

Panasonic

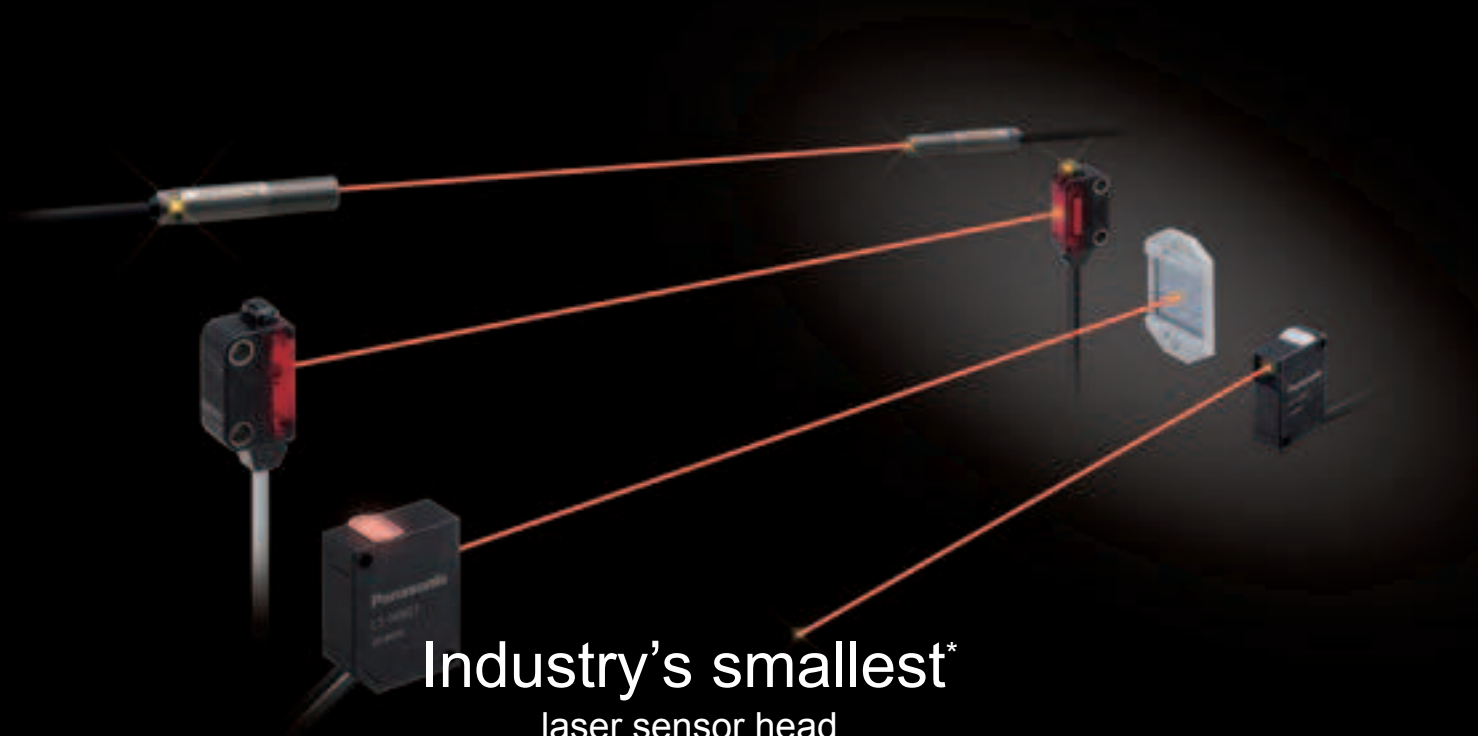
NEW

Amplifier-separated type
Digital Laser Sensor

LS-500_{SERIES}

CE
Conforming to
EMC Directive

FDA
Conforming to
FDA regulations



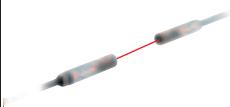
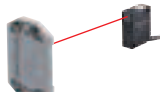
Industry's smallest*
laser sensor head

