Information of Discontinued Models

SUNX

Created November 2004

Slim body digital / auto / manual setting fiber sensor
FX-D1/A1/M1 series

Stopping taking order date: 30, Sep, 2005
Date of production discontinuance: 31, Dec, 2005

Discontinued models

Slim body digital / auto / manual setting fiber sensor
FX-D1/A1/M1 series

※Confirm that table in
Main points of difference between recommended replacements and discontinued models for details on model numbers for each type.

Recommended replacements

Digital fiber sensor
FX-300 series

Manually set fiber sensor
FX-311 series

Refer to 'Manually set fiber sensor **FX-311** series catalog' or 'Digital fiber sensor **FX-300** series catalog' for details.

Advantages of switching to recommended replacements

Increased sensing ranges

A double coupling lens has been adopted, so that light emitting efficiency has been increased to maximum limits.
Sensing ranges with small diameter fibers and ultra-small diameter fibers, have been increased by 50 % over previous values achieved with other amplifiers.

Stable sensing

The red LED type utilizes a 'four-chemical emitting element' to maintain a stable light emitting amount over long periods.
In addition, the digital fiber sensors are provided with an APC (auto power control) circuit to ensure light emitting amounts are stable over short periods, so that stable sensing can be obtained.

Digital display

The digital fiber sensors are equipped with a 4-digit display. This can be used for confirming incident light intensity, threshold value settings and a variety of other function displays.

MODE NAVI

The digital fiber sensors utilize a MODE NAVI function that is both multifunctional and easy operation. Basic sensor operations are indicated by means of six indicators, so even a first time user can easily operate the amplifier without becoming confused.

Wire-saving

A main cable and a sub cable enable the amount of wiring used to be reduced when the sensors are mounted close together.

Notes on using recommended replacements

Recommended replacements	Sensing performance	Specifications	Output circuit	Mounting dimensions	Dimensions	Enclosure color
FX-300 series	◎	◎	○	○	※	※
FX-311 series	◎	◎	○	○	※	※

◎: Highly interchangeable ○: Almost no difference
※: Large differences –: No corresponding item or model

- High degree of interchangeability in specifications, mounting dimensions and operability, so that replacement of the **FX-D1/A1/M1** series with the **FX-300/311** series can be carried out smoothly.
- The **FX-A1/M1** series is equipped with self-diagnosis output, but the **FX-300/311** series is not.
- Cable types and connector types both must be changed to quick-connection cables.

Main points of difference between recommended replacements and discontinued models

● Digital setting · Equipped with two sensing outputs

Discontinued models: Model No.	Light source		Recommended replacements: Model No.	Light source	Main points of difference from discontinued models
FX-D1	Red LED	→	**FX-305**	Red LED	● Recommended replacements are connector types. ● Recommended replacements require the use of a quick-connection cable (**CN-74-C**□). Note: The recommended replacement for the **FX-D1-C5** requires the use of a quick-connection cable (**CN-74-C5**).
FX-D1-C5	Red LED	→	**FX-305** (Note)	Red LED	
FX-D1J	Red LED	→	**FX-305**	Red LED	
FX-D1P	Red LED	→	**FX-305P**	Red LED	
FX-D1PJ	Red LED	→	**FX-305P**	Red LED	

● Auto-setting · Equipped with self-diagnosis output

Discontinued models: Model No.	Light source		Recommended replacements: Model No.	Light source	Main points of difference from discontinued models
FX-A1	Red LED	→	**FX-301**	Red LED	● Recommended replacements are connector types. ● Recommended replacements require the use of a quick-connection cable (**CN-73-C**□). Note: The recommended replacement for the **FX-A1-C5, FX-A1G-C5** requires the use of a quick-connection cable (**CN-73-C5**).
FX-A1-C5	Red LED	→	**FX-301** (Note)	Red LED	
FX-A1J	Red LED	→	**FX-301**	Red LED	
FX-A1P	Red LED	→	**FX-301P**	Red LED	
FX-A1PJ	Red LED	→	**FX-301P**	Red LED	
FX-A1G	Green LED	→	**FX-301G**	Green LED	
FX-A1G-C5	Green LED	→	**FX-301G** (Note)	Green LED	
FX-A1GJ	Green LED	→	**FX-301G**	Green LED	

