

Information of Discontinued Models

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

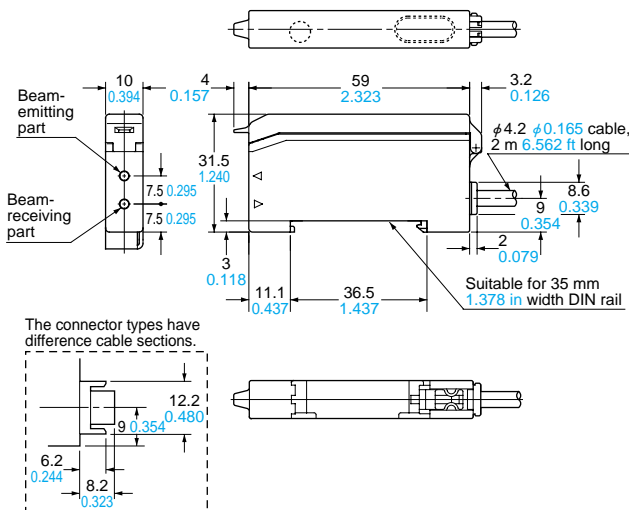
- High degree of interchangeability in specifications, mounting dimensions and operability, so that replacement of the FX-D1/A1/M1 series with the FX-300/311 series can be carried out smoothly.
- The FX-A1/M1 series is equipped with self-diagnosis output, but the FX-300/311 series is not.
- Cable types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

Main points of difference between recommended replacements and discontinued models

| Discontinued models | | Recommended replacements | | Main points of difference from discontinued models | |
|--|--------------|--------------------------|----------------|--|---|
| ● Digital setting · Equipped with two sensing outputs | | | | | |
| Model No. | Light source | → | Model No. | Light source | |
| FX-D1 | Red LED | → | FX-305 | Red LED | <ul style="list-style-type: none">● 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 | | | | | |
| Model No. | Light source | → | Model No. | Light source | |
| FX-A1 | Red LED | → | FX-301 | Red LED | <ul style="list-style-type: none">● 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 | | | | | |
| Model No. | Light source | → | Model No. | Light source | |
| FX-M1 | Red LED | → | FX-311 | Red LED | <ul style="list-style-type: none">● 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 | |

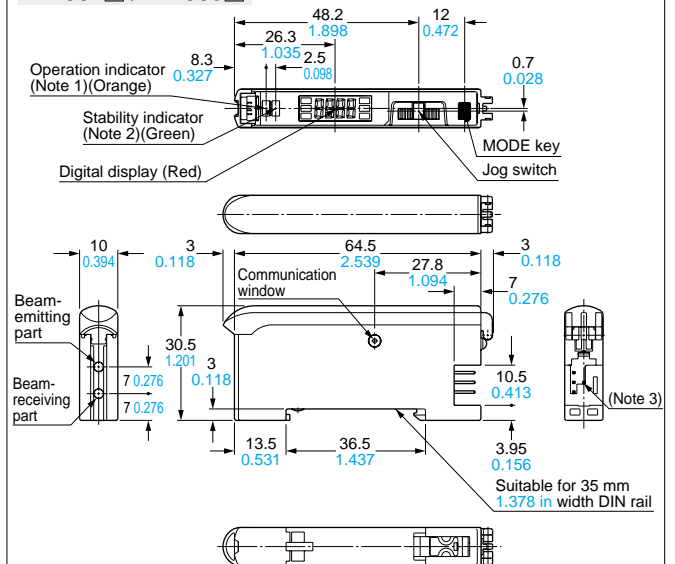
Dimensions (Unit: mm in)

Discontinued models FX-D1/A1/M1 series



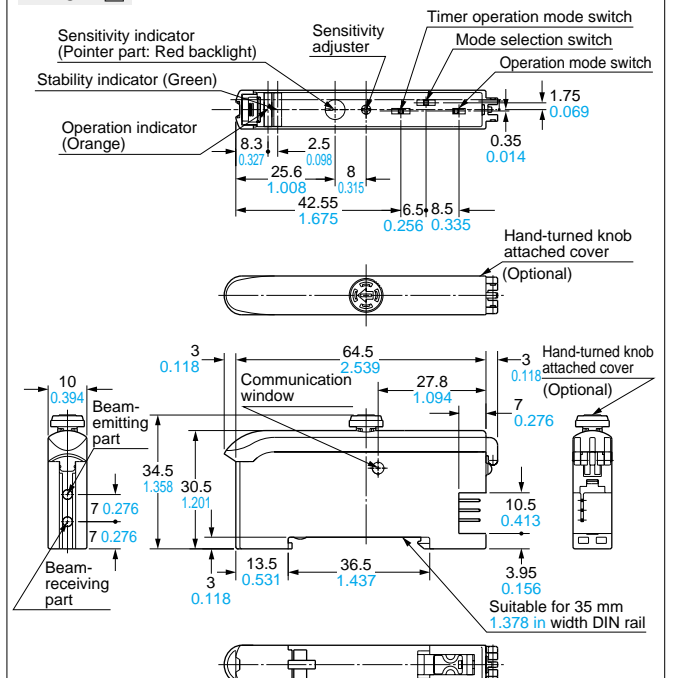
Recommended replacements FX-300 series, FX-311 series