LASER CLASS 1



ORDER GUIDE

Sensor heads

Type		Appearance	Model No.	Sensing range ■ : HYPR ■ : U-LG ■ : LONG ■ : STD ■ : FAST ■ : H-SP
Thru-beam type	Cylindrical		LS-H101	1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft
	Square		LS-H102	1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft 1 m 3.281 ft
Coaxial reflective type			LS-H201	750 mm 29.528 in 600 mm 23.622 in 450 mm 17.717 in 300 mm 11.811 in 200 mm 7.874 in 150 mm 5.906 in
Coaxial retroreflective type			LS-H901	0.01 to 2.5 m 0.033 to 8.202 ft 0.01 to 2 m 0.033 to 6.562 ft 0.01 to 1.5 m 0.033 to 4.921 ft 0.01 to 1 m 0.033 to 3.281 ft 0.01 to 1 m 0.033 to 3.281 ft 0.01 to 1 m 0.033 to 3.281 ft

5 m 16.404 ft cable length type

5 m 16.404 ft cable length types (Standard: 2 m 6.562 ft) are available. When ordering this type, add "-C5" at the end of the model number.

LS-H101-C5

LS-H102-C5

LS-H201-C5

LS-H901-C5

Package without reflector

The LS-H901 is also available without a reflector (RF-330).

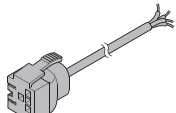
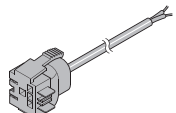
When ordering this type, add "-Y" at the end of the model number.

LS-H901-Y

Amplifiers

Type	Appearance	Model No.	Output	Connection method
Connector type		LS-501	NPN open-collector transistor two outputs	Use quick-connection cable (4-core) (optional)
		LS-501P	PNP open-collector transistor two outputs	
Cable type (With external input)		LS-501-C2	NPN open-collector transistor two outputs	2 m 6.562 ft cabtyre cable (6-core) included Cable outer diameter: ø4 mm ø0.157 in
		LS-501P-C2	PNP open-collector transistor two outputse	

Quick-connection cables Quick-connection cable is not supplied with the connector type amplifier. Please order it separately.

Type	Appearance	Model No.	Description	
Main cable (4-core)		CN-74-C1	Length: 1 m 3.281 ft	0.15 mm ² 4-core cabtyre cable, with connector on one end Cable outer diameter: ø3 mm ø0.118 in
		CN-74-C2	Length: 2 m 6.562 ft	
		CN-74-C5	Length: 5 m 16.404 ft	
Sub cable (2-core)		CN-72-C1	Length: 1 m 3.281 ft	0.15 mm ² 2-core cabtyre cable, with connector on one end Cable outer diameter: ø3 mm ø0.118 in Up to 15 sub cables can be connected to 1 main cable.
		CN-72-C2	Length: 2 m 6.562 ft	
		CN-72-C5	Length: 5 m 16.404 ft	

Connectors

Type	Appearance	Model No.	Description
Connector for amplifier		CN-EP4	Connector included with sensor head Use for maintenance, for example when another connector is damaged.