● Manual setting · Equipped with self-diagnosis output

Discontinued models: Model No.	Light source		Recommended replacements: Model No.	Light source	Main points of difference from discontinued models
FX-M1	Red LED	→	**FX-311**	Red LED	● Recommended replacements are connector types. ● Recommended replacements require the use of a quick-connection cable (**CN-73-C**□). Note: The recommended replacement for the **FX-M1-C5, FX-M1G-C5** requires the use of a quick-connection cable (**CN-73-C5**).
FX-M1-C5	Red LED	→	**FX-311** (Note)	Red LED	
FX-M1J	Red LED	→	**FX-311**	Red LED	
FX-M1P	Red LED	→	**FX-311P**	Red LED	
FX-M1PJ	Red LED	→	**FX-311P**	Red LED	
FX-M1G	Green LED	→	**FX-311G**	Green LED	
FX-M1G-C5	Green LED	→	**FX-311G** (Note)	Green LED	
FX-M1GJ	Green LED	→	**FX-311G**	Green LED	

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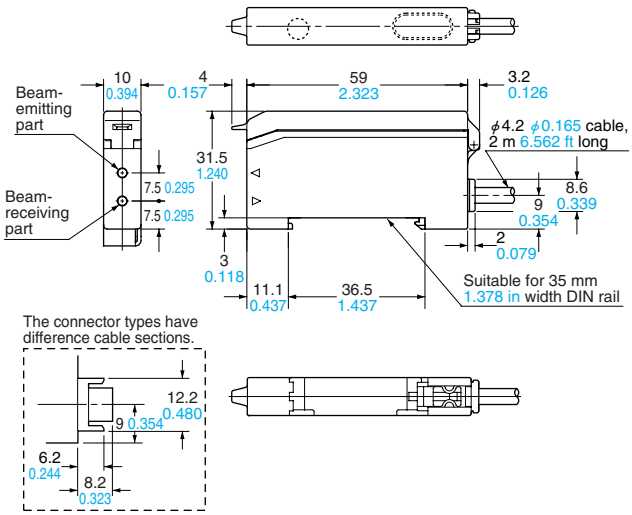
Dimensions (Unit: mm in)

