

High Performance Digital Fiber Sensor

The FX-300 series of digital fiber optic sensors offers a wide range of sensing possibilities in a compact, high-performance unit. Three types are available for optimal application coverage including the standard type (FX-301), high-function type (FX-305), and the high-speed type (FX-301-HS).

The core of the FX-300 series revolves around five main concepts for superior sensor performance:

- **High Stability**

SUNX has developed a system that drastically increases the long and short term stability of their FX-300 series fiber optic sensors.

- **Four-Chemical Element LED:** Primary to that system is the adoption of a four-chemical element LED light source that demonstrates unmatched stability in light output over time.
- **Auto Power Control (APC):** To enhance the stability further, SUNX also has integrated an 'Auto Power Control (APC)' circuit which combats short-term fluctuation in light emission due to ambient conditions.
- **Double Coupling Lens:** These two features are then used to their full advantage by adding a double coupling lens to focus the emitted light, impressively increasing the overall efficiency and detection distance of the sensor.

- **Superior Performance**

The FX-300 series has incorporated several functions that improve on the performance of previous models.

- **Light Output Level Selection:** The new light output emission function allows for the user to adjust the light output intensity without effecting the response time of the sensor. This is great for applications that are inhibited by close range sensing that result in an over-saturation of the sensor.
- **Large Four Digit Display:** The large 4-digit display also increases the saturation point to 9999 to provide better sensing at close range.
- **High Speed:** Ultra fast response times are also available with the high-speed type, FX-301-HS. Demonstrating a 35-microsecond response time, this can handle the most demanding speed requirements.
- **New Operating Modes:** By using the **window comparator mode** and the **differential sensing mode**, users can now perform sensing operations that once needed two sensors and complex threshold settings.
- **Five Timer Types:** In addition to the **ON-Delay**, **OFF-Delay**, and **ONE-SHOT** timers that are found in many conventional fiber sensors, the SUNX FX-300 series incorporates combination timers: **ON+OFF Delay** and **ON-Delay+ONE-SHOT**
- **Multi-Purpose Dual Output:** Two independent discrete outputs are available (FX-305) so that one sensor can be used to control tasks that previously required two sensors. In addition, the secondary output can be used for simple self-diagnosis or an alarm output so that ease on maintenance is improved.

- **Easy Operation**

The FX-300 series was designed around ease of use. The incorporation of a user-friendly jog-dial simplifies operation and maintenance. Beginners and advanced users alike will benefit from the intuitive programming and operation, thus, keeping the learning curve to a minimum.

- **Mode NAVI:** Six easy-to-see indicators surround the main display allowing quick and easy confirmation of the operating mode. Also, the threshold value can be conveniently checked at the touch of a button.
- **Key Lock Function:** The key lock function is a very useful feature in avoiding accidental changes to the sensor settings. The jog switch as well as the mode button is disabled to prevent any unwanted modifications.

- **Easy Maintenance**

SUNX has developed several new features/accessories that simplify sensor maintenance so you spend less time configuring the sensor and more time using it.

- **New Communication Unit:** The new **SC-GU1-485** communication unit allows for complete remote access to sensor settings. Functions such as teaching and data bank switching can now be performed via a PLC. All sensor

attributes, including incident light readings and threshold values, can also be conveniently checked without requiring access to the sensor amplifier. This is great for applications where the sensor may not be easily accessible for maintenance operations. The RS-485 based communication unit allows for 16 sensors per node, and up to 31 nodes. It is now possible to remotely control up to 496 sensors!

- o **External Input Unit:** The **FX-CH2** external input unit is useful when full access to all sensor functions is not necessary. This unit allows for external teaching and data bank switching for up to 16 sensors at one time.
- o **Easy Wiring:** The easy quick-connect wiring of the FX-300 series allows for any unit to be set up as a main or a sub unit, simply by changing the wire. The removable wiring also salvages the sensor in the event that the wiring is accidentally severed. This allows the user to just replace the wire, not the entire sensor.
- o **Optical Communication Function:** The optical communication function makes it easy to copy settings to up to 16 sensors connected together. This saves the time of setting up each sensor individually.
- o **Quick Set-Up Code:** Restoring settings has never been easier than with the quick set-up code that is built into the FX-300 series. Once initial set-up is completed, write down the four digit code and in the event that sensor settings are reset, the user can quickly restore the sensor back to operation.

- **Eco-Friendly**

- o **Pb Free:** SUNX promotes the use of lead-free materials in all of its sensor manufacturing processes including those used for the FX-300 series of digital fiber sensors.
- o **Reduced Power Consumption (ECO Mode):** The FX-300 series also had an available Eco-mode that reduces the power consumption from 960mW to 600mW by turning off the display during operation.

