# E3X-DA-S/E3X-MDA

## Operation Reference

### Operation Keys
- **UP**: Increases the setting.
- **DOWN**: Decreases the setting.
- **MODE**: Changes between modes.

### SET/RUN Mode Selector Switch
- **SET**: SET mode
- **RUN**: RUN mode

### Displays
- **Main Display (Red)**
  - Displays the incident light level or the function name.
- **Sub-Display (Green)**
  - Displays the threshold and function settings.

### Operation Keys
- **Operation Indicator**: Power tuning indicator
- **Power Tuning Indicator**: Used to set functions.

### Table of Operations and Displays

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<td>INIT</td>
<td>YES?</td>
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</tbody>
</table>

*Except on the E3X-MDA*, E3X-DA*TW-S*, and E3X-DA*AT-S*. These models have an operation indicator (ch2) instead of a power tuning indicator.
1 Setting the Operation Mode

The operation mode is set with the Mode Selector Switch.

<table>
<thead>
<tr>
<th>Operation mode</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light ON</td>
<td>L-ON</td>
</tr>
<tr>
<td>Dark ON</td>
<td>D-ON</td>
</tr>
</tbody>
</table>

*Note:* Press both keys for 3 s.

E3X-DA-TW-S/E3X-DA-AT-S/E3X-MDA:

The operation mode is set in SET mode. Refer to 5. Setting Functions in SET Mode on page 5.

E3X-DA-TW-S/E3X-DA-AT-S/E3X-MDA (Same for All Adjustments):

Set the Channel Selector Switch to the desired channel before making any adjustments or settings.

2 Adjusting the Power (RUN Mode)

The current incident light level can be adjusted near the power tuning target value (default: 2,000).

*Confirm that the MODE Key setting is PTUN (power tuning). The default setting is PTUN.

*If power tuning is executed while SHS is selected for the detection function, the minimum power will be set.

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

Release the key after the progress bar is displayed.

Display changes after specific time.

The Power Tuning indicator will light when the adjustment has been completed. (Except on the E3X-DA-TW-S, E3X-DA-AT-S, and E3X-MDA.)

3 Setting Thresholds Manually (RUN Mode)

A threshold can be set manually. A threshold can also be adjusted manually after teaching to fine-tune it.

To restore the default power settings:

- Press both keys for 3 s.

"OFF" will flash twice.

The Power Tuning indicator will go out when the default setting has been restored.

*Setting Errors

An error has occurred if one of the following displays appears after the progress bar is displayed.

<table>
<thead>
<tr>
<th>Display</th>
<th>Error</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTUN</td>
<td>OFF</td>
<td>The power will not be tuned. The power can be increased up to approximately 5 times the incident light value.</td>
</tr>
<tr>
<td>PTUN</td>
<td>BOTM</td>
<td>The power will be turned to the minimum level. The power can be decreased down to approximately 1/25th the incident light value.</td>
</tr>
</tbody>
</table>

Note: Press the DOWN Key right after pressing the MODE Key.

*Even if the display method is changed, the threshold will appear on the sub-display when the key is pressed.


4 Teaching the Threshold (SET Mode)

4-1. Setting the Threshold at Maximum Sensitivity

The threshold can be set to the maximum sensitivity. This method is ideal when using a Through-beam Fiber Unit to detect workpieces so that detection is not influenced to any great degree by dust and other environmental factors.

<table>
<thead>
<tr>
<th>Set the SET/RUN Mode Selector Switch to SET.</th>
<th>Light level</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET</td>
<td>02000</td>
<td>01234</td>
</tr>
</tbody>
</table>

The threshold that was set will flash twice.

The previous display will return when the setting has been completed.

4-2. Teaching a Through-beam Fiber Unit without a Workpiece

A value about 6% less than the incident light level can be set as the threshold. This method is ideal when detecting very small differences in light level, such as when detecting very fine workpieces or transparent workpieces like transparent fibers.

<table>
<thead>
<tr>
<th>Set the SET/RUN Mode Selector Switch to SET.</th>
<th>Light level</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET</td>
<td>02000</td>
<td>01234</td>
</tr>
</tbody>
</table>

"- - - -" will be displayed.

The threshold that was set will flash twice.

The previous display will return when the setting has been completed.