Discontinued models

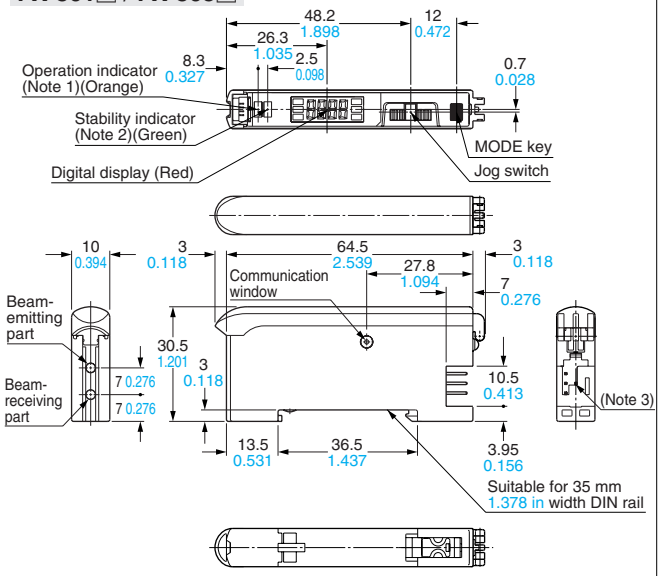
FX-D1/A1/M1 series



Recommended replacements

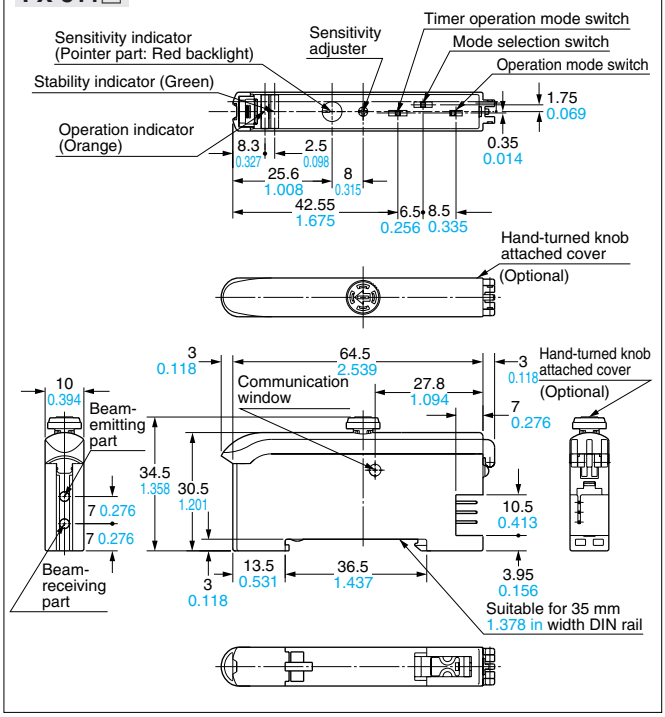
FX-300 series, **FX-311** series

FX-301□ / FX-305□



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

FX-311□



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Slim body digital / auto / manual setting fiber sensor FX-D1/A1/M1 series

Sensing performance

Discontinued models
FX-D1/A1/M1 series

Fiber	Sensing range (mm in) (Note)	Min. sensing object
Thru-beam type **FT-FM2**	380 14.961	ϕ0.12 mm ϕ0.005 in opaque object
Reflective type **FD-FM2**	140 5.512	ϕ0.01 mm ϕ0.0004 in gold wire

Recommended replacements
FX-300 series, FX-311 series

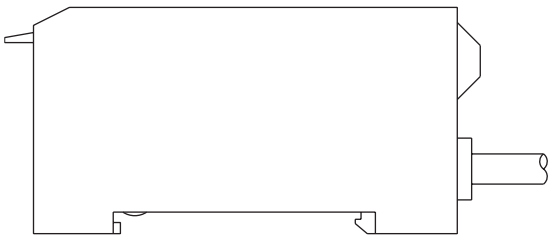
Fiber	Sensing range (mm in) (Note) ■: LONG ■: STD	Min. sensing object
Thru-beam type **FT-FM2**	780 30.709 400 15.748	ϕ0.03 mm ϕ0.0011 in opaque object
Reflective type **FD-FM2**	310 12.205 140 5.512	ϕ0.02 mm ϕ0.0008 in gold wire

Note: The sensing range is the value for red LED type.

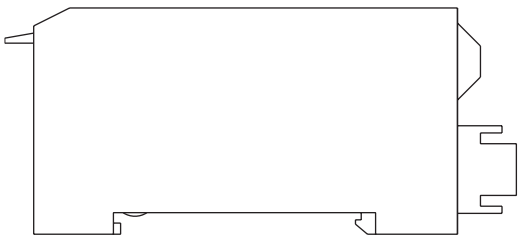
Examples of product configurations

Discontinued models
FX-D1/A1/M1 series

Cable connection type



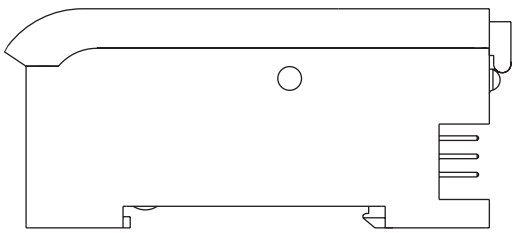
Connector connection type



※The **CN-54-C**□ cable with connector must be used.