SPECIFICATIONS

Sensor heads

Type		Thru-beam type		Coaxial reflective type	Coaxial retroreflective type
		Cylindrical	Small		
Item	Model No.	LS-H101	LS-H102	LS-H201	LS-H901
Applicable amplifiers		LS-501(P), LS-501(P)-C2			
Sensing range	H-SP	1 m 3.281 ft	1 m 3.281 ft	150 mm 5.906 in	0.01 to 1 m 0.033 to 3.281 ft
	FAST	1 m 3.281 ft	1 m 3.281 ft	200 mm 7.874 in	0.01 to 1 m 0.033 to 3.281 ft
	STD	1 m 3.281 ft	1 m 3.281 ft	300 mm 11.811 in	0.01 to 1 m 0.033 to 3.281 ft
	LONG	1 m 3.281 ft	1 m 3.281 ft	450 mm 17.717 in	0.01 to 1.5 m 0.033 to 4.921 ft
	U-LG	1 m 3.281 ft	1 m 3.281 ft	600 mm 23.622 in	0.01 to 2 m 0.033 to 6.562 ft
	HYPR	1 m 3.281 ft	1 m 3.281 ft	750 mm 29.528 in	0.01 to 2.5 m 0.033 to 8.202 ft
Spot size		Approx. ø5 mm ø0.197 in or less (at a distance from the emitter of 1 m 3.281 ft)	Approx. ø5 mm ø0.197 in or less (at a distance from the emitter of 1 m 3.281 ft)	Approx. ø2 mm ø0.079 in or less (at a distance from the emitter of 300 mm 11.811 in)	Approx. ø6 mm ø0.236 in or less (at a distance from the emitter of 1 m 3.281 ft)
Sensing object		Opaque, translucent, or transparent object (Note 3)			
Operation indicator		Orange LED (lights up when the amplifier output is ON)			
Environmental resistance	Protection	IP40 (IEC)	IP67 (IEC)	IP40 (IEC)	IP40 (IEC)
	Ambient temperature	-10 to +55 °C +14 to +131 °F (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F			
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH			
	Ambient illuminance	Incandescent light: 3,000 lx at the light-receiving face			
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure			
	Insulation resistance	20 MΩ, or more, with 250 V DC megger between all supply terminals connected together and enclosure			
	Vibration resistance	10 to 500 Hz frequency, 1.5 mm 0.059 in amplitude in X, Y and Z directions for two hours each			
	Shock resistance	100 m/s² acceleration (10 G approx.) in X, Y and Z directions for three times each			
Emitting element	Type	Red semiconductor laser diode			
	Peak emission wavelength	660 nm 0.026 mil			
	Laser class	Class 1 (IEC / FDA / JIS)			
	Max. output	2 mW	2 mW	2 mW	1 mW
Material		Enclosure: Stainless steel (SUS303) Cover: Polycarbonate	Enclosure: PBT Cover: Acrylic	Enclosure: PBT, Indicator cover: Polycarbonate, Beam-emitting / -receiving surfaces: Glass	
Cable		0.09 mm² 2-core shielded cable, 2 m 6.562 ft long		0.1 mm², single core two parallel shielded cables, 2 m 6.562 ft long	
Weight		Net weight: 50 g approx. Gross weight: 75 g approx.	Net weight: 50 g approx. Gross weight: 70 g approx.	Net weight: 50 g approx. Gross weight: 80 g approx.	Net weight: 50 g approx. Gross weight: 85 g approx.
Accessories		M6 screw: 4 pcs. Toothed lock washer: 2 pcs.	MS-EXL2-2 (mounting plate): 2 pcs.	MS-LS-1 (mounting bracket): 1pc.	MS-LS-1 (mounting bracket): 1pc. RF-330 (reflector): 1pc.

