Easy and reliable digital fiber-optic sensor E3X-DAC-S offers true color detection

» Color sensing engine covers all RGB wavelengths
» One-touch teaching simplifies color setup and ranging
» Fast workpiece detection, up to 60 µs
» Space-saving, 10-mm wide amplifier
» Wide range of cables/sensing heads
Color-sensing Engine

Easy and Reliable...
Featuring a Color-sensing Engine
The color sensing engine uses three parameters, RGB, to process incident light. It detects color information from the workpiece for precise detection of color differences.

Precise Color Detection

No Need to Select Separate Red, Green, Blue LED Amplifiers
A high-power white LED and a multi-RGB processing system combine to cover all RGB wavelengths, enabling easy and accurate detection of workpieces without having to use a different light source to match each one.

Resists Movement
Changes in the three parameters are processed as a ratio, so they are not affected by light-intensity variations due to workpiece movement.
Amplifier Unit

A Slim, 10-mm-wide Amplifier Unit
Use of a white LED and a one-package RGB light-receiving element has made it possible to unify the Amplifier Unit, both in size and operation, with conventional fiber-optic sensors. If detection should become unstable, the Amplifier Unit can be separately replaced to immediately regain stability.

Easy and Reliable ... Ease of Use and Smart Functions
In addition to ensuring ease of use, a number of smart functions have been included such as a remote control to simplify setup. Advanced models offer twin sensing and output to simultaneously distinguish two registered colors.

Easy and Reliable ... Simplified Wiring Connector Reduces Work Steps
OMRON’s unique simplified wiring connectors provide the power for each added Sensor. Up to 16 Units can be mounted, including a combination of Digital Fiber Sensors and Digital Laser Sensors that feature simplified wiring connectors.

First in Its Class
The Setting guide function shortens set-up and improves reliability. It guides the user to place the workpiece in an appropriate position for teaching. (Indicates OVER, OK, or LOW.)

Easy to understand
A double display for easy, precise setting.

Easy Setting
One push is all it takes.

Conventional fiber-optic amplifiers require three wiring connections for each sensor.

The new E3X-DAC-S requires three wires for the master sensor only. Each additional sensor in a group requires only one wiring connection.

Power is supplied through the master connection, so only one output wire is required for additional sensors.

Mix and Match
Omron Sensor Amplifiers
From left to right
Digital Fiber Sensors
E3X-NA
E3X-DA-S/MDA
E3X-DAC-S
Digital Laser Sensor
E3C-LDA
Proximity Sensor
E2C-EDA

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Application

Wide Range of Fiber Heads Available
Select from a wide range of Fiber Heads to match the workpiece and working space. This makes installation possible even in small spaces.

Easy and Reliable Applications (Examples)

Detecting Marks
Because it distinguishes RGB ratios, detection is highly resistant to workpiece movement.

Detecting Wafers
Workpieces that absorb a specific wavelength can be detected with a wide range of wavelengths.

Detecting Semi-transparent Objects
Through-beam Fiber Heads are capable of detecting color differences in semi-transparent objects.

Distinguishing Products
Detection is highly resistant to the effects of backgrounds and surface protrusions.

Distinguishing Trays
Twin sensing and remote control functions simplify setup of color sortation on a multi-product line.
## Ordering Information

### Amplifier Units

**Amplifier Units with Cables**

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Functions</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NPN output</td>
</tr>
<tr>
<td>Standard models</td>
<td></td>
<td>Timer, Response speed change</td>
<td>E3X-DAC11-S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PNP output</td>
</tr>
<tr>
<td>Advanced models</td>
<td></td>
<td>Standard models + Simultaneous determination (2 colors) AND/OR output, Remote setting</td>
<td>E3X-DAC21-S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E3X-DAC51-S</td>
</tr>
</tbody>
</table>

### Amplifier Units with Connectors (Amplifier Unit Connectors must be purchased separately.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Functions</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard models</td>
<td></td>
<td>Timer, Response speed change</td>
<td>E3X-DAC6-S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>E3X-DAC8-S</td>
</tr>
</tbody>
</table>

### Amplifier Unit Connectors (Order Separately)

<table>
<thead>
<tr>
<th>Item</th>
<th>Appearance</th>
<th>Cable length</th>
<th>No. of conductors</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Connector</td>
<td><img src="image" alt="Master Connector" /></td>
<td>2 m</td>
<td>3</td>
<td>E3X-CN11</td>
</tr>
<tr>
<td>Slave Connector</td>
<td><img src="image" alt="Slave Connector" /></td>
<td></td>
<td>1</td>
<td>E3X-CN12</td>
</tr>
</tbody>
</table>

### Combining Amplifier Units and Connectors

Amplifier Units and Connectors are sold separately. Refer to the following tables when placing an order.

