

FX-301 SERIES

New

Digital Fiber Sensor



Fiber Selection

FX-301

FX-302

Digital Setting

FX-303

FX-CH

Bank Selection Unit

FX-311

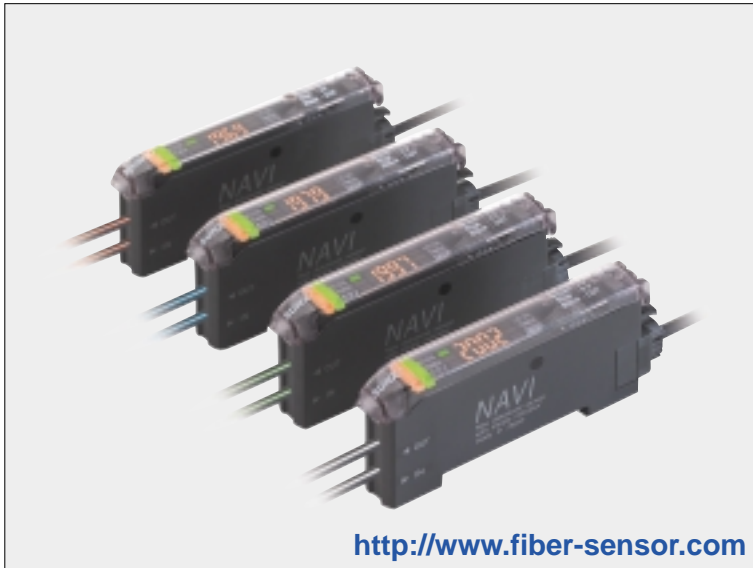
Manually Set

FX-11A

Analog Output

FZ-10

Color Detection



<http://www.fiber-sensor.com>

Superior performance and advanced user-friendly multi-functionality enables expert usage on the very first day

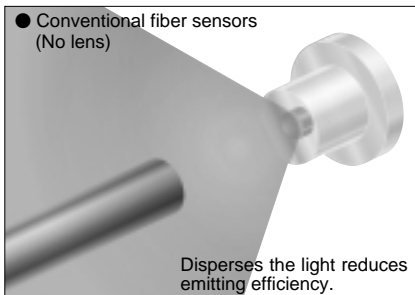
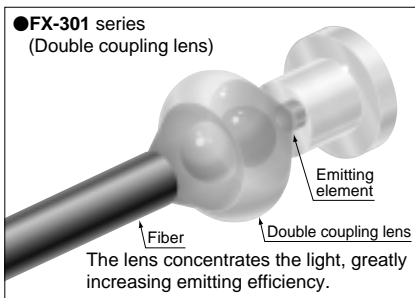
* Passed the UL 991 Environment Test



* UL 61010C-1 compatible, Passed the UL 991 Environment Test based on SEMI S2-0200.
 [Category applicable for semiconductor manufacturing: TWW2, Process Equipment]
 [Applicable standards: UL 61010C-1]
 [Additional test / evaluation standards as per intended use: UL 991, SEMI S2-0200]

Long-range sensing made possible with built-in optical lens

For the first time in the industry, an optical 'double coupling lens' has been incorporated directly into the fiber sensor itself. This lens maximizes the light emission efficiency, resulting in a tremendous improvement in the sensing range. Sensing ranges with small diameter fibers and ultra-small diameter fibers, which have become very popular in recent years due to the miniaturization of chip components, have been increased by 50 % over previous values achieved with other amplifiers.



Stable long-term sensing

The newly developed four-chemical emitting element that uses the **FX-301** (red LED type) suppresses changes over long periods of time as much as possible, so that a stable light emitting level is maintained. There is very little element deterioration so that stable and accurate sensing can be maintained over long periods.

Selectable response time

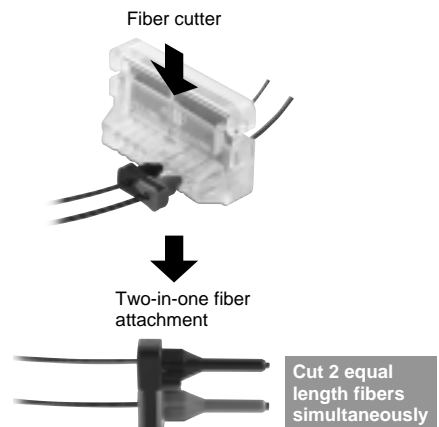
We offer 4 selectable levels to correspond with various applications: the response time 150 μ s FAST mode, the LONG mode, perfect for adverse environments, and the S-D mode, especially made for minute detection.