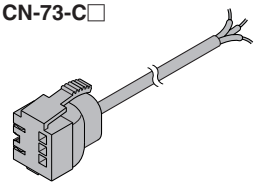
Recommended replacements
FX-300 series, FX-311 series

Connector connection type

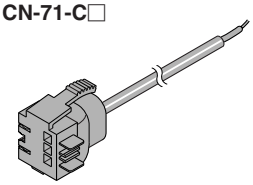


※The **CN-71-C**□ (**FX-305**: **CN-74-C**□) quick-connection cable must be used. Quick-connection cable is not supplied with the amplifier. Please order it separately.
※When mounting close together, you can reduce the amount of wiring used by using the **CN-71-C**□ (**FX-305**: **CN-72-C**□) quick-connection cable.

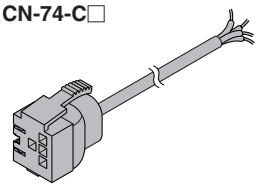
Main cable
CN-73-C□



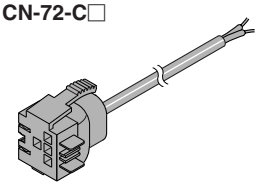
Sub cable
CN-71-C□



Main cable
CN-74-C□



Sub cable
CN-72-C□



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Slim body digital / auto / manual setting fiber sensor FX-D1/A1/M1 series

Main points of difference in rated specifications

Item \ Type	Discontinued models	Recommended replacements
	Digital setting	High-functional type
Basic model No. / NPN output	FX-D1	FX-305
Basic model No. / PNP output	FX-D1P	FX-305P
Emitting element	Red LED	
Supply voltage	12 to 24 V DC ± 10 % Ripple P-P 10 % or less	
Current / Power consumption	45 mA or less	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)
Sensing output	<NPN output type> NPN open-collector transistor 2 outputs • Maximum sink current: 100 mA each • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current.) 0.4 V or less (at 16 mA sink current.) <PNP output type> PNP open-collector transistor 2 outputs • Maximum source current: 100 mA each • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1 V or less (at 100 mA source current.) 0.4 V or less (at 16 mA source current.)	<NPN output type> NPN open-collector transistor 2 outputs • Maximum sink current: 50 mA each (25 mA each, 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 50 mA (at 25 mA, if five, or more, amplifiers are connected in cascade) sink current.] <PNP output type> PNP open-collector transistor 2 outputs • Maximum source current: 50 mA each (25 mA each, 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 50 mA (at 25 mA, if five, or more, amplifiers are connected in cascade) source current.]
Output operation	Selectable either Light-ON or Dark-ON, with jog switch	
Response time	0.5 ms or less (Emission Frequency 1) 0.65 ms or less (Emission Frequency 2) 0.75 ms or less (Emission Frequency 3)	65 μs or less (H-SP), 150 μs or less (FAST), 250 μs or less (STD), 700 μs or less (STDF), 2.5 ms or less (LONG), 4.5 ms or less (U-LG), selectable with jog switch
Sensitivity adjuster	———	———
Timer function	Incorporated with ON-delay / OFF-delay timer, switchable either effective or ineffective.	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 to 9999 ms, Output 2; 0.5 ms, 1 to 500 ms)
Automatic interference prevention function	Incorporated (Three units of sensors can be mounted close together.)	Incorporated [Up to 4 sets of fiber heads can be mounted close together. (However, up to 8 sets of fiber heads in U-LG mode and up to 2 sets of fiber heads in H-SP mode.)] (Note)
Sensitivity setting	2-level teaching / Limit teaching / Full-auto 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
Ambient temperature	0 to + 50 °C 32 to + 122 °F (No dew condensation or icing allowed), Storage: − 20 to + 70 °C − 4 to + 158 °F	− 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
Material	Enclosure: Heat-resistant ABS, Case cover: Polycarbonate Fiber lock lever: PES	Enclosure: Heat-resistant ABS, Case cover: Polycarbonate MODE key: Acrylic, Jog switch: Heat-resistant ABS
Connecting method	Cable type 0.2 mm² 4-core cabtyre cable, 2 m 6.562 ft long	Connector (The quick-connection cable is a 4-core or 2-core cable.)
Weight	70 g approx.	20 g approx.
Accessories	**MS-DIN-2** (Amplifier mounting bracket): 1 No.	———

Note: When the interference prevention function ' ｲﾝﾀｰﾌ ' is set, the number of mountable fiber heads becomes double. Furthermore, take care that the response time also becomes double.