- Notes: 1) Where measurement conditions have not been specified precisely, the conditions used were an ambient temperature of +23 °C +73.4 °F.
2) This product complies with 21 CFR 1040.10 and 1040.11 Laser Notice No. 50, dated June 24, 2007, issued by CDRH (Center for Devices and Radiological Health) under the FDA (Food and Drug Administration). For details, refer to the Laser Notice No. 50.
3) Make sure to confirm detection with an actual sensor before use.
4) The sensing range of the coaxial reflective type sensor is specified for white non-glossy paper (100 × 100 mm 3.937 × 3.937 in) as the object.
5) Sensing ranges for coaxial retroreflective type sensors are values for the RF-330 reflector. In addition, the sensing range is the possible setting range for the reflector. The sensor can detect an object less than 0.01 m 0.033 ft away. Note that due to the principles on which coaxial retroreflective sensors operate, if a mirrored object or other object that diffuses light readily is located close to the sensor, polarized light from these objects may be received, causing unstable sensing. In such cases, use the amplifier unit's receiving sensitivity function to lower the sensitivity, change the response time, or move the sensor head away from the target object. The incident light intensity may vary with the condition of the reflector surface. When using one of the applicable LS-500 series amplifiers, leave an adequate safety margin when setting the threshold.
6) When using the thru-beam type LS-H101□ or LS-H102□, do not set the receiving light sensitivity (gctL) of the applicable LS-500 series amplifier to level 2 or less. This is because there is a possibility of sensing becoming unstable.
7) Cable cannot be extended.

SPECIFICATIONS

Amplifiers

Item	Model No.	Type	Connector type	Cable type
		NPN Output	LS-501	LS-501-C2
		PNP Output	LS-501P	LS-501P-C2
Supply voltage		12 to 24 V DC $\pm_{-15}^{+10}$ % Ripple P-P 10 % or less		
Power consumption		Normal operation: 1,200 mW or less (Current consumption 50 mA or less at 24 V supply voltage) ECO mode: 980 mW or less (Current consumption 40 mA or less at 24 V supply voltage)		
Outputs (Output 1, Output 2)		<NPN output type> NPN open-collector transistor • Maximum sink current: 50 mA (Note 2) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 2 V or less (at max. sink current)		<PNP output type> PNP open-collector transistor • Maximum source current: 50 mA (Note 2) • Applied voltage: 30 V DC or less (between output and +V) • Residual voltage: 2 V or less (at max. source current)
	Output operation	Selectable either Light-ON or Dark-ON		
	Short-circuit protection	Incorporated		
Sensing output setting	Output 1	Normal mode, differential mode, hysteresis mode, window comparator mode, selectable		
	Output 2	Normal mode, differential mode, hysteresis mode, self-diagnostic output mode, selectable	Normal mode, differential mode, hysteresis mode, self-diagnostic output mode, answer-back output mode, selectable	
Response time		H-SP: 60 μ s or less, FAST: 150 μ s or less, STD: 250 μ s or less, LONG: 500 μ s or less, U-LG: 5 ms or less, HYPR: 24 ms or less , selectable		
Monitor current output		Output current: Approx. 4 to 20 mA (H-SP, FAST, STD: at 0 to 4,000 indication) Response time: 2 ms or less Zero point: 4 mA $\pm$ 1% F.S. Span: 16 mA $\pm$ 5 % F.S. Linearity: $\pm$ 3 % F.S. Load resistance: 0 to 250 Ω		
External input		<NPN output type> NPN non-contact input • Signal condition High: +8 V to +V DC or open, Low: 0 to +2 V DC (source current 0.5 mA or less) • Input impedance: 10 kΩ approx.		<PNP output type> PNP non-contact input • Signal condition High: +4 V to +V DC (sink current 3.0 mA or less), Low: 0 to +0.6 V DC or open • Input impedance: 10 kΩ approx.
External input function		Laser emission halt / teaching (full-auto teaching, limit teaching, 2 point teaching) / logic operation setting / copy lock / display adjustment / data bank load / data bank save, selectable		
Operation indicator		Orange LED (lights up when output 1 and output 2 are ON)		
Laser emission indicator		Green LED (lights up during laser emission)		
Output select indicator		Yellow LED (lights up when output is selected)		
Digital display		8-digit 7-segment digital display (4-digit green LED + 4-digit red LED), MODE indicator (Yellow LED): L/D, CUST, PRO		
Incident light indication range		H-SP / FAST / STD: 0 to 4,000, LONG / U-LG / HYPR: 0 to 9,999		
Sensitivity setting		2-level teaching / limit teaching / full auto teaching / manual adjustment		
Logical operation		Between sensing output 1 and calculation target: Disabled / and / or / xor, selectable Calculation target: Sensing output 2 / adjacent upstream amplifier (sensing output 1) / external input, selectable		
Timer functions		<Output 1> OFF-delay timer, ON-delay timer, ONE-SHOT timer, ON / OFF-delay timer, ON-delay / ONE-SHOT timer, switchable either effective of ineffective		
		<Output 2> OFF-delay timer, ON-delay timer, ONE-SHOT timer, switchable either effective of ineffective		
	Timer period	Timer range "ms": 0.5 ms approx., 1 to 9,999 ms approx., in approx. 1 ms intervals Timer range "sec": 0.5 sec approx., 1 to 32 sec approx., in approx. 1 sec intervals Timer range "1/10 ms": 0.05 ms approx., 0.1 to 999.9 ms approx., in approx. 0.1 ms intervals Set separately for each output.		
Interference prevention function		Incorporated (Note 3)		
Environmental resistance	Ambient temperature	-10 to +55°C +14 to +131 °F (If 4 to 7 units are mounted close together, -10 to +50°C +14 to +122 °F; if 8 to 16 units (cable type: 8 to 12 units) are mounted close together, -10 to +45 °C +14 to +113°F) (No dew condensation or icing allowed), Storage: -20 to +70 °C -4 to +158 °F		
	Ambient humidity	35 to 85 % RH, Storage: 35 to 85 % RH		
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure		
	Insulation resistance	20 M Ω , or more, with 250 V DC megger between all supply terminals connected together and enclosure		
	Vibration resistance	10 to 150 Hz frequency, 0.75 mm 0.030 in amplitude in X, Y and Z directions for two hours each		
	Shock resistance	98 m/s ² acceleration (10 G approx.) in X, Y and Z directions for five times each		
Material		Enclosure: polycarbonate, Protective cover: Polycarbonate, Switch: Polyacetal		
Protection		IP40 (IEC)		
Cable			0.2 mm ² 6-core cabtyre cable, 2 m 6.562 ft long	
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable.		
Weight		Net weight: 15 g approx., Gross weight: 55 g approx.	Net weight: 75 g approx., Gross weight: 110 g approx.	
Accessory		FX-MB1 (Amplifier protective seal): 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.