<table>
<thead>
<tr>
<th>Amplifier Unit</th>
<th>NPN output</th>
<th>PNP output</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard models</td>
<td>E3X-DAC6-S</td>
<td>E3X-DAC8-S</td>
<td>+</td>
</tr>
</tbody>
</table>

When Using 5 Amplifier Units

Amplifier Units (5 Units) + 1 Master Connector + 4 Slave Connectors

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="E39-L143" /></td>
<td>E39-L143</td>
<td>1</td>
</tr>
</tbody>
</table>

### Accessories (Order Separately)

**Mounting Bracket**

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="PFP-M" /></td>
<td>PFP-M</td>
<td>1</td>
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</table>

### End Plate

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Mounting Bracket" /></td>
<td>PFP-M</td>
<td>1</td>
</tr>
</tbody>
</table>
## Ratings and Specifications

### Amplifier Units

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard models</th>
<th>Advanced models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E3X-DAC: -S</td>
<td>E3X-DAC: -S</td>
</tr>
<tr>
<td></td>
<td>(●11/41/6/8)</td>
<td>(●21/51/</td>
</tr>
<tr>
<td>Sensing distance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensing object</td>
<td>Standard 11 color cards (See note 1.). Through-beam models: Opaque or translucent object</td>
<td></td>
</tr>
<tr>
<td>Light source (wavelength)</td>
<td>White LED (420 to 700 nm)</td>
<td></td>
</tr>
<tr>
<td>Sensing method</td>
<td>C Mode: RGB ratio determination (or I Mode: Light intensity determination for red, green, or blue) (See note 2.)</td>
<td></td>
</tr>
<tr>
<td>Number of registered colors</td>
<td>1</td>
<td>2 (simultaneous determination)</td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10%, ripple (p-p) 10% max.</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>960 mW max. (current consumption: 40 mA max. at power supply voltage of 24 VDC)</td>
<td></td>
</tr>
<tr>
<td>Control output</td>
<td>NPN or PNP open collector</td>
<td>Load power supply voltage: 26.4 VDC max. Load current: 50 mA max. (residual voltage: 2 V max.)</td>
</tr>
<tr>
<td>Remote control input</td>
<td>---</td>
<td>No-voltage input (contact/transistor) (See note 3.)</td>
</tr>
<tr>
<td>Protection circuits</td>
<td>Reverse polarity for power supply connection, output short-circuit, Reversed output polarity protection</td>
<td></td>
</tr>
<tr>
<td>Sensing object</td>
<td>Reflective models: Standard 11 color cards (See note 1.). Through-beam models: Opaque or translucent object</td>
<td></td>
</tr>
<tr>
<td>Power supply voltage</td>
<td>12 to 24 VDC ±10%, ripple (p-p) 10% max.</td>
<td></td>
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<td>Sensing method</td>
<td>C Mode: RGB ratio determination (or I Mode: Light intensity determination for red, green, or blue) (See note 2.)</td>
<td></td>
</tr>
<tr>
<td>Number of registered colors</td>
<td>1</td>
<td>2 (simultaneous determination)</td>
</tr>
</tbody>
</table>

### Response time

#### Super-high-speed mode (See note 4.)

- Operate or reset: 60 μs
- Operate or reset: 300 μs
- Operate or reset: 1 ms
- Operate or reset: 4 ms

#### High-speed mode

- Operate or reset: 120 μs
- Operate or reset: 600 μs
- 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

#### Operating 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-shot
- Timer range: 1 ms to 5 s

#### Control outputs

- Operation indicator (orange)/I mode display indicator (orange)
- Output for each channel, AND output, and OR output

#### Remote control

- One-point teaching, teaching with/without workpiece, zero reset, and light emission OFF

#### Display switch (See note 5.)

- Seven patterns total: Match + Threshold, Margin + Threshold, Analog bar display, Peak + Bottom, etc.

#### Initialization

- Initial reset (factory defaults) or user reset (saved settings)

### Display

- 7-segment displays (Main display: Red, Sub-display: Green), display direction can be reversed.

### Ambient Illumination (Receiver side)

- Incandescent lamp: 3,000 lux
- Sunlight: 10,000 lux

### Ambient temperature range (See note 6.)

- Operating: -25°C to 55°C
- 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

### Vibration resistance

- Destruction: 10 to 50 Hz with a 1.5-mm double amplitude for 2 hrs each in X, Y and Z directions

### Shock resistance

- Destruction: 500 m/s², for 3 times each in X, Y and Z directions

### Degree of protection

- IEC 60529 IP50 (with Protective Cover attached)

### Connection method

- Pre-wired or Amplifier Unit Connector (Units connected: 16 max.)
- Pre-wired

### 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
Note: 1. Sensing Object: Standard Color Card (230 Colors) from Japan Color Enterprise Co., Ltd.

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.