SUNX offers a complete line of over 180 different fiber heads to suit any of your detection needs, including diffuse-reflective (FD Series), retro-reflective (FR Series), and thru-beam (FT Series) types.

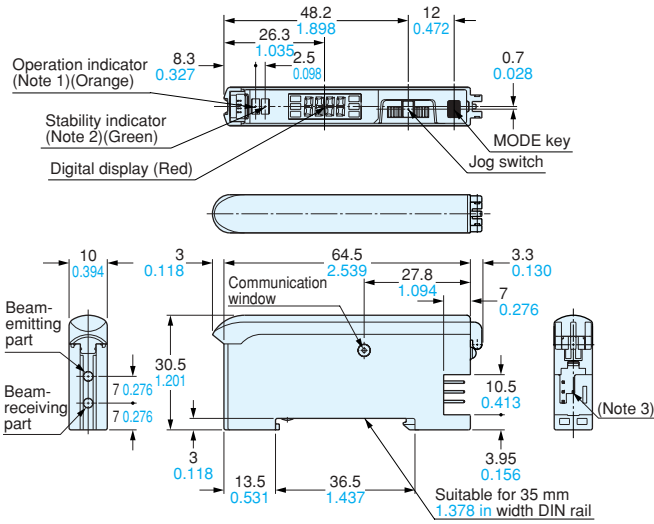


Model Name	Type	Emitting Element	Supply Voltage	Output Configuration	Output Operation	Teaching Method	Number Of Outputs
Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼	Sort ▲ ▼
FX-301	Standard Type	Red LED	12-24VDC	NPN	Light-ON/Dark-ON	Automatic	1
FX-301P	Standard Type	Red LED	12-24VDC	PNP	Light-ON/Dark-ON	Automatic	1
FX-305	High Function Type	Red LED	12-24VDC	NPN	Light-ON/Dark-ON	Automatic	2

FX-300

DIMENSIONS (Unit: mm in)

FX-301 □
FX-305 □ Amplifier

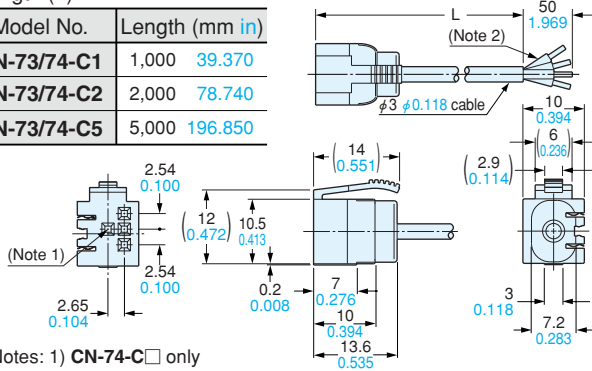


- Notes: 1) **FX-305** □; Output 1 operation indicator (Orange)
2) **FX-305** □; Output 2 operation indicator (Orange)
3) **FX-301** □; 3-pin, **FX-305** □; 4-pin

CN-73-C □
CN-74-C □ Main cable (Optional)

• Length (L)

Model No.	Length (mm in)
CN-73/74-C1	1,000 39.370
CN-73/74-C2	2,000 78.740
CN-73/74-C5	5,000 196.850

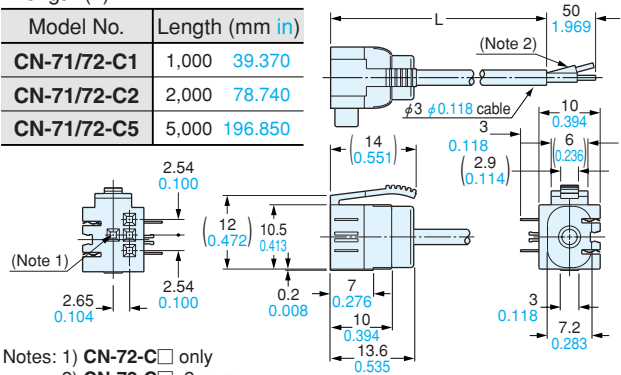


- Notes: 1) **CN-74-C** □ only
2) **CN-74-C** □; 4-core

CN-71-C □
CN-72-C □ Sub cable (Optional)

• Length (L)

Model No.	Length (mm in)
CN-71/72-C1	1,000 39.370
CN-71/72-C2	2,000 78.740
CN-71/72-C5	5,000 196.850



