

F3SJ-B

Safety Light Curtains

- Fast and easy installation
- Resolution: 25 mm (1.01 in.)
- Range: 7 m (23 ft.)
- Protected heights: 185 to 2065 mm (7.28 to 81.26 in.)
- Very compact size: 30 x 30 mm (1.18 x 1.18 in.)
- Cascaded designs possible – 3 segments
- Simple muting
- Cross-talk prevention



Description

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.

Up to three sets connected in a 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.



Functions inherited from the EASY type

Simple functions such as universal power voltage specification, easy-to-view diagnostics, a 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.



Instant visibility of process trouble during muting

The BASIC type includes a muting function which temporarily disables the safety light curtain when a workpiece 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.



Specifications

Main Units

F3SJ-B□□□□P25

| | | |
|---|--|--|
| Sensor type | Type 4 safety light curtain | |
| Setting tool connection *1 | Parameter settings: Not available | |
| Safety category | Safety purpose of category 4, 3, 2, 1, or B | |
| Detection capability | Opaque objects 25 mm in diameter | |
| Beam gap (P) | 20 mm | |
| Number of beams (n) | 8 to 102 | |
| Protective height (PH) | 185 to 2,065 mm | |
| Lens diameter | Diameter 5 mm | |
| Operating range *2 | 0.2 to 7 m | |
| Response time (under stable light incident condition) | ON to OFF | 15 ms max. (response time at 1 set connection, series connection of 2 sets or 3 sets) |
| | OFF to ON | 70 ms max. (response time at 1 set connection, series connection of 2 sets or 3 sets) |
| Startup waiting time | 2 s max. | |
| Power supply voltage (Vs) | SELV/PELV 24 VDC±20% (ripple p-p 10% max.) | |
| Consumption current (no load) | Emitter | Up to 22 beams: 52 mA max., 26 to 42 beams: 68 mA max., 46 to 62 beams: 75 mA max., 66 to 82 beams: 88 mA max., 86 to 102 beams: 101 mA max. |
| | Receiver | Up to 22 beams: 45 mA max., 26 to 42 beams: 50 mA max., 46 to 62 beams: 46 mA max., 66 to 82 beams: 61 mA max., 86 to 102 beams: 67 mA max. |
| Light source (emitted wavelength) | Infrared LED (870 nm) | |
| Effective aperture angle (EAA) | Based on IEC 61496-2. Within ±2.5° for both emitter and receiver when the detection distance is 3 m or over | |
| Safety outputs (OSSD) | Two PNP transistor outputs, load current 200 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), Leakage current 1 mA max., load inductance 2.2 H max. *3 Maximum capacity load 1 µF *4 | |
| Auxiliary output 1 | Two PNP transistor outputs, load current 100 mA max., residual voltage 2 V max. (except for voltage drop due to cable extension), leak current 1 mA max. | |
| Output operation mode | Safety output: On when receiving light Auxiliary output: – Reverse output of safety output for a basic system – ON when muting/override for a muting system | |
| Input voltage | ON voltage: Vs-3 V to Vs *5 OFF voltage: 0 V to 1/2 Vs or open | |
| Mutual interference prevention function | Mutual interference prevention algorithm prevents interference in up to 3 sets. | |
| Series connection | Time division emission by series connection • Number of connections: up to 3 sets (between F3SJ-Bs only) Other models cannot be connected. • Total number of beams: up to 192 beams • Maximum cable length for 2 sets: no longer than 7 m | |
| Test function | • Self test (at power-ON and at power distribution) • External test (emission stop function by test input) | |
| Safety-related functions | • Interlock (basic system) • External device monitoring (basic system) • Muting (muting system) • Override (muting system) | |
| Connection type | Connector method (M12, 8-pin) | |
| Protection circuit | Output short-circuit protection, and power supply reverse polarity protection | |
| Ambient temperature | Operating: -10 to 55°C (non-freezing), Storage: -25 to 70°C | |
| Ambient humidity | Operating: 35% to 85% (no condensation), Storage: 35% to 95% RH | |
| Operating ambient light intensity | Incandescent lamp: 3,000 lx max., Sunlight: 10,000 lx max. | |
| Insulation resistance | 20 MΩ min. (at 500 VDC) | |
| Dielectric strength | 1,000 VAC 50/60 Hz, 1 min | |
| Degree of protection | IP65 (IEC 60529) | |
| Vibration resistance | Malfunction: 10 to 55 Hz, Multiple amplitude of 0.7 mm, 20 sweeps in X, Y, and Z directions | |
| Shock resistance | Malfunction: 100 m/s ² , 1,000 times each in X, Y, and Z directions | |
| Pollution degree | Pollution degree 3 (IEC 60664-1) | |

(Continued on next page)

*1. Do not use the Support Software and Setting Console for F3SJ-A.
Operation cannot be guaranteed.

