

Smart Laser Sensors

E3NC

CSM_E3NC_DS_E_9_3

Ideal for Applications That Cannot Be Handled with Fiber Sensors or Photoelectric Sensors

- The lineup includes E3NC-L Sensors, which are ideal for presence detection, and E3NC-S Sensors, which are ideal for discriminations.
 - E3NC-L Sensors are available in Coaxial Retro-reflective Models, Long-distance Variable-spot Diffuse-reflective Models, and Small-spot Limited-reflective Models.
 - The E3NC-S Sensors include CMOS and provide stable detection of workpieces with different colors and inclined installation.
- Smart Tuning to achieve stable detection with easy setup.
- White on black display characters for high visibility.
- Flexible robot cables are used for the Sensor Heads.



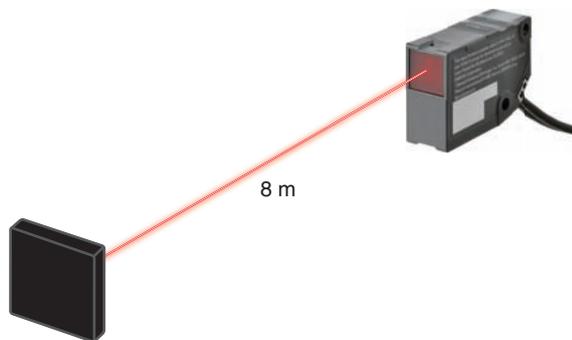
For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

 Refer to the *Safety Precautions* on page 14.

Features

Retro-reflective Models: E3NC-LH03

- Maximum sensing distance of 8 m.
- Stable detection of many types of workpieces.
- Stable detection of highly transparent films.



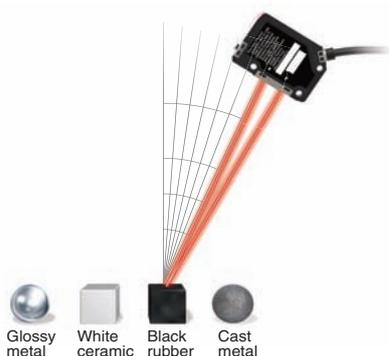
Diffuse-reflective Models: E3NC-LH02 **PAT.P**

- Long-distance detection at up to 1.2 m.
- Spot can be adjusted to the workpiece or application.



CMOS Laser, Reflective Models: E3NC-SH250H/SH250/SH100

- Stable detection even for different workpiece colors and materials.
- Stable detection for inclined Head installation and different workpiece shapes.



Amplifier Units

- Same shape as Fiber Amplifier Units plus easy operation.
- Smart Tuning with one button.



Ordering Information

Sensor Heads: E3NC-L Compact Laser Sensor Series (Dimensions → page 17)

Sensing method	Appearance	Beam shape	Sensing distance	Laser class	Cable length	Model
Coaxial Retro-reflective with MSR function		Spot	 8 m *	Class 1	2 m	E3NC-LH03 2M
					5 m	E3NC-LH03 5M
Diffuse-reflective		Variable spot	 1.2 m		2 m	E3NC-LH02 2M
					5 m	E3NC-LH02 5M
Limited-reflective		Spot	 70±15 mm		2 m	E3NC-LH01 2M
					5 m	E3NC-LH01 5M

* These values apply when an E39-R21, E39-R22, E39-RS10, or E39-RS11 Reflector is used. A Reflector is not included. Purchase a Reflector separately to match the intended use of the Sensor.

Note: Only an E3NC-LA□□ Amplifier Unit can be connected.

Amplifier Units: E3NC-L Compact Laser Sensor Series (Dimensions → page 19)

Connecting method	Appearance	Inputs/outputs	Model	
			NPN output	PNP output
Pre-wired (2 m)		2 outputs + 1 input	E3NC-LA21 2M	E3NC-LA51 2M
Wire-saving Connector		1 output + 1 input	E3NC-LA7	E3NC-LA9
M8 Connector		1 output + 1 input	E3NC-LA24	E3NC-LA54
Connector for Sensor Communications Unit *		---	E3NC-LA0	

* A Sensor Communications Unit is required if you want to use the Amplifier Unit on a network.

Note: Only an E3NC-LH□□ Sensor Head can be connected.

