# Simple Fiber Amplifier
## E3X-SD/-NA

### The Highest Level of Power and Precision in the Industry with "GIGA RAY" Giga Power Lighting Element

- **Stable detection of minute objects even when the Sensor is covered with dust and oil in severe environments.**
- **Quick-tuning to automatically adjust light level and set threshold value.**
- **Use the one-key one-function feature for quick, easy operation.**
- **Reasonable price.**

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## Ordering Information

### Amplifier Units [Refer to *Dimensions* on page *13*.]

#### Digital Display and Direct Key Setting

| Item | Appearance | Connection method | Ratings and Specifications | Model | |
|---|---|---|---|---|---|
| | | | | NPN output | PNP output |
| Standard models | | Pre-wired (2 m) | --- | **E3X-SD21 2M** | **E3X-SD51 2M** |
| | | Wire-saving connector * | | **E3X-SD7** | **E3X-SD9** |

*An Amplifier Unit Connector (sold separately) is required.

#### Bar Display and Adjuster Setting

| Item | Appearance | Connection method | Ratings and Specifications | Model | |
|---|---|---|---|---|---|
| | | | | NPN output | PNP output |
| Standard models | | Pre-wired (2 m) | --- | **E3X-NA11 2M** | **E3X-NA41 2M** |
| | | Wire-saving connector *1 | | **E3X-NA6** | **E3X-NA8** |
| High-speed detection models | | Pre-wired (2 m) | Response time: 20 µs | **E3X-NA11F 2M** | **E3X-NA41F 2M** |
| Water-resistant models | | Pre-wired (2 m) | Degree of protection: IP66 | **E3X-NA11V 2M** | **E3X-NA41V 2M** |
| | | Connector (M8) *2 | | **E3X-NA14V** | **E3X-NA44V** |

*1. An Amplifier Unit Connector (sold separately) is required.
*2. A Sensor I/O Connector (sold separately) is required.

## Amplifier Unit Connectors (sold separately)

**Note:** Protective seals provided. [Refer to *Dimensions* on page *17*.]

| Item | Appearance | Cable length | No. of conductors | Model |
|---|---|---|---|---|
| Master Connector | | 2 m | 3 | **E3X-CN11** |
| Slave Connector | | | 1 | **E3X-CN12** |

### Ordering Precautions for Amplifier Units Connectors

A Connector is not provided with the Amplifier Unit. Refer to the tables at the right when placing an order.

| Amplifier Units | | |
|---|---|---|
| **Type** | **NPN** | **PNP** |
| Standard models | E3X-SD7 | E3X-SD9 |
| | E3X-NA6 | E3X-NA8 |

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| Applicable Connectors (sold separately) | |
|---|---|
| **Master Connector** | **Slave Connector** |
| E3X-CN11 (3-wire) | E3X-CN12 (1-wire) |

**When Using 5 Amplifier Units**

| 5 Amplifier Units | + | 1 Master Connector + 4 Slave Connectors |
|---|---|---|

## Sensor I/O Connectors (Models for Connectors: A Connector is not provided with the Amplifier Unit. Be sure to order a Connector separately.)

[Refer to *Dimensions* on *XS3*.]

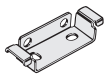
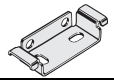
| Size | Cable specifications | Appearance | Cable type | | Model |
|---|---|---|---|---|---|
| M8 | Standard cable | Straight connector | 2 m | Four-conductor cable | **XS3F-M421-402-A** |
| | | | 5 m | | **XS3F-M421-405-A** |
| | | L-shaped connector | 2 m | | **XS3F-M422-402-A** |
| | | | 5 m | | **XS3F-M422-405-A** |

## Accessories (sold separately)

### Mounting Brackets

**A Mounting Bracket is not provided with the Amplifier Unit. Order a Mounting Bracket separately if required.**

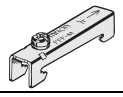
[Refer to *Dimensions* on page *17*.]

| Appearance | Applicable models | Model | Quantity |
|---|---|---|---|
|  | E3X-SD□<br>E3X-NA□<br>E3X-NA□F | **E39-L143** | 1 |
|  | E3X-NA□V | **E39-L148** | |

### End Plate

**End Plates are not provided with the Amplifier Unit. Order End Plates separately if required.**

[Refer to *Dimensions* on page *17*.]

| Appearance | Model | Quantity |
|---|---|---|
|  | **PFP-M** | 1 |

# Ratings and Specifications

## Amplifier Units

| Item \ Type | Digital display and direct key setting | Bar display and adjuster setting | | |
|---|---|---|---|---|
| | Standard models | Standard models | High-speed detection models | Water-resistant models |
| Model | E3X-SD□ | E3X-NA□ | E3X-NA□F | E3X-NA□V |
| **Light source (wavelength)** | Red, 4-element LED (625 nm) | | | Red LED (680 nm) |
| **Power supply voltage** | 12 to 24 VDC ±10%, ripple (p-p): 10% max. | | | |
| **Power consumption/ Current consumption** | 960 mW max.<br>(Power supply voltage: 24 V,<br>Current consumption: 40 mA max.)<br>(Power supply voltage: 12 V,<br>Current consumption: 80 mA max.) | 960 mW max. (Current consumption: 40 mA max.) | | |
| **Control output** | Open-collector output (NPN or PNP)<br>Load power supply: 26.4 V max.,<br>Load current: 50 mA max.<br>(Residual voltage: 1.5 V max.)<br>Light-ON/Dark-ON mode selector | Open-collector output (NPN or PNP)<br>Load power supply: 26.4 V max.,<br>Load current: 50 mA max.<br>(Residual voltage: 1 V max.)<br>Light-ON/Dark-ON mode selector. | | |
| **Response time** | Operate or reset: 200 μs max. (*1) | | Operate: 20 μs max.<br>Reset: 30 μs max. | Operate or reset:<br>200 μs max. (*1) |
| **Sensitivity adjustment** | UP/DOWN direct key setting, teaching with/without a workpiece, automatic teaching | 8-turn sensitivity adjuster (with indicator) | | |
| **Protection circuits** | Power supply reverse polarity protection,<br>output short-circuit protection,<br>output reverse polarity protection | Power supply reverse polarity protection,<br>output short-circuit protection | | |
| **Timer function** | --- | No timer, OFF-delay timer; or Timer selector (timer time: 40 ms (fixed)) | | |
| **Mutual interference prevention** | Up to 5 Amplifiers (optically synchronized) (*2) | | None | Up to 5 Amplifiers (optically synchronized) (*2) |
| **Ambient illumination** | Receiver side<br>Incandescent lamp: 10,000 lux max.<br>Sunlight: 20,000 lux max. | | | |
| **Number of gang-mounted Amplifiers** | 16 max. (The ambient temperature specification depends on the number of gang-mounted Amplifiers.) | | | |
| **Ambient temperature range** | Operating: Groups of 1 to 3 Amplifiers: –25°C to 55°C<br>Groups of 4 to 11 Amplifiers: –25°C to 50°C<br>Groups of 12 to 16 Amplifiers: –25°C to 45°C<br>Storage: –30°C to 70°C (with no icing or condensation) | | | |
| **Ambient humidity range** | Operating and storage: 35% to 85% (with no condensation) | | | |
| **Insulation resistance** | 20 MΩ. min. (at 500 VDC) | | | |
| **Dielectric strength** | 1,000 VAC at 50/60 Hz for 1 minute (*3) | | | |
| **Vibration resistance** | Destruction: 10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y and Z directions | | | |
| **Shock resistance** | Destruction: 500 m/s$^2$, for 3 times each in X, Y and Z directions | | | |
| **Degree of protection** | IEC 60529 IP50 (with Protective Cover attached) | | | IEC 60529 IP66<br>(with Protective Cover attached) |
| **Connection method** | Pre-wired (standard cable length: 2 m), or connector | | | |
| **Weight (packed state) (*4)** | Pre-wired model: Approx. 100 g, Model with connector: Approx. 55 g | | | |
| **Material** Case | Polybutylene terephthalate (PBT) | | | |
| **Material** Cover | Polycarbonate (PC) | | | Polyethersulfone (PES) |
| **Accessories** | Instruction manual | | | |

*1. When there are 8 or more E3X-NA Amplifiers mounted side-by-side, the response time will be 350 μs max.
*2. Mutual interference prevention is effective when E3X-SD/-NA-series Amplifiers are gang-mounted without other E3X-series Amplifiers.
*3. Water-resistant models and models with connectors have a dielectric strength of 500 VAC.
*4. Add 10 g for water-resistant models.