*2. Use of the Spatter Protection Cover causes a 10% maximum sensing distance attenuation.

*3. The load inductance is the maximum value when the safety output frequently repeats ON and OFF. When you use the safety output at 4 Hz or less, the usable load inductance becomes larger.

*4. These values must be taken into consideration when connecting elements including a capacitive load such as capacitor.

*5. The Vs indicates a voltage value in your environment.

*7. Mounting brackets are sold separately.

Specifications (continued)

Main Units

F3SJ-B□□□□P25 (continued)

| | |
|-----------------------|--|
| Power cable | Connection method: Prewired connector cable, cable length 0.3 m, connector type (M12, 8-pin), connector: IP67 rated (when mated) Number of wires: Emitter: 8 wires Cable diameter: Dia. 6 mm Allowable bending radius: R5 mm |
| Extension cable | 30 m max. |
| Material | Case: Aluminum Cap: ABS resin, PBT Optical cover: PMMA resin (acrylic) Cable: Oil resistant PVC |
| Weight (packed state) | Weight (g) = (protective height) x 2.7 + 500 |
| Accessories | Test rod, User's Manual (CD-ROM) *7 |
| Applicable standards | IEC 61496-1, EN 61496-1 UL 61496-1, Type 4 ESPE (Electro-Sensitive Protective Equipment) IEC 61496-2, CLC/TS 61496-2, UL 61496-2, Type 4 AOPD (Active Opto-electronic Protective Devices) IEC 61508-1 to -3, EN 61508-1 to -3 SIL3 IEC 13849-1: 2006, EN ISO 13849-1: 2008 (PLe, Cat.4) UL 508, UL 1998, CAN/CSA C22.2 No.14, CAN/CSA C22.2 No.0.8 |

Accessories

Control Unit

| | | F3SP-B1P |
|--------------------------|--------------------|---|
| Applicable sensor | | F3SJ-B/A (Only for PNP output type)* |
| Power supply voltage | | 24 VDC ±10% |
| Power supply consumption | | DC1.7 W max. (not including sensor's current consumption) |
| Operation time | | 100 ms max. (not including sensor's response time) |
| Response time | | 100 ms max. (not including sensor's response time) |
| Relay output | Number of contacts | 3NO + 1NC |
| | Rated load | 250 VAC 5 A (cos = 1), 30 VDC 5 A L/R = 0 ms |
| | Rated current | 5 A |
| Connection type | Between sensors | M12 connector (8-pin) |
| | Others | Terminal block |
| Weight (packed state) | | Approx. 280 g |
| Accessories | | Instruction manual |

*NPN output type cannot be connected. Also, the system cannot be used as a muting system.

Applications

Selecting the Best Configuration

Space Efficient and Low Cost

The built-in external device monitoring function eliminates the need for a safety relay unit.



Reduced Wiring and Easy Maintenance

Cables with connectors on both ends simplify connections and prevent wiring errors.



Wiring

Basic Wiring Diagram

Wiring when using manual reset mode, external device monitoring



- S1 : External test switch (connect to 0 V if a switch is not required)
- S2 : Interlock/lockout reset switch
- KM1, KM2 : Safety relay with force-guided contact (G7SA) or magnetic contactor
- K1 : Load or PLC, etc. (for monitoring)

Wiring for auto reset mode and deactivated external device monitoring



- S1 : External test switch (connect to 0 V if a switch is not required)
- S2 : Lockout reset switch
- KM1, KM2 : Safety relay with force-guided contact (G7SA) or magnetic contactor
- K1 : Load or PLC, etc. (for monitoring)

Dimensions

(mm)

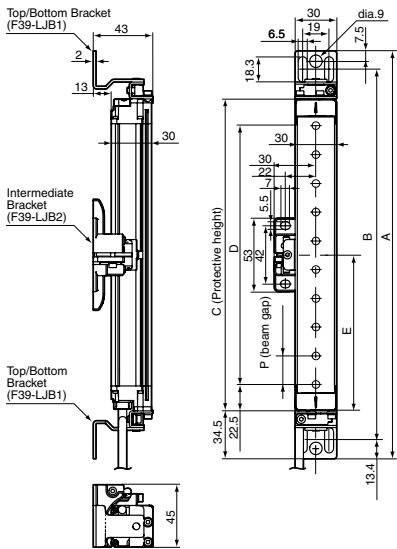
F3SJ-B/F3SJ-E Dimensions

The dimensions of the F3SJ-B and F3SJ-E are the same except for connector cables and cable leads.