Sensor Heads: E3NC-S Ultra-compact CMOS Laser Sensor Series (Dimensions → page 18)

Sensing method	Appearance	Beam shape	Measurement range	Laser class	Cable length	Model
Distance-settable		Spot	 35 to 250 mm	Class 2	2 m	E3NC-SH250H 2M
				Class 1	2 m	E3NC-SH250 2M
					2 m	E3NC-SH100 2M

Note: Only an E3NC-SA□□ Amplifier Unit can be connected.

Amplifier Units: E3NC-S Ultra-compact CMOS Laser Sensor Series (Dimensions → page 19)

Connecting method	Appearance	Inputs/outputs	Model	
			NPN output	PNP output
Pre-wired (2 m)		2 outputs + 1 input	E3NC-SA21 2M	E3NC-SA51 2M
Wire-saving Connector		1 output + 1 input	E3NC-SA7	E3NC-SA9
M8 Connector		1 output + 1 input	E3NC-SA24	E3NC-SA54
Connector for Sensor Communications Unit *		---	E3NC-SA0	

* A Sensor Communications Unit is required if you want to use the Amplifier Unit on a network.

Note: Only an E3NC-SH□□ or E3NC-SH□□H Sensor Head can be connected.

Accessories (Sold Separately)

Sensor Head Accessories

Reflectors (Required for Retro-reflective Sensors) (Dimensions → page 21)

A Reflector is not provided with the Sensor Head. It must be ordered separately.

Applicable Sensor Head	Appearance	Model	Quantity
E3NC-LH03		E39-R21	1
		E39-R22	
		E39-RS10	
		E39-RS11	

Note: Refer to the *Safety Precautions* on page 14 for how to attach the reflector.

Sensor Head Mounting Brackets (Dimensions → page 22)

A Mounting Bracket is not provided with the Sensor Head. It must be ordered separately as required.

Applicable Sensor Head	Appearance	Model	Quantity	Contents
E3NC-LH03		E39-L190	1	Mounting Bracket: 1 Nut plate: 1 Phillips screws (M3×18): 2
E3NC-LH02		E39-L185		
E3NC-LH01		E39-L186		
E3NC-SH250H E3NC-SH250 E3NC-SH100		E39-L187		
		E39-L188		

Lens Attachments for Sensor Heads (Dimensions → page 21)

A Lens Attachment is not provided with the Sensor Head. It must be ordered separately as required.

Applicable Sensor Head	Appearance	Model	Quantity
E3NC-LH03		E39-P51	1
E3NC-LH02		E39-P52	

Note: You can combine the Lens Attachment with an applicable Sensor Head to create a line beam.

Ultra-compact CMOS Laser Sensor: E3NC-S

Sensor Heads

Item	Sensing method	Distance-settable		
	Model	E3NC-SH250H	E3NC-SH250	E3NC-SH100
Light source (wavelength)*1	Visible semiconductor laser diode (660 nm), 1 mW (average output: 220 μW) (JIS Class 2, IEC/EN Class 2, and FDA Class 2)	Visible semiconductor laser diode (660 nm), 0.5 mW (average output: 100 μW) (JIS Class 1, IEC/EN Class 1, and FDA Class 1)		
Measurement range	35 to 250 mm (display value: 350 to 2,500)			35 to 100 mm (display value: 350 to 1,000)
Standard detected level difference*2	35 to 180mm: 9 mm 180 to 250 mm: 25 mm			35 to 50 mm: 1.5 mm 50 to 100 mm: 3 mm
Beam size*3	Approx. 1 mm dia. at 250 mm			Approx. 0.5 mm dia. at 100 mm
Indicators	OUT indicator (orange), STABILITY indicator (green), and ST indicator (blue)			
Ambient illumination (Receiver side)	Incandescent lamp: 4,000 lx max., Sunlight: 8,000 lx max.	Incandescent lamp: 2,000 lx max., Sunlight: 4,000 lx max.	Incandescent lamp: 4,000 lx max., Sunlight: 8,000 lx max.	
Ambient temperature range	Operating: -10 to 50°C; Storage: -25 to 70°C (with no icing or condensation)			
Ambient humidity range	Operating and storage: 35% to 85% (with no condensation)			
Altitude	2,000 m max.			
Installation environment	Pollution degree 3 (as per IEC 60947-1)			
Insulation resistance	20 MΩ min. (at 500 VDC)			
Dielectric strength	1,000 VAC at 50/60 Hz for 1 min			
Vibration resistance (destruction)	10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions			
Shock resistance (destruction)	500 m/s ² 3 times each in X, Y, and Z directions			
Degree of protection	IEC IP67			
Connecting method	Pre-wired connector (Standard cable length: 2 m)			
Materials	Case	Polybutylene terephthalate (PBT)		
	Lens	Methacrylic resin (PMMA)		
	Cable	Vinyl chloride (PVC)		
Weight (packed state/Sensor Head only)	Approx. 125 g/approx. 75 g			
Accessories	Instruction Manual, laser warning label (E3NC-SH250H only)			

Note: Incorrect detection may occur outside the measurement range if the object has a high reflection factor.

