Safety Light Curtains

F3SJ Overview

SpeedSPEC
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F3SJ

For full product information, visit www.sti.com. Use the SpeedSpec Code or scan the QR Code for quick access to the specific web page.

Introducing the F3SJ Series

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NEW!

Three Versions available to meet your exact safety needs

All versions conform to the latest Type 4, PLe and SIL3 requirements.

F3SJ-E: EASY type

Easy, simple and affordable hand protection

F3SJ-B: BASIC type

Basic, simple hand protection and muting functions

F3SJ-A: ADVANCED type

Supports finger protection, and complex blanking and muting functions

Overview (continued)

Offering the best selection of safety light curtains for your guarding needs.
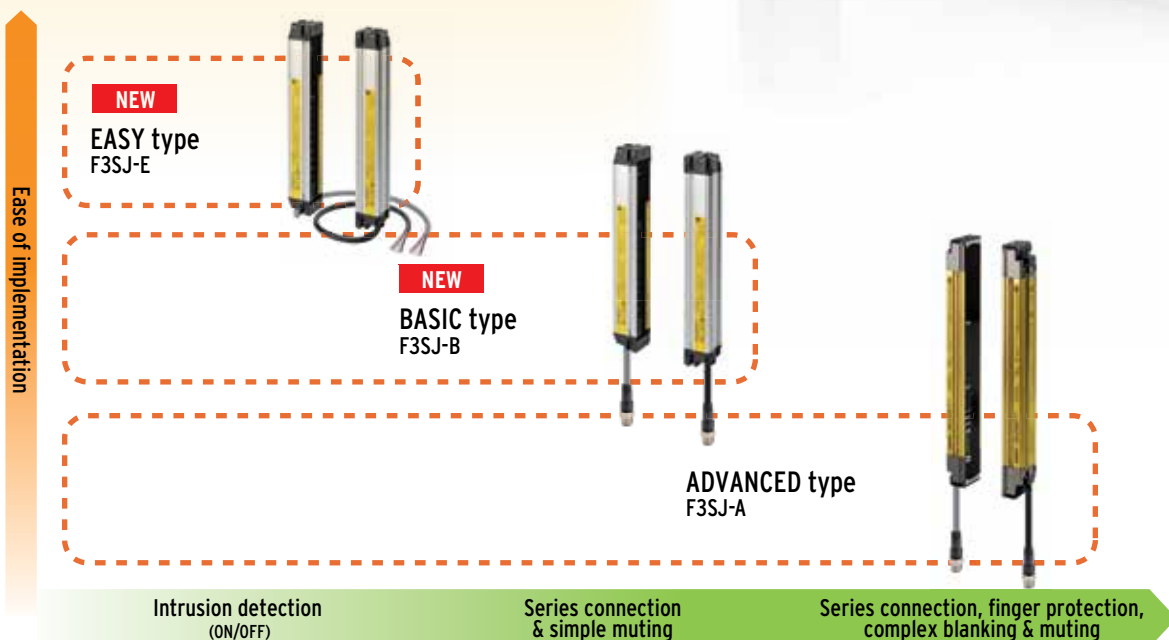## Three F3SJ types allow easy selection for your application.

Omron's new STI F3SJ series of safety light curtains offers a tailored approach for a variety of production environments. Conventional safety light curtains offer full-featured models, even when only simple intrusion detection is needed. The F3SJ series offers a product range that allows you to choose the best product according to your application needs.

The EASY type has been added for simple hand detection, while the BASIC type adds the potential for series connection and simple muting functions.
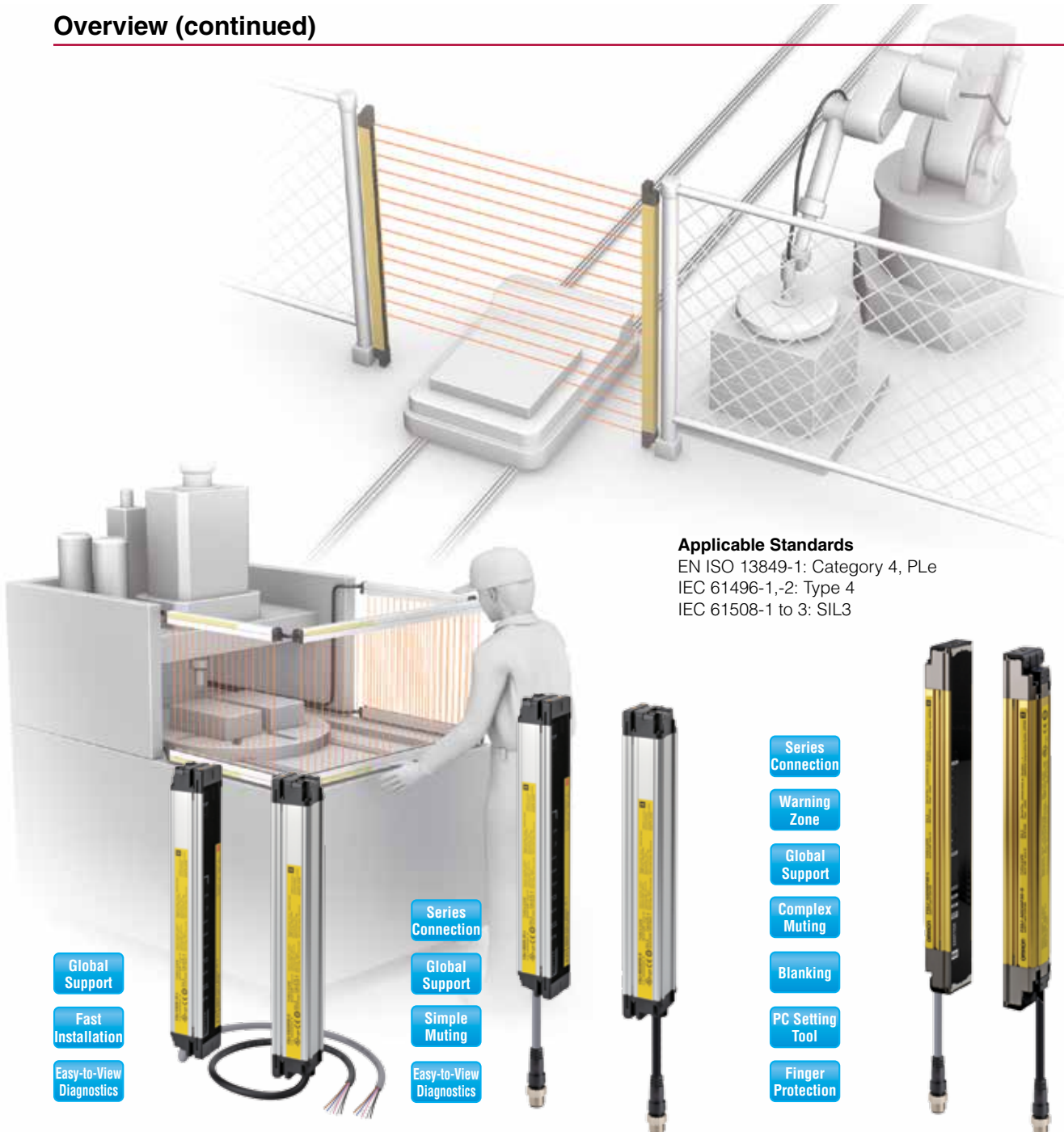
The F3SJ series now allows you to select the best safety light curtain for your application environment without paying for unused functions.