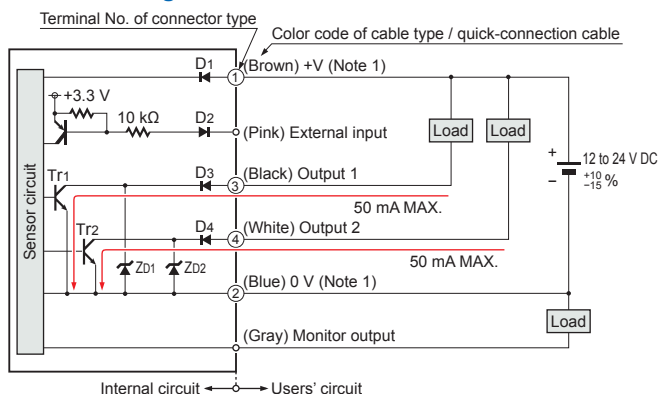
2) 25 mA if 5 or more amplifier are connected in cascade (excluding cable extension).

3) Number of units that can be mounted close together: 0 for H-SP; 2 for FAST; 4 for STD, LONG, U-LG, or HYPR

I/O CIRCUIT AND WIRING DIAGRAMS

NPN output type

I/O circuit diagram



Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue).
The power is supplied from the connector of the main cable.