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□







Information of Discontinued Models

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 | φ 0.12 mm φ 0.005 in opaque object |
| Reflective type FD-FM2 |  140 5.512 | φ 0.01 mm φ 0.0004 in gold wire |

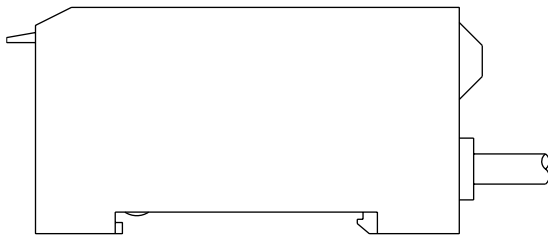
Note: The sensing range is the value for red LED type.

| 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 | φ 0.03 mm φ 0.0011 in opaque object |
| Reflective type FD-FM2 |  310 12.205  140 5.512 | φ 0.02 mm φ 0.0008 in gold wire |

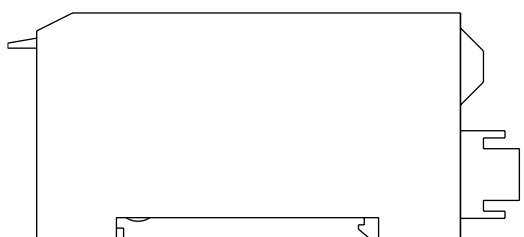
Examples of product configurations

Discontinued models
FX-D1/A1/M1 series

Cable connection type



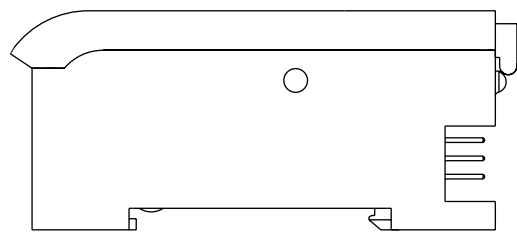
Connector connection type



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

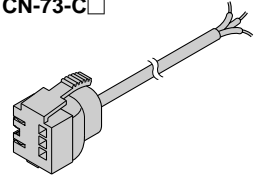
Recommended replacements
FX-300 series, FX-311 series

Connector connection type

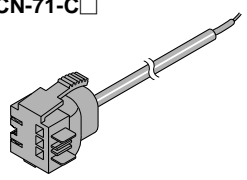


※The **CN-71-C□** (FX-305: **CN-74-C□**) quick-connection cable must be used. Quick-connection cable is not supplied with the amplifier. Please order it separately.
 ※When mounting close together, you can reduce the amount of wiring used by using the **CN-71-C□** (FX-305: **CN-72-C□**) quick-connection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

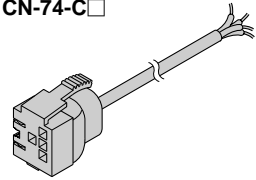
Main cable
CN-73-C□



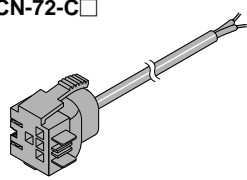
Sub cable
CN-71-C□



Main cable
CN-74-C□



Sub cable
CN-72-C□



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

Main points of difference in rated specifications

| Item | Basic model No. | Type | Discontinued models | Recommended replacements |
|--|-----------------|------------|---|---|
| | | | Digital setting | High-functional type |
| | | NPN output | FX-D1 | FX-305 |
| | | PNP output | FX-D1P | FX-305P |
| Emitting element | | | Red LED | |
| Supply voltage | | | 12 to 24 V DC $\pm 10\%$ 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 | | | <p><NPN output type> NPN open-collector transistor 2 outputs</p> <ul style="list-style-type: none"> • 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.) <p><PNP output type> PNP open-collector transistor 2 outputs</p> <ul style="list-style-type: none"> • 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.) | <p><NPN output type> NPN open-collector transistor 2 outputs</p> <ul style="list-style-type: none"> • 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.] <p><PNP output type> PNP open-collector transistor 2 outputs</p> <ul style="list-style-type: none"> • 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 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 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 mm ² 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 'P-2' 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.

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

Main rated specifications

| Item | Basic model No. | Type | Discontinued models | | Recommended replacements | |
|--|-----------------|------------|--|--|--|--|
| | | | Auto-setting | Manual setting | Digital (Auto) setting | Manual setting |
| | | NPN output | FX-A1 | FX-M1 | FX-301 | FX-311 |
| PNP output | FX-A1P | FX-M1P | FX-301P | FX-311P | | |
| Emitting element | | | Red LED | | | |
| Supply voltage | | | 12 to 24 V DC \pm 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 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 | |
| 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 mm ² 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.