Setting (Setting 200 7.874 -1 l i- 1 Slit on both sides ऻ = 曲. Receive Receiver Receiver 0 + 40 0 ↓ 200 0 ↓ 200 0 |--- 200 100 100 100 100 100 200 20 Ó 20 100 FX-Z Center ► Right l eft -- Center ► Right Left ◄ - Center ► Right ► Right Operating angle θ (°) CX-400 Operating point & (mm in) Operating point & (mm in) Operating point ℓ (mm in) CY-100 EX-11S_□/EX-11SE_□ Thru-beam type EX-13S_□/EX-13SE_□ Thru-beam type **EX-19E** Thru-beam type **EX-19S** Thru-beam type EX-10 Parallel deviation Parallel deviation Parallel deviation Parallel deviation **EX-20** EX-30 EX-13S EX-40 1.000 1 000 150 mm. 600 L (mm E E E EX-11SE EX-11S CX-440 EX-13SE Setting distance L EQ-30 distance distance 100 400 EX-11S Emitter Emitter EX-11SE EQ-500 500 500 Emitte Emitter 中. rh Emitte -| 8 |-- L -| { İ-- L MQ-W 200 -| l |- | ᡂ-RX-LS200 Receive H-1 Receiver

Receive

50

25 0.984

- Right

EX-13S

25

Receiver

50

Center

Operating point & (mm in)

Right

25 0.984

Center

Operating point & (mm

Left ◄

EX-13SE

25 0.984

Ó

Center

Operating point & (mm in)

0 100 3.93

50

Left ◄

Ó

Center

Operating point & (mm in)

Receiver

50

Right

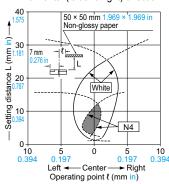
SENSING CHARACTERISTICS (TYPICAL)

EX-14

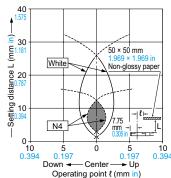
Convergent reflective type

Sensing fields

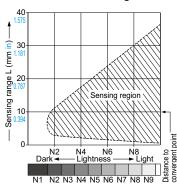
· Horizontal (left and right) direction



Vertical (up and down) direction



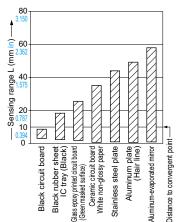
Correlation between lightness and sensing range



The sensing region (typical) is represented by oblique lines in the left figure. However, the sensitivity should be set with enough margin because of slight variation in products.

Lightness shown on the left may differ slightly from the actual object condition.

Correlation between material (50 × 50 mm 1.969 × 1.969 in) and sensing range



The bars in the graph indicate the sensing range (typical) for the respective material. However, there is a slight variation in the sensing range depending on the product. Further, if there is a reflective object (conveyor, etc.) in the background of the sensing object, since it affects the sensing, separate it by more than twice the sensing range shown in the left graph.

Refer to p.1552~ for general precautions.

PRECAUTIONS FOR PROPER USE

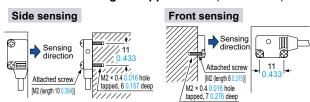
Never use this product as a sensing device for personnel protection.
In case of using sensing devices for



 In case of using sensing devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

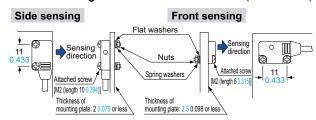
Mounting

• In case of mounting on tapped holes (Unit: mm in)



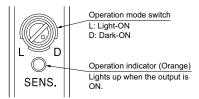
The tightening torque should be 0.2 N·m or less.

• In case of using attached screws and nuts (Unit: mm in)



The tightening torque should be 0.2 N·m or less.

Operation mode switch (EX-15□, EX-15E□, EX-17□ and EX-17E□ only)



Switch position	Description					
L	Light-ON mode is set when the switch is turned fully clockwise (L side).					
L D	Dark-ON mode is set when the switch is turned fully counterclockwise (D side).					

Others

- Do not use during the initial transient time (50 ms) after the power supply is switched on.
- Excess bending of the cable or stress applied to the cable may disconnect the internal lead wire.