- For simple and affordable hand protection:
     The EASY type (F3SJ-E)

- For simple hand protection, series connection and muting functions:
     The BASIC type (F3SJ-B)

- For finger protection, series connection, complex blanking and muting functions:
     The ADVANCED type (F3SJ-A)

NEW
EASY type
F3SJ-E

NEW
BASIC type
F3SJ-B

ADVANCED type
F3SJ-A

Ease of implementation

Intrusion detection
(ON/OFF)

Series connection
& simple muting

Series connection, finger protection,
complex blanking & muting

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Overview (continued)

Applicable Standards
EN ISO 13849-1: Category 4, PLe
IEC 61496-1,-2: Type 4
IEC 61508-1 to 3: SIL3

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| Global Support |
| Fast Installation |
| Easy-to-View Diagnostics |

| Series Connection |
| Global Support |
| Simple Muting |
| Easy-to-View Diagnostics |

| Series Connection |
| Warning Zone |
| Global Support |
| Complex Muting |
| Blanking |
| PC Setting Tool |
| Finger Protection |

For stand-alone devices

EASY type (F3SJ-E)

Can be used for simple hand intrusion detection. Mounting now takes less than half the man-hours that conventional models take.

Despite its simplicity, the EASY type is a highly reliable safety light curtain.

A new standard of
Safety Light Curtain

BASIC type (F3SJ-B)

The muting function allows use of the safety light curtain in a variety of manufacturing environments.

The flexible mounting supports up to three sets of series-connected sensors.

For special purposes including finger protection

ADVANCED type (F3SJ-A)

The detection capability supports finger protection through use of 14mm resolution. The ADVANCED type has a wide variety of muting and blanking functions to increase productivity.

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Overview (continued)

Implementation cost reduction with 1/2* the mounting time:

Start with the "EASY type"

NEW!

* Comparison with existing Omron products.

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The EASY type safety light curtain is well suited for straight forward on/off detection applications.

By carefully selecting the available functions, we have reduced man hours necessary for installation by approximately 1/2 when compared with existing STI models.

Reduced installation time means added savings to your project's budget, start with the EASY type.

Easy-to-view blue LEDs make beam adjustment easier!

I only need simple functions

Machine safety first, narrowed down to the simplest functions:

Upon detection of personnel, the machine stops.
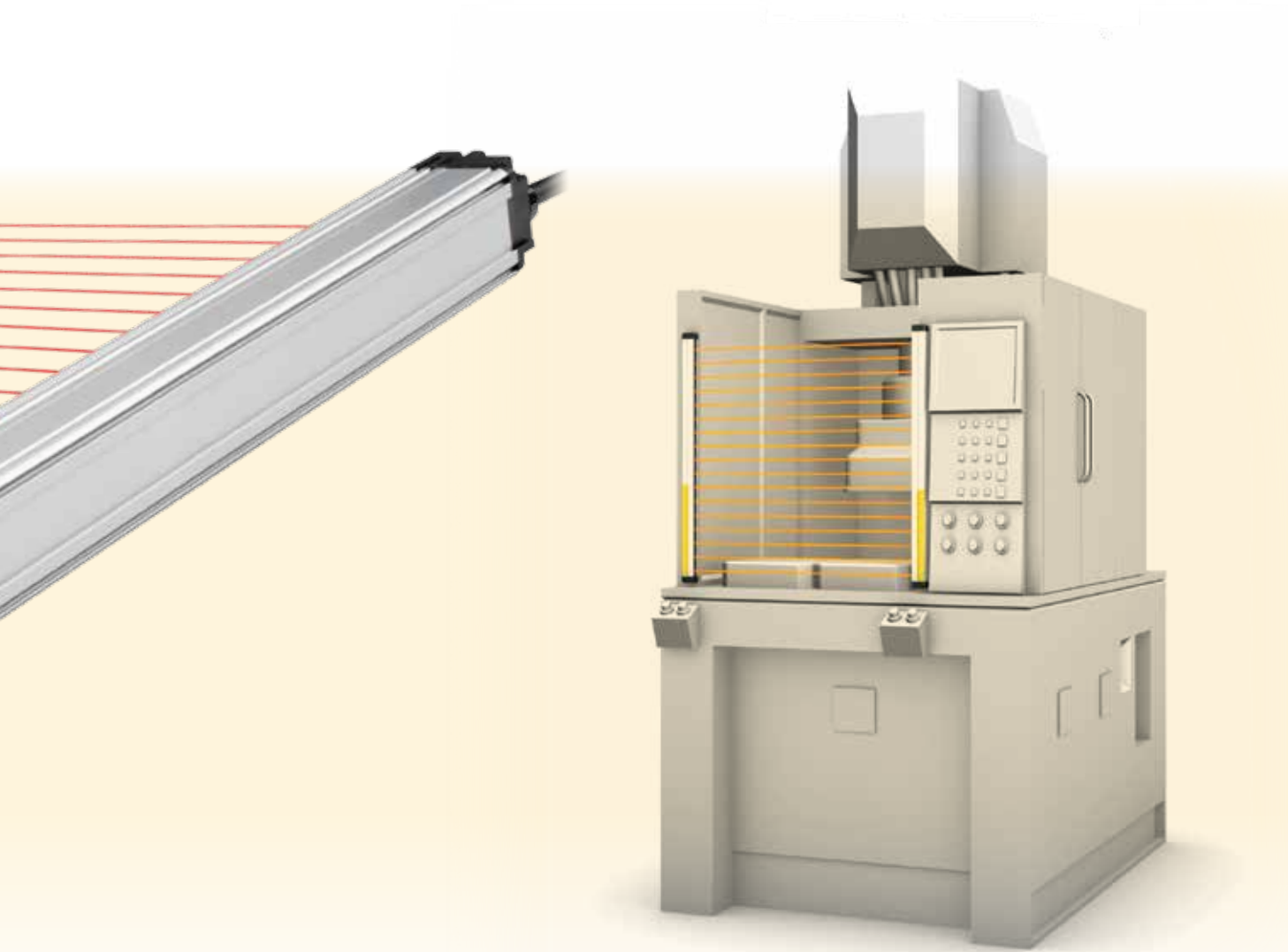
Simple yet very optimal.
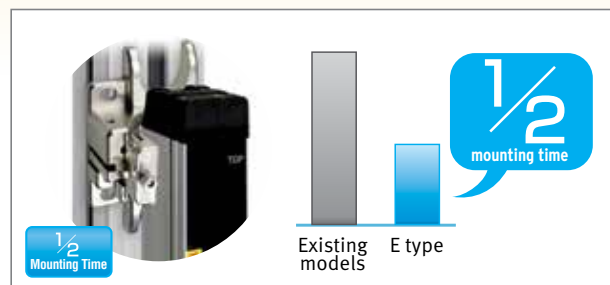
1/2 the mounting time

Fixed response time makes calculation of the safety distance easier.

Reduced wiring, quick mount brackets and easy-to-view alignment beams all add up to cost savings.

Additionally, with one fixed response time, it is now easier to calculate the safety distance.

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Overview (continued)

Global Support

OMRON Automation and Safety will support you through our global network.

Easy-to-view Diagnostics

These indicators enable you to intuitively know the status and cause of any error allowing faster installation while reducing machine down time.
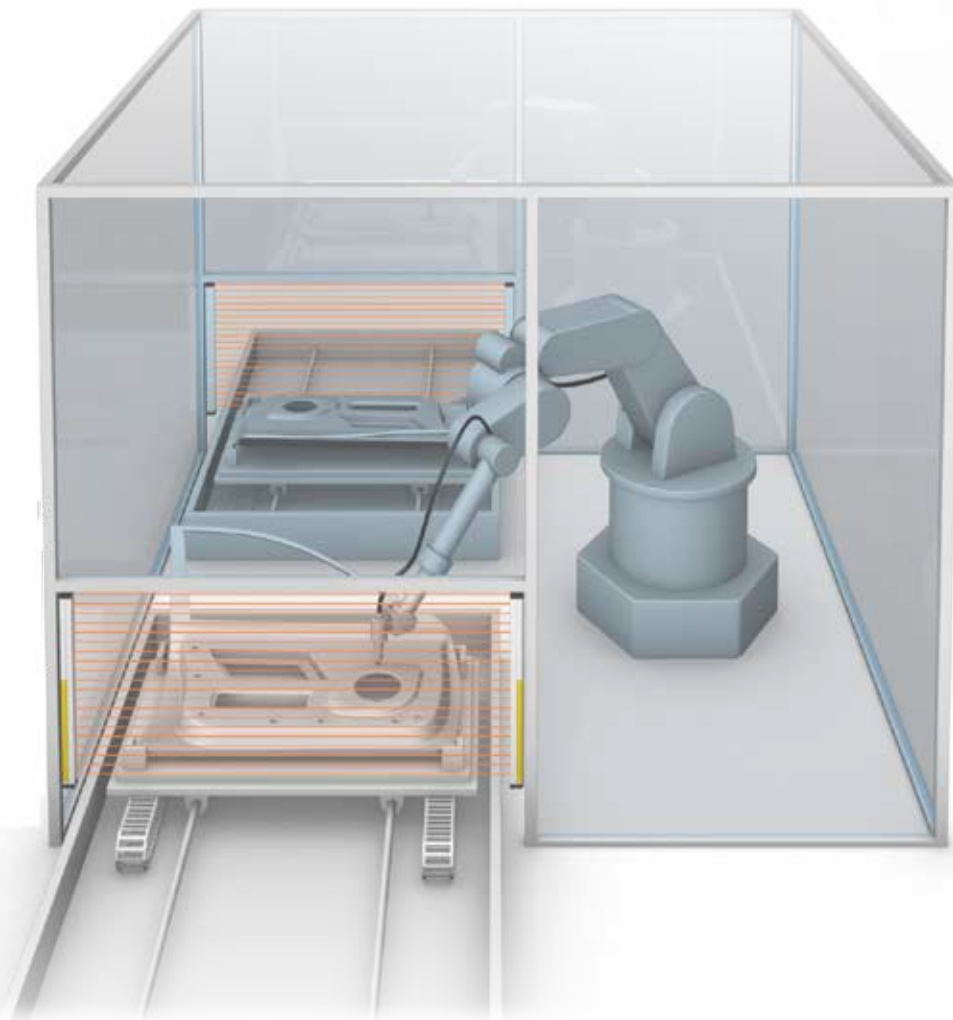
Overview (continued)

Fits any site, equipped with muting functions and series connection:
## Use the "BASIC type"

NEW!