Selectable sensing range as per the application	
Ex.: the FX-301 fiber sensor and the FT-B8 fiber	
LONG	1,100 mm 43.307 in
Long range mode (LONG): Response time 2 ms	
STD	530 mm 20.866 in
Standard mode (STD): Response time 250 μ s	
FAST	400 mm 15.748 in
High-speed mode (FAST): Response time 150 μ s	
S-D	180 mm 7.087 in
Reduced light intensity mode (S-D): Response time 250 μ s	

※The S-D mode can be set in the red LED type only.

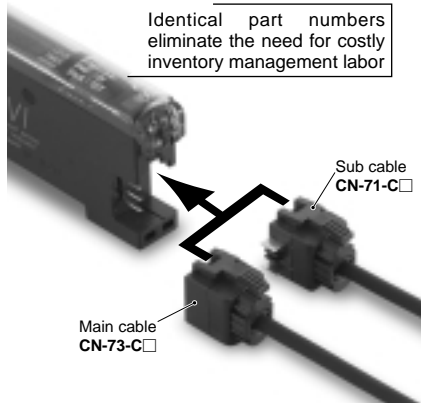
Enhanced worksite-friendly installability

Our new fiber cutter utilizes a specially developed two-in-one fiber attachment that now makes it possible to cut two fibers simultaneously to exactly the same length. Also, since the fibers can be attached to the amplifier while being fixed in position in the two-in-one fiber attachment, sensitivity changes due to variation in the amount of fiber insertion do not occur.



Easy maintenance, as main and sub units are identical

Both main and sub units utilize the same amplifier body. This feature allows for easy mounting in the side-by-side configuration. The main and sub unit functions are distinguished only by the proper use of 3-core main cable and the 1-core sub cable. Moreover, by utilizing the same body for both main and sub units, inventory management and maintenance is simplified.



Wiring- and labor-saving design allows side-by-side configuration for up to sixteen units

Up to sixteen amplifiers can be connected in a side-by-side configuration. As the sub cable contains only one output line, a great amount of wiring and space can be saved. Also, special 'sliding' connectors have been provided for all main and sub cables, which can be detached merely by releasing the lock and pulling directly back, without having to slide the amplifier body to the side. Using this connector system, only a minimal amount of space is required for regular maintenance.




Environmentally friendly packaging





















With regard to effects on the environment, we only utilize the simplest of packaging methods greatly contributing to the reduction in wastes generated by your worksite. Also, the bags are made of polyethylene, a substance that doesn't give off polluting gases when burned.



Even beginners can quickly learn how to use the MODE NAVI



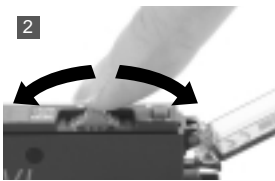

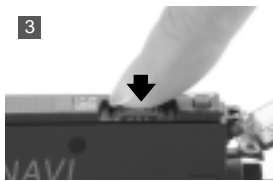

MODE NAVI uses six indicators to display the amplifier's basic operations. The current operating mode can be confirmed at a glance, so even a first time user can easily operate the amplifier without becoming confused.



<p>RUN</p> <p>This is the sensing mode. Incident light level is displayed in the digital display.</p>  <p>PUSH  </p>	<p>TEACH</p> <p>This mode is for setting the threshold value.</p>  <p>PUSH  → </p>	<p>ADJ</p> <p>In this mode, the threshold value, once set, may be fine-tuned.</p>  <p>PUSH  →   </p>
<p>PRO</p> <p>This mode allows the selection of further advanced functions, such as the copying of individual settings and the memory functions.</p>  <p>←  </p>	<p>TIMER</p> <p>This mode permits the choice of using or not using the timer.</p>  <p>←  </p>	<p>L/D ON</p> <p>This mode allows the selection of output operation as either Light-ON or Dark-ON.</p>  <p>←  </p>

The use of only two switches makes for very simple operations

Only two switches, the large jog switch and the large MODE key, are required for operation. Depressing the large MODE key sets the 'mode selection' and 'mode cancel' functions. The large jog switch is used to select from the detailed functions available within each mode, as well as to change numerical values after the mode has been chosen.