### Amplifier Unit Connectors

<table>
<thead>
<tr>
<th>Item</th>
<th>E3X-CN11</th>
<th>E3X-CN12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductors</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Rated current</td>
<td>2.5 A</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>50 V</td>
<td></td>
</tr>
<tr>
<td>Contact resistance</td>
<td>20 mΩ max. (20 mVDC max., 100 mA max.) (The figure is for connection to the Amplifier Unit and the adjacent Connector. It does not include the conductor resistance of the cable.)</td>
<td></td>
</tr>
<tr>
<td>No. of insertions</td>
<td>Destruction: 50 times (The figure for the number of insertions is for connection to the Amplifier Unit and the adjacent Connector.)</td>
<td></td>
</tr>
<tr>
<td>Materials</td>
<td>Polybutylene terephthalate (PBT)</td>
<td></td>
</tr>
<tr>
<td>Contacts</td>
<td>Phosphor bronze/gold-plated nickel</td>
<td></td>
</tr>
<tr>
<td>Weight (packed state)</td>
<td>Approx. 55 g</td>
<td>Approx. 25 g</td>
</tr>
</tbody>
</table>

3. **Input Specifications**

<table>
<thead>
<tr>
<th></th>
<th>Contact input (relay or switch)</th>
<th>Non-contact input (transistor)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PNP</strong></td>
<td>ON: Shorted to 0 V (sourcing current: 1 mA max.), Open or shorted to Vcc.</td>
<td>OFF: Vcc - 1.5 V to Vcc (leakage current: 0.1 mA max.)</td>
</tr>
<tr>
<td></td>
<td>ON: Vcc - 1.5 V to Vcc (sinking current: 3 mA max.)</td>
<td>OFF: 1.5 V max. (leakage current: 0.1 mA max.)</td>
</tr>
</tbody>
</table>

4. Mutual interference prevention cannot be used in super-high-speed mode, and light intensity determination (I Mode) must be used.

5. With light intensity determination (I 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 \(55^\circ C\)
- 3 to 10 Units: \(-25\) to \(50^\circ C\)
- 11 to 16 Units: \(-25\) to \(45^\circ C\)

### Operating Procedures (Typical)

- **Detecting Marks**: With RGB ratio determination, detection is highly resistant to workpiece movement.
- **Distinguishing Trays**: Twin sensing and remote control functions simplify tooling changes.
- **Detecting Wafers**: Workpieces that absorb a specific wavelength can be detected with a wide range of wavelengths.
- **Through-beam heads**: Through-beam heads are capable of detecting color differences in semi-transparent objects.
## Sensing Distance
### Reflective Models

<table>
<thead>
<tr>
<th>Sensing object</th>
<th>White paper</th>
<th>Standard color card (11 colors) (mutual determination)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High-resolution mode</td>
<td>Standard mode</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard models</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General-purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E32-DC200</td>
<td>70</td>
<td>54</td>
</tr>
<tr>
<td>E32-D11R/E32-D12R/ E32-D15XR/ E32-DC200BR (B4R)</td>
<td>42</td>
<td>32</td>
</tr>
<tr>
<td>E32-D14LR</td>
<td>11</td>
<td>8.5</td>
</tr>
<tr>
<td>E32-D15YR/E32-D15ZR</td>
<td>10</td>
<td>7.5</td>
</tr>
<tr>
<td>E32-D24</td>
<td>8.8</td>
<td>6.7</td>
</tr>
<tr>
<td>E32-D25Y/E32-D25Z</td>
<td>5.8</td>
<td>4.5</td>
</tr>
<tr>
<td>Break-resistant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E32-D11/E32-D15XB</td>
<td>42</td>
<td>32</td>
</tr>
<tr>
<td>E32-D21B/E32-D221B</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>E32-D21/E32-D22B</td>
<td>8.8</td>
<td>6.7</td>
</tr>
<tr>
<td>E32-D25XB</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Fluorine coating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E32-D11U</td>
<td>42</td>
<td>32</td>
</tr>
<tr>
<td><strong>Special-beam models</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-distance, high power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E32-A09</td>
<td>20 to 38</td>
<td>24 to 36</td>
</tr>
<tr>
<td>E32-D11L</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>E32-D21L/E32-D22L</td>
<td>35</td>
<td>26</td>
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<tr>
<td>Coaxial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E32-CC200</td>
<td>60</td>
<td>45</td>
</tr>
<tr>
<td>E32-CC200R</td>
<td>35</td>
<td>26</td>
</tr>
<tr>
<td>E32-D32L</td>
<td>35</td>
<td>26</td>
</tr>
<tr>
<td>E32-C31/E32-D32</td>
<td>17</td>
<td>13</td>
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<td>Area sensing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E32-D36P1</td>
<td>35</td>
<td>26</td>
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<td><strong>Environment resistive models</strong></td>
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<tr>
<td>Heat-resistant</td>
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<td></td>
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<tr>
<td>E32-D51</td>
<td>55</td>
<td>42</td>
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<tr>
<td>E32-D61R-S/E32-D61-S</td>
<td>20</td>
<td>15</td>
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<tr>
<td>E32-D73-S</td>
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<td>10</td>
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<td>Chemical resistant</td>
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<tr>
<td>E32-D12F</td>
<td>22</td>
<td>17</td>
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<tr>
<td>E32-D14F</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