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In addition to the simple functions inherited from the EASY type, such as global support, easy-to-view indicators, the BASIC type includes series connection and simple muting functions. This enables the BASIC type to satisfy installations that require multiple safety light curtains.
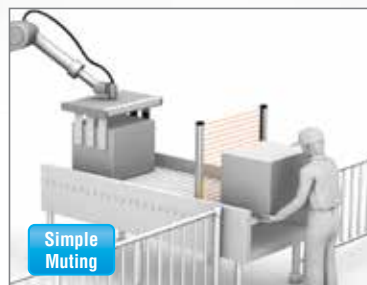
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Overview (continued)

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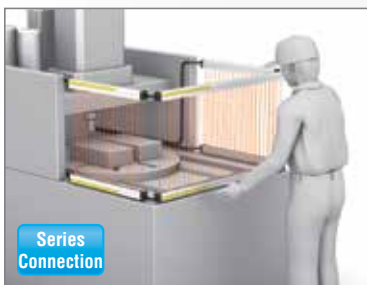
Up to three sets-connected in series

It is possible to connect up to three sets of safety light curtains in series. These sensors can be placed in a U-shaped or L-shaped pattern with a single power line, thus requiring less wiring.

Instant visibility of process trouble during muting

The BASIC type includes a muting function which temporarily disables the safety light curtain when a work-piece passes through. In the event of any trouble occurring, the error can be instantly recognized from the pattern of the LED indicators, allowing for a fast solution.
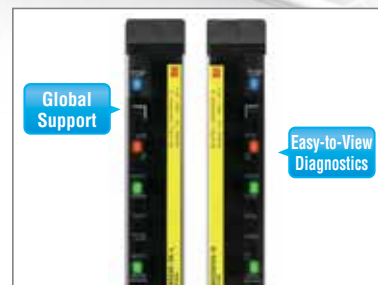
Functions inherited from the EASY type

Simple functions such as universal power voltage specification, easy-to-view diagnostics, and fixed response time have been inherited from the EASY type. As a result, expect reduced work-hours at each stage of use, from design and installation to operation.

Overview (continued)

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Multi-functional for special applications such as finger protection:

Select the "ADVANCED type"

The detection capability supports finger protection through use of 14 mm resolution. The ADVANCED type is equipped with various functions such as blanking, muting and the programing of warning zones. All settings can be done via an easy to use software tool. This tool simplifies installations that were previously complicated, again our way of reducing cost and increasing productivity.

• Beam alignment is easier.

PC Setting Tool

Tool for setting parameters and checking the system status

With the ADVANCED type (F3SJ-A) "SD Manager", all parameters can be set and the system status can be checked with a personal computer. Complex settings are now simple to configure
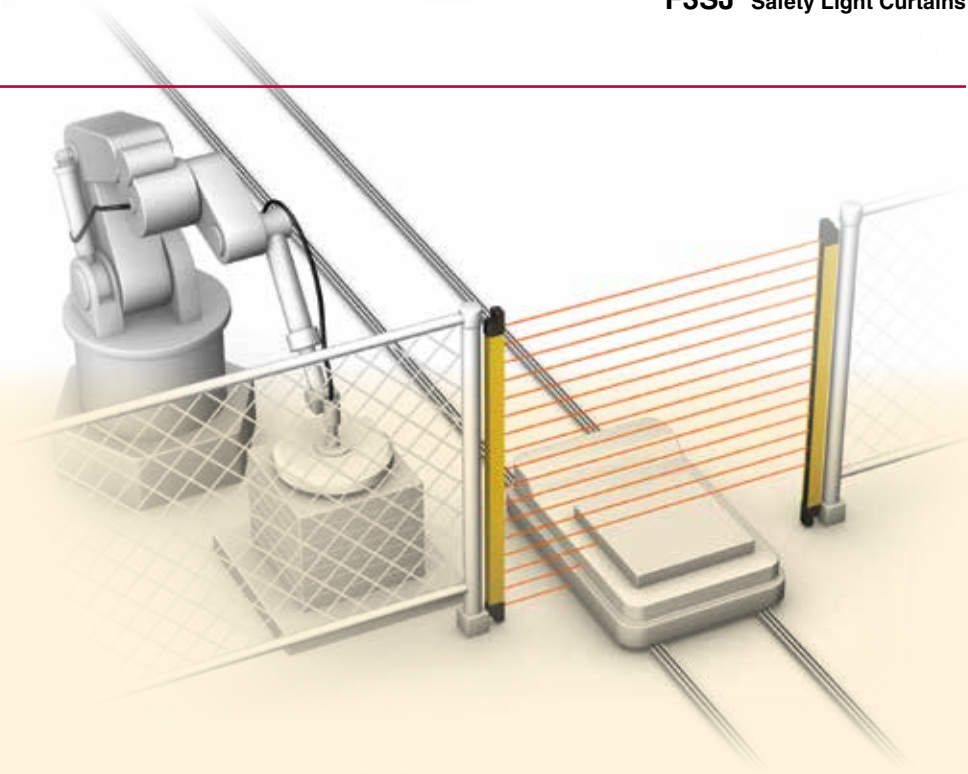
• Detection capability: 14 mm

Finger Protection

Detection capability supports finger-protection

Even if the distance from the hazard is short, we have prepared a lineup that includes safety light curtains with a detection capability of 14 mm.

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Overview (continued)


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Versatile muting function possible

Equipped with partial muting that disables only the beams where a workpiece passes through, and position detection muting that disables the beams while detecting the position of a machine or robot.

The blanking function disables specific beams of the Safety Light Curtain

If a part of the mechanical equipment is within the detection zone of the Safety Light Curtain, the relevant beams can be disabled. This is possible not only with non-moving parts but also with moving parts.

