## Ratings and Specifications

## Fiber Amplifier Units

| Item | Type Model | Standard models | Advanced models with simultaneous 2-color determination | Advanced models with 4-color determination |
| :---: | :---: | :---: | :---: | :---: |
|  |  | E3X-DAC $\square$-S $\square$ ( $\square$ : 11/41/6/8) | E3X-DAC $\square$-S ( $\square: 21 / 51$ ) | E3X-DAC $\square$ B-S ( $\square: 21 / 51$ ) |
| Sensing distance |  | Depends on the Fiber Unit. Refer to page 5 to 7 for details. |  |  |
|  | Sensing object | Reflective models: Standard 11 color cards *1, Through-beam models: Opaque or translucent object |  |  |
| Light source (wavelength) |  | White LED (420 to 700 nm ) |  |  |
| Sensing method |  | C Mode: RGB ratio determination (or I Mode: Light intensity determination for red, green, or blue; Black Mode: Determination of total light intensity for red, green, and blue) *2 |  |  |
|  | Number of registered colors | 1 | $2$ <br> (simultaneous determination) | 4 <br> (2-color simultaneous determination $\times 2$ banks) |
| Power supply voltage |  | 12 to 24 VDC $\pm 10 \%$, ripple (p-p) 10\% max. |  |  |
| Power consumption |  | 960 mW max. (current consumption: 40 mA max. at power supply voltage of 24 VDC ) |  |  |
| Control outputs |  | NPN or PNP open collector Load power supply voltage: 26.4 VDC max. Load current: 50 mA max. (residual voltage: 2 V max.) |  |  |
| Number of control outputs |  | 1 | 2 |  |
| External input *3 (page 4) |  | --- | Remote control | Bank switching |
| Protection circuits |  | Reverse polarity for power supply connection, Output short-circuit, Reversed output polarity protection |  |  |
| Response time | Super-high-speed mode *4 <br> High-speed mode <br> Standard mode High-resolution mode | Operate or reset: $60 \mu \mathrm{~s}$ Operate or reset: $300 \mu \mathrm{~s}$ Operate or reset: 1 ms Operate or reset: 4 ms | Operate or reset: $120 \mu \mathrm{~s}$ Operate or reset: $600 \mu \mathrm{~s}$ Operate or reset: 2 ms Operate or reset: 8 ms |  |
| Sensitivity setting (color registration, allowable range) |  | Teaching (one-point teaching or teaching with/without workpiece) or manual adjustment |  |  |
| Functions | Operation mode | ON for match (ON for same color as registered color) or ON for mismatch (ON for different color from registered color) |  |  |
|  | Timer function | Timer type: OFF delay, ON delay, or one-short, Timer time: 1 ms to 5 s (variable) |  |  |
|  | Control outputs | --- | Output for each channel, AND output, and OR output |  |
|  | Remote control | --- | One-point teaching, teaching with/without workpiece, zero reset, and light emission OFF | Bank switching (switching between banks A and $B$ and banks $C$ and D) |
|  | Display switch *5 | Seven patterns total: Match + Threshold, Margin + Threshold, Analog bar display, Peak + Bottom, etc. |  |  |
|  | Initialization | Initial reset (factory defaults) or user reset (saved settings) |  | Initial reset (factory defaults) |
|  | Zero reset | Supported |  | Not supported |
| Indicators |  | Operation indicator (orange)/l mode display indicator (orange) | Operation indicator for each channel (orange) |  |
| Digital display |  | 7-segment displays (Main display: Red, Sub-display: Green) |  |  |
| Display direction |  | Switchable between normal and reversed. |  |  |
| Ambient illumination (Receiver side) |  | Incandescent lamp: 3,000 lux Sunlight: 10,000 lux |  |  |
| Ambient temperature range *6 |  | Operating: $-25^{\circ} \mathrm{C}$ to $55^{\circ} \mathrm{C}$, Storage: $-30^{\circ} \mathrm{C}$ to $70^{\circ} \mathrm{C}$ (with no icing or condensation) |  |  |
| Ambient humidity range |  | Operating and storage: $35 \%$ to $85 \%$ (with no condensation) |  |  |
| Insulation resistance |  | $20 \mathrm{M} \Omega$ min. (at 500 VDC ) |  |  |
| Dielectric strength |  | 1,000 VAC at $50 / 60 \mathrm{~Hz}$ for 1 minute |  |  |
| Vibration resistance |  | Destruction: 10 to 50 Hz with a 1.5-mm double amplitude for 2 h each in $\mathrm{X}, \mathrm{Y}$ and Z directions |  |  |
| Shock resistance |  | Destruction: $500 \mathrm{~m} / \mathrm{s}^{2}$, for 3 times each in $\mathrm{X}, \mathrm{Y}$ and Z directions |  |  |
| Degree of protection |  | IEC IP50 (with Protective Cover attached) |  |  |
| Connection method |  | Pre-wired (standard cable length: 2 m ) or reduced-wiring connector (Units connected: 16 max.) | Pre-wired (standard cable length: 2 m ) |  |
| Weight (packed state) |  | Pre-wired model: Approx. 100 g , Amplifier unit connector model: Approx. 55 g |  |  |
| Materials | Case | Polybutylene terephthalate (PBT) |  |  |
|  | Cover | Polycarbonate (PC) |  |  |
| Accessories |  | Instruction manual |  |  |