Refer to the *E32 Series Fiber Sensor Best Selection Guide* (Cat. NO. E353).
<table>
<thead>
<tr>
<th>Type</th>
<th>Sensing object</th>
<th>Through-beam Sensing Heads Sensing Distance (Unit: mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High-resolution mode</td>
</tr>
<tr>
<td>General-purpose</td>
<td>E32-TC200</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>E32-T11R/E32-T12R/E32-T15XR/E32-TC200BR (B4R)</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>E32-T14LR/E32-T15YR/E32-T15ZR</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>E32-TC200E/E32-T22/E32-T222/E32-T25X/E32-TC200F (F4)</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>E32-T24/E32-T25Y/E32-T25Z</td>
<td>48</td>
</tr>
<tr>
<td>Break-resistant</td>
<td>E32-T11/E32-T12B/E32-T15XB</td>
<td>190</td>
</tr>
<tr>
<td></td>
<td>E32-T21/E32-T221B/E32-T22B</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>E32-T25XB</td>
<td>55</td>
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<tr>
<td>Fluorine coating</td>
<td>E32-T11U</td>
<td>190</td>
</tr>
<tr>
<td>Long-distance, high power</td>
<td>E32-T17L</td>
<td>4300</td>
</tr>
<tr>
<td></td>
<td>E32-TC200+E39-F1</td>
<td>1100</td>
</tr>
<tr>
<td></td>
<td>E32-T11R+E39-F1</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>E32-T11+E39-F1</td>
<td>1000</td>
</tr>
<tr>
<td></td>
<td>E32-T14</td>
<td>950</td>
</tr>
<tr>
<td></td>
<td>E32-T11L/E32-T12L</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>E32-T11L+E39-F2</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>E32-T11R+E39-F2</td>
<td>110</td>
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<tr>
<td></td>
<td>E32-T11+E39-F2</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>E32-T12L/E32-T22L</td>
<td>160</td>
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<tr>
<td>Fine beam</td>
<td>E32-T22S</td>
<td>500</td>
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<tr>
<td></td>
<td>E32-T24S</td>
<td>360</td>
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<tr>
<td>Area sensing</td>
<td>E32-T16</td>
<td>750</td>
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<tr>
<td></td>
<td>E32-T16PR</td>
<td>240</td>
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<tr>
<td></td>
<td>E32-T16JR</td>
<td>200</td>
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<tr>
<td></td>
<td>E32-T16WR</td>
<td>360</td>
</tr>
<tr>
<td>Label detection</td>
<td>E32-G14</td>
<td>10</td>
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</table>

Note: These sensing distances are recommended to make the most of the detection capabilities of the Sensor.

Refer to the E32 Series Fiber Sensor Best Selection Guide (Cat. NO. E353).
Through-beam Sensing Heads Sensing Distance continued

<table>
<thead>
<tr>
<th>Type</th>
<th>Sensing object</th>
<th>Opaque object</th>
<th>Translucent object (See note.)</th>
</tr>
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<tr>
<td></td>
<td>Sensing distance</td>
<td></td>
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<tr>
<td></td>
<td>High-resolution mode</td>
<td>Standard mode</td>
<td>High-speed mode</td>
</tr>
<tr>
<td>Heat-resistant</td>
<td>E32-T51</td>
<td>200</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>E32-T54</td>
<td>60</td>
<td>48</td>
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<tr>
<td></td>
<td>E32-T81R-S</td>
<td>75</td>
<td>60</td>
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<td></td>
<td>E32-T61-S</td>
<td>120</td>
<td>95</td>
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<tr>
<td></td>
<td>E32-T61-S+E39-F1</td>
<td>950</td>
<td>700</td>
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<tr>
<td></td>
<td>E32-T61-S+E39-F2</td>
<td>120</td>
<td>95</td>
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<td></td>
<td>E32-T84S-S</td>
<td>360</td>
<td>280</td>
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<tr>
<td>Chemical resistant</td>
<td>E32-T11F</td>
<td>550</td>
<td>420</td>
</tr>
<tr>
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<td>E32-T12F</td>
<td>850</td>
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<td>E32-T14F</td>
<td>100</td>
<td>80</td>
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<td></td>
<td>E32-T51F</td>
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<td>300</td>
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<tr>
<td></td>
<td>E32-T81F-S</td>
<td>190</td>
<td>150</td>
</tr>
<tr>
<td>Vacuum resistant</td>
<td>E32-T51V</td>
<td>55</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>E32-T51V+E39-F1V</td>
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<td>E32-T54V</td>
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<td>E32-T54V+E39-F1V</td>
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<tr>
<td></td>
<td>E32-T84SV</td>
<td>130</td>
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</tr>
</tbody>
</table>

Note: These sensing distances are recommended to make the most of the detection capabilities of the Sensor.

Refer to the *E32 Series Fiber Sensor Best Selection Guide* (Cat. No. E353).
**Color vs. Detection Capability**

E3X-DAC-\(\text{S}\)+E32-CC200

<table>
<thead>
<tr>
<th>Color</th>
<th>White</th>
<th>Red</th>
<th>Yellow/red</th>
<th>Yellow/green</th>
<th>Green</th>
<th>Blue/green</th>
<th>Blue</th>
<th>Blue/purple</th>
<th>Purple</th>
<th>Red/purple</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Red</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Yellow/red</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Yellow/green</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Green</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Blue/green</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>Blue</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Blue/purple</td>
<td>✓</td>
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<td>✓</td>
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</tr>
<tr>
<td>Purple</td>
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<td>✓</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Red/purple</td>
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<td>✓</td>
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<td>✓</td>
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<td>✓</td>
</tr>
<tr>
<td>Black</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Sensing distance: 9 mm (i.e., the teaching distance)

- ✓: Detection possible, ⬜: Detection not possible.
- * Use 2-point teaching to distinguish between white and black.