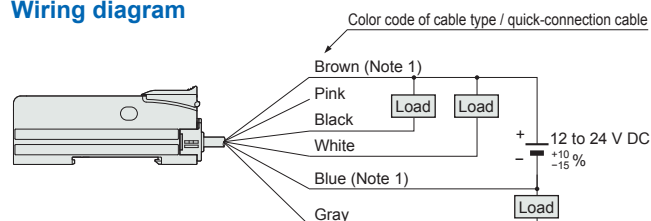
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Non-voltage contact or NPN open-collector transistor

- External input
High: +8 V to +V, or open
Low: 0 to +2 V (source current: 0.5 mA or less)
- Light emission halts and teaching occurs when at Low.

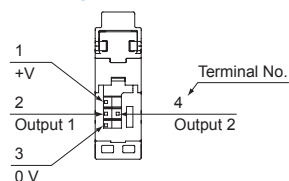
Symbols ... D₁, D₂, D₃, D₄: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr₁, Tr₂: NPN output transistor

Wiring diagram

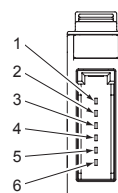


Notes: 1) The quick-connection sub cable does not have brown lead wire and blue lead wire. The power is supplied from the connector of the main cable.
2) The quick-connection cable does not have gray or pink lead wires.

Terminal layout of connector type



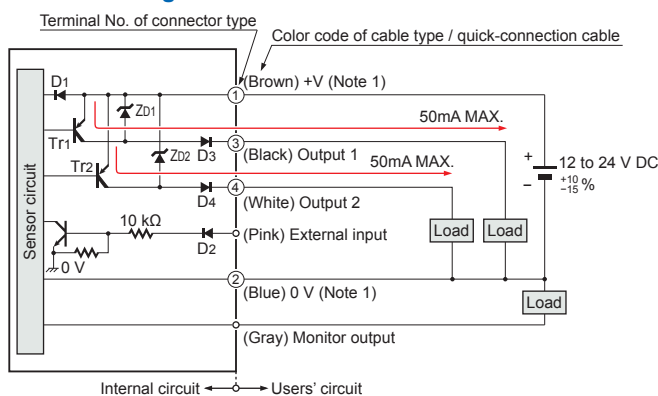
* Connector for amplifier (CN-EP4) pin position



Terminal No.	Connection cable
①	Purple
②	White
③	Shield
④	Shield
⑤	Black
⑥	Pink

PNP output type

I/O circuit diagram



Notes: 1) The quick-connection sub cable does not have +V (brown) and 0 V (blue).
The power is supplied from the connector of the main cable.

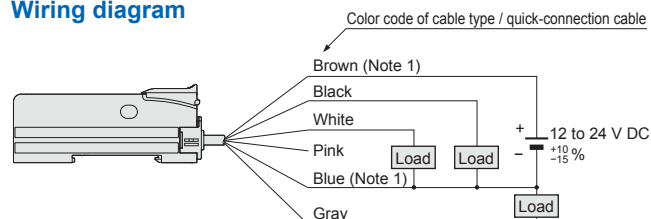
*1

Non-voltage contact or PNP open-collector transistor

- External input
High: +4 V to +V (sink current: 3 mA or less)
Low: 0 to +0.6 V, or open
- Light emission halts and teaching occurs when at Low.

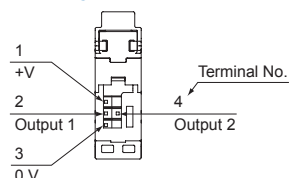
Symbols ... D₁, D₂, D₃, D₄: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
Tr₁, Tr₂: PNP output transistor

Wiring diagram

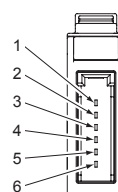


Notes: 1) The quick-connection sub cable does not have brown lead wire and blue lead wire. The power is supplied from the connector of the main cable.
2) The quick-connection cable does not have gray or pink lead wires.

Terminal layout of connector type



* Connector for amplifier (CN-EP4) pin position



Terminal No.	Connection cable
①	Purple
②	White
③	Shield
④	Shield
⑤	Black
⑥	Pink