## Amplifier Unit Connectors (Wire-saving Connectors)

| Item \ Model | E3X-CN11 | E3X-CN12 |
|---|---|---|
| **Rated current** | 2.5 A | |
| **Rated voltage** | 50 V | |
| **Contact resistance** | 20 mΩ max. (20 mVDC max., 100 mA max.)<br>(The above figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.) | |
| **Number of insertions** | Destruction: 50 times (for connection to the Amplifier Unit and the adjacent Connector) | |
| **Material** Housing | Polybutylene terephthalate (PBT) | |
| **Material** Contact | Phosphor bronze/gold-plated nickel | |
| **Weight (packed state)** | Approx. 55 g | Approx. 25 g |

## Sensing distance

| Fiber Unit / Screw-shaped model | | | | Amplifier Unit: E3X-SD□ E3X-NA□ | Amplifier Unit: E3X-NA□F | Amplifier Unit: E3X-NA□V |
|---|---|---|---|---|---|---|
| Sensing method | Size | Sensing direction | Model | Sensing distance (Unit: mm) Standard models | Sensing distance (Unit: mm) High-speed detection models | Sensing distance (Unit: mm) Water-resistance models |
| Through-beam models | M3 | Straight | E32-T21R 2M | 120 | 36 | 60 |
| | M4 | Right angle | E32-T11N 2M | 530 | 160 | 280 |
| | | Straight | E32-T11R 2M | 560 | 160 | 280 |
| | | | E32-TC200 2M | 800 | 240 | 400 |
| | | | E32-T11L 2M | 1,400 | 420 | 700 |
| Reflective models | M3 | Right angle | E32-C31N 2M | 25 | 7.5 | 13 |
| | | Straight | E32-D21R 2M | 30 | 10 | 15 |
| | | | E32-C31 2M | 80 | 26 | 40 |
| | M4 | | E32-D211R 2M | 30 | 10 | 15 |
| | M6 | Right angle | E32-D11N 2M | 170 | 50 | 90 |
| | | | E32-C11N 2M | 170 | 50 | 85 |
| | | Straight | E32-D11R 2M | 180 | 60 | 90 |
| | | | E32-DC200 2M | 300 | 100 | 150 |
| | | | E32-CC200 2M | 300 | 100 | 150 |
| | | | E32-D11L 2M | 400 | 130 | 200 |

| Fiber Unit / Flat model | | | | Amplifier Unit: E3X-SD□ E3X-NA□ | Amplifier Unit: E3X-NA□F | Amplifier Unit: E3X-NA□V |
|---|---|---|---|---|---|---|
| Sensing method | Sensing direction | Size | Model | Sensing distance (Unit: mm) Standard models | Sensing distance (Unit: mm) High-speed detection models | Sensing distance (Unit: mm) Water-resistance models |
| Through-beam models | Top view | Standard | E32-T15XR 2M | 560 | 160 | 280 |
| | | Small | E32-T25XR 2M | 120 | 36 | 60 |
| | Side view | Standard | E32-T15YR 2M | 220 | 66 | 110 |
| | | Small | E32-T25YR 2M | 60 | 18 | 30 |
| | Flat view | Standard | E32-T15ZR 2M | 220 | 66 | 110 |
| | | Small | E32-T25ZR 2M | 60 | 18 | 30 |
| Reflective models | Top view | Standard | E32-D15XR 2M | 180 | 60 | 90 |
| | | Small | E32-D25XR 2M | 30 | 10 | 15 |
| | Side view | Standard | E32-D15YR 2M | 40 | 10 | 20 |
| | | Small | E32-D25YR 2M | 8 | 2.4 | 4 |
| | Flat view | Standard | E32-D15ZR 2M | 40 | 10 | 20 |
| | | Small | E32-D25ZR 2M | 8 | 2.4 | 4 |

| Fiber Unit / Cylindrical model | | | | Amplifier Unit: E3X-SD□ E3X-NA□ | Amplifier Unit: E3X-NA□F | Amplifier Unit: E3X-NA□V |
|---|---|---|---|---|---|---|
| Sensing method | Sensing direction | Size | Model | Sensing distance (Unit: mm) Standard models | Sensing distance (Unit: mm) High-speed detection models | Sensing distance (Unit: mm) Water-resistance models |
| Through-beam models | Top view | ϕ1 | E32-T223R 2M | 120 | 36 | 60 |
| | | ϕ3 | E32-T12R 2M | 560 | 160 | 280 |
| | Side view | ϕ1 | E32-T24R 2M | 60 | 18 | 30 |
| | | ϕ3 | E32-T14LR 2M | 220 | 66 | 110 |
| Reflective models | Top view | ϕ1.5 | E32-D22B 2M | 30 | 10 | 15 |
| | | ϕ2 | E32-D32 2M | 80 | 26 | 40 |
| | | ϕ3 | E32-D22R 2M | 30 | 10 | 15 |
| | | | E32-D32L 2M | 160 | 50 | 80 |
| | Side view | ϕ2 | E32-D24R 2M | 14 | 4.6 | 7 |
| | | ϕ6 | E32-D14LR 2M | 32 | 10 | 16 |

**For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).**

| Fiber Unit / Model equipped with sleeve | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Sleeve size | Mounting size | Model | Standard models | High-speed detection models | Water-resistance models |
| Through-beam models | ϕ0.25 × 5 | ϕ3 | E32-T333-S5 1M | 10 | 3 | 5 |
| | ϕ0.5 × 40 | | E32-T33 1M | 40 | 13.5 | 20 |
| | ϕ0.9 × 40 | M3 | E32-TC200F4R 2M | 120 | 36 | 60 |
| | ϕ1.2 × 90 | M4 | E32-TC200BR 2M | 560 | 160 | 280 |
| Reflective models | ϕ0.5 × 15 | ϕ2 | E32-D331 2M | 3 | 1 | 1.5 |
| | ϕ0.8 × 15 | ϕ3 | E32-D33 2M | 16 | 4 | 10 |
| | ϕ1.2 × 40 | M3 | E32-DC200F4R 2M | 30 | 10 | 15 |
| | ϕ2.5 × 90 | M6 | E32-DC200BR 2M | 180 | 60 | 90 |

| Fiber Unit / Movable section (Flexibility) | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Shape | Size | Model | Standard models | High-speed detection models | Water-resistance models |
| Through-beam models | Screw-shaped model | M3 | E32-T21 2M | 200 | 60 | 100 |
| | | M4 | E32-T11 2M | 720 | 200 | 360 |
| | Cylindrical model | ϕ1.5 | E32-T22B 2M | 200 | 60 | 100 |
| | | ϕ3 | E32-T12B 2M | 720 | 200 | 360 |
| | Flat model | Standard | E32-T15XB 2M | 720 | 200 | 360 |
| | | Small | E32-T25XB 2M | 150 | 40 | 75 |
| Reflective models | Screw-shaped model | M3 | E32-D21 2M | 30 | 10 | 15 |
| | | M4 | E32-D21B 2M | 70 | 20 | 35 |
| | | M6 | E32-D11 2M | 180 | 60 | 90 |
| | Cylindrical model | ϕ1.5 | E32-D22B 2M | 30 | 10 | 15 |
| | | ϕ3 | E32-D221B 2M | 70 | 20 | 35 |
| | Flat model | Standard | E32-D15XB 2M | 180 | 60 | 90 |
| | | Small | E32-D25XB 2M | 50 | 16 | 25 |

| Fiber Unit / Heat-resistance model | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Operating temperature | Lens | Model | Standard models | High-speed detection models | Water-resistance models |
| Through-beam models | 100°C | --- | E32-T51R 2M | 400 | 120 | 225 |
| | | Lens | E32-T51R 2M + E39-F1 | 2,000 | 720 | 1,650 |
| | | High-power lens | E32-T51R 2M + E39-F16 | 4,000 ✻ | 1,560 | 2,900 |
| | 150°C | --- | E32-T51 2M | 800 | 240 | 400 |
| | | Lens | E32-T51 2M + E39-F1-33 | 2,400 | 720 | 1,400 |
| | | High-power lens | E32-T51 2M + E39-F16 | 4,000 ✻ | 3,120 | 4,000 ✻ |
| | | --- | E32-T54 2M | 260 | 70 | 130 |
| | 200°C | | E32-T81R-S 2M | 360 | 100 | 180 |
| | | Lens | E32-T61-S 2M + E39-F1 | 4,000 ✻ | 1,800 | 3,000 |
| | 350°C | --- | E32-T61-S 2M | 600 | 180 | 300 |
| | | High-power lens | E32-T61-S 2M + E39-F16 | 4,000 ✻ | 2,340 | 3,900 |
| Reflective models | 100°C | --- | E32-D51R 2M | 140 | 42 | 70 |
| | 150°C | | E32-D51 2M | 240 | 80 | 120 |
| | 200°C | | E32-D81R 2M | 90 | 27 | 45 |
| | 350°C | | E32-D61 2M | 90 | 27 | 45 |
| | 400°C | | E32-D73 2M | 60 | 18 | 30 |