4-3. Teaching a Reflective Fiber Unit without a Workpiece

A value about 6% greater than the incident light level can be set as the threshold. This method is ideal when using a Reflective Fiber Unit to detect workpieces so that detection is not influenced to any great degree by dust and other environmental factors.

<table>
<thead>
<tr>
<th>Set the SET/RUN Mode Selector Switch to SET.</th>
<th>Light level</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET</td>
<td>02000</td>
<td>01234</td>
</tr>
</tbody>
</table>

With no workpiece:

"- - - -" will be displayed.

The threshold that was set will flash twice.

The previous display will return when the setting has been completed.

4-4. Teaching with and without a Workpiece

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

<table>
<thead>
<tr>
<th>Set the SET/RUN Mode Selector Switch to SET.</th>
<th>Light level</th>
<th>Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>SET</td>
<td>02000</td>
<td>01234</td>
</tr>
</tbody>
</table>

With a workpiece:

"- - - -" will be displayed.

With no workpiece:

"- - - -" will be displayed.

The previous display will return when the setting has been completed.
Operating Procedures: Photoelectric Sensors

5 Setting Functions in SET Mode

Standard Mark Detection Models

E3X-DA□-S

Moving between Functions

Set the SET/RUN Mode Selector Switch to SET.

Teaching

Display switch

(To change response speed and detection precision)

Timer

MODE Key

(To change the function of the MODE Key during operation)

Display orientation

(To reverse the orientation of the display)

Refer to 4. Teaching the Threshold on page 4.

Functions

Use the UP and DOWN Keys to change the settings.

<table>
<thead>
<tr>
<th>Function</th>
<th>Setting (display)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection</td>
<td>Used to change the response speed or detection precision.</td>
<td></td>
</tr>
<tr>
<td>Timer</td>
<td>Used to enable or disable timers.</td>
<td></td>
</tr>
<tr>
<td>Time (timer enabled)</td>
<td>Used to change timer settings when timers are enabled. The timer can be set from 1 to 5000 ms.</td>
<td></td>
</tr>
<tr>
<td>MODE Key</td>
<td>Used to change the function of the MODE Key during operation.</td>
<td></td>
</tr>
<tr>
<td>Power tuning target value (when performing power tuning is selected)</td>
<td>Setting range: 100 to 3,900 (increments of 100) Maximum power M: FULL</td>
<td>Used to set target values during power tuning. Refer to 2. Adjusting the Power on page 3.</td>
</tr>
<tr>
<td>Detection status</td>
<td>Analog bar display. The current detection status is displayed as an analog bar. The bar will lengthen from the right as ON status is reached. (ON: Red, OFF: Green)</td>
<td></td>
</tr>
<tr>
<td>Current light level</td>
<td>Used to display the current incident light level and the peak incident light level. Display changes at a fixed interval.</td>
<td></td>
</tr>
<tr>
<td>Light level Channel (unit number)</td>
<td>Used to display the incident light level and the channel (unit number).</td>
<td></td>
</tr>
<tr>
<td>Display orientation</td>
<td>Used to reverse the orientation of the display.</td>
<td></td>
</tr>
</tbody>
</table>
Operating Procedures: Photoelectric Sensors

5 Setting Functions in SET Mode

Advanced (Twin-output, ATC) Models
E3X-DA TW-S and E3X-DA AT-S

Moving between Functions
Refer to 4. Teaching the Threshold on page 4.

Functions
(Only functions not supported by standard models are listed. For information on basic functions, refer to information on the standard models.)

- Use the UP and DOWN Keys to change the settings.

<table>
<thead>
<tr>
<th>Function</th>
<th>Setting (display)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode *</td>
<td>Light ON: Lon, Dark ON: don.</td>
<td>Refer to 1. Setting the Operation Mode on page 3.</td>
</tr>
<tr>
<td>Differential edge (differential operation selected)</td>
<td>Single edge: f, Double edge: d</td>
<td>Used to set the edge to be detected.</td>
</tr>
<tr>
<td>Differential time</td>
<td>Single edge—250 μs: 1, 500 μs: 2, 1 ms: 3, 10 ms: 4, 100 ms: 5, Double edge—500 μs: 1, 1 ms: 2, 2 ms: 3, 20 ms: 4, 200 ms: 5</td>
<td>Used to set the differential response time.</td>
</tr>
<tr>
<td>Twin outputs</td>
<td>ATC error output: R L, Output for each channel: OUtL, Output if level is between the two thresholds: Rr ER, Self-diagnosis output: SELF</td>
<td>Used to change the output for channel 2. This setting is disabled if differential operation is set for the detection function. (Alarm outputs are always used for differential operation.)</td>
</tr>
<tr>
<td>ATC (E3X-DA AT-S only)</td>
<td>ATC enabled: on, ATC disabled: off</td>
<td>Used to enable or disable ATC.</td>
</tr>
<tr>
<td>Setting at Power-ON (ATC ON)</td>
<td>No setting: off, ATC start processing: R L, Power tuning and ATC start processing: P L R</td>
<td>Used to set the processing to be performed when the power is turned ON.</td>
</tr>
</tbody>
</table>