*1. These Sensors are classified as Class 1 laser devices under IEC 60825-1 and the regulations of Laser Notice No. 50 for FDA certification. CDRH (Center for Devices and Radiological Health) registration has been completed. (Accession Number: 1220691)

*2. The values were measured at the center of the sensing distance using OMRON's standard sensing object (white ceramic).

*3. Beam size: Defined at the 1/e² (13.5 %) of the central intensity at the measurement center distance.

Measurement may be influenced if there is light leakage outside the defined region and the surroundings of the target object have a high reflectance in comparison to the target object.

Also, when detecting a workpiece that is smaller than the beam size, a correct value may not be obtained.

Amplifier Units

Item	Type	Standard models			Model for Sensor Communications Unit	
		NPN output	E3NC-SA21	E3NC-SA7	E3NC-SA24	E3NC-SA0
		PNP output	E3NC-SA51	E3NC-SA9	E3NC-SA54	
Connecting method	Pre-wired	Wire-saving Connector	M8 Connector	Connector for Sensor Communications Unit		
Inputs/ outputs	Outputs	2 outputs	1 output		-- *1	
	External inputs	1 input				
Power supply voltage *2		10 to 30 VDC, including 10% ripple (p-p)			Supplied from the connector through the Sensor Communications Unit	
Power consumption *3		At Power Supply Voltage of 24 VDC Normal mode: 1,920 mW max. (Current consumption: 80 mA max.) Eco ON: 1,680 mW max. (Current consumption: 70 mA max.) Eco LO: 1,800 mW max. (Current consumption: 75 mA max.)				
Control outputs *4		Load power supply voltage: 30 VDC max., open-collector output Load current: Groups of 1 to 3 Amplifier Units: 100 mA max., Groups of 4 to 30 Amplifier Units: 20 mA max. (Residual voltage: At load current of less than 10 mA: 1 V max. At load current of 10 to 100 mA: 2 V max.) OFF current: 0.1 mA max.			--	
External inputs		Refer to *5.				
Indicators		7-segment displays (Sub digital display: green, Main digital display: white) Display direction: Switchable between normal and reversed. OUT indicator (orange), L/D indicator (orange), ST indicator (blue), ZERO indicator (green), and OUT selection indicator (orange, only on models with 2 outputs)				
Protection circuits		Power supply reverse polarity protection, output short-circuit protection, and output reverse polarity protection			Power supply reverse polarity protection and output short-circuit protection	
Response time	Super-high-speed mode (SHS) *6	Operate or reset: 1.5 ms				
	High-speed mode (HS)	Operate or reset: 5 ms				
	Standard mode (Std)	Operate or reset: 10 ms				
	Giga-power mode (GIGA)	Operate or reset: 50 ms				
Sensitivity adjustment		Smart Tuning (2-point tuning, full auto tuning, 1-point tuning, tuning without workpiece, 2-point area tuning, 1-point area tuning, or area tuning without workpiece), or manual adjustment				
Maximum connectable Units		30			With E3NW-ECT: 30 units *7 With E3NW-CRT: 16 units With E3NW-CCL: 16 units	
No. of Units for mutual interference prevention	Super-high-speed mode (SHS) *6	0				
	High-speed mode (HS)	2				
	Standard mode (Std)	2				
	Giga-power mode (GIGA)	2				
Functions	Timer	Select from timer disabled, OFF-delay, ON-delay, one-shot, or ON-delay + OFF-delay timer: 1 to 9,999 ms				
	Zero reset	Negative values can be displayed. (Threshold value is shifted.)				
	Resetting settings *8	Select from initial reset (factory defaults) or user reset (saved settings).				
	Eco mode *9	Select from OFF (digital display lit), ECO ON (digital display not lit), and ECO LO (digital display dimmed).				
	Bank switching	Select from banks 1 to 4.				
	Output 1	Select from Normal detection mode, Area detection mode, or hold mode.				
	Output 2	Select from Normal detection mode or Error output mode.	--		Select from Normal detection mode or Error output mode.	
	External input	Select from input OFF, tuning, laser OFF, zero reset, or bank switching.			--	
	Keep function *10	Select from ON or OFF.				
	Background suppression *11	Select from ON or OFF.				
	Hysteresis width	Select from standard setting or user setting.				