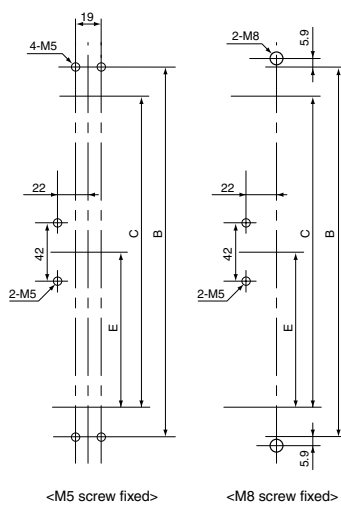
Main Units

Mounting Top/Bottom and Intermediate Brackets

Backside mounting



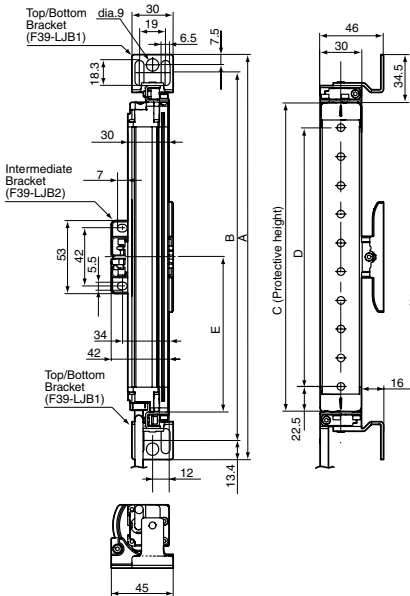
Mounting screw holes



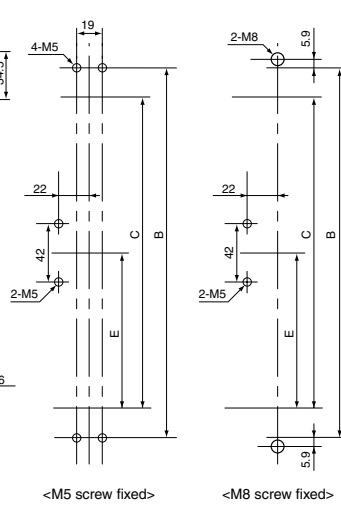
C (protective height): 4-digit number in the table
 $A = C + 69$, $B = C + 42.2$
 $D = C - 45$, $E =$ See table below, $P = 20$

| Protective height | Number of intermediate brackets | E |
|-------------------|---------------------------------|----------|
| 185 to 1,105 | 0 | — |
| 1,185 to 1,345 | 1 | C/2 max. |
| 1,425 to 2,065 | 2 | C/3 max. |

Side mounting



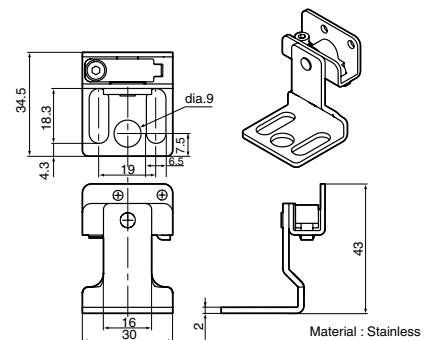
Mounting screw holes



C (protective height): 4-digit number in the table
 $A = C + 69$, $B = C + 42.2$
 $D = C - 45$, $E =$ See table below, $P = 20$

| Protective height | Number of intermediate brackets | E |
|-------------------|---------------------------------|----------|
| 185 to 1,105 | 0 | — |
| 1,185 to 1,345 | 1 | C/2 max. |
| 1,425 to 2,065 | 2 | C/3 max. |

Dimensions of top/bottom bracket for F39-LJB1



Dimensions (continued)

(mm)

Main Units

When Using Quick Mount Brackets

Backside mounting



Mounting screw holes



C (protective height): 4-digit number in the table
F = See the table below.

| Protective height | Number of intermediate brackets | F |
|-------------------|---------------------------------|-------------|
| 185 to 1,105 | 2 | 555 mm max. |
| 1,185 to 1,585 | 3 | 555 mm max. |
| 1,665 to 2,065 | 4 | 555 mm max. |

Side mounting



Mounting screw holes



C (protective height): 4-digit number in the table
F = See the table below.