- Notes: 1) **CN-72-C** □ only
2) **CN-72-C** □; 2-core

SPECIFICATIONS

Item	Model No.	Type	Standard type				High-speed type	High-function type
			Red LED	Blue LED	Green LED	Infrared LED		
			NPN output	FX-301	FX-301B	FX-301G	FX-301H	FX-301-HS
PNP output	FX-301P	FX-301BP	FX-301GP	FX-301HP	FX-301P-HS	FX-305P		
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 output type> 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.]				<NPN output type> NPN open-collector transistor 2 outputs • Maximum sink current: 50 mA each (Note 1) • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1.5 V or less [at 50 mA (Note 1)]			
	<PNP output type> 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.]				<PNP output type> PNP open-collector transistor 2 outputs • Maximum source current: 50 mA each (Note 1) • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1.5 V or less [at 50 mA (Note 1)]			
	Output operation	Selectable either Light-ON or Dark-ON, with jog switch						
Short-circuit protection	Incorporated							
Response time	65 μ s or less [H-SP (Red LED type only)], 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				35 μ s or less (H-SP), 150 μ s or less (FAST), 250 μ s or less (STD / S-D), 2 ms or less (LONG), selectable with jog switch		65 μ s or less (H-SP), 150 μ s or less (FAST), 250 μ s or less (STD), 700 μ s or less (STDF), 2.5 ms or less (LONG), 4.5 ms or less (U-LG), selectable with jog switch	
Sensitivity setting	2-level teaching / Limit teaching / Manual adjustment / Full-auto teaching / Max. sensitivity teaching				Normal mode: 2-level teaching / Limit teaching / Full-auto teaching / Max. sensitivity teaching / Manual adjustment Window comparator mode: Teaching (1-level / 2-level / 3-level) / Manual adjustment			
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: Red LED type; 0.5 ms approx., 1 ms to 9999 ms] [Blue LED, Green LED, Infrared LED type; approx. 0.5 ms to 500 ms]				Incorporated with variable ON-delay / OFF-delay / ONE-SHOT / ON-delay · OFF-delay / ON-delay · ONE-SHOT timer, switchable either effective or ineffective. (Timer period: Output 1; 0.5 ms, 1 ms to 9999 ms, Output 2; 0.5 ms, 1 ms to 500 ms)			
Light emitting amount selection function	Incorporated (Red LED type only)(Note 2) FAST, STD, LONG: 4 level, H-SP: 3 level, S-D: 2 level				Incorporated (Note 2) FAST, STD, LONG: 4 level H-SP, S-D: 2 level		Incorporated (Note 2) FAST, STD, STDF, LONG, U-LG: 4 level H-SP: 3 level	
Automatic interference prevention function	Incorporated (Up to four sets of fiber heads can be mounted close together. However, H-SP mode is 2 fiber heads.)(Note 3)				—————		Incorporated [Up to four sets of fiber heads can be mounted close together. (However, U-LG mode is 8 fiber heads, H-SP mode is 2 fiber heads.)] (Note 4)	
Environmental resistance	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 ℓ x at the light-receiving face, Incandescent light: 3,000 ℓ x at the light-receiving face						
	Voltage withstandability	1,000 V AC for one min. between all supply terminals connected together and enclosure (Note 5)						
	Insulation resistance	20 M Ω , or more, with 250 V DC megger between all supply terminals connected together and enclosure (Note 5)						
	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	Red LED		
Material	Enclosure: Heat-resistant ABS, Case cover: Polycarbonate, MODE key: Acrylic, Jog switch: Heat-resistant ABS (FX-301B/G/H: Acrylic)							
Connecting method	Connector (Note 6)							
Cable extension	Extension up to total 100 m 328.084 ft (50 m 164.042 ft for 5 to 8 units, 20 m 65.617 ft for 9 to 16 units) is possible with 0.3 mm ² , or more, cable.							
Weight	Net weight: 20 g approx., Gross weight: 25 g approx.							

Notes: 1) 50 mA per output. 25 mA if five, or more, amplifiers are connected in cascade.

2) The light emitting amount can be zero (emission halt) in all modes.

3) When the power supply is switched on, the light emission timing is automatically set for interference prevention.

4) When the interference prevention function 'IP-2' is set, the number of mountable fiber heads becomes double. Furthermore, take care that the response time also becomes double.

5) The voltage withstandability and the insulation resistance values given in the above table are for the amplifier only.

6) The cable for amplifier connection is not supplied as an accessory. Make sure to use the optional quick-connection cables given below.

Main cable (3-core) for FX-301(P)(-HS): 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) for FX-301(P)(-HS): 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)

Main cable (4-core) for FX-305(P): CN-74-C1 (Cable length 1 m 3.281 ft), CN-74-C2 (Cable length 2 m 6.562 ft), CN-74-C5 (Cable length 5 m 16.404 ft)

Sub cable (2-core) for FX-305(P): CN-72-C1 (Cable length 1 m 3.281 ft), CN-72-C2 (Cable length 2 m 6.562 ft), CN-72-C5 (Cable length 5 m 16.404 ft)