*The operation mode and timer function can be set for each channel specified using the Channel Selector Switch. The settings for other functions will be the same for channel 1 and channel 2.
5. Setting Functions in SET Mode

Advanced (External Input) Models

E3X-DA RM-S

Moving between Functions

- Refer to 4. Teaching the Threshold on page 4.

Set the SET/RUN Mode Selector Switch to SET.

**SET**

Teaching (To change function controlled by external input.)

Detection (To change response speed and detection precision.)

Timer (To use the timer setting.)

External input (To change function controlled by external input.)

MODE Key (To change the function of the MODE Key during operation.)

When the settings have been completed

Set the SET/RUN Mode Selector Switch to RUN.

**RUN**

External input batch setting (Refer to the Instruction Sheet provided with the product.)

Counter (To set the counter function.)

External input memory (Refer to the Instruction Sheet provided with the product.)

Display orientation (To reverse the orientation of the display.)

Display switch (To change the display method.)

Functions

- Used to increase the response speed and detection precision. Detection
  - Super-high-speed: $\text{HiS}$, High-speed: $\text{HS}$, Standard: $\text{Std}$, High-precision: $\text{HiP}$, Differential operation: $\text{Diff}$ (advanced models only)

- Used to set the edge to be detected. Differential edge (differential operation selected)
  - Single edge: $\text{S}$, Double edge: $\text{D}$ (advanced models only)

- Used to set the differential response time. Differential time
  - Single edge: $250 \mu s, 500 \mu s, 1 \ms, 10 \ms, 100 \ms$,
  - Double edge: $500 \mu s, 1 \ms, 2 \ms, 20 \ms, 200 \ms$,

- Used to change function controlled by external input. (Refer to Instruction Sheet provided with the product.) External input
  - Through-beam, no-workpiece teaching: $\text{TR}$
  - Reflective, no-workpiece teaching: $\text{RC}$
  - With/Without-workpiece teaching: $\text{WT}$
  - Automatic teaching: $\text{AT}$
  - Power tuning: $\text{PT}$
  - Zero reset: $\text{ZR}$
  - Light OFF: $\text{LO}$
  - Counter reset: $\text{CR}$

- Used to display the counter value. Display switch (Settings are added.)
  - Count

- Used to set writing the results. (Refer to Instruction Sheet provided with the product.) External input memory
  - Write results to EEPROM: $\text{on}$
  - Don’t write results: $\text{off}$

- Used to set the counter function. Counter
  - Counter disabled: $\text{off}$
  - Count incremented when output turns ON: $\text{UP}$
  - Count decremented when output turns ON: $\text{DO}$

- Used to set the counter value when the counter function is enabled. Count
  - Setting range: 1 to 9,999,999

- Used to set linked Amplifiers at the same time using an external input. External input batch setting
  - Only Sensor that receives external input: $\text{ch}$
  - All linked Sensors: $\text{RL}$

- The function transition boxes show the default settings.
- More functions may be displayed depending on the detailed settings.

*Refer to 4. Teaching the Threshold on page 4.*
5 Setting Functions in SET Mode

Two-channel Models
E3X-MDA

Moving between Functions

*The function transition boxes show the default settings.
*More functions may be displayed depending on the detailed settings.

- Set the SET/RUN Mode Selector Switch to SET.

- Teaching
  - (To set the operation mode)

- Operation mode
  - (To change response speed and detection precision)

- Detection
  - (To use the timer setting)

- Display orientation
  - (To reverse the orientation of the display.)

- Display switch
  - (To change the display method)

- MODE Key
  - (To change the function of the MODE Key during operation)

- Output setting
  - (To select the output details for channel 2)

- When the settings have been completed

- Refer to 4. Teaching the Threshold on page 4.