**Color Detection Characteristics**

E3X-DAC-\(\text{S}\)+E32-CC200

**Correlation vs. Distance**

E3X-DAC-\(\text{S}\)+E32-CC200

Sensing distance: 9 mm (i.e., the teaching distance)

**Correlation vs. Angle**

E3X-DAC-\(\text{S}\)+E32-CC200

Sensing distance: 9 mm (i.e., the teaching distance)

---

**Model with Red Light Source**

(E3X-DA\(\text{S}\))

No Need to Select

**Model with Green Light Source**

(E3X-DAG\(\text{S}\))

**Model with Blue Light Source**

(E3X-DAB\(\text{S}\))

---

**Color Detection Capability vs. Distance**

E3X-DAC-\(\text{S}\)+E32-CC200

E3X-DAB/G-\(\text{S}\)+E32-CC200 (Model with single-color light source)

**Correlation vs. Angle**

E3X-DAC-\(\text{S}\)+E32-CC200

Sensing distance: 9 mm (= Teaching distance)

Registered Color

- Red
- Green
- Blue

**Change in correlation (%)**

Change in distance X (%)

**Sensing object**

- Change in correlation (%)
- Angle of incline \(\theta\) (°)

For 2-point teaching

For one-point teaching

---

Sensing object color

- White
- Red
- Yellow/red
- Yellow/green
- Green
- Blue/green
- Blue
- Blue/purple
- Purple
- Red/purple
- Black
# Output Circuit Diagrams

## NPN Output

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation mode</th>
<th>Timing charts</th>
<th>Operation selector</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-DAC11-S</td>
<td>ON for match</td>
<td></td>
<td>LIGHT ON (L-ON)</td>
<td></td>
</tr>
<tr>
<td>E3X-DAC6-S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON for mismatch</td>
<td></td>
<td>DARK ON (D-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3X-DAC21-S</td>
<td>ON for match</td>
<td></td>
<td>LIGHT ON (L-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON for mismatch</td>
<td></td>
<td>DARK ON (D-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1. Timing Charts for Timer Function Settings (T: Set Time)
2. Control Output (AND, OR, Sync) and Timing Chart for Timer Settings (T: Set Time)

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation mode</th>
<th>Timing charts</th>
<th>Operation selector</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-DAC41-S</td>
<td>ON for match</td>
<td></td>
<td>LIGHT ON (L-ON)</td>
<td></td>
</tr>
<tr>
<td>E3X-DAC8-S</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON for mismatch</td>
<td></td>
<td>DARK ON (D-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3X-DAC51-S</td>
<td>ON for match</td>
<td></td>
<td>LIGHT ON (L-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>ON for mismatch</td>
<td></td>
<td>DARK ON (D-ON)</td>
<td></td>
</tr>
<tr>
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</tbody>
</table>

## PNP Output

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation mode</th>
<th>Timing charts</th>
<th>Operation selector</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-DAC11-S</td>
<td>ON for match</td>
<td></td>
<td>LIGHT ON (L-ON)</td>
<td></td>
</tr>
<tr>
<td>E3X-DAC6-S</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON for mismatch</td>
<td></td>
<td>DARK ON (D-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3X-DAC21-S</td>
<td>ON for match</td>
<td></td>
<td>LIGHT ON (L-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ON for mismatch</td>
<td></td>
<td>DARK ON (D-ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1. Timing Charts for Timer Function Settings (T: Set Time)
**Nomenclature**

**Amplifier Units**

**Standard Models**

E3X-DAC□-S (□: 11/41/6/8)

<table>
<thead>
<tr>
<th>Operation Indicator (orange)</th>
<th>Incident level, function, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Display (Green)</td>
<td>Threshold, function settings, etc.</td>
</tr>
<tr>
<td>Operation Selector</td>
<td>Use to switch between Light ON and Dark ON modes.</td>
</tr>
</tbody>
</table>

**LOCK**

Locks the fiber.

**Mode Selector**

Use to select SET or RUN mode.

**Operation Keys**

UP  DOWN  MODE

---

**Advanced Models**

E3X-DAC□-S (□: 21/51)

<table>
<thead>
<tr>
<th>Main Display (Red)</th>
<th>Incident level, function, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ch1 Operation Indicator</td>
<td>ON when output is ON.</td>
</tr>
<tr>
<td>Ch2 Operation Indicator</td>
<td>OFF when output is OFF.</td>
</tr>
<tr>
<td>Sub-Display (Green)</td>
<td>Threshold, function settings, etc.</td>
</tr>
<tr>
<td>Mode Selector</td>
<td>Use to select SET or RUN mode.</td>
</tr>
<tr>
<td>Channel Switch</td>
<td>Used to select the channel to display and set.</td>
</tr>
</tbody>
</table>

---

**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 use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.

Never use the product with an AC power supply. Otherwise, explosion may result.