FIBER SENSORS

LASER SENSORS

> PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC SENSORS

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INDUCTIVE PROXIMITY SENSORS

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UV CURING SYSTEMS

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EX-Z

CY-100

EX-10

EX-30 EX-40

CX-440 EQ-30

EQ-500

MQ-W RX-LS200

LASER SENSORS

AREA SENSORS

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PRESSURE / SENSORS

PARTICULAR

SENSORS

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HUMAN

FA COMPONENTS

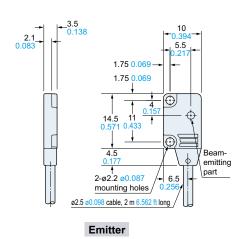
MACHINE VISION SYSTEMS

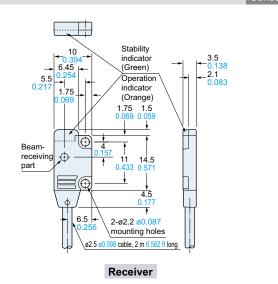
CURING

DIMENSIONS (Unit: mm in) FIBER SENSORS

The CAD data can be downloaded from our website.

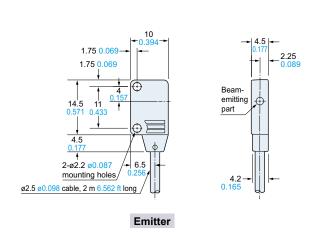
EX-110 EX-11S0 EX-130 EX-13S0 EX-190 EX-19S0

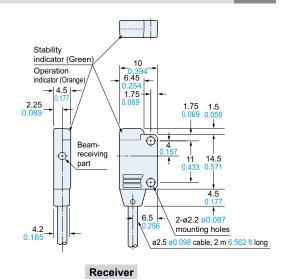




EX-11E_D EX-11SE_D EX-13E_D EX-13SE_D EX-19E_D

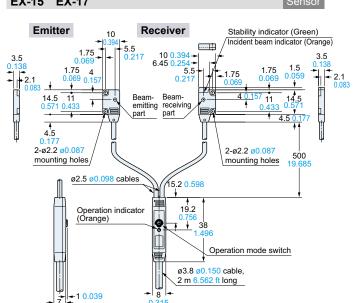
Sensor

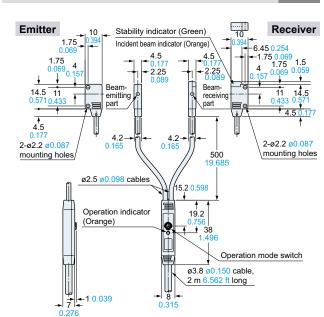




EX-15 EX-17

EX-15E EX-17E





Amplifier Built-in Power Supply Built-in

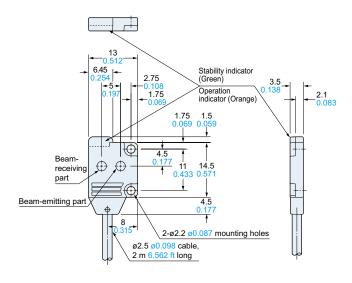
EX-Z CX-400 CY-100 **FX-20** EX-30

EX-40 CX-440 EQ-30 EQ-500

MQ-W RX-LS200 RX RT-610

DIMENSIONS (Unit: mm in)

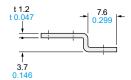
The CAD data can be downloaded from our website.

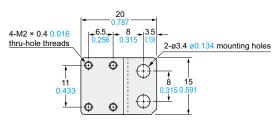


MS-EX10-1

EX-14□

Sensor mounting bracket (Optional)



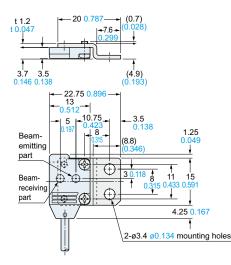


Material: Cold rolled carbon steel (SPCC) (Uni-chrome plated)

Two M2 (length 4 mm 0.157 in) pan head screws are attached.

Assembly dimensions

Mounting drawing with EX-14□

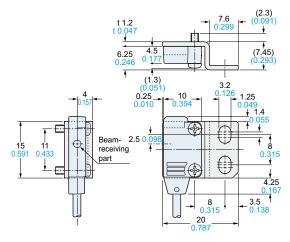


MS-EX10-2

Sensor mounting bracket (Optional)



Mounting drawing with EX-11E□ and EX-13E□



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

Two M2 (length 8 mm $0.315\ \text{in}$) pan head screws are attached.