[^0]*1. Sensing Object: Standard Color Card (230 Colors) from Japan Color Enterprise Co., Ltd.)

| Color (11 standard colors) | Munsell color notation |
| :---: | :---: |
| White | N9.5 |
| Red | 4R 4.5/12.0 |
| Yellow/red | 4YR 6.0/11.5 |
| Yellow | 5Y 8.5/11.0 |
| Yellow/green | 3GY 6.5/10.0 |
| Green | 3G 6.5/9.0 |
| Blue/green | 5BG 4.5/10.0 |
| Blue | 3PB 5.0/10.0 |
| Blue/purple | 9PB 5.0/10.0 |
| Purple | 7P 5.0/10.0 |
| Red/purple | 6RP 4.5/12.5 |
| (Black) | (N2.0) |

*2. When teaching with/without a workpiece, the best sensing method will be automatically selected (RGB ratio (C Mode) or light intensity determination (I Mode)). If color differences are not strong enough and RGB ratios would result in unstable detection, then light intensity determination (I Mode) will be selected. The detection mode can be set to C, I, or Black Mode.
*3. Input Specifications

| Contact input <br> (relay or switch) | Non-contact input <br> (transistor) |  |
| :---: | :---: | :---: |
| NPN | ON: Shorted to 0 V <br> (sourcing current: 1 mA max.). <br> OFF: Open or shorted to Vcc. | ON: $1.5 \mathrm{~V} \mathrm{max}$. <br> (sourcing current: 1 mA max.) <br> OFF: Vcc -1.5 V to Vcc <br> (leakage current: 0.1 mA max.) |
| PNP | ON: Shorted to Vcc <br> (sinking current: $3 \mathrm{~mA} \mathrm{max).}$. <br> OFF: Open or shorted to 0 V. | ON: Vcc -1.5 V to Vcc <br> (sinking current: 3 mA max.) <br> OFF: 1.5 V max. <br> (leakage current: 0.1 mA max.) |

Refer to the Instruction Manual for the external input pulse width.
A pulse width of 300 ms or longer is required to switch banks for the E3X-DAC $\square$ B-S
*4. Mutual interference prevention cannot be used in super-high-speed mode, and light intensity determination (I Mode) must be used. The response time will be $150 \mu$ s if an AND or OR is set for the control outputs.
*5. With light intensity determination (I Mode and Black Mode), the correlation is not displayed, but rather the light intensity is displayed.
*6. The allowable ambient operating temperature changes according to the number of Units that are linked
2 Units: -25 to $55^{\circ} \mathrm{C}, 3$ to 10 Units: -25 to $50^{\circ} \mathrm{C}$, and
11 to 16 Units: -25 to $45^{\circ} \mathrm{C}$

Amplifier Unit Connectors

| Item $\quad$ Model | E3X-CN11 | E3X-CN12 |  |  |  |
| :--- | :--- | :--- | :---: | :---: | :---: |
| Rated current | 2.5 A | 50 V |  |  |  |
| Rated voltage | $20 \mathrm{~m} \Omega$ max. (20 mVDC max., 100 mA max.) <br> (The figure is for connection to the Fiber Amplifier Unit and the adjacent Connector. It does not <br> include the conductor resistance of the cable.) |  |  |  |  |
| Contact resistance |  |  |  |  |  |
| No. of insertions | Destruction: 50 times (The figure for the number of insertions is for connection to the Fiber Amplifier <br> Unit and the adjacent Connector.) |  |  |  |  |
|  | Housing | Polybutylene terephthalate (PBT) |  |  |  |
|  | Contacts | Phosphor bronze/gold-plated nickel |  |  |  |
| Weight (packed state) |  |  |  | Approx. 55 g | Approx. 25 g |

## Operating Procedures (Typical)




In Black Mode, blank seam tape and other black marks can be detected regardless of film color or patterns


If you teach the conveyor (i.e., the background), you can detect workpieces even if they have different colors, shapes, or gloss.


[^0]:    Note: Refer to page 4 for * $\mathbf{1}$ to *6.