High-temperature environments may result in burn injury.

---

**Precautions for Safe Use**

The following precautions must be observed to ensure safe operation of the Sensor.

1. Do not use the Sensor in an environment where explosive or flammable gas is present.
2. Do not use the Sensor in a location subject to splattering of water, oils, or chemicals.
3. Do not attempt to disassemble, repair, or modify the Sensor.
4. Do not apply voltages or currents that exceed the rated range to the Sensor.
5. Do not use the Sensor in an ambient atmosphere or environment that exceeds the ratings.
6. Wire the power supply correctly, including the polarity.
7. Connect the load correctly.
8. Do not short-circuit the load at both ends.
9. Do not use the Sensor if the case is damaged.
10. Dispose of the Sensor as industrial waste.
11. Do not use the Sensor in locations subject to direct sunlight.
12. Burn injury may occur. The Sensor surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Use caution when operating or performing maintenance on the Sensor.
**Precautions for Correct Use**

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

**Amplifier Unit**

- **Designing**

  **Operation after Turning Power ON**
  
  The Sensor is ready to detect within 200 ms after the power supply is turned ON. If the Sensor and load are connected to separate power supplies, be sure to turn ON the Sensor first. Time may be required for the incident level to stabilize after the power supply is turned ON.

  **Operation When Turning Power OFF**
  
  Output pulses may occur when the power is turned OFF. Turn OFF the power supply to the load and the load line before turning OFF the power supply to the Sensor.

- **Mounting**

  **Connecting and Disconnecting Connectors**

  **Mounting Connectors**
  
  1. Insert the Master or Slave Connector into the Amplifier Unit until it clicks into place.
  
  2. Attach the protector seals (provided as accessories) to the sides of master and slave connectors that are not connected.

  ![Diagram of Mounting Connectors]

  Note: Attach the seals to the sides with grooves.

  **Removing Connectors**
  
  1. Slide the slave Amplifier Unit(s) for which the Connector is to be removed away from the rest of the group.
  
  2. After the Amplifier Unit(s) 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.)

  ![Diagram of Removing Connectors]

**Adding and Removing Amplifier Units**

**Adding Amplifier Units**

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

   ![Diagram of Adding Amplifier Units]

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

   ![Diagram of Removing Amplifier Units]

**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.)

**Mounting the End Plate (PFP-M)**

An End Plate should be used if there is a possibility of the Amplifier Unit moving, e.g., due to vibration.

**Fiber Connection**

The E3X Amplifier Unit has a lock button for easy connection of the Fiber Unit. Connect or disconnect the fibers 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.

![Diagram of Fiber Connection]

Note: Do not pull on, compress, or otherwise exert excessive force on the fibers after connecting them to the Amplifier Unit. (Do not exert more than 0.3 N·m.)
2. Disconnecting Fibers
Remove the protective cover and raise the lock lever to pull out the fibers.

![Diagram of protective cover and lock lever](image)

Note: 1. To maintain the fiber properties, confirm that the lock is released before removing the fibers.
2. Be sure to lock or unlock the lock button within an ambient temperature range between -10°C and 40°C.

● Adjusting

Mutual Interference Protection Function
Light from other sensors can cause the value on the digital display to become somewhat unstable. If this occurs, reduce the threshold to create a greater margin and enable more stable detection.

Shorting the Output
If the output short-circuit function operates because the load connected to the control output is short-circuited, OVER/CUR will flash on the display. Check the connection of the load.

EEPROM Writing Error
If the data is not written to the EEPROM correctly due to a power failure or static-electric noise, initialize the settings with the keys on the Amplifier Unit. ERR/EEP will flash on the display when a writing error has occurred.

Optical Communications
Several Amplifier Units can be slid together and used in groups. Do not, however, slide the Amplifier Units or attempt to remove any of the Amplifier Units during operation.

● Others

Protective Cover
Always keep the protective cover in place when using the Amplifier Unit.

Fiber Unit

● Design Precautions

Applicable Fiber Units
Refer to the sensing distance tables on pages 8 to 10 for the Fiber Units that can be used and the sensing distances. Retro-reflective, Limited-reflective, Ultra-compact, and Application-specific Fiber Units, which are not listed, cannot be used.

● Installation Precautions

Glossy Sensing Objects
If the sensing object is glossy, detection may not be stable. If the Sensor is inclined by 5° to 20° when using a glossy sensing object, as shown below, detection capabilities can be increased and stable detection achieved.
Dimensions

Amplifier Units

Amplifier Units with Cables

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-DAC11-S</td>
<td>4-dia., 3-conductor (Conductor cross section: 0.2 mm², insulator diameter: 1.1 mm)</td>
</tr>
<tr>
<td>E3X-DAC21-S</td>
<td>4-dia., 5-conductor (Conductor cross section: 0.2 mm², insulator diameter, 1.1 mm)</td>
</tr>
</tbody>
</table>

* The Mounting Bracket can also be used on this side.