## Setting up a warning zone to prevent unnecessary stoppage

Under normal use, if an intrusion occurs in the safety zone, the machine will stop immediately. However, use of a warning zone will only notify the operator that an intrusion has occurred. This can be used to prevent carelessness resulting in machine stoppage on the part of the operator.

Simple Muting
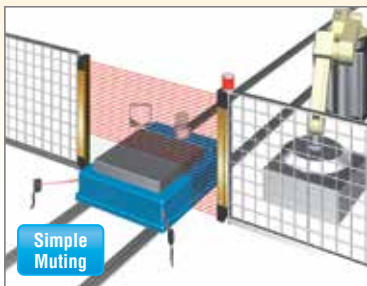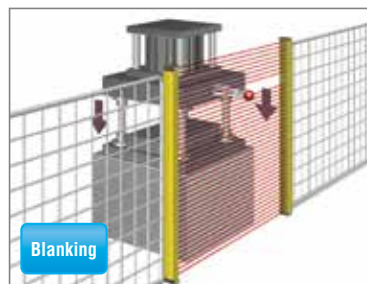
Partial muting
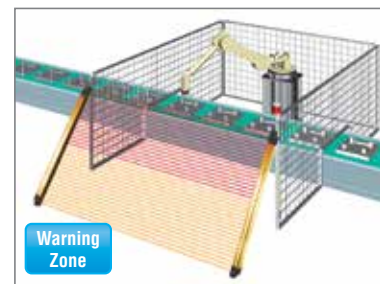

Blanking

Fixed blanking

Warning Zone
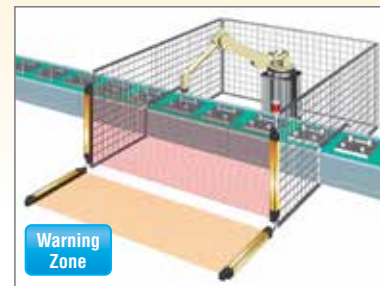
Dividing the zone between series-connected sensors

Simple Muting

Position detection muting

Blanking

Floating blanking

Warning Zone

A single sensor zone can also be divided
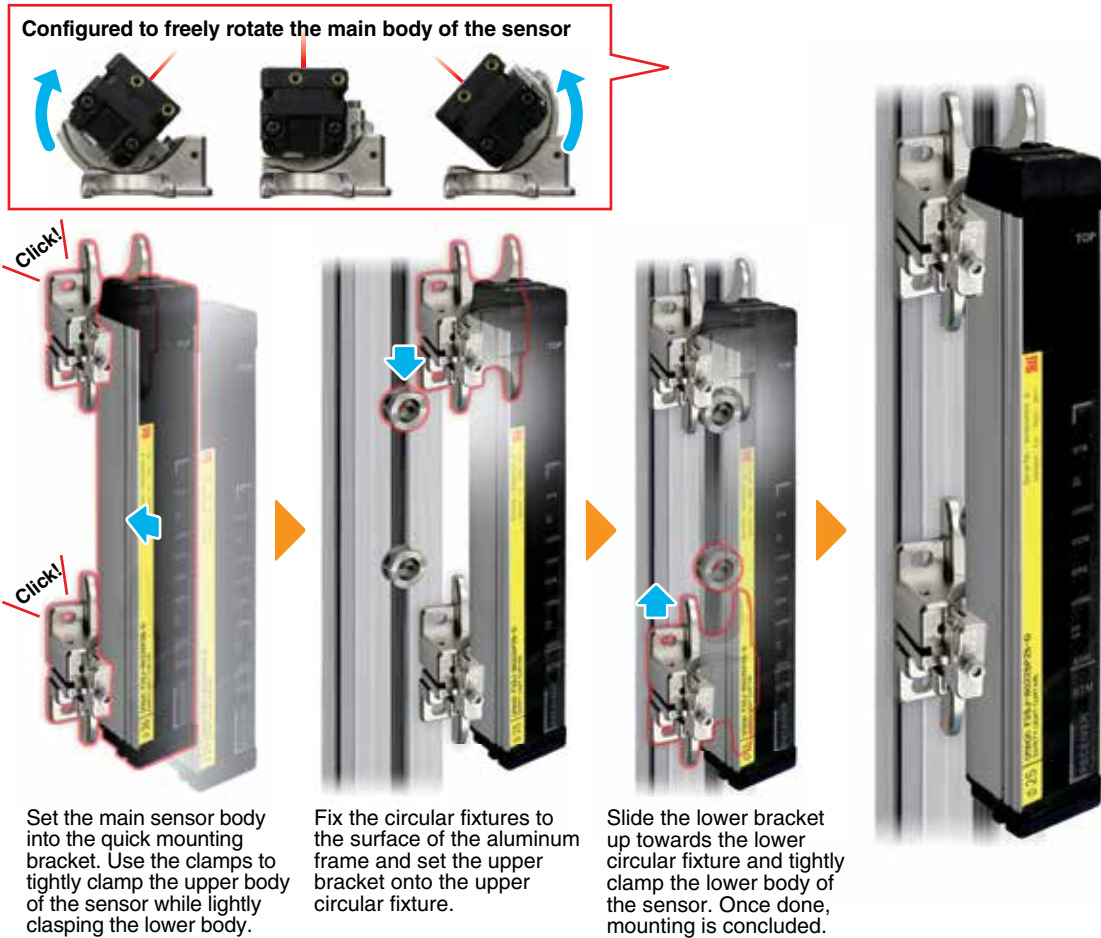
Overview (continued)