✻ The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

**For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).**

| Fiber Unit / Chemical-resistance / Oil-resistance model | | | Amplifier Unit | Sensing distance (Unit: mm) | |
|---|---|---|---|---|---|
| | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Type | Model | Standard models | High-speed detection models | Water-resistance models |
| Through-beam models | ϕ5 | E32-T12F 2M | 3,200 | 960 | 1,600 |
| | ϕ7.2 | E32-T11F 2M | 2,100 | 760 | 1,050 |
| | ϕ5 Heat-resistance | E32-T51F 2M | 1,400 | 400 | 700 |
| | ϕ5 Side view | E32-T14F 2M | 400 | 120 | 200 |
| | M4 Chemical-resistance cable | E32-T11U 2M | 720 | 200 | 360 |
| | M4 Right angle Chemical-resistance cable | E32-T11NU 2M | 400 | 120 | 210 |
| Reflective models | ϕ6 | E32-D12F 2M | 100 | 32 | 50 |
| | ϕ7 Side view | E32-D14F 2M | 40 | 13 | 20 |
| | M6 Chemical-resistance cable | E32-D11U 2M | 180 | 60 | 90 |

| Fiber Unit / Vacuum-resistance model | | | | Amplifier Unit | Sensing distance (Unit: mm) | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Operating ambient temperature | Sensing direction | Model | Standard models | High-speed detection models | Water-resistance models |
| Through-beam models | 120°C | Top view | E32-T51V 1M | 200 | --- | 100 |
| | | | E32-T51V 1M + E39-F1V | 1,200 | --- | 600 |
| | | Right angle | E32-T54V 1M | 130 | --- | 65 |
| | 200°C | | E32-T84SV 1M | 500 | --- | 250 |

**For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).**

| Fiber Unit / Long distance/Dust resistance (High-power), Detection through gaps (Narrow vision field) | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| **Sensing method** | **Type** | **Sensing direction/ Lens type** | **Model** | **Standard models** | **High-speed detection models** | **Water-resistance models** |
| Through-beam models | High-power (integrated unit) | Top view | E32-T17L 10M | 20,000 ✻1 | 8,400 | 14,000 |
| | | Side view | E32-T14 2M | 3,600 | 1,080 | 1,800 |
| | High-power (with lens unit) | High-power | E32-T11N 2M + E39-F1 | 3,700 | 1,110 | 2,100 |
| | | Ultrahigh-power | E32-T11N 2M + E39-F16 | 4,000 ✻2 | 2,000 | 3,600 |
| | | High-power | E32-T11R 2M + E39-F1 | 4,000 ✻2 | 1,260 | 2,100 |
| | | Ultrahigh-power | E32-T11R 2M + E39-F16 | 4,000 ✻2 | 2,000 | 3,600 |
| | | Side view | E32-T11R 2M + E39-F2 | 440 | 130 | 220 |
| | | High-power | E32-TC200 2M + E39-F1 | 4,000 ✻2 | 1,800 | 3,000 |
| | | Ultrahigh-power | E32-TC200 2M + E39-F16 | 4,000 ✻2 | 3,000 | 4,000 ✻2 |
| | | Side view | E32-TC200 2M + E39-F2 | 700 | 210 | 350 |
| | | High-power | E32-T11 2M + E39-F1 | 4,000 ✻2 | 1,200 | 2,000 |
| | | Ultrahigh-power | E32-T11 2M + E39-F16 | 4,000 ✻2 | 2,600 | 4,000 ✻2 |
| | | Side view | E32-T11 2M + E39-F2 | 720 | 200 | 360 |
| | | High-power | E32-T11U 2M + E39-F1 | 3,600 | 1,080 | 2,000 |
| | | Ultrahigh-power | E32-T11U 2M + E39-F16 | 4,000 ✻2 | 2,600 | 4,000 ✻2 |
| | | Side view | E32-T11U 2M + E39-F2 | 660 | 198 | 330 |
| | | High-power | E32-T11NU 2M + E39-F1 | 1,800 | 700 | 1,500 |
| | | Ultrahigh-power | E32-T11NU 2M + E39-F16 | 4,000 ✻2 | 1,500 | 2,700 |
| | | High-power | E32-T81R-S 2M + E39-F1 | 1,800 | 630 | 1,100 |
| | | Ultrahigh-power | E32-T81R-S 2M + E39-F16 | 4,000 ✻2 | 1,300 | 2,300 |
| | | Side view | E32-T81R-S 2M + E39-F2 | 280 | 84 | 140 |
| | | High-power | E32-T61-S 2M + E39-F1 | 4,000 ✻2 | 1,800 | 3,000 |
| | | Ultrahigh-power | E32-T61-S 2M + E39-F16 | 4,000 ✻2 | 2,340 | 3,900 |
| | | Side view | E32-T61-S 2M + E39-F2 | 780 | 260 | 390 |
| | Narrow vision field (aperture angle: 4°) | Top view | E32-T22S 2M | 2,000 | 600 | 1,000 |
| | | Side view | E32-T24S 2M | 1,400 | 420 | 700 |
| Reflective models | High-power | Top view | E32-D16 2M | 800 | 140 | 40 to 400 |

✻1. The fiber length is 10 m on each side, so the sensing distance is given as 20,000 mm.
✻2. The fiber length is 2 m on each side, so the sensing distance is given as 4,000 mm.

| Fiber Unit / Minute object detection (Small-spot model) | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| **Sensing method** | **Spot diameter (mm)** | **Focal length (mm)** | **Model** | **Standard models** | **High-speed detection models** | **Water-resistance models** |
| Reflective models | ϕ0.1 to 0.6 (Variable) | 6 to 15 | E32-C42 1M + E39-F3A | Spot diameter of 0.1 to 0.6 mm at 6 to 15 mm | | |
| | ϕ0.1 | 5 | E32-C42S 1M | Spot diameter of 0.1 mm at 5 mm | | |
| | | 7 | E32-C41 1M + E39-F3A-5 | Spot diameter of 0.1 mm at 7 mm | | |
| | ϕ0.2 | 17 | E32-C41 1M + E39-F3B | Spot diameter of 0.2 mm at 17 mm | | |
| | ϕ0.5 | 7 | E32-C31 2M + E39-F3A-5 | Spot diameter of 0.5 mm at 7 mm | | |
| | | 17 | E32-C31 2M + E39-F3B | Spot diameter of 0.5 mm at 17 mm | | |
| | ϕ6 | 50 | E32-L15 2M | Spot diameter of 6 mm at 50 mm | | |
| | ϕ4 Parallel light | 0 to 20 | E32-C31 2M + E39-F3C | Spot diameter of 4 mm max. at 0 to 20 mm | | |
| | ϕ3 | 50 | E32-C11N 2M + E39-F18 | Spot diameter of 3 mm at 50 mm | | |
| | | | E32-CC200 2M + E39-F18 | Spot diameter of 3 mm at 50 mm | | |

**For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).**

| Fiber Unit / Area-sensing (Area beam) | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Area range | Sensing direction | Model | Standard models | High-speed detection models | Water-resistance models |
| Through-beam models | 11 mm | Side view | E32-T16PR 2M | 800 | 260 | 450 |
| | | Flat view | E32-T16JR 2M | 700 | 220 | 390 |
| | 30 mm | Side view | E32-T16WR 2M | 1,380 | 400 | 690 |
| Reflective models | 11 mm | | E32-D36P1 2M | 150 | 50 | 75 |

| Fiber Unit / Detection without background interference (Convergent-reflective) | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Sensing detection | Size | Model | Standard models | High-speed detection models | Water-resistance models |
| Reflective models | Flat view | Standard | E32-L16-N 2M | 0 to 15 | 0 to 12 | 0 to 15 |
| | | Small | E32-L24S 2M | 0 to 4 | | |
| | Top view | --- | E32-L25L 2M | 5.4 to 9 (Center 7.2) | 5.4 to 8 (Center 7.2) | 5.4 to 9 (Center 7.2) |
| | Flat view | | E32-L24L 2M | 2 to 6 (Center 4) | | |

| Fiber Unit / Detection of transparent objects (Retro-reflective) | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|
| | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Type | Model | Standard models | High-speed detection models | Water-resistance models |
| Retro-reflective models ✻1 | Square | E32-R16 5M + E39-R1 (Attached) | 1,500 | 1,000 | 150 to 1,500 |
| | Small | E32-R21 2M + E39-R3 (Attached) | 10 to 250 | 250 | 10 to 250 |
| | Film detection ✻2 | E32-C31 2M + E39-F3R + E39-RP1 | 450 | 135 | 225 |
| | | E32-C31 2M + E39-F3R + E39-RSP1 | 220 | 65 | 110 |

✻1. When using a highly reflective object, light reflected from the object may affect the Sensor.
✻2. Film detection may not be effective for some types of film. Confirm operation in advance.