thru-hole threads

LASER SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

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FA COMPONENTS

MACHINE

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EX-Z

CX-400 CY-100

EX-20

EX-30 EX-40

CX-440

EQ-30 EQ-500

MQ-W RX-LS200

FIBER SENSORS LASER SENSORS

PHOTO-ELECTRIC SENSORS MICRO PHOTO-ELECTRIC SENSORS

AREA SENSORS SAFETY LIGHT CURTAINS / SAFETY COMPONENTS PRESSURE / FLOW SENSORS

PROXIMITY SENSORS PARTICULAR USE SENSORS SENSOR OPTIONS

WIRE-SAVING UNITS WIRE-SAVING SYSTEMS

MEASURE-MENT SENSORS STATIC CONTROL DEVICES

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UV CURING SYSTEMS

Selection Guide Amplifier Built-in Power Supply Built-in Amplifierseparated

EX-Z CX-400 CY-100

EX-10 EX-20 EX-30

EX-40 CX-440 EQ-30

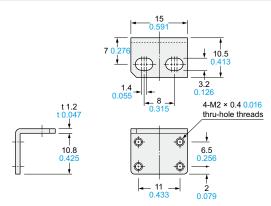
EQ-500 MQ-W

RX-LS200 RX RT-610

DIMENSIONS (Unit: mm in)

The CAD data can be downloaded from our website.

MS-EX10-3



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

t 1.2

3.7

0.146

11 0.433

4-M2 × 0.4 0.016

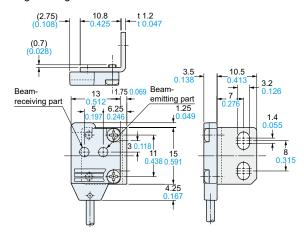
thru-hole threads

Two M2 (length 4 mm 0.157 in) pan head screws and two M2 (length 8 mm 0.315 in) pan head screws are attached.

Sensor mounting bracket (Optional)

Assembly dimensions

Mounting drawing with EX-14□



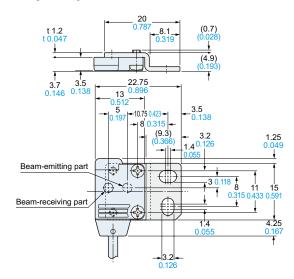
MS-EX10-11

Sensor mounting bracket (Optional)

Sensor mounting bracket (Optional)

Assembly dimensions

Mounting drawing with EX-14



Material: Stainless steel (SUS304)

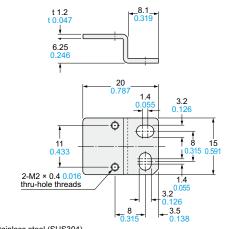
Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] are attached.

20

6.5

MS-EX10-12

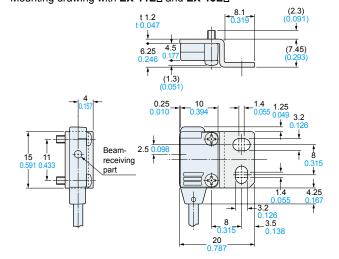
Assembly dimensions



Material: Stainless steel (SUS304)

Two M2 (length 8 mm 0.315 in) pan head screws [stainless steel (SUS304)] are attached.

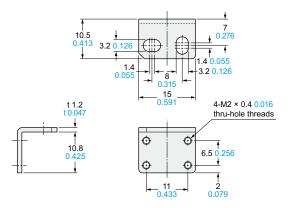
Mounting drawing with **EX-11E**□ and **EX-13E**□



DIMENSIONS (Unit: mm in)

The CAD data can be downloaded from our website.

MS-EX10-13

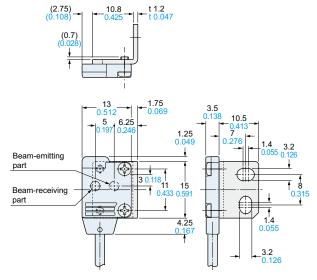


Material: Stainless steel (SUS304)

Two M2 (length 4 mm 0.157 in) pan head screws [stainless steel (SUS304)] and two M2 (length 8 mm 0.315 in) pan head screws [stainless steel (SUS304)] are attached.

Assembly dimensions

Mounting drawing with **EX-14**□



LASER SENSORS

SAFETY LIGHT CURTAINS / SAFETY COMPONENTS

PRESSURE / FLOW SENSORS

PARTICULAR USE SENSORS

SENSOR OPTIONS

MEASURE-MENT SENSORS

STATIC CONTROL DEVICES

LASER MARKERS

PLC

HUMAN MACHINE INTERFACES

FA COMPONENTS

MACHINE VISION SYSTEMS

EX-Z CX-400 CY-100

EX-20 EX-30

EX-40 CX-440 EQ-30

EQ-500 MQ-W RX-LS200