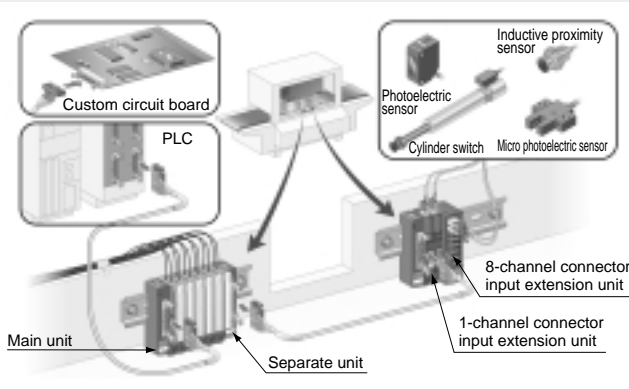
<p>Large MODE key</p> <p>1</p>  <p> Pressing the switch selects or cancels the operating mode</p>	<p>Large jog switch</p> <p>2</p>  <p> Moving the switch from side to side allows items to be selected</p>	<p>3</p>  <p> Pressing the switch then confirms the selected setting</p>
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Optional units for greater freedom and control when installing

Sensor-PLC connection system

SC SERIES

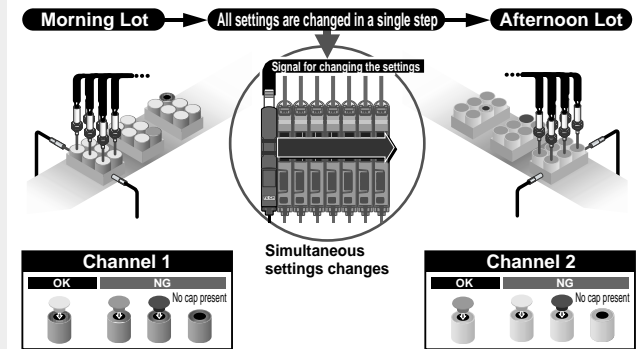
This wire-saving system enables the collective connection of up to 16 I/O devices with an MIL connector. Scattered installation is also possible with the help of a sensor separate unit.
(Refer to p.876 ~ for details)



Bank selection unit

FX-CH SERIES

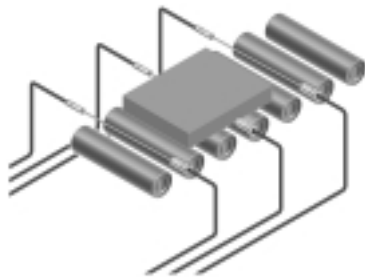
Without directly manipulating the sensor itself, you can simultaneously switch up to 16 fiber sensors' settings using an external emitted signal. (Load and save)
※Also possible with the FX-301 series' databank function
(Refer to p.144 ~ for details)



APPLICATIONS

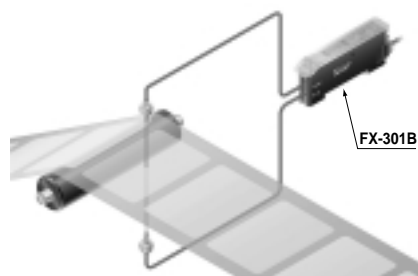
Workpieces detection

This standard type of FX-301 using red light has a four-chemical emitting element for stable sensing over long periods.



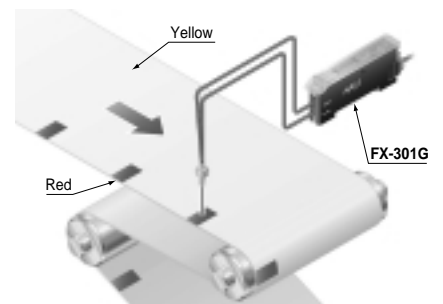
Sensing semi-transparent stickers

The blue LED type greatly reduces the dampening rate, making it ideal for delicate sensing.



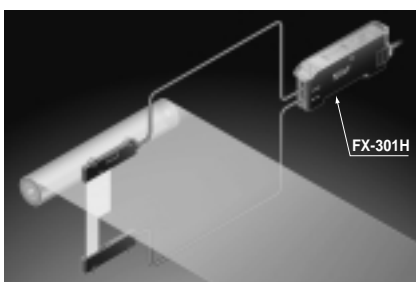
Sensing register marks

The green LED type can accurately discriminate between red and yellow, that cannot be easily detected using red LED type.