**For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).**

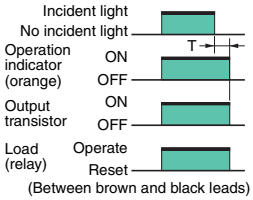
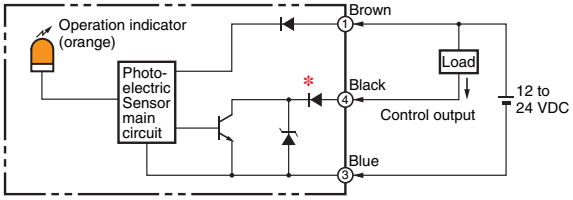
| Fiber Unit / FPD / Semiconductor / Solar battery industry | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Application | Operating temperature | Model | Standard models | High-speed detection models | Water-resistance models |
| Reflective models | Glass substrate alignment | 70°C | E32-L16-N 2M | 0 to 15 | | |
| | | | E32-A08 2M | 10 to 20 | | |
| | | 300°C | E32-A08H2 3M | 10 to 20 | | |
| | Glass detection | 70°C | E32-L16-N 2M | 0 to 15 | | |
| | Glass substrate mapping | 70°C | E32-A09 2M | 15 to 38 (Center 25) | | |
| | | 150°C | E32-A09H 2M | 15 to 38 (Center 25) | | |
| | | 300°C | E32-A09H2 2M | 20 to 30 (Center 25) | | |
| | WET process | 60°C | E32-L11FP 5M | 8 to 20 mm from end of lens (recommended: 11 mm)<br>19 to 31 mm from center point A of mounting hole (recommended: 22 mm) | | |
| | | 70°C | E32-L12FS 5M | 8 to 20 mm from end of lens (recommended: 11 mm)<br>32 to 44 mm from center point A of mounting hole (recommended: 35 mm) | | |
| | | 85°C | E32-L11FS 5M | 8 to 20 mm from end of lens (recommended: 11 mm)<br>32 to 44 mm from center point A of mounting hole (recommended: 35 mm) | | |
| Through-beam models | Wafer mapping | 70°C | E32-A03 2M | 890 | 267 | 445 |
| | | | E32-A03-1 2M | 890 | 267 | 445 |
| | | | E32-A04 2M | 340 | 102 | 170 |
| | | | E32-A04-1 2M | 340 | 102 | 170 |

| Fiber Unit / Liquid-level detection model | | | Amplifier Unit | Sensing distance (Unit: mm) | | |
|---|---|---|---|---|---|---|
| | | | | E3X-SD□ E3X-NA□ | E3X-NA□F | E3X-NA□V |
| Sensing method | Sensing direction | Pipe diameter | Model | Standard models | High-speed detection models | Water-resistance models |
| Reflective models | Mounted to pipe | No limit | E32-D36T 5M | Applicable pipe: Transparent (no restriction on diameter) | | |
| | | ϕ8 to 10 mm | E32-L25T 2M | Applicable pipe: Transparent pipe with diameter of 8 to 10 mm, recommended pipe wall thickness: 1 mm | | |
| | Wet | --- | E32-D82F1 4M | Wet model | | |

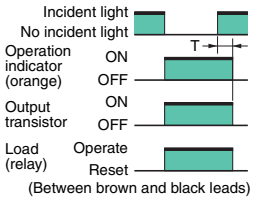
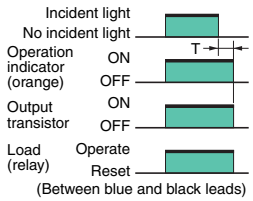
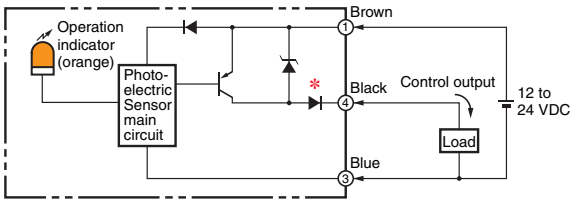
**For information on Fiber Units, refer to the *Fiber Sensors Best Selection Catalog* (Cat. No. E353).**

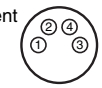
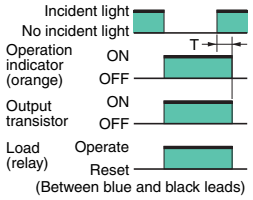
# E3X-SD/-NA

## I/O Circuit Diagrams

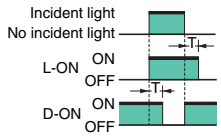
<table>
<tr><th>Output form</th><th>Model</th><th>Output transistor operation mode</th><th>Timing charts</th><th>Operation selector</th><th>Output circuit</th></tr>
<tr><td rowspan="2">NPN Output</td><td rowspan="2">E3X-SD21<br>E3X-SD7<br><br>E3X-NA11<br>E3X-NA6<br>E3X-NA11F<br>E3X-NA11V<br>E3X-NA14V</td><td>Light-ON</td><td> 
</td><td>LIGHT ON (L-ON)</td><td rowspan="2"> 

• M8 Connector Pin Arrangement

Note: Pin 2 is not used.
✻ Not present on the E3X-NA.</td></tr>
<tr><td>Dark-ON</td><td> 
</td><td>DARK ON (D-ON)</td></tr>
<tr><td rowspan="2">PNP Output</td><td rowspan="2">E3X-SD51<br>E3X-SD9<br><br>E3X-NA41<br>E3X-NA8<br>E3X-NA41F<br>E3X-NA41V<br>E3X-NA44V</td><td>Light-ON</td><td> 
</td><td>LIGHT ON (L-ON)</td><td rowspan="2"> 

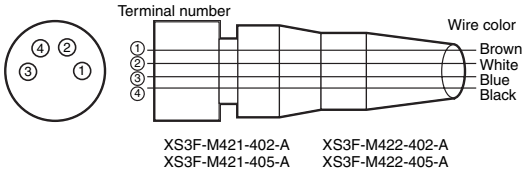
• M8 Connector Pin Arrangement

Note: Pin 2 is not used.
✻ Not present on the E3X-NA.</td></tr>
<tr><td>Dark-ON</td><td> 
</td><td>DARK ON (D-ON)</td></tr>
</table>

**Note:** Timing Charts for Timer Settings (T: Set Time)

| OFF delay |
|---|
|  |



### Plug (Sensor I/O Connector)




| Classification | Wire color | Connection pin | Application |
|---|---|---|---|
| DC | Brown | 1 | Power supply (+V) |
| | White | 2 | --- |
| | Blue | 3 | Power supply (0 V) |
| | Black | 4 | Output |

**Note:** Pin 2 is not used.

## Safety Precautions

### ⚠ WARNING

**This product is not designed or rated for ensuring safety of persons either directly or indirectly.**
**Do not use it for such purposes.**

### ⚠ Caution

**Do not exceed the rated voltage.**
**Excess voltage may result in malfunction or fire.**

**Do not use an AC power supply.**
**Using an AC power supply may result in rupturing.**

**High-temperature environments may result in burn injury.**

### Precautions for Safe Use

The following precautions must be observed to ensure safety.

1. Do not use the product in locations where flammable or explosive gas is present.
2. Do not use the product in locations subject to splashing water, oil, or chemicals, or in locations subject to steam.
3. Do not attempt to disassemble, repair, or modify the product.
4. Do not apply voltage or current in excess of the rated ranges.
5. Do not use the product in atmospheres or environments that exceed product ratings.
6. Do not wire the product incorrectly, such as using incorrect power supply polarity.
7. Connect the load properly.
8. Do not short-circuit both ends of the load.
9. Do not use the product if the case is damaged.
10. When disposing of the product, dispose of it as industrial waste.
11. Do not use the product in locations subject to direct sunlight.
12. The surface temperature of the product may rise as a result of the ambient temperature, power supply, or other usage conditions. Use caution when performing maintenance and washing. Failure to do so may result in burn injury.

### Precautions for Correct Use

Do not use the product in atmospheres or environments that exceed product ratings.

## Amplifier Units

### ● Designing

#### Communications Hole

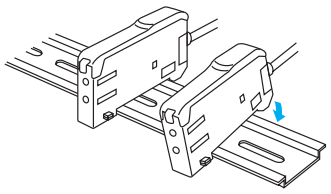
The hole on the side of the Amplifier Unit is a communications hole for preventing mutual interference when Amplifier Units are mounted side-by-side. The E3X-MC11 Mobile Console (sold separately) cannot be used.
If an excessive amount of light is received via the Sensor, the mutual interference prevention function may not work. In this case, make the appropriate adjustments using the sensitivity adjuster.
Mutual interference prevention is effective when E3X-SD/-NA-series Amplifiers are gang-mounted without other E3X-series Amplifiers.

### ● Mounting

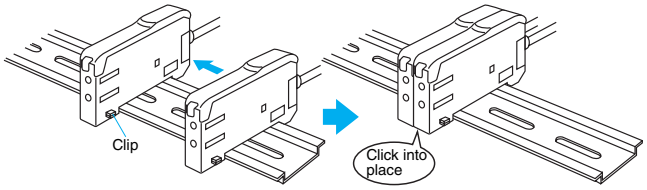
#### DIN Track Mounting/Removal

**Mounting Amplifier Units**

1. Mount the Amplifier Units one at a time onto the DIN track.



2. Slide the Amplifier Units together, line up the clips, and press the Amplifier Units together until they click into place.