Mounting Bracket (E39-L143) (Order Separately)
SUS304 stainless steel

With Mounting Bracket Attached

- Two, 2.4 dia.
- Two, 3.2 dia. holes
- Two, M3 Mounting Holes

Hole for optical communications

16

Dimensions (Unit: mm)

- Main display
- Sub-display
- Operation indicator
- Round ( ): Mode indicator
- Oblong ( ): Operation indicator for channel 2
- Vinyl-insulated round cable
  - Standard length: 2 m*

* Cable Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3X-DAC11-S</td>
<td>4-dia., 3-conductor (Conductor cross section: 0.2 mm², insulator diameter: 1.1 mm)</td>
</tr>
<tr>
<td>E3X-DAC21-S</td>
<td>4-dia., 5-conductor (Conductor cross section: 0.2 mm², insulator diameter, 1.1 mm)</td>
</tr>
</tbody>
</table>
Amplifier Units with Connectors
E3X-DAC6-S
E3X-DAC8-S

Amplifier Unit Connectors

Master Connectors
E3X-CN11
E3X-CN21

Slave Connectors
E3X-CN12
E3X-CN22

### Operation Reference

#### SET/RUN mode

<table>
<thead>
<tr>
<th>Operation Keys</th>
<th>Operation</th>
<th>Displays</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Display</strong></td>
<td><strong>Sub-Display</strong></td>
<td><strong>Remarks</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td><strong>Displays</strong></td>
<td><strong>Remarks</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Remarks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Main Display (Red)**
- Match, function, etc.

**Sub-Display (Green)**
- Threshold, function settings, etc.

**Operation Keys**
- Function setting operations
  - UP
  - DOWN
  - MODE

**Mode Selector**
- Use to select SET or RUN mode.

### Detection/adjustment

- **Operation Keys**
  - UP
  - DOWN

- **Operation**
  - Adjusting thresholds

- **Displays**
  - Incident level
    - **Main Display**
    - **Sub-Display**
  - Threshold
    - **Main Display**
    - **Sub-Display**

- **Remarks**
  - Used to executes various teaching and zero-reset operations.
  - Page 19
  - Refer to 2. Registering Workpiece Colors with Teaching in SET Mode.

### Function settings

- **Operation Keys**
  - UP
  - DOWN
  - MODE

- **Operation**
  - Executing user-specified functions
    (Factory-set to 1-point teaching.)

- **Displays**
  - **Main Display**
  - **Sub-Display**

- **Remarks**
  - Refer to 3. Setting the Operation Mode.

### Switching setting items

- **Operation Keys**
  - UP
  - DOWN
  - MODE

- **Operation**
  - Changing teaching and setting details

- **Displays**
  - Setting items
    - **Main Display**
    - **Sub-Display**
  - Setting details
    - **Main Display**
    - **Sub-Display**

- **Remarks**
  - Refer to 2. Registering Workpiece Colors with Teaching in SET Mode.
  - Page 20
  - Refer to 4. Setting Functions in SET Mode.

### Initialization and user reset

- **Operation Keys**
  - UP
  - DOWN

- **Operation**
  - Initializing and user reset

- **Displays**
  - **Main Display**
  - **Sub-Display**

- **Remarks**
  - Locks key operation to prevent incorrect operation.
  - Page 21
  - Refer to 5. Convenient Functions.
  - Returns the system to its initial state.
  - Page 21
  - Refer to 5. Convenient Functions.
1 Setting the Operation Mode

The operation mode is set with the Mode Selector.

<table>
<thead>
<tr>
<th>Operation mode</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match ON</td>
<td>L-ON</td>
</tr>
<tr>
<td>Mismatch ON</td>
<td>D-ON</td>
</tr>
</tbody>
</table>

*Advanced Models

The operation mode is set in SET mode.

Page 20 Refer to 4. Setting Functions in SET Mode.

2 Registering Workpiece Colors with Teaching in SET Mode

*Workpiece colors must always be taught to perform judgment for registered workpiece colors.

*With the factory settings, 1-point teaching can be executed in RUN mode. (Press the MODE Key for 3 s.)

2-1. One-point Teaching

Along with registering the workpiece colors, the threshold can be set at approximately –10% of the match.

The setting is completed in a simple operation with one press of a button.

Teaching with Workpiece

The set condition will flash twice.

2-2. Teaching with and without the Workpiece

Two points, with and without the workpiece, are detected, and the match of the intermediate point is set as the threshold value.

This method is ideal for setting thresholds with margins or performing judgments with low match.

Set the SET/RUN Mode Selector to SET.

Match Threshold

Teaching with Workpiece

The set condition will flash twice.

Teaching without Workpiece

The set threshold will flash twice.

3 Setting Thresholds Manually in RUN Mode

A threshold can be set manually. A threshold value can also be finetuned using manual setting after teaching.

Set the SET/RUN Mode Selector to SET.