Providing ease-of-use and ease-of-mounting through ingenuity

In pursuit of fast-easy mountable brackets `EASY` `BASIC`

Omron has developed "quick mount" brackets which speed mounting to aluminum framing and reduce mounting time in half, when compared with existing models.
This unique design allows for smooth horizontal movement, beam alignment is easy.
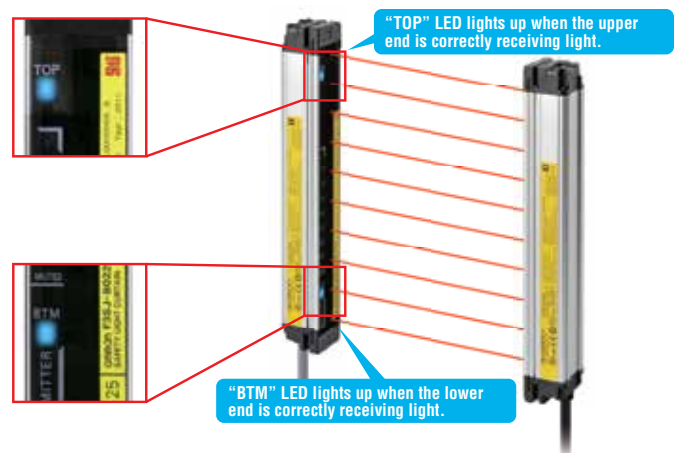
Configured to freely rotate the main body of the sensor

Click!

Click!

Set the main sensor body into the quick mounting bracket. Use the clamps to tightly clamp the upper body of the sensor while lightly clasping the lower body.

Fix the circular fixtures to the surface of the aluminum frame and set the upper bracket onto the upper circular fixture.

Slide the lower bracket up towards the lower circular fixture and tightly clamp the lower body of the sensor. Once done, mounting is concluded.

Top and bottom blue LEDs enabling beam alignment `EASY` `BASIC`

Simple positional alignment can be done using the blue LEDs at the top (TOP) and bottom (BTM) of the emitter and receiver. With the blue LEDs ON, you can see at a glance that the beams' positions are correctly aligned.
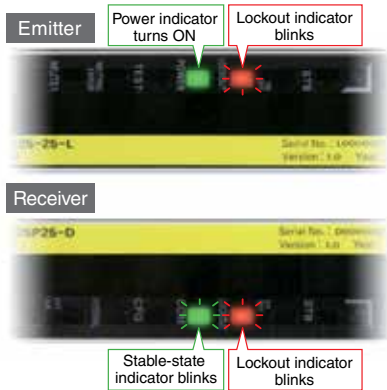
"TOP" LED lights up when the upper end is correctly receiving light.

"BTM" LED lights up when the lower end is correctly receiving light.

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Overview (continued)
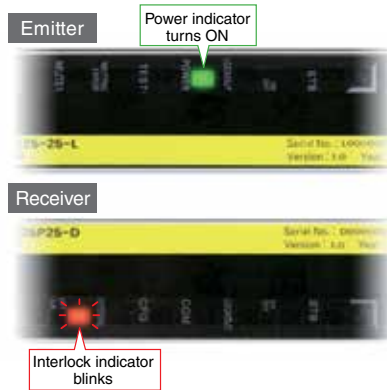
Easy-to-understand diagnostics EASY BASIC

Light curtain status can be immediately determined as the LED will light to indicate the status or possible error. As a result, there is no need to refer to a manual for the meaning of the diagnostics.

Communication error (EASY/BASIC type)

Emitter
Power indicator turns ON
Lockout indicator blinks

Receiver
Stable-state indicator blinks
Lockout indicator blinks

Input error (BASIC type)

Emitter
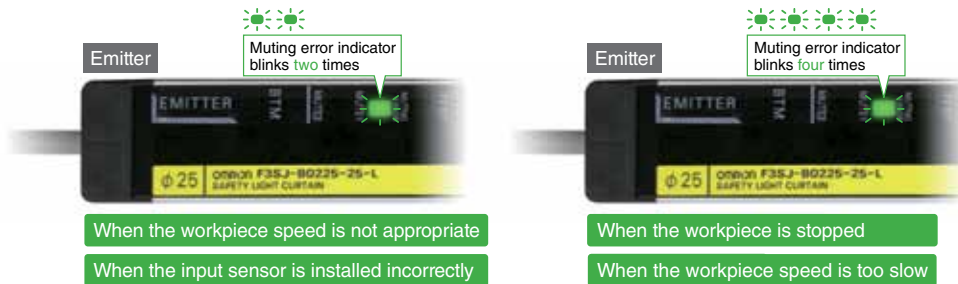Power indicator turns ON

Receiver
Interlock indicator blinks

Industry First! Error indication while muting is in progress. BASIC

The days of searching through user manuals to find the cause of certain muting errors are long gone. Now these errors and their causes can be well understood.

Emitter
Muting error indicator blinks two times

When the workpiece speed is not appropriate
When the input sensor is installed incorrectly

Emitter
Muting error indicator blinks four times

When the workpiece is stopped
When the workpiece speed is too slow

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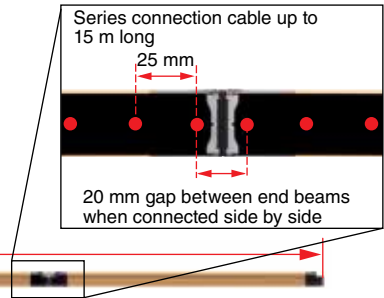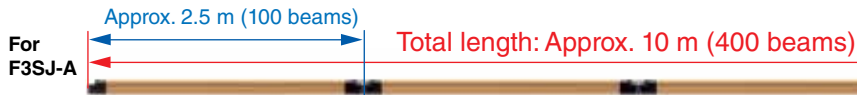
Overview (continued)

Providing multiple functions to cope with various safety requirements

Series connection up to 10 meters. Very convenient. `ADVANCED`

Sensors with protective heights of up to nearly 2.5 meters are available for applications that involve large-sized workpieces. And if you need to make changes in the future, you can always extend the protective height with series connections. Up to four sets, or 400 beams, can be series-connected, and with series connection cables up to 15 meters in length, applications can cover a wide area.