*1. Two sensor outputs are allocated in the programmable logic controller PLC I/O table.

PLC operation via Communications Unit enables reading detected values and changing settings.

*2. Applicable Sensor Head is the series of E3NC-SH□□ (Input/Output 10-30V DC Class 2).

*3. At Power Supply Voltage of 10 to 30 VDC.

Normal mode: 2,250 mW max. (Current consumption: 75 mA max. at 30 VDC, 145 mA max. at 10 VDC)

Eco ON: 2,010 mW max. (Current consumption: 67 mA max. at 30 VDC, 125 mA max. at 10 VDC)

Eco LO: 2,130 mW max. (Current consumption: 71 mA max. at 30 VDC, 135 mA max. at 10 VDC)

*4. The total for both outputs of a model with 2 outputs is 100 mA max. (Residual voltage: Load current of less than 10 mA: 1 V max., Load current of 10 to 100 mA: 2 V max.).

*5. The following details apply to the input.

	Contact input (relay or switch)	Non-contact input (transistor)	Input time*5-1
NPN	ON: Shorted to 0 V (Sourcing current: 1 mA max.). OFF: Open or shorted to Vcc.	ON: 1.5 V max. (Sourcing current: 1 mA max.) OFF: Vcc - 1.5 V to Vcc (Leakage current: 0.1 mA max.)	ON: 9 ms min. OFF: 20 ms min.
PNP	ON: Shorted to Vcc (Sinking current: 3 mA max.). OFF: Open or shorted to 0 V.	ON: Vcc - 1.5 V to Vcc (Sinking current: 3 mA max.) OFF: 1.5 V max. (Leakage current: 0.1 mA max.)	

*5-1. Input time is 25 ms (ON)/(OFF) only when (in tUnE) input is selected.

*6. The mutual interference prevention function is disabled if the detection mode is set to super-high-speed mode.

*7. When connected to an OMRON NJ-series Controller.

*8. The bank is not reset by the user reset function or saved by the user save function.

*9. Eco LO is supported for Amplifier Units manufactured in August 2014 or later.

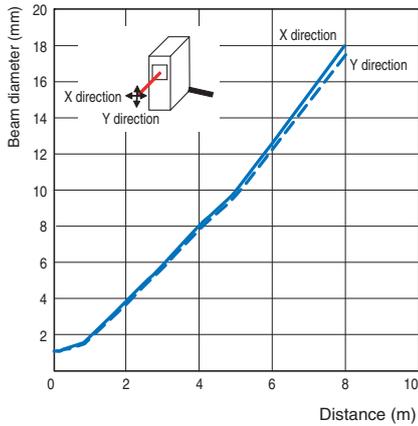
*10. The output for a measurement error is set. ON: The value of the output from before the measurement error is retained. OFF: The output is turned OFF when a measurement error occurs.

*11. Only the sensing object is detected when tuning.

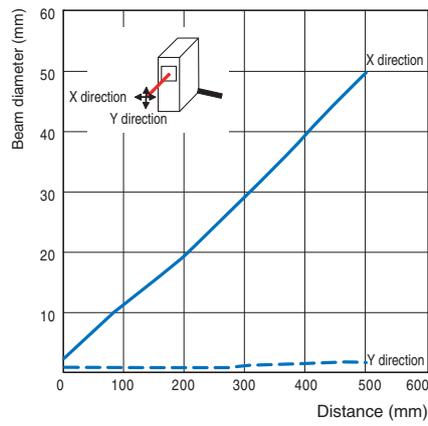
Engineering Data (Reference Value)