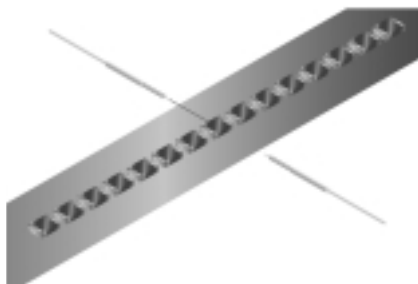
Sensing film meandering

Infrared LED type is ideal for sensing environments with light restrictions, such as places where light-sensitive film is being handled. (The emission peak wavelength: 940 nm 0.037 mil.) It includes full-auto teaching function which allows sensitivity to be set without stopping the workpiece line.



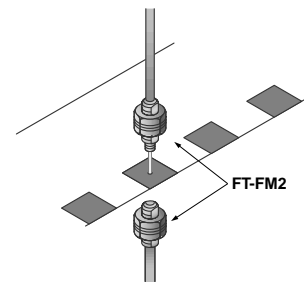
Detecting chip component

Because of low light intensity fluctuations when detecting minute moving objects, decrease the hysteresis in PRO mode and accurate sensing will be possible in high-speed mode. This method is optimal for chip component verification in taping equipment.



Detecting register marks on a transparent sheet

When detecting registration marks on transparent film with a thru-beam type, the S-D (reduced light intensity) mode will enable minute light intensity fluctuation sensing.



SPECIFICATIONS

Amplifiers

Item	Type Model No.	NPN output				PNP output			
		Red LED	Blue LED	Green LED	Infrared LED	Red LED	Blue LED	Green LED	Infrared LED
Supply voltage		12 to 24 V DC \pm 10 % Ripple P-P 10 % or less							
Power consumption		<Red LED / Infrared LED type> Normal operation: 960 mW or less (Current consumption 40 mA or less at 24 V supply voltage) ECO mode: 600 mW or less (Current consumption 25 mA or less at 24 V supply voltage)				<Blue LED / Green LED type> Normal operation: 720 mW or less (Current consumption 30 mA or less at 24 V supply voltage) ECO mode: 430 mW or less (Current consumption 18 mA or less at 24 V supply voltage)			
Output		NPN open-collector transistor • Maximum sink current: 100 mA (50 mA, if five, or more, amplifiers are connected in cascade.) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less (at 100 mA (at 50 mA, if five, or more, amplifiers are connected in cascade) sink current.)				PNP open-collector transistor • Maximum source current: 100 mA (50 mA, if five, or more, amplifiers are connected in cascade.) • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1.5 V or less (at 100 mA (at 50 mA, if five, or more, amplifiers are connected in cascade) source current.)			
	Utilization category	DC-12 or DC-13							
	Output operation	Selectable either Light-ON or Dark-ON, with jog switch							
	Short-circuit protection	Incorporated							
Response time		150 μ s or less (FAST), 250 μ s or less [STD / S-D (Red LED type only)], 2 ms or less (LONG) selectable with jog switch							
Sensitivity setting		2-level teaching / Limit teaching / Manual adjustment / Full auto-teaching (excluding red LED type)							
Operation indicator		Orange LED (lights up when the output is ON)							
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition)							
MODE indicator		RUN: Green LED, TEACH · ADJ · L/D ON · TIMER · PRO: Yellow LED							
Digital display		4 digit red LED display							
Fine sensitivity adjustment function		Incorporated							
Timer function		Incorporated with variable ON-delay / OFF-delay / ONE SHOT timer, switchable either effective or ineffective. (timer period: 0.5 to 500 ms approx.)							
Automatic interference prevention function		Incorporated (Up to four sets of fiber heads can be mounted close together) (Note 1)							
Environmental resistance	Pollution degree	3 (Industrial environment)							
	Ambient temperature	- 10 to +55 °C + 14 to +131 °F (If 4 to 7 units are connected in cascade: - 10 to +50 °C + 14 to +122 °F, if 8 to 16 units are connected in cascade: - 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							
	Ambient illuminance	Sunlight: 10,000 lx at the light-receiving face, Incandescent light: 3,000 lx at the light-receiving face							
	EMC	Red LED type: EN 50081-2, EN 50082-2, EN 60947-5-2 Blue / green / infrared LED type: EN 60947-5-2							
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure (Note 2)							
	Insulation resistance	20 M Ω , or more, with 250 V DC megger between all supply terminals connected together and enclosure (Note 2)							
	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								
Emitting element (modulated)		Red LED	Blue LED	Green LED	Infrared LED	Red LED	Blue LED	Green LED	Infrared LED
Material		Enclosure: Heat-resistant ABS, Case cover: Polycarbonate, Switch: Acrylic							
Connecting method		Connector (Note 3)							
Cable extension		Extension up to total 100 m 328.084 ft is possible with 0.3 mm ² , or more, cable.							
Weight		25 g approx.							