**Removing Amplifier Units**

Slide Amplifier Units away from each other, and remove from the DIN track one at a time. (Do not attempt to remove Amplifier Units from the DIN track without separating them first.)

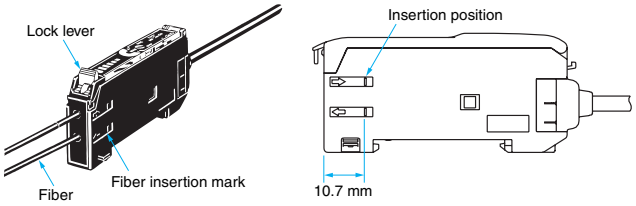
**Note** 1. The specifications for ambient temperature will vary according to the number of Amplifier Units used together. For details, refer to *Ratings and Specifications*.
2. Always turn OFF the power supply before mounting or removing Amplifier Units.

### Fiber Connection and Disconnection

The E3X Amplifier Unit has a lock lever. Connect or disconnect the fibers to or from the E3X Amplifier Unit using the following procedures:

**1. Connection**

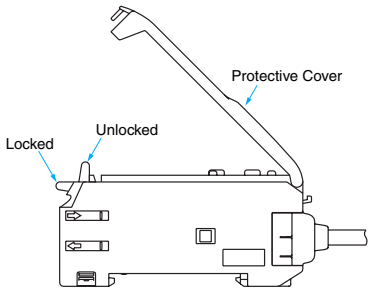
Open the Protective Cover, insert the fibers according to the fiber insertion marks on the side of the Amplifier Unit, and lower the lock lever.




**Note:** If one of the fibers from the Fiber Unit has a white line, such as with a Coaxial Sensor, that fiber is for the Emitter. Insert it into the Emitter section. Refer to Dimensions for the Fiber Unit to see if there is an Emitter fiber.

**2. Disconnection**

Remove the Protective Cover and raise the lock lever to pull out the fiber.




**Note:** To maintain the fiber properties, confirm that the lock is released before removing the fiber.

**3. Precautions for Fiber Connection/Disconnection**

Be sure to lock or unlock the lock lever within an ambient temperature range between –10°C and 40°C.

● **Operating Environment**

### Ambient Conditions

If dust or dirt adhere to the hole for optical communications, it may prevent normal communications. Be sure to remove any dust or dirt before using the Units.

● **Other**

### Protective Cover

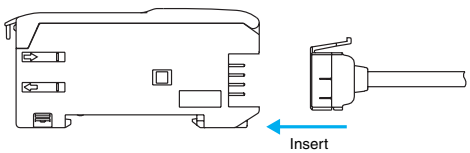
Be sure to mount the Protective Cover before use.

## Amplifier Units with Connectors

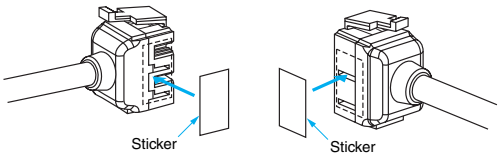
● **Mounting**

### Mounting Connectors

1. Insert the Master or Slave Connector into the Amplifier Unit until it clicks into place.



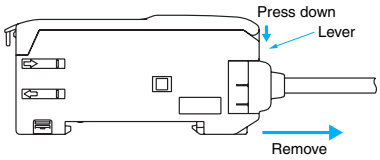

2. Join Amplifier Units together as required after all the Master and Slave Connectors have been inserted.
3. Attach the stickers (provided as accessories) to the sides of Master and Slave Connectors that are not connected to other Connectors.




**Note:** Attach the stickers to the sides with grooves.

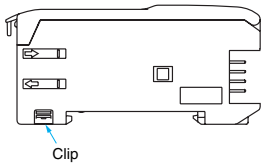
### Removing Connectors

1. Slide the slave Amplifier Unit for which the Connector is to be removed away from the rest of the group.
2. After the Amplifier Unit has been separated, press down on the lever on the Connector and remove it. (Do not attempt to remove Connectors without separating them from other Amplifier Units first.)



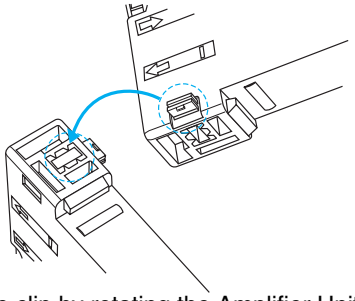

### Mounting End Plate (PFP-M)

Depending on how it is mounted, an Amplifier Unit may move during operation. In this case, use an End Plate.
Before mounting an End Plate, remove the clip from the master Amplifier Unit using a nipper or similar tool.

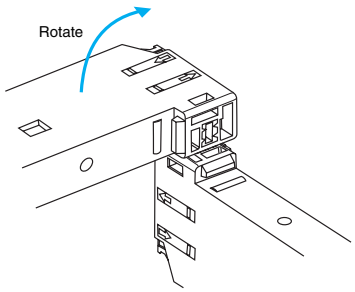



The clip can also be removed using the following mechanism, which is incorporated in the construction of the section underneath the clip.

1. Insert the clip to be removed into the slit underneath the clip on another Amplifier Unit.



2. Remove the clip by rotating the Amplifier Unit.




### Pull Strengths for Connectors (Including Cables)

E3X-CN11: 30 N max.
E3X-CN12: 12 N max.

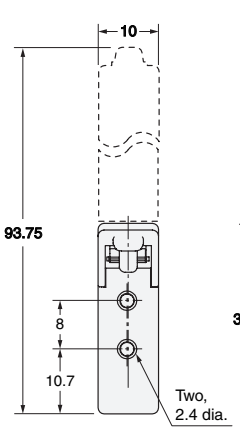
# Dimensions

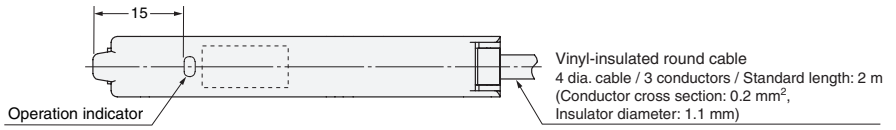
(Unit: mm)
Tolerance class IT16 applies to dimensions in this sheet unless otherwise specified.

## Amplifier Units

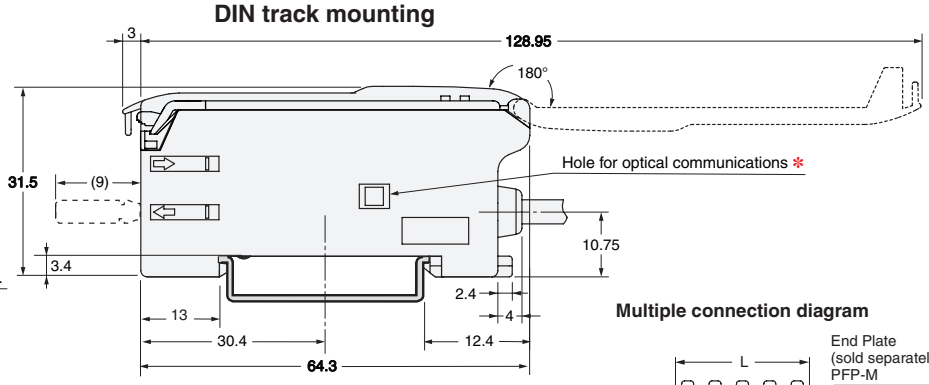
### Amplifier Units with Cables

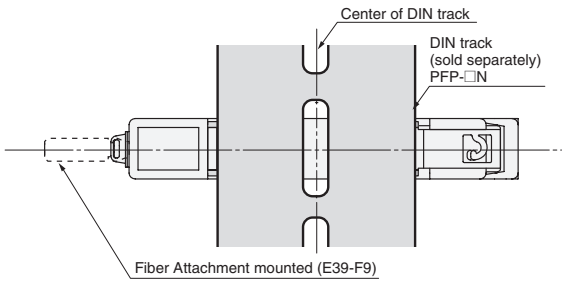
**E3X-SD21**
**E3X-SD51**
**E3X-NA11**
**E3X-NA11F**
**E3X-NA41**
**E3X-NA41F**