Refer to 'Digital fiber sensor **FX-305** series catalog' for details.

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Main rated specifications

Item \ Type	Discontinued models		Recommended replacements	
	Auto-setting	Manual setting	Digital (Auto) setting	Manual setting
Basic model No. / NPN output	FX-A1	FX-M1	FX-301	FX-311
Basic model No. / PNP output	FX-A1P	FX-M1P	FX-301P	FX-311P
Emitting element	Red LED			
Supply voltage	12 to 24 V DC ± 10 % Ripple P-P 10 % or less			
Current / Power consumption	50 mA or less	45 mA or less	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)	
Sensing output	<NPN output type> NPN open-collector transistor • Maximum sink current: 100 mA • Applied voltage: 30 V DC or less (between output and 0 V) • Residual voltage: 1 V or less (at 100 mA sink current.) 0.4 V or less (at 16 mA sink current.) <PNP output type> PNP open-collector transistor • Maximum source current: 100 mA • Applied voltage: 30 V DC or less (between output and + V) • Residual voltage: 1 V or less (at 100 mA source current.) 0.4 V or less (at 16 mA source current.)		<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.] <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.]	
Output operation	Selectable either Light-ON or Dark-ON, with jog switch [**FX-M1**(**P**): selection switch]			
Response time	0.5 ms or less (Emission Frequency 1) 0.65 ms or less (Emission Frequency 2) 0.75 ms or less (Emission Frequency 3)		65 μs or less (H-SP), 150 μs or less (FAST), 250 μs or less (STD / S-D), 2 ms or less (LONG), selectable with jog switch	
Sensitivity adjuster	———	Incorporated with 12-turn potentiometer with indicator	———	12-turn potentiometer with indicator (Pointer part: red backlight)
Timer function	Incorporated with approx. 40 ms fixed OFF-delay timer, switchable either effective or ineffective		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 to 9999 ms (Blue LED, Green LED, Infrared LED type; approx. 0.5 to 500 ms)]	Incorporated with OFF-delay timer, selectable either effective (10 ms or 40 ms approx.) or ineffective
Automatic interference prevention function	Incorporated (Three units of sensors can be mounted close together.)		Incorporated [Up to 4 sets of fiber heads can be mounted close together. However, up to 2 sets of fiber heads in H-SP mode. (Note)]	Incorporated [Up to 4 sets of fiber heads can be mounted close together.]
Sensitivity setting	2-level teaching / Limit teaching / Full-auto teaching		2-level teaching / Limit teaching / Manual adjustment / Full-auto teaching / Max. sensitivity teaching	
Ambient temperature	0 to + 50 °C 32 to + 122 °F (Auto-setting type: − 10 to + 50 °C + 14 to + 122 °F) (No dew condensation or icing allowed), Storage: − 20 to + 70 °C − 4 to + 158 °F		− 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	
Material	Enclosure: Heat-resistant ABS, Case cover: Polycarbonate Fiber lock lever: PES		Enclosure: Heat-resistant ABS Case cover: Polycarbonate MODE key: Acrylic Jog switch: Heat-resistant ABS	Enclosure: Heat-resistant ABS Case cover: Polycarbonate
Connecting method	Cable type 0.2 mm² 4-core cabtyre cable, 2 m 6.562 ft long		Connector (for quick-connection cable)	
Weight	70 g approx.		20 g approx.	15 g approx.
Accessories	**MS-DIN-2** (Amplifier mounting bracket): 1 No.	**MS-DIN-2** (Amplifier mounting bracket): 1 No. Adjusting screwdriver: 1 No.	———	

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

Refer to 'Manually set fiber sensor **FX-311** series catalog' or 'Digital fiber sensor **FX-300** series catalog' for details.