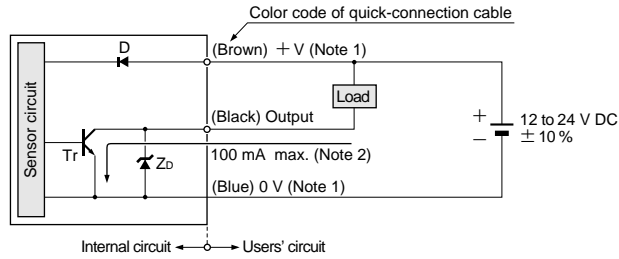
- Notes: 1) When the power supply is switched on, the emission timing are automatically set for interference prevention.
 2) The voltage withstandability and the insulation resistance values given in the above table are for the amplifier only.
 3) The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cable given below.
 Main cable (3-core): **CN-73-C1** (cable length 1 m 3.281 ft), **CN-73-C2** (cable length 2 m 6.562 ft), **CN-73-C5** (cable length 5 m 16.404 ft)
 Sub cable (1-core): **CN-71-C1** (cable length 1 m 3.281 ft), **CN-71-C2** (cable length 2 m 6.562 ft), **CN-71-C5** (cable length 5 m 16.404 ft)

FX-301

I/O CIRCUIT AND WIRING DIAGRAMS

NPN output type

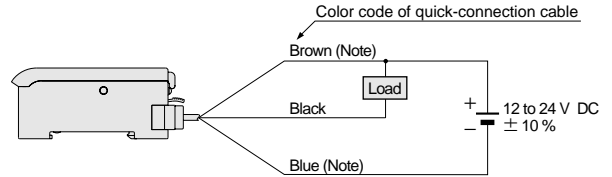
I/O circuit diagram



Notes: 1) The quick-connection sub cable does not have + V (brown) and 0 V (blue).
2) 50 mA max., if five amplifiers, or more, are connected together.

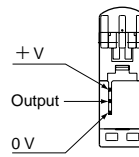
Symbols ... D : Reverse supply polarity protection diode
Zd: Surge absorption zener diode
Tr : NPN output transistor

Wiring diagram



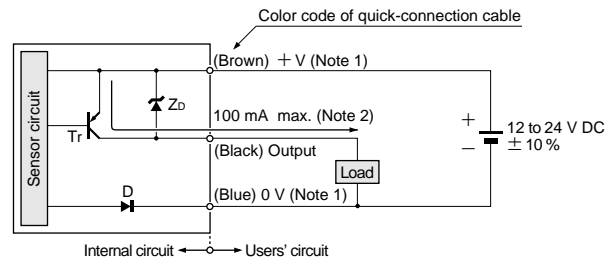
Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.

Terminal arrangement diagram



PNP output type

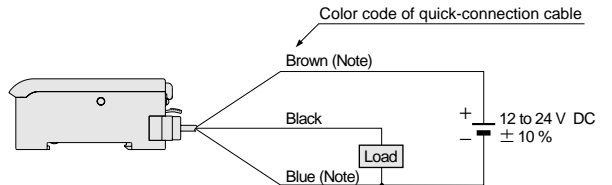
I/O circuit diagram



Notes: 1) The quick-connection sub cable does not have + V (brown) and 0 V (blue).
2) 50 mA max., if five amplifiers, or more, are connected together.

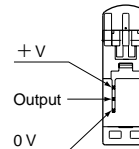
Symbols ... D : Reverse supply polarity protection diode
Zd: Surge absorption zener diode
Tr : PNP output transistor

Wiring diagram



Note: The quick-connection sub cable does not have brown lead wire and blue lead wire.