Series connection cable up to 15 m long

25 mm

20 mm gap between end beams when connected side by side

For F3SJ-A

Approx. 2.5 m (100 beams)

Total length: Approx. 10 m (400 beams)

Tool for setting parameters and checking the system status `ADVANCED`

"SD Manager" PC Setting Support Software (For F3SJ-A)

F3SJ-A

To a USB terminal

F39-JC□A Single-end Connector Cable or F39-JC□B Double-end Connector Cable

Branch Connector

Connection cable

All parameters can be set and the system status can be checked with a personal computer. In addition to making it easy to monitor the beam alignment, the ambient incident light intensity can be displayed in bar graph form for an easy check of the system status.

F39-GWUM "SD Manager" PC Setting Support Software

The "SD Manager" PC Setting Support Software helps reduce the time required for installing and troubleshooting the Safety Light Curtain.

● Beam alignment is easier.

● The ambient incident light intensity can be checked.

● The error log can be displayed.
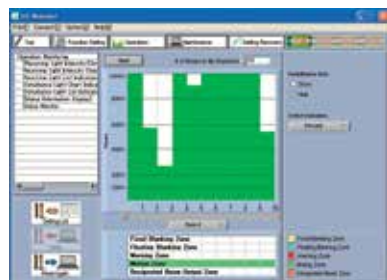
The incident light level can be displayed in a bar graph for each beam.
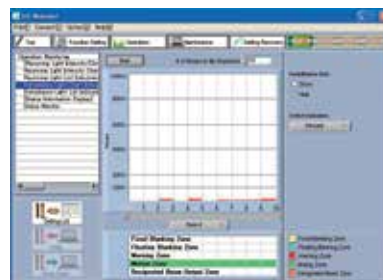
The incident light level when the light emission of the Safety Light Curtain is stopped is displayed in a bar graph.
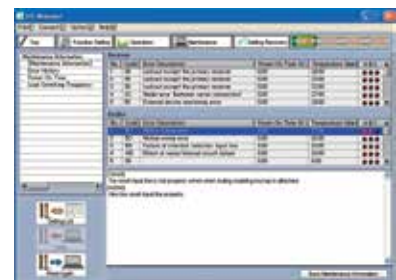
The cause of the errors and countermeasures are both displayed.

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Overview (continued)

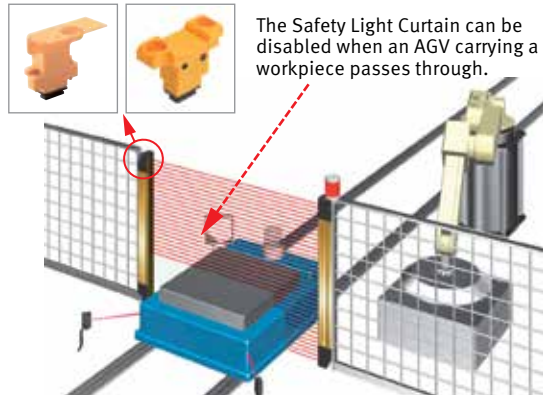## Achieving muting function without a controller `BASIC` `ADVANCED`

The muting function temporarily disables the light curtain when an object must pass through the detection zone, such as when supplying a workpiece to your equipment. In the past, this function required a dedicated muting controller, but now it is built into the F3SJ. To use the muting function, purchase the Muting Key Cap (for F3SJ-B: F39-CN10 and for F3SJ-A: F39-CN6)(sold separately). The muting function is enabled simply by replacing the Unit's cap with this Key Cap. In addition, a muting sensor that determines the muting timing, as well as a muting lamp that alerts the muting status to other operators, should be connected to the F3SJ.

Example of a muting key cap for F3SJ-A

Built-in muting function

No controller required. Simply attach the Key Cap (sold separately) to the sensor.

Key caps for muting
F39-CN6 (for F3SJ-A)   F39-CN10 (for F3SJ-B)

The Safety Light Curtain can be disabled when an AGV carrying a workpiece passes through.
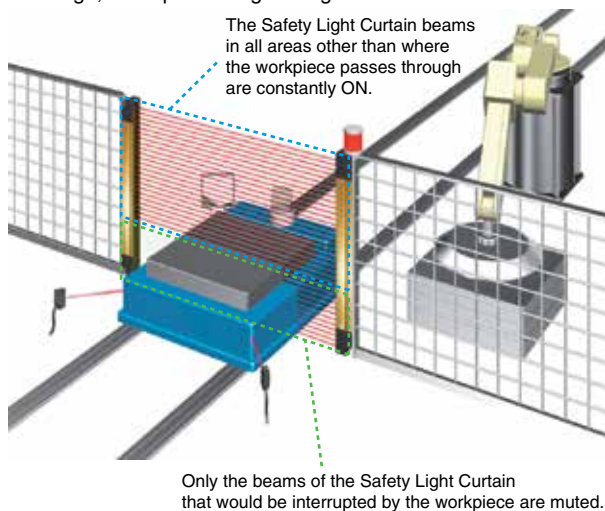

Equipped with two muting functions `ADVANCED`

With F3SJ-A, the muting function temporarily disables the Safety Light Curtain when an object must pass through the detection zone, such as when supplying a workpiece to your equipment. "Partial muting," which further heightens the level of safety, and "position detection muting," which allows muting when the safety status can be determined by the position of a machine (such as a robot), have been newly added to the muting function.

Partial muting

Partial muting raises safety by muting only the beams of the Safety Light Curtain in the area where the workpiece passes through, while preventing muting in all other areas.

The Safety Light Curtain beams in all areas other than where the workpiece passes through are constantly ON.

Only the beams of the Safety Light Curtain that would be interrupted by the workpiece are muted.

Position detection muting

This is used in applications where the workpiece is set in position each time by an operator, and then a turntable or positioning robot moves the workpiece to the area where the work is done. A limit switch or other means is used to detect when the robot is in a safe position, and muting is then applied.