Beam Diameter Vs. Distance

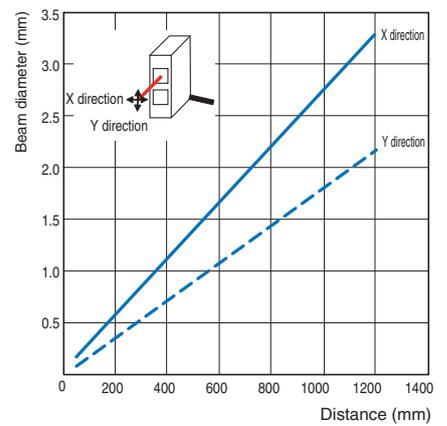
**Retro-reflective Model
E3NC-LH03**



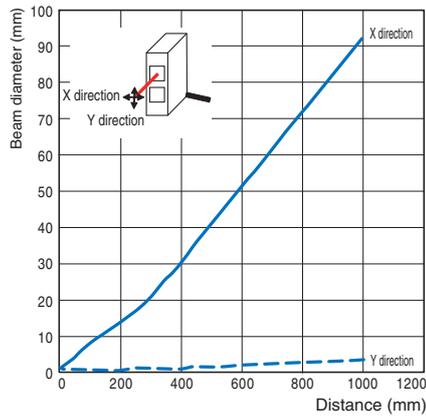
**Retro-reflective Model
E3NC-LH03 + E39-P51**



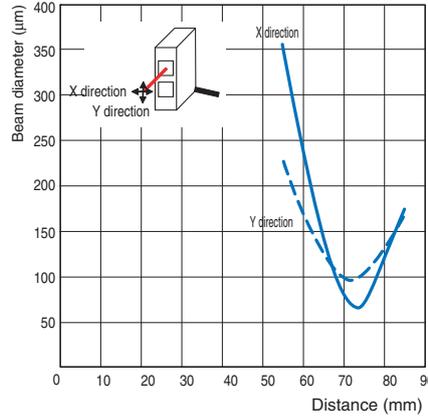
**Diffuse-reflective Model
E3NC-LH02**



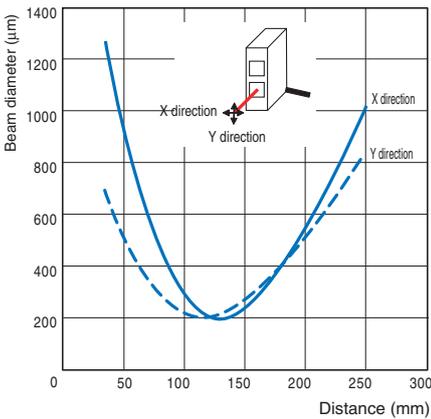
**Diffuse-reflective Model
E3NC-LH02 + E39-P52**