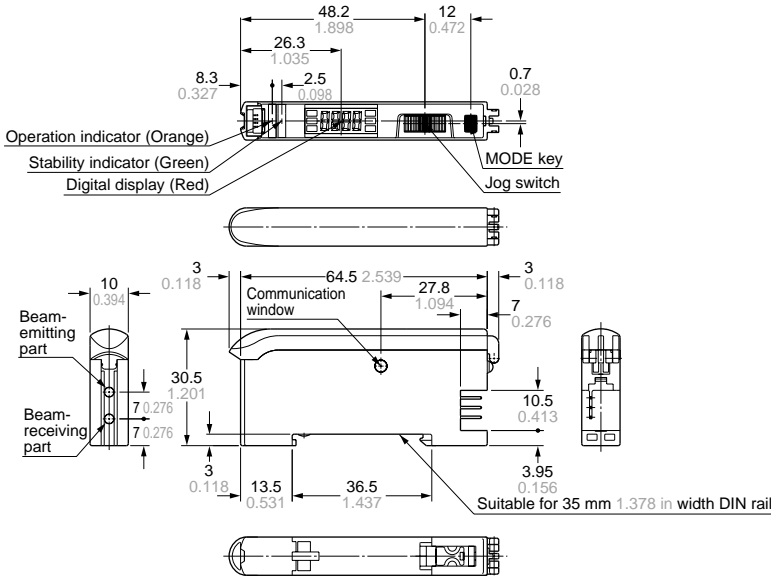
Terminal arrangement diagram



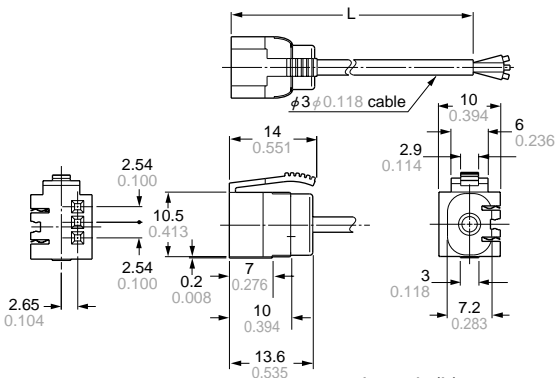
FX-301

DIMENSIONS (Unit: mm in) The CAD data in the dimensions can be downloaded from the SUNX fiber sensor website: <http://www.fiber-sensor.com/>

FX-301 **FX-301P** Amplifier



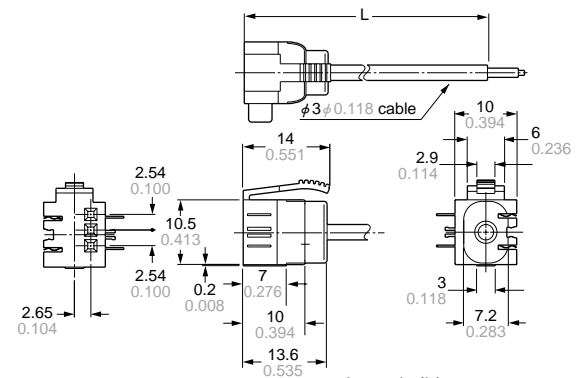
CN-73-C1 CN-73-C2 CN-73-C5 Main cable (Optional)



• Length (L)

Model No.	Length (mm in)
CN-73-C1	1,000 39.370
CN-73-C2	2,000 78.740
CN-73-C5	5,000 196.850

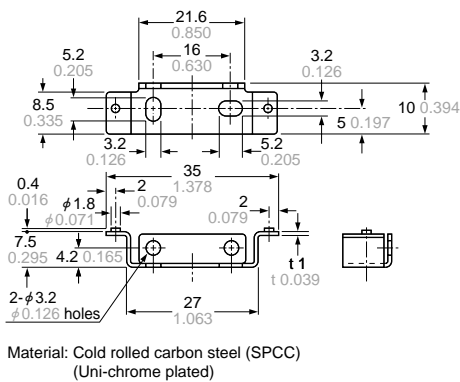
CN-71-C1 CN-71-C2 CN-71-C5 Sub cable (Optional)



• Length (L)

Model No.	Length (mm in)
CN-71-C1	1,000 39.370
CN-71-C2	2,000 78.740
CN-71-C5	5,000 196.850

MS-DIN-2 Amplifier mounting bracket (Optional)



MS-DIN-E End plate (Optional)