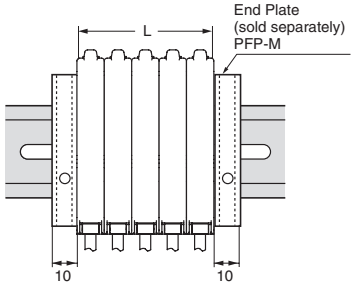




#### DIN track mounting



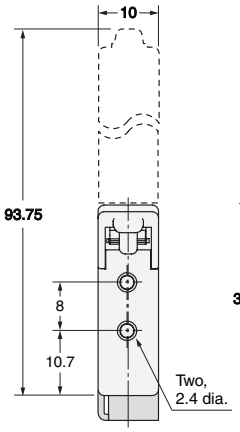



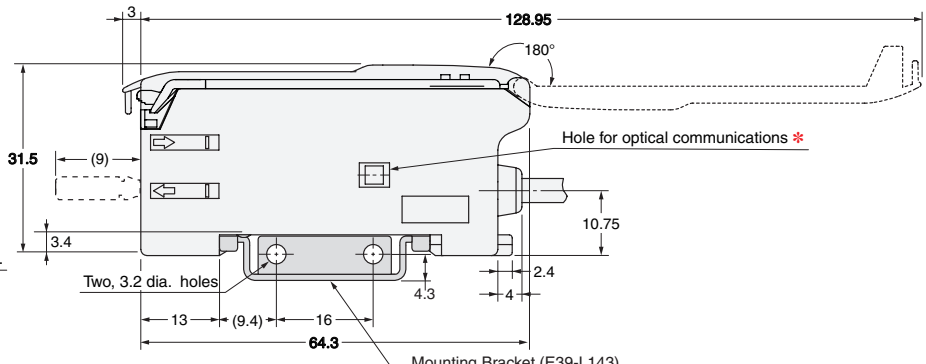

#### Multiple connection diagram



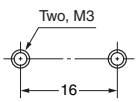

| The number of expansion | L (mm) |
|---|---|
| 1 | 10 |
| 2 | 20 |
| 3 | 30 |
| 4 | 40 |
| 5 | 50 |
| 6 | 60 |
| 7 | 70 |
| 8 | 80 |
| 9 | 90 |
| 10 | 100 |

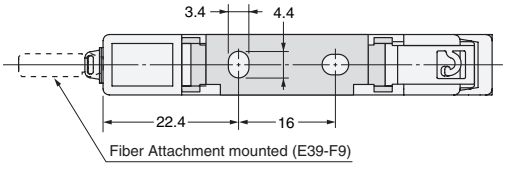
#### With Mounting Bracket Attached




**Mounting Holes**



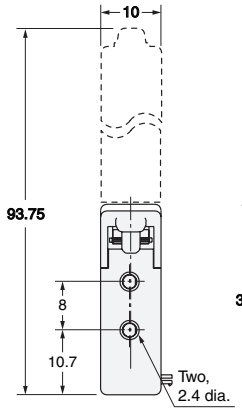



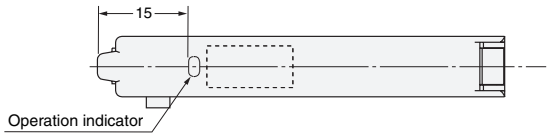

✻ There is no hole for E3X-NA□F models.

**Note:** When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

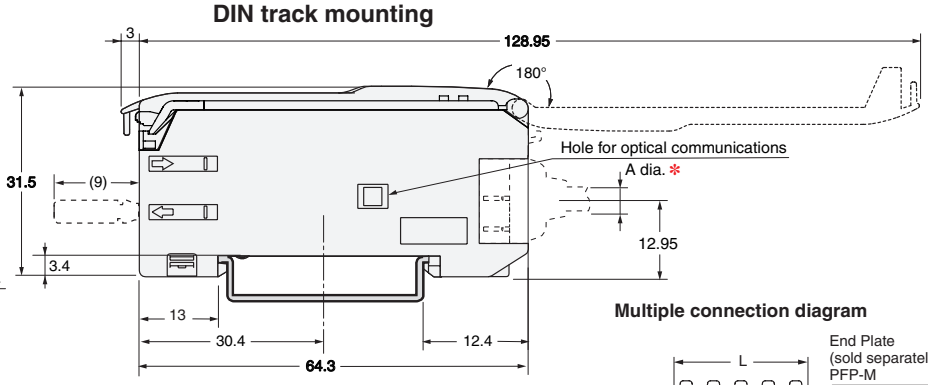
## Amplifier Units with Connectors

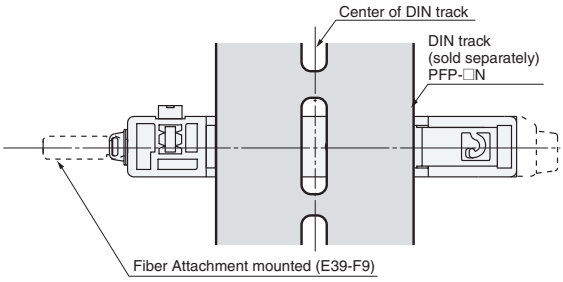
**E3X-SD7**
**E3X-SD9**
**E3X-NA6**
**E3X-NA8**



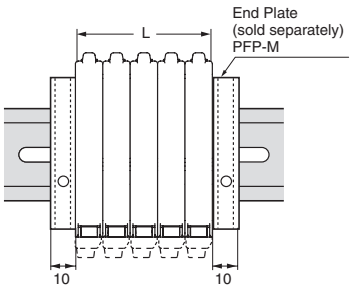




### DIN track mounting



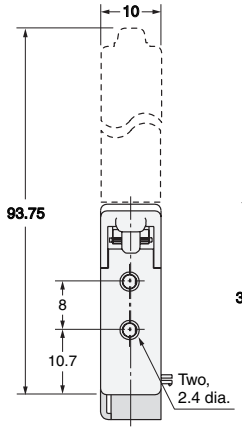



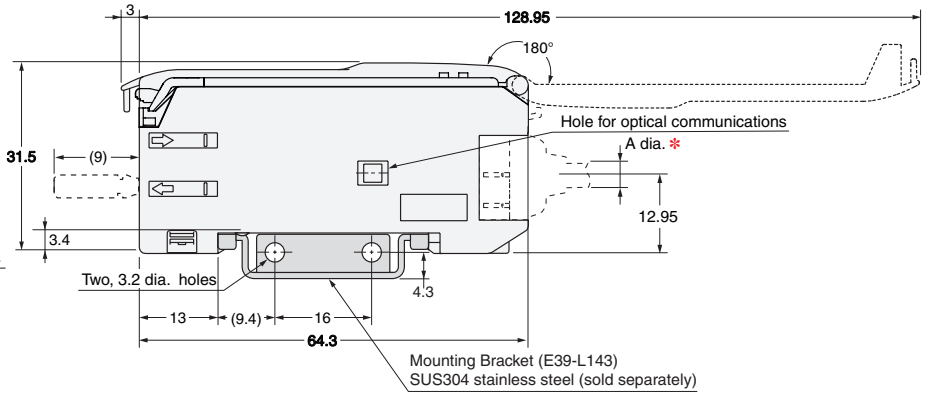

### Multiple connection diagram



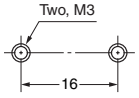

| The number of expansion | L (mm) |
|---|---|
| 1 | 10 |
| 2 | 20 |
| 3 | 30 |
| 4 | 40 |
| 5 | 50 |
| 6 | 60 |
| 7 | 70 |
| 8 | 80 |
| 9 | 90 |
| 10 | 100 |

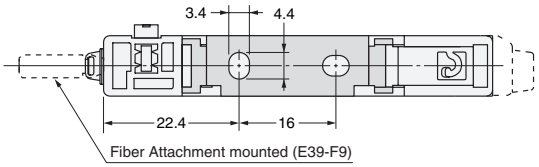
### With Mounting Bracket Attached




### Mounting Holes



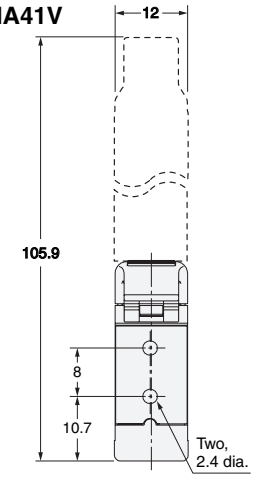

✻ Cable Diameters

| | |
|---|---|
| **E3X-CN11 (3 conductors)** | 4.0 dia. |
| **E3X-CN12 (1 conductor)** | 2.6 dia. |

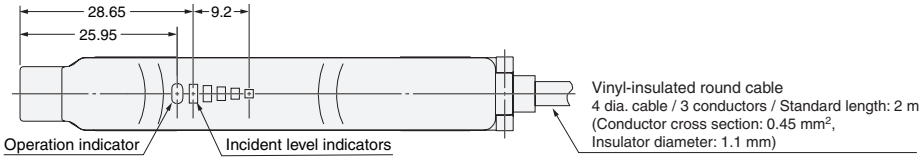
**Note:** When using E39-L143 Mounting Brackets, there will be small gaps between the Amplifier Units if they are mounted side by side.