| Protective height | Number of intermediate brackets | F |
|-------------------|---------------------------------|-------------|
| 185 to 1,105 | 2 | 555 mm max. |
| 1,185 to 1,585 | 3 | 555 mm max. |
| 1,665 to 2,065 | 4 | 555 mm max. |

Dimensions of quick mount bracket for F39-LJB3

Backside mounting



Side mounting



Quick mount M6 bracket



Quick mount M8 bracket



Ordering

Main Units

Safety Light Curtains

| Application | Detection capability | Beam gap | Operating range | Protective height (mm) | Model |
|-----------------|----------------------|----------|-----------------|------------------------|---------------|
| | | | | | PNP output |
| Hand protection | Dia. 25 mm | 20 mm | 0.2 to 7 m | 185 to 2,065 | F3SJ-B□□□□P25 |

Safety Light Curtain Model List

Please contact our sales representatives.

F3SJ-B Series (20 mm pitch)

| Model | Number of beams | Protective height [mm] * |
|---------------|-----------------|--------------------------|
| F3SJ-B0185P25 | 8 | 185 |
| F3SJ-B0225P25 | 10 | 225 |
| F3SJ-B0305P25 | 14 | 305 |
| F3SJ-B0385P25 | 18 | 385 |
| F3SJ-B0465P25 | 22 | 465 |
| F3SJ-B0545P25 | 26 | 545 |
| F3SJ-B0625P25 | 30 | 625 |
| F3SJ-B0705P25 | 34 | 705 |
| F3SJ-B0785P25 | 38 | 785 |
| F3SJ-B0865P25 | 42 | 865 |
| F3SJ-B0945P25 | 46 | 945 |
| F3SJ-B1025P25 | 50 | 1,025 |
| F3SJ-B1105P25 | 54 | 1,105 |

| Model | Number of beams | Protective height [mm] * |
|---------------|-----------------|--------------------------|
| F3SJ-B1185P25 | 58 | 1,185 |
| F3SJ-B1265P25 | 62 | 1,265 |
| F3SJ-B1345P25 | 66 | 1,345 |
| F3SJ-B1425P25 | 70 | 1,425 |
| F3SJ-B1505P25 | 74 | 1,505 |
| F3SJ-B1585P25 | 78 | 1,585 |
| F3SJ-B1665P25 | 82 | 1,665 |
| F3SJ-B1745P25 | 86 | 1,745 |
| F3SJ-B1825P25 | 90 | 1,825 |
| F3SJ-B1905P25 | 94 | 1,905 |
| F3SJ-B1985P25 | 98 | 1,985 |
| F3SJ-B2065P25 | 102 | 2,065 |

*Protective height (mm) = Total sensor length

Accessories (sold separately)

Single-end Connector Cable (2 cables per set, for emitter and receiver)

For wiring with safety circuit such as single safety relay, safety relay unit, and safety controller.

| Appearance | Cable length | Specifications | Model |
|---|--------------|-----------------------|-----------|
|  | 3 m | M12 connector (8-pin) | F39-JD3A |
| | 7 m | | F39-JD7A |
| | 10 m | | F39-JD10A |
| | 15 m | | F39-JD15A |
| | 20 m | | F39-JD20A |

Double-end Connector Cable (2 cables per set, for emitter and receiver)

Control unit for connection with F3SP-B1P, to extend the length under series connection.*

| Appearance | Cable length | Specifications | Model |
|---|--------------|-----------------------|-----------|
|  | 0.5 m | M12 connector (8-pin) | F39-JDR5B |
| | 1 m | | F39-JD1B |
| | 3 m | | F39-JD3B |
| | 5 m | | F39-JD5B |
| | 7 m | | F39-JD7B |
| | 10 m | | F39-JD10B |
| | 15 m | | F39-JD15B |
| | 20 m | | F39-JD20B |

*To extend the cable length under series connection, use F39-JBR2W and F39-JD□B in combination. Also, the cable length 10 to 20 m cannot be used.

Ordering (continued)

Accessories (sold separately) (continued)

Series-connection Cable (2 cables per set, for emitter and receiver)

| Type | Appearance | Cable length | Model | Application |
|---------------------------------------|---|--------------|--------------|--|
| Series connection cable for extension |  | 0.2 m | F39-JBR2W *1 | For series connection *2 |
| Extension cable |  | 0.5 to 7 m | F39-JD□B | To change series connection length in combination with F39-JBR2W |

*1. This product is for F3SJ-B only.

*2. Total cable length of series connection is 0.5 m to connect to connector cable of the main sensor unit.