- Set the SET/RUN Mode Selector Switch to RUN.
### Functions

Use the UP and DOWN Keys to change the settings.

<table>
<thead>
<tr>
<th>Function</th>
<th>Setting (display)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>Light ON: L on, Dark ON: Don</td>
<td>➜Refer to 1. Setting the Operation Mode on page 3.</td>
</tr>
<tr>
<td>Timer</td>
<td>Timer disabled: · · · · · ·, OFF-delay timer: O F d d, ON-delay timer: ON · d d, One-shot timer: 1Sh t</td>
<td>Used to enable or disable timers.</td>
</tr>
<tr>
<td>Time (timer enabled)</td>
<td>1 to 20 ms: 1-ms increments, 20 to 200 ms: 5-ms increments, 200 ms to 1 s: 100-ms increments, 1 to 5 s: 1-s increments</td>
<td>Used to change timer settings when timers are enabled. The timer can be set from 1 to 5000 ms.</td>
</tr>
<tr>
<td>Output setting</td>
<td>Each channel: 0ut, AND: A nd, OR: O r, Rising edge synchronization: $ \uparrow $, Falling edge synchronization: $ \downarrow $, Differential operation: 1-2</td>
<td>Used to change the output details for channel 2.</td>
</tr>
<tr>
<td>Timer function for output setting</td>
<td>Timer disabled: · · · · · ·, OFF-delay timer: O F d d, ON-delay timer: ON · d d, One-shot timer: 1Sh t</td>
<td>Used to enable or disable the timer function for output settings of channel 2.</td>
</tr>
<tr>
<td>Timer time</td>
<td>1 to 20 ms: 1-ms increments, 20 to 200 ms: 5-ms increments, 200 ms to 1 s: 100-ms increments, 1 to 5 s: 1-s increments</td>
<td>Used to change timer setting when timer is enabled. The timer can be set from 1 to 5,000 ms.</td>
</tr>
<tr>
<td>MODE Key</td>
<td>Executes power tuning: P tUn, Executes a zero reset: Z rSt, With/without workpiece teaching: W/P, Automatic teaching: A U tO</td>
<td>Used to change the function of the MODE Key during operation.</td>
</tr>
<tr>
<td>Power tuning target value (performing power tuning)</td>
<td>Setting range: 100 to 3900 (increments of 100) Maximum power M: F U L L</td>
<td>Used to set target values during power tuning. ➜Refer to 2. Adjusting the Power on page 3.</td>
</tr>
</tbody>
</table>

### Display switch

- **Light level Threshold**
- **% light level Threshold**
- **PEAK BOTM**
- **L - PE D - BT**
- **Detection status**
- **Current light level PEAK**
- **Light level Channel**

Used to display the incident light level and the threshold. Used to display the incident light level as a percentage of the threshold and the threshold. Used to display the peak and bottom levels of incident light within a set time. (Updated every 2 s.) Used to display the incident light peak level and no incident light bottom level. (Refreshed when output turns ON or OFF.) Analog bar display. The current detection status is displayed as an analog bar. The bar will lengthen from the right as ON status is reached. (ON: Red, OFF: Green) Used to display the current incident light level and the peak incident light level. Display changes at a fixed interval. Used to display the incident light level and the channel. Used to display the incident light level and the channel. Used to reverse the orientation of the display.

### Display orientation

- **Normal display:** d 23
- **Up/down reversed display:** E 2 p

Note: The operation mode and timer function can be set for each channel. The setting will be executed for channels specified using the Channel Selector Switch.
6 Convenient Functions

6-1. Zeroing the Digital Display (Zero Reset)

The incident light level on the main display can be set to 0.

*Change the function to 0RST (zero reset) with the MODE Key.
The default setting is PTUN.

Refer to 5. Setting Functions in SET Mode on page 5.

Set the SET/RUN Mode Selector Switch to RUN.

To reset to 0 again:

To return to original value for incident light level:

6-2. Locking the Keys (Key Lock)

All key operations can be disabled.

Set the SET/RUN Mode Selector Switch to RUN.

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

To release the lock:

"OFF" will flash twice and key operations will be disabled.

Note: Press the UP Key right after pressing the MODE Key.

6-3. Initializing Settings (Initial Reset)

All settings can be returned to their original default settings.

Set the SET/RUN Mode Selector Switch to SET.

Settings initialized. Operation canceled.