## Amplifier Units with Cables, Water-resistant Models

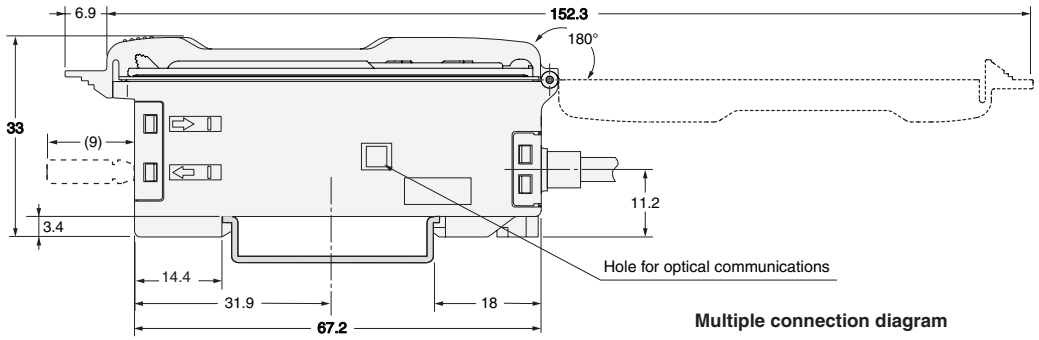
**E3X-NA11V**
**E3X-NA41V**

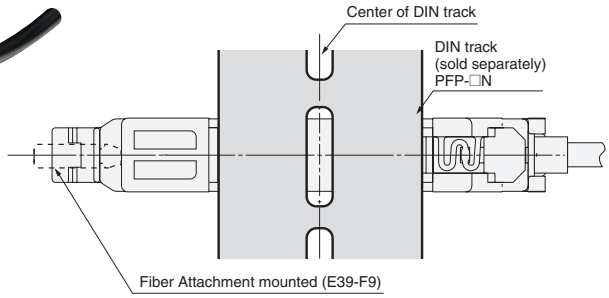



**Area of digital indication**

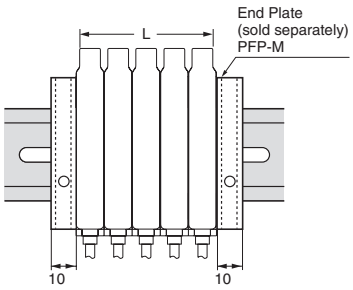



### DIN track mounting

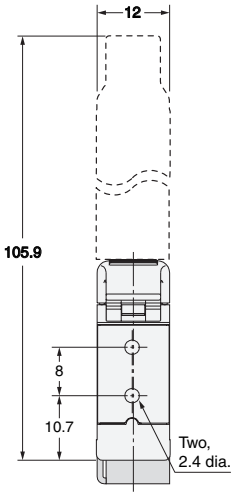




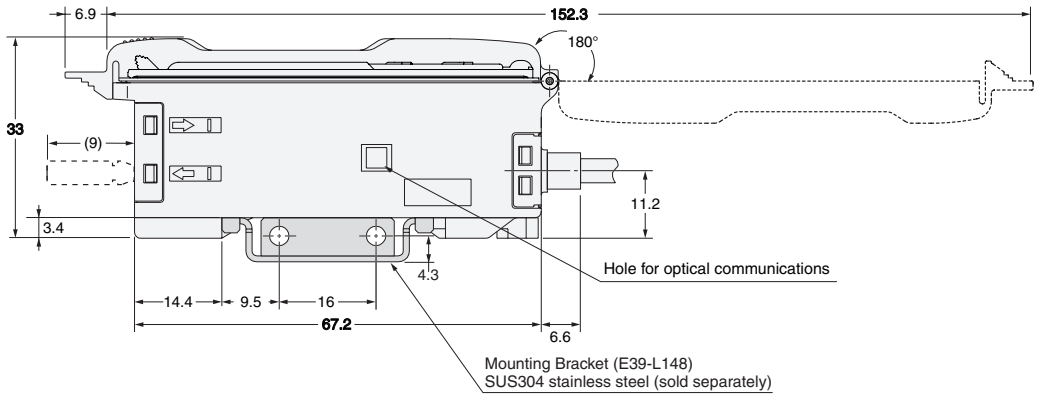

**Multiple connection diagram**



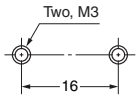

| The number of expansion | L (mm) |
|---|---|
| 1 | 12 |
| 2 | 24 |
| 3 | 36 |
| 4 | 48 |
| 5 | 60 |
| 6 | 72 |
| 7 | 84 |
| 8 | 96 |
| 9 | 108 |
| 10 | 120 |

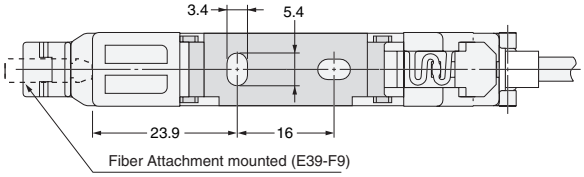



### With Mounting Bracket Attached



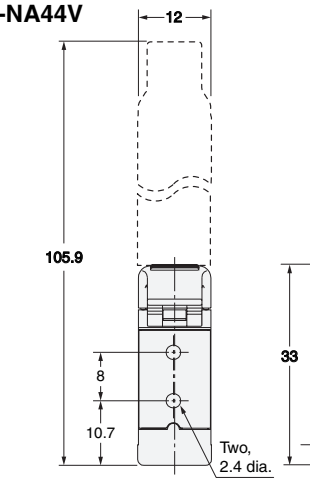

**Mounting Holes**



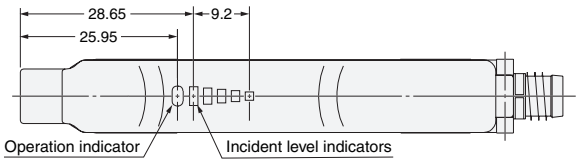



## Amplifier Units with Connectors, Water-resistant Models

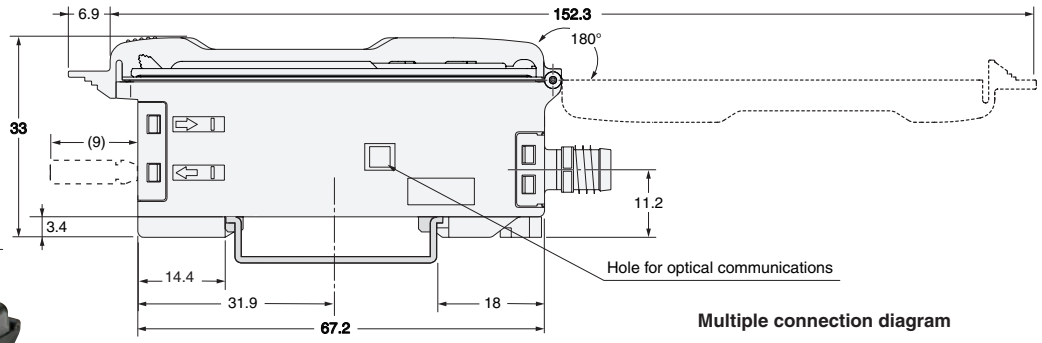
**E3X-NA14V**
**E3X-NA44V**

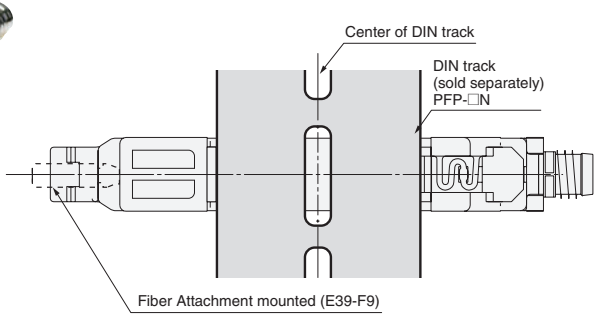



**Area of digital indication**

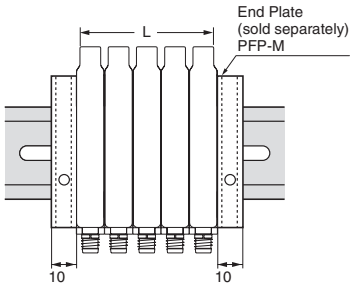



### DIN track mounting

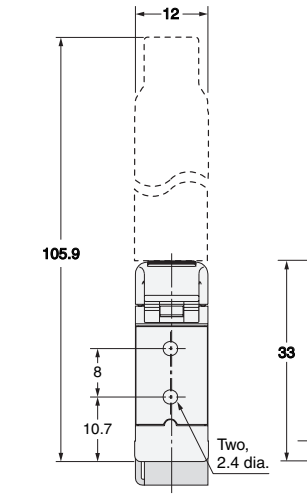




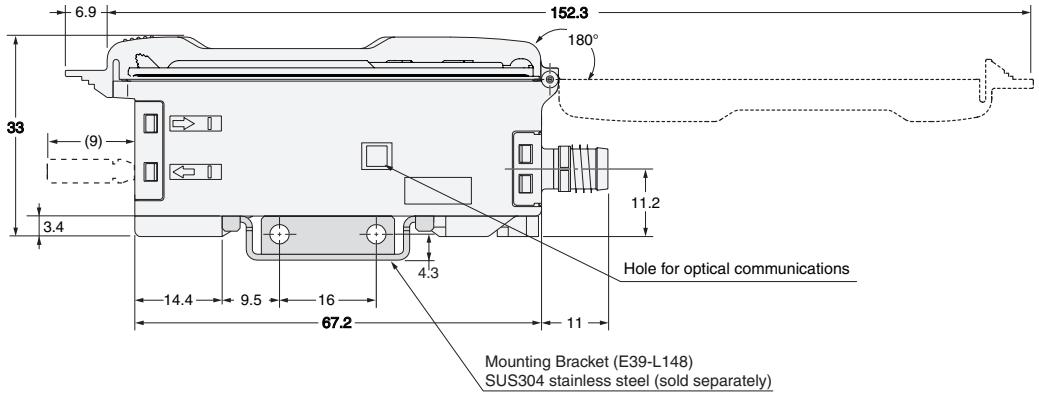

**Multiple connection diagram**



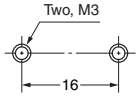

| The number of expansion | L (mm) |
|---|---|
| 1 | 12 |
| 2 | 24 |
| 3 | 36 |
| 4 | 48 |
| 5 | 60 |
| 6 | 72 |
| 7 | 84 |
| 8 | 96 |
| 9 | 108 |
| 10 | 120 |