Relays with Forcibly Guided Contacts

| Type | Appearance | Specifications | Model | Remarks |
|--|---|---|------------|--|
| G7SA Relays with Forcibly Guided Contacts |  | <ul style="list-style-type: none"> Nodes: 4 Contact type: 2A2B Rated switch load: 250 VAC 6A, 30 VDC 6A | G7SA-2A2B |  For information on the G7SA, contact Omron or visit website. |
| | | <ul style="list-style-type: none"> Nodes: 4 Contact type: 3NO+1NC Rated switch load: 250 VAC 6A, 30 VDC 6A | G7SA-3A1B | |
| G7S-□-E Relays with Forcibly Guided Contacts |  | <ul style="list-style-type: none"> Nodes: 6 Contact type: 4NO+2NC Rated switch load: 250 VAC 10 A, 30 VDC 10 A | G7S-4A2B-E |  For information on the G7S-□-E, contact Omron or visit website |
| | | <ul style="list-style-type: none"> Nodes: 6 Contact type: 3NO+3NC Rated switch load: 250 VAC 10 A, 30 VDC 10 A | G7S-3A3B-E | |

Laser Pointer

| Appearance | Description | Model |
|---|------------------------|---------|
|  | Laser Pointer for F3SJ | F39-PTJ |

Key Cap for Muting

| Appearance | Description | Model |
|---|---------------------------|----------|
|  | Muting key cap for F3SJ-B | F39-CN10 |

Ordering (continued)

Accessories (sold separately) (continued)

Sensor Mounting Bracket (sold separately)

| Appearance | Specifications | Model | Application | Remarks |
|---|-----------------------------|-----------------|---|---|
|  | Top/bottom bracket | F39-LJB1 | Top/bottom bracket for F3SJ-E/B | 2 for the emitter, 2 for the receiver, total of 4 per set |
|  | Intermediate bracket | F39-LJB2 *1 *2 | In combination use with top/bottom bracket for F3SJ-E/B Can be used as free-location bracket. | 1 set with 2 pieces |
|  | Quick mount bracket | F39-LJB3-M6 *1 | Quick mount bracket for F3SJ-E/B Supports M6 slide nut for aluminum frame. | 1 set with 2 pieces |
| | | F39-LJB3-M8 *2 | Quick mount bracket for F3SJ-E/B Supports M8 slide nut for aluminum frame. | |
|  | M6 slide nut | F39-LJB3-M6K *1 | Spare slide nut for use with Quick mount bracket. | Hexagon socket head cap screws (M6 x 10) are included. |
| | M8 slide nut | F39-LJB3-M8K *2 | | Hexagon socket head cap screws (M8 x 14) are included. |
|  | Compatible mounting bracket | F39-LJB4 | Mounting bracket used when replacing existing area sensors (F3SJ-A or F3SN) with the F3SJ-E/B. | 2 for the emitter, 2 for the receiver, total of 4 per set |

Note: All the sensor mounting brackets for the F3SJ-E are sold separately.

*1. Combining F39-LJB2 and F39-LJB3-M6K makes F39-LJB3-M6.

*2. Combining F39-LJB2 and F39-LJB3-M8K makes F39-LJB3-M8.

Ordering (continued)

Accessories (sold separately) (continued)

Spatter Protection Cover (2 cables per set, common for emitter/receiver)

| Appearance | Model |
|---|-----------------|
|  | F39-HB□□□□*1 *2 |

*1. The same 4-digit numbers as the protective heights (□□□□ in the light curtain model names) are substituted in the model names.

*2. It cannot be mounted to the models with the suffix "-02TS".

Protective Bar

| Appearance | Model | Remarks |
|---|--------------------|---|
|  | F39-PB□□□□*1 | <ul style="list-style-type: none"> • 2 light curtain brackets • 4 mounting brackets • 0 to 4 intermediate brackets for backside mounting (quantity required for the sensing width) • 0 to 4 intermediate brackets for mounting to the sides (quantity required for the sensing width) |
| | F39-PB□□□□-S *1 *2 | <ul style="list-style-type: none"> • 1 light curtain bracket • 2 mounting brackets • 0 to 2 intermediate brackets for backside mounting (quantity required for the sensing width) • 0 to 2 intermediate brackets for mounting to the sides (quantity required for the sensing width) |

Note: The following are not provided with the protective bars: Safety Light Curtain, Safety Light Curtain Top/Bottom Brackets, Wall Mounting Screw Unit

*1. The same 4-digit numbers indicating the protective height that is used in the Sensor model number (□□□□) are used in the part of the Protector model number.

*2. Purchase the F39-PB□□□□ (which contains two sets of brackets) to use Protective Bars for both the Emitter and Receiver.

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