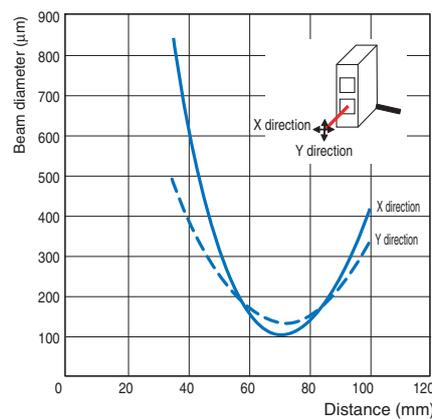
**Limited-reflective Model
E3NC-LH01**



**Distance-settable Model
E3NC-SH250/SH250H**



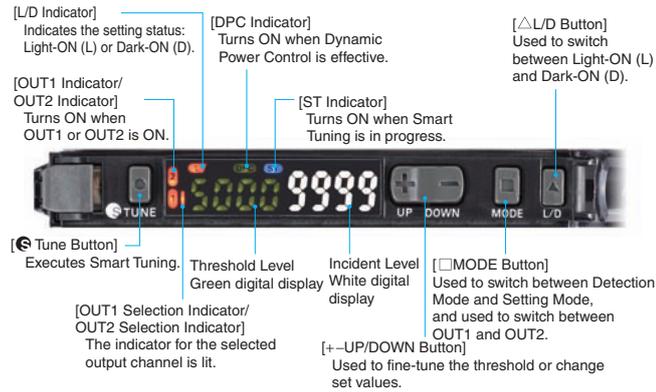
**Distance-settable Model
E3NC-SH100**



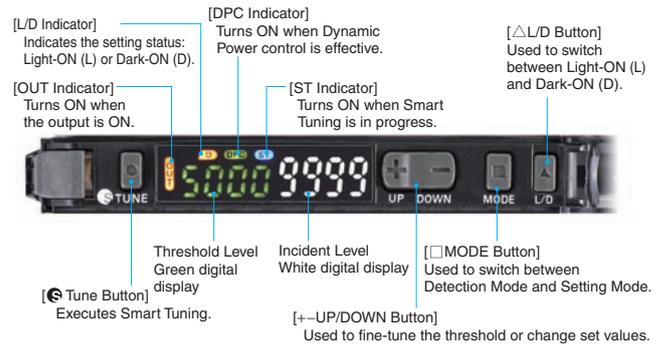
Nomenclature

Compact Laser Sensors

E3NC-LA21/LA51/LA0

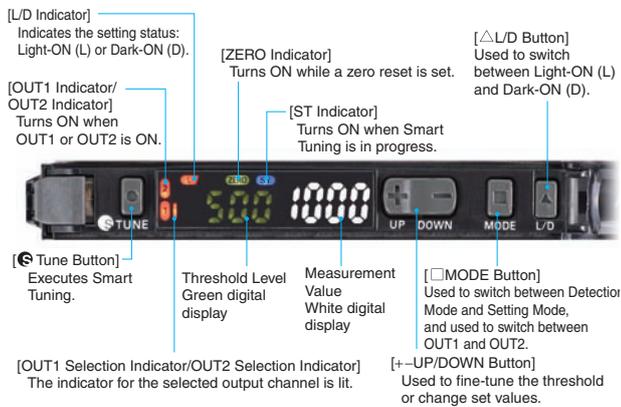


E3NC-LA7/LA9/LA24/LA54

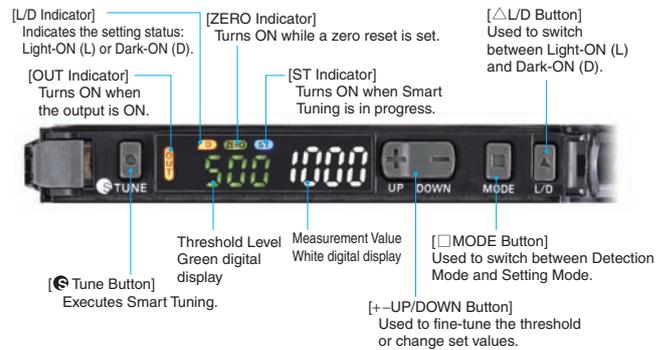


Ultra-compact CMOS Laser Sensors

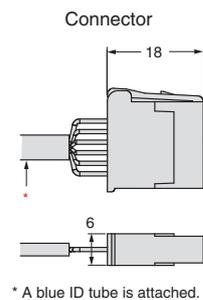
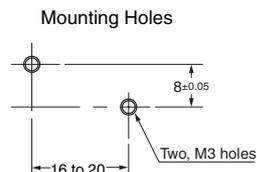
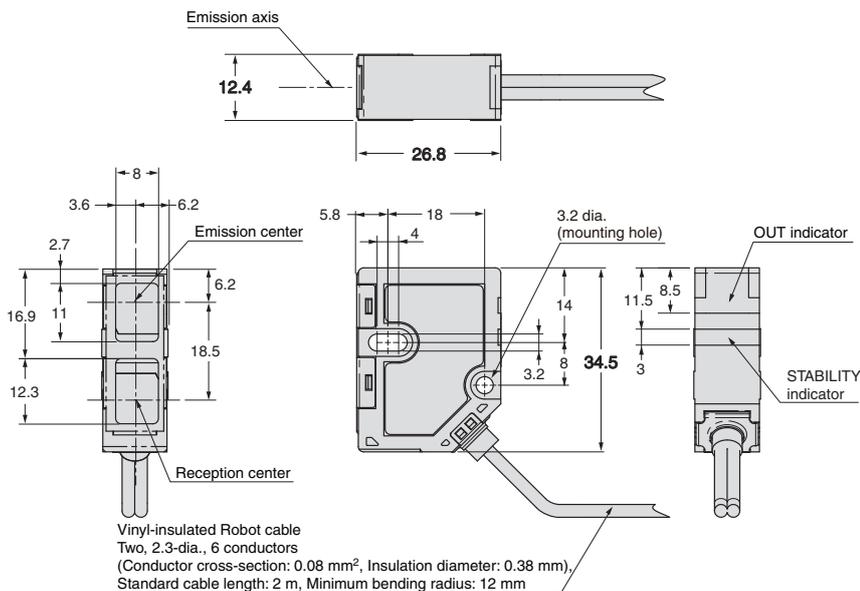
E3NC-SA21/SA51/SA0



E3NC-SA7/SA9/SA24/SA54



Limited-reflective Model
E3NC-LH01



Distance-settable Models
E3NC-SH250H
E3NC-SH250
E3NC-SH100



*1 E3NC-SH100
L = 35 to 100 mm,
A = 15.92° to 5.67°

E3NC-SH250H/250
L = 35 to 250 mm,
A = 15.92° to 2.27°