Overview (continued)

Function List

Functions that can be used on F3SJ are shown as follows: For details, refer to the User's Manual.
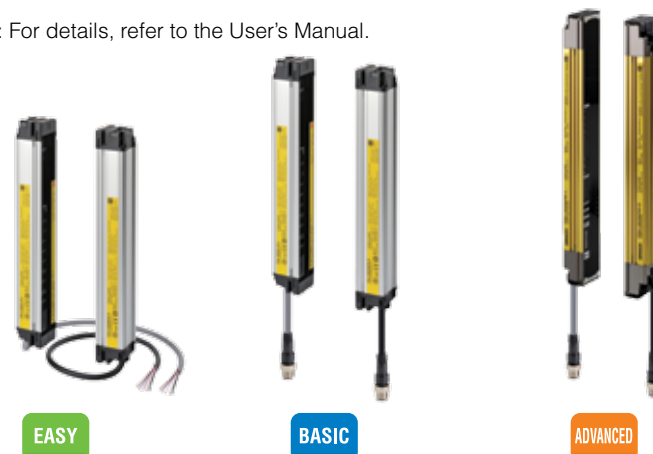
✓: Can be used.
X: Cannot be used.

| EASY | BASIC | ADVANCED |

Basic functions

Function	F3SJ-E	F3SJ-B	F3SJ-A
Self-test function	✓	✓	✓
External test function	✓	✓	✓
External device monitoring function	X	✓ *	✓
Interlock function	X	✓ *	✓
Auxiliary output function	X	✓	✓
Muting function	X	✓	✓

*Cannot be used during muting.

Functions for individual applications

	F3SJ-E	F3SJ-B	F3SJ-A
Override function	X	✓	✓
Partial muting function	X	X	✓
Position detection muting function	X	X	✓
Fixed blanking function	X	X	✓
Floating blanking function	X	X	✓
Warning zone function	X	X	✓
Use of setting tools	X	X	✓

Wiring/mounting related function

	F3SJ-E	F3SJ-B	F3SJ-A
Series connection function	X	✓	✓
Less dead space (single connection)	✓	✓	✓
Less dead space (series connection)	X	X	✓
Response time integration (15 ms) *	✓	✓	X
Simple wiring	✓	X	X
Connector cable	X	✓	✓
Quick mounting	✓	✓	X
TOP/BOTTOM indicator for beam adjustment	✓	✓	X
Laser Pointer	✓	✓	✓

*Convenient for calculating safety distance.

Indicator related functions

	F3SJ-E	F3SJ-B	F3SJ-A
External indicator output	X	✓	✓
Muting error display	X	✓	X

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Overview (continued)

Function List (continued)

Self-test Function
A self-test is performed to check for errors when the power is turned ON. Also, the self-test is regularly performed (within the response time) while operating.

External Test Function
This function stops the transmitter emissions using an external signal. It can be used to verify that a safety system should properly stop when F3SJ is interrupted.

External Device Monitoring Function
This function detects malfunctions, such as welding, in external relays (or contactors) that control the hazardous part of a machine.

This function constantly monitors that a specified voltage is applied to the receiver's external device monitoring input line, and the system enters lockout state when an error occurs. The relay's operational delay can be up to 300 ms without being evaluated as an error.

For example, if the normally closed N.C. contact does not close within 0.3 s after the safety outputs turn from ON to OFF, and a specified voltage is not applied to the external device monitoring line, it is evaluated as an error and the system enters a lockout state. To utilize this function properly, use safety relays and contactors that have force guided or mechanically linked contact structure.

Interlock Function
The F3SJ turns the safety outputs OFF when its power is turned on or its beam is interrupted and holds this state until reset input is applied. This state is called "interlock".

Two methods can be used to reset the interlock state: "auto reset that automatically turns control outputs ON when the interrupting object is removed" and "manual reset mode that keeps control outputs OFF until a reset signal is provided, if the interrupting object is removed".

Auto Reset
When the interrupting object is removed from the detection zone, the safety outputs automatically turn ON. Auto reset is used on machines where a worker is not able to enter the area between the detection zone and the hazardous part of the machine.

Manual Reset
When a reset input is given while no objects are in a detection zone, the safety outputs turn ON. This allows the machine to be manually reset using a reset switch after ensuring safety, preventing unexpected startup.

Auxiliary Output Function
The auxiliary output is used to monitor the status of the F3SJ. This output can be connected to a device such as a programmable controller.

Muting Function
Muting function temporarily disables safety function of the F3SJ, keeping safety output ON even if beams are interrupted.
This makes it possible to install safety light curtains for material transfer carriers, enabling both safety and productivity.

Override Function
The override function turns the safety outputs ON when the muting start condition is not satisfied. If a workpiece stops while passing through the F3SJ causing a muting error, the normal state cannot be recovered unless the workpiece is removed from the muting sensors and the detection field of the F3SJ. However, the override function will mute the safety outputs of the F3SJ so that the conveyor can be restarted to move the workpiece out of the muting sensors and detection zone.

Partial Muting Function
Partial muting function secures safety without enabling muting except for beams when a workpiece passes.

Position Detection Muting
A limit switch or other means is used to detect when the robot is in a safe position, and muting is then applied.

Fixed Blanking Function
Fixed blanking function disables a specific beam of the F3SJ. This function keeps safety output ON even when part of machinery equipment exists within a detection zone.

Floating Blanking Function
Floating blanking function increases the diameter of the F3SJ's detection capability and turns OFF the safety output when multiple objects are detected. When there is a moving object with a fixed width in the detection area that we do not want to detect, the detection function can be disabled.

Warning Zone Function
When an individual enters, a warning lamp lights or buzzer sounds without stopping the equipment by dividing the detection zone into the detection zone and a warning zone.

Setting Tool
The following setting tools (sold separately) can be purchased in order to change or confirm various F3SJ-A parameters.

- F39-MC21 Setting Console
- F39-GWUM SD Manager Setting Support Software for the F3SJ

Series Connection Function
Up to 3 sets of the F3SJ-Bs or up to 4 sets of F3SJ-As can be series-connected. Series connection allows them to be used as a safety light curtain, requiring only one set to be wired to a controller and preventing mutual interference.

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