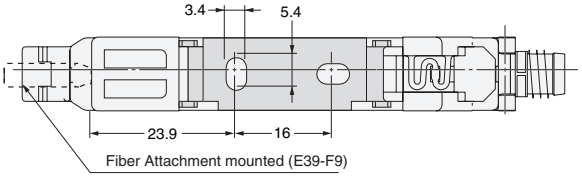



### With Mounting Bracket Attached



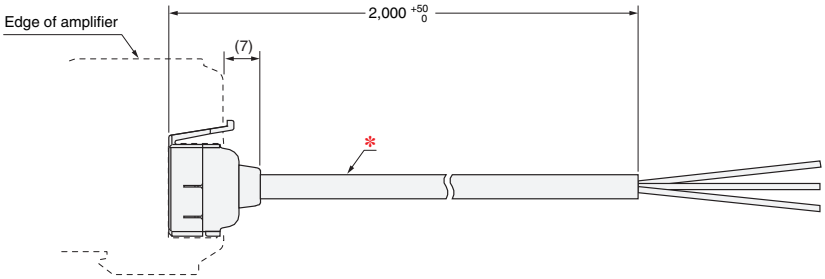

**Mounting Holes**



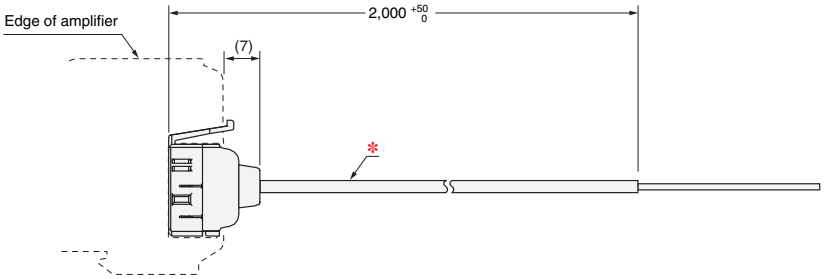
## Amplifier Unit Connectors (Wire-saving Connectors)

### Master Connector
**E3X-CN11**




* E3X-CN11: **4 dia.** cable / **3 conductors** / Standard length: 2 m (Conductor cross section: 0.2 mm$^2$ (AWG24), Insulator diameter: 1.1 mm)

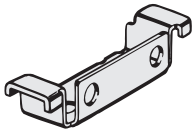
### Slave Connector
**E3X-CN12**



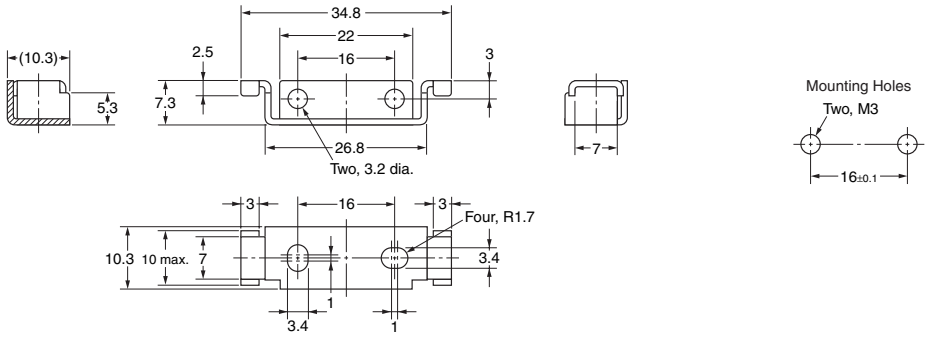

* E3X-CN12: **2.6 dia.** cable / **1 conductor** / Standard length: 2 m (Conductor cross section: 0.2 mm$^2$ (AWG24), Insulator diameter: 1.1 mm)

## Accessories (sold separately)

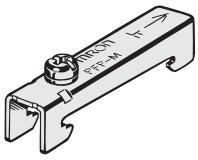
### Mounting Brackets
**E39-L143**

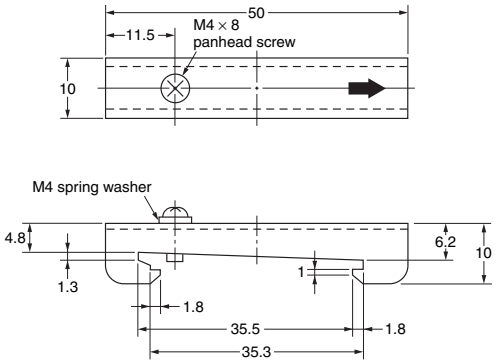


Material: Stainless steel (SUS304)




### End Plates
**PFP-M**



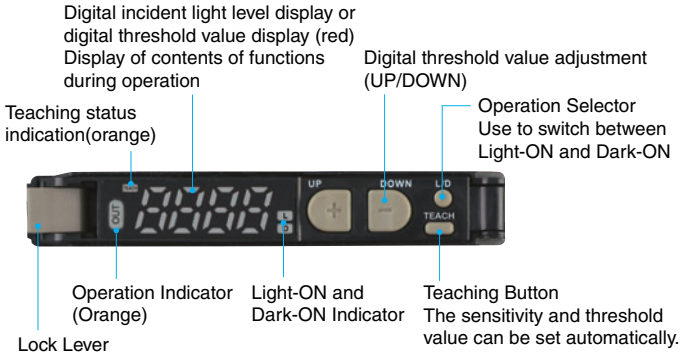


# E3X-SD/-NA

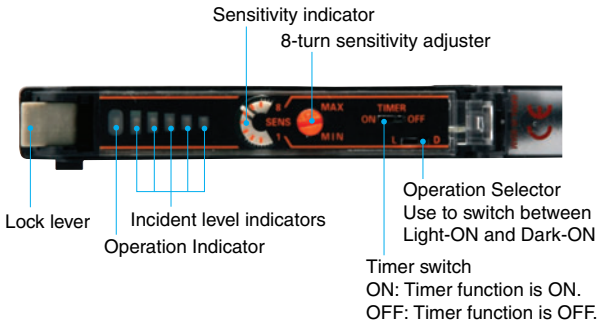
## Nomenclature

### Amplifier Units

#### E3X-SD




#### E3X-NA




## Operating Procedure

### E3X-SD

#### 1 Sensitivity Setting

The sensitivity can be set with the UP and DOWN Keys similar to using an adjuster knob. The sensitivity can also be easily set by using the following two teaching functions.

##### 2-1. Teaching with/without a Workpiece

Two points (one with the workpiece and the other without) are detected, and the operating level is set to the midpoint. Light level is also automatically set to the optimal value.

| Operation description | Button/Key |
|---|---|
| Press the TEACH button with the workpiece. | TEACH |
| Press the TEACH button without the workpiece. | TEACH |

##### 2-2. Automatic Teaching

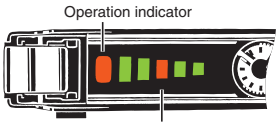
Changes within a time are detected, and the operating level is set to the midpoint between the maximum and the minimum values of the changes. This setting is optimal for when the workpieces cannot be stopped. Execute automatic teaching again if the incident light level is not automatically set to the optimal value.

| Operation description | Button/Key |
|---|---|
| Press the TEACH button for 3 s min. Let the workpiece pass while the button is pressed. | TEACH |

### E3X-NA

#### 1 Displays

A bar display (with four green and one red) showing excess gain is provided in addition to the orange operation indicator. Use these when adjusting the light axis and setting the sensitivity at setup.

| Display/indicator status (for L/ON) | Excess gain level | Description |
|---|---|---|
|   | Approx. 120% min. | Stable incident light |
| | Approx. 110% to 120% | |
| | Approx. 90% to 110% | Unstable incident light or Unstable interrupted light |
| | Approx. 80% to 90% | Stable interrupted light |
| | Approx. 80% max. | |

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Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».

AVIC JONHON

**«JONHON»** (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

**«FORSTAR»** (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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