Match Threshold

Increases threshold. Decreases threshold.

*Even if the display method for the Display Switch Function is changed, the threshold will appear on the sub-display when the key is pressed.
**Function Transitions**

Refer to **Registering Workpiece Colors with Teaching in SET Mode.**

1. **Detection**
   - (To increase the response speed or detection precision)
   - Used to increase the response speed or detection precision.*

2. **Timer**
   - Enabled: **● OFF**
   - ON-delay timer: **α**
   - One-shot timer: **β**
   - Used to set control output timers.

3. **MODE key**
   - 1-point teaching: **γ**
   - Teaching with workpiece: **δ**
   - Zero-shift reset: **ε**
   - Used to change the function of the MODE key during operation.

4. **Teaching level**
   - 0 to 99: 0 to 99
   - Used to change the threshold setting level during 1-point teaching.

5. **Display switch**
   - Match/threshold: **φ**
   - Margin/threshold: **ψ**
   - Peak/hold (updated periodically): **θ**
   - Peak/hold (updated linked with output): **κ**
   - Analog bar display: **λ**
   - Match/peak (updated periodically): **μ**
   - Match/channel: **ν**
   - Used to change display contents.

6. **Display orientation**
   - Normal display: **ω**
   - Upside down display: **π**
   - Used to change the orientation of the display.

7. **Output setting**
   - Each channel: 2OUT, AND: AND, OR: OR
   - Used to change the item output on control output 2.

8. **Timer function**
   - Enabled: **● OFF**
   - ON-delay timer: **α**
   - One-shot timer: **β**
   - Used to set timers for the AND/OR control output.

9. **Timer range**
   - 1 to 5000 ms: **● 1000**
   - (1 to 20: 1 ms increments, 20 to 200 ms: 5 ms increments, 200 to 1000: 100 ms increments, 1000 to 5000: 1000 ms increments)
   - Used to change time setting.
   - The timer can be set from 1 ms to 5 s.

10. **External input**
    - 1-point teaching: **γ**
    - Teaching without workpiece: **δ**
    - Zero-shift reset: **ε**
    - Light OFF: **η**
    - Used to change the functions to be remotely controlled with external input.
    - (For the effective pulse width and other information, refer to the instructions provided with the product.)

11. **External input memory**
    - Write: **α**
    - Do not write: **γ**
    - Used to set whether to write the control results to memory. (Refer to the instructions provided with the product.)

*Be sure to register (i.e., teach) the workpiece colors if the detection functions have been changed.
5 Convenient Functions

5-1. Zeroing the Display (Zero Reset)

The incident light level on the main display can be set to 0. This is useful when the reference display is to be reset to zero because the match display and the threshold are shifted at the same time.

- Change the function to ORST (zero reset) with the MODE key. The default setting is 1PNT.

- Refer to 4. Setting Functions in SET Mode.

To return to original value for incident light level:

Set the SET/RUN Mode Selector to RUN (Factory-set to RUN)

5-2. Locking the Keys (Key Lock)

All key operations can be disabled.

Set the SET/RUN Mode Selector to RUN (Factory-set to RUN)

*ON* will flash twice and key operations will be disabled.

To release the lock:

Set the SET/RUN Mode Selector to RUN (Factory-set to RUN)

*OFF* will flash twice and key operations will be enabled.

*Press the DOWN or UP key right after pressing the MODE key.

5-3. Initializing Settings (Initialization and User Reset)

All settings will be initialized and returned to the factory settings or to a saved state.

Set the SET/RUN Mode Selector to SET.

The incident light level on the main display can be set to 0. This is useful when the reference display is to be reset to zero because the match display and the threshold are shifted at the same time.

- Change the function to ORST (zero reset) with the MODE key. The default setting is 1PNT.

- Refer to 4. Setting Functions in SET Mode.

Press both buttons for 3 s.

*If a key is pressed while key operations are locked, *LOC* will flash twice on the display to indicate that key operations have been disabled.

Press both buttons for 3 s.

Press both buttons for 5 s.

The incident light level on the main display can be set to 0. This is useful when the reference display is to be reset to zero because the match display and the threshold are shifted at the same time.

- Change the function to ORST (zero reset) with the MODE key. The default setting is 1PNT.

- Refer to 4. Setting Functions in SET Mode.

Press both buttons for 3 s.

*Press the DOWN or UP key right after pressing the MODE key.

5-3. Initializing Settings (Initialization and User Reset)

All settings will be initialized and returned to the factory settings or to a saved state.

Set the SET/RUN Mode Selector to SET.

The section enclosed by dotted lines applies to user-saved settings.

Press both buttons for 3 s.

Press both buttons for 5 s.

Settings initialized. Operation canceled.

Operation canceled. Initialized.

Saving User Settings

A set state can be saved.

Set the SET/RUN Mode Selector to SET.

User settings saved. Operation canceled.

Press both buttons for 3 s.

Press both buttons for 5 s.

Press both buttons for 5 s.

Press both buttons for 5 s.

Press both buttons for 5 s.

Press both buttons for 5 s.

Press both buttons for 5 s.
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